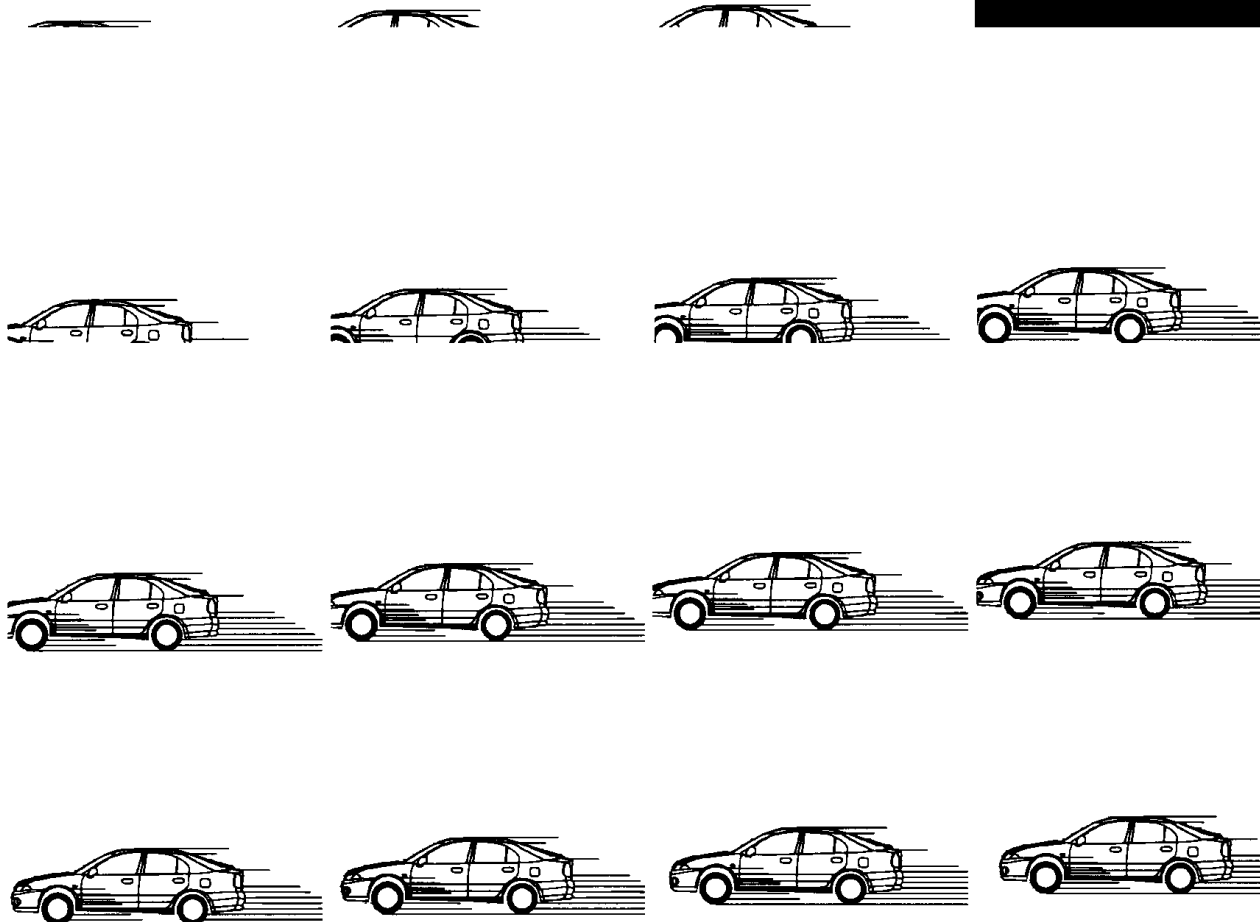
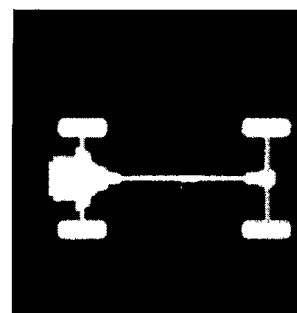




Workshop Manual

chassis SUPPLEMENT

CARISMA 2001



CARISMA

WORKSHOP MANUAL SUPPLEMENT

FOREWORD

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

TECHNICAL INFORMATION MANUAL

PYGE951
PYGE951-A (Supplement)
PYGE951-B (Supplement)
PYGE951-C (Supplement)

WORKSHOP MANUAL CHASSIS GROUP

PWDE9502
PWDE9502-A (Supplement)
PWDE9502-B (Supplement)
PWDE9502-C (Supplement)
PWDE9502-D (Supplement)

ELECTRICAL WIRING

PHDE9501
PHDE9501-A (Supplement)
PHDE9501-B (Supplement)
PHDE9501-C (Supplement)
PHDE9501-D (Supplement)
PHDE9501-E (Supplement)

BODY REPAIR MANUAL

BMXE99E1

ENGINE GROUP

PWEE
(Looseleaf edition)

PARTS CATALOGUE

N606C006D□

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



MITSUBISHI MOTOR SALES

Europe B.V.

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May 2000

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WARNING REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLE

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or 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) The SRS components should not be subjected to temperature of 93°C or more. So, remove the SRS-ECU, driver's and front passenger's air bag modules, clock spring, side impact sensors and front seat assemblies (side air bag modules) before drying or baking the vehicle after painting.**
- (3) Service or maintenance of any SRS component or 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 SRS component or any SRS-related component.**

NOTE

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

GENERAL

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VEHICLE IDENTIFICATION

MODELS

<HATCHBACK>

Model code		Engine model	Transmission model	Fuel supply system
DA1A	LNSEL6/R6	4G92 MPI (1,597 mL)	F5MR1 <5M/T>	MPI (Electronically Controlled Multi Point Fuel Injection)
	LNUEL6/R6			
	LNGEL6/R6			
	LRUEL6/R6		F4A41 <4A/T>	
	LRGEL6/R6			
DA2A	LNSCL6/R6	4G93 GDI (1,834 mL)	F5M42 <5M/T>	GDI (Gasoline Direct Injection)
	LNUCL6/R6			
	LNGCL6/R6			
	LNXCCL6/R6			
	LRUCL6/R6		F4A42 <INVECS-II 4A/T>	
	LRGCL6/R6			
	LRXCCL6/R6			
	LRUCL6C/R6C		F4A42 <INVECS-II 4A/T with Sports Mode>	
DA5A	LNSFL6/R6	F9Q1 (1,870 mL)	F5MV1 <5M/T>	DI-D (Direct Injection Diesel)
	LNUFL6/R6			
	LNXCFL6/R6			
	LNUVL6/R6	F9Q2 (1,870 mL)		
	LNGVL6/R6			
	LNXCVL6/R6			

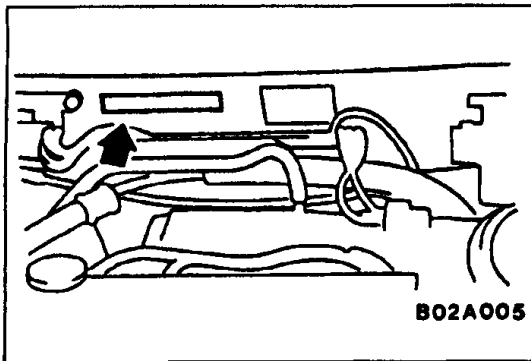
<SEDAN>

Model code		Engine model	Transmission model	Fuel supply system
DA1A	SNSEL6/R6	4G92 MPI (1,597 mL)	F5MR1 <5M/T>	MPI (Electronically Controlled Multi Point Fuel Injection)
	SNUEL6/R6			
	SNGEL6/R6			
	SRUEL6/R6		F4A41 <4A/T>	
	SRGEL6/R6			
DA2A	SNSCL6/R6	4G93 GDI (1,834 mL)	F5M42 <5M/T>	GDI (Gasoline Direct Injection)
	SNUCL6/R6			
	SNGCL6/R6			
	SNXCL6/R6			
	SRUCL6/R6		F4A42 <INVECS-II 4A/T>	
	SRGCL6/R6			
	SRXCL6/R6			
	SRUCL6C/R6C		F4A42 <INVECS-II 4A/T with Sports Mode>	
DA5A	SNSFL6/R6	F9Q1 (1,870 mL)	F5MV1 <5M/T>	DI-D (Direct Injection Diesel)
	SNUFL6/R6			
	SNXFL6/R6			
	SNUVL6/R6	F9Q2 (1,870 mL)		
	SNGVL6/R6			
	SNXVL6/R6			

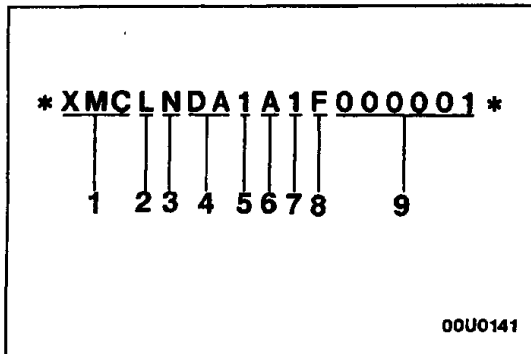
DA	2	A	L	N	S	C	L	6	C
1	2	3	4	5	6	7	8	9	10

MODEL CODE

No.	Items	Contents
1	Development	DA: MITSUBISHI CARISMA
2	Engine type	1: 1,597 mL petrol engine 2: 1,834 mL petrol engine 5: 1,870 mL diesel engine
3	Sort	A: Passenger car
4	Body style	A: 4-door sedan L: 5-door hatchback
5	Transmission type	N: 5-speed manual transmission R: 4-speed automatic transmission
6	Trim level	G: Sport S: Classic U: Comfort X: Elegance
7	Specification engine feature	C: GDI E: MPI F: F9Q1 DI-D (Medium Performance) V: F9Q2 DI-D (High Performance)
8	Steering wheel location	L: Left hand R: Right hand
9	Destination	6: For Europe
10	Other	C: INVECS-II 4A/T with Sports Mode

**CHASSIS NUMBER**

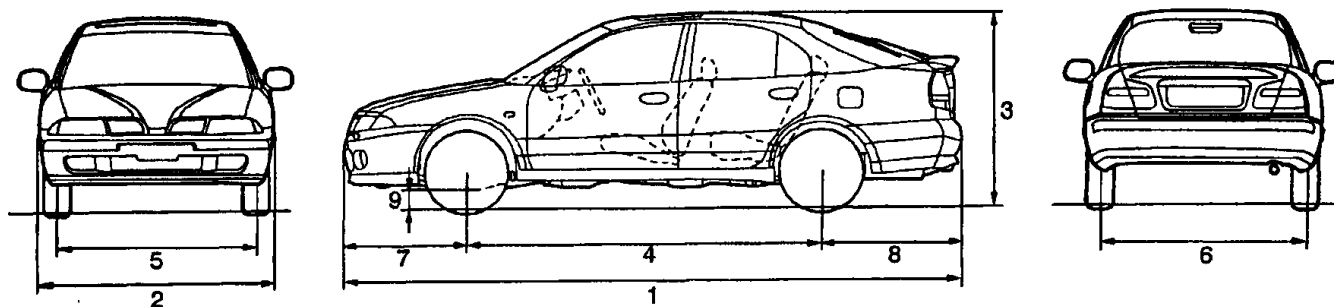
The chassis number is stamped on the toeboard inside the engine compartment.



No.	Items		Contents
1	Steering wheel location	XMC	Left hand drive
		XMD	Right hand drive
2	Body style	S	4-door sedan
		L	5-door hatchback
3	Transmission type	N	5-speed manual transmission
		R	4-speed automatic transmission
4	Vehicle line	DA	CARISMA
5	Development order	1	4G92: 1,597 mL petrol engine
		2	4G93: 1,834 mL petrol engine
		5	F9Q1 or F9Q2: 1,870 mL diesel engine
6	Sort	A	Passenger car
7	Model year	1	2001
8	Factory code	F	Netherlands Car B.V.
9	Serial number	-	-

MAJOR SPECIFICATIONS

HATCHBACK

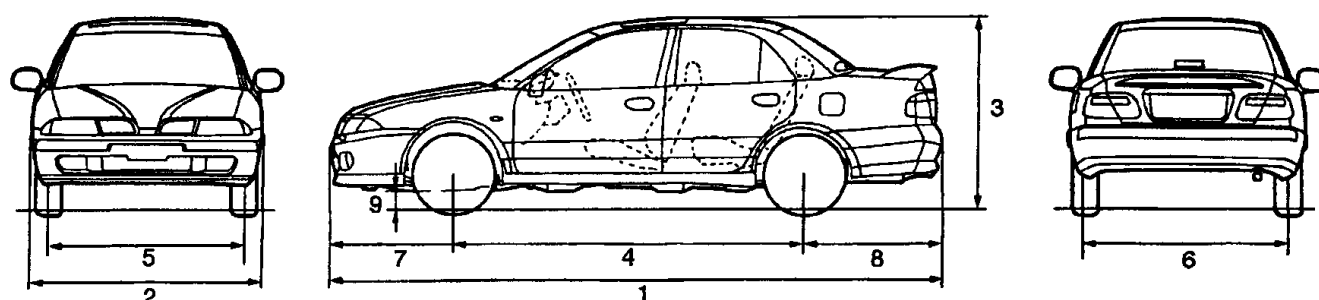


AP01A044

Items			DA1A LNSEL6, LNSER6	DA1A LNUEL6, LNUER6, LNGEL6, LNGER6	DA1A LRUEL6, LRUER6, LRGEL6, LRGER6
Vehicle dimensions mm	Overall length	1	4,475	4,475	4,475
	Overall width	2	1,710	1,710	1,710
	Overall height (unladen)	3	1,405	1,405	1,405
	Wheelbase	4	2,550	2,550	2,550
	Track-front	5	1,475	1,475	1,475
	Track-rear	6	1,470	1,470	1,470
	Overhang-front	7	905	905	905
	Overhang-rear	8	1,020	1,020	1,020
	Ground clear- ance (unladen)	9	155	155	150
Vehicle weight kg	Kerb weight		1,175	1,180	1,210
	Max. gross vehicle weight rating		1,685	1,695	1,725
	Max. axle weight rating-front		940	940	940
	Max. axle weight rating-rear		865	865	865
Seating capacity			5		
Engine	Model No.		4G92		
	Total displacement mL		1,597		
Transmis- sion	Model No.		F5MR1		F4A41
	Type		5 speed-manual		4 speed-automatic
Fuel sys- tem	Fuel supply system		Electronic control multipoint fuel injection		

Items			DA5A LNSFL6, LNSFR6	DA5A LNUFL6, LNUFR6	DA5A LNXFL6, LNXFR6	DA5A LNUVL6, LNUVR6	DA5A LNGVL6, LNGVR6	DA5A LNXVL6, LNXVR6
Vehicle dimensions mm	Overall length	1	4,475	4,475	4,475	4,475	4,475	4,475
	Overall width	2	1,710	1,710	1,710	1,710	1,710	1,710
	Overall height (unladen)	3	1,405	1,405	1,405	1,405	1,405	1,405
	Wheelbase	4	2,550	2,550	2,550	2,550	2,550	2,550
	Track-front	5	1,475	1,475	1,475	1,475	1,475	1,475
	Track-rear	6	1,470	1,470	1,470	1,470	1,470	1,470
	Overhang-front	7	905	905	905	905	905	905
	Overhang-rear	8	1,020	1,020	1,020	1,020	1,020	1,020
	Ground clearance (unladen)	9	145	145	145	145	145	145
Vehicle weight kg	Kerb weight		1,280	1,285	1,310	1,285	1,285	1,310
	Max. gross vehicle weight rating		1,785	1,795	1,800	1,795	1,795	1,800
	Max. axle weight rating-front		940	940	940	940	940	940
	Max. axle weight rating-rear		870	870	870	870	870	870
Seating capacity			5					
Engine	Model No.		F9Q1			F9Q2		
	Total displacement mL		1,870					
Transmission	Model No.		F5MV1					
	Type		5 speed-manual					
Fuel system	Fuel supply system		Direct Injection Diesel					

SEDAN



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Items			DA1A SNSER6, SNSER6	DA1A SNUER6, SNUER6, SNGEL6, SNGER6	DA1A SRUER6, SRUER6, SRGEL6, SRGER6
Vehicle dimensions mm	Overall length	1	4,475	4,475	4,475
	Overall width	2	1,710	1,710	1,710
	Overall height (unladen)	3	1,405	1,405	1,405
	Wheelbase	4	2,550	2,550	2,550
	Track-front	5	1,475	1,475	1,475
	Track-rear	6	1,470	1,470	1,470
	Overhang-front	7	905	905	905
	Overhang-rear	8	1,020	1,020	1,020
	Ground clear- ance (unladen)	9	155	155	150
Vehicle weight kg	Kerb weight		1,180	1,185	1,215
	Max. gross vehicle weight rating		1,685	1,695	1,725
	Max. axle weight rating-front		945	945	945
	Max. axle weight rating-rear		875	875	875
Seating capacity			5		
Engine	Model No.		4G92		
	Total displacement mL		1,597		
Transmis- sion	Model No.		F5MR1		F4A41
	Type		5 speed-manual		4 speed-automatic
Fuel sys- tem	Fuel supply system		Electronic control multipoint fuel injection		

Items			DA2A SNSC L6, SNSC R6	DA2A SNUC L6, SNUC R6	DA2A SNGC L6, SNGC R6	DA2A SNXC L6, SNXC R6	DA2A SRUC L6, SRUC R6, SRUC L6C, SRUC R6C	DA2A SRGC L6, SRGC R6	DA2A SRXC L6, SRXC R6
Vehicle dimensions mm	Overall length	1	4,475	4,475	4,475	4,475	4,475	4,475	4,475
	Overall width	2	1,710	1,710	1,710	1,710	1,710	1,710	1,710
	Overall height (unladen)	3	1,405	1,405	1,405	1,405	1,405	1,405	1,405
	Wheelbase	4	2,550	2,550	2,550	2,550	2,550	2,550	2,550
	Track-front	5	1,475	1,475	1,475	1,475	1,475	1,475	1,475
	Track-rear	6	1,470	1,470	1,470	1,470	1,470	1,470	1,470
	Overhang-front	7	905	905	905	905	905	905	905
	Overhang-rear	8	1,020	1,020	1,020	1,020	1,020	1,020	1,020
	Ground clear- ance (unladen)	9	150	150	150	150	150	150	150
Vehicle weight kg	Kerb weight		1,210	1,215	1,215	1,240	1,235	1,235	1,260
	Max. gross vehicle weight rating		1,715	1,725	1,725	1,730	1,745	1,745	1,750
	Max. axle weight rating-front		945	945	945	945	945	945	945
	Max. axle weight rating-rear		875	875	875	875	875	875	875
Seating capacity		5							
Engine	Model No.	4G93							
	Total displacement mL	1,834							
Transmis- sion	Model No.	F5M42					F4A42		
	Type	5 speed-manual					4 speed-automatic		
Fuel sys- tem	Fuel supply system	Gasoline direct injection							

Items			DA5A SNSFL6, SNSFR6	DA5A SNUFL6, SNUFR6	DA5A SNXFL6, SNXFR6	DA5A SNUVL6, SNUVR6	DA5A SNGVL6, SNGVR6	DA5A SNXVL6, SNXVR6
Vehicle dimensions mm	Overall length	1	4,475	4,475	4,475	4,475	4,475	4,475
	Overall width	2	1,710	1,710	1,710	1,710	1,710	1,710
	Overall height (unladen)	3	1,405	1,405	1,405	1,405	1,405	1,405
	Wheelbase	4	2,550	2,550	2,550	2,550	2,550	2,550
	Track-front	5	1,475	1,475	1,475	1,475	1,475	1,475
	Track-rear	6	1,470	1,470	1,470	1,470	1,470	1,470
	Overhang-front	7	905	905	905	905	905	905
	Overhang-rear	8	1,020	1,020	1,020	1,020	1,020	1,020
	Ground clear- ance (unladen)	9	145	145	145	145	145	145
Vehicle weight kg	Kerb weight		1,260	1,265	1,290	1,265	1,265	1,290
	Max. gross vehicle weight rating		1,765	1,775	1,780	1,775	1,775	1,780
	Max. axle weight rating-front		945	945	945	945	945	945
	Max. axle weight rating-rear		875	875	875	875	875	875
Seating capacity			5					
Engine	Model No.		F9Q1			F9Q2		
	Total displacement mL		1,870					
Transmis- sion	Model No.		F5MV1					
	Type		5 speed-manual					
Fuel sys- tem	Fuel supply system		Direct Injection Diesel					

ENGINE

CONTENTS

ENGINE <4G9>	11A
ENGINE <F9Q>	11C

ENGINE <4G9>

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CYLINDER HEAD GASKET	9		
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GDI

GENERAL

OUTLINE OF CHANGES

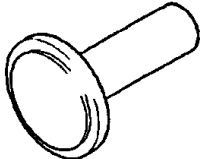
Due to the changes below, the following service procedures have been established. Other procedures are the same as before.

- The resin intake manifold is adopted.
- The fuel system is changed.

SEALANTS

Items	Specified sealants	Remarks
Beam camshaft cap and cylinder head	3M ATD Part No.8660 or equivalent	Semi-drying sealant
Camshaft position sensor support	MITSUBISHI GENUINE PART MD970389 or equivalent	

SPECIAL TOOL

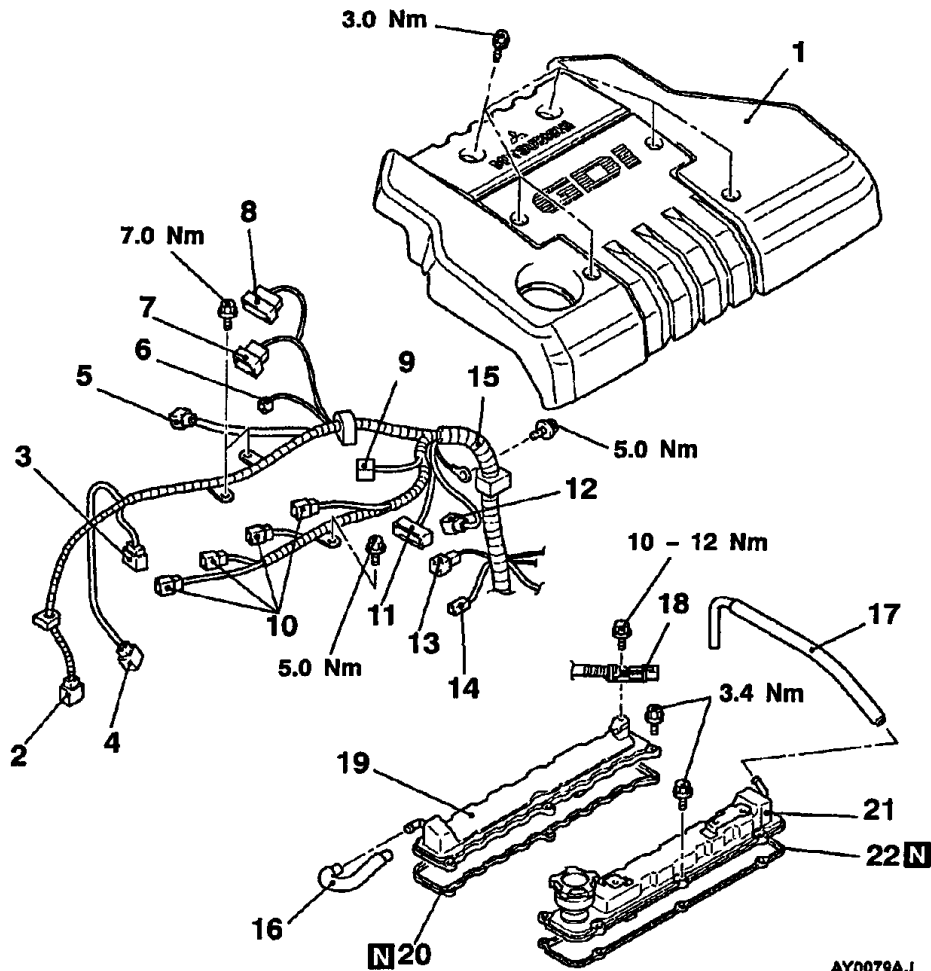
Tool	Number	Name	Use
	MD998762	Circular packing installer	Press-fitting the circular packing

CAMSHAFT AND CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Air Bleeding the High Pressure Fuel Path <after installation only> [Refer to GROUP 13A – Fuel Pump (High pressure).]
- Under Cover Removal and Installation
- Engine Coolant Draining and Supplying
- Air Intake Hose Removal and Installation



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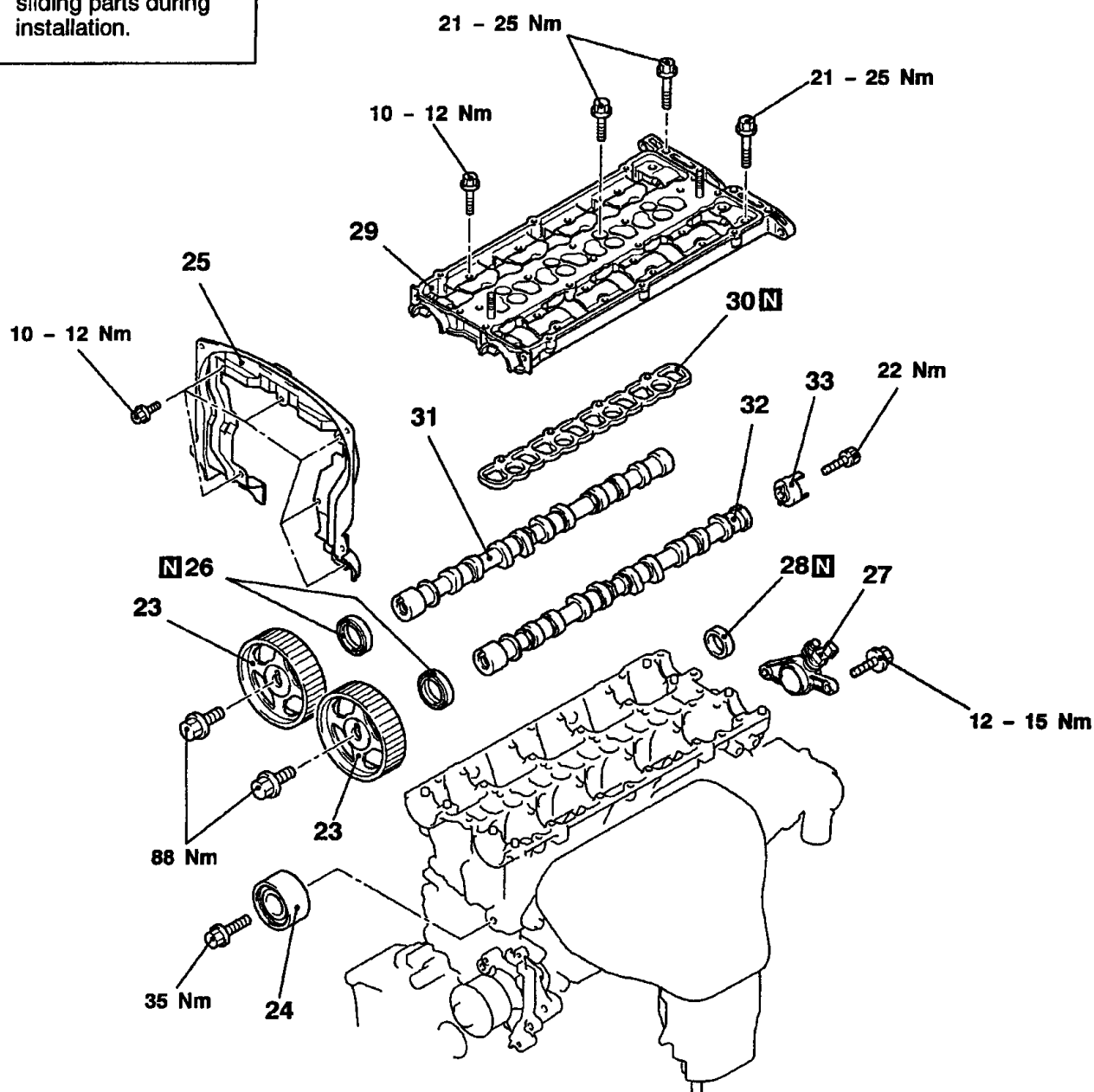
Removal steps



1. Engine cover	12. Camshaft position sensor connector
2. Crank angle sensor connector	13. Engine coolant temperature sensor connector
3. Fuel pressure sensor	14. Engine coolant temperature gauge unit connector
4. Oxygen sensor (front) connector	15. Control wiring harness
5. Control wiring harness and EGR wiring harness combination connector	16. PCV hose
6. Purge control solenoid valve connector	17. Breather hose
7. Throttle position sensor connector	• Ignition coil (Refer to GROUP 16.)
8. Throttle valve control servo connector	• Intake manifold (Refer to GROUP 15.)
9. Control wiring harness and injector wiring harness combination connector	• Timing belt
10. Ignition coil connector	18. Connector bracket (injector wiring harness)
11. Ignition failure sensor connector	19. Rocker cover (intake side)
	20. Rocker cover gasket
	21. Rocker cover (exhaust side)
	22. Rocker cover gasket



Apply engine oil to all sliding parts during installation.

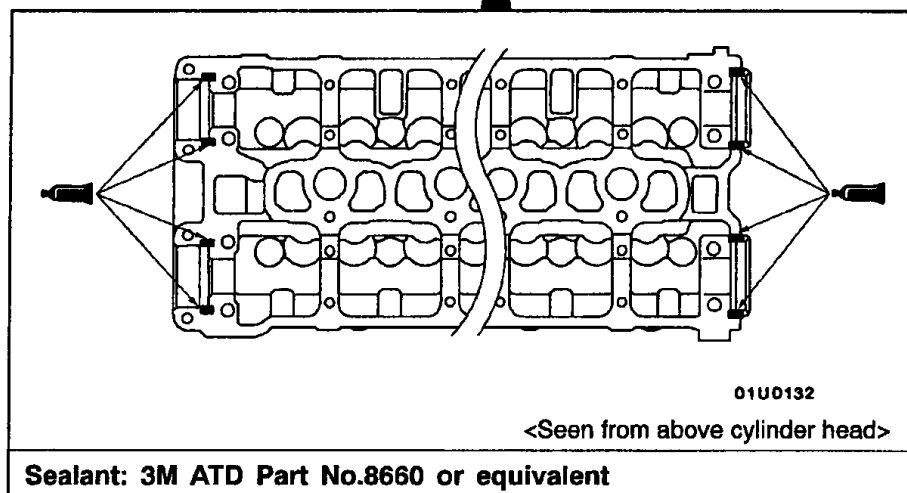
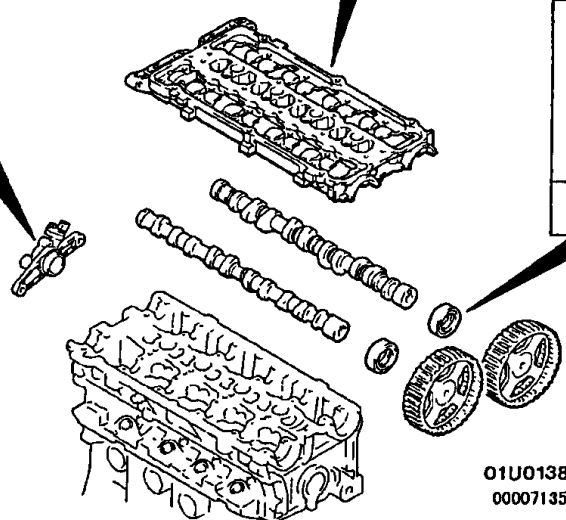
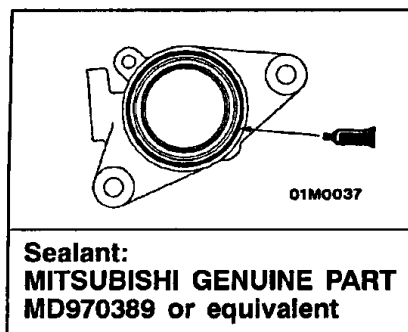
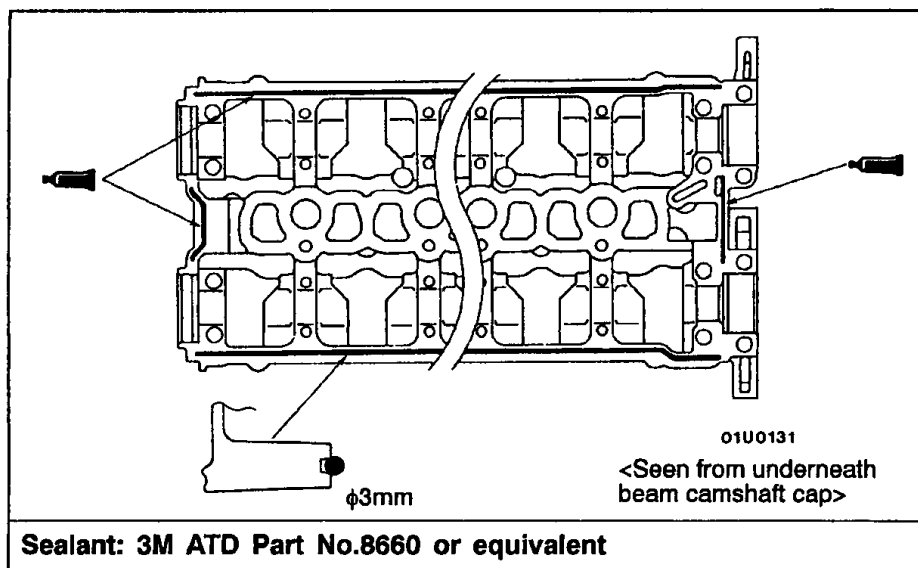


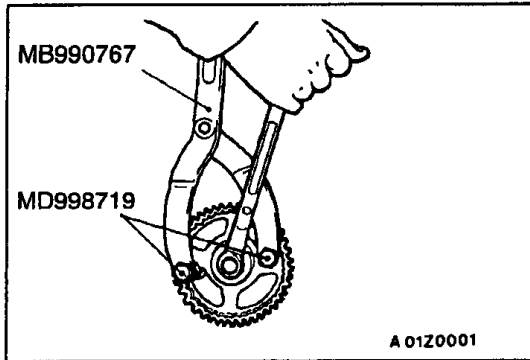
AY0080AJ

- ◀A▶ ▶E▶ 23. Camshaft sprocket
- ▶D▶ 24. Idle pulley
- ▶D▶ 25. Timing belt rear upper cover
- ▶D▶ 26. Camshaft oil seal
- ▶C▶ 27. Camshaft position sensor support
- ▶C▶ 28. Circular packing

- Fuel pump (high pressure) assembly
(Refer to GROUP 13A.)
- ▶B▶ 29. Beam camshaft cap
- ▶A▶ 30. Beam camshaft cap gasket
- ▶A▶ 31. Camshaft (intake side)
- ▶A▶ 32. Camshaft (exhaust side)
- ▶A▶ 33. Camshaft position sensing cylinder

Lubrication points



**REMOVAL SERVICE POINT****◀A▶ CAMSHAFT SPROCKET REMOVAL****INSTALLATION SERVICE POINTS****▶A◀ CAMSHAFT INSTALLATION**

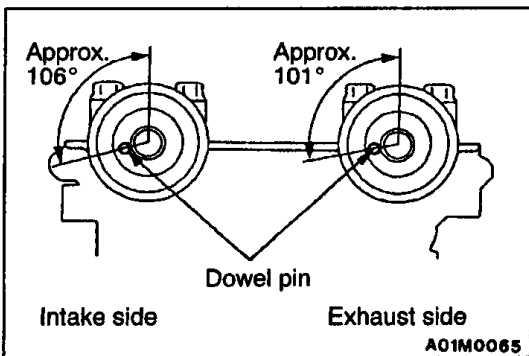
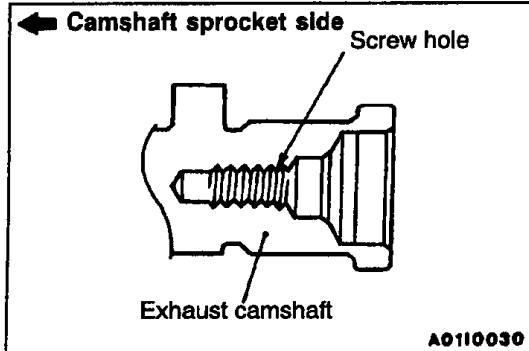
1. Apply engine oil to journals and cams of the camshafts.
2. Install the camshafts on the cylinder head.

Caution

Be careful not to confuse the intake camshaft with the exhaust one. There is a screw hole for the cam position sensing cylinder mounting bolt on the exhaust-side camshaft.

▶B◀ BEAM CAMSHAFT CAP INSTALLATION

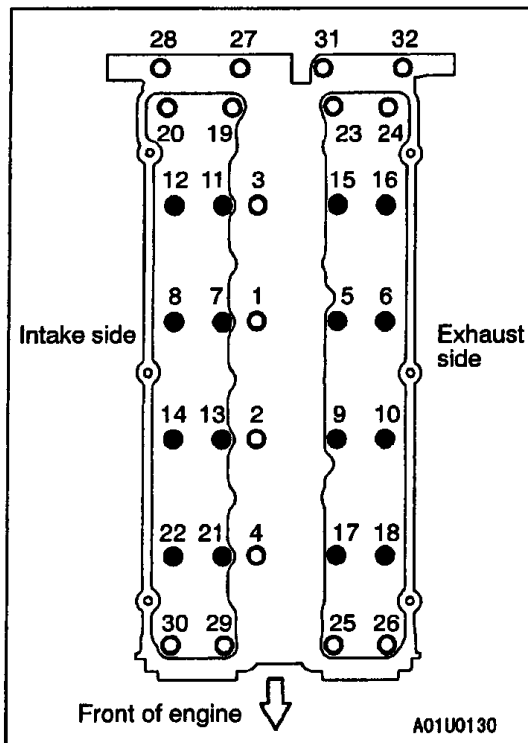
1. Place the camshaft dowel pin as shown in the illustration.

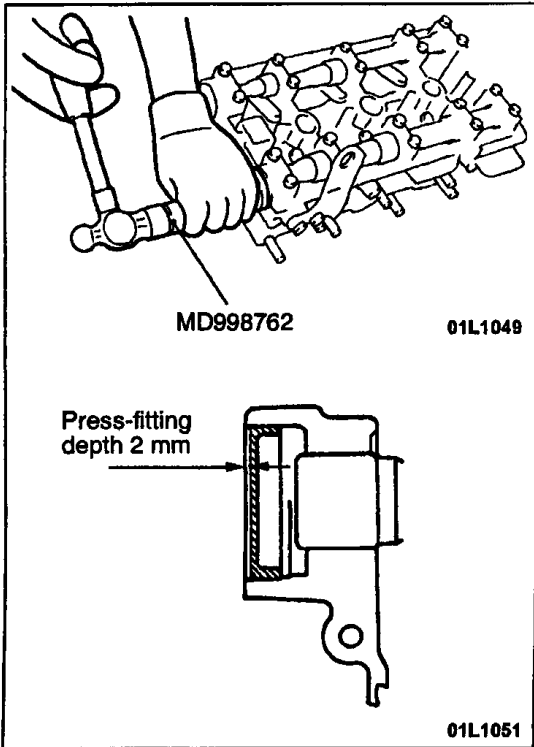


2. Tighten the beam camshaft cap mounting bolts to the specified torque in the order shown in the illustration.

Tightening torque:

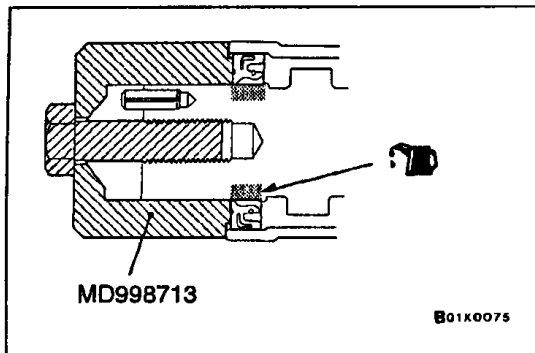
- : 10 – 12 Nm
- : 21 – 25 Nm





►C◄ CIRCULAR PACKING INSTALLATION

Use the special tool to press-fit the circular packing as shown in the illustration.



►D◄ CAMSHAFT OIL SEAL INSTALLATION

1. Apply engine oil to the entire circumference of the oil seal lip.
2. Press-fit the oil seal as shown in the illustration.

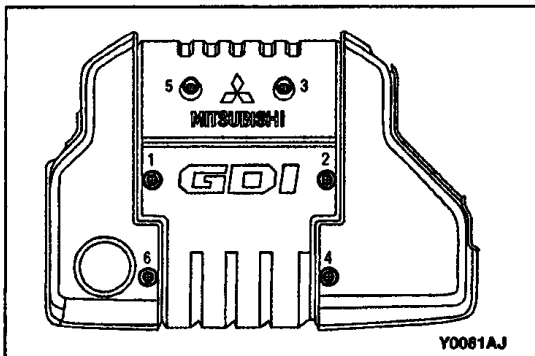
►E◄ CAMSHAFT SPROCKET INSTALLATION

Use the special tool to secure the camshaft sprocket in the same way as during removal, and then tighten the bolt to the specified torque.

►F◄ ENGINE COVER INSTALLATION

1. Temporarily tighten the mounting bolt in the order of the numbers shown in the illustration so that the engine cover can move easily by hand.
2. Tighten the mounting bolt to the specified torque in the order of the numbers shown in the illustration.

Tightening torque: 3.0 Nm

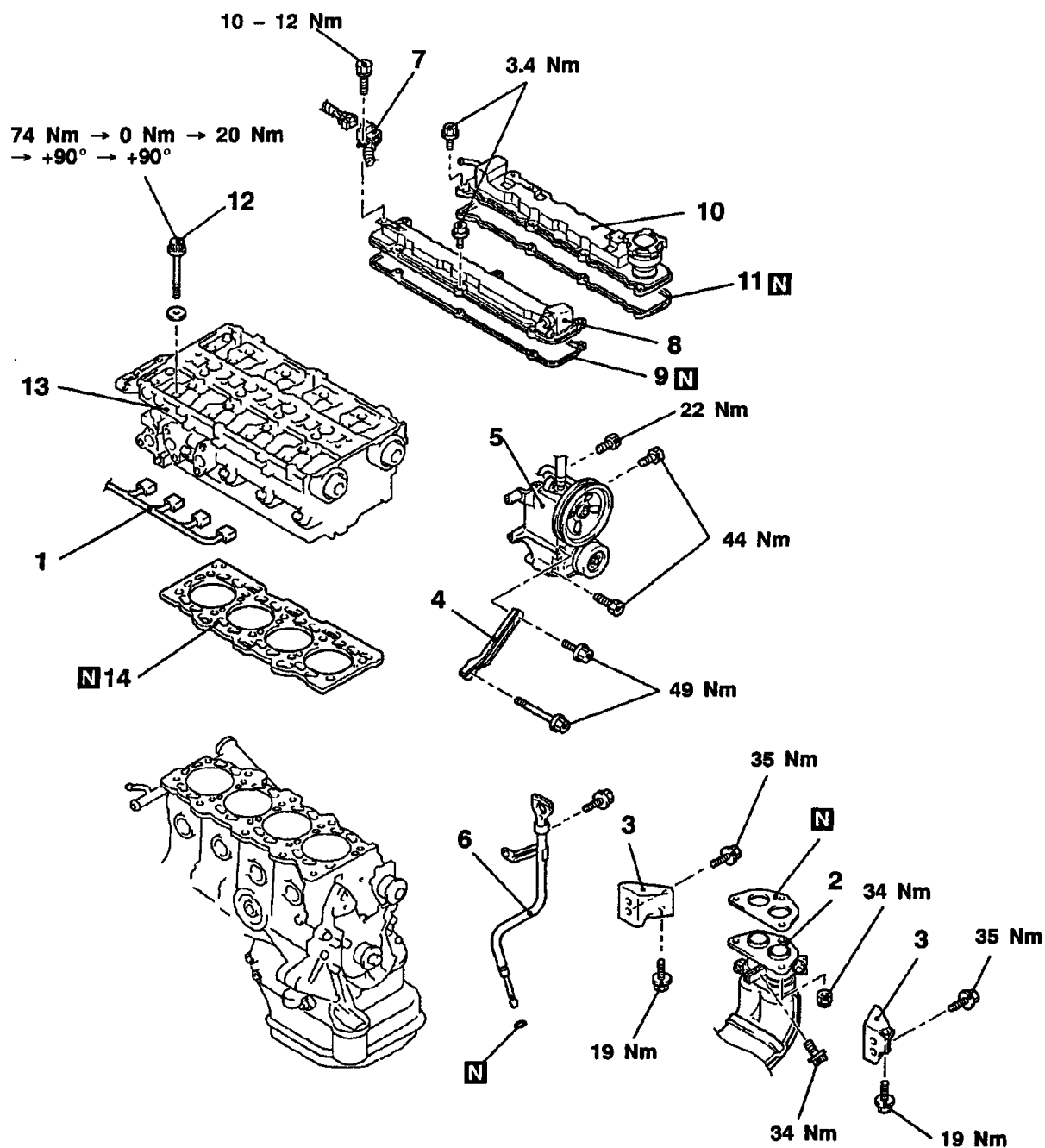


CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Cover Removal and Installation
(Refer to P.11A-4.)
- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Air Bleeding the High Pressure Fuel Path<after installation only>
[Refer to GROUP 13A – Fuel Pump (High-pressure).]
- Under Cover Removal and Installation
- Engine Coolant Draining and Supplying
- Engine Oil Draining and Supplying
- Air Intake Hose Removal and Installation
- Intake Manifold Removal and Installation
(Refer to GROUP 15.)
- Fuel Pump (high-pressure) Assembly Removal and Installation (Refer to GROUP 13A.)
- Timing Belt Rear Upper Cover Removal and Installation
- Thermostat Case Assembly and Radiator upper hose Removal and Installation
(Refer to GROUP 14 – Water Hose and Water Pipe.)



AY0083AJ

Removal steps

1. Injector harness connector
2. Front exhaust pipe connection
3. Exhaust manifold bracket
4. Power steering oil pump bracket stay
5. Power steering oil pump and bracket assembly
6. Engine oil level gauge assembly
7. Connector bracket (injector wiring harness)
8. Rocker cover (intake side)

9. Rocker cover gasket
10. Rocker cover (exhaust side)
11. Rocker cover gasket
12. Cylinder head bolt
13. Cylinder head assembly
14. Cylinder head gasket

◀B▶

▶B▶

▶A▶

NOTE

Removal and installation service points are the same as before.

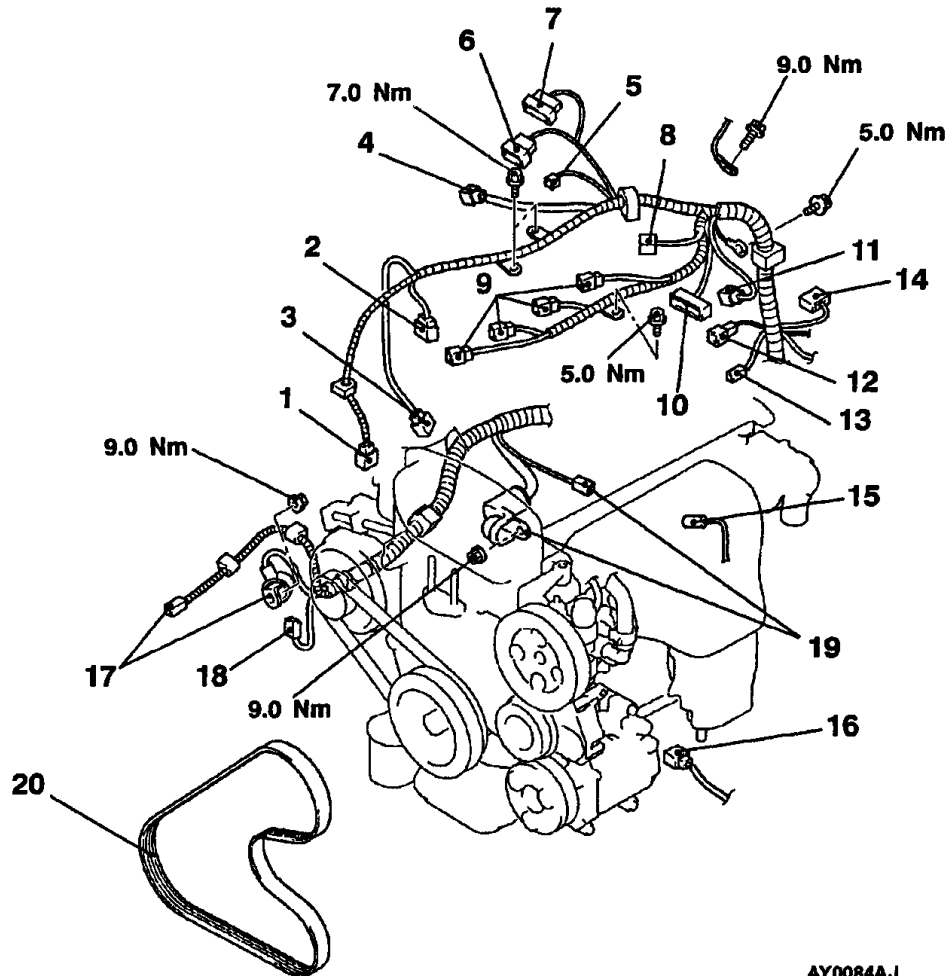
◀A▶

ENGINE ASSEMBLY

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Cover Removal and Installation (Refer to P.11A-4.)
- Prevention of Fuel Discharge <before removal only>
- Air Bleeding the High Pressure Fuel Path <after installation only> [Refer to GROUP 13A – Fuel Pump (High pressure).]
- Fuel Leak Check <after installation only>
- Drive Belt Tension Adjustment
- Under Cover Removal and Installation
- Air Cleaner Removal and Installation
- Hood Removal and Installation
- Radiator Assembly Removal (Refer to GROUP 14.)



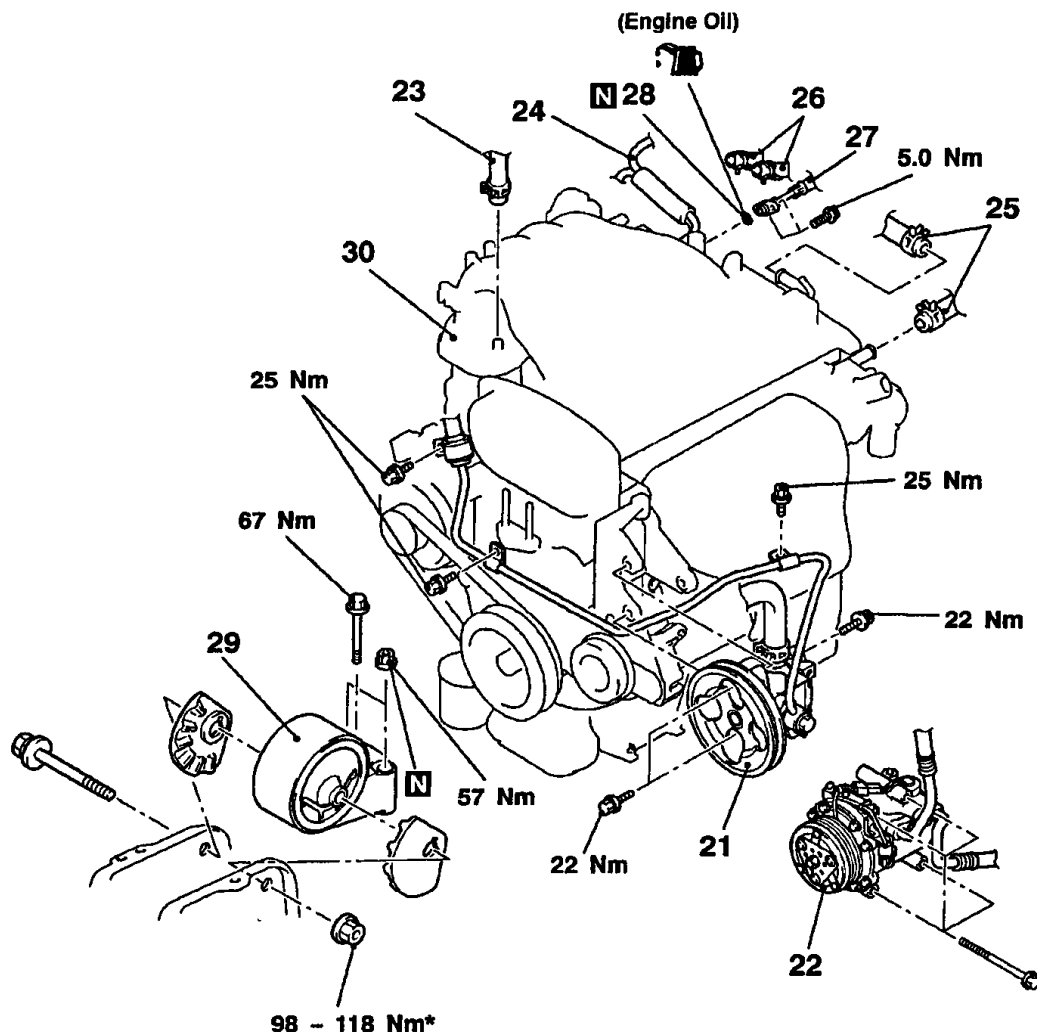
AY0084AJ

Removal steps

1. Crank angle sensor connector
2. Fuel pressure sensor
3. Oxygen sensor (front) connector
4. Control wiring harness and EGR wiring harness combination connector
5. Purge control solenoid valve connector
6. Throttle position sensor connector
7. Throttle valve control servo connector
8. Control wiring harness and injector wiring harness combination connector
9. Ignition coil connector
10. Ignition failure sensor connector
11. Camshaft position sensor connector
12. Engine coolant temperature sensor connector
13. Engine coolant temperature gauge unit connector
14. Detonation sensor connector
15. Power steering oil pressure switch connector
16. A/C compressor connector
17. Alternator connector
18. Engine oil pressure switch connector
19. Starter connector
20. Drive belt (Power steering and A/C)

Caution

Mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.



AY0073BN



- 21. Power steering oil pump
- 22. A/C compressor
- 23. Brake booster vacuum hose connection
- 24. Vacuum hose connection
- 25. Heater hoses connection

- ▶D▶ 26. Fuel return hoses connection
- ▶C▶ 27. High-pressure fuel hose connection

- ▶C▶ 28. O-ring
- Transmission assembly
- ▶B▶ 29. Engine mount Bracket
- ▶A▶ 30. Engine assembly

NOTE

Removal and installation service points which are not listed in this manual are the same as before.

INSTALLATION SERVICE POINTS**►C◄ O-RING/HIGH-PRESSURE FUEL HOSE INSTALLATION**

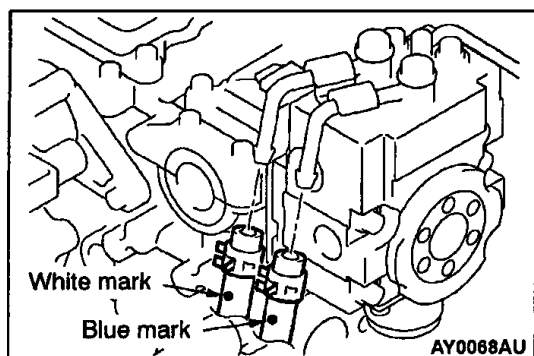
1. Apply a small amount of new engine oil to the O-ring.

Caution

Do not let any engine oil get into the delivery pipe.

2. While turning the high-pressure fuel hose 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 the hose does not turn smoothly, the O-ring is probably being clamped. Disconnect the high-pressure fuel hose and check the O-ring for damage. After this, re-insert the delivery pipe and check that the hose turns smoothly.
4. Tighten to the specified torque.

Specified torque: 5.0 Nm

**►D◄ FUEL RETURN HOSES INSTALLATION**

Install so that the identification marks of the fuel return hoses are at the positions shown in the illustration.

MPI

GENERAL

OUTLINE OF CHANGE

The following service adjustment procedures have been changed. Other procedures are the same as before.

- Auto-lash adjusters have been adopted.
- The valve timing has been changed.

GENERAL INFORMATION

Items			4G92-MPI
Valve timing	Intake	Opening	BTDC 12°
		Closing	ABDC 46°
	Exhaust	Opening	BBDC 46°
		Closing	ATDC 12°
Auto-lash adjuster			equipped

ON-VEHICLE SERVICE

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.

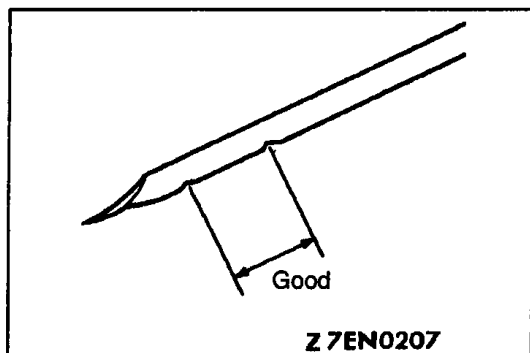
- (2) If there is a problem with the lash adjusters, the noise will almost never disappear, even if the engine has been run at idle to let it warm up.

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.

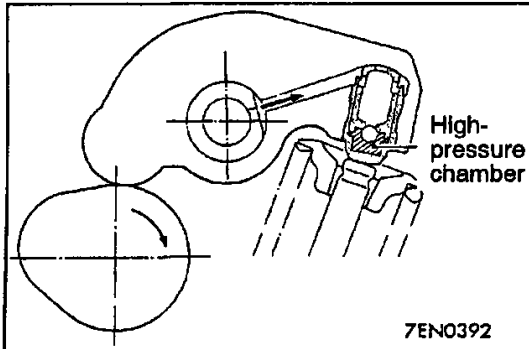


1. Check the engine oil and replenish or replace the oil if necessary.

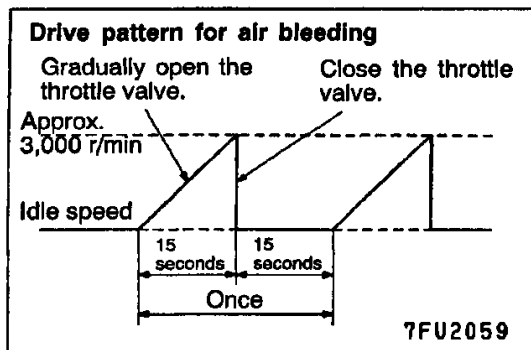
NOTE

- (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 be 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.

ENGINE <F9Q>

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11C-2 ENGINE <F9Q> – General/General Information/Service Specifications

GENERAL

OUTLINE OF CHANGE

The following maintenance service points have been established to correspond to the adoption of the F9Q engine.

GENERAL INFORMATION

Items			Specification
Total displacement mL			1,870
Bore × Stroke mm			80 × 93
Compression ratio			19
Combustion chamber			Direct injection type
Camshaft arrangement			SOHC
Number of valve	Intake		4
	Exhaust		4
Valve timing	Intake	Opening	3° BTDC
		Closing	21° ABDC
	Exhaust	Opening	46° BBDC
		Closing	6° BTDC
Fuel system			Common rail fuel injection

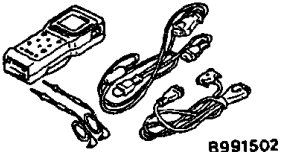
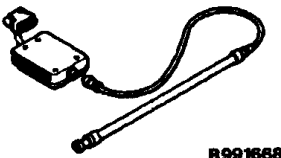
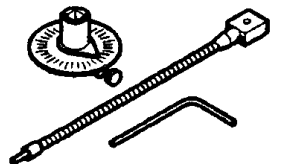
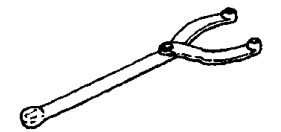
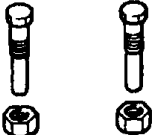
SERVICE SPECIFICATIONS

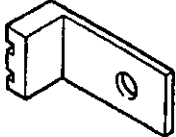
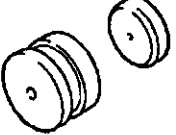
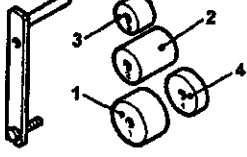
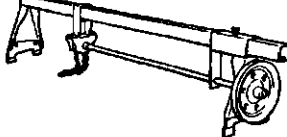
Items			Standard value	Limit
Valve clearance (at cold) mm	When checking	Intake valve	0.15 – 0.25	–
		Exhaust valve	0.35 – 0.45	–
	When adjusting	Intake valve	0.20	–
		Exhaust valve	0.40	–
Idle speed r/min			750 ± 10	–
Compression pressure (250 – 400 r/min) kPa			–	Min. 2,000
Compression pressure difference of all cylinder kPa			–	Max. 400
Timing belt frequency Hz			90 ± 15	–

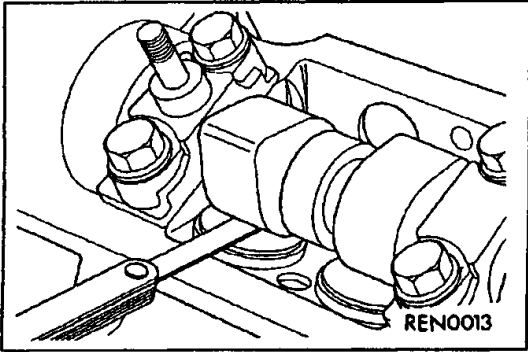
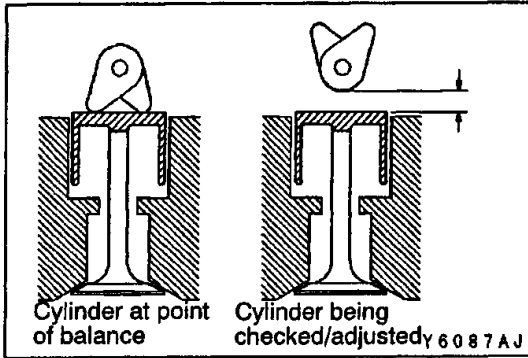
SEALANTS

Item	Specified sealant	Remark
Oil pan	MITSUBISHI GENUINE PART MD970389 or equivalent	Semi-drying sealant
Beam cam cap		
Fly wheel bolt	3M stud locking 4170 or equivalent	Anaerobic sealant

SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	- Measuring the drive belt tension - Checking the idle speed
 B991668	MB991668	Belt tension meter set	Measuring the drive belt tension (Used together with the MUT-II)
	MD998747	Crankshaft pulley holder	Holding the crankshaft pulley
	MB991614	Angle gauge	- Tightening of the crankshaft pulley bolt - Tightening of the cylinder head bolts
	MB990767	End yoke holder	Holding the camshaft sprocket
	MD998719	Crankshaft pulley holder pin	
	MB996042	Oil seal installer	Installation of camshaft oil seal

Tool	Number	Name	Use
	MB996015	Flywheel stopper	Locking the flywheel
	MB996038	Oil seal installer	Installation of the crankshaft rear oil seal
	MB996040	Oil seal installer	Installation of the crankshaft front oil seal
	MB996048	Belt pretensioner 1, 2, 3: cover 4: washer	Timing belt tension adjustment
	GENERAL SERVICE TOOL MZ203827	Engine lifter	Supporting the engine assembly during removal and installation of the transmission



ON-VEHICLE SERVICE

VALVE CLEARANCE CHECK AND ADJUSTMENT

1. The valve clearances have to be checked/adjusted in the following sequence.

Cylinder at point of balance	Cylinder being checked/adjusted
1	4
2	3
3	2
4	1

2. Measure the valve clearance.

Standard value:

Cold engine	Checking	Adjusting
Intake valve mm	0.15 – 0.20	0.20
Exhaust valve mm	0.35 – 0.45	0.40

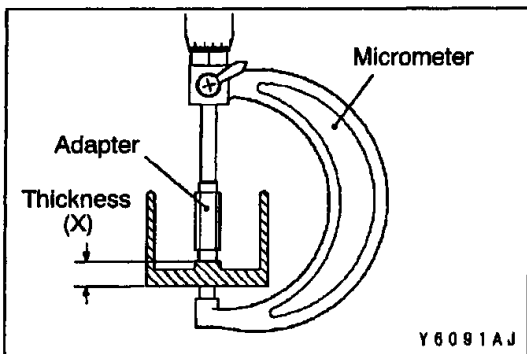
3. If the valve clearance is outside the standard value, adjust by replacing the tappets using the following procedure.
4. Re-measure the places which were outside the standard value, and make a note of the measurement value.

5. Measure the thickness of the tappet (X) with a micrometer.
6. Select a tappet which will bring the valve clearance to then standard value based on the measurement value.

Thickness of tappet for adjustment =
Thickness of tappet installed during inspection (X) +
(measurement value – standard value)

NOTE

- (1) Measure the thickness of the tappet pad with a micrometer.
- (2) Always use new tappets.
- (3) Tappets are available in thickness from 7.550 mm to 8.150 mm, increasing by increments of 0.025 mm.
7. Remove the camshaft, and then install the selected tappet.
8. Install the camshaft.
9. After rotating the camshaft once, check that the valve clearances are at the standard values.



IDLE SPEED CHECK

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to the "LOCK" (OFF) position and the connect the MUT-II to the diagnosis connector.
3. Start the engine and check that the idle speed is at the standard value.

Standard value: 750 ± 10 r/min

4. If the idle speed is not at the standard value, refer to GROUP 13E – Troubleshooting.

COMPRESSION PRESSURE CHECK

1. Before inspection, check that the engine oil, starter and battery are normal. In addition, set the vehicle to the pre-inspection condition.
2. Disconnect the all injector connector.

NOTE

Doing this will prevent carrying out fuel injection.

3. Remove all of the glow plugs.
4. Cover the glow plug hole with a shop towel etc., and after the engine has been cranked, check that no foreign material is adhering to the shop towel.

Caution

- (1) **Keep away from the glow plug hole when cranking.**
 - (2) **If compression is measured with water, oil, fuel, etc., that has come from cranks inside the cylinder, these materials will become heated and will gush out from glow plug hole, which is dangerous.**
5. Set compression gauge to one of the glow plug holes.
 6. Crank the engine and measure the compression pressure.
Limit: Min. 2,000 kPa
 7. Measure the compression pressure for all cylinders, and check that the pressure differences of the cylinders are below the limit.
Limit: Max. 400 kPa
 8. If there is a cylinder with compression or a compression difference that is outside the limit, pour a small amount of engine oil through the glow plug hole, and repeat the operations in steps 6 and 7.
 - (1) If the compression increases after oil is added, the cause of the malfunction is a worn or damaged piston ring and/or cylinder inner surface.
 - (2) If the compression does not rise after oil is added, the cause is a burnt or defective valve seat, or pressure is leaking from the gasket.
 9. Install the glow plugs.
 10. Connect the injector connectors.

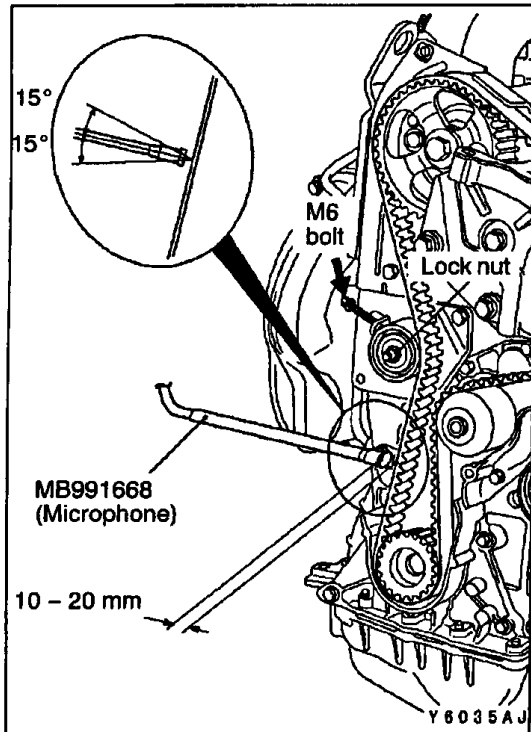
TIMING BELT TENSION ADJUSTMENT

1. Connect the special tool (belt tension meter set) to the MUT-II.
2. Connect the MUT-II to the diagnosis connector.
3. Remove the timing belt cover.
4. Turn the crankshaft clockwise to set the No. 1 cylinder to top dead compression centre.
5. Turn the ignition switch to "ON" position and select "Belt tension measurement" from the MUT-II menu screen.
6. Slacken the lock nut of the timing belt tensioner.
7. Tension the timing belt with the aid of an M6 bolt.
8. As shown in the illustration, keep the microphone (MB991668) 10 to 20 mm away from the back side of the belt perpendicularly (within an inclination of ± 15 degrees).
9. With your finger tip lightly tap the centre of the belt between the tensioner and crankshaft sprocket in the location shown by the arrow in the illustration to check whether the belt frequency is within the standard value.

Standard value: 90 ± 15 Hz

Caution

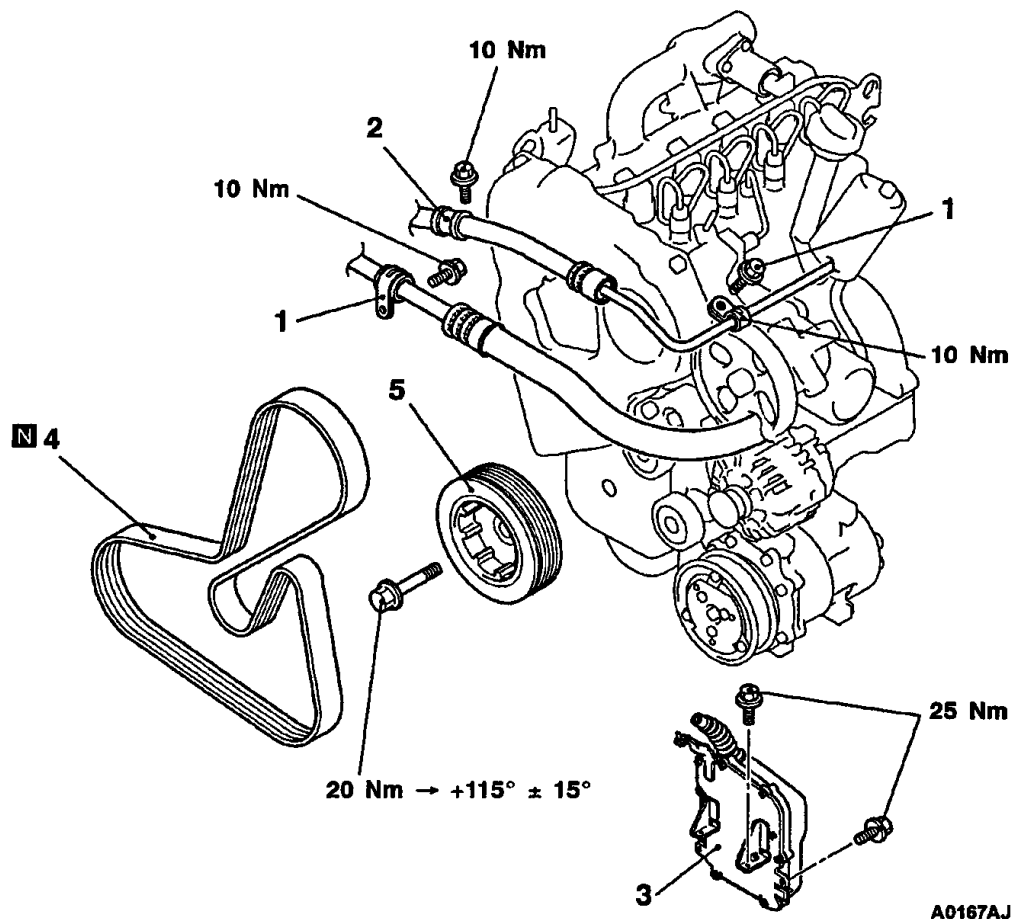
- (1) Measure when the belt surface temperature is close to room temperature.
- (2) Make sure that the water or oil, etc., does not get on the microphone.
- (3) If a strong wind blows or noise is made close to the microphone during measure, the meter will show a value that differs from the actual value.
- (4) If the measurement is taken with the microphone touching the belt, the meter will show a value that differs from the actual value.
- (5) Do not measure while the engine is running.



CRANKSHAFT PULLEY

REMOVAL AND INSTALLATION

- Pre-removal and Post-Installation Operation**
- Under Cover Removal and Installation

**Removal steps**

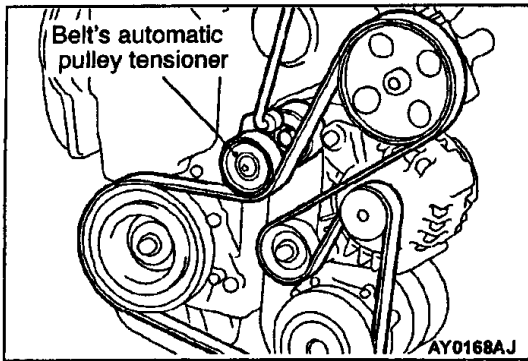
1. A/C suction hose clamp
2. Power steering pressure hose clamp



3. Engine-ECU assembly
4. Drive belt
5. Crankshaft pulley

REMOVAL SERVICE POINTS**◀A▶ ENGINE-ECU ASSEMBLY REMOVAL**

Remove the engine-ECU assembly with the harness attached to hold in the location where the removal of drive belt cannot be hindered.

**◀B▶ DRIVE BELT REMOVAL**

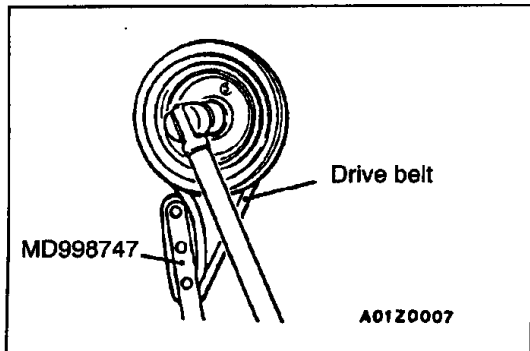
1. Loosen the belt's automatic pulley tensioner mounting bolt.
2. Hook 16 mm wrench to the protrusion of the belt's automatic pulley tensioner and turn the belt's automatic pulley tensioner clockwise to remove the drive belt.

Caution

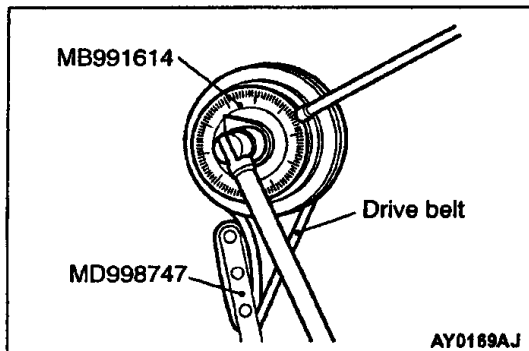
Do not use the removed drive belt again. Always make sure to replace the used drive belt with a new one.

◀C▶ CRANKSHAFT PULLEY REMOVAL**Caution**

1. This drive belt will get damaged. Do not use the engine's drive belt.
2. Never use a damaged drive belt.

**INSTALLATION SERVICE POINT****▶A◀ CRANKSHAFT PULLEY INSTALLATION**

1. Use the special tool to hold the crankshaft pulley.
2. Tighten the crankshaft pulley mounting bolt to 20 Nm.
3. Place the special tool in a wrench to tighten the crankshaft pulley mounting bolt to $115^\circ \pm 15^\circ$.



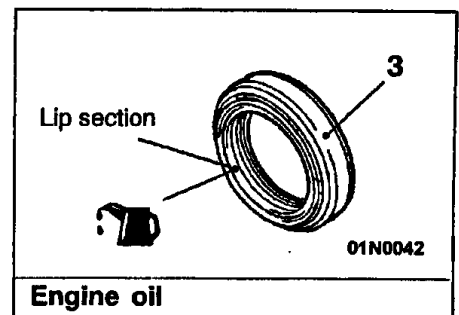
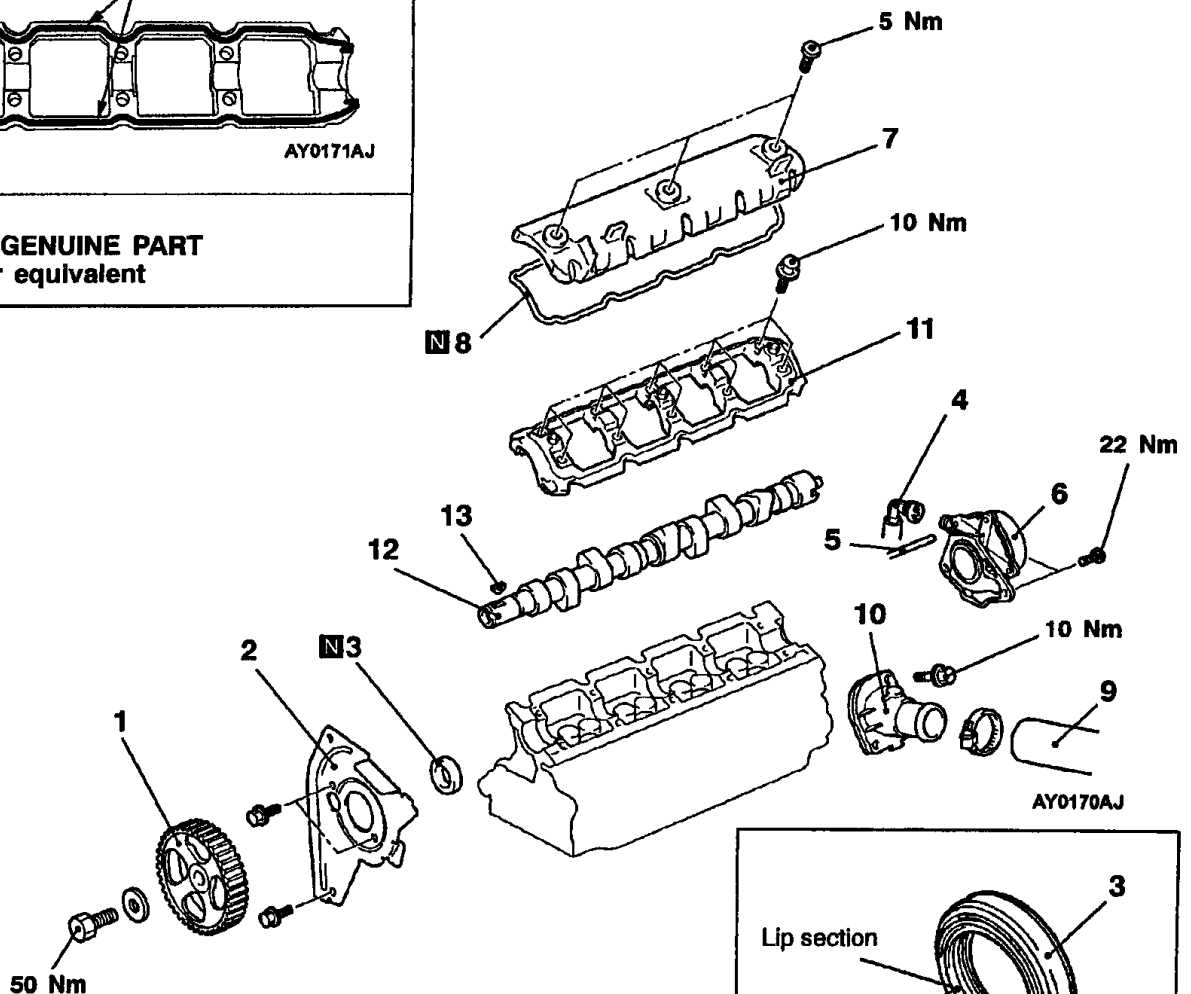
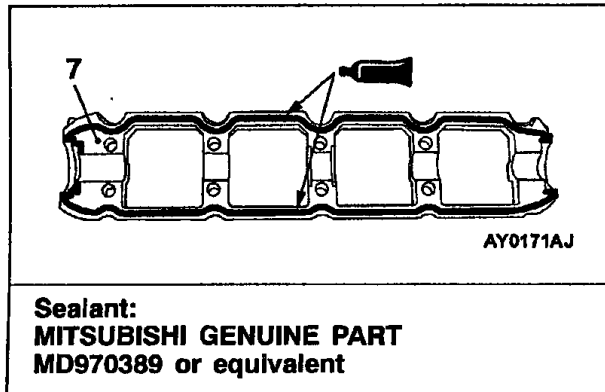
CAMSHAFT AND CAMSHAFT OIL SEAL

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

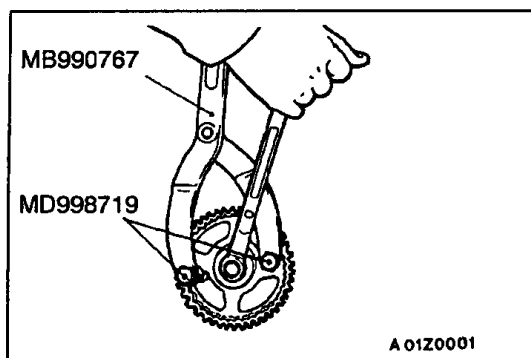
- Engine Coolant Draining and Supplying
(Refer to GROUP 14 - On-vehicle Service.)
- Air Cleaner Removal and Installation
(Refer to GROUP 15.)

- Timing Belt Removal and Installation
(Refer to P.11C-18.)

**Removal steps**

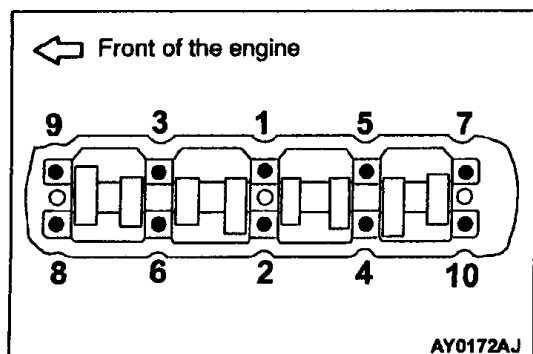
- ◀A▶ ▶C▶ 1. Camshaft sprocket
▶B▶ 2. Timing belt under cover upper
3. Camshaft oil seal
4. Brake booster vacuum hose connection
5. Vacuum hose connection
6. Vacuum pump assembly

- ▶A▶ 7. Rocker cover
8. Rocker cover gasket
9. Radiator upper hose connection
10. Water inlet fitting
11. Beam camshaft cap
12. Camshaft
13. Key

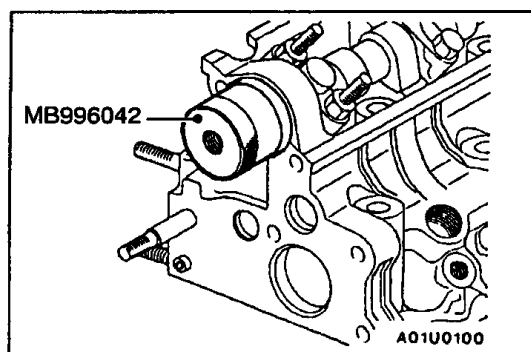
**REMOVAL SERVICE POINT****◀A▶ CAMSHAFT SPROCKET REMOVAL****INSTALLATION SERVICE POINTS****▶A◀ BEAM CAMSHAFT CAP INSTALLATION**

Tighten the beam camshaft cap mounting bolts to the specified torque in the order shown in the illustration.

Tightening torque: 10 Nm

**▶B◀ CAMSHAFT OIL SEAL INSTALLATION**

1. Coat the lip of the oil seal with a thin layer of engine oil.
2. Tape off the camshaft.
3. Locate the oil seal over the camshaft.
4. Fit the oil seal with the special tool.

**▶C◀ CAMSHAFT SPROCKET INSTALLATION**

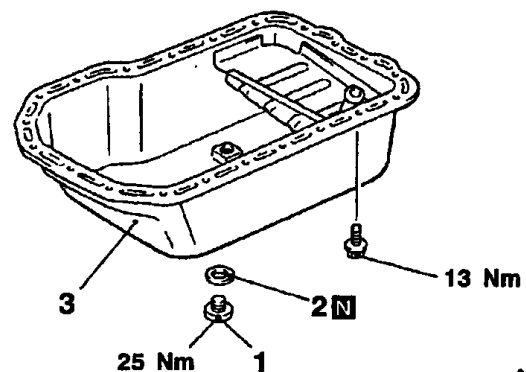
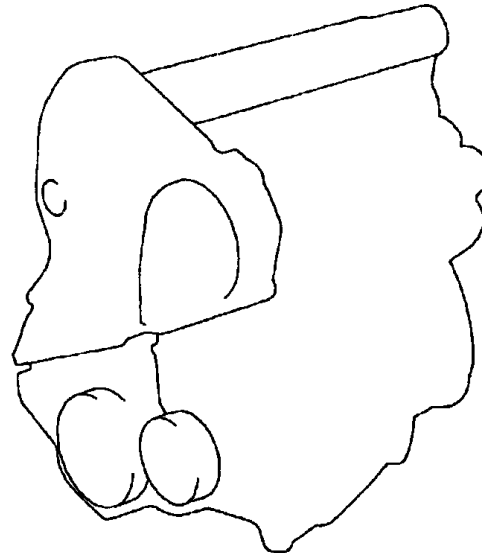
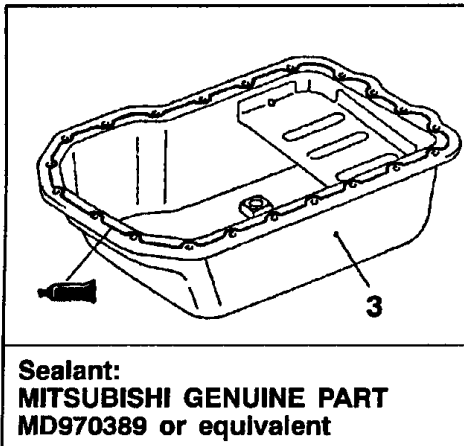
Use the special tool to secure the camshaft sprocket in the same way as during removal, and then tighten the bolt to the specified torque.

OIL PAN

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

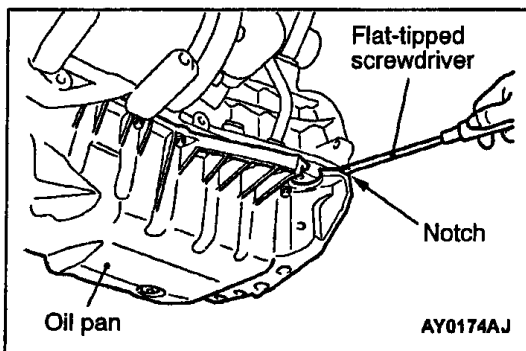
- Under Cover Removal and Installation
- Engine Oil Draining and Supplying
(Refer to GROUP 12 – On-vehicle Service.)
- Oil Level Gauge Removal and Installation



AY0173AJ

Removal steps

1. Drain plug
2. Drain plug gasket
3. Oil pan

**REMOVAL SERVICE POINT****◀A▶ OIL PAN REMOVAL**

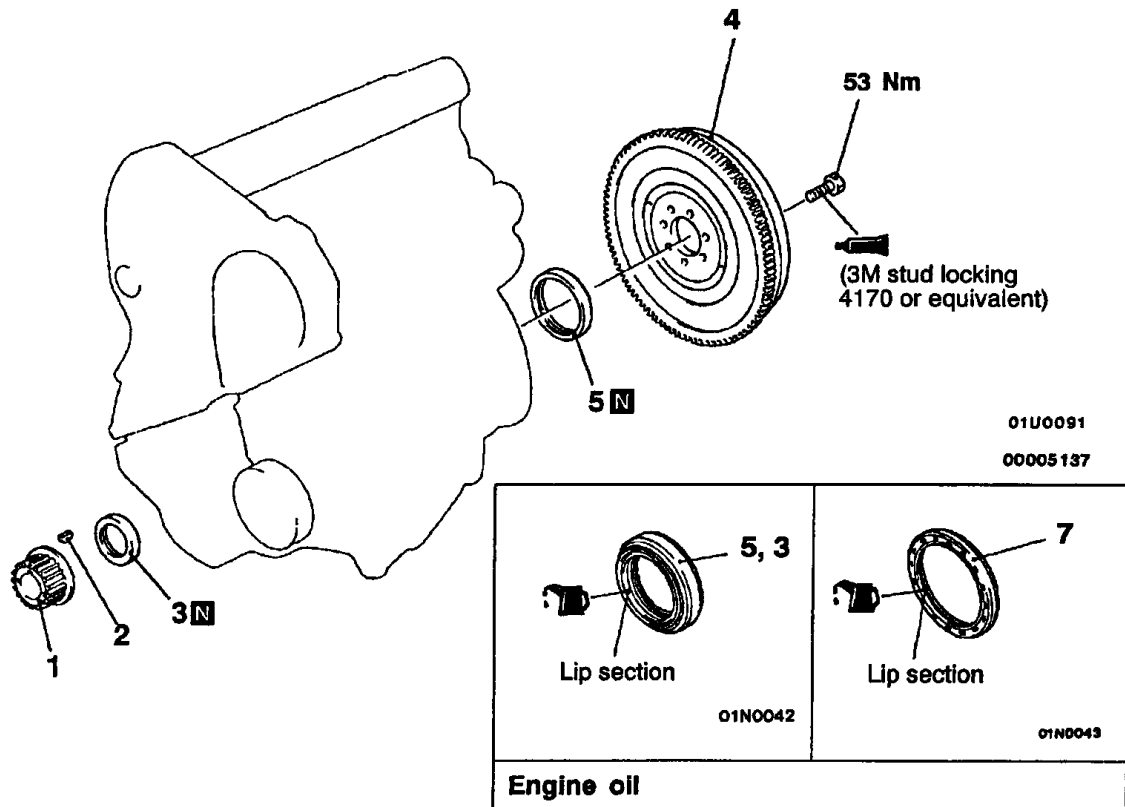
Insert a flat-tipped screwdriver into the notch of the oil pan, and turn it to remove the oil pan.

Caution

Because the upper oil pan used is made from aluminum, the oil pan remover (MB998727) should not be used.

CRANKSHAFT OIL SEAL

REMOVAL AND INSTALLATION



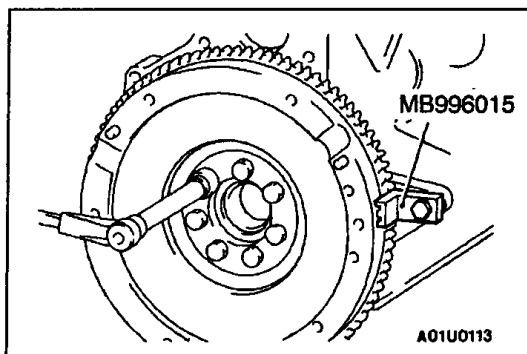
Crankshaft front oil seal removal steps

- Timing belt (Refer to P.11C-18.)
- 1. Crankshaft sprocket
- 2. Key
- 3. Crankshaft front oil seal



Crankshaft rear oil seal removal steps

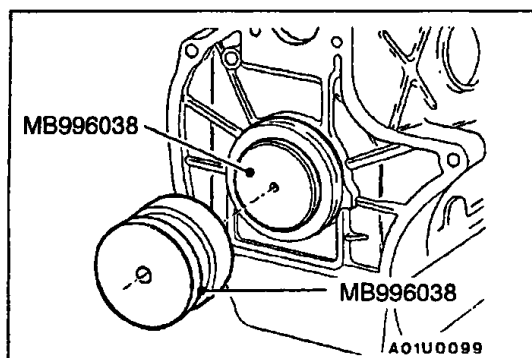
- Transmission assembly (Refer to GROUP 22.)
- Clutch cover and disc
- 4. Flywheel assembly
- 5. Crankshaft rear oil seal



REMOVAL SERVICE POINT

◀A▶ FLYWHEEL ASSEMBLY REMOVAL

Use the special tool to secure the flywheel and remove the bolts.



INSTALLATION SERVICE POINTS

►A◄ CRANKSHAFT REAR OIL SEAL INSTALLATION

1. Coat the lip of the oil seal with a thin layer of engine oil.
2. Locate the special tool (installer guide) over the crankshaft.
3. Locate the oil seal over the guide.
4. Fit the oil seal with special tool (installer).

►B◄ FLYWHEEL ASSEMBLY INSTALLATION

1. Clean off all sealant, oil and other substances which are adhering to the threaded bolts, crankshaft thread holes and the flywheel.
2. Apply sealant to the threaded mounting bolts.

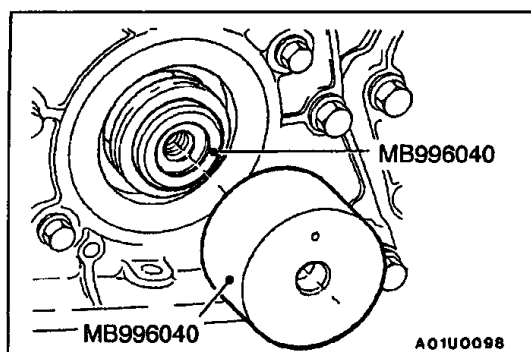
Specified sealant: 3M Stud locking 4170 or equivalent

3. Use the special tool to secure the flywheel, and then tighten the bolts to the specified torque.

Tightening torque: 53 Nm

►C◄ CRANKSHAFT FRONT OIL SEAL INSTALLATION

1. Coat the lip of the oil seal with a thin layer of engine oil.
2. Locate the special tool (installer guide) over the crankshaft.
3. Locate the oil seal over the guide.
4. Fit the oil seal with special tool (installer).

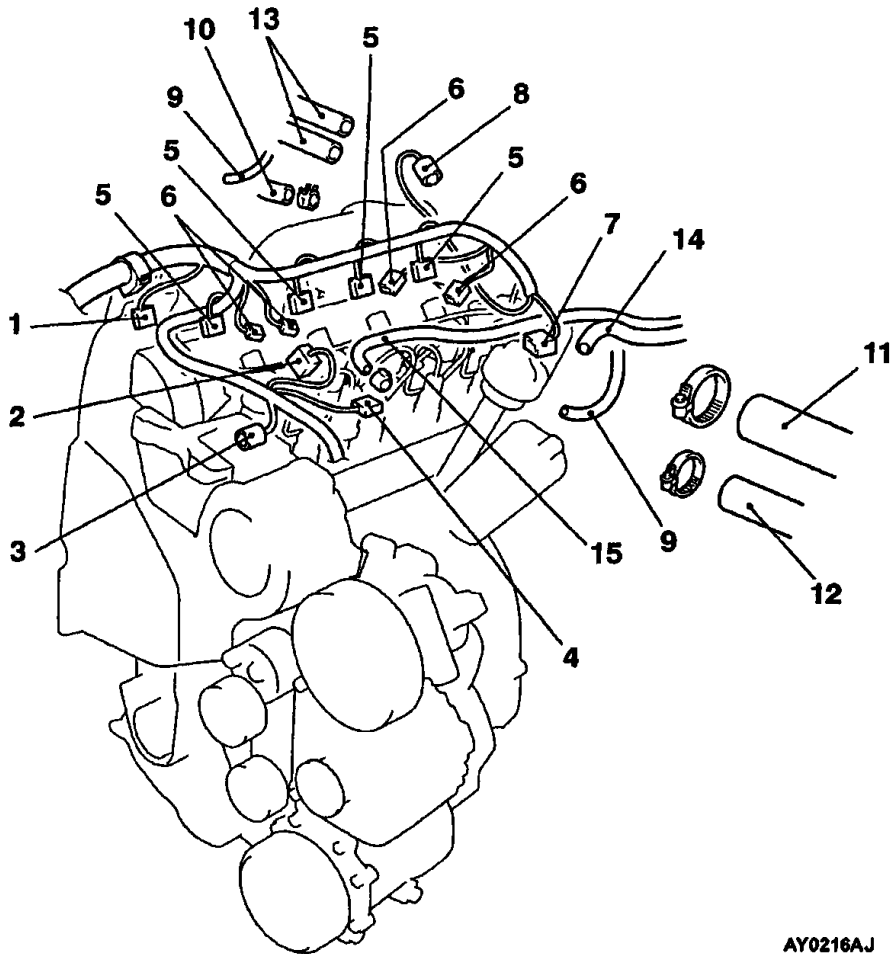


CYLINDER HEAD GASKET

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Coolant Draining and Supplying (Refer to GROUP 14 – On-vehicle Service.)
- Engine Oil Draining and Supplying (Refer to GROUP 12 – On-vehicle Service.)
- Timing Belt Removal and Installation (Refer to P.11C-18.)
- Air Cleaner and Air Intake Hose Removal and Installation (Refer to GROUP 15.)
- Catalytic Converter Removal and Installation (Refer to GROUP 15 – Exhaust Pipe and Main Muffler.)



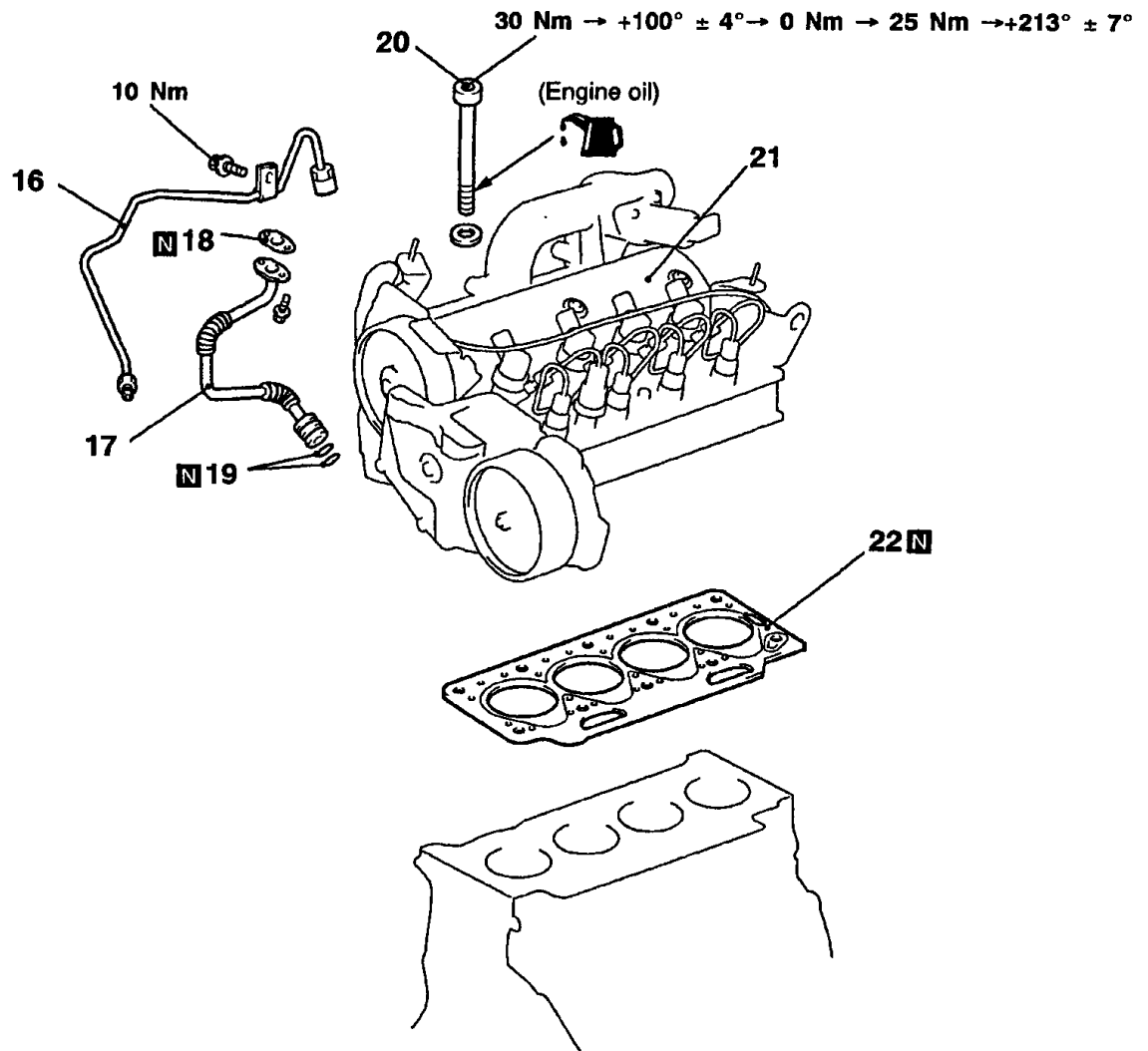
AY0216AJ

Removal steps

1. Camshaft position sensor connector
2. Fuel pressure sensor connector
3. Fuel high pressure pump connector
4. Fuel temperature sensor connector
5. Fuel injector connector
6. Glow plug connector
7. Water temperature sensor connector
8. EGR valve connector



9. Vacuum hose connection
10. Brake booster vacuum hose connection
11. Radiator upper hose connection
12. Water hose connection
13. Heater hose connection
14. Fuel return hose connection
15. Fuel supply hose connection



Y0218A.J

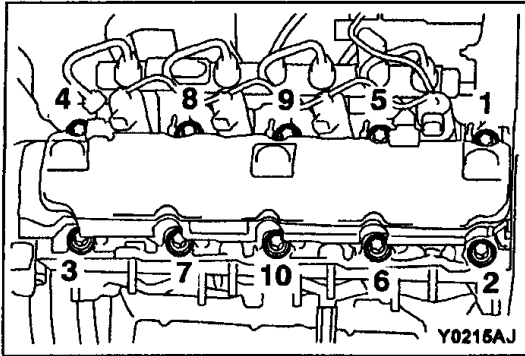
- 16. Oil pipe assembly
- 17. Oil return pipe assembly
- 18. Oil return pipe gasket
- 19. O-ring

- ◀B▶ ▶B◀ 20. Cylinder head bolt
- ▶A◀ 21. Cylinder head assembly
- ▶A◀ 22. Cylinder head gasket

REMOVAL SERVICE POINTS

◀A▶ FUEL RETURN HOSE CONNECTION/FUEL SUPPLY HOSE CONNECTION REMOVAL

After disconnecting the fuel return hose and the fuel supply hose, put the cover at the end of the fuel line to prevent foreign objects from entering.



◀B▶ CYLINDER HEAD BOLT REMOVAL

Loosen the cylinder head bolt in the order of the illustrated numbers in two or three stages for removal.

Caution

Do not use the removed cylinder head bolt again. Always replace the used cylinder head bolt with a new one.

INSTALLATION SERVICE POINTS

▶A▶ CYLINDER HEAD GASKET INSTALLATION

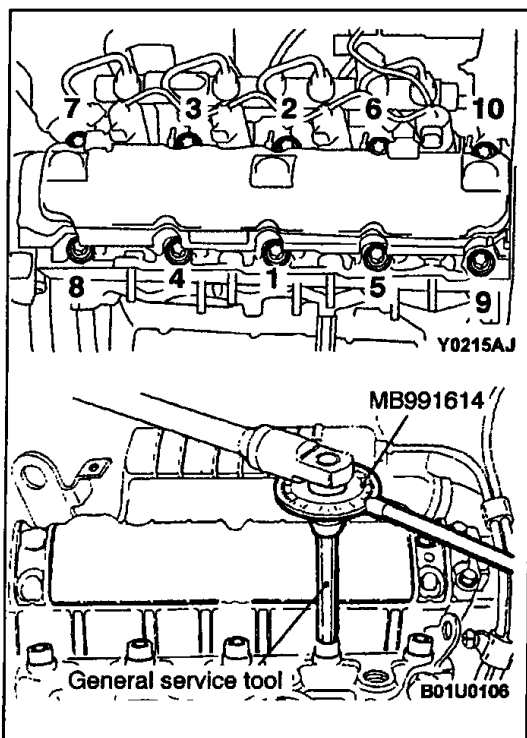
1. Wipe off all oil and grease from the gasket mounting surface.
2. Install so that the shapes of the cylinder head holes match the shapes of the respective cylinder head gasket holes.

▶B▶ CYLINDER HEAD BOLT INSTALLATION

1. Tighten the new cylinder head bolt in the order of the illustrated numbers to 30 Nm.
2. Place the special tool in a wrench to tighten the cylinder head bolt in the order of the illustrated numbers to $100^\circ \pm 4^\circ$.
3. Wait for approximately 3 minutes until the cylinder head gasket fits in the cylinder head and the cylinder block.
4. Loosen the illustrated number 1 and 2 bolts completely.
5. Tighten the illustrated number 1 and 2 bolts to 25 Nm.
6. Place the special tool in a wrench to tighten the illustrated number 1 and 2 bolts to $213^\circ \pm 7^\circ$.
7. Divide the rest of the bolts into pairs: Number 3 and 4 bolts, number 5 and 6 bolts, number 7 and 8 bolts, number 9 and 10 bolts. And tighten them as a pair according to the procedures 3, 4, and 5.

Caution

The cylinder head bolt will be extended if the cylinder head is tightened. If the cylinder head bolt is tightened too much, replace it with a new one instead of tightening it again.

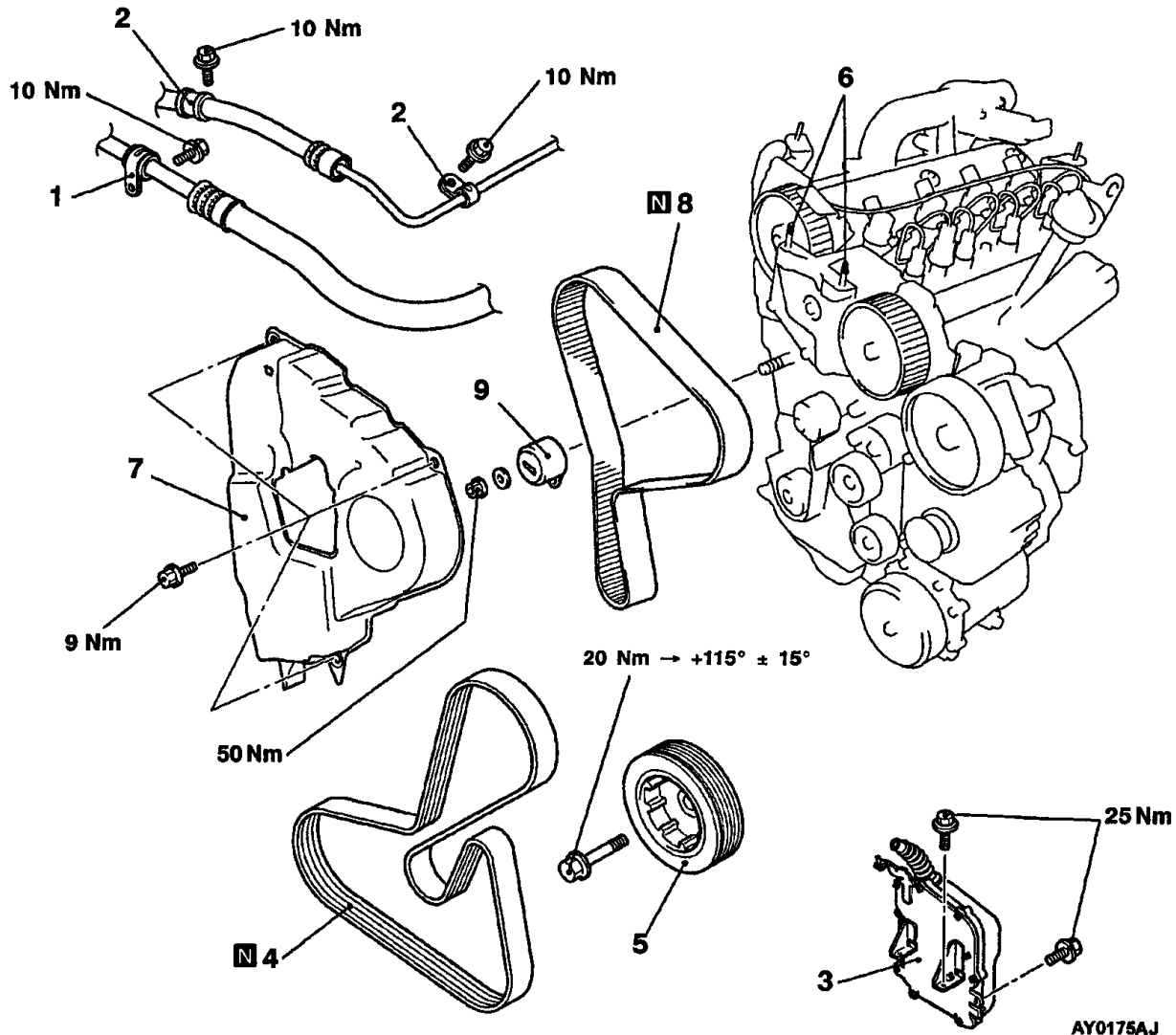


TIMING BELT

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Under Cover Removal and Installation
- Engine Mount Bracket Removal and Installation
(Refer to GROUP 32.)

**Removal steps**

1. A/C suction hose clamp
2. Power steering pressure hose clamp
3. Engine-ECU assembly
4. Drive belt

◀C▶ ▶B◀

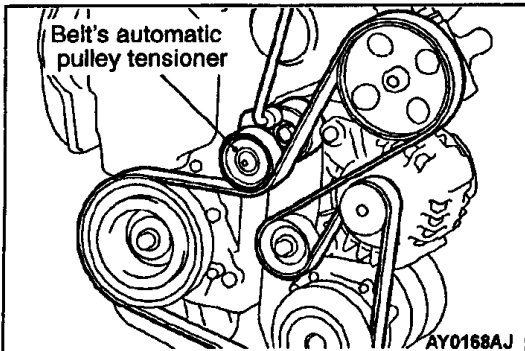
◀D▶ ▶A◀

5. Crankshaft pulley
6. Stud bolt
7. Timing belt cover
8. Timing belt
9. Timing belt tensioner pulley



REMOVAL SERVICE POINTS**◀A▶ ENGINE-ECU ASSEMBLY REMOVAL**

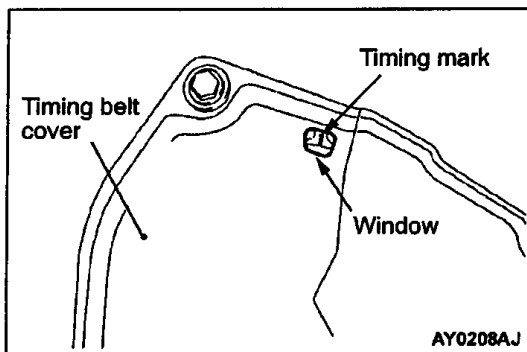
Remove the engine-ECU assembly with the harness attached and hold it in the location where the removal of drive belt cannot be hindered.

**◀B▶ DRIVE BELT REMOVAL**

1. Loosen the belt's automatic pulley tensioner mounting bolt.
2. Hook 16 mm wrench to the protrusion of the belt's automatic pulley tensioner and turn the belt's automatic pulley tensioner clockwise to remove the drive belt.

Caution

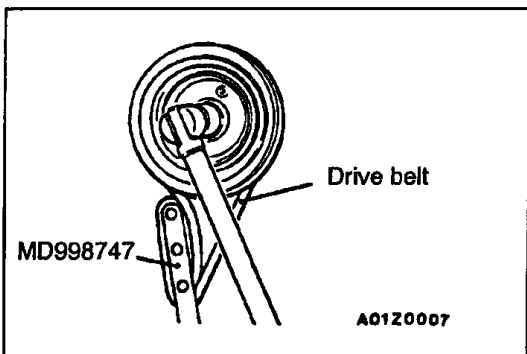
Do not use the removed drive belt again. Always make sure to replace the used drive belt with a new one.

**◀C▶ CRANKSHAFT PULLEY REMOVAL**

1. Turn the crankshaft clockwise to align the timing mark of the camshaft sprocket with the centre of the window of the timing belt cover.

Caution

The crankshaft must always be turned clockwise.



2. Use the special tool to hold the crankshaft pulley, loosen the crankshaft pulley mounting bolt, and remove the crankshaft pulley.

Caution

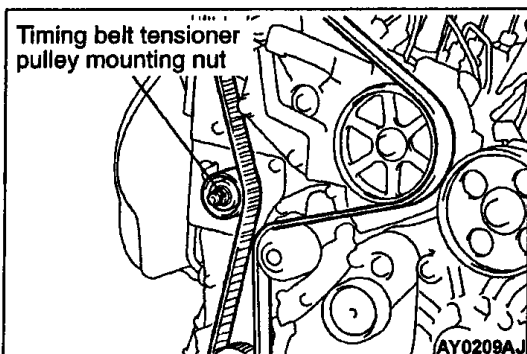
1. **This drive belt will get damaged. Do not use the engine's drive belt.**
2. **Never use a damaged drive belt.**
3. **When the crankshaft pulley mounting bolt is loosened, be careful not to miss the timing mark while turning the crankshaft pulley.**

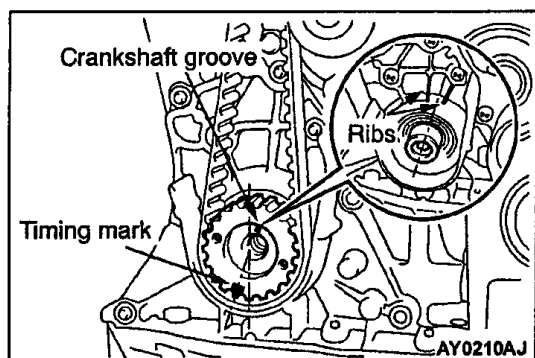
◀D▶ TIMING BELT REMOVAL

Loosen the timing belt tensioner pulley mounting nut to remove the timing belt.

Caution

Do not use the removed timing belt again. Always replace the used timing belt with a new one.

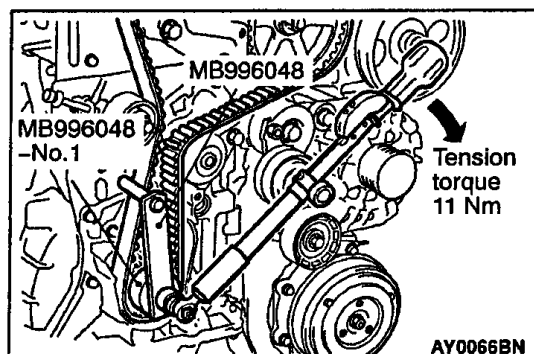
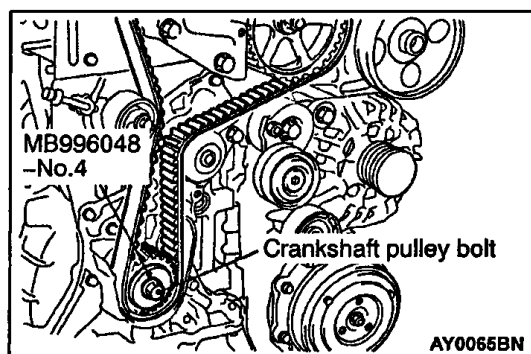
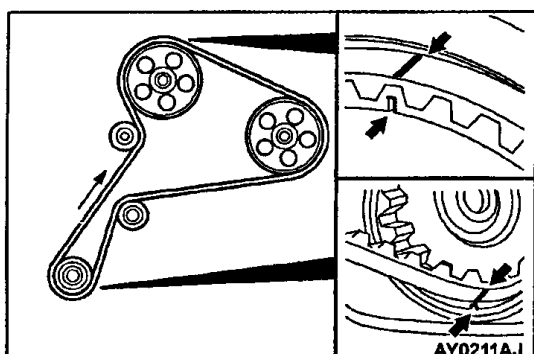
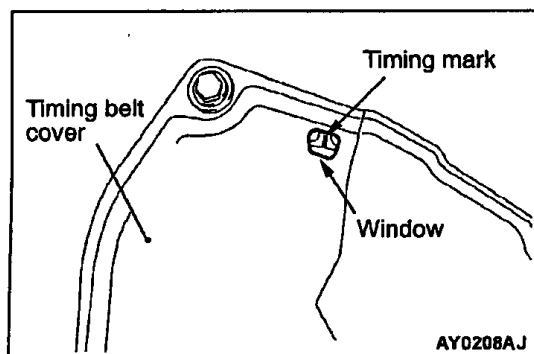


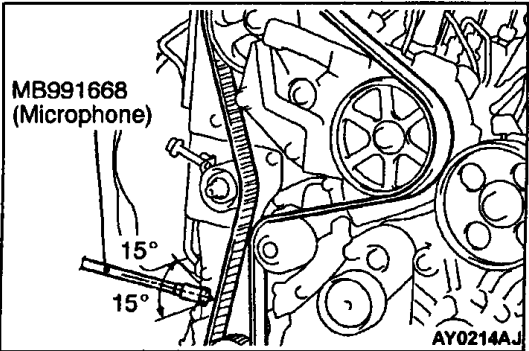
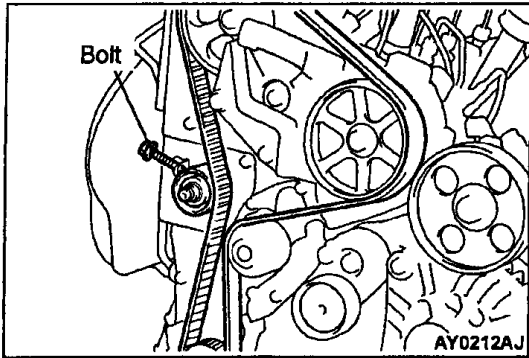


INSTALLATION SERVICE POINTS

►A◄TIMING BELT INSTALLATION

1. Turn the crankshaft clockwise to align the crankshaft groove with the centre of the two ribs of the crankshaft closure cover. Furthermore, confirm that the timing mark of the crankshaft sprocket is a tooth off to the left of the perpendicular shaft in the engine.
2. Confirm that the timing mark of the camshaft sprocket aligns with the centre of the window of the timing belt cover.
3. Fit the timing belt so that the lines on the belt are aligned with the marks on the crankshaft and camshaft sprockets.
4. Install No.4 washer of special tool MB996048 and the crankshaft pulley bolt to the crankshaft.
5. Install No.1 cover of special tool MB996048 to the crankshaft pulley bolt, and use a torque wrench to tension the timing belt to 11 Nm.
6. Remove special tool MB996048 and No.1 cover.



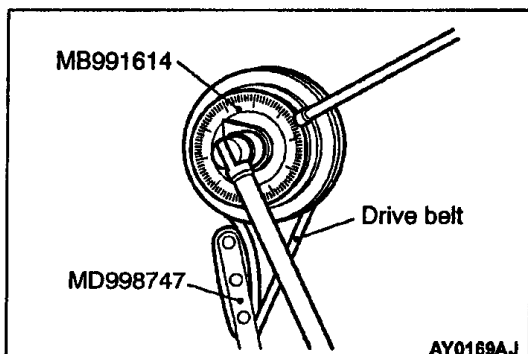


7. Place the bolt in the timing belt tensioner pulley to tighten the bolt so that the timing belt tension becomes the standard value.
Use the MUT-II to measure the timing belt tension.

Standard value: 90 ± 15 Hz

The Measurement Method of Timing Belt Tension

- (1) Connect the special tool (MB991668) to the MUT-II.
 - (2) Connect the MUT-II to the diagnosis connector.
 - (3) Turn the ignition switch to the on position to select "Belt tension measurement" in the menu.
 - (4) Place the microphone 10 to 20 mm behind the belt located in the centre between the camshaft sprocket and the crankshaft sprocket and hold it perpendicular to the belt (approximate inclination of $\pm 15^\circ$ or less).
 - (5) Pluck the centre position of the belt between the camshaft sprocket and the crankshaft sprocket to measure the vibration frequency of the belt.
 8. After adjusting the vibration frequency, tighten the tensioner pulley bolt to 10 Nm.
 9. Rotate the crankshaft clockwise, and align the timing marks.
 10. Tension the timing belt to 11 Nm in the same manner as step 5.
 11. Measure the vibration frequency of the timing belt in the same manner as step 7, and check that it is within the standard value. If not within the standard value, adjust the timing belt again.
- Standard value: 90 ± 15 Hz**
12. Tighten the tensioner pulley bolt to 50 Nm, and remove No.4 washer of special tool MB996048 and the crankshaft pulley bolt.



►B◄ CRANKSHAFT PULLEY INSTALLATION

1. Use the special tool to hold the crankshaft pulley as shown in the removal procedures.
2. Tighten the crankshaft pulley mounting bolt to 20 Nm.
3. Place the special tool in a wrench to tighten the crankshaft pulley mounting bolt to $115^\circ \pm 15^\circ$.

ENGINE ASSEMBLY

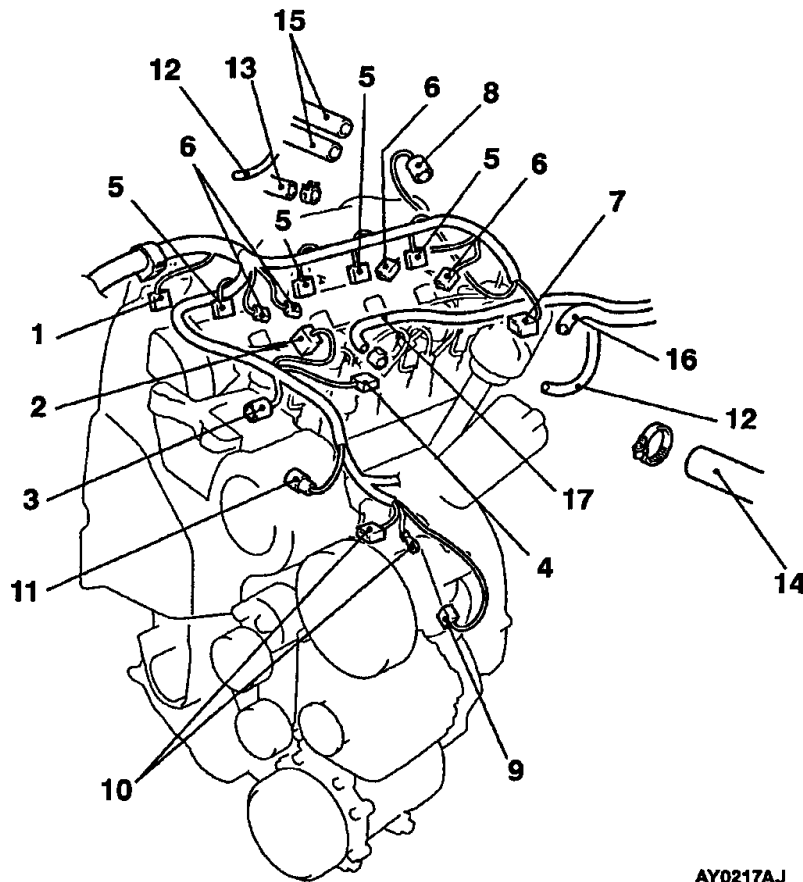
REMOVAL AND INSTALLATION

Caution

Mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

Pre-removal and Post-Installation Operation

- Hood Removal and Installation
- Under Cover Removal and Installation
- Engine Coolant Draining and Supplying (Refer to GROUP 14 – On-vehicle Service.)
- Air Cleaner Removal and Installation (Refer to GROUP 15.)
- Inter Cooler and Inter Cooler Hose Removal and Installation (Refer to GROUP 15.)
- Front Exhaust Pipe Removal and Installation (Refer to GROUP 15.)
- Drive Belt Removal and Installation (Refer to P.11C-8.)

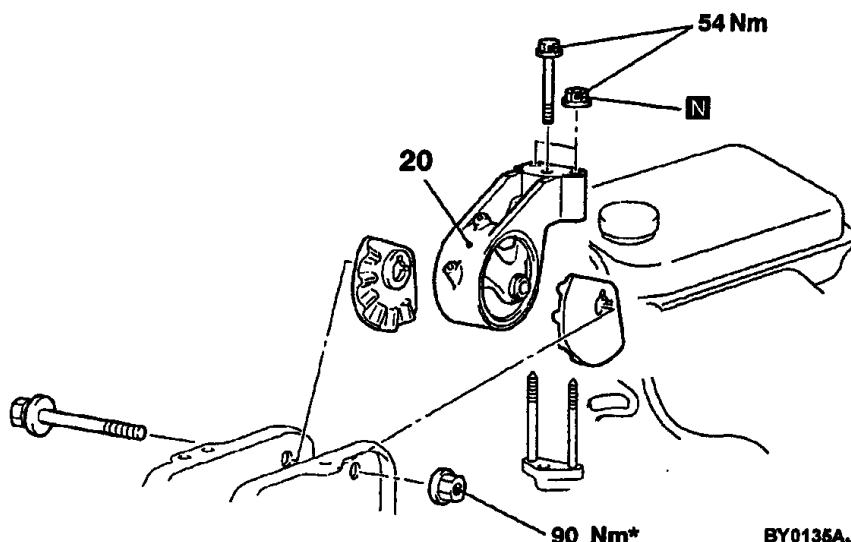
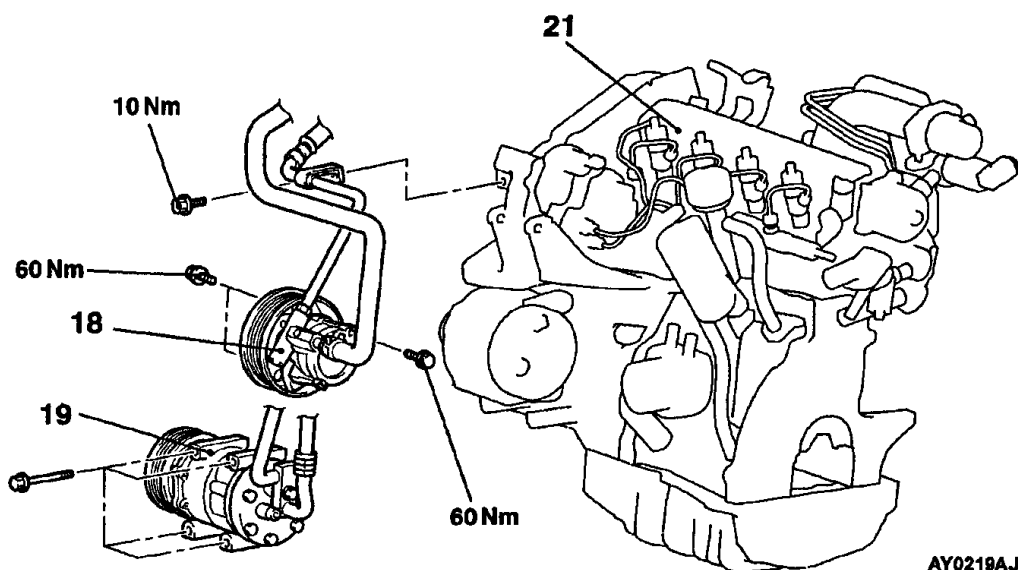


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Removal steps

1. Camshaft position sensor connector	10. Alternator connector
2. Fuel pressure sensor connector	11. Oil pressure switch connector
3. Fuel high pressure pump connector	12. Vacuum hose connection
4. Fuel temperature sensor connector	13. Brake booster vacuum hose connection
5. Fuel injector connector	14. Water hose connection
6. Glow plug connector	15. Heater hose connection
7. Engine coolant temperature sensor connector	16. Fuel return hose connection
8. EGR valve connector	17. Fuel supply hose connection
9. A/C compressor connector	





18. Power steering oil pump
19. A/C compressor
• Transmission assembly
(Refer to GROUP 22.)



20. Engine mount bracket
21. Engine assembly

REMOVAL SERVICE POINTS

◀A▶ FUEL RETURN HOSE CONNECTION/FUEL SUPPLY HOSE CONNECTION REMOVAL

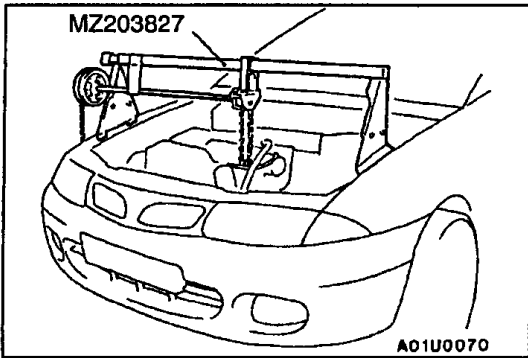
After disconnecting the fuel return hose and the fuel supply hose, put the cover at the end of the fuel line to prevent the foreign objects from entering.

◀B▶ POWER STEERING OIL PUMP REMOVAL

Remove the power steering oil pump from the engine with the hose attached.

NOTE

Place the removed power steering oil pump where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

**◀C▶ A/C COMPRESSOR REMOVAL**

Disconnect the A/C compressor connector and remove the compressor from the compressor bracket with the hose still attached.

NOTE

Place the removed A/C compressor where it will not be a hindrance when removing and installing the engine assembly, and tie it with a cord.

◀D▶ ENGINE MOUNT BRACKET REMOVAL

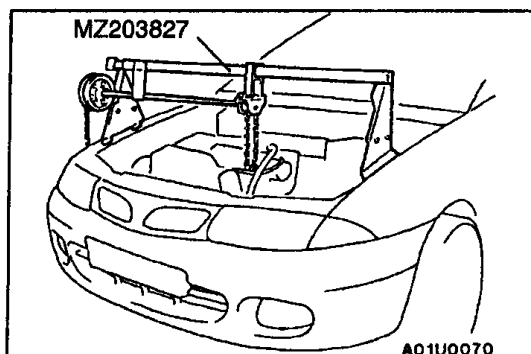
1. Support the engine with a garage jack.
2. Remove the special tool which was attached when the transmission assembly was removed.
3. Hold the engine assembly with a chain block or similar tool.
4. Place a garage jack against the engine oil pan with a piece of wood in between, jack up the engine so that the weight of the engine is no longer being applied to the engine mount bracket, and then remove the engine mount bracket.

◀E▶ ENGINE ASSEMBLY REMOVAL

After checking that all cables, hoses and harness connectors, etc., are disconnected from the engine, lift the chain block slowly to remove the engine assembly upward from the engine compartment.

INSTALLATION SERVICE POINTS**▶A▶ ENGINE ASSEMBLY INSTALLATION**

Install the engine assembly, checking that the cables, hoses, and harness connectors are not clamped.

**▶B▶ ENGINE MOUNT BRACKET INSTALLATION**

1. Place a garage jack against the engine oil pan with a piece of wood in between, and install the engine mount bracket while adjusting the position of the engine.
2. Support the engine with the garage jack.
3. Remove the chain block and support the engine assembly with the special tool.

GROUP 12

ENGINE LUBRICATION

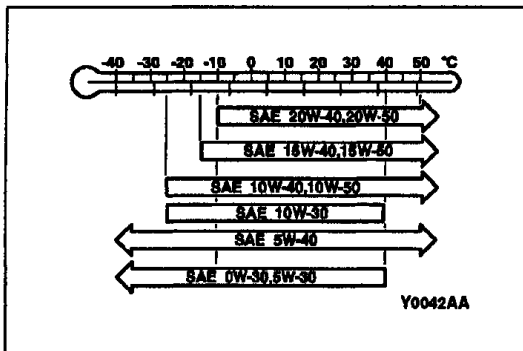
GENERAL

OUTLINE OF CHANGE

- A quality of the petrol engine oil has been changed.
- The following service procedures have been established to correspond to the addition of the F9Q diesel engine. Other service procedures are the same as before.

LUBRICANT <F9Q>

Items	Engine oil	Quantity L
Oil filter	CCMC classification For SERVICE PD2, ACEA classification For SERVICE B2-96 or B3-96	0.14
Total quantity		5.04

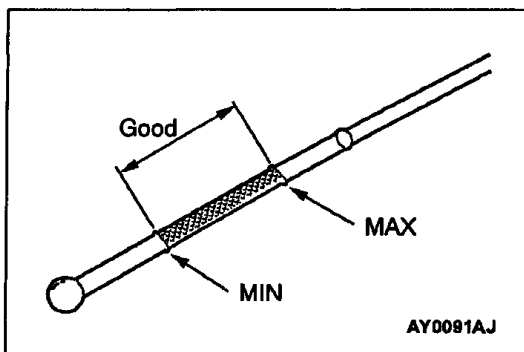


ON-VEHICLE SERVICE

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

ENGINE OIL INSPECTION <F9Q>

1. Pull out the level gauge slowly and check that the oil level is in the illustrated range.
2. Check that the oil is not excessively dirty, that there is no coolant or gasoline mixed in, and that it has sufficient viscosity.



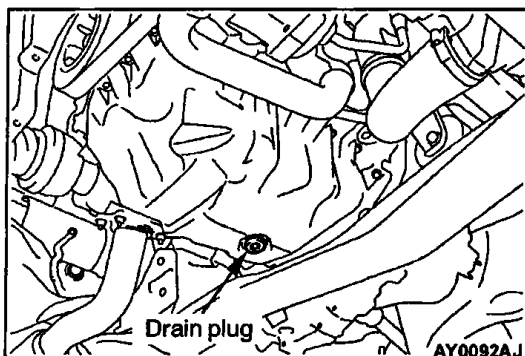
ENGINE OIL REPLACEMENT <F9Q>

1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C to 90°C.
2. Remove the engine oil filler cap.
3. Remove the under cover.
4. Remove the drain plug to drain oil.

Caution

Use care as oil could be hot.

5. Fit the drain plug after oil has been drained completely.



NOTE

Tightening torque: 25 Nm

6. Refill with specified quantity of oil.

Specified Engine Oil:

CCMC classification For SERVICE PD2

ACEA classification For SERVICE B2-96 or B3-96

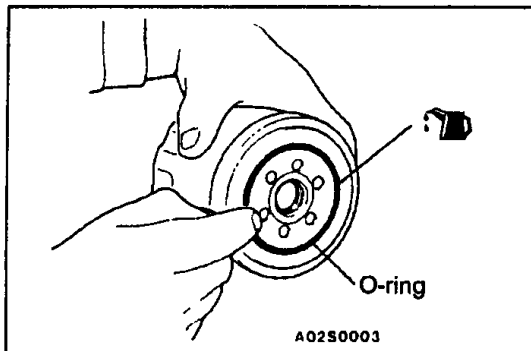
Total quantity (Includes volume inside oil filter):

5.04 L

7. Install the engine oil filler cap.
8. Check oil level.

OIL FILTER REPLACEMENT <F9Q>

1. After removing the engine oil filler cap, remove the engine oil drain plug to drain the engine oil.
2. Use the oil filter wrench to remove the engine oil filter.
3. Clean the cylinder block side mounting surface.



4. Apply a small amount of engine oil to the O-ring of a new oil filter.
5. Use the oil filter wrench to install the engine oil filter.

NOTE

Tightening torque: 10 – 14 Nm

6. Fill with engine oil.
7. Race the engine 2 – 3 times, and check to be sure that no engine oil leaks from installation section of the oil filter.

FUEL

CONTENTS

MULTIPOINT FUEL INJECTION (MPI)	13A
DIESEL FUEL <F9Q>	13E
FUEL SUPPLY	13F
GASOLINE DIRECT INJECTION (GDI)	13J

MULTIPOINT FUEL INJECTION (MPI)

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Outline of Changes	3
GENERAL INFORMATION	3
Self-diagnosis Function	3

General Specifications	3
SERVICE SPECIFICATIONS	3
TROUBLESHOOTING	4

MULTIPOINT FUEL INJECTION (MPI)

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 changed. <Vehicles with A/T>
- An ignition failure sensor has been adopted.
- The oxygen sensor has been changed. (same parts for Germany)

GENERAL INFORMATION

SELF-DIAGNOSIS FUNCTION

Following functions have been added.

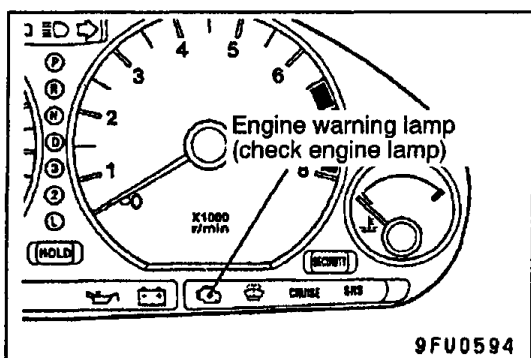
- This engine-ECU records the engine operating condition when the diagnosis code is set.
This data is called "freeze frame" data.
This data can be read by using the MUT-II, are can then be used in simulation tests for troubleshooting.

GENERAL SPECIFICATIONS

Items		Specifications
Engine-ECU <M/T>	Identification model No.	E2T68487
Engine-A/T-ECU <A/T>	Identification model No.	E2T77771

SERVICE SPECIFICATIONS

Items		Standard value
Oxygen sensor output voltage V		0.6 – 1.0
Oxygen sensor heater coil resistance (at 20°C) Ω	front	4.5 – 8.0
	rear	11 – 18



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 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

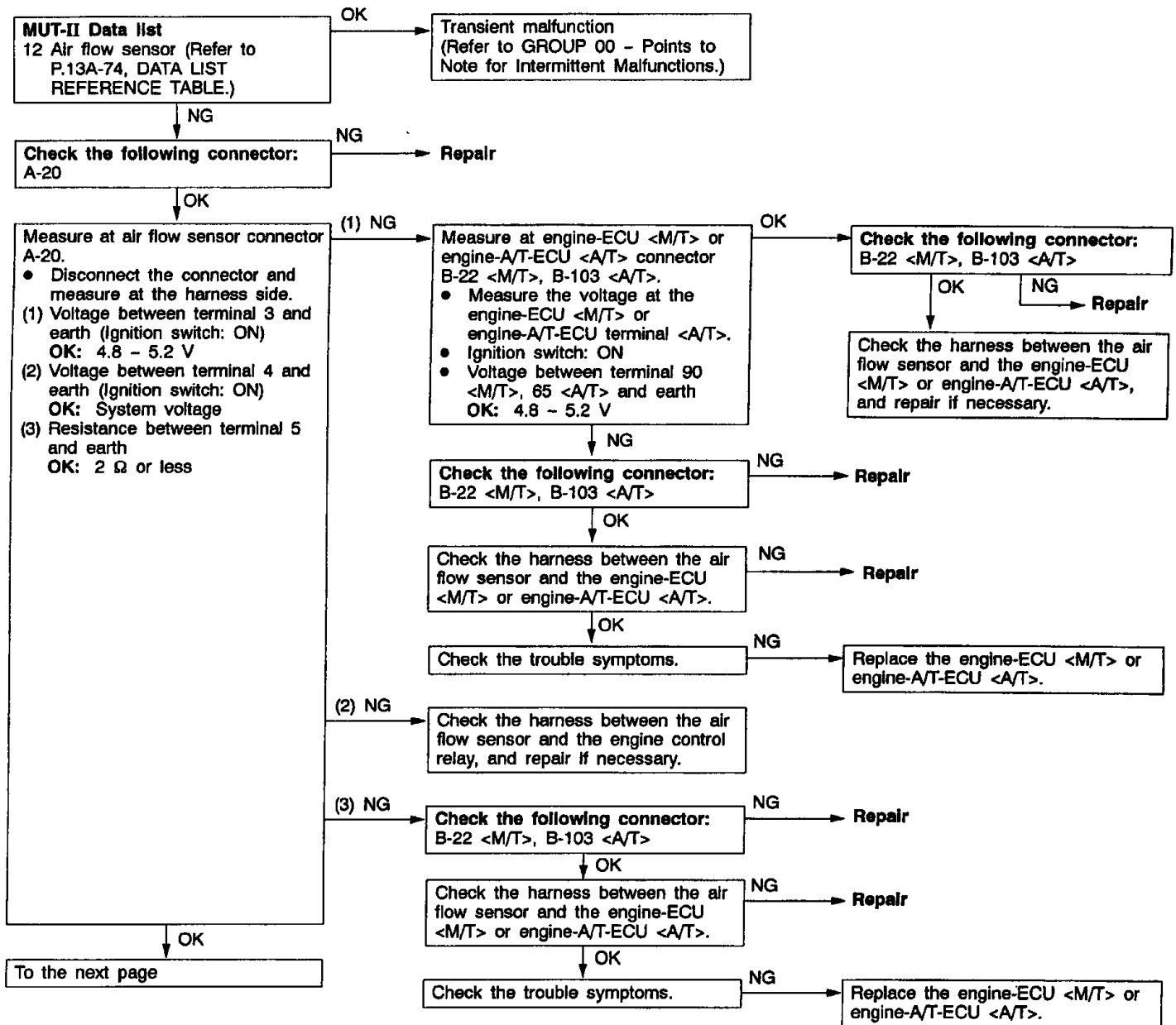
Code No.	Diagnosis item	Reference page
P0100	Air flow sensor system	13A-11
P0105	Barometric pressure sensor system	13A-13
P0110	Intake air temperature sensor system	13A-15
P0115	Engine coolant temperature sensor system	13A-17
P0120	Throttle position sensor system	13A-19
P0125	Feedback system	13A-21
P0130	Oxygen sensor (front) system <sensor 1>	13A-22
P0135	Oxygen sensor heater (front) system <sensor 1>	13A-24
P0136	Oxygen sensor (rear) system <sensor 2>	13A-25
P0141	Oxygen sensor heater (rear) system <sensor 2>	13A-27
P0170	Abnormal fuel system	13A-28
P0201	No. 1 injector system	13A-29
P0202	No. 2 injector system	13A-29
P0203	No. 3 injector system	13A-29
P0204	No. 4 injector system	13A-29
P0300★	Ignition coil (power transistor) system	13A-30
P0301	No. 1 cylinder misfire detected	13A-31
P0302	No. 2 cylinder misfire detected	13A-31
P0303	No. 3 cylinder misfire detected	13A-31
P0304	No. 4 cylinder misfire detected	13A-31
P0325	Detonation sensor system	13A-32
P0335	Crank angle sensor system	13A-32
P0340	Camshaft position sensor system	13A-34
P0403	EGR valve system	13A-36
P0420	Catalyst malfunction	13A-37
P0443	Purge control solenoid valve system	13A-38
P0500	Vehicle speed sensor system	13A-39
P0505	Idle speed control system	13A-39
P0551	Power steering fluid pressure switch system	13A-42
P1610	Immobilizer system	13A-43

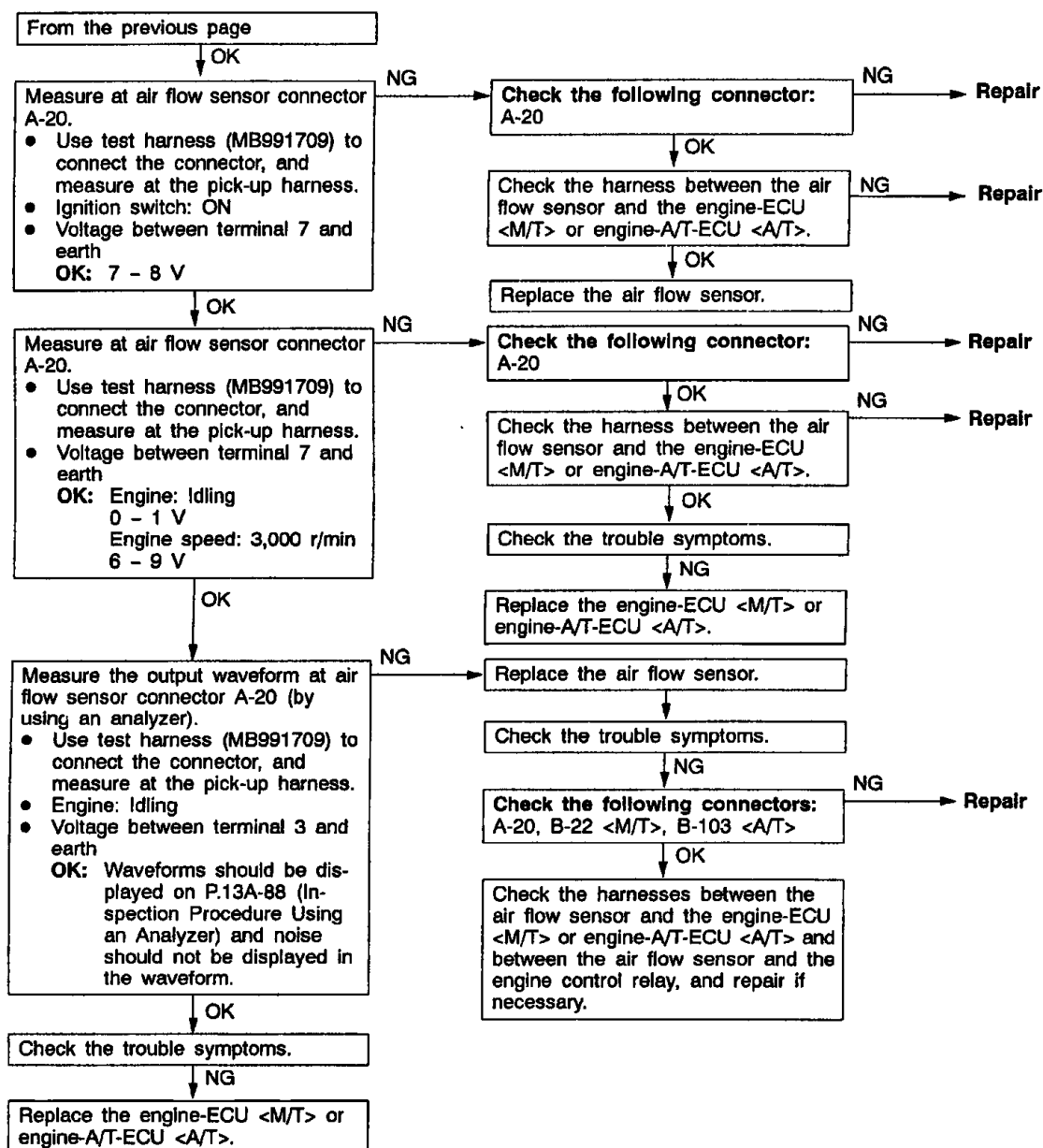
NOTE

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.

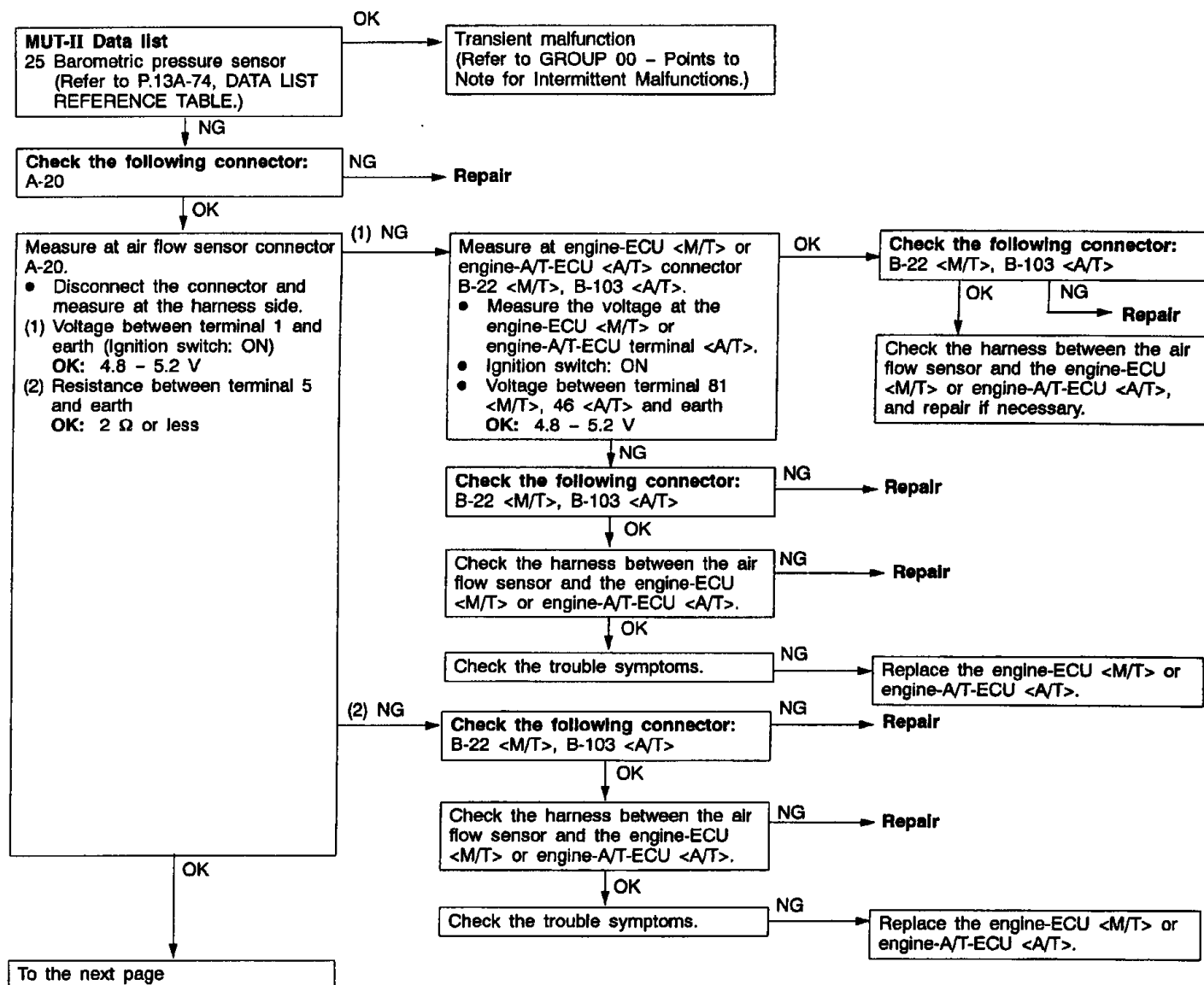
INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

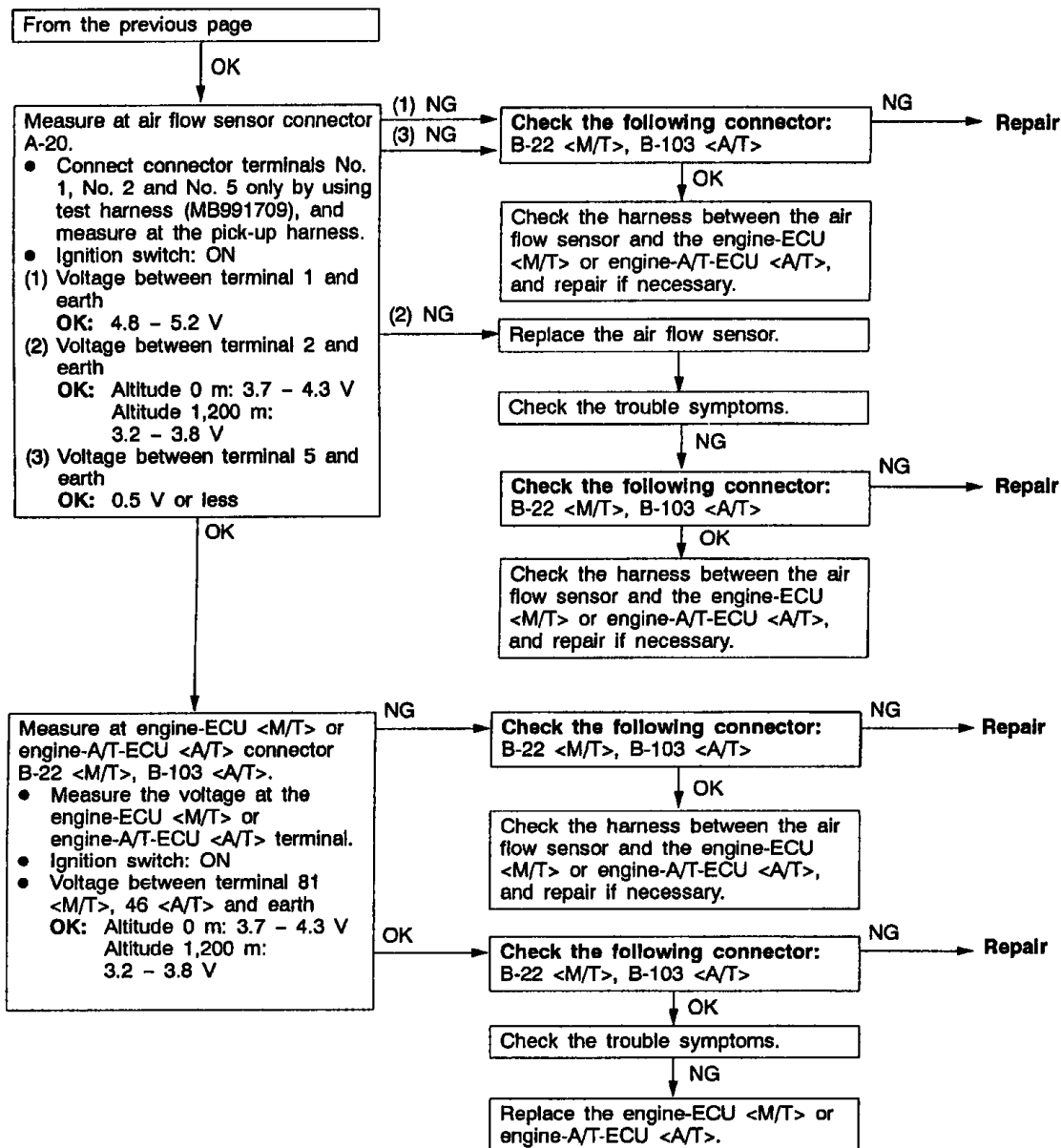
Code No. P0100 Air flow sensor system	Probable cause
Range of Check • Engine speed: 500 r/min or more Set Conditions • The sensor output frequency is 3.3 Hz or less for four seconds.	• Malfunction of air flow sensor • Open or short circuit in air flow sensor circuit or loose connector contact • Malfunction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



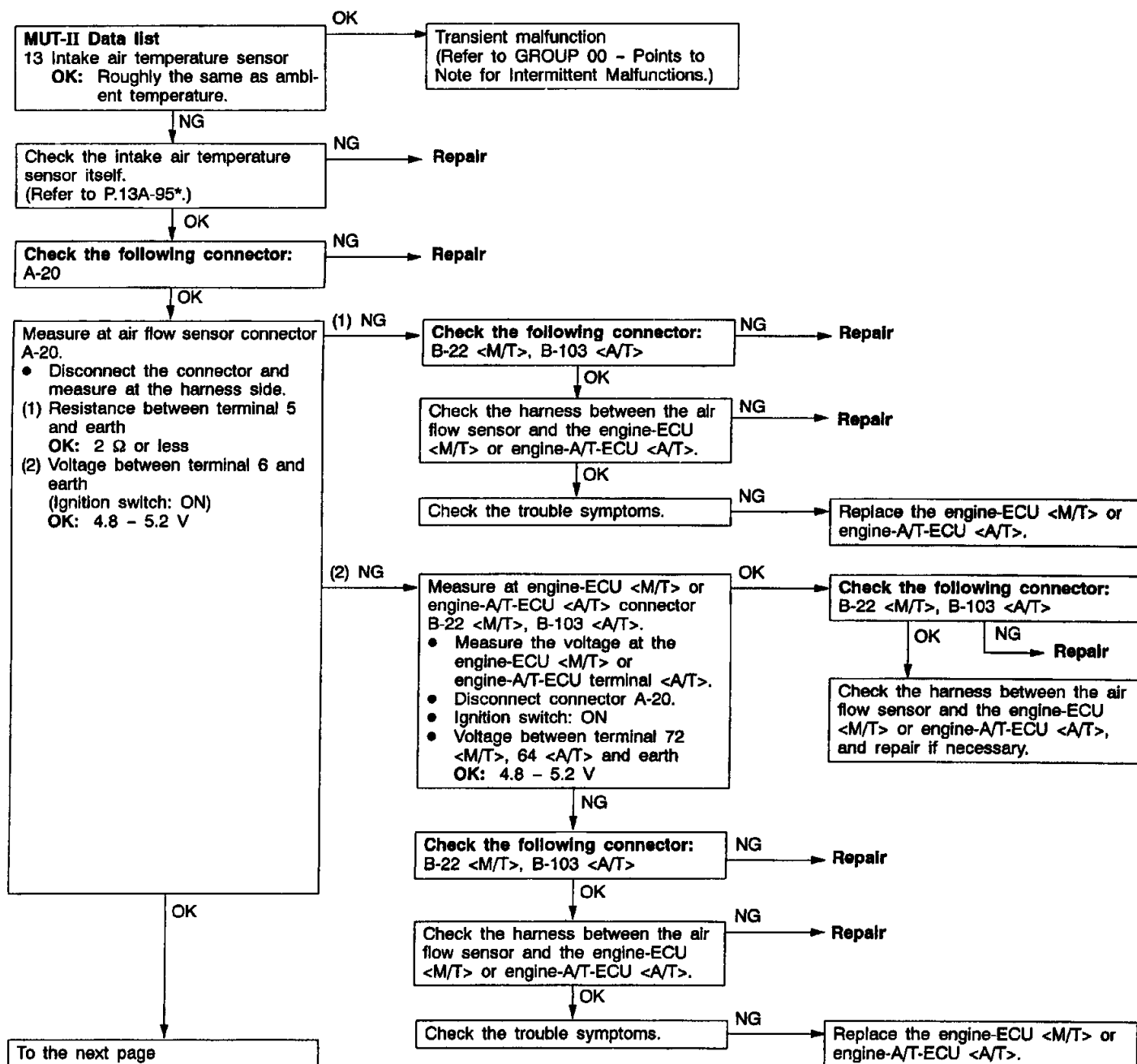


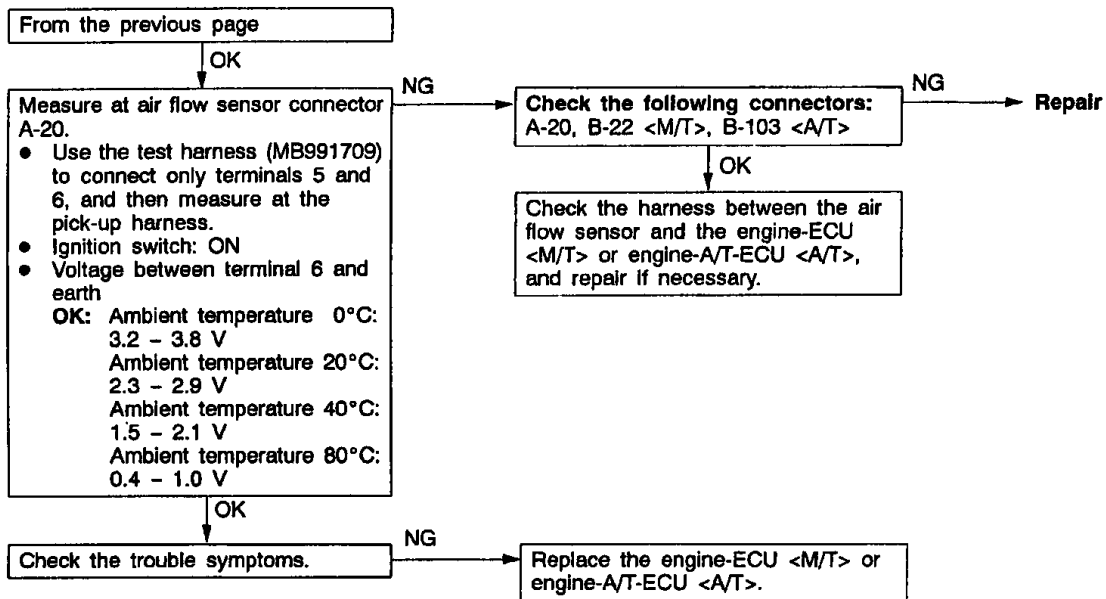
Code No. P0105 Barometric pressure sensor system	Probable cause
Range of Check - Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. - Battery voltage: 8 V or more Set Conditions - The sensor output voltage is 4.5 V or more for four seconds (equivalent 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>





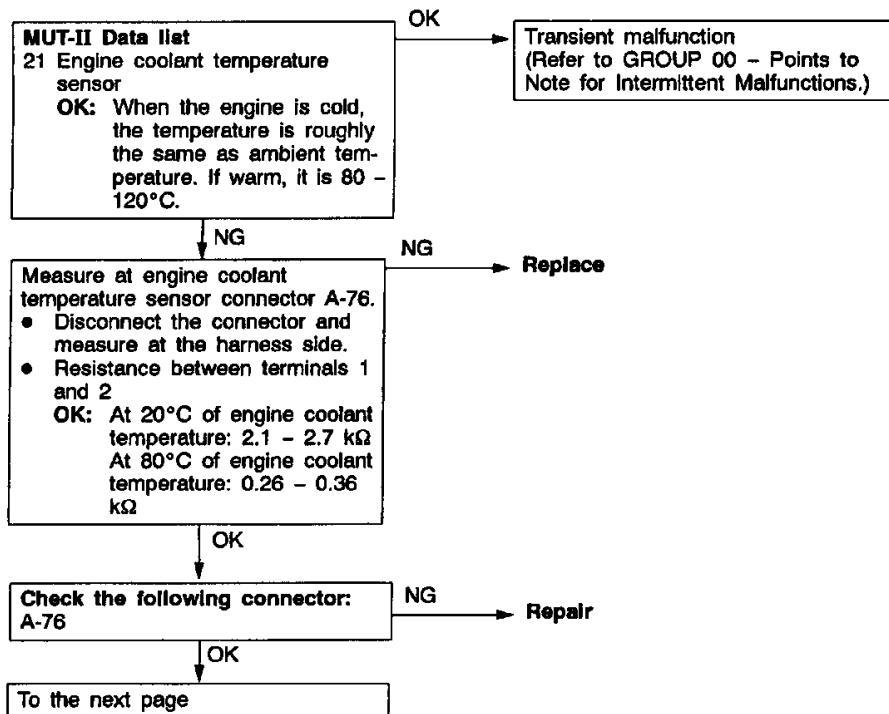
Code No. P0110 Intake air temperature sensor system	Probable cause
Range of Check - Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. Set Conditions - The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of intake air 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>

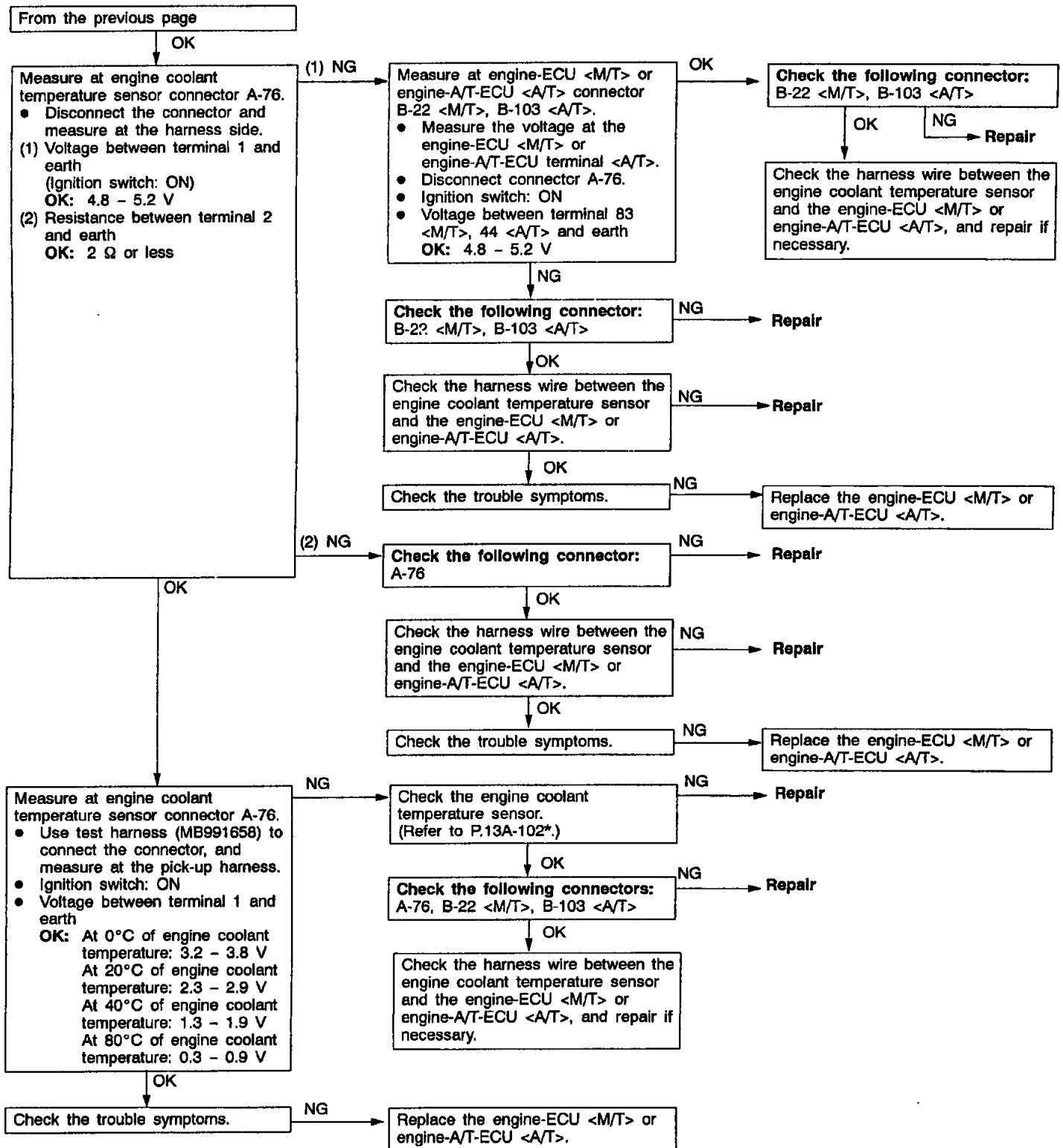


**NOTE:**

*: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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 or lower of engine coolant temperature) or • The sensor output voltage is 0.1 V or less for four seconds (equivalent to 140°C or higher 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.	

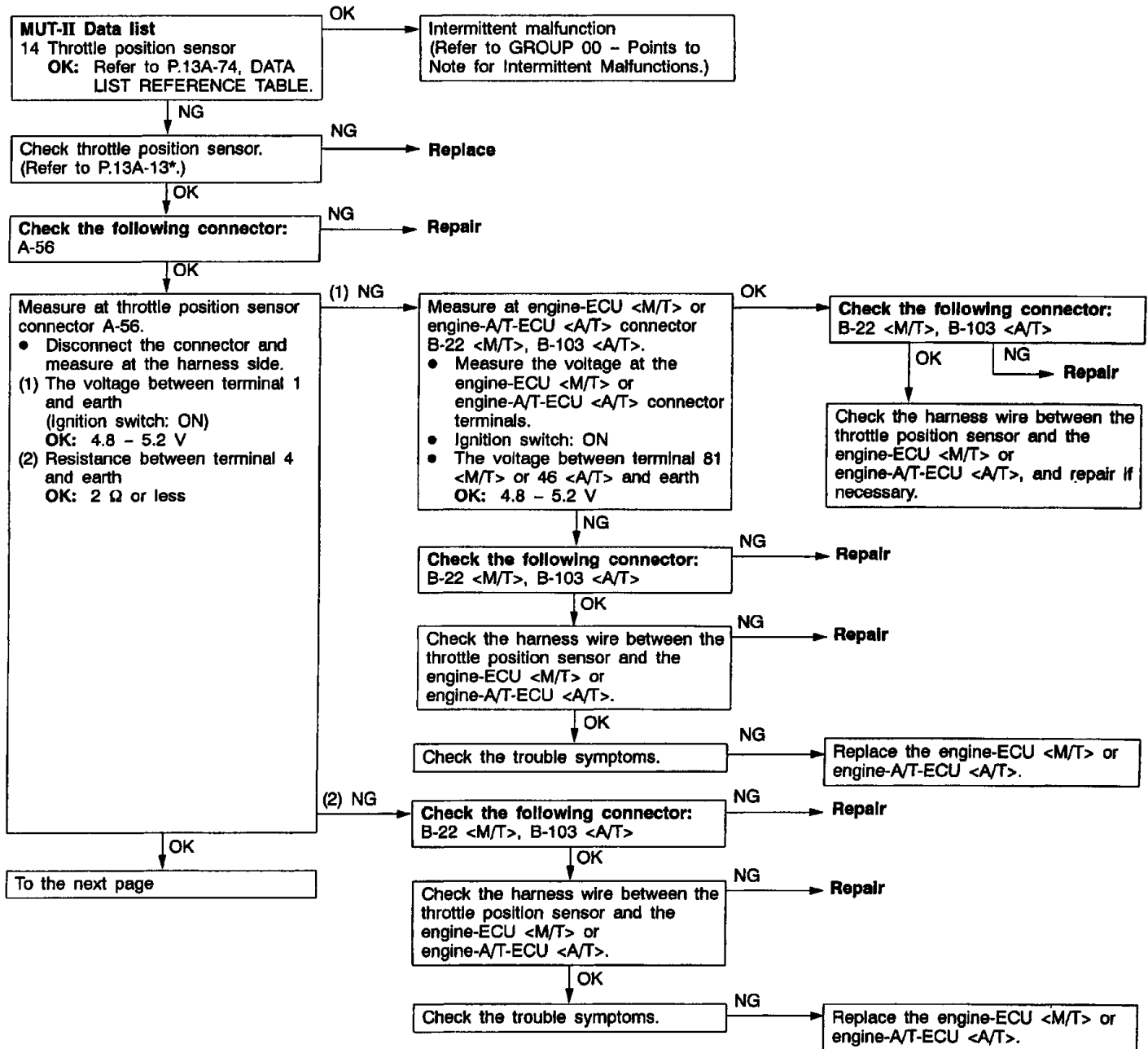




NOTE:

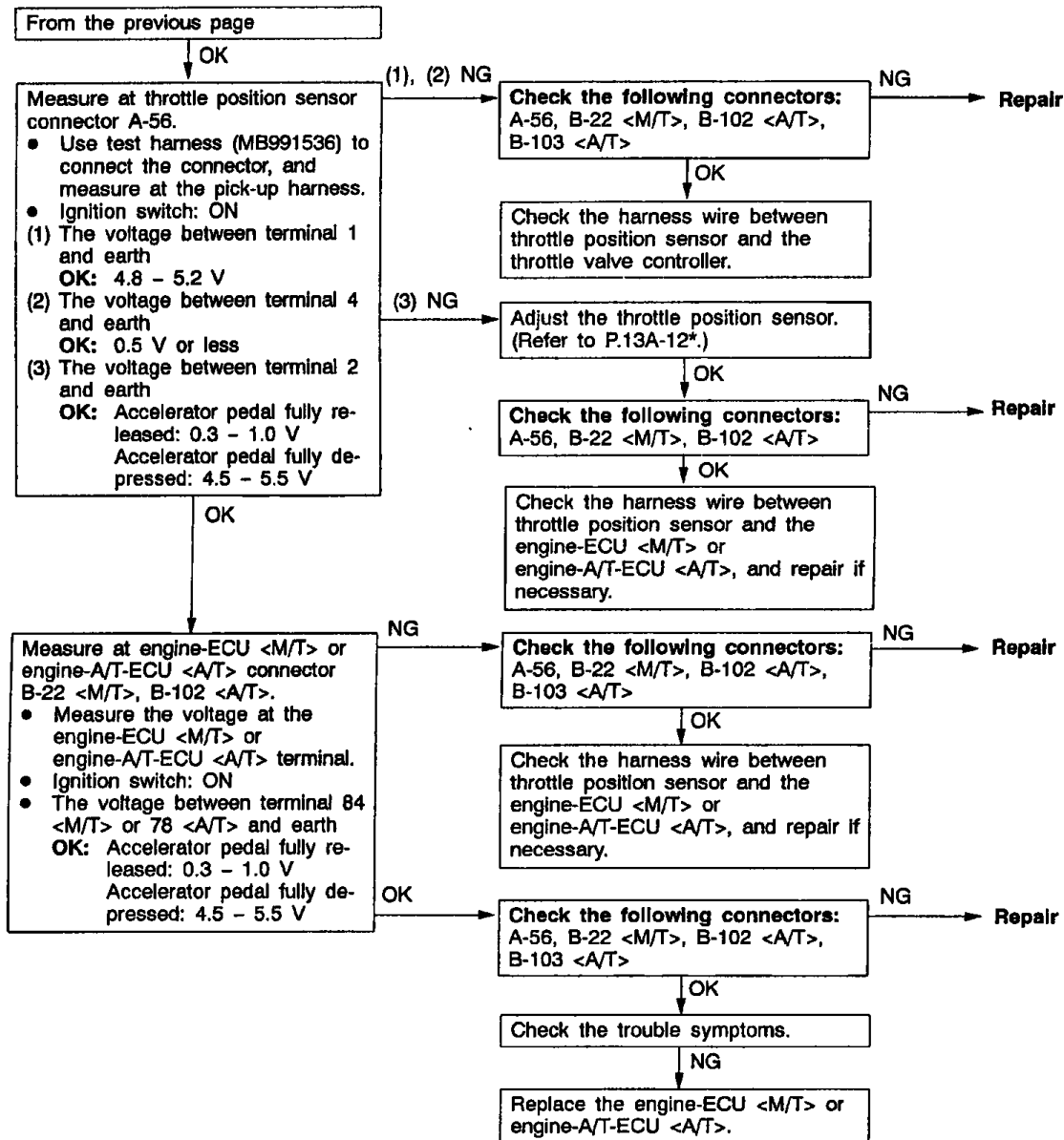
*: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No. 0120 Throttle position sensor (2nd channel) system	Probable cause
The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. Range of Check ● Ignition switch: ON ● The throttle position sensor (1st channel) 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 (1st channel) and throttle position sensor (2nd channel) 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

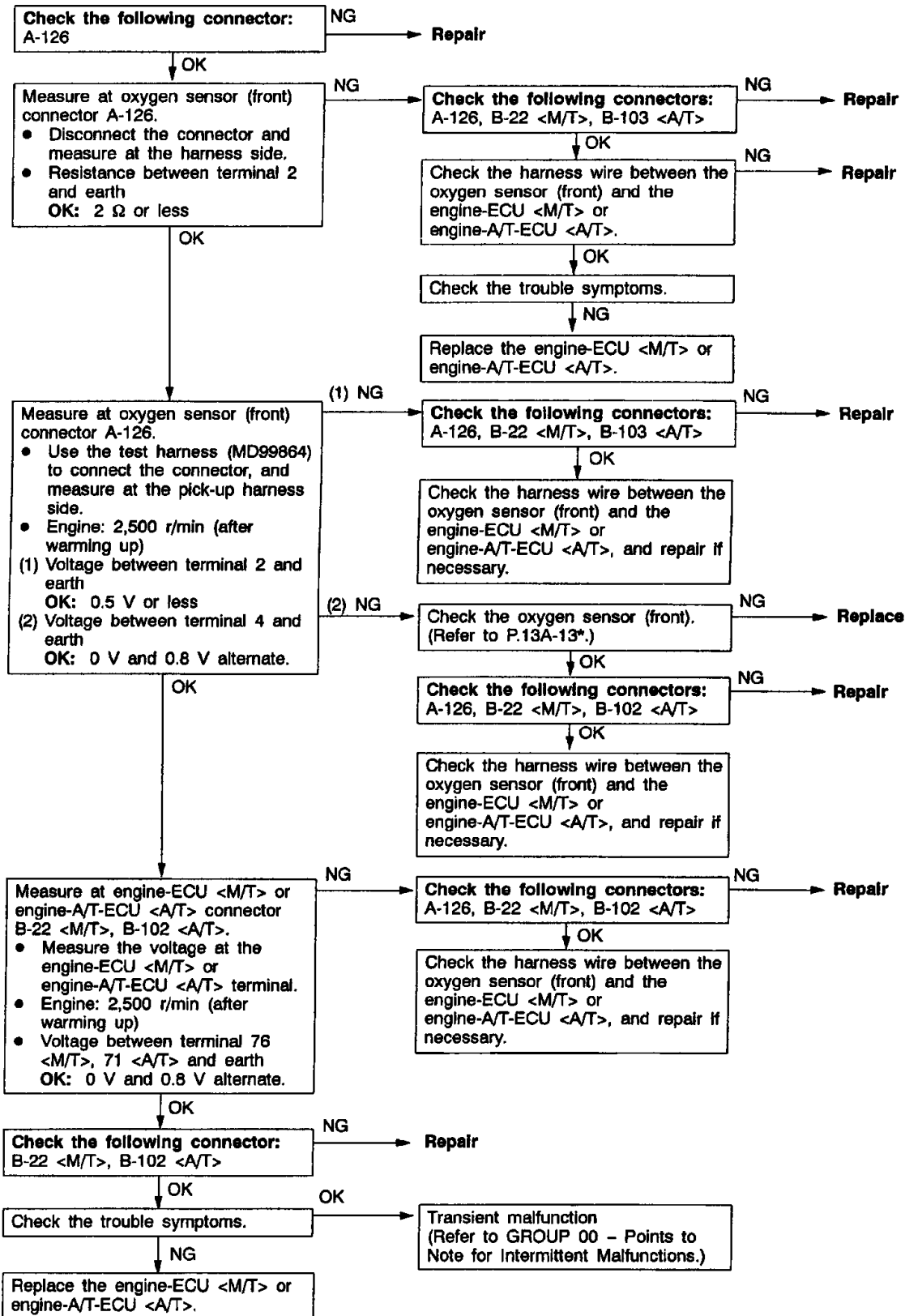
*: Refer to the 2000 CARISIMA Workshop Manual (Pub. No. PWDE9502-D).



NOTE

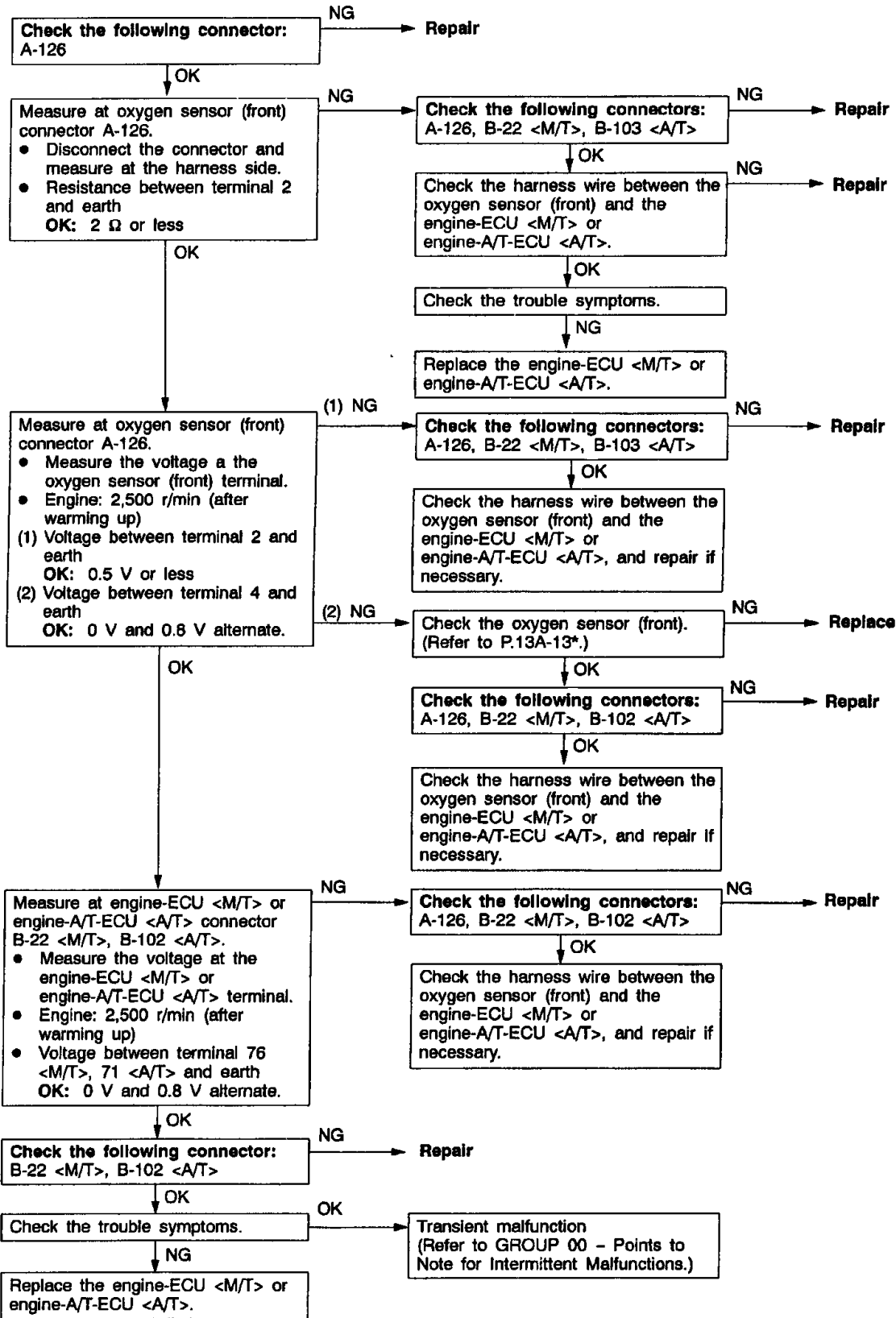
*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

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 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

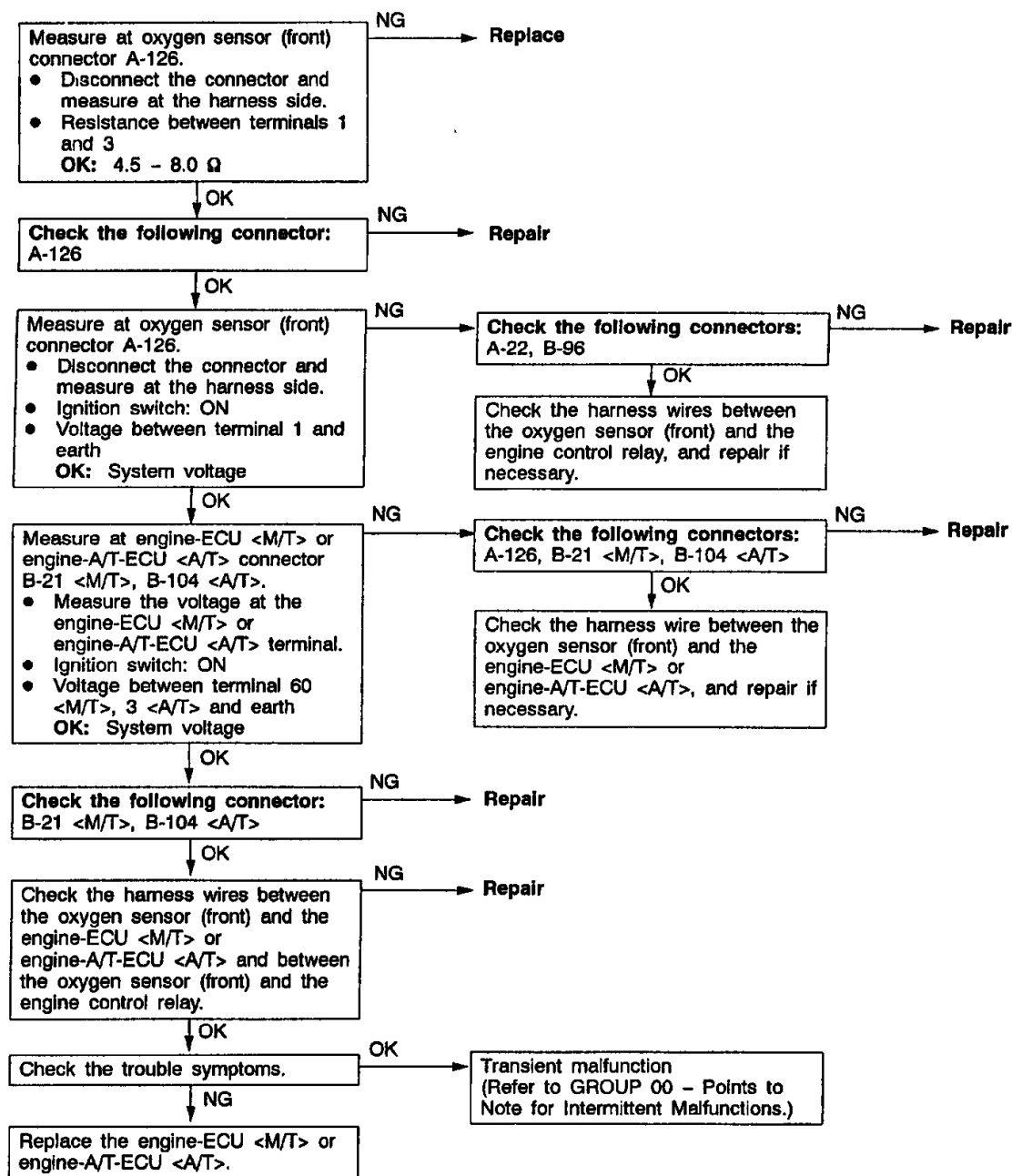
Code No. P0130 Oxygen sensor (front) system <sensor 1>	Probable cause
Range of Check • Three minutes have been passed since the engine has been started. • The engine coolant temperature is approx. 80°C or more. • Engine speed is 1,200 r/min or more • Driving on a level surface at constant speed. Set 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 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.	



NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

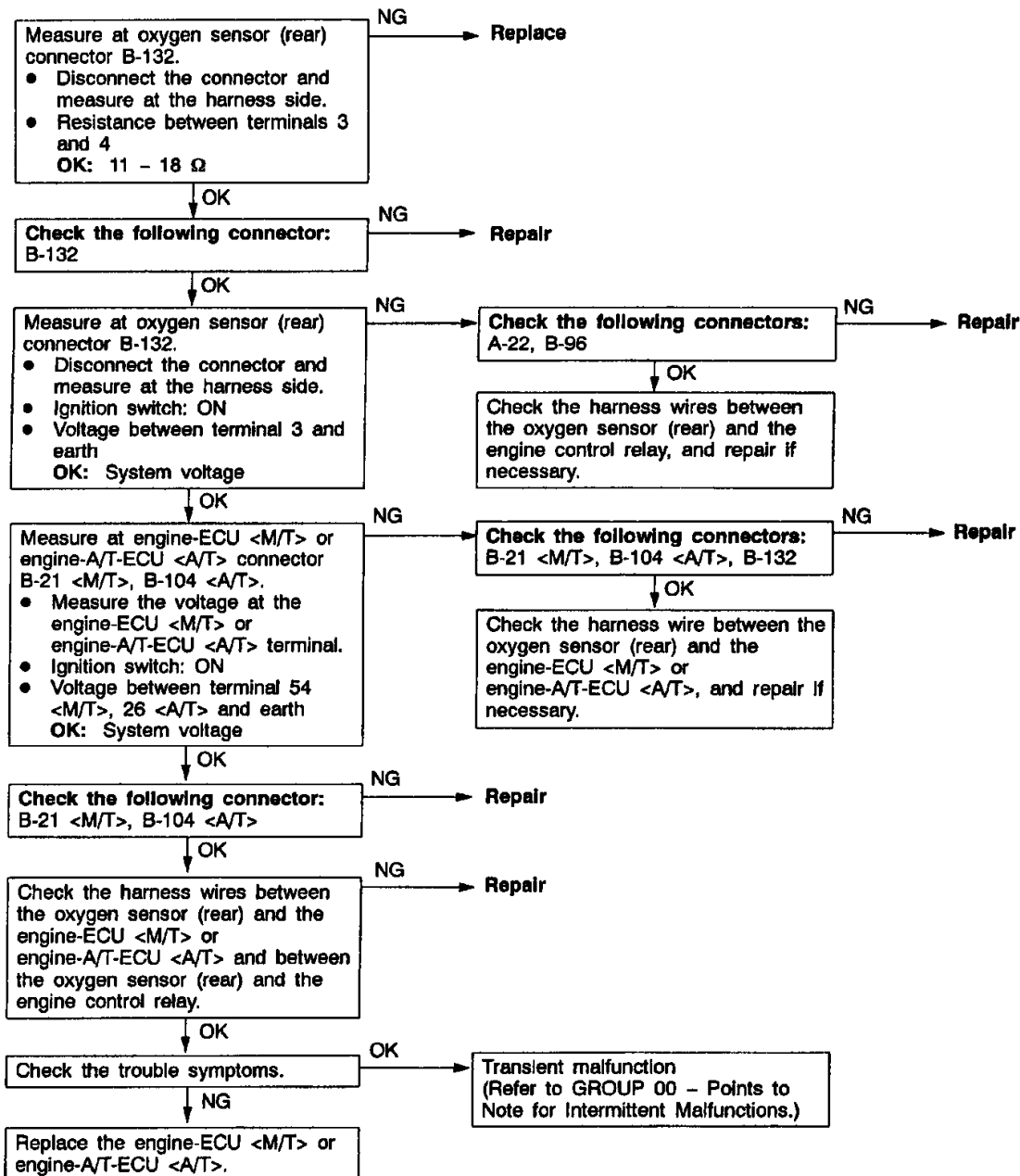
Code No. P0135 Oxygen sensor heater (front) system <sensor 1>	Probable cause
Range of Check - The engine coolant temperature is approx. 20°C or more. - The oxygen sensor heater (front) remains on. - The engine speed is 50 r/min or more. - Battery voltage is 11 - 16 V. Set Conditions - The current, which 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>



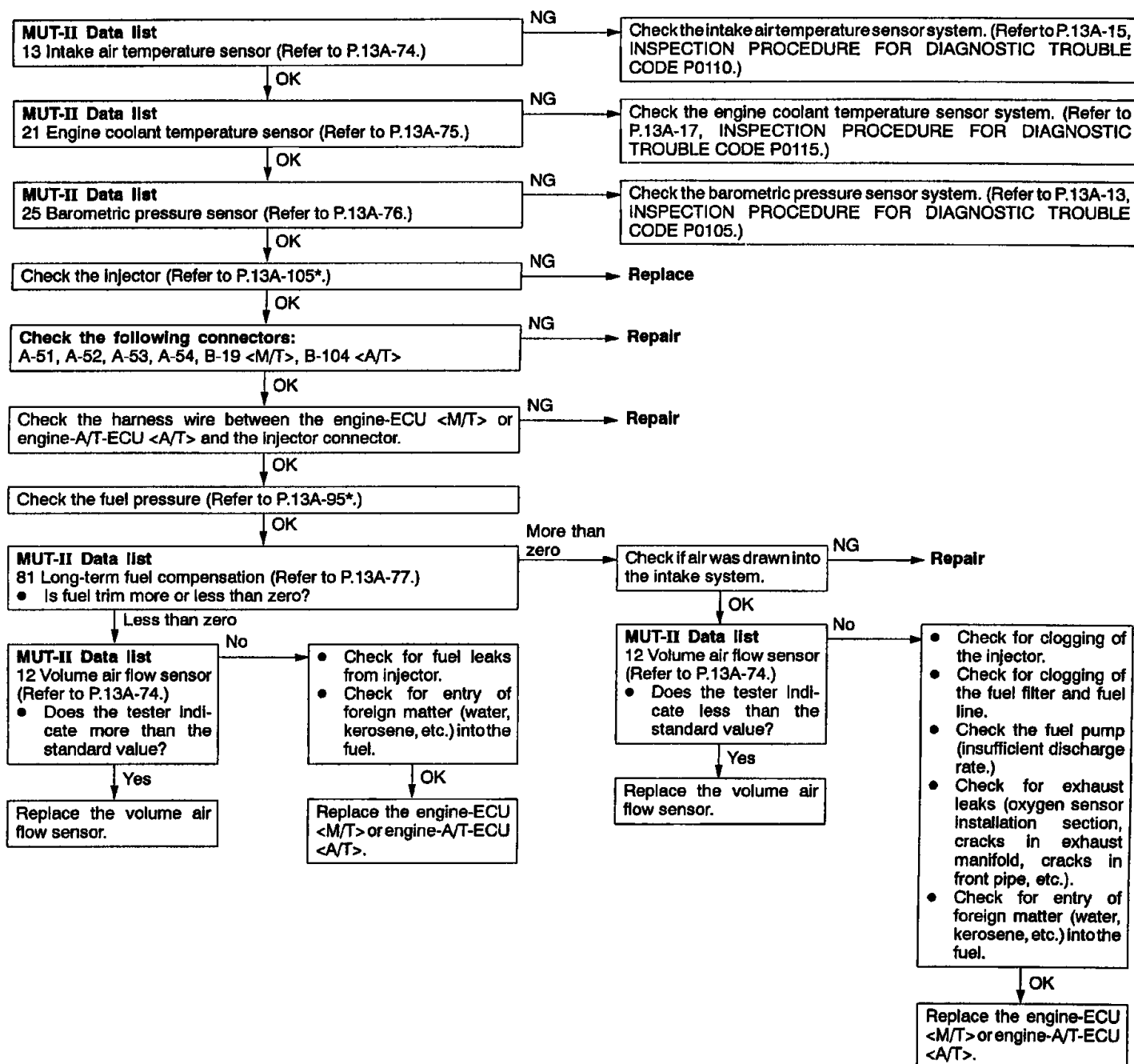
Code No. P0136 Oxygen sensor (rear) system <sensor 2>	Probable cause
Range of Check • Three minutes have been passed since the engine has been started. • The engine coolant temperature is approx. 80°C or more. • Engine speed is 1,200 r/min or more • Driving on a level surface at constant speed. Set Conditions • 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>



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>



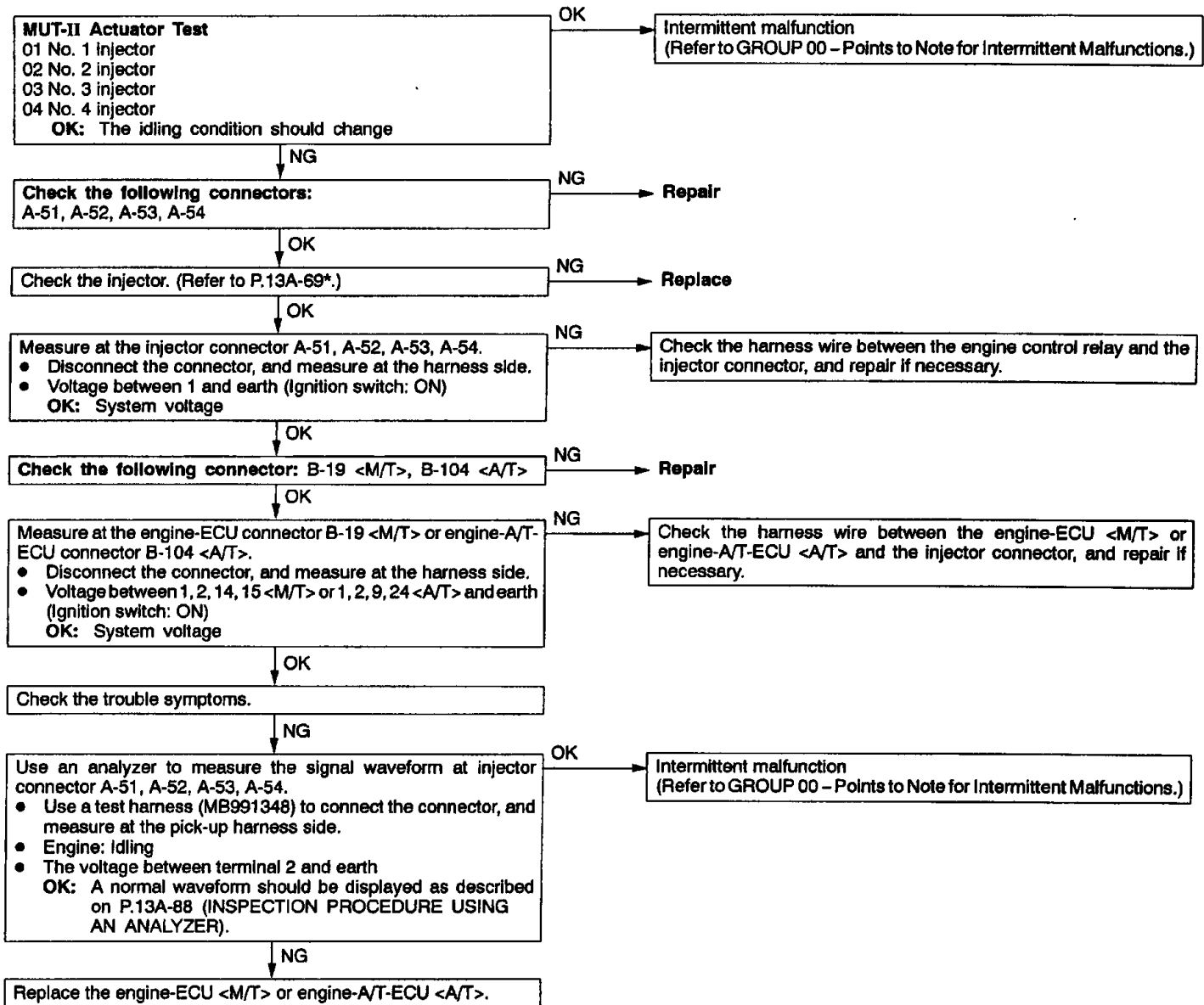
Code No. P0170 Abnormal fuel system	Probable cause
Range of Check • Engine: Being learning the air-fuel ratio Set Conditions • Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or • Ten seconds or more have been passed while the fuel injection amount 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:

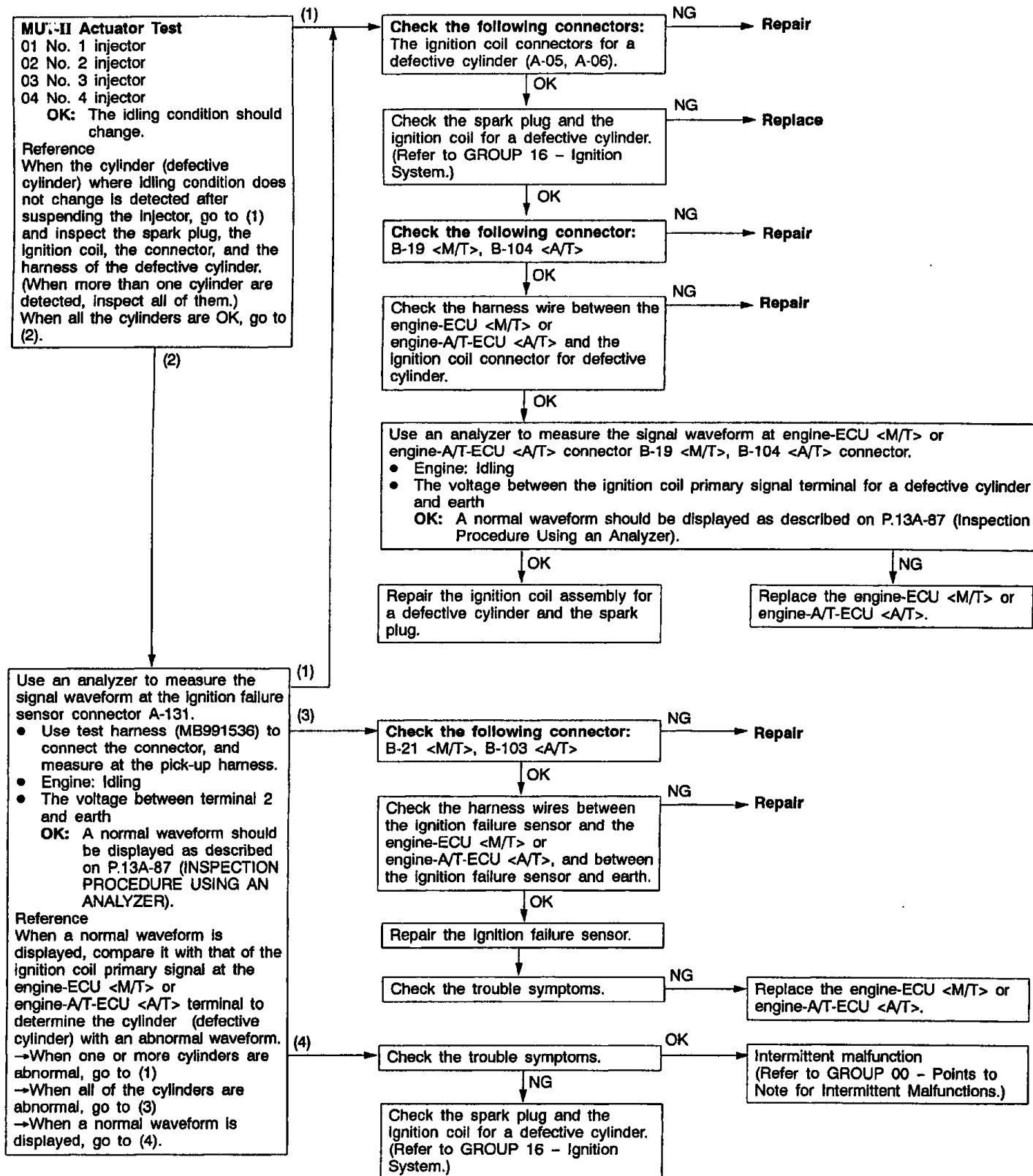
*: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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>

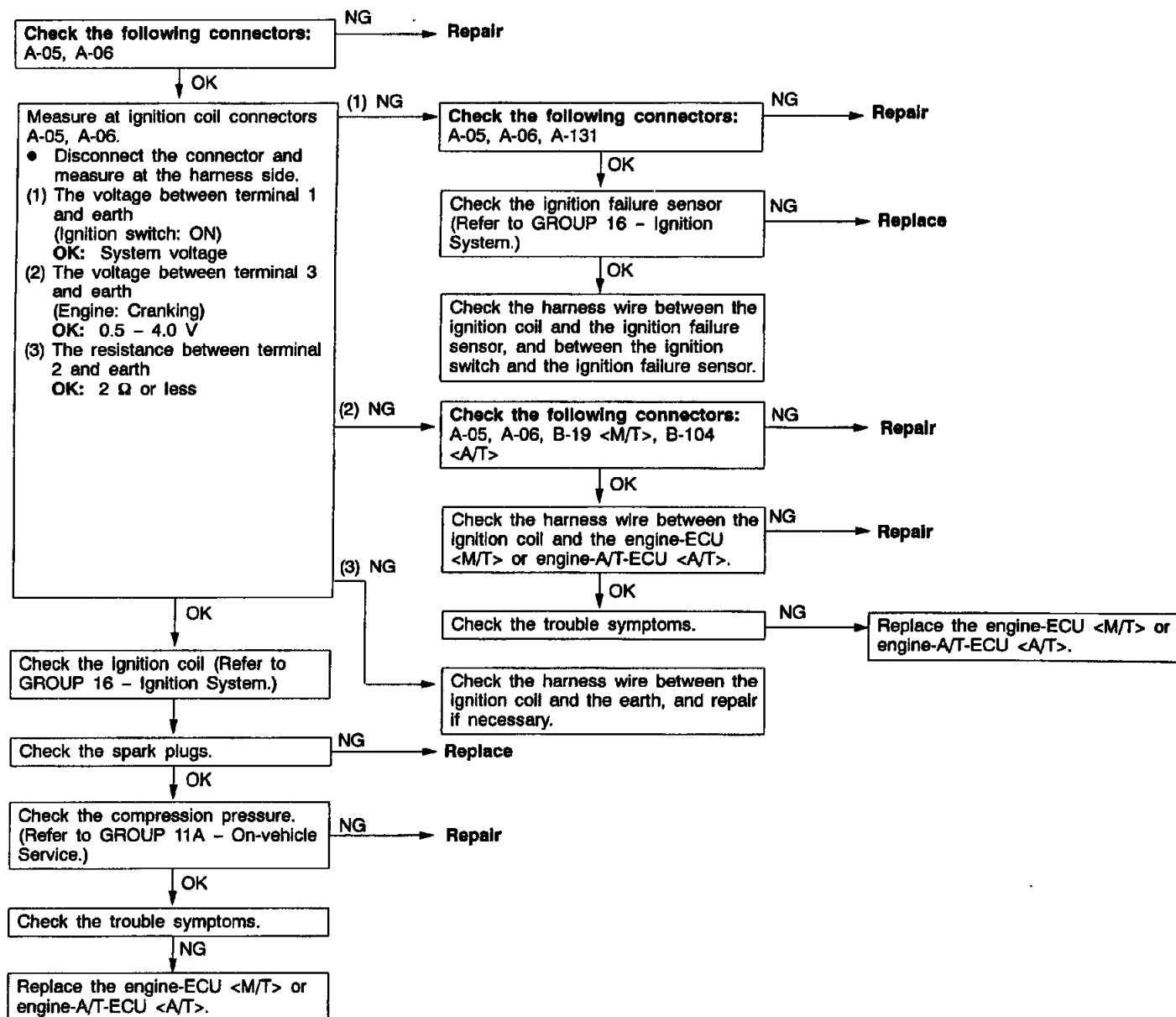
**NOTE:**

*: Refer to the '98 CARISMA (except GDI) Workshop Manual (Pub. No. PWDE9502-B).

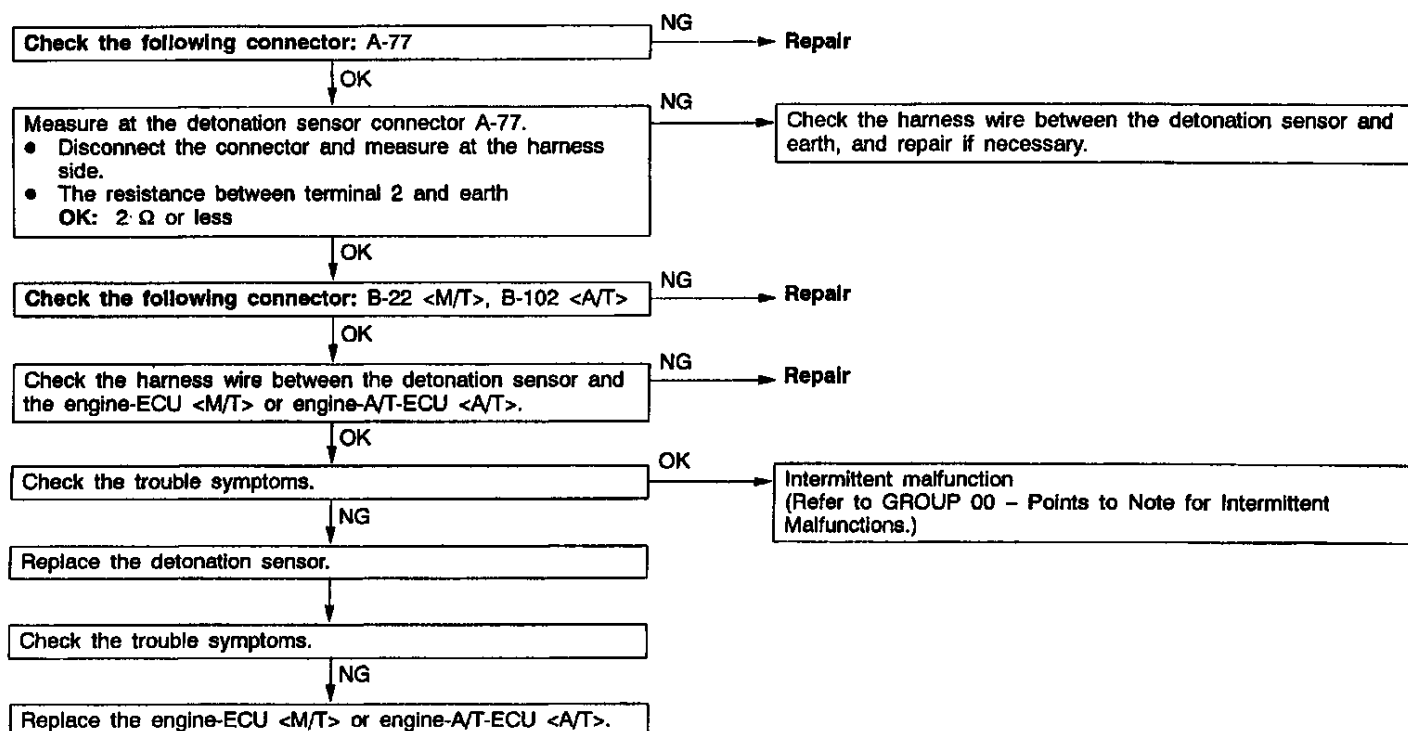
Code No. P0300 Ignition coil (power transistor) system	Probable cause
Range of Check • Engine speed is approx. 50 – 4,000 r/min. • Engine is not cranking. Set Conditions • The ignition failure sensor does not send a signal about a certain cylinder for four seconds.	• Malfunction of the ignition coil • 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>



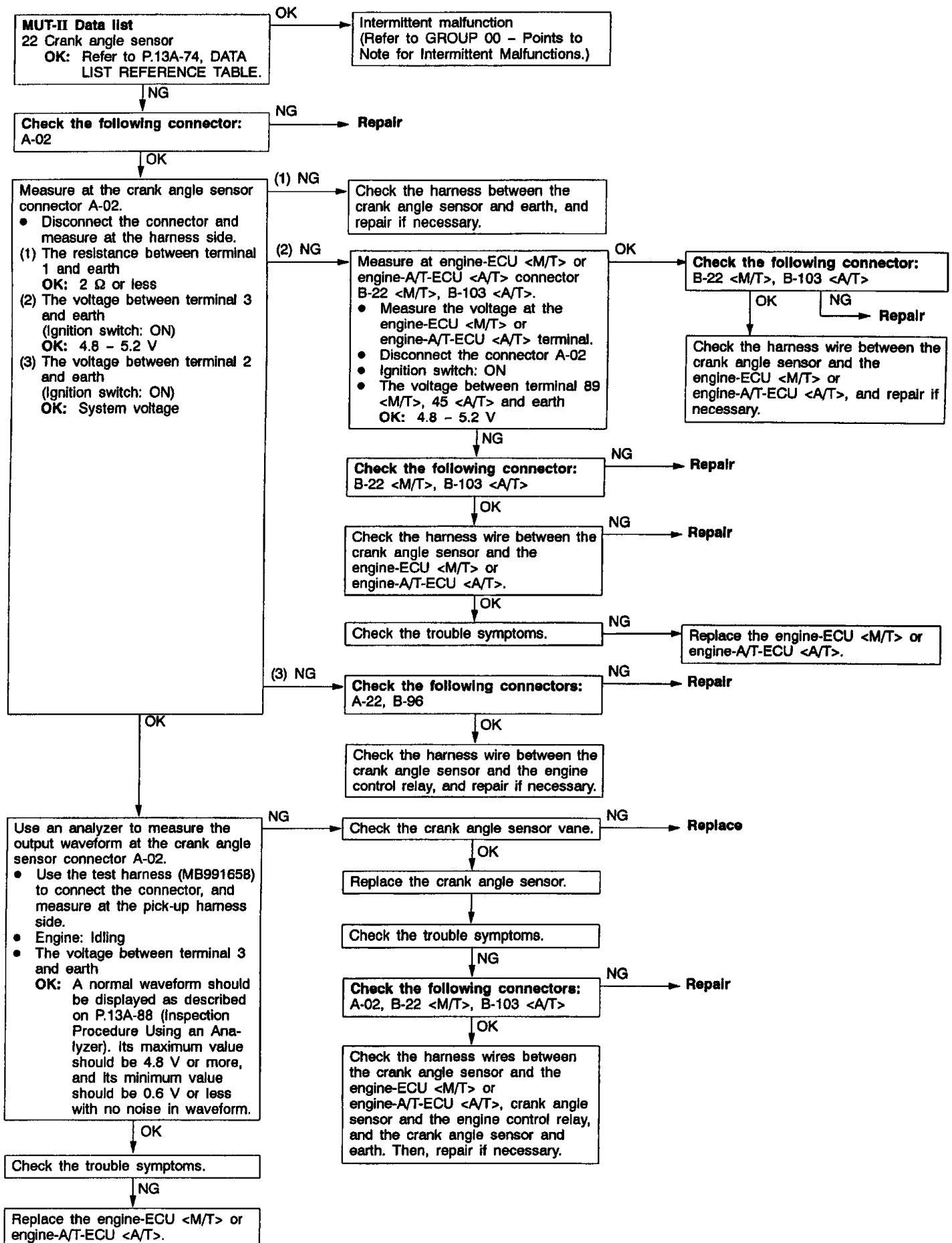
Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected	Probable cause
Range of Check - The engine speed is 500 – 4,500 r/min. - While the engine is running except deceleration 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>



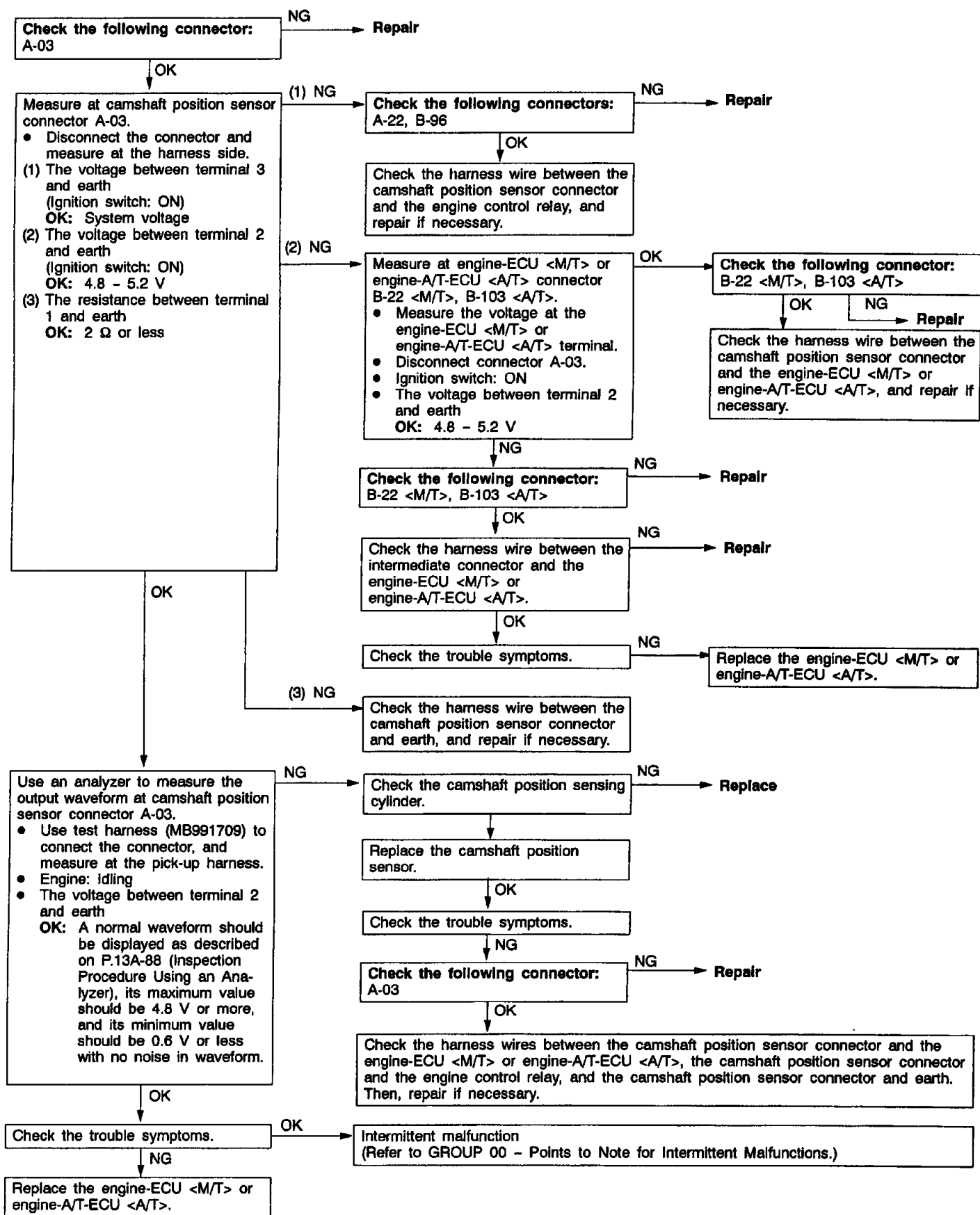
Code No. P0325 Detonation sensor system	Probable cause
Range of Check • Engine: Two seconds after the engine has been started Set Conditions • Changes in sensor output voltage (detonation sensor peak voltage per 1/2 crankshaft rotation) in 200 consecutive cycles are 0.06 V or less.	• Malfunction of the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



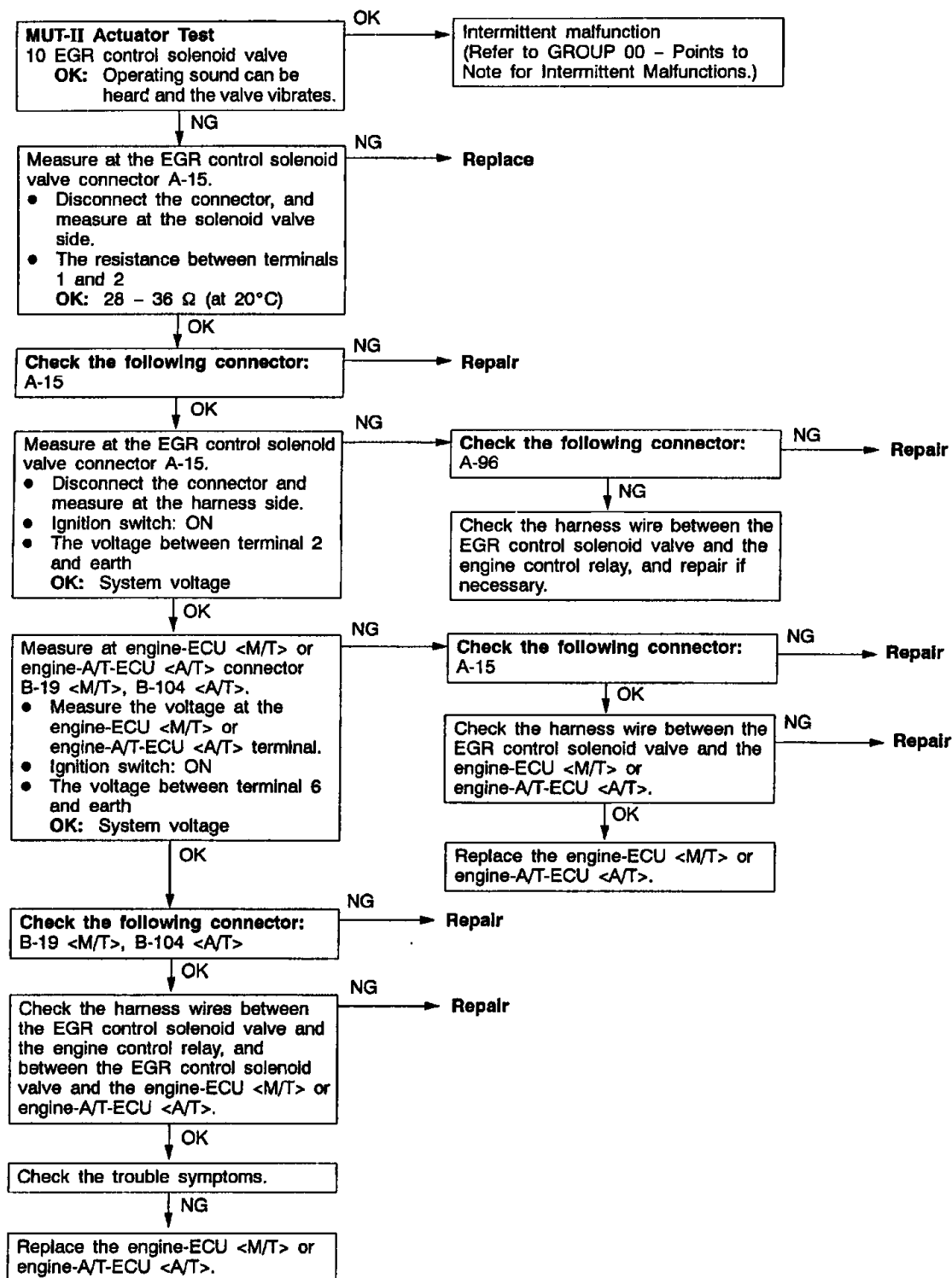
Code No. P0335 Crank angle sensor system	Probable cause
Range of Check • Engine is cranking Set Conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input).	• Malfunction of the crank angle sensor. • Open or short circuit in the crank angle sensor circuit or loose connector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



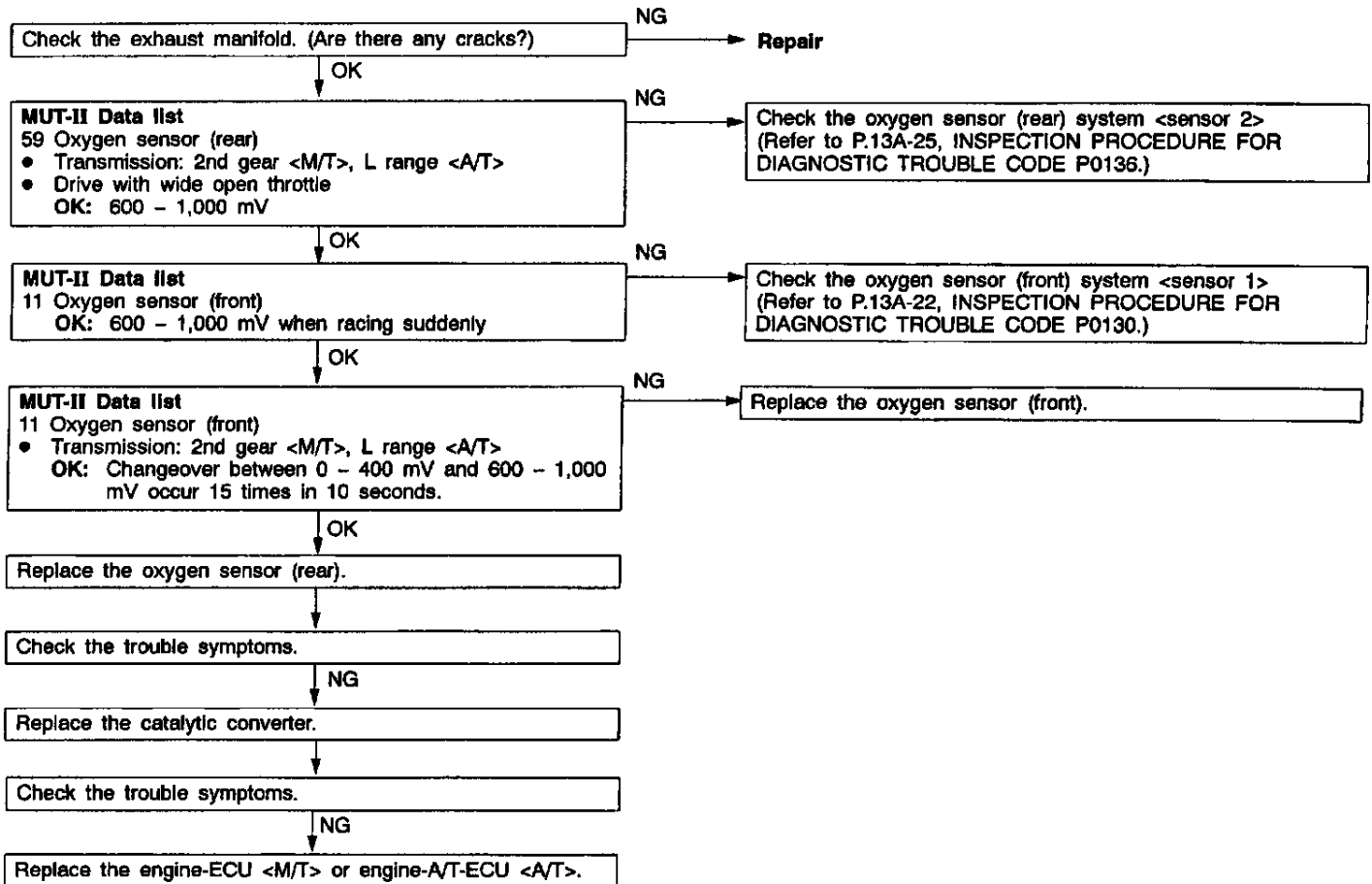
Code No. P0340 Camshaft position sensor system	Probable cause
Range of Check • Ignition switch: ON • Engine speed: 50 r/min or more Set Conditions • The sensor output voltage does not change for 4 seconds (no pulse signal input).	• Malfunction of the camshaft position sensor • Open or short circuit in the camshaft position sensor circuit or loose connector contact. • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T>



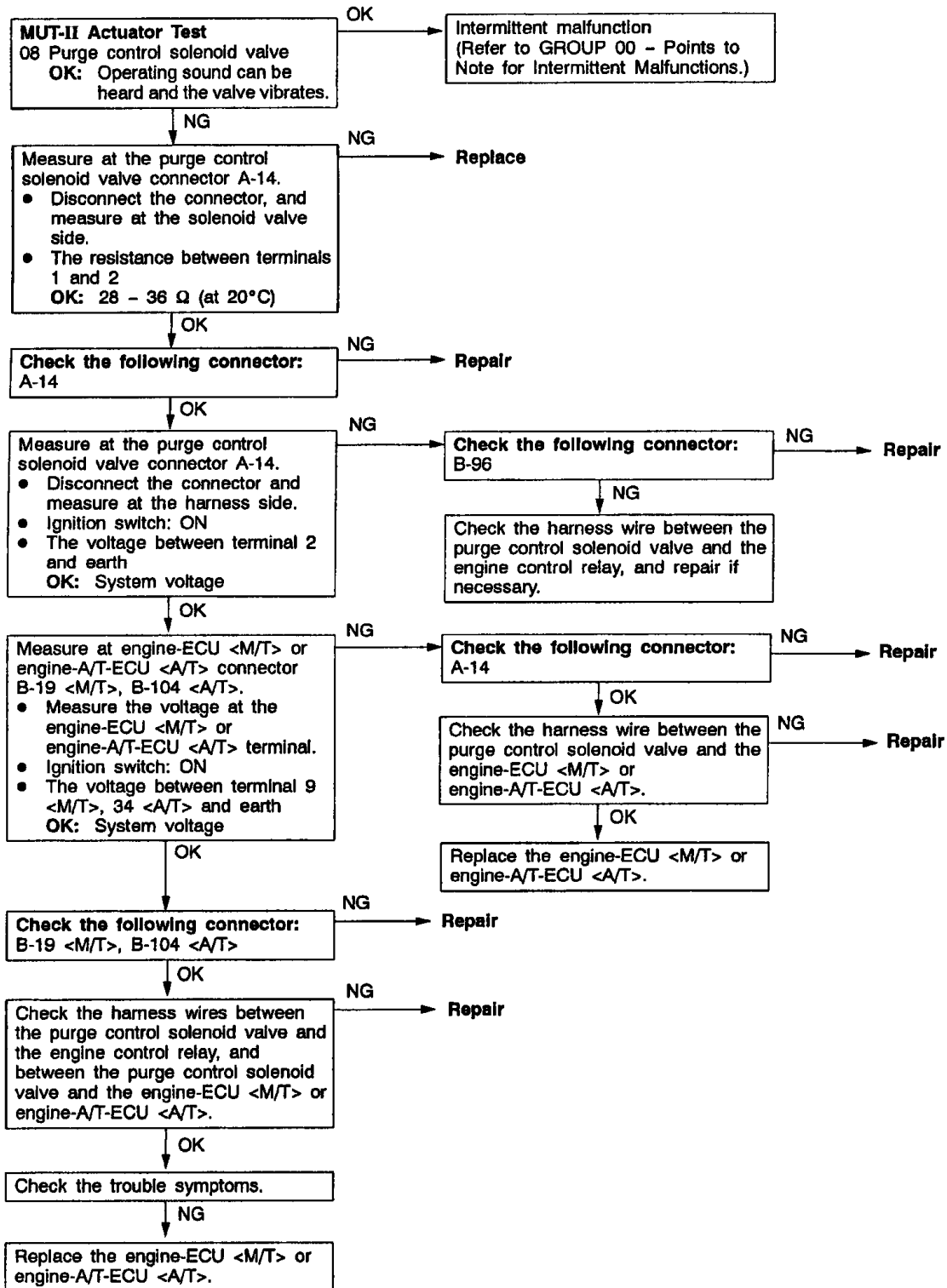
Code No. P0403 EGR control solenoid valve system	Probable cause
Range of Check - Ignition switch: ON - Battery voltage is 10 V or more. Set Conditions - The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off.	- Malfunction 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>



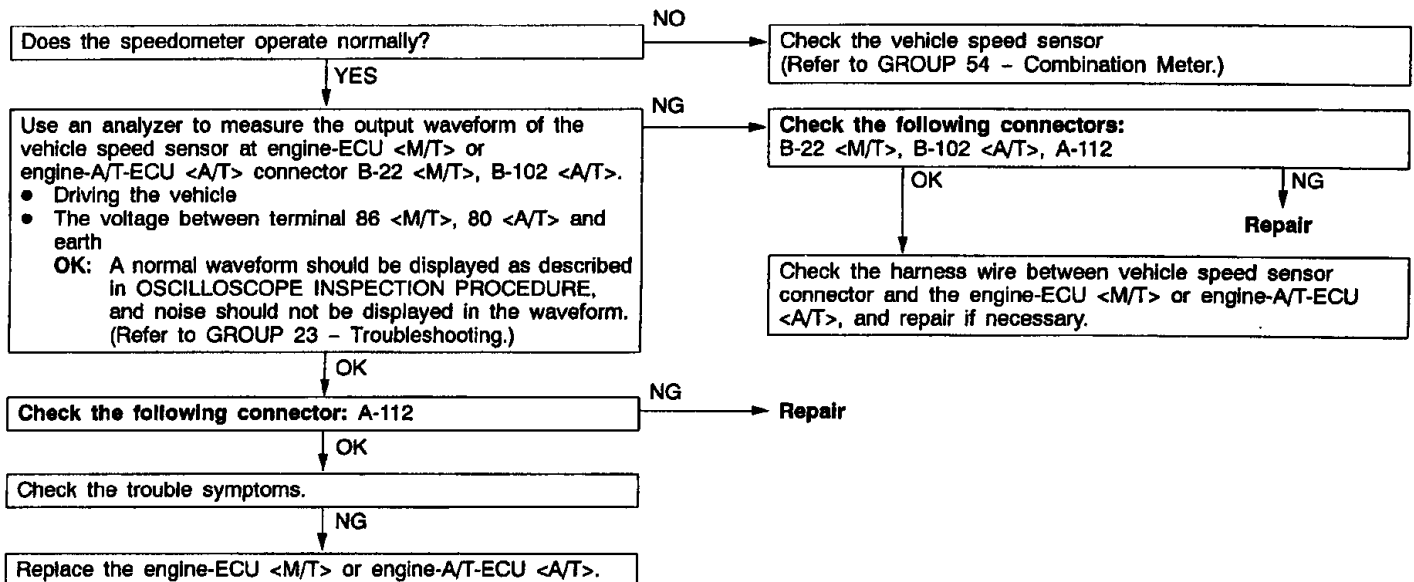
Code No. P0420 Catalyst malfunction	Probable cause
Range of Check • The engine speed is 3,000 r/min or less. • During driving • During air/fuel ratio feedback control Set Conditions • The ratio between the oxygen sensor (rear) and the oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds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



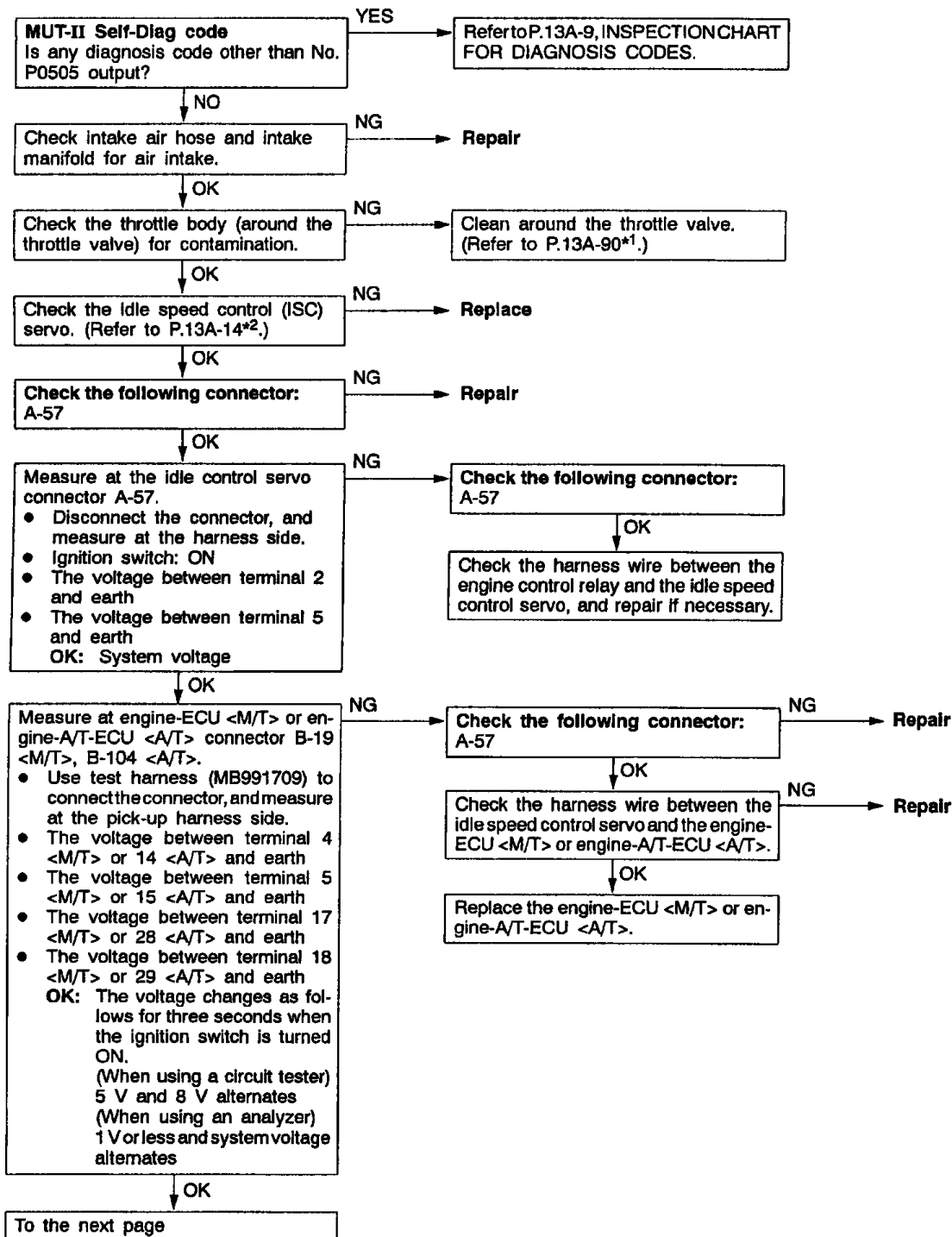
Code No. P0443 Purge control solenoid valve system	Probable cause
Range of Check • Ignition switch: ON • Battery voltage is 10 V or more. Set Conditions • The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off.	• Malfunction 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>

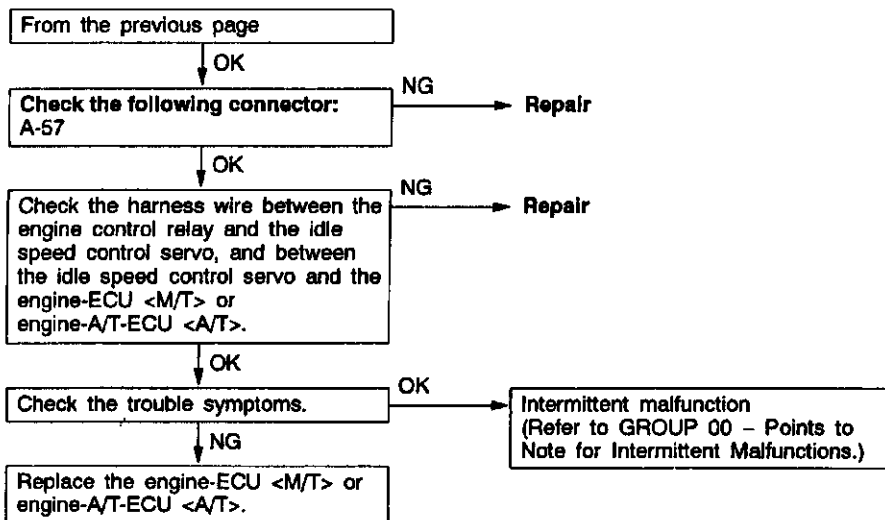


Code No. P0500 Vehicle speed sensor system	Probable cause
Range of Check - Engine: Two seconds after the engine was started - Idle switch: OFF - Engine speed: 2,500 r/min or more - During high engine load Set Conditions - The sensor output voltage does not change for 2 seconds (no pulse signal input).	- Malfunction of the vehicle speed sensor - Open or short circuit in the vehicle speed sensor circuit or loose connector contact - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/C-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. - Barometric pressure is 76 kPa or higher. - 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. - Volumetric efficiency is 40 % or lower. - Barometric pressure is 76 kPa or higher. - 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/C-ECU <A/T>

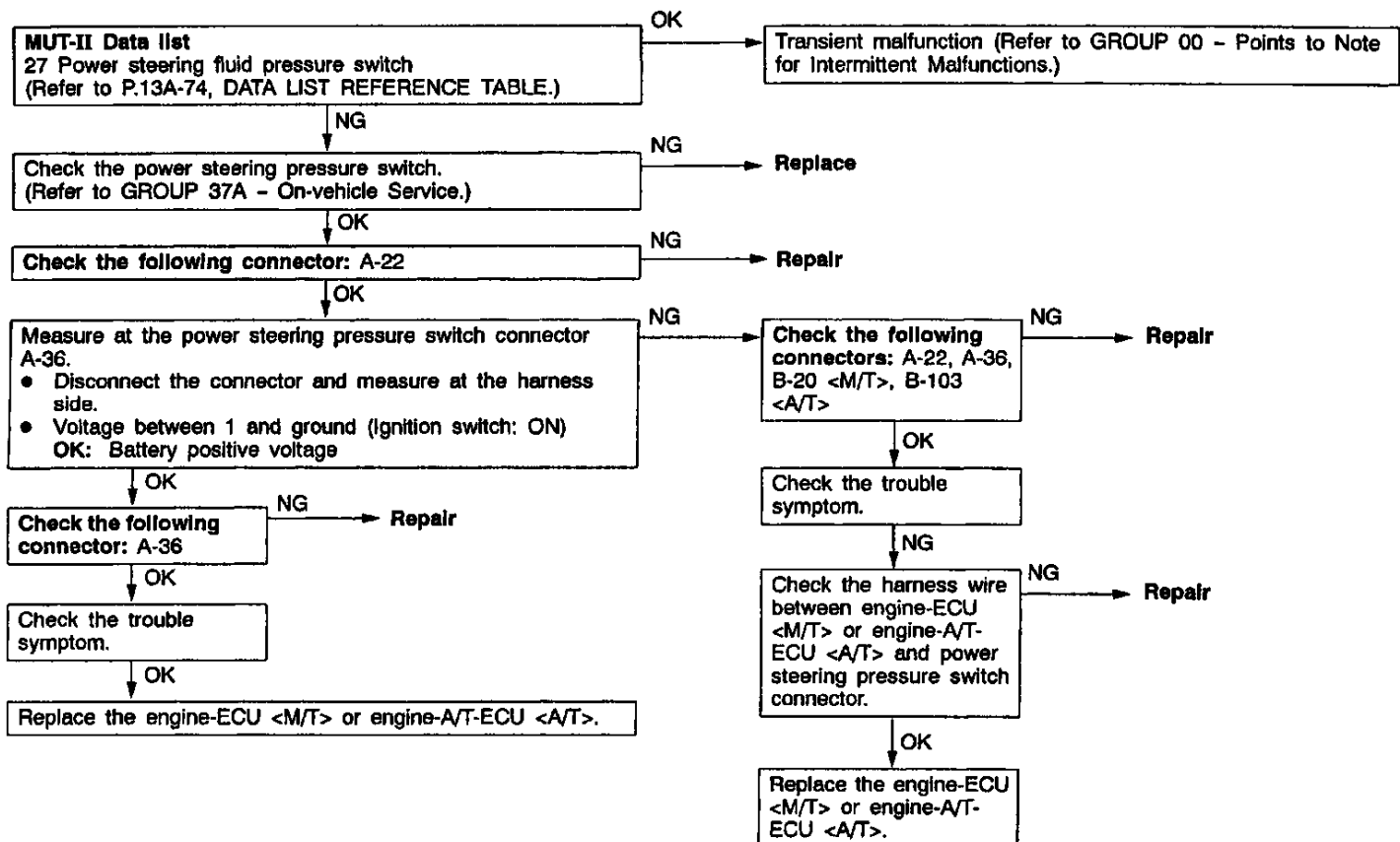


**NOTE:**

*1: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

*2: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

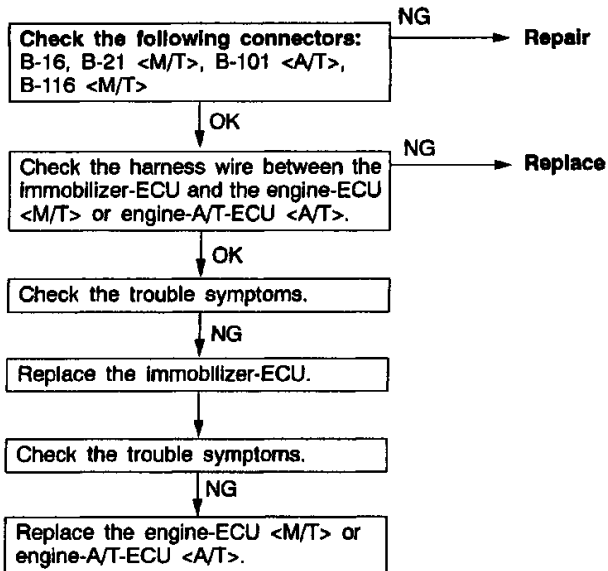
Code No. P0551 Power Steering fluid Pressure Switch System	Probable cause
Check Area - Intake air temperature is -10°C or higher. - Barometric pressure is 76 kPa or higher. - Engine coolant temperature is 30°C or more. - Repeat the *1 drive and *2 stop ten times or more. *1: Engine speed is 2,500 r/min 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 the engine-ECU <M/T> - Malfunction of the engine-A/C-ECU <A/T>



Cord 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.



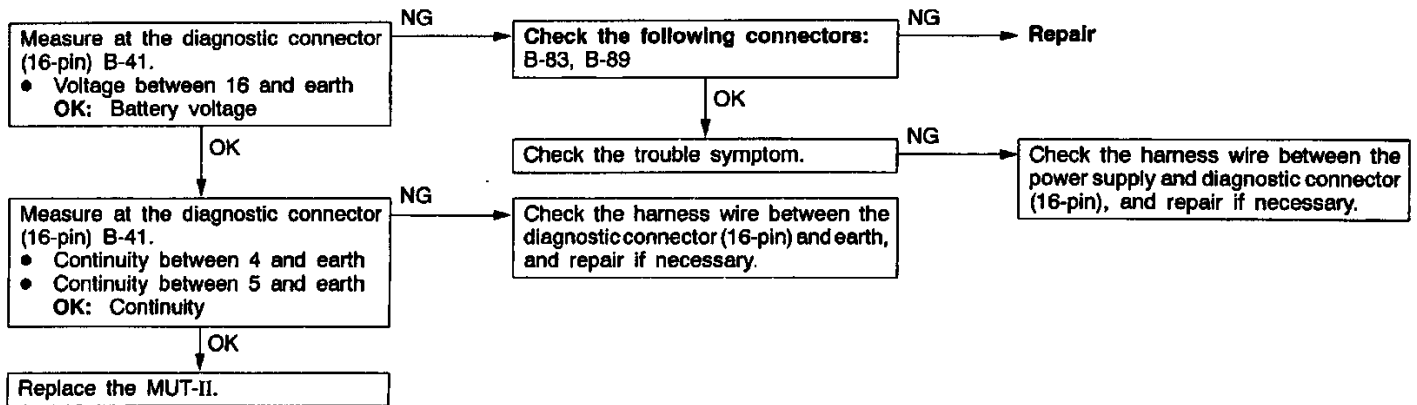
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13A-45
	Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible.	2	13A-45
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-46
	The engine warning lamp remains illuminating and never goes out.	4	13A-46
Starting	No initial combustion (starting impossible)	5	13A-47
	Initial combustion but no complete combustion (starting impossible)	6	13A-48
	Long time to start (improper starting)	7	13A-49
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13A-50
	Idling speed is high. (Improper idling speed)	9	13A-52
	Idling speed is low. (Improper idling speed)	10	13A-53
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-54
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-55
	The engine stalls when starting the car. (Pass out)	13	13A-57
	The engine stalls when decelerating.	14	13A-57
Driving	Hesitation, sag or stumble	15	13A-58
	The feeling of impact or vibration when accelerating	16	13A-59
	The feeling of impact or vibration when decelerating	17	13A-59
	Poor acceleration	18	13A-60
	Surge	19	13A-62
	Knocking	20	13A-63
Dieseling		21	13A-63
Too high CO and HC concentration when idling		22	13A-64
Idling speed is improper when A/C is operating		23	13A-65
Fans (radiator fan, A/C condensor fan) are inoperative		24	13A-66

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

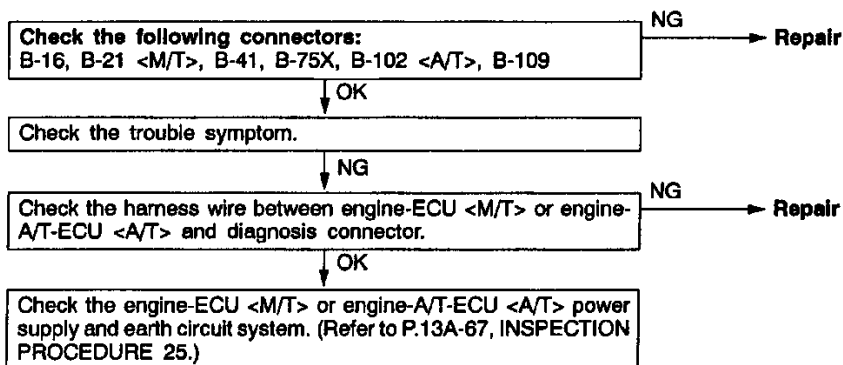
INSPECTION PROCEDURE 1

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



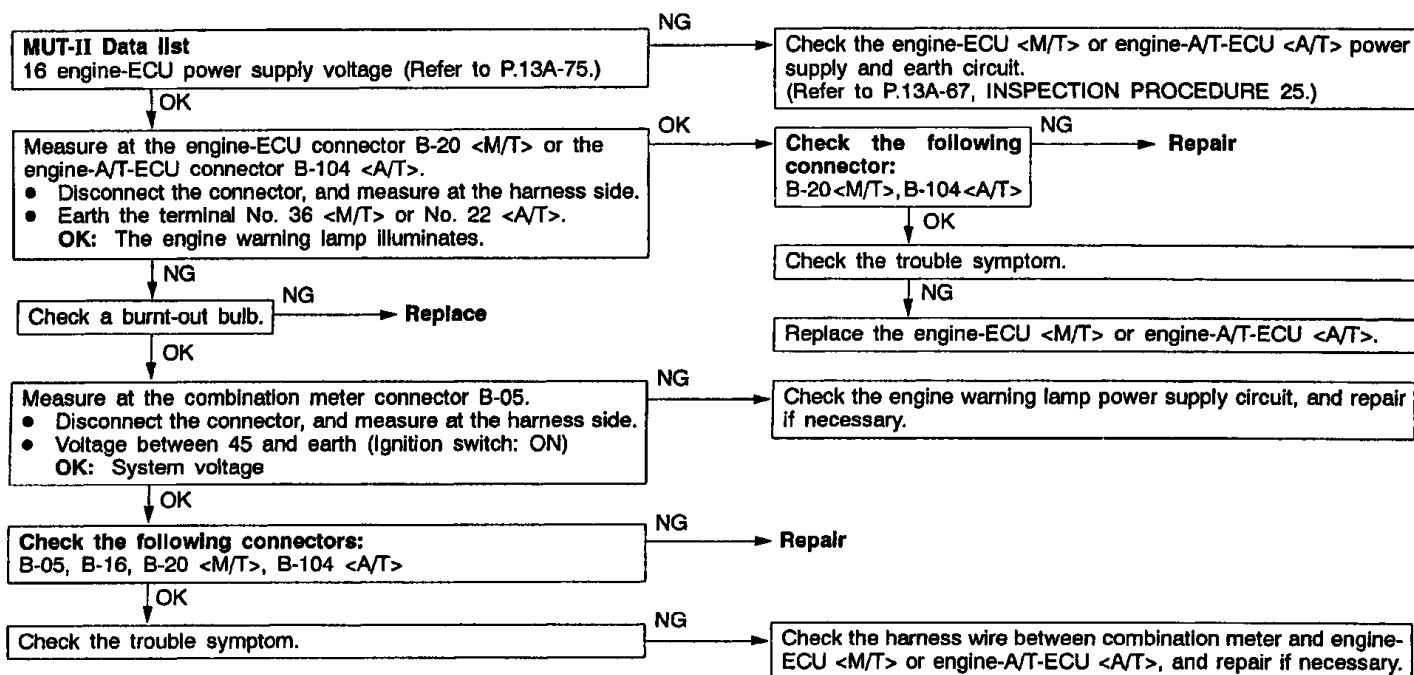
INSPECTION PROCEDURE 2

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



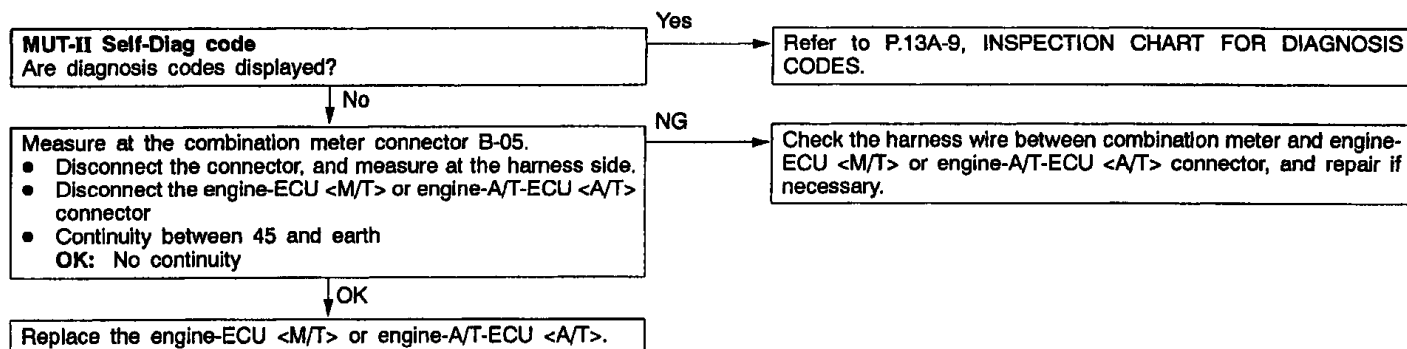
INSPECTION PROCEDURE 3

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>



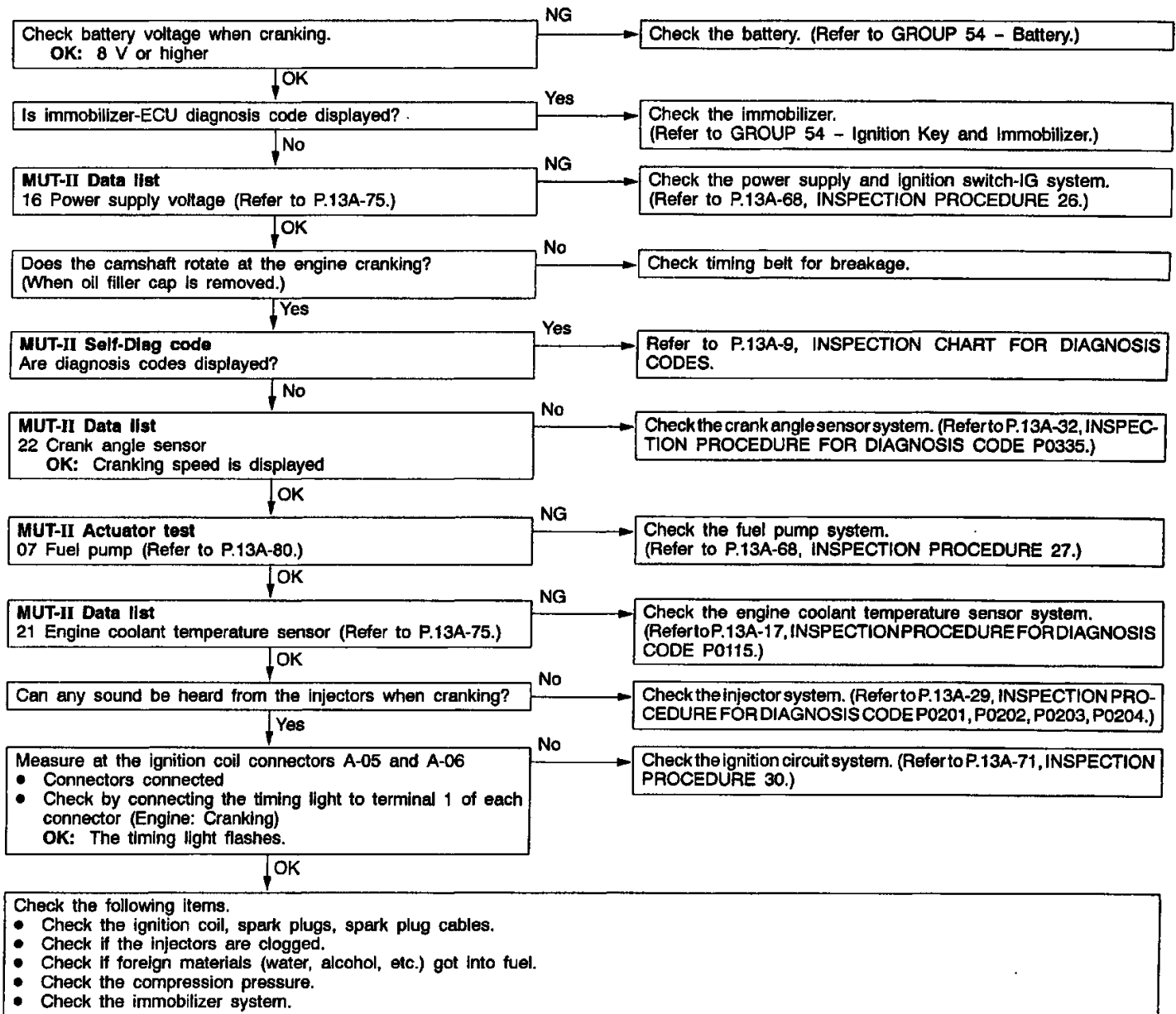
INSPECTION PROCEDURE 4

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>



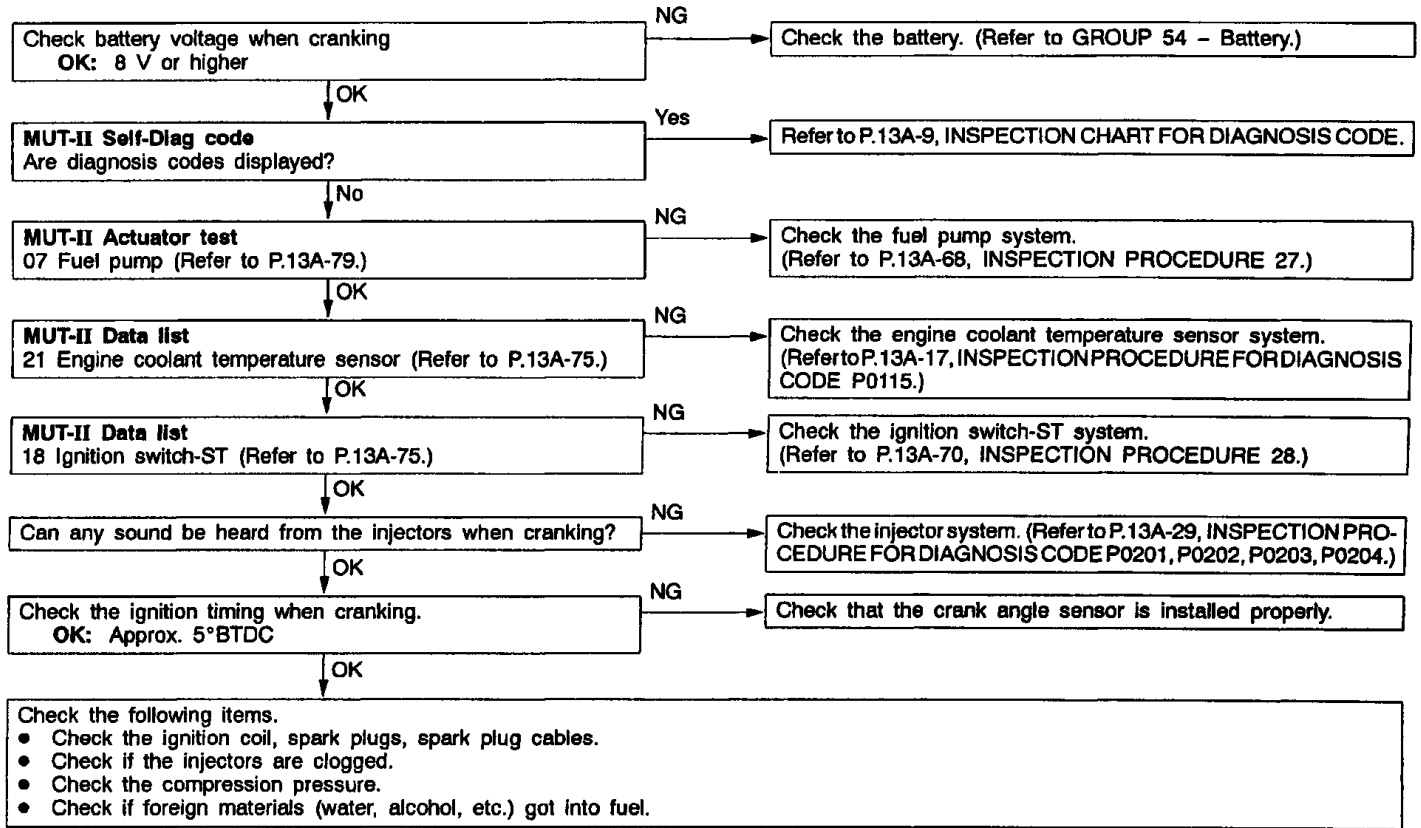
INSPECTION PROCEDURE 5

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



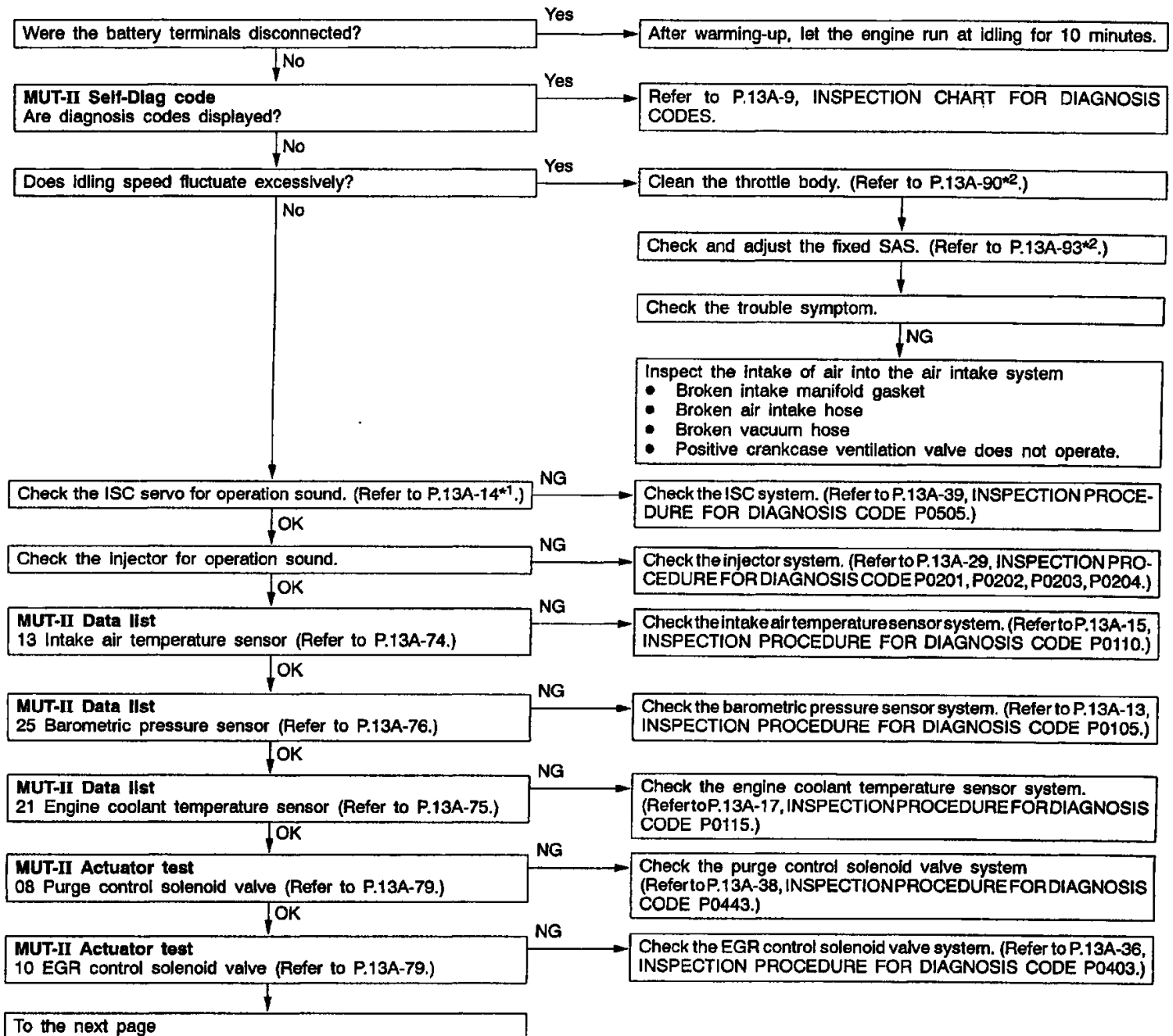
INSPECTION PROCEDURE 7

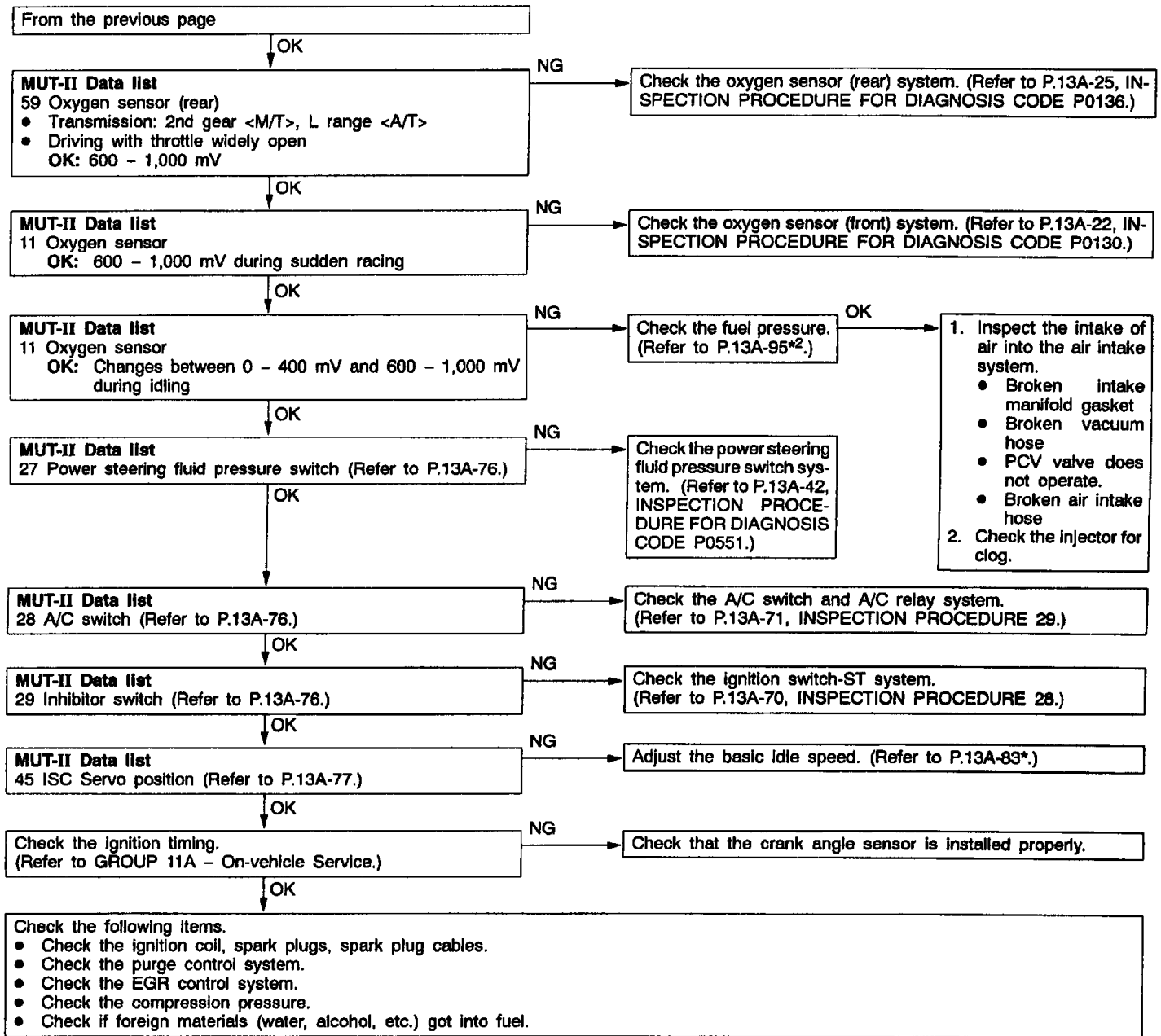
It takes too long time to start. (Incorrect starting)	Probable cause
In cases such as the above, the cause is probably that the spark is weak and ignition is difficult, the initial mixture for starting is not appropriate, or sufficient compression pressure is not being obtained.	• Malfunction of the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





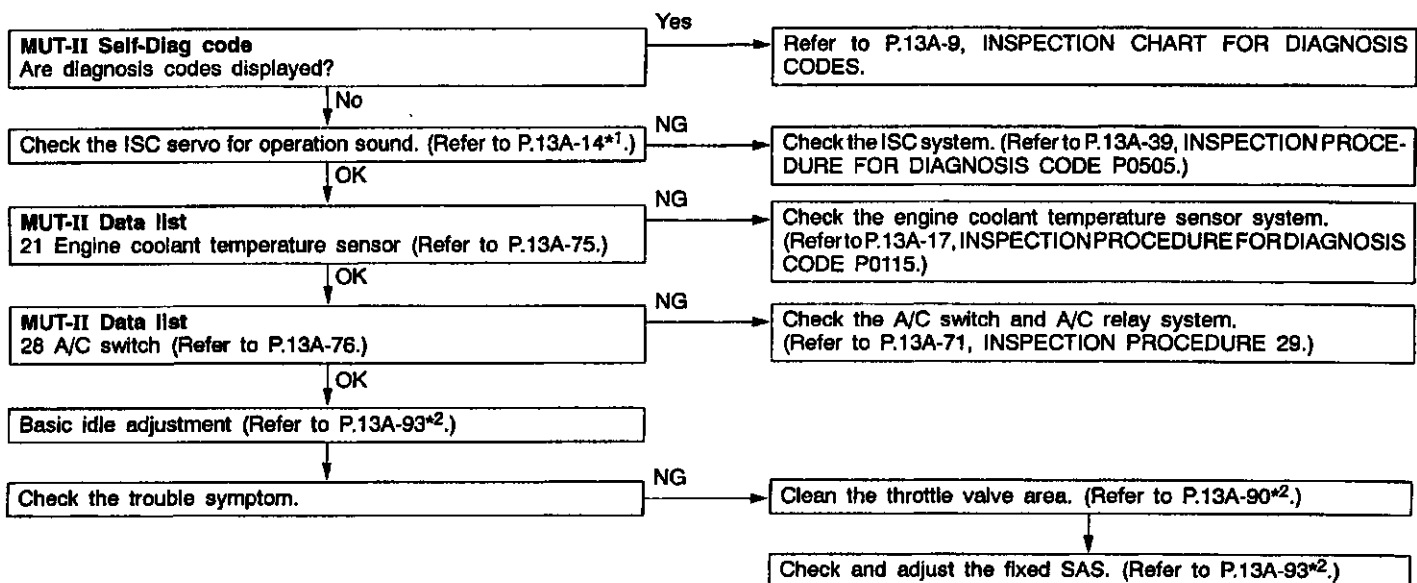
NOTE:

*1: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

*2: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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



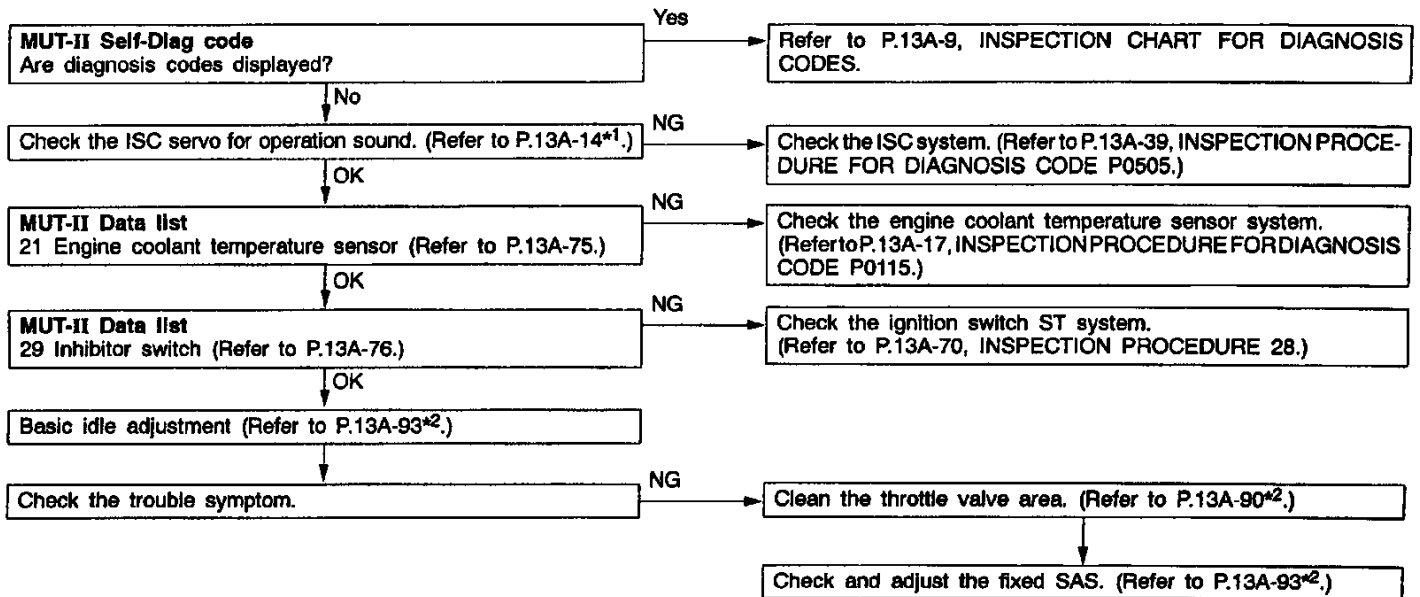
NOTE:

*1: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

*2: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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



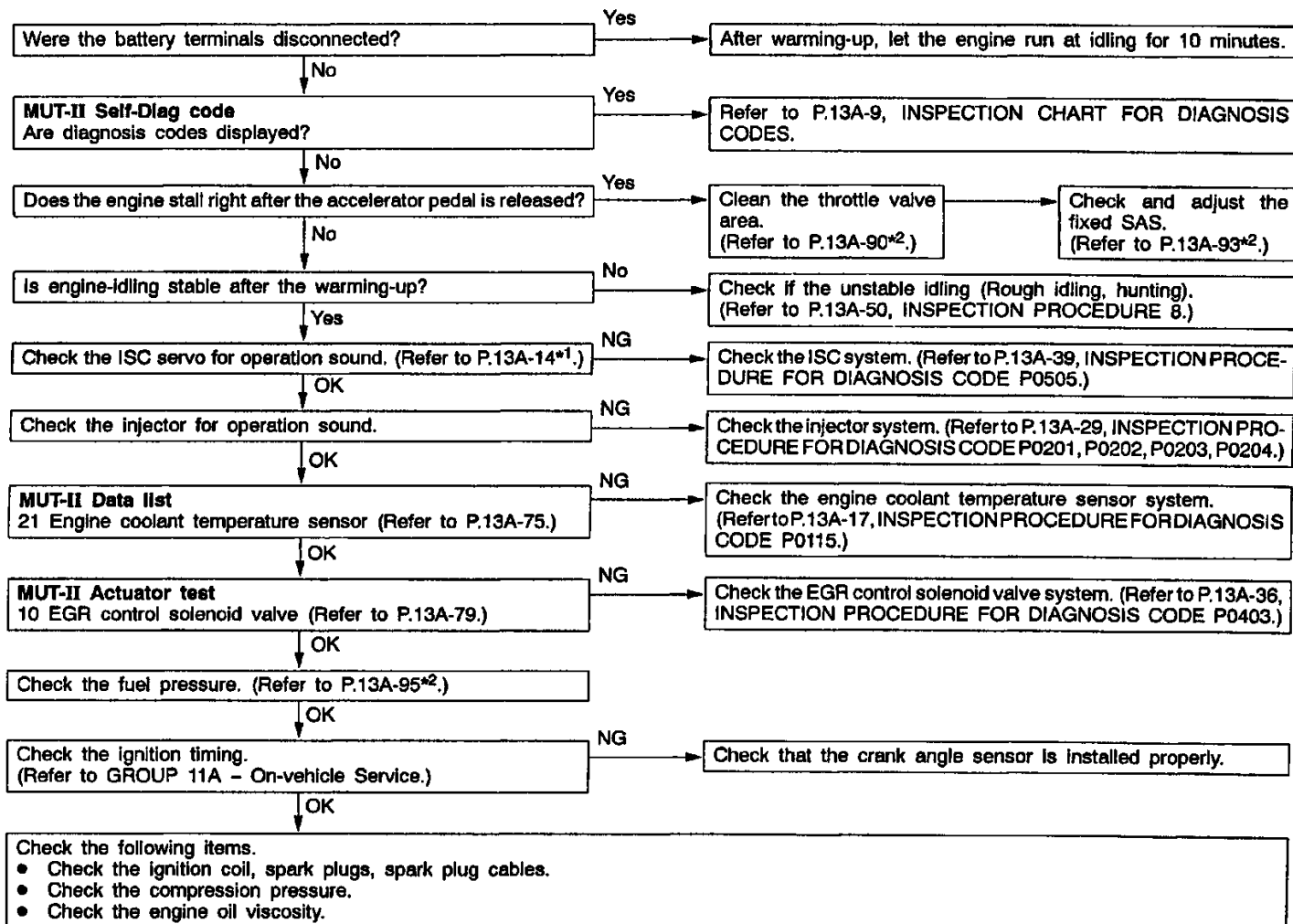
NOTE:

*1: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

*2: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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



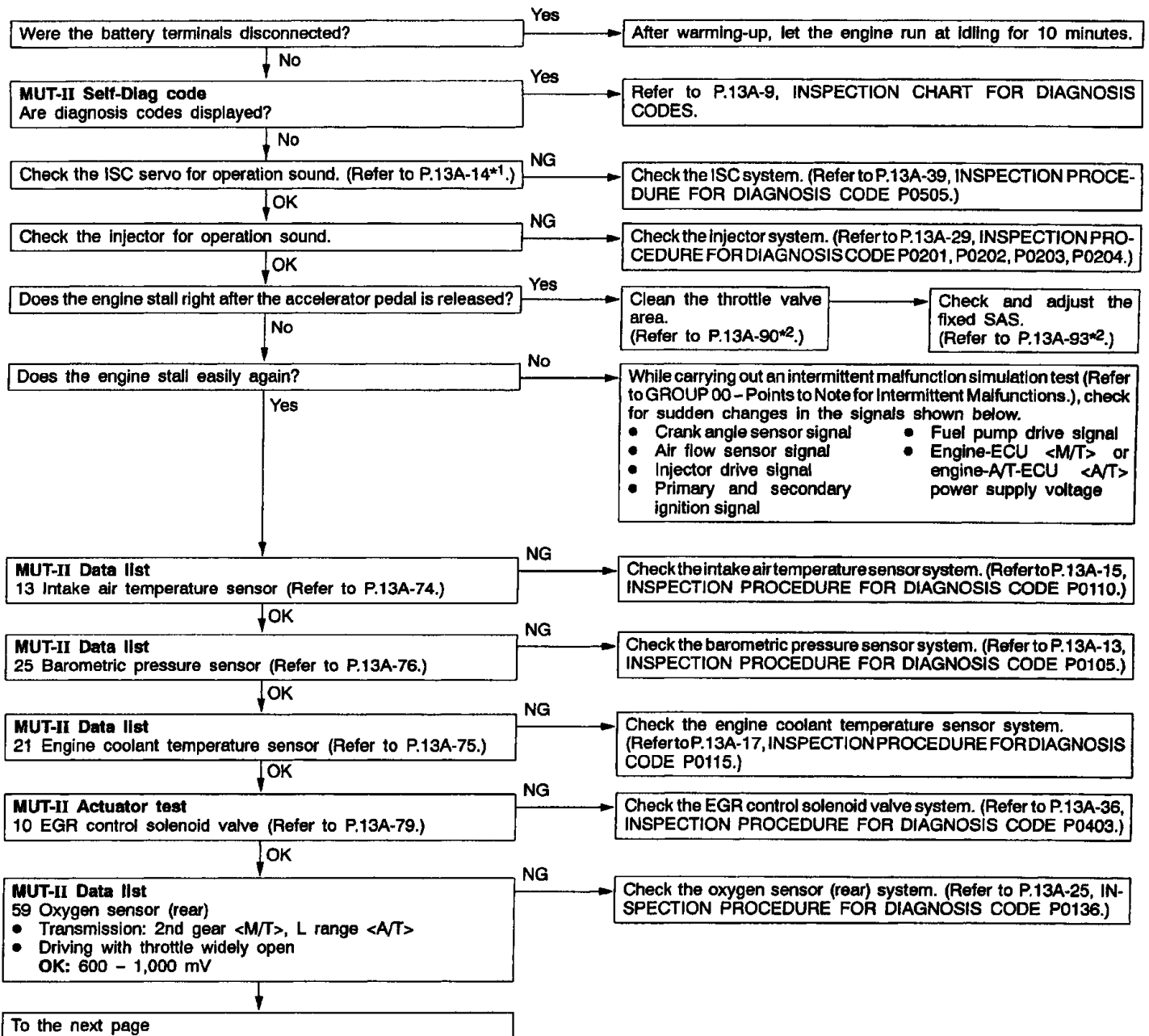
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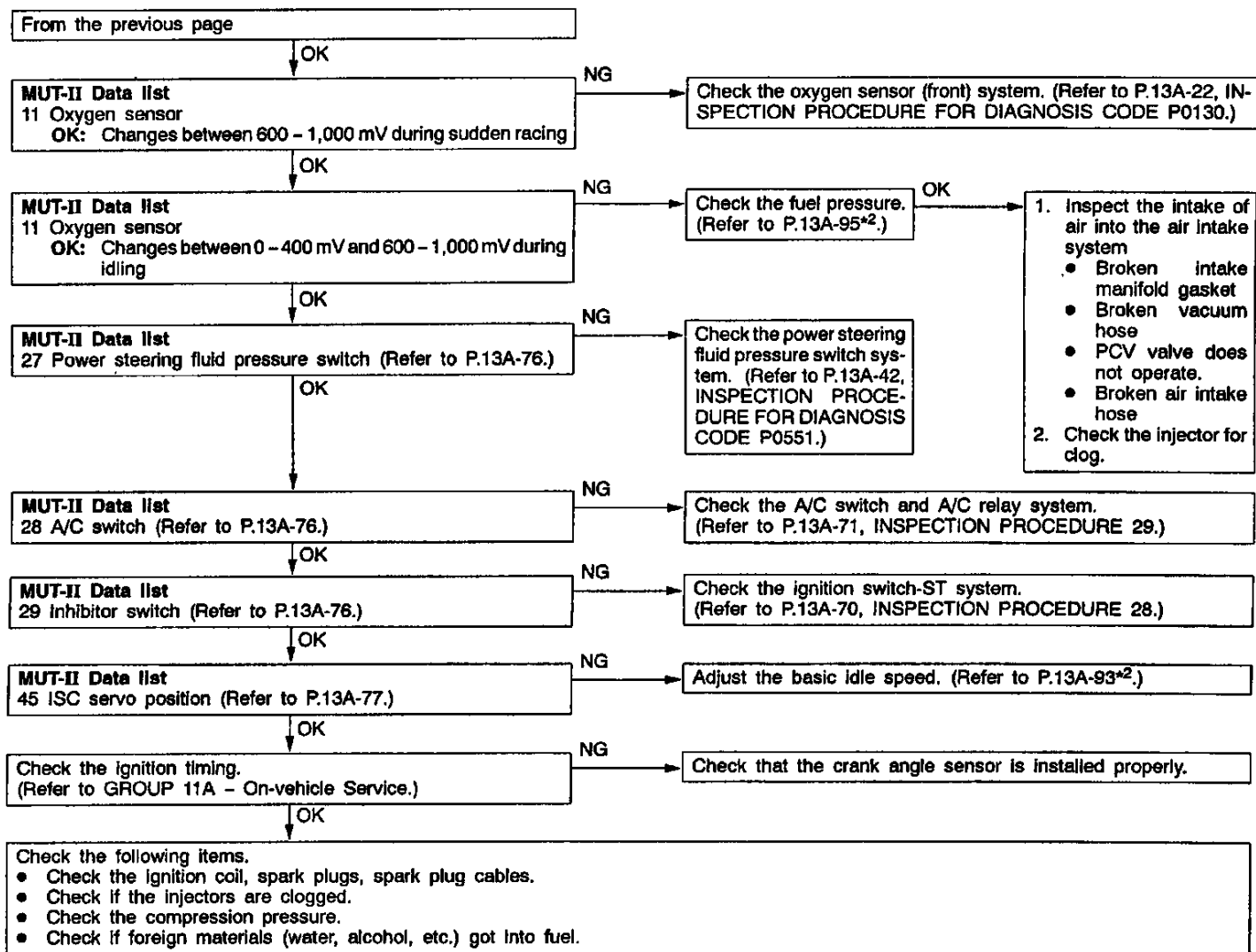
*1: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

*2: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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





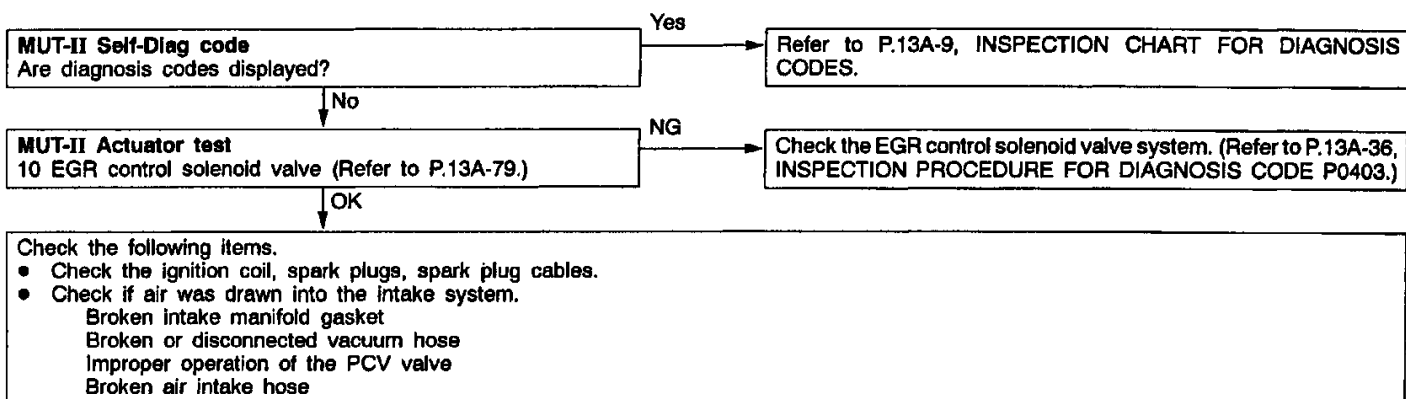
NOTE:

*1: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

*2: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

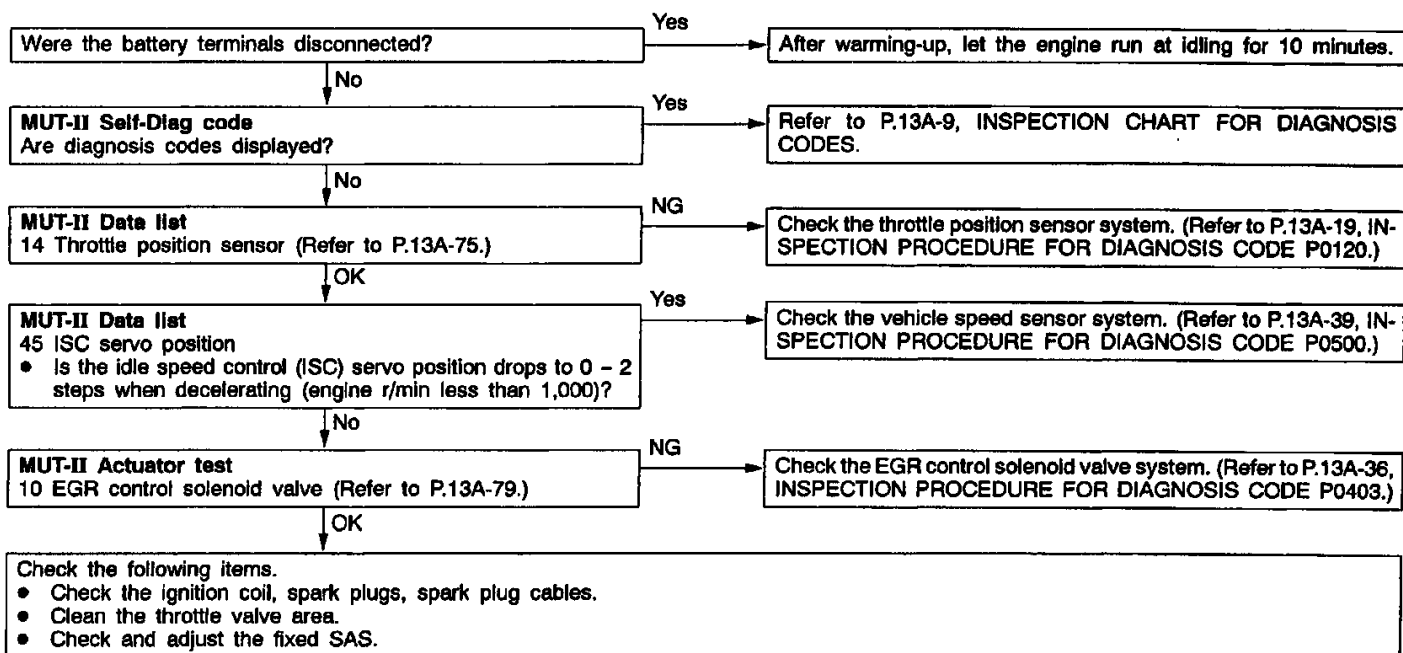
INSPECTION PROCEDURE 13

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



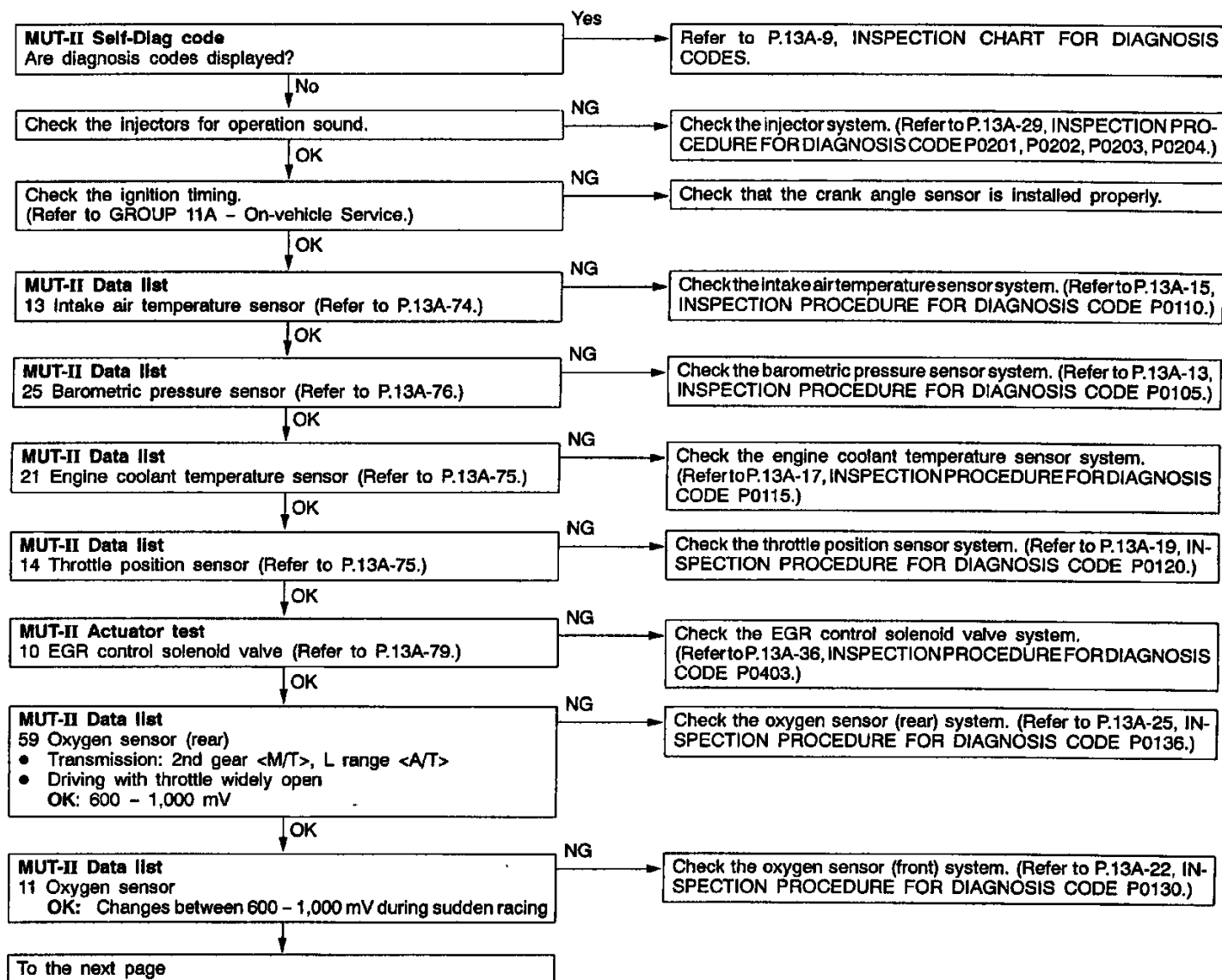
INSPECTION PROCEDURE 14

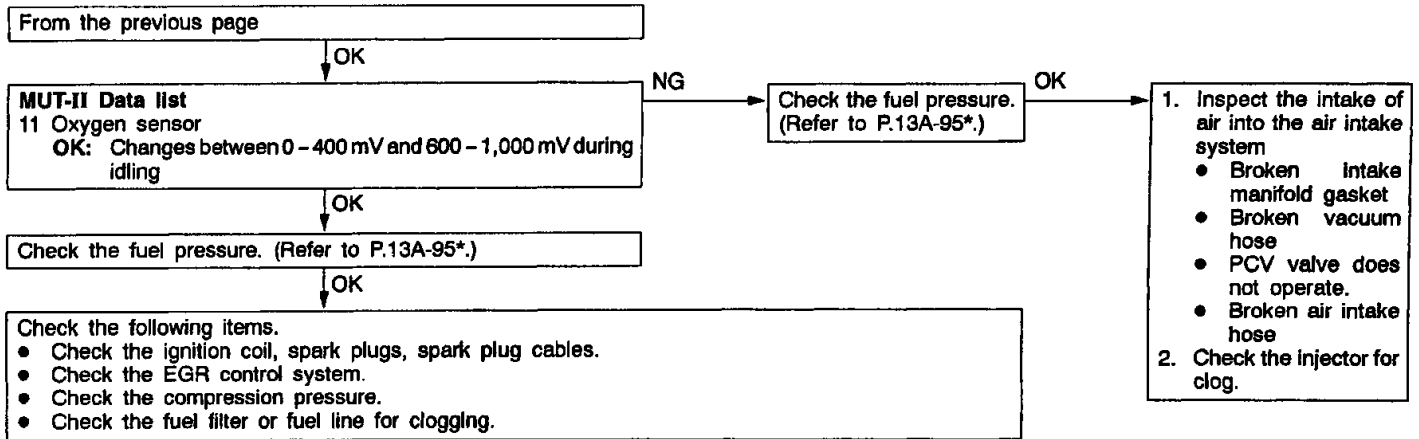
The engine stalls when decelerating.	Probable cause
In cases such as the above, the cause is probably that the intake air volume is insufficient due to a defective idle speed control (ISC) servo system.	• Malfunction of the ISC system



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

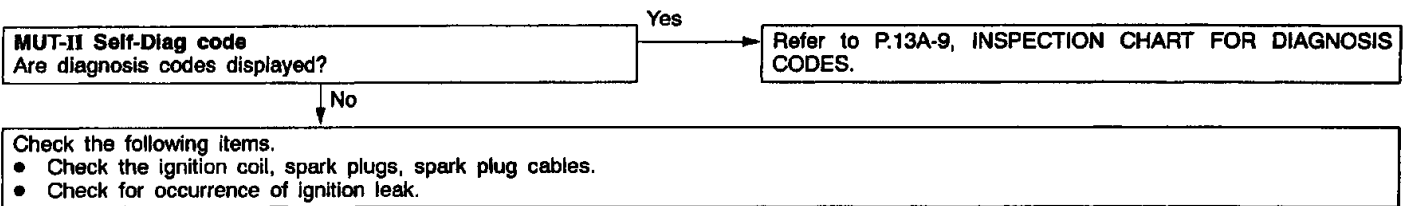


**NOTE:**

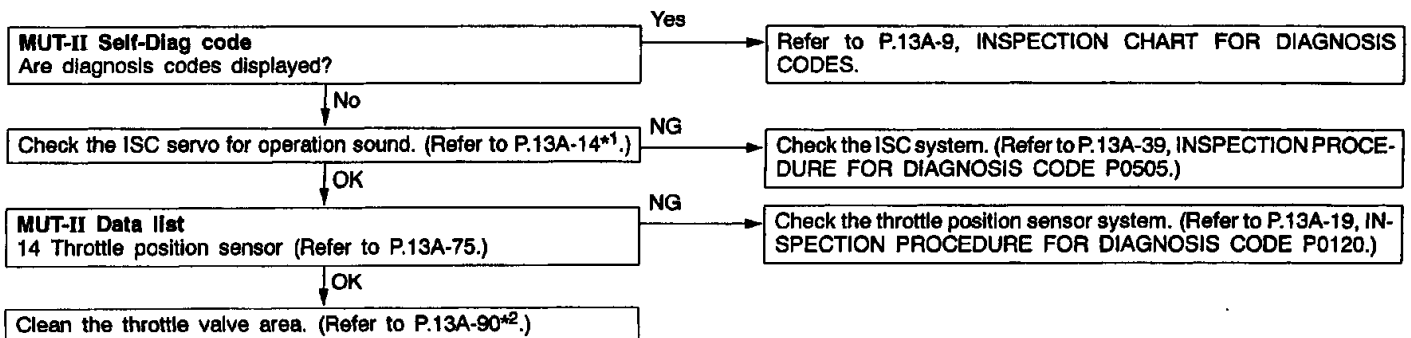
*: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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

**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

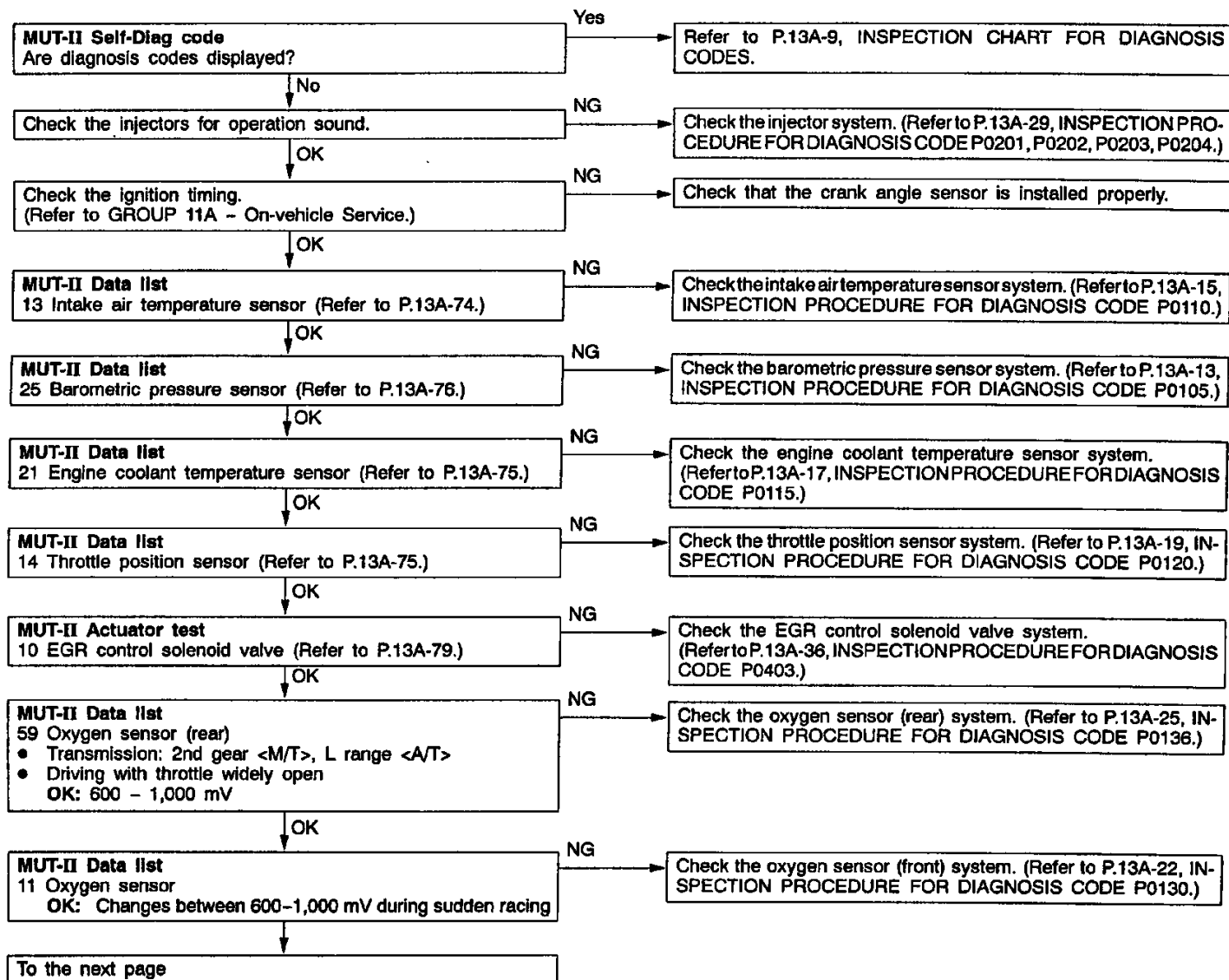
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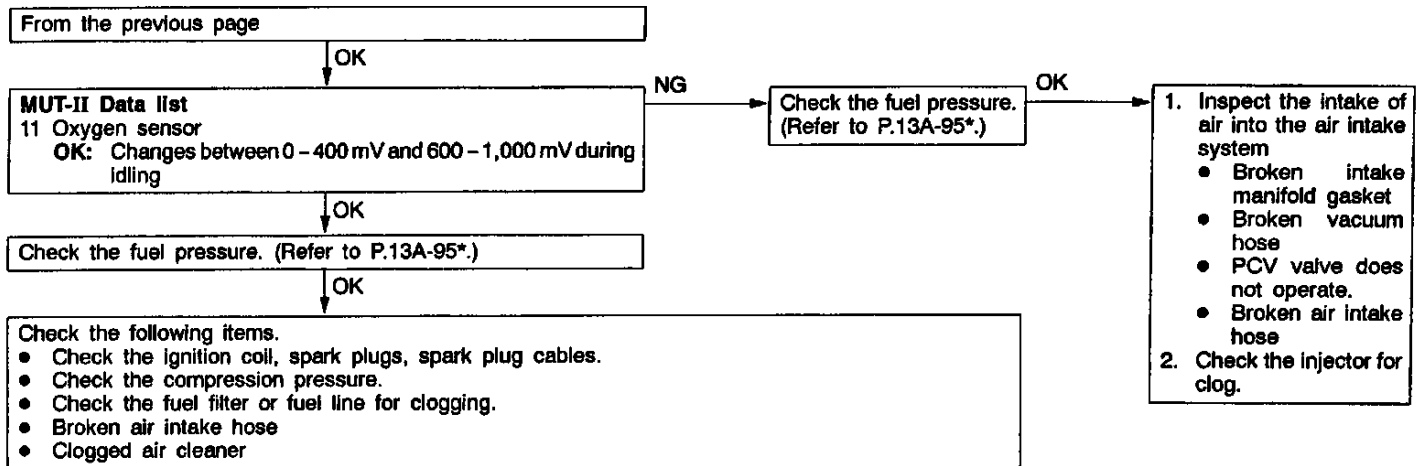
*1: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

*2: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

INSPECTION PROCEDURE 18

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

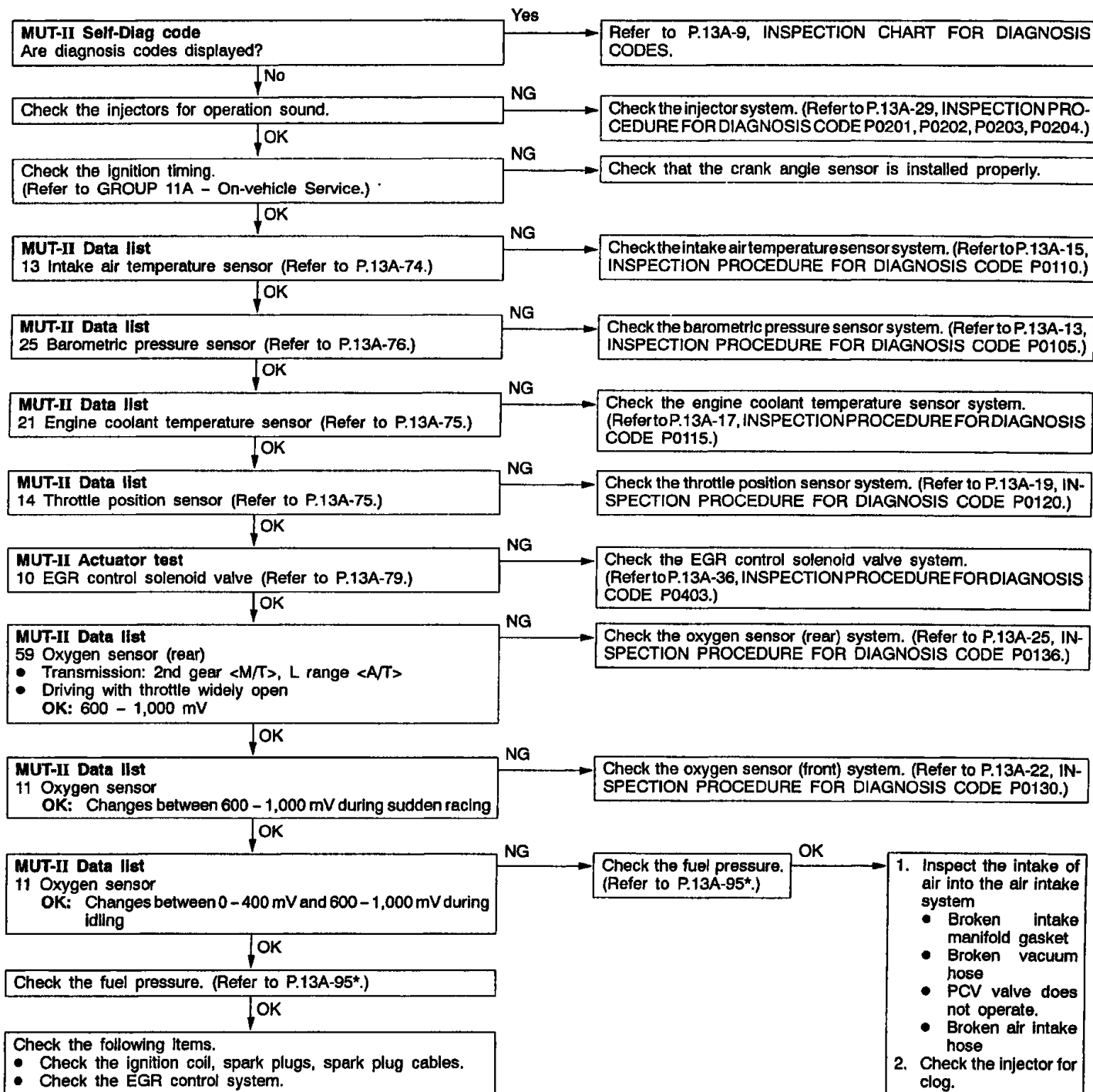


**NOTE:**

*: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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

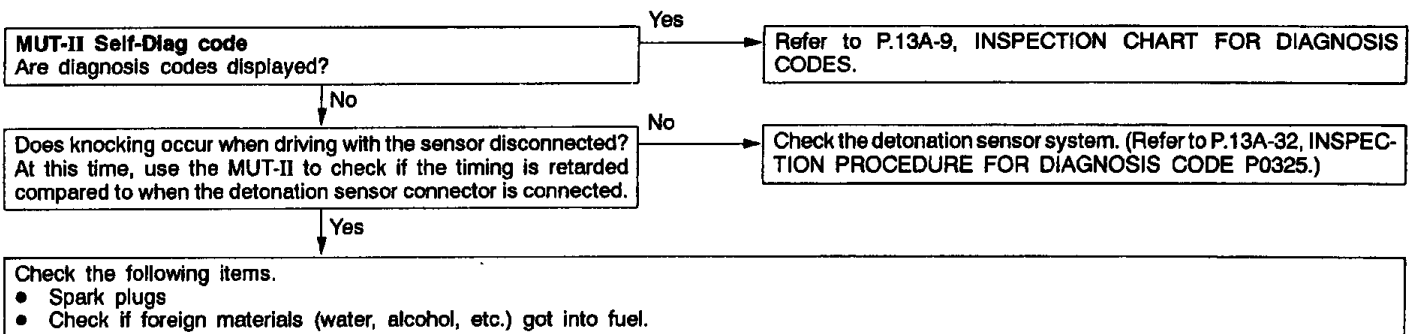


NOTE:

*: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

INSPECTION PROCEDURE 20

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

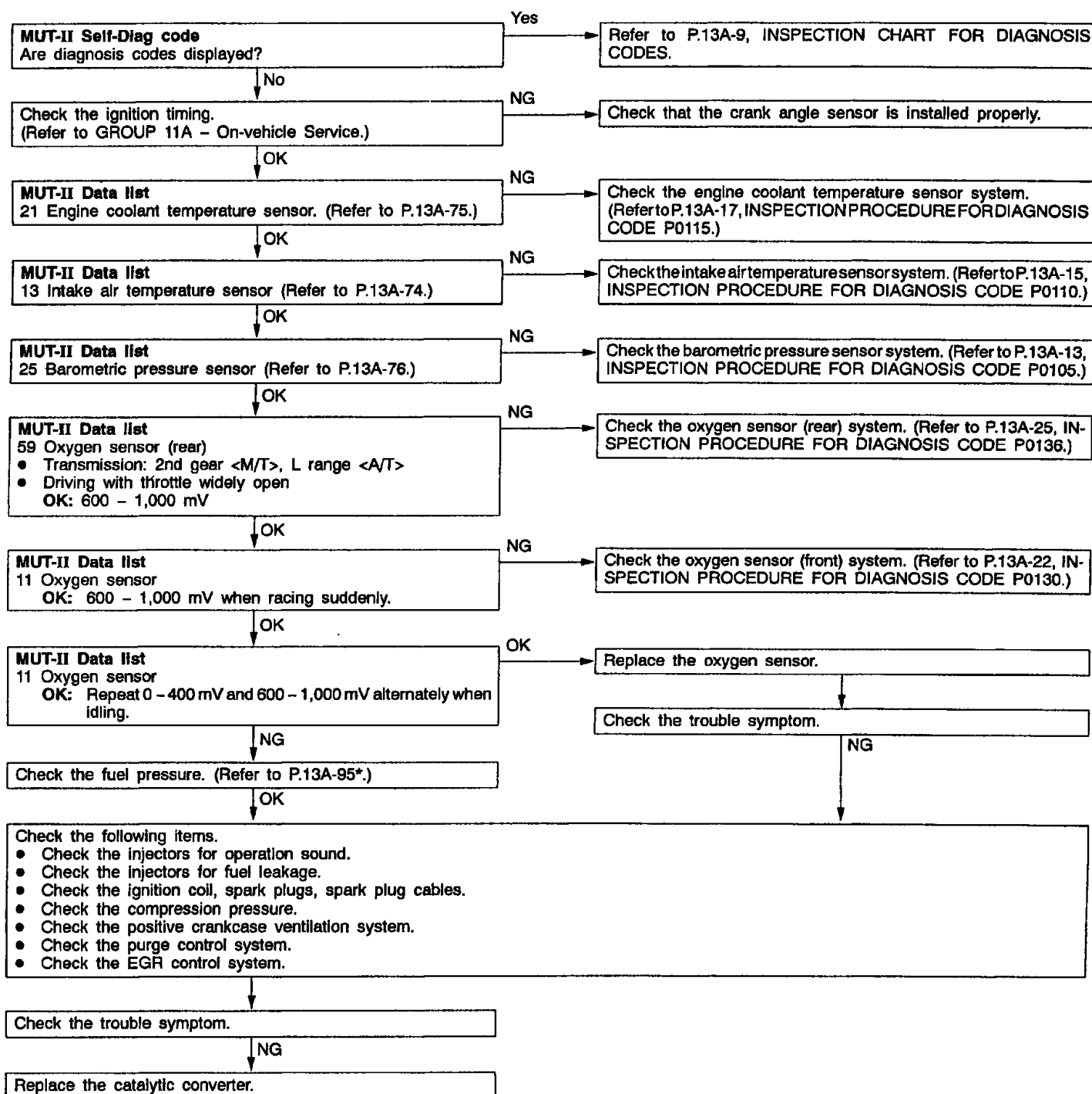
**INSPECTION PROCEDURE 21**

Dieselling	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

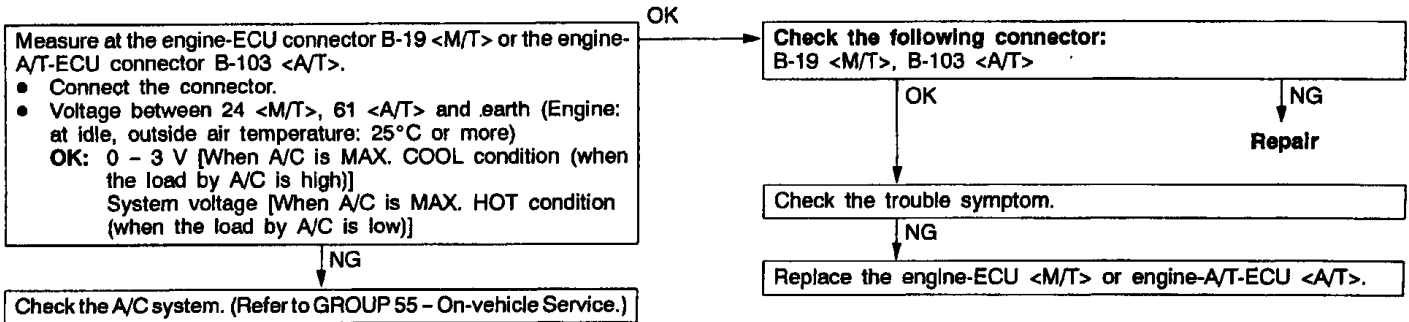


NOTE:

*: Refer to the '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

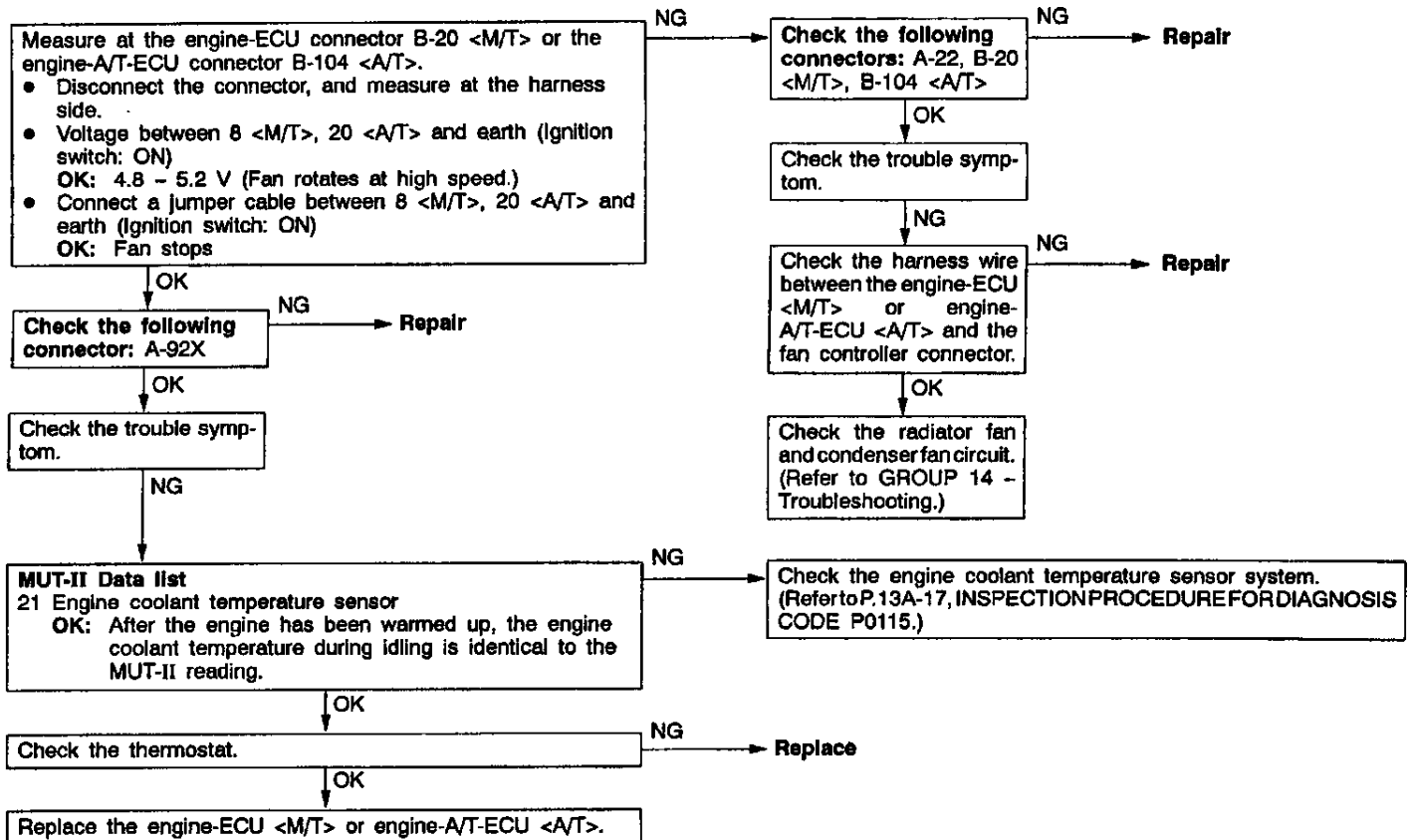
INSPECTION PROCEDURE 23

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>



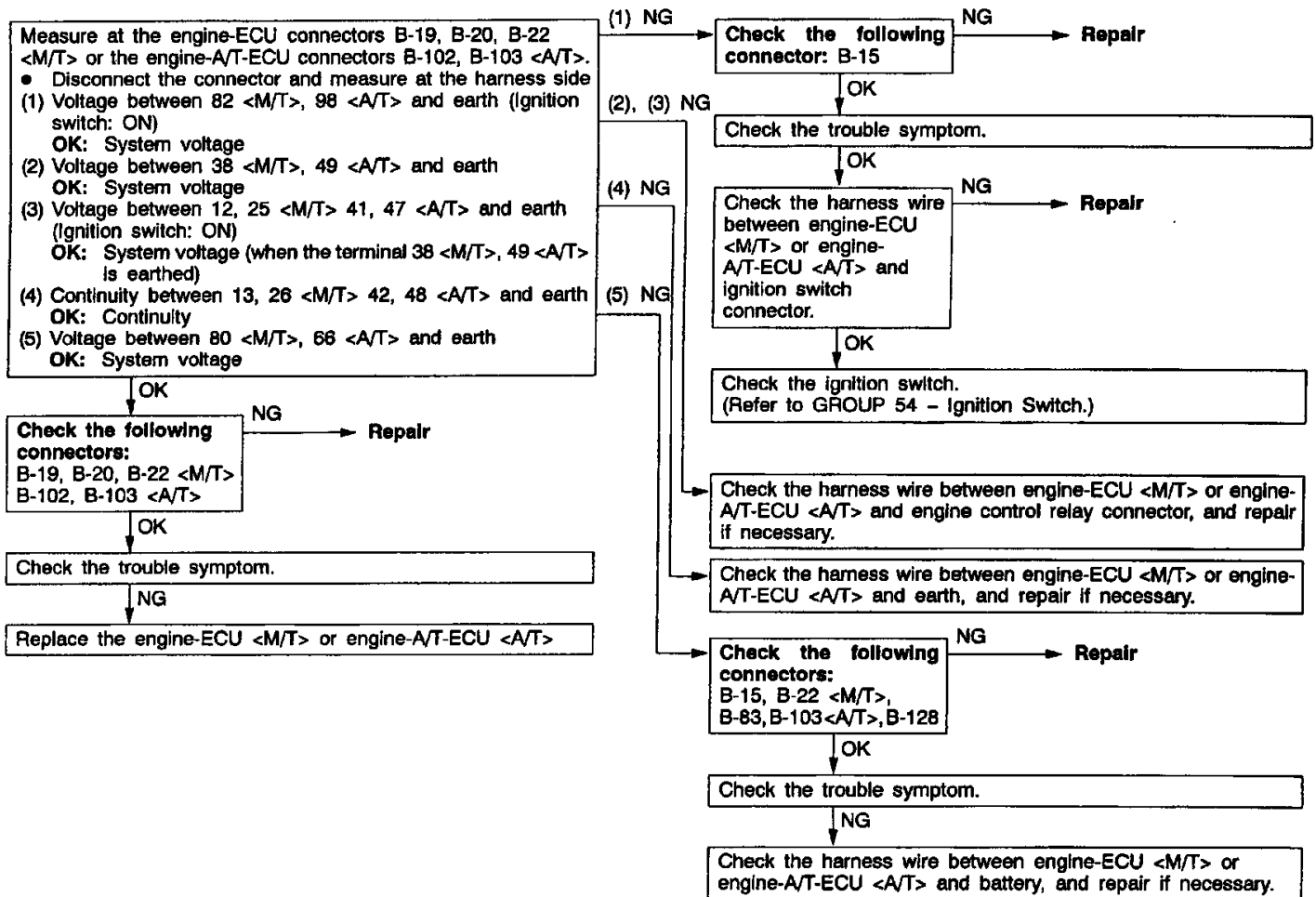
INSPECTION PROCEDURE 24

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>



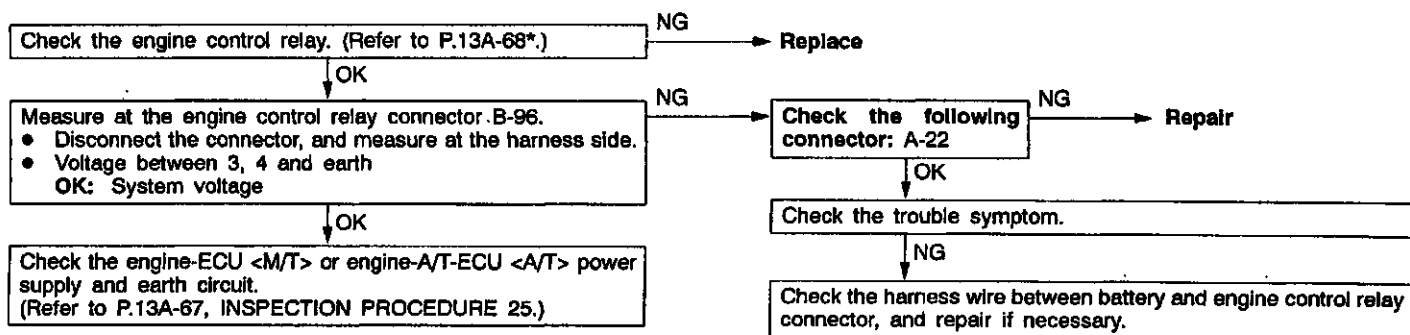
INSPECTION PROCEDURE 25

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 engine 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 engine 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>

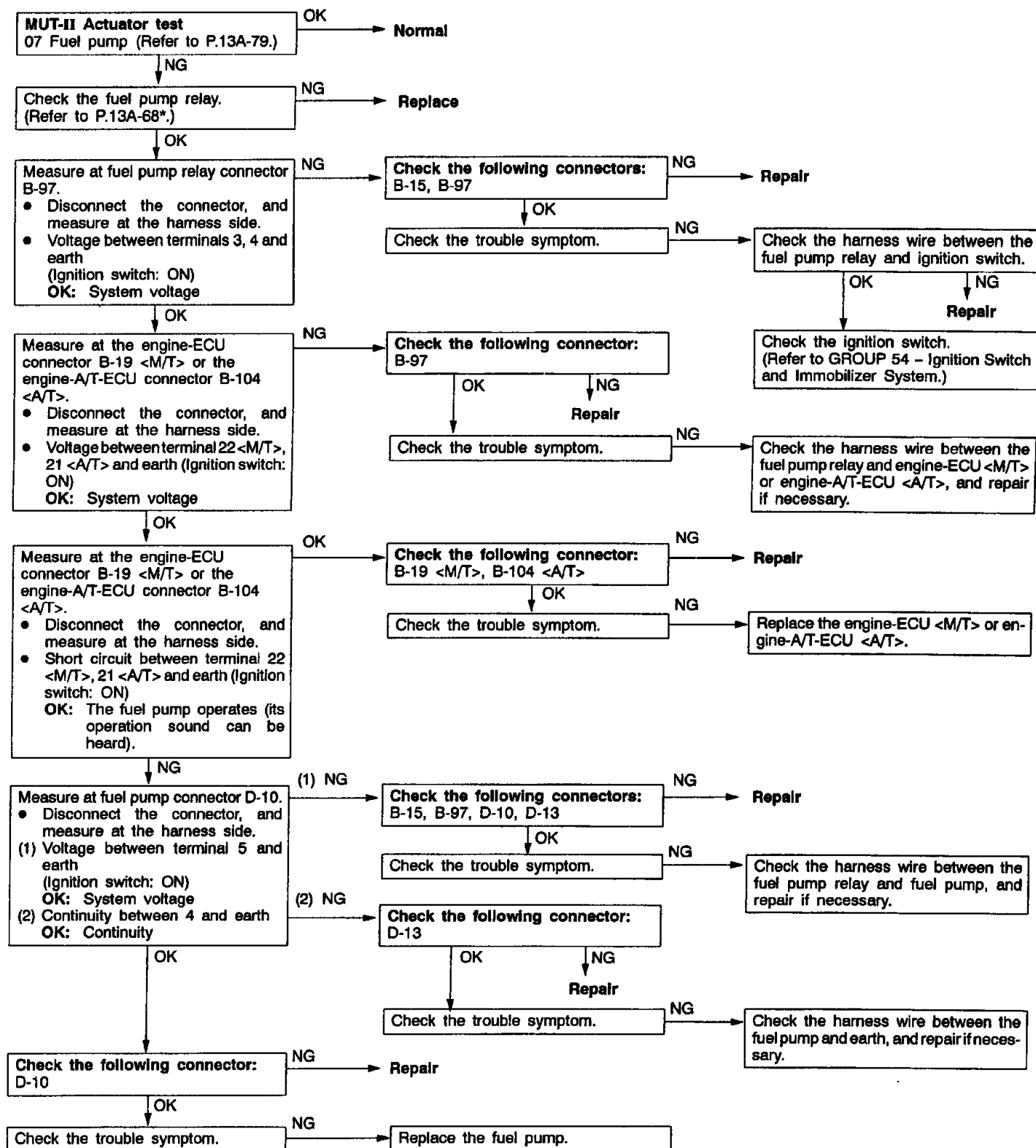


NOTE:

*: Refer to the '97 CARISMA Workshop Manual (Pub. No. PWDE9502-A).

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>



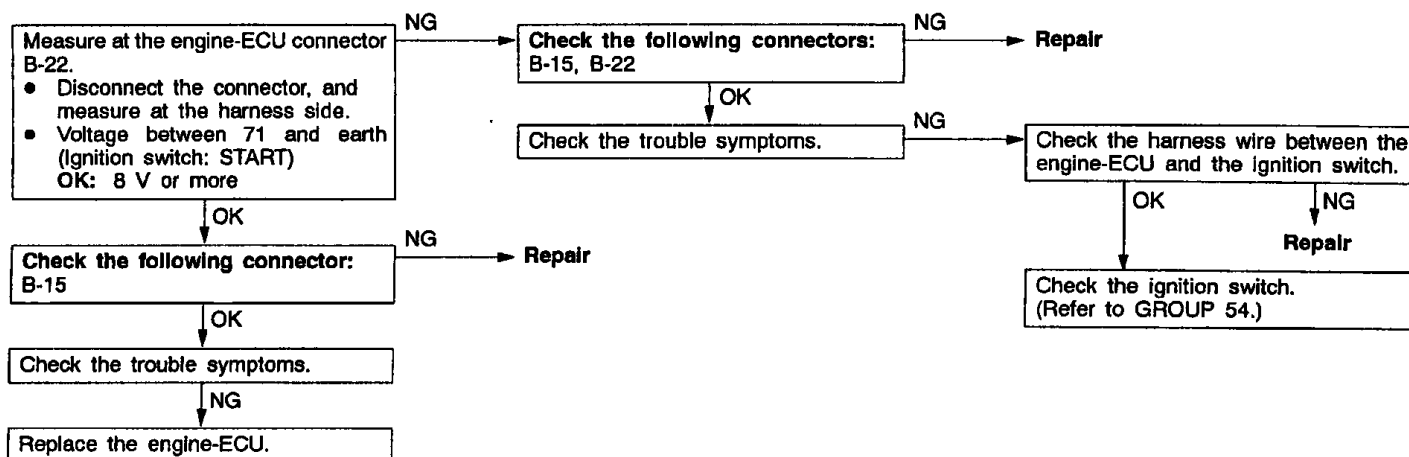
NOTE:

*: Refer to the '97 CARISMA Workshop Manual (Pub. No. PWDE9502-A).

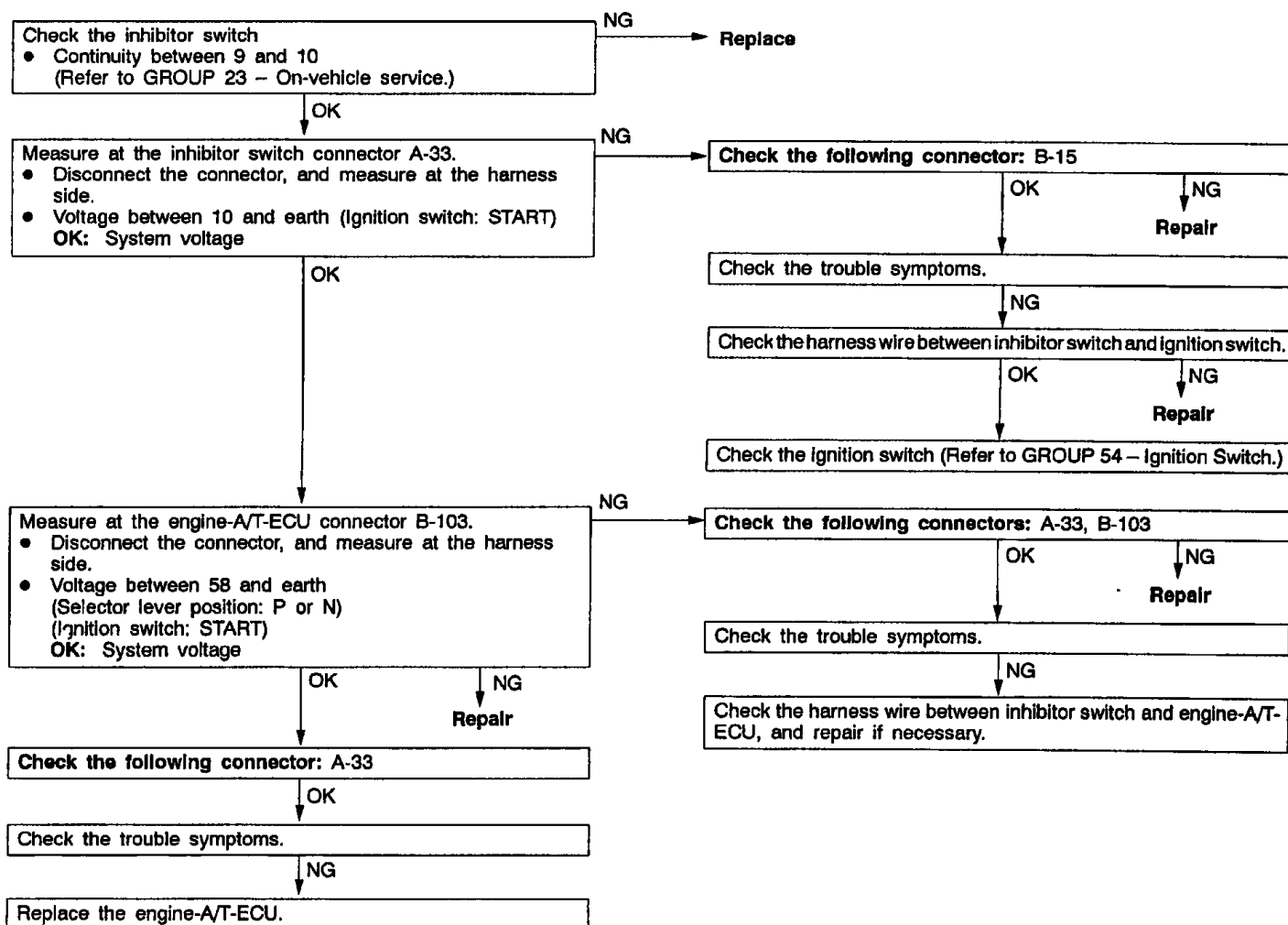
Inspection procedure 28

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>

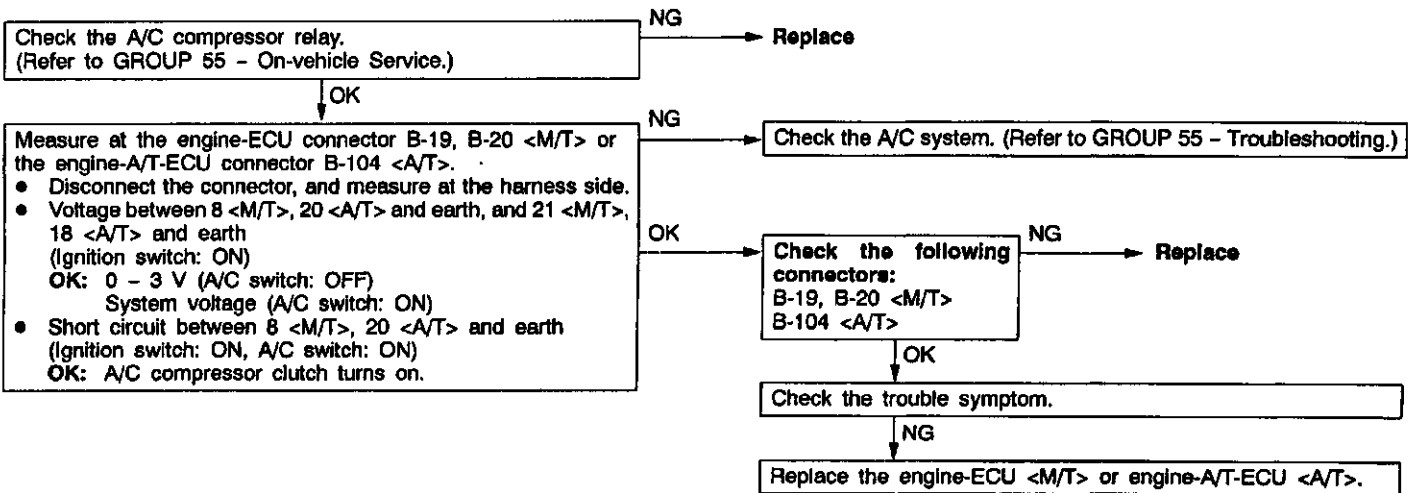


<A/T>



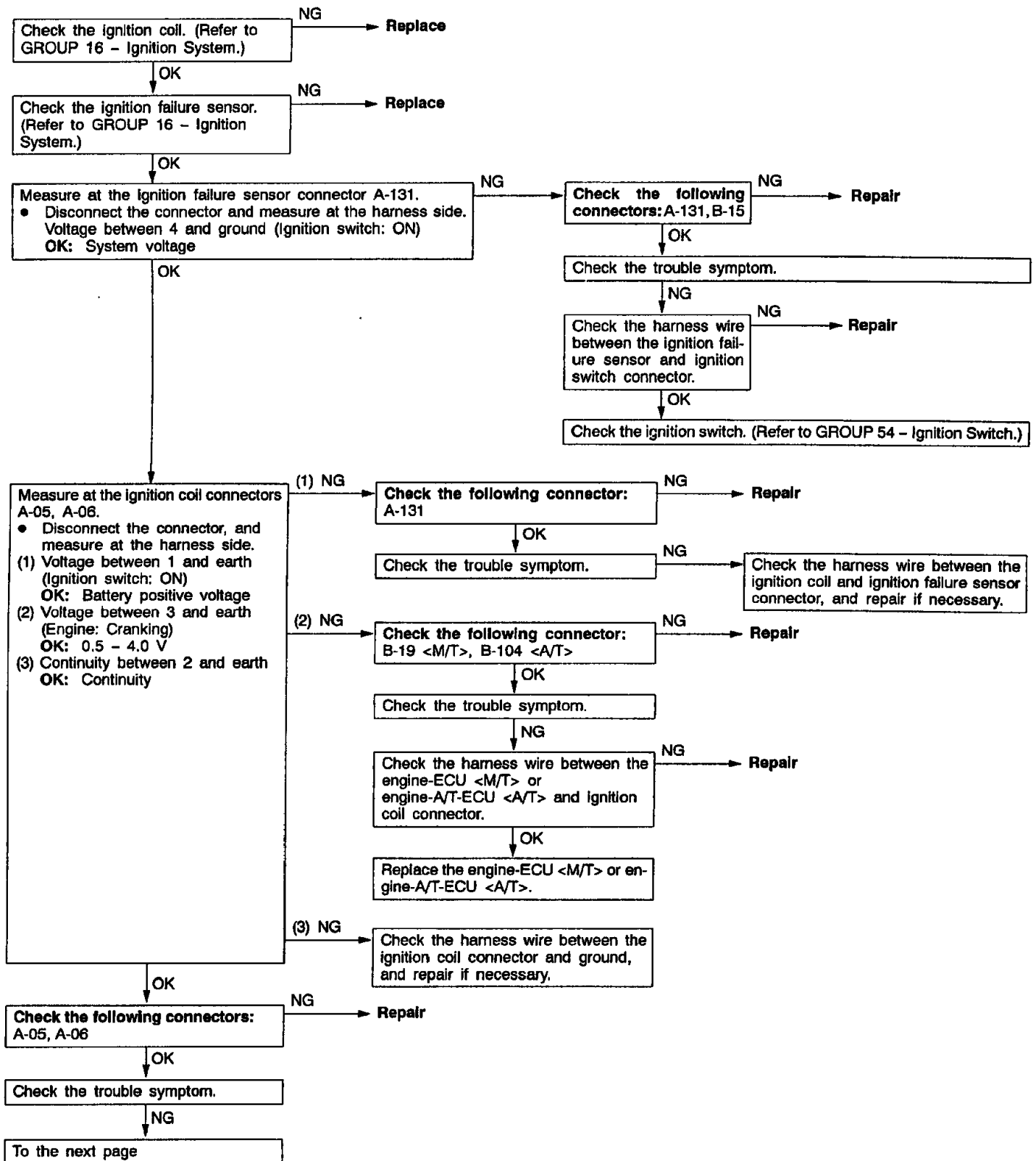
INSPECTION PROCEDURE 29

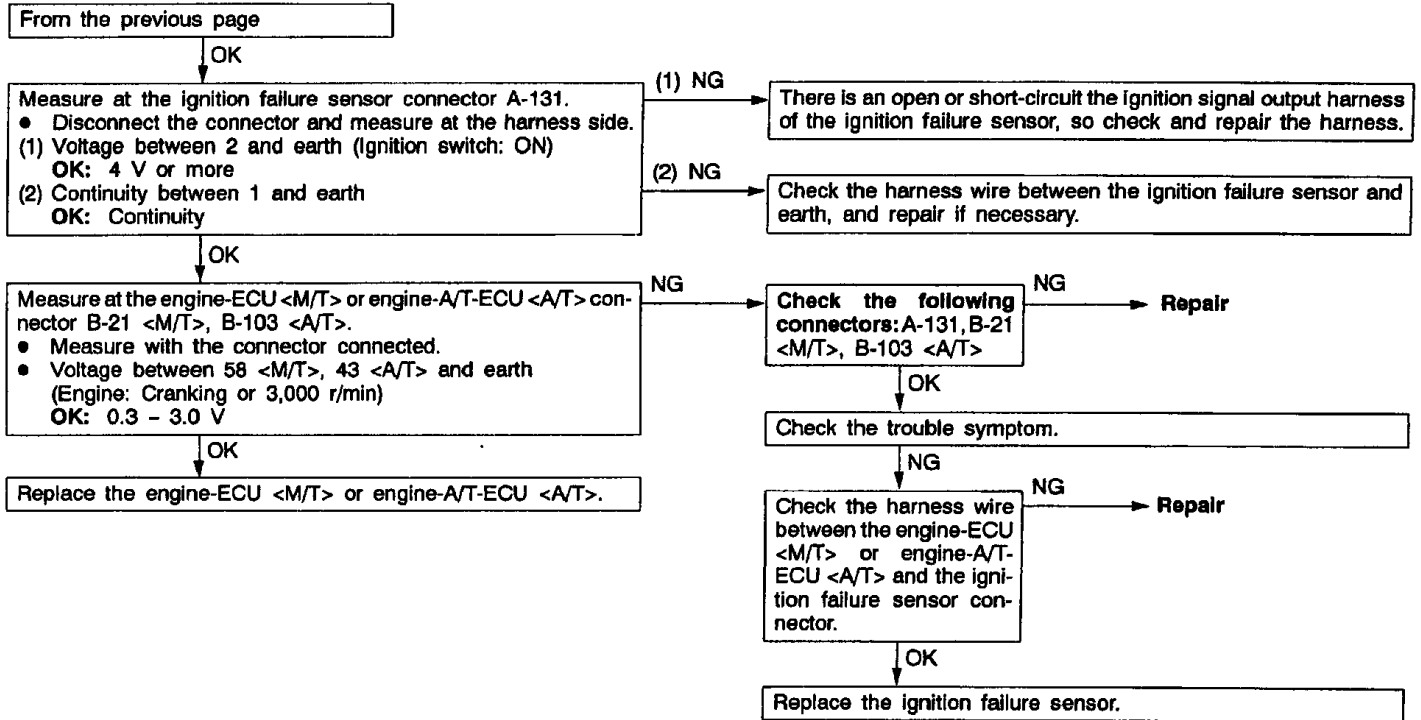
A/C switch and A/C relay system	Probable cause
When an A/C ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> carries out control of the idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch.	• Malfunction of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





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	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Code No. P0130	13A-22
		Air/fuel mixture is made leaner when decelerating, and is made richer when racing.	When engine is suddenly raced	600 – 1,000 mV		
		Engine: After having warmed up	Engine is idling	400 mV or less (Changes) 600 – 1,000 mV		
		The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.	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 (1.0 – 4.0 g/s)	–	–
			2,500 r/min	70 – 110 Hz (5.0 – 10.0 g/s)		
			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-15
			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-19
			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-67
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 28	13A-70
			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-17
			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-32
		- 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		

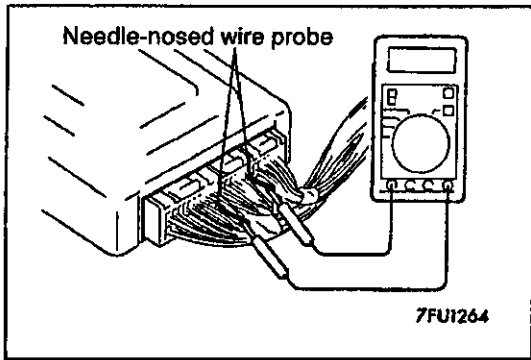
Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
24	Vehicle speed sensor	Drive at 40 km/h		Approximately 40 km/h	Code No. P0500	13A-39
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. P0105	13A-13
			At altitude 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-42
			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-71
			A/C switch: ON	ON		
29	Inhibitor switch <A/T>	Ignition switch: ON	P or N	P or N	Procedure No. 28	13A-70
			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	13A-30
			2,500 r/min	18 – 38° BTDC		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
45	ISC (step-per) 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-71
			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-25
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-28
82	Short-term fuel compensation	Engine: Warm, 2,500 r/min without any load (during closed loop)		–30 – 25 %	Code No. P0170	13A-28
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-21
			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-22
			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-25

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-19
			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-29
02		Cut fuel to No. 2 injector				Code No. P0202	13A-29
03		Cut fuel to No. 3 injector				Code No. P0203	13A-29
04		Cut fuel to No. 4 injector				Code No. P0204	13A-29
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. Listen near the fuel tank for the sound of fuel pump operation.	Pulse is felt. Sound of operation is heard.	Procedure No. 27	13A-68
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-38
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-36
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-66



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

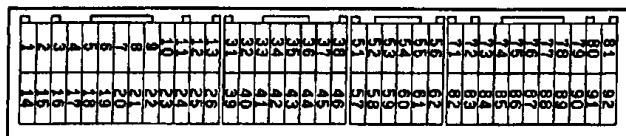
- (1) Make the voltage measurement with the engine-ECU <M/T> or engine-A/T-ECU <A/T> connectors connected.
- (2) You may find it convenient to pull out the engine-ECU <M/T> or engine-A/T-ECU <A/T> to make it easier to reach the connector terminals.
- (3) The checks can be carried out off the order given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

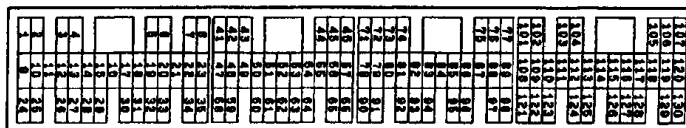
3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

Engine-ECU <M/T> Connector Terminal Arrangement



9FU0393

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



7FU1763

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 <A1>	Engine: Soon after the warmed up engine is started	System voltage ↔ 0 V (Changes repeatedly)
17	28	Stepper motor coil <A2>		
5	15	Stepper motor coil <B1>		
18	29	Stepper motor coil <B2>		
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	20	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)		
12	41	Power supply	Ignition switch: ON	System voltage
25	47			

Terminal No. <M/T>	Terminal No. <A/T>	Check item	Check condition (Engine condition)		Normal condition
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 (Engine coolant temperature is 105°C or more)		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 operating (Engine coolant temperature is 90 – 105°C or less)		0 – 3 V
22	21	Fuel pump relay	Ignition switch: ON		System voltage
			Engine: Idle speed		0 – 3 V
24	61	A/C switch 2	- Engine: Idling - Outside air temperature: 25°C or more	When A/C is MAX. COOL condition (when the load by A/C is high)	0 – 3 V
				(When A/C is MAX. HOT condition (when the load by A/C is low)	System voltage
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
60	3	Oxygen sensor (front) heater	Engine: Idling after warming up		0 – 3 V
			Engine r/min: 5,000 r/min.		System voltage

Terminal No. <M/T>	Terminal No. <A/T>	Check item	Check condition (Engine condition)		Normal condition
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**



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



7FU1764

9FU0392

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 (A1)	28 – 33 Ω (At 20°C)
17 – 12	28 – 41	Stepper motor coil (A2)	
5 – 12	15 – 41	Stepper motor coil (B1)	
18 – 12	29 – 41	Stepper motor coil (B2)	
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 earth <M/T> Engine-A/T-ECU earth <A/T>	Continuity (0 Ω)
26 – Body earth	48 – Body earth	Engine-ECU earth <M/T> Engine-A/T-ECU earth <A/T>	
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 k Ω (When intake air temperature is 0°C)
			2.3 - 3.0 k Ω (When intake air temperature is 20°C)
			1.0 - 1.5 k Ω (When intake air temperature is 40°C)
			0.30 - 0.42 k Ω (When intake air temperature is 80°C)
83 - 92	44 - 57	Engine coolant temperature sensor	5.1 - 6.5 k Ω (When coolant temperature is 0°C)
			2.1 - 2.7 k Ω (When coolant temperature is 20°C)
			0.9 - 1.3 k Ω (When coolant temperature is 40°C)
			0.26 - 0.36 k Ω (When coolant temperature is 80°C)

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

DIESEL FUEL

<F9Q>

CONTENTS

GENERAL	2	Engine Coolant Temperature Sensor Check	
Outline of Change	2	Accelerator Pedal Position Sensor (1st channel) Check	
GENERAL INFORMATION	2	Accelerator Pedal Position Sensor (2nd channel) Check	
SERVICE SPECIFICATIONS		Injector Check	
SPECIAL TOOLS		Fuel Temperature Sensor Check	
TROUBLESHOOTING		Fuel Pressure Regulator Check	
ON-VEHICLE SERVICE		Crank Angle Sensor Check	
Component Location		Throttle Valve Control Solenoid Check	
Main Relay Continuity Check		Throttle Actuator Check	
Intake Air Temperature Sensor Check		FUEL HIGH PRESSURE PUMP AND FUEL INJECTOR	

GENERAL

OUTLINE OF CHANGE

The following maintenance service points have been established to correspond to the adoption of the F9Q1 engine.

GENERAL INFORMATION

The common rail fuel injection system consists of sensors which detect the condition of the diesel engine, an engine-ECU which controls the system based on signals from these sensors, and actuators which operate according to control commands from the engine-ECU. The engine-ECU carries out

activities such as fuel injection control and idle speed control. In addition, the engine-ECU is equipped with several self-diagnosis functions which make troubleshooting easier in the event that a problem develops.

FUEL INJECTION CONTROL

The injector drive time and the timing are controlled so that the appropriate quantities of fuel are supplied to the engine in response to engine conditions which can change frequently. A single injector is mounted at each cylinder. The fuel is sent

from the fuel tank by the electronic fuel pump to the high pressure pump. The high pressure pump increases the fuel pressure to the pressure which is required for high-pressure injection, and then send the fuel to each injector.

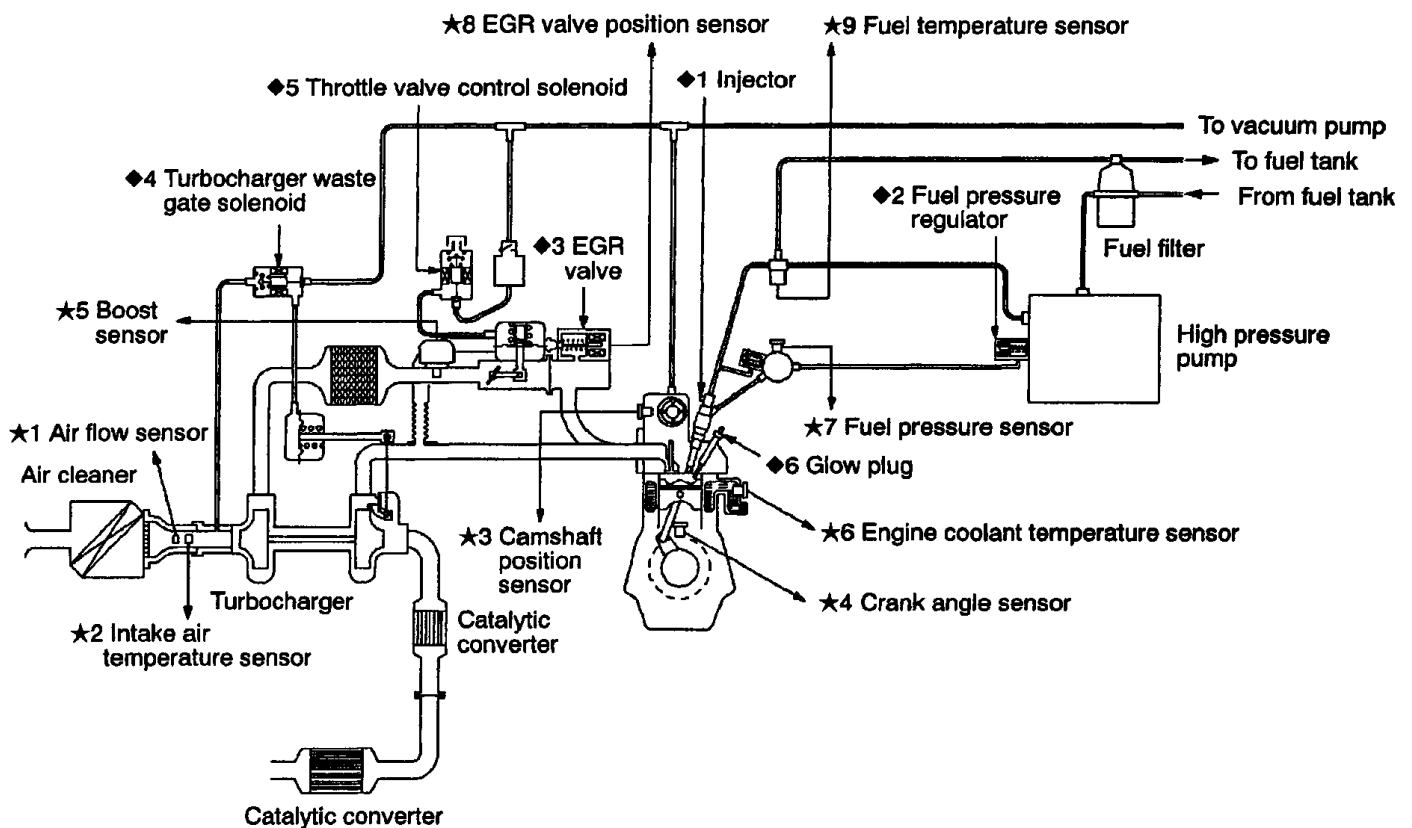
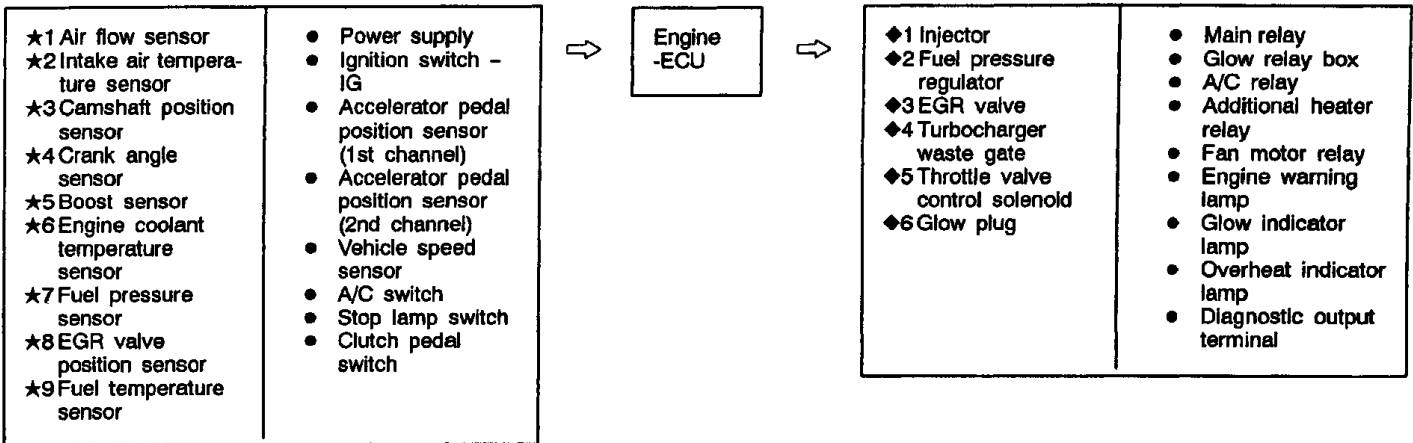
SELF-DIAGNOSIS FUNCTION

- When an abnormality is detected in any of the sensors or actuators, the engine warning lamp illuminates to warn the driver.
- When an abnormality is detected in any of the sensors or actuators, a diagnosis code number corresponding to the problem which occurred is output.
- The RAM data relating to the sensors and actuators which is stored in the engine-ECU can be read using the MUT-II. In addition, the actuators can be force-driven under certain conditions.

OTHER CONTROL FUNCTIONS

1. A/C Relay Control
Turn the compressor clutch of the A/C ON and OFF.
2. Glow Control
Refer to GROUP 16.
3. Fan Control
The revolutions of the radiator fan and condenser fan are controlled in response to the engine coolant temperature and vehicle speed.
4. EGR Control
Refer to GROUP 17.
5. Throttle Valve Control
The throttle valve control solenoid controls vacuum pressure to the throttle actuator to open and close the throttle valve.
6. Boost Pressure Control
Turbocharger waste gate solenoid controls vacuum pressure to the waste gate actuator to control boost pressure.<F9Q1>
Turbocharger waste gate solenoid controls the air flow volume and ratio, which is applied to the turbine, by controlling vacuum pressure to the variable nozzle turbine actuator. <F9Q2>
7. Additional Heater Control
Refer to GROUP 55.

FUEL INJECTION SYSTEM DIAGRAM

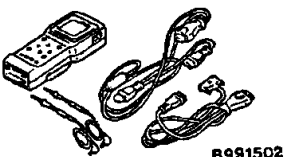
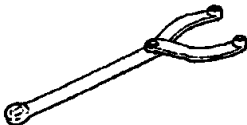
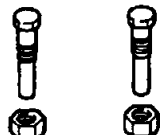


Y6030AJ

SERVICE SPECIFICATIONS

Items		Standard value
Intake air temperature sensor resistance k Ω	at -30°C	24.0 – 27.2
	at 20°C	2.35 – 2.55
	at 100°C	0.180 – 0.186
Engine coolant temperature sensor resistance k Ω	at 25°C	2.14 – 2.36
	at 80°C	0.27 – 0.29
Accelerator pedal position sensor (1st channel) Resistance between terminals (3) and (5) Ω		Approx. 1,200
Accelerator pedal position sensor (2nd channel) Resistance between terminals (2) and (6) Ω		Approx. 1,700
Injector coil resistance Ω (at 20°C)		Approx. 0.33
Fuel temperature sensor resistance k Ω (at 25°C)		2.05
Fuel pressure regulator Ω (at 20°C)		Approx. 5
Crank angle sensor resistance Ω		720 – 880
Throttle valve control solenoid coil resistance Ω (at 25°C)		43 – 49

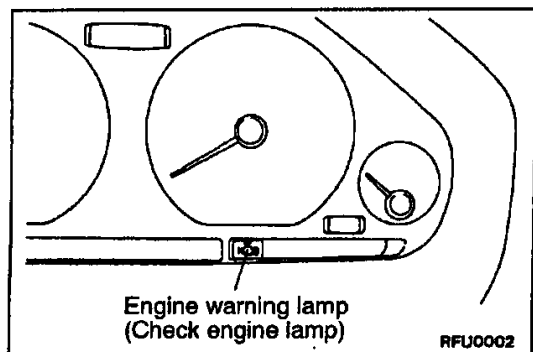
SPECIAL TOOLS

Tool	Number	Name	Use
 MB991502	MB991502	MUT-II sub assembly	• Reading diagnosis code • Checking the fuel injection system
	MB990767	End yoke holder	Holding the fuel high pressure pump sprocket
	MD998719	Crankshaft pulley holder pin	

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502), GROUP 00 – How to Use Troubleshooting/Inspection Service Points.



DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the items related to the electronic controlled injection 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.

NOTE

When the ignition switch is ON, the engine warning lamp illuminates as checking of the engine warning lamp circuit and the bulb, and then the warning lamp is extinguished after a few seconds.

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502), GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

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.
5. Start the engine again and carry out a road test to confirm that the problem has disappeared.

FAIL-SAFE FUNCTION REFERENCE TABLE

Malfunctioning item	Control contents during malfunction
Crank angle sensor system	Engine cut-off
Camshaft position sensor system	Engine cut-off
Fuel pressure sensor system	Engine cut-off
Boost sensor system	• Turbocharger waste gate control is stopped • EGR control is stopped
Air flow sensor system	EGR control is stopped
Engine coolant temperature sensor system	• The coolant temperature is regulated as specified • The radiator fan is driven
Intake air temperature sensor system	Thermoplunger control is stopped
EGR valve position sensor system	EGR control is stopped
Immobilizer system	The engine is immobilized. However, the engine is not cut-off while the engine is running
EGR valve system	• Turbocharger waste gate control is stopped • EGR control is stopped
Turbocharger waste gate solenoid system	• Turbocharger waste gate control is stopped • EGR control is stopped
Fuel pressure regulator system	Engine cut-off
Fuel pressure system	Engine cut-off
Engine-ECU	Engine cut-off
Additional heater relay system	Thermoplunger control is stopped

INSPECTION CHART FOR DIAGNOSIS CODES

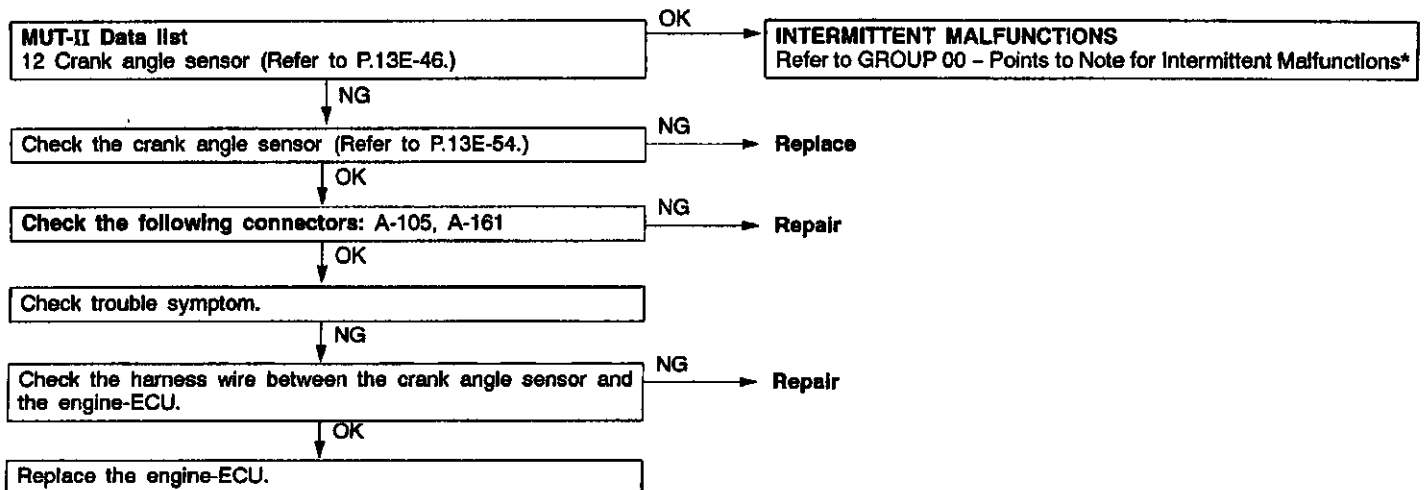
Caution

Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.

Code No.	Diagnosis item	Reference page
11	Crank angle sensor system	13E-8
12	Camshaft position sensor system	13E-9
13	Accelerator pedal position sensor (1st channel) system	13E-10
14	Accelerator pedal position sensor (2nd channel) system	13E-11
15	Fuel pressure sensor system	13E-12
16	Boost sensor system	13E-13
17	Barometric pressure sensor system	13E-14
18	Air flow sensor system	13E-15
19	Engine coolant temperature sensor system	13E-16
21	Fuel temperature sensor system	13E-17
22	Intake air temperature sensor system	13E-18
23	EGR valve position sensor system	13E-19
24	Glow relay box system	13E-20
25	Immobilizer system	13E-21
26	EGR valve system	13E-22
27	Turbocharger waste gate solenoid system	13E-23
28	Fuel pressure regulator system	13E-24
29	No. 1 injector system	13E-25
31	No. 2 injector system	13E-25
32	No. 3 injector system	13E-26
33	No. 4 injector system	13E-26
34	Glow plug system	13E-27
35	Vehicle speed sensor system	13E-27
36	Fuel pressure system	13E-28
37	Throttle valve control solenoid system	13E-29
38	Engine-ECU	13E-30
40	Additional heater relay system	13E-30
41	Fan control relay (low) system	13E-31
42	Stop lamp switch system	13E-31
43	Clutch pedal switch system	13E-32
44	Power latch system	13E-32
45	Main relay system	13E-33
46	Power supply system	13E-34
47	ECU alimentation	13E-34

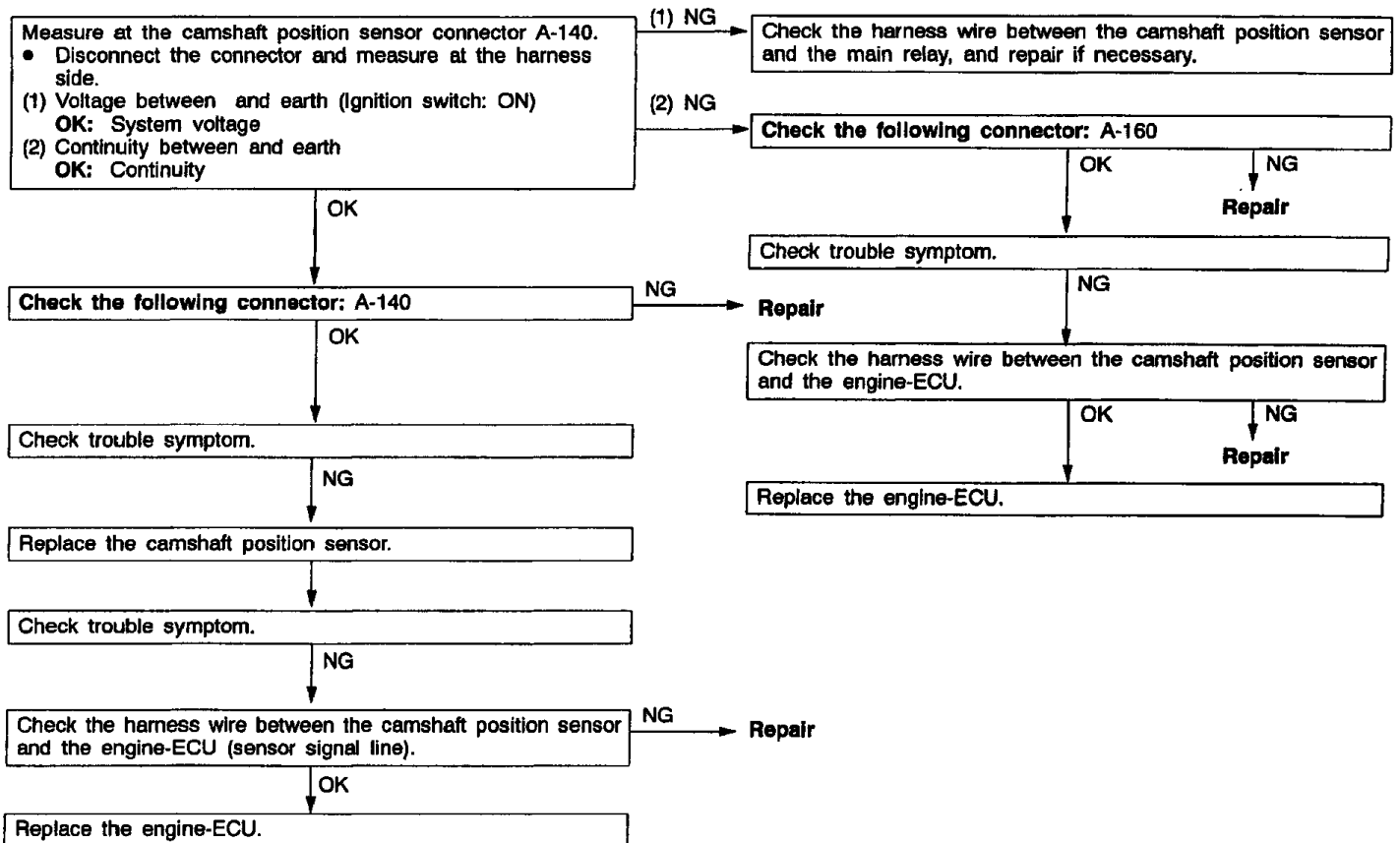
INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Crank angle sensor system	Probable cause
Range of Check • During engine running Set Conditions • Sensor output voltage does not change (no pulse signal input) or • Sensor output value is 5,000 r/min or more for 1 second	• Malfunction of the crank angle sensor • Improper connector contact, open circuit or short-circuited harness wire of the crank angle sensor circuit • Malfunction of the engine-ECU

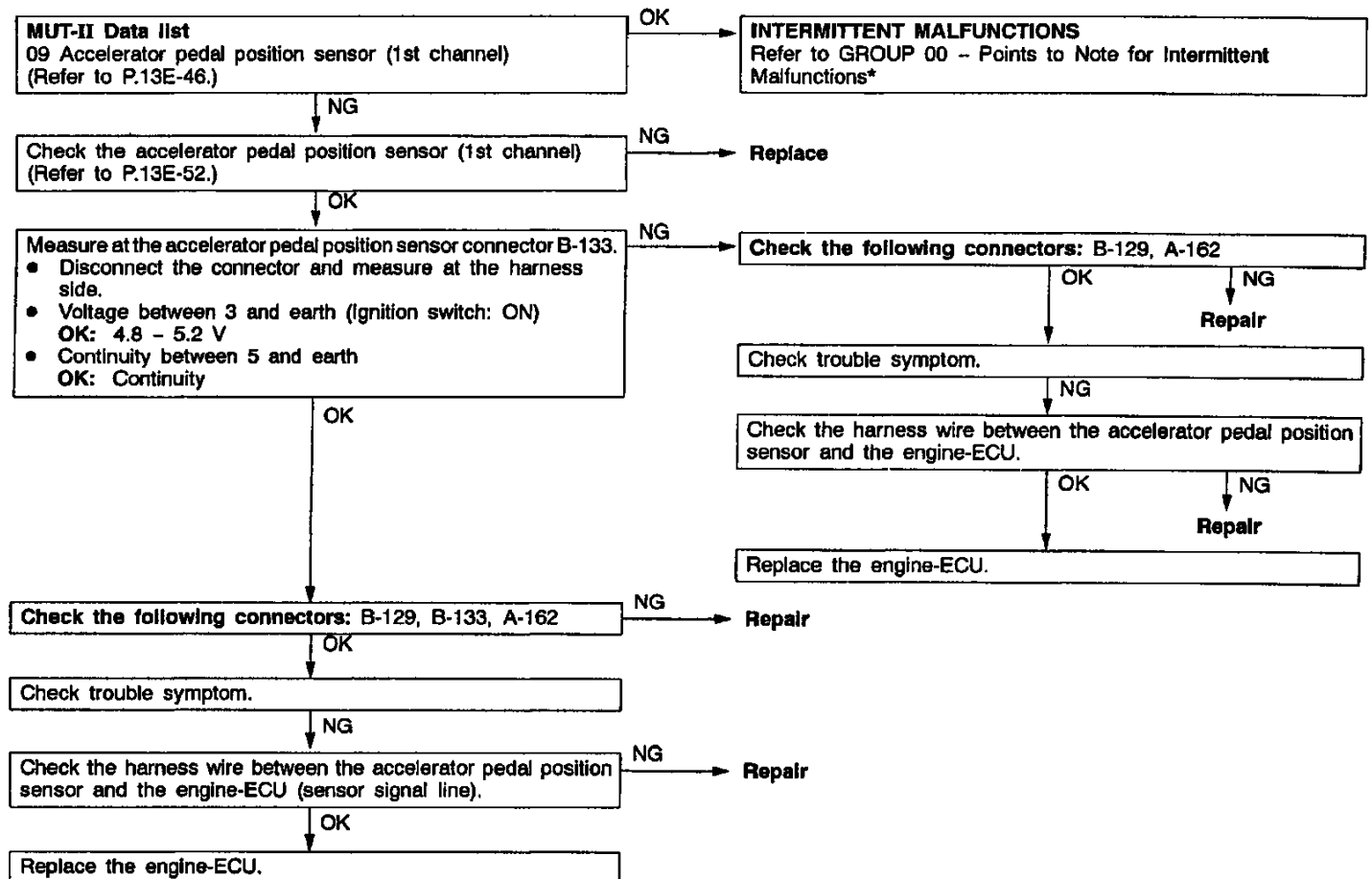


*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 12 Camshaft position sensor system	Probable cause
Range of Check - During engine running Set Conditions - Sensor output voltage does not change for 0.5 second (no pulse signal input) Range of Check - During engine running - Pulse signal detected two or more times Set Conditions - Not synchronized with crank angle sensor output or - Crank angle sensor output voltage does not change for 0.5 second (no pulse signal input)	- Malfunction of the camshaft position sensor - Improper connector contact, open circuit or short-circuited harness wire of the camshaft position sensor circuit - Malfunction of the engine-ECU

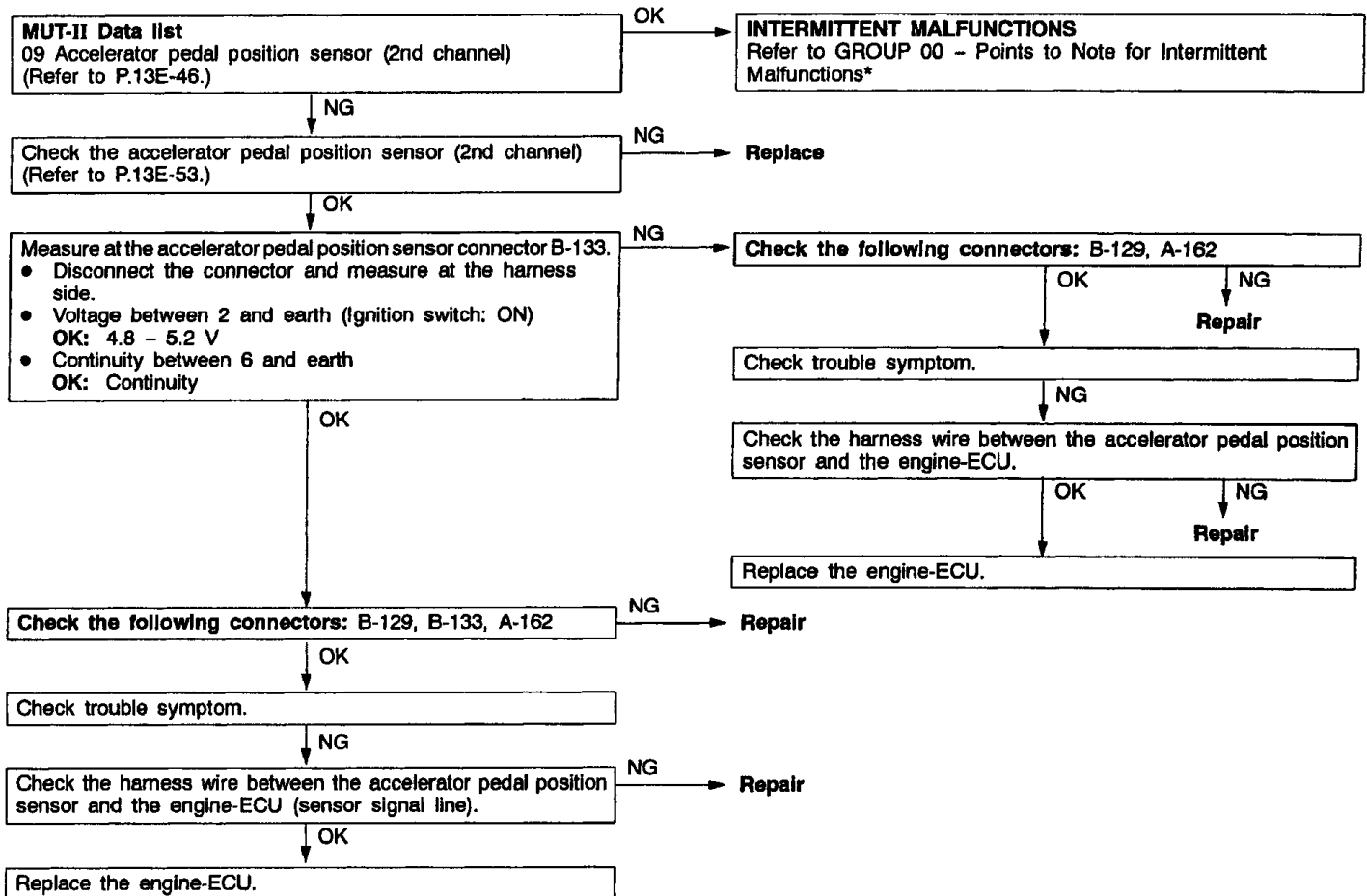


Code No. 13 Accelerator pedal position sensor (1st channel) system	Probable cause
Range of Check - Ignition switch: ON Set Conditions - Sensor output voltage is 200 mV or less - or - Sensor output voltage is 4.750 mV or more	- Malfunction of the accelerator pedal position sensor (1st channel) - Improper connector contact, open circuit or short-circuited harness wire of the accelerator pedal position sensor (1st channel) circuit - Malfunction of the engine-ECU



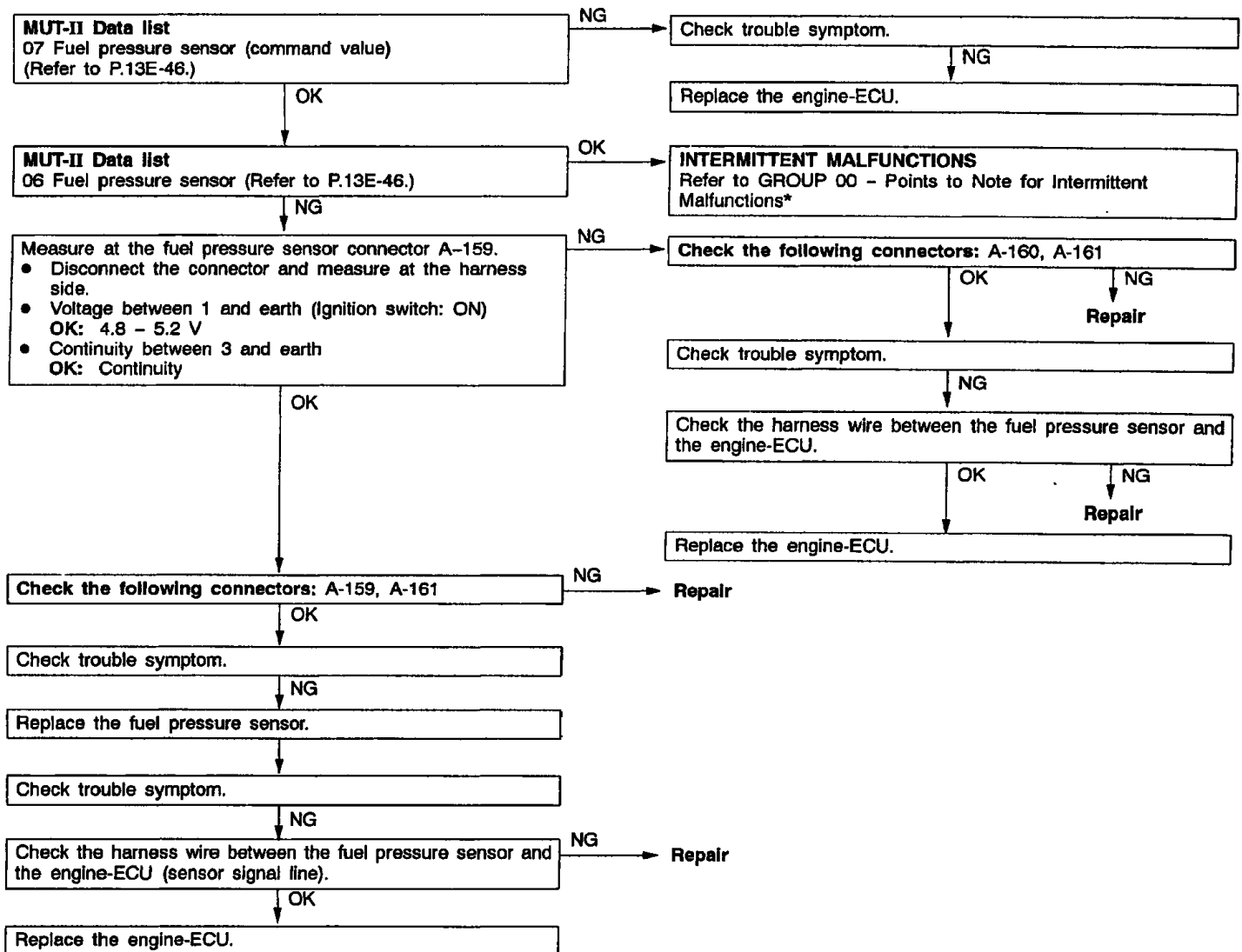
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 14 Accelerator pedal position sensor (2nd channel) system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 200 mV or less or • Sensor output voltage is 2,500 mV or more Range of Check • Ignition switch: ON Set Conditions • Output difference compared to accelerator pedal position sensor (1st channel) is 6 % or more	• Malfunction of the accelerator pedal position sensor (2nd channel) • Improper connector contact, open circuit or short-circuited harness wire of the accelerator pedal position sensor (2nd channel) circuit • Malfunction of the engine-ECU



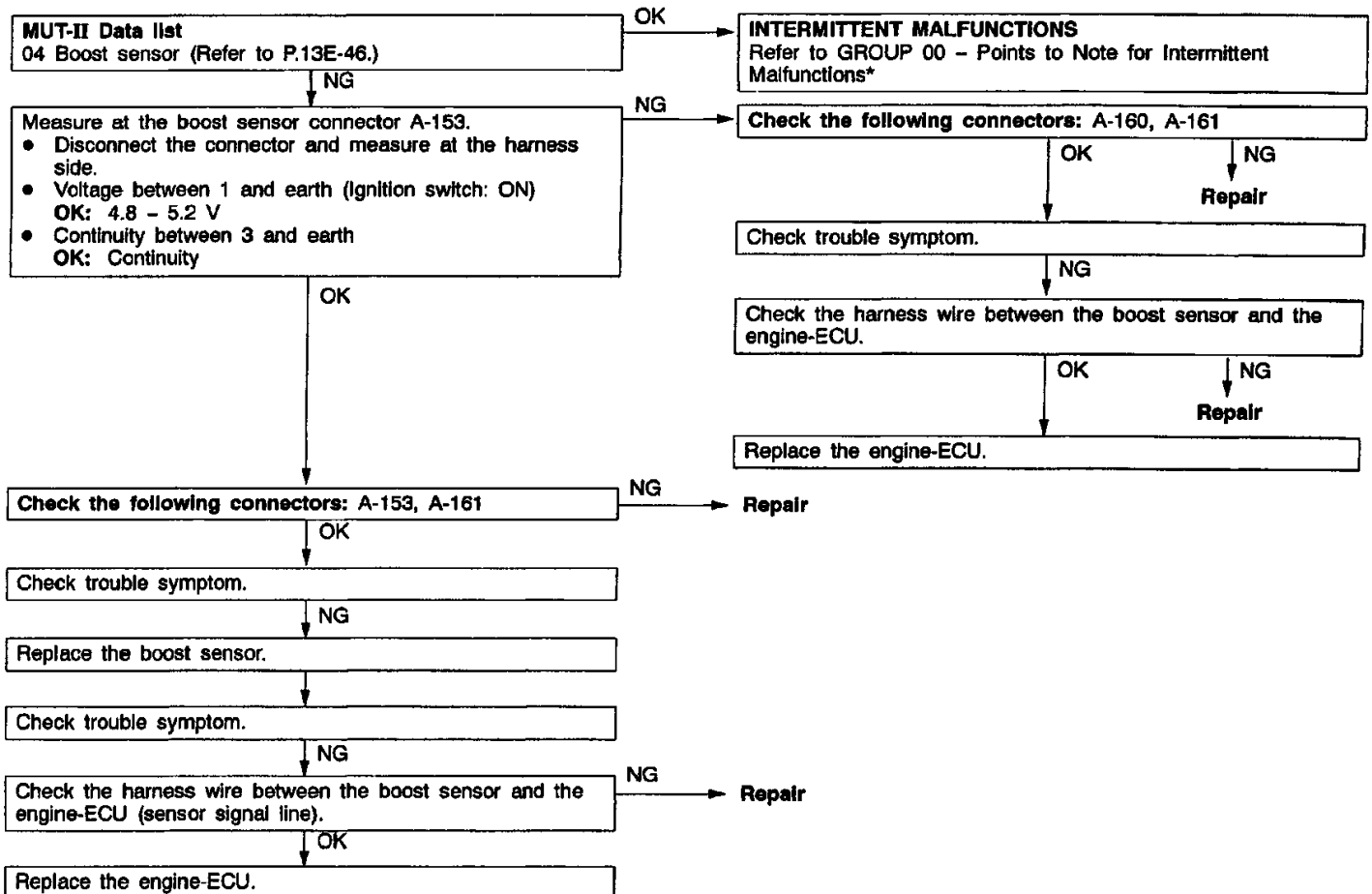
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 15 Fuel pressure sensor system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 250 mV or less or • Sensor output voltage is 4,750 mV or more Range of Check • During engine running Set Conditions • Fuel pressure varies greatly from command value	• Malfunction of the fuel pressure sensor • Improper connector contact, open circuit or short-circuited harness wire of the fuel pressure sensor circuit • Malfunction of the engine-ECU



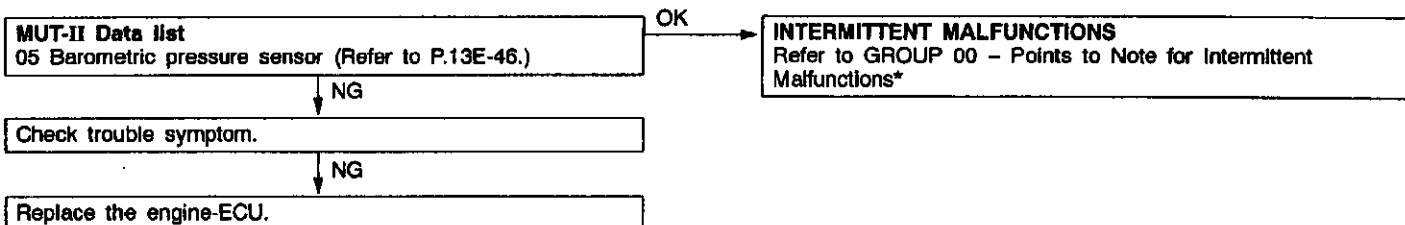
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 16 Boost sensor system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 100 mV or less for 1 second or • Sensor output voltage is 4,900 mV or more for 1 second Range of Check • Engine speed: 900 r/min or less Set Conditions • Variation from barometric pressure sensor output signal is 15 kPa or more for 4.6 seconds	• Malfunction of the boost sensor • Improper connector contact, open circuit or short-circuited harness wire of the boost sensor circuit • Malfunction of the engine-ECU



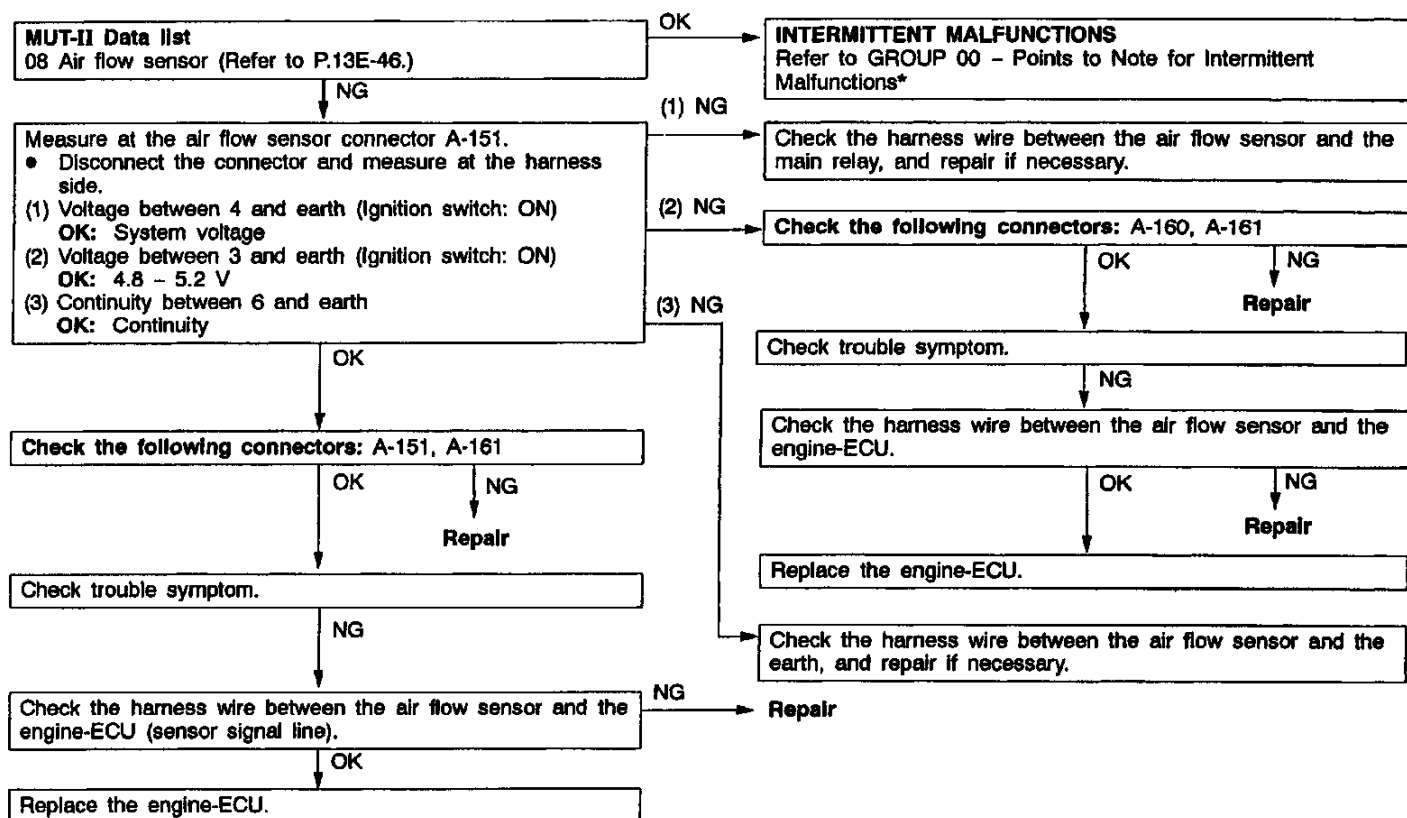
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 17 Barometric pressure sensor system	Probable cause
Range of Check - Ignition switch: ON Set Conditions - Sensor output voltage is 200 mV or less for 1 second - or - Sensor output voltage is 4,950 mV or more for 1 second	- Malfunction of the barometric pressure sensor - Malfunction of the engine-ECU



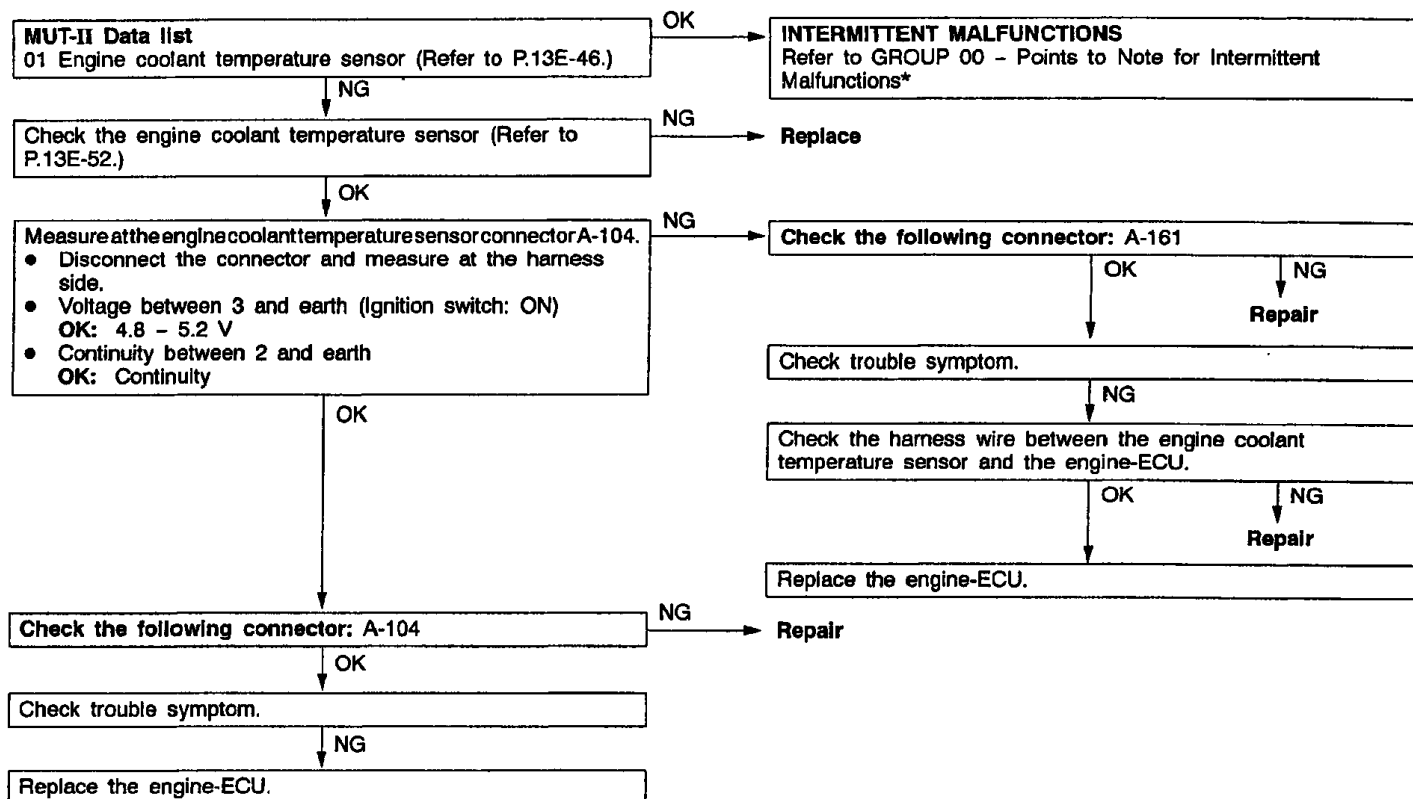
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 18 Air flow sensor system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 100 mV or less for 1.5 seconds or • Sensor output voltage is 1,200 mV or more for 1.5 seconds Range of Check • Engine speed : 700 r/min or more Set Conditions • Sensor output is 10 kg/h or less for 1 second	• Malfunction of the air flow sensor • Improper connector contact, open circuit or short-circuited harness wire of the air flow sensor circuit • Malfunction of the engine-ECU



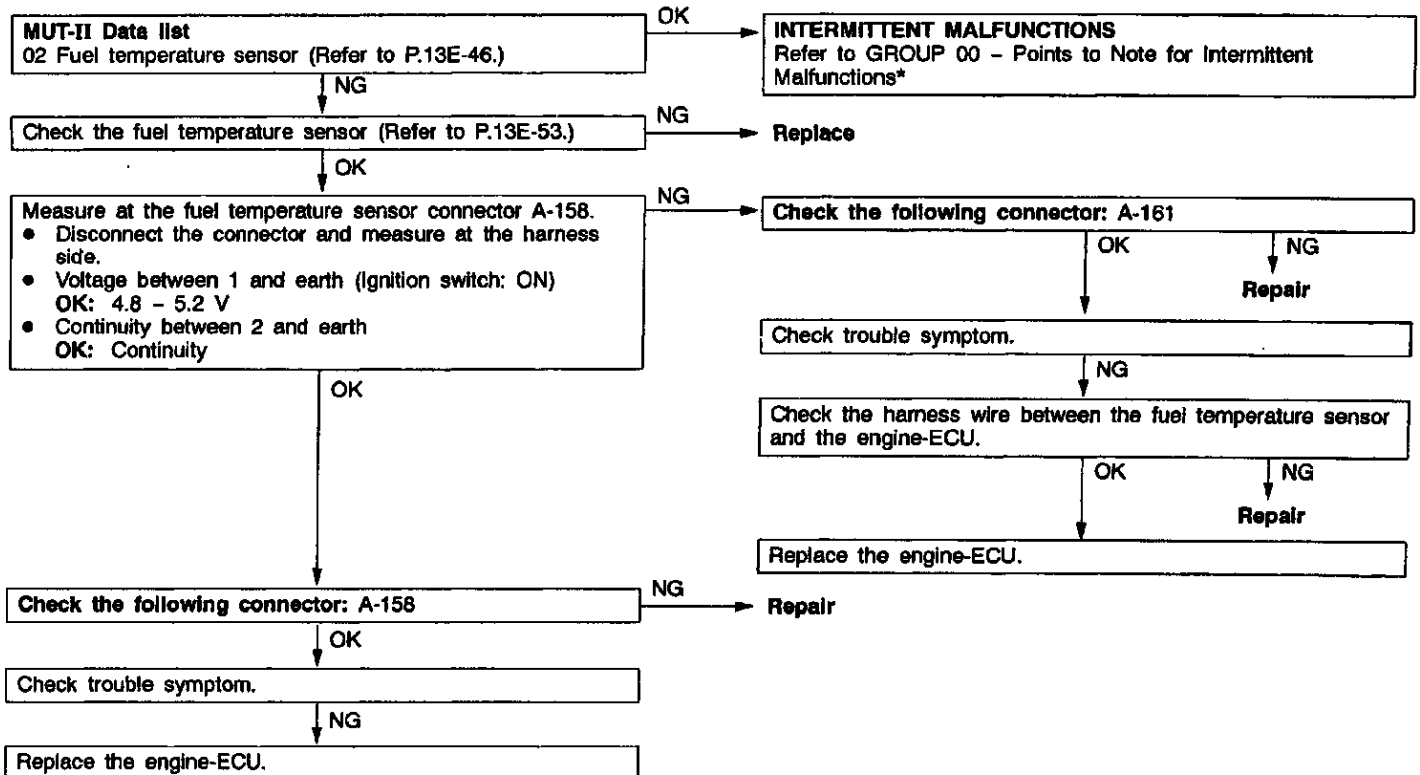
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 19 Engine coolant temperature sensor system	Probable cause
Range of Check - Ignition switch: ON Set Conditions - Sensor output voltage is 100 mV or less for 1 second or - Sensor output voltage is 4,900 mV or more for 1 second	- Malfunction of the engine coolant temperature sensor - Improper connector contact, open circuit or short-circuited harness wire of the engine coolant temperature sensor circuit - Malfunction of the engine-ECU



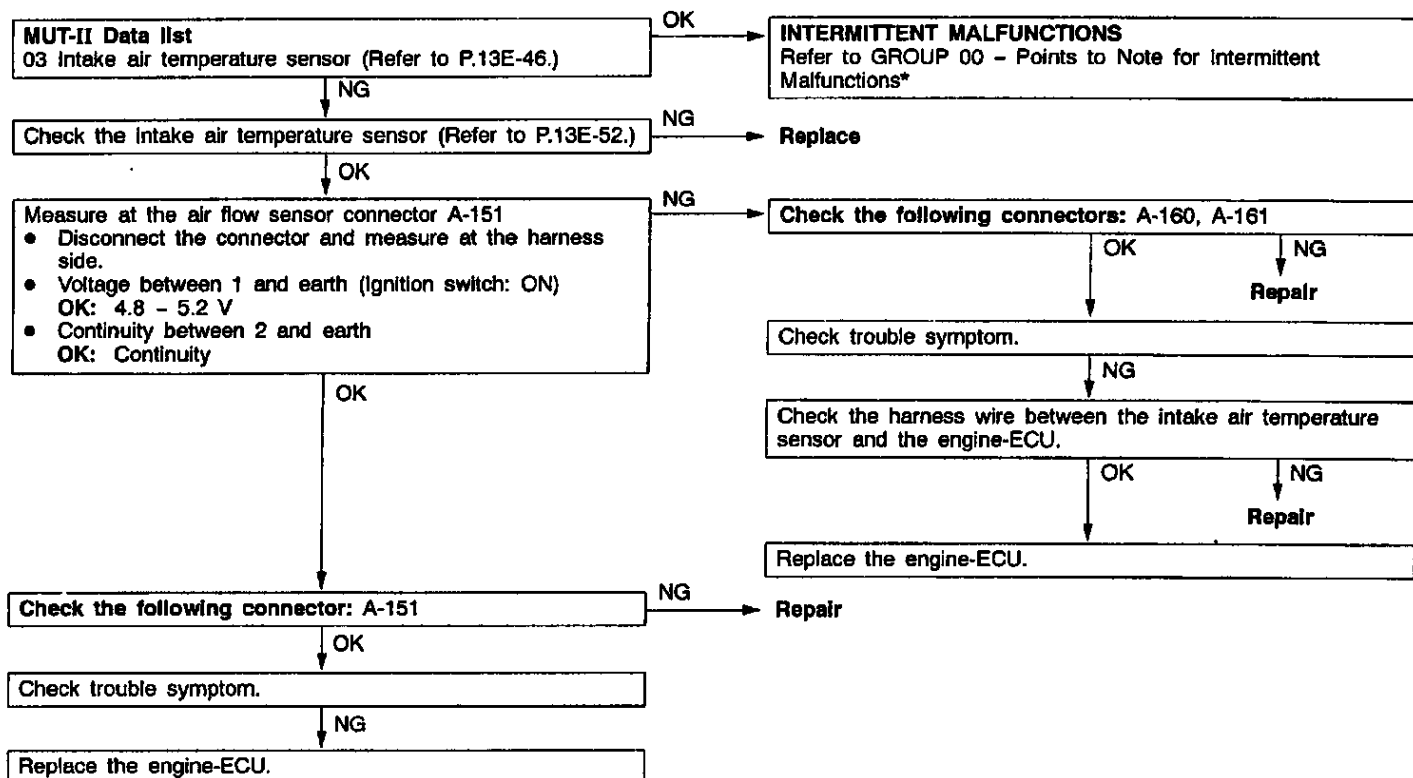
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 21 Fuel temperature sensor system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 100 mV or less for 1 second or • Sensor output voltage is 4,900 mV or more for 1 second	• Malfunction of the fuel temperature sensor • Improper connector contact, open circuit or short-circuited harness wire of the fuel temperature sensor circuit • Malfunction of the engine-ECU



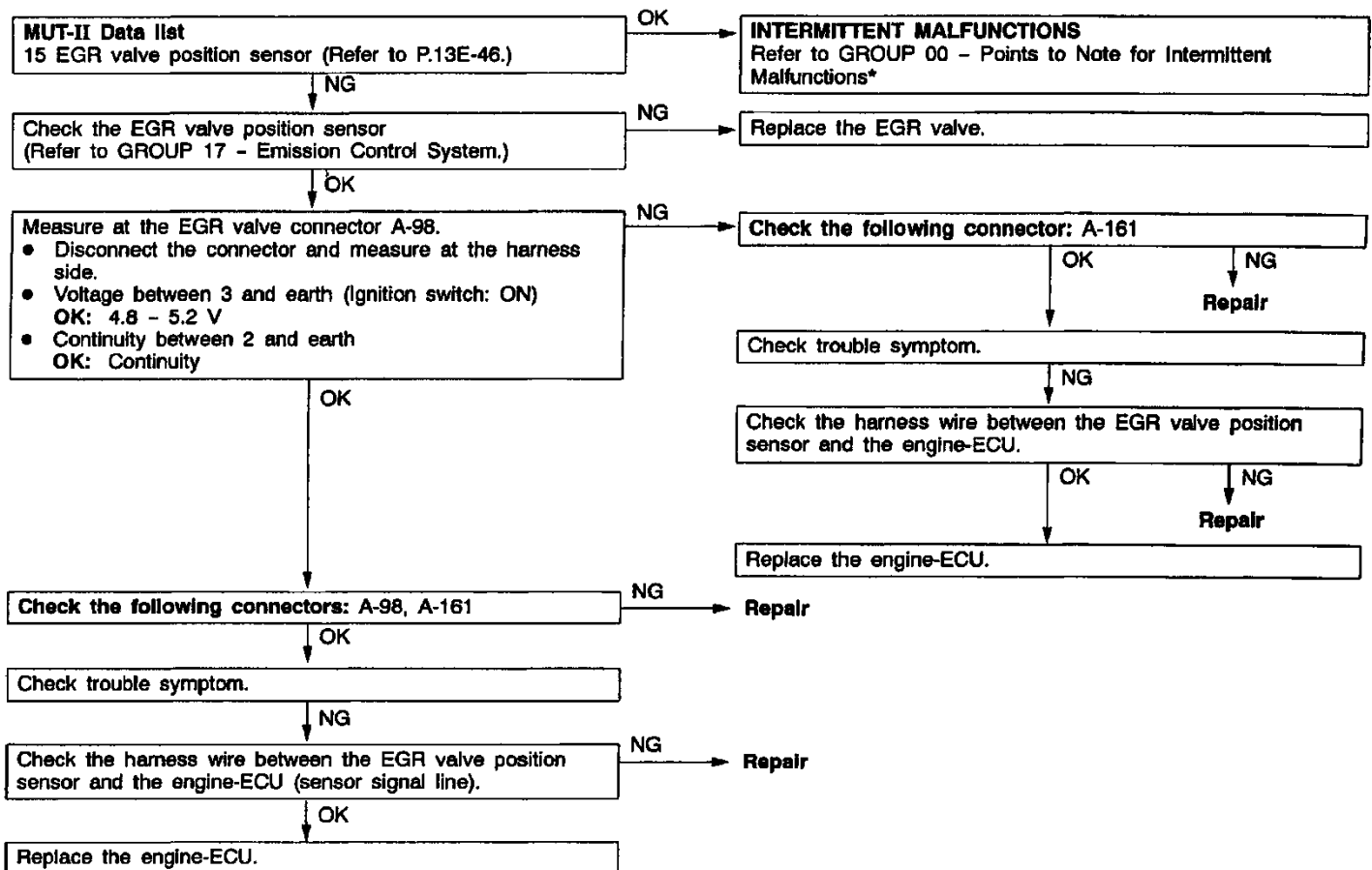
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 22 Intake air temperature sensor system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 100 mV or less for 1 second or • Sensor output voltage is 4,850 mV or more for 1 second	• Malfunction of the intake air temperature sensor • Improper connector contact, open circuit or short-circuited harness wire of the intake air temperature sensor circuit • Malfunction of the engine-ECU



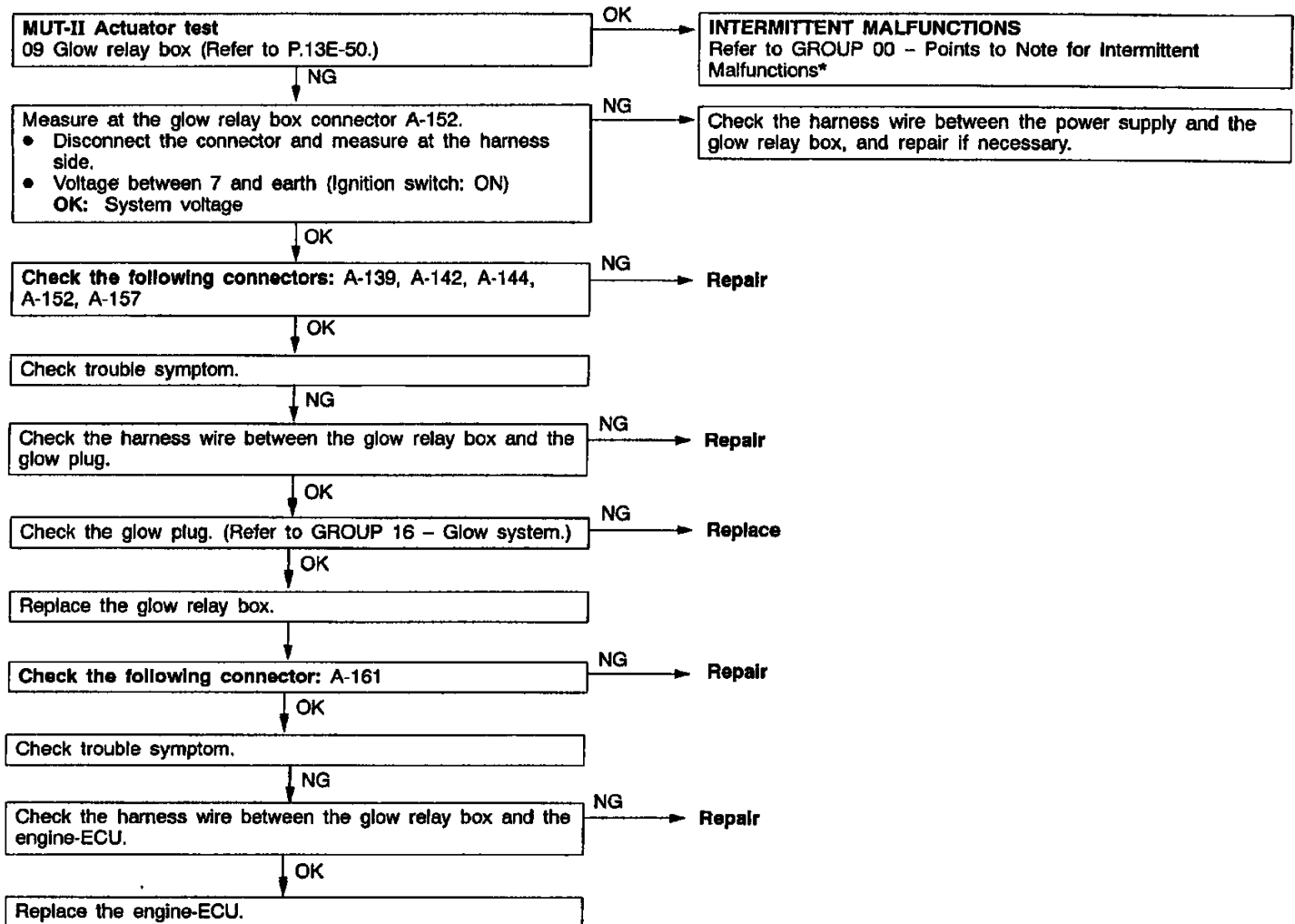
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 23 EGR valve position sensor system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 250 mV or less for 1 second or • Sensor output voltage is 4,700 mV or more for 1 second Range of Check • Ignition switch: OFF → ON Set Conditions • Sensor output voltage is 1,500 mV or more for 1 second	• Malfunction of the EGR valve position sensor • Improper connector contact, open circuit or short-circuited harness wire of the EGR valve position sensor circuit • Malfunction of the engine-ECU



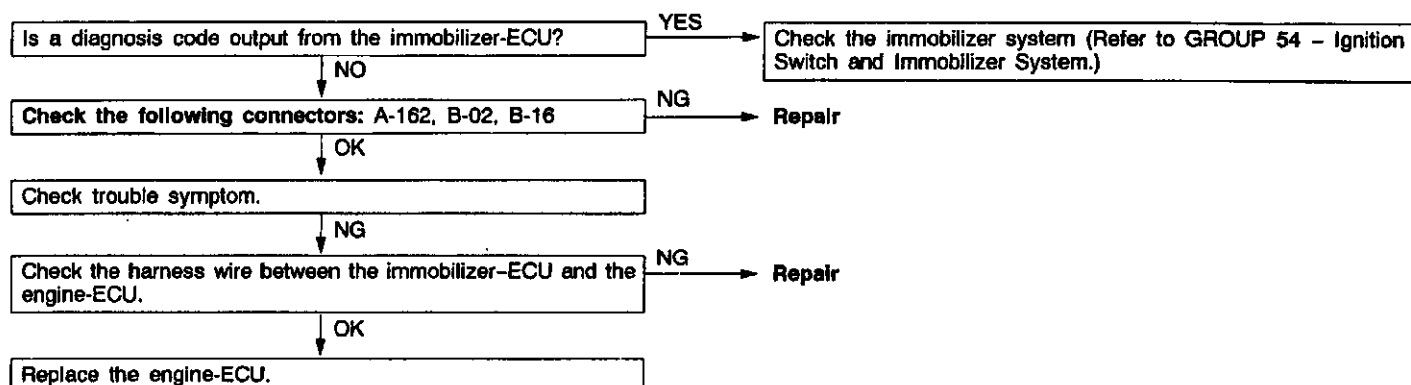
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 24 Glow relay box system	Probable cause
Range of Check • Ignition switch: OFF→ON Set Conditions • Trouble signal input from the glow relay box	• Malfunction of the glow relay box • Improper connector contact, open circuit or short-circuited harness wire of the glow relay box circuit • Malfunction of the engine-ECU



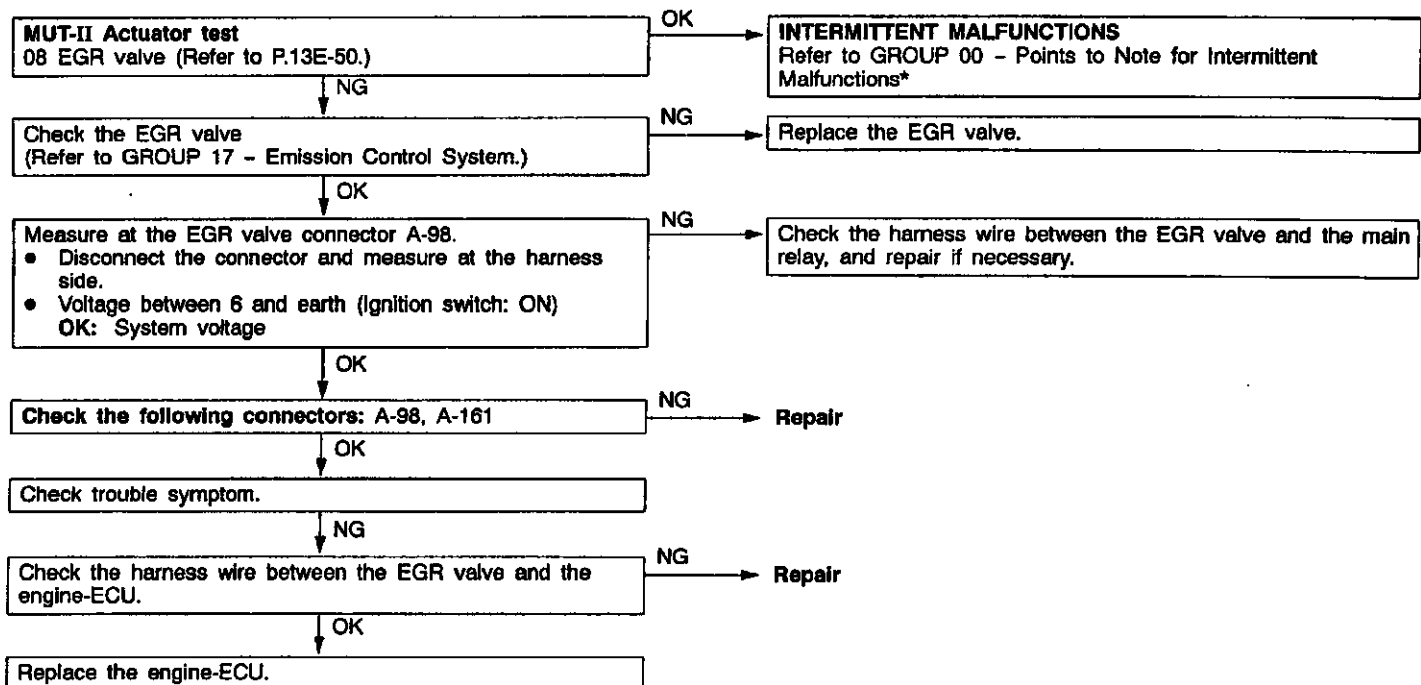
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 25 Immobilizer system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Improper communication between the engine-ECU and Immobilizer-ECU	• Malfunction of the immobilizer-ECU • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU

**NOTE**

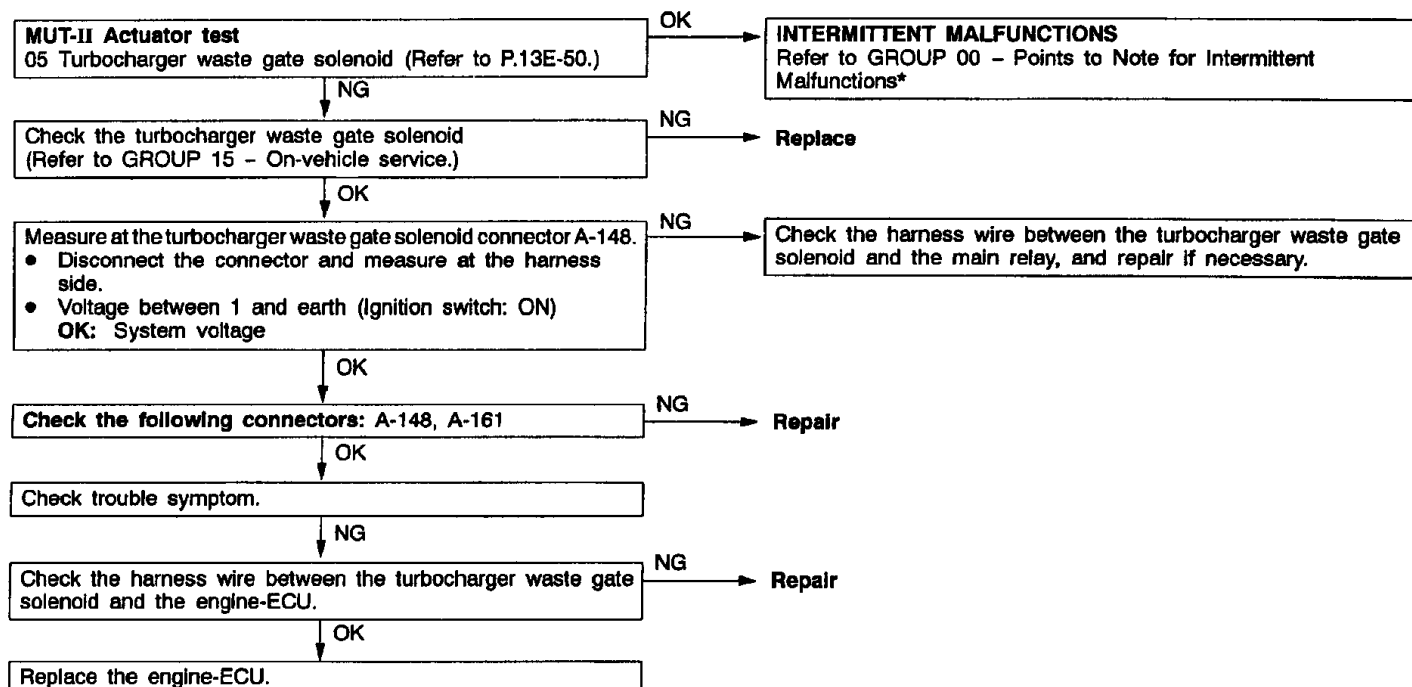
If the engine-ECU is replaced, the immobilizer-ECU and ignition key should be replaced together with it.

Code No. 26 EGR valve system	Probable cause
	• Malfunction of the EGR valve • Improper connector contact, open circuit or short-circuited harness wire of the EGR valve circuit • Malfunction of the engine-ECU



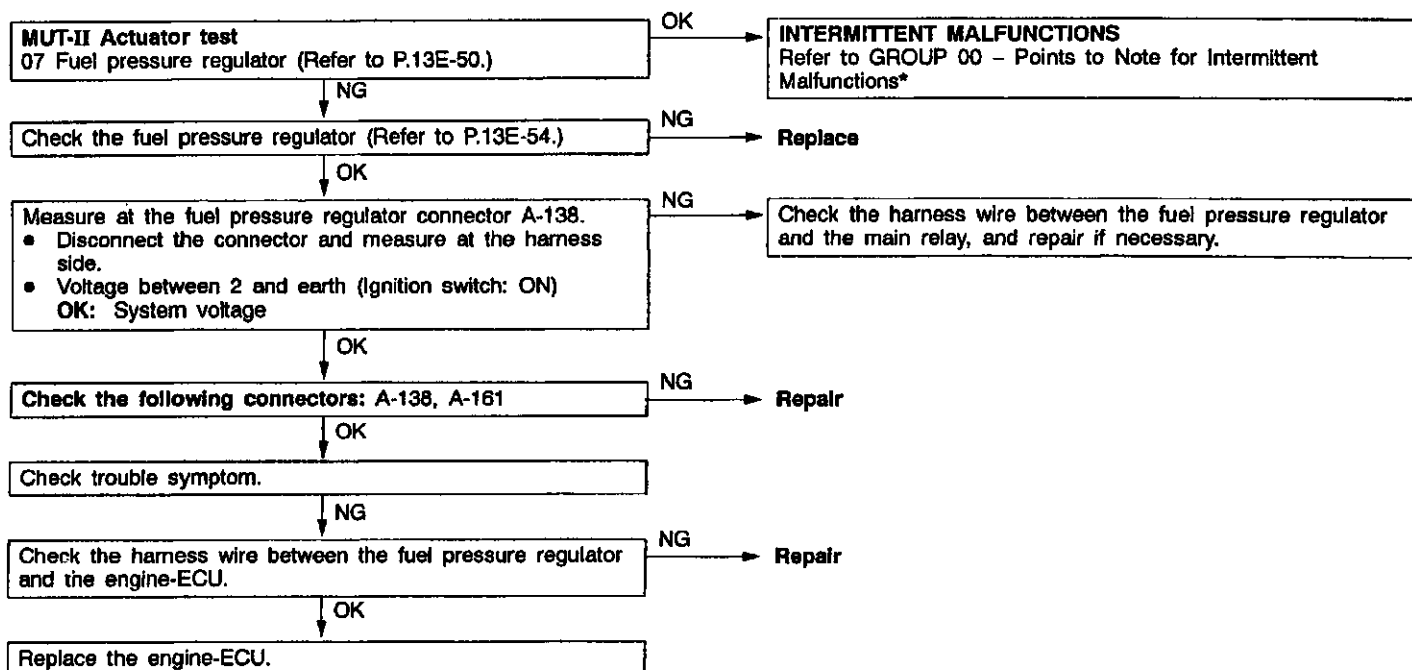
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 27 Turbocharger waste gate solenoid system	Probable cause
	- Malfunction of the turbocharger waste gate solenoid - Improper connector contact, open circuit or short-circuited harness wire of the turbocharger waste gate solenoid circuit - Malfunction of the engine-ECU



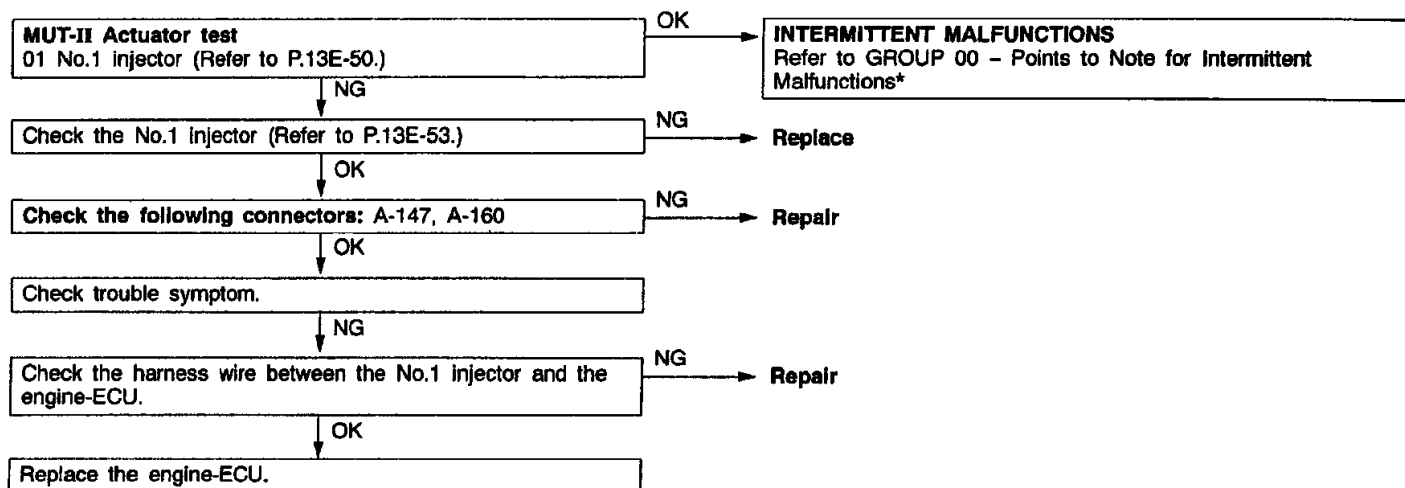
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 28 Fuel pressure regulator system	Probable cause
	• Malfunction of the fuel pressure regulator • Improper connector contact, open circuit or short-circuited harness wire of the fuel pressure regulator circuit • Malfunction of the engine-ECU



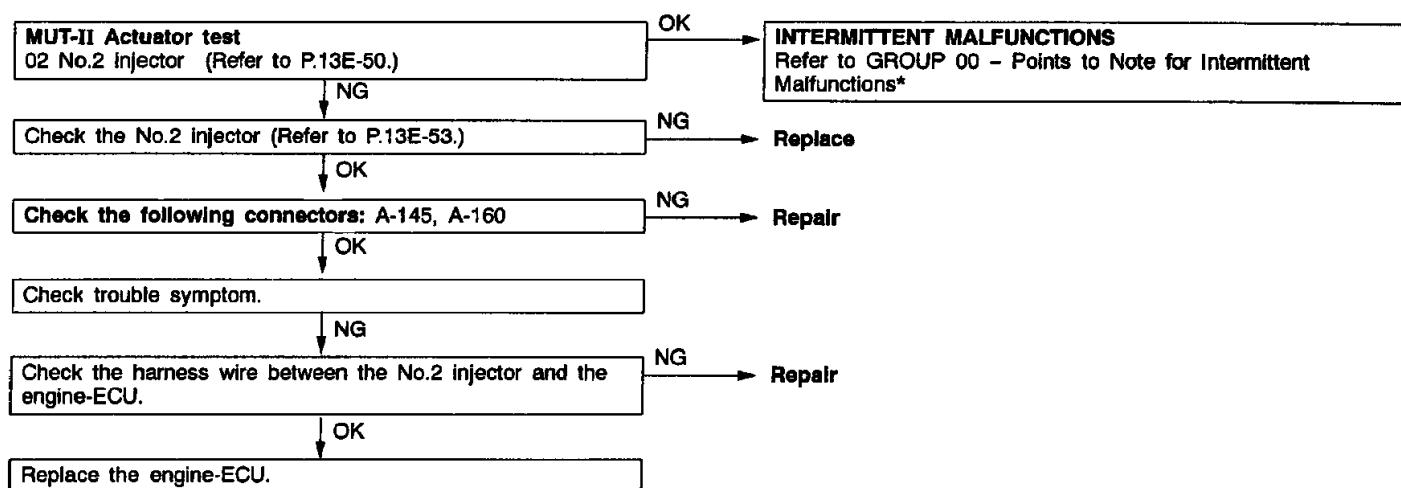
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 29 No.1 injector system	Probable cause
	• Malfunction of the No.1 injector • Improper connector contact, open circuit or short-circuited harness wire of the No.1 injector circuit • Malfunction of the engine-ECU



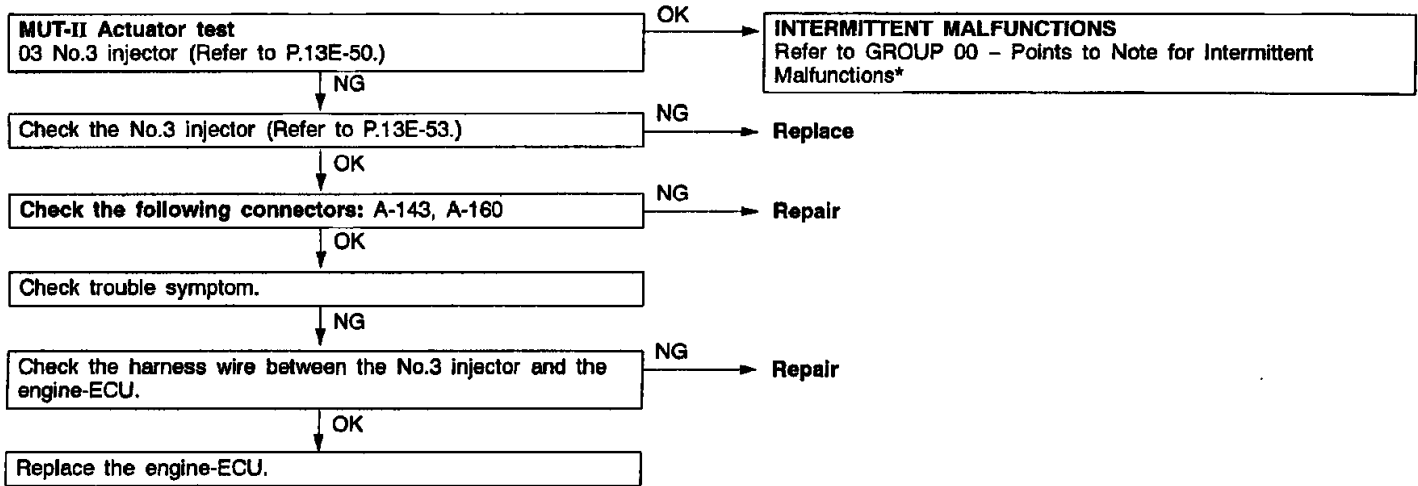
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 31 No.2 injector system	Probable cause
	• Malfunction of the No.2 injector • Improper connector contact, open circuit or short-circuited harness wire of the No.2 injector circuit • Malfunction of the engine-ECU



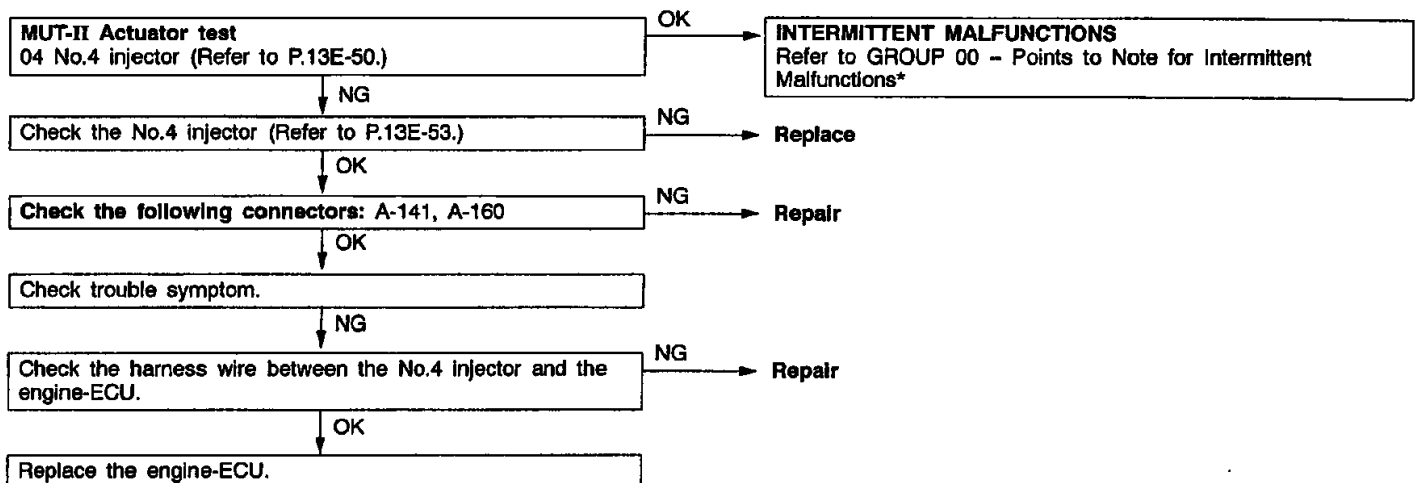
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 32 No.3 injector system	Probable cause
	• Malfunction of the No.3 injector • Improper connector contact, open circuit or short-circuited harness wire of the No.3 injector circuit • Malfunction of the engine-ECU



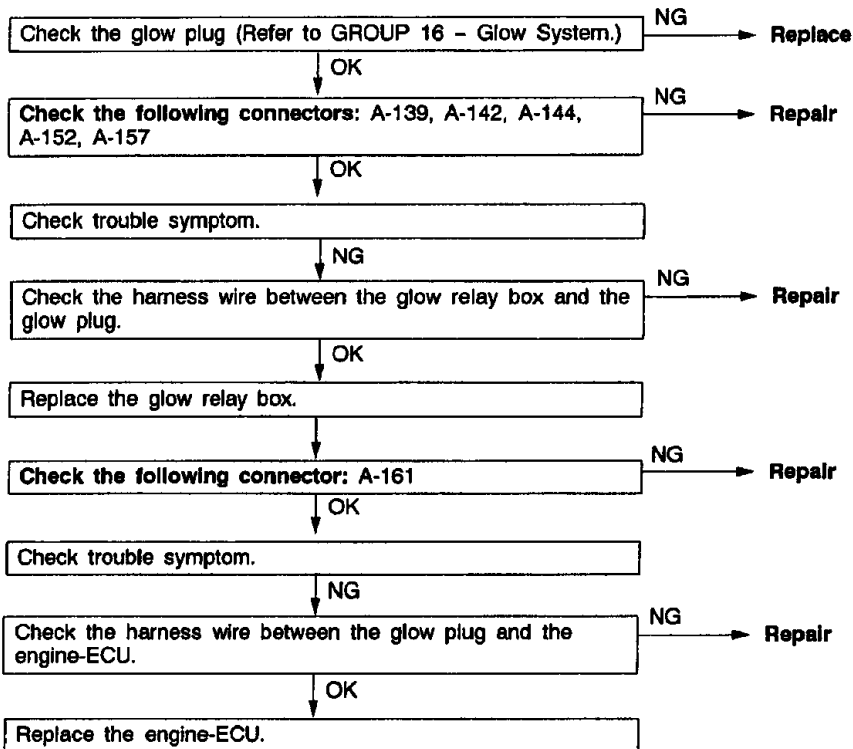
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 33 No.4 injector system	Probable cause
	• Malfunction of the No.4 injector • Improper connector contact, open circuit or short-circuited harness wire of the No.4 injector circuit • Malfunction of the engine-ECU



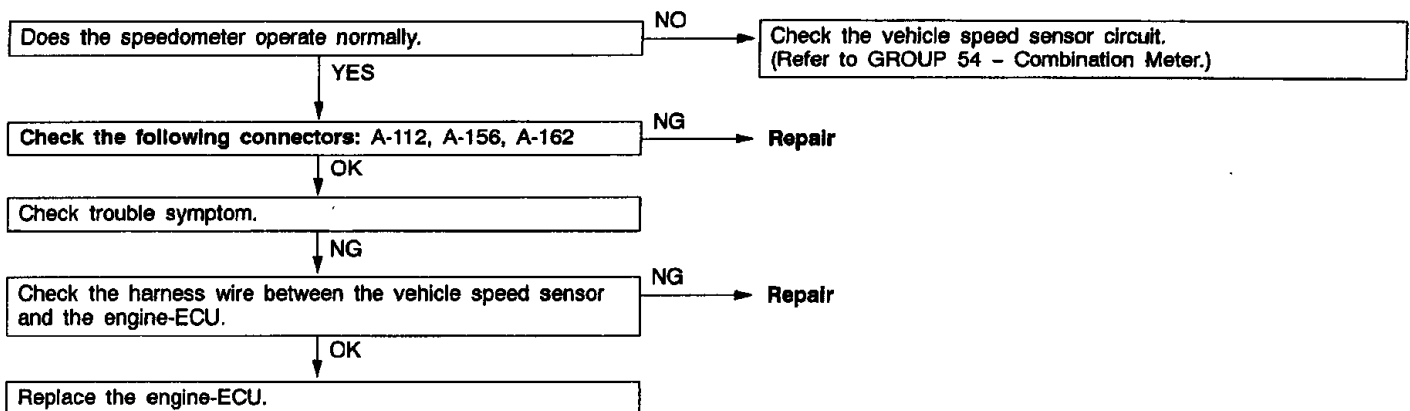
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 34 Glow plug system	Probable cause
	• Malfunction of the glow plug • Improper connector contact, open circuit or short-circuited harness wire of the glow plug circuit • Malfunction of the engine-ECU

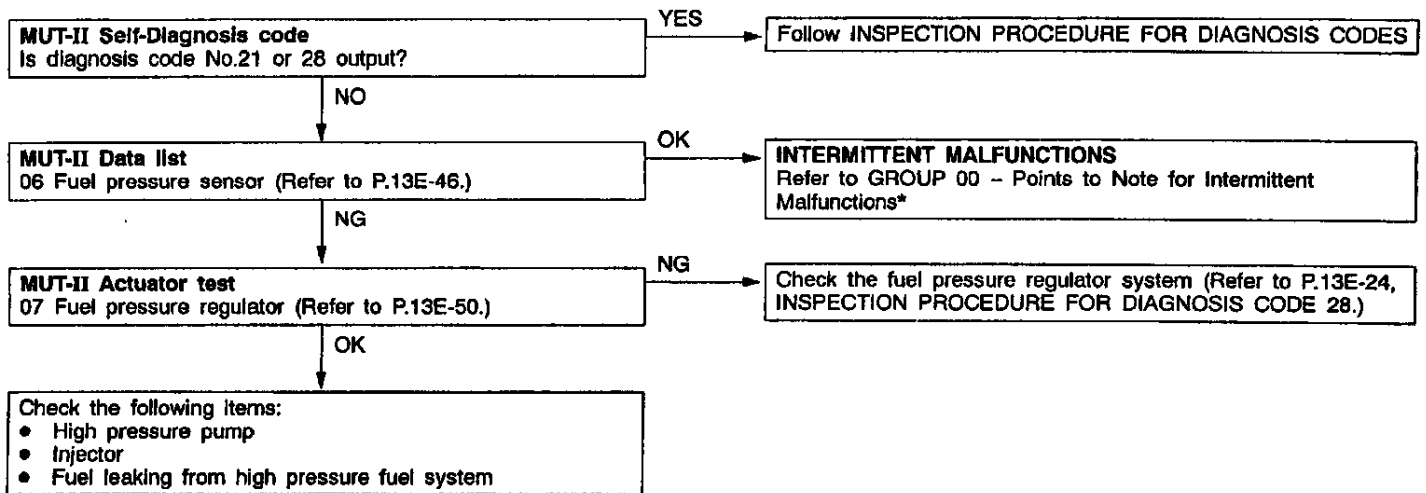


*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 35 Vehicle speed sensor system	Probable cause
Range of Check • Ignition switch: ON or • During engine running Set Conditions • Sensor output voltage corresponds to a speed of 250 km/h or more for 1 second	• Malfunction of the vehicle speed sensor • Improper connector contact, open circuit or short-circuited harness wire of the vehicle speed sensor circuit • Malfunction of the engine-ECU

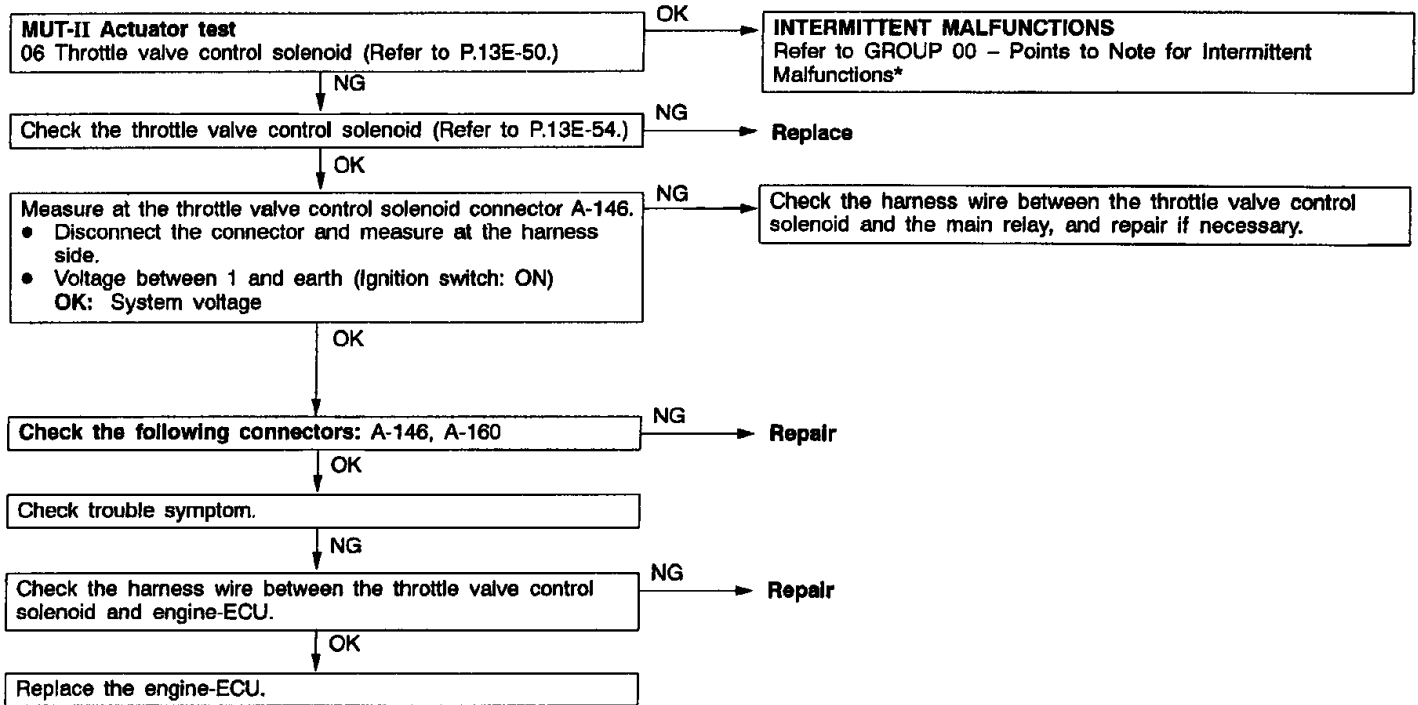


Code No. 36 Fuel pressure system	Probable cause
	• Malfunction of the high pressure pump • Malfunction of the injector • Seized fuel pressure regulator • Fuel leaking from high pressure fuel system



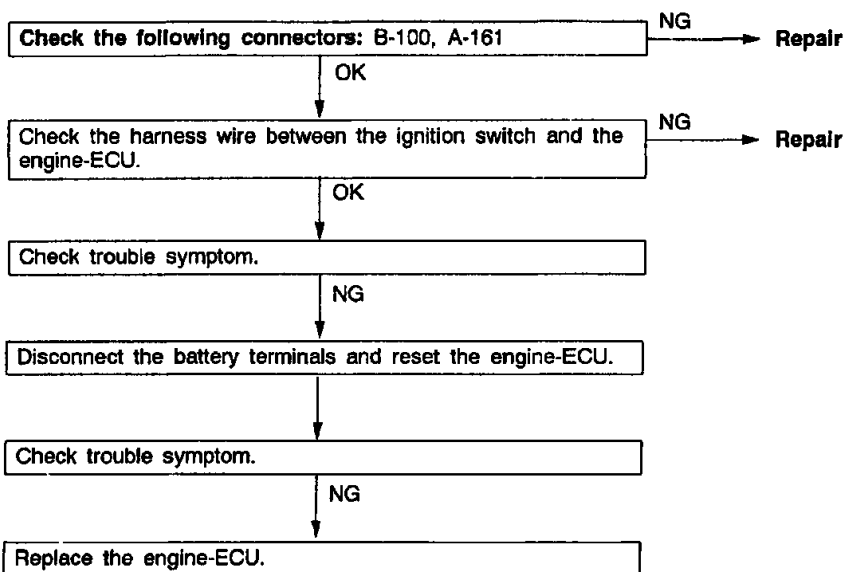
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 37 Throttle valve control solenoid system	Probable cause
	• Malfunction of the throttle valve control solenoid • Improper connector contact, open circuit or short-circuited harness wire of the throttle valve control solenoid circuit • Malfunction of the engine-ECU

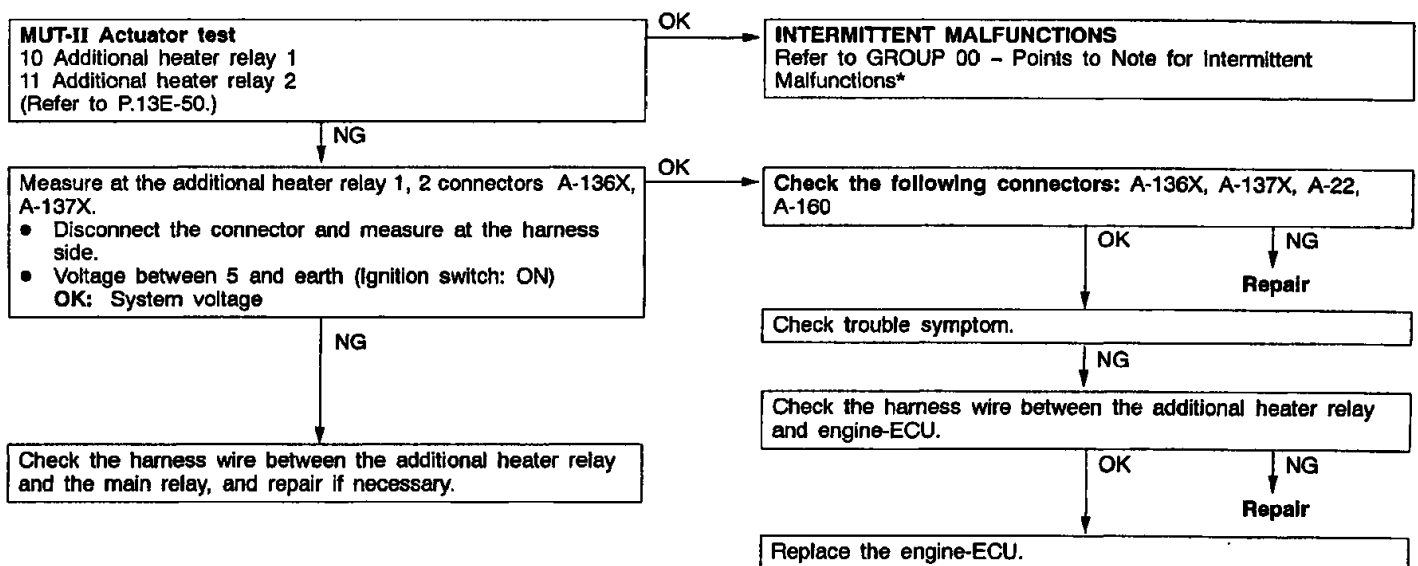


*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 38 Engine-ECU	Probable cause
	Malfunction of the engine-ECU

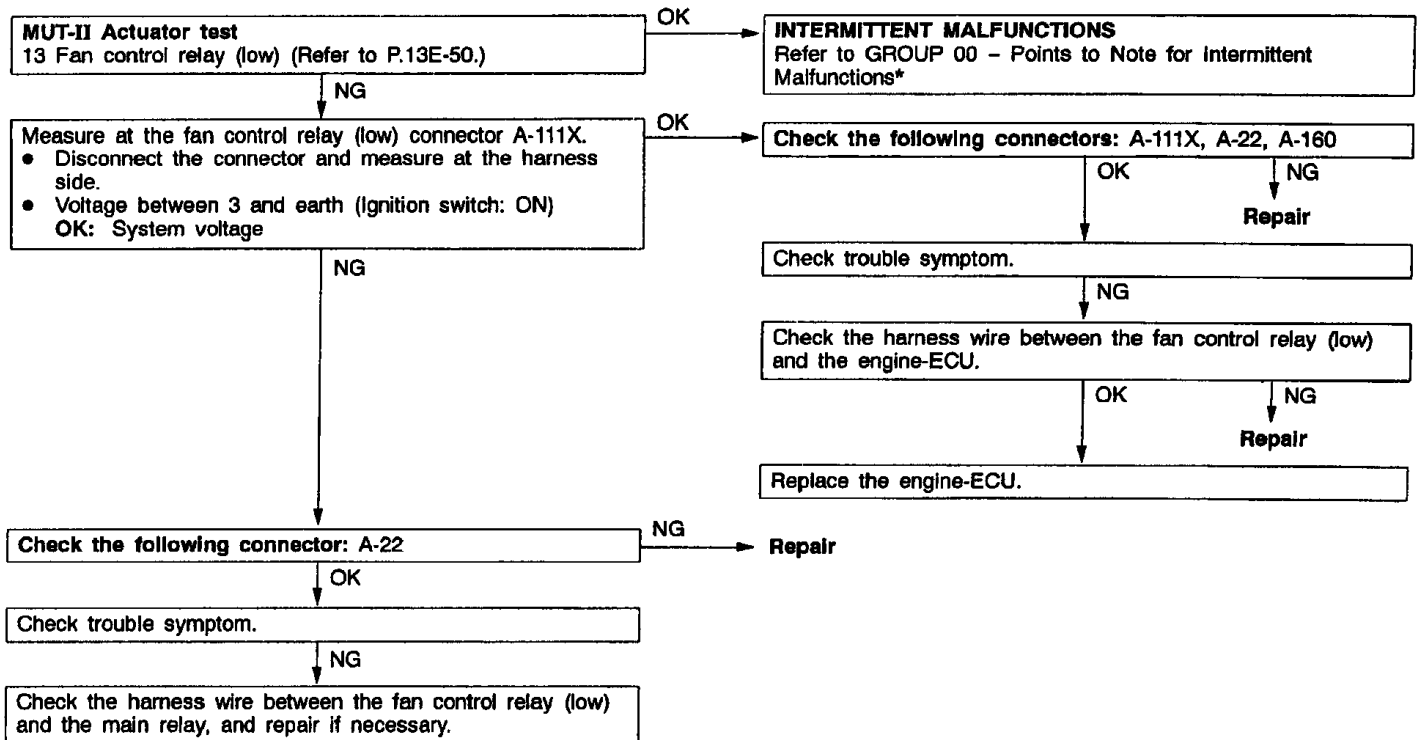


Code No. 40 Additional heater relay system	Probable cause
	- Malfunction of the additional heater relay 1, 2 - Improper connector contact, open circuit or short-circuited harness wire of the additional heater relay circuit - Malfunction of the engine-ECU



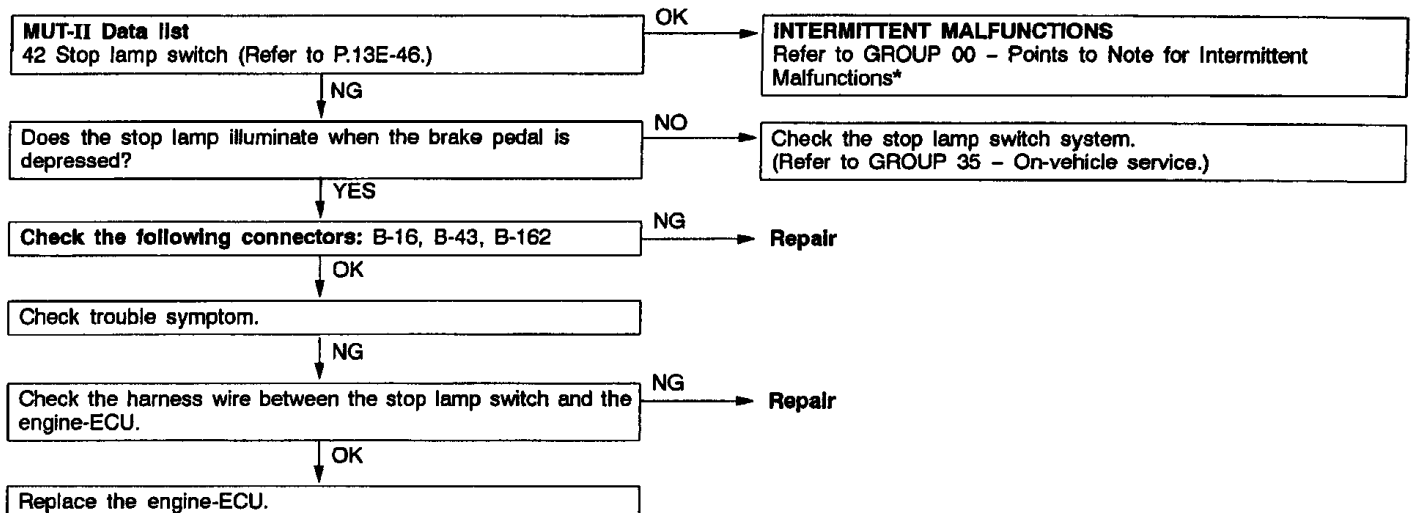
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 41 Fan control relay (low) system	Probable cause
	• Malfunction of the fan control relay • Improper connector contact, open circuit or short-circuited harness wire of the fan control relay circuit • Malfunction of the engine-ECU



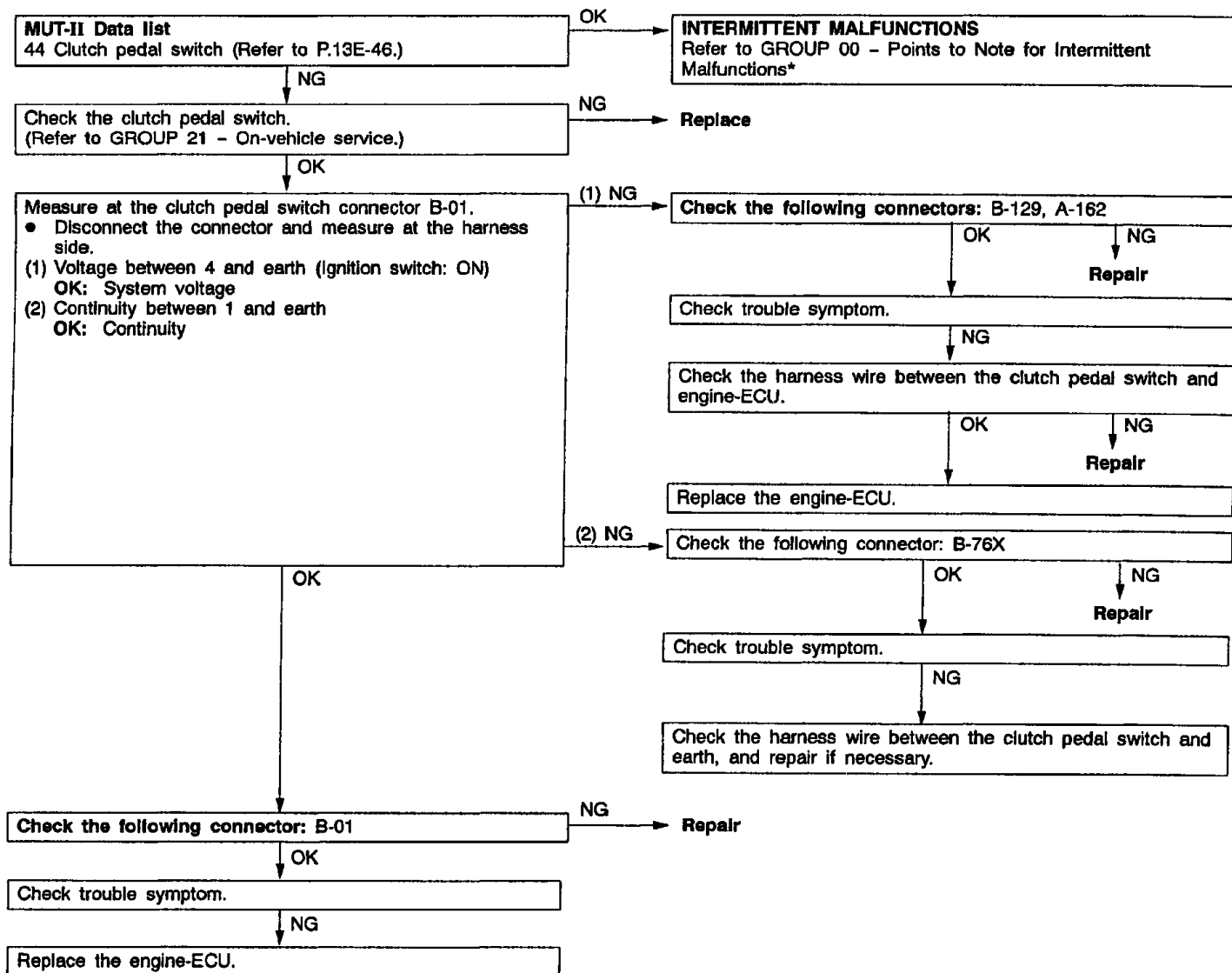
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 42 Stop lamp switch system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Outputs for stop lamp switches 1 and 2 are different	• Malfunction of the stop lamp switch • Improper connector contact, open circuit or short-circuited harness wire of the stop lamp switch circuit • Malfunction of the engine-ECU



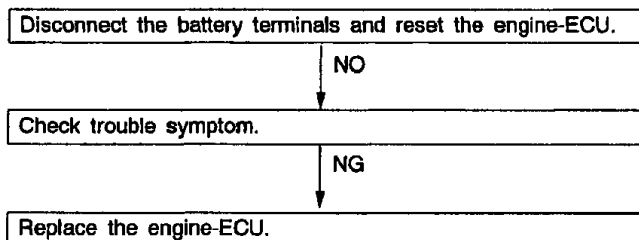
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

Code No. 43 Clutch pedal switch system	Probable cause
Range of Check • Vehicle speed: 100 km/h or more Set Conditions • Clutch pedal switch remains off for 1 second	• Malfunction of the clutch pedal switch • Improper connector contact, open circuit or short-circuited harness wire of the clutch pedal switch circuit • Malfunction of the engine-ECU

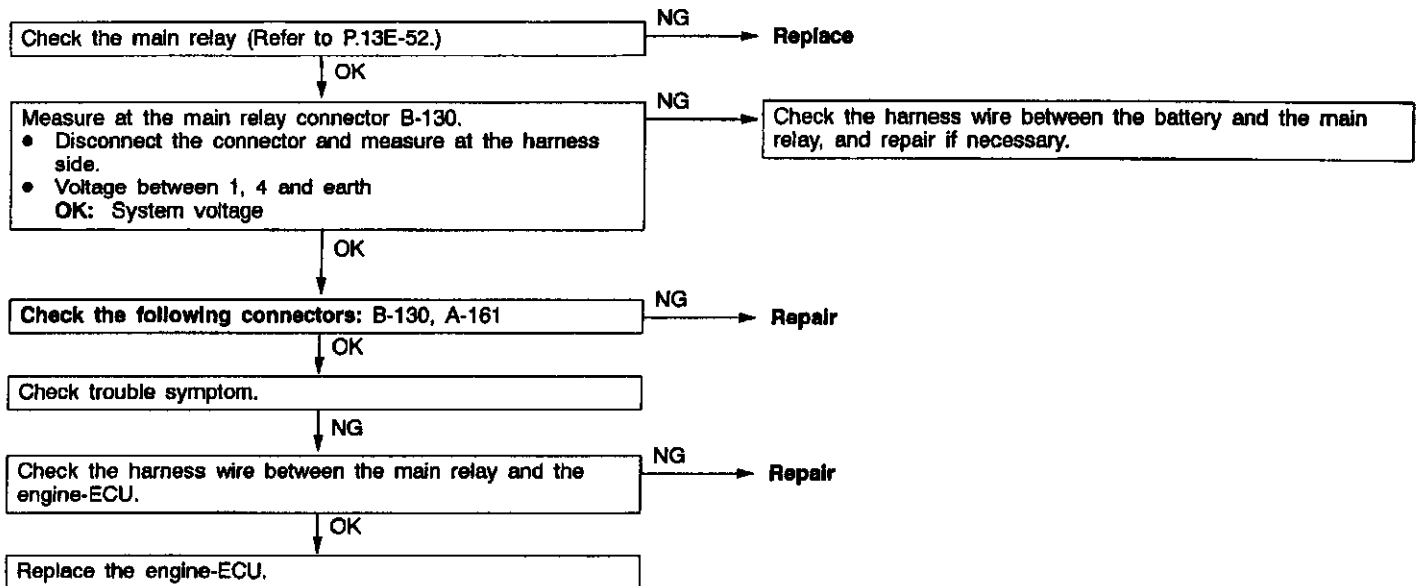


*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502)

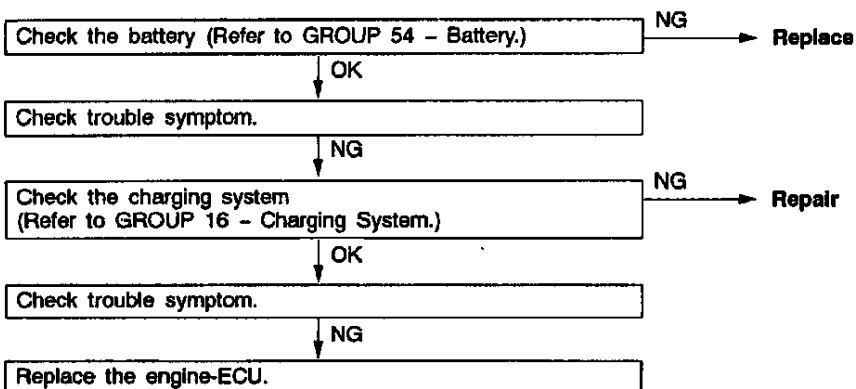
Code No. 44 Power latch system	Probable cause
	• Malfunction of the engine-ECU



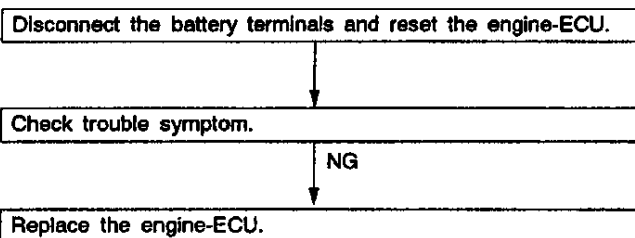
Code No. 45 Main relay system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Power is not supplied Range of Check • Ignition switch: OFF → ON Set Conditions • Power latch time is short or long	• Malfunction of the main relay • Improper connector contact, open circuit or short-circuited harness wire of the main relay circuit • Malfunction of the engine-ECU



Code No. 46 Power supply system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Power supply voltage is 6.5 V or less, or 16.5 V or more	• Malfunction of the engine-ECU



Code No. 47 ECU alimentation	Probable cause
	• Malfunction of the engine-ECU



INSPECTION CHART FOR TROUBLE SYMPTOMS

Caution

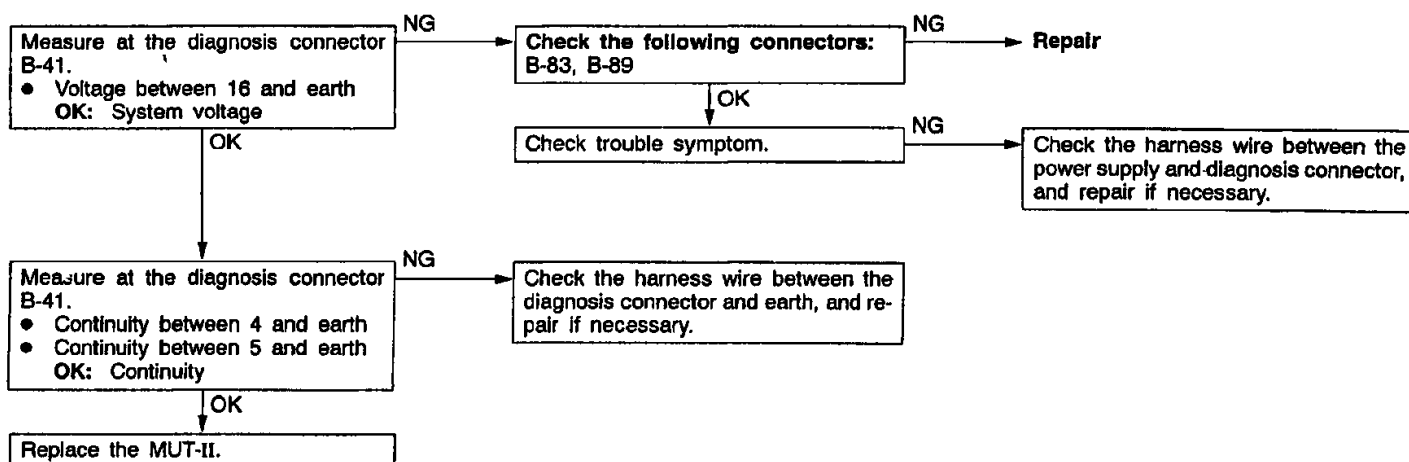
Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.

Trouble symptoms		Inspection procedure No.	Reference page
Communication with MUT-II is impossible	Communication with all systems is not possible.	1	13E-36
	Communication with engine-ECU only is not possible.	2	13E-36
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	13E-37
	The engine warning lamp remains illuminating and never goes out.	4	13E-38
Starting	No initial combustion (Starting not possible)	5	13E-38
	Poor startability when engine is cold (Poor starting)	6	13E-39
	Poor startability when engine is cold or warm (Poor starting)	7	13E-39
Idling stability (Improper idling)	Idle speed is low when engine is cold (Improper idling speed)	8	13E-40
	Idling speed is high (Improper idling speed)	9	13E-40
	Idling speed is low (Improper idling speed)	10	13E-41
	Idle speed is unstable (Rough idling, hunting)	11	13E-41
Idling stability (Engine stalls)	Engine stops soon after starting	12	13E-42
	Engine stops during idling	13	13E-42
Driving	Engine output is too low	14	13E-43
	Abnormal engine knocking occurs	15	13E-43
	Abnormally black smoke	16	13E-44
	Abnormally white smoke	17	13E-44
	Hunting occurs while driving	18	13E-45

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

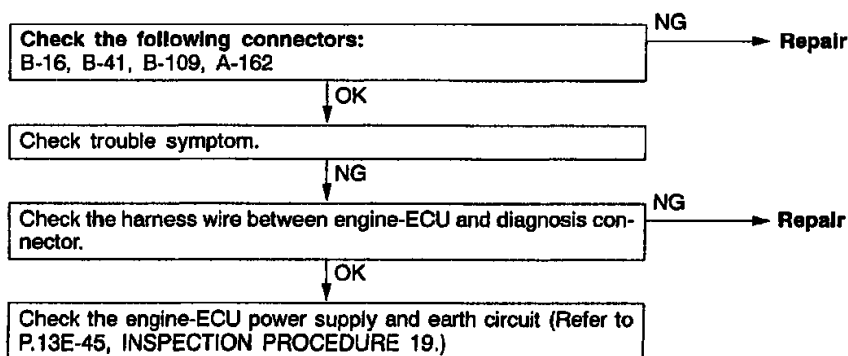
INSPECTION PROCEDURE 1

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 the engine-ECU - Open circuit between engine-ECU and diagnosis connector

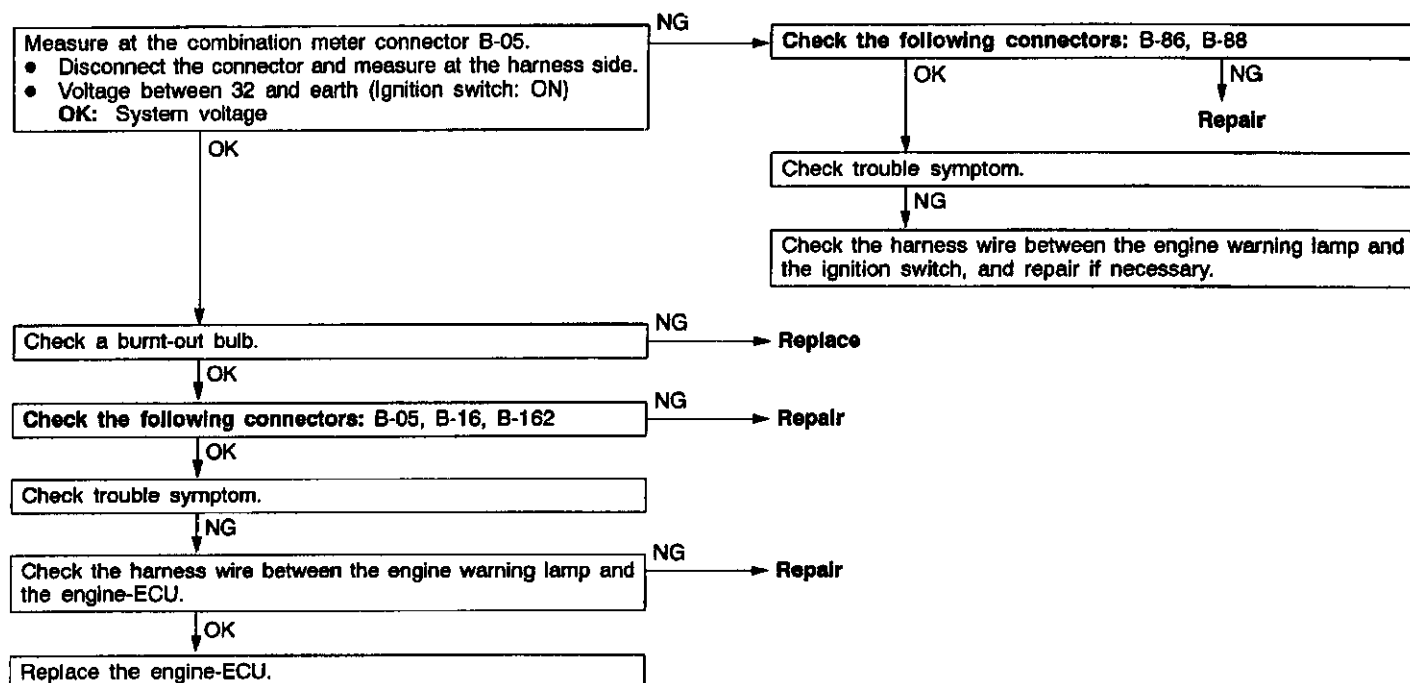


NOTE

On vehicles with the multi-center display, if a malfunction cannot be resolved after the procedure above, check the multi-center display and replace if necessary. (Refer to GROUP 54 – Multi-center Display.)

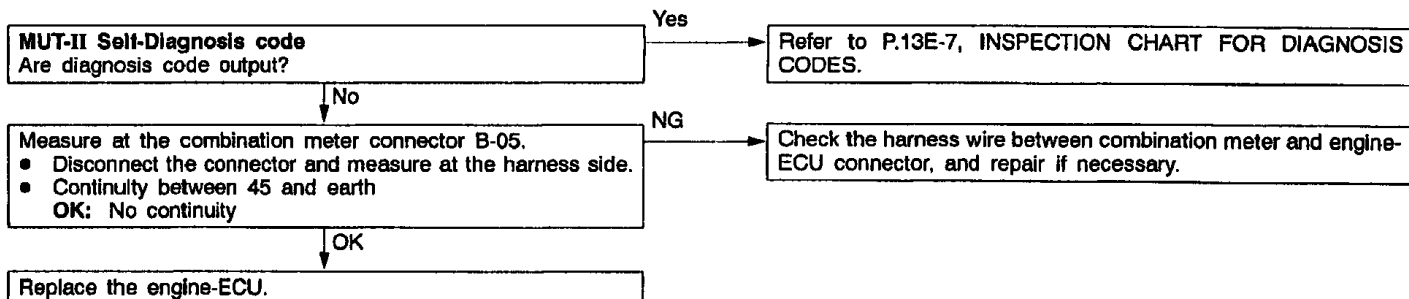
INSPECTION PROCEDURE 3

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 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



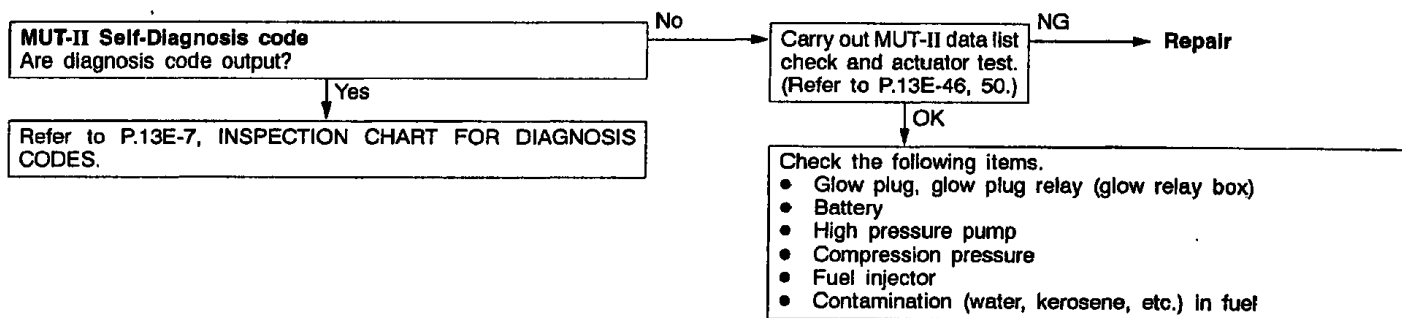
INSPECTION PROCEDURE 4

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



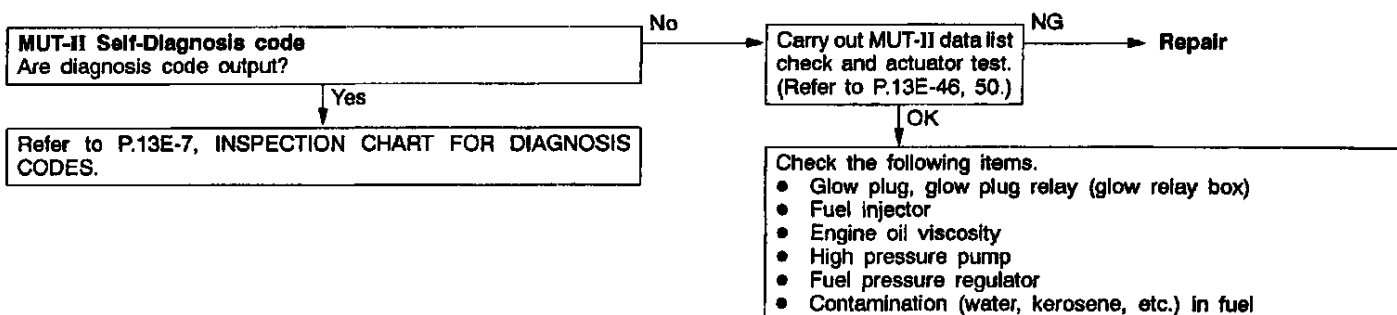
INSPECTION PROCEDURE 5

No Initial combustion (Starting not possible)	Probable cause
The cause is probably a malfunction of the control system, high pressure pump, glow system or power supply.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the glow system • Malfunction of the immobilizer system • Malfunction of the engine-ECU



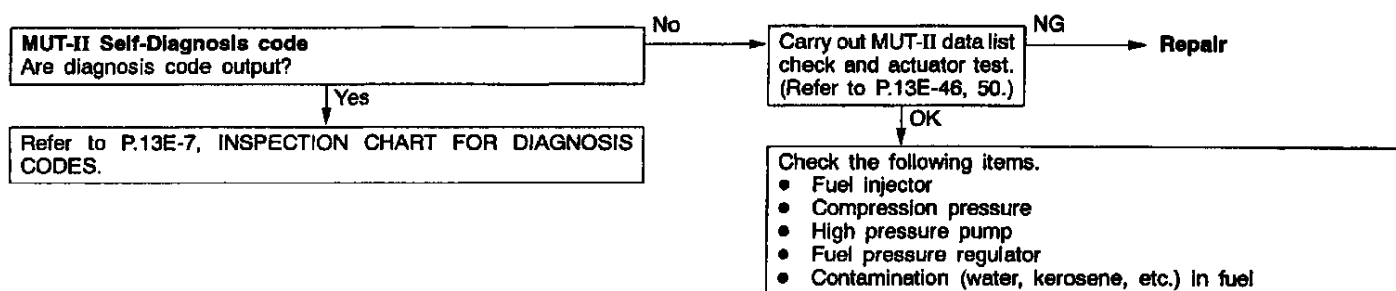
INSPECTION PROCEDURE 6

Poor startability when engine is cold (Poor starting)	Probable cause
The cause is probably a malfunction of the control system, high pressure pump, fuel system or glow system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the glow system • Malfunction of the engine-ECU



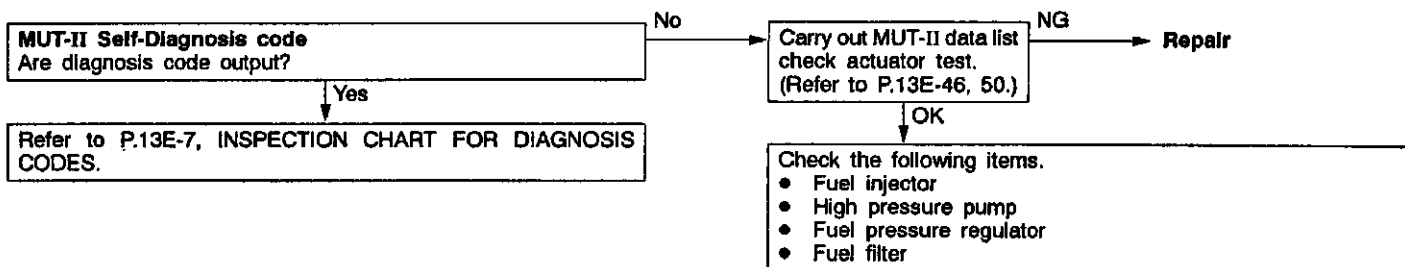
INSPECTION PROCEDURE 7

Poor startability when engine is both cold and warm (Poor starting)	Probable cause
The cause is probably a malfunction of the control system, high pressure pump or fuel system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the engine-ECU



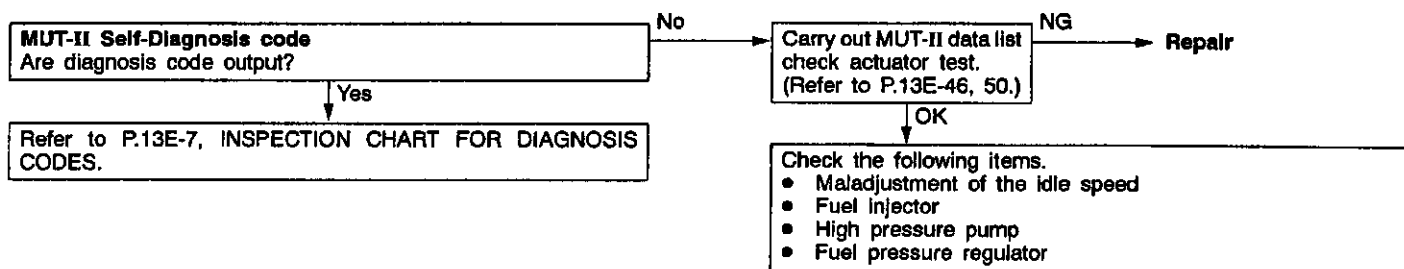
INSPECTION PROCEDURE 8

Idle speed is low when engine is cold (Improper idling speed)	Probable cause
The cause is probably a malfunction of the control system, high pressure pump or fuel system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the engine-ECU



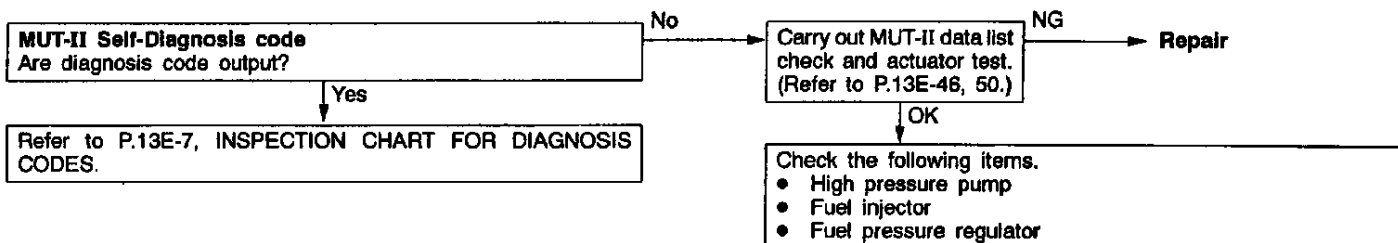
INSPECTION PROCEDURE 9

Idle speed is high (Improper idling speed)	Probable cause
The cause is probably a malfunction of the control system, fuel injector or high pressure pump.	• Malfunction of the control system • Malfunction of the fuel injector • Malfunction of the high pressure pump • Malfunction of the engine-ECU



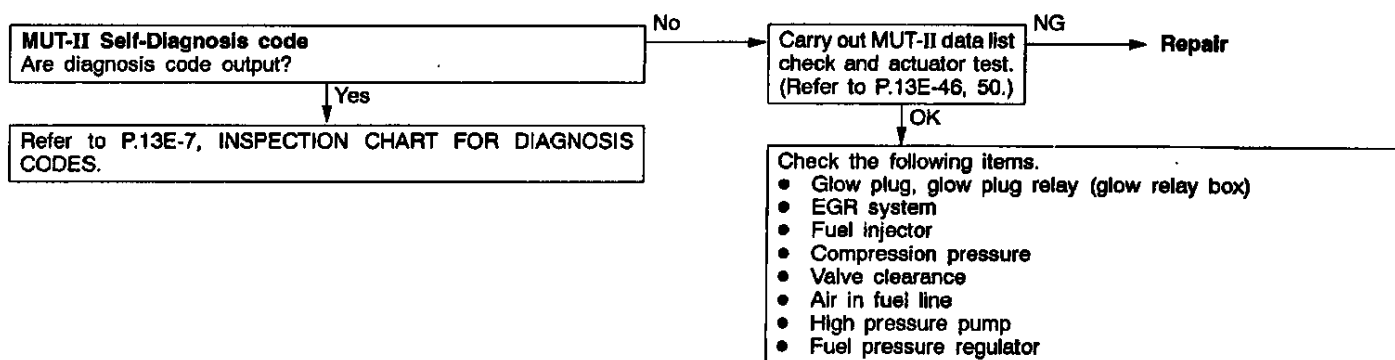
INSPECTION PROCEDURE 10

Idle speed is low (Improper idling speed)	Probable cause
The cause is probably a malfunction of the control system, high pressure pump or fuel system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the engine-ECU



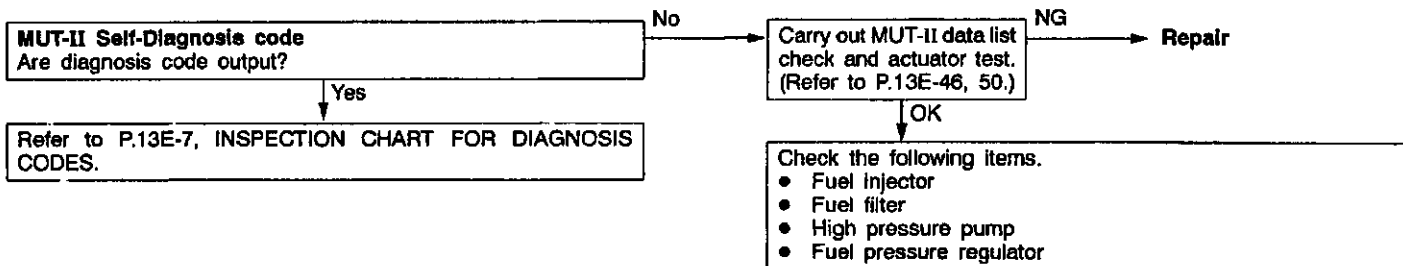
INSPECTION PROCEDURE 11

Idle speed is unstable (Rough idling, hunting)	Probable cause
The cause is probably a malfunction of the control system, high pressure pump, fuel system or glow system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the glow system • Malfunction of the EGR system • Malfunction of the engine-ECU



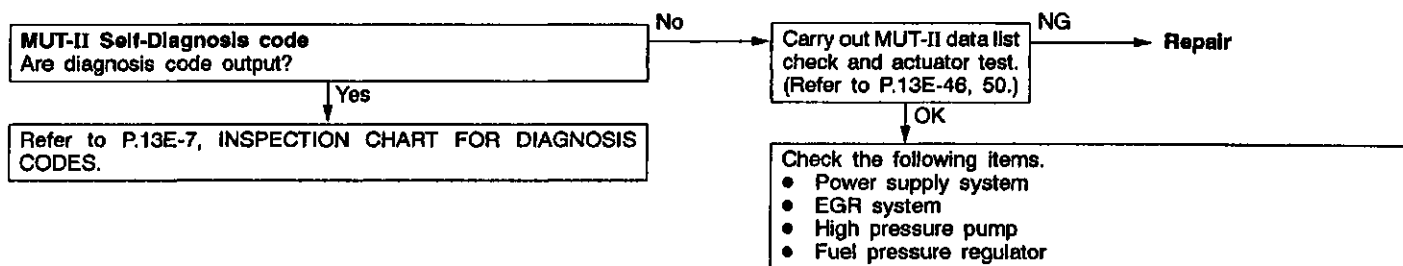
INSPECTION PROCEDURE 12

Engine stops soon after starting	Probable cause
The cause is probably a malfunction of the control system, high pressure pump or fuel system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the engine-ECU



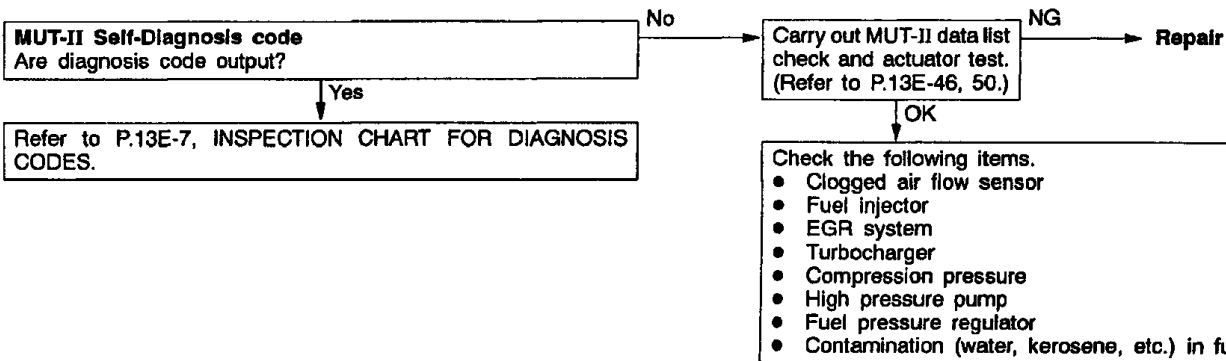
INSPECTION PROCEDURE 13

Engine stops during idling	Probable cause
The cause is probably a malfunction of the control system, high pressure pump or power supply system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the EGR system • Malfunction of the engine-ECU



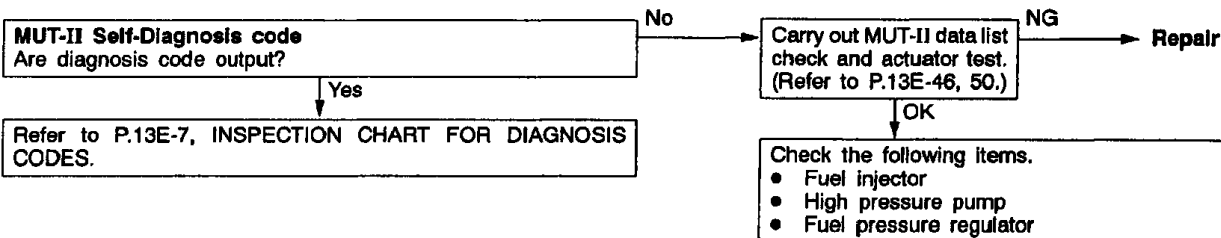
INSPECTION PROCEDURE 14

Engine output is too low	Probable cause
The cause is probably a malfunction of the control system, high pressure pump, fuel system or EGR system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the EGR system • Clogged air flow sensor • Malfunction of the engine-ECU



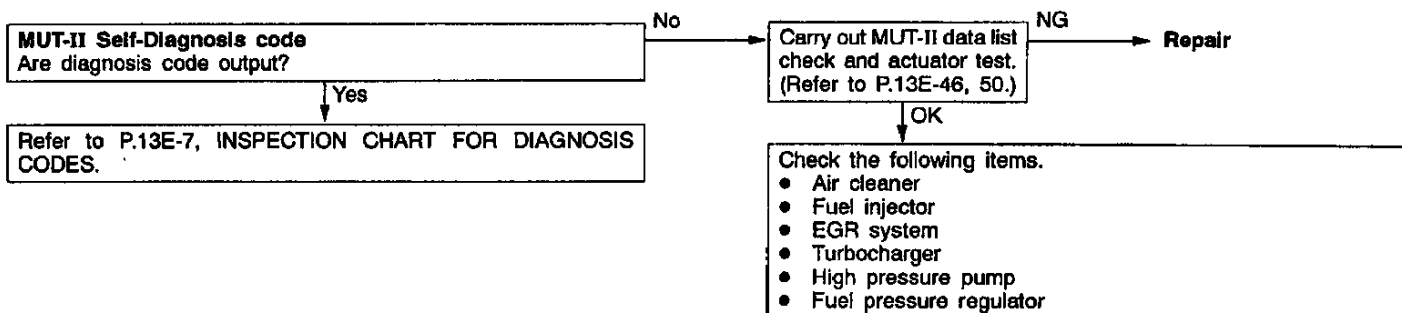
INSPECTION PROCEDURE 15

Abnormal engine knocking occurs	Probable cause
The cause is probably a malfunction of the control system, high pressure pump or fuel system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the engine-ECU



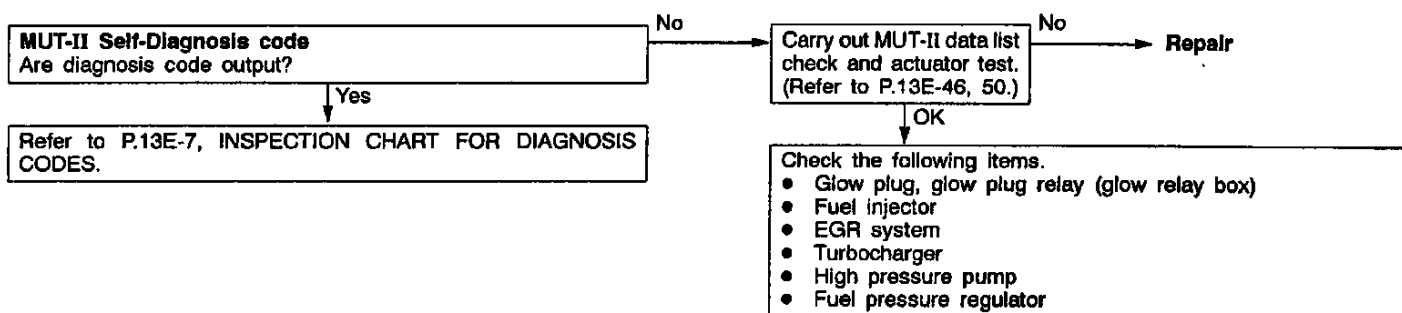
INSPECTION PROCEDURE 16

Abnormally black smoke	Probable cause
The cause is probably a malfunction of the control system, high pressure pump, fuel system or EGR system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the EGR system • Malfunction of the engine-ECU



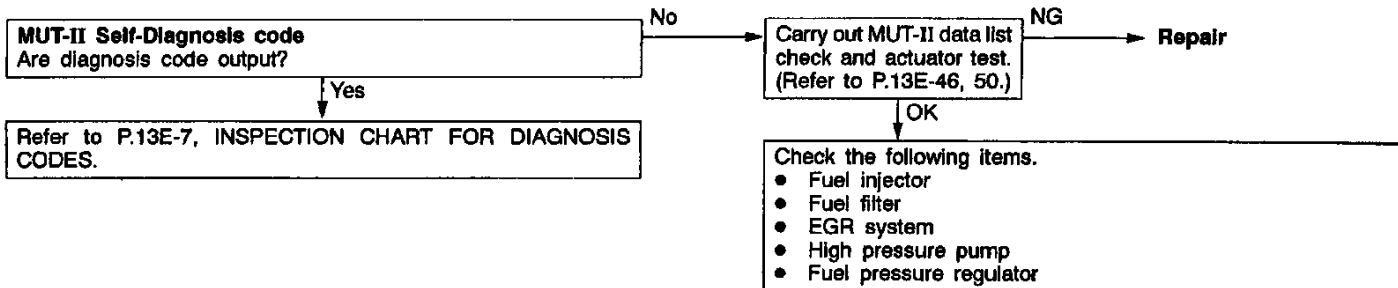
INSPECTION PROCEDURE 17

Abnormally white smoke	Probable cause
The cause is probably a malfunction of the control system, high pressure pump, fuel system, EGR system or glow system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the EGR system • Malfunction of the glow system • Malfunction of the engine-ECU



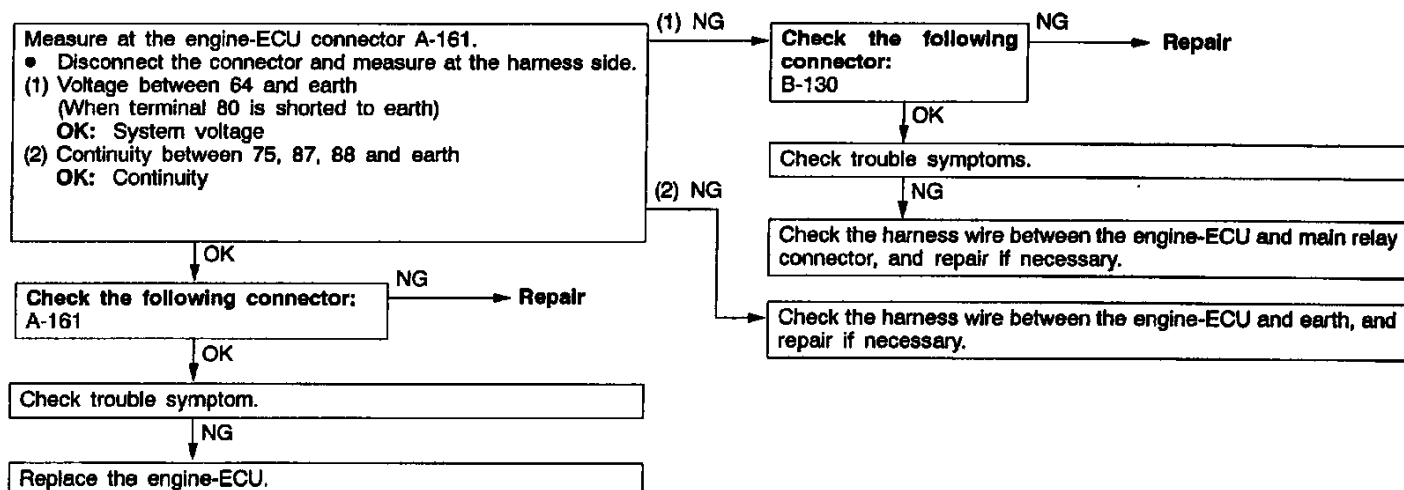
INSPECTION PROCEDURE 18

Hunting occurs while driving	Probable cause
The cause is probably a malfunction of the control system, high pressure pump or fuel system.	• Malfunction of the control system • Malfunction of the high pressure pump • Malfunction of the fuel system • Malfunction of the engine-ECU



INSPECTION PROCEDURE 19

Check the engine-ECU power supply and earth circuit



DATA LIST REFERENCE TABLE

Caution**Driving tests always need another personnel.**

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
01	Engine coolant temperature sensor	Ignition switch: ON	Engine coolant temperature is -20°C	-20°C	Code No. 19	13E-16
			Engine coolant temperature is 0°C	0°C		
			Engine coolant temperature is 20°C	20°C		
			Engine coolant temperature is 40°C	40°C		
			Engine coolant temperature is 80°C	80°C		
02	Fuel temperature sensor	- In cooled state - Ignition switch: ON		Approx. the same as the outdoor temperature	Code No. 21	13E-17
03	Intake air temperature sensor	Ignition switch: ON	Intake air temperature is -20°C	-20°C	Code No. 22	13E-18
			Intake air temperature is 0°C	0°C		
			Intake air temperature is 20°C	20°C		
			Intake air temperature is 40°C	40°C		
			Intake air temperature is 80°C	80°C		
04	Boost sensor	Ignition switch: ON		950 – 1040 hPa	Code No. 16	13E-13
		- Engine coolant temperature: 80 – 95°C - Lamp, electric cooling fan and all accessories: OFF	When engine is suddenly raced	Pressure increases		
05	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	950 – 1040 hPa	Code No. 17	13E-14
06	Fuel pressure sensor	Engine: After warm-up	When engine is suddenly raced	Pressure increases	Code No. 15	13E-12
07	Fuel pressure sensor (command value)	Engine: After warm-up	When engine is suddenly raced	Pressure increases	–	–

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
08	Air flow sensor	- Engine coolant temperature: 80 – 95°C - Lamp, electric cooling fan and all accessories: OFF	When engine is suddenly raced	Increases	–	–
09	Accelerator pedal position sensor (1st channel)	Ignition switch: ON	Release the accelerator pedal	700 – 800 mV	Code No. 13	13E-10
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	3,270 – 4,700 mV		
10	Accelerator pedal position sensor (1st channel)	Ignition switch: ON	Release the accelerator pedal	375 mV	Code No. 14	13E-11
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	1,635 – 2,500 mV		
11	Accelerator pedal position sensor	Ignition switch: ON	Release the accelerator pedal	0 %	–	–
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	100 %		
12	Crank angle sensor	- Engine: Cranking - Tachometer: Connected	Compare the engine speed readings on the tachometer and the MUT-II	Accord	Code No. 11	13E-8
14	Fuel injection amount	- Engine coolant temperature: 80 – 95°C - Lamp, electric cooling fan and all accessories: OFF	Engine is Idling	4 – 9 mm ³	–	–

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
15	EGR valve position sensor	- Engine coolant temperature: 80 – 95°C - Lamp, electric cooling fan and all accessories: OFF	When engine is suddenly raced	Increases	Code No. 23	13E-19
16	EGR valve	- Engine coolant temperature: 80 – 95°C - Lamp, electric cooling fan and all accessories: OFF	Engine is Idling	5 – 10 %	Code No. 26	13E-22
			When engine is suddenly raced	Increases		
17	Turbocharger waste gate solenoid	Ignition switch: ON	When engine is suddenly raced	Increases	Code No. 27	13E-23
18	Fuel pressure regulator	Engine: After warm-up	When engine is suddenly raced	Voltage increases	Code No. 28	13E-24
20	Crank angle sensor (2,000 r/min or less)	- Engine: Cranking [reading is possible at 2,000 r/min or less] - Tachometer: Connected		Engine speeds displayed on the MUT-II and tachometer are identical	-	-
21	Vehicle speed sensor	When vehicle is moving	Compare the speeds displayed on the speedometer and the MUT-II	Accord	Code No. 35	13E-27
41	Ignition switch – IG	Ignition switch: ON		ON	-	-
42	Stop lamp switch	Ignition switch: ON	Brake pedal: Depressed	ON	Code No. 42	13E-31
			Brake pedal: Released	OFF		
44	Clutch pedal switch	Ignition switch: ON	Clutch pedal: Depressed	ON	Code No. 43	13E-32
			Clutch pedal: Released	OFF		
45	Overheat indicator lamp	Ignition switch: ON	Several seconds pass after ignition switch is turned to ON	ON → OFF	-	-
46	Glow indicator lamp	Ignition switch: ON	From 0.5 – 16 seconds after ignition switch is turned to ON	ON → OFF	-	-
47	Throttle valve control solenoid	Engine: Idle		OFF	Code No. 37	13E-29
		Engine: Idle → stopped		ON		
48	Glow relay box	Ignition switch: ON	From 0.5 – 16 seconds after ignition switch is turned to ON	ON → OFF	Code No. 24	13E-20

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
50	A/C relay	Engine: After warm-up, idle	A/C switch: OFF	OFF (Compressor clutch is not operating)	-	-
			A/C switch: ON	ON (Compressor clutch is operating)		
51	A/C switch	Engine: After warm-up, idle	A/C switch: OFF	OFF	-	-
			A/C switch: ON	ON		
52	Additional heater relay 1	- Engine coolant temperature: 75°C or lower - Intake air temperature: 10°C or lower - Post-heating complete - All accessories: OFF		ON	Code No. 40	13E-30
		Engine: After warm-up		OFF		
53	Additional heater relay 2	- Engine coolant temperature: 75°C or lower - Intake air temperature: 10°C or lower - Post-heating complete - All accessories: OFF		ON	Code No. 40	13E-30
		Engine: After warm-up		OFF		
54	Fan control relay (high)	Engine coolant temperature: 96°C or lower		OFF	-	-
		Engine coolant temperature: 102°C or higher		ON		
55	Fan control relay (low)	Engine coolant temperature: 99°C or lower		OFF	-	-
		Engine coolant temperature: 99 - 102°C		ON		

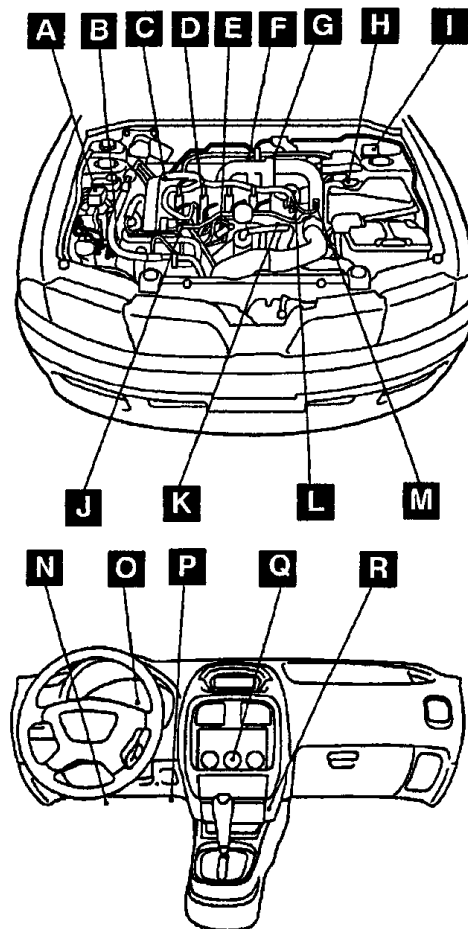
ACTUATOR TEST REFERENCE TABLE

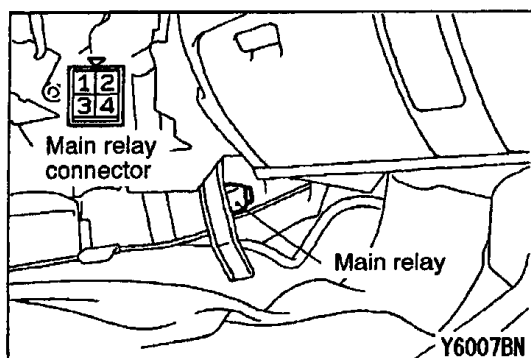
Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
01	Injector	Cut fuel to No. 1 injector	Engine: After warm-up, idle (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling)	Idling condition becomes different (becomes unstable)	Code No. 29	13E-25
02		Cut fuel to No. 2 injector			Code No. 31	13E-25
03		Cut fuel to No. 3 injector			Code No. 32	13E-26
04		Cut fuel to No. 4 injector			Code No. 33	13E-26
05	Turbocharger waste gate solenoid	Solenoid valve turns from OFF to ON	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven	Code No. 27	13E-23
06	Throttle valve control solenoid	Solenoid valve turns from OFF to ON	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven	Code No. 37	13E-29
07	Fuel pressure regulator	Solenoid valve turns from OFF to ON	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven	Code No. 28	13E-24

Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
08	EGR valve	Solenoid valve turns from OFF to ON	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven	Code No. 26	13E-22
09	Glow relay box	Relay turns from OFF to ON	- Ignition switch: ON - Check operating condition on data list	OFF → ON	Code No. 24	13E-20
10	Additional heater relay 1	Relay turns from OFF to ON	Ignition switch: ON	Sound of operation can be heard when relay is driven	Code No. 40	13E-30
11	Additional heater relay 2	Relay turns from OFF to ON	Ignition switch: ON	Sound of operation can be heard when relay is driven	Code No. 40	13E-30
12	Fan control relay (high)	Relay turns from OFF to ON	Ignition switch: ON	Fan motor operates at high speed	-	-
13	Fan control relay (low)	Relay turns from OFF to ON	Ignition switch: ON	Fan motor operates at low speed	-	-
14	Engine warning lamp	Causes engine warning lamp to illuminate	Engine: Idle	Engine warning lamp illuminates	-	-
15	Glow indicator lamp	Causes glow indicator lamp to illuminate	Engine: Idle	Glow indicator lamp illuminates	-	-
16	Overheat indicator lamp	Causes overheat indicator lamp to illuminate	Engine: Idle	Glow overheat lamp illuminates	-	-

ON-VEHICLE SERVICE**COMPONENT LOCATION**

Name	Symbol	Name	Symbol
A/C relay	A	Engine-ECU (with barometric pressure sensor)	B
A/C switch	Q	Fuel pressure regulator	J
Accelerator pedal position sensor (1st and 2nd channel)	P	Fuel pressure sensor	E
Air flow sensor (with intake air temperature sensor)	H	Fuel temperature sensor	E
Boost sensor	M	Glow relay box	I
Camshaft position sensor	C	Injector	D
Clutch pedal switch	N	Main relay	R
Crank angle sensor	K	Stop lamp switch	N
Diagnosis connector	R	Throttle valve control solenoid	F
EGR valve	G	Turbocharger waste gate solenoid	F
EGR valve position sensor	G	Vehicle speed sensor	K
Engine coolant temperature sensor	L		





MAIN RELAY CONTINUITY CHECK

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

INTAKE AIR TEMPERATURE SENSOR CHECK

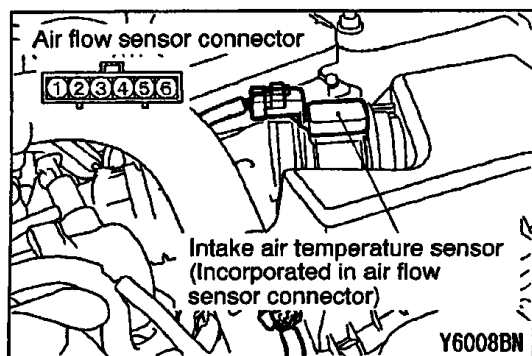
1. Disconnect the air flow sensor connector.
2. Measure the resistance between terminals 1 and 2.

Standard value:

24.0 – 27.2 k Ω (at -30°C)

2.35 – 2.55 k Ω (at 20°C)

0.180 – 0.186 k Ω (at 100°C)

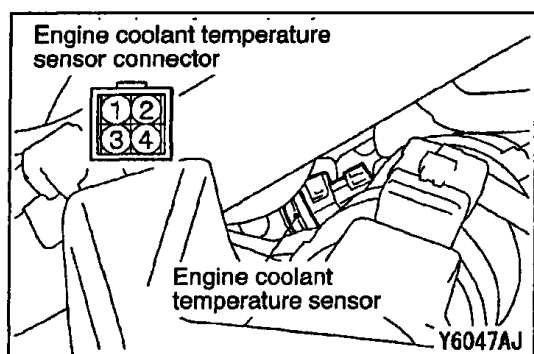


ENGINE COOLANT TEMPERATURE SENSOR CHECK

1. Disconnect the engine coolant temperature sensor connector.
2. Measure the resistance between terminals 2 and 3.

Standard value: 2.14 – 2.36 k Ω (at 25°C)

0.27 – 0.29 k Ω (at 80°C)



ACCELERATOR PEDAL POSITION SENSOR (1st channel) CHECK

1. Disconnect the accelerator pedal position sensor connector.
2. Measure the resistance between terminals 3 and 5.

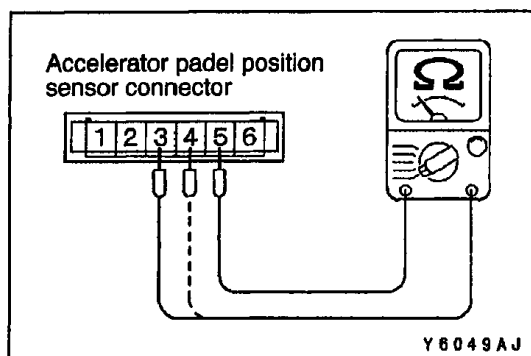
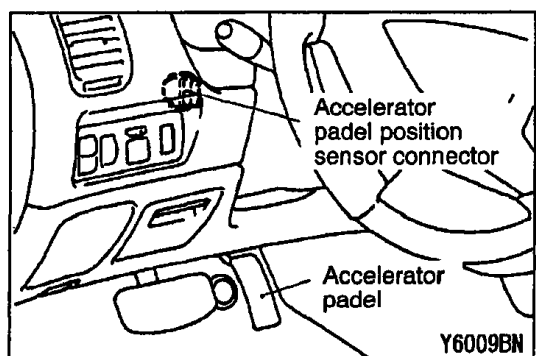
Standard value: Approx. 1,200 Ω

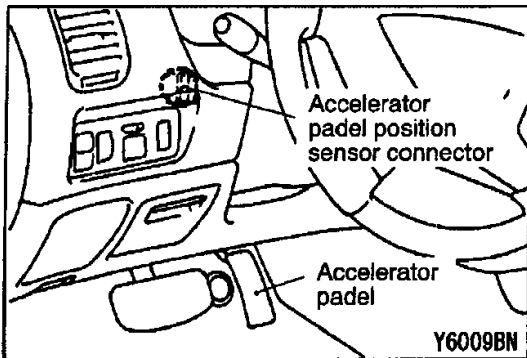
3. Measure the resistance between terminals 4 and 5.

Normal condition:

Depress the accelerator pedal slowly

Resistance value changes in accordance with the accelerator pedal depression smoothly





ACCELERATOR PEDAL POSITION SENSOR (2nd channel) CHECK

1. Disconnect the accelerator pedal position sensor connector.
2. Measure the resistance between terminals 2 and 6.

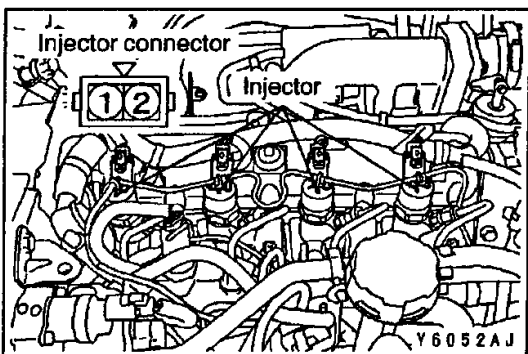
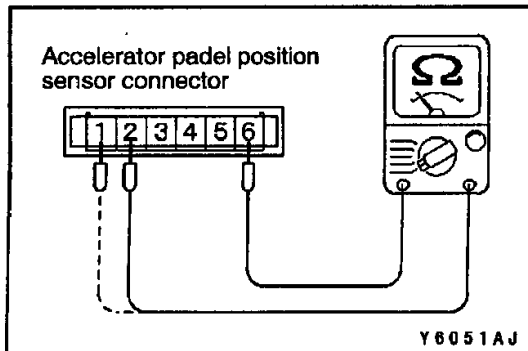
Standard value: Approx. 1,700 Ω

3. Measure the resistance between terminals 1 and 6.

Normal condition:

Depress the accelerator pedal slowly

Resistance value changes in accordance with the accelerator pedal depression smoothly



INJECTOR CHECK

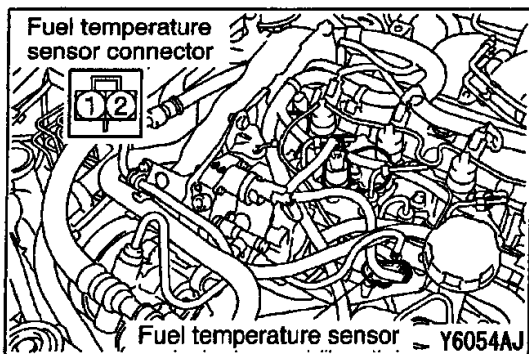
1. Disconnect the injector connector.
2. Measure the resistance between terminals.

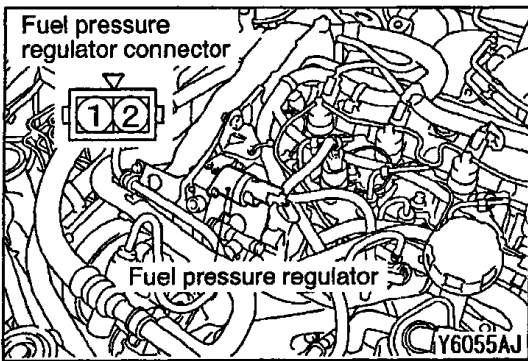
Standard value: Approx. 0.33 Ω (at 20°C)

FUEL TEMPERATURE SENSOR CHECK

1. Disconnect the fuel temperature sensor connector.
2. Measure the resistance between terminals.

Standard value: 2.05 k Ω (at 25°C)

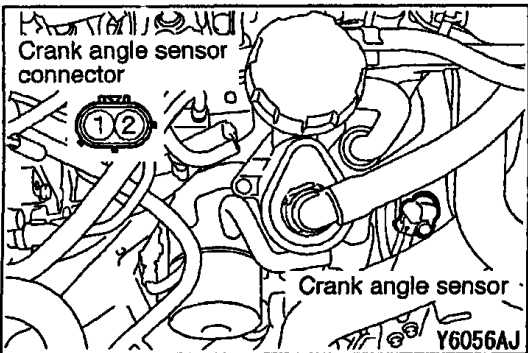




FUEL PRESSURE REGULATOR CHECK

1. Disconnect the fuel pressure regulator connector.
2. Measure the resistance between terminals.

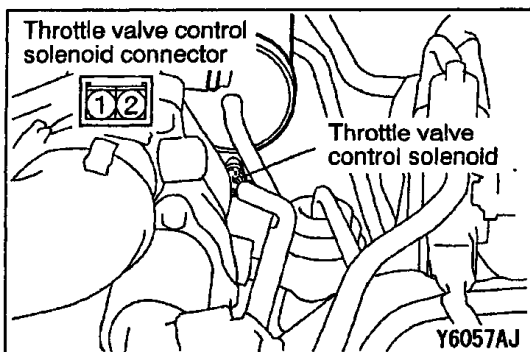
Standard value: Approx. 5 Ω (at 20°C)



CRANK ANGLE SENSOR CHECK

1. Disconnect the crank angle sensor connector.
2. Measure the resistance between terminals.

Standard value: 720 - 880 Ω



THROTTLE VALVE CONTROL SOLENOID CHECK

NOTE

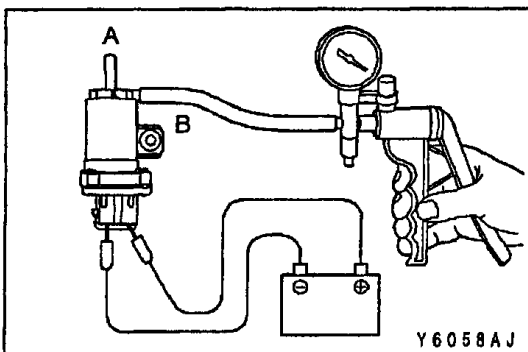
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

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

Battery voltage	Nipple A condition	Normal condition
Applied	Open	Vacuum leaks
	Close	Vacuum maintained
Not applied	Open	Vacuum leaks

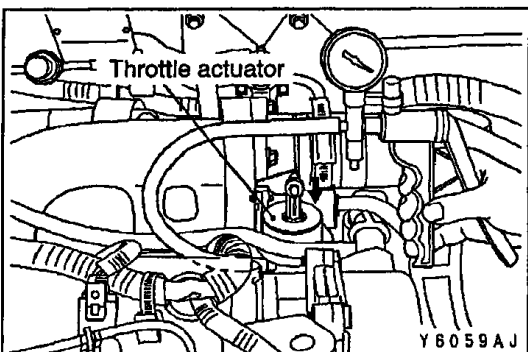
5. Measure the resistance between the terminals.

Standard value: 43 - 49 Ω (at 25°C)



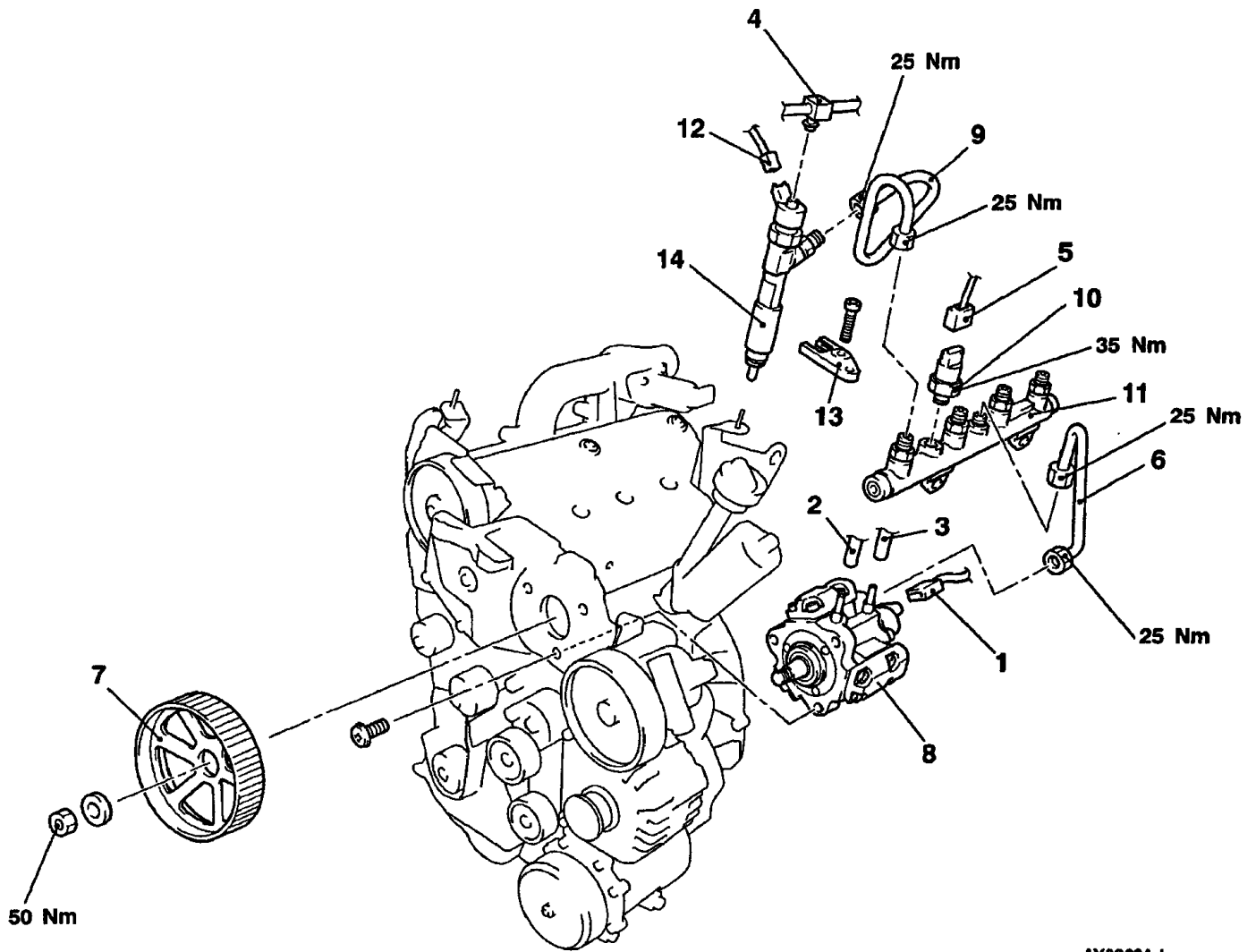
THROTTLE ACTUATOR CHECK

1. Disconnect the vacuum hose from the throttle actuator and connect a hand vacuum pump to the throttle actuator nipple.
2. Check that the actuator rod moves smoothly when applying vacuum gradually.



FUEL HIGH PRESSURE PUMP AND FUEL INJECTOR

REMOVAL AND INSTALLATION



AY0220AJ

Fuel high pressure pump removal steps

- Timing belt (Refer to GROUP 11C.)
- 1. Fuel high pressure pump connector
- 2. Fuel supply hose connection
- 3. Fuel return hose connection
- 6. Fuel pump pipe
- 7. Fuel high pressure pump sprocket
- 8. Fuel high pressure pump

◀A▶

◀A▶

◀A▶

◀A▶

◀A▶

◀A▶

◀A▶

◀B▶ ▶A◀

Fuel injector removal steps

- 4. Fuel return tube
- 5. Fuel pressure sensor connector
- 6. Fuel pump pipe
- 9. Fuel injector pipe
- 10. Fuel pressure sensor
- 11. Common rail
- 12. Fuel injector connector
- 13. Fuel injector holder
- 14. Fuel injector

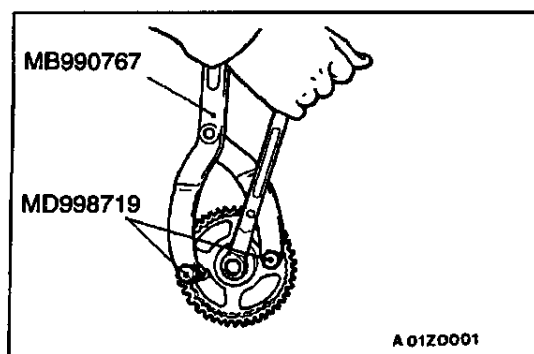
13E-56 DIESEL FUEL <F9Q> – Fuel High Pressure Pump and Fuel Injector

REMOVAL SERVICE POINTS

- ◀A▶ FUEL SUPPLY HOSE CONNECTION/FUEL RETURN HOSE CONNECTION/FUEL PUMP PIPE/FUEL RETURN TUBE/FUEL PUMP PIPE/FUEL INJECTOR PIPE/FUEL PRESSURE SENSOR

Disconnect the fuel hose, fuel pipe, fuel return tube and the fuel pressure sensor. Then, plug them to prevent dust from entering the fuel line, common rail and the fuel high pressure pump.

- ◀B▶ FUEL HIGH PRESSURE PUMP SPROCKET REMOVAL



INSTALLATION SERVICE POINT

- ▶A◀ FUEL HIGH PRESSURE PUMP SPROCKET INSTALLATION

Use the special tool to secure the fuel high pressure pump sprocket in the same way as during removal, and then tighten the bolt to the specified torque.

Tightening torque: 50 Nm

FUEL SUPPLY

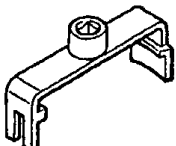
CONTENTS

GENERAL	2	SPECIAL TOOL	2
Outline of Change	2	FUEL TANK <F9Q>	3

GENERAL**OUTLINE OF CHANGE**

The following service procedures have been established to correspond to the addition of the F9Q diesel engine. Other service procedures are the same as before.

SPECIAL TOOL

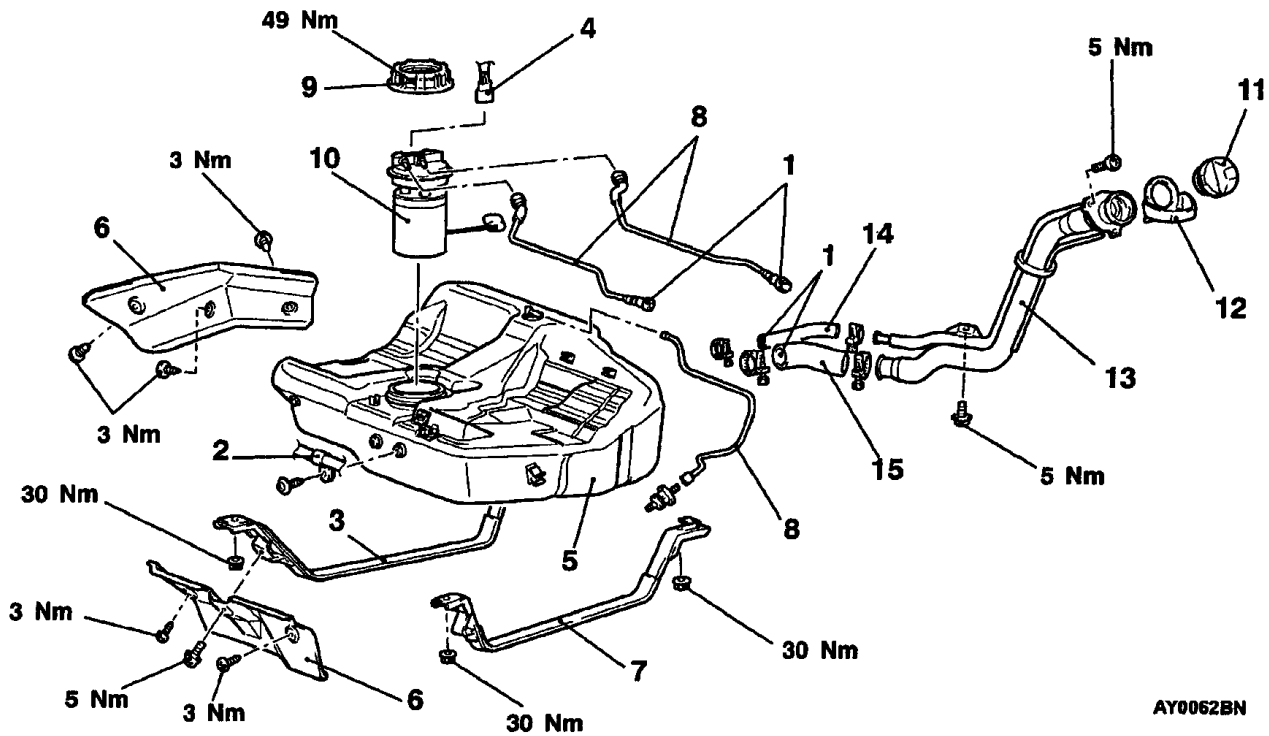
Tool	Number	Name	Use
	MB996009	Tank cap wrench	Installation of tank cap

FUEL TANK <F9Q>**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Draining the Fuel
- Removal of the Center Exhaust Pipe (Refer to GROUP 15.)

Post-Installation Operation

- Installation of the Center Exhaust Pipe (Refer to GROUP 15.)
- Refilling the Fuel
- Checking for Fuel Leaks

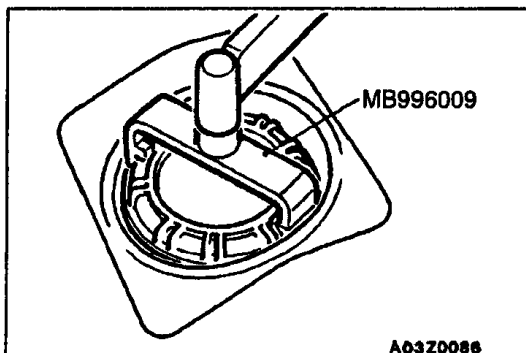


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Removal steps

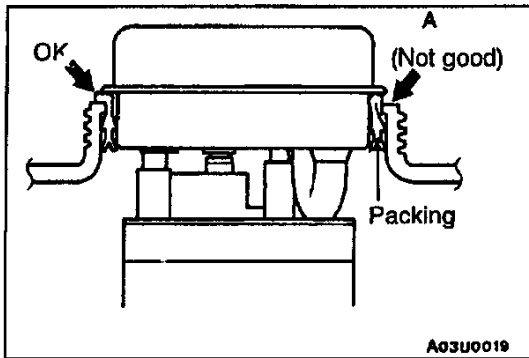
1. Fuel hoses connection
2. Harness clamp
3. Band (RH)
4. Fuel pump module connector
5. Fuel tank assembly
6. Heat protector
7. Band (LH)
8. Fuel hoses

- ◀A▶ ▶B▶ 9. Cap
 ▶A▶ 10. Fuel pump module
 11. Fuel filler cap
 12. Fuel rubber drain
 13. Filler neck assembly
 14. Leveling hose
 15. Filler hose



A03Z0086

REMOVAL SERVICE POINT**◀A▶ CAP REMOVAL**



INSTALLATION SERVICE POINTS

►A◄ FUEL PUMP MODULE INSTALLATION

1. Check to be sure that the fuel tank packing is not damaged or deformed, and then securely install the packing to the fuel tank.

Caution

If the packing is installed to the fuel pump module, packing lip will be damaged when installing the fuel pump module to the fuel tank and the fuel leak will result.

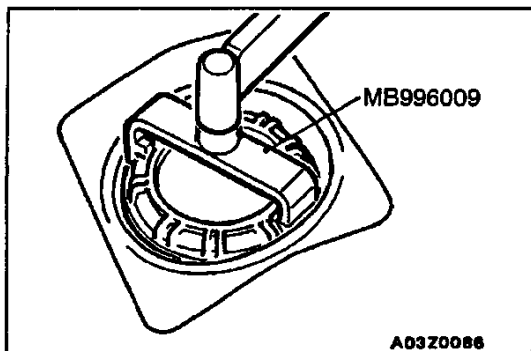
NOTE

If the packing is damaged or deformed, replace the defective packing with a new packing.

2. Apply soapy water to the inside of the packing, and then install the fuel pump module to the fuel tank.

Caution

- (1) Do not tilt the fuel pump module when installing.
- (2) The packing should not be folded over as shown by (A) in the illustration.



►B◄ CAP INSTALLATION

Apply soapy water to the cap thread, and then use the special tool as the same manner as for removal to tighten the cap to the specified torque.

Tightening torque: 49 Nm

Caution

Prevent the fuel pump module from turning with the cap when tightening the cap.

GASOLINE DIRECT INJECTION (GDI)

CONTENTS

GENERAL	2	Fuel Leak Check	126
Outline of Changes	2	Component Location	127
GENERAL INFORMATION	2	Accelerator Pedal Position Sensor Check	128
SERVICE SPECIFICATIONS	4	Accelerator Pedal Position Switch Check	128
TROUBLESHOOTING	5	Oxygen Sensor Check	128
ON-VEHICLE SERVICE	122	Catalyst Temperature Sensor Check <M/T> ...	130
Accelerator Pedal Position Sensor		FUEL PUMP (HIGH PRESSURE)	131
Adjustment	122	FUEL INJECTOR	134
Fuel Pressure Test	122	THROTTLE BODY	138

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.
- Fuel pressure regulator (high-pressure) incorporate fuel pump (high-pressure) has been adopted.
- Catalyst temperature sensor has been added. <Vehicles with M/T>
- An oxygen sensor (rear) has been added.
- A ignition failure sensor has been added.
- An engine-ECU has been changed. (Change of terminal layout) <Vehicles with M/T>
- An engine-A/T-ECU has been adopted. <Vehicles with A/T>

GENERAL INFORMATION

SELF-DIAGNOSIS FUNCTION

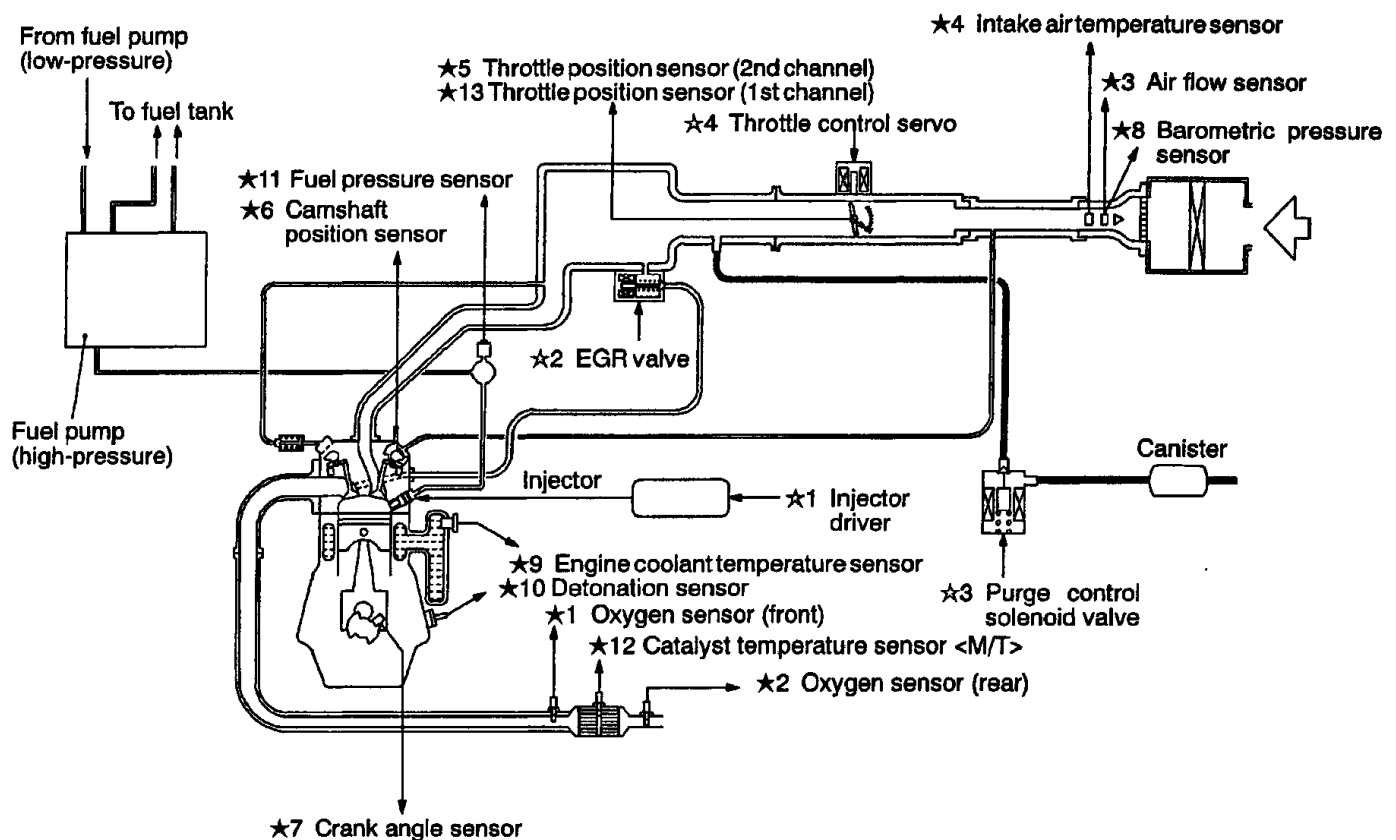
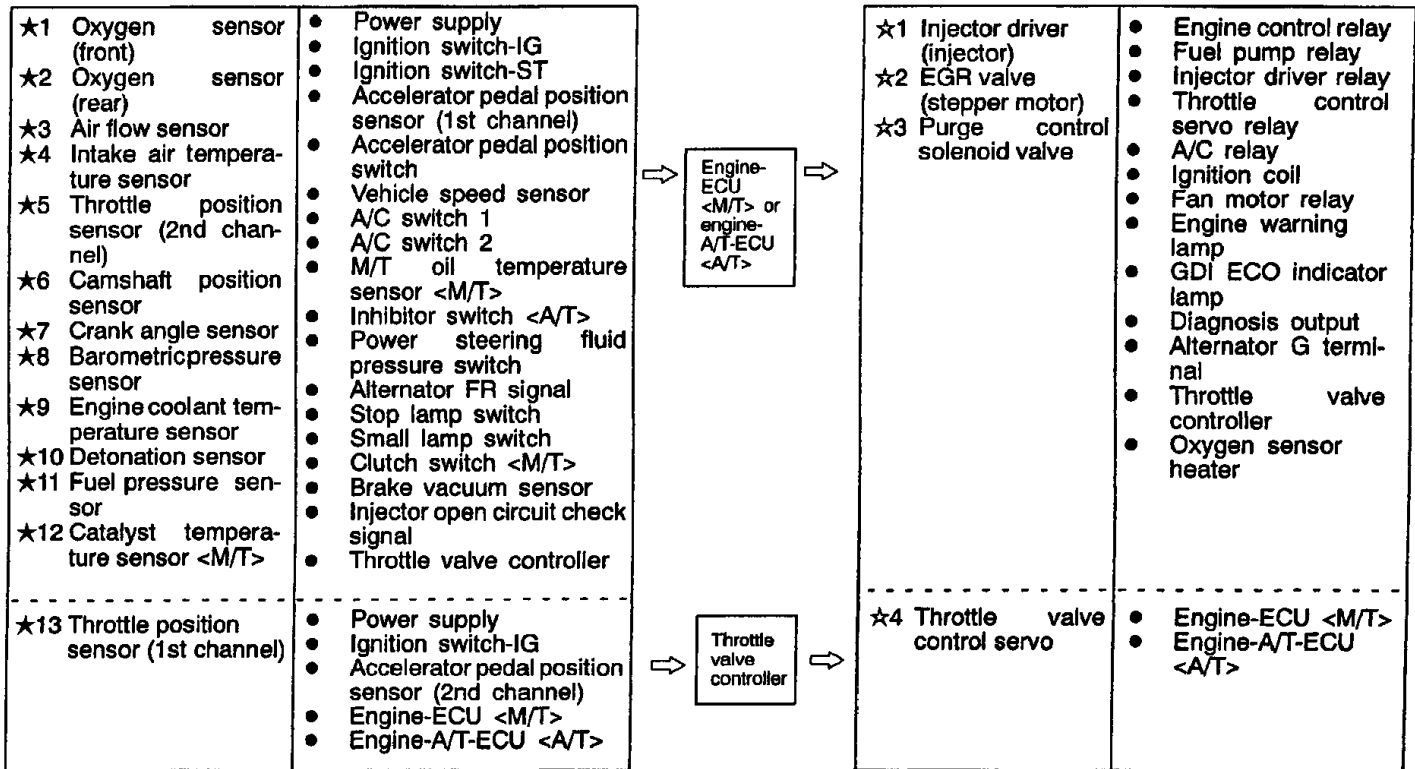
Following functions have been added.

- 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

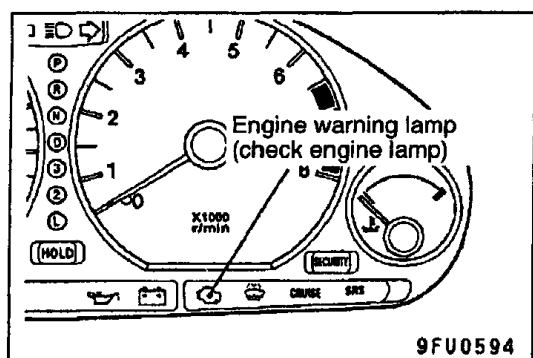
Items		Specifications
Engine-ECU <M/T>	Identification No.	E2T73379
Engine-A/T-ECU <A/T>	Identification No.	E2T77672

GASOLINE DIRECT INJECTION SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

Items		Standard value
Fuel pressure	High-pressure side MPa	4 – 6.9
	Low-pressure side kPa	Approximately 329
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



TROUBLESHOOTING

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the following items related to the GDI 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 (1st channel) 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
P0190★	Abnormal fuel pressure
P0201	No. 1 injector system
P0202	No. 2 injector system
P0203	No. 3 injector system
P0204	No. 4 injector system
P0220★	Accelerator pedal position sensor (1st channel) system
P0225★	Throttle position sensor (2nd channel) 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

Code No.	Diagnosis item
P0304	No. 4 cylinder misfire detected
P0335	Crank angle sensor system
P0340	Camshaft position sensor system
P0403	EGR valve system
P0420	Catalyst malfunction
P0425	Catalyst temperature sensor <M/T>
P0443	Purge control solenoid valve system
P1200	Injector driver system
P1220★	Electronic-controlled throttle valve system
P1221★	Throttle valve position feedback system
P1223★	Communication line with throttle valve controller
P1224★	Throttle valve control servo motor (motor 1st phase malfunction) system
P1225★	Accelerator pedal position sensor (2nd channel) system
P1228★	Throttle valve control servo motor (motor 2nd phase malfunction) system
P1515	Brake vacuum sensor system

NOTE

- If the engine warning lamp illuminates because of a malfunction of the engine-ECU (engine-A/T-ECU), communication between MUT-II and the engine-ECU (engine-A/T-ECU) is impossible. In this case, the diagnosis code cannot be read.
- After the engine-ECU (engine-A/T-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.
As for P1220, P1221, P1223, P1224, and P1228, the engine warning lamp flashes. If malfunctions are detected at the throttle position sensor (1st channel) and the throttle position sensor (2nd channel) at the same time, or malfunctions are detected at the accelerator pedal position sensor (1st channel) and the accelerator pedal position sensor (2nd channel) at the same time, the engine warning lamp will flash.
- After the engine warning lamp illuminates, it will be switched off under the following conditions.
 - When the engine-ECU (engine-A/T-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.
 - For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
- 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 <M/T> or engine-A/T-ECU <A/T> 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 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. Suspends lean burn operation. 2. 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.
Intake air temperature sensor	Controls as if the intake air temperature is 25°C.
Throttle position sensor (2nd channel)	1. Suspends lean burn operation. 2. Controls the throttle opening angle feedback (half as much as the opening rate in the normal condition) by using signals from the throttle position sensor (1st channel). However, this controlling system is not applied if the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 – 6 V. 3. Refrains from controlling the throttle opening angle feedback if the throttle position sensor (1st channel) is also defective.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C. (Moreover, the control system is working until the ignition switch is turned OFF if the sensor signal returns to normal.)
Camshaft position sensor	Controls maintaining the condition before determined as failure. Fuel will be cut-off 4 seconds after a malfunction is detected. (However, only if No. 1 cylinder TDC has never been detected after the ignition switch is turned to the ON position)
Vehicle speed sensor	1. Suspends lean burn operation. However, the control is cancelled as a certain time passes by with the engine speed of 1,500 r/min or more. 2. Suspends lean burn operation during the engine idling.
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.
Detonation sensor	Fixes the ignition timing as that for standard petrol.
Injector	1. Suspends lean burn operation. 2. Suspends the exhaust gas recirculation.
Ignition coil (incorporating power transistor)	1. Suspends lean burn operation. 2. Cuts off the fuel supply to cylinders with an abnormal ignition signal.
Fuel pressure sensor	1. Controls as if the fuel pressure is 5 MPa. (In case of open/short circuit) 2. Turns the fuel pump relay off. (In case of abnormality in high pressure) 3. Suspends fuel injection. (when the low pressure is detected and the engine speed is more than 3,000 r/min)
Alternator FR terminal	Refrains from controlling to suppress the alternator output to electrical load. (Operated as a normal alternator)
Accelerator pedal position sensor (2nd channel)	1. Suspends lean burn operation. 2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (1st channel). (However, the control system is not applicable if the difference from the accelerator pedal position sensor (1st channel) output voltage is 1.0 V or higher.) 3. Suspends the electronic controlled throttle valve system if accelerator pedal position sensor (1st channel) is also defective.

Malfunctioning item	Control contents during malfunction
Accelerator pedal position sensor (1st channel)	1. Suspends lean burn operation. 2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (2nd channel). (However, this control is not applicable if the voltage difference between the accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) is 1.0 V or higher.) 3. Also suspends the electronic-controlled throttle valve system when the accelerator pedal position sensor (2nd channel) is defective.
Throttle position sensor (1st channel)	1. Suspends lean burn operation. 2. Controls throttle opening angle feedback by using signals from throttle position sensor (2nd channel). (However, the controlling system is not applied when the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 – 6 V.) Refrains from controlling the throttle opening angle feedback when throttle position sensor (2nd channel) is also defective.
Electronic-controlled throttle valve system	1. Suspends the electronic controlled throttle valve system. 2. Suspends lean burn operation. 3. Suspends the idle speed feedback control.
Throttle valve position feedback	1. Suspends the electronic controlled throttle valve system. 2. Suspends lean burn operation. 3. Suspends the engine speed feedback control.
Communication line between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T>	1. Communication error between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T>: • Suspends lean burn operation. • Cuts the fuel supply when the engine speed reaches 3,000 r/min or more. • Suspends the cruise-control. 2. Communication error between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T>: • Suspends lean burn operation. • Cuts the fuel supply when the engine speed reaches 3,000 r/min or more. • Suspends the cruise-control. • The throttle valve controller controls the throttle valve opening angle by using signals from accelerator pedal position sensor (2nd channel).
Throttle control servo motor 1st phase malfunction	Bans lean burn operation.
Throttle control servo motor 2nd phase malfunction	Suspends electronic control throttle valve system. Bans lean burn operation. Bans engine speed feed back control.
Misfiring	If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down.

NOTE

If the electronic-controlled throttle valve system is suspended, the engine warning lamp will illuminate.

INSPECTION CHART FOR DIAGNOSIS CODES

Code No.	Diagnosis item	Reference page
P0100	Air flow sensor system	13J-13
P0105	Barometric pressure sensor system	13J-15
P0110	Intake air temperature sensor system	13J-17
P0115	Engine coolant temperature sensor system	13J-18
P0120★	Throttle position sensor 1 (1st channel) system	13J-21
P0125	Feedback system	13J-23
P0130	Oxygen sensor (front) system <sensor 1>	13J-25
P0135	Oxygen sensor heater (front) system <sensor 1>	13J-27
P0136	Oxygen sensor (rear) system <sensor 2>	13J-28
P0141	Oxygen sensor heater (rear) system <sensor 2>	13J-30
P0170	Abnormal fuel system	13J-31
P0190★	Abnormal fuel pressure	13J-33
P0201	No. 1 injector system	13J-34
P0202	No. 2 injector system	13J-36
P0203	No. 3 injector system	13J-37
P0204	No. 4 injector system	13J-38
P0220★	Accelerator pedal position sensor (1st channel) system	13J-40
P0225★	Throttle position sensor (2nd channel) system	13J-43
P0300★	Ignition coil (power transistor) system	13J-44
P0301	No. 1 cylinder misfire detected	13J-46
P0302	No. 2 cylinder misfire detected	13J-46
P0303	No. 3 cylinder misfire detected	13J-46
P0304	No. 4 cylinder misfire detected	13J-46
P0325	Detonation sensor system	13J-47
P0335	Crank angle sensor system	13J-47
P0340	Camshaft position sensor system	13J-49
P0403	EGR valve system	13J-51
P0420	Catalyst malfunction	13J-53
P0425	Catalyst temperature sensor <M/T>	13J-54
P0443	Purge control solenoid valve system	13J-56
P0500	Vehicle speed sensor system	13J-57
P1200	Injector driver system	13J-57

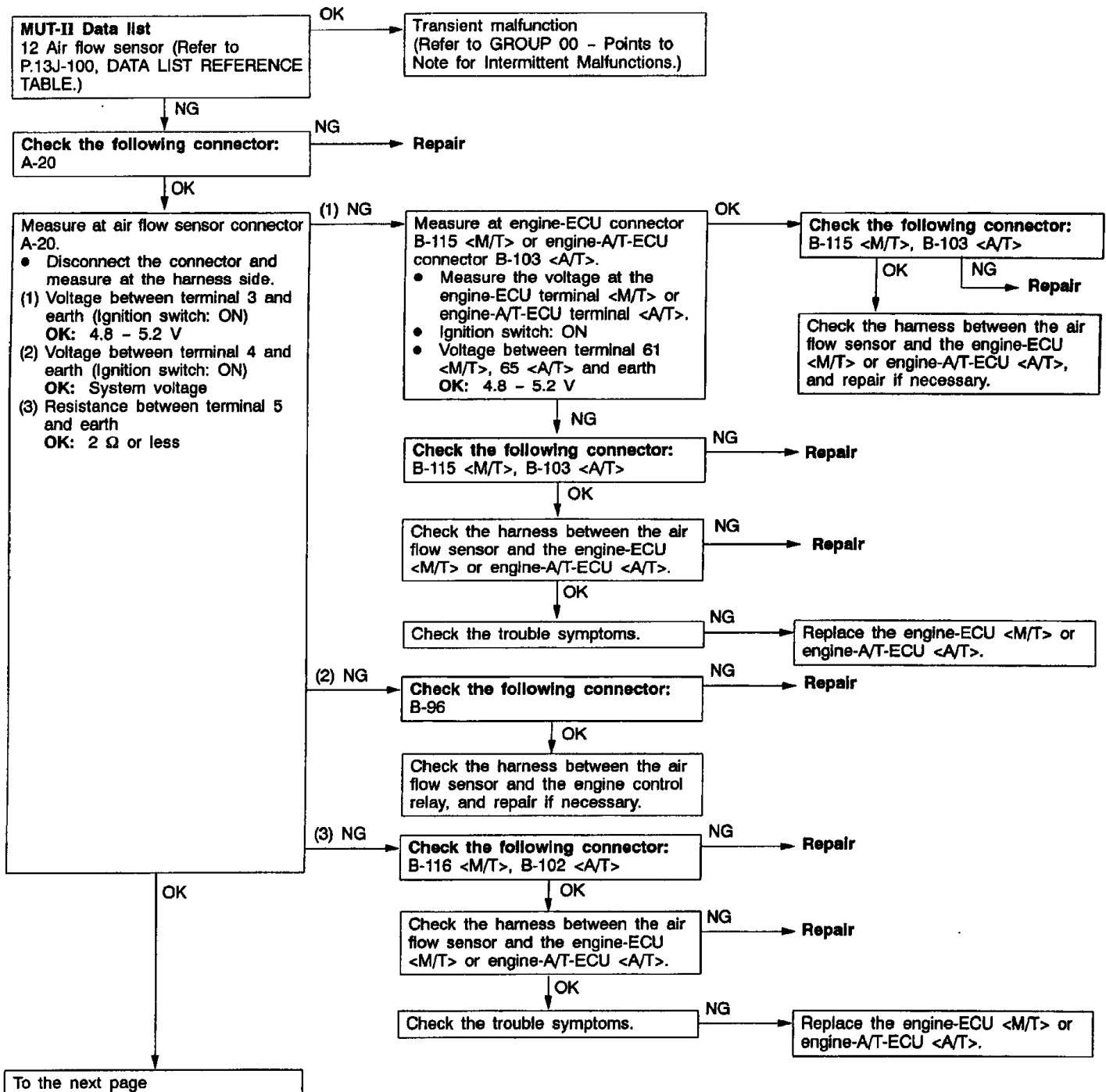
Code No.	Diagnosis item	Reference page
P1220★	Electronic-controlled throttle valve system	13J-58
P1221★	Throttle valve position feedback system	13J-59
P1223★	Communication line with throttle valve controller	13J-60
P1224★	Throttle valve control servo motor (motor 1st phase malfunction) system	13J-61
P1225★	Accelerator pedal position sensor (2nd channel) system	13J-62
P1228★	Throttle valve control servo motor (motor 2nd phase malfunction) system	13J-64
P1500	Alternator FR terminal system	13J-65
P1515	Brake vacuum sensor system	13J-66
P1610	Immobilizer system	13J-68

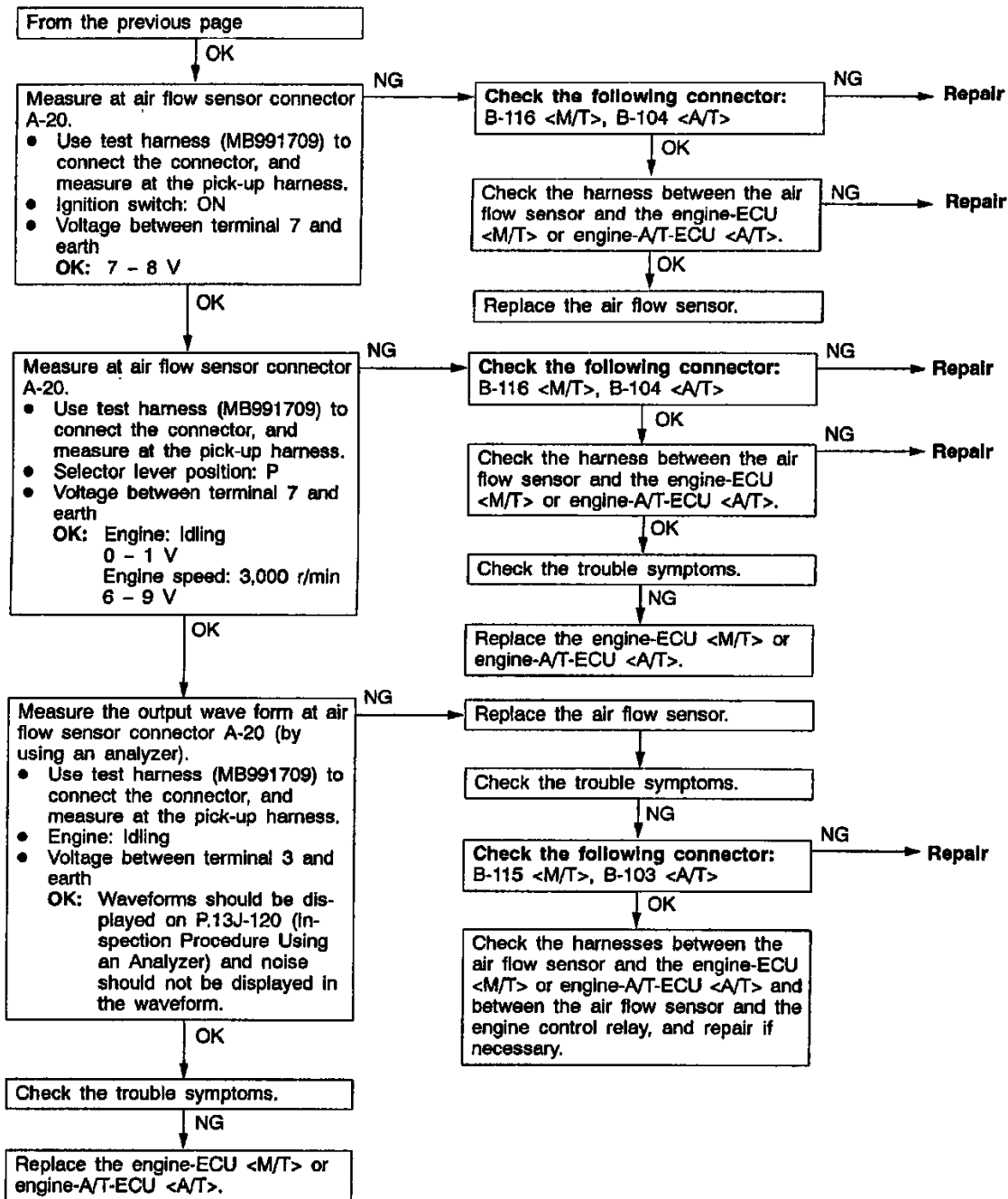
NOTE

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.

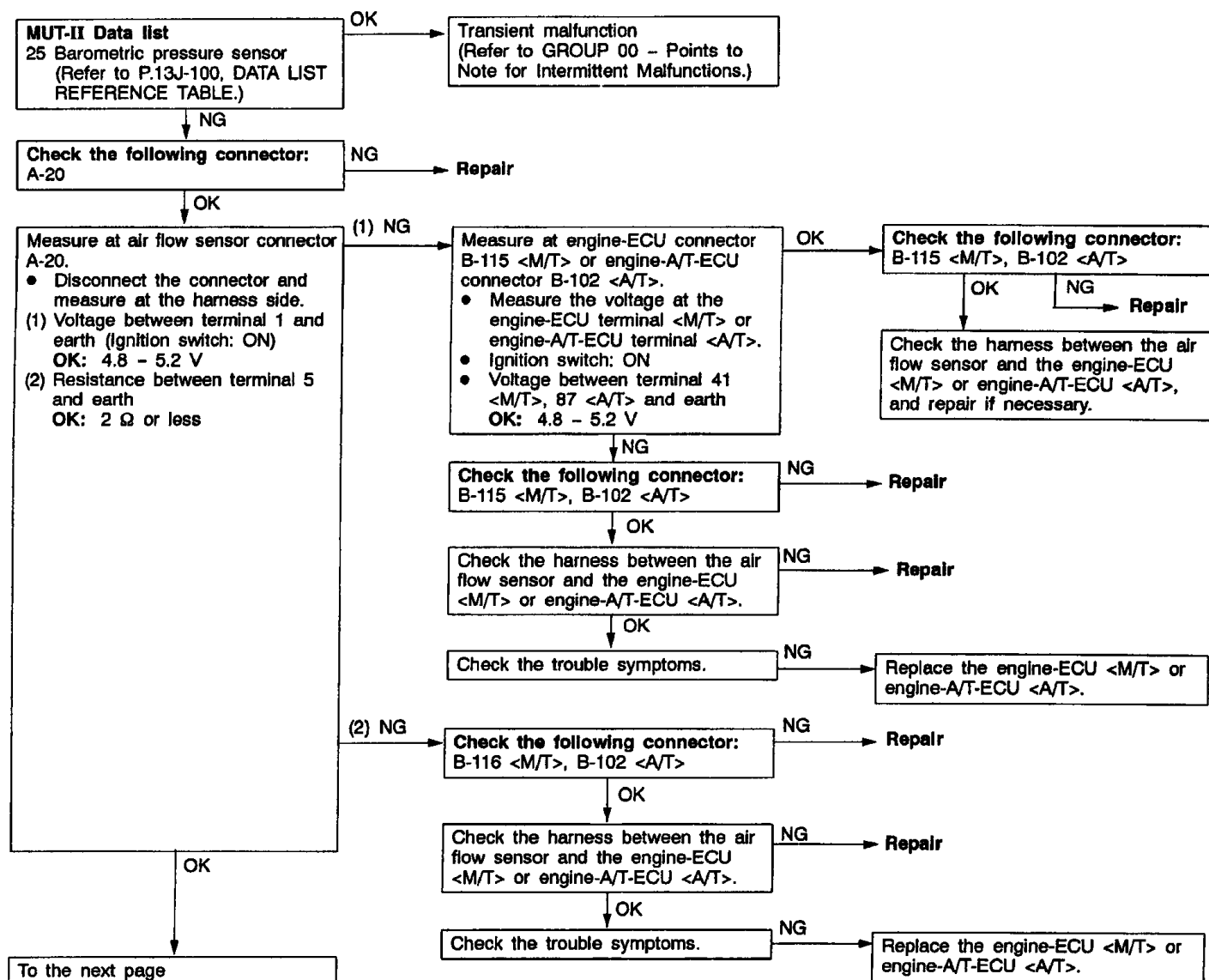
INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

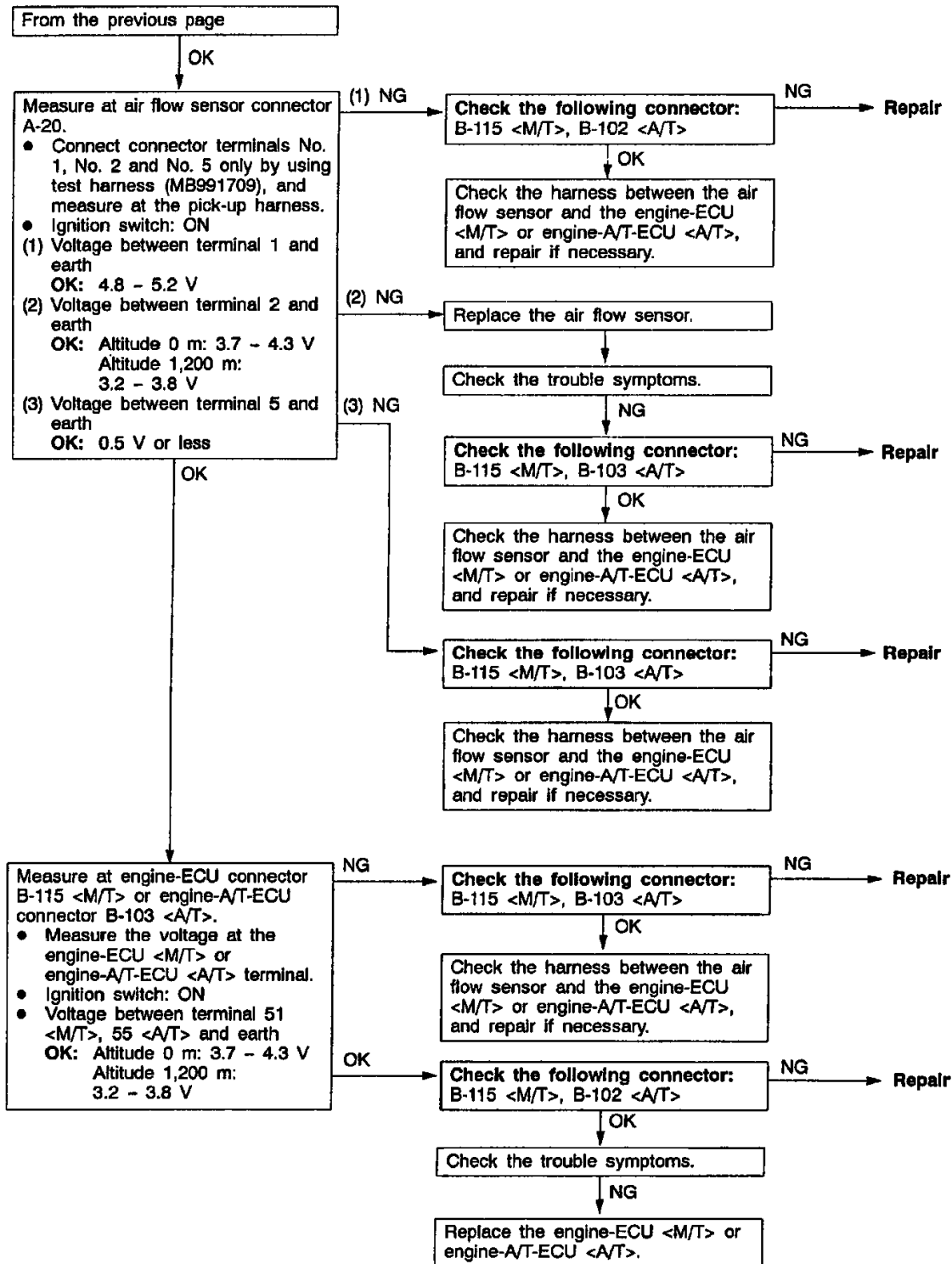
Code No. P0100 Air flow sensor system	Probable cause
Range of Check • Engine speed: 500 r/min or more Set Conditions • The sensor output frequency is 3.3 Hz or less for four seconds.	• Malfunction of air flow sensor • Open or short circuit in air flow sensor circuit or loose connector contact • Malfunction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



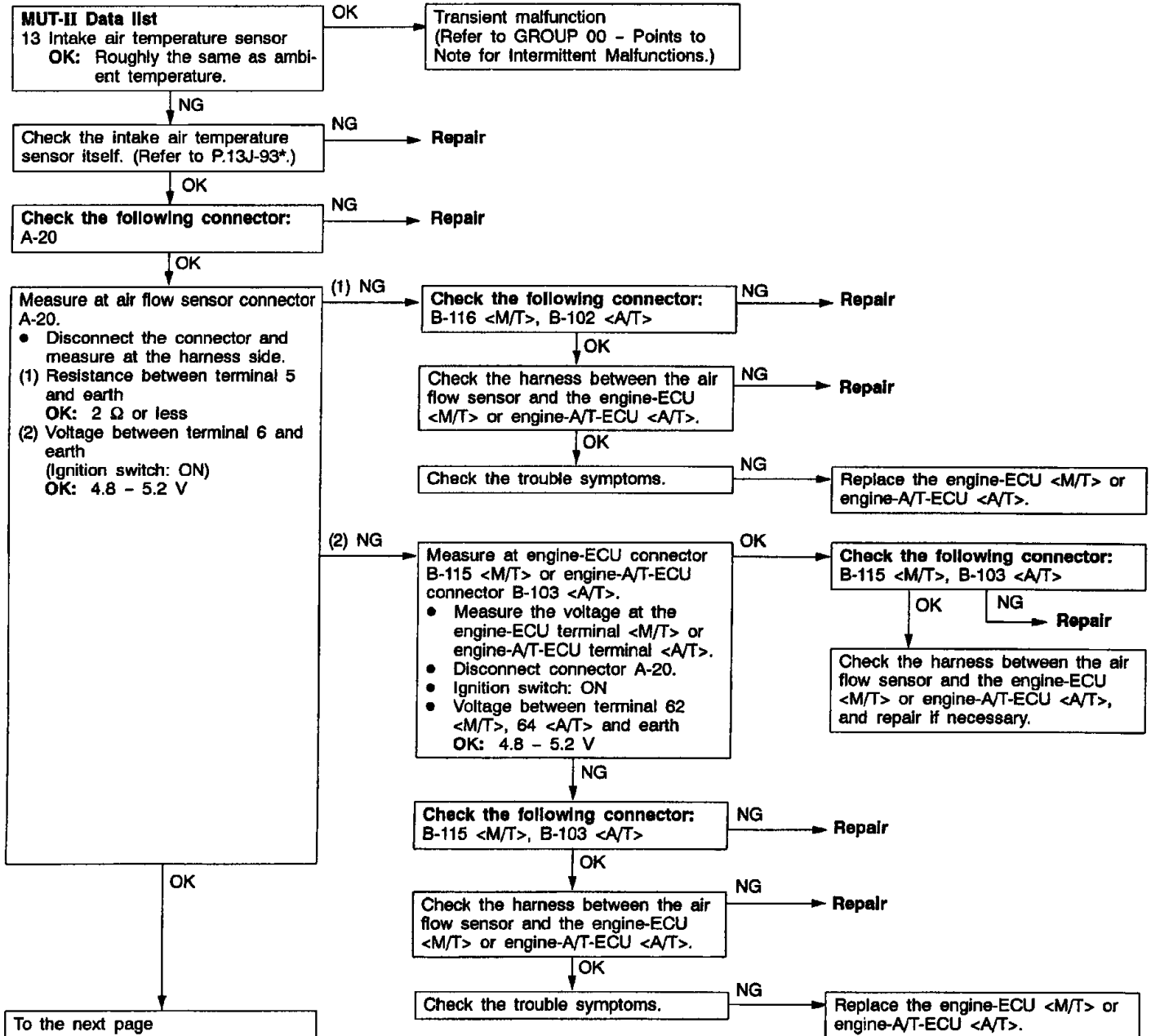


Code No. P0105 Barometric pressure sensor system	Probable cause
Range of Check - Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. - Battery voltage: 8 V or more Set Conditions - The sensor output voltage is 4.5 V or more for four seconds (equivalent 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>



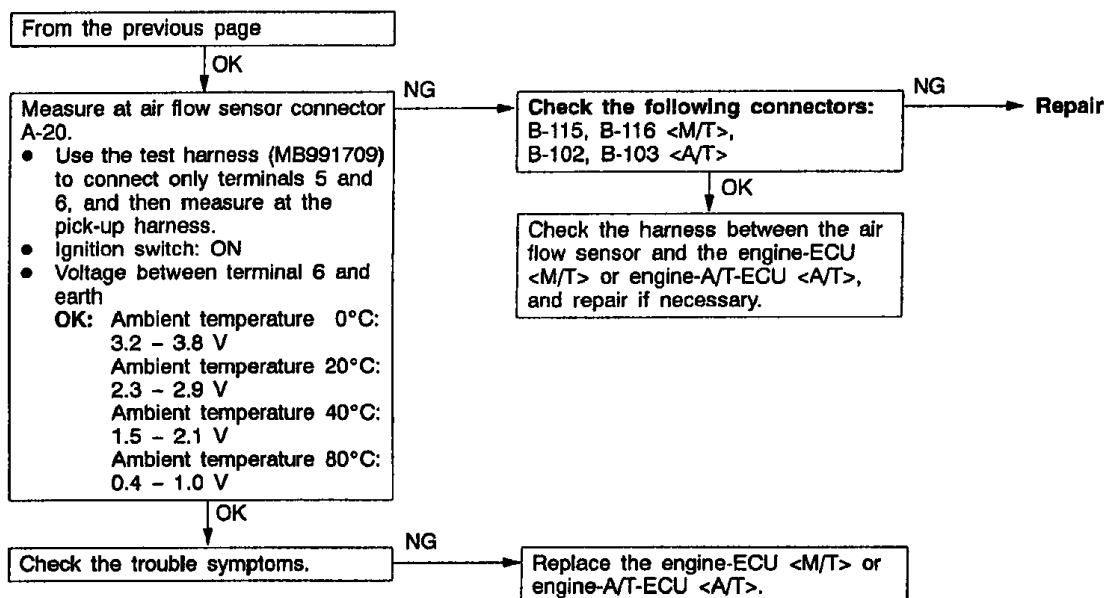


Code No. P0110 Intake air temperature sensor system	Probable cause
Range of Check - Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. Set Conditions - The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of intake air 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>

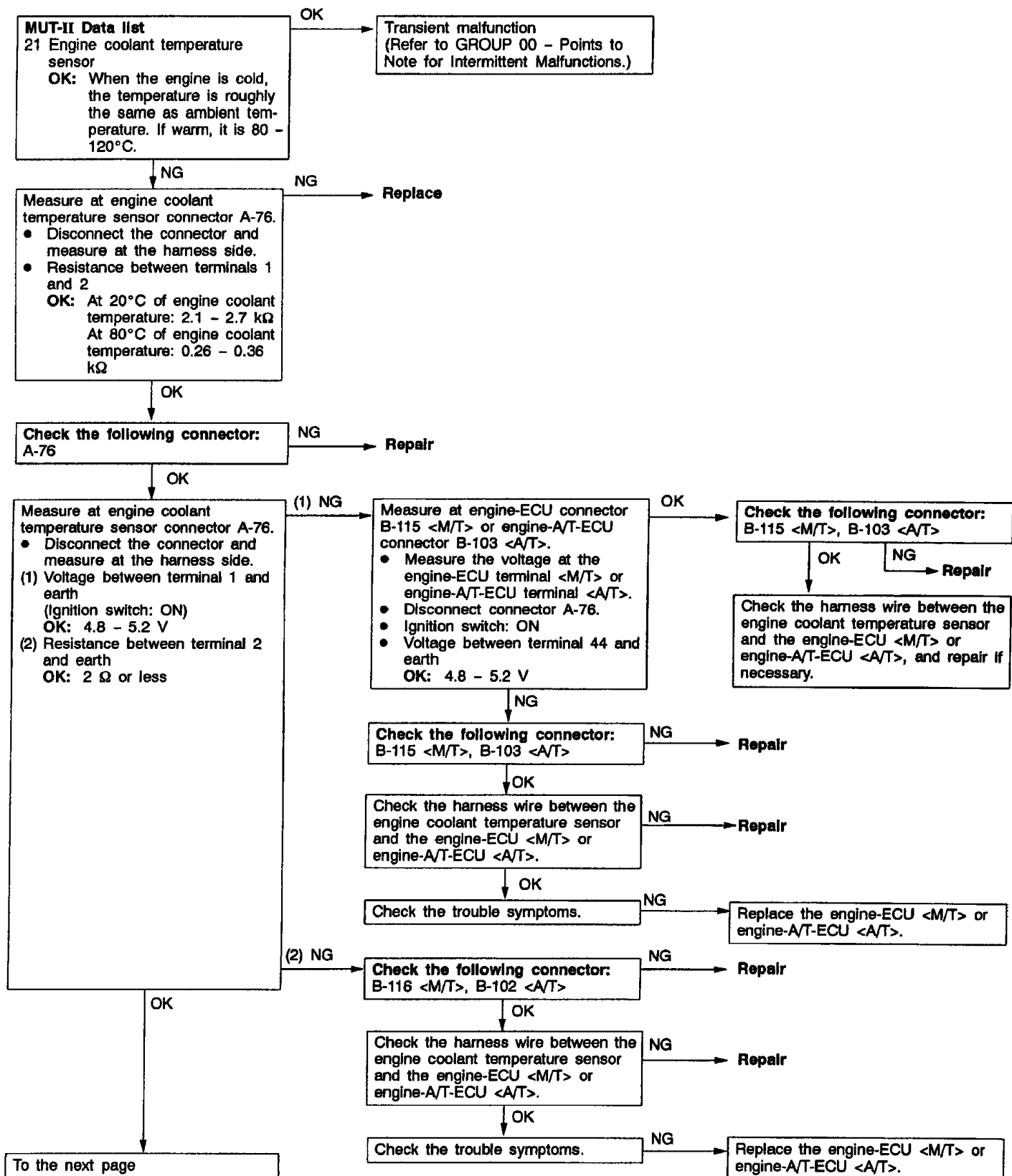


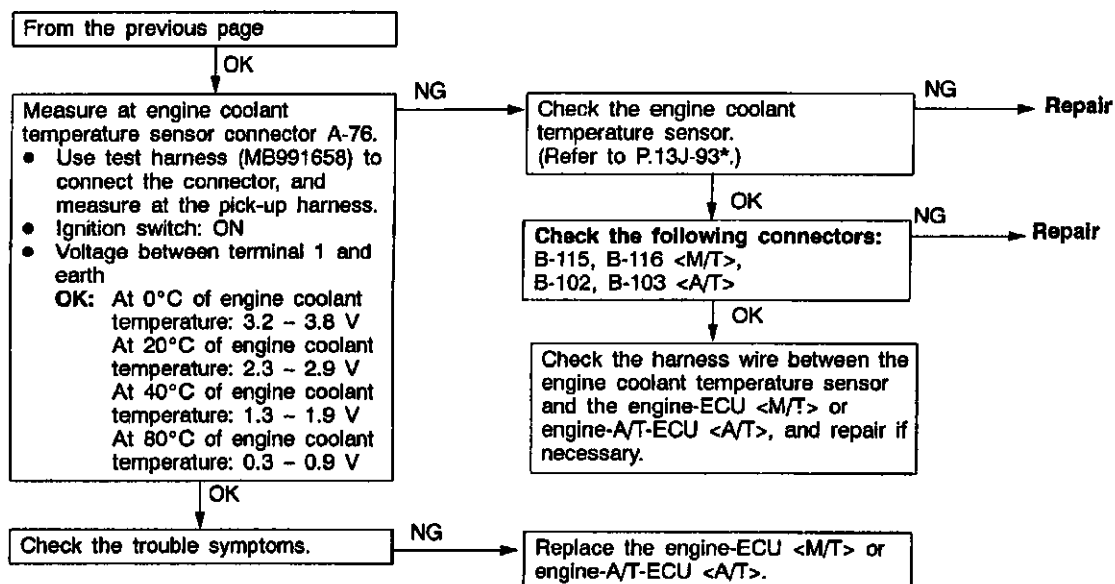
NOTE

*: Refer to the '98 CARISMA-GDI Workshop Manual (Pub. No. PWDE9502-C).



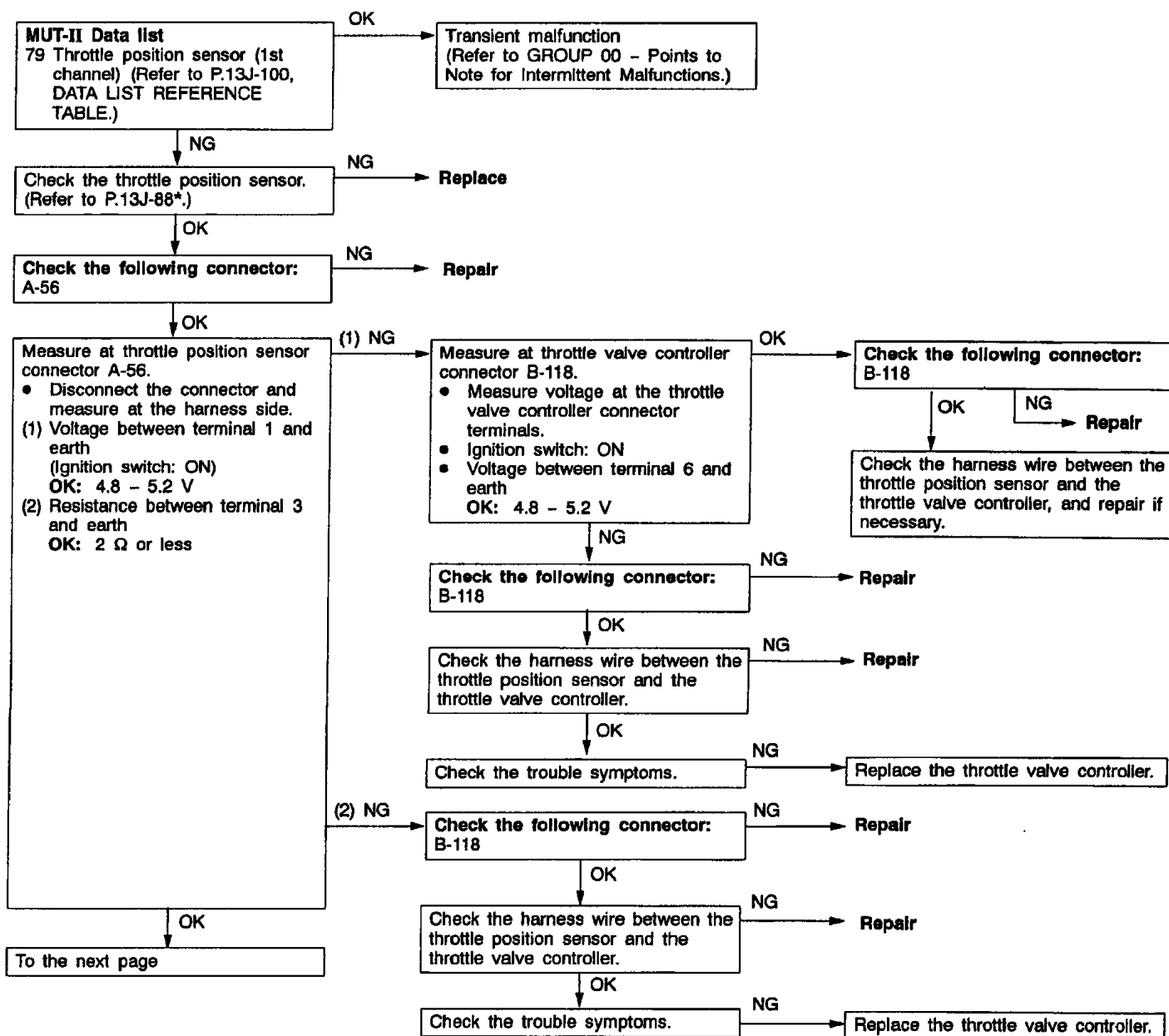
Code No. P0115 Engine coolant temperature sensor system	Probable cause
Range of Check • Engine: Two seconds after the engine has been started Set Conditions • The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of engine coolant temperature) or • The sensor output voltage 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.	



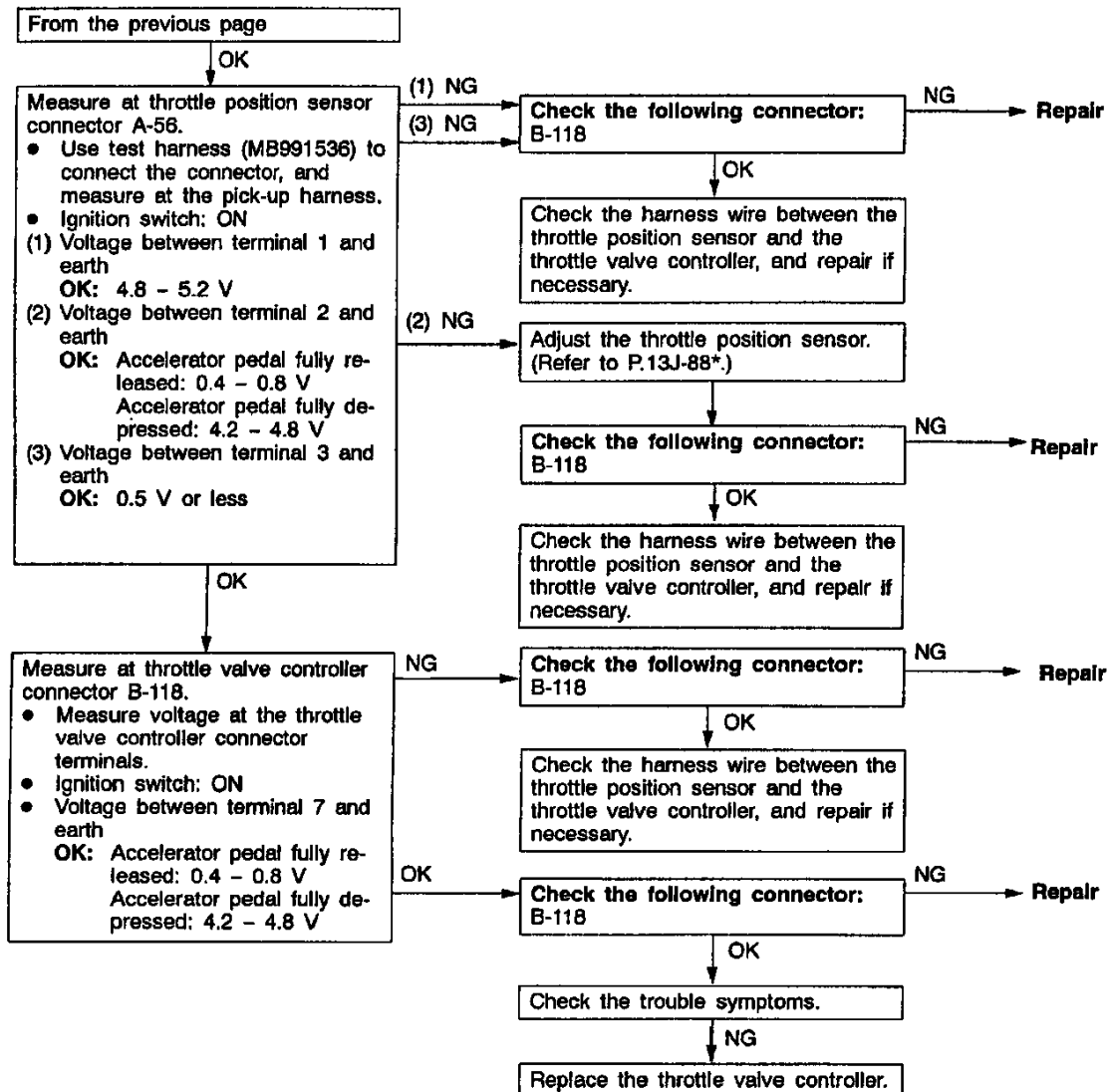


NOTE

*: Refer to the '98 CARISMA-GDI Workshop Manual (Pub. No. PWDE9502-C).



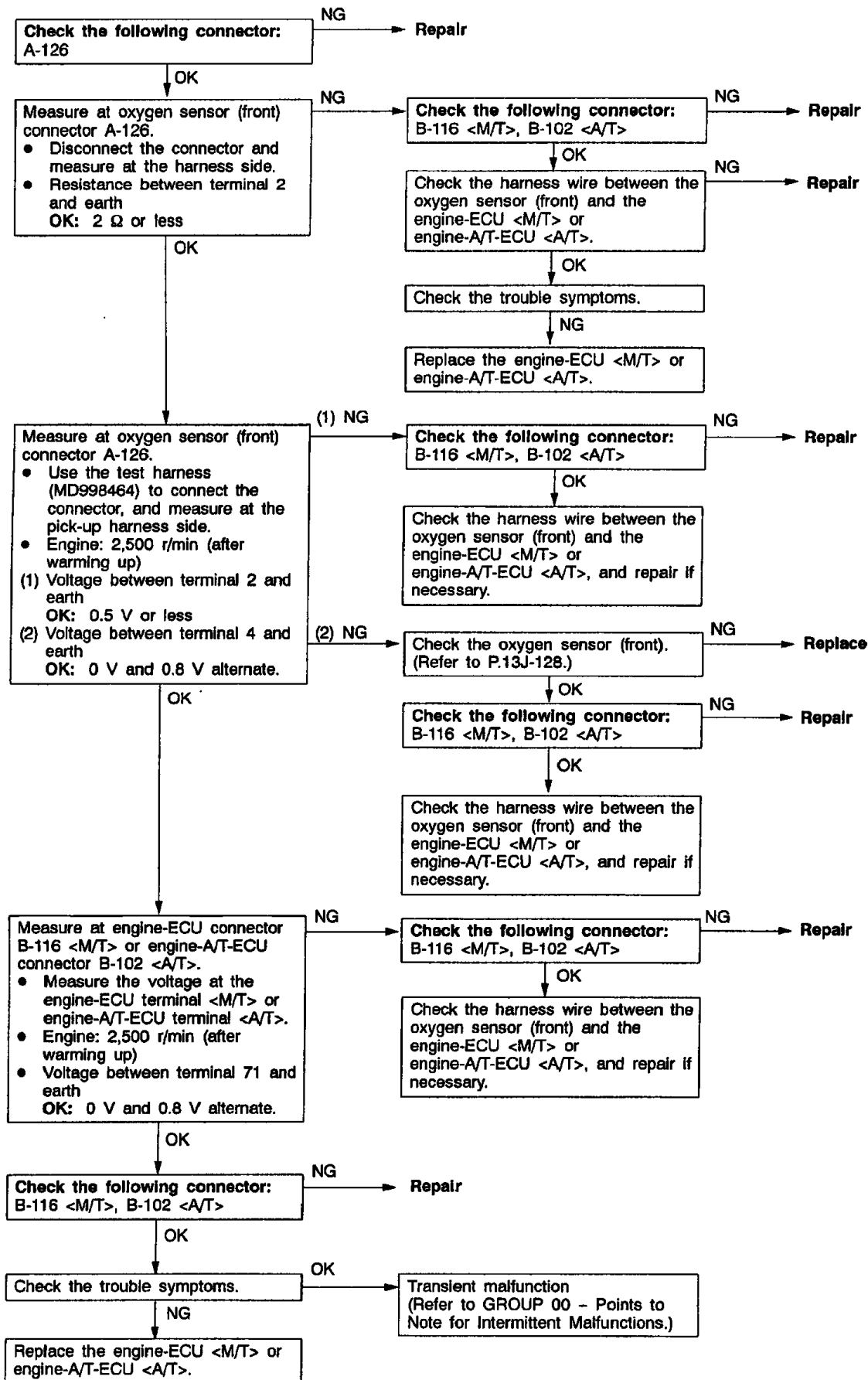
*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).



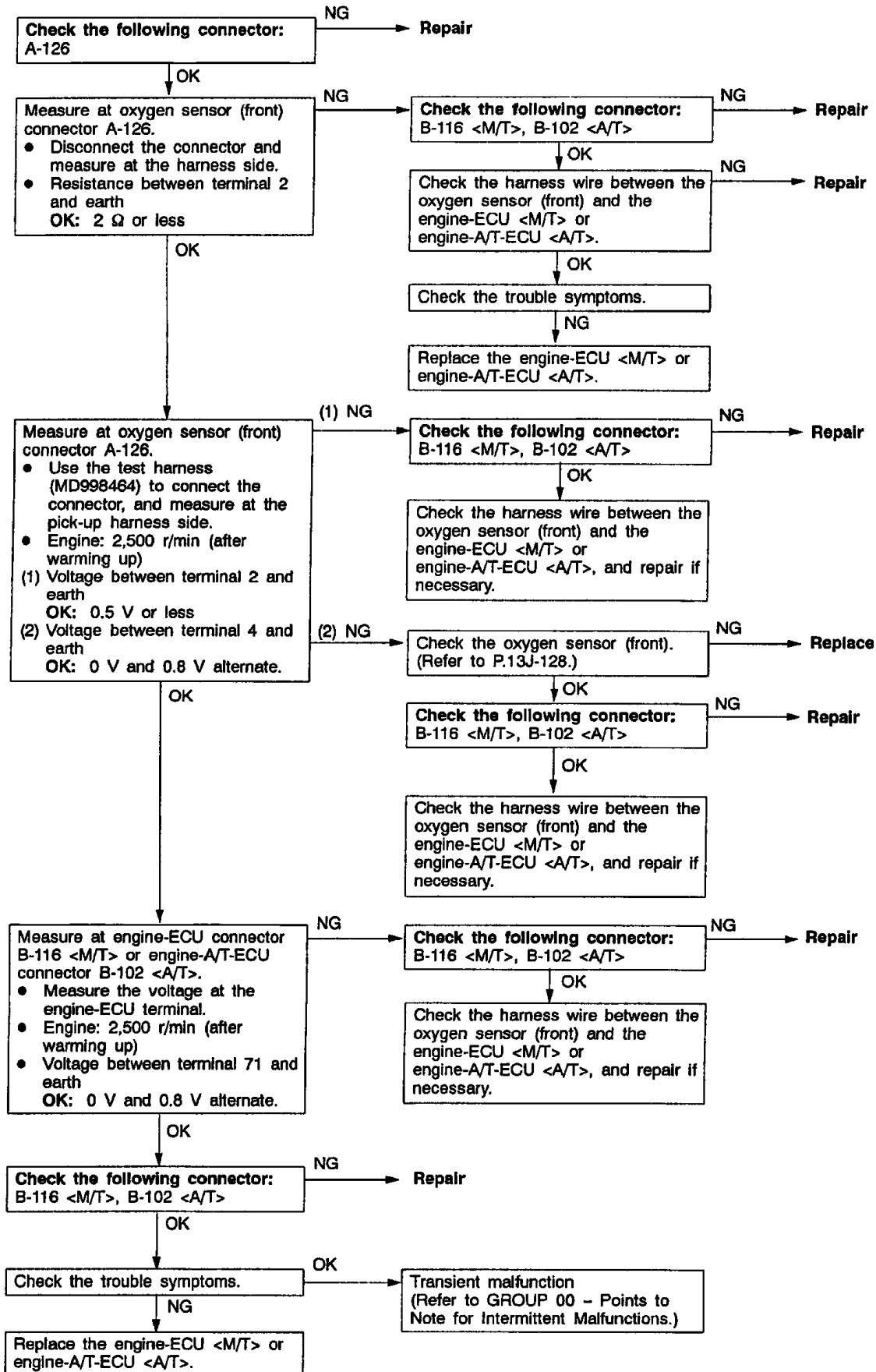
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

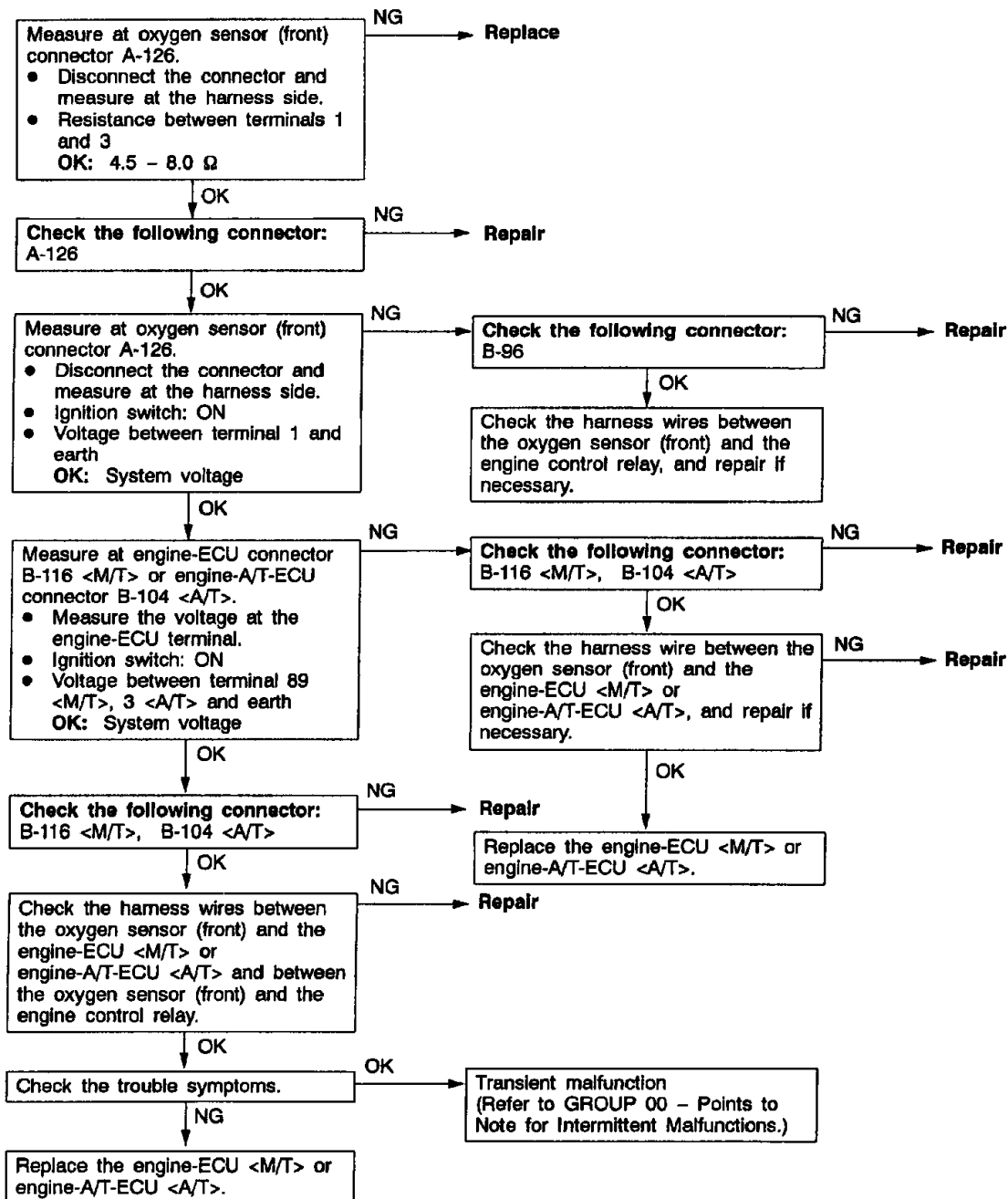
Code No. P0125 Feedback system	Probable cause
Range of Check • The engine coolant temperature is approx. 80°C or more. • During stoichiometric feedback control • The vehicle is not being decelerated. Set Conditions • Oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least 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>



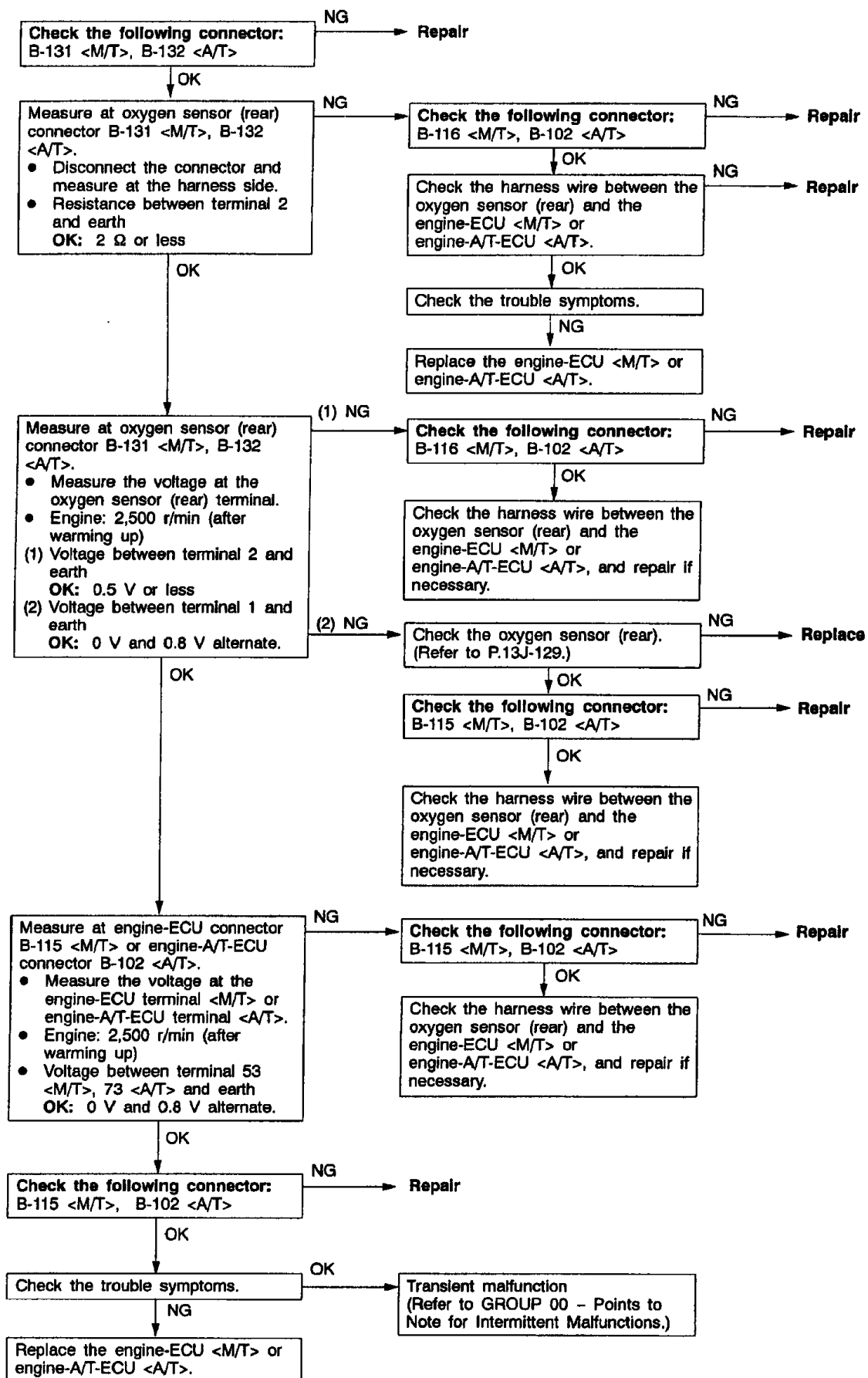
Code No. P0130 Oxygen sensor (front) system <sensor 1>	Probable cause
Range of Check • Three minutes have been passed since the engine has been started. • The engine coolant temperature is approx. 80°C or more. • Intake air temperature is 20 – 50°C • Engine speed is 1,200 r/min or more • Driving on a 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 <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.	



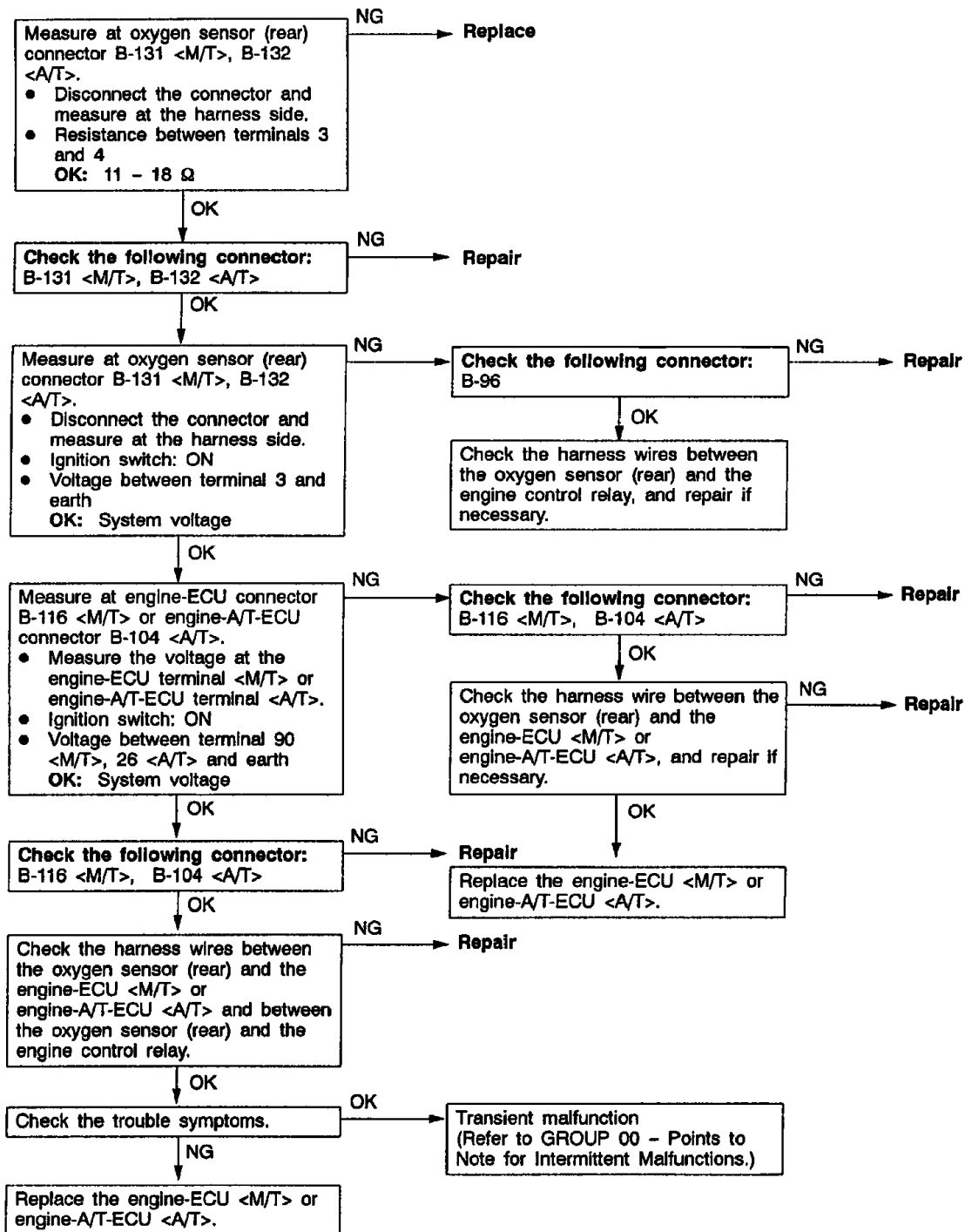
Code No. P0135 Oxygen sensor heater (front) system <sensor 1>	Probable cause
Range of Check • The engine coolant temperature is approx. 20°C or more. • The oxygen sensor heater (front) remains on. • The engine speed is 50 r/min or more. • Battery voltage is 11 – 16 V. Set Conditions • The current, which 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>



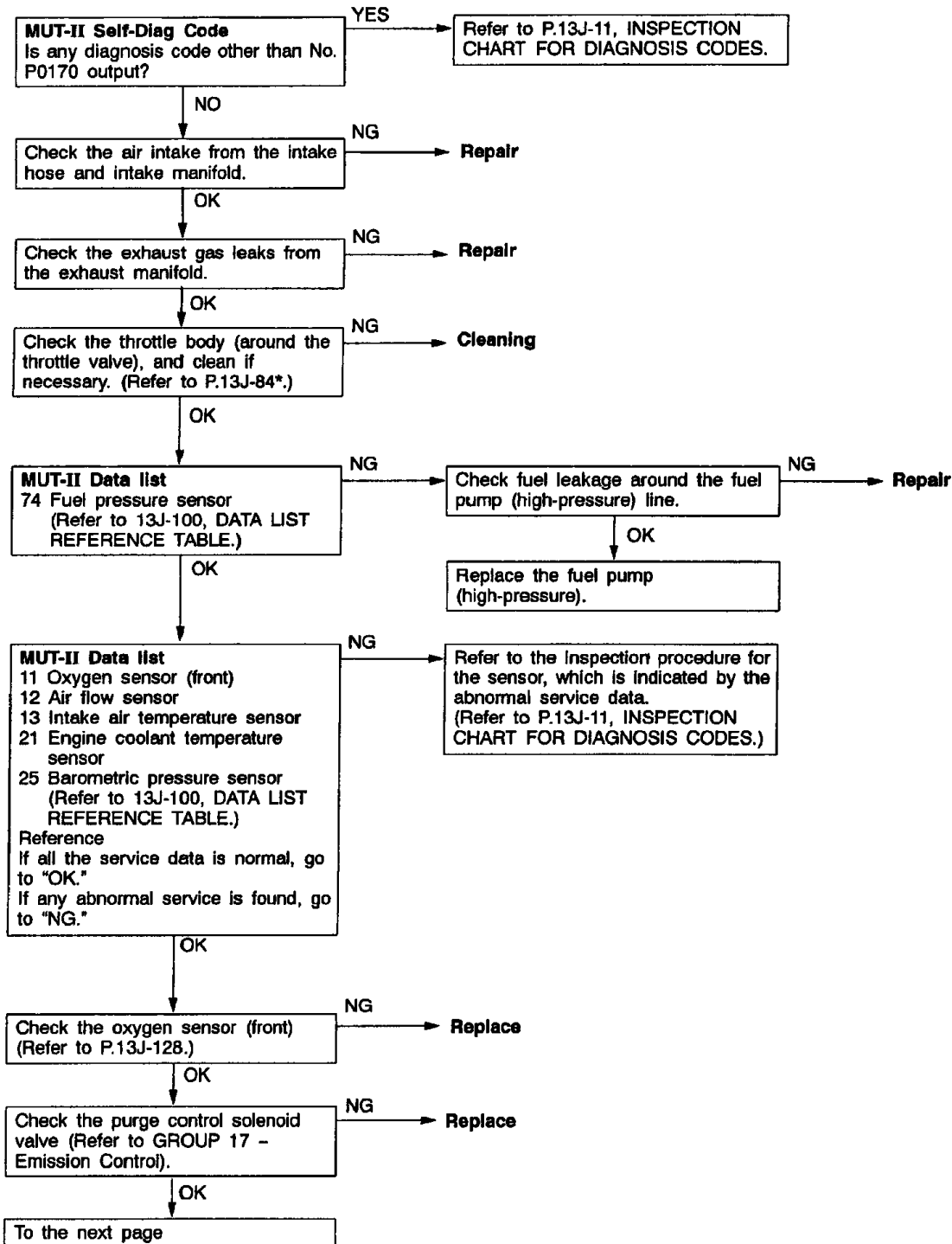
Code No. P0136 Oxygen sensor (rear) system <sensor 2>	Probable cause
Range of Check • Three minutes have been passed since the engine has been started. • The engine coolant temperature is approx. 80°C or more. • Intake air temperature is 20 – 50°C • Engine speed is 1,200 r/min or more • Driving on a 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>. 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.	• 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>



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>

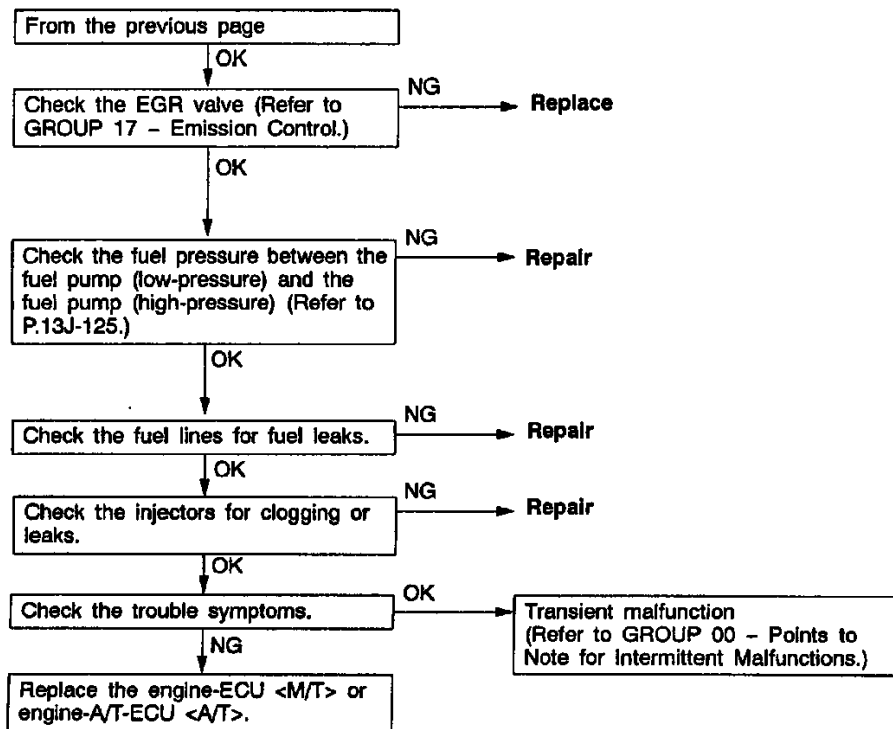


Code No. P0170 Abnormal fuel system	Probable cause
Range of Check • Engine: Being learning the air-fuel ratio Set Conditions • Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or • Ten seconds or more have been passed while the fuel injection amount compensation value is too high.	• 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>

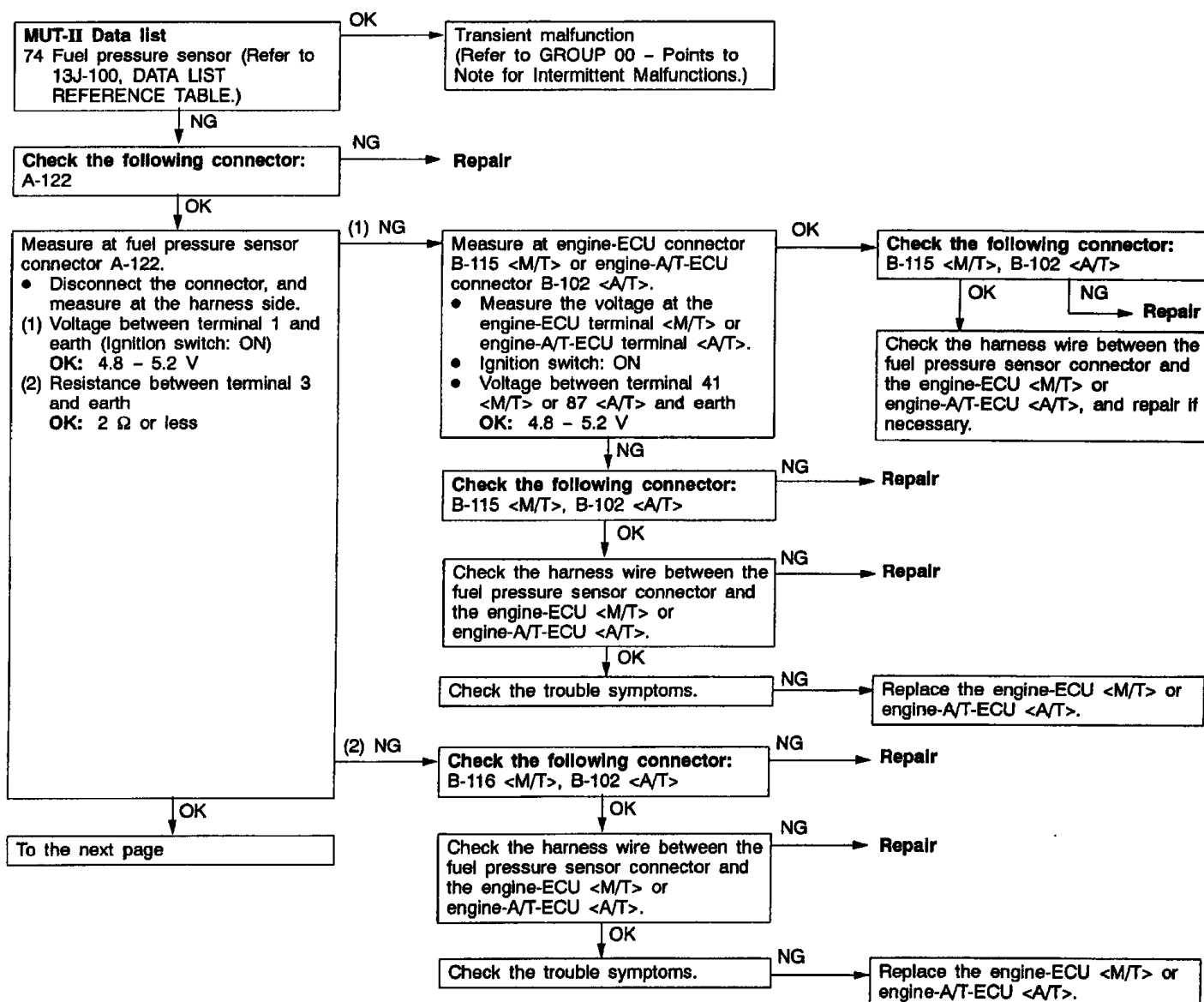


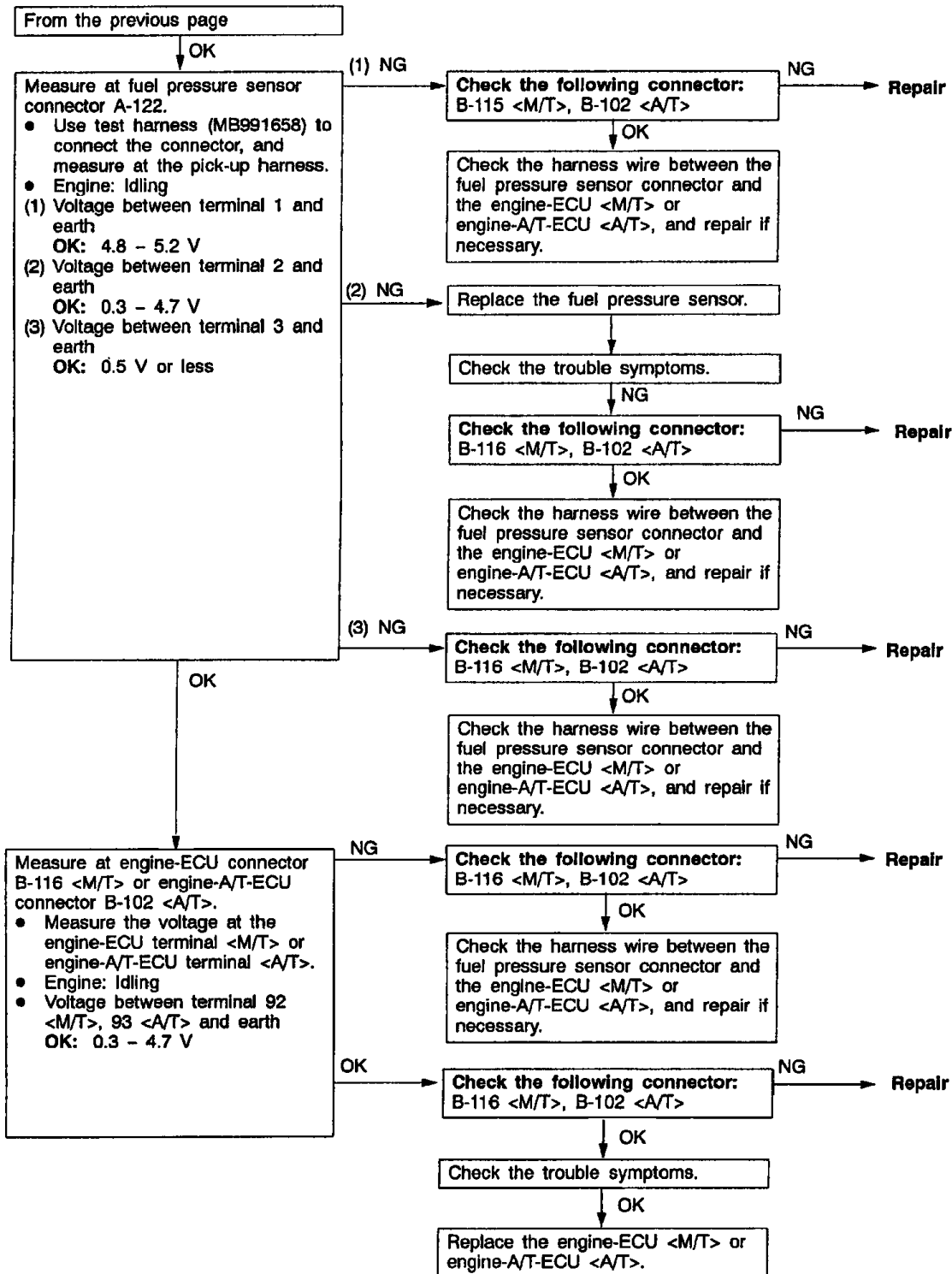
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

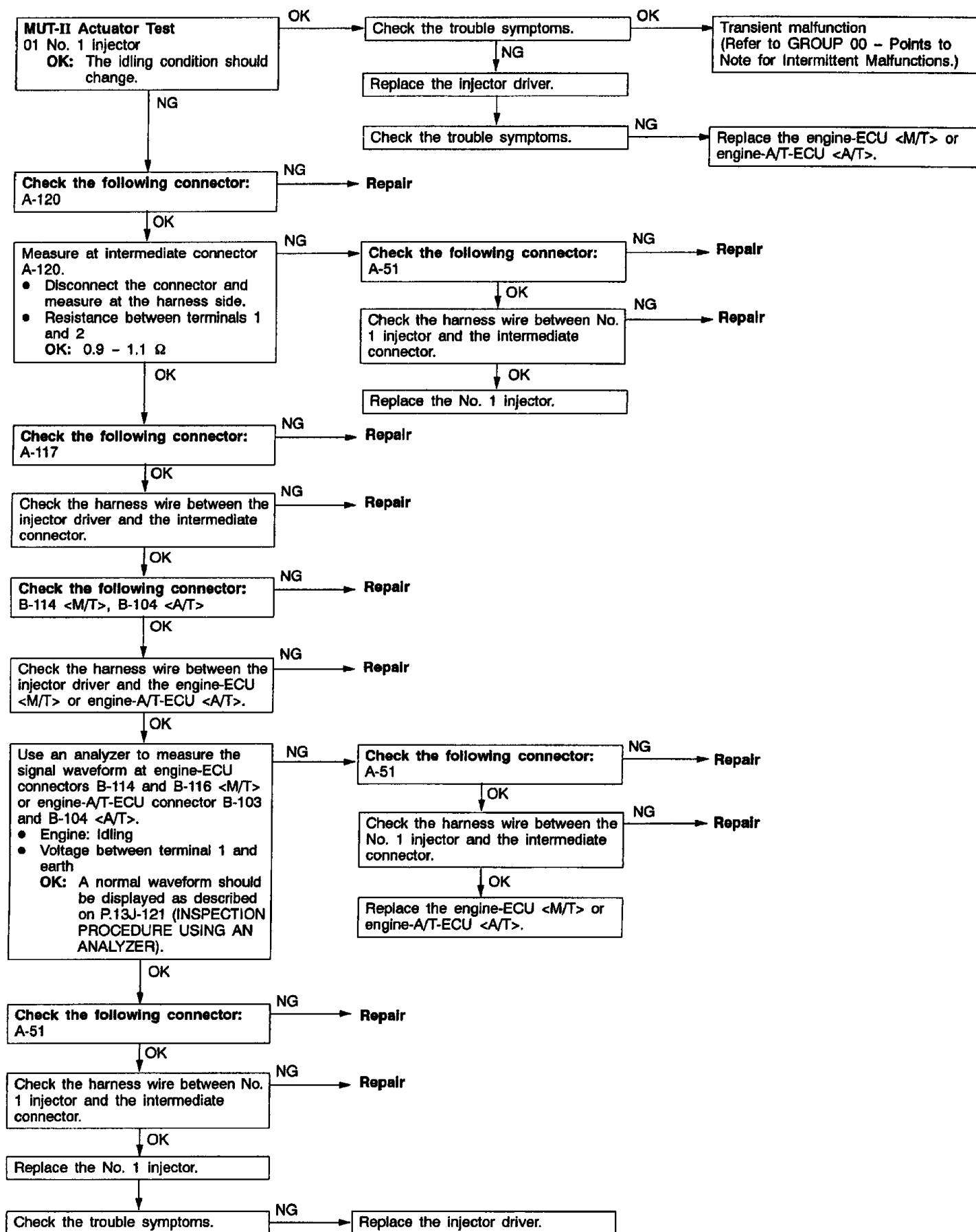


Code No. P0190 Abnormal fuel pressure	Probable cause
Range of Check • Ignition switch: ON Set Conditions • The sensor output voltage is 4.8 V or more, or 0.2 V or less for four seconds.	• Malfunction of fuel pressure sensor • Open or short circuit in the fuel pressure sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T>
Range of Check • The following conditions are detected temporarily after the engine has been started. (1) Engine speed: 1,000 r/min or more (2) Fuel pressure: 2 MPa or more • Engine running Set Conditions • The fuel pressure is 6.9 MPa or more, or 2 MPa or less for four seconds.	• Malfunction of high-pressure fuel pump • Clogging of high-pressure fuel lines
This diagnosis code will also be output when air is trapped into the high-pressure fuel lines (such as poor fuel level). In that case, the air can be evacuated by operating the engine for at least 15 seconds at 2,000 r/min. After the repair, use the MUT-II to erase the diagnosis code.	• Air trapped due to poor fuel level

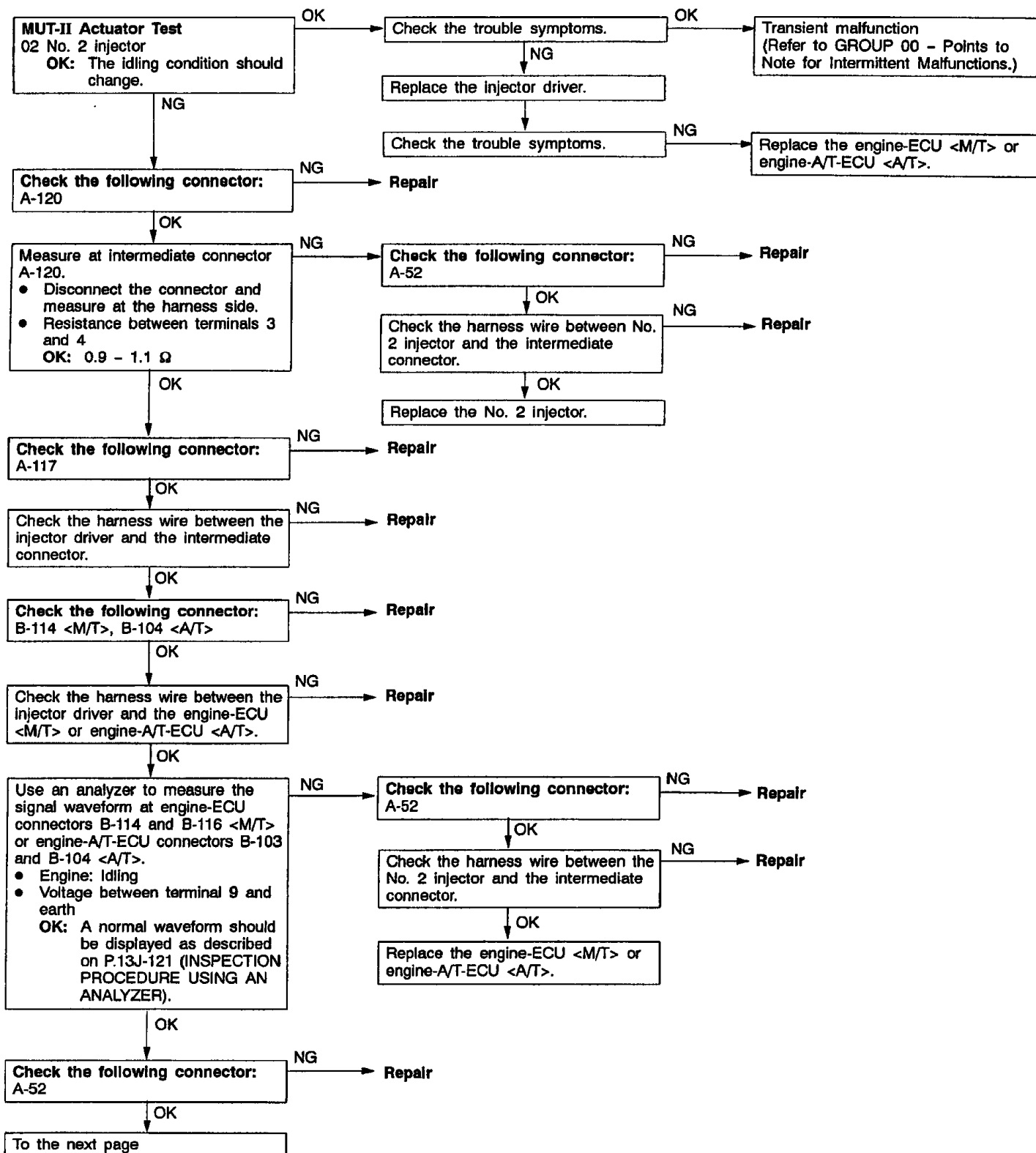


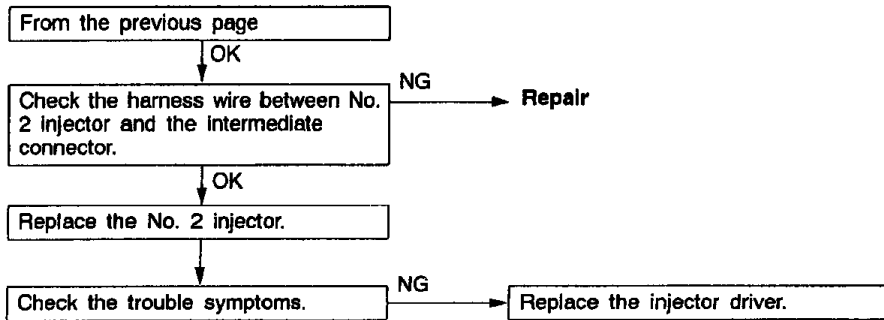


Code No. P0201 No. 1 injector system	Probable cause
Range of Check • The engine speed is 4,000 r/min or less. • The battery voltage is 10 V or more. • The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. Set Conditions • The injector driver is not transmitting a injector open circuit check signal for four seconds.	• Malfunction of No. 1 injector • Open or short circuit in the No. 1 injector circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T>

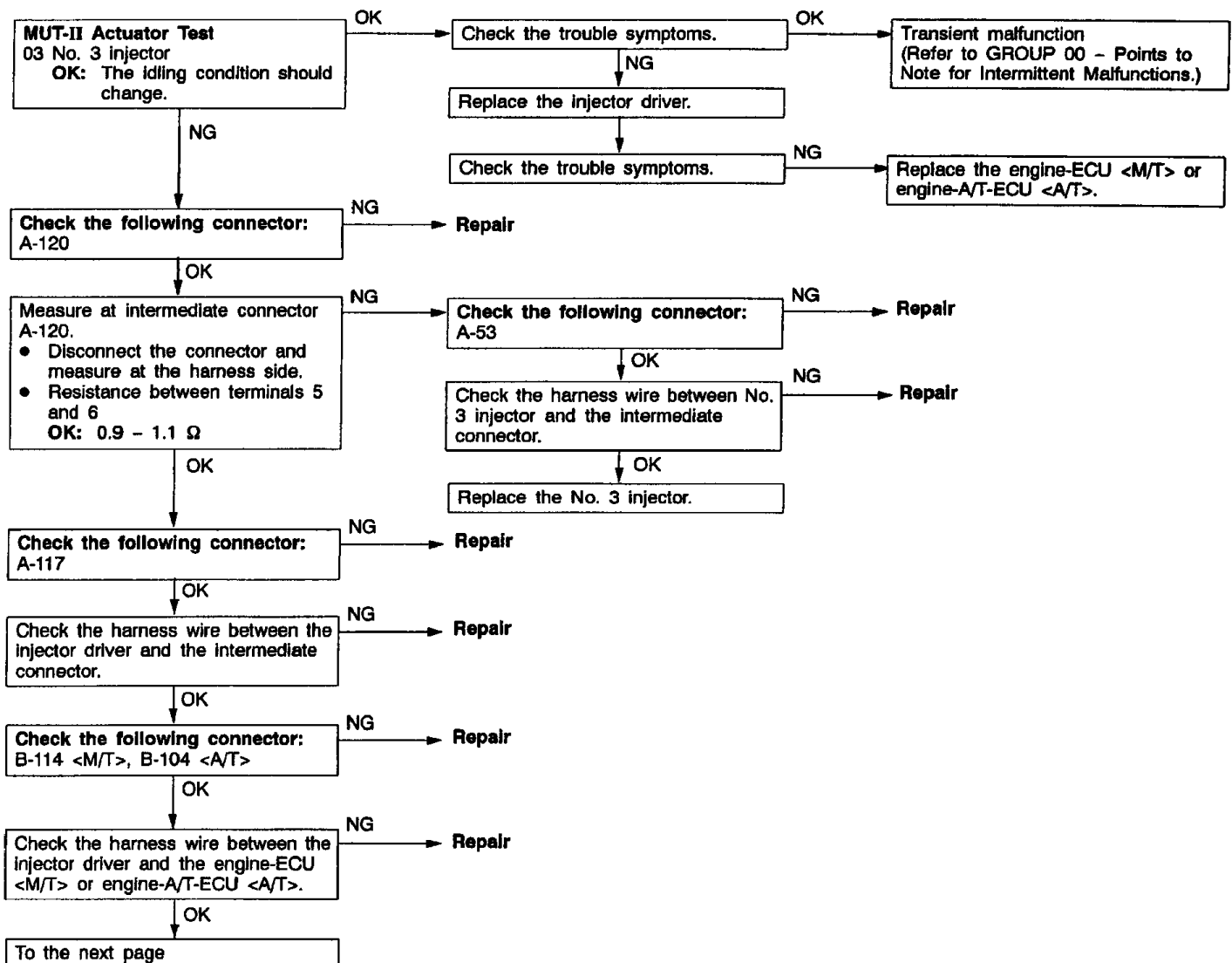


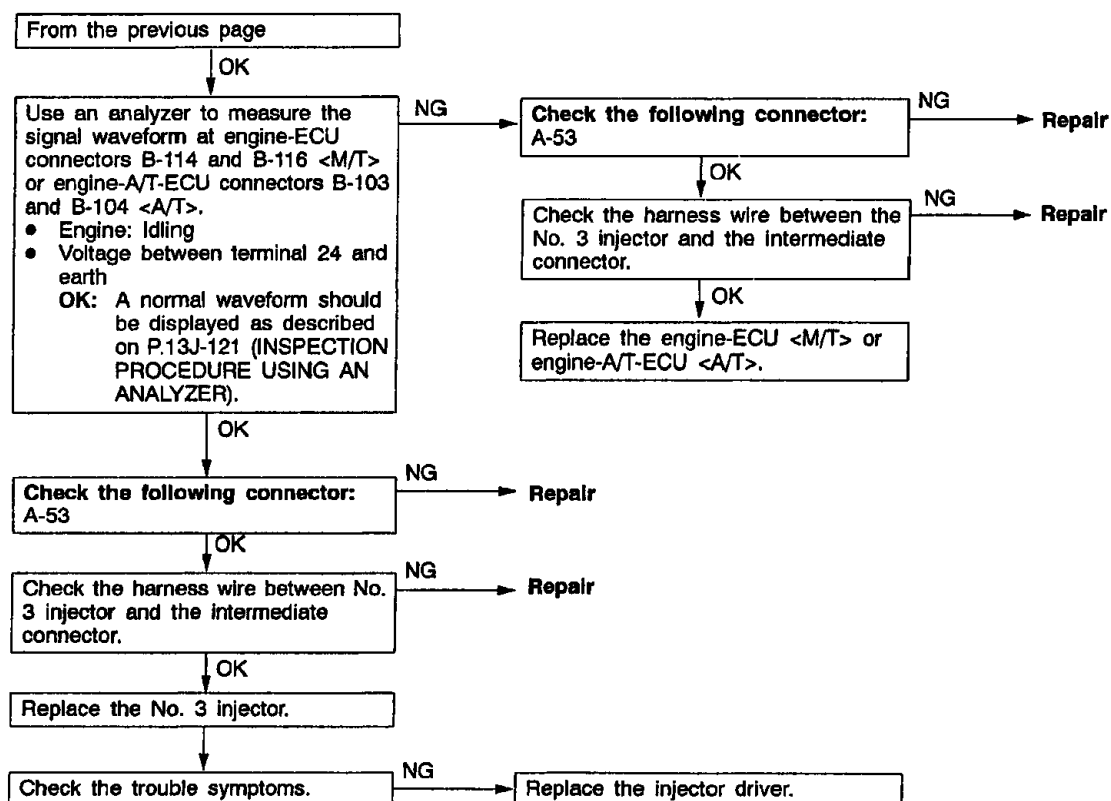
Code No. P0202 No. 2 injector system	Probable cause
Range of Check - The engine speed is 4,000 r/min or less. - The battery voltage is 10 V or more. - The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. Set Conditions - The injector driver is not transmitting a injector open circuit check signal for four seconds.	- Malfunction of No. 2 injector - Open or short circuit in the No. 2 injector circuit or loose connector contact - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/T-ECU <A/T>



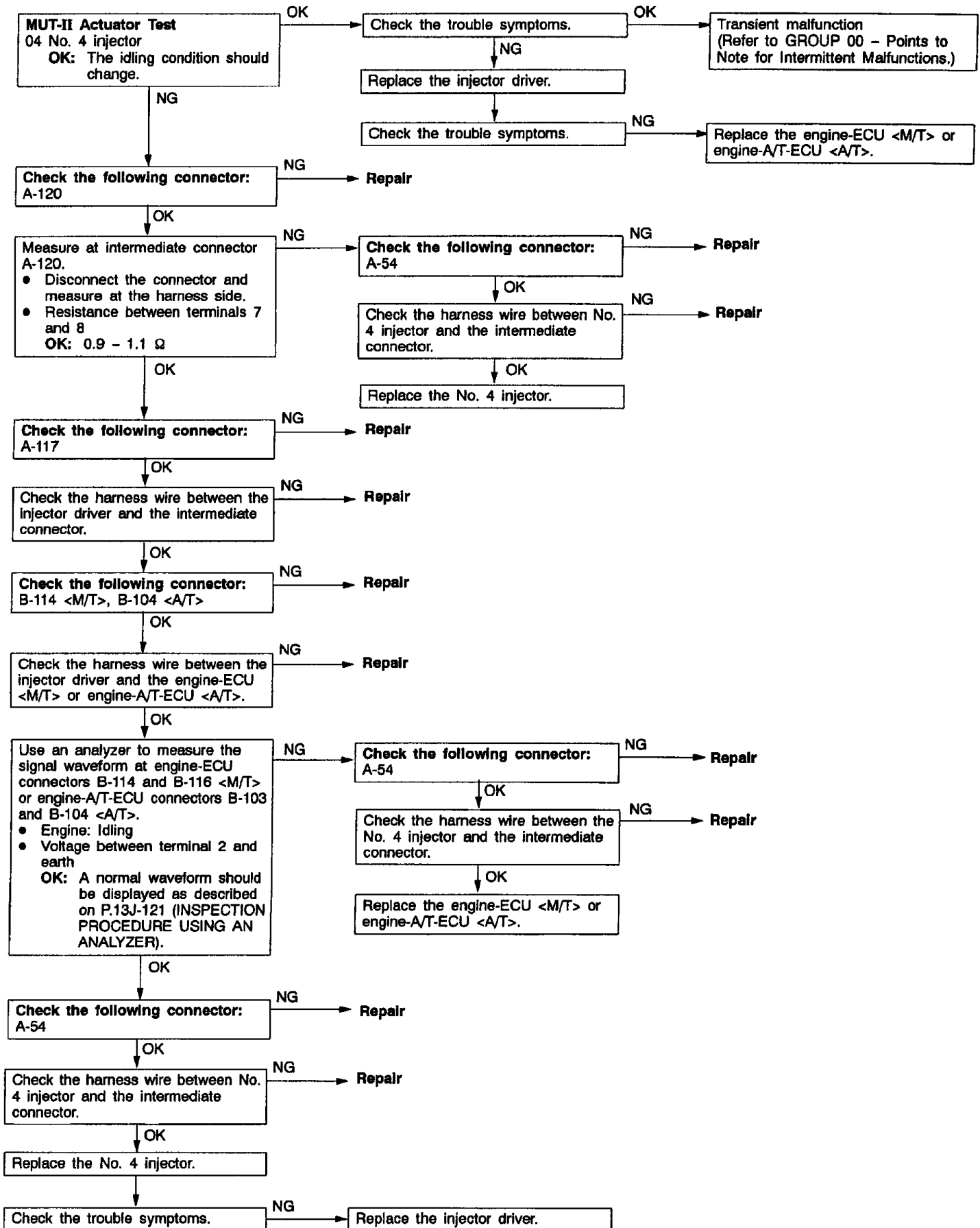


Code No. P0203 No. 3 injector system	Probable cause
Range of Check - The engine speed is 4,000 r/min or less. - The battery voltage is 10 V or more. - The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. Set Conditions - The injector driver is not transmitting a injector open circuit check signal for four seconds.	- Malfunction of No. 3 injector - Open or short circuit in the No. 3 injector circuit or loose connector contact - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/T-ECU <A/T>

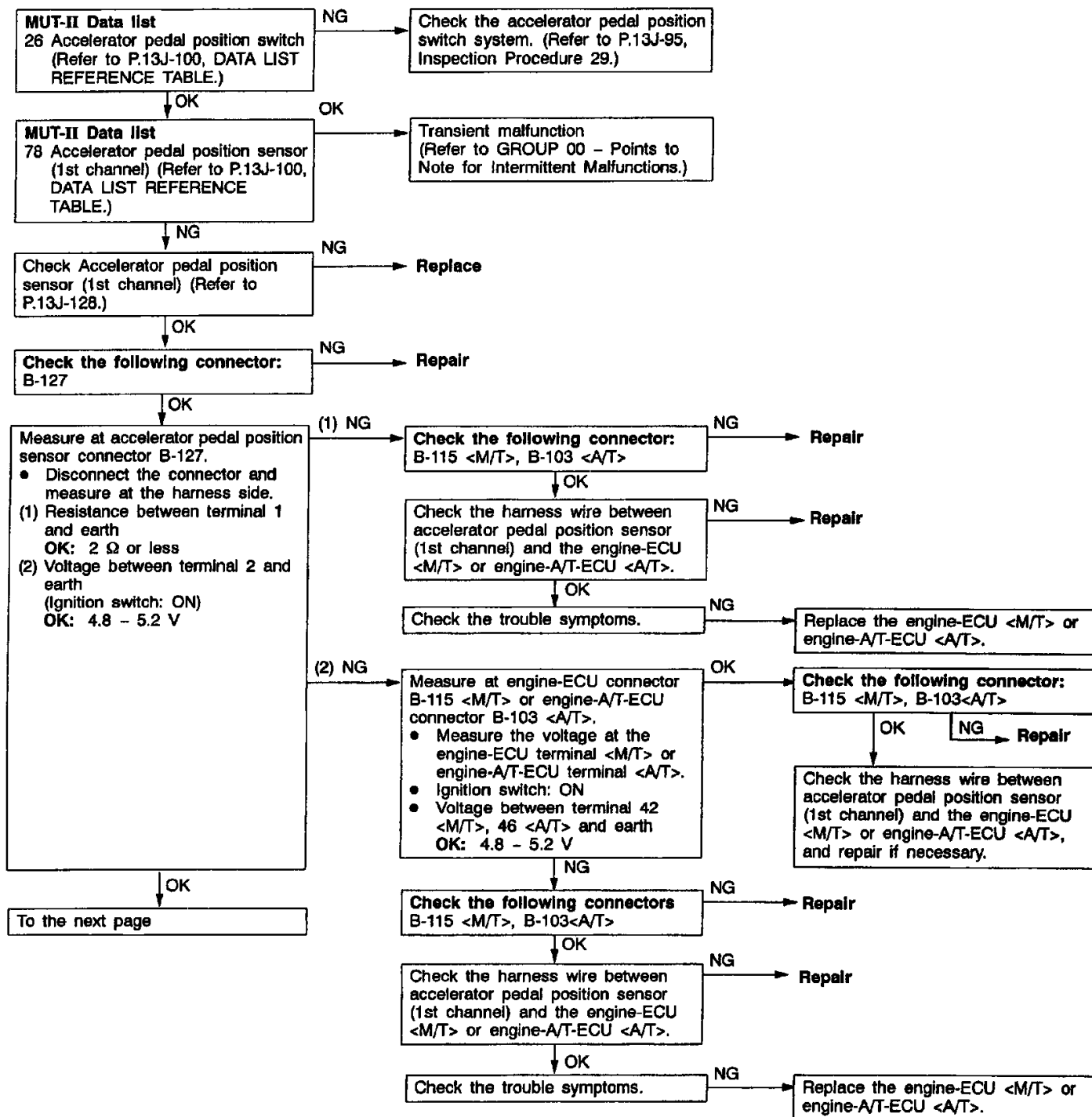


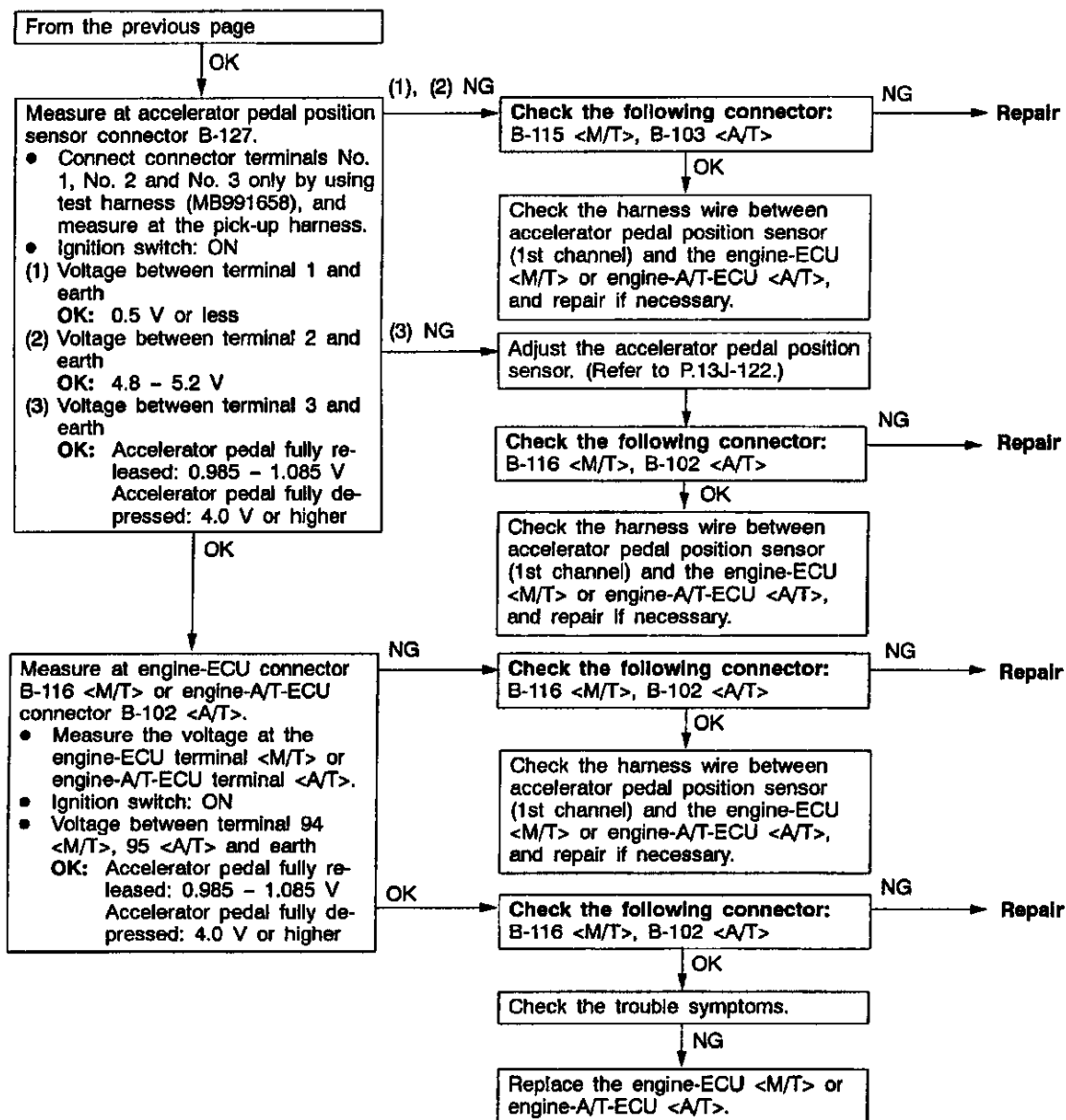


Code No. P0204 No. 4 injector system	Probable cause
Range of Check - The engine speed is 4,000 r/min or less. - The battery voltage is 10 V or more. - The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. Set Conditions - The injector driver is not transmitting a injector open circuit check signal for four seconds.	- Malfunction of No. 4 injector - Open or short circuit in the No. 4 injector circuit or loose connector contact - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/T-ECU <A/T>

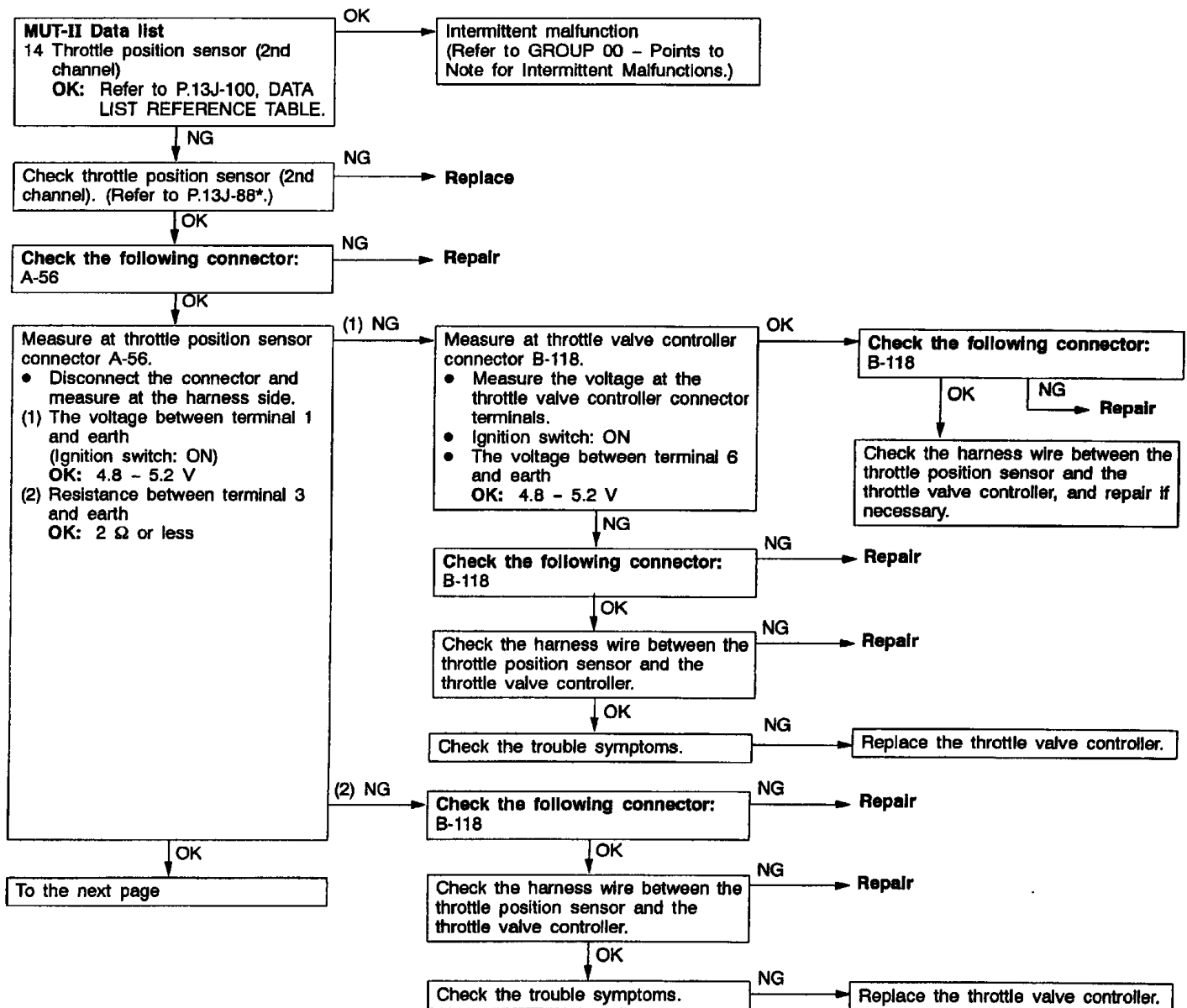


Code No. P0220 Accelerator pedal position sensor (1st channel) system	Probable cause
Range of Check - Accelerator pedal position sensor (2nd channel) is normal. - Communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller is normal. Set Conditions - The output voltage of accelerator pedal position sensor (1st channel) is 0.2 V or less for one second. or - The output voltage of accelerator pedal position sensor (2nd channel) is 2.5 V or less, and that of accelerator pedal position sensor (1st channel) is 4.5 V or more for one second or - The difference between accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) output voltages is 1.0 V or more (i.e. the throttle opening angle changes slightly). or - The output voltage of accelerator pedal position sensor (1st channel) is 1.875 V or more for one second when the accelerator pedal position switch is turned on.	- Malfunction of accelerator pedal position sensor (1st channel) - Open or short circuit in the accelerator pedal position sensor (1st channel) circuit or loose connector contact - Accelerator pedal position switch seized ON - Malfunction of throttle valve controller - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/T-ECU <A/T>



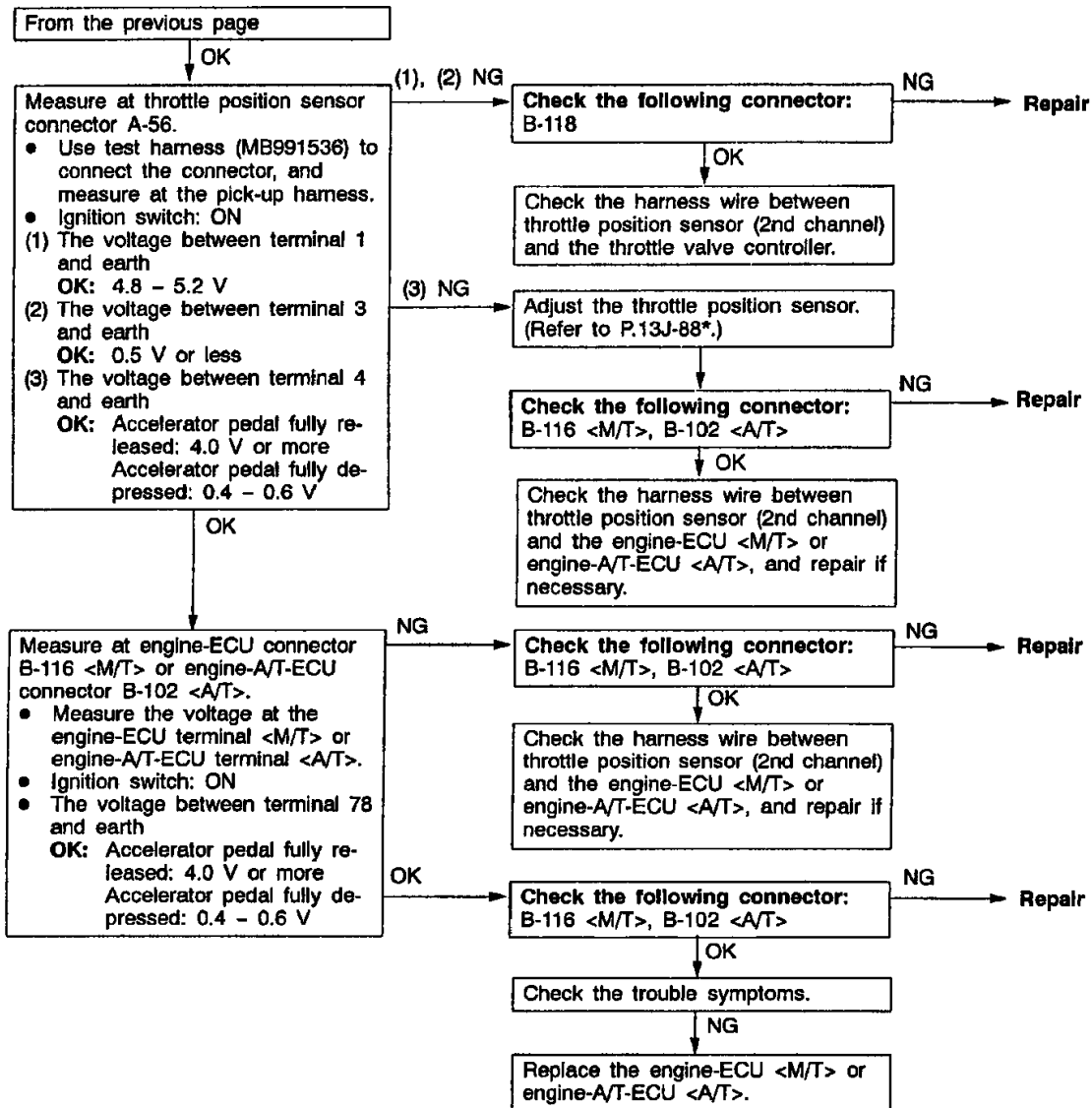


Code No. 0225 Throttle position sensor (2nd channel) system	Probable cause
The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. Range of Check - Ignition switch: ON - The throttle position sensor (1st channel) is normal. Set 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 (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 – 6 V.	- Malfunction of throttle position sensor (2nd channel) - Open or short circuit in the throttle position sensor (2nd channel) circuit or loose connector contact - Malfunction of the throttle valve controller - Malfunction of the engine-ECU <M/T> - Malfunction of the engine-A/T-ECU <A/T>



NOTE

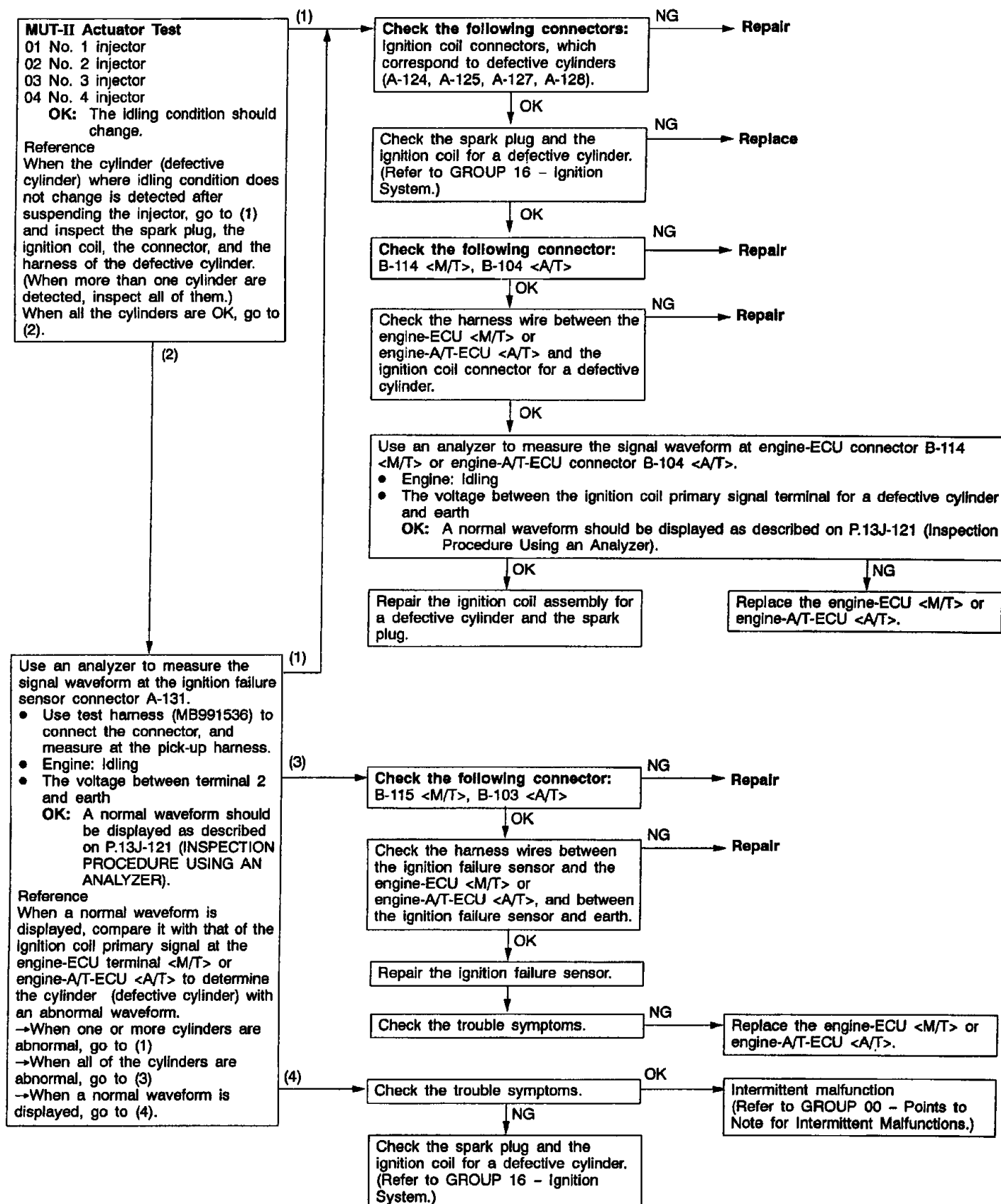
*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).



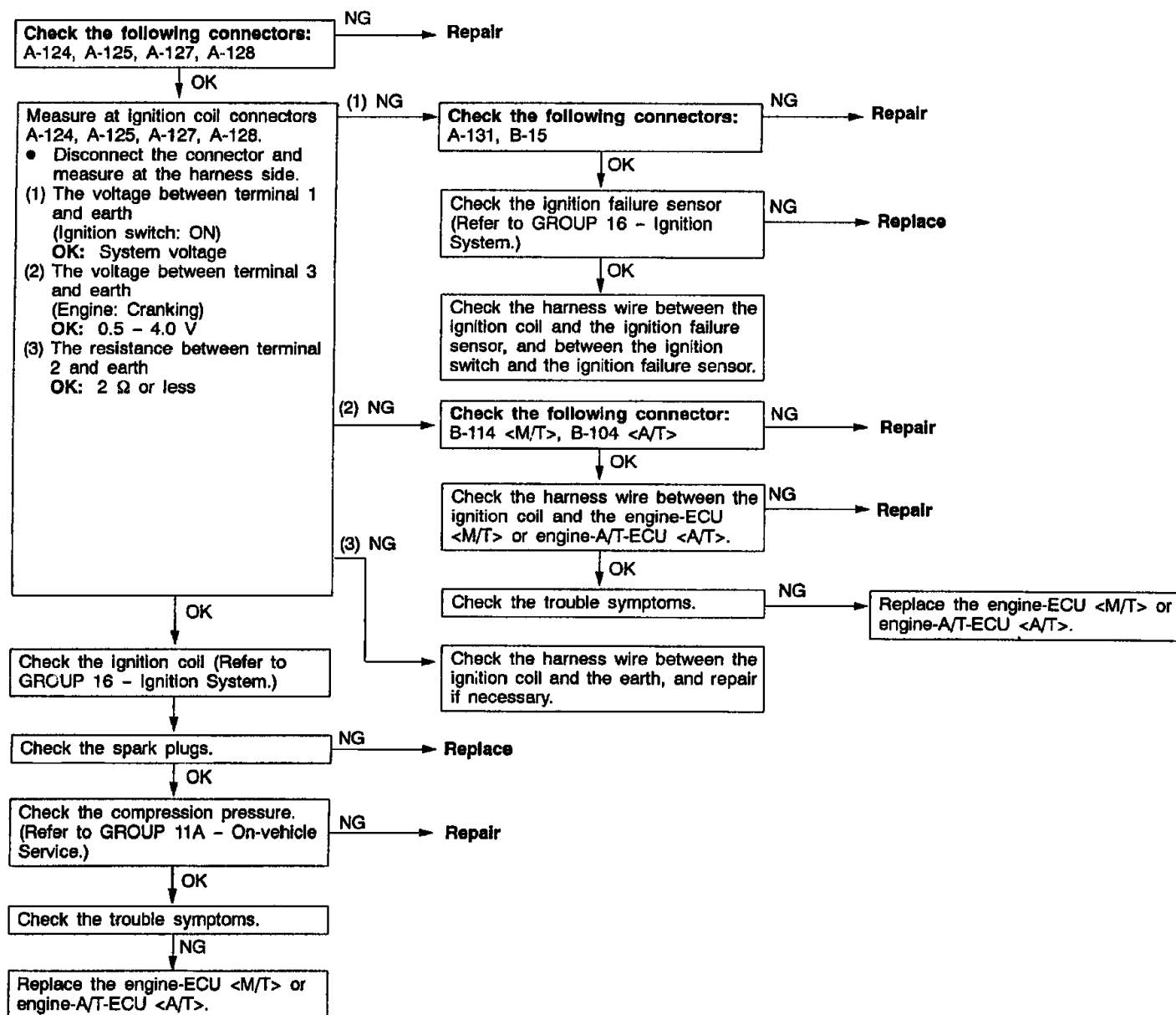
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

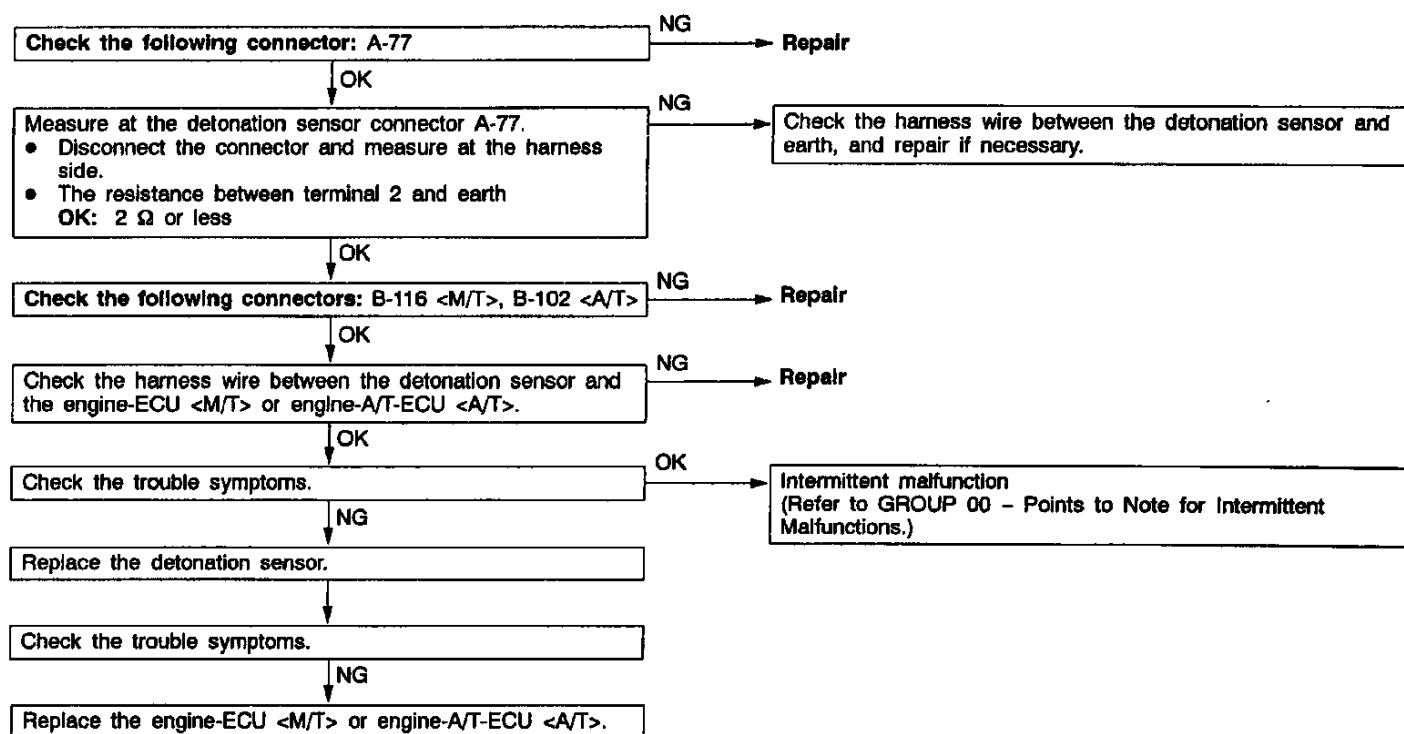
Code No. P0300 Ignition coil (power transistor) system	Probable cause
Range of Check • Engine speed is approx. 50 - 4,000 r/min. • Engine is not cranking. Set Conditions • The ignition failure sensor does not send a signal about a certain cylinder for four seconds.	• Malfunction of the Ignition coil • 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>



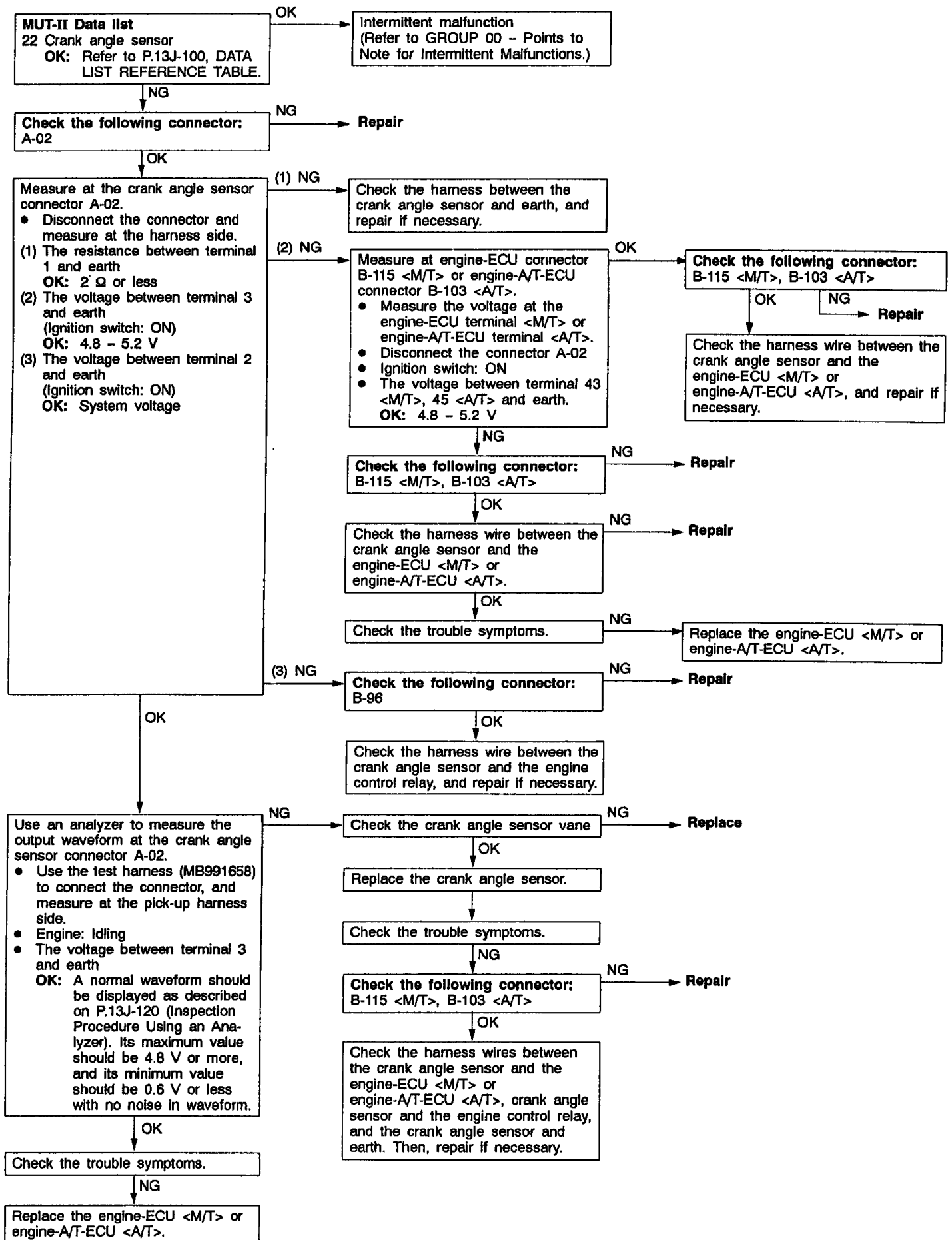
Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected	Probable cause
Range of Check - The engine speed is 500 – 4,500 r/min. - While the engine is running except deceleration 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>



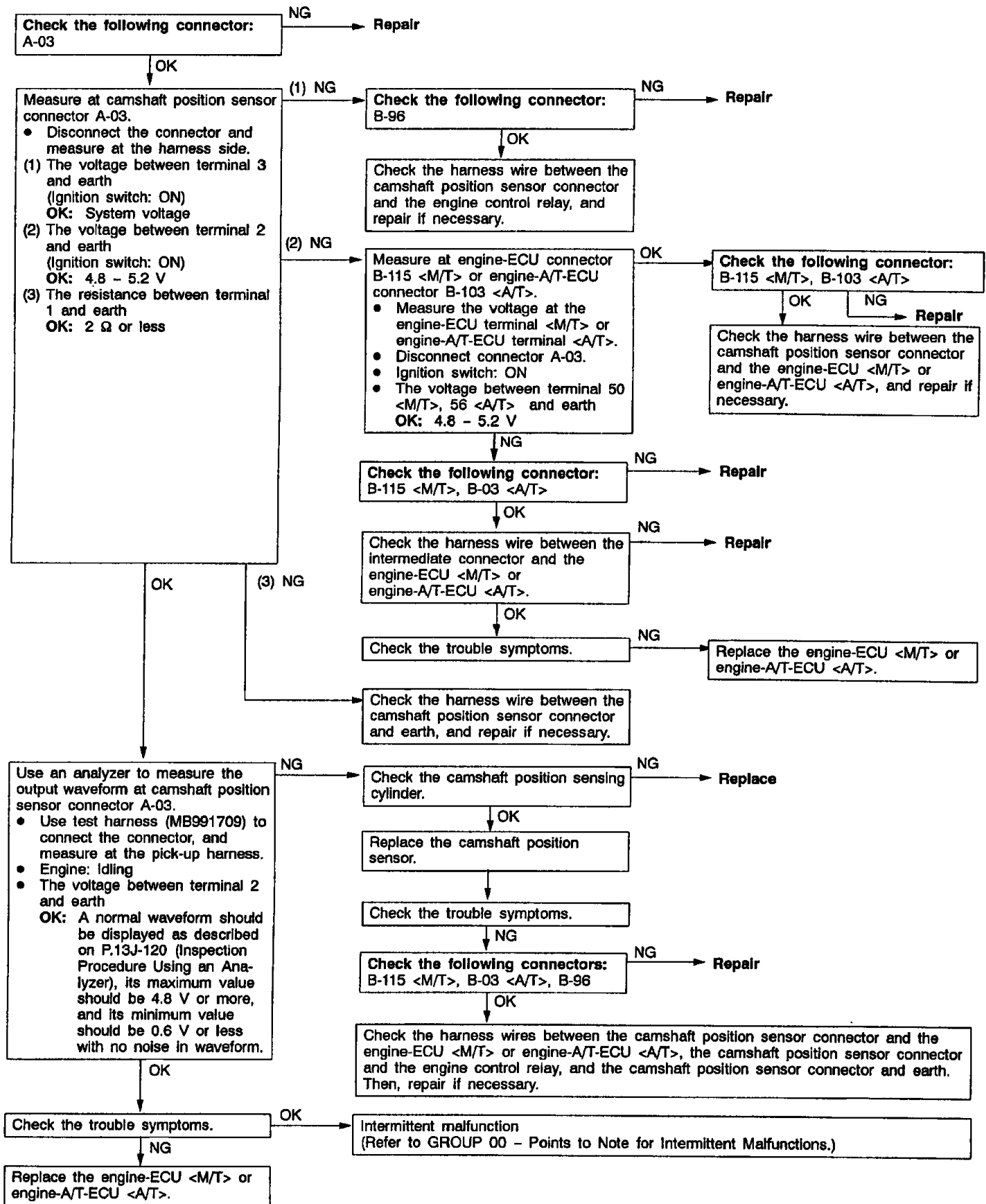
Code No. P0325 Detonation sensor system	Probable cause
Range of Check • Engine: Two seconds after the engine has been started Set Conditions • Changes in sensor output voltage (detonation sensor peak voltage per 1/3 crankshaft rotation) in 200 consecutive cycles are 0.08 V or less.	• Malfunction of the 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>



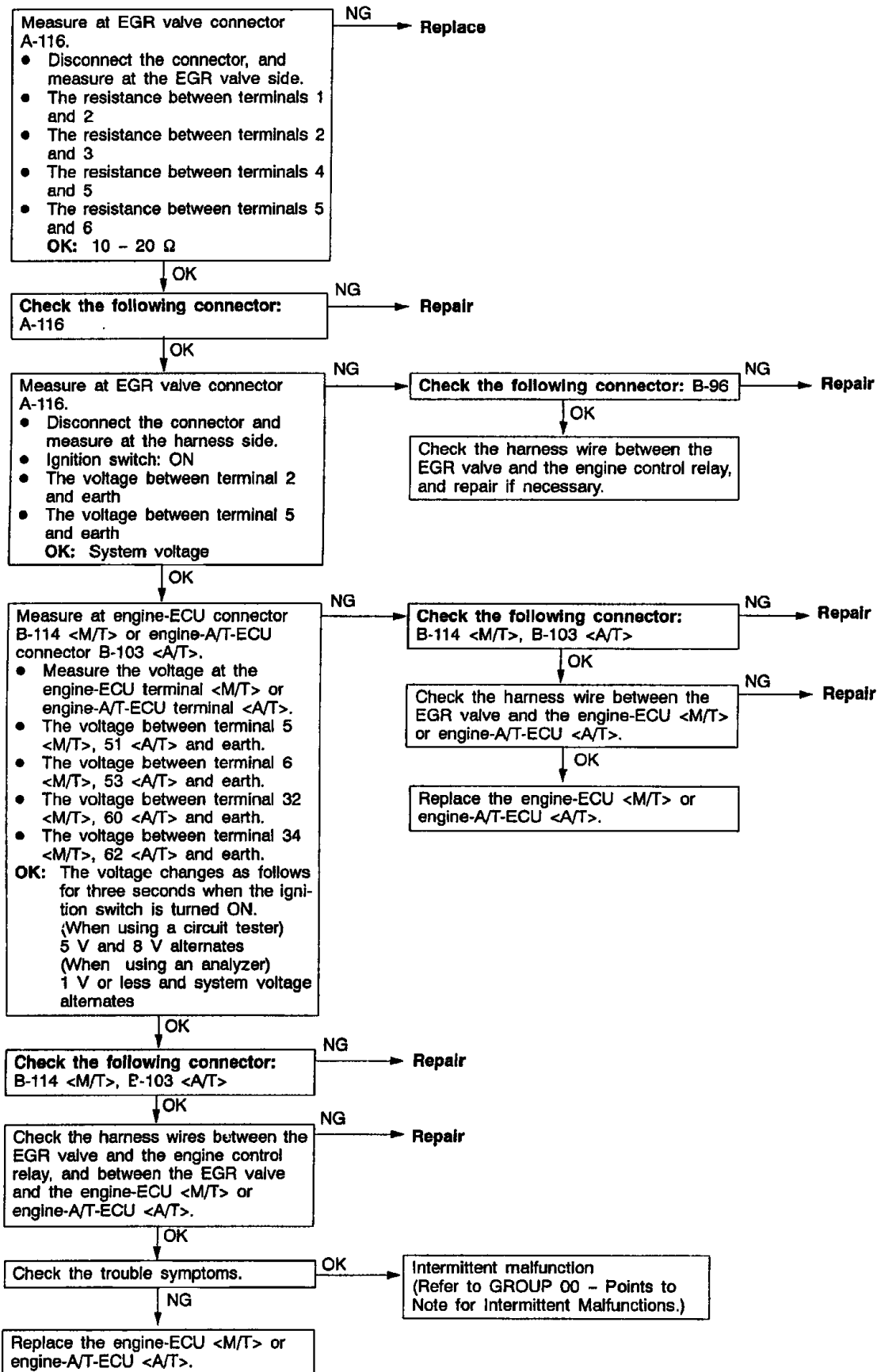
Code No. P0335 Crank angle sensor system	Probable cause
Range of Check • Engine is cranking Set Conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input).	• Malfunction of the crank angle sensor. • Open or short circuit in the crank angle sensor circuit or loose connector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



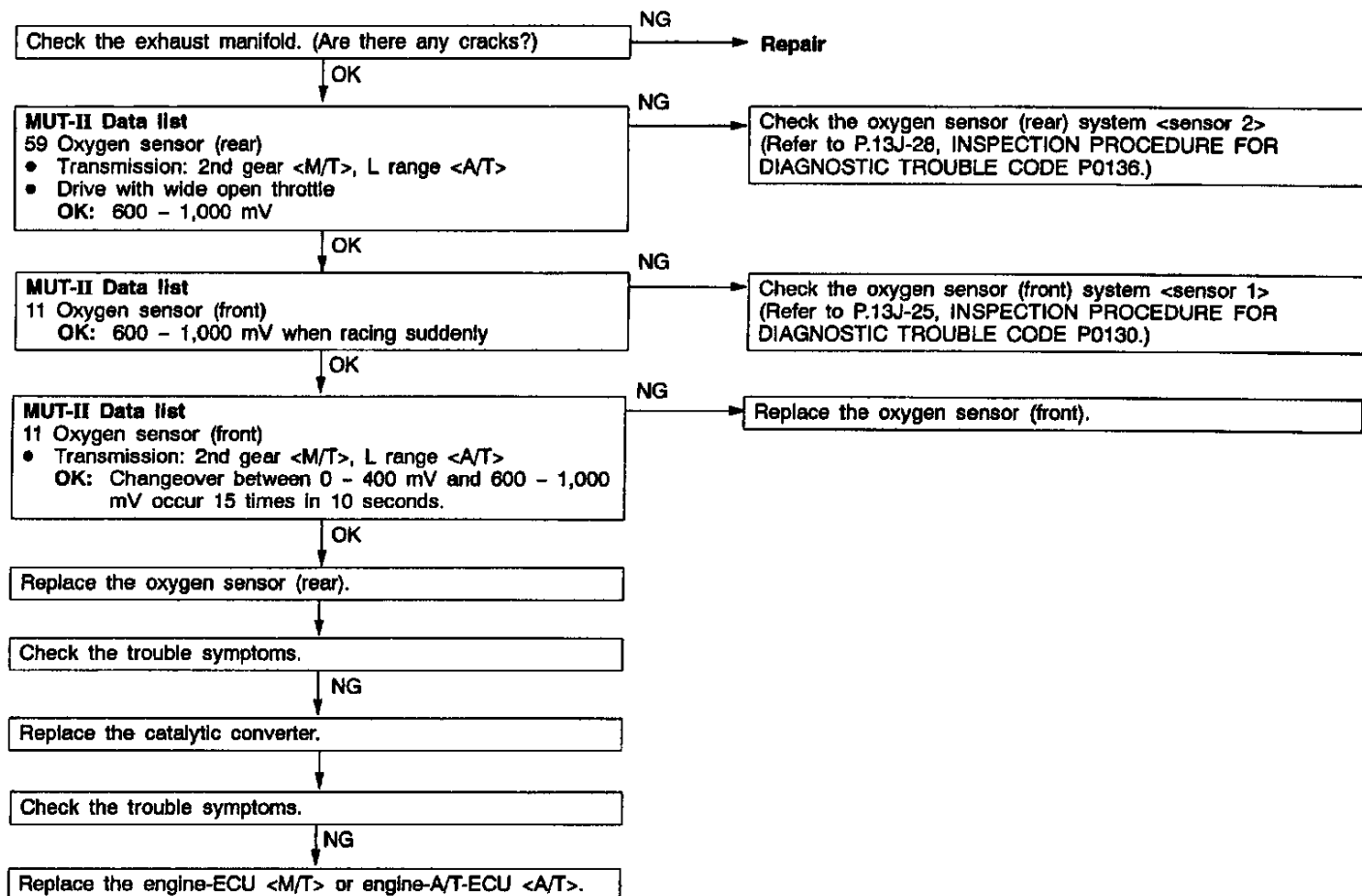
Code No. P0340 Camshaft position sensor system	Probable cause
Range of Check • After the engine was started Set Conditions • The sensor output voltage does not change for 4 seconds (no pulse signal input).	• Malfunction of the camshaft position sensor • Open or short circuit in the camshaft position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



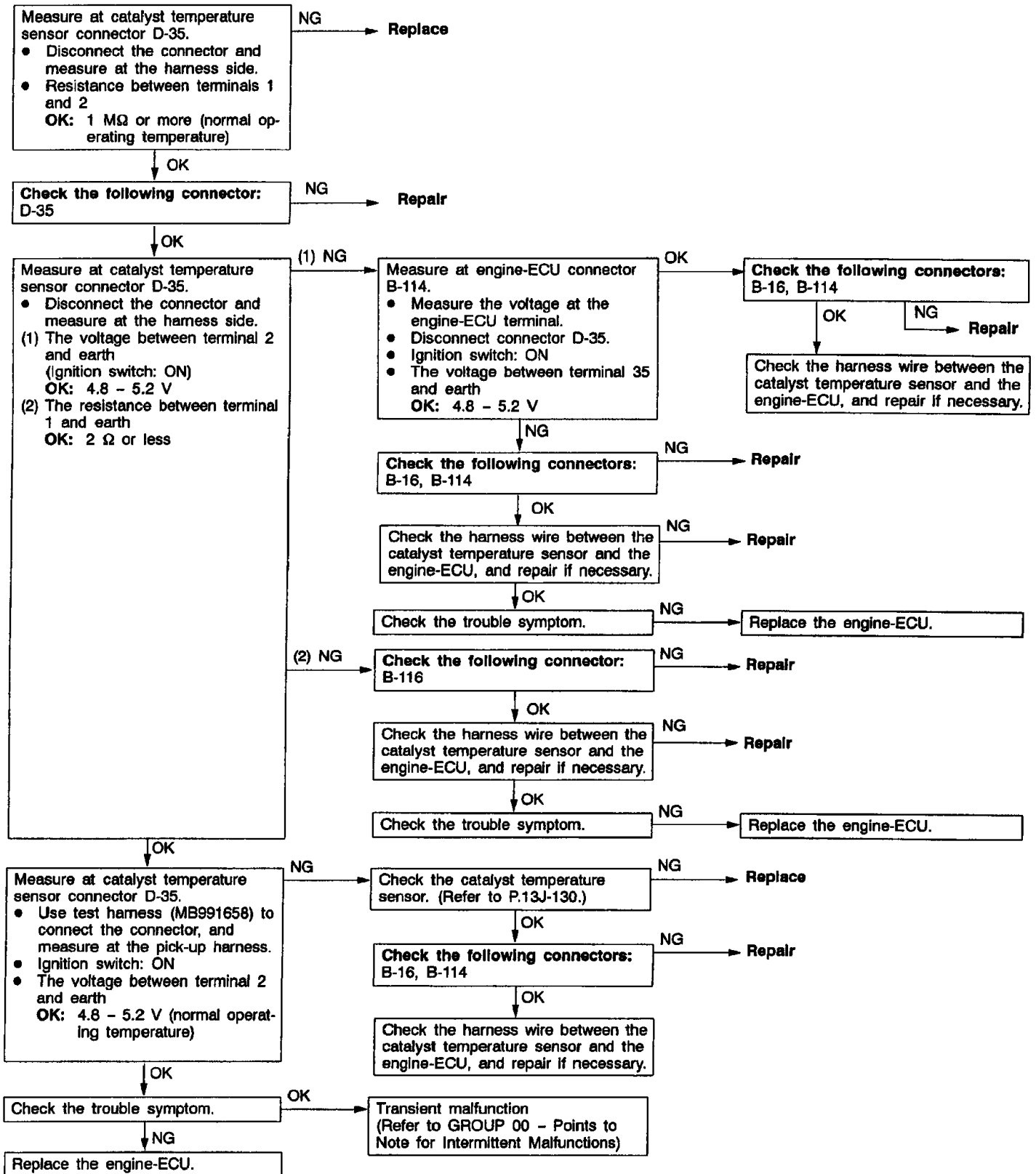
Code No. P0403 EGR valve system	Probable cause
Range of Check ● Ignition switch: OFF to ON ● EGR valve is in operation after the engine starting process is complete. Set Conditions ● Off-surge voltage is not generated from the motor coil while the EGR valve control motor is running.	● Malfunction of the EGR valve ● Open or short circuit in the EGR valve circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T>



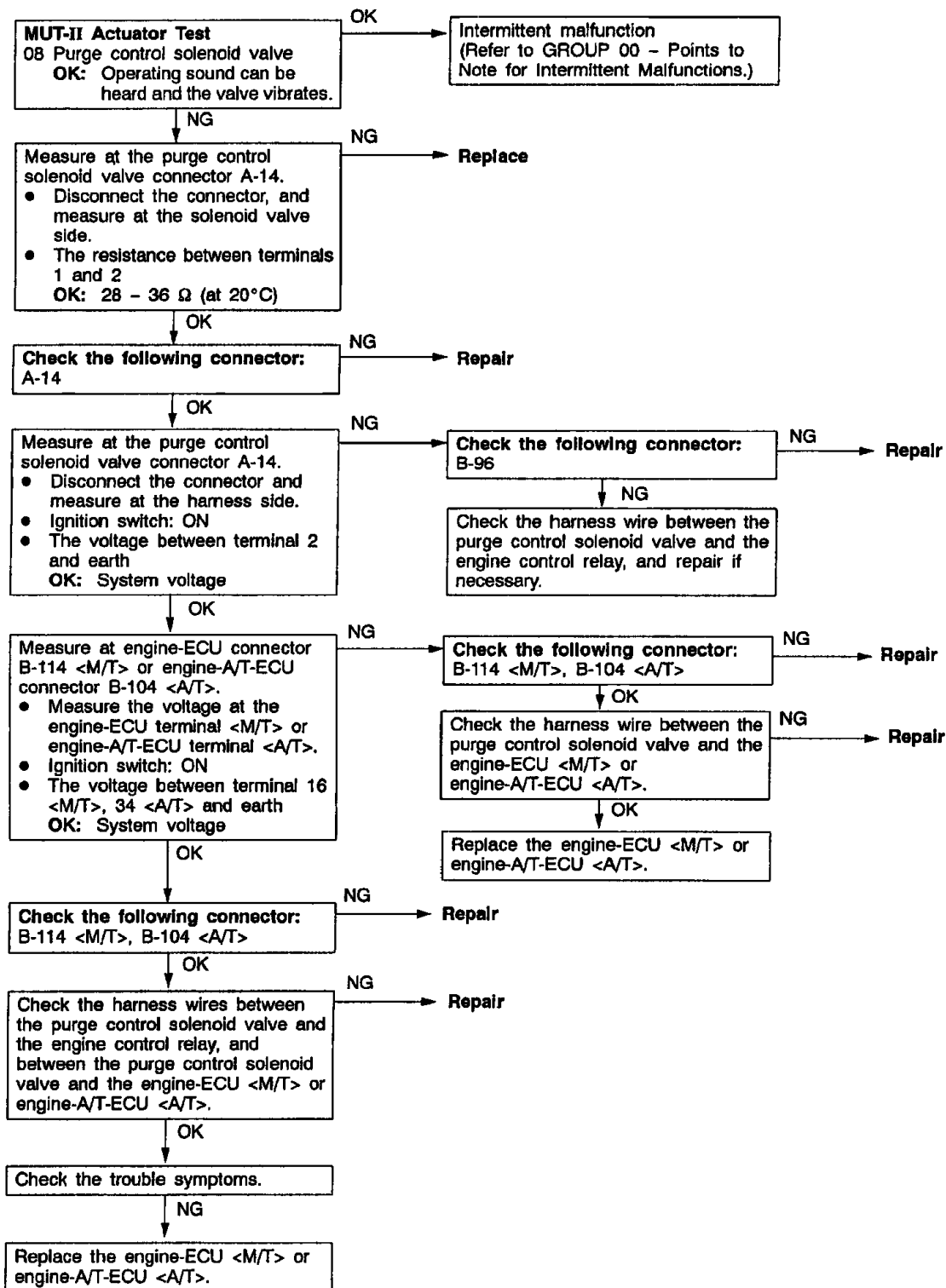
Code No. P0420 Catalyst malfunction	Probable cause
Range of Check - The engine speed is 3,000 r/min or less. - During driving - During air/fuel ratio feedback control Set Conditions - The ratio between the oxygen sensor (rear) and the oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds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



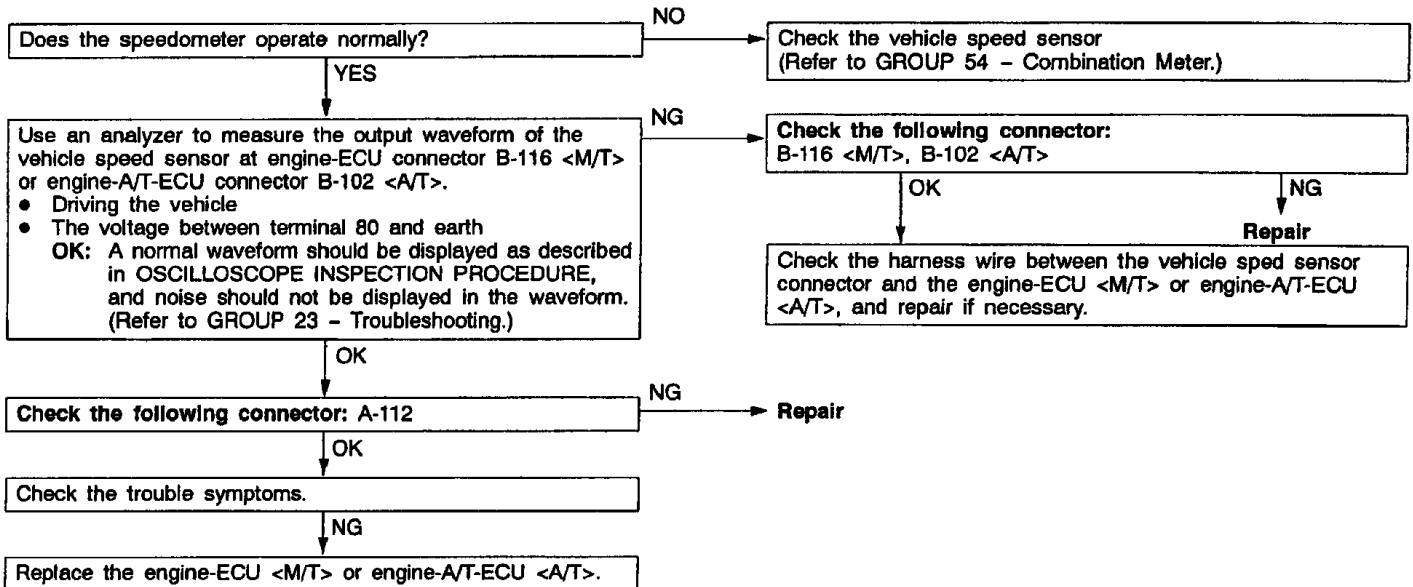
Code No. P0425 Catalyst temperature sensor system <M/T>	Probable cause
Range of Check • After 20 seconds have passed since the engine has started • The coolant temperature is 77°C or more • Ten seconds have elapsed after the fuel is cut. • Engine speed remains 2,500 r/min or more for five seconds. Set Conditions • The sensor output voltage is 4.8 V or more (380°C or less) Range of Check • After 20 seconds have passed since the engine has started Set Conditions • The sensor output voltage is 0.2 V or less for four seconds.(1300°C or more)	• Malfunction of the catalyst temperature sensor • Open or short circuit in the catalyst temperature sensor circuit or loose connector contact • Malfunction of the engine-ECU



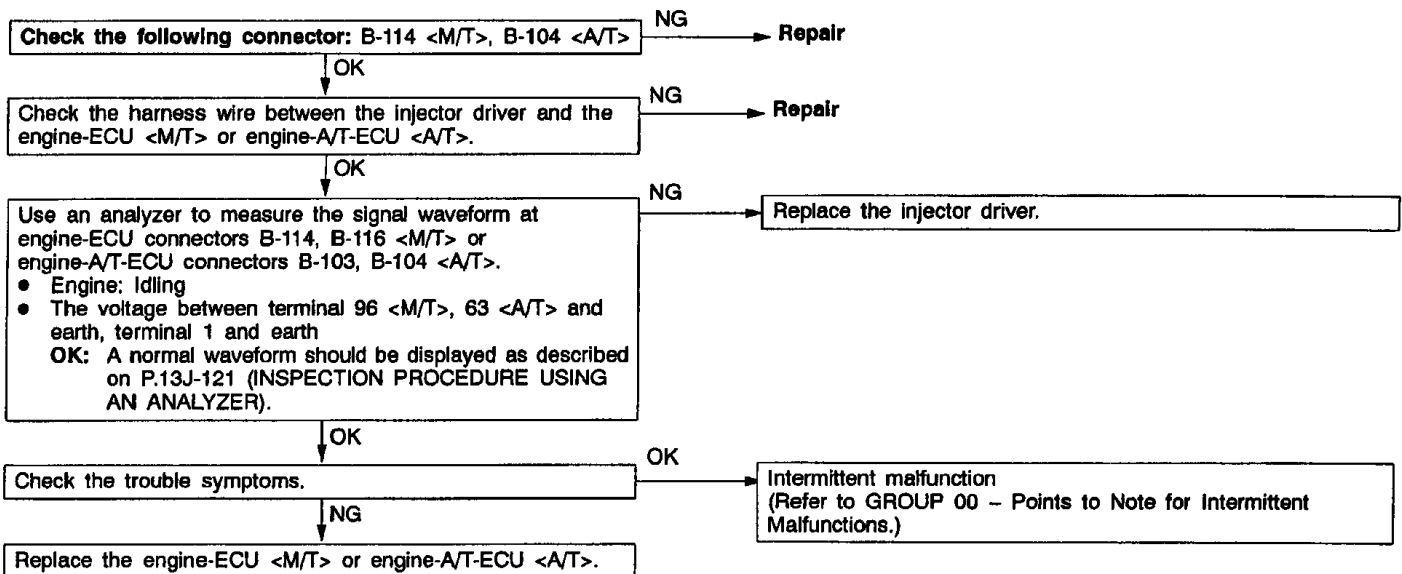
Code No. P0443 Purge control solenoid valve system	Probable cause
Range of Check • Ignition switch: ON • Battery voltage is 10 V or more. Set Conditions • The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off.	• Malfunction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



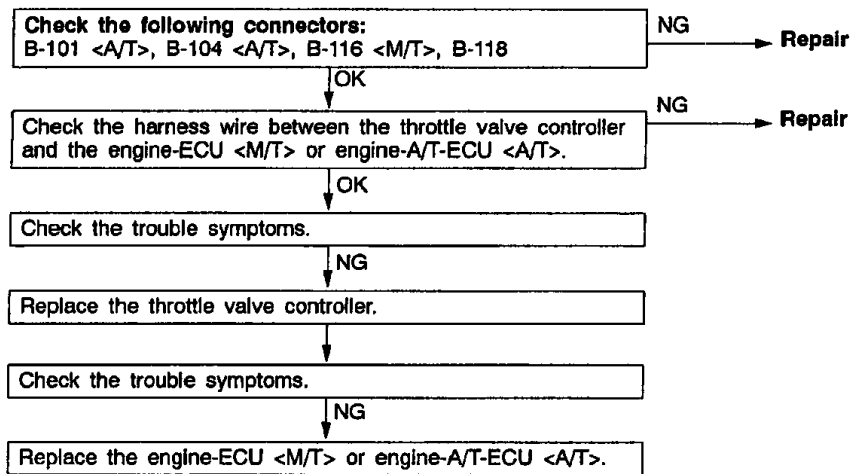
Code No. P0500 Vehicle speed sensor system	Probable cause
Range of Check - Engine: Two seconds after the engine was started - Idle switch: OFF - Engine speed: 2,500 r/min or more - During high engine load Set Conditions - The sensor output voltage does not change for 4 seconds (no pulse signal input).	- 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>



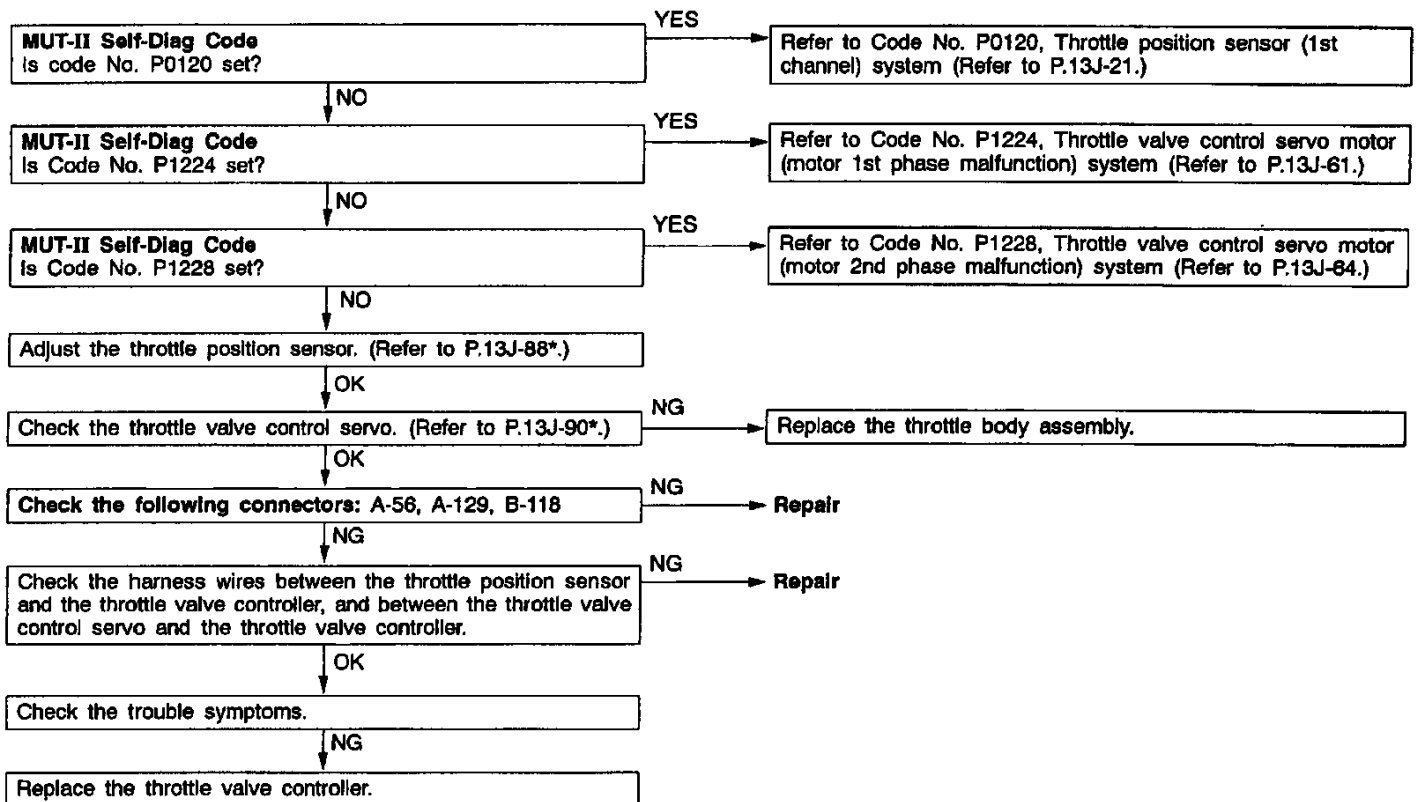
Code No. P1200 Injector driver system	Probable cause
Range of Check - Engine speed: 4,000 r/min or less - Battery voltage: 10 V or more - The fuel cut operation and the injector operation (by carrying out the Actuator test) are not in progress. - During high engine load Set Conditions - Injector open circuit check signal is not output from the injector driver.	- Malfunction of the injector driver - Open or short circuit, or loose connector contact - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/T-ECU <A/T>



Code No. P1220 Electronic-controlled throttle valve system	Probable cause
Range of Check - Ignition switch: ON - Error in communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller Set Conditions - Output voltage of throttle position sensor (2nd channel) fluctuates significantly (approx. 1 V or more) from an expected value, based on that of the accelerator pedal position sensor (2nd channel). Range of Check - Ignition switch: ON - Error in communication between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T> Set Conditions - The output voltage of the throttle position sensor (2nd channel) is significantly different (approx. 1 V) from the throttle valve opening angle (voltage), which the engine-ECU <M/T> or engine-A/T-ECU <A/T> request the throttle valve controller.	- Short in communication line - Malfunction of the engine-ECU <M/T> - Malfunction of the engine-A/T-ECU <A/T> - Malfunction of the throttle valve controller



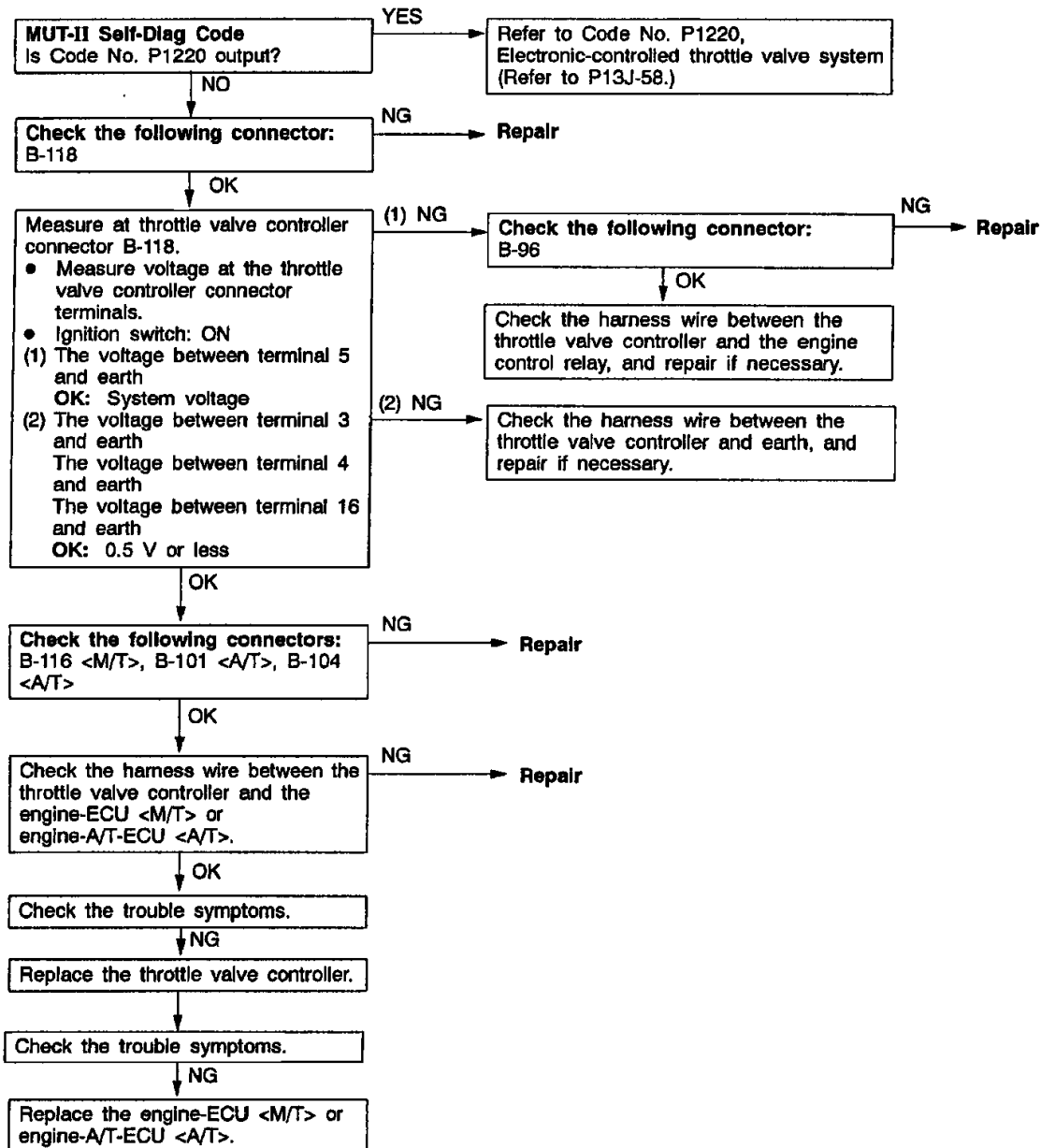
Code No. P1221 Throttle valve position feedback system	Probable cause
The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. Range of Check - Ignition switch: ON - Battery voltage: 10 V or more Set Conditions - Failure in the motor position feedback (The engine-ECU <M/T> or engine-A/T-ECU <A/T> detects that the current in the motor is excessive and the opening angle difference between the target value of throttle position sensor (1st channel) and the actual value of throttle position sensor (1st channel) is 1.0 V or more)	- Malfunction of throttle position sensor (1st channel) - Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact - Malfunction of the throttle valve controller



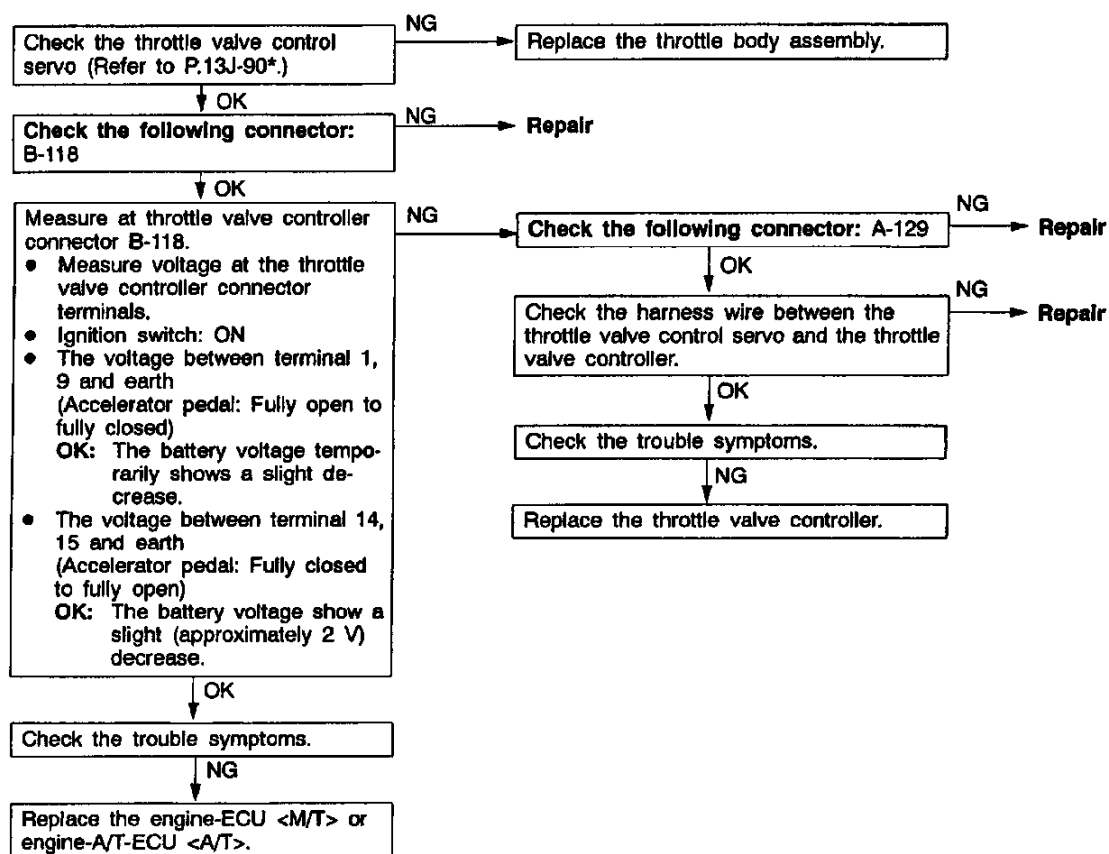
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

Code No. P1223 Communication line system with the throttle valve controller	Probable cause
Range of Check - Ignition switch: ON - Battery voltage: 8 V or more. - Engine: Not cranking Set Conditions - System detects an error in communication line between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller, and between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T>.	- Short in communication line - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/T-ECU <A/T> - Malfunction of throttle valve controller

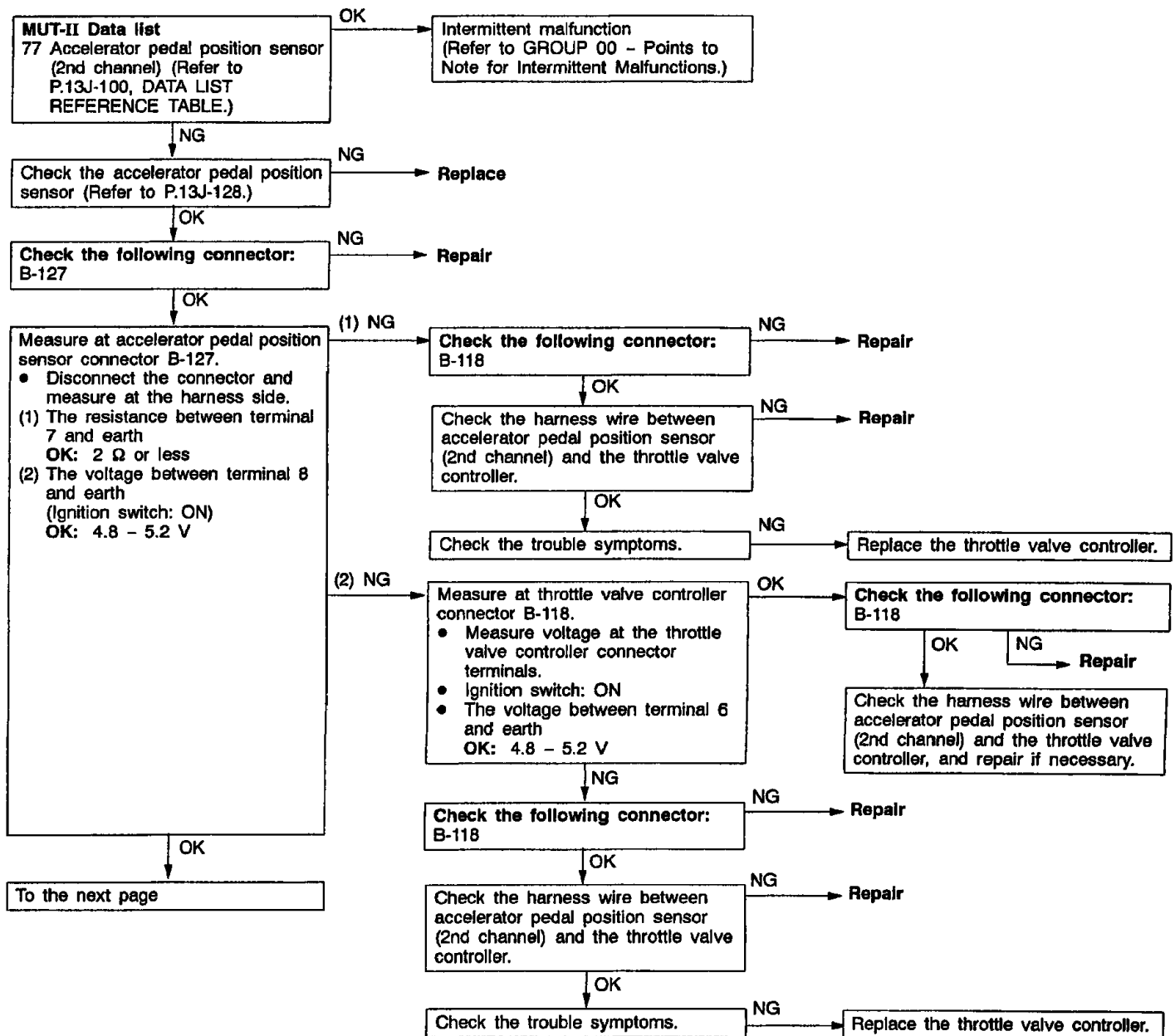


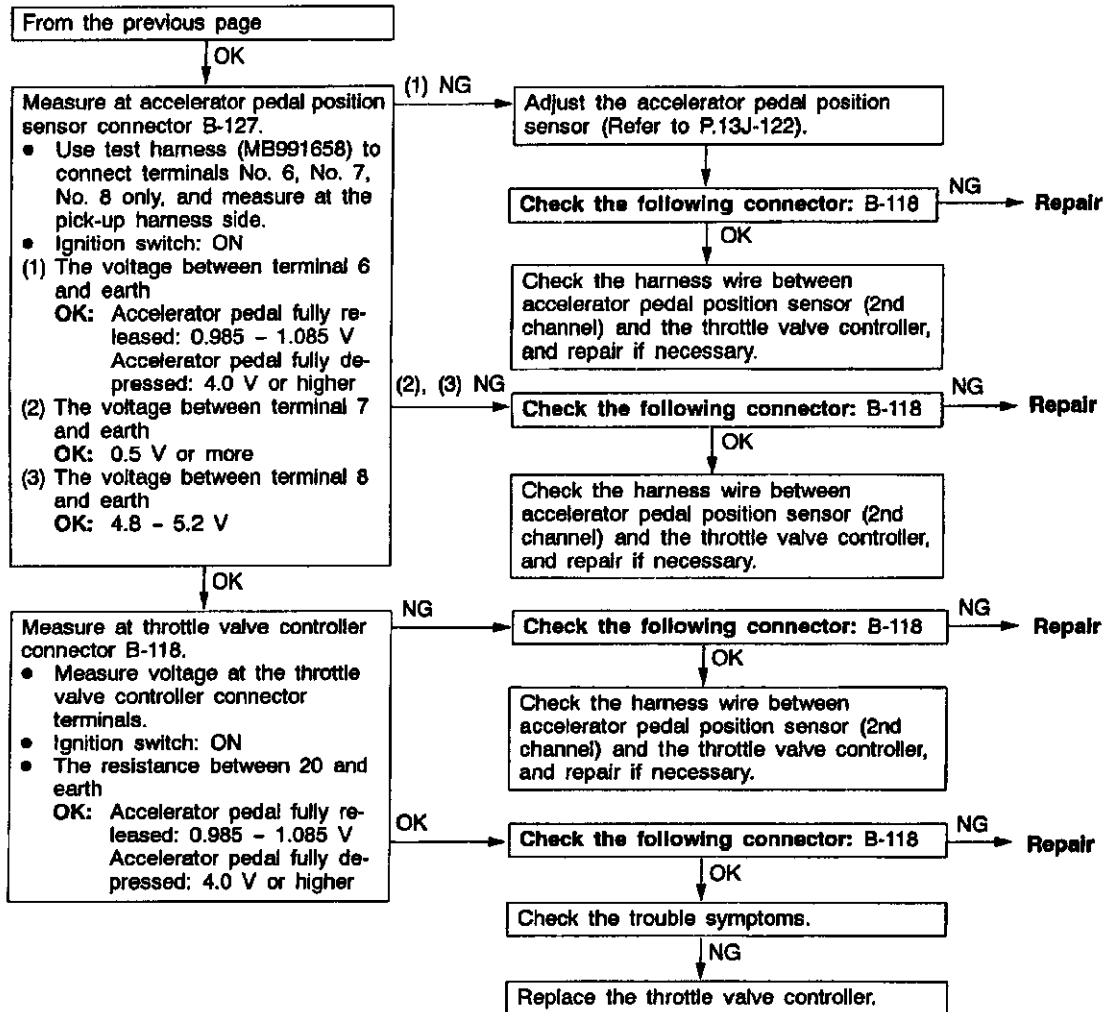
Code No. P1224 Throttle valve control servo motor (Motor 1st phase malfunction) system	Probable cause
Range of Check - Throttle valve control servo relay: ON - System voltage: 8 V or more. Set Conditions - Throttle valve control servo drive circuit is shorted to earth. - Other power source interferences with throttle valve control servo drive circuit. - Throttle valve control servo drive circuit is open circuit.	- Malfunction of the throttle valve control servo - Open circuit or short-circuited harness wire in throttle valve control servo system, or poor connector contact - Malfunction of the throttle valve controller

**NOTE**

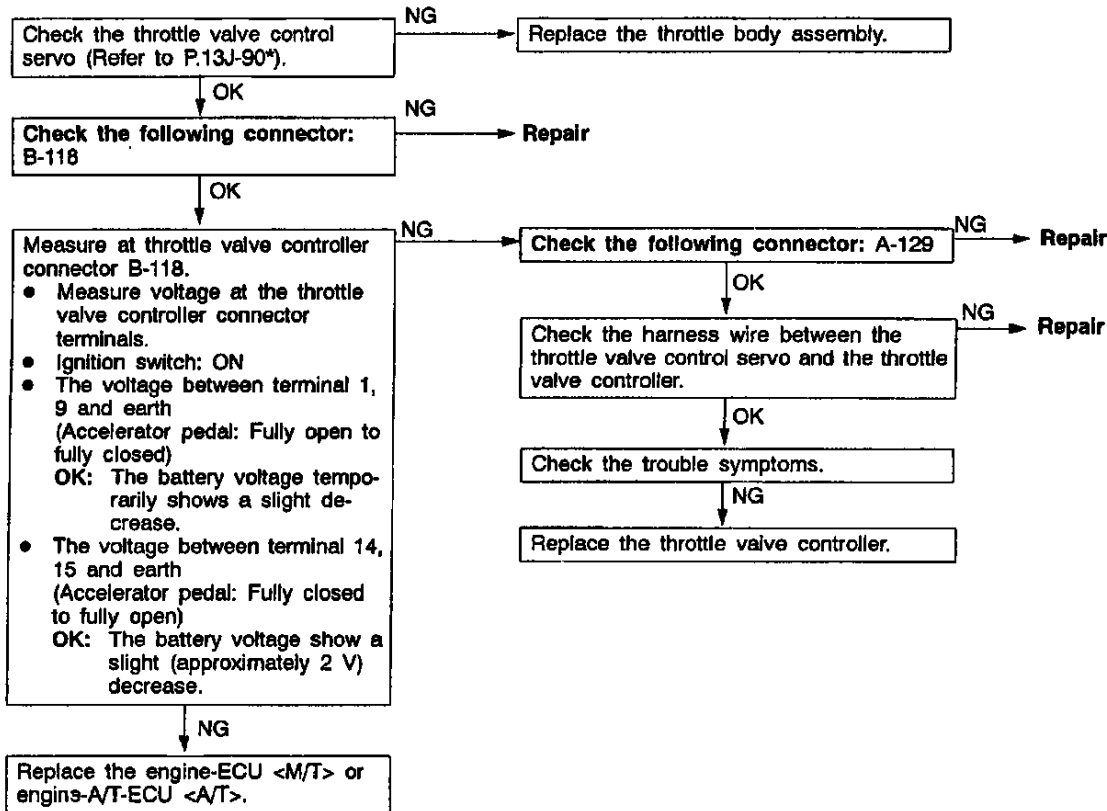
*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

Code No. P1225 Accelerator pedal position sensor (2nd channel) system	Probable cause
Range of Check - Accelerator pedal position sensor (2nd channel) is normal. - Communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller is normal. Set Conditions - Output voltage of the accelerator pedal position sensor (2nd channel) is 0.2 V or less for one second or - Output voltage of the accelerator pedal position sensor (1st channel) is 2.5 V or less, and output voltage of the accelerator pedal position sensor (2nd channel) is 4.5 V or more for one second. or - Difference between the accelerator pedal position sensor (1st and 2nd channels) output voltages exceeds 1.0 V (i.e. when the throttle valve opening angle changes slightly).	- Malfunction of accelerator pedal position sensor (2nd channel) - Open or short circuit in accelerator pedal position sensor (2nd channel) circuit or loose connector contact - Malfunction of the throttle valve controller - Malfunction of engine-ECU <M/T> - Malfunction of engine-A/T-ECU <A/T>



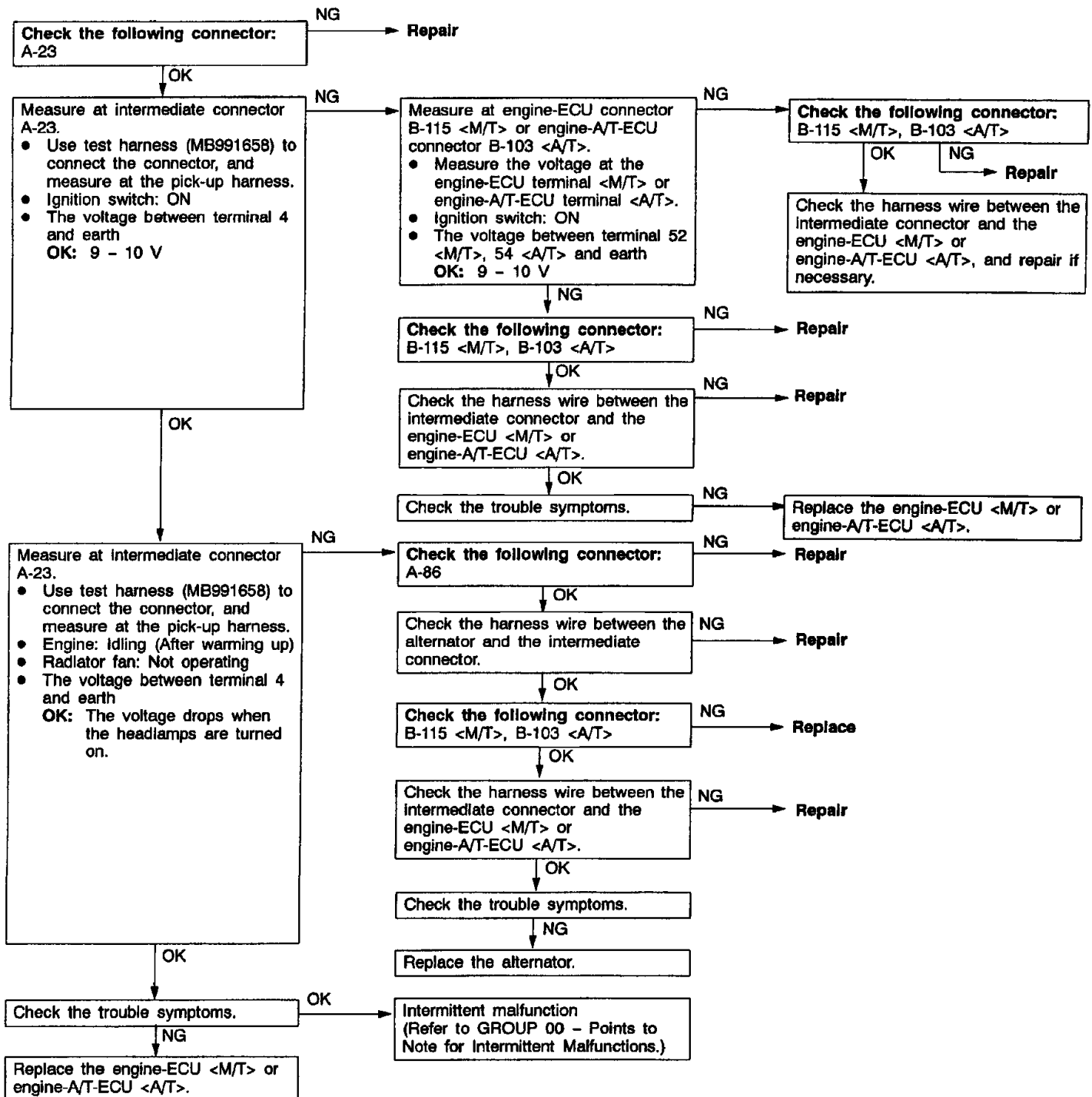


Code No. P1228 Throttle valve control servo motor (Motor 2nd phase malfunction) system	Probable cause
Range of Check - Throttle valve control servo relay: ON - System voltage: 8 V or more Set Conditions - Throttle valve control servo drive circuit is shorted to earth. - Other power source interferes with throttle valve control servo drive circuit. - Throttle valve control servo drive circuit is open-circuit.	- Malfunction of the throttle valve control servo - Open circuit or short-circuited harness wire in throttle valve control servo system, or poor connector contact - Malfunction of the throttle valve controller

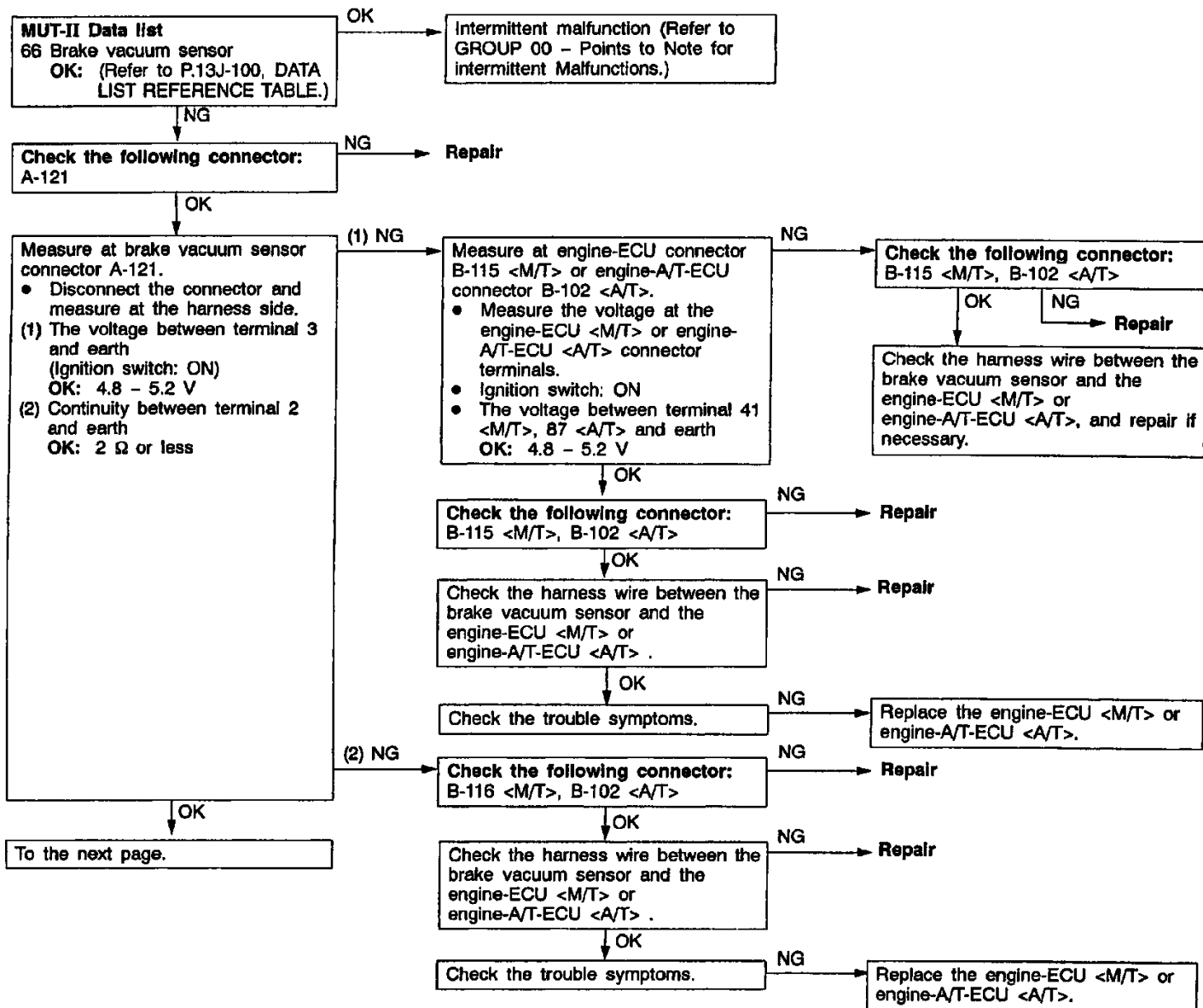
**NOTE**

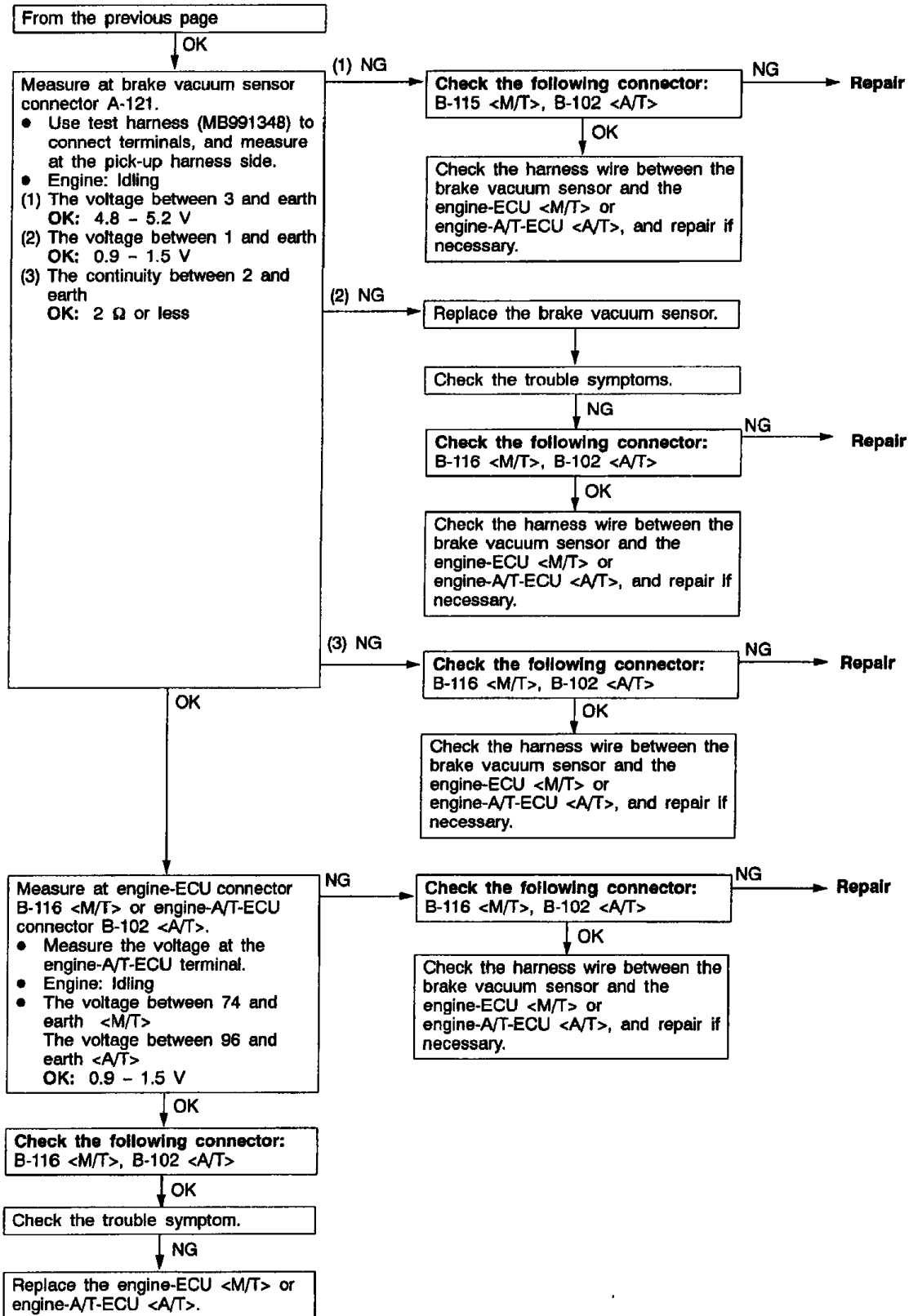
*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

Code No. P1500 Alternator FR terminal system	Probable cause
Range of Check • Engine speed: 50 r/min or more Set Conditions • Input voltage from the alternator FR terminal is system voltage for 20 seconds.	• Open circuit in alternator FR terminal circuit • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T>



Code No. P1515 Brake vacuum sensor system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 4.8 V or more. or • Sensor output voltage is 0.2 V or less.	• Malfunction of the brake vacuum sensor • Improper connector contact, open circuit or short-circuited harness wire of the brake vacuum sensor • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>

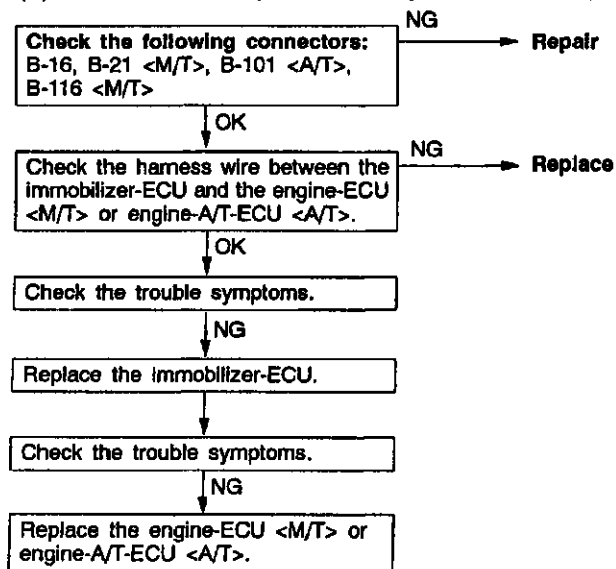




Cord No. P1610 Immobilizer system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Improper communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU	• Open or short circuit, or loose connector contact • Malfunction of the immobilizer-ECU • Malfunction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



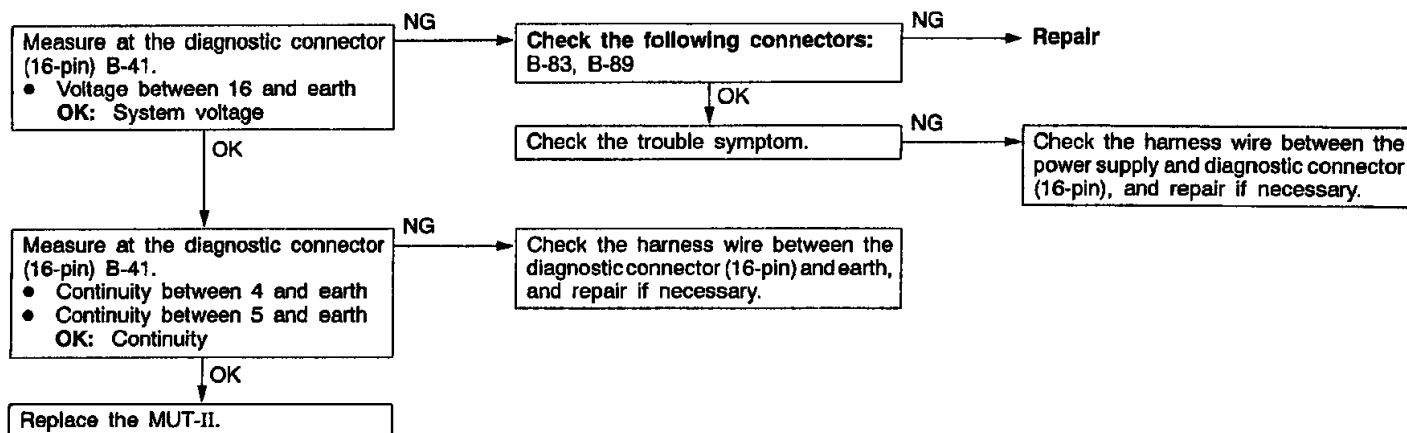
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13J-70
	Communication with engine-ECU only is not possible.	2	13J-70
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	13J-71
	The engine warning lamp remains illuminating and never goes out.	4	13J-71
Starting	No initial combustion (starting impossible)	5	13J-72
	Initial combustion but no complete combustion (starting impossible)	6	13J-74
	Long time to start (improper starting)		
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	7	13J-75
	Idling speed is high. (Improper idling speed)	8	13J-77
	Idling speed is low. (Improper idling speed)		
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	9	13J-78
	When the engine is hot, it stalls at idling. (Die out)	10	13J-79
	The engine stalls when starting the car. (Pass out)	11	13J-81
	The engine stalls when decelerating.	12	13J-82
Driving	Hesitation, sag or stumble	13	13J-83
	Poor acceleration		
	Surge		
	The feeling of impact or vibration when accelerating	14	13J-84
	The feeling of impact or vibration when decelerating	15	13J-85
	Knocking	16	13J-85
Dieseling		17	13J-85
Too high CO and HC concentration when idling		18	13J-86
Low alternator output voltage (approx. 12.3 V)		19	13J-87
Engine idle speed is incorrect while the A/C is on.		20	13J-88
Fans (radiator fan, A/C condenser fan) are inoperative		21	13J-88
Clutch switch system malfunction <M/T>		22	13J-89
GDI ECO indicator lamp system	GDI ECO indicator lamp does not illuminate.	23	13J-89
	GDI ECO indicator lamp remains illuminated and does not go off.	24	13J-90

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

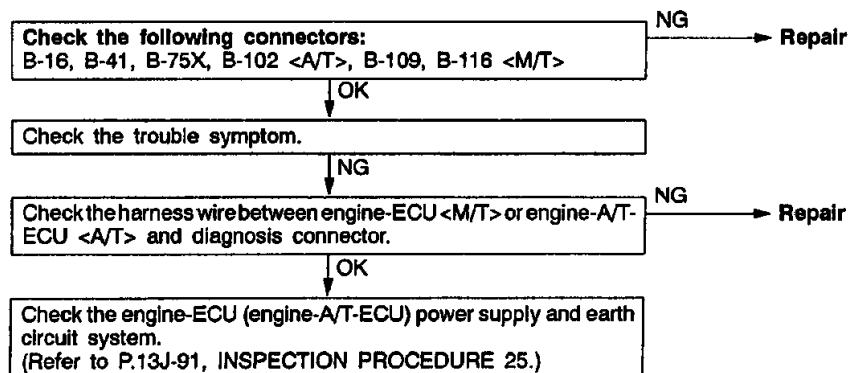
INSPECTION PROCEDURE 1

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 • Malfunction of MUT-II



INSPECTION PROCEDURE 2

MUT-II communication with engine-ECU (engine-A/T-ECU) 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

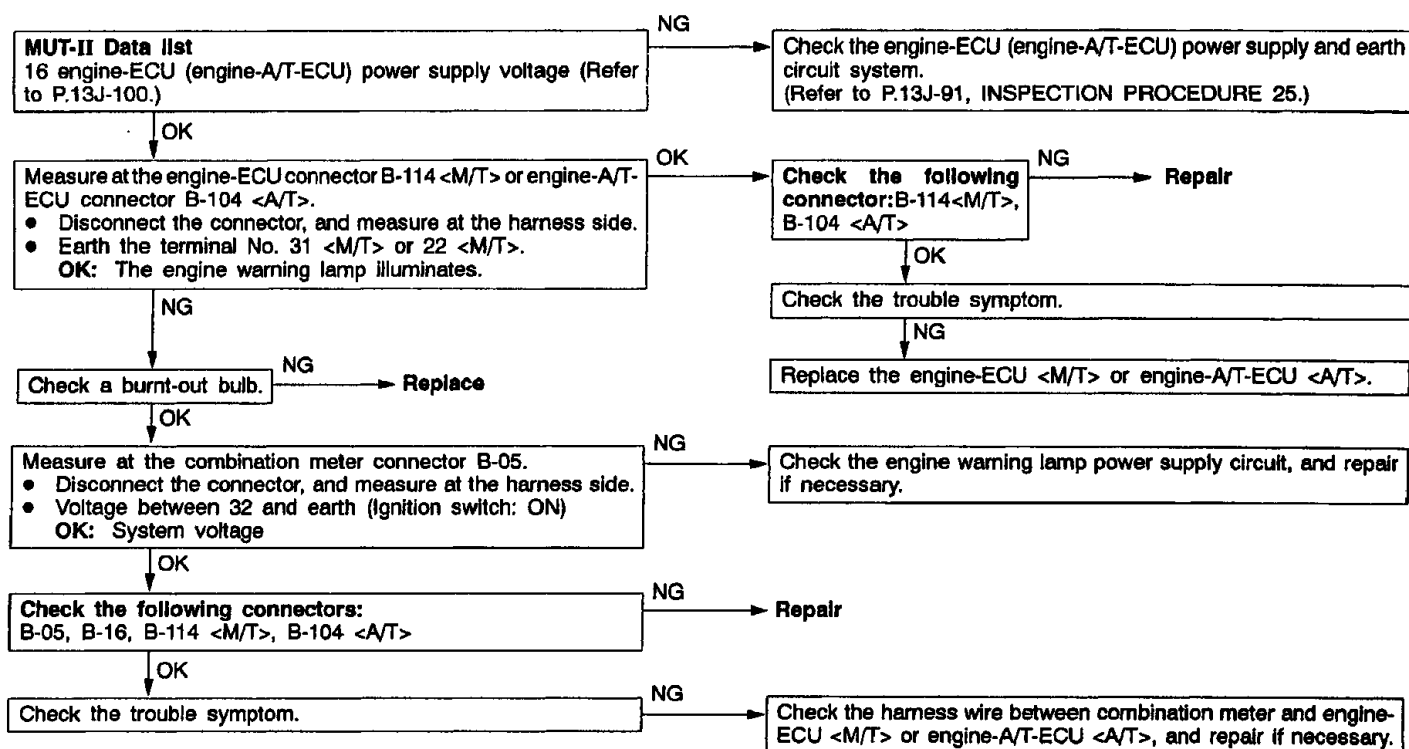


NOTE

On vehicles with multi center display, if a malfunction cannot be resolved after the procedure above, check the multi center display and replace if necessary. (Refer to GROUP 54 – Multi Center display.)

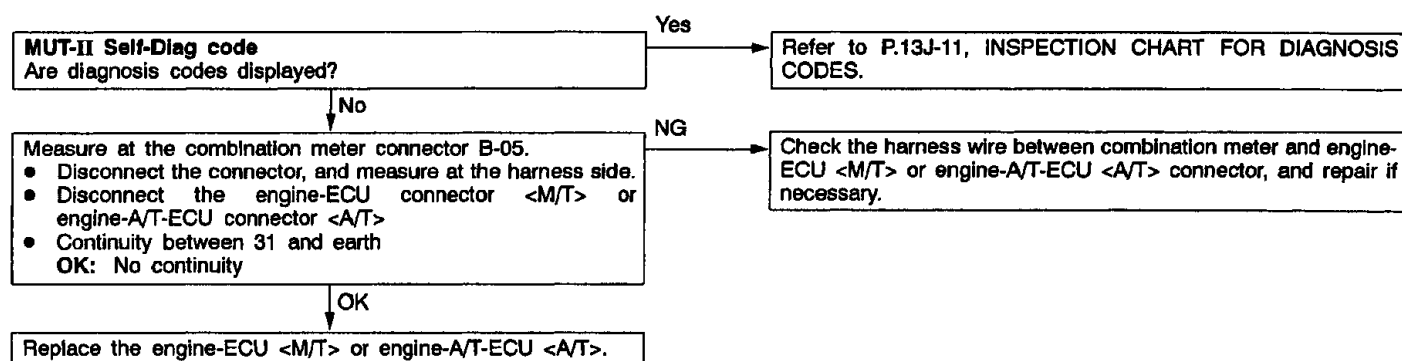
INSPECTION PROCEDURE 3

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



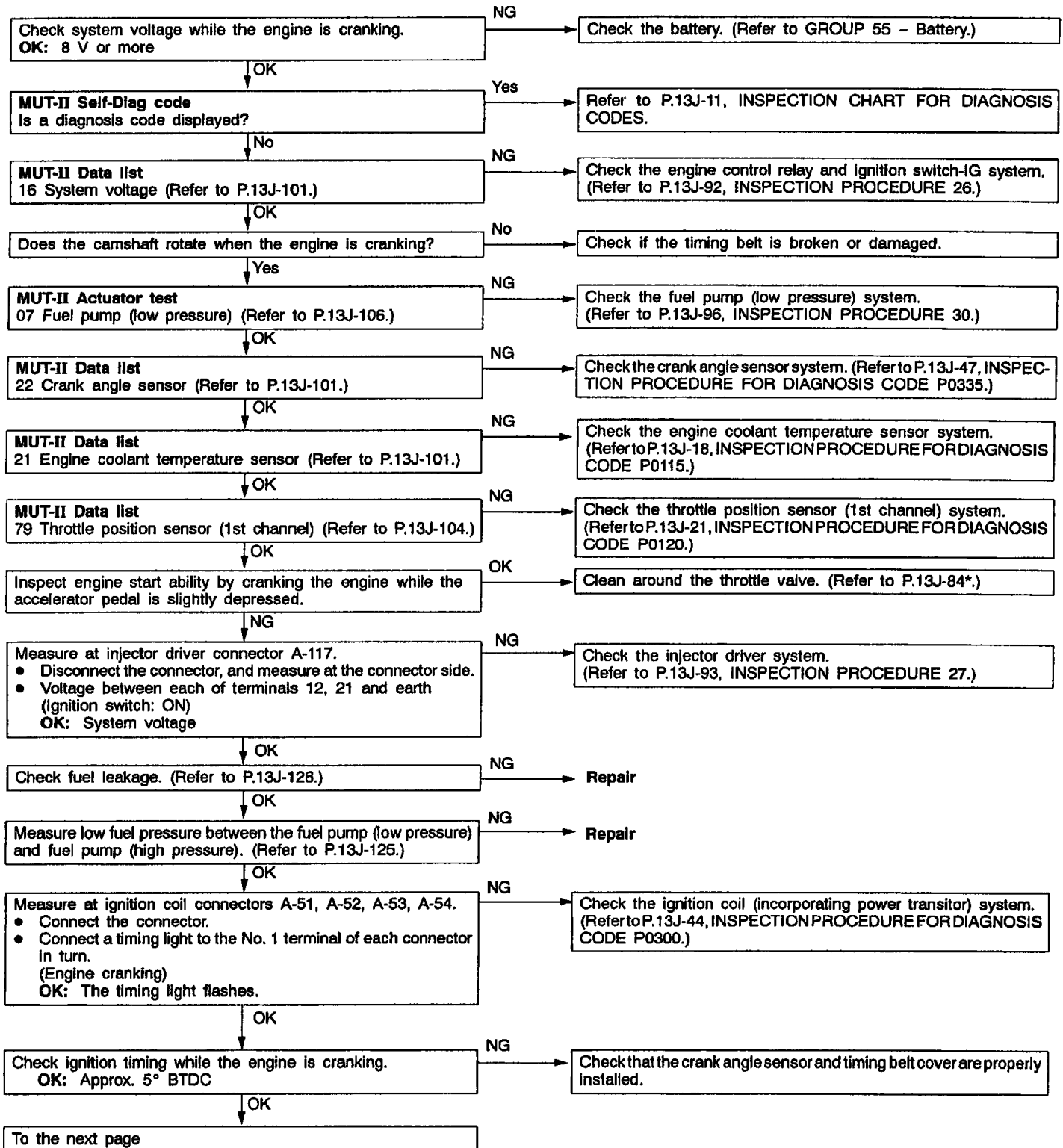
INSPECTION PROCEDURE 4

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



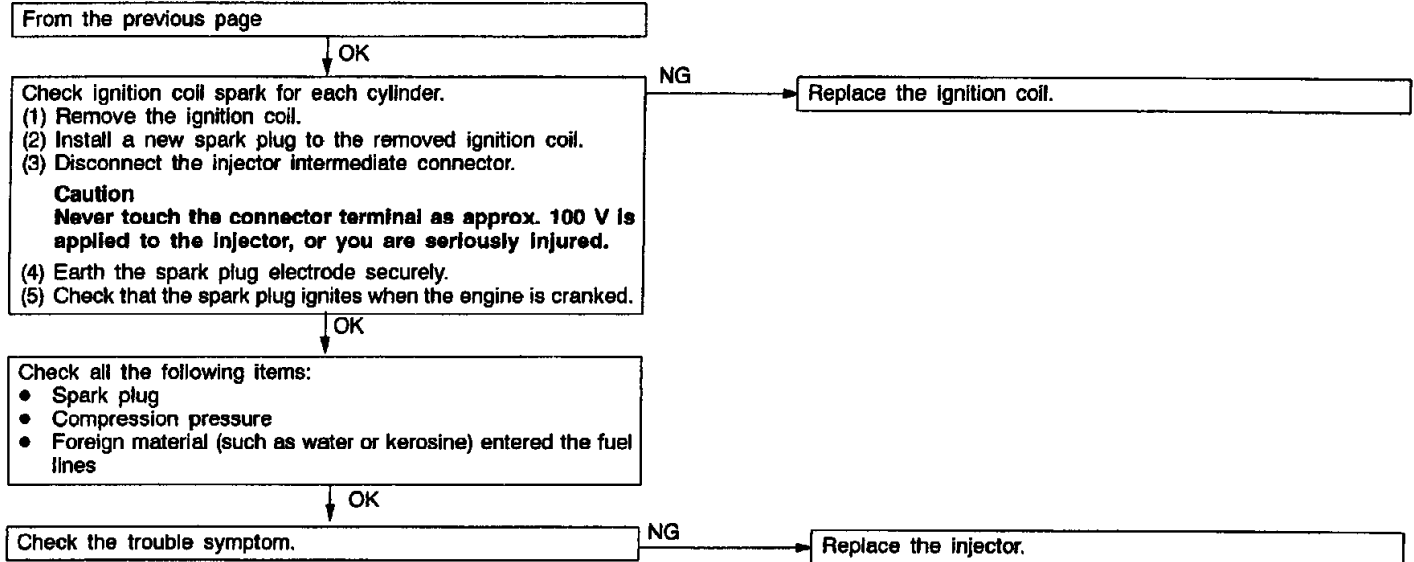
INSPECTION PROCEDURE 5

No initial combustion (starting impossible)	Probable cause
This is caused by incorrect fuel supply into the combustion chamber, and improper ignition circuit. Besides that, foreign material may be contaminated in fuel.	• Malfunction of the fuel supply system • Malfunction of the ignition system • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>



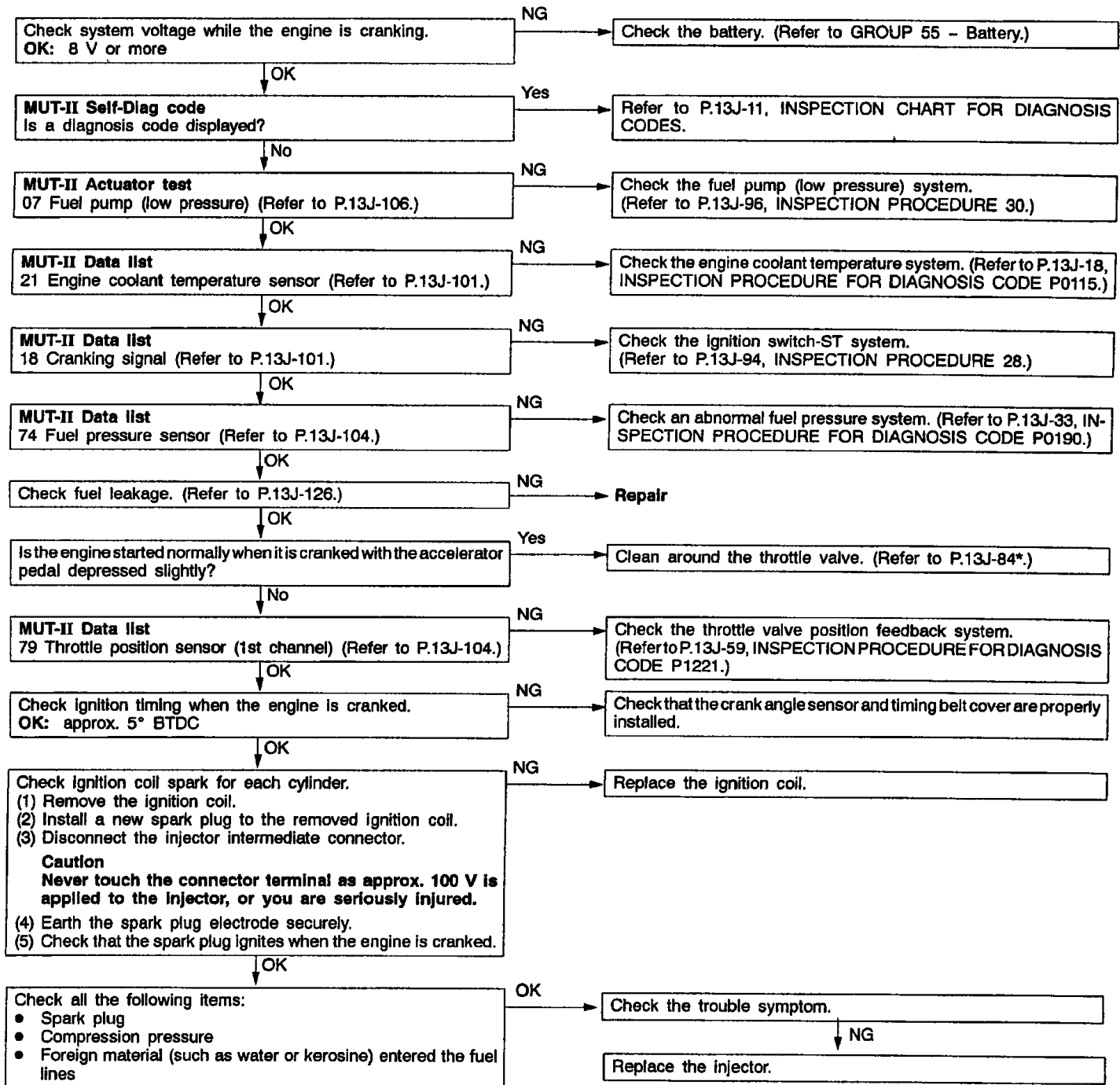
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).



INSPECTION PROCEDURE 6

Initial combustion takes place, but does not complete (start impossible), too long time to start (poor start)	Probable cause
This may be caused by improper spark plug ignition (poor spark), improper mixture during engine cranking, improper fuel pressure.	• Malfunction of the fuel supply system • Malfunction of the fuel pressure sensor • Malfunction of the ignition system • Malfunction of the electronic-controlled throttle valve system • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>

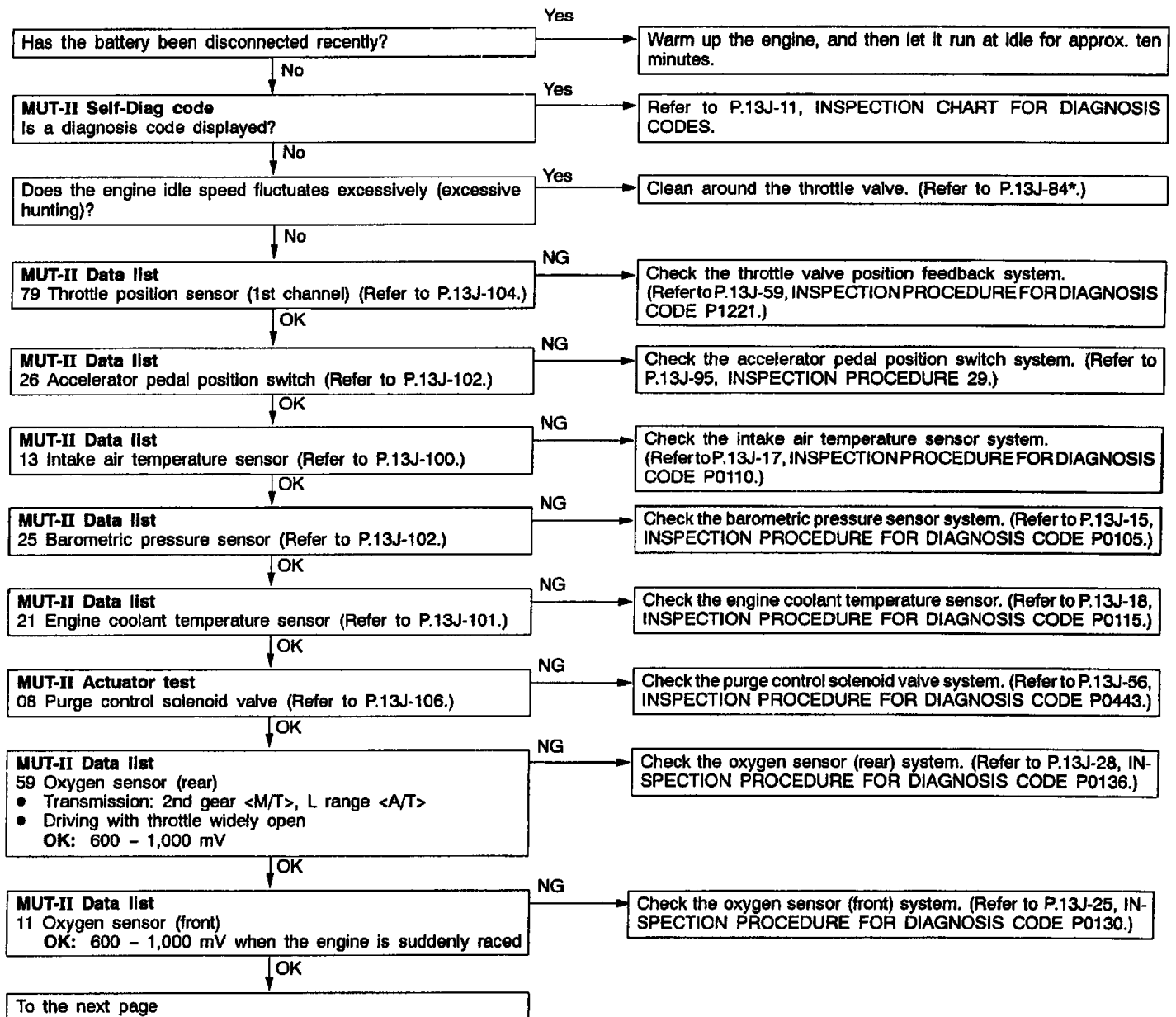


NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

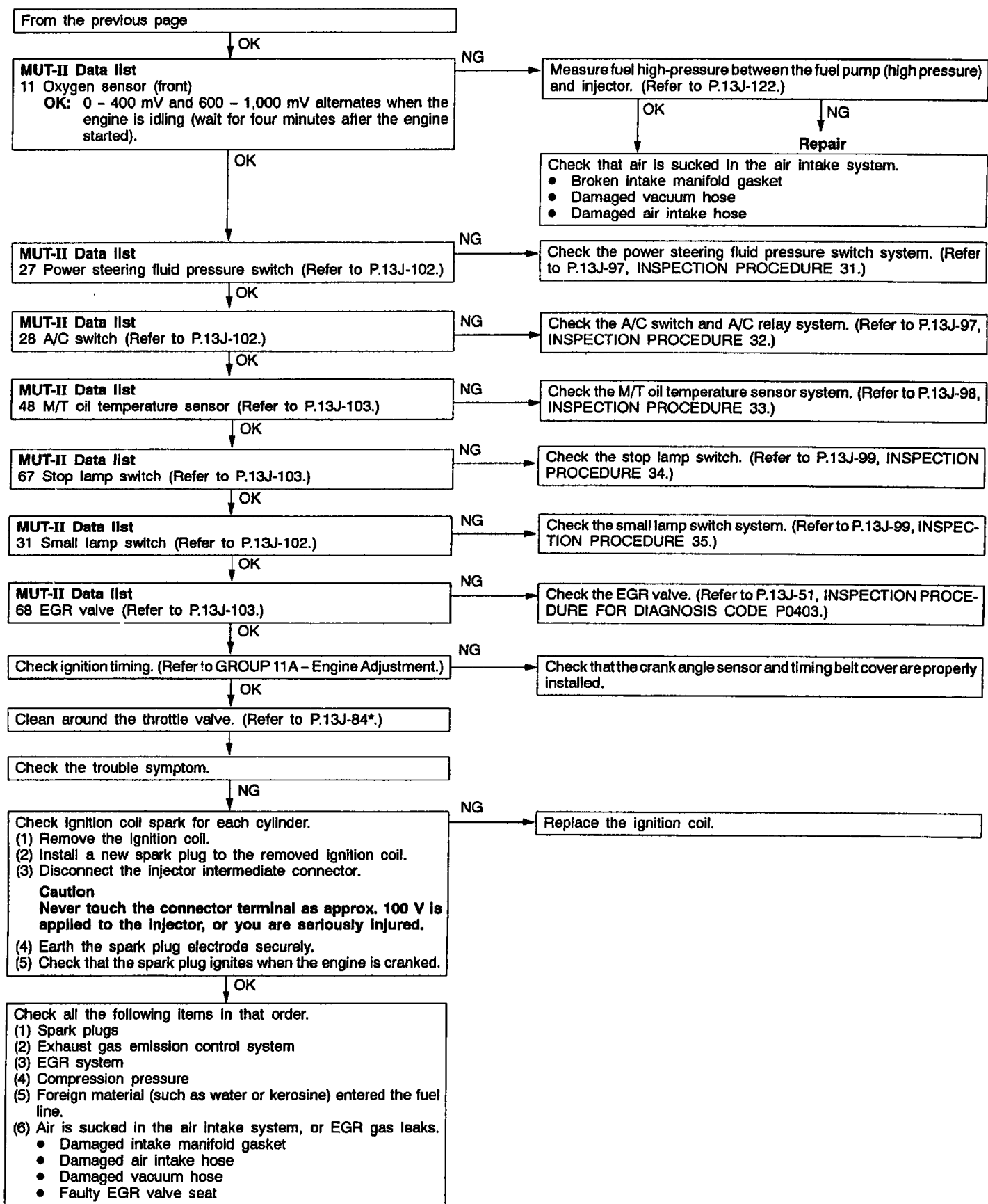
INSPECTION PROCEDURE 7

Unstable idling (rough idle, hunting)	Probable cause
This malfunction is probably caused by a faulty ignition system, improper air/fuel ratio, a faulty electronic-controlled throttle valve system, improper compression pressure, etc. As many causes can be suspected, diagnose from easier items.	• Malfunction of the ignition system • Malfunction of the air/fuel ratio control system • Malfunction of the electronic-control throttle valve system • Improper compression pressure • Air sucking into the air intake system



NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

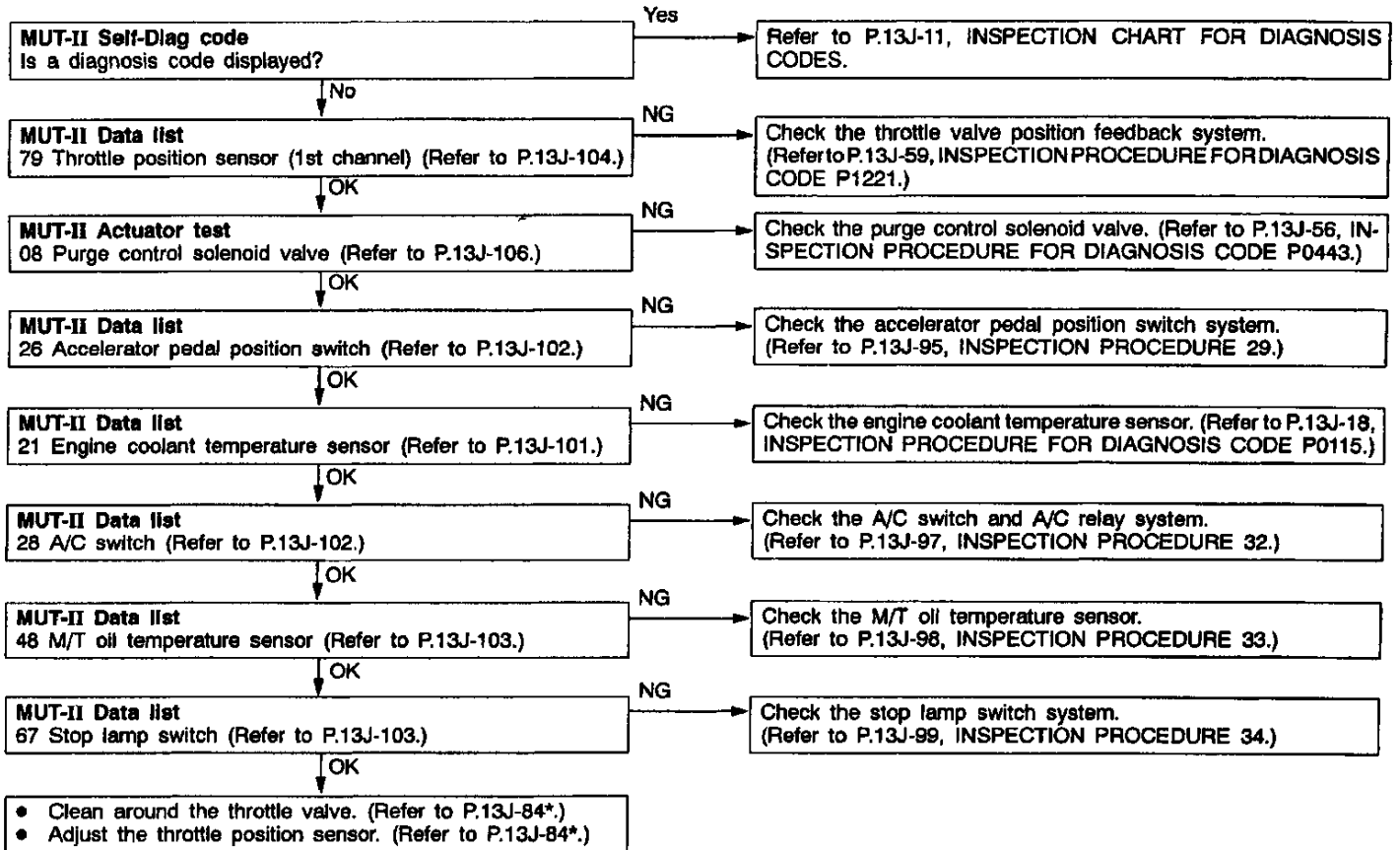


NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE902-D).

INSPECTION PROCEDURE 8

Idle speed is high or low (Improper idling)	Probable cause
The cause is probably that the intake air amount during idling is too great or too small.	• Malfunction of the electronic-controlled throttle valve system • Malfunction of the throttle body

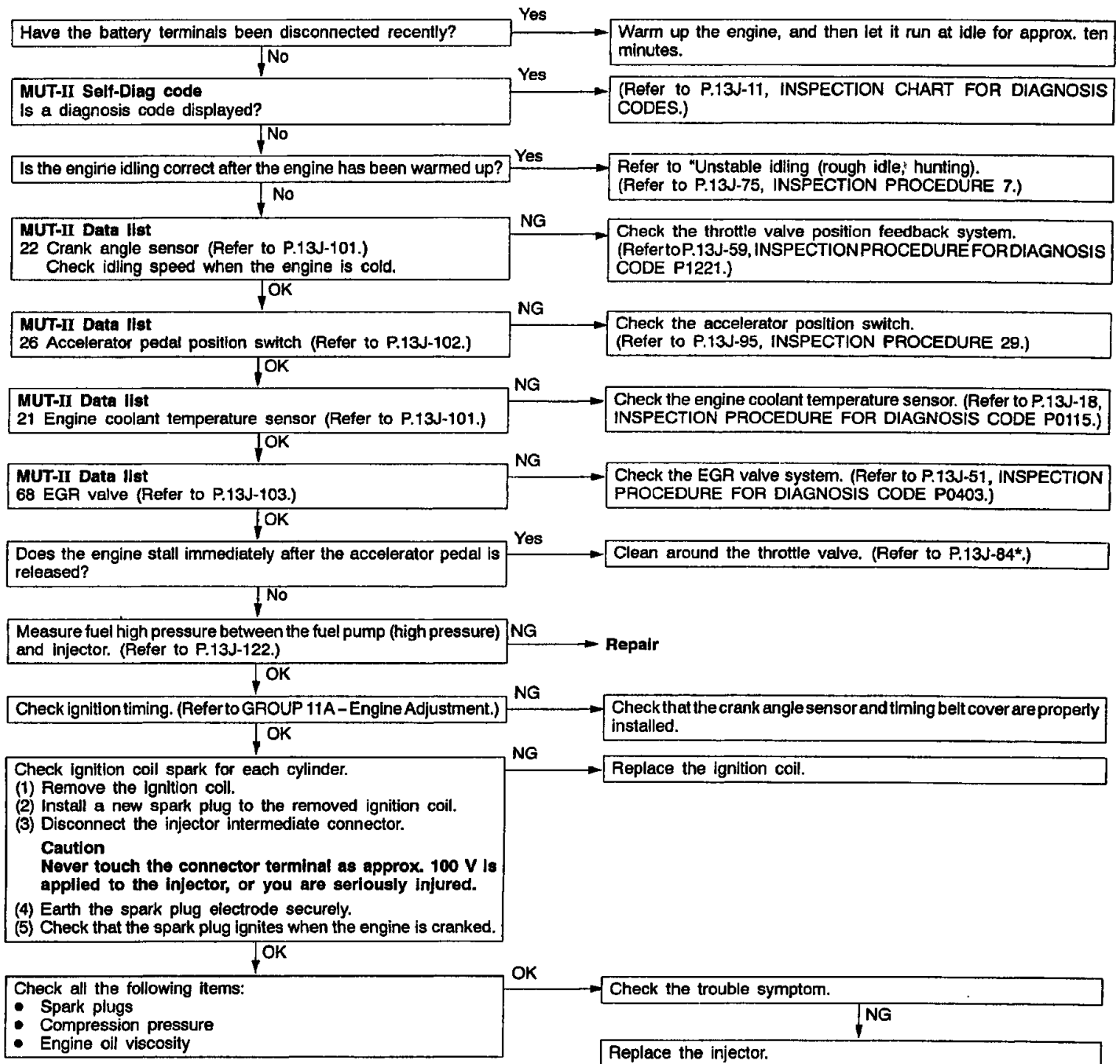


NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

INSPECTION PROCEDURE 9

When the engine is cold, it stalls at idling. (Die out)	Probable cause
The cause is probably an incorrect air/fuel ratio or poor intake air amount when the engine is cold.	• Malfunction of the electronic-control throttle valve system • Malfunction of the throttle body

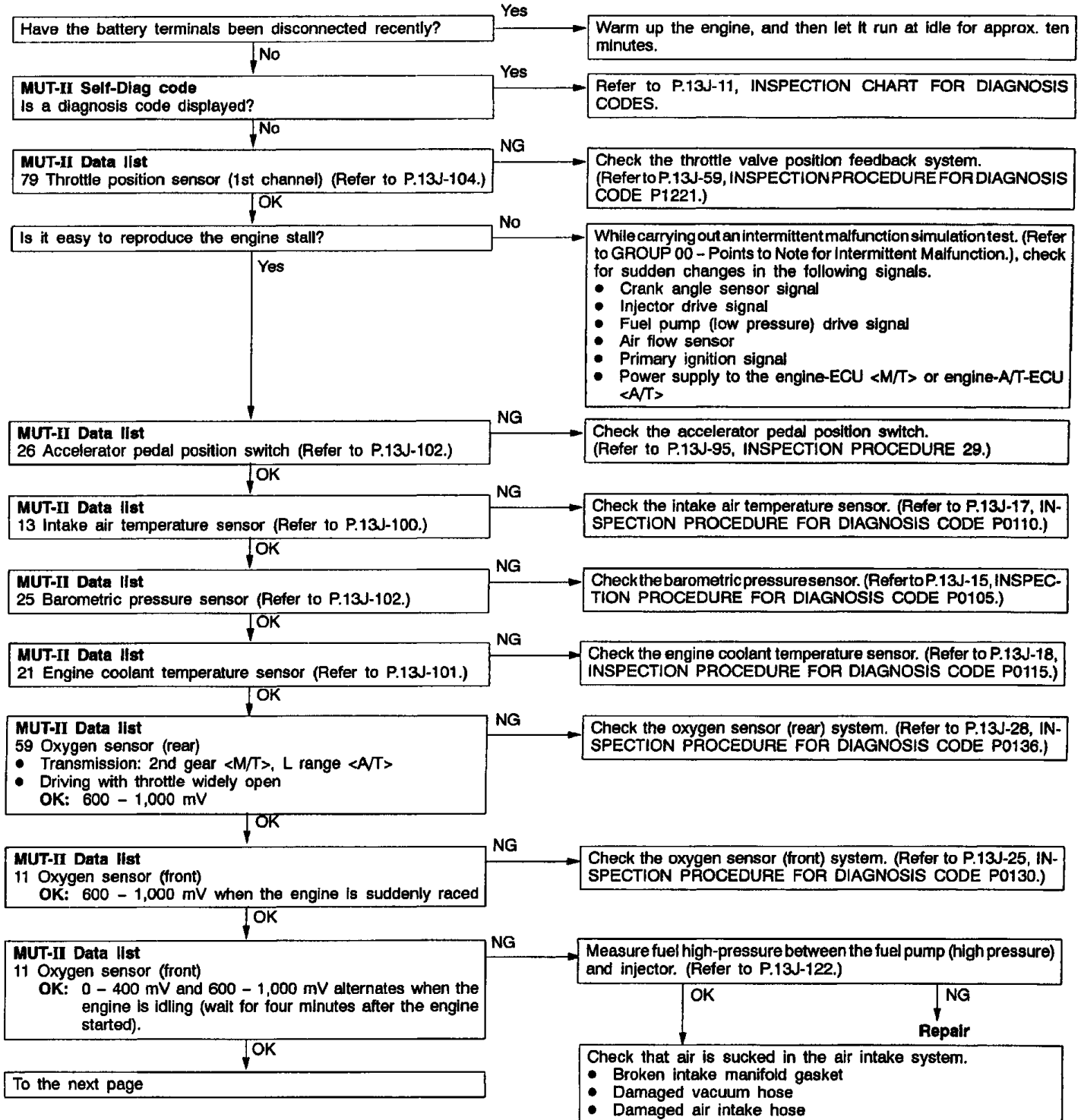


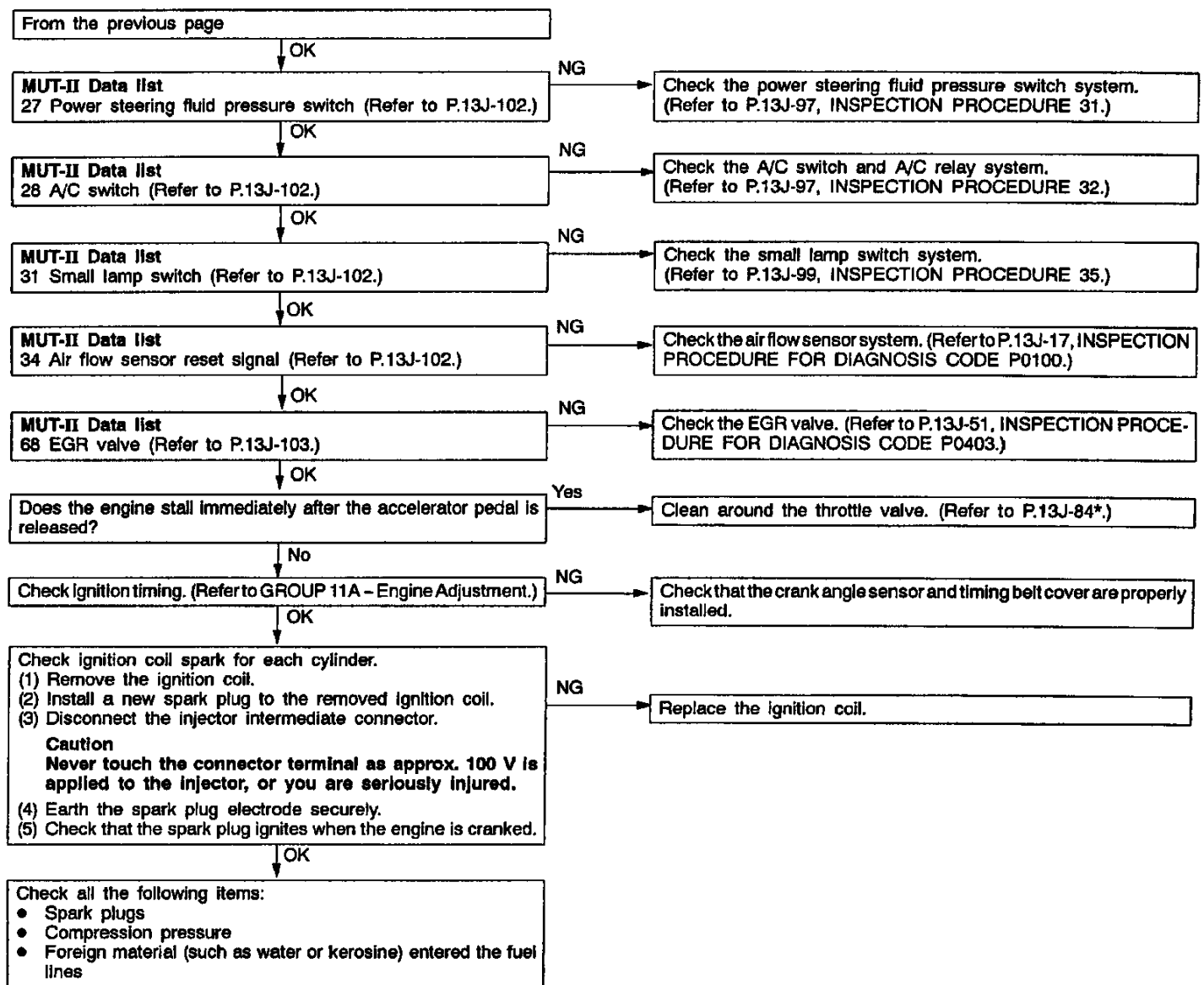
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

INSPECTION PROCEDURE 10

When the engine is hot, it stalls at idling. (Die out)	Probable cause
The cause is probably an improper air/fuel ratio, faulty electronic-controlled throttle valve system, compression pressure. In addition, if the engine stalls suddenly, another possible cause might be a poor connector contact.	• Malfunction of the ignition system • Malfunction of air/fuel ratio control system • Malfunction of electronic-controlled throttle valve system • Malfunction of the throttle body • Poor connector contact • Improper compression pressure • Air stuck in the air intake system



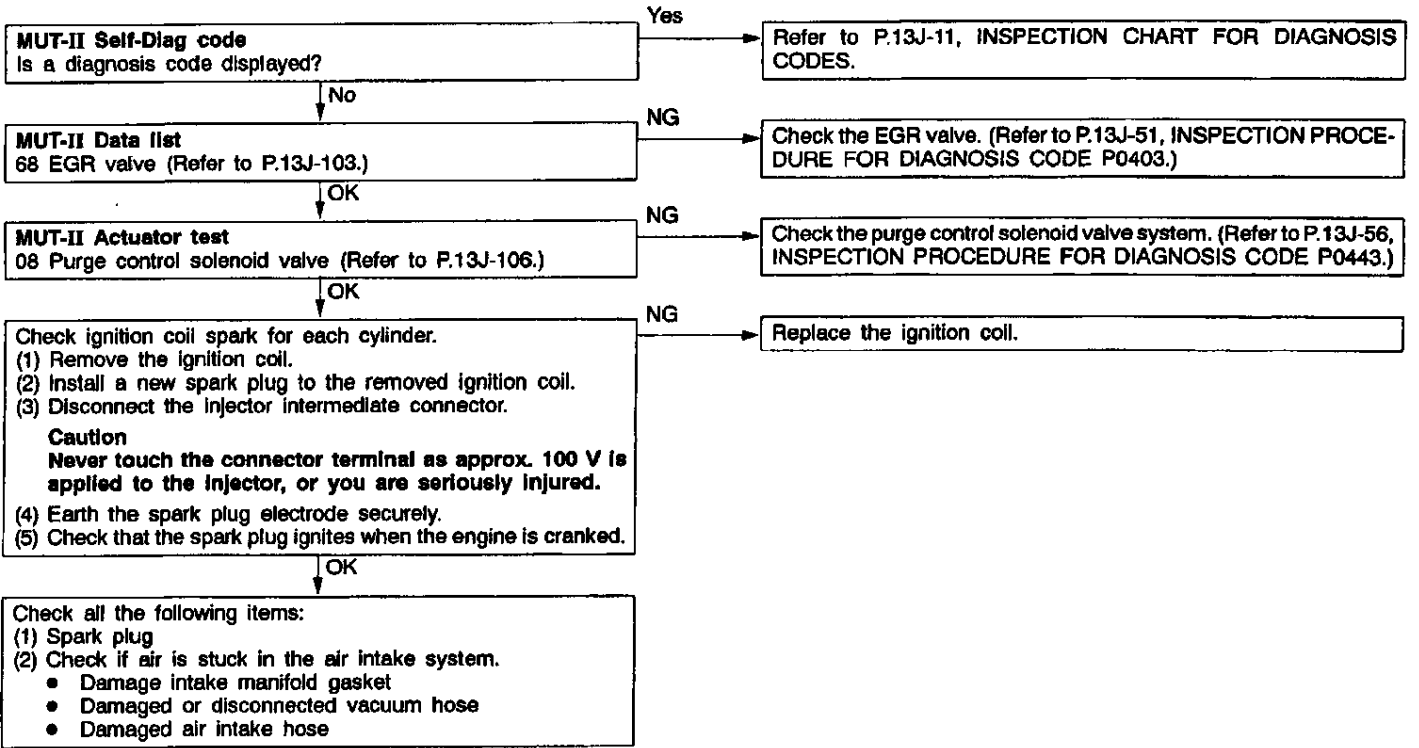


NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

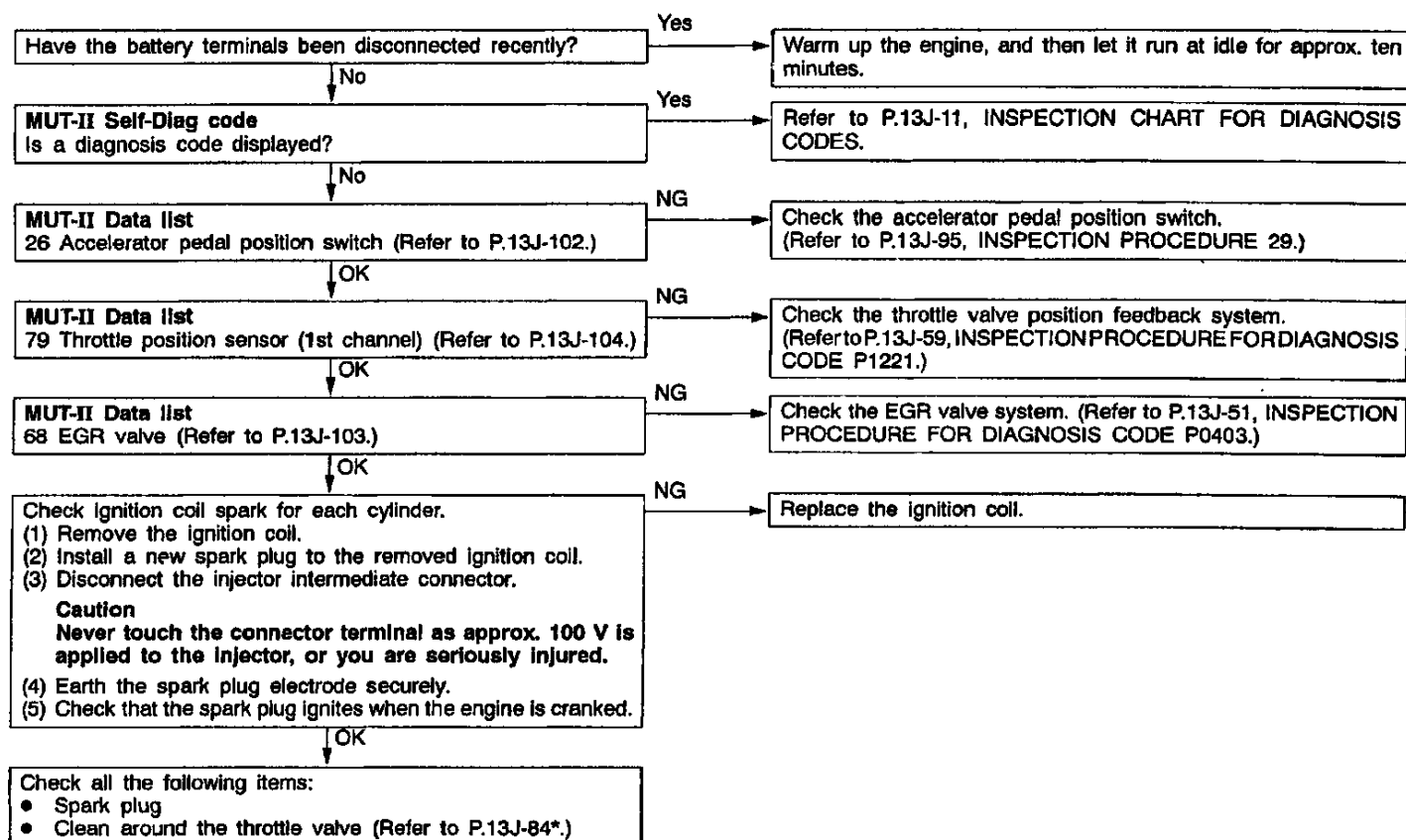
INSPECTION PROCEDURE 11

The engine stalls when starting the car. (Pass out)	Probable cause
The cause is probably poor ignition due to a malfunctioning spark plug (weak spark), or an incorrect air/fuel ratio when the accelerator is depressed.	• Malfunction of the ignition system • Malfunction of the EGR valve • Air stuck in the air intake system



INSPECTION PROCEDURE 12

The engine stalls when decelerating.	Probable cause
The cause is probably an improper air/fuel ratio due to a faulty EGR system, or poor intake air volume due to a faulty electronic-controlled throttle valve system.	• Malfunction of the electronic-controlled throttle valve system • Malfunction of the EGR valve

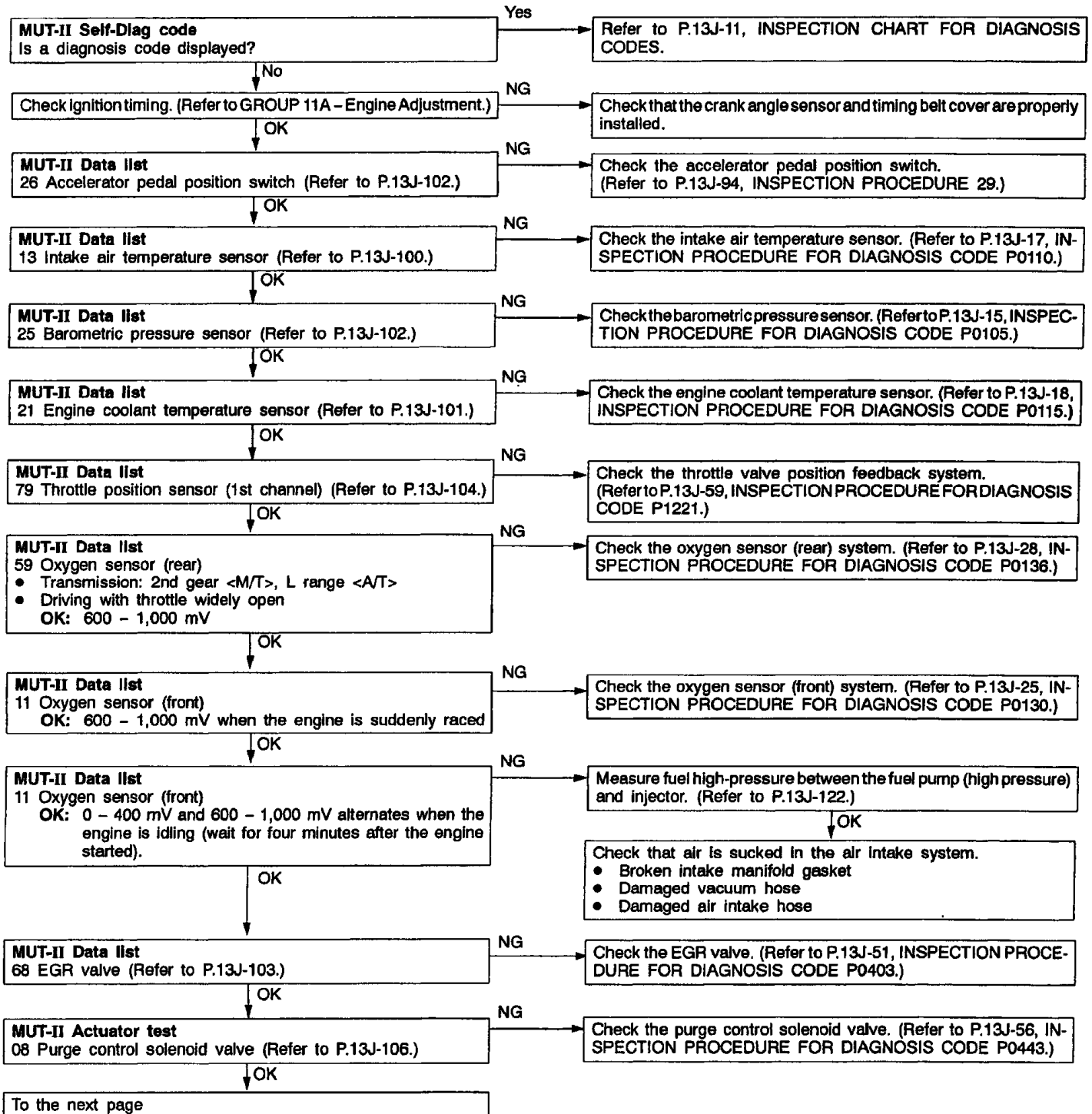


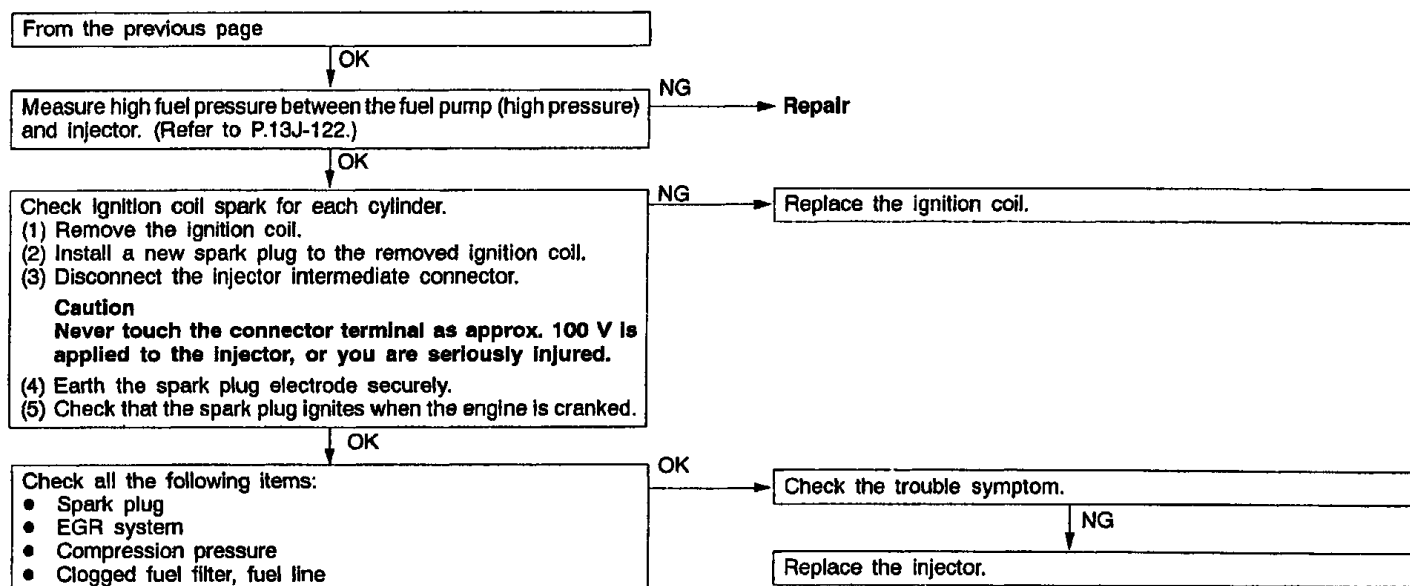
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

INSPECTION PROCEDURE 13

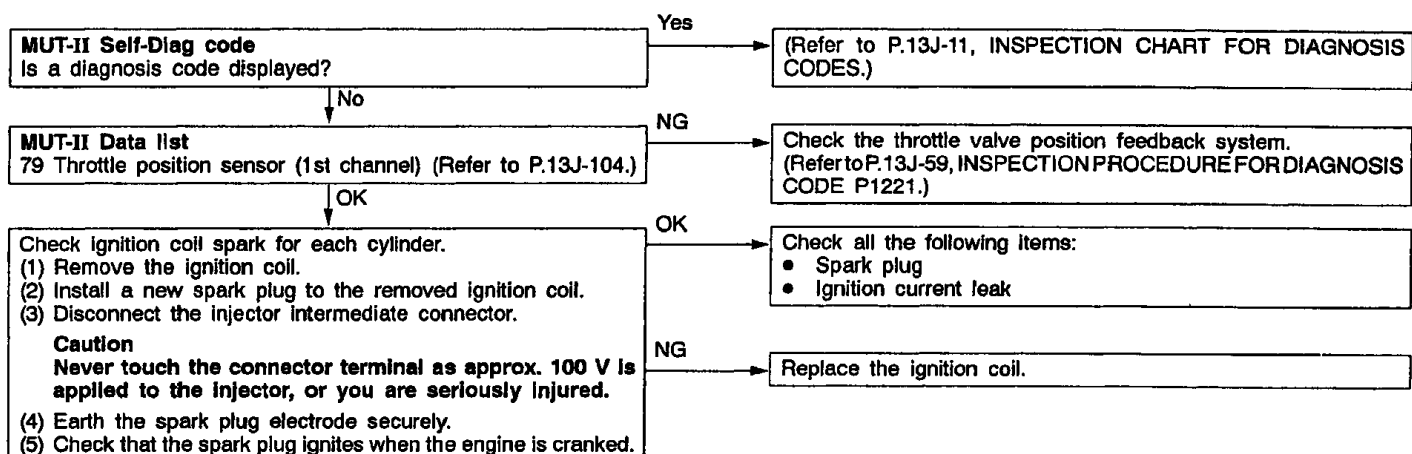
Hesitation, sag, stumble, poor acceleration or surge	Probable cause
The cause is probably a malfunction of the ignition system, electronic-controlled throttle valve system, compression pressure, etc.	- Malfunction of the ignition system - Malfunction of the air/fuel ratio control system - Malfunction of the electronic-controlled throttle valve system - Improper compression pressure - Air stuck in the air intake system





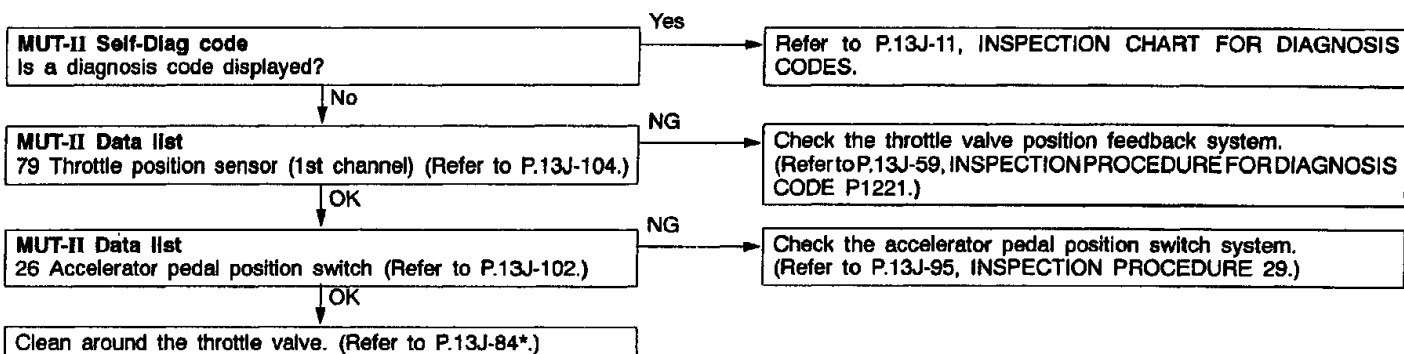
INSPECTION PROCEDURE 14

The feeling of Impact when accelerating	Probable cause
The cause is probably an Ignition leak being generated in line with an increase in the spark plug request voltage during acceleration.	Malfunction of the ignition system



INSPECTION PROCEDURE 15

The feeling of Impact when decelerating	Probable cause
The cause is probably insufficient intake air due to a faulty electronic-controlled throttle valve system.	Malfunction of the electronic-controlled throttle valve system

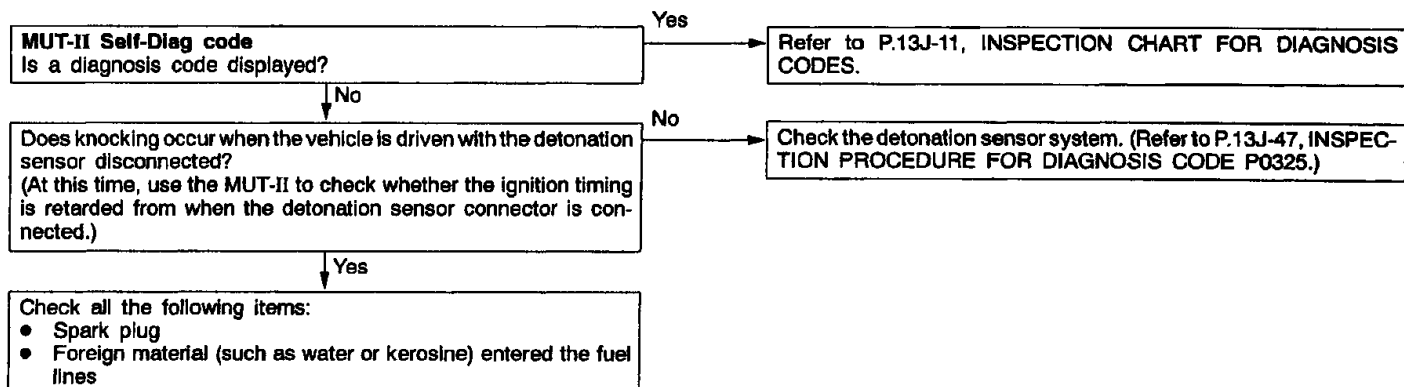


NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

INSPECTION PROCEDURE 16

Knocking	Probable cause
The cause is probably incorrect detonation control or improper heat range of the spark plugs.	- Malfunction of the detonation sensor - Improper heat range of the spark plugs



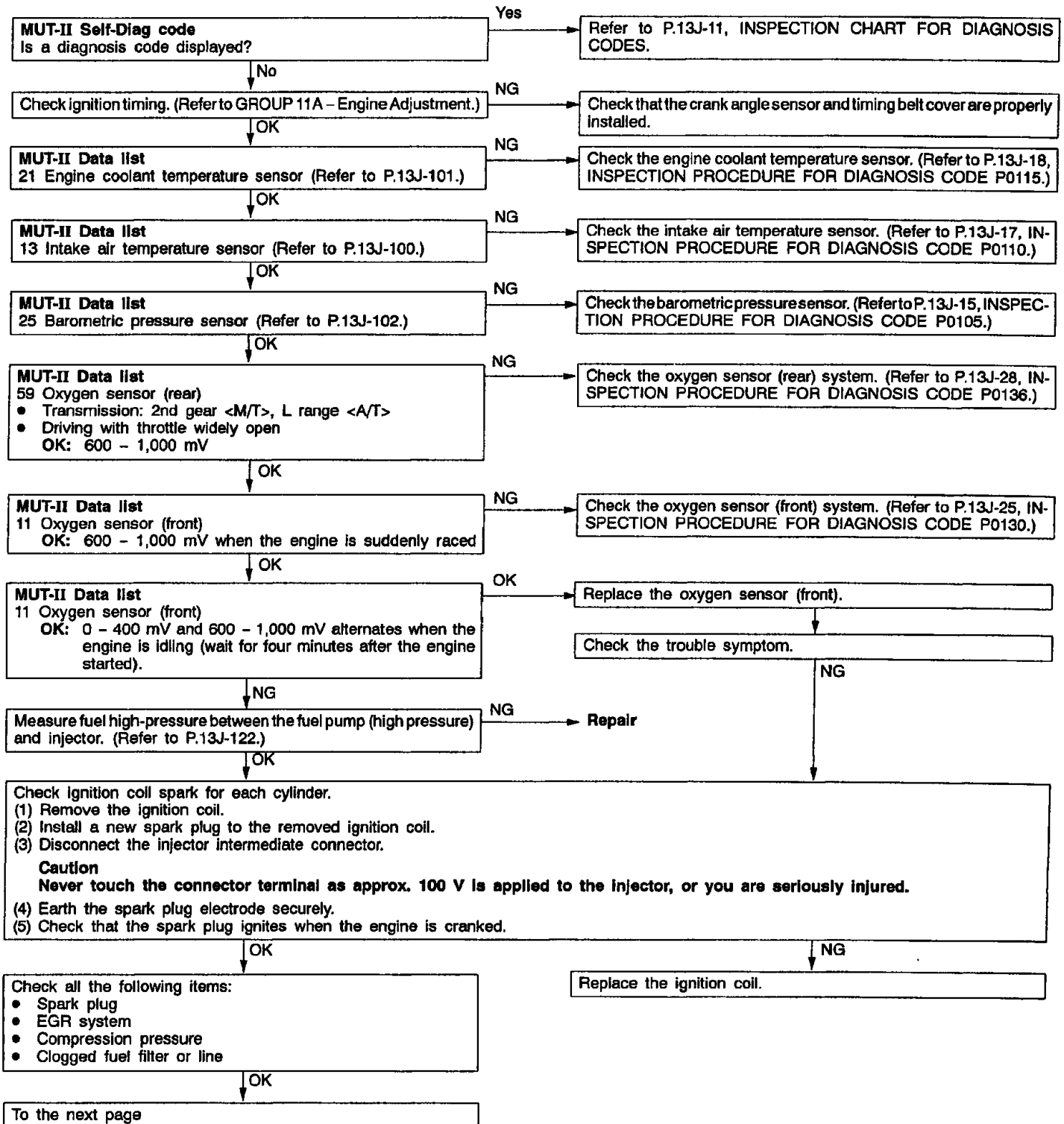
INSPECTION PROCEDURE 17

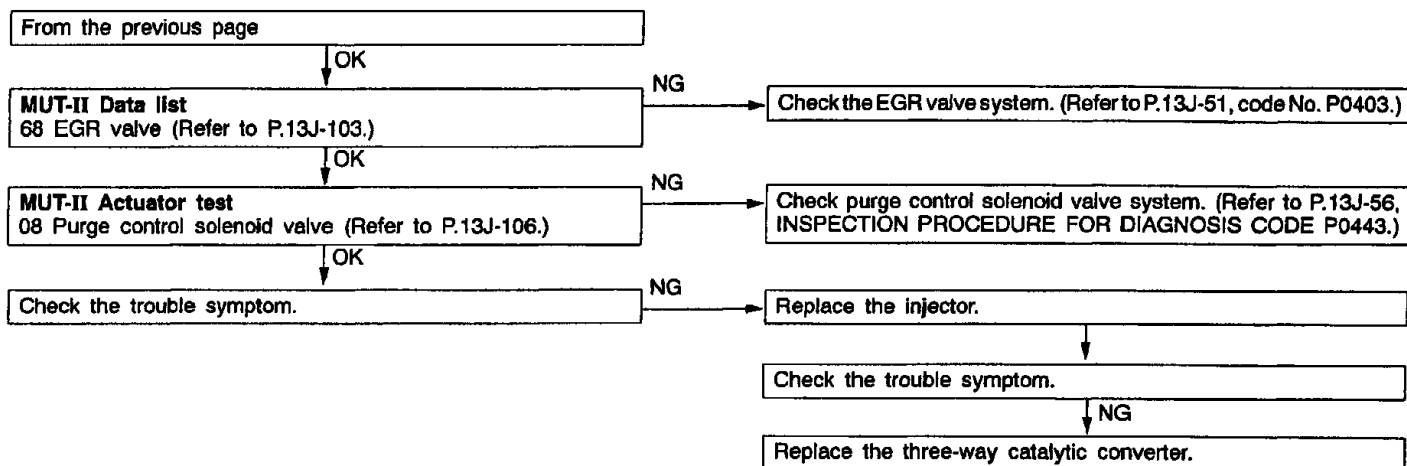
Run-on (dieseling)	Probable cause
The cause is probably fuel leak from injector(s)	Malfunction of the injector

Replace the injector.

INSPECTION PROCEDURE 18

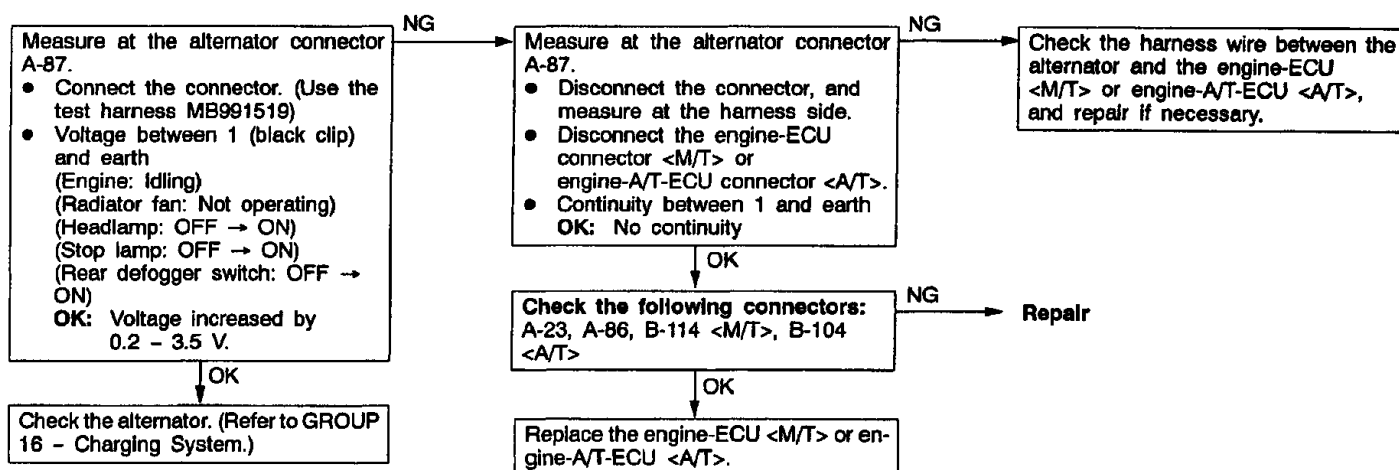
Too high CO and HC concentration when idling	Probable cause
The cause is probably an incorrect air/fuel ratio	• Malfunction of air/fuel ratio control system • Deterioration of the catalyst





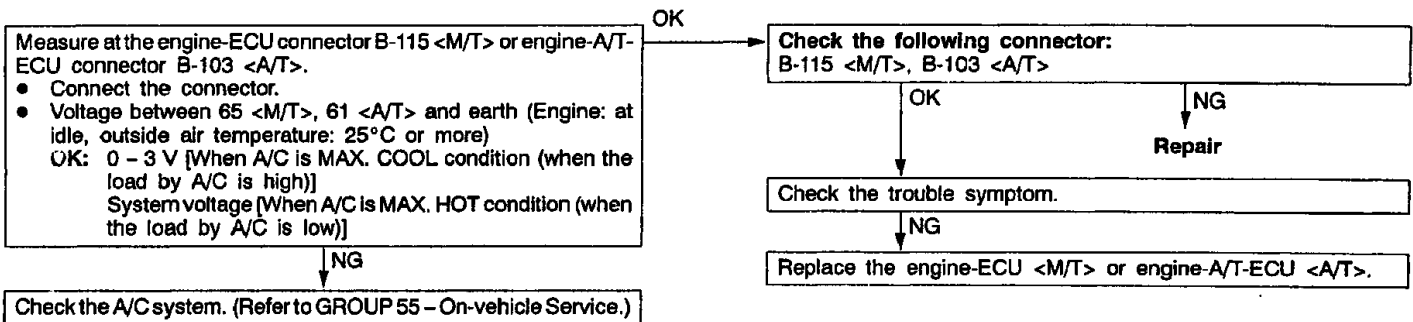
INSPECTION PROCEDURE 19

Low alternator output voltage (approx. 12.3 V)	Probable cause
The cause is probably a malfunction of the alternator or one of the problems listed at right.	- Malfunction of the charging system - Open circuit between the alternator G terminal and the engine-ECU <M/T> or engine-A/T-ECU <A/T> - Malfunction of the engine-ECU <M/T> - Malfunction of the engine-A/T-ECU <A/T>



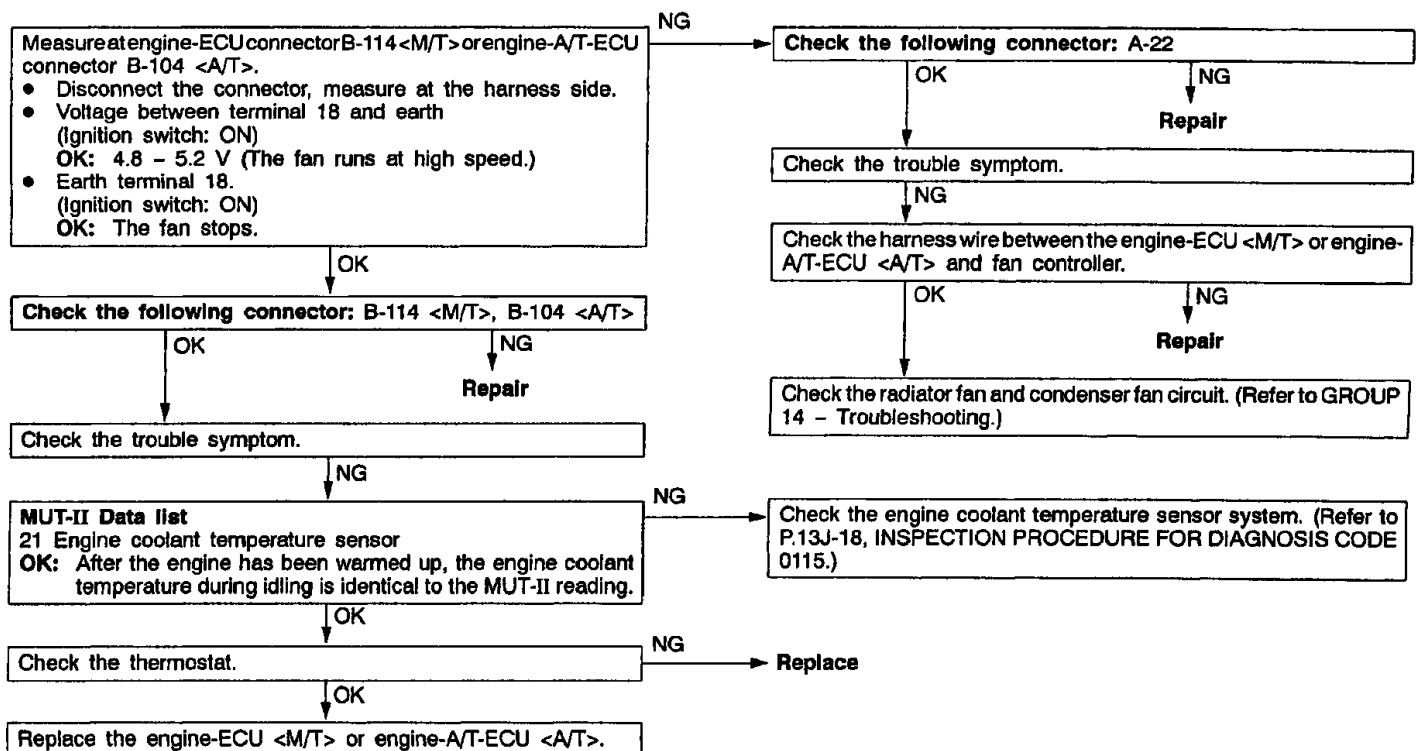
INSPECTION PROCEDURE 20

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 throttle control 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> • Malfunction of the engine-A/T-ECU <A/T>



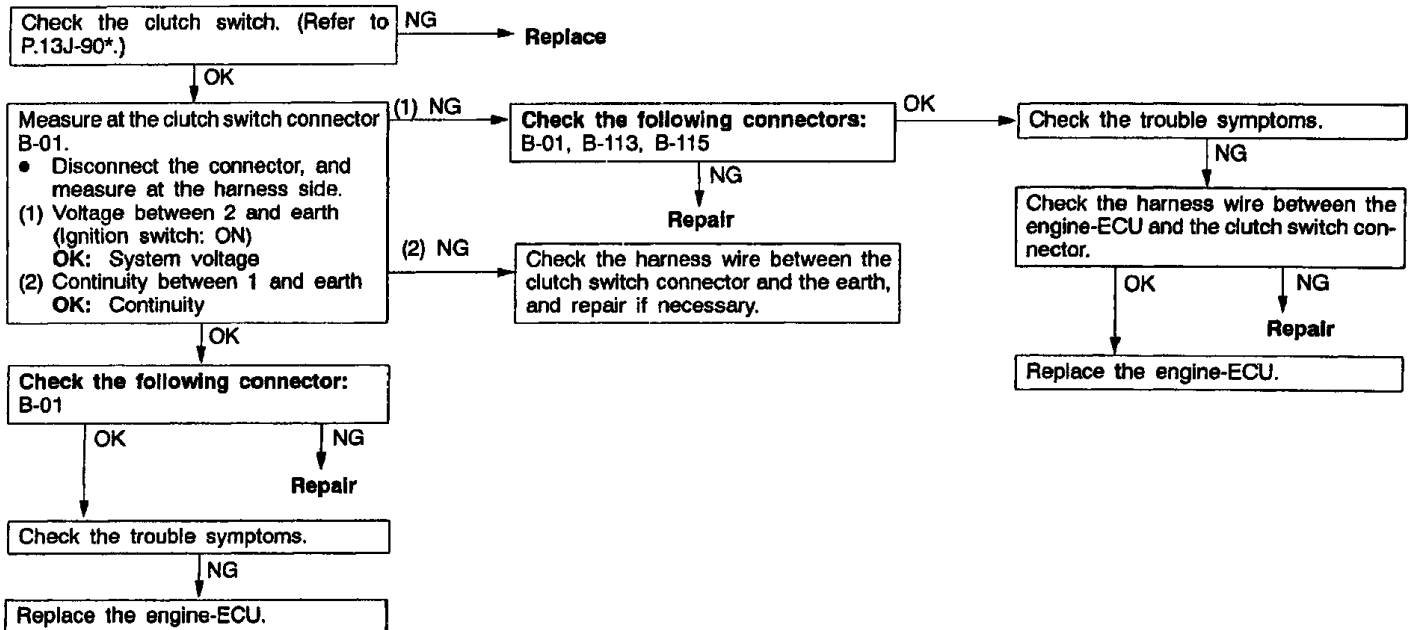
INSPECTION PROCEDURE 21

Fans (radiator fan, A/C condenser fan) are inoperative.	Probable cause
The engine-ECU <M/T> or engine-A/T-ECU <A/T> sends a duty signal to the fan controller according to engine coolant temperature, vehicle speed, or A/C switch load. The fan controller controls radiator fan and condenser fan speeds, based on this signal. (The closer the terminal voltage comes to 5V, the higher the fan speed becomes.)	• Malfunction of the fan motor relay • Malfunction of the fan motor • Malfunction of the fan controller • Open or short circuit, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>



INSPECTION PROCEDURE 22

Clutch switch system malfunction <M/T>	Probable cause
The clutch pedal switch sends a signal indicating clutch pedal depression to the engine-ECU. The engine-ECU controls the fuel injection properly according to this signal, thus prevents the fluctuation of the engine speed during shift change.	• Malfunction of the clutch switch • Open circuit or short-circuited harness wire in the clutch switch circuit • Malfunction of the engine-ECU

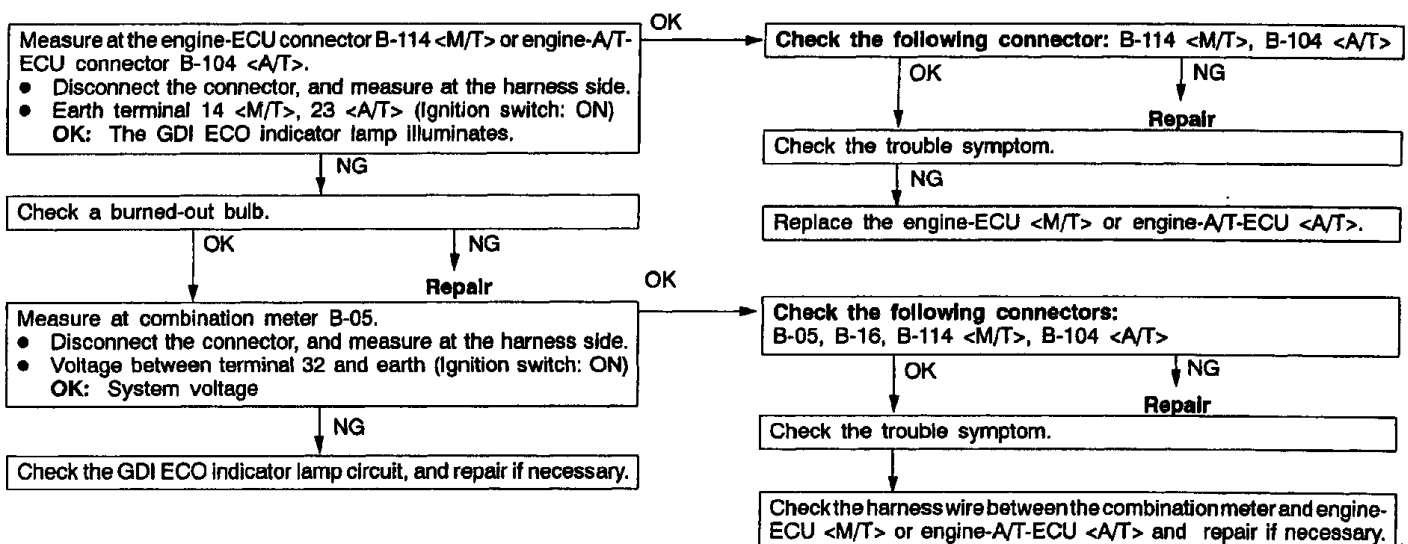


NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

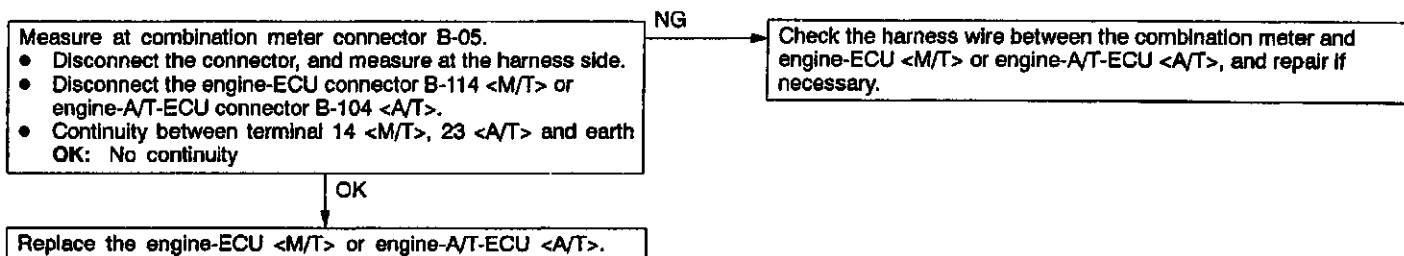
INSPECTION PROCEDURE 23

GDI ECO Indicator lamp does not illuminate.	Probable cause
If the GDI ECO indicator lamp does not illuminate after turning switch, the causes listed in the right column are suspected.	• Burned-out GDI ECO indicator lamp bulb • Open circuit or short-circuited harness wire in the GDI ECO indicator lamp circuit • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>



INSPECTION PROCEDURE 24

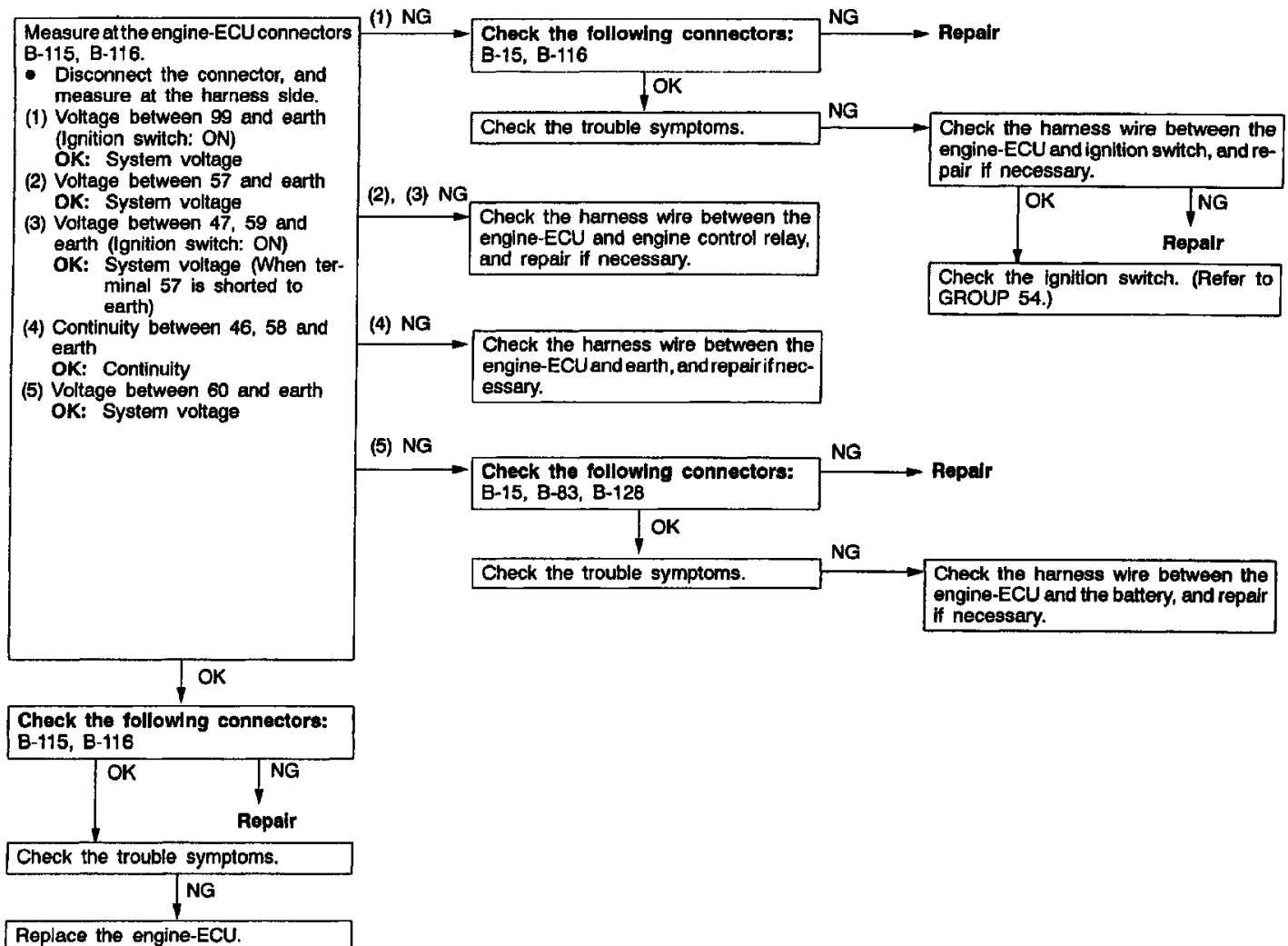
GDI ECO Indicator lamp remains illuminated and does not go off.	Probable cause
If the GDI ECO indicator lamp does not go off during high load operation, the causes listed in the right column are suspected.	• Short circuit between the GDI ECO indicator lamp and engine-ECU • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>



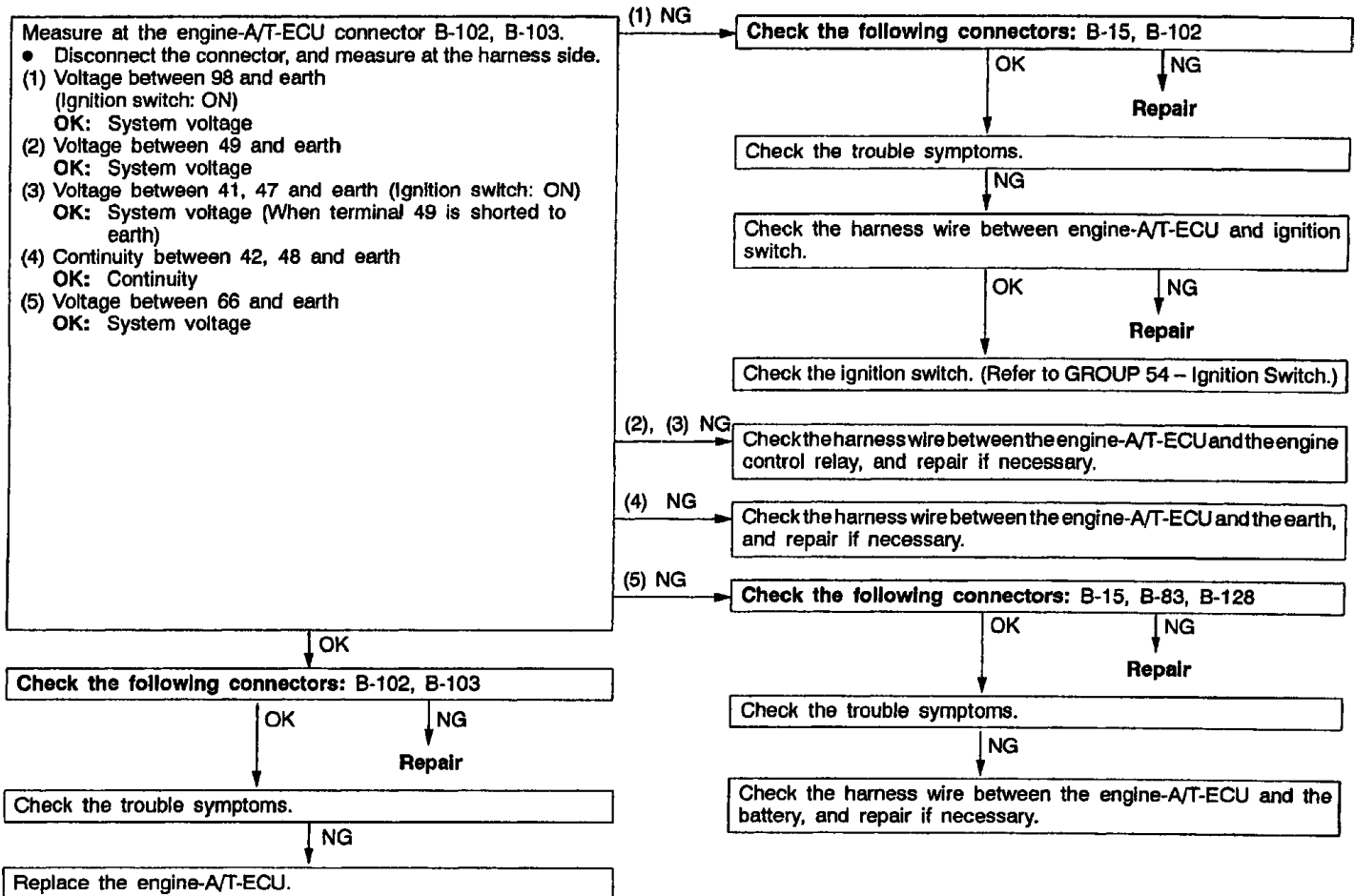
INSPECTION PROCEDURE 25

Engine-ECU (engine-A/T-ECU) power supply and earth circuit system	Probable cause
The cause is probably a malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> or one of the problems listed at right.	• 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> • Malfunction of the engine-A/T-ECU <A/T>

<M/T>

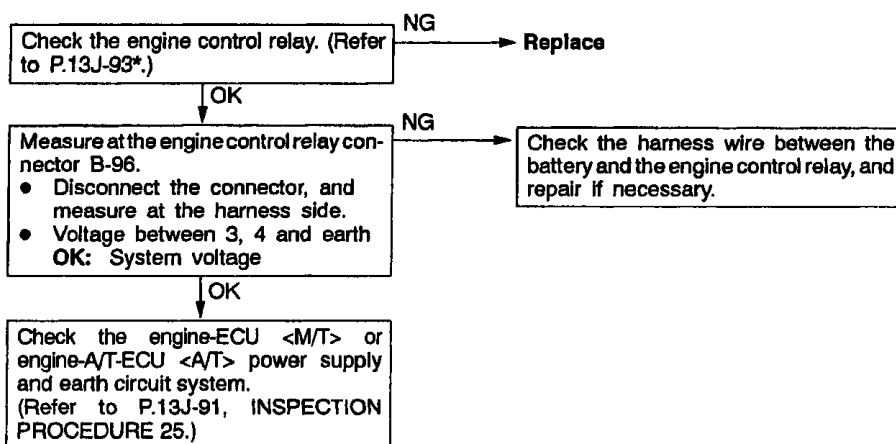


<A/T>



INSPECTION PROCEDURE 26

Engine control relay and ignition switch-IG system	Probable cause
When the 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 on the engine control relay. This causes system voltage to be supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T> and to the sensors and actuators.	• Malfunction of the ignition switch • Malfunction of the engine control relay • Open circuit or short-circuited harness wire of the engine control relay circuit • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>

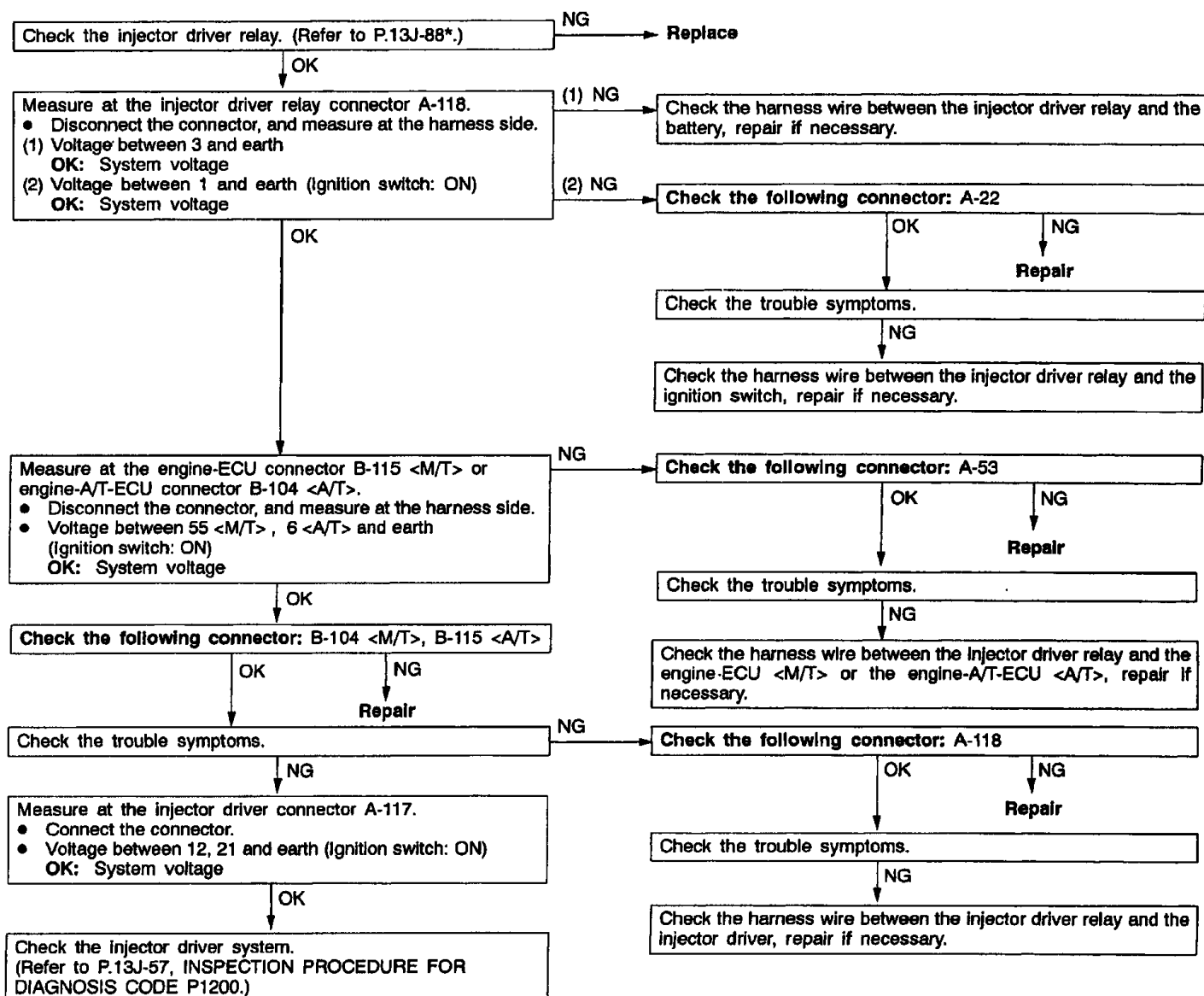


NOTE

*: Refer to the '98 CARISMA-GDI Workshop Manual (Pub. No. PWDE9502-C).

INSPECTION PROCEDURE 27

Injector driver relay system	Probable cause
When the ignition switch ON signal is input to the engine-ECU <M/T> or the engine -A/T-ECU <A/T>, engine-ECU <M/T> or the engine -A/T-ECU <A/T> turns on the injector driver relay. This causes system voltage to be supplied to the injector driver.	- Malfunction of the injector driver relay - Improper connector contact, open circuit or short-circuited harness wire - Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>



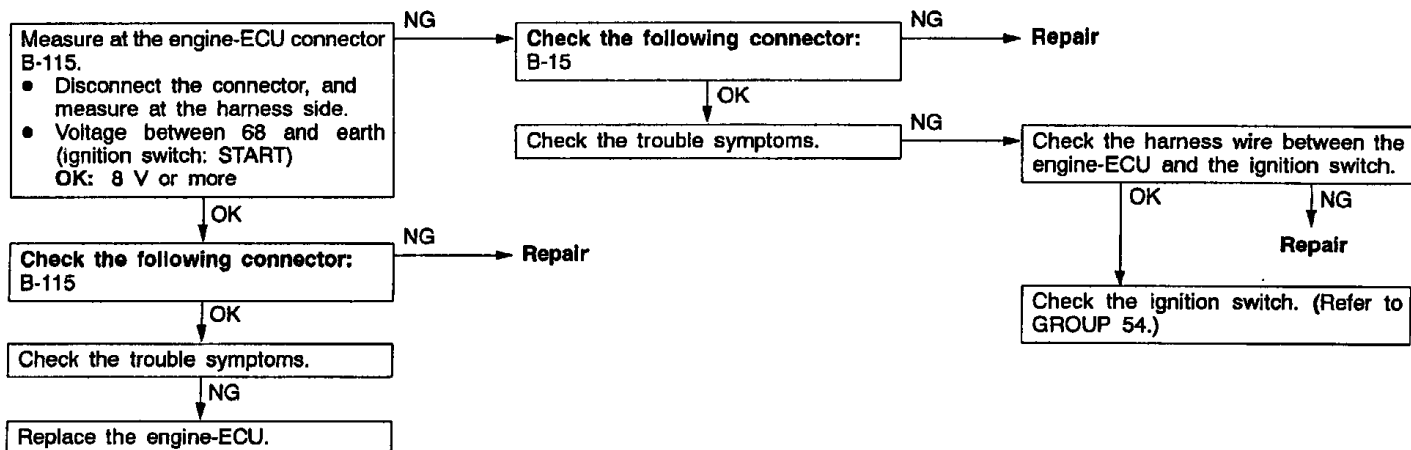
NOTE

*: Refer to the 2000 CARISMA Workshop Manual (Pub. No. PWDE9502-D).

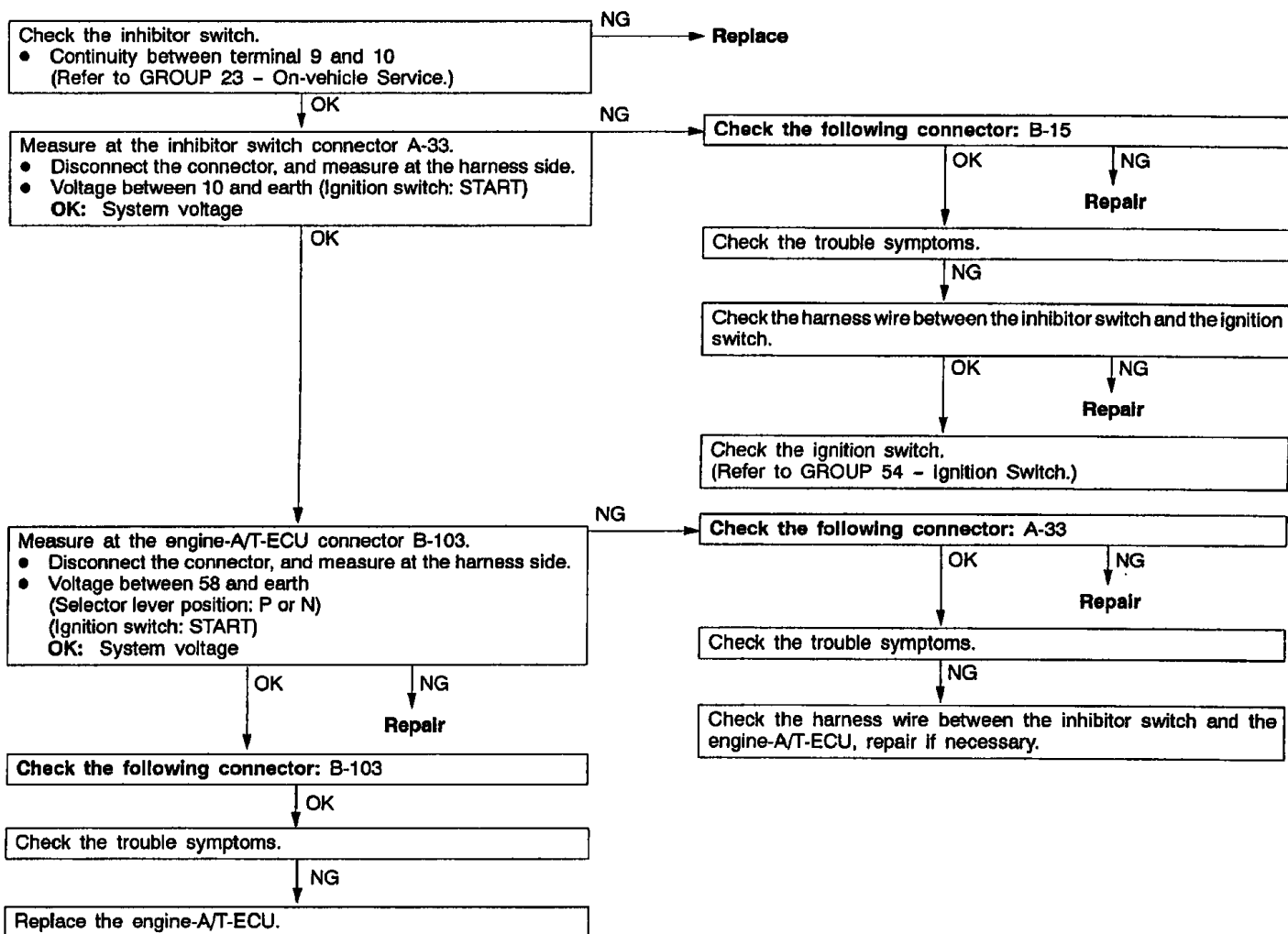
INSPECTION PROCEDURE 28

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>

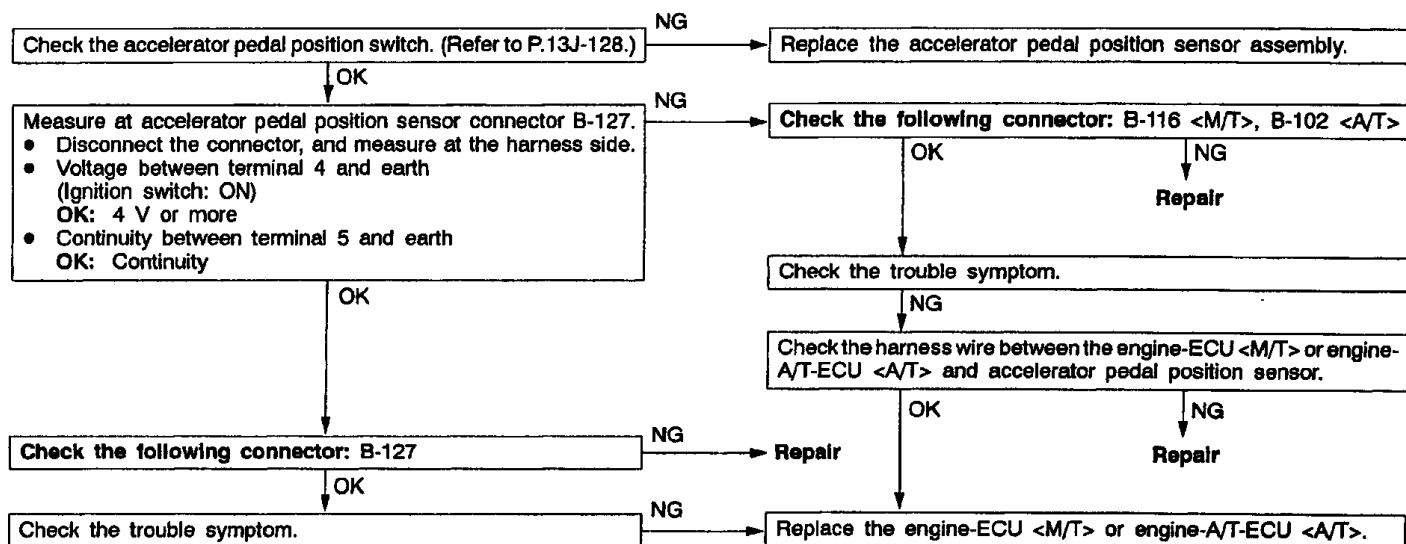


<A/T>



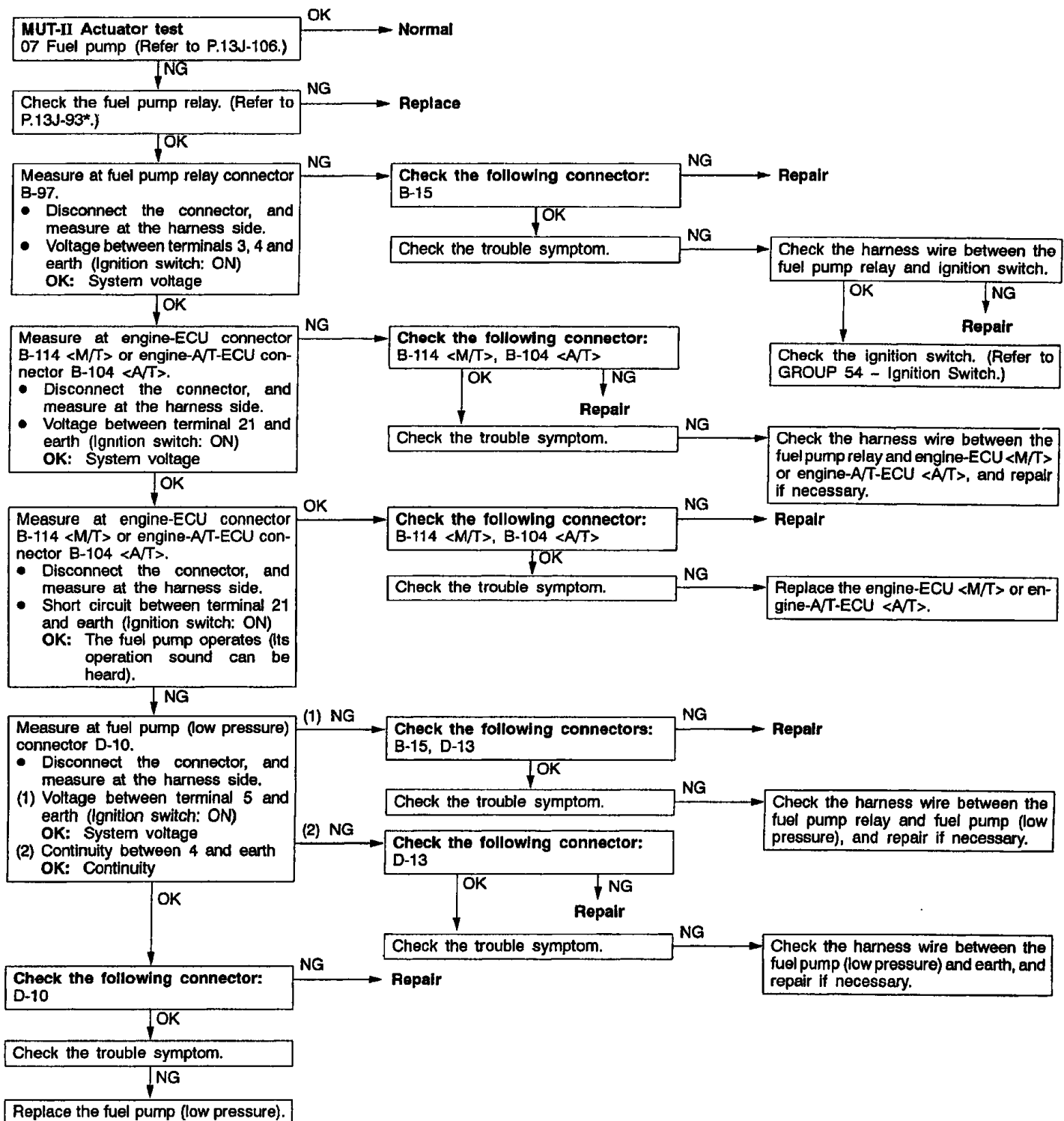
INSPECTION PROCEDURE 29

Accelerator pedal position switch system	Probable cause
The accelerator pedal position switch detects that the accelerator pedal is fully closed, and sends a signal 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> controls idle speed, based on this signal.	• Maladjustment of the accelerator cable • Maladjustment of the accelerator pedal position switch • Open circuit or short-circuited harness wire in the accelerator pedal position switch system, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>



INSPECTION PROCEDURE 30

Fuel pump (low pressure) system	Probable cause
The engine-ECU <M/T> or engine-A/T-ECU <A/T> turns on the fuel pump relay while the engine is cranking or running, and supplies power source to the fuel pump (low pressure).	• Malfunction of the fuel pump relay • Malfunction of the fuel pump (low pressure) • Open circuit or short-circuited harness wire in the fuel pump (low pressure) circuit, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T>

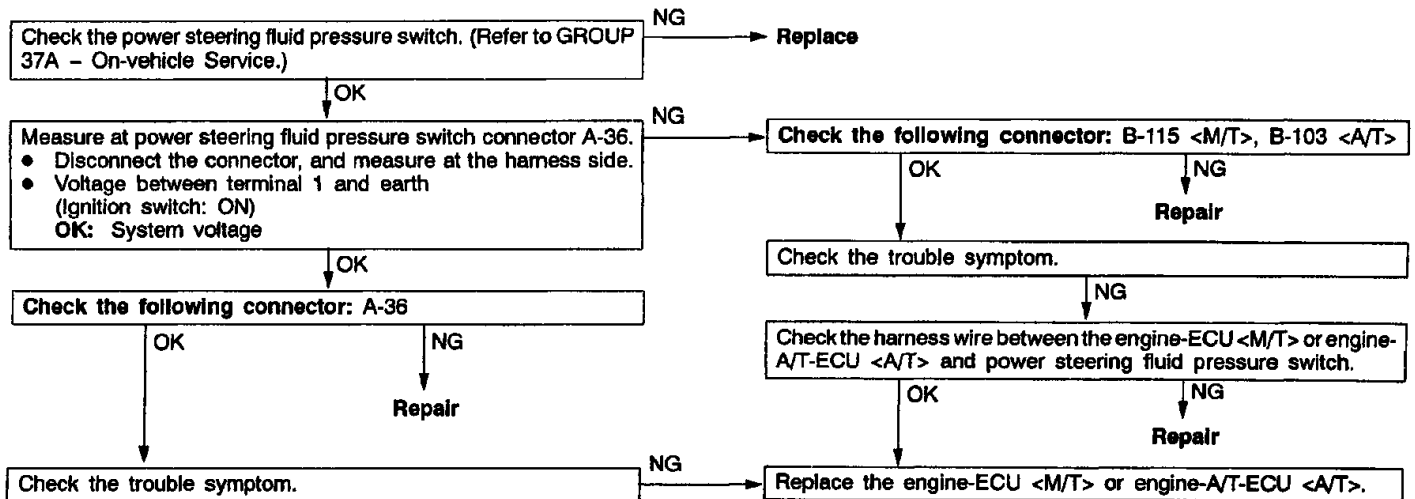


NOTE

*: Refer to the '98 CARISMA-GDI Workshop Manual (Pub. No. PWDE9502-D).

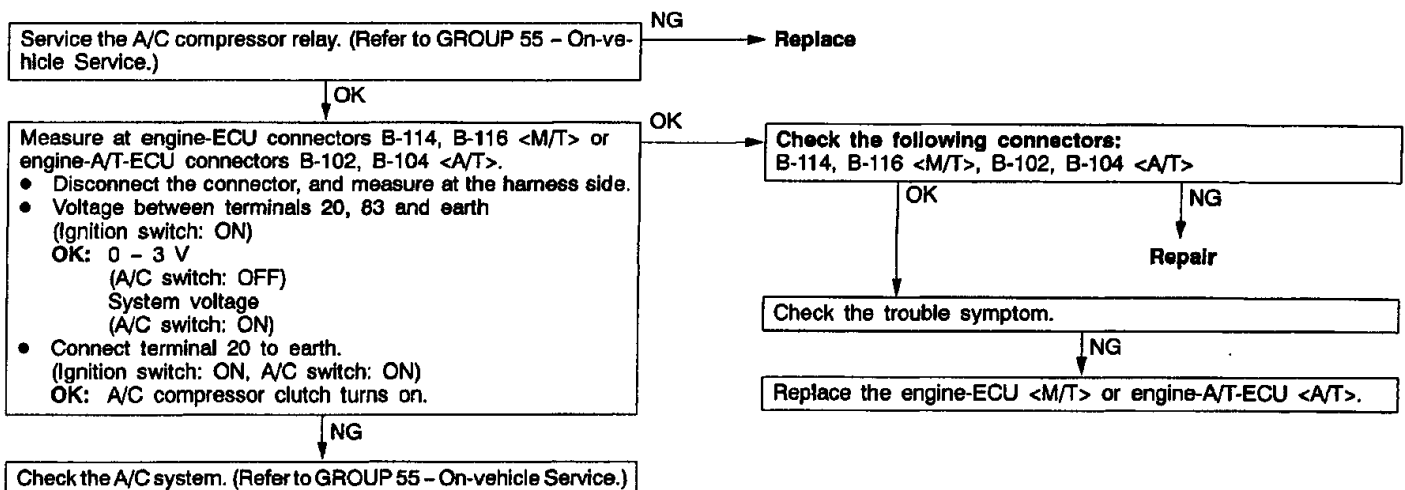
INSPECTION PROCEDURE 31

Power steering fluid pressure switch system	Probable cause
The power steering fluid pressure switch sends a signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T> according to power steering load. Based on this signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the throttle control servo so that idle speed increases when the power steering is in operation.	- Malfunction of the power steering fluid pressure switch - Open circuit or short-circuited harness wire in the power steering fluid pressure switch circuit, or poor connector contact - Malfunction of the engine-ECU <M/T> - Malfunction of the engine-A/T-ECU <A/T>



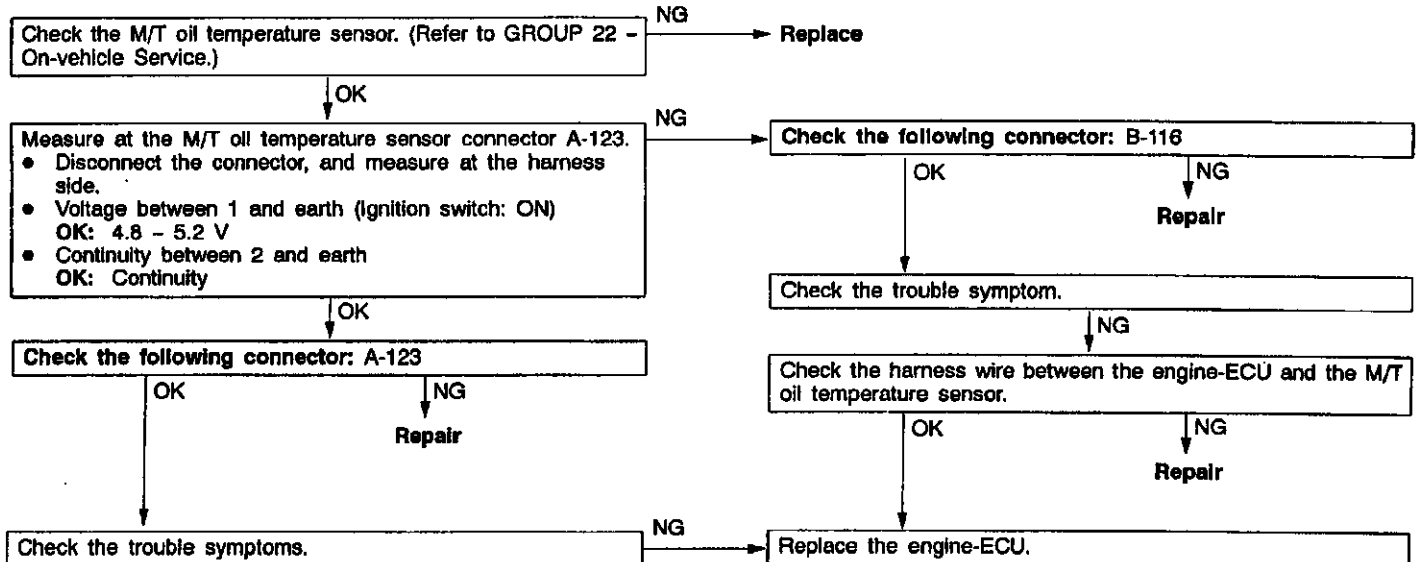
INSPECTION PROCEDURE 32

A/C switch and A/C relay system	Probable cause
If the engine-ECU receives a 'A/C on' signal, it operates the throttle control servo and A/C compressor magnetic clutch so that idle speed increases.	- Malfunction of the A/C control system - Malfunction of the A/C switch - Open circuit or short-circuited harness wire in the A/C switch circuit, or poor connector contact - Malfunction of the engine-ECU <M/T> - Malfunction of the engine-A/T-ECU <A/T>



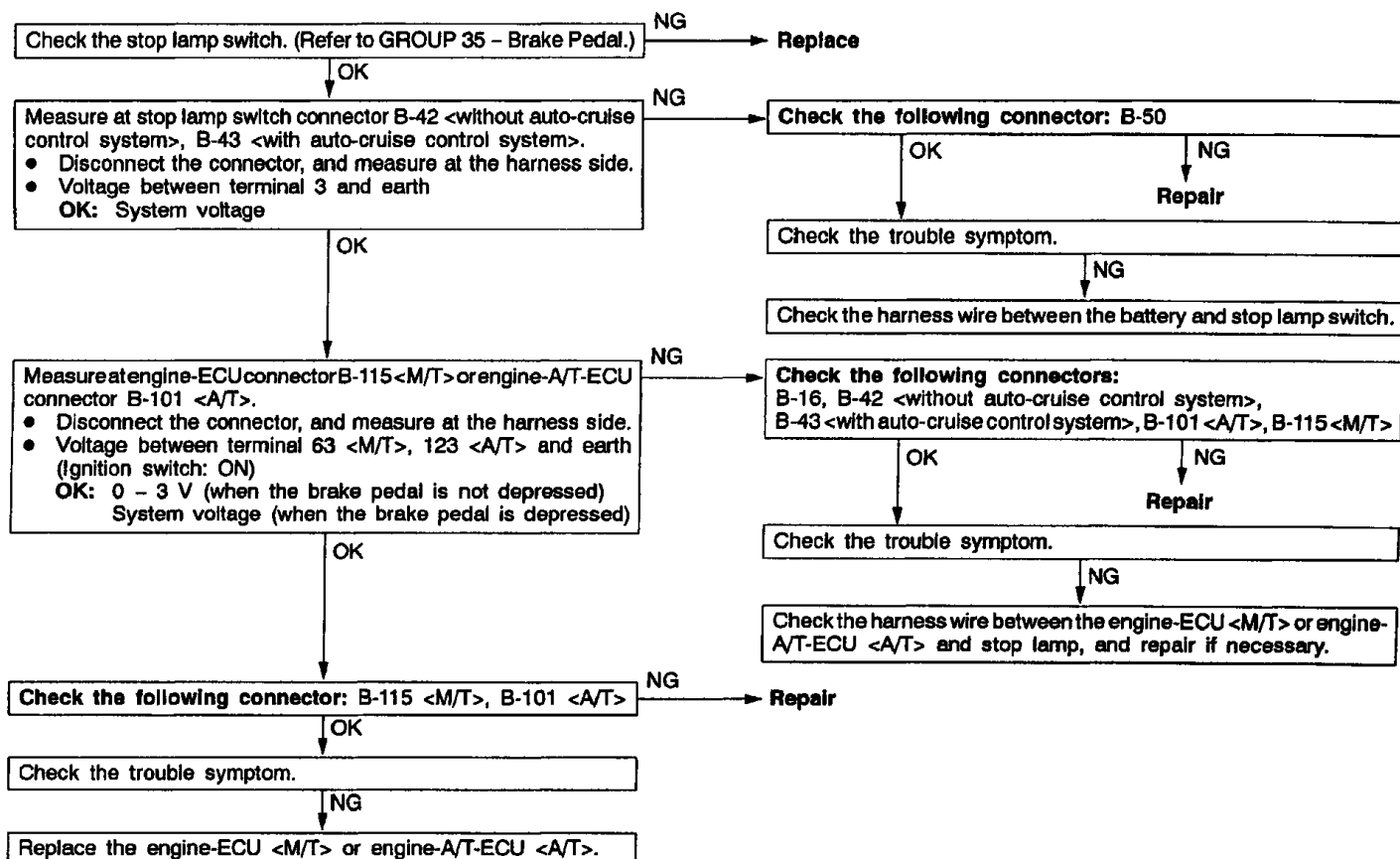
INSPECTION PROCEDURE 33

M/T oil temperature sensor system <M/T>	Probable cause
This sensor inputs the manual transmission oil temperature to the engine-ECU. The engine-ECU uses this input to control the idle speed control servo so that the idle speed is increased when the manual transmission oil temperature becomes low.	- Malfunction of the M/T oil temperature sensor - Open circuit or short-circuited harness wire in the M/T oil temperature sensor circuit - Malfunction of the engine-ECU



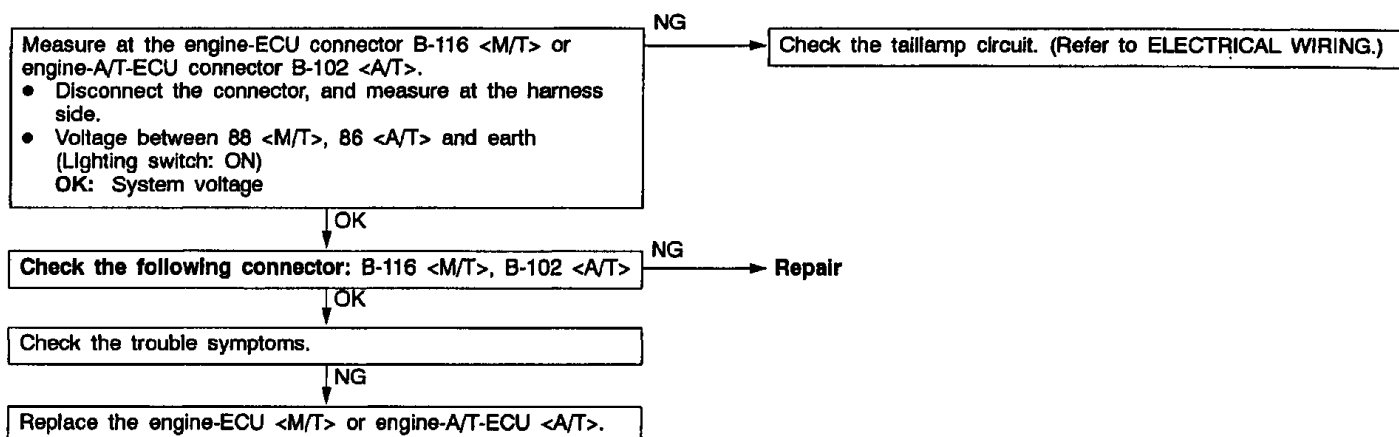
INSPECTION PROCEDURE 34

Stop lamp switch system	Probable cause
The engine-ECU <M/T> or engine-A/T-ECU <A/T> determines whether the brake pedal is depressed or not, by means of the stop lamp switch input signal.	- Malfunction of the stop lamp switch - Open circuit or short-circuited harness wire in the stop lamp circuit, or poor connector contact - Malfunction of the engine-ECU <M/T> - Malfunction of the engine-A/T-ECU <A/T>



INSPECTION PROCEDURE 35

Small lamp switch system	Probable cause
The engine-ECU <M/T> or engine-A/T-ECU <A/T> determines whether the small lamp switch is on or off. According to that information, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls alternator output current when the vehicle is started.	- Improper connector contact, open circuit or short-circuited harness wire in the taillamp circuit - Malfunction of the engine-ECU <M/T> - Malfunction of the 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: Within four minutes after starting the engine

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

*3: The accelerator pedal position switch normally turns off when the voltage of the accelerator pedal position sensor (1st channel) is 200 – 600 mV higher than the voltage at the idle position. If the accelerator pedal position switch turns back on after the accelerator pedal position sensor voltage has risen by 100 mV and the throttle valve has opened, the accelerator pedal position switch and the accelerator pedal position sensor (1st channel) need to be adjusted.

Item No.	Check items	Requirements	Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor (front)	Engine: After warm-up	Idling	200 mV or less*1	Code No. P0130 13J-25
			Sudden racing	600 – 1,000 mV	
			2,500 r/min	400 mV or less and 600 – 1,000 mV alternates.	
12	Air flow sensor	- Engine coolant temperature: 80 – 95°C - Lamps, electric cooling fan and all accessories: OFF - Transmission: Neutral (A/T: P range)	Idling	27 – 53 Hz	Code No. P0100 13J-13
			2,500 r/min	55 – 95 Hz	
			Racing	Frequency increases in response to racing.	
13	Intake air temperature sensor	Ignition switch: ON	Intake air temperature: -20°C	-20°C	Code No. P0110 13J-17
			Intake air temperature: 0°C	0°C	
			Intake air temperature: 20°C	20°C	
			Intake air temperature: 40°C	40°C	
			Intake air temperature: 80°C	80°C	

Item No.	Check items	Requirements		Normal condition	Inspection procedure No.	Reference page
14	Throttle position sensor (2nd channel)	- Engine coolant temperature: 80 – 95°C - Ignition switch: ON (Engine stopped)	Release the accelerator pedal.	4,500 – 5,500	Code No. P0225	13J-43
			Depress the accelerator pedal gradually.	Voltage decreases in response to the pedal depression.		
			Depress the accelerator pedal fully.	400 – 600 mV		
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 25	13J-91
18	Cranking signal (Ignition switch – ST)	Transmission: Neutral (A/T: P range)	Engine: Stopped	OFF	Procedure No. 28	13J-94
			Engine: Cranking	ON		
21	Engine coolant temperature sensor	Ignition switch: ON	Engine coolant temperature: –20°C	–20°C	Code No. P0115	13J-18
			Engine coolant temperature: 0°C	0°C		
			Engine coolant temperature: 20°C	20°C		
			Engine coolant temperature: 40°C	40°C		
			Engine coolant temperature: 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	13J-47
		- Engine: Idling - Accelerator pedal position switch: ON	Engine coolant temperature: –20°C	1,200 – 1,400 r/min		
			Engine coolant temperature: 0°C	1,100 – 1,300 r/min		
			Engine coolant temperature: 20°C	1,000 – 1,200 r/min		
			Engine coolant temperature: 40°C	900 – 1,100 r/min		
			Engine coolant temperature: 80°C	550 – 650 <M/T> r/min*1 600 – 700 <A/T> r/min*1		
24	Vehicle speed sensor	Drive at 40 km/h		Approximately 40 km/h	Code No. P0500	13J-57

Item No.	Check items	Requirements		Normal condition	Inspection procedure No.	Reference page
25	Barometric pressure sensor	Ignition switch: ON	Altitude: 0 m	101 kPa	Code No. P0105	13J-15
			Altitude: 600 m	95 kPa		
			Altitude: 1,200 m	88 kPa		
			Altitude: 1,800 m	81 kPa		
26	Accelerator pedal position switch	Ignition switch: ON (Depress and release the accelerator pedal several times)	Release the accelerator pedal.	ON	Procedure No. 29	13J-95
			Depress the accelerator pedal slightly.	OFF		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 31	13J-97
			Steering wheel turning	ON		
28	A/C switch	Engine: Idling (The A/C compressor is running when the A/C switch is on.)	A/C switch: OFF	OFF	Procedure No. 32	13J-97
			A/C switch: ON	ON		
31	Small lamp switch	Engine: Idling	Lighting switch: OFF	OFF	Procedure No. 35	13J-99
			Lighting switch: ON	ON		
34	Air flow sensor reset signal	Engine: After having warmed up	Engine is idling	ON	Code No. P0100	13J-17
			3,000 r/min	OFF		
37	Volumetric efficiency	- Engine coolant temperature: 80 – 95°C - Lamps, electric cooling fan and all accessories: OFF - Transmission: Neutral (A/T: P range)	Engine is idling	15 – 35 %	–	–
			2,500 r/min	15 – 35 %		
			Engine is suddenly raced	Volumetric efficiency increases in response to racing		
38	Crank angle sensor	- Engine: Cranking [reading is possible at 2,000 r/min or less] - Tachometer: Connected	Engine speeds displayed on the MUT-II and tachometer are identical.		–	–

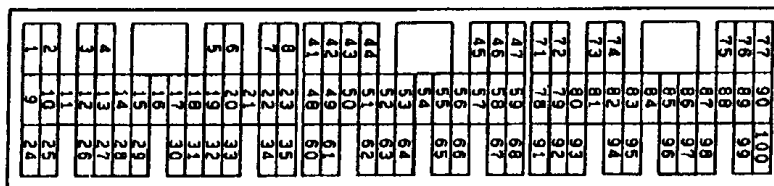
Item No.	Check items	Requirements	Normal condition	Inspection procedure No.	Reference page
41	Injector drive time*2	- Engine coolant temperature: 80 – 95°C - Lamps, electric cooling fan and all accessories: OFF - Transmission: Neutral (A/T: P range)	Idling	0.5 – 0.7 ms*1	–
			2,500 r/min	0.6 – 0.8 ms	
			Sudden racing	Increases	
44	Ignition advance	- Engine: After warm-up - Set a timing light.	Idling	12 – 20° BTDC*1	Code No. P0300
			2,500 r/min	20 – 40° BTDC	
48	M/T oil temperature sensor	Drive after the engine has warmed up.	Drive for 15 minutes or more	Gradually increases to 50 – 90°C	Procedure No. 33
49	A/C relay	Engine: After warm-up, idling	A/C switch: OFF	OFF (compressor clutch is not operating)	Procedure No. 32
			A/C switch: ON	ON (compressor clutch is operating)	
59	Oxygen sensor (rear)	- Transmission: 2nd gear (A/T: L range) - Drive with throttle widely open	3,500 r/min	600 – 1,000 mV	Code No. P0136
66	Brake vacuum sensor	- Engine coolant temperature: 80 – 95°C - Lamps, electric cooling fan and all accessories: OFF - Transmission: Neutral (A/T: P range)	Stop the engine from idling speed, and then depress the brake pedal several times with the ignition switch on.	Displayed pressure increases.	Code No. P1515
67	Stop lamp switch	Ignition switch: ON	Brake pedal: Depressed	OFF	Procedure No. 34
			Brake pedal: Released	ON	
68	EGR valve	- Engine coolant temperature: 80 – 95°C - Lamps, electric cooling fan and all accessories: OFF - Transmission: Neutral (A/T: P range)	Idling	2 – 20 STEP	Code No. P0403
			2,500 r/min	0 – 10 STEP	

Item No.	Check items	Requirements		Normal condition	Inspection procedure No.	Reference page
74	Fuel pressure sensor	- Engine coolant temperature: 80 – 95°C - Lamps, electric cooling fan and all accessories: OFF - Transmission: Neutral (A/T: P range)	Engine: Idling	4 – 6.9 MPa	Code No. P0190	13J-33
77	Accelerator pedal position sensor (2nd channel)*3	Ignition switch: ON	Release the accelerator pedal.	985 – 1,085 mV	Code No. P1225	13J-62
			Depress the accelerator pedal gradually.	Increases in response to the pedal depression stroke.		
			Depress the accelerator pedal fully.	4,000 mV or more		
78	Accelerator pedal position sensor (1st channel)*3	Ignition switch: ON	Release the accelerator pedal.	985 – 1,085 mV	Code No. P0220	13J-40
			Depress the accelerator pedal gradually.	Increases in response to pedal depression stroke.		
			Depress the accelerator pedal fully.	4,000 mV or more		
79	Throttle position sensor (1st channel)	- Engine coolant temperature: 80 – 95°C - Ignition switch: ON (Engine stopped)	Release the accelerator pedal.	450 – 800 mV	Code No. P0120	13J-21
			Depress the accelerator pedal gradually.	Increases in response to pedal depression stroke.		
			Depress the accelerator pedal fully.	4,200 – 4,900 mV		
		Engine: After warm-up, idling	No load	450 – 1,000 mV		
			A/C switch: OFF → ON	Increases by 100 – 600 mV.		
81	Long-term fuel compensation	Engine: Warm, 2,500 r/min without any load (during closed loop)		-12.5 – 12.5 %	Code No. P0170	13J-31
82	Short-term fuel compensation	Engine: Warm, 2,500 r/min without any load (during closed loop)		-30 – 25 %	Code No. P0170	13J-31

Item No.	Check items	Requirements	Normal condition	Inspection procedure No.	Reference page
85	Fuel pressure sensor	- Engine coolant temperature: 80 – 95°C - Lamps, electric cooling fan and all accessories: OFF - Transmission: Neutral (A/T: P range)	Engine: Idling 4,000 – 6,900 kPa	–	–
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	13J-23
			When engine is suddenly raced Open loop – drive condition		
99	Fuel injection mode	Engine: After warm up	Idling (after four minutes or more have passed since engine start) Lean compression	–	–
			2,500 r/min Stoichiometric metric feedback		
			Sudden racing after idle position Open loop		
A1	Oxygen sensor (front)	Engine: After warm-up	Idling 0 V	Code No. P0130	13J-25
			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 (rear)	- 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	13J-28
8A	Throttle position sensor (1st channel) (Throttle valve opening angle)	- Engine coolant temperature: 80 – 95°C - Ignition switch: ON (Engine: stopped)	Release the accelerator pedal. 8 – 16 %	Code No. P0120	13J-21
			Depress the accelerator pedal gradually. Increase in response to pedal depression stroke.		
			Depress the accelerator pedal fully. 80 – 100 %		
		Engine: After warm-up, idling	No load 8 – 18 %		
			A/C switch: OFF → ON Rises by 2 – 10 %		

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	13J-34
02		Cut fuel to No. 2 injector			Code No. P0202	13J-36
03		Cut fuel to No. 3 injector			Code No. P0203	13J-37
04		Cut fuel to No. 4 injector			Code No. P0204	13J-38
07	Fuel pump (low pressure)	Fuel pump operates and fuel is recirculated.	Ignition switch: ON	Sound of operation is heard.	Procedure No. 30	13J-96
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	13J-56
17	Basic ignition timing	Set the engine-ECU <M/T> or engine-A/T-ECU <A/T> to ignition timing adjustment mode	Idling after engine warm up	5°BTDC	-	-
21	Fan controller	Drive the fan motor	Ignition switch: ON	The fan motor operates	Procedure No. 21	13J-88
34	Electronic-controlled throttle valve system	Stop the throttle control servo.	Ignition switch: ON	Throttle valve is opened slightly.	Code No. P1220	13J-58

CHECK AT THE ENGINE-ECU TERMINALS <M/T>**TERMINAL VOLTAGE CHECK CHART****Engine-ECU Connector Terminal Arrangement**

7FU2119

Terminal No.	Check item	Check requirements (engine condition)		Normal condition
1	No. 1 injector	Engine: Warm up, and then depress the accelerator pedal suddenly from the idle speed.		Decreases slightly for short time from 9 – 13 V
9	No. 2 injector			
24	No. 3 injector			
2	No. 4 injector			
3	No. 1 ignition coil	Engine: 3,000 r/min		0.3 – 3.0 V
13	No. 2 ignition coil			
12	No. 3 ignition coil			
4	No. 4 ignition coil			
5	EGR valve (D)	Ignition switch: Immediately after turning ON		5 – 8 V (fluctuates for approx. three seconds)
6	EGR valve (C)			
32	EGR valve (B)			
34	EGR valve (A)			
8	Alternator G terminal	- Engine: Warm up, and then idling - Radiator fan: Not operating - Headlamp: OFF → ON - Stop lamp: OFF → ON - Rear defogger switch: OFF → ON		Voltage increases by 0.2 – 3.5 V
14	GDI ECO indication lamp	Ignition switch: OFF → ON		0 – 3 V (System voltage after five seconds)
		Engine: When the accelerator pedal is suddenly depressed while the engine is idling		System voltage
16	Purge control solenoid valve	- Engine coolant temperature: 80 – 95°C - Ignition switch: ON	Engine: Stopped	System voltage
			Engine: Start the engine, and then increase engine speed up to 3,500 r/min.	Voltage decreases

Terminal No.	Check item	Check requirements (engine condition)		Normal condition
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 (Engine coolant temperature is 105°C or more)		0 – 3 V
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
20	A/C relay	- Engine: Idling - A/C switch: OFF → ON (Compressor is operating)		System voltage, or changes from momentarily 6 V or more to 0 → 3 V
21	Fuel pump relay	Ignition switch: ON	Engine: Stopped	System voltage
			Engine: Idling	0 – 3 V
31	Engine warning lamp	Ignition switch: OFF → ON		0 – 3 V → System voltage (after several seconds)
41	Sensor power supply	Ignition switch: ON		4.5 – 5.5 V
42	Power supply to accelerator pedal position sensor (1st channel)	Ignition switch: ON		4.5 – 5.5 V
43	Crank angle sensor	Engine: Cranking		0.4 – 4.0 V
		Engine: Idling		1.5 – 2.5 V
44	Engine coolant temperature sensor	Ignition switch: ON	Engine coolant temperature: 0°C	3.2 – 3.5 V
			Engine coolant temperature: 20°C	2.3 – 2.9 V
			Engine coolant temperature: 40°C	1.5 – 2.1 V
			Engine coolant temperature: 80°C	0.4 – 1.0 V
45	Engine ignition signal	Engine: 3,000 r/min		0.3 – 3.0 V
47	Power supply	Ignition switch: ON		System voltage
59				
50	Camshaft position sensor	Engine: Cranking		0.4 – 3.0 V
		Engine: Idling		0.5 – 2.0 V

Terminal No.	Check item	Check requirements (engine condition)		Normal condition
51	Barometric pressure sensor	Ignition switch: ON	Altitude: 0 m	3.7 – 4.3 V
			Altitude: 1,200 m	3.2 – 3.8 V
52	Alternator FR terminal	- Engine: Warm up, and then idling - Radiator fan: Not operating - Headlamp: OFF → ON - Stop lamp: OFF → ON - Rear defogger: OFF → ON		Voltage decreases
53	Oxygen sensor (rear)	- Transmission: 2nd gear - Engine speed: 3,500 r/min or more - Driving with the throttle valve widely open		0.6 – 1.0 V
54	Power steering fluid pressure switch	Engine: Warm up, and then idling	Steering wheel stationary	System voltage
			Steering wheel turning	0 – 3 V
55	Injector driver relay	Ignition switch: OFF		0 – 0.1 V
		Ignition switch: ON		0.5 – 1.0 V
56	Throttle valve control servo relay	Ignition switch: OFF		0 – 0.3 V
		Ignition switch: ON		0.5 – 1.0 V
57	Engine control relay	Ignition switch: OFF		0 – 3 V
		Ignition switch: ON		System voltage
60	Back-up power source	Ignition switch: OFF		System voltage
61	Air flow sensor	Engine: Idling		2.2 – 3.2 V
		Engine: 2,500 r/min		
62	Intake air temperature sensor	Ignition switch: ON	Intake air temperature: 0°C	3.2 – 3.8 V
			Intake air temperature: 20°C	2.3 – 2.9 V
			Intake air temperature: 40°C	1.5 – 2.1 V
			Intake air temperature: 80°C	0.4 – 1.0 V
63	Stop lamp switch	Depress the brake pedal.		System voltage
		Release the brake pedal.		0 – 3 V
65	A/C switch (2nd channel)	Refer to GROUP 55 – Troubleshooting “Check at the A/C-ECU terminal, engine-ECU output terminals.”		
66	Clutch switch	Depress the clutch pedal.		0 – 3 V
		Release the clutch pedal.		System voltage
68	Ignition switch-ST	Engine: Cranking		8 V or more

Terminal No.	Check item	Check requirements (engine condition)		Normal condition
71	Oxygen sensor (front)	Engine: Warm up, and then hold the engine speed at 2,500 r/min (Use a digital voltmeter).		0 ↔ 0.8 V alternates.
73	M/T oil temperature sensor	M/T oil temperature: 25°C		2.4 – 2.7 V
		M/T oil temperature: 80°C		0.5 – 0.8 V
74	Brake vacuum sensor	Engine: Stop the engine from idle speed, turn the ignition switch ON, and then depress the brake pedal several times.		Voltage increases
76	Air flow sensor reset signal	Engine: Idling		0 – 1 V
		Engine: 3,000 r/min		6 – 9 V
78	Throttle position sensor (2nd channel)	Ignition switch: ON	Release the accelerator pedal.	4.5 – 5.5 V
			Depress the accelerator pedal fully.	0.4 – 0.6 V
79	Accelerator pedal position switch	Ignition switch: ON	Release the accelerator pedal.	0 – 1 V
			Depress the accelerator pedal fully.	4 V or more
80	Vehicle speed sensor	- Ignition switch: ON - Move the vehicle forward.		0 ↔ system voltage alternates.
83	A/C switch (1st channel)	Engine: Idling	A/C switch: OFF	0 – 3 V
			A/C switch: ON (Compressor is operating)	System voltage
88	Small lamp switch	Lighting switch: OFF		0 – 3 V
		Lighting switch: ON (Taillamp: ON)		System voltage
89	Oxygen sensor heater (front)	Engine: Idling		0 – 3 V
		Engine: 3,500 r/min		System voltage
90	Oxygen sensor heater (rear)	Engine: Idling		0 – 3 V
		Engine: 3,500 r/min		System voltage
92	Fuel pressure sensor	Engine: Idling		0.3 – 4.7 V
94	Accelerator pedal position sensor (1st channel)	Ignition switch: ON	Release the accelerator pedal.	0.985 – 1.085 V*1
			Depress the accelerator pedal fully.	4 V or more*2
96	Injector open circuit check signal	Engine: Increase engine speed from idle speed to 4,000 r/min.		Decreases slightly (approx. 0.7 V) from 4.5 V – 5.0 V.

Terminal No.	Check item	Check requirements (engine condition)	Normal condition
99	Ignition switch-IG	Ignition switch: ON	System voltage

NOTE

Check if the difference in output between *1 and *2 is 4 V or more.

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

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

NOTE

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

Caution

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

Be careful to prevent this!

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

Engine-ECU Harness Side Connector Terminal Arrangement

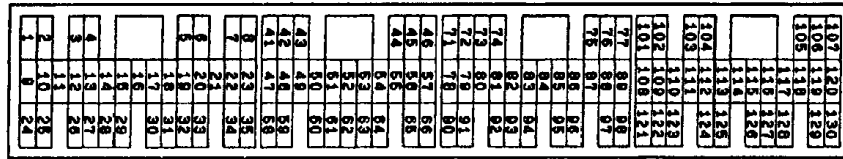
75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

7FU2120

Terminal No.	Check item	Standard value, normal condition (check requirements)
5 – 47	EGR valve (D)	15 – 20 Ω (at 20°C)
6 – 47	EGR valve (C)	
32 – 47	EGR valve (B)	
34 – 47	EGR valve (A)	
16 – 47	Purge control solenoid valve	36 – 44 Ω (at 20°C)
35 – 72	Catalyst temperature sensor <M/T>	1 M Ω or more (at 20°C)
44 – 72	Engine coolant temperature sensor	5.1 – 6.5 k Ω (when engine coolant temperature is 0°C)
		2.1 – 2.7 k Ω (when engine coolant temperature is 20°C)
		0.9 – 1.3 k Ω (when engine coolant temperature is 40°C)
		0.26 – 0.36 k Ω (when engine coolant temperature is 80°C)
46 – Body earth	Earth	Continuity (0 Ω)
58 – Body earth		
62 – 72	Intake air temperature sensor	5.3 – 6.7 k Ω (when intake air temperature is 0°C)
		2.3 – 3.0 k Ω (when intake air temperature is 20°C)
		1.0 – 1.5 k Ω (when intake air temperature is 40°C)
		0.30 – 0.42 k Ω (when intake air temperature is 80°C)
79 – 49	Accelerator pedal position switch	Continuity (when the accelerator pedal is released)
		No continuity (when the accelerator pedal is slightly depressed)
89 – 47	Oxygen sensor heater control (front)	4.5 – 8.0 Ω (at 20°C)
90 – 47	Oxygen sensor heater (rear)	11 – 18 Ω (at 20°C)

CHECK AT THE ENGINE-A/T-ECU TERMINALS <A/T>**TERMINAL VOLTAGE CHECK CHART**

Engine-A/T-ECU Connector Terminal Arrangement



7FU1763

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No. 1 injector	While engine is idling after having warmed up, suddenly depress the accelerator pedal.	From 9 – 13 V, momentarily drops slightly
9	No. 2 injector		
24	No. 3 injector		
2	No. 4 injector		
3	Oxygen sensor heater (front)	Engine: Idling	0 – 3 V
		Engine: 3,500 r/min	System voltage
6	Injector driver relay	Ignition switch: OFF	0 – 0.1 V
		Ignition switch: ON	0.5 – 1.0 V
8	Alternator G terminal	- Engine: Idling after warming-up - Radiator fan: Not operating - Headlamp: OFF to ON - Stop lamp: OFF to ON - Defogger switch: OFF to ON	The voltage increases by 0.2 – 3.5 V
54	Alternator FR terminal	- Engine: Idling after warming-up - Radiator fan: Not operating - Headlamp: OFF to ON - Stop lamp: OFF to ON - Defogger switch: OFF to ON	The voltage drops
11	No. 1 ignition coil	Engine speed: 3,000 r/min	0.3 – 3.0 V
12	No. 2 ignition coil		
31	No. 3 ignition coil		
30	No. 4 ignition coil		
14	Throttle control servo relay	Ignition switch: OFF	0 – 0.1 V
		Ignition switch: ON	0.5 – 1.0 V
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 (Engine coolant temperature is 105°C or more)	0 – 3 V

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
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
19	Air flow sensor reset signal	Engine: Idling		0 – 1 V
		Engine speed: 3,000 r/min		6 – 9 V
20	A/C relay	- Engine: Idling - A/C switch: OFF to ON (Compressor operating)		System voltage or changes momentarily 6 V or more to 0 – 3 V
21	Fuel pump relay	Ignition switch: ON		System voltage
		Engine: Idling		0 – 3 V
22	Engine warning lamp	Ignition switch: OFF to ON		System voltage
23	GDI ECO indication lamp	Ignition switch: OFF → ON		0 – 3 V (System voltage after five seconds)
		Rev the engine suddenly.		System voltage
26	Oxygen sensor heater (rear)	Engine: Idling		0 – 3 V
		Engine: 3,500 r/min		System voltage
34	Purge control solenoid valve	- Engine coolant temperature: 80 – 95°C - Ignition switch: ON	Engine: Stopped	System voltage
			Engine: After starting, increase the engine speed up to 3,500 r/min	The voltage drops
41	Power supply	Ignition switch: ON		System voltage
47				
43	Engine ignition signal	Engine speed: 3,000 r/min		0.3 – 3.0 V
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
45	Crank angle sensor	Engine: Cranking		0.4 – 4.0 V
		Engine: Idling		1.5 – 2.5 V
46	Power supply voltage applied to accelerator pedal position sensor (1st channel)	Ignition switch: ON		4.5 – 5.5 V

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
49	Engine control relay	Ignition switch: OFF		0 – 3 V
		Ignition switch: ON		System voltage
51	EGR valve (A)	Ignition switch: OFF to ON		5 – 8 V (Repeatedly changes for approx. 3 seconds)
53	EGR valve (C)			
60	EGR valve (B)			
62	EGR valve (D)			
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
55	Barometric pressure sensor	Ignition switch: ON	At an altitude of 0 m	3.7 – 4.3 V
			At an altitude of 1,200 m	3.2 – 3.8 V
56	Camshaft position sensor	Engine: Cranking		0.4 – 3.0 V
		Engine: Idling		0.5 – 2.0 V
58	Ignition switch-ST	Engine: Cranking		8 V or more
61	A/C switch 2	Refer to GROUP 55 – Troubleshooting (Check at A/C-ECU or Engine-ECU Terminal).		
63	Injector open circuit check signal	Engine: Increases from idling up to 4,000 r/min		The voltage decreases slightly (approx. 0.7 V) from 4.5 – 5.0 V.
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
65	Air flow sensor	Engine: Idling		2.2 – 3.2 V
		Engine speed: 2,500 r/min		
66	Backup power supply	Ignition switch: OFF		System voltage
71	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warming-up (Check by using a digital voltmeter.)		Voltages of 0 V and 0.8 V alternate
73	Oxygen sensor (rear)	● Transmission: L range ● Engine speed: 3,500 r/min or more ● Driving with the throttle valve widely open		0.6 – 1.0 V

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
78	Throttle position sensor (2nd channel)	Ignition switch: ON	Release the accelerator pedal.	4.5 – 5.5 V
			Depress the accelerator pedal fully.	0.4 – 0.6 V
79	Accelerator pedal position switch	Ignition switch: ON	Release the accelerator pedal.	0 – 1 V
			Depress the accelerator pedal slightly.	4 V or more
80	Vehicle speed sensor	- Ignition switch: ON - Move the vehicle slowly forward		Voltages of 0 and 8 – 12 V alternate (changes repeatedly)
83	A/C switch 1	Engine: Idling	A/C switch: OFF	0 – 3 V
			A/C switch: ON (Compressor is operating)	System voltage
86	Small lamp switch	Lighting switch: OFF		0 – 3 V
		Lighting switch: Tail light position		System voltage
87	Sensor applied voltage	Ignition switch: ON		4.5 – 5.5 V
93	Fuel pressure sensor	Engine: Idling		0.3 – 4.7 V
95	Accelerator pedal position sensor (1st channel)	Ignition switch: ON	Release the accelerator pedal.	0.985 – 1.085 V
			Depress the accelerator pedal fully.	4.0 V or higher
96	Brake vacuum sensor	Engine: Stop the engine from idle speed, turn the ignition switch ON, and then depress the brake pedal several times.		Voltage increases
98	Ignition switch-IG	Ignition switch: ON		System voltage
123	Stop lamp switch	Depress the brake pedal.		System voltage
		Release the brake pedal.		0 – 3 V

**CHECK CHART FOR RESISTANCE AND CONTINUITY
BETWEEN TERMINALS**

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

NOTE

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

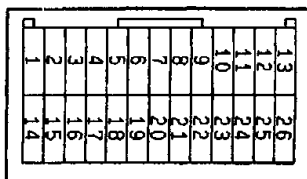
Caution

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

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

[illegible]

Terminal No.	Check item	Standard value, normal condition (check conditions)
3 - 41	Oxygen sensor heater (front)	4.5 - 8.0 Ω (at 20°C)
26 - 41	Oxygen sensor heater (rear)	11 - 18 Ω (at 20°C)
34 - 41	Purge control solenoid valve	28 - 36 Ω (at 20°C)
Between terminal 42 and body earth	Earth	Continuity (0 Ω)
Between terminal 48 and body earth		
51 - 41	EGR valve (A)	15 - 20 Ω (at 20°C)
53 - 41	EGR valve (C)	
60 - 41	EGR valve (B)	
62 - 41	EGR valve (D)	
44 - 81	Engine coolant temperature sensor	5.1 - 6.5 k Ω (When coolant temperature is 0°C)
		2.1 - 2.7 k Ω (When coolant temperature is 20°C)
		0.9 - 1.3 k Ω (When coolant temperature is 40°C)
		0.26 - 0.36 k Ω (When coolant temperature is 80°C)
64 - 81	Intake air temperature sensor	5.3 - 6.7 k Ω (When intake air temperature is 0°C)
		2.3 - 3.0 k Ω (When intake air temperature is 20°C)
		1.0 - 1.5 k Ω (When intake air temperature is 40°C)
		0.30 - 0.42 k Ω (When intake air temperature is 80°C)
79 - 81	Accelerator pedal position switch	Continuity (when the accelerator pedal is released)
		No continuity (when the accelerator pedal is depressed slightly)

CHECK AT THE THROTTLE VALVE CONTROLLER TERMINALS**TERMINAL VOLTAGE CHECK CHART****Throttle Valve Controller Terminal Arrangement**

7FU2121

Terminal No.	Check items	Requirements		Normal value
1	Throttle valve control servo (A+)	- Ignition switch: ON - Accelerator pedal: Fully opened → fully closed		Decreases slightly from system voltage.
9	Throttle valve control servo (B+)			
14	Throttle valve control servo (A-)	- Ignition switch: ON - Accelerator pedal: Fully closed → fully opened		Decreases slightly (approx. 2 V) from system voltage.
15	Throttle valve control servo (B-)			
2	Power supply to throttle valve control servo	Ignition switch: ON		System voltage
19				
5	Power supply	Ignition switch: ON		System voltage
6	Sensor voltage	Ignition switch: ON		4.5 – 5.5 V
7	Throttle position sensor (1st channel)	Ignition switch: ON	Release the accelerator pedal.	0.45 – 0.8 V
			Depress the accelerator pedal fully.	4.2 – 4.9 V
20	Accelerator pedal position sensor (2nd channel)	Ignition switch: ON	Release the accelerator pedal.	0.985 – 1.085 V*1
			Depress the accelerator pedal fully.	4 V or more*2

NOTE:

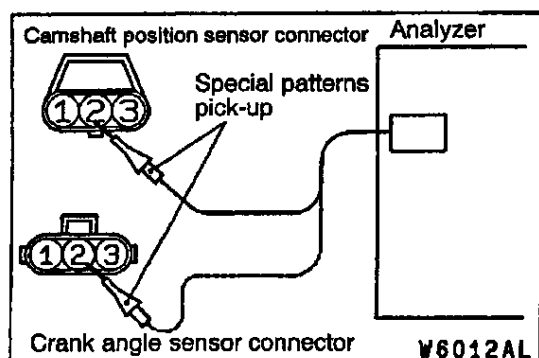
Check that the voltage difference between *1 and *2 is 4 V or more.

INSPECTION PROCEDURE USING AN ANALYZER**AIR FLOW SENSOR (AFS) <A/T>**

The followings have been changed from the previous description.

Alternate Method (Test harness not available)

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

**CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR <A/T>**

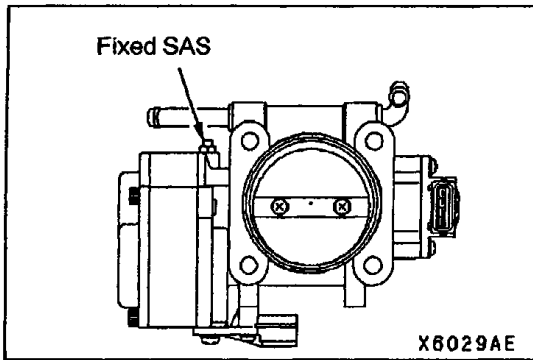
The measurement method has been changed from the previous description.

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-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.)



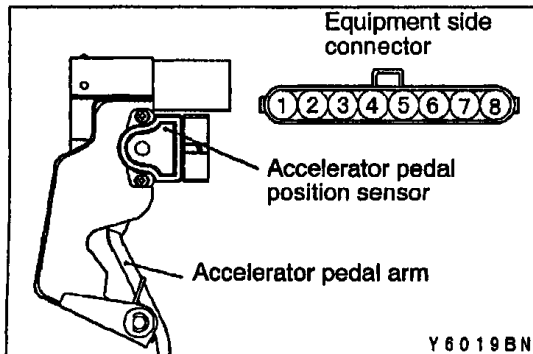
ON-VEHICLE SERVICE

Caution

- (1) Never attempt to tamper the fixed SAS. The fixed SAS is precisely adjusted at factory.
- (2) Should it be tampered, the full closed position of the throttle valve will be changed. This causes the engine-ECU <M/T> or engine-A/T-ECU <A/T> to learn a wrong position of the throttle valve.

ACCELERATOR PEDAL POSITION SENSOR ADJUSTMENT

1. The shape of the accelerator pedal position sensor connector has been changed, but the adjustment procedure is the same as before.



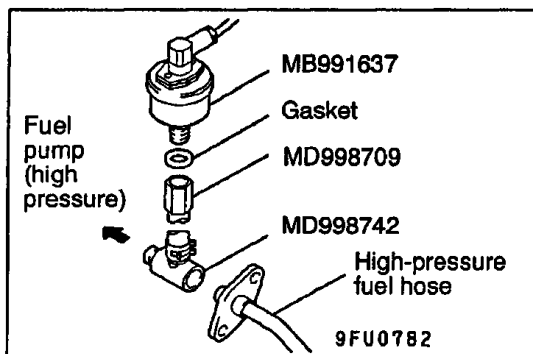
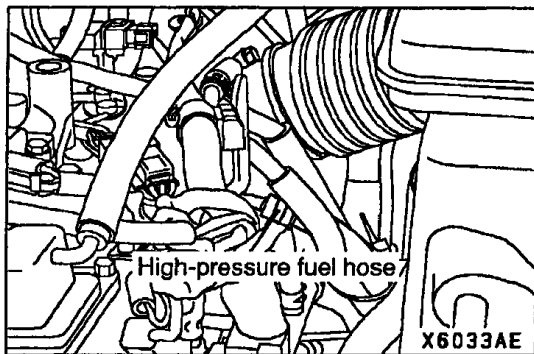
FUEL PRESSURE TEST

MEASUREMENT OF FUEL LOW PRESSURE BETWEEN FUEL PUMP (LOW PRESSURE) AND FUEL PUMP (HIGH PRESSURE)

1. Release residual pressure from the fuel pipe line to prevent fuel gush out. (Refer to P.13J-126.)
2. Disconnect the high-pressure fuel hose at the fuel pump (high pressure) side.

Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

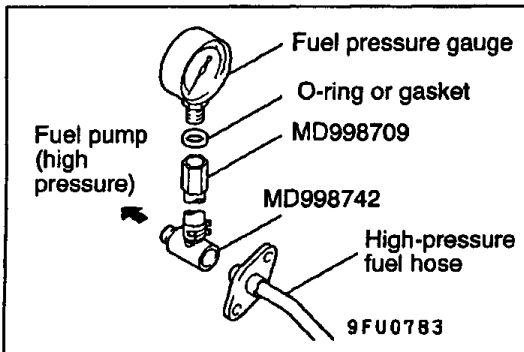


3. Remove the union joint and bolt from the special tool (adapter hose) and instead attach the special tool (hose adapter) to the adapter hose.
4. Install the special tool (for measuring the fuel pressure) that was set up in step 3.

<When using the fuel pressure gauge set (special tool)>

- (1) Install the special tool (for measuring the fuel pressure) between the high-pressure fuel hose and the fuel pump (high pressure).

- (2) Install the fuel pressure gauge set (special tool) on the special tool (for measuring the fuel pressure) putting the gasket between them.
- (3) Connect the lead wire of the fuel pressure gauge set (special tool) to the power supply (cigarette lighter socket) and to the MUT-II.



<When using the fuel pressure gauge>

- (1) Install the fuel pressure gauge on the special tool (for measuring the fuel pressure) putting a suitable O-ring or gasket between them.
- (2) Install the special tool which was set up in step (1) between the high-pressure fuel hose and the fuel pump (high pressure).

5. Connect the MUT-II to the diagnosis connector.

Caution

Turn off the Ignition switch before disconnecting or connecting the MUT-II.

6. Turn the ignition switch to ON. (But do not start the engine.)
7. Select "Item No. 07" from the MUT-II Actuator test to drive the fuel pump (low pressure) at the fuel tank side. Check that there are no fuel leaks from any parts.
8. Finish the actuator test or turn the ignition switch to OFF.
9. Start the engine and run at idle.
10. Measure fuel pressure while the engine is running at idle.

Standard value: approximately 324 kPa

11. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
12. If fuel pressure is out of the standard value, troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
• Fuel pressure too low • Fuel pressure drops after racing	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel pressure regulator (low pressure) valve seating or settled spring	Replace fuel pressure regulator (low pressure)
	Low fuel pump (low pressure) delivery pressure	Replace the fuel pump (low pressure)
Fuel pressure too high	Binding valve in fuel pressure regulator (low pressure)	Replace fuel pressure regulator (low pressure)
	Clogged fuel return hose or pipe	Clean or replace hose or pipe

13. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
Fuel pressure drops gradually after engine is stopped	Leaky fuel pressure regulator (low pressure) valve seat	Replace fuel pressure regulator (low pressure)
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump (low pressure) is held open	Replace the fuel pump (low pressure)

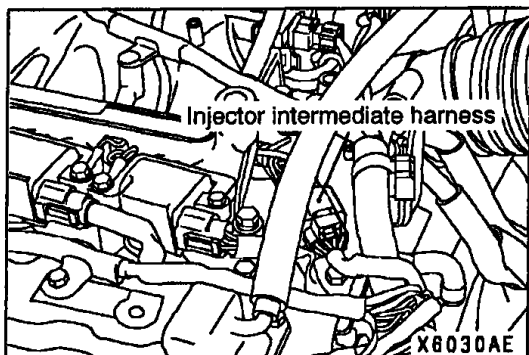
14. Release residual pressure from the fuel pipe line. (Refer to P.13J-126.)

15. Remove the fuel pressure gauge and special tools from the fuel pump (high pressure).

Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

16. Replace the O-ring at the end of the high-pressure fuel hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.
17. Fit the high-pressure fuel hose to the fuel pump (high pressure) and tighten the mounting bolt to specified torque.
18. Check for any fuel leaks by following the procedure in step 7.
19. Disconnect the MUT-II.



MEASUREMENT OF FUEL HIGH PRESSURE BETWEEN FUEL PUMP (HIGH PRESSURE) AND INJECTORS

NOTE

Measurement of the fuel pressure between the fuel pump (high pressure) and the injectors should be carried out after checking that the fuel pressure between the fuel pump (low pressure) and the fuel pump (high pressure) is normal.

1. Connect the MUT-II to the diagnosis connector.
2. Disconnect the injector intermediate harness connector.
3. Turn the ignition switch to ON.
4. Select "Item No. 74" from the MUT-II Data list.
5. Crank the engine continuously for 2 seconds or more, and visually check that there are no fuel leaks from any parts.

Caution

If any fuel leaks appear, stop cranking immediately and repair the source of the leak.

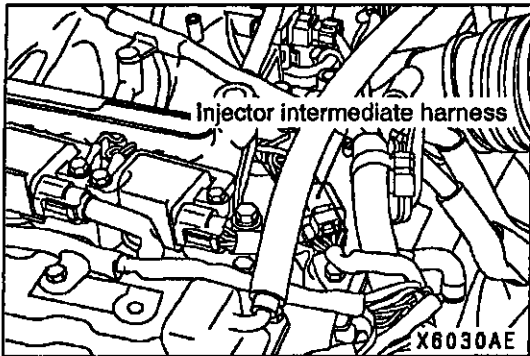
6. Check if the fuel pressure is more than 1 MPa immediately after 20 seconds have passed since cranking was finished.
7. If the fuel pressure is lower than 1 MPa, it means that there is likely to be a leak in the high-pressure fuel system, so this system should be checked.
8. Turn the ignition switch to OFF.
9. Connect the injector intermediate harness connector.
10. Start the engine and run at idle.
11. Measure fuel pressure while the engine is running at idle.

Standard value: 4 – 6.9 MPa

12. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
13. If fuel pressure is out of the standard value, troubleshoot and repair according to the table below.

Symptom	Probable cause	Remedy
● Fuel pressure too low ● Fuel pressure drops after racing	Fuel leaking to return side due to poor fuel pressure regulator valve seating or settled spring in the fuel pump (high pressure).	Replace fuel pump (high pressure)
	Low fuel pump (high pressure) delivery pressure	Replace the fuel pump (high pressure)
Fuel pressure too high	Clogged fuel pressure regulator valve in the fuel pump (high pressure)	Replace fuel pump (high pressure)
	Clogged fuel return hose or pipe	Clean or replace hose or pipe

14. Stop the engine and turn the ignition switch to OFF.
15. Disconnect the MUT-II.



FUEL LEAK CHECK

1. Connect the MUT-II to the diagnosis connector.
2. Disconnect the injector intermediate harness connector.
3. Turn the ignition switch to ON.
4. Select "Item No. 74" from the MUT-II Data list.
5. Crank the engine continuously for two seconds or more, and visually check that there are no fuel leaks from any parts.

Caution

If any fuel leaks appear, stop cranking immediately and repair the source of the leak.

6. Crank the engine, and then measure fuel pressure immediately after 20 seconds.

Limit: Minimum 1 MPa

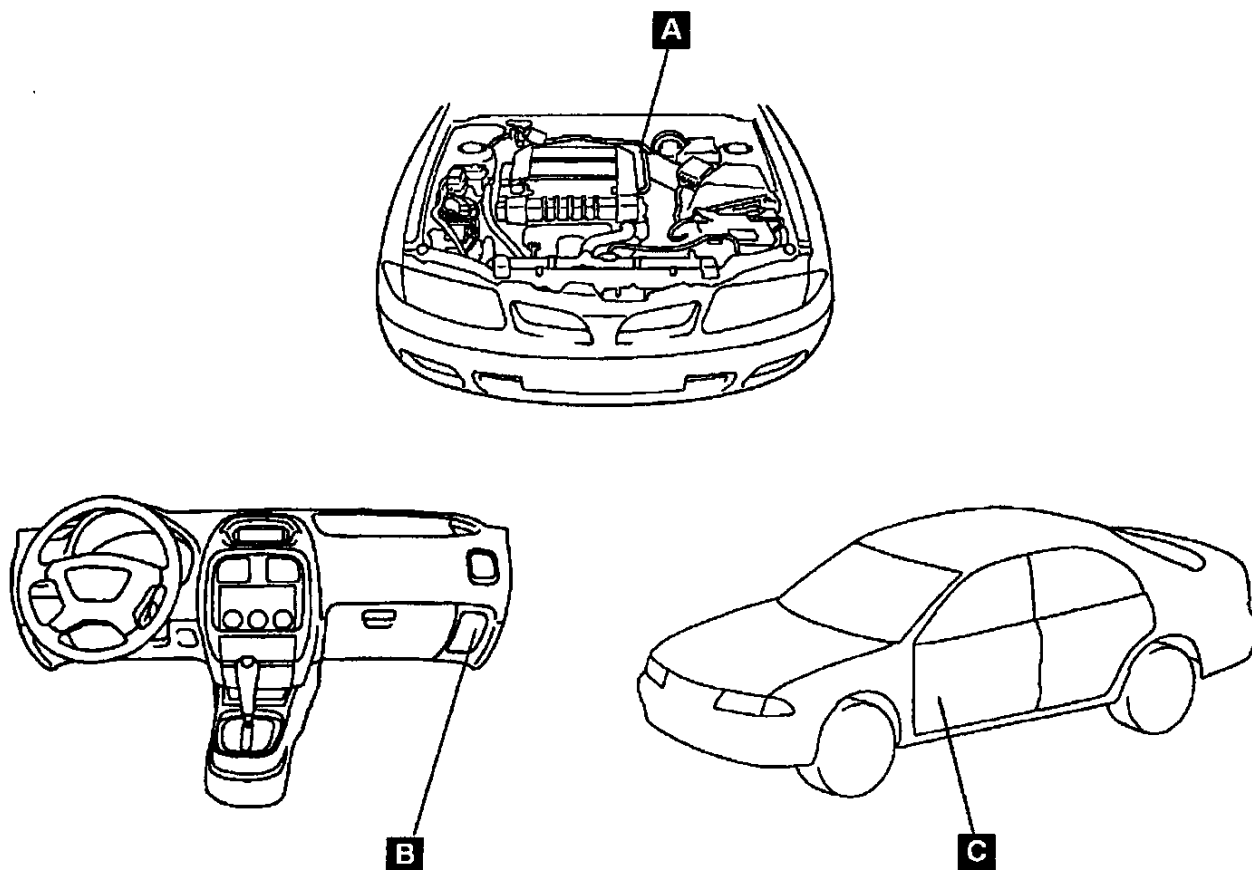
Caution

If the fuel pressure is less than 1 MPa, there may be a partial fuel leak in the high-pressure fuel system.

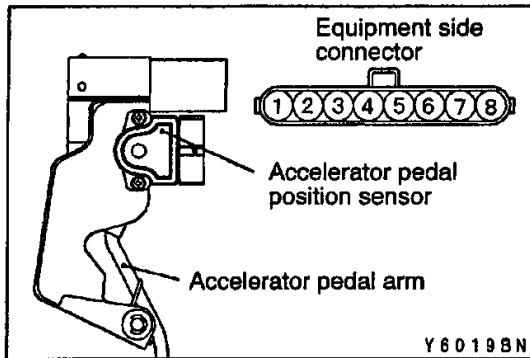
7. Turn off the ignition switch.
8. Reconnect the injector intermediate connector.
9. Remove the MUT-II.

COMPONENT LOCATION

Name	Symbol	Name	Symbol
Catalyst temperature sensor <M/T>	C	Ignition failure sensor	A
Engine-A/T-ECU <A/T>	B		

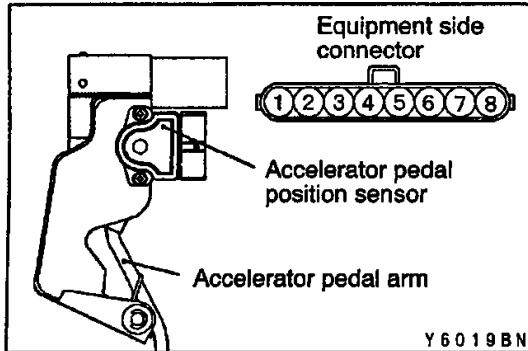


Y6020BN



ACCELERATOR PEDAL POSITION SENSOR (1ST AND 2ND CHANNELS) CHECK

1. The shape of the accelerator pedal position sensor connector has been changed, but the inspection procedure is the same as before.



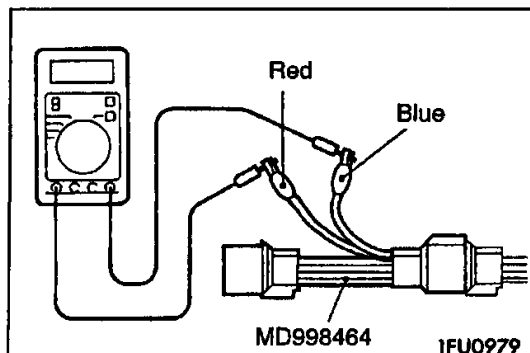
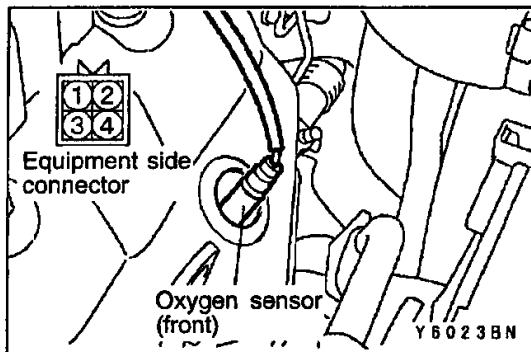
ACCELERATOR PEDAL POSITION SWITCH CHECK

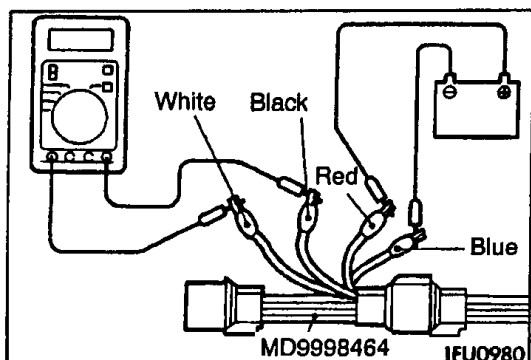
1. The shape of the accelerator pedal position sensor connector has been changed, but the inspection procedure is the same as before.

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 ($4.5 - 8.0 \Omega$ 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.

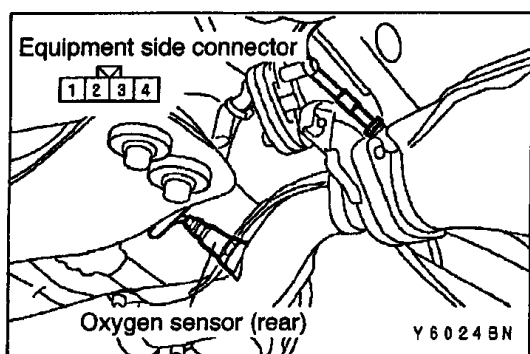
Standard value:

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.

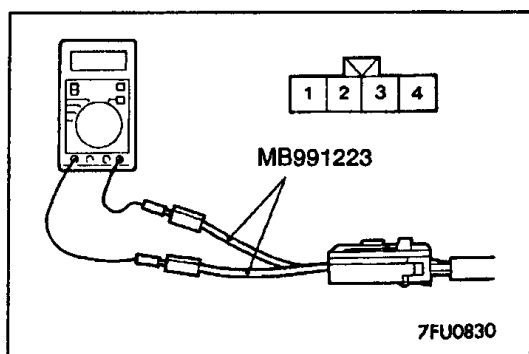


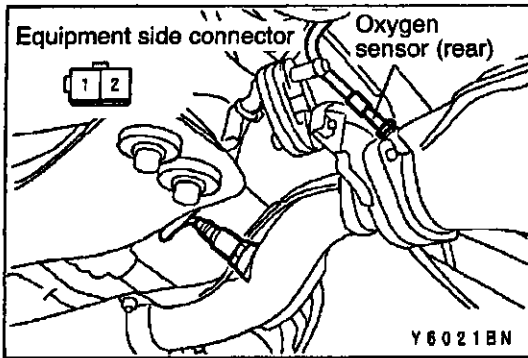
<Oxygen sensor (rear)>

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 3 and terminal 4 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.

NOTE

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





CATALYST TEMPERATURE SENSOR CHECK <M/T>

1. Disconnect the sensor connector.
2. Measure the resistance between the sensor-side connector terminals.

Standard value: 1 M Ω or more (at 20°C)

NOTE

The resistance should be approx. 77 k Ω when the sensor temperature reaches 400°C.

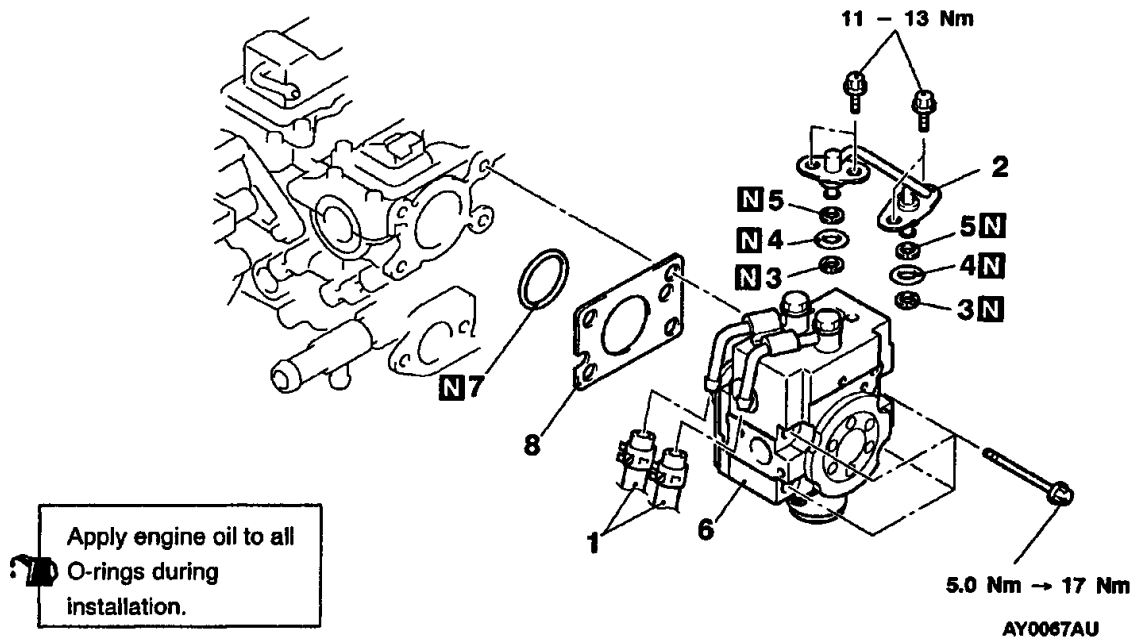
3. If significantly out of the standard value, replace the catalyst temperature sensor.

FUEL PUMP (HIGH PRESSURE)

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

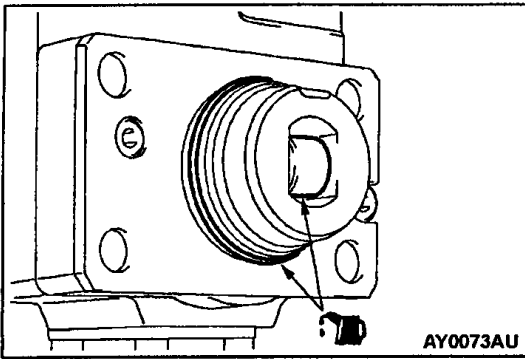
- Engine Cover Removal and Installation
(Refer to GROUP 11A - Camshaft, Camshaft Oil Seal.)
- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Air Cleaner Assembly Removal and Installation
- Throttle Body Remove and Installation
(Refer to P.13J-138.)
- Intake Manifold Removal and Installation
(Refer to GROUP 15.)



Removal steps

- ▶D◀ • Air bleeding the high-pressure fuel path
- ▶C◀ 1. Fuel return hoses connection
- ▶B◀ 2. Fuel pipe
- ▶B◀ 3. Back-up ring A

- ▶B◀ 4. O-ring
- ▶B◀ 5. Back-up ring B
- ▶A◀ 6. Fuel pump (high pressure)
- 7. O-ring
- 8. Insulator



INSTALLATION SERVICE POINTS

►A◀ FUEL PUMP (HIGH PRESSURE) INSTALLATION

1. Apply a small amount of fresh engine oil to the fuel pump (high pressure) roller and O-ring.
2. Insert the fuel pump (high pressure) to the cylinder head ports squarely, and then tighten the mounting bolts temporarily (a little more tightly than finger-tightening). Tightening them to the specified torque should be carried out in later step ►B◀.

►B◀ BACK-UP RING B/O-RING/BACK-UP RING A/FUEL PIPE INSTALLATION

1. Install the back-up rings and the O-ring as shown in the illustration.

Caution

(1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.

(2) Confirm the outer diameter of the back-up ring A. Take care not to install the back-up ring for the fuel pressure sensor by mistake. (Outer diameter of the back-up ring A: 14.8 mm)

2. Apply a small amount of fresh engine oil to the O-ring.

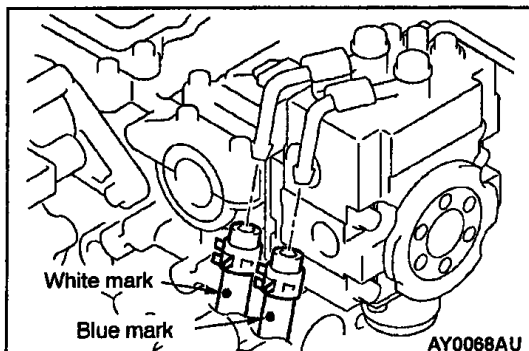
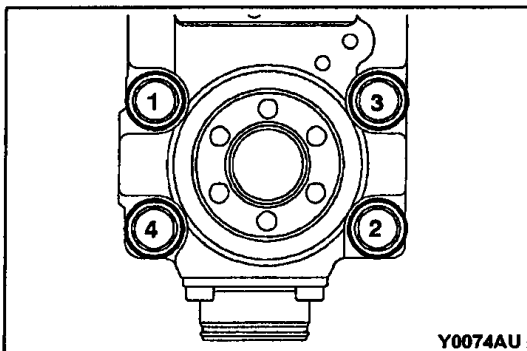
Caution

Take care not to let any of the engine oil get inside the fuel pump (high-pressure) or the delivery pipe assembly.

3. Install the fuel pipe into the fuel pump (high pressure) and the delivery pipe ports squarely. Insert the pipe securely, being careful not to twisting it, and then tighten the mounting bolts to the specified torque.

Tightening torque: 11 – 13 Nm

4. Tighten the temporarily tightened mounting bolts of the fuel pump (high pressure) in shown order to 5.0 Nm.
5. Tighten the bolts to 17 Nm in the order shown in the illustration. The overall difference in tightening torque between the four bolts should be within 2 Nm.



►C◀ FUEL RETURN HOSES INSTALLATION

Install the fuel return hoses so that the identification mark of fuel return hoses comes to the illustrated position.

►D◄ AIR BLEEDING THE HIGH-PRESSURE FUEL PATH

1. Air-bleed the high-pressure fuel path with the engine running at 2000 r/min for 15 seconds or more.

NOTE

- When the air is trapped into the high-pressure fuel path due to the fuel pipe removal, an abnormality in the fuel pressure causes the output of diagnosis code No. 56.
2. If diagnosis code No. 56 at the fuel pressure sensor system is output after the diagnosis code is confirmed by MUT-II, the code will be erased.

FUEL INJECTOR

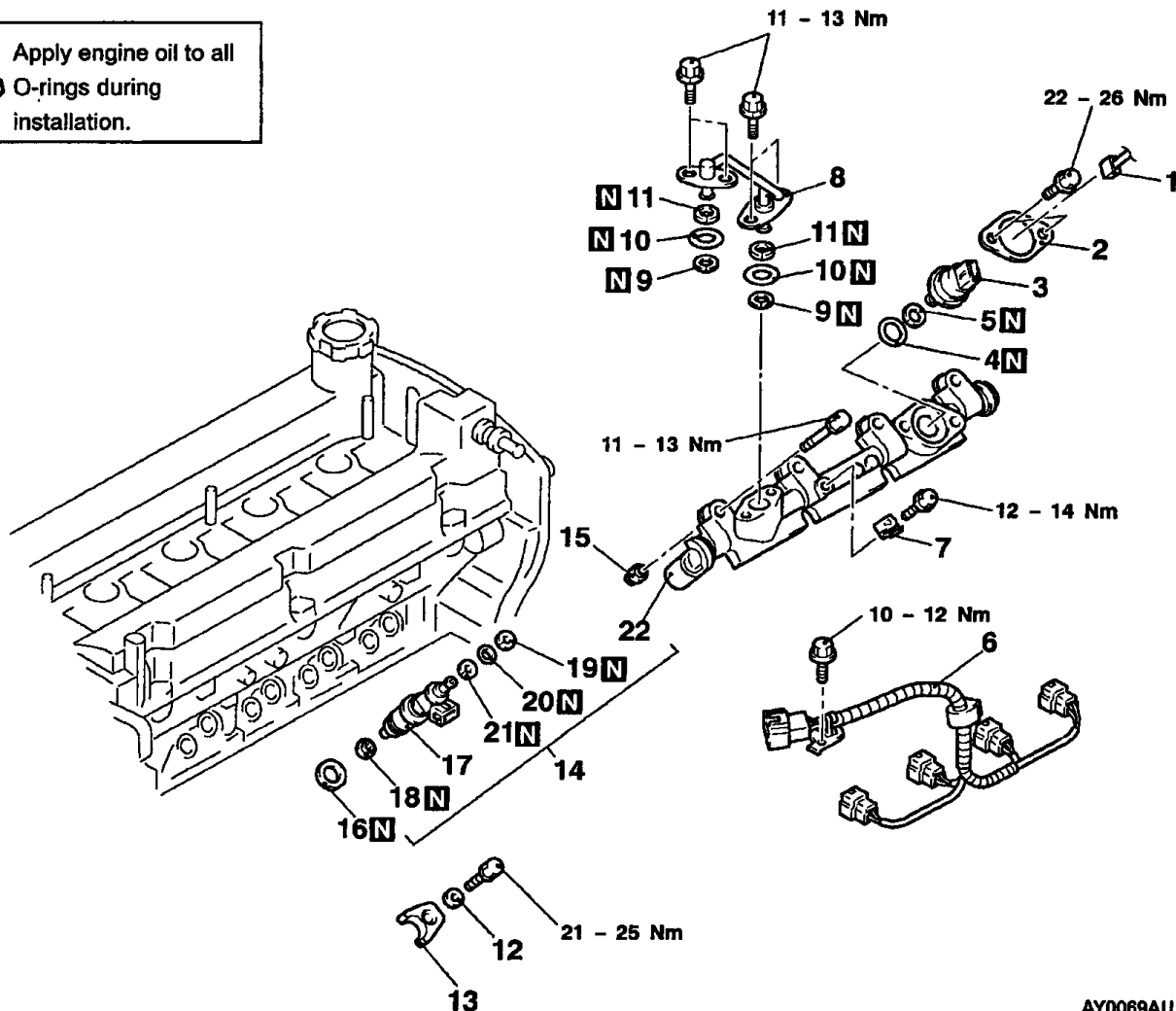
REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Cover Removal and Installation (Refer to GROUP 11A – Camshaft, Camshaft Oil Seal.)
- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Air bleeding the high-pressure fuel path <after installation only> (Refer to P.13J-133.)



Apply engine oil to all O-rings during installation.



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Fuel pressure sensor removal steps

◀A▶

 ▶E▶
 ▶E▶
 ▶D▶
 ▶D▶

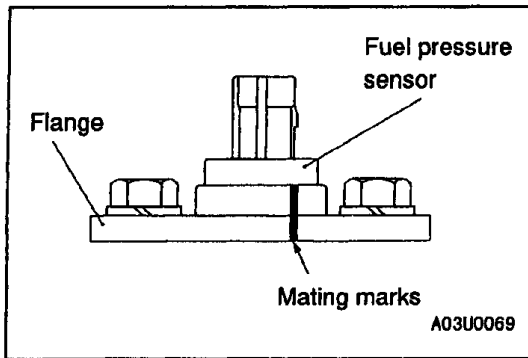
1. Fuel pressure sensor connector
2. Flange
3. Fuel pressure sensor
4. O-ring
5. Back-up ring

Fuel Injector removal steps

- Air cleaner
- Throttle body (Refer to P.13J-138.)
- Intake manifold (Refer to GROUP 15.)
- 6. Injector harness
- 7. Injector harness support bracket
- ▶C▶ 8. Fuel pipe

◀B▶

▶C▶	9. Back-up ring A
▶C▶	10. O-ring
▶C▶	11. Back-up ring B
▶B▶	12. Injector washer
▶B▶	13. Injector holder
▶B▶	14. Delivery pipe and fuel injector assembly
▶B▶	15. Insulator
▶B▶	16. Injector gasket
▶B▶	17. Fuel injector
▶A▶	18. Corrugated washer
▶A▶	19. Back-up ring A
▶A▶	20. O-ring
▶A▶	21. Back-up ring B
▶A▶	22. Delivery pipe



REMOVAL SERVICE POINTS

◀A▶ FLANGE REMOVAL

If the fuel pressure sensor is reused, make mating marks on the sensor and the flange.

NOTE

The flange secures sealing performance of fuel pressure sensor and installation rigidity by bending to deform the shape at installation. Therefore, make mating marks to install the flange with the right phase and side. In addition, If the fuel pressure sensor is replaced with a new one, replace it together with the flange as a set.

◀B▶ DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY REMOVAL

Remove the delivery pipe with the fuel injector assembly still attached.

Caution

Be careful not to drop the fuel injector assembly when removing the delivery pipe.

INSTALLATION SERVICE POINTS

▶A◀ BACK-UP RING B/O-RING/BACK-UP RING A /CORRUGATED WASHER INSTALLATION

1. Install the back-up rings and the O-ring as shown in the illustration.

Caution

(1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.

(2) Confirm the outer diameter of the back-up ring A. Take care not to install the back-up ring for the fuel pressure sensor by mistake. (Outer diameter of the back-up ring A: 14.8 mm)

2. Apply petroleum jelly to the corrugated washer to prevent it from dropping, and then install it to the direction shown.

Caution

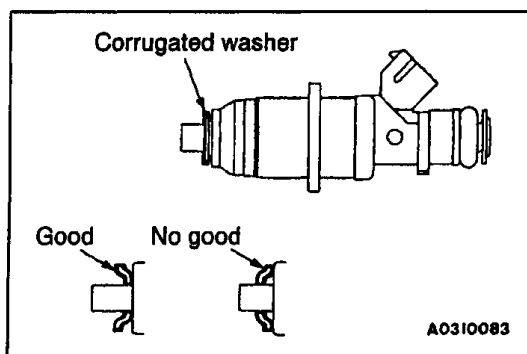
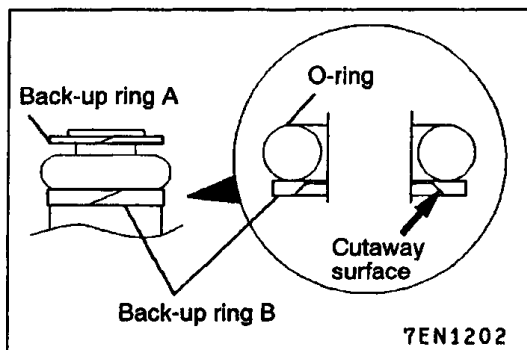
The corrugated washer should always be replaced with a new part.

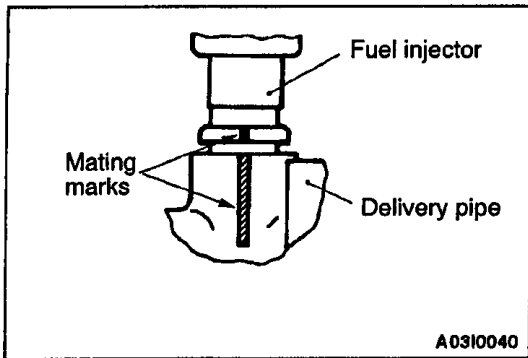
▶B◀ FUEL INJECTOR/INJECTOR GASKET /INSULATOR/DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY/INJECTOR HOLDER /INJECTOR WASHER INSTALLATION

1. Apply a small amount of fresh engine oil to the O-ring.

Caution

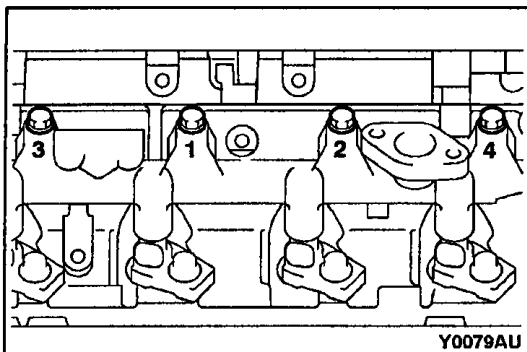
Take care not to let any of the engine oil get inside the delivery pipe.





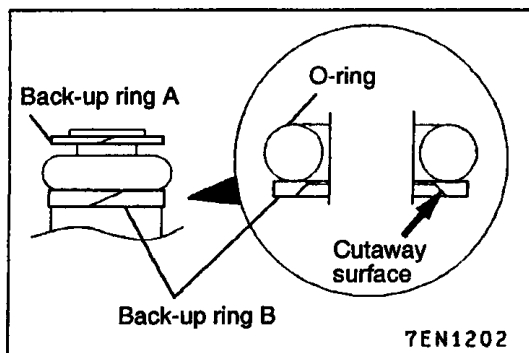
2. While being careful not to damage the O-ring, turn the fuel injector to the left and right and connect it to the delivery pipe. After connecting, check that the fuel injector turns smoothly.
3. If the fuel injector does not turn smoothly, the cause may be that the O-ring is getting caught. Remove the fuel injector, check the O-ring for damage and re-connect the fuel injector to the delivery pipe assembly and then re-check.
4. Align the Fuel injector mating mark with the delivery pipe mating mark.
5. Install the injector gasket and insulator to the cylinder head.
6. Install the delivery pipe and fuel injector assembly to the cylinder head, and then temporarily tighten mounting bolts.
7. Install the injector holder and the injector washer then tighten mounting bolts to the specified torque.

Tightening torque: 21 – 25 Nm



8. Tighten the mounting bolts to temporarily tighten the delivery pipe and the fuel injector assembly according to the illustrated sequence to the specified torque.

Tightening torque: 11 – 13 Nm



►C◄ BACK-UP RING B/O-RING/BACK-UP RING A /FUEL PIPE INSTALLATION

1. Install the back-up rings and the O-ring as shown in the illustration.

Caution

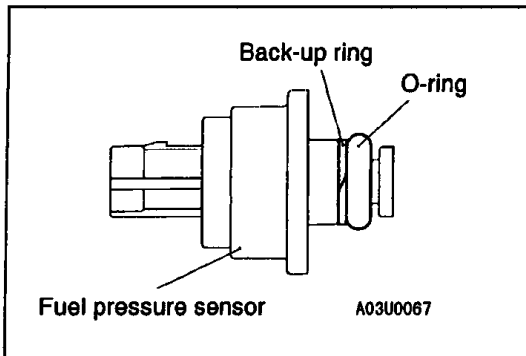
- (1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.
- (2) Confirm the outer diameter of the back-up ring A. Take care not to install the back-up ring for the fuel pressure sensor by mistake. (Outer diameter of the back-up ring A: 14.8 mm)
2. Apply a small amount of fresh engine oil to the O-ring.

Caution

Take care not to let any of the engine oil get inside the fuel pump (high pressure) or the delivery pipe.

3. Insert the fuel pipe into the fuel pump (high pressure) and the delivery pipe ports squarely. Insert the pipe securely, being careful not to twisting it, and then tighten the mounting bolts to the specified torque.

Tightening torque: 11 – 13 Nm



►D◄ BACK-UP RING/O-RING INSTALLATION

Install the back-up ring and the O-ring as shown in the illustration.

Caution

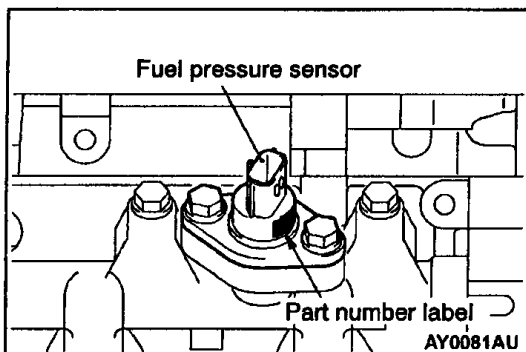
Be careful not to confuse this back-up ring with the back-up ring A for the fuel injector or back-up ring A for the fuel pipe. (External diameter of the back-up ring: 15.1 mm)

►E◄ FUEL PRESSURE SENSOR/FLANGE INSTALLATION

1. Apply a small amount of fresh engine oil to the O-ring.

Caution

Take care not to let any of the engine oil get inside the delivery pipe.



2. Install the fuel pressure sensor so that the part number label comes to the same direction shown in the illustration. If the old fuel pressure sensor is reused, Install the sensor to the delivery pipe using the mating mark made during its removal.

Caution

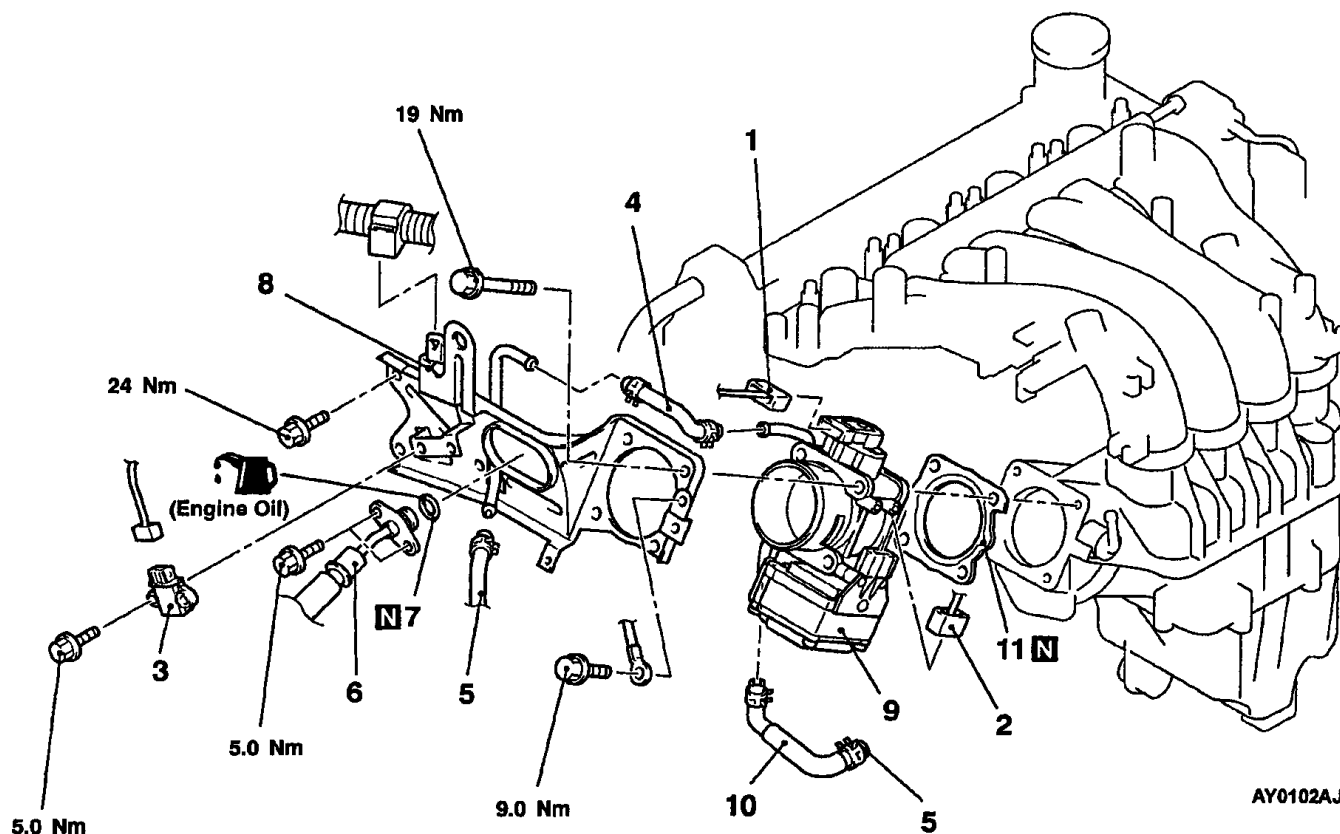
If the fuel pressure sensor is replaced with a new one, replace it together with the flange as a set.

THROTTLE BODY

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Cover Removal and Installation (Refer to GROUP 11A - Camshaft, Camshaft Oil Seal.)
- Prevention of Fuel Discharge <before removal only>
- Fuel Leak Check <after installation only>
- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation



Removal steps

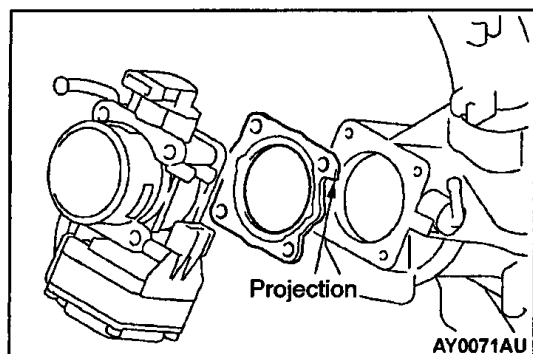
1. Throttle position sensor connector
2. Idle speed control servo connector
3. Ignition failure sensor
4. Water hose
5. Water hose connection
6. High-pressure fuel hose connection

►B◄

►B◄

7. O-ring
8. Throttle body stay
9. Throttle body
10. Water hose
11. Throttle body gasket

►A◄



INSTALLATION SERVICE POINTS

►A◄ THROTTLE BODY GASKET INSTALLATION

Install the throttle body gasket so that the projection comes to the illustrated position.

**►B◄ O-RING/HIGH-PRESSURE FUEL HOSE
INSTALLATION**

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

Caution

Do not let any engine oil get into the delivery pipe.

2. While turning the high-pressure fuel hose 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 the hose does not turn smoothly, the O-ring is probably being clamped. Disconnect the high-pressure fuel hose and check the O-ring for damage. After this, re-insert the delivery pipe and check that the hose turns smoothly.
4. Tighten to the specified torque.

Tightening torque: 5.0 Nm

ENGINE COOLING

CONTENTS

GENERAL	2	WATER PUMP <F9Q>	4
Outline of Changes	2	WATER HOSE AND WATER PIPE	
SERVICE SPECIFICATIONS	2	<4G93-GDI>	5
SEALANT	2	RADIATOR FAN <F9Q>	7
THERMOSTAT <4G93-GDI>	2	RADIATOR <F9Q>	9
THERMOSTAT <F9Q>	3		

GENERAL

OUTLINE OF CHANGES

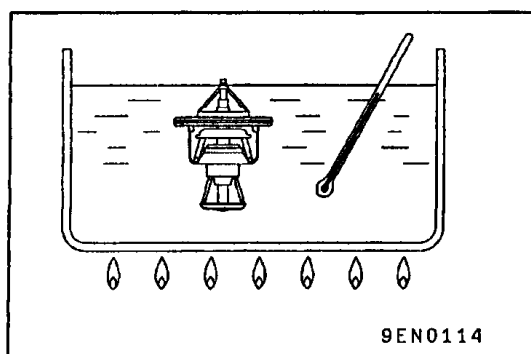
- Since the thermostat of 4G93-GDI engine is changed, the service procedures are made.
 - Since the water hose is changed because of adopting the resin intake manifold, the service procedures are made.
 - Since F9Q diesel engine is added, the service procedures are made.
- Other service procedures are the same as before.

SERVICE SPECIFICATIONS

Items		Standard value
Thermostat <4G93-GDI>	Valve opening temperature of thermostat °C	82 ± 1.5
	Full-opening temperature of thermostat °C	95
	Valve lift (at 95°C) mm	8.5 or more

SEALANT

Items	Specified sealant	Remarks
Thermostat case assembly <4G93-GDI> Water pump <F9Q>	Mitsubishi Genuine Parts No. MD970389 or equivalent	Semi-drying sealant



THERMOSTAT <4G93-GDI>

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: 82 ± 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.

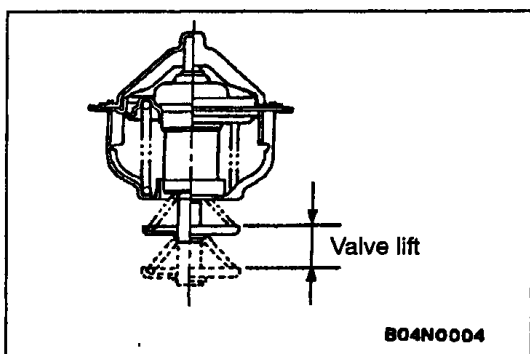
Standard value:

Full-opening temperature: 95°C

Amount of valve lift: 8.5 mm or more

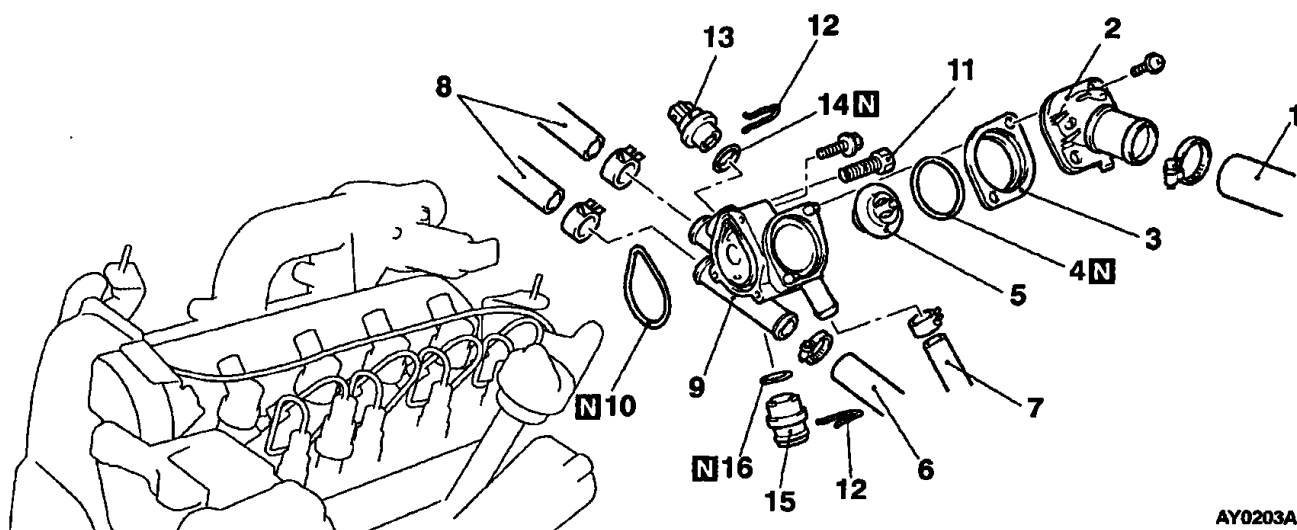
NOTE

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.



THERMOSTAT <F9Q>**REMOVAL AND INSTALLATION****Pre-removal and Post-Installation Operation**

- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation
(Refer to GROUP 15.)



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Removal steps

◀A▶ ▶A▶

1. Radiator upper hose connection
2. Water inlet fitting
3. Plate
4. O-ring
5. Thermostat
6. Water hose connection
7. Radiator lower hose connection
8. Heater hoses connection

◀A▶ ▶A▶

9. Thermostat housing
10. O-ring
11. Bleed screw
12. Clip
13. Engine coolant temperature sensor
14. O-ring
15. Plug
16. O-ring

REMOVAL SERVICE POINT**▶A◀ RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION**

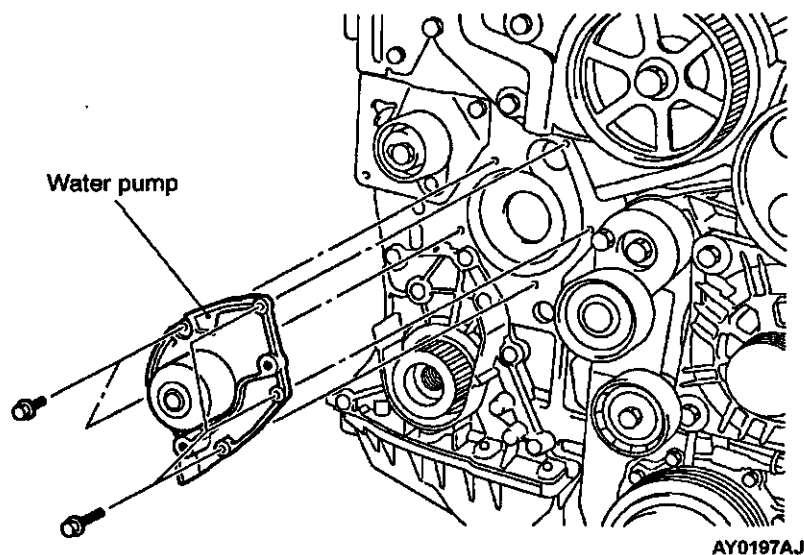
After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.

INSTALLATION SERVICE POINT**▶A◀ RADIATOR LOWER HOSE/RADIATOR UPPER HOSE CONNECTION**

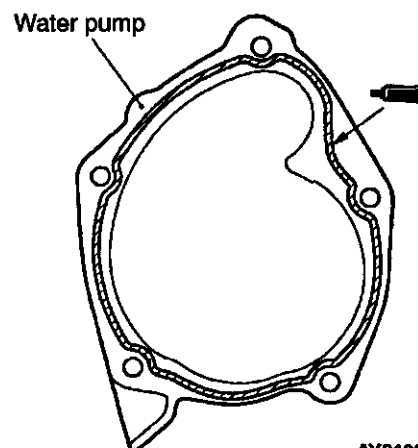
1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.

WATER PUMP <F9Q>**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Engine Coolant Draining and Supplying
- Timing Belt Removal and Installation
(Refer to GROUP 11C.)



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Sealant:

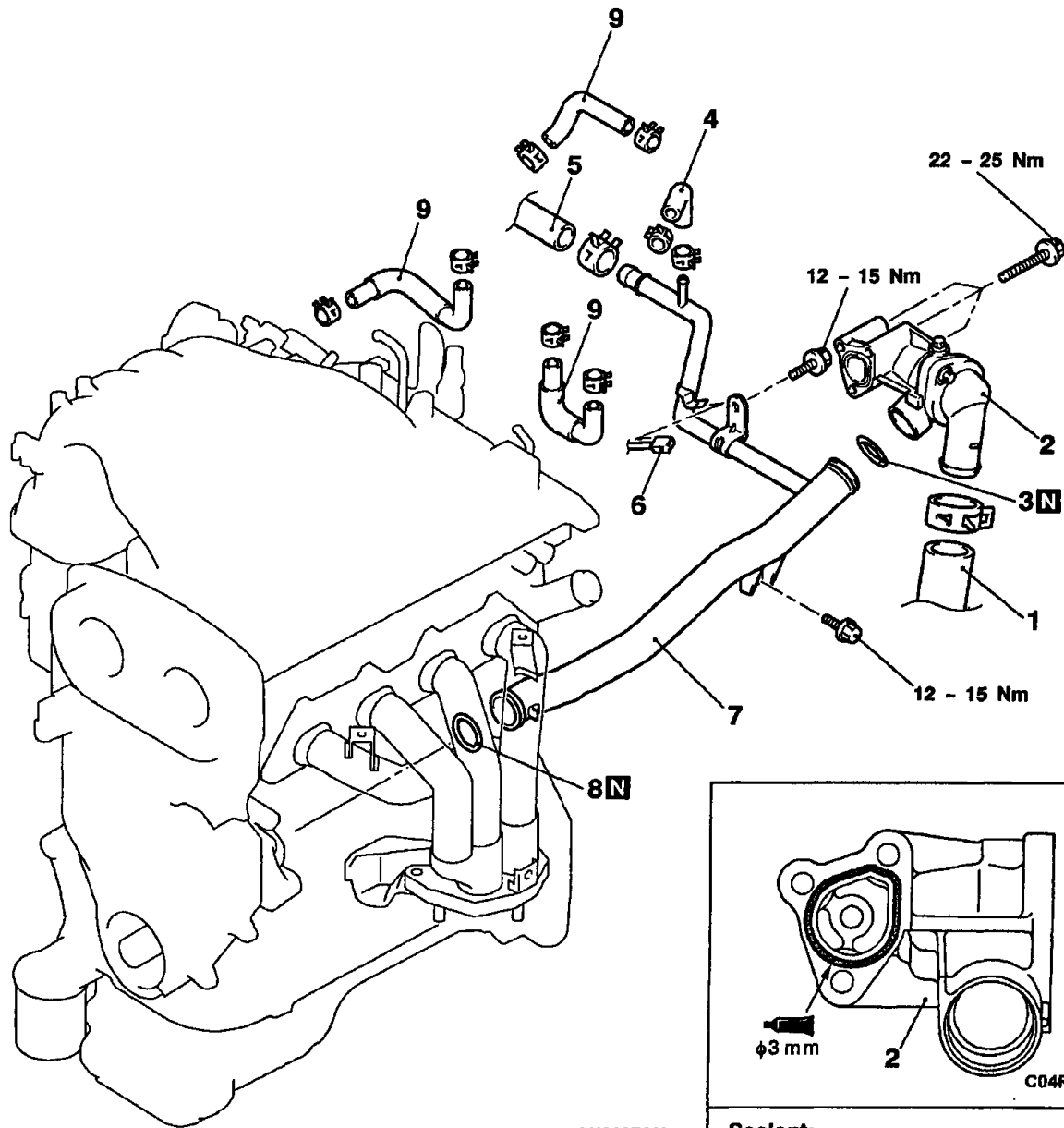
**Mitsubishi Genuine Part No.
MD970389 or equivalent**

WATER HOSE AND WATER PIPE <4G93-GDI>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Under Cover Removal and Installation
- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation
- Engine Cover and Control Wiring Harness Removal and Installation (Refer to GROUP 11A - Camshaft, Camshaft Oil Seal.)



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Sealant:

Mitsubishi Genuine Part No.
MD970389 or equivalent

Removal steps

- ◀A▶ ▶C▶
 ▶B▶
 ▶A▶
1. Radiator lower hose connection
 2. Thermostat case assembly
 3. O-ring
 4. Water hose
 5. Heater hose connection

- ▶A▶
6. Detonation sensor connector
 7. Water inlet pipe
 8. O-ring
 9. Water hoses

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◀ 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◀ THERMOSTAT CASE ASSEMBLY INSTALLATION

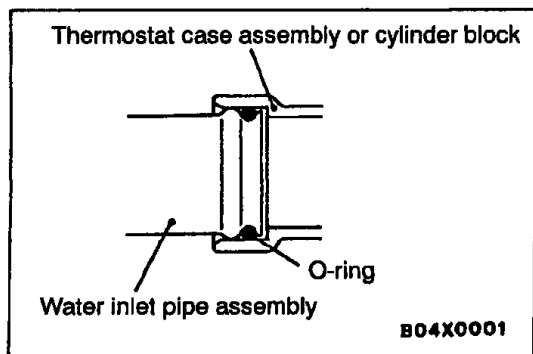
Squeeze out the sealant from the tube evenly and apply it so that there is not too much sealant and no places without sealant.

Specified Sealant:

Mitsubishi Genuine Parts No. MD970389 or equivalent

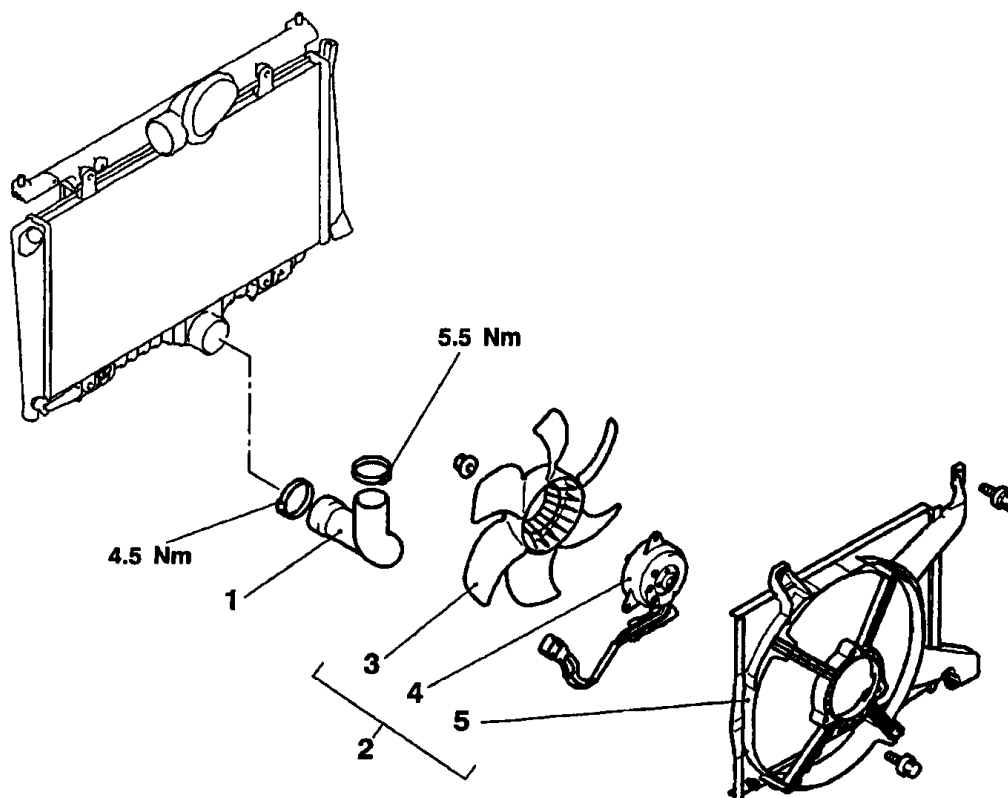
▶C◀ RADIATOR LOWER HOSE CONNECTION

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.



RADIATOR FAN <F9Q>**REMOVAL AND INSTALLATION**

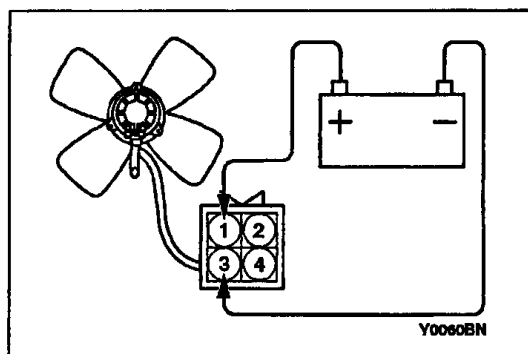
Pre-removal and Post-Installation Operation
Under Cover Removal and Installation



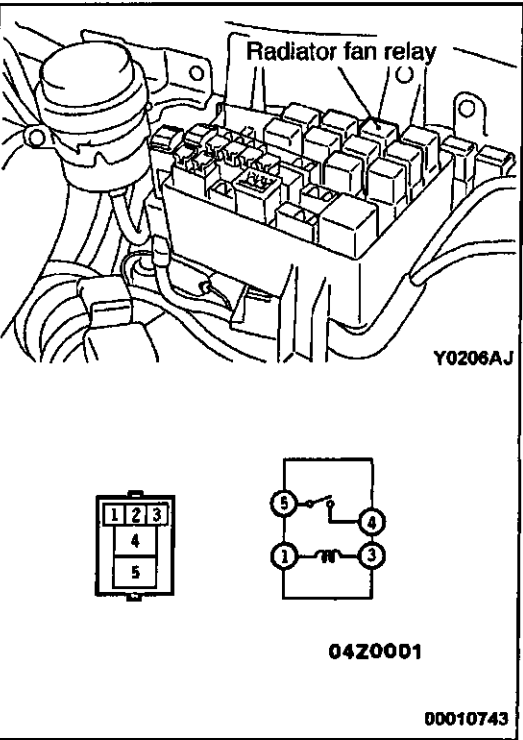
AY0178AJ

Removal steps

1. Air hose ● Centermember (Refer to GROUP 32.) 2. Radiator fan motor assembly	3. Radiator fan 4. Radiator fan motor 5. Radiator shroud

**INSPECTION****RADIATOR FAN MOTOR CHECK**

1. Check to be sure that the radiator fan rotates when battery voltage is applied between terminals (as shown in the figure).
2. Check to see that abnormal noises are not produced, while motor is turning.

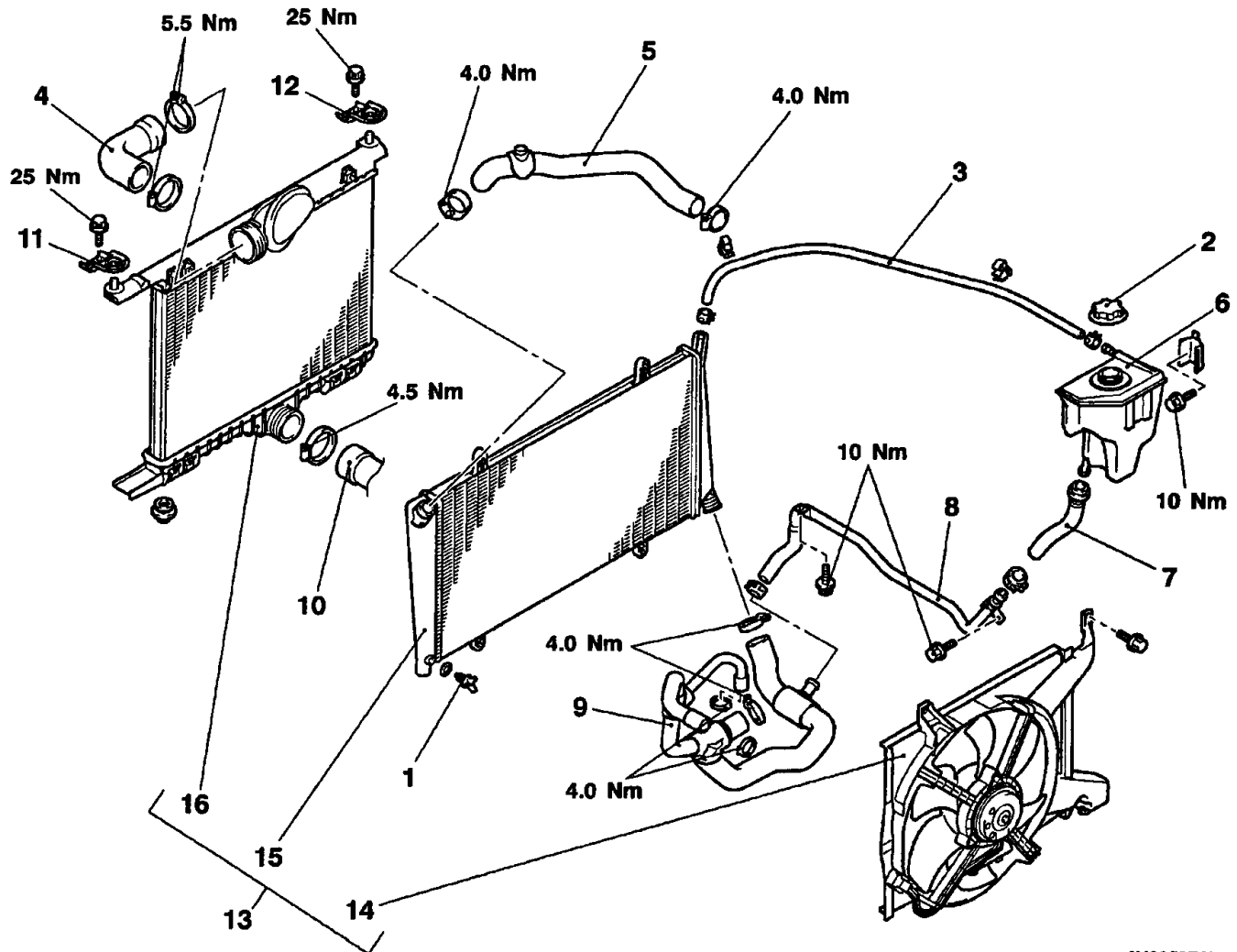


RADIATOR FAN RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
Not supplied	○	○		
Supplied	⊖	⊕	○	○

RADIATOR <F9Q>**REMOVAL AND INSTALLATION****Pre-removal and Post-Installation Operation**

- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation
(Refer to GROUP 15.)



AY0059BN

Removal steps

1. Drain plug
2. Pressure cap
3. Hot bottle hose
4. Air hose
5. Radiator upper hose
6. Hot bottle tank
7. Filler hose assembly
8. Filler pipe assembly
9. Radiator lower hose

10. Air hose connection
11. Upper insulator (L.H.)
12. Upper insulator (R.H.)
13. Radiator fan motor, radiator and intercooler assembly
14. Radiator fan motor assembly
15. Radiator assembly
16. Intercooler assembly

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 POINT**▶A◀ RADIATOR LOWER HOSE/RADIATOR UPPER 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.

INTAKE AND EXHAUST

CONTENTS

GENERAL	2	INTERCOOLER <F9Q>	5
SERVICE SPECIFICATION	2	INTAKE MANIFOLD <4G93-GDI>	6
SPECIAL TOOL	2	INTAKE MANIFOLD AND EXHAUST MANIFOLD <F9Q>	8
ON-VEHICLE SERVICE <F9Q>	2	EXHAUST MANIFOLD <4G92-MPI>	8
Waste Gate Actuator/Variable Nozzle Turbine Control Actuator	2	TURBOCHARGER <F9Q>	10
Turbocharger Waste Gate Solenoid Check	3	EXHAUST PIPE AND MAIN MUFFLER	11
AIR CLEANER <F9Q>	4		

GENERAL

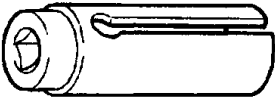
OUTLINE OF CHANGES

- The service procedures have been established due to the adoption of the intake manifold made of resin for the 4G93-GDI engine and the change of the exhaust pipe.
- The service procedures have been established due to the adoption of the exhaust manifold incorporated with the catalytic converter for the 4G92-MPI engine.
- The following service procedures have been added to correspond to the addition of the F9Q engine.
 1. On-vehicle Service
 2. Removal and installation of the intercooler
 3. Removal and installation of the intake manifold
 4. Removal and installation of the exhaust manifold
 5. Removal and installation of the turbocharger
 6. Removal and installation of the exhaust pipe and main muffler

SERVICE SPECIFICATION

Items	Standard value
Turbocharger waster gate solenoid coil resistance Ω (at 25°C)	15.5 - 17.5

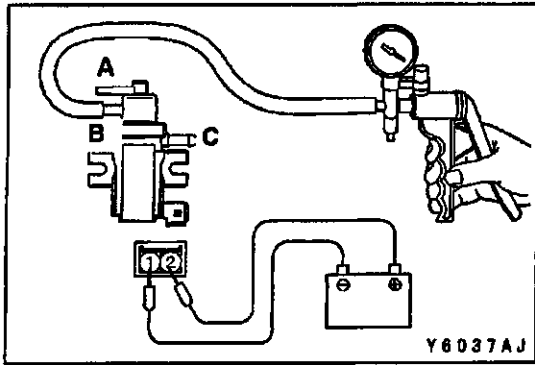
SPECIAL TOOL

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

ON-VEHICLE SERVICE <F9Q>

WASTE GATE ACTUATOR/VARIABLE NOZZLE TURBINE CONTROL ACTUATOR

1. Disconnect the vacuum hose from the actuator nipple.
2. Connect a hand vacuum pump to the nipple.
3. The rod should move smoothly when vacuum is applied gradually.



TURBOCHARGER WASTE GATE SOLENOID CHECK

NOTE

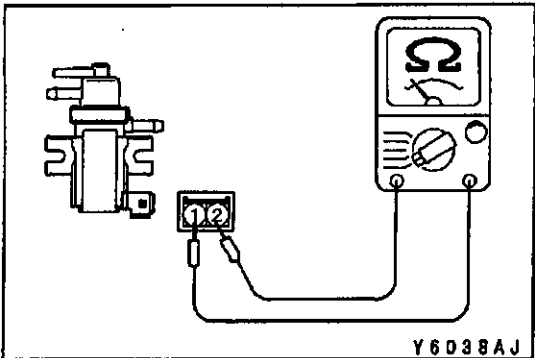
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

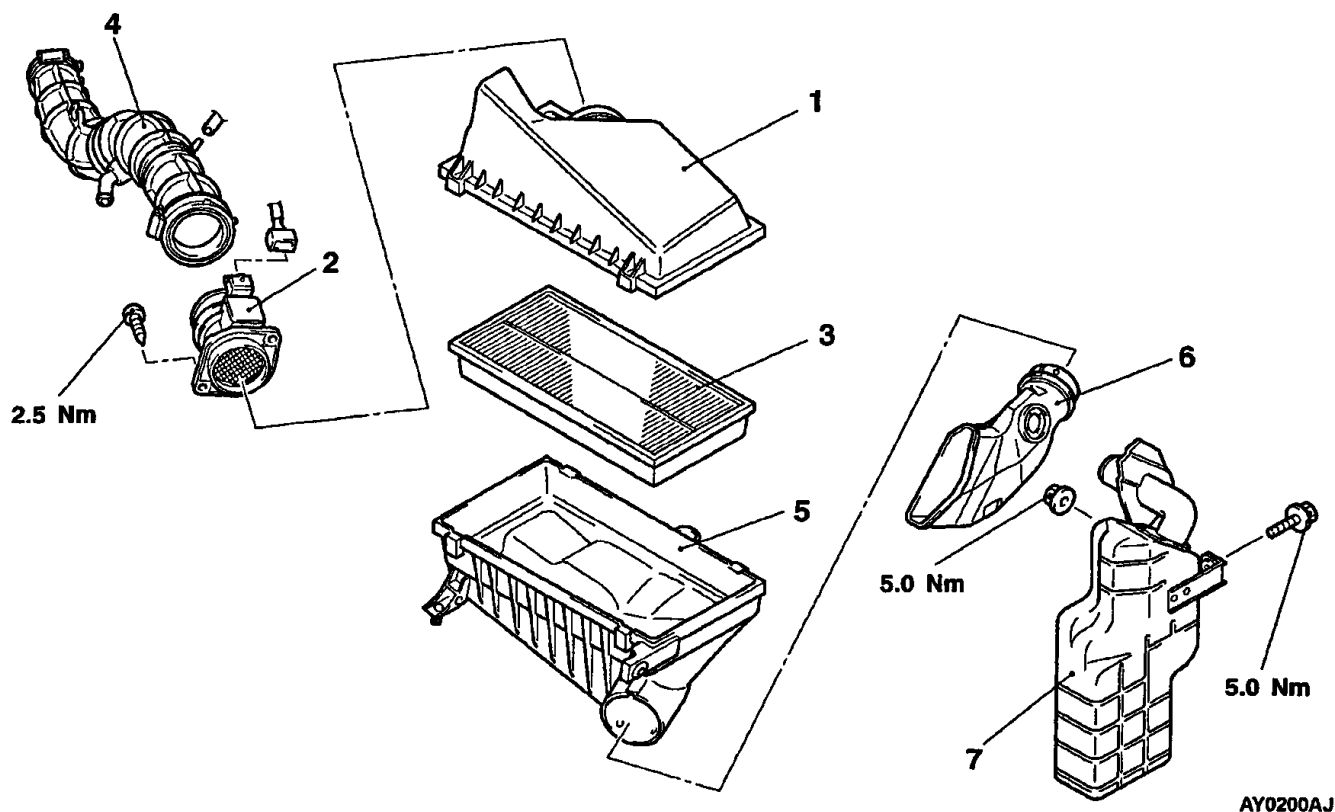
1. Disconnect the vacuum hose from the solenoid.
2. Disconnect the solenoid connector.
3. Connect a hand vacuum pump to the nipple (B) of the solenoid (refer to the illustration at left).
4. Check the air-tightness by applying a vacuum with voltage applied directly from the battery to the solenoid and without applying voltage.

Battery voltage	Nipple A condition	Normal condition
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained
Not applied	Open	Vacuum leaks

5. Measure the resistance between the terminals.

Standard value: 15.5 – 17.5 Ω (at 25°C)



AIR CLEANER <F9Q>**REMOVAL AND INSTALLATION****Removal steps**

1. Air cleaner cover
2. Air flow sensor assembly
3. Air cleaner element
4. Air intake hose
- Battery

5. Air cleaner body
6. Air duct
- Splash shield
7. Resonator

INSTALLATION SERVICE POINT**►A◄ AIR FLOW SENSOR ASSEMBLY INSTALLATION**

Make sure that the mesh of the air flow sensor assembly is not contaminated with dirt, then install the air flow sensor.

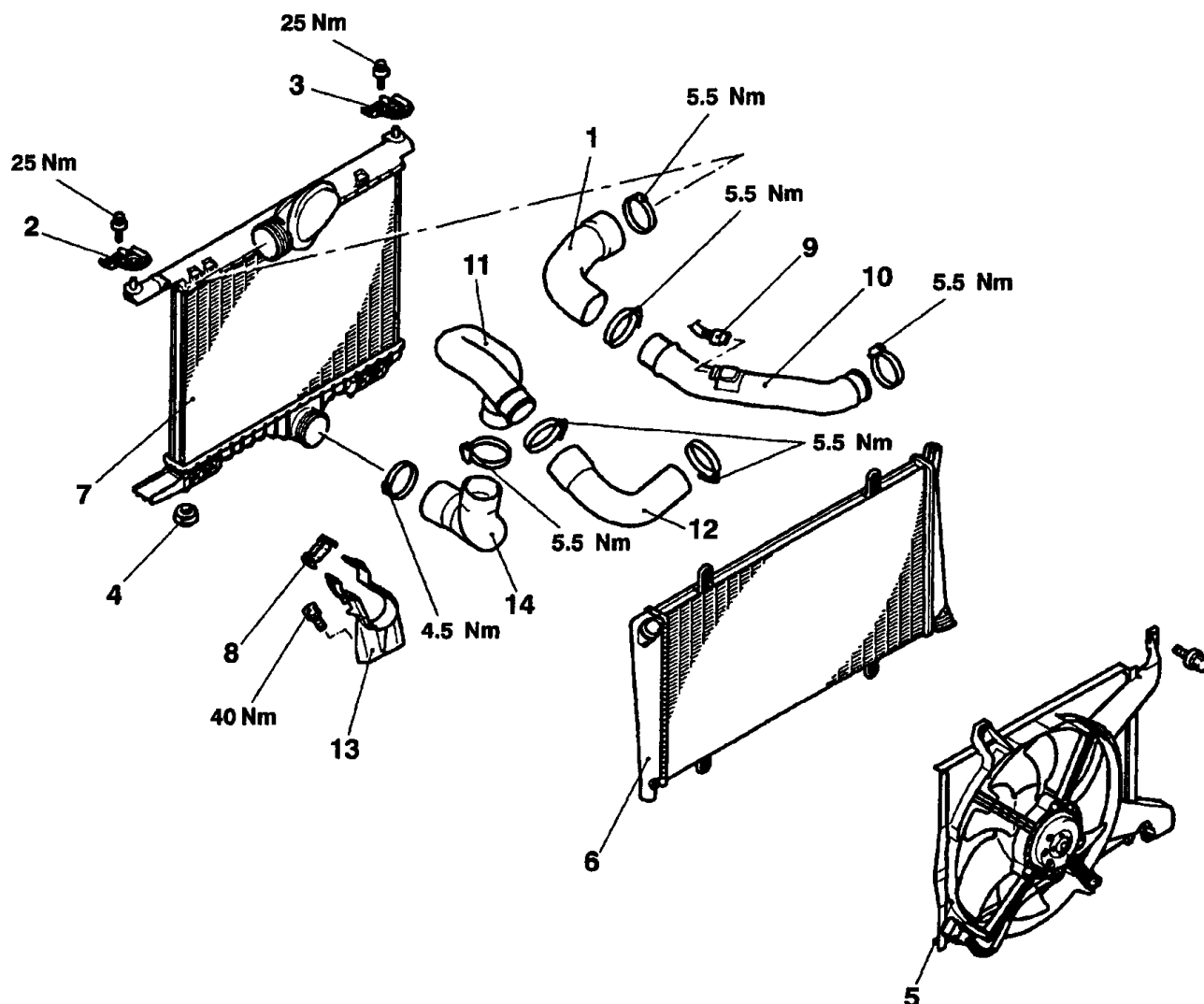
Caution

If the sensor mesh remains contaminated, the air flow sensor could not sense air flow volume exactly.

INTERCOOLER <F9Q>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
Radiator Fan Motor, Radiator and Intercooler assembly
Removal and Installation
(Refer to GROUP 14 – RADIATOR <F9Q>.)



AY0180AJ

Removal steps

1. Air hose
2. Upper insulator (L.H.)
3. Upper insulator (R.H.)
4. Insulator
5. Radiator fan motor assembly
6. Radiator assembly
7. Intercooler assembly

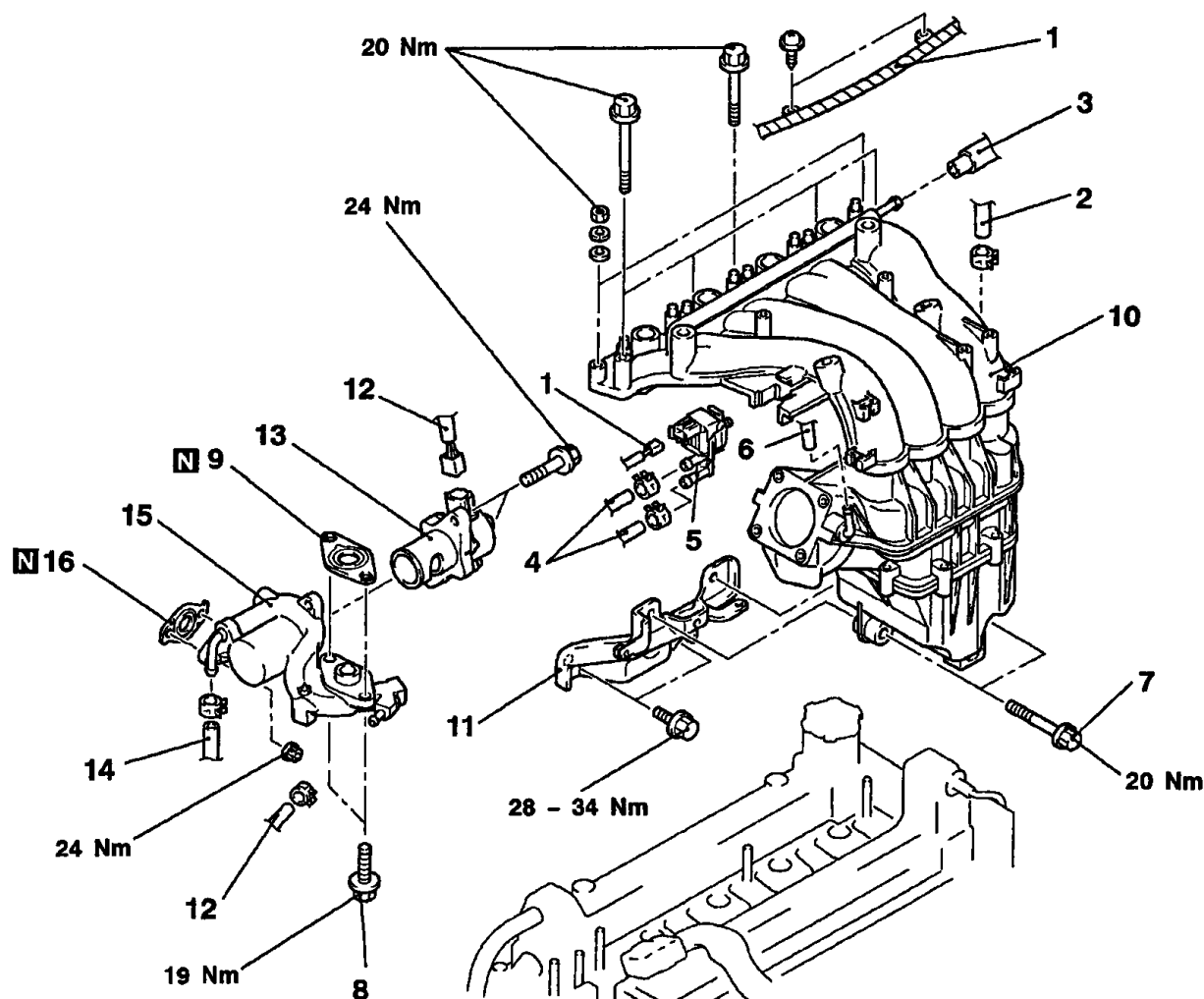
8. Clip
9. Boost sensor connector
10. Air pipe
11. Air pipe
12. Air hose
13. Hose bracket
14. Air hose

INTAKE MANIFOLD <4G93-GDI>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Coolant Draining and Supplying
- Air Cleaner Removal and Installation
- Throttle Body Removal and Installation (Refer to GROUP 13J.)
- Fuel Injector Removal and Installation (Refer to GROUP 13J.)
- Ignition Coil Removal and Installation (Refer to GROUP 16.)



AY0066AU

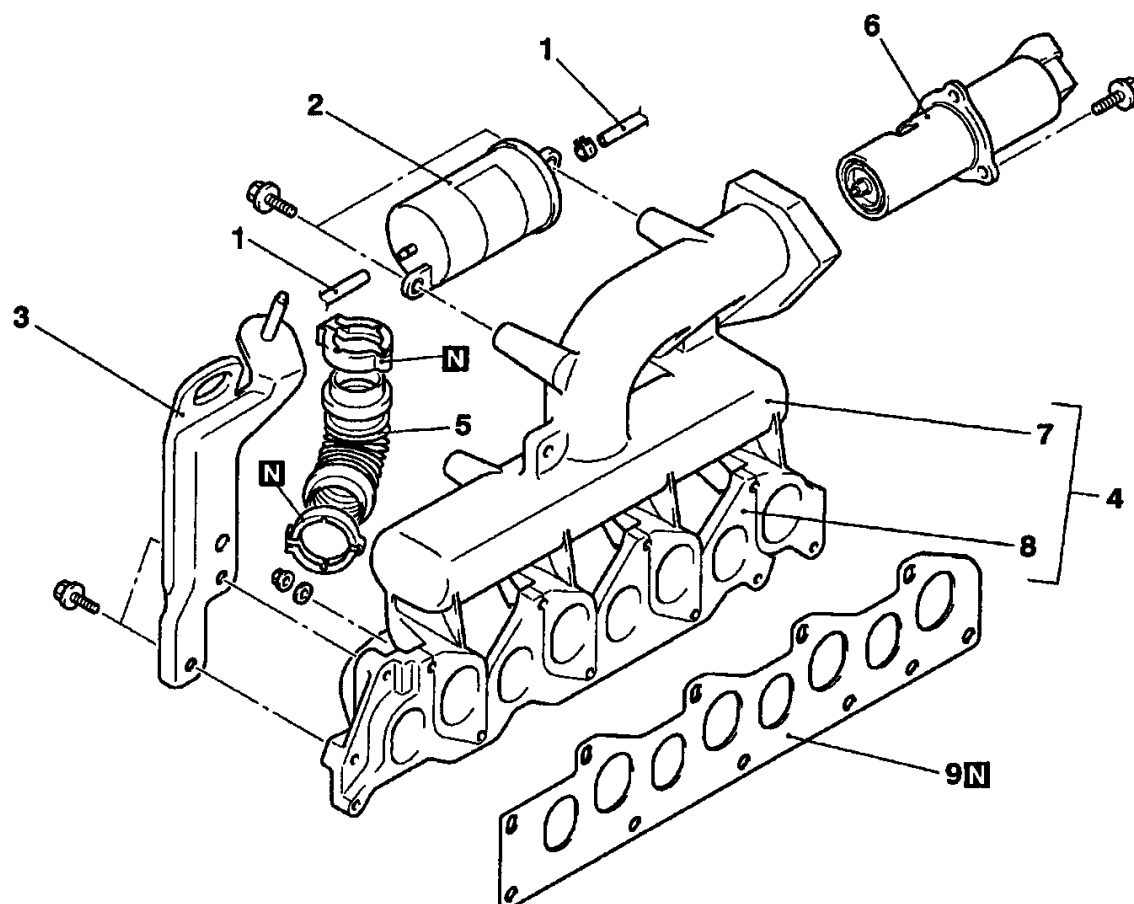
Removal steps

1. Control wiring harness, connector
2. Brake booster vacuum hose connection
3. PCV hose connection
4. Vacuum hoses connection
5. Purge control solenoid valve
6. Purge hose connection
7. Intake manifold to intake manifold stay connecting bolt
8. Intake manifold to EGR valve support connecting bolt
9. EGR valve support gasket
 - Injector driver
10. Intake manifold assembly
11. Intake manifold stay
12. EGR valve connector
13. EGR valve
14. Water hose connection
15. EGR valve support
16. EGR valve support gasket

INTAKE MANIFOLD AND EXHAUST MANIFOLD <F9Q>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
 Turbocharger Assembly Removal and Installation
 (Refer to P.15-9.)

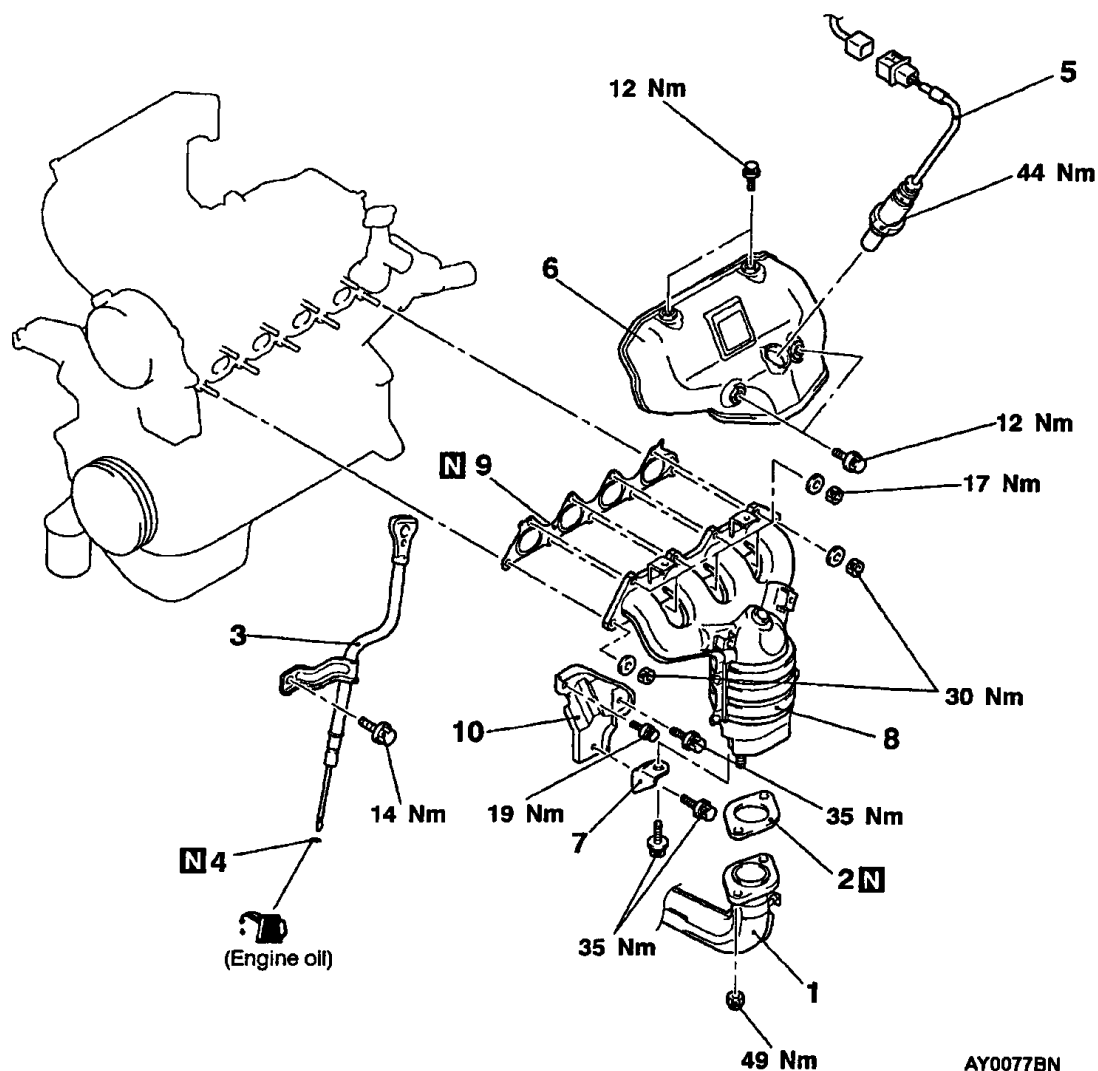


AY0199AJ

Removal steps

1. Vacuum hose connection	5. EGR pipe
2. Vacuum tank assembly	6. EGR valve assembly
3. Engine hanger	7. Intake manifold
4. Intake and exhaust manifold assembly	8. Exhaust manifold
	9. Intake and exhaust manifold gasket

EXHAUST MANIFOLD <4G92-MPI>



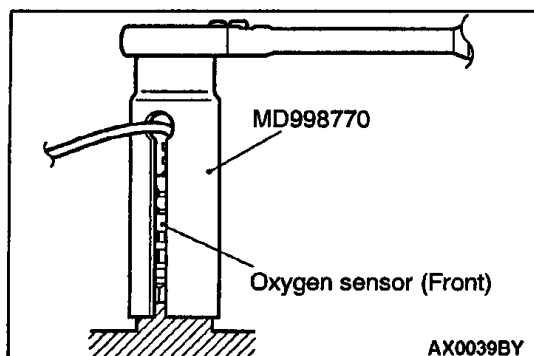
AY0077BN

Removal steps

1. Front exhaust pipe connection
2. Gasket
3. Engine oil level gauge assembly
4. O-ring
5. Oxygen sensor (front)

6. Exhaust manifold cover
7. Exhaust manifold bracket B
8. Exhaust manifold
9. Exhaust manifold gasket
10. Exhaust manifold bracket A

◀A▶ ▶A◀

**REMOVAL SERVICE POINT**

◀A▶ OXYGEN SENSOR (FRONT) REMOVAL

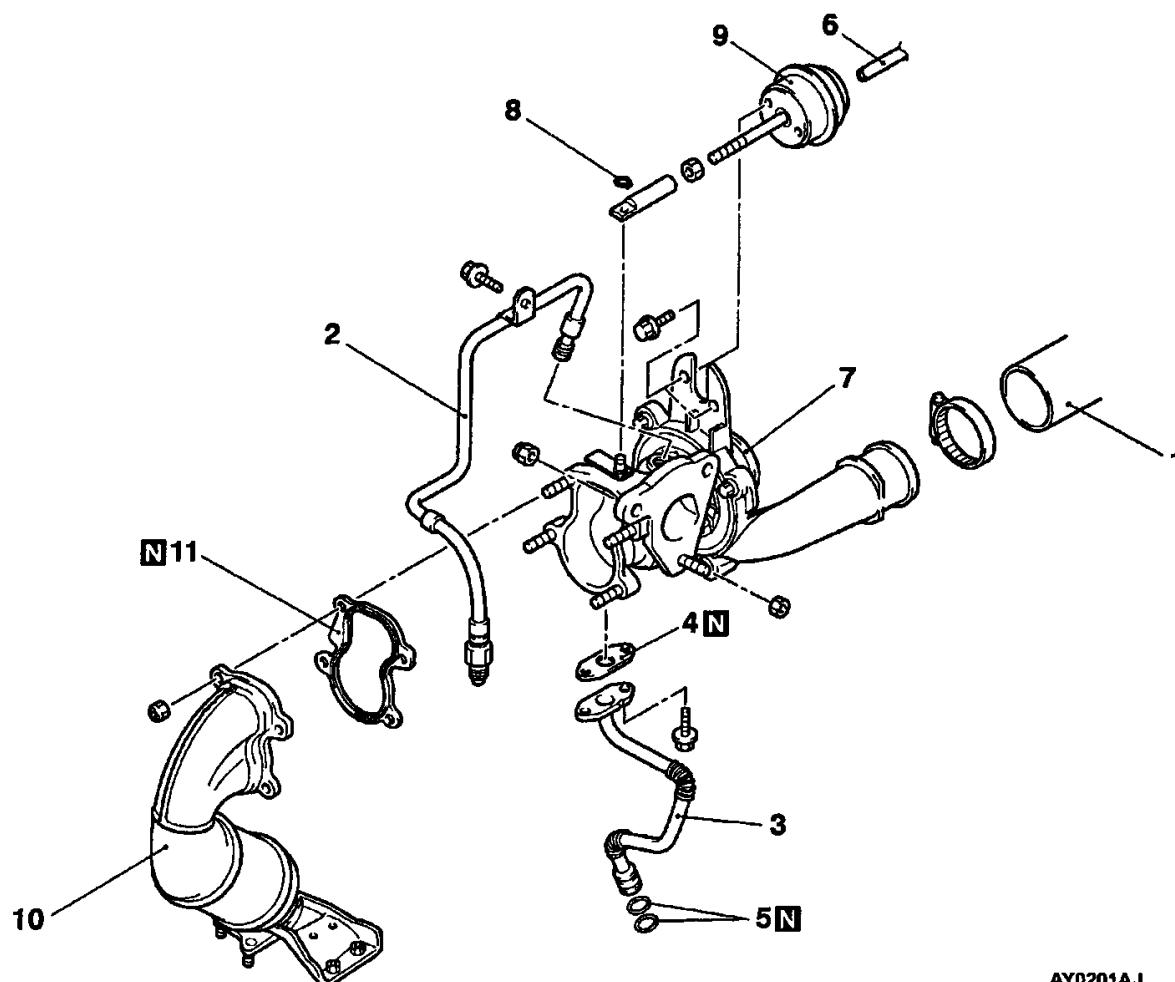
INSTALLATION SERVICE POINT

▶A◀ OXYGEN SENSOR (FRONT) INSTALLATION

TURBOCHARGER <F9Q>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
 Air Intake Hose Removal and Installation
 (Refer to P.15-4.)



AY0201AJ

Removal steps

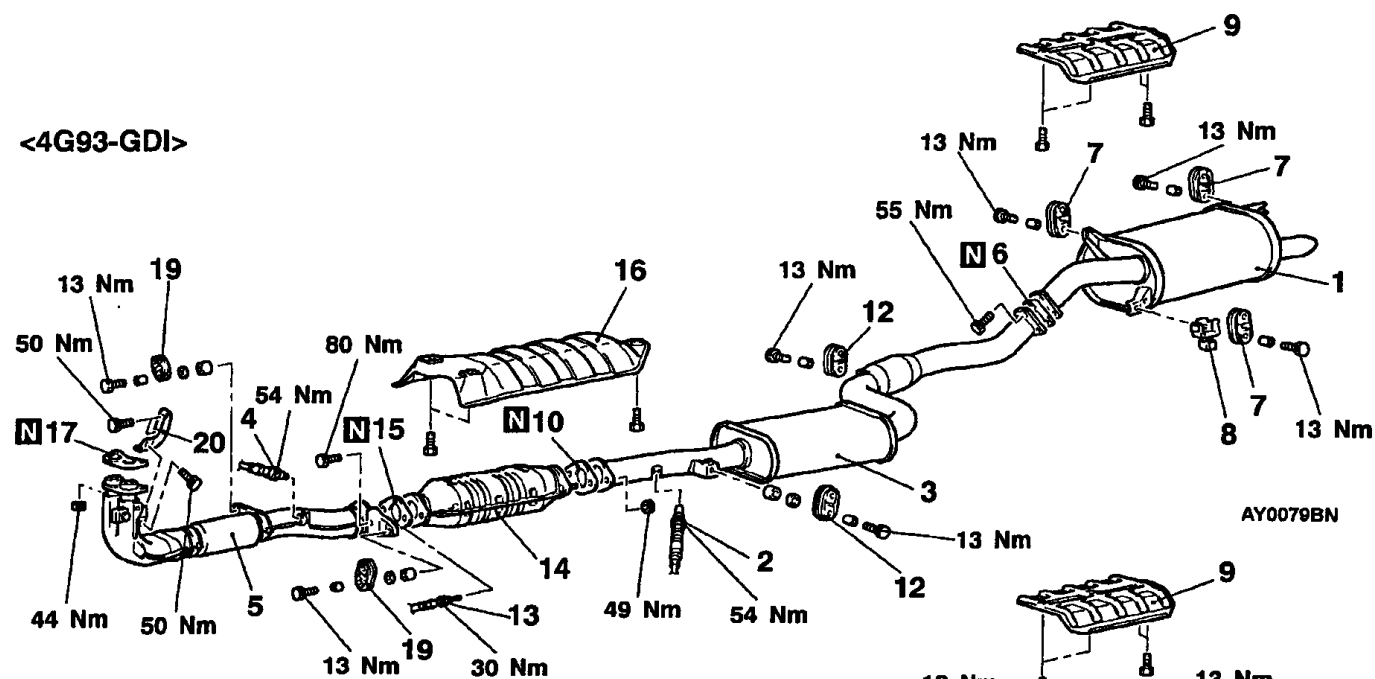
1. Air hose connection
2. Oil pipe assembly
3. Oil return pipe assembly
4. Oil return pipe gasket
5. O-ring
6. Vacuum hose connection

7. Turbocharger assembly
8. Circlip
9. Waste gate assembly
10. Catalytic converter
11. Gasket

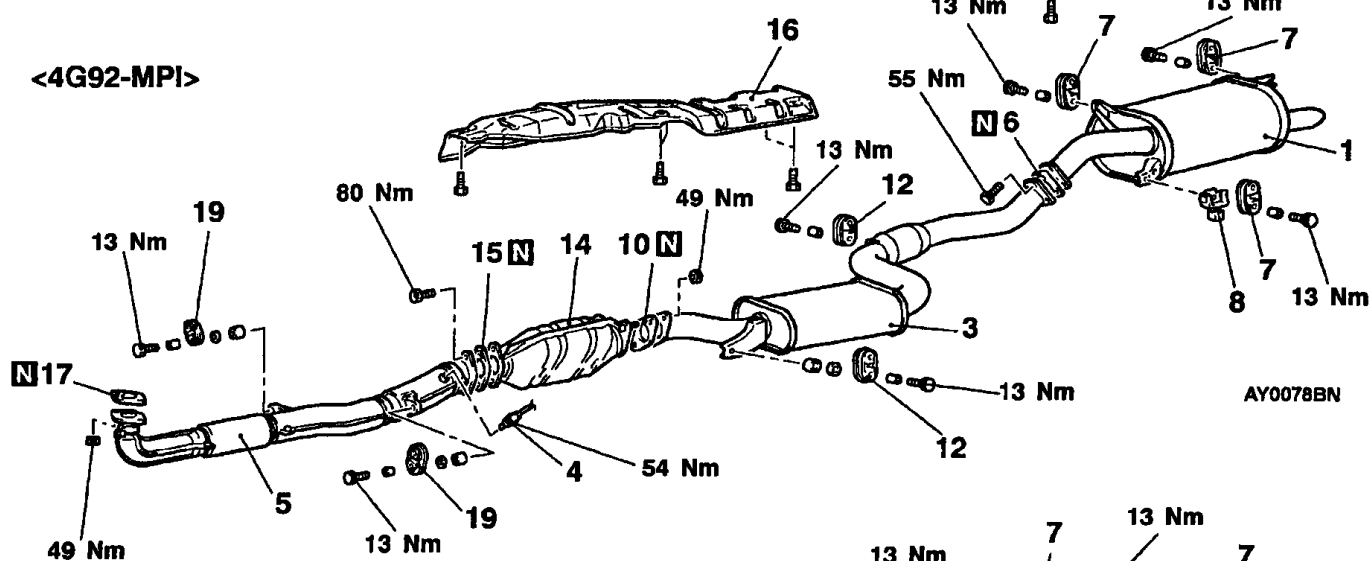
EXHAUST PIPE AND MAIN MUFFLER

REMOVAL AND INSTALLATION

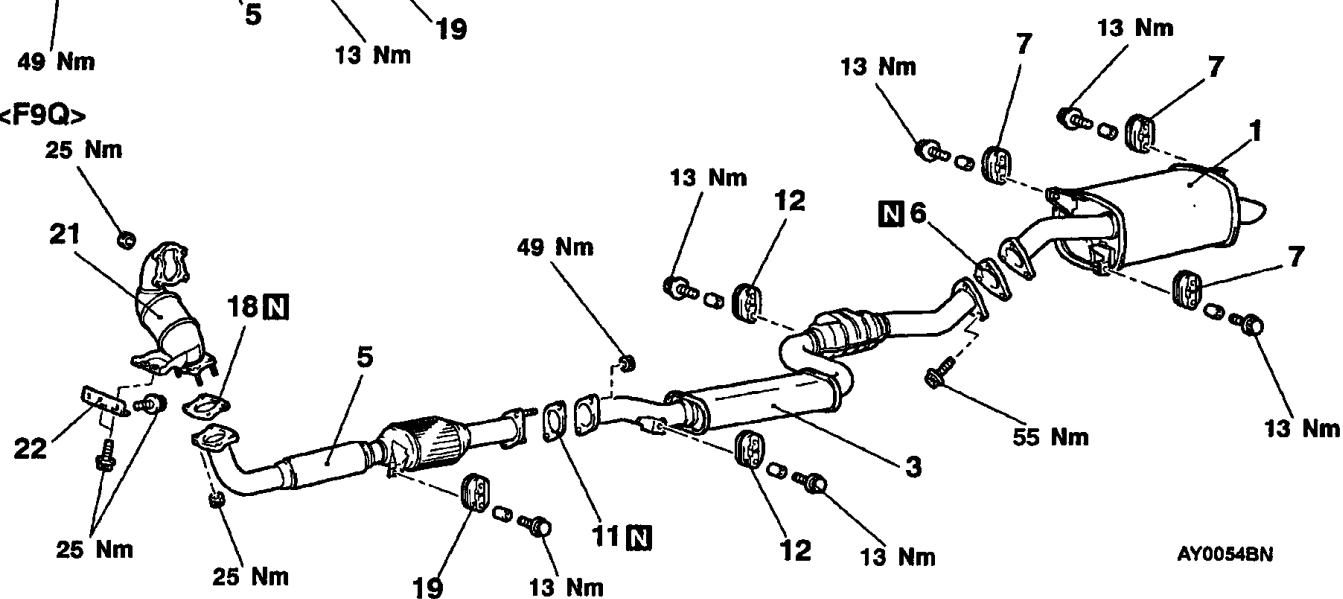
<4G93-GDI>



<4G92-MPI>



<F9Q>



Main muffler removal steps

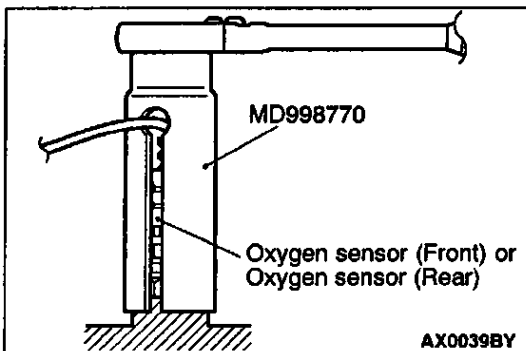
1. Main muffler
6. Gasket
7. Hanger
8. Dynamic damper
<4G93-GDI, 4G13-MPI>
9. Rear floor heat protector
<4G93-GDI, 4G13-MPI>

Center exhaust pipe removal steps

- ◀A▶ ▶A▶
2. Oxygen sensor (rear) <4G93-GDI>
 3. Center exhaust pipe
 6. Gasket
 10. Gasket <4G93-GDI, 4G13-MPI>
 11. Gasket <F9Q>
 12. Hanger
 13. Catalyst temperature sensor
<4G93-GDI-M/T>
 14. Catalytic converter
<4G93-GDI, 4G13-MPI>
 15. Gasket <4G93-GDI, 4G13-MPI>
 16. Front floor heat protector
<4G93-GDI, 4G13-MPI>

Front exhaust pipe removal steps

- ◀A▶ ▶A▶
4. Oxygen sensor (front) <4G93-GDI>
or oxygen sensor (rear) <4G92-MPI>
 5. Front exhaust pipe
 11. Gasket <F9Q>
 15. Gasket <4G93-GDI, 4G13-MPI>
 17. Gasket <4G93-GDI, 4G13-MPI>
 18. Gasket <F9Q>
 19. Hanger
 20. Front exhaust pipe bracket
<4G93-GDI>
 21. Catalytic converter <F9Q>
 22. Bracket <F9Q>



REMOVAL SERVICE POINT

- ◀A▶ OXYGEN SENSOR (REAR)/OXYGEN SENSOR (FRONT) REMOVAL

INSTALLATION SERVICE POINT

- ▶A▶ OXYGEN SENSOR (FRONT)/OXYGEN SENSOR (REAR) INSTALLATION

ENGINE ELECTRICAL

CONTENTS

CHARGING SYSTEM	2	CAMSHAFT POSITION SENSOR	
GENERAL	2	<F9Q>	5
Outline of Change	2	DETONATION SENSOR <4G93-GDI>	6
ALTERNATOR <F9Q>	2	GLOW SYSTEM	6
IGNITION SYSTEM	3	GENERAL	6
GENERAL	3	Outline of Changes	6
Outline of Changes	3	GENERAL INFORMATION	6
SERVICE SPECIFICATIONS	3	SERVICE SPECIFICATIONS	7
SPECIAL TOOL	3	ON-VEHICLE SERVICE	7
ON-VEHICLE SERVICE	3	Glow System Check	7
Ignition Failure Sensor Check	3	Glow Plug Check	8
IGNITION COIL <4G93-GDI>	4	GLOW PLUG	9

CHARGING SYSTEM

GENERAL

OUTLINE OF CHANGE

The following service procedures have been added due to the introduction of the F9Q engine vehicles.

ALTERNATOR <F9Q>

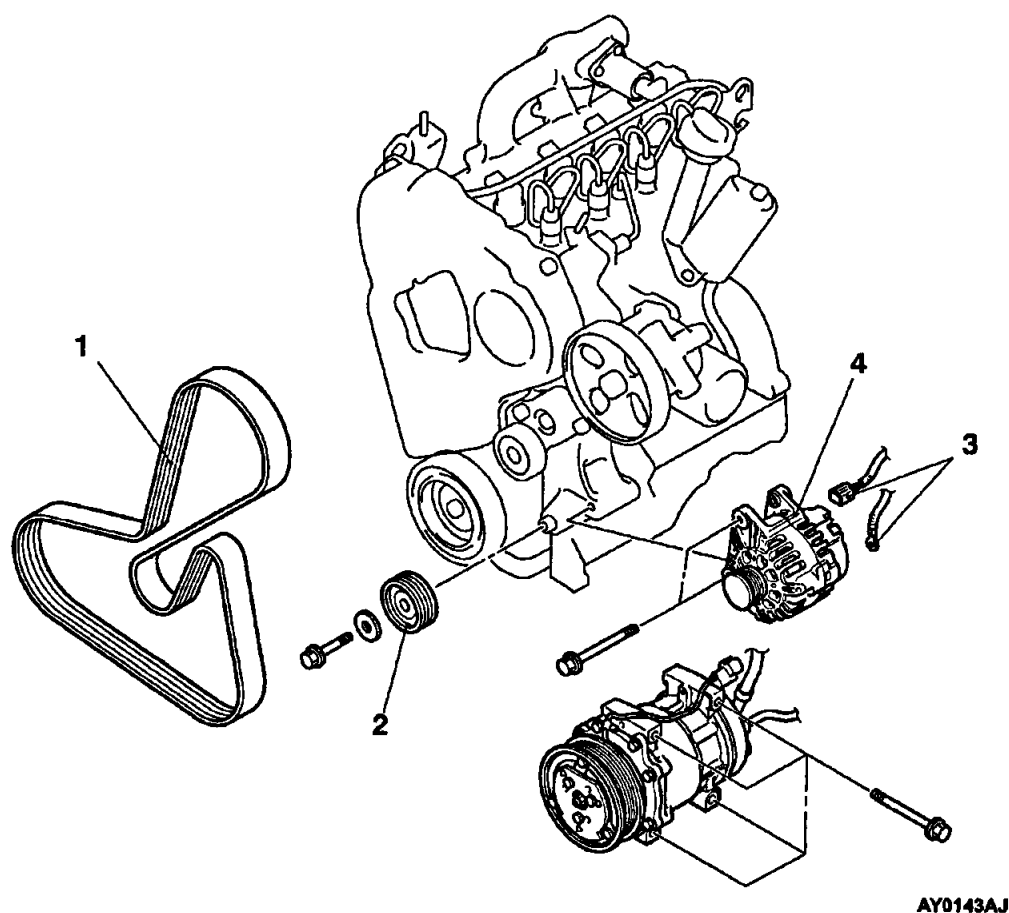
REMOVAL AND INSTALLATION

Pre-removal Operation

- Under Cover Removal
- Intercooler Air Hose Removal
(Refer to GROUP 15 – Intercooler.)

Post-Installation Operation

- Intercooler Air Hose Installation
(Refer to GROUP 15 – Intercooler.)
- Under Cover Installation

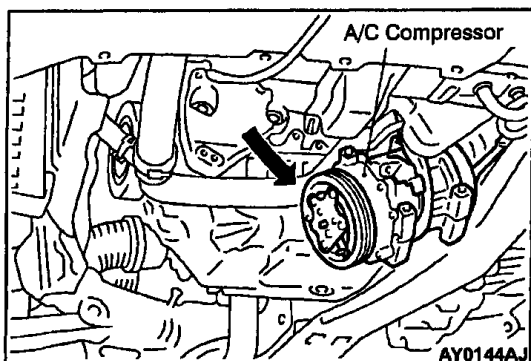


Removal steps

1. Drive belt
2. Idler pulley
- A/C Compressor mounting bolt



3. Alternator connector
4. Alternator

**REMOVAL SERVICE POINT****◀A▶ ALTERNATOR REMOVAL**

Put the A/C compressor aside so that enough space to remove the alternator can be secured.

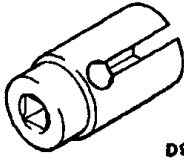
IGNITION SYSTEM**GENERAL****OUTLINE OF CHANGE**

On vehicles with the 4G93-GDI engine, an ignition failure sensor has been added.

SERVICE SPECIFICATIONS**IGNITION FAILURE SENSOR**

Items	4G93-GDI, 4G92-MPI
Resistance Ω	0.1 or less

SPECIAL TOOL

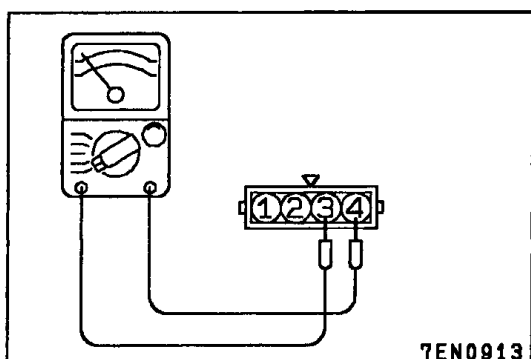
Tool	Number	Name	Use
	MD998773	Detonation sensor wrench	Detonation sensor removal and installation

ON-VEHICLE SERVICE**IGNITION FAILURE SENSOR CHECK****NOTE**

An analog-type circuit tester should be used.

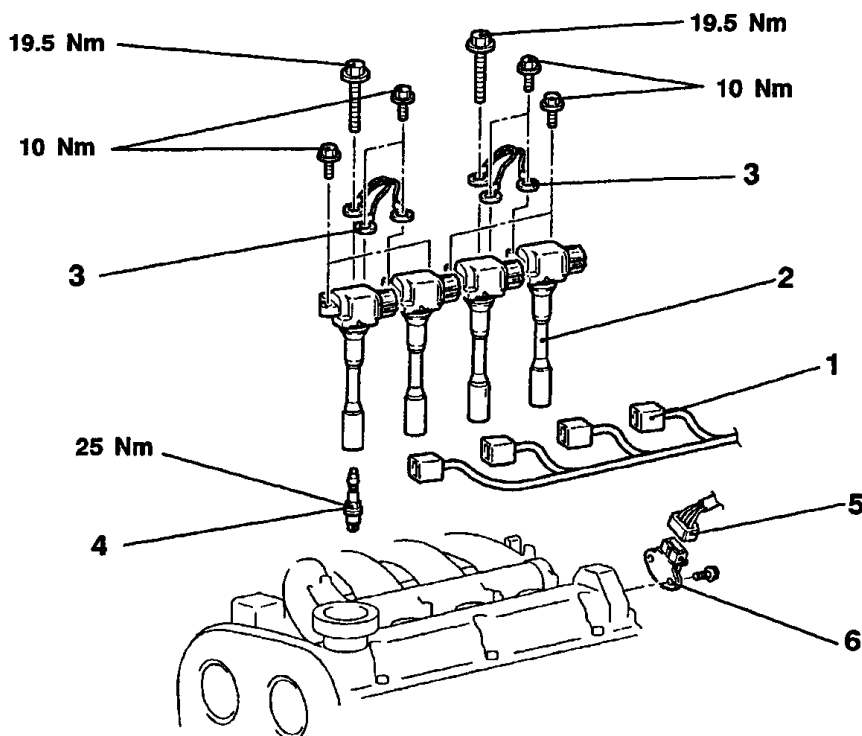
Check that the resistance between terminals 3 and 4 is at the standard value.

Standard value: 0.1 Ω or less



IGNITION COIL <4G93-GDI>**REMOVAL AND INSTALLATION**

Pre-removal and Post-Installation Operation
 Engine Cover Removal and Installation
 (Refer to GROUP 11A – Camshaft, Camshaft Oil Seal.)



BY0099AJ

Ignition coil removal steps

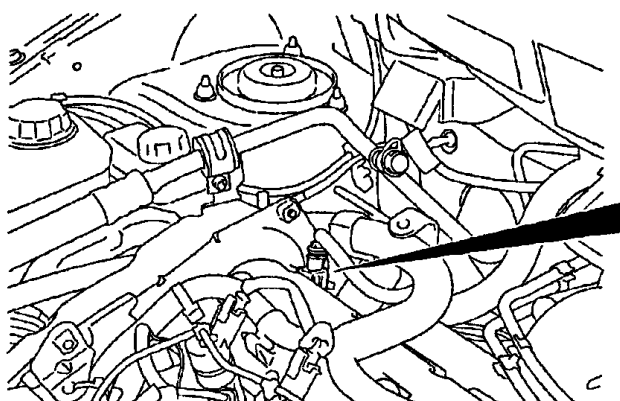
1. Ignition coil connector
2. Ignition coil
3. Earth strap
4. Spark plug

Ignition failure sensor removal steps

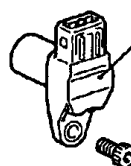
5. Ignition failure sensor connector
6. Ignition failure sensor

CAMSHAFT POSITION SENSOR <F9Q>**REMOVAL AND INSTALLATION**

Pre-removal and Post-Installation Operation
 Engine hanger (Refer to GROUP 15 – Intake Manifold
 and Exhaust Manifold.)



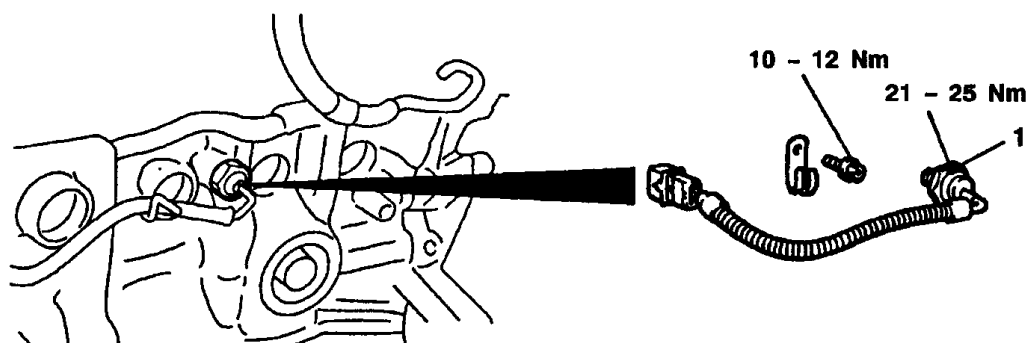
Camshaft position sensor



BY0146AJ

DETONATION SENSOR <4G93-GDI>**REMOVAL AND INSTALLATION****Pre-removal and Post-Installation Operation**

- Engine Cover Removal and Installation
(Refer to GROUP 11A - Camshaft, Camshaft Oil Seal.)
- Intake Manifold Stay Removal and Installation
(Refer to GROUP 15.)

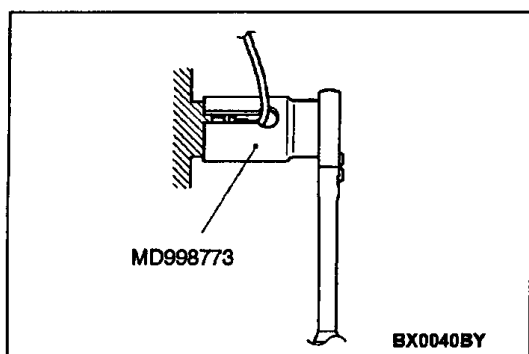


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◀A▶ ▶A◀ 1. Detonation sensor

Caution

Do not subject the detonation sensor to any shocks.

**REMOVAL SERVICE POINT**

◀A▶ DETONATION SENSOR REMOVAL

INSTALLATION SERVICE POINT

▶A◀ DETONATION SENSOR INSTALLATION

GLOW SYSTEM

GENERAL

OUTLINE OF CHANGE

The following service procedures have been added to correspond to the adoption of the F9Q engine.

GENERAL INFORMATION

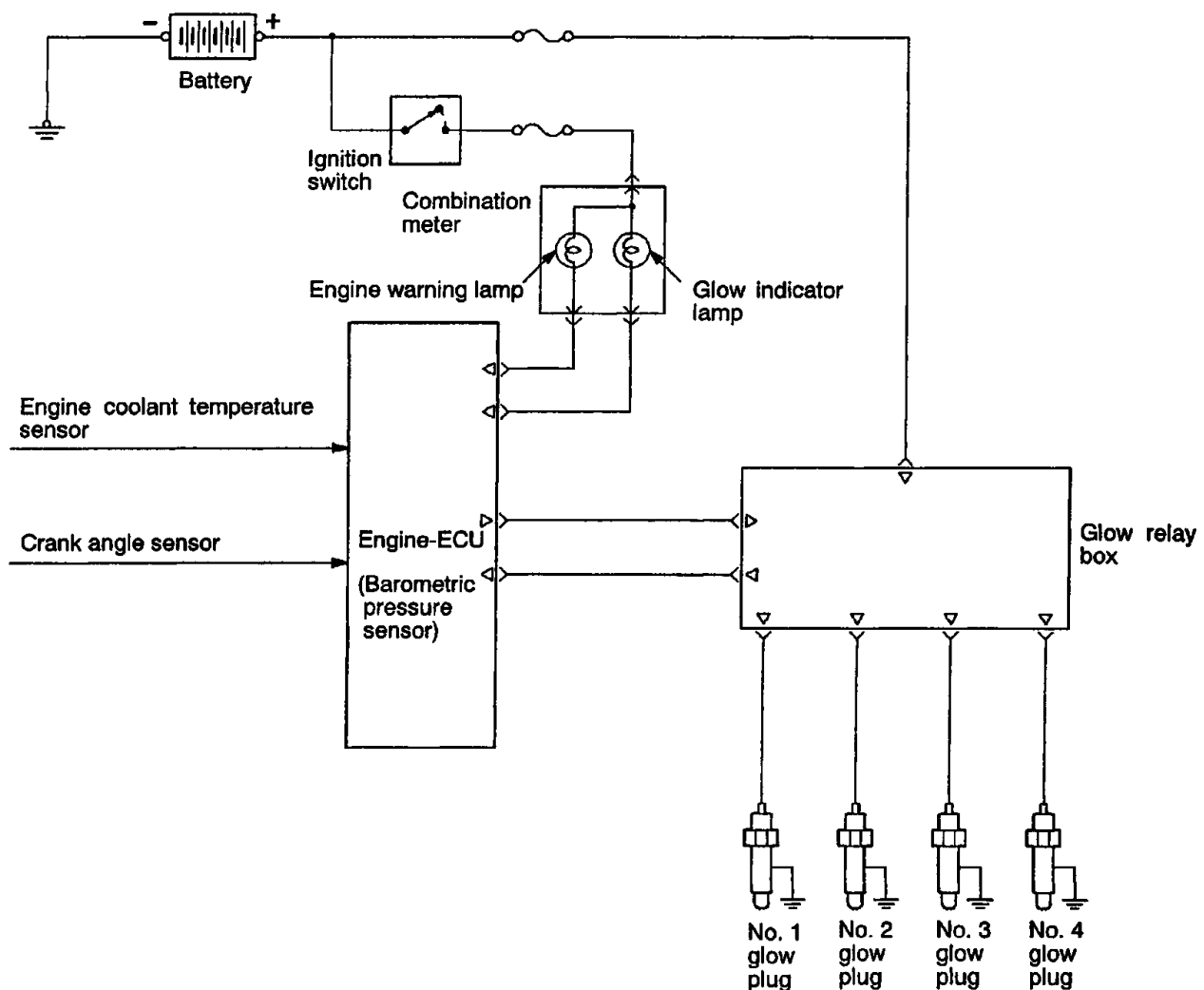
The glow system reduces the time required for starting at low temperatures to provide a degree of starting and operation that is identical to petrol-engine vehicles by preheating the glow plugs at super-quick speed.

The engine-ECU controls both the time during which current is supplied to the glow plugs after the ignition

switch is turned to the ON position and also the glow indicator lamp illumination time in accordance with the engine coolant temperature.

When the engine-ECU detects a malfunction, it sets a diagnosis code, which corresponds to that malfunction (related to the diesel fuel system).

SYSTEM DIAGRAM



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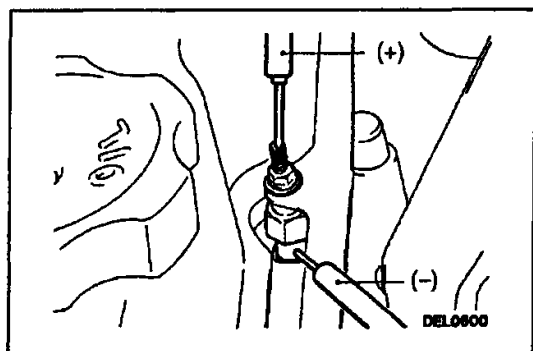
SERVICE SPECIFICATIONS

Item		Standard value
Voltage between glow plug lead and glow plug body V	Immediately after ignition switch is turned to ON (without starting the engine)	9 – 11 (Drops to 0 V after 0.5 – 16 seconds have passed)
	While engine is cranking	6 or more
	While engine is warming up	12 – 15 (Drops to 0 V if 10 – 60 seconds have passed since the engine was started)
Glow plug resistance Ω		0.6

ON-VEHICLE SERVICE

GLOW SYSTEM CHECK

1. Check that the battery voltage is 11 – 13 V.
2. Check that the engine coolant temperature is 40 °C or less.



3. Measure the voltage in the glow plug circuit for each cylinder.
 - No.1 glow plug circuit: Between the glow relay box connector terminal 5 and body earth
 - No.2 glow plug circuit: Between the glow relay box connector terminal 7 and body earth
 - No.3 glow plug circuit: Between the glow relay box connector terminal 3 and body earth
 - No.4 glow plug circuit: Between the glow relay box connector terminal 4 and body earth

Standard value: 0.05 – 0.07 Ω (at 20 °C)

4. Measure the voltage immediately after the ignition switch is turned to ON (without starting the engine).

Standard value:

9 – 11 V (Drops to 0 V after 0.5 – 16 seconds have passed)

In addition, check to be sure that the glow indicator lamp illuminates immediately after the ignition switch is turned to ON.

NOTE

The voltage generated time (continuity time) varies depending on the engine coolant temperature when the ignition switch is ON.

5. Measure the voltage while the engine is cranking.

Standard value: 6 V or more

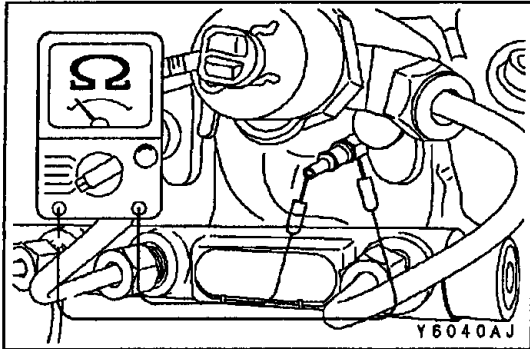
6. Start the engine and measure the voltage while the engine is warming up.

The voltage will always drops to 0 V when 10 – 60 seconds have passed after starting the engine.

Standard value: 12 – 15 V

NOTE

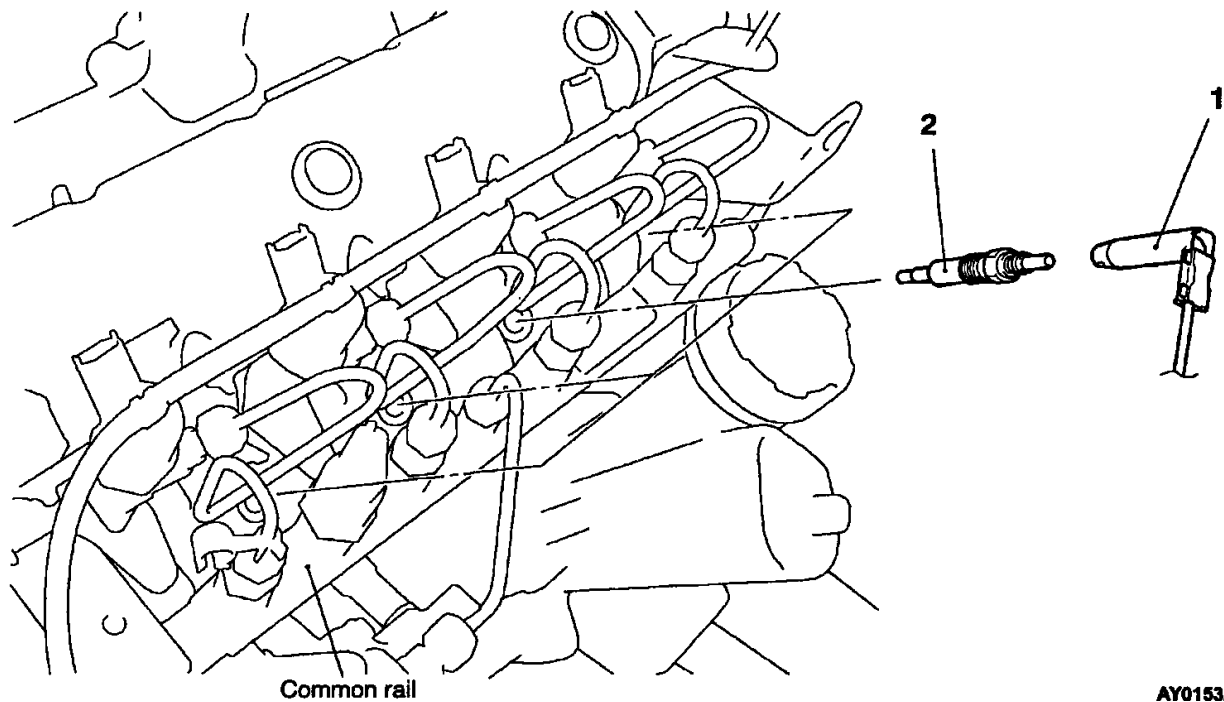
The voltage generated time (continuity time) varies depending on the engine coolant temperature when the ignition switch is ON.



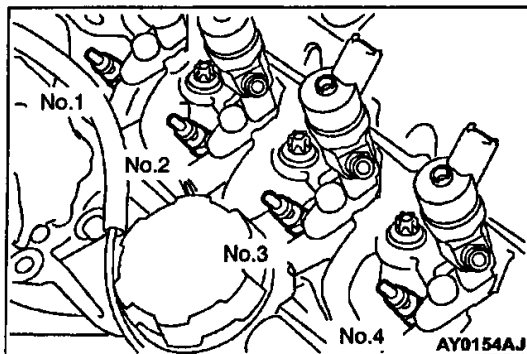
GLOW PLUG CHECK

1. Remove the glow plug leads.
2. Measure the resistance between the glow plug terminals and the body.

Standard value: 0.6 Ω

GLOW PLUG**REMOVAL AND INSTALLATION****Removal steps**

1. Glow plug connector connection
2. Glow plug

**REMOVAL SERVICE POINT****◀A▶ GLOW PLUG (NO.1) REMOVAL**

After removing the common rail, remove the glow plug (No.1). (Refer to GROUP 13D – Injection Pump and Nozzle)

ENGINE AND EMISSION CONTROL

CONTENTS

ENGINE CONTROL SYSTEM	2	Purge Port Vacuum Check <GDI>	6
GENERAL	2	Purge Port Vacuum Check <MPI>	6
Outline of Change	2	EMISSION CONTROL SYSTEM	
ACCELERATOR PEDAL		<F9Q1>	7
<4G93-GDI, F9Q1>	2	GENERAL	7
EMISSION CONTROL SYSTEM	3	Outline of Change	7
GENERAL	3	GENERAL INFORMATION	7
Outline of Changes	3	SERVICE SPECIFICATIONS	7
VACUUM HOSE	3	EXHAUST GAS RECIRCULATION (EGR)	
Vacuum Hose Piping Diagram	3	SYSTEM	8
Vacuum Circuit Diagram	4	General Information	8
EVAPORATIVE EMISSION CONTROL		Operation	8
SYSTEM	5	System Diagram	8
System Diagram	5	EGR Valve Check	8
Purge Control System Check <GDI>	6	EGR Valve Position Sensor Check	9
Purge Control System Check <MPI>	6	CATALYTIC CONNVERTER	10

ENGINE CONTROL SYSTEM

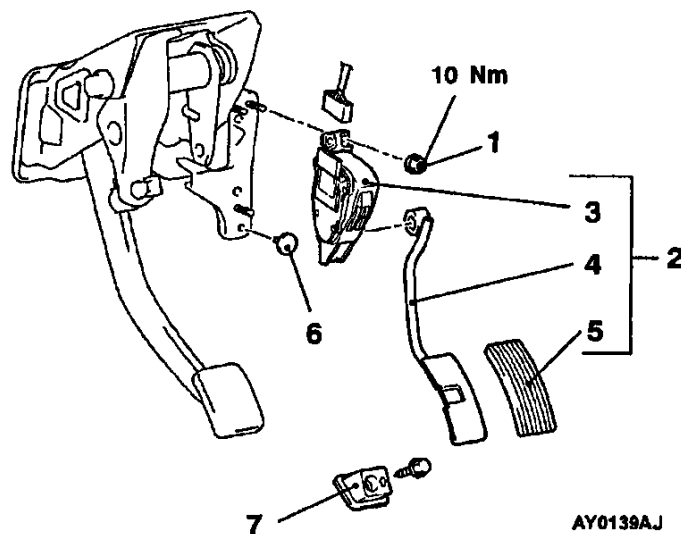
GENERAL

OUTLINE OF CHANGE

The following service procedures have been established to correspond to the addition of the F9Q diesel engine. Other service procedures are the same as before.

ACCELERATOR PEDAL < F9Q >

REMOVAL AND INSTALLATION



Removal steps

1. Accelerator pedal assembly mounting bolts or nuts	4. Accelerator pedal
2. Accelerator pedal assembly	5. Pedal pad
3. Accelerator pedal position sensor	6. Stopper
	7. Accelerator pedal stopper

EMISSION CONTROL SYSTEM

GENERAL

OUTLINE OF CHANGE

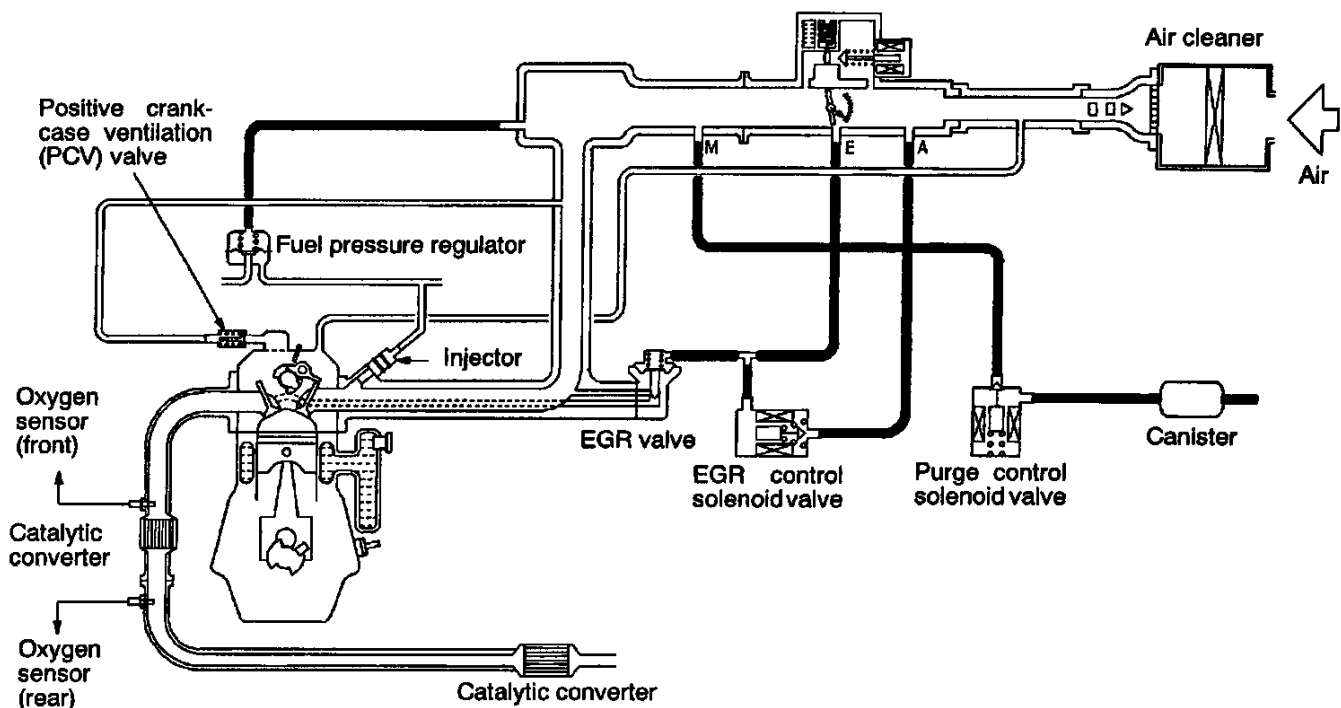
The following service procedures have been established to correspond to the following changes.

- The colours of the purge control vacuum hoses have been changed.
- EGR control vacuum hose piping has been changed. <MPI>
- The purge control ports have been relocated. <MPI>

VACUUM HOSE

VACUUM HOSE PIPING DIAGRAM

<MPI>



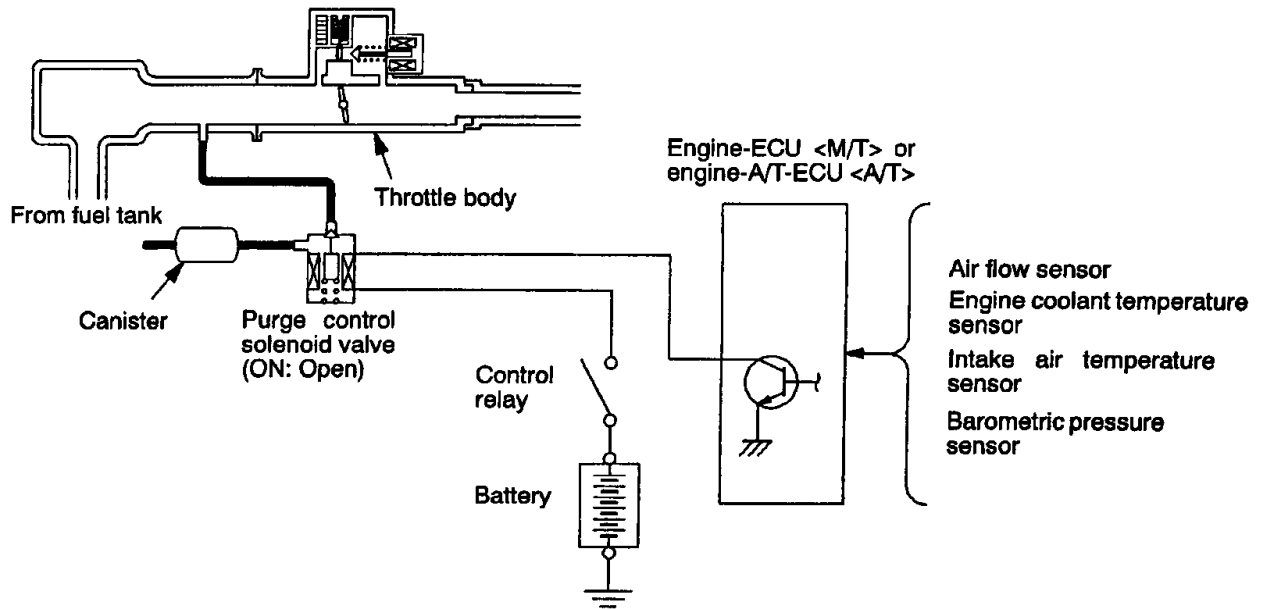
Y60258N

EVAPORATIVE EMISSION CONTROL SYSTEM

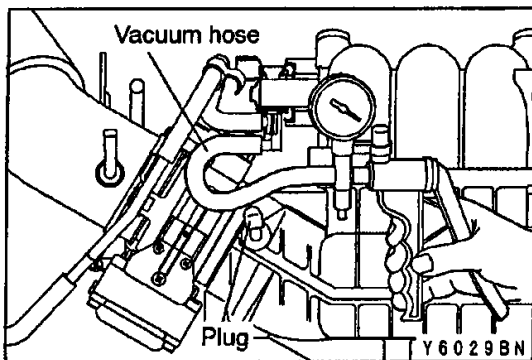
SYSTEM DIAGRAM

The purge control port has been relocated.

<MPI>

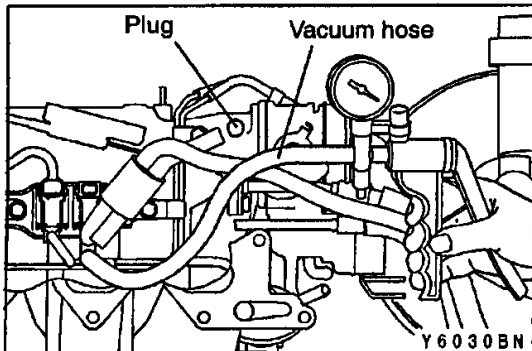


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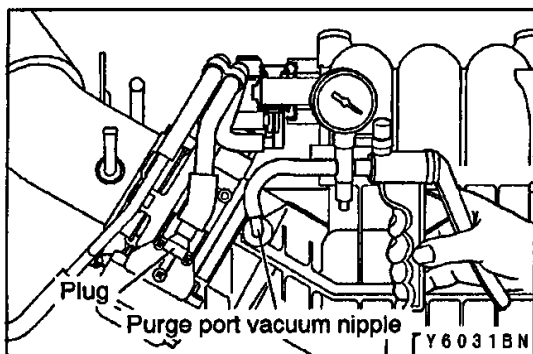
PURGE CONTROL SYSTEM CHECK <GDI>

1. The red stripe on the vacuum hose has been discontinued. However, the inspection procedure is the same as before.



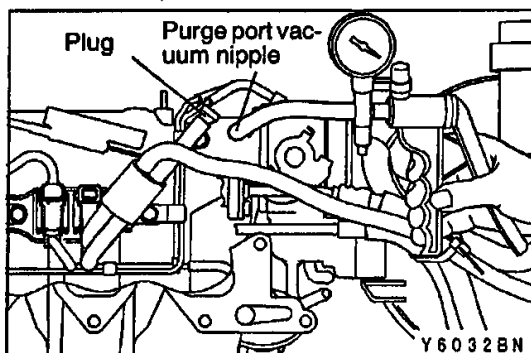
PURGE CONTROL SYSTEM CHECK <MPI>

1. The red stripe on the vacuum hose has been discontinued, and the vacuum port has been relocated. However, the inspection procedure is the same as before.



PURGE PORT VACUUM CHECK <GDI>

1. The red stripe on the vacuum hose has been discontinued. However, the inspection procedure is the same as before.



PURGE PORT VACUUM CHECK <MPI>

1. The red stripe on the vacuum hose has been discontinued, and the vacuum port has been relocated. However, the inspection procedure is the same as before.

EMISSION CONTROL SYSTEM <F9Q>

GENERAL

OUTLINE OF CHANGE

The following service procedures have been established to correspond to the adoption of the F9Q engine.

GENERAL INFORMATION

The electronically-controlled EGR system consists of an EGR valve, the engine-ECU and various sensors. The EGR valve is optimally controlled by the engine-ECU in response to the engine operation

conditions, based on data input from each of the sensors. In this way, the EGR valve is controlled to reduce NOx emissions while maintaining good engine performance.

Items	Name	Specification
Exhaust emission control system	Exhaust gas recirculation system • EGR valve • EGR valve position sensor	Electronically-controlled EGR system Electric motor type Potentiometer type

SERVICE SPECIFICATIONS

Items	Standard value
EGR valve resistance Ω (at 20°C)	7.5 – 8.5
EGR valve position sensor resistance Ω (at 20°C)	2.4 – 5.6

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

GENERAL INFORMATION

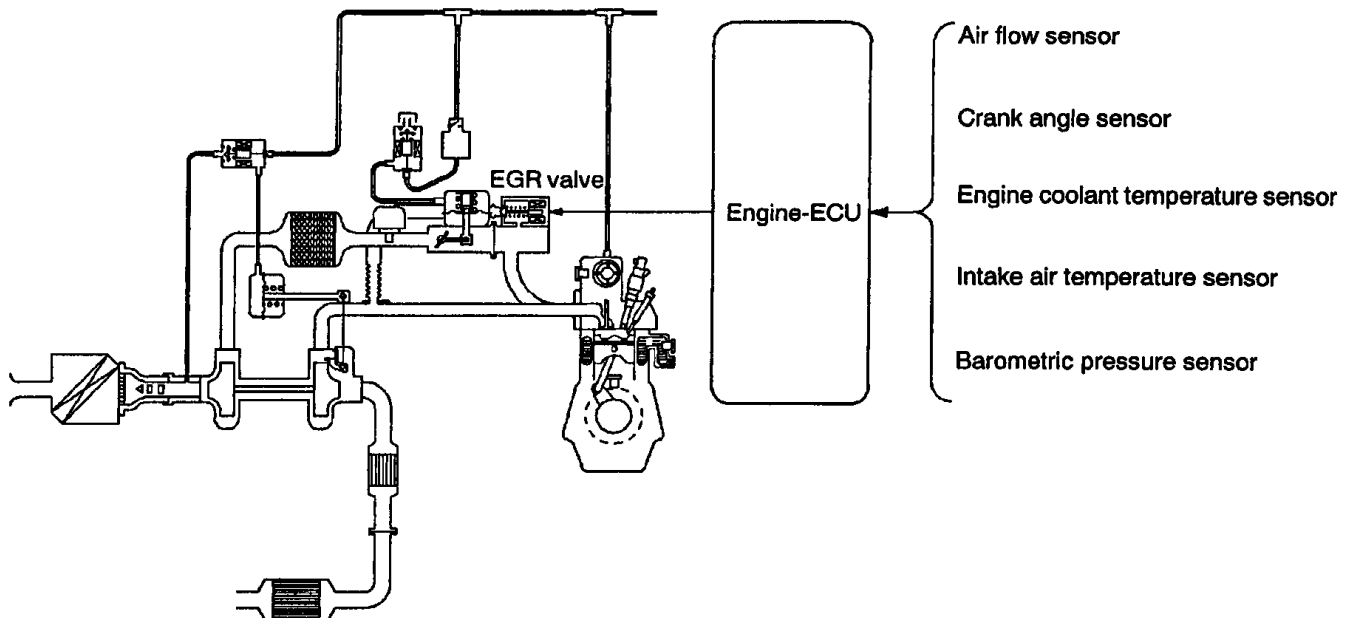
The electronically-controlled EGR system consists of an EGR valve, engine-ECU and various sensors. The EGR valve is optimally controlled by the engine-ECU in response to the engine operation conditions, based on data input from each of the sensors. In this way, the EGR valve is controlled to reduce NOx emissions while maintaining good engine performance.

OPERATION

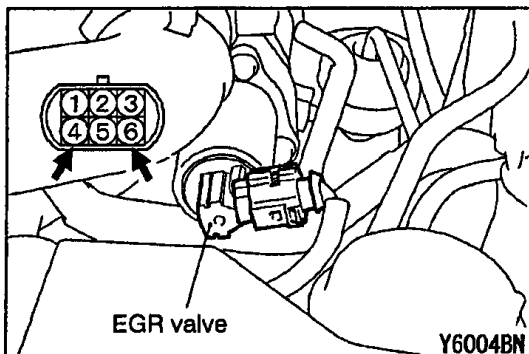
The EGR valve is being closed and does not recirculate exhaust gases under one of the following conditions. Otherwise, the EGR valve is opened and recirculates exhaust gases.

- The engine coolant temperature is low.
- The throttle valve is widely opened.

SYSTEM DIAGRAM



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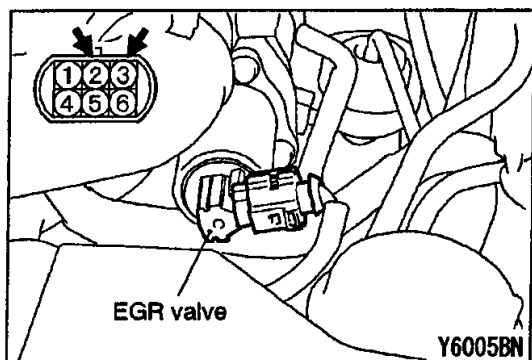


EGR VALVE CHECK

1. Disconnect the EGR valve connector.
2. Measure the resistance between the EGR valve side connector terminal 4 and terminal 6.

Standard value: 7.5 – 8.5 Ω (at 20°C)

3. If the resistance is outside the standard value, replace the EGR valve.

**EGR VALVE POSITION SENSOR CHECK**

1. Disconnect the EGR valve connector.
2. Measure the resistance between the EGR valve side connector terminal 2 and terminal 3.

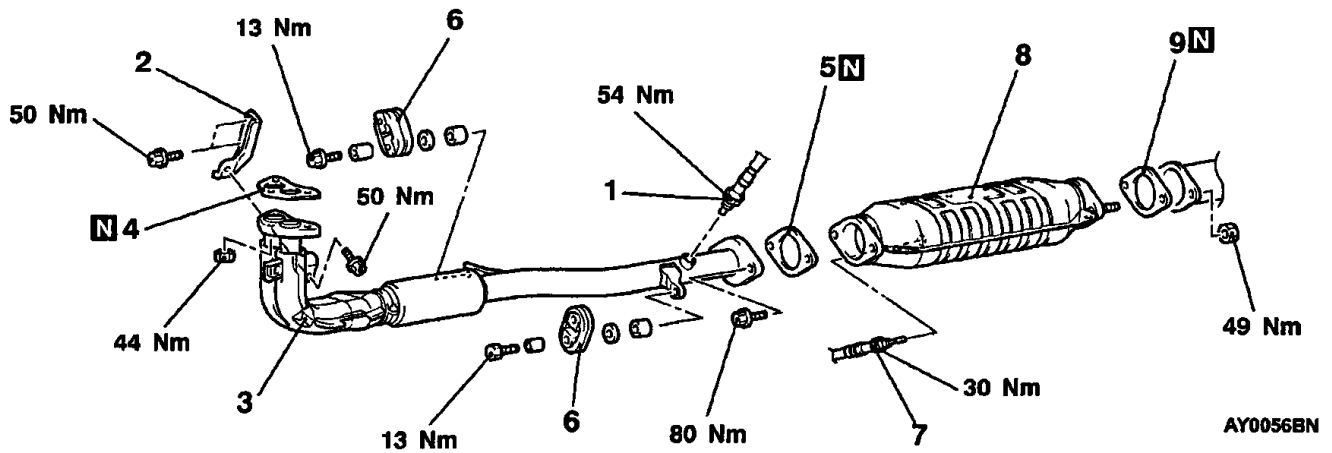
Standard value: 2.4 – 5.6 Ω (at 20°C)

3. If the resistance is outside the standard value, replace the EGR valve.

CATALYTIC CONVERTER

REMOVAL AND INSTALLATION

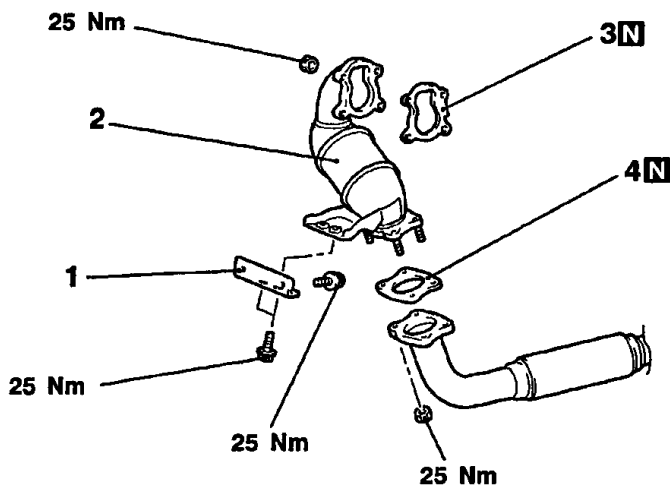
<4G93-GDI>



Removal steps

1. Oxygen censer	6. Hunger
2. Front exhaust pipe bracket	7. Catalyst temperature sensor <M/T>
3. Front exhaust pipe	8. Catalytic converter
4. Gasket	9. Gasket
5. Gasket	

<F9Q>



Removal steps

1. Bracket	3. Gasket
2. Catalytic converter	4. Gasket

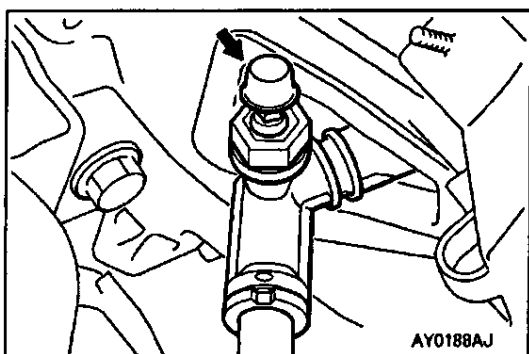
GROUP 21

CLUTCH

GENERAL

OUTLINE OF CHANGE

- The following service procedures have been added due to the introduction of the F5MV1 type transmission.
- “NOTE” has been added in the clutch pedal service procedure.
- The clutch switch inspection has been added due to the introduction of the F5MV1 type transmission.
- The clutch control has been changed due to the introduction of the F5MV1 type transmission.



ON-VEHICLE SERVICE <F9Q>

BLEEDING

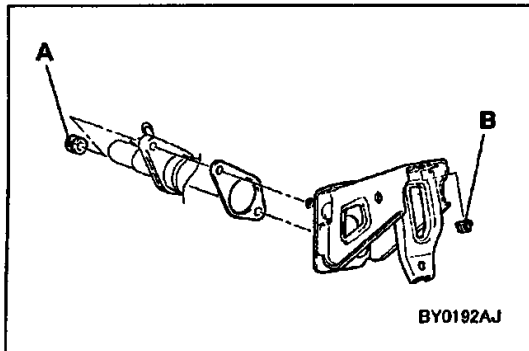
Specified brake fluid: DOT 3 or DOT 4

Caution

Avoid using a mixture of the specified fluid and other fluid, otherwise the clutch fluid will deteriorate resulting clutch fault.

CLUTCH PEDAL

The descriptions other than the installation service points below are the same as before.



INSTALLATION SERVICE POINT

►A◄ MASTER CYLINDER MEMBER ASSEMBLY

Tighten the clutch master cylinder mounting nuts (A), and then the master cylinder member assembly mounting bolts (B).

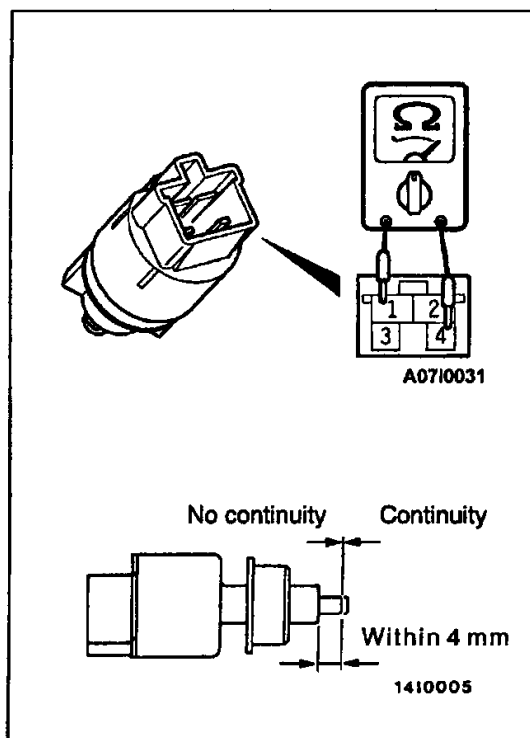
NOTE

The master cylinder member assembly can not be positioned correctly if the pedal mounting bolts (B) are tightened first as the their holes are oblong holes.

INSPECTION <F9Q>

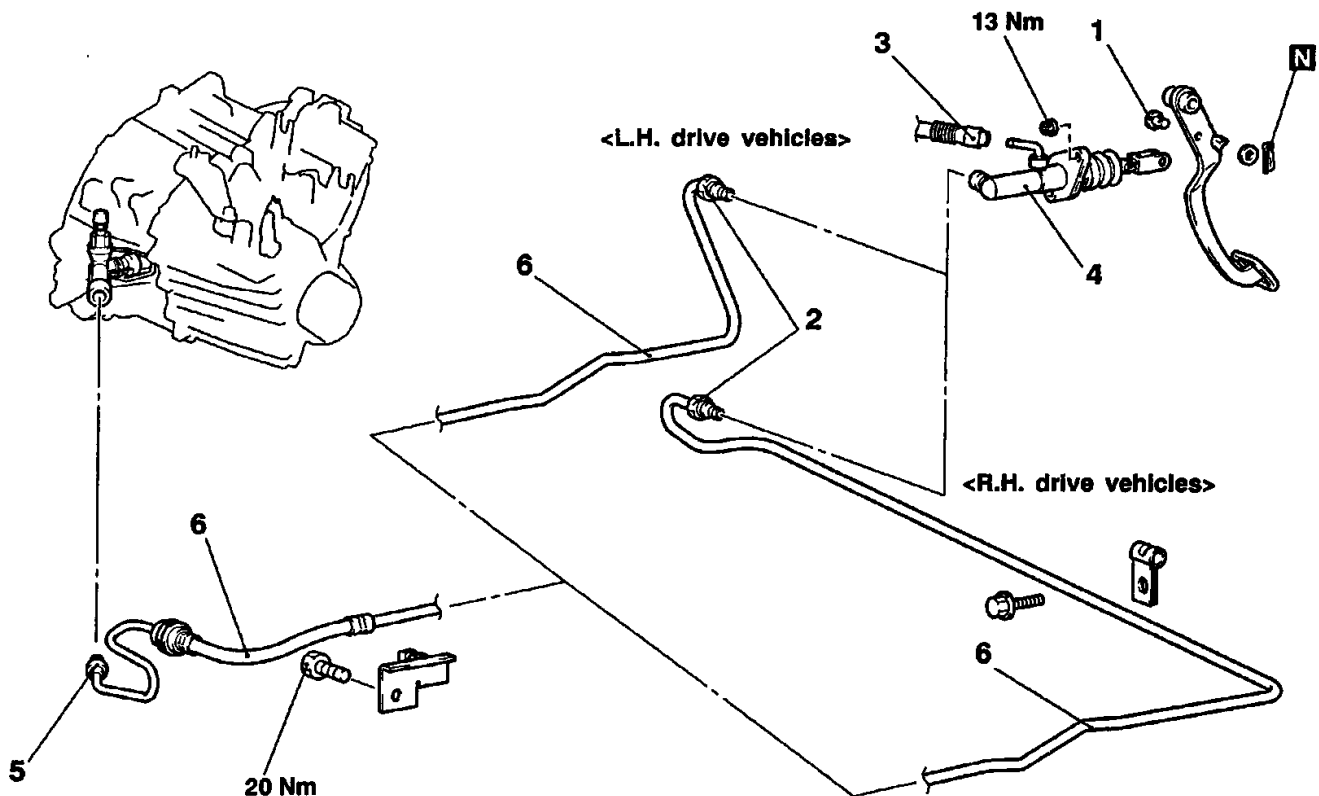
CLUTCH SWITCH CHECK

1. Connect an ohmmeter to the clutch switch connector terminals.
2. Continuity should not exist when the plunger is pushed within 4 mm from the outer case end. Then, if the plunger is released, continuity will exist again.



CLUTCH CONTROL <F9Q>**REMOVAL AND INSTALLATION****Pre-removal Operation**
Clutch Fluid Draining**Post-Installation Operation**

- Clutch Fluid Supplying
- Clutch Line Bleeding (Refer to P.21-1)
- Clutch Pedal Adjustment



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Clutch master cylinder removal steps

- Battery and battery tray
 - Intercooler pipe (Refer to GROUP 15 – Intercooler)
 - Air cleaner
 - Transmission mount and transmission mount bracket (Refer to GROUP 22 – Manual Transmission)
 - Fuel filter
1. Clevis pin

2. Clutch tube connection (master cylinder side)
3. Reservoir hose connection
4. Clutch master cylinder

Clutch line removal steps

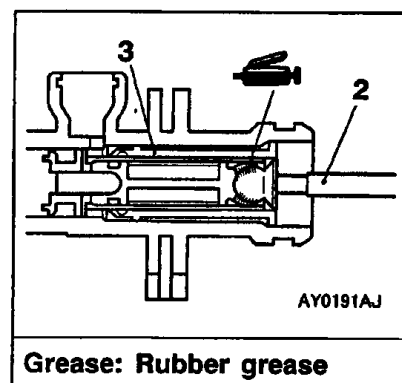
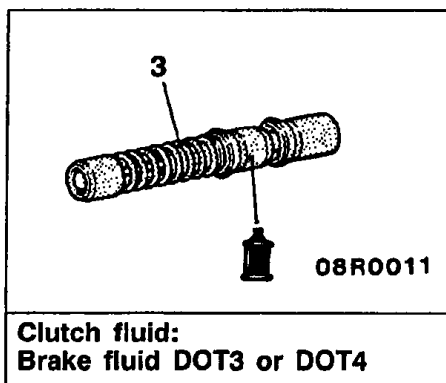
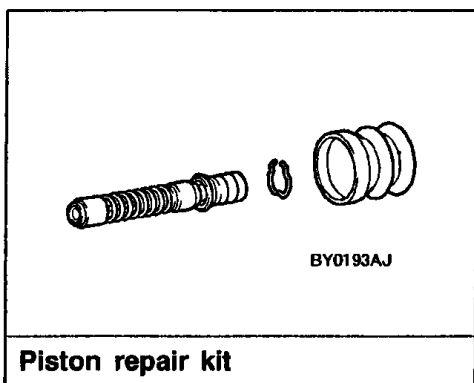
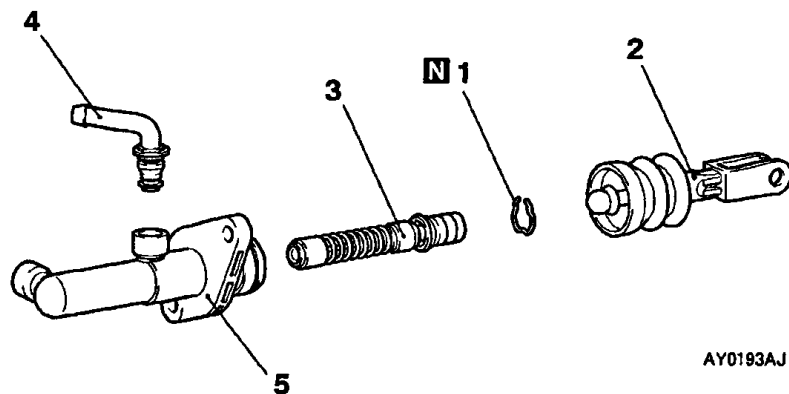
5. Clutch tube connection (transmission side)
6. Clutch tube assembly

DISASSEMBLY AND REASSEMBLY

CLUTCH MASTER CYLINDER

Caution:

Do not disassemble piston assembly. The piston assembly can not be reassembled.



Disassembly steps



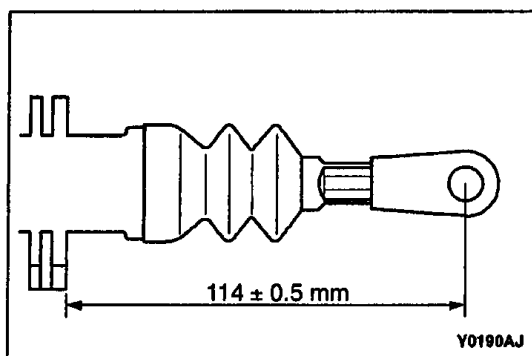
1. Piston stopper ring
2. Push rod assembly
3. Piston assembly

4. Connector
5. Clutch master cylinder body

INSTALLATION SERVICE POINT

◀A▶ PUSH ROD ASSEMBLY INSTALLATION

Set the length of the push rod assembly to the shown dimension to make the adjustment of the clutch pedal easier.



MANUAL TRANSMISSION

CONTENTS

GENERAL INFORMATION	2	Transmission Oil Level Check	3
LUBRICANTS	2	Transmission Oil Change	3
SEALANT	2	TRANSMISSION CONTROL*	4
SPECIAL TOOLS	3	Shift Lever Assembly	5
ON-VEHICLE SERVICE	3	TRANSMISSION ASSEMBLY	6

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or 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) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) 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 or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

GENERAL INFORMATION

The following service procedures have been added due to the addition of the F5MV1-type transmission.

Items		Specifications
Model		F5MV1
Type		Manual, 5-speed, Front wheel drive
Gear ratio	1st	3.385
	2nd	1.905
	3rd	1.194
	4th	0.868
	5th	0.652
	Reverse	3.298
Final reduction ratio		3.773

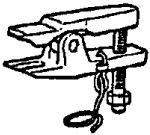
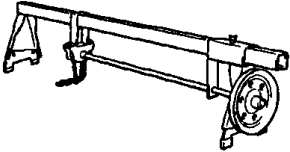
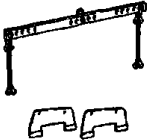
LUBRICANTS

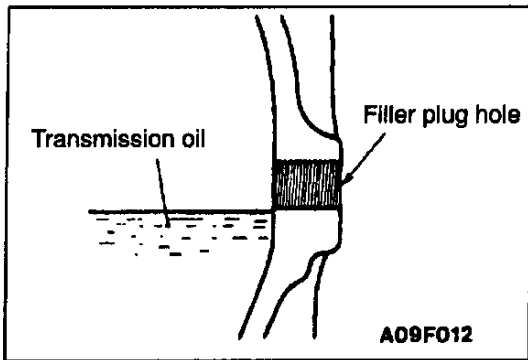
Item	Specified lubricant	Quantity L
Transmission oil	Volvo oil 97308	2.1

SEALANT

Item	Specified sealant	Remark
Drive shaft spring pin	mitsubishi genuine part MD970389 or equivalent	Semi-drying sealant

SPECIAL TOOLS

Tool	Number	Name	Use
	MB990635 or MB991113	Steering linkage puller	Supporting the engine assembly during removal and installation of the transmission
	GENERAL SERVICE TOOL MZ203827	Engine lifter	
	MB991453	Engine hanger	



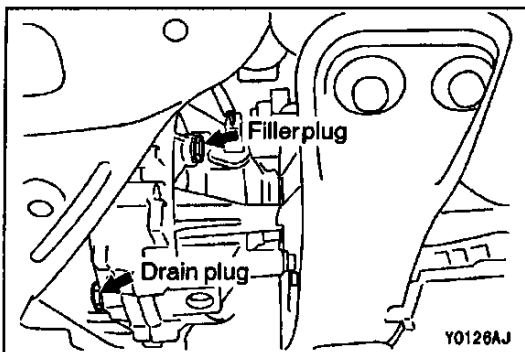
ON-VEHICLE SERVICE

TRANSMISSION OIL LEVEL CHECK

Inspect each component for evidence of leakage, and check the oil level by remaining the filler plug. If the oil is contaminated, it is necessary to replace it with new oil.

1. Oil level should be at the lower portion of the filler plug hole.
2. Check that the transmission oil is not noticeably dirty, and that it has a suitable viscosity.
3. Tighten filler plug to specified torque.

Tightening torque: 35 Nm



TRANSMISSION OIL CHANGE

1. Remove transmission drain plug.
2. Drain oil.
3. Tighten drain plug to specified torque.

Tightening torque: 35 Nm

4. Remove filler plug and fill with specified oil till the level comes to the lower portion of filler plug hole.

Specified oil: Volvo oil 97308

Quantity: 2.1 L

5. Tighten filler plug to specified torque.

Tightening torque: 35 Nm

TRANSMISSION CONTROL

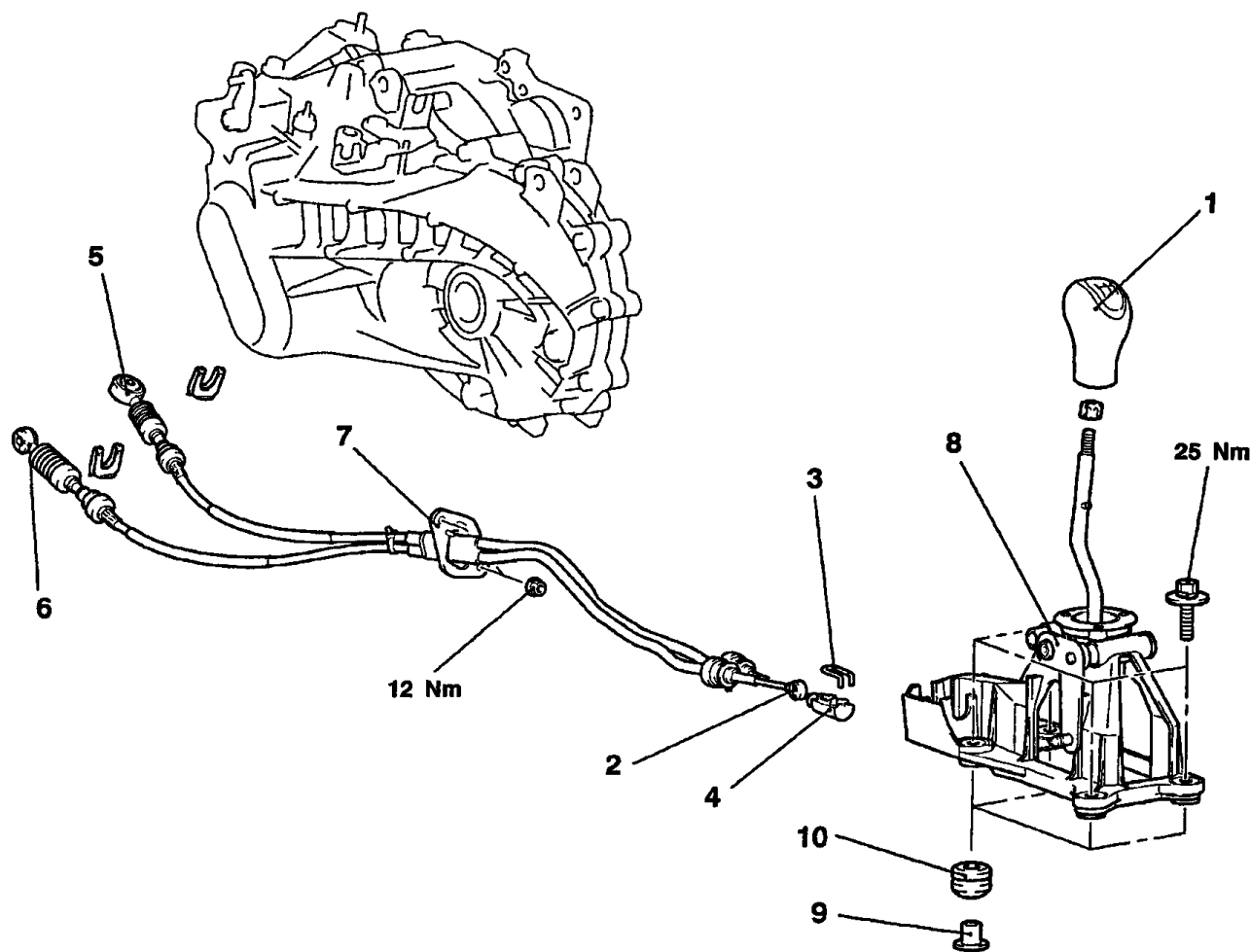
REMOVAL AND INSTALLATION

Caution: SRS

Be careful not to subject the SRS-ECU to any shocks during removal and installation of the shift lever assembly, shift cable and select cable assembly.

Pre-removal and Post-Installation Operation

- Air Cleaner Assembly Removal and Installation
- Floor Console Box Removal and Installation (Refer to GROUP 52A.)
- Transmission Mount Lower Bracket Removal and Installation (Refer to GROUP 32.)



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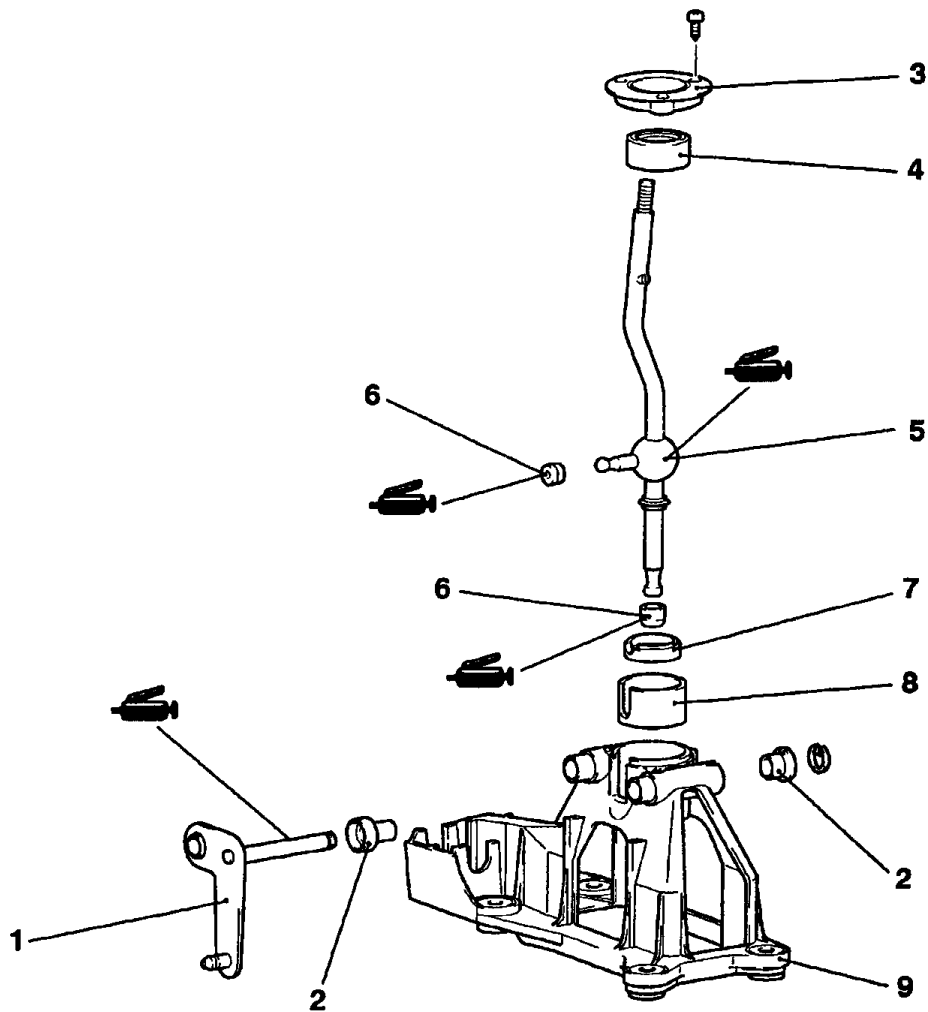
Shift cable and select cable assembly removal steps

2. Select cable connection (passenger compartment side)
3. Clip
4. Shift cable connection (passenger compartment side)
5. Select cable connection (Transmission side)
6. Shift cable connection (Transmission side)
7. Shift cable and select cable assembly

Shift lever assembly removal steps

1. Shift knob
2. Select cable connection (passenger compartment side)
3. Clip
4. Shift cable connection (passenger compartment side)
8. Shift lever assembly
9. Distance piece
10. Bushing

SHIFT LEVER ASSEMBLY DISASSEMBLY AND REASSEMBLY



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Disassembly steps

1. Lever
2. Bushing
3. Cap
4. Ball socket
5. Gear lever

6. Ball seat
7. Ball socket
8. Shroud insulation
9. Housing

TRANSMISSION ASSEMBLY

REMOVAL AND INSTALLATION

Caution

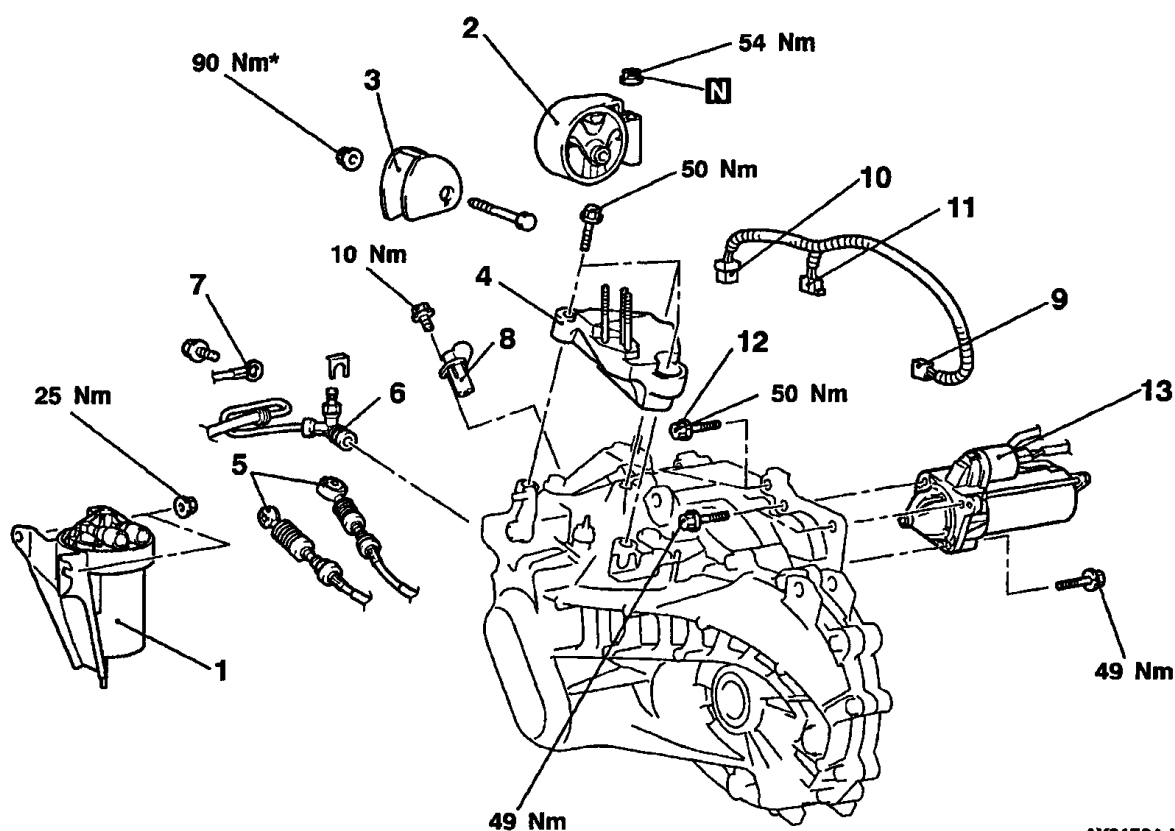
In order to prevent the insulator from being damaged, mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

Pre-removal Operation

- Transmission Oil Draining (Refer to P.22-3.)
- Under Cover Removal
- Air Cleaner Assembly Removal
- Battery Removal
- Intercooler Hose Removal (Refer to GROUP 15.)

Post-installation Operation

- Intercooler Hose Installation (Refer to GROUP 15.)
- Battery Installation
- Air Cleaner Assembly Installation
- Under Cover Installation
- Transmission Oil Supplying (Refer to P.22-3.)
- Shift Lever Operation Check
- Speedometer Operation Check



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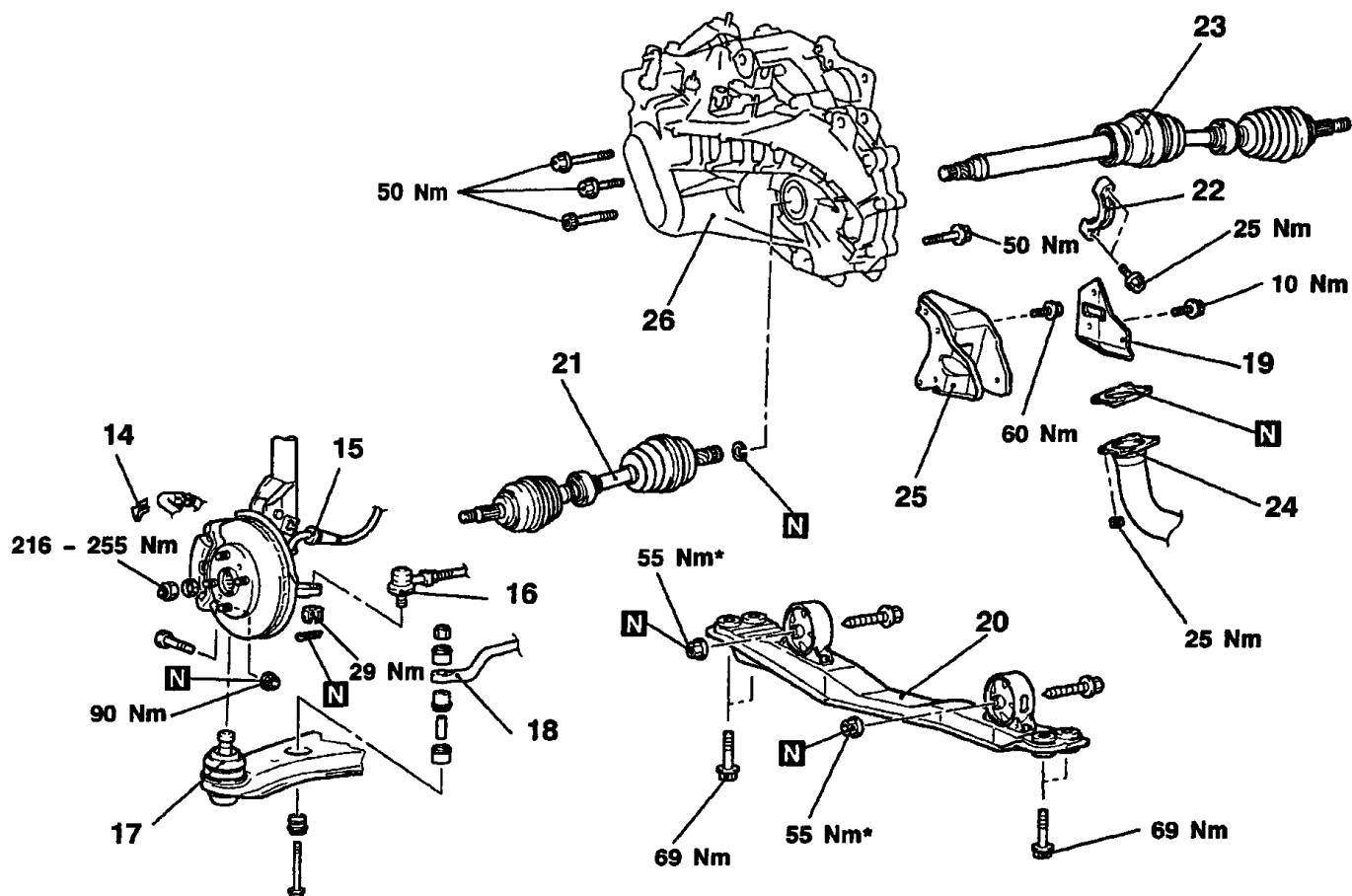
Removal steps

1. Fuel filter (Refer to GROUP 13D)
2. Transmission mount
3. Transmission mount stopper
4. Transmission mount lower bracket
5. Transmission control cable (transmission side)
6. Clutch tube connection
7. Earth cable

8. Crank angle sensor
9. Speed sensor connector
10. Backup lamp switch connector
11. Control harness and sub-harness connection
12. Transmission upper mounting bolt
13. Starter

◀A▶

▶B◀



AY0177AJ

Lifting up of the vehicle

- 14. Brake hose clamp
- 15. Wheel speed sensor cable connection <Vehicles with ABS>
- 16. Tie rod end connection
- 17. Lower arm ball joint connection
- 18. Stabilizer bar connection
- 19. Heat protector

◀B▶

▶A◀

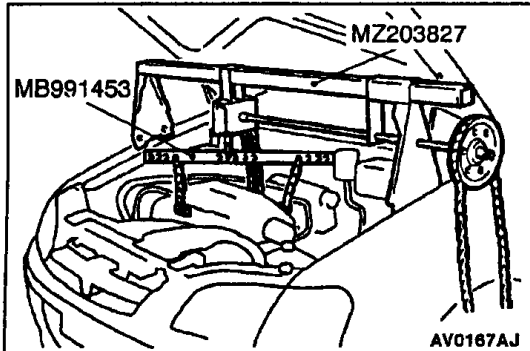
◀C▶

◀C▶

- 20. Center member assembly
- 21. Drive shaft <L.H.> connection
- 22. Bearing bracket
- 23. Drive shaft <R.H.> connection
- 24. Front exhaust pipe connection
- 25. Rear roll stopper bracket
- 26. Transmission assembly

REMOVAL SERVICE POINTS**◀A▶ TRANSMISSION MOUNT BRACKET REMOVAL**

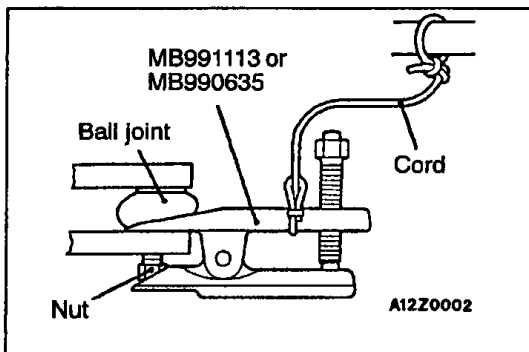
Jack up the transmission assembly gently with a garage jack, and then remove the transmission mount bracket.

**◀B▶ ENGINE ASSEMBLY SUPPORTING**

Set the special tool to the vehicle to support the engine assembly.

◀C▶ TIE ROD END DISCONNECTION**Caution**

1. Loosen the nut only; do not remove it from the ball joint. Otherwise ball joint thread will be damaged.
2. The special tool should be suspended by a cord to prevent it from coming off.

**◀D▶ DRIVE SHAFT <L.H.>/DRIVE SHAFT <R.H.> DISCONNECTION**

1. Insert a pry bar between the transmission case and the drive shaft as shown to remove the drive shaft.

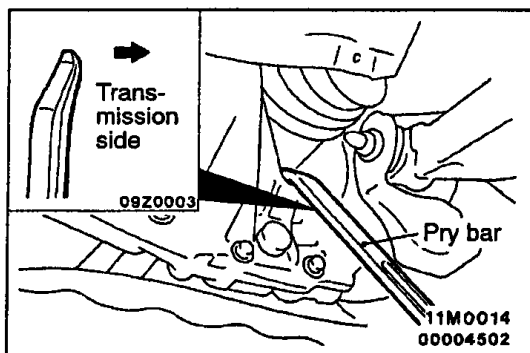
NOTE

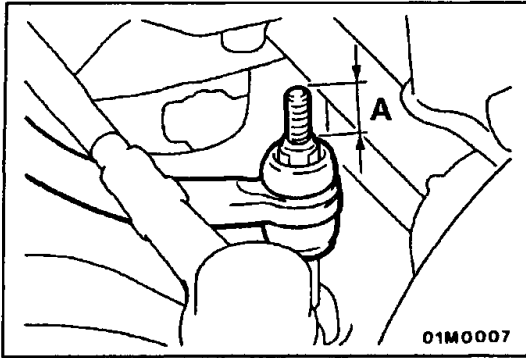
Do not remove the hub and knuckle from the drive shaft.

Caution

Always use a pry bar, or the T.J. will be damaged.

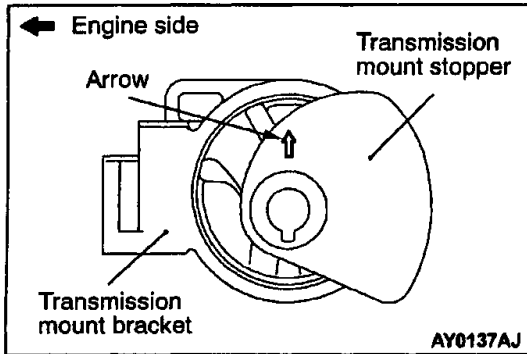
2. Suspend the removed drive shaft with a wire so that there are no sharp bends in any of the joints.
3. Use a shop towel to cover the transmission case not to let foreign material get into it.



**INSTALLATION SERVICE POINTS****►A◄ STABILIZER BAR INSTALLATION**

Tighten the self-locking nut so that the stabilizer bar mounting bolt protrudes as shown.

Standard value (A): 22 mm

**►B◄ TRANSMISSION MOUNT STOPPER INSTALLATION**

Install the transmission mount stopper so that the arrow points as shown in the illustration.

AUTOMATIC TRANSMISSION

CONTENTS

GENERAL	2	ON-VEHICLE SERVICE	26
Outline of Changes	2	Key Interlock Mechanism Check	26
GENERAL INFORMATION	2	Shift Lock Mechanism Check	27
LUBRICANT	2	Transmission Control Cable Adjustment	27
TROUBLESHOOTING	2	Shift Switch Assembly Continuity Check	28
<A/T>	2	TRANSMISSION CONTROL*	29
<A/T Key Interlock and Shift Lock		SHIFT LOCK AND KEY INTERLOCK	
Mechanisms>	24	MECHANISMS*	32

WARNINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

WARNING!

- (1) Improper service or maintenance of any component of the SRS, or 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) Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.
- (3) 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 or any SRS-related component.

NOTE

The SRS includes the following components: SRS-ECU, SRS warning lamp, air bag module, clock spring and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

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 sports mode is now available on some GDI engine vehicles.
- The final reduction ratio has been changed.
- On GDI engine vehicles, the ECU has been changed from the A/T-ECU to the engine-A/T-ECU.
- The shift pattern has been changed.
- The A/T key interlock and shift lock mechanisms have been added.

GENERAL INFORMATION

Transmission model	F4A41	F4A42
Engine model	4G9-MPI	4G9-GDI
Final reduction ratio	4.406	4.041

LUBRICANT

Items	Specified lubricant	Quantity L
Transmission fluid	DIA QUEEN ATF SP II M, ATF SP III or equivalent	7.8

TROUBLESHOOTING <A/T>

ROAD TEST

The road test procedure has been established due to the addition of models with sports mode.

*: Refer to '96 CARISMA Workshop Manual (Pub No. PWDE9502).

Check by the following procedure.

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
1	Ignition switch: OFF	Ignition switch (1) ON	Data list No. 54 Battery voltage [V]	Control relay	54	A/T Control relay system (23-15)
2	Ignition switch: ON Engine: Stopped Selector lever position: P	Selector lever position (1) P, (2) R, (3) N, (4) D	Data list No. 61 (1) P, (2) R, (3) N, (4) D	Inhibitor switch	–	Inhibitor switch system (23-17)
		Selector lever position (1) D (1st gear) (2) Selector sports mode (1st gear) (3) Upshift and hold the selector lever (2nd gear) (4) Downshift and hold the selector lever (1st gear)	Data list No.67 No.68 No.69 (1) OFF OFF OFF (2) ON OFF OFF (3) ON ON OFF (4) ON OFF ON Shift indicator lamp (1) D and 1 illuminate (2) Only 1 illuminates (3) Only 2 illuminates (4) Only 1 illuminates	Select switch Upshift switch Downshift switch	–	Shift switch assembly system (23-18)

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
2	Ignition switch: ON Engine: Stopped Selector lever position: P	Accelerator pedal (1) Released (2) Half depressed (3) Depressed	Data list No. 11 (1) 400 – 1,000 mV (2) Gradually rises from (1) (3) 4,500 – 5,000 mV	Accelerator pedal position sensor	11 12 14	Accelerator pedal position sensor system (23-8)
			Data list No. 25 (1) OFF (2) ON	Wide open throttle switch	25	Wide open throttle switch system (23-11)
		Brake pedal (1) Depressed (2) Released	Data list No. 26 (1) ON (2) OFF	Stop lamp switch	26	Stop lamp switch system (23-12)
3	Ignition switch: ST Engine: Stopped	Starting test with lever P or N range	Starting should be possible	Starting possible or impossible	—	Starting impossible (23-27)*
4	Warming up	Drive for 15 minutes or more so that the A/T fluid temperature becomes 70 – 80°C.	Data list No. 15 Gradually rises to 70 – 80°C	A/T fluid temperature sensor	15	A/T fluid temperature sensor system (23-9)
5	Engine: Idling Selector lever position: N Engine: Idling Selector lever position: N	Brake pedal (Retest) (1) Depressed (2) Released	Data list No. 26 (1) ON (2) OFF	Stop lamp switch	26	Stop lamp switch system (23-12)
		A/C switch (1) ON (2) OFF	Data list No. 65 (1) ON (2) OFF	Dual pressure switch	—	Dual pressure switch system (23-19)
		Accelerator pedal (1) Released (2) Half depressed	Data list No. 21 (1) 550 – 850 r/min Gradually rises from (1)	Crank angle sensor	21	Crank angle sensor system (23-9)
		Selector lever position (1) N → D (2) N → R	Should be no abnormal shifting shocks Time lag should be within 2 seconds	Malfunction when starting	—	Engine stalling during shifting (23-29)*
					—	Shocks when changing from N to D and large time lag (23-29)*
					—	Shocks when changing from N to R and large time lag (23-30)*
					—	Shocks when changing from N to D, N to R and large time lag (23-31)*

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
5	Engine: Idling Selector lever position: N	Selector lever position (1) N → D (2) N → R	Should be no abnormal shifting shocks Time lag should be within 2 seconds	Driving impossible	–	Does not move forward (23-27)*
					–	Does not reverse (23-28)*
					–	Does not move (forward or reverse) (23-28)*
6	Selector lever position: Sports mode (Carry out on a flat and straight road.)	Selector lever position and vehicle speed (1) Idling in 1st (Vehicle stopped) (2) Driving at constant speed of 10 km/h in 1st (3) Driving at constant speed of 30 km/h in 2nd (4) Driving at 50 km/h in 3rd with accelerator fully closed (5) Driving at constant speed of 50 km/h in 4th (Each condition should be maintained for 10 seconds or more.)	Data list No. 63 (2) 1st, (4) 3rd, (3) 2nd, (5) 4th	Shift condition	–	–
			Data list No. 31 (2) 0 %, (4) 100 %, (3) 100 %, (5) 100 %	Low and reverse solenoid valve	31	Low and reverse solenoid valve system (23-12)
			Data list No. 32 (2) 0 %, (4) 0 %, (3) 0 %, (5) 100 %	Underdrive solenoid valve	32	Underdrive solenoid valve system (23-12)
			Data list No. 33 (2) 100 %, (4) 100 %, (3) 0 %, (5) 0 %	Second solenoid valve	33	Second solenoid valve system (23-12)
			Data list No. 34 (2) 100 %, (4) 0 %, (3) 100 %, (5) 0 %	Overdrive solenoid valve	34	Overdrive solenoid valve system (23-12)
			Data list No. 29 (1) 0 km/h (4) 50 km/h	Vehicle speed sensor	–	Vehicle speed sensor system (23-19)
			Data list No. 22 (4) 1,800 – 2,100 r/min	Input shaft speed sensor	22	Input shaft speed sensor system (23-10)
			Data list No. 23 (4) 1,800 – 2,100 r/min	Output shaft speed sensor	23	Output shaft speed sensor system (23-11)
7	Selector lever position: Sports mode (Carry out on a flat and straight road.)	Selector lever position and vehicle speed (1) Release the accelerator pedal fully while driving at 50 km/h in 3rd gear. (2) Driving at constant speed of 50 km/h in 3rd gear.	Data list No. 36 (1) 0 % (2) Approx. 70 – 90 %	Damper clutch control solenoid valve	36 52	Damper clutch control solenoid valve system (23-13)
			Data list No. 52 (1) Approx. 100 – 300 r/min (2) Approx. 0 – 10 r/min			

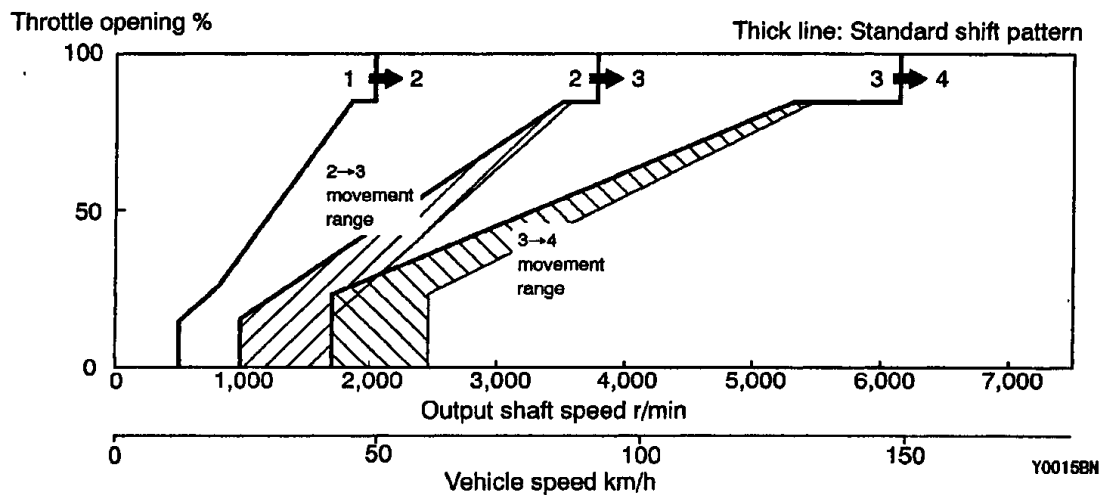
No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
8	Use the MUT-II to stop the INVECS-II function. Selector lever position: D (Carry out on a flat and straight road.)	Monitor data list No. 11, 23, and 63 with the MUT-II. (1) Accelerate to 4th gear at a throttle position sensor output of 1.5V (accelerator opening angle of 30 %). (2) Gently decelerate to a standstill. (3) Accelerate to 4th gear at a throttle position sensor output of 2.5 V (accelerator opening angle of 50%). (4) While driving at 60 km/h in 4th gear, shift down to 3rd (5) While driving at 40 km/h in 3rd gear, shift down to 2nd (6) While driving at 20 km/h in 2nd gear, shift down to 1st	For (1), (2) and (3), the reading should be the same as the specified output shaft speed and no abnormal shocks should occur. For (4), (5) and (6), downshifting should occur immediately after the shifting operation is made.	Malfunction when shifting	—	Shocks and running up (23-31)*
				Displaced shifting points	—	All points (23-32)*
					—	Some points (23-33)*
				Does not shift	—	No diagnosis code (23-33)*
					22	Input shaft speed sensor system (23-10)
					23	Output shaft speed sensor system (23-11)
				Does not shift from 1 to 2 or 2 to 1	31	Low and reverse solenoid valve system (23-9)
					33	Second solenoid valve system (23-9)
					41	1st gear ratio is not specified (23-14)
					42	2nd gear ratio is not specified (23-14)
				Does not shift from 2 to 3 or 3 to 2	33	Second solenoid valve system (23-9)
					34	Overdrive solenoid valve system (23-9)
					42	2nd gear ratio is not specified (23-14)
					43	3rd gear ratio is not specified (23-14)
				Does not shift from 3 to 4 or 4 to 3	32	Underdrive solenoid valve system (23-9)
					33	Second solenoid valve system (23-9)
					43	3rd gear ratio is not specified (23-14)
					44	4th gear ratio is not specified (23-14)

No.	State prior to test and operation	Test and operation	Judgement value	Check item	Diagnosis code No.	Inspection procedure page if there is an abnormality
9	Selector lever position: N (Carry out on a flat and straight road.)	Monitor data list No. 22 and No. 23 with the MUT-II. (1) Move selector lever to R range, drive at constant speed of 10 km/h.	The ratio between data list No. 22 and No. 23 should be the same as the gear ratio when reversing.	Does not shift	22	Input shaft speed sensor system (23-10)
					23	Output shaft speed sensor system (23-11)
					46	Reverse gear ratio is not specified (23-14)

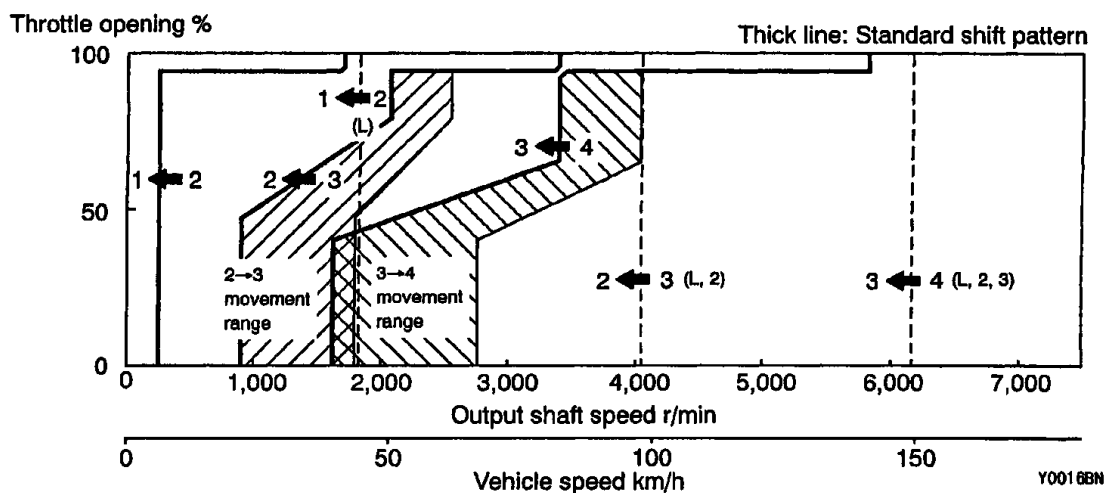
SHIFT PATTERN

<MPI>

UPSHIFT PATTERN

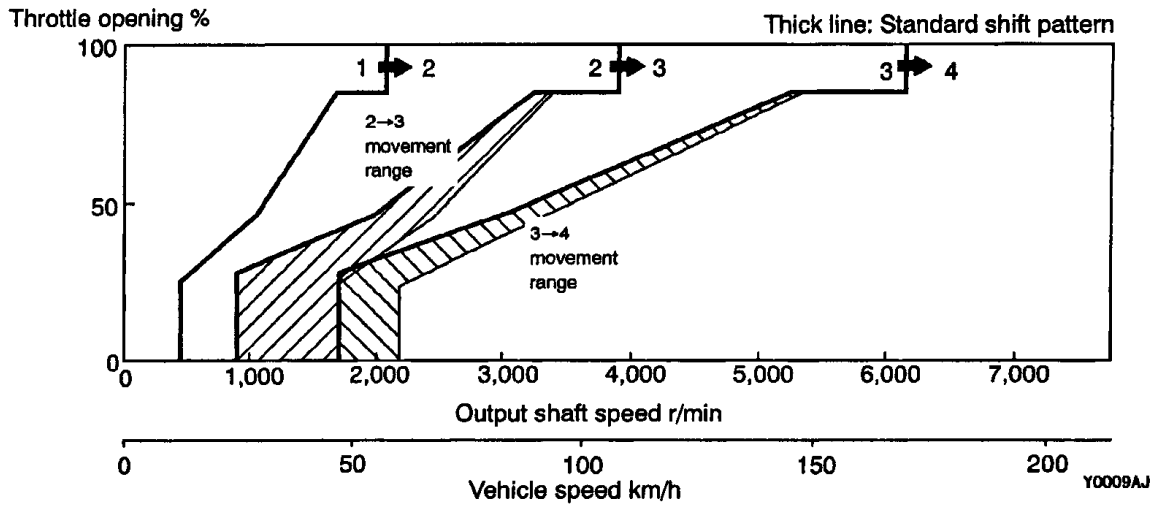


DOWNSHIFT PATTERN

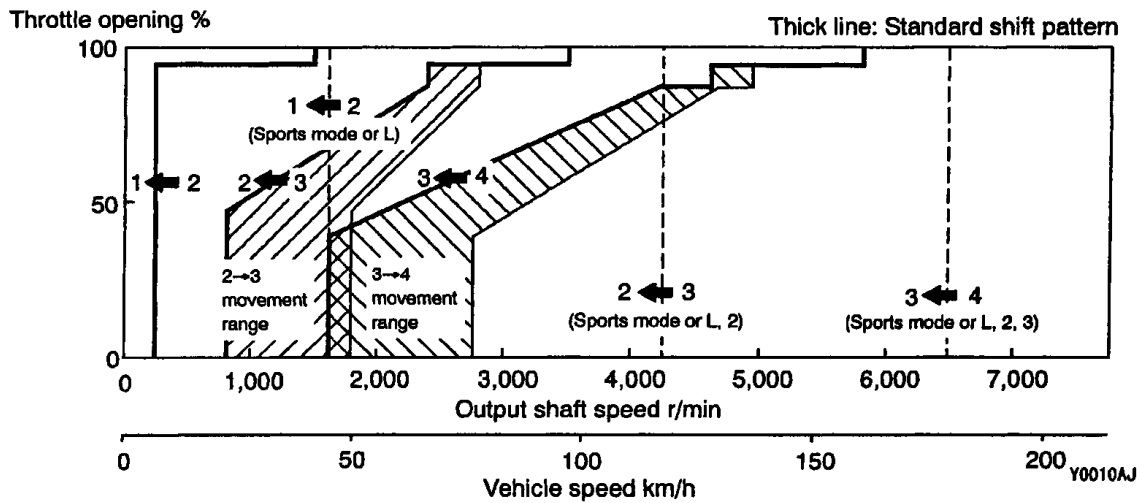


<GDI>

UPSHIFT PATTERN



DOWNSHIFT PATTERN



INSPECTION CHART FOR DIAGNOSIS CODE

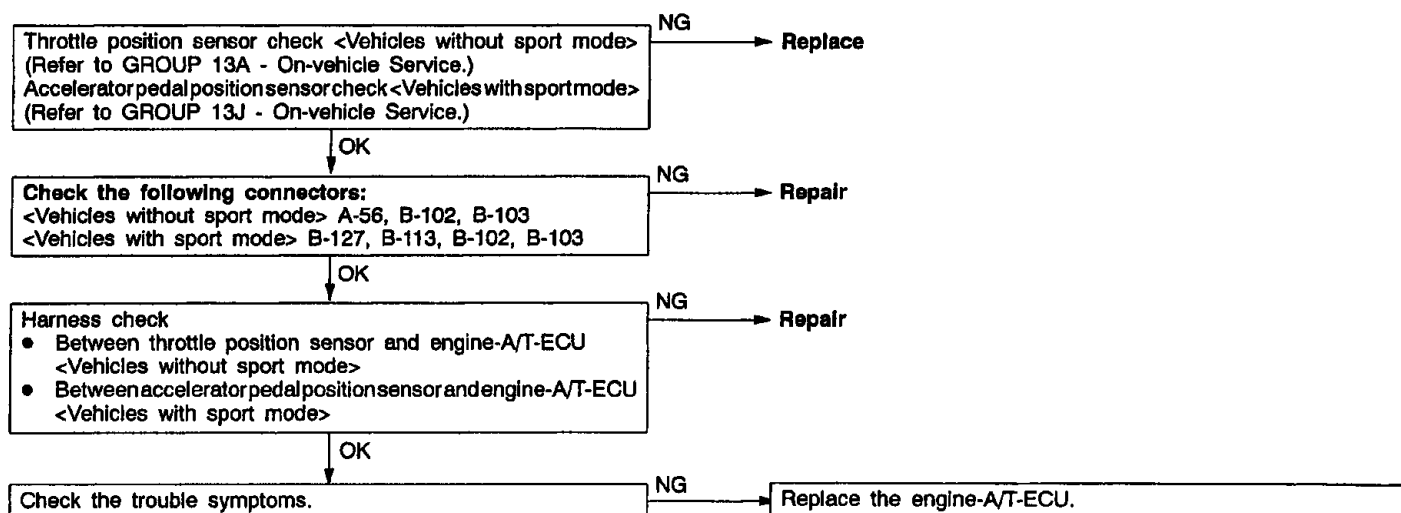
Code	Diagnosis item		Reference page
11	Throttle position sensor system (TPS) <Vehicles without sport mode> Accelerator pedal position sensor system (APS) <Vehicles with sport mode>	Short circuit	23-8
12		Open circuit	23-8
14		Sensor maladjustment	23-8
15	A/T fluid temperature sensor system	Open circuit	23-9
21	Crank angle sensor system	Open circuit	23-9
22	Input shaft speed sensor system	Short circuit/open circuit	23-10
23	Output shaft speed sensor system	Short circuit/open circuit	23-11
25	Wide open throttle switch system	Short circuit	23-11
26	Stop lamp switch system	Short circuit/open circuit	23-12
31	Low and reverse solenoid valve system	Short circuit/open circuit	23-12
32	Underdrive solenoid valve system	Short circuit/open circuit	23-12

Code	Diagnosis item	Reference page
33	Second solenoid valve system	23-12
34	Overdrive solenoid valve system	23-12
36	Damper control clutch solenoid valve system	23-13
41	1st gear ratio does not meet the specification	23-14
42	2st gear ratio does not meet the specification	23-14
43	3rd gear ratio does not meet the specification	23-14
44	4th gear ratio does not meet the specification	23-14
46	Reverse gear ratio does not meet the specification	23-14
51	Abnormal communication with engine-ECU	23-15
52	Damper control clutch solenoid valve system	23-13
54	A/T Control relay system	23-15
56	N range lamp system	23-15

INSPECTION PROCEDURES FOR DIAGNOSIS CODES

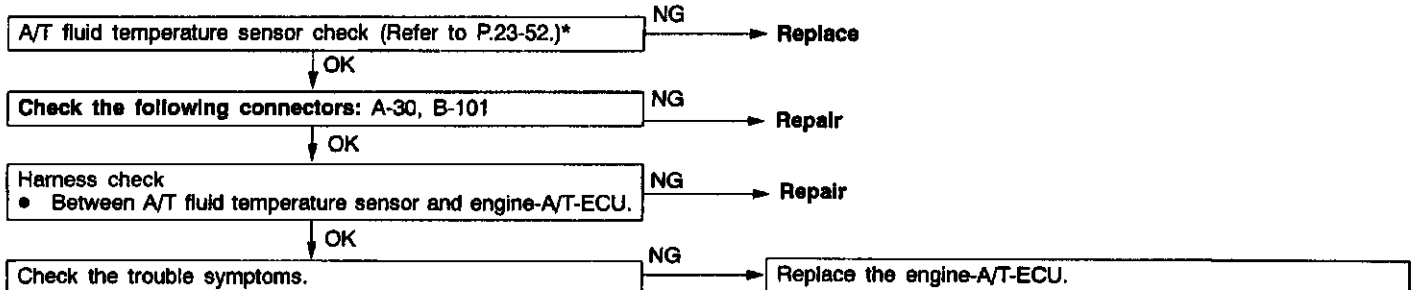
On GDI engine vehicles, the ECU has been changed from the A/T-ECU to the engine-A/T-ECU. Due to this change, the INSPECTION PROCEDURES FOR DIAGNOSIS CODES have been changed as follows:

Code No. 11, 12, 14 Throttle position sensor system (TPS) <Vehicles without sport mode>, Accelerator pedal position sensor (APS) <Vehicles with sport mode>	Probable cause
If the APS 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 or APS 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 or APS output voltage is 0.2 V or lower or if it is 1.2 V or higher when the engine is idling, the TPS or APS adjustment is judged to be incorrect and diagnosis code No. 14 is output.	• Malfunction of the throttle position sensor <Vehicles without sport mode> • Malfunction of the accelerator pedal position sensor <Vehicles with sport mode> • Malfunction of connector • Malfunction of the engine-A/T-ECU



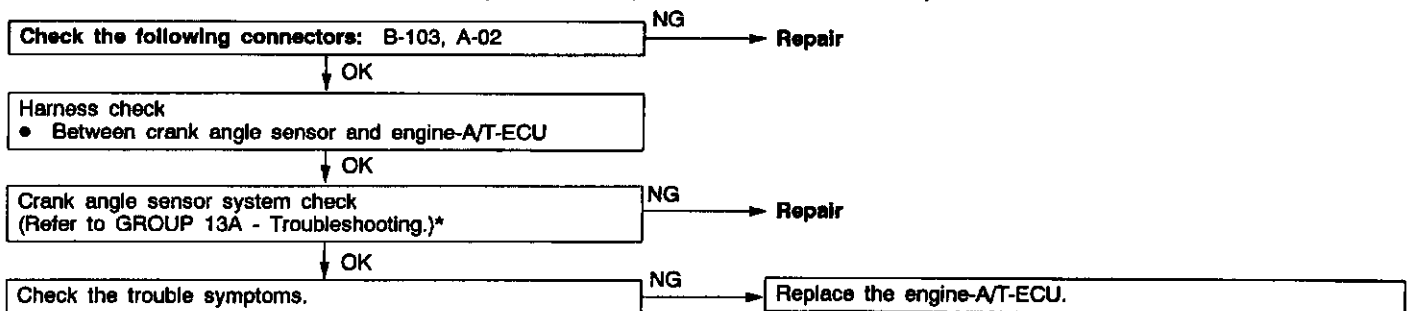
Code No. 15 A/T fluid temperature sensor system	Probable cause
If the A/T fluid temperature sensor output voltage is 2.6 V or more even after driving for 10 minutes or more (if the A/T fluid temperature does not increase), it is judged that there is an open circuit in the A/T fluid temperature sensor 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 CARISMA Workshop Manual (Pub. No. PWDE9502).



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

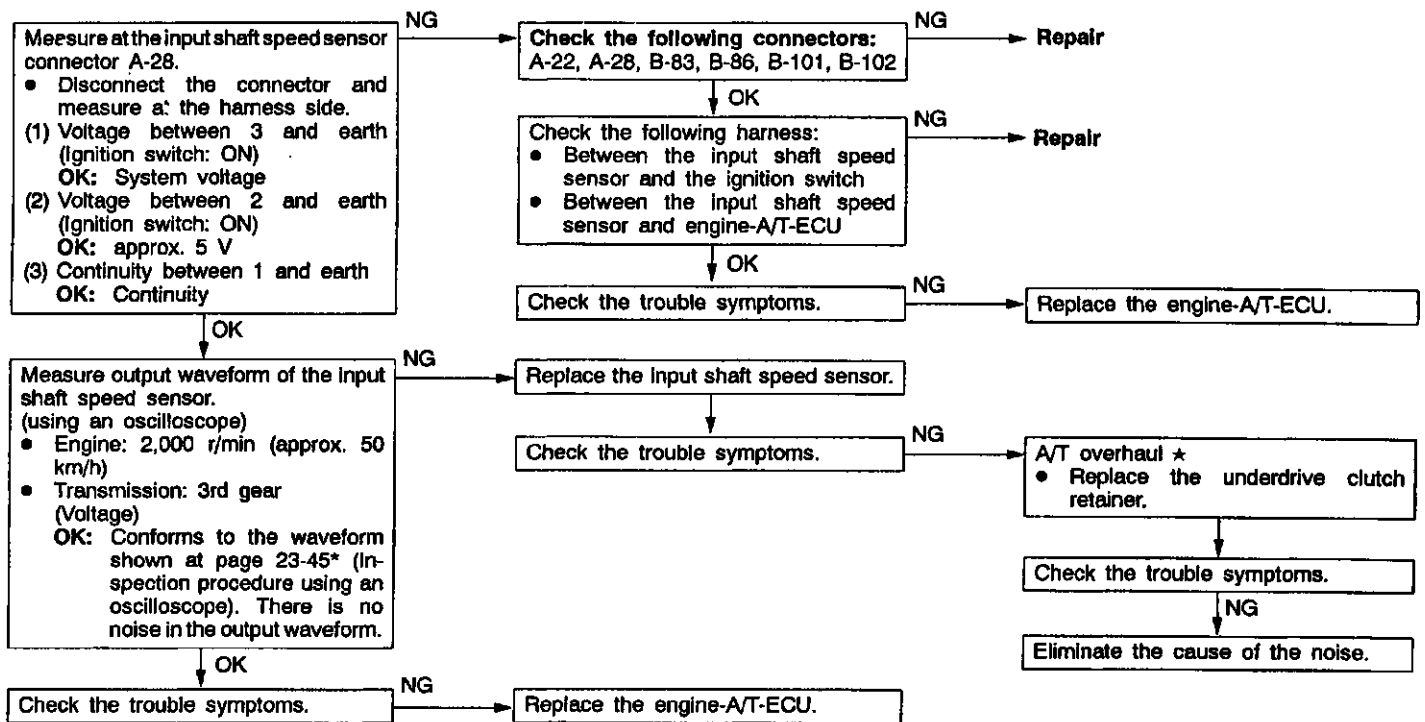
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).



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 (downshifting at Sport mode) 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 CARISMA Workshop Manual (Pub. No. PWDE9502).

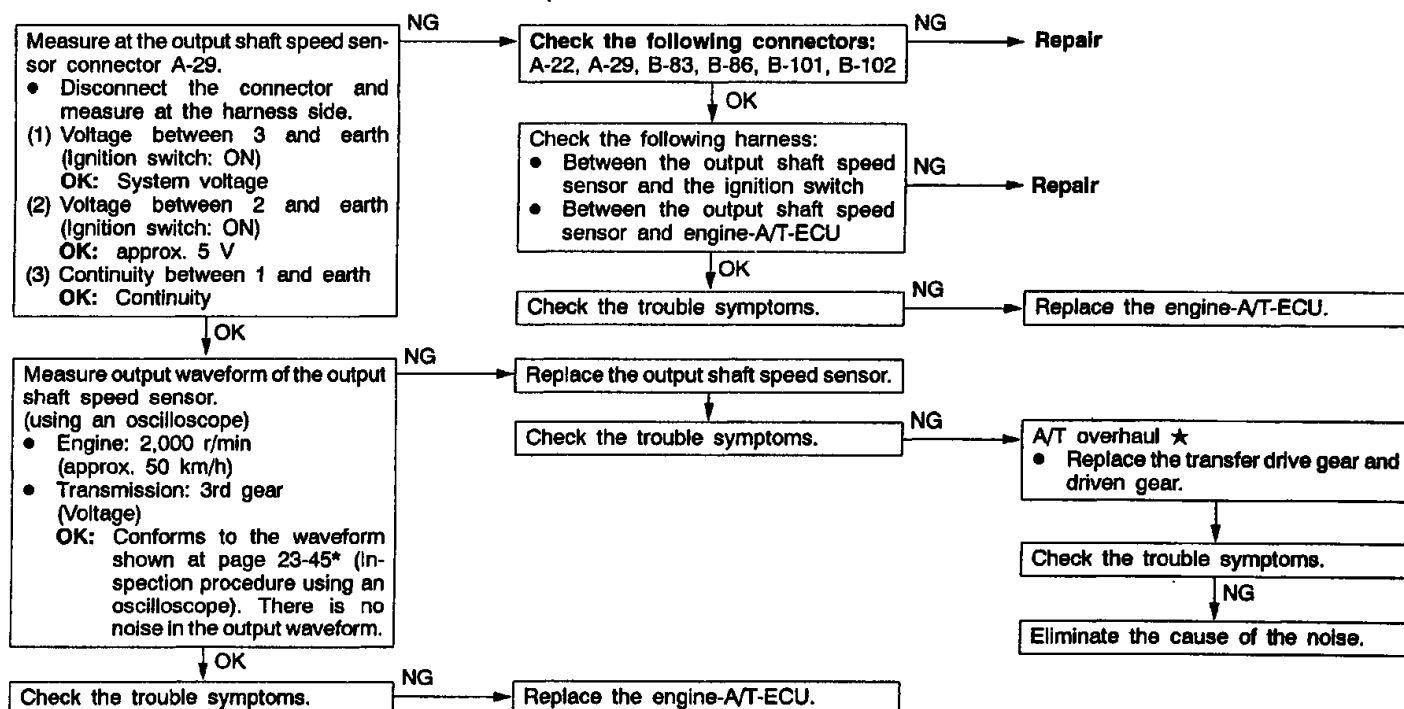
★: Refer to the Transmission Workshop Manual.



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 (downshifting at Sport mode) 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

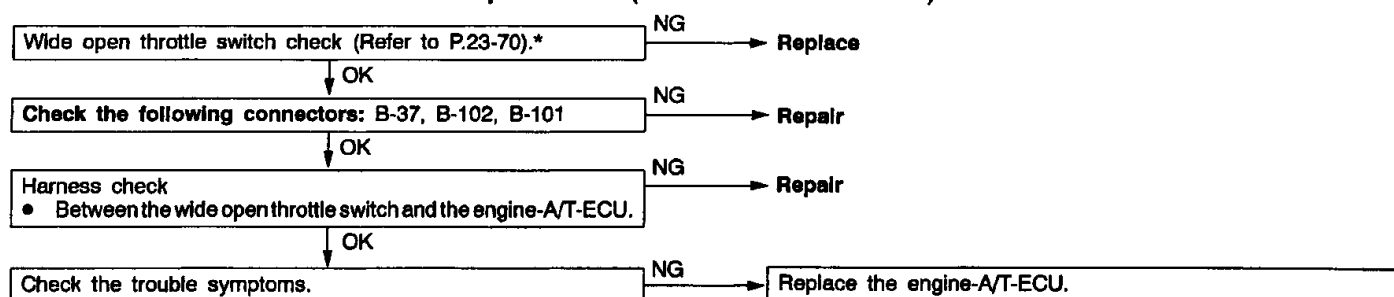
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

★: Refer to the Transmission Workshop Manual.



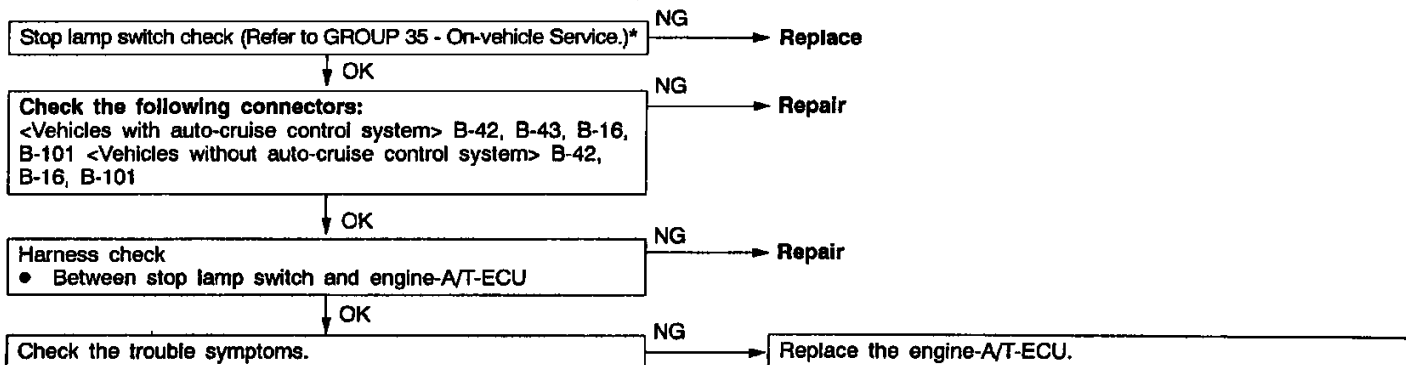
Code No. 25 Wide open throttle switch system	Probable cause
If the wide open throttle switch is on for 1 second or more with the throttle valve opening angle at 70% or less, it is judged that there is a short circuit in the wide open throttle switch and diagnosis code No. 25 is output.	● Malfunction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

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).



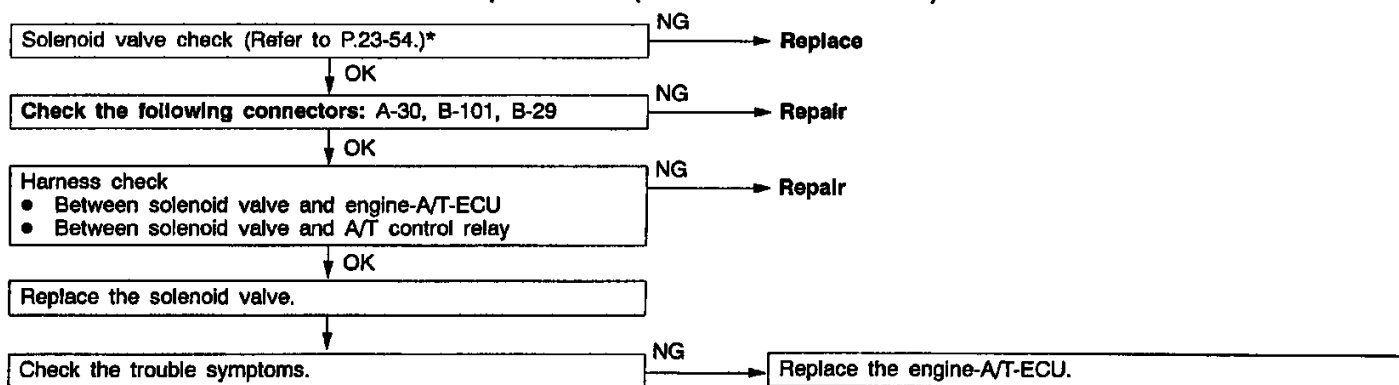
Code No. 26 Stop lamp switch system	Probable cause
If the stop lamp switch is on for 5 minutes or more while driving, it is judged that there is a short circuit in the stop lamp switch and diagnosis code No. 26 is output.	• Malfunction of the stop lamp switch • Malfunction of connector • Malfunction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

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).



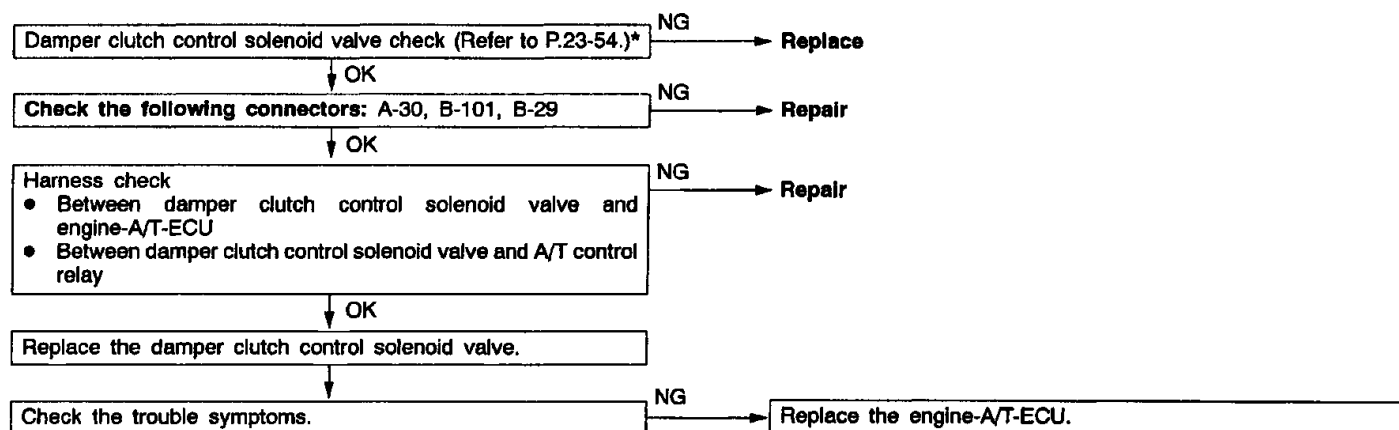
Code No. 31 Low and reverse solenoid valve system	Probable cause
Code No. 32 Underdrive solenoid valve system	
Code No. 33 Second solenoid valve system	
Code No. 34 Overdrive solenoid valve system	
If the resistance value for a solenoid valve is too large or too small, it is judged that there is a short-circuit 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 CARISMA Workshop Manual (Pub. No. PWDE9502).



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

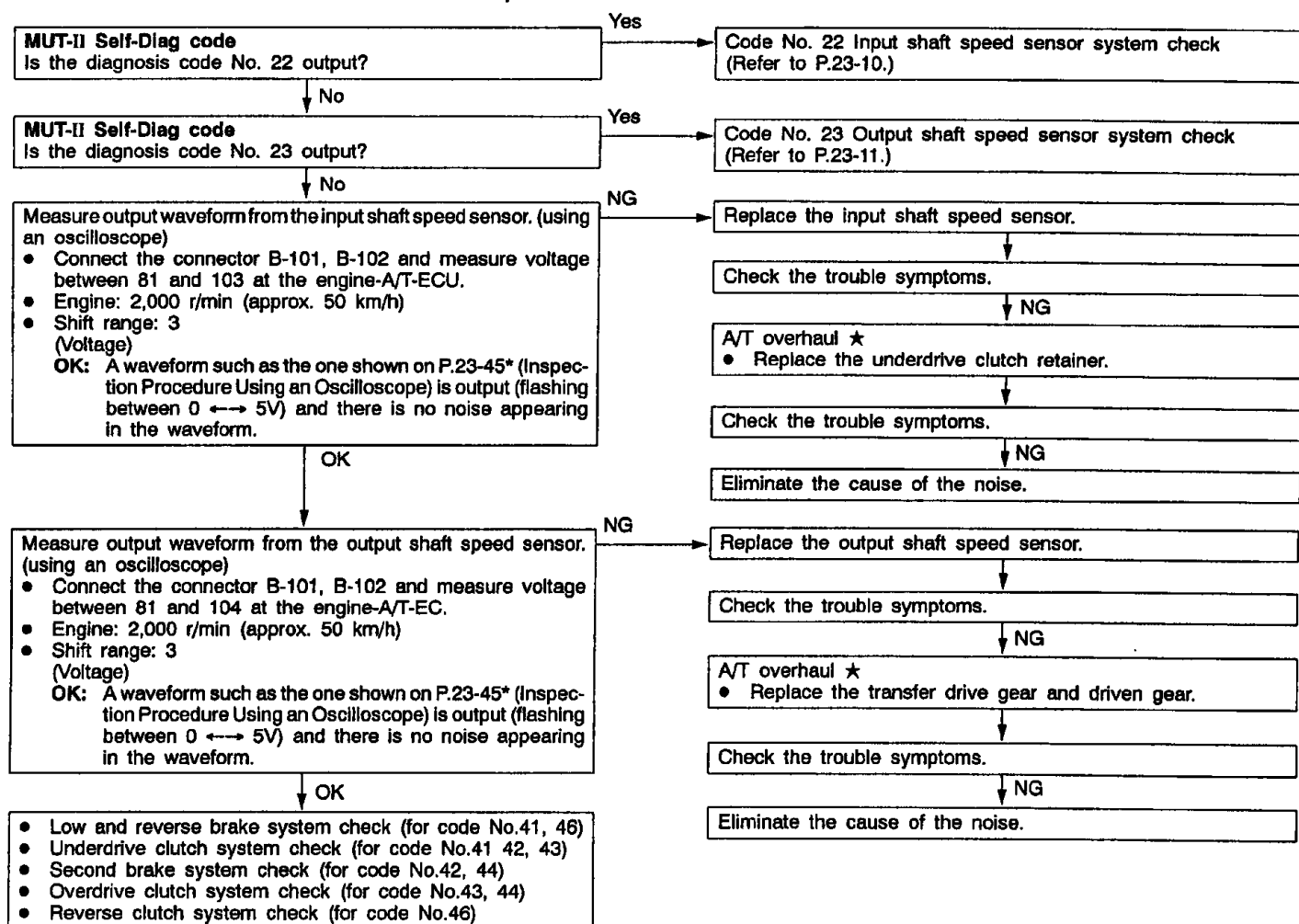
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).



Code No. 41 1st gear ratio does not meet the specification	Probable cause
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	
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 CARISMA Workshop Manual (Pub. No. PWDE9502).

★: Refer to the Transmission Workshop Manual.

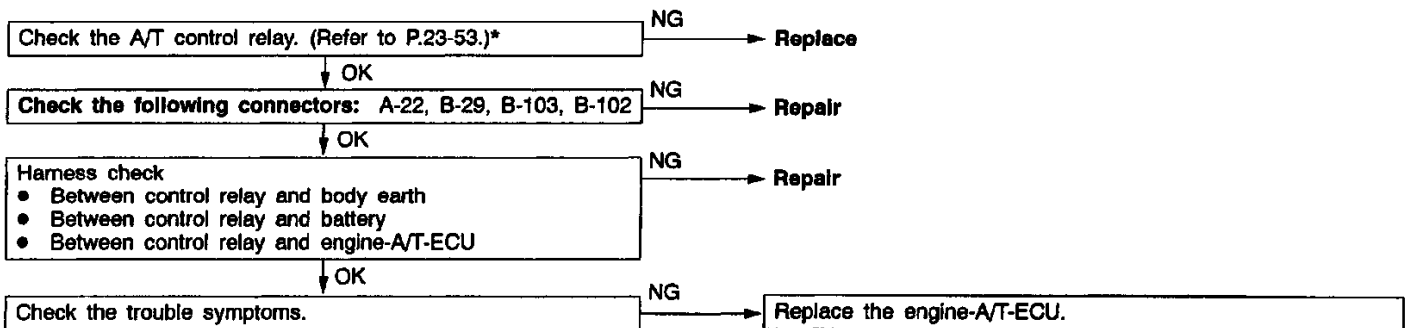


Code No. 51 Abnormal communication with engine-A/T-ECU	Probable cause
If normal communication is not possible for a continuous period of 1 second or more when the ignition switch is at the ON position, the battery voltage is 10 V or more and the engine speed is 450 r/min or more, diagnosis code No. 51 is output. Diagnosis code No. 51 is also output if the data being received is abnormal for a continuous period of 4 seconds under the same conditions.	• Malfunction of connector • Malfunction of the engine-A/T-ECU

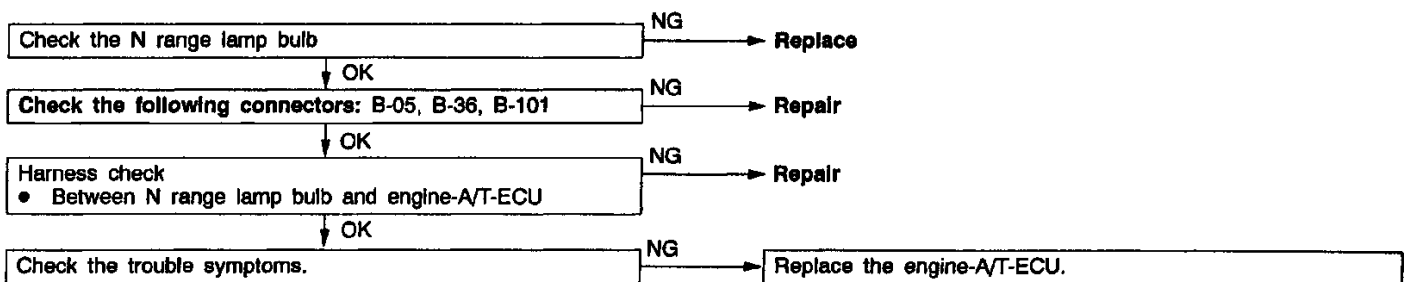
Replace the engine-A/T-ECU.

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 CARISMA Workshop Manual (Pub. No. PWDE9502).



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 CARISMA Workshop Manual (Pub. No. PWDE9502).

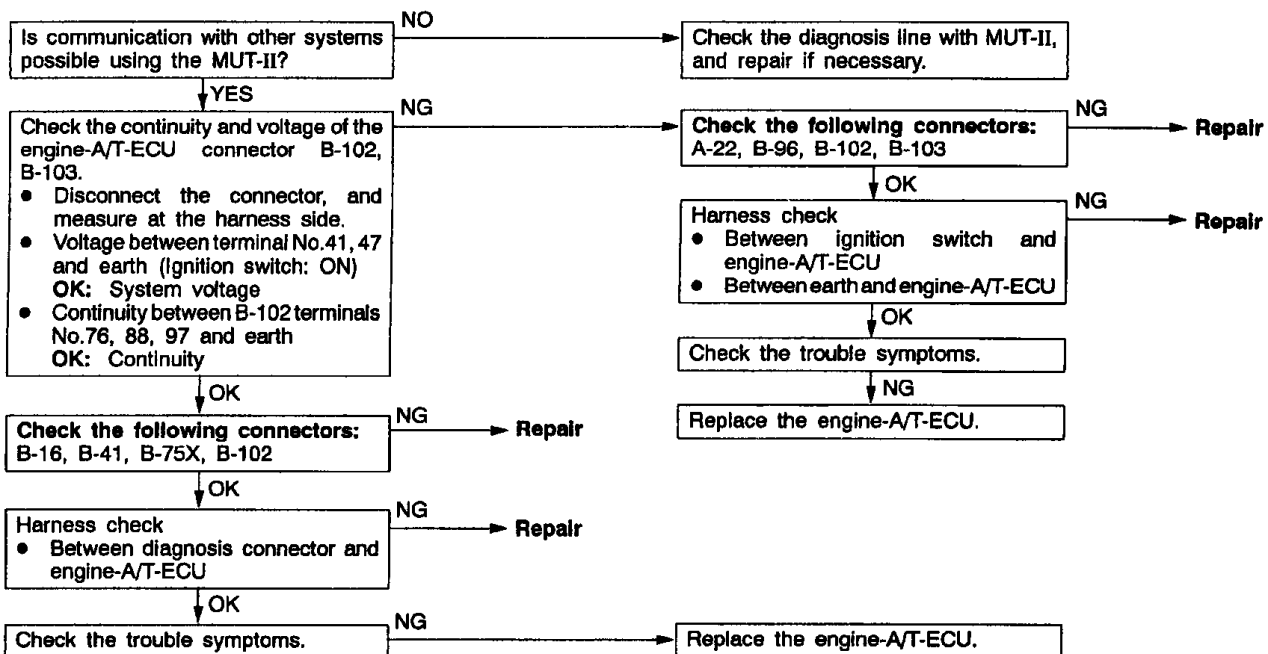
Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible		1	23-17
Driving impossible	Starting impossible	2	23-27*
	Does not move forward	3	23-27*
	Does not reverse	4	23-28*
	Does not move (forward or reverse)	5	23-28*
Malfunction when starting	Engine stalling when shifting	6	23-29*
	Shocks when changing from N to D and large time lag	7	23-29*
	Shocks when changing from N to R and large time lag	8	23-30*
	Shocks when changing from N to D, N to R and large time lag	9	23-31*
Malfunction when shifting	Shocks and running up	10	23-31*
Displaced shifting points	All points	11	23-32*
	Some points	12	23-33*
Does not shift	No diagnosis codes	13	23-33*
Malfunction while driving	Poor acceleration	14	23-34*
	Vibration	15	23-35*
Inhibitor switch system		16	23-17
Mode control switch system <Vehicles without sport mode>		17	23-18
Shift switch assembly system <Vehicles with sport mode>		18	23-18
Dual pressure switch system		19	23-19
Vehicle speed sensor system		20	23-19

INSPECTION PROCEDURES FOR TROUBLE SYMPTOMS

On GDI engine vehicles, the ECU has been changed from the A/T-ECU to the engine-A/T-ECU. Due to this change, the INSPECTION PROCEDURES FOR TROUBLE SYMPTOMS have been changed as follows:

INSPECTION PROCEDURE 1

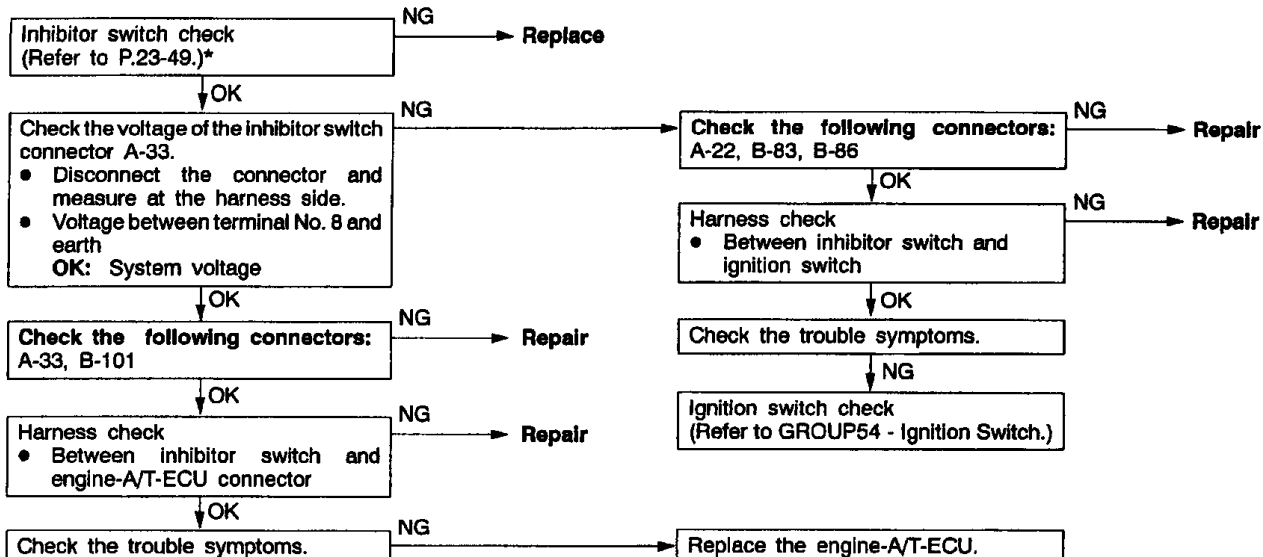
Communication with MUT-II is not possible	Probable cause
If communication with the MUT-II is not possible, the cause is probably a defective diagnosis line or the engine-A/T-ECU is not functioning.	• Malfunction of diagnosis line • Malfunction of connector • Malfunction of the engine-A/T-ECU



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

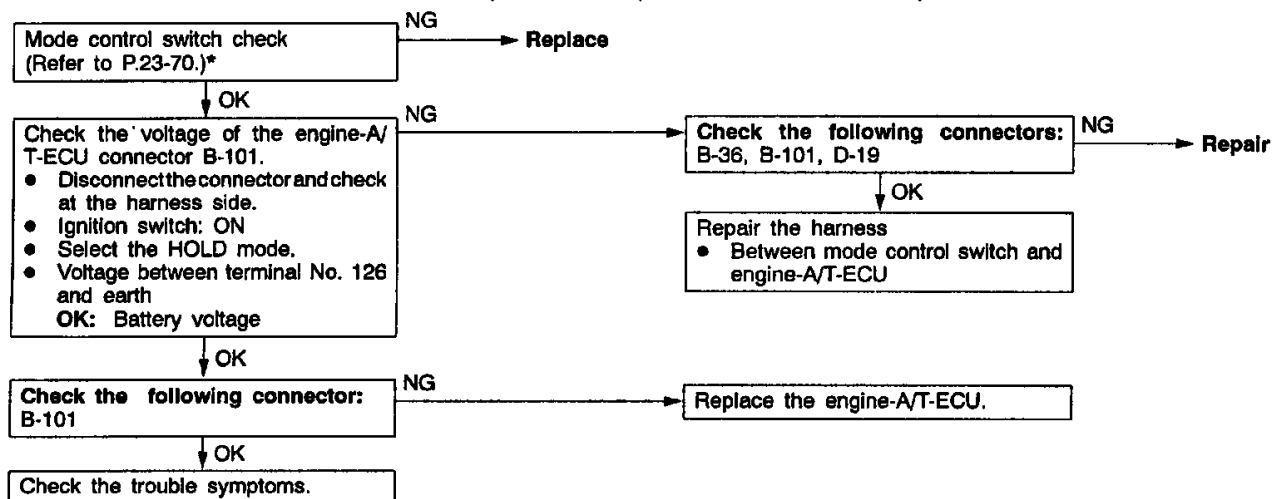
*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).



INSPECTION PROCEDURE 17

Mode control switch system <Vehicles without sport mode>	Probable cause
The cause is probably a defective mode control switch circuit or a defective engine-A/T-ECU.	• Malfunction of the mode control switch • Malfunction of connector • Malfunction of the engine-A/T-ECU

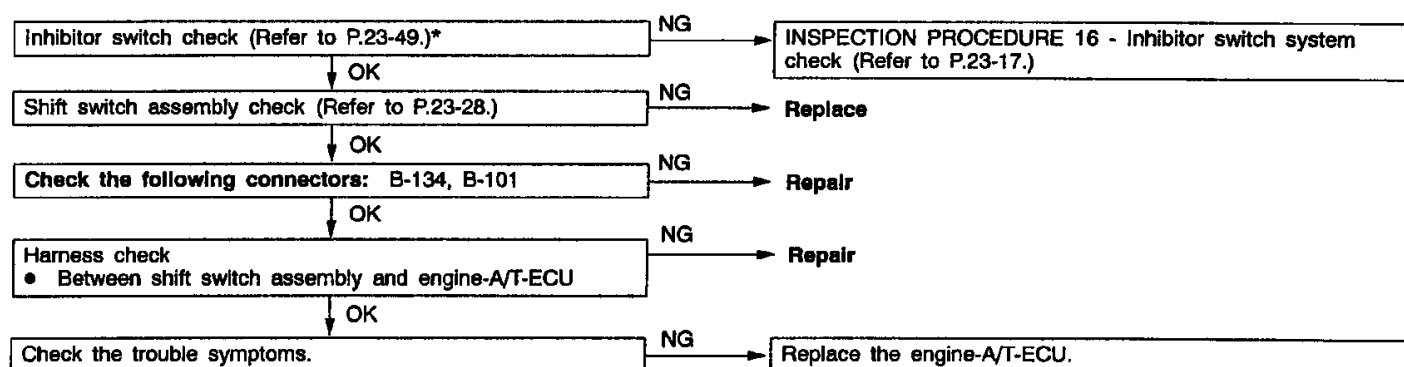
*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).



INSPECTION PROCEDURE 18

Shift switch assembly system <Vehicles with sport mode>	Probable cause
The cause is probably a malfunction of the inhibitor switch circuit, shift switch assembly circuit or a engine-A/T-ECU.	• Malfunction of the inhibitor switch • Malfunction of the shaft switch assembly • Malfunction of connector • Malfunction of the engine-A/T-ECU

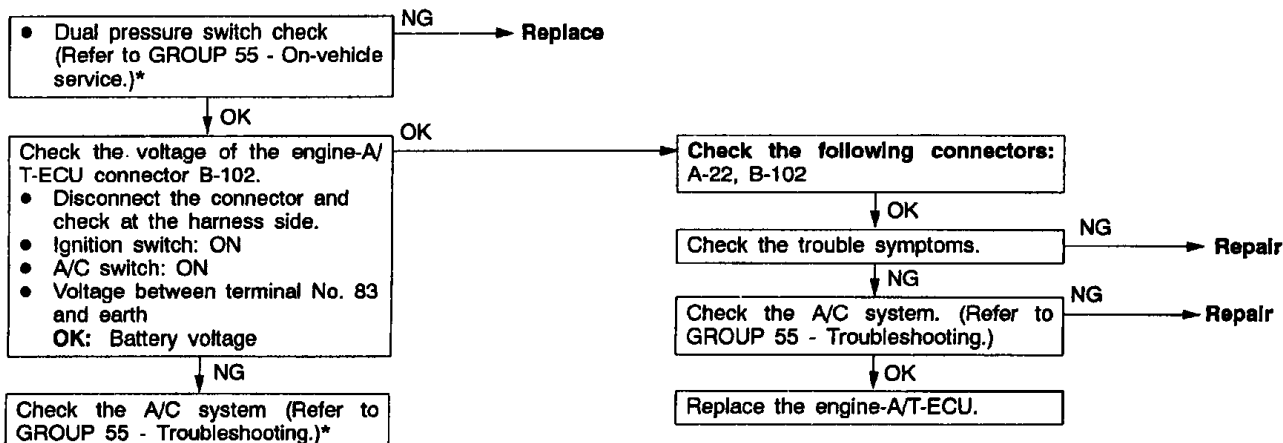
*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).



INSPECTION PROCEDURE 19

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

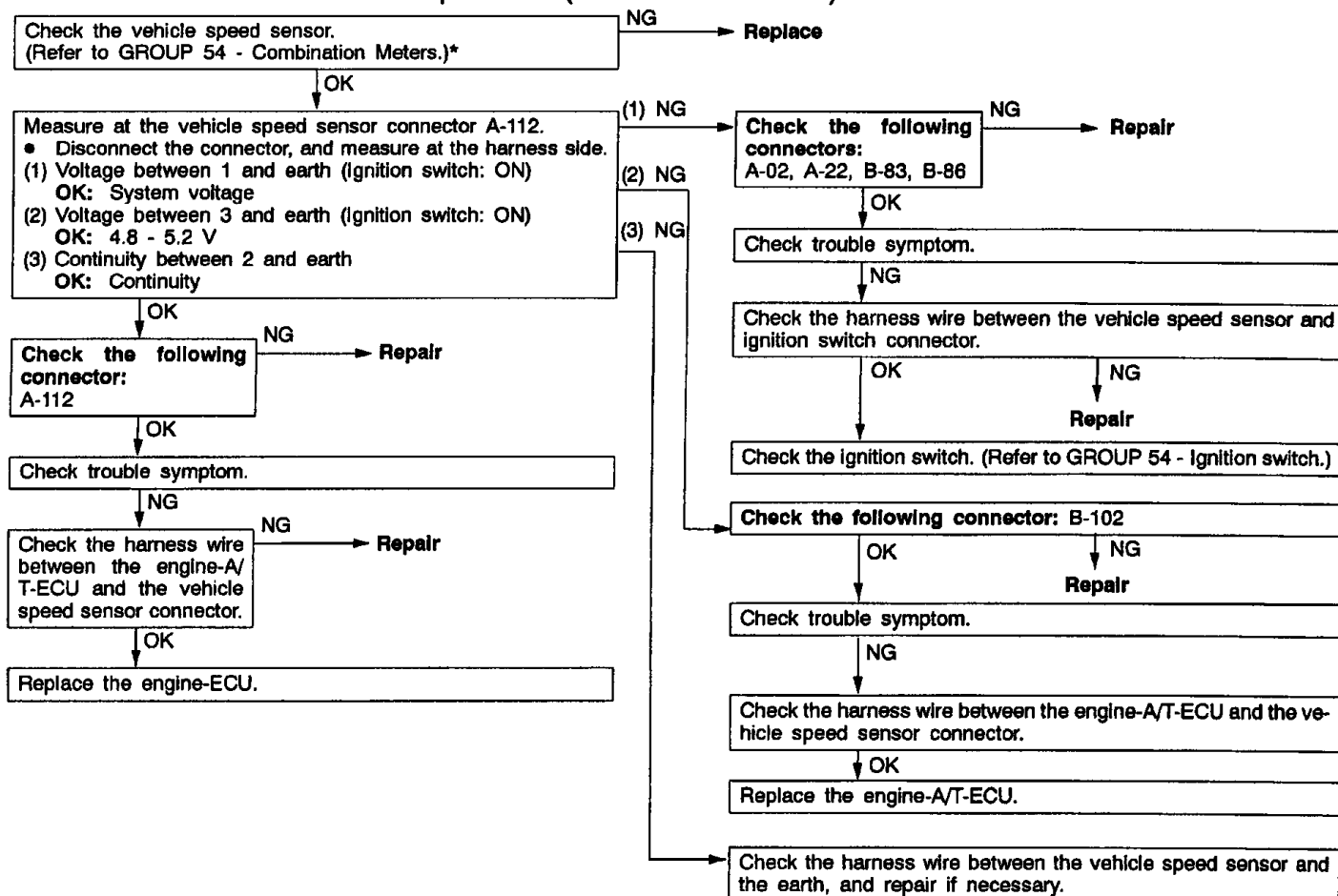
*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).



INSPECTION PROCEDURE 20

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 CARISMA Workshop Manual (Pub. No.PWDE9502).



DATA LIST REFERENCE TABLE

Due to the introduction of vehicles with sports mode, item Nos. 61 and 63 have been changed as follows:

Item No.	Check item	Check requirement		Normal value
61	Inhibitor switch	Ignition switch: ON Engine: Stopped	Selector lever position: P	P
			Selector lever position: R	R
			Selector lever position: N	N
			Selector lever position: D	D
63	Shift position	Selector lever position: Sports mode	Driving at constant speed of 10 km/h in 1st gear	1st
			Driving at constant speed of 30 km/h in 2nd gear	2nd
			Driving at constant speed of 50 km/h in 3rd gear	3rd
			Driving at constant speed of 70 km/h in 4th gear	4th

ACTUATOR TEST JUDGEMENT VALUE

Due to the introduction of vehicles with sports mode, item Nos. 7, 8, 9 and 10 have been added as follows:

Item No.	Check item	Test content	Check requirement	Normal value
7	1st indicator lamp	Illuminate each indicator lamp for three seconds according to the signal from the MUT-II.	Ignition switch: ON Selector lever position: P Engine: 0 r/min Vehicle speed: 0 km/h (Vehicles stopped) Throttle (Accelerator) opening voltage: Less than 0 V	Shift indicator lamp illuminates.
8	2nd indicator lamp			
9	3rd indicator lamp			
10	4th indicator lamp			

CHECK AT ENGINE-A/T-ECU TERMINALS

On GDI engine vehicles, the ECU has been changed from the A/T-ECU to the engine-A/T-ECU. Due to this change, the CHECK AT ENGINE-A/T-ECU TERMINALS has been changed as follows:

1	2	3	4	5	6	7	8	41	42	43	44	45	46	71	72	73	74	75	76	77	101	102	103	104	105	106	107																							
9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	47	48	49	50	51	52	53	54	55	56	57	78	79	80	81	82	83	84	85	86	87	88	89	108	109	110	111	112	113	114	115	116	117	118	119	120
24	25	26	27	28	29	30	31	32	33	34	35	58	59	60	61	62	63	64	65	66	90	91	92	93	94	95	96	97	98	121	122	123	124	125	126	127	128	129	130											

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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
57	Sensor earth	Always	0 V
66	Backup power supply	Ignition switch: OFF	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) <Vehicles without sport mode>	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
83	A/C compressor load signal	A/C switch: OFF	0 V
		A/C switch: ON	0 V
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
95	Accelerator pedal position sensor (APS) <Vehicles with sport mode>	Accelerator pedal: Released (Engine stopped)	0.5 – 1.0 V
		Accelerator pedal: Depressed (Engine stopped)	4.5 – 5.0 V
97	Earth	Always	0 V
101	Inhibitor switch P	Selector lever position: P	System voltage
		Selector lever position: Other than above	0 V

Terminal No.	Check item	Check requirement	Standard value
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. 81 and No.103 by an oscilloscope. Engine: 2,000 r/min Shift range: 3rd gear	Refer to P.23-45*, Oscilloscope inspection procedure.
104	Output shaft speed sensor	Measure between terminal No. 81 and No.104 by an oscilloscope. Engine: 2,000 r/min Shift range: 3rd gear	Refer to P.23-45*, Oscilloscope inspection procedure.
105	1st gear shift indicator lamp <Vehicles with sport mode>	Gear: 1st gear	System voltage
		Gear: Other than above	0 V
106	Second solenoid valve	Shift range: 2nd gear	System voltage
		Selector lever position: P	Approx. 7 – 9 V
107	Damper clutch control solenoid valve	Selector lever position: Sport mode (1st gear)	System voltage
		Selector lever position: Sport mode (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 <Vehicles without sport mode>	Selector lever position: 3	System voltage
		Selector lever position: Other than above	0 V
	Select switch <Vehicles with sport mode>	Selector lever position: Sport mode	System voltage
		Selector lever position: Other than above	0 V
110	Inhibitor switch L <Vehicles without sport mode>	Selector lever position: L	System voltage
		Selector lever position: Other than above	0 V
	Down shift switch <Vehicles with sport mode>	Selector lever position: Downshift and lever held	System voltage
		Selector lever position: Other than above	0 V
115	Wide-open throttle switch	Accelerator pedal: Released	4.5 – 5.5 V
		Accelerator pedal: Depressed	Less than 0.4 V
117	3rd gear shift indicator lamp <Vehicles with sport mode>	Shift range: 3rd gear	System voltage
		Shift range: Other than above	0 V
118	2nd gear shift indicator lamp <Vehicles with sport mode>	Shift range: 2nd gear	System voltage
		Shift range: Other than above	0 V
120	Underdrive solenoid valve	Shift range: 1st gear	System voltage
		Selector lever position: P	Approx. 7 – 9 V

Terminal No.	Check item	Check requirement	Standard value
121	Inhibitor switch N	Selector lever position: N	System voltage
121	Inhibitor switch N	Selector lever position: Other than above	0 V
122	Inhibitor switch 2 <Vehicles without sport mode>	Selector lever position: 2	System voltage
		Selector lever position: Other than above	0 V
	Upshift switch <Vehicles with sport mode>	Selector lever position: Upshift and lever held	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
126	Mode control switch <Vehicles without sport mode>	Select HOLD mode	System voltage
		Select AUTO mode	0 V
128	4th gear shift indicator lamp <Vehicles with sport mode>	Gear: 4th gear	System voltage
		Gear: Other than above	0 V
129	Low-reverse solenoid valve	Selector lever position: P	System voltage
		Shift range: 2nd gear	Approx. 7 – 9 V
130	Overdrive solenoid valve	Shift range: 3rd gear	System voltage
		Selector lever position: P	Approx. 7 – 9 V

TROUBLESHOOTING <A/T KEY INTERLOCK AND SHIFT LOCK MECHANISMS>

TROUBLE SYMPTOM TABLE

Symptom	Inspection procedure No.	Reference page
Can move selector lever from "P" to "R" without depressing brake pedal when ignition key is at positions other than "LOCK (OFF)"	1	23-24
Cannot move selector lever from "P" to "R" with brake pedal depressed when ignition key is at positions other than "LOCK (OFF)"	2	23-24
Can move selector lever from "P" to "R" with brake pedal depressed when ignition key is at "LOCK (OFF)"	3	23-25
Cannot move selector lever from "P" to "R" smoothly	4	23-25
Cannot move selector lever from "R" to "P"	5	23-25
Cannot turn ignition key to "LOCK (OFF)" when selector lever is at "P"	6	23-25
Can turn ignition key to "LOCK (OFF)" when selector lever is at positions other than "P"	7	23-25

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

Can move selector lever from "P" to "R" without depressing brake pedal when ignition key is at positions other than "LOCK (OFF)"	Probable cause
Lock cam or lock cable is suspected to be faulty.	• Malfunction of lock cam • Defective shift lock cable

Check by referring to the probable cases.

INSPECTION PROCEDURE 2

Cannot move selector lever from "P" to "R" with brake pedal depressed when ignition key is at positions other than "LOCK (OFF)"	Probable cause
Selector lever assembly, shift lock cable, key interlock cable transmission control cable or lock cam is suspected to be faulty.	• Malfunction of selector lever assembly • Malfunction of shift lock cable • Defective key interlock cable • Defective transmission control cable • Malfunction of lock cam

Check by referring to the probable cases.

INSPECTION PROCEDURE 3

Can move selector lever from “P” to “R” with brake pedal depressed when ignition key is at “LOCK (OFF)”	Probable cause
Lock cam or key interlock cable is suspected to be faulty.	● Malfunction of lock cam ● Defective key interlock cable

Check by referring to the probable cases.

INSPECTION PROCEDURE 4

Cannot move selector lever from “P” to “R” smoothly	Probable cause
Key interlock cable, shift lock cable, lock cam or selector lever assembly is suspected to be faulty.	● Defective key interlock cable ● Defective shift lock cable ● Malfunction of lock cam ● Malfunction of selector lever assembly

Check by referring to the probable cases.

INSPECTION PROCEDURE 5

Cannot move selector lever from “R” to “P”	Probable cause
Selector lever assembly or transmission control cable is suspected to be faulty.	● Malfunction of selector lever assembly ● Defective transmission control cable

Check by referring to the probable cases.

INSPECTION PROCEDURE 6

Cannot turn ignition key to “LOCK (OFF)” when selector lever is at “P”	Probable cause
Lock cam key interlock cable or key cylinder slider is suspected to be faulty.	● Malfunction of lock cam ● Defective key interlock cable ● Malfunction of slider

Check by referring to the probable cases.

INSPECTION PROCEDURE 7

Can turn ignition key to “LOCK (OFF)” when selector lever is at positions other than “P”	Probable cause
Lock cam, key cylinder cover or key interlock cable is suspected to be faulty.	● Malfunction of lock cam ● Defective key cylinder cover ● Malfunction of key inter lock cable

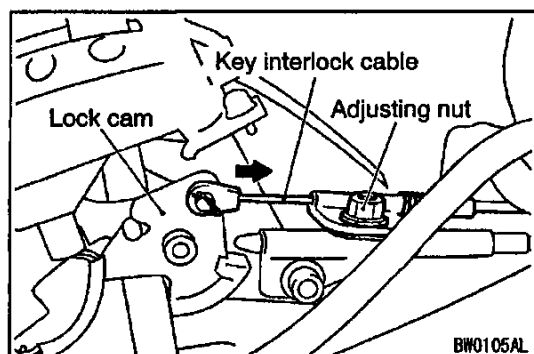
Check by referring to the probable cases.

ON-VEHICLE SERVICE

KEY INTERLOCK MECHANISM CHECK

1. Carry out the following check.

Inspection procedure	Inspection conditions		Check details (Normal condition)
1	Brake pedal: Depressed	Ignition switch position: "LOCK (OFF)" or pulled out	The selector lever cannot be moved from the "P" position to any other position when the pushbutton on the selector lever is not being pressed.
2		Ignition switch position: Other than "LOCK (OFF)" or pulled out	The selector lever can easily be moved from the "P" position to some other position when the pushbutton on the selector lever is being pressed.
3	Brake pedal: Released	Selector lever position: Other than "P"	The ignition switch will not turn to the "LOCK (OFF)" position.
4		Selector lever position: "P"	The ignition switch can turn smoothly to the "LOCK (OFF)" position.



2. When the above operations are defective, adjust the shift lock cable as follows:

- (1) Remove the front floor console, and then provisionally install the selector lever knob.
- (2) Move the selector lever to the "P" position.
- (3) Turn the ignition key to "LOCK (OFF)" position.
- (4) Loosen the locking nut of the key interlock cable.
- (5) Push the cable joint on the lock cam gently toward the arrow until the cable stops. Tighten the locking nut.

Tightening torque: 12 Nm

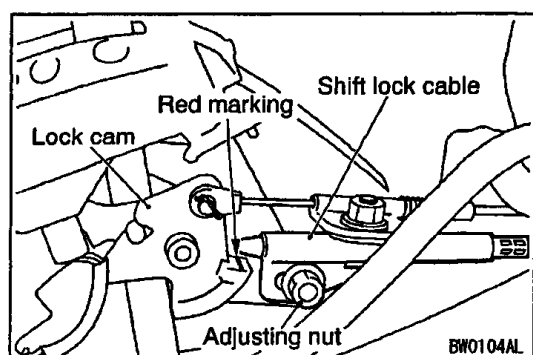
- (6) Install the floor console.

3. After adjusting, check the operation once more. If the operation is still incorrect, replace the key interlock cable. (Refer to P.23-32.)

SHIFT LOCK MECHANISM CHECK

1. Carry out the following check.

Inspection procedure	Inspection conditions		Check details (Normal condition)
1	Brake pedal: Depressed	Ignition switch position: "ACC"	The selector lever cannot be moved from the P position to any other position when the pushbutton on the selector lever is not being pressed.
2			The selector lever can easily be moved from the P position to some other position when the pushbutton on the selector lever is being pressed.
3	Brake pedal: Released		The selector lever can easily be moved from the R position to the P position when the pushbutton on the selector lever is being pressed.



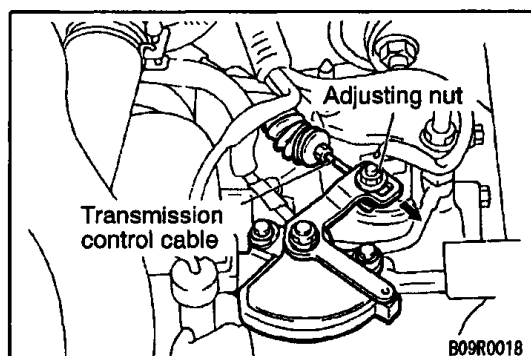
2. If the above operations do not occur correctly, adjust the shift lock cable unit by the following procedure.

- (1) Remove the front floor console, and then provisionally install the selector lever knob.
- (2) Move the selector lever to the "P" position.
- (3) Turn the ignition key to "LOCK (OFF)" position.
- (4) Loosen the locking nut of the shift lock cable.
- (5) Tighten the locking nut so that the end of the shift lock cable comes above the red marking of the lock cam.

Tightening torque: 12 Nm

(6) Install the floor console.

3. After adjusting, check the operation once more. If the operation is still incorrect, replace the shift lock cable. (Refer to P.23-32.)

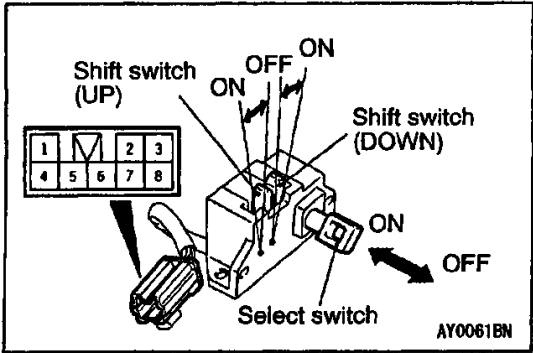


TRANSMISSION CONTROL CABLE ADJUSTMENT

1. Move the selector lever to the "N" position.
2. Loosen the upper control lever adjusting nut.
3. Check that the inhibitor switch is at "N" range.
4. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.

Tightening torque: 12 Nm

- 5. Check that the transmission shifts to the correct range corresponding to the position of the selector lever, and that it functions correctly in that range.



SHIFT SWITCH ASSEMBLY CONTINUITY CHECK

Switch position		Terminal No.					
		3	4	5	6	7	8
Select switch	ON	☐					☐
	OFF	☐				☐	
Shift switch (UP)	ON			☐	☐		
	OFF	☐					☐
Shift switch (DOWN)	ON		☐		☐		
	OFF	☐					☐

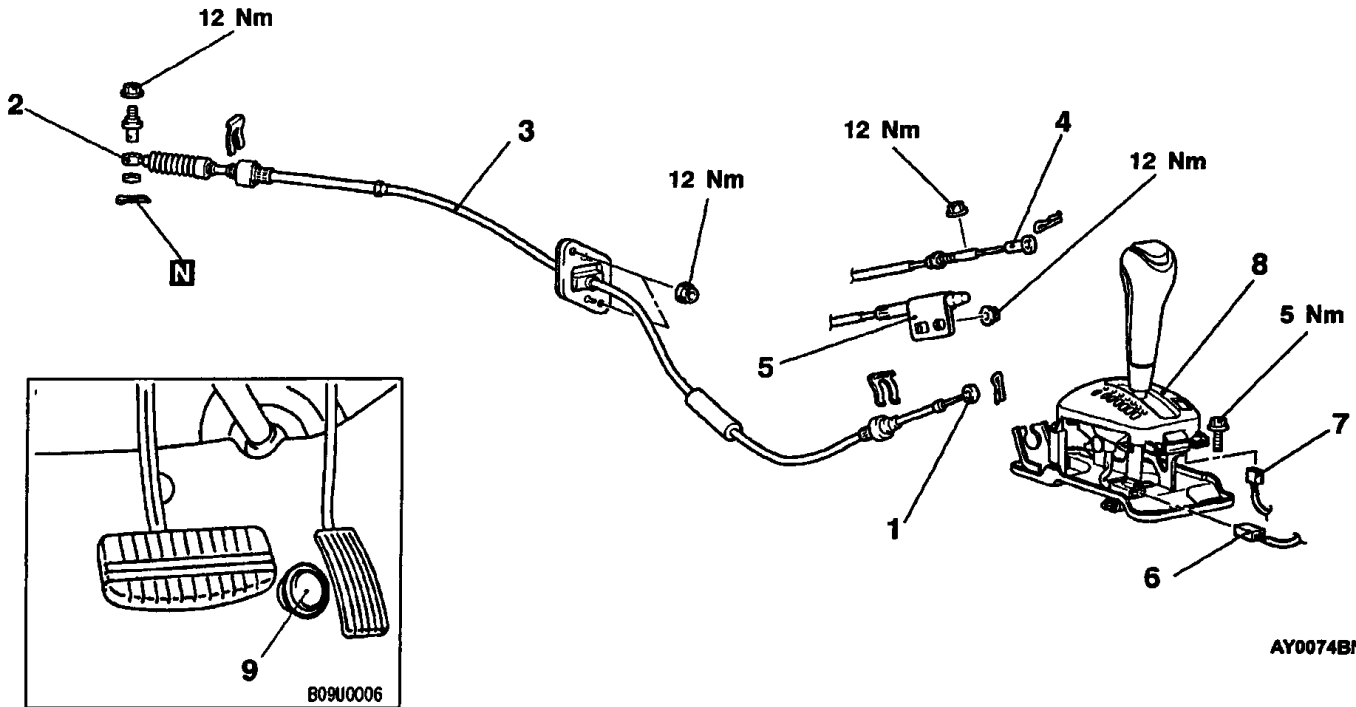
TRANSMISSION CONTROL

REMOVAL AND INSTALLATION

Caution: SRS

Be careful not to subject the SRS-ECU to any shocks during removal and installation of the transmission control cable and selector lever assembly.

Pre-removal and Post-Installation Operation
Front Floor Console Assembly Removal and Installation
(Refer to GROUP 52A.)



AY0074BN

Transmission control cable removal steps

- Front floor console
- 1. Transmission control cable connection (Shift lever side)
- 2. Transmission control cable connection (Transmission side)
- SRS-ECU
- 3. Transmission control cable

►C◄

Selector lever assembly removal steps

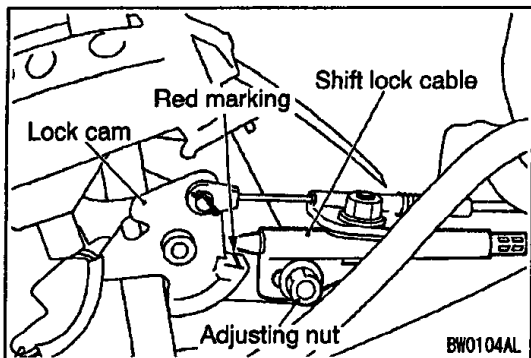
- Front floor console
- 1. Transmission control cable connection (Shift lever side)
- 4. Key interlock cable connection (selector lever side)
- 5. Shift lock cable connection (selector lever side)
- 6. Indicator lamp connector connection
- 7. Hold switch connector connection
- 8. Selector lever assembly

►B◄

►A◄

Wide open throttle switch removal

- 9. Wide open throttle switch



INSTALLATION SERVICE POINTS

►A◄ SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Provisionally install the selector lever knob, and then move the selector lever to the "P" position and turn the ignition switch to the "LOCK (OFF)" position.
2. Tighten the locking nut so that the end of the shift lock cable comes above the red marking of the lock cam.

Tightening torque: 12 Nm

►B◄ KEY INTER LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

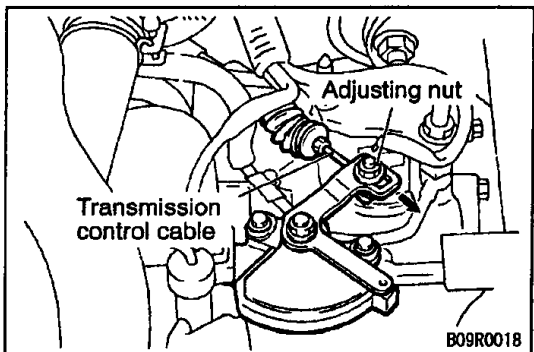
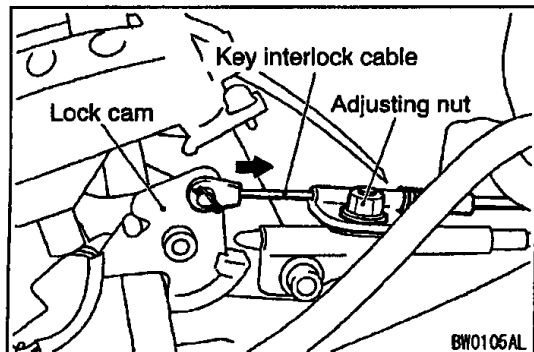
1. Install the key interlock cable on the lock cam.
2. Install the spring and washer of the key interlock cable as shown.
3. While lightly pushing the cable coupling portion of the lock cam in the direction, tighten the nut to the specified torque.

Tightening torque: 12 Nm

►C◄ TRANSMISSION CONTROL CABLE (TRANSMISSION SIDE) INSTALLATION

1. Move the selector lever to the "N" position.
2. Check that the inhibitor switch is at "N" range.
3. Gently pull the transmission control cable in the direction of the arrow, and then tighten the adjusting nut.

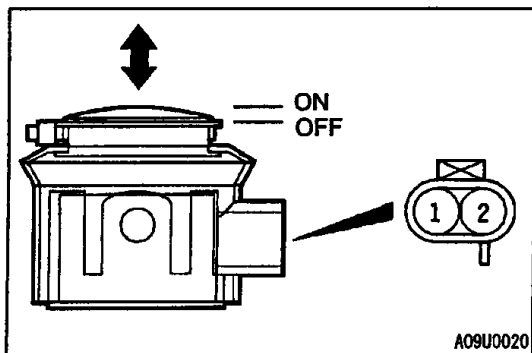
Tightening torque: 12 Nm



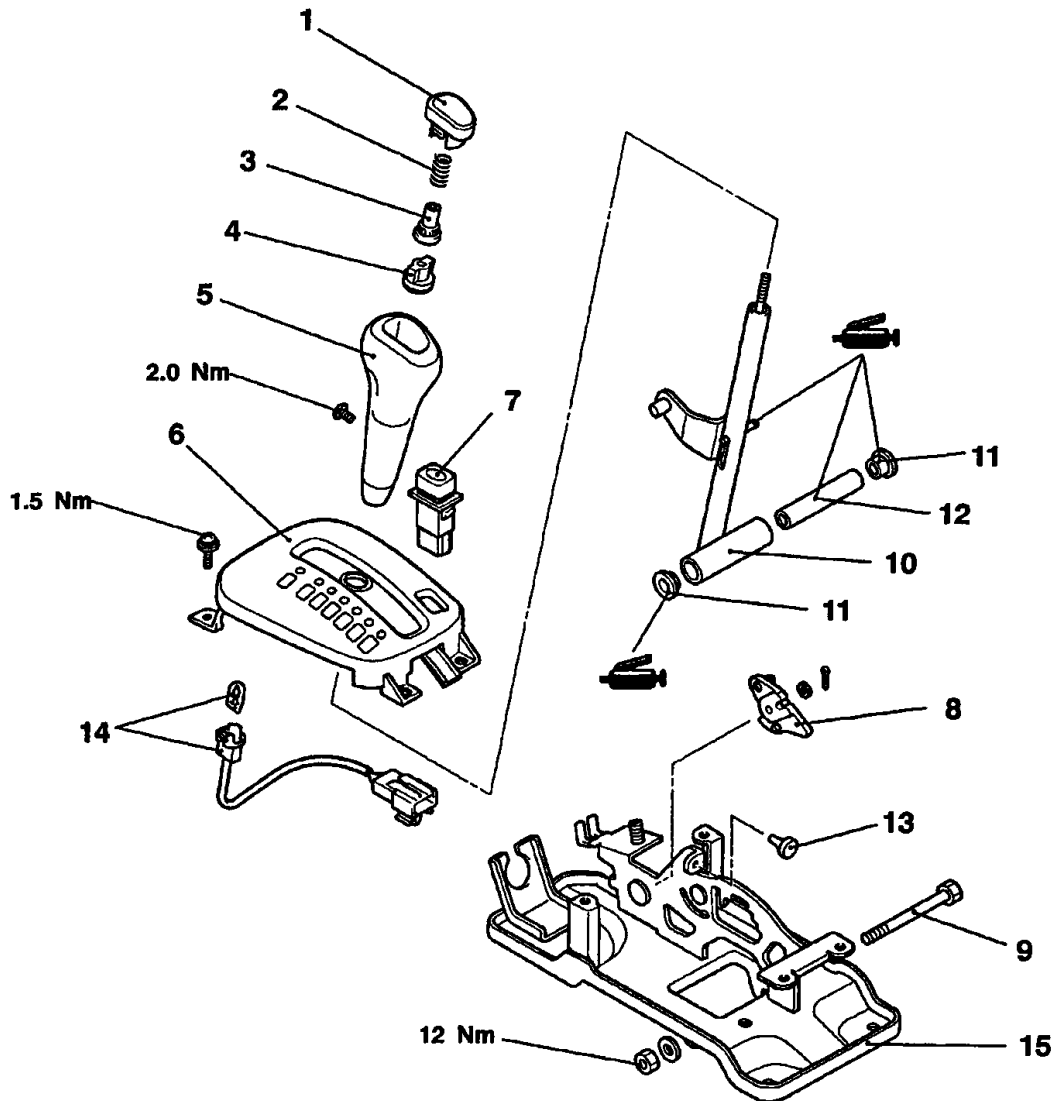
INSPECTION

WIDE OPEN THROTTLE SWITCH CHECK

Switch position	Terminal No.	
	1	2
ON		
OFF		



SELECTOR LEVER ASSEMBLY DISASSEMBLY AND REASSEMBLY



AY0075BN

Disassembly steps

1. Push button
2. Spring
3. Bumper
4. Adjuster
5. Selector knob
6. Indicator panel assembly
7. Hold switch
8. Lock cam

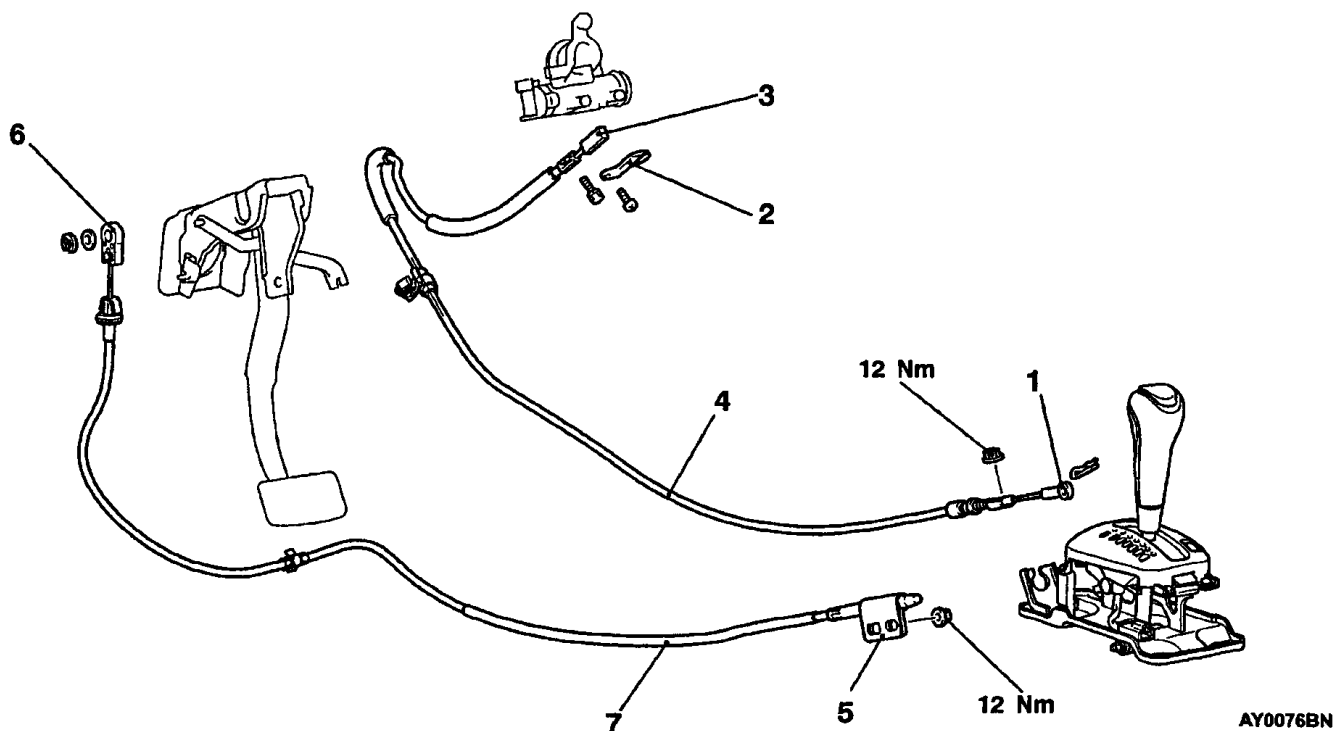
9. Bolt
10. Shift lever assembly
11. Bushing
12. Pipe
13. Stopper
14. Indicator lamp assembly
15. Bracket assembly

SHIFT LOCK AND KEY INTERLOCK MECHANISMS

REMOVAL AND INSTALLATION

NOTE

When removing and installing the transmission control cable and shift lock cable unit, be careful not to hit them against the SRS-ECU.



AY0076BN

Key interlock cable removal steps

►B◄

- Front floor console
- 1. Key interlock cable connection (Selector lever side)
- Lower column cover
- 2. Cover
- 3. Key interlock cable connection (Steering lock cylinder side)
- 4. Key interlock cable

◄A►

Shift lock cable removal steps

►A◄

- Front floor console
- 5. Shift lock cable connection (Selector lever side)
- Under cover
- 6. Shift lock cable connection (Brake pedal side)
- 7. Shift lock cable

REMOVAL SERVICE POINT**◀A▶ KEY INTERLOCK CABLE (STEERING CYLINDER SIDE) REMOVAL**

Turn the ignition switch to the "ACC" position, and then pull the key interlock cable out from the ignition key cylinder.

INSTALLATION SERVICE POINTS**▶A◀ SHIFT LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION**

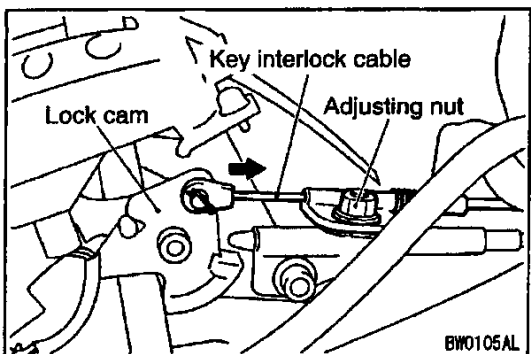
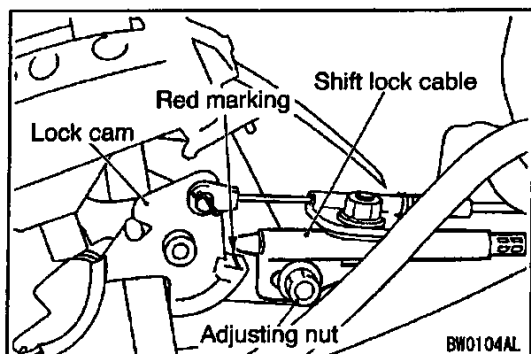
1. Provisionally install the selector lever knob, and then move the selector lever to the "P" position and turn the ignition switch to the "LOCK (OFF)" position.
2. Tighten the locking nut so that the end of the shift lock cable comes above the red marking of the lock cam.

Tightening torque: 12 Nm

▶B◀ KEY INTER LOCK CABLE (SELECTOR LEVER SIDE) INSTALLATION

1. Install the key interlock cable on the lock cam.
2. Install the spring and washer of the key interlock cable as shown.
3. While lightly pushing the cable coupling portion of the lock cam in the direction, tighten the nut to the specified torque.

Tightening torque: 12 Nm



GROUP 26

FRONT AXLE

GENERAL

OUTLINE OF CHANGES

The service procedures for the front axle has been added due to the introduction of the F9Q engine vehicles.

DRIVE SHAFT<F9Q>

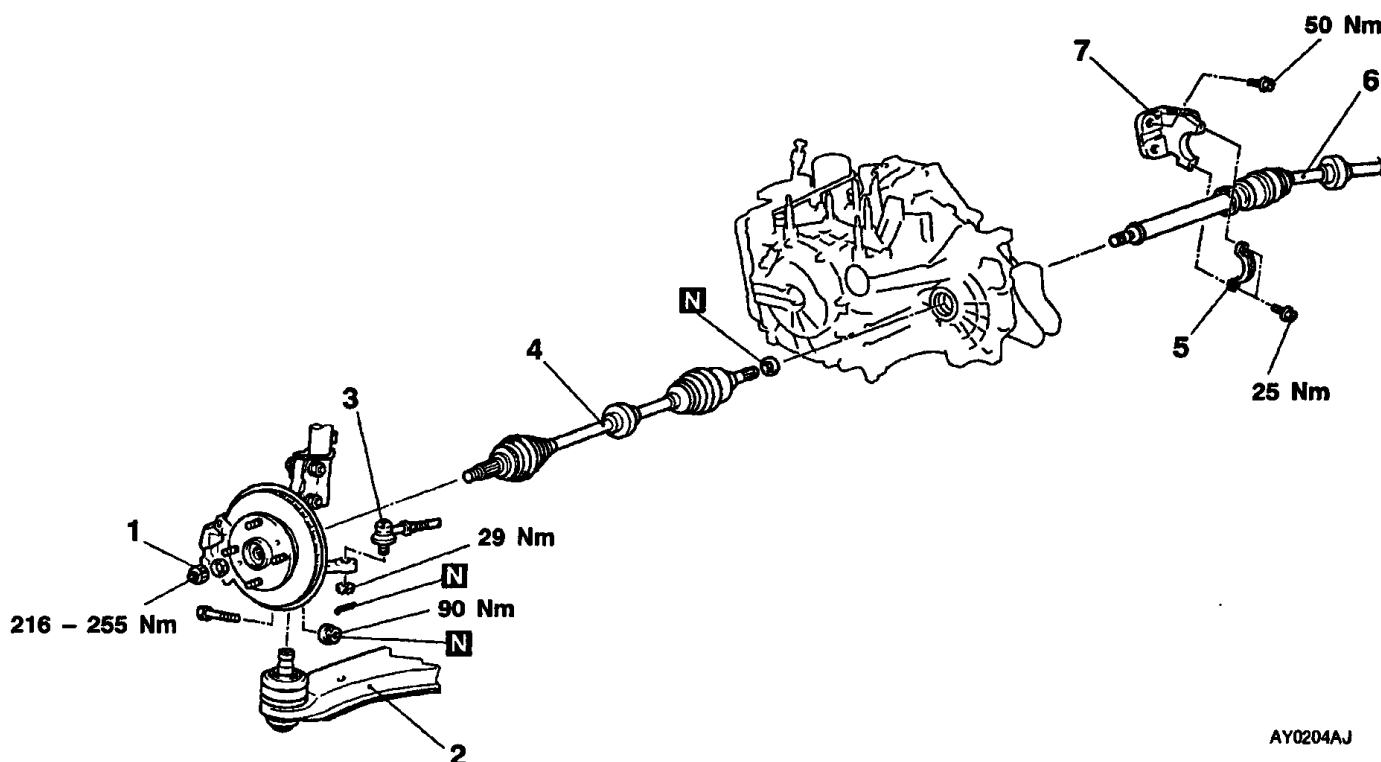
REMOVAL AND INSTALLATION

Caution:

Do not strike the ABS rotors installed to the R.J. outer race of drive shaft against other parts when removing or installing the drive shaft. Otherwise the ABS rotors will be damaged.

Pre-removal and Post-Installation Operation

- Brake hose Clamp, Speed Sensor Cable Connection.
- Stabilizer Link Connection Removal and Installation.
- Side Under Cover Removal and Installation



AY0204AJ

Removal steps

- ◀A▶ ▶A▶ 1. Drive shaft nut
 ▶B▶ 2. Lower arm ball joint connection
 ▶C▶ 3. Tie rod end connection
 4. Drive shaft (L.H.)
 5. Bearing bracket cap

- ◀C▶ 6. Drive shaft and transmission side shaft (R.H.)
 7. Bearing bracket

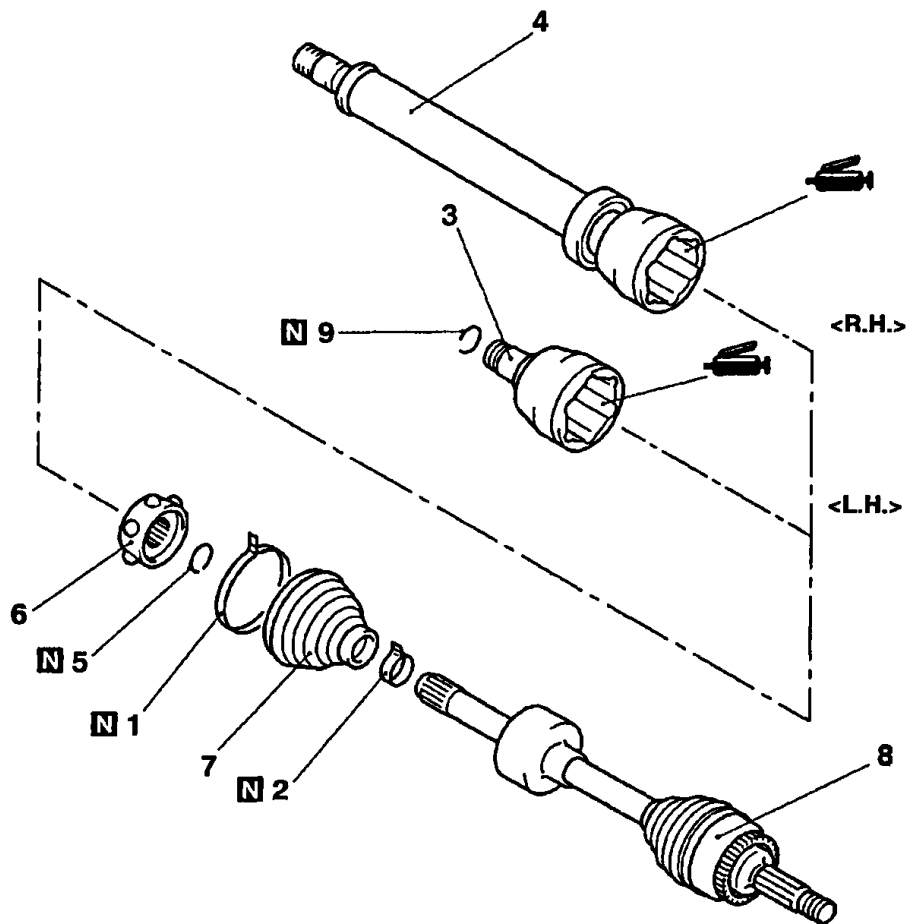
NOTE

The service points for removal and installation are the same procedures as before.

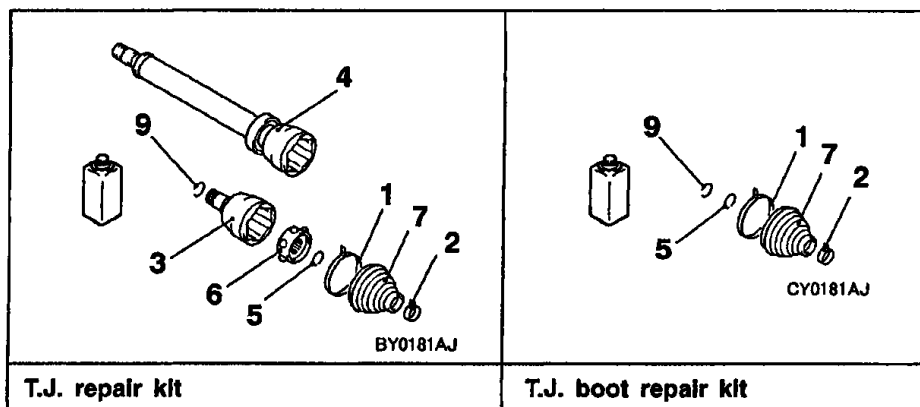
DISASSEMBLY AND REASSEMBLY

Caution

1. R.J. assembly cannot be disassembled.
2. Be sure not to damage the rotor attached to the R.J. outer race.



AY0181AJ



T.J. repair kit

T.J. boot repair kit

Disassembly steps

1. T.J. boot band (large)
2. T.J. boot band (small)
3. T.J. case (L.H.)
4. T.J. assembly (R.H.)
5. Snap ring



6. Joint assembly
7. T.J. boot
8. R.J. assembly
9. Circlip (L.H.)

DISASSEMBLY SERVICE POINTS**◀A▶ T.J. CASE/T.J. ASSEMBLY/JOINT ASSEMBLY
REMOVAL**

1. Remove grease from T.J. case, T.J. assembly, and the joint assembly.
2. If removed grease contains foreign objects, such as water and dust, make sure to clean the joint assembly.

◀B▶ T.J. BOOT REMOVAL

1. Remove grease from the shaft spline.
2. If T.J. boot is reused, wind tape around the spline of the shaft to prevent the boot from being damaged during removal.

GROUP 31

WHEEL AND TYRE

GENERAL

OUTLINE OF CHANGES

The specifications of the wheel and tyre have been established.

GENERAL SPECIFICATION

Items		CLASSIC, COMFORT	SPORT, ELEGANCE
Wheel	Type	Steel Aluminium*	Aluminium
	Size	15 × 6.0J	15 × 6.0J
	Amount of wheel offset mm	46	46
	Pitch circle diameter (P.C.D.) mm	114.3	114.3
Tyre	Size	195/60R15 88H	195/60R15 88H
Spare wheel	Type	Steel Aluminium*	Steel Aluminium*
	Size	15 × 3.50B 15 × 6.0J*	15 × 3.50B 15 × 6.0J*
	Amount of wheel offset mm	46	46
	Pitch circle diameter (P.C.D.) mm	114.3	114.3
Spare tyre	Size	T125/90 R15 (High pressure) 195/60 R15 88H*	T125/90 R15 (High pressure) 195/60 R15 88H*

NOTE

*: Optional items

POWER PLANT MOUNT

CONTENTS

GENERAL	2	TRANSMISSION MOUNTING	4
ENGINE MOUNTING	2	ENGINE ROLL STOPPER AND CENTERMEMBER	5

GENERAL

OUTLINE OF CHANGES

The following service procedures have been established to correspond to the addition of the F9Q diesel engine.

ENGINE MOUNTING

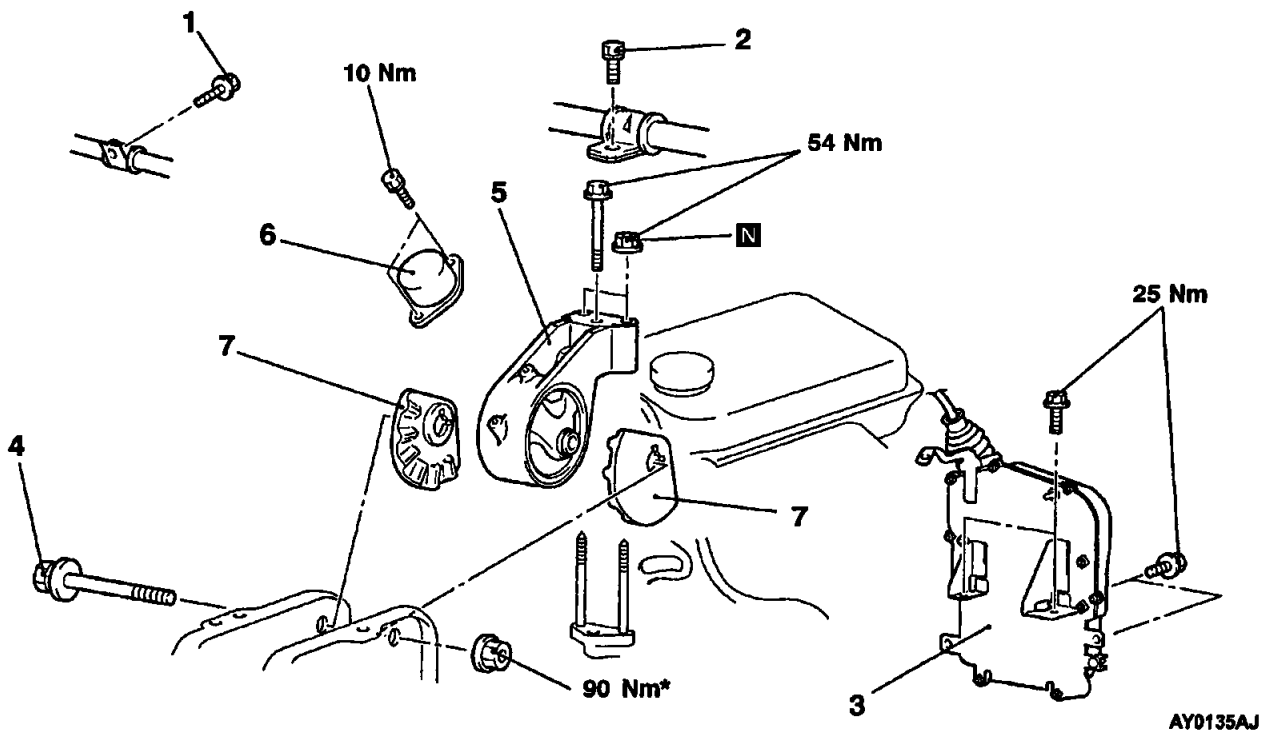
REMOVAL AND INSTALLATION

Caution

Mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

Pre-removal Operation

Jack up the Engine and Transmission Assembly until There is no Weight on the Engine Mount Bracket Insulator.



AY0135AJ

Removal steps

1. A/C suction hose clump
2. Power steering pressure hose clump
3. Engine-ECU assembly
4. Engine mount insulator mounting bolt



5. Engine mount bracket
6. Engine mount stopper
7. Dynamic damper

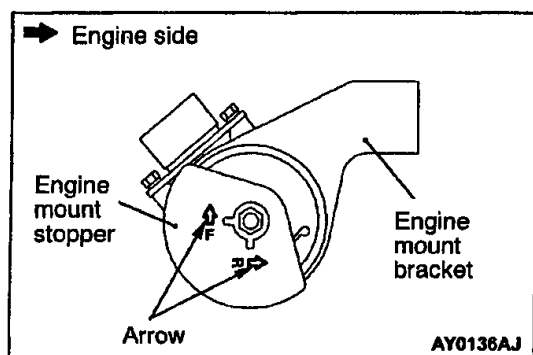


REMOVAL SERVICE POINT**◀A▶ ENGINE-ECU ASSEMBLY REMOVAL**

Disconnect the engine-ECU assembly, with its wiring harness attached, and move the ECU assembly aside so that it will not be in the way while removing the engine mount.

INSTALLATION SERVICE POINT**▶A◀ ENGINE MOUNT STOPPER INSTALLATION**

Install the engine mount stopper so that the arrow marks point toward the shown direction.



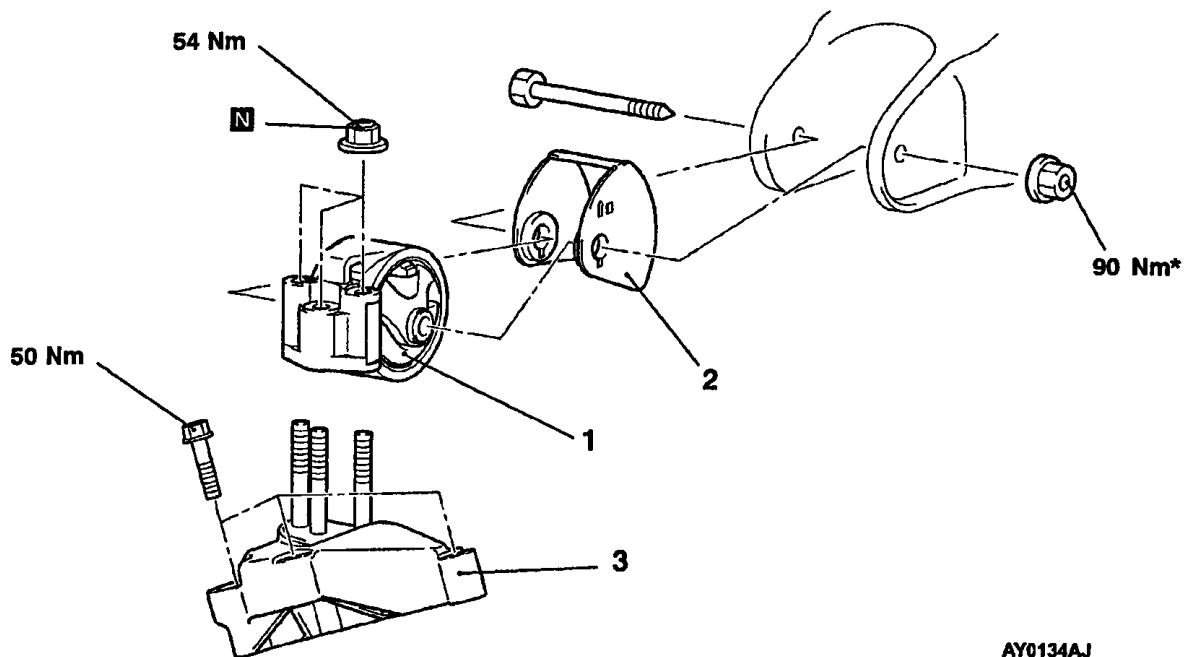
TRANSMISSION MOUNTING

REMOVAL AND INSTALLATION

Caution

Mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

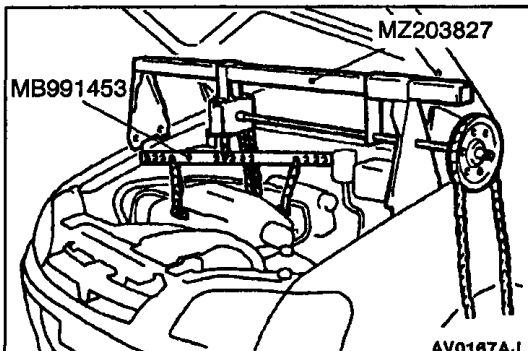
Pre-removal and Post-installation Operation
Air Cleaner Assembly Removal and Installation



Removal steps

- Centermember mounting bolt
- 1. Transmission mount bracket

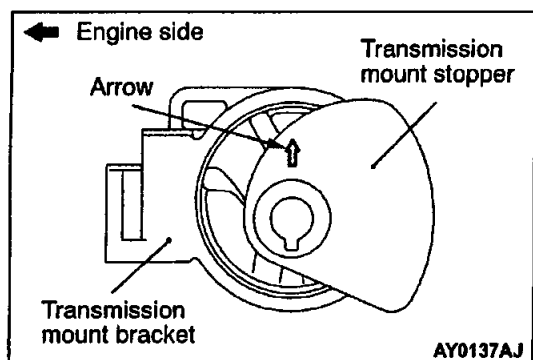
- 2. Transmission mount stopper
- 3. Transmission mount lower bracket



REMOVAL SERVICE POINT

TRANSMISSION MOUNT BRACKET REMOVAL

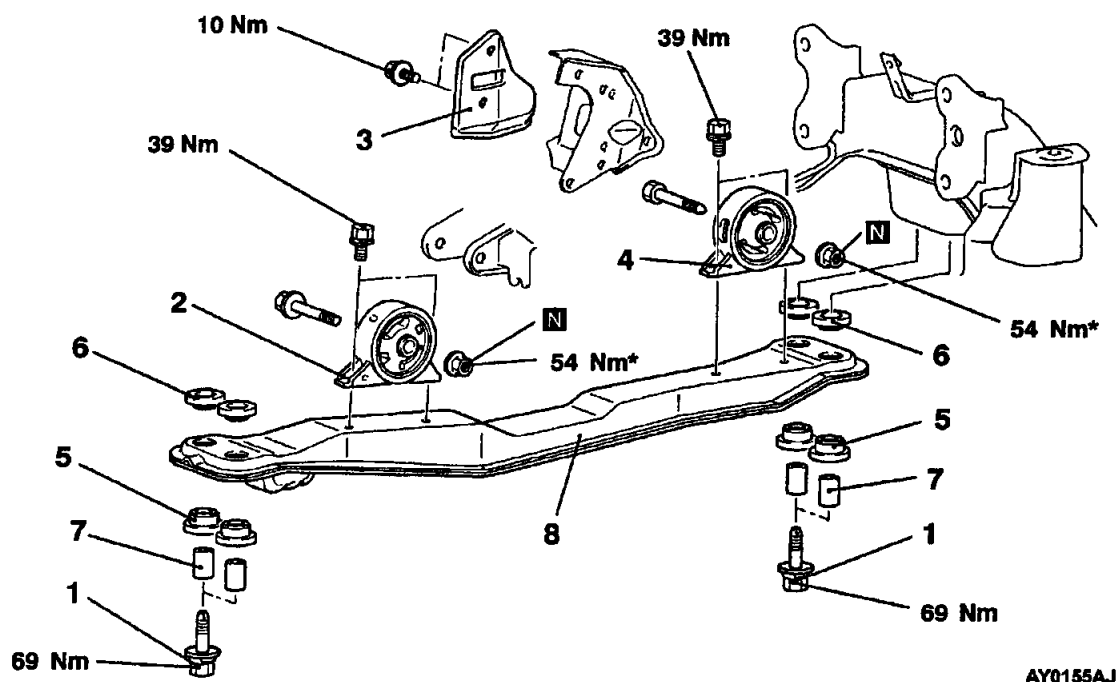
1. Install the special tool to the vehicle body to support the engine and transmission assembly.
2. Remove the centermember mounting bolts.
3. Remove the bolt and nuts of the transmission mount bracket.
4. After lowering the engine and transmission assembly, remove the transmission mount bracket.

**INSTALLATION SERVICE POINT****►A◄ TRANSMISSION MOUNT STOPPER INSTALLATION**

Install the transmission mount stopper so that the arrow mark points toward the shown direction.

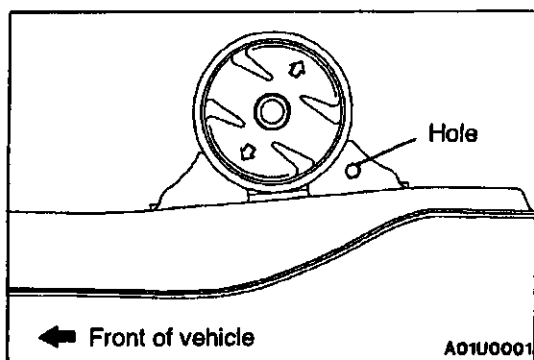
ENGINE ROLL STOPPER AND CENTERMEMBER**REMOVAL AND INSTALLATION****Caution**

Mounting locations marked by * should be provisionally tightened, and then fully tightened when the body is supporting the full weight of the engine.

**Removal steps**

- B◄ 1. Bolt
2. Front roll stopper bracket assembly
3. Rear roll stopper heat protector
►A◄ 4. Rear roll stopper bracket assembly

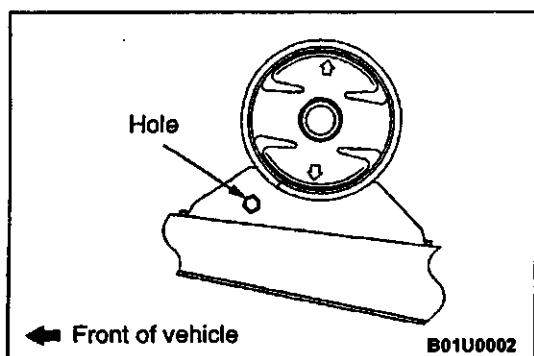
5. Bushing (lower)
6. Bushing (upper)
7. Collar
8. Centermember



INSTALLATION SERVICE POINTS

►A◄ REAR ROLL STOPPER BRACKET ASSEMBLY INSTALLATION

Install so that the hole in the rear roll stopper bracket is facing towards the rear of the vehicle.



►B◄ FRONT ROLL STOPPER BRACKET ASSEMBLY INSTALLATION

Install so that the hole in the front roll stopper bracket is facing towards the front of the vehicle.

SERVICE BRAKES

CONTENTS

BASIC BRAKE SYSTEM 35A

ANTI-SKID BRAKING SYSTEM (ABS) 35B



BASIC BRAKE SYSTEM

CONTENTS

GENERAL	3	Proportioning Valve Function Test	
Outline of Changes	3	<Vehicles without ABS>	4
SERVICE SPECIFICATIONS	3	Brake Disc Run-out (Front) Check	4
ON-VEHICLE SERVICE	4	BRAKE PEDAL	5

GENERAL

OUTLINE OF CHANGES

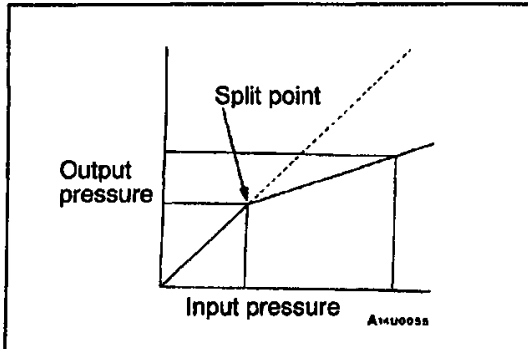
- The limit value for the front brake disc run-out has been changed.
- The proportioning valve has been discontinued since the Electronic-controlled Braking force Distribution (EBD) system, which realizes a ideal braking force, has been introduced. <Vehicles with ABS>
- On vehicles without ABS, the specifications of the proportioning valve have been changed.
- "NOTE" has been added into the brake pedal service procedure.

SERVICE SPECIFICATIONS

Items			Standard value	Limit
Proportioning valve <Vehicles without ABS>	Split point MPa	Hatchback	2.94	–
		Sedan	2.45	–
	Output fluid pressure (Input fluid pressure) MPa	Hatchback	4.66 ± 0.4 (9.81)	–
		Sedan	4.30 ± 0.4 (9.81)	–
	Output fluid pressure difference between left and right MPa		–	0.4
Front disc brake	Pad thickness mm		12.0	2.0
	Disc thickness mm		24.0	22.4
	Disc runout mm		–	0.03 or less
	Drag force (tangential force of wheel mounting bolts) N		40 or less	–

ON-VEHICLE SERVICE

The service specifications have been changed as follows.
The service procedure is the same as before.



PROPORTIONING VALVE FUNCTION TEST <Vehicles without ABS>

The service specifications have been changed as follows:

1. Input pressure (Split point)

Standard value:

<Hatchback> 2.94 MPa

<Sedan> 2.45 MPa

2. Output pressure when input pressure is 9.81 MPa

Standard value:

<Hatchback> 4.66 ± 0.4 MPa

<Sedan> 4.30 ± 0.4 MPa

BRAKE DISC RUN-OUT (FRONT) CHECK

The limit value for the front brake disc run-out has been changed.

Limit: 0.03 mm or less

BRAKE PEDAL

Only the following service point has been changed. The other description is the same as before.

INSTALLATION SERVICE POINT

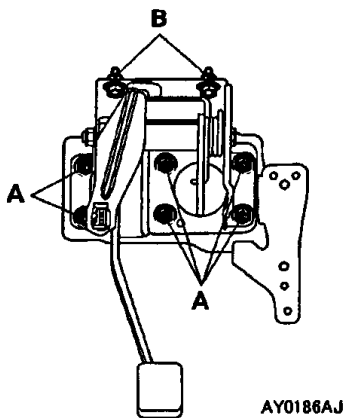
►A◄ BRAKE PEDAL ASSEMBLY INSTALLATION

Tighten the brake booster mounting nuts (A), and then the brake pedal mounting bolts (B).

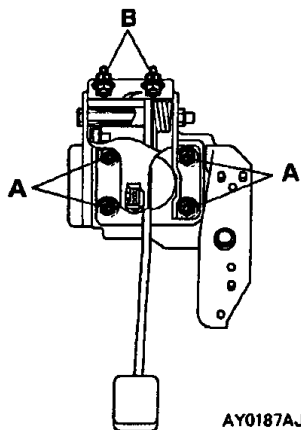
NOTE

The pedal support member can not be positioned correctly if the pedal mounting bolts (B) are tightened first as the their holes are oblong holes.

<L.H. drive vehicles>



<R.H. drive vehicles>



ANTI-SKID BRAKING SYSTEM (ABS) <2WD>

CONTENTS

GENERAL	2	ON-VEHICLE SERVICE	6
Outline of change	2	Wheel Speed Sensor Output Voltage	
TROUBLESHOOTING	2	Check	6

GENERAL

OUTLINE OF CHANGE

Electronic-controlled Braking force Distribution (EBD) system, which ensures maximum braking force regardless of luggage load condition, has been adopted. Due to this adoption, the ABS-ECU terminal layout and the ABS circuit have been changed.

EBD CONTROL

The vehicle with ABS can electronically control brake fluid pressure to rear brakes during applying braking force corresponding to deceleration and slip at the front/rear wheels calculated by wheel speed sensor signals using rear wheel solenoid valves. EBD control allows braking force of the vehicle to be compatible with stability at a high level characterized by the following features:

- Since ideal braking force to rear wheels can be obtained regardless of laden conditions of the vehicle or road surface, applied force to the braking pedal on a high-friction coefficient road can be reduced especially when the vehicle is laden.
- Due to a reduction of the load on the front brakes, temperature increase in the pads during applying braking force can be suppressed. Thus, tolerance for wear is improved.
- Control valves, such as proportioning valves are unnecessary.

TROUBLESHOOTING

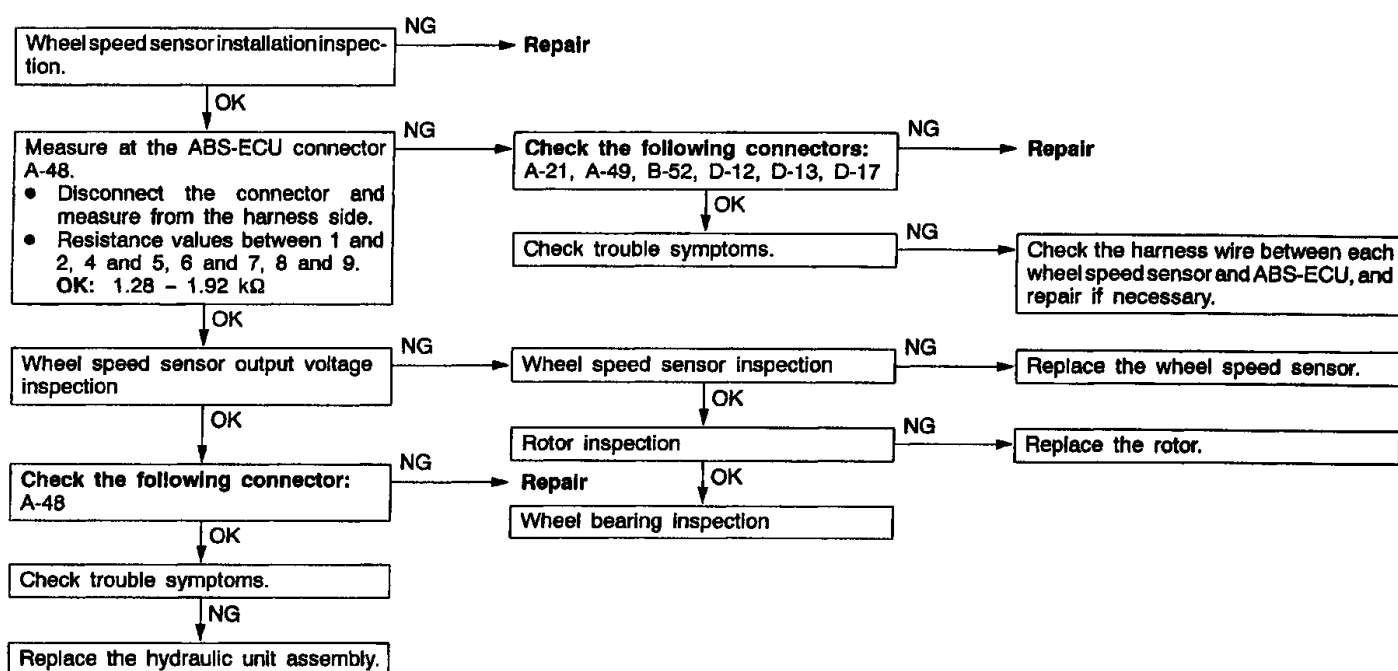
The procedures other than stated here are the same as before.

INSPECTION CHART FOR DIAGNOSIS CODES

Diagnosis code No.	Inspection item	Diagnosis content	Reference page
11	Front right wheel speed sensor	Open circuit	35B-3
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
21	Front right wheel speed sensor	Short circuit	35B-3
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code Nos.11, 12, 13 and 14 Wheel speed sensor open circuit	Probable cause
Code Nos.21, 22, 23 and 24 Wheel speed sensor short circuit	
Code Nos.11, 12, 13 and 14 are output if the ABS-ECU detects an open circuit in any one of the four wheel speed sensors.	• Malfunction of wheel speed sensor • Malfunction of wiring harness or connector • Malfunction of ABS-ECU
Code Nos.21, 22, 23 and 24 are output in the following cases. • When there is no input from any one of the four wheel speed sensors when traveling at 12 km/h or more, even though open circuit verified. • When a chipped or blocked-up ABS rotor is detected during driving at 12 km/h or more.	• Malfunction of wheel speed sensor • Malfunction of wiring harness or connector • Malfunction of rotor • Malfunction of ABS-ECU • Malfunction of wheel bearing



INSPECTION CHART FOR TROUBLE SYMPTOMS

Get an understanding of the trouble symptoms and check according to the inspection procedure chart.

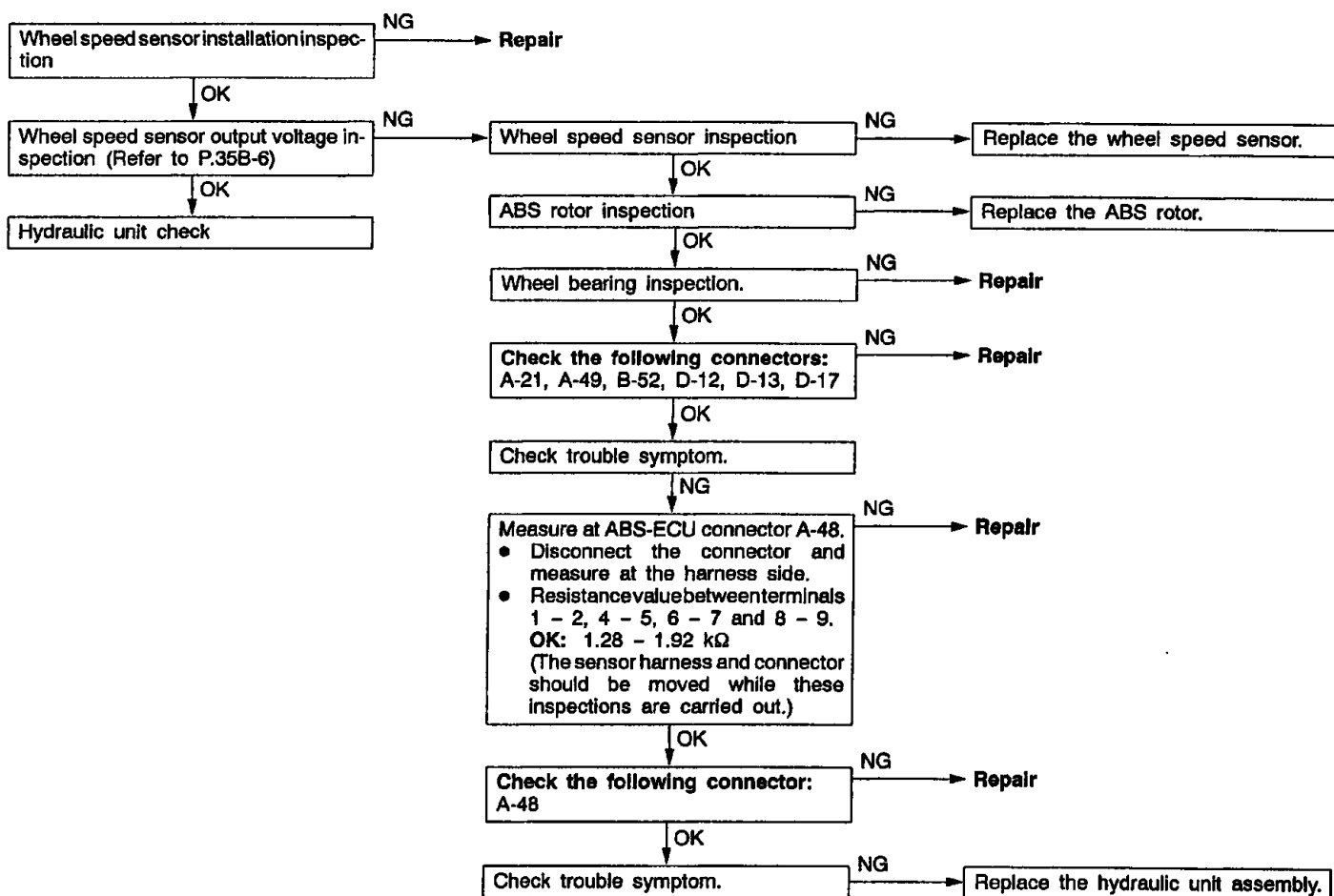
Trouble symptoms		Inspection procedure No.	Reference page
Faulty ABS operation	Unequal braking power on both sides	5	35B-4
	Insufficient braking power		
	ABS operates under normal braking conditions		
	ABS operates before vehicle stops under normal braking conditions		
	Large brake pedal vibration (Caution 2.)	-	-

Caution

1. If steering movements are made when driving at high speed, or when driving on road surfaces with low frictional resistance, or when passing over bumps, the ABS may operate even though sudden braking is not being applied. Because of this, when getting information from the customer, check if the problem occurred while driving under such conditions as these.
2. During ABS operation, the brake pedal may vibrate or may not be able to be depressed. Such phenomena are due to intermittent changes in hydraulic pressure inside the brake line to prevent the wheels from locking and is not an abnormality.

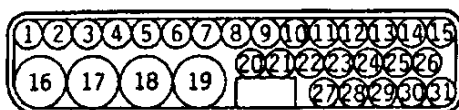
INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS**Inspection Procedure 5**

Brake operation is abnormal.	Probable cause
This varies depending on the driving conditions and the road surface conditions, so problem diagnosis is difficult. However, if a normal diagnosis code is displayed, carry out the following inspection.	• Improper installation of wheel speed sensor • Incorrect sensor harness contact • Foreign material adhering to wheel speed sensor • Malfunction of wheel speed sensor • Malfunction of ABS rotor • Malfunction of wheel bearing • Malfunction of hydraulic unit • Malfunction of ABS-ECU



CHECK AT ABS-ECU**TERMINAL VOLTAGE CHECK CHART**

1. Measure the voltages between terminals (16) and (19) (earth terminals) and each respective terminal.
2. The terminal layouts are shown in the illustrations below.

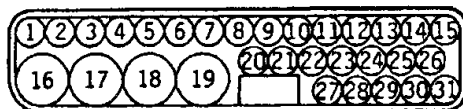


14U0122

Connector terminal No.	Signal	Checking requirements		Normal condition
11	MUT-II	Connect the MUT-II.		Serial communication with MUT-II
		Do not connect the MUT-II.		1 V or less
12	Input from diagnosis indication selection	Connect the MUT-II.		0 V
		Do not connect the MUT-II.		Approx. 12 V
14	Input from stop lamp switch	Ignition switch: ON	Stop lamp switch: ON	System voltage
			Stop lamp switch: OFF	1 V or less
15	ABS-ECU power supply	Ignition switch: ON		System voltage
		Ignition switch: START		0 V
17	Pump motor power supply	Always		System voltage
18	Solenoid valve power supply	Always		System voltage
20	Output to ABS warning lamp	Ignition switch: ON	The lamp is switched off.	System voltage
			The lamp is illuminated.	0 - 2 V

RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS

1. Turn the ignition switch off and disconnect the ABS-ECU connectors before checking resistance and continuity.
2. Check them between the terminals indicated in the table below.
3. The terminal layouts are shown in the illustrations below.



14U0122

Connector terminal No.	Signal	Normal condition
1 – 2	Rear-right wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
4 – 5	Front-right wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
6 – 7	Front-left wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
8 – 9	Rear-left wheel speed sensor (+ wire)	1.28 – 1.92 kΩ
16 – Body earth	ABS-ECU earth	Continuity
19 – Body earth		

ON-VEHICLE SERVICE**WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK**

The terminal numbers, which voltage is measured at, have been changed. The measurement procedures are the same as before.

Wheel speed sensor	Front left	Front right	Rear left	Rear right
Terminal No.	6	4	8	1
	7	5	9	2

GROUP 37A

STEERING

GENERAL

OUTLINE OF CHANGE

The following service procedures have been added due to the introduction of the 1900-mL diesel engine. The other items are the same as before.

- Power steering oil pump
- Power steering hoses

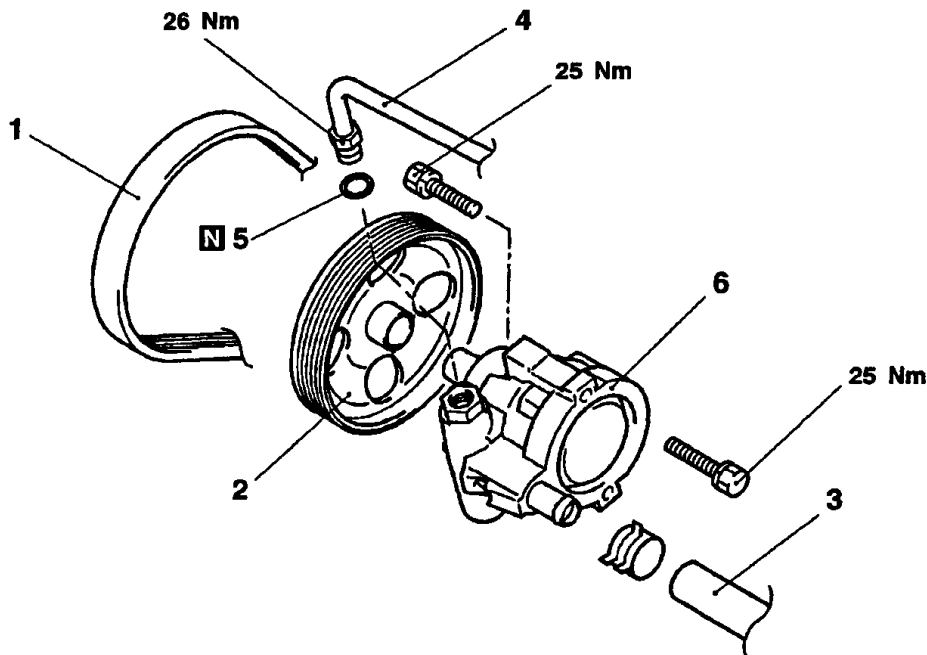
POWER STEERING OIL PUMP

REMOVAL AND INSTALLATION

Pre-removal Operation
Power Steering Fluid Draining

Post-installation Operation

- Power Steering Fluid Supplying
- Drive-belt Tension Adjusting
(Refer to GROUP 11C – On-vehicle Service.)
- Power Steering Fluid Line Bleeding



Removal steps

1. Drive-belt
2. Power steering pump pulley
3. Suction hose

4. Pressure hose
5. O-ring
6. Oil pump

INSPECTION

- Check the drive-belt for cracks.
- Check the pulley assembly for uneven rotation.

POWER STEERING HOSES

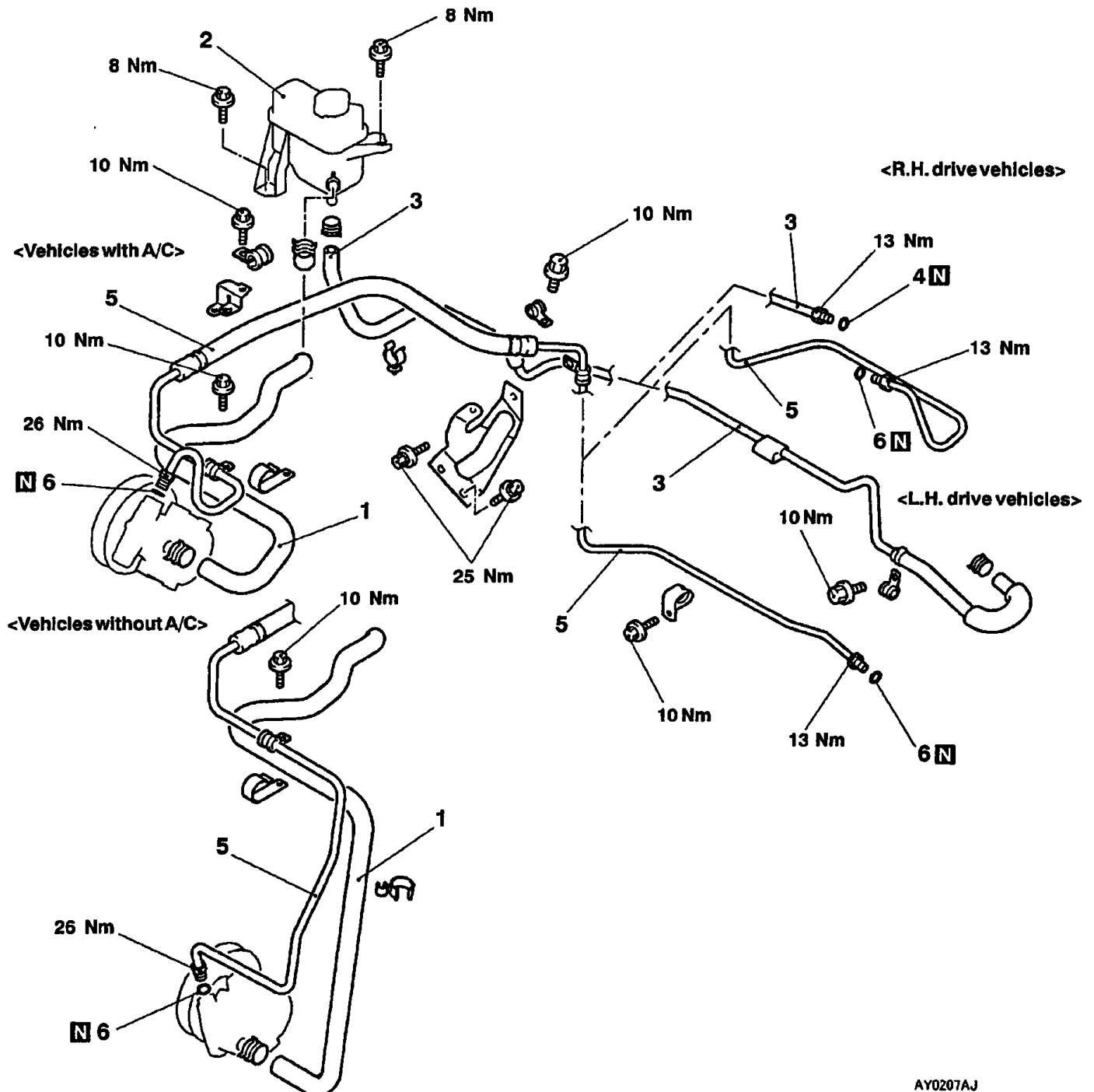
REMOVAL AND INSTALLATION

Pre-removal Operation

Power Steering Fluid Draining

Post-installation Operation

- Power Steering Fluid Supplying
- Power Steering Fluid Line Bleeding



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Removal steps

1. Suction hose
2. Oil reservoir
3. Return hose

4. O-ring
5. Pressure hose
6. O-ring

GROUP 51

EXTERIOR

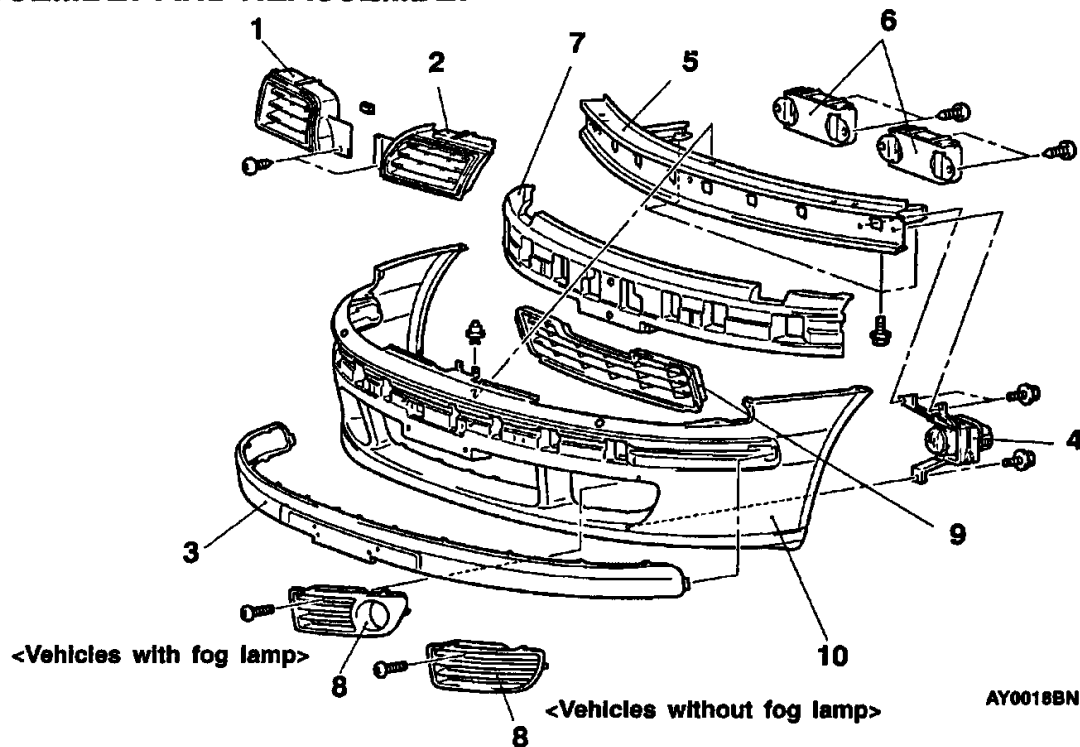
GENERAL

OUTLINE OF CHANGES

- The following service procedure has been revised as a dynamic damper has been added as the front bumper component <For Diesel>.
- The service procedure has been added due to the addition of the DI-D mark.

FRONT BUMPER<FOR DIESEL>

DISASSEMBLY AND REASSEMBLY



Disassembly steps

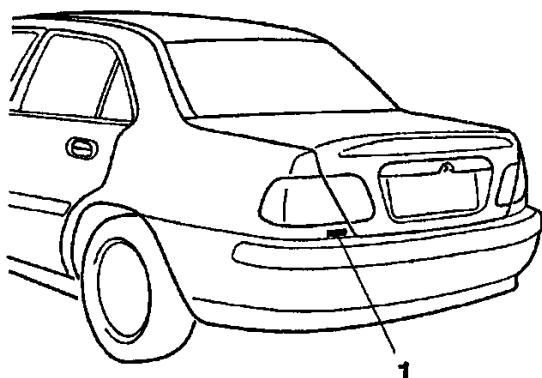
1. Radiator grille, R.H.
2. Radiator grille, L.H.
3. Bumper protector
4. Fog lamp
5. Bumper reinforcement

6. Dynamic damper
7. Form
8. Fog lamp cover
9. Under grille
10. Bumper face

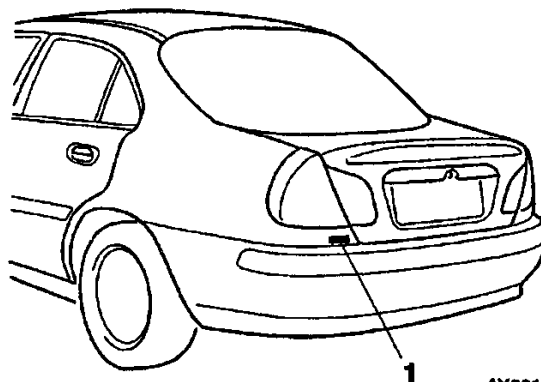
MARK

REMOVAL AND INSTALLATION

<Sedan>



<Hatchback>



AY0019BN

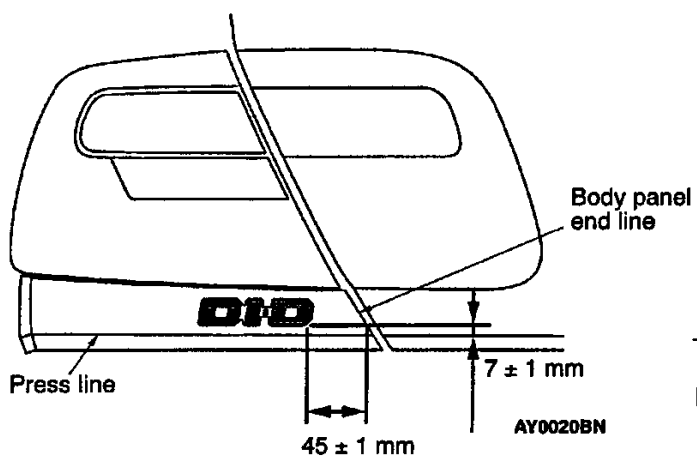
▶A◀ 1. DI-D MARK

INSTALLATION SERVICE POINT

▶A◀ MARK INSTALLATION

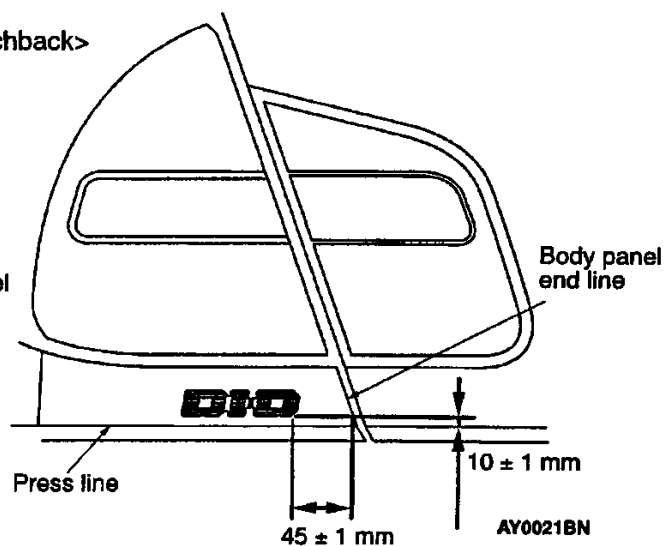
(1) DI-D MARK

<Sedan>



AY0020BN

<Hatchback>



AY0021BN

GROUP 54

CHASSIS ELECTRICAL

GENERAL

OUTLINE OF CHANGES

- Troubleshooting procedures have been changed as the immobilizer-ECU has been changed due to changes on the diesel engine <Diesel-powered vehicles>.
- The SRS warning lamp bulb inside the combination meter has been changed from 0.84 W to 1.4 W.
- The GDI ECO indicator lamp inside the combination meter can be dimmed by operating the rheostat.
- The defogger switch inspection procedure has been added as the timer function of the rear window defogger has been discontinued <Vehicles with manual air conditioner>.

IMMOBILIZER SYSTEM <Diesel-powered Vehicles>

TROUBLESHOOTING

INSPECTION CHART FOR DIAGNOSIS CODES

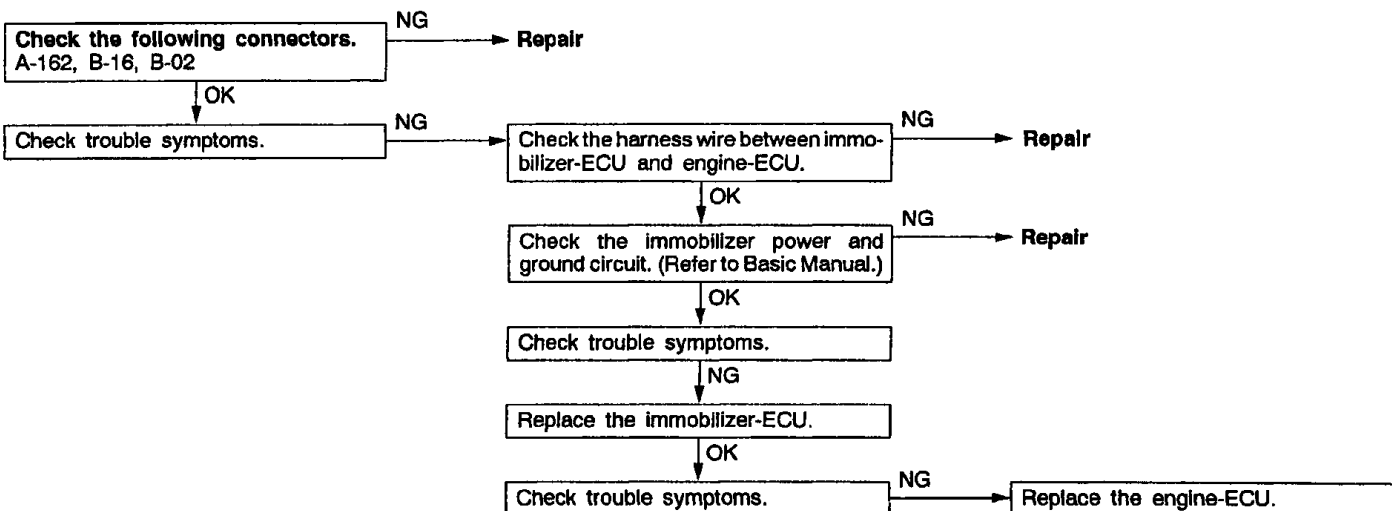
Diagnosis code No.	Inspection items	Reference page
11	Transponder communication system	–
12	ID code are not the same or are not registered	–
21	Communication system between immobilizer-ECU and engine-ECU	54-2

NOTE

Refer to the Basic Manual for the inspection procedures of diagnosis code Nos. 11 and 12.

INSPECTION PROCEDURE FOR DIAGNOSIS CODE

Code No.21 Communication system between Immobilizer-ECU and engine-ECU	Probable cause
After the ignition switch is turned to the ON position, the confirmation code is not received from the engine-ECU within the allowable time, or an abnormal code is received.	• Malfunction of harness or connector • Malfunction of the engine-ECU • Malfunction of immobilizer-ECU

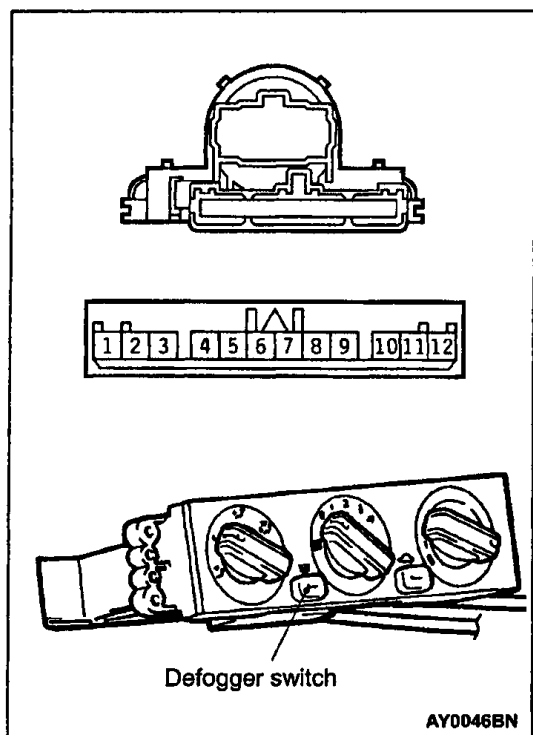


REAR WINDOW DEFOGGER SWITCH <Vehicles with Manual Air Conditioner>

INSPECTION

DEFOGGER SWITCH CONTINUITY CHECK

Switch position	Terminal No.			
	10		11	12
OFF	○	IND ⦿	○	○
ON	○	IND ⦿	○	○



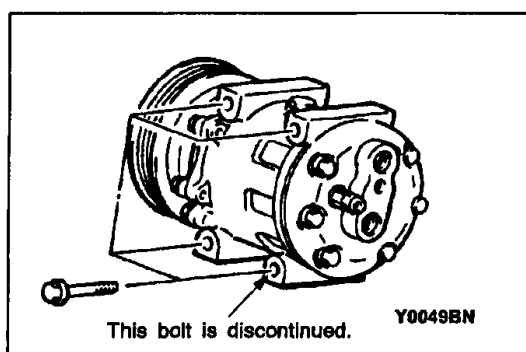
GROUP 55

HEATER, AIR CONDITIONER AND VENTILATION

GENERAL

OUTLINE OF CHANGES

- The service specifications and procedures have been added due to the introduction of an additional heater <Diesel-powered vehicles>.
- The removal and installation procedure for the refrigerant lines have been changed due to the change on the diesel engine <Diesel-powered vehicles>.
- To improve heating performance, an inside air mix damper has been added to the inside/outside air changeover damper in the blower assembly <Diesel-powered vehicles>.



- One of the compressor mounting bolt has been discontinued <Diesel-powered vehicles>.

SERVICE SPECIFICATION

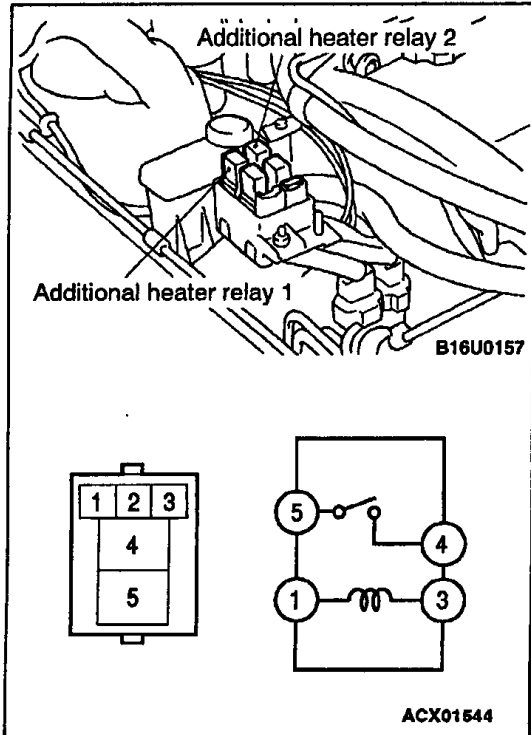
Item	Standard value
Additional heater resistance Ω <Diesel-powered vehicles>	0.45 ± 0.05 (at 20°C)

ADDITIONAL HEATER <Diesel-powered Vehicles>

ON-VEHICLE SERVICES

ADDITIONAL HEATER RELAY (1 AND 2) CHECK

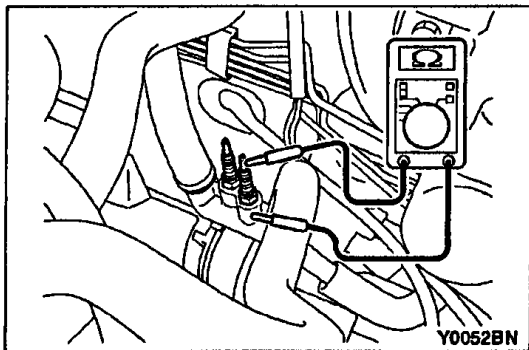
Battery voltage	Terminal No.			
	1	3	4	5
Supplied	⊕	⊖	○	○
Not supplied	○	○		



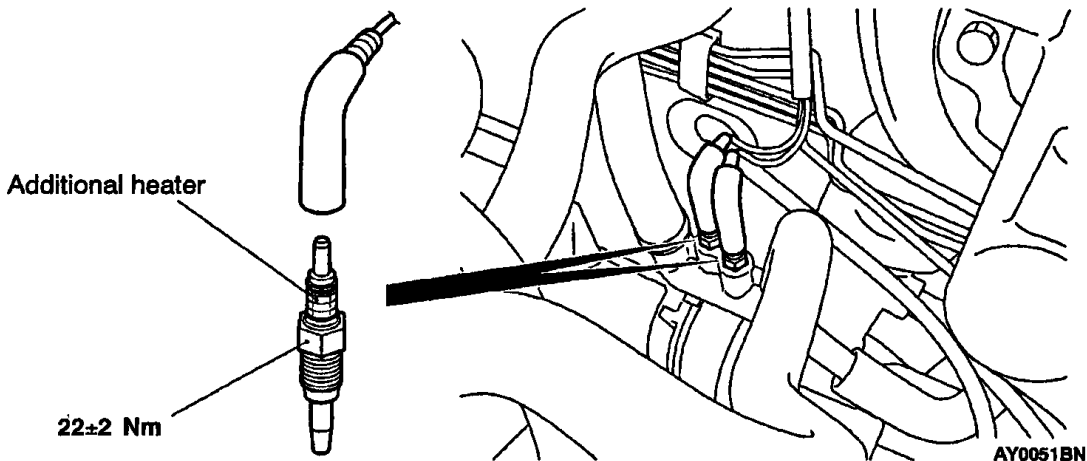
ADDITIONAL HEATER CHECK

Measure the resistance between the additional heater terminal and the body.

Standard value: $0.45 \pm 0.05 \Omega$ (at 20°C)



REMOVAL AND INSTALLATION

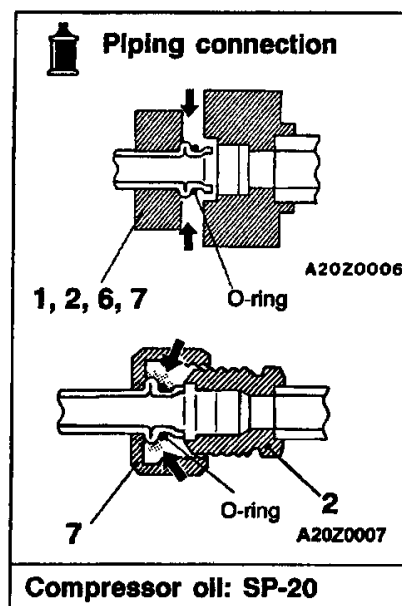
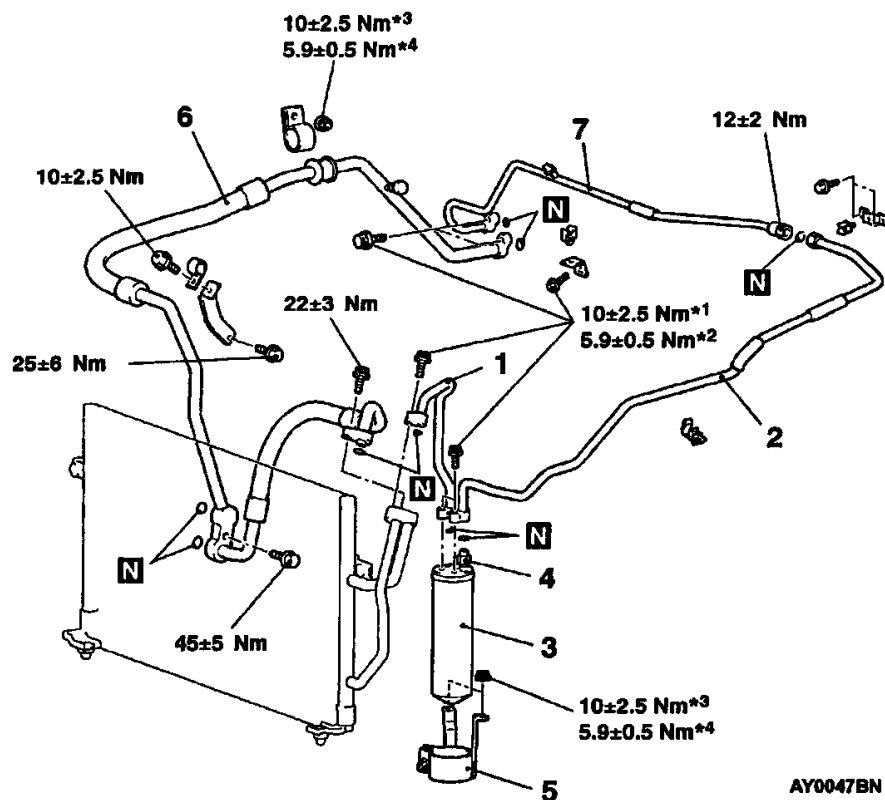


REFRIGERANT LINE <Diesel-powered Vehicles>

REMOVAL AND INSTALLATION

<L.H. Drive Vehicles>

Pre-removal Operation
Discharging and charging of refrigerant



Removal steps

1. Liquid pipe A
2. Liquid pipe B
- ▶A◀ 3. Receiver assembly
4. Dual pressure switch
- ▶A◀ 5. Receiver bracket
6. A/C flexible hose assembly
7. Liquid pipe C

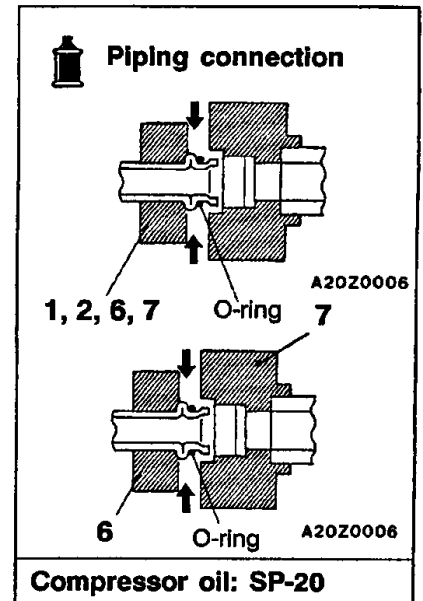
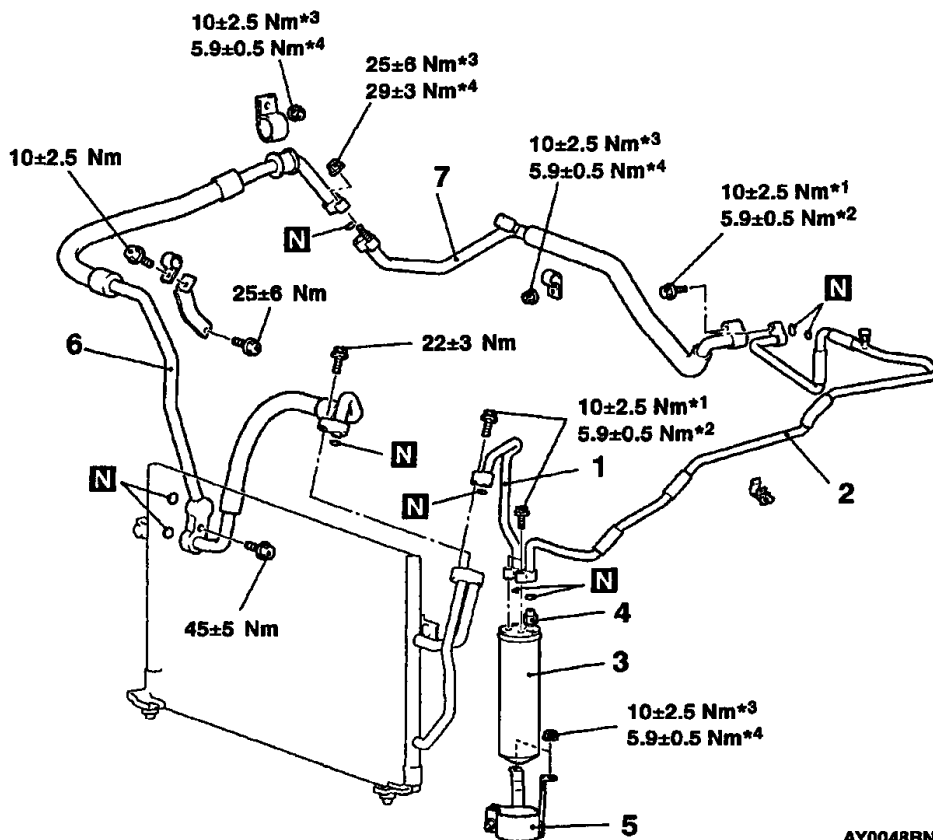
NOTE

1. *1: indicates flange bolt
2. *2: indicates bolt and washer assembly
3. *3: indicates flange nut
4. *4: indicates nut and washer assembly

<R.H. Drive Vehicles>

Pre-removal Operation

Discharging and charging of refrigerant



AY0048BN

Removal steps

- 1. Liquid pipe A
- 2. Liquid pipe B
- ▶A◀ 3. Receiver assembly
- 4. Dual pressure switch
- ▶A◀ 5. Receiver bracket
- 6. A/C flexible hose assembly
- 7. Suction pipe assembly

NOTE

- 1. *1: indicates flange bolt
- 2. *2: indicates bolt and washer assembly
- 3. *3: indicates flange nut
- 4. *4: indicates nut and washer assembly

INSTALLATION SERVICE POINT**▶A◀ A/C FLEXIBLE HOSE ASSEMBLY/RECEIVER ASSEMBLY INSTALLATION**

When replacing the A/C flexible hose assembly or receiver assembly, refill them with a specified amount of compressor oil, and then install them.

Compressor oil: SP-20

Quantity:

A/C flexible hose assembly: 10 mL

Receiver assembly: 10 mL