
GENERAL

CONTENTS

VEHICLE IDENTIFICATION	2	MAJOR SPECIFICATIONS	5
Models	2	Hatchback	5
Model Code	4	Sedan	8

VEHICLE IDENTIFICATION

MODELS

<HATCHBACK>

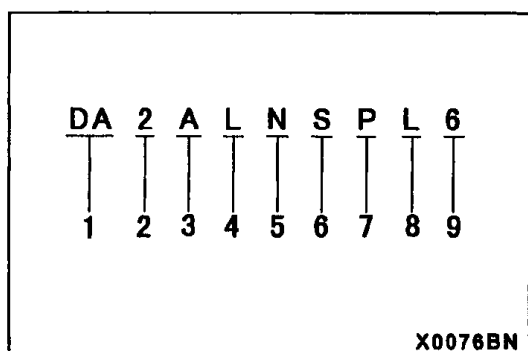
Model code		Engine model	Transmission model	Fuel supply system
DA1A	LNSPL6/R6	4G92-SOHC (1,597 ml)	F5MR1 (2WD-5M/T)	MPI
	LNUPL6/R6			
	LRUPL6/R6		F4A41 (2WD-4A/T)	
	LNGPL6/R6		F5MR1 (2WD-5M/T)	
	LRGPL6/R6		F4A41 (2WD-4A/T)	
	LNSJL6		F5MR1 (2WD-5M/T)	
	LNSLL6			
	LNULL6			
	LNUJL6			
	LRUJL6		F4A41 (2WD-4A/T)	
	LNGLL6		F5MR1 (2WD-5M/T)	
	LNGJL6			
	LRGJL6		F4A41 (2WD-4A/T)	
DA2A	LNSQL6/R6	4G93-DOHC (1,834 ml)	F5M42 (2WD-5M/T)	GDI
	LNUQL6/R6		F5M42 (2WD-5M/T)	
	LRUQL6/R6		F4A42 (2WD-4A/T)	
	LNGQL6/R6		F5M42 (2WD-5M/T)	
	LRGQL6/R6		F4A42 (2WD-4A/T)	
	LNXQL6/R6		F5M42 (2WD-5M/T)	
	LRXQL6/R6		F4A42 (2WD-4A/T)	
	LNSGL6		F5M42 (2WD-5M/T)	
	LNSRL6			
	LNUGL6			
	LNURL6			
	LRUGL6		F4A42 (2WD-4A/T)	
	LNGGL6		F5M42 (2WD-5M/T)	
	LNGRL6			
	LRGGL6		F4A42 (2WD-4A/T)	
	LNXGL6		F5M42 (2WD-5M/T)	

Model code		Engine model	Transmission model	Fuel supply system
DA2A	LNXRL6	4G93-DOHC (1,834 mℓ)	F5M42 (2WD-5M/T)	GDI
	LRXGL6		F4A42 (2WD-4A/T)	
DA4A	LNSFL6/R6	F8QT (1,870 mℓ)	F5MR3 (2WD-5M/T)	Fuel injection pump
	LNUFL6/R6			
	LNXFL6/R6			

<SEDAN>

Model code		Engine model	Transmission model	Fuel supply system
DA1A	SNSPL6/R6	4G92-SOHC (1,597 ml)	F5MR1 (2WD-5M/T)	MPI
	SNUPL6/R6			
	SRUPL6/R6		F4A41 (2WD-4A/T)	
	SNGPL6/R6		F5MR1 (2WD-5M/T)	
	SRGPL6/R6		F4A41 (2WD-4A/T)	
	SNSJL6		F5MR1 (2WD-5M/T)	
	SNSLL6			
	SNULL6			
	SNUJL6			
	SRUJL6		F4A41 (2WD-4A/T)	
	SNGLL6		F5MR1 (2WD-5M/T)	
	SNGJL6			
	SRGJL6		F4A41 (2WD-4A/T)	
	DA2A		SNSQL6/R6	
SNUQL6/R6				
SRUQL6/R6		F4A42 (2WD-4A/T)		
SNGQL6/R6		F5M42 (2WD-5M/T)		
SRGQL6/R6		F4A42 (2WD-4A/T)		
SNXQL6/R6		F5M42 (2WD-5M/T)		
SRXQL6/R6		F4A42 (2WD-4A/T)		
SNSGL6		F5M42 (2WD-5M/T)		
SNSRL6				
SNUGL6				
SNURL6				
SRUGL6		F4A42 (2WD-4A/T)		

Model code		Engine model	Transmission model	Fuel supply system
DA2A	SNGGL6	4G93-DOHC (1,834 mℓ)	F5M42 (2WD-4A/T)	GDI
	SNGRL6			
	SRGGL6		F4A42 (2WD-4A/T)	
	SNXGL6		F5M42 (2WD-5M/T)	
	SNXRL6			
	SRXGL6		F4A42 (2WD-4A/T)	
DA4A	SNSFL6/R6	F8QT (1,870 mℓ)	F5MR3 (2WD-5M/T)	Fuel injection pump
	SNUFL6/R6			
	SNXFL6/R6			

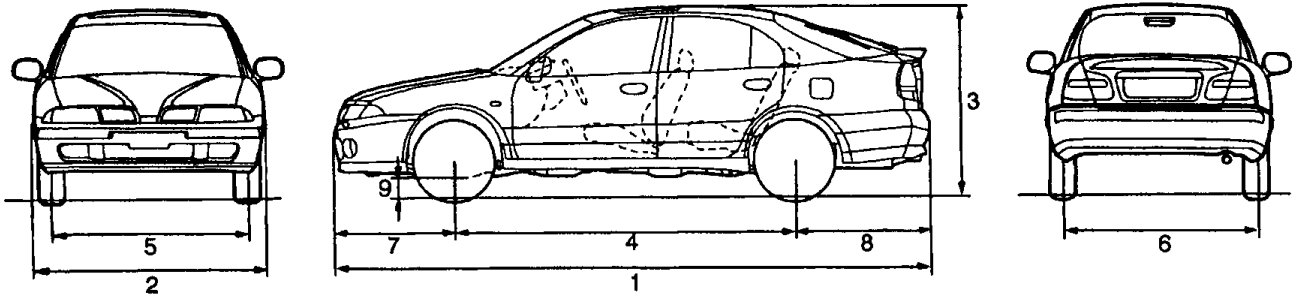


MODEL CODE

No.	Items	Contents
1	Development	DA: MITSUBISHI CARISMA
2	Engine type	1: 1,597 mℓ petrol engine
		2: 1,834 mℓ petrol engine
		4: 1,870 mℓ diesel engine
3	Sort	A: Passenger car
4	Body style	L: 5-door hatchback
		S: 4-door sedan
5	Transmission type	N: 5-speed manual transmission
		R: 4-speed automatic transmission
6	Trim level	S: BASE
		U: COMFORT
		G: SPORT
		X: LUXURY
7	Specified engine feature	P: MPI-SOHC (D3 spec.)
		J or L: MPI-SOHC (D4 spec.)
		Q: GDI-DOHC (D3 spec.)
		G or R: GDI-DOHC (D4 spec.)
		F: Turbocharger with intercooler
8	Steering wheel location	L: Left hand
		R: Right hand
9	Destination	6: For Europe

MAJOR SPECIFICATIONS

HATCHBACK



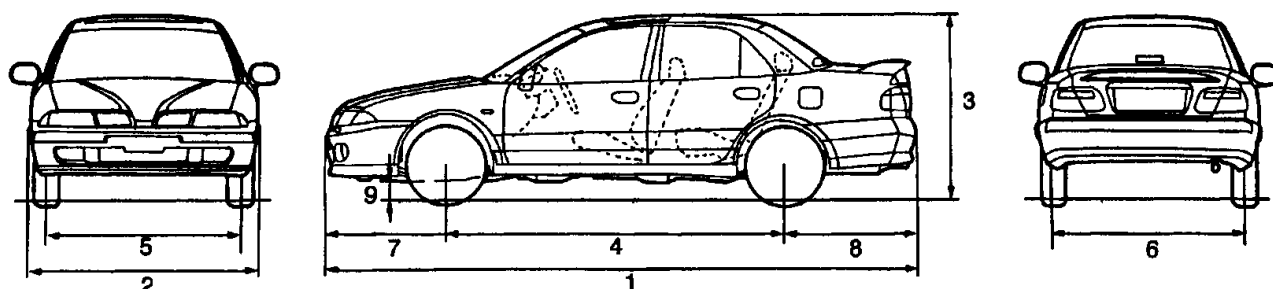
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Items			DA1A LNSPL6, LNSPR6, LNSJL6, LNSLL6	DA1A LNUPL6, LNUPR6, LNULL6, LNUJL6	DA1A LRUPL6, LRUPR6, LRUJL6, LRGPL6, LRGPR6, LRGJL6	DA1A LNGPL6, LNGPR6, LNGLL6, LNGJL6
Vehicle dimensions mm	Overall length	1	4,475	4,475	4,475	4,475
	Overall width	2	1,710	1,710	1,710	1,710
	Overall height (unladen)	3	1,405	1,405	1,405	1,405
	Wheelbase	4	2,550	2,550	2,550	2,550
	Track-front	5	1,475	1,475	1,475	1,475
	Track-rear	6	1,470	1,470	1,470	1,470
	Overhang-front	7	905	905	905	905
	Overhang-rear	8	1,020	1,020	1,020	1,020
	Ground clear- ance (unladen)	9	140	140	140	140
Vehicle weight kg	Kerb weight		1,175	1,180	1,210	1,180
	Max. gross vehicle weight rating		1,685	1,695	1,725	1,695
	Max. axle weight rating-front		940	940	940	940
	Max. axle weight rating-rear		865	865	865	865
Seating capacity		5				
Engine	Model No.	4G92				
	Total displacement ml	1,597				
Transmis- sion	Model No.	F5MR1			F4A41	F5MR1
	Type	5 speed-manual			4 speed-auto- matic	5 speed-manual
Fuel system	Fuel supply system	Electronic control multipoint fuel injection				

Items			DA2A LNSQ L6, LNSQ R6, LNSG L6, LNSRL6	DA2A LNUQ L6, LNUQ R6, LNUG L6, LNURL6	DA2A LRUQ L6, LRUQ R6, LRUGL6	DA2A LNGQ L6, LNGQ R6, LNGG L6, LNGRL6	DA2A LRGQ L6, LRGQ R6, LRGG L6	DA2A LNXQ L6, LNXQ R6, LNXG L6, LNXRL6	DA2A LRXQ L6, LRXQ R6, LRXGL6
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	140	140	140	140	140	140	140
Vehicle weight kg	Kerb weight		1,215	1,220	1,235	1,225	1,240	1,250	1,265
	Max. gross vehicle weight rating		1,725	1,730	1,745	1,730	1,745	1,735	1,750
	Max. axle weight rating-front		940	940	940	940	940	940	940
	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	F5M42	F4A42	F5M42	F4A42
	Type	5 speed-manual			4 speed- auto- matic	5 speed- manual	4 speed- auto- matic	5 speed- manual	4 speed- auto- matic
Fuel system	Fuel supply system	Gasoline direct injection							

Items			DA4A LNSFL6, LNSFR6	DA4A LNUFL6, LNUFR6	DA4A LNXFL6, LNXFR6
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	140	140	140
Vehicle weight kg	Kerb weight		1,215	1,220	1,255
	Max. gross vehicle weight rating		1,730	1,740	1,740
	Max. axle weight rating-front		940	940	940
	Max. axle weight rating-rear		870	870	870
Seating capacity			5		
Engine	Model No.		F8QT		
	Total displacement mℓ		1,870		
Transmis- sion	Model No.		F5MR3		
	Type		5 speed-manual		
Fuel system	Fuel supply system		Fuel injection pump		

SEDAN



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Items			DA1A SNSPL6, SNSPR6, SNSJL6, SNSLL6	DA1A SNUPL6, SNUPR6, SNULL6, SNUJL6, SNGPL6, SNGPR6, SNGLL6, SNGJL6	DA1A SRUPL6, SRUPR6, SRUJL6, SRGPL6, SRGPR6, SRGJL6
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 clearance (unladen)	9	140	140	140
Vehicle weight kg	Kerb weight		1,155	1,160	1,190
	Max. gross vehicle weight rating		1,665	1,675	1,705
	Max. axle weight rating-front		940	940	940
	Max. axle weight rating-rear		840	840	840
Seating capacity			5		
Engine	Model No.		4G92		
	Total displacement ml		1,597		
Transmission	Model No.		F5MR1		F4A41
	Type		5 speed-manual		4 speed-automatic
Fuel system	Fuel supply system		Electronic control multipoint fuel injection		

GENERAL – Major Specifications

00-9

Items			DA2A SNSQ L6, SNSQ R6, SNSG L6, SNSRL6	DA2A SNUQ L6, SNUQ R6, SNUG L6, SNURL6	DA2A SRUQ L6, SRUQ R6, SRUG L6	DA2A SNGQ L6, SNGQ R6, SNGG L6, SNGRL 6	DA2A SRGQ L6, SRGQ R6, SRGG L6	DA2A SNXQ L6, SNXQ R6, SNXG L6, SNXRL6	DA2A SRXQ L6, SRXQ R6, SRXG L6
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	140	140	140	140	140	140	140
Vehicle weight kg	Kerb weight		1,195	1,200	1,215	1,205	1,220	1,230	1,245
	Max. gross vehicle weight rating		1,705	1,710	1,725	1,710	1,725	1,715	1,730
	Max. axle weight rating-front		940	940	940	940	940	940	940
	Max. axle weight rating-rear		850	850	850	850	850	850	850
Seating capacity			5						
Engine	Model No.	4G93							
	Total displacement mℓ	1,834							
Transmis- sion	Model No.	F5M42			F4A42	F5M42	F4A42	F5M42	F4A42
	Type	5 speed-manual			4 speed- auto- matic	5 speed- manual	4 speed- auto- matic	5 speed- manual	4 speed- auto- matic
Fuel system	Fuel supply system	Gasoline direct injection							

Items			DA4A SNSFL6, SNSFR6	DA4A SNUFL6, SNUFR6	DA4A SNXFL6, SNXFR6
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	140	140	140
Vehicle weight kg	Kerb weight		1,195	1,200	1,235
	Max. gross vehicle weight rating		1,710	1,720	1,720
	Max. axle weight rating-front		940	940	940
	Max. axle weight rating-rear		845	845	845
Seating capacity			5		
Engine	Model No.		F8QT		
	Total displacement ml		1,870		
Transmis- sion	Model No.		F5MR3		
	Type		5 speed-manual		
Fuel system	Fuel supply system		Fuel injection pump		

ENGINE <4G9>

CONTENTS

GENERAL	2	Ignition Timing Check <GDI>	3
Outline of Changes	2	Idle Speed Check <GDI>	4
GENERAL INFORMATION	2	Compression Pressure Check <GDI>	5
SERVICE SPECIFICATIONS	2	Manifold Vacuum Check <GDI>	6
ON-VEHICLE SERVICE	3	TIMING BELT	7

11A-2 ENGINE <4G9>-- General/General Information/Service Specifications

GENERAL

OUTLINE OF CHANGES

The service procedures have been established due to the following changes:

- The electronically-controlled throttle valve system has been introduced <GDI>.
- The timing belt cover has been changed <MPI, GDI>.

GENERAL INFORMATION

Items	GDI
Compression ratio	12.0

SERVICE SPECIFICATIONS

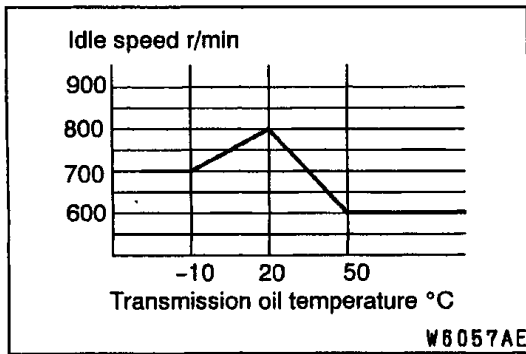
<GDI>

Items		Standard value	Limit
Basic ignition timing		5° BTDC ± 3°	–
Ignition timing		Approx. 16° BTDC (Approx. 6° BTDC)*2	–
Idle speed r/min	M/T	600 ± 100*1 (750 ± 100)*2	–
	A/T	650 ± 100 (750 ± 100)*2	–
Compression pressure kPa ~ r/min		1,720 – 300	1,462 – 300
Compression pressure difference of all cylinder kPa		–	Max. 100
Intake manifold vacuum kPa		–	Min. 34

NOTE

*1: Depends on the transmission oil temperature. For details, refer to P. 11A-3.

*2: Indicates the value when more than four minutes have passed since the engine was started.



ON-VEHICLE SERVICE

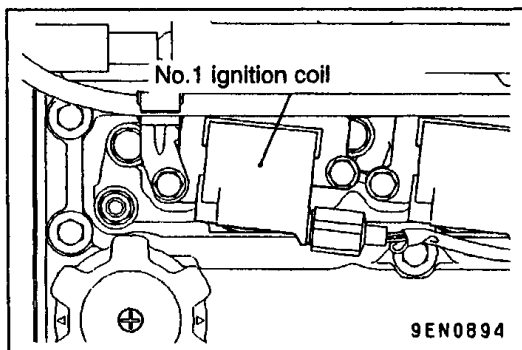
IGNITION TIMING CHECK <GDI>

1. Before inspection, set the vehicle to the pre-inspection condition.

For vehicles with manual transmission, drive the vehicle for 15 minutes or more to warm the engine, and then carry out the checking while the transmission oil temperature is more than 50°C.

NOTE

The idle speed in vehicles with manual transmission varies as shown in the illustration in accordance with the transmission oil temperature.



2. Turn the ignition switch to LOCK (OFF) position, and then connect the MUT-II to the diagnosis connector.
3. Set the timing light to the power supply line (terminal No.1) of the ignition coil No.1.

NOTE

The power supply line is looped and also longer than the other ones.

4. Start the engine and let it run at idle.
5. Use the MUT-II to measure engine idle speed and check that it is within the standard value.

Standard value:

Items	Idle speed r/min
M/T	600 ± 100 (750 ± 100)*
A/T	650 ± 100 (750 ± 100)*

NOTE

*: Indicates the values when more than 4 minutes have passed since the idling condition was started.

6. Select No.17 of the MUT-II Actuator test.

NOTE

At this time, the engine speed will become approximately 750 r/min.

7. Check that basic ignition timing is within the standard value.

Standard value: 5° BTDC ± 3°

8. If the basic ignition timing is outside the standard value, inspect the GDI system while referring to GROUP 13J – Troubleshooting.

9. Press the MUT-II clear key (Select a forced driving cancel mode) to release the Actuator test.

Caution

If the test is not cancelled, a forced driving will continue for 27 minutes. Driving under this condition may damage the engine.

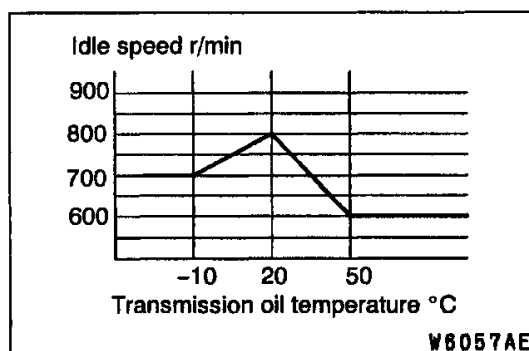
10. Check that ignition timing is at the standard value.

Standard value: approx. 16° BTDC

NOTE

- (1) The ignition timing will become approximately 6° BTDC after more than 4 minutes have passed since the basic ignition timing set mode was released.
- (2) The ignition timing may fluctuate within $\pm 7^\circ$ BTDC. This is normal.

11. Remove the timing light.
12. Turn the ignition switch to LOCK (OFF) position, and then remove the MUT-II.



IDLE SPEED CHECK <GDI>

1. Before inspection, set the vehicle to the pre-inspection condition.
For vehicles with manual transmission, drive the vehicle for 15 minutes or more to warm the engine, and then carry out the checking while the transmission oil temperature is more than 50°C.

NOTE

The idle speed in vehicles with manual transmission varies as shown in the illustration in accordance with the transmission oil temperature.

2. Turn the ignition switch to LOCK (OFF) position, and then connect the MUT-II to the diagnosis connector.
3. Check the basic ignition timing.

NOTE

Refer to P.11A-3 concerning the check procedure of the basic ignition timing.

Standard value: 5° BTDC $\pm$ 3°

4. Run the engine at idle for 2 minutes.

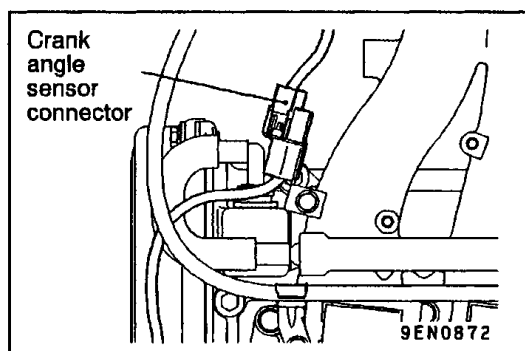
5. Check the idle speed. Select item No. 22 and take a reading of the idle speed.

Standard value:

Items	Idle speed r/min
M/T	600 ± 100 (750 ± 100)*
A/T	650 ± 100 (750 ± 100)*

NOTE

- (1) *: Indicates the values when more than 4 minutes have passed since the idling condition was started.
 - (2) The idle speed is automatically controlled by the idle speed control system.
6. If the idle speed is outside the standard value, inspect the GDI components by referring to GROUP 13J - Troubleshooting.

**COMPRESSION PRESSURE CHECK <GDI>**

1. Before inspection, check that the engine oil, starter and battery are normal. In addition, set the vehicle to the pre-inspection condition.
2. Remove all of the ignition coils and spark plugs.
3. Disconnect the crank angle sensor connector.

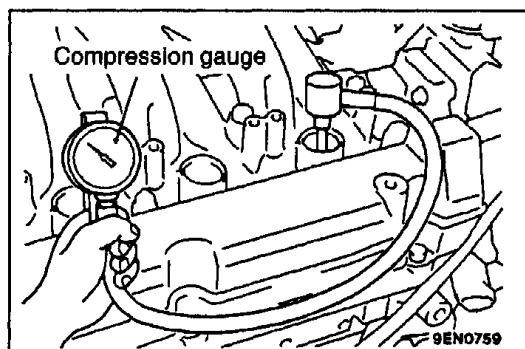
NOTE

Doing this will prevent the engine-ECU from carrying out ignition and fuel injection.

4. Cover the spark 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 spark plug hole when cranking.
- (2) If compression is measured with water, oil, fuel, etc., that has come from cracks inside the cylinder, these materials will become heated and will gush out from the spark plug hole, which is dangerous.



5. Set compression gauge to one of the spark plug holes.
6. Crank the engine with the throttle valve fully open and measure the compression pressure.

Standard value (at engine speed of 300 r/min):
1,720 kPa

Limit (at engine speed of 300 r/min):
Min. 1,462 kPa

- Limit: Max. 100 kPa**

- (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.

- ### NOTE

Ventilation hose

PCV valve

Vacuum gauge

9EN0873

1. Before inspection, set the vehicle to the pre-inspection condition.
2. Disconnect the ventilation hose from the positive crankcase ventilation (PCV) valve, and then connect a vacuum gauge to the ventilation hose.
3. Check the intake manifold vacuum while the engine is idling.

Limit: Min. 34 kPa

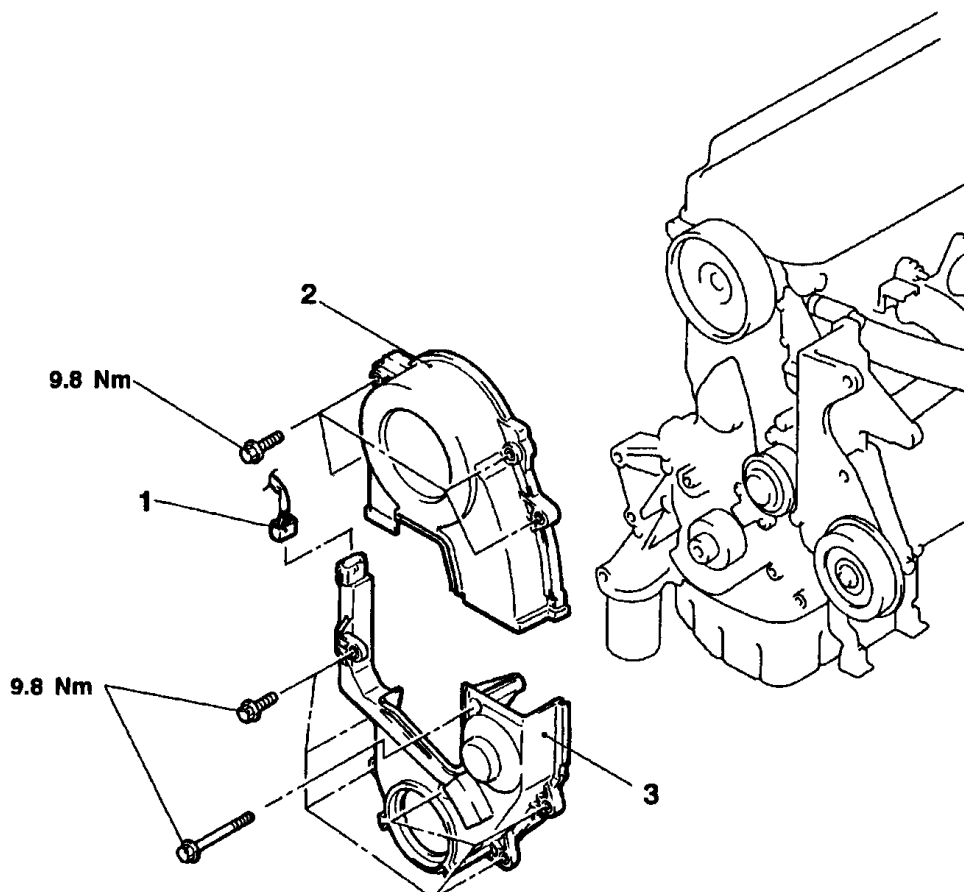
TIMING BELT

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Under Cover Removal and Installation
- Crankshaft Pulley Removal and Installation
- Drive Belt Tension Adjustment

<MPI>



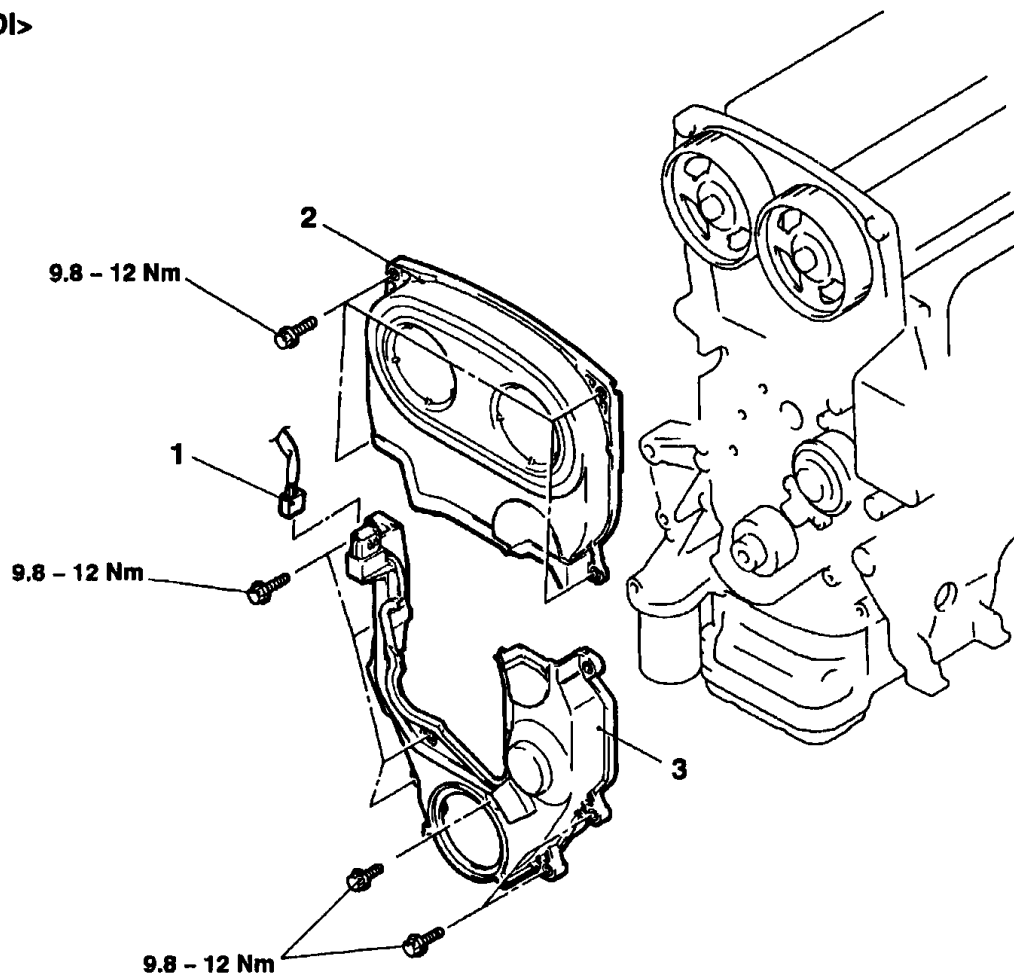
AX0002BN

Removal steps

1. Crank angle sensor connector
2. Timing belt front upper cover
3. Timing belt front lower cover



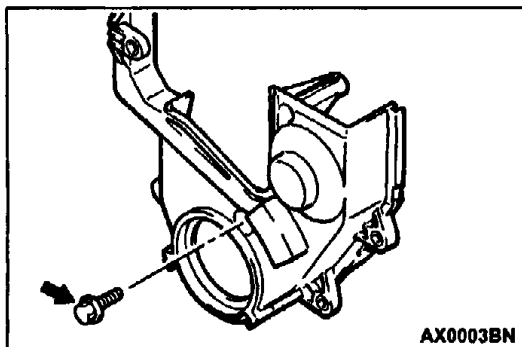
<GDI>



AX0001BN

Removal steps

1. Crank angle sensor connector
2. Timing belt front upper cover
3. Timing belt front lower cover

**INSTALLATION SERVICE POINT****►A◄ TIMING BELT FRONT LOWER COVER INSTALLATION**

1. Install the shown bolt first.
2. Install the remaining bolts, and then tighten the all bolts to the specified torque.

Tightening torque:

<MPI> 9.8 Nm
 <GDI> 9.8 - 12 Nm

FUEL

CONTENTS

MULTIPOINT FUEL INJECTION (MPI)	13A
ELECTRONIC CONTROL TYPE CARBURETTOR	13B
CONVENTIONAL TYPE CARBURETTOR	13C
VARIABLE VENTURI TYPE CARBURETTOR	13D
DIESEL FUEL	13E
FUEL SUPPLY	13F
AUTO-CRUISE CONTROL SYSTEM	Refer to GROUP 17
TRACTION CONTROL SYSTEM (TCL)	13H
GASOLINE DIRECT INJECTION (GDI)	13J

NOTE

THE GROUPS MARKED BY ARE NOT IN THIS MANUAL

MULTIPOINT FUEL INJECTION (MPI)

CONTENTS

GENERAL	3	Fuel Pump Connector Disconnection (How to Reduce the Fuel Pressure)	11
Outline of Changes	3	Fuel Pump Operation Check	12
GENERAL INFORMATION	3	Throttle Position Sensor Adjustment	12
SERVICE SPECIFICATIONS	5	Throttle Position Sensor Check	13
SPECIAL TOOLS	5	Oxygen Sensor Check <D4-spec. vehicles for Germany>	13
TROUBLESHOOTING	5	Idle Speed Control (ISC) Servo (Stepper Motor) Check	14
ON-VEHICLE SERVICE	11	THROTTLE BODY	16

GENERAL

OUTLINE OF CHANGES

The service procedures have been established due to the following changes:

- The fixed SAS has been discontinued due to the change in the throttle body. The shape of the idle speed control (ISC) servo connector has been changed.
- The idle position switch has been discontinued.
- On D4-spec. engine vehicles for Germany, a quick-activated oxygen sensor has been adopted.
- The fuel pump module, which integrates the fuel pump, the fuel filter and the fuel gauge unit, has been adopted.

GENERAL INFORMATION

GENERAL SPECIFICATIONS

Items			specifications
Engine-ECU	Identification model No.	Except vehicles for Germany	E2T68483 <M/T> E2T68585 <A/T>
		Vehicles for Germany	E2T68484 <M/T> E2T68586 <A/T> E2T68486 <D4 spec.>

MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM

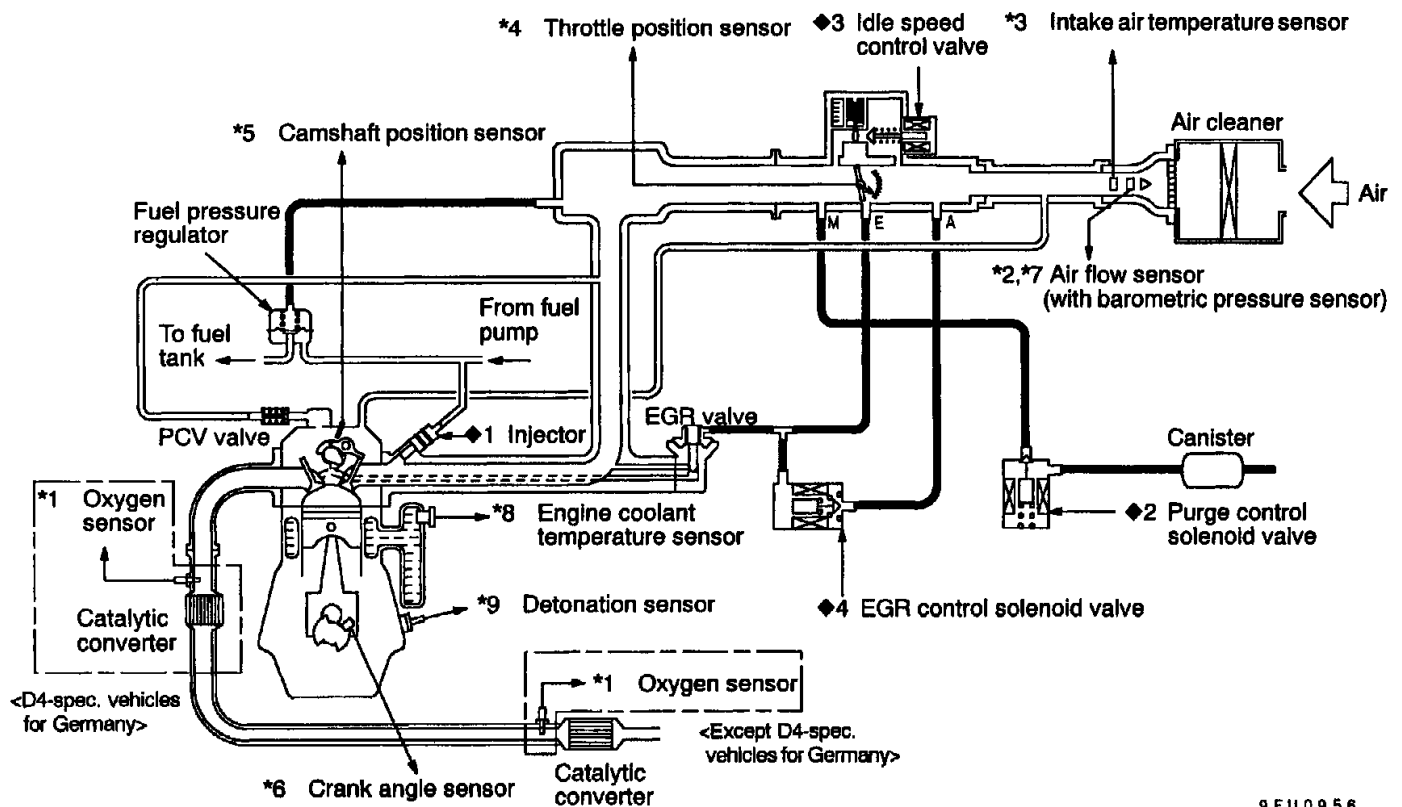
- *1 Oxygen sensor
- *2 Air flow sensor
- *3 Intake air temperature sensor
- *4 Throttle position sensor
- *5 Camshaft position sensor
- *6 Crank angle sensor
- *7 Barometric pressure sensor
- *8 Engine coolant temperature sensor
- *9 Detonation sensor

- Power supply voltage
- Vehicle speed sensor
- A/C switch 1, 2
- Inhibitor switch
- Power steering fluid pressure switch
- Vehicle speed sensor
- Ignition switch-ST
- Ignition switch-IG
- A/T-ECU

Engine-ECU

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

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



SERVICE SPECIFICATIONS

Items	specifications
Throttle position sensor adjusting voltage mV	535 – 735

SPECIAL TOOLS

Tools	Number	Name	Use
	MB991709	Test harness	• Measurement of voltage during troubleshooting • Inspection using an analyzer • Inspection of idle speed control servo

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

NOTE

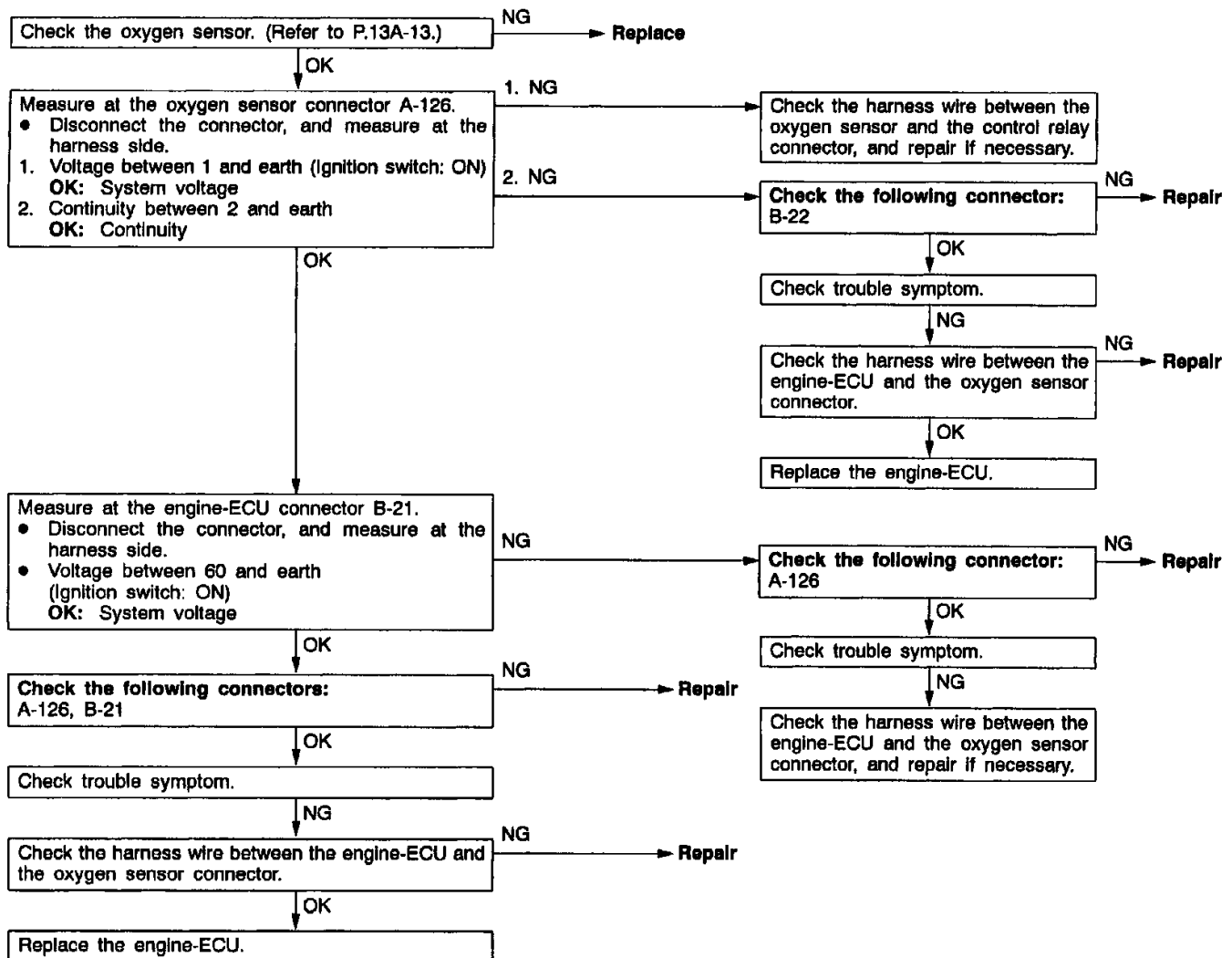
If the engine-ECU is replaced, the immobilizer-ECU and ignition key should be replaced together with it.

INSPECTION CHART FOR DIAGNOSIS CODES

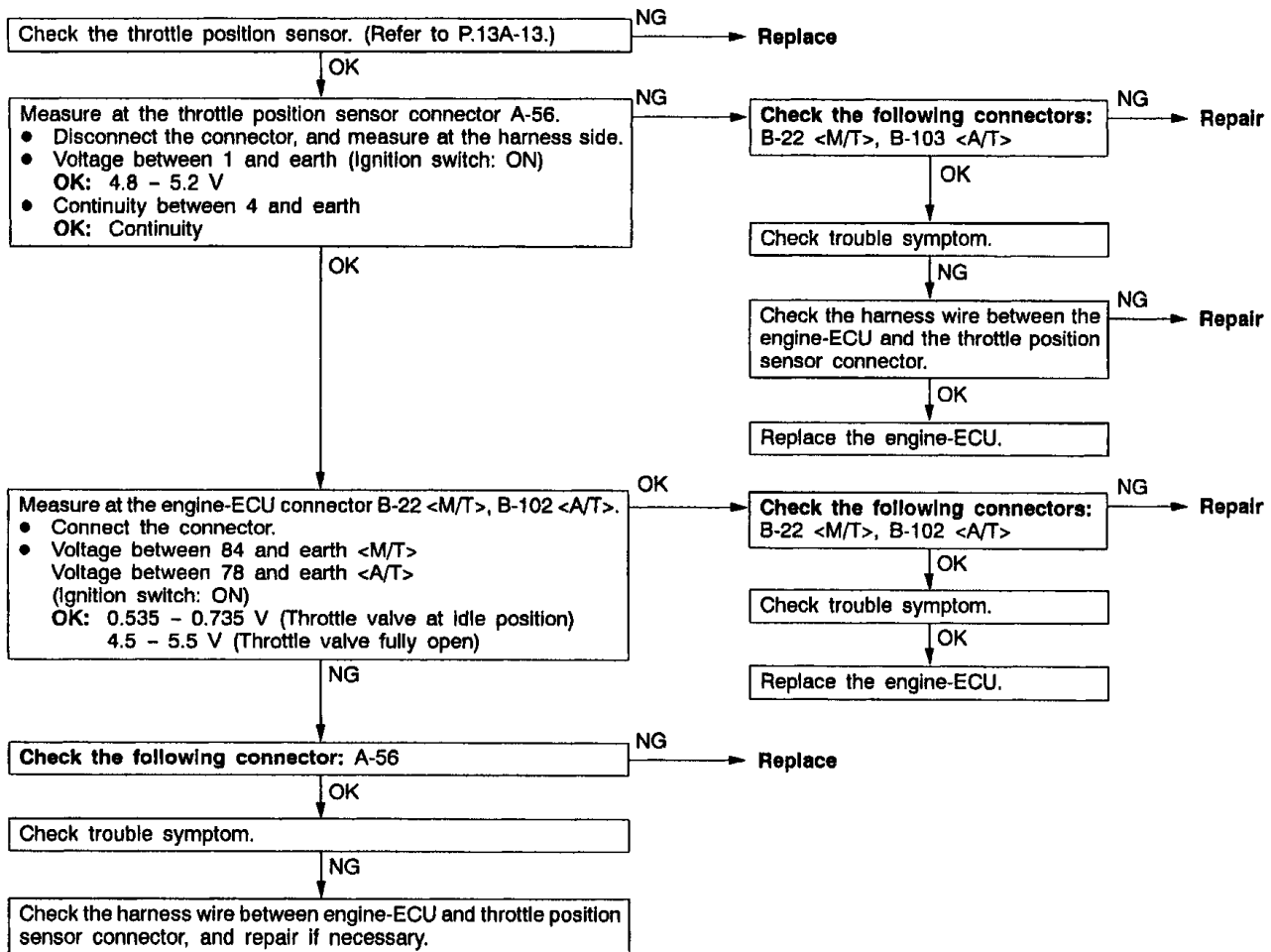
Code No.	Diagnosis item	Reference page
11	Oxygen sensor system <D4-spec. vehicles for Germany>	13A - 6
14	Throttle position sensor system	13A - 7
54	Immobilizer system	13A - 8

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Oxygen sensor system <D4-spec. vehicles for Germany>	Probable cause
Range of Check 3 minutes have passed after engine was started. - Engine coolant temperature is approx. 80°C or more. - Intake air temperature is 20 – 50°C. - Engine speed is approx. 2,000 – 3,000 r/min - Vehicle is moving at constant speed on a flat, level road surface Set conditions - The oxygen sensor output voltage is around 0.6 V for 30 seconds (does not cross 0.6 V for 30 seconds). - When the range of check operations given above which accompany starting of the engine are carried out four time in succession, a problem is detected after each operation.	- Malfunction of the oxygen sensor - Improper connector contact, open circuit or short-circuited harness wire - Malfunction of the engine-ECU



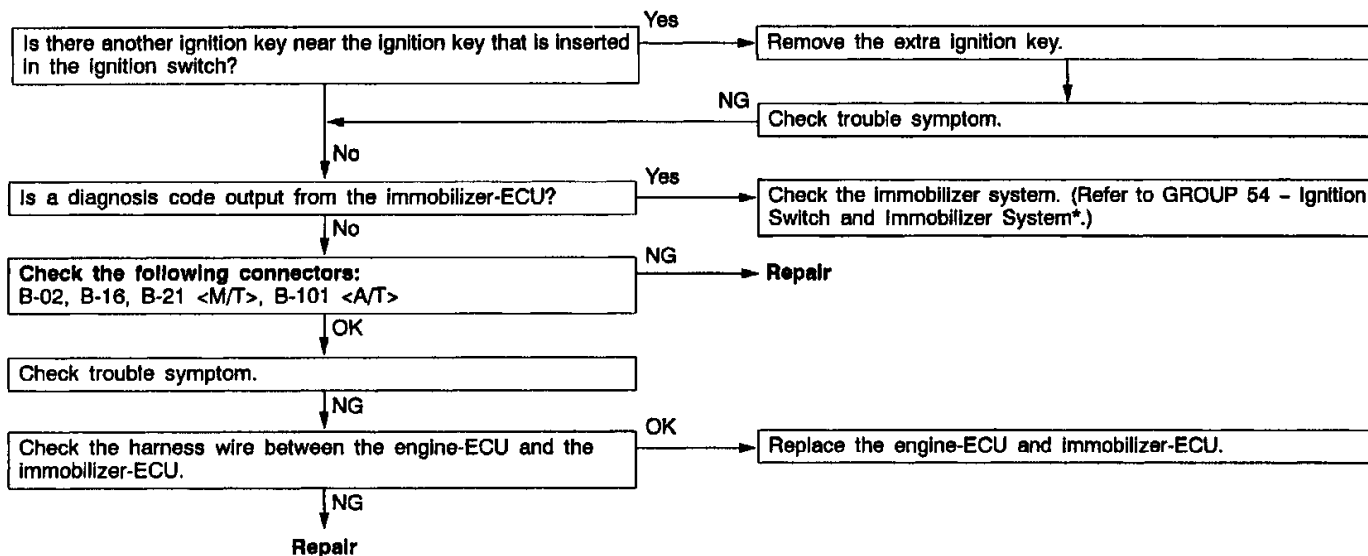
Code No. 14 Throttle position sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions - Engine speed is 3,000 r/min or less, and volumetric efficiency is 30% or less, TPS output voltage is 4.6 V or more for 4 seconds. or - Engine speed is 2,000 r/min or more, and volumetric efficiency is 60% or more, TPS output voltage is 0.8 V or less for 4 seconds.	- Malfunction of the throttle position sensor or maladjustment - Improper connector contact, open circuit or short-circuited harness wire of the throttle position sensor circuit - Malfunction of the engine-ECU



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

NOTE

- (1) If the ignition switches 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 encrypted code.



NOTE

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

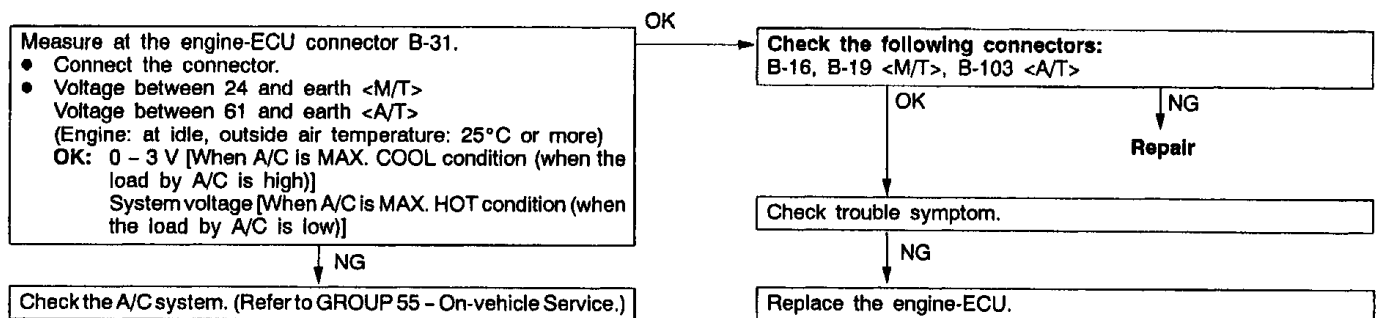
INSPECTION CHART FOR DIAGNOSIS CODES

Trouble symptom	Inspection procedure No.	Reference page
Idling speed is improper when A/C is operating	50	13A-9

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 50

Idling speed is improper when A/C is operating	Probable cause
If the engine-ECU 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. Based on this voltage signal, the engine-ECU 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



DATA LIST REFERENCE TABLE

Item No.	Diagnosis item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
14	Throttle position sensor	Ignition switch: ON	Release the accelerator pedal.	535 – 735 mV	Code No.14	13A-7
			Depress the accelerator pedal gradually.	Increases in proportion to throttle opening angle		
			Depress the accelerator pedal fully.	4,500 – 5,000 mV		

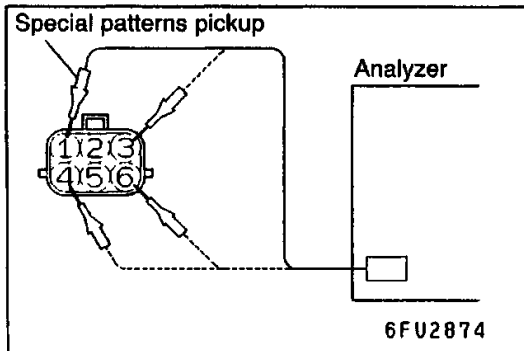
CHECK AT THE ENGINE-ECU TERMINALS

TERMINAL VOLTAGE CHECK CHART

terminal No.<M/T>	terminal No.<A/T>	Check item	Check condition (Engine condition)		Normal condition
24	61	A/C switch 2	Refer to GROUP 55 – Troubleshooting “Check at the A/C-ECU terminal, engine-ECU output terminals.”		
84	78	Throttle position sensor	Ignition switch: ON	Release the accelerator pedal.	0.535 – 0.735 V
				Depress the accelerator pedal fully.	4.5 – 5.5 V
87	79	Idle position switch signal	Ignition switch: ON	Release the accelerator pedal.	0 – 1 V
				Depress the accelerator pedal fully.	4 V or more

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

terminal No.<M/T>	terminal No.<A/T>	Check item	Standard value, normal value (Check condition)
60 - 12	3 - 41	Oxygen sensor heater <D-4spec. vehicles for Germany>	4.5 – 8.0 Ω (At 20°C)



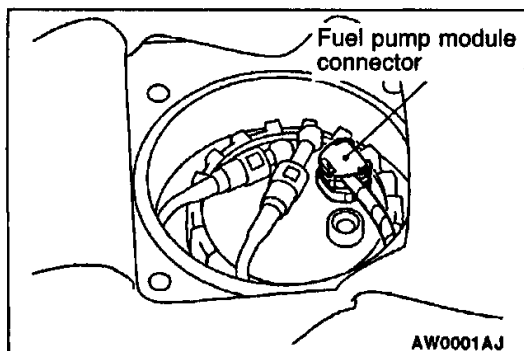
INSPECTION PROCEDURE USING AN ANALYZER

IDLE SPEED CONTROL (ISC) SERVO (STEPPER MOTOR)

The service procedure has been established due to the change in the ISC servo connector. The other procedures are the same as before.

Measurement method

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

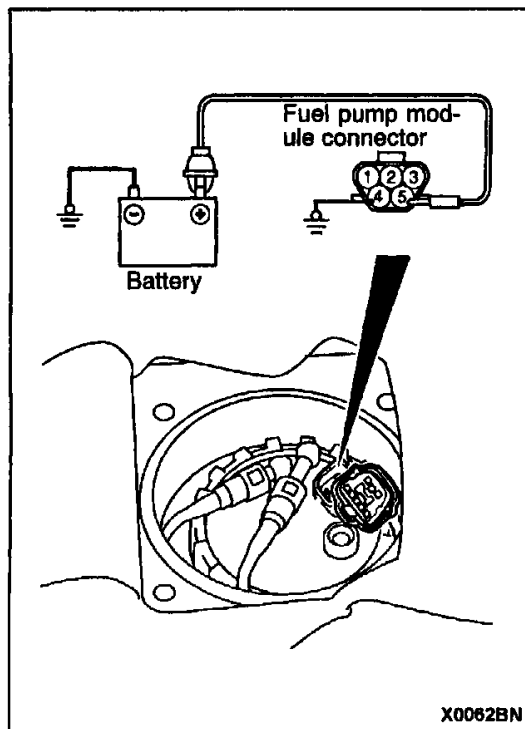


ON-VEHICLE SERVICE

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE THE FUEL PRESSURE)

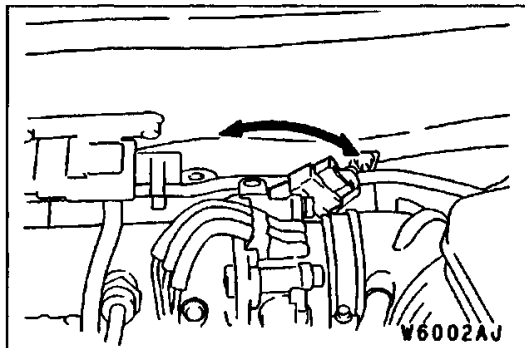
When removing the fuel pipe, hose, etc., since fuel pressure in the fuel pipe line is high, do the following operation so as to release the fuel pressure in the line and prevent fuel from running out.

- (1) Remove the rear seat cushion. (Refer to GROUP 52A.)
- (2) Remove the protector.
- (3) Disconnect the fuel pump module connector.
- (4) After starting the engine and letting it run until it stops naturally, turn the ignition switch to LOCK (OFF).
- (5) Connect the fuel pump module connector.
- (6) Install the protector and rear seat cushion.



FUEL PUMP OPERATION CHECK

1. Check the operation of the fuel pump by using the MUT-II to force-drive the fuel pump.
2. If the fuel pump will not operate, check by using the following procedure, and if it is normal, check the drive circuit.
 - (1) Turn the ignition switch to LOCK(OFF).
 - (2) Remove the rear seat cushion.
(Refer to GROUP 52A.)
 - (3) Remove the protector.
 - (4) Disconnect the fuel pump module connector. Apply a battery voltage to the terminal No.5 of the fuel pump module connector and connect the terminal No.4 to earth, and check that the fuel pump operation sound can be heard.
 - (5) Check the fuel pressure by pinching the fuel hose with the fingertip.
 - (6) Connect the fuel pump module connector.
 - (7) Install the protector and rear seat cushion.



THROTTLE POSITION SENSOR ADJUSTMENT

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

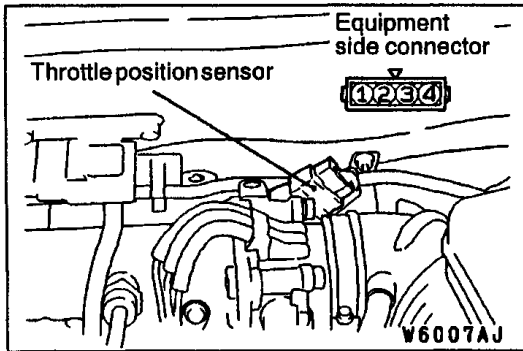
Caution

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

2. Turn the ignition switch to ON (but do not start the engine).
3. Check the throttle position sensor output voltage.

Standard value: 535 – 735 mV

4. If not within the standard value, loosen the throttle position sensor mounting bolts, and then rotate the sensor body to adjust the output voltage.
5. Turn the ignition switch to LOCK(OFF).
6. Remove the MUT-II.
7. If a diagnosis code is displayed, erase the diagnosis code by using the MUT-II or disconnect the negative battery cable from the battery terminal and then leave it for at least ten seconds. After that, reconnect the battery cable, and then let the engine run at idle for approx. 10 minutes.



THROTTLE POSITION SENSOR CHECK

1. Disconnect the throttle position sensor connector.
2. Measure the resistance between the throttle position sensor side connector terminal 1 and terminal 4.

Standard value: 3.5 – 6.5 k Ω

3. Measure the resistance between the throttle position sensor side connector terminal 1 and terminal 3.

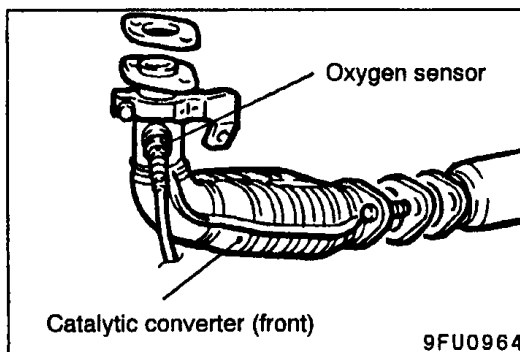
Normal condition:

Throttle valve slowly open until fully open from the idle position	Changes smoothly in proportion to the opening angle of the throttle valve

4. If the resistance is outside the standard value, or if it doesn't change smoothly, replace the throttle position sensor.

NOTE

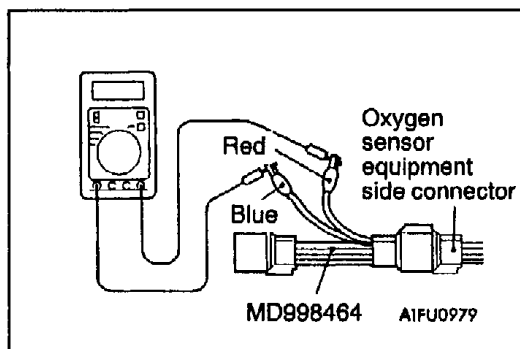
For the throttle position sensor adjustment procedure, refer to P.13A-12.



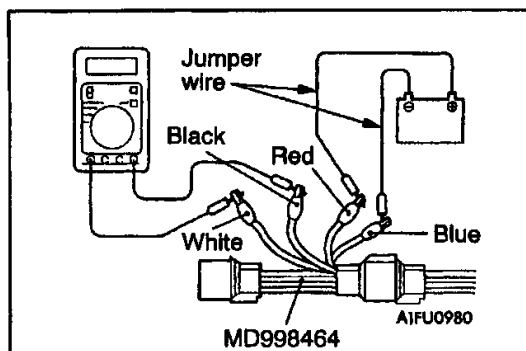
OXYGEN SENSOR CHECK

<D4-spec. vehicles for Germany>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness) to the connector on the oxygen sensor side.
2. Make sure that there is continuity (4.5 – 8.0 Ω at 20°C) between terminal 1 (red clip of special tool) and terminal 3 (blue clip of special tool) on the oxygen sensor connector.



3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.



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

Caution

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

6. Connect a digital voltage meter between terminal 2 (black clip) and terminal 4 (white clip).
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

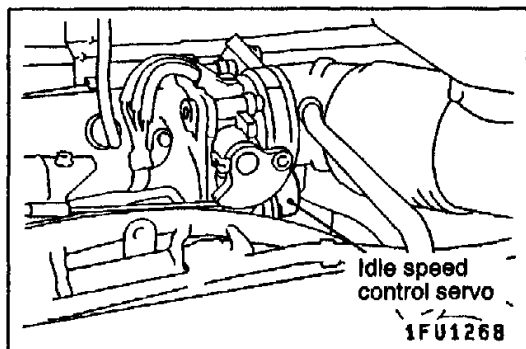
Standard value:

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

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

NOTE

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



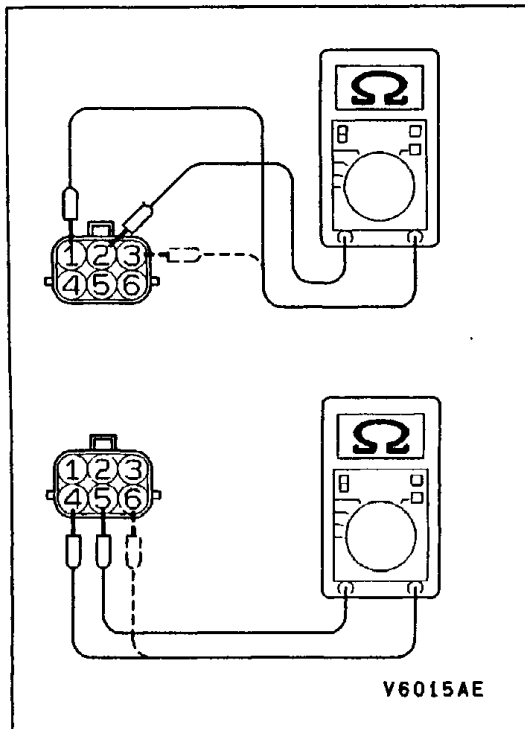
IDLE SPEED CONTROL (ISC) SERVO (STEPPER MOTOR) CHECK

Checking the Operation Sound

1. Check that the engine coolant temperature is 20°C or below.

NOTE

Disconnecting the engine coolant temperature sensor connector and connecting the harness-side of the connector to another engine coolant temperature sensor that is at 20°C or below is also okay.



2. Check that the operation sound of the stepper motor can be heard after the ignition is switched ON. (but without starting the motor.)
3. If the operation sound cannot be heard, check the stepper motor's activation circuit.
If the circuit is normal, it is probable that there is a malfunction of the stepper motor or of the engine control unit.

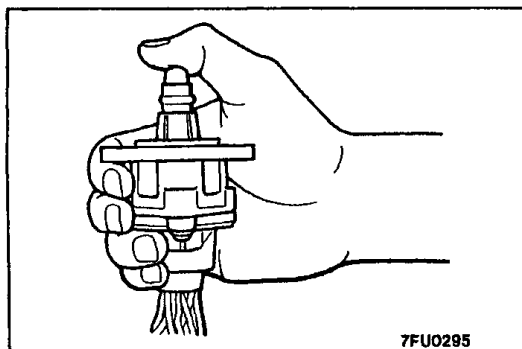
Checking the Coil Resistance

1. Disconnect the idle speed control servo connector.
2. Measure the resistance between terminal 2 and either terminal 1 or terminal 3 of the connector at the idle speed control servo side.

Standard value: 28 – 33 Ω (at 20°C)

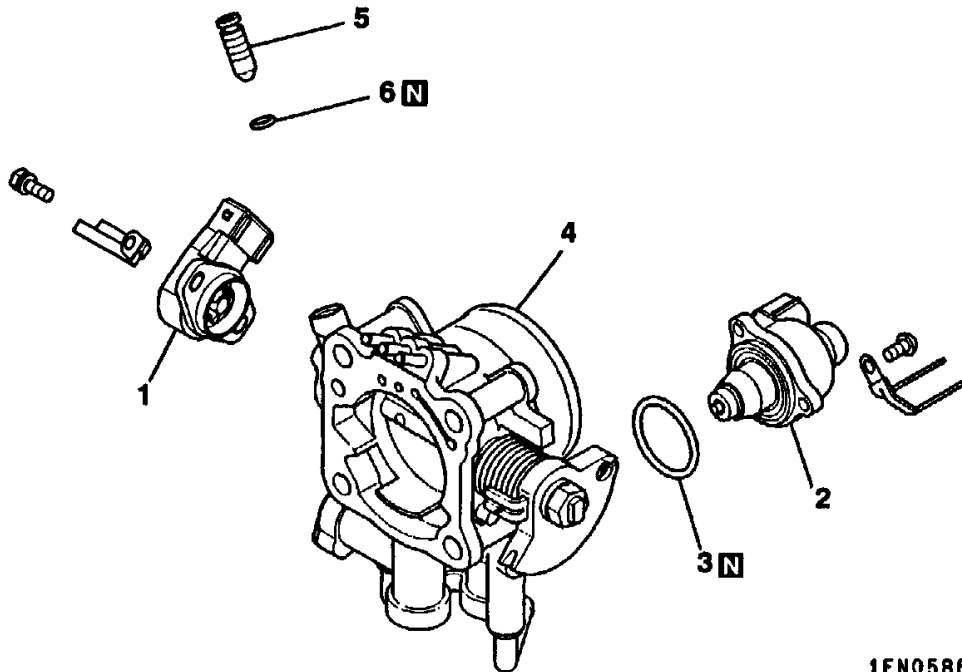
3. Measure the resistance between terminal 5 and either terminal 6 or terminal 4 of the connector at the idle speed control servo side.

Standard value: 28 – 33 Ω (at 20°C)



Operation Check

1. Remove the throttle body.
2. Remove the idle speed control servo.
3. Connect the special tool (test harness set: MB991709) to the idle speed control servo connector.
4. Connect the positive (+) terminal of a power supply (approx. 6 V) to the terminals No.2 and No.5.
5. Hold the ISC servo as shown in the illustration. Connect the negative (-) terminal of the power supply to each clip as described in the following steps, and check whether or not a vibrating feeling (a feeling of very slight vibration of the stepper motor) is generated as a result of the activation of the stepper motor.
 - (1) Connect the negative (-) terminal of the power supply to the terminals No.1 and No.4.
 - (2) Connect the negative (-) terminal of the power supply to the terminals No.3 and No.4.
 - (3) Connect the negative (-) terminal of the power supply to the terminals No.3 and No.6.
 - (4) Connect the negative (-) terminal of the power supply to the terminals No.1 and No.6.
 - (5) Connect the negative (-) terminal of the power supply to the terminals No.1 and No.4.
 - (6) Repeat the tests in sequence from (5) to (1).
6. If, as a result of these tests, vibration is detected, the stepper motor can be considered to be normal.

THROTTLE BODY**DISASSEMBLY AND REASSEMBLY**

1EN0586

Disassembly steps

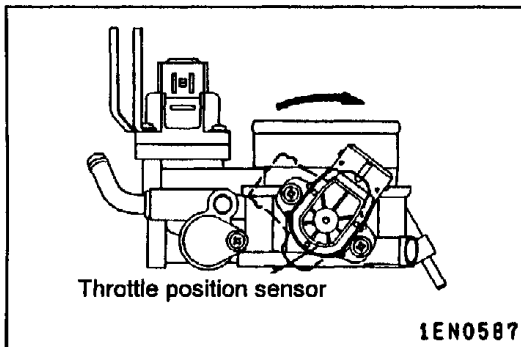
- A◄
1. Throttle position sensor (TPS)
 2. Idle speed control servo
 3. O-ring
 4. Throttle body
 5. Speed adjusting screw
 6. O-ring

NOTE

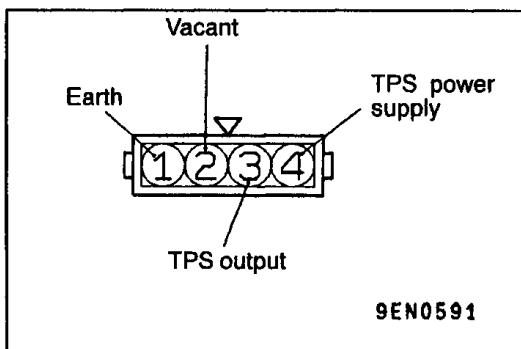
1. The speed adjusting screw is correctly adjusted at the factory and should not be removed.
2. If the speed adjusting screw should happen to have been removed, carry out speed adjusting screw adjustment.

CLEANING THROTTLE BODY PARTS

1. Clean all throttle body parts.
Do not use solvent to clean the following parts:
 - Throttle position sensor
 - Idle speed control servo assemblyIf these parts are immersed in solvent, their insulation will deteriorate.
Wipe them with cloth only.
2. Check if the vacuum port or passage is clogged. Use compressed air to clean the vacuum passage.

**REASSEMBLY SERVICE POINT****▶A◀ THROTTLE POSITION SENSOR (TPS) INSTALLATION**

1. Install the TPS so that it faces as shown in the illustration, and then tighten it with the screw.
2. Connect a circuit tester between terminal No.4 (TPS power supply) and terminal No.3 (TPS output) of the TPS connector, and check that the resistance increases gradually as the throttle valve is opened slowly to the fully-open position.



GROUP 13F

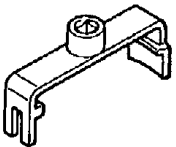
FUEL SUPPLY

GENERAL

OUTLINE OF CHANGE

On vehicles with 4G9 engine, the fuel pump module, which integrates the fuel pump <MPI> or the low-pressure fuel pump <GDI>, the fuel filter and the fuel gauge unit, has been adopted. Due to this change, the removal and installation procedure for the fuel tank has been revised.

SPECIAL TOOL

Tool	Number	Name	Use
	MB996009	Tank cap wrench	Removal and installation of tank cap

REMOVAL AND INSTALLATION

- **Draining the Fuel**
- **Reduce the Inner Pressure of Fuel Line and Hose**
(MPI: Refer to GROUP 13A – On-vehicle Service.)
(GDI: Refer to GROUP 13J – On-vehicle Service.)
- **Removal of the Center Exhaust Pipe**
(Refer to GROUP 15.)

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

This diagram illustrates the front suspension assembly, including the upper and lower control arms, steering knuckle, and steering rack. The components are numbered 1 through 17, and the torque specifications are provided for each assembly point.

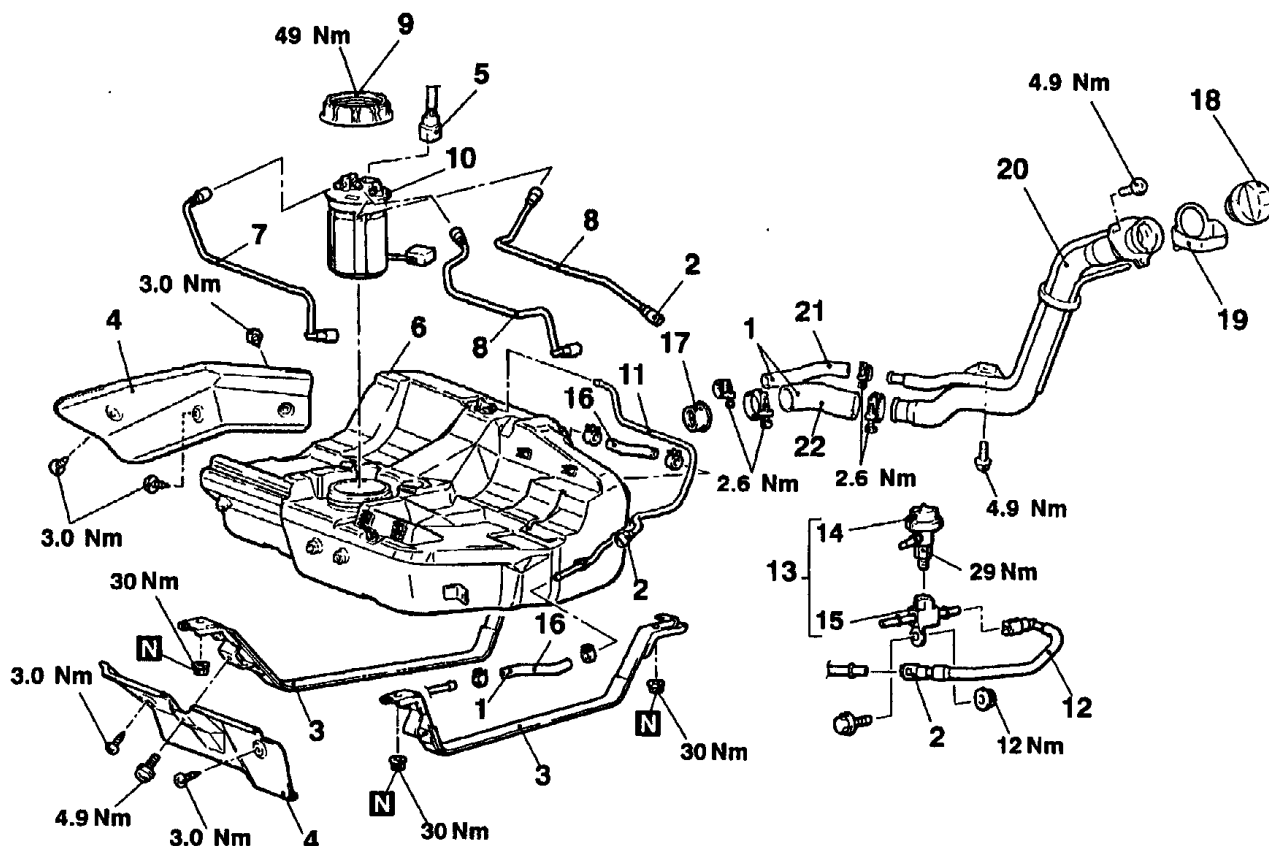
- Upper Control Arm (1):** Torque: 2.6 Nm.
- Lower Control Arm (2):** Torque: 3.0 Nm.
- Steering Knuckle (3):** Torque: 30 Nm.
- Steering Rack (4):** Torque: 3.0 Nm.
- Steering Rack Mounting (5):** Torque: 4.9 Nm.
- Steering Rack Mounting (6):** Torque: 4.9 Nm.
- Steering Rack Mounting (7):** Torque: 4.9 Nm.
- Steering Rack Mounting (8):** Torque: 4.9 Nm.
- Steering Rack Mounting (9):** Torque: 4.9 Nm.
- Steering Rack Mounting (10):** Torque: 4.9 Nm.
- Steering Rack Mounting (11):** Torque: 4.9 Nm.
- Steering Rack Mounting (12):** Torque: 4.9 Nm.
- Steering Rack Mounting (13):** Torque: 4.9 Nm.
- Steering Rack Mounting (14):** Torque: 4.9 Nm.
- Steering Rack Mounting (15):** Torque: 4.9 Nm.
- Steering Rack Mounting (16):** Torque: 4.9 Nm.
- Steering Rack Mounting (17):** Torque: 4.9 Nm.

- ▶ **A** ▶
 1. Hoses connection
 2. Hoses connection
 3. Band
 4. Protector
 5. Fuel pump module connector
 6. Fuel tank assembly
- ▶ **A** ▶
 7. Fuel main hose
- ▶ **A** ▶
 8. Fuel return hose
- ▶ **C** ▶
 9. Cap

►B◄

10. Fuel pump module
11. Fuel vapor hose
12. Fuel shut-off valve
13. Fuel filler cap
14. Fuel rubber drain
15. Filler neck assembly
16. Leveling hose
17. Filler hose

<GDI>

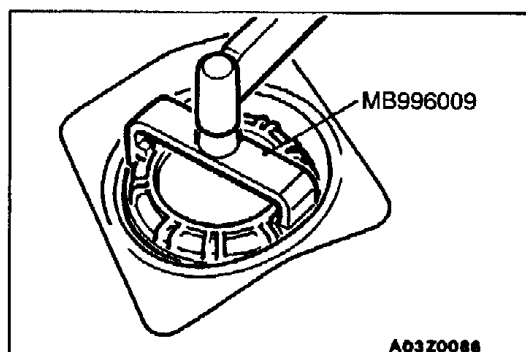


AX0060BN

Removal steps

- ▶A◀ 1. Hoses connection
- ▶A◀ 2. Hoses connection
- 3. Band
- 4. Protector
- 5. Fuel pump module connector
- 6. Fuel tank assembly
- ▶A◀ 7. Fuel main hose
- ▶A◀ 8. Fuel return hose
- ▶C◀ 9. Cap
- ▶B◀ 10. Fuel pump module
- 11. Fuel vapor hose
- ▶A◀ 12. Fuel pressure hose

- 13. Pressure regulator assembly (low pressure)
- 14. Pressure regulator (low pressure)
- 15. Connector
- 16. Fuel return hose
- 17. Fuel shut-off valve
- 18. Fuel filler cap
- 19. Fuel rubber drain
- 20. Filler neck assembly
- 21. Leveling hose
- 22. Filler hose

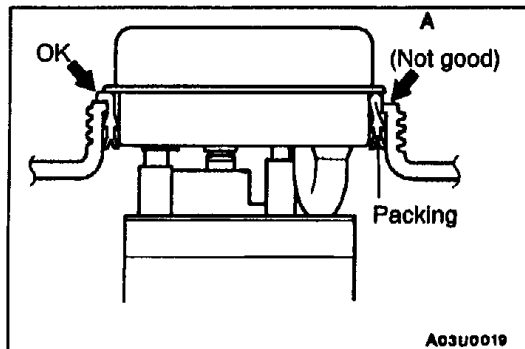
**REMOVAL SERVICE POINT****◀A▶ CAP REMOVAL**

INSTALLATION SERVICE POINTS

►A◄ FUEL PRESSURE HOSE/FUEL RETURN HOSE/FUEL MAIN HOSE/FUEL VAPOR HOSE INSTALLATION

Caution

After the connection, pull the pressure tube and suction tube gently in the direction of removal to check that they are firmly connected.



►B◄ 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.

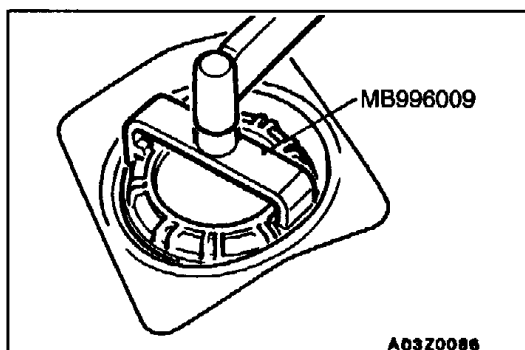
NOTE

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.



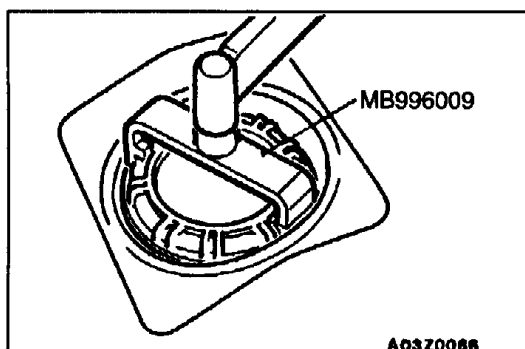
►C◄ CAP INSTALLATION

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

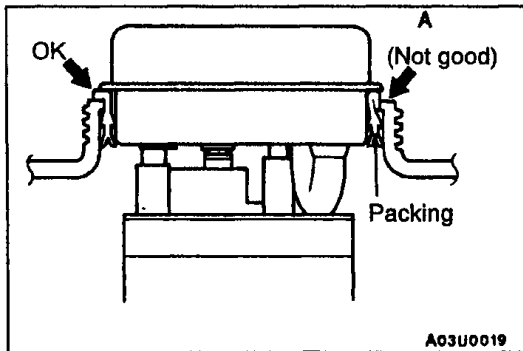
Prevent the fuel pump module from turning with the cap when tightening the cap.



INSPECTION

FUEL PUMP MODULE REPLACEMENT

1. Bleed the residual pressure from inside the fuel pipe line to prevent the fuel from spraying out.
(MPI: Refer to GROUP 13A – On-vehicle Service.)
(GDI: Refer to GROUP 13J – On-vehicle Service.)
2. Disconnect the fuel hoses.
3. Use the special tool to remove the cap, and then remove the fuel pump module.



4. 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.

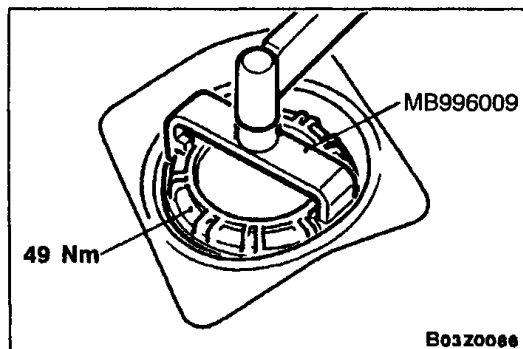
NOTE

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

5. 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.



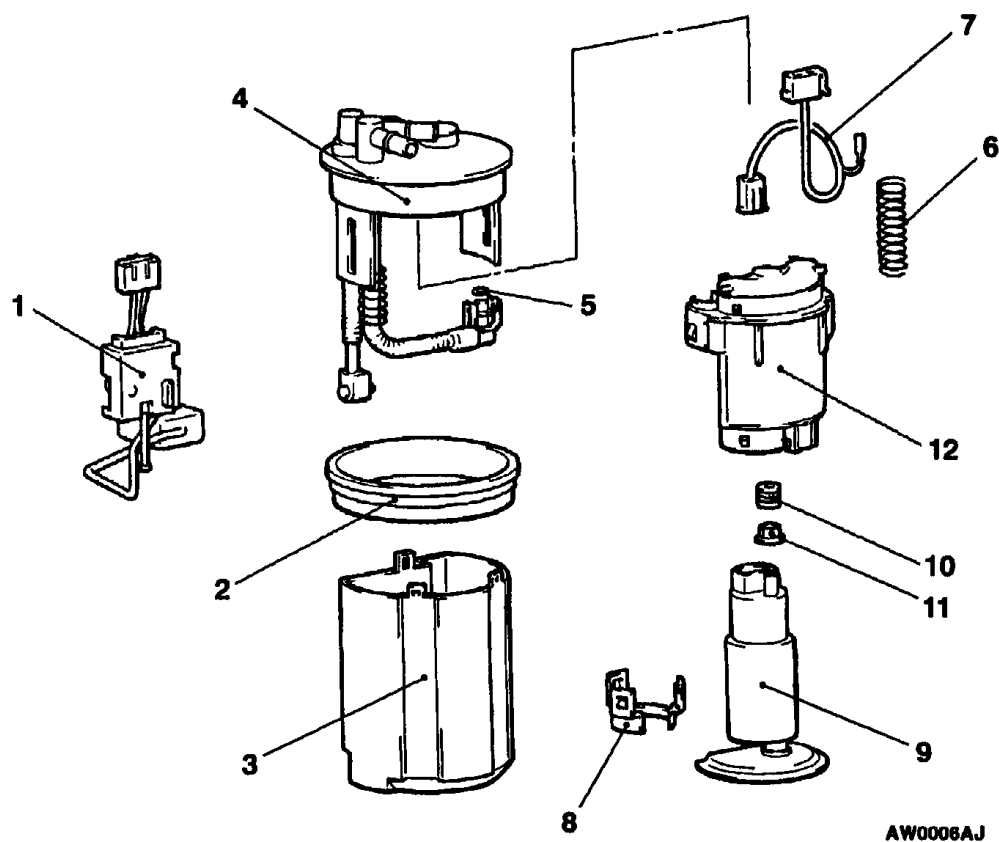
6. Use the special tool to tighten the cap to the specified torque.

Tightening torque: 49 Nm

7. Check for leaks from the installation section of the fuel pump module by the following procedure.
 - (1) Apply soapy water to the circumference of the cap.
 - (2) Choke the vapor hose and main hose, apply an internal pressure of 10 kPa or less from the return hose and check to be sure that no bubbles form in the soapy water.

FUEL GAUGE CHECK

Refer to GROUP 54 – Combination Meter.

DISASSEMBLY AND REASSEMBLY**FUEL PUMP MODULE****Disassembly steps**

1. Fuel gauge unit
2. Packing
3. Reservoir cap
4. Pump support bracket assembly
5. O-ring
6. Spring
7. Pump harness



8. Lock bracket
9. Fuel pump <MPI>,
Fuel pump (low pressure) <GDI>
10. Grommet
11. Spacer
12. Fuel filter

**REASSEMBLY SERVICE POINTS****►A◄ GROMMET/O-RING INSTALLATION**

Apply a unleaded petrol to the grommet and O-ring before installing them in order to prevent damage.

GASOLINE DIRECT INJECTION (GDI)

CONTENTS

GENERAL	2	Component Location	87
Outline of Changes	2	Throttle Valve Control Servo Relay Continuity Check	88
GENERAL INFORMATION	2	Injector Driver Relay Continuity Check	88
SERVICE SPECIFICATIONS	4	Throttle Position Sensor Check	88
TROUBLESHOOTING	5	Accelerator Pedal Position Sensor (1st and 2nd Channels) Check	88
ON-VEHICLE SERVICE	83	Accelerator Pedal Position Switch Check	89
Fuel Pump Connector Disconnection (How to Reduce the Fuel Pressure)	83	Throttle Valve Control Servo Check	90
Fuel Pump (Low Pressure) Operation Check ..	84	Clutch Switch Check	90
Throttle Body (Throttle Valve Area) Cleaning ...	84	THROTTLE BODY	91
Throttle Position Sensor Adjustment	84	THROTTLE VALVE CONTROLLER	94
Accelerator Pedal Position Sensor Adjustment	85		

GENERAL

OUTLINE OF CHANGES

The service procedures have been established due to the following changes:

- An electronic-controlled throttle valve has been used.
- A 32-bit CPU type engine-ECU has been used.
- GDI ECO indication lamp has been used.
- The fuel pump module, which integrates the low-pressure fuel pump, the fuel filter and the fuel gauge unit, has been adopted.

GENERAL INFORMATION

THROTTLE VALVE OPENING ANGLE CONTROL

This system controls throttle valve opening angle electronically. The engine-ECU determines how deeply the accelerator pedal is depressed by means of the accelerator position sensor (APS). Then the engine-ECU sends a target value of the throttle valve opening angle to the throttle valve controller. The throttle valve control servo operates the throttle valve so that it reaches the target opening angle.

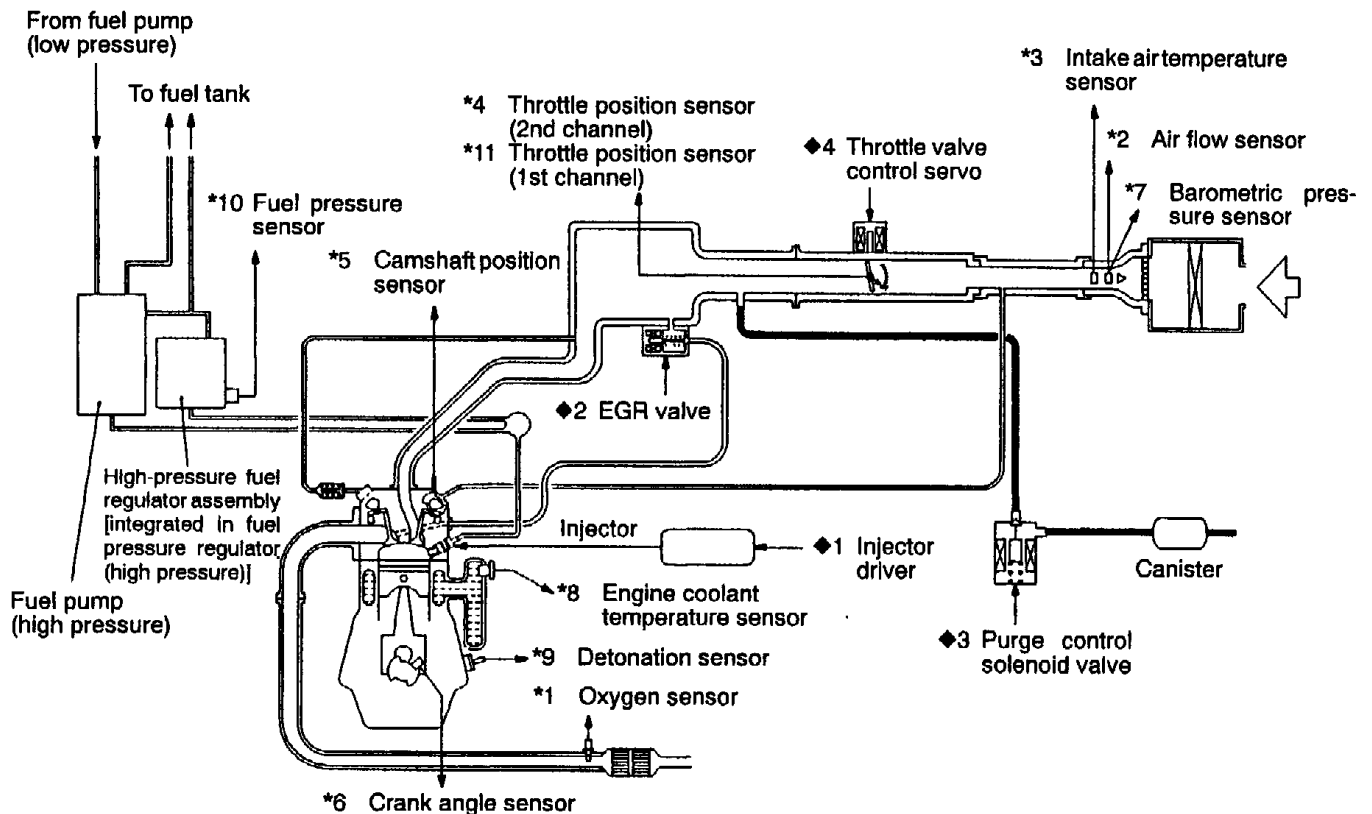
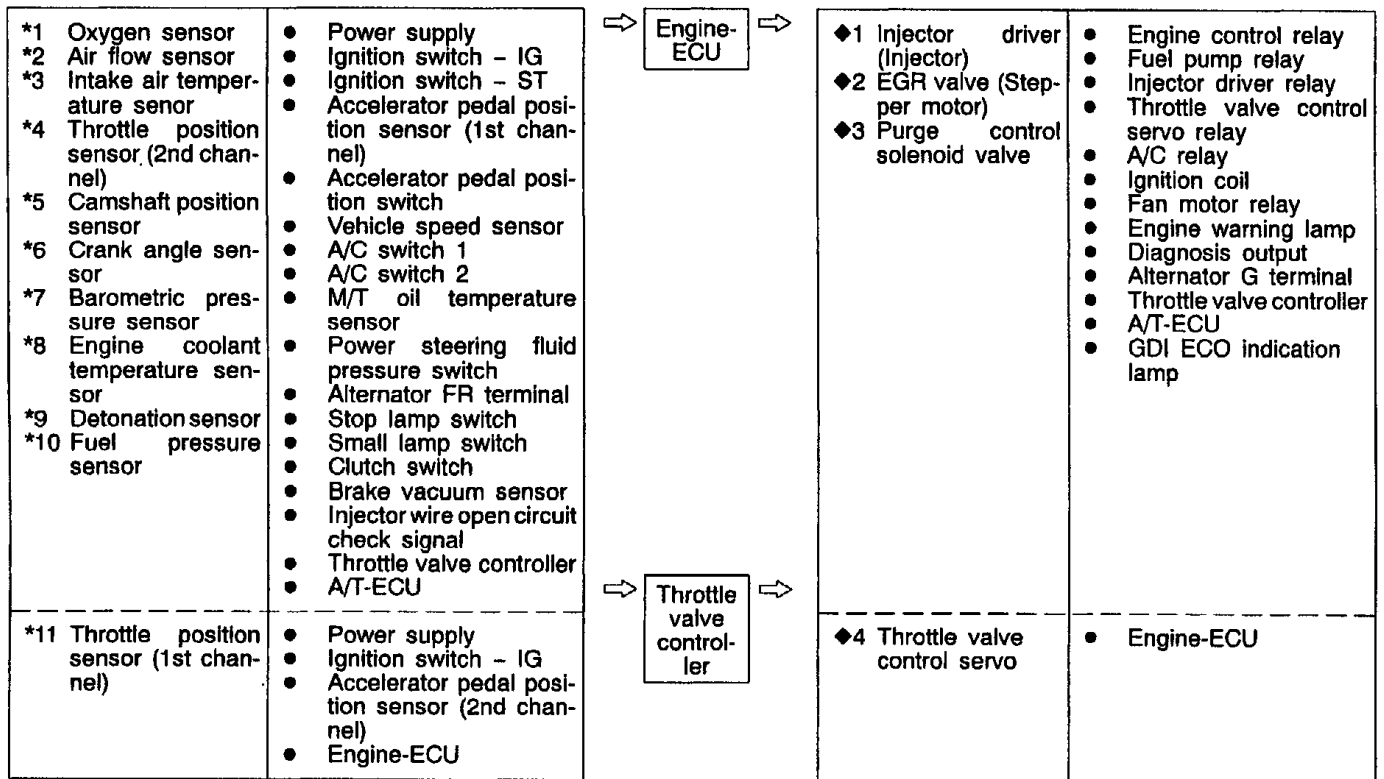
IDLE SPEED CONTROL

This system maintains engine idle speed at a predetermined condition by controlling the air flow that passes through the throttle valve according to engine idling condition and engine loads at idling. The engine-ECU operates the throttle valve control servo so that engine speed is maintained within a map value. The map value is predetermined according to engine coolant temperature and air-conditioning load.

GENERAL SPECIFICATIONS

Items			Specifications
Throttle body	Throttle bore mm		60
	Throttle position sensor		Variable resistor type (Dual system type)
	Throttle valve control servo		Torque motor type
Engine-ECU	Identification model No.	Except vehicles for Germany	E2T73375
		Vehicles for Germany	E2T73376 E2T73377 <D4-spec.>
Sensors	Accelerator pedal position sensor		Variable resistor type
	Accelerator pedal position switch		Rotary contact type, within accelerator pedal position sensor
Actuators	Throttle valve control servo relay		Contact switch type

GASOLINE DIRECT INJECTION SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

Item	Standard value
Adjustment voltage of throttle position sensor (1st channel) V	0.4 – 0.6
Adjustment voltage of throttle position sensor (2nd channel) V	4.2 – 4.8
Resistance of throttle position sensor (1st and 2nd channel) k Ω	1.7 – 3.3
Adjustment voltage of accelerator pedal position sensor (1st and 2nd channels) V	0.985 – 1.085
Resistance of accelerator pedal position sensor (1st and 2nd channel) k Ω	3.5 – 6.5
Throttle valve control servo resistance Ω	1.35 – 1.65

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

NOTE

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

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

Engine warning lamp inspection items

Engine-ECU
Oxygen sensor
Air flow sensor
Intake air temperature sensor
Throttle position sensor (1st channel)
Throttle position sensor (2nd channel)
Engine coolant temperature sensor
Crank angle sensor
Camshaft position sensor
Barometric pressure sensor
Detonation sensor
Injector
Abnormal combustion
Immobilizer system
Abnormal fuel pressure
Brake vacuum sensor
Fuel system malfunction
Accelerator pedal position sensor (1st channel)
Accelerator pedal position sensor (2nd channel)
Electronic-controlled throttle valve system
Throttle valve position feedback
Throttle valve control servo motor (Motor 1st phase malfunction)
Throttle valve control servo motor (Motor 2nd phase malfunction)
Communication line system with throttle valve controller

NOTE

The engine warning lamp flashes when the electronic-controlled throttle valve system is disabled.

FAIL-SAFE FUNCTION REFERENCE TABLE

If the diagnosis system detects any sensor malfunction, the vehicle can be driven safely by using a default control logic instead of the faulty sensors.

Defective part or function	What to do when a sensor is defective
Air flow sensor	(1) Disables lean-mixture combustion. (2) Determines injector basic operating time and basic ignition timing according to map value, which has been predetermined by throttle position sensor and crank angle sensor signals.
Intake air temperature sensor	Controls as the intake air temperature is 25°C.
Throttle position sensor (1st channel)	(1) Disables lean-mixture combustion. (2) Controls throttle valve opening angle by closed loop control by using the throttle position sensor (2nd channel) signal. (3) Disables the throttle valve opening angle control when the throttle position sensor (2nd channel) signal is also defective.
Throttle position sensor (2nd channel)	(1) Disables lean-mixture combustion. (2) Controls throttle valve opening angle by closed loop control by using the throttle position sensor (1st channel) signal. (3) Disables the throttle valve opening angle control when the throttle position sensor (1st channel) signal is also defective.
Engine coolant temperature sensor	Controls as if the engine coolant temperature is 80°C. (Note that this control will continue until the ignition switch is turned off even if the sensor signal return to normal.)
Camshaft position sensor	Controls according to the conditions before a failure is detected.
Vehicle speed sensor	(1) Disables lean-mixture combustion. However, if a predetermined time elapses at an engine speed of 1,500 r/min or more, the lean-mixture combustion will return to normal. (2) Disables lean-mixture combustion during engine idling.
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.
Detonation sensor	Holds the ignition timing at that for regular gasoline.
Injector	(1) Disables lean-mixture combustion. (2) Shuts down exhaust gas recirculation.
Abnormal combustion	Disables lean-mixture combustion.
Communication line with A/T-ECU	Disables ignition timing retard control (engine and transmission total control) during shaft change.
Alternator FR terminal	Disables inhibition control of the alternator output according to electrical load (treats the alternator as if it is conventional one).
Oxygen sensor	Air/fuel ratio closed loop control is not performed.
Fuel pressure sensor	(1) Controls as if the fuel pressure is 5 MPa (if there is open or short circuit). (2) Turns off the fuel pump relay (if the fuel pressure is excessively high). (3) Shuts off the fuel injection (if an excessively low pressure is detected or the engine speed exceeds 3,000 r/min).

Defective part or function	What to do when a sensor is defective
Accelerator pedal position sensor (1st channel)	(1) Disables lean-mixture combustion. (2) Controls the throttle valve position by using the accelerator pedal position sensor (2nd channel) signal. (3) Disables the electronic-controlled throttle valve system if the accelerator pedal position sensor (2nd channel) signal is also defective, and holds the throttle valve at a predetermined angle where the vehicle can be driven safely although its performance is reduced.
Accelerator pedal position sensor (2nd channel)	(1) Disables lean-mixture combustion. (2) Controls the throttle valve position by using the accelerator pedal position sensor (1st channel) signal. (3) Disables the electronic-controlled throttle valve system if the accelerator pedal position sensor (1st channel) signal is also defective.
Electronic-controlled throttle valve system	(1) Disables the electronic-controlled throttle valve system. (2) Disables lean-mixture combustion. (3) Disables engine idle speed feedback control.
Throttle valve position feedback	(1) Disables the electronic-controlled throttle valve system. (2) Disables lean-mixture combustion. (3) Disables engine idle speed feedback control.
Throttle valve control servo motor (Motor 1st phase malfunction)	Disables lean-mixture combustion.
Throttle valve control servo motor (Motor 2nd phase malfunction)	(1) Disables the electronic-controlled throttle valve system. (2) Disables lean-mixture combustion. (3) Disables engine idle speed feedback control.
Communication line with the throttle valve controller	(1) Error in communication between the throttle valve controller and engine-ECU • Disables lean-mixture combustion. • Shuts off fuel supply when engine speed exceeds 3,000 r/min. (1) Error in communication between the throttle valve controller and engine-ECU • Disables lean-mixture combustion. • Shuts off fuel supply when engine speed exceeds 3,000 r/min. • The throttle valve controller controls the throttle valve opening angle by using the accelerator pedal position sensor (2nd channel) signal.

NOTE

The engine warning lamp illuminates when the electronic-controlled throttle valve system is disabled.

INSPECTION CHART FOR DIAGNOSIS CODES

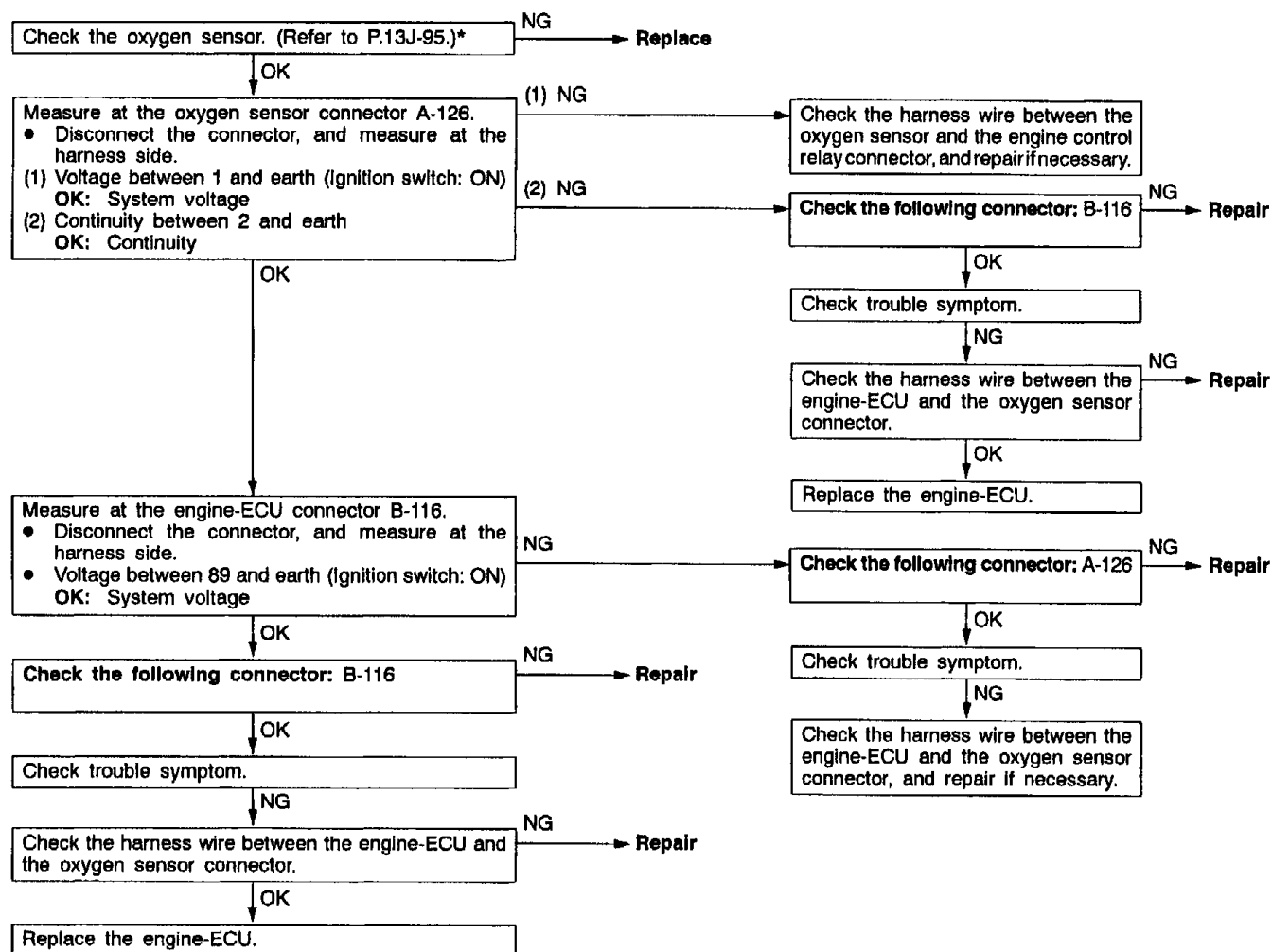
Code No.	Diagnosis item	Reference page
11	Oxygen sensor system	13J-9
12	Air flow sensor system	13J-10
13	Intake air temperature sensor system	13J-11
14	Throttle position sensor (2nd channel) system	13J-12
21	Engine coolant temperature sensor system	13J-13
22	Crank angle sensor system	13J-14
23	Camshaft position sensor system	13J-15
24	Vehicle speed sensor system	13J-16
25	Barometric pressure sensor system	13J-17
31	Detonation sensor system	13J-18
41	Injector system	13J-19
44	Abnormal combustion	13J-21
54	Immobilizer system	13J-22
56	Abnormal fuel pressure system	13J-23
61	Communication line with A/T-ECU system	13J-25
64	Alternator FR terminal system	13J-25
66	Brake vacuum sensor system	13J-26
77	Accelerator pedal position sensor (2nd channel) system	13J-27
78	Accelerator pedal position sensor (1st channel) system	13J-28
79	Throttle position sensor (1st channel) system	13J-29
89	Abnormal fuel system	13J-30
91	Electronic-controlled throttle valve system	13J-31
92	Throttle valve position feedback system	13J-31
94	Communication line system with throttle valve controller	13J-32
95	Throttle valve control servo motor (Motor 1st phase malfunction) system	13J-32
99	Throttle valve control servo motor (Motor 2nd phase malfunction) system	13J-33

NOTE

Code No. 56 may be also output when air is sucked in high-pressure fuel line due to no fuel supply.

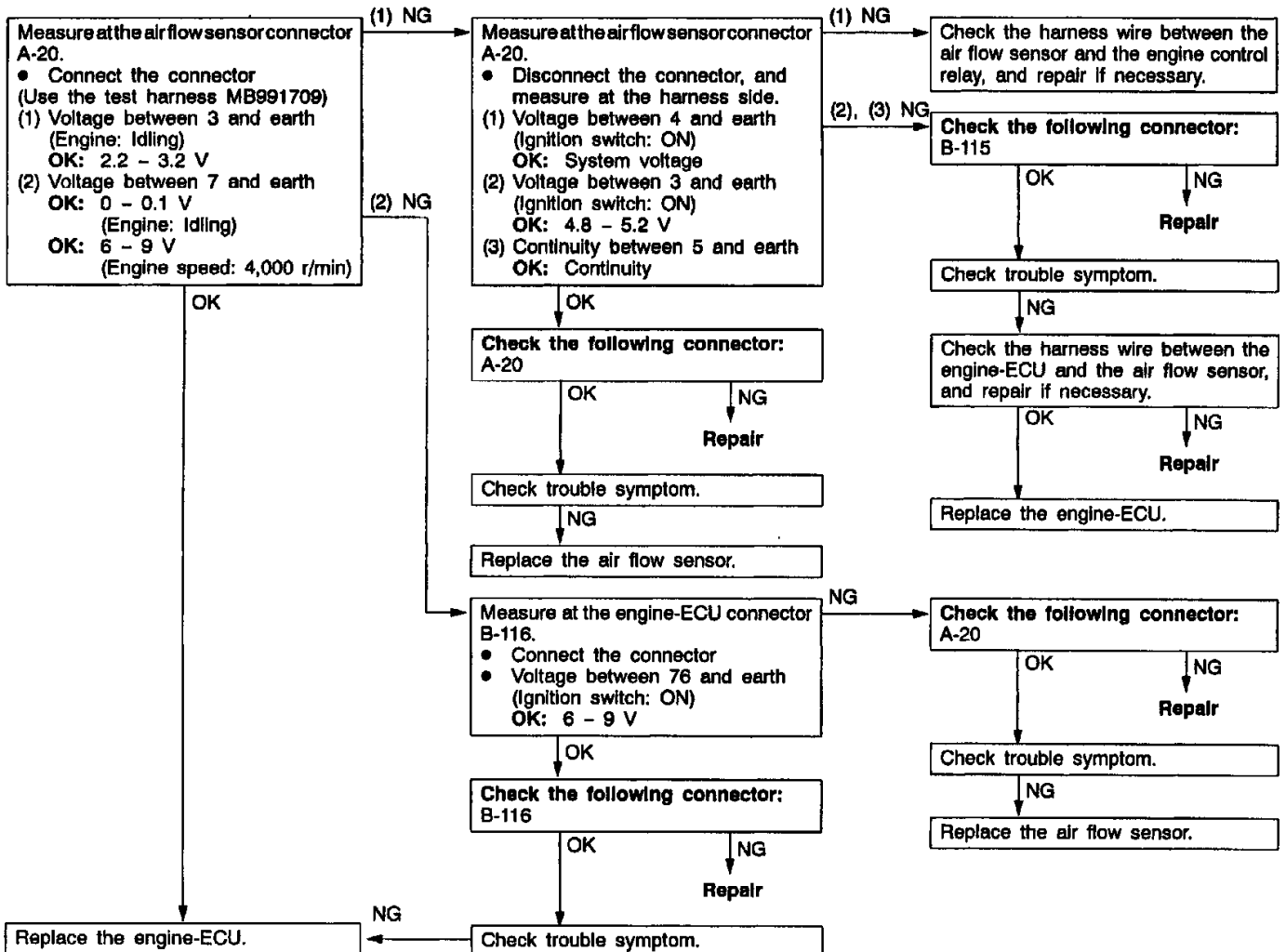
INSPECTION PROCEDURE FOR DIAGNOSIS CODES

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

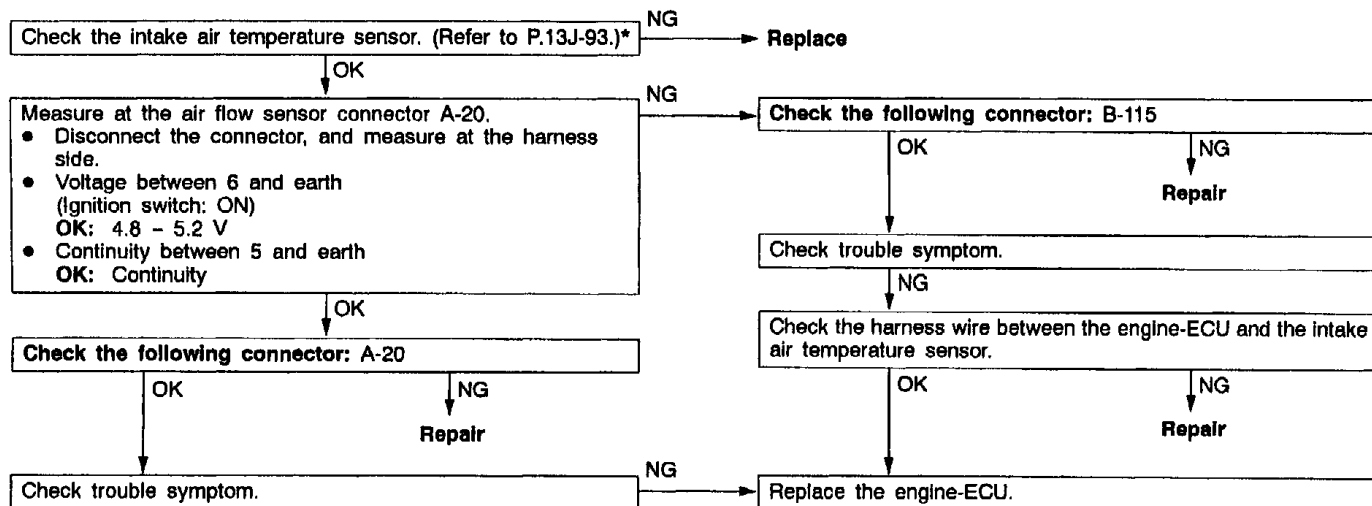


*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

Code No.12 Air flow sensor system	Probable cause
Range of check • Engine speed is 500 r/min or more. Set conditions • Sensor output frequency is 3.3 Hz or less for 4 seconds.	• Malfunction of the air flow sensor • Open circuit or short-circuited harness wire of air flow sensor circuit • Malfunction of the engine-ECU

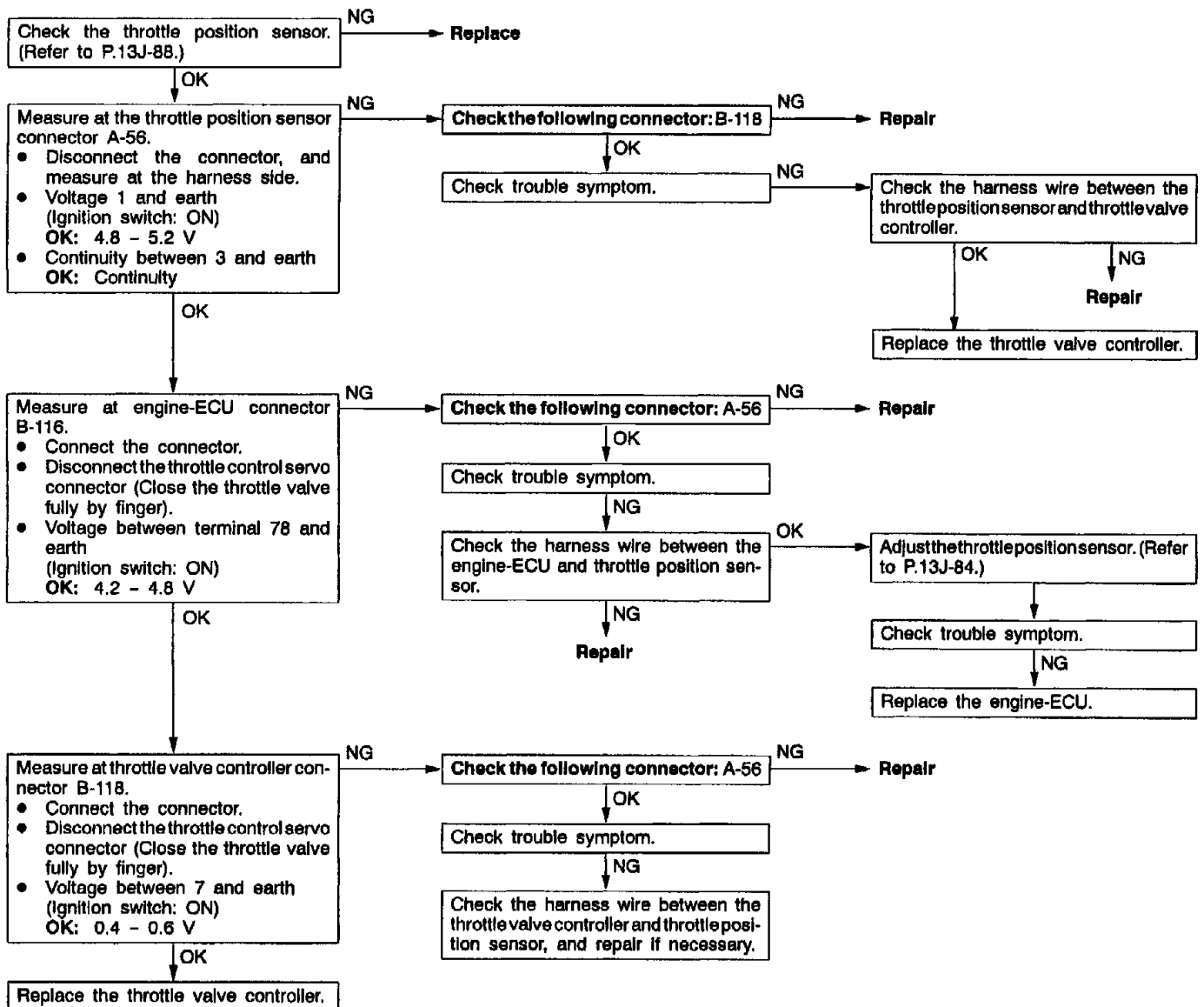


Code No.13 Intake air temperature sensor system	Probable cause
Range of check - After 60 seconds have passed since the engine have started Set conditions - Sensor resistance is 0.14 kΩ or less for 4 seconds. or - Sensor resistance is 50 kΩ or more for 4 seconds.	- Malfunction of the intake air temperature sensor - Open circuit or short-circuited harness wire of the intake air temperature sensor circuit - Malfunction of the engine-ECU

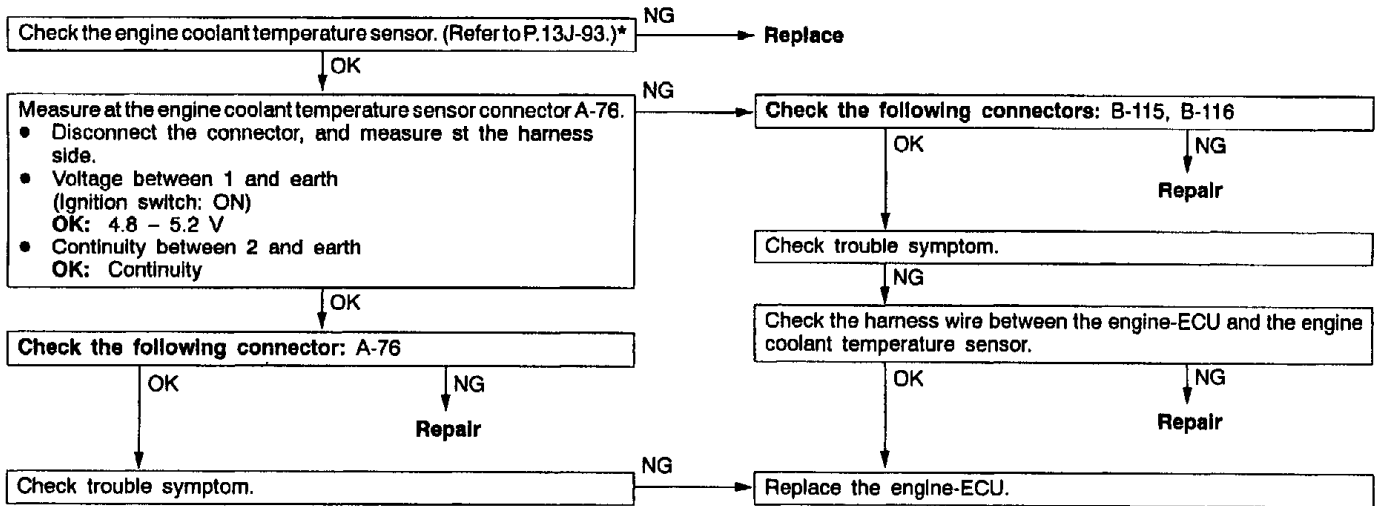


*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

Code No.14 Throttle position sensor system (2nd channel)	Probable cause
The throttle valve controller determines whether a failure is present or not, and sends a signal indicating its result to the engine-ECU. Range of check - Ignition switch: ON - Throttle position sensor (1st channel) is normal Set conditions - The throttle position sensor (1st channel) output voltage is 1.24 V or more, and the (2nd channel) output voltage is 4.6 V or more for one second. or - The throttle position sensor (1st channel) output voltage is 3.53 V or less, and the (2nd channel) output voltage is 0.2 V or less for one second. or - Throttle position sensor (1st and 2nd channels) output voltages are outside 4 to 6 V.	- Malfunction of throttle position sensor (2nd channel) - Open circuit or short-circuited harness wire in throttle position sensor (2nd channel) or poor connector contact - Faulty throttle valve controller - Malfunction of the engine-ECU

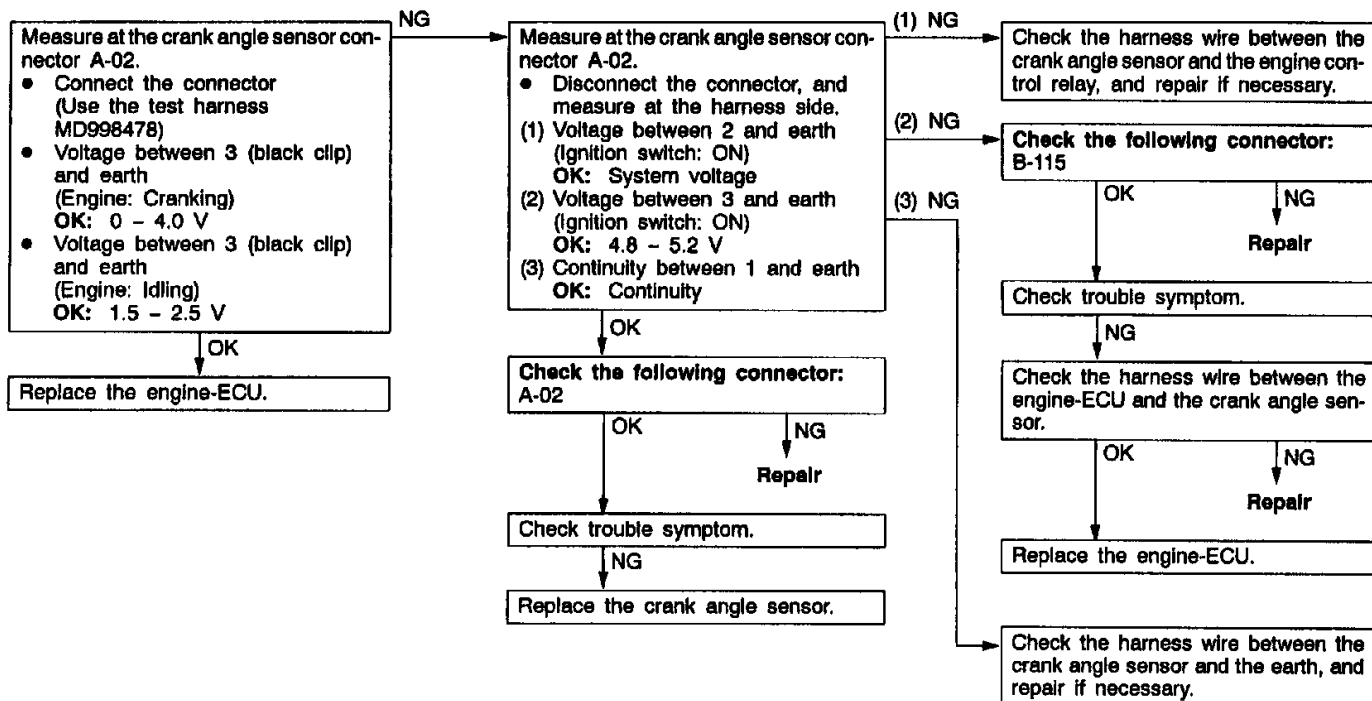


Code No.21 Engine coolant temperature sensor system	Probable cause
Range of check • After 60 seconds have passed since the engine have started Set conditions • Sensor resistance is 50 Ω or less for 4 seconds. or • Sensor resistance is 72 k Ω or more for 4 seconds.	• Malfunction of the engine coolant temperature sensor • Open circuit or short-circuited harness wire of the engine coolant temperature sensor circuit • Malfunction of the engine-ECU
Range of check • After engine starts Set conditions • After 5 minutes or more have passed since the engine coolant temperature after filtering has dropped from 40°C or more to less than this temperature	

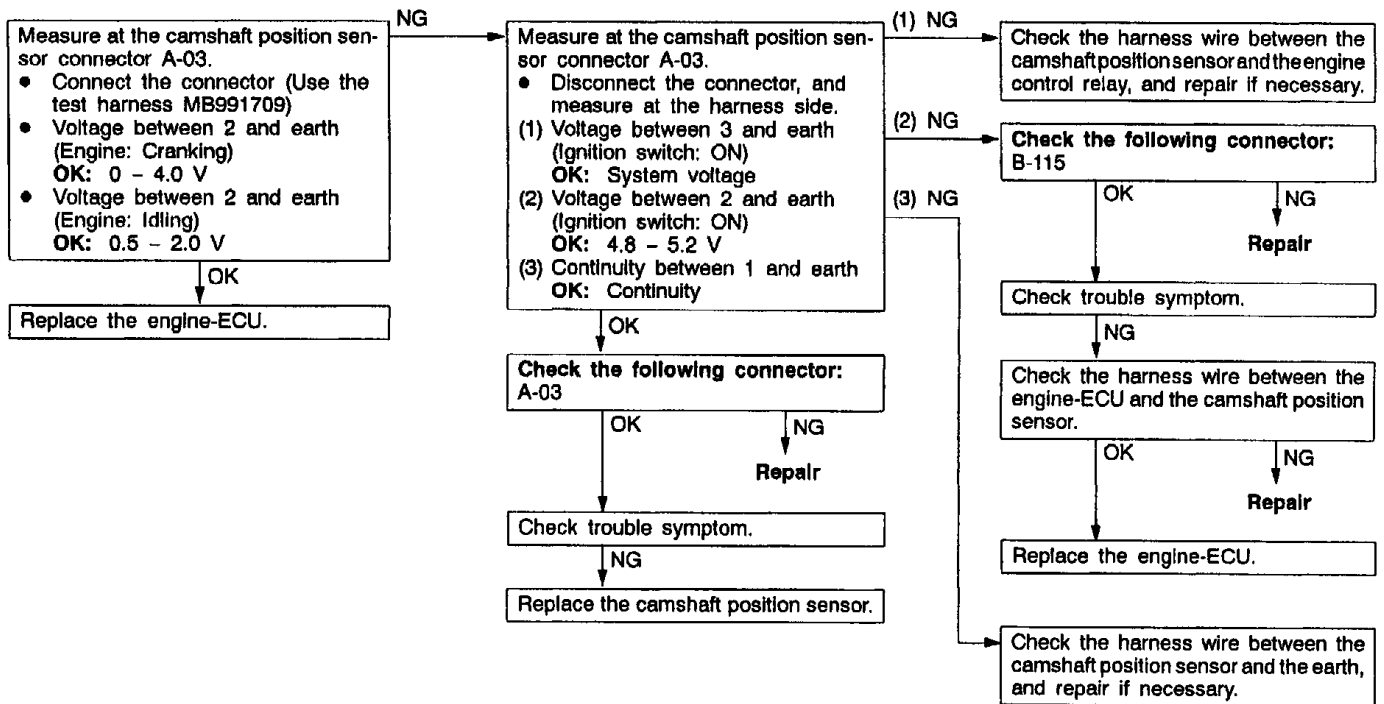


*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

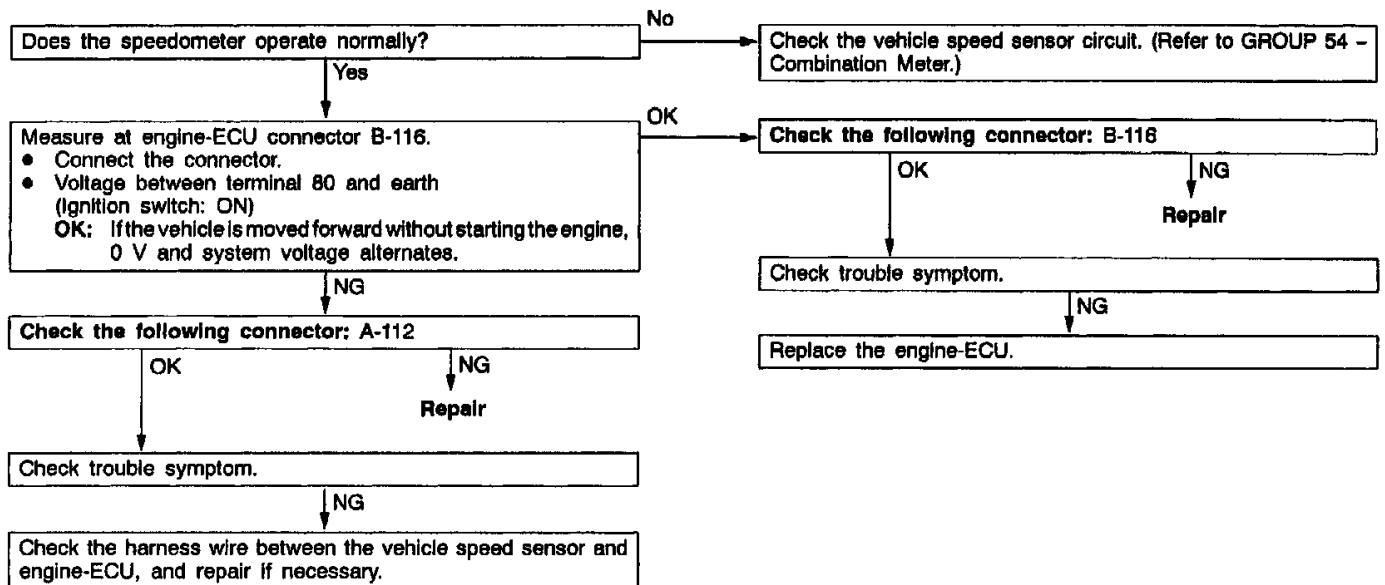
Code No.22 Crank angle sensor system	Probable cause
Range of check • Engine: During cranking Set conditions • Sensor output voltage does not change for 4 seconds (no pulse signal is being input).	• Malfunction of the crank angle sensor • Open circuit or short-circuited harness wire of the crank angle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



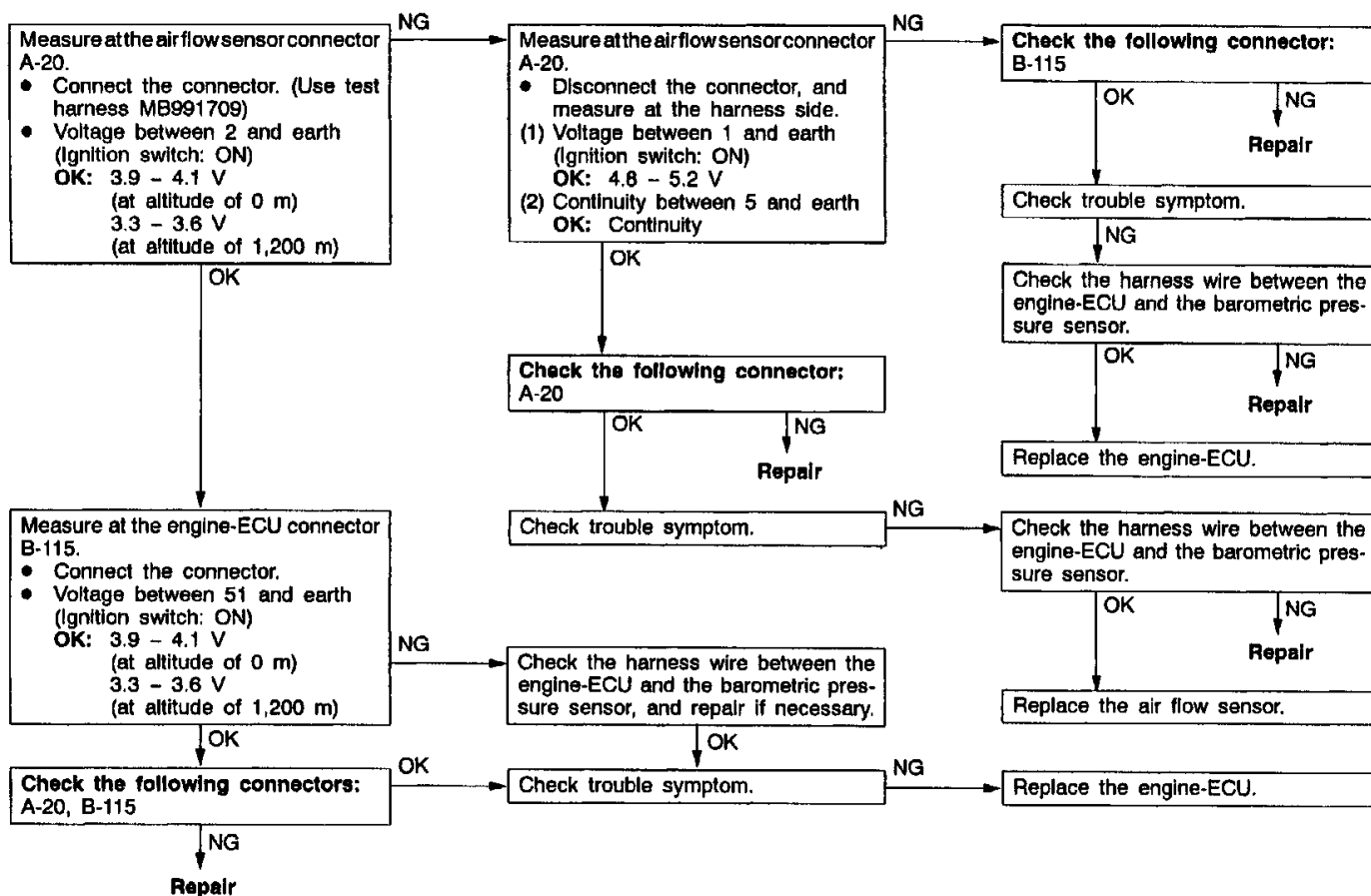
Code No.23 Camshaft position sensor system	Probable cause
Range of check • While engine is cranking or running Set conditions • Sensor output voltage does not change for 4 seconds (no pulse signal is being input). or • Abnormal pulse signal pattern is output.	• Malfunction of the camshaft position sensor • Open circuit or short-circuited harness wire of the camshaft position sensor • Malfunction of the engine-ECU



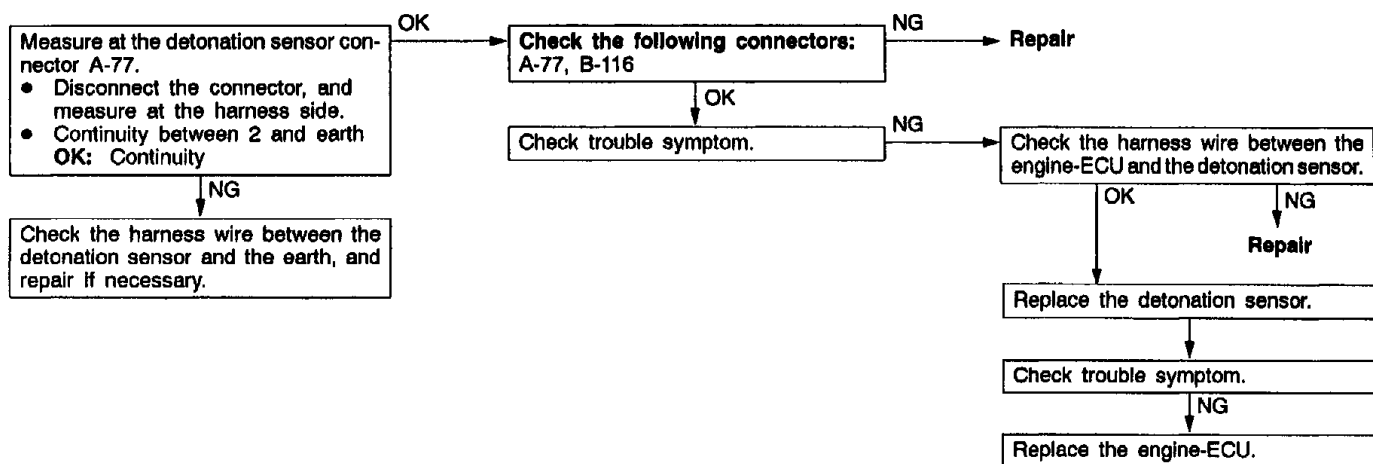
Code No. 24 Vehicles speed sensor system	Probable cause
Range of check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. - Engine speed is 3,000 r/min or more. - Driving under high engine load conditions. Set conditions - Sensor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



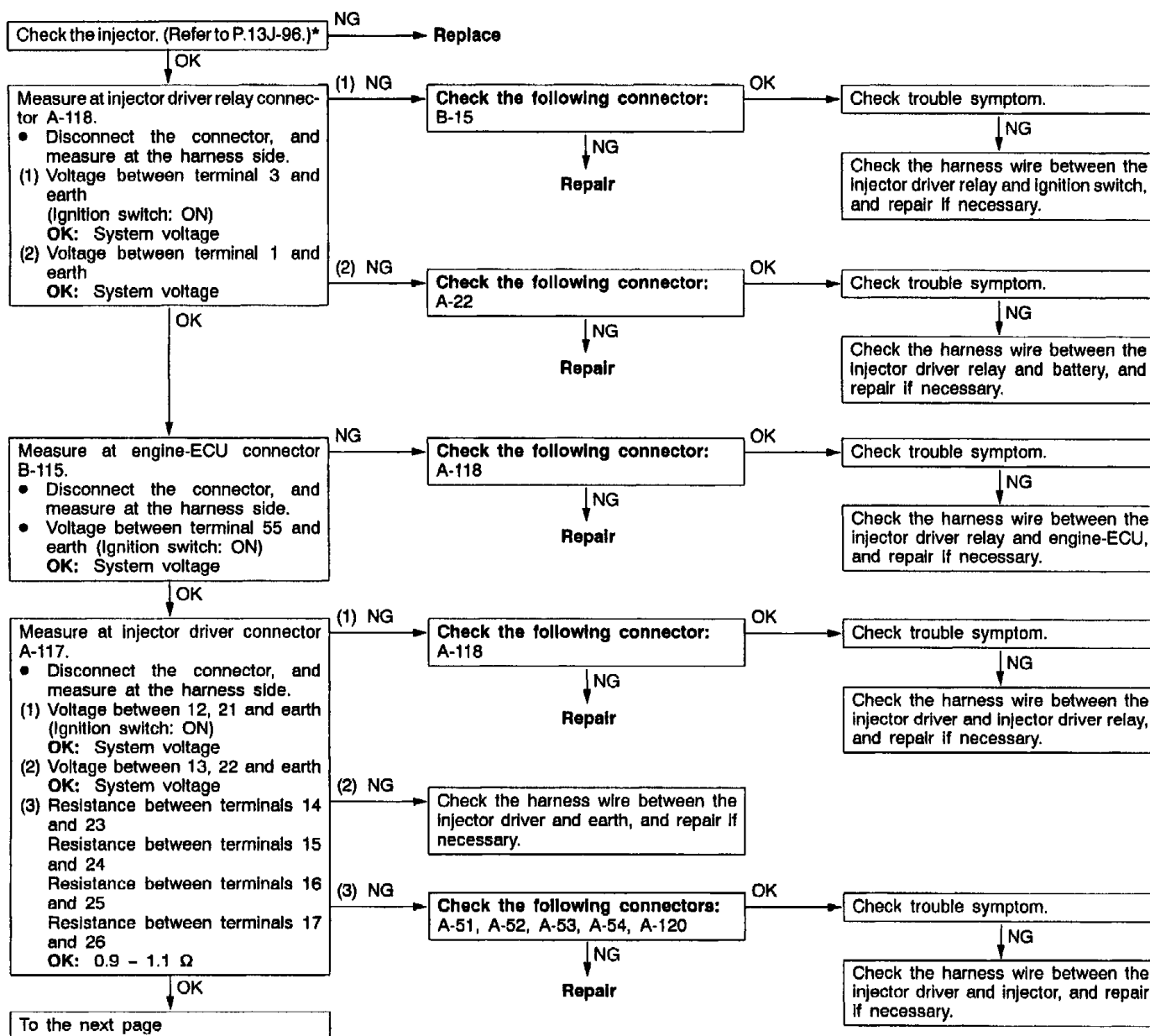
Code No.25 Barometric pressure sensor system	Probable cause
Range of check - After 60 seconds have passed since the engine have started - Battery voltage is 8 V or more. Set conditions - Sensor output voltage is 0.2 V or less for 4 seconds. or - Sensor output voltage is 4.5 V or more for 4 seconds.	- Malfunction of the barometric pressure sensor - Open circuit or short-circuited harness wire of the barometric pressure sensor - Malfunction of the engine-ECU

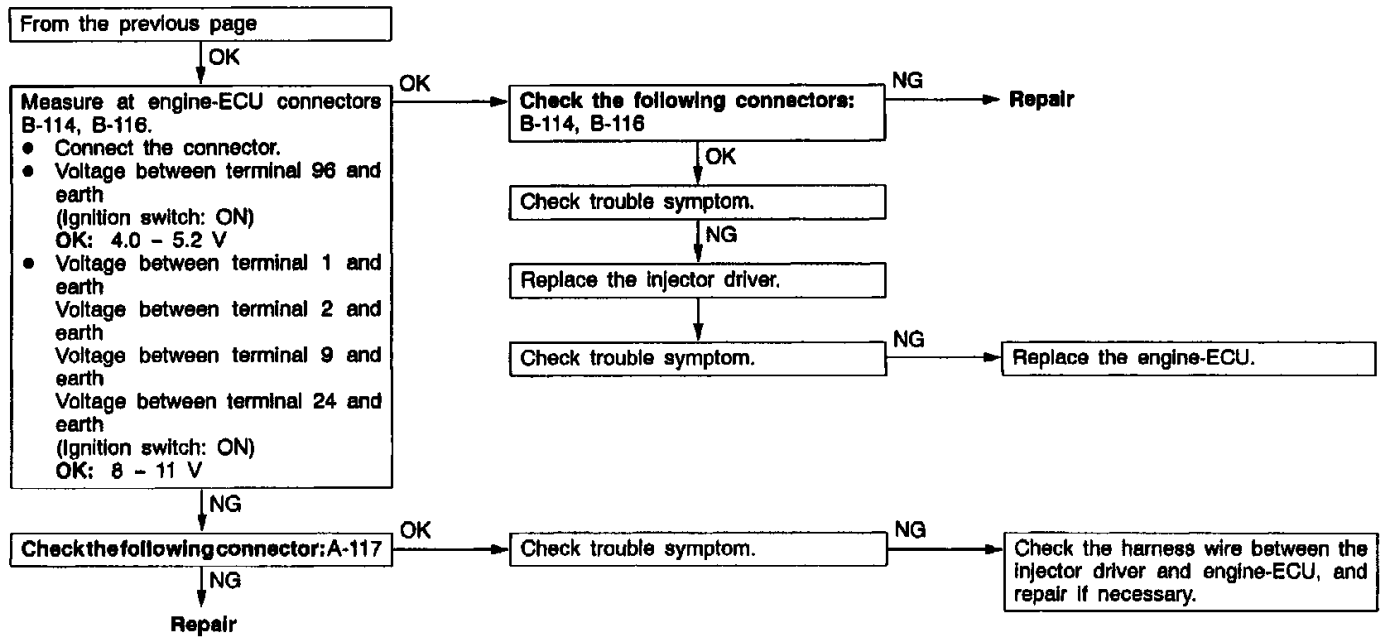


Code No.31 Detonation sensor system	Probable cause
Range of check - After 60 seconds have passed since the engine have started Set conditions - Amount of change in the sensor output voltage (detonation sensor peak voltage for each half rotation of the crankshaft) is 0.06 V or less for 200 continuous times.	- Malfunction of the detonation sensor - Open circuit or short-circuited harness wire of the detonation sensor - Malfunction of the engine-ECU



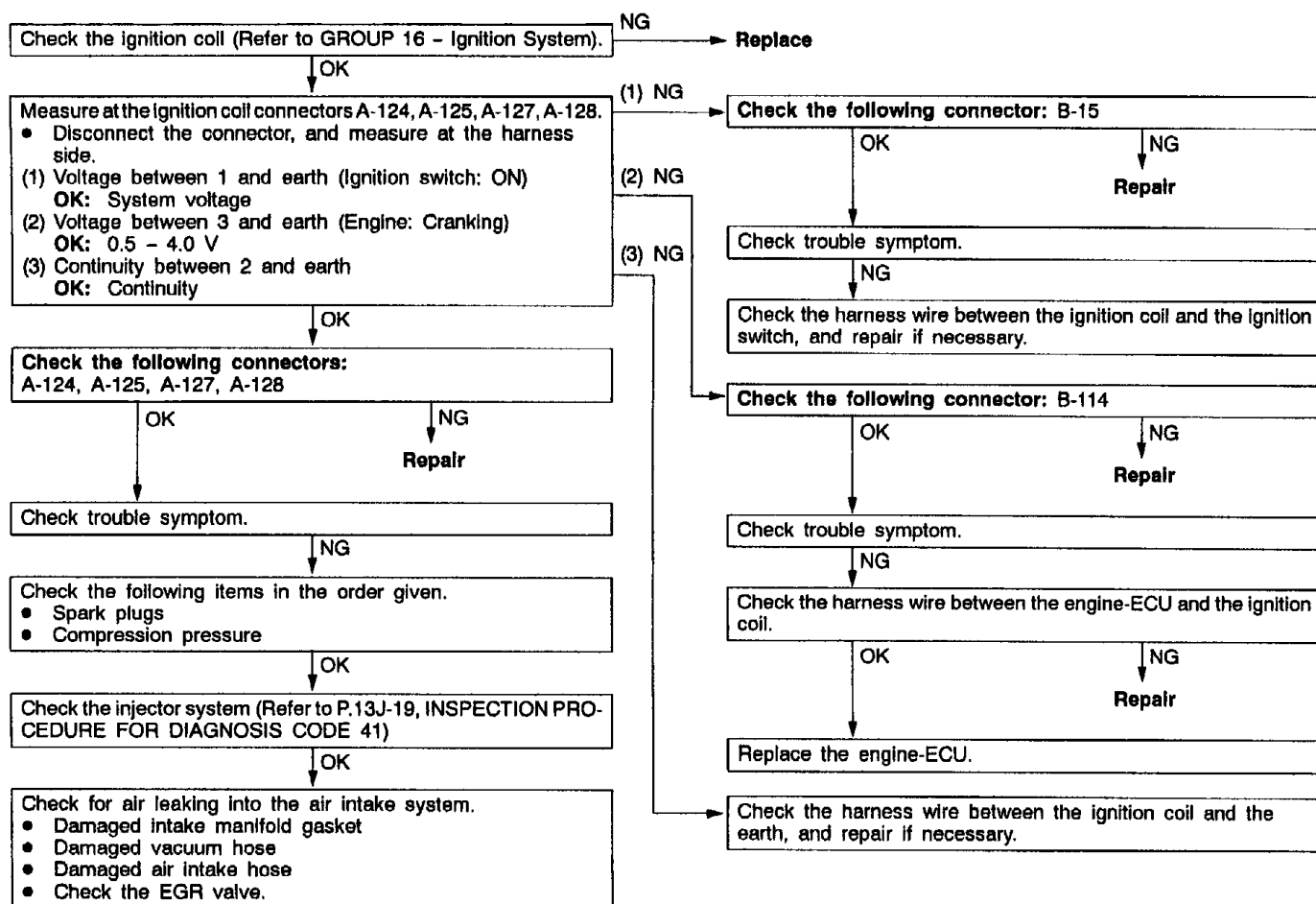
Code No.41 Injector system	Probable cause
Range of check - Engine: while cranking, or running - Engine speed: 4,000 r/min or less - System voltage: 10 V or more - Fuel shut off, or forcible activating of injector (actuator test) is not in operation. Set conditions - Injector open circuit check signal is not output from the injector driver predetermined time(s).	- Malfunction of the injector - Faulty injector driver relay - Faulty injector driver - Open circuit or short-circuited harness wire in the injector drive circuit, or poor connector contact - Malfunction of the engine-ECU





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

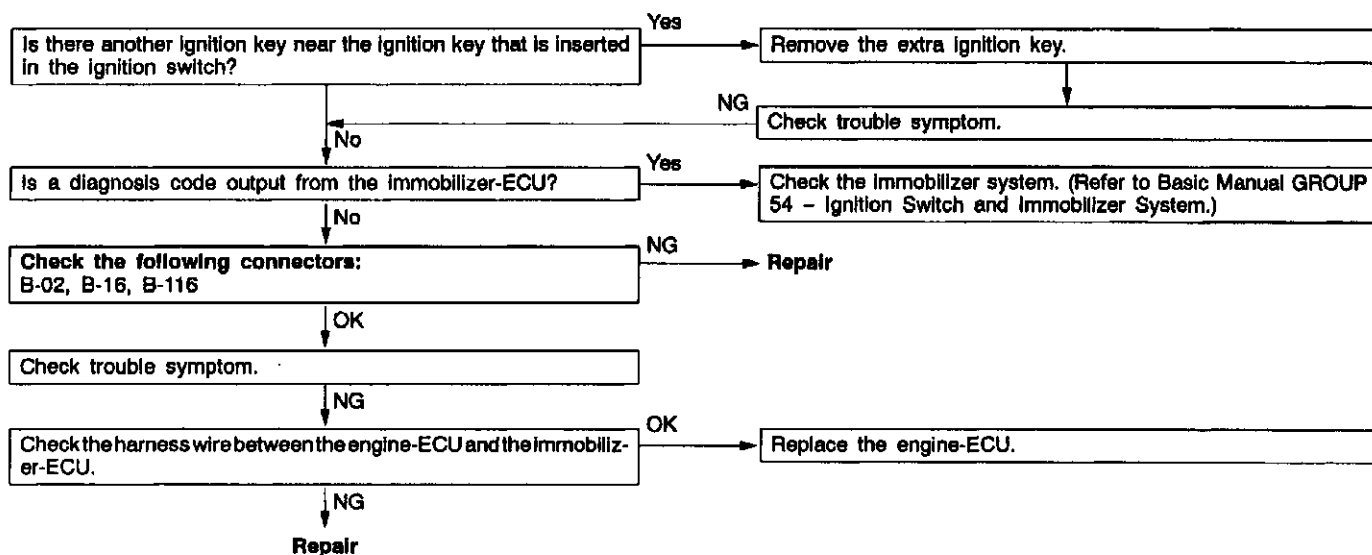
Code No.44 Abnormal combustion	Probable cause
Range of check • While engine is running during lean fuel combustion Set conditions • Abnormal engine speed due to mis-firing is detected by the crank angle sensor	• Malfunction of the ignition coil • Malfunction of the spark plug • Malfunction of the EGR valve • Open circuit or short-circuit in ignition primary circuit • Malfunction of the injector system • Malfunction of the engine-ECU



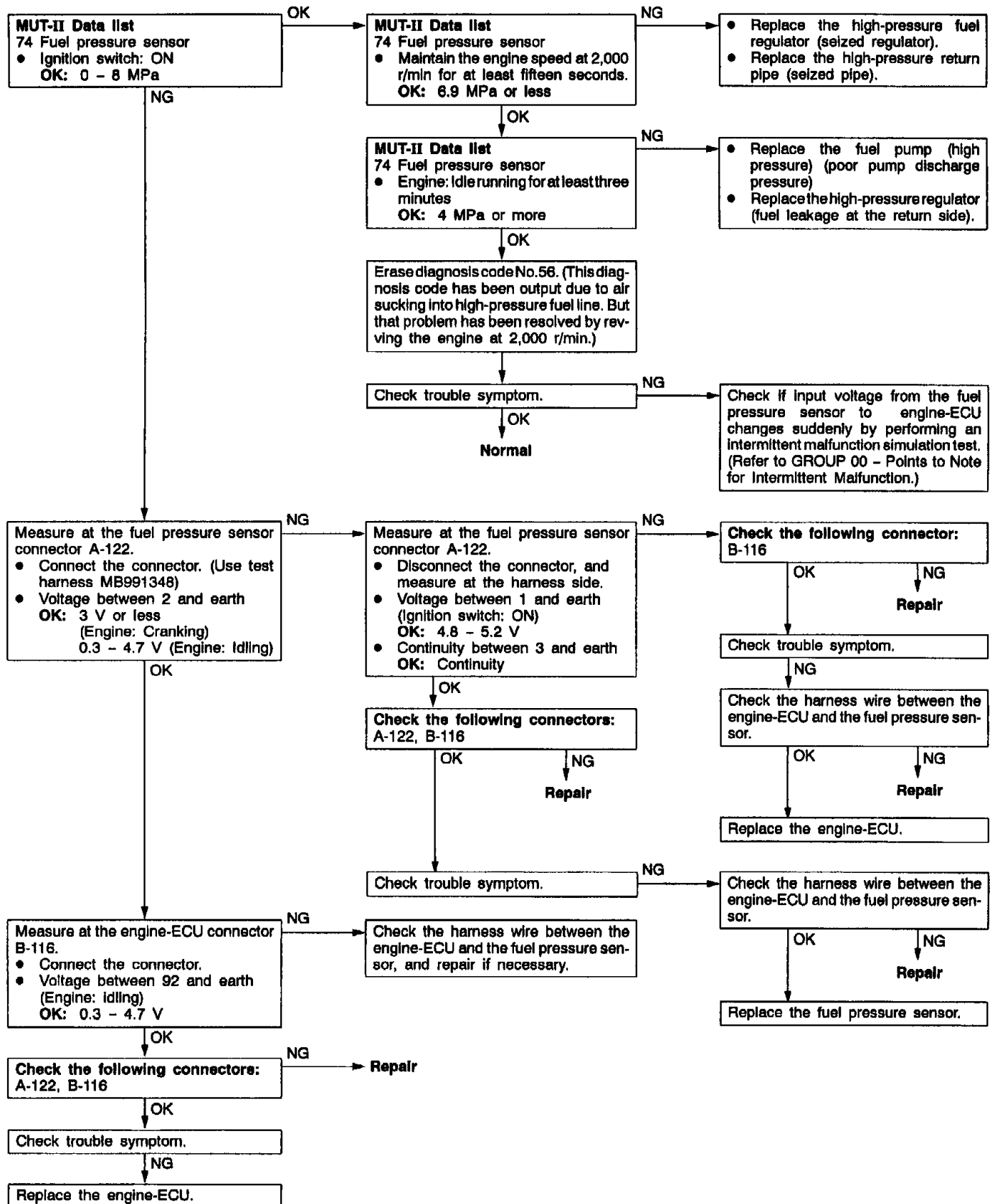
Code No.54 Immobilizer system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • Improper communication between the engine-ECU and immobilizer-ECU	• Radio interference of encrypted codes • Incorrect encrypted code • Malfunction of harness or connector • Malfunction of immobilizer-ECU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

NOTE

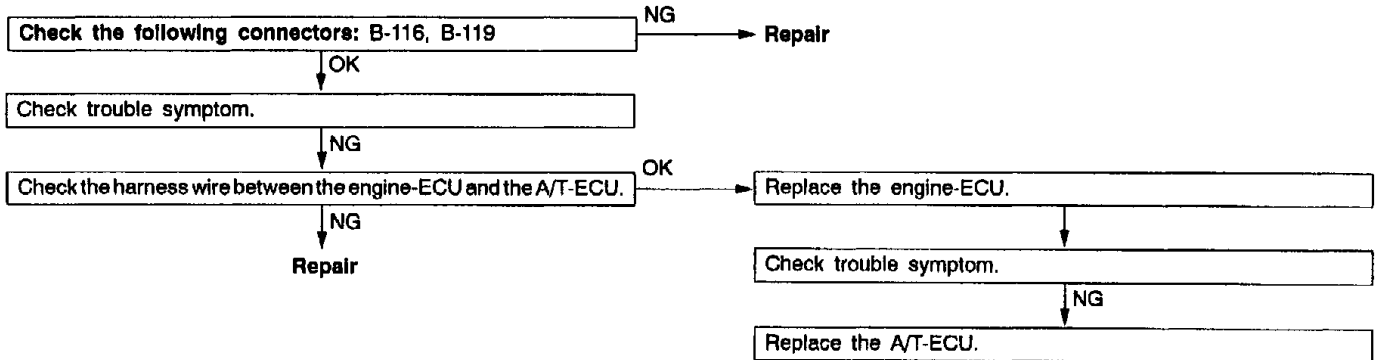
- (1) If the ignition switches are close each other when starting the engine, radio interference may cause this code to be displayed.
- (2) This code may be displayed when registering the key encrypted code.



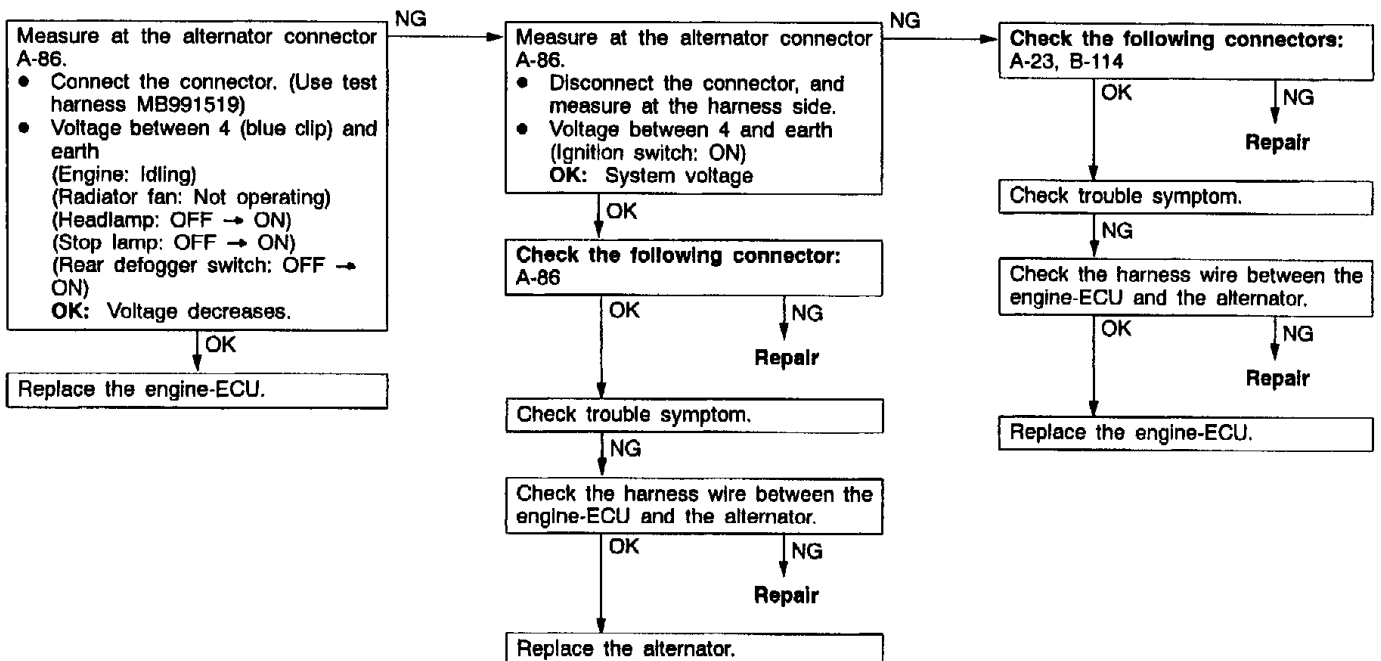
Code No.56 Abnormal fuel pressure system	Probable cause
Range of check • Ignition switch: ON Set conditions • Sensor output voltage is 4.8 V or more for four seconds. or • Sensor output voltage is 0.2 V or less for four seconds. Range of check • After the engine is started, the following conditions have been detected: (1) Engine speed: 1,000 r/min or more (2) Fuel pressure: 2 MPa or more • While engine is running Set conditions • Fuel pressure is 6.9 MPa or more for four seconds. or • Fuel pressure is 2 MPa or less for four seconds.	• Malfunction of the fuel pressure sensor • Open circuit or short-circuited harness wire of the fuel pressure sensor • Malfunction of the engine-ECU • Malfunction of the fuel pump (high pressure) • Malfunction of the fuel pressure regulator (high pressure) • Clogged high-pressure fuel line
This diagnosis code is also output when air is sucked in high-pressure fuel line due to no fuel supply. In this case, air can be bled by letting the engine run at 2,000 r/min for at least fifteen seconds. After the air bleeding, the diagnosis code must be erased by the MUT-II.	• Air sucking due to no fuel supply



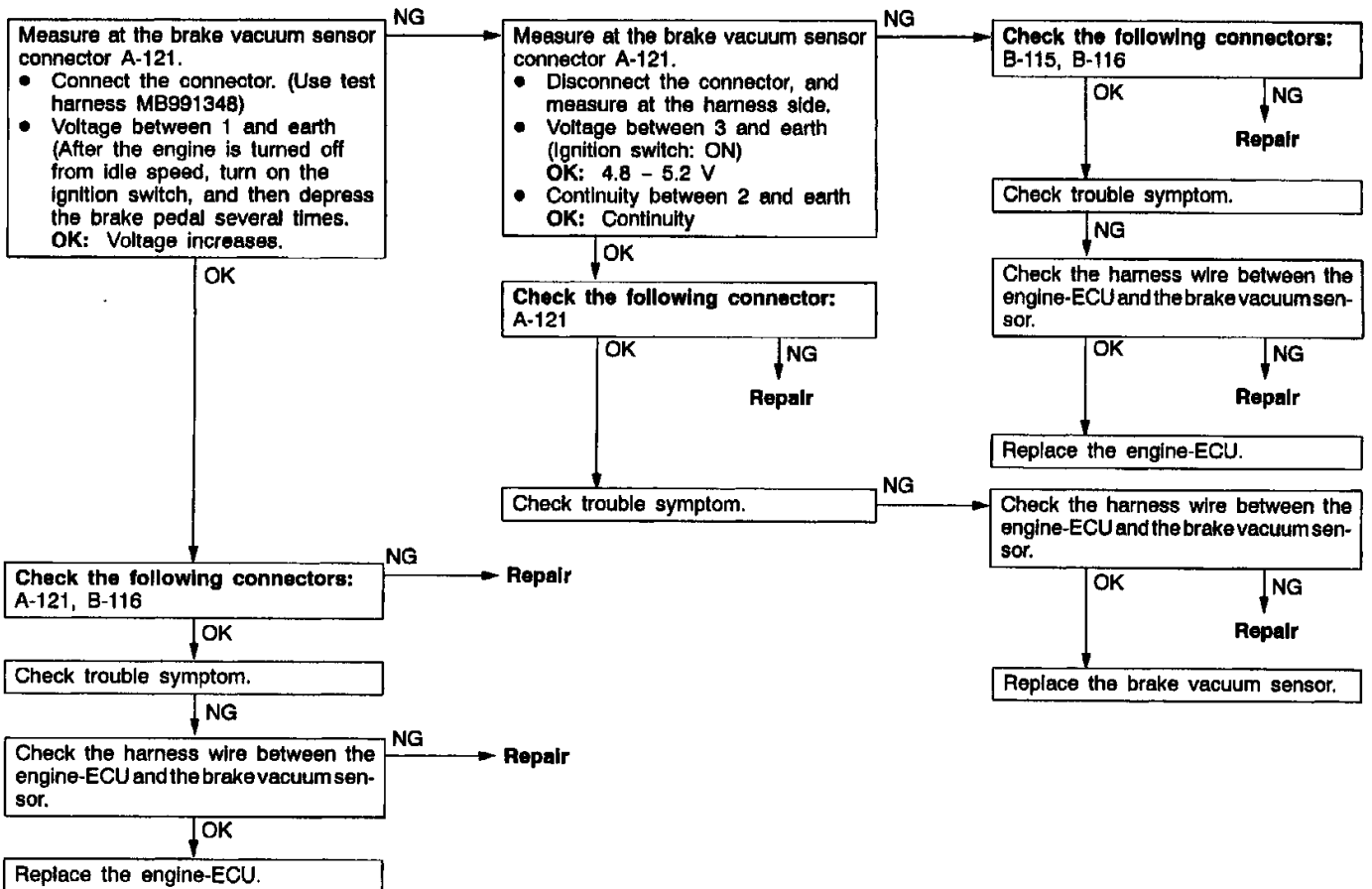
Code No.61 Communication wire with A/T-ECU system	Probable cause
Range of check • After 60 seconds have passed since the engine have started Set conditions • Torque reduction request signal from A/T-ECU is input continuously for 1.5 seconds or more.	• Short circuit in ECU communication circuit • Malfunction of the engine-ECU • Malfunction of the A/T-ECU



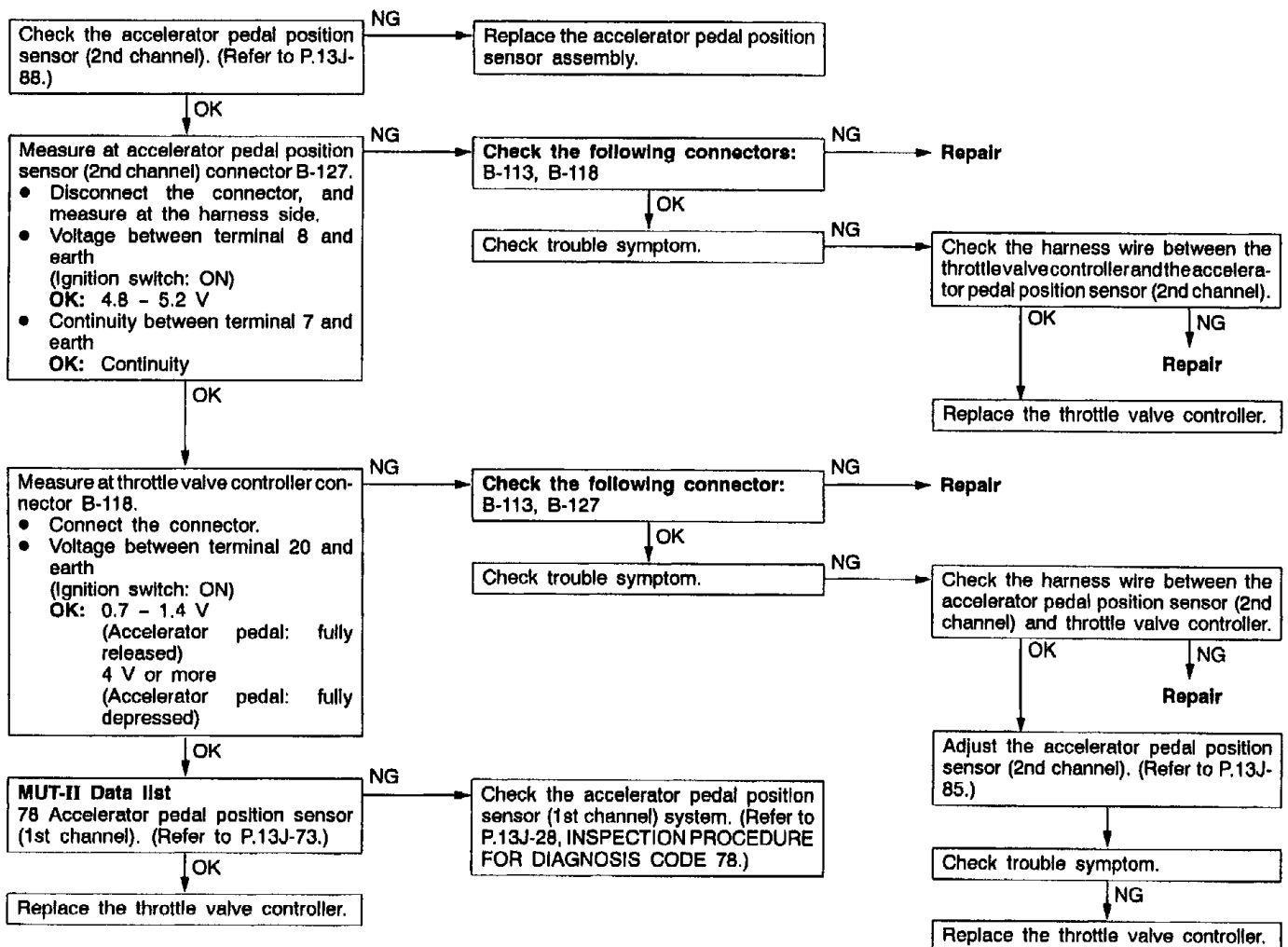
Code No.64 Alternator FR terminal system	Probable cause
Range of check • Engine speed is 50 r/min or more. Set conditions • Input voltage from the alternator FR terminal is system voltage for 20 seconds.	• Open circuit in alternator FR terminal circuit • Malfunction of the engine-ECU



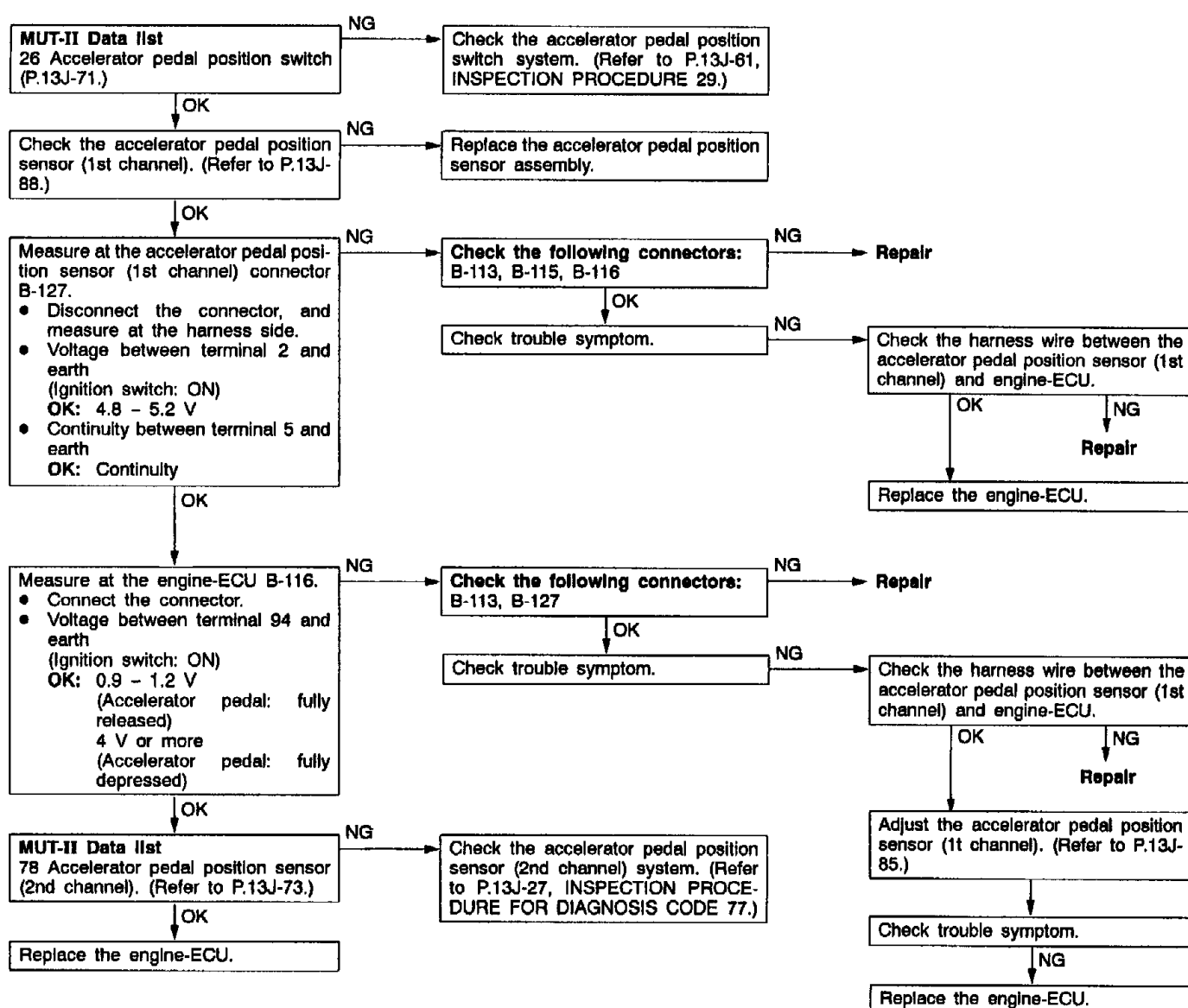
Code No.66 Brake vacuum sensor system	Probable cause
Range of check • Ignition switch: ON Set conditions • Sensor output voltage is 4.8 V or more. or • Sensor output voltage is 0.2 V or less.	• Malfunction of the brake vacuum sensor • Improper connector contact, open circuit or short-circuited harness wire of the brake vacuum sensor • Malfunction of the engine-ECU



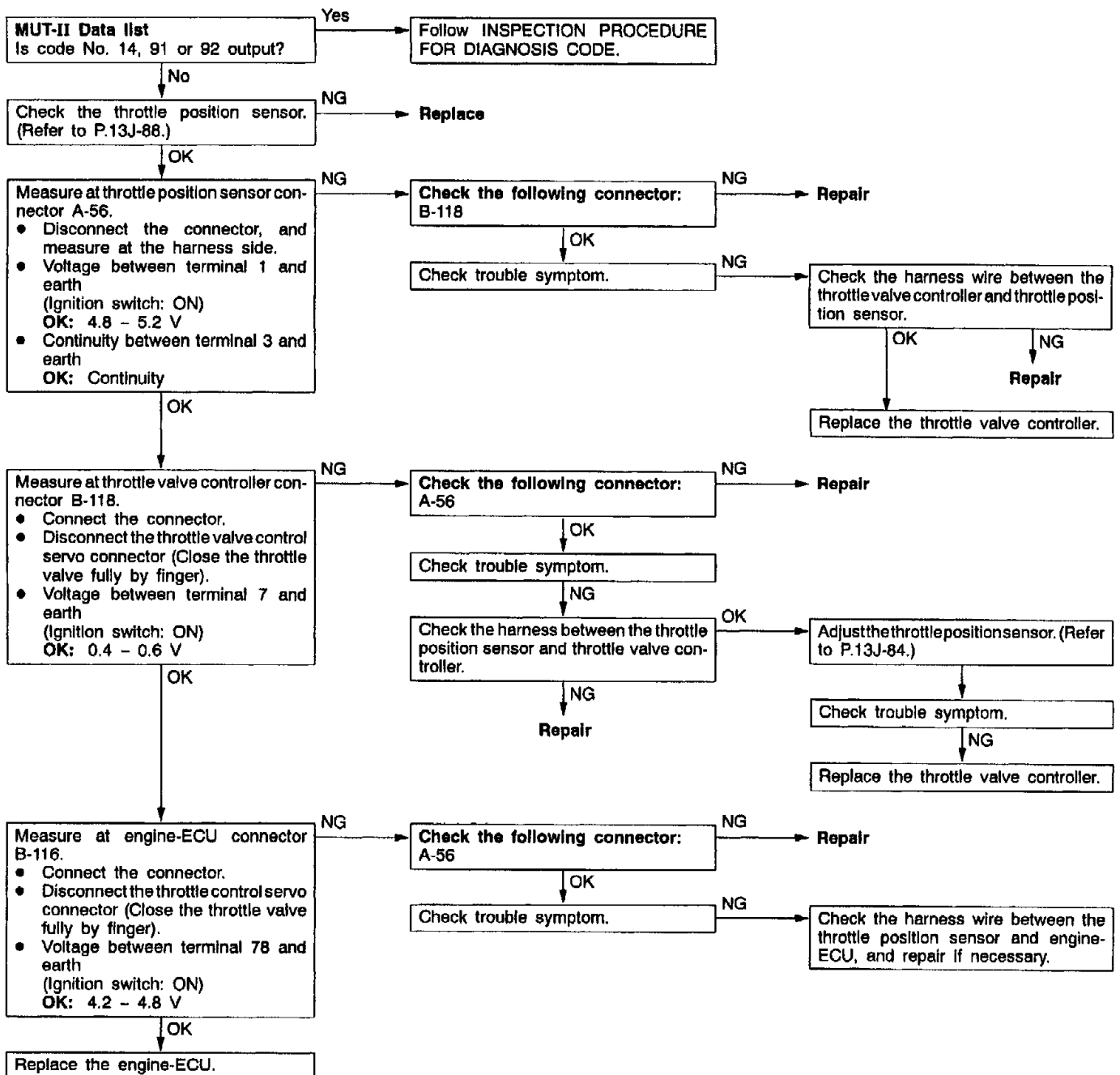
Code No.77 Accelerator pedal position sensor (2nd channel) system	Probable cause
Range of check - Accelerator pedal position sensor (1st channel) system is normal. - Communication between the engine-ECU and throttle valve controller is normal. Set conditions - Output voltage of accelerator position sensor (2nd channel) system 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 output voltages (1st and 2nd channels) exceeds 1.0V (i.e. when the throttle valve opening angle changes slightly).	- Malfunction of the accelerator pedal position sensor (2nd channel) - Open circuit or short-circuited harness wire in the accelerator pedal position sensor (2nd channel) system, or poor connector contact - Malfunction of the throttle valve controller - Malfunction of the engine-ECU



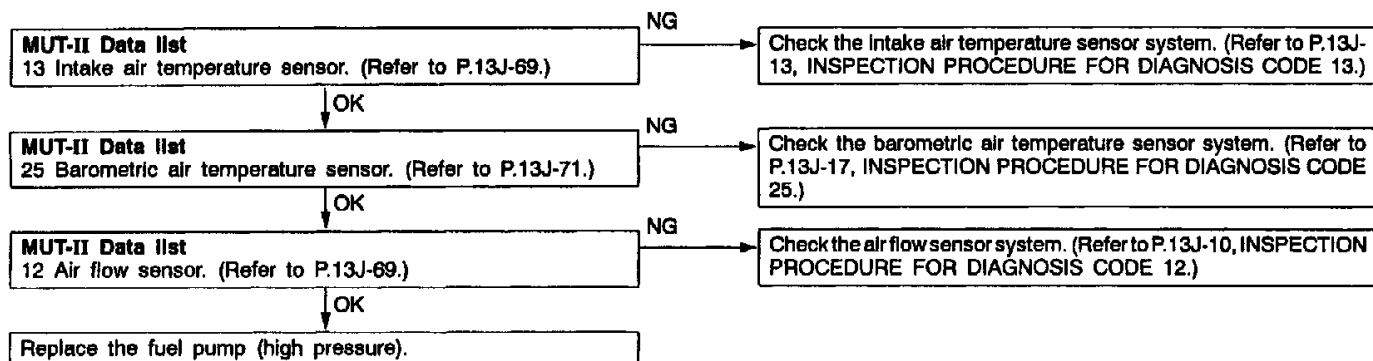
Code No.78 Accelerator pedal position sensor (1st channel) system	Probable cause
Range of check - Accelerator pedal position sensor (2nd channel) system is normal. - Communication between the engine-ECU and throttle valve controller is normal. Set conditions - Output voltage of accelerator position sensor (1st channel) system is 0.2 V or less for one second. or - Output voltage of the accelerator pedal position sensor (2nd channel) is 2.5 V or less, and (1st channel) output voltage of the accelerator pedal position sensor 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). or - Although the accelerator pedal position switch is on, 1st-channel output voltage of the accelerator pedal position sensor exceeds 1.1 V for one second.	- Malfunction of the accelerator pedal position sensor (1st channel) - Open circuit or short-circuited harness wire in the accelerator pedal position sensor (1st channel) system, or poor connector contact - ON-seizure of the accelerator pedal position switch - Malfunction of the throttle valve controller - Malfunction of the engine-ECU



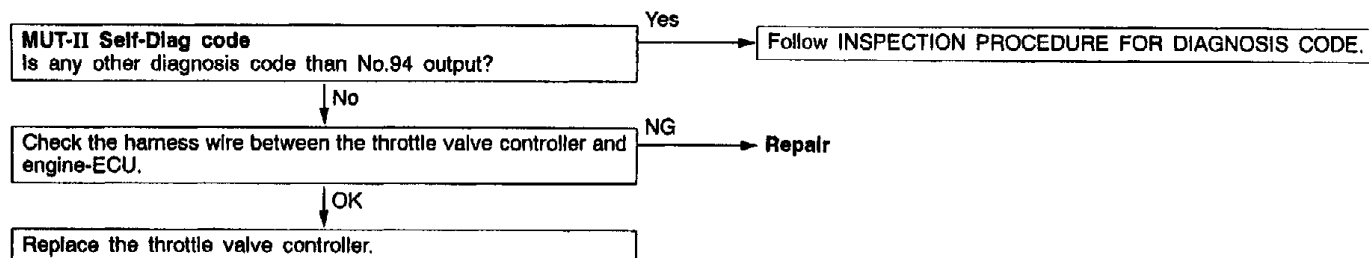
Code No.79 Throttle position sensor (1st channel) system	Probable cause
The throttle valve controller determines a failure, and sends its result to the engine-ECU. Range of check - Ignition switch: ON - System voltage: 8 V or more Set conditions - Output voltage of the sensor remains 0.2 V for one second. or - Output voltage of the sensor remains 4.9 V for one second. or - Output voltage of the throttle position sensor (1st and 2nd channels) remains outside 4 – 6 V for four seconds.	- Malfunction of the throttle position sensor (1st channel) - Open circuit or short-circuited harness wire in the throttle position sensor (1st channel), or poor connector contact - Malfunction of the throttle valve controller - Malfunction of the engine-ECU



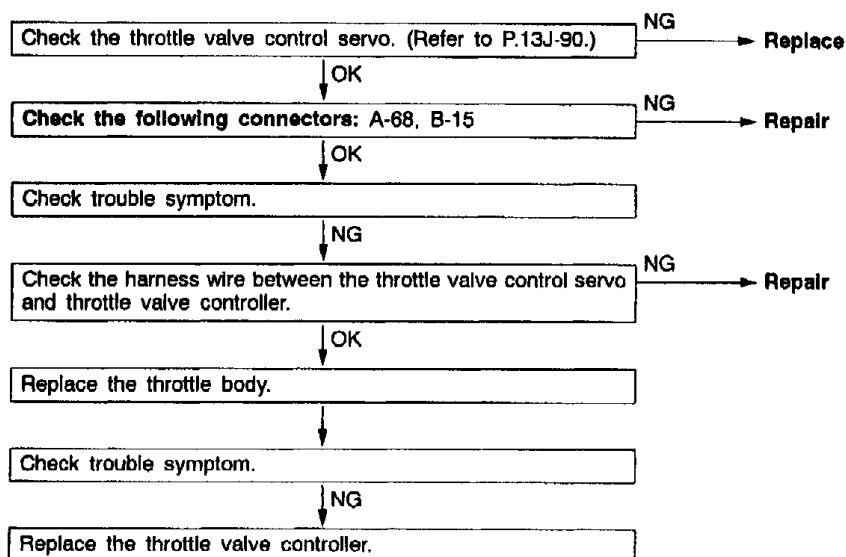
Code No.89 Abnormal fuel system	Probable cause
Range of check • Engine: Idling (during stoichiometric-feedback operation) Set conditions • Fuel injection correction value remains excessively low for ten seconds or more. or • Fuel injection correction value remains excessively high for ten seconds or more.	• Malfunction of the fuel pump (high pressure) • Malfunction of the intake air temperature sensor • Malfunction of the barometric pressure sensor • Malfunction of the air flow sensor • Malfunction of the engine-ECU



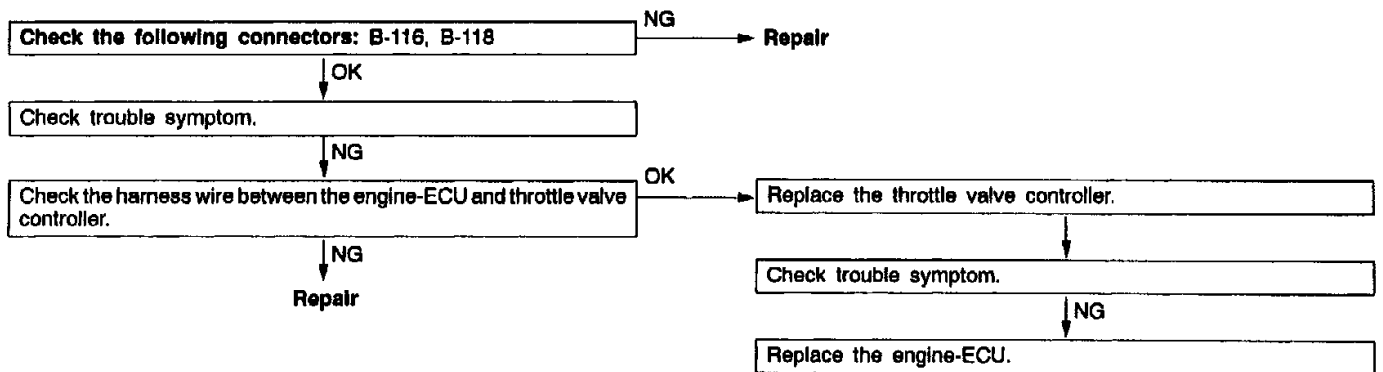
Code No.91 Electronic-controlled throttle valve system	Probable cause
Range of check - Ignition switch: ON - Error in communication between the engine-ECU and throttle valve controller Set conditions - Output voltage of the throttle position sensor (2nd channel) fluctuates significantly (approx. 1 V or more) from an expected value. Range of check - Ignition switch: ON - Error in communication between the throttle valve controller and engine-ECU Set conditions - The throttle valve opening angle (voltage) which the engine-ECU requested of the throttle valve controller is significantly different from output voltage of the (2nd channel) throttle position sensor (approx. one volt).	- Short in communication line - Malfunction of the engine-ECU - Malfunction of the throttle valve controller



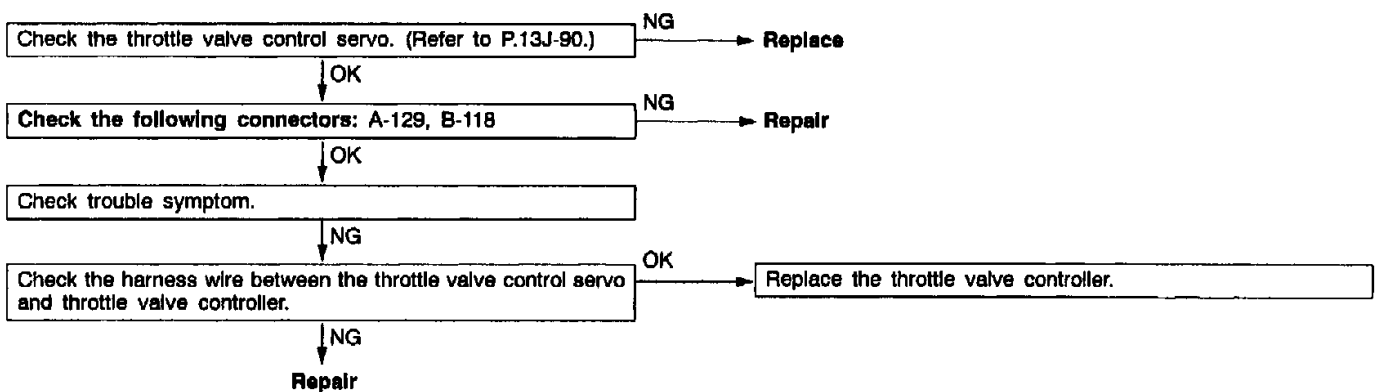
Code No.92 Throttle valve position feedback system	Probable cause
The throttle valve controller determines if a failure is present, and sends its result to the engine-ECU. Range of check - Ignition switch: ON - System voltage: 8 V or more Set condition - Motor position feedback system is defective (System detects a motor overcurrent, or that actual and projected opening angles of the throttle position sensor (1st channel) are different by 1.0 V or more.	- Malfunction of the throttle position sensor (1st channel) - Open circuit or short-circuited harness wire in the throttle position sensor system (1st channel), or poor connector contact - Malfunction of the throttle valve controller



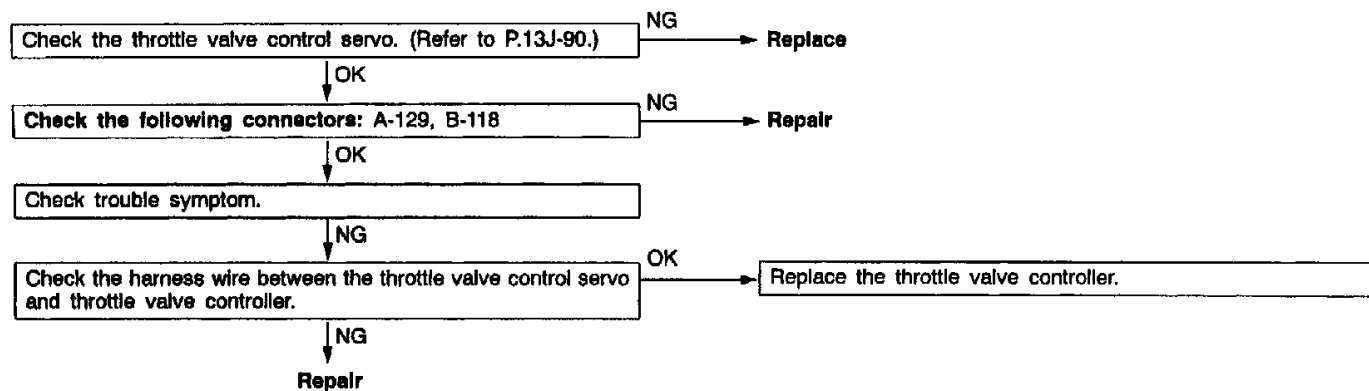
Code No.94 Communication line system with throttle valve controller	Probable cause
Range of check - Ignition switch: ON - System voltage: 8 V or more - Engine: not cranking Set condition - System detects an error in communication line between the engine-ECU and throttle valve controller.	- Short circuit in communication line - Malfunction of the engine-ECU - Malfunction of the throttle valve controller



Code No.95 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



Code No.99 Throttle valve control servo motor (Motor 2nd phase malfunction) system	Probable cause
Range of check - Throttle valve control servo relay: ON - System voltage: 8V 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-circuited.	- Malfunction of the throttle valve control servo - Open circuit or short-circuited harness wire in the throttle valve control servo system, or poor connector contact - Malfunction of the throttle valve controller



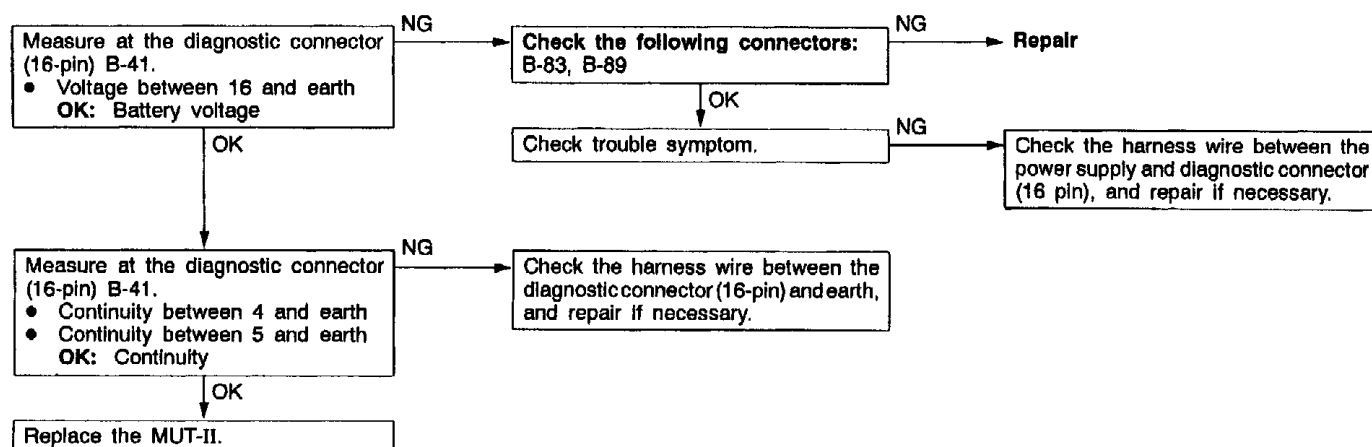
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13J-35
	Communication with engine-ECU only is not possible.	2	13J-35
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-36
	The engine warning lamp remains illuminating and never goes out.	4	13J-36
Starting	No initial combustion (starting impossible)	5	13J-37
	Initial combustion but no complete combustion (starting impossible)	6	13J-39
	Long time to start (improper starting)		
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	7	13J-41
	Idling speed is high. (Improper idling speed)	8	13J-43
	Idling speed is low. (Improper idling speed)		
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	9	13J-44
	When the engine is hot, it stalls at idling. (Die out)	10	13J-45
	The engine stalls when starting the car. (Pass out)	11	13J-47
	The engine stalls when decelerating.	12	13J-48
Driving	Hesitation, sag or stumble	13	13J-49
	Poor acceleration		
	Surge		
	The feeling of impact or vibration when accelerating	14	13J-50
	The feeling of impact or vibration when decelerating	15	13J-51
	Knocking	16	13J-51
Dieseling		17	13J-51
Too high CO and HC concentration when idling		18	13J-52
Low alternator output voltage (approx. 12.3 V)		19	13J-54
Engine idle speed is incorrect while the A/C is on.		20	13J-54
Fans (radiator fan, A/C condenser fan) are inoperative		21	13J-55
GDI ECO indication lamp system	The GDI ECO indication lamp does not illuminate.	22	13J-56
	The GDI ECO indication lamp remains on (does not extinguish).	23	13J-57
Malfunction of the clutch switch system <M/T>		24	13J-57

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

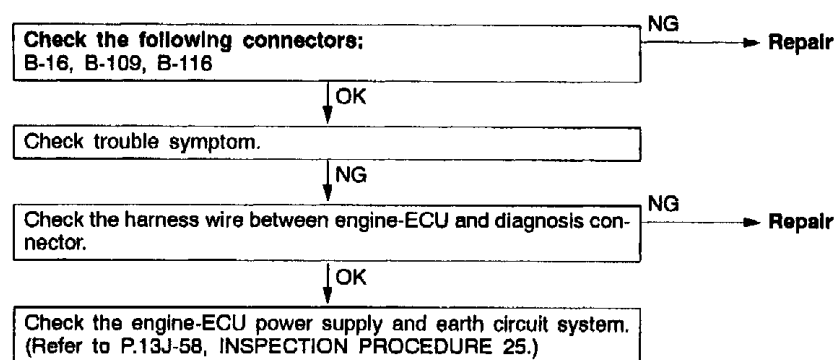
INSPECTION PROCEDURE 1

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



INSPECTION PROCEDURE 2

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

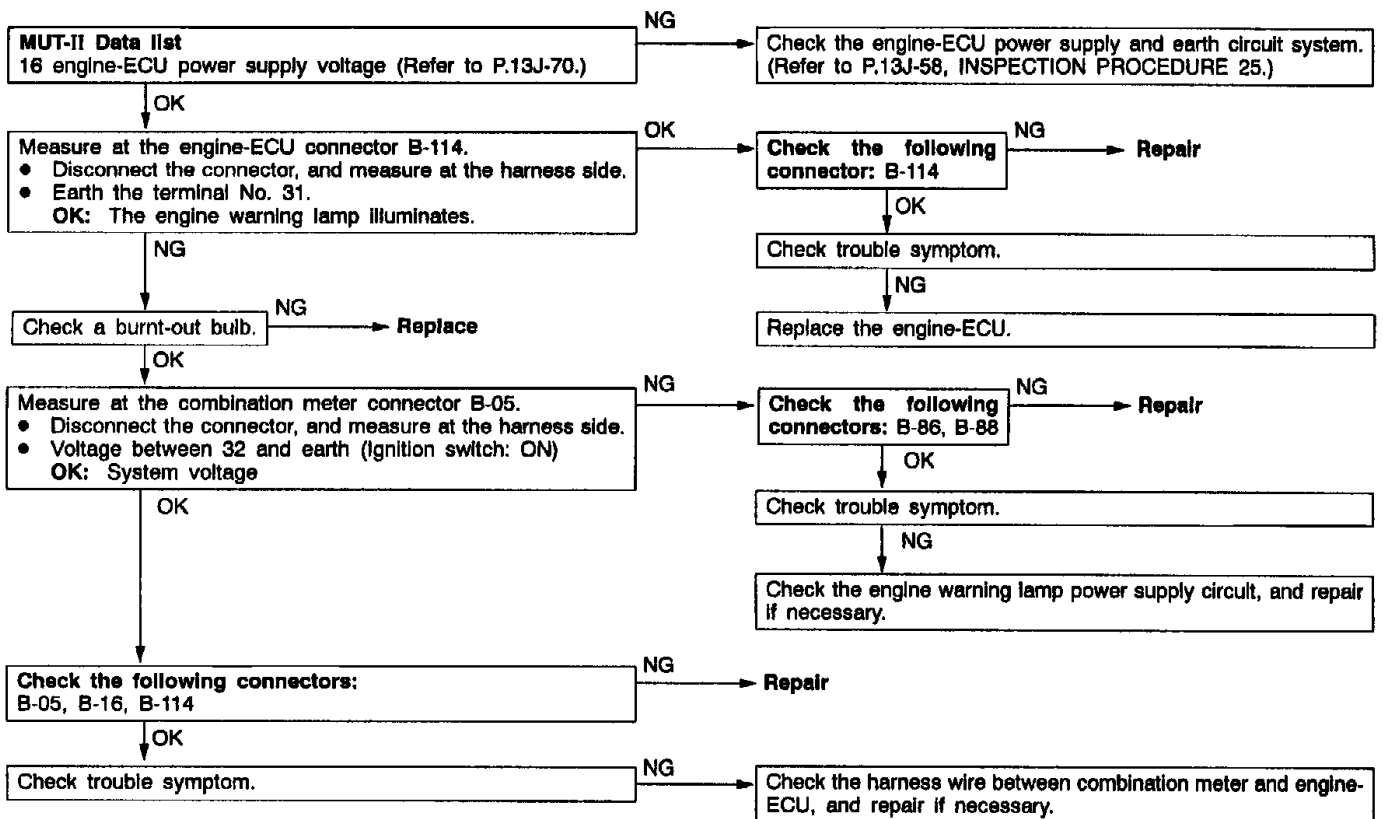


NOTE

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.)

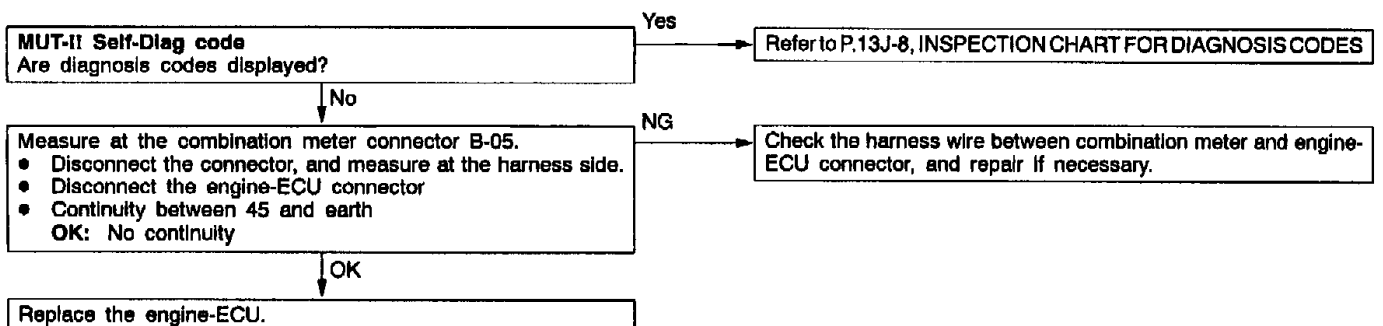
INSPECTION PROCEDURE 3

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



INSPECTION PROCEDURE 4

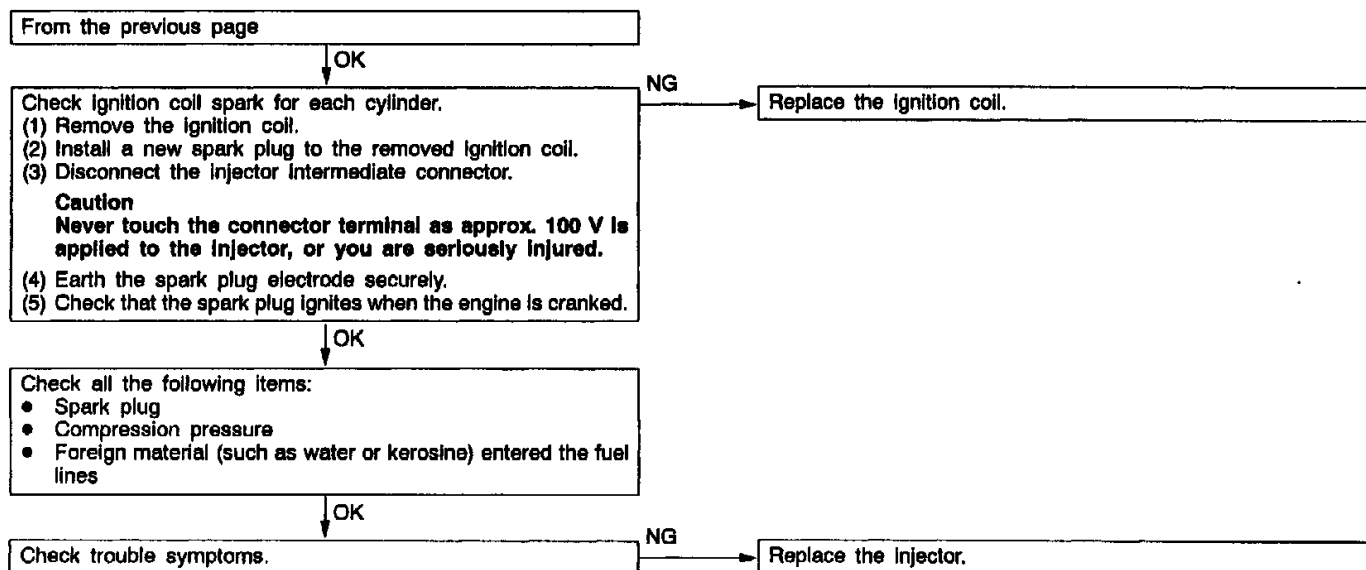
The engine warning lamp remains illuminating and never goes out.	Probable cause
In cases such as the above, the cause is probably that the engine-ECU is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at right has occurred.	• Short-circuit between the engine warning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



INSPECTION PROCEDURE 5

No Initial combustion (starting impossible)	Probable cause
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

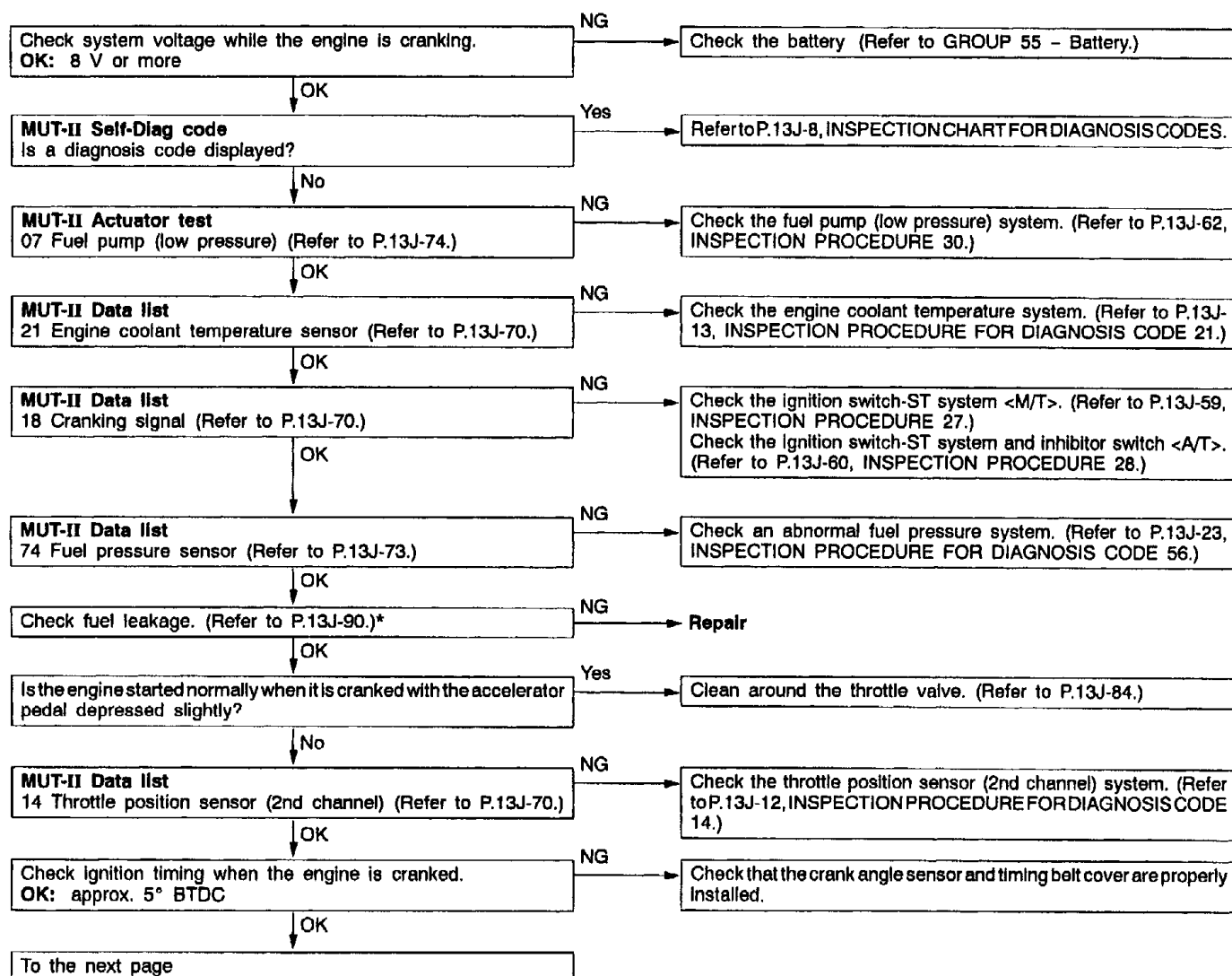
Check system voltage while the engine is cranking. OK: 8 V or more	NG → Check the battery. (Refer to GROUP 55 – Battery.)
OK MUT-II Self-Diag code Is a diagnosis code displayed?	Yes → Refer to P.13J-8, INSPECTION CHART FOR DIAGNOSIS CODES.
No MUT-II Data list 16 System voltage (Refer to P.13J-70.)	NG → Check the engine control relay and ignition switch-IG system. (Refer to P.13J-59, INSPECTION PROCEDURE 26.)
OK Does the camshaft rotate when the engine is cranking?	No → Check if the timing belt is broken or damaged.
Yes MUT-II Actuator test 07 Fuel pump (low pressure) (Refer to P.13J-74.)	NG → Check the fuel pump (low pressure) system. (Refer to P.13J-62, INSPECTION PROCEDURE 30.)
OK MUT-II Data list 22 Crank angle sensor (Refer to P.13J-70.)	NG → Check the crank angle sensor system. (Refer to P.13J-14, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 22.)
OK MUT-II Data list 21 Engine coolant temperature sensor (Refer to P.13J-70.)	NG → Check the engine coolant temperature sensor system. (Refer to P.13J-13, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK MUT-II Data list 14 Throttle position sensor (2nd channel) (Refer to P.13J-70.)	NG → Check the throttle position sensor (2nd channel) system. (Refer to P.13J-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
OK Inspect engine start ability by cranking the engine while the accelerator pedal is slightly depressed.	OK → Clean around the throttle valve. (Refer to P.13J-84.)
NG Check fuel leakage. (Refer to P.13J-90.)*	NG → Repair
OK Measure low fuel pressure between the fuel pump (low pressure) and fuel pump (high pressure). (Refer to P.13J-87.)*	NG → Repair
OK Measure at Ignition coil connectors A-124, A-125, A-127, A-128. • Connect the connector. • Connect a timing light to the No.1 terminal of each connector in turn. (Engine cranking) OK: The timing light flashes.	NG → Check abnormal fuel combustion system. (Refer to P.13J-21, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 44.)
OK Check ignition timing while the engine is cranking. OK: Approx. 5° BTDC	NG → Check that the crank angle sensor and timing belt cover are properly installed.
OK To the next page	

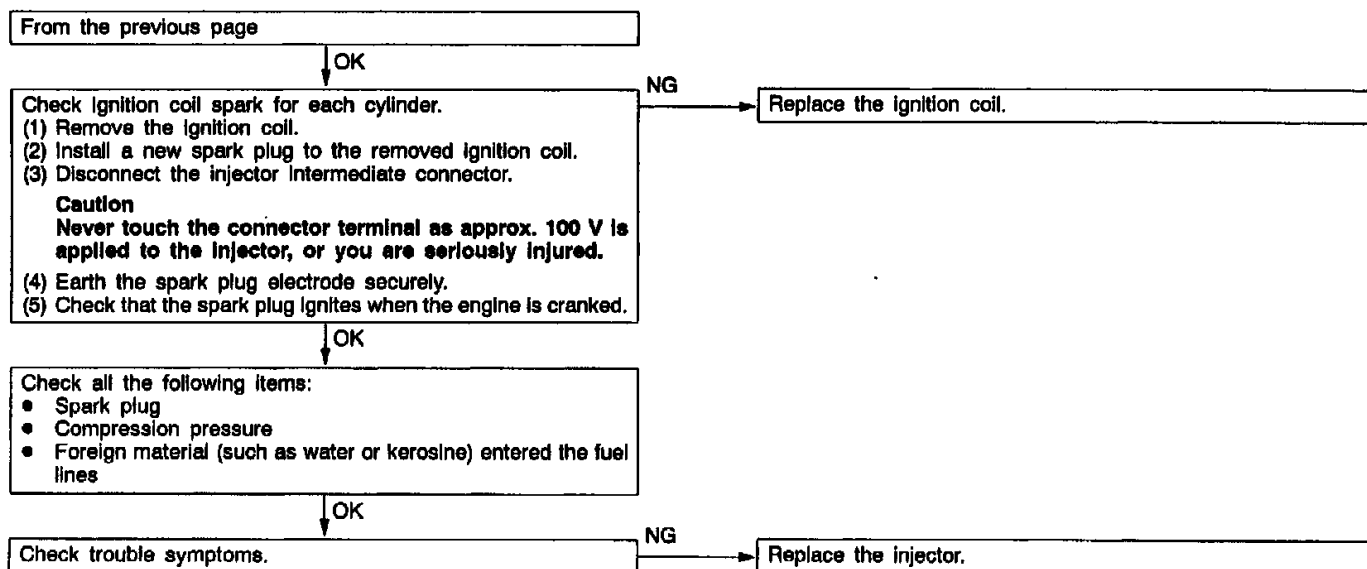


*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

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

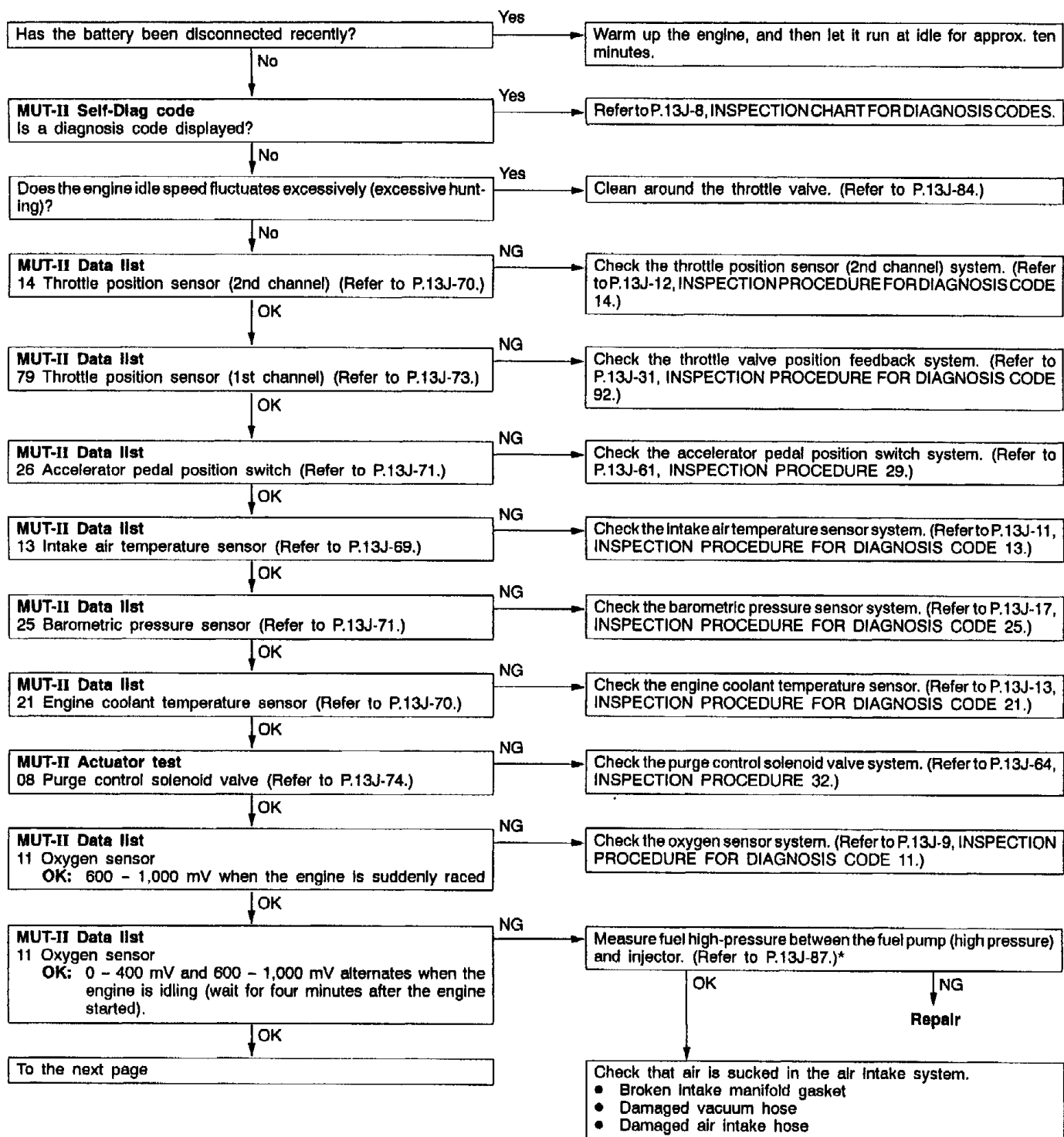


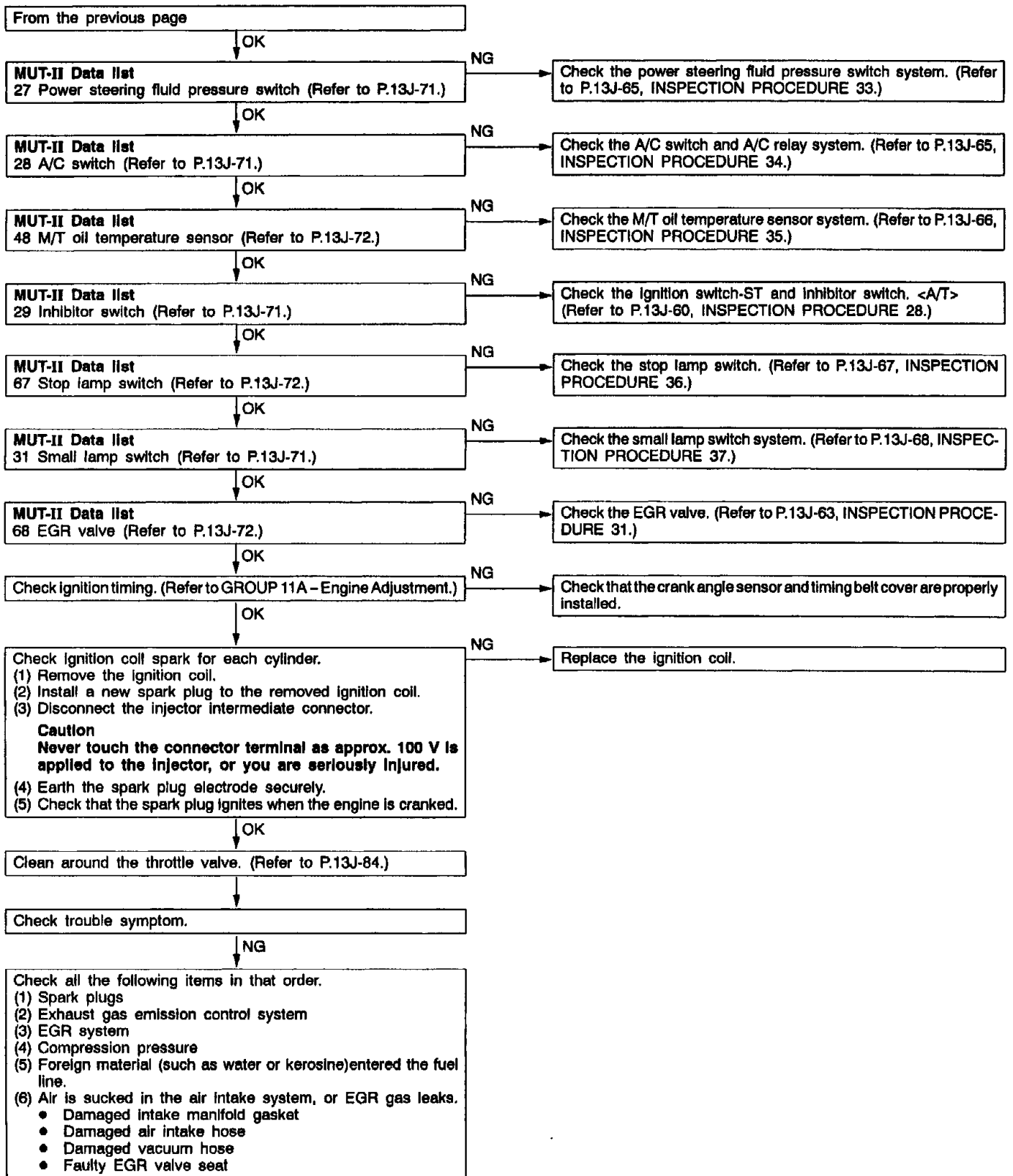


*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

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

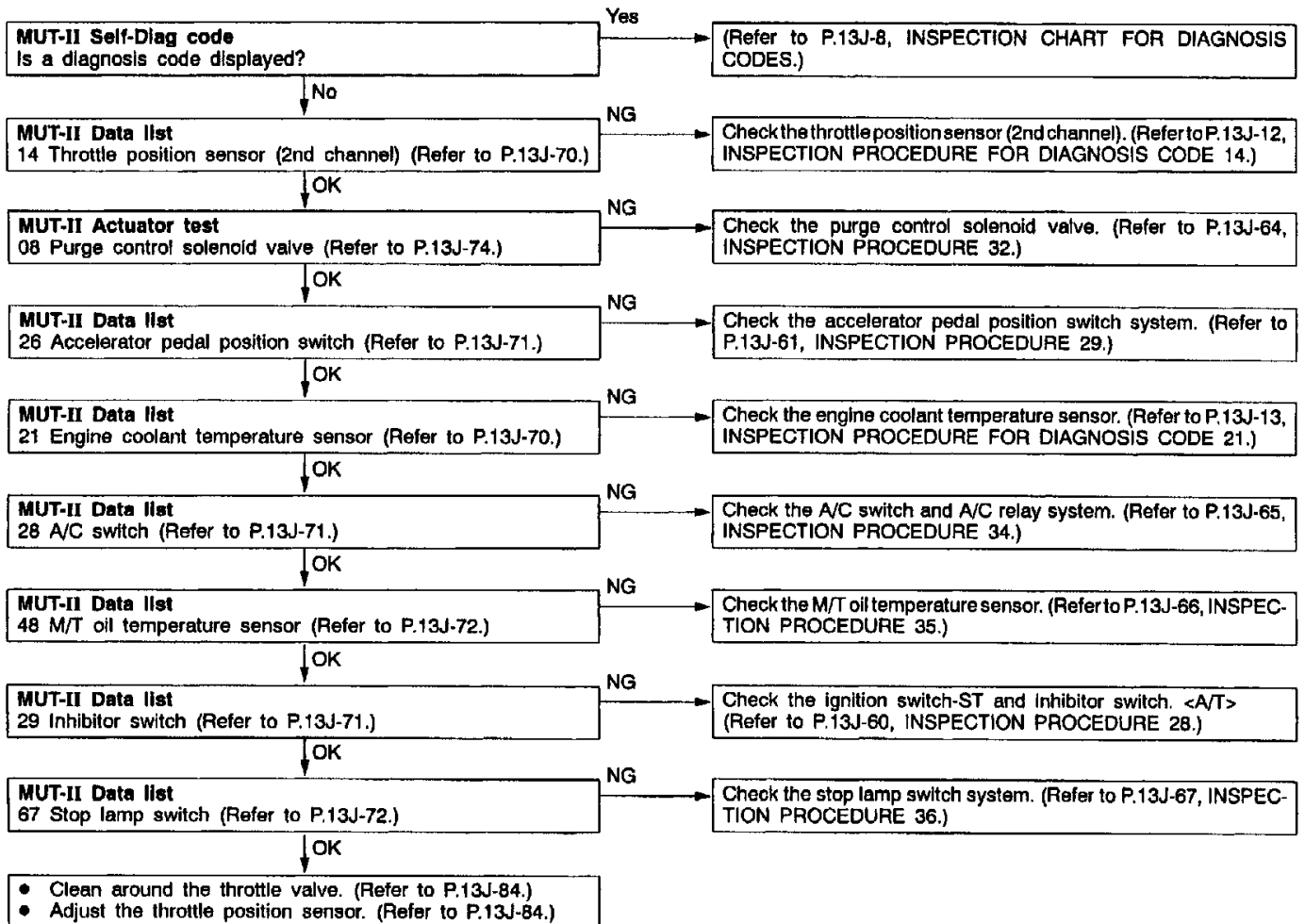




*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

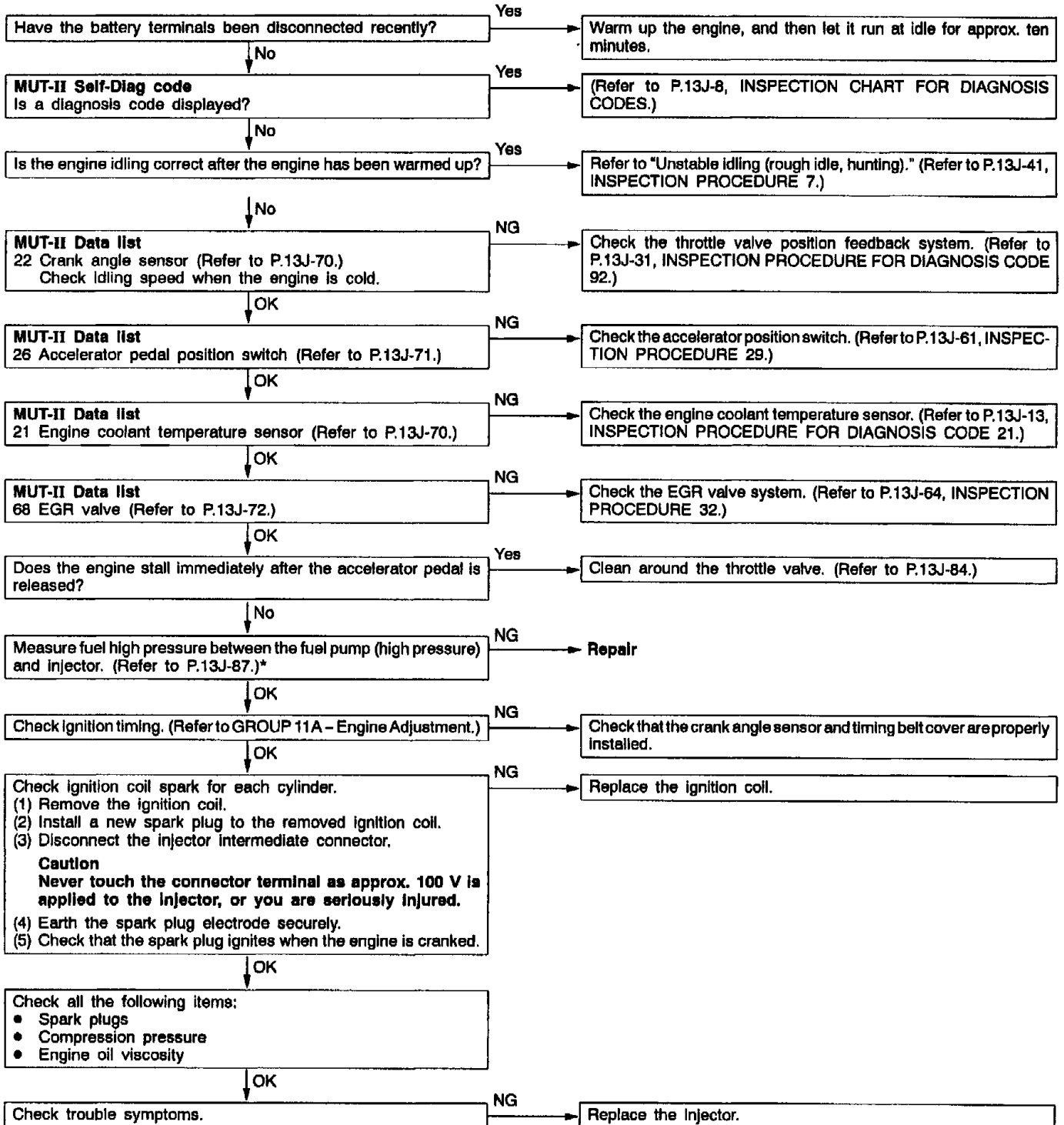
INSPECTION PROCEDURE 8

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



INSPECTION PROCEDURE 9

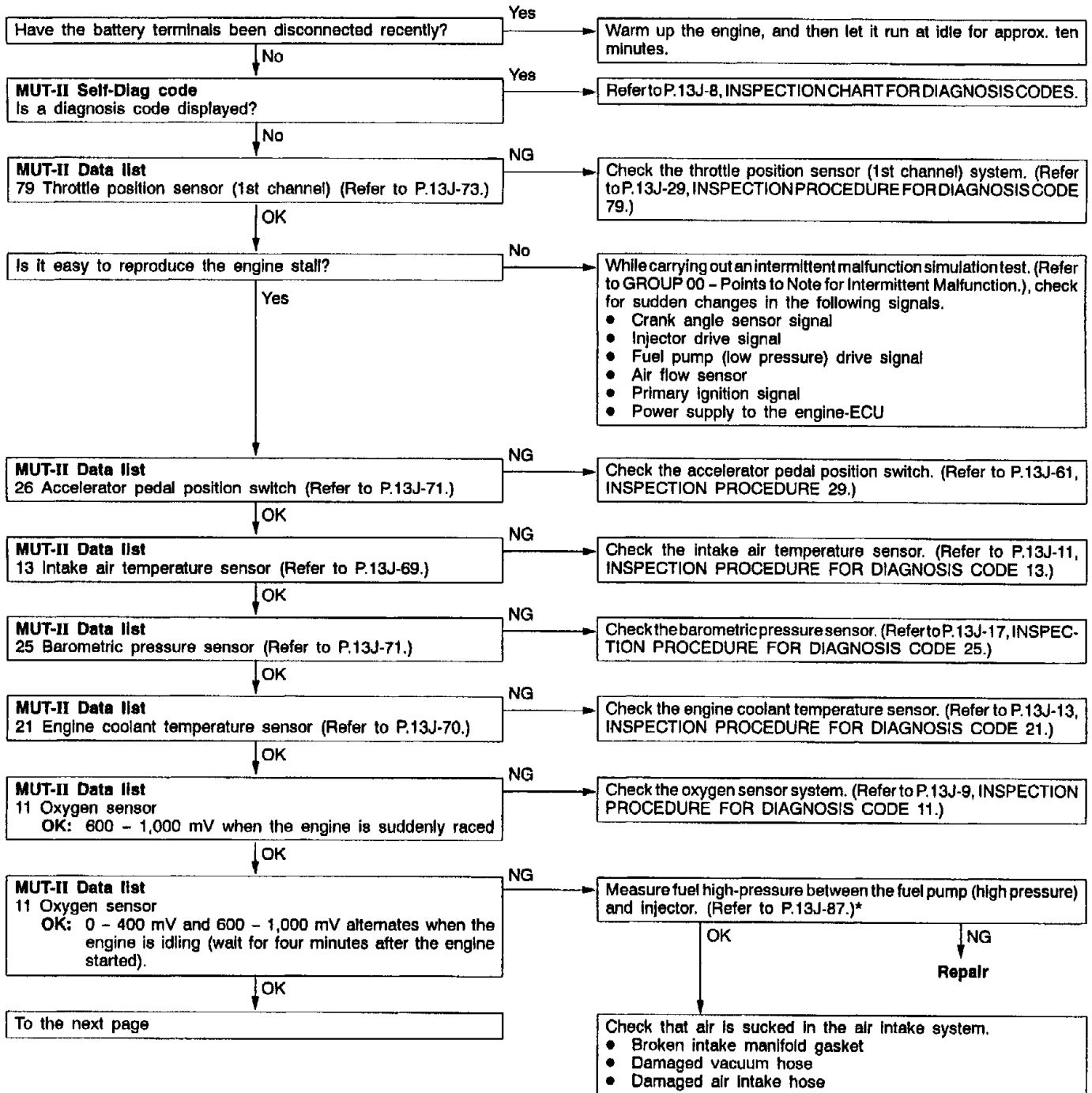
When the engine is cold, it stalls at idling. (Die out)	Probable cause
The cause is probably an incorrect air/fuel ratio or poor intake air amount when the engine is cold.	• Malfunction of the electronic-control throttle valve system • Malfunction of the throttle body

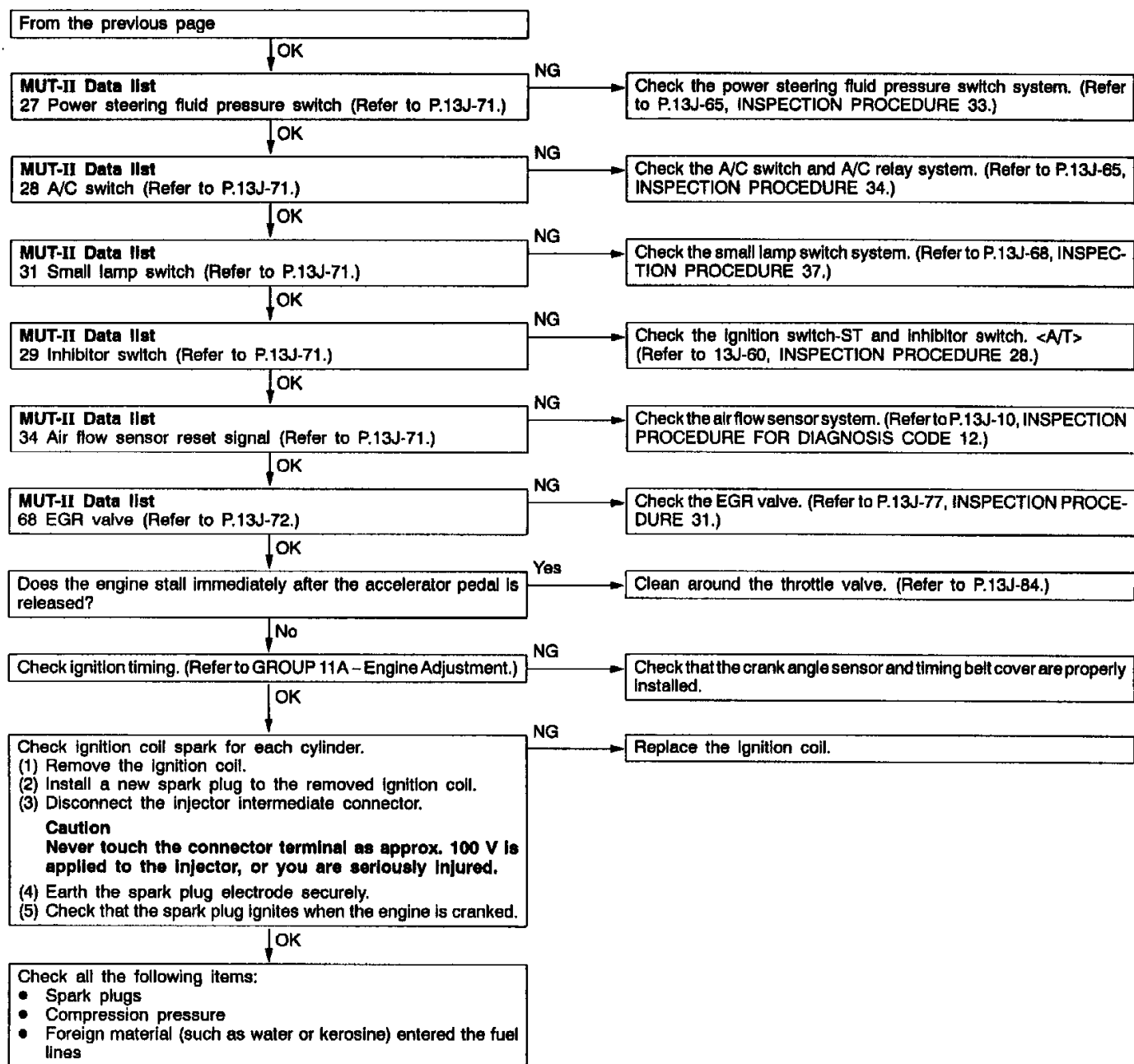


*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

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 the air/fuel ratio control system • Malfunction of the electronic-controlled throttle valve system • Malfunction of the throttle body • Poor connector contact • Improper compression pressure • Air stuck in the air intake system

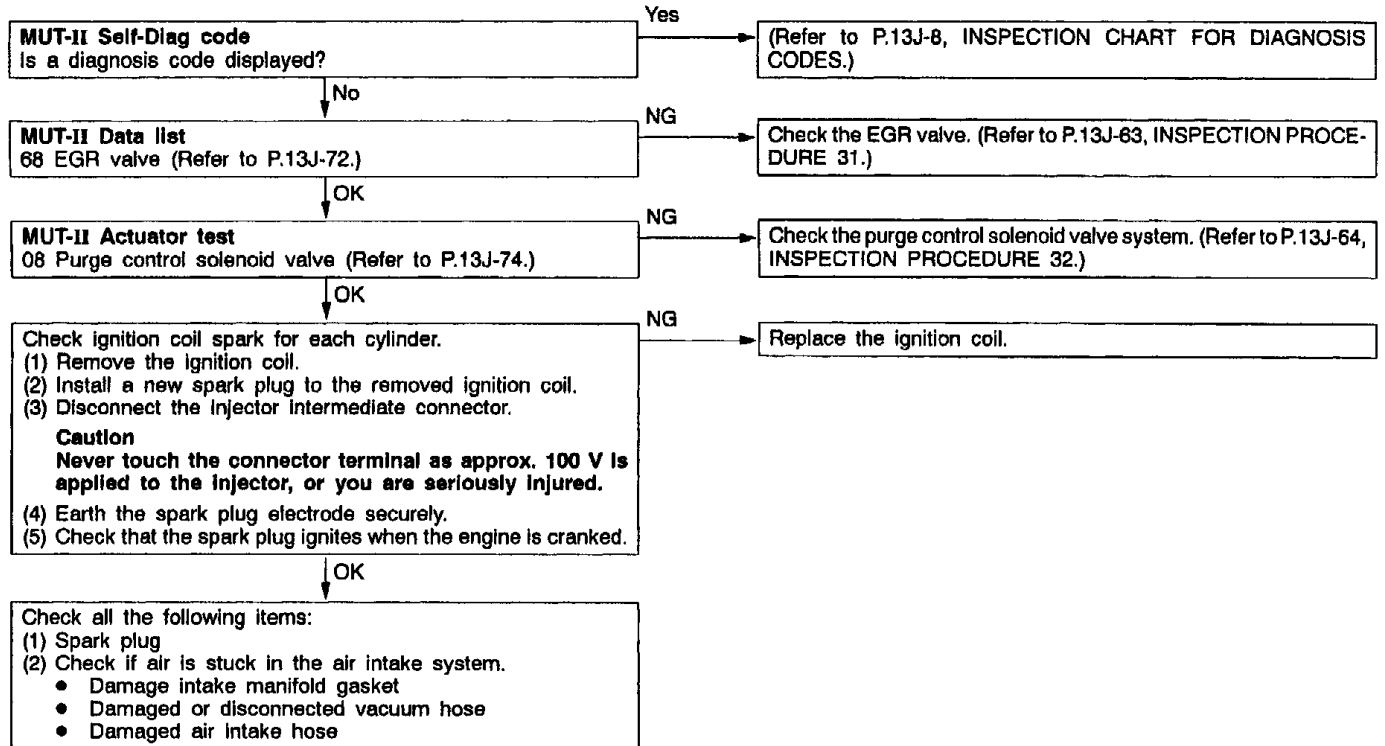




*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

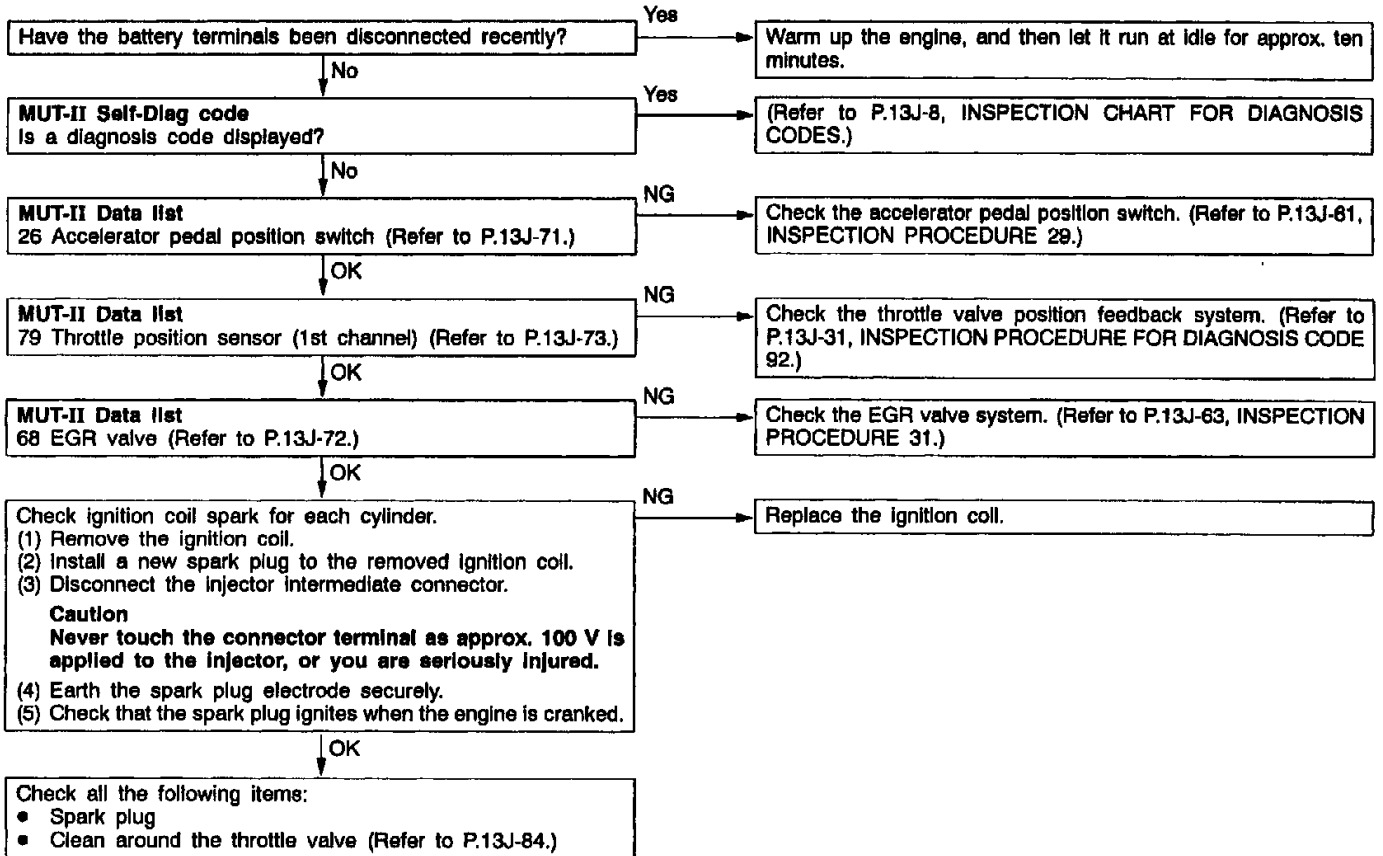
INSPECTION PROCEDURE 11

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



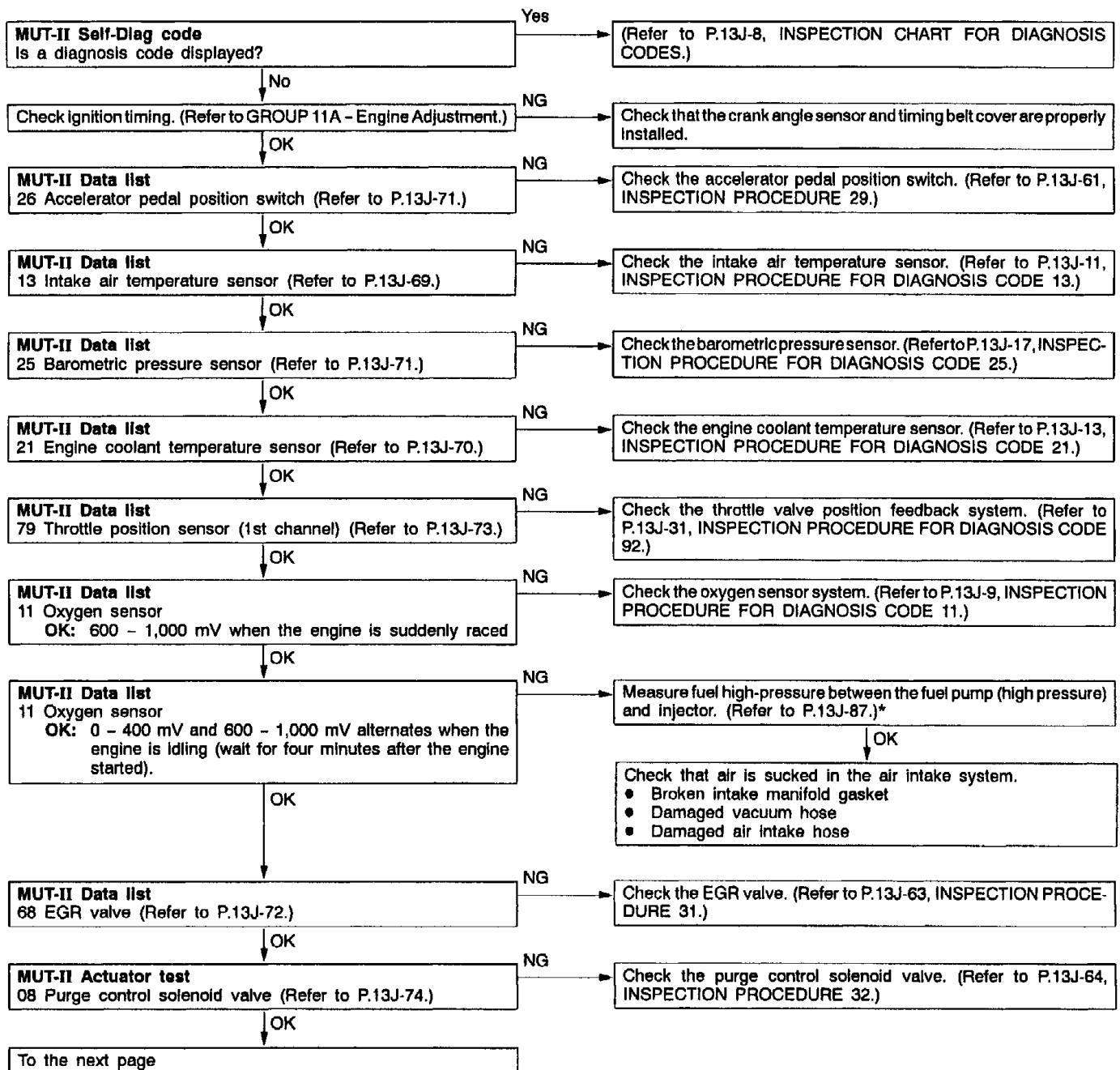
INSPECTION PROCEDURE 12

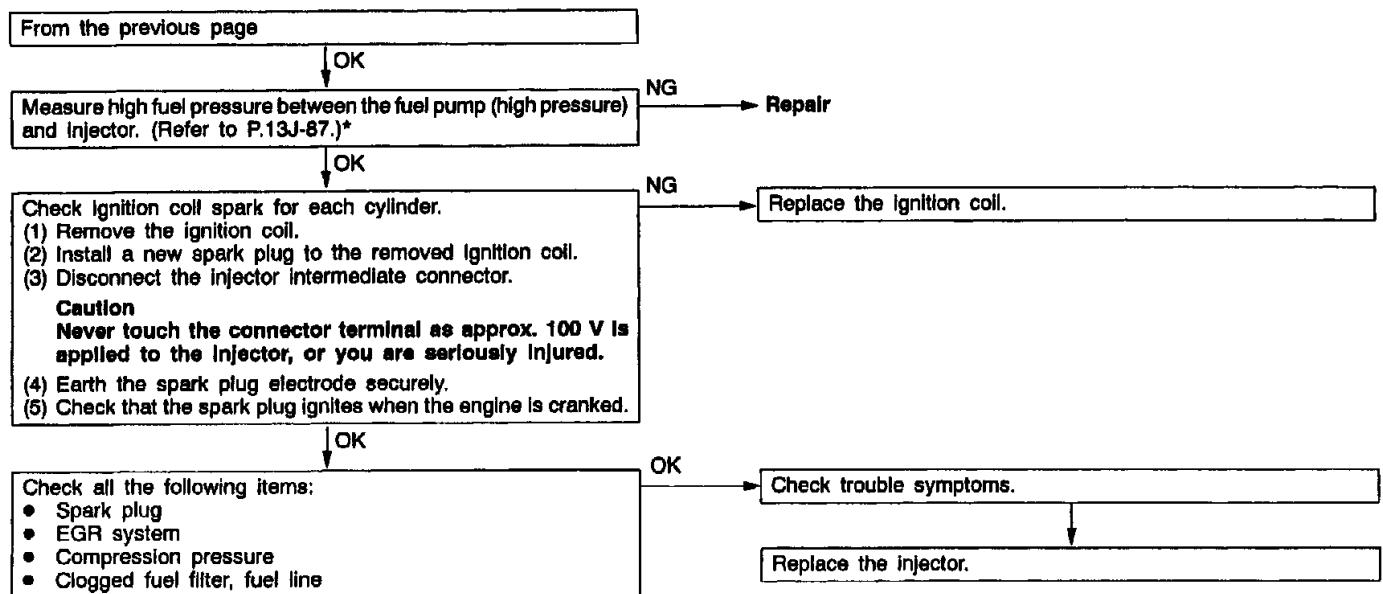
The engine stalls when decelerating.	Probable cause
The cause is probably an improper air/fuel ratio due to a faulty EGR system, or poor intake air volume due to a faulty electronic-controlled throttle valve system.	- Malfunction of the electronic-controlled throttle valve system - Malfunction of the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



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

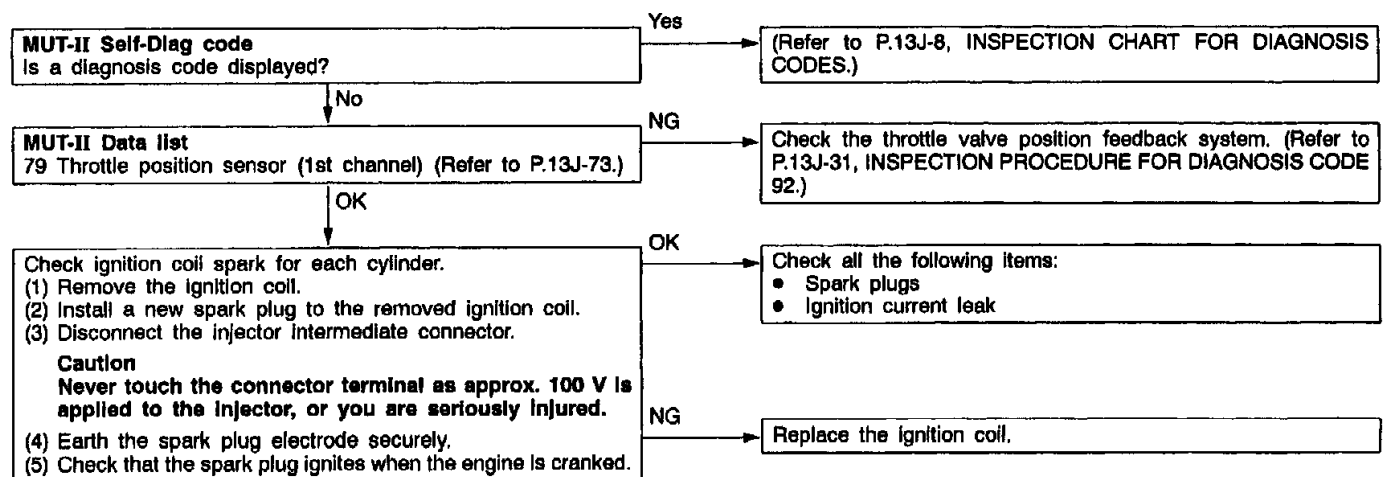




*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

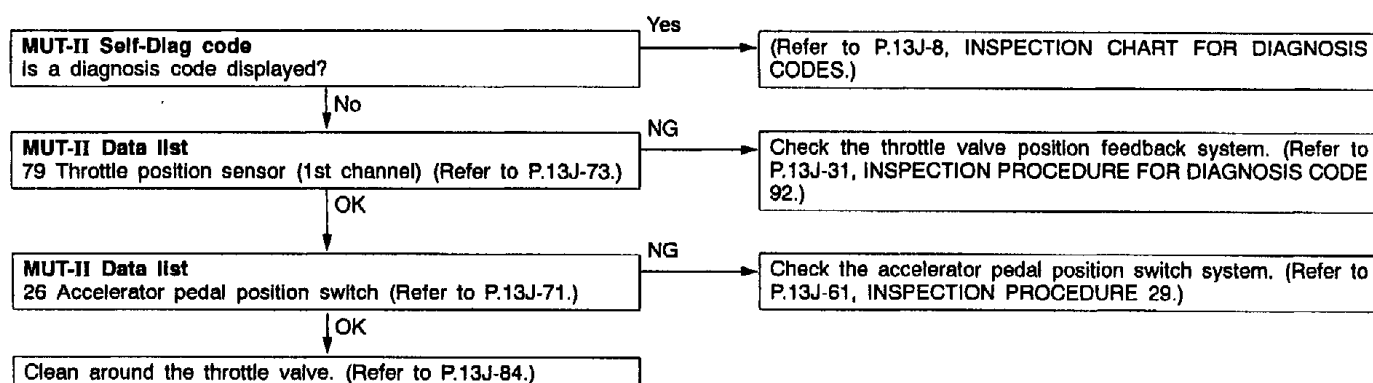
INSPECTION PROCEDURE 14

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



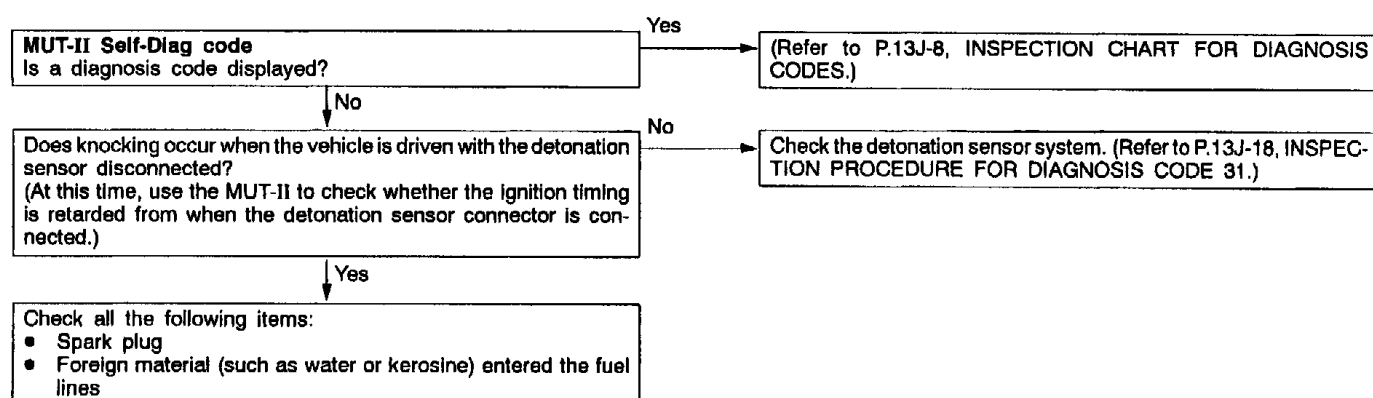
INSPECTION PROCEDURE 15

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



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



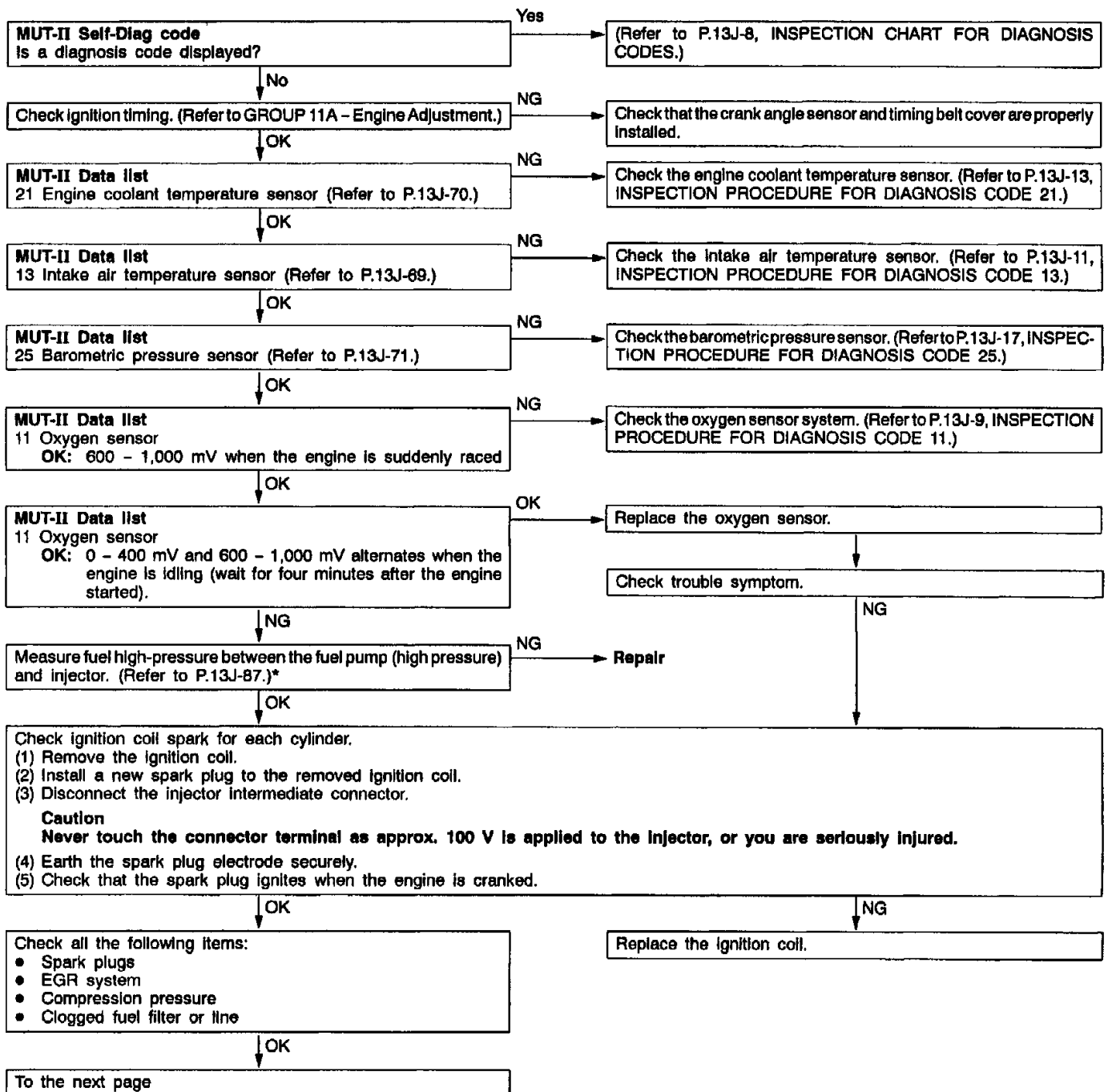
INSPECTION PROCEDURE 17

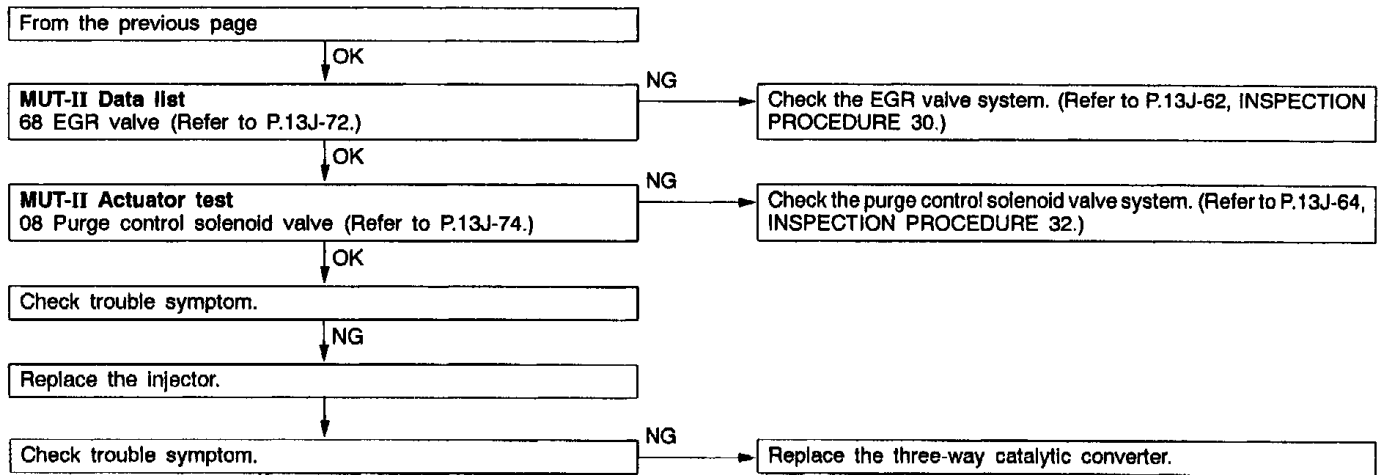
Run-on (dieseling)	Probable cause
The cause is probably fuel leak from injector(s)	Malfunction of the injector

Replace the injector.

INSPECTION PROCEDURE 18

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

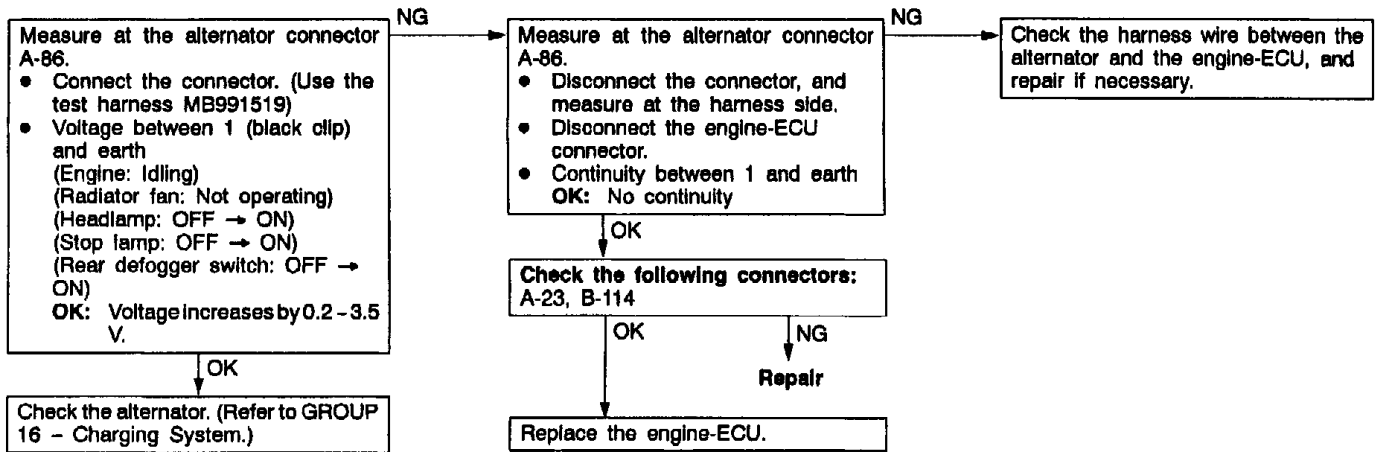




*: Refer to '98 CARISMA GDI Workshop Manual (Pub. No. PWDE9502-C)

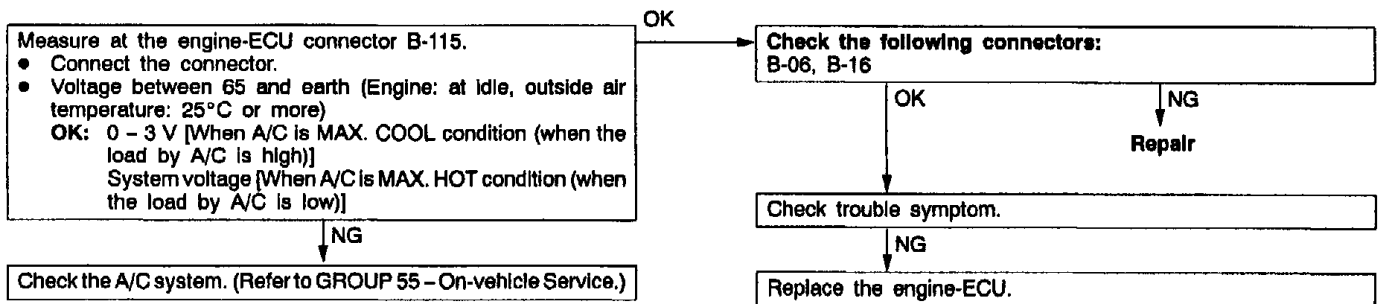
INSPECTION PROCEDURE 19

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 - Malfunction of the engine-ECU



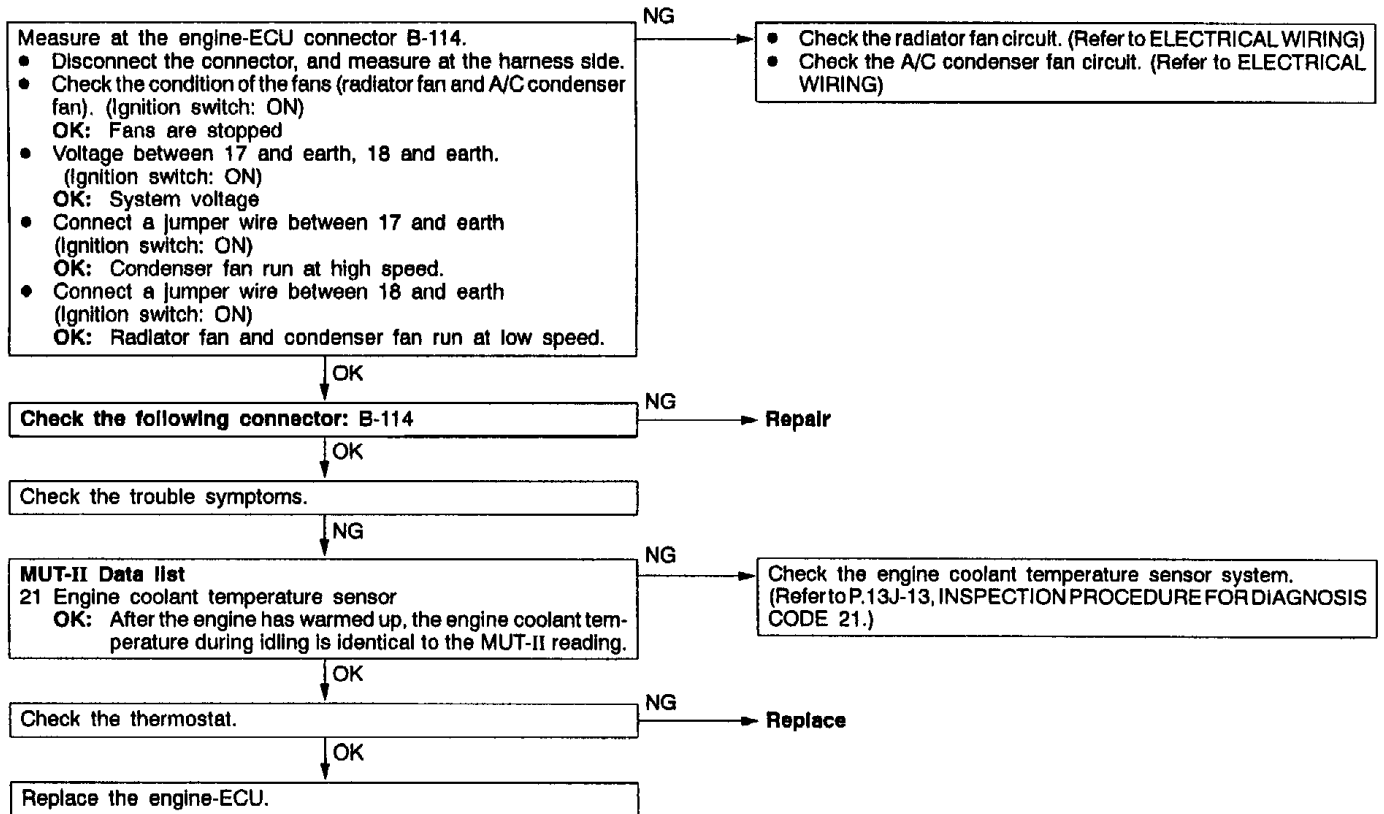
INSPECTION PROCEDURE 20

Idling speed is improper when A/C is operating	Probable cause
If the engine-ECU 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. Based on this voltage signal, the engine-ECU 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



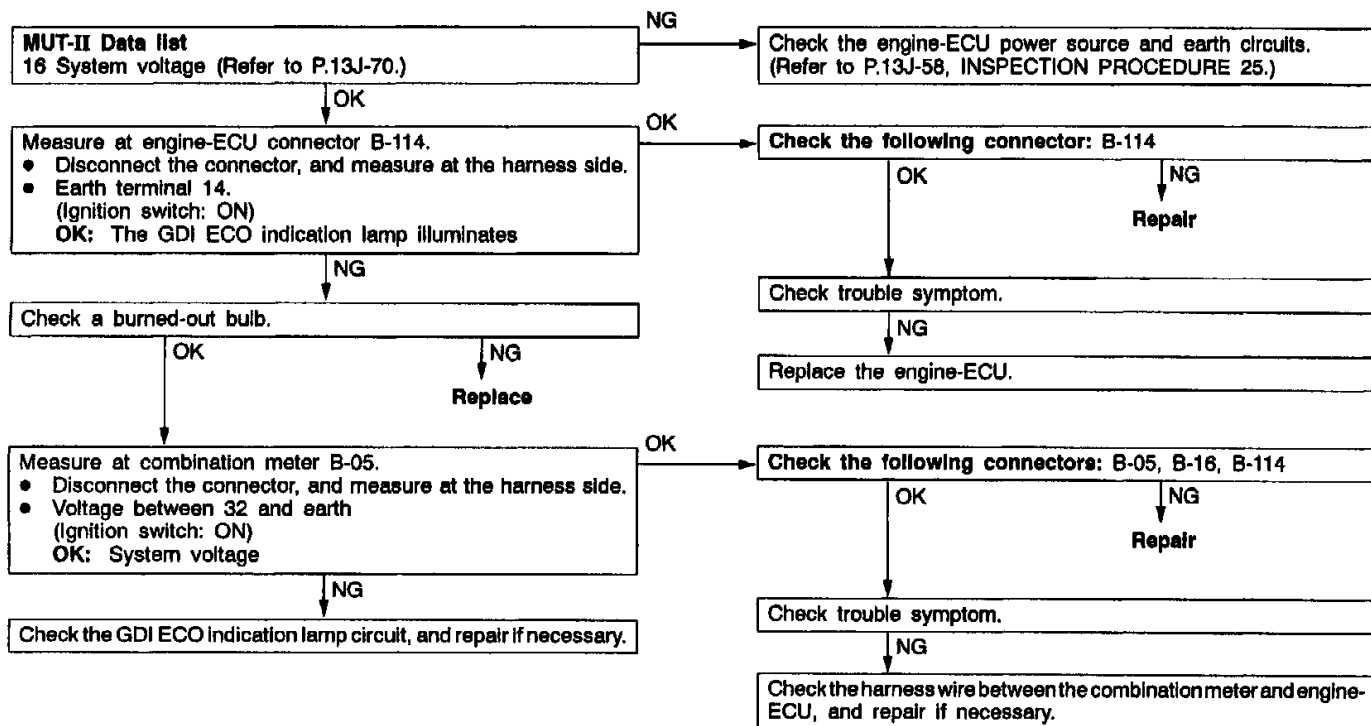
INSPECTION PROCEDURE 21

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



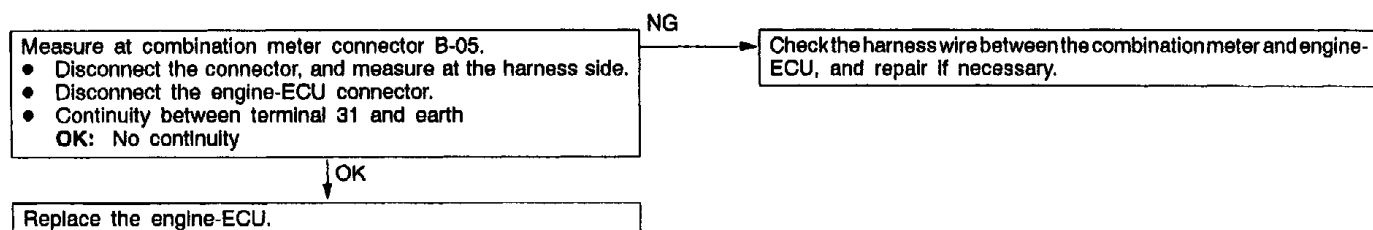
INSPECTION PROCEDURE 22

The GDI ECO Indication lamp does not illuminate.	Probable cause
If the GDI ECO indication lamp does not illuminate after turning on the ignition switch, the causes listed in the right column are suspected.	• Burned-out GDI ECO indication lamp bulb • Open circuit or short-circuited harness wire in the GDI ECO indication lamp circuit • Malfunction of the engine-ECU



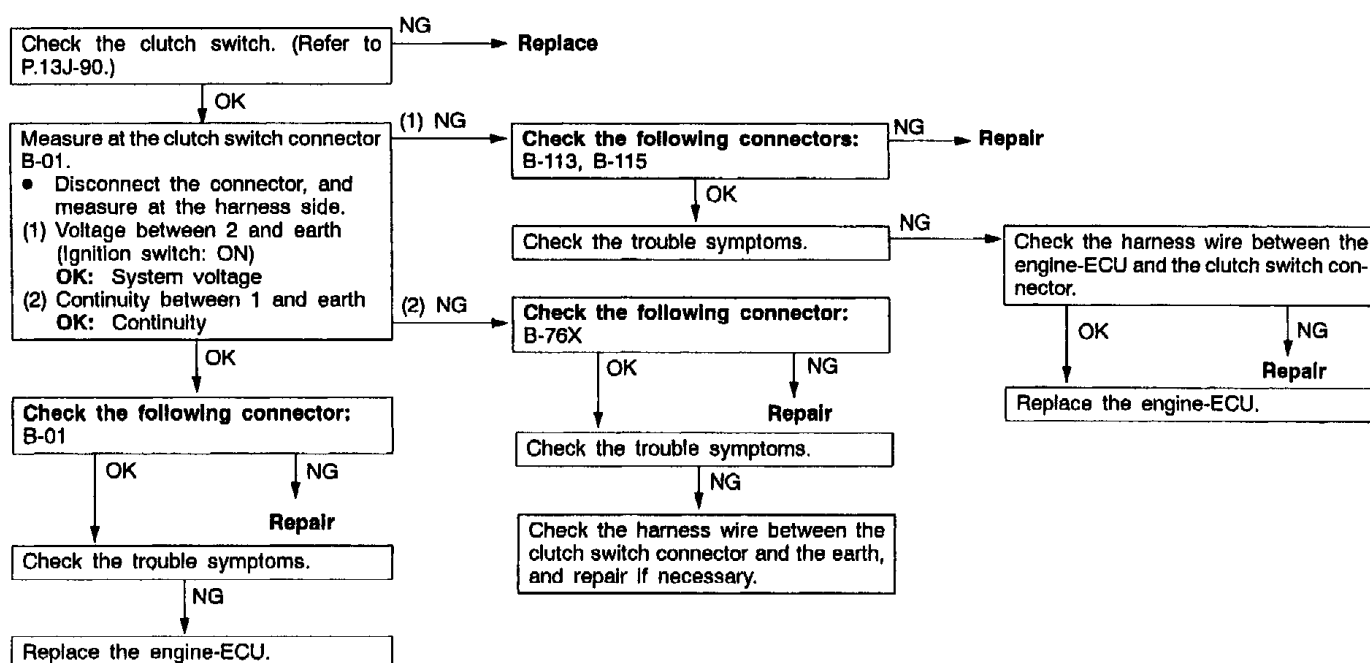
INSPECTION PROCEDURE 23

The GDI ECO indication lamp remains on (does not extinguish).	Probable cause
If the GDI ECO indication lamp does not extinguish during high load operation, the causes listed in the right column are suspected.	- Short circuit between the GDI ECO indication lamp and engine-ECU - Malfunction of the engine-ECU



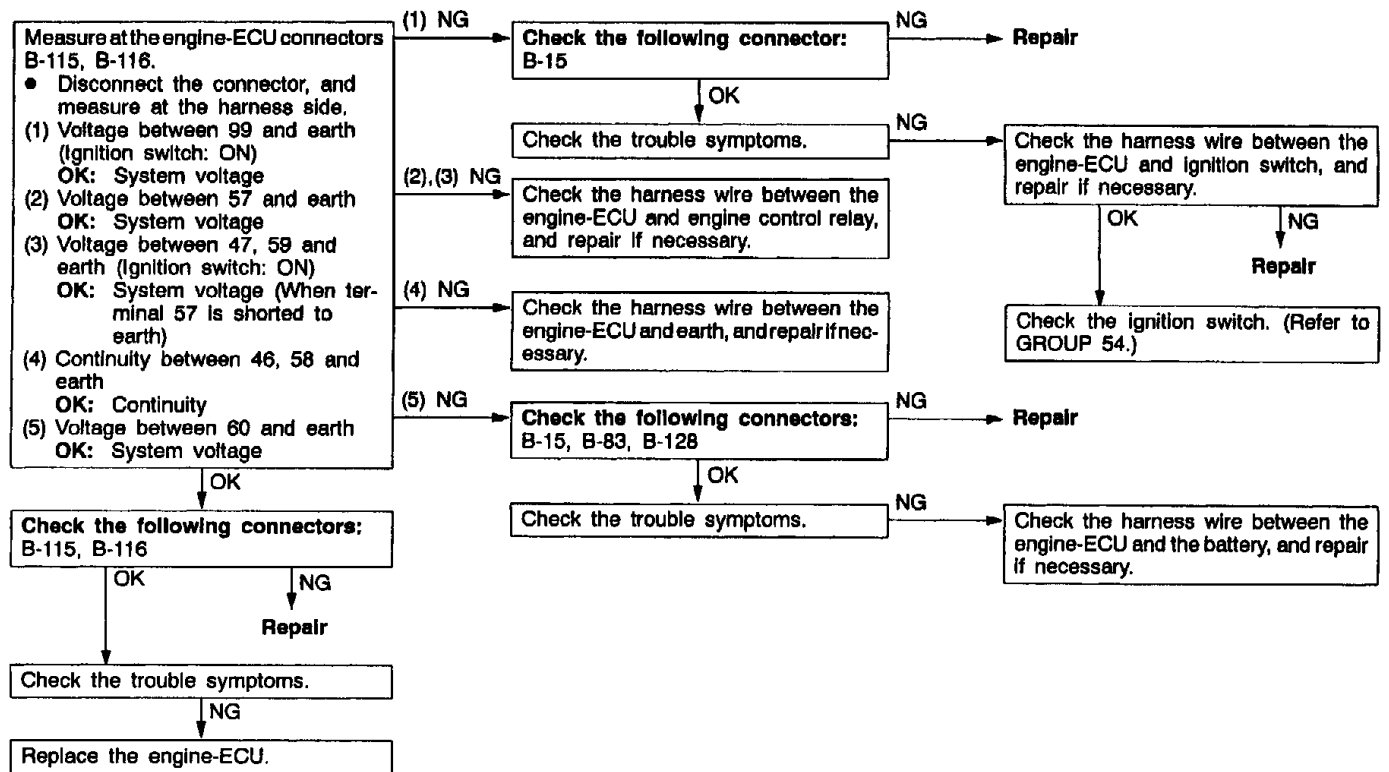
INSPECTION PROCEDURE 24

Malfunction of the clutch switch system <M/T>	Probable cause
When the clutch pedal is depressed, the clutch switch sends a signal to the engine-ECU, and the engine-ECU controls the fuel injection properly based on this signal. Due to this, engine speed fluctuation is reduced at shifting.	- Malfunction of the clutch switch - Open circuit or short-circuited harness wire in the clutch switch circuit - Malfunction of the engine-ECU



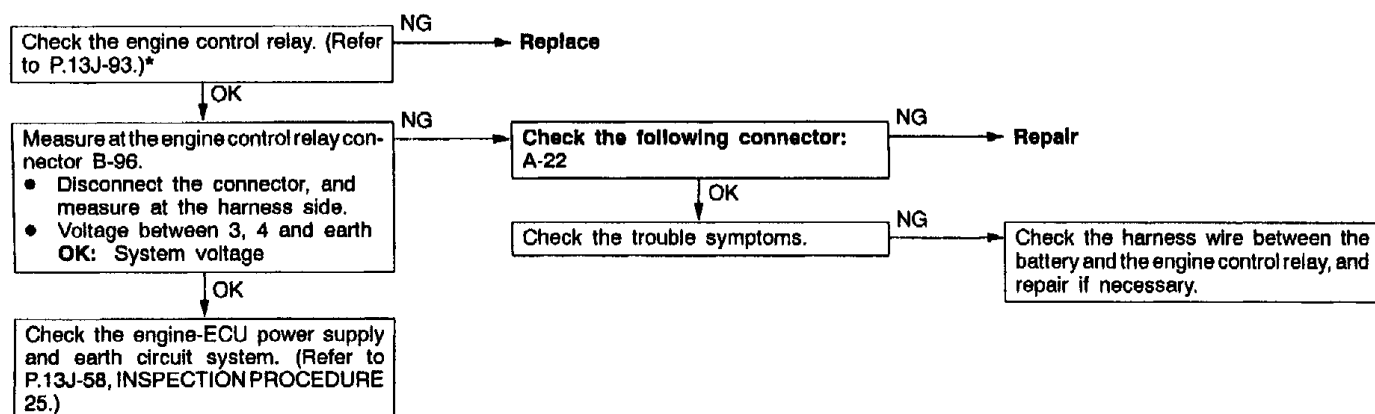
INSPECTION PROCEDURE 25

Engine-ECU power supply and earth circuit system	Probable cause
The cause is probably a malfunction of the engine-ECU or one of the problems listed at right.	• Open circuit or short-circuited harness wire in the engine-ECU power supply circuit • Open circuit or short-circuited harness wire in the engine-ECU earth circuit • Malfunction of the engine-ECU



INSPECTION PROCEDURE 26

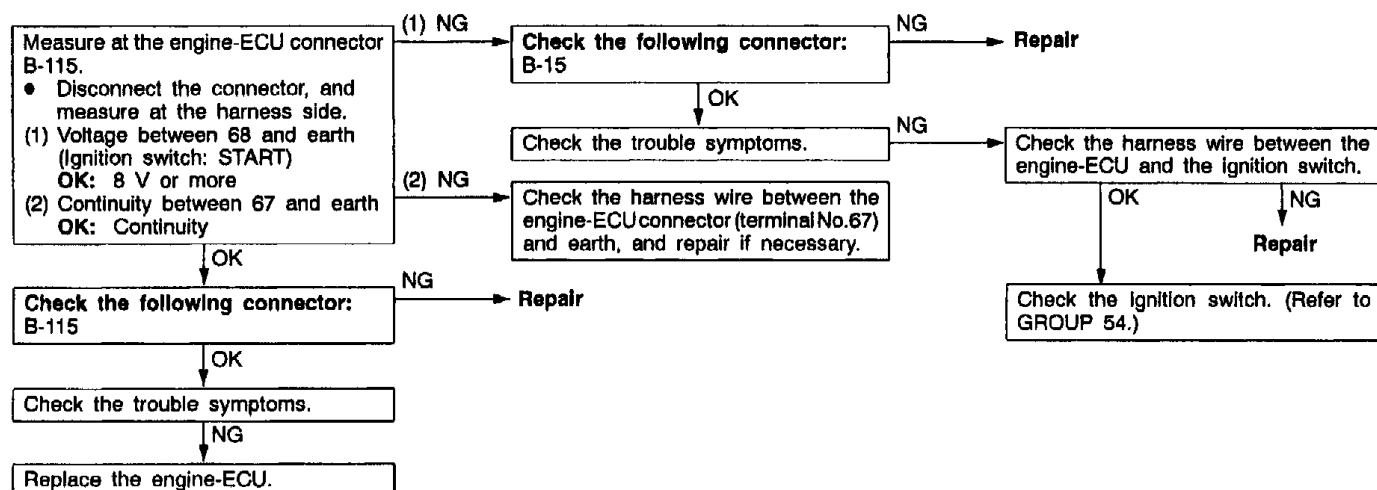
Engine control relay and ignition switch-IG system	Probable cause
When the ignition switch ON signal is input to the engine-ECU, the engine-ECU turns on the engine control relay. This causes system voltage to be supplied to the engine-ECU and to the sensors and actuators.	• Malfunction of the ignition 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



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

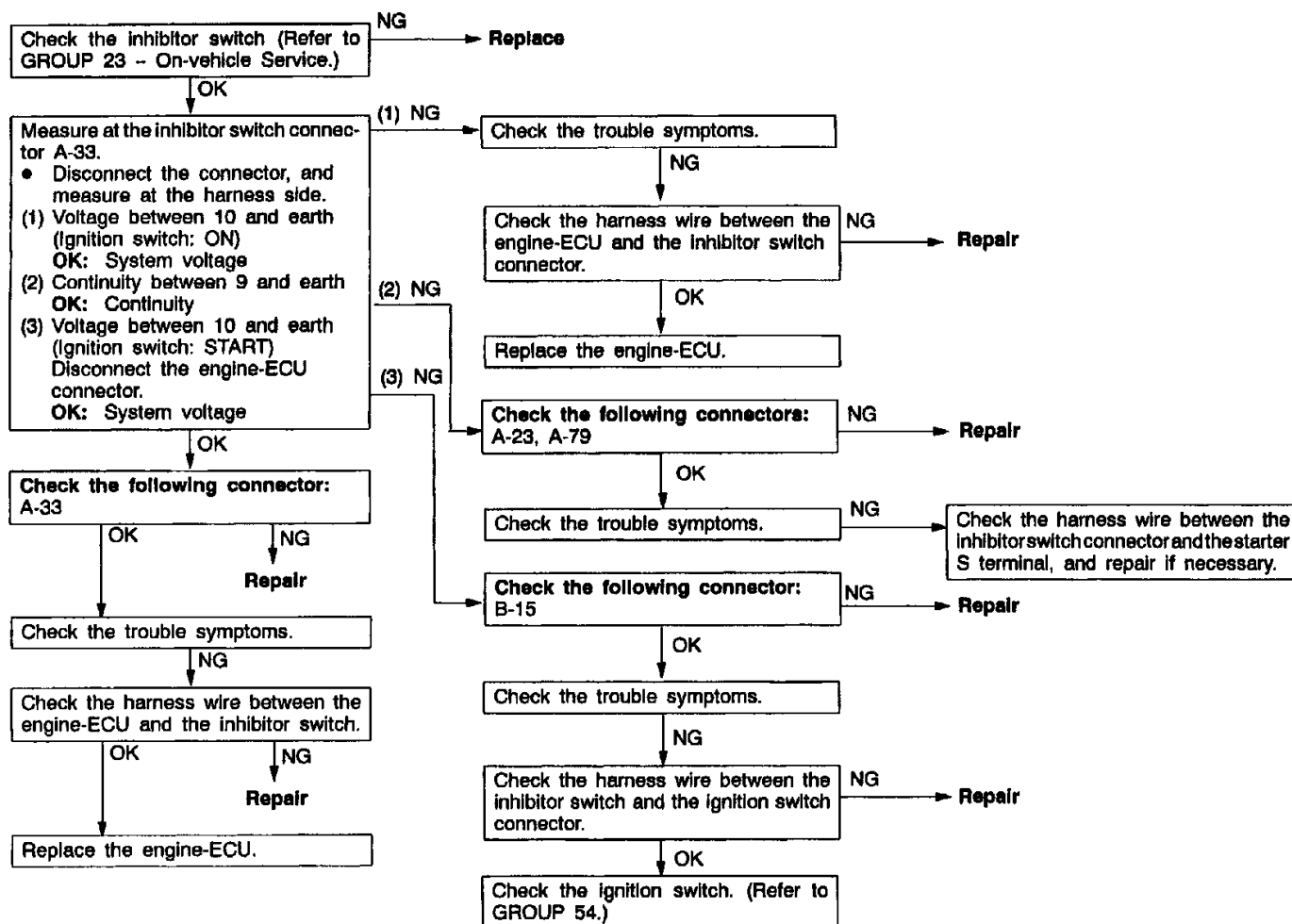
INSPECTION PROCEDURE 27

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



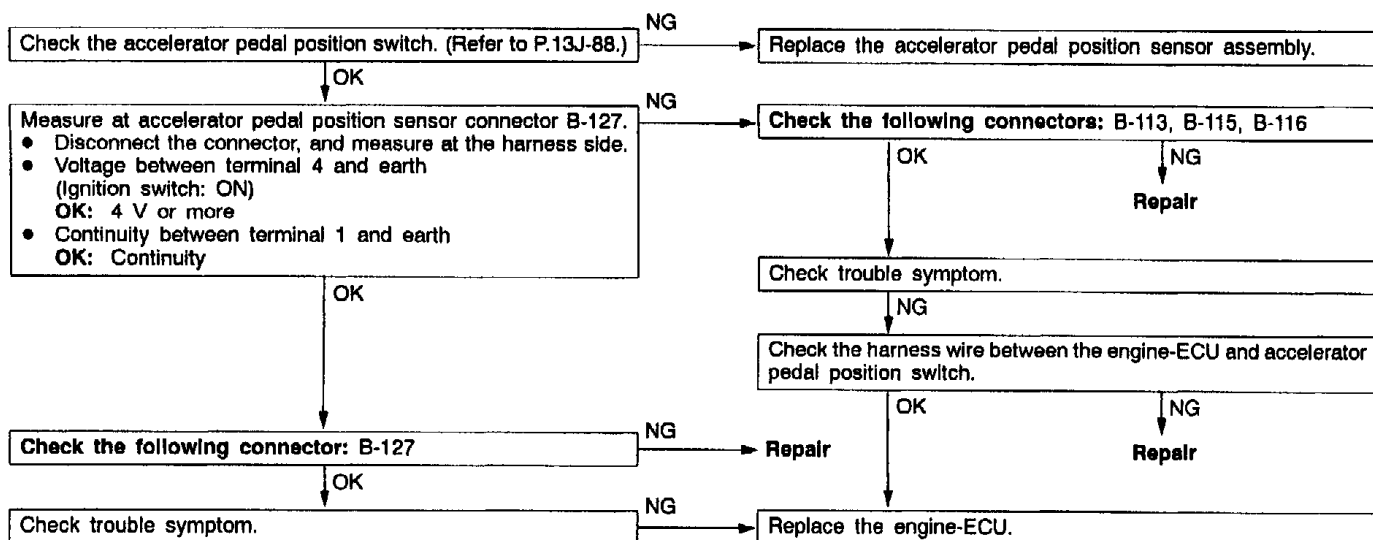
INSPECTION PROCEDURE 28

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



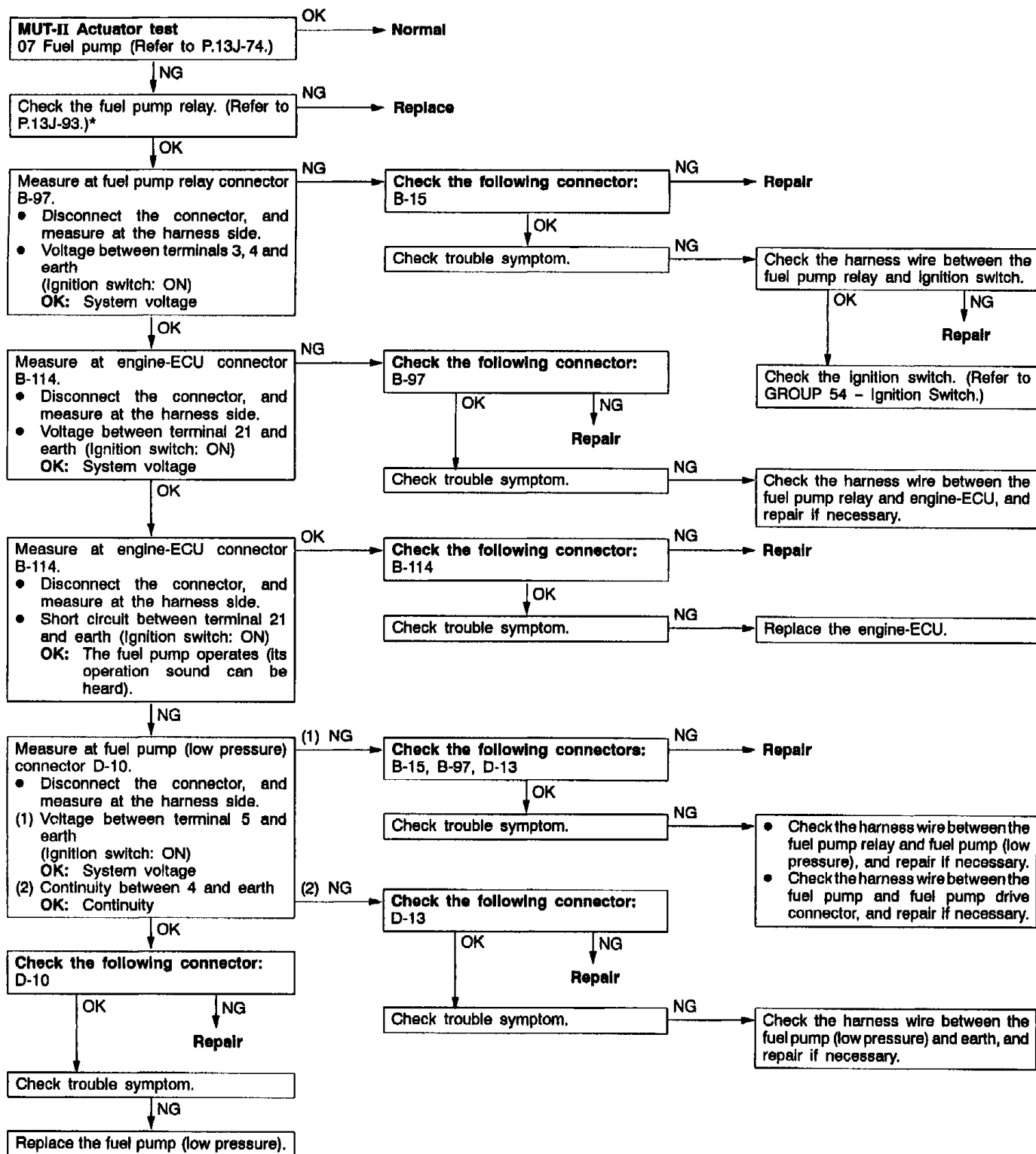
INSPECTION PROCEDURE 29

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. The engine-ECU judges if the accelerator pedal position sensor is faulty, 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



INSPECTION PROCEDURE 30

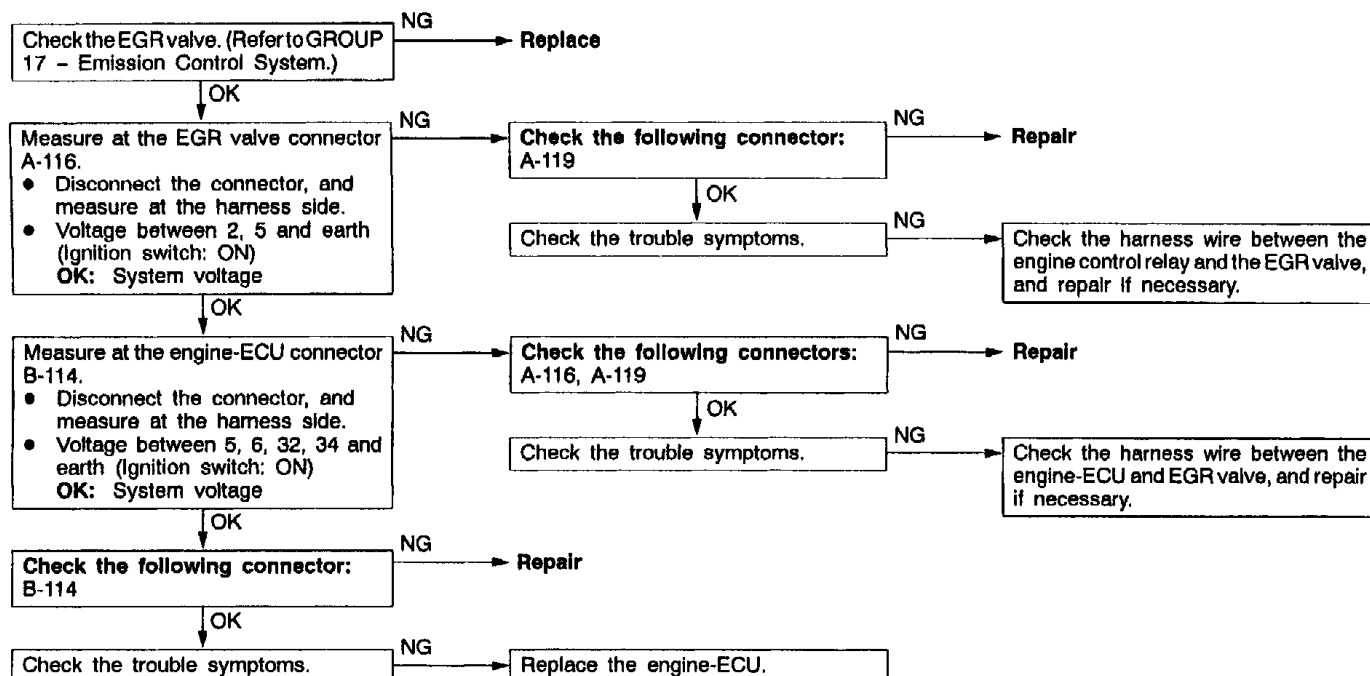
Fuel pump (low pressure) system	Probable cause
The engine-ECU turns on the fuel pump relay while the engine is cranking or running, and supplies power source to the fuel pump (low pressure).	- Malfunction of the fuel pump relay - Malfunction of the fuel pump (low pressure) - Open circuit or short-circuited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



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

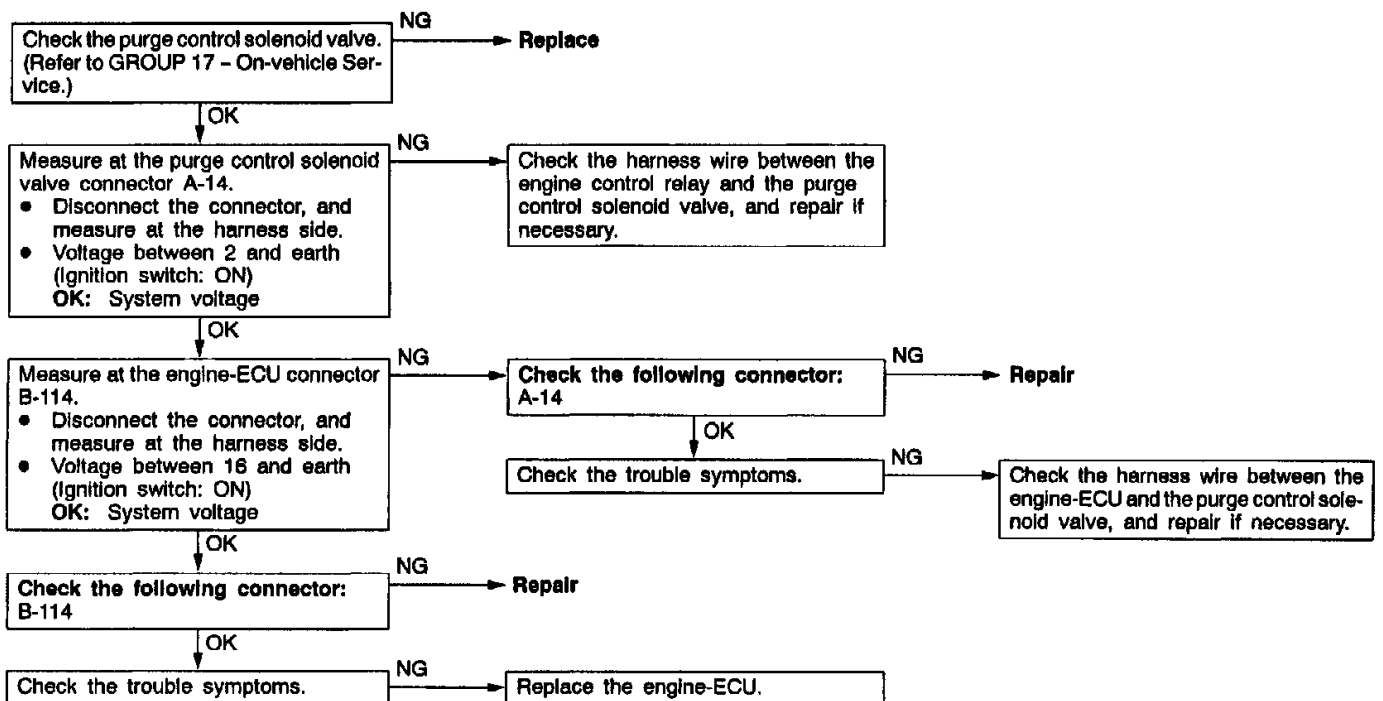
INSPECTION PROCEDURE 31

EGR valve (stepper motor) system	Probable cause
The engine-ECU controls the EGR valve (stepper motor) in order to control the amount of exhaust gas mixed in the intake air.	• Malfunction of the EGR valve • Open circuit or short-circuited harness wire in the EGR valve circuit • Malfunction of the engine-ECU



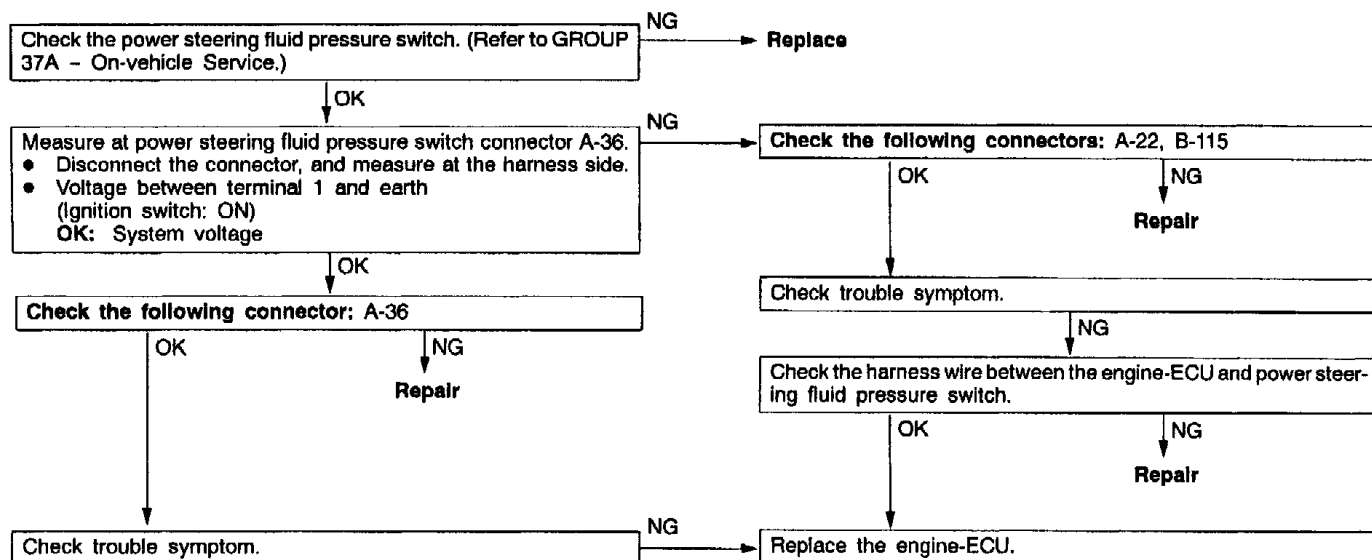
INSPECTION PROCEDURE 32

Purge control solenoid valve system	Probable cause
The engine-ECU controls the purge control solenoid valve in order to control the purge air coming from the canister.	- Malfunction of the purge control solenoid valve - Open circuit or short-circuited harness wire in the purge control solenoid valve circuit - Malfunction of the engine-ECU



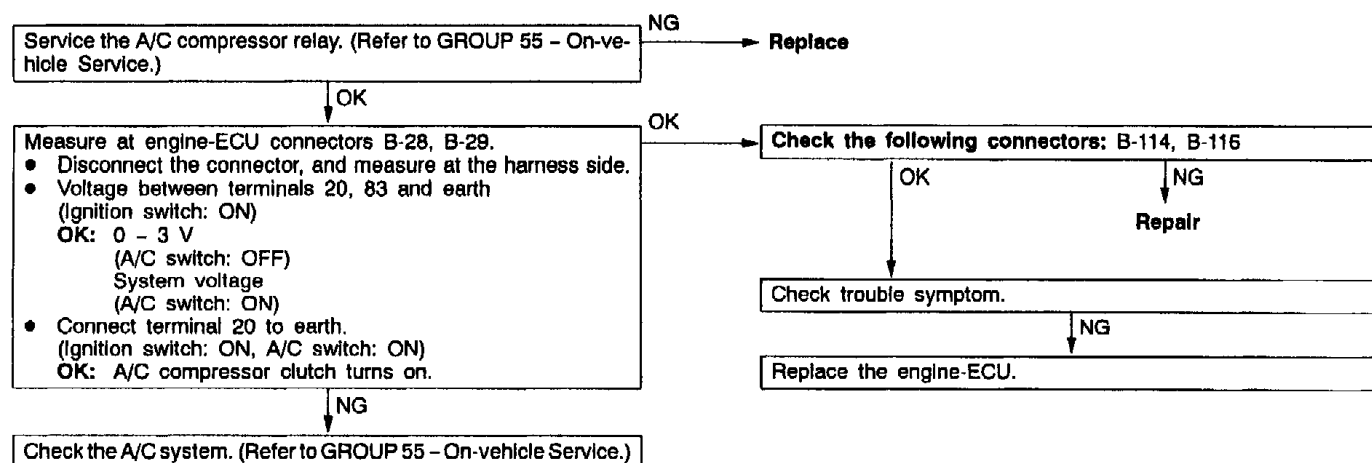
INSPECTION PROCEDURE 33

Power steering fluid pressure switch system	Probable cause
The power steering fluid pressure switch sends a signal to the engine-ECU according to power steering load. Based on this signal, the engine-ECU 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



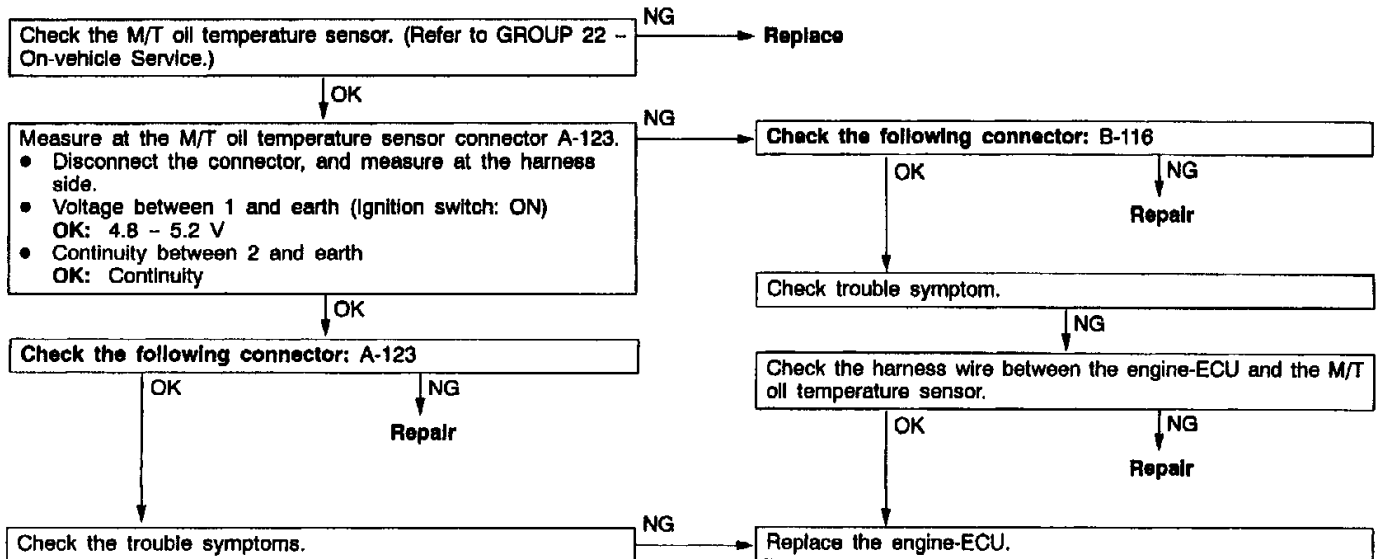
INSPECTION PROCEDURE 34

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



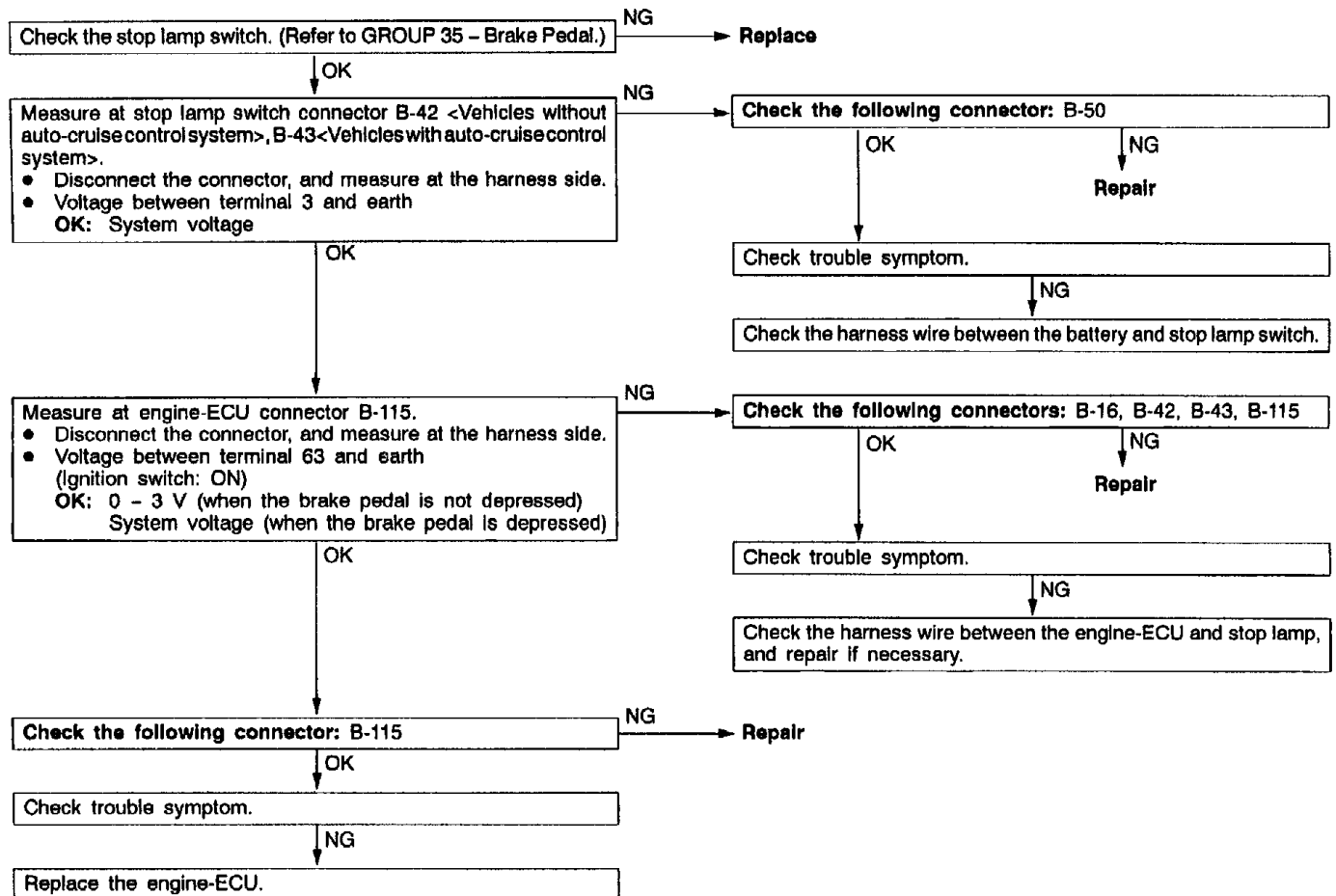
INSPECTION PROCEDURE 35

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



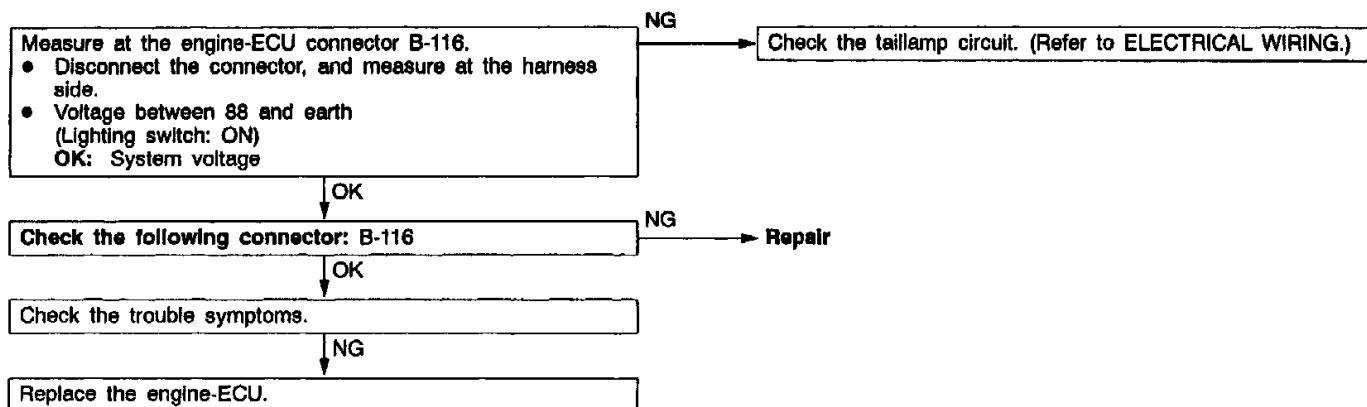
INSPECTION PROCEDURE 36

Stop lamp switch system	Probable cause
The engine-ECU 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



INSPECTION PROCEDURE 37

Small lamp switch	Probable cause
The engine-ECU determines whether the small lamp switch is on or off. According to that information, the engine-ECU 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



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: Transmission oil temperature is 50 °C or more

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

*4: The accelerator pedal position switch normally turns off when the voltage of the accelerator pedal position sensor (1st channel) is 300 – 500 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 500 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	Engine: After warm-up	Idling	0 mV *1	Code No.11 13J-9
			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	20 – 55 Hz	–
			2,500 r/min	65 – 85 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.13 13J-11
			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 mV	Code No.14	13J-12
			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-58
18	Cranking signal (Ignition switch – ST)	Transmission: Neutral (A/T: P range)	Engine: Stopped	OFF	Procedure No.27 <M/T>	13J-59 <M/T> 13J-60 <A/T>
			Engine: Cranking	ON	Procedure No.28 <A/T>	
21	Engine coolant temperature sensor	Ignition switch: ON	Engine coolant temperature: -20°C	-20°C	Code No.21	13J-13
			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	-	-
		- 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	500 – 700 r/min <M/T>*1,*2 550 – 750 r/min <A/T>*1		

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.25	13J-17
			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-61
			Depress the accelerator pedal slightly.	OFF		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No.33	13J-65
			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.34	13J-65
			A/C switch: ON	ON		
29	Inhibitor switch	Ignition switch: ON	Selector lever: P or N	P, N	Procedure No.28	13J-60
			Selector lever: D, 2, L or R	D, 2, L, R		
31	Small lamp switch	Engine: Idling	Lighting switch: OFF	OFF	Procedure No.37	13J-68
			Lighting switch: ON	ON		
34	Air flow sensor reset signal	Engine: After having warmed up	Engine is idling	ON	Code No.12	13J-10
			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 *3	- 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.44
			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.35
49	A/C relay	Engine: After warm-up, idling	A/C switch: OFF	OFF (compressor clutch is not operating)	Procedure No.34
			A/C switch: ON	ON (compressor clutch is operating)	
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.66
67	Stop lamp switch	Ignition switch: ON	Brake pedal: Depressed	OFF	Procedure No.36
			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	5 – 15 STEP	Procedure No.31
			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)	Leave the engine running at the idle speed for more than three minutes	4 – 6.9 MPa	Code No.56	13J-23
77	Accelerator pedal position sensor (2nd channel)	Ignition switch: ON	Release the accelerator pedal.	935 – 1,135 mV	Code No.77	13J-27
			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.	935 – 1,135 mV	Code No.78	13J-28
			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.79	13J-29
			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.		
			Selector lever: N → D range	Increases by 0 – 200 mV.		
99	Fuel injection mode	Engine: After warm up	Idling (for several minutes after engine start)	Lean compression	–	–
			2,500 r/min	Stoichio metric feedback		
			Sudden racing after idle position	Open loop		

ACTUATOR TEST REFERENCE TABLE

Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
01	Injectors	Cut fuel to No. 1 injector	Engine: After having warmed up/Engine is idling (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)	Idling condition becomes different (becomes unstable).	Code No. 41	13J-19
02		Cut fuel to No. 2 injector				
03		Cut fuel to No. 3 injector				
04		Cut fuel to No. 4 injector				
07	Fuel pump (low pressure)	Fuel pump operates and fuel is recirculated.	Ignition switch: ON	Sound of operation is heard.	Procedure No. 30	13J-62
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven.	Procedure No. 32	13J-64
17	Basic ignition timing	Set the engine-ECU to ignition timing adjustment mode	Idling after engine warm up	5° BTDC	-	-
20	Fan motor relay	Drive the fan motor	Ignition switch: ON	Condenser fan motor operates	Procedure No.21	13J-55
21	Fan motor relay	Drive the fan motor	Ignition switch: ON	Condenser fan motor and radiator fan motor operates	Procedure No.21	13J-55
34	Electronic-controlled throttle valve system	Close the throttle valve fully	Ignition switch: ON	Operation sound can be heard	Code No.91	13J-31

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

77	80	100
76	89	99
75	88	98
	87	97
	86	96
	85	95
	84	94
74	83	93
73	82	92
	81	91
72	80	90
71	79	89
	78	88
	77	87
47	59	68
46	58	67
45	57	66
	56	65
	55	64
	54	63
44	53	62
43	52	61
42	51	60
41	50	59
	49	58
	48	57
8	33	34
7	32	31
	31	30
6	20	33
5	19	32
	18	31
	17	30
	16	29
	15	28
4	14	27
3	13	26
	12	25
2	11	24
1	10	23

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	0.1 – 2.0 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
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
14	GDI ECO indication lamp	Constant speed driving at 40 km/h	0 – 3 V
		Engine: Depress the accelerator pedal suddenly from the idle speed.	System voltage

Terminal No.	Check item	Check requirements (engine condition)		Normal condition
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.
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 – 3.8 V
			Engine coolant temperature: 20°C	2.3 – 2.9 V
			Engine coolant temperature: 40°C	1.3 – 1.9 V
			Engine coolant temperature: 80°C	0.3 – 0.9 V
45	Tachometer output	Engine: 3,000 r/min		2.0 – 9.0 V
47	Power supply	Ignition switch: ON		System voltage
59				

Terminal No.	Check item	Check requirements (engine condition)		Normal condition
50	Camshaft position sensor	Engine: Cranking		0.3 – 3.0 V
		Engine: Idling		0.5 – 3.5 V
51	Barometric pressure sensor	Ignition switch: ON	Altitude: 0 m	3.7 – 4.3 V
			Altitude: 1,200 m	3.2 – 3.8 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 terminals, engine-ECU output terminals.”		
66	Clutch switch <M/T>	Depress the clutch pedal		0 – 3 V
		Release the clutch pedal		System voltage
67	Inhibitor switch <A/T>	Ignition switch: ON	Selector lever: P or N range	0 – 3 V
			Selector lever: Other than P or N range	8 – 14 V
68	Ignition switch – ST	Engine: Cranking		8 V or more

Terminal No.	Check item	Check requirements (engine condition)		Normal condition
71	Oxygen sensor	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>	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 slightly.	4 V or more
80	Vehicle speed sensor	- Ignition switch: ON - Move the vehicle forward.		0 V ↔ 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	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.	0.9 – 1.2 V
			Depress the accelerator pedal fully.	4 V or more
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.
99	Ignition switch – IG	Ignition switch: ON		System voltage

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

1. Turn the ignition switch to LOCK(OFF) position.
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!**

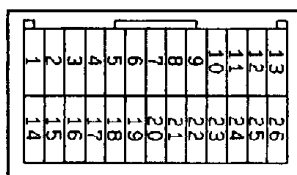
4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU Harness Side Connector Terminal Arrangement

1	9	24
2	10	25
3	11	26
4	12	27
5	13	28
6	14	29
7	15	30
8	16	31
9	17	32
10	18	33
11	19	34
12	20	35
13	21	36
14	22	37
15	23	38
16	24	39
17	25	40
18	26	41
19	27	42
20	28	43
21	29	44
22	30	45
23	31	46
24	32	47
25	33	48
26	34	49
27	35	50
28	36	51
29	37	52
30	38	53
31	39	54
32	40	55
33	41	56
34	42	57
35	43	58
36	44	59
37	45	60
38	46	61
39	47	62
40	48	63
41	49	64
42	50	65
43	51	66
44	52	67
45	53	68
46	54	69
47	55	70
48	56	71
49	57	72
50	58	73
51	59	74
52	60	75
53	61	76
54	62	77
55	63	78
56	64	79
57	65	80
58	66	81
59	67	82
60	68	83
61	69	84
62	70	85
63	71	86
64	72	87
65	73	88
66	74	89
67	75	90
68	76	91
69	77	92
70	78	93
71	79	94
72	80	95
73	81	96
74	82	97
75	83	98
76	84	99
77	85	100

7FU2120

Terminal No.	Check item	Standard value, normal condition (check requirements)
16 - 47	Purge control solenoid valve	36 - 44 Ω (at 20°C)
89 - 47	Oxygen sensor (front) heater	11 - 18 Ω (at 20°C)
46 - Body earth	Earth	Continuity (0 Ω)
58 - Body earth		
5 - 47	EGR valve (B)	15 - 20 Ω (at 20°C)
6 - 47	EGR valve (C)	
32 - 47	EGR valve (B)	
34 - 47	EGR valve (A)	
72 - 79	Accelerator pedal position switch	Continuity (when the accelerator pedal is released)
		No continuity (when the accelerator pedal is slightly depressed)
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)
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)
67 - Body earth	Inhibitor switch <A/T>	Continuity (when the selector lever is at P or N range)
		No continuity (when the selector lever is at a range other than P or N)

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
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.	0.4 – 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.	0.9 – 1.2 V
			Depress the accelerator pedal fully.	4 V or more
22	Ignition switch – IG	Ignition switch: ON		System voltage

INSPECTION PROCEDURE USING AN ANALYZER

The following service procedures have been established due to the change on the engine-ECU connector terminal layout. The other procedures are the same as before.

AIR FLOW SENSOR (AFS)

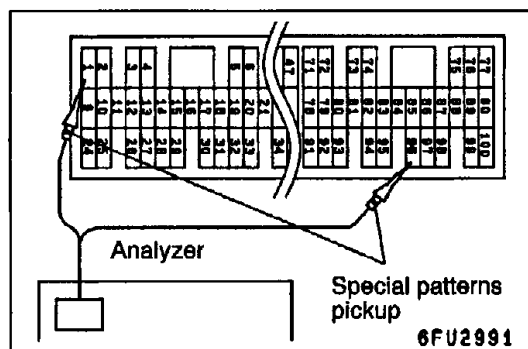
Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 61.

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 50. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal 43. (When checking the crank angle sensor signal wave pattern.)



INJECTORS AND INJECTOR OPEN CIRCUIT CHECK SIGNAL

Measurement Method

1. Connect the analyzer special patterns pickup to terminal 1 (No.1 injector) of the engine-ECU connector.
2. Connect the analyzer special patterns pickup to terminal 96 (injector open circuit check signal) of the engine-ECU connector.
3. After checking terminal 1 (No.1 injector), check terminal 9 (No.2 injector), terminal 24 (No.3 injector) and terminal 2 (No.4 injector).

IGNITION COIL AND POWER TRANSISTOR

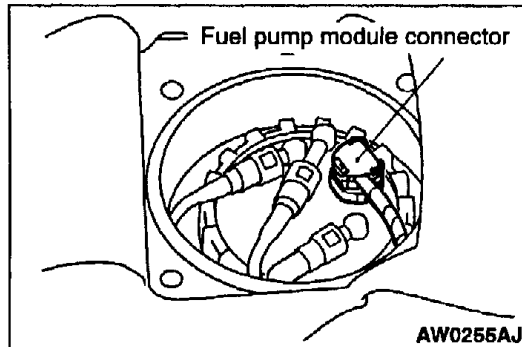
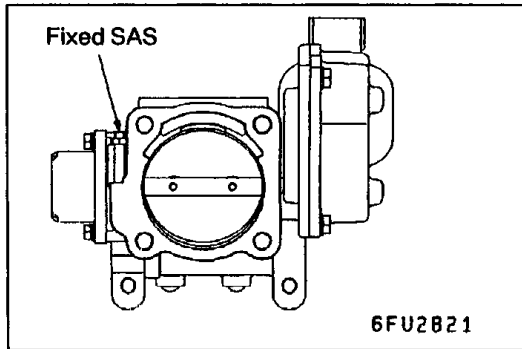
Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 3 (No. 1 ignition coil), terminal 13 (No. 2 ignition coil), terminal 12 (No. 3 ignition coil), terminal 4 (No. 4 ignition coil) respectively.

EGR VALVE (STEPPER MOTOR)

Alternate Method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 5, connection terminal 6, connection terminal 32, and connection terminal 34 respectively.



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 to learn a wrong position of the throttle valve.

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE FUEL PRESSURE)

When removing the fuel pipe, hose, etc., since fuel pressure in the fuel pipe line is high, do the following operation so as to release fuel pressure in the line and prevent fuel from running out.

- (1) Remove the rear seat cushion. (Refer to GROUP 52A.)
- (2) Remove the protector.
- (3) Disconnect the fuel pump module connector.
- (4) Connect the MUT-II to the diagnosis connector.

Caution

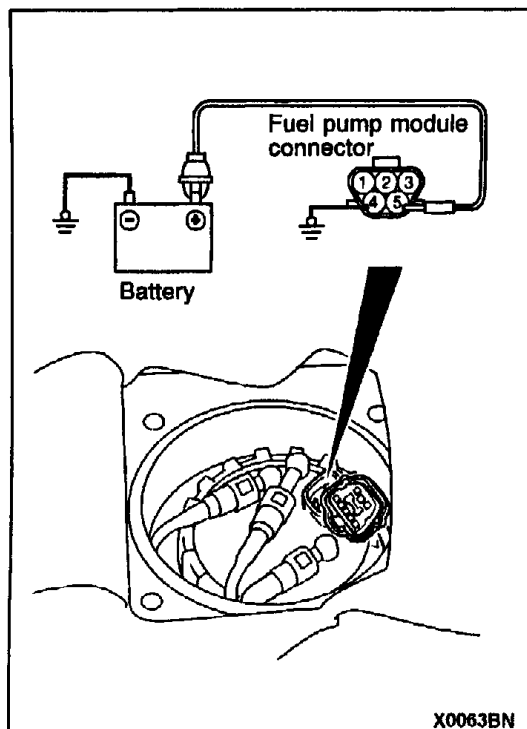
Turn off the Ignition switch before disconnecting or connecting the MUT-II.

- (5) Turn on the ignition switch.
- (6) Select "Item No.74" from the MUT-II Data list.
- (7) Crank the engine for at least two seconds.
- (8) If the engine is not be started, use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
- (9) If the engine is started, release fuel pressure by the following procedure:
 - 1) Turn off the ignition switch, and then stop the engine.
 - 2) Disconnect one of the ignition coil connectors.
 - 3) Crank the engine for at least two seconds.
 - 4) If the engine can not be started, use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
 - 5) If the engine is started, stop it by racing and use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
 - 6) Reconnect the ignition coil connector.

Caution

Clean the spark plug which corresponds to the disconnected ignition coil connector.

- (10) Remove the MUT-II.
- (11) Reconnect the fuel pump module connector.
- (12) Install the protector and rear seat cushion.

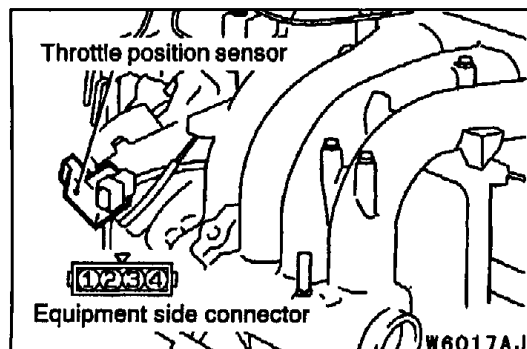


FUEL PUMP (LOW PRESSURE) OPERATION CHECK

1. Check the operation of the fuel pump (low pressure) by using the MUT-II to force-drive the fuel pump.
2. If the fuel pump (low pressure) will not operate, check by using the following procedure, and if it is normal, check the drive circuit.
 - (1) Turn the ignition switch to LOCK(OFF).
 - (2) Remove the rear seat cushion. (Refer to GROUP 52A.)
 - (3) Remove the protector.
 - (4) Disconnect the fuel pump module connector. Listen to a fuel pump operation sound while connecting battery voltage to No.5 terminal of the fuel pump module, and No.4 terminal to earth.
 - (5) Check fuel pressure by pinching the fuel hose with your finger.
 - (6) Connect the fuel pump module connector.
 - (7) Install the protector and rear seat cushion.

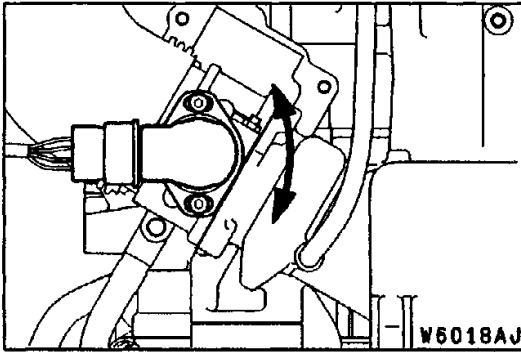
THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

1. Start the engine, and warm it up until engine coolant temperature reaches 80°C. Then stop the engine.
2. Remove the air intake hose at the throttle body side.
3. Apply cleaning agent to the throttle valve through the intake port of the throttle valve, and then leave it for approx. five minutes.
4. Start the engine, race it several times, and then let it run at idle for approx. one minute.
5. If carbon deposits are not removed from the throttle valve area, repeat steps (3) and (4).
6. Install the air intake hose.
7. Use the MUT-II or disconnect the negative battery cable from the battery terminal in order to erase a diagnosis code. Wait for at least ten seconds, and then let the engine run at idle again for approx. ten minutes.



THROTTLE POSITION SENSOR ADJUSTMENT

1. Connect the MUT-II to the diagnosis connector.
2. Disconnect the throttle valve control servo connector.
3. Turn on the ignition switch (but do not start the engine).



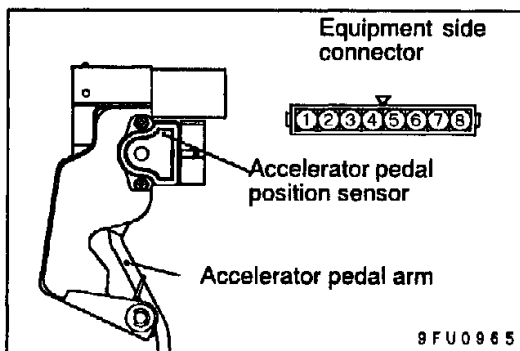
4. Check the output voltage of the throttle position sensor (1st channel) when the throttle valve is fully closed by your finger.

Standard value: 0.4 – 0.6 V

5. If not within the standard value, loosen the throttle position sensor mounting bolts. Then rotate the sensor body to adjust.
6. Check the output voltage of the throttle position sensor (2nd channel) when the throttle valve is fully closed by your finger.

Standard value: 4.2 – 4.8 V

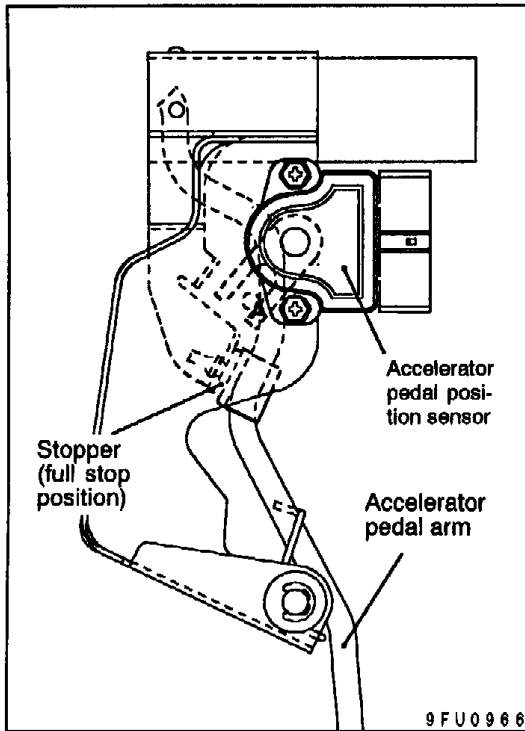
7. If not within the standard value, replace the throttle position sensor.
8. Turn the ignition switch to LOCK(OFF).
9. Reconnect the throttle valve control servo connector.
10. Remove the MUT-II.
11. If a diagnosis code is displayed, erase the diagnosis code by using the MUT-II or disconnect the negative battery cable from the battery terminal and then leave it for at least ten seconds. After that, reconnect the battery cable.
12. Turn on the ignition switch, wait for at least 10 seconds, and then off again. In addition, if the battery cable is disconnected at step 11, let the engine run at idle for approx. ten minutes.



ACCELERATOR PEDAL POSITION SENSOR ADJUSTMENT

Caution

- (1) **Never attempt to tamper the accelerator pedal position sensor. The sensor position is precisely adjusted at factory.**
- (2) **Should it be tampered, follow the procedure below:**
 1. Remove the accelerator pedal complete.
 2. Connect the MUT-II to the diagnosis connector.
 3. Loosen the accelerator pedal position sensor attaching bolts to allow it to be loosely fitted.



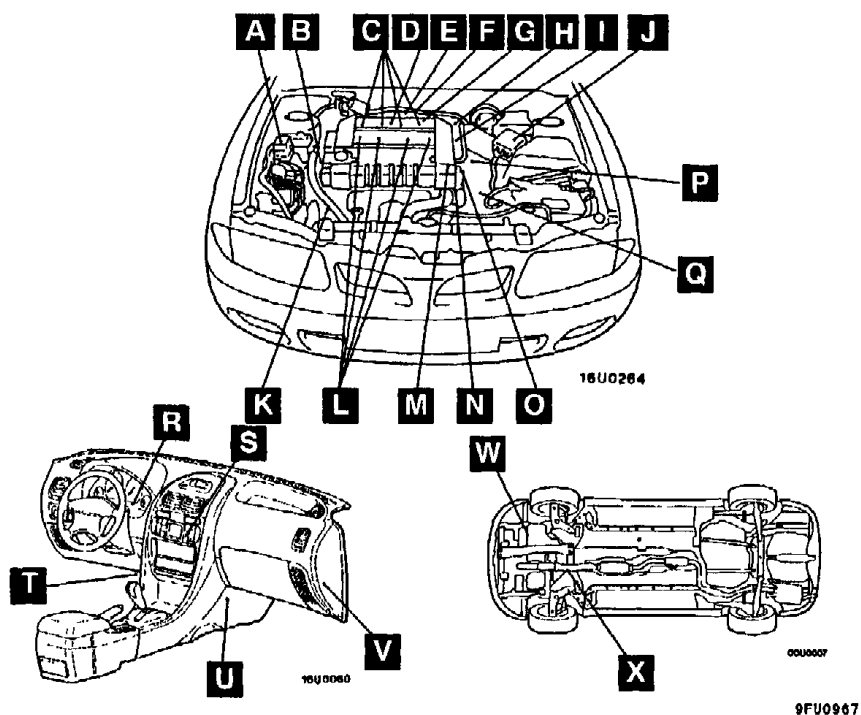
4. Ensure that the accelerator pedal arm contacts the full-stop position stopper.
5. Turn the ignition switch to the ON position (but do not start the engine).
6. Rotate the accelerator pedal position sensor to adjust sensor output voltage to the standard value.

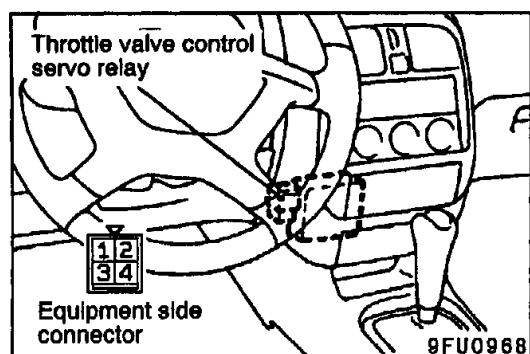
Standard value: 0.985 – 1.085 V

7. Tighten the sensor mounting bolts securely.
8. Install the accelerator pedal complete.

COMPONENT LOCATION

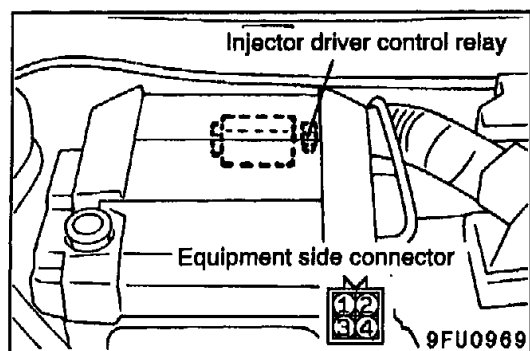
Name	Symbol	Name	Symbol
A/C relay	A	Fuel pump relay	U
A/C switch	S	GDI ECO indication lamp	R
Accelerator pedal position sensor (1st and 2nd channels)	T	Ignition coil	L
		Inhibitor switch <A/T>	Q
Air flow sensor (with intake air temperature sensor and barometric pressure sensor)	J	Injectors	C
		Injector driver	E
Camshaft position sensor	M	Injector driver relay	F
Clutch switch <M/T>	T	M/T oil temperature sensor <M/T>	W
Crank angle sensor	B	Oxygen sensor	X
Detonation sensor	D	Power steering fluid pressure switch	K
Diagnosis connector	T	Purge control solenoid valve	G
EGR valve	G	Throttle position sensor	H
Engine control relay	U	Throttle valve controller	U
Engine coolant temperature sensor	N	Throttle valve control servo	I
Engine-ECU	V	Throttle valve control servo relay	U
Engine warning lamp (CHECK ENGINE lamp)	R	Vehicle speed sensor	P
Fuel pressure sensor	O		





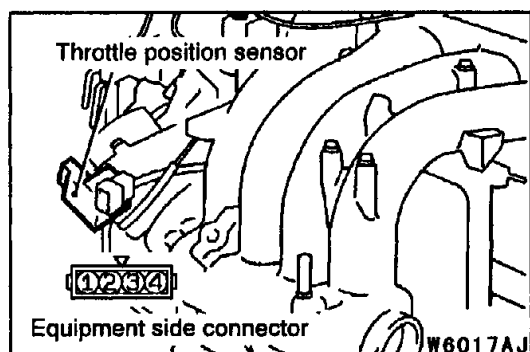
THROTTLE VALVE CONTROL SERVO RELAY CONTINUITY CHECK

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



INJECTOR DRIVER RELAY CONTINUITY CHECK

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



THROTTLE POSITION SENSOR CHECK

1. Disconnect the throttle position sensor connector.
2. Measure the resistance between throttle position sensor side connector terminal 1 and terminal 3.

Standard value: 1.7 - 3.3 kΩ

3. Measure resistance between terminal Nos. 1 and 2 as well as 1 and 4 of the throttle position sensor connector, respectively.

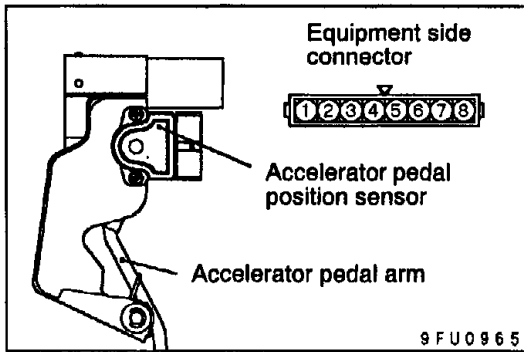
Normal condition:

Throttle valve slowly open until fully open from the idle position	Changes smoothly in proportion to the opening angle of the throttle valve

4. If the resistance is outside the standard value, or if it doesn't change smoothly, replace the throttle position sensor.

NOTE

For the throttle position sensor adjustment procedure, refer to P.13J-84.



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

1. Disconnect the accelerator pedal position sensor connector.
2. Measure resistance between terminal Nos.2 (1st channel power supply) and 1 (1st channel earth) as well as between terminal Nos.8 (2nd channel power supply) and terminal No.7 (2nd channel earth) of the sensor connector.

Standard value: 3.5 – 6.5 k Ω

3. Measure resistance between terminal Nos.2 (1st channel power supply) and 3 (1st channel output) as well as between terminal Nos.8 (2nd channel power supply) and terminal No.6 (2nd channel output) of the sensor connector.

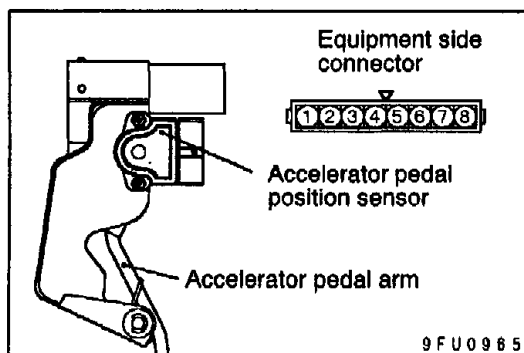
Normal condition:

Depress the accelerator pedal slowly.	Resistance value changes in accordance with the accelerator pedal depression smoothly.

4. If not within the standard value, or resistance value does not change smoothly, replace the accelerator pedal position sensor.

NOTE

After replacement, adjust the accelerator pedal position sensor. (Refer to P.13J-85.)



ACCELERATOR PEDAL POSITION SWITCH CHECK

1. Disconnect the accelerator pedal position sensor connector.
2. Check continuity between terminal Nos. 4 (accelerator pedal position switch) and 5 (earth) of the connector.

Normal condition

Accelerator pedal	Continuity
Depressed	No continuity
Released	Continuity (0 Ω)

3. If defective, replace the accelerator pedal position sensor.

NOTE

After replacement, adjust the accelerator pedal position sensor. (Refer to P.13J-85.)

THROTTLE VALVE CONTROL SERVO CHECK**Operation Check**

1. Disconnect the air intake hose from the throttle body.
2. Turn on the ignition switch.
3. Check that the throttle valve opens or closes in response to the accelerator pedal depression.

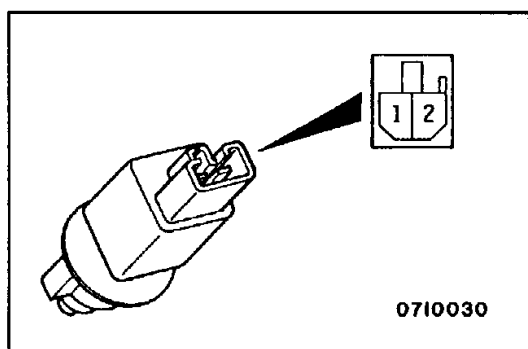
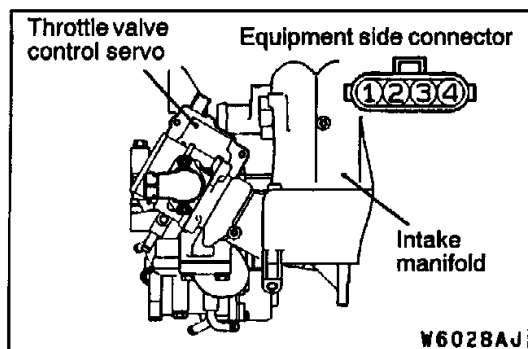
Check of Coil Resistance

1. Disconnect the throttle valve control servo connector.
2. Measure resistance between the throttle valve control servo connector terminals.

Standard value:

Terminals to be measured	Resistance value (Ω)
1 - 3	1.35 - 1.65 (at 20°C)
2 - 4	

3. Check that there is no continuity between the terminals and body.

**CLUTCH SWITCH CHECK**

1. Disconnect the connector.
2. Check for continuity between the terminals of the switch.

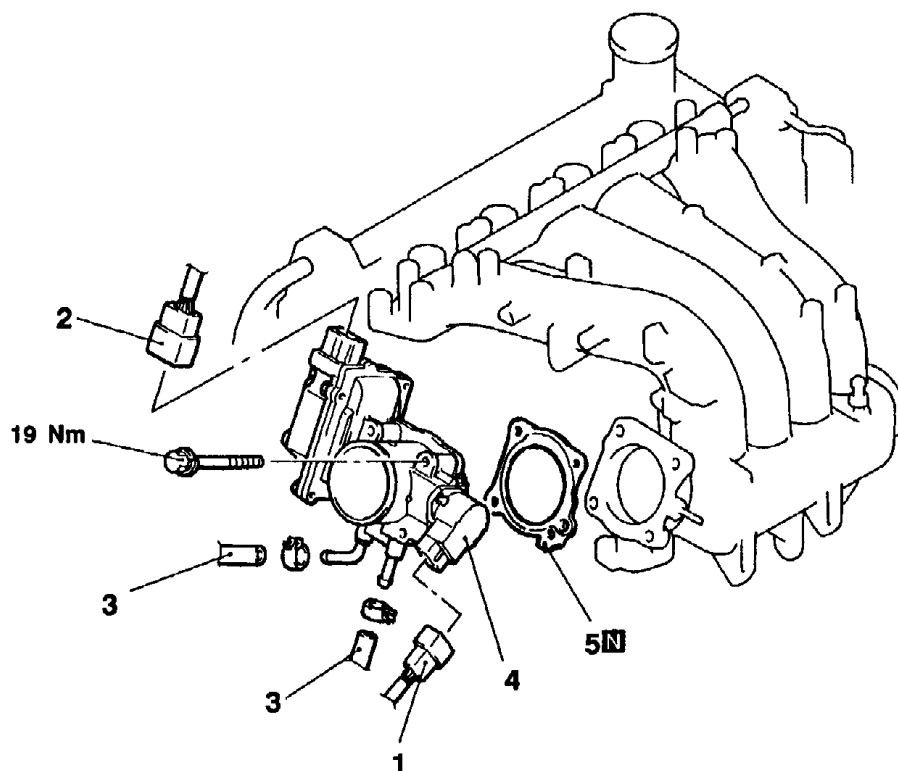
Measurement conditions	Terminal No.	
	1	2
When clutch pedal is depressed.	○ — ○	○ — ○
When clutch pedal is not depressed.		

THROTTLE BODY

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Coolant Draining and Supplying
- Air Intake Hose Removal and Installation
- Initialization (Refer to P.13J-92.)
<after installation only>

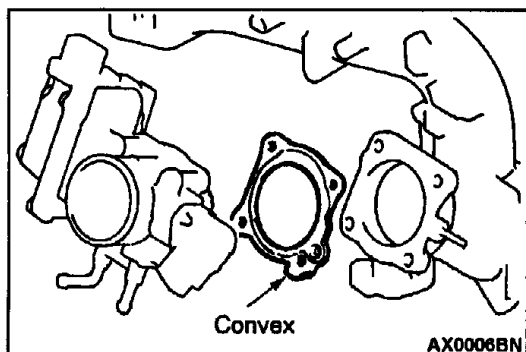


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Removal steps

1. Throttle position sensor connector
2. Throttle control servo connector
3. Water hose connection

- A◄
4. Throttle body
 5. Throttle body gasket

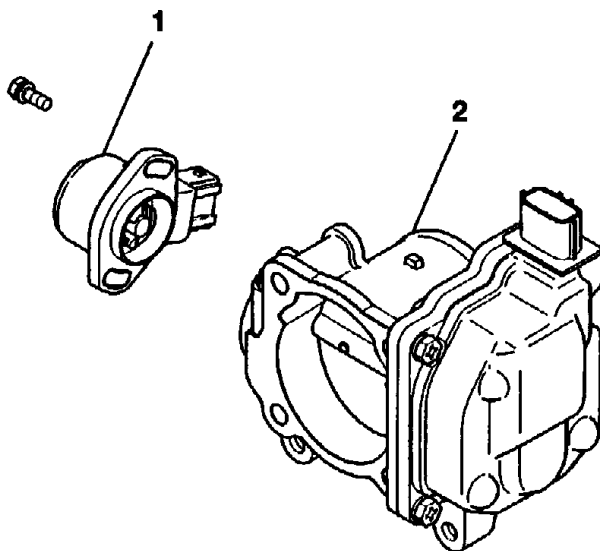
**INSTALLATION SERVICE POINT****►A◄ THROTTLE BODY GASKET INSTALLATION**

Place the gasket so that the projecting part is positioned as shown in the illustration, and then install it between the intake manifold and the throttle body.

INITIALIZATION

When replacing the throttle body, initialize the electronic-controlled throttle valve system as follows:

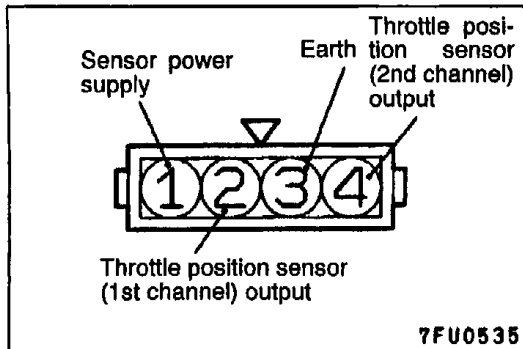
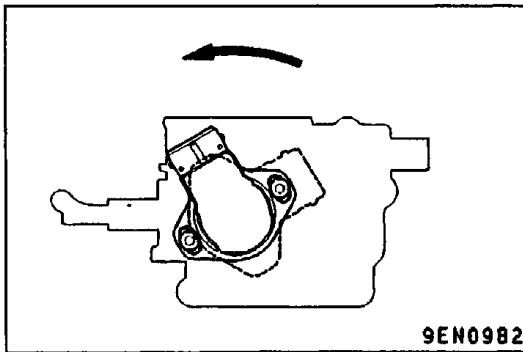
1. Turn the ignition switch to ON, and then turn it to LOCK(OFF) within one second. Hold the ignition switch at LOCK(OFF) position for for ten seconds or more.

DISASSEMBLY AND REASSEMBLY

9EN0981

Disassembly steps

- A◄**
1. Throttle position sensor
 2. Throttle body



REASSEMBLY SERVICE POINTS

►A◄ THROTTLE POSITION SENSOR

- (1) Position the throttle position sensor on the throttle body along the dotted line as shown in the illustration.
- (2) Rotate the throttle position sensor anticlockwise as shown in the illustration, and then tighten the screws.
- (3) Measure resistance value between terminal Nos. 1 (sensor power supply) and 2 (throttle position sensor 1st-channel output) as well as 1 (sensor power supply) and 4 (throttle position sensor 2nd-channel output).

Normal condition

Open the throttle valve slowly from the idle position to full-open position.

Resistance value changes smoothly in response to throttle valve opening angle.

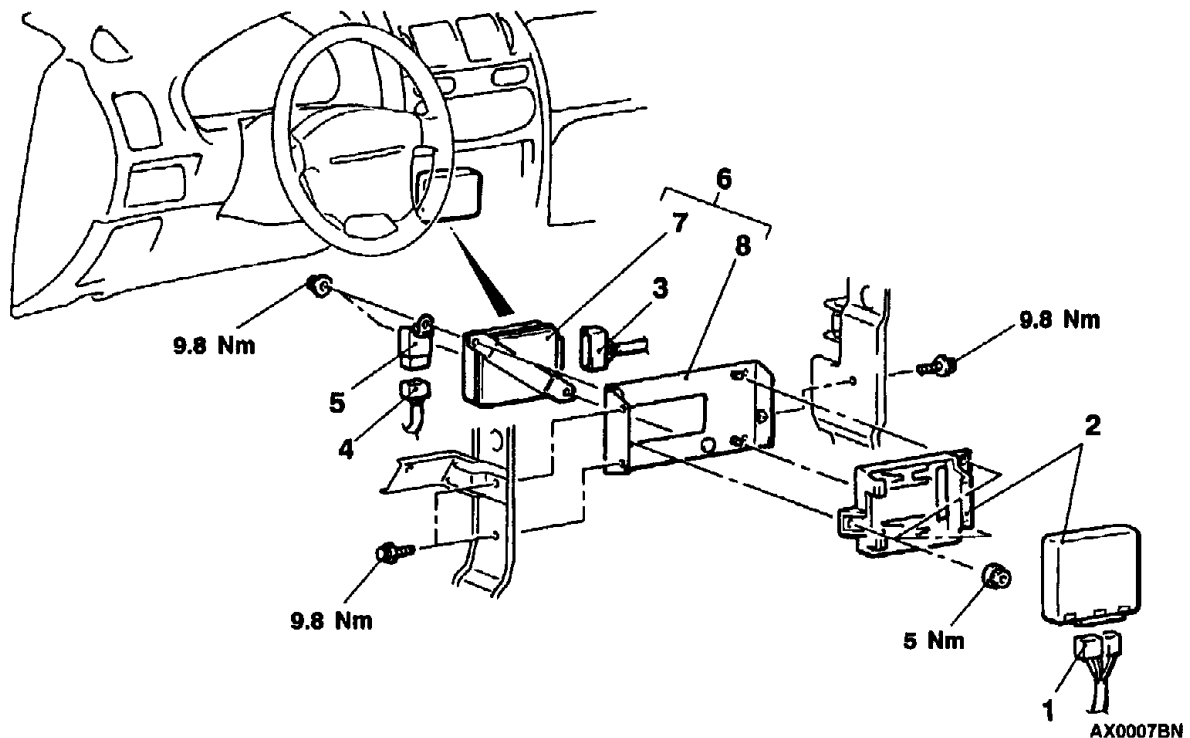
- (4) If the resistance value does not change smoothly, replace the throttle position sensor.

THROTTLE VALVE CONTROLLER

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Front Floor Console Assembly Removal
- Initialization (Refer to P.13J-94.)
<After Installation only>


Removal steps

1. Keyless entry receiver-ECU connector	5. Throttle control servo relay
2. Keyless entry receiver-ECU and bracket	6. Throttle valve controller and ECU bracket
3. Throttle valve controller connector	7. Throttle valve controller
4. Throttle control servo relay connector	8. ECU bracket

INITIALIZATION

When replacing the throttle valve controller, initialize the electronic-controlled throttle valve system as follows:

1. Turn the ignition switch to ON, and then turn it to LOCK(OFF) within one second. Hold the ignition switch at LOCK(OFF) position for ten seconds or more.

GROUP 14

ENGINE COOLING

GENERAL

OUTLINE OF CHANGES

The service procedures have been established due to the following changes:

- Specifications of the radiator have been changed <4G9-GDI>.
- The service specifications for the thermostat have been changed <4G9>.
- The air by-pass valve has been discontinued <4G9-GDI>.

GENERAL SPECIFICATIONS

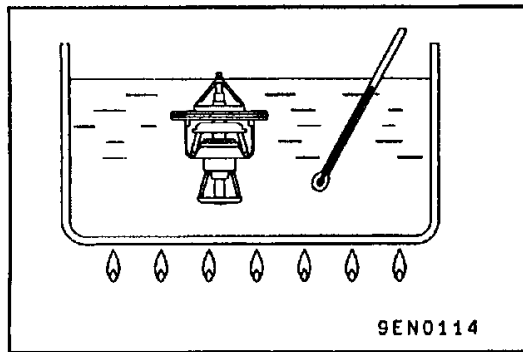
<4G9-GDI>

Items		Specifications
Radiator	Performance kJ/h	129,800
Automatic transmission oil cooler	Performance kJ/h	5,300

SERVICE SPECIFICATIONS

<4G9>

Items		Standard value
Valve opening temperature of thermostat °C	MPI	88 ± 1.5
	GDI-D3 spec.	85 ± 1.5
	GDI-D4 spec.	82 ± 1.5
Full-opening temperature of thermostat °C	MPI	100
	GDI-D3 spec.	98
	GDI-D4 spec.	95
Lift stroke when thermostat is fully opened		8.5 or more



THERMOSTAT <4G9>

INSPECTION

THERMOSTAT CHECK

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

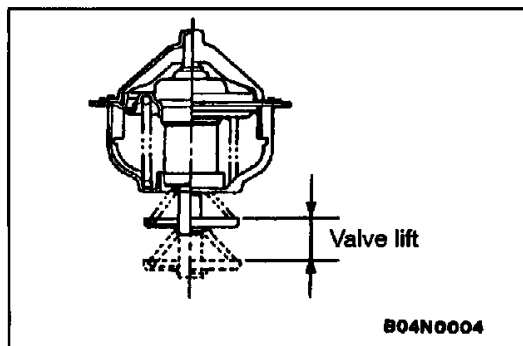
Standard value:

Valve opening temperature:

<MPI>: $88 \pm 1.5^{\circ}\text{C}$

<GDI-D3 spec.>: $85 \pm 1.5^{\circ}\text{C}$

<GDI-D4 spec.>: $82 \pm 1.5^{\circ}\text{C}$



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:

<MPI>: 100°C

<GDI-D3 spec.>: 98°C

<GDI-D4 spec.>: 95°C

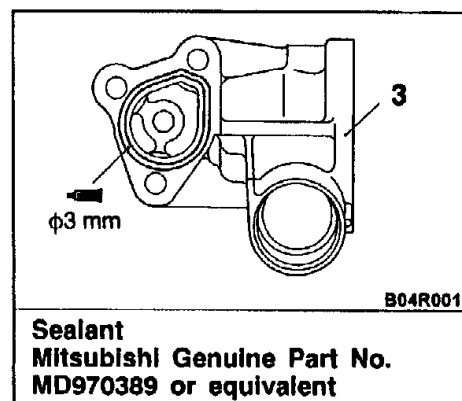
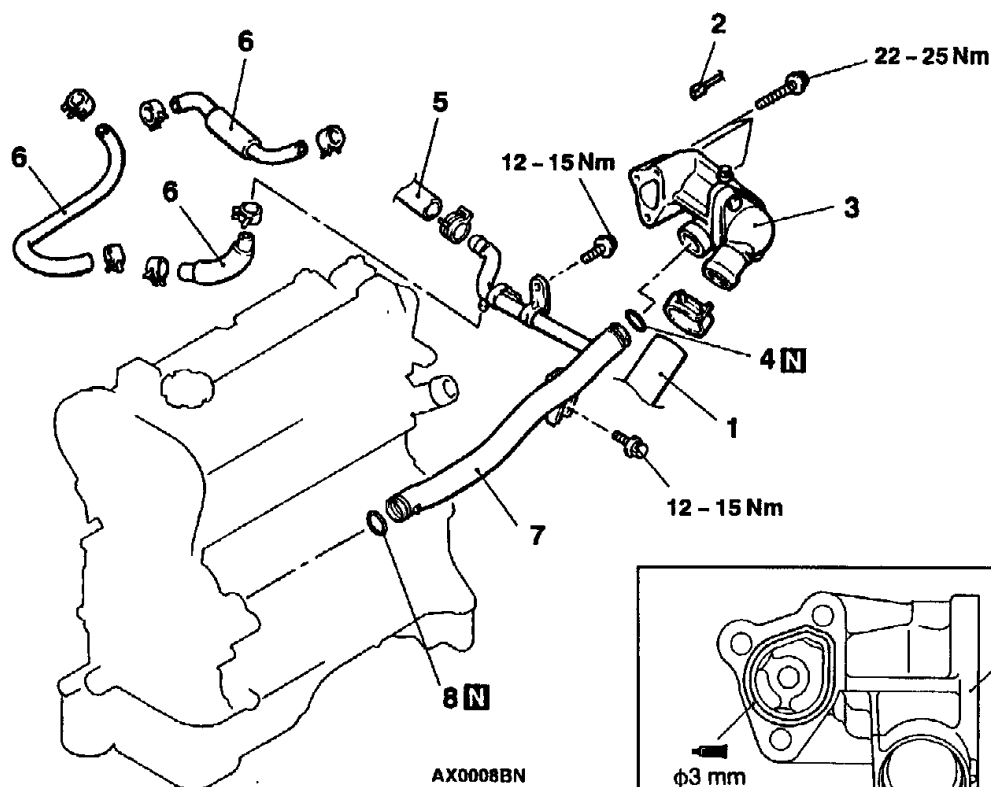
Amount of valve lift: 8.5 mm or more

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.

WATER HOSE AND WATER PIPE <4G9-GDI>**REMOVAL AND INSTALLATION****Pre-removal and Post-Installation Operation**

- Engine Coolant Draining and Suppling
- Air Cleaner and Air Intake Hose Assembly Removal and Installation

**Removal steps**

- ◀A▶ ▶C▶ 1. Radiator lower hose connection
 2. Engine coolant temperature gauge unit connector
 ▶B▶ ▶A▶ 3. Thermostat case assembly
 4. O-ring
 5. Heater hose connection
 6. Water hose

- ▶A▶ 7. Water inlet pipe assembly
 8. O-ring

NOTE

Removal and installation service points are the same as before.

GROUP 15

INTAKE AND EXHAUST

GENERAL

OUTLINE OF CHANGES

The service procedures have been established due to the following changes:

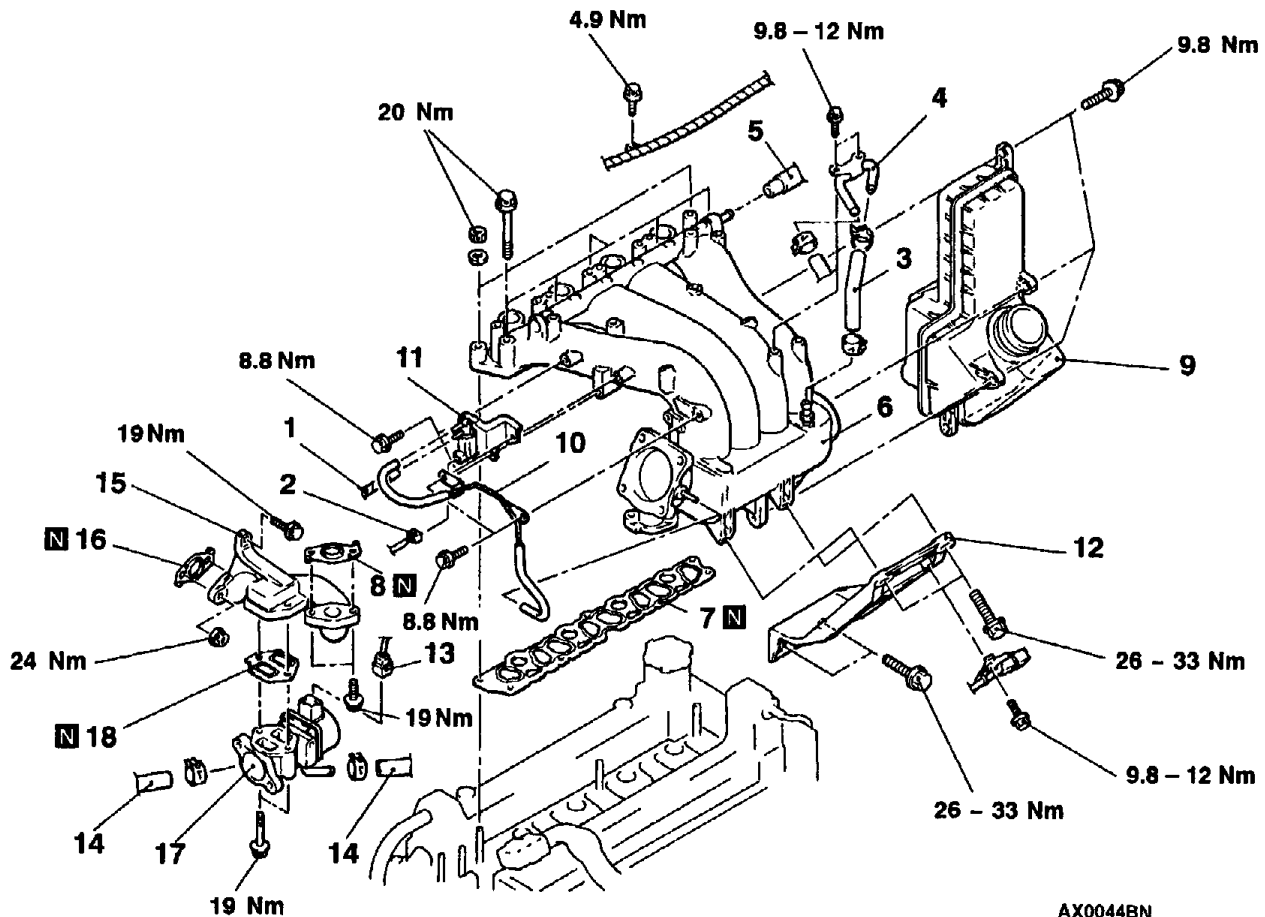
- The air by-pass valve has been discontinued <4G9-GDI>.
- The main muffler, exhaust pipe and catalytic converter have been changed <4G9>.

INTAKE MANIFOLD <4G9-GDI>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Engine Coolant Draining and Supplying
- Air Intake Hose Assembly Removal and Installation
- Engine Cover Removal and Installation
- Ignition Coil Removal and Installation
- Throttle Body Removal and Installation (Refer to GROUP 13J.)



AX0044BN

Intake manifold removal steps

1. Vacuum hose connection
2. Purge control solenoid valve connector
3. Brake booster vacuum hose connection
4. Brake booster vacuum pipe
5. PCV hose connection
6. Intake manifold assembly
7. Intake manifold gasket
8. EGR pipe gasket
9. Surging resonator
10. Vacuum pipe and hose assembly
11. Purge control solenoid valve
12. Intake manifold stay

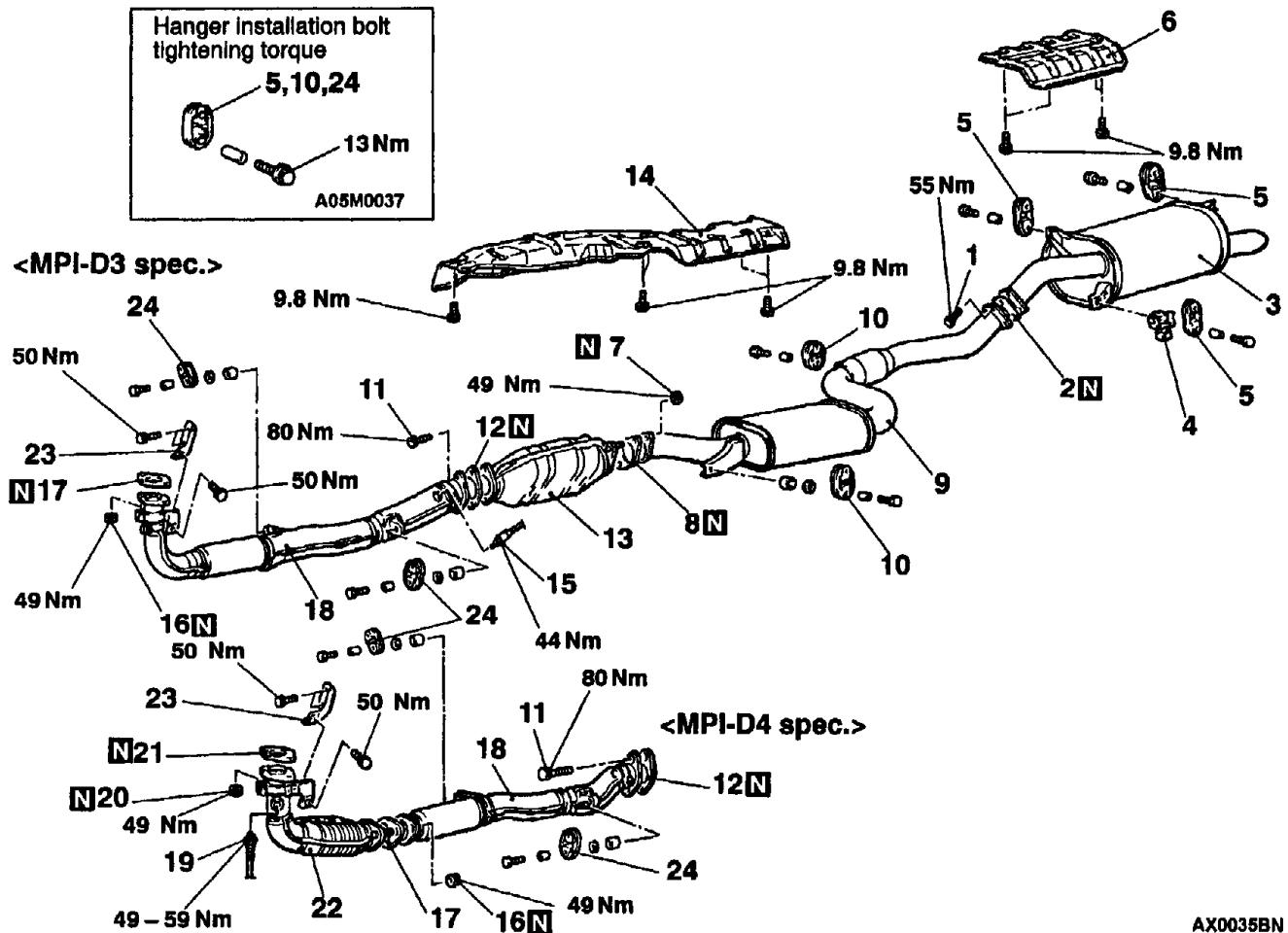
EGR valve assembly removal steps

6. Intake manifold assembly
13. EGR servo connector
14. Water hose connection
15. EGR valve support
16. EGR pipe gasket
17. EGR valve assembly
18. EGR valve gasket

EXHAUST PIPE AND MAIN MUFFLER <4G9>

REMOVAL AND INSTALLATION

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



AX0035BN

Main muffler removal steps

1. Bolt
2. Gasket
3. Main muffler
4. Dynamic damper
5. Hanger
6. Rear floor heat protector panel

Center exhaust pipe removal steps

1. Bolt
2. Gasket
7. Self locking nuts
8. Gasket
9. Center exhaust pipe
10. Hanger
11. Bolt
12. Gasket
13. Catalytic converter
14. Front floor heat protector panel

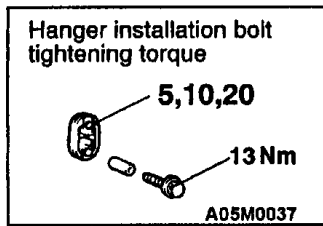
Front exhaust pipe removal steps

11. Bolt
12. Gasket
15. Oxygen sensor<MPI-D3 spec.>
16. Self locking nuts
17. Gasket
18. Front exhaust pipe
19. Oxygen sensor <MPI-D4 spec.>
20. Self-locking nut <MPI-D4 spec.>
21. Gasket <MPI-D4 spec.>
22. Front catalytic converter <MPI-D4 spec.>
23. Front exhaust pipe bracket
24. Hanger

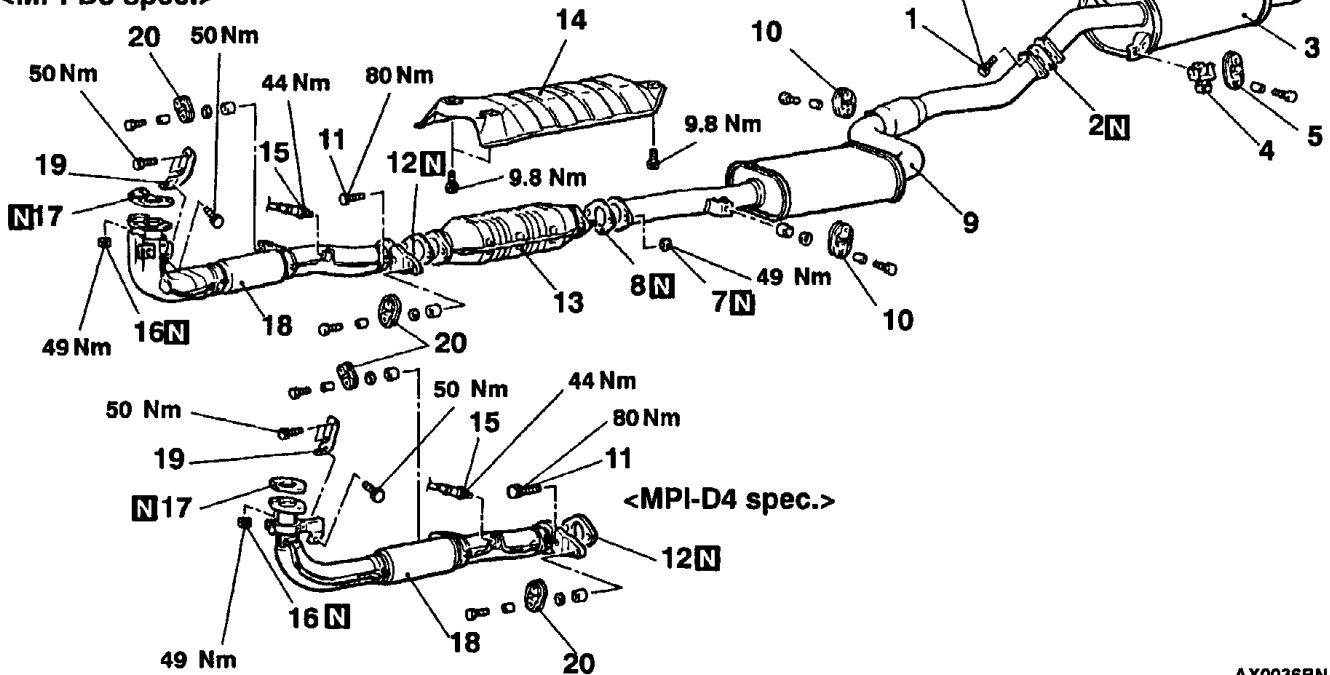


NOTE

Removal and installation service points are the same as before.



<MPI-D3 spec.>



<MPI-D4 spec.>

AX0036BN

Main muffler removal steps

1. Bolt
2. Gasket
3. Main muffler
4. Dynamic damper
5. Hanger
6. Rear floor heat protector panel

Center exhaust pipe removal steps

1. Bolt
2. Gasket
7. Self locking nuts
8. Gasket
9. Center exhaust pipe
10. Hanger
11. Bolt
12. Gasket
13. Catalytic converter
14. Front floor heat protector panel

Front exhaust pipe removal steps

11. Bolt
12. Gasket
15. Oxygen sensor
16. Self locking nuts
17. Gasket
18. Front exhaust pipe
19. Front exhaust pipe bracket
20. Hanger



NOTE

Removal and installation service points are the same as before.

GROUP 16

ENGINE ELECTRICAL

IGNITION SYSTEM

GENERAL

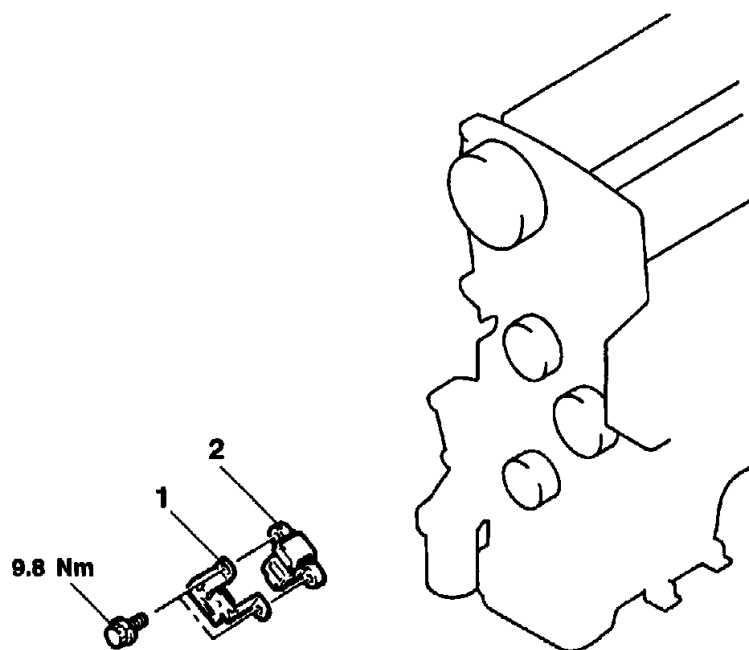
OUTLINE OF CHANGE

The crank angle sensor for the 4G9 engine has been changed.

CRANK ANGLE SENSOR <4G9>

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
Timing Belt Cover Removal and Installation
(Refer to GROUP 11A.)



AX0004BN

Removal steps

1. Bracket
2. Crank angle position sensor

ENGINE AND EMISSION CONTROL

CONTENTS

ENGINE CONTROL SYSTEM <4G9-GDI>	2	EMISSION CONTROL SYSTEM <4G9>	19
GENERAL	2	GENERAL	19
Outline of Change	2	Outline of Changes	19
ACCELERATOR PEDAL	2	SPECIAL TOOL	19
AUTO-CRUISE CONTROL SYSTEM <4G9-GDI>	3	VACUUM HOSE	19
GENERAL	3	Vacuum Hose Piping Diagram	19
Outline of Change	3	Vacuum Circuit Diagram	21
GENERAL INFORMATION	3	EVAPORATIVE EMISSION CONTROL SYSTEM	22
SPECIAL TOOL	3	System Diagram	22
TROUBLESHOOTING	4	Purge Control System Check <GDI>	23
ON-VEHICLE SERVICE	16	Purge Port Vacuum Check <MPI>	23
AUTO-CRUISE CONTROL	18	Purge Port Vacuum Check <GDI>	23
		CATALYTIC CONVERTER	25

ENGINE CONTROL SYSTEM <4G9-GDI>

GENERAL

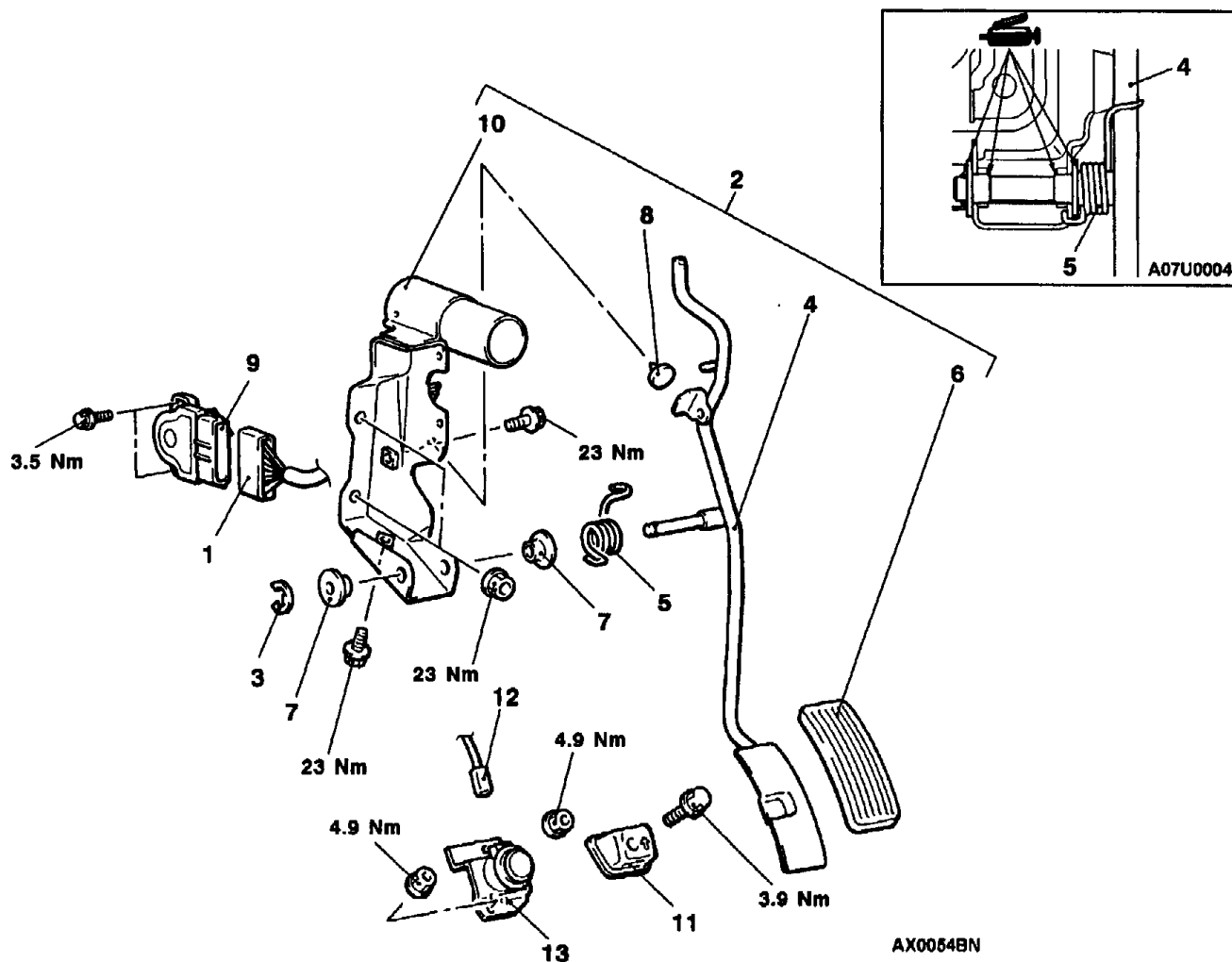
OUTLINE OF CHANGE

The service procedures have been revised due to the addition of the accelerator pedal position sensor.

ACCELERATOR PEDAL

REMOVAL AND INSTALLATION

Post-Installation Operation
Check and Adjustment of the Accelerator Pedal Position Sensor (Refer to GROUP 13J – On-vehicle Service.)



Removal steps

1. Accelerator pedal position sensor connector	8. Stopper
2. Accelerator pedal assembly	9. Accelerator pedal position sensor
3. Snap ring	10. Accelerator pedal bracket
4. Accelerator pedal	11. Accelerator pedal stopper <M/T>
5. Return spring	12. Wide open throttle switch connector <A/T>
6. Accelerator pedal pad	13. Wide open throttle switch <A/T>
7. Bushing	

AUTO-CRUISE CONTROL SYSTEM <4G9-GDI>

GENERAL

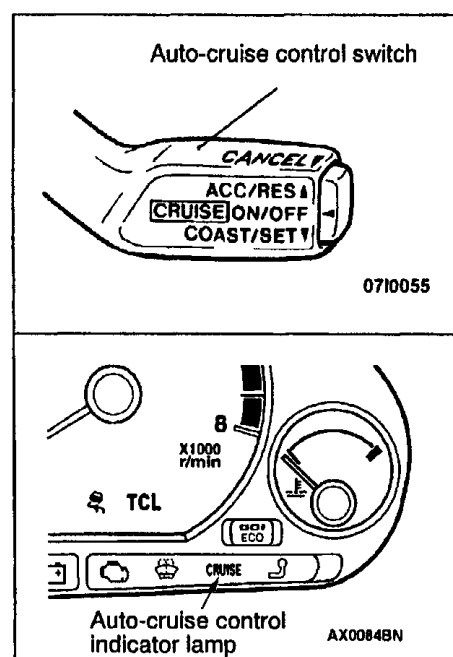
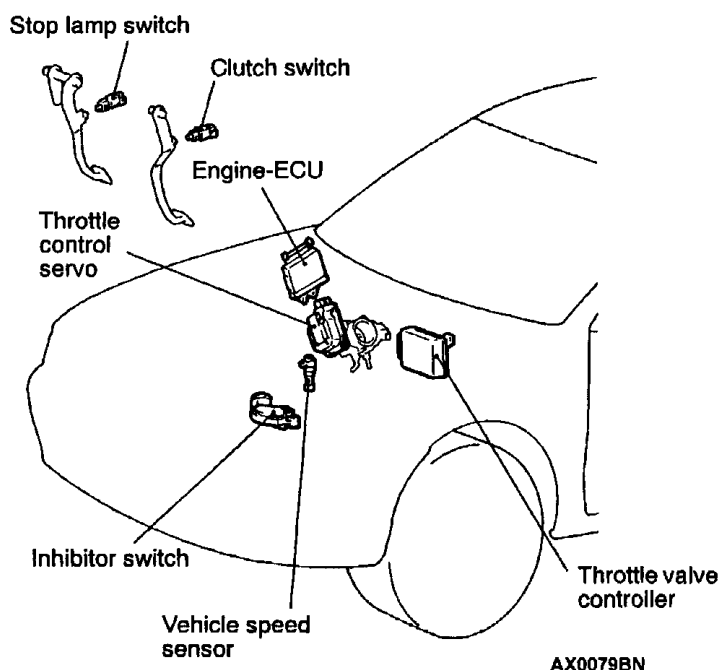
OUTLINE OF CHANGE

The following service procedures have been added to correspond to the introduction of the electronically controlled throttle valve system and a built-in auto-cruise control switch.

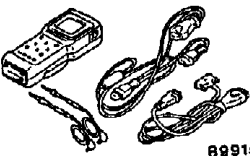
GENERAL INFORMATION

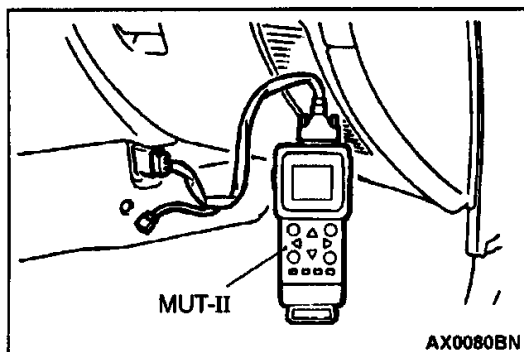
By using the auto-cruise control, the driver can drive at the speed he/she likes (in a range of

approximately 40–200 km/h) without depressing the accelerator pedal.



SPECIAL TOOL

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	• Reading diagnosis codes • Auto-cruise control system check



TROUBLESHOOTING

DIAGNOSIS FUNCTION

METHOD OF READING THE DIAGNOSIS CODES WHEN USING THE MUT-II

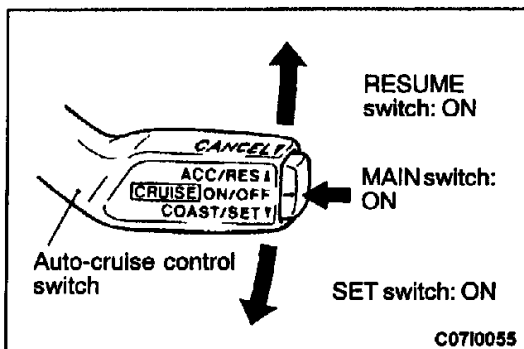
Connect the MUT-II to the diagnosis connector and take a reading of the diagnosis codes.

Caution

Turn the Ignition switch to LOCK (OFF) position before connecting or disconnecting the MUT-II.

WHEN USING THE AUTO-CRUISE CONTROL INDICATOR LAMP

1. Turn the ignition switch to ON, and then turn on the MAIN switch of the auto-cruise control switch.
2. Turn off the MAIN switch of the auto-cruise control switch and the ignition switch.
3. While the MAIN switch and the SET switch of the auto-cruise control switch remain on, turn the ignition switch to ON. Then turn on the RESUME switch of the auto-cruise control switch within one second.



Indication of diagnosis code by the auto-cruise control indicator lamp

When the diagnosis code No.23 is output	When no diagnosis code is output

METHOD OF ERASING DIAGNOSIS CODES

WHEN USING THE MUT-II

Connect the MUT-II to the diagnosis connector and erase the diagnosis code.

Caution

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

WHEN NOT USING THE MUT-II

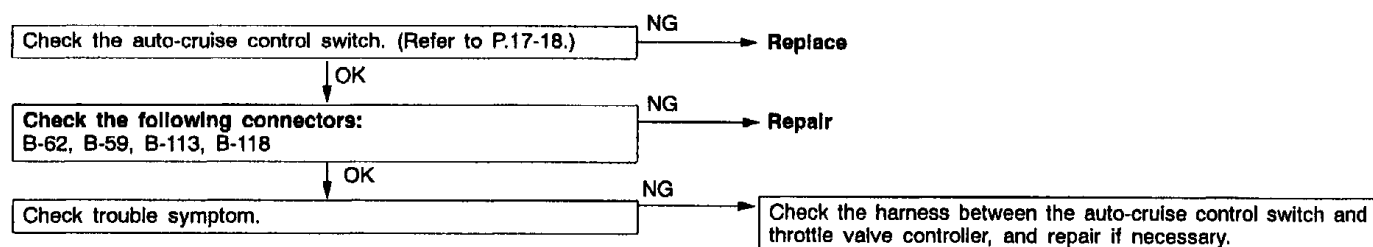
1. Turn the ignition switch to LOCK (OFF) position.
2. After disconnecting the battery cable from the battery (-) terminal for 10 seconds or more, reconnect the cable.

INSPECTION CHART FOR DIAGNOSIS CODES

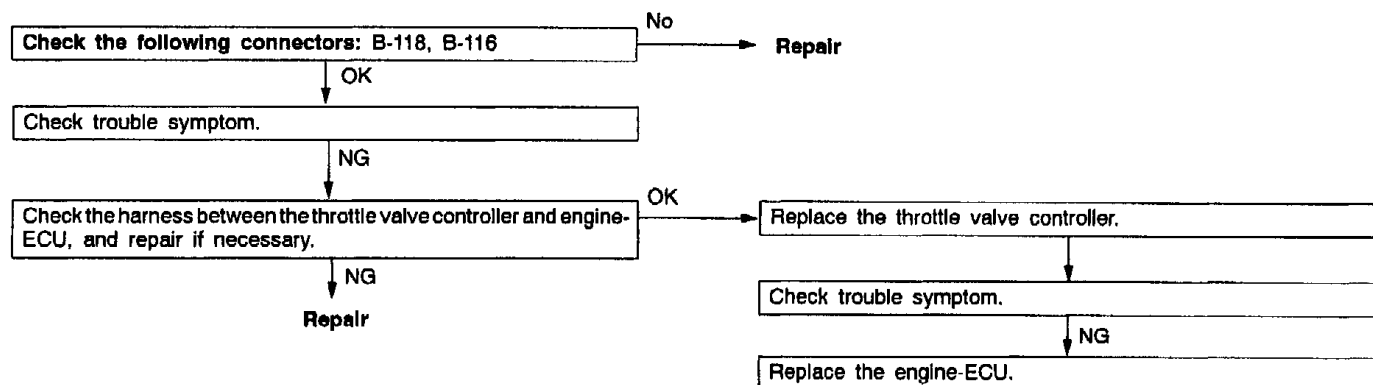
Code No.	Diagnosis item	Reference page
15	Auto-cruise control switch system	17-5
21	Cancel latch signal system	17-5
22	Stop lamp switch system	17-6
23	Engine-ECU system	17-7

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 15 Auto-cruise control switch system	Probable cause
This diagnosis code is output if the RESUME and SET switches of the auto-cruise control switch remain on.	• Malfunction of the auto-cruise control switch • Malfunction of the connector • Malfunction of the harness

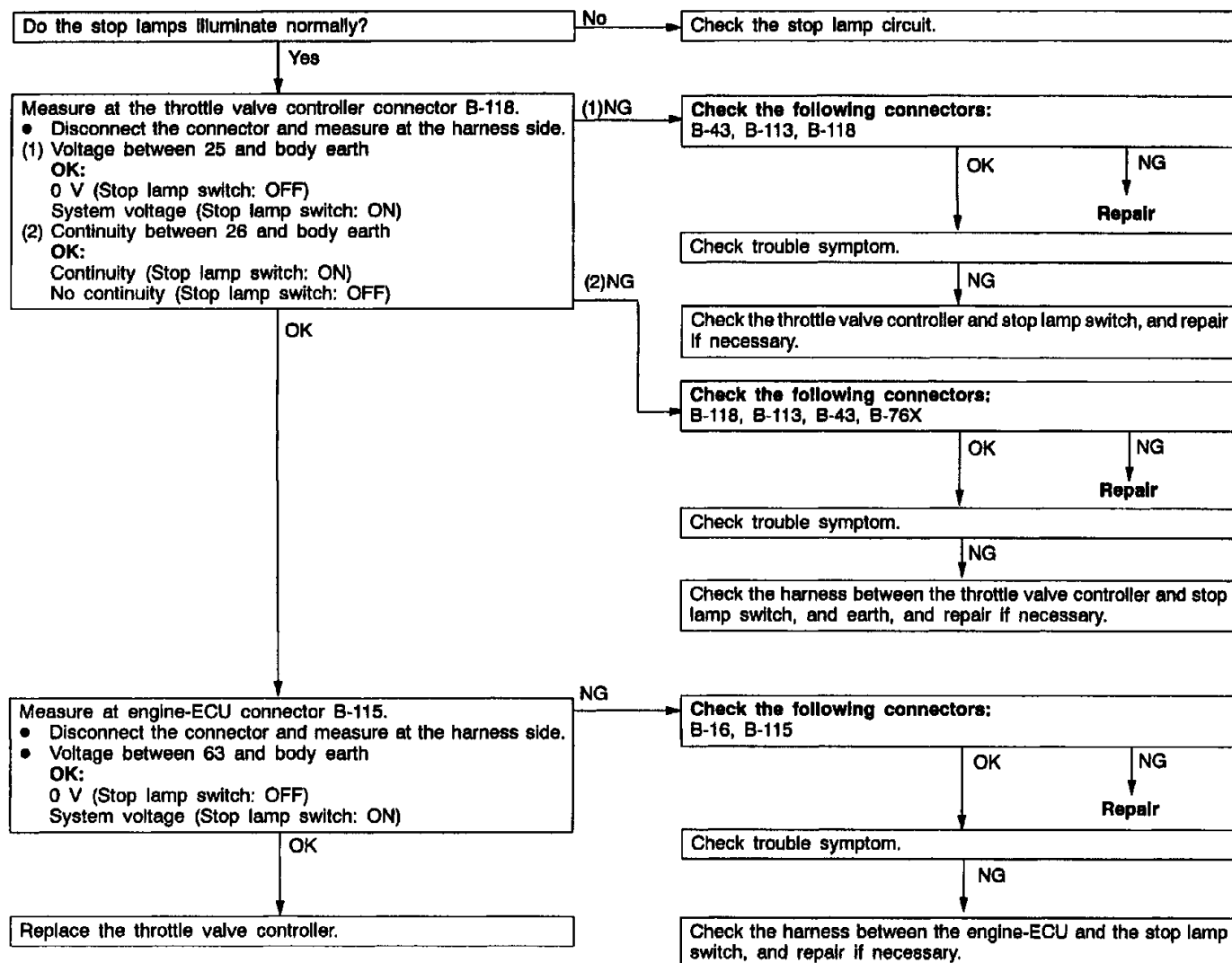


Code No. 21 Cancel latch signal system	Probable cause
The throttle valve controller and the engine-ECU send a cancel holding information to the engine-ECU via a cancel latch signal line and the serial communication line. This diagnosis code is output if there is a failure in the cancel latch signal line, or a disaccord in the communication data.	• Malfunction of the connector • Malfunction of the harness • Malfunction of the throttle valve controller • Malfunction of the auto-cruise control-ECU

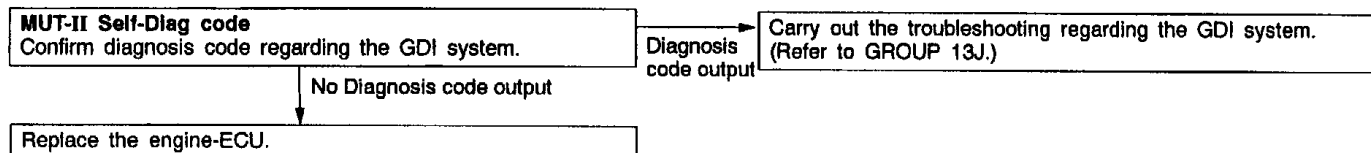


17-6 ENGINE AND EMISSION CONTROL – Auto-cruise Control System <4G9-GDI>

Code No. 22 Stop lamp switch system	Probable cause
This diagnosis code is output when the throttle valve controller detects a failure in the stop lamp switch output.	- Malfunction of the connector or harness wire - Malfunction of the stop lamp switch - Malfunction of the throttle valve controller



Code No. 23 Engine-ECU system	Probable cause
This diagnosis code is output if the engine-ECU system is defective as follows: • Communication error between the throttle valve controller and the engine-ECU • Malfunction of the throttle position sensor • Malfunction of the accelerator pedal position sensor • Malfunction of the throttle control servo • Malfunction of the vehicle speed sensor	• Malfunction of the connector • Malfunction of the harness • Malfunction of the engine-ECU



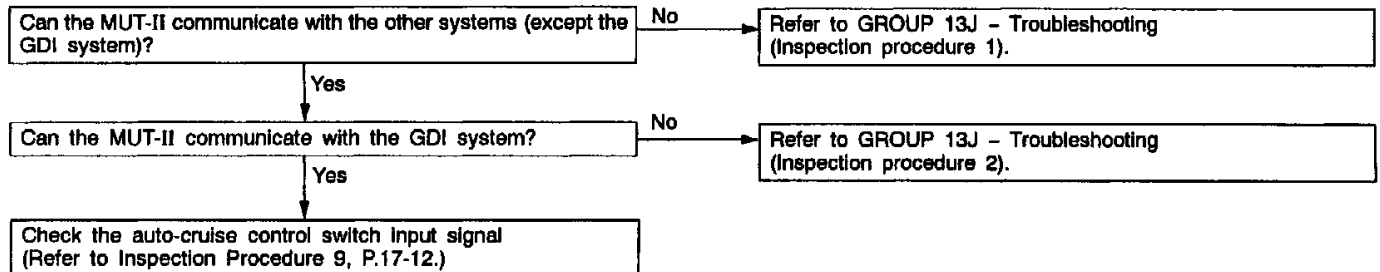
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.		1	17-8
Auto-cruise control is not cancelled.	Even if brake pedal is depressed	2	17-8
	Even if clutch pedal is depressed <M/T>	3	17-9
	Even if select lever is set to N range <A/T>	4	17-9
	Even if CANCEL switch is set to ON	5	17-10
Auto-cruise control cannot be set.		6	17-10
Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.		7	17-11
When the MAIN switch of the auto-cruise control switch is turned on, the auto-cruise control indicator lamp does not illuminate. (However, the auto-cruise control is normal.)		8	17-11

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

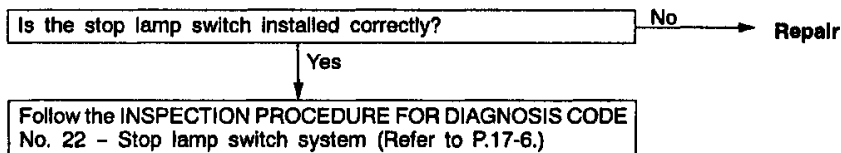
Inspection Procedure 1

Communication with MUT-II is not possible.	Probable cause
If the MUT-II can not also communicate with the systems other than the GDI system, the diagnosis line circuit may be defective. If the MUT-II can not communicate with only the GDI system and the auto-cruise control system, the harness wire between the engine-ECU and the diagnosis connector, may be defective. In addition, If the the MUT-II can not communicate with only the auto-cruise control system, the auto-cruise control switch circuit may be defective.	● Malfunction of the connector or harness ● Malfunction of the auto-cruise control switch ● Malfunction of the throttle valve controller ● Malfunction of the engine-ECU



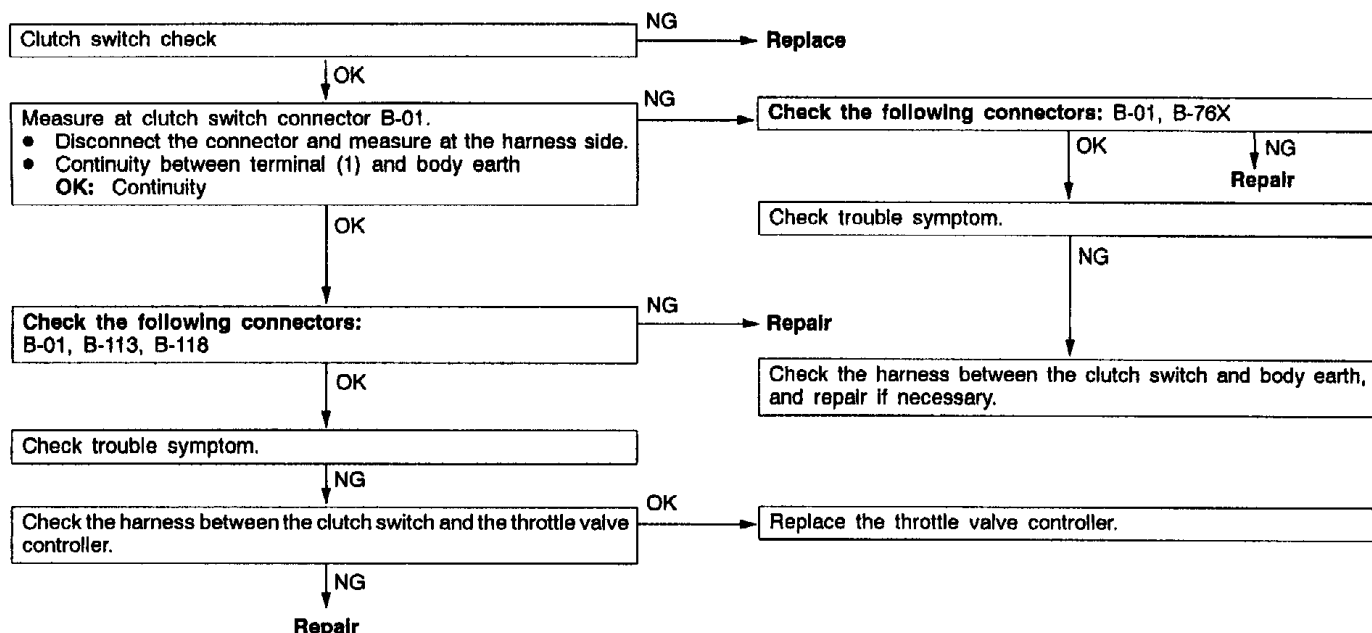
Inspection Procedure 2

Auto-cruise control can not be cancel even if brake pedal is depressed.	Probable cause
The cause is probably a malfunction of the stop lamp switch, or the stop lamp circuit.	● Malfunction of the connector or the harness ● Malfunction of the stop lamp switch ● Malfunction of the throttle valve controller ● Malfunction of the engine-ECU



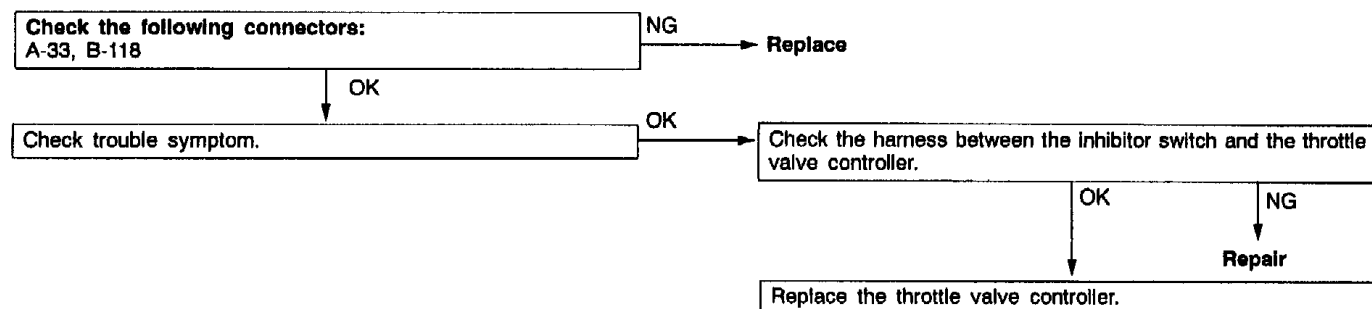
Inspection Procedure 3

Even if clutch pedal is depressed, auto-cruise control is not cancelled. <M/T>	Probable cause
The cause is probably a malfunction of clutch switch or clutch switch circuit.	• Malfunction of the clutch switch • Malfunction of the connector • Malfunction of the harness • Malfunction of the throttle valve controller



Inspection Procedure 4

Even if select lever is set to N range, auto-cruise control is not cancelled. <A/T>	Probable cause
The cause is probably a defective inhibitor switch circuit.	• Malfunction of the connector or harness • Malfunction of the inhibitor switch • Malfunction of the throttle valve controller



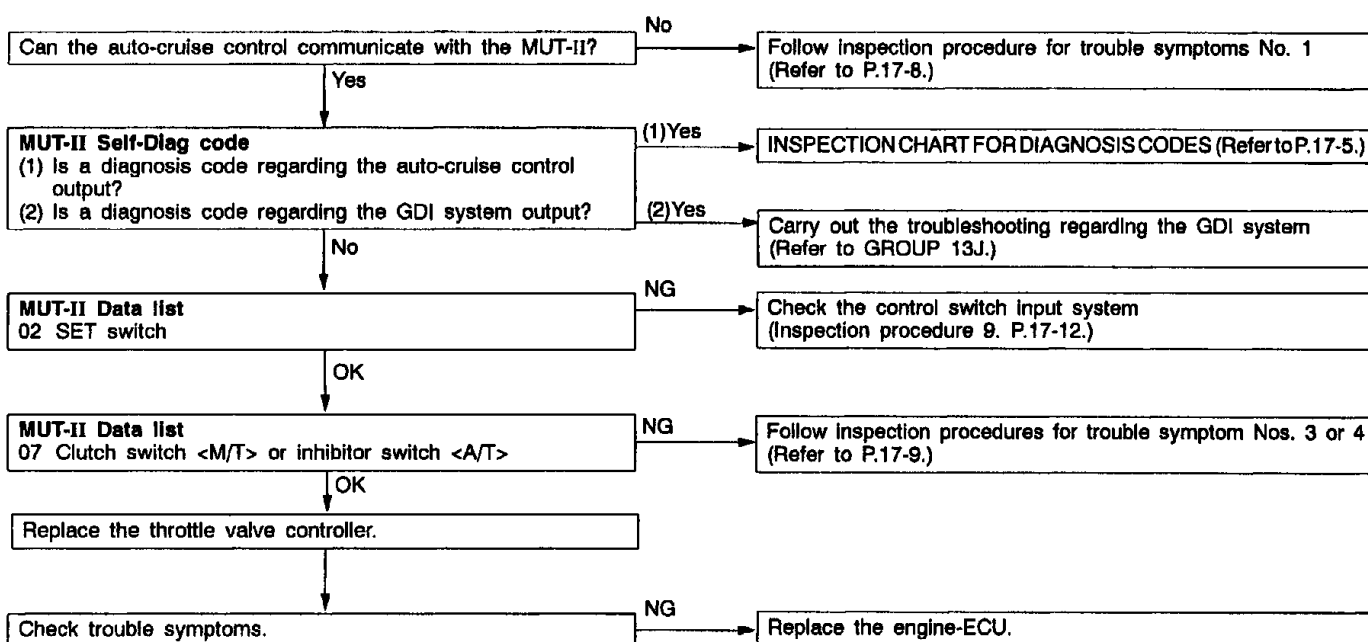
Inspection Procedure 5

Even if auto-cruise control CANCEL switch is set to ON, auto-cruise control is not cancelled.	Probable cause
The cause is probably an open-circuit in the circuit inside the CANCEL switch.	• Malfunction of the auto-cruise control switch

Replace the auto-cruise control switch.

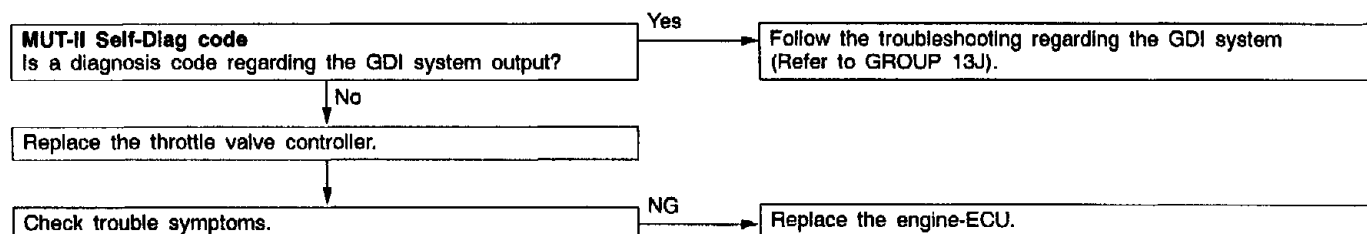
Inspection Procedure 6

Auto-cruise control cannot be set.	Probable cause
The cause is probably that the fail-safe function is cancelling auto-cruise control. In this case, the MUT-II can be used to check the trouble symptoms in each system by inspecting the diagnosis codes. The MUT-II can also be used to check if the circuits of each input switch are normal or not by inspecting the input switch codes.	• Malfunction of the auto-cruise control switch • Malfunction of the harnesses or connectors • Malfunction of the control switch • Malfunction of the throttle valve controller • Malfunction of the engine-ECU



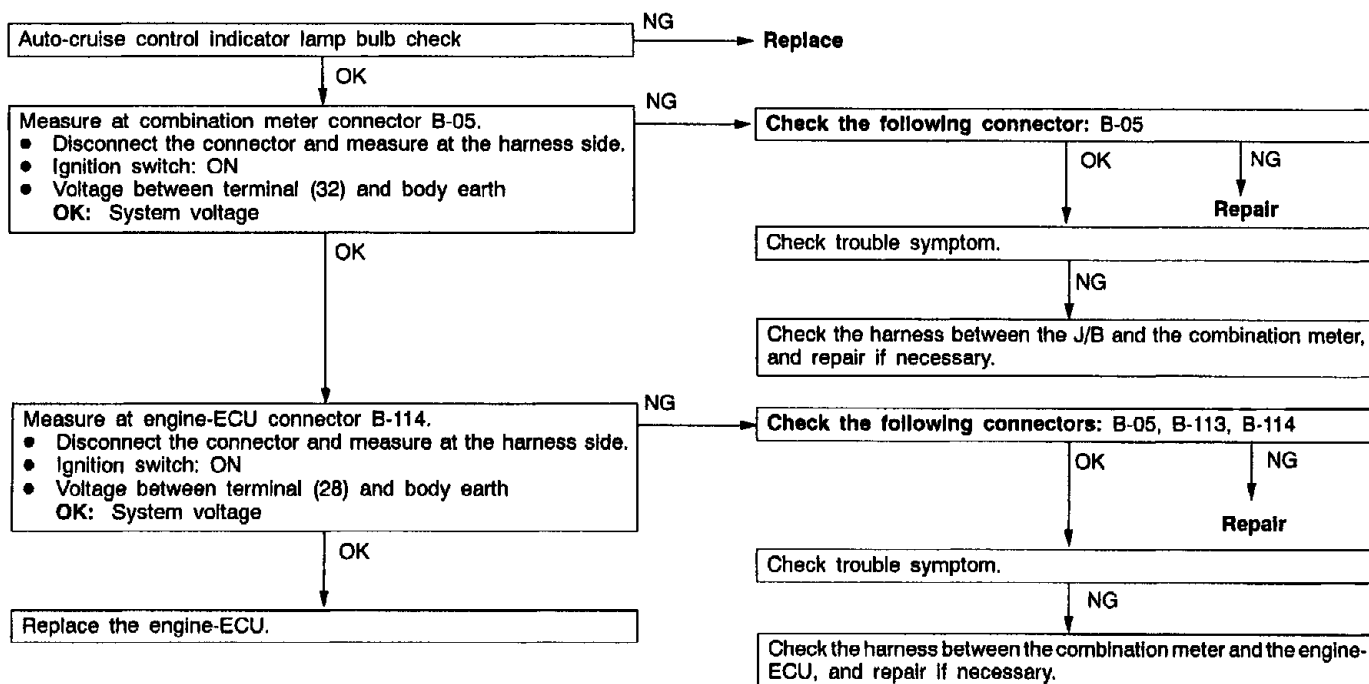
Inspection Procedure 7

Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.	Probable cause
The cause is probably a malfunction of vehicle speed sensor or throttle control servo. In either case, a diagnosis code regarding the GDI system must be confirmed.	• Malfunction of the connector and harness • Malfunction of the vehicle speed sensor • Malfunction of the throttle control servo • Malfunction of the throttle valve controller • Malfunction of the engine-ECU



Inspection Procedure 8

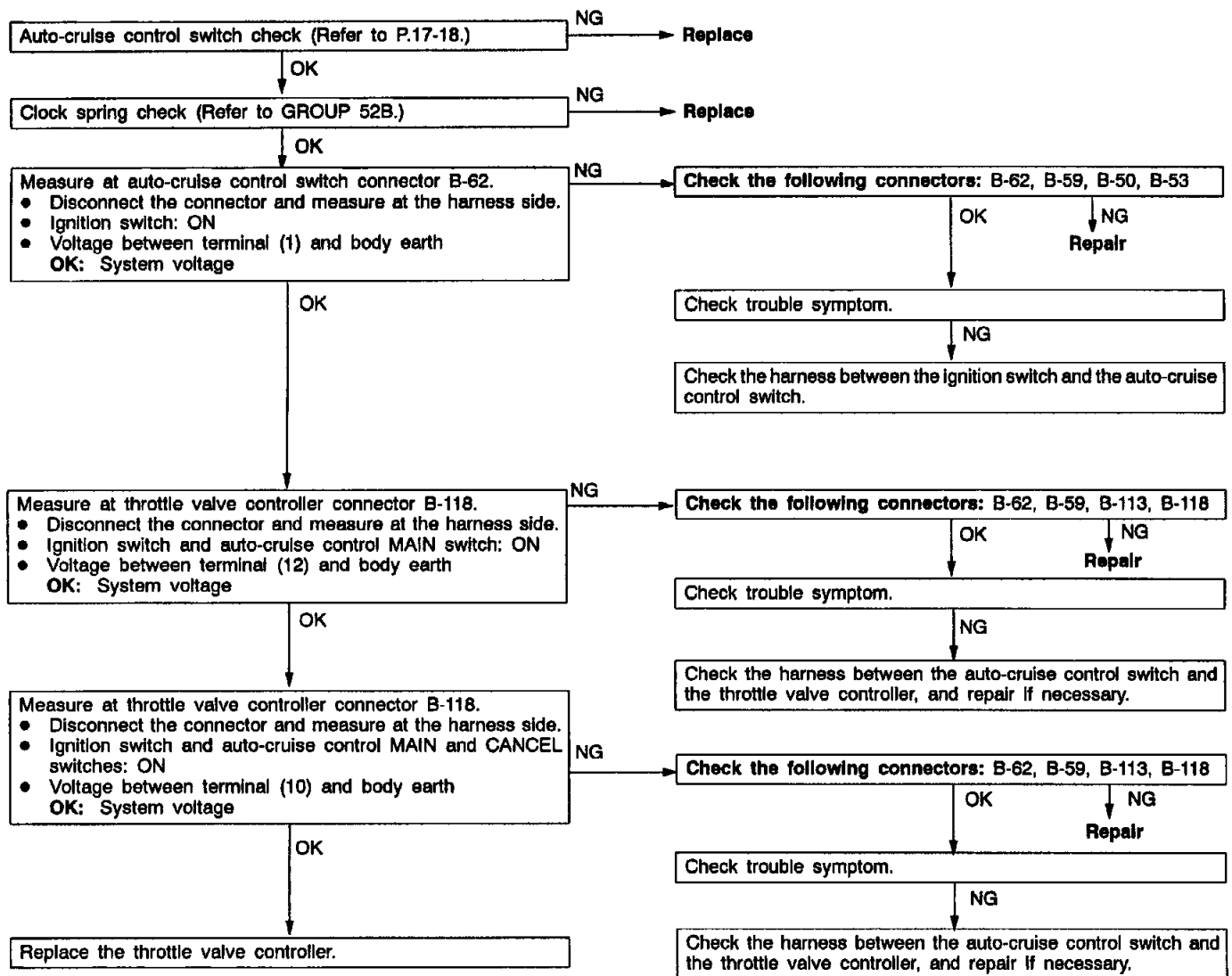
When the MAIN switch of the auto-cruise control switch is turned on, the auto-cruise control indicator lamp does not illuminate. (However, the auto-cruise control is normal.)	Probable cause
There may be a burnt-out bulb or a malfunction of the auto-cruise control indicator lamp circuit.	• Burnt-out bulb • Malfunction of the connector and harness • Malfunction of the engine-ECU



17-12 ENGINE AND EMISSION CONTROL – Auto-cruise Control System <4G9-GDI>

Inspection Procedure 9

Auto-cruise control switch input system check



DATA LIST REFERENCE TABLE

For the data, which is input to the throttle valve controller and the engine-ECU, the following items can be read out by using the MUT-II.

HOW TO READ OUT DATA LIST

1. Connect the MUT-II to the 16-pin diagnosis connector.

Caution

Turn the ignition switch to LOCK (OFF) position before connecting and disconnecting the MUT-II.

2. Turn the ignition switch to ON, and then turn on the auto-cruise control MAIN switch.
3. Select "auto-cruise control" on the MUT-II menu, and then read out the data list.

Item No.	Check item		Check conditions	Normal condition
01	Auto-cruise control switch	MAIN	MAIN switch: ON	ON
			MAIN switch: OFF	OFF
02		SET	SET switch: ON	ON
			SET switch: OFF	OFF
03		RESUME	RESUME switch: ON	ON
			RESUME switch: OFF	OFF
04		CANCEL	CANCEL switch: ON	ON
			CANCEL switch: OFF	OFF
05	Stop lamp switch	Brake pedal: Depressed	ON	
		Brake pedal: Released	OFF	
06	Stop lamp switch	Brake pedal: Depressed	OFF	
		Brake pedal: Released	ON	
07	Clutch switch <M/T>	Clutch pedal: Depressed	ON	
		Clutch pedal: Released	OFF	
	Inhibitor switch <A/T>	Selector lever: N position	ON	
		Selector lever: Other than N position	OFF	
08	Accelerator pedal position switch	Accelerator pedal: Released	ON	
		Accelerator pedal: Depressed	OFF	
09	Auto-cruise control	Auto-cruise control: Activated	ON	
		Auto-cruise control: No activated	OFF	
10	Vehicle speed sensor	Road test the vehicle	The speedometer and the MUT-II display the same value.	
11	Throttle position sensor (1st channel)	Accelerator pedal: Released	450 – 800 mV	
		Accelerator pedal: Depressed	The more deeply the pedal is depressed, the higher value the MUT-II displays	
		Accelerator pedal: Fully depressed	4,200 – 4,900 mV	
12	Accelerator pedal position sensor (2nd channel)	Accelerator pedal: Released	935 – 1,135 mV	
		Accelerator pedal: Depressed	The more deeply the pedal is depressed, the higher value the MUT-II displays	
		Accelerator pedal: Fully depressed	4,000 mV or more	

17-14 ENGINE AND EMISSION CONTROL – Auto-cruise Control System <4G9-GDI>

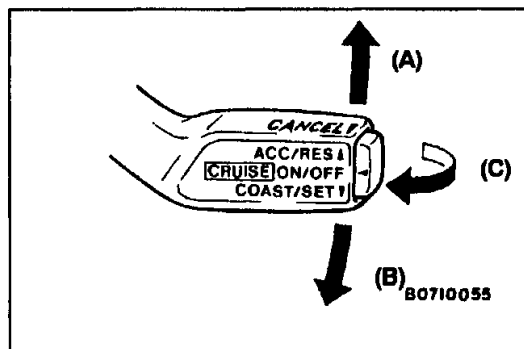
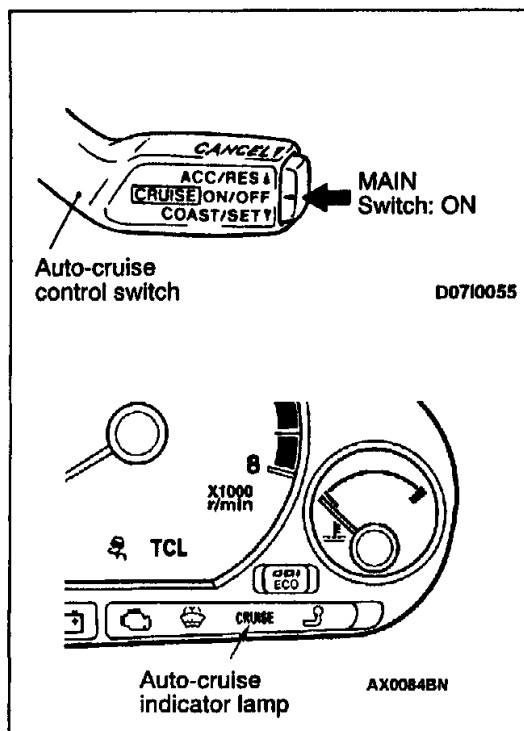
CHECK AT THE THROTTLE VALVE CONTROLLER TERMINALS

1	2	3	4	5	6	7	8	9	10	11	12	13
14	15	16	17	18	19	20	21	22	23	24	25	26

00009994

Terminal No.	Check item	Check conditions		Normal condition
1	Throttle control servo (A+)	Ignition switch: ON Accelerator pedal: Fully depressed position to released position		Value changes
9	Throttle control servo (B+)			
14	Throttle control servo (A-)			
15	Throttle control servo (B-)			
2	Throttle control servo power supply	Ignition switch: ON		System voltage
3, 4, 16	Earth	–		0 V
5	Power supply	Ignition switch: ON		System voltage
6	Sensor power supply	Ignition switch: ON		4.5 – 5.5 V
7	Throttle position sensor (1st channel)	Ignition switch: ON	Accelerator pedal: Released	0.4 – 0.8 V
			Accelerator pedal: Fully depressed	4.2 – 4.9 V
10	Auto-cruise control switch	Ignition switch: ON MAIN switch: ON	SET switch: ON	Approximately 3 V
			RESUME switch: ON	Approximately 6 V
			CANCEL switch: ON	System voltage
			All switches: OFF	0 V
11	Clutch switch <M/T>	Ignition switch: ON	Clutch pedal: Depressed	0 V
			Clutch pedal: Released	8 – 14 V
	Inhibitor switch <A/T>	Ignition switch: ON	Selector lever: N or P position	0 V
			Selector lever: Other than the above	8 – 14 V
12	Auto-cruise control switch	Ignition switch: ON	MAIN switch: ON	System voltage
			MAIN switch: OFF	0 V
17	Sensor earth	–		0 V

Terminal No.	Check item	Check conditions		Normal condition
20	Accelerator pedal position sensor (2nd channel)	Ignition switch: ON	Accelerator pedal: Released	0.9 – 1.2 V
			Accelerator pedal: Fully depressed	4 V or more
22	Ignition switch (IG)	Ignition switch: ON		System voltage
23	Auto-cruise control cancel latch signal	Auto-cruise control: Activated		0 V
		Auto-cruise control: Not activated		System voltage
25	Stop lamp switch	Brake pedal: Depressed		System voltage
		Brake pedal: Released		0 V
26	Stop lamp switch	Ignition switch: ON	Brake pedal: Depressed	0 V
			Brake pedal: Released	System voltage



ON-VEHICLE SERVICE

The other items than the below are the same as the ones for 4G9-MPI.

AUTO-CRUISE CONTROL SWITCH CHECK

AUTO-CRUISE MAIN SWITCH CHECK

1. Turn the ignition key to ON.
2. Check to be sure that the indicator lamp within the combination meter illuminates when the MAIN switch is switched ON.

AUTO-CRUISE CONTROL SETTING

1. Switch ON the MAIN switch.
2. Drive at the desired speed within the range of approximately 40 – 200 km/h.
3. Push the auto-cruise control switch in the direction of arrow (B).
4. Check to be sure that when the switch is released the speed is the desired constant speed.

NOTE

If the vehicle's speed decreases to approximately 15 km/h below the set speed because of climbing a hill for example, the auto-cruise control will be cancelled.

SPEED-INCREASE SETTING

1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow (A).
3. Check to be sure that acceleration continues while the switch is held, and that when it is released the constant speed at the time when it was released becomes the driving speed.

NOTE

Acceleration can be continued even if the vehicle speed has passed the high-speed limit (approx. 200 km/h). But the speed when the auto-cruise control switch is released will be recorded as the high-speed limit.

SPEED-REDUCTION SETTING

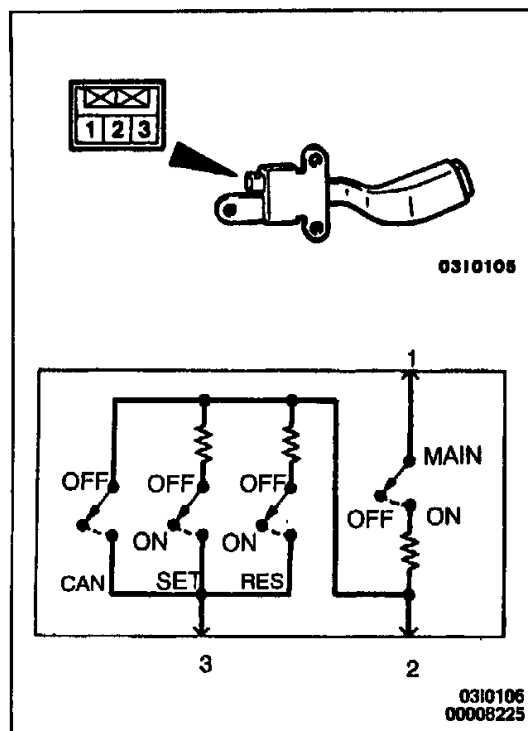
1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow (B).
3. Check to be sure that deceleration continues while the switch is pressed, and that when it is released the constant speed at the time when it was released becomes the driving speed.

NOTE

When the vehicle speed reaches the low limit (approximately 40 km/h) during deceleration, the auto-cruise control will be cancelled.

RETURN TO THE SET SPEED BEFORE CANCELLATION AND AUTO-CRUISE CONTROL CANCELLATION

1. Set the auto-cruise speed control.
2. When any of the following operations are performed while at constant speed during auto-cruise control, check if normal driving is resumed and deceleration occurs.
 - a. The auto-cruise control switch is pushed in the direction of arrow (C).
 - b. The brake pedal is depressed.
 - c. The clutch pedal is depressed. <M/T>
 - d. The selector lever is moved to the "N" range. <A/T>
3. When the auto-cruise control switch is pushed in the direction of arrow (A) at a vehicle speed of 40 km/h or higher, check if the vehicle speed returns to the speed before auto-cruise control driving was cancelled, and constant speed driving occurs.
4. When the MAIN switch is turned to OFF while driving at constant speed, check if normal driving is resumed and deceleration occurs.



AUTO-CRUISE CONTROL

INSPECTION

AUTO-CRUISE CONTROL SWITCH CHECK

Measure the resistance between the terminals when each of the SET, RESUME, CANCEL and MAIN switches is pressed. If the values measured at this time correspond to those in the table below, then there is no problem.

Switch position	Resistance between terminals	
Switch OFF	No continuity	
CANCEL switch: ON	Terminals 1 and 3	Approx. 3.9 k Ω
	Terminals 2 and 3	Approx. 0 Ω
RESUME switch: ON	Terminals 1 and 3	Approx. 4.8 k Ω
	Terminals 2 and 3	Approx. 910 Ω
SET switch: ON	Terminals 1 and 3	Approx. 4.1 k Ω
	Terminals 2 and 3	Approx. 220 Ω
MAIN switch: ON	Terminals 1 and 2	Approx. 3.9 k Ω

EMISSION CONTROL SYSTEM <4G9>

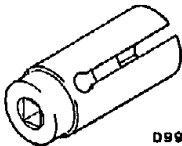
GENERAL

OUTLINE OF CHANGES

The service procedures have been revised due to the following changes:

- The purge port vacuum characteristics has been changed <MPI>.
- The purge port nipple has been relocated <GDI>.
- The catalytic converter has been changed.

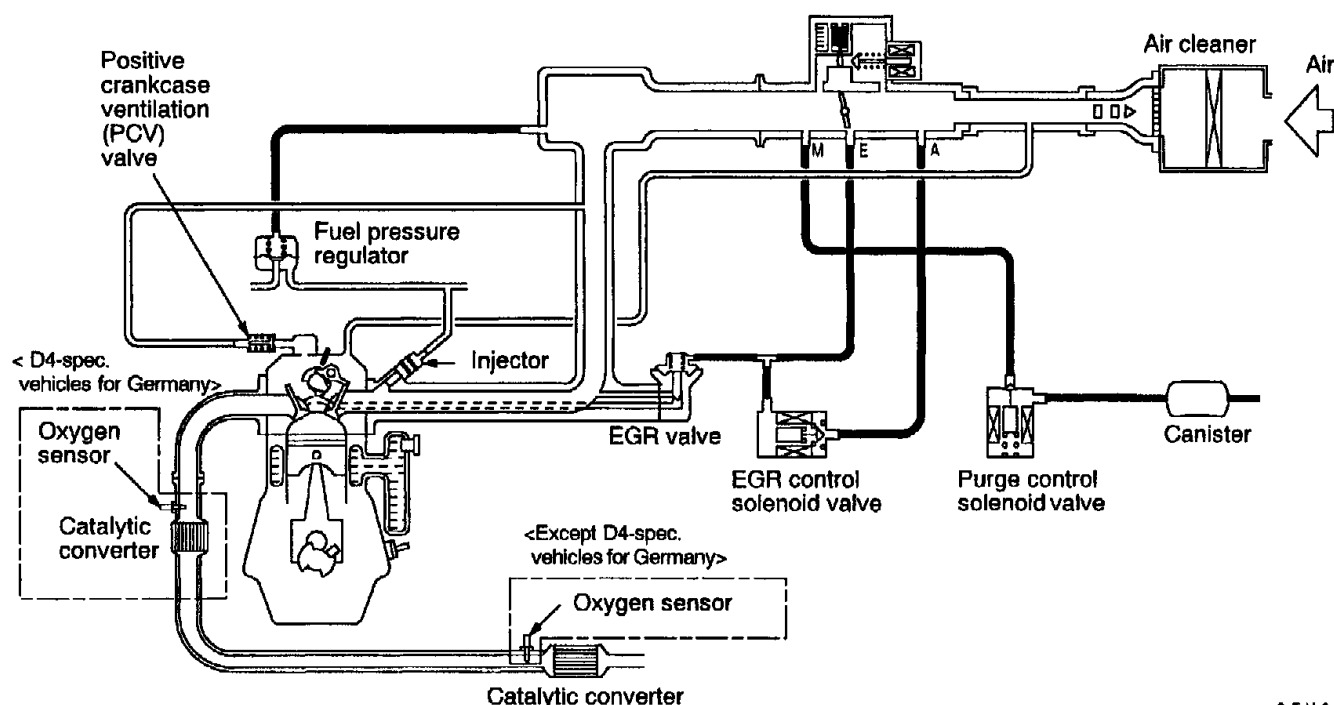
SPECIAL TOOL

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

VACUUM HOSE

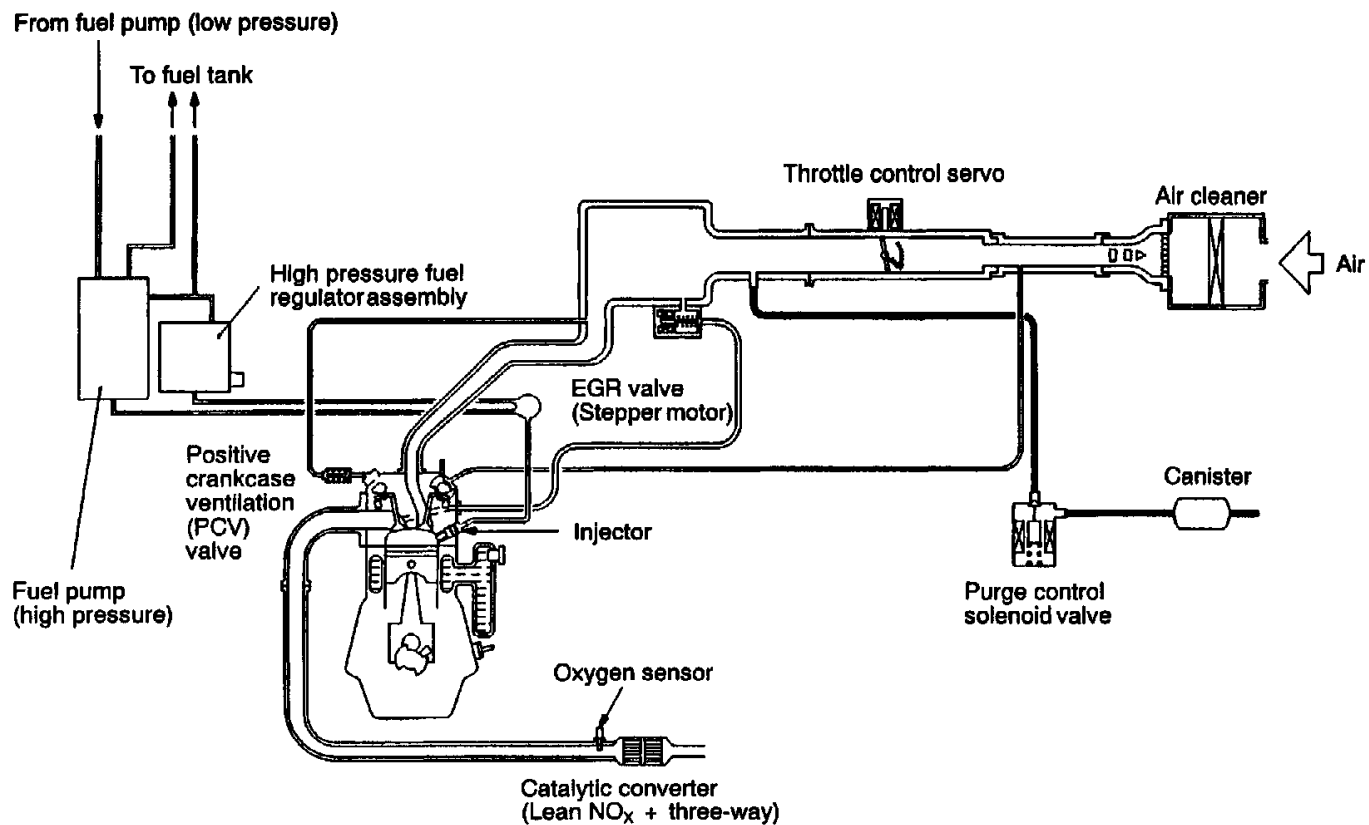
VACUUM HOSE PIPING DIAGRAM

<MPI>



9FU0961

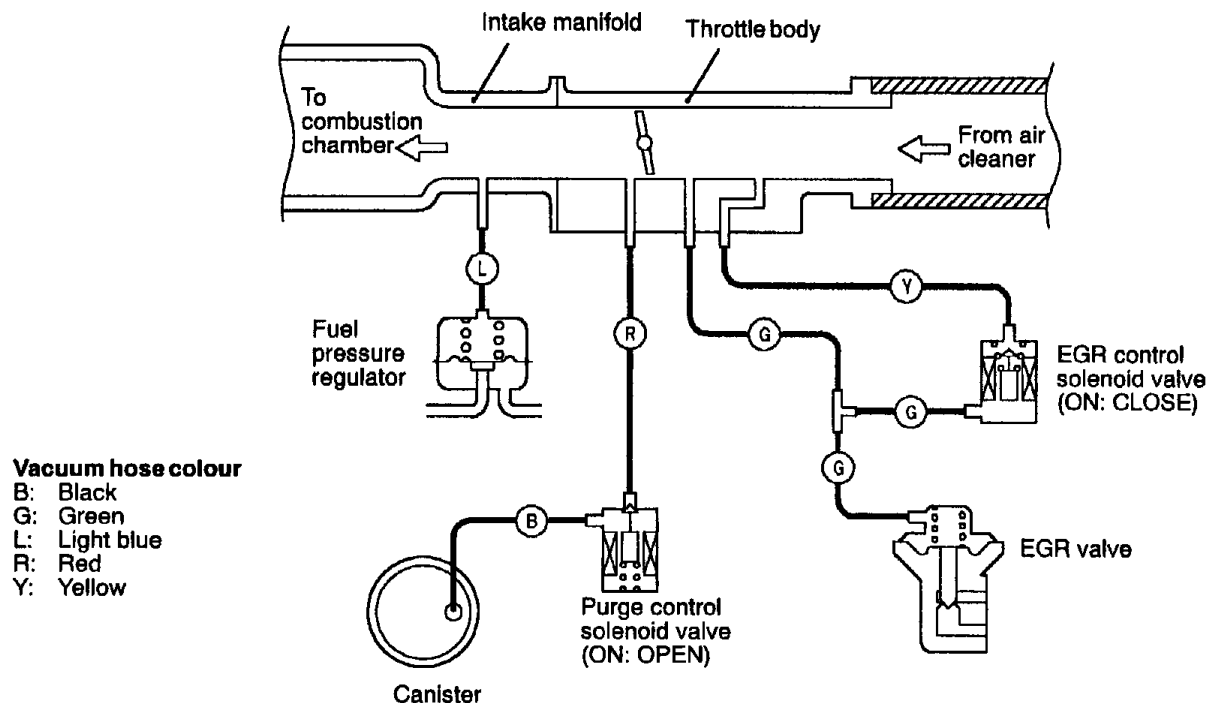
<GDI>



9FU0933

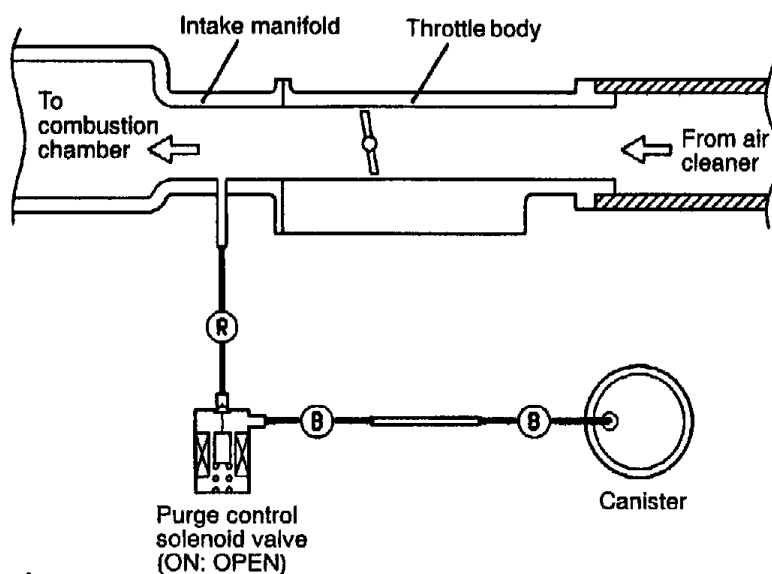
VACUUM CIRCUIT DIAGRAM

<MPI>



9FU0962

<GDI>



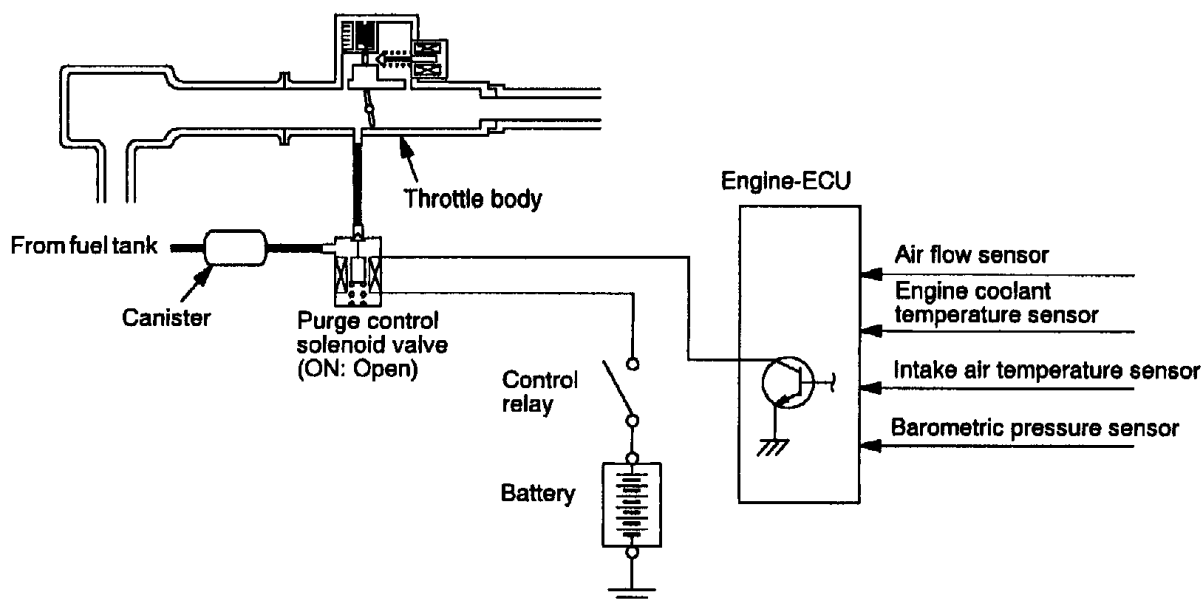
Vacuum hose colour
 B: Black
 R: Red

W6048AE

EVAPORATIVE EMISSION CONTROL SYSTEM

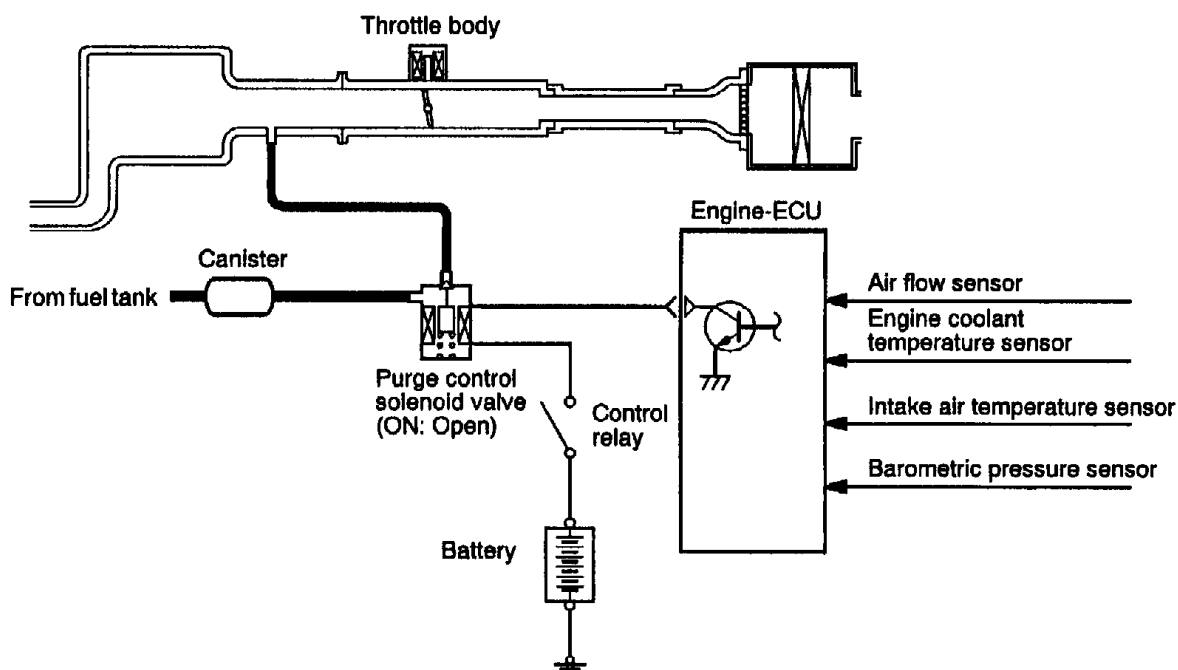
SYSTEM DIAGRAM

<MPI>

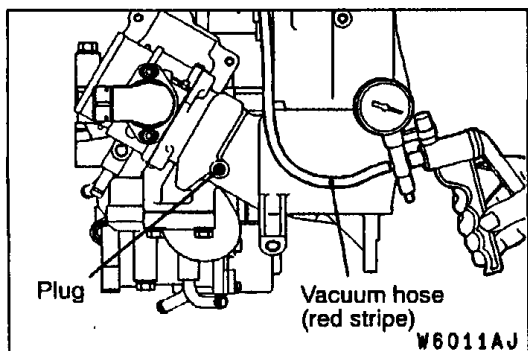


9FU0960

<GDI>



6EM0679

**PURGE CONTROL SYSTEM CHECK <GDI>**

1. Disconnect the vacuum hose (red stripe) from the intake manifold, and connect it to a hand vacuum pump.
2. Plug the nipple from which the vacuum hose was removed.
3. When the engine is cold or hot, apply a vacuum of 53 kPa, and check the condition of the vacuum.

When engine is cold

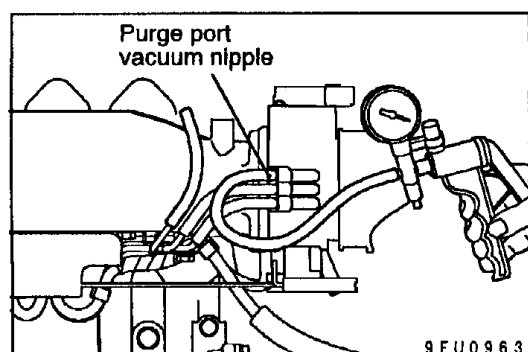
(Engine coolant temperature: 40°C or less)

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

When engine is hot

(Engine coolant temperature: 80°C or higher)

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

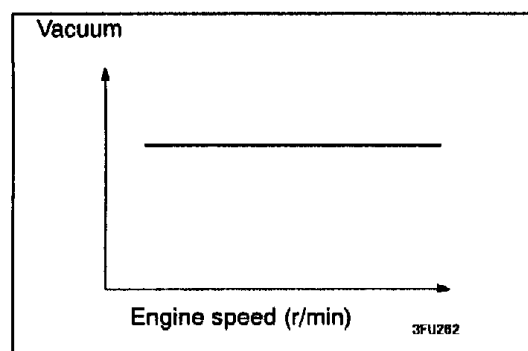
**PURGE PORT VACUUM CHECK <MPI>**

1. Disconnect the vacuum hose (red stripe) from the throttle body purge vacuum nipple and connect a hand vacuum pump to the nipple.

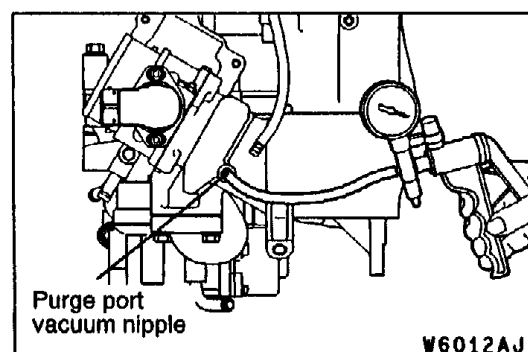
2. Start the engine and check that the vacuum remains fairly constant after racing the engine.

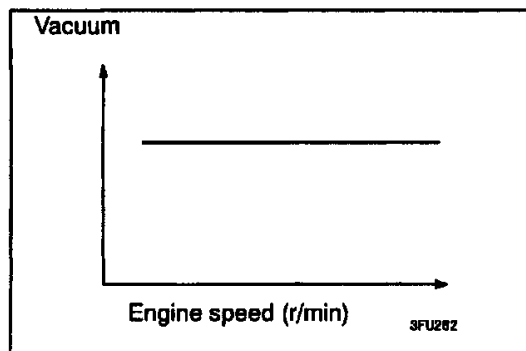
NOTE

If vacuum changes, it is possible that the throttle body purge port may be clogged and require cleaning.

**PURGE PORT VACUUM CHECK <GDI>**

1. Disconnect the vacuum hose (red stripe) from the intake manifold purge vacuum nipple and connect a hand vacuum pump to the nipple.





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

NOTE

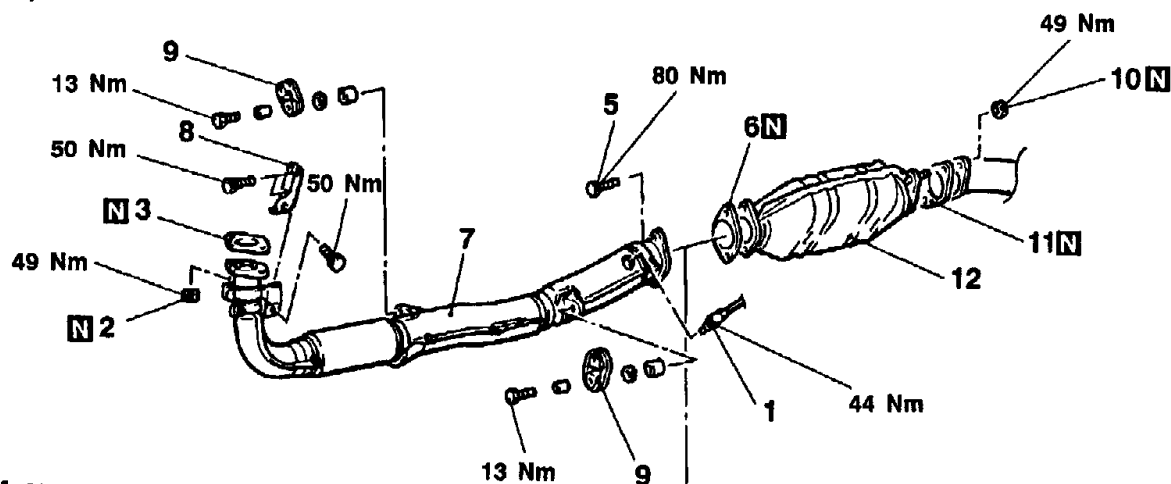
If vacuum changes, it is possible that the intake manifold purge port may be clogged and require cleaning.

CATALYTIC CONVERTER

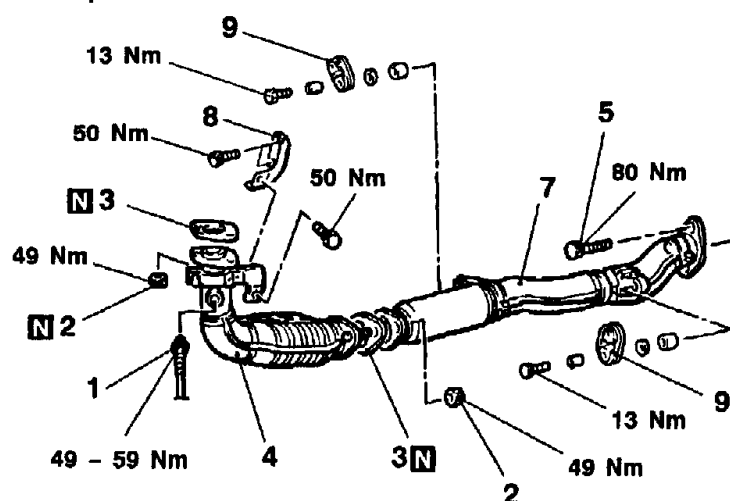
REMOVAL AND INSTALLATION

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

<MPI-D3 spec.>



<MPI-D4 spec.>



AX0040BN

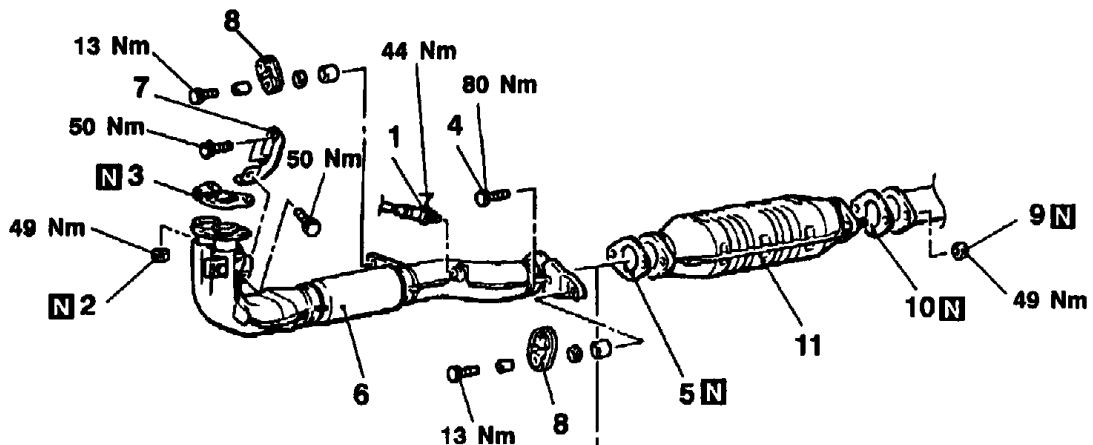
Removal steps



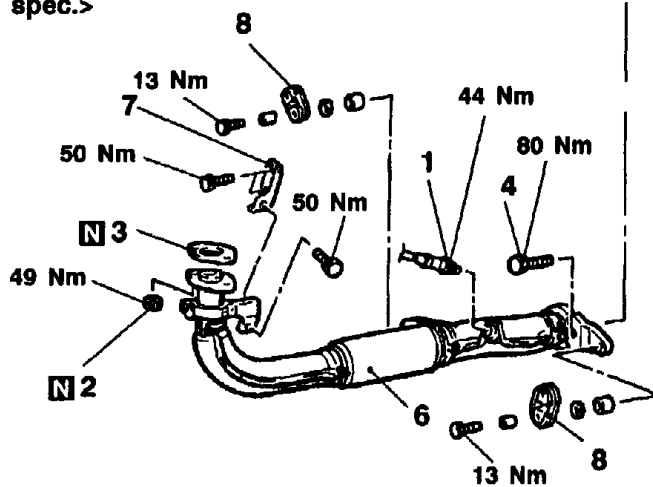
1. Oxygen sensor
2. Self-locking nut
3. Gasket
4. Front catalytic converter
<MPI-D4 spec.>
5. Bolt
6. Gasket

7. Front exhaust pipe
8. Front exhaust pipe bracket
9. Hanger
10. Self-locking nut
11. Gasket
12. Catalytic converter

<GDI-D3 spec.>



<GDI-D4 spec.>

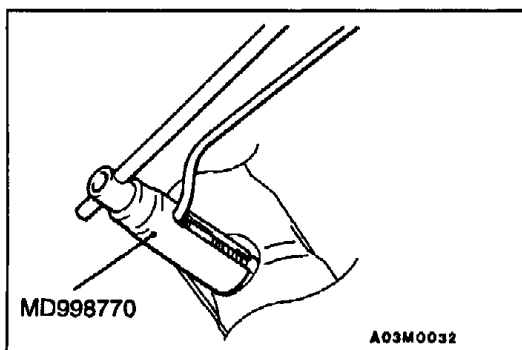


AX0041BN

Removal steps

1. Oxygen sensor
2. Self-locking nut
3. Gasket
4. Bolt
5. Gasket
6. Front exhaust pipe

7. Front exhaust pipe bracket
8. Hanger
9. Self-locking nut
10. Gasket
11. Catalytic converter

**REMOVAL SERVICE POINT**

◀A▶ OXYGEN SENSOR REMOVAL

INSTALLATION SERVICE POINT

▶A◀ OXYGEN SENSOR INSTALLATION

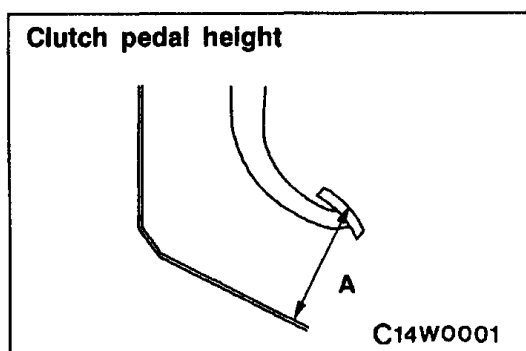
GROUP 21

CLUTCH

GENERAL

OUTLINE OF CHANGE

- Due to the addition of the clutch switch, the following service procedures has been added <1800>.
- (1) Clutch pedal inspection and adjustment
 - (2) Clutch pedal removal and installation
 - (3) Clutch switch check



ON-VEHICLE SERVICE

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

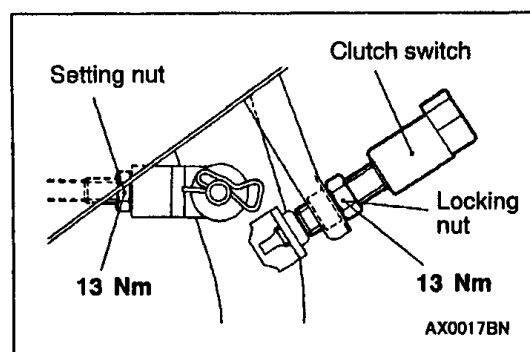
The clutch pedal height check and adjustment procedures have been revised as follows. The other procedures are the same as before.

1. Turn up the carpet, etc. under the clutch pedal.
2. Measure the clutch pedal height.

Standard value (A):

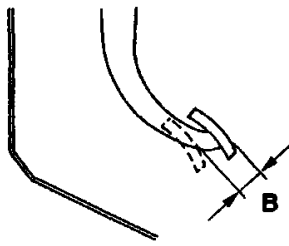
163.5 – 166.5 mm <L.H. drive vehicles>

171.2 – 174.2 mm <R.H. drive vehicles>



3. If the height of the clutch pedal is outside the standard value, loosen the lock nut and adjust the pedal height to the standard value using the clutch switch or push rod.

Clutch pedal clevis pin play



A14W0002

4. Measure the play at the clutch pedal clevis pin.
Standard value (B): 1 – 3 mm
5. If the clutch pedal pin play is not within the standard value, loosen the locking nut and move the push rod to adjust.

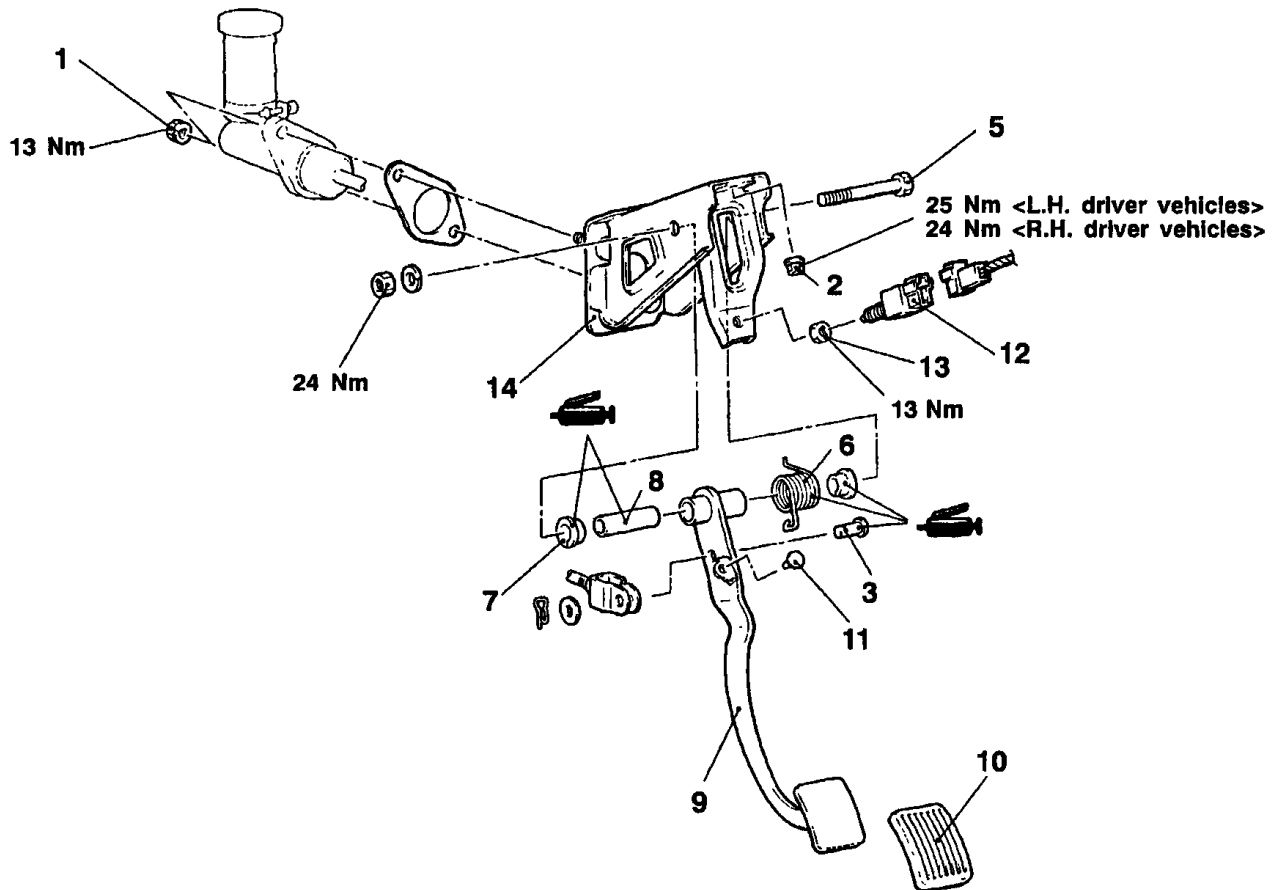
Caution

Do not push in the master cylinder push rod at this time.

6. Turn back the carpet, etc.

CLUTCH PEDAL <1800>**REMOVAL AND INSTALLATION****Post-Installation Operation**

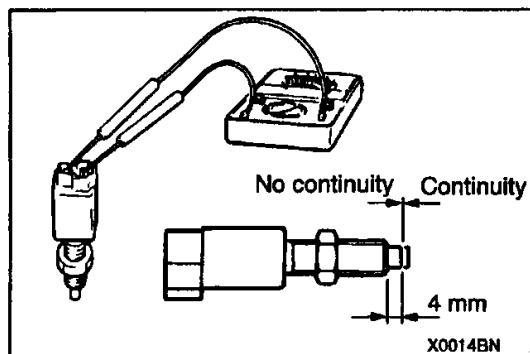
- Clutch Pedal Adjustment (Refer to P.21-1.)



AX0013BN

Removal steps

1. Clutch master cylinder installation nut	7. Clutch pedal bushing
2. Master cylinder member installation nut	8. Pipe
3. Clevis pin	9. Clutch pedal
4. Pedal support member and clutch pedal assembly	10. Pedal pad
5. Bolt	11. Stopper
6. Clutch pedal return spring	12. Clutch switch
	13. Lock nut
	14. Master cylinder member assembly



INSPECTION

CLUTCH SWITCH CHECK

1. Connect an ohmmeter between the clutch switch terminals.
2. The clutch switch is in good condition if there is no continuity when the plunger is pushed in to a depth of within 4 mm from the outer case edge surface, and if there is continuity when it is released.

GROUP 22

MANUAL TRANSMISSION

GENERAL

OUTLINE OF CHANGES

The service procedures have been revised due to the following changes:

- The double-cone synchronizer mechanism has been used for the 1st-speed gear in addition to the 2nd-speed gear <F5M42>.
- The final reduction ratio has been changed from 3.722 to 4.058 <F5M42>.
- The shift lever assembly has been changed.

TRANSMISSION CONTROL <F5MR1, F5MR3>

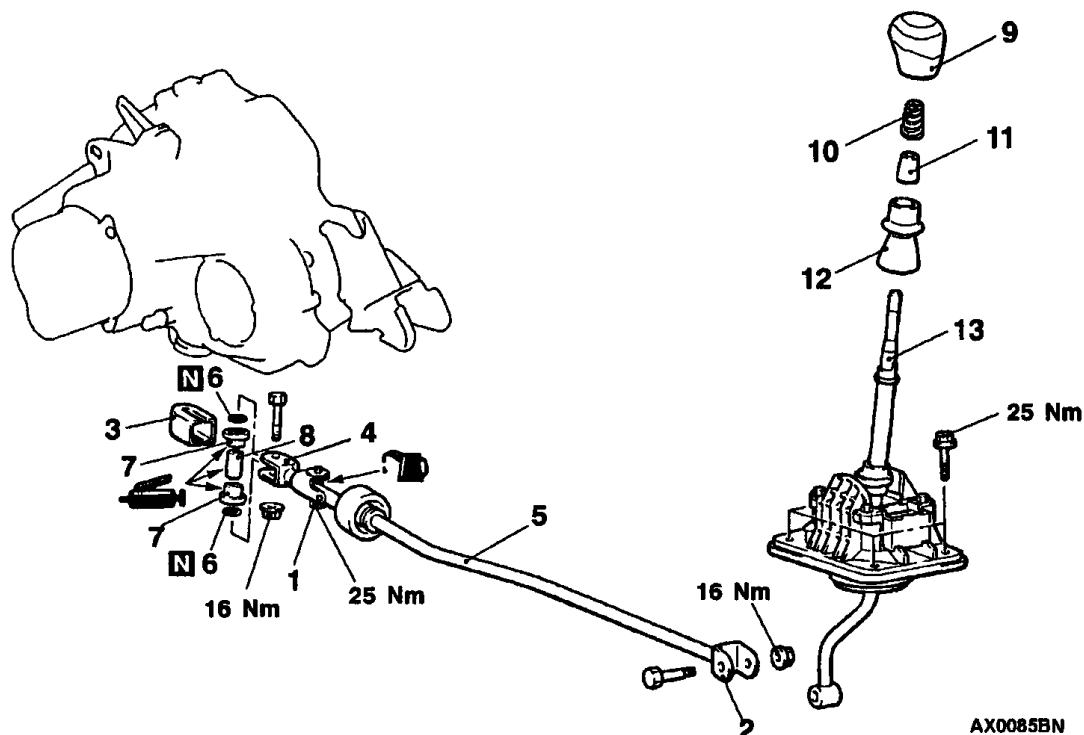
REMOVAL AND INSTALLATION

Caution: SRS

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

Post-Installation Operation

- Reverse Mis-operation Prevention Function Check
- Shift Lever Operation Check



Shift rod assembly removal steps

1. Shift rod adjusting bolt
2. Shift rod assembly connection (Shift lever side)
3. Shift rod cap
4. Shift rod assembly connection (Transmission side)
5. Shift rod assembly
6. O-ring
7. Shift rod bushing
8. Collar



Shift lever assembly removal steps

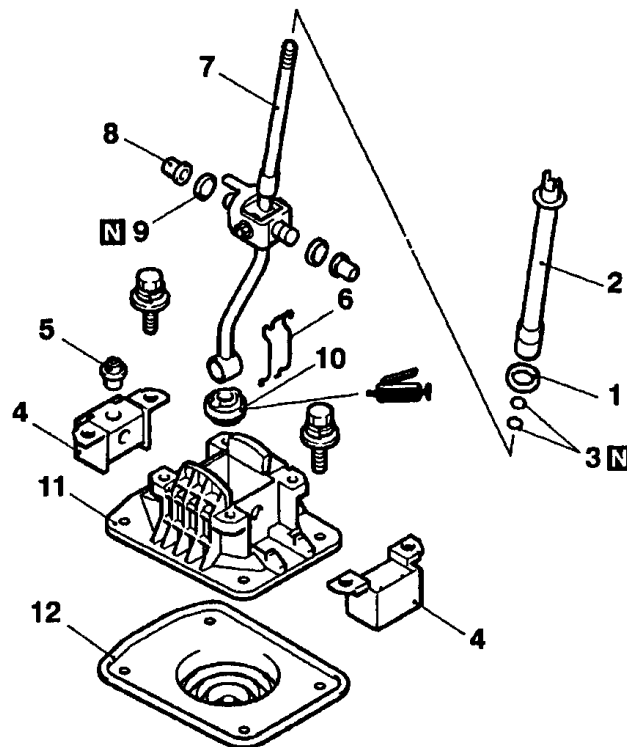
2. Shift rod assembly connection (Shift lever side)
9. Shift knob
10. Spring
11. Foam
12. Locking knob
 - Front floor console assembly (Refer to GROUP 52A.)
13. Shift lever assembly

REMOVAL SERVICE POINT

◀A▶ SHIFT ROD ASSEMBLY DISCONNECTION

Suspend the shift rod assembly from the vehicle with wire.

SHIFT LEVER ASSEMBLY DISASSEMBLY AND REASSEMBLY



BW0244AJ

Disassembly steps

1. Stopper rubber A
2. Locking tube
3. O-ring
4. Insulator
5. Detent assembly
6. Steel rod

7. Shift lever assembly
8. Shift bushing
9. O-ring
10. Lower stopper assembly
11. Base assembly
12. Dust cover

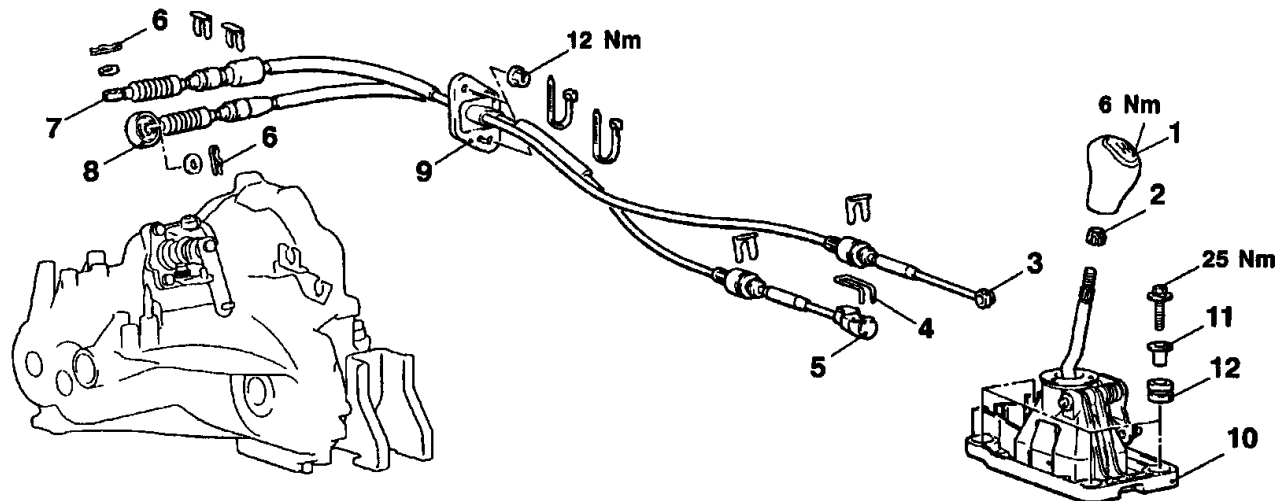
TRANSMISSION CONTROL <F5M42>

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
Shift Lever Operation Check



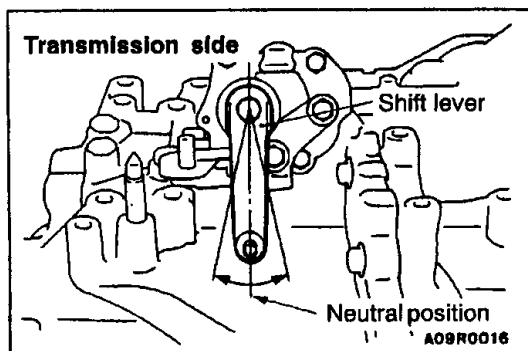
AX0086BN

Shift cable and select cable assembly removal steps

- Air cleaner assembly
- 1. Shift knob
- 2. Sleeve
- Front floor console assembly (Refer to GROUP 52A)
- 3. Select cable connection (passenger compartment side)
- 4. Clip
- 5. Shift cable connection (passenger compartment side)
- 6. Snap pin
- ▶◀ 7. Select cable connection (Transmission side)
- ▶◀ 8. Shift cable connection (Transmission side)
- ▶◀ 9. Shift cable and select cable assembly

Shift lever assembly removal steps

- 1. Shift knob
- 2. Sleeve
- Front floor console assembly (Refer to GROUP 52A)
- 3. Select cable connection (passenger compartment side)
- 4. Clip
- 5. Shift cable connection (passenger compartment side)
- 10. Shift lever assembly
- 11. Distance piece
- 12. Bushing

**INSTALLATION SERVICE POINT****►A◄ SHIFT CABLE AND SELECT CABLE ASSEMBLY/
SHIFT CABLE CONNECTION/SELECT CABLE
CONNECTION**

1. Set the transmission side shift lever and the passenger compartment side shift lever to the neutral position.
2. For the transmission side, face the white and yellow paint marks on the shift and select cable ends to the snap pins, and install the cables.
3. Move the shift lever to all positions and check that the operation is smooth.

AUTOMATIC TRANSMISSION

CONTENTS

GENERAL	2	ON-VEHICLE SERVICE	23
Outline of Changes	2	A/T Control Component Location	23
GENERAL INFORMATION	2	Selector Lever Operation Check	23
TROUBLESHOOTING	2	TRANSMISSION CONTROL*	24

WARNING 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 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, side impact sensors 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 A/T-ECU idle position switch terminal has been discontinued.
- The auto-cruise control terminal has been discontinued from the engine-A/T-ECU <4G9-MPI>.
- The shift pattern has been changed.
- The final reduction ratio has been changed.
- The selector lever assembly has been changed.

GENERAL INFORMATION

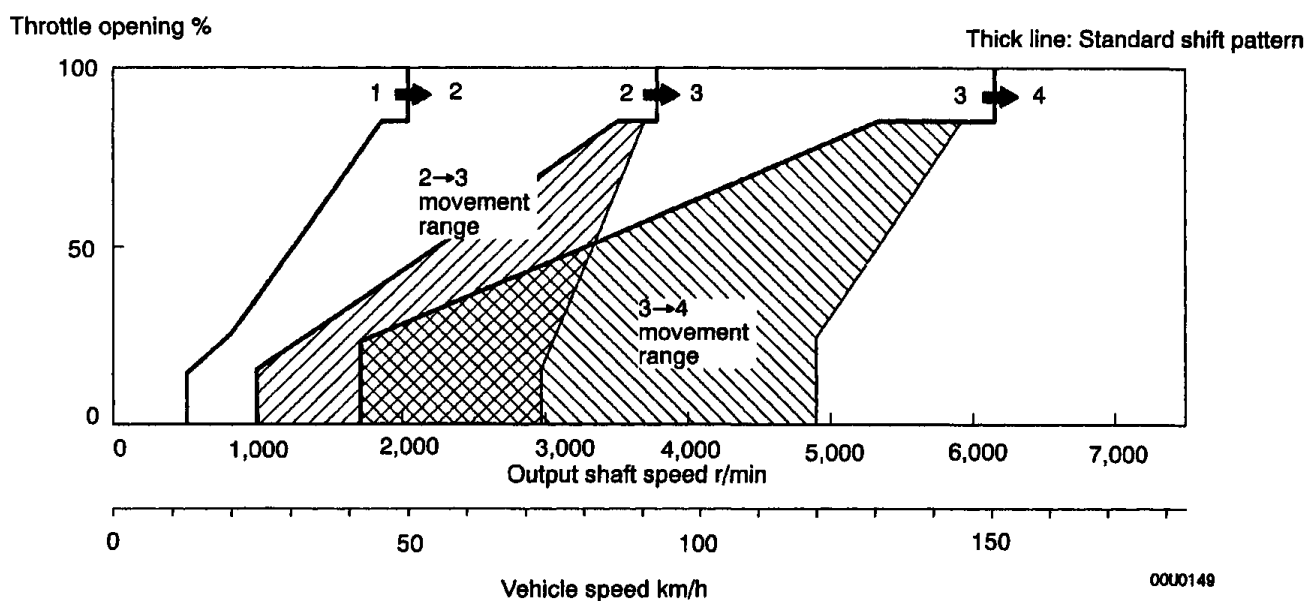
Transmission model	F4A41	F4A42
Engine model	4G9-MPI	4G9-GDI
Final reduction ratio	4.407	4.042

TROUBLESHOOTING

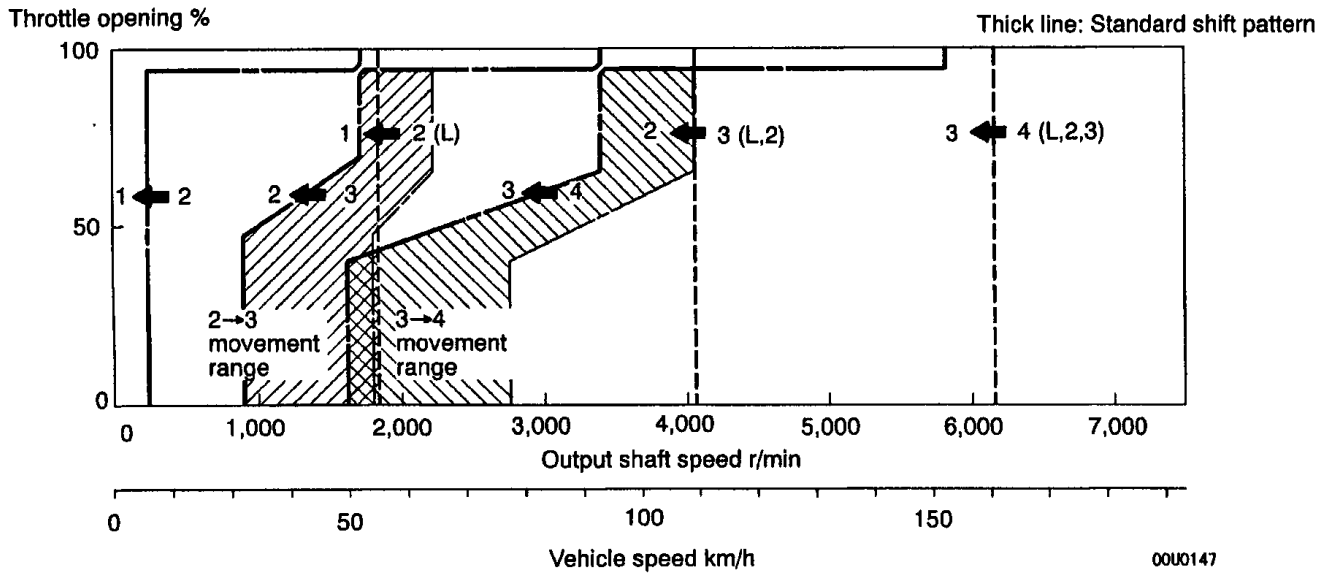
SHIFT PATTERN

<MPI>

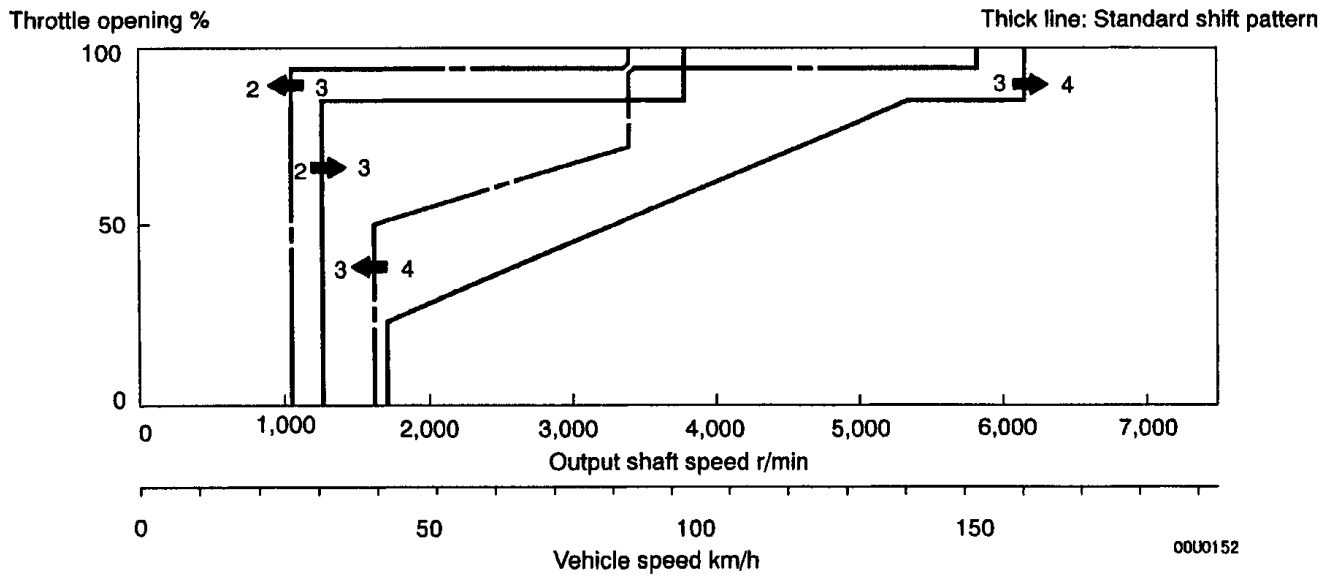
UPSHIFT PATTERN



DOWNSHIFT PATTERN

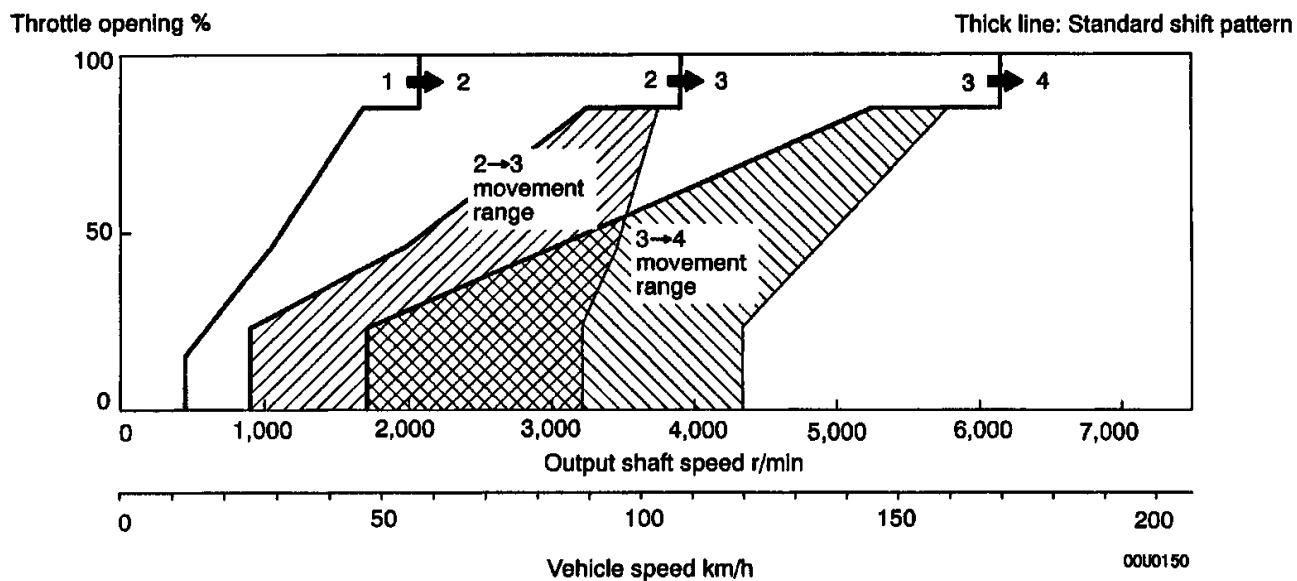


HOLD MODE PATTERN

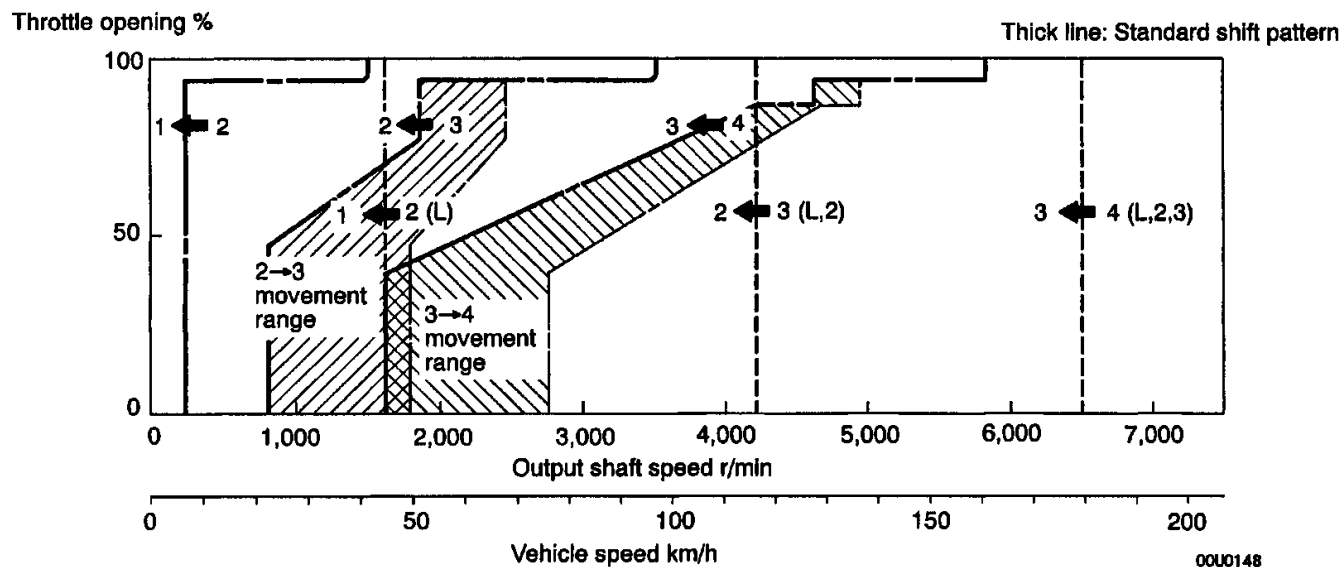


<GDI>

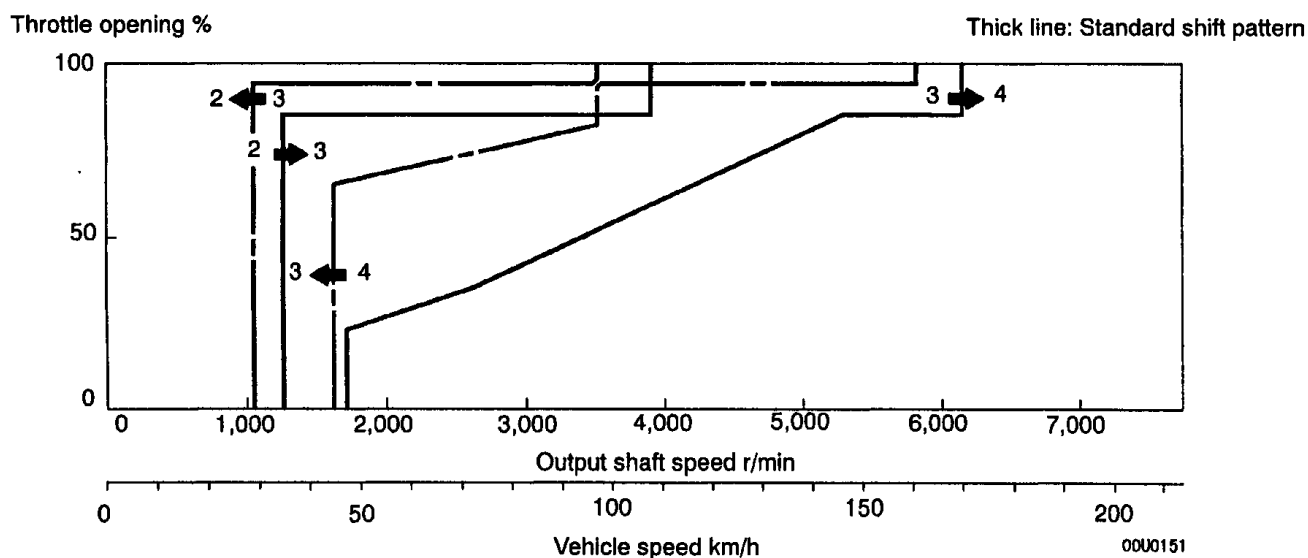
UPSHIFT PATTERN



DOWNSHIFT PATTERN



HOLD MODE PATTERN



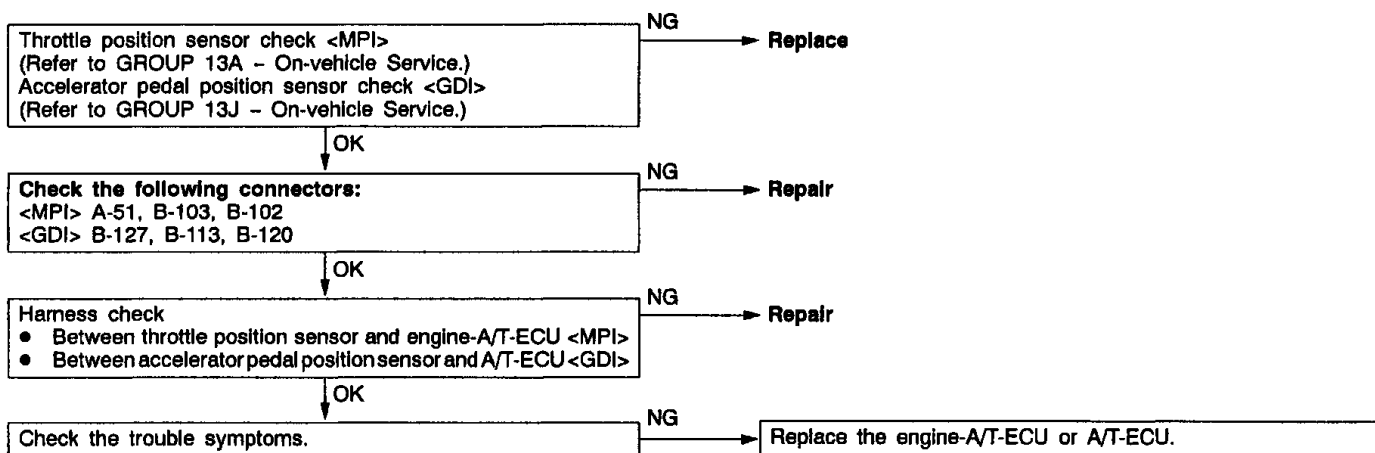
INSPECTION CHART FOR DIAGNOSIS CODE

Code	Diagnosis item	Reference page
11	Throttle position sensor system <MPI>	Short circuit 23-6
12	Accelerator pedal position sensor system <GDI>	Open circuit 23-6
14		Sensor maladjustment 23-6
15	Oil temperature sensor system	Open circuit 23-6
21	Crank angle sensor system	Open circuit 23-7
22	Input shaft speed sensor system	Short circuit/open circuit 23-7
23	Output shaft speed sensor system	Short circuit/open circuit 23-8
25	Wide open throttle switch system	Short circuit 23-8
26	Stop lamp switch system	Short circuit/open circuit 23-9
31	Low and reverse solenoid valve system	Short circuit/open circuit 23-9
32	Underdrive solenoid valve system	Short circuit/open circuit 23-9
33	Second solenoid valve system	Short circuit/open circuit 23-9
34	Overdrive solenoid valve system	Short circuit/open circuit 23-9
36	Damper control clutch solenoid valve system	Short circuit/open circuit 23-10
41	1st gear ratio does not meet the specification	23-10
42	2st gear ratio does not meet the specification	23-10
43	3rd gear ratio does not meet the specification	23-10
44	4th gear ratio does not meet the specification	23-10
46	Reverse gear ratio does not meet the specification	23-10
51	Abnormal communication with engine-ECU	23-12

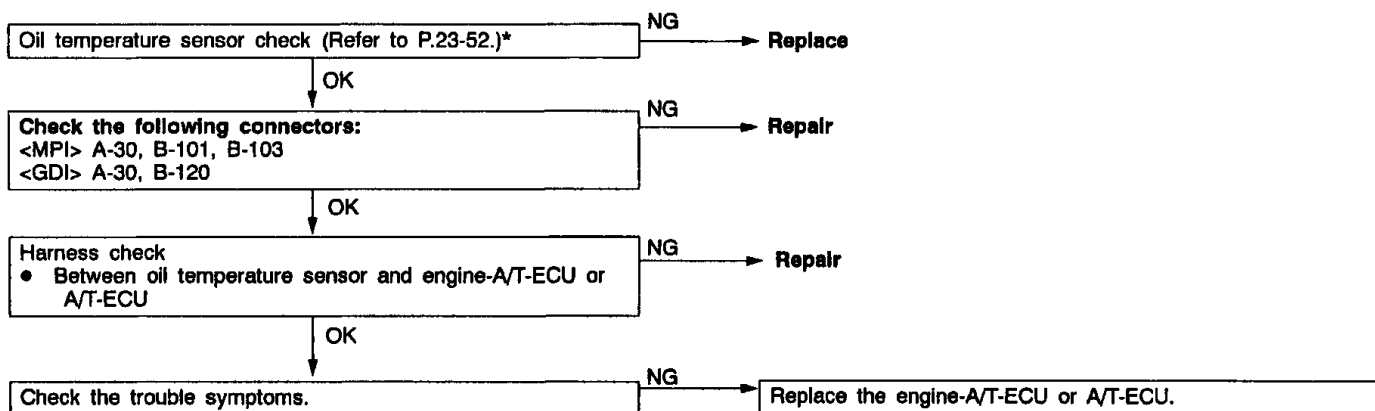
Code	Diagnosis item		Reference page
52	Damper control clutch solenoid valve system	Defective system	23-10
54	A/T Control relay system	Short circuit to earth/ open circuit	23-12
56	N range lamp system	Short circuit to earth	23-13

INSPECTION PROCEDURES FOR DIAGNOSIS CODES

Code No. 11, 12, 14 Throttle position sensor system <MPI>, accelerator pedal position sensor <GDI>	Probable cause
If the TPS or 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 <MPI> • Malfunction of the accelerator pedal position sensor <GDI> • Malfunction of connector • Malfunction of the engine-A/T-ECU <MPI> • Malfunction of the A/T-ECU <GDI>



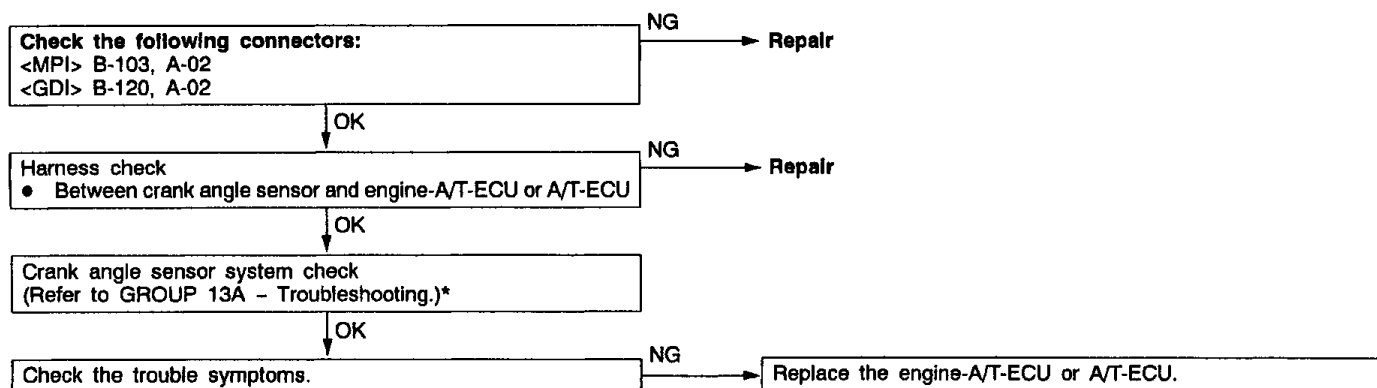
Code No. 15 Oil temperature sensor system	Probable cause
If the oil temperature sensor output voltage is 2.6 V or more even after driving for 10 minutes or more (if the oil temperature does not increase), it is judged that there is an open circuit in the oil temperature sensor and diagnosis code No.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



NOTE

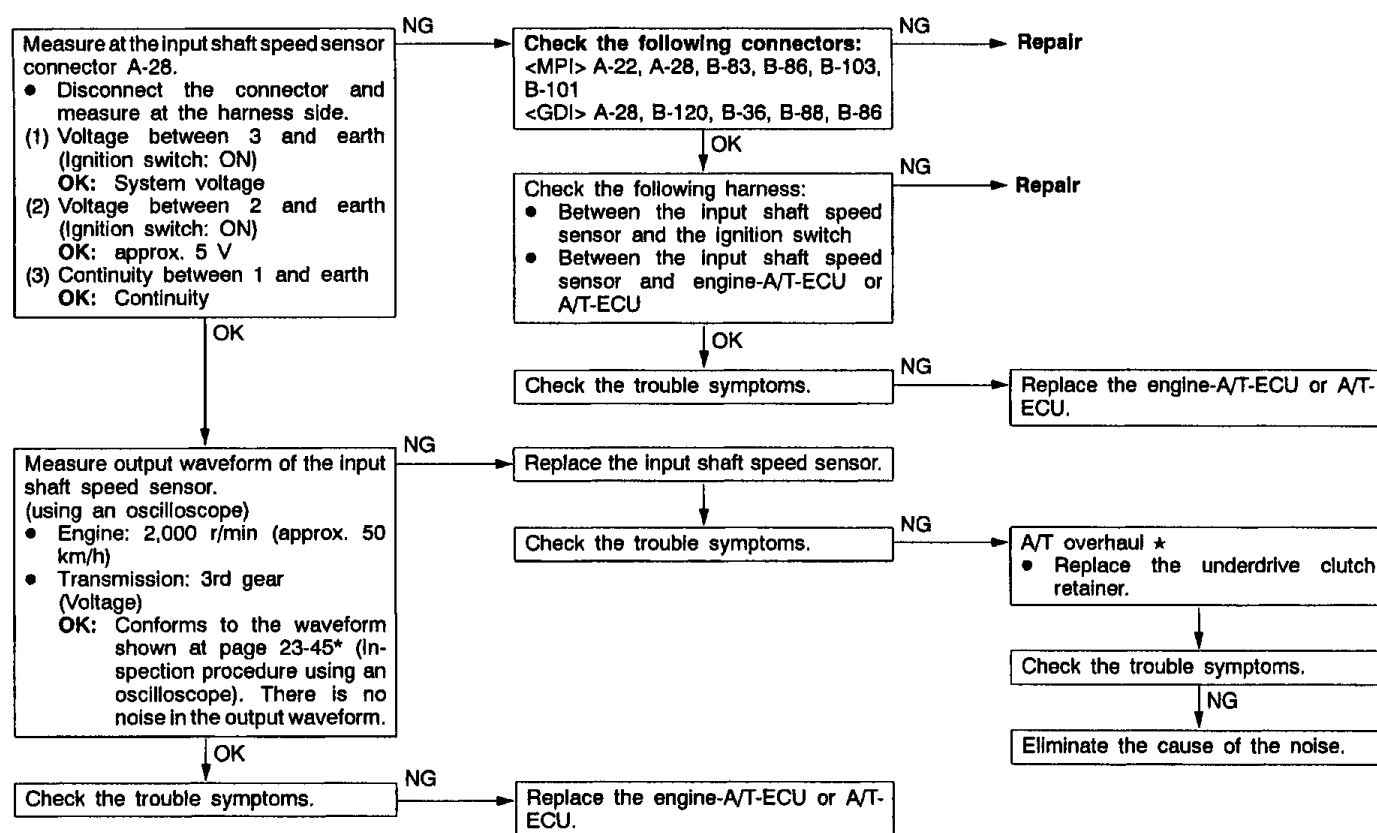
*: Refer to '96 CARISMA Workshop Manual (Pub No. PWDE9502).

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 <MPI> • Malfunction of the A/T-ECU <GDI>



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

★: Refer to the Transmission Workshop Manual.

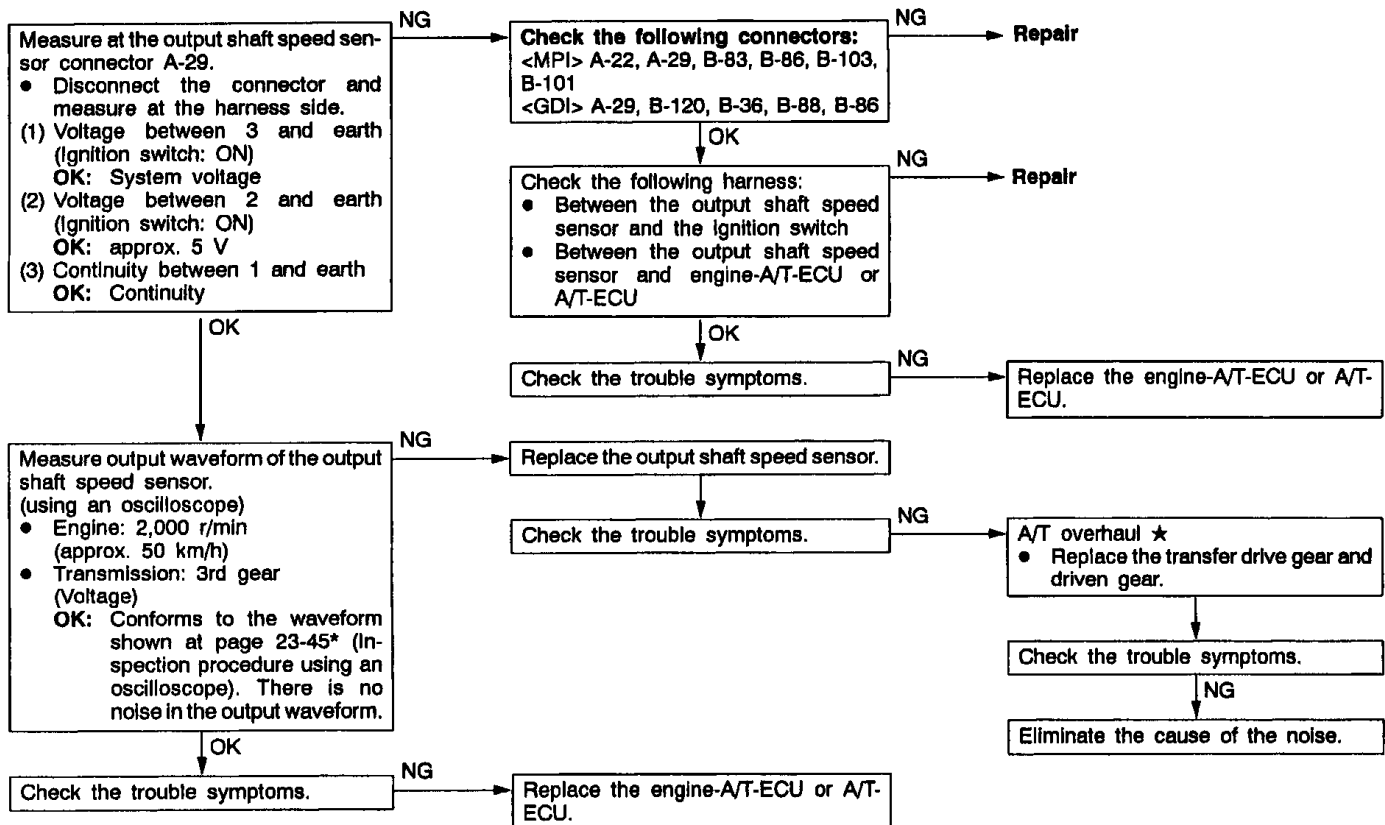


NOTE

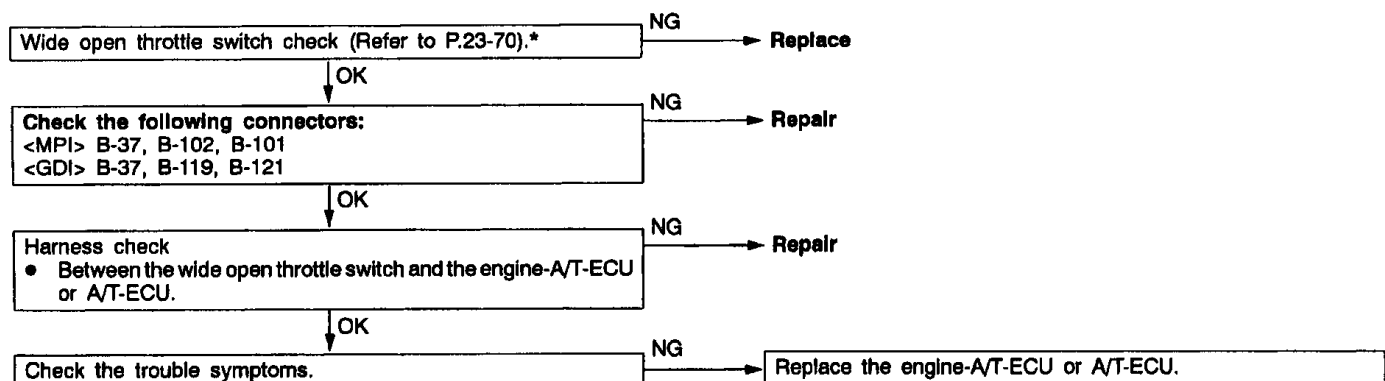
*: Refer to '96 CARISMA Workshop Manual (Pub No. PWDE9502).

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

★: Refer to the Transmission Workshop Manual.



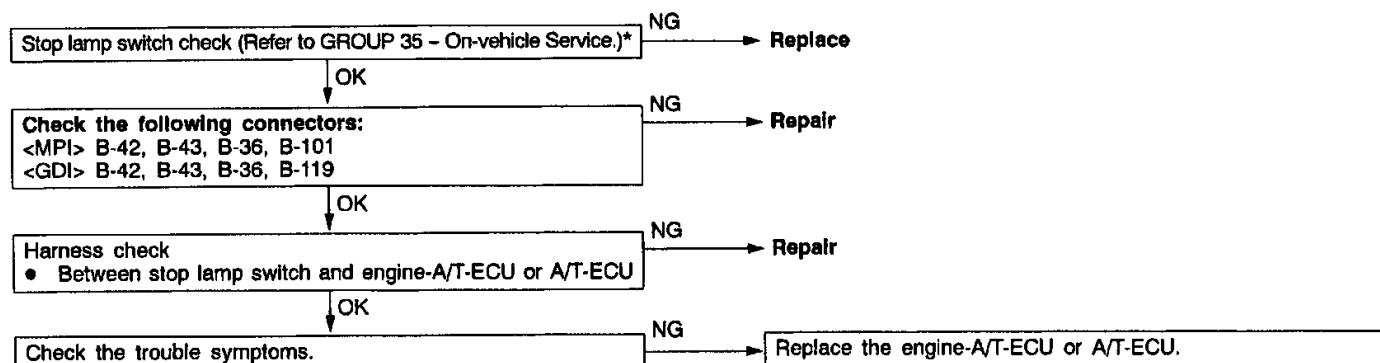
Code No. 25 Wide open throttle switch system	Probable cause
If the wide open throttle switch is on for 1 second or more with the throttle valve opening angle at 70% or less, it is judged that there is a short circuit in the wide open throttle switch and diagnosis code No. 25 is output.	• Malfunction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



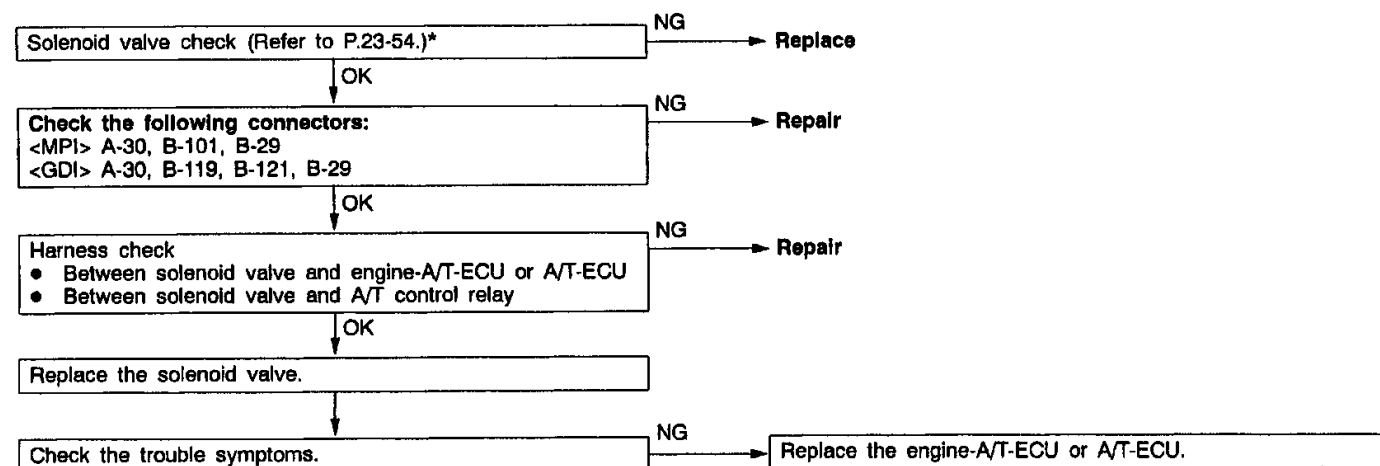
NOTE

*: 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 <MPI> • Malfunction of the A/T-ECU <GDI>



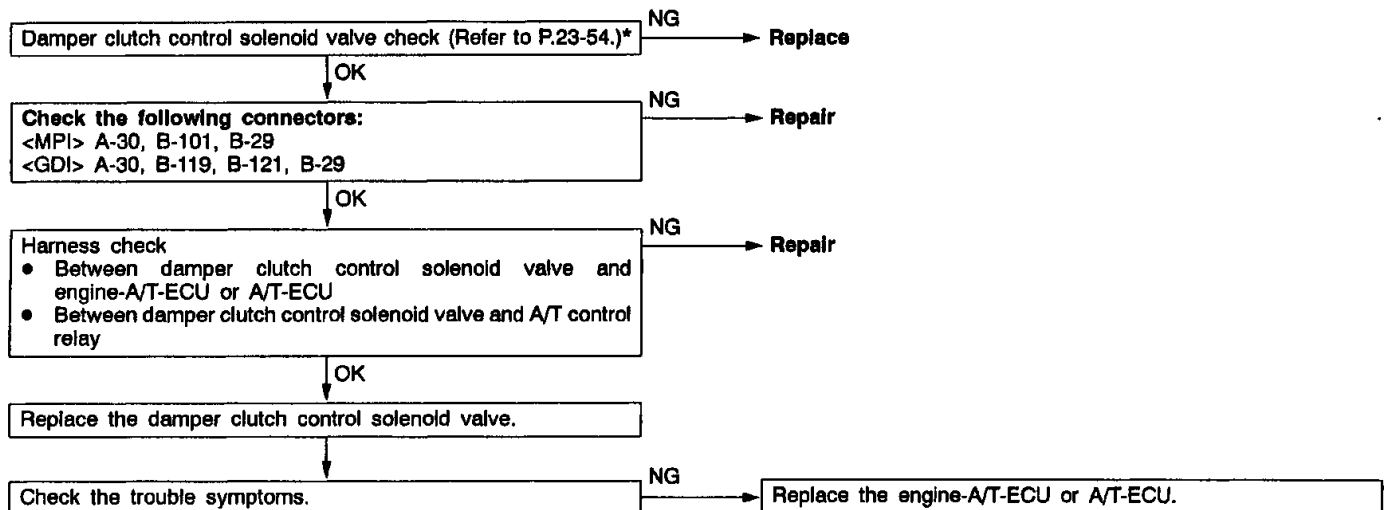
Code No. 31 Low and reverse solenoid valve system	Probable cause
Code No. 32 Underdrive solenoid valve system	
Code No. 33 Second solenoid valve system	
Code No. 34 Overdrive solenoid valve system	
If the resistance value for a solenoid valve is too large or too small, it is judged that there is a short-circuit 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 <MPI> • Malfunction of the A/T-ECU <GDI>



NOTE

*: 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 <MPI> • Malfunction of the A/T-ECU <GDI>

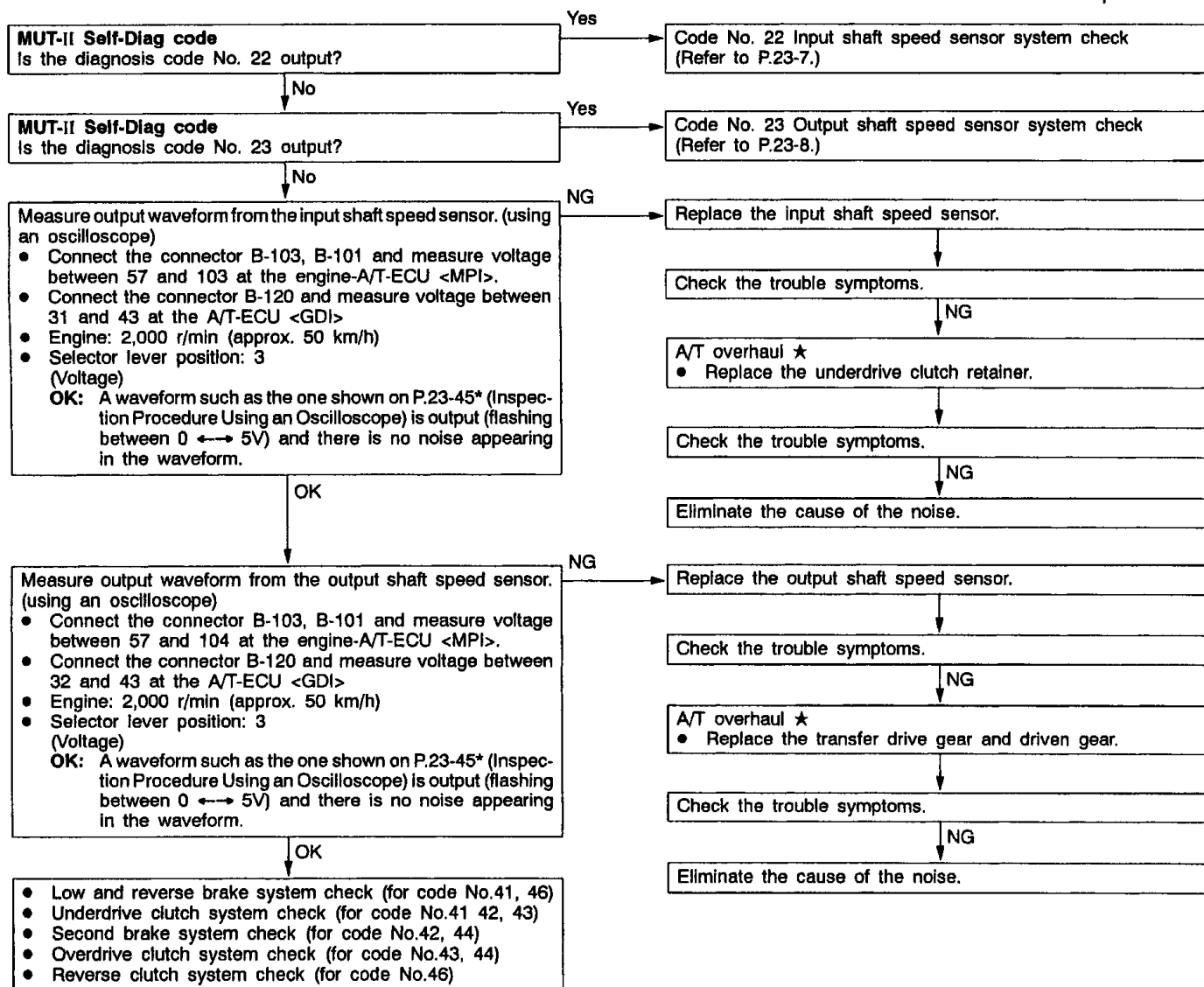


NOTE

*: 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 the Transmission Workshop Manual.



NOTE

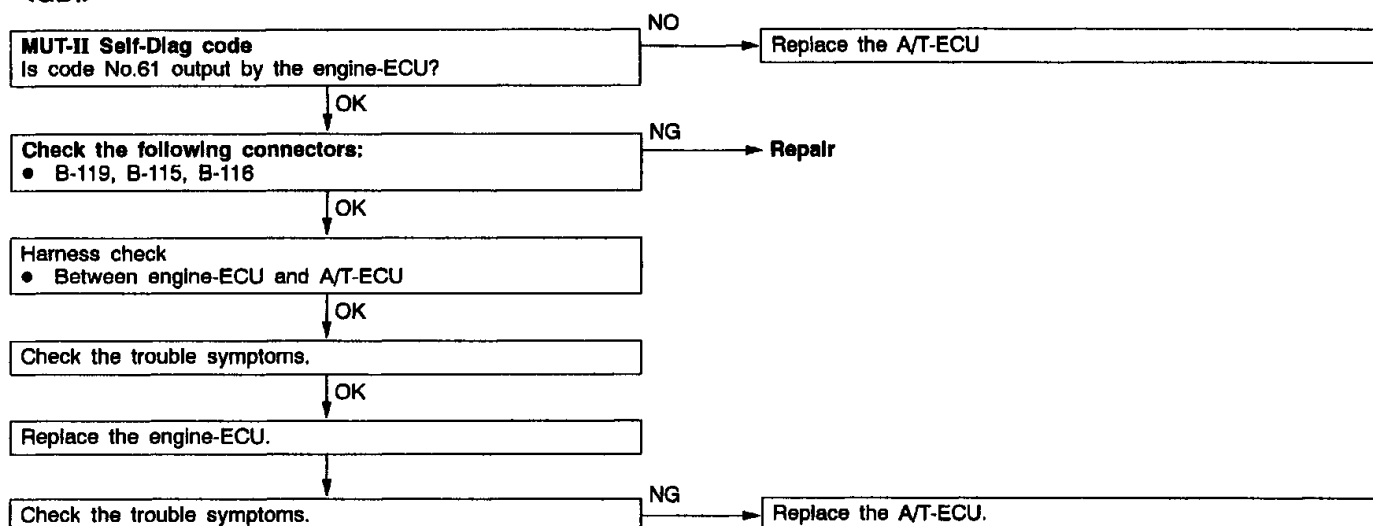
*: Refer to '96 CARISMA Workshop Manual (Pub No. PWDE9502).

Code No. 51 Abnormal communication with engine-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 <MPI> • Malfunction of the A/T-ECU <GDI> • Malfunction of the engine-ECU <GDI>

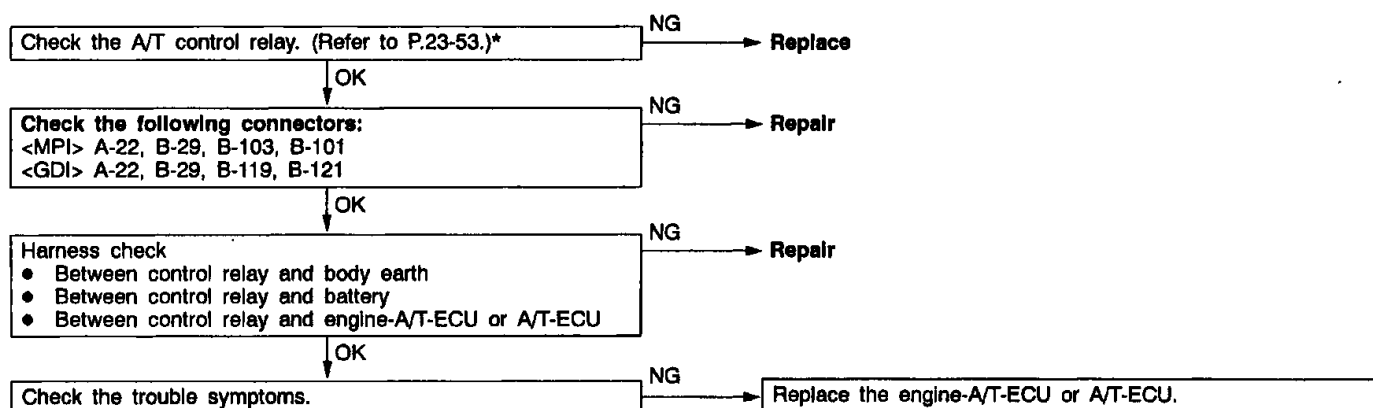
<MPI>

Replace the engine-A/T-ECU.

<GDI>



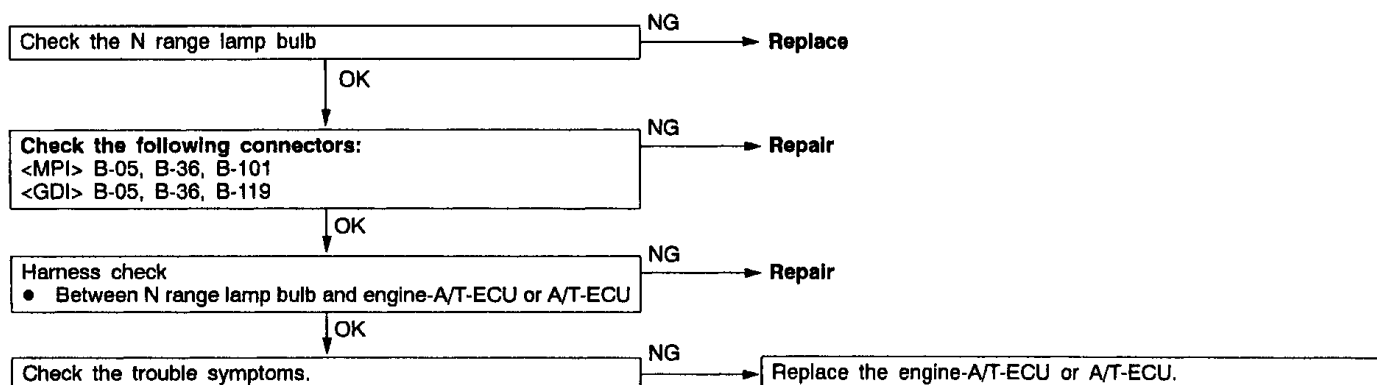
Code No. 54 A/T control relay system	Probable cause
If the A/T control relay voltage is less than 7 V after the ignition switch has been turned ON, it is judged that there is an open circuit or a short-circuit in the A/T control relay earth and diagnosis code No. 54 is output. Then the transmission is 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 <MPI> • Malfunction of the A/T-ECU <GDI>



NOTE

*: 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 <MPI> • Malfunction of the A/T-ECU <GDI>



INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible		1	23-14
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	23-34*
Inhibitor switch system		16	23-15
Mode control switch system		17	23-16
Dual pressure switch system		18	23-16

Trouble symptom	Inspection procedure No.	Reference page
Vehicle speed sensor system	19	23-17

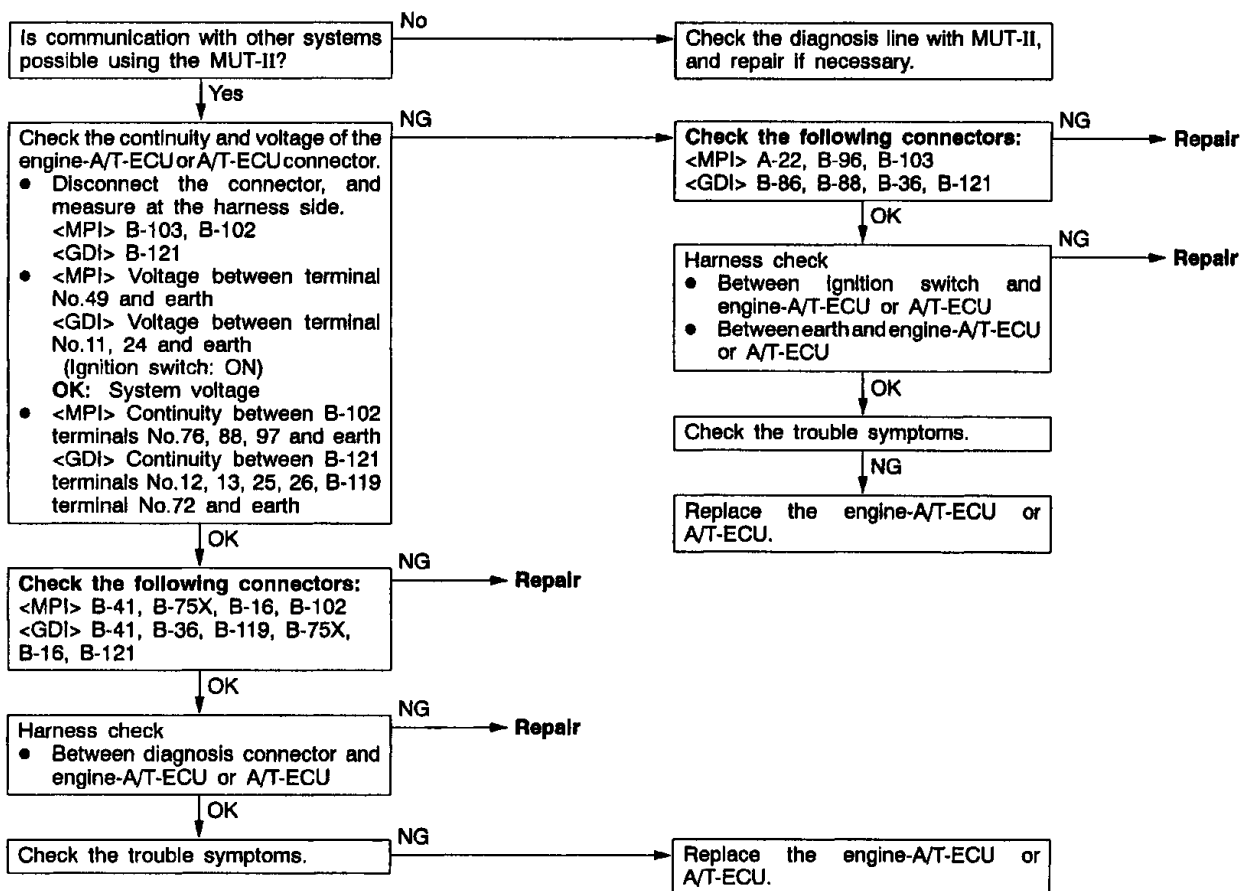
NOTE

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

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

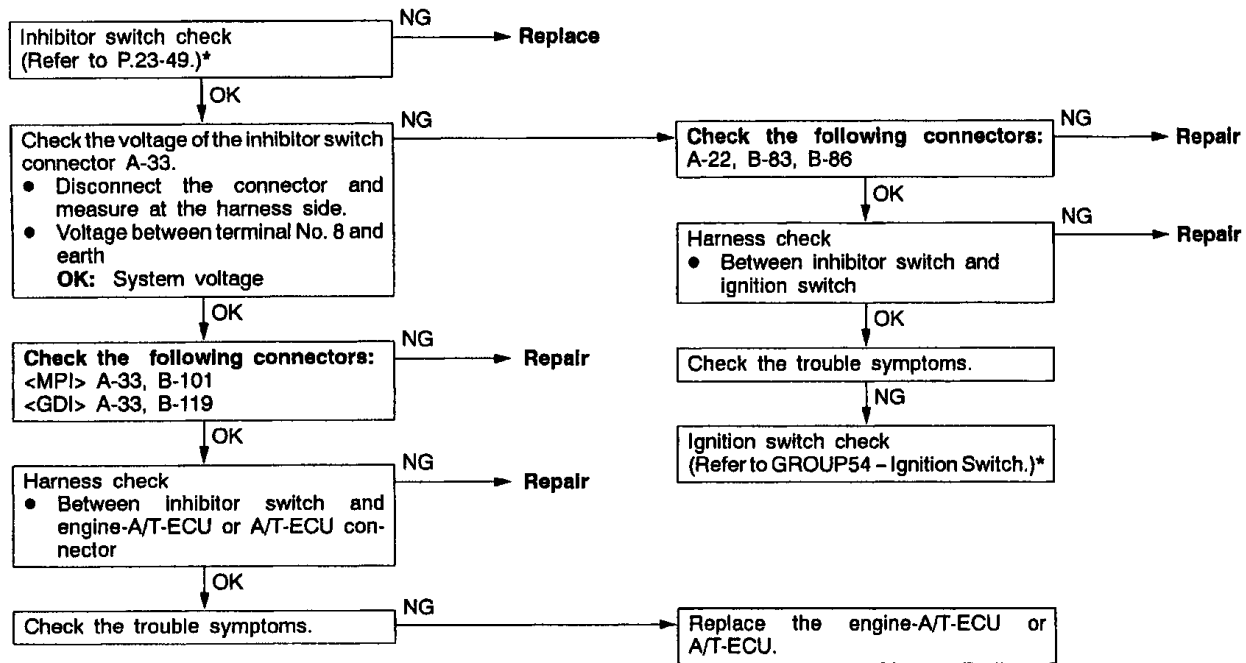
INSPECTION PROCEDURE 1

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



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 or A/T-ECU.	• Malfunction of the inhibitor switch • Malfunction of the ignition switch • Malfunction of connector • Malfunction of the engine-A/T-ECU <MPI> • Malfunction of the A/T-ECU <GDI>

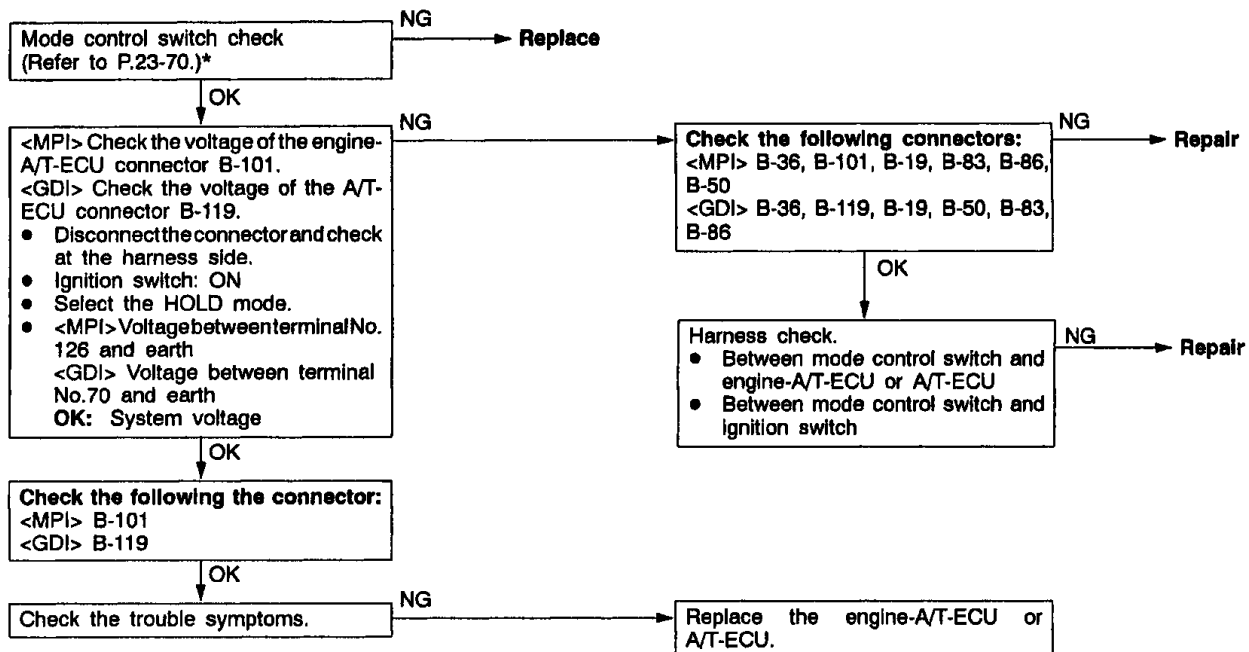


NOTE

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

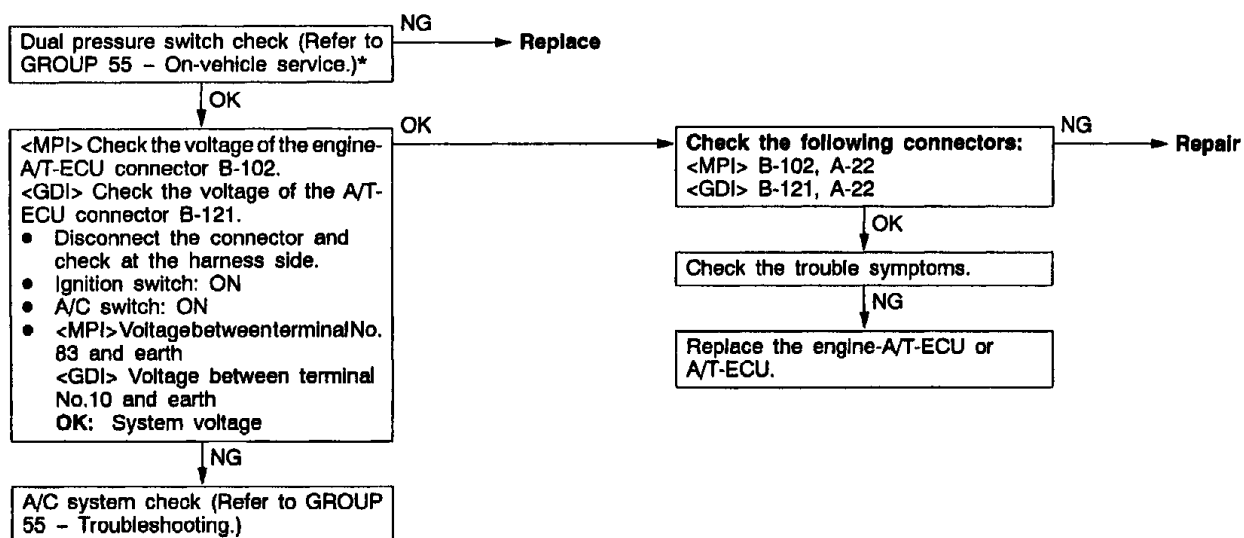
INSPECTION PROCEDURE 17

Mode control switch system	Probable cause
The cause is probably a defective mode control switch circuit or a defective engine-A/T-ECU or A/T-ECU.	• Malfunction of the mode control switch • Malfunction of connector • Malfunction of the engine-A/T-ECU <MPI> • Malfunction of the A/T-ECU <GDI>



INSPECTION PROCEDURE 18

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

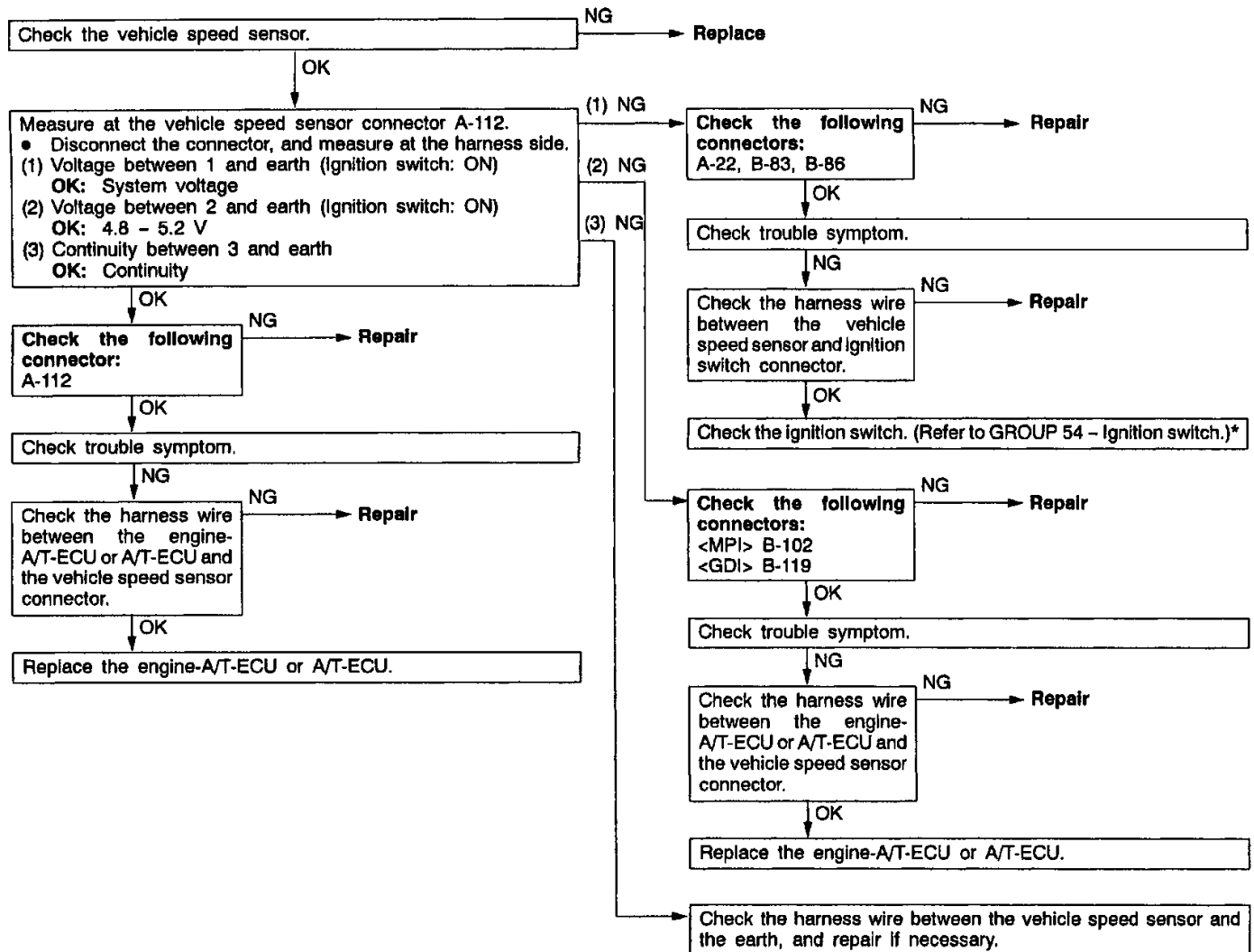


NOTE

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

INSPECTION PROCEDURE 19

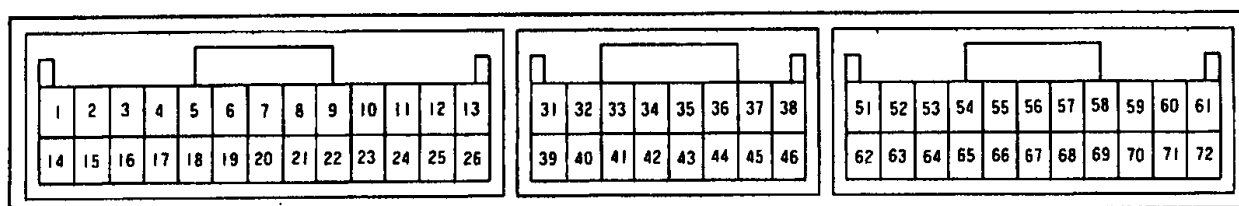
Vehicle speed sensor system	Probable cause
The cause is probably a defective vehicle speed sensor circuit or a defective engine-A/T-ECU or A/T-ECU.	• Malfunction of the vehicle speed sensor • Malfunction of connector • Malfunction of the engine-A/T-ECU <MPI> • Malfunction of the A/T-ECU <GDI>



NOTE

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

CHECK AT A/T-ECU TERMINALS <GDI>



A9FA0133

Terminal No.	Check item	Check requirement	Standard value
1	Underdrive solenoid valve	Selector lever position: D (1st gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V
2	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
3	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
10	A/C compressor load signal	A/C switch: OFF	0 V
		A/C switch: ON	System voltage
11	Power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
12	Earth	Always	0 V
13	Earth	Always	0 V
14	Overdrive solenoid valve	Selector lever position: D (3rd gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V
15	Damper clutch control solenoid valve	Selector lever position: L (1st gear)	System voltage
		Selector lever position: 3 (50 km/h in 3rd gear)	Other than system voltage
16	Second solenoid valve	Selector lever position: 2 (2nd gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V
23	Diagnosis control	–	–

Terminal No.	Check item	Check requirement	Standard value
24	Power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
25	Earth	Always	0 V
26	Earth	Always	0 V
31	Input shaft speed sensor	Measure between terminal No. 31 and No. 43 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3	Refer to P.23-45*, Oscilloscope inspection procedure.
32	Output shaft speed sensor	Measure between terminal No. 32 and No. 43 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3	Refer to P.23-45*, Oscilloscope inspection procedure.
33	Crank angle sensor	Engine: Idling	2.0 – 2.4 V
38	Back up power supply	Ignition switch: OFF	System voltage
43	Sensor earth	Always	0 V
44	Oil temperature sensor	ATF temperature: 25 °C	3.8 – 4.0 V
		ATF temperature: 80 °C	2.3 – 2.5 V
45	Accelerator pedal position sensor (APS)	Accelerator pedal: Released (Engine stopped)	0.5 – 1.0 V
		Accelerator pedal: Depressed (Engine stopped)	4.5 – 5.0 V
53	Communication with engine-ECU	Engine: Idling Selector lever position: D	Other than 0 V
54	Communication with engine-ECU	Engine: Idling Selector lever position: D	Other than 0 V
55	Inhibitor switch P	Selector lever position: P	System voltage
		Selector lever position: Other than above	0 V
56	Inhibitor switch N	Selector lever position: N	System voltage
		Selector lever position: Other than above	0 V
57	Inhibitor switch 3	Selector lever position: 3	System voltage
		Selector lever position: Other than above	0 V
58	Inhibitor switch L	Selector lever position: L	System voltage
		Selector lever position: Other than above	0 V

NOTE

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

Terminal No.	Check item	Check requirement	Standard value
59	Stop lamp switch	Brake pedal: Depressed	System voltage
		Brake pedal: Released	0 V
62	Low and reverse solenoid valve	Selector lever position: D (1st gear)	System voltage
		Selector lever position: D (2nd gear)	Approx. 7 – 9 V
63	Diagnosis output	Normal (No diagnosis code output)	0 → 5 V flashing
65	Wide open throttle switch	Accelerator pedal: Released	4.5 → 5.5 V
		Accelerator pedal: Depressed	Less than 0.4 V
66	Inhibitor switch R	Selector lever position: R	System voltage
		Selector lever position: Other than above	0 V
67	Inhibitor switch D	Selector lever position: D	System voltage
		Selector lever position: Other than above	0 V
68	Inhibitor switch 2	Selector lever position: 2	System voltage
		Selector lever position: Other than above	0 V
69	Vehicle speed sensor	When stopped	0 V
		Move forward slowly	0 → 5 V flashing
71	A/T control relay	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
72	Earth	Ignition switch: ON	0 V

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		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		121	122	123	124	125	126	127	128		129	130

9FA0253

Terminal No.	Check item	Check requirement	Standard value
50	A/T control relay	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
57	Sensor earth	Always	0 V
76	Earth	Always	0 V
77	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
88	Earth	Always	0 V
89	Solenoid valve power supply	Ignition switch: OFF	0 V
		Ignition switch: ON	System voltage
97	Earth	Always	0 V
101	Inhibitor switch P	Selector lever position: P	System voltage
		Selector lever position: Other than above	0 V
102	Inhibitor switch D	Selector lever position: D	System voltage
		Selector lever position: Other than above	0 V
103	Input shaft speed sensor	Measure between terminal No. 57 and No. 103 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3 (3rd gear)	Refer to P.23-45*, Oscilloscope inspection procedure.
104	Output shaft speed sensor	Measure between terminal No. 57 and No. 104 by an oscilloscope. Engine: 2,000 r/min Selector lever position: 3 (3rd gear)	Refer to P.23-45*, Oscilloscope inspection procedure.
106	Second solenoid valve	Selector lever position: 2 (2nd gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V
107	Damper clutch control solenoid valve	Selector lever position: L (1st gear)	System voltage
		Selector lever position: 3 (50 km/h in 3rd gear)	Other than System voltage

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

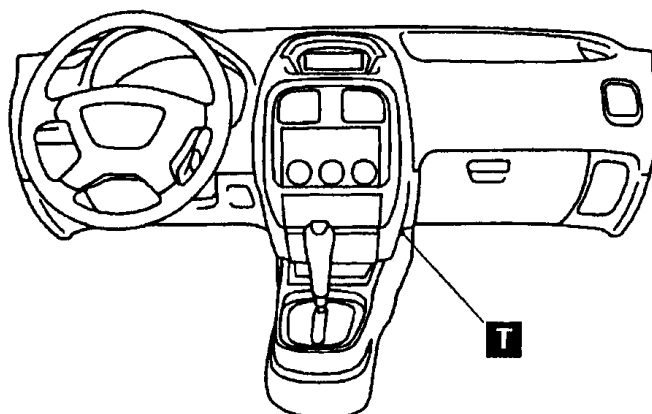
Terminal No.	Check item	Check requirement	Standard value
108	Inhibitor switch R	Selector lever position: R	System voltage
		Selector lever position: Other than above	0 V
109	Inhibitor switch 3	Selector lever position: 3	System voltage
		Selector lever position: Other than above	0 V
110	Inhibitor switch L	Selector lever position: L	System voltage
		Selector lever position: Other than above	0 V
115	Wide open throttle switch	Accelerator pedal: Released	4 V or more
		Accelerator pedal: Depressed	Less than 0.4 V
120	Underdrive solenoid valve	Selector lever position: L (1st gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V
121	Inhibitor switch N	Selector lever position: N	System voltage
		Selector lever position: Other than above	0 V
122	Inhibitor switch 2	Selector lever position: 2	System voltage
		Selector lever position: Other than above	0 V
123	Stop lamp switch	Brake pedal: Depressed	System voltage
		Brake pedal: Released	0 V
124	Oil temperature sensor	ATF temperature: 25 °C	3.8 – 4.0 V
		ATF temperature: 80 °C	2.3 – 2.5 V
126	Mode control switch	Select HOLD mode	System voltage
		Select AUTO mode	0V
129	Low and reverse solenoid valve	Selector lever position: P	System voltage
		Selector lever position: 2 (2nd gear)	Approx. 7 – 9 V
130	Overdrive solenoid valve	Selector lever position: 3 (3rd gear)	System voltage
		Selector lever position: P	Approx. 7 – 9 V

ON-VEHICLE SERVICE

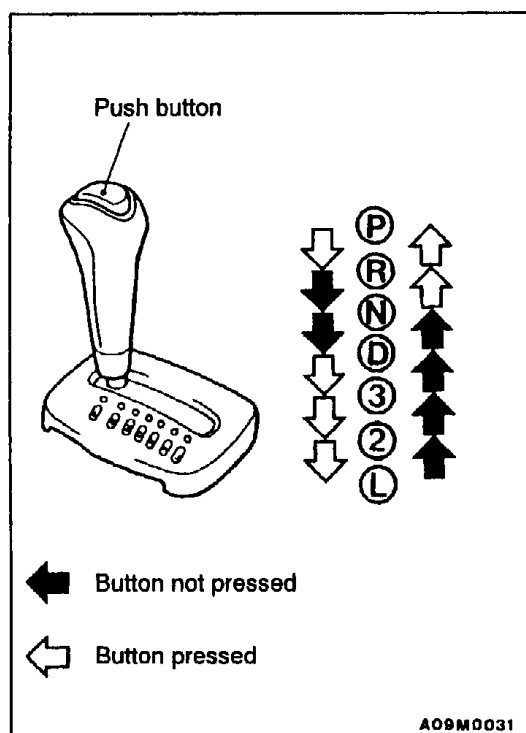
A/T CONTROL COMPONENT LOCATION

The diagnosis connector has been removed from the driver side to the passenger side.

Name	Symbol
Diagnosis connector	T



AX00898N



SELECTOR LEVER OPERATION CHECK

1. Shift selector lever to each range and check that lever moves smoothly and is controlled. Check that position indicator is correct.
2. Check the selector lever can be moved to each position (by button operation as shown in the illustration).
3. Start the engine and check if the vehicle moves forward when the selector lever is moved from N or D, and moves backward when moved to R.
4. When the shift lever malfunctions, adjust control cable and selector lever sleeve. Check for worn shift lever assembly sliding parts.

A09M0031

TRANSMISSION CONTROL

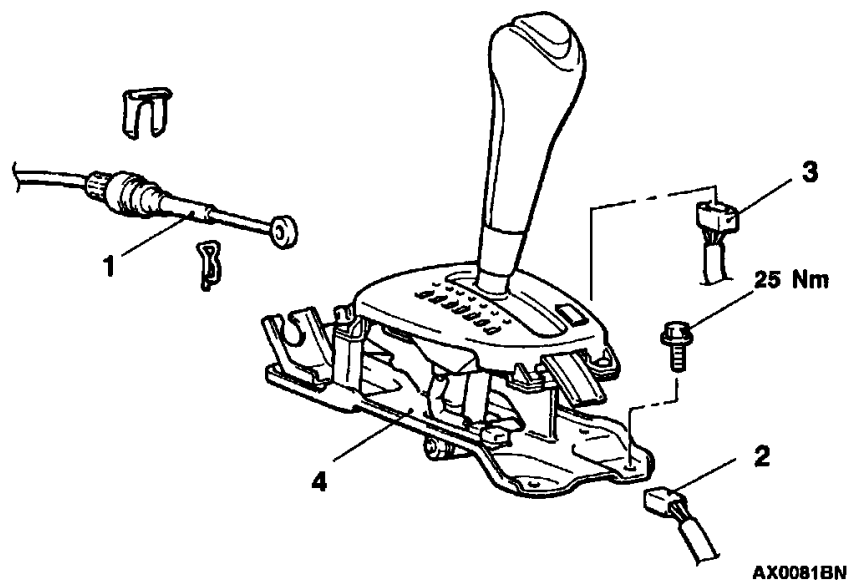
REMOVAL AND INSTALLATION

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.

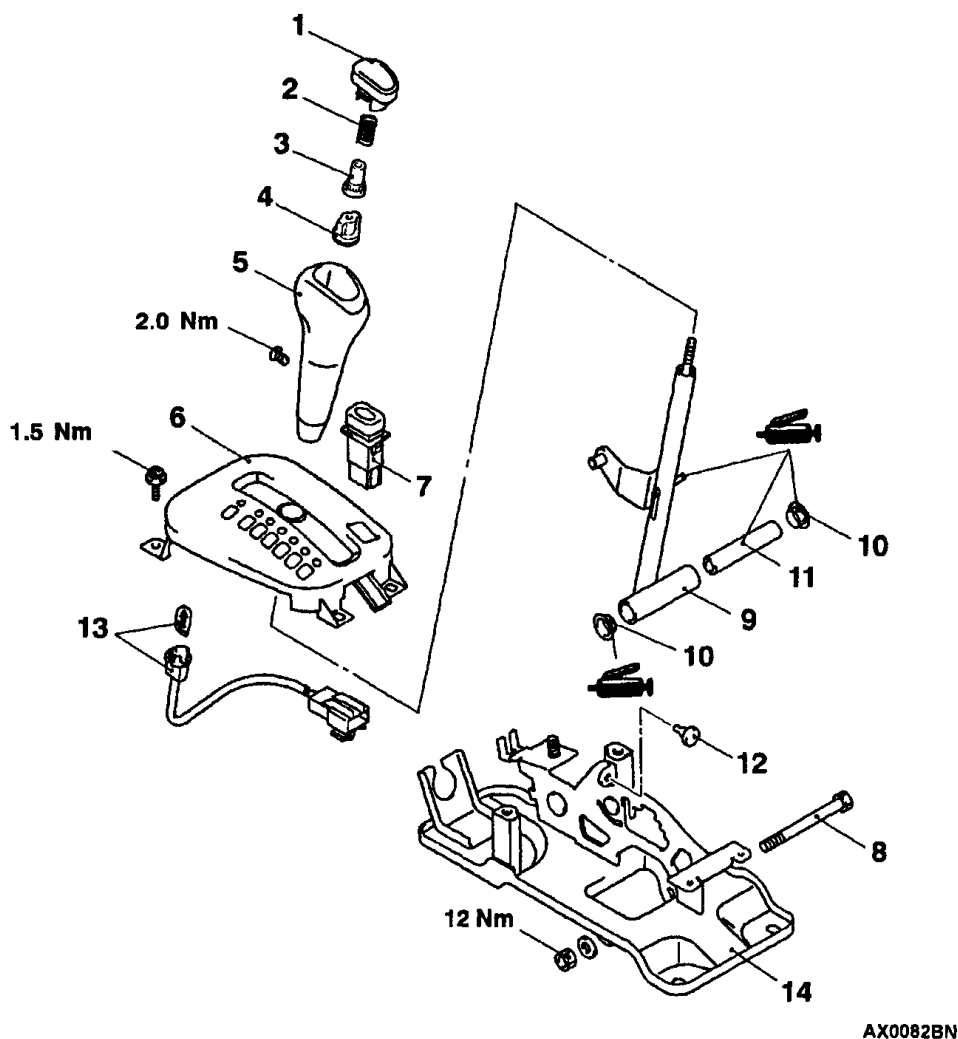
Pre-removal and Post-Installation Operation

- Front Floor Console Assembly Removal and Installation (Refer to GROUP 52A.)

**Removal steps**

1. Transmission control cable connection
2. Shift indicator illumination lamp connector
3. Hold switch connector
4. Selector lever assembly

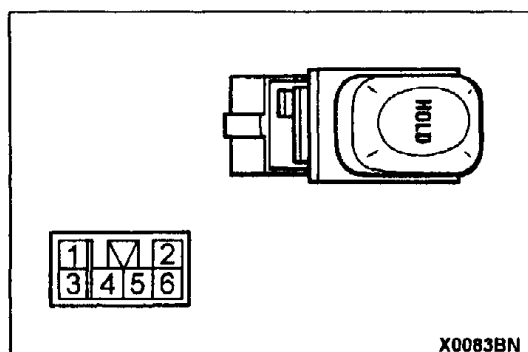
SELECTOR LEVER ASSEMBLY DISASSEMBLY AND REASSEMBLY



AX0082BN

Disassembly steps

1. Push button	9. Shift lever assembly
2. Spring	10. Bushing
3. Bumper	11. Pipe
4. Adjuster	12. Stopper
5. Selector knob	13. Shift indicator illumination lamp assembly
6. Indicator panel assembly	14. Bracket assembly
7. Hold switch	
8. Bolt	



X0083BN

INSPECTION HOLD SWITCH CHECK

Switch position	Terminal No.					
	1	2	5	3		6
OFF	☐	☐	☐	☐	☒	☐
ON	☐	☐	☐	☐	☒	☐

GROUP 26

FRONT AXLE

GENERAL

OUTLINE OF CHANGES

- The service procedures have been established due to the change on the axle hub and the drive shaft.
 - (1) Axle hub removal and installation
 - (2) Drive shaft removal and installation
 - (3) Drive shaft disassembly and reassembly

AXLE HUB

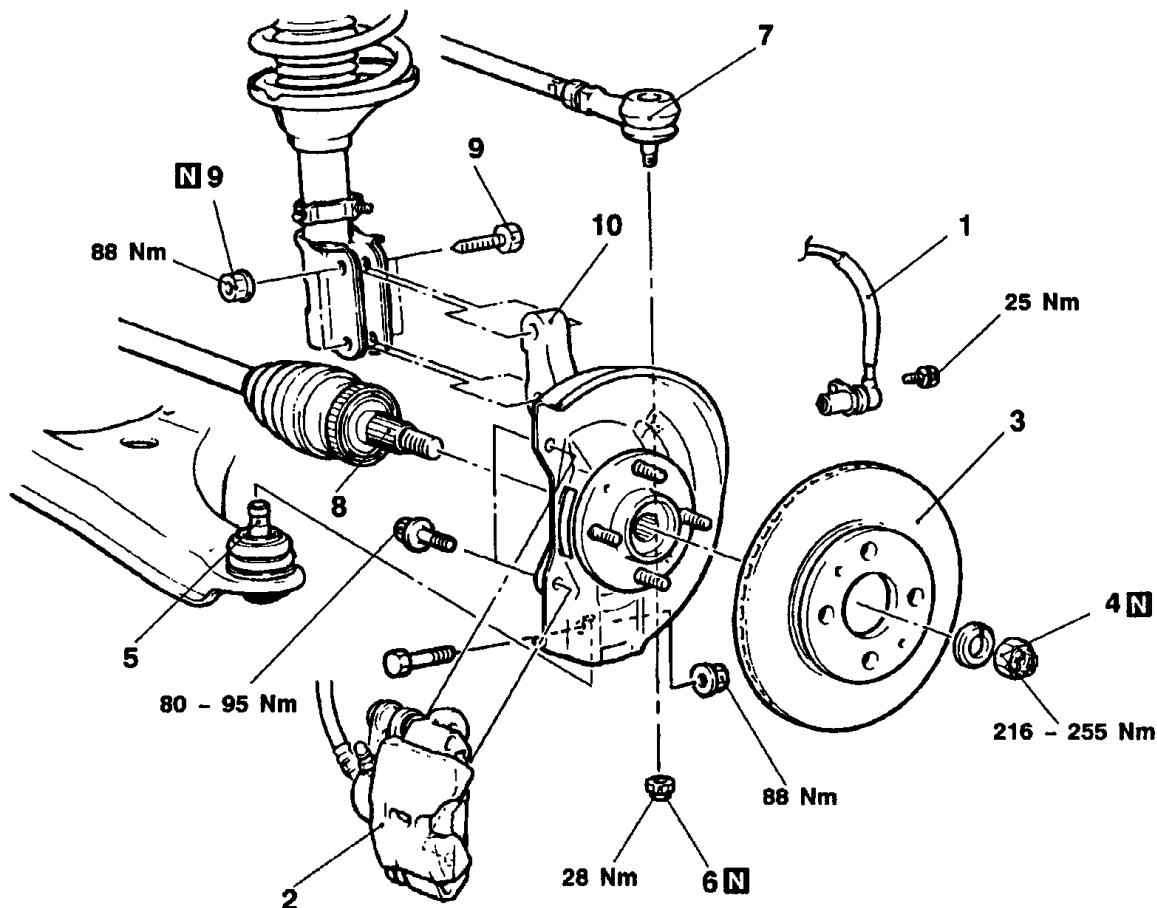
REMOVAL AND INSTALLATION

Caution

1. Do not strike the speed sensor against other parts when removing or installing it. Otherwise the speed sensor will be damaged.
2. Do not strike the ABS rotors installed to the B.J. outer race of drive shaft against other parts when removing or installing the drive shaft. Otherwise the ABS rotors will be damaged.

Post-Installation Operation

- Press the dust cover with a finger to check whether the dust cover is cracked or damaged.
- Wheel Alignment Check and Adjustment.
(Refer to GROUP 33A – On-vehicle Service.)



AX0016BN

Removal steps

- ◀A▶ 1. Front speed sensor
 ▶A▶ 2. Caliper assembly
 ▶A▶ 3. Brake disc
 ▶A▶ 4. Drive shaft nut
 ▶A▶ 5. Connection for lower arm ball joint
 ▶A▶ 6. Self-locking nut
 ▶A▶ 7. Connection for tie rod end

- ▶D▶ 8. Drive shaft
 ▶D▶ 9. Front strut mounting bolt and nut
 ▶D▶ 10. Hub and knuckle

NOTE

For service points, refer to Basic Manual.

DRIVE SHAFT

REMOVAL AND INSTALLATION

Caution:

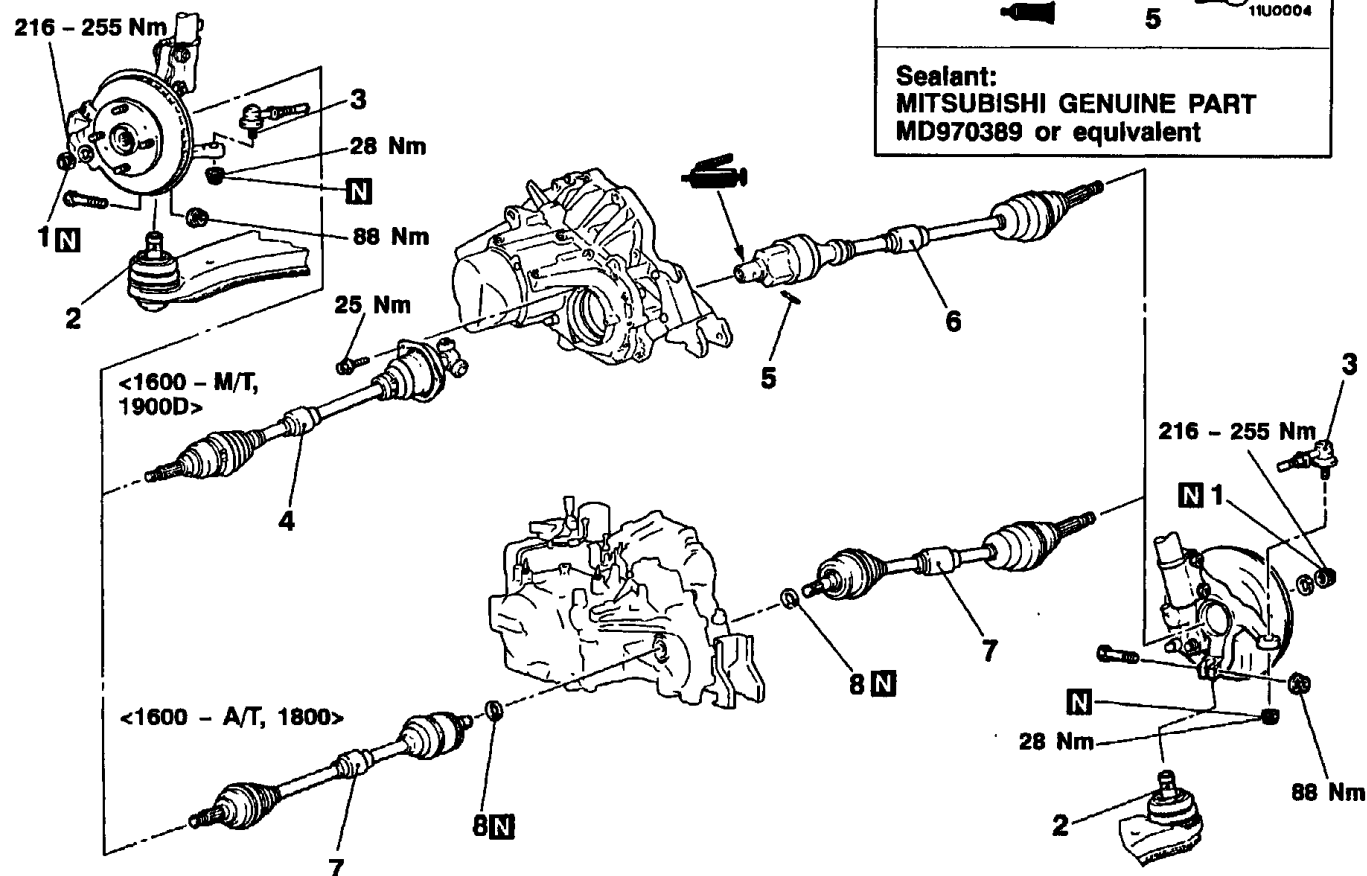
Do not strike the ABS rotors installed to the B.J. outer race of drive shaft against other parts when removing or installing the drive shaft. Otherwise the ABS rotors will be damaged.

Pre-removal Operation

Brake hose Clamp, Speed Sensor Cable Connection, Stabilizer Link Connection Removal.

Post-Installation Operation

- Press the dust cover with a finger to check whether the dust cover is cracked or damaged.
- Brake hose Clamp, Speed Sensor Cable Connection Stabilizer Link Connection Installation.



AX0015BN

Removal steps

- ◀A▶ ▶B▶ 1. Drive shaft nut
- ◀B▶ 2. Lower arm ball joint connection
- ◀C▶ 3. Tie rod end connection
4. Drive shaft L.H.
<1600 - M/T, 1900D>
- ▶A▶ 5. Spring pin
<1600 - M/T, 1900D>

- ◀C▶ ▶A▶ 6. Drive shaft R.H.
<1600 - M/T, 1900D>
- ◀C▶ 7. Drive shaft <1600 - A/T, 1800>
8. Circlip <1600 - A/T, 1800>

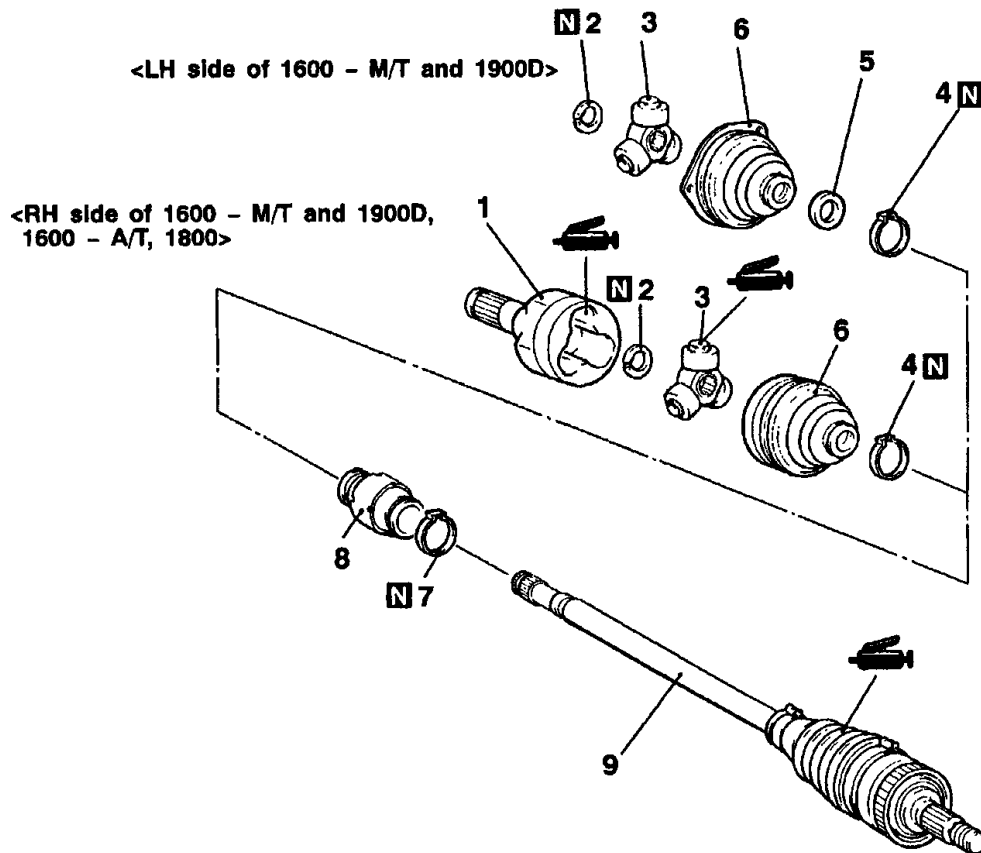
NOTE

For service point, refer to Basic Manual.

DISASSEMBLY AND REASSEMBLY

Caution

1. Never disassemble the B.J. assembly except when replacing the B.J. boot.
2. Be sure not to damage the rotor attached to the B.J. outer race.



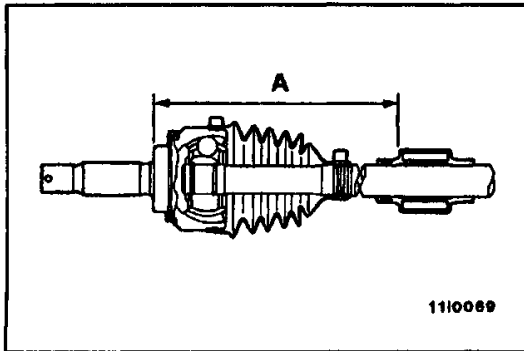
B11U0093

T.J. boot repair kit <LH side of 1600 - M/T and 1900D>	T.J. boot repair kit <RH side of 1600 - M/T and 1900D, 1600 - A/T, 1800>	B.J. boot repair kit

Disassembly steps

- ◀A▶ ▶E▶ 1. T.J. case
 ▶A▶ ▶D▶ 2. Snap ring
 ▶A▶ ▶C▶ 3. Spider assembly
 ▶B▶ ▶B▶ 4. T.J. boot band
 5. Dust cover
 6. T.J. boot

- ▶A▶ ▶A▶ 7. Damper band <1600, 1800>
 ▶C▶ ▶A▶ 8. Dynamic damper <1600, 1800>
 9. B.J. assembly
 10. B.J. boot band (small)
 11. B.J. boot band (large)
 12. B.J. boot

**REASSEMBLY SERVICE POINTS**

The assembly procedures for the drive shaft have been established. The other procedures are the same as before.

►A◄ DYNAMIC DAMPER <1600, 1800>/DAMPER BAND <1600, 1800> INSTALLATION

Install the dynamic damper in the position shown in the illustration.

Items		A
1600 – M/T	L.H.	264 ± 3 mm
	R.H.	369 ± 3 mm
1600 – A/T, 1800	L.H.	191 ± 3 mm
	R.H.	371 ± 3 mm

GROUP 27

REAR AXLE

GENERAL

OUTLINE OF CHANGE

- Due to the addition of the rear disc brakes, the following service procedures has been added <1800>.

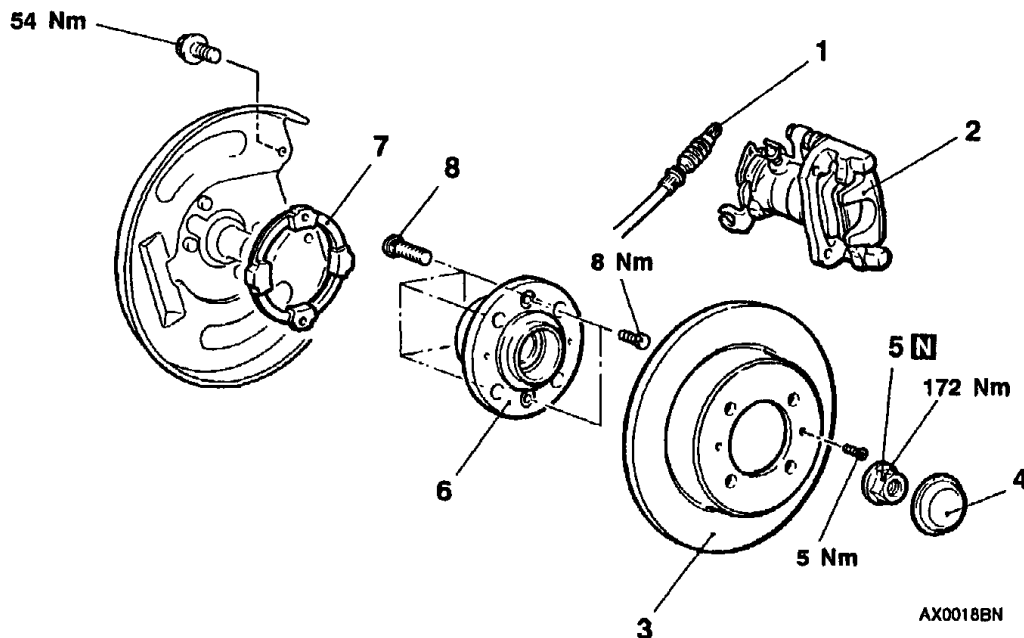
REAR AXLE HUB

REMOVAL AND INSTALLATION

Caution

- The rear hub unit bearing should not be dismantled. When removing the rear hub assembly, the wheel bearing inner race may be left at the spindle side. In this case, always replace the rear hub assembly, otherwise the hub will damage the oil seal, causing oil leaks or excessive play.
- Care must be taken not to scratch or otherwise damage the teeth of the ABS rotor. The ABS rotor must never be dropped. If the teeth of the ABS rotor are chipped, resulting in a deformation of the ABS rotor, it will not be able to accurately detect the wheel rotation speed, and the system will not function normally.

Post-Installation Operation
Adjustment of Parking Brake



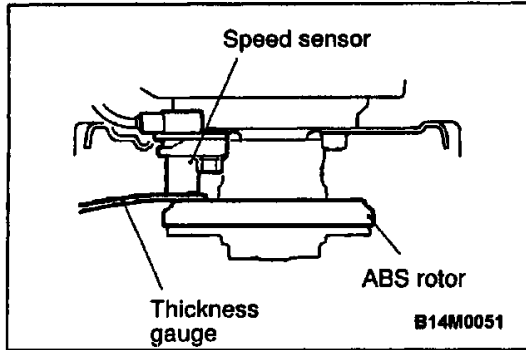
Removal steps

- Parking brake cable connection
- Caliper assembly
- Brake disc
- Hub cap

- Flange nut
- Rear hub assembly
- ABS rotor
- Hub bolt

REMOVAL SERVICE POINT**◀A▶ CALIPER ASSEMBLY REMOVAL**

Remove the caliper assembly and suspend it.

**INSTALLATION SERVICE POINT****▶A◀ REAR HUB ASSEMBLY INSTALLATION****Caution**

Be sure not to damage the pole piece at the tip the speed sensor by striking against other parts.

Insert a thickness gauge into the space between the speed sensor's pole piece and the ABS rotor's toothed surface, and check the clearance is the standard value all around.

Standard value: 0.1 – 1.9 mm

INSPECTION

- Check the oil seal for crack or damage.
- Check the rear hub unit bearing for wear or damage.
- Check the rear rotor for chipped teeth.

GROUP 31

WHEEL AND TYRE

GENERAL

OUTLINE OF CHANGE

- Specifications for wheels and tyres have been changed.

GENERAL SPECIFICATIONS

Items		1600, 1900D		1800	
		CLASSIC, COMFORT	SPORT, ELEGANCE	CLASSIC, COMFORT	SPORT, ELEGANCE
Wheel	Type	Steel Aluminium*1*2	Aluminium*2	Steel Aluminium*1	Aluminium*2
	Size	14 x 5.5J 14 x 5.5JJ*1*2	14 x 5.5JJ*2	15 x 6.0J*2	15 x 6.0J*2
	Amount of wheel offset mm	46*2	46*2	44 46*1*2	46*2
	Pitch circle diameter (P.C.D.) mm	114.3*2	114.3*2	114.3	114.3
Tyre	Size	185/65R14 86H 195/60R14 86V*1	195/60R14 86V*2	195/60R15 88H*2	195/60R15 88H*2
Spare wheel	Type	Steel Aluminium*1*2	Steel Aluminium*1*2	Steel Aluminium*1	Steel Aluminium*1
	Size	15 x 4.0T 14 x 5.5J*1*2 14 x 5.5JJ*1*2	15 x 4.0T 14 x 5.5J*1*2 14 x 5.5JJ*1*2	15 x 5.0J*2 15 x 6.0J*1	15 x 5.0J*2 15 x 6.0J*1
	Amount of wheel offset mm	46	46	40*2 46*1	40*2 46*1
	Pitch circle diameter (P.C.D.) mm	114.3*2	114.3*2	114.3	114.3
Spare tyre	Size	T125/70D15 (High pressure) 185/65R14 88H*1*2 195/60R14 86V*1*2	T125/70D15 (High pressure) 185/65R14 88H*1*2 195/60R14 86V*1*2	175/65R15 84T*2 195/60R15 88H*1*2	175/65R15 84T*2 195/60R15 88H*1*2

NOTE

*1: Optional items

*2: shows changed items.

FRONT SUSPENSION

CONTENTS

GENERAL	2	STRUT ASSEMBLY	4
Outline of Changes	2	LOWER ARM	7
SERVICE SPECIFICATIONS	2	STABILIZER BAR	9
SPECIAL TOOLS	2		
ON-VEHICLE SERVICE	3		
Front Wheel Alignment Check and Adjustment	3		

33A-2 FRONT SUSPENSION – General/Service Specifications/Special Tools

GENERAL

OUTLINE OF CHANGES

- Spring specifications have been changed.
- The following items have been revised to correspond to the change of the front stabilizer.
 - (1) Strut assembly removal and installation.
 - (2) Lower arm assembly removal and installation.
 - (3) Stabilizer bar removal and installation.
- Disassembly and reassembly procedures for the strut assembly have been changed.

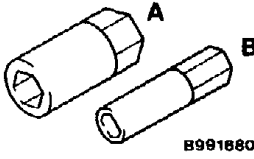
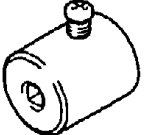
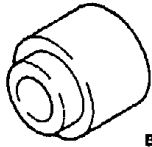
COIL SPRING

Items	1600 – M/T	1600 – A/T, 1800, 1900D
Wire dia. × O.D. × free length mm	13 × 160 × 374	13 × 160 × 384

SERVICE SPECIFICATIONS

Items		Standard value
Toe-in	At the centre of tyre tread mm	0 ± 2
	Toe-angle (per wheel)	0°00' ± 06'
Toe-out angle on turns (inner wheel when outer wheel at 20°)		18°34'
Steering angle	Inner wheel	37°30' ± 1°30'
	Outer wheel	31°36'
Camber		-0°40' ± 30'
Caster		2°54'
Kingpin inclination		13°36'
Lower arm ball joint starting torque Nm		1.0 – 5.9
Lower arm ball joint turning torque Nm		1.0 – 3.9
Protruding length of stabilizer bar mounting bolt mm		22

SPECIAL TOOLS

Tools	Number	Name	Use
	A: MB991619 B: MB991682	A: Wrench B: Socket	Strut assembly disassembly and reassembly
	MB991006	Preload socket	Lower arm ball joint rotation torque measurement
	MB990800	Ball joint remover and installer	Lower arm ball joint dust cover installation

ON-VEHICLE SERVICE

FRONT WHEEL ALIGNMENT CHECK AND ADJUSTMENT

The wheel alignment standard values have been revised as follows. The inspection and adjustment procedures are the same as before.

TOE-IN

Standard value:

At the centre of tyre tread 0 ± 2 mm

Toe angle (per wheel) $0^{\circ}00' \pm 06'$

TOE-OUT ANGLE ON TURNS

Standard value:

$18^{\circ}34'$ (inner wheel when outer wheel at 20°)

STEERING ANGLE

Standard value:

Inner wheel $37^{\circ}30' \pm 1^{\circ}30'$

Outer wheel $31^{\circ}36'$

CAMBER, CASTER AND KINGPIN INCLINATION

Standard value:

Camber – $0^{\circ}40' \pm 30'$

Caster $2^{\circ}54'$

Kingpin Inclination $13^{\circ}36'$

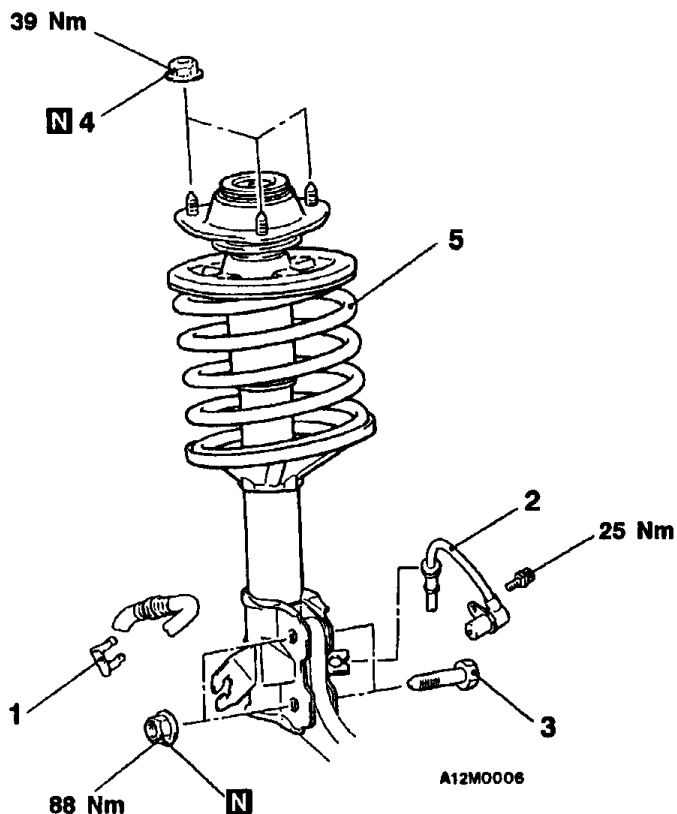
STRUT ASSEMBLY

REMOVAL AND INSTALLATION

Caution:

Do not strike the speed sensor against other parts when removing or installing it. Otherwise the speed sensor will be damaged.

Post-Installation Operation
Front Wheel Alignment Adjustment
(Refer to P.33A-3.)


Removal steps

1. Brake hose clamp
2. Front speed sensor
3. Bolts

4. Self-locking nut
5. Strut assembly



REMOVAL SERVICE POINT

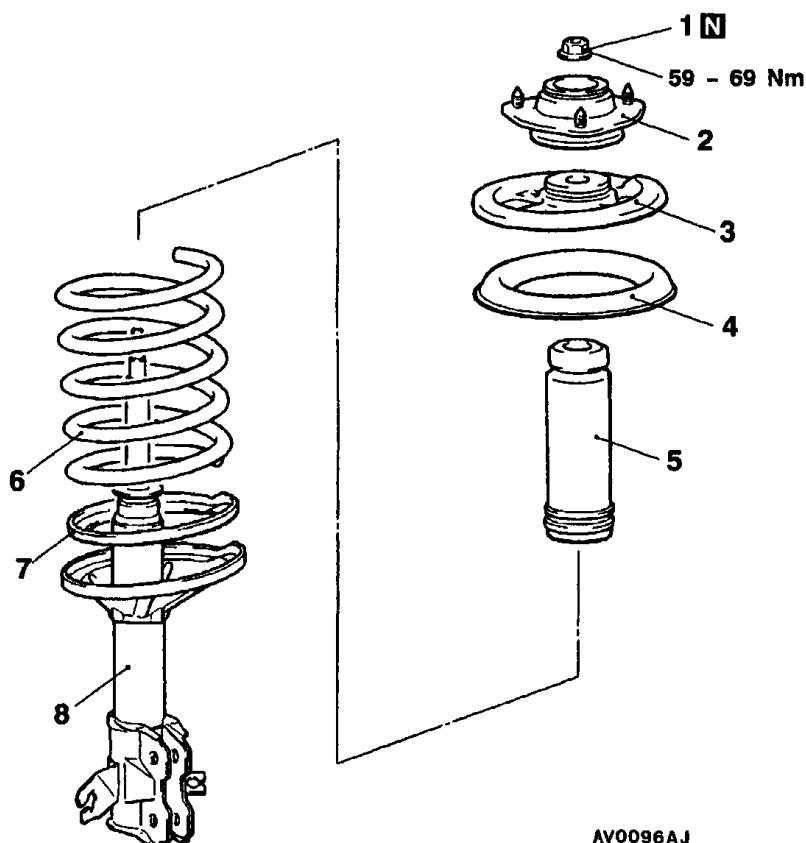
◀A▶ BOLTS REMOVAL

1. Suspend the lower arm from the vehicle with wire.
2. Separate the strut from the knuckle.

INSPECTION

- Check for oil leaks from the strut assembly.
- Check the strut assembly for damage or deformation.

DISASSEMBLY AND REASSEMBLY



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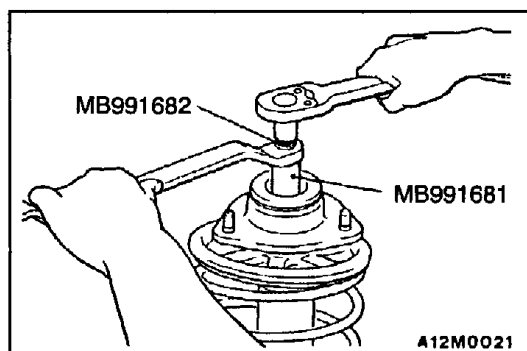
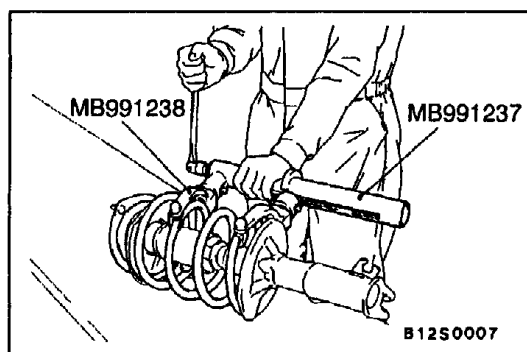
Disassembly steps

◀A▶ ▶A▶

1. Self-locking nut
2. Strut insulator
3. Spring seat, upper
4. Spring pad, upper

◀B▶

5. Bump rubber
6. Coil spring
7. Spring pad, lower
8. Strut assembly



DISASSEMBLY SERVICE POINTS

◀A▶ SELF-LOCKING NUT REMOVAL

1. Use the special tools to compress the coil spring.

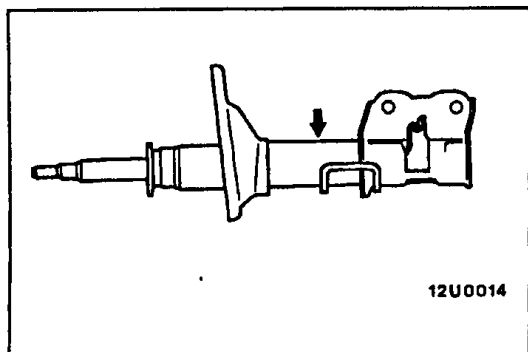
Caution

- (1) To compress the coil spring fully, install the special tools evenly, and so that the space between both arms of the special tool will be maximum within the installation range.
- (2) Do not use an impact wrench to tighten the special tool bolt, otherwise the special tool will break.

2. Use the special tools to remove the self-locking nut.

Caution

Do not use an impact wrench, otherwise the strut assembly internal parts will loose.



►B◄ STRUT ASSEMBLY REMOVAL

To discard the strut assembly, place the assembly horizontally with its piston rod extended. Then drill a hole approx. 3 mm in diameter at the location shown in the illustration and discharge the gas.

Caution

The gas itself is harmless but it may issue out of the hole together with chips generated by the drill. Therefore, be sure to wear goggles.

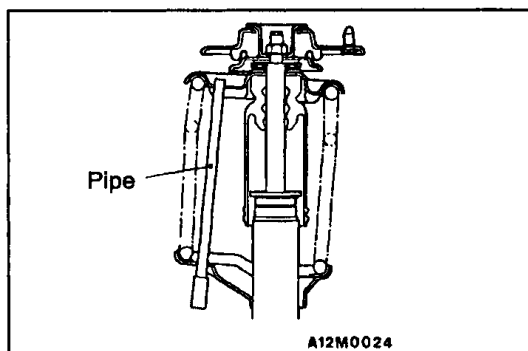
REASSEMBLY SERVICE POINT

►A◄ SELF-LOCKING NUT INSTALLATION

1. With the coil spring held compressed by the special tools (MB991237 and MB991238), provisionally tighten the self-locking nut.

Caution

Do not use an impact wrench to tighten the special tool bolt, otherwise the special tool will break.

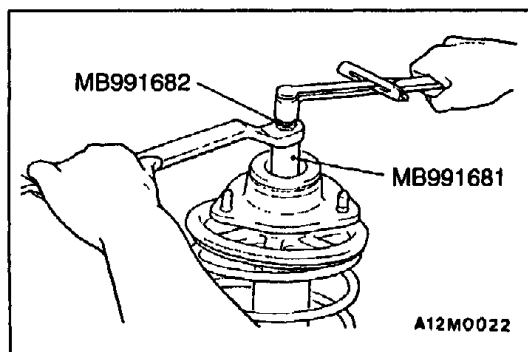


2. Line up the holes in the strut assembly spring lower seat with the hole in the spring upper seat.

NOTE

The job is easily accomplished with a pipe.

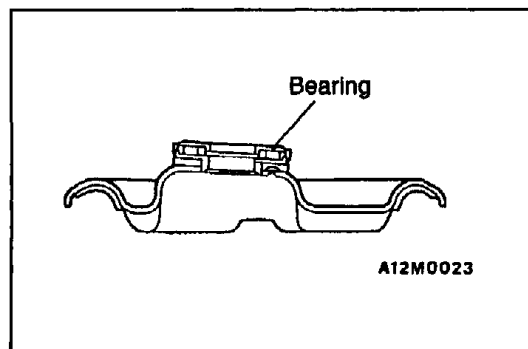
3. Correctly align both ends of the coil spring with the grooves in the spring seat, and then loosen the special tools (MB991237 and MB991238).



4. Using the special tools, tighten the self-locking nut to the specified torque.

Caution

Do not use an impact wrench, otherwise the strut assembly internal parts will loose.



INSPECTION

- Check the bearing for wear or rust.
- Check the rubber parts for damage or deterioration.
- Check the spring for deformation, deterioration or damage.
- Check the shock absorber for deformation.

LOWER ARM

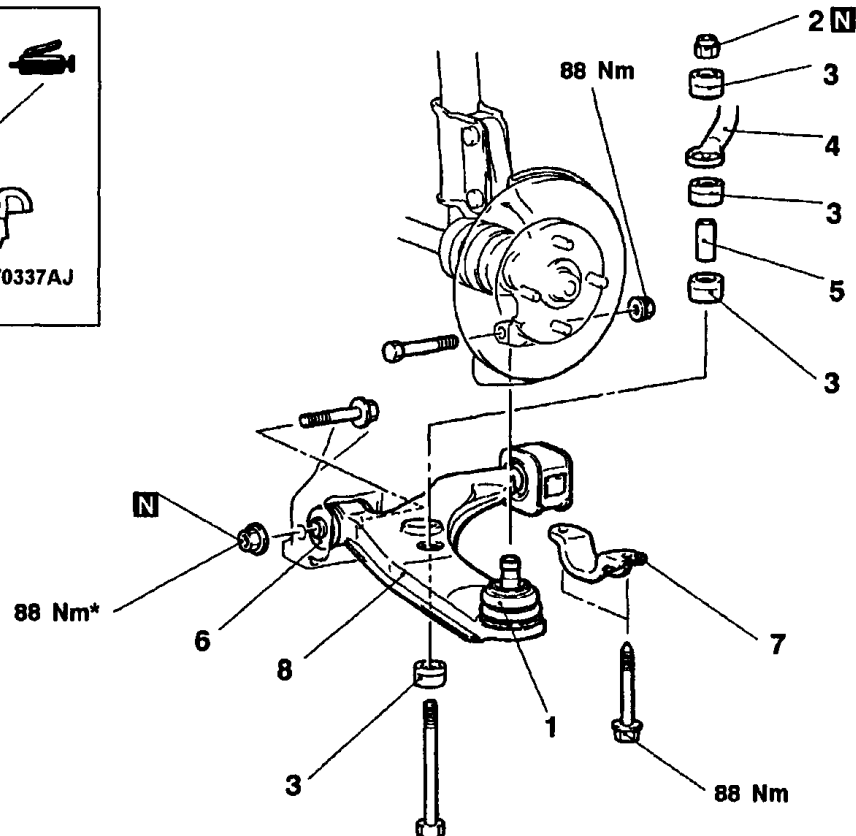
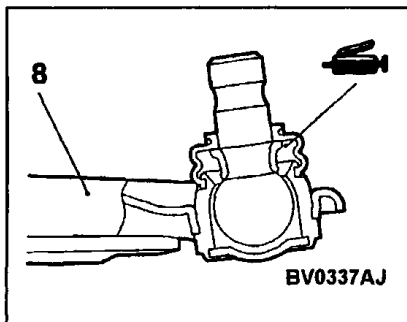
REMOVAL AND INSTALLATION

Caution:

*Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the ground in the unladen condition. Otherwise the bushing will be damaged.

Post-Installation Operation

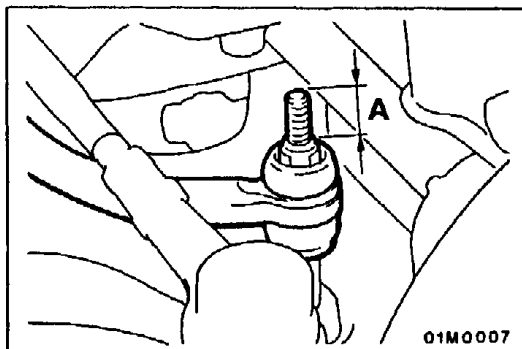
- Check the Dust Cover for Cracks or Damaged by Pushing it with Finger.
- Front Wheel Alignment Adjustment (Refer to P.33A-3.)



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Removal steps

- A◄
1. Lower arm ball joint connection
 2. Self-locking nut
 3. Stabilizer rubber
 4. Stabilizer bar
 5. Collar
 6. Lower arm front bushing connection
 7. Support bracket
 8. Lower arm assembly



INSTALLATION SERVICE POINT

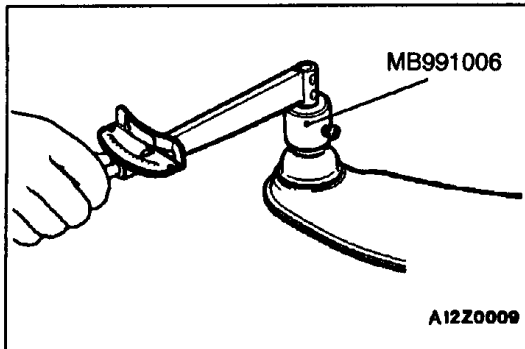
►A◄ SELF-LOCKING NUT INSTALLATION

Tighten the self-locking nut so that the amount of protrusion of the end of the stabilizer bar mounting bolt is at the standard value.

Standard value (A): 22 mm

INSPECTION

- Check the bushing for wear and deterioration.
- Check the lower arm for bend or breakage.
- Check the support bracket for deterioration or damage.
- Check all bolts for condition and straightness.

**BALL JOINT STARTING TORQUE/TURNING TORQUE CHECK**

1. After shaking the ball joint stud several times, install the nut to the stud and use the special tool to measure the starting/turning torque of the ball joint.

Standard value:

Starting torque 1.0 – 5.9 Nm

Turning torque 1.0 – 3.9 Nm

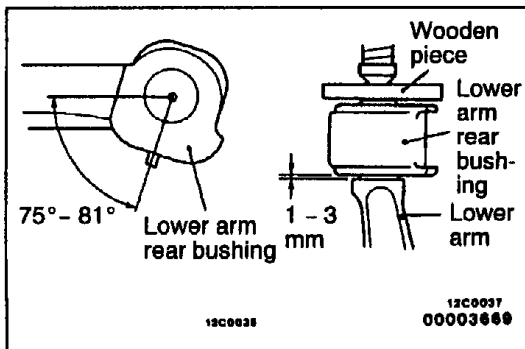
2. If the measured values exceed the standard values, replace the ball joint.
3. If the measured values are lower than the standard values, check that the ball joint does not feel stiff. If it doesn't feel stiff, it is possible to use the ball joint.

LOWER ARM BALL JOINT DUST COVER CHECK

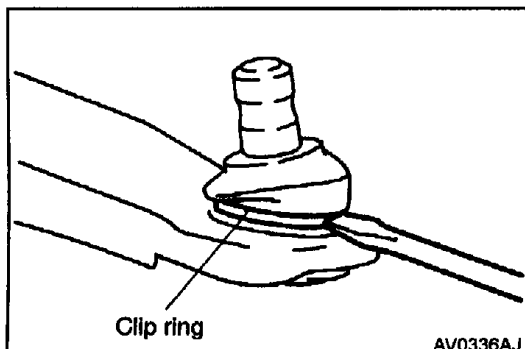
1. Check the dust cover for cracks or damage by pushing it with finger.
2. If the dust cover is cracked or damaged, replace the lower arm assembly.

NOTE

Cracks or damage of the dust cover may cause damage of the ball joint.

**LOWER ARM REAR BUSHING REPLACEMENT**

1. Apply soapy water between the shaft and old bushing, and pry up bushing using a screwdriver.
2. Apply soapy water to the shaft and new bushing and install new bushing into the shaft at the angle shown in the illustration.
3. Press in the bushing as illustrated.

**LOWER ARM BALL JOINT DUST COVER REPLACEMENT**

When the dust cover is damaged or the grease gushes out accidentally during service work, replace the dust cover as follows:

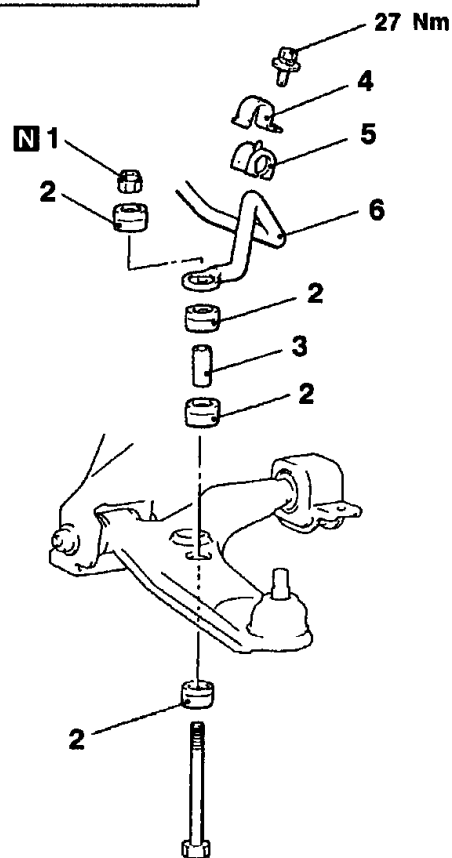
1. Remove the clip ring and the dust cover.
2. Apply multipurpose grease to the inside of the dust cover.
3. Install the dust cover to the ball joint.
4. Secure the dust cover by the clip ring.

5. Check the dust cover for cracks or damage by pushing it with finger.

STABILIZER BAR

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation
Crossmember Removal and Installation



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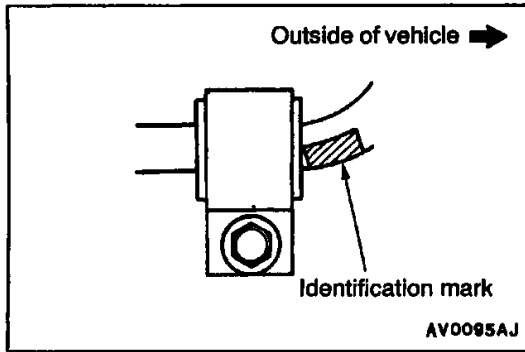
Removal steps



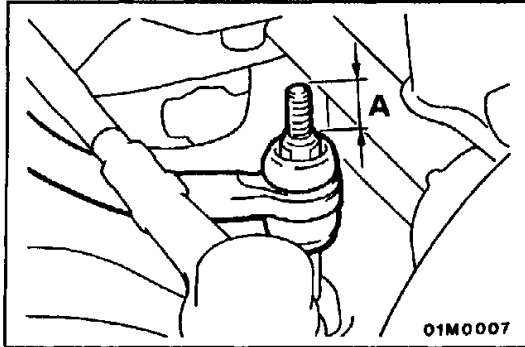
1. Self-locking nut
2. Stabilizer rubber
3. Collar



4. Fixture
5. Bushing
6. Stabilizer bar

**INSTALLATION SERVICE POINTS****►A◄ BUSHING/FIXTURE INSTALLATION**

Place the identification mark of the stabilizer bar to the right, and install the bushing so that the identification mark is at the shown position.

**►B◄ SELF-LOCKING NUT INSTALLATION**

Tighten the self-locking nut so that the amount of protrusion of the end of the stabilizer bar mounting bolt is at the standard value.

Standard value (A): 22 mm

INSPECTION

- Check the bushing for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.

GROUP 34

REAR SUSPENSION

GENERAL

OUTLINE OF CHANGES

- The specifications of the coil spring have been revised.
- Due to the change on the stabilizer link, the service procedures have been revised.

COIL SPRING

Items	Sedan	Hatchback
Wire dia. x O.D. x free length mm	13 x 86 x 400	10 x 86 x 414

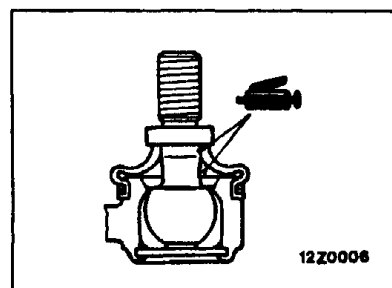
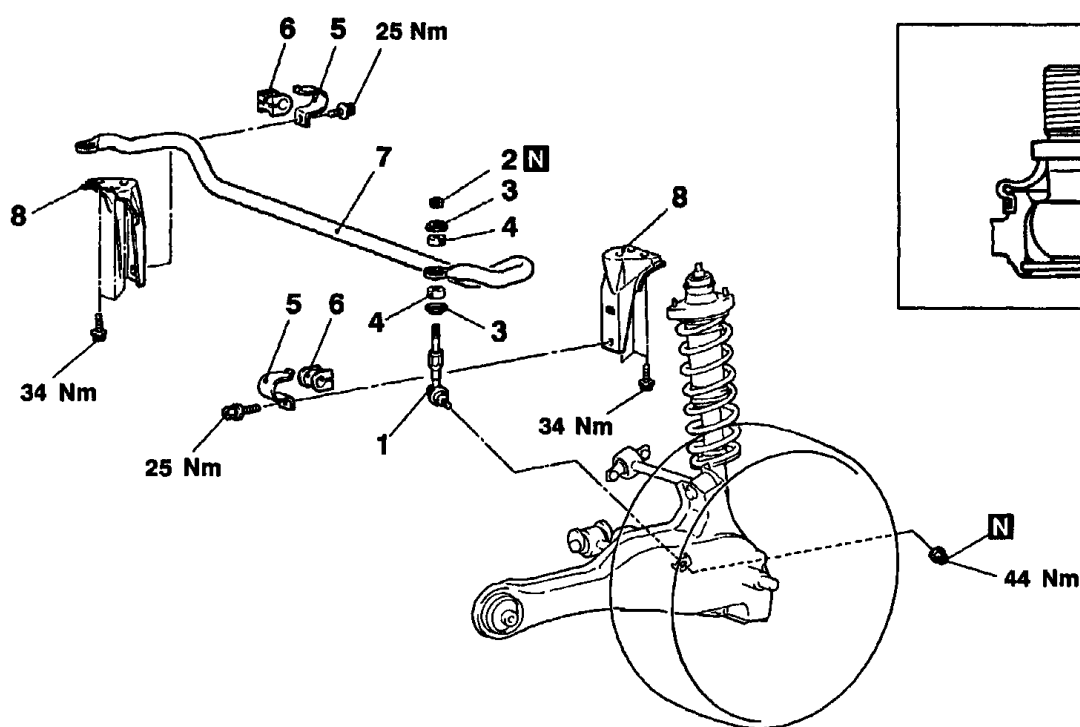
SERVICE SPECIFICATIONS

Items	Standard value
Protruding length of stabilizer bar mounting bolt mm	3 – 5

STABILIZER BAR

REMOVAL AND INSTALLATION

Post-Installation Operation
Wheel Alignment Check



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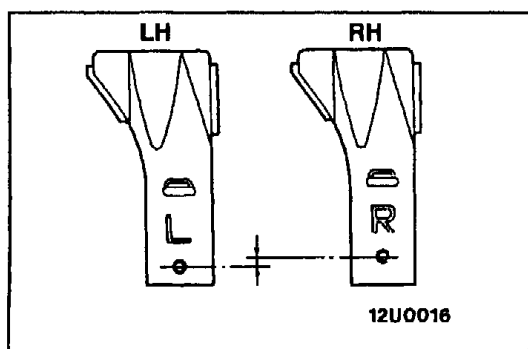
Removal steps



1. Stabilizer link
2. Self-locking nut
3. Joint cup
4. Stabilizer rubber



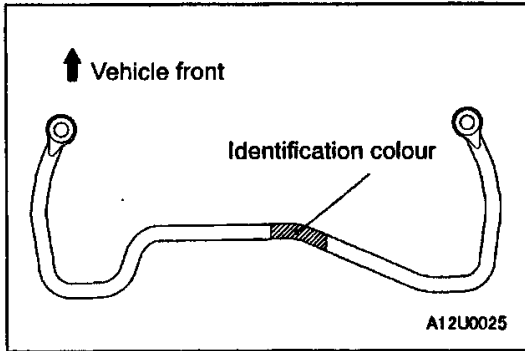
5. Fixture
6. Bushing
7. Stabilizer bar
8. Stabilizer bracket



INSTALLATION SERVICE POINTS

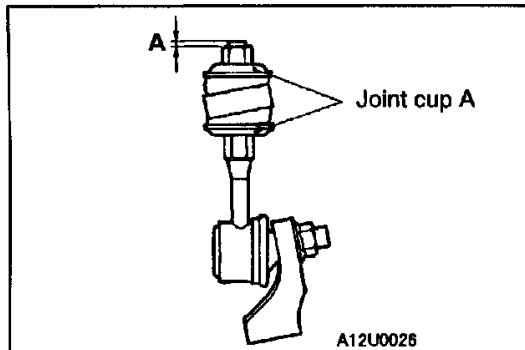
►A◄ STABILIZER BRACKET INSTALLATION

Because the left and right installation positions of the fixtures are different, be careful not to make a mistake when installing the stabilizer bracket.



►B◄ STABILIZER BAR INSTALLATION

Install the stabilizer bar so that its identification colour is positioned in the right of the vehicle.



►C◄ SELF-LOCKING NUT INSTALLATION

Check that the joint cup faces as shown, and then tighten the self-locking nut so that the shown dimension (A) is at the standard value.

Standard value (A): 3 – 5 mm

INSPECTION

The inspection procedures are the same as before.

SERVICE BRAKES

CONTENTS

BASIC BRAKE SYSTEM 35A

ANTI-SKID BRAKING SYSTEM (ABS) 35B

TRACTION CONTROL SYSTEM (TCL) 35C



BASIC BRAKE SYSTEM

CONTENTS

GENERAL	3	Disc Brake Pad Check and Replacement	5
Outline of Changes	3	Brake Disc Thickness Check	6
SERVICE SPECIFICATIONS	4	Brake Disc Run-out Check	6
LUBRICANT	4	Brake Disc Run-out Correction	7
ON-VEHICLE SERVICE	5	MASTER CYLINDER AND BRAKE	
Proportioning Valve Function Test	5	BOOSTER	8
		DISC BRAKE	9

GENERAL

OUTLINE OF CHANGES

- The size of the front brake discs for 1600 and 1900 has been changed from 13 inch to 14 inch. The service procedures have been established as the 15-inch ventilated front brake disc has been used for 1800.
- The service procedures have been established as 14-inch ventilated rear brake disc has been used for 1800.
- The service procedures have been established due to the change in the proportioning valve.
- The service procedures have been established due to the change in the brake booster.

Items		1800 - SPORT	Except 1800 - SPORT
Master cylinder	Type	Tandem type	Tandem type
	I.D. mm	23.81	23.81
Brake booster	Type	Vacuum type, tandem	Vacuum type, tandem
	Effective dia. of power cylinder mm	190 + 217	190 + 217
	Boosting ratio	6.5	6.5
Proportioning valve	Type	Dual type	Dual type
	Decompression ratio	0.37	0.25, 0.37*
Front disc brakes	Type	Floating caliper, 1-piston, ventilated disc	Floating caliper, 1-piston, ventilated disc
	Disc effective dia. × thickness mm	232 × 24	211 × 24, 232 × 24*
	Wheel cylinder I.D. mm	53.97	53.97
	Pad thickness mm	12.0	10.0, 12.0*
	Clearance adjustment	Automatic	Automatic
Rear disc brakes	Type	Floating caliper, 1-piston, ventilated disc	Floating caliper, 1-piston, ventilated disc*
	Disc effective dia. × thickness mm	211.6 × 10	211.6 × 10*
	Wheel cylinder I.D. mm	35.00	35.00*
	Pad thickness mm	9.0	9.0*
	Clearance adjustment	Automatic	Automatic*
Rear drum brakes	Type	–	Leading trailing
	Drum I.D. mm	–	203
	Wheel cylinder I.D. mm	–	19.05
	Lining thickness mm	–	4.4
	Clearance adjustment	–	Automatic
Brake fluid		DOT3 or DOT4	DOT3 or DOT4

NOTE

* : Vehicles with rear disc brake (option) or traction control (option).

SERVICE SPECIFICATIONS

Items				Standard value	Limit
Proportioning valve	Split point fluid pressure MPa	Hatchback	Vehicles with rear drum brake	3.68 – 4.17	–
			Vehicles with rear disc brake	3.19 – 3.68	–
		Sedan	Vehicles with rear drum brake	3.19 – 3.68	–
			Vehicles with rear disc brake	2.70 – 3.19	–
	Output fluid pressure MPa (Input fluid pressure: 13.7 MPa)	Hatchback	Vehicles with rear drum brake	4.66 – 5.15	–
			Vehicles with rear disc brake	4.64 – 5.13	–
		Sedan	Vehicles with rear drum brake	4.17 – 4.66	–
			Vehicles with rear disc brake	4.15 – 4.64	–
	Output fluid pressure difference between left and right MPa			–	0.39
Front disc brake	Pad thickness mm		14 inch disc brake	10.0	2.0
			15 inch disc brake	12.0	2.0
	Disc thickness mm			24.0	22.4
	Disc runout mm			–	0.06 or less
	Drag force N			40 or less	–
Rear disc brake	Pad thickness mm			9.0	2.0
	Disc thickness mm			10.0	8.4
	Disc runout mm			–	0.08 or less
	Drag force N			20 or less	–
Hub end play mm				–	0.05
Brake booster push rod to master cylinder piston clearance mm				0.4 – 0.6	–

LUBRICANT

Item	Specified Lubricant
Guide pin and boot	Repair kit grease

ON-VEHICLE SERVICE

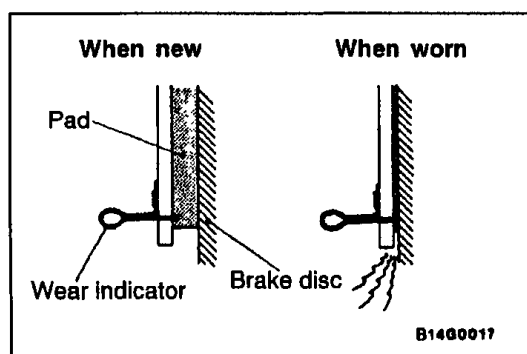
PROPORTIONING VALVE FUNCTION TEST

Standard values have been set as follows. The inspection procedure is the same as before.

Standard value:

Items	Hatchback		Sedan	
	Vehicles with rear drum brake	Vehicles with rear disc brake	Vehicles with rear drum brake	Vehicles with rear disc brake
Split point fluid pressure MPa	3.68 – 4.17	3.19 – 3.68	3.19 – 3.68	2.70 – 3.19
Output fluid pressure MPa (Input fluid pressure: 13.7 MPa)	4.66 – 5.15	4.64 – 5.13	4.17 – 4.66	4.15 – 4.64

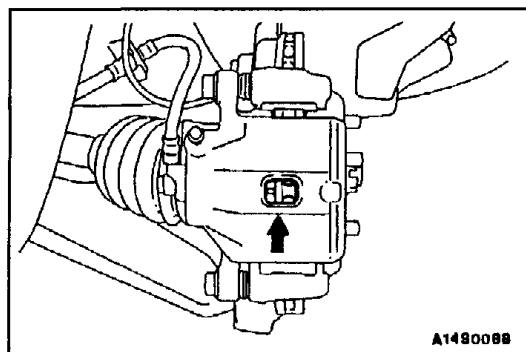
Limit (Output fluid pressure difference between left and right) : 0.39 MPa



DISC BRAKE PAD CHECK AND REPLACEMENT

NOTE

The brake pads have wear indicators that contact the brake disc when the brake pad thickness becomes 2 mm and emit a squealing sound to warn the driver.



1. Check brake pad thickness through caliper body check port.

Standard value:

<Front 14 inch disc brake> 10.0 mm

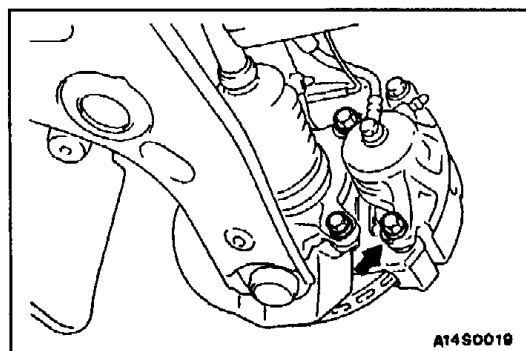
<Front 15 inch disc brake> 12.0 mm

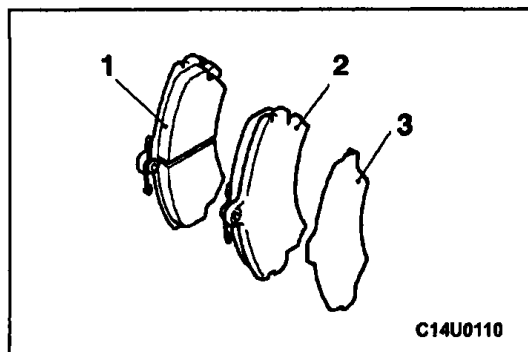
<Rear 14 inch disc brake> 9.0 mm

Limit: 2.0 mm

Caution

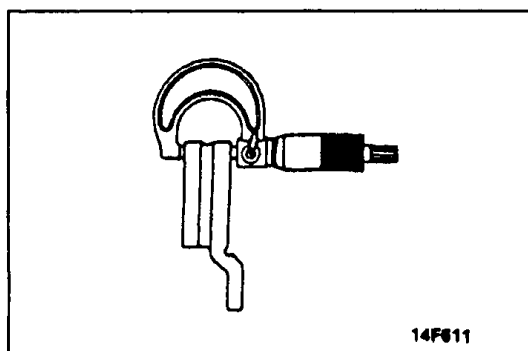
- (1) When the limit is exceeded, replace the pads at both sides, and also the brake pads for the wheels on the opposite side at the same time.
 - (2) If there is a significant difference in the thickness of the pads on the left and right sides, check the sliding condition of the piston, lock pin and guide pin.
 - (3) Do not wipe off the special grease that is on the lock pin or allow it to contaminate the lock pin.
2. Remove the caliper lower bolt, and then tilt the caliper body upwards to support it with a wire.





3. Remove the following parts from caliper support.
 1. Pad & wear indicator assembly
 2. Pad assembly
 3. Outer shim <Front 14 inch disc brake>

4. In order to measure the brake drag torque after pad installation, measure the rotary-sliding resistance of the hub with the pads removed. (Refer to P.35A-10.)
5. Install the pads and the caliper assembly, and then check the brake drag torque. (Refer to P.35A-10.)



BRAKE DISC THICKNESS CHECK

1. Using a micrometer, measure disc thickness at eight positions, approximately 45° apart and 10 mm in from the outer edge of the disc.

Brake disc thickness

Standard value:

- <Front> 24.0 mm
- <Rear> 10.0 mm

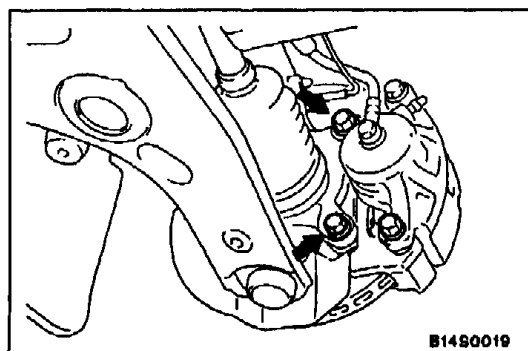
Limit:

- <Front> 22.4 mm
- <Rear> 8.4 mm

Thickness variation (at least 8 positions)

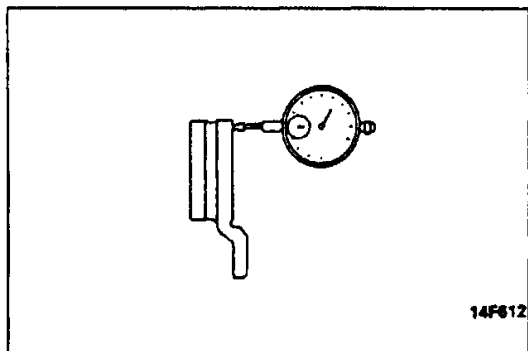
The difference between any thickness measurements should not be more than 0.015 mm.

2. If the disc is beyond the limits for thickness, remove it and install a new one. If thickness variation exceeds the specification, replace the brake disc or turn rotor with on-the-car type brake lathe ("MAD, DL-8700PF" or equivalent).



BRAKE DISC RUN-OUT CHECK

1. Remove the caliper support; then raise the caliper assembly upward and secure by using wire.
2. Inspect the disc surface for grooves, cracks and rust. Clean the disc thoroughly and remove all rust.



3. Place a dial gauge approximately 5 mm from the outer circumference of the brake disc, and measure the run-out of the disc.

Limit:

<Front> 0.06 mm or less

<Rear> 0.08 mm or less

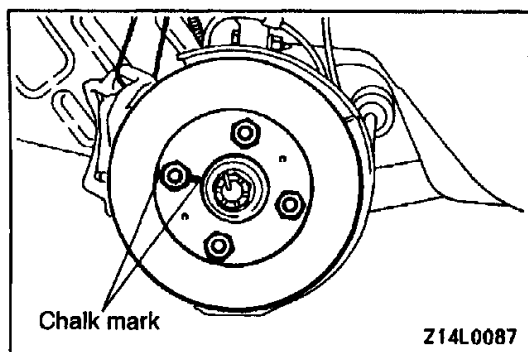
NOTE

Tighten the nuts in order to secure the disc to the hub.

BRAKE DISC RUN-OUT CORRECTION

1. If the run-out of the brake disc is equivalent to or exceeds the limit specification, change the phase of the disc and hub, and then measure the run-out again.

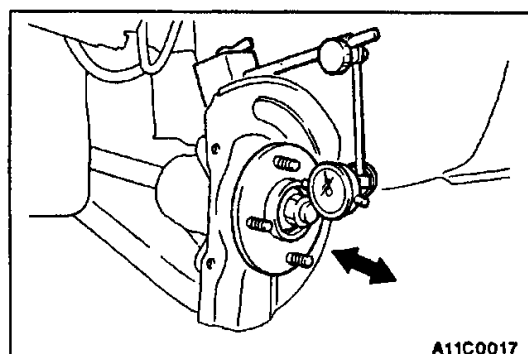
(1) Before removing the brake disc, chalk both sides of the wheel stud on the side at which run-out is greatest.



- (2) Remove the brake disc, and then place a dial gauge as shown in the illustration; then move the hub in the axial direction and measure the play.

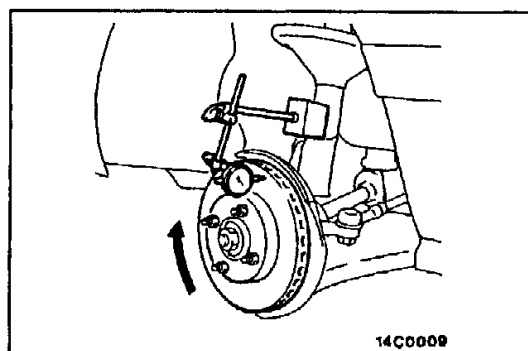
Limit: 0.05 mm

If the play is equivalent to or exceeds the limit, disassemble the hub knuckle and check each part.



- (3) If the play does not exceed the limit specification, install the brake disc at a position 180° away from the chalk mark, and then check the run-out of the brake disc once again.

2. If the run-out cannot be corrected by changing the phase of the brake disc, replace the disc or turn rotor with on-the-car type brake lathe ("MAD, DL-8700PF or equivalent).



MASTER CYLINDER AND BRAKE BOOSTER

REMOVAL AND INSTALLATION

The procedure is the same as before.

INSTALLATION SERVICE POINT

CLEARANCE ADJUSTMENT BETWEEN BRAKE BOOSTER PUSH ROD AND PRIMARY PISTON

The following standard value has been revised. The procedure is the same as before.

Standard value: 0.4 – 0.6 mm

INSPECTION

VACUUM SENSOR CHECK

Refer to GROUP 13 – Troubleshooting.

NOTE

The engine-ECU monitors the vacuum sensor. If it is defective, a diagnosis code will be displayed on the MUT-II.

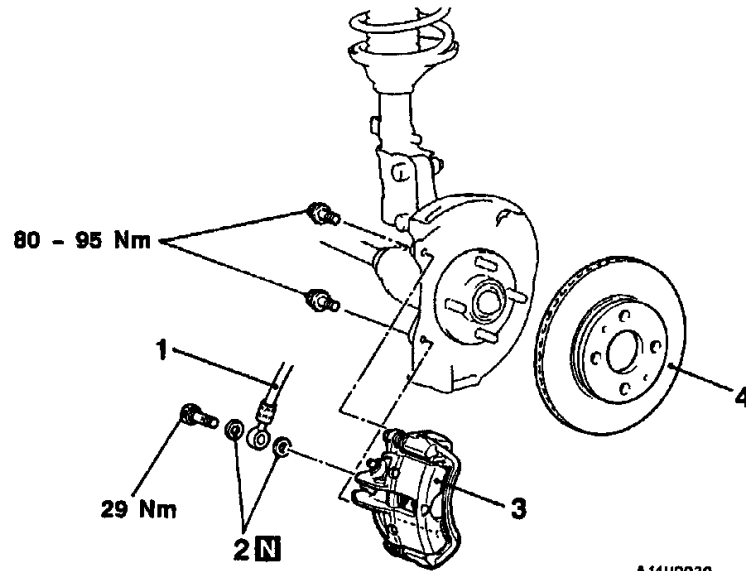
DISC BRAKE**REMOVAL AND INSTALLATION**

Pre-removal Operation
Brake Fluid Draining

Post-Installation Operation

- Brake Fluid Supplying
- Brake Line Bleeding (Refer to P.35A-9.)

<Front>

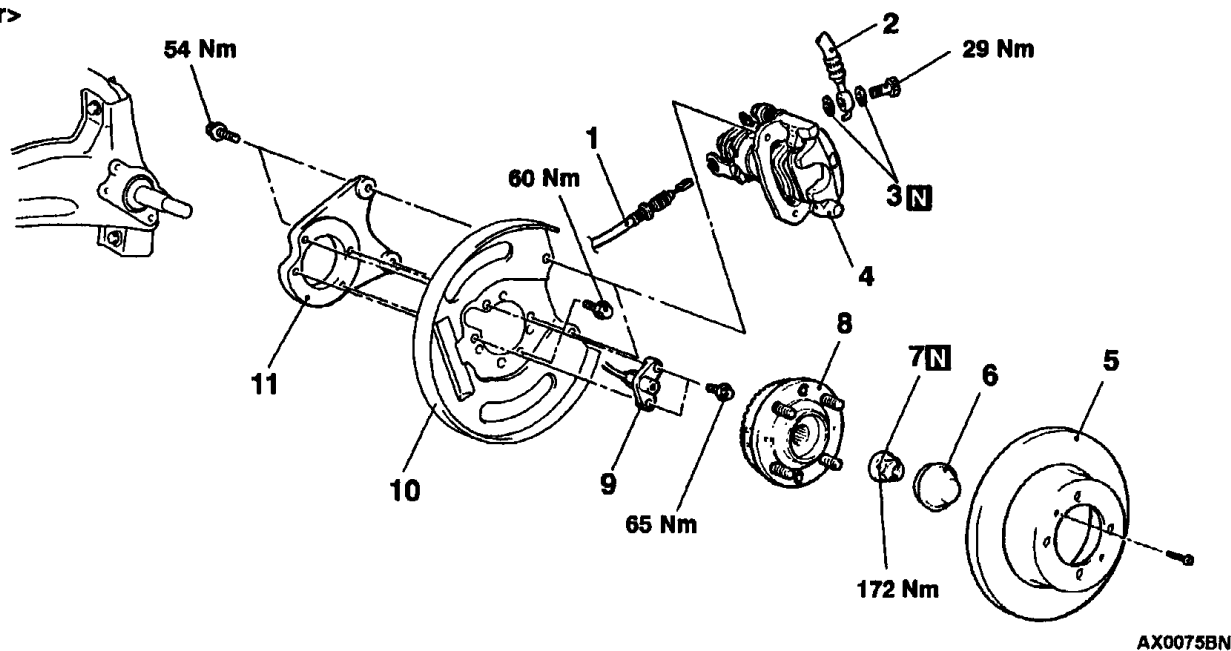


Removal steps

1. Brake hose connection
2. Gasket
3. Disc brake assembly
4. Brake disc



<Rear>

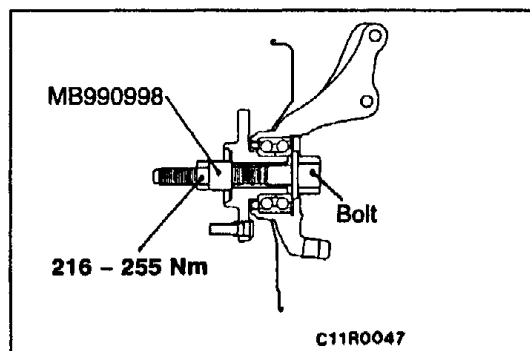
**Removal steps**

1. Parking brake cable connection
2. Brake hose connection
3. Gasket
4. Disc brake assembly
5. Brake disc
6. Hub cap

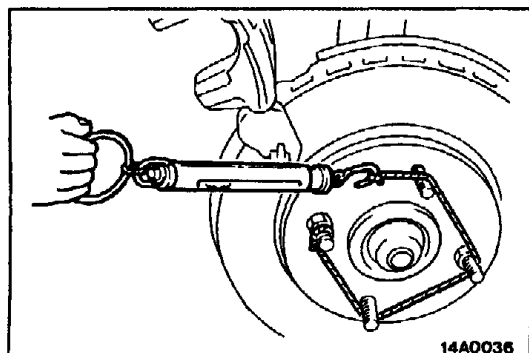
►A◄

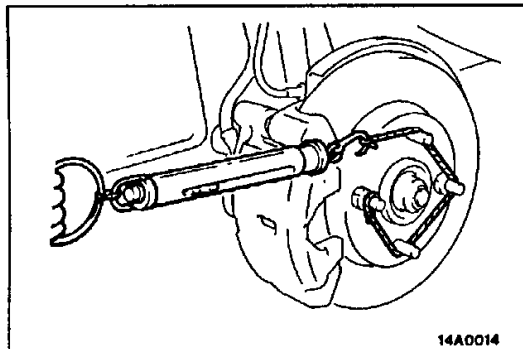
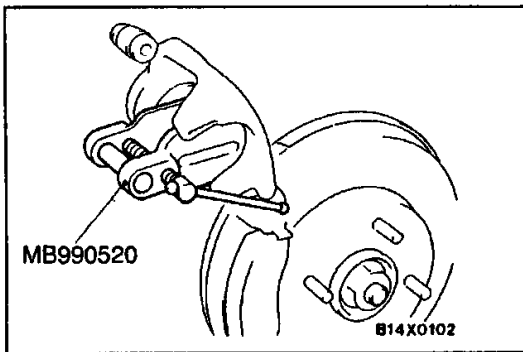
7. Self locking nut
8. Rear hub and rotor assembly
9. Rear speed sensor
10. Dust shield
11. Disc brake adapter

►B◄

**INSTALLATION SERVICE POINT****►A◄ DISC BRAKE ASSEMBLY INSTALLATION**

1. In order to measure the brake drag torque after pad installation, measure the rotary-sliding resistance of the hub by the following procedure with the pads removed.
 - (1) Remove the drive shaft. (Refer to GROUP 26.)<Front>
 - (2) Attach the special tool to the front hub assembly as shown in the illustration, and tighten it to the specified torque.<Front>
- (3) Use a spring balance to measure the rotary-sliding resistance of the hub in the forward direction.





2. Install the caliper support, and then install the brake pad to the caliper support.

Caution

Do not let any oil, grease or other contamination get onto the friction surfaces of the pads and brake discs.

3. Clean piston and insert into cylinder with special tool.
4. Be careful that the piston boot does not become caught, when lowering the caliper assembly, and then tighten the bolt to the specified torque.

Tightening torque: 27 Nm

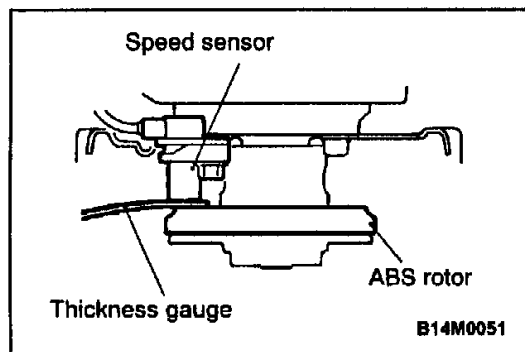
5. Start the engine and then depress the brake pedal 2-3 times.
6. Stop engine.
7. Turn brake disc forward 10 times.
8. Use a spring balance to measure the rotation sliding resistance of the hub in the forward direction.
9. Calculate the drag force of the disc brake (difference between of values measured in item 8 and item 1.)

Standard value:

<Front> 40 N or less

<Rear> 20 N or less

10. If the drag force of the disc brake exceeds the standard value, disassemble piston and clean piston. Check for corrosion or worn piston seal, and check the sliding condition of the lock pin and guide pin.



►B◄ REAR SPEED SENSOR INSTALLATION

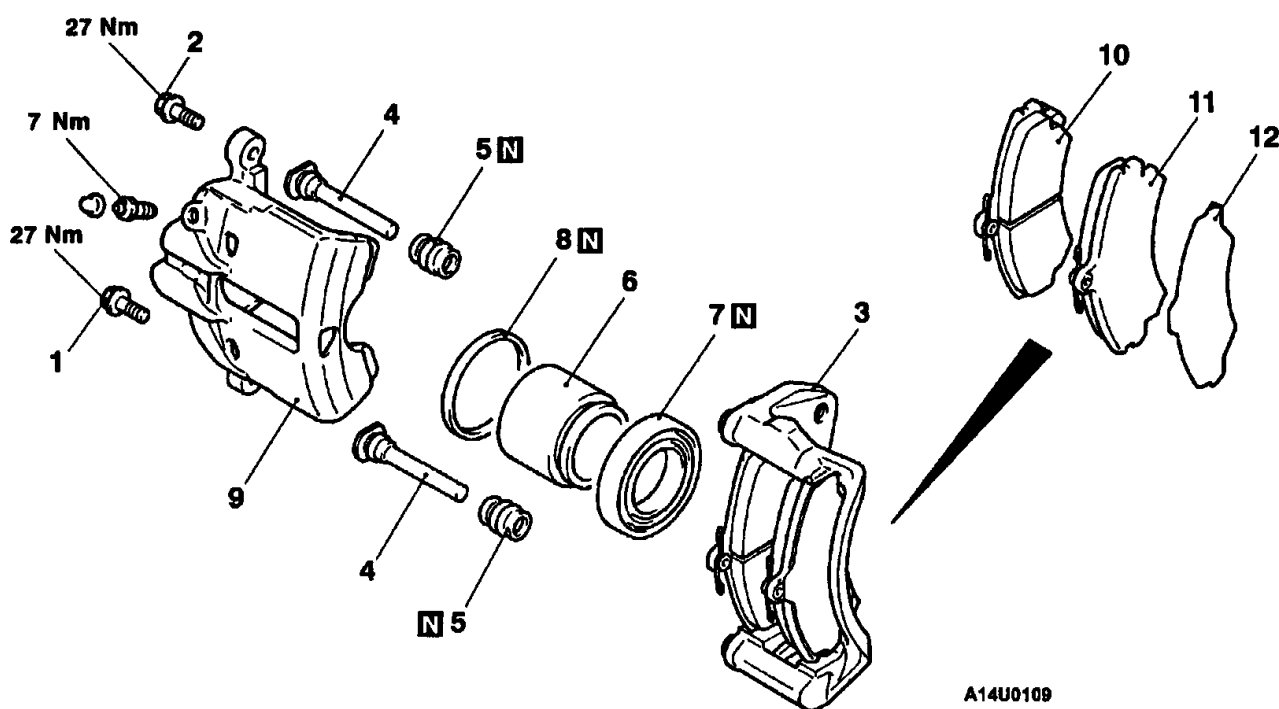
Caution

Be sure not to damage the pole piece at the tip of the speed sensor by striking against other parts.

Insert a thickness gauge into the space between the speed sensor's pole piece and the ABS rotor's toothed surface, and check the clearance is the standard value all around.

Standard value: 0.1 - 1.9 mm

DISASSEMBLY AND REASSEMBLY <FRONT DISC BRAKE>



A14U0109

A14U0108	A14U0110	B14U0110	A14U0111
Brake caliper kit	Pad set	Shim set	Seal and boots kit

Caliper assembly disassembly steps

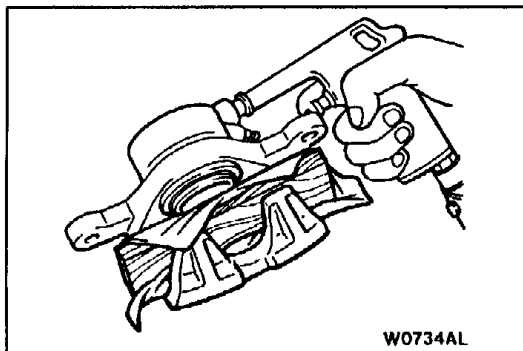
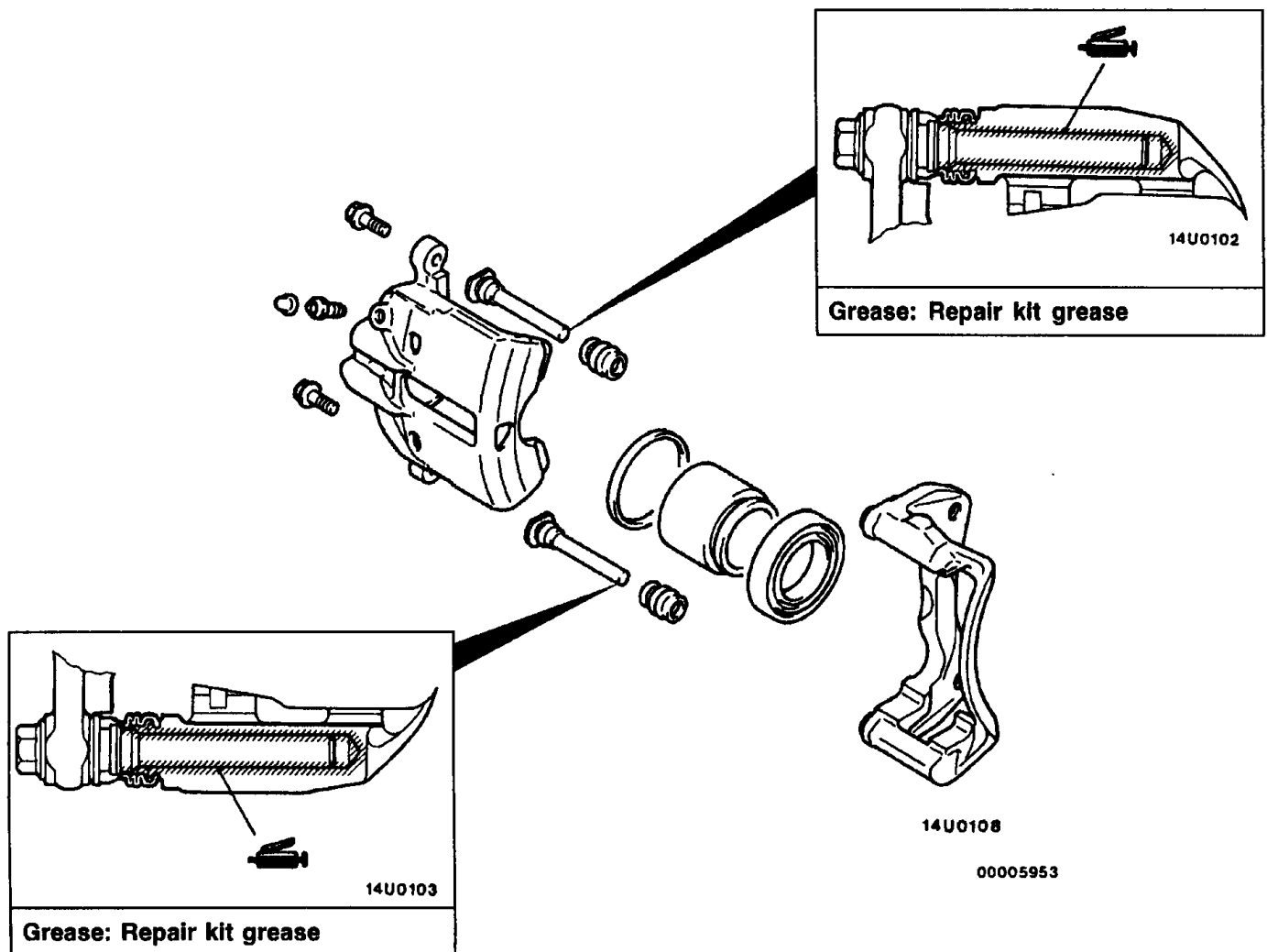
1. Bolt
2. Bolt
3. Caliper support
4. Guide pin
5. Boot
6. Piston
7. Piston boot
8. Piston seal
9. Caliper body

Pad assembly disassembly steps

1. Bolt
10. Pad and wear indicator assembly
11. Pad assembly
12. Outer shim <14 inch disc brake>



LUBRICATION POINTS



DISASSEMBLY SERVICE POINTS

◀A▶ PISTON BOOT/PISTON REMOVAL

Use a piece of wood to protect the caliper body outer side, and then apply compressed air through the brake hose connection hole to withdraw the piston and piston boot.

Caution

If air is blown into the caliper body suddenly, the piston will pop out, causing damage to the caliper body. Be sure to apply compressed air gradually.

◀B▶ PISTON SEAL REMOVAL

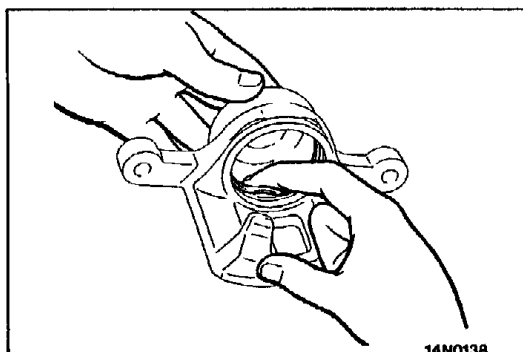
1. Remove piston seal with finger tip.

Caution

Do not use a flat-tipped screwdriver or other tool to prevent damage to inner cylinder.

2. Clean piston surface and inner cylinder with trichloroethylene, alcohol or specified brake fluid.

Specified brake fluid: DOT3 or DOT4



INSPECTION

- Check cylinder for wear, damage or rust.
- Check piston surface for wear, damage or rust.
- Check caliper body or guide pin for wear.
- Check pad for damage or adhesion of grease, check backing metal for damage.

PAD WEAR CHECK

Measure thickness at the thinnest and worn area of the pad. Replace pad assembly if pad thickness is less than the limit value.

Standard value:

<14 inch disc brake> 10.0 mm

<15 inch disc brake> 12.0 mm

Limit: 2.0 mm

Caution

1. **Always replace the right and left brake pads as a set.**
2. **If an excessive difference is found in the thickness between the right and left brake pads, check moving parts.**

ANTI-SKID BRAKING SYSTEM (ABS)

CONTENTS

GENERAL	2	TROUBLESHOOTING	2
Outline of Changes	2	REAR WHEEL SPEED SENSOR	4

GENERAL

OUTLINE OF CHANGES

- Troubleshootings have been revised for the modification of the anti-skid braking system (ABS) circuit.
- The removal and installation procedures for the rear wheel speed sensor have been changed due to the change on the sensor.

TROUBLESHOOTING

INSPECTION CHART FOR TROUBLE SYMPTOMS

Get an understanding of the trouble symptoms and check according to the inspection procedure chart. The other procedures than the revision below are the same as before.

Trouble symptoms		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	*
	Communication with ABS only is not possible.	2	35B-3

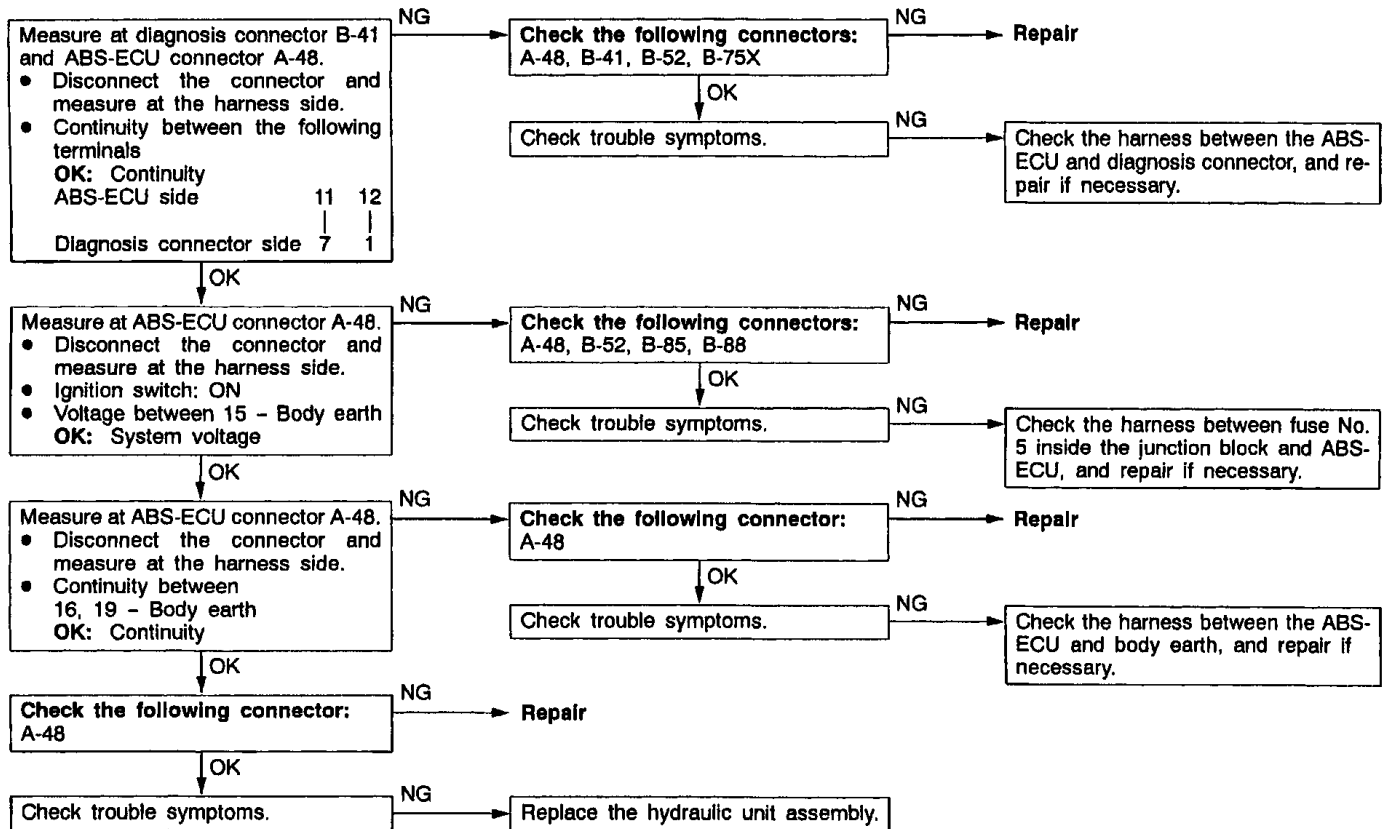
NOTE

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

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 2

Communication with MUT-II is not possible. (Communication with ABS only is not possible.)	Probable cause
When communication with the MUT-II is not possible, the cause is probably an open circuit in the ABS-ECU power circuit or an open circuit in the diagnosis output circuit.	• Blown fuse • Malfunction of wiring harness or connector • Malfunction of ABS-ECU

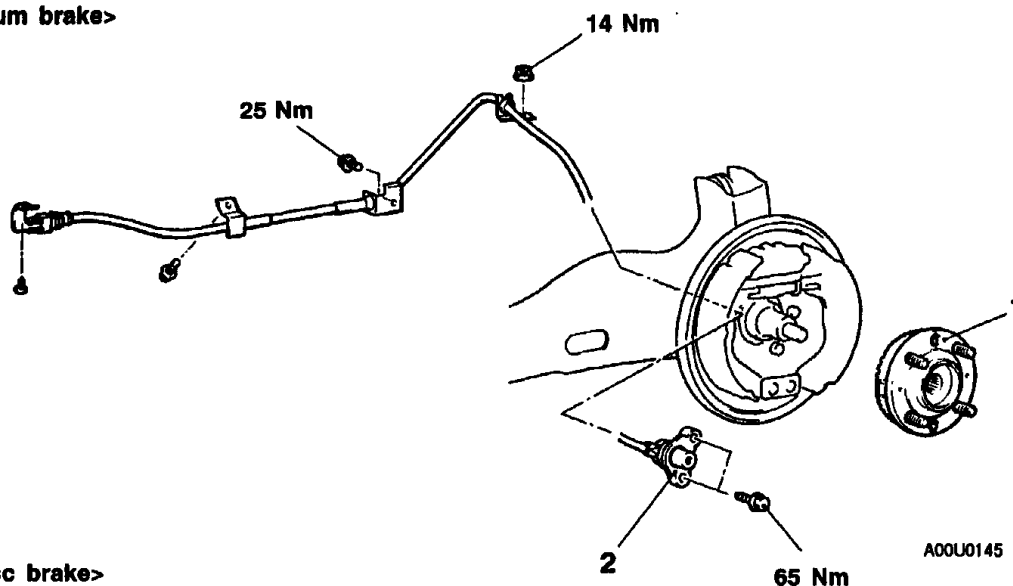


REAR WHEEL SPEED SENSOR

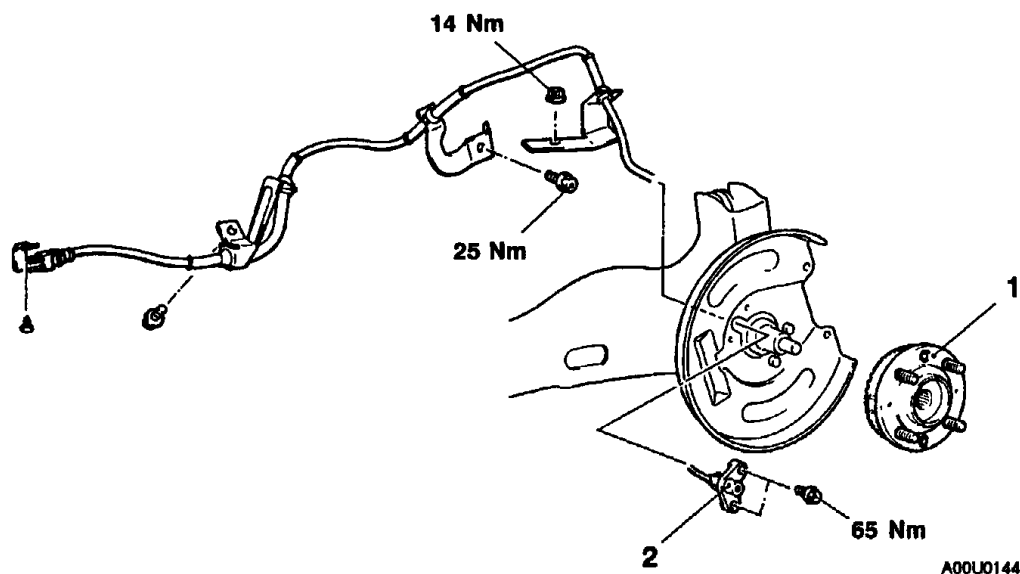
REMOVAL AND INSTALLATION

Post-Installation Operation
Wheel Speed Sensor Output Voltage Check

<Vehicles with drum brake>



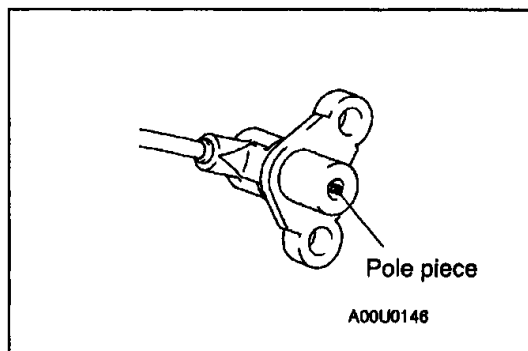
<Vehicles with disc brake>



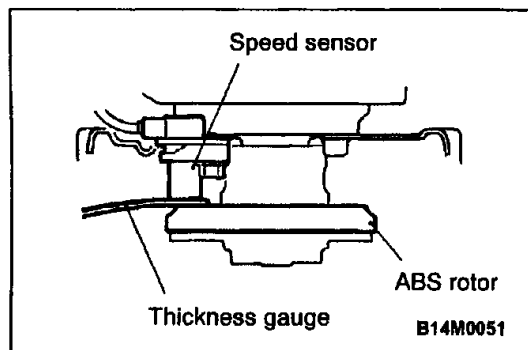
Removal steps

1. Rear ABS rotor
(Refer to GROUP 27 – Rear Axle Hub.)
2. Rear speed sensor

◀A▶ ▶A▶

**REMOVAL SERVICE POINT****◀A▶ REAR SPEED SENSOR REMOVAL****Caution**

Be sure not to damage the pole piece at the tip of the speed sensor by striking against other parts.

**INSTALLATION SERVICE POINT****▶A◀ REAR SPEED SENSOR INSTALLATION****Caution**

Be sure not to damage the pole piece at the tip the speed sensor by striking against other parts.

Insert a thickness gauge into the space between the speed sensor's pole piece and the ABS rotor's toothed surface, and check the clearance is the standard value all around.

Standard value: 0.1 – 1.9 mm

INSPECTION

The inspections are the same as before.

TRACTION CONTROL SYSTEM (TCL)

CONTENTS

GENERAL	2	ON-VEHICLE SERVICE	17
Outline of Change	2	Stop Lamp Switch Check	17
GENERAL INFORMATION	2	Wheel Speed Sensor Output Voltage Check	17
SPECIAL TOOLS	8	Wheel Speed Sensor Check	17
TROUBLESHOOTING	8	Hydraulic Unit (HC) Check	18
		HYDRAULIC UNIT	18

GENERAL

OUTLINE OF CHANGE

- The following service procedures have been added to the use of the brake-controlled TCL.

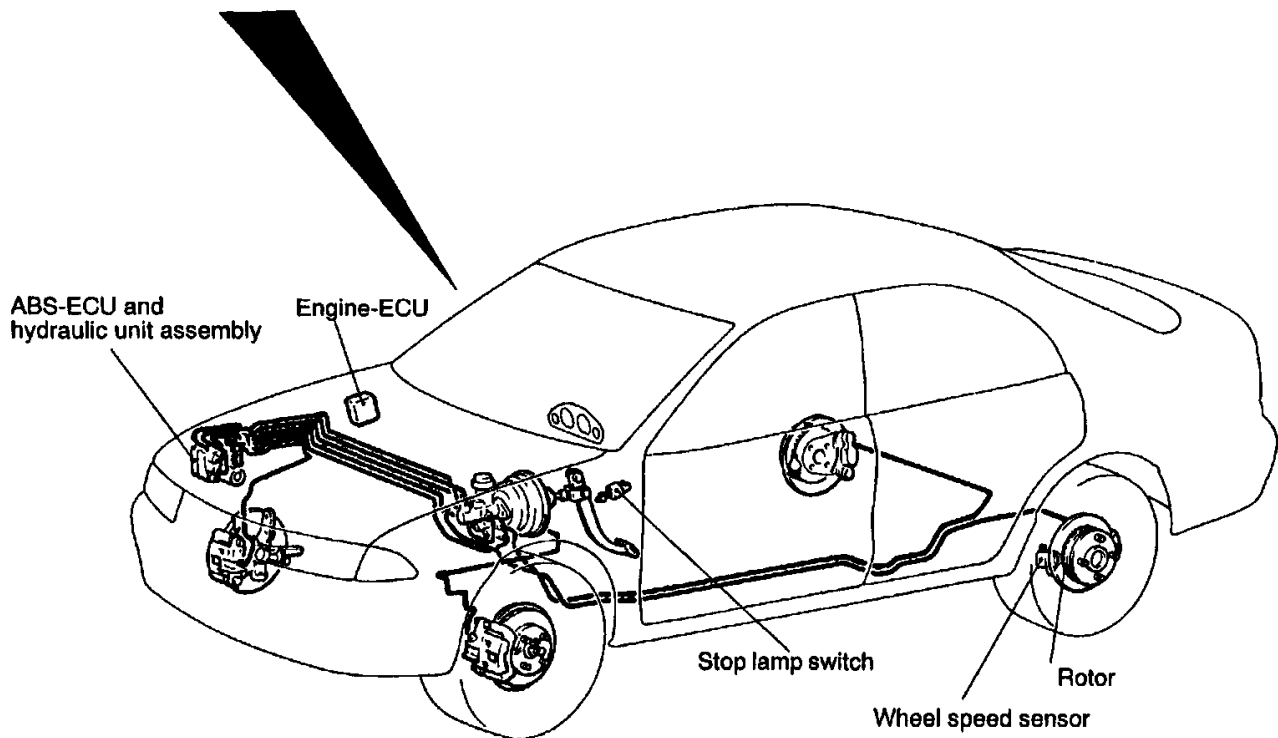
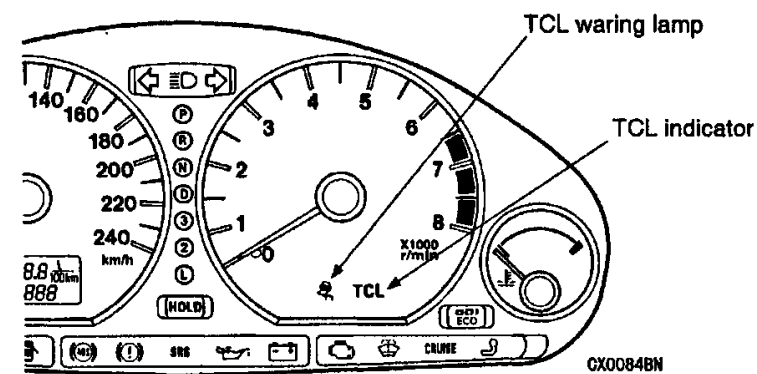
GENERAL INFORMATION

If a throttle valve is opened excessively widely when a vehicle is started or accelerated, driving wheels may slip due to excessive driving torque, thus adversely affecting startability, accelerating ability or controllability. In order to ensure startability, accelerating ability and controllability, this TCL system will prevent the wheel slips by controlling (applying) the brake fluid pressure to the driving wheels and thus adjust the driving torque according to road conditions.

Each wheel-speed sensor detects wheel speed and convert it to electric signal. The ABS-ECU determines which wheel almost slips according to that signal. If the ABS-ECU determines the wheel slip, it activates the solenoid valves and the pump inside the hydraulic unit to prevent the wheel slip by applying brake, thus ensuring controllability. Furthermore, this TCL system is controlled by the ABS-ECU, and the TCL components are shared by the ABS system.

System operation	TCL indicator	TCL warning lamp	ABS lamp warning	TCL control function
TCL: ON	On	Off	Off	Enable
TCL: OFF	Off	Off	Off	
Fail-safe: activated	Off	On	On	Disable

CONSTRUCTION DIAGRAM



SYSTEM OPERATION

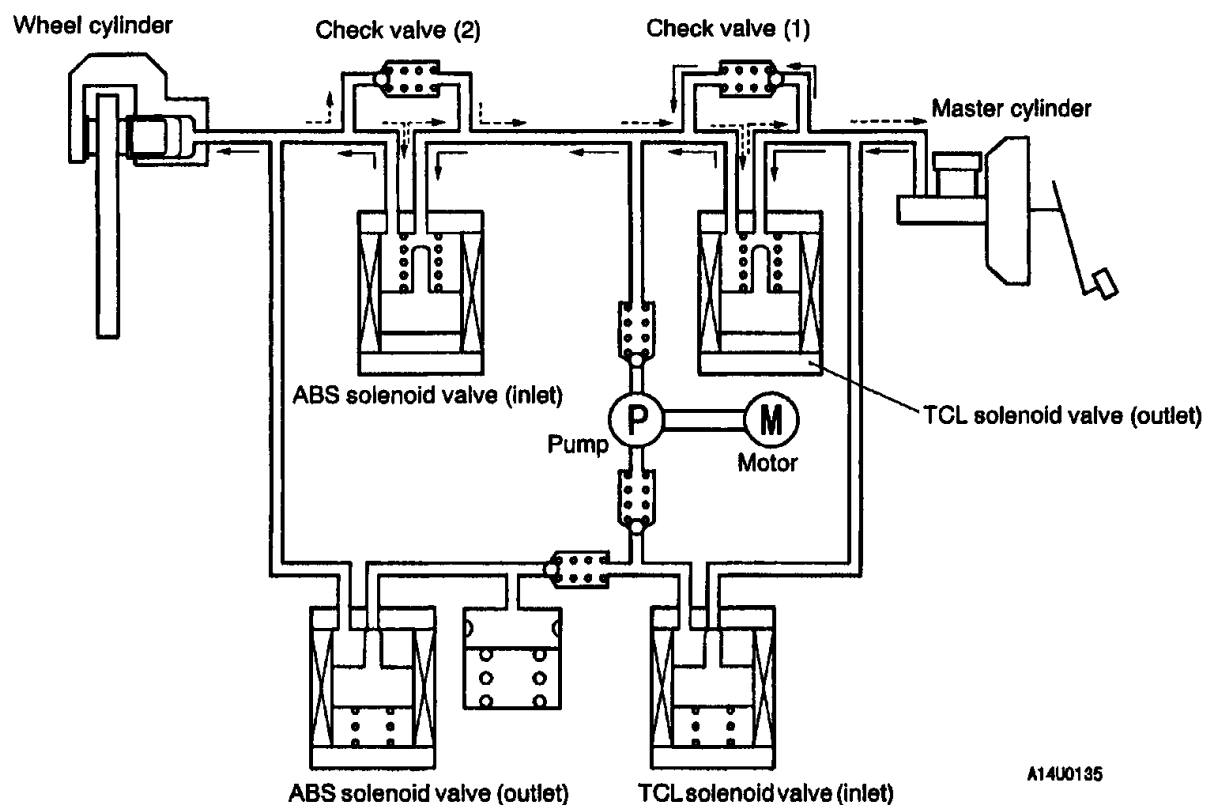
The hydraulic unit contains eight ABS solenoid valves and four TCL solenoid valves. Two ABS solenoid valves (inlet and outlet valves) are mounted in each road wheels, and two TCL solenoid valves (inlet and outlet valves) are mounted in each front driving wheel. The following description explains one front driving wheel.

1. When the TCL is off

The TCL solenoid valve (outlet) and the ABS solenoid valve (inlet) are opened while the TCL solenoid valve (inlet) and the ABS solenoid valve (outlet) is closed. If the brake pedal is depressed, the brake fluid flows through the TCL solenoid valve (outlet) and check valve (1) and the ABS solenoid valve (inlet) to the wheel cylinder, thus applying brake.

Next, if the brake pedal is released, the brake fluid returns through the ABS solenoid valve (inlet), check valve (2) and the TCL solenoid valve (outlet) to the master cylinder, thus releasing brake.

Name		Energisation	Open/Close	Name		Energisation	Open/Close
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	OFF	Close
	OUT	OFF	Close		OUT	OFF	Open



A14U0135

← — When brake pedal is depressed

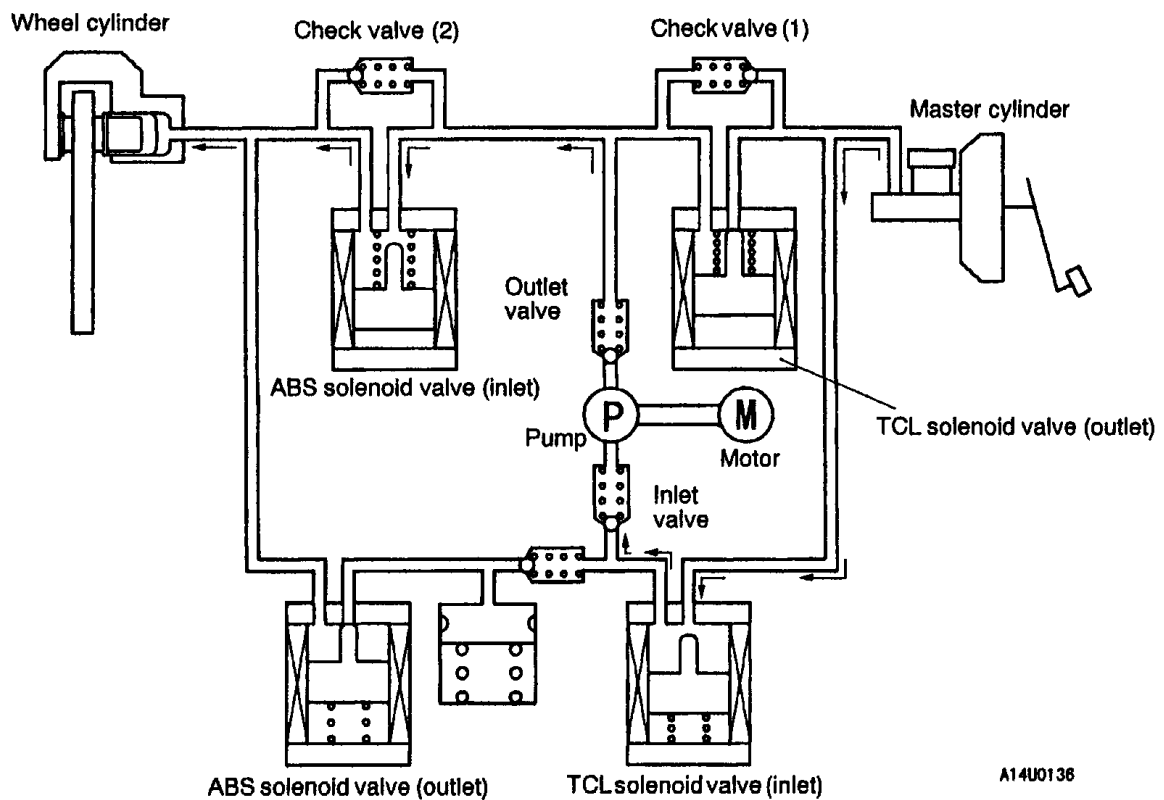
← - - - When brake pedal is released

2. When the TCL Is on

(1) When the brake fluid pressure is increased

When the ABS-ECU determines wheel slip due to sudden acceleration or others, the ABS-ECU closes the TCL solenoid valve (outlet), opens the TCL solenoid valve (inlet), and energises the motor to activate the plunger pump. Then the brake fluid is pumped from the master cylinder through the TCL solenoid valve (inlet) and the inlet valve. The pressurised brake fluid flows through the ABS solenoid valve (inlet) to the wheel cylinder, thus increasing the brake fluid pressure.

Name		Energisation	Open/Close	Name		Energisation	Open/Close
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	ON	Open
	OUT	OFF	Close		OUT	ON	Close

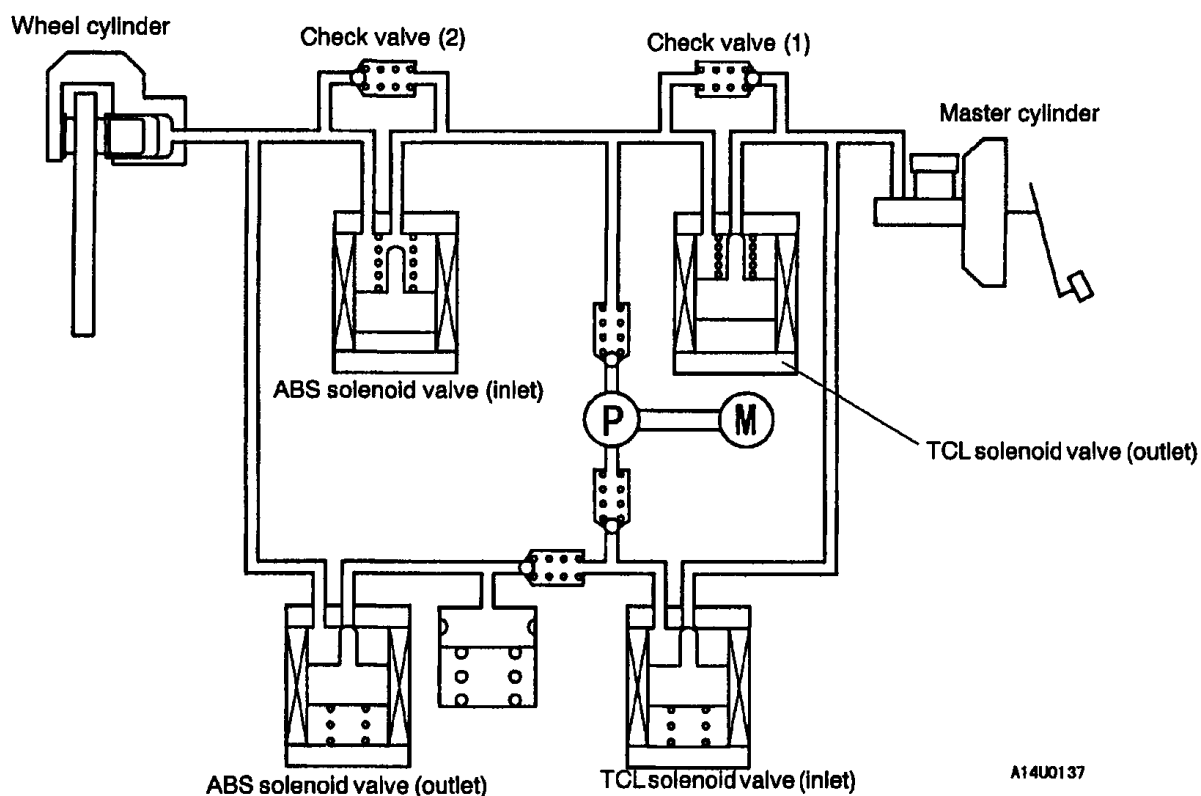


A14U0136

(2) When the brake fluid pressure is maintained

If the brake fluid pressure to the wheel cylinder reaches an optimal value, the ABS-ECU de-energises the motor and the TCL solenoid valve (inlet). Then the pump will stop, and the TCL solenoid valve (inlet) closes, thus closing the hydraulic circuit to maintain the brake fluid pressure to the wheel cylinder.

Name		Energisation	Open/Close	Name		Energisation	Open/Close
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	OFF	Close
	OUT	OFF	Close		OUT	ON	Close

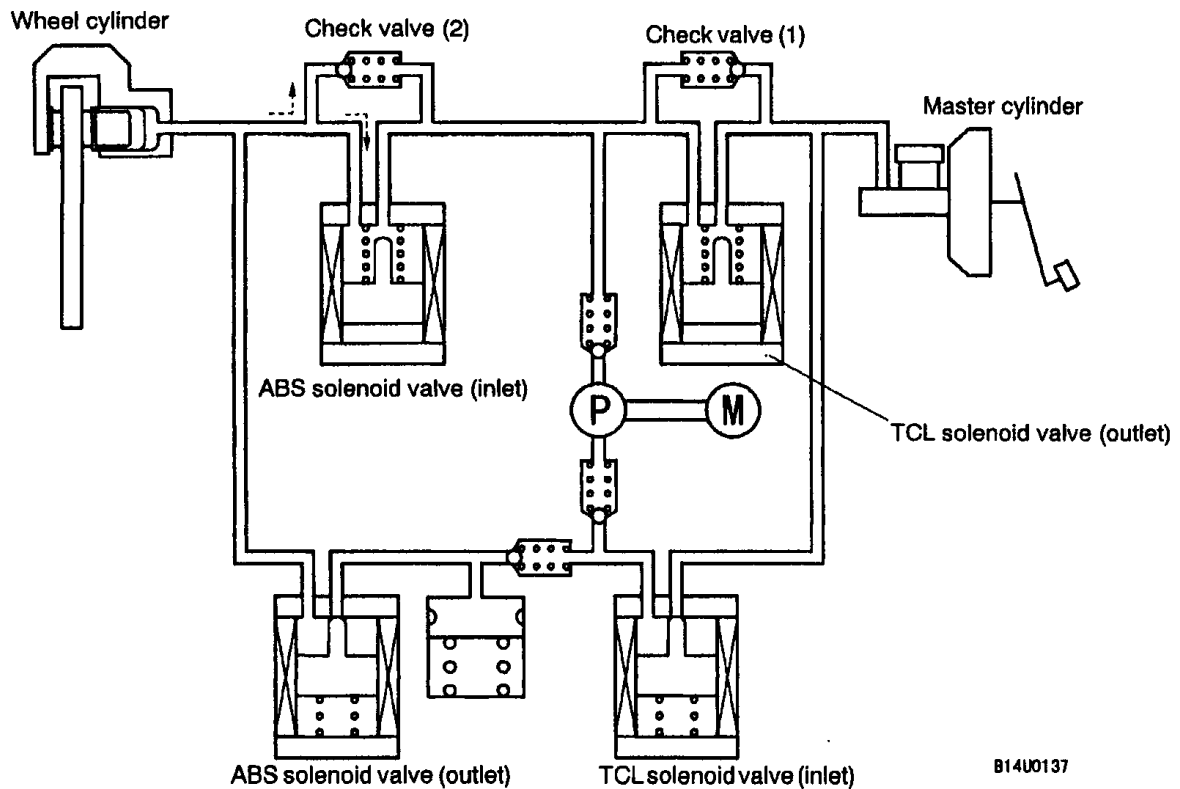


A14U0137

(3) When the brake fluid pressure is decreased

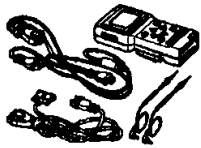
When the ABS-ECU determines no wheel slips, it opens the TCL solenoid valve (outlet). Then the brake fluid returns from the wheel cylinder through the ABS solenoid valve (inlet), check valve (2) and the TCL solenoid valve (outlet) to the master cylinder, thus decreasing the brake fluid pressure.

Name		Energisation	Open/Close	Name		Energisation	Open/Close
ABS solenoid valve	IN	OFF	Open	TCL solenoid valve	IN	OFF	Close
	OUT	OFF	Close		OUT	OFF	Open



B14U0137

SPECIAL TOOLS

Tool	Number	Name	Use
	MB991502	MUT-II sub assembly	For checking of TCL (Diagnosis code display when using the MUT-II)
	MB991529	Diagnosis code check harness	For checking of TCL (Diagnosis code display when using the ABS warning lamp)

TROUBLESHOOTING**STANDARD FLOW OF DIAGNOSTIC TROUBLESHOOTING**

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

DIAGNOSIS FUNCTION**DIAGNOSIS CODES CHECK****With the MUT-II**

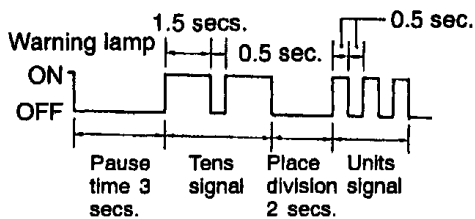
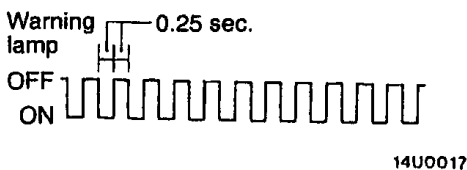
Connect the MUT-II to the diagnosis connector (16-pin), then check diagnosis codes.

Caution

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

Without the MUT-II

1. Use the special tool to earth diagnosis connector terminal No. 1.

When diagnosis code No. 23 is output**When no diagnosis code is output**

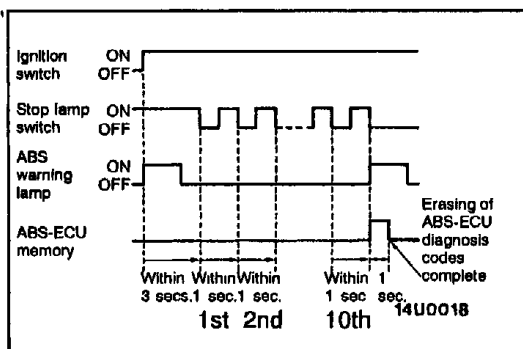
2. Turn the ignition switch to ON and then take a reading of the diagnosis codes from the flashing of the ABS warning lamp.

ERASING DIAGNOSIS CODES**With the MUT-II**

Connect the MUT-II to the diagnosis connector (16-pin), then erase the diagnosis codes.

Without the MUT-II

The diagnosis codes can only be erased by operating the brake switch ten times according to the pattern shown in the illustration at left while the TCL is active and while driving at a speed of 10 km/h or less.



INSPECTION CHART FOR DIAGNOSIS CODES

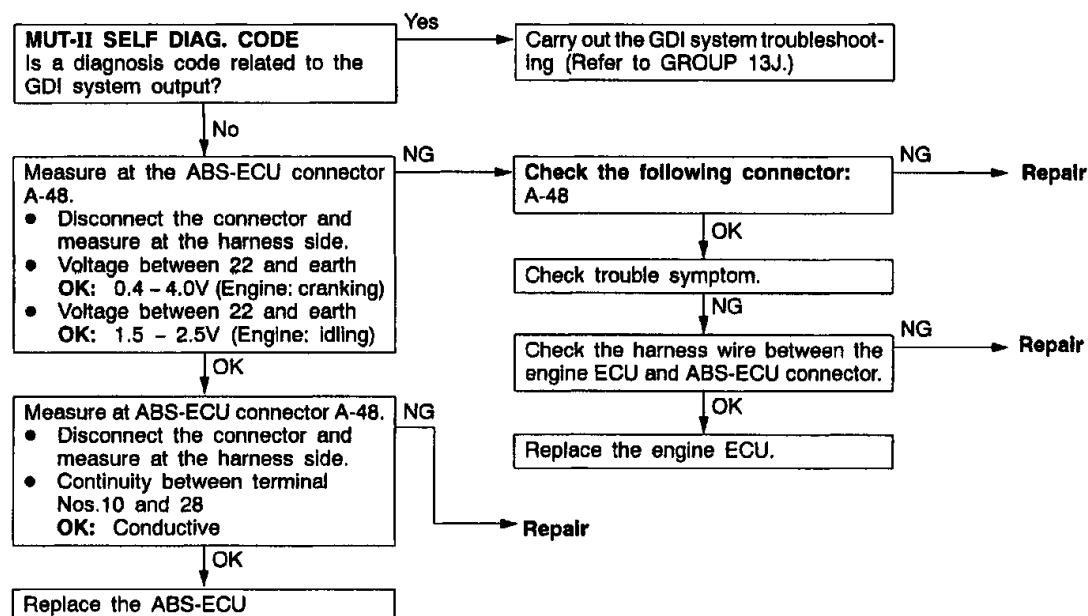
Inspect according to the inspection chart that is appropriate for the malfunction code.

Diagnosis code No.	Inspection item	Diagnosis content	Reference page
11	Front right wheel speed sensor	Open circuit	Refer to '98 CARISMA Workshop Manual – GROUP 35B – Troubleshooting
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
15 <Added>	Wheel speed sensor	Abnormal output signal	Refer to '98 CARISMA Workshop Manual – GROUP 35B Troubleshooting
16	Power supply system		Refer to '98 CARISMA Workshop Manual – GROUP 35B – Troubleshooting
21	Front right wheel speed sensor	Short circuit	Refer to '98 CARISMA Workshop Manual – GROUP 35B – Troubleshooting
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor		
25	Engine speed		35C-10
31	TLC solenoid valve (inlet)		35C-10
32	TLC solenoid valve (outlet)		
33	TLC solenoid valve (inlet)		
34	TLC solenoid valve (outlet)		
38	Stop lamp switch system		Refer to '98 CARRISMA Workshop Manual – GROUP 35B – Troubleshooting
41	Front right inlet solenoid valve		35C-10
42	Front left inlet solenoid valve		
43	Rear right inlet solenoid valve		
44	Rear left inlet solenoid valve		
45	Front right outlet solenoid valve		
46	Front left outlet solenoid valve		
47	Rear left outlet solenoid valve		
48	Rear left outlet solenoid valve		
51	Valve power supply		35C-10
53	Pump motor		35C-10
63	ABS-ECU		Refer to '98 CARRISMA Workshop Manual – GROUP 35B – Troubleshooting (Replace the Hydraulic unit assembly)

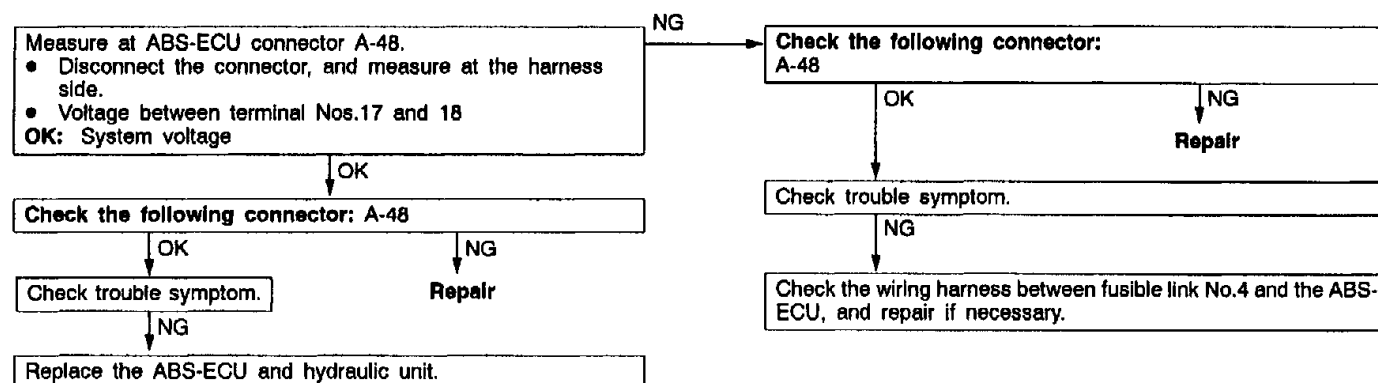
INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Refer to GROUP 35B – Troubleshooting except the following procedures.

Code No.25 Engine speed system <M/T>	Probable cause
This diagnosis code is output under the following condition: • The sensor output voltage does not change for five seconds (a pulse signal is not sent to the ABS-ECU).	• Malfunction of wiring harness or connector • Malfunction of engine-ECU • Malfunction of ABS-ECU



Code Nos.31, 32, 33, 34 TCL solenoid valve system	Probable cause
Code Nos. 41, 42, 43, 44, 45, 46, 47, 48 ABS solenoid valve system	
Code No.51 Valve relay system	
Code No.53 Pump motor system	
These diagnosis codes is output when the ABS-ECU power supply circuit (solenoid valves and motor) is short, or the hydraulic unit internal circuit is defective.	• Malfunction of wiring harness or connector • Malfunction of ABS-ECU and hydraulic unit



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
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	35C-12
	Communication with TCL only is not possible.	2	35C-12
When the ignition key is turned to "ON" (engine stopped), the TCL indicator lamp does not illuminate.		3	35C-13
After the engine starts, the lamp remains illuminated.		4	35C-13
Faulty TCL operation	The TCL system does not operate.	5	35C-13
	Insufficient braking power		
	TCL operates under normal braking conditions		

Caution

If steering movements are made when driving on road surfaces with low frictional resistance, or when passing over bumps, the TCL 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.

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

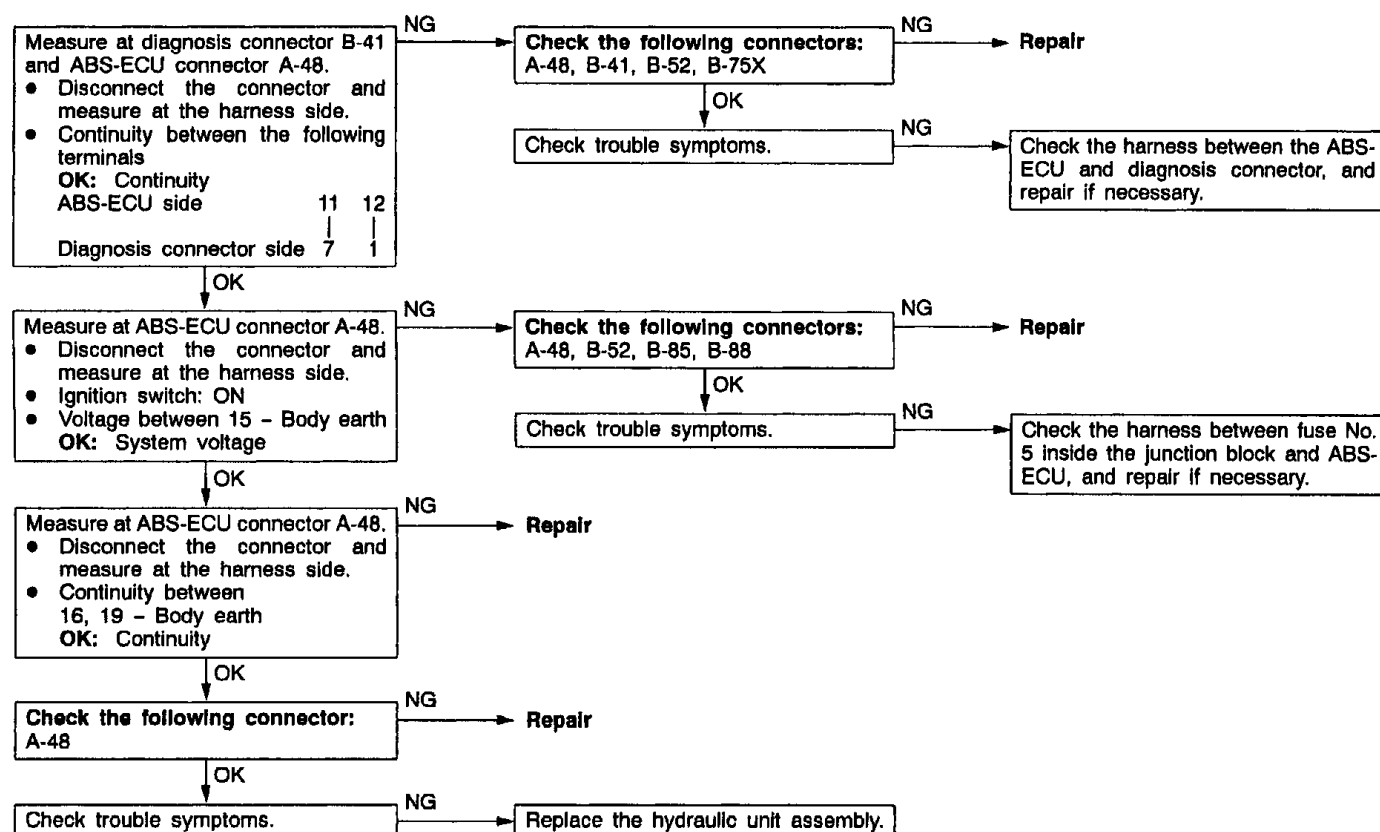
Inspection Procedure 1

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

Refer to GROUP 13J – Troubleshooting.

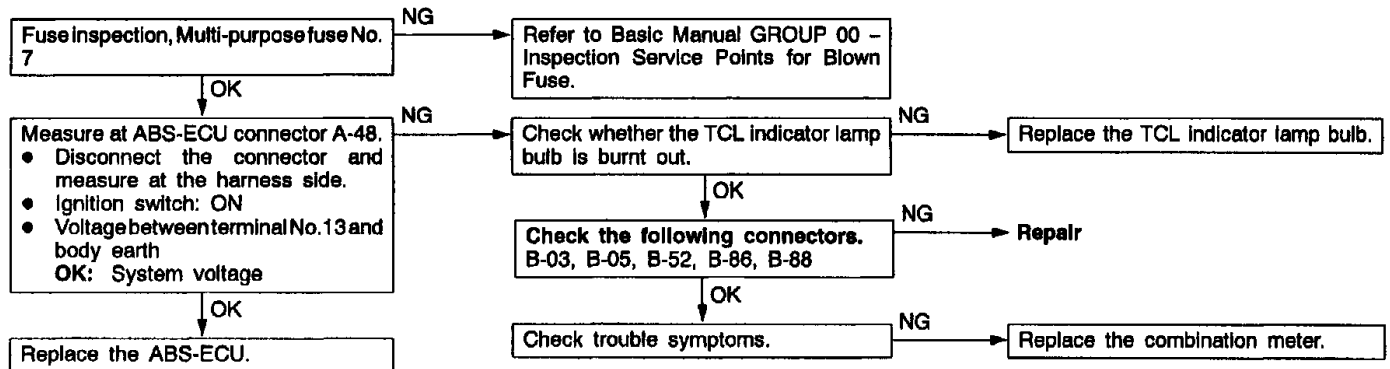
Inspection Procedure 2

Communication with MUT-II is not possible. (Communication with TCL only is not possible.)	Probable cause
When communication with the MUT-II is not possible, the cause is probably an open circuit in the ABS-ECU power circuit or an open circuit in the diagnosis output circuit.	- Blown fuse - Malfunction of wiring harness or connector - Malfunction of ABS-ECU



Inspection Procedure 3

When Ignition key is turned to "ON" (engine stopped), TCL Indicator lamp does not illuminate.	Probable cause
The cause may be: an open circuit in the lamp power supply circuit, a blown lamp bulb, an open circuit in both the circuit between the TCL Indicator lamp and the ABS-ECU.	• Blown fuse • Burnt out TCL Indicator lamp bulb • Malfunction of wiring harness or connector

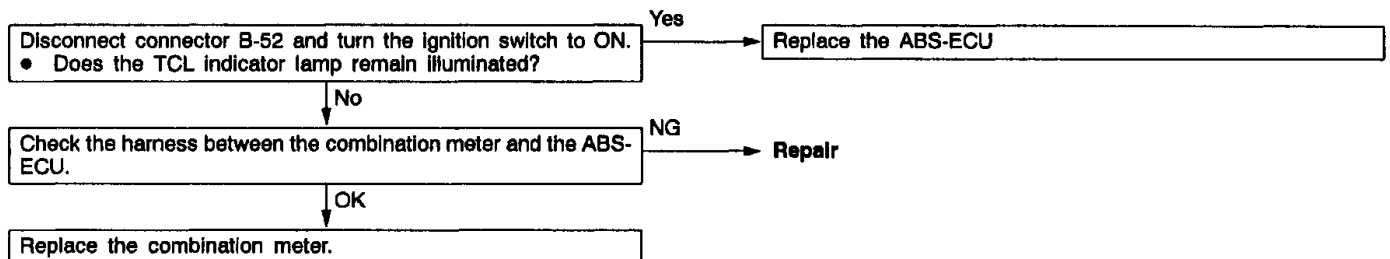


Inspection Procedure 4

The TCL Indicator lamp remains illuminated.	Probable cause
The cause is probably a short-circuit in the TCL indicator lamp illumination circuit.	• Malfunction of combination meter • Malfunction of ABS-ECU • Malfunction of wiring harness

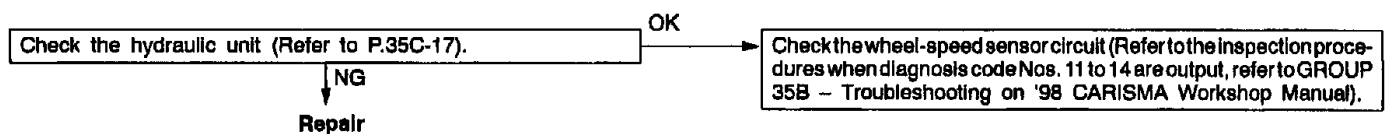
NOTE

This trouble symptom is limited to cases where communication with the MUT-II is possible (ABS-ECU power supply is normal) and the diagnosis code is a normal diagnosis code.



Inspection Procedure 5

The TCL system does not operate.	Probable cause
The TCL system operates according to various driving and road conditions. Therefore, it is difficult to diagnose the system correctly. If the diagnosis code is not output, follow the procedure below.	• Malfunction of the wheel-speed sensor • Malfunction of wiring harness or connector • Malfunction of rotor • Foreign matter attached on wheel-speed sensor • Malfunction of wheel bearing • Malfunction of hydraulic unit • Malfunction of ABS-ECU



SERVICE DATA REFERENCE TABLE

The following items can be read by the MUT-II from the ABS-ECU input data.

1. When the system is normal

Item No.	Check item	Checking requirements	Normal value
11	Front-right wheel speed sensor	Perform a test run	Vehicle speeds displayed on the speedometer and MUT-II are identical.
12	Front-left wheel speed sensor		
13	Rear-right wheel speed sensor		
14	Rear-left wheel speed sensor		
16	ABS-ECU power supply voltage	Ignition switch power supply voltage and valve monitor voltage	9 – 16 V
38	Stop lamp switch	Depress the brake pedal.	ON
		Release the brake pedal.	OFF

2. When the ABS-ECU shuts off ABS operation.

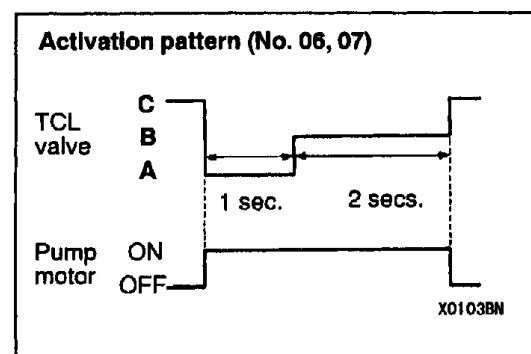
When the diagnosis system stops the ABS-ECU, the MUT-II display data will be unreliable.

ACTUATOR TEST REFERENCE TABLE

The MUT-II activates the following actuators for testing.

NOTE

1. If the ABS-ECU runs down, actuator testing cannot be carried out.
2. Actuator testing is only possible when the vehicle is stationary. If the vehicle speed during actuator testing exceeds 10 km/h, forced actuation will be canceled.



ACTUATOR TEST SPECIFICATIONS

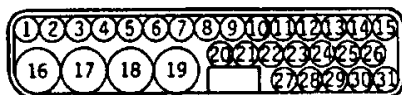
No.	Item	
01	Solenoid valve for front-left wheel	Refer to CARISMA Basic Manual (Pub. No. PWDE9502) GROUP 35B – Troubleshooting
02	Solenoid valve for front-right wheel	
03	Solenoid valve for rear-left wheel	
04	Solenoid valve for rear-right wheel	
06	TCL valve for front-right wheel	TCL valves and pump motors in the hydraulic unit (simple inspection mode)
07	TCL valve for front-left wheel	
12	Pump motor	Activate the pump motor for two seconds.

NOTE

- A: Hydraulic pressure increases
 B: Hydraulic pressure holds
 C: Hydraulic pressure decreases

CHECK AT ABS-ECU**TERMINAL VOLTAGE CHECK CHART**

1. Measure the voltages between terminals (16) and (19) (earth terminals) and each respective terminal. <M/T>
2. Measure the voltage between terminals (16, 19) and (30) (earth terminals) and each respective terminal. <A/T>
3. The terminal layouts are shown in the illustrations below.

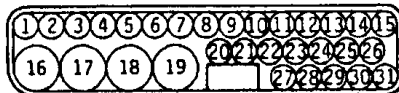


14U0122

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. 12V
13	Output to TCL indicator lamp	Ignition switch: ON	The lamp is switched off.	System voltage
			The lamp is illuminated.	0 – 2 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
21	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 – 3	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		
30 – Body earth <A/T>		

ON-VEHICLE SERVICE**STOP LAMP SWITCH CHECK**

Refer to Basic Manual (Pub. No. PWDE9502) GROUP 35A
– On-vehicle Service.

WHEEL SPEED SENSOR OUTPUT VOLTAGE CHECK

Refer to Basic Manual (Pub. No. PWDE9502) GROUP 35B
– On-vehicle Service.

WHEEL SPEED SENSOR CHECK

Refer to Basic Manual (Pub. No. PWDE9502) GROUP 35B
– On-vehicle Service.

HYDRAULIC UNIT (HU) CHECK

Caution

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

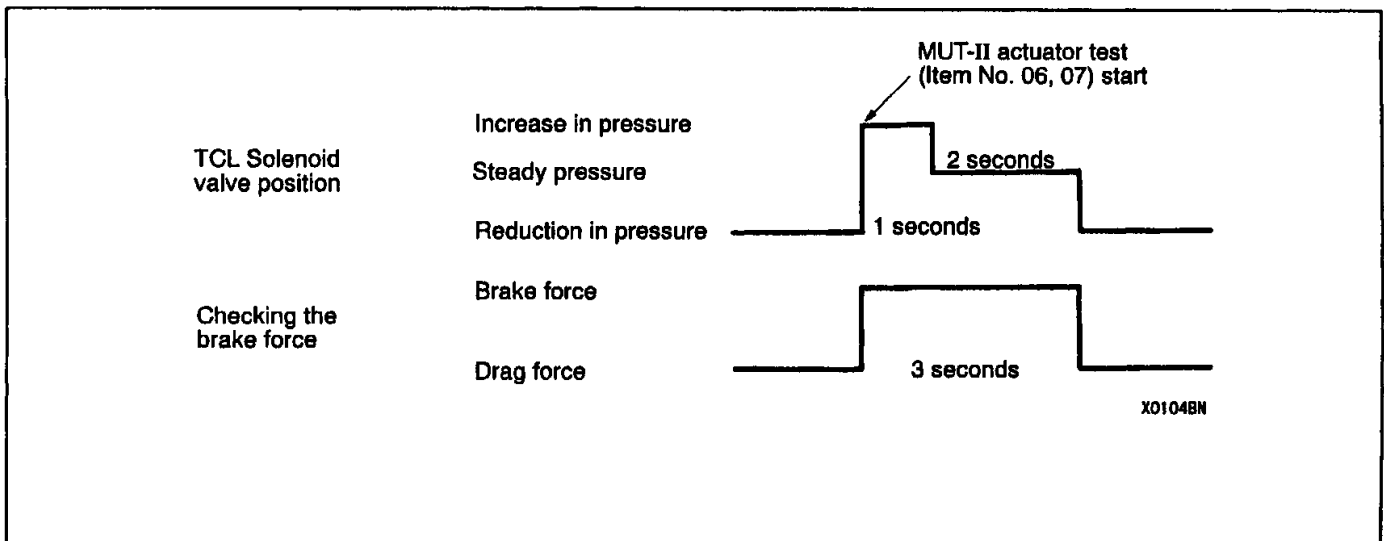
1. Jack up the vehicle and support the vehicle with rigid racks placed at the specified jack-up points or place the wheels which are checked on the rollers of the braking force tester.

Caution

- (1) The roller of the braking force tester and the tyre should be dry during testing.
 - (2) When testing the front brakes, apply the parking brake, and when testing the rear brakes, stop the front wheels by chocking them.
2. Release the parking brake, and feel the drag force (drag torque) on each road wheel. When using the braking force tester, take a reading of the brake drag force.
 3. Turn the ignition key to the OFF position and set the MUT-II.
 4. After checking that the shift lever <M/T> or the selector lever <A/T> is in neutral, start the engine.

NOTE

- (1) At this time, the ABS system will switch to the MUT-II mode and the ABS warning lamp will illuminate.
 - (2) When the ABS has been interrupted by the fail-safe function, the MUT-II actuator testing cannot be used.
5. Use the MUT-II to force-drive the actuator.
 6. Turn the wheel by hand and check the change in braking force. When a braking force tester is used, check that the braking force changes during actuator test. The result should be as shown in the following diagram.
 7. If the result of inspection is abnormal, replace the hydraulic unit.



HYDRAULIC UNIT

REMOVAL AND INSTALLATION

Refer to Basic Manual (Pub. No. PWDE9502) GROUP 35B – Hydraulic unit.

GROUP 36

PARKING BRAKES

GENERAL

OUTLINE OF CHANGES

- Due to the introduction of the rear disc brakes, the following service procedures have been added.
 - (1) Parking brake lever stroke check
 - (2) Parking brake cable removal and installation

ON-VEHICLE SERVICE

The adjustment procedure of the parking brake lever stroke has been added. The other service procedures are the same as for vehicles with rear drum brakes.

PARKING BRAKE LEVER STROKE CHECK

<Vehicles with rear disc brakes>

Check the parking brake lever stroke according to the previous procedure.

Standard value:

5–7 notches [Operation force: Approx. 196N]

If the parking brake lever stroke is not the standard value, adjust as described below.

1. Loosen the adjusting nut to the end of the cable rod, thus freeing the parking brake cable.
2. With the engine idling, forcefully depress the brake pedal five or six times and confirm that the pedal stroke stops changing.

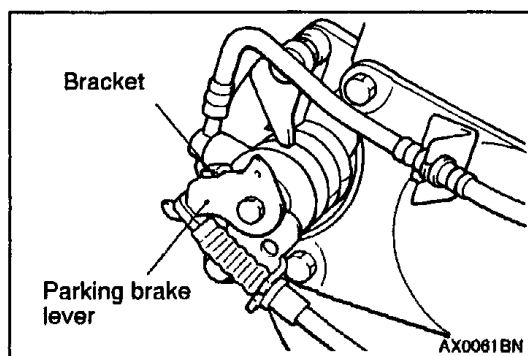
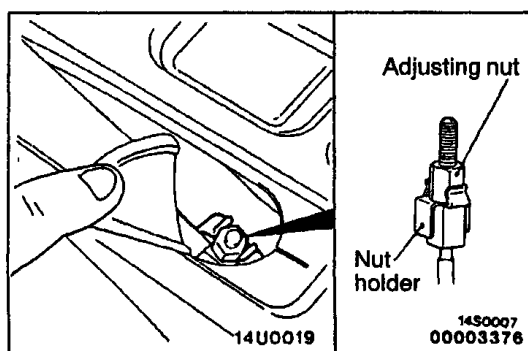
NOTE

If the pedal stroke stops changing, the automatic-adjustment mechanism is functioning normally, and the clearance between the pad and disc is correct.

3. Check that the parking brake lever on the caliper side is touching the bracket.

NOTE

If the parking brake lever is not touching the bracket, the parking brake cable might be stuck or routed incorrectly, or there might be a problem with the automatic adjustment mechanism inside the rear brake calipers. Therefore, it is necessary to check the parking brake cable and rear brake calipers.



4. Turn the adjusting nut to adjust the parking brake lever stroke to the standard value. After adjusting, check that there is no space between the adjusting nut and the parking brake lever.
Check that the adjusting nut is also securely held by the nut holder.

Caution

If the parking brake lever stroke is below the standard value and the braking is too firm, the rear brakes may drag.

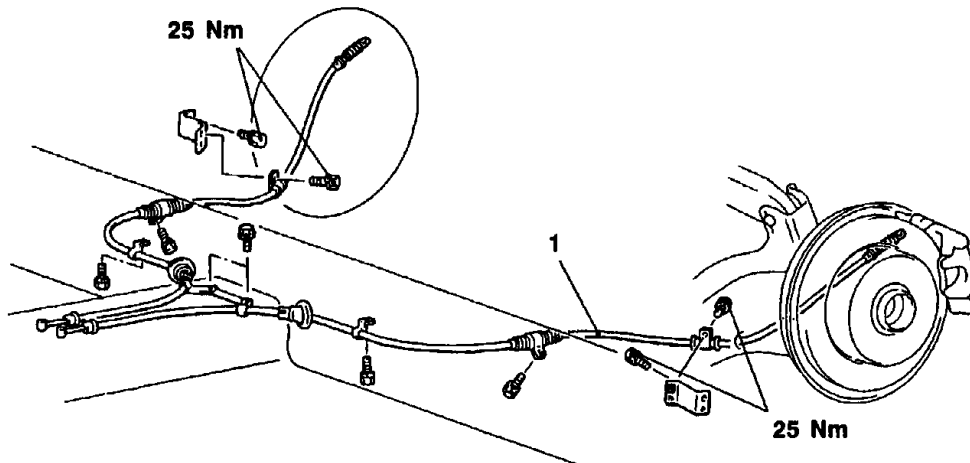
5. After adjusting the parking brake lever stroke, jack up the rear of the vehicle. Release the parking brake and turn the rear wheels to check that the rear brakes are not dragging. In addition, check that the parking brake lever on the caliper side is touching the bracket.

PARKING BRAKE CABLE <Vehicles with rear disc brakes>**REMOVAL AND INSTALLATION****Pre-removal Operation**

- Floor Console Removal

Post-Installation Operation

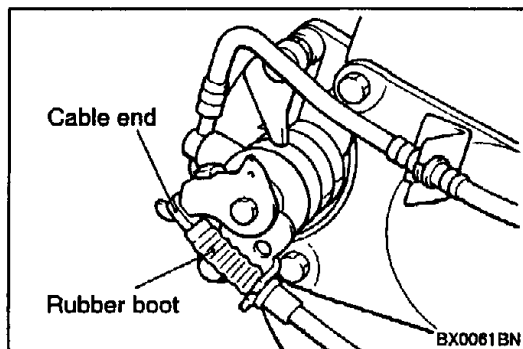
- Parking Brake Lever Stroke Adjustment
(Refer to P.36-1.)
- Floor Console Installation



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Removal steps

- A◄ 1. Rear brake cable

**INSTALLATION SERVICE POINT****►A◄ PARKING BRAKE CABLE INSTALLATION**

Connect the parking brake cable, and then make sure that the rubber boot is securely engaged with the cable end.

GROUP 37A

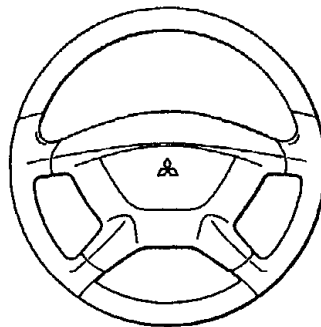
STEERING

GENERAL

OUTLINE OF CHANGES

- A newly-designed steering wheel (incorporating air bag) has been adopted <ELEGANCE>. Its removal and installation procedure is the same as for the conventional steering wheel (incorporating air bag).

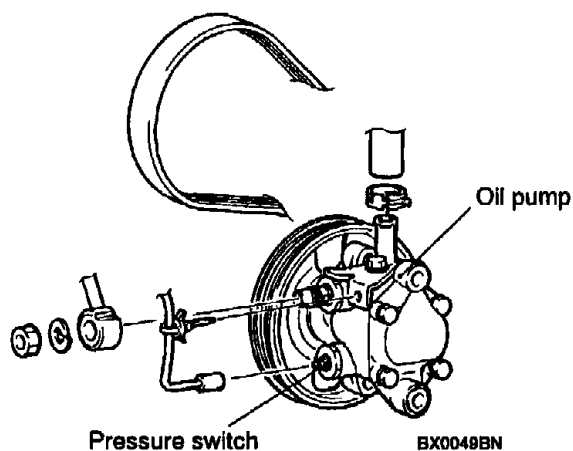
<Newly-designed steering wheel>



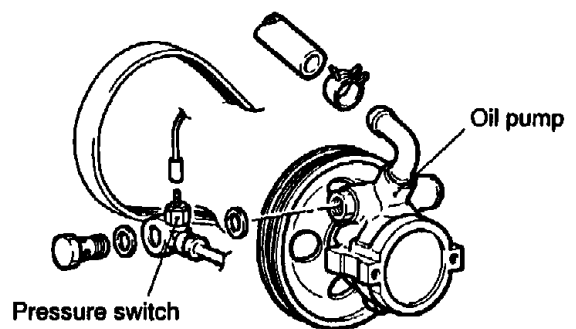
13P0076

- The service procedures for the steering system have been established due to the change in the oil pump.
 - (1) Steering angle check
 - (2) Power steering gear box disassembly and reassembly
- The service procedures have been established due to the change in the oil pump <1600>.
 - (1) Power steering oil pressure switch check
 - (2) Oil pump removal and installation

<NEW>



<OLD>



A13U0013

SPECIFICATIONS

Items		Specifications
Steering wheel maximum turns		2.91*
Steering angle (Unladen vehicles)	Inner wheel	37°30'*
	Outer wheel	31°36'*
Steering gear and linkage	Type	Integral type
	Gear type	Rack and pinion
	Gear ratio	47.06*
	Rack stroke mm	137
Oil pump	Type	Vane type
	Displacement ml/rev.	5.9
	Relief set pressure MPa	9.8
	Reservoir type	Separate type

NOTE

* indicates a change.

ON-VEHICLE SERVICE

STEERING ANGLE CHECK

The following standard values have been revised. The inspection procedure is the same as before.

Standard value:

Inner wheel 37°30' ± 2°

(Difference in right and left wheels: 1°30' or less)

Outer wheel 31°36'

POWER STEERING OIL PRESSURE SWITCH CHECK

The following standard values have been revised. The inspection procedure is the same as before.

Standard value:

OFF to ON 1.5 – 2.0 MPa

ON to OFF 0.8 MPa

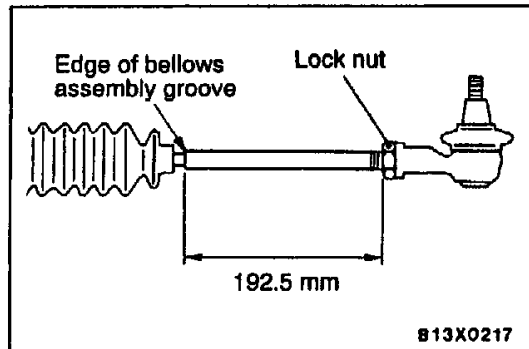
POWER STEERING GEAR BOX

DISASSEMBLY AND REASSEMBLY

The procedure is the same as before.

REASSEMBLY SERVICE POINTS

The procedure other than below is the same as before.



TIE ROD INSTALLATION

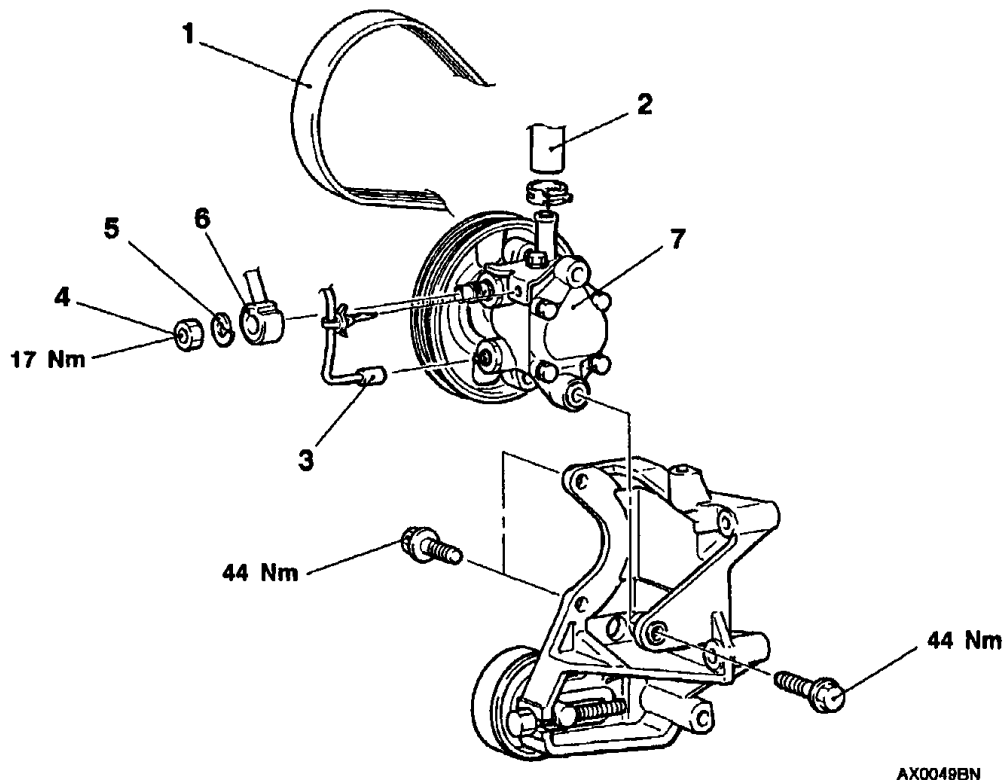
Screw in tie-rod end to have its right and left length as illustrated. Lock with lock nut.

POWER STEERING OIL PUMP <1600>**REMOVAL AND INSTALLATION****Pre-removal Operation**

Power Steering Fluid Draining

Post-Installation Operation

- Power Steering Fluid Supplying
- Drive-belt Tension Adjusting
- Power Steering Fluid Line Bleeding
- Oil Pump Pressure Check

**Removal steps**

1. Drive belt
2. Suction hose
3. Pressure switch connector
4. Eye bolt

5. Washer
6. Banjo block
7. Oil pump

INSPECTION

Check the drive-belt for cracks.
Check the pulley assembly for uneven rotation.

BODY

CONTENTS

GENERAL	2	DOOR HANDLE AND LATCH	17
Outline of Changes	2	TRUNK LID	19
HOOD	3	TROUBLESHOOTING	19
FENDER	4	TRUNK LID	19
WINDOW GLASS	5	TRUNK LID LATCH	21
TAILGATE WINDOW GLASS	5	TAILGATE	22
DOOR	7	TROUBLESHOOTING	22
SERVICE SPECIFICATIONS	7	TAILGATE ASSEMBLY	23
TROUBLESHOOTING	7	TAILGATE TRIM	25
ON-VEHICLE SERVICE	11	TAILGATE LATCH	26
Door Outside Handle Play Check	11	KEYLESS ENTRY SYSTEM	27
Door Inside Handle Play Check	11	TROUBLESHOOTING	27
DOOR ASSEMBLY	12	ON-VEHICLE SERVICE	29
DOOR TRIM AND WATERPROOF		Secret Code Registration Method	29
FILM	13		

GENERAL

OUTLINE OF CHANGES

The service procedures have been revised as the following parts or system have been changed:

- Hood panel
- Fender panel
- Tailgate window glass
- Front and rear door trims
- Front and rear door lock systems
- Trunk lid
- Tailgate

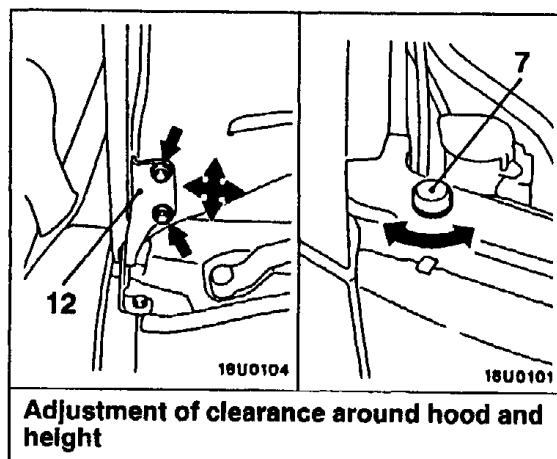
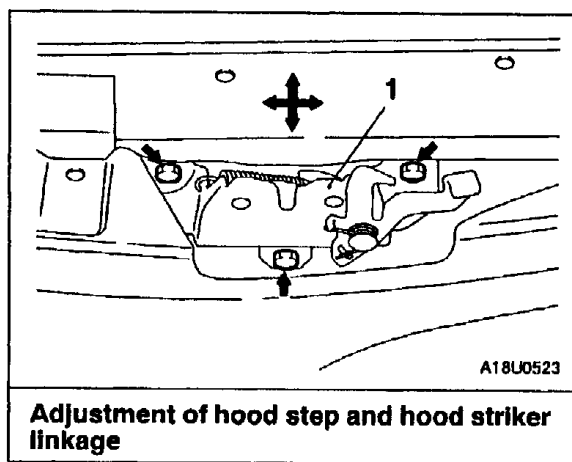
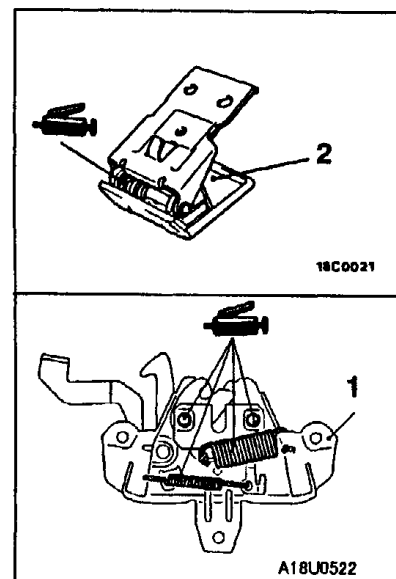
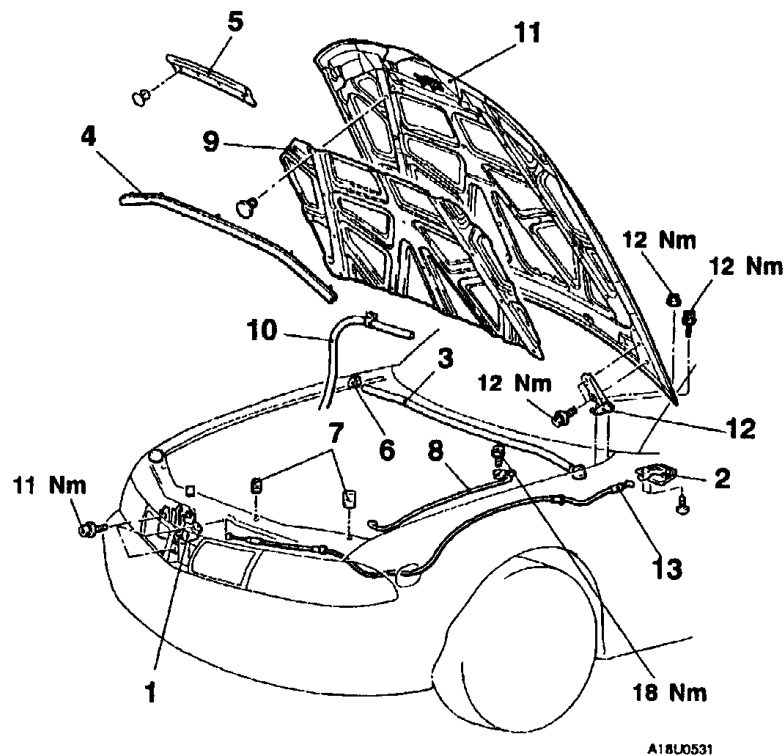
The troubleshooting for the central door locking system has been changed.

The circuit breaker for the power window motor has been controlled by the power window motor-ECU.

Troubleshooting has been revised as the theft-alarm system has been discontinued.

HOOD

REMOVAL AND INSTALLATION



1. Hood latch
2. Hood lock release handle
3. Hood weatherstrip A
4. Hood weatherstrip B
• Vehicles with air conditioner>
5. Hood weatherstrip C <GDI>
6. Hood side weatherstrip
7. Bumper
8. Hood support rod
9. Hood insulator

Hood and hood hinge removal steps

10. Washer hose connection
11. Hood
 - Front deck garnish
(Refer to GROUP51.)
12. Hood hinge

Hood lock release cable removal steps

- Splash shield <Driver's side>
(Refer to P.42-4.)
13. Hood lock release cable

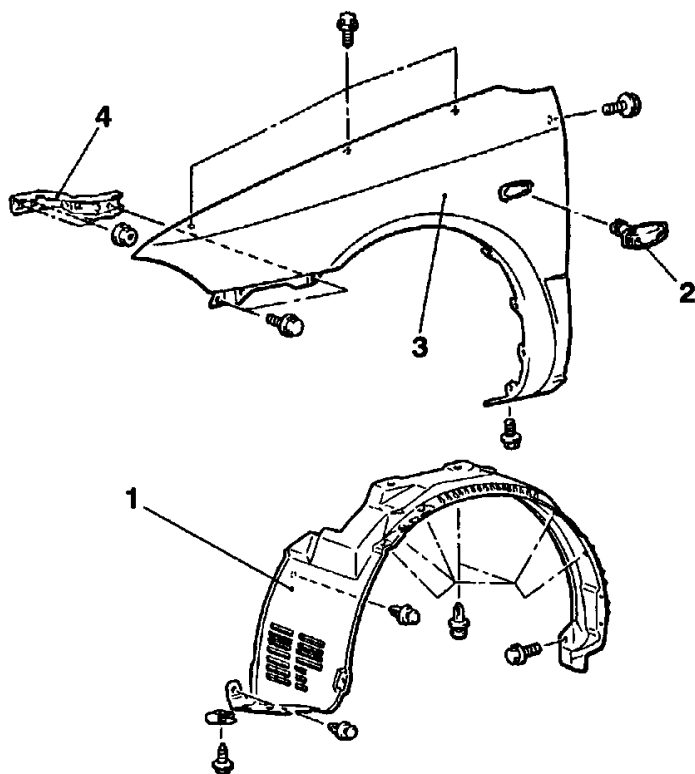
FENDER

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- (1) Front Bumper Removal and Installation
(Refer to GROUP 51.)
- (2) Headlamp Removal and Installation
(Refer to GROUP 54.)

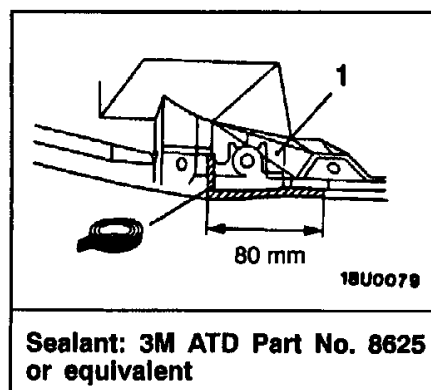
- (3) Side Airdam Removal and Installation



A18U0518

Removal steps

- 1. Splash shield
- 2. Side turn signal lamp
(Refer to GROUP 54.)



- 3. Fender
- 4. Fender support bracket

WINDOW GLASS

TAILGATE WINDOW GLASS

REMOVAL AND INSTALLATION

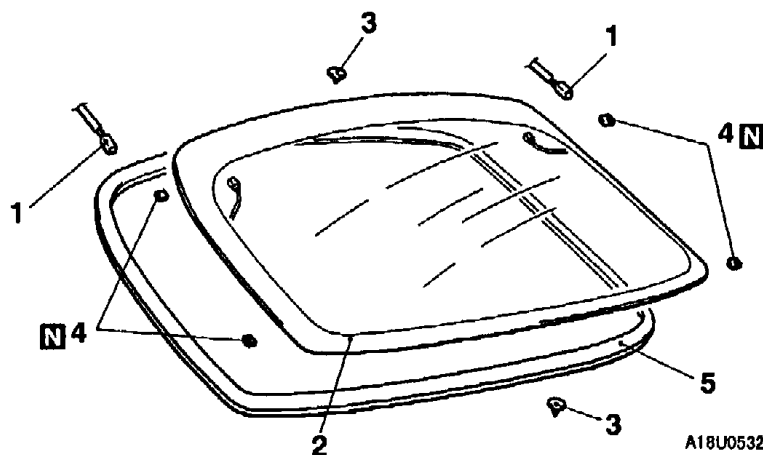
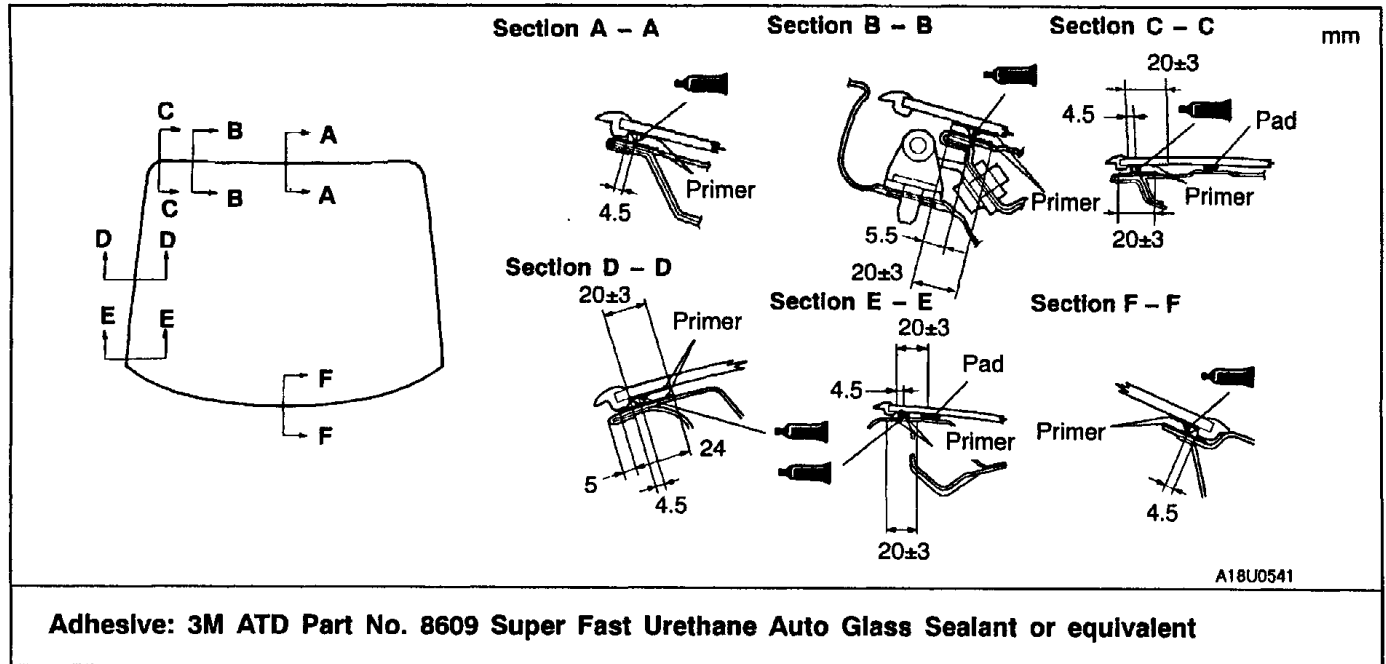
Pre-removal and Post-Installation Operation
Removal and Installation

(1) Rear Wiper Blade and Arm Assembly

(Refer to GROUP 51.)

(2) High Mounted Stop Lamp (Refer to GROUP 54.)

(2) Tailgate Upper Trim, Tailgate Side Trim and Tailgate Lower Trim (Refer to P.42-25.)



Removal steps

1. Harness connector
2. Tailgate window glass
3. Locator pin

4. Pad
5. Tailgate moulding



REMOVAL SERVICE POINT**◀A▶ TAILGATE WINDOW GLASS REMOVAL**

Remove the tailgate window glass by the same procedure as for the windshield. (Refer to '96 CARISMA Workshop Manual.)

INSTALLATION SERVICE POINTS**▶A◀ TAILGATE WINDOW GLASS INSTALLATION**

Apply primer and adhesive in the specified position, and then install the tailgate window glass by the same procedure as for the windshield. (Refer to '96 CARISMA Workshop Manual.)

DOOR

SERVICE SPECIFICATIONS

Items		Standard value
Door outside handle play mm	FRONT DOOR	3.5–5.5
	REAR DOOR	3.0–6.0
Door inside handle play mm	FRONT DOOR	18.0–26.0
	REAR DOOR	15.0–19.0

TROUBLESHOOTING

INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom			Inspection procedure	Reference page
Power windows	Driver's power window cannot be operated by the power window main switch.		1	*1
	No power window can be operated by the power window main switch (but they can be operated by the sub-switches).		2	*1
	No power window can be operated by the power window sub-switches (but they can be operated by the main switch).		3	*1
	No power window can be operated by the power window sub-switches (nor can they be operated by the main switch).		4	*1
	Automatic operation is not possible.		5	*1
	When the glass is raised, it then lowers automatically.		6	*1
	The window does not lower if it clamps something, or it lowers automatically after closing fully.		7	*1
	The key off timer does not operate.		8	*1
	If the driver's side door is opened while the key off timer is operating, the power windows do not operate for a further 30 seconds after the door is opened.		9	*1
Door locking mechanism	Vehicles without keyless entry system	None of the door lock functions operate.	10	*2
		Doors do not lock or unlock when the key cylinders (except the one at the driver's side door) are operated.	11	42-7
		Some doors do not lock or unlock.	12	42-8
	Vehicles with keyless entry system	None of the door lock functions operate. (The keyless entry system also does not operate.)	13	42-8
		The doors do not lock or unlock when the key cylinders are operated.	14	42-9
		Some doors do not lock or unlock.	15	42-9

NOTE

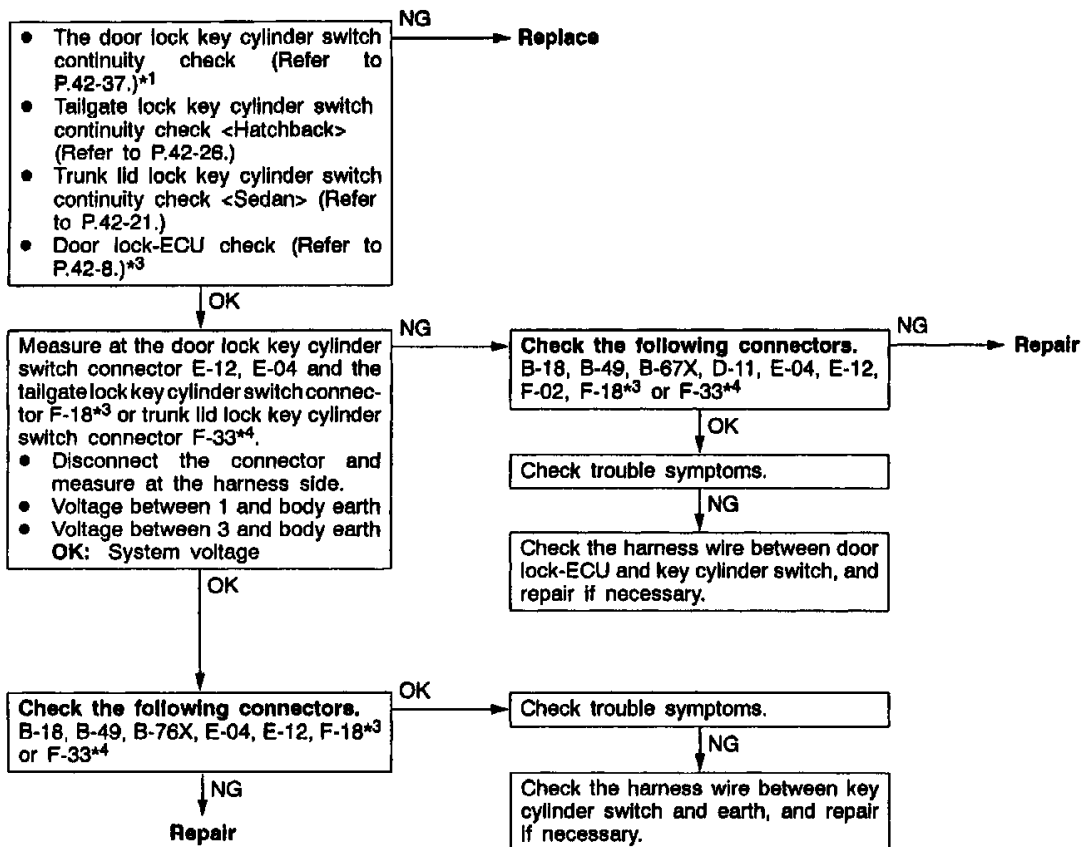
*1: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

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

INSPECTION CHART FOR TROUBLE SYMPTOMS

Inspection Procedure 11

Doors do not lock or unlock when the key cylinders (except the one at the driver's side door) are operated.	Probable cause
The key cylinder switch or the door lock-ECU may be defective.	• Malfunction of the door lock key cylinder switch • Malfunction of the tailgate lock key cylinder switch • Malfunction of the trunk lid lock key cylinder switch • Malfunction of the door lock-ECU • Malfunction of harness or connector



NOTE

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

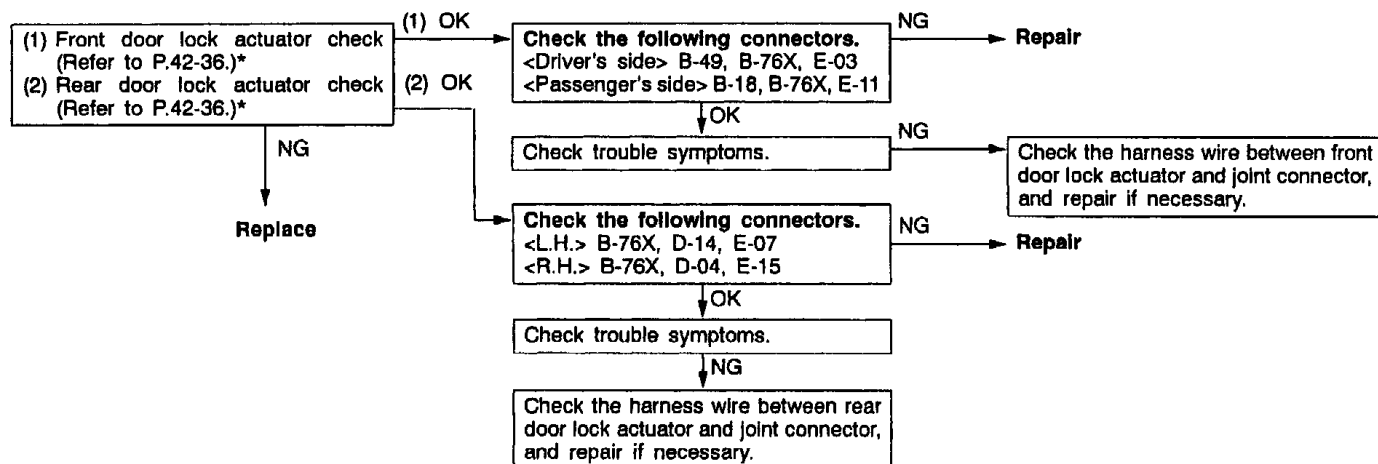
*2: Refer to '98 CARISMA (except GDI) Workshop Manual (Pub. No. PWDE9502-B).

*3: Hatchback

*4: Sedan

Inspection Procedure 12

Some doors do not lock or unlock.	Probable cause
The door lock actuator, a harness or connector may be defective.	• Malfunction of door lock actuator • Malfunction of wiring harness or connector

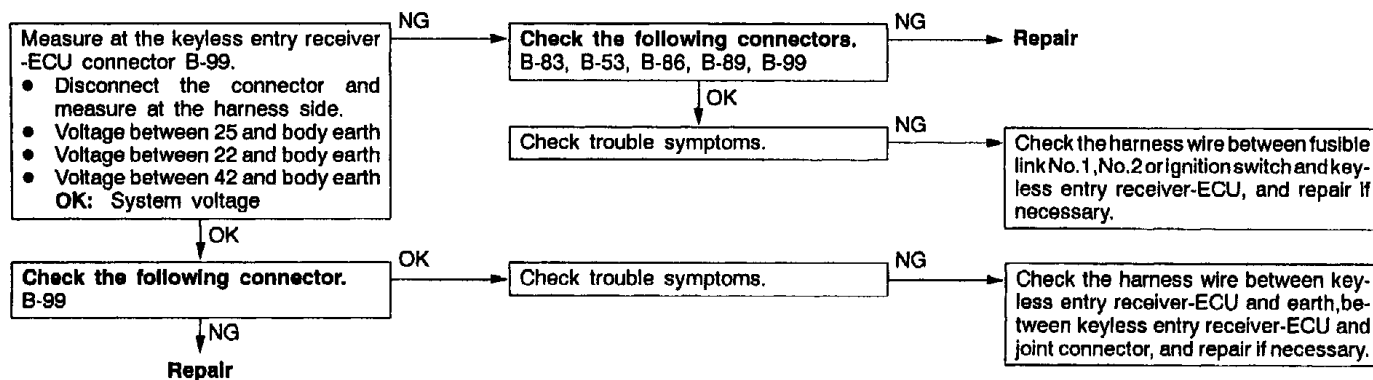


NOTE

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

Inspection Procedure 13

None of the door lock functions operate.(The keyless entry system does not operate,either.)	Probable cause
Power circuit system or earth circuit system of the keyless entry receiver-ECU may be defective.	• Malfunction of keyless entry receiver-ECU • Malfunction of wiring harness or connector

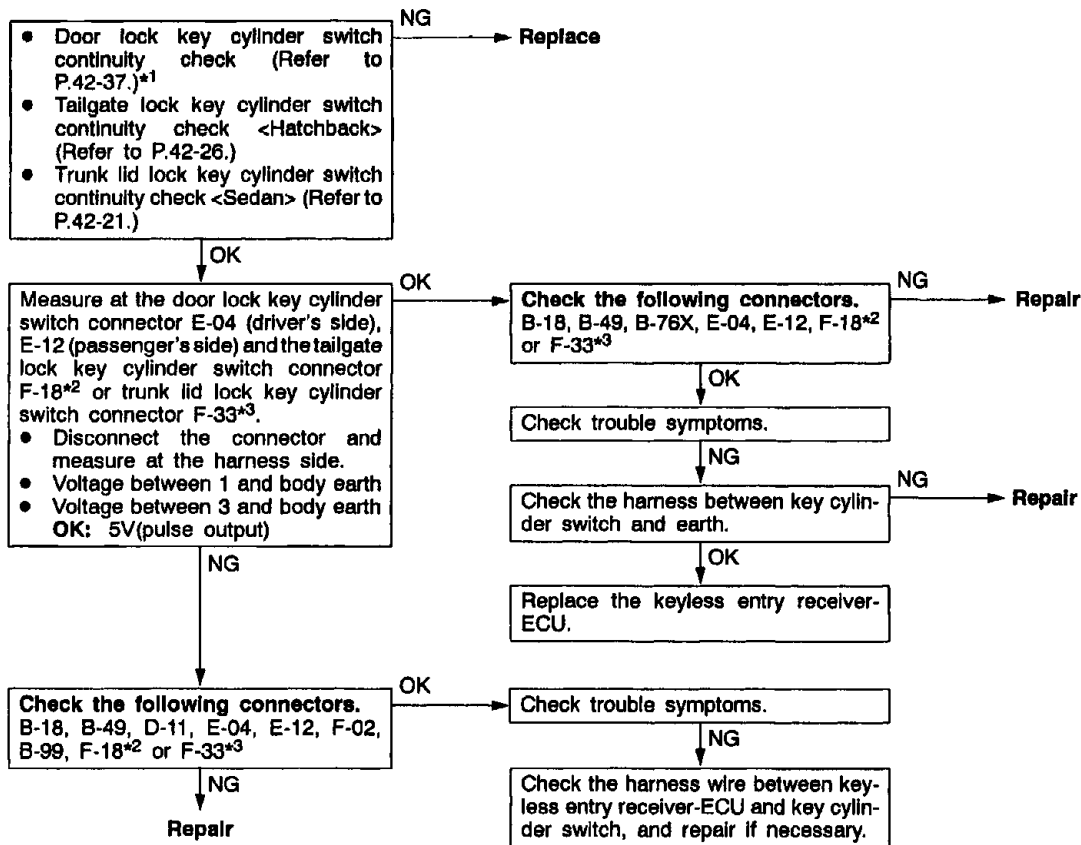


NOTE

If the keyless entry or central door locking system is operated while the No.2 fuse in the junction block is melted or disconnected, the keyless entry receiver-ECU judges its circuit as defective. Then the system will not function after connecting No.2 fuse correctly. In this case, the wiring harness abnormal signal is stored inside the ECU. This signal can be cleared by disconnecting and reconnecting the No.3 fuse in the engine compartment relay box. After clearing this signal, the system will be restored.

Inspection Procedure 14

The doors do not lock or unlock when the key cylinders are operated.	Probable cause
The keyless entry receiver-ECU or the key cylinder switch may be defective.	• Malfunction of the door lock key cylinder switch • Malfunction of the tailgate lock key cylinder switch • Malfunction of the trunk lid lock key cylinder switch • Malfunction of the keyless entry receiver-ECU • Malfunction of harness or connector



NOTE

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

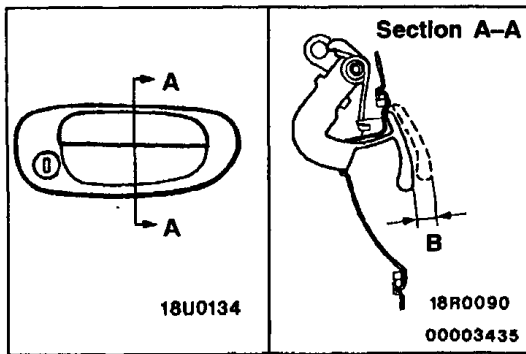
^{*2}: Hatchback

^{*3}: Sedan

Inspection Procedure 15

Some doors do not lock or unlock.	Probable cause
The door lock actuator, a harness or connector may be defective.	• Malfunction of door lock actuator • Malfunction of wiring harness or connector

INSPECTIONPROCEDURE12FORTROUBLESYMPTOMS
(Refer to P.42-9.)



ON-VEHICLE SERVICE

DOOR OUTSIDE HANDLE PLAY CHECK

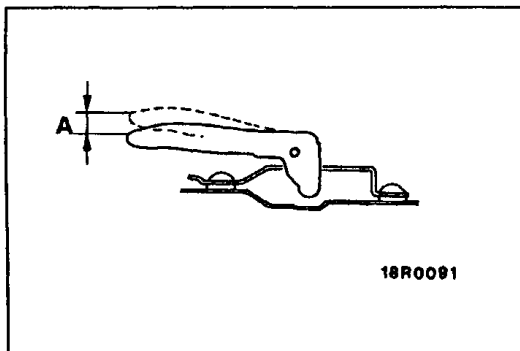
1. Check that the door outside handle play is within the standard value range.

Standard value (B):

FRONT DOOR 3.5 – 5.5 mm

REAR DOOR 3.0 – 6.0 mm

2. If the door outside handle play is not within the standard value range, check the door outside handle or the door latch assembly. Replace, if necessary.



DOOR INSIDE HANDLE PLAY CHECK

1. Check that the door inside handle play is within the standard value range.

Standard value (A):

FRONT DOOR 18.0 – 26.0 mm

REAR DOOR 15.0 – 19.0 mm

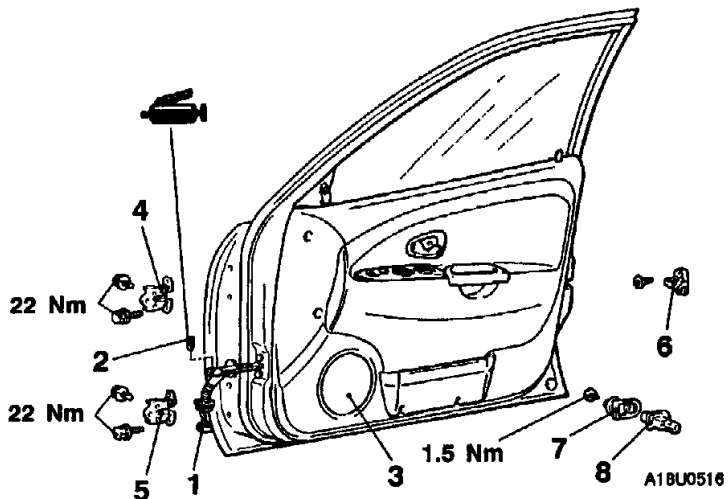
2. If the door inside handle play is not within the standard value range, check the door inside handle or the door latch assembly. Replace, if necessary.

DOOR ASSEMBLY

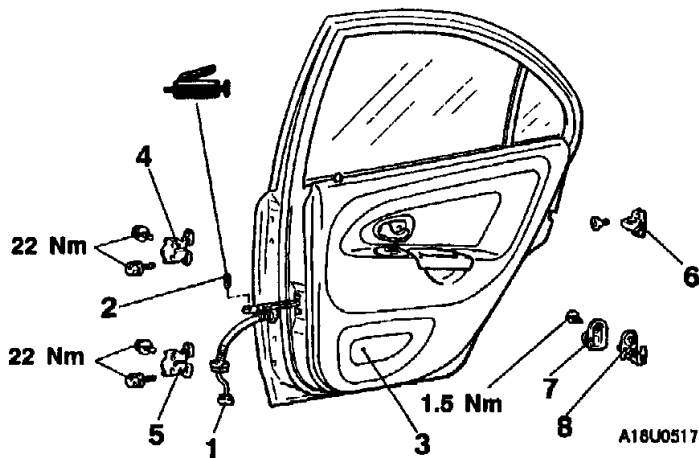
REMOVAL AND INSTALLATION

Post-Installation Operation
Door Adjustment.

Front door

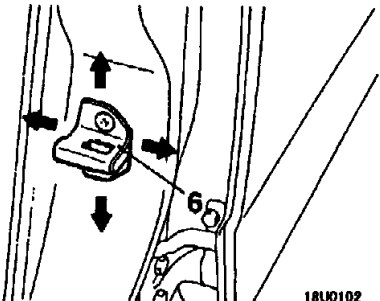


Rear door

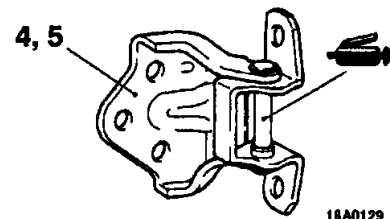


Door assembly removal steps

1. Harness connector
2. Spring pin
3. Door assembly
4. Door upper hinge
5. Door lower hinge



Adjustment of the door stepping and the door latch linkage



Striker removal

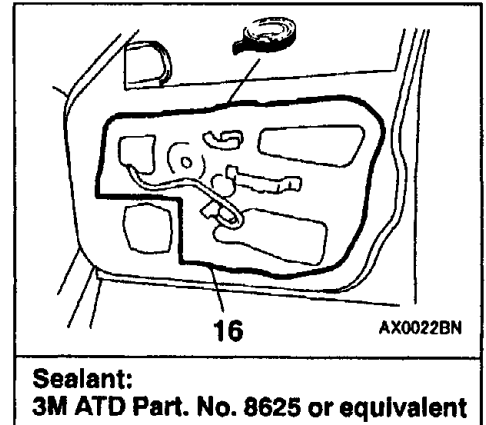
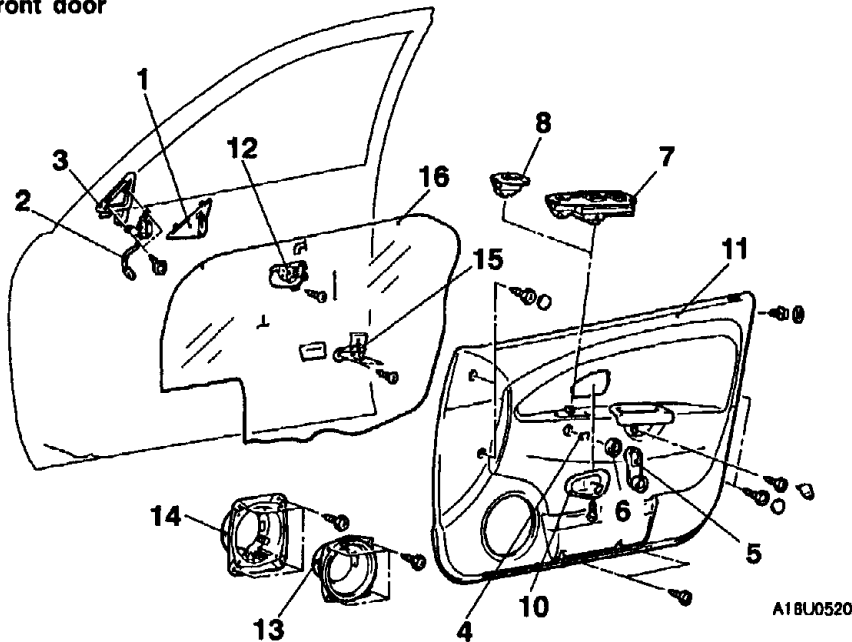
6. Striker

Door switch removal steps

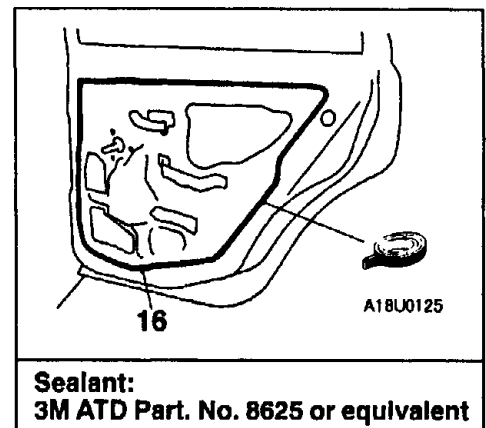
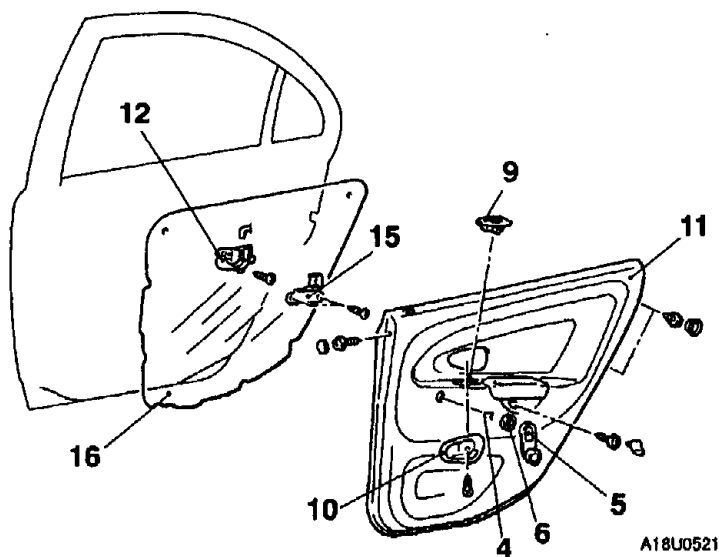
7. Door switch cap
8. Door switch

DOOR TRIM AND WATERPROOF FILM REMOVAL AND INSTALLATION

Front door



Rear door

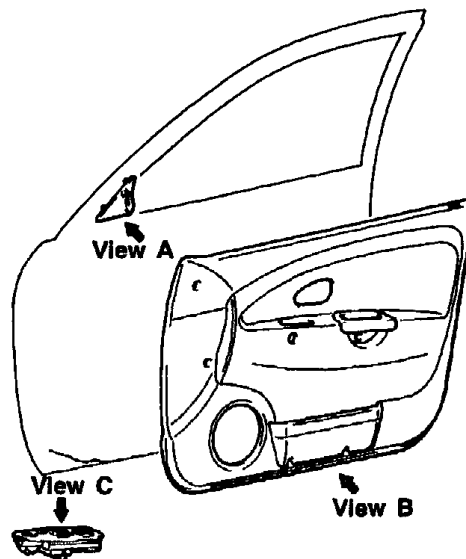


Removal steps

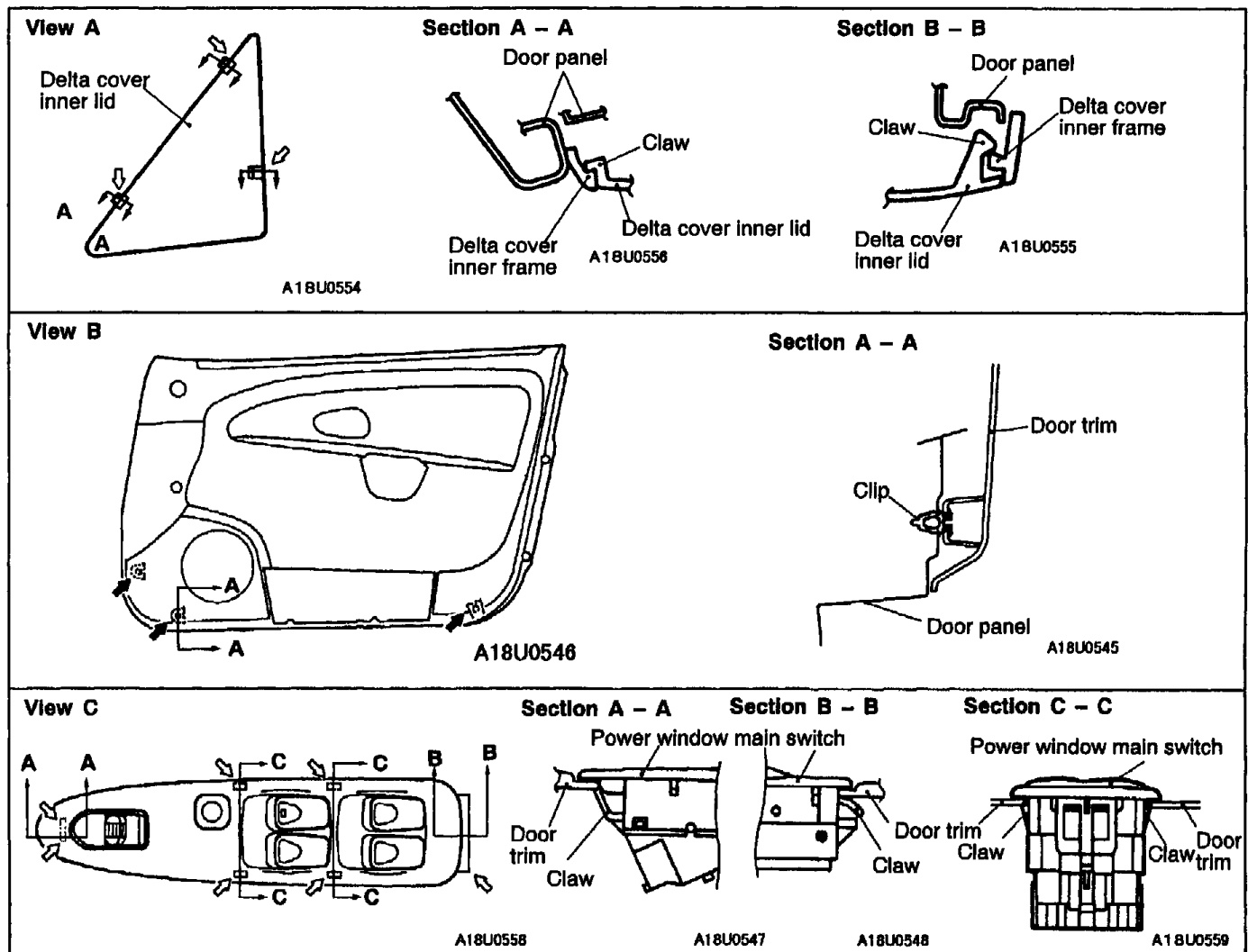
1. Delta cover inner lid
2. Tweeter assembly
3. Delta cover inner frame
4. Clip
<Vehicles without power windows>
5. Regulator handle
<Vehicles without power windows>
6. Escutcheon
<Vehicles without power windows>
7. Power window main switch
<Vehicles with power windows>

8. Central door lock switch
<Vehicles without power windows>
9. Power window sub switch
<Vehicles without power windows>
10. Cover
11. Door trim
12. Door inside handle
13. Speaker
14. Speaker bracket
15. Pull handle bracket
16. Waterproof film

CLIP AND CLAW POSITIONS <FRONT DOOR>



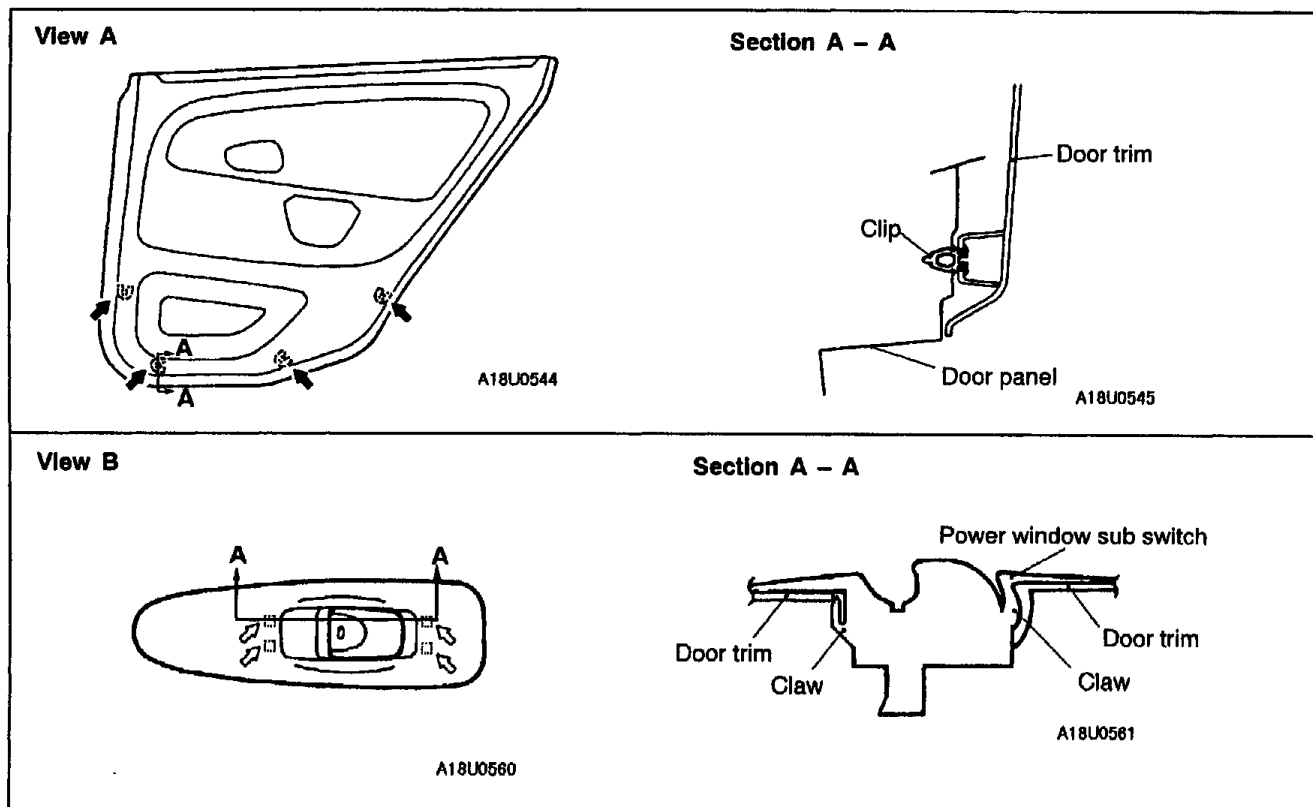
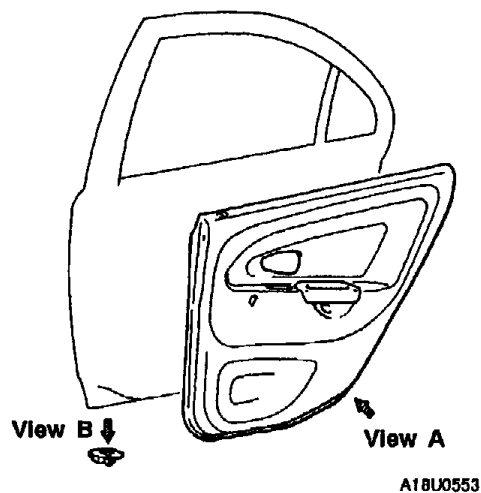
A18U0552



NOTE

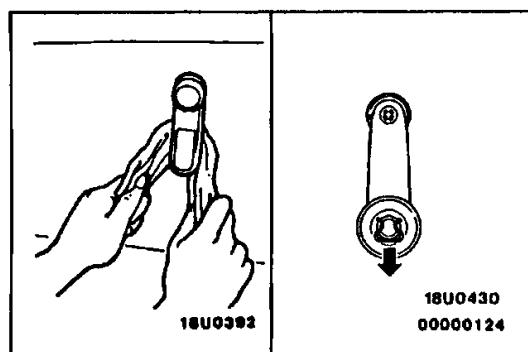
- ➡ : Resin clip positions
- ⇔ : Claw positions

CLIP AND CLAW POSITIONS <REAR DOOR>

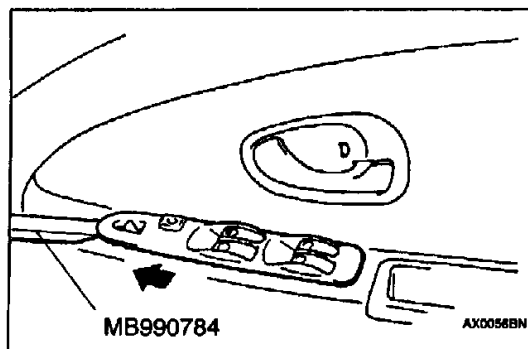


NOTE

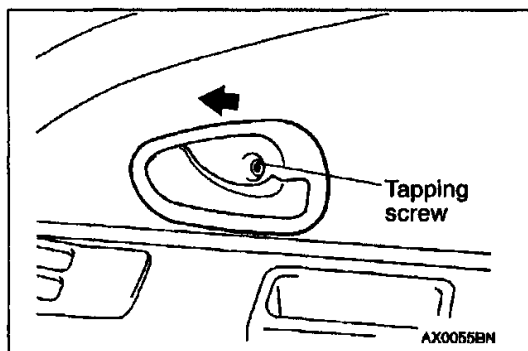
- ◀ : Resin clip positions
- ◁ : Claw positions

**REMOVAL SERVICE POINT****◀A▶ CLIP REMOVAL**

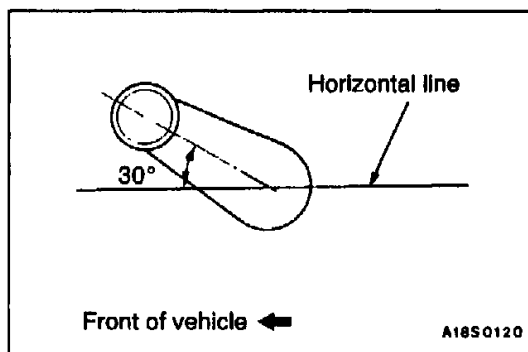
Remove the clip by using a rag, and then remove the regulator handle.

**◀B▶ POWER WINDOW MAIN SWITCH REMOVAL**

Use the special tool to undo the front part of the power window main switch, and then remove the switch by sliding towards the shown direction (Refer to CLIP AND CLAW POSITIONS <FRONT DOOR>).

**◀C▶ COVER REMOVAL**

Remove the tapping screw, and then remove the cover by sliding it towards the shown direction.

**INSTALLATION SERVICE POINT****▶A◀ REGULATOR HANDLE INSTALLATION**

1. Install the escutcheon and the clip to the regulator handle.
2. Fully close the front door glass, and install the regulator handle so that it faces as shown in the illustration.

DOOR HANDLE AND LATCH REMOVAL AND INSTALLATION

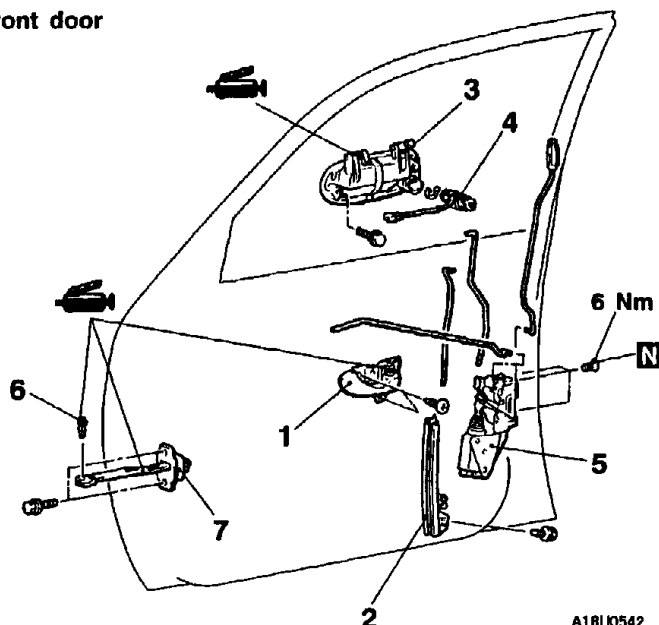
Pre-removal Operation

Door Trim Removal (Refer to P. 42-13.)

Post-Installation Operation

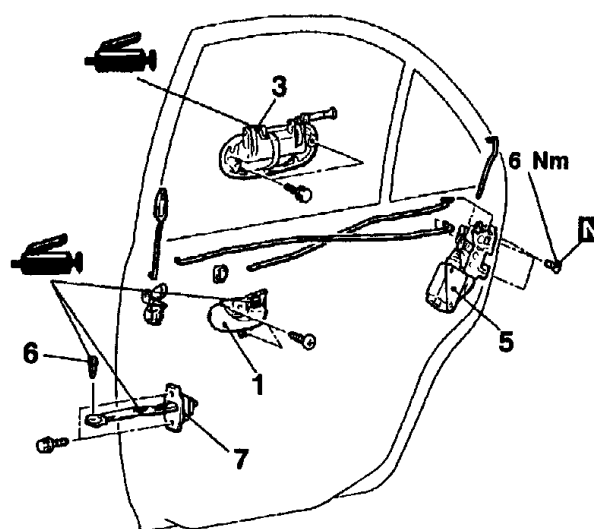
- (1) Door Inside Handle Play Check (Refer to P. 42-11.)
- (2) Door Trim Installation (Refer to P. 42-13.)
- (3) Door Fit Adjustment

Front door

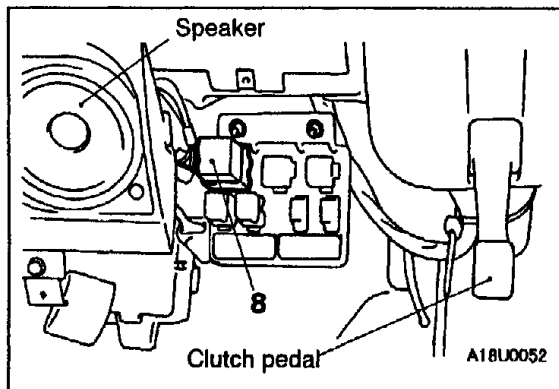


A18U0542

Rear door



A18U0543



A18U0052

Front door handle and door latch assembly removal steps

1. Door inside handle
- Waterproof film (Refer to P. 42-13.)
2. Lower sash rear
3. Door outside handle
4. Door lock key cylinder
5. Door latch assembly

Rear door handle and door latch assembly removal steps

1. Door inside handle
- Waterproof film (Refer to P. 42-13.)
3. Door outside handle
5. Door latch assembly

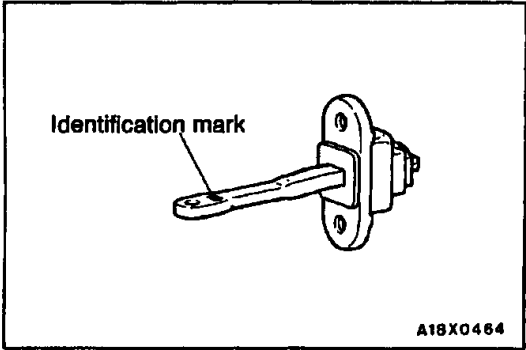
Door check removal steps

1. Door inside handle
- Waterproof film (Refer to P. 42-13.)
6. Spring pin
7. Door check



Door lock-ECU removal

8. Door lock-ECU
- <Vehicles with central door locking system (without keyless entry system)>



INSTALLATION SERVICE POINT

►A◄ DOOR CHECK INSTALLATION

Install the door check so that the identification mark faces upwards.

Applicable location		Identification mark
L.H.	Front door	FL
	Rear door	RL
R.H.	Front door	FR
	Rear door	RR

TRUNK LID

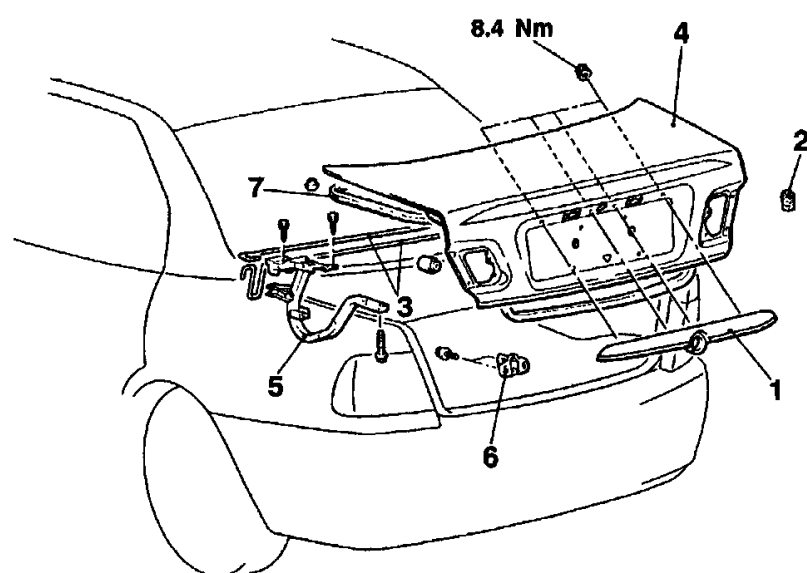
TROUBLESHOOTING

INSPECTION CHART FOR TROUBLE SYMPTOMS

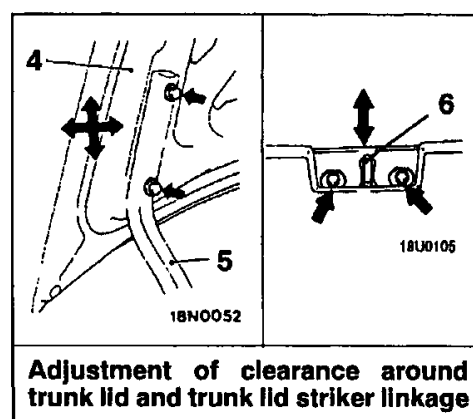
Trouble symptom	Reference page
Door lock mechanism does not operate.	42-7

TRUNK LID

REMOVAL AND INSTALLATION



A18U0550



Trunk lid panel removal steps

- Licence plate lamp
- Rear lid lamp
- Trunk lid lock
- 1. Licence plate lamp garnish
- 2. Bumper
- 3. Trunk lid torsion bar
- 4. Trunk lid panel

Trunk lid hinge removal steps

- Rear shelf trim (Refer to GROUP 52A.)
- 4. Trunk lid panel assembly
- 5. Trunk lid hinge

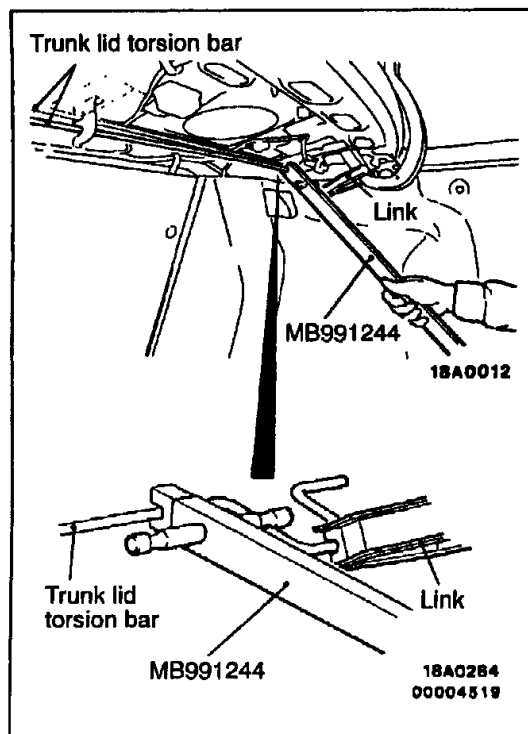
Trunk lid striker removal steps

- Rear end trim (Refer to GROUP 52A.)
- 6. Trunk lid striker

Trunk lid weatherstrip removal

- 7. Trunk lid weatherstrip





REMOVAL SERVICE POINT

◀A▶ TRUNK LID TORSION BAR REMOVAL

1. Disconnect the body harness and the harness connector of the rear shelf lower panel.
2. Install the special tool as shown in the illustration, and then remove the torsion bar from the link while pushing the special tool downwards. Next, repeat the procedure from the other side.

Caution

Be sure to attach the special tool properly, as the body or parts could be damaged when the torsion bar is removed from the special tool.

INSTALLATION SERVICE POINTS

▶A◀ TRUNK LID WEATHERSTRIP INSTALLATION

Install the trunk lid weatherstrip so that the marking and the joint are aligned with the body centre line.

▶B◀ TRUNK LID TORSION BAR INSTALLATION

1. Check the colour of the identification mark at the middle of the torsion bars to make sure that the correct torsion bars are being used.

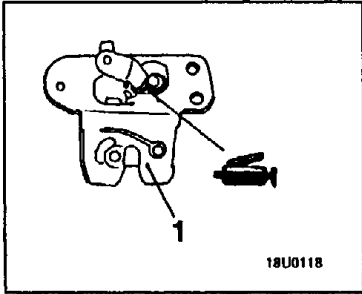
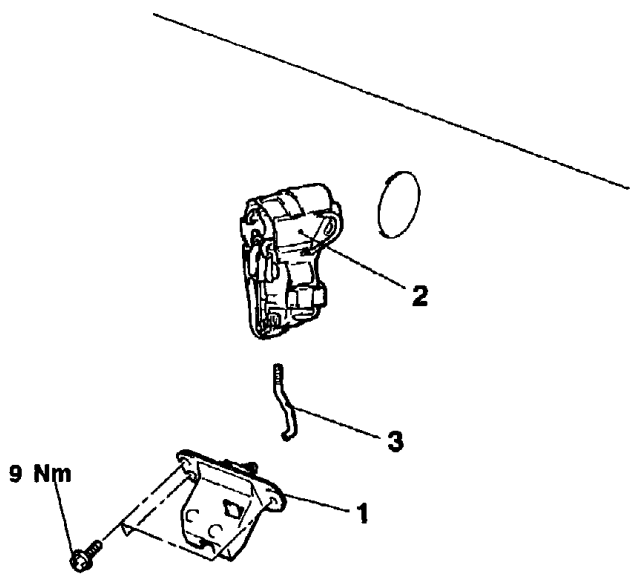
Torsion bar	Identification colour	
	Vehicles without rear spoiler	Vehicles with rear spoiler
L.H.	-	Blue
R.H.	White	Red

2. Insert the end of the torsion bar through the link side mating hole.
3. Install the special tool in the same way as when removing the torsion bar, and then twist the torsion bar while hooking it onto the link. After this, hook the torsion bar onto the holder.

Caution

Be sure to attach the special tool properly, as the body or parts could be damaged when the torsion bar is removed from the special tool.

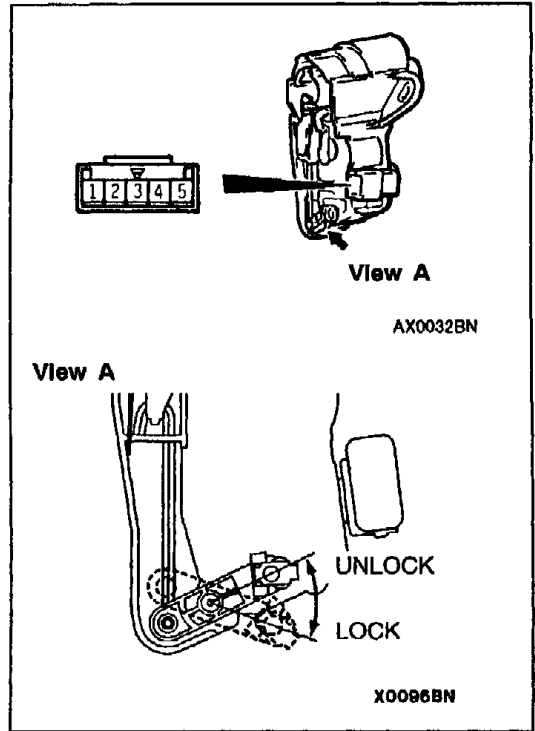
TRUNK LID LATCH
REMOVAL AND INSTALLATION



A18U0540

Removal steps

1. Trunk lid latch
2. Trunk lid lock key cylinder switch and trunk lid lock actuator
3. Trunk lid rod



INSPECTION

TRUNK LID LOCK KEY CYLINDER SWITCH AND TRUNK LID LOCK ACTUATOR CONTINUITY CHECK

Rod position	Terminal No.					Rod position
	1	2	3	4	5	
LOCK	⊕	⊖				LOCK position to UNLOCK position
UNLOCK	⊖	⊕				UNLOCK position to LOCK position
LOCK			○	○		
Neutral (OFF)						
UNLOCK				○	○	

TAILGATE

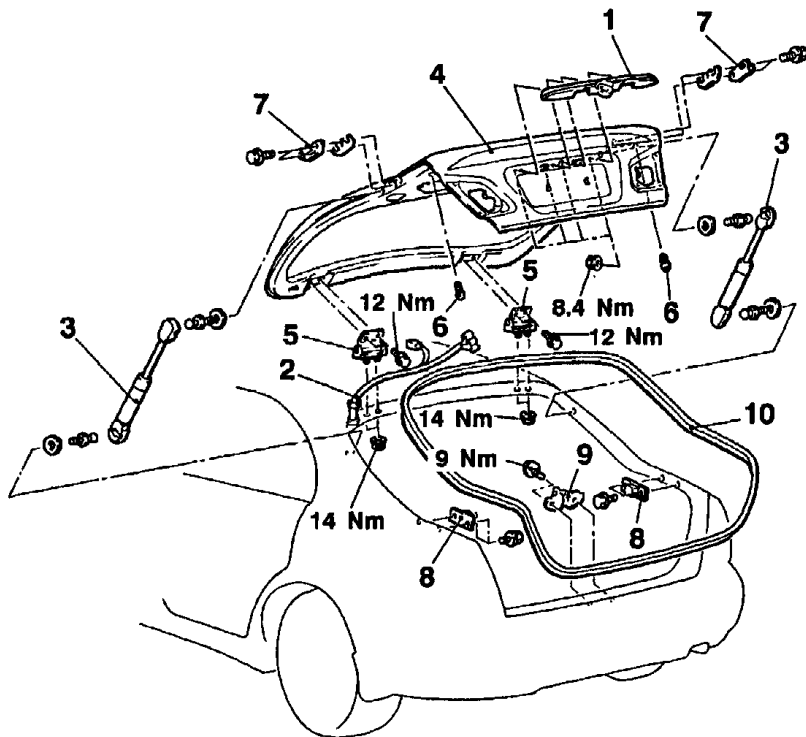
TROUBLESHOOTING

INSPECTION CHART FOR TROUBLE SYMPTOMS

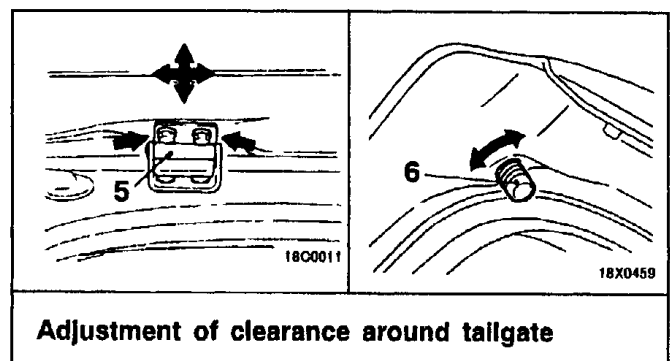
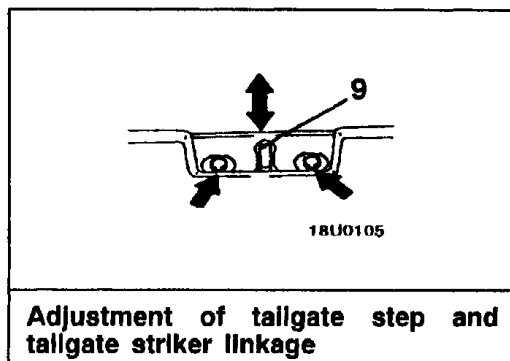
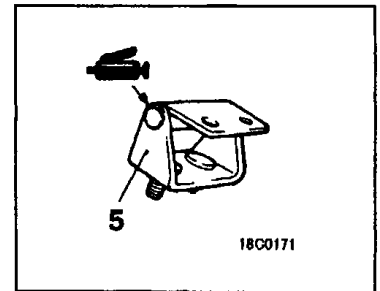
Trouble symptom	Reference page
Door lock mechanism does operate.	42-7

TAILGATE ASSEMBLY

REMOVAL AND INSTALLATION



18U0551



Tailgate and tailgate hinge removal steps

- Tailgate trim (Refer to P. 42-25.)
- Rear fog lamp
- Tailgate lock
- License plate lamp
- 1. License plate lamp garnish
- 2. Harness connection
- 3. Tailgate gas spring
- 4. Tailgate assembly
- Rear roof rail trim
- 5. Tailgate hinge
- 6. Bumper
- 7. Damper upper
- 8. Damper lower

Tailgate striker removal steps

- Rear end trim (Refer to GROUP 52A.)
- 9. Tailgate striker

Tailgate opening weatherstrip removal

- ▶A◀ 10. Tailgate opening weatherstrip

◀A▶

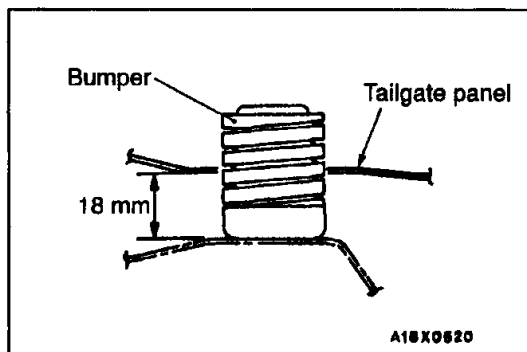
▶B◀

REMOVAL SERVICE POINT**◀A▶ TAILGATE GAS SPRING REMOVAL****Caution**

1. Never try to disassemble the tailgate gas spring or burn it.
2. Always bore a hole in the tailgate gas spring to release the interior gas before the gas spring is discarded.

INSTALLATION SERVICE POINTS**▶A◀ TAILGATE OPENING WEATHERSTRIP INSTALLATION**

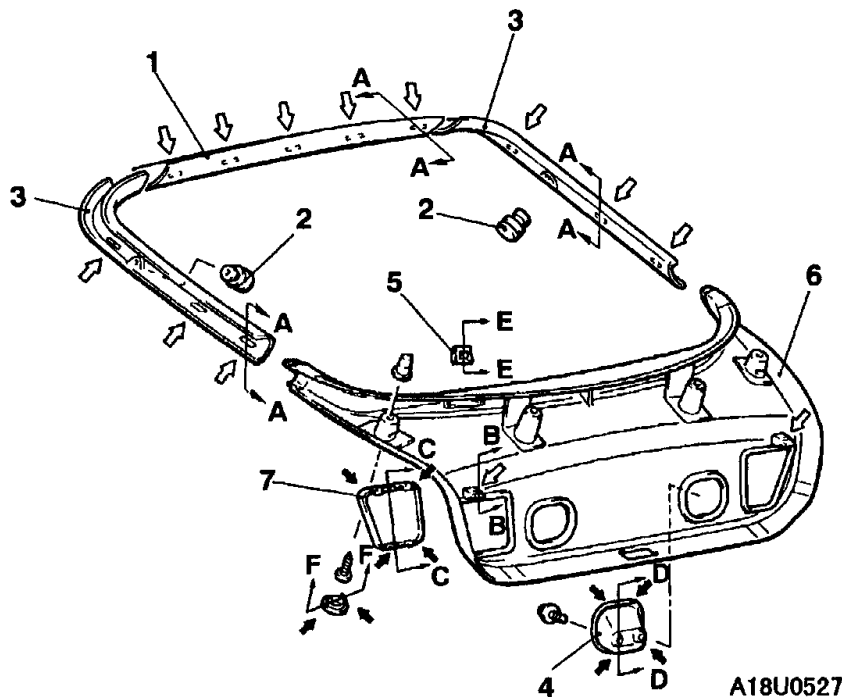
Install the tailgate opening weatherstrip so that the joint is at the centre of the body.

**▶B◀ BUMPER INSTALLATION**

Install the bumper so that the amount of projection from the tailgate panel is as shown in the illustration.

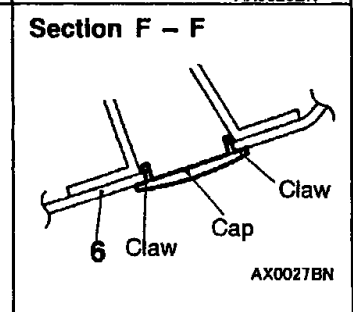
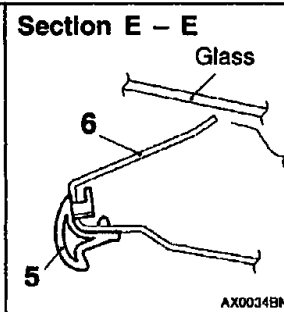
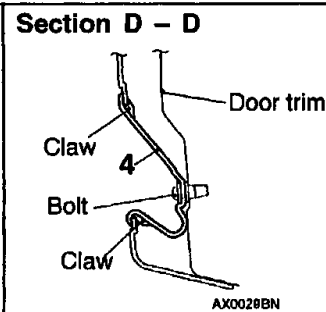
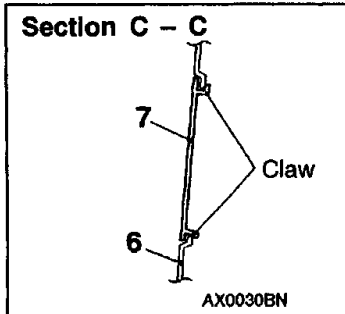
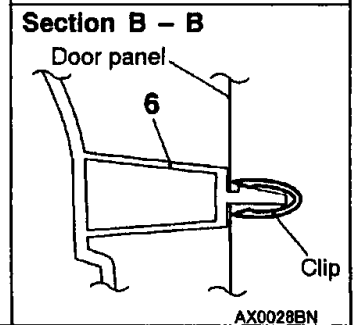
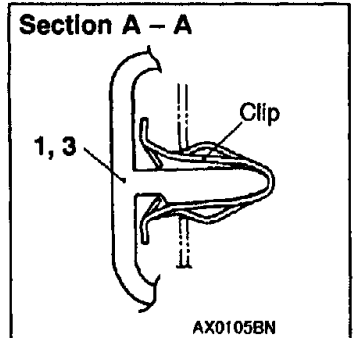
TAILGATE TRIM

REMOVAL AND INSTALLATION



NOTE

- ⇐ : Metal clip positions
- ➡ : Claw positions



Removal steps

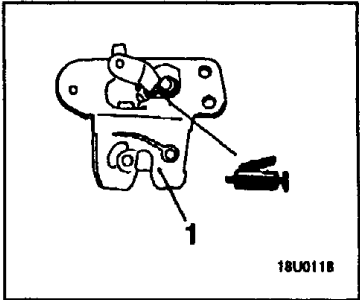
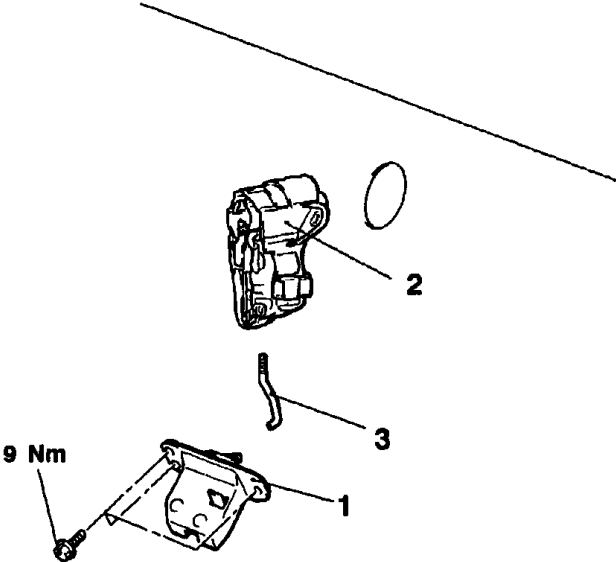
1. Tailgate upper trim
2. Tailgate trim hook
3. Tailgate side trim
4. Tailgate grip box
5. Shelf damper
6. Tailgate lower trim
7. Lid

TAILGATE LATCH

REMOVAL AND INSTALLATION

- Pre-removal and Post-Installation Operation**

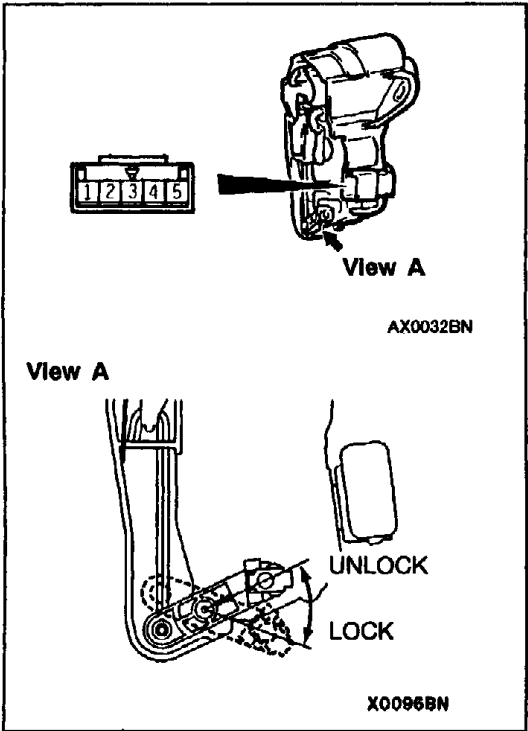
 - Tailgate Lower Trim Removal and Installation
(Refer to P.42-25.)



A18U0540

Removal steps

- 1. Tailgate latch
- 2. Tailgate lock key cylinder switch and tailgate lock actuator
- 3. Tailgate rod



INSPECTION

TRUNK LID LOCK KEY CYLINDER SWITCH AND TRUNK LID LOCK ACTUATOR CONTINUITY CHECK

Rod position	Terminal No.					Rod position
	1	2	3	4	5	
LOCK	⊕	⊖				LOCK position to UNLOCK position
UNLOCK	⊖	⊕				UNLOCK position to LOCK position
LOCK			○	○		
Neutral (OFF)						
UNLOCK				○	○	

KEYLESS ENTRY SYSTEM

TROUBLESHOOTING

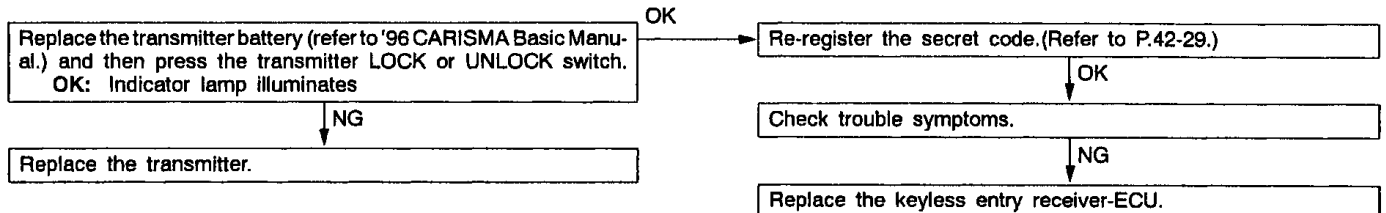
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptoms		Inspection procedure	Reference page
Keyless entry system	None of the doors, including the tailgate, can be locked or unlocked. (However, the central door locking system is functioning normally.)	1	42-27
	All of the doors, including the tailgate, can be locked and unlocked, but the hazard lamp does not illuminate or does not flash. (However, the hazard lamp flashes normally when the hazard lamp switch is used.)	2	42-27
	Secret codes cannot be registered.	3	42-28

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

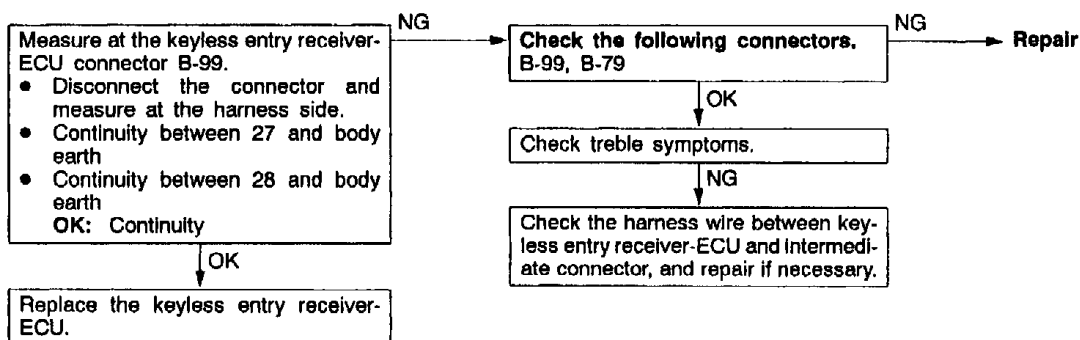
Inspection Procedure 1

None of the doors, including the tailgate, can be locked or unlocked. (However, the central door locking system is functioning normally.)	Probable cause
The transmitter battery may be spent, the secret code may not have been registered correctly, or there may be a malfunction of the transmitter. If the transmitter is normal, the cause is probably a malfunction of the keyless entry receiver-ECU.	• Malfunction of the battery • Malfunction of the transmitter • Malfunction of the keyless entry receiver-ECU



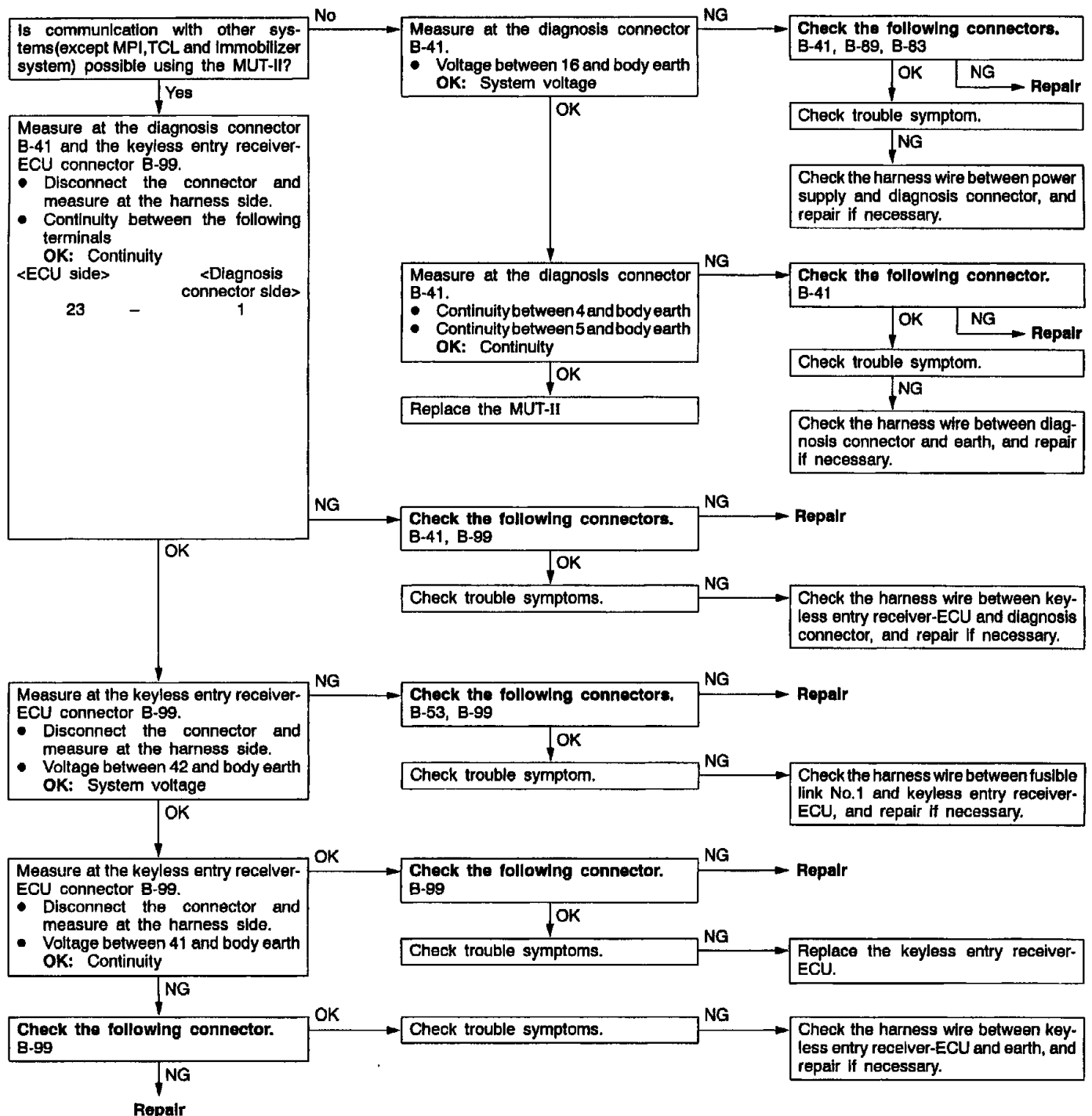
Inspection Procedure 2

All of the doors, including the tailgate, can be locked and unlocked, but the hazard lamp does not illuminate or does not flash. (However, the hazard lamp flashes normally when the hazard lamp switch is used.)	Probable cause
The keyless entry receiver-ECU or the harness between hazard lamp and keyless entry receiver-ECU may be defective.	• Malfunction of the keyless entry receiver-ECU • Malfunction of harness or connector



Inspection Procedure 3

Secret codes cannot be registered.	Probable cause
One of the following items may be defective. Diagnosis connector Keyless entry receiver-ECU power supply circuit Earth circuit Diagnosis output circuit	• Malfunction of the keyless entry receiver-ECU • Malfunction of the MUT-II • Malfunction of harness or connector



INSPECTION AT KEYLESS ENTRY RECEIVER-ECU TERMINALS**TERMINAL VOLTAGE CHART**

1. Measure the voltages between terminal (41) (earth terminal) and each respective terminal.
2. The terminal arrangements are shown in the illustrations below.



18U0130

Connector Terminal No.	Signal	Checking Requirements	Normal Condition
21	Door lock output	When operating	System voltage
		When not operating	0 V
22	Ignition switch	Ignition switch: ACC or ON	System voltage
		Ignition switch: OFF	0 V
23	Diagnostic selection (Input)	MUT-II : Connected	0 V
		MUT-II : Disconnected	Approx. 4V
42	Keyless entry receiver-ECU power supply	Always	System voltage
27, 28	Hazard warning lamp	When lamp is switched off	0 V
		When lamp illuminates	System voltage
41	Earth	Always	0 V

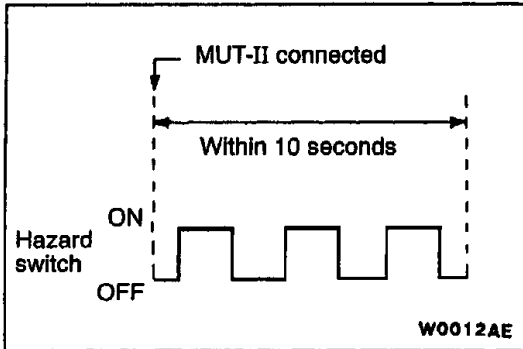
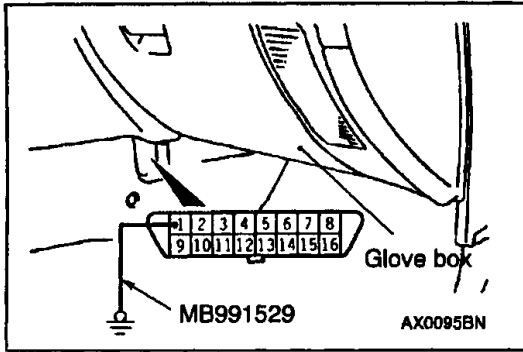
ON-VEHICLE SERVICE**SECRET CODE REGISTRATION METHOD**

Each individual secret code is registered inside the transmitter, and so it is necessary to register these codes with the EEPROM inside the receiver in the following cases.

- When either the transmitter or receiver is replaced;
- If a second transmitter is to be used;
- If it appears that a problem is occurring because of faulty registration of a code.

A maximum of two different codes can be stored in the memory area of the EEPROM (two different transmitters can be used). When the code for the first transmitter is registered, the previously-registered codes for four transmitters are cleared. Therefore, if you are using more than two transmitters or are adding a second transmitter, the codes for all the transmitters must be registered at the same time.

1. Check that the doors lock normally when the key is used.
2. Insert the ignition key to the ignition switch.



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

NOTE

This will connect terminal (1) of the diagnosis connector to earth, and the system will be in secret code registration standby mode.

Caution

Always turn the Ignition switch to OFF before connecting and disconnecting the MUT-II.

4. Within 10 seconds after connecting the MUT-II, press the hazard switch six times.

NOTE

The doors will lock and unlock once at this time and the system will switch to registration mode.

5. Press the lock switch or unlock switch of the transmitter switch, and then press it two times within 10 seconds of the first press. This will register the code.
6. After registration is completed, the doors will be automatically locked and unlocked once.
7. If you are using more than two transmitters or have added a second transmitter, the same registration procedure should be carried out for the remaining transmitters, and it should be carried out within one minute after registration of the code for the first transmitter has been completed. The registration procedure are all the same for all transmitters.
8. Registration mode will be terminated under the following conditions.
 - When the secret codes for four transmitters have been registered;
 - When one minute has passed after registration mode started;
 - If the MUT-II is disconnected (earth is released);
 - If the ignition switch is turned to ON;
 - If one of the doors are opened;
9. After registration mode has been completed, carry out the followings to make sure that the keyless entry system operates.
 - Pull the ignition key out.
 - Close the all windows.

EXTERIOR

CONTENTS

GENERAL	2	REAR WIPER AND WASHER	
Outline of Changes	2	<HATCHBACK>*	9
FRONT BUMPER	2	HEADLAMP WASHER*	11
REAR BUMPER	3	MARKS	12
MOULDING	4	DOOR MIRROR	15
WINDSHIELD WIPER AND WASHER*	7		

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

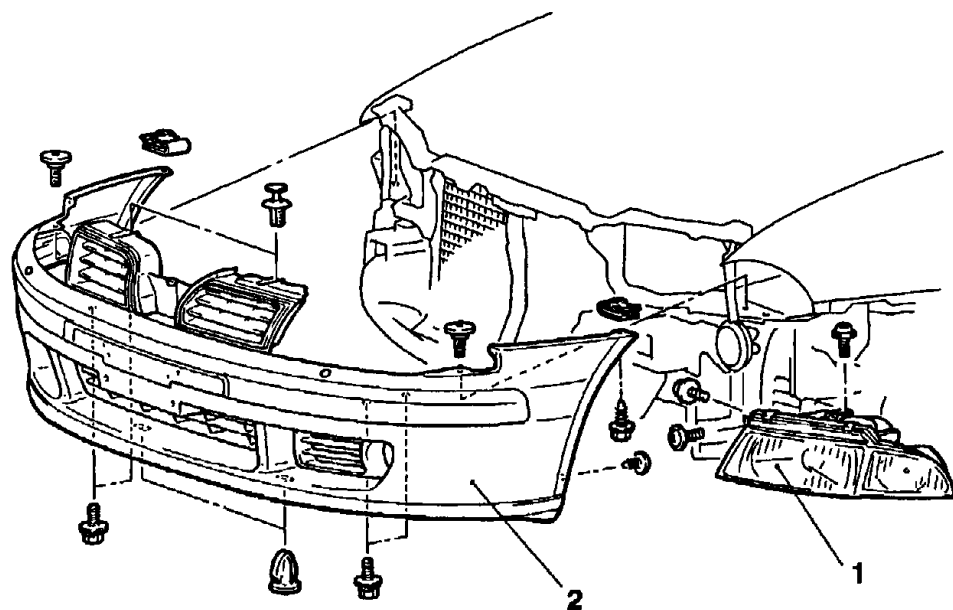
- The service procedures for the front and rear bumpers have been revised due to their new design.
- The service procedure for the side protector mouldings has been revised due to their new design.
- The service procedure for the windshield wiper and washer has been revised as the windshield washer hose and nozzles have been changed.
- The service procedure for the rear wiper has been revised due to the change in the rear wiper motor and arm blade.
- The service procedure for the headlamp washer has been revised.
- The service procedure for the marks has been revised.
- The service procedure for the outside mirrors has been revised as tweeters have been incorporated.

FRONT BUMPER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

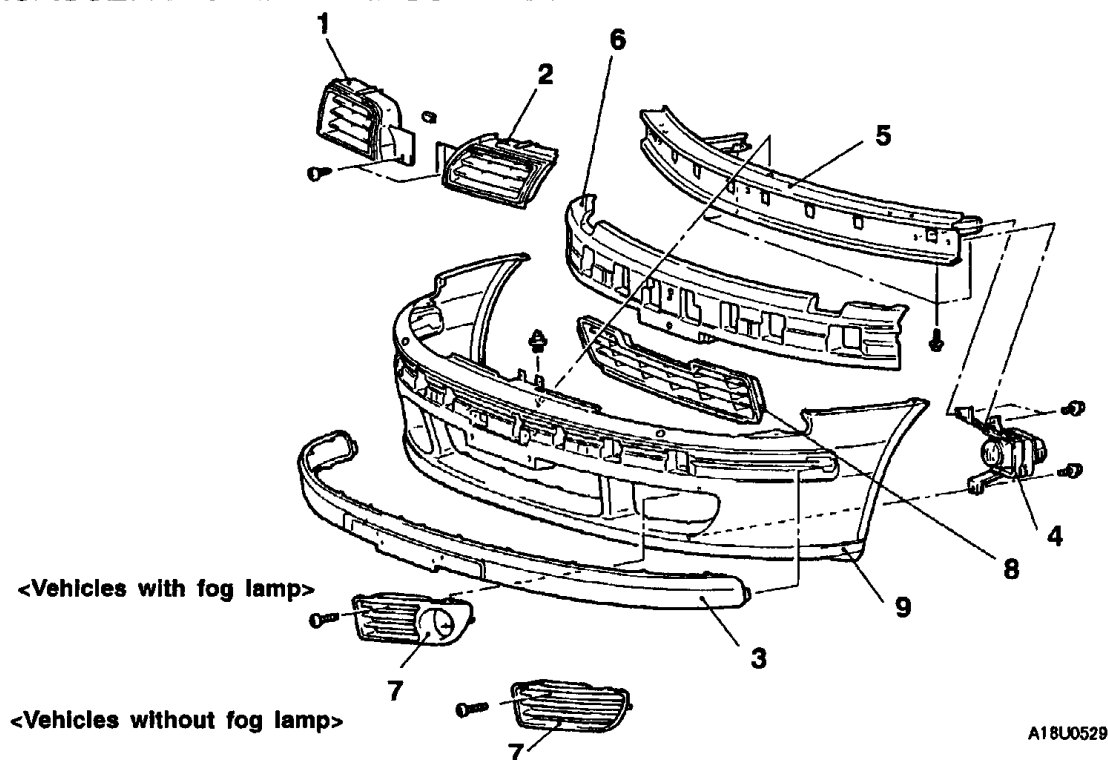
- Front Under Cover Panel Removal and Installation



A18U0530

Removal steps

1. Head lamp
2. Bumper assembly

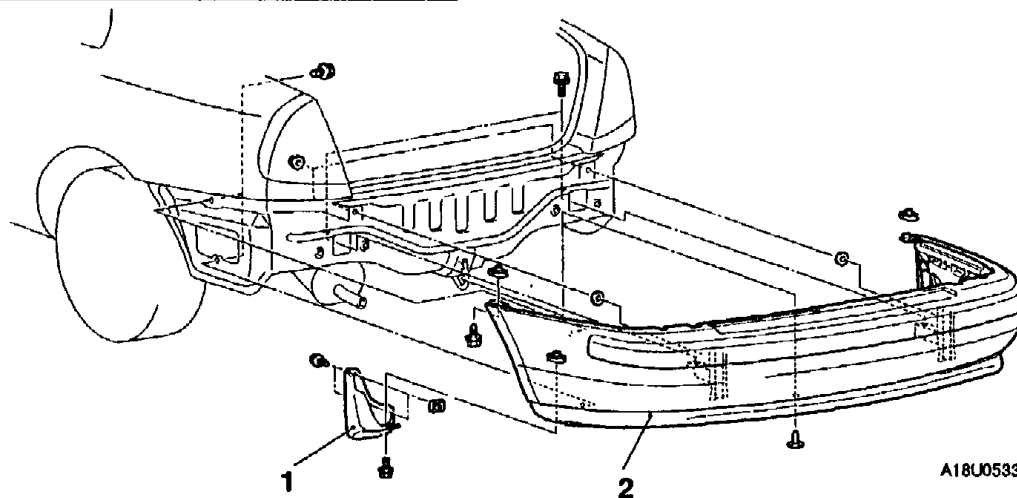
DISASSEMBLY AND REASSEMBLY**Disassembly steps**

1. Radiator grille, R.H.
2. Radiator grille, L.H.
3. Bumper protector
4. Fog lamp
5. Bumper reinforcement

6. Form
7. Fog lamp cover
8. Under grille
9. Bumper face

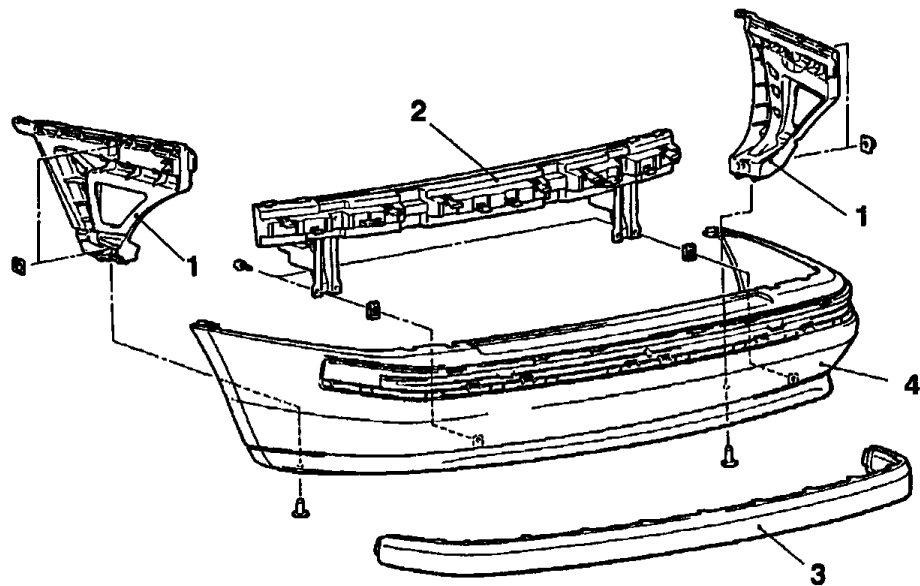
REAR BUMPER**REMOVAL AND INSTALLATION****Pre-removal and Post-Installation Operation**

- Rear End Trim Removal and Installation (Refer to GROUP 52A.)

**Removal steps**

1. Rear mud guard
2. Rear bumper assembly

DISASSEMBLY AND REASSEMBLY



A18U0528

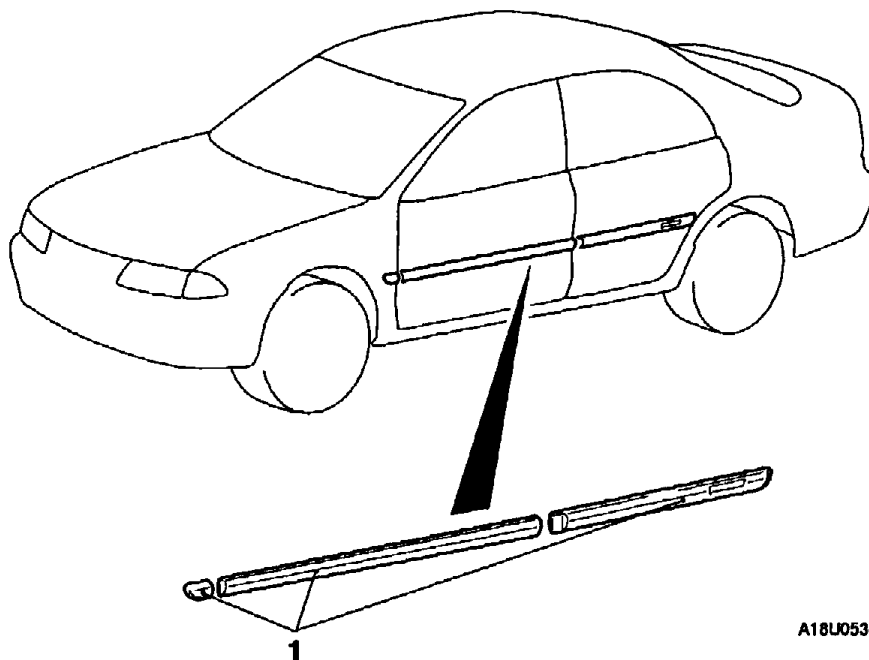
Disassembly steps

1. Side reinforcement
2. Bumper reinforcement

3. Bumper protector
4. Bumper face

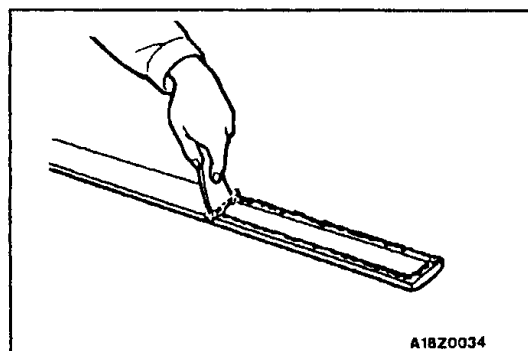
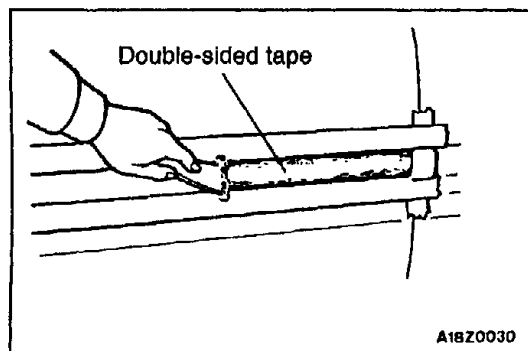
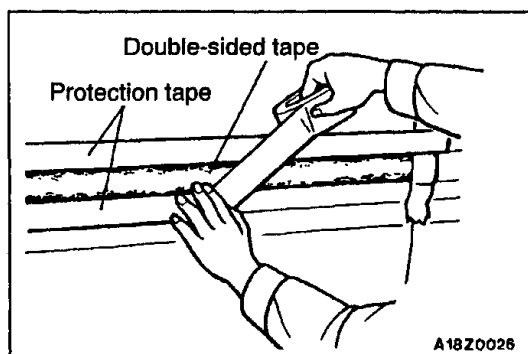
MOULDING

REMOVAL AND INSTALLATION



A18U0534

- ◀A▶ ▶A◀ 1. Side protect moulding



REMOVAL SERVICE POINT

◀A▶ SIDE PROTECT MOULDING REMOVAL

1. Attach protection tape all the way along the edges of the double-sided tape which is still adhering to the body.
2. Use a resin spatula to scrape off the double-sided tape.
3. Peel off the protection tape.
4. Wipe the body surface and clean it with a rag moistened with isopropyl alcohol.

INSTALLATION SERVICE POINT

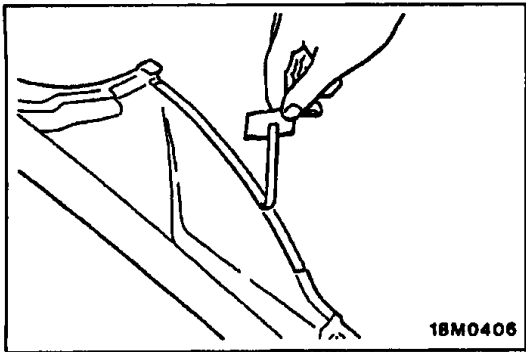
▶A◀ SIDE PROTECT MOULDING INSTALLATION

Double-sided tape affixing to the side protect moulding (when reusing)

1. Installation procedure
 - (1) Scrape off the double-sided tape with a resin spatula or gasket scraper.
 - (2) Wipe the side protect moulding adhesion surface and clean it with a rag moistened with isopropyl alcohol.
 - (3) Affix specified pressure sensitive double-sided tape to the side protect moulding.

Specified adhesive tape:

Double-sided tape [10 mm wide and 1.0 mm thick]



- (4) Remove strip paper from the pressure sensitive double-sided tape.

NOTE

Affix double-sided tape to the end of strip paper for ease of strip paper removal.

- (5) Install the side protect moulding.

NOTE

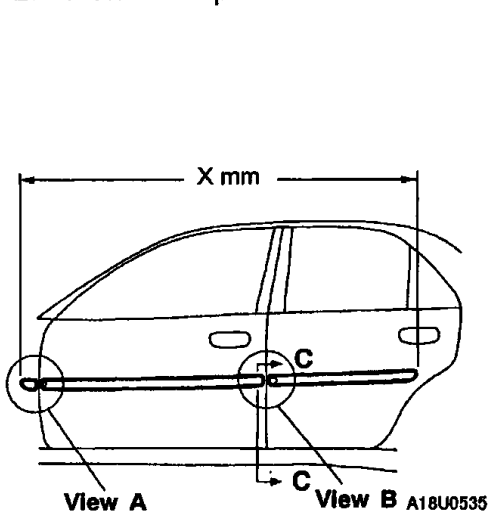
If it is hard to affix the pressure sensitive double-sided tape in winter, heat the application surfaces at both the vehicle body and the side protect moulding.

Body 40 – 60°C

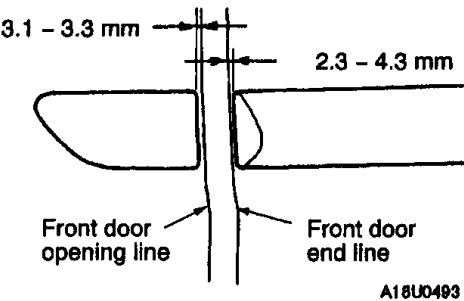
Side protect moulding 20 – 30°C

Apply pressure fully to the side protect moulding.

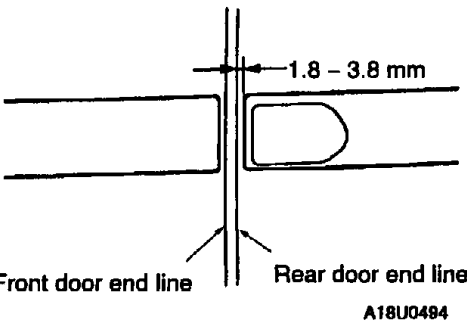
2. Installation position



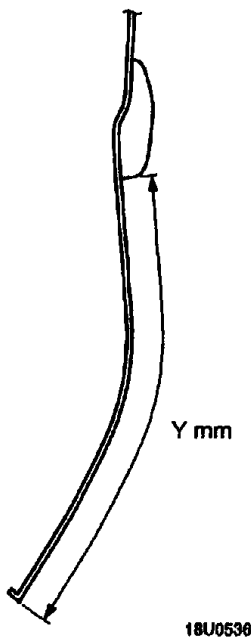
View A



View B



Section C-C



X	Y
493	186.6 ± 1
1525	216.5 ± 1
1546	217.3 ± 1
2000	221.3 ± 1

WINDSHIELD WIPER AND WASHER

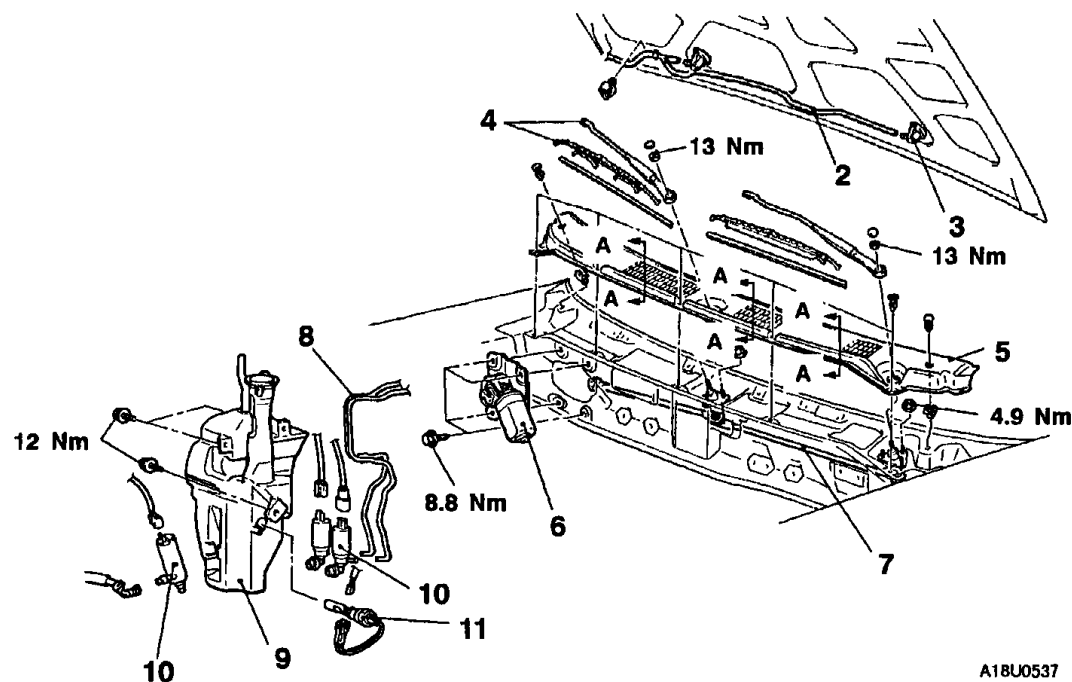
REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

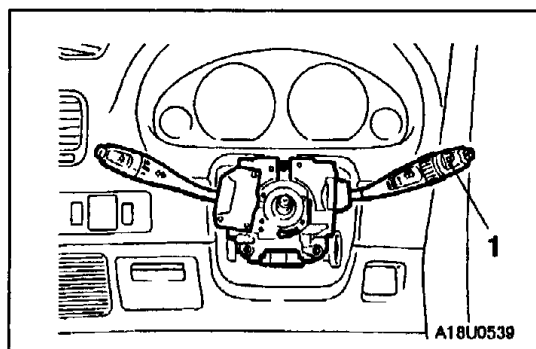
- Relay Box Removal and Installation
<R.H. drive vehicles>

CAUTION: SRS

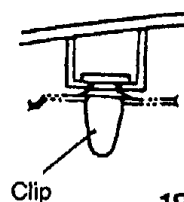
Before removal of air bag module and clock spring, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.



A18U0537



Section A – A



19X0027

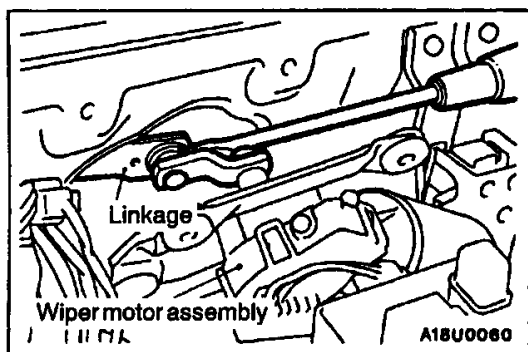
1. Column switch assembly
(with built-in wiper and washer switch, and wiper relay)
(Refer to GROUP 37A – Steering wheel and shaft.)
2. Washer hose
3. Washer nozzle

Wiper motor and linkage removal steps

- ▶◀ 4. Wiper arm and blade assembly
- ▶◀ 5. Front deck garnish
- ▶◀ 6. Wiper motor
- ▶◀ 7. Linkage

Washer tank removal steps

- Draining of washer fluid
- Front bumper (Refer to P.51-2.)
- 8. Washer hose
- 9. Washer tank
- 10. Washer motor
- 11. Washer fluid level switch

**REMOVAL SERVICE POINT****◀A▶ WIPER MOTOR REMOVAL**

Loosen the wiper motor assembly mounting bolts, and then remove the wiper motor assembly. Disconnect the linkage and the motor assembly, and then remove the linkage.

Caution

Because the installation angle of the crank arm and the motor has been set, do not remove them unless it is necessary to do so. If they must be removed, remove them only after marking their mounting positions.

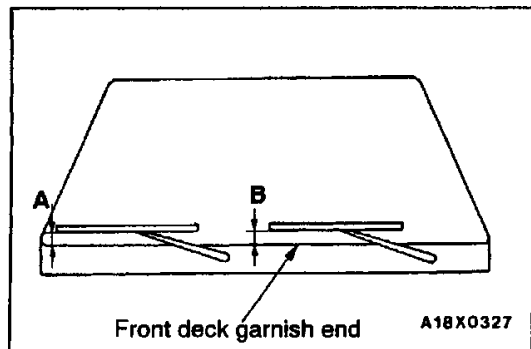
INSTALLATION SERVICE POINT**▶A◀ WIPER ARM AND BLADE ASSEMBLY INSTALLATION**

- (1) The movements of the left and right wiper arms are different, so check the identification marks.
- (2) Install the wiper blade in the specified position (standard value) as shown in the illustration.

Standard value:

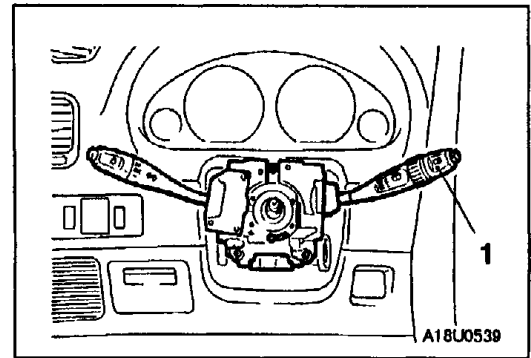
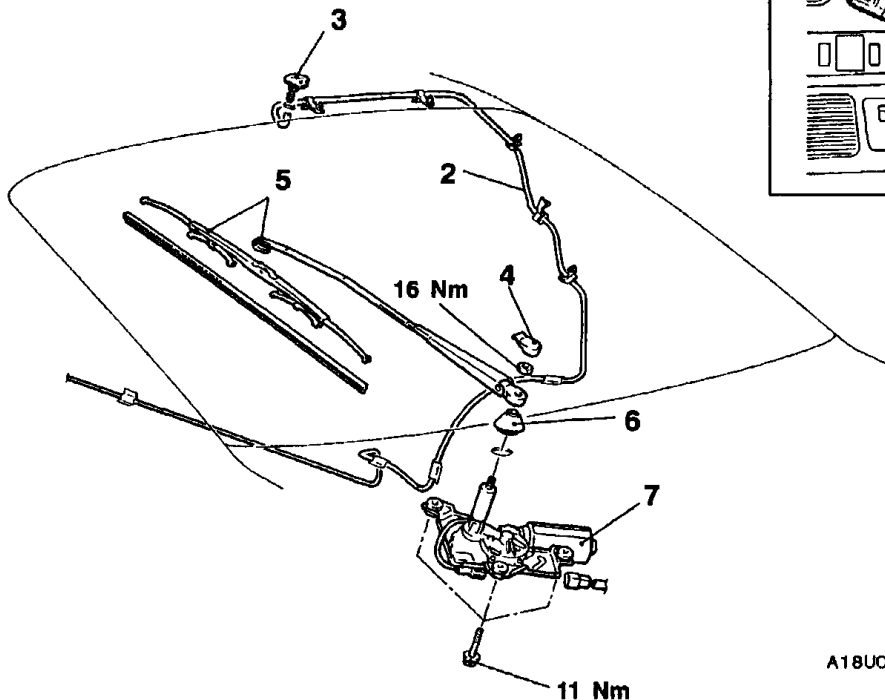
Passenger's side (A): 20 ± 5 mm

Driver's side (B): 25 ± 5 mm



REAR WIPER AND WASHER <HATCHBACK>**REMOVAL AND INSTALLATION****CAUTION: SRS**

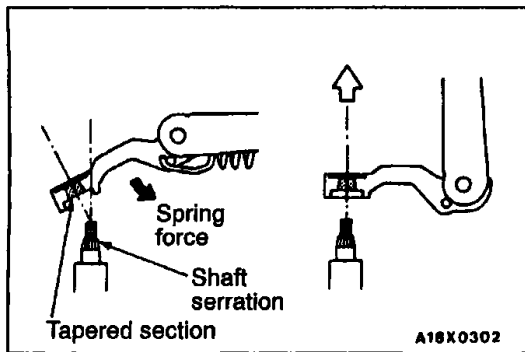
Before removal of air bag module and clock spring, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.



1. Column switch assembly
(with built-in rear wiper and washer switch)
(Refer to GROUP 37A – Steering wheel and shaft.)
2. Washer hose
3. Washer nozzle

Wiper motor removal steps

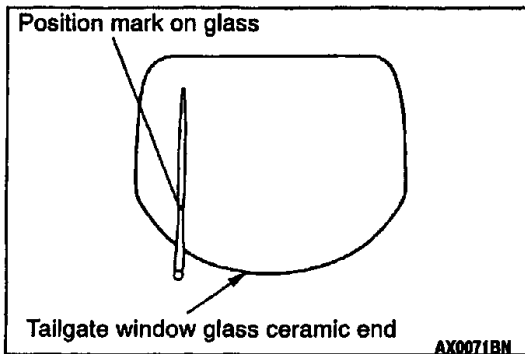
4. Cover
5. Wiper arm and blade
6. Grommet
7. Wiper motor

**REMOVAL SERVICE POINT****◀A▶ WIPER ARM AND BLADE REMOVAL**

Remove the wiper arm from the shaft while the wiper arm is raised.

Caution

If the wiper arm is forced while it is still lowered, the tapered section of the wiper arm will be scraped by the shaft serrations and the diameter of the tapered section will become too big, so sufficient care should be exercised.

**INSTALLATION SERVICE POINT****▶A◀ WIPER ARM ASSEMBLY INSTALLATION**

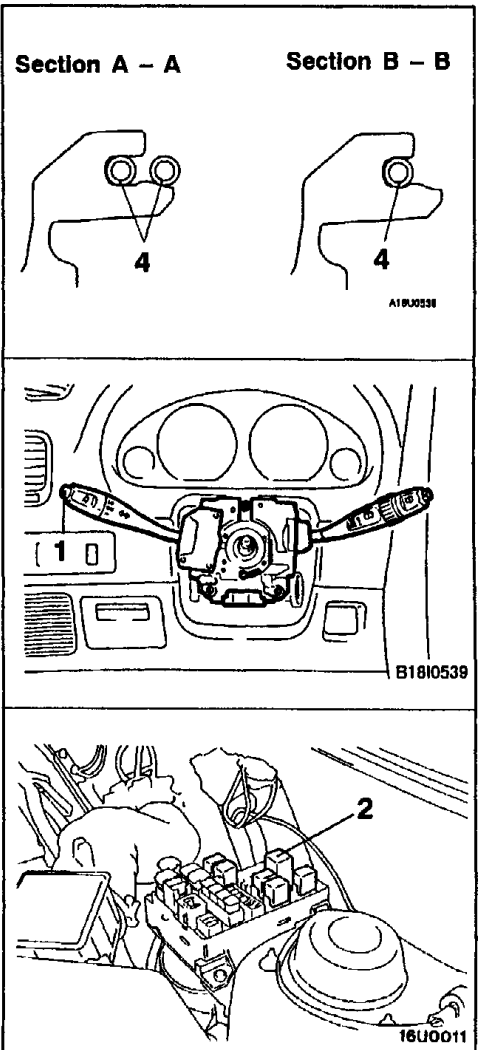
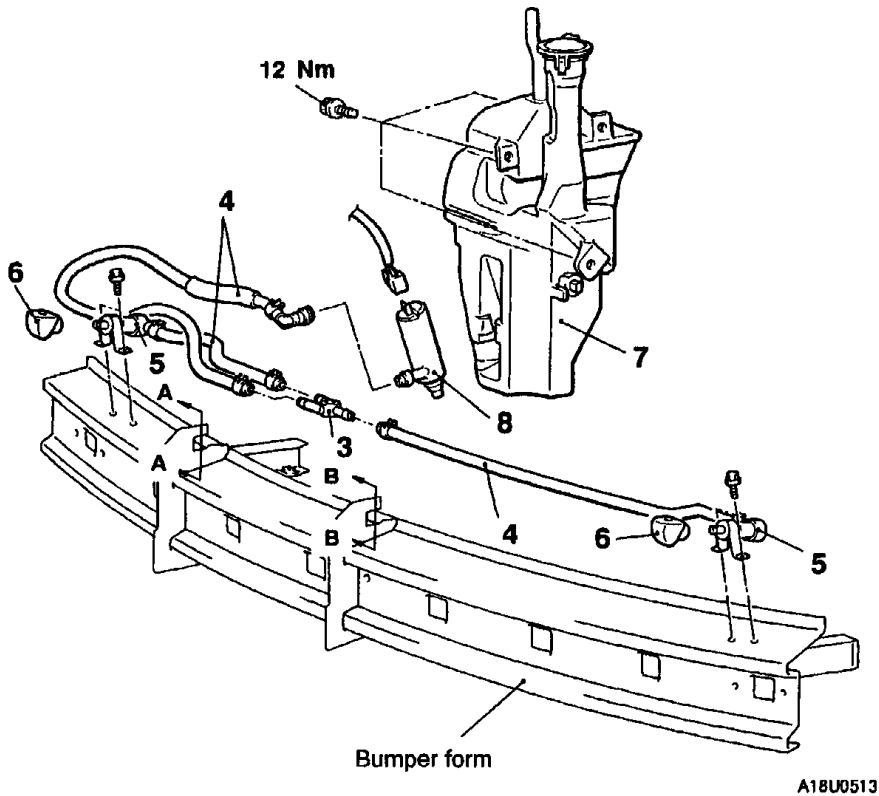
Align the wiper blade with the position mark to secure the wiper arm.

HEADLAMP WASHER

REMOVAL AND INSTALLATION

CAUTION: SRS

Before removal of air bag module and clock spring, refer to GROUP 52B – SRS Service Precautions and Air Bag Module and Clock Spring.



1. Column switch assembly (with built-in headlamp washer switch) (Refer to GROUP 37A – Steering Wheel and Shaft.)
2. Headlamp washer relay

Telescopic and Y connector removal steps

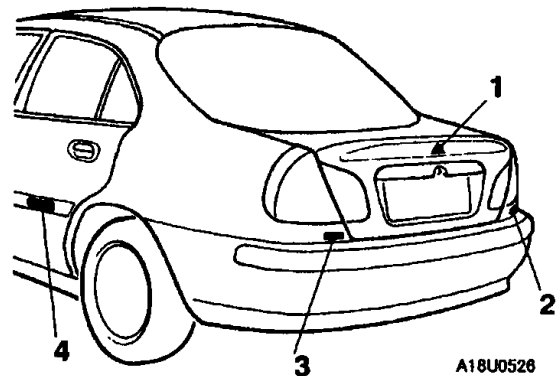
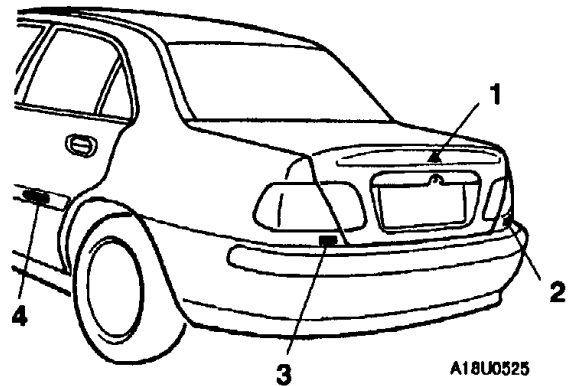
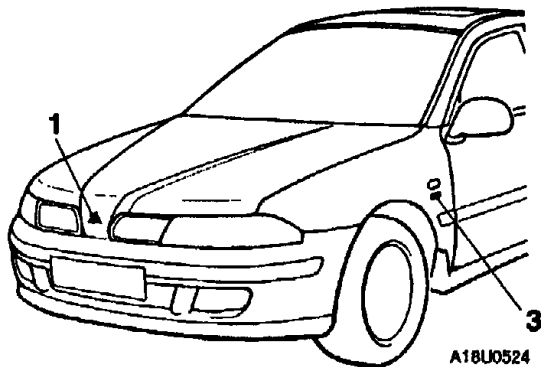
- Draining of washer fluid
- Front bumper (Refer to P.51-2.)
- 3. Y connector
- 4. Washer hose assembly
- 5. Telescopic assembly
- 6. Eyeball holder and cover

Washer tank removal steps

- Draining of washer fluid
- Front bumper (Refer to P.51-2.)
- 7. Washer tank assembly
- 8. Headlamp washer motor

MARKS

REMOVAL AND INSTALLATION



- ▶A◀ 1. Three Diamond MARK
▶A◀ 2. CARISMA MARK

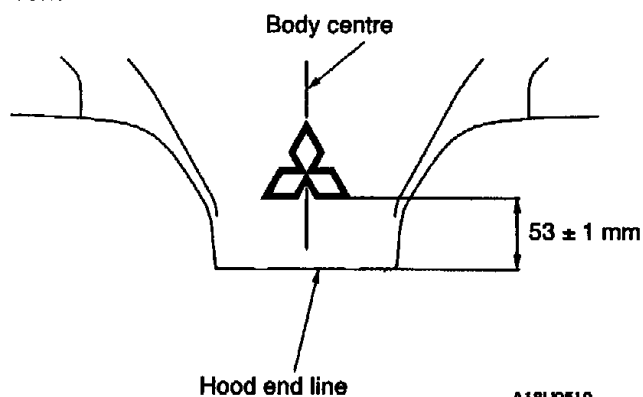
- ▶A◀ 3. GDI MARK
▶A◀ 4. GRADE MARK

INSTALLATION SERVICE POINT

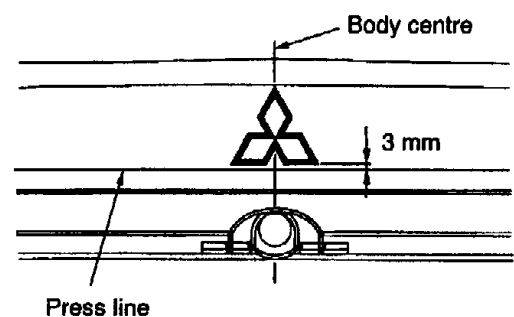
▶A◀ MARK INSTALLATION

(1) Three Diamond MARK

<Front>



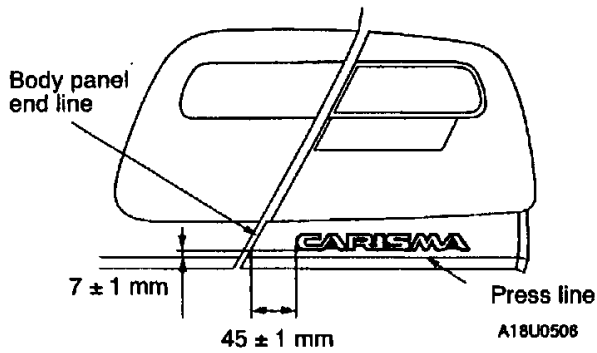
<Rear>



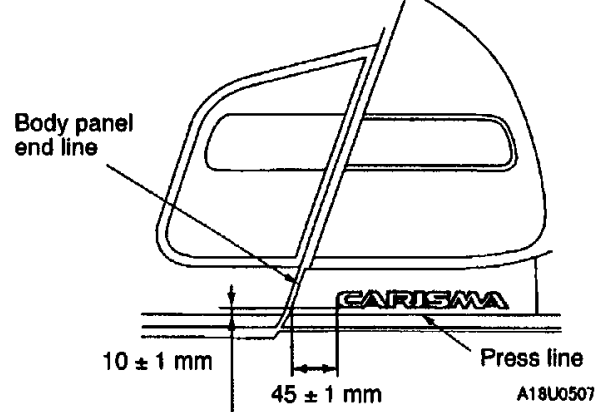
A18U0511

(2) CARISMA MARK

<Sedan>

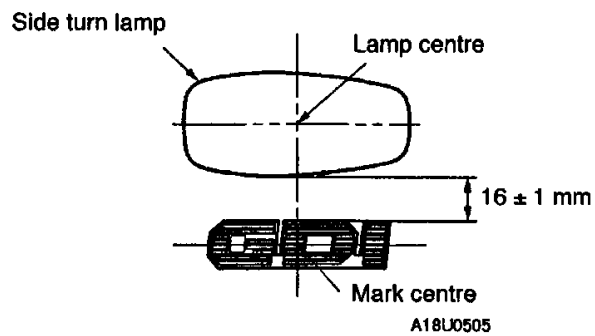


<Hatchback>



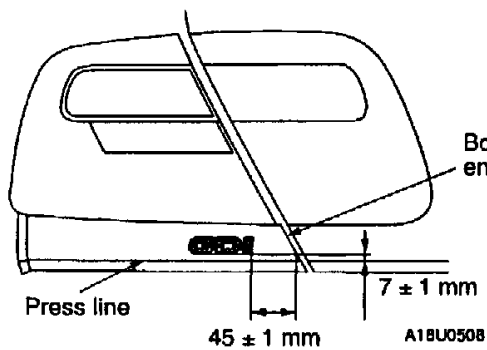
(3) GDI MARK

{Side}

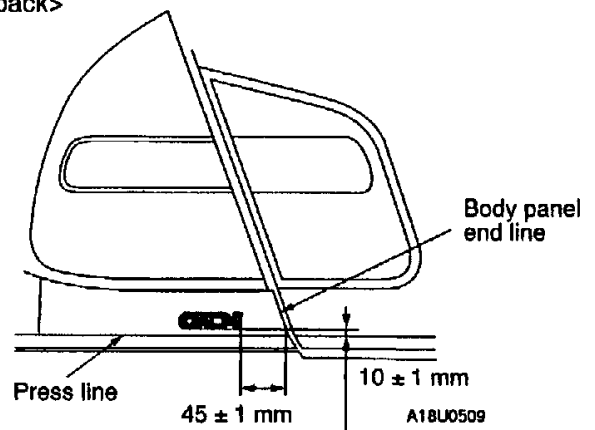


{Rear}

<Sedan>

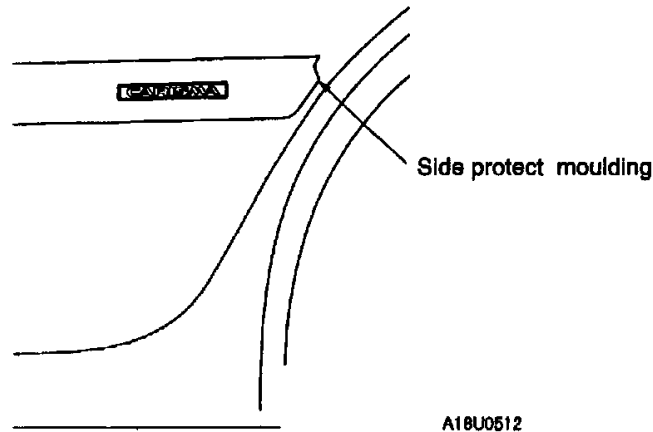


<Hatchback>



(4) GRADE MARK

<CARISMA, CLASSIC, COMFORT, SPORT, ELEGANCE>

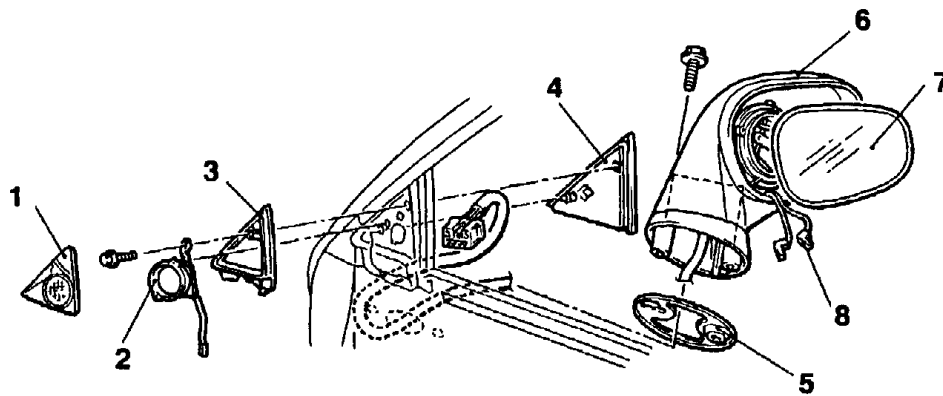
**MARKS INSTALLATION**

1. Clean the mark installation surfaces on the body with unleaded petrol.
2. Peel off the backing paper from the reverse side of the marks, and then attach the marks to the vehicle body so that they fit properly position.

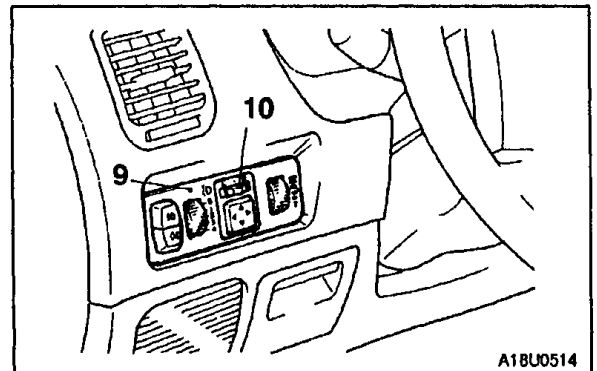
Caution

When attaching the marks, the surrounding temperature should be 20 – 38°C and the air should be completely free from dust.

If the surrounding temperature is lower than 20°C, the marks and the places on the body where the marks are to be attached should be heated to 20 – 38°C.

DOOR MIRROR**REMOVAL AND INSTALLATION**

A18U0515



A18U0514

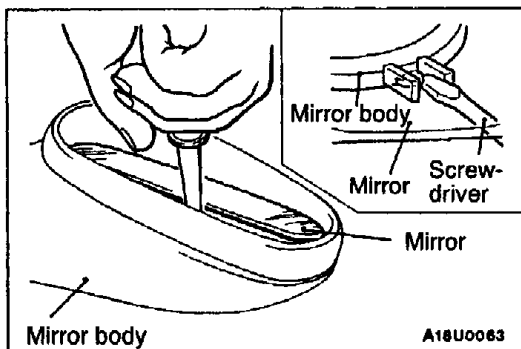
Door mirror removal steps

- Front door trim (Refer to GROUP 42)

1. Delta cover, inner
2. Tweeter assembly
3. Delta cover, inner flame
4. Delta cover, outer
5. Gasket
6. Door mirror
7. Mirror
8. Harness connector

**Door mirror control switch removal steps**

9. Instrument panel switch assembly
10. Door mirror control switch



A18U0063

REMOVAL SERVICE POINT**◀▶ MIRROR REMOVAL**

Turn the mirror by hand so that it faces upwards, insert the flat-tipped screwdriver wound with masking tape into the notched section, and lever out the mirror to remove it.

INTERIOR AND SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

INTERIOR	52A
SUPPLEMENTAL RESTRAINT SYSTEM (SRS)	52B

INTERIOR

CONTENTS

GENERAL	3	SEAT*	12
Outline of Changes	3	Front Seat	12
INSTRUMENT PANEL*	3	Rear Seat	14
FLOOR CONSOLE*	8	SEAT BELT	19
TRIMS <SEDAN>	10	Front Seat Belt	19
		Rear Seat Belt	20

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 service procedure for the instrument panel has been revised due to the change in the front passenger's SRS air bag module.
- The service procedure for the floor console has been revised due to the change in the floor console.
- The service procedure for the trims has been revised due to the change in the trim clips and the trunk rear trim <Sedan>.
- The service procedure for the front seat has been revised due to the change in the seat adjust lever.
- The service procedure for the rear seat has been revised due to the addition in the seat head restraint (centre).
- The service procedures for the front and rear seat belts have been revised due to the change in the seat belt.

INSTRUMENT PANEL

REMOVAL AND INSTALLATION

For installation of the instrument panel, the bolts and screws described below are used. They are indicated by symbols in the illustration.

Name	Symbol	Size mm (D × L)	Colour	Shape
Tapping screw	A	5 × 16	-	 19Z0026
	B	4.8 × 13		
	C	4.8 × 16	Black	
	D	4.2 × 13	-	
	E	2.5 × 9.5		
Machine screw	F	5 × 16	-	 19Z0025
	G	4.8 × 19	-	
Washer assembled bolt	H	6 × 12	-	 19Z0005
Gimlet bolt	I	6 × 16	-	 19Z0012
Flange bolt	J	6 × 14	-	 19Z0024
	K	6 × 14.29		
	L	6 × 16		
	M	5 × 16		

D = Thread diameter

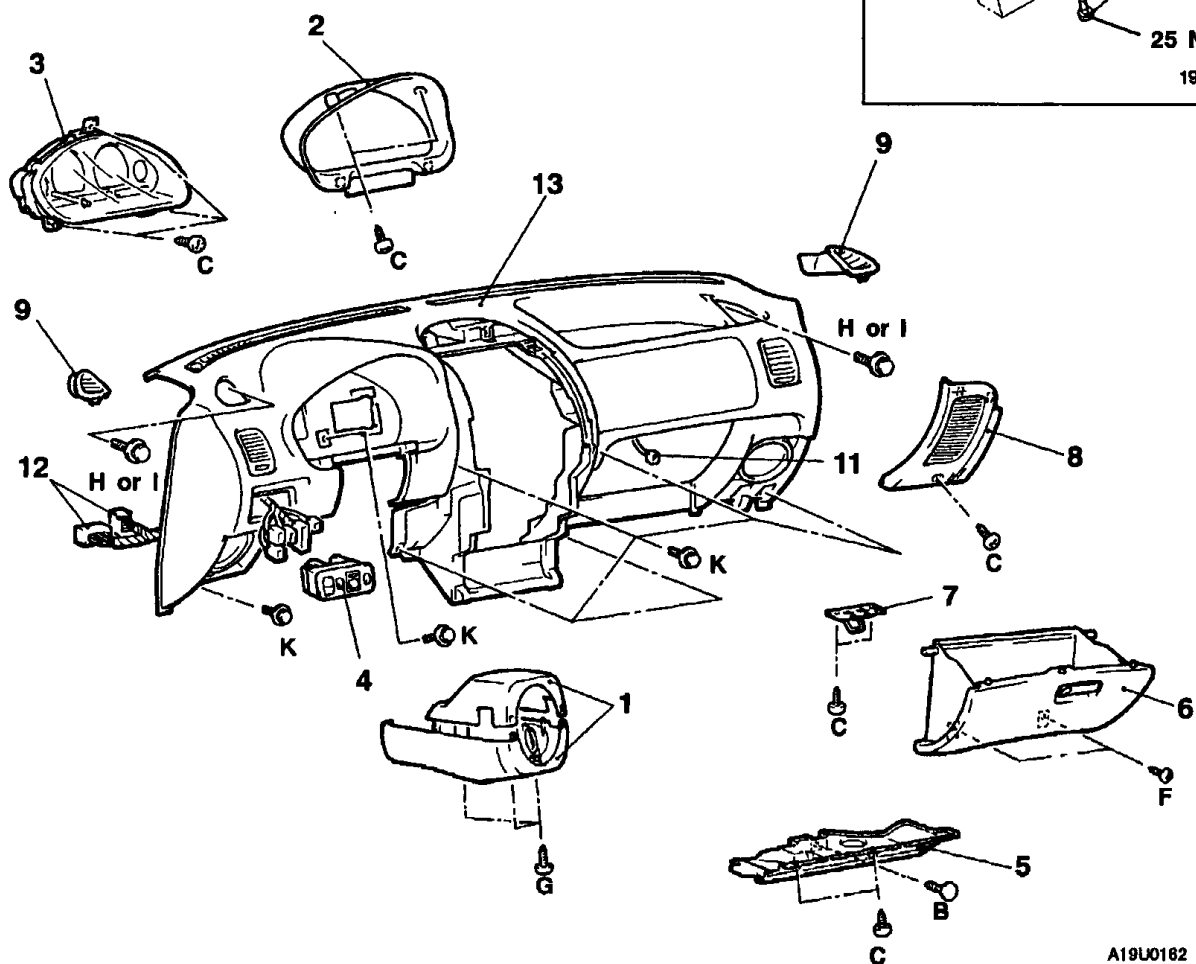
L = Effective thread length

CAUTION: SRS

- (1) When removing and installing the floor console (vehicles equipped with SRS), do not let it bump against the SRS-ECU.
- (2) For the passenger side air bag module removal/installation, always observe the service procedures of GROUP 52B – Air Bag Module and Clock Spring.

Pre-removal and Post-Installation Operation

- Floor Console Assembly Removal and Installation (Refer to P.52A-8.)

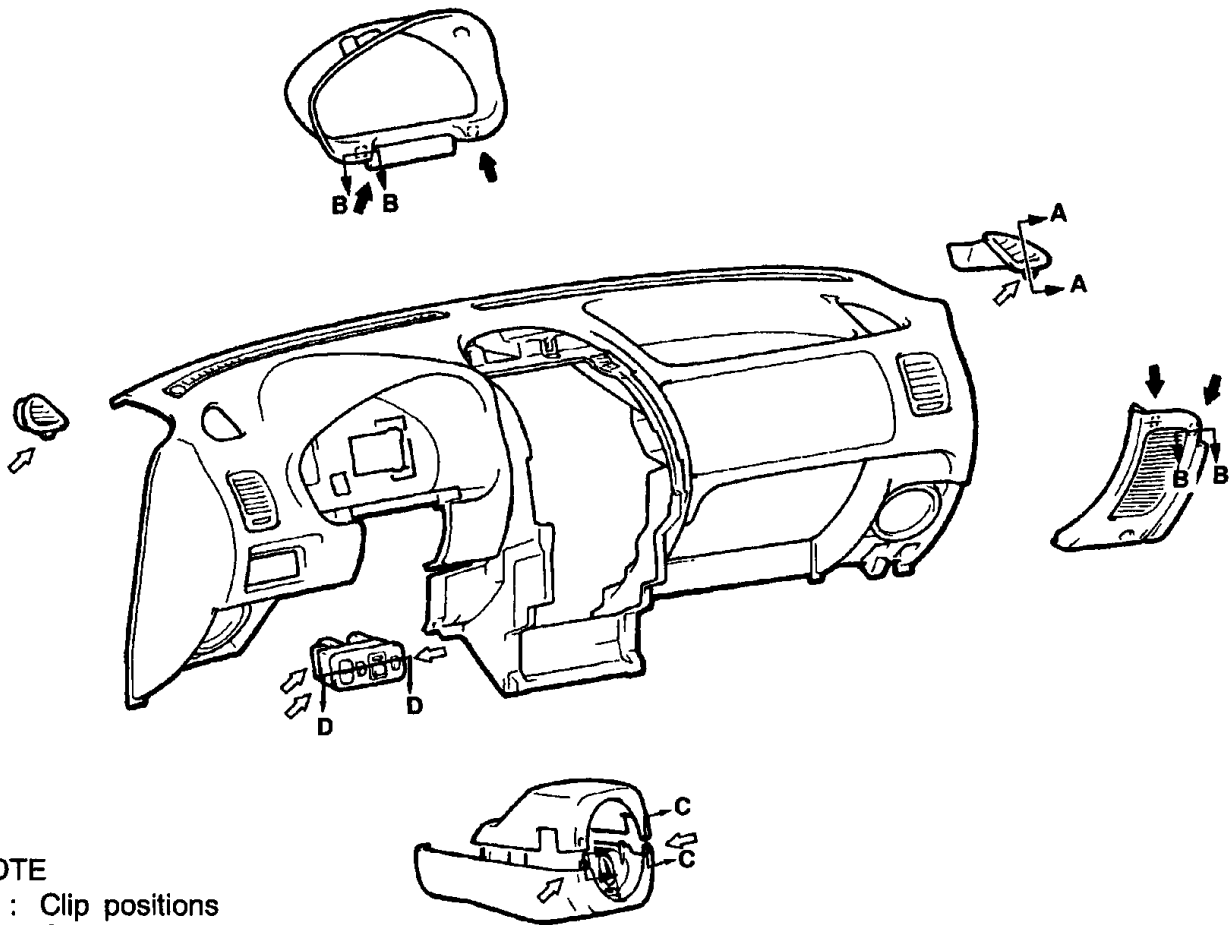


A19U0162

Removal steps

1. Column cover
2. Meter bezel
3. Combination meter
4. Instrument panel switch
5. Under cover
6. Glove box
7. Glove box striker
8. Corner panel
9. Side defroster grille
10. Steering column assembly installation bolts
11. Photo sensor connector
12. Harness connector
13. Instrument panel assembly

CLIP AND CLAW POSITIONS

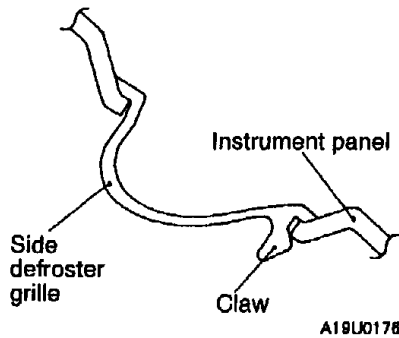


NOTE

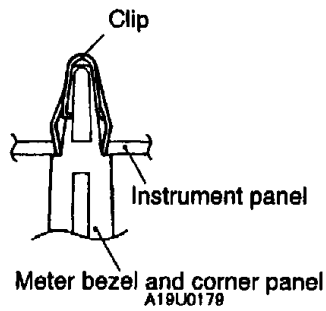
- ◀ : Clip positions
- ◁ : Claw positions

AX0024BN

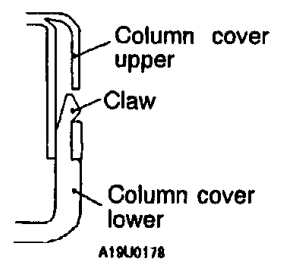
Section A – A



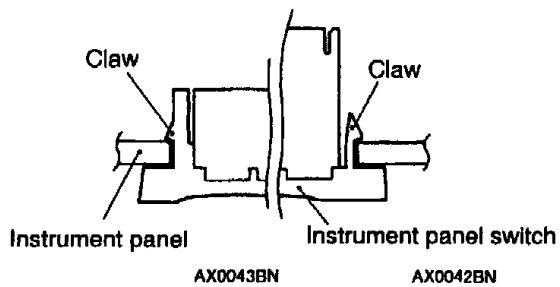
Section B – B



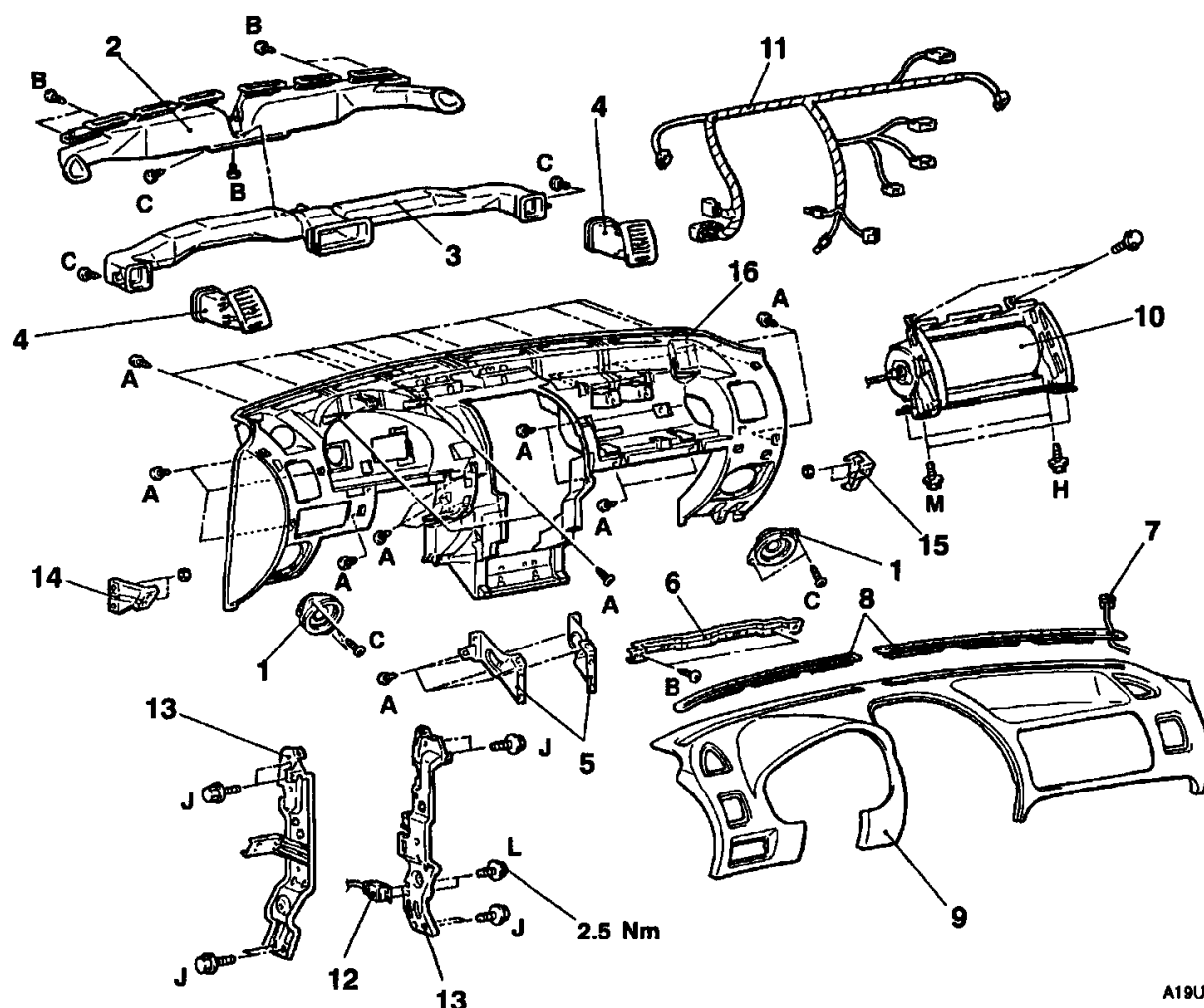
Section C – C



Section D – D



DISASSEMBLY AND REASSEMBLY

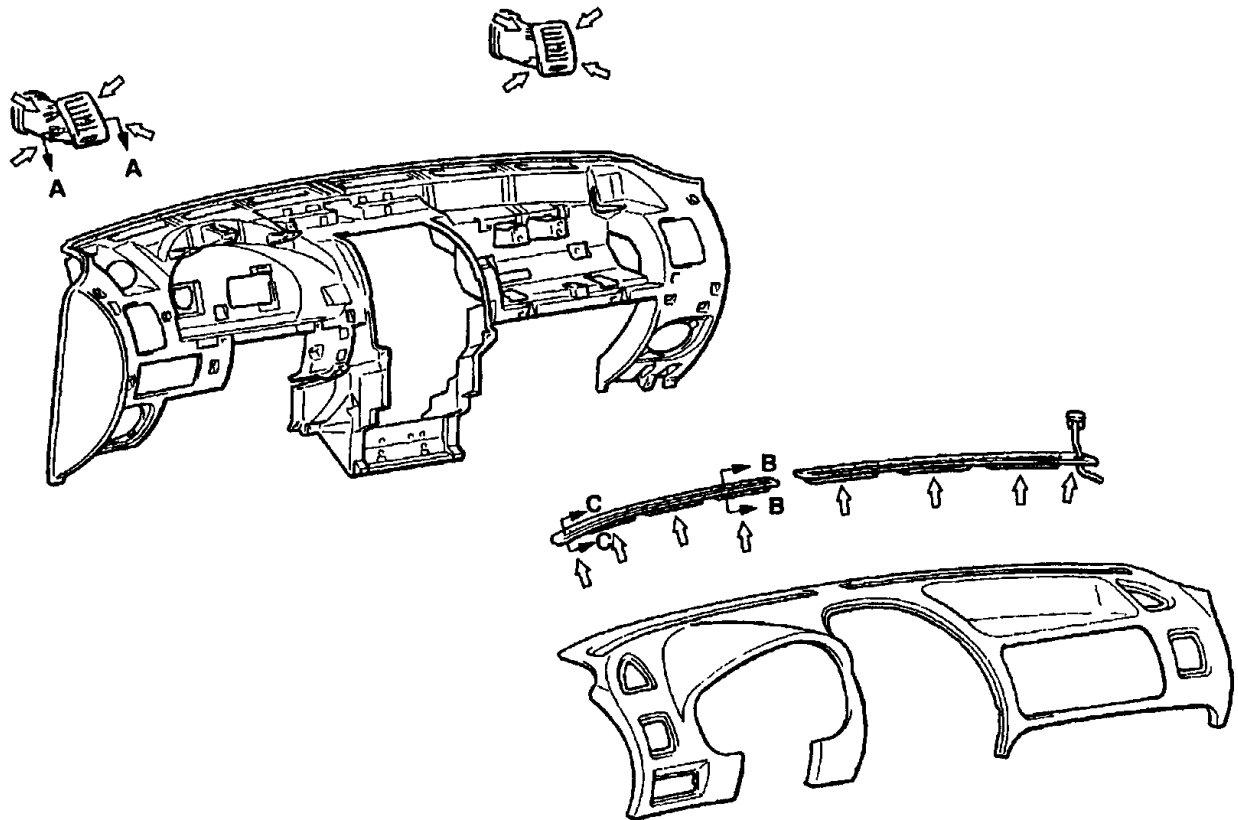


A19U0165

Disassembly steps

1. Speaker	11. Instrument panel wiring harness
2. Defroster nozzle assembly	12. Engine control relay
3. Distribution duct	13. Center reinforcement
4. Side air outlet assembly	14. Driver's side lower bracket
5. Instrument panel reinforcement	15. Passenger's side lower bracket
6. Glove box frame	16. Instrument panel
7. Photo sensor	
8. Defroster garnish	
9. Instrument pad	
10. Front passenger's air bag module assembly	

CLAW POSITIONS

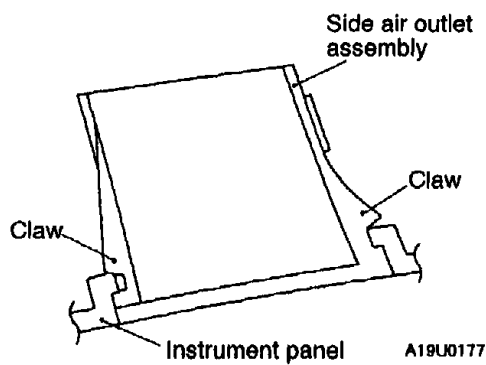


NOTE

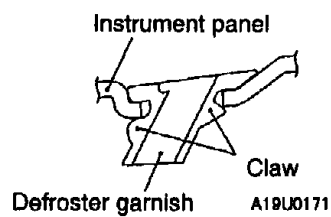
↔ : Claw positions

AX0025BN

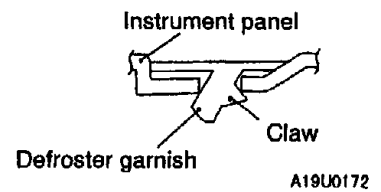
Section A - A



Section B - B



Section C - C

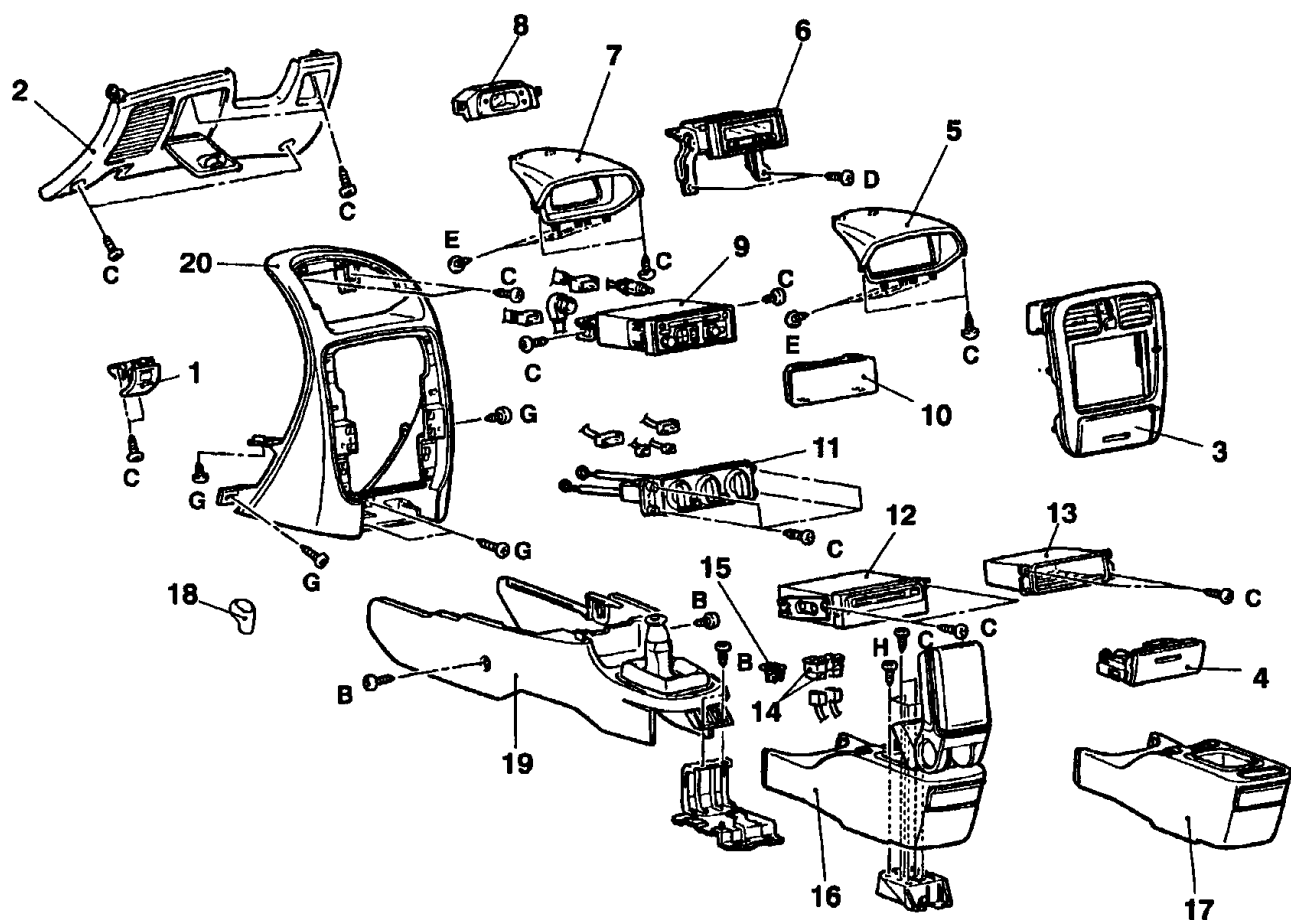


FLOOR CONSOLE

REMOVAL AND INSTALLATION

CAUTION: SRS

When removing and installing the rear floor console assembly from vehicles equipped with SRS, do not let it bump against the SRS-ECU or other components.

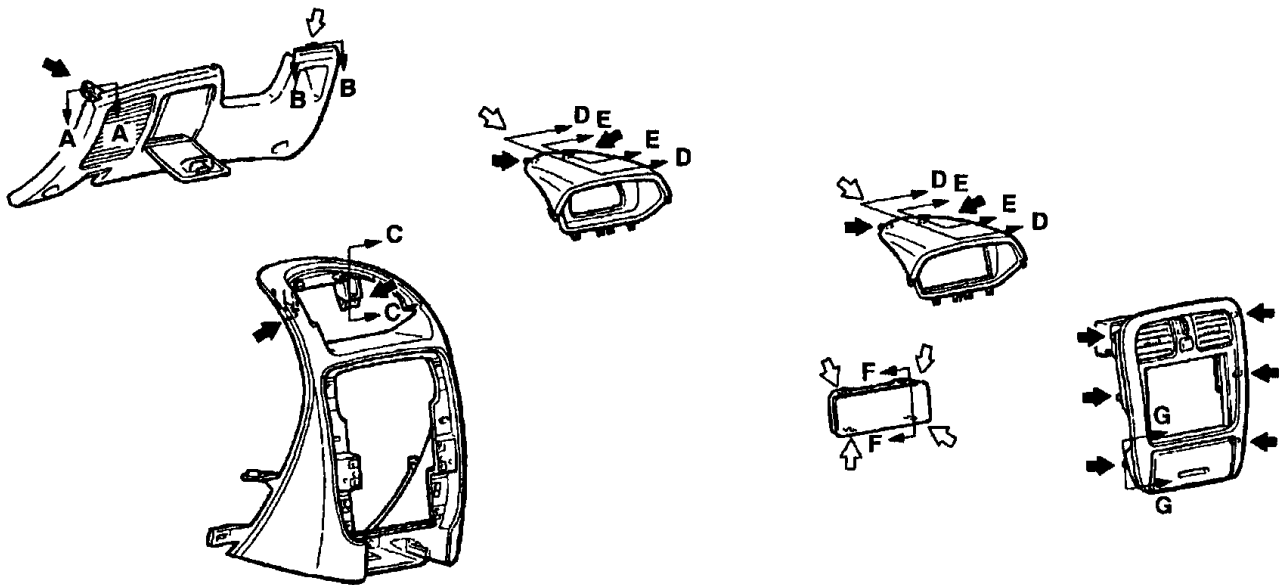


A19U0184

Removal steps

1. Hood lock release handle
2. Instrument under cover
3. Center panel assembly
4. Ashtray
5. Hood display (display)
6. Display unit
7. Hood display (clock)
8. Clock
9. Radio and tape player
10. Radio plug
11. Heater control assembly
12. Navigation unit
13. Box
14. Switch
15. Coin plug
16. Rear floor console assembly (with centre armrest)
17. Rear floor console assembly (without centre armrest)
18. Shift lever knob <M/T> (Refer to GROUP 22.)
19. Front floor console assembly
20. Center console assembly

CLIP AND CLAW POSITIONS

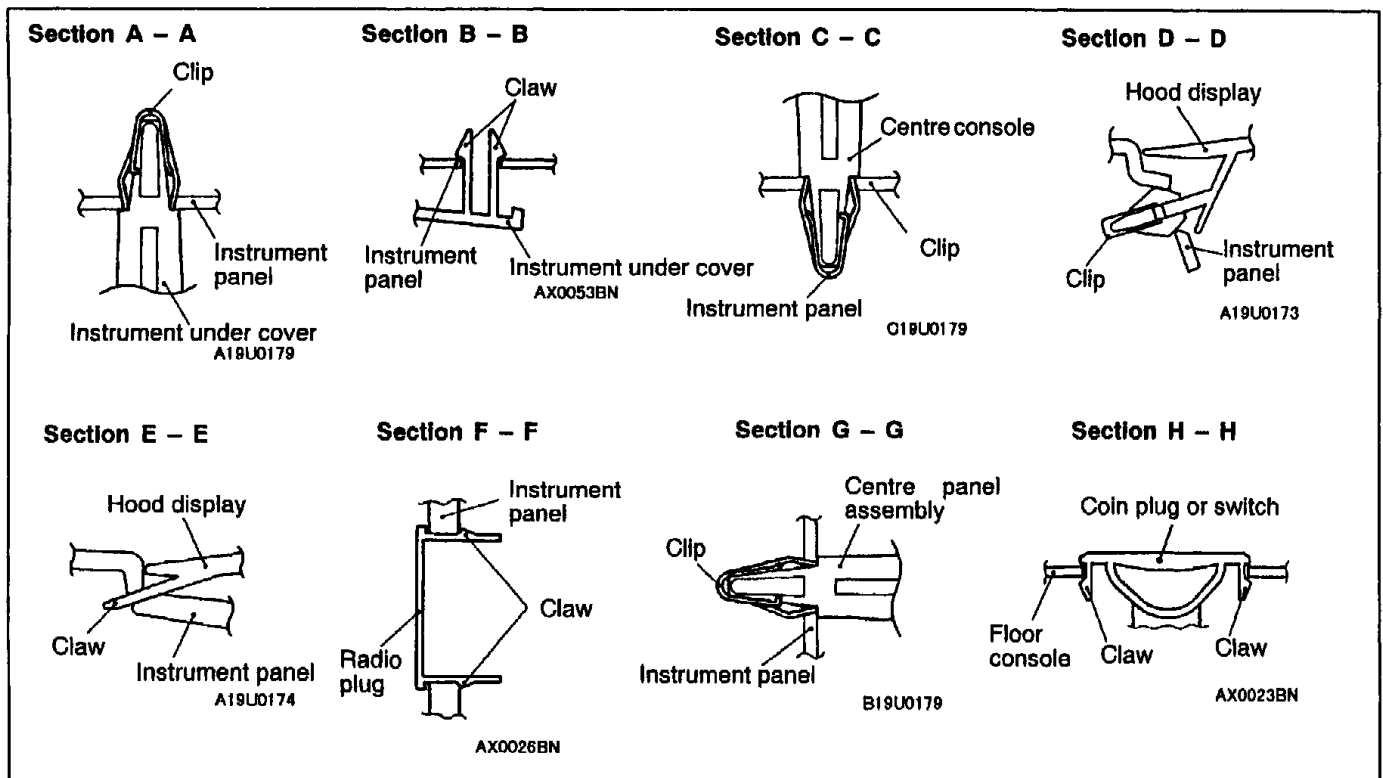


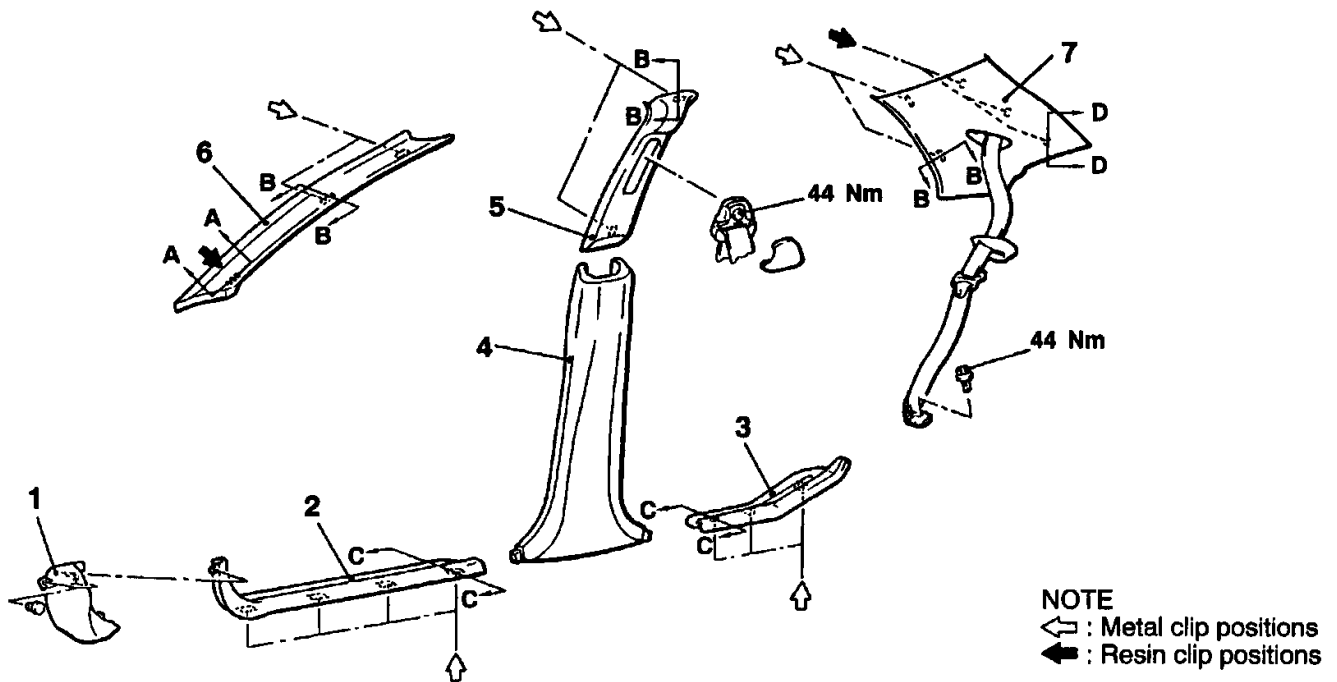
NOTE

- ◄ : Clip positions
- ◄◊ : Claw positions

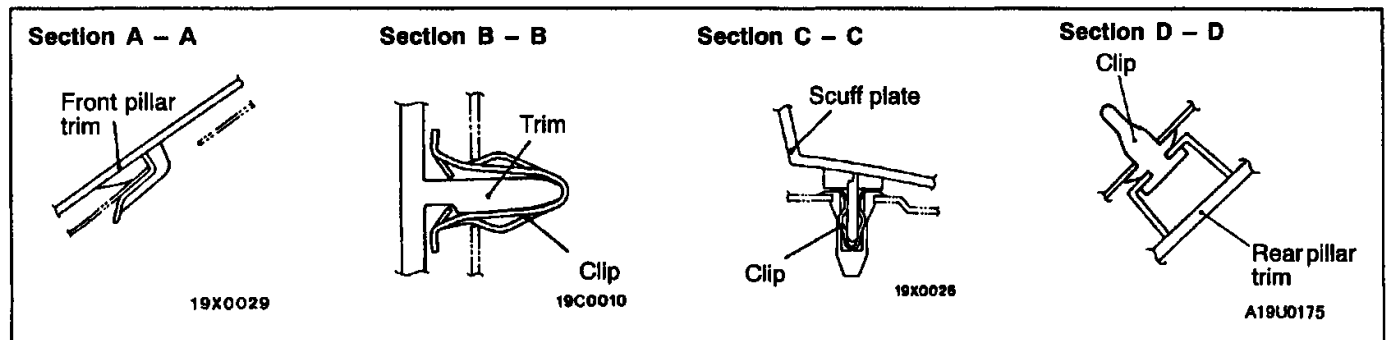


AX0033BN



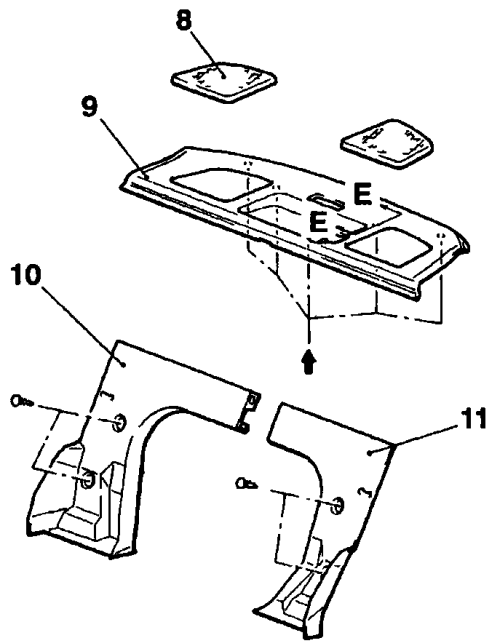
TRIMS <SEDAN>**REMOVAL AND INSTALLATION**

19U0097



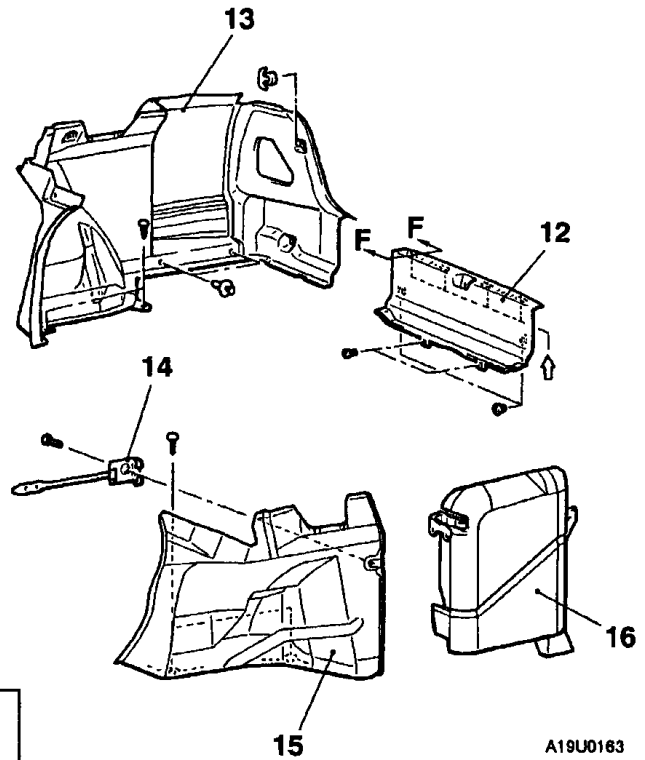
1. Cowl side trim
2. Front scuff plate
3. Rear scuff plate
4. Center pillar lower trim

5. Center pillar upper trim
6. Front pillar trim
7. Rear pillar trim

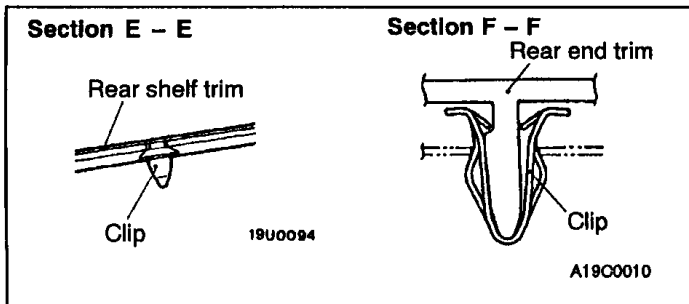


NOTE

- : Metal clip positions
 : Resin clip positions



A19U0163



- 8. Rear speaker garnish
- 9. Rear shelf trim
- 10. Shelf front cover (RH) or trunk front trim
- 11. Shelf front cover (LH)

- 12. Rear end trim
- 13. Trunk side trim (RH)
- 14. Hook assembly
- 15. Trunk side trim (LH)
- 16. Trunk box

SEAT

FRONT SEAT

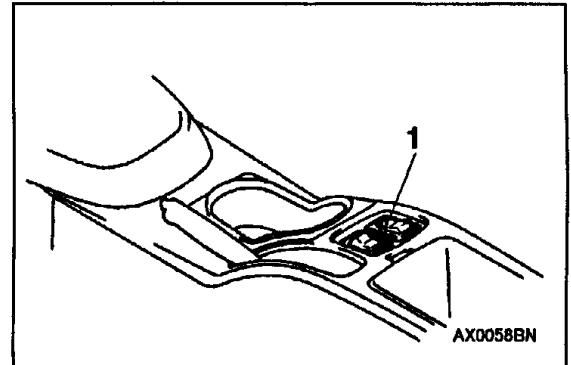
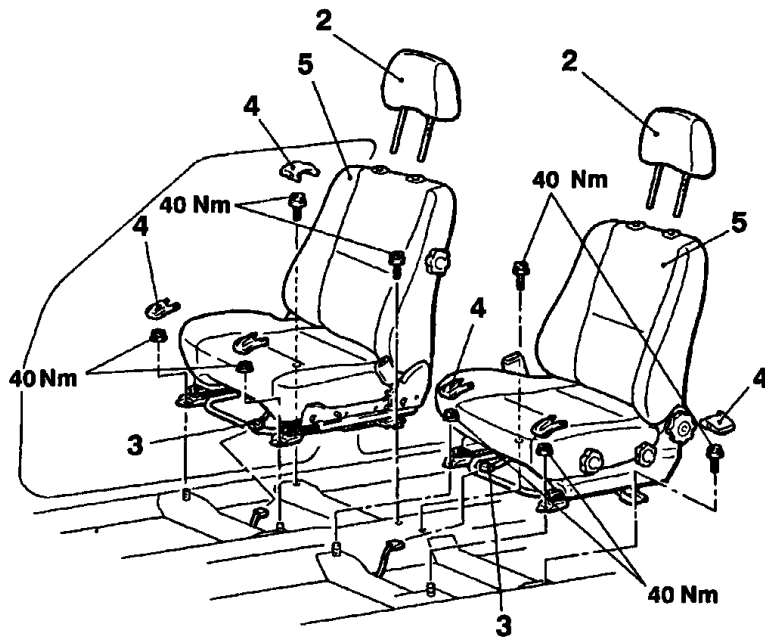
REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

- Rear Floor Console Assembly Removal and Installation (Refer to P.52A-8).
- Before removal of the seat equipped with the side air bag module, refer to GROUP 52B – SRS Service Precautions and Air Bag Module.

CAUTION: SRS

When removing and installing the rear floor console (vehicles equipped with SRS), do not let it bump against the SRS-ECU.

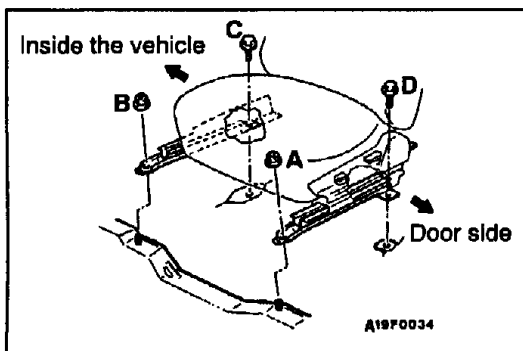
**NOTE**

After provisionally tightening the seat assembly mounting nuts and bolts in every installation location, fully tighten them to the specified torque.

1. Heated seat switch
<vehicles with heated seat>
2. Headrest

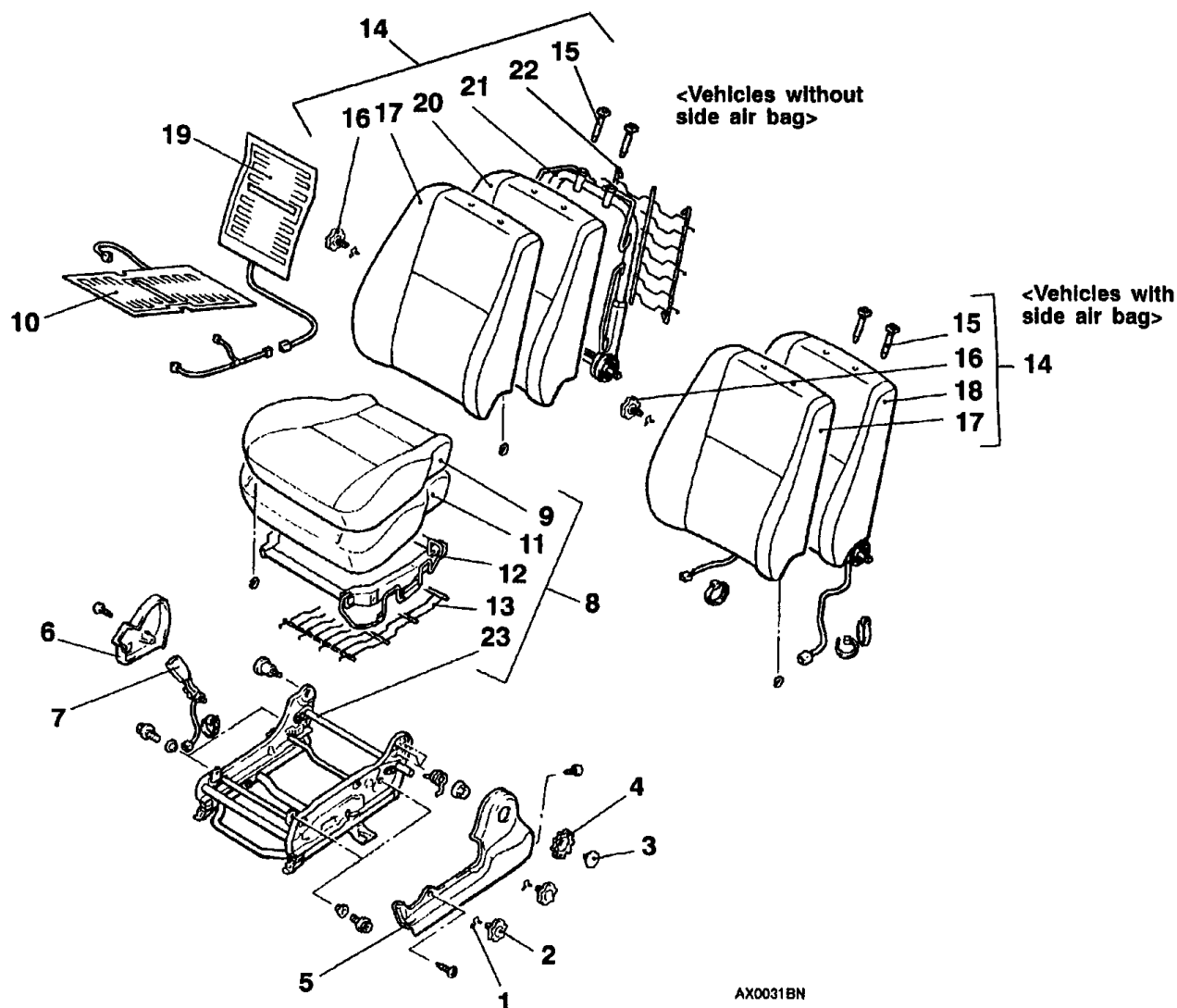
Front seat assembly removal steps

3. Harness connector
<vehicles with heated seat>
4. Seat anchor cover
5. Front seat assembly

**INSTALLATION SERVICE POINT****▶A◀FRONT SEAT ASSEMBLY INSTALLATION**

Tighten the front seat mounting bolts in the order A, B, C, and D.

DISASSEMBLY AND REASSEMBLY

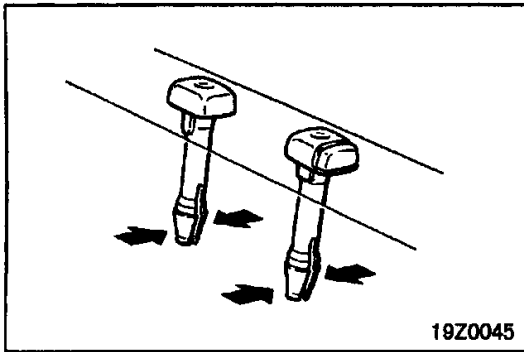


Seat disassembly steps

1. Shaft snap ring
2. Height adjust knob
3. Cap
4. Reclining knob
5. Front seat side shield cover
6. Front seat hinge cover
7. Inner seat belt
8. Front seat cushion assembly
9. Front seat cushion cover
10. Front seat heater cushion
11. Front seat cushion pad
12. Front seat cushion frame



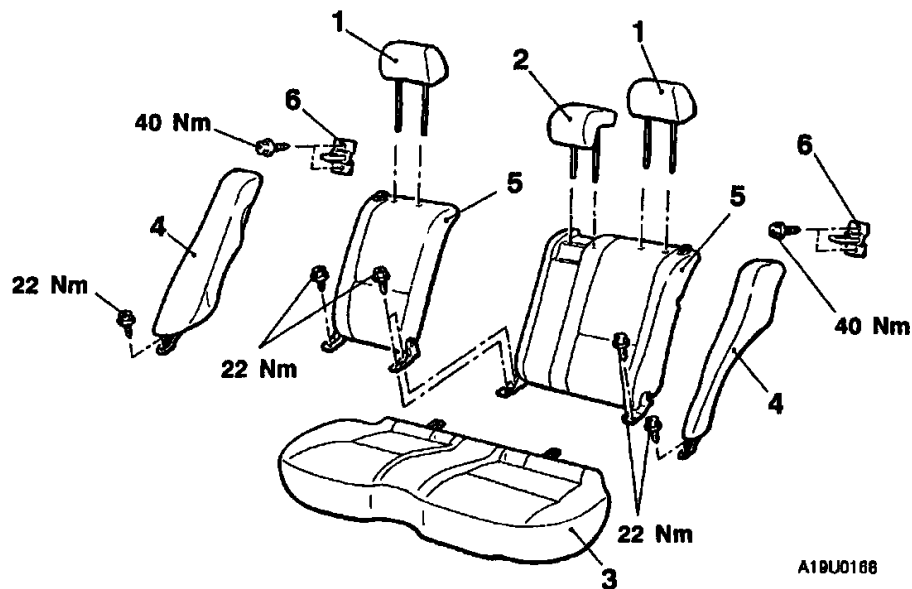
13. Suspension cushion
14. Front seatback assembly
15. Headrest guide
16. Lumber support knob
17. Front seatback cover
18. Front seatback pad and frame assembly
19. Front seat heater back
20. Front seatback pad
21. Front seatback frame
22. Suspension back
23. Seat adjuster assembly

**REMOVAL SERVICE POINT****◀A▶ HEADRESTRAINT GUIDE REMOVAL**

Compress the indicated portions of the guides to remove them.

**REAR SEAT
REMOVAL AND INSTALLATION**

<Sedan>

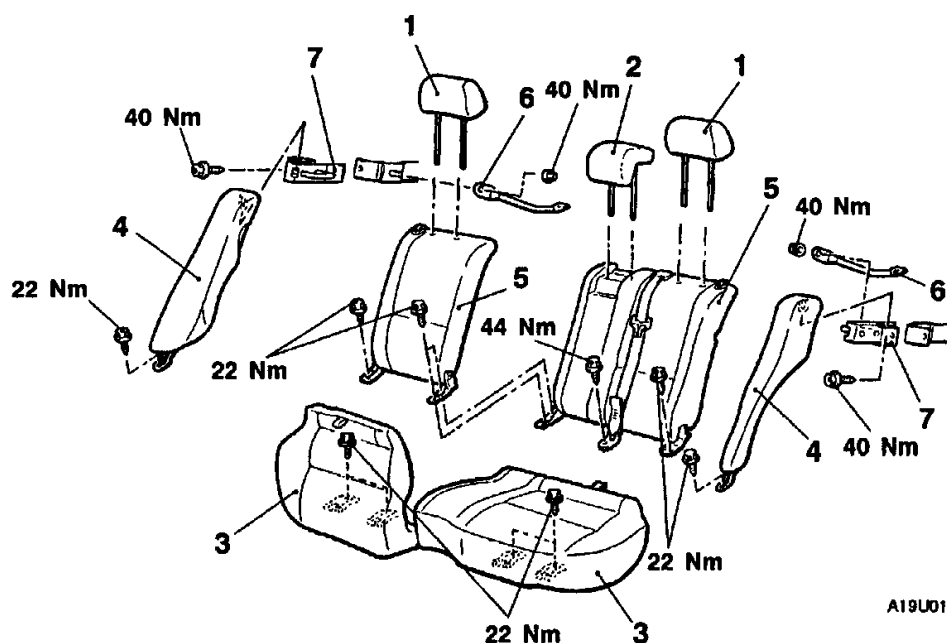
**Removal steps**

1. Headrest (side)
2. Headrest (centre)
3. Seat cushion

◀A▶ ▶B▶

- ▶A▶ 4. Side seatback assembly
- ▶A▶ 5. Rear seatback assembly
6. Rear seat striker

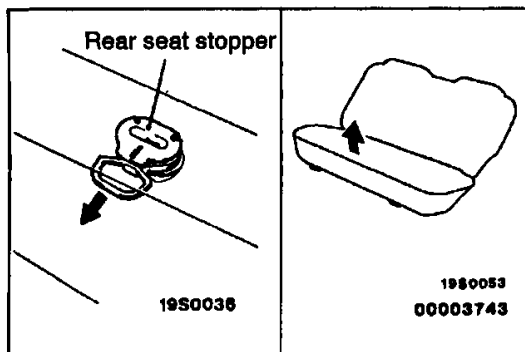
<Hatchback>



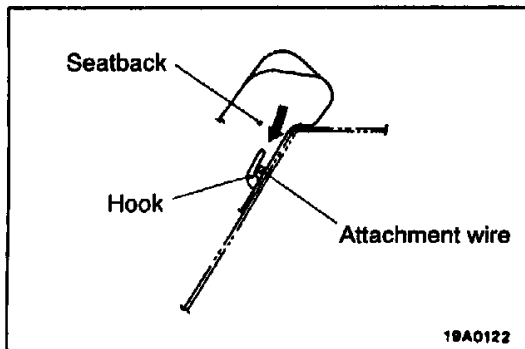
A19U0189

Removal steps

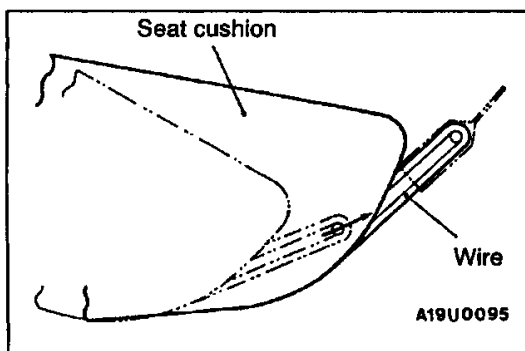
1. Headrest (side)	5. Rear seatback assembly
2. Headrest (centre)	6. Rear seat stabilizer
3. Seat cushion	7. Rear seat striker
4. Side seatback assembly	

**REMOVAL SERVICE POINT****◀A▶ SEAT CUSHION REMOVAL**

While keeping the rear seat stopper pulled, lift up the seat cushion to remove it.

**INSTALLATION SERVICE POINTS****▶A◀ REAR SEATBACK ASSEMBLY/SIDE SEATBACK ASSEMBLY INSTALLATION**

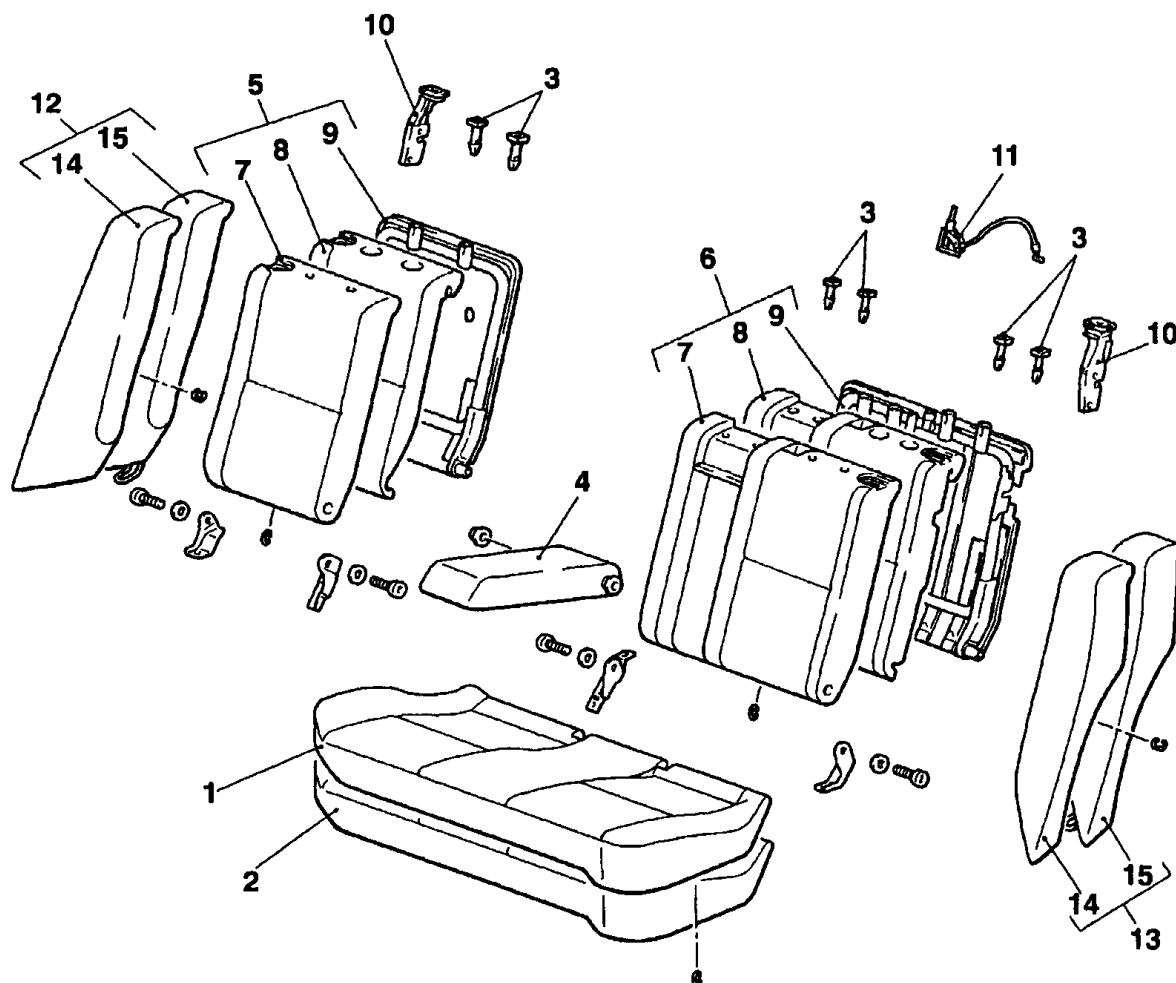
Push the rear seatback assembly or side seatback assembly in the direction indicated in the illustration; then securely attach the attachment wire to the body side hook and install the rear seatback assembly or side seatback assembly.

**▶B◀ SEAT CUSHION INSTALLATION**

Insert the wire of the seat cushion into the body hole to install the seat cushion.

DISASSEMBLY AND REASSEMBLY

<Sedan>



AX0074BN

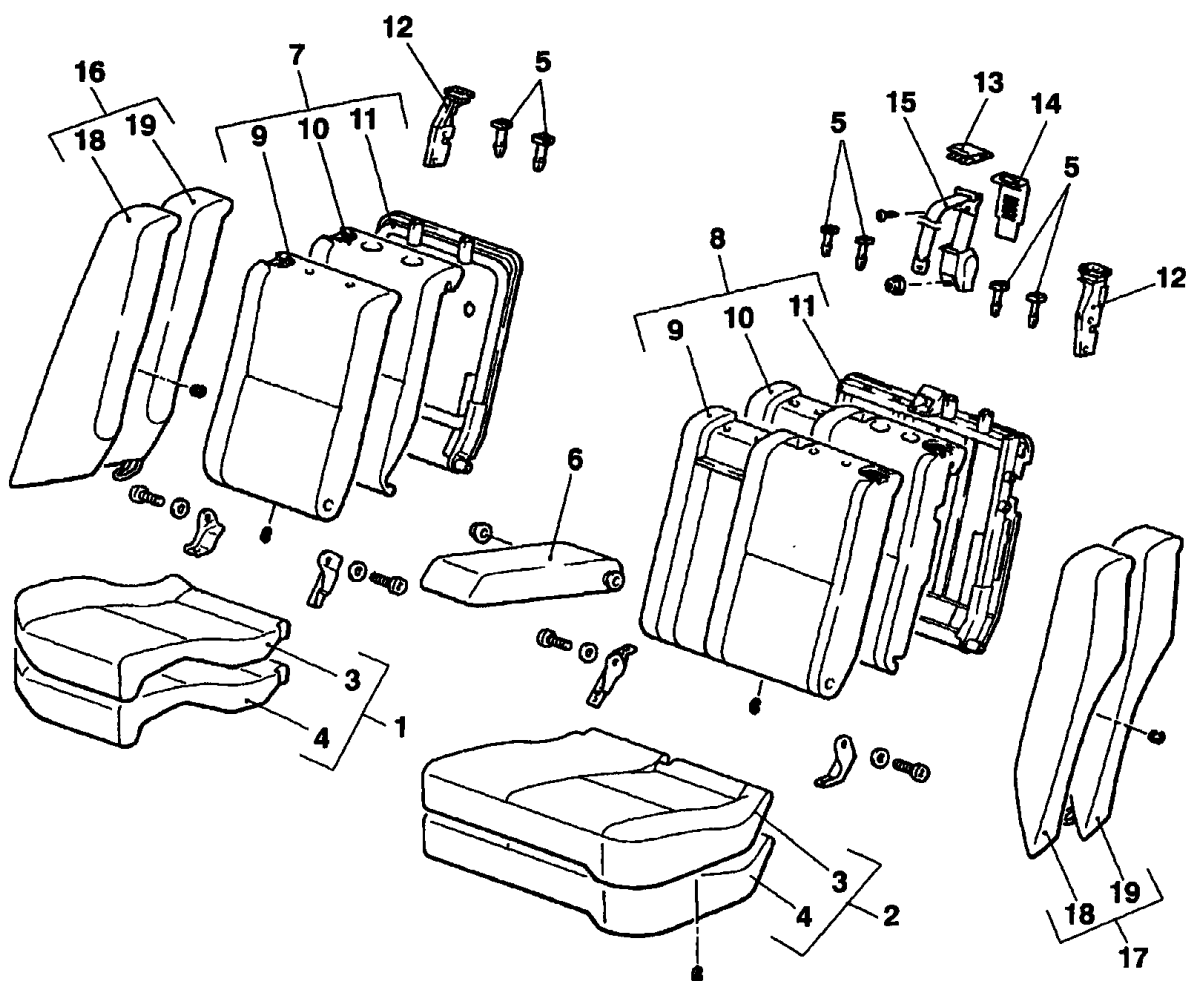
Seat disassembly steps

1. Seat cushion cover
2. Seat cushion pad
3. Headrest guide
4. Armrest
5. Rear seatback assembly (R.H.)
6. Rear seatback assembly (L.H.)
7. Rear seatback cover
8. Rear seatback pad
9. Rear seatback frame

10. Lock assembly
11. Centre lock assembly
12. Rear side seatback assembly (R.H.)
13. Rear side seatback assembly (L.H.)
14. Rear side seatback cover
15. Rear side seatback pad

◀A▶

<Hatchback>

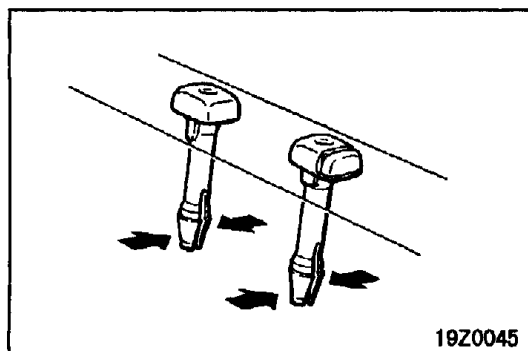


AX0073BN

Seat disassembly steps

1. Rear seat cushion assembly (R.H.)	12. Lock assembly
2. Rear seat cushion assembly (L.H.)	13. Centre seat belt garnish
3. Rear seat cushion cover	14. Centre seat belt garnish plate
4. Rear seat cushion pad	15. Centre seat belt assembly
5. Headrest assembly guide	16. Rear side seatback assembly (R.H.)
6. Armrest	17. Rear side seatback assembly (L.H.)
7. Rear seatback assembly (R.H.)	18. Rear side seatback cover
8. Rear seatback assembly (L.H.)	19. Rear side seatback pad
9. Rear seatback cover	
10. Rear seatback pad	
11. Rear seatback frame	

<A>

**REMOVAL SERVICE POINT****<A> HEADRESTRAINT GUIDE REMOVAL**

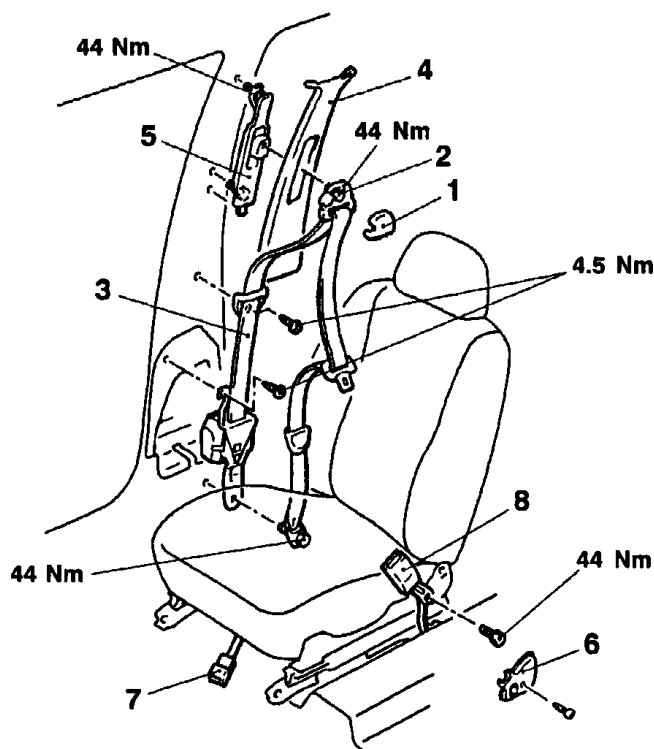
Compress the indicated portions of the guides to remove them.

SEAT BELT

For removal and installation procedures for the seat belt with pre-tensioner, refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

FRONT SEAT BELT

REMOVAL AND INSTALLATION



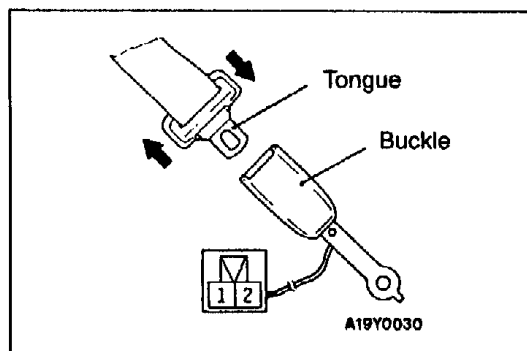
A19U0170

Outer seat belt removal steps

- Front scuff plate and rear scuff plate (Refer to P.52A-10.)
- Center pillar lower trim (Refer to P.52A-10.)
- 1. Sash guide cover
- 2. Sash guide
- 3. Outer seat belt
- 4. Center pillar upper trim (Refer to P.52A-10.)
- 5. Adjustable seat belt anchor

Inner seat belt removal steps

- Front seat assembly (Refer to P.52A-12.)
- 6. Front seat hinge cover
- 7. Buckle harness
- 8. Inner seat belt



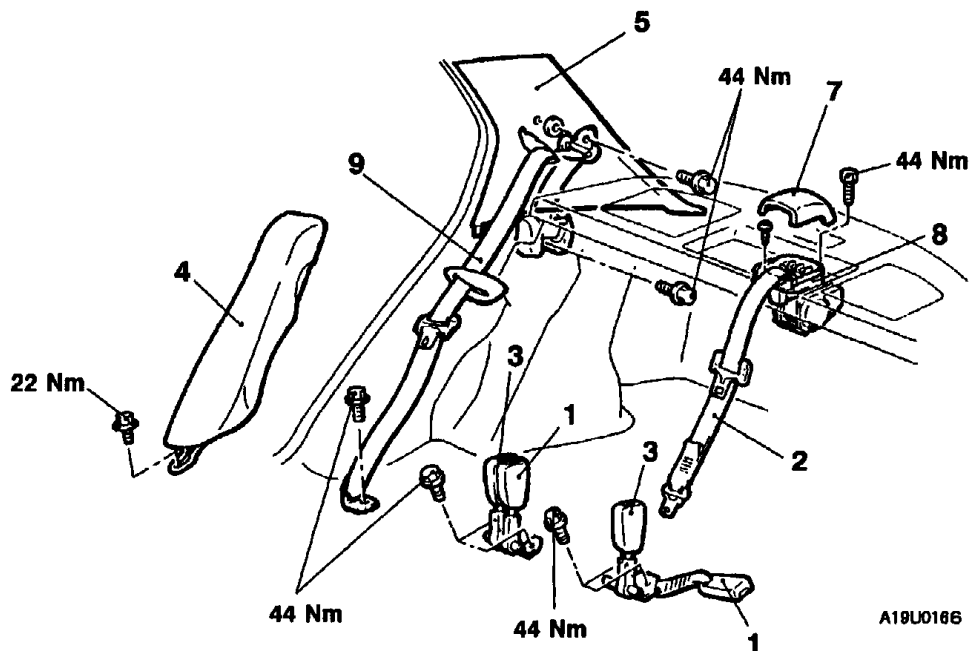
INSPECTION

SEAT BELT SWITCH CONTINUITY CHECK

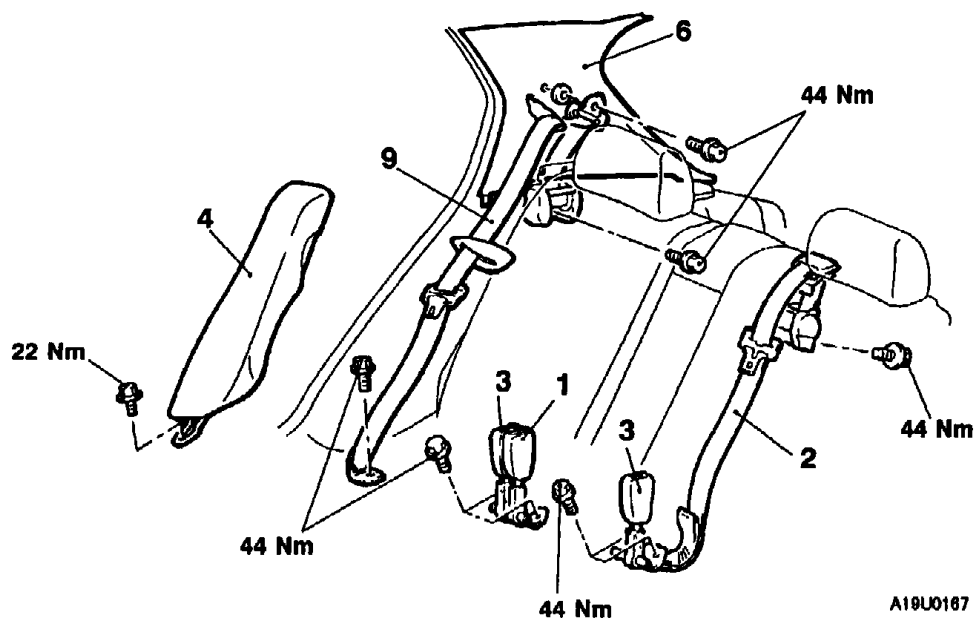
Items	Terminal No.	
	1	2
Fastened seat belt		
Unfastened seat belt	○	○

REAR SEAT BELT REMOVAL AND INSTALLATION

<Sedan>



<Hatchback>



Removal steps

- Rear seat cushion
(Refer to P.52A-14.)
- 1. Inner seat belt
(Center seat belt)
- 2. Outer seat belt
(Center seat belt)
- 3. Inner seat belt
- 4. Side seatback assembly
(Refer to P.52A-14.)
- 5. Rear pillar trim <Sedan>
(Refer to P.52A-10.)
- 6. Rear pillar trim <Hatchback>
(Refer to '96 CARISMA Basic
Manual Pub. No. PWDE9502.)
- 7. Cover <Sedan>
- 8. Webbing guide <Sedan>
- 9. Outer seat belt

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

CONTENTS

GENERAL	2	AIR BAG MODULES AND CLOCK	
Outline of Changes	2	SPRING	6
SRS SERVICE PRECAUTIONS	2	SIDE IMPACT SENSOR	10
TROUBLESHOOTING	3		

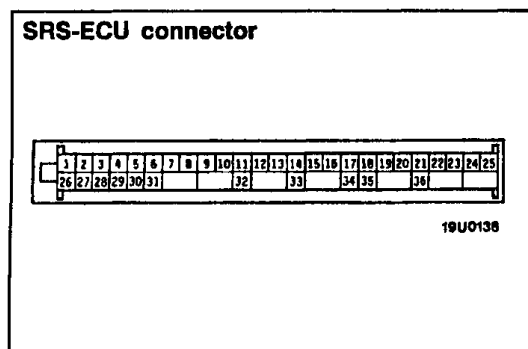
CAUTION

- Carefully read and observe the information in the SERVICE PRECAUTIONS (P.52B-3.) prior to any service.
 - For information concerning troubleshooting or maintenance, always observe the procedures in the Troubleshooting (P.52B-5.) section.
 - If any SRS components are removed or replaced in connection with any service procedures, be sure to follow the procedures in the INDIVIDUAL COMPONENT SERVICE section (P.52B-18.) for the components involved.
 - If you have any questions about the SRS, please contact your local distributor.
-

GENERAL

OUTLINE OF CHANGES

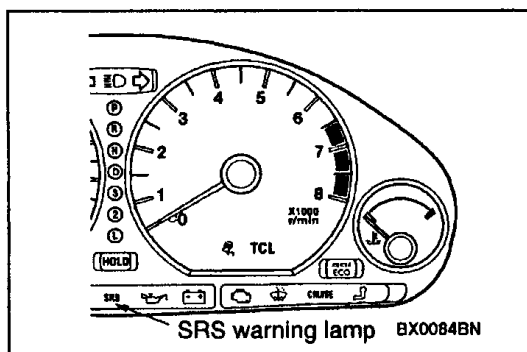
- The SRS service precautions have been revised due to the change in the SRS-ECU connector.
- The troubleshooting has been revised due to the change in the SRS-ECU connector, the side impact sensor and the SRS warning lamp.
- The service procedures have been revised due to the change in the front passenger's air bag module and the clock spring connector.
- The service procedure has been revised due to the change in the side impact sensor.



SRS SERVICE PRECAUTIONS

1. Do not attempt to repair the wiring harness connectors of the SRS. If any of the connectors are diagnosed as faulty, replace the wiring harness. If the wires are diagnosed as faulty, replace or repair the wiring harness according to the following table.

SRS-ECU Terminal No.	Destination of harness	Corrective action
1 to 4	–	–
5, 14	Body wiring harness → Side impact sensor (R.H.)	Correct or replace each wiring harness.
6, 34	Body wiring harness → Side impact sensor (L.H.)	
7, 8	Body wiring harness → Side air bag module (R.H.)	
9, 10	Body wiring harness → Side air bag module (L.H.)	
11	–	–
12, 13	Body wiring harness → Air bag module (Front passenger's side)	Correct or replace each wiring harness.
15, 16	Body wiring harness → Clock spring → Air bag module (Driver's side)	Correct or replace the dash wiring harness. Replace the clock spring.
17	Body wiring harness → Diagnosis connector	Correct or replace each wiring harness.
18	Body wiring harness → Junction block (fuse No.4)	
19	Body wiring harness → Combination meter (SRS warning lamp)	
20	Body wiring harness → Earth	
21	Body wiring harness → Junction block (fuse No.11)	
22, 23	Body wiring harness → Seat belt with pre-tensioner (Front passenger's side)	
24, 25	Body wiring harness → Seat belt with pre-tensioner (Driver's side)	
26 to 33, 35, 36	–	–



TROUBLESHOOTING

SRS WARNING LAMP CHECK

Turn the ignition with the key ON position. Does the SRS warning lamp illuminate for about 7 seconds, turn OFF and then remain extinguished for at least 5 seconds? If yes, SRS system is functioning properly. If no, consult page 52B-3.

Caution

The SRS warning lamp bulb should be 0.84 W. If other bulb than the specified rating is used, the SRS warning lamp bulb will be burned out.

INSPECTION CHART FOR DIAGNOSIS CODES

Inspect according to the inspection chart that is appropriate for the malfunction code.

Code No.	Diagnosis Item	Reference page
14	Analog G-sensor system in the SRS-ECU	*2
15, 16	Front impact safing G sensor system inside SRS-ECU	*2
17	Side impact safing G sensor system inside SRS-ECU	*3
21, 22, 61, 62	Driver's side air bag module (squib) system	*3
24, 25, 64, 65	Front passenger's side air bag module (squib) system	*3
26, 27	Driver's side pre-tensioner (squib) system	*2
28, 29	Front passenger's side pre-tensioner (squib) system	*2
31, 32	SRS-ECU capacitor system	*2
35	SRS-ECU (deployed air bag) system	*2
41*1	IG ₁ (A) power circuit system	*3
42*1	IG ₁ (B) power circuit system	*3
43	SRS warning lamp drive circuit system	Lamp does not illuminate.*1
		Lamp does not switch off.
44	SRS warning lamp drive circuit system	*2
45	Internal circuit system of non-volatile memory (EEPROM) inside SRS-ECU	*2
51, 52	Driver's side air bag module (squib ignition drive circuit) system	*2
54, 55	Front passenger's side air bag module (squib ignition drive circuit) system	*2

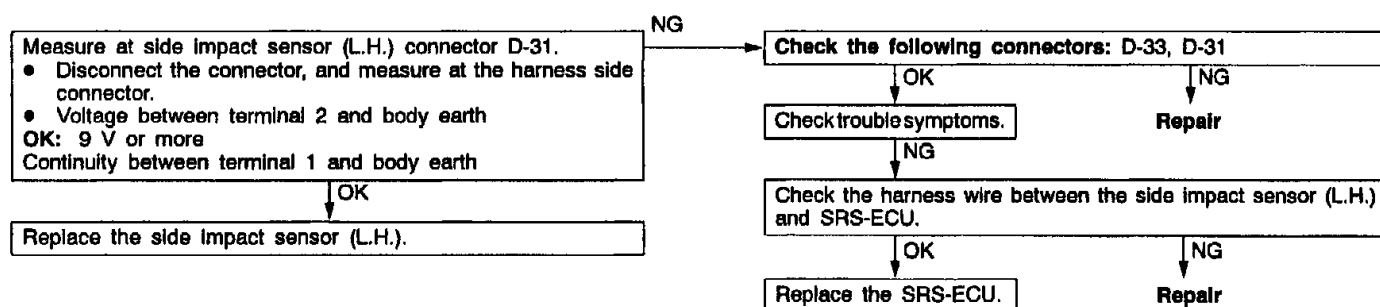
Code No.	Diagnosis Item	Reference page
56, 57	Driver's side pre-tensioner (squib ignition drive circuit) system	*2
58, 59	Passenger's side pre-tensioner (squib ignition drive circuit) system	*2
66, 67	Driver's side pre-tensioner (squib) system	*3
68, 69	Front passenger's side pre-tensioner (squib) system	*3
71, 72, 75, 76	Side air bag module (L.H.) (squib) system	*3
73, 74	Side air bag module (L.H.) (squib) ignition drive circuit system	*3
81, 82, 85, 86	Side air bag module (R.H.) (squib) system	*3
83, 84	Side air bag module (R.H.) (squib) ignition drive circuit system	*3
91*1	Side impact sensor (L.H.) power supply circuit system	52B-4
92	Side impact sensor (L.H.) system	*3
93	Side impact sensor (L.H.) communication system	*3
94*1	Side impact sensor (R.H.) power supply circuit system	*3
95	Side impact sensor (R.H.) system	*3
96	Side impact sensor (R.H.) communication system	*3

NOTE

- (1) *1: If the vehicle condition returns to normal, the diagnosis code will be automatically erased, and the SRS warning lamp will return to normal.
- (2) *2: Refer to '96 CARISMA Basic Manual (Pub. No. PWDE9502).
- (3) *3: Refer to '98 CARISMA (except GDI) Workshop Manual (Pub. No. PWDE9502-B).
- (4) If the vehicle has a discharged battery it will store the fault codes 41 or 42. When these diagnosis codes are displayed, check the battery.

INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

Code No.91 Side impact sensor (L.H.) power supply circuit system	Probable cause
This diagnosis code is output if the power supply voltage of the side impact sensor (L.H.) drops below the rated value for a continuous period of 5 seconds or more. However, code No.91 will be automatically cleared and the SRS warning lamp will switch off if the condition returns to normal.	• Malfunction of wiring harnesses or connectors • Malfunction of side impact sensor (L.H.) • Malfunction of SRS-ECU



INSPECTION CHART FOR TROUBLE SYMPTOMS

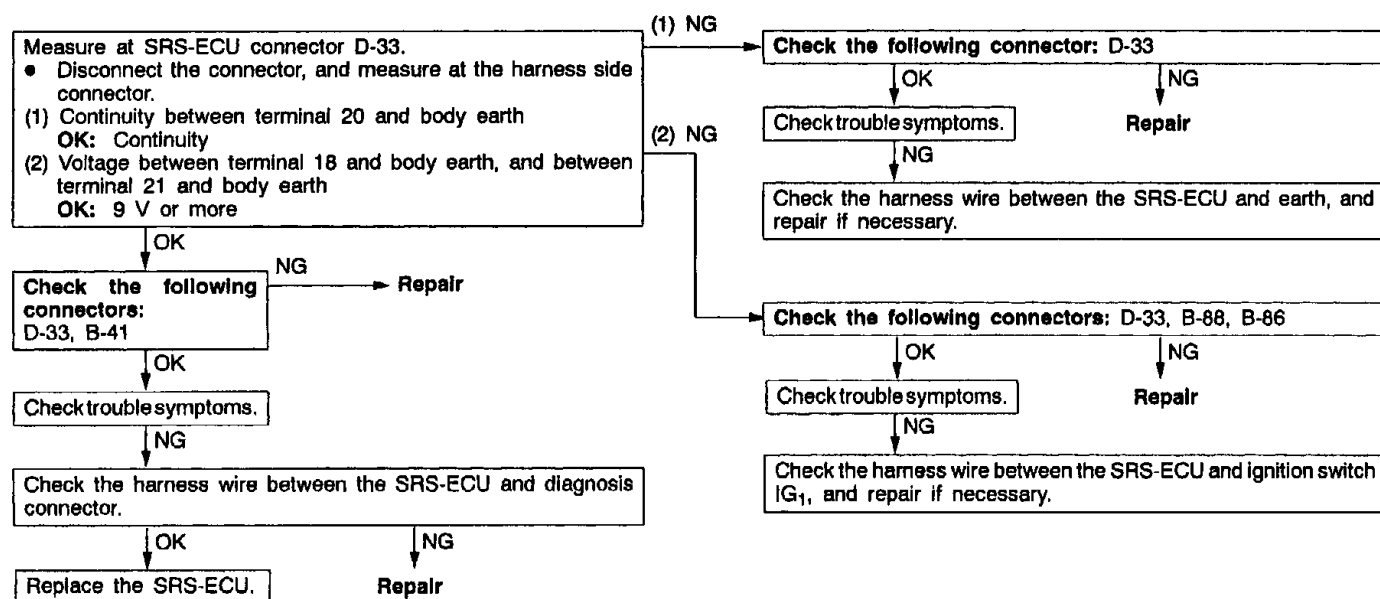
Get an understanding of the trouble symptoms and check according to the inspection procedure chart.

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is not possible.	Communication with all systems is not possible.	1	Refer to '96 CARISMA Basic Manual
	Communication is not possible with SRS only.	2	52B-5
When the ignition key is turned to ON (engine stopped), the SRS warning lamp does not illuminate.		Refer to diagnosis code No.43.	Refer to '98 CARISMA (except GDI) Workshop Manual
After the ignition switch is turned to ON, the SRS warning lamp is still on after approximately 7 seconds have passed.		Refer to diagnosis code No.43.	Refer to '98 CARISMA (except GDI) Workshop Manual
		Refer to diagnosis code No.44.	Refer to '96 CARISMA Basic Manual

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

Inspection Procedure 2

Communication with MUT-II is not possible. (Communication is not possible with SRS only.)	Probable cause
If communication is not possible with the SRS only, the cause is probably an open circuit in the diagnosis output circuit of the SRS or in the power circuit (including earth circuit).	- Malfunction of wiring harnesses or connectors - Malfunction of SRS-ECU



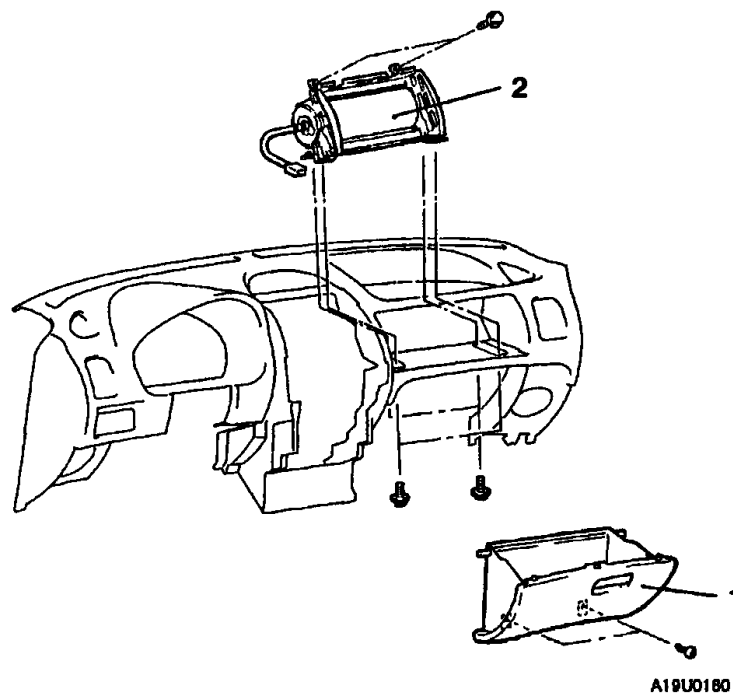
AIR BAG MODULES AND CLOCK SPRING

Caution

1. Disconnect the battery (–) terminal and wait for 60 seconds or more before starting work. Furthermore, the disconnected battery terminal should be covered with tape to insulate it. (Refer to '96 CARISMA Basic Manual.)
2. Never attempt to disassemble or repair the air bag modules or clock spring. If faulty, replace it.
3. Do not drop the air bag modules or clock spring or allow contact with water, grease or oil. Replace it if a dent, crack, deformation or rust is detected.
4. The air bag modules should be stored on a flat surface and placed so that the pad surface is facing upward. Do not place anything on top of it.
5. Do not expose the air bag modules to temperatures over 93°C.
6. After deployment of an air bag, replace the clock spring with a new one.
7. Wear gloves and safety glasses when handling air bags that have already deployed.
8. An undeployed air bag module should only be disposed of in accordance with the procedures (Refer to '96 CARISMA Basic Manual.)

REMOVAL AND INSTALLATION

<Air bag module (front passenger's side)>



Air bag module removal steps

- ▶B◀ • Post-installation inspection
- Negative (–) battery cable connection
- 1. Glove box
- 2. Air bag module
- ▶A◀ • Pre-installation inspection

REMOVAL SERVICE POINT**◀A▶ AIR BAG MODULE REMOVAL (FRONT PASSENGER'S SIDE)****Caution**

The removed air bag module should be stored in a clean, dry place with the pad cover face up.

INSTALLATION SERVICE POINTS**▶A◀ PRE-INSTALLATION INSPECTION**

1. When installing the new air bag modules and clock spring, refer to "INSPECTION".

Caution

Dispose of air bag modules only according to the specified procedure. (Refer to '96 CARISMA Basic Manual.)

2. Connect the battery (-) terminal.
3. Connect the MUT-II to the diagnosis connector.

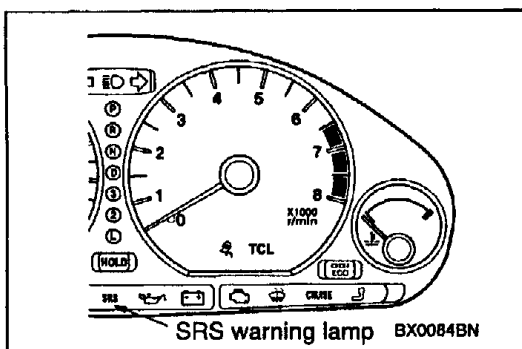
Caution

Make certain that the Ignition switch is LOCK (OFF) position when the MUT-II is connected or disconnected.

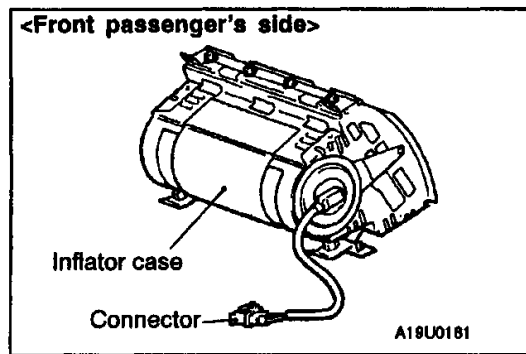
4. Turn the ignition switch to the ON position.
5. Conduct self-diagnosis using the MUT-II to ensure entire SRS operates properly, except open circuit of air bag modules.
6. Turn the ignition switch to the LOCK (OFF) position, disconnect the negative battery cable and tape the terminal.

Caution

Wait at least 60 seconds after disconnecting the battery cable before doing any further work. (Refer to '96 CARISMA Basic Manual.)

**▶B◀ POST-INSTALLATION INSPECTION**

1. Reconnect the negative battery terminal.
2. Turn the ignition switch to the ON position.
3. Does the SRS warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 5 seconds after turning OFF?
4. If yes, SRS system is functioning properly. If no, consult page 52B-3.



INSPECTION

AIR BAG MODULES CHECK

If any improper part is found during the following inspection, replace the air bag modules with a new one. Dispose the old one according to the specified procedure. (Refer to '96 CARISMA Basic Manual.)

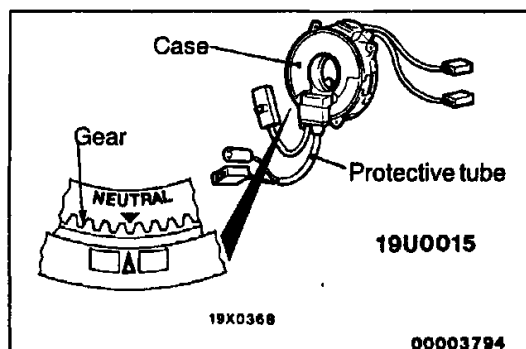
Caution

Never attempt to measure the circuit resistance of the air bag modules (squib) even if you are using the specified tester. If the circuit resistance is measured with a tester, accidental air bags deployment will result in serious personal injury.

1. Check pad cover for dents, cracks or deformation.
2. Check connectors for damage, terminals for deformation, and harness for binds.
3. Check air bag inflator case for dents, cracks or deformation.
4. Install the air bag module to steering wheel to check fit or alignment with the wheel.

Caution

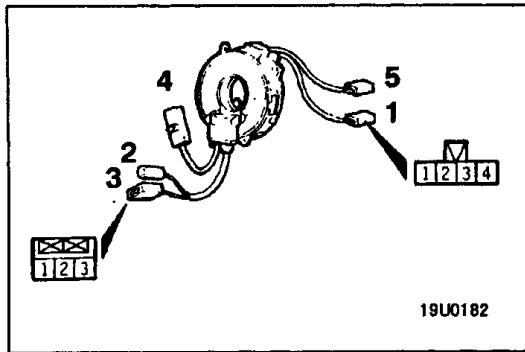
If dents, cracks, deformation, or rust are discovered in the air bag module, replace it with a new one. Dispose of the old one according to the specified procedure. (Refer to '96 CARISMA Basic Manual.)



CLOCK SPRING CHECK

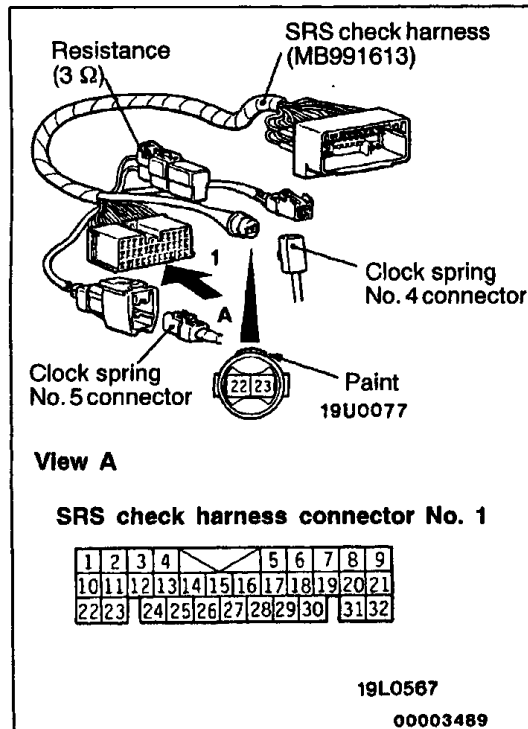
If, as result of following checks, even one abnormal point is discovered, replace the clock spring with a new one.

1. Check connectors and protective tube for damage, and terminals for deformation.
2. Visually check the case and the gears for damage.



3. Check for continuity between the No. 1 connector of the clock spring and connectors No. 2 and 3.

Connector No.	1				2	3		
Terminal No.	1	2	3	4	1	1	2	3
Continuity between terminals			○	○	○	○	○	○



4. Joint the No. 4 and 5 connectors of the clock spring to the connector of the SRS Check Harness.
5. Check for continuity between terminal 22 and terminal 25, and terminal 23 and terminal 24, of SRS Check Harness connector No. 1 using a digital multi-meter.

SIDE IMPACT SENSOR

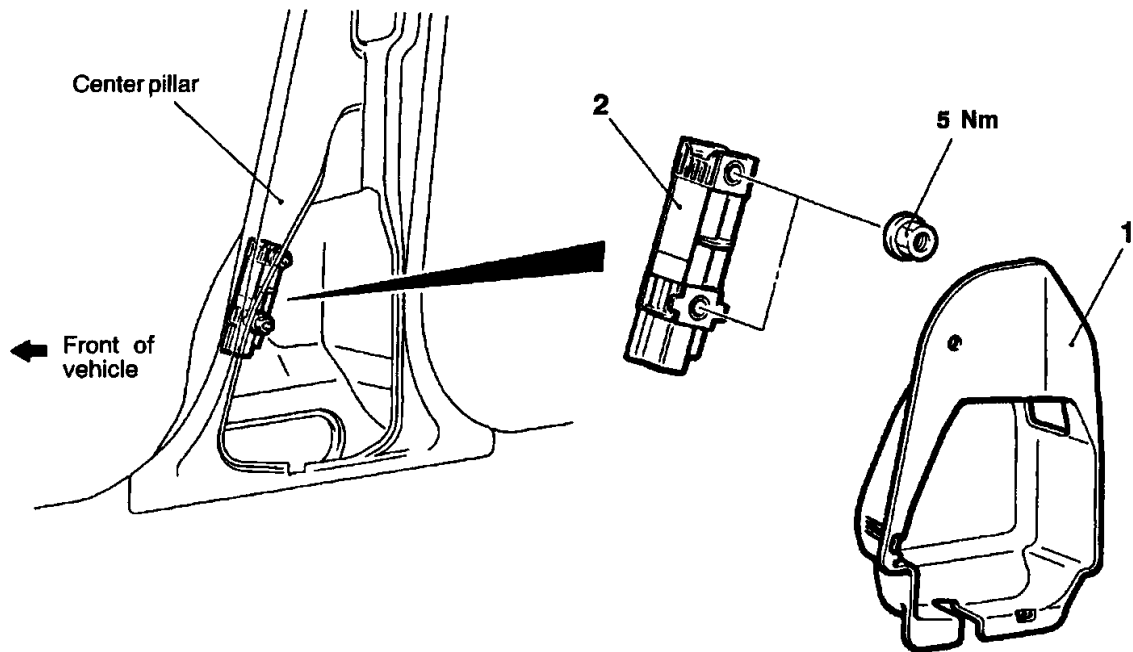
Caution

1. Disconnect the battery (-) terminal and wait for 60 seconds or more before starting work. Furthermore, the disconnected battery terminal should be covered with tape to insulate it. (Refer to '96 CARISMA Basic Manual.)
2. Never attempt to disassemble or repair the side impact sensor. If faulty, replace it.
3. Do not drop or subject the side impact sensor to impact or vibration. If denting, cracking, deformation, or rust are discovered in the side impact sensor, replace it with a new side impact sensor. Discard the old one.
4. After deployment of an air bag, replace the side impact sensor with a new one.

REMOVAL AND INSTALLATION

Pre-removal Operation

Turn the ignition switch to the LOCK (OFF) position.



AX0037BN

Removal steps

- C◄
- Post-installation inspection
 - Negative (-) battery cable connection
 - Center pillar lower trim (Refer to GROUP 52A.)
 - Seat belt with pre-tensioner (Refer to '96 CARISMA Basic Manual.)
1. Water proof cover

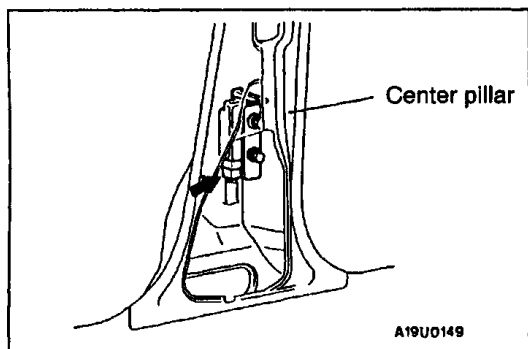
- B◄ 2. Side impact sensor
►A◄ • Pre-installation inspection

NOTE

The illustration above shows the side impact sensor (L.H.). The position of the side impact sensor (R.H.) is symmetrical to this.

INSTALLATION SERVICE POINTS**►A◄ PRE-INSTALLATION INSPECTION**

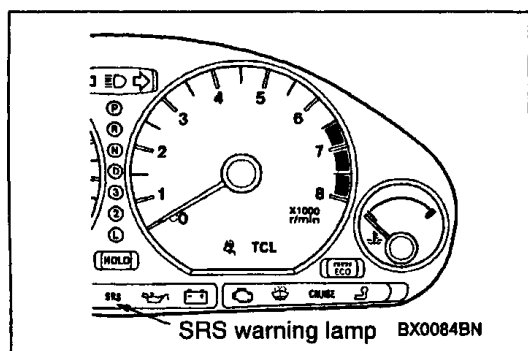
Check the side impact sensor for dents, breakage and bending and measure the resistance between the terminals, even when installing a new side impact sensor.

**►B◄ SIDE IMPACT SENSOR INSTALLATION**

Securely connect the connector.

Caution

If the side impact sensor is not installed securely and correctly, the side air bag may not operate normally.

**►C◄ POST-INSTALLATION INSPECTION**

1. Reconnect the negative battery terminal.
2. Turn the ignition switch to the ON position.
3. Does the SRS warning lamp illuminate for about 7 seconds, and then remain extinguished for at least 5 seconds after turning the ignition switch to the LOCK (OFF) position?
4. If yes, SRS system is functioning properly. If no, consult page 52B-3.

CHASSIS ELECTRICAL

CONTENTS

GENERAL	2	MULTI CENTER DISPLAY	4
OUTLINE CHANGES	2	TROUBLESHOOTING <VEHICLES WITH	
HEADLAMP	2	NAVIGATION SYSTEM>	4
REAR COMBINATION LAMP	3	TROUBLESHOOTING <VEHICLES	
REAR WINDOW DEFOGGER		WITHOUT NAVIGATION SYSTEM>	31
SWITCH	3	MULTI CENTER DISPLAY	43

GENERAL

OUTLINE CHANGES

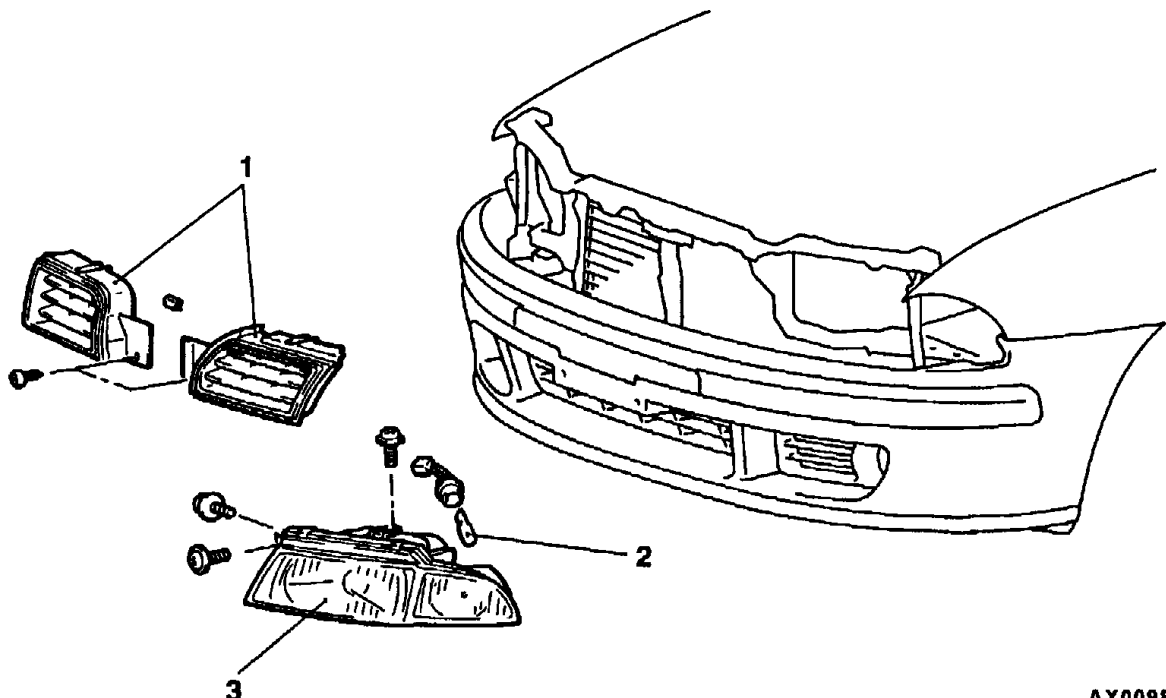
- The service procedure has been revised as the headlamp and the front turn-signal lamp have been unified.
- The service procedure has been revised due to the change in the rear combination lamp.
- The service procedure has been revised due to the change in the rear window defogger switch <Vehicles with manual air conditioner>.
- The service procedure has been added as the multi center display has been introduced. Furthermore, the multi center display is the same as for SPACE STAR and SPACE WAGON.
- The SRS warning lamp bulb inside the combination meter has been changed from 1.4 W to 0.84 W.

HEADLAMP

REMOVAL AND INSTALLATION

Pre-removal and Post-Installation Operation

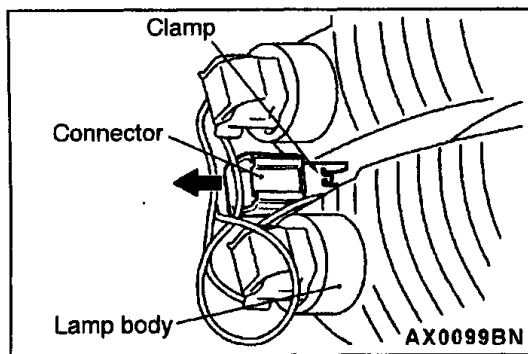
- Removal and installation of radiator reserve tank and battery (When replacing only left side headlamp).



AX0098BN

Removal steps

1. Radiator grille
(Refer to GROUP 51)
2. Front turn-signal lamp bulb
3. Headlamp assembly



REAR COMBINATION LAMP

REMOVAL SERVICE POINTS

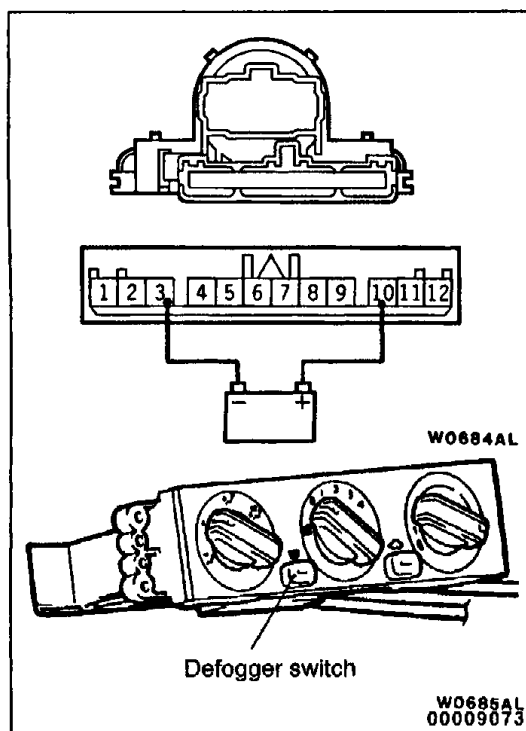
REAR LID LAMP ASSEMBLY

- (1) Remove the lamp lid.
- (2) Disconnect the wiring harness connector.
- (3) Unclamp the rear lid lamp assembly connector from the lamp body.
- (4) Remove the rear lid lamp assembly.

REAR WINDOW DEFOGGER SWITCH

REMOVAL AND INSTALLATION

Refer to GROUP 55 – Heater Control.



INSPECTION

DEFOGGER SWITCH CONTINUITY CHECK

Switch position	Terminal No.				
	3	10	–	11	12
OFF	○		IND	○	
	⊖	⊕			
ON	○		IND	○	
	⊖	⊕			
	○				○

NOTE

Turn on the defogger switch, and then check that there is continuity between the terminals 3 and 12 for 9 to 13 minutes and after it, the defogger switch is turned off.

MULTI CENTER DISPLAY

TROUBLESHOOTING <Vehicles with navigation system>

NOTES WITH REGARD TO SERVICE PROCEDURES

1. Before removing the battery

The multi center display has a large amount of data stored in memory which the user enters over time. When the terminals are disconnected from the battery, the memory which stores this data is affected as shown in the table below. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery.

Function	Input function	When battery is disconnected
Radio function	Channels which are selected during a search	Disappear after a few seconds
	Preset channels	Do not disappear
Navigation function	Current location	
	Recommended route	
	Destination	
	Route search conditions	
	Sensor initialization data	
	Language selection setting	
	Guidance volume setting	
Data search function, data display and input functions	Registered location names	Disappear after a few seconds
	Past destinations	
	Average fuel consumption, average speed, cruising range	
Clock display function	Current time	
Vehicle model settings for travel data	Setting details for vehicle model	
Monitor backlight luminance setting	Luminance setting value	

2. Notes on trouble diagnosis relating to the overall system

- (1) If a problem occurs which seems like all of the functions have developed an abnormality simultaneously, the cause is most likely a communication abnormality between the various systems. Thus you should use the communication checking service function in the trouble diagnosis service functions in order to verify the cause.

- (2) If the above is not the problem, check the connections of the related harness connectors. If a malfunctioning location is discovered, repair it and then re-check the trouble symptoms.
- (3) If there are no abnormalities in the harness connections, check the harnesses themselves. If there are no abnormalities in the harnesses, replace the relevant unit. Make a note of any error codes and service function data generated at this time.

NOTE

If the cause of the problem seems to be related to system communication, carry out troubleshooting.

3. Notes on trouble diagnosis when only specific functions are abnormal

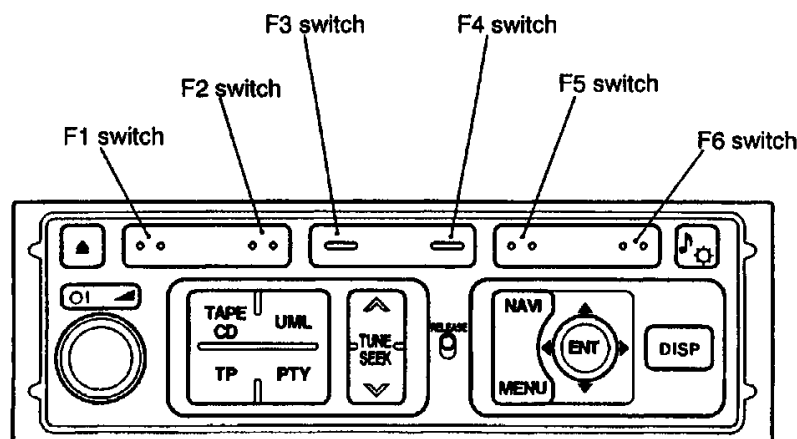
- (1) If only certain functions are showing an abnormality, use the audio checking function of the service functions to check the hardware switches.
- (2) If the switch functions are normal, check the connections of the related harness connectors. If a malfunctioning location is discovered, repair it and then re-check the trouble symptoms.
- (3) If there are no abnormalities in the harness connections, check the harnesses themselves. If there are no abnormalities in the harnesses, replace the unit which controls that function.

4. Notes on trouble diagnosis of the navigation function

- (1) The vehicle positioning accuracy of the navigation function is limited because of the principle of operation which it uses. Because of this, the system may be operating normally even though customers might be reporting a problem.

Before carrying out troubleshooting, get as much information as possible from the customer regarding things such as usage conditions and driving locations. If it is possible to judge from this that the problem is not caused by a system abnormality, explain the principle of operation used by the navigation function and how to utilize it effectively.

- (2) If you find that there is a system abnormality, check according to the Inspection Chart Classified by Trouble Symptoms in the Troubleshooting section.

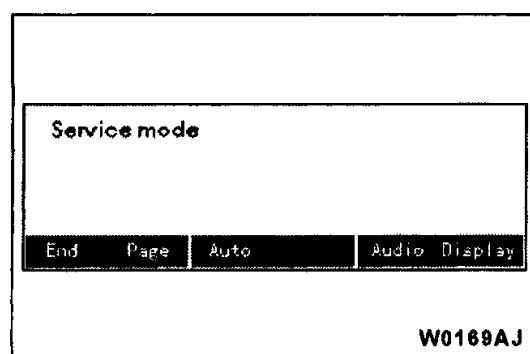
MULTI CENTER DISPLAY

AV0273AJ

TROUBLE DIAGNOSIS SERVICE FUNCTIONS

The Multi Center Display is equipped with the following trouble diagnosis service functions.

Function	Contents
Diagnosis function	During normal use, this function constantly monitors the system communication lines, and displays an error if it finds any abnormalities.
CD-ROM checking function	This function displays a message if it cannot read the CD-ROM or if no CD-ROM is inserted.
Service functions 1. Monitor checking 2. Audio checking 3. Automatic diagnosis by mode 4. Self-diagnosis • Wiring and communication checking • Sensor checking • Vehicle signals • Version data 5. Diagnosis recording	There are five checking modes available: monitor checking, audio checking, automatic checking by mode, self-diagnosis and diagnosis recording. This mode checks that the image display function is operating normally. This mode checks that the speakers and operating switches of the audio system are all working normally. In this mode, wiring and communication checking, audio checking, sensor checking and vehicle signal checking are carried out continuously. This mode includes functions such as wiring and communication checking, sensor checking, vehicle signals and version data checking. This checks system communication between all units. This checks all of the sensors that are necessary to the navigation system. This displays the current vehicle signal condition. This displays the version numbers for each unit in the Multi Center Display. This mode displays error codes from communication checking. (Error codes are erased when the ignition switch is turned to LOCK (OFF) position.)

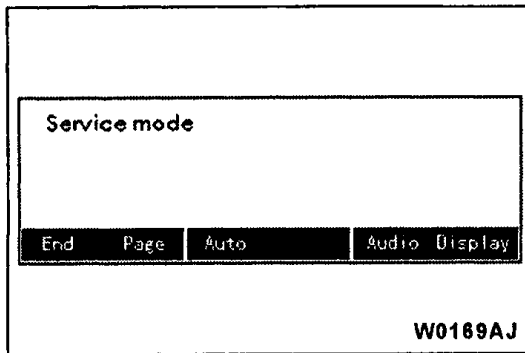


1. ACTIVATING AND ENDING SERVICE MODE

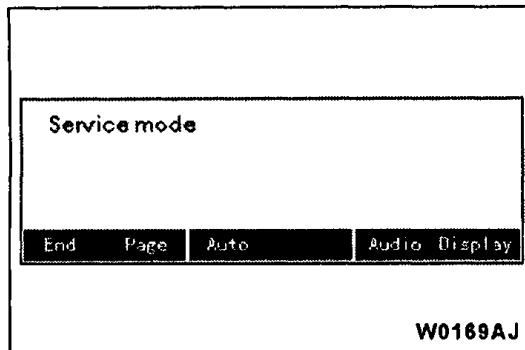
- (1) Activating service mode can be carried out by turning the ignition switch to the ON position while pressing the DISP switch on the audio unit and the F6 switch. (Continue pressing each switch for at least 5 seconds after turning the ignition switch to ON.)
- (2) If the special CD-ROM has been inserted into the navigation unit but the program has not been set up, the program will then be loaded from the CD-ROM. Service mode can be used once this process is completed.

NOTE

The special CD-ROM is a map CD-ROM which a distributor vends.

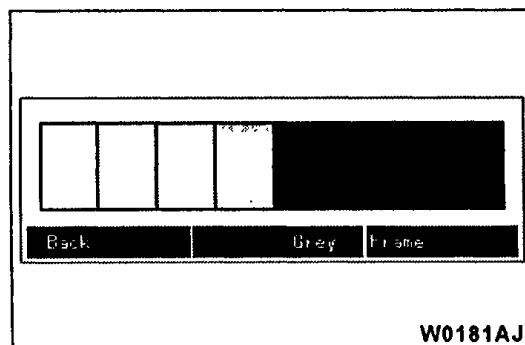


- (3) If the F1 switch is pressed at the service mode initial screen, service mode will be ended and the screen will change to navigation mode.

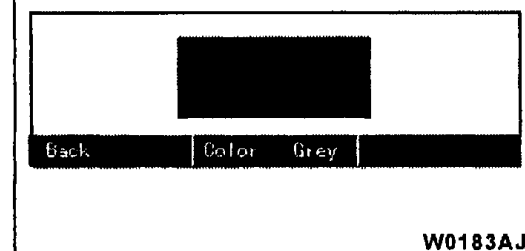
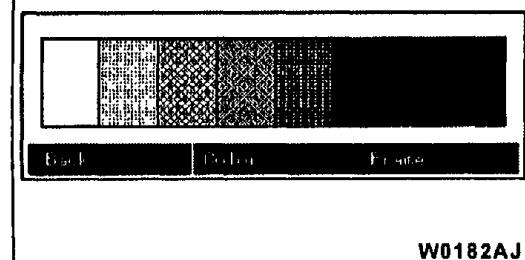


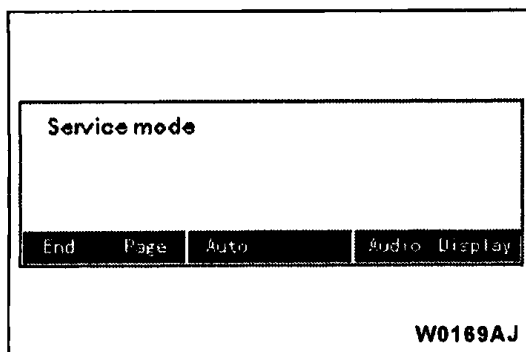
2. MONITOR CHECKING

- (1) If the F6 switch is pressed at the service mode initial screen, monitor checking will start.



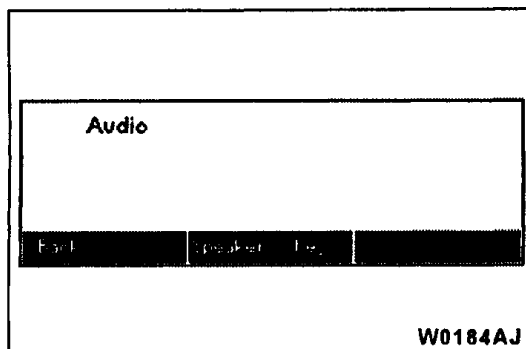
- (2) A colored bar will appear on the screen. Press a function switch to change to another screen. The screen will return to the service mode initial screen if the F1 switch is pressed.



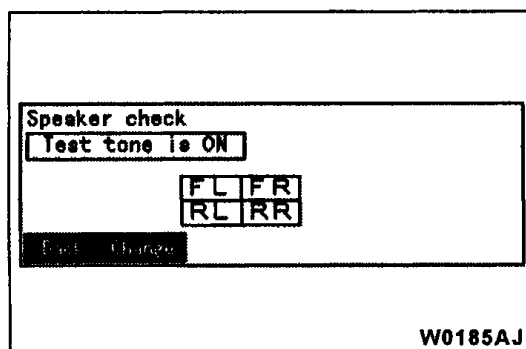


3. AUDIO CHECKING

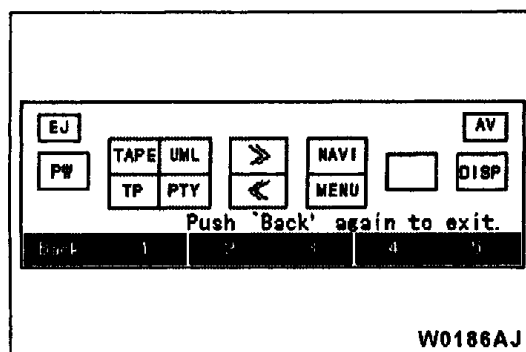
- (1) If the F5 switch is pressed at the service mode initial screen, the audio checking menu screen will appear.



- (2) Next, press the function switches to carry out audio checking.



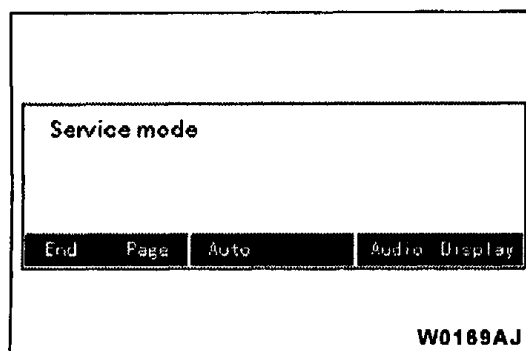
- (3) Press the F3 switch to display the speaker checking screen. The test sound will be output alternately from each speaker each time the F2 switch is pressed. Press the F1 switch to end speaker checking and return to the audio checking menu screen. At the early mass production, sometimes radio sound will be output. This is not a sign of abnormality.

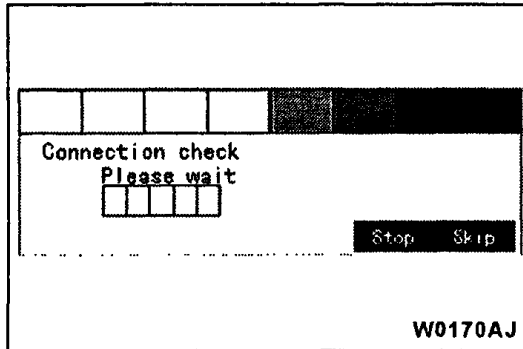


- (4) Press F4 to display the audio key checking screen. When one of the audio switches is pressed, the screen display color for that switch should change. This indicates that this particular switch system is working normally. Press the F1 switch to check the operation of the F1 switch. Press the F1 switch once more to return to the audio checking menu screen.

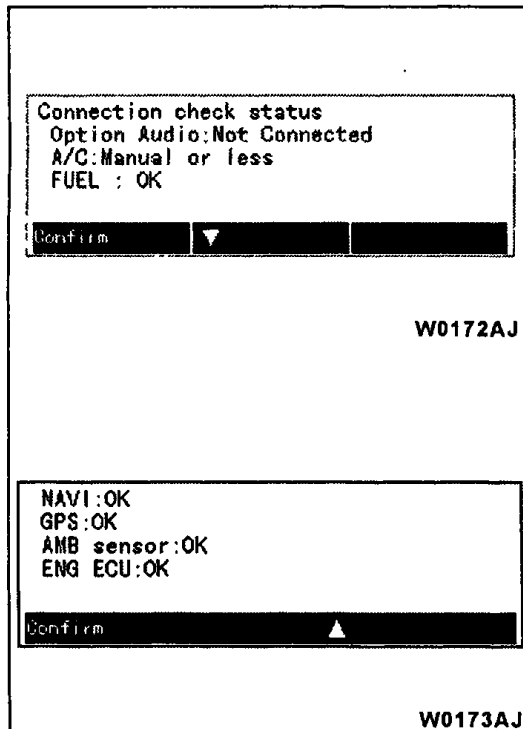
4. AUTOMATIC DIAGNOSIS BY MODE

- (1) If the F3 switch is pressed at the service mode screen, automatic diagnosis by mode will start.





- (2) A colored bar will appear on the screen of the Multi Center Display unit, and all units which are connected to the navigation unit will be checked during this time.

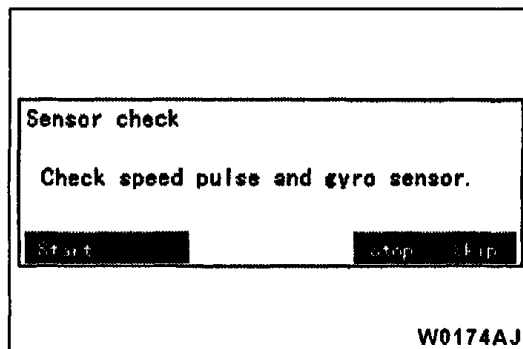


- (3) Once the transmission checking is completed, the results of the wiring and transmission checking will appear on the screen.

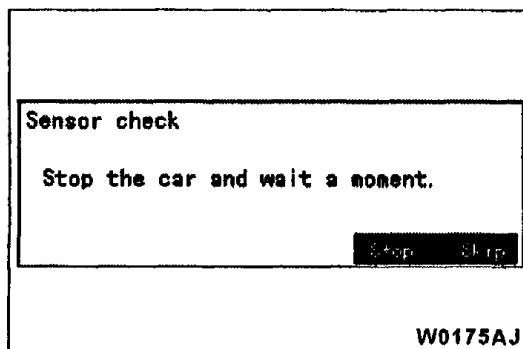
After checking the results, press the F1 switch to proceed to the next check. The next check will start when the switch is pressed.

NOTE

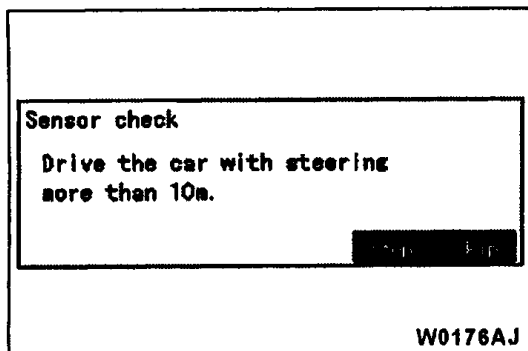
- 1) If the fuel gauge and the engine-ECU are checked while the ignition switch is at ACC, an error will be generated, but this is not a sign of an abnormality.
- 2) If checking is carried out while the fuel tank is full or the while ignition switch is at ACC, the fuel gauge may be shown to be not connected, but this is not a sign of an abnormality.



- (4) The next mode is the sensor checking mode. Press the F1 switch to start sensor checking.
If you would like to proceed to the next checking operation without carrying out sensor checking, press the F6 switch.



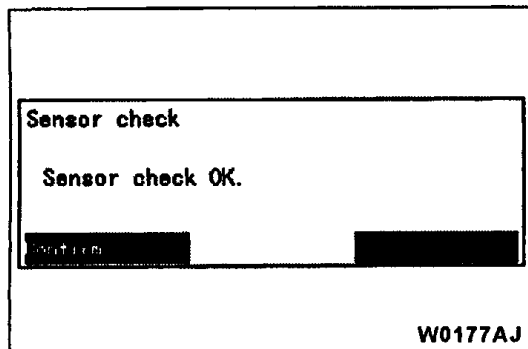
- (5) When sensor checking starts, the gyro output will be checked first while the vehicle is stopped, so make sure that the vehicle is stopped for this check.
If the vehicle is moving when the sensor checking starts, the vehicle speed sensor will be shown as defective.
Follow the guidance message on the multi center display.



- (6) Next, drive the vehicle for approximately 10 meters while changing the running direction in order to check the vehicle speed pulse and the gyro sensor output. The sensor checking will then be completed. If there is an open circuit in the vehicle speed sensor, sensor checking will not complete even after the vehicle has travelled more than 10 meters. In this case, press the F5 switch to stop checking.

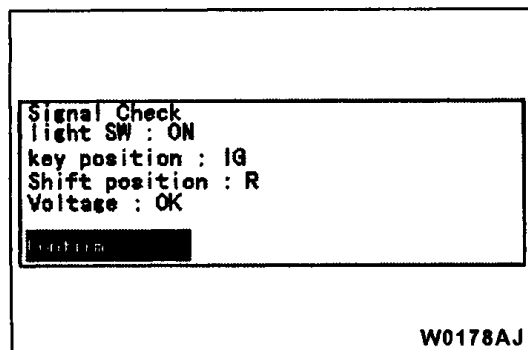
If the vehicle does not move or there is an open circuit in vehicle speed sensor, the vehicle speed sensor will be shown as defective.

- (7) When sensor checking is completed, the check results will appear on the screen. After checking the results, press the F1 switch to proceed to the next check.



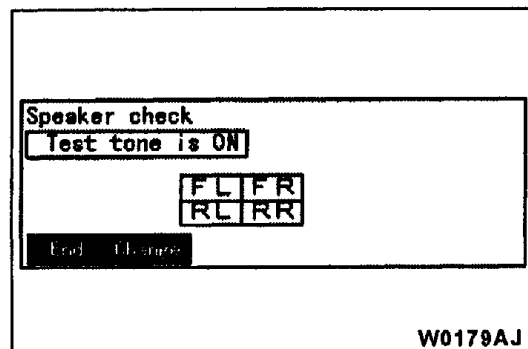
- (8) The next mode is the vehicle signal checking mode. The lighting switch condition, ignition key position, shift lever selection (R or a position other than R) and the power supply voltage drop will be appear on the screen. Check that the details displayed match the actual vehicle signals, and then press the F1 switch.

If the vehicles does not move or there is an open circuit in vehicle speed sensor, the vehicle speed sensor will be shown as defective.

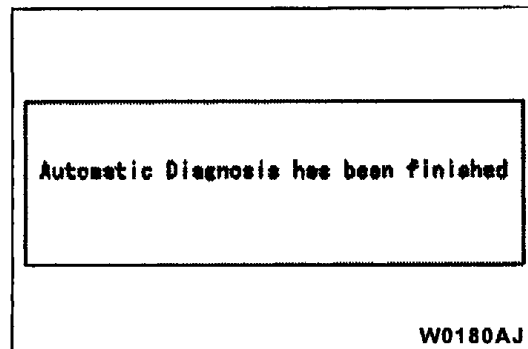


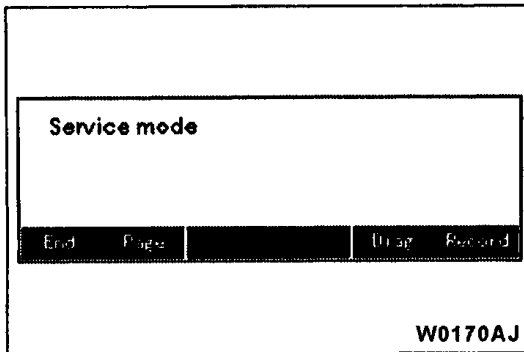
- (9) The next mode is speaker checking mode. The test sound will be output alternately from each speaker each time the F2 switch is pressed.

At the early mass production, sometimes radio sound will be output. This is not a sign of abnormality.



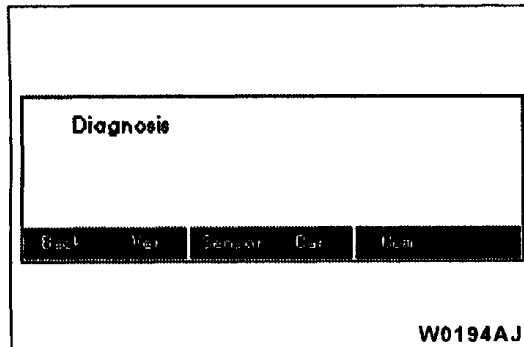
- (10) Press the F1 switch to end service mode. The screen will change to navigation mode.



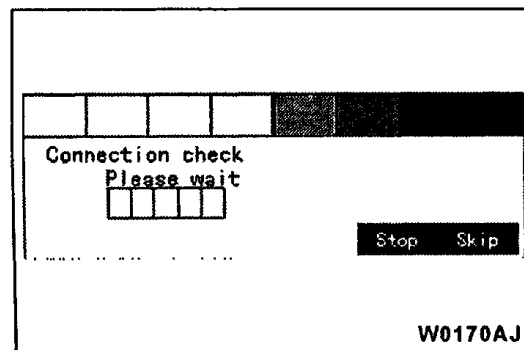


5. SELF-DIAGNOSIS

- (1) If the F5 switch is pressed at the service mode initial screen, the self-diagnosis menu screen will appear.

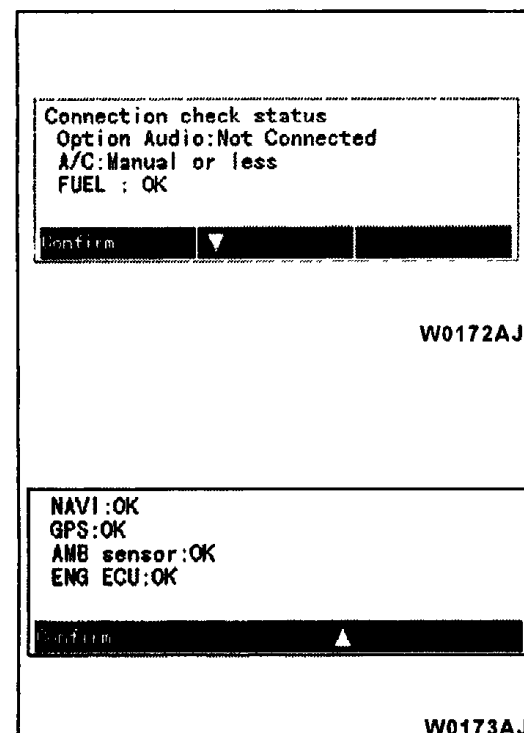


- (2) Next, use the function switches to carry out self-diagnosis.

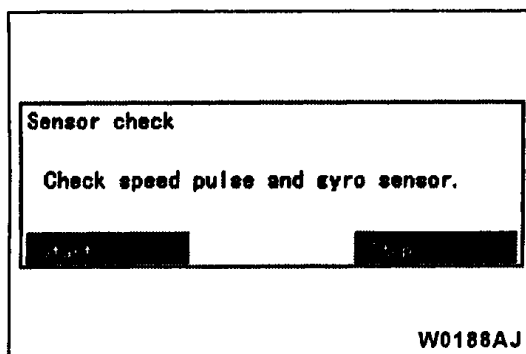


- (3) When the F5 switch is pressed, self-diagnosis for the wiring is carried out.

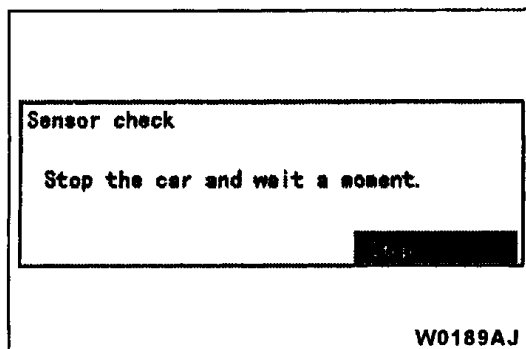
A colored bar will appear on the screen of the Multi Center Display unit, and all units which are connected to the navigation unit will be checked during this time.



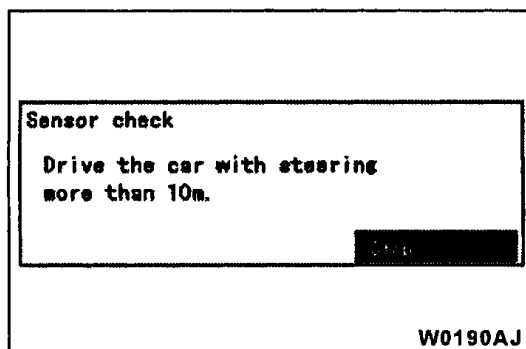
- (4) Once the transmission checking is completed, the results of checking will appear on the screen. After checking the results, press the F1 switch to return to the self-diagnosis menu screen.



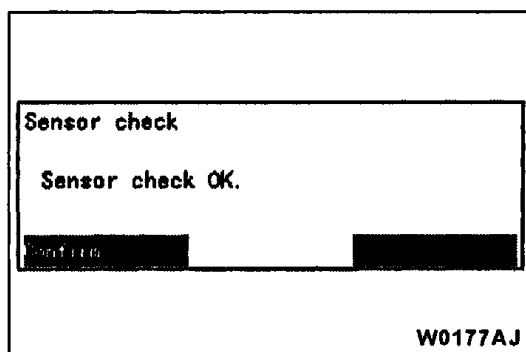
- (5) If the F6 switch is pressed at the self-diagnosis menu screen, sensor checking will start. Press the F1 switch to start sensor checking. If you would like to return to the self-diagnosis menu screen without carrying out sensor checking, press the F5 switch.



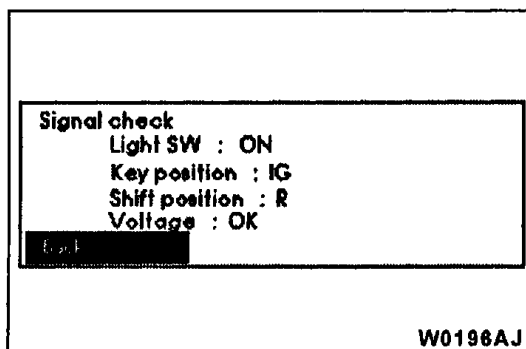
- (6) When sensor checking starts, the gyro output will be checked first while the vehicle is stopped, so make sure that the vehicle is stopped for this check. If the vehicle is moving when the sensor checking starts, the vehicle speed sensor will be shown as defective. Follow the guidance message on the multi center display.



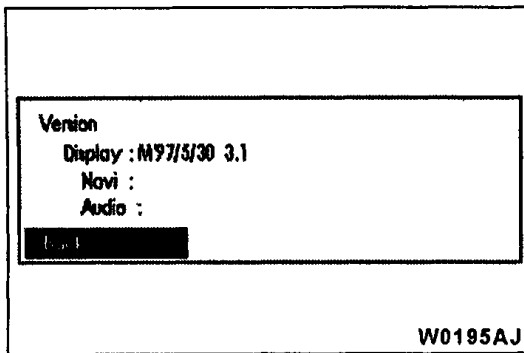
- (7) Next, drive the vehicle for approximately 10 meters while changing the running direction in order to check the vehicle speed pulse and the gyro sensor output. The sensor checking will then be completed. If there is an open circuit in the vehicle speed sensor, sensor checking will not complete even after the vehicle has travelled more than 10 meters. In this case, press the F5 switch to stop checking. If the vehicle does not move or there is an open circuit in vehicle speed sensor, the vehicle speed sensor will be shown as defective.



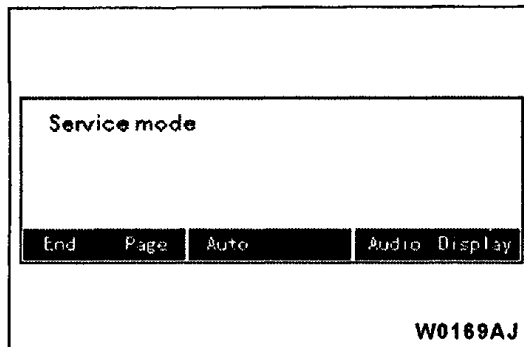
- (8) When sensor checking is completed, the check results will appear on the screen. After checking the results, press the F1 switch to return to the self-diagnosis menu screen.



- (9) If the F6 switch is pressed at the self-diagnosis menu screen, vehicle signal checking will start. The lighting switch condition, ignition key position, shift lever selection (R or a position other than R) and the power supply voltage drop will be appear on the screen. Press the F1 switch to return to the self-diagnosis menu screen.

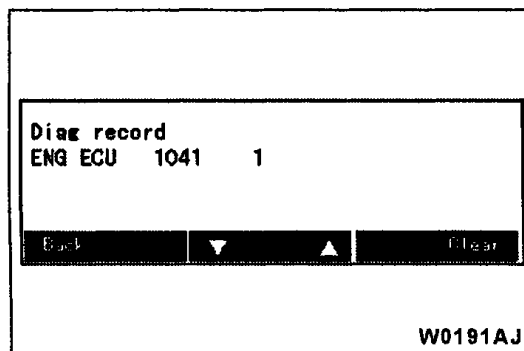


If the F2 switch is pressed at the self-diagnosis menu screen, version data self-diagnosis will be carried out, and the check results will appear on the screen. Press the F1 switch to return to the self-diagnosis menu screen.

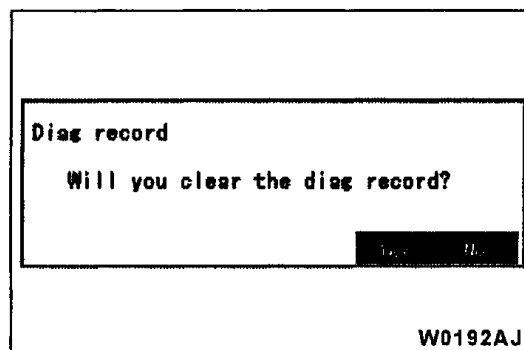


6. DIAGNOSIS RECORDING

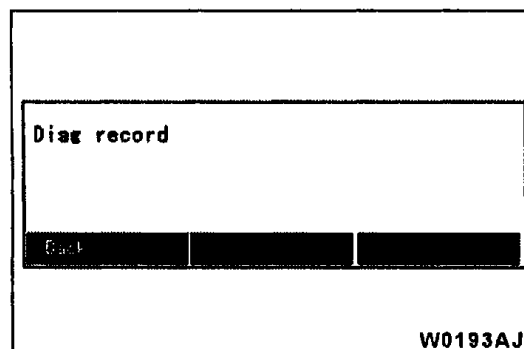
- (1) If the F6 switch is pressed at the service mode initial screen, the diagnosis recording screen will appear.
- (2) Press the F1 switch to return to the service mode initial screen.



- (3) Press the F6 switch to clear any error codes which may still be remaining from diagnosis recording. When this is done, the clearing confirmation screen will appear. If it is okay to continue with the clear, press the F5 switch. To cancel clearing, press the F6 switch. If the F6 switch is pressed, the screen will return to the diagnosis recording screen.



- (4) If the F5 switch is pressed, all past error codes will be cleared, and the screen will return to the diagnosis recording screen. The Clear button will not be displayed at this time.



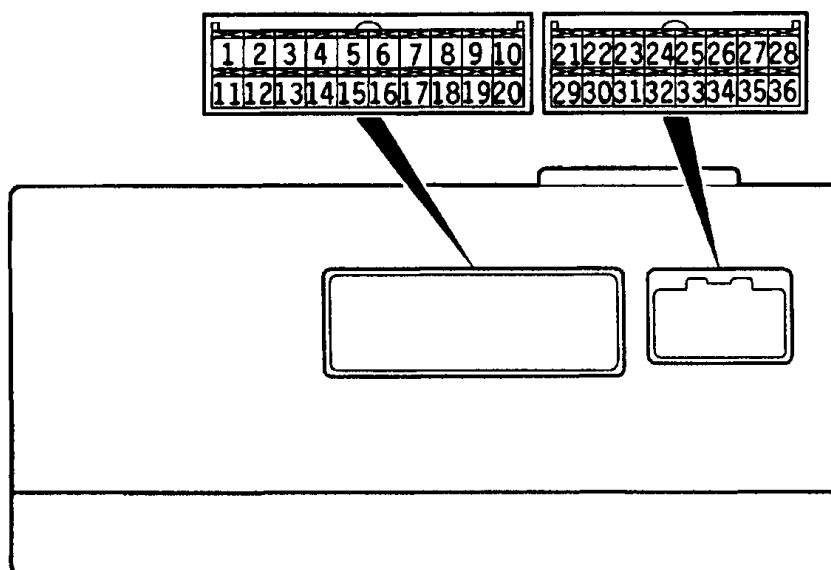
- (5) Press the F1 switch to return to the service mode initial screen.

7. ERROR CODE TABLE

Error Code No.	Error Details	Detection Method (Reference)	Reference Page
1011	Ambient temperature sensor not connected during diagnosis	Connection checking	54-28
1021	Fuel gauge not connected during diagnosis	Connection checking	54-29
1031	GPS abnormality during diagnosis	Connection checking	54-29
1041	Engine-ECU not connected during diagnosis	Connection checking	54-29
1051	SWS not connected during diagnosis (This error does not occur when correct car type is set)	Connection checking	54-29
1091	CD drive too hot during diagnosis	Connection checking	54-29
1092 – 1096	CD drive abnormality during diagnosis	Connection checking	54-30
10A1, 10B1	Memory of navigation unit abnormality during diagnosis	Connection checking	54-30
20D1, 30D1	Vehicle speed pulse abnormality during diagnosis	Sensor checking	54-30
20E1, 20E2, 30E1, 30E2	Gyro level abnormality during diagnosis	Sensor checking	54-30

MAIN UNIT TERMINAL VOLTAGES

1. MULTI CENTER DISPLAY UNIT



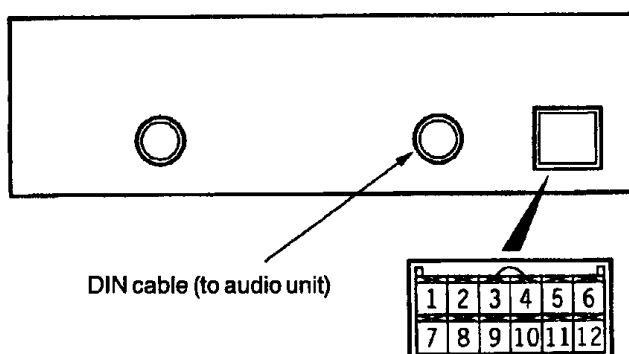
W0278AJ

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1	Input	G+SYTNC (AUDIO)	–	○	○	Noise display (random dot pattern)
2	Input	B+SYNC (AUDIO)	–	○	○	Blue, white, cyan and magenta do not appear in RGB screen.
3, 4	–	–	–	–	–	–
5	Input	ISOK	Hi: System voltage Lo: 0 – 1	○	○	MUT-II cannot be used to check engine-ECU.
6	–	–	–	–	–	–
7	Input/Output	M-DATA (AUDIO)	Hi: 4 – 5 Lo: 0 – 1	○	○	Buzzer sounds 30 seconds after the power turned to on. Nighttime illumination does not appear for any navigation system.
8	Input/Output	M-CLOCK (AUDIO)	Hi: 4 – 5 Lo: 0 – 1	○	○	Buzzer sounds 30 seconds after the power turned to on. Nighttime illumination does not appear for any navigation system.
9, 10	–	–	–	–	–	–
11	–	SHIELD-GND	–	–	–	–
12	–	–	–	–	–	–
13	Input	R+SYNC (AUDIO)	–	○	○	Red, white, yellow and magenta do not appear in RGB screen.

Terminal No.	Input/ Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
14	-	-	-	-	-	-
15	Input/ Output	K	Hi: System voltage Lo: 0 - 1	○	○	Values on Trip information screen (average speed, fuel consumption and cruising distance) are abnormal. Wiring and communication error. Communication is not possible between the engine-ECU and the MUT-II.
16	-	-	-	-	-	-
17	Input/ Output	M-BUSY (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	○	-	Screen display does not appear.
				-	○	Buzzer sounds 30 seconds after the power turned to on. Nighttime illumination does not appear for any navigation system.
18	-	SHIELD-GND	-	-	-	-
19 - 21	-	-	-	-	-	-
22	Input	PS-R	Hi: System voltage Lo: 0 - 1	○	○	Current location is not correct when reversing.
23	Input	EX-TEMP	0 - 5	○	○	Outside air temperature does not appear.
24	Input	ILL+	Hi: System voltage Lo: 0 - 1	○	-	Nighttime illumination does not appear for any navigation system units.
				-	○	Blown multipurpose fuse.
25	Input	ACC (ACC power supply)	System voltage	○	-	Screen display does not appear.
				-	○	Blown multipurpose fuse.
26	Input	+B	System voltage	○	-	Screen display does not appear.
				-	○	Blown multipurpose fuse.
27	Input	VSS	Hi: 4 - 5 Lo: 0 - 1	○	-	No effect.
28	-	GND (Ground)	-	○	-	Screen display does not appear.
29, 30	-	-	-	-	-	-
31	-	GND-TEMP	-	○	○	Outside air temperature does not appear.
32	-	-	-	-	-	-
33	Input	FUEL GAUGE	0 - 3	○	○	Abnormal cruising distance display.
34, 35	-	-	-	-	-	-

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
36	Input	IG1	System voltage	○	–	Communication with engine-ECU is not possible. Driving data values displayed are abnormal.
				–	○	Communication with engine-ECU is not possible. Driving data values displayed are abnormal. Blown multipurpose fuse.

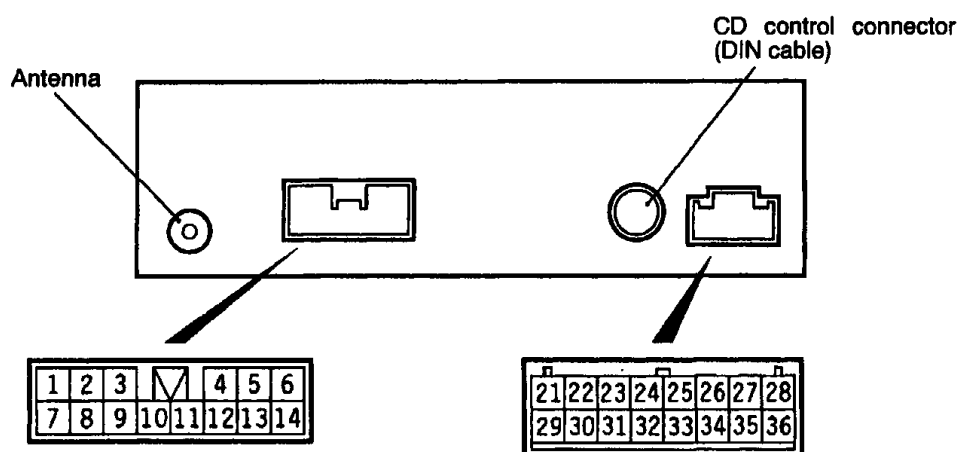
2. NAVIGATION UNIT



AV0845AE

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1 – 3	–	–	–	–	–	–
4	Input	VEHICLE SPEED PULSE	Voltage should change when wheels are turning. Hi: 4 – 5 Lo: 0 – 1	○	○	Compass display does not change when not following a route. Guide does not appear when following a route.
5	Input	+BATTERY	System voltage	○	–	Navigation does not operate.
				–	○	Blown fuse in +B system.
6	Input	ACCESSORY	System voltage	○	–	Navigation does not operate.
				–	○	Blown fuse in ACC system.
7 – 11	–	–	–	–	–	–
12	–	GND	–	○	–	Navigation sometimes does not operate.

3. AUDIO UNIT



BV0846AE

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1	Output	SPEAKER RR (+)	0 - System voltage (AC)	○	-	No sound is output from rear right speaker.
				-	○	No sound is output from rear left and right speakers.
2	Output	SPEAKER RL (+)	0 - System voltage (AC)	○	-	No sound is output from rear left speaker.
				-	○	No sound is output from rear left and right speakers.
3	Output	ANTENNA +B (Radio antenna amplifier power supply)	Hi: 10 or more Lo: 0 - 1	○	○	Low radio sensitivity.
4	-	-	-	-	-	-
5	Output	SPEAKER FL (+)	0 - System voltage (AC)	○	-	No sound is output from front left speaker.
				-	○	No sound is output from front left and right speakers.
6	Output	SPEAKER FR (+)	0 - System voltage (AC)	○	-	No sound is output from front right speaker.
				-	○	No sound is output from front left and right speakers.
7	Output	SPEAKER RR (-)	0 - System voltage (AC)	○	-	No sound is output from rear right speaker.
				-	○	No sound is output from rear left and right speakers.

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
8	Output	SPEAKER RL (-)	0 – System voltage (AC)	○	–	No sound is output from rear left speaker.
				–	○	No sound is output from rear left and right speakers.
9	–	–	–	–	–	–
10	Input	ACC (ACC power supply) (System voltage)	System voltage	○	–	Audio power supply does not turn on.
				–	○	Blown multipurpose fuse.
11	Input	+B (System voltage)	System voltage	○	–	Cassette is not ejected when ACC power turned off. Contents of memory are cleared.
				–	○	Blown multipurpose fuse.
12	Input	ILL (-)	–	–	–	–
13	Output	SPEAKER FL (-)	0 – System voltage (AC)	○	–	No sound is output from front left speaker.
				–	○	No sound is output from front left and right speakers.
14	Output	SPEAKER FR (-)	0 – System voltage (AC)	○	–	No sound is output from front right speaker.
				–	○	No sound is output from front left and right speakers.
21	Input/Output	M-DATA	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
22	Input/Output	M-SCK	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
23	Input	TELEPHONE MUTE	Hi: 4 or more Lo: 1 or less	–	–	–
24	Output	G+SYNC	0 – 5	○	○	Abnormal navigation screen color.
25	Output	B+SYNC	0 – 5	○	○	Abnormal navigation screen color.
26 – 28	–	–	–	–	–	–
29	Input/Output	M-BUSY	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
30	–	SHIELD EARTH (M-BUS)	–	–	–	–

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
31	-	-	-	-	-	-
32	-	SHIELD EARTH	-	-	-	-
33	-	-	-	-	-	-
34	Output	R+SYNC	0 – 5	○	○	Abnormal navigation screen color.
35, 36	-	-	-	-	-	-

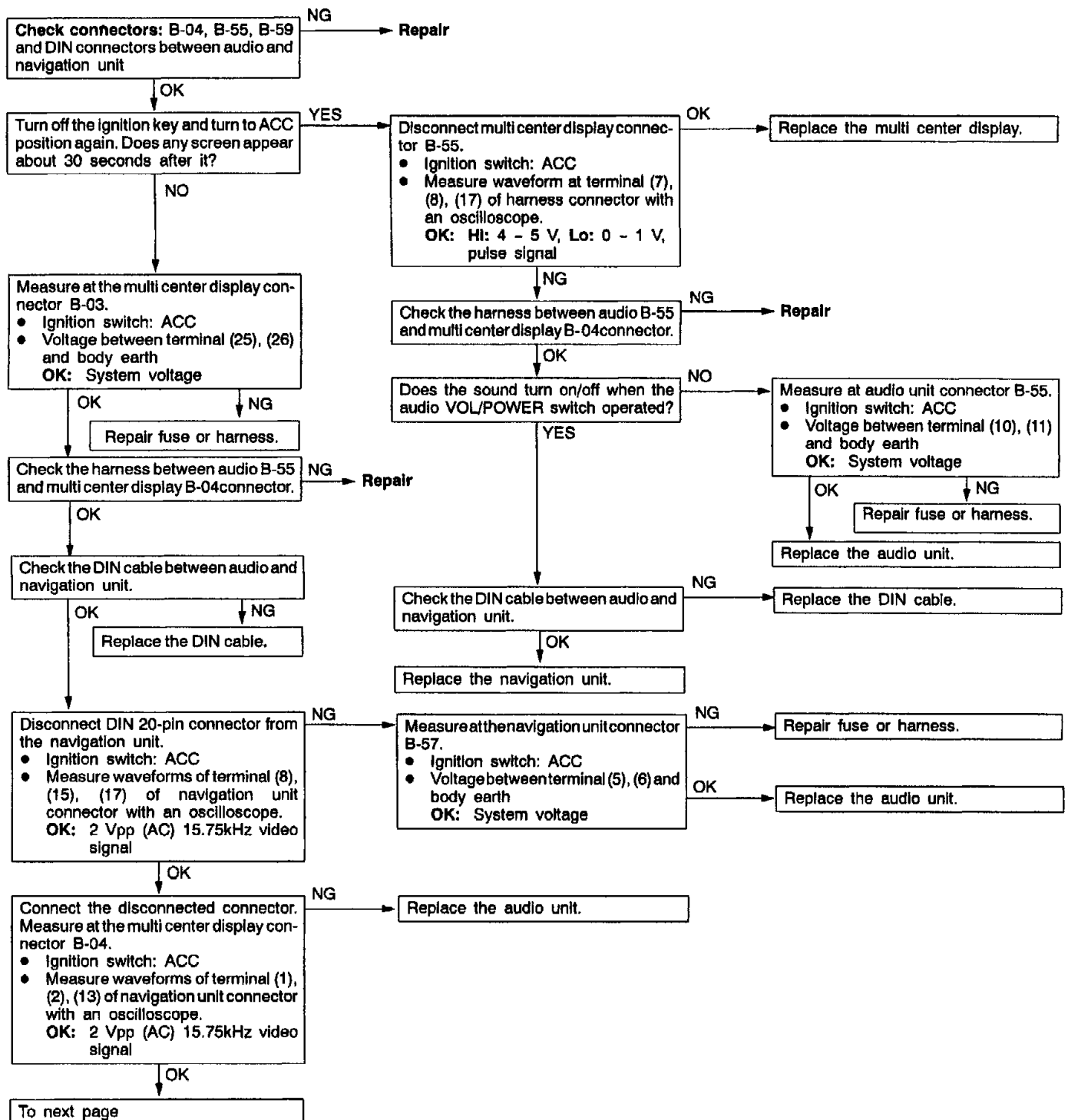
INSPECTION CHART CLASSIFIED BY TROUBLE SYMPTOMS

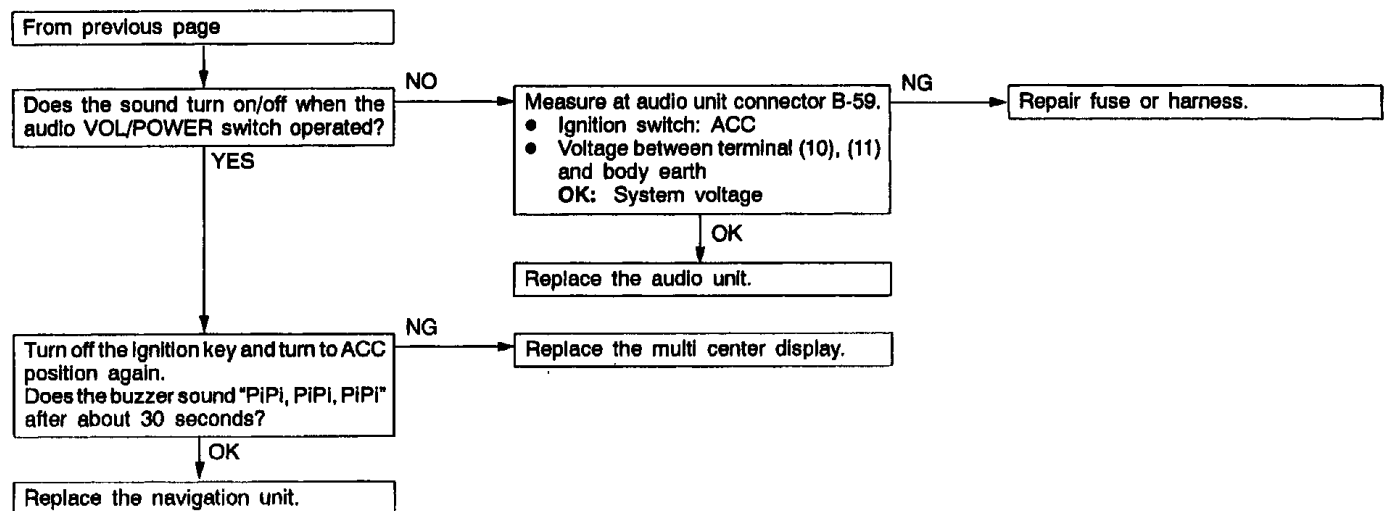
Related Unit	Trouble Symptom	Inspection Procedure No.	Reference Page
Malfunction of navigation unit, multi center display, audio unit and related sensor, harness	TAPE/CD, UML switches do not work. No display appears after the ignition key is turned to ACC.	1	54-21
	TAPE/CD, UML switches do not work. (Display appears.)	2	54-22
	No display appears after the ignition key is turned to ACC, but TAPE/CD, UML switches can be operative.	3	54-23
	CD changer screen display does not appear when TAPE/CD switch is operated.	4	54-24
	GPS reception is not possible.	5	54-24
	Outside air temperature data is not displayed.	6	54-24
	Abnormal driving data display - Abnormal average fuel consumption (momentary fuel consumption) and average speed displays. - Abnormal cruising distance displays	7	54-25
	Daytime/nighttime display mode does not change in conjunction with lighting switch operations.	8	54-26
	Display moves about. Screen colours do not match correctly.	9	54-26
	Compass display does not rotate , or guidance does not appear when following a route.	10	54-27
	One of the following messages appears during navigation mode. - The CD drive has failure condition. Check and reload the disc, please. - Wrong disc is in the CD drive. Insert a map disc, please. - No disc is in the CD drive. Insert a map disc please. - A music disc is in the CD drive.	11	54-27

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

INSPECTION PROCEDURE 1

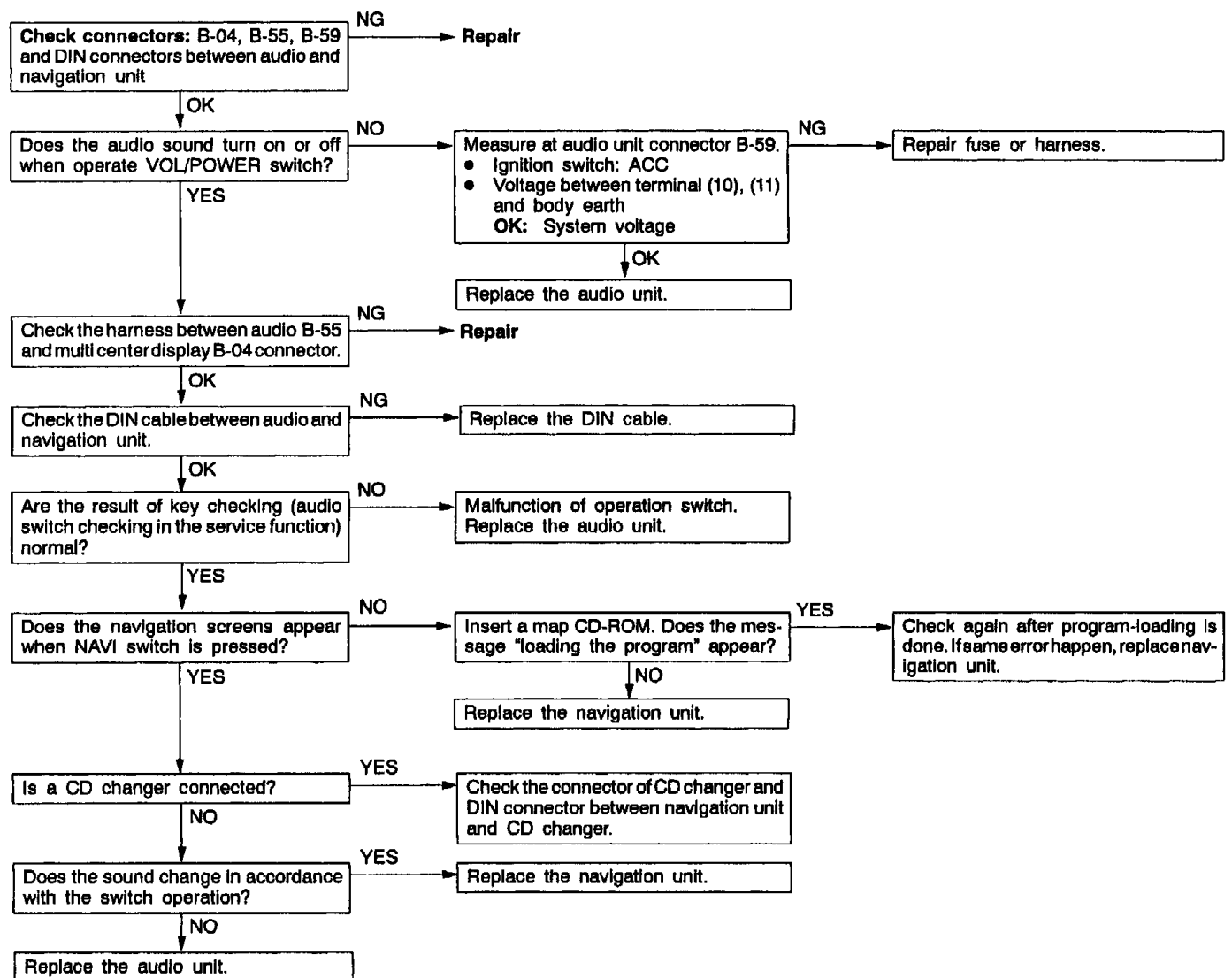
TAPE/CD, UML switches do not work. No display appears after the Ignition key is turned to ACC.





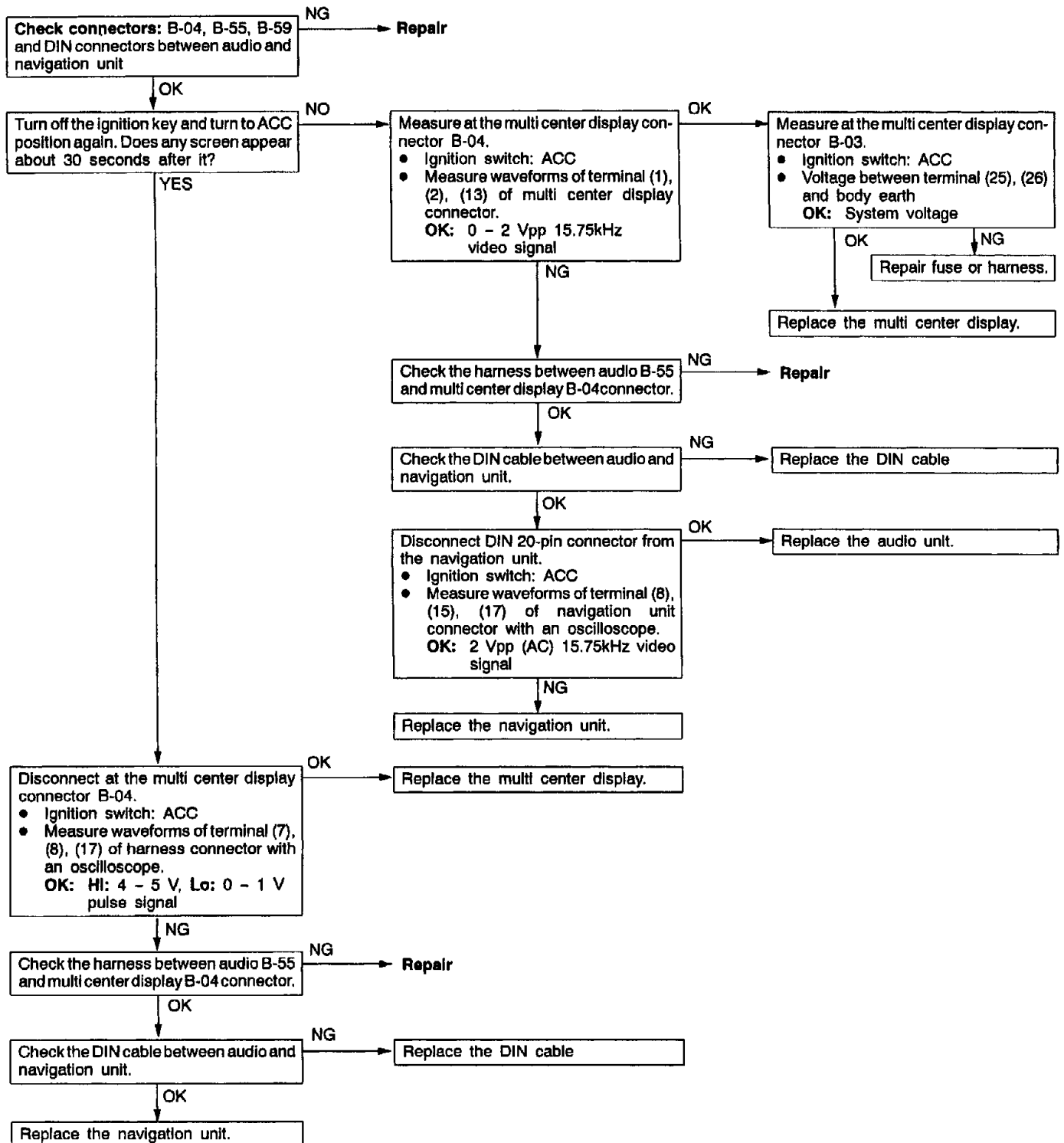
INSPECTION PROCEDURE 2

TAPE/CD, UML switches do not work. (Display appears.)



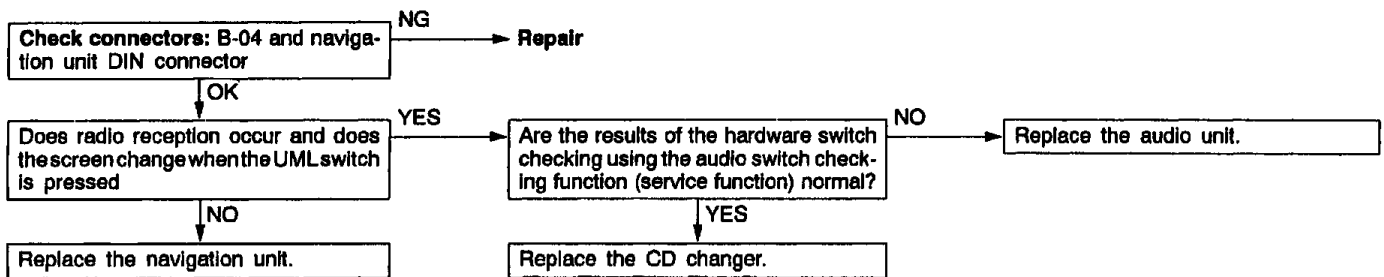
INSPECTION PROCEDURE 3

No display appears after the Ignition key is turned to ACC, but TAPE/CD, UML switches can be operative.



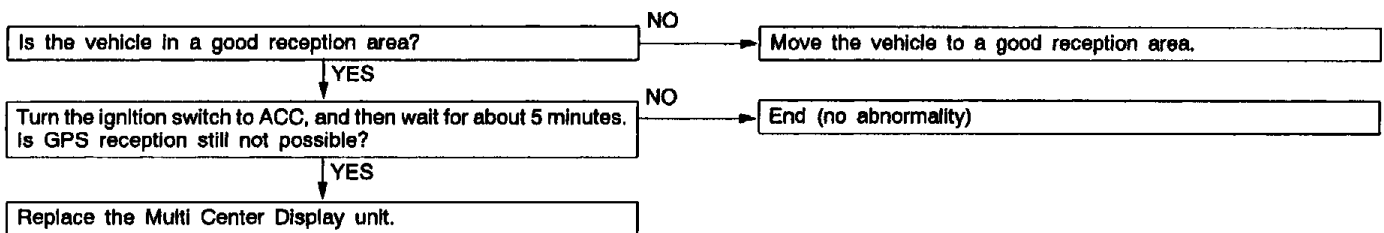
INSPECTION PROCEDURE 4

CD changer screen displays do not appear when TAPE/CD switches are operated.



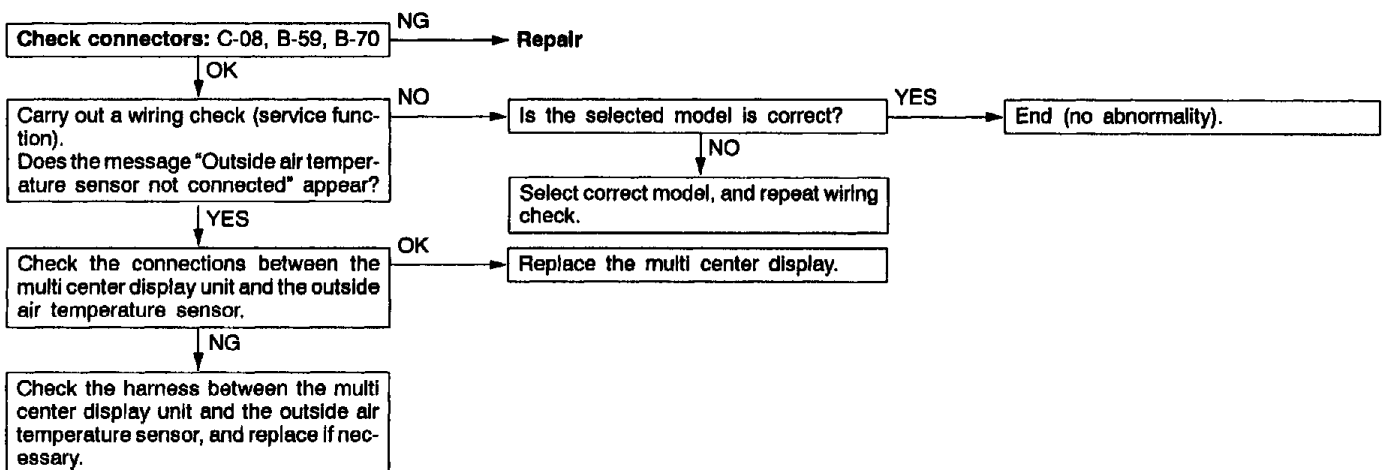
INSPECTION PROCEDURE 5

GPS reception is not possible.



INSPECTION PROCEDURE 6

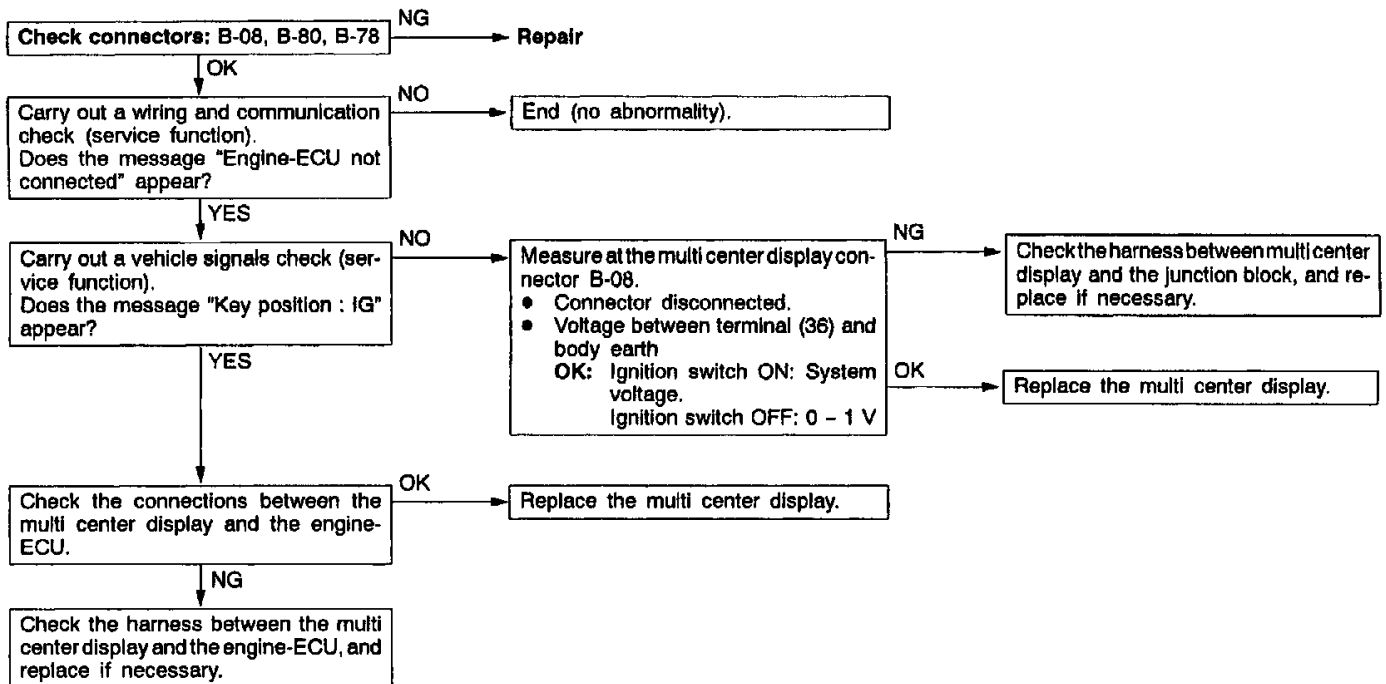
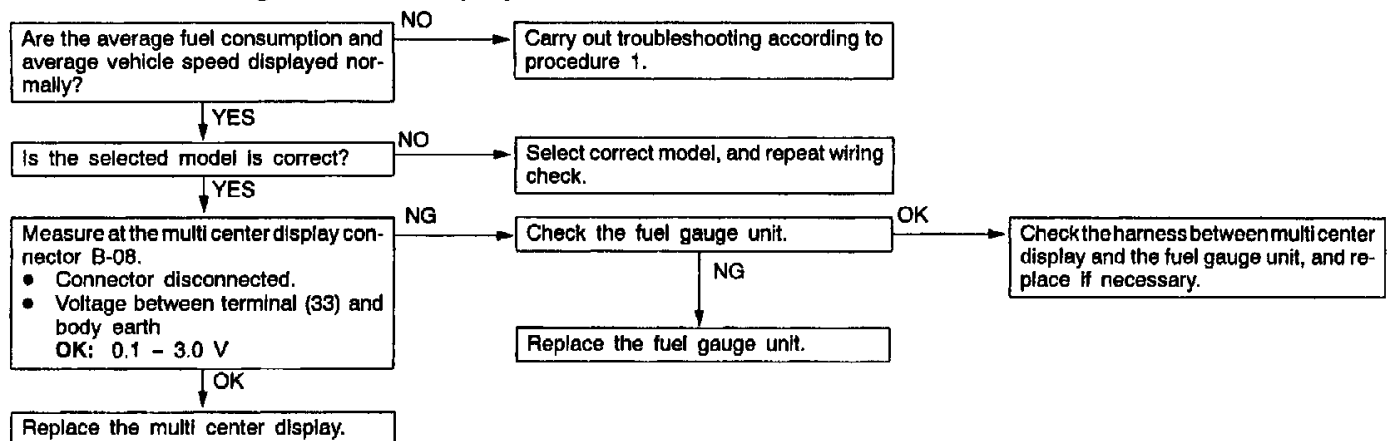
Outside air temperature data is not displayed.



INSPECTION PROCEDURE 7

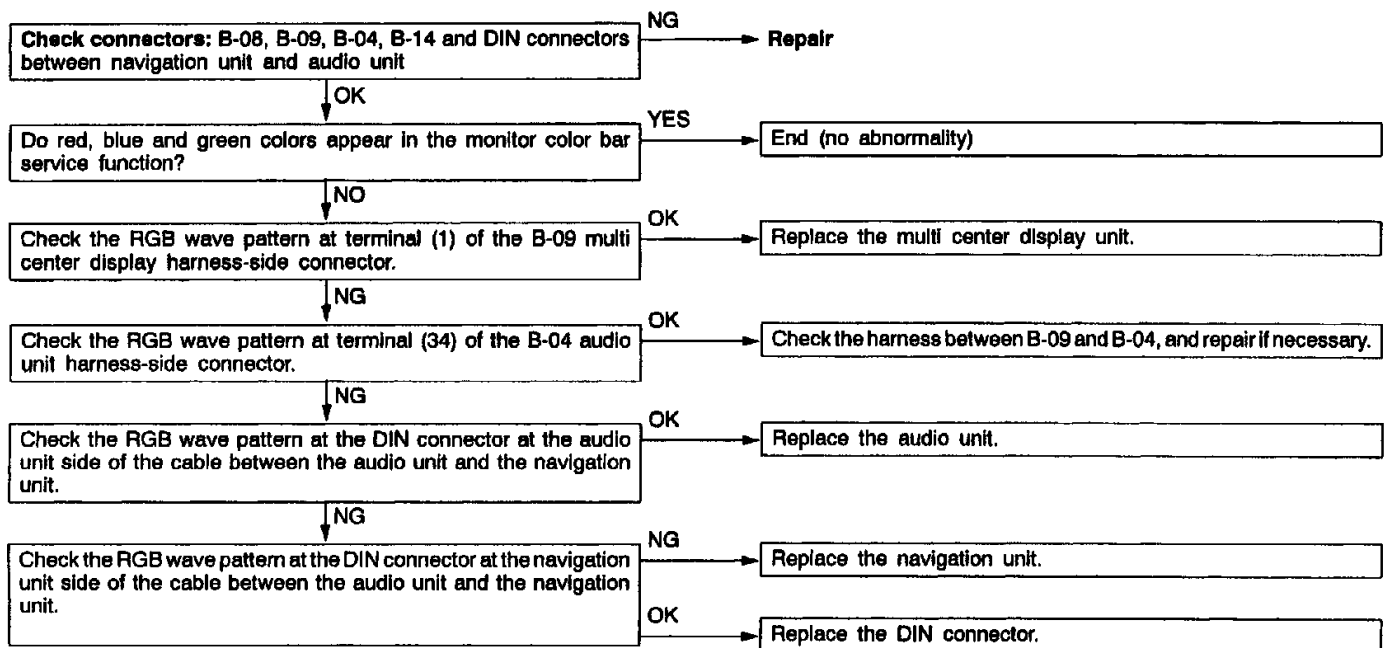
Abnormal driving data displays.

- Abnormal average fuel consumption (momentary fuel consumption) and average speed displays.
- Abnormal cruising distance displays.

1. When average fuel consumption (momentary fuel consumption) and average speed displays are abnormal.**2. When cruising distance display is abnormal.**

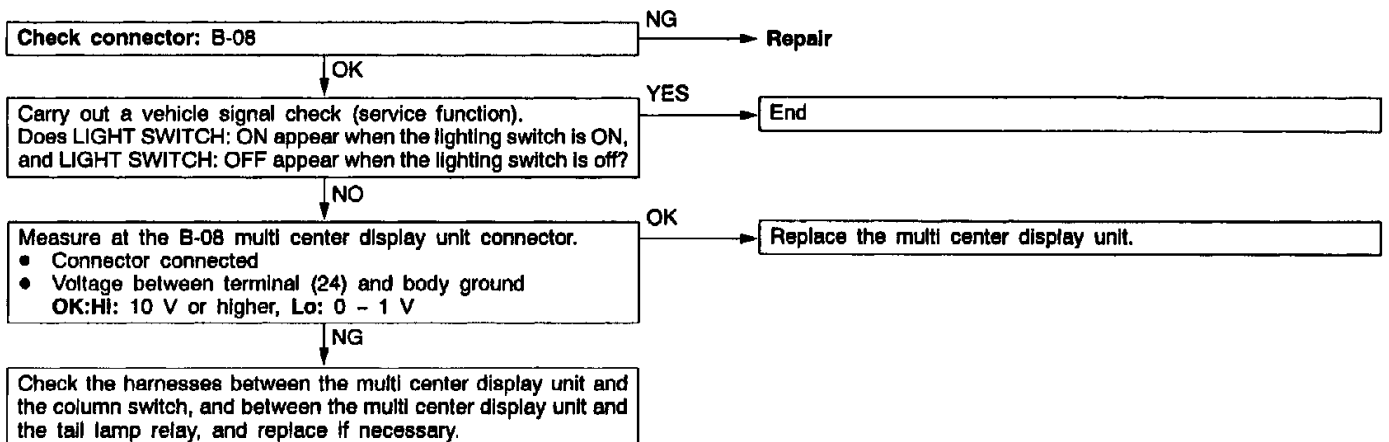
INSPECTION PROCEDURE 8

**Display moves about.
Screen colors do not match correctly.**



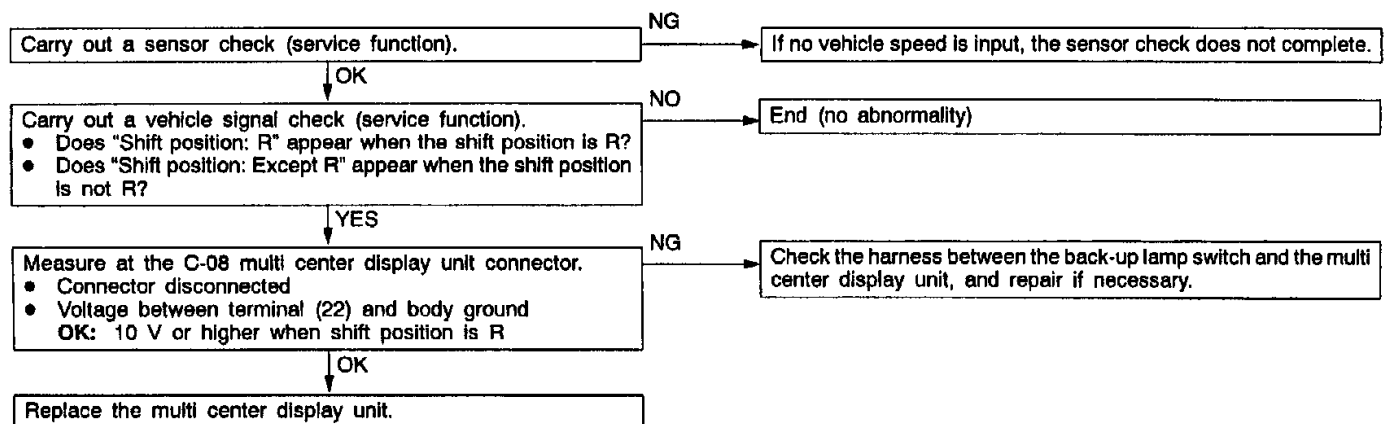
INSPECTION PROCEDURE 9

Daytime/nighttime display mode does not change in conjunction with lighting switch operations.



INSPECTION PROCEDURE 10

Compass display does not change when not following a route, or guide does not appear when searching for and following a route.

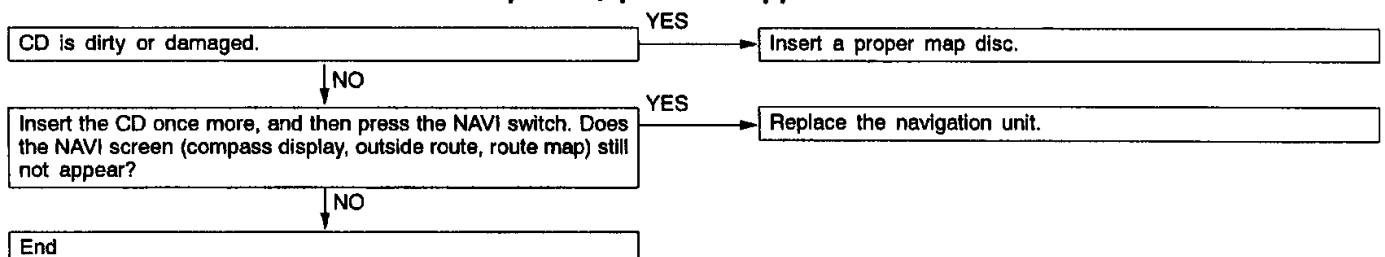


INSPECTION PROCEDURE 11

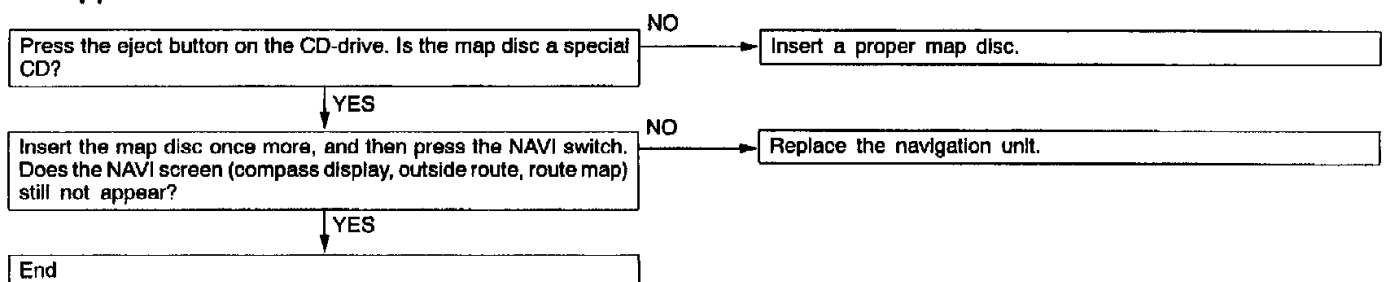
One of the following messages appears during navigation mode.

- The CD-drive has failure condition. Confirm and reload the disc, please.
- Wrong disc is in the CD-drive. Insert a map disc, please.
- No disc is in the CD-drive. Insert a map disc, please.
- A music disc is in the CD-drive.

1. "The CD-drive has failure condition. Confirm and reload the disc, please." or "Wrong disc is in the CD-drive. Insert a map disc, please." appears.

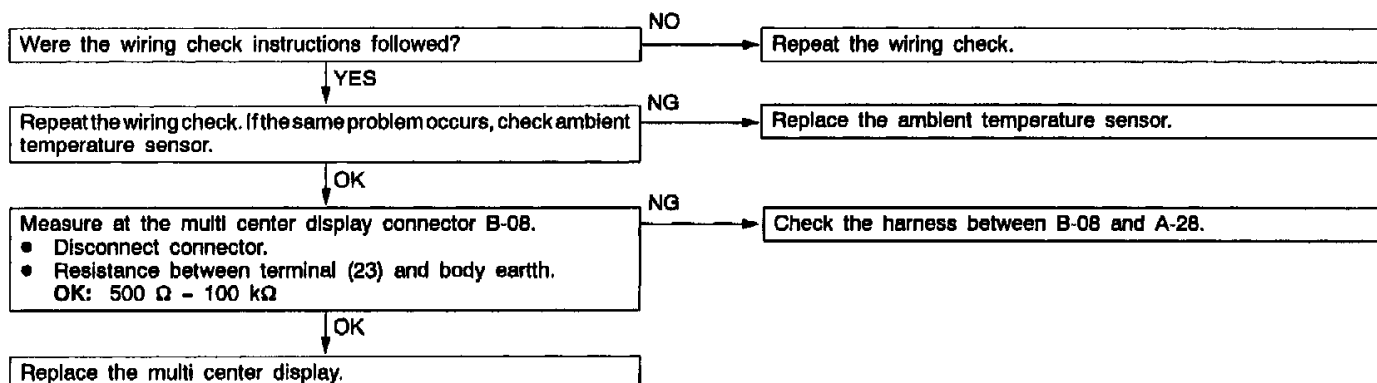


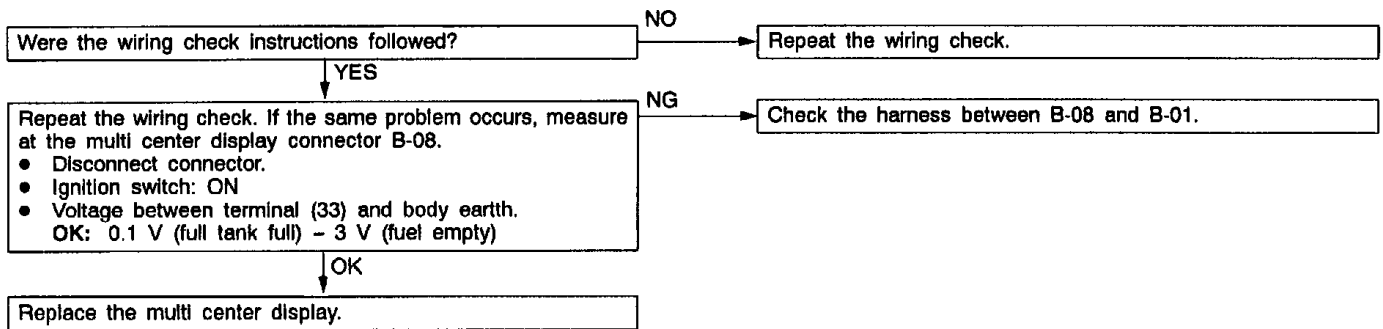
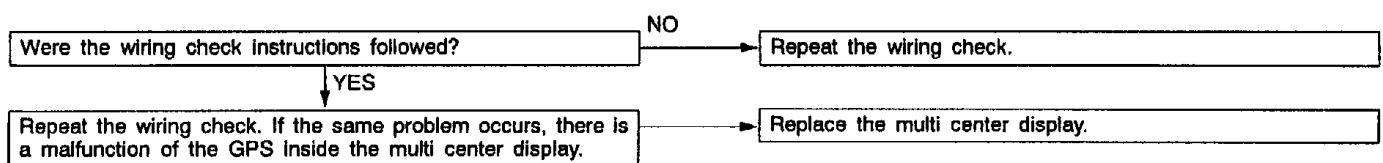
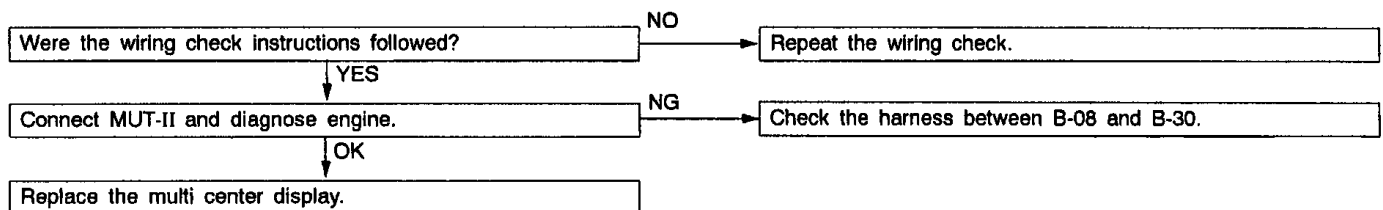
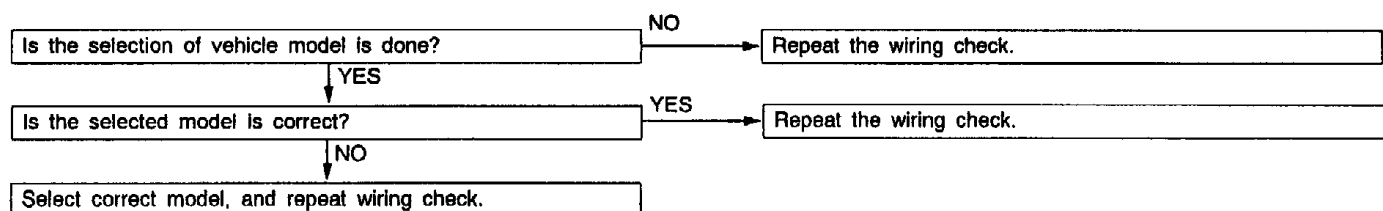
2. "No disc is in the CD-drive. Insert a map disc, please." or "A music disc is in the CD-drive" appears.



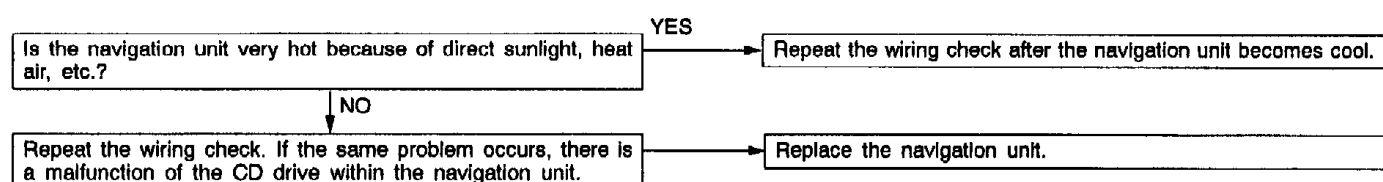
ERROR CODE TABLE

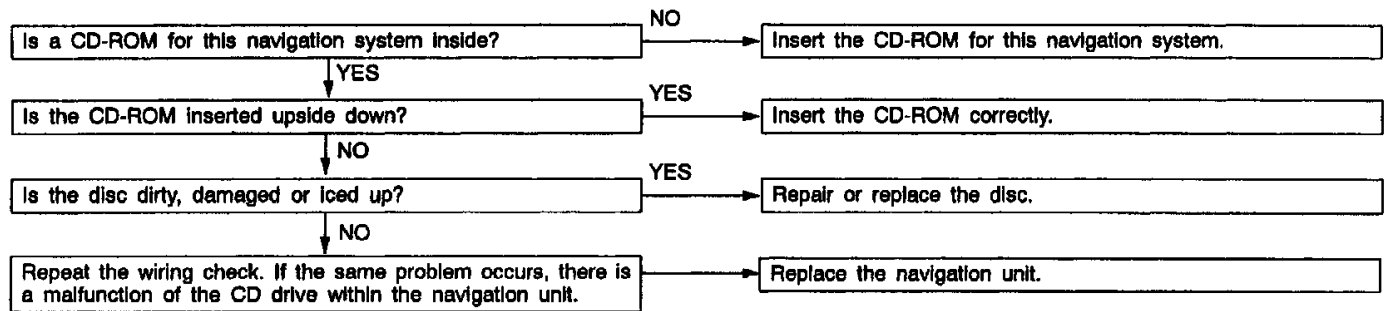
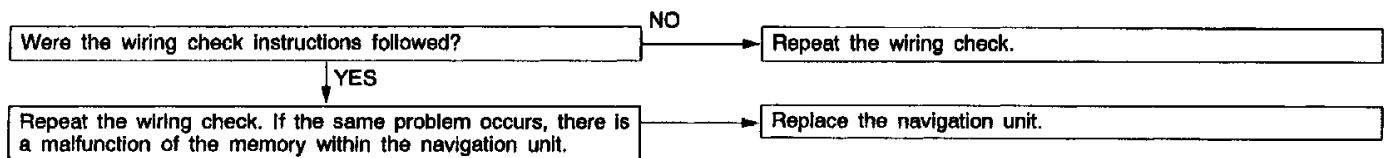
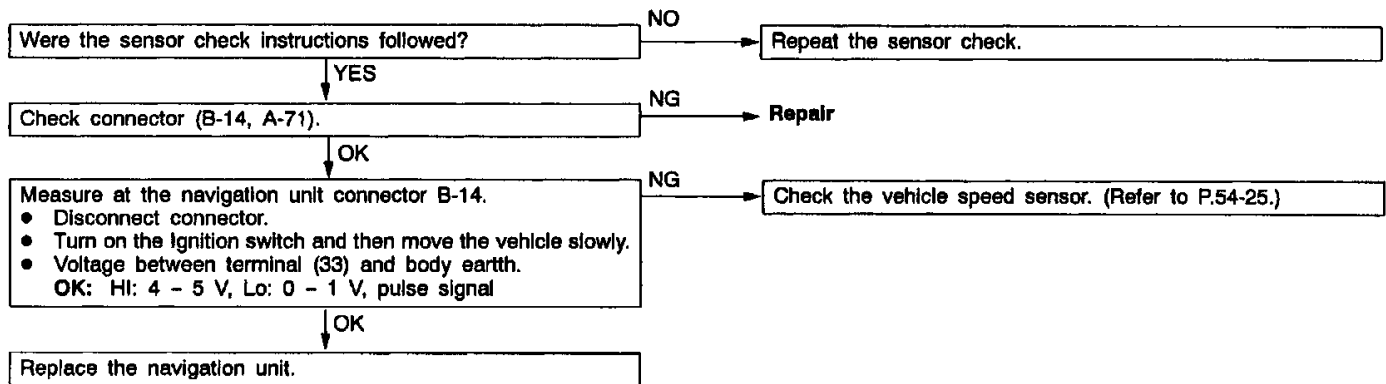
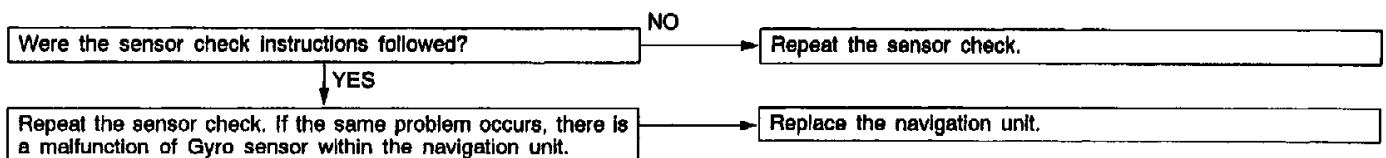
Error Code No.	Error Details	Detection Method (Reference)	Reference Page
1011	Ambient temperature sensor not connected during diagnosis	Connection checking	54-28
1021	Fuel gauge not connected during diagnosis	Connection checking	54-29
1031	GPS abnormality during diagnosis	Connection checking	54-29
1041	Engine-ECU not connected during diagnosis	Connection checking	54-29
1051	SWS not connected during diagnosis (This error does not occur when correct car type is set)	Connection checking	54-29
1091	CD drive too hot during diagnosis	Connection checking	54-29
1092 – 1096	CD drive abnormality during diagnosis	Connection checking	54-30
10A1, 10B1	Memory of navigation unit abnormality during diagnosis	Connection checking	54-30
20D1, 30D1	Vehicle speed pulse abnormality during diagnosis	Sensor checking	54-30
20E1, 20E2, 30E1, 30E2	Gyro level abnormality during diagnosis	Sensor checking	54-30

INSPECTION PROCEDURES FOR EACH ERROR CODE**Error Code No. 1011**

Error Code No. 1021**Error Code No. 1031****Error Code No. 1041****Error Code No. 1051****How to confirm model selection is correctly done.**

- (1) Press "DISP" switch to get trip information display.
- (2) If "Please set your car type" message appears, the vehicle model is not set. Select the correct vehicle model from the list.
- (3) If trip information display appears normally, the vehicle model is set already. Press RESET (F1) switch and keep until the vehicle setting display appears. Current setting of vehicle model will appear on the display.

Error Code No. 1091

Error Code No. 1092, 1093, 1094, 1095, 1096**Error Code No. 10A1, 10B1****Error Code No. 20D1, 30D1****Error Code No. 20E1, 20E2, 30E1, 30E2**

TROUBLESHOOTING <Vehicles without navigation system>**NOTES WITH REGARD TO SERVICE PROCEDURES****1. Before removing the battery**

The audio system has a large amount of data stored in memory which the user enters over time. When the terminals are disconnected from the battery, the memory which stores this data is affected as shown in the table below. Accordingly, it is necessary to make sure that you take notes of important information before disconnecting the battery.

Function	Input function/memory	When battery is disconnected
Radio	Channels which are selected during a search	Disappear after a few seconds
	Preset channels	
Tone/Balance	Position set on Bass, Treble, Balance and Fader	
Clock set on display	Current time	Keep a data for approx. one hour
Brightness set for display	Position set on display	
Unit set for trip computer	km or mile, L/100km or mpg or km/L	
Average speed on display	Average speed after reset	
Average fuel consumption on display	Average fuel consumption after reset	
Cruising range on display	Cruising range, fuel economy	
Outside temperature on display	A temperature after the Ignition switch is turned to OFF (LOCK).	Keep a data for approx. one hour If the engine is hot, the multi center display might show high temperature when the display unit is reconnected after one hour.

2. Diagnosis Function for Audio System

Audio system has the following diagnosis function.

Function	Contents
Speaker diagnosis function	This function checks if the speakers are all working normally on the audio system or not.
Service functions (1) Check the LCD segments (2) Check the sensors (3) Check units connected into audio system	There are the following 3 diagnosis modes available. The LCD segments for display available to light on or not. Outside temperature, voltage of fuel gauge unit and battery, remaining fuel level, fuel economy calculated after refuelling. Units connected on display Voltage on terminal for MUT-II Engine speed signal, which is sent by ECU Oscillation of internal clock

3. Speaker Connection Diagnosis

Outline

- This diagnosis function checks whether the more than one wired speakers are normally connected to the audio unit and the speaker wiring is pinched in the vehicle.
- The test tone sounds from an applicable speaker according to the display (FL, FR, RL, RR).

Function explanation

To diagnose speaker connections, follow the procedure below to enter the test mode.

1. Entry to test mode

- (1) Turn the ignition switch to ACC.
- (2) Turn off the power supply switch of the audio unit.
- (3) Press the "CH1" button.
- (4) Press the "Automatic tuning in down button."
- (5) Press the "Automatic tuning in up button."
- (6) Press the "CH6" button. Then the audio unit will enter the test mode.

NOTE

The above operation must be finished within 60 seconds after the power supply switch is turned off (If 60 seconds have passed, the operation is invalid).

If you fail in the operation, you must push the power supply switch twice to reset the unit. Then repeat the steps above from step (1).

- (7) The test tone will sound at a constant interval. If you want to change an applicable speaker, you should press the "CH6" button.

2. Cancelling the test mode

The test mode will be canceled by one of the operations below.

- Press any button (except the "CH6" button). In addition, if a mode button (LW/MW/LW, CD, TAPE) is pressed, the audio unit will enter an applicable function after cancelling the test mode.
- Turn the ignition switch to OFF(LOCK).

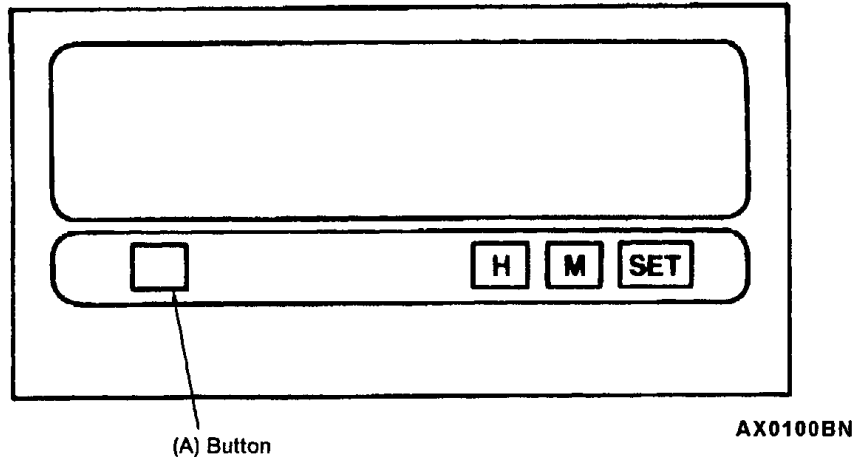
4. Service Mode For Multi Center Display

1. Enter and terminate the service mode

- (1) To enter the service mode, turn the ignition switch to ACC.
- (2) Press the "H" button twice.
- (3) Press the "SET" button and (A) button at the same time.
- (4) Then the audio unit will enter the service mode.

First of all, the service mode will show model identification for the multi center display and the vehicle identification. Then the service mode proceeds to three checks; LCD segment check, Sensor check and Unit check. To switch over these checks, press the "SET" button.

- (5) To terminate the service mode, press any button other than the "SET" button.



2. Details of the service mode

The service mode checks the following in that order:

(1) LCD segment check

This screen is divided into four areas. Each area will be active sequentially whenever the "SET" button is pressed.

When the "SET" button is pressed four times in this screen, the service mode will proceed to the Sensor check.

(2) Sensor check

This screen shows voltage signals from the outside temperature sensor, the fuel gauge unit, and the ignition switch as well as fuel economy.

When the "SET" button is pressed once in this screen, the service mode will proceed to the Unit check.

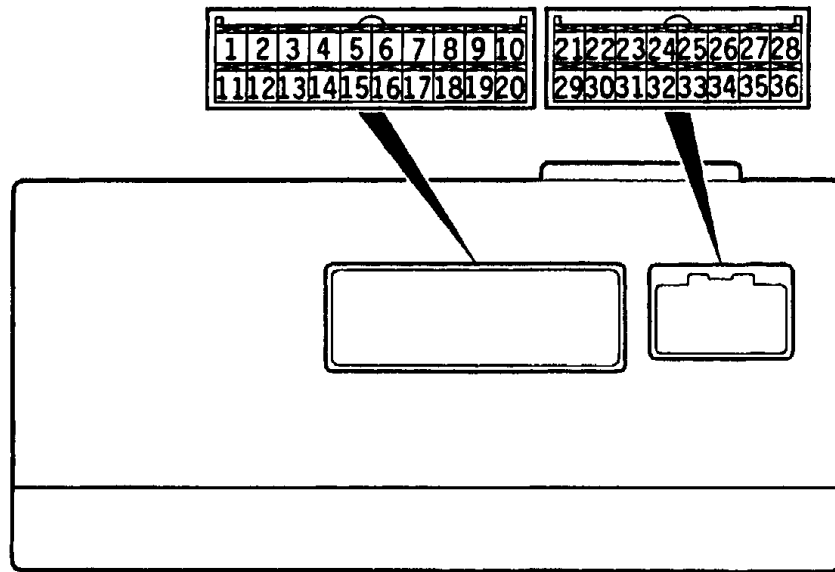
(3) Unit check connected into audio system

This screen shows an audio equipment, air conditioner or MUT-II connected in the system, percentage of system voltage, engine speed sent by the engine-ECU, and oscillation of internal clock.

When the "SET" button is pressed once in this screen, the service mode will return to the first screen (model identification screen).

MAIN UNIT TERMINAL VOLTAGES

1. MULTI CENTER DISPLAY UNIT

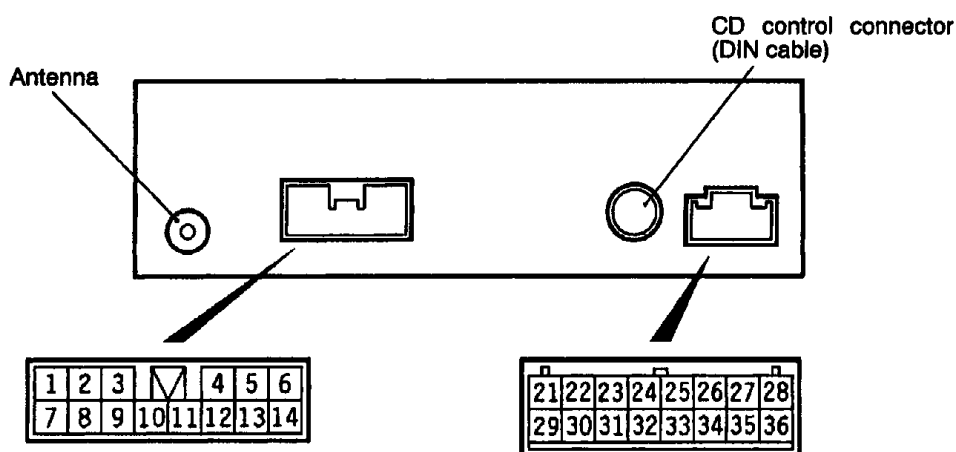


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Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1-4	-	-	-	-	-	-
5	Input	ISOK	Hi: System voltage Lo: 0 - 1	○	○	MUT-II cannot be used to check engine-ECU.
6	-	-	-	-	-	-
7	Input/Output	M-DATA (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	○	○	Audio display dose not appear. Panel switch cannot be operated for audio unit. Nighttime illumination dose not appear for audio unit.
8	Input/Output	M-CLOCK (AUDIO)	Hi: 4 - 5 Lo: 0 - 1	○	○	Audio display dose not appear. Panel switch cannot be operated for audio unit. Nighttime illumination dose not appear for audio unit.
9-14	-	-	-	-	-	-
15	Input/Output	K	Hi: System voltage Lo: 0 - 1	○	○	Values on Trip information screen (average speed, fuel consumption and cruising distance) are abnormal. Communication is not possible between the engine-ECU and the MUT-II.
16	-	-	-	-	-	-

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
17	Input/Output	M-BUSY (AUDIO)	Hi: 4 – 5 Lo: 0 – 1	○	○	Audio display does not appear. Panel switch cannot be operated for audio unit. Nighttime illumination does not appear for audio unit.
18	–	SHIELD-GND	–	–	–	–
19 – 22	–	–	–	–	–	–
23	Input	EX-TEMP		○	○	Outside air temperature does not appear.
24	Input	ILL+	Hi: System voltage Lo: 0 – 1	○	–	Nighttime illumination does not appear for any navigation system units.
				–	○	Blown multipurpose fuse.
25	Input	ACC (ACC power supply)	System voltage	○	–	Screen display does not appear.
				–	○	Blown multipurpose fuse.
26	Input	+B	System voltage	○	–	Screen display does not appear.
				–	○	Blown multipurpose fuse.
27	Input	VSS		○	–	No effect.
28	–	GND (Ground)	–	○	–	Screen display does not appear.
29, 30	–	–	–	–	–	–
31	–	GND-TEMP	–	○	○	Outside air temperature does not appear.
32	Input	ILL–	–	–	–	–
33	Input	FUEL GAUGE	–	○	○	Abnormal cruising distance display.
34, 35	–	–	–	–	–	–
36	Input	IG1	System voltage	○	–	Communication with engine-ECU is not possible. Driving data values displayed are abnormal.
				–	○	Communication with engine-ECU is not possible. Driving data values displayed are abnormal. Blown multipurpose fuse.

2. AUDIO UNIT



BV0846AE

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
1	Output	SPEAKER RR (+)	0 – System voltage (AC)	○	–	No sound is output from rear right speaker.
				–	○	No sound is output from rear left and right speakers.
2	Output	SPEAKER RL (+)	0 – System voltage (AC)	○	–	No sound is output from rear left speaker.
				–	○	No sound is output from rear left and right speakers.
3	Output	ANTENNA +B (Radio antenna amplifier power supply)	Hi: 10 or more Lo: 0 – 1	○	○	Low radio sensitivity.
4	–	–	–	–	–	–
5	Output	SPEAKER FL (+)	0 – System voltage (AC)	○	–	No sound is output from front left speaker.
				–	○	No sound is output from front left and right speakers.
6	Output	SPEAKER FR (+)	0 – System voltage (AC)	○	–	No sound is output from front right speaker.
				–	○	No sound is output from front left and right speakers.
7	Output	SPEAKER RR (–)	0 – System voltage (AC)	○	–	No sound is output from rear right speaker.
				–	○	No sound is output from rear left and right speakers.

Terminal No.	Input/Output	Signal Symbol	Terminal Voltage (V)	Harness Problem		Trouble Symptom Resulting from Harness Problem
				Open Circuit	Short-circuit	
8	Output	SPEAKER RL (-)	0 - System voltage (AC)	○	-	The rear left speaker does not sound.
				-	○	The rear left and right speakers do not sound.
9	-	-	-	-	-	-
10	Input	ACC (ACC power supply) (System voltage)	System voltage	○	-	The audio unit power supply does not turn on.
				-	○	Blown multipurpose fuse.
11	Input	+B (System voltage)	System voltage	○	-	Cassette is not ejected when the ignition switch is at ACCf. The memory are cleared.
				-	○	Blown multipurpose fuse.
12	Input	ILL (-)	-	-	-	-
13	Output	SPEAKER FL (-)	0 - System voltage (AC)	○	-	The front left speaker does not sound.
				-	○	The front left and right speakers do not sound.
14	Output	SPEAKER FR (-)	0 - System voltage (AC)	○	-	The front right speaker does not sound.
				-	○	The front left and right speakers do not sound.
21	Input/Output	M-DATA	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
22	Input/Output	M-SCK	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
23	Input	TELEPHONE MUTE	Hi: 4 or more Lo: 1 or less	-	○	Audio volume does not drop.
24 - 28	-	-	-	-	-	-
29	Input/Output	M-BUSY	Hi: 4 or more Lo: 1 or less	○	○	Panel switches cannot be operated.
30	-	SHIELD EARTH (M-BUS)	-	-	-	-
31 - 36	-	-	-	-	-	-

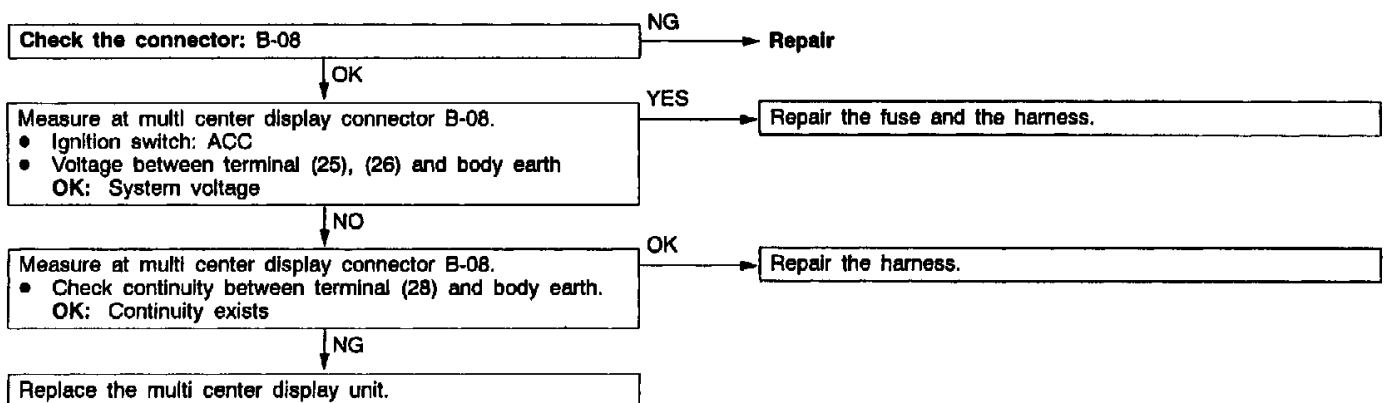
INSPECTION CHART CLASSIFIED BY TROUBLE SYMPTOMS

Related Unit	Trouble Symptom	Inspection Procedure No.	Reference Page
Malfunction of multi center display	No display appears after the ignition key is turned to ACC.	1	54-38
	TAPE/CD, UML switches do not work.	2	54-39
	CD switches do not work.	3	54-40
	Outside temperature data is not displayed. /Outside temperature data is abnormal.	4	54-40
	Abnormal driving data display - Abnormal average fuel consumption (momentary fuel consumption) and average speed displays. - Abnormal cruising distance displays	5	54-41
	No illumination of audio button	6	54-42
	Dim display	7	54-42
	Clock runs fast or slow	8	54-42

INSPECTION PROCEDURES FOR EACH TROUBLE SYMPTOM

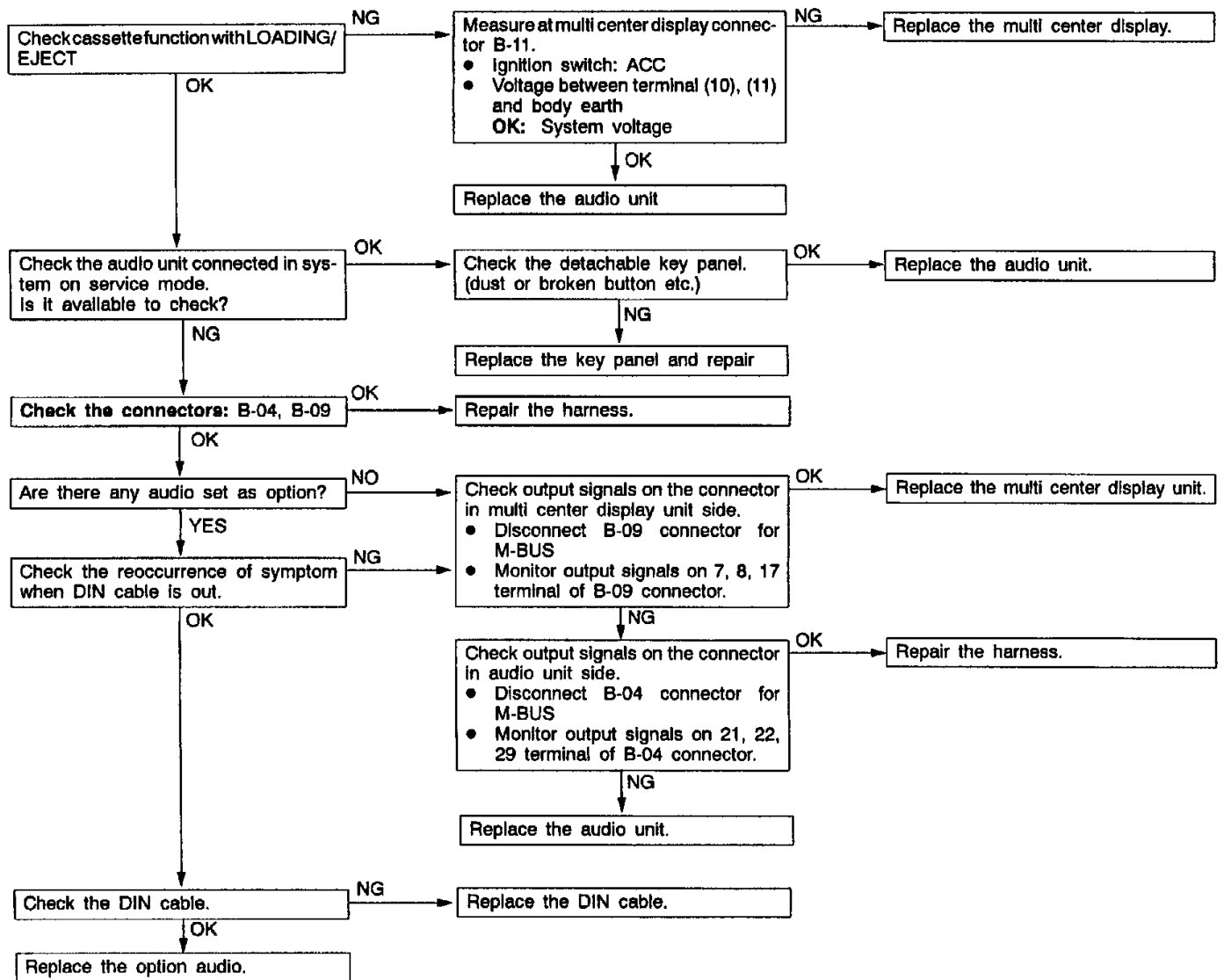
INSPECTION PROCEDURE 1

No display appears after the ignition key is turned to ACC.



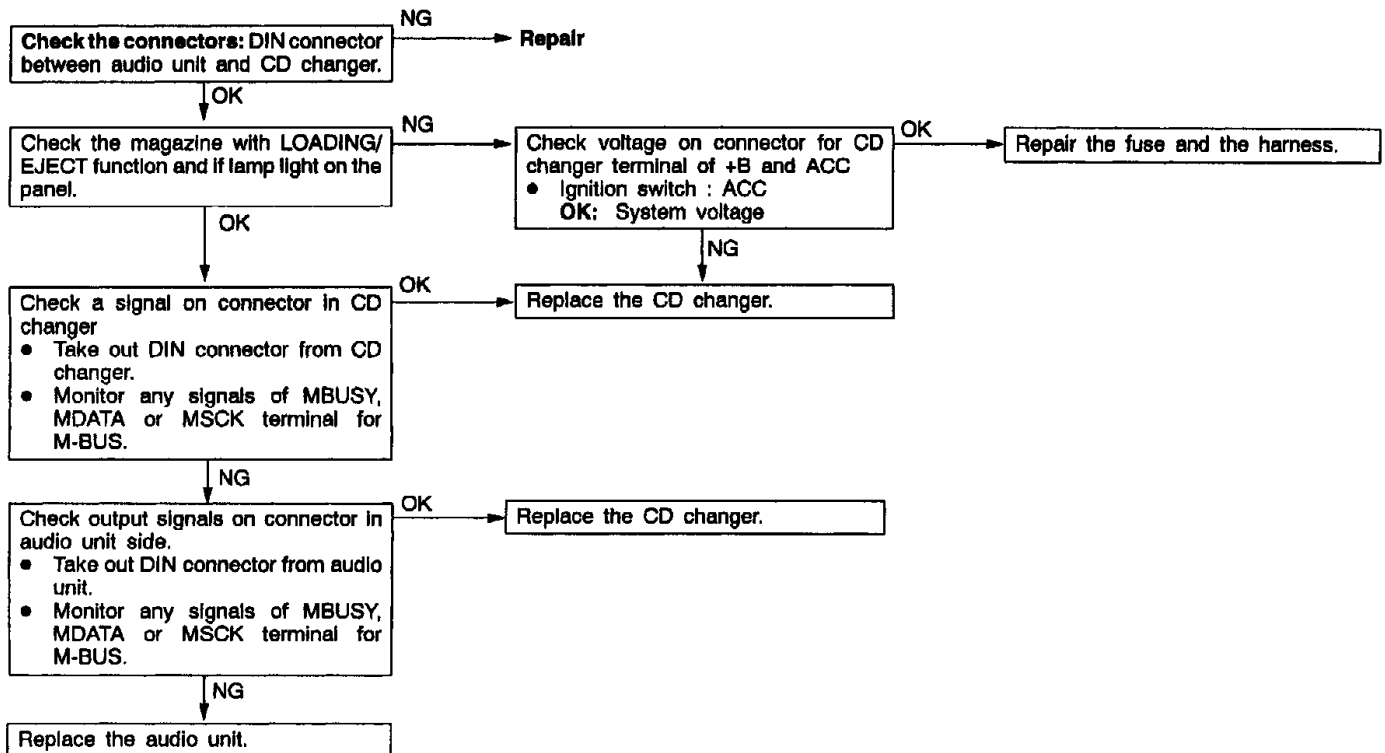
INSPECTION PROCEDURE 2

TAPE/CD, UML switches do not work.



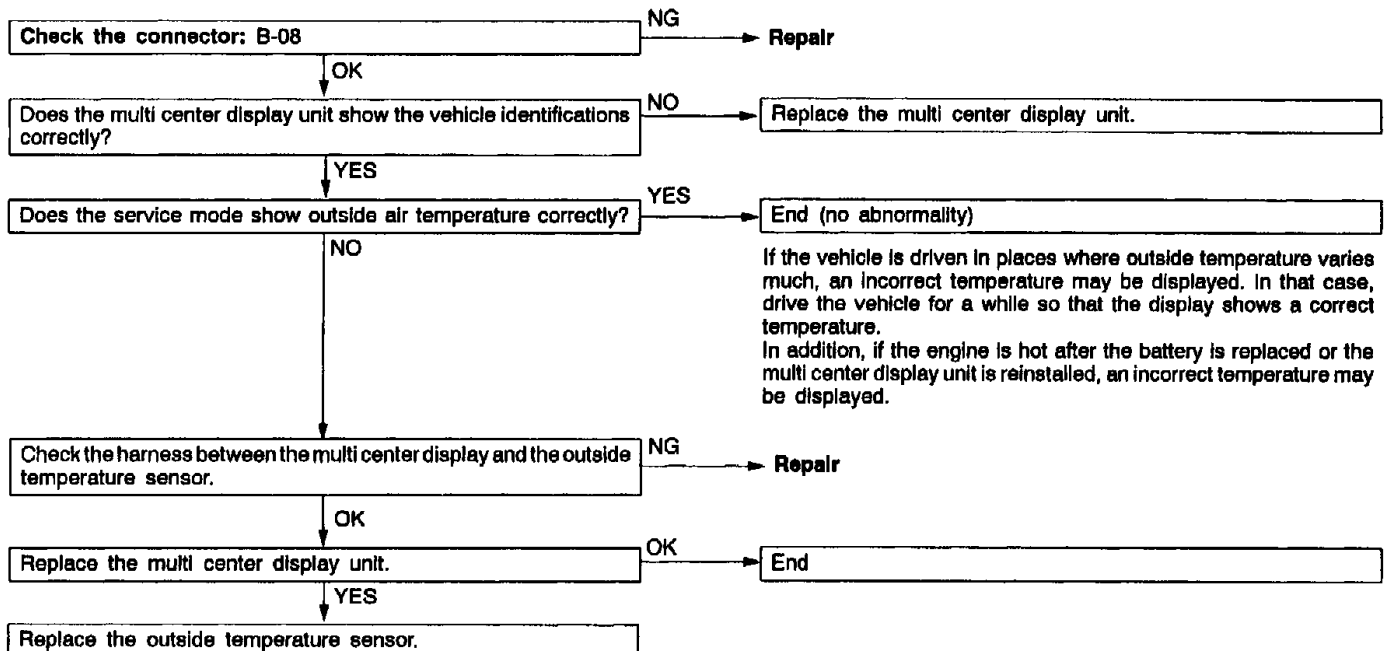
INSPECTION PROCEDURE 3

CD switch do not work.



INSPECTION PROCEDURE 4

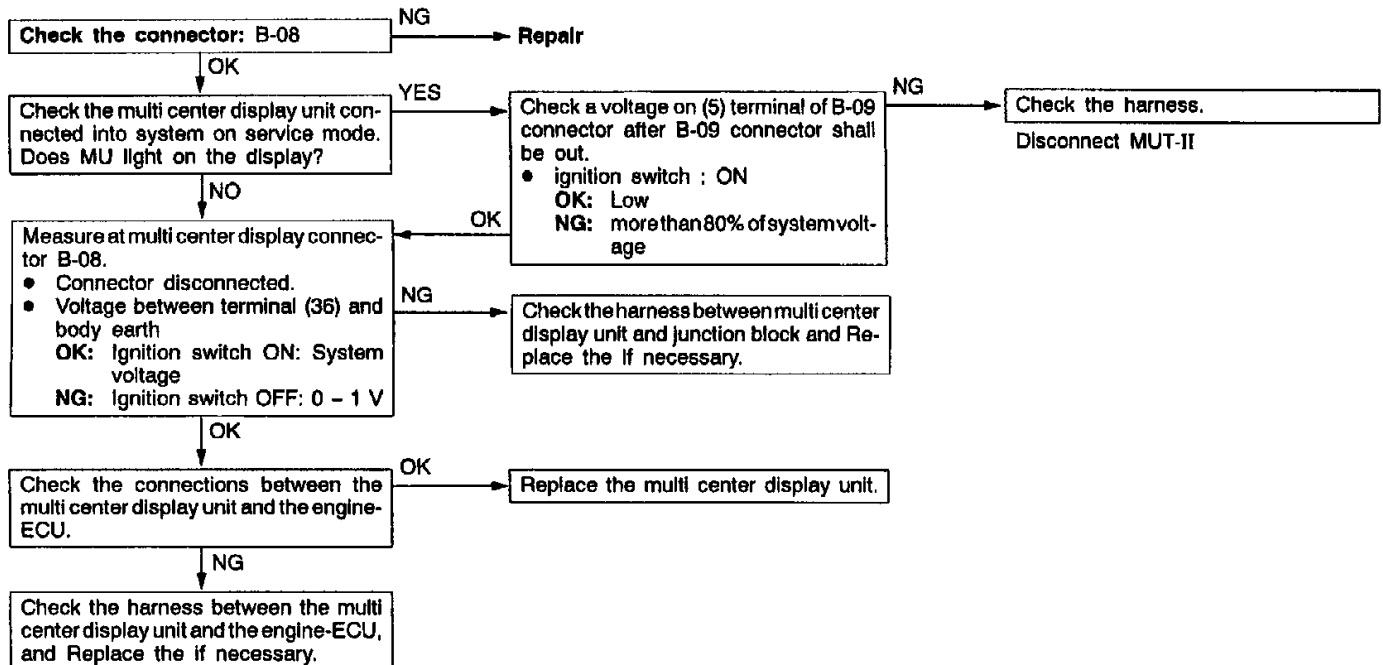
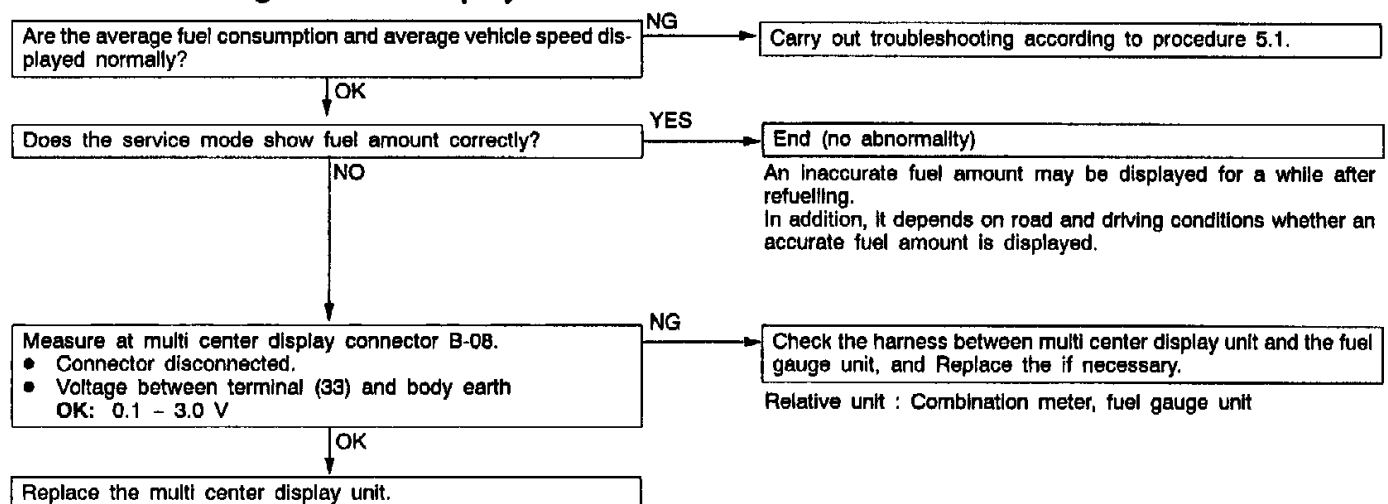
Outside air temperature data is not displayed. /Outside air temperature data is abnormal.



INSPECTION PROCEDURE 5

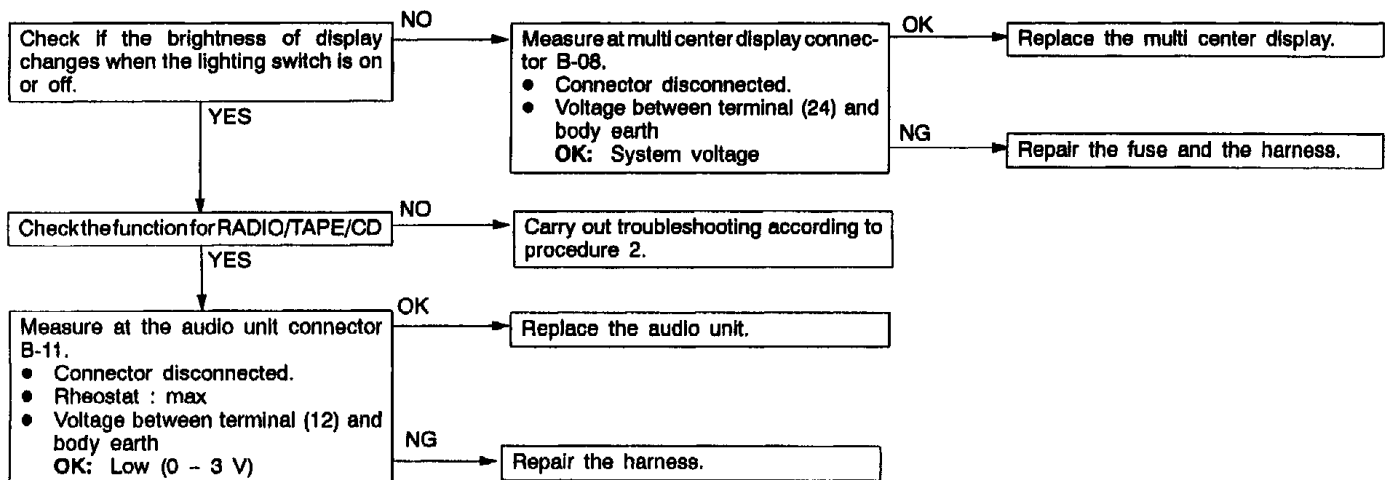
Abnormal driving data displays.

- Abnormal average fuel consumption (momentary fuel consumption) and average speed displays.
- Abnormal cruising distance displays.

1. When average fuel consumption (momentary fuel consumption) and average speed displays are abnormal.**2. When cruising distance display is abnormal.**

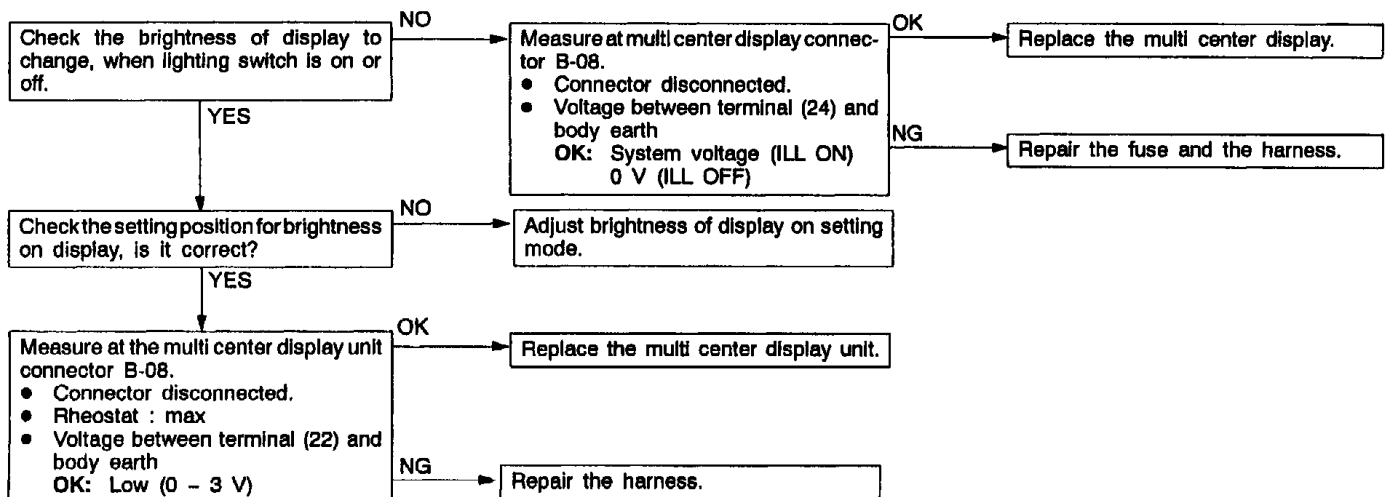
INSPECTION PROCEDURE 6

No illumination for audio buttons light on.



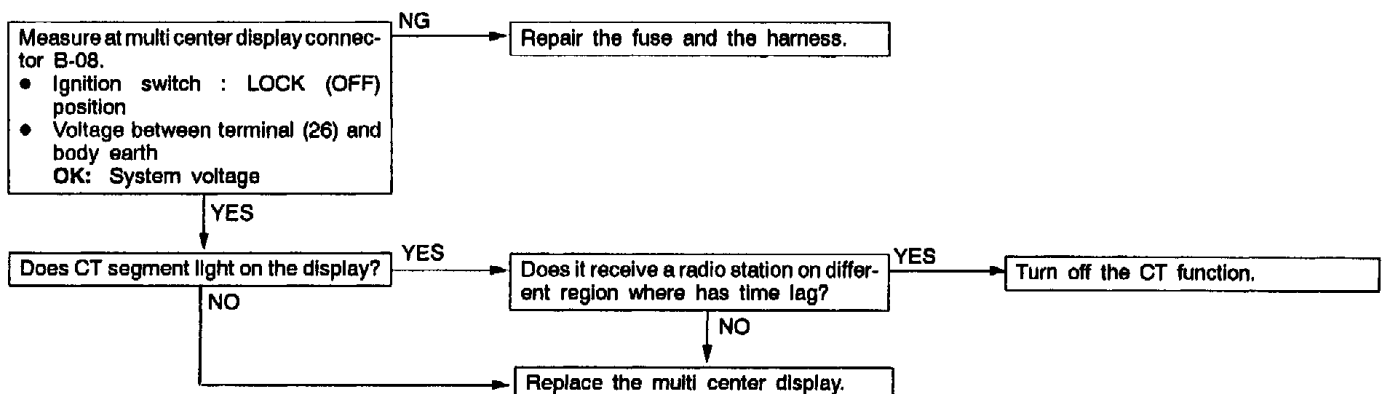
INSPECTION PROCEDURE 7

Dim display

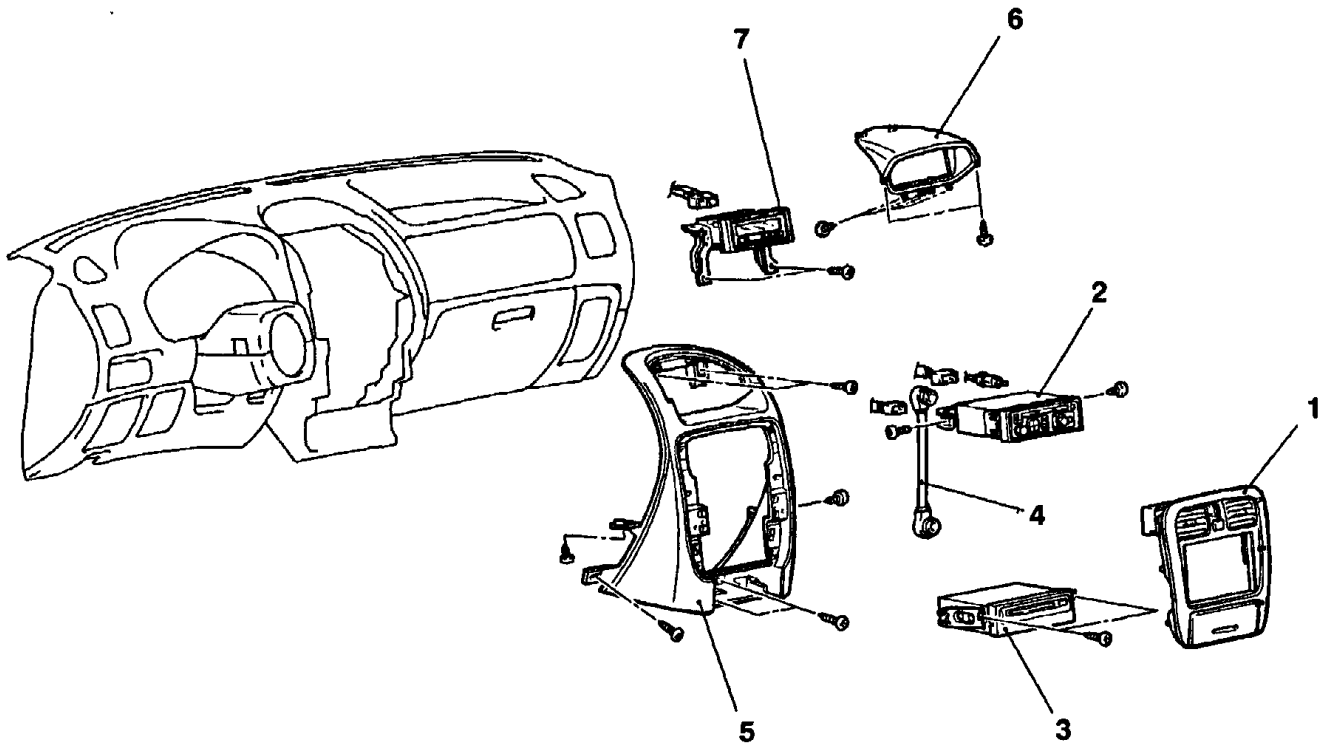


INSPECTION PROCEDURE 8

Clock runs fast or slow/indicate different time



MULTI CENTER DISPLAY REMOVAL AND INSTALLATION



AX0101BN

Removal steps

1. Center panel assembly
(Refer to GROUP 52A – Floor Console.)
2. Radio and tape player
3. Navigation unit <Vehicles with navigation system>
4. DIN cable
5. Center console assembly
(Refer to GROUP 52A – Floor Console.)
6. Multi center display hood
7. Multi center display

GROUP 55

HEATER, AIR CONDITIONER AND VENTILATION

GENERAL

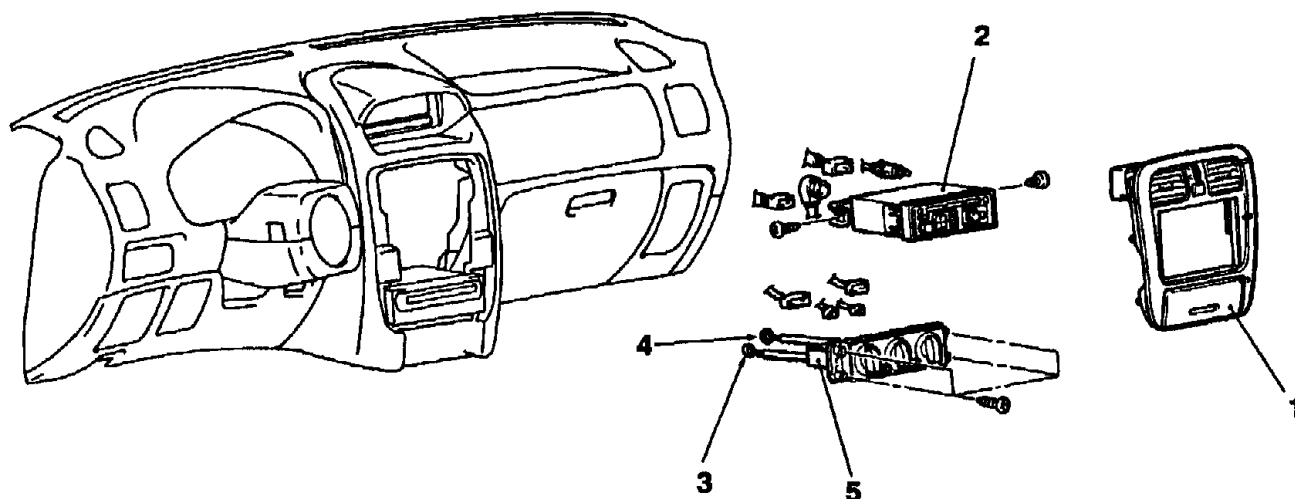
OUTLINE CHANGES

- The service procedure has been revised due to the change in the heater control <Vehicles with manual air conditioner>.
- The service procedure has been revised due to the change in the air control panel and ECU assembly <Vehicles with fully automatic air conditioner>

MANUAL AIR CONDITIONER

HEATER CONTROL ASSEMBLY

REMOVAL AND INSTALLATION

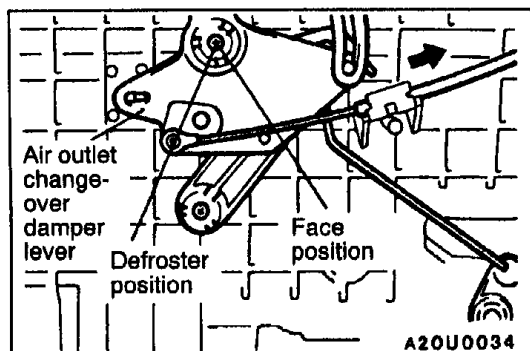


AX0102BN

Removal steps

1. Center panel assembly
(Refer to GROUP 52A – Floor Console.)
2. Radio and tape player

- B◄ 3. Air mix damper cable connection
►A◄ 4. Air outlet changeover damper cable connection
5. Heater control assembly



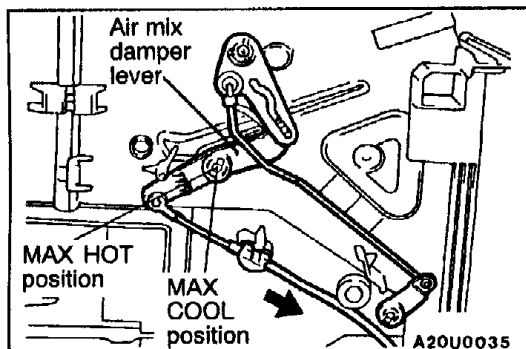
INSTALLATION SERVICE POINTS

AIR OUTLET CHANGEOVER DAMPER CABLE CONNECTION

1. Set the air outlet changeover control knob on the heater control assembly to the DEF position.
2. Set the air outlet changeover damper lever of the heater unit to the DEF position and install the cable to the lever pin.
3. Push the outer cable in the direction of the arrow so that there is no looseness, and then secure it with the clip.

AIR MIX DAMPER CABLE CONNECTION

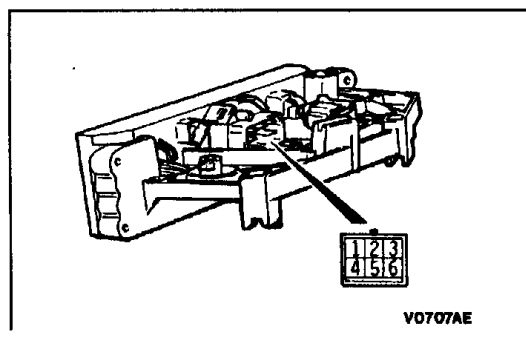
1. Set the temperature control knob on the heater control assembly to the MAX HOT position.
2. Set the air mix damper lever of the heater unit to the MAX HOT position as shown in the illustration, and then connect the cable to the lever pin.
3. Push the outer cable in the direction of the arrow so that there is no looseness, and then secure it with the clip.



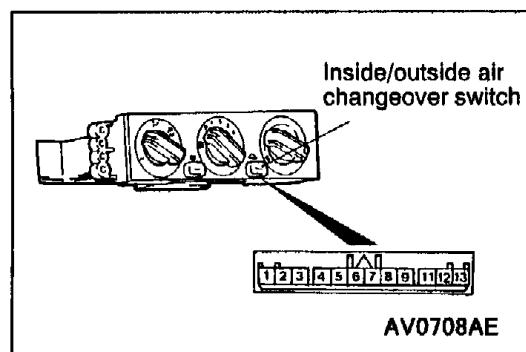
INSPECTION

BLOWER SWITCH CONTINUITY CHECK

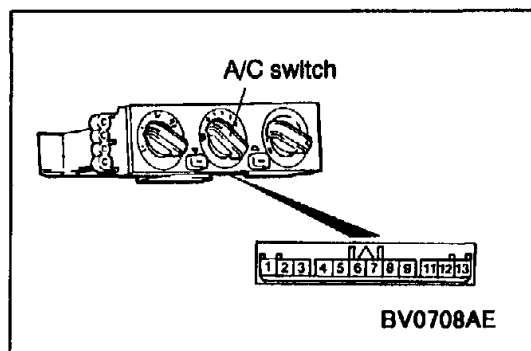
Switch position	Terminal No.					
	1	2	3	4	5	6
OFF						
● (LO)			○	—	○	
● (ML)	○	—	○			
● (MH)			○	—	—	○
● (HI)			○	—	○	



INSIDE/OUTSIDE AIR CHANGEOVER SWITCH CONTINUITY CHECK



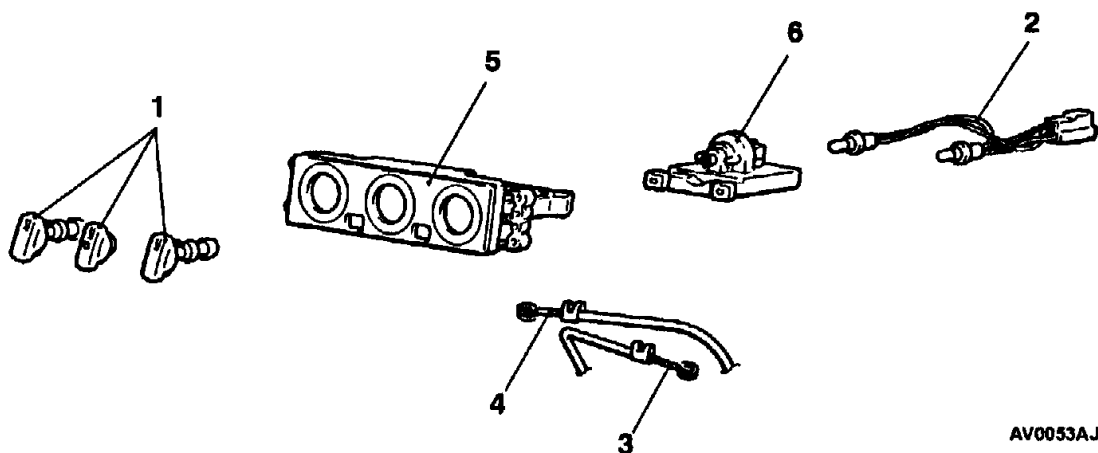
Switch position	Terminal No.						
	1	2	3	IND	4	8	9
RECIRC			○	○	○	ILL	
FRESH	○		○				



A/C SWITCH CONTINUITY CHECK

Switch position	Terminal No.					
	5	IND	6	7	8	9
OFF					ILL	
ON	○	○	○	○		

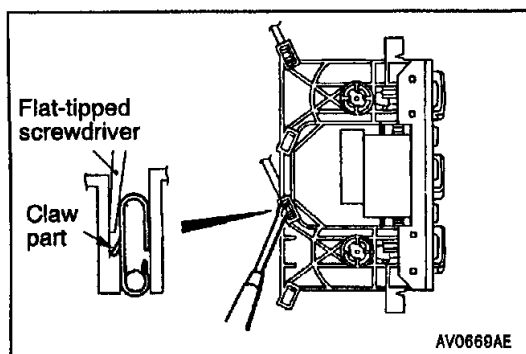
DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Knob assembly
2. Bulb harness
3. Air outlet changeover damper cable

4. Air mix damper cable
5. Heater control panel
6. Blower switch assembly



DISASSEMBLY SERVICE POINT

◀A▶ AIR OUTLET CHANGEOVER DAMPER CABLE/AIR MIX DAMPER CABLE REMOVAL

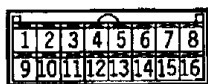
Insert a flat-tipped screwdriver into the control base clip from inner side, and then remove the cable by lifting the claw part of the clip.

FULLY AUTOMATIC AIR CONDITIONER

TROUBLESHOOTING

CHECK AT THE A/C-ECU TERMINALS

A/C-ECU



V0716AE

Terminal No.	Check item	Check condition	Normal condition
1	Sensor power supply	At all times	5 V
2	Outside air temperature sensor input	When sensor section temperature is 25°C (1.7 kΩ)	1.9 V
3	Heater water temperature sensor input	When sensor section temperature is 25°C (5 kΩ)	2.8 V
4	Air mix damper motor potentiometer input	When damper is moved to MAX. HOT position	0.7 – 1.3 V
5	Illumination power supply	Lighting switch: ON	System voltage
6	IG2 power supply	Ignition switch: ON	System voltage
7	ACC power supply	Ignition switch: ON	System voltage
8	Back-up power supply	At all times	System voltage
9	Sensor earth	At all times	0 V
10	Air thermo sensor input	When sensor section temperature is 25°C (1.5 kΩ)	2.2 V
11	Photo sensor (+)	At 800 kcal/m ² -h	1 V
12	Air outlet changeover damper potentiometer	Set to DEF. position.	0.7 – 1.3 V
13	Diagnosis input	Ignition switch: ON	0 V
15	Illumination earth	At all times	Continuity
16	Earth	At all times	Continuity
21	Air mix damper motor (MAX. COOL)	Set to MAX. COOL position.	10 V
		Set to MAX. HOT position.	Weak voltage (0.5 V)
22	Air outlet changeover damper motor (FACE)	Set to FACE position.	10 V
		Set to DEF. position.	Weak voltage (0.5 V)

Terminal No.	Check item	Check condition	Normal condition
23	Inside/outside air changeover damper motor (Inside air)	Set to inside air position.	Weak voltage (0.5 V)
		Set to outside air position.	10 V (When the motor is stopped)
24	Inside/outside air changeover damper motor (Outside air)	Set to inside air position.	10 V (When the motor is stopped)
		Set to outside air position.	Weak voltage (0.5 V)
25	A/C output	When A/C is OFF	0 V
		When A/C is ON	System voltage
26	-	-	-
27	Engine-ECU output	When air mix damper is at MAX. COOL position (Compressor: ON, Inside air temperature: 31°C or more)	0 V
		When air mix damper is at MAX. HOT position (Compressor: OFF, Inside air temperature: 29°C or more)	System voltage
30	Blower pulse controller output	Air volume adjusting dial: LO - HI	3.5 - 0 V (Effective value at alternative current)
31	Air mix damper motor (MAX. HOT)	Set to MAX. COOL position.	Weak voltage (0.5 V)
		Set to MAX. HOT position.	10 V
32	Air outlet changeover damper motor (DEF.)	Set to FACE position.	Weak voltage 0.5 V
		Set to DEF. position.	10 V
34	Front blower relay	When front A/C is OFF	System voltage
		When front A/C is ON	0 V
35	Rear defogger	When rear defogger switch is ON	1.5 V or less
		When rear defogger switch is OFF	System voltage
38	-	-	-
39	Diagnosis data output	When ignition switch is ON	Voltmeter fluctuates between 0 and 12 V.
41	Rear power transistor collector output	When rear cooler is ON	0 - 10 V
42	Rear balancer solenoid valve	When rear cooler is OFF	System voltage

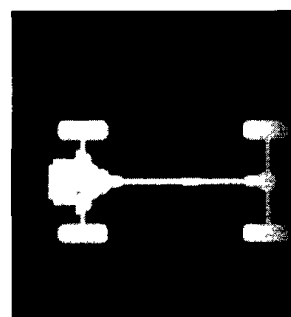
Terminal No.	Check item	Check condition	Normal condition
44	Rear A/C air volume adjusting dial switch input (HI)	When air volume adjusting dial is at HI.	0 V
45	Rear A/C air volume adjusting dial switch input (LO)	When air volume adjusting dial is at LO.	0 V
46	Rear balancer input	Set the temperature dial to "+4" position.	1 V
		Set the temperature dial to "-4" position.	4 V
47	Rear power transistor base output	When rear cooler is ON	0.5 – 7 V
48	Rear cooler relay	When rear cooler is OFF	System voltage
		When rear cooler is ON	0 V
50	Rear A/C air volume adjusting dial switch input (AUTO)	Set air volume adjusting dial to "AUTO" position.	0 V
51	Rear A/C air volume adjusting dial switch input (ME)	Set air volume adjusting dial to "ME" position.	0 V
52	Air thermo sensor input	When sensor section temperature is 25°C (1.7 kΩ)	2.2 V



Workshop Manual

chassis SUPPLEMENT

CARISMA '99



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

PYGE95E1
PYGE95E1-A
PYGE95E1-B

WORKSHOP MANUAL ENGINE GROUP

PWEE□□□□
(Looseleaf edition)

CHASSIS GROUP

PWDE9502
PWDE9502-A
PWDE9502-B
PWDE9502-C

ELECTRICAL WIRING

PHDE9501
PHDE9501-A
PHDE9501-B
PHDE9501-C
PHDE9501-D

BODY REPAIR MANUAL

PBGE95E1
PBGE95E1-A

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.

General	00
Engine	11
Fuel	13
Engine Cooling	14
Intake and Exhaust	15
Engine Electrical	16
Engine and Emission Control	17
Clutch	21
Manual Transmission	22
Automatic Transmission	23
Front Axle	26
Rear Axle	27
Wheel and Tyre	31
Front Suspension	33
Rear Suspension	34
Service Brakes	35
Parking Brakes	36
Steering	37
Body	42
Exterior	51
Interior and Supplemental Restrain System (SRS)	52
Chassis Electrical	54
Heater, Air Conditioner and Ventilation	55

WARNING!

- (1) Improper service or maintenance of any component of the SRS and seat belt with pre-tensioner, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag and seat belt with pre-tensioner) or to the driver and passenger (from rendering the SRS Inoperative).**
- (2) SRS components and seat belt with pre-tensioner should not be subjected to heat, so remove the SRS-ECU, air bag module, clock spring and seat belt with pre-tensioner before drying or baking the vehicle after painting.**
SRS-ECU, air bag module, clock spring: 93°C or more
Seat belt with pre-tensioner: 90°C or more
- (3) Service or maintenance of any SRS component and seat belt with pre-tensioner 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 component of the SRS and seat belt with pre-tensioner or any SRS-related component.**

NOTE

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