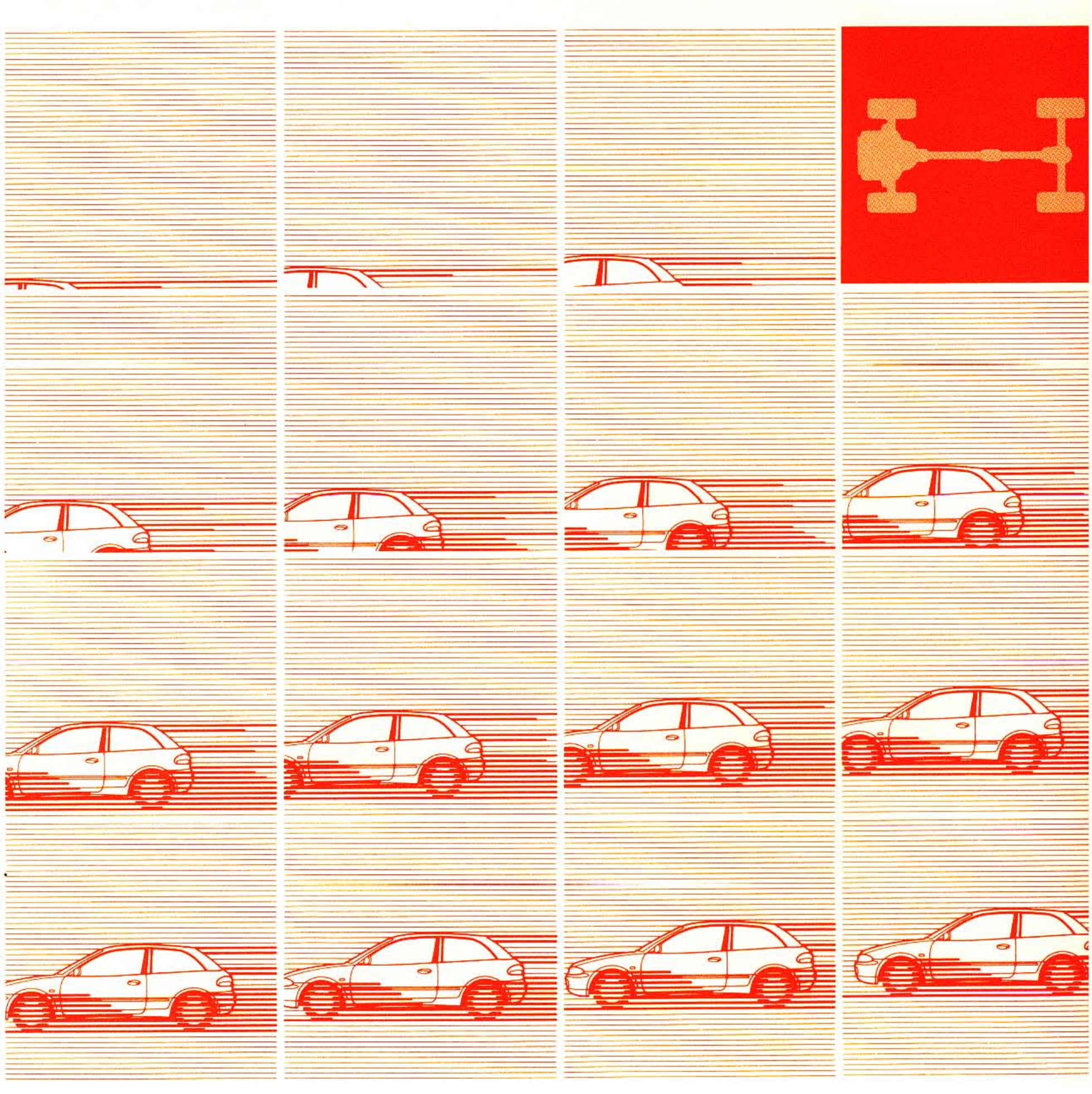
MITSUBISHI MOTORS

Workshop Manual

chassis

Supplement

COLT/LANCER



MITSUBISHI
COLT

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.
Please read this manual carefully so that it will be of assistance for your service activities.
Please note that the following service manuals are also available and should be used in conjunction with this manual.

TECHNICAL INFORMATION MANUAL
PYME9501
PYME9501-1
WORKSHOP MANUAL
CHASSIS GROUP PWME9511 (Basic)
PWME9511-A (Supplement)
PWME9511-B (Supplement)
ENGINE GROUP PWEE____
(Looseleaf edition)
ELECTRICAL WIRING PHME9511 (Basic)
PHME9511-A (Supplement)
PHME9511-B (Supplement)
PHME9511-C (Supplement)
BODY REPAIR MANUAL PBME9501 (Basic)
PBME9501-1 (Supplement)
PBME9501-2 (Supplement)
PARTS CATALOGUE B806F006A_

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 MOTORS CORPORATION

Jun. 2000

WARNING!

(1) Improper service or maintenance of any component of the SRS and any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag or to the driver and passenger (from rendering the SRS inoperative).

(2) SRS components should not be subjected to heat, so remove the SRS-ECU, air bag module (driver's side and front passenger's side), clock spring, side impact sensor and front seat assembly (side air bag module) before drying or baking the vehicle after painting.
SRS-ECU, air bag module, clock spring and side impact sensor: 93°C or more

(3) Service or maintenance of any SRS component and SRS-related component must be performed only at an authorized MITSUBISHI dealer.

(4) MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS), before beginning any service or maintenance of any component of the SRS and any SRS-related component.

NOTE
Section titles with asterisks (*) in the table of contents in each group indicate operations requiring warnings.

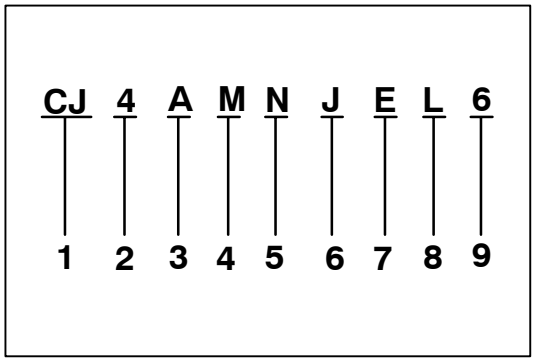
GENERAL

CONTENTS

VEHICLE IDENTIFICATION

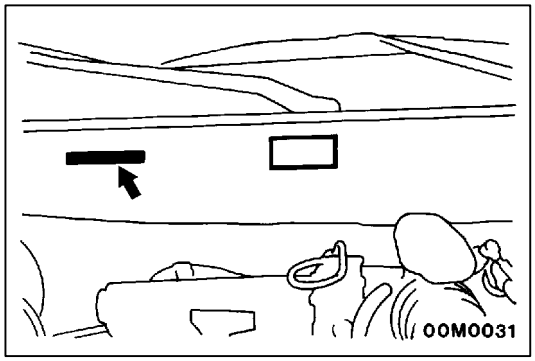
MODELS

Model code		Engine model	Transmission model	Fuel supply system
CJ1A	MNDEL6/R6	4G13 (1,298 mL)	F5M41 <5M/T>	MPI (Electronically Controlled Multi Point Fuel Injection)
	MNJEL6/R6			
CJ4A	MNJEL6/R6	4G92 MPI (1,597 mL)		
	MRJEL6/R6		F4A41 <INVECS-II 4A/T>	



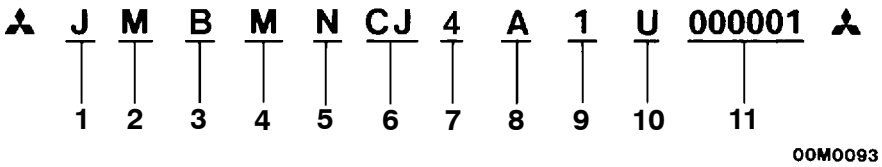
MODEL CODE

No.	Items	Contents
1	Development	CJ: MITSUBISHI (2-door)
2	Engine type	1: 1,298 mL petrol engine 4: 1,597 mL petrol engine
3	Sort	A: Passenger car
4	Body style	M: 2-door hatchback
5	Transmission type	N: 5-speed manual transmission R: 4-speed automatic transmission
6	Trim level	D: GL J: GLX or GLXi
7	Specification engine feature	E: SOHC-MPI
8	Steering wheel location	L: Left hand R: Right hand
9	Destination	6: For Europe



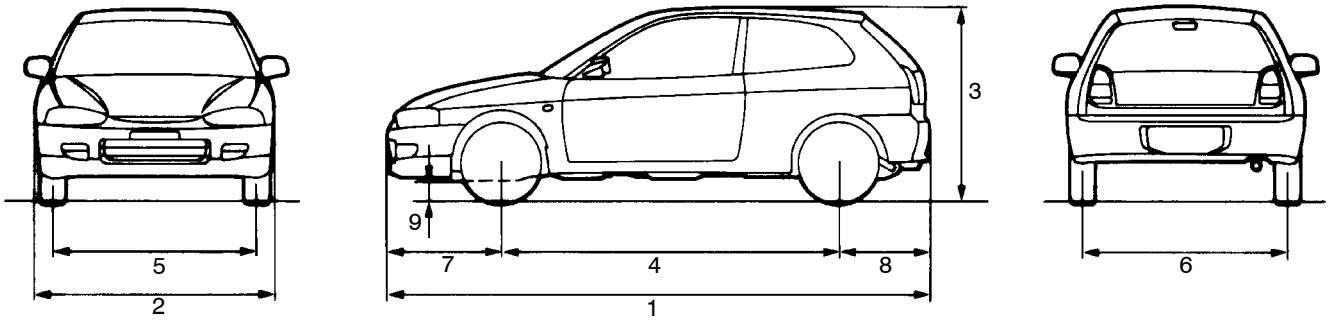
CHASSIS NUMBER

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



No.	Items		Contents
1	Fixed figure	J	Asia
2	Distribution channel	M	Japan channel
3	Destination	A	For Europe, right hand drive
		B	For Europe, left hand drive
4	Body style	M	2-door hatchback
5	Transmission type	N	5-speed manual transmission
		R	4-speed automatic transmission
6	Development order	CJ	COLT
7	Engine	1	4G13: 1,298 mL petrol engine
		4	4G92: 1,597 mL petrol engine
8	Sort	A	Passenger car
9	Model year	1	2001
10	Plant	U	Mizushima Motor Vehicle Works
11	Serial number	-	-

MAJOR SPECIFICATIONS
HATCHBACK



00M0035

Items			CJ1A MNDEL6, MNDER6	CJ1A MNJEL6, MNJER6	CJ4A MNJEL6, MNJER6	CJ4A MNJEL6, MNJER6
Vehicle dimensions mm	Overall length	1	3,900	3,900	3,900	3,900
	Overall width	2	1,680	1,680	1,680	1,680
	Overall height (unladen)	3	1,365, 1,380*1, 1,385*2, 1,400*3	1,365, 1,380*1, 1,385*2, 1,400*3	1,365, 1,380*1, 1,385*2, 1,400*3	1,365, 1,380*1, 1,385*2, 1,400*3
	Wheelbase	4	2,415	2,415	2,415	2,415
	Track-front	5	1,450	1,450	1,450	1,450
	Track-rear	6	1,460	1,460	1,460	1,460
	Overhang-front	7	825	825	825	825
	Overhang-rear	8	660	660	660	660
	Ground clearance (unladen)	9	150, 165*1,*3	150, 165*1,*3	150, 165*1,*3	150, 165*1,*3
Vehicle weight kg	Kerb weight		950	955	975	995
	Max. gross vehicle weight rating		1,445	1,445	1,470	1,480
	Max. axle weight rating-front		810	810	810	810
	Max. axle weight rating-rear		705	705	705	705
Seating capacity			5			
Engine	Model No.		4G13		4G92	
	Total displacement mL		1,298		1,597	
Transmission	Model No.		F5M41			F4A41
	Type		5 speed-manual			4 speed-automatic
Fuel system	Fuel supply system		MPI (Electronically Controlled Multi Point Fuel Injection)			

NOTE
1. *1: indicates vehicles with high ground suspension.
2. *2: indicates vehicles with rear spoiler.
3. *3: indicates vehicles with high ground suspension and rear spoiler.

ENGINE

CONTENTS

ENGINE <4G1>

CONTENTS

GENERAL

OUTLINE OF CHANGES

The following service procedures have been established due to the addition of the 4G13-SOHC 16 valve MPI engine. Furthermore, other items are the same as for the 4G13-SOHC 12 valve MPI engine.

- The basic ignition timing has been changed as a direct-mounted crank angle sensor has been used.
- The compression pressure has been changed.
- An auto-lash adjuster has been adopted.
- Camshaft and camshaft oil seal removal and installation
- Crankshaft front oil seal removal and installation
- Cylinder head gasket removal and installation

GENERAL INFORMATION

Items			4G13
Compression ratio			10.0
Combustion chamber			Pentroof type
Number of valve	Intake		8
	Exhaust		8
Valve timing	Intake	Opening	BTDC 17°
		Closing	ABDC 39°
	Exhaust	Opening	BBDC 49°
		Closing	ATDC 7°
Auto-lash adjuster			Equipped

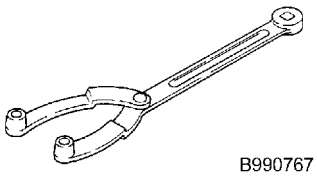
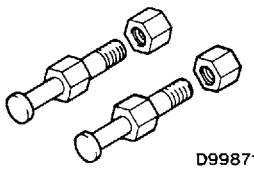
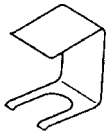
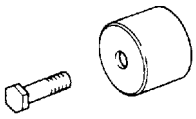
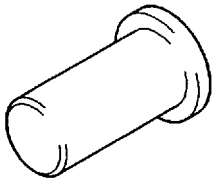
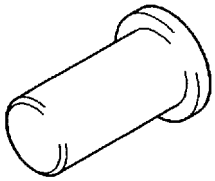
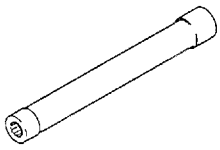
SERVICE SPECIFICATIONS

Items	Standard value	Limit
Basic ignition timing	5° BTDC ± 3°	-
Compression pressure (250 – 400 r/min) kPa	1,598	Min. 1,161
Cylinder head bolt shank length mm	-	103.2

SEALANT

Items	Specified sealant	Remarks
Camshaft position sensor support	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant

SPECIAL TOOLS

Tool	Number	Name	Use
 B990767	MB990767	Front hub and flange yoke holder	Holding the camshaft sprocket
 D998719	MD998719	Crankshaft pulley holder pin	
	MD998443	Auto-lash adjuster holder	Supporting of lash adjuster
	MD998713	Camshaft oil seal installer	Press-in of the camshaft oil seal
	MD998304	Crankshaft front oil seal installer	Press-fitting the crankshaft front oil seal
	MD998305	Crankshaft front oil seal guide	
	MB991653	Cylinder head bolt wrench	Cylinder head bolt removal and installation

ON-VEHICLE SERVICE

COMPRESSION PRESSURE CHECK

The disconnection of the distributor connector has been changed to the disconnection of the crank angle sensor connector due to the change of the crank angle sensor. Other service procedures are the same as before.

Standard value (at engine speed of 250 - 400 r/min): 1,598 kPa

Limit (at engine speed of 250 - 400 r/min): Min. 1,161 kPa

LASH ADJUSTER CHECK

If an abnormal noise (knocking) that seems to be coming from the lash adjuster is heard after starting the engine and does not stop, carry out the following check.

NOTE

(1) The abnormal noise which is caused by a problem with the lash adjusters is generated after the engine is started, and will vary according to the engine speed. However, this noise is not related to the actual engine load.

Because of this, if the noise does not occur immediately after the engine is started, if it does not change in accordance with the engine speed, or if it changes in accordance with the engine load, the source of the noise is not the lash adjusters.

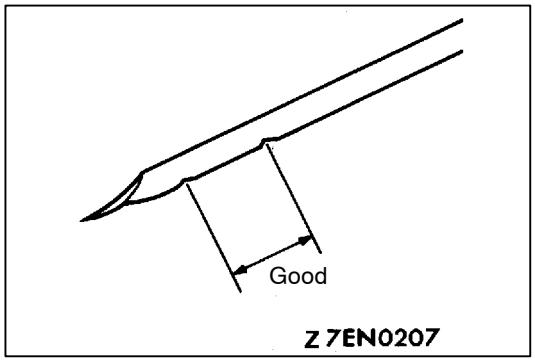
(2) If there is a problem with the lash adjusters, the noise will almost never disappear, even if the engine has been run at idle to let it warm up.
The only case where the noise might disappear is if the oil in the engine has not been looked after properly and oil sludge has caused the lash adjusters to stick.

1. Start the engine.
2. Check that the noise occurs immediately after the engine is started, and that the noise changes in accordance with changes in the engine speed.
   If the noise does not occur immediately after the engine is started, or if it does not change in accordance with the engine speed, the problem is not being caused by the lash adjusters, so check for some other cause of the problem. Moreover, if the noise does not change in accordance with the engine speed, the cause of the problem is probably not with the engine. (In these cases, the lash adjusters are normal.)
3. While the engine is idling, check that the noise level does not change when the engine load is varied.
   If the noise level changes, the cause of the noise is probably parts striking because of worn crankshaft bearings or connecting rod bearings. (In such cases, the lash adjusters are normal.)

4. After the engine has warmed up, run it at idle and check if any noise can be heard.
   If the noise has become smaller or disappeared, oil sludge could make the lash adjusters stick. Clean the lash adjusters. (Refer to the Engine Workshop Manual.) If not improved, go to step 5.
5. Bleed air from the lash adjusters.
6. If the noise has not disappeared even after the air bleeding, clean the lash adjusters. (Refer to the Engine Workshop Manual.)

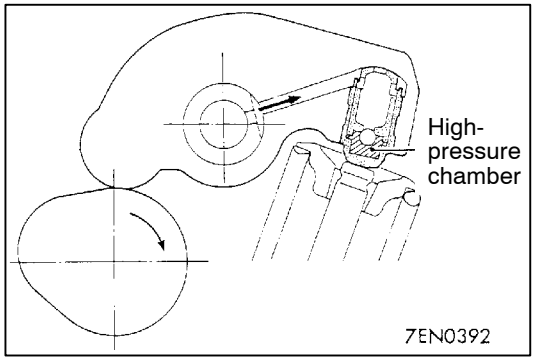
<LASH ADJUSTER AIR BLEEDING>

NOTE
(1) If the vehicle is parked on a slope for a long period of time, the amount of oil inside the lash adjuster will decrease, and air may get into the high pressure chamber when starting the engine.
(2) After parking the vehicle for long periods, the oil drains out of the oil passage, and it takes time for the oil to be supplied to the lash adjuster, so air can get into the high pressure chamber.
(3) If either of the above situations occur, the abnormal noise can be eliminated by bleeding the air from inside the lash adjusters.



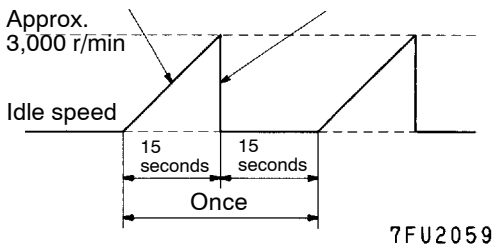
1. Check the engine oil and replenish or replace the oil if necessary.

NOTE
(1) If there is a only small amount of oil, air will be drawn in through the oil screen and will get into the oil passage.
(2) If the amount of oil is greater than normal, then the oil will being mixed by the crankshaft and a large amount of air may get mixed into the oil.
(3) If the oil is degenerated, air and oil will not separate easily in oil, and the amount of air mixed into the oil will increase.



(4) If the air which has been mixed in with the oil due to any of the above reasons gets into the high pressure chamber of the lash adjuster, the air inside the high pressure chamber will be compressed when the valve is open and the lash adjuster will over-compress, resulting in abnormal noise when the valve closes. This is the same effect as if the valve clearance is adjusted to be too large by mistake. If the air inside the lash adjusters is then released, the operation of the lash adjusters will return to normal.

Drive pattern for air bleeding



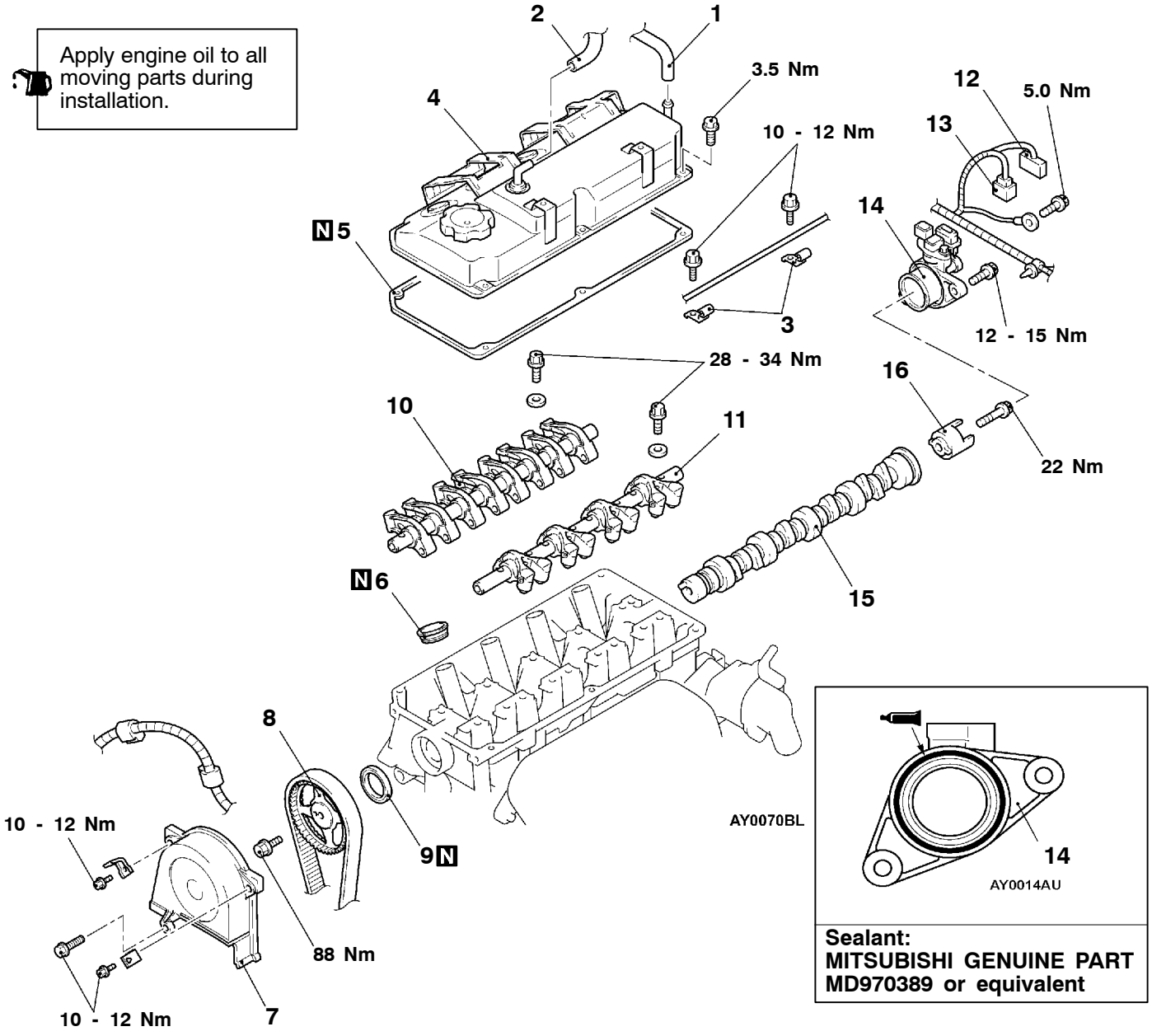
2. Run the engine at idle for 1 - 3 minutes to let it warm up.
3. With no load on the engine, repeat the drive pattern shown in the illustration at left and check if the abnormal noise disappears. (The noise should normally disappear after 10 - 30 repetitions, but if there is no change in the noise level after 30 repetitions or more, the problem is probably not due to air inside the lash adjusters.)
4. After the noise has disappeared, repeat the drive pattern shown in the illustration at left a further 5 times.
5. Run the engine at idle for 1 - 3 minutes and check that the noise has disappeared.

CAMSHAFT AND CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Air Cleaner Removal and Installation
- Ignition Coil Removal and Installation (Refer to GROUP16.)

Apply engine oil to all moving parts during installation.



Sealant:
MITSUBISHI GENUINE PART MD970389 or equivalent

Removal steps

1. Breather hose connection
2. PCV hose connection
3. Accelerator cable clamp <LH drive vehicles>
4. Rocker cover
5. Rocker cover gasket
6. Spark plug guide
7. Timing belt front upper cover

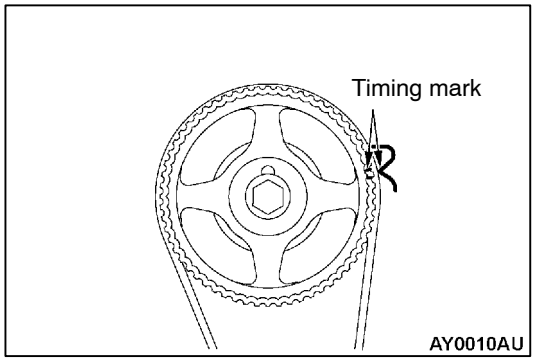
◀A▶ ▶C◀ 8. Camshaft sprocket

▶B◀ 9. Camshaft oil seal

◀B▶ ▶A◀ 10. Lash adjuster, intake rocker arm and shaft assembly

◀B▶ ▶A◀ 11. Lash adjuster, exhaust rocker arm and shaft assembly

12. Ignition failure sensor connector
13. Camshaft position sensor connector
14. Camshaft position sensor support
15. Camshaft
16. Camshaft position sensing cylinder

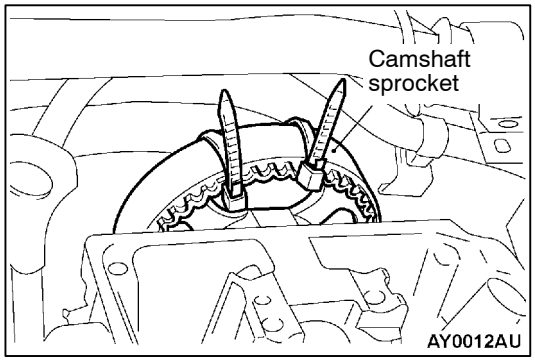


REMOVAL SERVICE POINTS

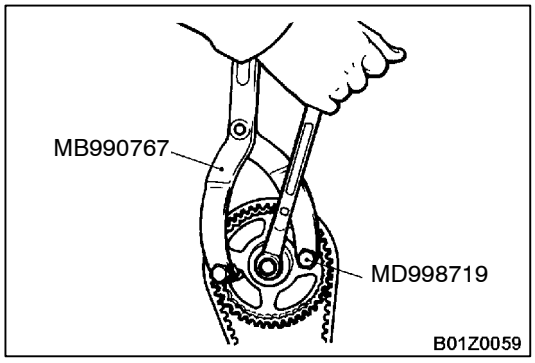
◀A▶ CAMSHAFT SPROCKET REMOVAL

1. Turn the crankshaft in the forward direction (clockwise) to align the timing mark so that No.1 cylinder is at the compression TDC.

   Caution
   Always turn the crankshaft in the forward direction (clockwise).

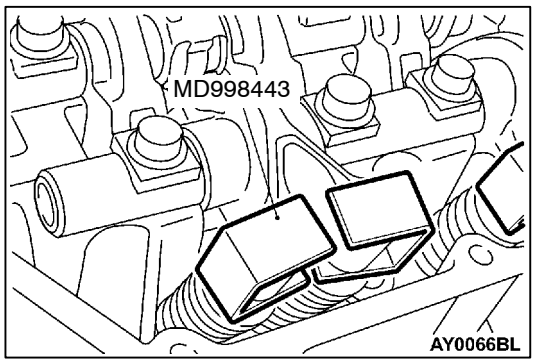


2. Secure the camshaft sprocket and the timing belt with band cables to prevent deviation from the relative positions between the camshaft sprocket and the timing belt.



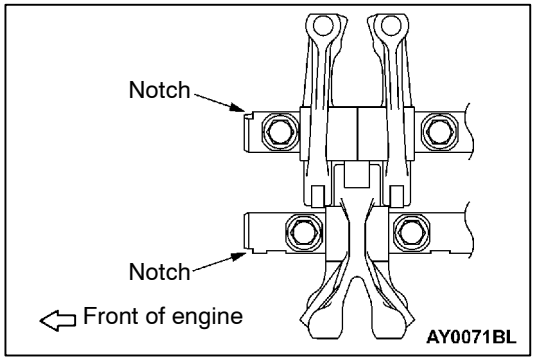
3. Use the special tool to stop the camshaft sprocket from turning.
4. Remove the camshaft sprocket with the timing belt attached.

   Caution
   Do not turn the crankshaft after the camshaft sprocket is removed.



◀B▶ LASH ADJUSTER, INTAKE ROCKER ARM AND SHAFT ASSEMBLY/LASH ADJUSTER, EXHAUST ROCKER ARM AND SHAFT ASSEMBLY REMOVAL

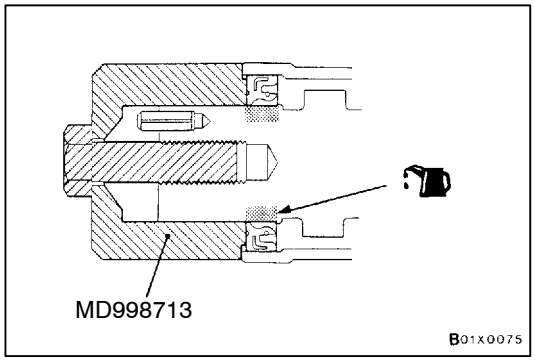
Before removing the lash adjuster, rocker arm and shaft assembly, install the special tools as shown in the illustration so that the lash adjusters will not fall out.



INSTALLATION SERVICE POINTS

▶A◀ LASH ADJUSTER, EXHAUST ROCKER ARM AND SHAFT ASSEMBLY/LASH ADJUSTER, INTAKE ROCKER ARM AND SHAFT ASSEMBLY INSTALLATION

Position the rocker arm shaft so that their notches point the direction shown, and install the lash adjuster, rocker arm and shaft assembly.



▶B◀ CAMSHAFT OIL SEAL INSTALLATION

1. Apply engine oil to the camshaft oil seal lip.
2. Use the special tool to press-fit the camshaft oil seal.

▶C◀ CAMSHAFT SPROCKET INSTALLATION

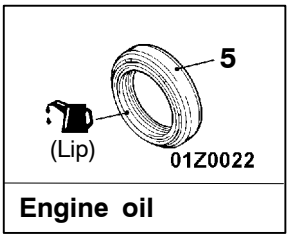
Use the special tool to stop the camshaft sprocket from turning in the same way as was done during removal, and then tighten the bolts to the specified torque.

Tightening torque: 88 Nm

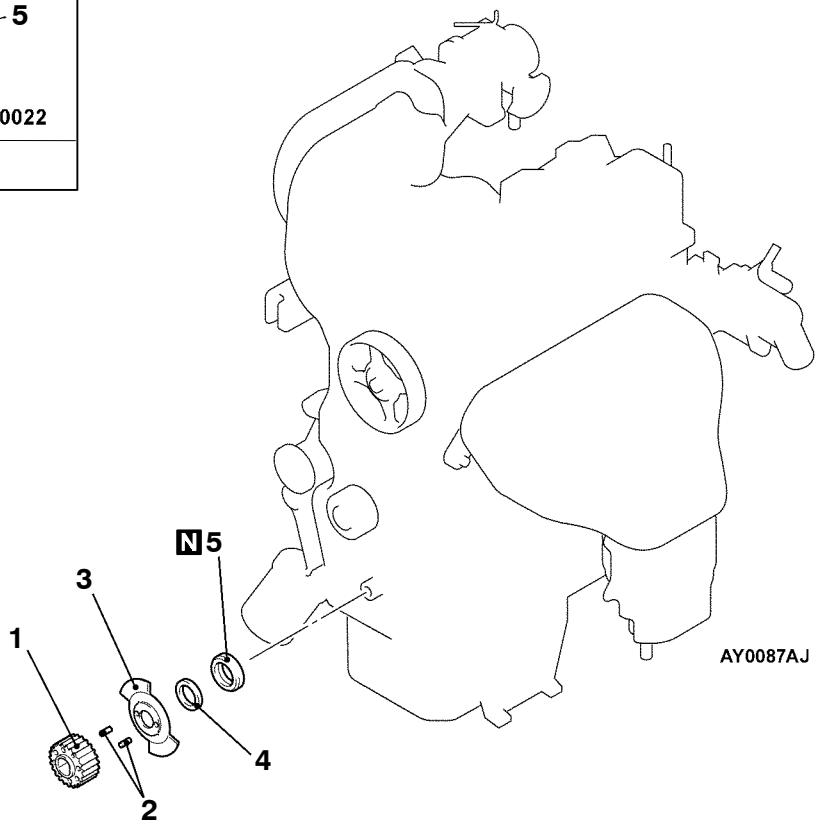
CRANKSHAFT FRONT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Timing Belt Removal and Installation
- Crank angle sensor Removal and Installation (Refer to GROUP16.)

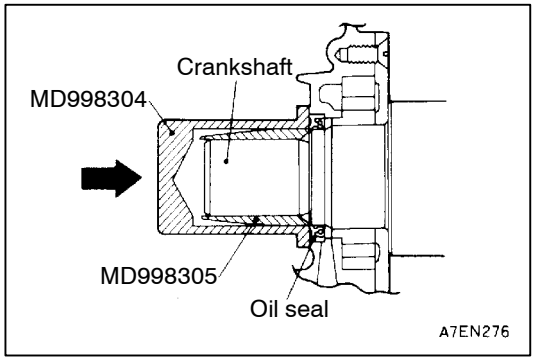


Engine oil



Removal steps

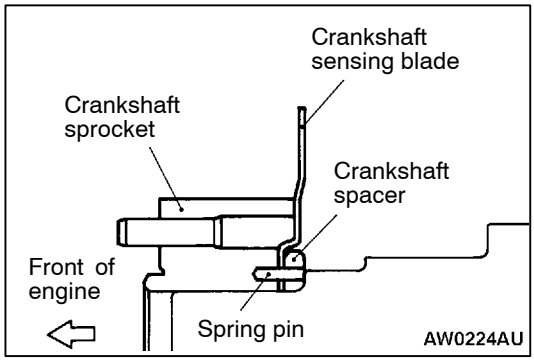
▶B◀ 1. Crankshaft sprocket
▶B◀ 2. Spring pin
▶B◀ 3. Crankshaft sensing blade
▶B◀ 4. Crankshaft spacer
▶A◀ 5. Crankshaft front oil seal



INSTALLATION SERVICE POINTS

▶A◀ CRANKSHAFT FRONT OIL SEAL INSTALLATION

1. Apply a small amount of engine oil to the entire circumference of the oil seal lip.
2. Tap the oil seal unit it flushes with the oil seal case.



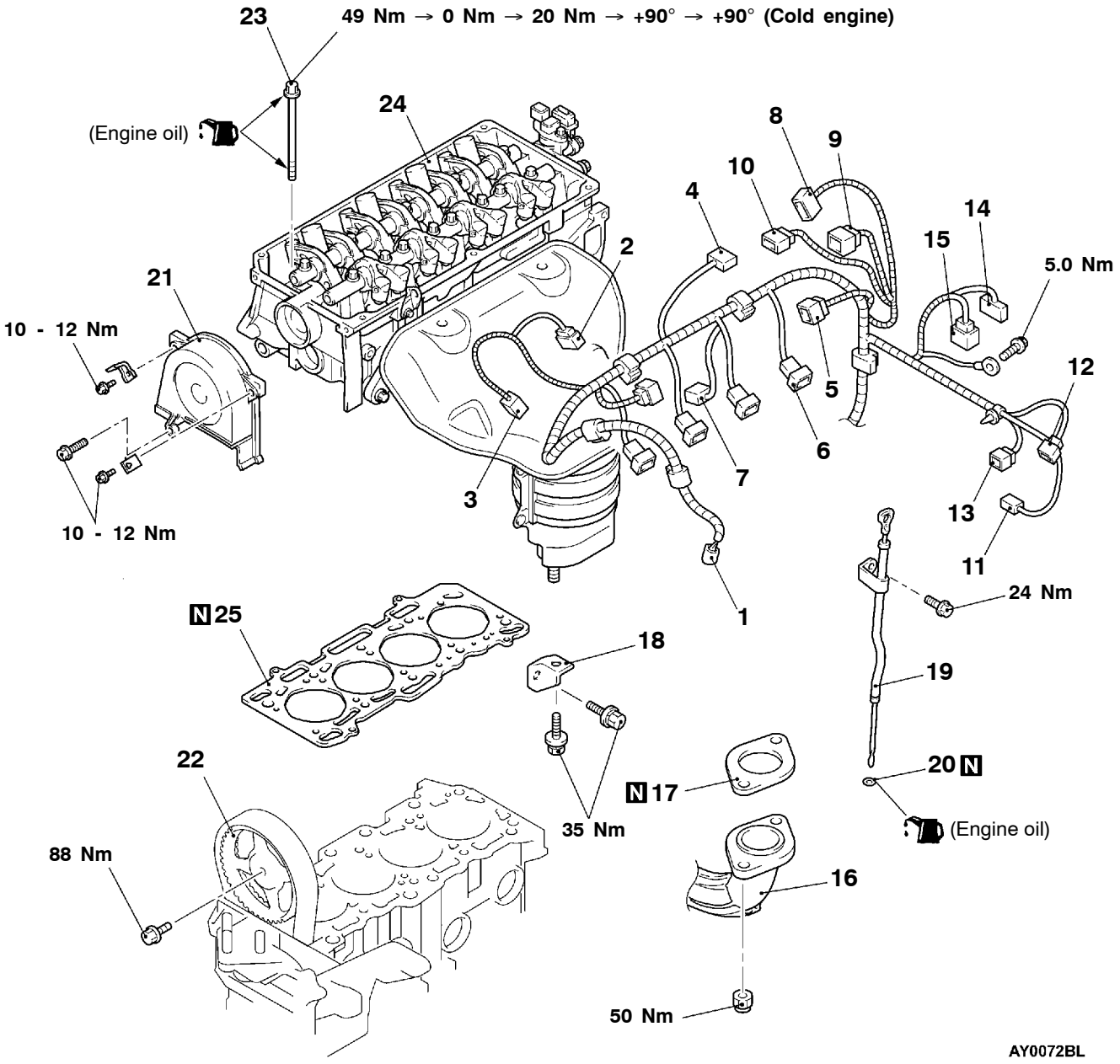
▶B◀ CRANKSHAFT SPACER/CRANKSHAFT SENSING BLADE/SPRING PIN/CRANKSHAFT SPROCKET INSTALLATION

Install the crankshaft sprocket assembled with the spring pin, the crankshaft sensing blade, and the crankshaft spacer to the crankshaft.

CYLINDER HEAD GASKET

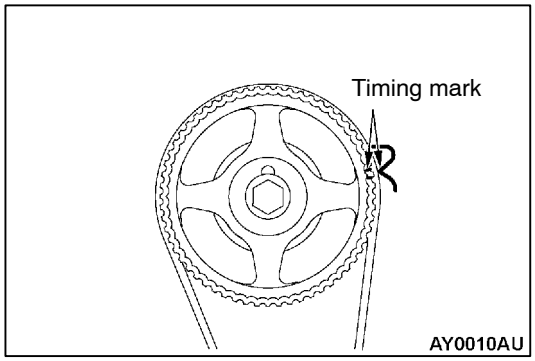
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Under Cover Removal and Installation
- Engine Coolant Draining and Supplying
- Engine Oil Draining and Supplying
- Air Cleaner Removal and Installation



Removal steps

1. Crank angle sensor connector
2. Detonation sensor connector
3. Oxygen sensor (rear) connector
4. Vacuum sensor connector
5. Ignition coil connector
6. Injector connector
7. EGR solenoid valve connector
8. Throttle position sensor connector
9. Idle speed control servo connector
10. Purge control solenoid valve connector
11. Engine coolant temperature gauge unit connector
12. Oxygen sensor (front) connector
13. Engine coolant temperature sensor connector
14. Ignition failure sensor connector
15. Camshaft position sensor connector
    - Rocker cover (Refer to P.11A-8.)
    - Intake manifold (Refer to GROUP 15.)
    - Water inlet pipe (Refer to GROUP 14.)
16. Front exhaust pipe connection
17. Front exhaust pipe gasket
18. Exhaust manifold bracket
19. Oil level gauge assembly
20. O-ring
21. Timing belt front upper cover
22. ◀A▶ ▶C◀ Camshaft sprocket
23. ◀B▶ ▶B◀ Cylinder head bolts
24. Cylinder head assembly
25. ▶A◀ Cylinder head gasket

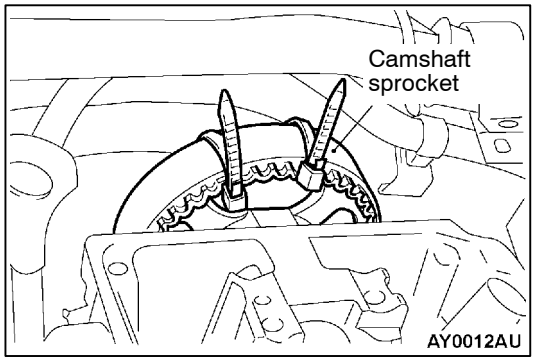


REMOVAL SERVICE POINTS

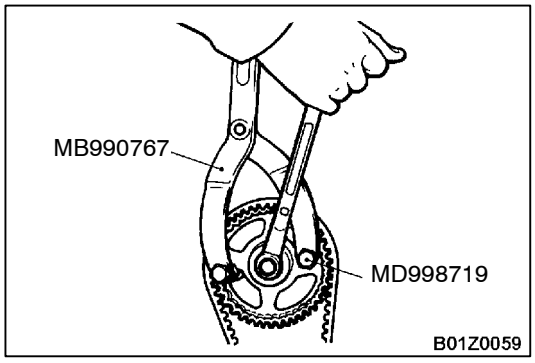
◀A▶ CAMSHAFT SPROCKET REMOVAL

1. Turn the crankshaft in the forward direction (clockwise) to align the timing mark so that No.1 cylinder is at the compression TDC.

   Caution
   Always turn the crankshaft in the forward direction (clockwise).



2. Secure the camshaft sprocket and the timing belt with band cables to prevent deviation from the relative positions between the camshaft sprocket and the timing belt.

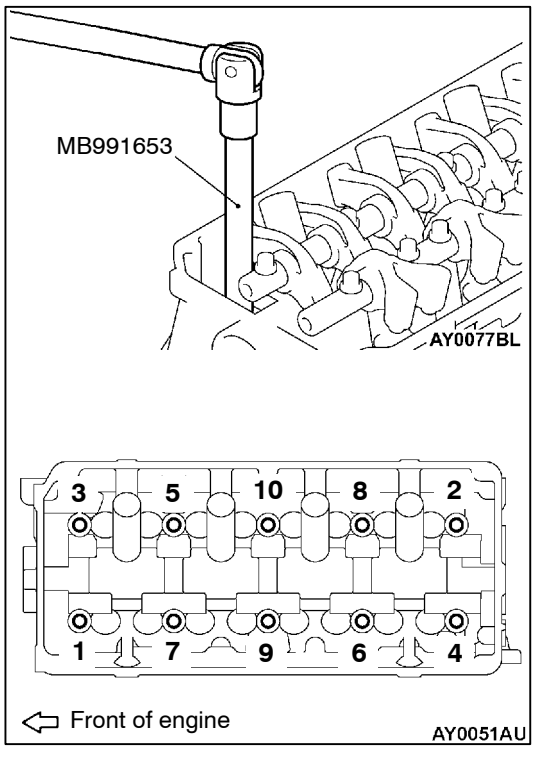


3. Use the special tool to stop the camshaft sprocket from turning.
4. Remove the camshaft sprocket with the timing belt attached.

   Caution
   Do not turn the crankshaft after the camshaft sprocket is removed.

◀B▶ CYLINDER HEAD BOLT REMOVAL

Use the special tool to loosen the bolts in 2 or 3 steps in order of the numbers shown in the illustration, and remove the cylinder head assembly.



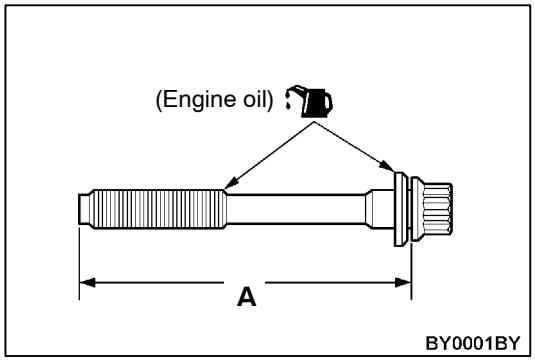
INSTALLATION SERVICE POINTS

▶A◀ CYLINDER HEAD GASKET INSTALLATION

1. Wipe off all oil and grease from the gasket mounting surface.

   Caution
   Do not allow foreign material to enter the engine coolant or oil passages and the cylinder.

2. Install so that the shapes of the cylinder head holes match the shapes of the respective cylinder head gasket holes.

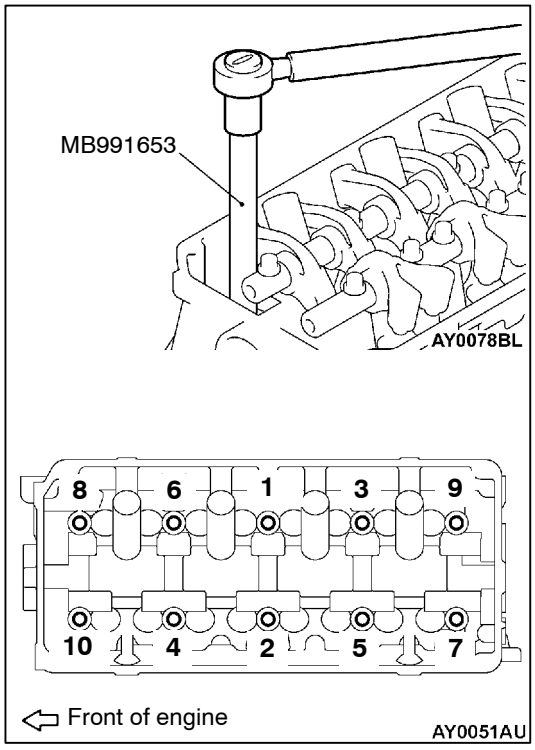


▶B◀ CYLINDER HEAD BOLT INSTALLATION

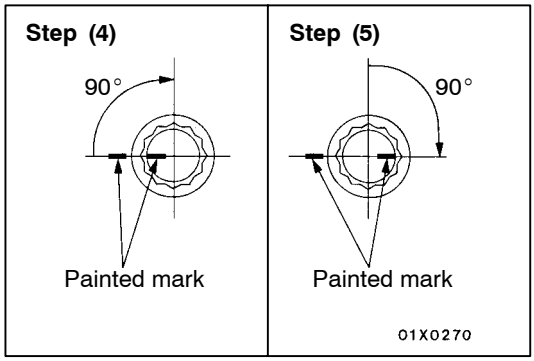
1. When installing the cylinder head bolts, the length below the head of the bolts should be within the limit.
   If it is outside the limit, replace the bolts.

   Limit (A): 103.2 mm

2. Apply a small amount of engine oil to the thread section and the washer of the cylinder head bolt.



3. Use the special tool to tighten the bolts by the following procedure (angle-tightening procedure).
   (1) Tighten the cylinder head bolts in the shown sequence to 49 Nm.
   (2) Loosen the cylinder head bolts completely in the reverse of the shown sequence.
   (3) Tighten the cylinder head bolts in the shown order to 20 Nm.



(4) Mark the cylinder head bolts and the cylinder head with paint, and then tighten the bolts in the shown sequence to 90°.
(5) Tighten the bolts in the shown sequence to additional 90°, and check that the paint marks on the cylinder head bolts are flush with the paint marks on the cylinder head.

Caution
1) If the tightening angle is less than 90°, the bolt is loose.
2) If the tightening angle is more than 90°, loosen the bolt and repeat the procedure from step 1.

▶C◀ CAMSHAFT SPROCKET INSTALLATION

Use the special tool to stop the camshaft sprocket from turning in the same way as was done during removal, and then tighten the bolts to the specified torque.

Tightening torque: 88 Nm

ENGINE <4G9>

CONTENTS

GENERAL

OUTLINE OF CHANGES

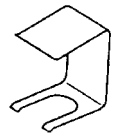
The following service procedures have been changed. Furthermore, other items are the same as before.

- The valve timing has been changed.
- The ignition timing has been changed.
- An auto-lash adjuster has been added.
- The timing belt lower cover has been changed.

GENERAL INFORMATION

Items			4G9
Valve timing	Intake	Opening	BTDC 12°
		Closing	ABDC 46°
	Exhaust	Opening	BBDC 46°
		Closing	ATDC 2°

SPECIAL TOOL

Tool	Number	Name	Use
	MD998443	Auto-lash adjuster holder	Supporting of lash adjuster

ON-VEHICLE SERVICE

IGNITION TIMING CHECK

The ignition timing has been changed. Other service procedures are the same as before.

Standard value: Approx. 8°BTDC

LASH ADJUSTER CHECK

If an abnormal noise (knocking) that seems to be coming from the lash adjuster is heard after starting the engine and does not stop, carry out the following check.

NOTE

(1) The abnormal noise which is caused by a problem with the lash adjusters is generated after the engine is started, and will vary according to the engine speed. However, this noise is not related to the actual engine load.

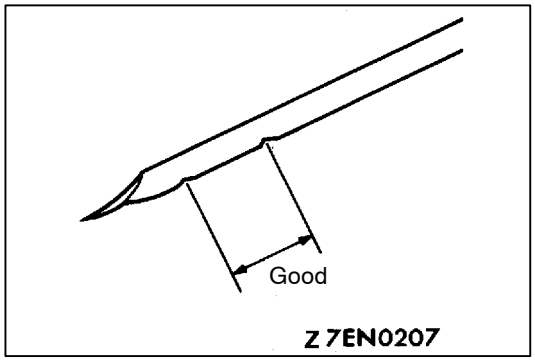
Because of this, if the noise does not occur immediately after the engine is started, if it does not change in accordance with the engine speed, or if it changes in accordance with the engine load, the source of the noise is not the lash adjusters.

(2) If there is a problem with the lash adjusters, the noise will almost never disappear, even if the engine has been run at idle to let it warm up.
The only case where the noise might disappear is if the oil in the engine has not been looked after properly and oil sludge has caused the lash adjusters to stick.

1. Start the engine.
2. Check that the noise occurs immediately after the engine is started, and that the noise changes in accordance with changes in the engine speed.
If the noise does not occur immediately after the engine is started, or if it does not change in accordance with the engine speed, the problem is not being caused by the lash adjusters, so check for some other cause of the problem. Moreover, if the noise does not change in accordance with the engine speed, the cause of the problem is probably not with the engine. (In these cases, the lash adjusters are normal.)
3. While the engine is idling, check that the noise level does not change when the engine load is varied (for example, by shifting from N → D).
If the noise level changes, the cause of the noise is probably parts striking because of worn crankshaft bearings or connecting rod bearings. (In such cases, the lash adjusters are normal.)
4. After the engine has warmed up, run it at idle and check if any noise can be heard.
If the noise has become smaller or disappeared, oil sludge could make the lash adjusters stick. Clean the lash adjusters. (Refer to the Engine Workshop Manual.) If not improved, go to step 5.
5. Bleed air from the lash adjusters.
6. If the noise has not disappeared even after the air bleeding, clean the lash adjusters. (Refer to the Engine Workshop Manual.)

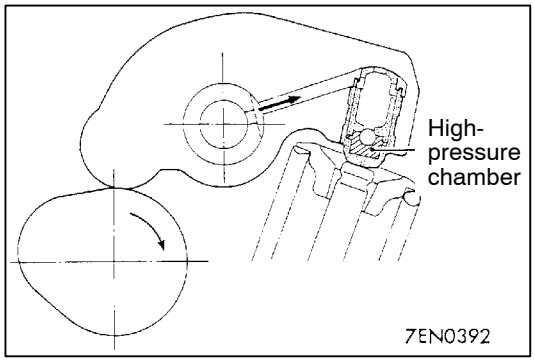
<LASH ADJUSTER AIR BLEEDING>

NOTE
(1) If the vehicle is parked on a slope for a long period of time, the amount of oil inside the lash adjuster will decrease, and air may get into the high pressure chamber when starting the engine.
(2) After parking the vehicle for long periods, the oil drains out of the oil passage, and it takes time for the oil to be supplied to the lash adjuster, so air can get into the high pressure chamber.
(3) If either of the above situations occur, the abnormal noise can be eliminated by bleeding the air from inside the lash adjusters.

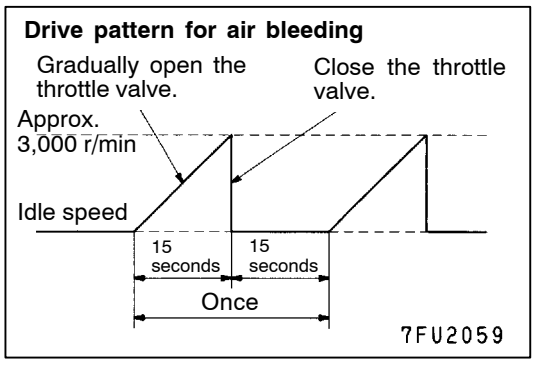


1. Check the engine oil and replenish or replace the oil if necessary.

   NOTE
   (1) If there is a only small amount of oil, air will be drawn in through the oil screen and will get into the oil passage.
   (2) If the amount of oil is greater than normal, then the oil will being mixed by the crankshaft and a large amount of air may get mixed into the oil.
   (3) If the oil is degenerated, air and oil will not separate easily in oil, and the amount of air mixed into the oil will increase.



   (4) If the air which has been mixed in with the oil due to any of the above reasons gets into the high pressure chamber of the lash adjuster, the air inside the high pressure chamber will be compressed when the valve is open and the lash adjuster will over-compress, resulting in abnormal noise when the valve closes. This is the same effect as if the valve clearance is adjusted to be too large by mistake. If the air inside the lash adjusters is then released, the operation of the lash adjusters will return to normal.

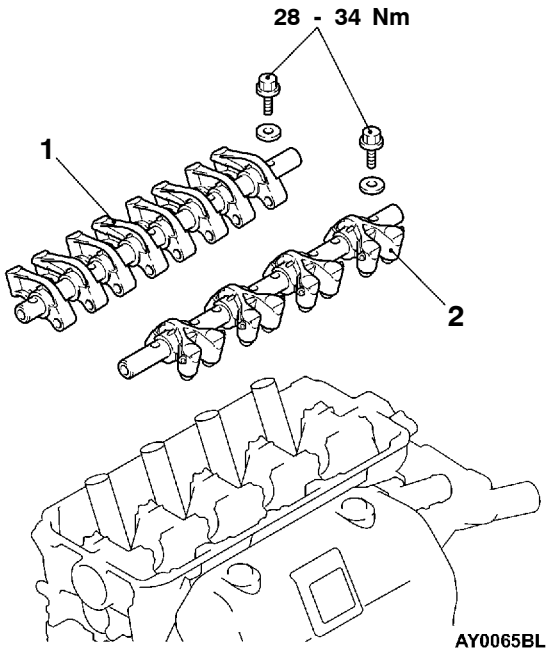


2. Run the engine at idle for 1 - 3 minutes to let it warm up.
3. With no load on the engine, repeat the drive pattern shown in the illustration at left and check if the abnormal noise disappears. (The noise should normally disappear after 10 - 30 repetitions, but if there is no change in the noise level after 30 repetitions or more, the problem is probably not due to air inside the lash adjusters.)
4. After the noise has disappeared, repeat the drive pattern shown in the illustration at left a further 5 times.
5. Run the engine at idle for 1 - 3 minutes and check that the noise has disappeared.

CAMSHAFT AND CAMSHAFT OIL SEAL

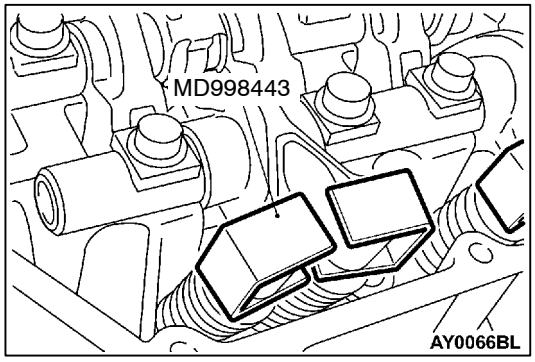
REMOVAL AND INSTALLATION

Apply engine oil to all sliding parts during installation.



Removal steps

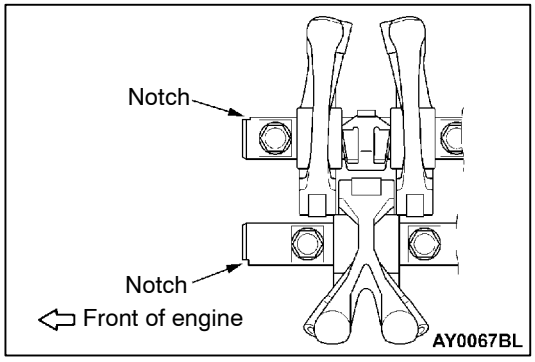
◀A▶ ▶A◀ 1. Lash adjuster, intake rocker arm and shaft assembly
◀A▶ ▶A◀ 2. Lash adjuster, exhaust rocker arm and shaft assembly



REMOVAL SERVICE POINT

◀A▶ LASH ADJUSTER, INTAKE ROCKER ARM AND SHAFT ASSEMBLY/LASH ADJUSTER, EXHAUST ROCKER ARM AND SHAFT ASSEMBLY REMOVAL

Before removing the lash adjuster, rocker arm and shaft assembly, install the special tools as shown in the illustration so that the lash adjusters will not fall out.



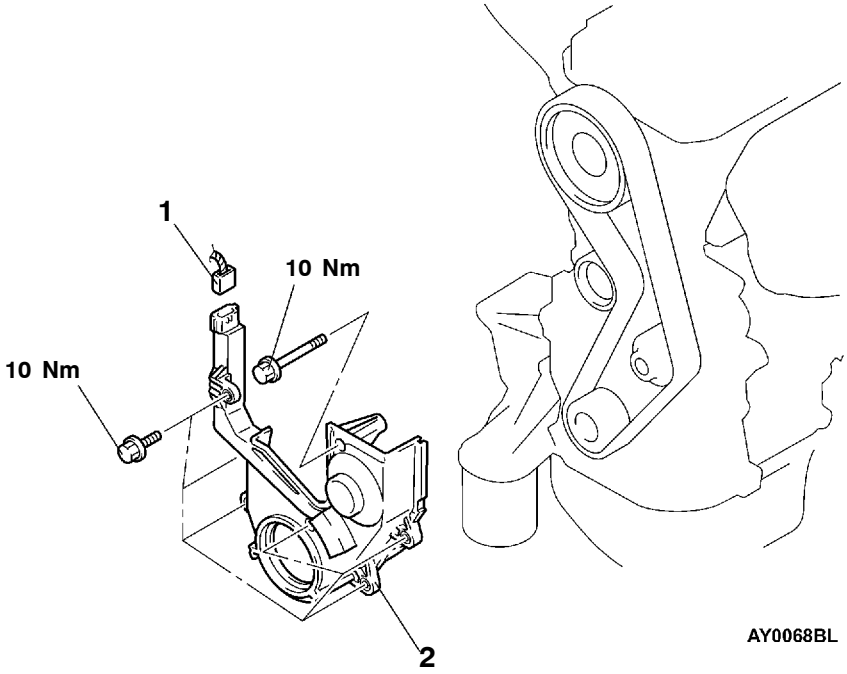
INSTALLATION SERVICE POINT

▶A◀ LASH ADJUSTER, EXHAUST ROCKER ARM AND SHAFT ASSEMBLY/LASH ADJUSTER, INTAKE ROCKER ARM AND SHAFT ASSEMBLY INSTALLATION

Position the rocker arm shafts so that their notches point the direction shown, and install the lash adjuster, rocker arm and shaft assembly.

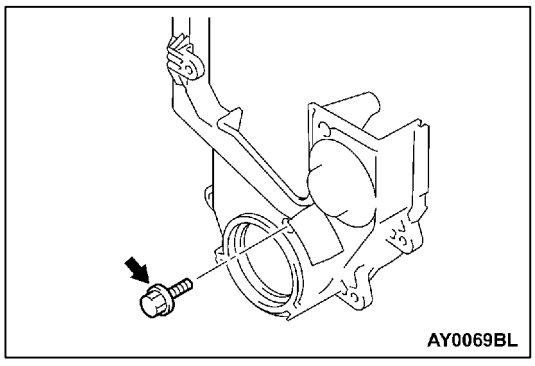
TIMING BELT

REMOVAL AND INSTALLATION



Removal steps

1. Crank angle sensor connector
▶A◀ 2. Timing belt lower cover



INSTALLATION SERVICE POINT

▶A◀ TIMING BELT LOWER COVER INSTALLATION

1. Mount the bolt shown in the illustration (M6 × 20 mm) first.
2. Mount the other bolts, and tighten them to the specified torque.

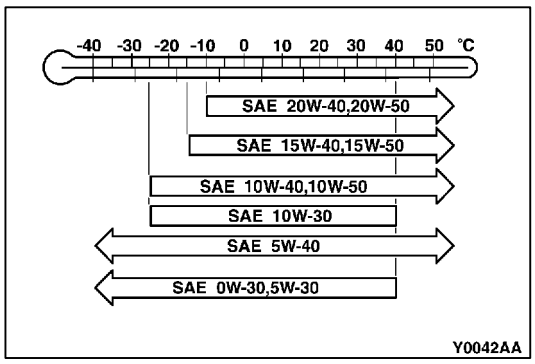
   Tightening torque: 10 Nm

GROUP 12
ENGINE LUBRICATION

GENERAL

OUTLINE OF CHANGE

A quality of the engine oil has been changed.



ON-VEHICLE SERVICE

Specified Engine Oil (ACEA and API classification):
ACEA A1, A2, A3/API SG or higher

NOTES

MULTIPOINT FUEL INJECTION (MPI)

CONTENTS

MULTIPOINT FUEL INJECTION (MPI) <4G1>

GENERAL

OUTLINE OF CHANGES

The service procedures have been established to describe revised sections due to the changed items shown below.

- On-board Diagnostics System has been adopted, diagnostic items have been expanded, and diagnostic code numbering system has been changed.
- Non-distributor two-coiled ignition system has been adopted.
- Crank angle sensor attached to the crank shaft has been adopted.
- Camshaft position sensor has been added.
- Ignition failure sensor has been added.
- Intake air temperature sensor built in the vacuum sensor (manifold absolute pressure sensor) has been adopted.
- Oxygen sensor (front, rear) has been changed.
- Ignition timing adjustment terminal has been abolished.
- Delivery pipe has been changed.

GENERAL INFORMATION

SELF-DIAGNOSIS FUNCTION

The following functions have been added.

- The engine-ECU records the engine operating condition when the diagnosis code is set.
  This data is called “freeze frame” data.
  This data can be read by using the MUT-II, are can then be used in simulation tests for troubleshooting.

GENERAL SPECIFICATIONS

Item		Specifications
Engine-ECU	Identification No.	E6T31372 <Vehicles with immobilizer system> E6T31373 <Vehicles without immobilizer system>

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM

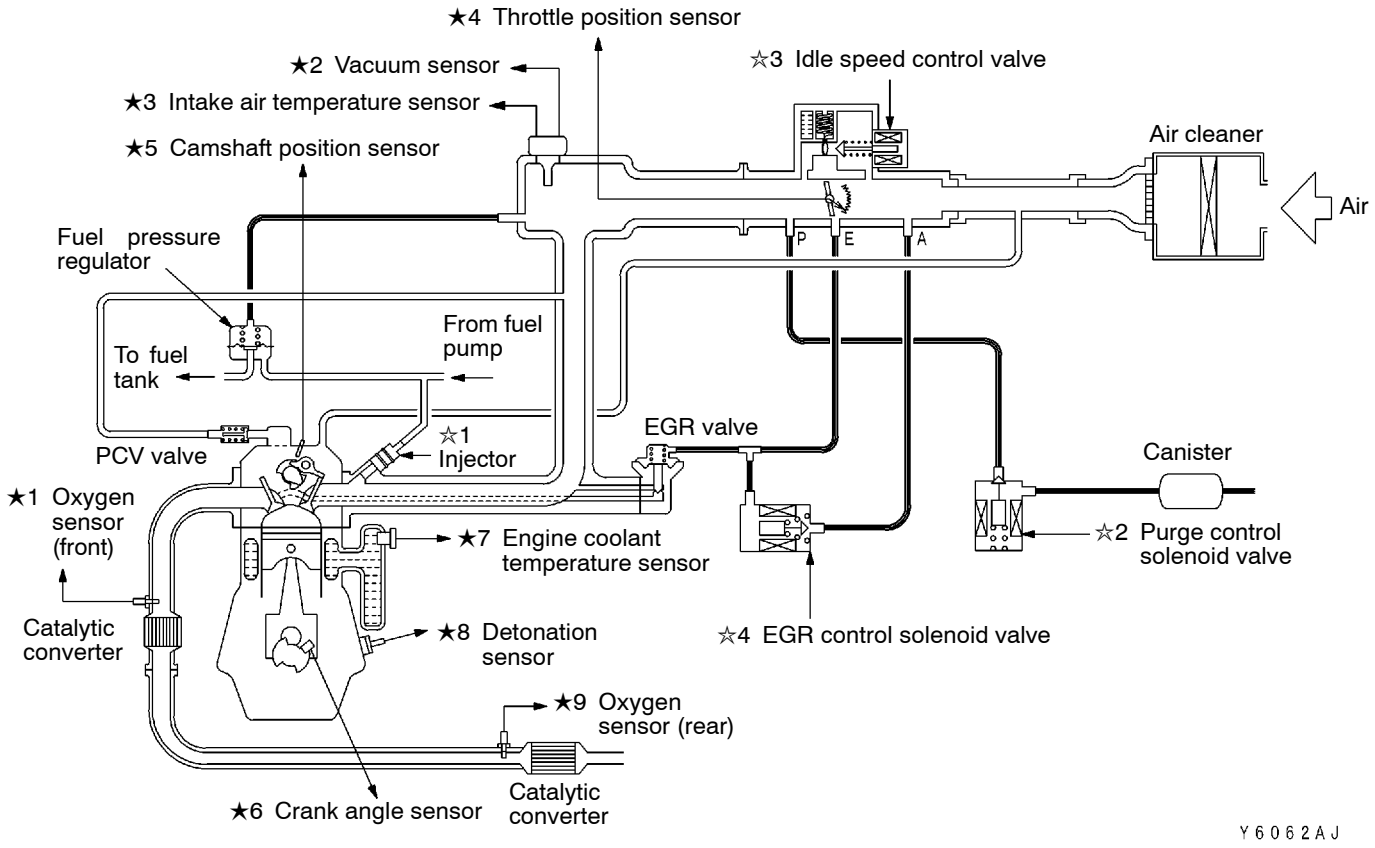
★1 Oxygen sensor (front)
★2 Vacuum sensor
★3 Intake air temperature sensor
★4 Throttle position sensor
★5 Camshaft position sensor
★6 Crank angle sensor
★7 Engine coolant temperature sensor
★8 Detonation sensor
★9 Oxygen sensor (rear)

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

⇨ Engine-ECU ⇨

☆1 Injector
☆2 Purge control solenoid valve
☆3 Idle speed control valve
☆4 EGR control servo valve

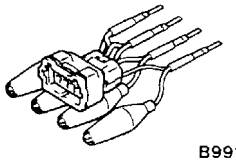
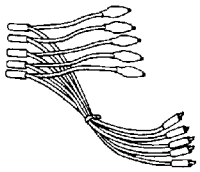
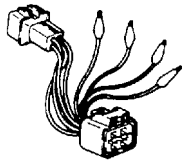
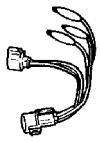
- Fuel pump relay
- Engine control relay
- A/C power relay
- Engine warning lamp
- Diagnosis signal
- Ignition coil (power transistor)
- Fan controller

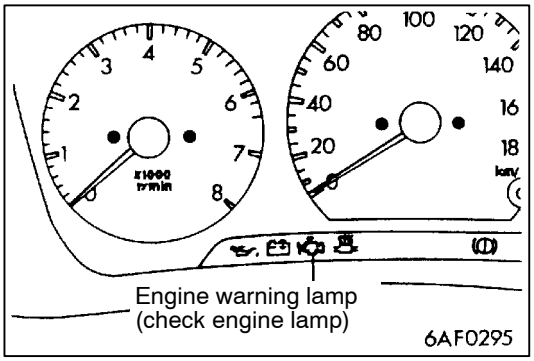


SERVICE SPECIFICATIONS

Items		Standard value
Intake air temperature sensor resistance kΩ	20°C	2.3 - 3.0
	80°C	0.30 - 0.42
Oxygen sensor output voltage (during revving) V		0.6 - 1.0
Oxygen sensor heater resistance (at 20°C) Ω	Front	4.5 - 8.0
	Rear	11 - 18

SPECIAL TOOLS

Tool	Number	Name	Use
 B991536	MB991536	Throttle position sensor adjustment harness	• Measurement of voltage during trouble-shooting
	MB991658	Test harness set	• Measurement of voltage during trouble-shooting
	MD998464	Test harness (4-pin, square)	• Measurement of voltage during trouble-shooting • Inspection of oxygen sensor (front)
	MD998478	Test harness (3-pin, triangle)	• Measurement of voltage during trouble-shooting • Inspection using an analyzer



TROUBLESHOOTING

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.
However, the warning lamp will illuminate as bulb check for five seconds whenever the ignition switch is turned to the ON position.

Engine warning lamp inspection items

Code No.	Diagnosis item
-	Engine-ECU
P0105	Vacuum sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0120	Throttle position sensor system
P0125	Feedback system
P0130	Oxygen sensor (front) system <sensor 1>
P0135	Oxygen sensor heater (front) system <sensor 1>
P0136	Oxygen sensor (rear) system <sensor 2>
P0141	Oxygen sensor heater (rear) system <sensor 2>
P0170	Abnormal fuel system
P0201	No. 1 injector system
P0202	No. 2 injector system
P0203	No. 3 injector system
P0204	No. 4 injector system
P0300★	Random cylinder misfire detected
P0301	No. 1 cylinder misfire detected
P0302	No. 2 cylinder misfire detected
P0303	No. 3 cylinder misfire detected
P0304	No. 4 cylinder misfire detected
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	EGR control solenoid valve system
P0420	Catalyst malfunction
P0443	Purge control solenoid valve system
P0505	Idle speed control system

NOTE
1. If the engine warning lamp illuminates because of a malfunction of the engine-ECU, communication between MUT-II and the engine-ECU is impossible. In this case, the diagnosis code cannot be read.
2. After the engine-ECU has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected. However, for items marked with a "★" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.
3. After the engine warning lamp illuminates, it will be switched off under the following conditions.
   (1) When the engine-ECU monitored the power train malfunction three times* and met set condition requirements, it detected no malfunction.
   *: In this case, "one time" indicates from engine start to stop.
   (2) For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

METHOD OF READING AND ERASING DIAGNOSIS CODES

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

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the MUT-II.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

   NOTE
   By turning the ignition switch to OFF, the engine-ECU will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

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

FREEZE FRAME DATA

When the engine-ECU detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "freeze frame data." By analyzing this "freeze frame" data with the MUT-II, an effective troubleshooting can be performed.

Displayed items of freeze frame data are shown in the following:

DISPLAYED ITEM LIST

Data item		Unit
Engine coolant temperature sensor		°C
Engine speed		r/min
Vehicle speed		km/h
Long-term fuel compensation (long-term fuel trim)		%
Short-term fuel compensation (short-term fuel trim)		%
Fuel control condition	Open loop	OL
	Closed loop	CL
	Open loop owing to drive condition	OL-DRV.
	Open loop owing to system malfunction	OL-SYS.
	Closed loop based on one oxygen sensor	CL-H02S
Calculation load value		%
Diagnosis code during data recording		-

NOTE
If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

READINESS TEST STATUS

The engine-ECU monitors the following main diagnosis items, judges if these items are in good condition or not, and the stores its history. This history can be read out by using MUT-II. (If the ECU has judged a item before, the MUT-II displays "Complete.")
In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).

- Catalyst: P0421
- Oxygen sensor: P0130
- Oxygen sensor heater: P0135, P0141

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
Vacuum sensor	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 45°C.
Throttle position sensor (TPS)	No increase in fuel injection amount during acceleration due to the throttle position sensor signal.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C.
Camshaft position sensor	Injects fuel into the cylinders in the order 1-3-4-2 with irregular timing. (After the ignition switch is turned to ON, the No. 1 cylinder top dead centre is not detected at all.)
Detonation sensor	Switches the ignition timing from ignition timing for super petrol to ignition timing for standard petrol.
Oxygen sensor (front)	Air/fuel ratio feedback control (closed loop control) is not performed.
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.
Misfire detection	The engine-ECU stops supplying fuel to the cylinder with the highest misfiring rate if a misfiring that could damage the catalytic converter is detected.

INSPECTION CHART FOR DIAGNOSIS CODES

Code No.	Diagnosis item	Reference page
P0105	Vacuum sensor system	13A-10
P0110	Intake air temperature sensor system	13A-12
P0115	Engine coolant temperature sensor system	13A-13
P0120	Throttle position sensor system	13A-16
P0125	Feedback system	13A-18
P0130	Oxygen sensor (front) system <sensor 1>	13A-19
P0135	Oxygen sensor heater (front) system <sensor 1>	13A-21
P0136	Oxygen sensor (rear) system <sensor 2>	13A-22
P0141	Oxygen sensor heater (rear) system <sensor 2>	13A-24
P0170	Abnormal fuel system	13A-25
P0201	No. 1 injector system	13A-26
P0202	No. 2 injector system	13A-26
P0203	No. 3 injector system	13A-26
P0204	No. 4 injector system	13A-26
P0300★	Random cylinder misfire detected	13A-27
P0301	No. 1 cylinder misfire detected	13A-28
P0302	No. 2 cylinder misfire detected	13A-28
P0303	No. 3 cylinder misfire detected	13A-28
P0304	No. 4 cylinder misfire detected	13A-28
P0325	Detonation sensor system	13A-29
P0335	Crank angle sensor system	13A-29
P0340	Camshaft position sensor system	13A-31
P0403	EGR control solenoid valve system	13A-32
P0421	Catalyst malfunction	13A-33
P0443	Purge control solenoid valve system	13A-34
P0500	Vehicle speed sensor system	13A-35
P0505	Idle speed control system	13A-36
P1610	Immobilizer system	13A-38

NOTE
1. Do not replace the engine-ECU until a through terminal check reveals there are no short/open circuit.
2. Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.
3. After the engine-ECU has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with a "★", the diagnosis code is recorded on the first detection of the malfunction.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

Code No. P0105 Vacuum sensor system	Range of Check
Range of Check ● Ignition switch: ON Set Conditions ● The output voltage of the vacuum sensor is 4.5 V or more for 2 seconds. (This corresponds to the absolute manifold pressure of 115 kPa or more.)	● Malfunction of the vacuum sensor ● Improper connector contact, open circuit or short-circuited harness ● Malfunction of the engine-ECU
Range of Check ● The output voltage of the throttle position sensor is 1.25 V or more. or ● The vehicle is stationary. Set Conditions ● The output voltage of the vacuum sensor is 0.2 V or less for 2 seconds. (This corresponds to the absolute manifold pressure of 4.9 kPa or less.)	

MUT-II Data list
32 Barometric pressure sensor (Refer to P.13A-65, DATA LIST REFERENCE TABLE.)
- OK → Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
- NG ↓

Check the following connector: A-54
- NG → **Repair**
- OK ↓

Measure at vacuum sensor connector A-54.
- Disconnect the connector and measure at the harness side.

(1) Voltage between terminal 3 and earth (Ignition switch: ON)
OK: 4.8 - 5.2 V
(2) Resistance between terminal 2 and earth
OK: 2 Ω or less

(1) NG → Measure at engine-ECU connector B-34.
- Measure the voltage at the engine-ECU terminal.
- Ignition switch: ON
- Voltage between terminal 81 and earth
  OK: 4.8 - 5.2 V

Measure at engine-ECU connector B-34.
- OK → **Check the following connector:** B-34
  - OK → Check the harness between the vacuum sensor and the engine-ECU, and repair if necessary.
  - NG → **Repair**
- NG ↓

Check the following connector: B-34
- NG → **Repair**
- OK ↓

Check the harness between the vacuum sensor and the engine-ECU.
- NG → **Repair**
- OK ↓

Check the trouble symptoms.
- NG → Replace the engine-ecu.

(2) NG → **Check the following connector:** B-34
- NG → **Repair**
- OK ↓

Check the harness between the vacuum sensor and the engine-ECU.
- NG → **Repair**
- OK ↓

Check the trouble symptoms.
- NG → Replace the engine-ECU.

OK ↓

Measure at vacuum sensor connector A-54.
- Connect connector terminals No. 1, No. 2 and No. 5 only by using test harness (MB991348), and measure at the pick-up harness.
- Ignition switch: ON

(1) Voltage between terminal 3 and earth
OK: 4.8 - 5.2 V
(2) Voltage between terminal 1 and earth
OK: Altitude 0 m: 3.7 - 4.3 V
Altitude 1,200 m: 3.2 - 3.8 V
(3) Voltage between terminal 2 and earth
OK: 0.5 V or less

(1) NG, (3) NG → **Check the following connector:** B-34
- NG → **Repair**
- OK ↓

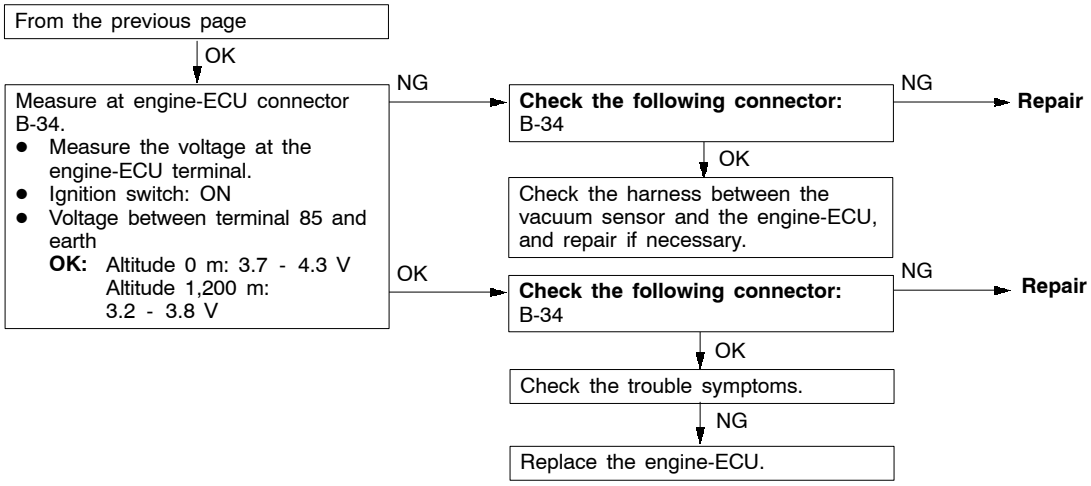
Check the harness between the vacuum sensor and the engine-ECU, and repair if necessary.

(2) NG → Replace the vacuum sensor.
↓
Check the trouble symptoms.
- NG → **Check the following connector:** B-34
  - NG → **Repair**
  - OK ↓

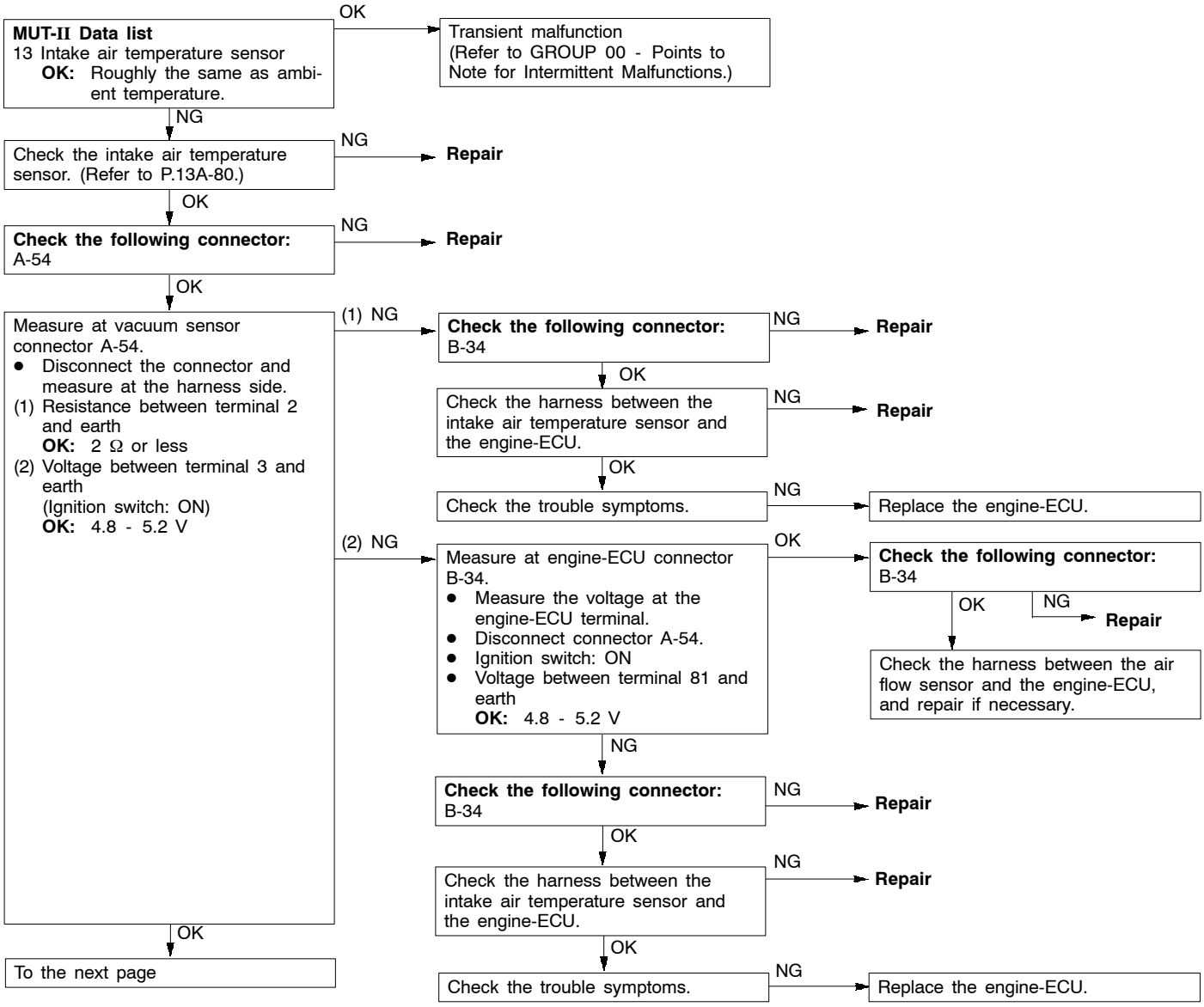
Check the harness between the vacuum sensor and the engine-ECU, and repair if necessary.

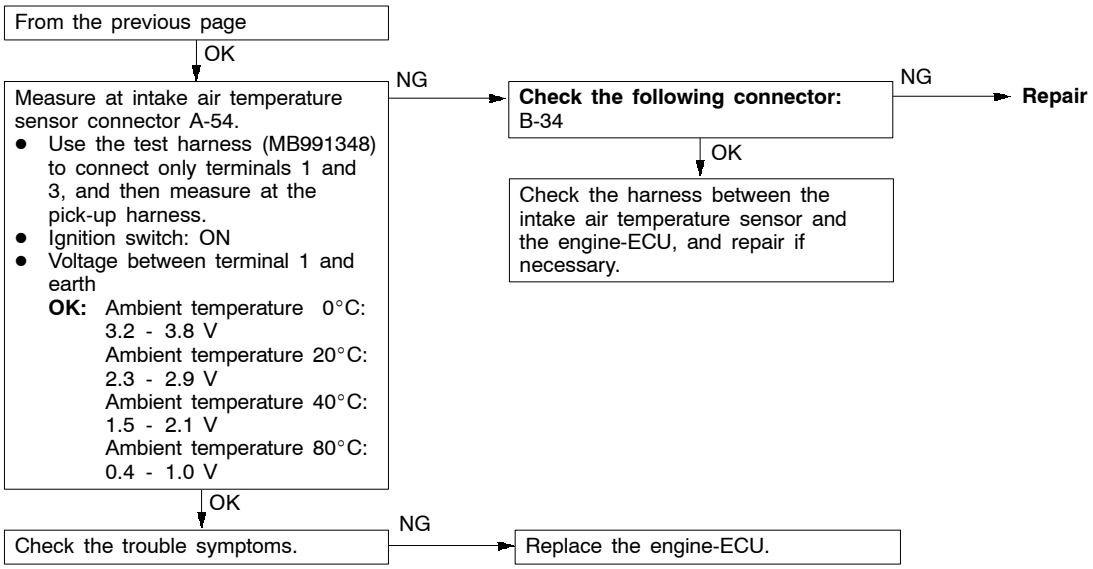
OK ↓

To the next page

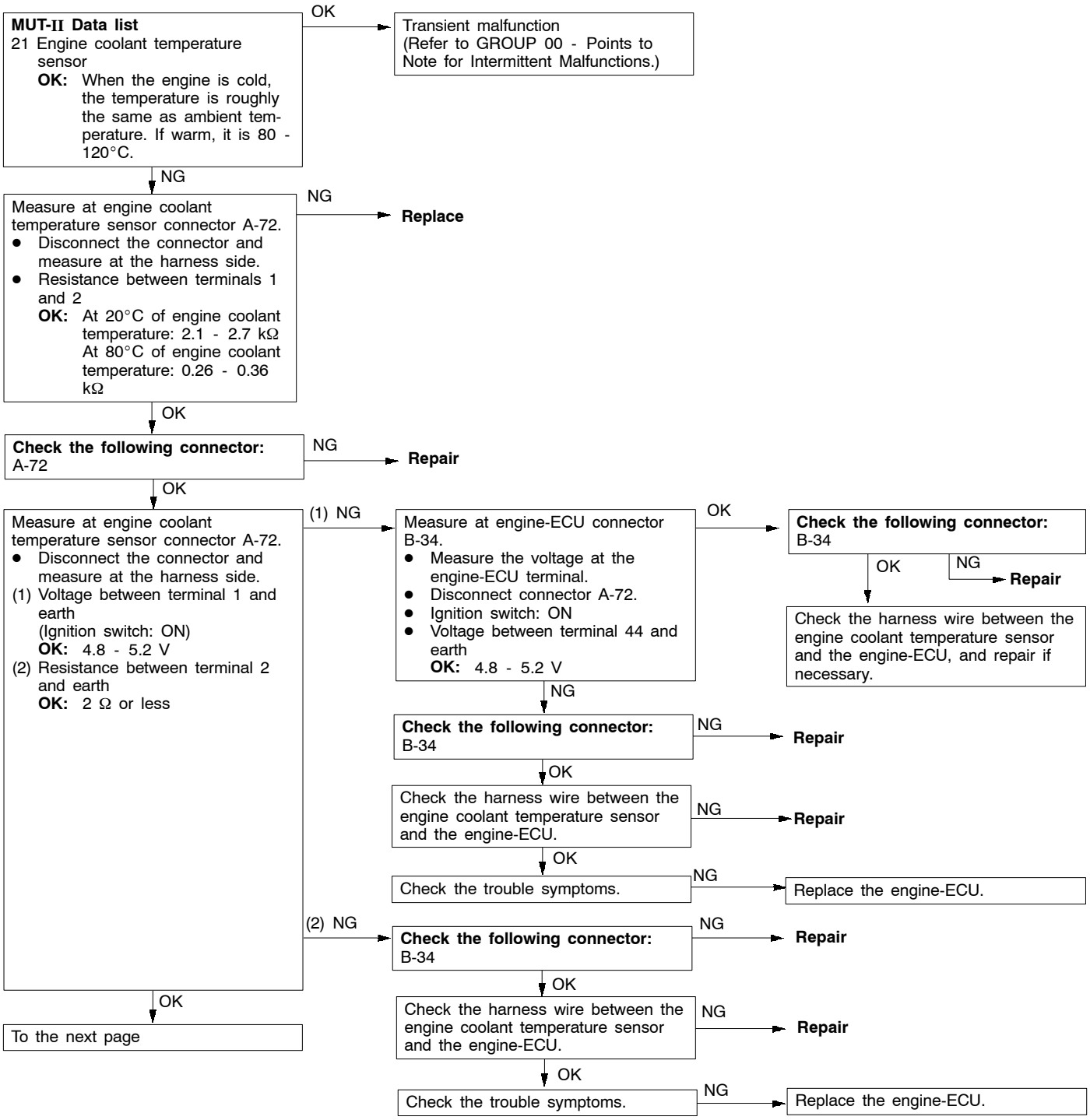

From the previous page
OK
Measure at engine-ECU connector B-34.
• Measure the voltage at the engine-ECU terminal.
• Ignition switch: ON
• Voltage between terminal 85 and earth
OK: Altitude 0 m: 3.7 - 4.3 V
Altitude 1,200 m: 3.2 - 3.8 V
NG
Check the following connector: B-34
NG
Repair
OK
Check the harness between the vacuum sensor and the engine-ECU, and repair if necessary.
OK
Check the following connector: B-34
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU.

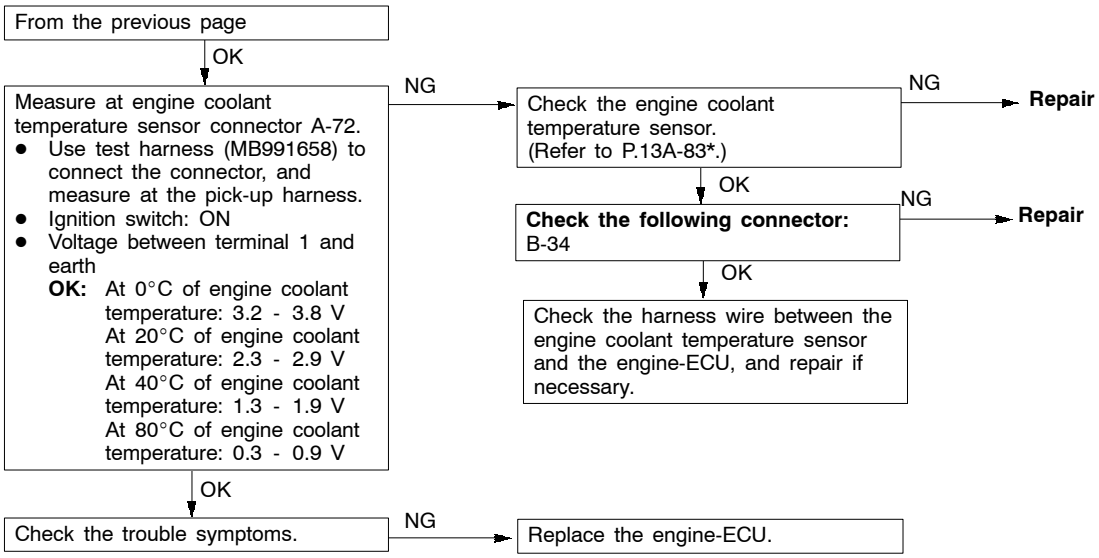
Code No. P0110 Intake air temperature sensor system	Probable cause
Range of Check ● Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. Set Conditions ● The sensor output voltage is 4.6 V or more for two seconds (equivalent to -45°C of intake air temperature) or ● The sensor output voltage is 0.2 V or more for two seconds (equivalent to 125°C of intake air temperature)	● Malfunction of intake air temperature sensor ● Open or short circuit in intake air temperature sensor or loose connector contact ● Malfunction of engine-ECU





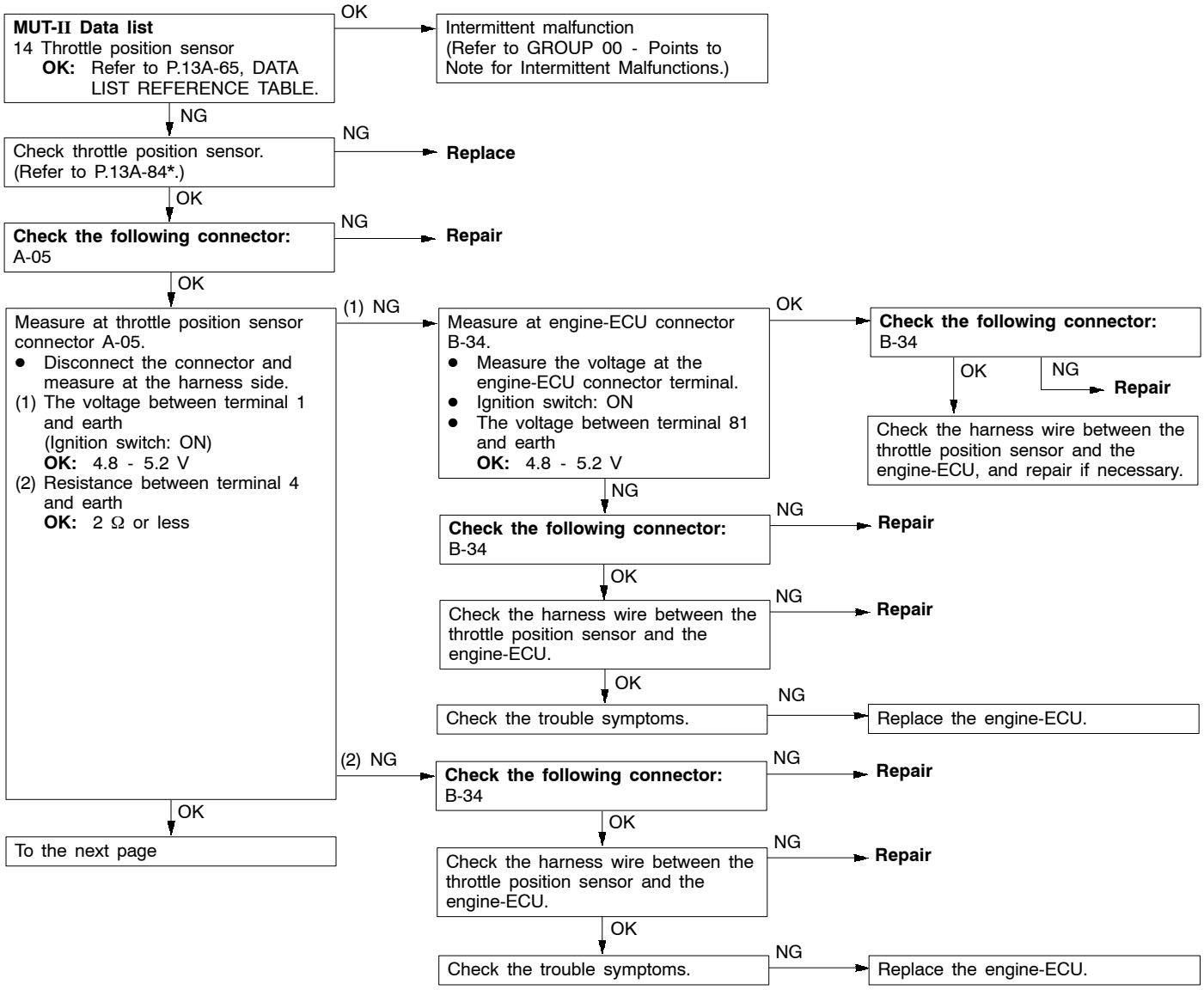
Code No. P0115 Engine coolant temperature sensor system	Probable cause
Range of Check ● Engine: Two seconds after the engine has been started Set Conditions ● The sensor output voltage is 4.6 V or more for two seconds (equivalent to -45°C of engine coolant temperature) or ● The sensor output voltage is 0.1 V or less for two seconds (equivalent to 140°C of engine coolant temperature)	● Malfunction of engine coolant temperature sensor ● Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact ● Malfunction of engine-ECU
Range of Check ● Engine: After starting Set Conditions ● The engine coolant temperature has reduced from over 40°C to less than 40°C, and that condition has lasted for five minutes or more.	


MUT-II Data list
21 Engine coolant temperature sensor
OK: When the engine is cold, the temperature is roughly the same as ambient temperature. If warm, it is 80 - 120°C.
OK
Transient malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
NG
Measure at engine coolant temperature sensor connector A-72.
Disconnect the connector and measure at the harness side.
Resistance between terminals 1 and 2
OK: At 20°C of engine coolant temperature: 2.1 - 2.7 kΩ
At 80°C of engine coolant temperature: 0.26 - 0.36 kΩ
NG
Replace
OK
Check the following connector: A-72
NG
Repair
OK
Measure at engine coolant temperature sensor connector A-72.
Disconnect the connector and measure at the harness side.
(1) Voltage between terminal 1 and earth
(Ignition switch: ON)
OK: 4.8 - 5.2 V
(2) Resistance between terminal 2 and earth
OK: 2 Ω or less
(1) NG
Measure at engine-ECU connector B-34.
Measure the voltage at the engine-ECU terminal.
Disconnect connector A-72.
Ignition switch: ON
Voltage between terminal 44 and earth
OK: 4.8 - 5.2 V
OK
Check the following connector: B-34
OK
NG
Repair
Check the harness wire between the engine coolant temperature sensor and the engine-ECU, and repair if necessary.
NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the engine coolant temperature sensor and the engine-ECU.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU.
(2) NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the engine coolant temperature sensor and the engine-ECU.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU.
OK
To the next page

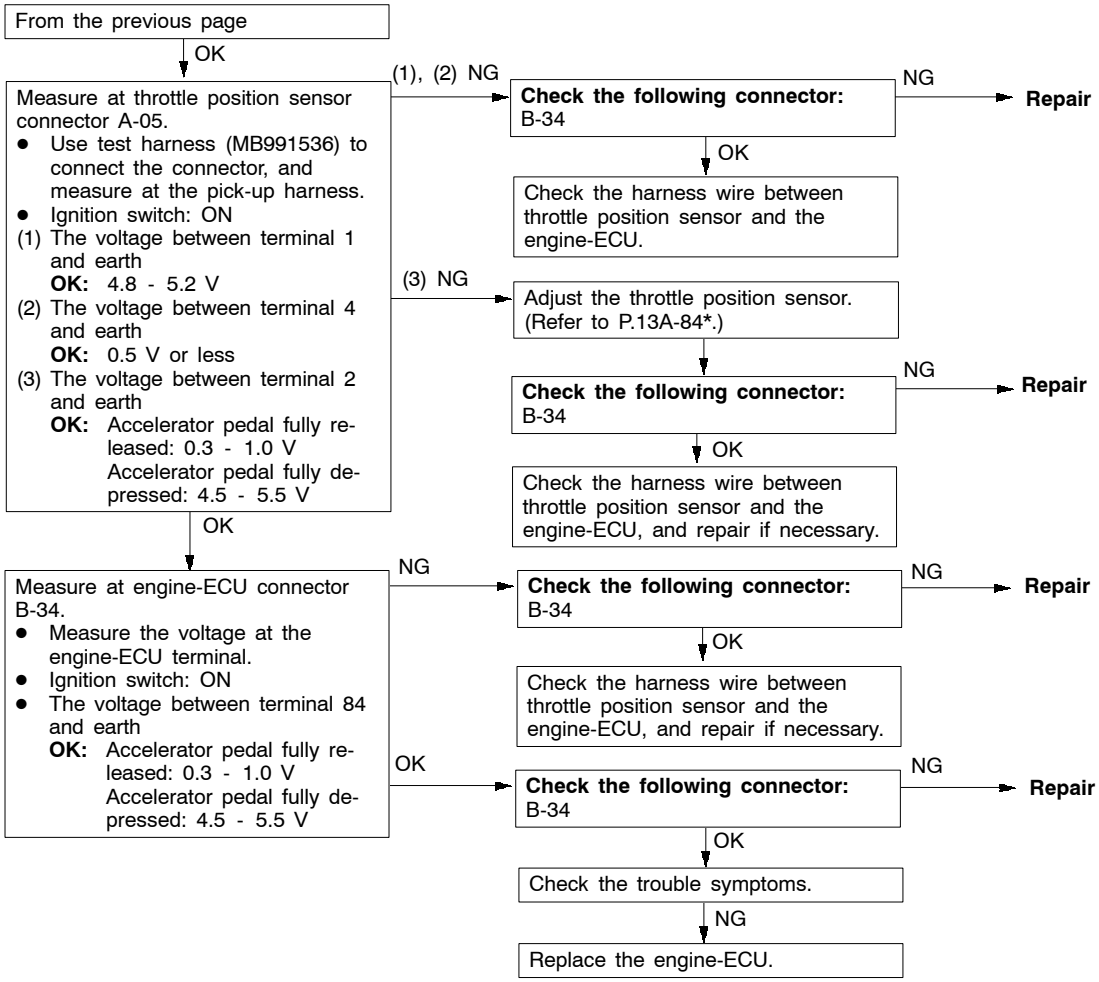


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. 0120 Throttle position sensor system	Probable cause
Range of Check ● Ignition switch: ON ● Excluding 2 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set Conditions ● Engine speed is 1,000 r/min or less, and intake air pressure is 48 kPa or less, TPS output voltage is 4.6 V or more for 2 seconds. or ● The sensor output voltage is 0.2 V or less for 2 seconds.	● Malfunction of throttle position sensor ● Open or short circuit in the throttle position sensor circuit or loose connector contact ● Malfunction of the engine-ECU

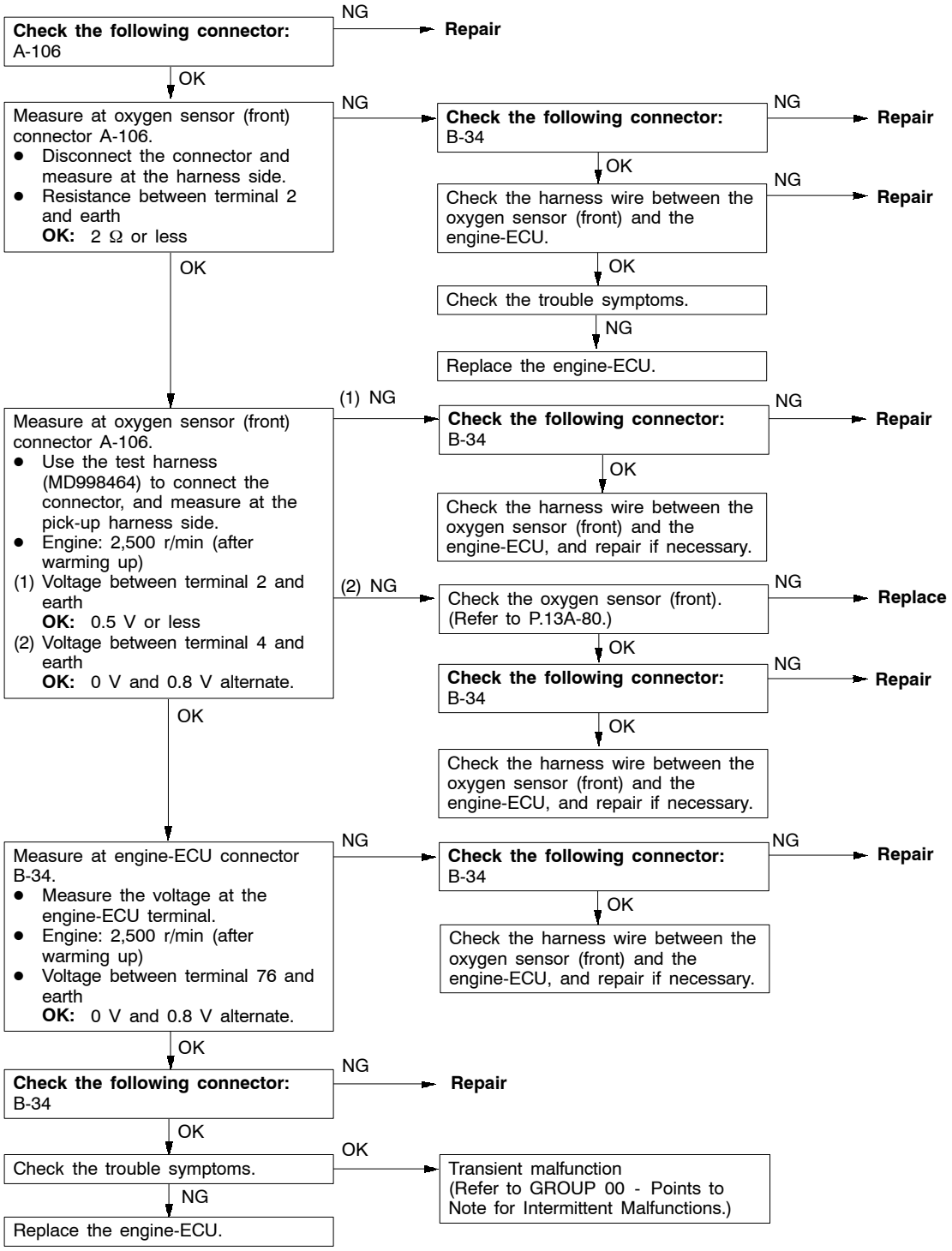


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

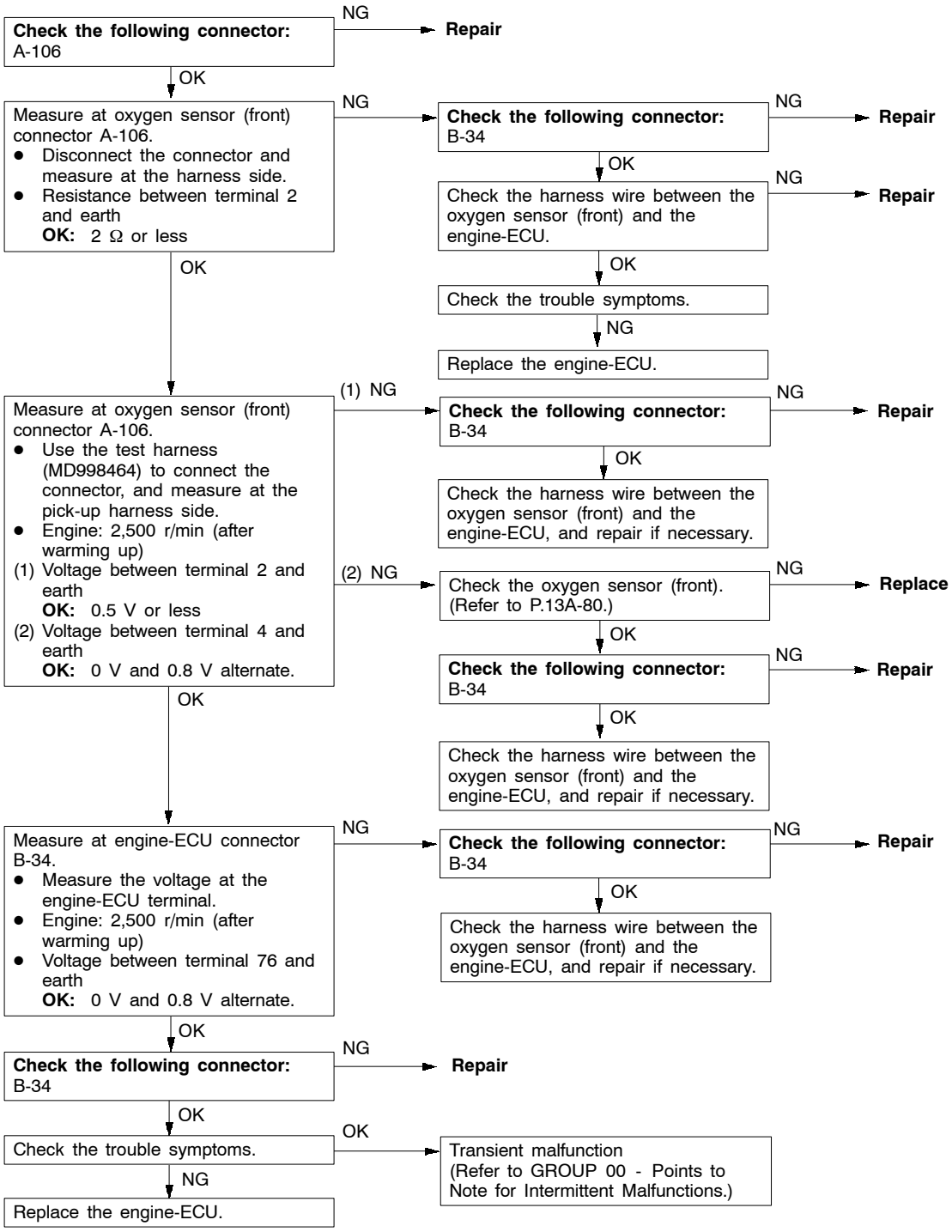


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

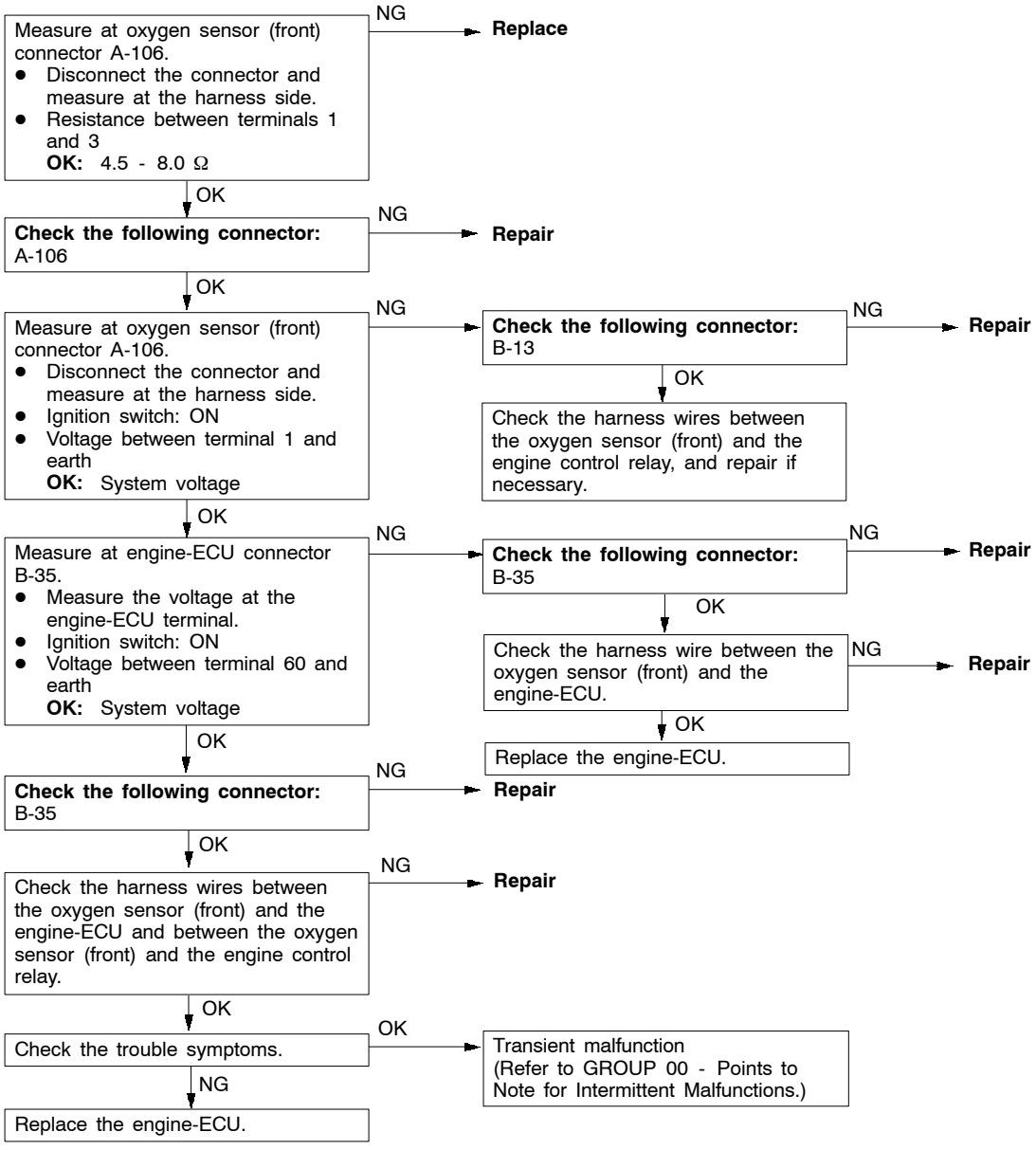
Code No. P0125 Feedback system	Probable cause
Range of Check ● The engine coolant temperature is approx. 80°C or more. ● During stoichiometric feedback control ● The vehicle is not being decelerated. Set Conditions ● Oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds.	● Malfunction of oxygen sensor (front) ● Open or short circuit in the oxygen sensor (front) circuit or loose connector contact ● Malfunction of engine-ECU



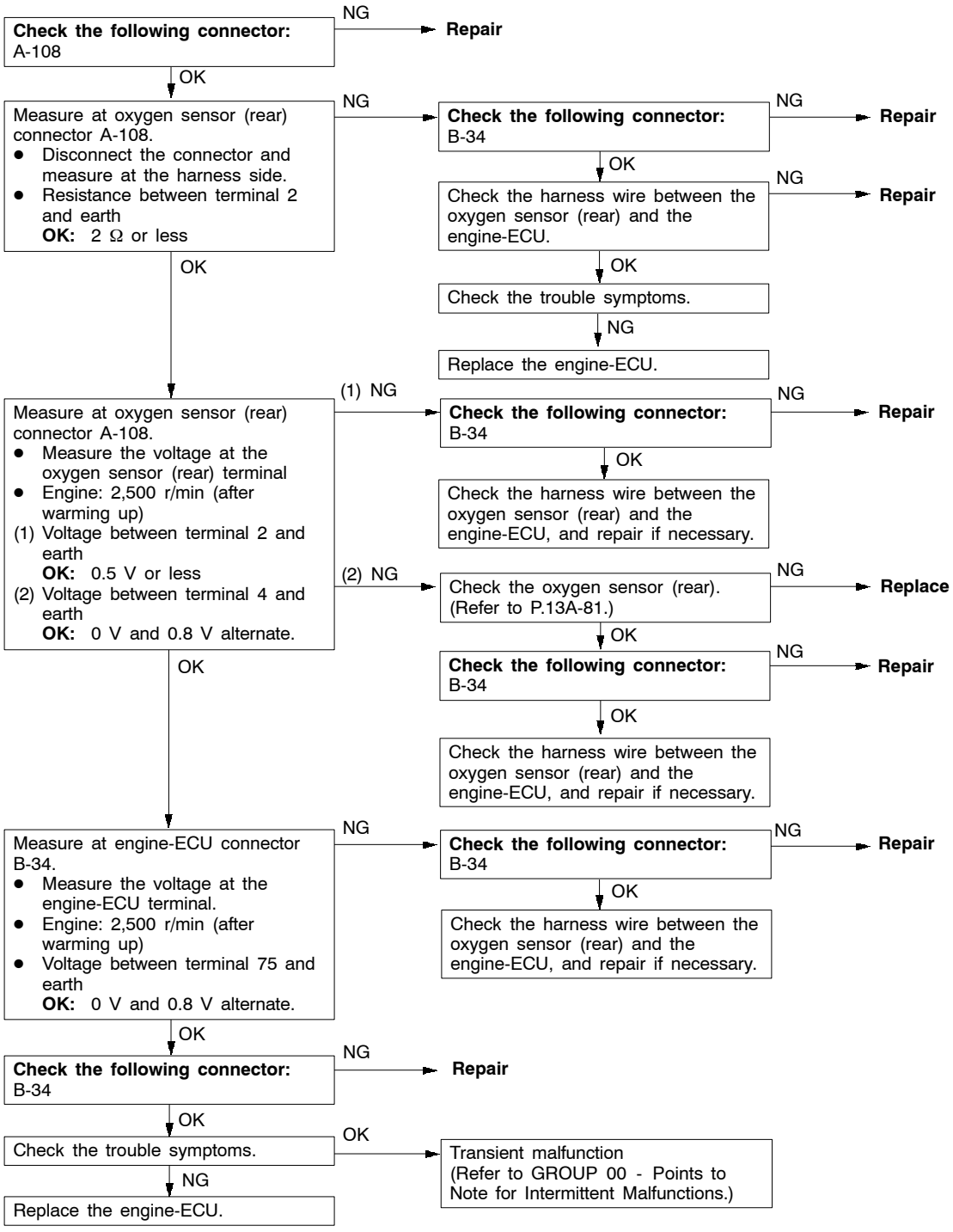
Code No. P0130 Oxygen sensor (front) system <sensor 1>	Probable cause
Range of Check ● Three minutes have been passed since the engine has been started. ● The engine coolant temperature is approx. 80°C or more. ● Intake air temperature is 20 - 50°C ● Engine speed is 1,200 r/min or more ● Driving on a level surface at constant speed. Set Conditions ● The oxygen sensor (front) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (front) inside the engine-ECU.	● Malfunction of oxygen sensor (front) ● Open or short circuit in the oxygen sensor (front) circuit or loose connector contact ● Malfunction of engine-ECU
Range of Check ● Engine speed is 2,800 r/min or less ● During driving ● During air/fuel ratio feedback control Set Conditions ● The oxygen sensor (front) output frequency is six or less per 10 seconds on average.	


Check the following connector: A-106
NG
Repair
OK
Measure at oxygen sensor (front) connector A-106.
● Disconnect the connector and measure at the harness side.
● Resistance between terminal 2 and earth
OK: 2 Ω or less
NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (front) and the engine-ECU.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU.
OK
Measure at oxygen sensor (front) connector A-106.
● Use the test harness (MD998464) to connect the connector, and measure at the pick-up harness side.
● Engine: 2,500 r/min (after warming up)
(1) Voltage between terminal 2 and earth
OK: 0.5 V or less
(2) Voltage between terminal 4 and earth
OK: 0 V and 0.8 V alternate.
(1) NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (front) and the engine-ECU, and repair if necessary.
(2) NG
Check the oxygen sensor (front). (Refer to P.13A-80.)
NG
Replace
OK
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (front) and the engine-ECU, and repair if necessary.
OK
Measure at engine-ECU connector B-34.
● Measure the voltage at the engine-ECU terminal.
● Engine: 2,500 r/min (after warming up)
● Voltage between terminal 76 and earth
OK: 0 V and 0.8 V alternate.
NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (front) and the engine-ECU, and repair if necessary.
OK
Check the following connector: B-34
NG
Repair
OK
Check the trouble symptoms.
OK
Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
NG
Replace the engine-ECU.

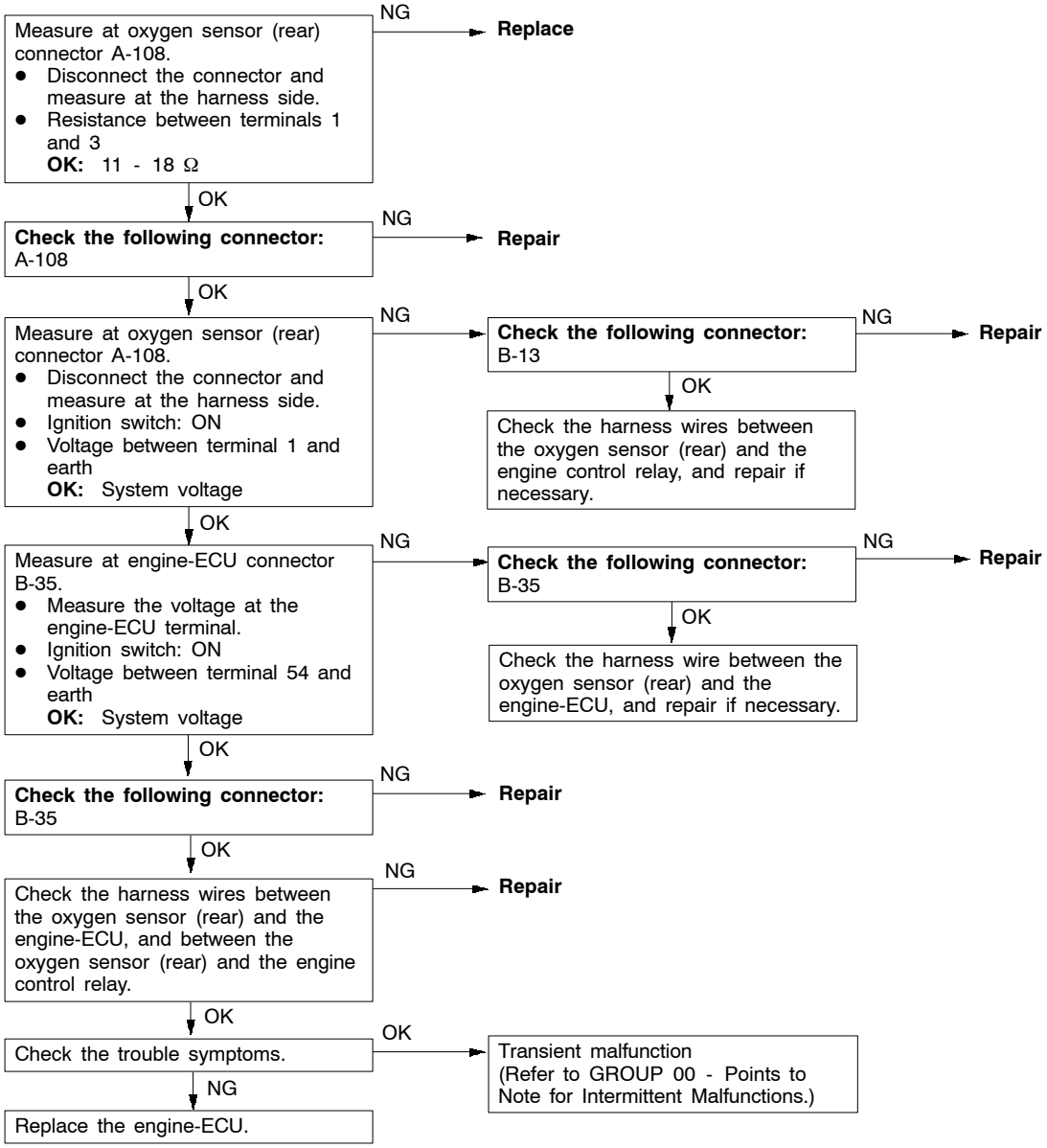
Code No. P0135 Oxygen sensor heater (front) system <sensor 1>	Probable cause
Range of Check ● The engine coolant temperature is approx. 20°C or more. ● The oxygen sensor heater (front) remains on. ● The engine speed is 50 r/min or more. ● Battery voltage is 11 - 16 V. Set Conditions ● The current, which flows through the oxygen sensor heater (front), is 0.2 A or less or 3.5 A or more for six seconds.	● Malfunction of oxygen sensor heater (front) ● Open or short circuit in the oxygen sensor heater (front) circuit or loose connector contact ● Malfunction of engine-ECU



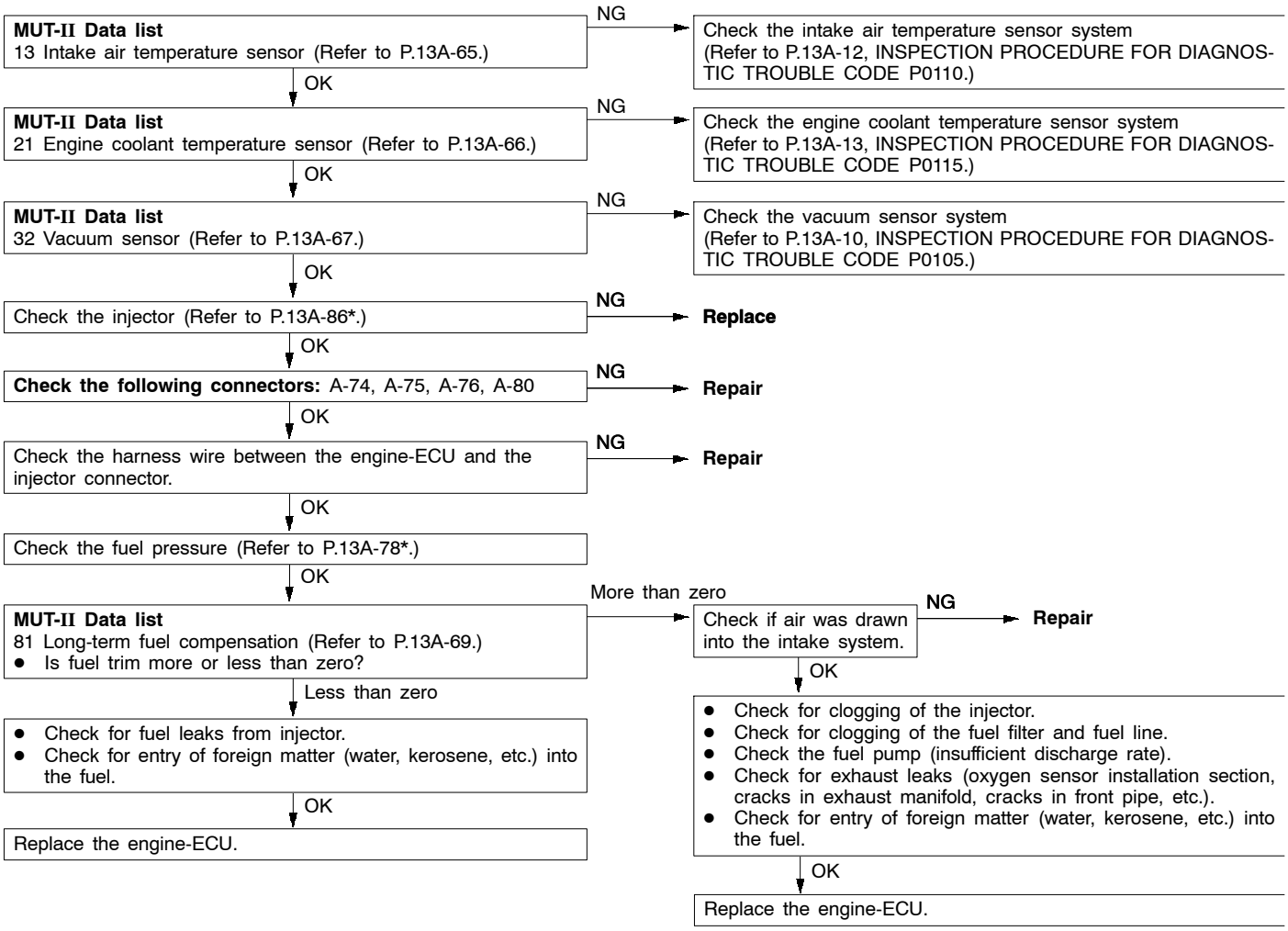
Code No. P0136 Oxygen sensor (rear) system <sensor 2>	Probable cause
Range of Check ● Three minutes have been passed since the engine has been started. ● The engine coolant temperature is approx. 80°C or more. ● Intake air temperature is 20 - 50°C ● Engine speed is 1,200 r/min or more ● Driving on a level surface at constant speed. Set Conditions ● The oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (rear) inside the engine-ECU.	● Malfunction of oxygen sensor (rear) ● Open or short circuit in the oxygen sensor (rear) circuit or loose connector contact ● Malfunction of engine-ECU
Range of Check ● Two seconds have passed after the ECU detected an open circuit. ● When the oxygen sensor (front) is in good condition. Set Conditions ● When the air/fuel ratio is rich, the oxygen sensor (front) output voltage is 0.5 V or more, the oxygen sensor (rear) output voltage is less than 0.1 V, and the oxygen sensor (rear) output voltage fluctuates within 0.078 V.	


Check the following connector: A-108
NG
Repair
OK
Measure at oxygen sensor (rear) connector A-108.
● Disconnect the connector and measure at the harness side.
● Resistance between terminal 2 and earth
OK: 2 Ω or less
NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (rear) and the engine-ECU.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU.
OK
Measure at oxygen sensor (rear) connector A-108.
● Measure the voltage at the oxygen sensor (rear) terminal
● Engine: 2,500 r/min (after warming up)
(1) Voltage between terminal 2 and earth
OK: 0.5 V or less
(2) Voltage between terminal 4 and earth
OK: 0 V and 0.8 V alternate.
(1) NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (rear) and the engine-ECU, and repair if necessary.
(2) NG
Check the oxygen sensor (rear). (Refer to P.13A-81.)
NG
Replace
OK
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (rear) and the engine-ECU, and repair if necessary.
OK
Measure at engine-ECU connector B-34.
● Measure the voltage at the engine-ECU terminal.
● Engine: 2,500 r/min (after warming up)
● Voltage between terminal 75 and earth
OK: 0 V and 0.8 V alternate.
NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the oxygen sensor (rear) and the engine-ECU, and repair if necessary.
OK
Check the following connector: B-34
NG
Repair
OK
Check the trouble symptoms.
OK
Transient malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
NG
Replace the engine-ECU.

Code No. P0141 Oxygen sensor heater (rear) system <sensor 2>	Probable cause
Range of Check ● The engine coolant temperature is approx. 20°C or more. ● The oxygen sensor heater (rear) remains on. ● The engine speed is 50 r/min or more. ● Battery voltage is 11 - 16 V. Set Conditions ● The current, which flows through the oxygen sensor heater (rear), is 0.2 A or less or 3.5 A or more for six seconds.	● Malfunction of oxygen sensor heater (rear) ● Open or short circuit in the oxygen sensor heater (rear) circuit or loose connector contact ● Malfunction of engine-ECU

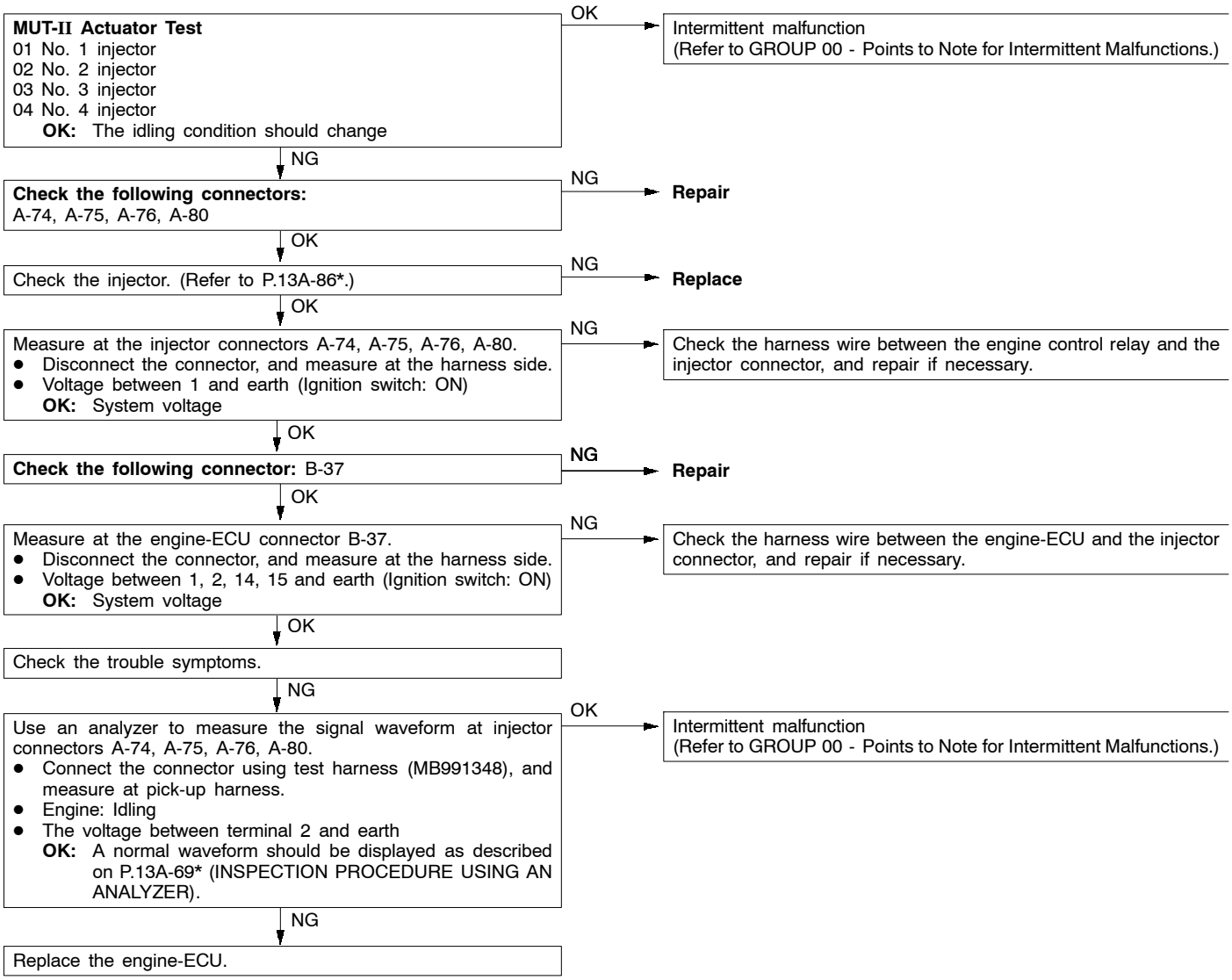


Code No. P0170 Abnormal fuel system	Probable cause
Range of Check ● Engine: Being learning the air-fuel ratio Set Conditions ● Two seconds or more have been passed while the fuel injection amount compensation value is too low. or ● Two seconds or more have been passed while the fuel injection amount compensation value is too high.	● Incorrect fuel pressure ● Malfunction of injector ● Malfunction of oxygen sensor (front) ● Malfunction of intake air temperature sensor ● Malfunction of vacuum sensor ● Malfunction of engine-ECU



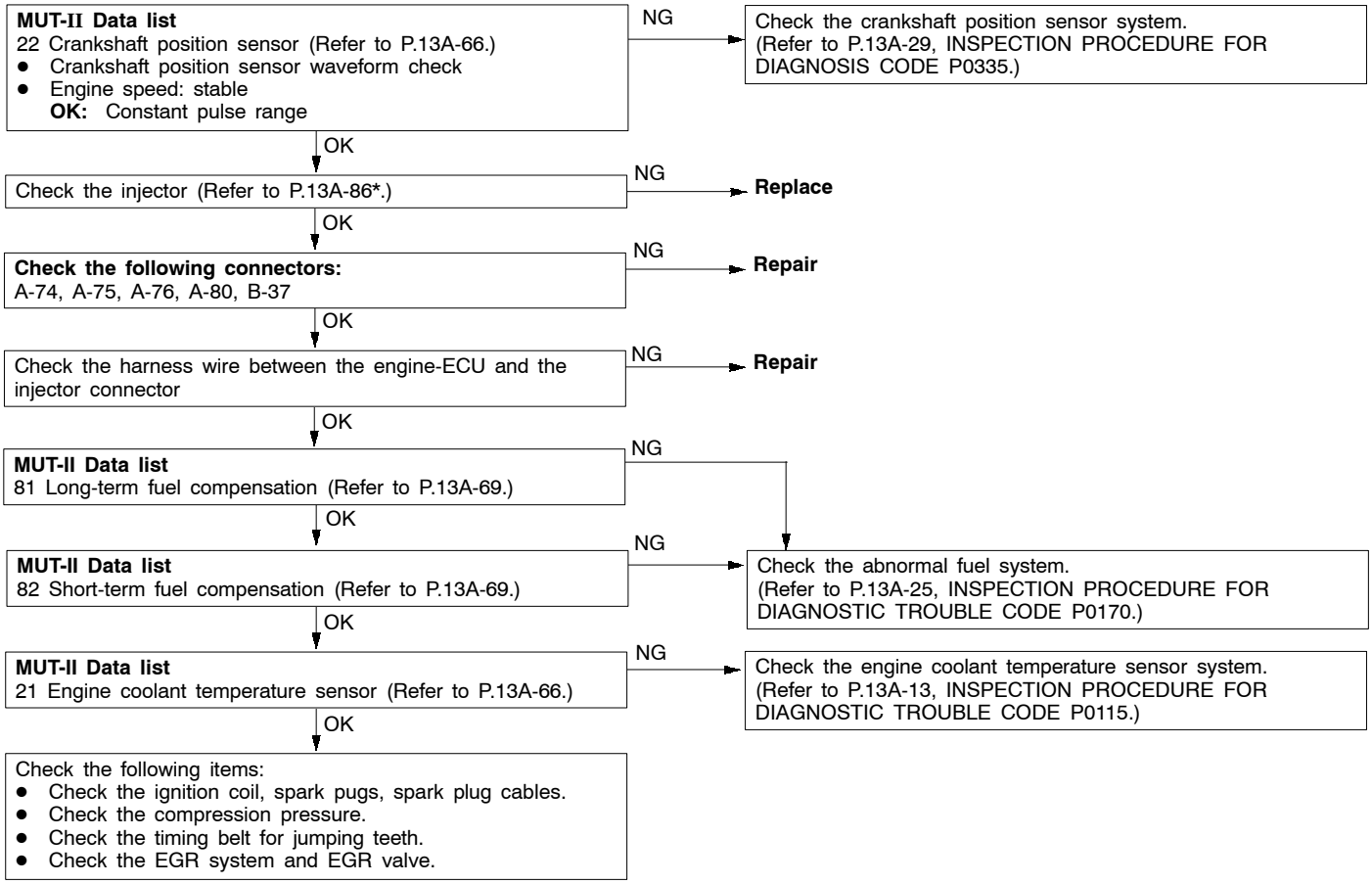
NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. P0201 No. 1 injector system Code No. P0202 No. 2 injector system Code No. P0203 No. 3 injector system Code No. P0204 No. 4 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 2 seconds.	● Malfunction of the injector ● Improper connector contact, open circuit or short-circuited harness wire of the injector circuit ● Malfunction of the engine-ECU



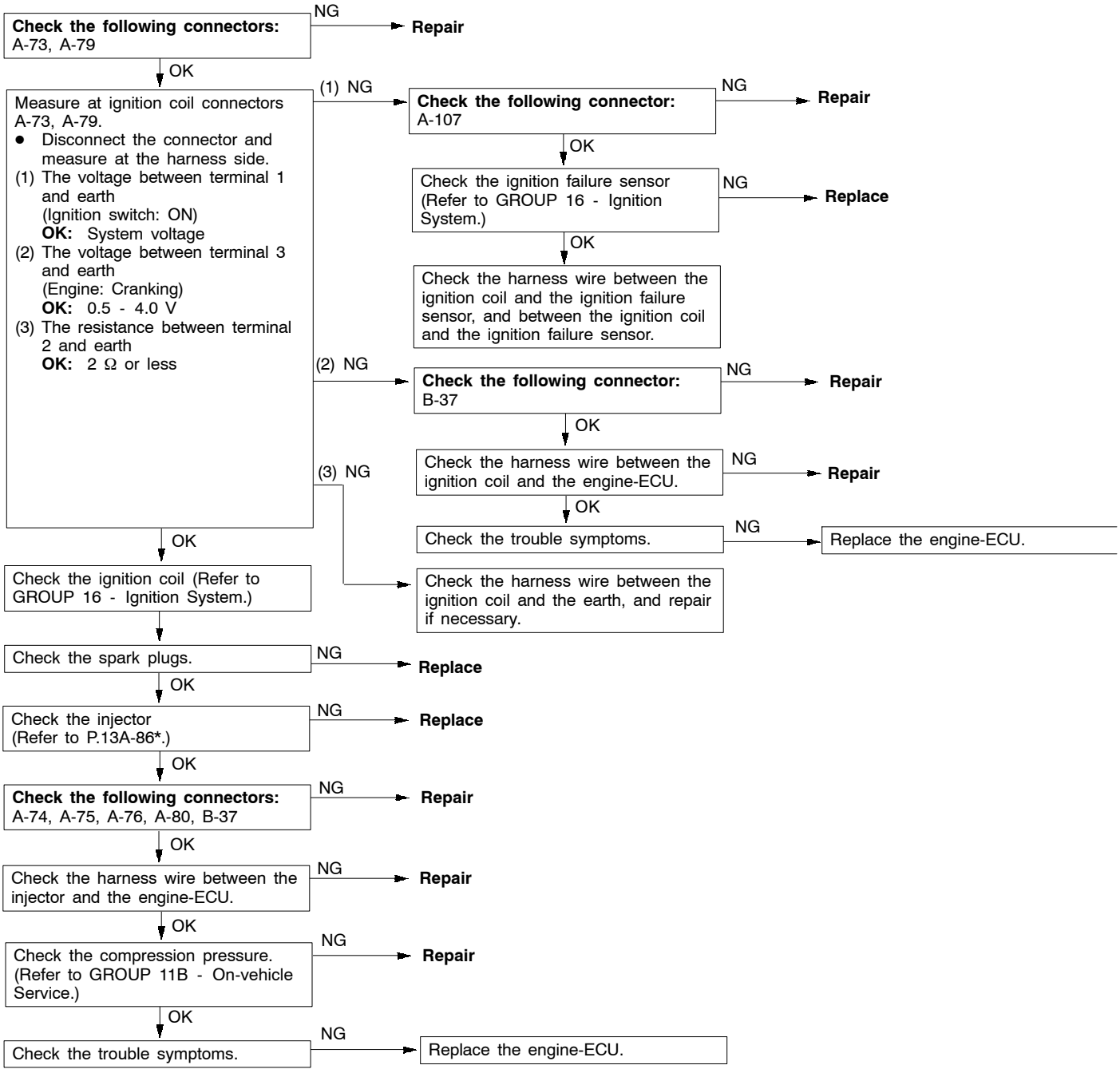
NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. P0300 Random cylinder misfire detected	Probable cause
Range of Check ● Engine speed is approx. 50 - 4,500 r/min. ● When the engine is running except deceleration and sudden acceleration. Set Conditions ● The number of misfires exceeds a predetermined number per 200 engine revolutions. ● The number of misfires exceeds a predetermined number per 1,000 engine revolutions.	● Malfunction of the ignition system ● Abnormal compression ● Malfunction of injector ● Abnormal signal from the crank angle sensor ● Malfunction of the lambda control system ● Malfunction of the engine coolant temperature sensor ● Missing timing belt teeth ● Malfunction of the EGR valve ● Malfunction of engine-ECU



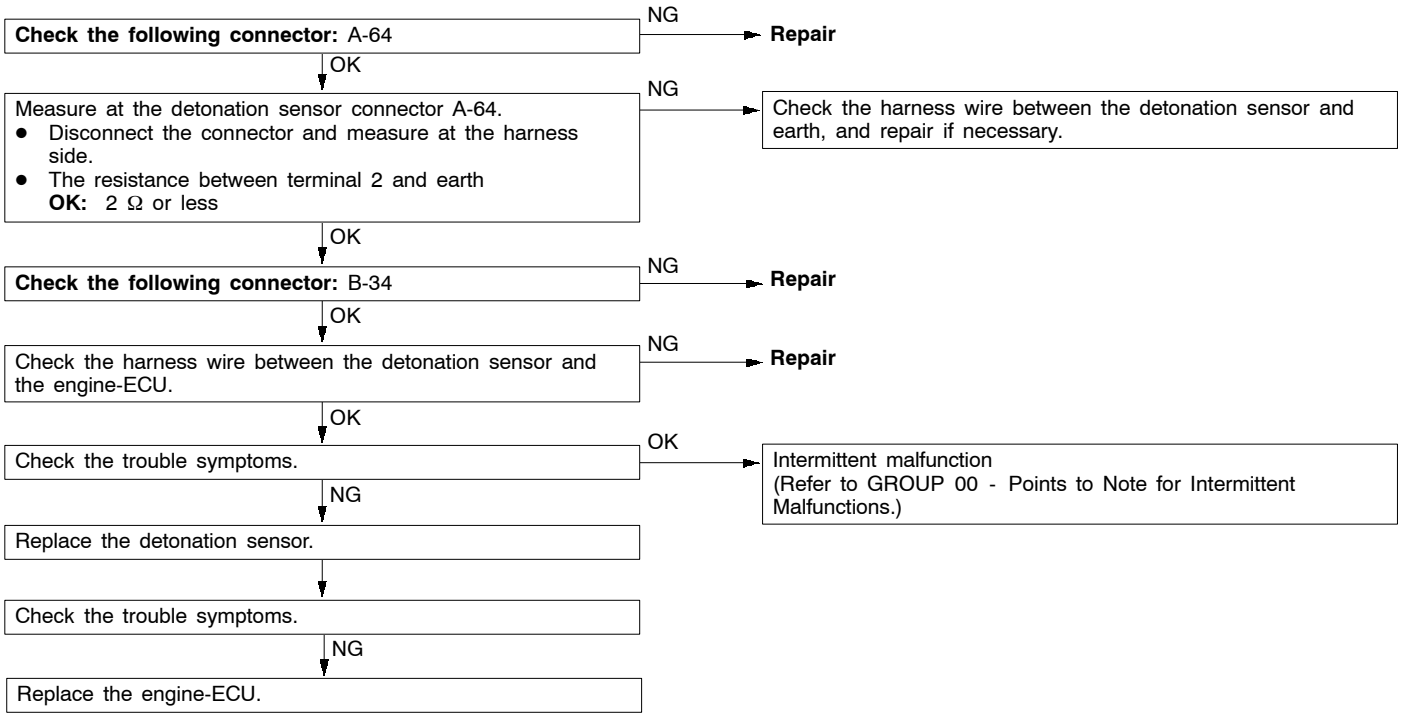
NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected	Probable cause
Range of Check ● The engine speed is 500 - 4,500 r/min. ● While the engine is running except deceleration and sudden acceleration. Set Conditions ● The number of misfires exceeds a predetermined number per 200 engine revolutions (Misfire has occurred in only one cylinder). or ● The number of misfires exceeds a predetermined number per 1,000 engine revolutions (Misfire has occurred in only one cylinder).	● Malfunction of the ignition system ● Abnormal compression ● Malfunction of injector ● Malfunction of engine-ECU

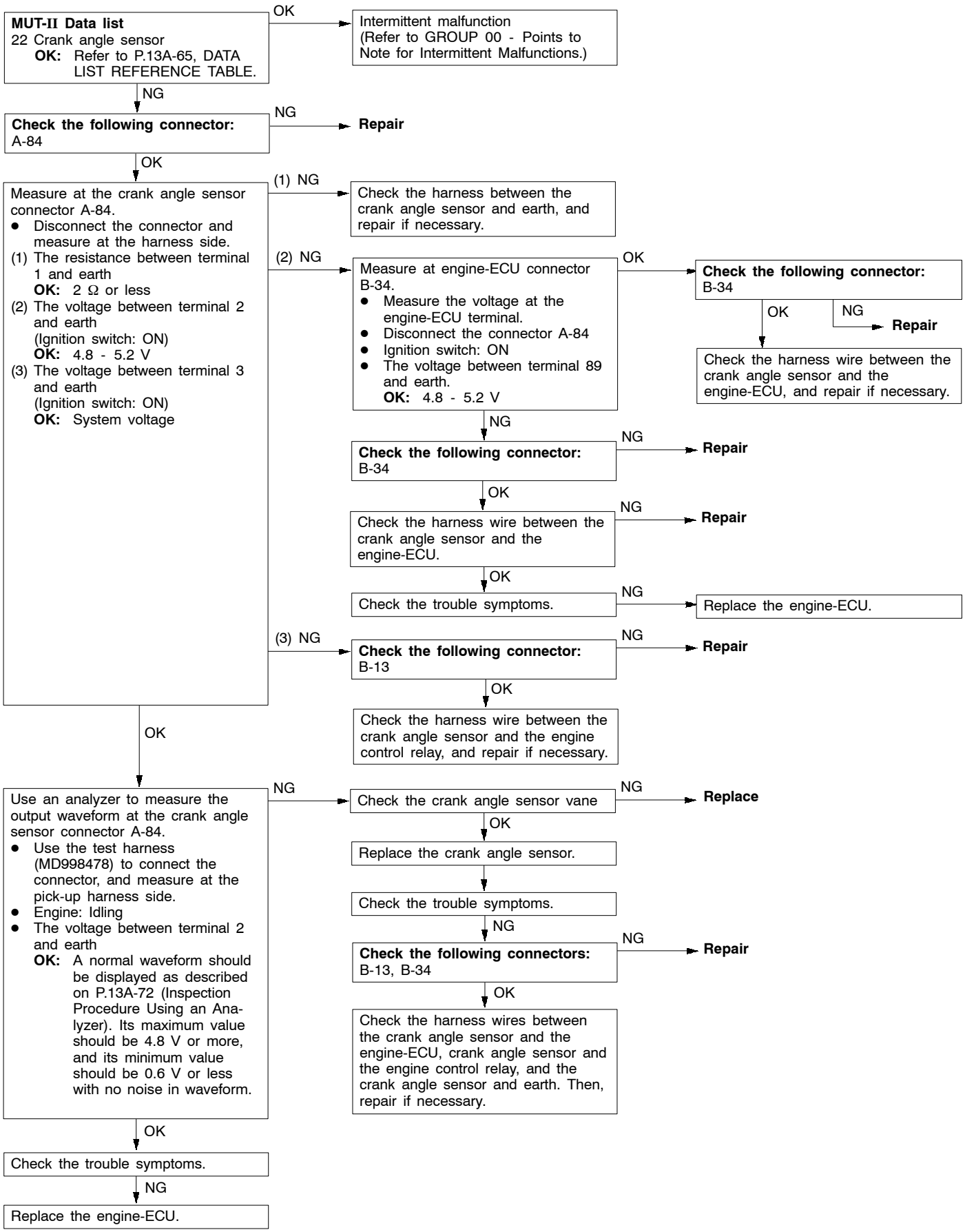


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

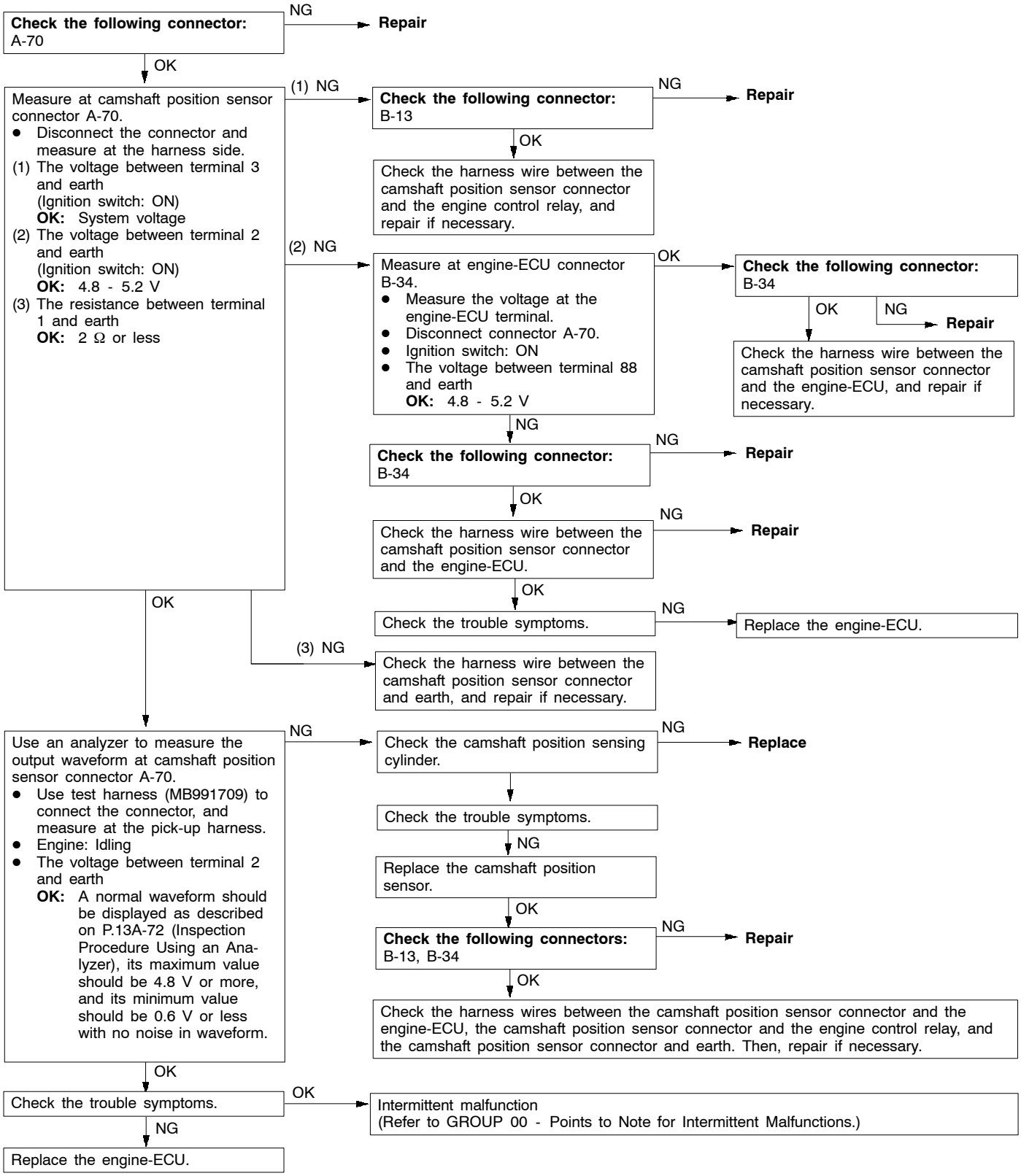
Code No. P0325 Detonation sensor system	Probable cause
Range of Check ● Engine: Two seconds after the engine has been started Set Conditions ● Changes in sensor output voltage (detonation sensor peak voltage per 1/2 crankshaft rotation) in 200 consecutive cycles are 0.06 V or less.	● Malfunction of the detonation sensor ● Open or short circuit in the detonation sensor circuit or loose connector contact ● Malfunction of engine-ECU



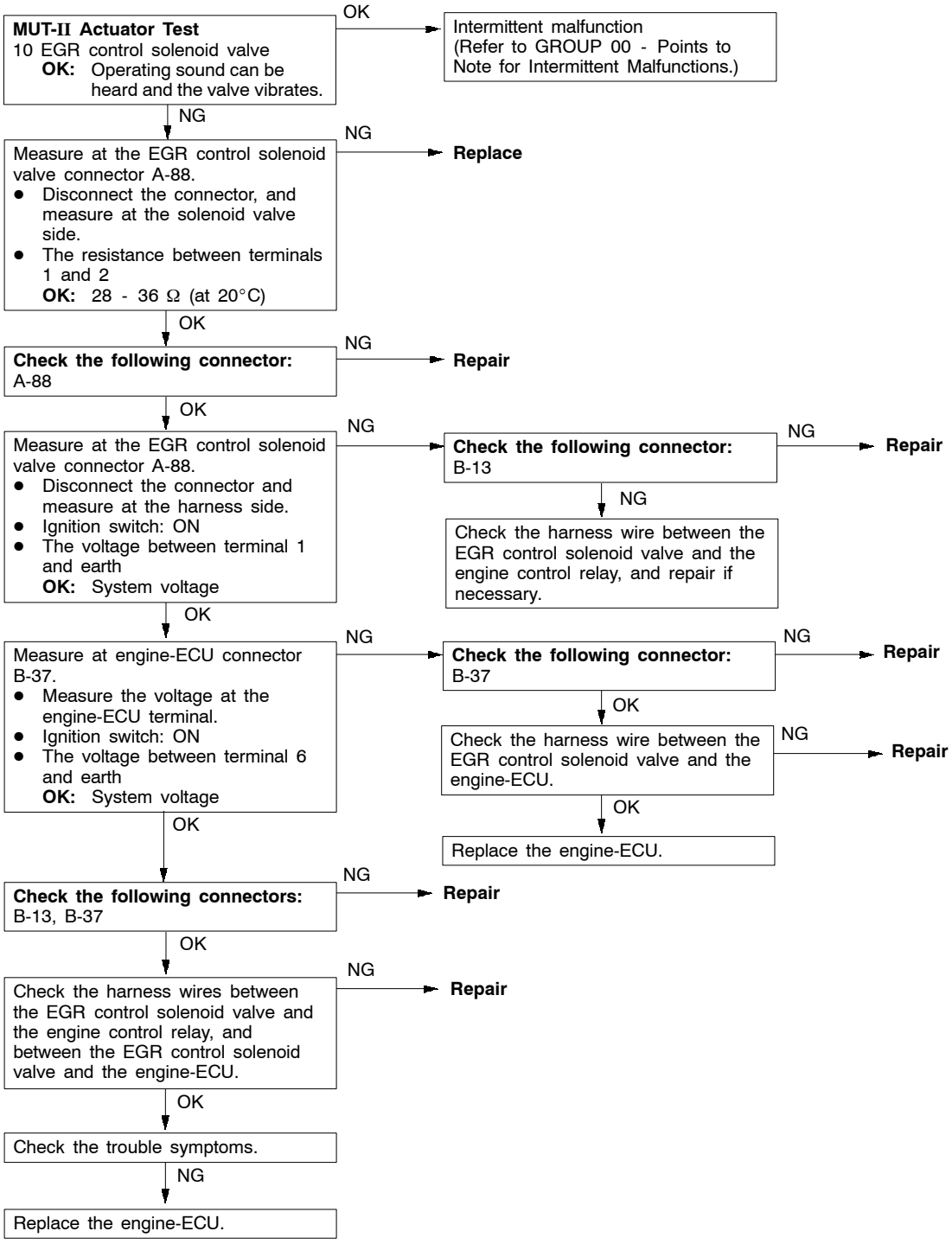
Code No. P0335 Crank angle sensor system	Probable cause
Range of Check ● Engine is cranking Set Conditions ● Sensor output voltage does not change for 2 seconds (no pulse signal input).	● Malfunction of the crank angle sensor. ● Open or short circuit in the crank angle sensor circuit or loose connector contact. ● Malfunction of engine-ECU


MUT-II Data list
22 Crank angle sensor
OK: Refer to P.13A-65, DATA LIST REFERENCE TABLE.
OK
Intermittent malfunction (Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
NG
Check the following connector: A-84
NG
Repair
OK
Measure at the crank angle sensor connector A-84.
Disconnect the connector and measure at the harness side.
(1) The resistance between terminal 1 and earth
OK: 2 Ω or less
(2) The voltage between terminal 2 and earth
(Ignition switch: ON)
OK: 4.8 - 5.2 V
(3) The voltage between terminal 3 and earth
(Ignition switch: ON)
OK: System voltage
(1) NG
Check the harness between the crank angle sensor and earth, and repair if necessary.
(2) NG
Measure at engine-ECU connector B-34.
Measure the voltage at the engine-ECU terminal.
Disconnect the connector A-84
Ignition switch: ON
The voltage between terminal 89 and earth.
OK: 4.8 - 5.2 V
OK
Check the following connector: B-34
OK
NG
Repair
Check the harness wire between the crank angle sensor and the engine-ECU, and repair if necessary.
NG
Check the following connector: B-34
NG
Repair
OK
Check the harness wire between the crank angle sensor and the engine-ECU.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU.
(3) NG
Check the following connector: B-13
NG
Repair
OK
Check the harness wire between the crank angle sensor and the engine control relay, and repair if necessary.
OK
Use an analyzer to measure the output waveform at the crank angle sensor connector A-84.
Use the test harness (MD998478) to connect the connector, and measure at the pick-up harness side.
Engine: Idling
The voltage between terminal 2 and earth
OK: A normal waveform should be displayed as described on P.13A-72 (Inspection Procedure Using an Analyzer). Its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.
NG
Check the crank angle sensor vane
NG
Replace
OK
Replace the crank angle sensor.
Check the trouble symptoms.
NG
Check the following connectors: B-13, B-34
NG
Repair
OK
Check the harness wires between the crank angle sensor and the engine-ECU, crank angle sensor and the engine control relay, and the crank angle sensor and earth. Then, repair if necessary.
OK
Check the trouble symptoms.
NG
Replace the engine-ECU.

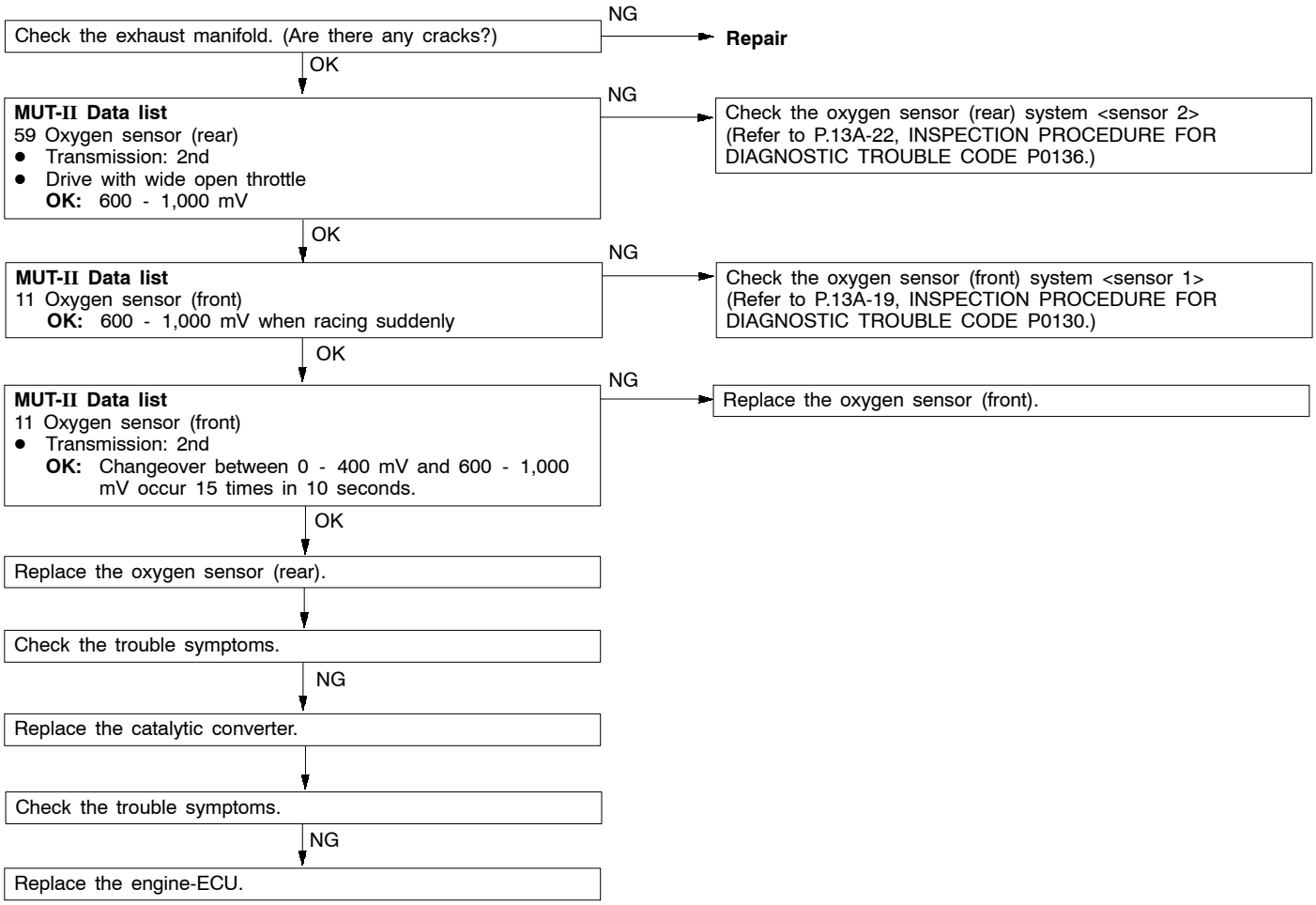
Code No. P0340 Camshaft position sensor system	Probable cause
Range of Check ● After the engine was started Set Conditions ● The sensor output voltage does not change for 2 seconds (no pulse signal input).	● Malfunction of the camshaft position sensor ● Open or short circuit in the camshaft position sensor circuit or loose connector contact. ● Malfunction of engine-ECU



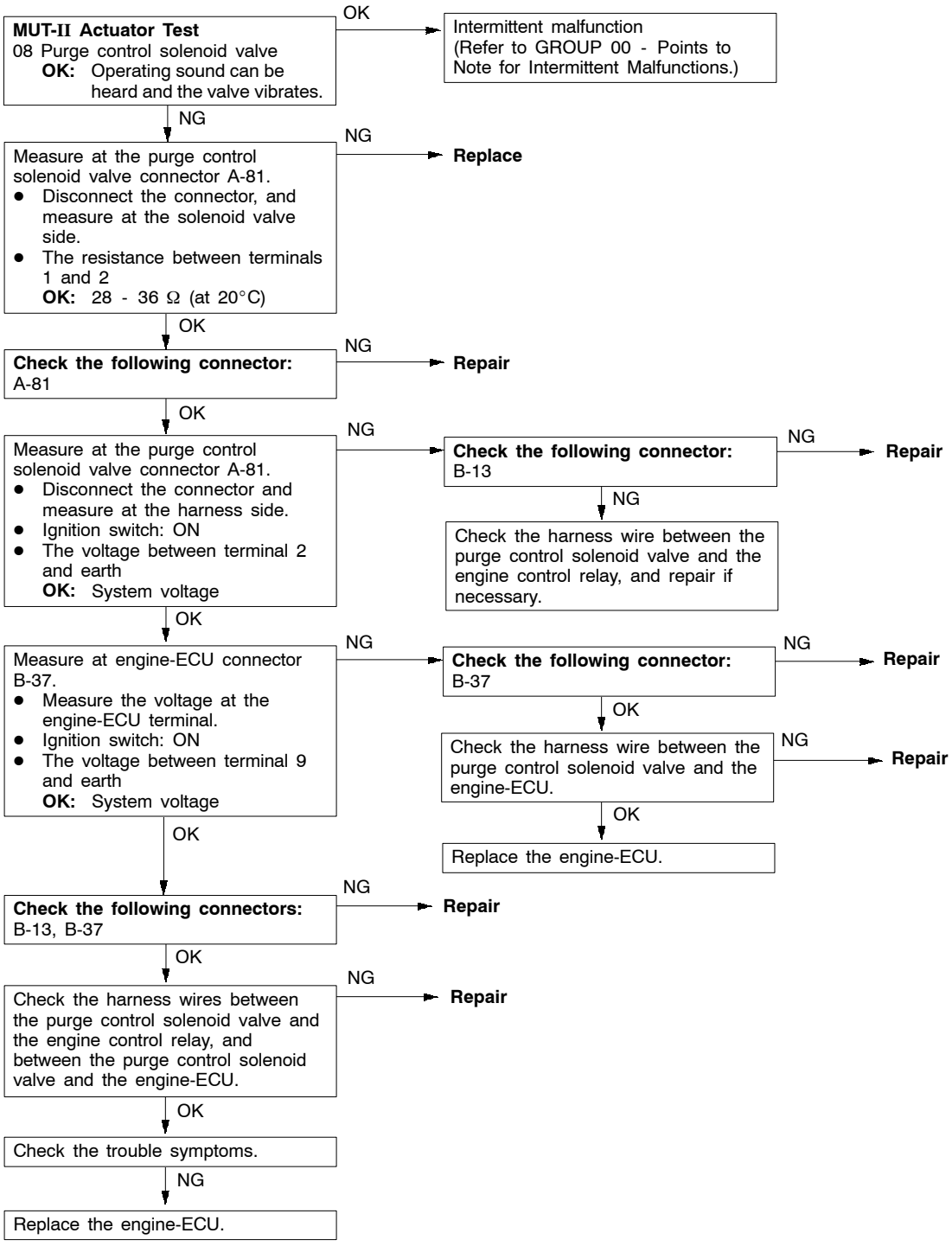
Code No. P0403 EGR control solenoid valve system	Probable cause
Range of Check ● Ignition switch: ON ● Battery voltage is 10 V or more. Set Conditions ● The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the EGR control solenoid valve is turned from on to off.	● Malfunction of the EGR control solenoid valve ● Open or short circit in the EGR control solenoid valve circuit or loose connector contact ● Malfunction of engine-ECU



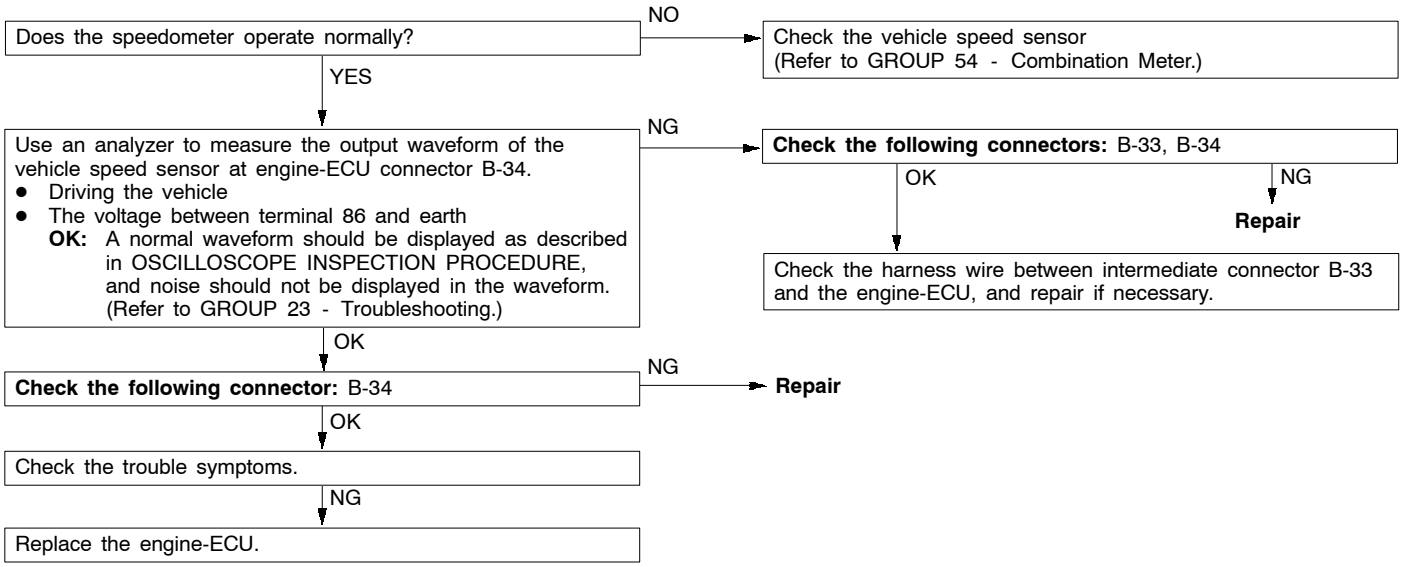
Code No. P0421 Catalyst malfunction	Probable cause
Range of Check ● The engine speed is 4,000 r/min or less. ● During driving ● During air/fuel ratio feedback control Set Conditions ● The ratio between the oxygen sensor (rear) and the oxygen sensor (front) output frequencies reaches 0.8 per 10 seconds on average.	● Malfunction of catalyst ● Malfunction of the oxygen sensor (front) ● Malfunction of the oxygen sensor (rear) ● Malfunction of engine-ECU



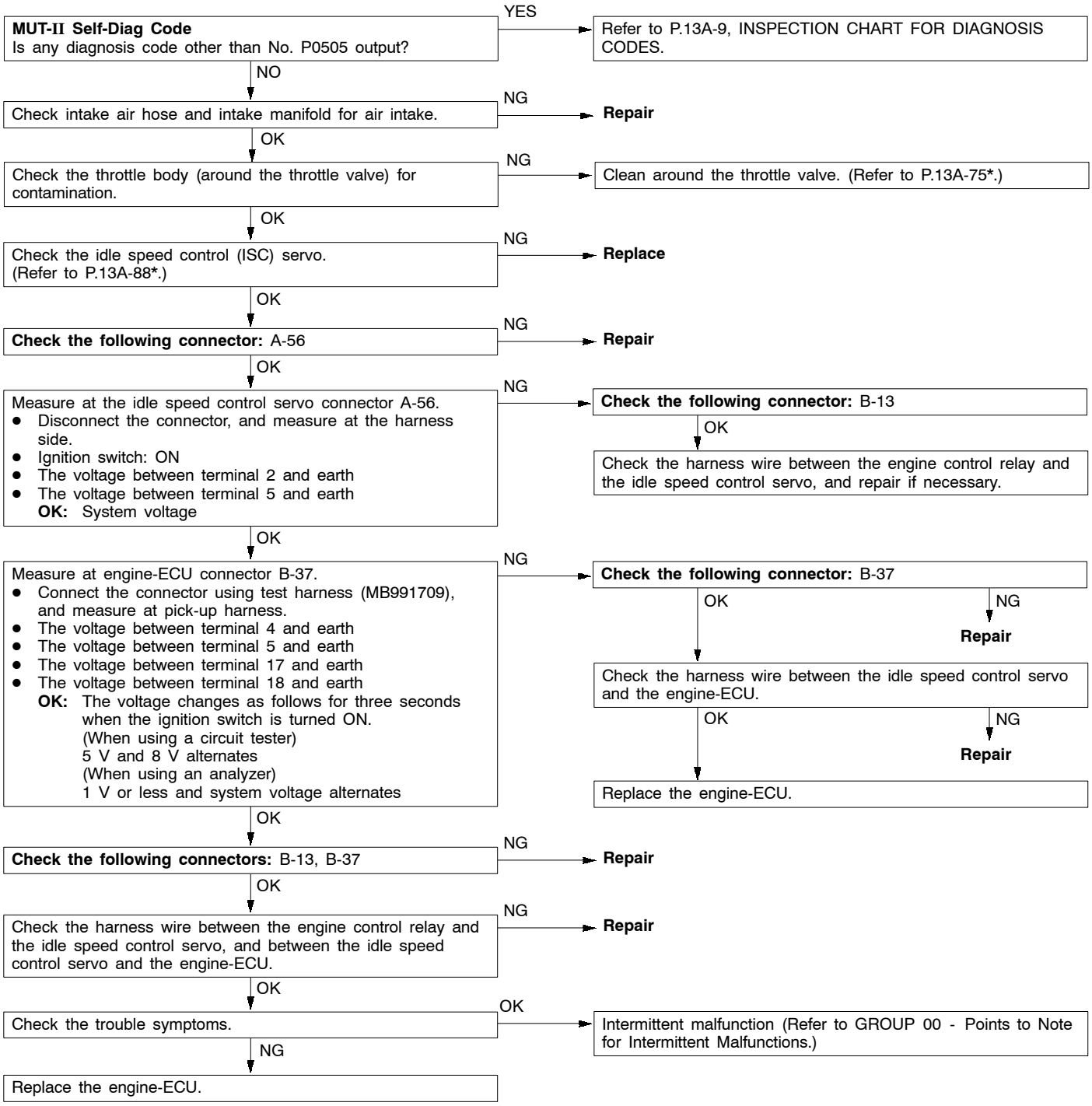
Code No. P0443 Purge control solenoid valve system	Probable cause
Range of Check ● Ignition switch: ON ● Battery voltage is 10 V or more. Set Conditions ● The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off.	● Malfunction of the purge control solenoid valve ● Open or short circuit in the purge control solenoid valve circuit or loose connector contact ● Malfunction of engine-ECU



Code No. P0500 Vehicle speed sensor system	Probable cause
Range of Check ● Engine: Two seconds after the engine was started ● Idle switch: OFF ● Engine speed: 2,500 r/min or more ● During high engine load Set Conditions ● The sensor output voltage does not change for 2 seconds (no pulse signal input).	● Malfunction of the vehicle speed sensor ● Open or short circuit in the vehicle speed sensor circuit or loose connector contact ● Malfunction of engine-ECU



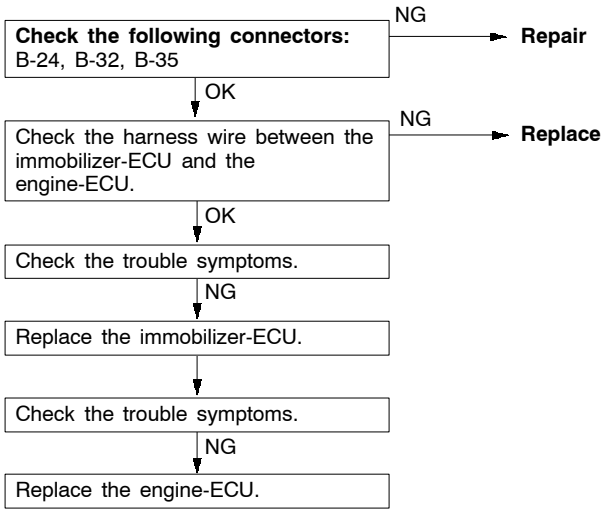
Code No. P0505 Idle speed control (ISC) system	Probable cause
Check Area ● Vehicle speed has reached 1.5 km/h at least once. ● Under the closed loop idle speed control. Judgment Criteria ● Actual idle speed has continued to be higher than the target idle speed by 300 r/min or more for 10 sec. Check Area ● Vehicle speed has reached 1.5 km/h at least once. ● During idle speed closed loop control. ● The highest temperature at the last drive is 45°C or less. ● Engine coolant temperature is approx. 80°C or more. ● Battery voltage is 10 V or more. ● Intake air temperature is -10°C (14°F) or more. Judgment Criteria ● Actual idle speed has been minimum 200 r/min higher than the target idle speed for ten seconds. Check Area ● During idle speed closed loop control. ● Engine coolant temperature is about 80°C or higher. ● Battery voltage is 10 V or higher. ● Power steering switch is off. ● Intake air pipe pressure is 53 kPa or less. ● Intake air temperature is -10°C or more. Judgment Criteria ● Actual idle speed has been minimum 100 r/min higher than the target idle speed for ten seconds.	● Malfunction of idle speed control (ISC) servo ● Improper connector contact, open circuit or short-circuited harness wire ● Malfunction of the engine-ECU



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. P1610 Immobilizer system	Probable cause
Range of Check ● Ignition switch: ON Set Conditions ● Improper communication between the engine-ECU and the immobilizer-ECU	● Open or short circuit, or loose connector contact ● Malfunction of the immobilizer-ECU ● Malfunction of the engine-ECU

NOTE
(1) If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
(2) This code may be displayed when registering the key ID code.



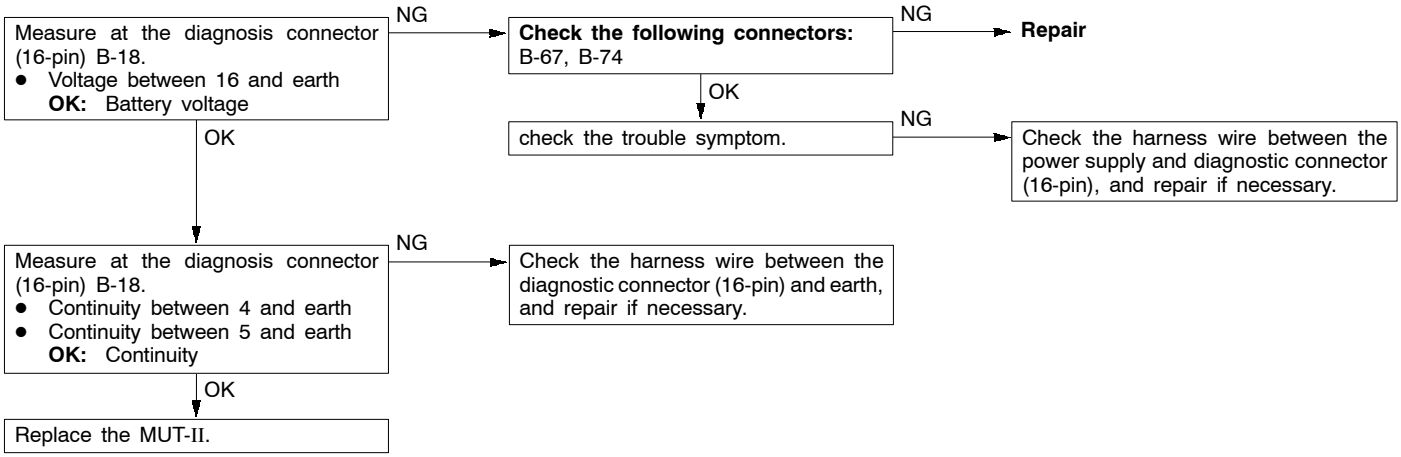
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13A-40
	Communication with engine-ECU only is not possible.	2	13A-40
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-41
	The engine warning lamp remains illuminating and never goes out.	4	13A-41
Starting	No initial combustion (starting impossible)	5	13A-42
	Initial combustion but no complete combustion (starting impossible)	6	13A-43
	Long time to start (improper starting)	7	13A-44
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13A-45
	Idling speed is high. (Improper idling speed)	9	13A-47
	Idling speed is low. (Improper idling speed)	10	13A-47
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-48
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-49
	The engine stalls when starting the car. (Pass out)	13	13A-51
	The engine stalls when decelerating.	14	13A-51
Driving	Hesitation, sag or stumble	15	13A-52
	The feeling of impact or vibration when accelerating	16	13A-53
	The feeling of impact or vibration when decelerating	17	13A-53
	Poor acceleration	18	13A-54
	Surge	19	13A-55
	Knocking	20	13A-56
Dieseling		21	13A-56
Too high CO and HC concentration when idling		22	13A-57
Fans (radiator fan, A/C condenser fan) are inoperative		23	13A-58

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

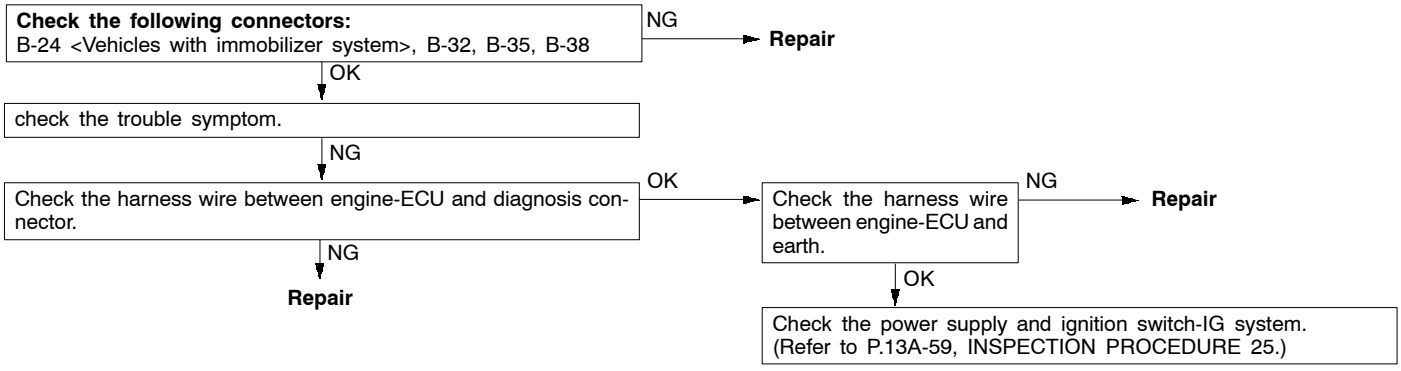
INSPECTION PROCEDURE 1

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



INSPECTION PROCEDURE 2

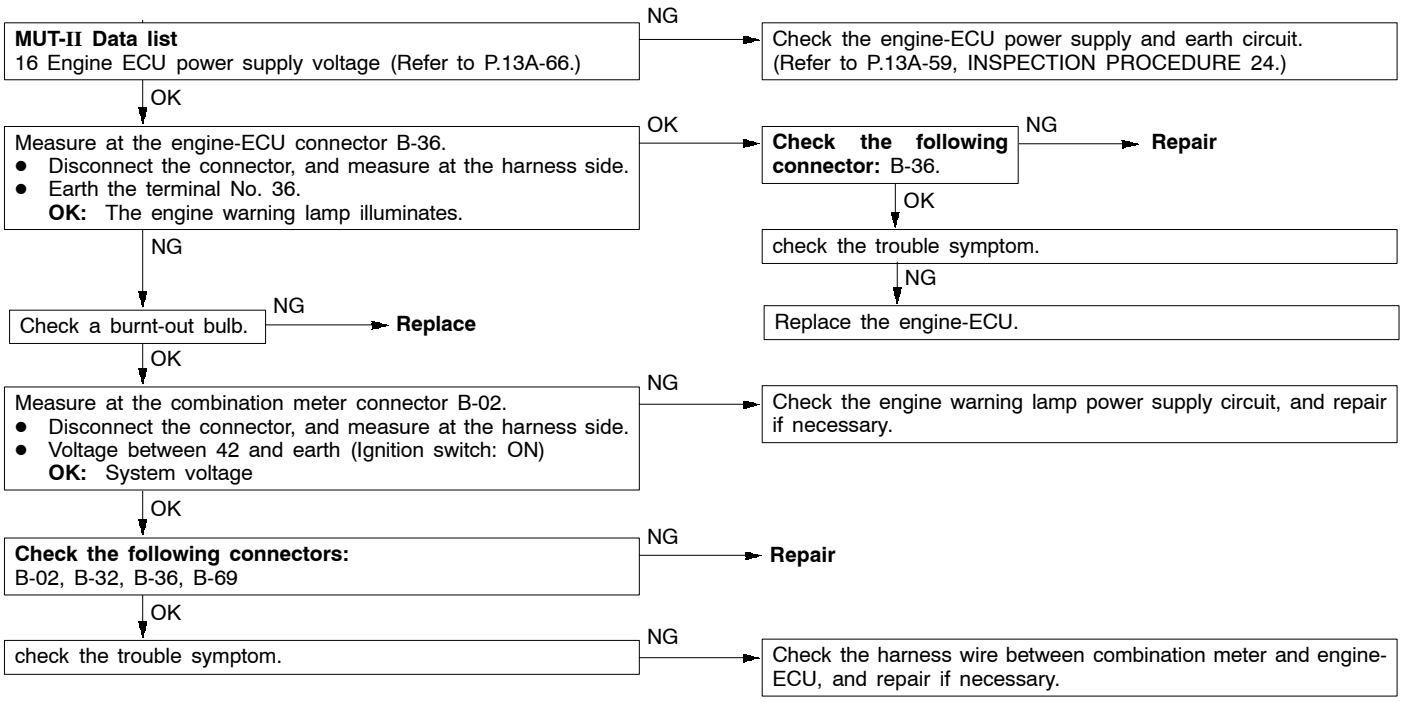
MUT-II communication with engine-ECU is impossible.	Probable cause
One of the following causes may be suspected: • No power supply to engine-ECU. • Defective earth circuit of engine-ECU. • Defective engine-ECU. • Improper communication line between engine-ECU and MUT-II	• Malfunction of engine-ECU power supply circuit • Malfunction of engine-ECU • Open circuit between engine-ECU and diagnosis connector



NOTE
Though the above inspection has been performed, if trouble symptom does not disappear, check the multi center display, and replace it if necessary.

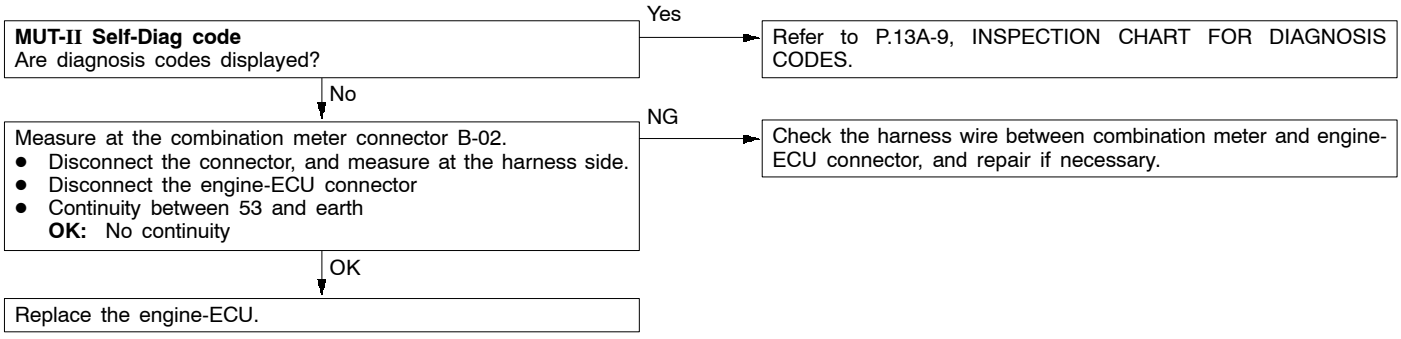
INSPECTION PROCEDURE 3

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



INSPECTION PROCEDURE 4

The engine warning lamp remains illuminating and never goes out.	Probable cause
In cases such as the above, the cause is probably that the engine-ECU is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at right has occurred.	• Short-circuit between the engine warning lamp and engine-ECU • Malfunction of the engine-ECU



INSPECTION PROCEDURE 5

No initial combustion (starting impossible)	Probable cause
In cases such as the above, the cause is probably that a spark plug is defective, or that the supply of fuel to the combustion chamber is defective. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.	• Malfunction of the ignition system • Malfunction of the fuel pump system • Malfunction of the injectors • Malfunction of the engine-ECU • Malfunction of the immobilizer system • Foreign materials in fuel

Check battery voltage when cranking.
OK: 8 V or higher
NG → Check the battery. (Refer to GROUP 54 - Battery.)
OK ↓

Is an immobilizer-ECU diagnosis code displayed?
Yes → Check the immobilizer. (Refer to GROUP 54 - Ignition Key and Immobilizer.)
No ↓

MUT-II Data list
16 Voltage of engine-ECU power source (Refer to P.13A-66.)
NG → Check the power supply and ignition switch-IG system. (Refer to P.13A-59, INSPECTION PROCEDURE 25.)
OK ↓

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

MUT-II Data list
22 Crank angle sensor
OK: Cranking speed is displayed.
No → Check the crank angle sensor system. (Refer to P.13A-29, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0335.)
OK ↓

MUT-II Actuator test
07 Fuel pump (Refer to P.13A-70.)
NG → Check the fuel pump system. (Refer to P.13A-60, INSPECTION PROCEDURE 26.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-66.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

Can any sound be heard from the injectors when cranking?
NG → Check the injector system. (Refer to P.13A-26, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
OK ↓

Does the engine tachometer display the cranking speed?
- Set the tachometer of primary voltage detection type.

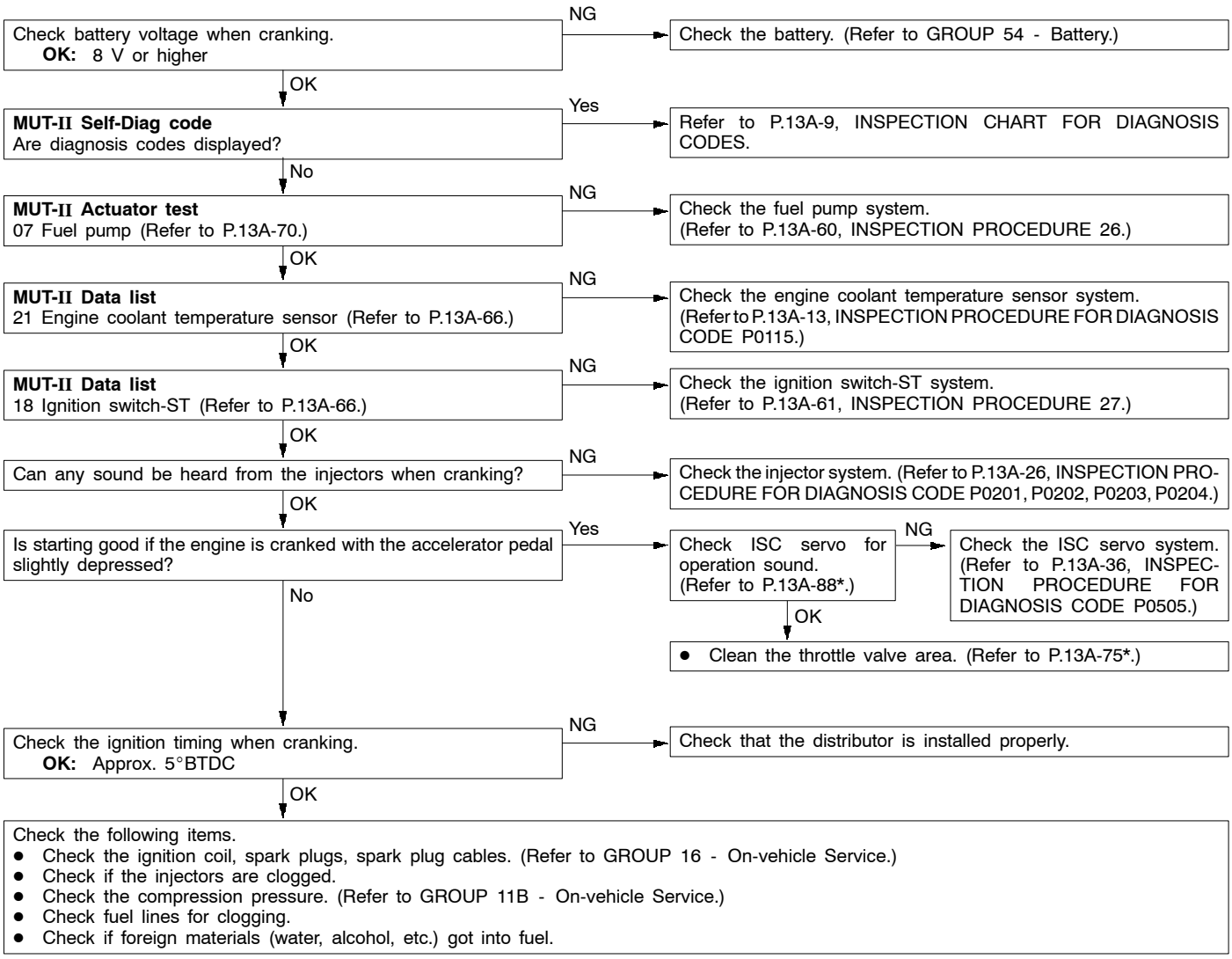
NG → Check the ignition circuit system. (Refer to P.13A-63, INSPECTION PROCEDURE 30.)
OK ↓

Check the ignition timing when cranking.
OK: Approx. 5° BTDC
NG → Check that the distributor is installed properly.
OK ↓

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 if foreign materials (water, alcohol, etc.) got into fuel.
- Check the compression pressure.
- Check the immobilizer system. (Refer to GROUP 54 - Ignition Key and Immobilizer.)

INSPECTION PROCEDURE 6

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



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 7

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

Check battery voltage when cranking
OK: 8 V or higher
NG → Check the battery. (Refer to GROUP 54 - Battery.)
OK ↓

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

MUT-II Actuator test
07 Fuel pump (Refer to P.13A-70.)
NG → Check the fuel pump system. (Refer to P.13A-60, INSPECTION PROCEDURE 26.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-66.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

MUT-II Data list
18 Ignition switch-ST (Refer to P.13A-66.)
NG → Check the ignition switch-ST system. (Refer to P.13A-61, INSPECTION PROCEDURE 27.)
OK ↓

Can any sound be heard from the injectors when cranking?
NG → Check the injector system. (Refer to P.13A-26, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
OK ↓

Check the ignition timing when cranking.
OK: Approx. 5°BTDC
NG → Check that the distributor is installed properly.
OK ↓

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 11B - On-vehicle Service.)
- Check if foreign materials (water, alcohol, etc.) got into fuel.

INSPECTION PROCEDURE 8

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

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
- Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

Does idling speed fluctuate excessively?
- Yes → Check the throttle body. (Refer to P.13A-75*.) ↓
  check the trouble symptom. ↓ NG
  Inspect the intake of air into the air intake system.
  - Broken intake manifold gasket
  - Broken air intake hose
  - Broken vacuum hose
  - Positive crankcase ventilation valve does not operate.
- No ↓

Check the ISC servo for operation sound. (Refer to P.13A-88*.)
- NG → Check the ISC system. (Refer to P.13A-36, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0505.)
- OK ↓

Check the injector for operation sound.
- NG → Check the injector system. (Refer to P.13A-26, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
- OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-65.)
- NG → Check the throttle position sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
- OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-65.)
- NG → Check the intake air temperature sensor system. (Refer to P.13A-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-66.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
- OK ↓

MUT-II Actuator test
08 Purge control solenoid valve (Refer to P.13A-70.)
- NG → Check the purge control solenoid valve system. (Refer to P.13A-34, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0443.)
- OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-70.)
- NG → Check the EGR control solenoid valve system. (Refer to P.13A-32, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
- OK ↓

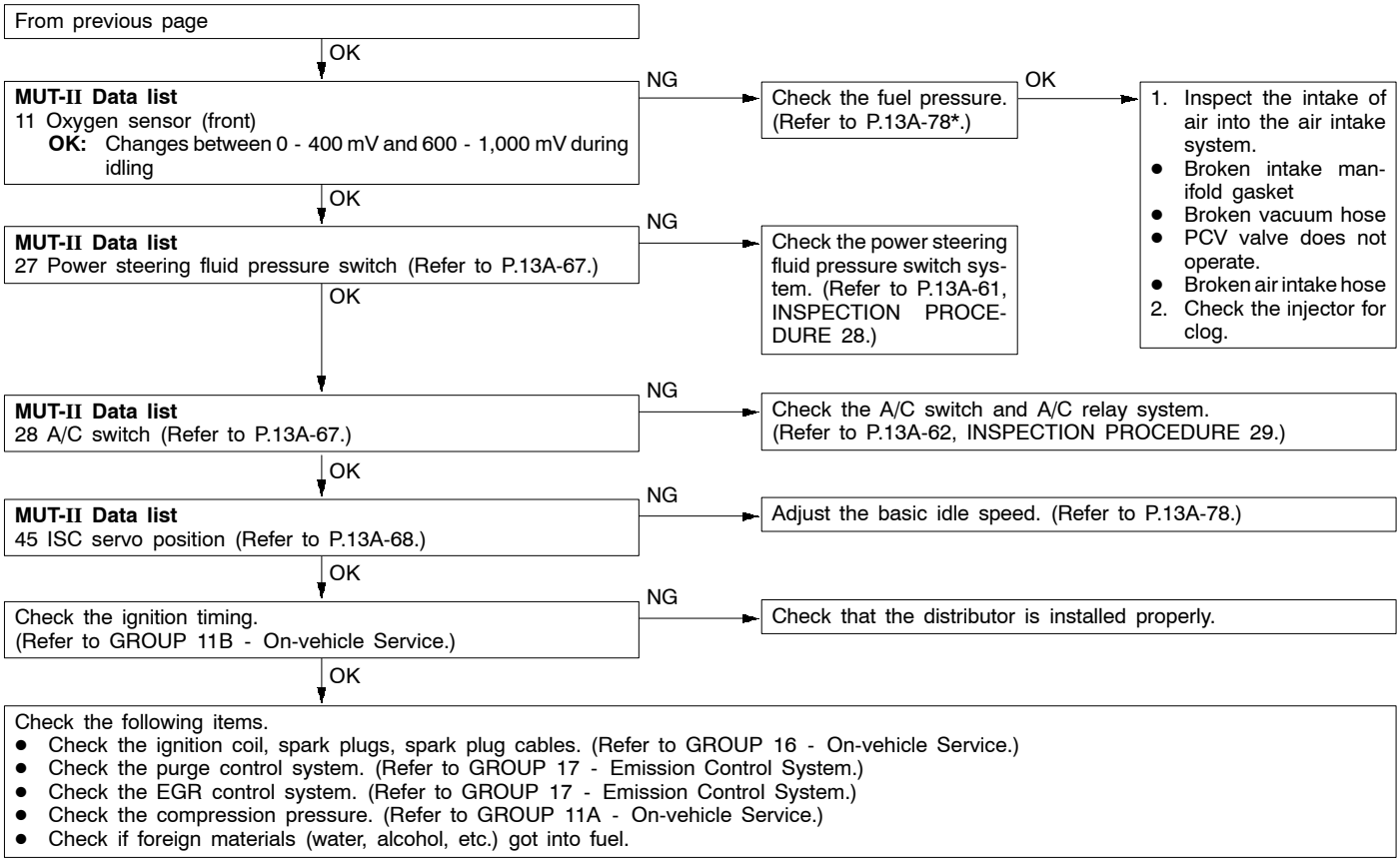
MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear
- Driving with throttle widely open
  OK: 600 - 1,000 mV

NG → Check the oxygen sensor (rear) system. (Refer to P.13A-22, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)

OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: 600 - 1,000 mV during sudden racing
- NG → Check the oxygen sensor (front) system. (Refer to P.13A-19, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
- OK → To next page

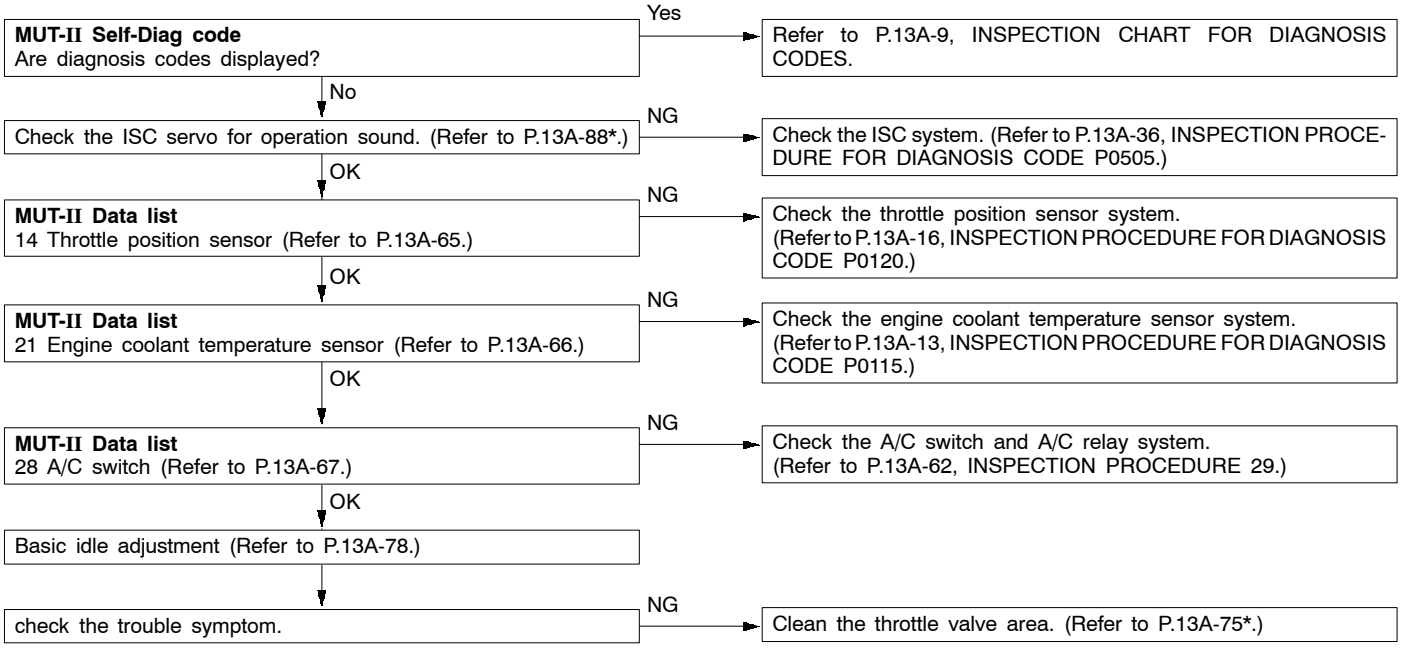
NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 9

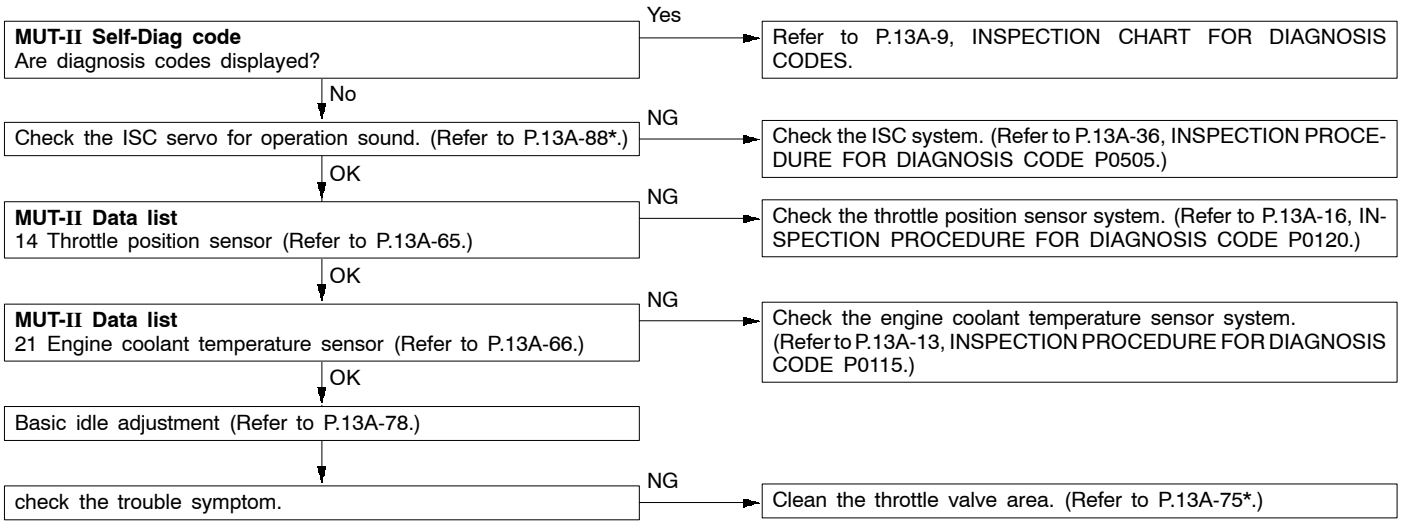
Idling speed is high. (Improper idling speed)	Probable cause
In such cases as the above, the cause is probably that the intake air volume during idling is too great.	• Malfunction of the ISC system • Malfunction of the throttle body



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 10

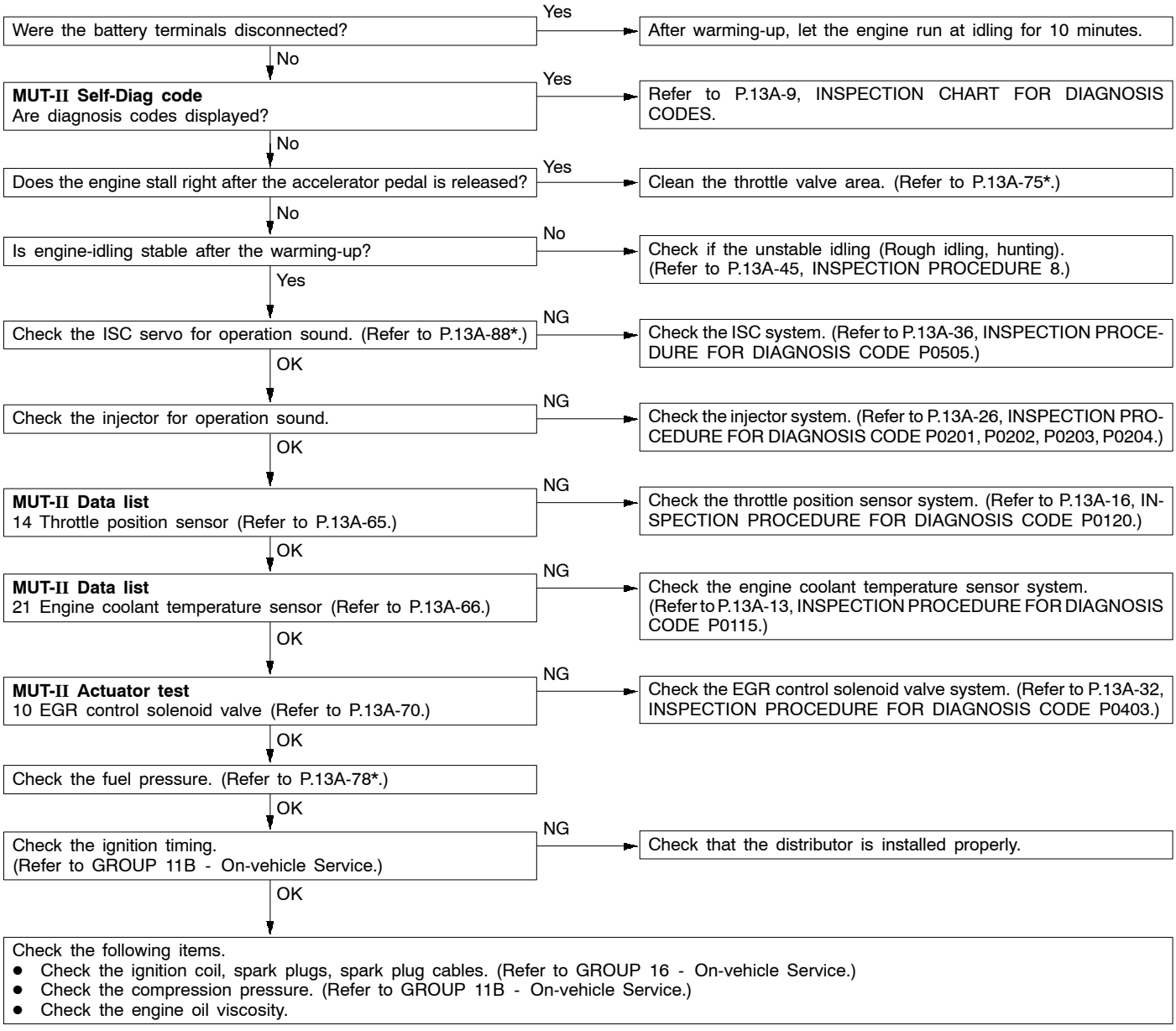
Idling speed is low. (Improper idling speed)	Probable cause
In cases such as the above, the cause is probably that the intake air volume during idling is too small.	• Malfunction of the ISC system • Malfunction of the throttle body



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

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 system • Malfunction of the throttle body • Malfunction of the injector system • Malfunction of the ignition system



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

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

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
- Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

Check the ISC servo for operation sound. (Refer to P.13A-88*.)
- NG → Check the ISC system. (Refer to P.13A-36, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0505.)
- OK ↓

Check the injector for operation sound.
- NG → Check the injector system. (Refer to P.13A-26, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
- OK ↓

Does the engine stall right after the accelerator pedal is released?
- Yes → Clean the throttle valve area. (Refer to P.13A-75*.)
- No ↓

Does the engine stall easily again?
- No → 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
  - Injector drive signal
  - Primary and secondary ignition signal
  - Fuel pump drive signal
  - Engine ECU power supply voltage
- Yes ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-65.)
- NG → Check the throttle position sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
- OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-65.)
- NG → Check the intake air temperature sensor system. (Refer to P.13A-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-66.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
- OK ↓

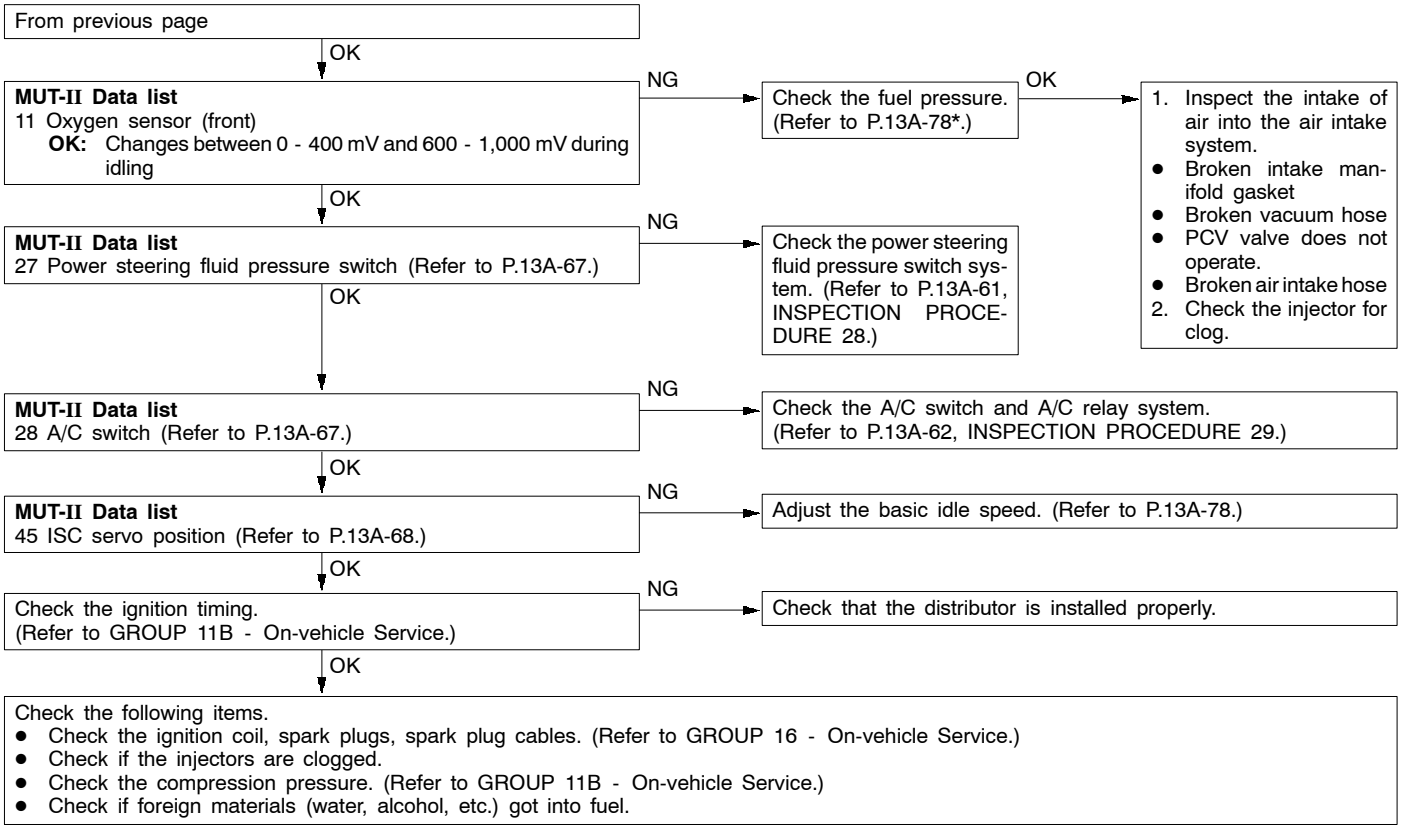
MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-70.)
- NG → Check the EGR control solenoid valve system. (Refer to P.13A-32, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
- OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear
- Driving with throttle widely open

OK: 600 - 1,000 mV
- NG → Check the oxygen sensor (rear) system. (Refer to P.13A-22, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
- OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: 600 - 1,000 mV during sudden racing
- NG → Check the oxygen sensor (front) system. (Refer to P.13A-19, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
- OK ↓

To next page



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 13

The engine stalls when starting the car. (Pass out)	Probable cause
In cases such as the above, the cause is probably misfiring due to a weak spark, or an inappropriate air/fuel mixture when the accelerator pedal is depressed.	• Drawing air into intake system • Malfunction of the ignition system

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-70.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-32, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 - On-vehicle Service.)
- Check if air was drawn into the intake system.
  - Broken intake manifold gasket
  - Broken or disconnected vacuum hose
  - Improper operation of the PCV valve
  - Broken air intake hose

INSPECTION PROCEDURE 14

The engine stalls when decelerating.	Probable cause
In cases such as the above, the cause is probably that the intake air volume is insufficient due to a defective idle speed control (ISC) servo system.	• Malfunction of the ISC system

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-65.)
NG → Check the throttle position sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
OK ↓

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

Yes → Check the vehicle speed sensor system. (Refer to P.13A-35, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0500.)
No ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-70.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-32, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 - On-vehicle Service.)
- Clean the throttle valve area.

INSPECTION PROCEDURE 15

Hesitation, sag or stumble	Probable cause
In cases such as the above, the cause is probably that ignition system, air/fuel mixture or compression pressure is defective.	• Malfunction of the ignition system • Malfunction of air-fuel ratio control system • Malfunction of the fuel supply system • Malfunction of the EGR control solenoid valve system • Poor compression

MUT-II Self-Diag code
Are diagnosis codes displayed?
- Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

Check the injectors for operation sound.
- NG → Check the injector system. (Refer to P.13A-26, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
- OK ↓

Check the ignition timing.
(Refer to GROUP 11B - On-vehicle Service.)
- NG → Check that the distributor is installed properly.
- OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-65.)
- NG → Check the intake air temperature sensor system. (Refer to P.13A-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-66.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
- OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-65.)
- NG → Check the throttle position sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
- OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-70.)
- NG → Check the EGR control solenoid valve system. (Refer to P.13A-32, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
- OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear
- Driving with throttle widely open

OK: 600 - 1,000 mV
- NG → Check the oxygen sensor (rear) system. (Refer to P.13A-22, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
- OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: 600 - 1,000 mV during sudden racing
- NG → Check the oxygen sensor (front) system. (Refer to P.13A-19, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
- OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: Changes between 0 - 400 mV and 600 - 1,000 mV during idling
- NG → Check the fuel pressure. (Refer to P.13A-78*.)
  - OK → 1. Inspect the intake of air into the air intake system.
    - Broken intake manifold gasket
    - Broken vacuum hose
    - PCV valve does not operate.
    - Broken air intake hose

    2. Check the injector for clog.
- OK ↓

Check the fuel pressure. (Refer to P.13A-78*.)
- OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 - On-vehicle Service.)
- Check the EGR control system. (Refer to GROUP 17 - Emission Control System.)
- Check the compression pressure. (Refer to GROUP 11B - On-vehicle Service.)
- Check the fuel filter or fuel line for clogging.

NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 16

The feeling of impact or vibration when accelerating	Probable cause
In cases such as the above, the cause is probably that there is an ignition leak accompanying the increase in the spark plug demand voltage during acceleration.	• Malfunction of the ignition system

MUT-II Self-Diag code
Are diagnosis codes displayed?
→ Yes: Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
↓ No:
Check the following items.
- Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 - On-vehicle Service.)
- Check for occurrence of ignition leak.

INSPECTION PROCEDURE 17

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
→ Yes: Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
↓ No:
Check the ISC servo for operation sound. (Refer to P.13A-88*.)
→ NG: Check the ISC system. (Refer to P.13A-36, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0505.)
↓ OK:
MUT-II Data list
14 Throttle position sensor (Refer to P.13A-65.)
→ NG: Check the throttle position sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
↓ OK:
Clean the throttle valve area. (Refer to P.13A-75*.)

NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 18

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the injectors for operation sound.
NG → Check the injector system. (Refer to P.13A-26, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
OK ↓

Check the ignition timing.
(Refer to GROUP 11B - On-vehicle Service.)
NG → Check that the distributor is installed properly.
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-65.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-66.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-65.)
NG → Check the throttle position sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-70.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-32, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear
- Driving with throttle widely open

OK: 600 - 1,000 mV
NG → Check the oxygen sensor (rear) system. (Refer to P.13A-22, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: 600 - 1,000 mV during sudden racing
NG → Check the oxygen sensor (front) system. (Refer to P.13A-19, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: Changes between 0 - 400 mV and 600 - 1,000 mV during idling
NG → Check the fuel pressure. (Refer to P.13A-78*.)
OK → 1. Inspect the intake of air into the air intake system.
- Broken intake manifold gasket
- Broken vacuum hose
- PCV valve does not operate.
- Broken air intake hose

2. Check the injector for clog.

OK ↓

Check the fuel pressure. (Refer to P.13A-78*.)
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 - On-vehicle Service.)
- Check the compression pressure. (Refer to GROUP 11B - On-vehicle Service.)
- Check the fuel filter or fuel line for clogging.
- Broken air intake hose
- Clogged air cleaner

NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 19

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the injectors for operation sound.
NG → Check the injector system. (Refer to P.13A-26, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
OK ↓

Check the ignition timing.
(Refer to GROUP 11B - On-vehicle Service.)
NG → Check that the distributor is installed properly.
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-65.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-66.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-65.)
NG → Check the throttle position sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-70.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-32, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear
- Driving with throttle widely open

OK: 600 - 1,000 mV
NG → Check the oxygen sensor (rear) system. (Refer to P.13A-22, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: 600 - 1,000 mV during sudden racing
NG → Check the oxygen sensor (front) system. (Refer to P.13A-19, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: Changes between 0 - 400 mV and 600 - 1,000 mV during idling
NG → Check the fuel pressure. (Refer to P.13A-78*.)
OK → 1. Inspect the intake of air into the air intake system.
- Broken intake manifold gasket
- Broken vacuum hose
- PCV valve does not operate.
- Broken air intake hose

2. Check the injector for clog.

OK ↓

Check the fuel pressure. (Refer to P.13A-78*.)
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 - On-vehicle Service.)
- Check the EGR control system. (Refer to GROUP 17 - Emission Control System.)

NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 20

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

MUT-II Self-Diag code
Are diagnosis codes displayed?

Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.

No ↓

Does knocking occur when driving with the detonation sensor connector disconnected? At this time, use the MUT-II to check if the timing is retarded compared to when the detonation sensor connector is disconnected.

No → Check the detonation sensor system. (Refer to P.13A-29, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0325.)

Yes ↓

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

INSPECTION PROCEDURE 21

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

Check the injectors for fuel leakage.

INSPECTION PROCEDURE 22

Too high CO and HC concentration when idling	Probable cause
Abnormal air-fuel ratio is suspected.	• Malfunction of the air-fuel ratio control system • Deteriorated catalyst

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-9, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the ignition timing.
(Refer to GROUP 11B - On-vehicle Service.)
NG → Check that the distributor is installed properly.
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor. (Refer to P.13A-66.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-65.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear
- Driving with throttle widely open

OK: 600 - 1,000 mV
NG → Check the oxygen sensor (rear) system. (Refer to P.13A-22, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
OK ↓

MUT-II Data list
11 Oxygen sensor (front)
OK: 600 - 1,000 mV when racing suddenly
NG → Check the oxygen sensor (front) system. (Refer to P.13A-19, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
OK ↓

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

Check the fuel pressure. (Refer to P.13A-78*.)
OK ↓

Check the following items.
- Check the injectors for operation sound.
- Check the injectors for fuel leakage.
- Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 - On-vehicle Service.)
- Check the compression pressure. (Refer to GROUP 11B - On-vehicle Service.)
- Check the positive crankcase ventilation system. (Refer to GROUP 17 - Emission Control System.)
- Check the purge control system. (Refer to GROUP 17 - Emission Control System.)
- Check the EGR control system. (Refer to GROUP 17 - Emission Control System.)

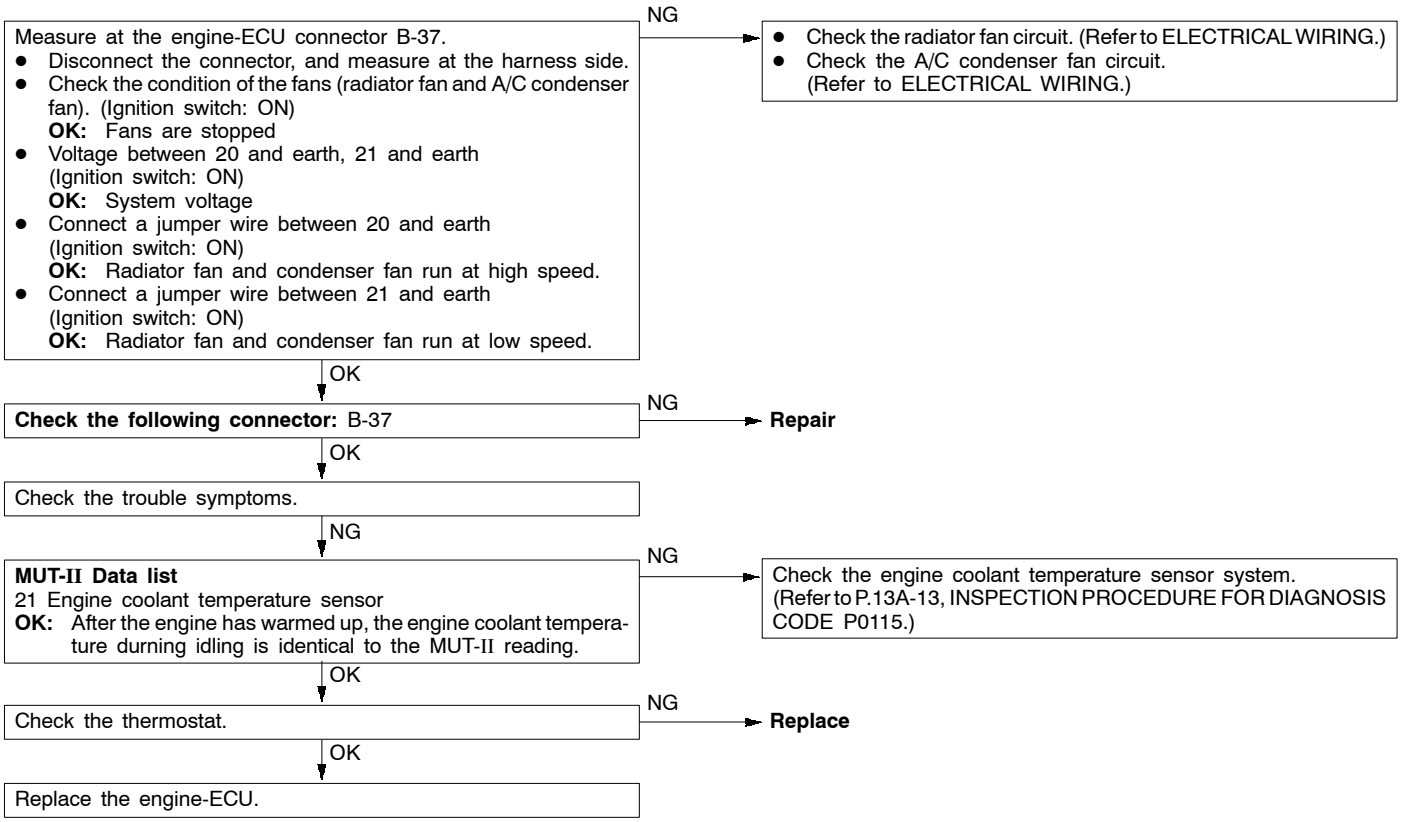
Check the trouble symptom.
NG ↓

Replace the catalytic converter.

NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

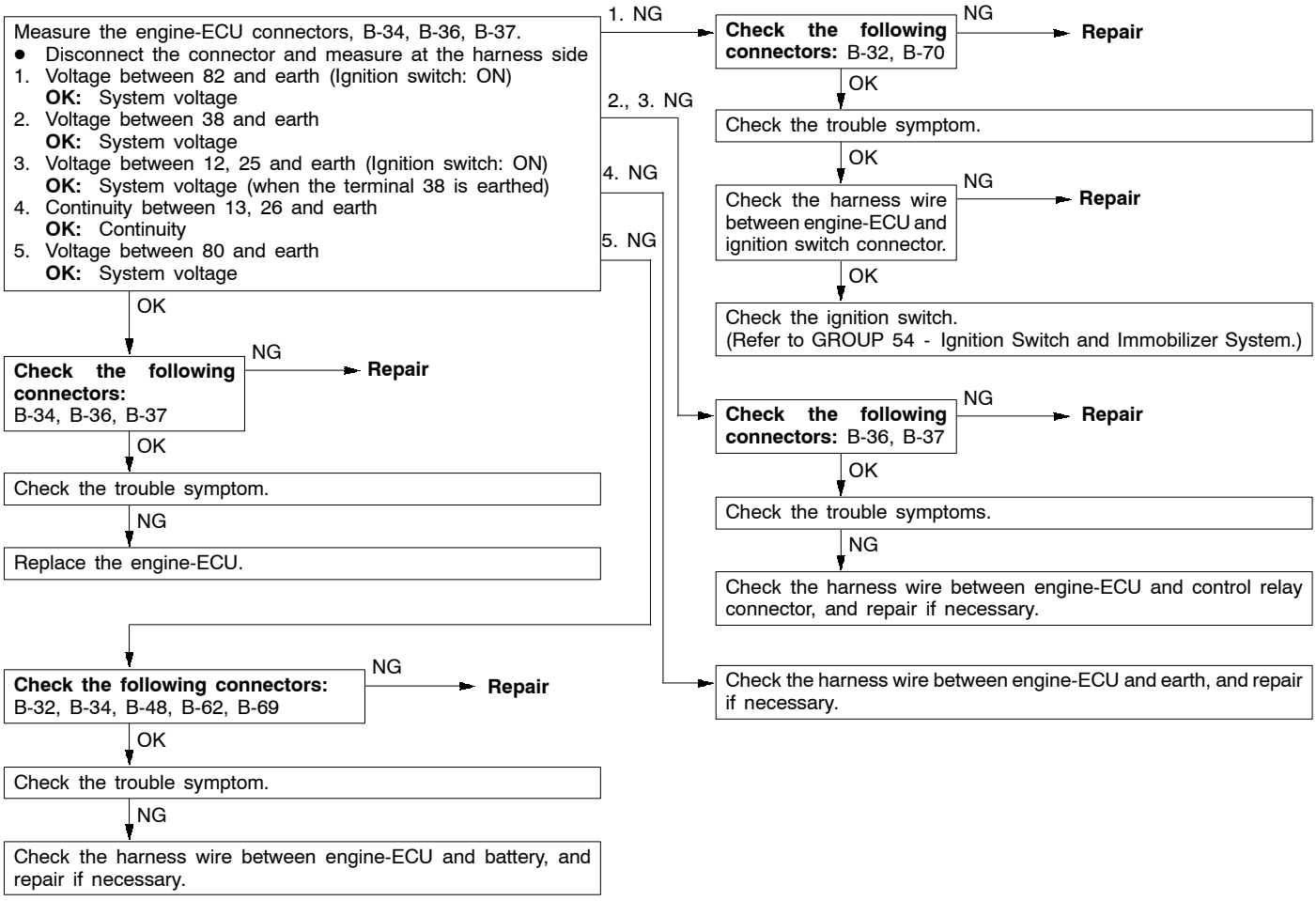
INSPECTION PROCEDURE 23

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



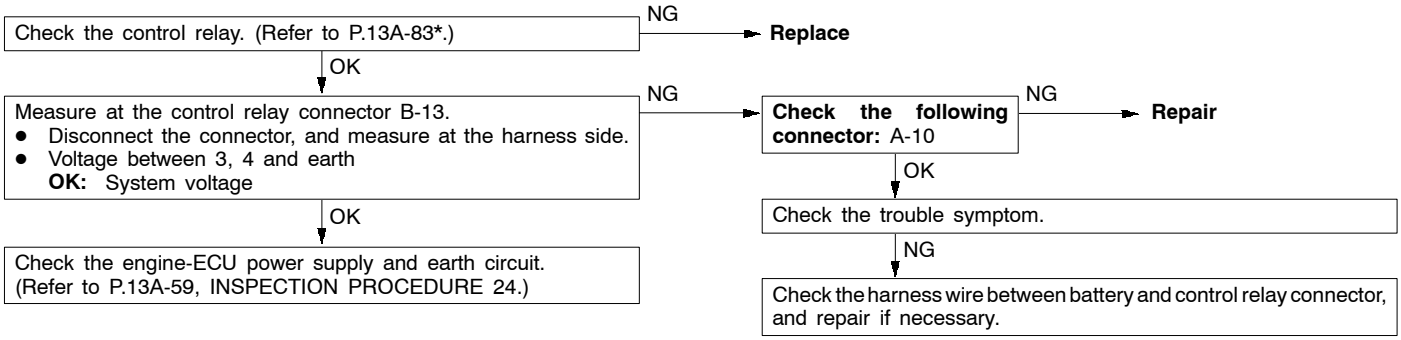
INSPECTION PROCEDURE 24

Check the engine-ECU power supply and earth circuit.



INSPECTION PROCEDURE 25

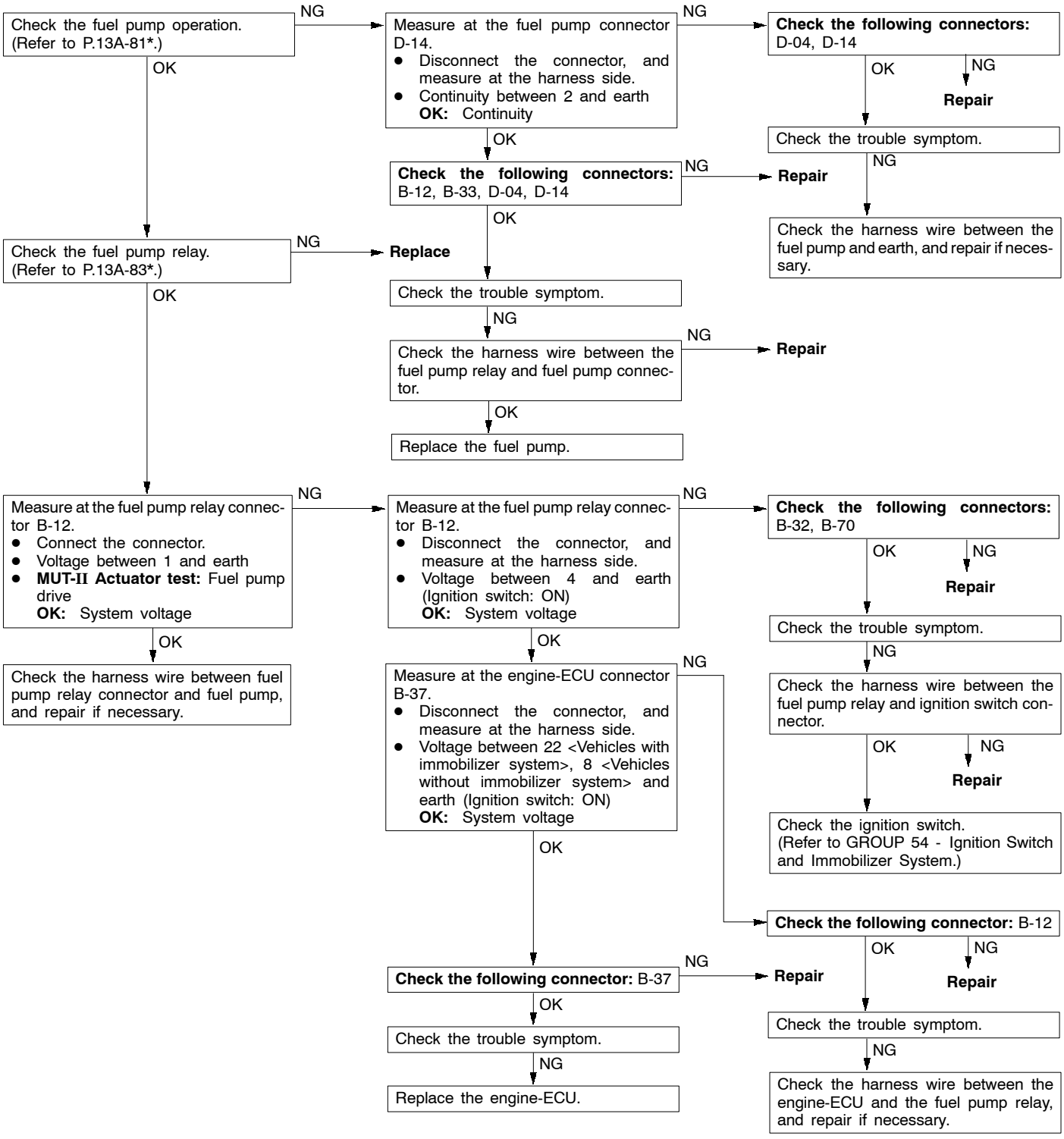
Power supply system and ignition switch-IG system	Probable cause
When an ignition switch ON signal is input to the engine-ECU, the engine-ECU turns the control relay ON. This causes battery voltage to be supplied to the engine-ECU, injectors and air flow sensor.	● Malfunction of the ignition switch ● Malfunction of the control relay ● Improper connector contact, open circuit or short-circuited harness wire ● Disconnected engine-ECU earth wire ● Malfunction of the engine-ECU



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 26

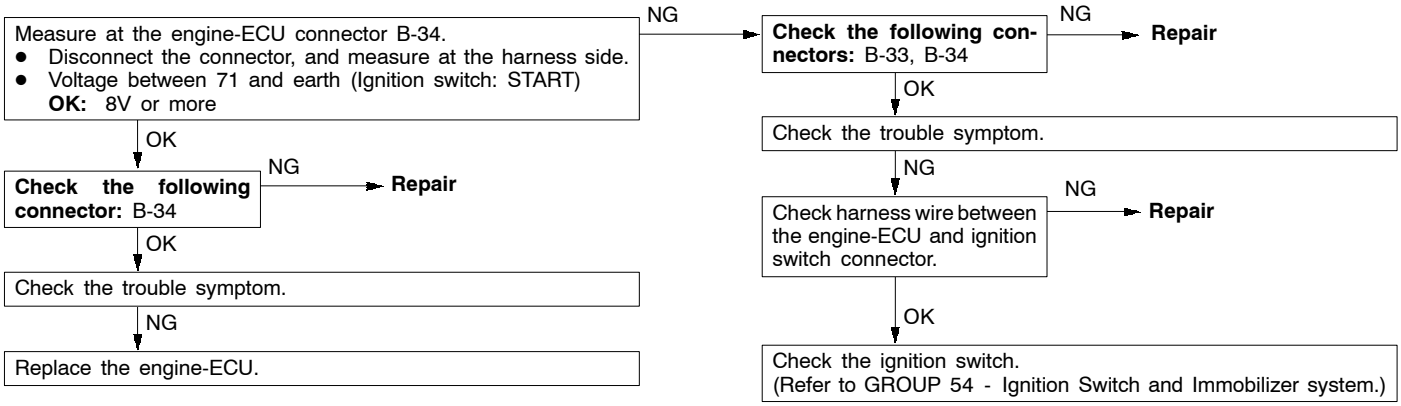
Fuel pump system	Probable cause
The engine-ECU turns the fuel pump relay ON when the engine is cranking or running, and this supplies power to drive the fuel pump.	• Malfunction of the fuel pump relay • Malfunction of the fuel pump • Improper connector contact, open circuit or short-circuited harness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



NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

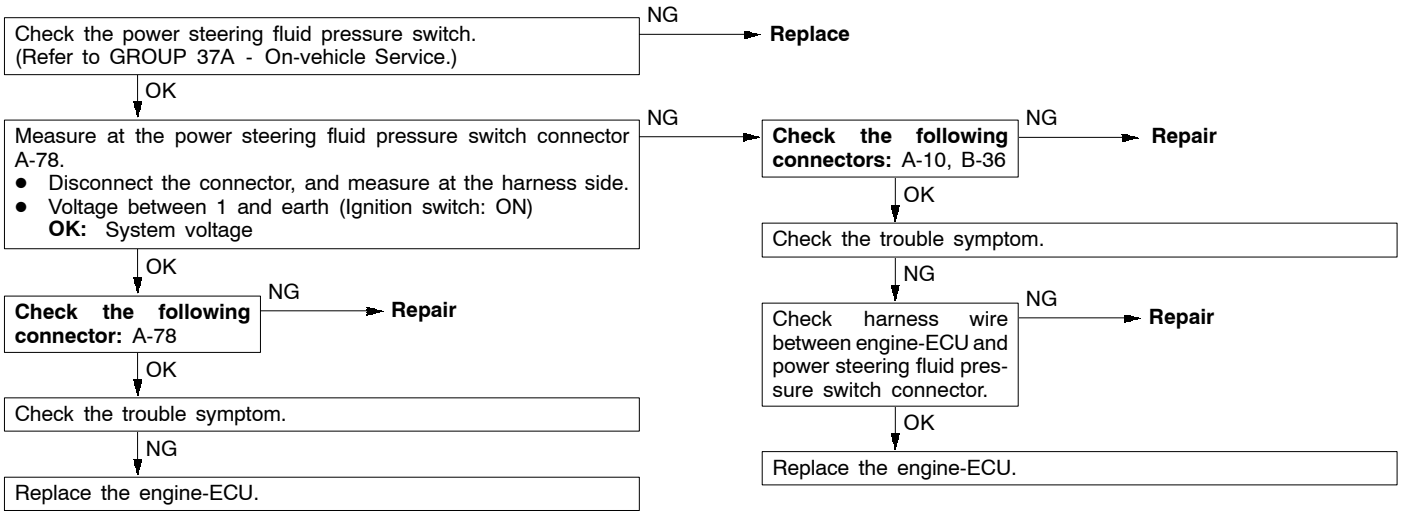
INSPECTION PROCEDURE 27

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



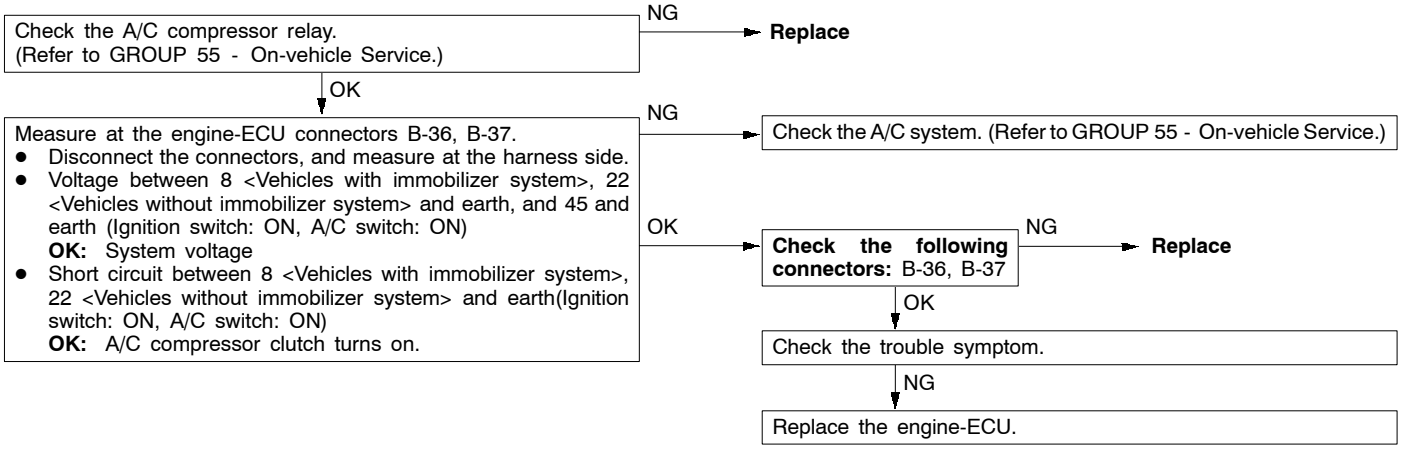
INSPECTION PROCEDURE 28

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



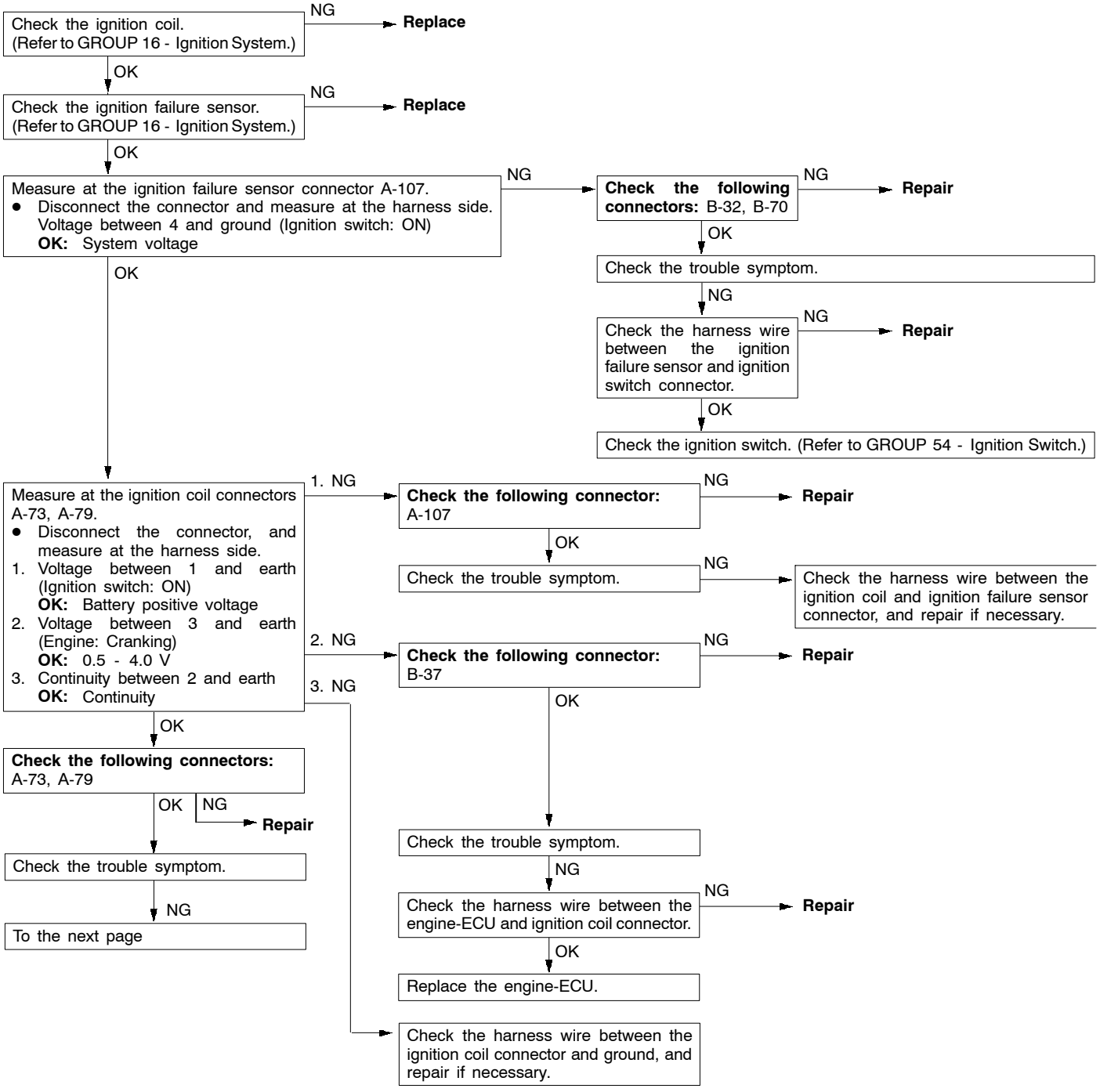
INSPECTION PROCEDURE 29

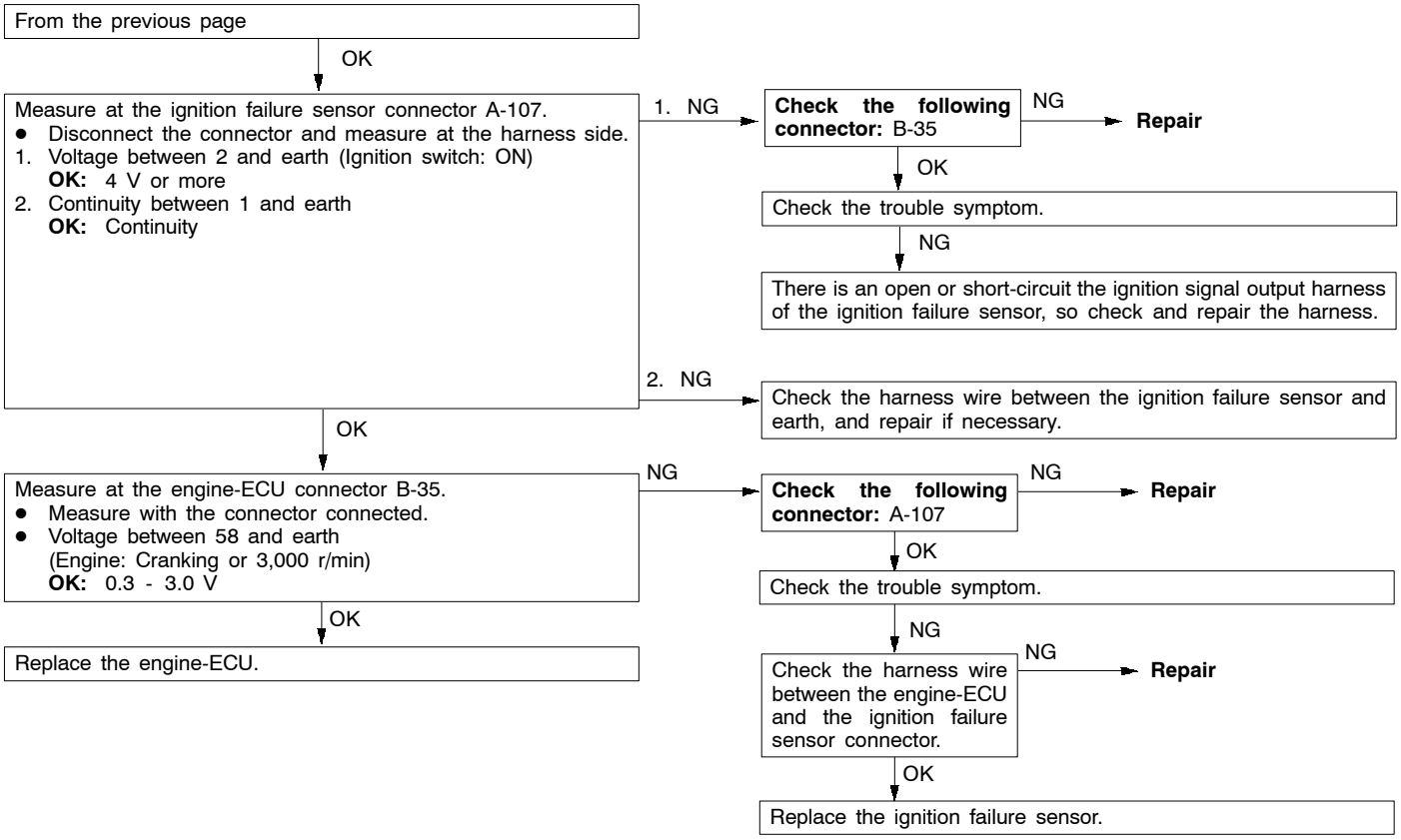
A/C switch and A/C relay system	Probable cause
When an A/C ON signal is input to the engine-ECU, the engine-ECU carries out control of the idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch.	• Malfunction of A/C control system • Malfunction of A/C switch • Improper connector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



INSPECTION PROCEDURE 30

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




From the previous page
OK
Measure at the ignition failure sensor connector A-107.
● Disconnect the connector and measure at the harness side.
1. Voltage between 2 and earth (Ignition switch: ON)
OK: 4 V or more
2. Continuity between 1 and earth
OK: Continuity
1. NG
Check the following connector: B-35
NG
Repair
OK
Check the trouble symptom.
NG
There is an open or short-circuit the ignition signal output harness of the ignition failure sensor, so check and repair the harness.
2. NG
Check the harness wire between the ignition failure sensor and earth, and repair if necessary.
OK
Measure at the engine-ECU connector B-35.
● Measure with the connector connected.
● Voltage between 58 and earth
(Engine: Cranking or 3,000 r/min)
OK: 0.3 - 3.0 V
NG
Check the following connector: A-107
NG
Repair
OK
Check the trouble symptom.
NG
OK
Replace the engine-ECU.
Check the harness wire between the engine-ECU and the ignition failure sensor connector.
NG
Repair
OK
Replace the ignition failure sensor.

DATA LIST REFERENCE TABLE

NOTE
*1: In a new vehicle [driven approximately 500 km or less], the air intake plenum pressure is sometimes 10 % higher than the standard pressure.
*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.

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. P0130	13A-19
			When engine is suddenly raced	600 - 1,000 mV		
		Engine: After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.	Engine is idling	400 mV or less (Changes) 600 - 1,000 mV		
			2,500 r/min			
13	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is -20°C	-20°C	Code No. P0110	13A-12
			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. P0120	13A-16
			Gradually open	Increases in proportion to throttle opening angle		
			Open fully	4,500 - 5,500 mV		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 25	13A-59
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27	13A-61
			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. P0115	13A-13
			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. P0335	13A-29
		• Engine: Idling • Idle position switch: ON	When engine coolant temperature is -20°C	1,475 - 1,675 r/min		
			When engine coolant temperature is 0°C	1,345 - 1,545 r/min		
			When engine coolant temperature is 20°C	1,200 - 1,400 r/min		
			When engine coolant temperature is 40°C	1,025 - 1,225 r/min		
			When engine coolant temperature is 80°C	650 - 850 r/min		
24	Vehicle speed sensor	Drive at 40 km/h		Approximately 40 km/h	Code No. P0500	13A-35

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 28	13A-61
			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-62
			A/C switch: ON	ON		
32	Vacuum sensor*1	• Engine coolant temperature: 80 - 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral • Ignition switch: ON	Engine: Stopped (At altitude of 0 m)	101 kPa	Code No. P0105	13A-10
			Engine: Stopped (At altitude of 600 m)	95 kPa		
			Engine: Stopped (At altitude of 1,200 m)	88 kPa		
			Engine: Stopped (At altitude of 1,800 m)	81 kPa		
			Engine: Idling	24.3 - 37.7 kPa		
			When engine is suddenly raced	Increases		
41	Injectors*2	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	13 - 23 ms	-	-
			When engine coolant temperature is 20°C	26 - 46 ms		
			When engine coolant temperature is 80°C	8 - 12 ms		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
41	Injectors*3	● Engine coolant temperature: 80 – 95°C ● Lamps, electric cooling fan and all accessories: OFF ● Transmission: Neutral	Engine is idling	1.7 - 2.9 ms	-	-
			2,500 r/min	1.4 - 2.6 ms		
			When engine is suddenly raced	Increases		
44	Ignition coils and power transistors	● 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 - 20 °BTDC	-	-
			2,500 r/min	19 - 39 °BTDC		
45	ISC (stepper) motor position*4	● Engine coolant temperature: 80 - 95°C ● Lamps, electric cooling fan and all accessories: OFF ● Transmission: Neutral ● 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-62
			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. P0136	13A-22

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
81	Long-term fuel compensation	Engine: Warm, 2,500 r/min without any load (during closed loop)		-12.5 - 12.5 %	Code No. P0170	13A-25
82	Short-term fuel compensation	Engine: Warm, 2,500 r/min without any load (during closed loop)		-17 - 17 %	Code No. P0170	13A-25
87	Calculation load value	Engine: Warm	Engine: Idling	20 - 33 %	-	-
			2,500 r/min	20 - 33 %		
88	Fuel control condition	Engine: Warm	2,500 r/min	Closed loop	Code No. P0125	13A-18
			When engine is suddenly raced	Open loop - drive condition		
A1	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	0.2 V or less	Code No. P0130	13A-19
			When engine is sudden racing	0.6 - 1.0 V		
		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 engine-ECU.	Engine is idling	0.4 V or less (Changes) 0.6 - 1.0 V		
			2,500 r/min			
A2	Oxygen sensor (rear)	● Transmission: 2nd gear ● Drive with throttle widely open	3,500 r/min	0.6 - 1.0 V	Code No. P0136	13A-22
8A	Throttle position sensor (Throttle opening angle)	● Ignition switch: ON	Set to idle position	6 - 20 %	Code No. P0120	13A-16
			Gradually open	Increase in proportion to throttle opening angle		
			Open fully	80 - 100 %		

ACTUATOR TEST REFERENCE TABLE

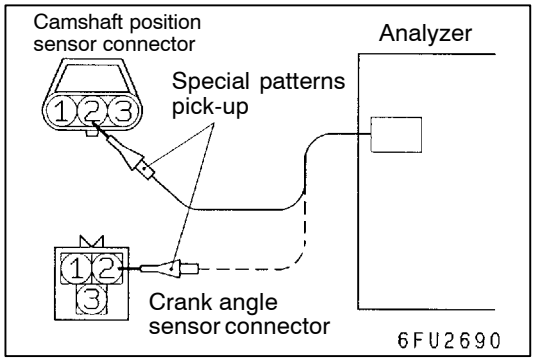
Item No.	Inspection item	Drive contents	Inspection contents		Normal condition	Inspection procedure No.	Reference page
01	Injectors	Cut fuel to No. 1 injector	Engine: After having warmed up/Engine is idling (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)		Idling condition becomes different (becomes unstable).	Code No. P0201	13A-26
02		Cut fuel to No. 2 injector				Code No. P0202	
03		Cut fuel to No. 3 injector				Code No. P0203	
04		Cut fuel to No. 4 injector				Code No. P0204	
07	Fuel pump	Fuel pump operates and fuel is recirculated.	• Engine: Cranking • Fuel pump: Forced driving Inspect according to both the above conditions.	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 26	13A-60
				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.	Code No. P0443	13A-34
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.	Code No. P0403	13A-32
20	Condenser fan	Drive the fan motors (condenser)	• Ignition switch: ON • A/C switch: ON		Fan motor runs	Procedure No. 23	13A-58
21	Radiator fan	Drive the fan motors (radiator)	• Ignition switch: ON		Fan motor runs	Procedure No. 23	13A-58

CHECK AT THE ENGINE-ECU TERMINALS

TERMINAL VOLTAGE CHECK CHART

The following items have been added. The ignition timing adjustment terminal (terminal No. 52) and inhibitor switch-A/T (terminal No. 91) has been discontinued.

Terminal No.	Check item	Check condition	Normal condition
10	Ignition coil - No. 1, No. 4 (Ignition power transistor)	Engine r/min: 3,000 r/min	0.3 - 3.0 V
20	Fan motor relay (HI)	Radiator fan is not operating (Engine coolant temperature is 90°C or less)	System voltage
		Radiator fan is not operating (Engine coolant temperature is 105°C or more)	0 - 3 V
21	Fan motor relay (LO)	Radiator fan and condenser fan are not operating (Engine coolant temperature is 90°C or less)	System voltage
		Radiator fan and condenser fan are not operating (Engine coolant temperature is 90 - 105°C or less)	0 - 3 V
23	Ignition coil - No. 2, No. 3 (Ignition power transistor)	Engine r/min: 3,000 r/min	0.3 - 3.0 V
58	Engine ignition signal	Engine r/min: 3,000 r/min	0.3 - 3.0 V
88	Camshaft position sensor	Engine: Cranking	0.4 - 3.0 V
		Engine: Idling	0.5 - 2.0 V



INSPECTION PROCEDURE USING AN ANALYZER

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Measurement Method

1. Disconnect the camshaft position sensor connector and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to camshaft position sensor terminal 2.
3. Disconnect the crank angle sensor connector and connect the special tool (test harness: MD998478) in between.
4. Connect the analyzer special patterns pickup to crank angle sensor terminal 2.

Alternate Method (Test harness not available)

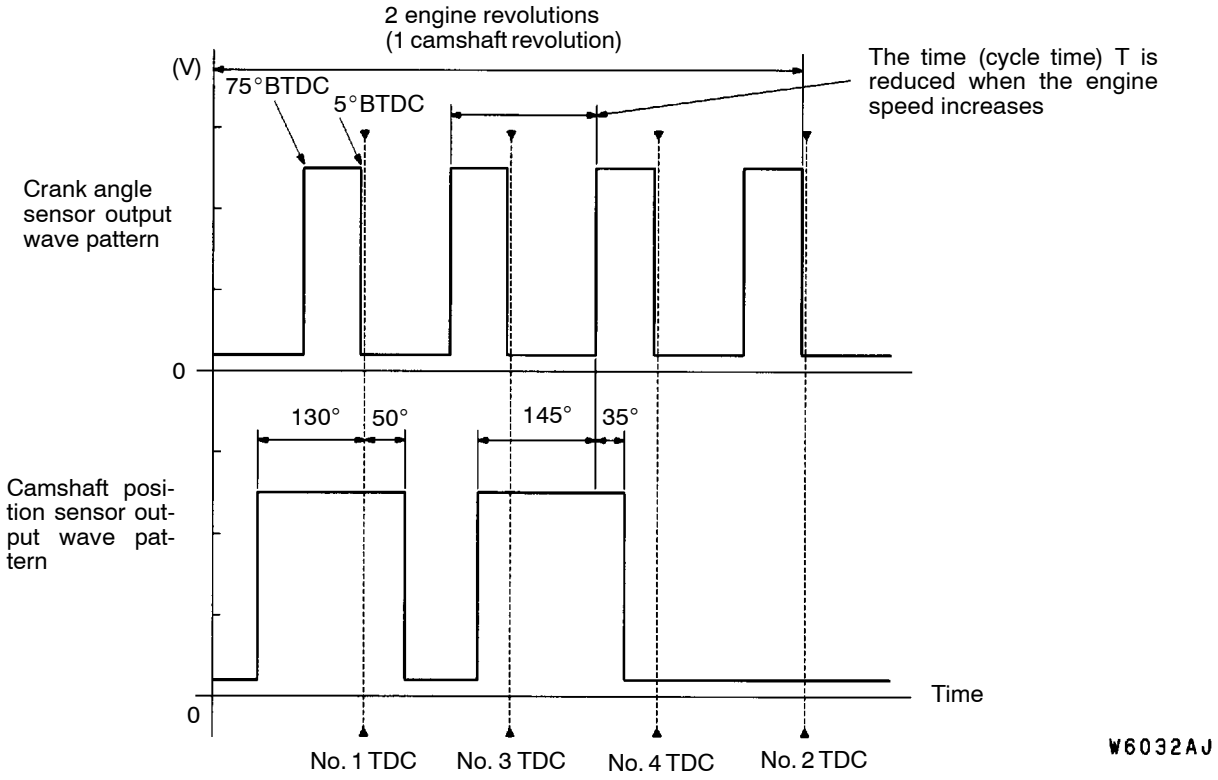
1. Connect the analyzer special patterns pickup to engine-ECU terminal 88. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal 89. (When checking the crank angle sensor signal wave pattern.)

Standard Wave Pattern

Observation conditions

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

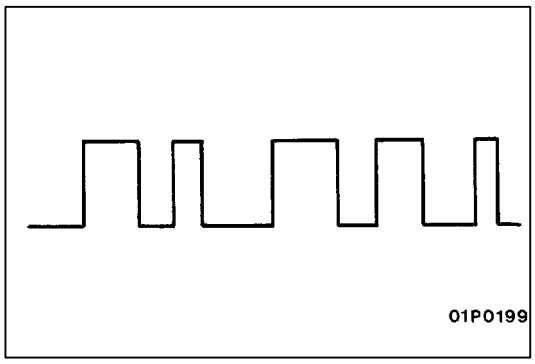
Standard wave pattern



TDC: Top dead centre

Wave Pattern Observation Points

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



Examples of Abnormal Wave Patterns

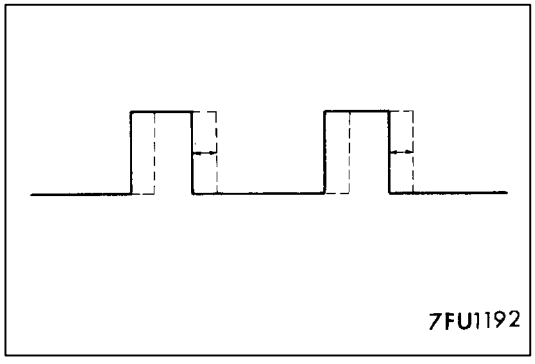
- Example 1

  Cause of problem

  Sensor interface malfunction

  Wave pattern characteristics

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



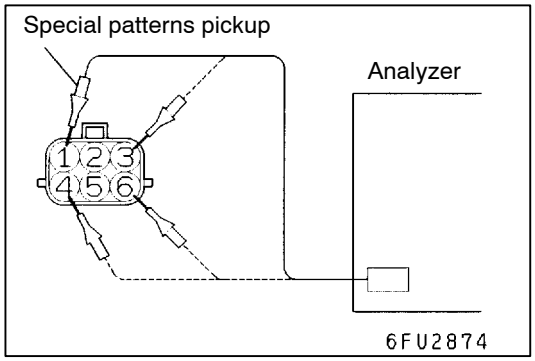
- Example 2

  Cause of problem

  Loose timing belt
  Abnormality in sensor disk

  Wave pattern characteristics

  Wave pattern is displaced to the left or right.



IDLE SPEED CONTROL (ISC) SERVO (STEPPER MOTOR)

Measurement Method

1. Disconnect the ISC servo connector, and connect the special tool (test harness: MB991709) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to the ISC servo-side connector terminal 1, terminal 3, terminal 4 and terminal 6 respectively.

Alternate Method (Test harness not available)

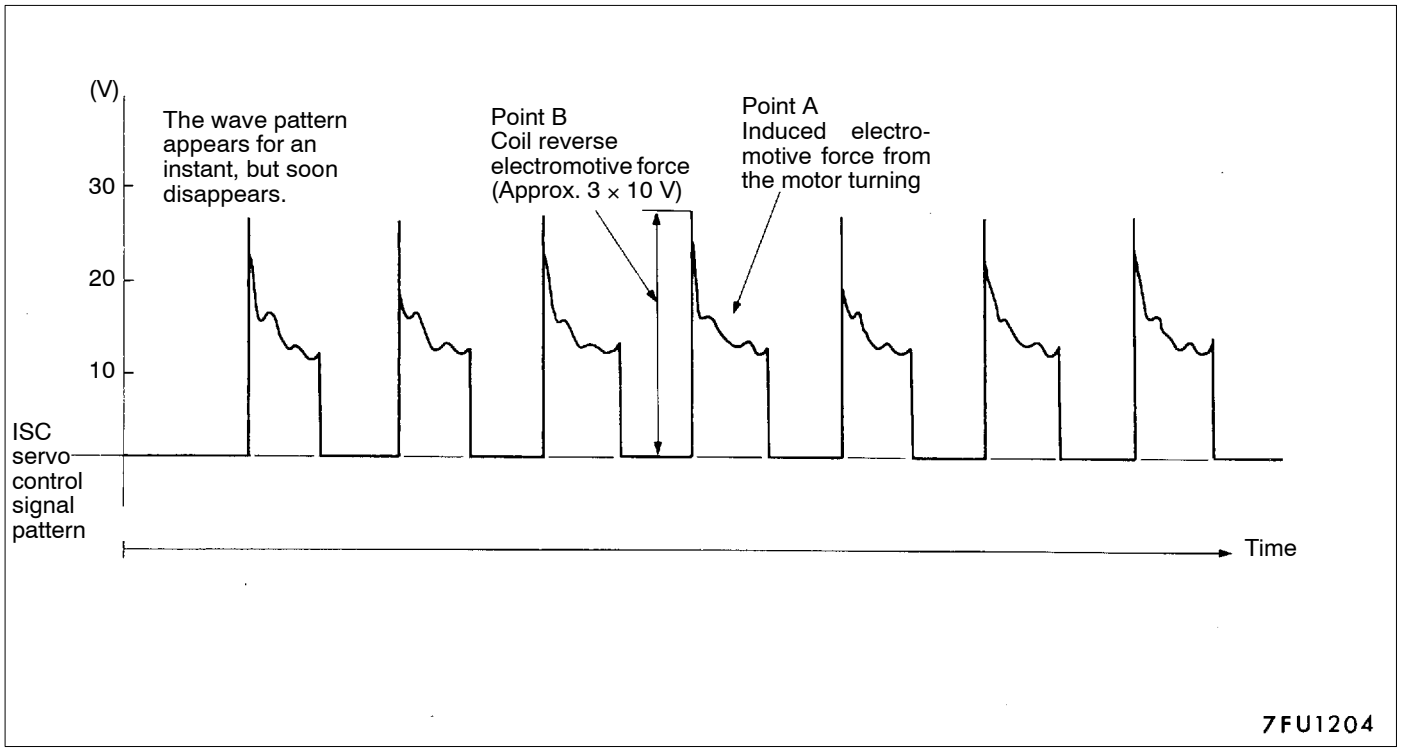
1. Connect the analyzer special patterns pickup to engine-ECU terminal 4, connection terminal 5, connection terminal 17, and connection terminal 18 respectively.

Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	High
Pattern selector	Display
Engine condition	When the engine coolant temperature is 20°C or below, turn the ignition switch from OFF to ON (without starting the engine).
	While the engine is idling, turn the A/C switch to ON.
	Immediately after starting the warm engine

Standard wave pattern



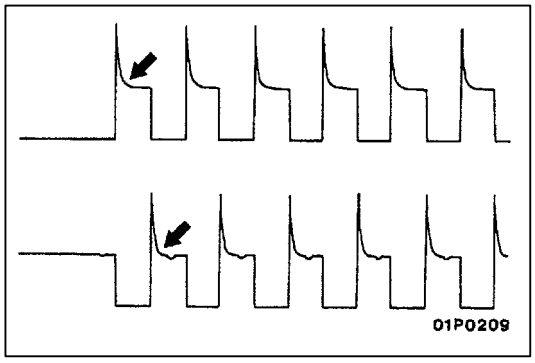
Wave Pattern Observation Points

Check that the standard wave pattern appears when the ISC servo is operating.
Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to the abnormal wave pattern.)

Contrast with standard wave pattern	Probable cause
Induced electromotive force does not appear or is extremely small.	Motor is malfunctioning

Point B: Height of coil electromotive force

Contrast with standard wave pattern	Probable cause
Coil reverse electromotive force does not appear or is extremely small.	Short in the coil



Examples of Abnormal Wave Pattern

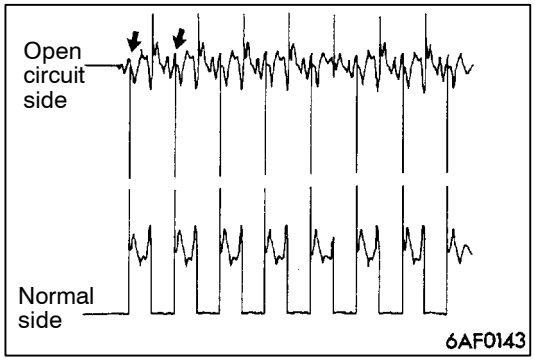
- Example 1

  Cause of problem

  Motor is malfunctioning. (Motor is not operating.)

  Wave pattern characteristics

  Induced electromotive force from the motor turning does not appear.



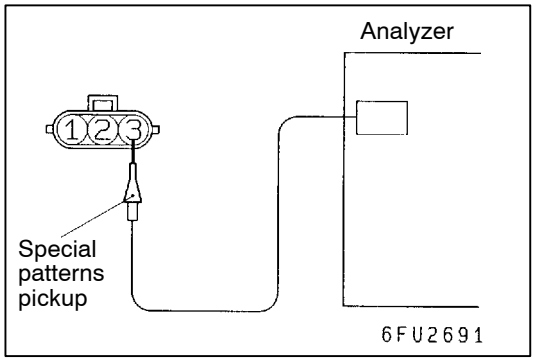
- Example 2

  Cause of problem

  Open circuit in the line between the ISC servo and the engine-ECU.

  Wave pattern characteristics

  Current is not supplied to the motor coil on the open circuit side. (Voltage does not drop to 0 V.)
  Furthermore, the induced electromotive force waveform at the normal side is slightly different from the normal waveform.



IGNITION COIL AND POWER TRANSISTOR

Power transistor control signal

Measurement Method

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

Alternate Method (Test harness not available)

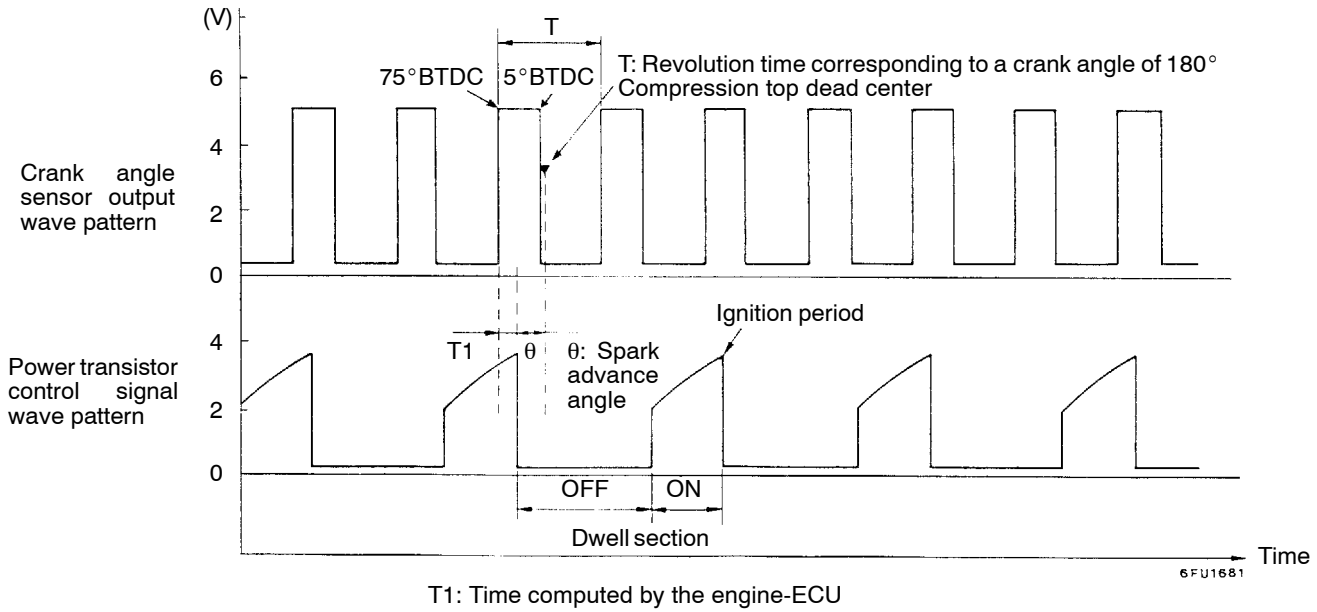
1. Connect the analyzer special patterns pickup to engine-ECU terminal 10 (No. 1 - No. 4), terminal 23 (No. 2 - No. 3) respectively.

Standard Wave Pattern

Observation condition

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

Standard wave pattern

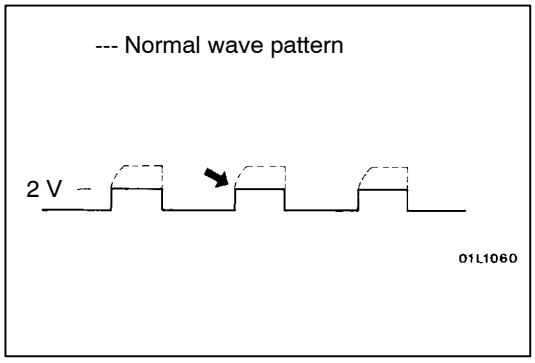


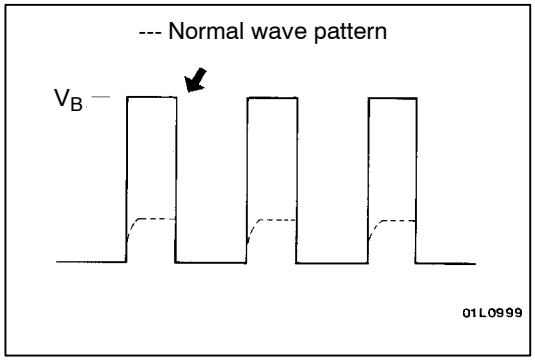
T1: Time computed by the engine-ECU

Wave Pattern Observation Points

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

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





Examples of Abnormal Wave Pattern

- Example 1

  Wave pattern during engine cranking

  Cause of problem

  Open-circuit in ignition primary circuit

  Wave pattern characteristics

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

- Example 2

  Wave pattern during engine cranking

  Cause of problem

  Malfunction in power transistor

  Wave pattern characteristics

  Power voltage results when the power transistor is ON.

ON-VEHICLE SERVICE

BASIC IDLE SPEED ADJUSTMENT

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

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

   NOTE
   When the MUT-II is connected, the diagnosis control terminal should be earthed.

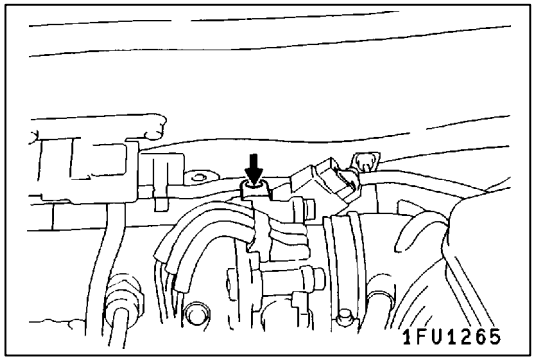
3. Start the engine and run at idle.
4. Select the item No. 30 of the MUT-II Actuator test.

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

5. Check the idle speed.

   Standard value: 750 ± 50 r/min

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



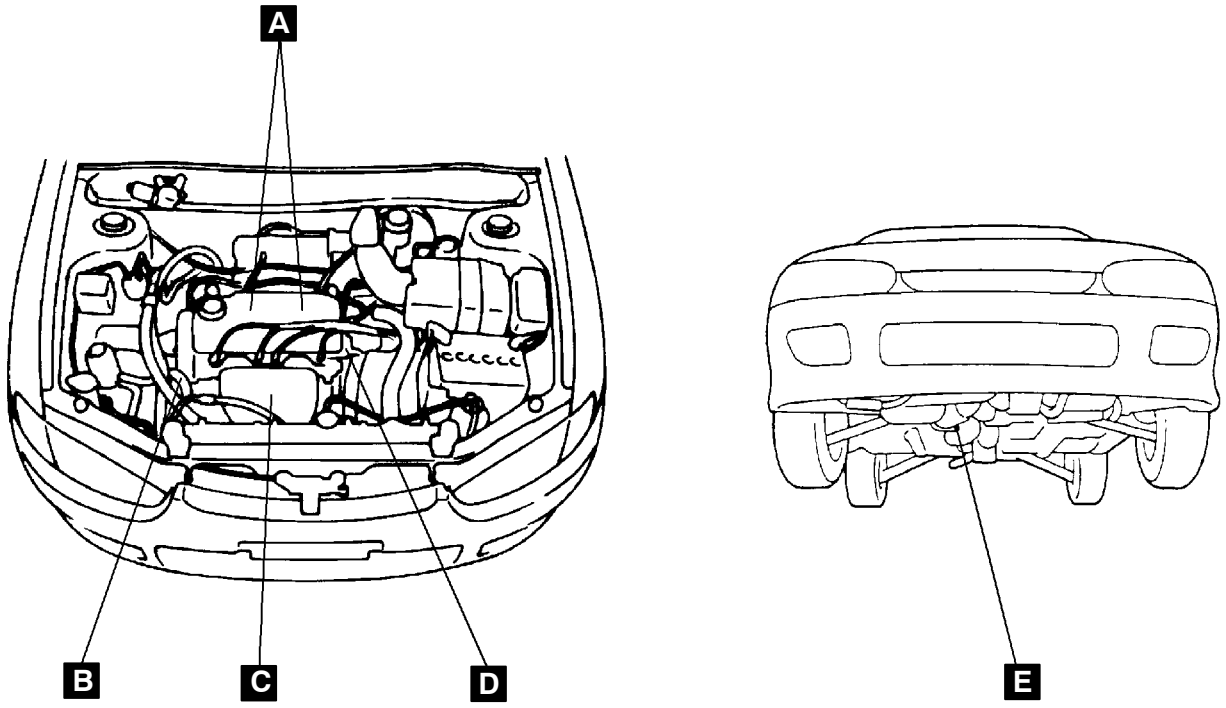
6. If not within the standard value range, turn the speed adjusting screw (SAS) to make the necessary adjustment.
7. Press the MUT-II clear key, and release the ISC servo from the Actuator test mode.

NOTE
Unless the ISC servo is released, the Actuator test mode will continue 27 minutes.

8. Switch OFF the ignition switch.
9. Disconnect the MUT-II.
10. Start the engine again and let it run at idle speed for about 10 minutes; check that the idling condition is normal.

COMPONENT LOCATION

Name	Symbol	Name	Symbol
Camshaft position sensor	D	Ignition failure sensor	D
Crank angle sensor	B	Oxygen sensor (front)	C
Ignition coil	A	Oxygen sensor (rear)	E



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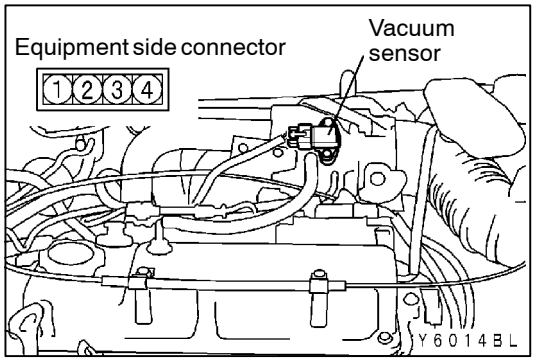
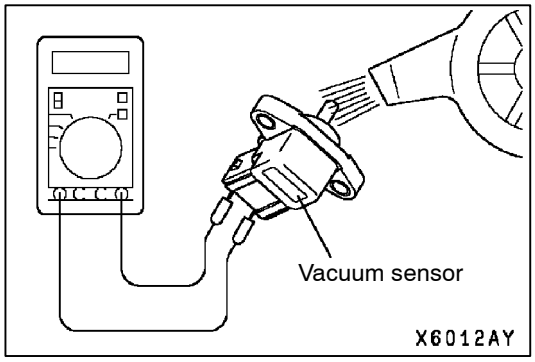


INTAKE AIR TEMPERATURE SENSOR CHECK

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

   Standard value:
   2.3 - 3.0 kΩ (at 20°C)
   0.30 - 0.42 kΩ (at 80°C)

3. Remove the vacuum sensor.



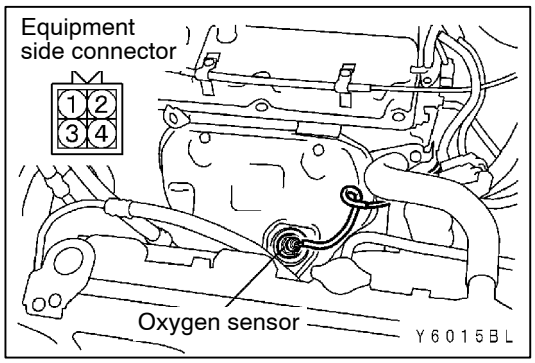
4. Measure resistance while heating the sensor using a hair drier.

   Normal condition:

Temperature (°C)	Resistance (kΩ)
Higher	Smaller

5. If the value deviates from the standard value or the resistance remains unchanged, replace the vacuum sensor.
6. Install the vacuum sensor and tighten it to the specified torque.

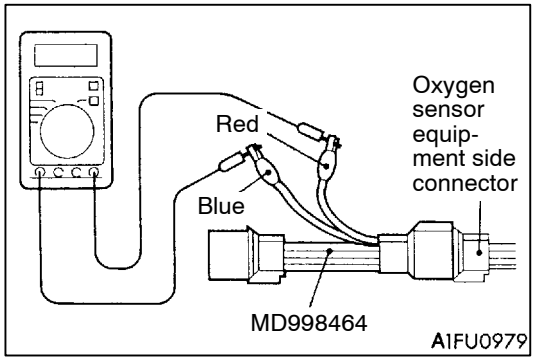
   Tightening torque: 4 - 6 N·m



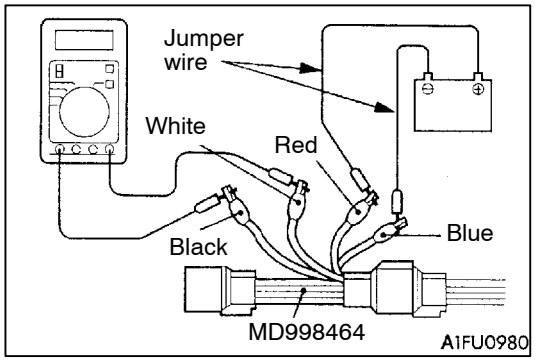
OXYGEN SENSOR CHECK

<Oxygen sensor (front)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness) to the connector on the oxygen sensor side.



2. Make sure that there is continuity (4.5 - 8.0 Ω at 20°C) between terminal 1 (red clip of special tool) and terminal 3 (blue clip of special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.



5. Use a jumper wire to connect terminal 1 (red clip) of the oxygen sensor connector to the battery (+) terminal and terminal 3 (blue clip) to the battery (-) terminal.

   Caution
   Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

6. Connect a digital voltage meter between terminal 2 (black clip) and terminal 4 (white clip).

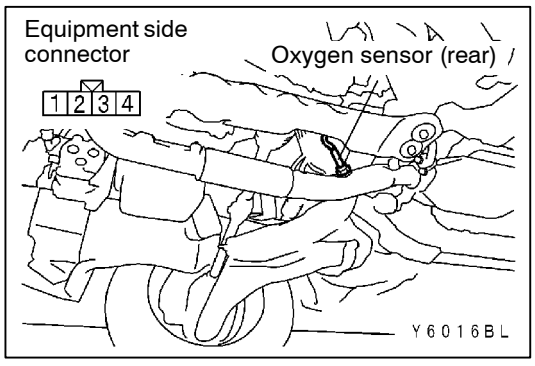
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

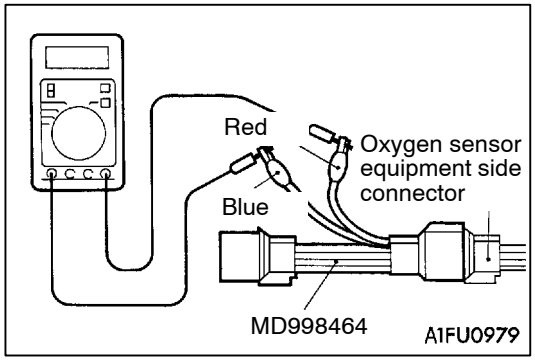
   Standard value:

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

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

   NOTE
   For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.





<Oxygen sensor (rear)>

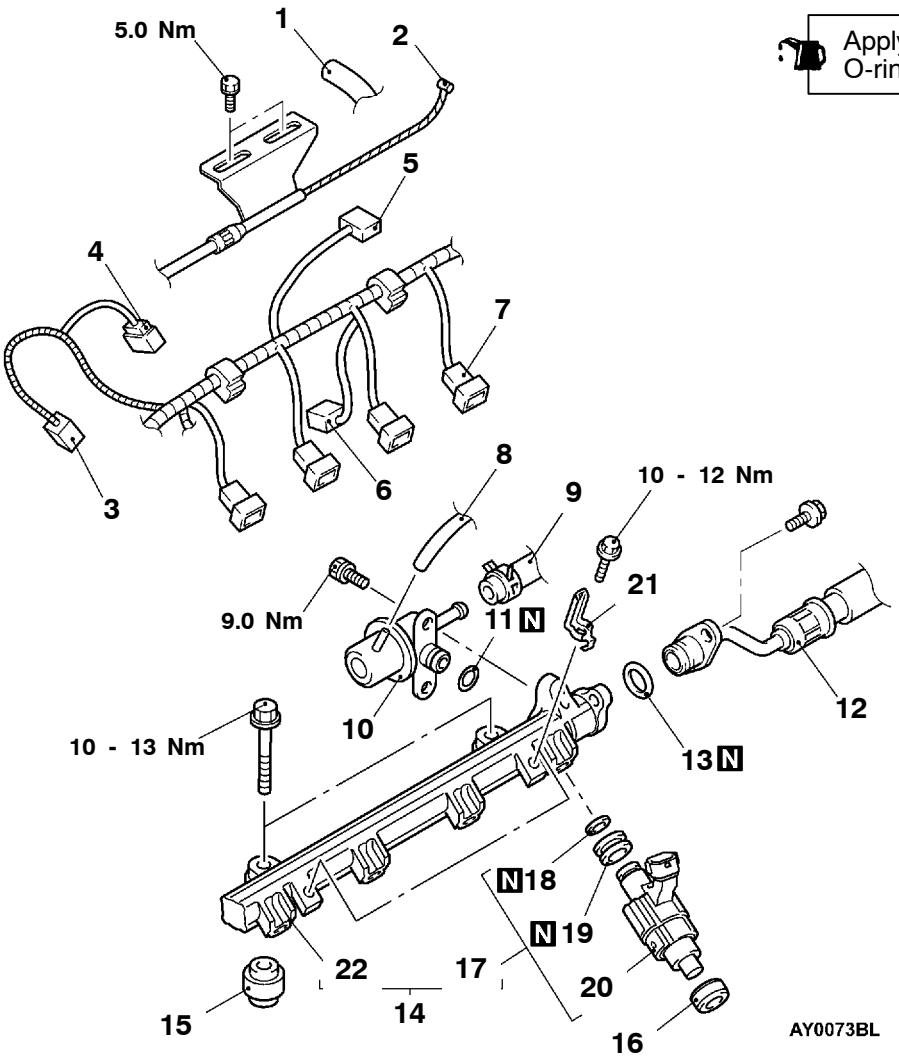
1. Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
2. Make sure that there is continuity (11 - 18 Ω at 20°C) between terminal 1 and terminal 3 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen 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.

INJECTOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Accelerator Cable Adjustment



Apply engine oil to all O-rings during installation.

Removal steps

1. PCV hose connection
2. Accelerator cable connection
3. Oxygen sensor (rear) connector
4. Detonation sensor connector
5. Vacuum sensor connector
6. EGR solenoid valve connector
7. Injector connector
8. Vacuum hose connection
9. Fuel return hose connection
- ▶A◀ 10. Fuel pressure regulator
- ▶A◀ 11. O-ring
- ▶A◀ 12. High-pressure fuel hose connection
- ▶A◀ 13. O-ring
- ◀A▶ 14. Delivery pipe and injector assembly
15. Insulator
16. Insulator
- ▶A◀ 17. Injector assembly
- ▶A◀ 18. O-ring
19. Grommet
20. Injector
21. Harness bracket
22. Delivery pipe

REMOVAL SERVICE POINT

◀A▶ DELIVERY PIPE AND INJECTOR ASSEMBLY REMOVAL

Remove the delivery pipe (with the injectors attached to it).

Caution
Care must be taken, when removing the delivery pipe, not to drop the injector.

INSTALLATION SERVICE POINT

▶A◀ O-RING/INJECTOR ASSEMBLY/HIGH-PRESSURE FUEL HOSE/FUEL PRESSURE REGULATOR INSTALLATION

1. Apply a drop of new engine oil to the O-ring.

   Caution
   Be sure not to let engine oil enter the delivery pipe.

2. While turning the injector, high-pressure fuel hose and fuel pressure regulator to the right and left, install the delivery pipe, while being careful not to damage the O-ring. After installing, check that the hose turns smoothly.
3. If it does not turn smoothly, the O-ring may be trapped, remove the injector, high-pressure fuel hose or fuel pressure regulator and then re-insert it into the delivery pipe and check once again.
4. Tighten the high-pressure fuel hose to the standard torque, and tighten the fuel pressure regulator to the specified torque.

   Tightening torque: 9.0 Nm (Fuel pressure regulator)

MULTIPOINT FUEL INJECTION (MPI) <4G9>

GENERAL

OUTLINE OF CHANGES

Due to the changes shown below, the service procedures regarding the different description from the previous version have been established.

- On-board Diagnostics System has been adopted to expand the diagnostic items and to change diagnosis code numbering system.
- The engine-ECU has been changed. <Vehicles with M/T>
- An engine-A/T-ECU has been adopted. <Vehicles with A/T>
- An ignition failure sensor has been adopted.

GENERAL INFORMATION

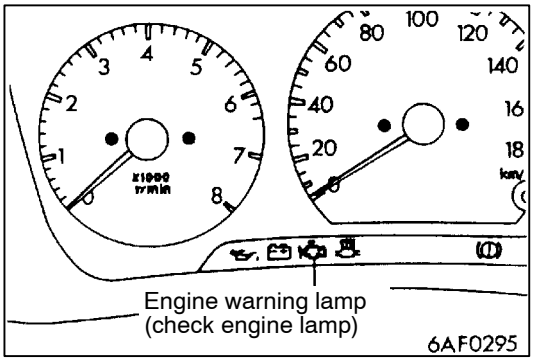
SELF-DIAGNOSIS FUNCTION

Following functions have been added.

- This engine-ECU records the engine operating condition when the diagnosis code is set.
  This data is called “freeze frame” data.
  This data can be read by using the MUT-II, are can then be used in simulation tests for troubleshooting.

GENERAL SPECIFICATIONS

Items		Specifications
Engine-ECU <M/T>	Identification model No.	E6T31972 <Vehicles with immobilizer system> E6T31973 <Vehicles without immobilizer system>
Engine-A/T-ECU <A/T>	Identification model No.	E6T32072 <Vehicles with immobilizer system> E6T32073 <Vehicles without immobilizer system>



TROUBLESHOOTING

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the following items related to the MPI system, the engine warning lamp will illuminate or flash. If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.
However, the warning lamp will illuminate as bulb check for five seconds whenever the ignition switch is turned to the ON position.

Engine warning lamp inspection items

Code No.	Diagnosis item
-	Engine-ECU <M/T> or engine-A/T-ECU <A/T>
P0100	Air flow sensor system
P0105	Barometric pressure sensor system
P0110	Intake air temperature sensor system
P0115	Engine coolant temperature sensor system
P0120★	Throttle position sensor system
P0125	Feedback system
P0130	Oxygen sensor (front) system <sensor 1>
P0135	Oxygen sensor heater (front) system <sensor 1>
P0136	Oxygen sensor (rear) system <sensor 2>
P0141	Oxygen sensor heater (rear) system <sensor 2>
P0170	Abnormal fuel system
P0201	No. 1 injector system
P0202	No. 2 injector system
P0203	No. 3 injector system
P0204	No. 4 injector system
P0300★	Ignition coil (power transistor) system
P0301	No. 1 cylinder misfire detected
P0302	No. 2 cylinder misfire detected
P0303	No. 3 cylinder misfire detected
P0304	No. 4 cylinder misfire detected
P0335	Crank angle sensor system
P0340	Camshaft position sensor system

Code No.	Diagnosis item
P0403	EGR valve system
P0420	Catalyst malfunction
P0443	Purge control solenoid valve system
P0505	Idle speed control system
P0551	Power steering fluid pressure switch system

NOTE
1. If the engine warning lamp illuminates because of a malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>, communication between MUT-II and the engine-ECU <M/T> or engine-A/T-ECU <A/T> is impossible. In this case, the diagnosis code cannot be read.
2. After the engine-ECU <M/T> or engine-A/T-ECU <A/T> has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected. However, for items marked with a "★" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.
3. After the engine warning lamp illuminates, it will be switched off under the following conditions.
   (1) When the engine-ECU <M/T> or engine-A/T-ECU <A/T> monitored the power train malfunction three times* and met set condition requirements, it detected no malfunction.
   *: In this case, "one time" indicates from engine start to stop.
   (2) For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

METHOD OF READING AND ERASING DIAGNOSIS CODES

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

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the MUT-II.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

NOTE
By turning the ignition switch to OFF, the ENGINE-ECU will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

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

FREEZE FRAME DATA

When the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame data." By analyzing this "freeze frame" data with the MUT-II, an effective troubleshooting can be performed.
The display items of freeze frame data are shown below.

Display item list

Data item		Unit
Engine coolant temperature sensor		°C
Engine speed		r/min
Vehicle speed		km/h
Long-term fuel compensation (long-term fuel trim)		%
Short-term fuel compensation (short-term fuel trim)		%
Fuel control condition	Open loop	OL
	Closed loop	CL
	Open loop owing to drive condition	OL-DRV.
	Open loop owing to system malfunction	OL-SYS.
	Closed loop based on one oxygen sensor	CL-H02S
Calculation load value		%
Diagnosis code during data recording		-

NOTE
If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

READINESS TEST STATUS

The engine-ECU <M/T> or engine-A/T-ECU <A/T> monitors the following main diagnosis items, judges if these items are in good condition or not, and the stores its history. This history can be read out by using MUT-II. (If the ECU has judged a item before, the MUT-II displays "Complete.")
In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).

- Catalyst: P0420
- Oxygen sensor: P0130
- Oxygen sensor heater: P0135, P0141

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	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 (TPS)	No increase in fuel injection amount during acceleration due to the throttle position sensor signal.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C.
Camshaft position sensor	Injects fuel to all cylinders simultaneously. (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	Cuts off the fuel supply to cylinders with an abnormal ignition.
Oxygen sensor (front)	Air/fuel ratio feedback control (closed loop control) is not performed.
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.
Alternator FR terminal	Does not control the output of the alternator according to an electrical load. (works as a normal alternator)
Misfiring	If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down.

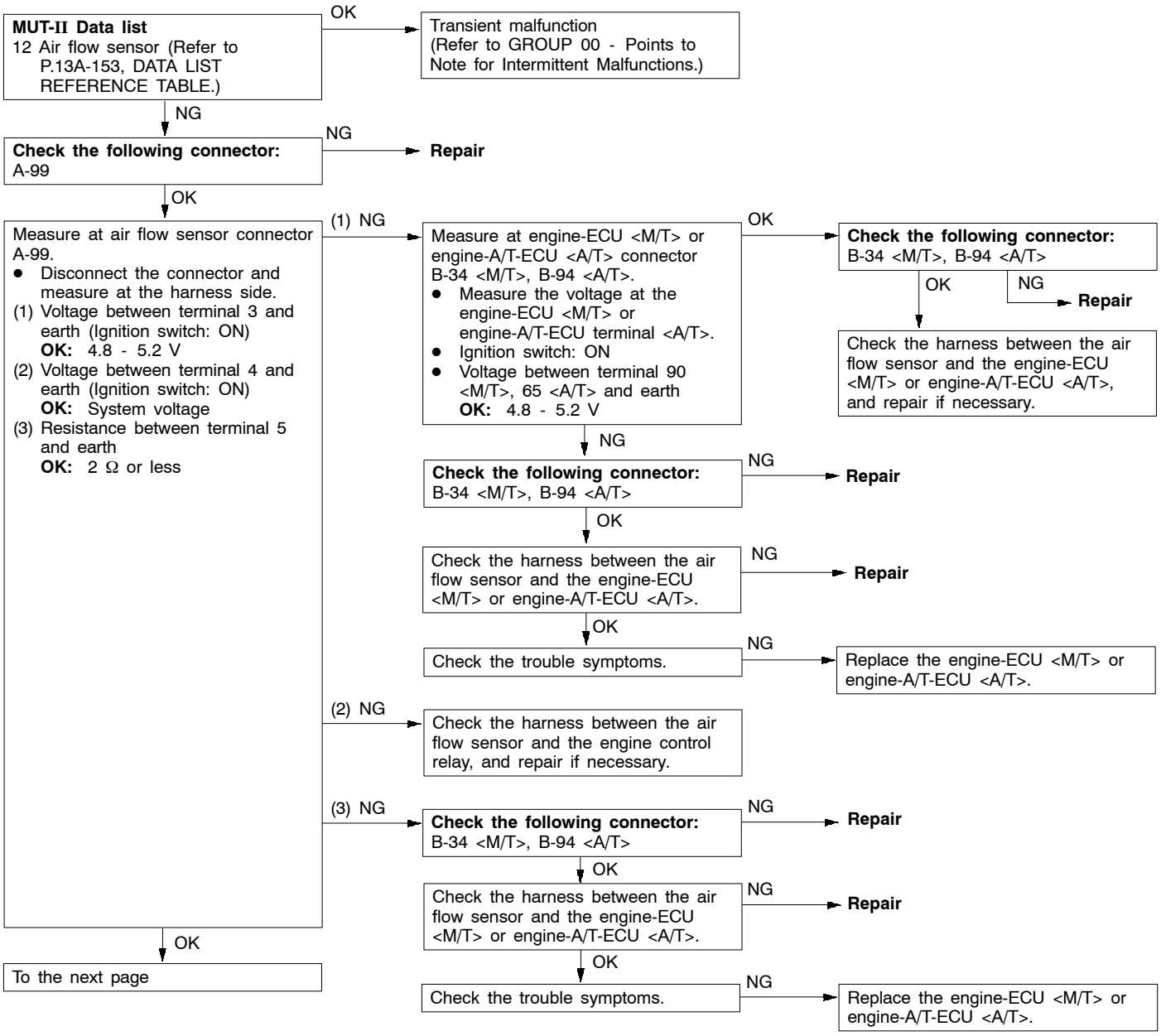
INSPECTION CHART FOR DIAGNOSIS CODES

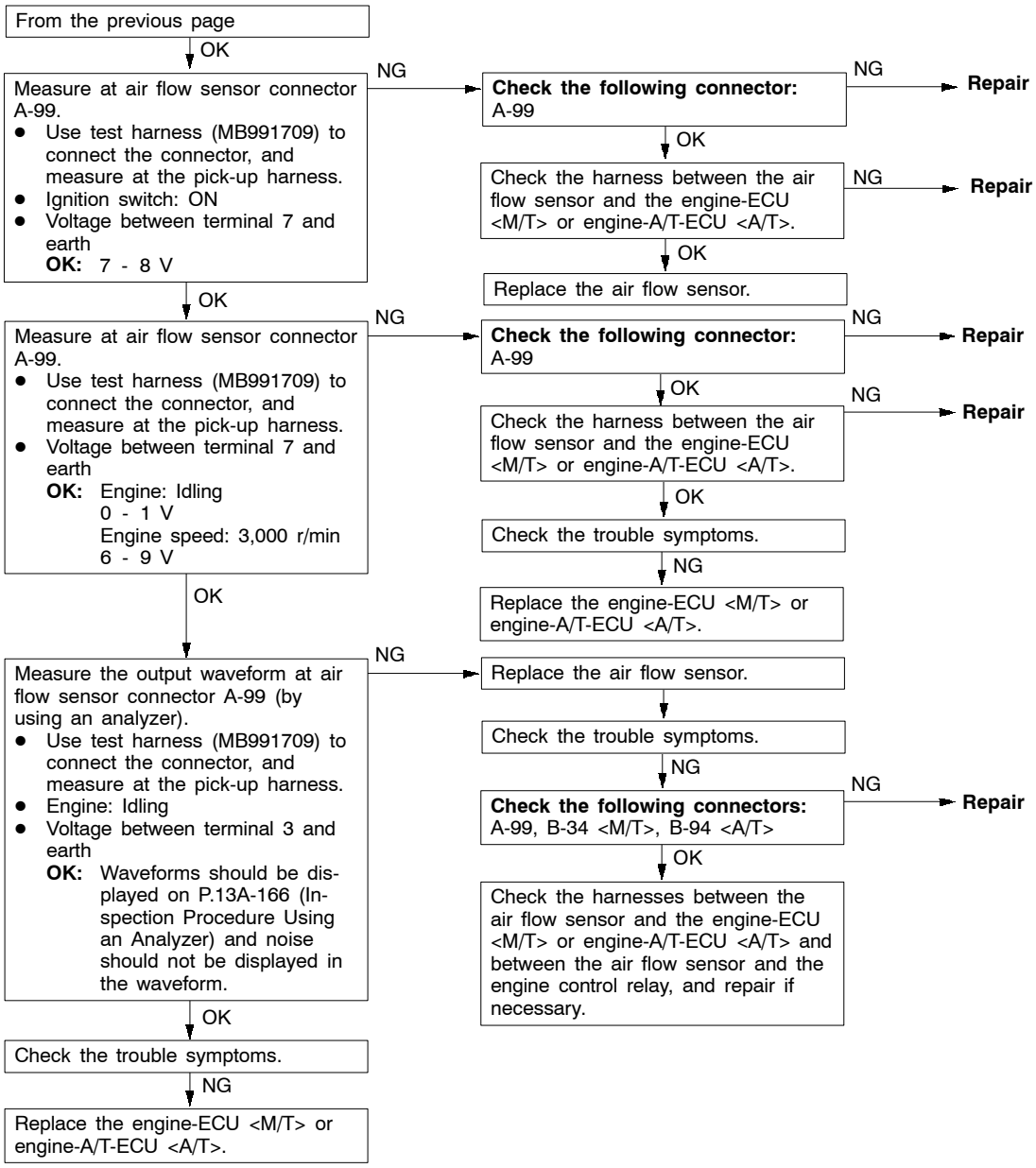
Code No.	Diagnosis item	Reference page
P0100	Air flow sensor system	13A-92
P0105	Barometric pressure sensor system	13A-94
P0110	Intake air temperature sensor system	13A-96
P0115	Engine coolant temperature sensor system	13A-98
P0120	Throttle position sensor 1 system	13A-100
P0125	Feedback system	13A-101
P0130	Oxygen sensor (front) system <sensor 1>	13A-103
P0135	Oxygen sensor heater (front) system <sensor 1>	13A-105
P0136	Oxygen sensor (rear) system <sensor 2>	13A-106
P0141	Oxygen sensor heater (rear) system <sensor 2>	13A-108
P0170	Abnormal fuel system	13A-109
P0201	No. 1 injector system	13A-110
P0202	No. 2 injector system	13A-110
P0203	No. 3 injector system	13A-110
P0204	No. 4 injector system	13A-110
P0300★	Ignition coil (power transistor) system	13A-111
P0301	No. 1 cylinder misfire detected	13A-112
P0302	No. 2 cylinder misfire detected	13A-112
P0303	No. 3 cylinder misfire detected	13A-112
P0304	No. 4 cylinder misfire detected	13A-112
P0325	Detonation sensor system	13A-113
P0335	Crank angle sensor system	13A-113
P0340	Camshaft position sensor system	13A-115
P0403	EGR valve system	13A-117
P0420	Catalyst malfunction	13A-118
P0443	Purge control solenoid valve system	13A-119
P0500	Vehicle speed sensor system	13A-120
P0505	Idle speed control system	13A-120
P0551	Power steering fluid pressure switch system	13A-123
P1610	Immobilizer system	13A-124

NOTE
1. Do not replace the engine-ECU <M/T> or engine-A/T-ECU <A/T> until a through terminal check reveals there are no short/open circuit.
2. Check that the engine-ECU <M/T> or engine-A/T-ECU <A/T> earth circuit is normal before checking for the cause of the problem.
3. After the engine-ECU <M/T> or engine-A/T-ECU <A/T> has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with a "★", the diagnosis code is recorded on the first detection of the malfunction.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

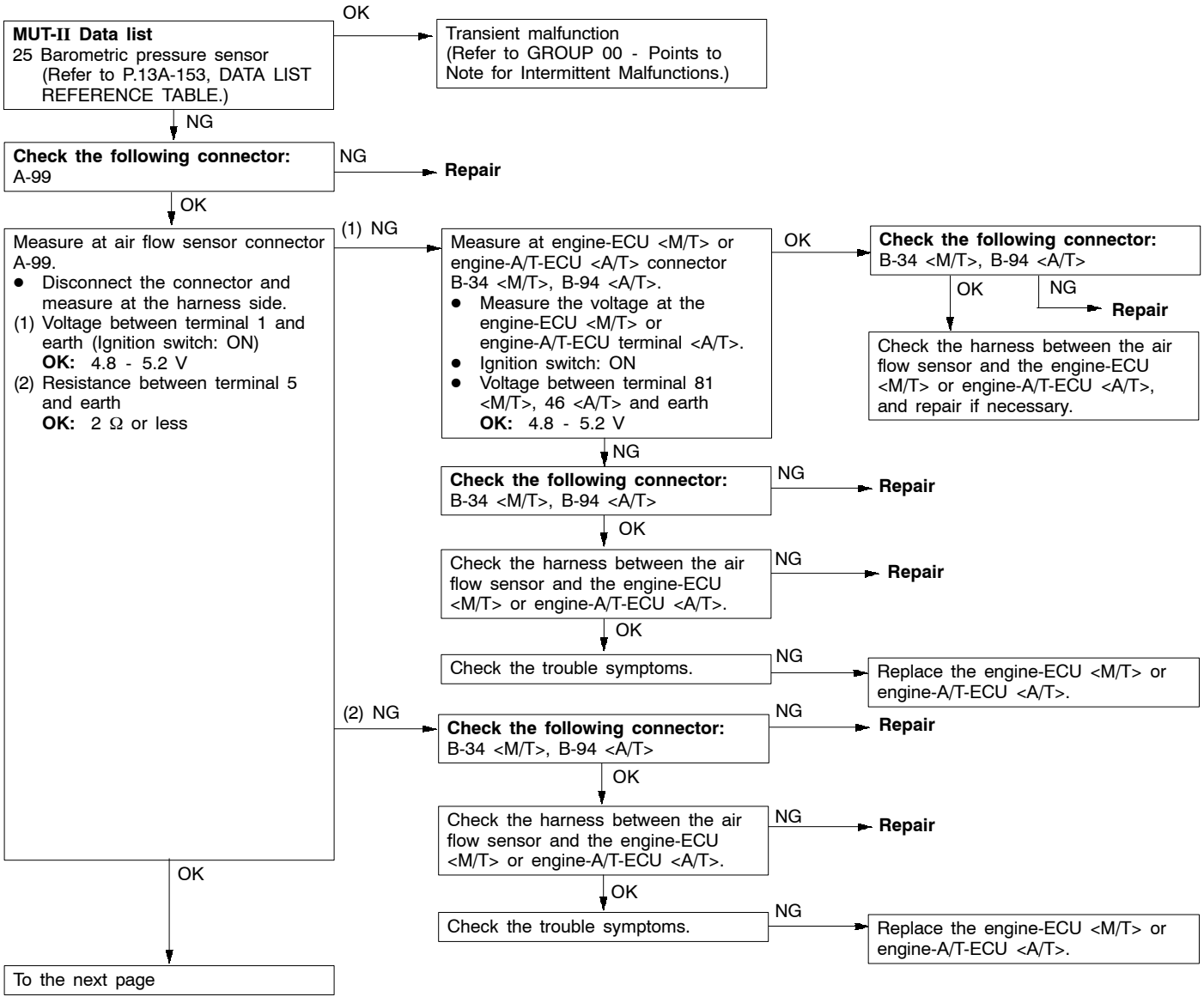
INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

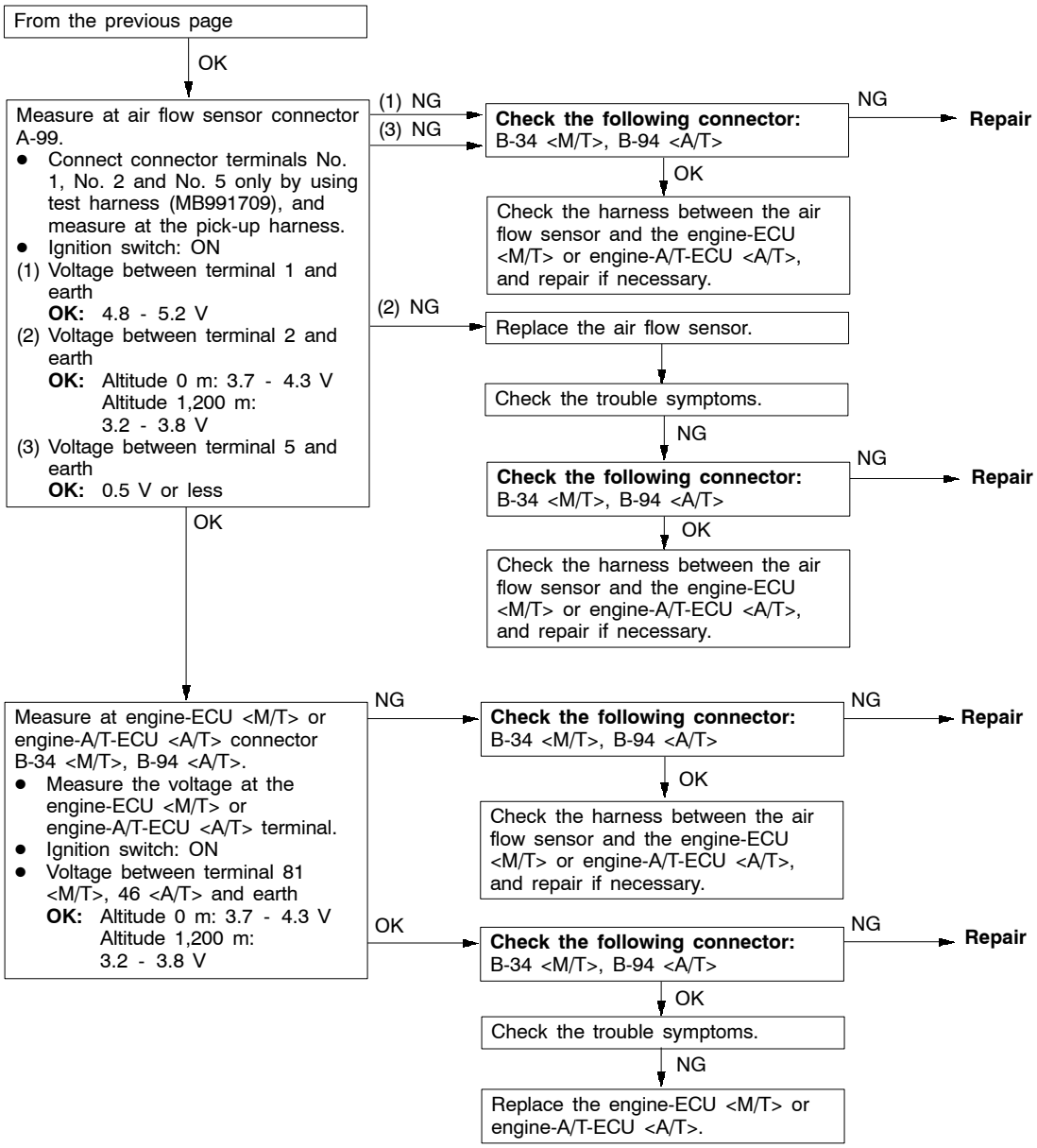
Code No. P0100 Air flow sensor system	Probable cause
Range of Check ● Engine speed: 500 r/min or more Set Conditions ● The sensor output frequency is 3.3 Hz or less for four seconds.	● Malfunction of air flow sensor ● Open or short circuit in air flow sensor circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>




From the previous page
OK
Measure at air flow sensor connector A-99.
● Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.
● Ignition switch: ON
● Voltage between terminal 7 and earth
OK: 7 - 8 V
NG
Check the following connector: A-99
NG
Repair
OK
Check the harness between the air flow sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NG
Repair
OK
Replace the air flow sensor.
OK
Measure at air flow sensor connector A-99.
● Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.
● Voltage between terminal 7 and earth
OK: Engine: Idling
0 - 1 V
Engine speed: 3,000 r/min
6 - 9 V
NG
Check the following connector: A-99
NG
Repair
OK
Check the harness between the air flow sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
OK
Measure the output waveform at air flow sensor connector A-99 (by using an analyzer).
● Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.
● Engine: Idling
● Voltage between terminal 3 and earth
OK: Waveforms should be displayed on P.13A-166 (Inspection Procedure Using an Analyzer) and noise should not be displayed in the waveform.
NG
Replace the air flow sensor.
Check the trouble symptoms.
NG
Check the following connectors: A-99, B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the harnesses between the air flow sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T> and between the air flow sensor and the engine control relay, and repair if necessary.
OK
Check the trouble symptoms.
NG
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

Code No. P0105 Barometric pressure sensor system	Probable cause
Range of Check ● Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. ● Battery voltage: 8 V or more Set Conditions ● The sensor output voltage is 4.5 V or more for four seconds (equivalent to 114 kPa of barometric pressure) or ● The sensor output voltage is 0.2 V or less (equivalent to 53 kPa of barometric pressure)	● Malfunction of barometric pressure sensor ● Open or short circuit in barometric pressure sensor circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

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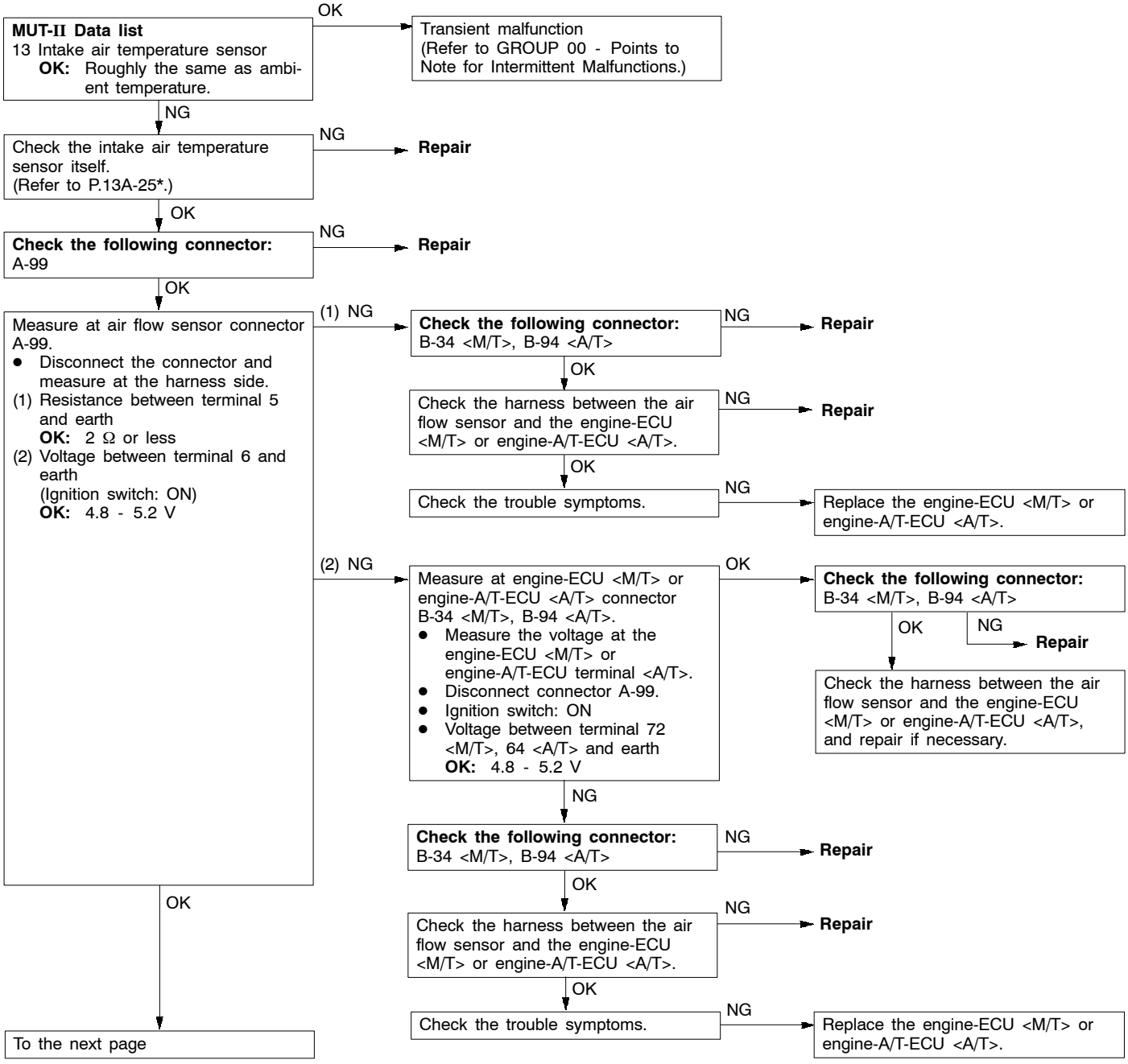
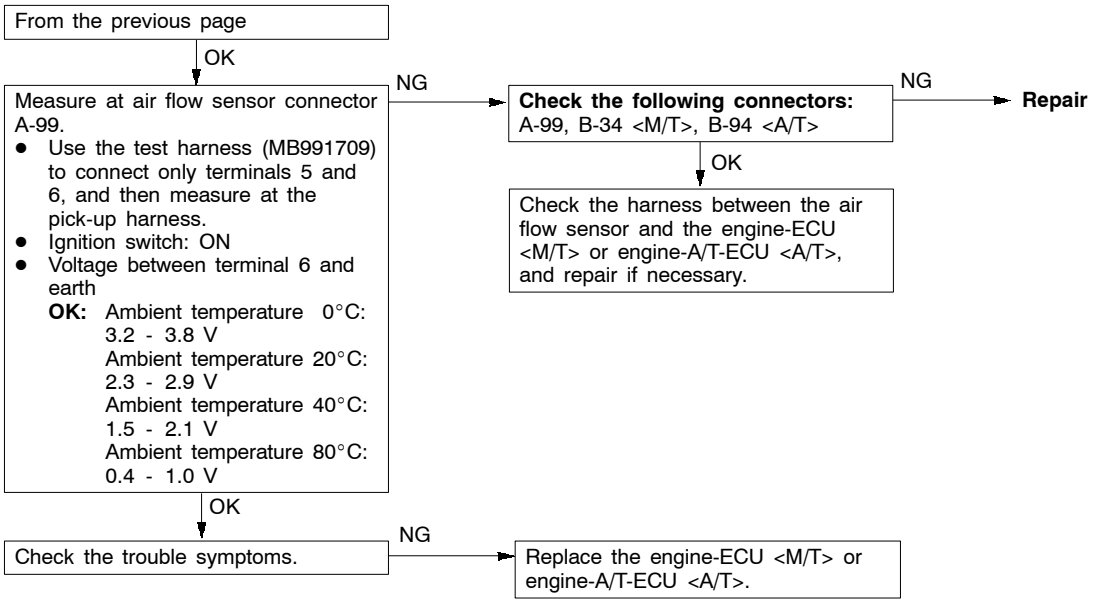
OK
Measure at air flow sensor connector A-99.
● Connect connector terminals No. 1, No. 2 and No. 5 only by using test harness (MB991709), and measure at the pick-up harness.
● Ignition switch: ON
(1) Voltage between terminal 1 and earth
OK: 4.8 - 5.2 V
(2) Voltage between terminal 2 and earth
OK: Altitude 0 m: 3.7 - 4.3 V
Altitude 1,200 m: 3.2 - 3.8 V
(3) Voltage between terminal 5 and earth
OK: 0.5 V or less
(1) NG
(3) NG
Check the following connector: B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the harness between the air flow sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and repair if necessary.
(2) NG
Replace the air flow sensor.
Check the trouble symptoms.
NG
Check the following connector: B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the harness between the air flow sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and repair if necessary.
OK
Measure at engine-ECU <M/T> or engine-A/T-ECU <A/T> connector B-34 <M/T>, B-94 <A/T>.
● Measure the voltage at the engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal.
● Ignition switch: ON
● Voltage between terminal 81 <M/T>, 46 <A/T> and earth
OK: Altitude 0 m: 3.7 - 4.3 V
Altitude 1,200 m: 3.2 - 3.8 V
NG
Check the following connector: B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the harness between the air flow sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and repair if necessary.
OK
Check the following connector: B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

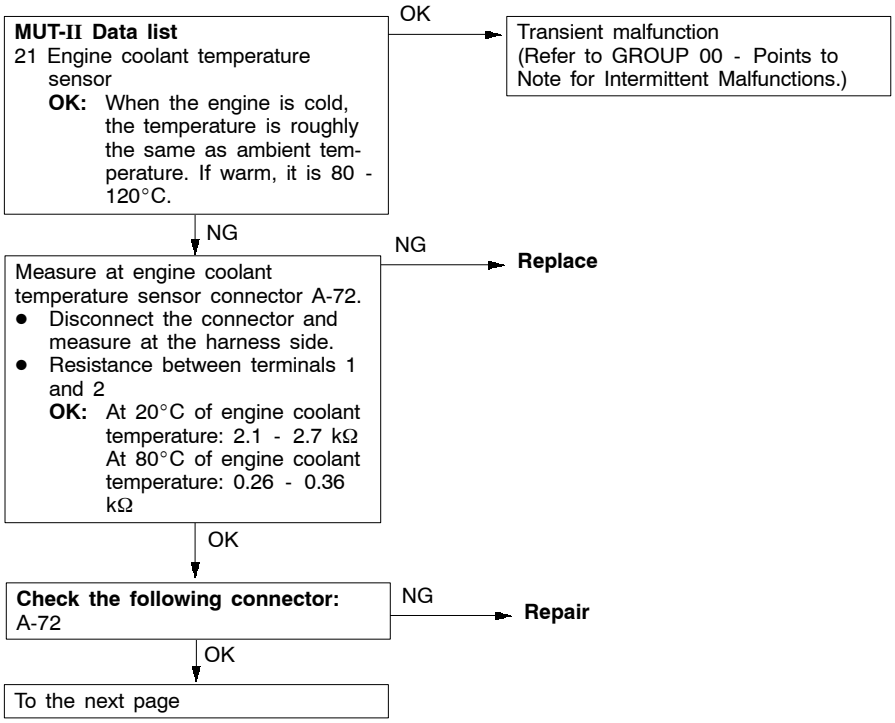
Code No. P0110 Intake air temperature sensor system	Probable cause
Range of Check ● Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. Set Conditions ● The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of intake air temperature) or ● The sensor output voltage is 0.2 V or more for four seconds (equivalent to 125°C of intake air temperature)	● Malfunction of intake air temperature sensor ● Open or short circuit in intake air temperature sensor or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

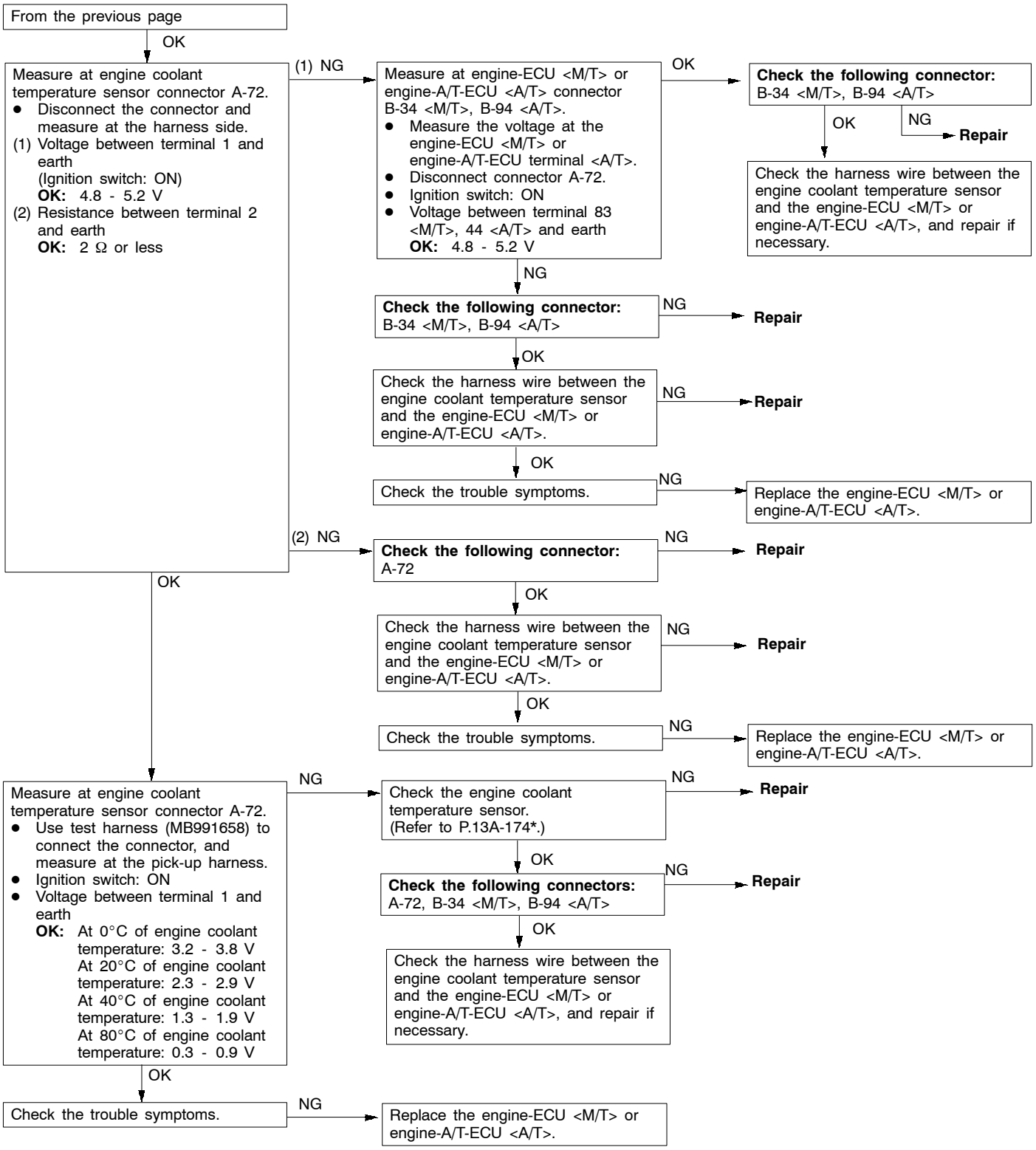




NOTE:
*: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9911-B).

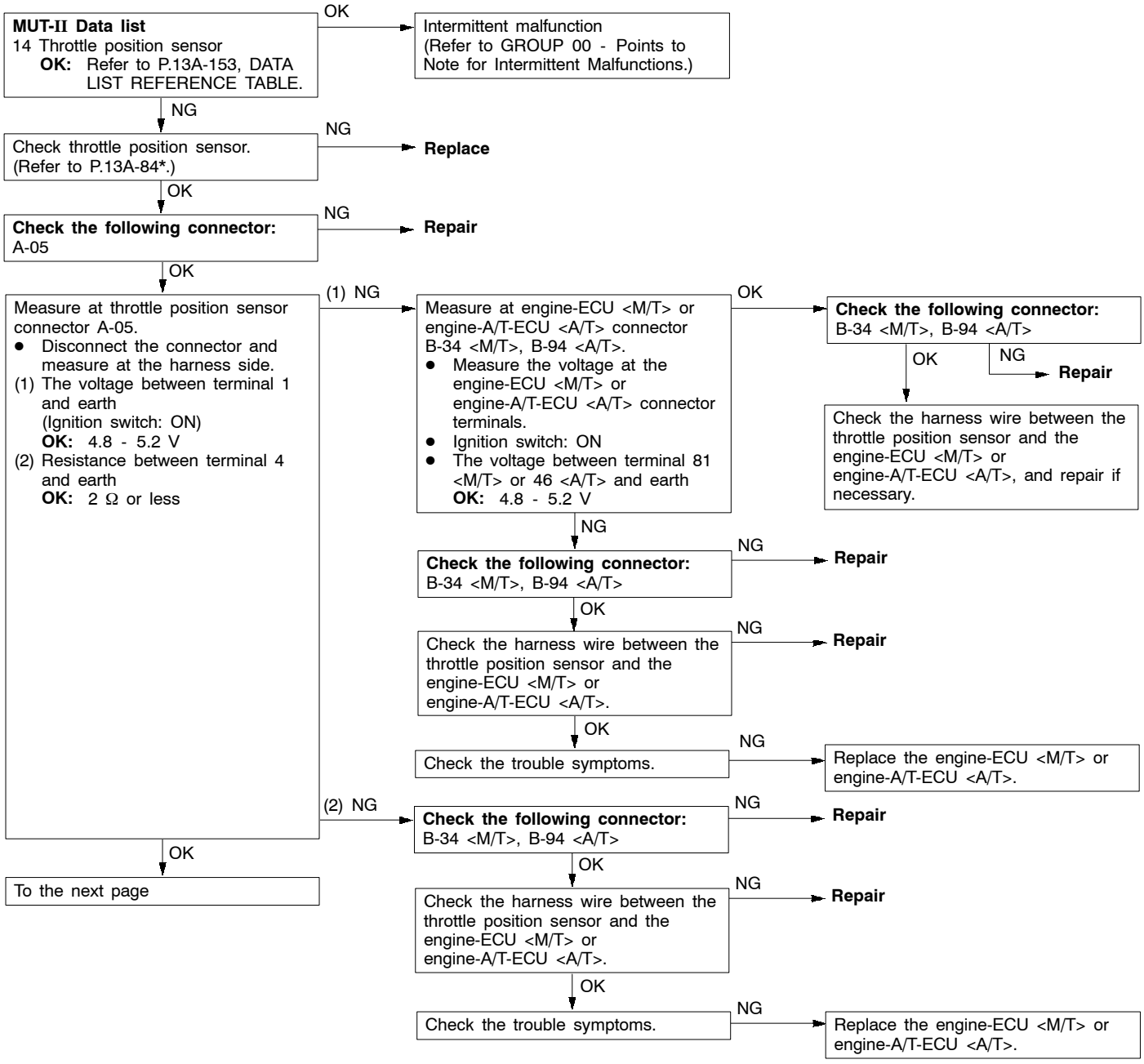
Code No. P0115 Engine coolant temperature sensor system	Probable cause
Range of Check ● Engine: Two seconds after the engine has been started Set Conditions ● The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C engine coolant temperature) or ● The sensor output voltage is 0.1 V or less for four seconds (equivalent to 140°C of engine coolant temperature)	● Malfunction of engine coolant temperature sensor ● Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>
Range of Check ● Engine: After starting Set Conditions ● The engine coolant temperature has reduced from over 40°C to less than 40°C, and that condition has lasted for five minutes or more.	



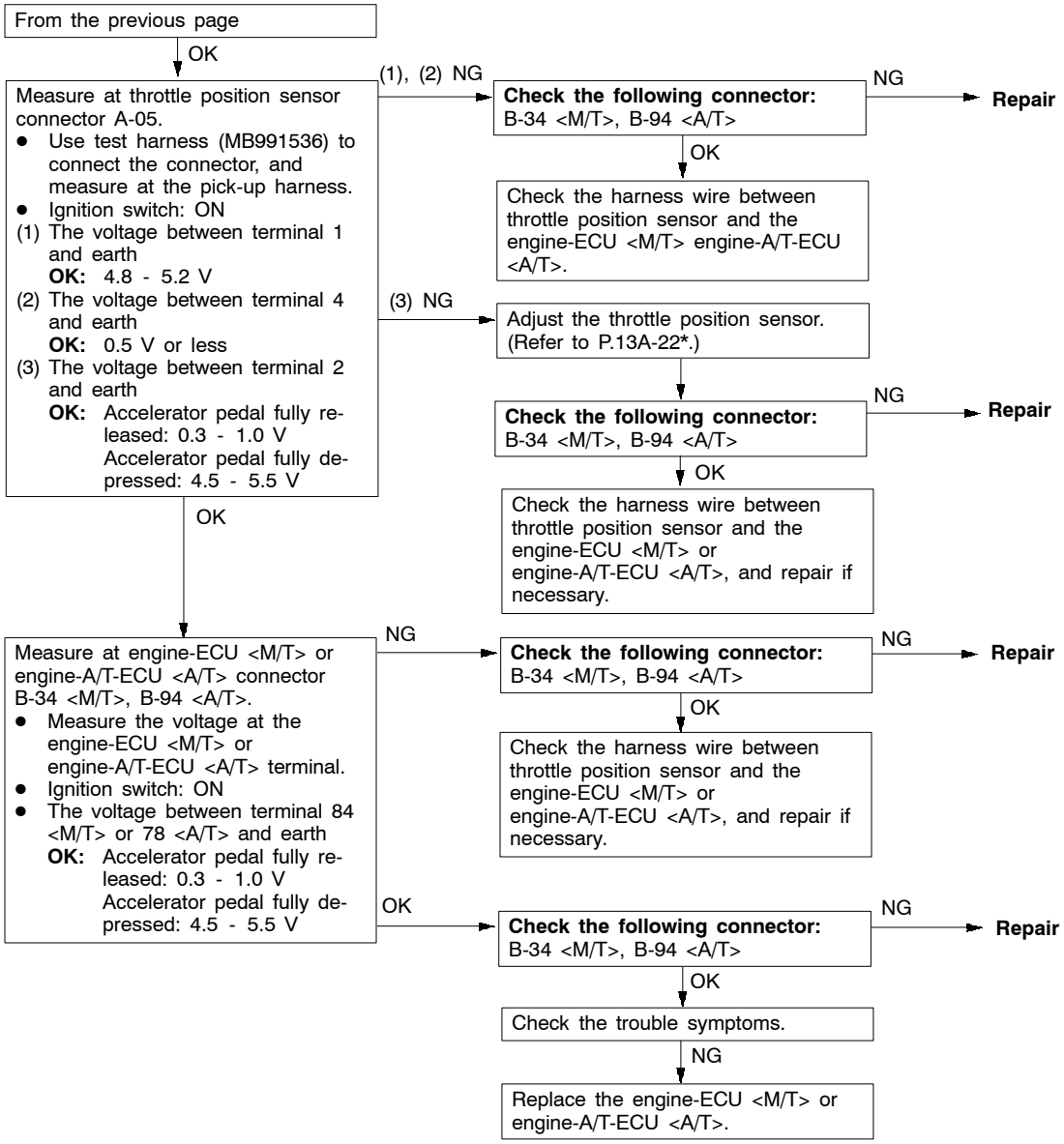


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. 0120 Throttle position sensor system	Probable cause
Range of Check ● Ignition switch: ON ● The throttle position sensor is normal. Set Conditions ● The sensor output voltage is 0.2 V or less for four seconds. or ● The sensor output voltage is 4.85 V or more for four seconds, and the output voltage of the throttle position sensor (1st channel) is 1.2 V or more. or ● The throttle position sensor and combination output voltage is outside 4 - 6 V.	● Malfunction of throttle position sensor ● Open or short circuit in the throttle position sensor circuit or loose connector contact ● Malfunction of the engine-ECU <M/T> ● Malfunction of the engine-A/T-ECU <A/T>

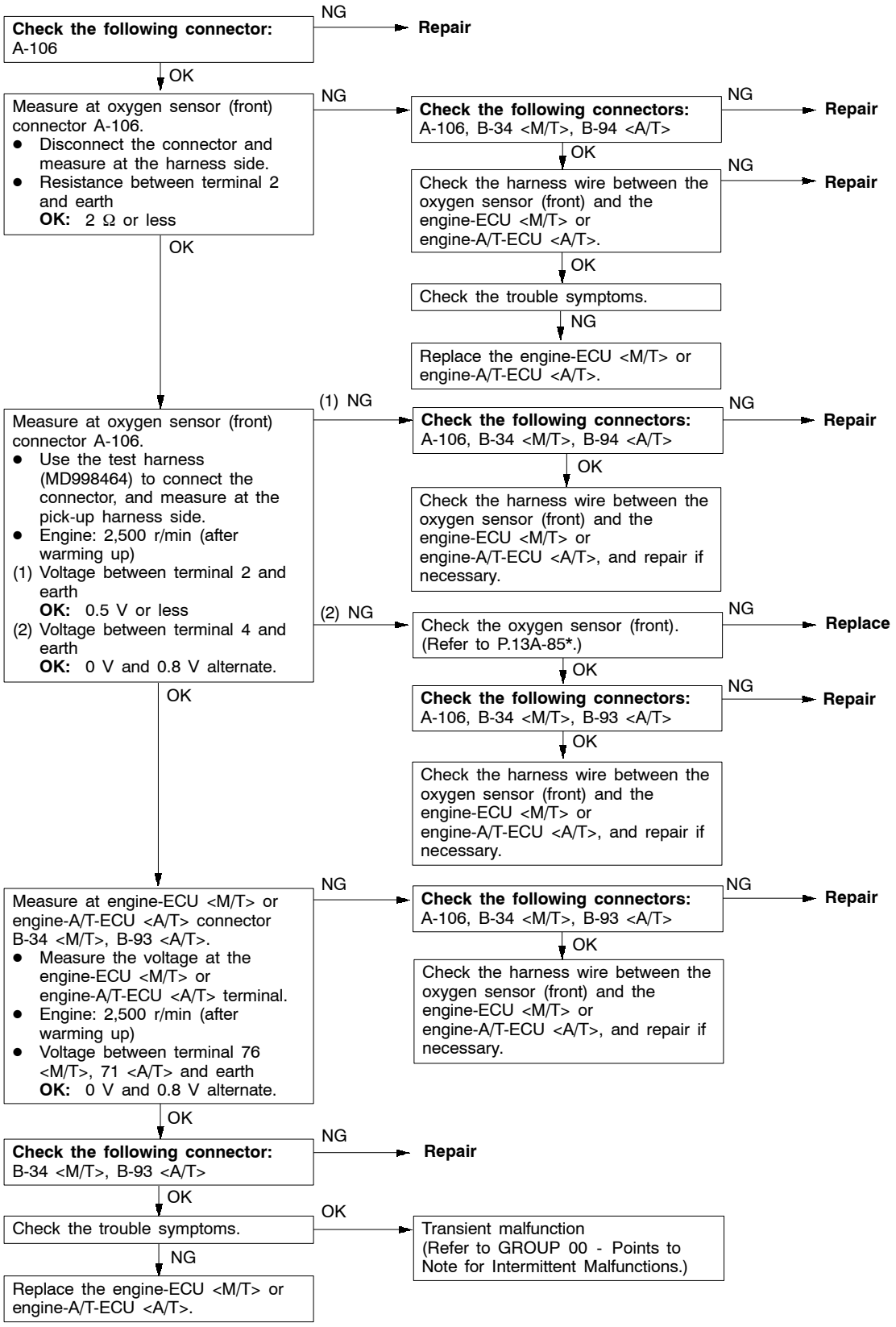


NOTE
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



NOTE
*: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

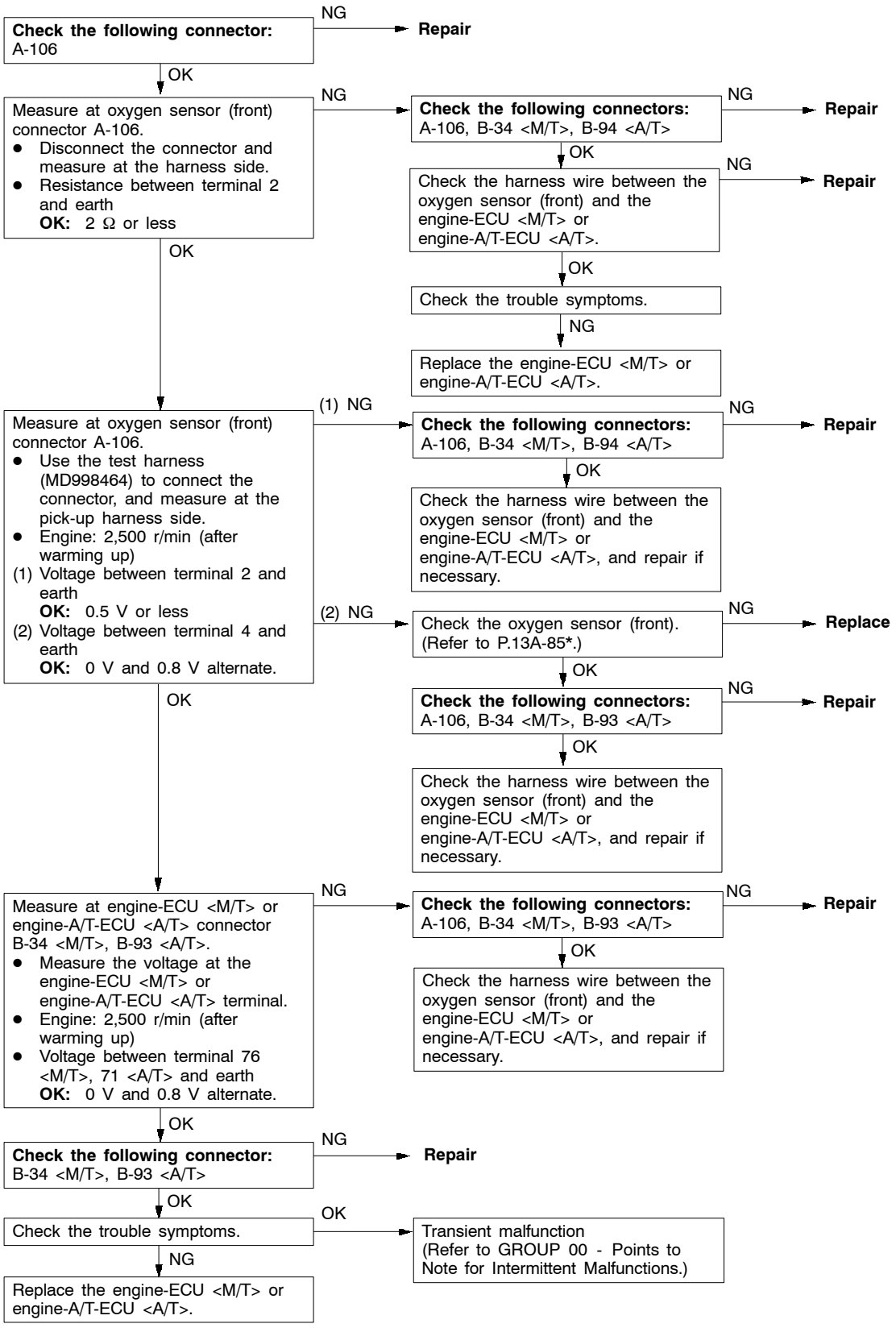
Code No. P0125 Feedback system	Probable cause
Range of Check ● The engine coolant temperature is approx. 80°C or more. ● During stoichiometric feedback control ● The vehicle is not being decelerated. Set Conditions ● Oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds.	● Malfunction of oxygen sensor (front) ● Open or short circuit in the oxygen sensor (front) circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



NOTE

*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

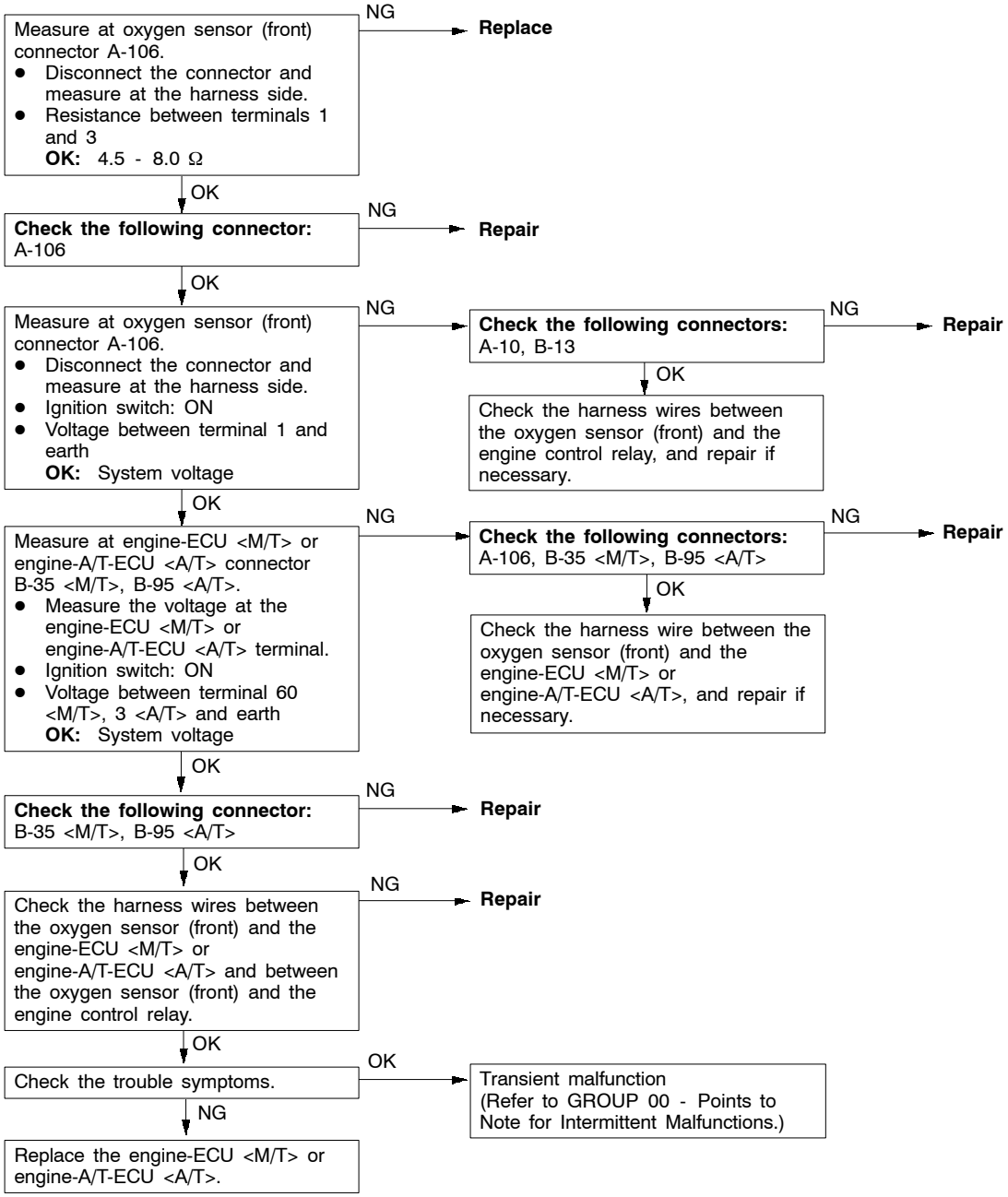
Code No. P0130 Oxygen sensor (front) system <sensor 1>	Probable cause
Range of Check ● Three minutes have been passed since the engine has been started. ● The engine coolant temperature is approx. 80°C or more. ● Engine speed is 1,200 r/min or more ● Driving on a level surface at constant speed. Set Conditions ● The oxygen sensor (front) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (front) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>.	● Malfunction of oxygen sensor (front) ● Open or short circuit in the oxygen sensor (front) circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>
Range of Check ● Engine speed is 3,000 r/min or less ● During driving ● During air/fuel ratio feedback control Set Conditions ● The oxygen sensor (front) output frequency is five or less per 12 seconds on average.	



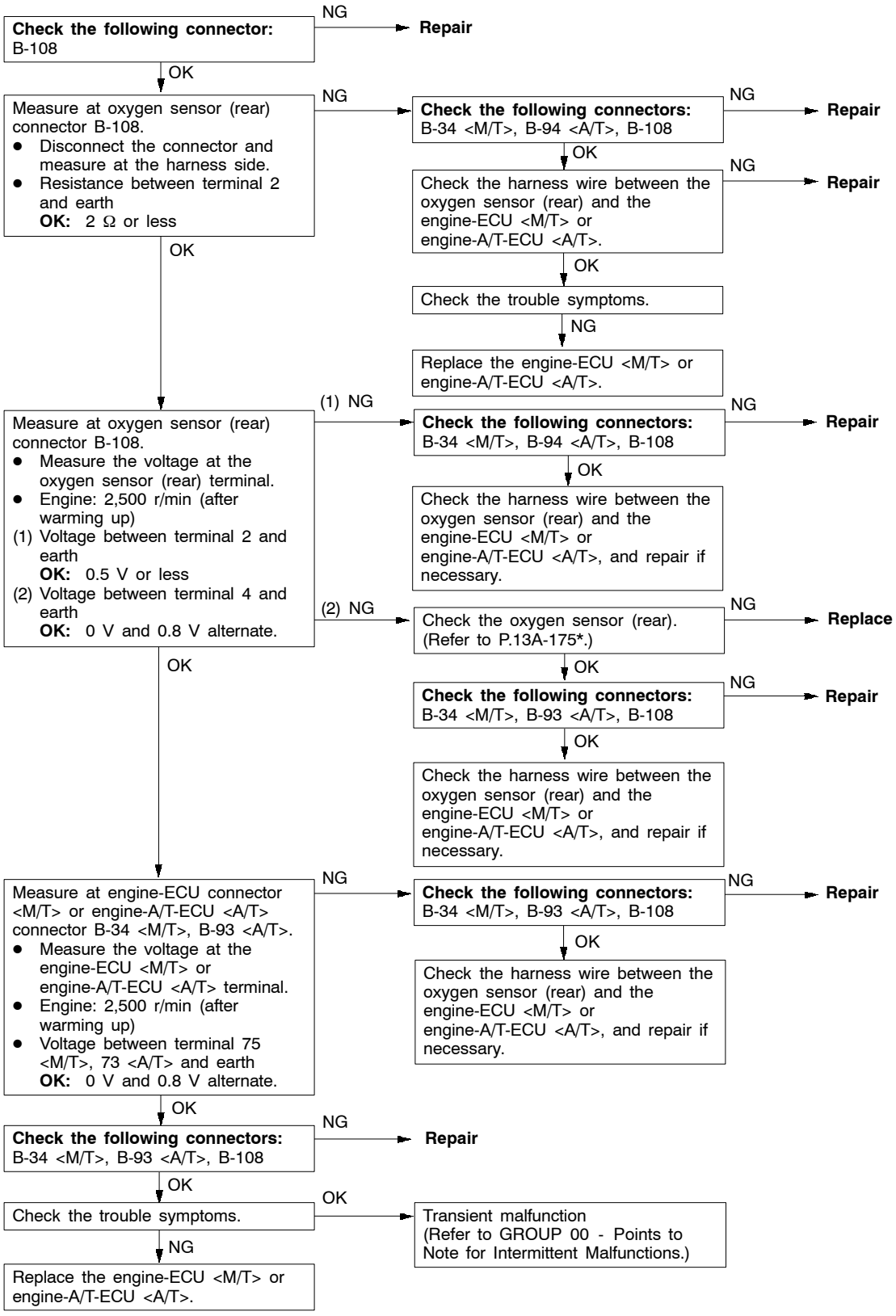
NOTE

*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. P0135 Oxygen sensor heater (front) system <sensor 1>	Probable cause
Range of Check ● The engine coolant temperature is approx. 20°C or more. ● The oxygen sensor heater (front) remains on. ● The engine speed is 50 r/min or more. ● Battery voltage is 11 - 16 V. Set Conditions ● The current, which flows through the oxygen sensor heater (front), is 0.2 A or less or 3.5 A or more for six seconds.	● Malfunction of oxygen sensor heater (front) ● Open or short circuit in the oxygen sensor heater (front) circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



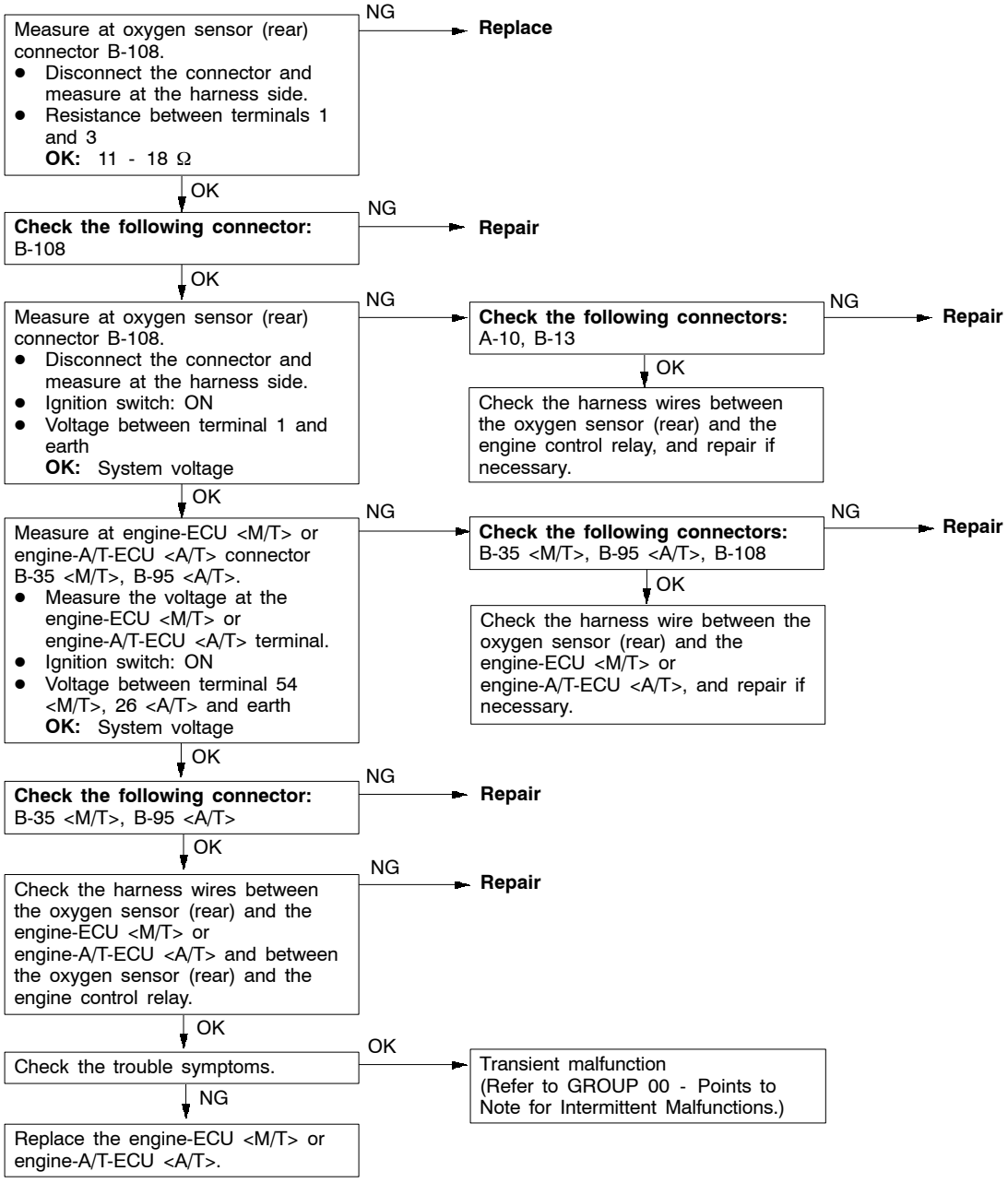
Code No. P0136 Oxygen sensor (rear) system <sensor 2>	Probable cause
Range of Check ● Three minutes have been passed since the engine has been started. ● The engine coolant temperature is approx. 80°C or more. ● Intake air temperature is 20 - 50°C ● Engine speed is 1,200 r/min or more ● Driving on a level surface at constant speed. Set Conditions ● The oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (rear) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>.	● Malfunction of oxygen sensor (rear) ● Open or short circuit in the oxygen sensor (rear) circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>
Range of Check ● Two seconds have passed after the engine-ECU <M/T> or engine-A/T-ECU <A/T> detected an open circuit. ● When the oxygen sensor (front) is in good condition. Set Conditions ● When the air/fuel ratio is rich, the oxygen sensor (front) output voltage is 0.5 V or more, the oxygen sensor (rear) output voltage is less than 0.1 V, and the oxygen sensor (rear) output voltage fluctuates within 0.078 V.	



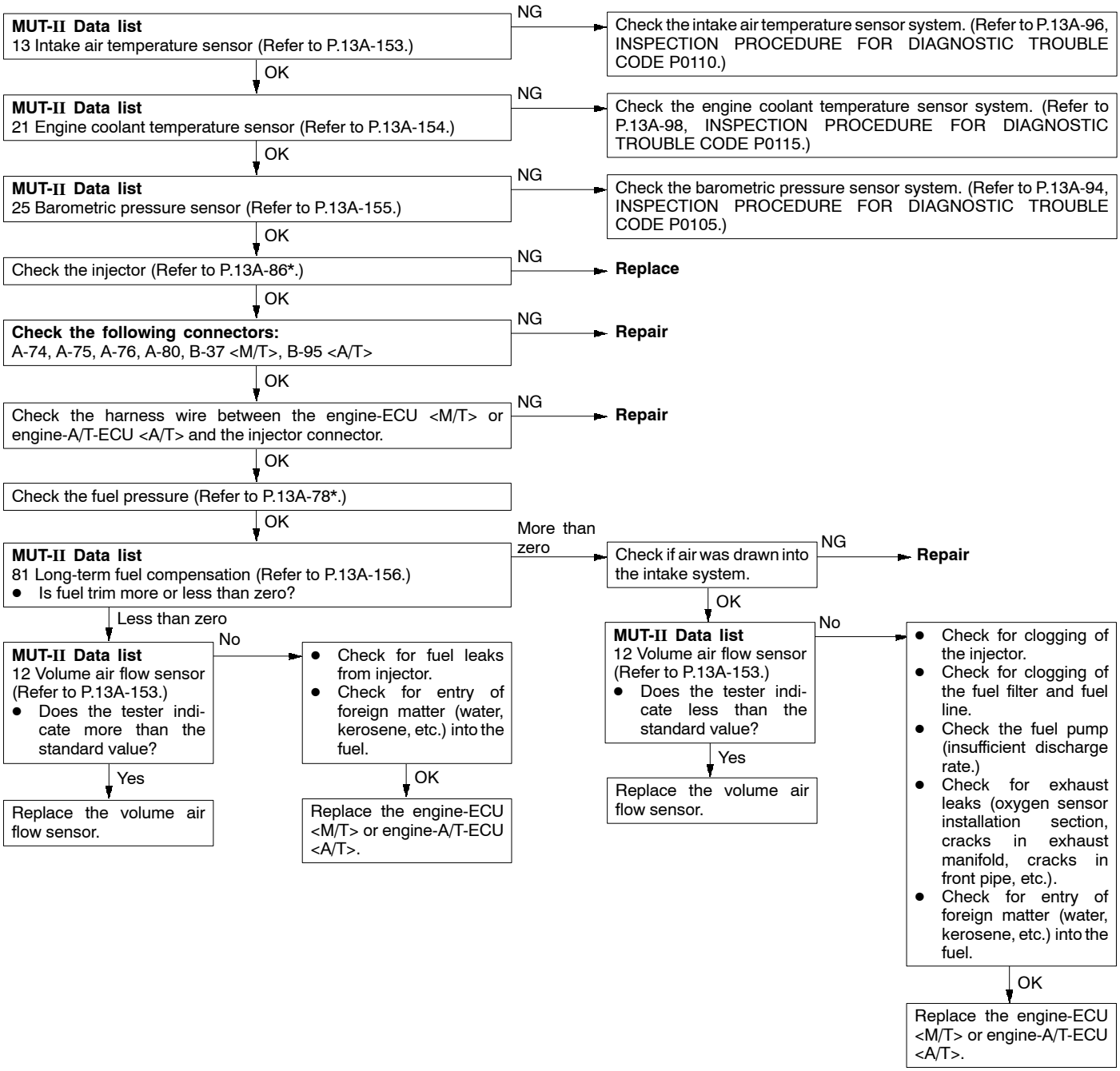
NOTE

*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. P0141 Oxygen sensor heater (rear) system <sensor 2>	Probable cause
Range of Check ● The engine coolant temperature is approx. 20°C or more. ● The oxygen sensor heater (rear) remains on. ● The engine speed is 50 r/min or more. ● Battery voltage is 11 - 16 V. Set Conditions ● The current, which flows through the oxygen sensor heater (rear), is 0.2 A or less or 3.5 A or more for six seconds.	● Malfunction of oxygen sensor heater (rear) ● Open or short circuit in the oxygen sensor heater (rear) circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

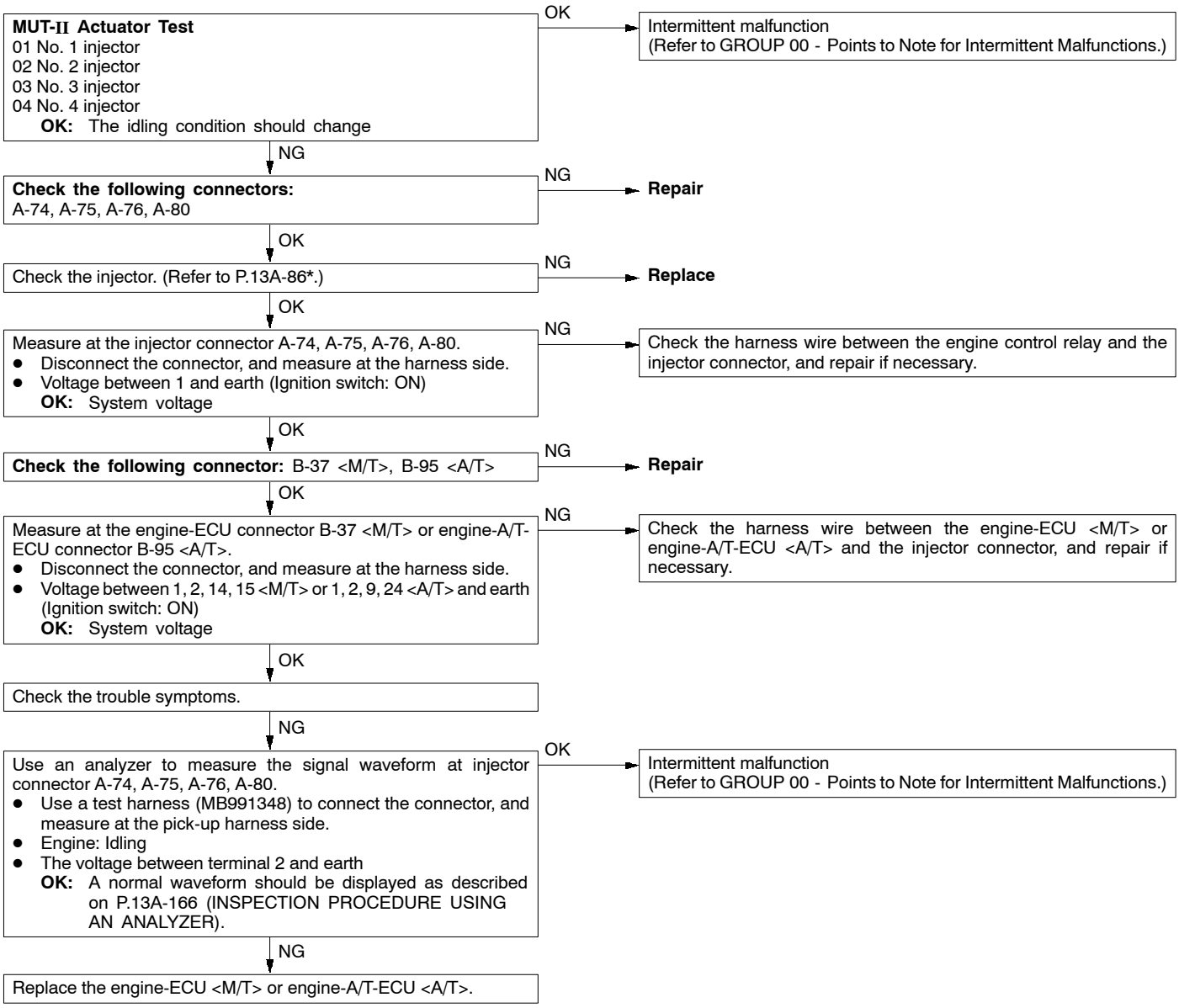


Code No. P0170 Abnormal fuel system	Probable cause
Range of Check ● Engine: Being learning the air-fuel ratio Set Conditions ● Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or ● Ten seconds or more have been passed while the fuel injection amount compensation value is too high.	● Incorrect fuel pressure ● Malfunction of fuel supply system ● Malfunction of oxygen sensor (front) ● Malfunction of intake air temperature sensor ● Malfunction of barometric pressure sensor ● Malfunction of air flow sensor ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



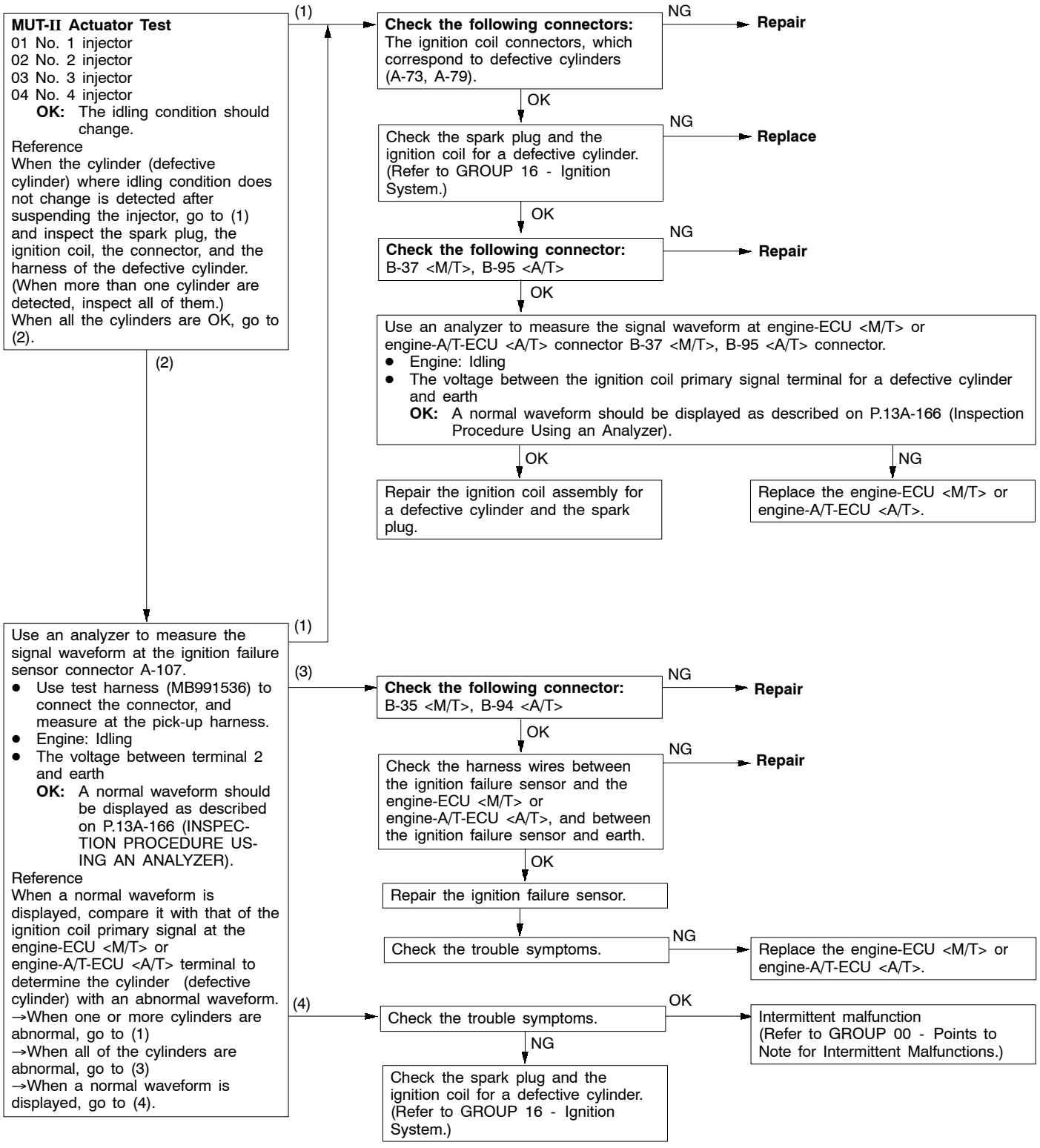
NOTE
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Code No. P0201 No. 1 injector system Code No. P0202 No. 2 injector system Code No. P0203 No. 3 injector system Code No. P0204 No. 4 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 engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

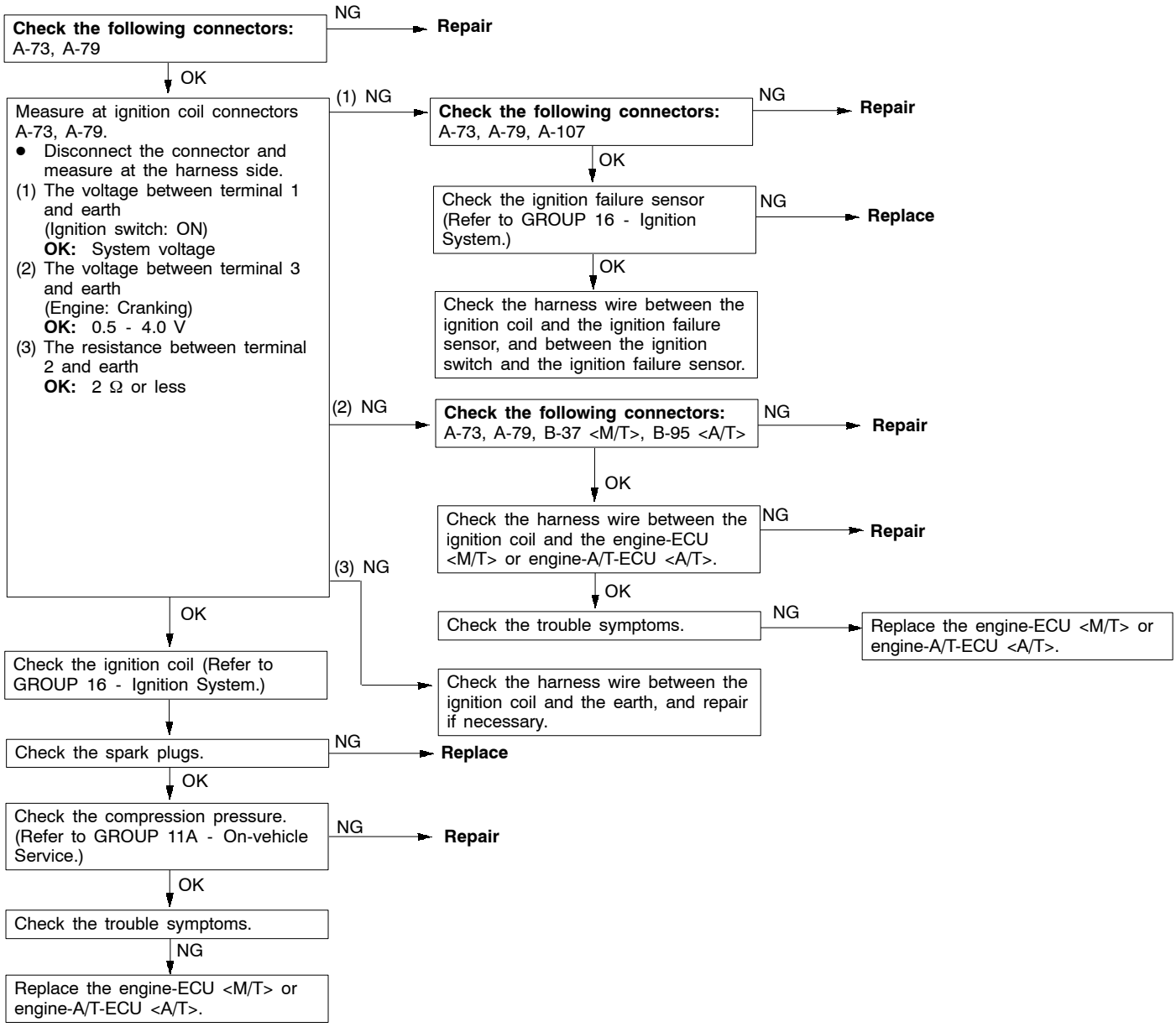


NOTE
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

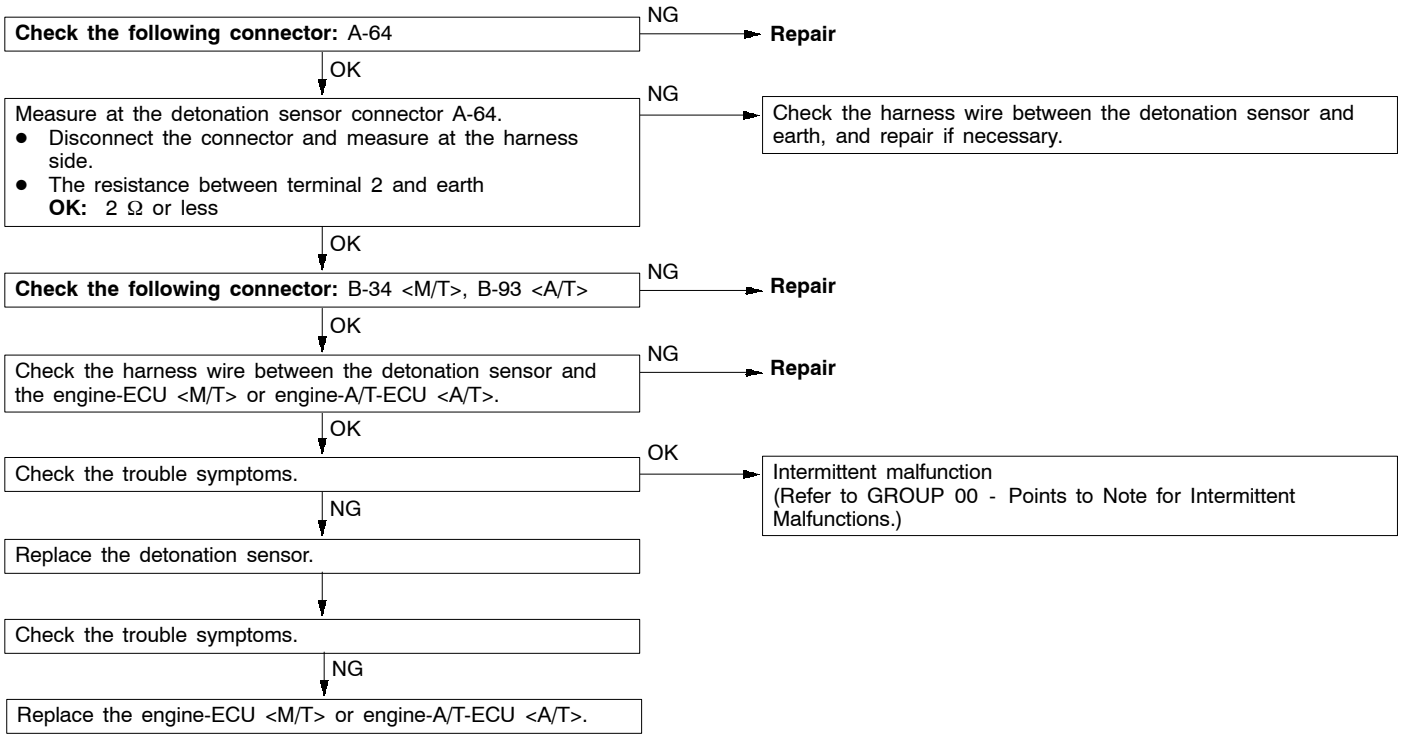
Code No. P0300 Ignition coil (power transistor) system	Probable cause
Range of Check ● Engine speed is approx. 50 - 4,000 r/min. ● Engine is not cranking. Set Conditions ● The ignition failure sensor does not send a signal about a certain cylinder for four seconds.	● Malfunction of the ignition coil ● Malfunction of the ignition failure sensor ● Malfunction of spark plug ● Open or short circuit in the primary ignition circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



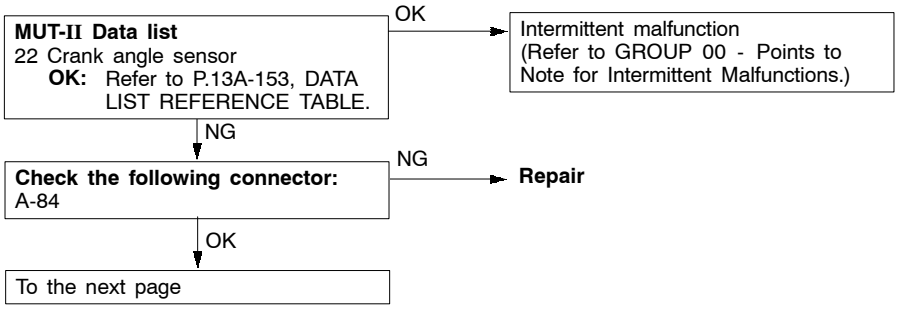
Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected	Probable cause
Range of Check ● The engine speed is 500 - 4,500 r/min. ● While the engine is running except deceleration and sudden acceleration. Set Conditions ● The number of misfires exceeds a predetermined number per 200 engine revolutions (Misfire has occurred in only one cylinder). or ● The number of misfires exceeds a predetermined number per 100 engine revolutions (Misfire has occurred in only one cylinder).	● Malfunction of the ignition system ● Abnormal compression ● Malfunction of injector ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

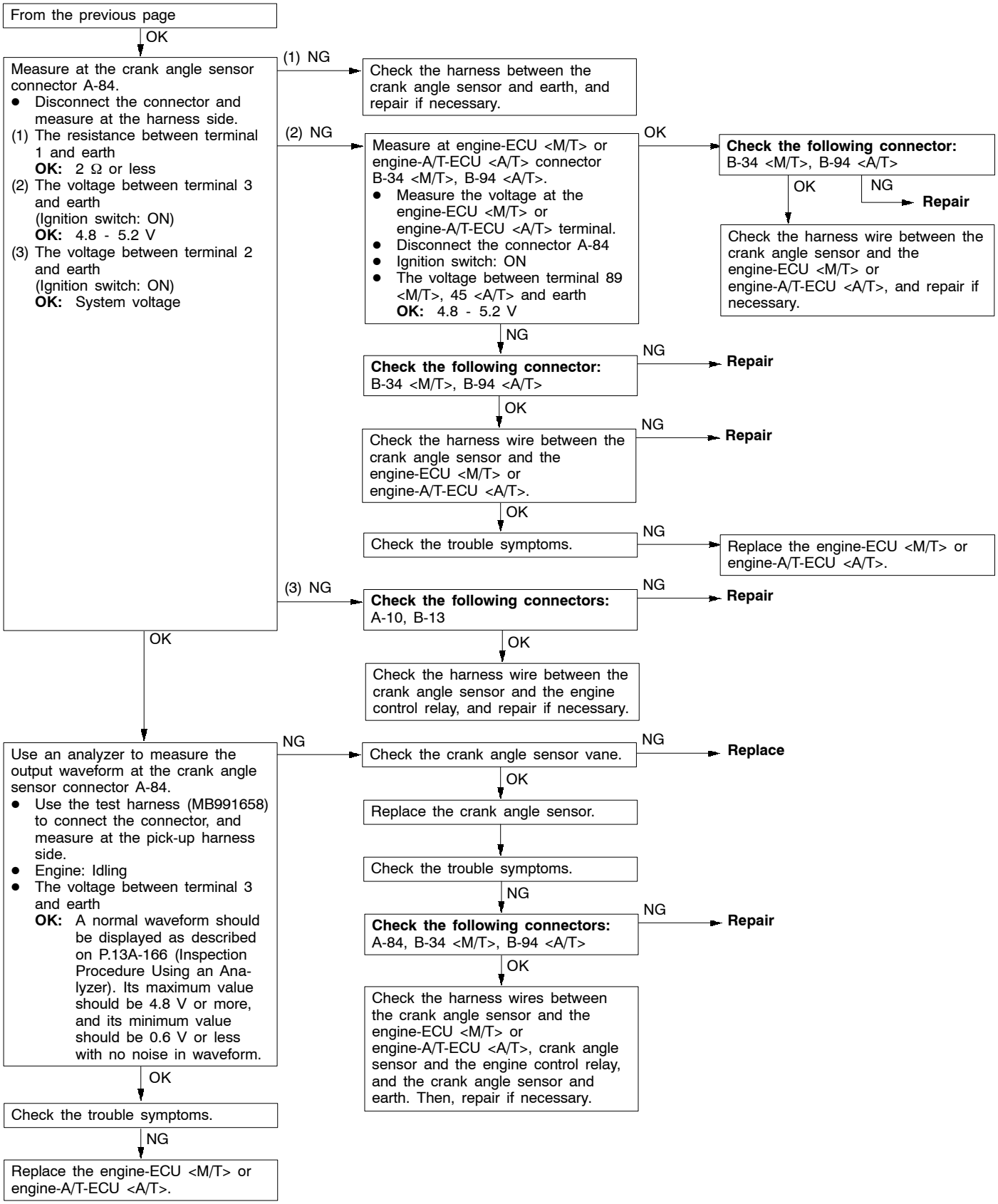


Code No. P0325 Detonation sensor system	Probable cause
Range of Check ● Engine: Two seconds after the engine has been started Set Conditions ● Changes in sensor output voltage (detonation sensor peak voltage per 1/2 crankshaft rotation) in 200 consecutive cycles are 0.08 V or less.	● Malfunction of the detonation sensor ● Open or short circuit in the detonation sensor circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

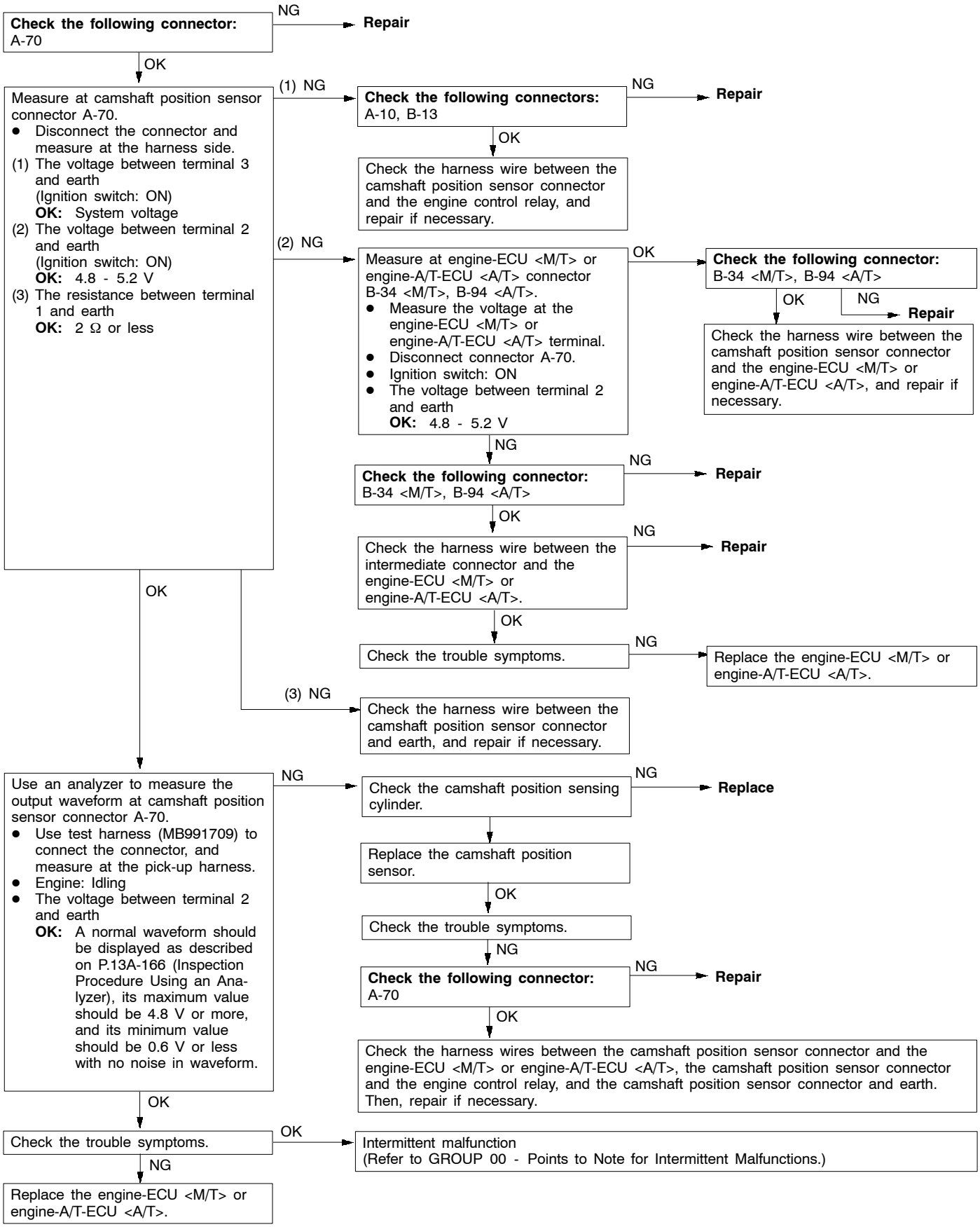


Code No. P0335 Crank angle sensor system	Probable cause
Range of Check ● Engine is cranking Set Conditions ● Sensor output voltage does not change for 4 seconds (no pulse signal input).	● Malfunction of the crank angle sensor. ● Open or short circuit in the crank angle sensor circuit or loose connector contact. ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

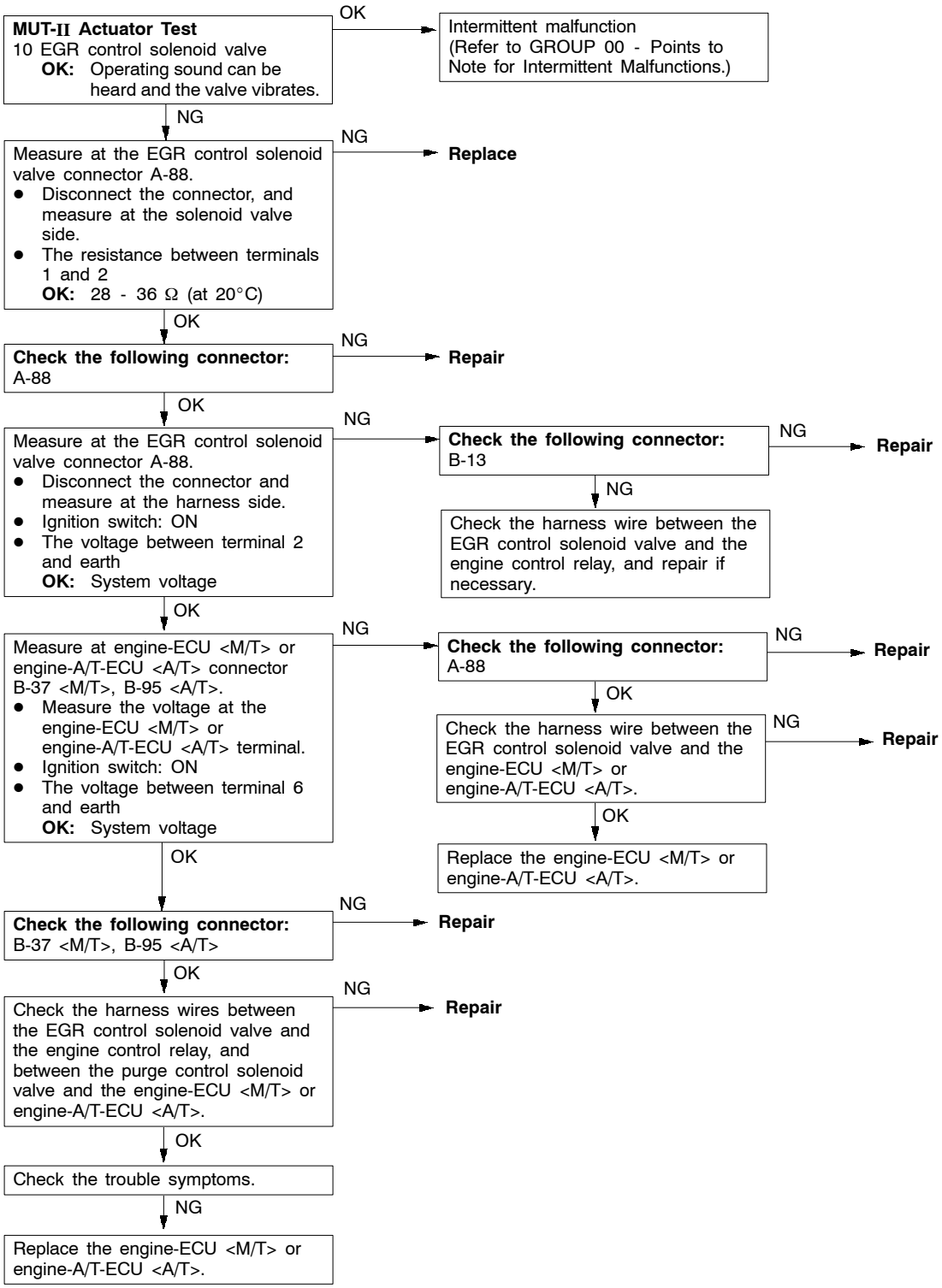



From the previous page
OK
Measure at the crank angle sensor connector A-84.
● Disconnect the connector and measure at the harness side.
(1) The resistance between terminal 1 and earth
OK: 2 Ω or less
(2) The voltage between terminal 3 and earth
(Ignition switch: ON)
OK: 4.8 - 5.2 V
(3) The voltage between terminal 2 and earth
(Ignition switch: ON)
OK: System voltage
(1) NG
Check the harness between the crank angle sensor and earth, and repair if necessary.
(2) NG
Measure at engine-ECU <M/T> or engine-A/T-ECU <A/T> connector B-34 <M/T>, B-94 <A/T>.
● Measure the voltage at the engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal.
● Disconnect the connector A-84
● Ignition switch: ON
● The voltage between terminal 89 <M/T>, 45 <A/T> and earth
OK: 4.8 - 5.2 V
OK
Check the following connector: B-34 <M/T>, B-94 <A/T>
OK
NG
Repair
Check the harness wire between the crank angle sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and repair if necessary.
NG
Check the following connector: B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the harness wire between the crank angle sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
(3) NG
Check the following connectors: A-10, B-13
NG
Repair
OK
Check the harness wire between the crank angle sensor and the engine control relay, and repair if necessary.
OK
Use an analyzer to measure the output waveform at the crank angle sensor connector A-84.
● Use the test harness (MB991658) to connect the connector, and measure at the pick-up harness side.
● Engine: Idling
● The voltage between terminal 3 and earth
OK: A normal waveform should be displayed as described on P.13A-166 (Inspection Procedure Using an Analyzer). Its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.
NG
Check the crank angle sensor vane.
NG
Replace
OK
Replace the crank angle sensor.
Check the trouble symptoms.
NG
Check the following connectors: A-84, B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the harness wires between the crank angle sensor and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, crank angle sensor and the engine control relay, and the crank angle sensor and earth. Then, repair if necessary.
OK
Check the trouble symptoms.
NG
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

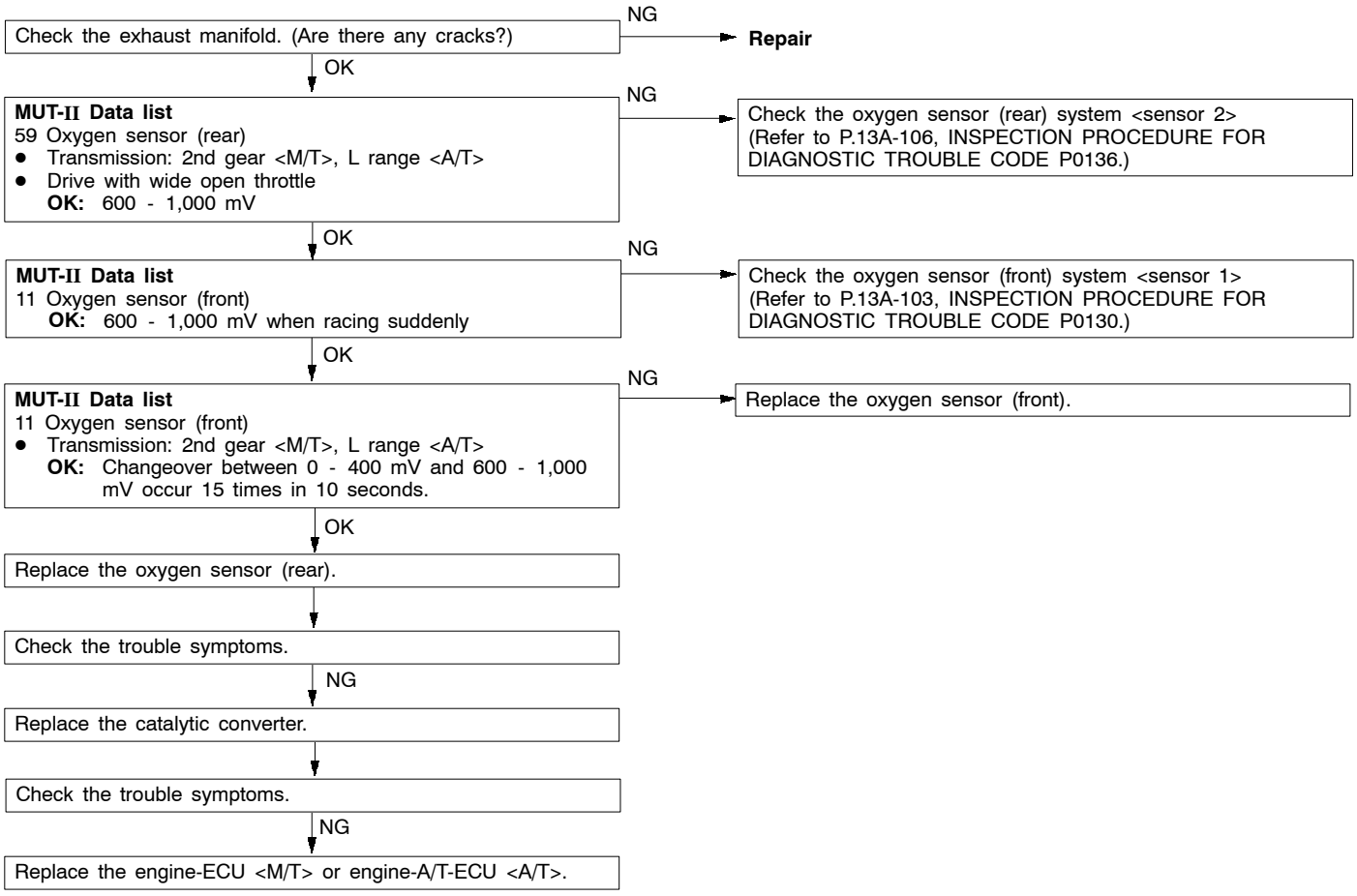
Code No. P0340 Camshaft position sensor system	Probable cause
Range of Check ● After the engine was started Set Conditions ● The sensor output voltage does not change for 4 seconds (no pulse signal input).	● Malfunction of the camshaft position sensor ● Open or short circuit in the camshaft position sensor circuit or loose connector contact. ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>


Check the following connector: A-70
NG
Repair
OK
Measure at camshaft position sensor connector A-70.
● Disconnect the connector and measure at the harness side.
(1) The voltage between terminal 3 and earth (Ignition switch: ON)
OK: System voltage
(2) The voltage between terminal 2 and earth (Ignition switch: ON)
OK: 4.8 - 5.2 V
(3) The resistance between terminal 1 and earth
OK: 2 Ω or less
(1) NG
Check the following connectors: A-10, B-13
NG
Repair
OK
Check the harness wire between the camshaft position sensor connector and the engine control relay, and repair if necessary.
(2) NG
Measure at engine-ECU <M/T> or engine-A/T-ECU <A/T> connector B-34 <M/T>, B-94 <A/T>.
● Measure the voltage at the engine-ECU <M/T> or engine-A/T-ECU <A/T> terminal.
● Disconnect connector A-70.
● Ignition switch: ON
● The voltage between terminal 2 and earth
OK: 4.8 - 5.2 V
OK
Check the following connector: B-34 <M/T>, B-94 <A/T>
OK
NG
Repair
Check the harness wire between the camshaft position sensor connector and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and repair if necessary.
NG
Check the following connector: B-34 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the harness wire between the intermediate connector and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NG
Repair
OK
Check the trouble symptoms.
NG
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
OK
(3) NG
Check the harness wire between the camshaft position sensor connector and earth, and repair if necessary.
Use an analyzer to measure the output waveform at camshaft position sensor connector A-70.
● Use test harness (MB991709) to connect the connector, and measure at the pick-up harness.
● Engine: Idling
● The voltage between terminal 2 and earth
OK: A normal waveform should be displayed as described on P.13A-166 (Inspection Procedure Using an Analyzer), its maximum value should be 4.8 V or more, and its minimum value should be 0.6 V or less with no noise in waveform.
NG
Check the camshaft position sensing cylinder.
NG
Replace
Replace the camshaft position sensor.
OK
Check the trouble symptoms.
NG
Check the following connector: A-70
NG
Repair
OK
Check the harness wires between the camshaft position sensor connector and the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the camshaft position sensor connector and the engine control relay, and the camshaft position sensor connector and earth. Then, repair if necessary.
OK
Check the trouble symptoms.
OK
Intermittent malfunction
(Refer to GROUP 00 - Points to Note for Intermittent Malfunctions.)
NG
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

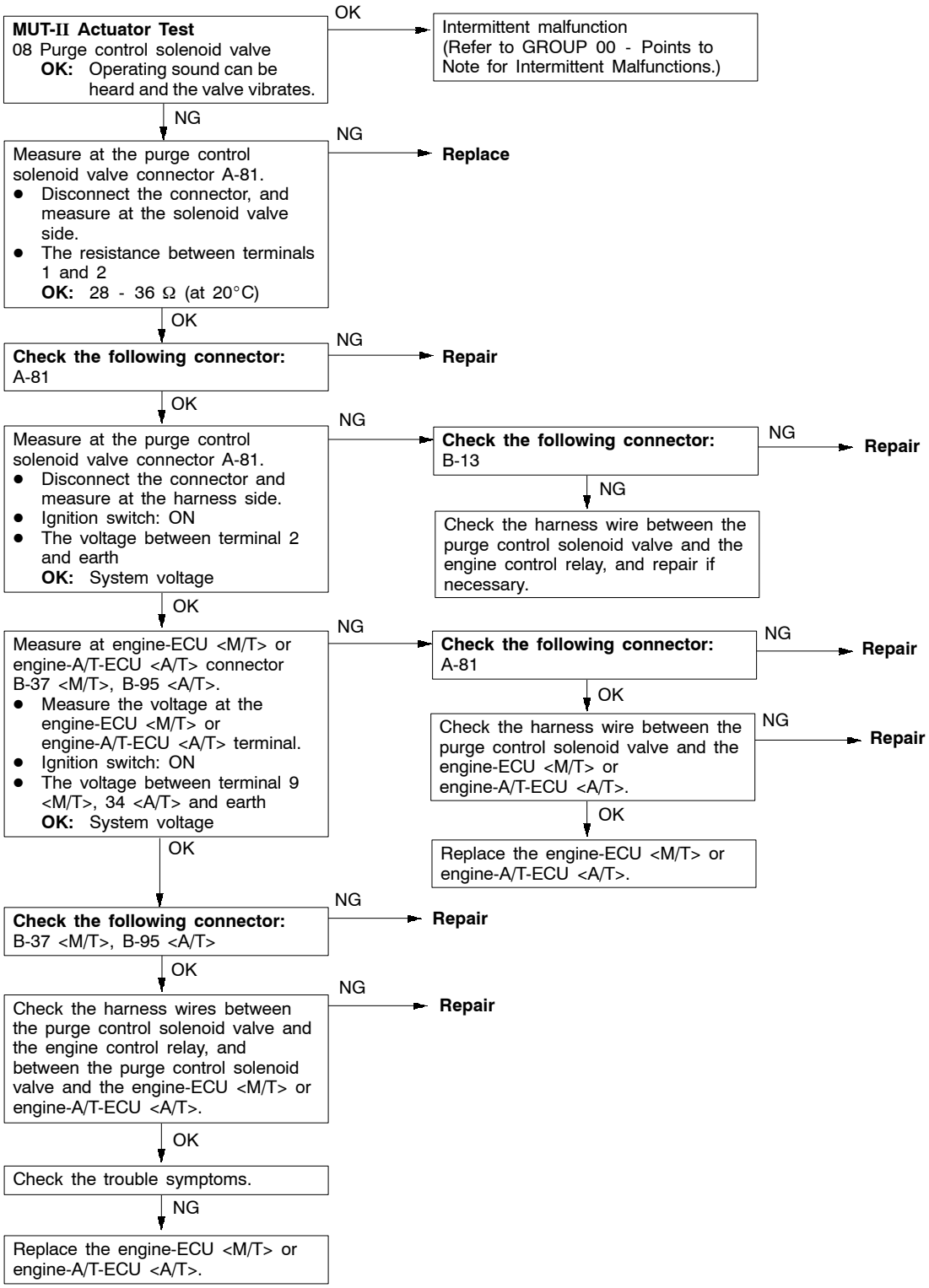
Code No. P0403 EGR control solenoid valve system	Probable cause
Range of Check ● Ignition switch: ON ● Battery voltage is 10 V or more. Set Conditions ● The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off.	● Malfunction of the EGR control solenoid valve ● Open or short circuit in the EGR control solenoid valve circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



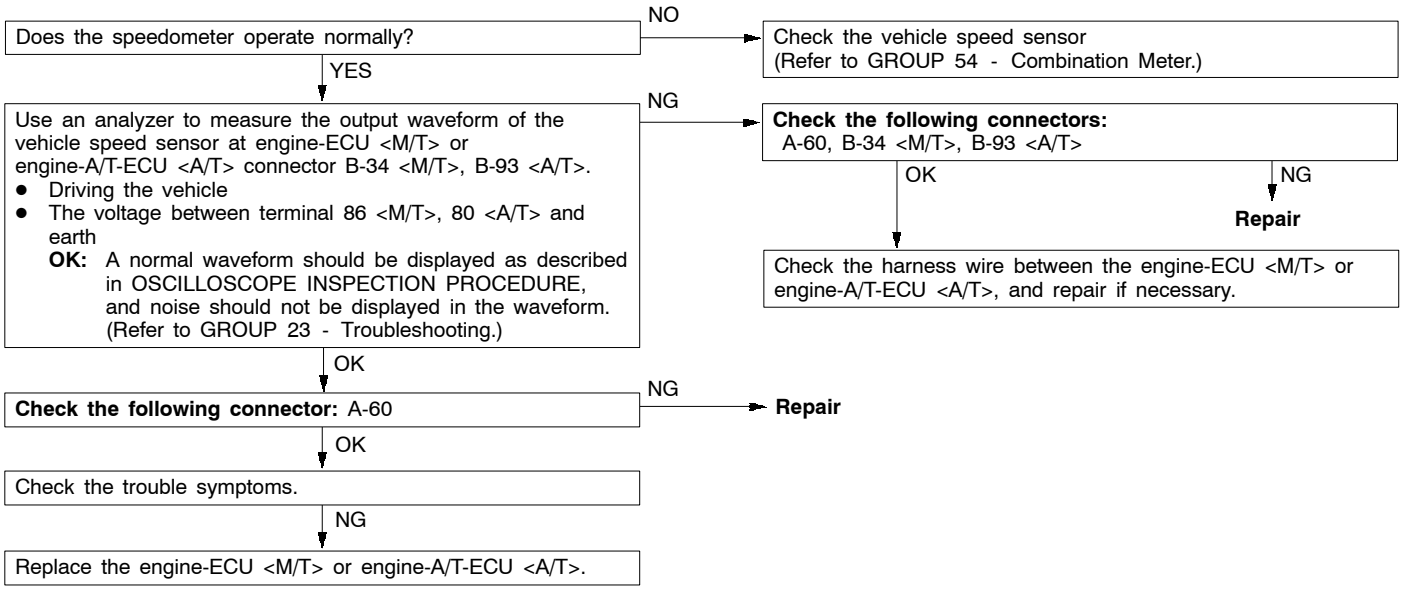
Code No. P0420 Catalyst malfunction	Probable cause
Range of Check ● The engine speed is 3,000 r/min or less. ● During driving ● During air/fuel ratio feedback control Set Conditions ● The ratio between the oxygen sensor (rear) and the oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds on average.	● Malfunction of catalyst ● Malfunction of the oxygen sensor (front) ● Malfunction of the oxygen sensor (rear) ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



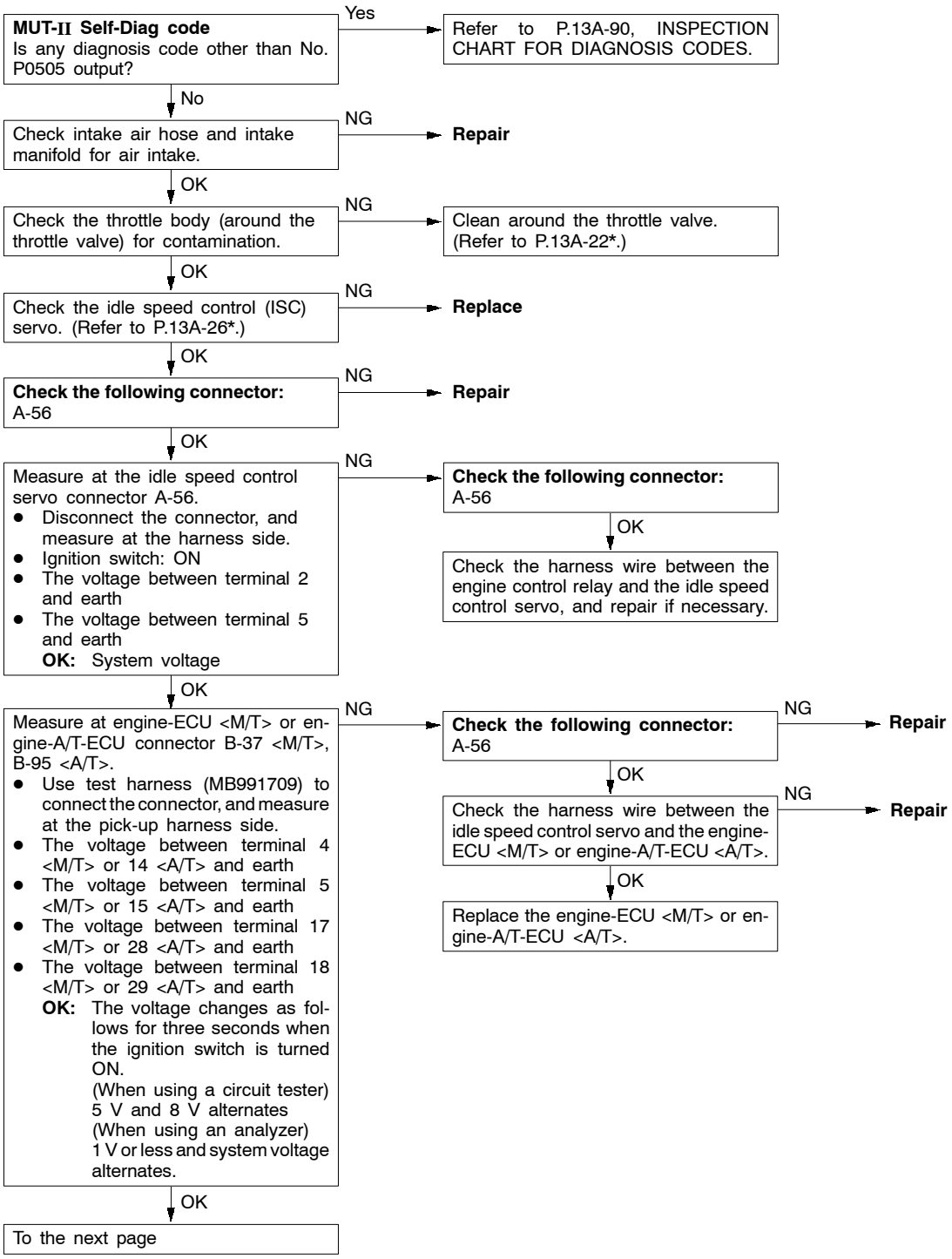
Code No. P0443 Purge control solenoid valve system	Probable cause
Range of Check ● Ignition switch: ON ● Battery voltage is 10 V or more. Set Conditions ● The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off.	● Malfunction of the purge control solenoid valve ● Open or short circuit in the purge control solenoid valve circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>

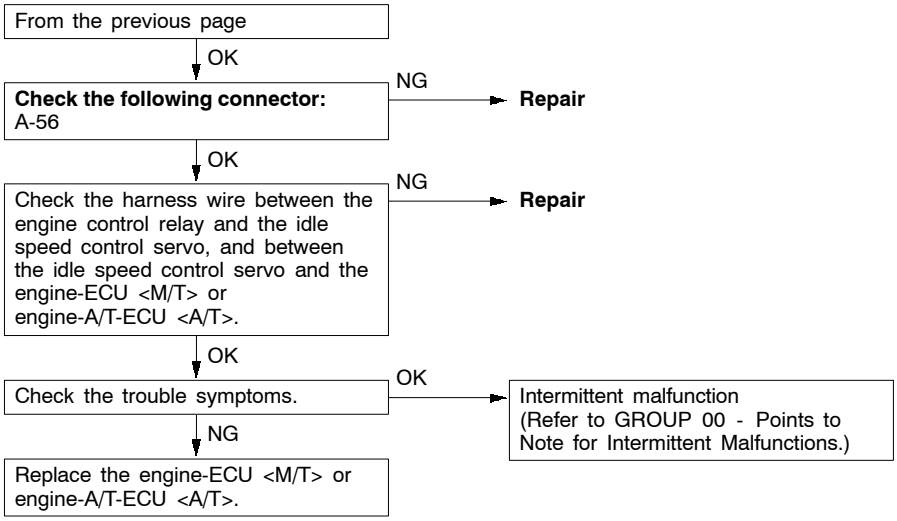


Code No. P0500 Vehicle speed sensor system	Probable cause
Range of Check ● Engine: Two seconds after the engine was started ● Idle switch: OFF ● Engine speed: 2,500 r/min or more ● During high engine load Set Conditions ● The sensor output voltage does not change for 4 seconds (no pulse signal input).	● Malfunction of the vehicle speed sensor ● Open or short circuit in the vehicle speed sensor circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



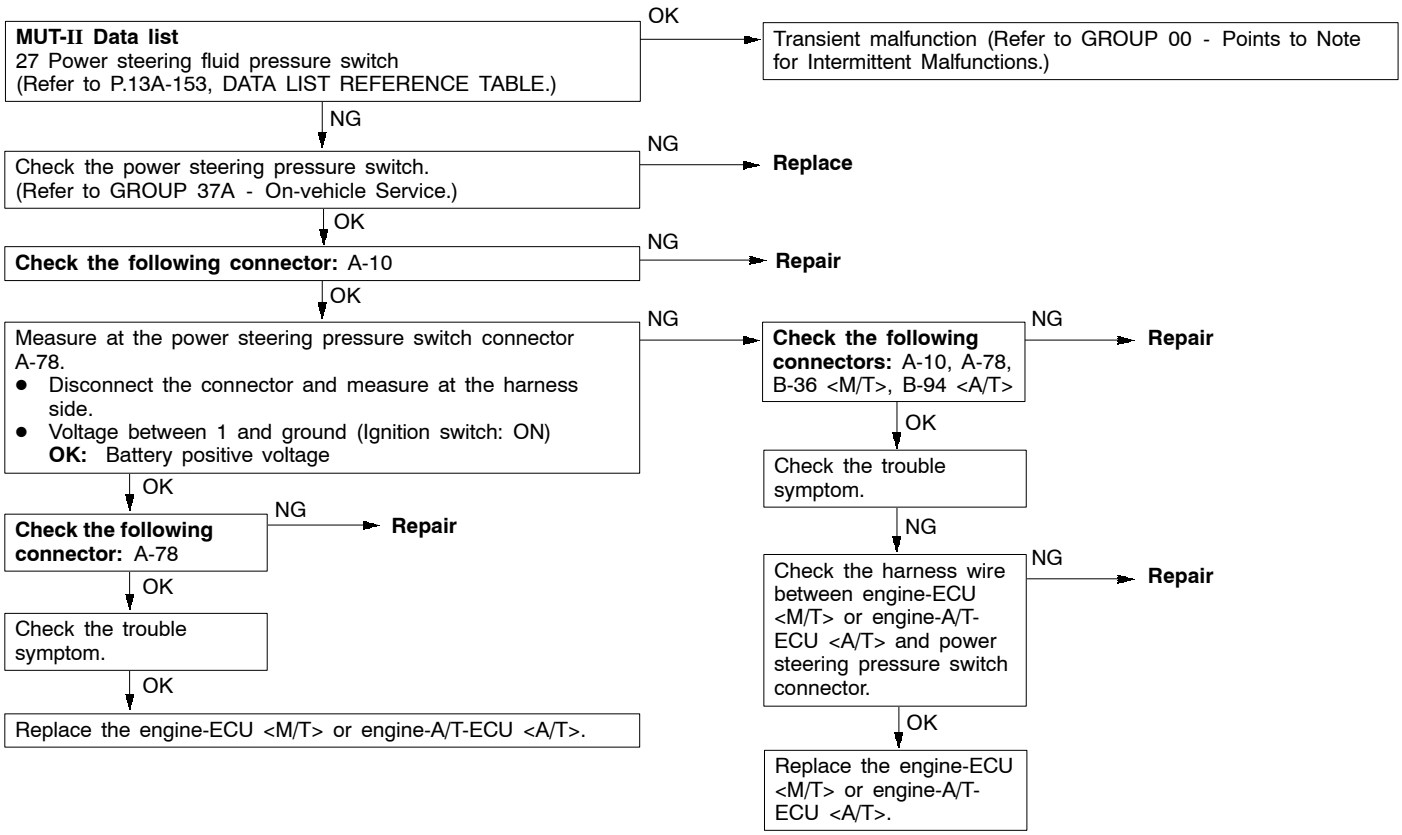
Code No. P0505 Idle speed control (ISC) system	Probable cause
Check Area ● Vehicle speed has reached 1.5 km/h at least once. ● Under the closed loop idle speed control. Judgment Criteria ● Actual idle speed has continued to be higher than the target idle speed by 300 r/min or more for 10 sec. Check Area ● Vehicle speed has reached 1.5 km/h at least once. ● During idle speed closed loop control. ● The highest temperature at the last drive is 45°C or less. ● Engine coolant temperature is approx. 80°C or more. ● Battery voltage is 10 V or more. ● Intake air temperature is -10°C or more. Judgment Criteria ● Actual idle speed has been minimum 200 r/min higher than the target idle speed for ten seconds. Check Area ● During idle speed closed loop control. ● Engine coolant temperature is about 80°C or higher. ● Battery voltage is 10 V or higher. ● Power steering switch is off. ● Intake air pip pressure is 53 kPa or less. ● Intake air temperature is -10°C or more. Judgment Criteria ● Actual idle speed has been minimum 100 r/min higher than the target idle speed for ten seconds.	● Malfunction of idle speed control (ISC) servo ● Improper connector contact, open circuit or short-circuit harness wire ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>


MUT-II Self-Diag code
Is any diagnosis code other than No. P0505 output?
Yes
Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
No
Check intake air hose and intake manifold for air intake.
NG
Repair
OK
Check the throttle body (around the throttle valve) for contamination.
NG
Clean around the throttle valve. (Refer to P.13A-22*.)
OK
Check the idle speed control (ISC) servo. (Refer to P.13A-26*.)
NG
Replace
OK
Check the following connector:
A-56
NG
Repair
OK
Measure at the idle speed control servo connector A-56.
Disconnect the connector, and measure at the harness side.
Ignition switch: ON
The voltage between terminal 2 and earth
The voltage between terminal 5 and earth
OK: System voltage
NG
Check the following connector:
A-56
OK
Check the harness wire between the engine control relay and the idle speed control servo, and repair if necessary.
OK
Measure at engine-ECU <M/T> or engine-A/T-ECU connector B-37 <M/T>, B-95 <A/T>.
Use test harness (MB991709) to connect the connector, and measure at the pick-up harness side.
The voltage between terminal 4 <M/T> or 14 <A/T> and earth
The voltage between terminal 5 <M/T> or 15 <A/T> and earth
The voltage between terminal 17 <M/T> or 28 <A/T> and earth
The voltage between terminal 18 <M/T> or 29 <A/T> and earth
OK: The voltage changes as follows for three seconds when the ignition switch is turned ON.
(When using a circuit tester)
5 V and 8 V alternates
(When using an analyzer)
1 V or less and system voltage alternates.
NG
Check the following connector:
A-56
NG
Repair
OK
Check the harness wire between the idle speed control servo and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
NG
Repair
OK
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
OK
To the next page



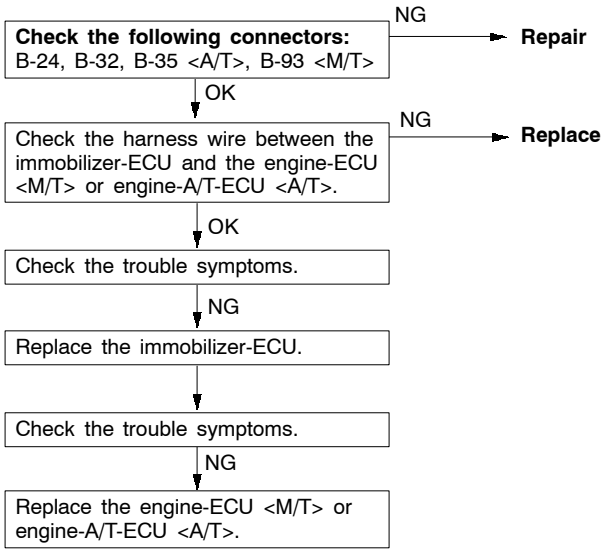
NOTE
*: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

Code No. P0551 Power Steering fluid Pressure Switch System	Probable cause
Check Area ● Intake air temperature is -10°C or higher. ● Barometric pressure is 76 kPa or higher. ● Engine coolant temperature is 30°C or more. ● Repeat *1 drive and *2 stop ten times or more. *1: Engine speed is 2,500 r/min or higher, volumetric efficiency is 55 % or higher and vehicle speed is 5 km/h or higher for 4 seconds or more. *2: Vehicle speed is 1.5 km/h or lower. Judgment Criteria ● Power steering pressure switch remains on.	● Power steering fluid pressure switch failed. ● Open or shorted power steering fluid pressure switch circuit or loose connector ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



Code No. P1610 Immobilizer system	Probable cause
Range of Check ● Ignition switch: ON Set Conditions ● Improper communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU	● Open or short circuit, or loose connector contact ● Malfunction of the immobilizer-ECU ● Malfunction of the engine-ECU <M/T> ● Malfunction of the engine-A/T-ECU <A/T>

NOTE
(1) If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
(2) This code may be displayed when registering the key ID code.



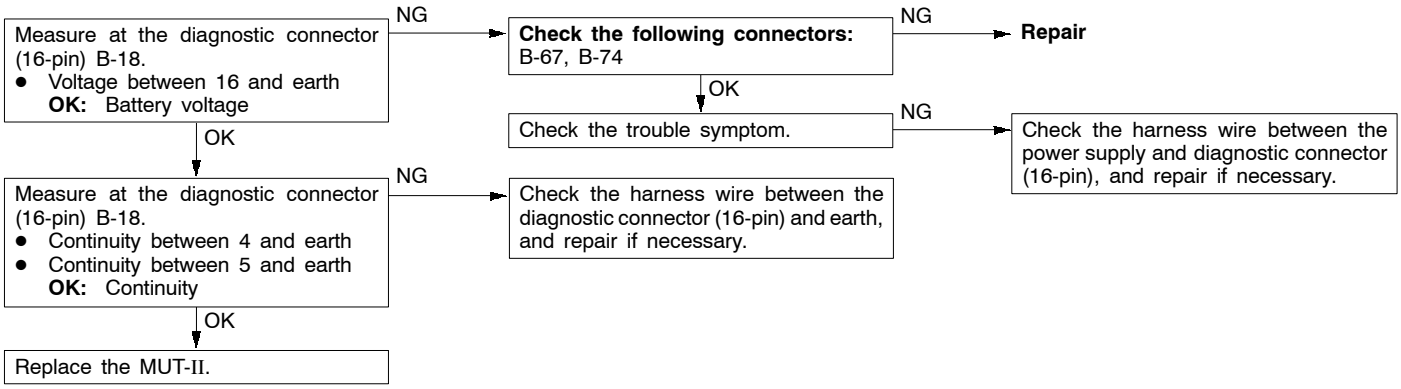
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13A-126
	Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible.	2	13A-126
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-127
	The engine warning lamp remains illuminating and never goes out.	4	13A-127
Starting	No initial combustion (starting impossible)	5	13A-128
	Initial combustion but no complete combustion (starting impossible)	6	13A-129
	Long time to start (improper starting)	7	13A-130
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13A-131
	Idling speed is high. (Improper idling speed)	9	13A-133
	Idling speed is low. (Improper idling speed)	10	13A-133
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-134
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-135
	The engine stalls when starting the car. (Pass out)	13	13A-137
	The engine stalls when decelerating.	14	13A-137
Driving	Hesitation, sag or stumble	15	13A-138
	The feeling of impact or vibration when accelerating	16	13A-139
	The feeling of impact or vibration when decelerating	17	13A-139
	Poor acceleration	18	13A-140
	Surge	19	13A-142
	Knocking	20	13A-143
Dieseling		21	13A-143
Too high CO and HC concentration when idling		22	13A-144
Idling speed is improper when A/C is operating		23	13A-145
Fans (radiator fan, A/C condensor fan) are inoperative		24	13A-146

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

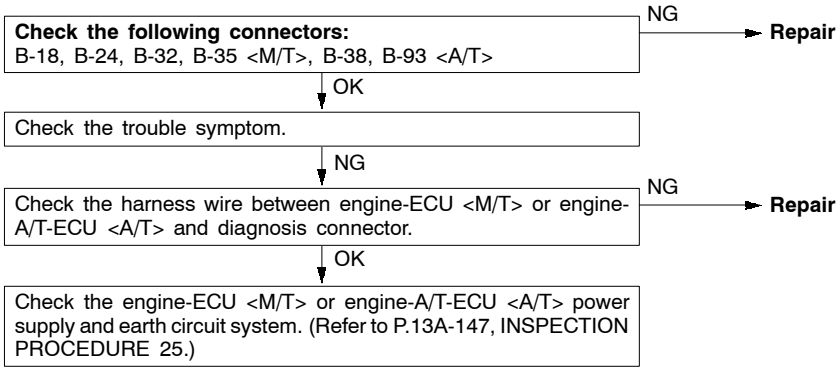
INSPECTION PROCEDURE 1

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



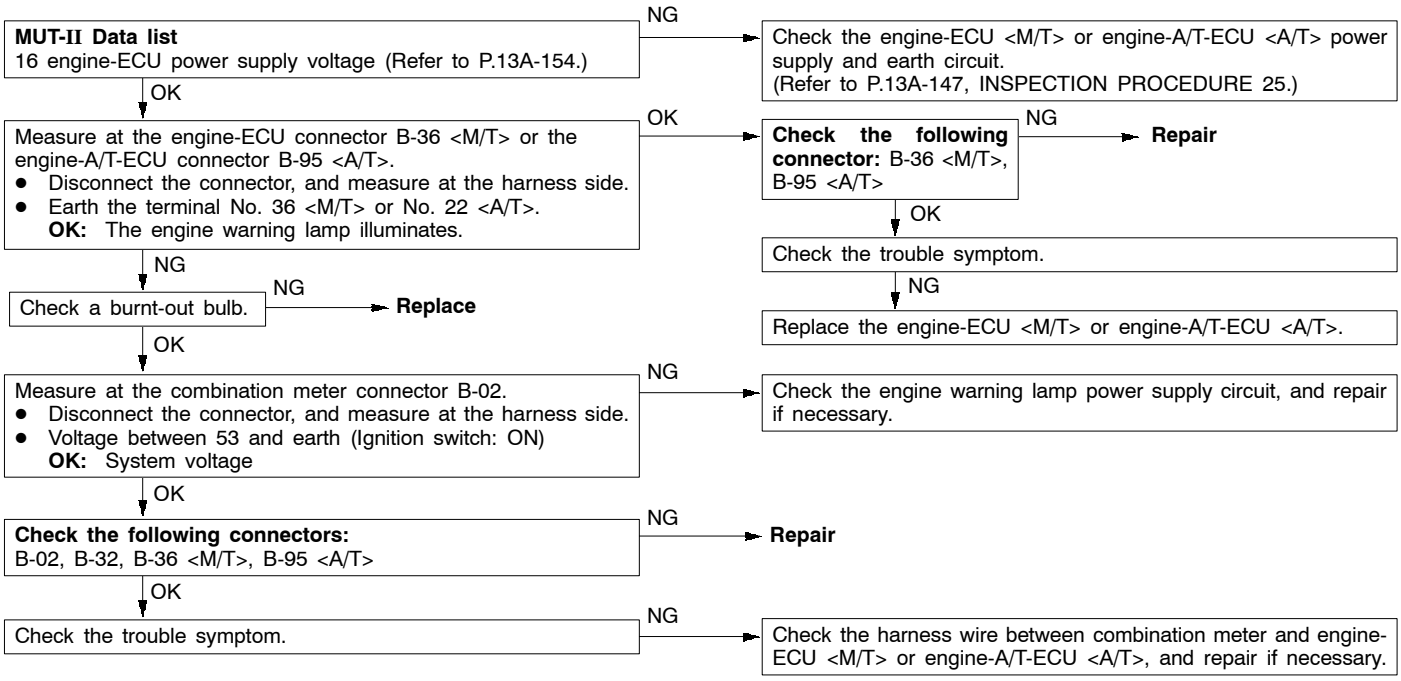
INSPECTION PROCEDURE 2

MUT-II communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> is impossible.	Probable cause
One of the following causes may be suspected. • No power supply to engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Defective earth circuit of engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Defective engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Improper communication line between engine-ECU <M/T> or engine-A/T-ECU <A/T> and MUT-II	• Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply circuit • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T> • Open circuit between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and diagnosis connector



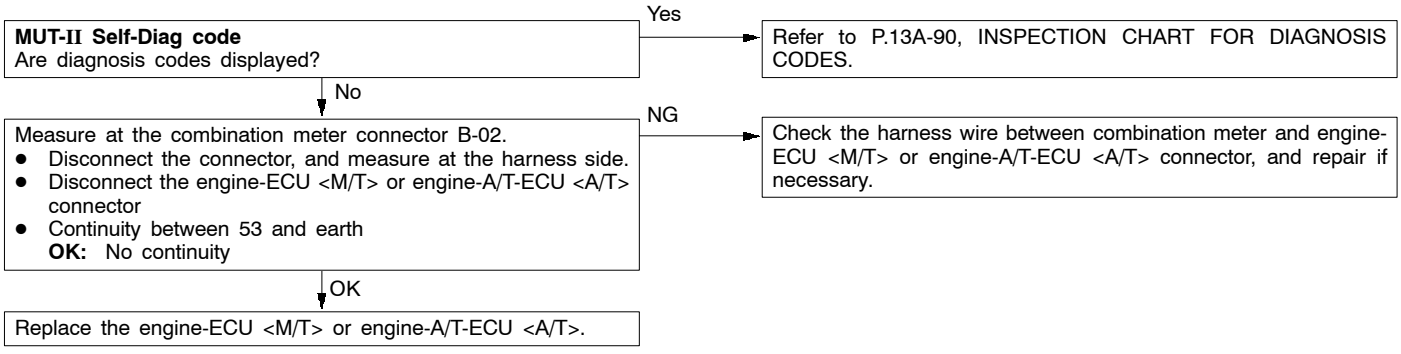
INSPECTION PROCEDURE 3

The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.	Probable cause
Because there is a burnt-out bulb, the engine-ECU <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T>



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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> or engine-A/T-ECU <A/T> • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>



INSPECTION PROCEDURE 5

No initial combustion (starting impossible)	Probable cause
In cases such as the above, the cause is probably that a spark plug is defective, or that the supply of fuel to the combustion chamber is defective. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.	• Malfunction of the ignition system • Malfunction of the fuel pump system • Malfunction of the injectors • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> • Malfunction of the immobilizer system • Foreign materials in fuel

Check battery voltage when cranking.
OK: 8 V or higher
- NG → Check the battery. (Refer to GROUP 54 - Battery.)
- OK ↓

Is immobilizer-ECU diagnosis code displayed?
- Yes → Check the immobilizer. (Refer to GROUP 54 - Ignition Key and Immobilizer.)
- No ↓

MUT-II Data list
16 Power supply voltage (Refer to P.13A-154.)
- NG → Check the power supply and ignition switch-IG system. (Refer to P.13A-148, INSPECTION PROCEDURE 26.)
- OK ↓

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
- Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

MUT-II Data list
22 Crank angle sensor
OK: Cranking speed is displayed
- No → Check the crank angle sensor system. (Refer to P.13A-113, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0335.)
- OK ↓

MUT-II Actuator test
07 Fuel pump (Refer to P.13A-158.)
- NG → Check the fuel pump system. (Refer to P.13A-148, INSPECTION PROCEDURE 27.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-154.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-98, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
- OK ↓

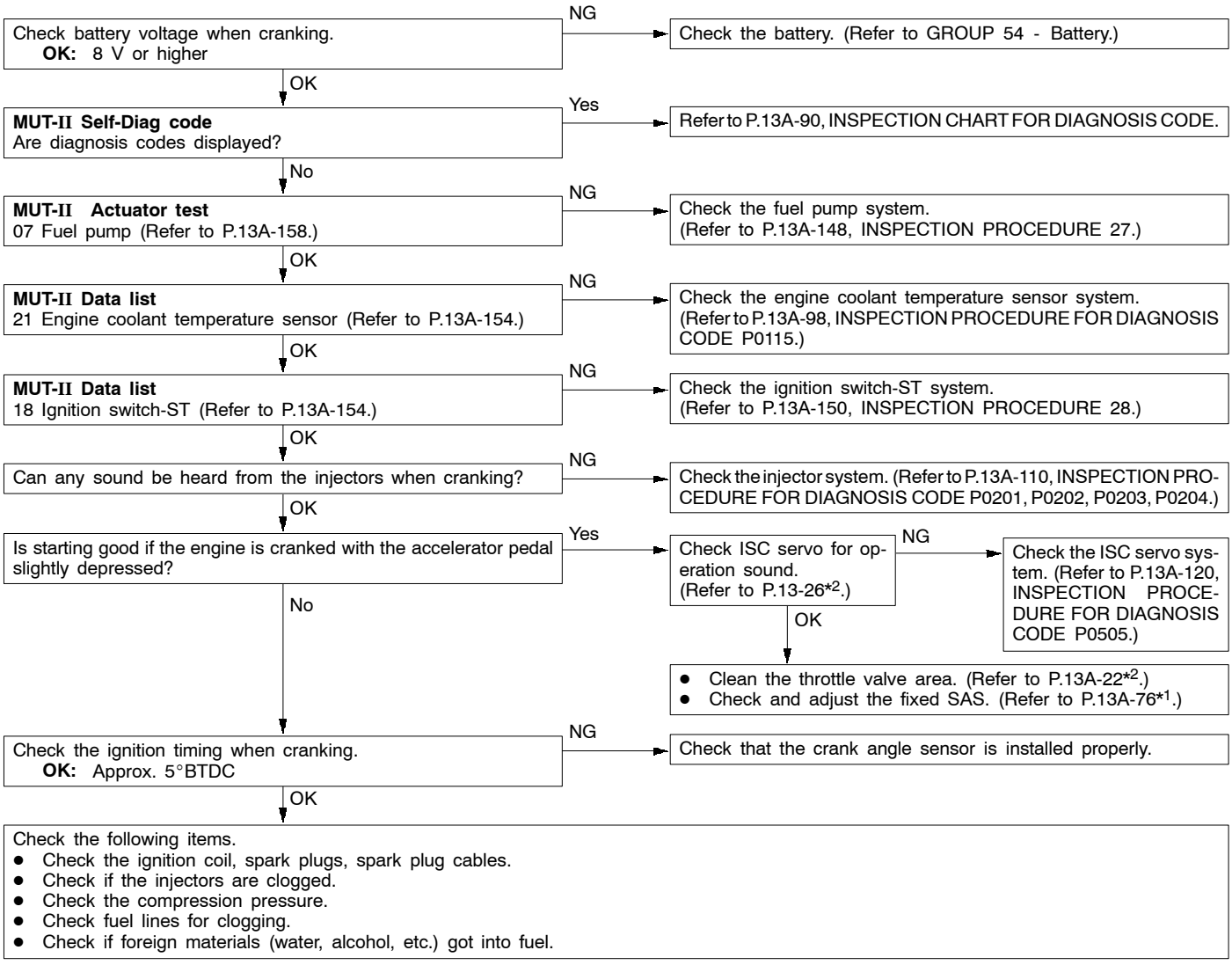
Can any sound be heard from the injectors when cranking?
- No → Check the injector system. (Refer to P.13A-110, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
- Yes ↓

Measure at the ignition coil connectors A-73 and A-79
- Connectors connected
- Check by connecting the timing light to terminal 1 of each connector (Engine: Cranking)
  OK: The timing light flashes.
- No → Check the ignition circuit system. (Refer to P.13A-151, INSPECTION PROCEDURE 30.)
- OK ↓

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

INSPECTION PROCEDURE 6

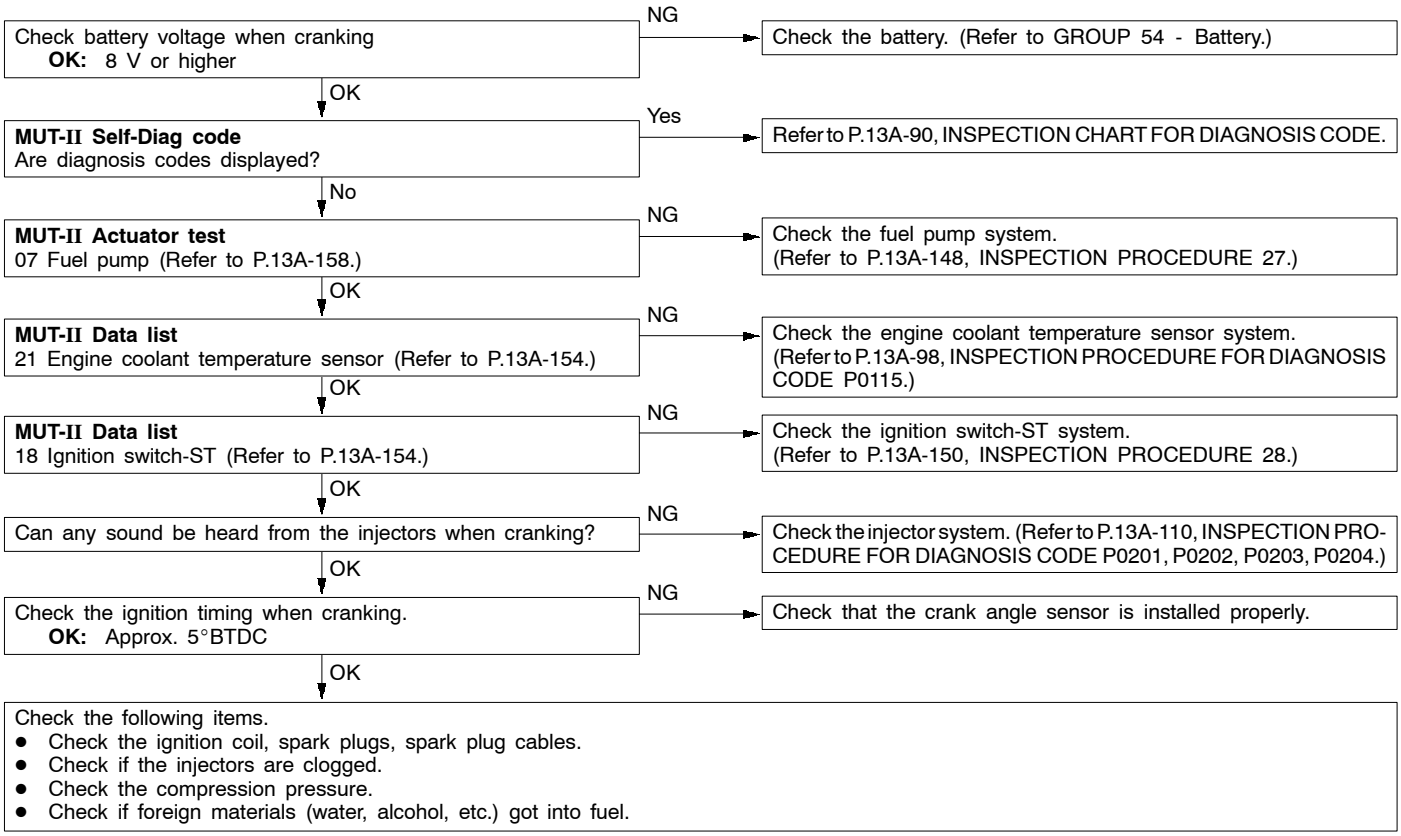
Initial combustion but no complete combustion (starting impossible)	Probable cause
In such cases as the above, the cause is probably that the spark plugs are generating sparks but the sparks are weak, or the initial mixture for starting is not appropriate.	• Malfunction of the ignition system • Malfunction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



NOTE
*1: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).
*2: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

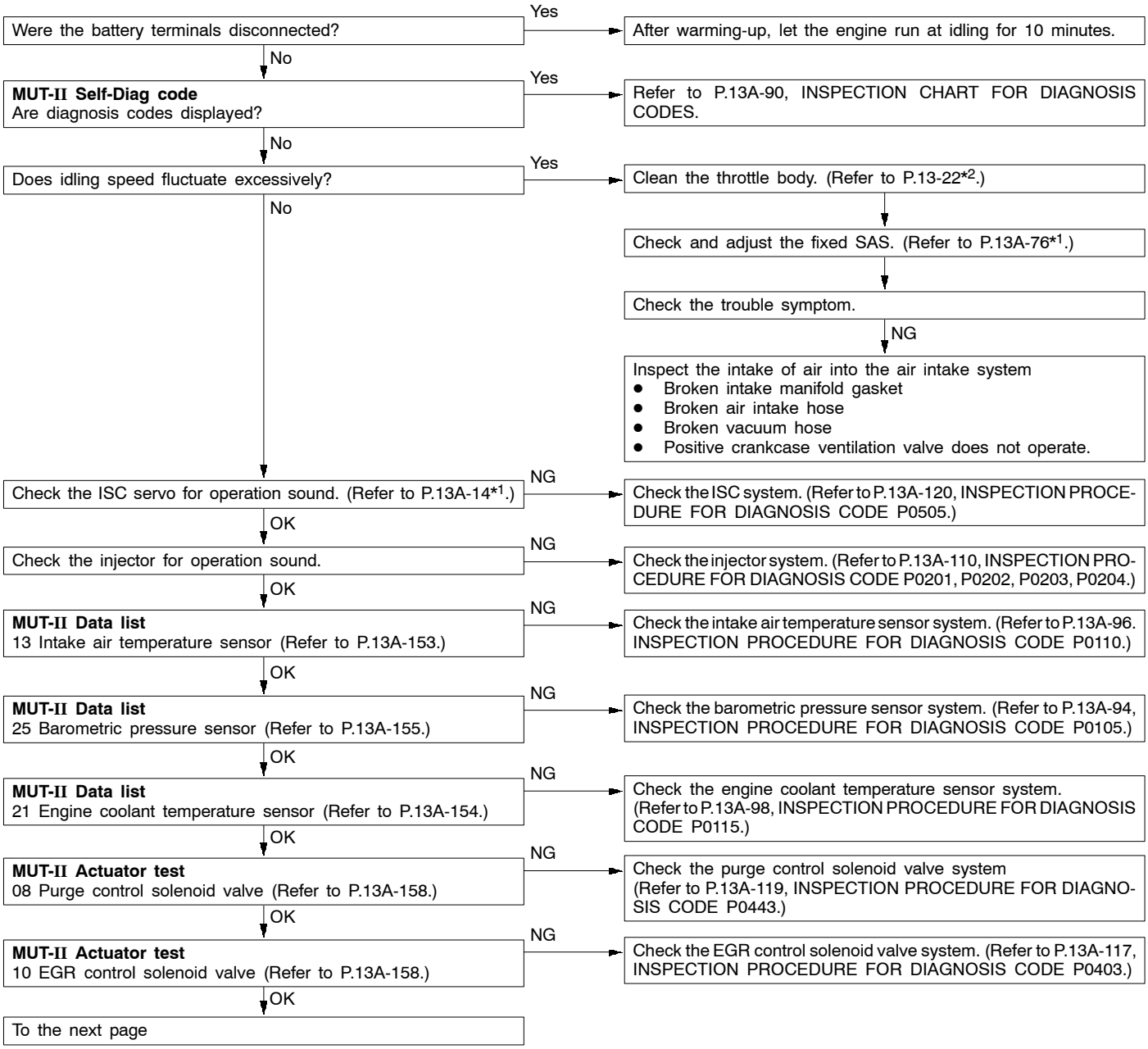
INSPECTION PROCEDURE 7

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



INSPECTION PROCEDURE 8

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



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OK

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear <M/T>, L range <A/T>
- Driving with throttle widely open

OK: 600 - 1,000 mV

NG → Check the oxygen sensor (rear) system. (Refer to P.13A-106, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)

OK

MUT-II Data list
11 Oxygen sensor

OK: 600 - 1,000 mV during sudden racing

NG → Check the oxygen sensor (front) system. (Refer to P.13A-103, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)

OK

MUT-II Data list
11 Oxygen sensor

OK: Changes between 0 - 400 mV and 600 - 1,000 mV during idling

NG → Check the fuel pressure. (Refer to P.13A-78*1.)

OK →
1. Inspect the intake of air into the air intake system.
   - Broken intake manifold gasket
   - Broken vacuum hose
   - PCV valve does not operate.
   - Broken air intake hose
2. Check the injector for clog.

OK

MUT-II Data list
27 Power steering fluid pressure switch (Refer to P.13A-155.)

NG → Check the power steering fluid pressure switch system. (Refer to P.13A-123, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0551.)

OK

MUT-II Data list
28 A/C switch (Refer to P.13A-155.)

NG → Check the A/C switch and A/C relay system. (Refer to P.13A-151, INSPECTION PROCEDURE 29.)

OK

MUT-II Data list
29 Inhibitor switch (Refer to P.13A-155.)

NG → Check the ignition switch-ST. (Refer to P.13A-150, INSPECTION PROCEDURE 28.)

OK

MUT-II Data list
45 ISC Servo position (Refer to P.13A-156.)

NG → Adjust the basic idle speed. (Refer to P.13-23*2.)

OK

Check the ignition timing. (Refer to GROUP 11A - On-vehicle Service.)

NG → Check that the crank angle sensor is installed properly.

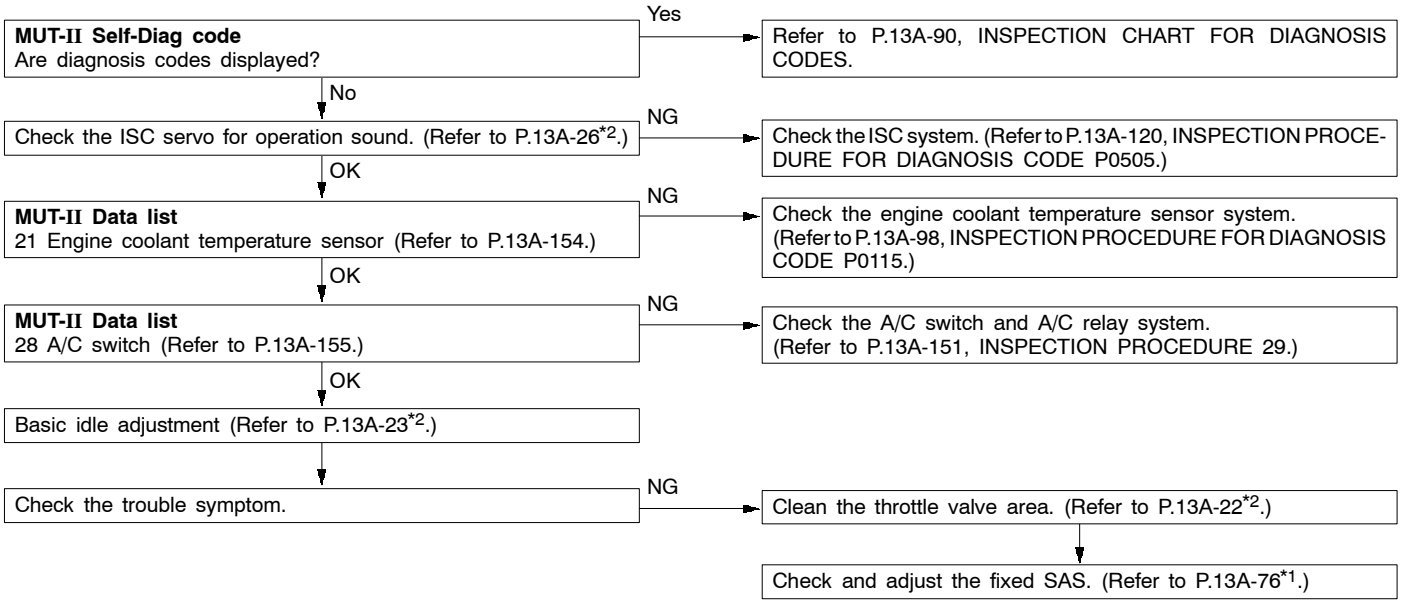
OK

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

NOTE
*1: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).
*2: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

INSPECTION PROCEDURE 9

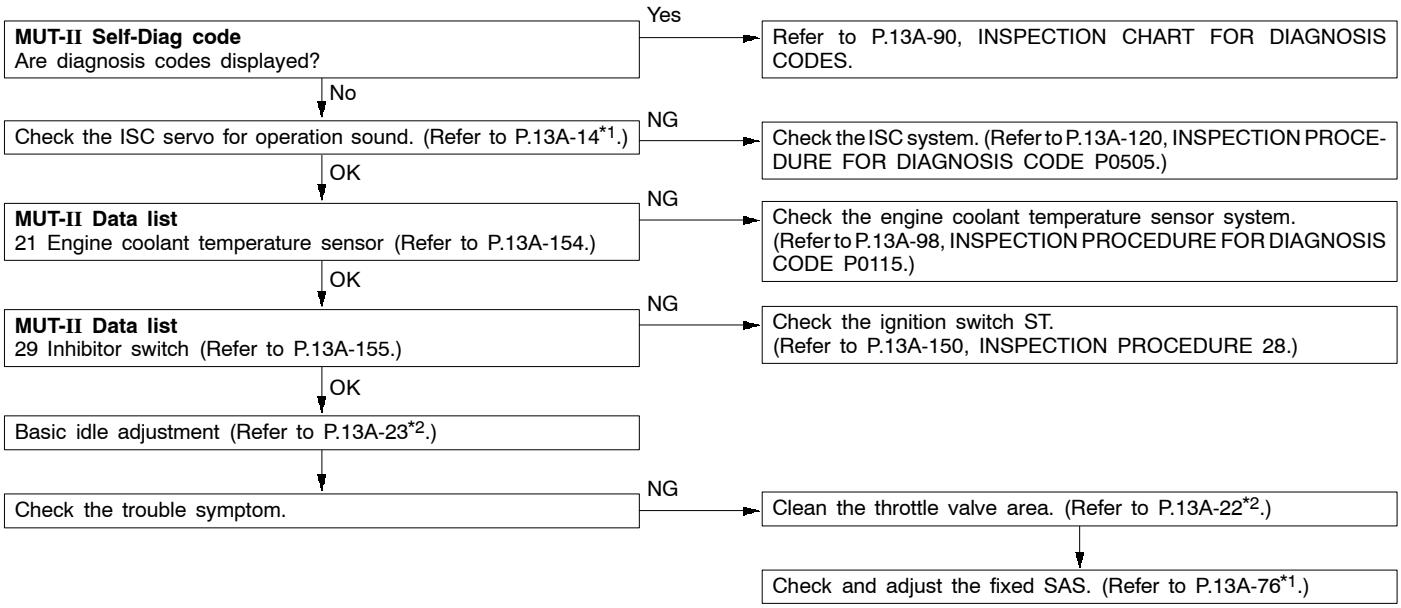
Idling speed is high. (Improper idling speed)	Probable cause
In such cases as the above, the cause is probably that the intake air volume during idling is too great.	• Malfunction of the ISC servo system • Malfunction of the throttle body



NOTE:
*1: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).
*2: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

INSPECTION PROCEDURE 10

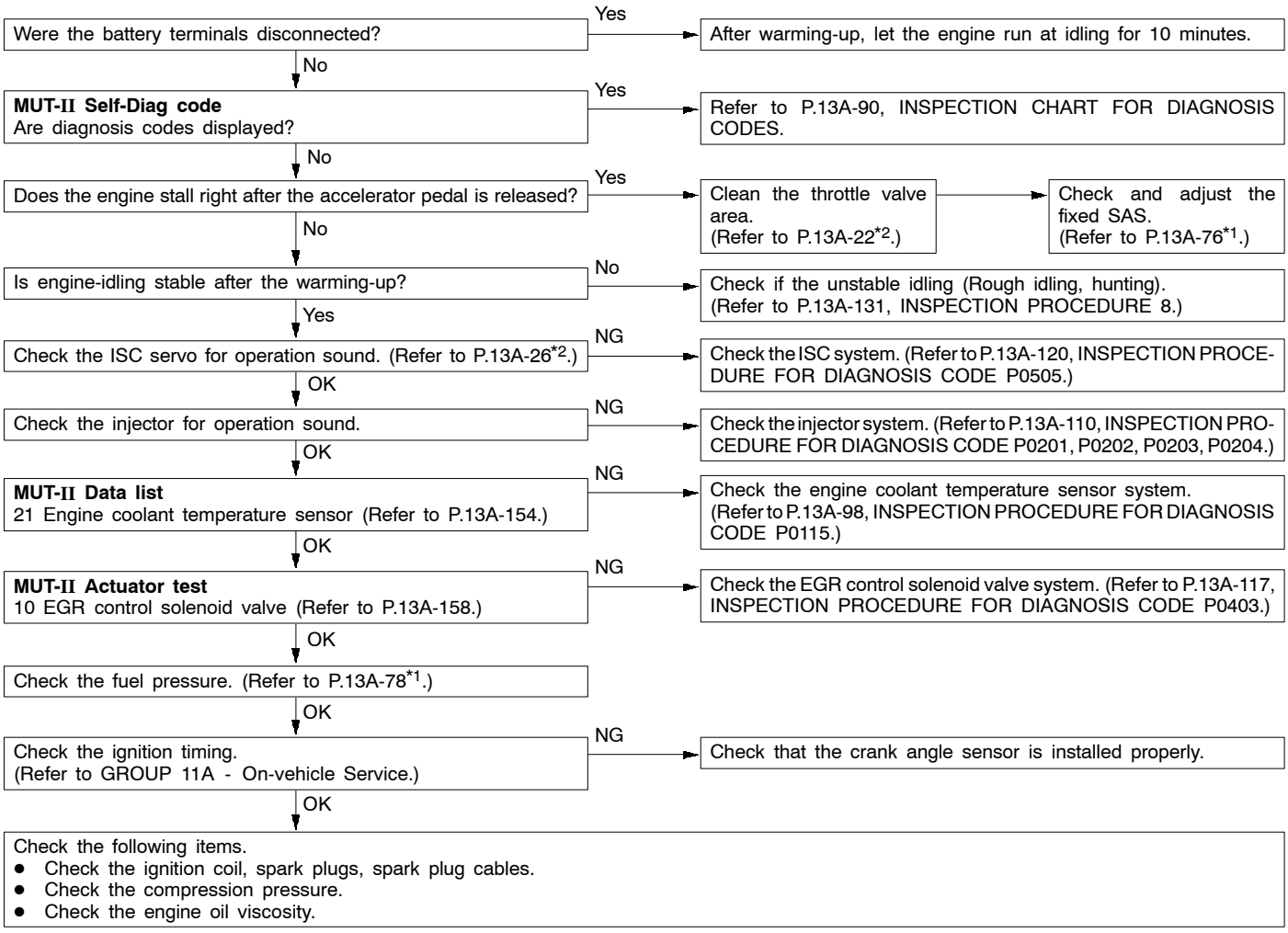
Idling speed is low. (Improper idling speed)	Probable cause
In cases such as the above, the cause is probably that the intake air volume during idling is too small.	• Malfunction of the ISC servo system • Malfunction of the throttle body



NOTE:
*1: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).
*2: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

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:
*1: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).
*2: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

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

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
- Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

Check the ISC servo for operation sound. (Refer to P.13A-26*2.)
- NG → Check the ISC system. (Refer to P.13A-120, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0505.)
- OK ↓

Check the injector for operation sound.
- NG → Check the injector system. (Refer to P.13A-110, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
- OK ↓

Does the engine stall right after the accelerator pedal is released?
- Yes → Clean the throttle valve area. (Refer to P.13A-22*2.) → Check and adjust the fixed SAS. (Refer to P.13A-76*1.)
- No ↓

Does the engine stall easily again?
- No → 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
  - Air flow sensor signal
  - Injector drive signal
  - Primary and secondary ignition signal
  - Fuel pump drive signal
  - Engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply voltage
- OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-153.)
- NG → Check the intake air temperature sensor system. (Refer to P.13A-96, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
- OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-155.)
- NG → Check the barometric pressure sensor system. (Refer to P.13A-94, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0105.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-154.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-98, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
- OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-158.)
- NG → Check the EGR control solenoid valve system. (Refer to P.13A-117, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
- OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear <M/T>, L range <A/T>
- Driving with throttle widely open
  OK: 600 - 1,000 mV
- NG → Check the oxygen sensor (rear) system. (Refer to P.13A-106, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
- OK ↓

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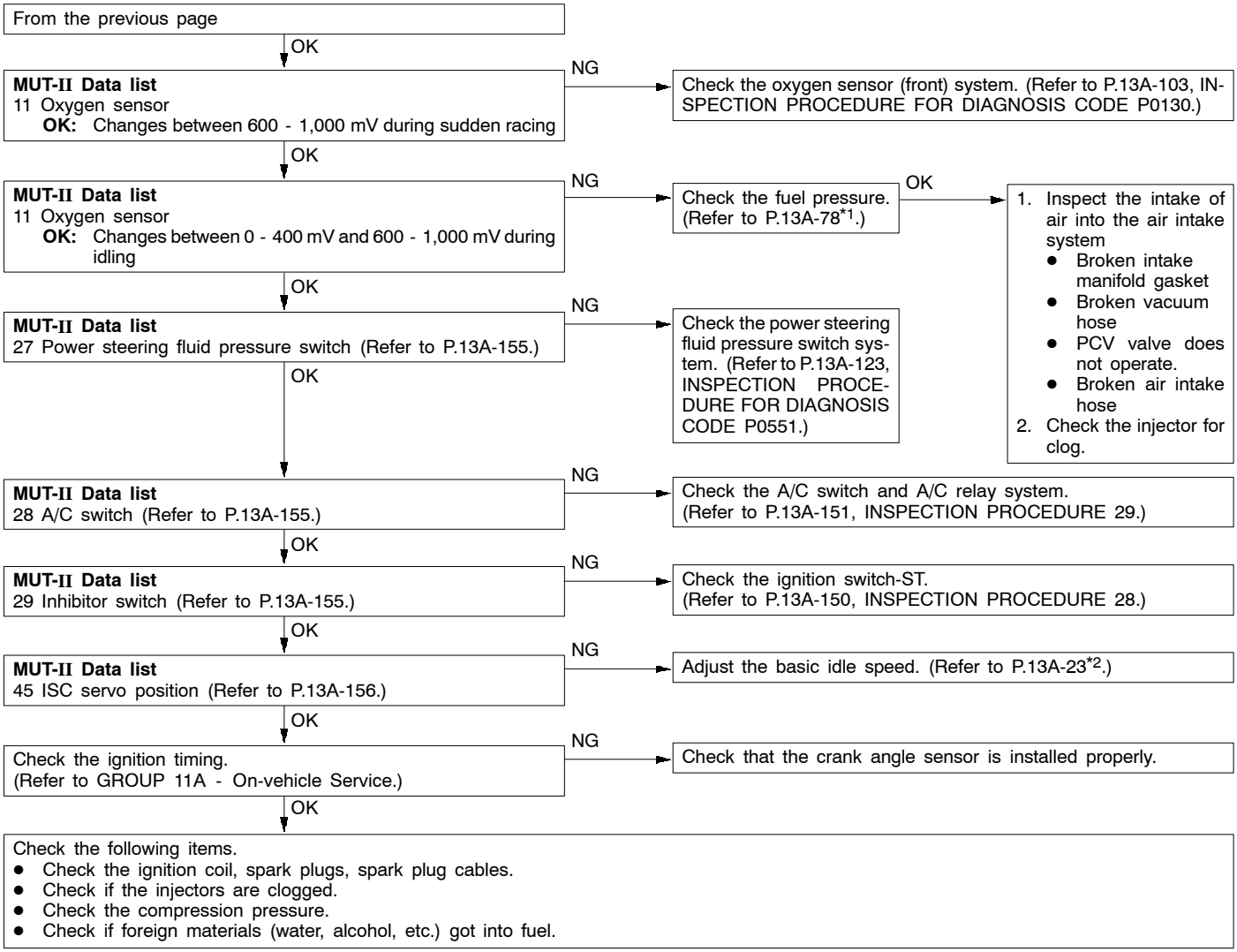

NOTE:
*1: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).
*2: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

INSPECTION PROCEDURE 13

The engine stalls when starting the car. (Pass out)	Probable cause
In cases such as the above, the cause is probably misfiring due to a weak spark, or an inappropriate air/fuel mixture when the accelerator pedal is depressed.	• Drawing air into intake system • Malfunction of the ignition system

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-158.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-117, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

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

INSPECTION PROCEDURE 14

The engine stalls when decelerating.	Probable cause
In cases such as the above, the cause is probably that the intake air volume is insufficient due to a defective idle speed control (ISC) servo system.	• Malfunction of the ISC system

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-154.)
NG → Check the throttle position sensor system. (Refer to P.13A-100, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
OK ↓

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

Yes → Check the vehicle speed sensor system. (Refer to P.13A-120, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0500.)
No ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-158.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-117, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

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

INSPECTION PROCEDURE 15

Hesitation, sag or stumble	Probable cause
In cases such as the above, the cause is probably that ignition system, air/fuel mixture or compression pressure is defective.	• Malfunction of the ignition system • Malfunction of air-fuel ratio control system • Malfunction of the fuel supply system • Malfunction of the EGR control solenoid valve system • Poor compression

MUT-II Self-Diag code
Are diagnosis codes displayed?
- Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

Check the injectors for operation sound.
- NG → Check the injector system. (Refer to P.13A-110, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
- OK ↓

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

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-153.)
- NG → Check the intake air temperature sensor system. (Refer to P.13A-96, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
- OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-155.)
- NG → Check the barometric pressure sensor system. (Refer to P.13A-94, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0105.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-154.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-98, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
- OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-154.)
- NG → Check the throttle position sensor system. (Refer to P.13A-100, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
- OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-158.)
- NG → Check the EGR control solenoid valve system. (Refer to P.13A-117, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
- OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear <M/T>, L range <A/T>
- Driving with throttle widely open

OK: 600 - 1,000 mV
- NG → Check the oxygen sensor (rear) system. (Refer to P.13A-106, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
- OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 600 - 1,000 mV during sudden racing
- NG → Check the oxygen sensor (front) system. (Refer to P.13A-103, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
- OK ↓

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OK

MUT-II Data list
11 Oxygen sensor
OK: Changes between 0 - 400 mV and 600 - 1,000 mV during idling

NG → Check the fuel pressure. (Refer to P.13A-78*.)

OK → 1. Inspect the intake of air into the air intake system
- Broken intake manifold gasket
- Broken vacuum hose
- PCV valve does not operate.
- Broken air intake hose

2. Check the injector for clog.

OK

Check the fuel pressure. (Refer to P.13A-78*.)

OK

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Check the EGR control system.
- Check the compression pressure.
- Check the fuel filter or fuel line for clogging.

INSPECTION PROCEDURE 16

The feeling of impact or vibration when accelerating	Probable cause
In cases such as the above, the cause is probably that there is an ignition leak accompanying the increase in the spark plug demand voltage during acceleration.	• Malfunction of the ignition system

MUT-II Self-Diag code
Are diagnosis codes displayed?

Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.

No

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

INSPECTION PROCEDURE 17

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

MUT-II Self-Diag code
Are diagnosis codes displayed?

Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.

No

Check the ISC servo for operation sound. (Refer to P.13A-26*.)

NG → Check the ISC system. (Refer to P.13A-120, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0505.)

OK

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-154.)

NG → Check the throttle position sensor system. (Refer to P.13A-100, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)

OK

Clean the throttle valve area. (Refer to P.13A-22*.)

NOTE:
*: Refer to the 2000 COLT/LANCER Workshop Manual (Pub. No. PWME9511-B).

INSPECTION PROCEDURE 18

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the injectors for operation sound.
NG → Check the injector system. (Refer to P.13A-110, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
OK ↓

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

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-153.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-96, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-155.)
NG → Check the barometric pressure sensor system. (Refer to P.13A-94, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0105.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-154.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-98, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-154.)
NG → Check the throttle position sensor system. (Refer to P.13A-100, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-158.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-117, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear <M/T>, L range <A/T>
- Driving with throttle widely open

OK: 600 - 1,000 mV
NG → Check the oxygen sensor (rear) system. (Refer to P.13A-106, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 600 - 1,000 mV during sudden racing
NG → Check the oxygen sensor (front) system. (Refer to P.13A-103, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
OK ↓

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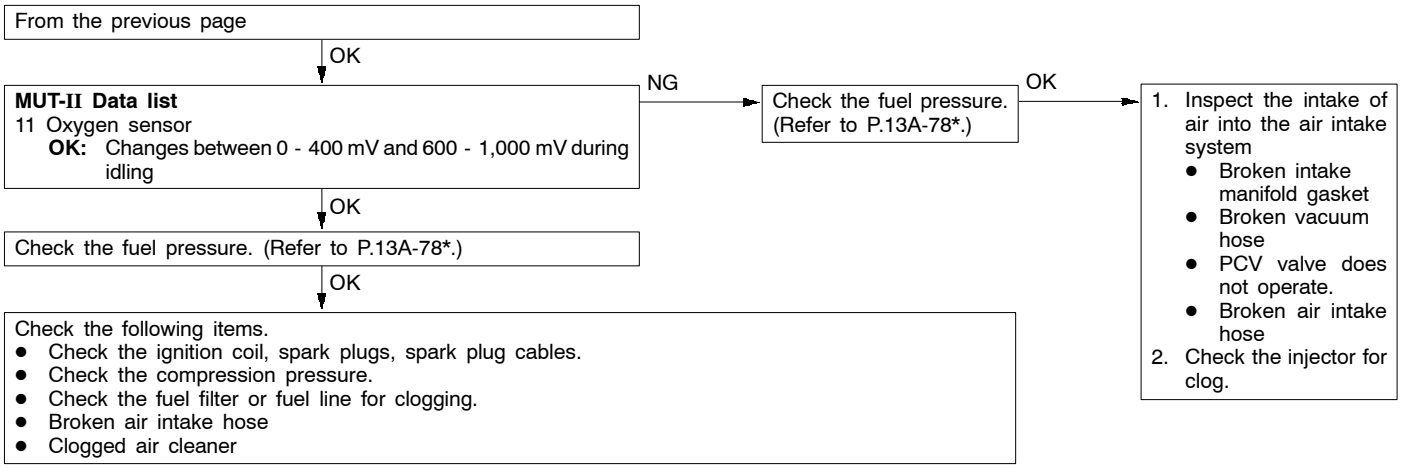


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 19

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the injectors for operation sound.
NG → Check the injector system. (Refer to P.13A-110, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0201, P0202, P0203, P0204.)
OK ↓

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

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-153.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-96, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-155.)
NG → Check the barometric pressure sensor system. (Refer to P.13A-94. INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0105.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-154.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-98, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-154.)
NG → Check the throttle position sensor system. (Refer to P.13A-100, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0120.)
OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-158.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-117, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0403.)
OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear <M/T>, L range <A/T>
- Driving with throttle widely open

OK: 600 - 1,000 mV
NG → Check the oxygen sensor (rear) system. (Refer to P.13A-106, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 600 - 1,000 mV during sudden racing
NG → Check the oxygen sensor (front) system. (Refer to P.13A-103, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 0 - 400 mV and 600 - 1,000 mV during idling
NG → Check the fuel pressure. (Refer to P.13A-78*.)
OK →
1. Inspect the intake of air into the air intake system
   - Broken intake manifold gasket
   - Broken vacuum hose
   - PCV valve does not operate.
   - Broken air intake hose
2. Check the injector for clog.

OK ↓

Check the fuel pressure. (Refer to P.13A-78*.)
OK ↓

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

NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 20

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

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Does knocking occur when driving with the sensor disconnected? At this time, use the MUT-II to check if the timing is retarded compared to when the detonation sensor connector is connected.
No → Check the detonation sensor system. (Refer to P.13A-113, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0325.)
Yes ↓

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

INSPECTION PROCEDURE 21

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

Check the injectors for fuel leakage.

INSPECTION PROCEDURE 22

Too high CO and HC concentration when idling	Probable cause
Abnormal air-fuel ratio is suspected.	• Malfunction of the air-fuel ratio control system • Deteriorated catalyst

MUT-II Self-Diag code
Are diagnosis codes displayed?
Yes → Refer to P.13A-90, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

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

MUT-II Data list
21 Engine coolant temperature sensor. (Refer to P.13A-154.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-98, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0115.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-153.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-96, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0110.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-155.)
NG → Check the barometric pressure sensor system. (Refer to P.13A-94, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0105.)
OK ↓

MUT-II Data list
59 Oxygen sensor (rear)
- Transmission: 2nd gear <M/T>, L range <A/T>
- Driving with throttle widely open

OK: 600 - 1,000 mV
NG → Check the oxygen sensor (rear) system. (Refer to P.13A-106, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0136.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: 600 - 1,000 mV when racing suddenly.
NG → Check the oxygen sensor (front) system. (Refer to P.13A-103, INSPECTION PROCEDURE FOR DIAGNOSIS CODE P0130.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Repeat 0 - 400 mV and 600 - 1,000 mV alternately when idling.
OK → Replace the oxygen sensor. → Check the trouble symptom.
NG ↓ (NG → Check the following items.)

Check the fuel pressure. (Refer to P.13A-78*.)
OK ↓

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

↓

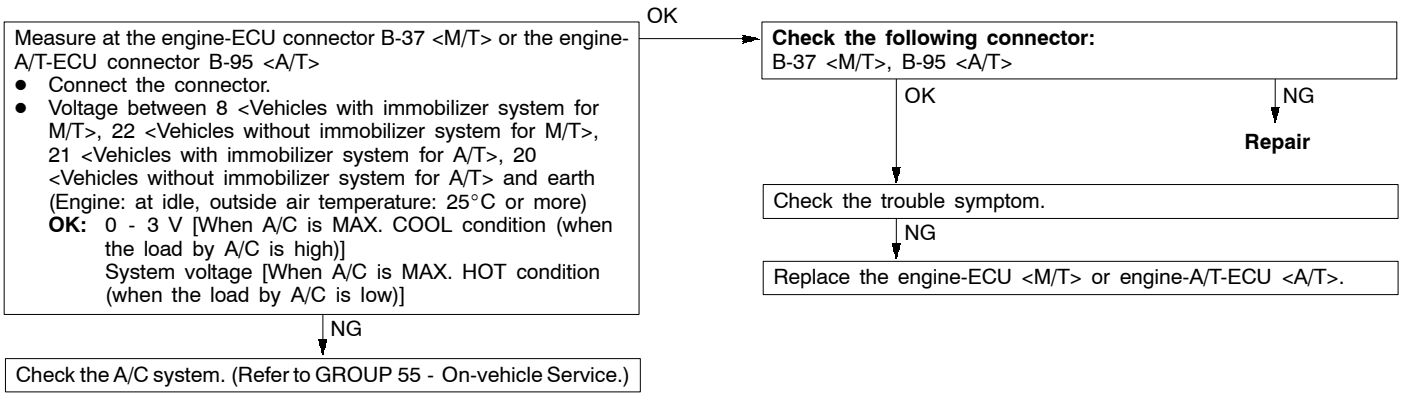
Check the trouble symptom.
NG ↓

Replace the catalytic converter.

NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

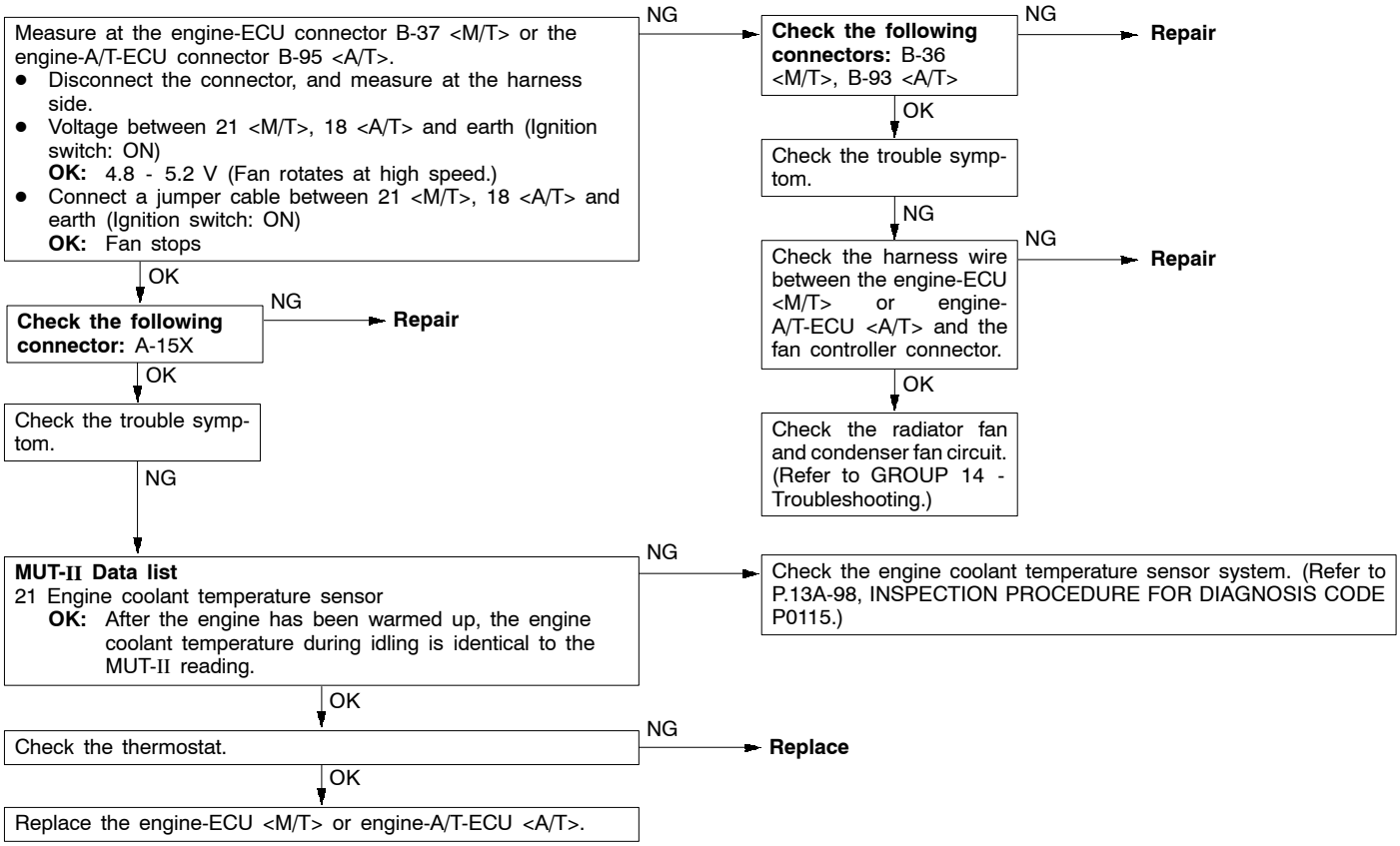
INSPECTION PROCEDURE 23

Idling speed is improper when A/C is operating	Probable cause
If the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects that the air conditioner is on, it activates the idle speed control (ISC) servo to control idle-up operation. The A/C-ECU judges if the load caused by air conditioner operation is high or low, and converts it to voltage signal (high or low voltage) and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. Based on this voltage signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the idle-up speed (for high or low load).	• Malfunction of the A/C control system • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>



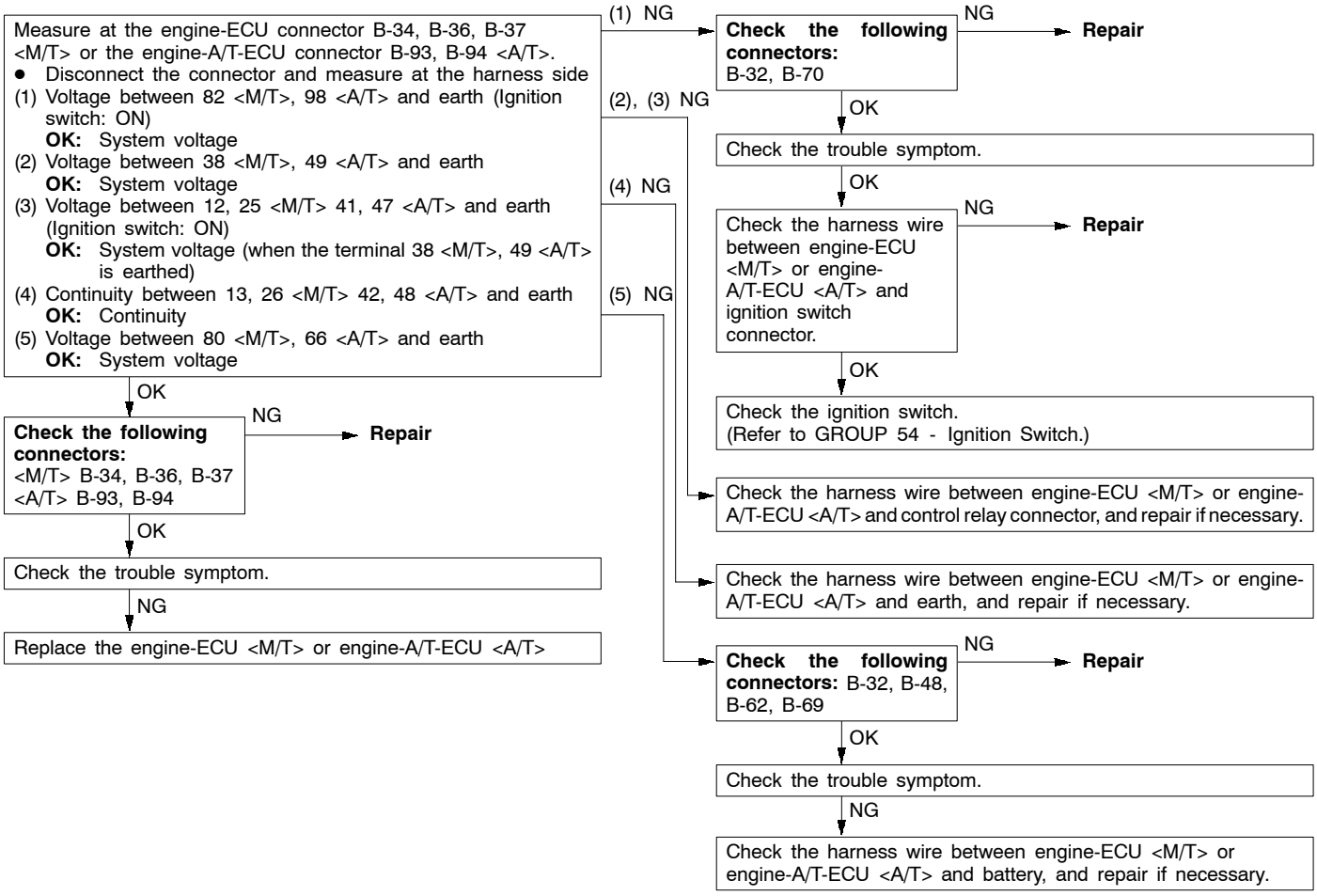
INSPECTION PROCEDURE 24

Fans (radiator fan, A/C condenser fan) are inoperative	Probable cause
The engine-ECU <M/T> or engine-A/T-ECU <A/T> outputs a duty signal to the fan controller depending on the engine coolant temperature, vehicle speed, and air conditioner switch condition. Based on this signal, the fan controller controls the radiator fan and condenser fan speeds (The more the average voltage at the terminal approaches 5 V, the higher the fan speed become.)	• Malfunction of the fan motor relay • Malfunction of the fan motor • Malfunction of the fan controller • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>



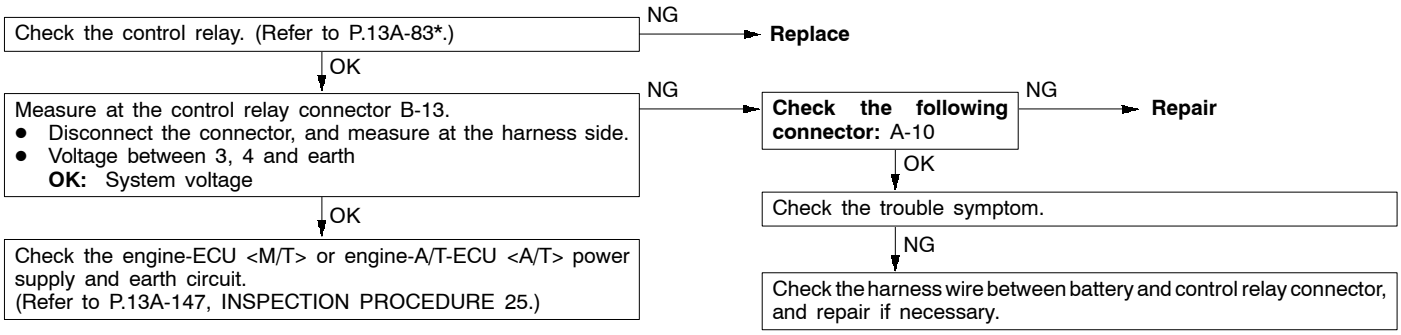
INSPECTION PROCEDURE 25

Engine-ECU <M/T> or Engine-A/T-ECU <A/T> power supply and earth circuit system	Probable cause
The engine-ECU <M/T> or engine-A/T-ECU <A/T> may be defective, or that one of the malfunctions listed at right has occurred.	• Improper connector contact, open circuit or short-circuited harness wire in the engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply circuit. • Open circuit or short-circuited harness wire in the engine-ECU <M/T> or engine-A/T-ECU <A/T> earth circuit • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>



INSPECTION PROCEDURE 26

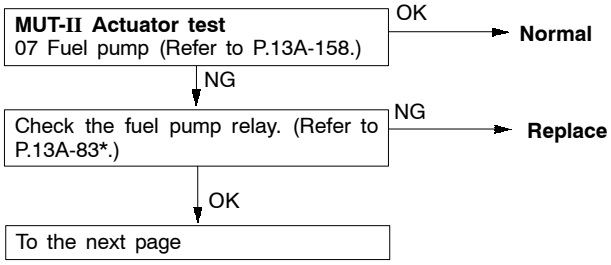
Power supply system and ignition switch-IG system	Probable cause
When an ignition switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> turns the control relay ON. This causes battery voltage to be supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, injectors and air flow sensor.	• Malfunction of the ignition switch • Malfunction of the control relay • Improper connector contact, open circuit or short-circuited harness wire • Disconnected engine-ECU <M/T> or engine-A/T-ECU <A/T> earth wire • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>

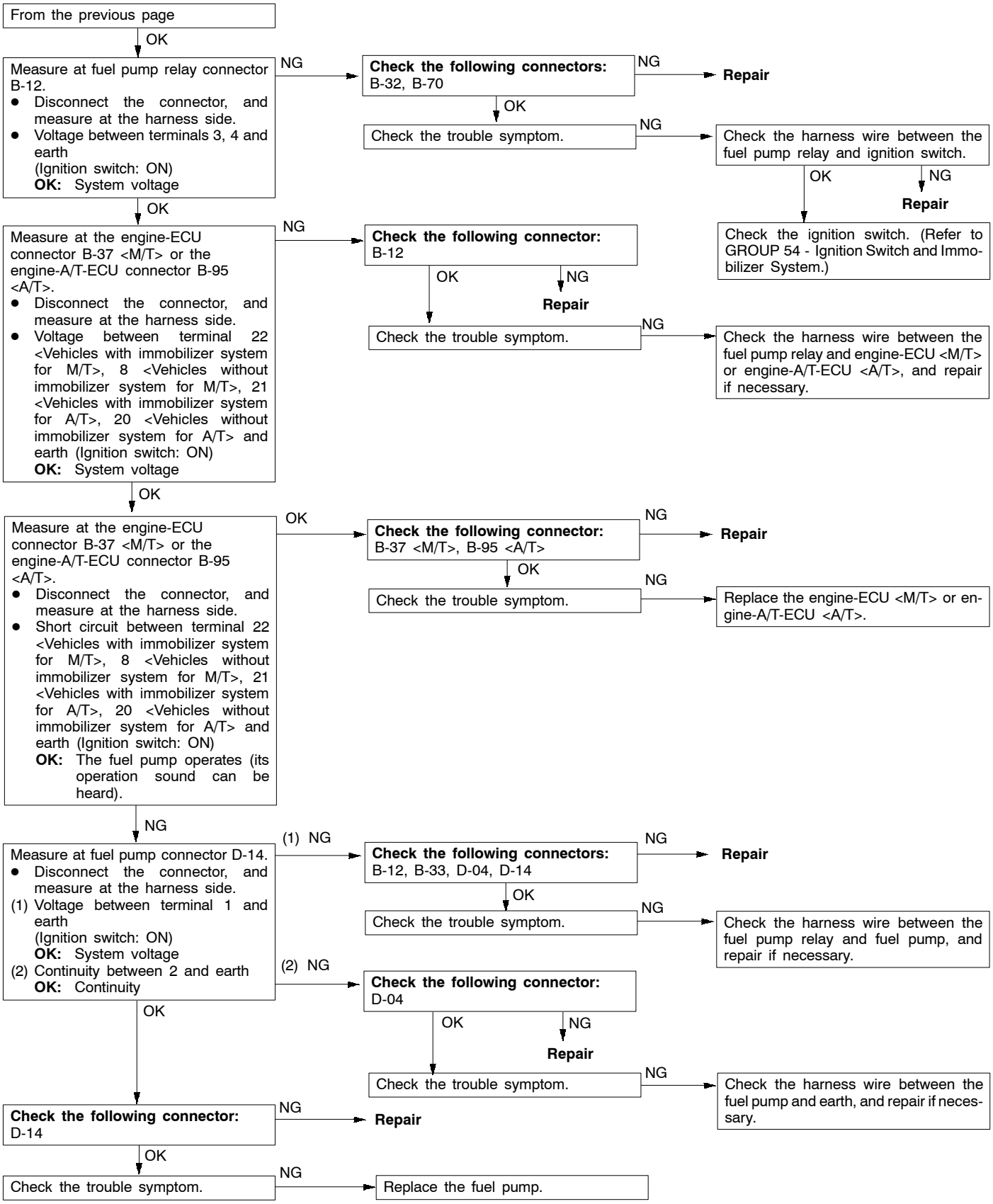


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

INSPECTION PROCEDURE 27

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



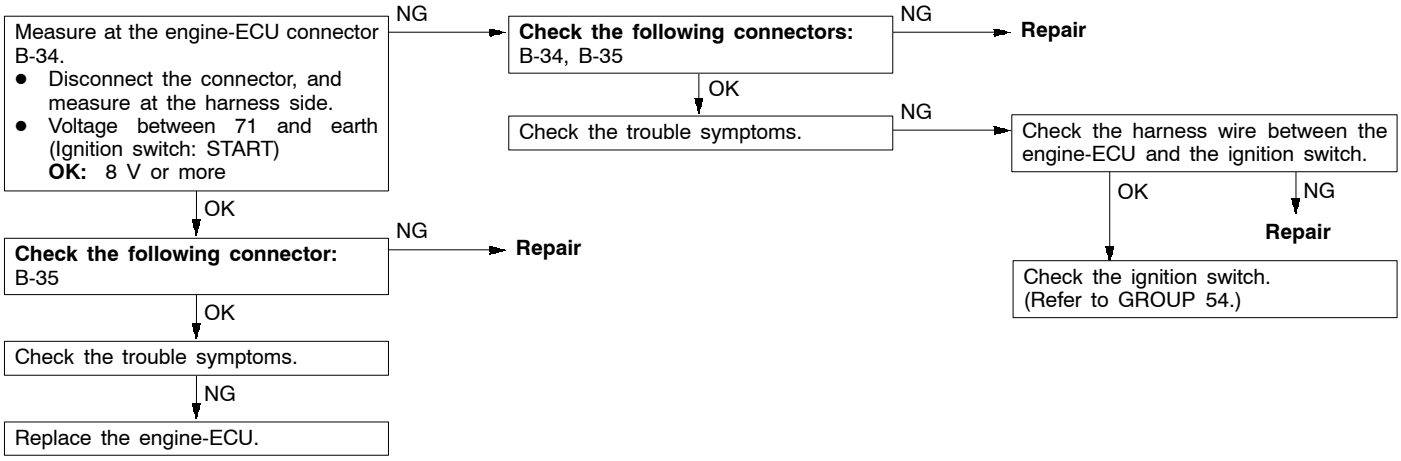


NOTE:
*: Refer to the '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

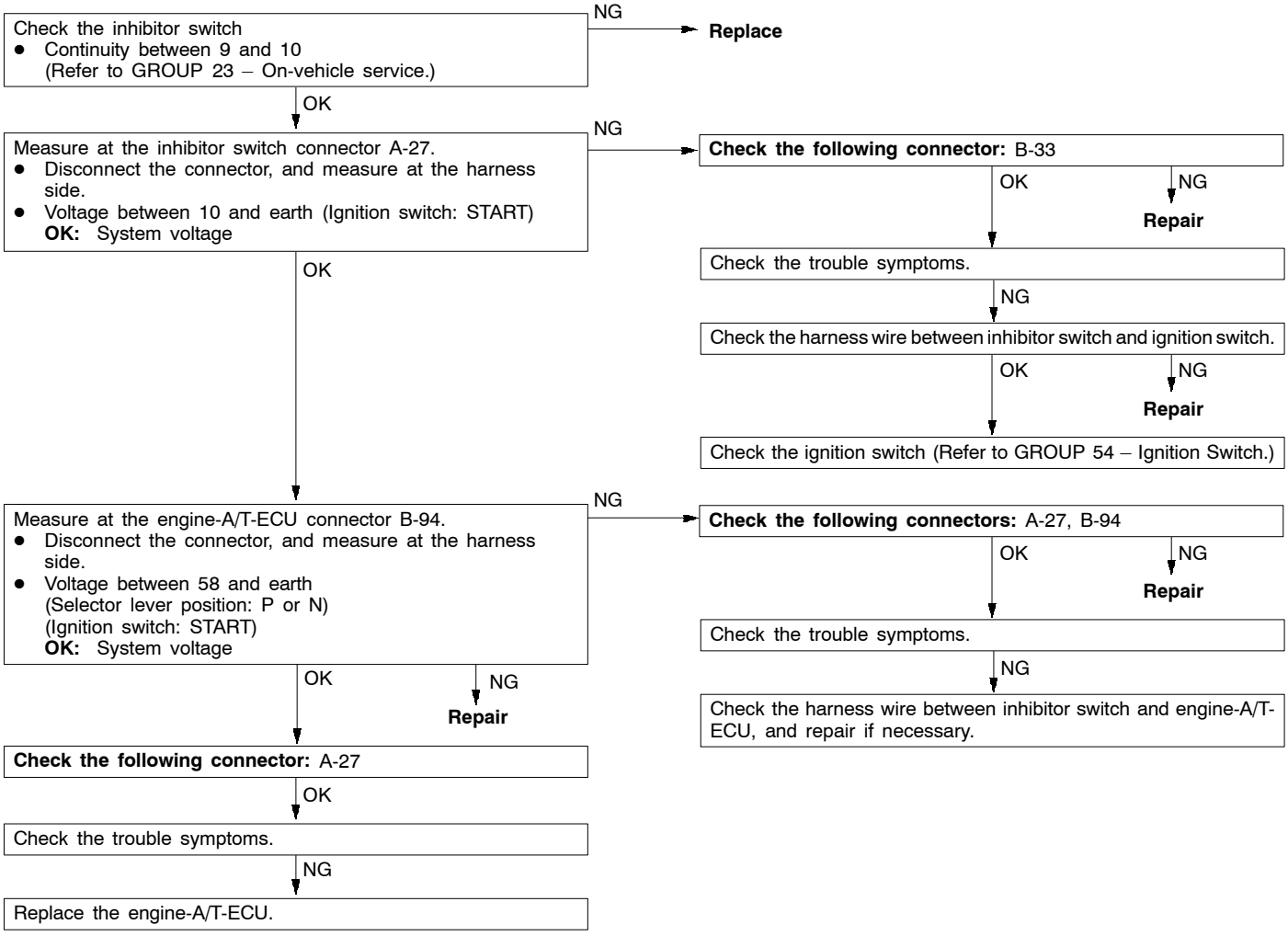
INSPECTION PROCEDURE 28

Ignition switch-ST system	Probable cause
The ignition switch-ST outputs a HIGH signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T> while the engine is cranking. The engine-ECU <M/T> or engine-A/T-ECU <A/T> uses this signal to carry out functions such as fuel injection control during starting.	• Malfunction of the ignition switch • Malfunction of the inhibitor switch <A/T> • Open circuit or short-circuited harness wire of the ignition switch circuit • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>

<M/T>

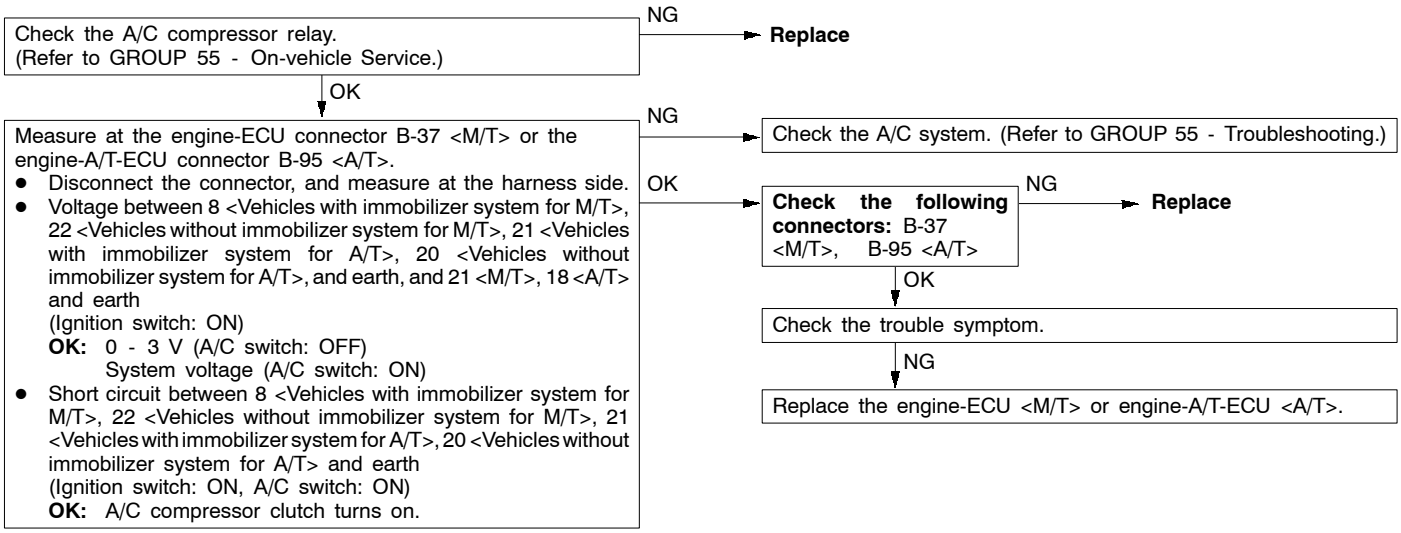


<A/T>



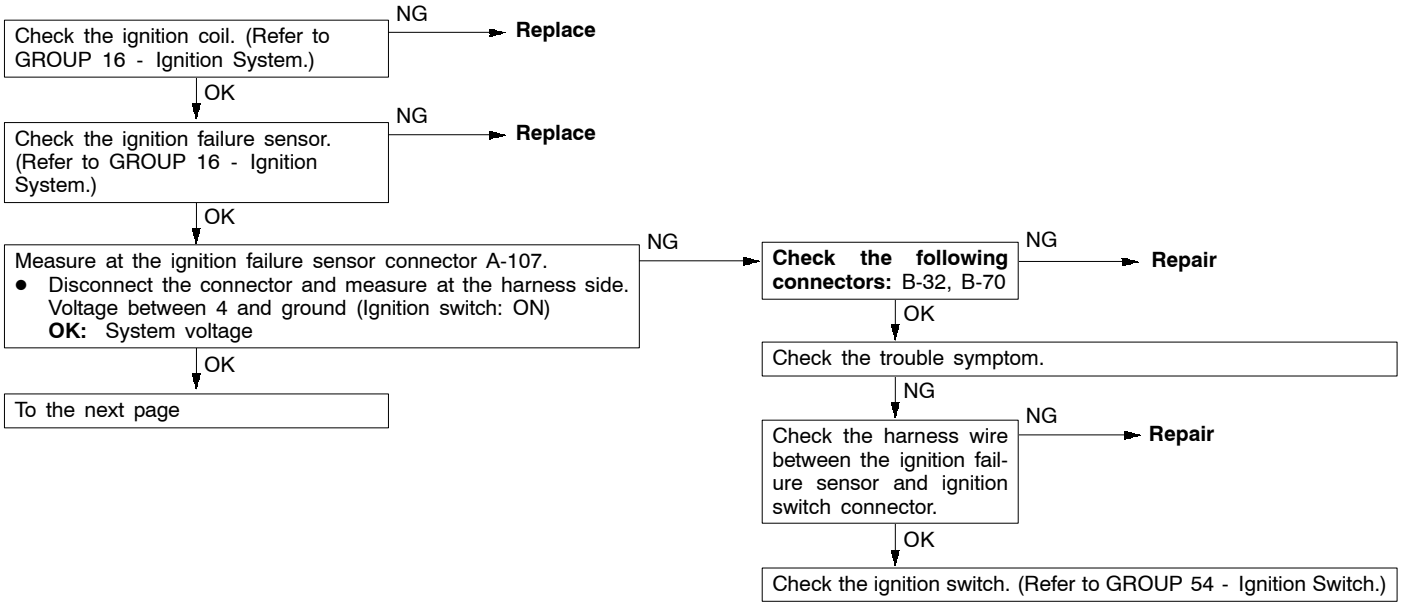
INSPECTION PROCEDURE 29

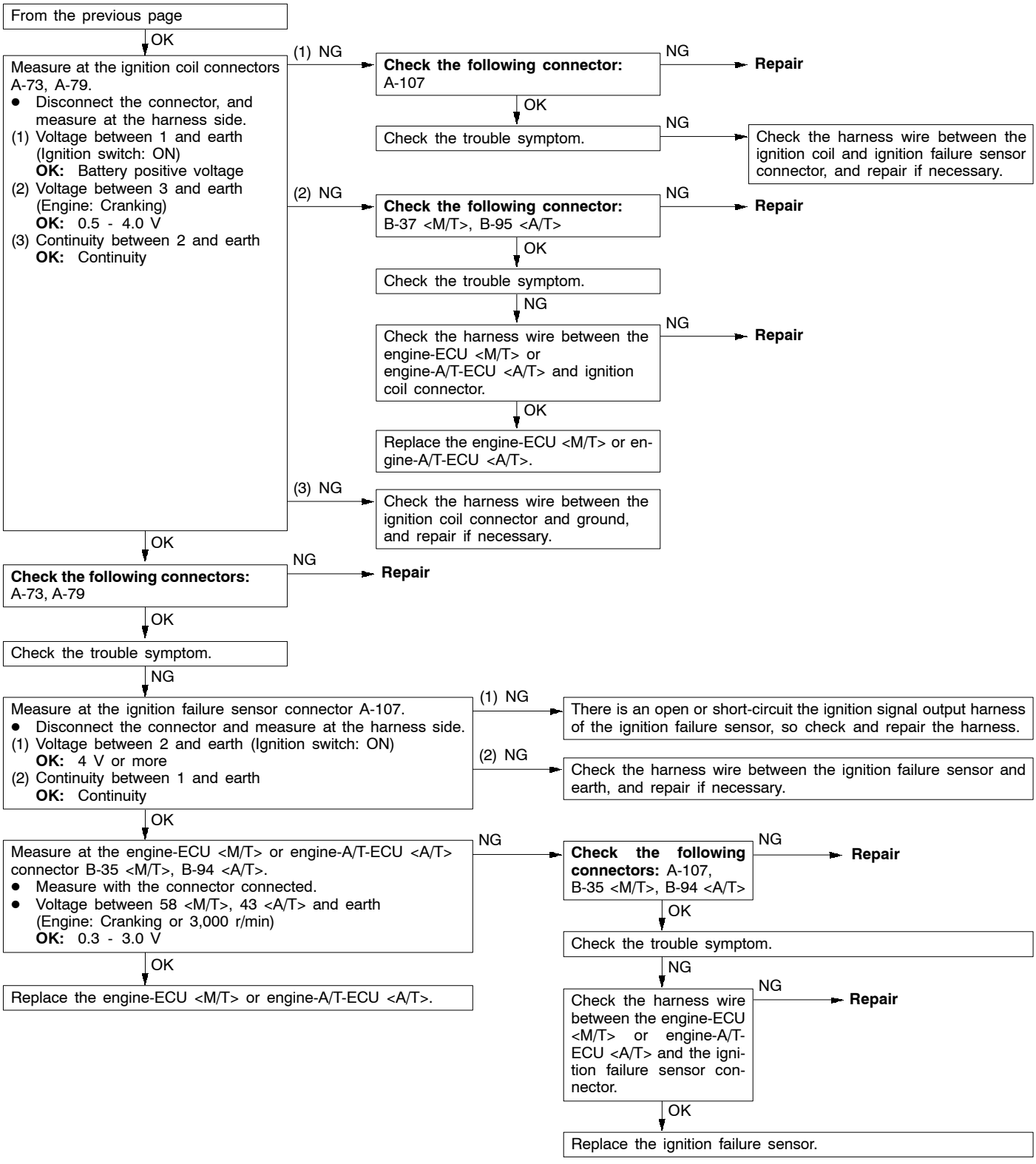
A/C switch and A/C relay system	Probable cause
When an A/C ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> carries out control of the idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch.	• Malfunction of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



INSPECTION PROCEDURE 30

Ignition circuit system	Probable cause
The engine-ECU <M/T> or engine-A/T-ECU <A/T> interrupts the ignition coil primary current by turning the power transistor inside the engine-ECU <M/T> or engine-A/T-ECU <A/T> ON and OFF.	• Malfunction of ignition coil. • Malfunction of ignition failure sensor. • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>

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OK
Measure at the ignition coil connectors A-73, A-79.
● Disconnect the connector, and measure at the harness side.
(1) Voltage between 1 and earth (Ignition switch: ON)
OK: Battery positive voltage
(2) Voltage between 3 and earth (Engine: Cranking)
OK: 0.5 - 4.0 V
(3) Continuity between 2 and earth
OK: Continuity
(1) NG
Check the following connector: A-107
NG
Repair
OK
Check the trouble symptom.
NG
Check the harness wire between the ignition coil and ignition failure sensor connector, and repair if necessary.
(2) NG
Check the following connector: B-37 <M/T>, B-95 <A/T>
NG
Repair
OK
Check the trouble symptom.
NG
Check the harness wire between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and ignition coil connector.
NG
Repair
OK
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.
(3) NG
Check the harness wire between the ignition coil connector and ground, and repair if necessary.
OK
Check the following connectors: A-73, A-79
NG
Repair
OK
Check the trouble symptom.
NG
Measure at the ignition failure sensor connector A-107.
● Disconnect the connector and measure at the harness side.
(1) Voltage between 2 and earth (Ignition switch: ON)
OK: 4 V or more
(2) Continuity between 1 and earth
OK: Continuity
(1) NG
There is an open or short-circuit the ignition signal output harness of the ignition failure sensor, so check and repair the harness.
(2) NG
Check the harness wire between the ignition failure sensor and earth, and repair if necessary.
OK
Measure at the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector B-35 <M/T>, B-94 <A/T>.
● Measure with the connector connected.
● Voltage between 58 <M/T>, 43 <A/T> and earth (Engine: Cranking or 3,000 r/min)
OK: 0.3 - 3.0 V
NG
Check the following connectors: A-107, B-35 <M/T>, B-94 <A/T>
NG
Repair
OK
Check the trouble symptom.
NG
Check the harness wire between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the ignition failure sensor connector.
NG
Repair
OK
Replace the ignition failure sensor.
OK
Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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.

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. P0130	13A-103
			When engine is suddenly raced	600 - 1,000 mV		
		Engine: After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.	Engine is idling	400 mV or less (Changes) 600 - 1,000 mV		
			2,500 r/min			
12	Air flow sensor*1	● 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	70 - 110 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. P0110	13A-96
			When intake air temperature is 0°C	0°C		
			When intake air temperature is 20°C	20°C		
			When intake air temperature is 40°C	40°C		
			When intake air temperature is 80°C	80°C		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
14	Throttle position sensor	Ignition switch: ON	Set to idle position	300 - 1,000 mV	Code No. P0120	13A-100
			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. 25	13A-147
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 28	13A-150
			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. P0115	13A-98
			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. P0335	13A-113
		● Engine: Idling ● Idle position switch: ON	When engine coolant temperature is -20°C	1,275 - 1,475 rpm		
			When engine coolant temperature is 0°C	1,225 - 1,425 rpm		
			When engine coolant temperature is 20°C	1,100 - 1,300 rpm		
			When engine coolant temperature is 40°C	950 - 1,150 rpm		
			When engine coolant temperature is 80°C	650 - 850 rpm		

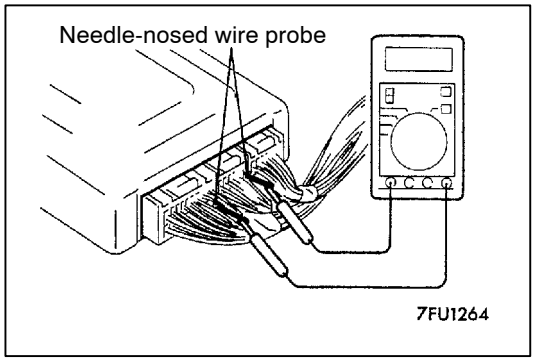
Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
24	Vehicle speed sensor	Drive at 40 km/h		Approximately 40 km/h	Code No. P0500	13A-120
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. P0105	13A-94
			At altitude of 600 m	95 kPa		
			At altitude of 1,200 m	88 kPa		
			At altitude of 1,800 m	81 kPa		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Code No. P0551	13A-123
			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-151
			A/C switch: ON	ON		
29	Inhibitor switch <A/T>	Ignition switch: ON	P or N	P or N	Procedure No. 28	13A-150
			D, 2, L or R	D, 2, L or R		
41	Injectors*2	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	12 - 19 ms	-	-
			When engine coolant temperature is 20°C	26 - 40 ms		
			When engine coolant temperature is 80°C	6.0 - 9.1 ms		
	Injectors*3	• Engine coolant temperature: 80 – 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral (A/T: P range)	Engine is idling	1.6 - 2.8 ms		
			2,500 r/min	1.4 - 2.6 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	2 - 18°BTDC	Code No. P0300	-
			2,500 r/min	18 - 38°BTDC		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
45	ISC (stepper) motor position*4	• Engine coolant temperature: 80 - 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral (A/T: P range) • Idle position switch: ON • Engine: Idling • When A/C switch is ON, A/C compressor should be operating	A/C switch: OFF	2 - 25 STEP	-	-
			A/C switch: OFF → ON	Increases by 10 - 70 steps		
			• 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	13A-151
			A/C switch: ON	ON (Compressor clutch is operating)		
59	Oxygen sensor (rear)	• Transmission: 2nd gear <M/T>, L range <A/T> • Drive with throttle widely open	3,500 r/min	600 - 1,000 mV	Code No. P0136	13A-106
81	Long-term fuel compensation	Engine: Warm, 2,500 r/min without any load (during closed loop)		-12.5 - 12.5 %	Code No. P0170	13A-109
82	Short-term fuel compensation	Engine: Warm, 2,500 r/min without any load (during closed loop)		-30 - 25 %	Code No. P0170	13A-109
87	Calculation load value	Engine: Warm	Engine: Idling	15 - 35 %	-	-
			2,500 r/min	15 - 35 %		
88	Fuel control condition	Engine: Warm	2,500 r/min	Closed loop	Code No. P0125	13A-101
			When engine is suddenly raced	Open loop - drive condition		
A1	Oxygen sensor (sensor 1)	Engine: After warm-up	Idling	0 V	Code No. P0130	13A-103
			Sudden racing	0.6 - 1.0 V		
			2,500 r/min	0.4 V or less and 0.6 - 1.0 V alternates		
A2	Oxygen sensor (sensor 2)	• Transmission: 2nd gear <M/T>, L range <A/T> • Drive with throttle widely open	3,500 r/min	0.6 - 1.0 V	Code No. P0136	13A-106

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
8A	Throttle position sensor (Throttle valve opening angle)	● Engine coolant temperature: 80 - 95°C ● Ignition switch: ON (Engine: Stopped)	Release the accelerator pedal.	6 - 20 %	Code No. P0120	13A-100
			Depress the accelerator pedal gradually	Increase in response to pedal depression stroke.		
			Depress the accelerator pedal fully.	80 - 100 %		

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. P0201	13A-110
02		Cut fuel to No. 2 injector				Code No. P0202	13A-110
03		Cut fuel to No. 3 injector				Code No. P0203	13A-110
04		Cut fuel to No. 4 injector				Code No. P0204	13A-110
07	Fuel pump	Fuel pump operates and fuel is recirculated.	• Engine: Cranking • Fuel pump: Forced driving Inspect according to both the above conditions.	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 27	13A-148
				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.	Code No. P0443	13A-119
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.	Code No. P0403	13A-117
17	Basic ignition timing	Set to ignition timing adjustment mode	Engine: Idling Timing light is set		5°BTDC	-	-
21	Fan controller	Drive the fan motor	Ignition switch: ON		Radiator fan and condenser fan operate at high speed	Procedure No. 24	13A-146



CHECK AT THE ENGINE-ECU TERMINALS

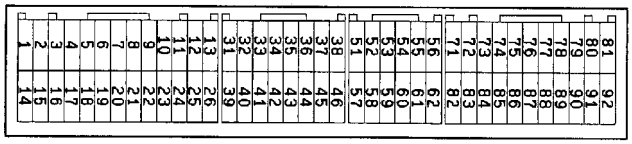
TERMINAL VOLTAGE CHECK CHART

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 <M/T> or engine-A/T-ECU <A/T> connector terminals from the wire side, and measure the voltage while referring to the check chart.

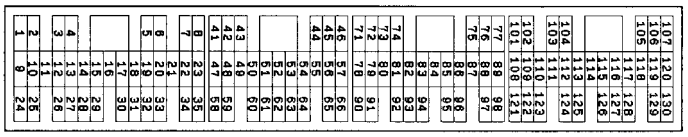
   NOTE
   (1) Make the voltage measurement with the engine-ECU <M/T> or engine-A/T-ECU <A/T> connectors connected.
   (2) You may find it convenient to pull out the engine-ECU <M/T> or engine-A/T-ECU <A/T> to make it easier to reach the connector terminals.
   (3) The checks can be carried out off the 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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> Connector Terminal Arrangement



Engine-A/T-ECU <A/T> Connector Terminal Arrangement



NOTE:
*: Vehicles with immobilizer system.

Terminal No. <M/T>	Terminal No. <A/T>	Check item	Check condition (Engine condition)	Normal condition
1	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	9	No. 2 injector		
2	24	No. 3 injector		
15	2	No. 4 injector		
4	14	Stepper motor coil <A>	Engine: Soon after the warmed up engine is started	System voltage ↔ 0 V (Changes repeatedly)
17	28	Stepper motor coil <B>		
5	15	Stepper motor coil <C>		
18	29	Stepper motor coil <D>		
6	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	20* or 21	A/C relay	• Engine: Idle speed • A/C switch: OFF → ON (A/C compressor is operating)	System voltage or momentarily 6 V or more → 0 - 3 V
9	34	Purge control solenoid valve	Ignition switch: ON	System voltage
			Running at 3,000 r/min while engine is warming up after having been started.	0 - 3 V
10	11	Ignition coil - No. 1, No. 4 (power transistor)	Engine r/min: 3,000 r/min	0.3 - 3.0 V
23	12	Ignition coil - No. 2, No. 3 (power transistor)		

Terminal No. <M/T>	Terminal No. <A/T>	Check item	Check condition (Engine condition)		Normal condition
12	41	Power supply	Ignition switch: ON		System voltage
25	47				
19	19	Air flow sensor reset signal	Engine: Idle speed		0 - 1 V
			Engine r/min: 3,000 r/min		6 - 9 V
20	17	Fan motor relay (HI)	Radiator fan is not operating (Engine coolant temperature is 90°C or less)		System voltage
			Radiator fan is not operating (Englne coolant temperature is 105°C or less)		0 - 3 V
21	18	Fan motor relay (LO)	Radiator fan and condenser fan are not operating (Engine coolant temperature is 90°C or less)		System voltage
			Radiator fan and condenser fan are not operating (Engine coolant temperature is 90 - 105°C or less)		0 - 3 V
8 or 22*	20 or 21*	Fuel pump relay	Ignition switch: ON		System voltage
			Engine: Idle speed		0 - 3 V
33	8	Alternator G terminal	● Engine: Warm, idle (radiator fan: OFF) ● Headlamp: OFF to ON ● Rear defogger switch: OFF to ON ● Brake lamp: ON		Voltage rises by 0.2 - 3.5 V.
41	54	Alternator FR terminal	● Engine: Warm, idle (radiator fan: OFF) ● Headlamp: OFF to ON ● Rear defogger switch: OFF to ON ● Brake lamp: ON		Voltage drops by 0.2 - 3.5 V.
36	22	Engine warning lamp	Ignition switch: “LOCK” (OFF) position → ON		0 - 3 V → 9 - 13 V (After several seconds have elapsed)
37	52	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	49	Control relay (Power supply)	Ignition switch: “LOCK” (OFF) position		System voltage
			Ignition switch: ON		0 - 3 V
45	83	A/C switch 1	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
58	43	Tachometer signal	Engine r/min: 3,000 r/min		0.3 - 3.0 V

Terminal No. <M/T>	Terminal No. <A/T>	Check item	Check condition (Engine condition)		Normal condition
60	3	Oxygen sensor (front) heater	Engine: Idling after warming up		0 - 3 V
			Engine r/min: 5,000 r/min		System voltage
54	26	Oxygen sensor (rear) heater	Engine: Idling after warming-up		0 - 3 V
			Engine r/min: 5,000 r/min		System voltage
71	58	Ignition switch - ST	Engine: Cranking		8 V or more
72	64	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
75	73	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 - 1.0 V
76	71	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ↔ 0.8 V (Changes repeatedly)
80	66	Backup power supply	Ignition switch: “LOCK” (OFF) position		System voltage
81	46	Sensor impressed voltage	Ignition switch: ON		4.5 - 5.5 V
82	98	Ignition switch - IG	Ignition switch: ON		System voltage
83	44	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

Terminal No. <M/T>	Terminal No. <A/T>	Check item	Check condition (Engine condition)		Normal condition
84	78	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	55	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	80	Vehicle speed sensor	● Ignition switch: ON ● Move the vehicle slowly forward		0 ↔ 5 V (Changes repeatedly)
88	56	Camshaft position sensor	Engine: Cranking		0.4 - 3.0 V
			Engine: Idle speed		0.5 - 2.0 V
89	45	Crank angle sensor	Engine: Cranking		0.4 - 4.0 V
			Engine: Idle speed		1.5 - 2.5 V
90	65	Air flow sensor	Engine: Idle speed		2.2 - 3.2 V
			Engine r/min: 2,500 r/min		

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

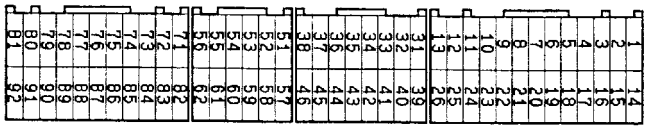
1. Turn the ignition switch to “LOCK” (OFF) position.
2. Disconnect the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU <M/T> or engine-A/T-ECU <A/T> harness-side connector while referring to the check chart.

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 <M/T> or engine-A/T-ECU <A/T> 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 <M/T> Harness Side Connector Terminal Arrangement



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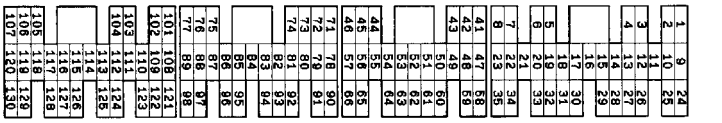
Engine-A/T-ECU <A/T> Harness Side Connector Terminal Arrangement



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Terminal No.<M/T>	Terminal No. <A/T>	Inspection item	Normal condition (Check condition)
1 - 12	1 - 41	No. 1 injector	13 - 16 Ω (At 20°C)
14 - 12	9 - 41	No. 2 injector	
2 - 12	24 - 41	No. 3 injector	
15 - 12	2 - 41	No. 4 injector	
4 - 12	14 - 41	Stepper motor coil (A)	28 - 33 Ω (At 20°C)
17 - 12	28 - 41	Stepper motor coil (B)	
5 - 12	15 - 41	Stepper motor coil (C)	
18 - 12	29 - 41	Stepper motor coil (D)	
6 - 12	6 - 41	EGR control solenoid valve	29 - 35 Ω (At 20°C)
9 - 12	34 - 41	Purge control solenoid valve	29 - 35 Ω (At 20°C)
13 - Body earth	42 - Body earth	Engine-ECU <M/T> or engine-A/T-ECU <A/T> earth	Continuity (0 Ω)
26 - Body earth	48 - Body earth	Engine-ECU <M/T> or engine-A/T-ECU <A/T> earth	
60 - 12	3 - 41	Oxygen sensor (front) heater	4.5 - 8.0 Ω (At 20°C)
54 - 12	26 - 41	Oxygen sensor (rear) heater	11 - 18 Ω (At 20°C)

Terminal No.<M/T>	Terminal No. <A/T>	Inspection item	Normal condition (Check condition)
72 - 92	64 - 57	Intake air temperature sensor	5.3 - 6.7 kΩ (When intake air temperature is 0°C)
			2.3 - 3.0 kΩ (When intake air temperature is 20°C)
			1.0 - 1.5 kΩ (When intake air temperature is 40°C)
			0.30 - 0.42 kΩ (When intake air temperature is 80°C)
83 - 92	44 - 57	Engine coolant temperature sensor	5.1 - 6.5 kΩ (When coolant temperature is 0°C)
			2.1 - 2.7 kΩ (When coolant temperature is 20°C)
			0.9 - 1.3 kΩ (When coolant temperature is 40°C)
			0.26 - 0.36 kΩ (When coolant temperature is 80°C)

INSPECTION PROCEDURE USING AN ANALYZER

On A/T models, the engine-A/T-ECU (combination ECU) has been introduced. Due to this, only the inspection procedures at the engine-A/T-ECU terminals are described below (On M/T models, the inspection procedures at the engine-ECU terminals are not changed).

AIR FLOW SENSOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 65.

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 56. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 45. (When checking the crank angle sensor signal wave pattern.)

INJECTOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 1. (When checking the No. 1 cylinder.)
2. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 9. (When checking the No. 2 cylinder.)
3. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 24. (When checking the No. 3 cylinder.)
4. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 2. (When checking the No. 4 cylinder.)

IDLE SPEED CONTROL SERVO (STEPPER MOTOR)

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 14, connection terminal 28, connection terminal 15, and connection terminal 29 respectively.

IGNITION COIL AND POWER TRANSISTOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 11 (No. 1 - No. 4), terminal 12 (No. 2 - No. 3) respectively

GROUP 14
ENGINE COOLING

GENERAL

OUTLINE OF CHANGE

The service procedures have been established due to the change of the thermostat, the thermostat case assembly and the water inlet pipe assembly in vehicles with 4G1 engine.
Other service procedures are the same as before.

SERVICE SPECIFICATIONS

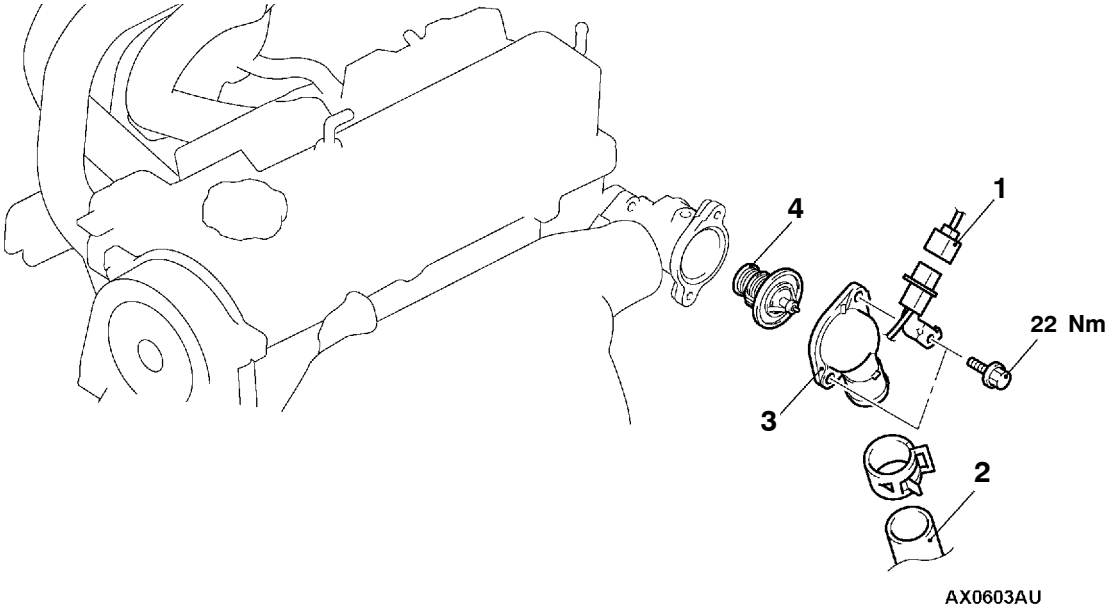
Items		Standard value
Thermostat <4G1>	Valve opening temperature of thermostat °C	88 ± 1.5
	Full-opening temperature of thermostat °C	100
	Valve lift (at 100°C) mm	8.5 or more

THERMOSTAT

REMOVAL AND INSTALLATION

<4G1>

Pre-removal and Post-installation Operation
Engine Coolant Draining and Supplying



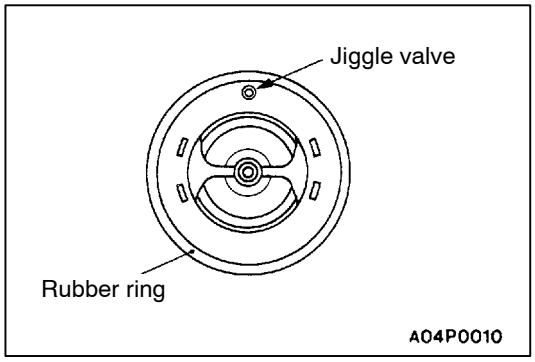
Removal steps

1. Oxygen sensor (front) connector
◀A▶ ▶B◀ 2. Radiator lower hose connection
3. Water inlet fitting
▶A◀ 4. Thermostat

REMOVAL SERVICE POINT

◀A▶ RADIATOR LOWER HOSE DISCONNECTION

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.



INSTALLATION SERVICE POINTS

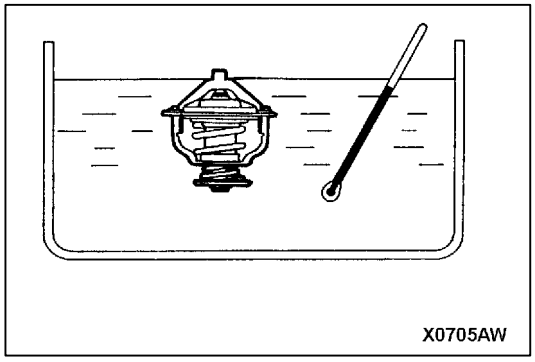
▶A◀ THERMOSTAT INSTALLATION

Install the thermostat so that the jiggle valve is facing straight up.

Caution
Make absolutely sure that no oil is adhering to the rubber ring of the thermostat. In addition, be careful not to fold over or scratch the rubber ring when inserting. If the rubber ring is damaged, replace the thermostat.

▶B◀ RADIATOR LOWER HOSE CONNECTION

1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.



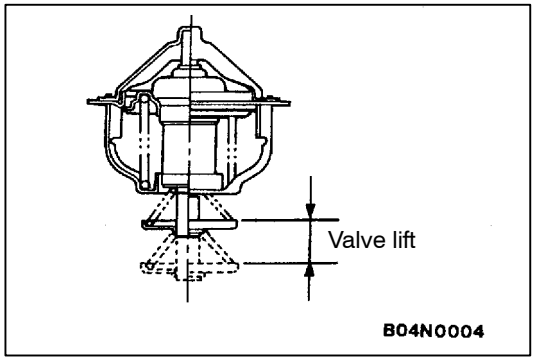
INSPECTION

THERMOSTAT CHECK

1. Immerse the thermostat in water, and heat the water while stirring. Check the thermostat valve opening temperature.

   Standard value:

   Valve opening temperature: 88 ± 1.5°C



2. Check that the amount of valve lift is at the standard value when the water is at the full-opening temperature.

   Standard value:

   Full-opening temperature: 100°C

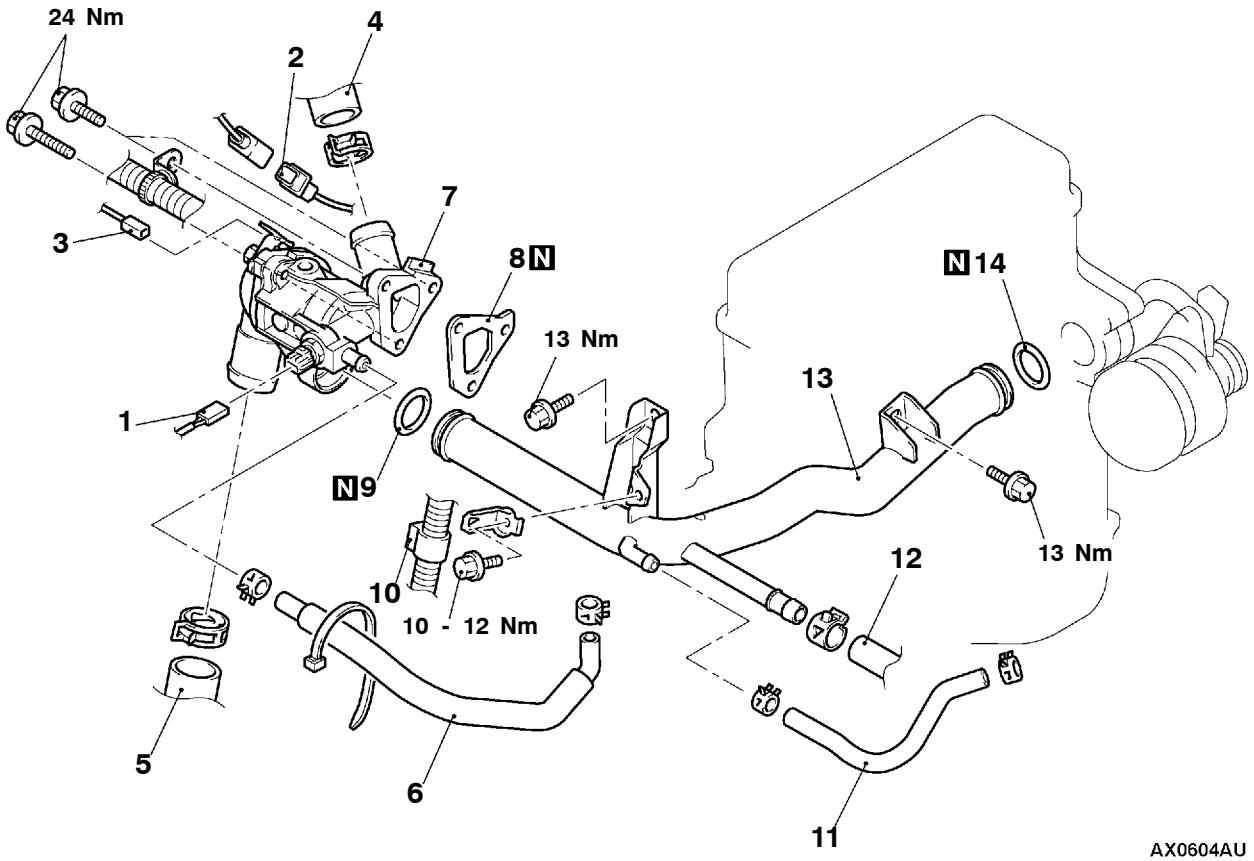
   Amount of valve lift: 8.5 mm or more

   NOTE
   Measure the valve height when the thermostat is fully closed, and use this measurement to calculate the valve height when the thermostat is fully open.

WATER HOSE AND WATER PIPE <4G1>

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation
- Battery and Battery Tray Removal and Installation



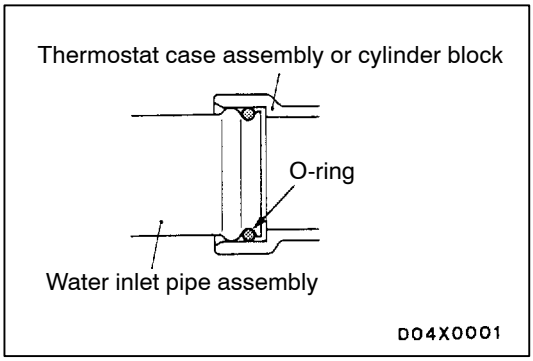
Removal steps

1. Engine coolant temperature sensor connector
2. Oxygen sensor (front) connector
3. Engine coolant temperature gauge unit connector
◀A▶ ▶B◀ 4. Radiator upper hose connection
◀A▶ ▶B◀ 5. Radiator lower hose connection
6. Water hose
7. Thermostat case assembly
8. Thermostat case gasket
▶A◀ 9. O-ring
10. Control harness connection
11. Water hose
12. Heater hose connection
13. Water inlet pipe
▶A◀ 14. O-ring

REMOVAL SERVICE POINT

◀A▶ RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION

After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.



INSTALLATION SERVICE POINTS

▶A◀ O-RING INSTALLATION

Insert the O-ring to the water inlet pipe assembly, and coat the outer circumference of the O-ring with water or engine coolant.

Caution
Do not allow engine oil or other greases to adhere to the O-ring.

▶B◀ RADIATOR LOWER HOSE/RADIATOR UPPER HOSE CONNECTION

1. Insert each hose as far as the projection of the water inlet fitting or thermostat case assembly.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

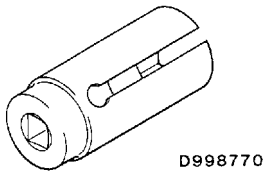
GROUP 15
INTAKE AND EXHAUST

GENERAL

OUTLINE OF CHANGE

The service procedures have been established due to the adoption of the intake manifold made of steel pipe for the 4G1 engine and the exhaust manifold incorporated with the catalytic converter.
Other service procedures are the same as before.

SPECIAL TOOL

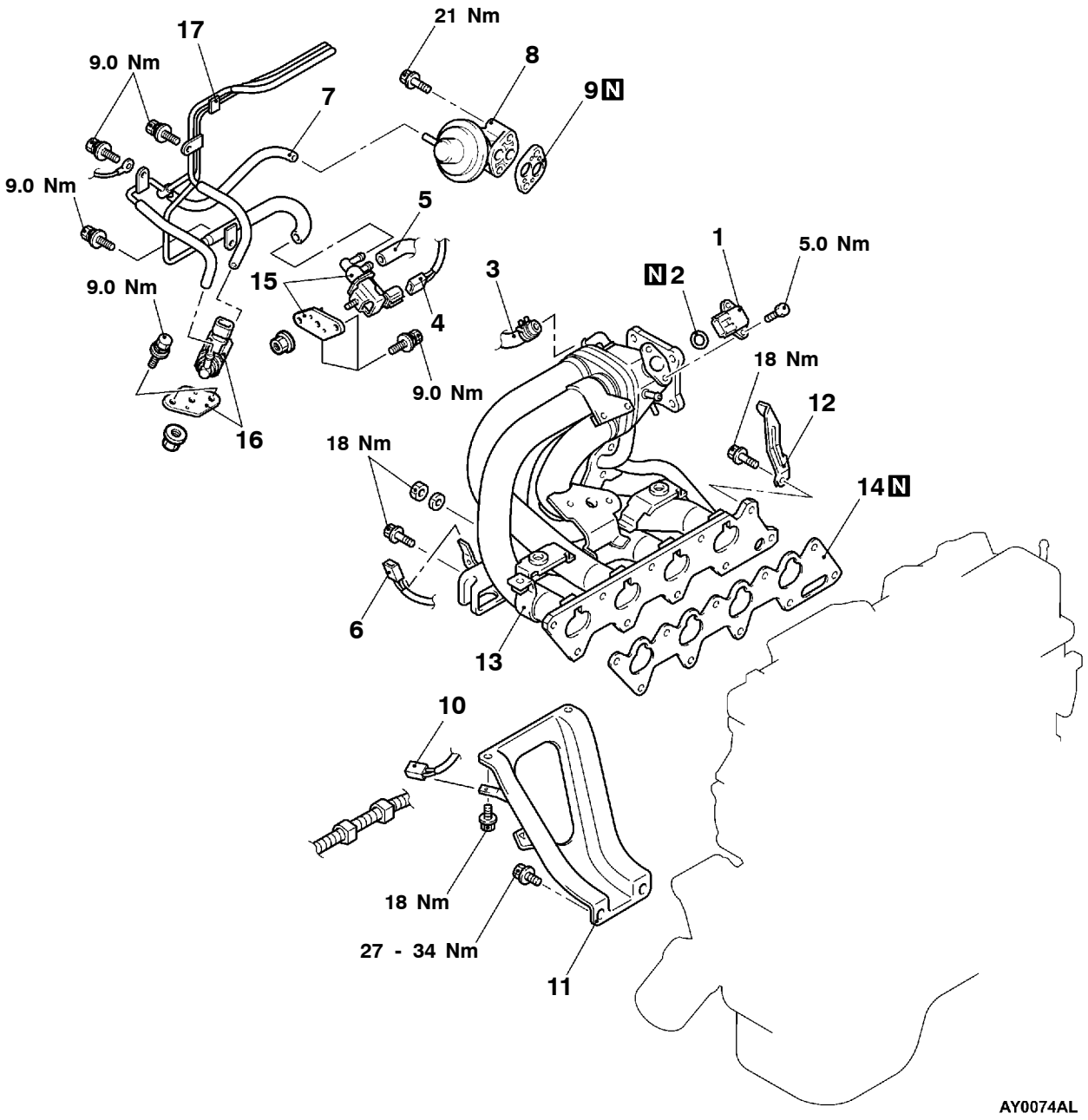
Tool	Number	Name	Use
 D998770	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor

INTAKE MANIFOLD

REMOVAL AND INSTALLATION

<4G1>

Pre-removal and Post-installation Operation
- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Accelerator Cable Adjustment
- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation
- Throttle Body Removal and Installation
- Fuel Pressure Regulator, Delivery Pipe and Injector Assembly Removal and Installation (Refer to GROUP 13A - Injector.)



Removal steps

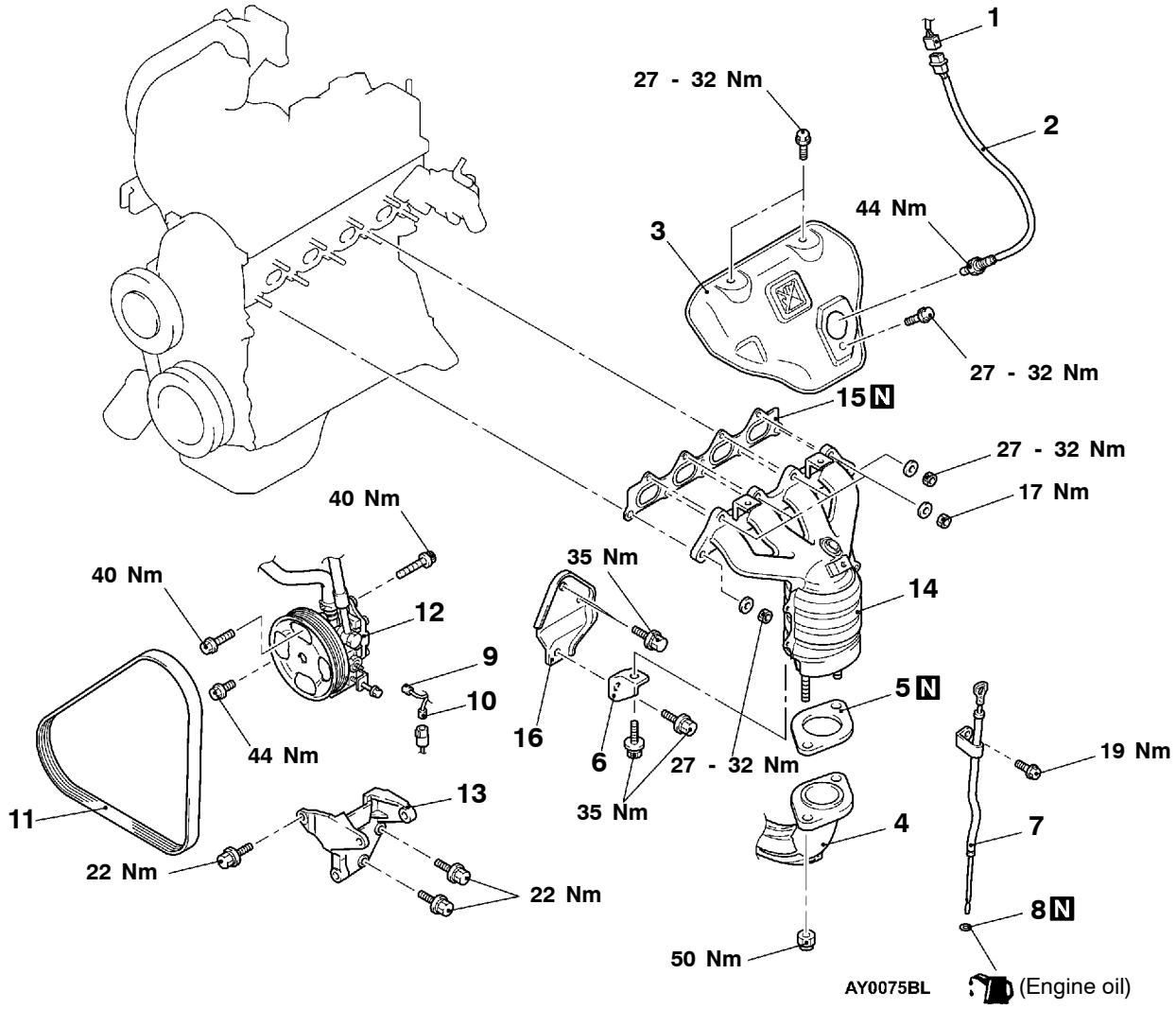
1. Vacuum sensor
2. O-ring
3. Brake booster vacuum hose connection
4. Purge control solenoid valve connector
5. Vacuum hose connection
6. Detonation sensor connector
7. Vacuum hose connection
8. EGR valve
9. EGR valve gasket
10. Oxygen sensor (rear) connector
11. Intake manifold stay
12. Engine hanger
13. Intake manifold
14. Intake manifold gasket
15. Purge control solenoid valve assembly
16. EGR solenoid valve assembly
17. Vacuum pipe and hose assembly

EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Under Cover Removal and Installation
- Drive Belt Tension Adjustment <4G1> <after installation only>

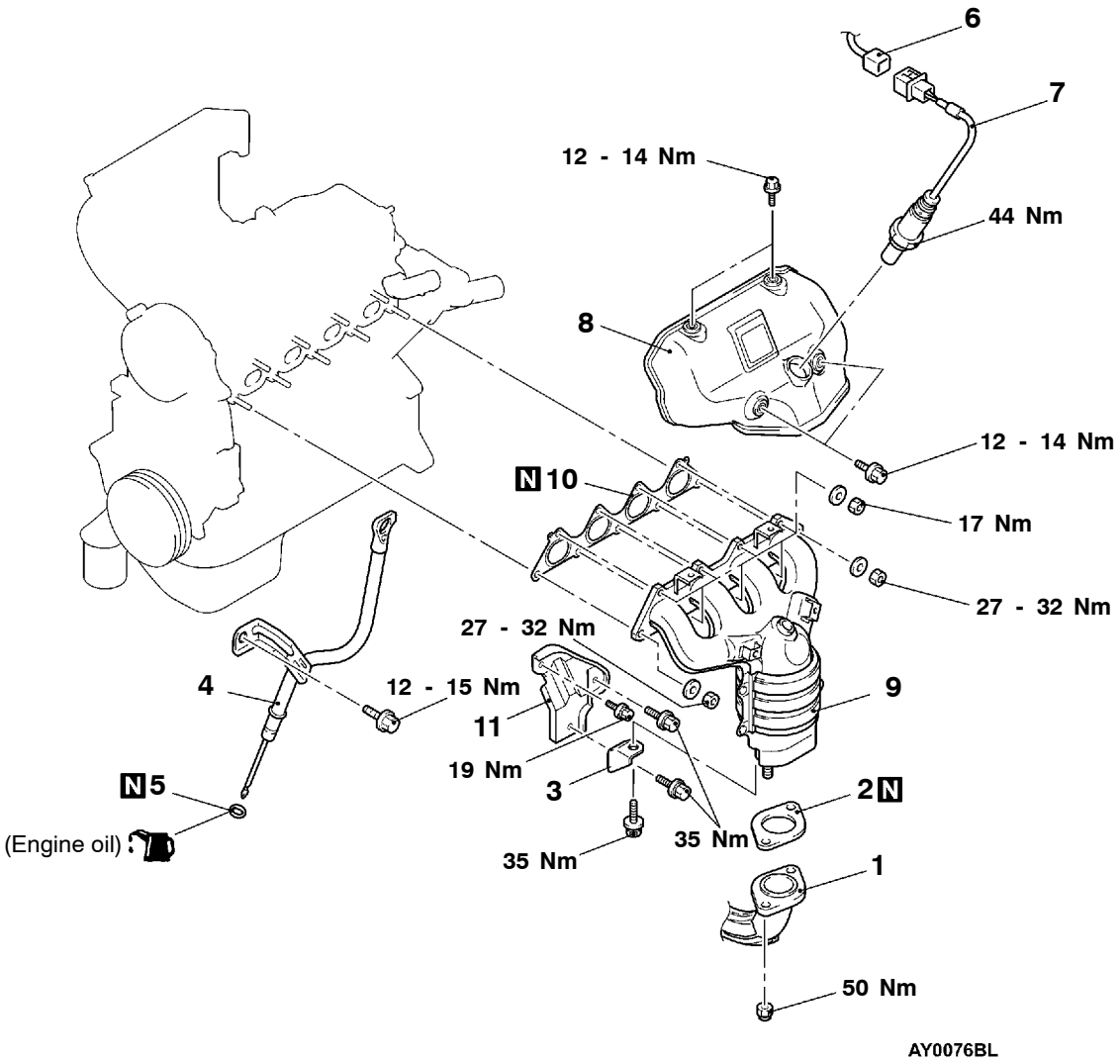
<4G1>



Removal steps

◀A▶ ▶A◀ 1. Oxygen sensor (front) connector
2. Oxygen sensor (front)
3. Exhaust manifold cover
4. Front exhaust pipe connection
5. Front exhaust pipe gasket
6. Exhaust manifold bracket
7. Engine oil level gauge assembly
8. O-ring
9. Power steering oil pressure switch connector
10. Air conditioner refrigerant temperature switch and magnetic clutch connector
11. Power steering oil pump and air conditioner compressor drive belt
12. Power steering oil pump and brace assembly
13. Power steering oil pump bracket
14. Exhaust manifold
15. Exhaust manifold gasket
16. Exhaust manifold bracket

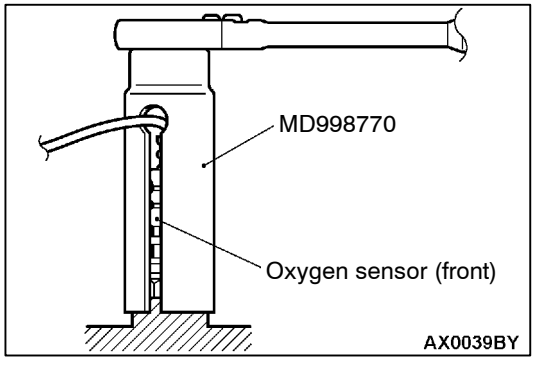
<4G9>



Removal steps

1. Front exhaust pipe connection
2. Front exhaust pipe gasket
3. Exhaust manifold bracket
4. Engine oil level gauge assembly
5. O-ring
6. Oxygen sensor (front) connector

◀A▶ ▶A◀ 7. Oxygen sensor (front)
8. Exhaust manifold cover
9. Exhaust manifold
10. Exhaust manifold gasket
11. Exhaust manifold bracket



REMOVAL SERVICE POINT

◀A▶ OXYGEN SENSOR (FRONT) REMOVAL

INSTALLATION SERVICE POINT

▶A◀ OXYGEN SENSOR (FRONT) INSTALLATION

ENGINE ELECTRICAL

CONTENTS

IGNITION SYSTEM

GENERAL

OUTLINE OF CHANGES

<4G1>
The following service procedures have been established to correspond to the addition of vehicles with 4G13-SOHC 16 valve MPI engine. Items other than those given below are the same as for the 4G13 engine.

- A distributorless 2 coil ignition system has been adopted.
- The spark plug has been changed.
- An ignition failure sensor has been added.
- A detonation sensor has been added.

<4G9>
An ignition failure sensor has been added. The crank angle sensor has been changed. Other items are the same as before.

GENERAL INFORMATION

IGNITION COIL SPECIFICATIONS

Items	4G1
Type	Molded 2-coil

SPARK PLUG SPECIFICATIONS

Items	4G1
NGK	BKR6E-11
DENSO	K20PR-U11

SERVICE SPECIFICATIONS

IGNITION COIL

Items	4G1
Secondary coil resistance kΩ	11.7 - 14.3

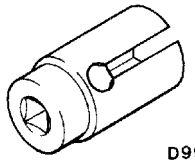
IGNITION FAILURE SENSOR

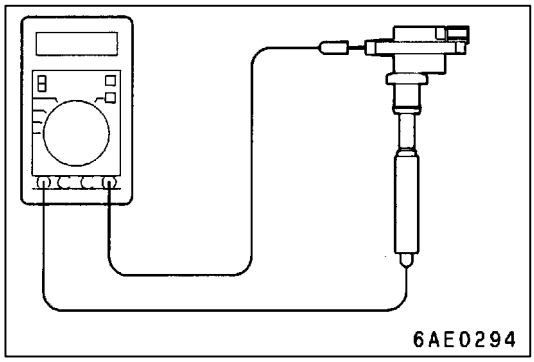
Items	4G1, 4G9
Resistance Ω	0.1 or less

SPARK PLUG

Items	4G1
Spark plug gap mm	1.0 - 1.1

SPECIAL TOOL

Tool	Number	Name	Use
 D998773	MD998773	Detonation sensor wrench	Detonation sensor removal and installation


6AE0294

ON-VEHICLE SERVICE

IGNITION COIL (WITH BUILT-IN POWER TRANSISTOR) CHECK

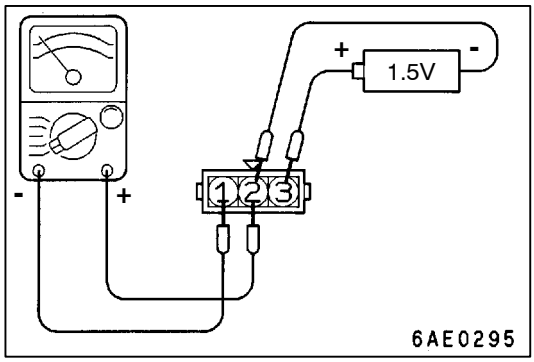
<4G1>

Check by the following procedure, and replace if there is a malfunction.

SECONDARY COIL RESISTANCE CHECK

Measure the resistance between the high-voltage terminals of the ignition coil.

Standard value: 11.7 - 14.3 kΩ



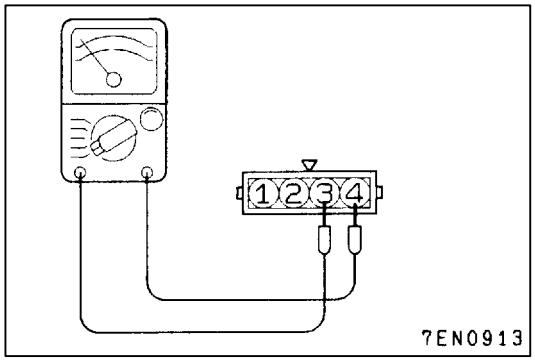
6AE0295

PRIMARY COIL AND POWER TRANSISTOR CONTINUITY CHECK

NOTE

An analog-type circuit tester should be used.

Voltage: 1.5V	Terminal No.		
	1	2	3
When current is flowing	○	⊖	⊕
When current is not flowing			



IGNITION FAILURE SENSOR CHECK

NOTE

An analog-type circuit tester should be used.

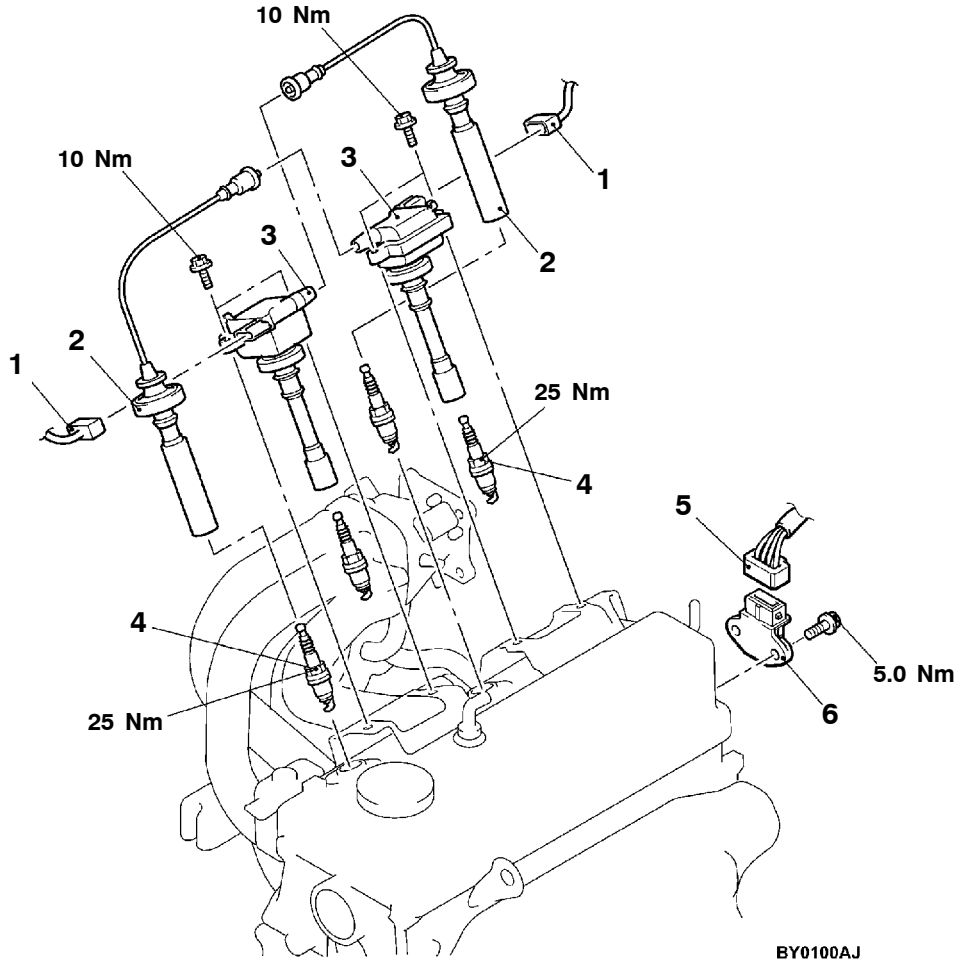
Check that the resistance between terminals 3 and 4 is at the standard value.

Standard value: 0.1 Ω or less

IGNITION COIL

REMOVAL AND INSTALLATION

<4G1>



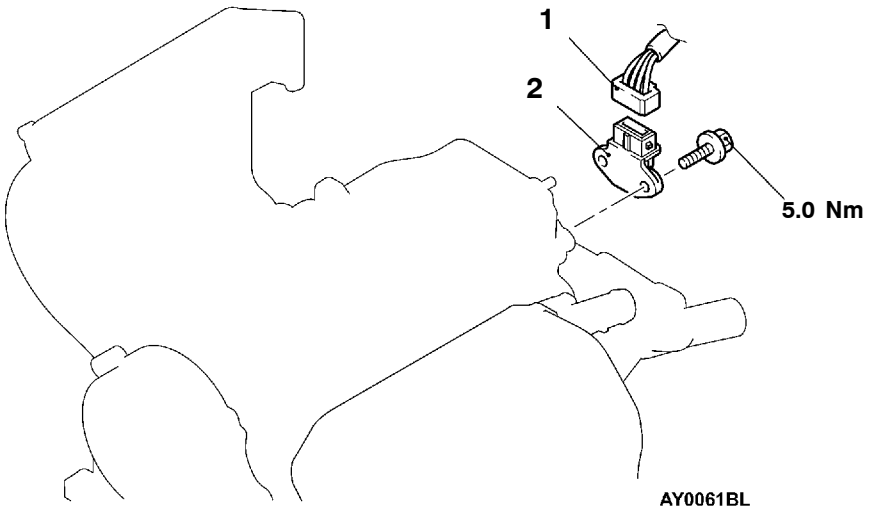
Ignition coil removal steps

1. Ignition coil connector
2. Spark plug cable assembly
3. Ignition coil
4. Spark plug

Ignition failure sensor removal steps

5. Ignition failure sensor connector
6. Ignition failure sensor

<4G9>

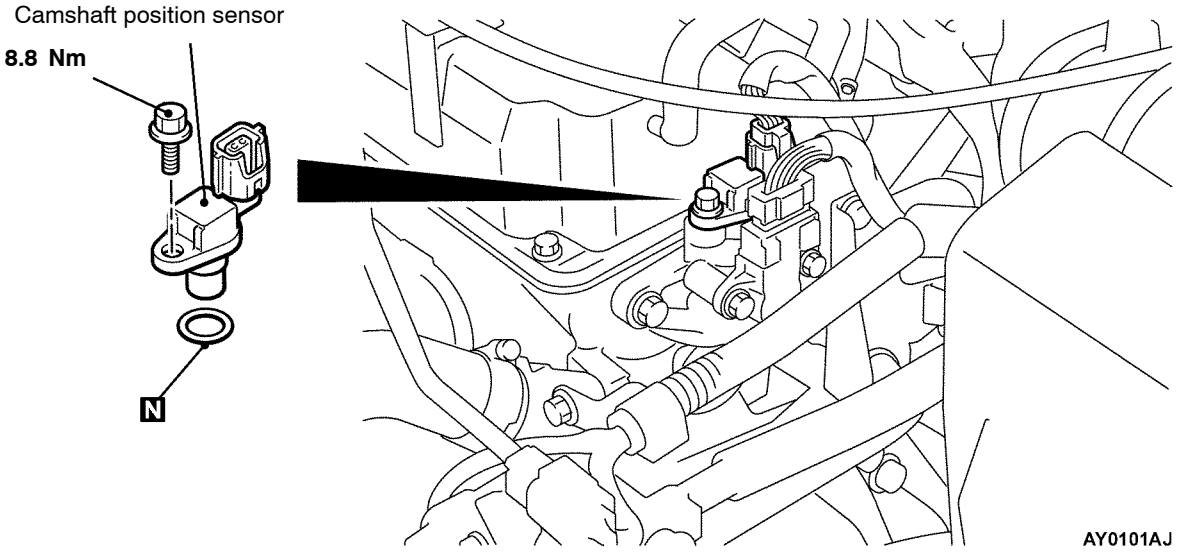


Removal steps

1. Ignition failure sensor connector
2. Ignition failure sensor

CAMSHAFT POSITION SENSOR

<4G1>

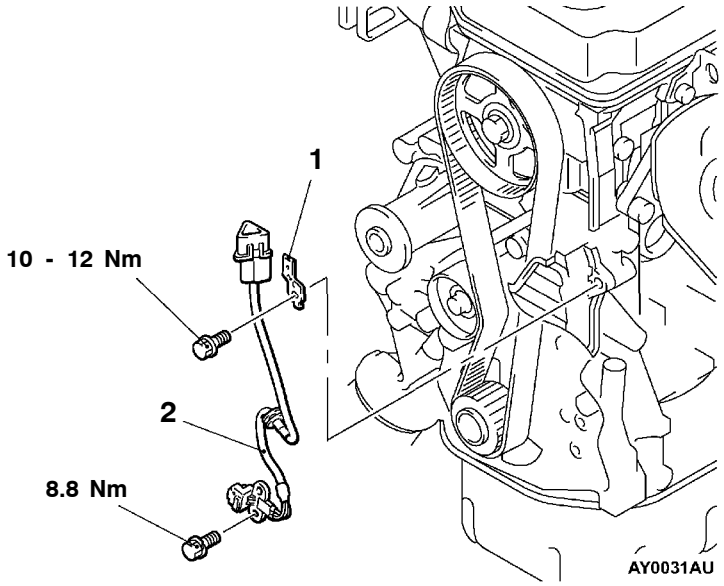


CRANK ANGLE SENSOR

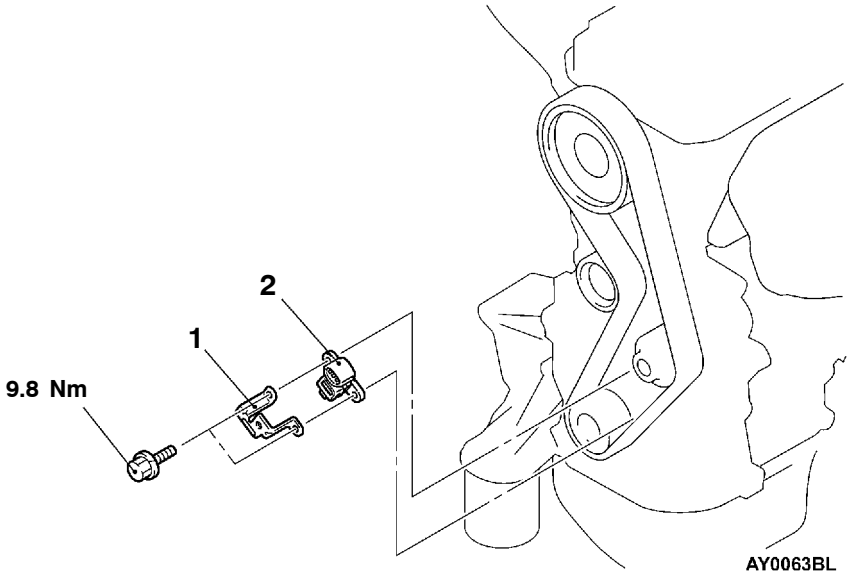
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
Timing Belt Cover Removal and Installation

<4G1>



<4G9>



Removal steps

1. Crank angle sensor bracket
2. Crank angle sensor

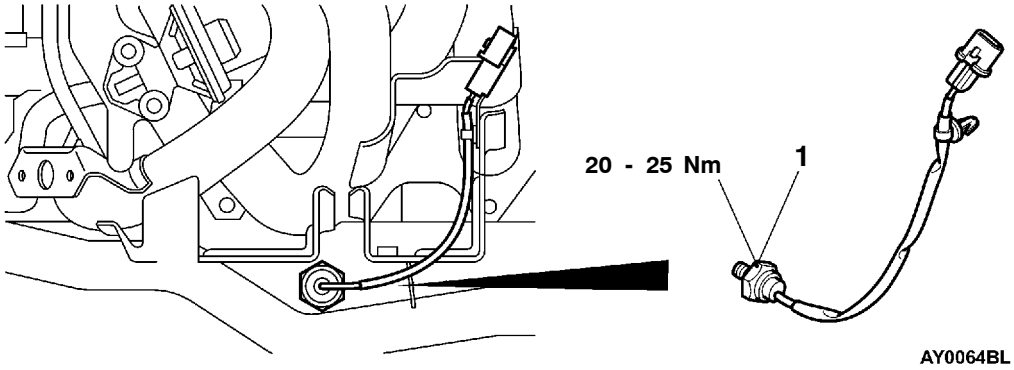
DETONATION SENSOR

Caution
Do not subject the detonation sensor to any shocks.

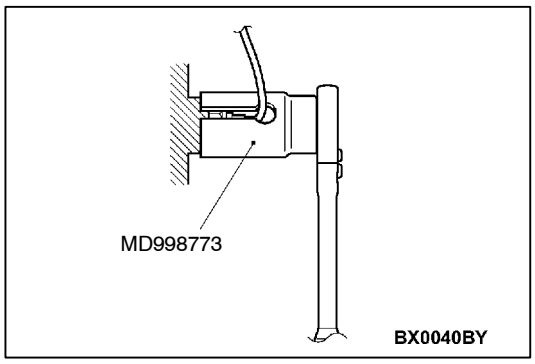
REMOVAL AND INSTALLATION

<4G1>

Pre-removal and Post-installation Operation
Intake Manifold Stay Removal and Installation
(Refer to GROUP 15.)



◀A▶ ▶A◀ 1. Detonation sensor



REMOVAL SERVICE POINT

◀A▶ DETONATION SENSOR REMOVAL

INSTALLATION SERVICE POINT

▶A◀ DETONATION SENSOR INSTALLATION

ENGINE AND EMISSION CONTROL

CONTENTS

EMISSION CONTROL SYSTEM

GENERAL

OUTLINE OF CHANGES

Service adjustment procedures have been established for items which are different from before in order to correspond to the following changes.

<4G1>

- The purge control solenoid valve control has been changed from ON/OFF control to duty control, and the purge inlet port in the throttle body has been changed from the upstream side of the throttle valve to the downstream side.
  In addition, the purge control solenoid valve has been changed to one which has an increased flow capacity.
- The mounting positions for the EGR valve and the EGR control solenoid valve have been changed.

<4G9>

- The purge control solenoid valve has been changed to one which has an increased flow capacity, and the layout of the vacuum pipe has been changed.
- The vacuum hose colour of purge control has been changed.
- The port position of purge control has been changed.

GENERAL INFORMATION

The evaporative emission control system in 4G1 engines has been changed.

Item	Name	Specification
Evaporative emission control system	Canister	Equipped
	Purge control solenoid valve	Duty cycle type solenoid valve (Purpose: HC reduction)

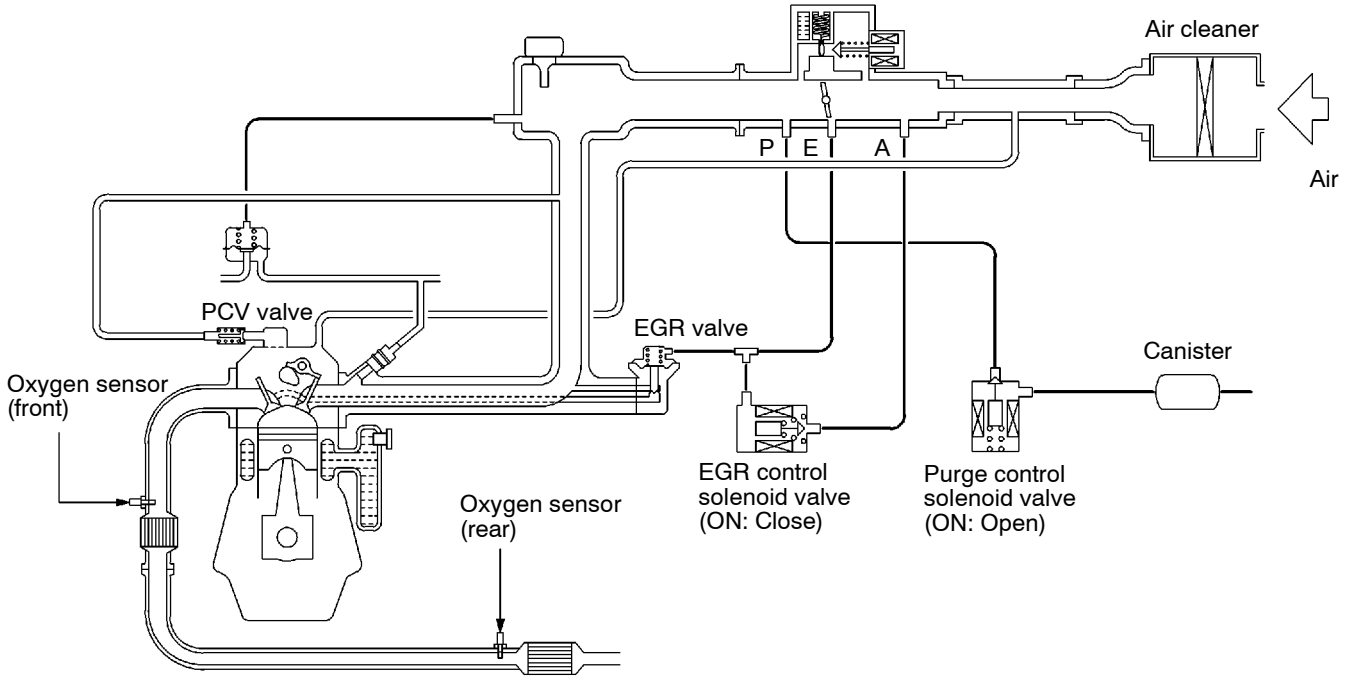
SERVICE SPECIFICATION

Item	Standard value
Purge control solenoid valve coil resistance (at 20°C) Ω	30 - 34

VACUUM HOSE

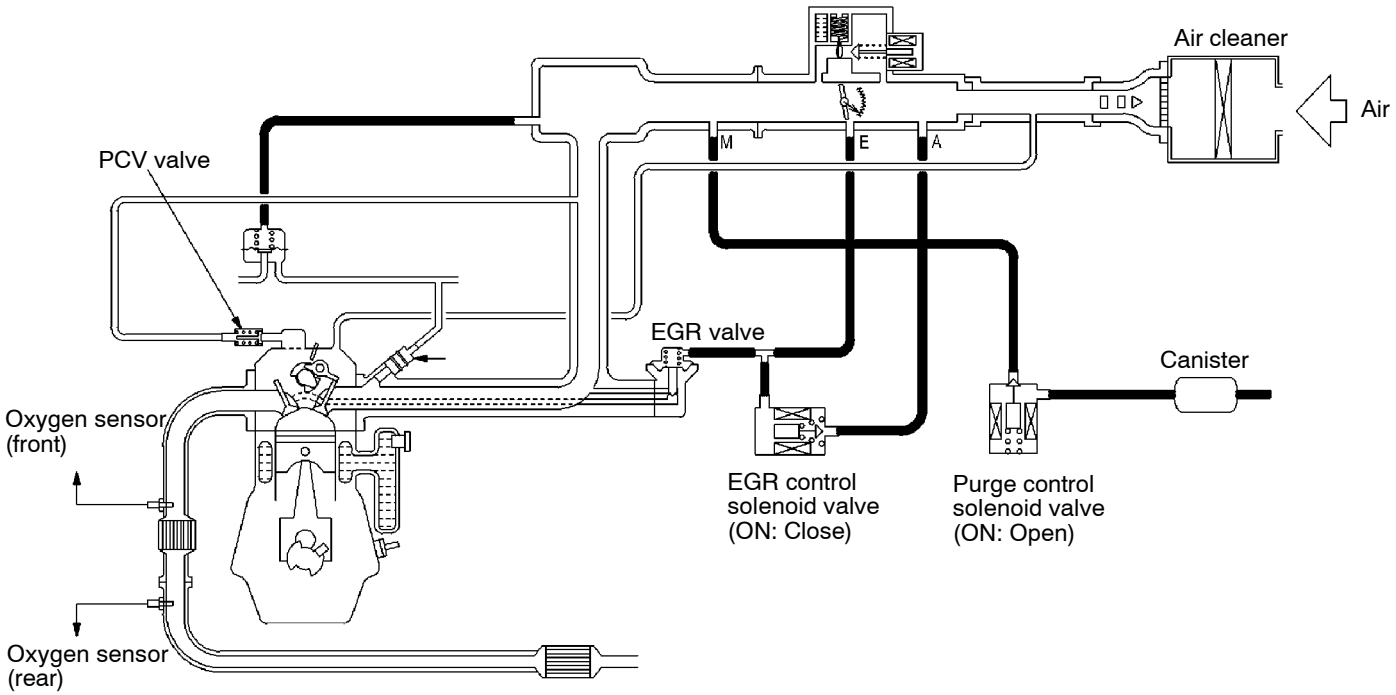
VACUUM HOSE PIPING DIAGRAM

<4G1>



Y6073AJ

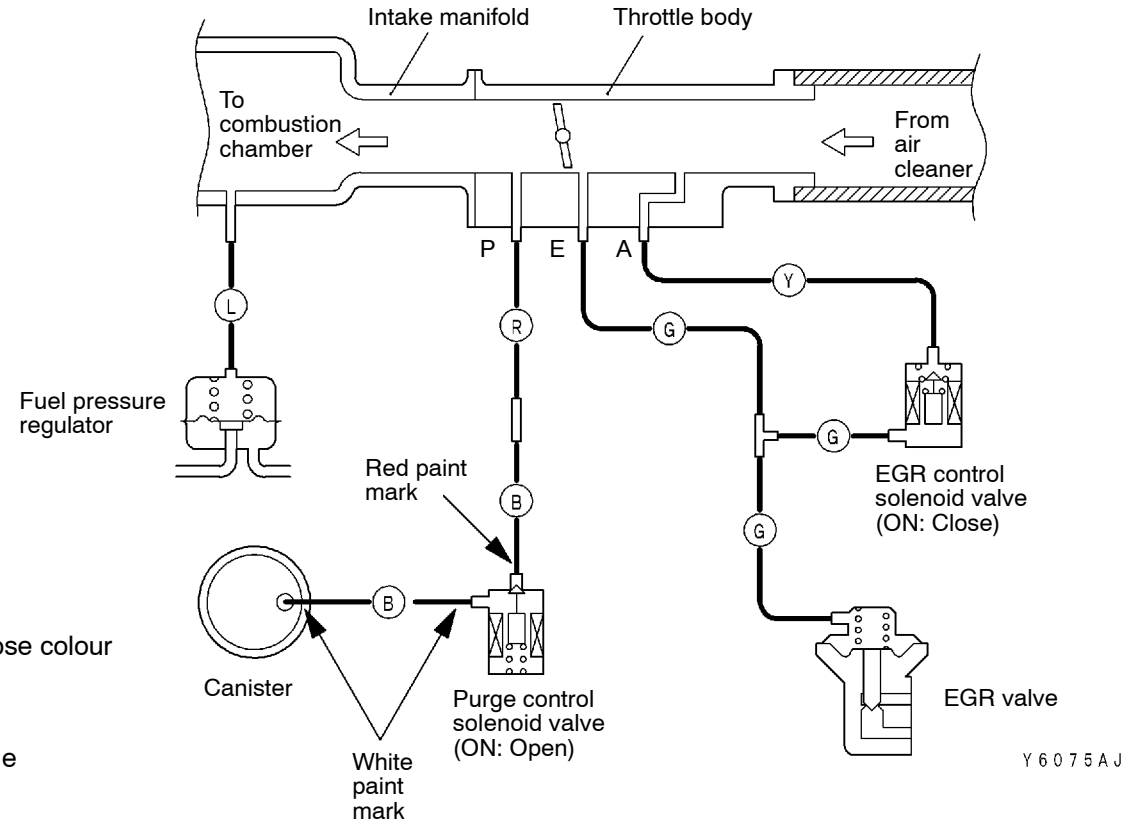
<4G9>



Y6025BN

VACUUM CIRCUIT DIAGRAM

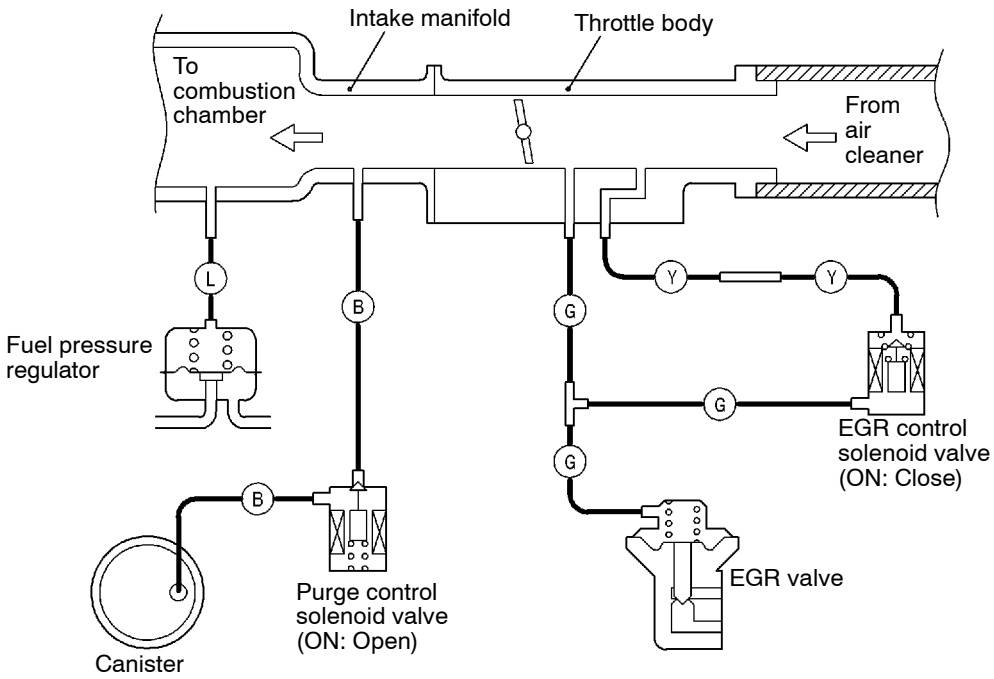
<4G1>



Vacuum hose colour

B: Black
G: Green
L: Light blue
R: Red
Y: Yellow

<4G9>



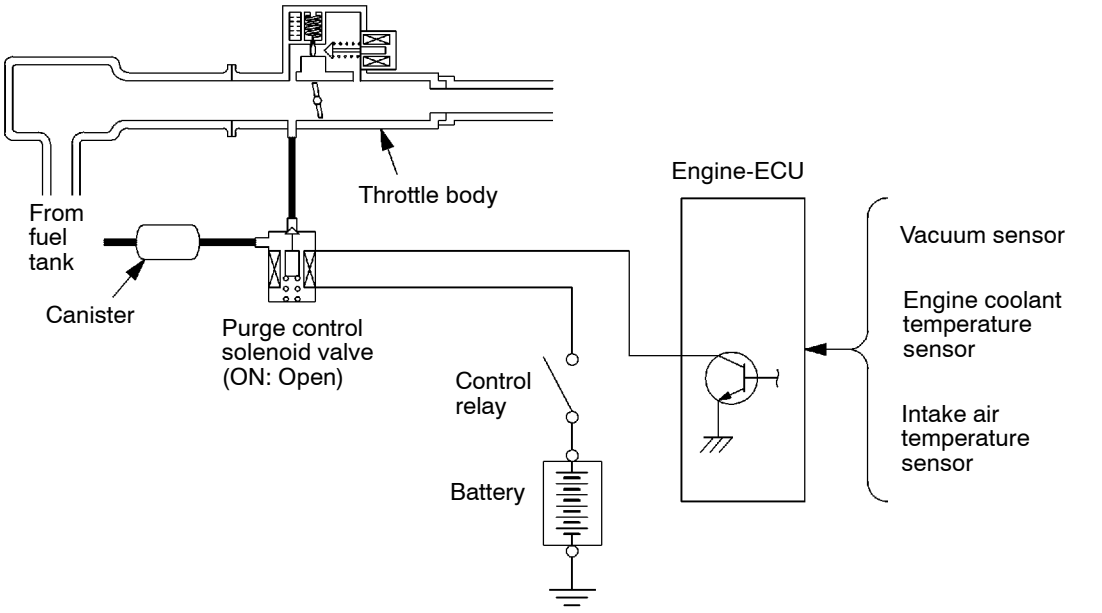
Vacuum hose colour

B: Black
G: Green
L: Light blue
Y: Yellow

EVAPORATIVE EMISSION CONTROL SYSTEM

SYSTEM DIAGRAM

<4G1>



Y6017BL

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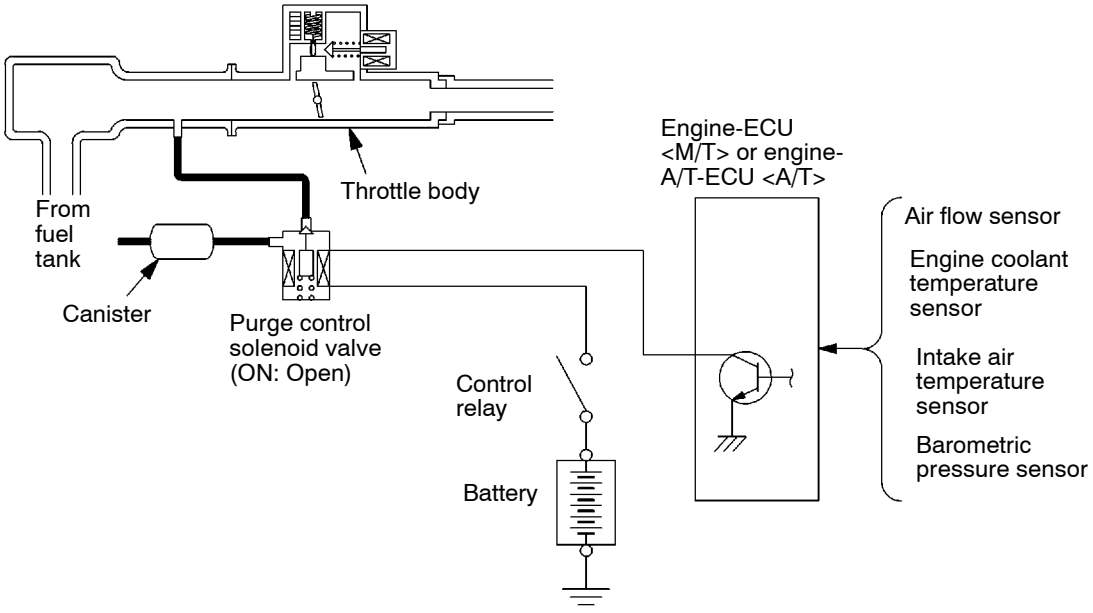
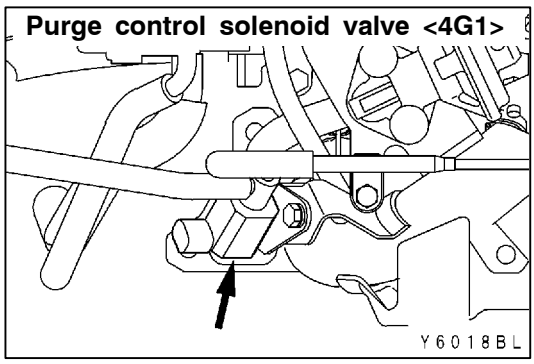
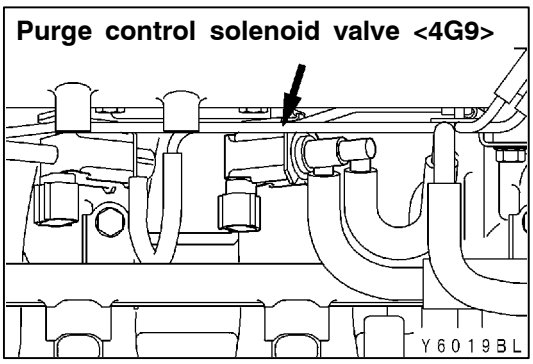
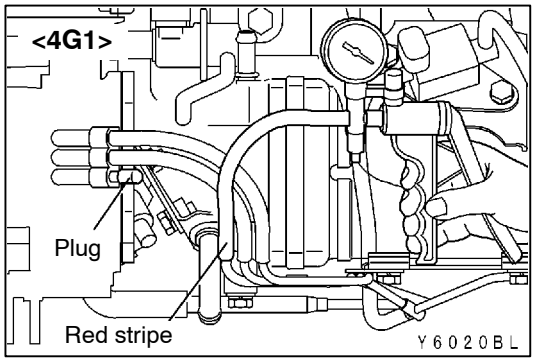


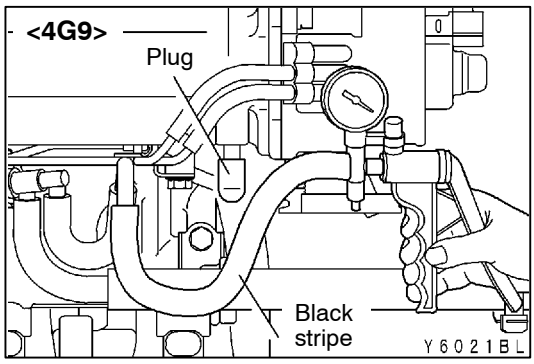
Y6033BN

COMPONENT LOCATION









PURGE CONTROL SYSTEM CHECK

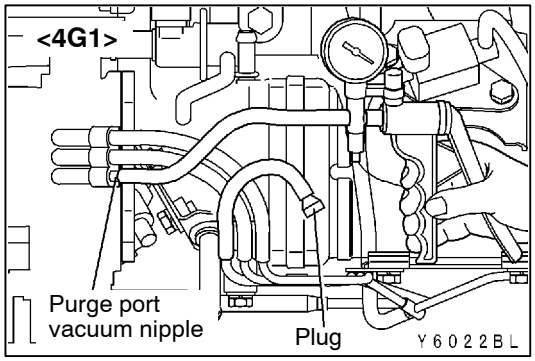
1. Disconnect the vacuum hose (red stripe <4G1>, black stripe <4G9>) from the throttle body and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold or hot, apply a vacuum of 53 kPa, and check the condition of the engine and the vacuum.

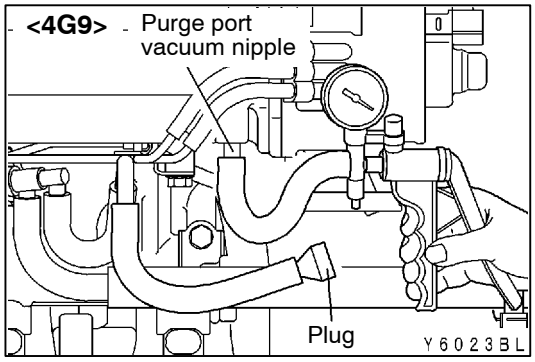
When engine is cold
(Engine coolant temperature: 40°C or less)

Engine condition	Normal condition
At idle	Vacuum is maintained.
3,000 r/min	

When engine is hot
(Engine coolant temperature: 80°C or higher)

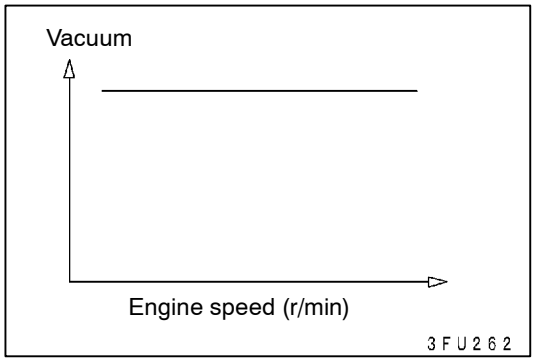
Engine condition	Normal condition
At idle	Vacuum is maintained.
3,000 r/min (for approximately 3 minutes after the engine is started.)	Vacuum will leak.





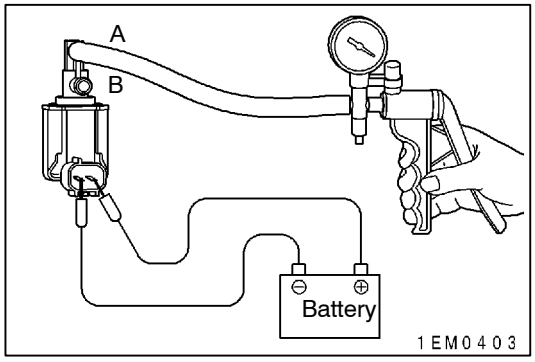
PURGE PORT VACUUM CHECK

1. Disconnect the vacuum hose (red stripe <4G1>, black stripe <4G9>) from the throttle body purge vacuum nipple and connect a hand vacuum pump to the nipple.



2. Start the engine and check that the vacuum remains fairly constant after racing the engine.

   NOTE
   If vacuum changes, it is possible that the intake manifold purge port may be clogged and require cleaning.

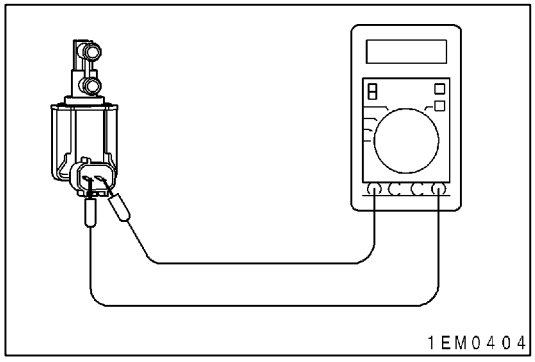


PURGE CONTROL SOLENOID VALVE CHECK

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

1. Disconnect the vacuum hose from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to nipple (A) of the solenoid valve (refer to the illustration at left).
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the purge control solenoid valve and without applying voltage.

Battery voltage	Normal condition
Applied	Vacuum leaks
Not applied	Vacuum maintained

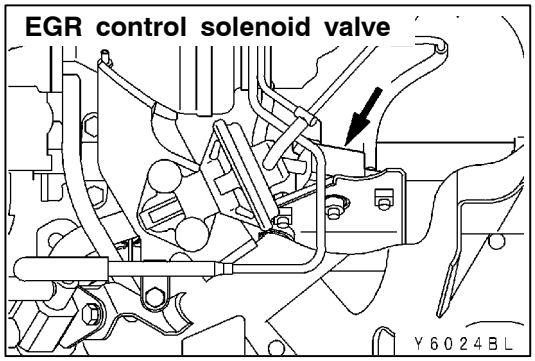


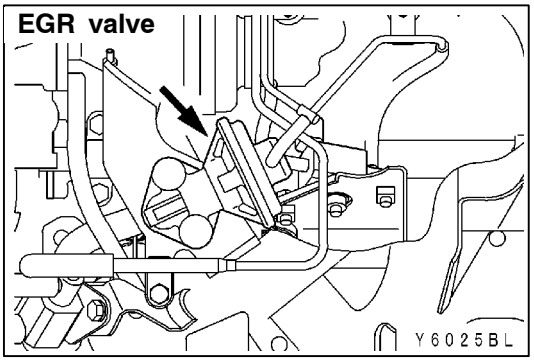
5. Measure the resistance between the terminals of the solenoid valve.

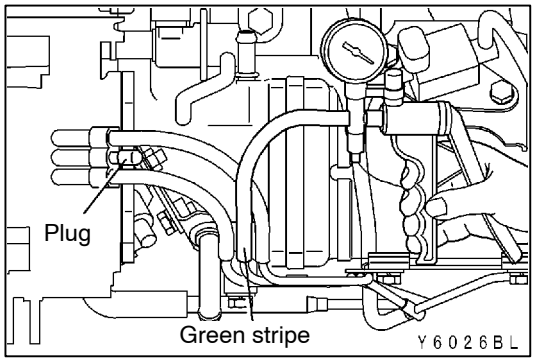
   Standard value: 30 - 34 Ω (at 20°C)

EXHAUST GAS RECIRCULATION (EGR) SYSTEM <4G1>

COMPONENT LOCATION

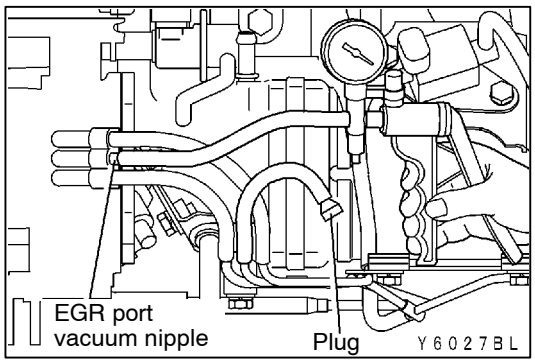






EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM CHECK

Inspection procedures have not changed.



EGR PORT VACUUM CHECK

Inspection procedures have not changed.

AUTOMATIC TRANSMISSION

CONTENTS

GENERAL

OUTLINE OF CHANGES

The following service procedures for items which are different from before have been established to correspond to the following changes:

- The ECU has been changed from the A/T-ECU to the engine-A/T-ECU.

TROUBLESHOOTING

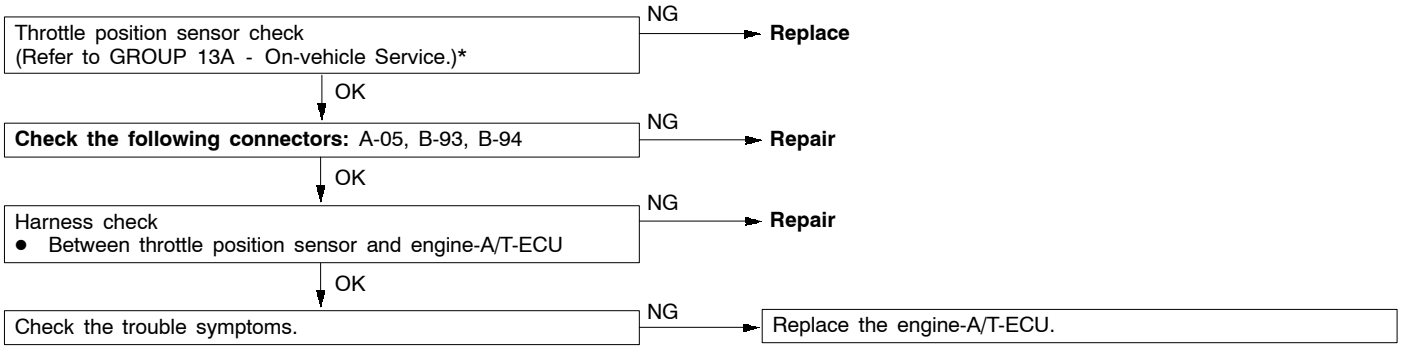
INSPECTION CHART FOR DIAGNOSIS CODE

Code	Diagnosis item		Reference page
11	Throttle position sensor system (TPS)	Short circuit	23-3
12		Open circuit	23-3
14		Sensor maladjustment	23-3
15	A/T fluid temperature sensor system	Open circuit	23-3
21	Crank angle sensor system	Open circuit	23-3
22	Input shaft speed sensor system	Short circuit/open circuit	23-4
23	Output shaft speed sensor system	Short circuit/open circuit	23-5
25	Wide open throttle switch system	Short circuit	23-5
26	Stop lamp switch system	Short circuit/open circuit	23-6
31	Low and reverse solenoid valve system	Short circuit/open circuit	23-6
32	Underdrive solenoid valve system	Short circuit/open circuit	23-6
33	Second solenoid valve system	Short circuit/open circuit	23-6
34	Overdrive solenoid valve system	Short circuit/open circuit	23-6
36	Damper control clutch solenoid valve system	Short circuit/open circuit	23-7
41	1st gear ratio does not meet the specification		23-8
42	2nd gear ratio does not meet the specification		23-8
43	3rd gear ratio does not meet the specification		23-8
44	4th gear ratio does not meet the specification		23-8
46	Reverse gear ratio does not meet the specification		23-8
52	Damper control clutch solenoid valve system	Defective system	23-7
54	A/T Control relay system	Short circuit to earth/ open circuit	23-9
56	N range lamp system	Short circuit to earth	23-9

INSPECTION PROCEDURES FOR DIAGNOSIS CODES

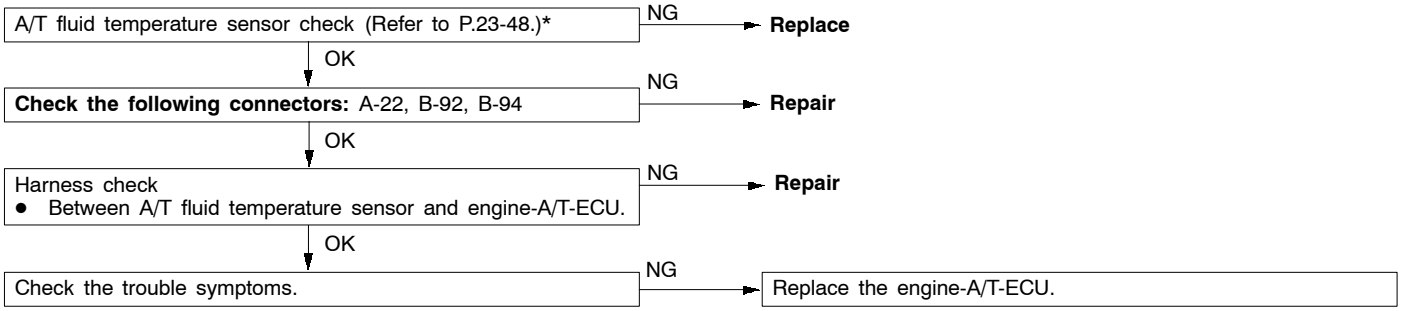
Code No. 11, 12, 14 Throttle position sensor system (TPS)	Probable cause
If the TPS output voltage is 4.8 V or higher when the engine is idling, the output is judged to be too high and diagnosis code No. 11 is output. If the TPS output voltage is 0.2 V or lower at times other than when the engine is idling, the output is judged to be too low and diagnosis code No. 12 is output. If the TPS output voltage is 0.2 V or lower or if it is 1.2 V or higher when the engine is idling, the TPS adjustment is judged to be incorrect and diagnosis code No. 14 is output.	• Malfunction of the throttle position sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

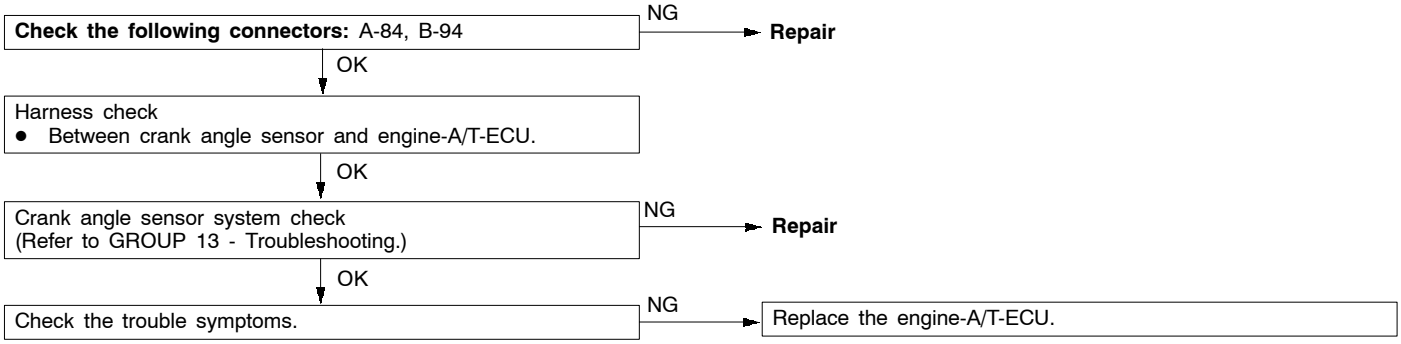


Code No. 15 A/T fluid temperature sensor system	Probable cause
If the A/T fluid temperature sensor output voltage is 2.6 V or more even after driving for 10 minutes or more (if the A/T fluid temperature does not increase), it is judged that there is an open circuit in the A/T fluid temperature sensor and diagnosis code No. 15 is output.	• Malfunction of the A/T fluid temperature sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



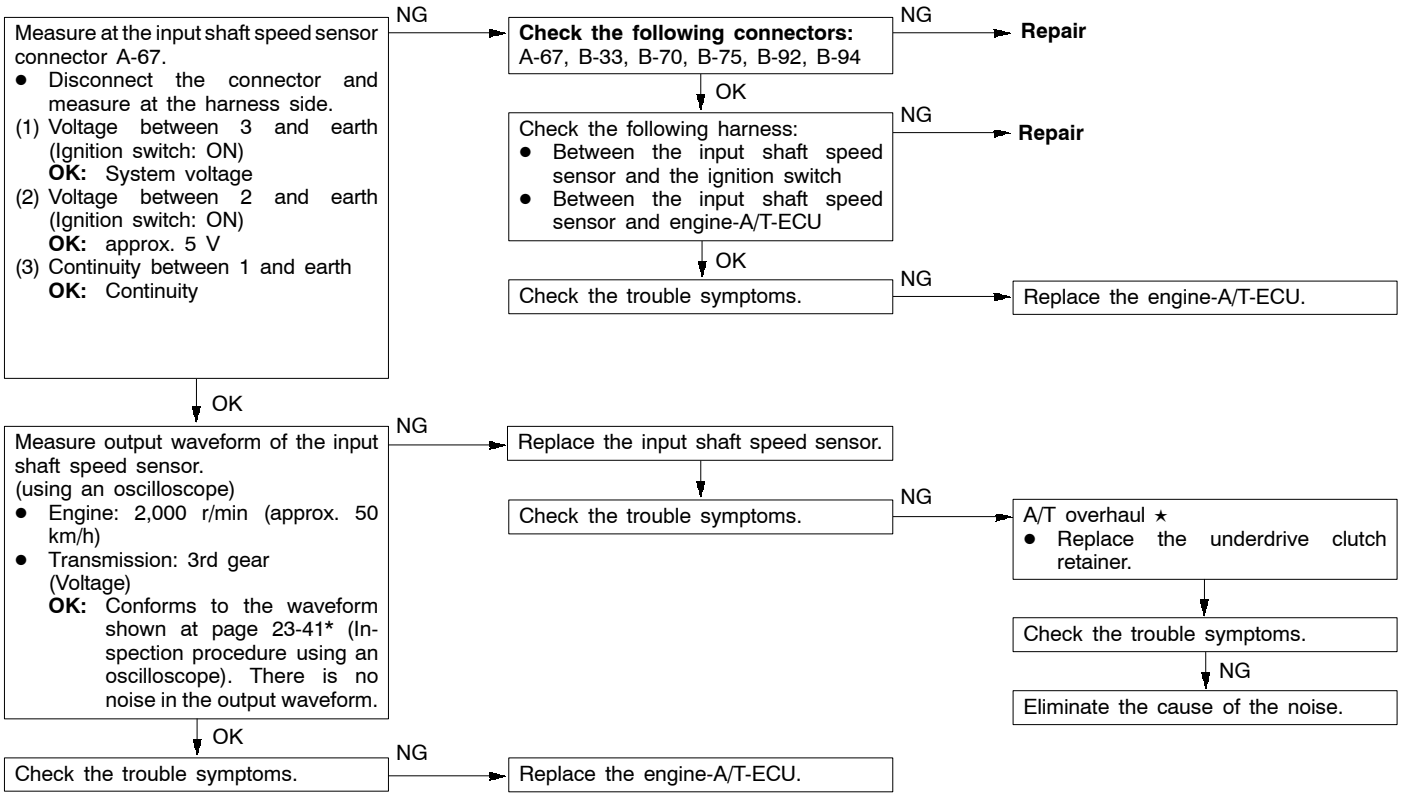
Code No. 21 Crank angle sensor system	Probable cause
If no output pulse is detected from the crank angle sensor for 5 seconds or more while driving at 25 km/h or more, it is judged that there is an open circuit in the crank angle sensor and diagnosis code No. 21 is output.	• Malfunction of the crank angle sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU



Code No. 22 Input shaft speed sensor system	Probable cause
If no output pulse is detected from the input shaft speed sensor for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more, there is judged to be an open circuit or short-circuit in the input shaft speed sensor and diagnosis code No. 22 is output. If diagnosis code No. 22 is output four times, the transmission is locked into 3rd gear (D range) or 2nd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the input shaft speed sensor • Malfunction of the underdrive clutch retainer • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

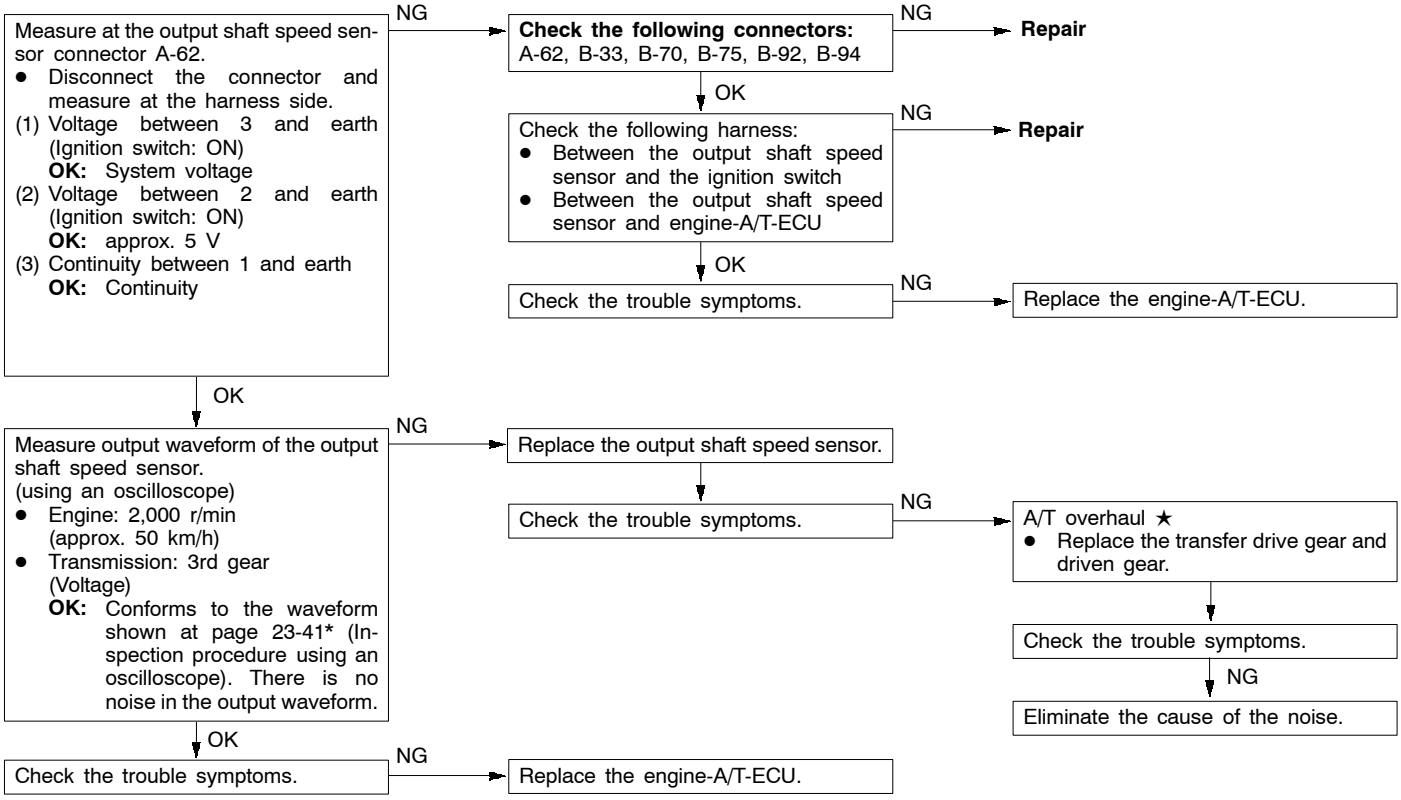
★: Refer to the Transmission Workshop Manual.



Code No. 23 Output shaft speed sensor system	Probable cause
If the output from the output shaft speed sensor is continuously 50% lower than the vehicle speed for 1 second or more while driving in 3rd or 4th gear at a speed of 30 km/h or more, there is judged to be an open circuit or short-circuit in the output shaft speed sensor and diagnosis code No. 23 is output. If diagnosis code No. 23 is output four times, the transmission is locked into 3rd gear (D range) or 2nd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the output shaft speed sensor • Malfunction of the transfer drive gear or driven gear • Malfunction of connector • Malfunction of the engine-A/T-ECU

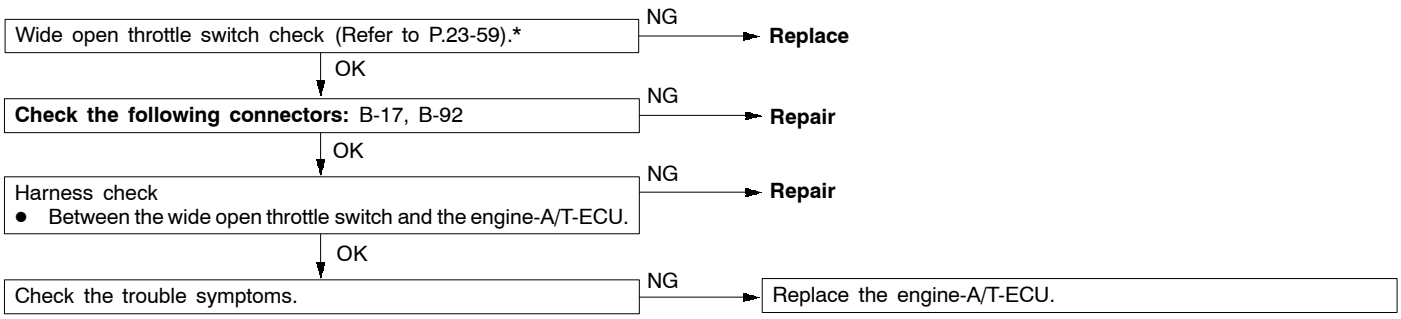
*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

★: Refer to the Transmission Workshop Manual.



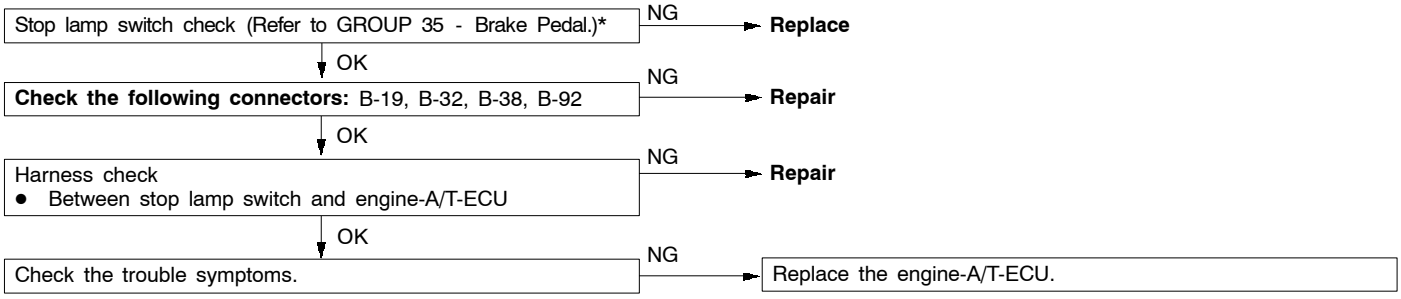
Code No. 25 Wide open throttle switch system	Probable cause
If the wide open throttle switch is on for 1 second or more with the throttle valve opening angle at 70% or less, it is judged that there is a short circuit in the wide open throttle switch and diagnosis code No. 25 is output.	• Malfunction of the wide open throttle switch • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



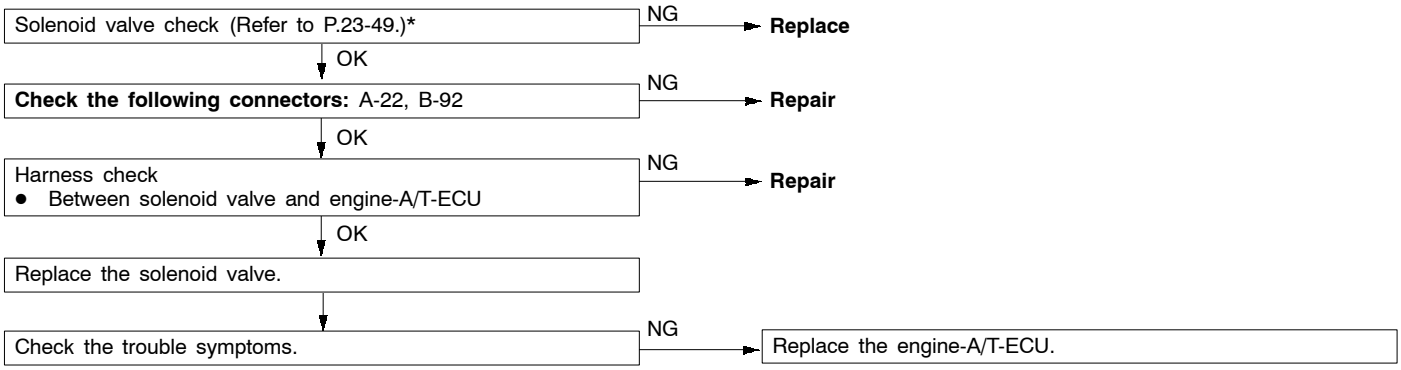
Code No. 26 Stop lamp switch system	Probable cause
If the stop lamp switch is on for 5 minutes or more while driving, it is judged that there is a short circuit in the stop lamp switch and diagnosis code No. 26 is output.	• Malfunction of the stop lamp switch • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



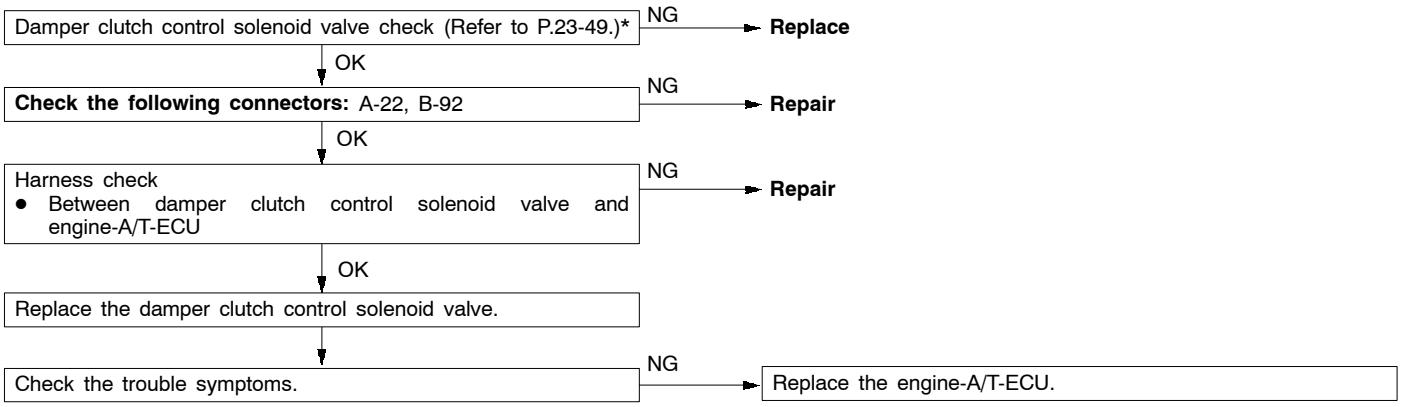
Code No. 31 Low and reverse solenoid valve system Code No. 32 Underdrive solenoid valve system Code No. 33 Second solenoid valve system Code No. 34 Overdrive solenoid valve system	Probable cause
If the resistance value for a solenoid valve is too large or too small, it is judged that there is a short-circuit or an open circuit in the solenoid valve and the respective diagnosis code is output. The transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of solenoid valve • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



Code No. 36, 52 Damper clutch control solenoid valve system	Probable cause
If the resistance value for the damper clutch control solenoid valve is too large or too small, it is judged that there is a short-circuit or an open circuit in the damper clutch control solenoid valve and diagnosis code No. 36 is output. If the drive duty rate for the damper clutch control solenoid valve is 100 % for a continuous period of 4 seconds or more, it is judged that there is an abnormality in the damper clutch control system and diagnosis code No. 52 is output. When diagnosis code No. 36 is output, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the damper clutch control solenoid valve • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



Code No. 41 1st gear ratio does not meet the specification Code No. 42 2nd gear ratio does not meet the specification Code No. 43 3rd gear ratio does not meet the specification Code No. 44 4th gear ratio does not meet the specification Code No. 46 Reverse gear ratio does not meet the specification	Probable cause
If the output from the output shaft speed sensor multiplied by each gear ratio is not the same as the output from the input shaft speed sensor after shifting to each gear has been completed, each diagnosis code is output. If each diagnosis code is output four times, the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	● Malfunction of the input shaft speed sensor ● Malfunction of the output shaft speed sensor ● Malfunction of the underdrive clutch retainer ● Malfunction of the transfer drive gear or driven gear ● Malfunction of the low and reverse brake system (for code No.41, 46) ● Malfunction of the underdrive clutch system (for code No.41 42, 43) ● Malfunction of the second brake system (for code No.42, 44) ● Malfunction of the overdrive clutch system (for code No.43, 44) ● Malfunction of the reverse clutch system (for code No.46) ● Noise generated

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

★: Refer to the Transmission Workshop Manual.

MUT-II Self-Diag code
Is the diagnosis code No. 22 output?
YES → Code No. 22 Input shaft speed sensor system check (Refer to P.23-4.)
NO ↓

MUT-II Self-Diag code
Is the diagnosis code No. 23 output?
YES → Code No. 23 Output shaft speed sensor system check (Refer to P.23-5.)
NO ↓

Measure output waveform from the input shaft speed sensor. (using an oscilloscope)
- Connect the connector B-92, B-94 and measure voltage between 57 and 103 at the engine-A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-41* (Inspection Procedure Using an Oscilloscope) is output (flashing between 0 ←→ 5V) and there is no noise appearing in the waveform.

NG → Replace the input shaft speed sensor.
→ Check the trouble symptoms.
NG → A/T overhaul ★
- Replace the underdrive clutch retainer.

→ Check the trouble symptoms.
NG → Eliminate the cause of the noise.

OK ↓

Measure output waveform from the output shaft speed sensor. (using an oscilloscope)
- Connect the connector B-92, B-94 and measure voltage between 57 and 104 at the engine-A/T-ECU.
- Engine: 2,000 r/min (approx. 50 km/h)
- Selector lever position: 3

(Voltage)
OK: A waveform such as the one shown on P.23-41* (Inspection Procedure Using an Oscilloscope) is output (flashing between 0 ←→ 5V) and there is no noise appearing in the waveform.

NG → Replace the output shaft speed sensor.
→ Check the trouble symptoms.
NG → A/T overhaul ★
- Replace the transfer drive gear and driven gear.

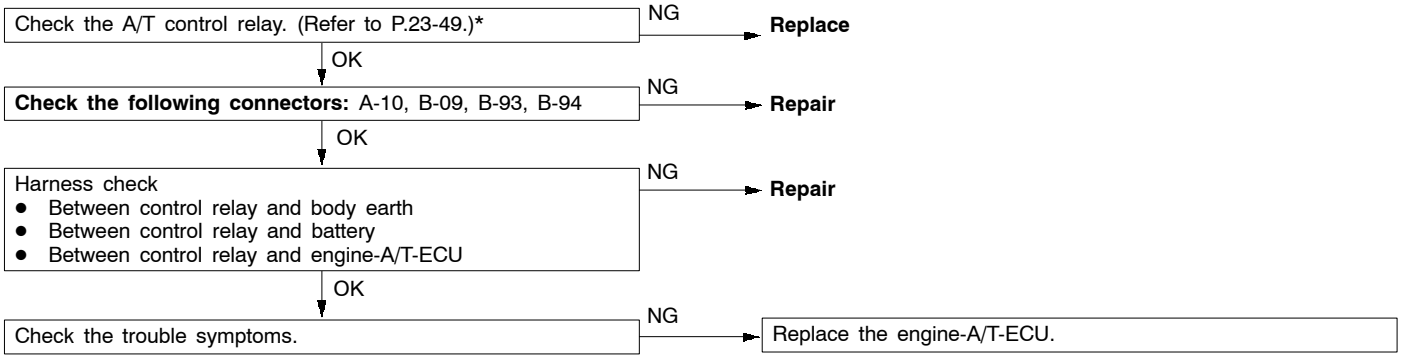
→ Check the trouble symptoms.
NG → Eliminate the cause of the noise.

OK ↓

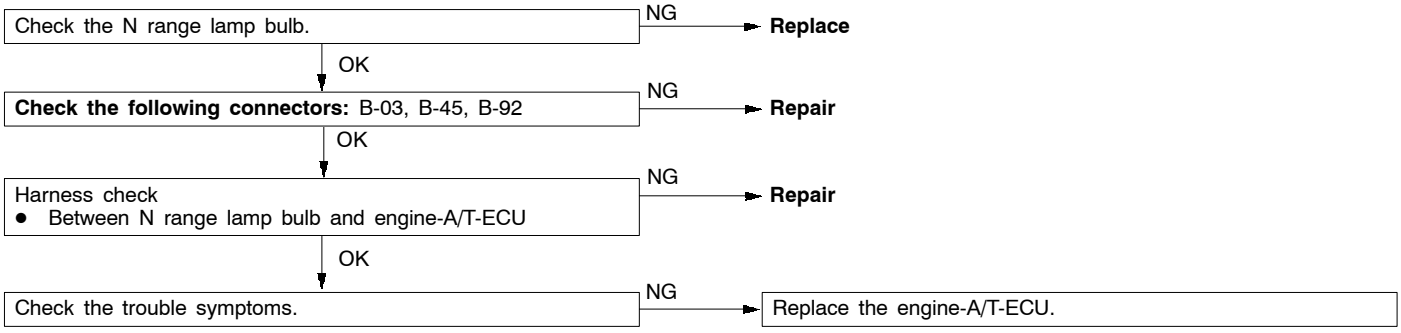
- Low and reverse brake system check (for code No.41, 46)
- Underdrive clutch system check (for code No.41 42, 43)
- Second brake system check (for code No.42, 44)
- Overdrive clutch system check (for code No.43, 44)
- Reverse clutch system check (for code No.46)

Code No. 54 A/T control relay system	Probable cause
If the A/T control relay voltage is less than 7 V after the ignition switch has been turned ON, it is judged that there is an open circuit or a short-circuit in the A/T control relay earth and diagnosis code No. 54 is output. Then the transmission is locked into 3rd gear as a fail-safe measure, and the N range lamp flashes at a frequency of 1 Hz.	• Malfunction of the A/T control relay • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



Code No. 56 N range lamp system	Probable cause
If the N range signal is off after an N range lamp illumination instruction (ON instruction) has been given, it is judged that there is a short-circuit in the N range lamp earth and diagnosis code No. 56 is output.	• Malfunction of the N range lamp bulb • Malfunction of connector • Malfunction of the engine-A/T-ECU



INSPECTION CHART FOR TROUBLE SYMPTOMS

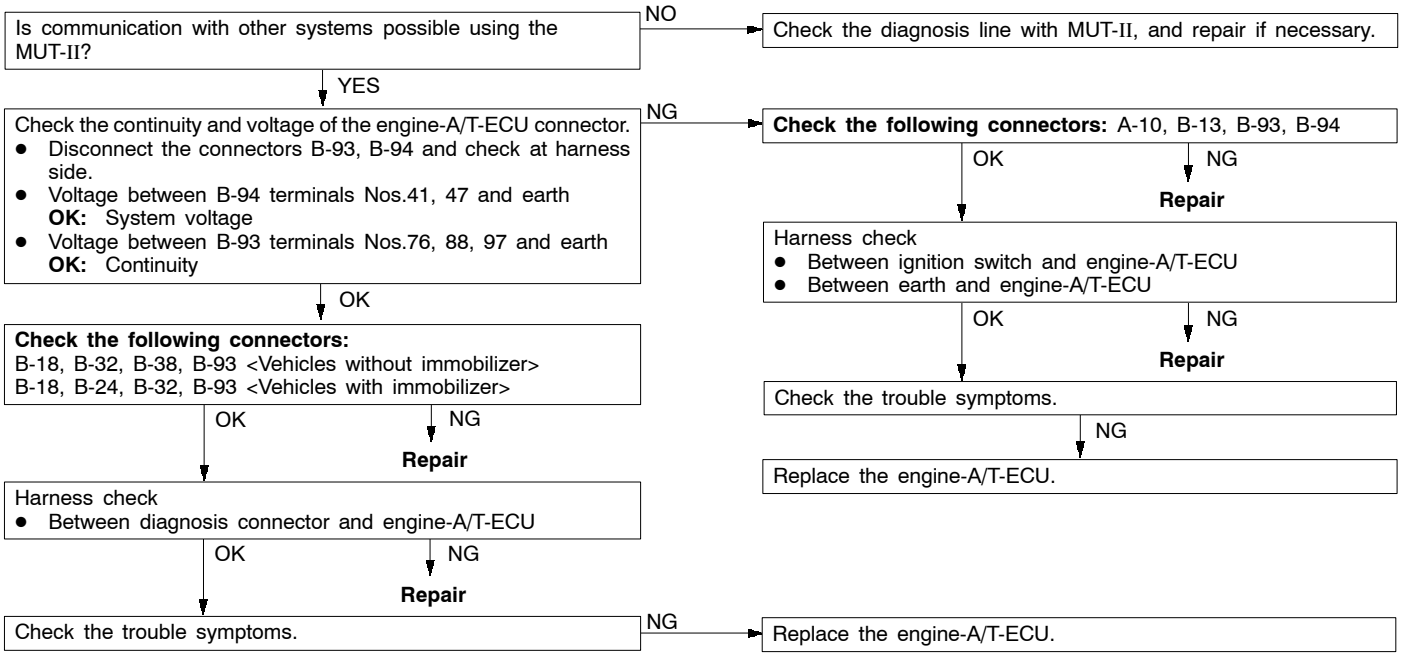
*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible		1	23-11
Driving impossible	Starting impossible	2	23-26*
	Does not move forward	3	23-26*
	Does not reverse	4	23-27*
	Does not move (forward or reverse)	5	23-27*
Malfunction when starting	Engine stalling when shifting	6	23-28*
	Shocks when changing from N to D and large time lag	7	23-28*
	Shocks when changing from N to R and large time lag	8	23-29*
	Shocks when changing from N to D, N to R and large time lag	9	23-30*
Malfunction when shifting	Shocks and running up	10	23-30*
Displaced shifting points	All points	11	23-31*
	Some points	12	23-32*
Does not shift	No diagnosis codes	13	23-32*
Malfunction while driving	Poor acceleration	14	23-33*
	Vibration	15	23-33*
Inhibitor switch system		16	23-11
Dual pressure switch system		17	23-12
Vehicle speed sensor system		18	23-12

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

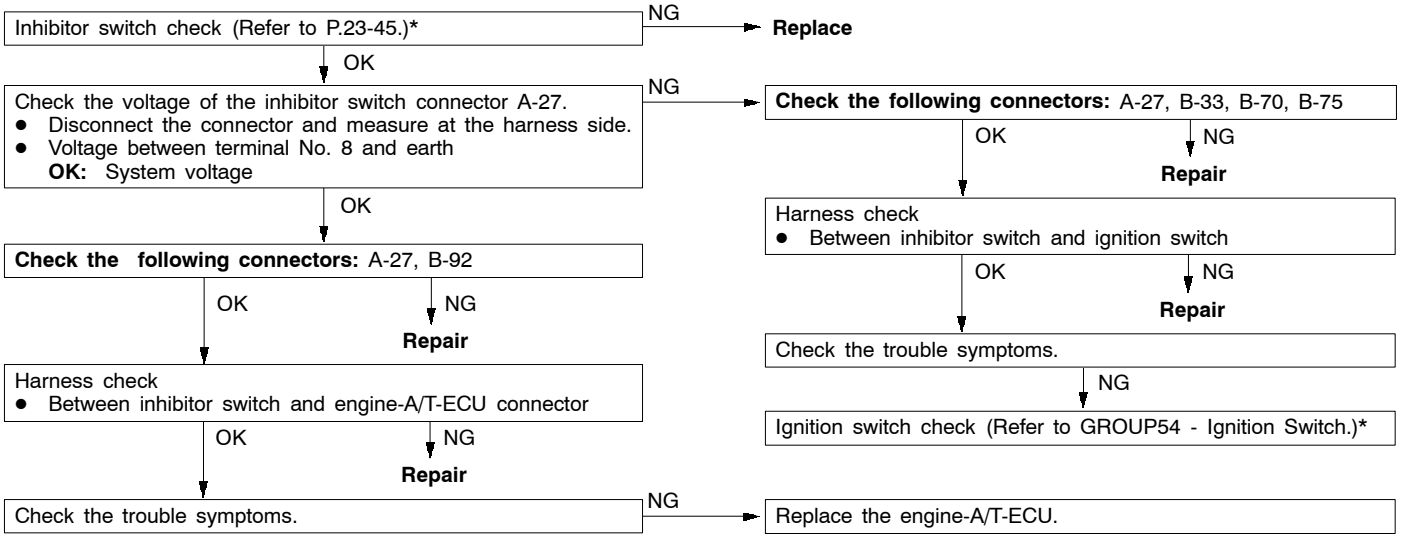
Communication with MUT-II is not possible	Probable cause
If communication with the MUT-II is not possible, the cause is probably a defective diagnosis line or the engine-A/T-ECU is not functioning.	• Malfunction of diagnosis line • Malfunction of harness or connector • Malfunction of engine-A/T-ECU



INSPECTION PROCEDURE 16

Inhibitor switch system	Probable cause
The cause is probably a malfunction of the inhibitor switch circuit, ignition switch circuit or a defective engine-A/T-ECU.	• Malfunction of the inhibitor switch • Malfunction of the ignition switch • Malfunction of connector • Malfunction of the engine-A/T-ECU

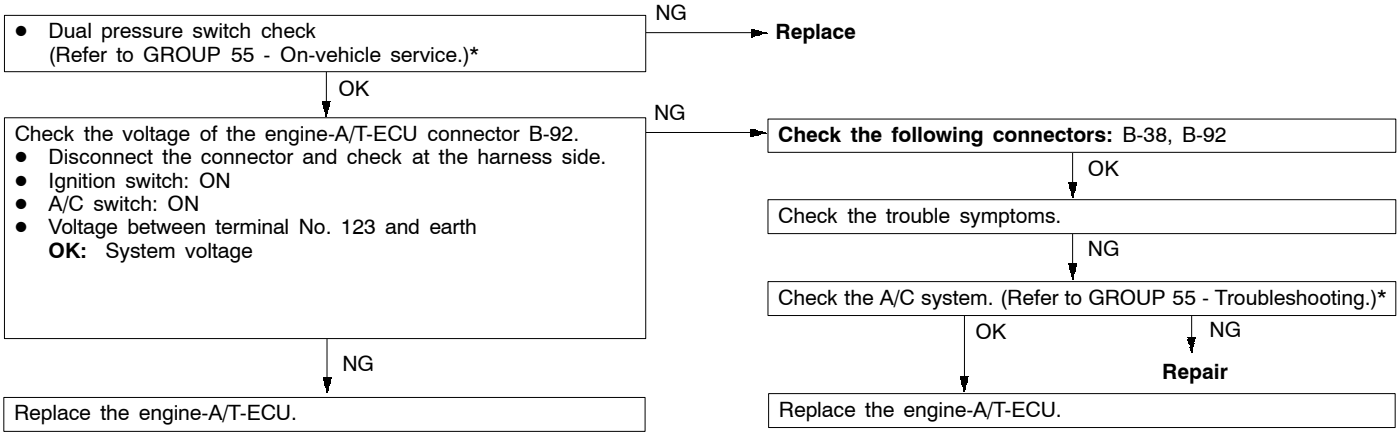
*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



INSPECTION PROCEDURE 17

Dual pressure switch system	Probable cause
The cause is probably a defective dual pressure switch circuit or a defective engine-A/T-ECU.	• Malfunction of the dual pressure switch • Malfunction of connector • Malfunction of A/C system • Malfunction of the engine-A/T-ECU

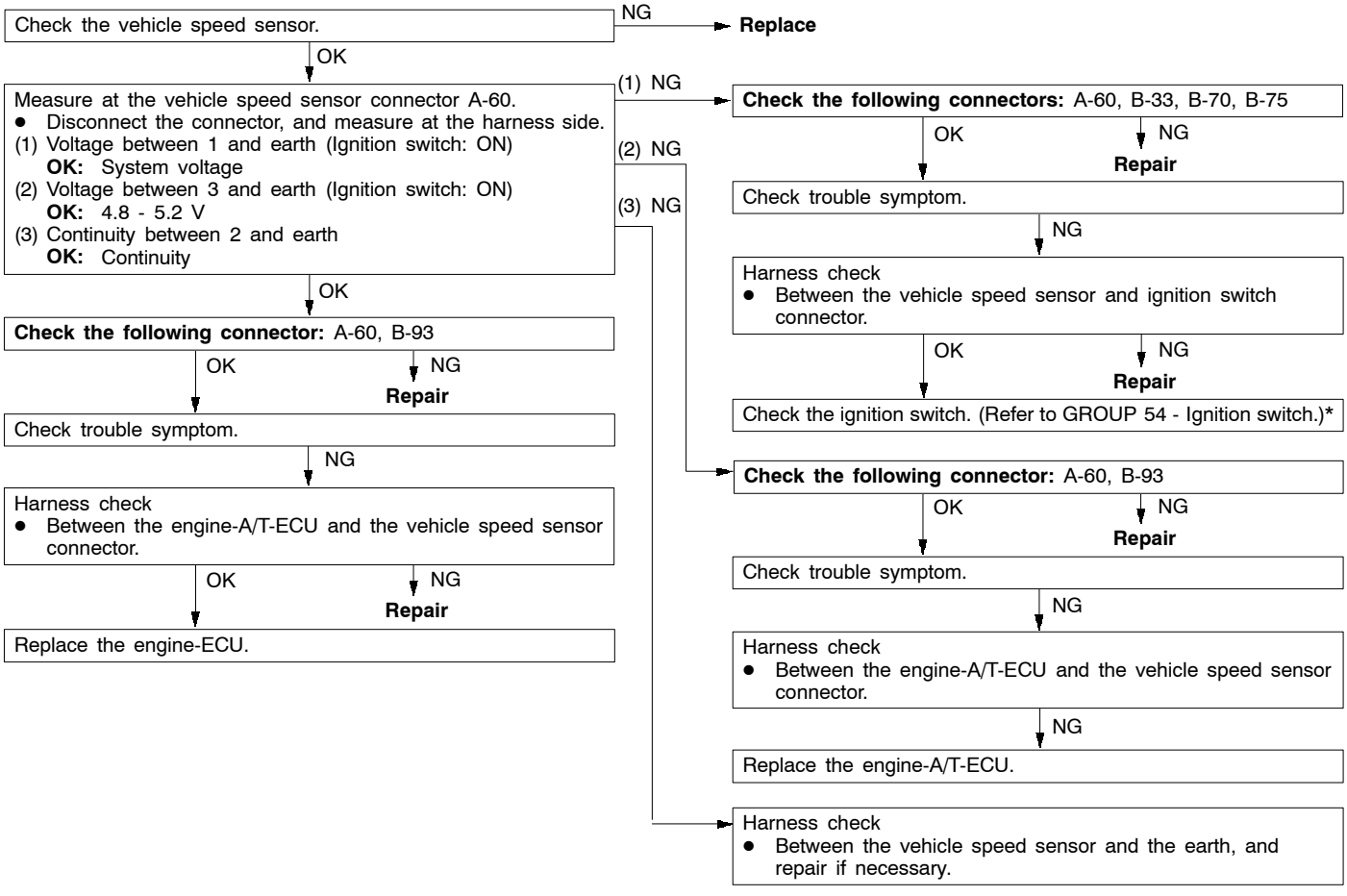
*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



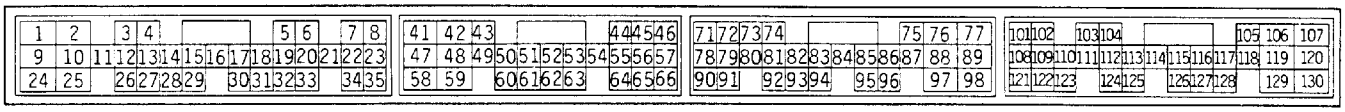
INSPECTION PROCEDURE 18

Vehicle speed sensor system	Probable cause
The cause is probably a defective vehicle speed sensor circuit or a defective engine-A/T-ECU.	• Malfunction of the vehicle speed sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU

*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).



CHECK AT ENGINE-A/T-ECU TERMINALS



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*: Refer to '96 COLT/LANCER Workshop Manual (Pub. No. PWME9511).

Terminal No.	Check item	Check requirement	Standard value
45	Crank angle sensor	Engine: Idling	2.0 – 2.4 V
50	A/T control relay	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
76	Earth	Always	0 V
77	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
78	Throttle position sensor (TPS)	Accelerator pedal: Released (Engine stopped)	0.5 – 1.0 V
		Accelerator pedal: Depressed (Engine stopped)	4.5 – 5.0 V
80	Vehicle speed sensor	When stopped	0 V
		Move forward slowly	0 → 5 V flashing
84	Diagnosis control	–	–
85	Diagnosis output	Normal (No diagnosis code output)	0 → 5 V flashing
88	Earth	Always	0 V
89	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
97	Earth	Always	0 V
101	Inhibitor switch P	Selector lever position: P	System voltage
		Selector lever position: Other than above	0 V
102	Inhibitor switch D	Selector lever position: D	System voltage
		Selector lever position: Other than above	0 V
103	Input shaft speed sensor	Measure between terminal No. 57 and No.103 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3 (3rd gear)	Refer to P.23-41*, Oscilloscope inspection procedure.
104	Output shaft speed sensor	Measure between terminal No. 57 and No.104 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3 (3rd gear)	Refer to P.23-41*, Oscilloscope inspection procedure.
106	Second solenoid valve	Selector lever position: 2 (2nd gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V

Terminal No.	Check item	Check requirement	Standard value
107	Damper clutch control solenoid valve	Selector lever position: L (1st gear)	System voltage
		Selector lever position: 3 (50 km/h in 3rd gear)	Other than system voltage
108	Inhibitor switch R	Selector lever position: R	System voltage
		Selector lever position: Other than above	0 V
109	Inhibitor switch 3	Selector lever position: 3	System voltage
		Selector lever position: Other than above	0 V
110	Inhibitor switch L	Selector lever position: L	System voltage
		Selector lever position: Other than above	0 V
115	Wide open throttle valve	Accelerator pedal: Released	4 V or more
		Accelerator pedal: Depressed	Less than 0.4 V
120	Underdrive solenoid valve	Selector lever position: L (1st gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V
121	Inhibitor switch N	Selector lever position: N	System voltage
		Selector lever position: Other than above	0 V
122	Inhibitor switch 2	Selector lever position: 2	System voltage
		Selector lever position: Other than above	0 V
123	Stop lamp switch	Brake pedal: Depressed	System voltage
		Brake pedal: Released	0 V
124	A/T fluid temperature sensor	A/T fluid temperature: 20°C (68°F)	3.8 – 4.0 V
		A/T fluid temperature: 40°C (104°F)	3.2 – 3.4 V
		A/T fluid temperature: 80°C (176°F)	1.7 – 1.9 V
129	Low-reverse solenoid valve	Selector lever position: P	System voltage
		Selector lever position: 2 (2nd gear)	Approx. 7 – 9 V
130	Overdrive solenoid valve	Selector lever position: 3 (3rd gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V