

SUZUKI

VITARA

SUPPLEMENTARY SERVICE MANUAL

USE THIS SUPPLEMENTARY SERVICE MANUAL
WITH MANUALS MENTIONED IN THE FOREWORD
OF THIS MANUAL.

SUZUKI
Caring for Customers

99501-61A40-01E
(英)

IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:

Indicates a potential hazard that could result in death or injury.

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

This service manual is intended for authorized Suzuki dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:

For vehicles equipped with a Supplemental Inflatable Restraint Air Bag System:

- Service on or around air bag system components or wiring must be performed only by an authorized Suzuki dealer. Please observe all **WARNINGS** and **SERVICE PRECAUTIONS** in Section 9J under "On-Vehicle Service" and the Air Bag System Component and Wiring Location view in Section 9J before performing service on or around air bag system components or wiring. Failure to follow **WARNINGS** could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.
- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag deployment.
- Do not modify the steering wheel, dashboard, or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C, 200°F (for example, during a paint baking process), remove the air bag system components (air bag inflator module, sensing and diagnostic module, forward discriminating sensor) beforehand to avoid component damage or unintended deployment.

FOREWORD

This SUPPLEMENTARY SERVICE MANUAL is a supplement to SE416 SERVICE MANUAL.

Applicable model:

SE416 vehicles on and after following body No.

GROUP 1

(X) JSAETA02C01200001 (X)

(X) JSAETA02V01200001 (X)

(X) JSAETD01V01200001 (X)

TD01V-200001

GROUP 2

Refer to body number mentioned in FOREWORD of GROUP 2

When servicing a vehicle with a body number after the above listed number, refer to this Supplementary Service Manual first.

And for any section, item or description not found in this service manual, refer to the right listed SERVICE MANUAL.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricants, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced. The right is reserved to make changes at any time without notice.

SUZUKI MOTOR CORPORATION
OVERSEAS SERVICE DEPARTMENT

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RELATED SERVICE MANUAL

- VITARA SERVICE MANUAL (99500-60A10)
- VITARA SUPPLEMENTARY SERVICE MANUAL (99501-60A70)
- VITARA SUPPLEMENTARY SERVICE MANUAL (99501-61A10)
- SE/SV/SZ/SY SERIES SUPPLEMENTARY SERVICE MANUAL (99501-60G10)
- SE416/SZ416 SUPPLEMENTARY SERVICE MANUAL (99501-61A20)

GROUP 1

3D

6E1

7B1

GROUP 2

1A

5

8

9J

ABBREVIATIONS USED IN THIS MANUAL

A. ABS	: Anti-lock Brake System
A/C	: Air Conditioning
A/F	: Air Fuel mixture ratio
A/T	: Automatic Transmission
B. B+	: Battery Voltage
C. CMP sensor	: Camshaft Position Sensor
CPU	: Central Processing Unit
CTP switch	: Closed Throttle Position switch
D. DLC	: Data Link Connector
E. ECM	: Engine Control Module
ECT sensor	: Engine Coolant Temp. sensor
EGR	: Exhaust Gas Recirculation
EVAP	: Evaporative Emission
F. 4WD	: Four Wheel Drive
G. GND	: Ground
I. IAC valve	: Idle Air Control valve
IAT sensor	: Intake Air Temp. sensor
IC	: Ignition Control
M. MAF sensor	: Mass Air Flow sensor
MAP sensor	: Manifold Absolute Pressure sensor
MIL	: Malfunction Indicator Lamp
M/T	: Manual Transmission
O. O/D	: Over Drive
P. PCM	: Powertrain Control Module
PCV valve	: Positive Crankcase Ventilation valve
PSP switch	: Power Steering Pressure switch
T. TCC	: Torque Converter Clutch
TCM	: Transmission Control Module
TP sensor	: Throttle Position sensor
V. VSS	: Vehicle Speed Sensor

SECTION 3D

3D

FRONT SUSPENSION

NOTE:

- For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in Foreword of this manual.
- All front suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any front suspension part. Replace it with a new part or damage to the part may result.

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FRONT FREE WHEELING HUB (IF EQUIPPED)

There are two types of the front free wheeling hub in this vehicle (if equipped). One is manual type and the other is automatic type.

As removal, installation and maintenance procedures vary between them, be sure to correct section applicable to each kind.

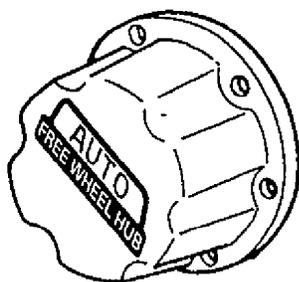
CAUTION:

- Make sure that the same front free wheeling hub is installed for both right and left.
- For vehicle equipped with manual free wheeling hub, both of the right and left wheeling hub knobs must be set to the same position (either FREE or LOCK). Don't set one to "FREE" and the other to "LOCK" positions.
- Never disassemble free wheeling hub assembly. Disassembly will spoil its original function.

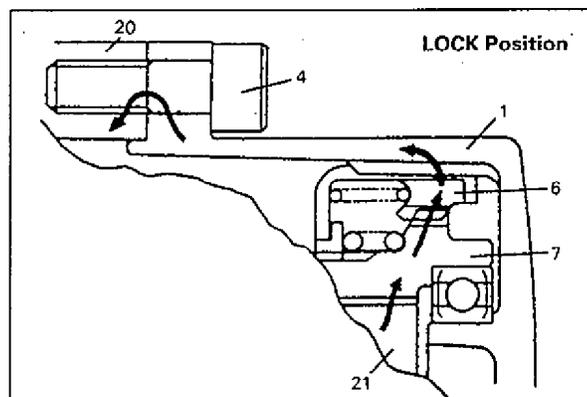
MANUAL FREE WHEELING HUB

Refer to the same section of the Service Manual mentioned in Foreword of this manual for operation, installation and maintenance.

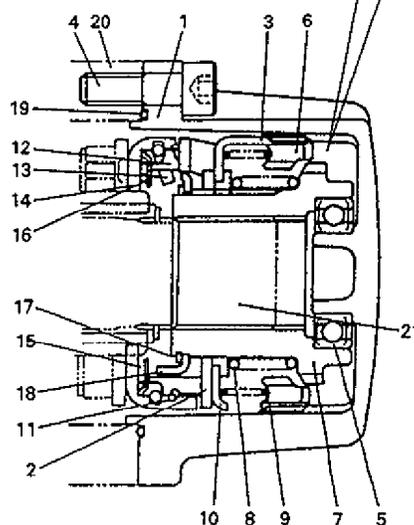
AUTOMATIC FREE WHEELING HUB



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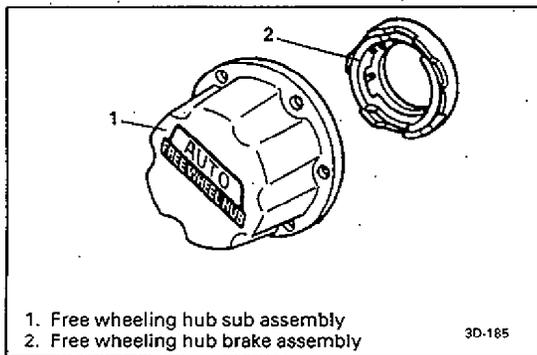


FREE Position

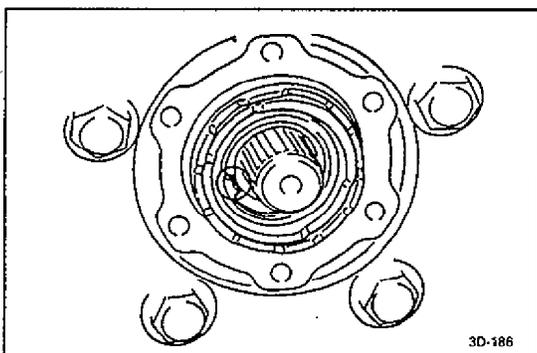


1. Housing
2. Cam
3. Retainer
4. Bolt
5. Ball bearing
6. Slide gear
7. Drive gear
8. Return spring
9. Shift spring
10. Spring holder
11. C-ring
12. Inner brake
13. Wire brake
14. Outer brake
15. Needle bearing
16. Thrust washer
17. Snap ring
18. Release plate
19. O-ring
20. Wheel hub
21. Drive shaft

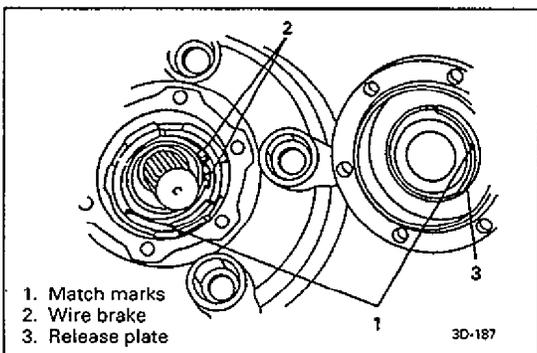
3D-166

**REMOVAL**

- 1) Set free wheeling hub to free condition. (Set transfer gear shift lever to 2H position, and move vehicle 2 m (6.5 ft) or more backward slowly.)
- 2) Hoist vehicle, if wheel (tire) removal is necessary.
- 3) Remove wheel (tire), if necessary.
- 4) Remove free wheeling hub (sub assembly and brake assembly) slowly.

**INSTALLATION**

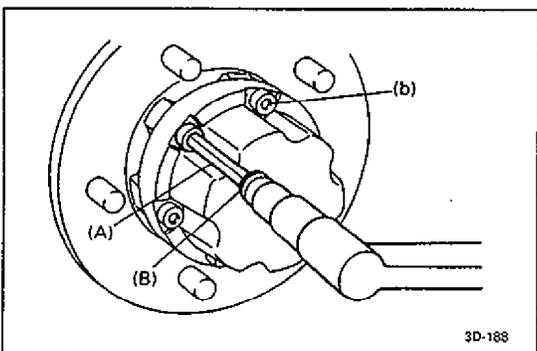
- 1) Check O-ring for damage and clean mating surfaces of hubs.
- 2) Install free wheeling hub brake assembly to spindle aligning key of brake assembly with slot in spindle.



- 3) Install free wheeling hub sub assembly to spindle aligning the match marks of brake assembly and sub assembly.

CAUTION:

Make sure that match marks are aligned. If they aren't, wire brake and release plate may interfere with each other, causing spring to break.



- 4) Tighten hub bolts to specified torque.

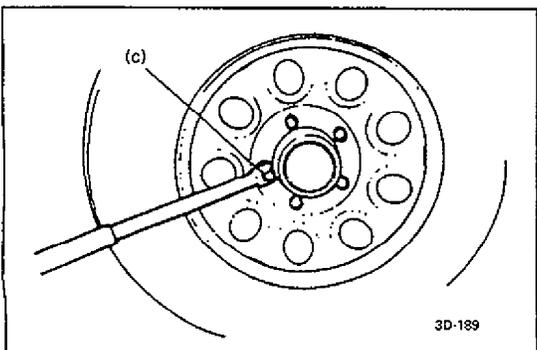
Special Tool

(A): 09900-00414 (6 mm bit)

(B): 09900-00411 (Socket)

Tightening Torque

(b): 33 N·m (3.3 kg-m, 24 lb-ft)

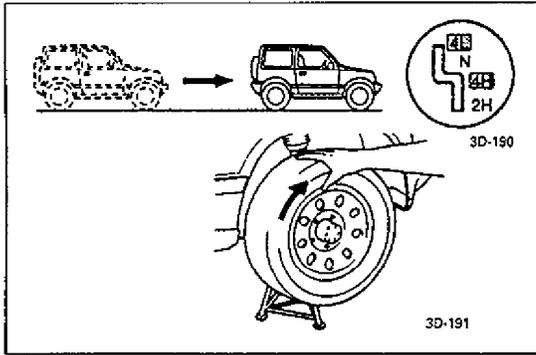


- 5) Install front wheels and tighten wheel nuts to specified torque, if removed.

Tightening Torque

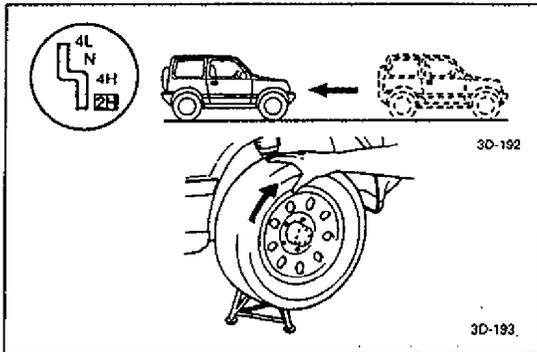
(c): 95 N·m (9.5 kg-m, 69.0 lb-ft)

- 6) Dismount the vehicle from the lift, and be sure to carry out the operation check of free wheeling hub mentioned in the next item "Post-assembly confirmation".

**Post-assembly confirmation**

Confirm automatic free wheeling hub for proper operation in the sequence described below.

- 1) Set transfer gear shift lever to 4H or 4L position, and move vehicle 2 m (6.5 ft) or more forward slowly.
- 2) Hoist vehicle and check that wheel (tire) rotation is transmitted to drive shaft (lock condition) when rotating right wheel clockwise (left wheel counterclockwise) by hand.
- 3) Dismount vehicle from lift.



- 4) Set transfer gear shift lever to 2H position, and move vehicle 2 m (6.5 ft) or more backward slowly.
- 5) Hoist vehicle and check that wheel (tire) rotation is not transmitted to drive shaft (free condition) when rotating right wheel clockwise (left wheel counterclockwise) by hand.

- 6) Check to ensure that free wheeling hub locks and unlocks properly by reversing vehicle moving directions described in steps 1) and 4). (It should lock when moving backward and unlock when moving forward.)

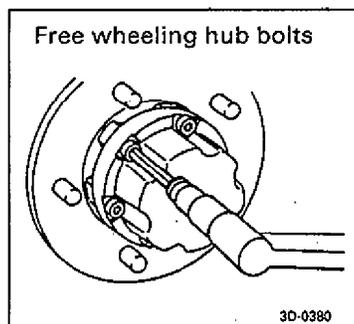
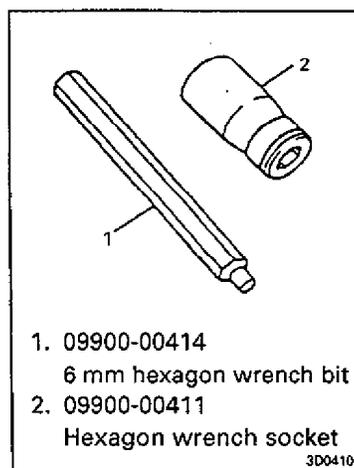
If any malfunction is found as to the confirmation in the above steps 1) through 6), reinstall or replace free wheeling hub assembly.

MAINTENANCE SERVICE

Confirm automatic free wheeling hub for proper operation periodically according to the procedure described previously in "Post-assembly confirmation". If automatic free wheeling hub shows any malfunction, replace it with new one.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N-m	kg-m	lb-ft
Automatic free wheeling hub bolts	33	3.3	24

**SPECIAL TOOLS**

SECTION 6E1

ELECTRONIC FUEL INJECTION SYSTEM

6E1

(SEQUENTIAL MULTIPOINT FUEL INJECTION)

WARNING:

For vehicles equipped with a Supplemental Inflatable Restraint Air Bag System:

- Service on or around Air Bag System Components or Wiring must be performed only by an authorized Suzuki dealer. Please observe all WARNINGS and SERVICE PRECAUTIONS in Section 9J under "On-Vehicle Service" and the Air Bag System Component and Wiring Location view in Section 9J before performing service on or around Air Bag System Components or Wiring. Failure to follow WARNINGS could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the air bags may be deployed by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

For the descriptions (items) not found in this section of this manual, refer to the same section of SE416/SZ416 supplementary service manual (99501-61A20).

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GENERAL DESCRIPTION

The Electronic Fuel Injection System in this vehicle supplies the combustion chambers with air/fuel mixture of optimized ratio under widely varying driving conditions.

It uses the sequential multiport fuel injection system which injects fuel into each intake port of the cylinder head.

This system has 3 major sub-systems: air intake system, fuel delivery system and electronic control system.

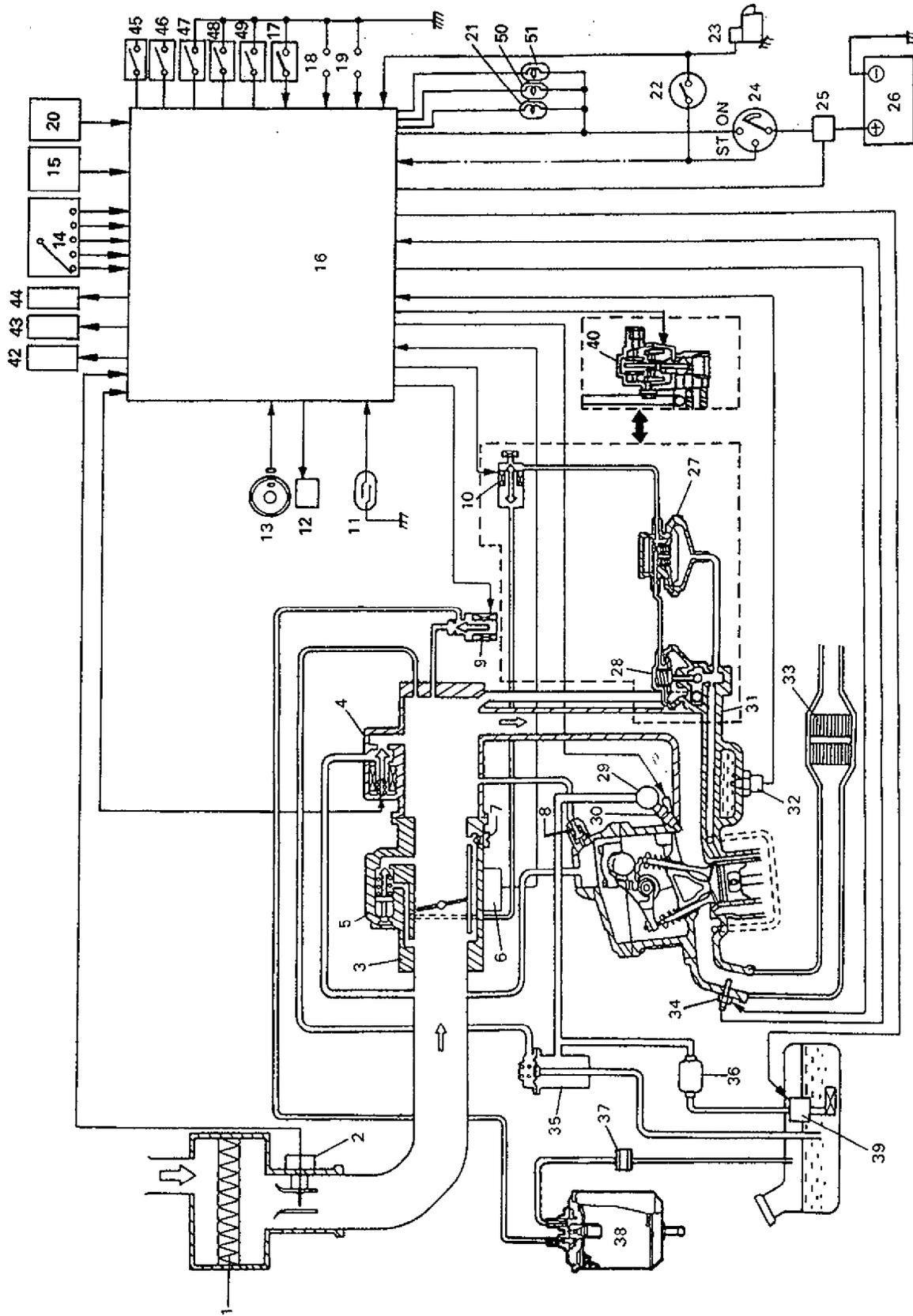
Air intake system includes air cleaner, mass air flow sensor, throttle body, fast idle air valve, idle air control valve and intake manifold.

Fuel delivery system includes fuel pump, delivery pipe, fuel pressure regulator, etc.

Electronic control system includes ECM, various sensors and controlled devices.

This section explains the system related to the electronic fuel injection as well as such functions of ECM as listed below.

- EGR system. (Stepper motor or solenoid vacuum valve, if equipped)
- Evaporative emission control system.
- IC (Ignition Control) system.



1. Air Cleaner
2. Mass air flow sensor
3. Throttle body
4. Idle air control valve
5. Fast idle air valve
6. Throttle position sensor
7. Idle air adjusting screw
8. PCV valve
9. EVAP canister purge valve
10. EGR solenoid vacuum valve (if equipped)
11. Vehicle speed sensor
12. Igniter
13. Camshaft position sensor
14. Transmission range switch (A/T)
15. A/C amplifier (if equipped)
16. ECM
17. Power steering pressure switch (if equipped)
18. Test switch terminal
19. Diag. switch terminal
20. CO adjusting resistor (if equipped)
21. Malfunction indicator lamp ("CHECK ENGINE" light)
22. Clutch pedal position switch (M/T, if equipped) or transmission range switch (A/T)
23. Starter magnetic switch
24. Main switch
25. Main fuse
26. Battery
27. EGR pressure transducer (if equipped)
28. EGR valve (if equipped)
29. Fuel delivery pipe
30. Fuel injector
31. Intake manifold
32. Engine coolant temp. sensor
33. Three way catalytic converter (if equipped)
34. Heated oxygen sensor (if equipped)
35. Fuel pressure regulator
36. Fuel filter
37. Tank pressure control valve
38. EVAP canister
39. Fuel pump
40. EGR valve (stepper motor), if equipped
41. Shift solenoid valve A (A/T)
42. Shift solenoid valve B (A/T)
43. TCC solenoid valve (A/T)
44. Lighting switch (A/T)
45. Brake switch (A/T)
46. Mode selector switch (A/T)
47. O/D cut switch (A/T)
48. 4WD low switch (A/T)
49. "OD/OFF" light (A/T)
50. "POWER" light (A/T)

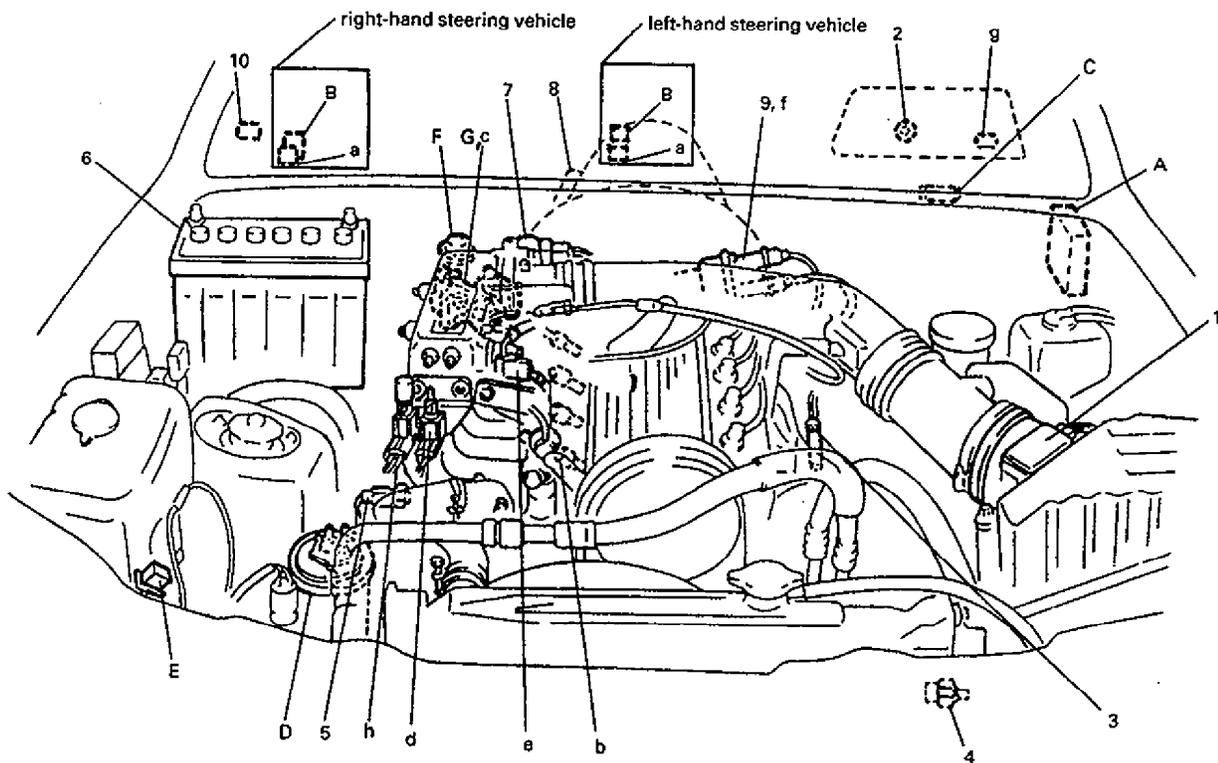
ELECTRONIC CONTROL SYSTEM

The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM which controls various devices according to the signals from the sensors and 3) various controlled devices. Functionally, it is divided into the following sub systems:

- Fuel injection control system
- Heated oxygen sensor heater control system (if equipped)

- Idle air control system
- Fuel pump control system
- Evaporative emission control system
- IC (Ignition Control) system
- EGR system (stepper motor or solenoid vacuum valve, if equipped)

Also, with 4 A/T model, ECM controls A/T.



INFORMATION SENSORS

1. MAF sensor
2. VSS
3. Heated oxygen sensor (if equipped)
4. Power steering pressure switch (if equipped)
5. ECT sensor
6. Battery
7. TP sensor
8. Transmission range switch (A/T only)
9. Camshaft position sensor (CMP sensor) (in distributor)
10. CO adjust resistor (vehicle without heated oxygen sensor)

CONTROLLED DEVICES

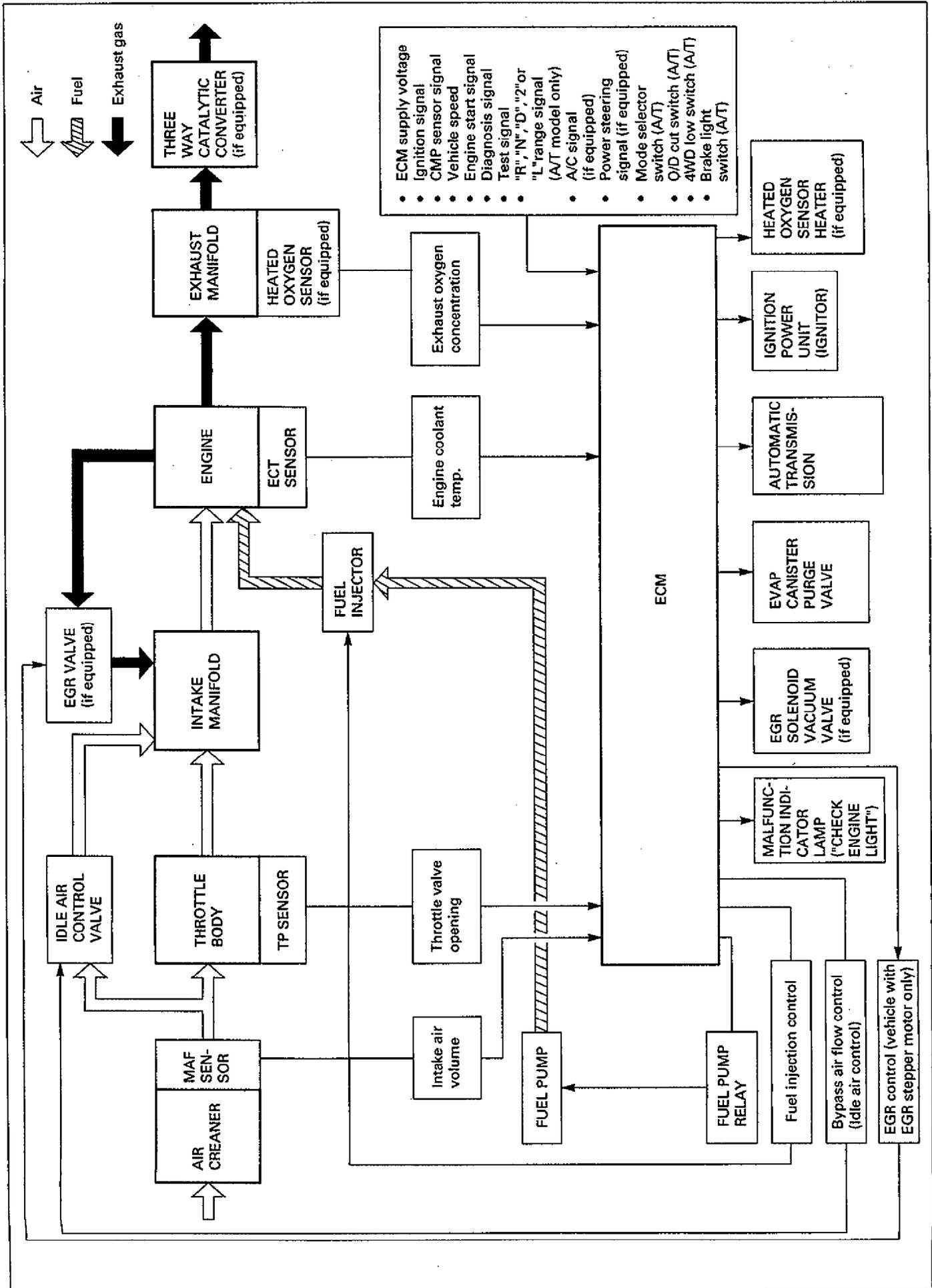
- a : Fuel pump relay
 b : Injector
 c : EGR valve (stepper motor, if equipped)
 d : Idle air control valve
 e : Igniter (in distributor)
 g : Malfunction indicator lamp ("CHECK ENGINE" light)
 h : EGR solenoid vacuum valve (if equipped)

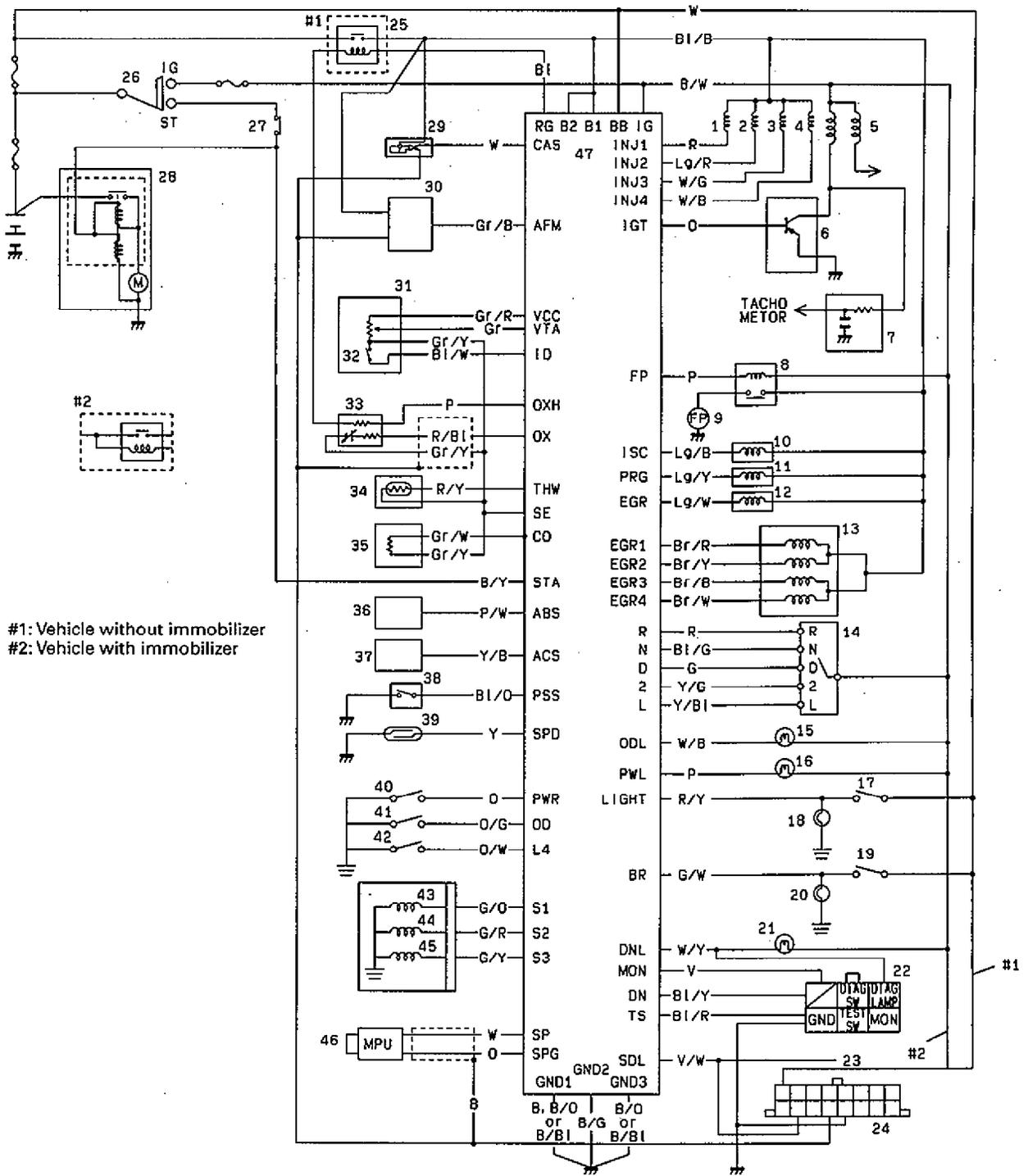
OTHERS

- A : ECM
 B : Main relay
 C : Data link connector (Assembly line diag. link)
 D : EVAP canister
 E : Monitor coupler (Engine)
 F : EGR pressure transducer (if equipped)
 G : EGR valve (if equipped)

NOTE:

Above figure shows left-hand steering vehicle. For right-hand steering vehicle, CO adjusting resistor, combination meter, DLC and ECM are installed at the other side.





TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE

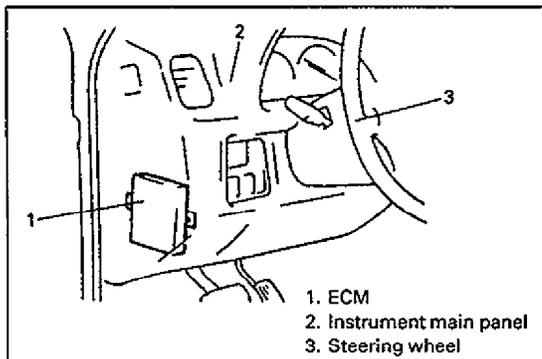
A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22

A/T VEHICLE

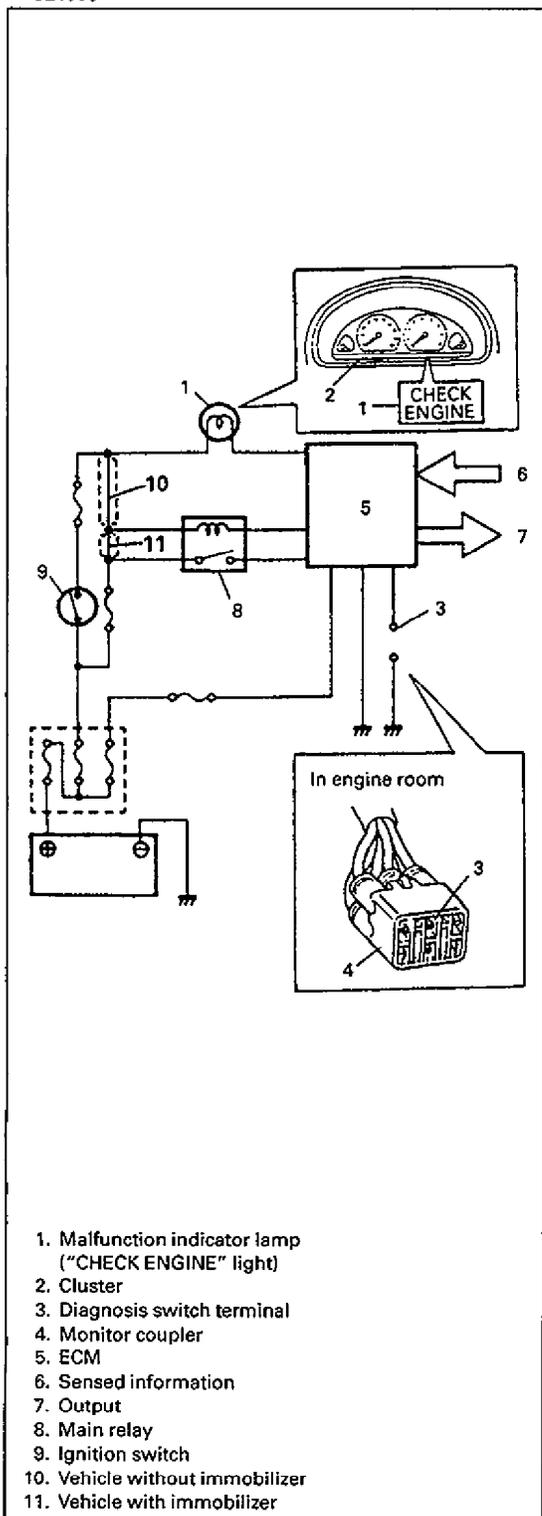
A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8							D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B9	B10	B11	B12	B13	B14	B15	B16							D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22

1. No.1 injector
2. No.2 injector
3. No.3 injector
4. No.4 injector
5. Ignition coil
6. Ignitor
7. Noise suppressor
8. Fuel pump relay
9. Fuel pump
10. IAC valve
11. EVAP canister purge valve
12. EGR solenoid vacuum valve (if equipped)
13. EGR valve (stepper motor, if equipped)
14. Transmission range switch (A/T)
15. "OD/OFF" indicator light (A/T)
16. "POWER" indicator light (A/T)
17. Lighting switch
18. Small light
19. Brake switch
20. Brake light
21. Malfunction indicator lamp ("CHECK ENGINE" light)
22. Monitor coupler
23. To immobilizer (if equipped)
24. Data link connector
25. Main relay
26. Ignition switch
27. Transmission range switch (A/T)
28. Starter magnetic switch
29. CMP sensor
30. MAF sensor
31. TP sensor
32. CTP switch
33. Heated oxygen sensor
34. ECT sensor
35. CO adjusting resister (vehicle without heated oxygen sensor)
36. ABS controller (if equipped)
37. A/C amplifier (if equipped)
38. Power steering pressure switch (if equipped)
39. Vehicle speed sensor (in speedometer)
40. Mode selector switch (A/T)
41. OD cut switch (A/T)
42. 4WD-low switch (A/T)
43. Shift solenoid valve A (A/T)
44. Shift solenoid valve B (A/T)
45. TCC solenoid valve (A/T)
46. A/T vehicle speed sensor (A/T)
47. ECM

TER-MINAL	POSITION		CIRCUIT		TER-MINAL	POSITION		CIRCUIT
	M/T	A/T				M/T	A/T	
BB	B11	A10	Power source for back up		GND1	A12	A12	Ground
B1	B22	A11	Power source		GND2	A26	A25	
B2	B21	A24			GND3	A13	A26	
RG	B2	A13	Main relay		CO	A21	D5	CO adjusting resister (vehicle without heated oxygen sensor)
CAS	A11	D9	CMP sensor		ABS	B14	D17	ABS controller (if equipped)
AFM	A6	D3	MAF sensor			IG	A18	D11
VCC	A8	D2	Power source (for sensors)		EGR1		A10	A7
VTA	A7	D14	TP sensor		EGR2	A23	A20	EGR valve (stepper motor coil 2, if equipped)
ID	B16	D19	CTP switch			EGR3	A9	A6
OXH	A17	A21	Heated oxygen sensor heater (if equipped)		EGR4		A22	A19
OX	A20	D4	Heated oxygen sensor (if equipped)			R	-	B11
THW	A5	D13	ECT sensor		N	-	B12	Transmission range switch ("N" range, A/T)
SE	A25	D1	Sensor ground			D	-	B13
ACS	B3	D7	A/C signal		2		-	B14
STA	B10	D10	Engine start switch			L	-	B15
PSS	B15	D18	Power steering pressure switch (if equipped)		SP		-	B8
SPD	B5	D8	Vehicle speed sensor (in speedometer)			SPG	-	B16
INJ1	A3	A3	Injector No.1		OD		-	B7
INJ2	A16	A16	Injector No.2			LIGHT	-	B4
INJ3	A1	A1	Injector No.3		L4		-	B6
INJ4	A14	A14	Injector No.4			PWR	-	B5
IGT	B8	A8	Ignitor		BR		-	D21
FP	B13	A15	Vehicle with immobilizer	Fuel pump relay		S1	-	B10
	B7	A5	Vehicle without immobilizer					
ISC	A2	A2	IAC valve		S2	-	B1	Shift solenoid valve B (A/T)
PRG	A15	A5	Vehicle with immobilizer	EVAP canister purge valve		S3	-	B9
		A15	Vehicle without immobilizer					
EGR	B19	A7	EGR solenoid vacuum valve (if equipped)		ODL	-	B3	"OD/OFF" indicator light (A/T)
DNL	B20	A17	Malfunction indicator lamp ("CHECK ENGINE" light)			PWL	-	B2
MON	B9	A9	Duty output terminal		TS		B6	D16
DN	B17	D6	Diag. switch terminal			SDL	A24	A23
TS	B6	D16	Test switch terminal					
SDL	A24	A23	Data link connector					



6E1006



6E1007

Engine Control Module (ECM)

ECM is installed to the underside of the instrument panel at the driver's seat side.

ECM is a precision unit consisting of microcomputer, A/D (Analog/Digital) converter, I/O (Input/Output) unit, etc..

It is an essential part of the electronic control system, for its functions include not only such a major function as to control fuel injector, idle air control valve, fuel pump relay, etc. but also on-board diagnostic system (self-diagnosis function) and fail-safe function as described in the following section.

On-board diagnostic system (Self-diagnosis function)

ECM diagnoses troubles which may occur in the areas including the following parts when the ignition switch is ON or the engine is running, and indicates the result by turning on or flashing malfunction indicator lamp ("CHECK ENGINE" light).

- Heated oxygen sensor (if equipped)
- Engine coolant temp. sensor
- Throttle position sensor (including idle switch)
- Vehicle speed sensor
- Mass air flow sensor
- Camshaft position sensor
- EGR stepper motor (if equipped)
- CPU (Central Processing Unit) of ECM

ECM and malfunction indicator lamp ("CHECK ENGINE" light) operate as follows.

- Malfunction indicator lamp ("CHECK ENGINE" light) lights when the ignition switch is turned ON (but the engine at stop) with the diagnosis switch terminal ungrounded regardless of the condition of Electronic Fuel Injection system. This is only to check the malfunction indicator lamp ("CHECK ENGINE" light) bulb and its circuit.
- If the above areas of Electronic Fuel Injection system is free from any trouble after the engine start (while engine is running), malfunction indicator lamp ("CHECK ENGINE" light) turns OFF.
- When ECM detects a trouble which has occurred in the above areas, it makes malfunction indicator lamp ("CHECK ENGINE" light) turn ON while the engine is running to warn the driver of such occurrence of trouble and at the same time it stores the exact trouble area in ECM back-up memory.

(The memory is kept as it is even if the trouble was only temporary and disappeared immediately. And it is not erased unless the power to ECM is shut off for 20 seconds or longer.)

ECM also indicates trouble area in memory by means of flashing of malfunction indicator lamp ("CHECK ENGINE" light) at the time of inspection (i.e. when diagnosis switch terminal is grounded and ignition switch is turned ON).

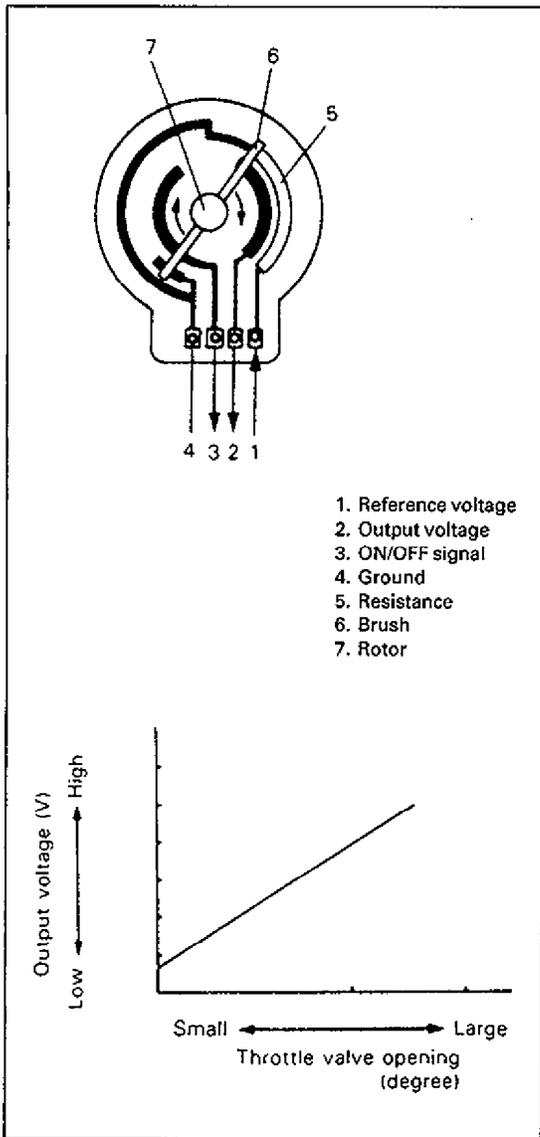
NOTE:

- Even when a trouble occurs in CMP sensor or CTP switch circuit (circuit open), ECM does not indicate it (or activate malfunction indicator lamp (“CHECK ENGINE” light)) while engine is running.
And when that troubled circuit regains good condition, the memory of defective area will be erased automatically even if the power circuit to ECM is not opened as described above.
- For on-board diagnostic system and fail-safe function of A/T relet parts, refer to On-Board Diagnostic System in the section 7B1.

Fail-safe function

Even when a trouble has occurred in such areas of Electronic Fuel Injection system that include the following parts and a failure signal is sent to ECM, control over the injector, idle air control valve and other is maintained on the basis of the standard signals and/or back-up program prestored in the ECM while ignoring that failure signal and/or CPU. This function is called “fail-safe function”. Thus, with this function, a certain level of engine performance is available even when some failure occurs in such areas so that disability in running is avoided.

- Engine coolant temp. sensor
- Throttle position sensor
- Mass air flow sensor
- EGR stepper motor (if equipped)
- CPU in ECM



6E1008

6E1009

Throttle Position Sensor (TP Sensor)

The throttle position sensor consisting of a contact point (CTP switch) and a potentiometer is installed on the throttle body, and detects the throttle valve opening.

The throttle opening in the idle state is detected by means of the contact point which turns ON in that state.

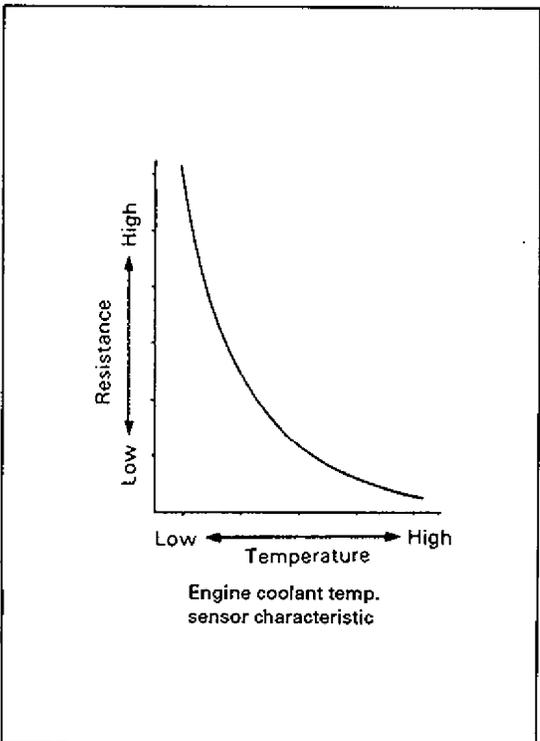
But beyond that, the full opening is detected by the potentiometer as follows.

A 5-volt reference voltage is applied to the sensor from ECM and as its brush moves over the print resistance according to the throttle valve opening, the output voltage varies accordingly.

By monitoring the ON/OFF signal and sensor output voltage, ECM detects the throttle valve opening.

ECM uses the signal from TP sensor as one of the signals to control fuel injector, idle air control valve, ignition timing, EVAP solenoid purge valve and EGR solenoid vacuum valve (if equipped).

Also for A/T model, ECM controls the automatic transmission.



6E1010

Engine Coolant Temperature Sensor (ECT Sensor)

Located at the side of intake manifold, this sensor measures the temperature of the engine coolant and converts its change into that in resistance through the thermister.

By monitoring the resistance of the coolant temperature sensor, ECM detects the engine coolant temperature and that affects most systems under the control of ECM.

Also for A/T model, ECM control the automatic transmission (TCC operation and gear shift to O/D gear).

EXHAUST GAS RECIRCULATION (EGR) SYSTEM (For vehicle with EGR stepper motor)

This system controls the formation of NO_x emission by recirculating the exhaust gas into the combustion chamber through the intake manifold.

The EGR system consists EGR valve and piping for exhaust gas.

The EGR valve is controlled by ECM according to the signals from CMP sensor, ECT sensor, MAF sensor and VSS.

The EGR valve consists of a stepper motor, rods, valve, etc.

When the EGR valve stepper motor receives "open" signal from ECM, it turns in the "open" direction according to the number of steps and pushes out the rod which is in mesh with the worm of the stepper motor. As the rod installed

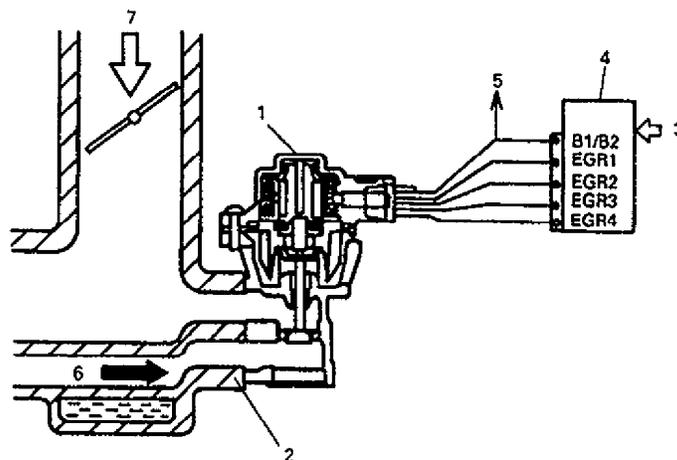
to the EGR valve is pushed by this rod, the EGR valve opens by the amount corresponding to the number of steps of the "open" signal from ECM to let the exhaust gas flow from the exhaust manifold to the intake manifold.

To close the EGR valve, the stepper motor turns in the "close" direction according to the number of steps of the "close" signal from ECM and pulls up the rod. In this way, the valve is closed by the spring force.

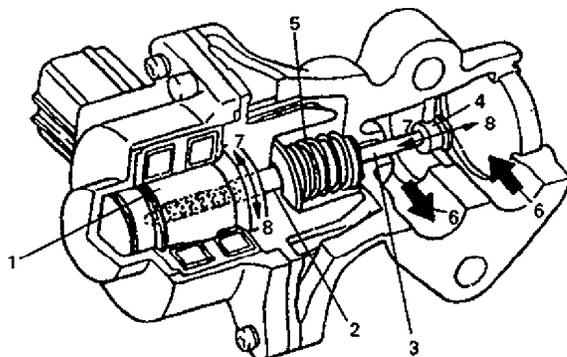
And in this state, the exhaust gas is not allowed to flow to the air intake system or the combustion chamber.

Under any one of the following conditions, ECM closes the EGR valve.

- When engine coolant temperature is low
- When throttle valve is at idle position
- When engine is running under high load



1. EGR valve
2. Intake manifold
3. Sensed information
4. ECM
5. From main relay
6. Exhaust gas
7. Fresh air



1. Stepper motor
2. Rod (with thread)
3. Rod
4. Valve
5. Spring
6. Exhaust gas
7. Valve close
8. Valve open

EXHAUST GAS RECIRCULATION (EGR) SYSTEM (For vehicle with EGR valve, pressure transducer and solenoid vacuum valve)

This system controls the formation of NO_x emission by recirculating the exhaust gas into the combustion chamber through the intake manifold.

The EGR valve is controlled by EGR pressure transducer and EGR solenoid vacuum valve controlled by ECM according to signals from various sensors.

The diaphragm mounted in the EGR pressure transducer is operated by back pressure of the exhaust gas to open and close the valve. By this opening and closing action of the valve, the EGR pressure transducer controls the vacuum transmitted to the EGR valve.

Under a low load condition such as low speed driving, the exhaust pressure is low. In this state, the diaphragm in the EGR pressure transducer is pushed down by the spring force and the pressure transducer valve opens to allow the air into the vacuum passage from the outside.

As a result, the vacuum transmitted to the EGR valve becomes smaller and so does the opening

of the EGR valve.

Thus, less amount of exhaust gas is recirculated to the intake manifold.

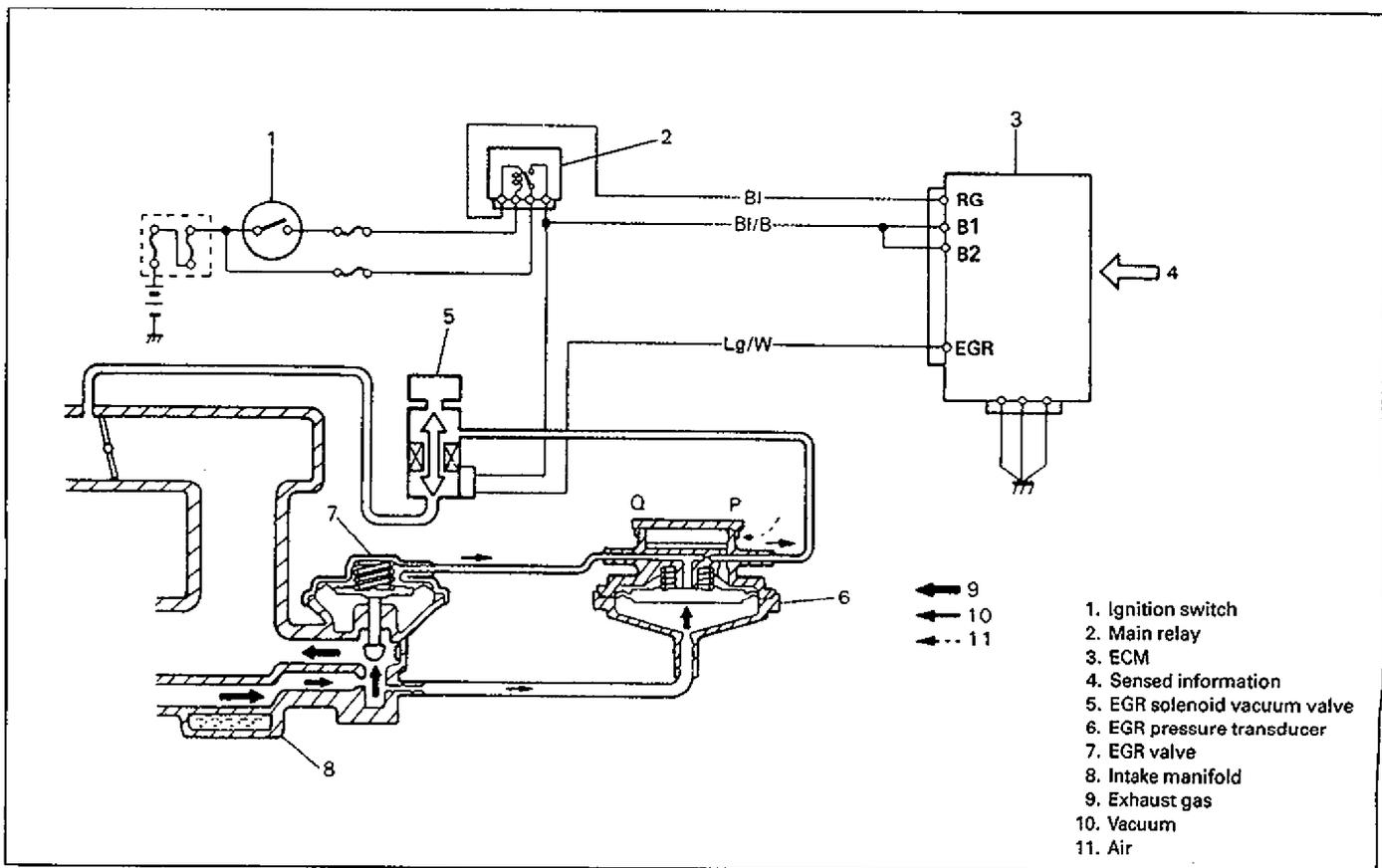
Under a high load condition such as high speed driving, on the other hand, the exhaust pressure is high. By the high exhaust pressure, the diaphragm in the modulator is pushed up and closes its valve. As the air does not enter the vacuum passage in this state, the vacuum transmitted to the EGR valve grows larger and so does the opening of the EGR valve.

Thus, larger amount of exhaust gas is recirculated to the intake manifold.

Under any one of the following conditions, ECM closes the vacuum passage of solenoid vacuum valve. In this state, as the vacuum is not transmitted to the EGR valve, it remains closed.

- When engine coolant temperature is low
- When throttle valve opening is less than specification.
- When engine is running under high load
- When vehicle is stopped.

Other than the above, EGR valve opens and closes in accordance with the EGR pressure transducer operation.



DIAGNOSIS

ECM has on-board diagnostic system (a system self-diagnosis function) as described previously (p. 6E1-10).

Investigate where the trouble is by referring to "DIAGNOSTIC FLOW CHART" and "DIAGNOSTIC TROUBLE CODE TABLE" on later pages.

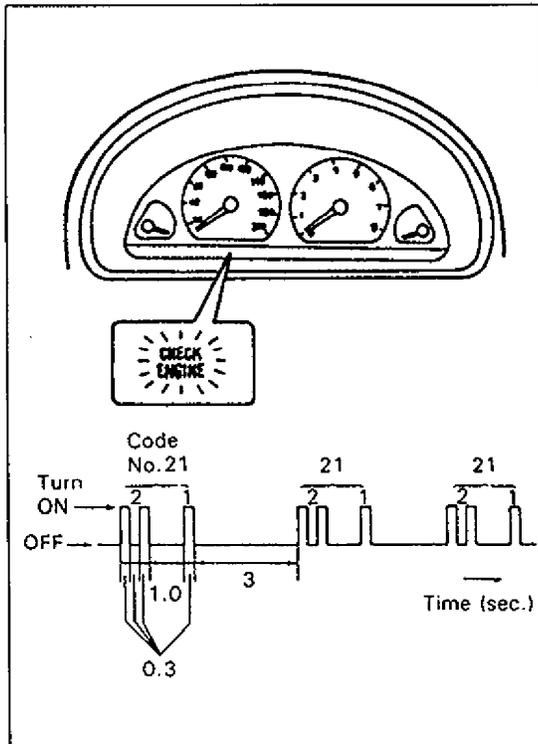
NOTE:

For diagnosis of A/T related part detected by ECM, refer to DIAGNOSIS in section 7B1.

PRECAUTIONS IN DIAGNOSING TROUBLES

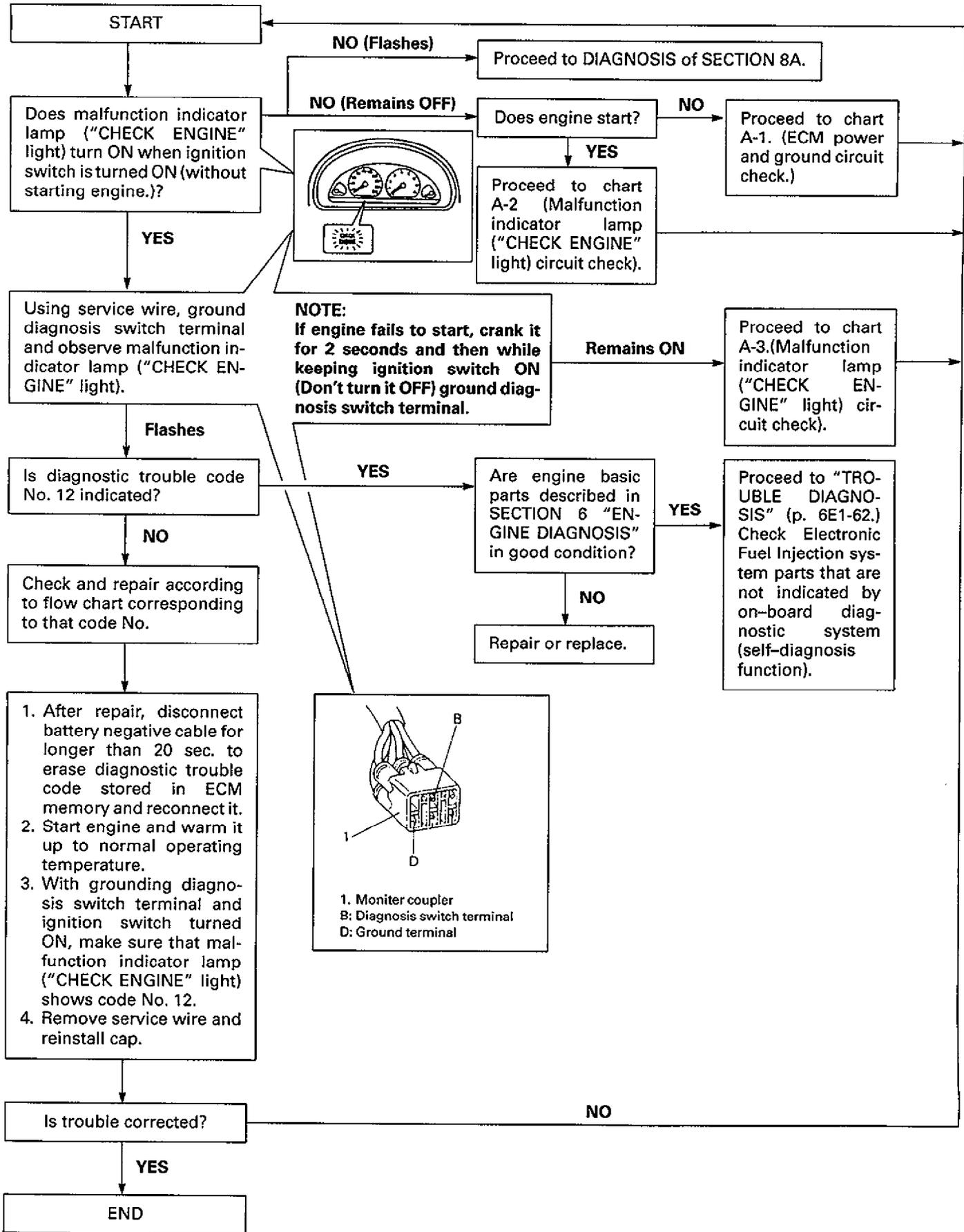
[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

- Before identifying diagnostic trouble code indicated by malfunction indicator lamp ("CHECK ENGINE" light), don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine. Such disconnection will erase memorized trouble in ECM memory
- If abnormality or malfunction lies in two or more areas, malfunction indicator lamp ("CHECK ENGINE" light) indicates applicable codes three times each. And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.
- Take a note of diagnostic trouble code indicated first.



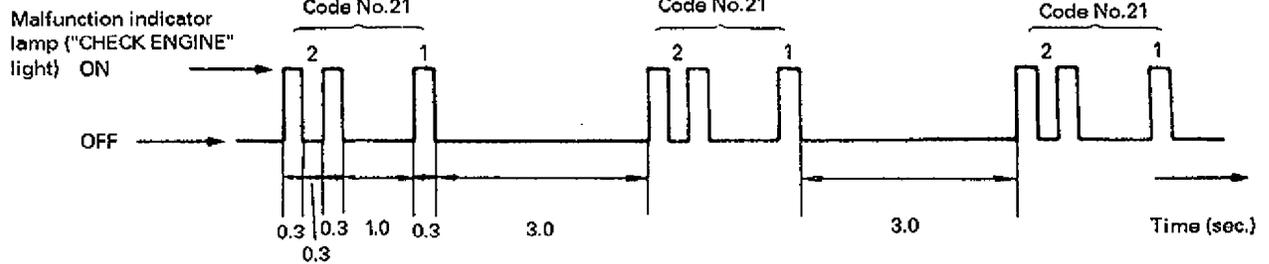
6E1014

DIAGNOSTIC FLOW CHART



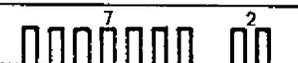
DIAGNOSTIC TROUBLE CODE TABLE (1 OF 2, M/T AND A/T)

EXAMPLE: When throttle position sensor is defective (Code No.21)



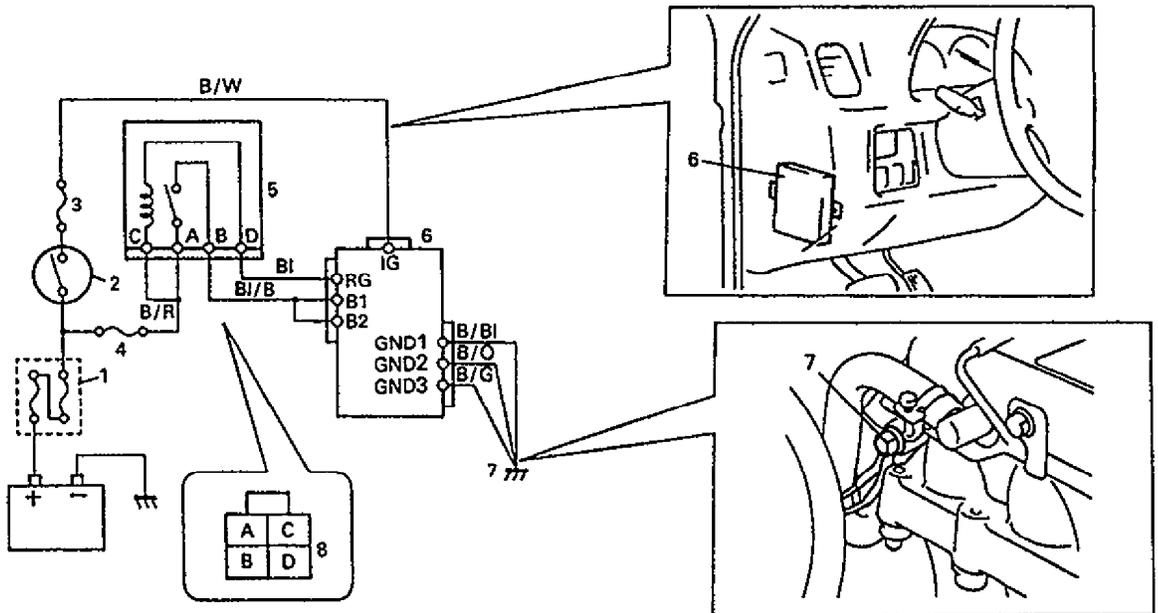
DIAGNOSTIC TROUBLE CODE NO.	MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) FLASHING PATTERN	DIAGNOSTIC ITEM	DIAGNOSIS
13		Heated oxygen sensor (if equipped)	Diagnose trouble according to "DIAGNOSTIC FLOW CHART" corresponding to each code No.
14		Engine coolant temperature sensor	
15			
21		Throttle position sensor	
22			
24		Vehicle speed sensor	
33		Mass air flow sensor	
34			
42		Camshaft position sensor	Diagnose trouble according to "DIAGNOSTIC FLOW CHART" corresponding to each code No.
44		CTP switch of throttle position sensor	
45			
51		EGR valve (stepper motor, if equipped)	
ON		ECM	ECM failure.
12		Normal	This code appears when none of the other codes (above codes) are identified.

DIAGNOSTIC TROUBLE CODE TABLE (2 OF 2, A/T)

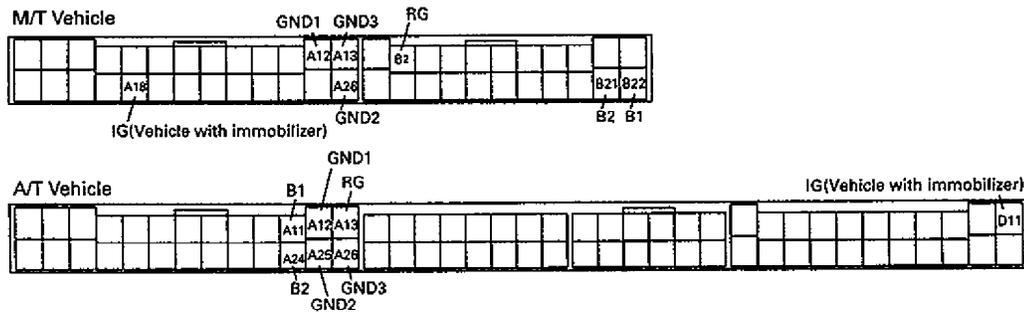
DIAGNOSTIC TROUBLE CODE NO.	MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) FLASHING PATTERN	DIAGNOSTIC ITEM	DIAGNOSIS
61		Shift solenoid valve A	Refer to section 7B1.
62			
63		Shift solenoid valve B	
64			
65		TCC solenoid valve.	
66			
72		Transmission range switch	
75		A/T vehicle speed sensor.	

A-1 ECM POWER AND GROUND CIRCUIT CHECK (VEHICLE WITH IMMOBILIZER)
 (MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) DOESN'T LIGHT AT IGNITION SWITCH ON AND ENGINE DOESN'T START THOUGH IT IS CRANKED UP.)

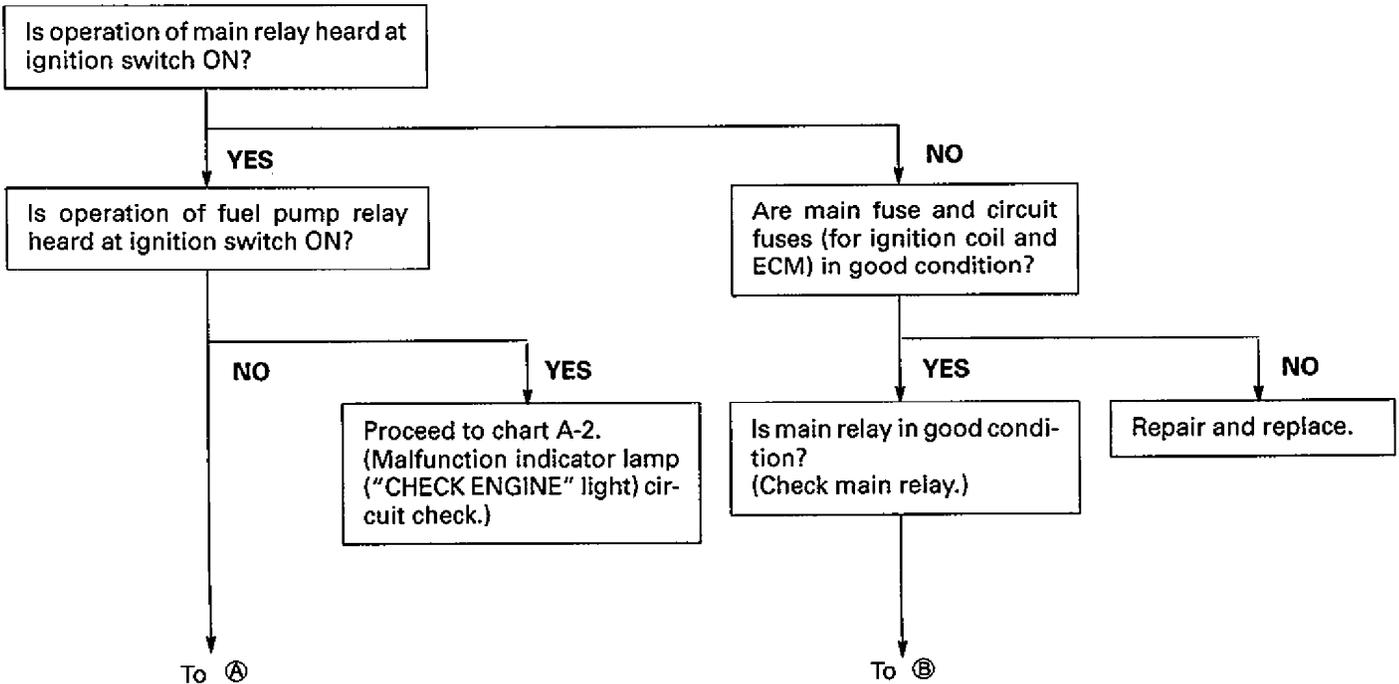
1. Main fuse
2. Ignition switch
3. Circuit fuse for ignition coil
4. Circuit fuse for ECM
5. Main relay
6. ECM
7. Engine ground for ECM
8. Terminal position of relay coupler (viewed from wire side)

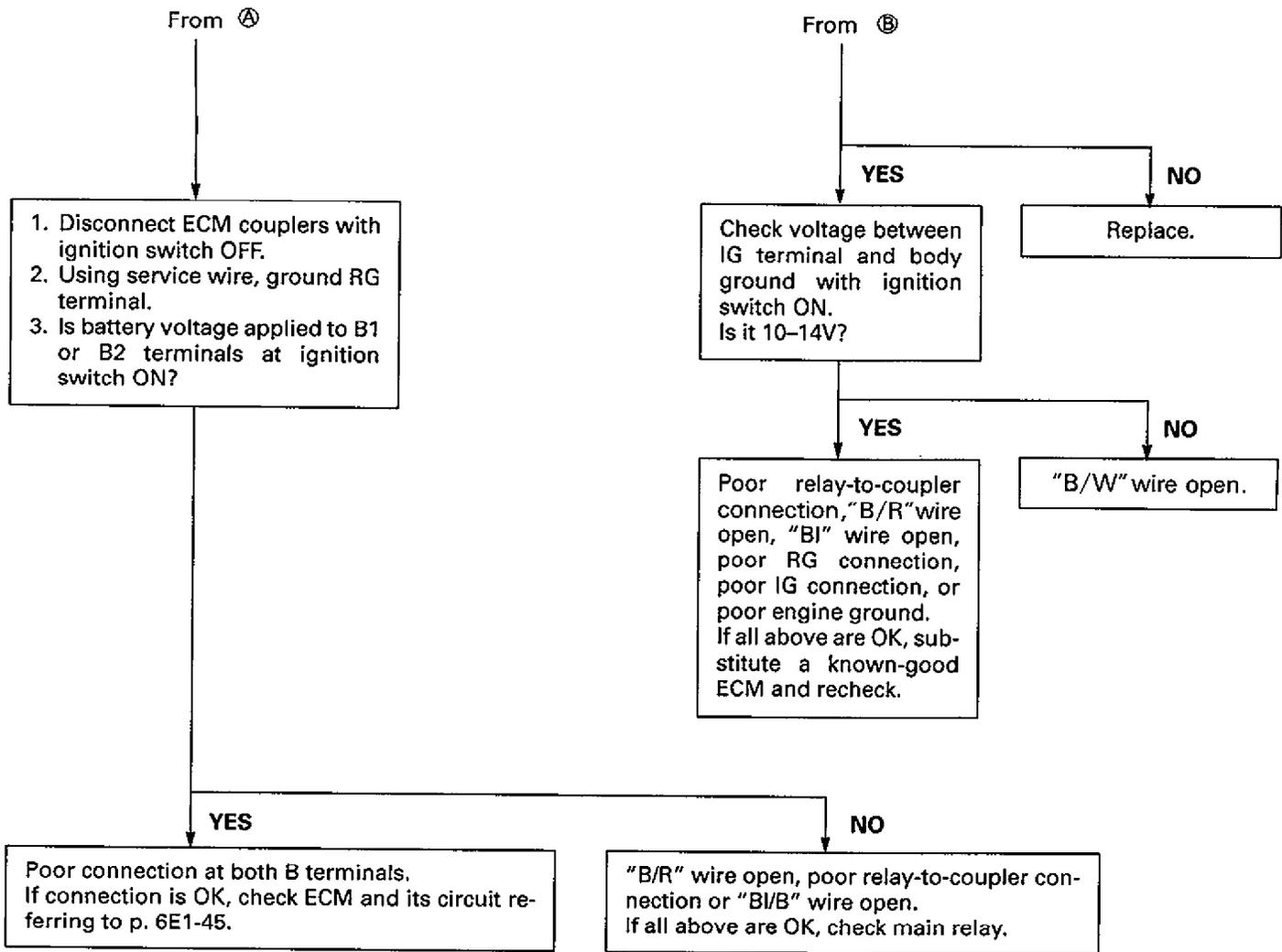


TERMINAL ARRANGEMENT OF ECM COUPLER (Viewed from harness side)

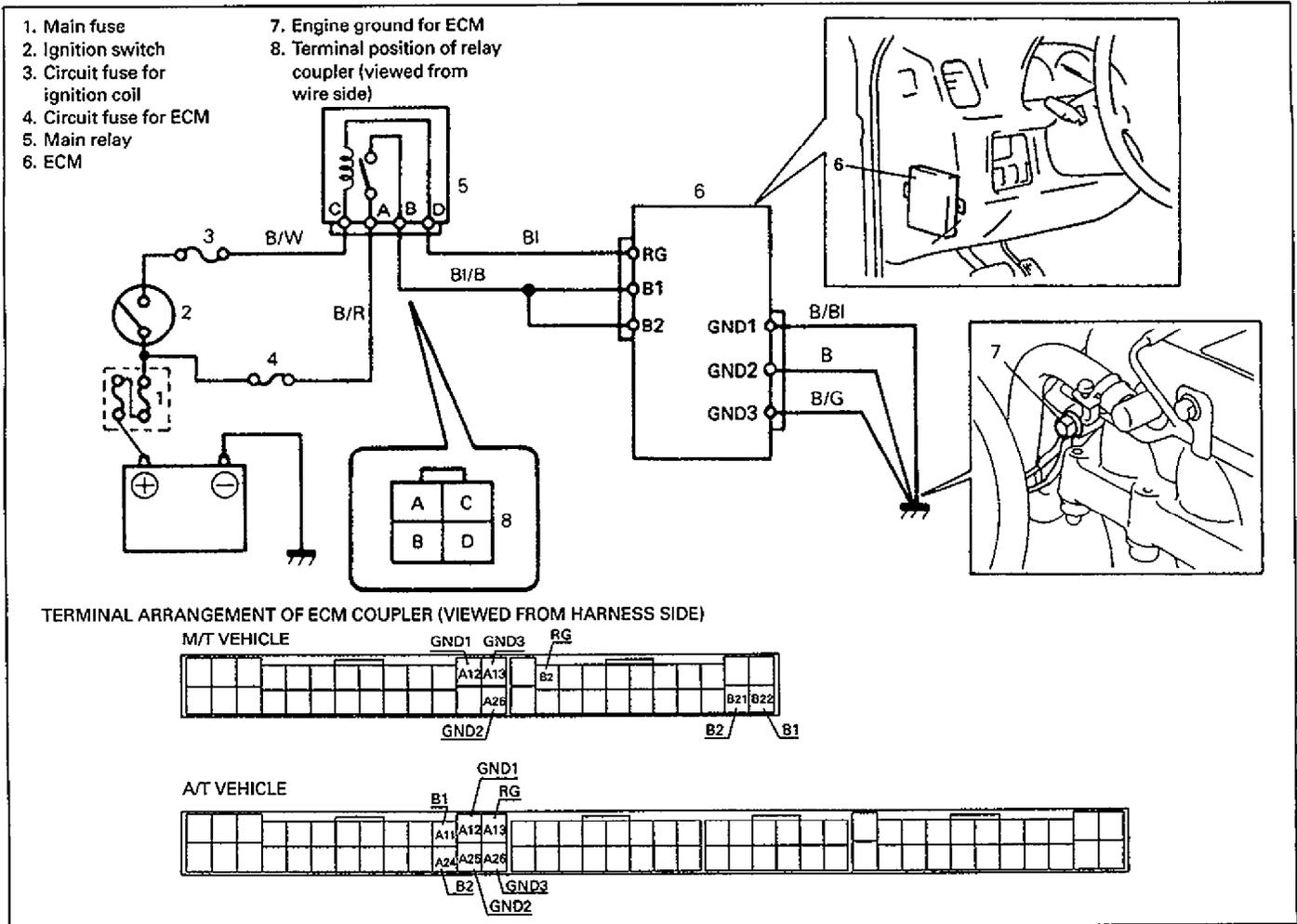


6E1018 6E1019

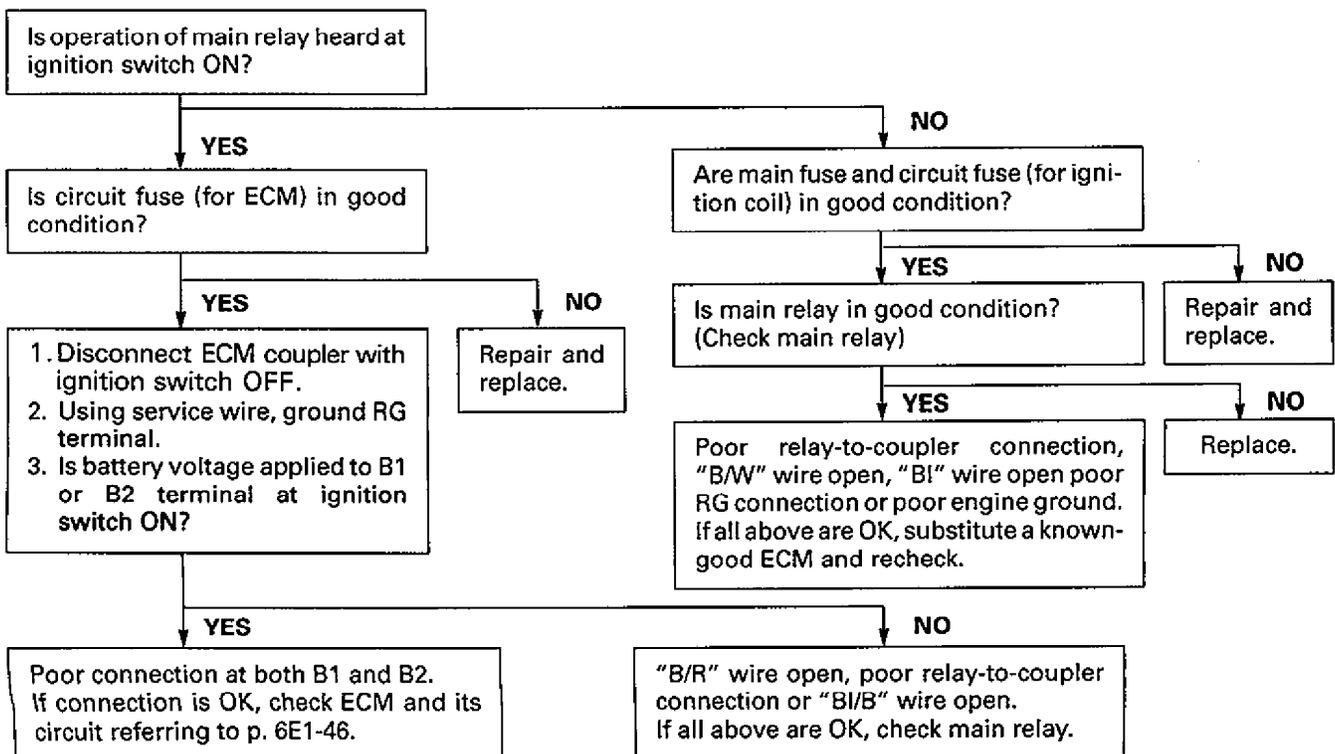




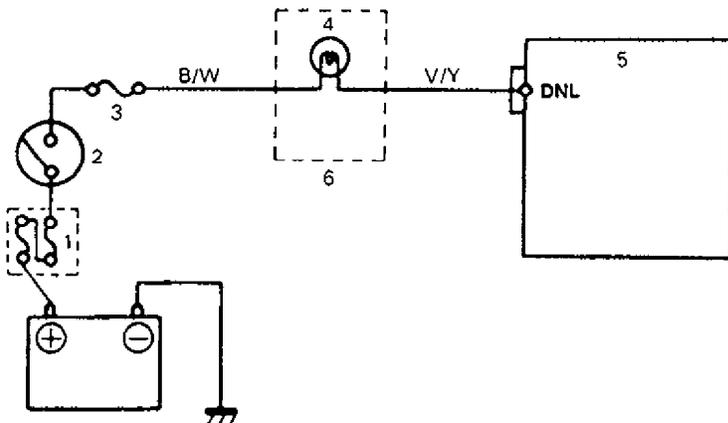
A-1 ECM POWER AND GROUND CIRCUIT CHECK (VEHICLE WITHOUT IMMOBILIZER).
 (MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) DOESN'T LIGHT AT IGNITION SWITCH ON AND ENGINE DOESN'T START THOUGH IT IS CRANKED UP.)



6E1020 6E1021



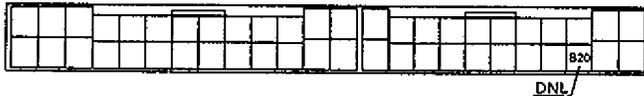
A-2 MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) CIRCUIT CHECK
 (MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) DOESN'T LIGHT AT IGNITION SWITCH ON THOUGH ENGINE STARTS.)



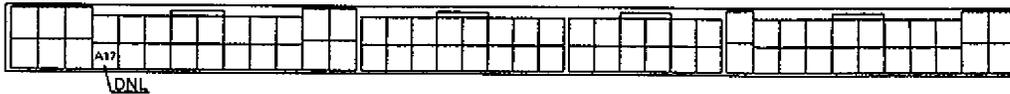
- 1. Main fuse
- 2. Ignition switch
- 3. Circuit fuse
- 4. Malfunction indicator lamp ("CHECK ENGINE" light) bulb
- 5. ECM
- 6. Combination meter

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE



A/T VEHICLE



6E1022 6E1023

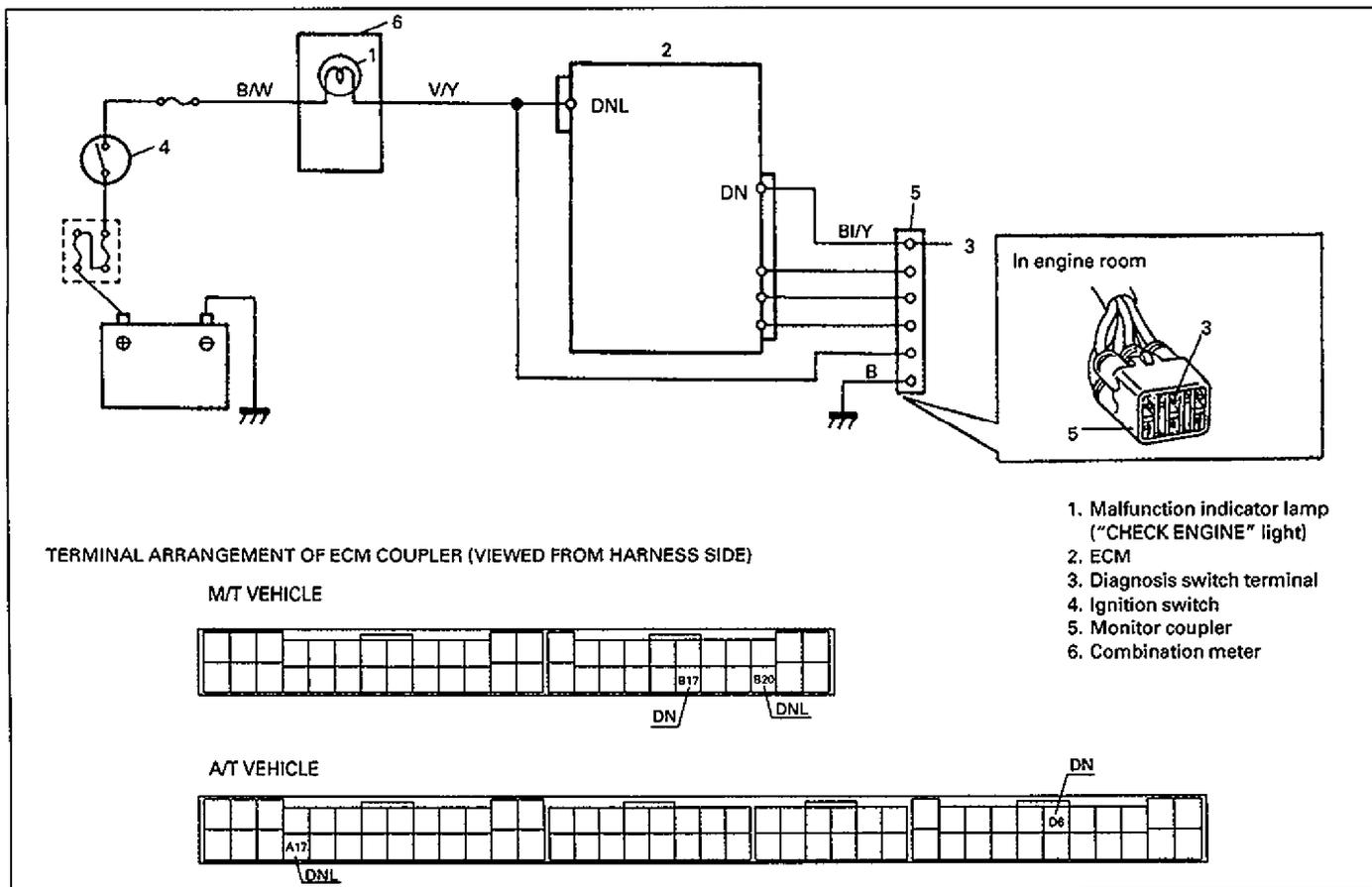
1. With ignition switch turned OFF, disconnect coupler from ECM.
2. Body-ground terminal DNL in coupler disconnected.
3. Does malfunction indicator lamp ("CHECK ENGINE" light) turn ON at ignition switch ON?



Poor DNL connection.
 If connection OK, is substitute a known-good ECM and recheck.

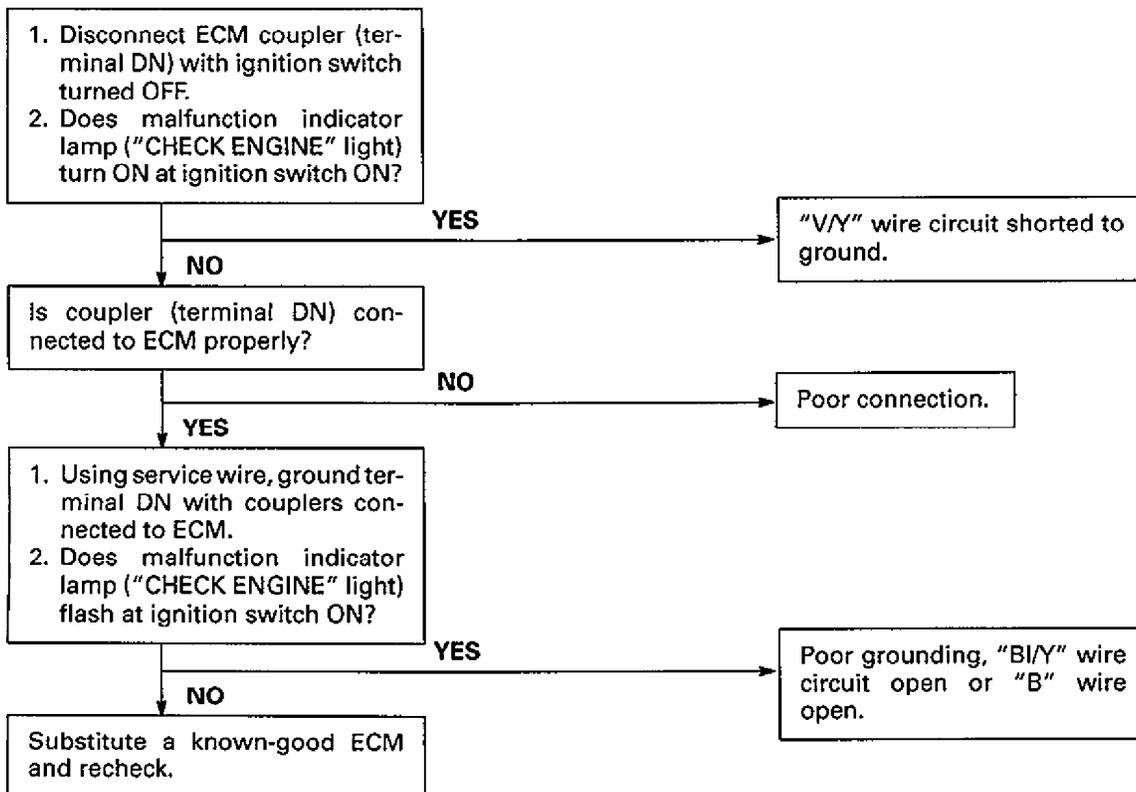
Bulb burned out, "V/Y" wire circuit open or "B/W" wire circuit open.

A-3 MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) CIRCUIT CHECK
 (MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) DOESN'T FLASH OR JUST REMAINS ON EVEN WITH GROUNDING DIAGNOSIS SWITCH TERMINAL.)

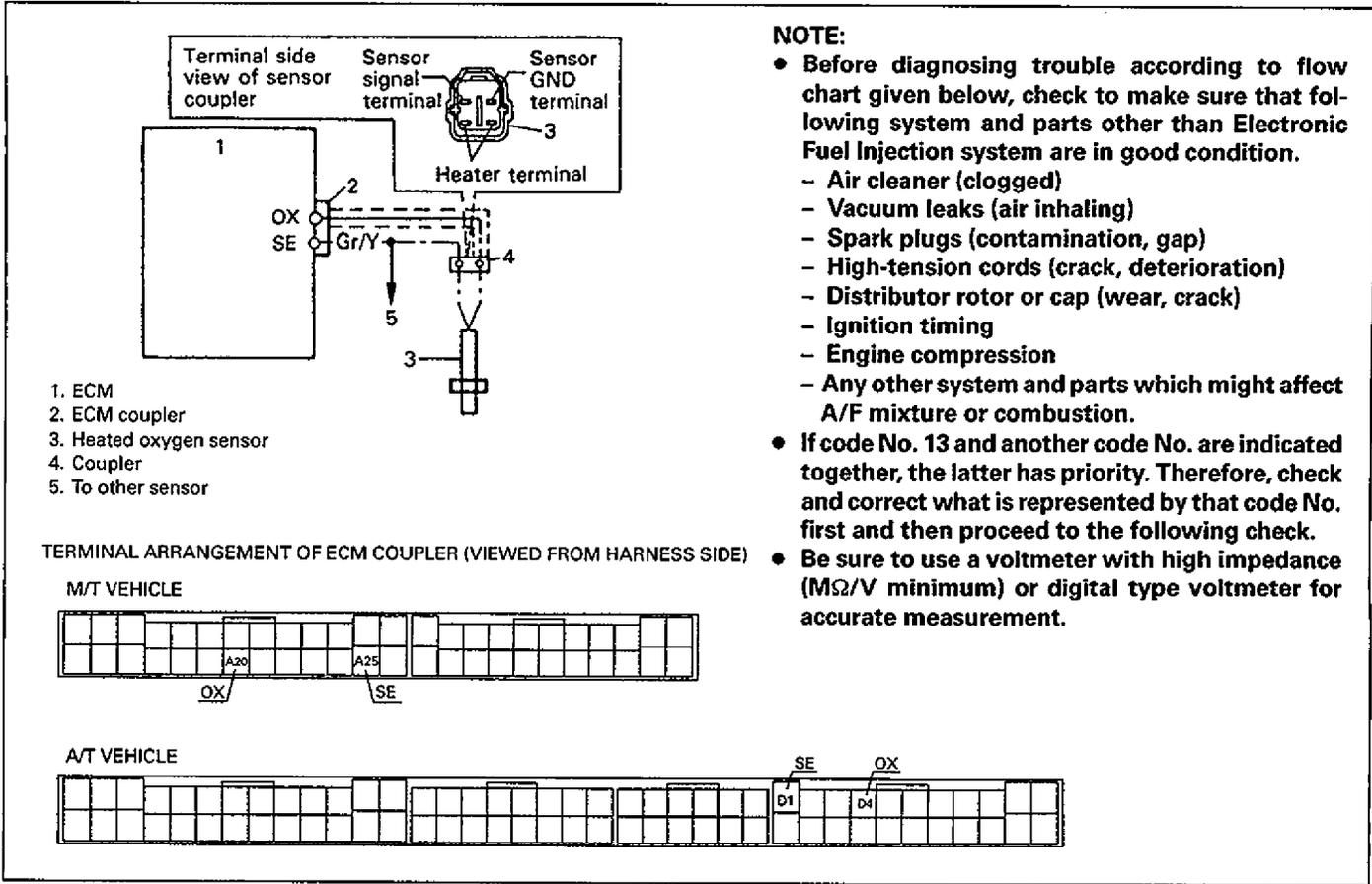


6E1024 6E1025

Not For Federal Spec. Vehicle



CODE NO. 13 HEATED OXYGEN SENSOR CIRCUIT (if equipped) (SIGNAL VOLTAGE DOESN'T CHANGE)

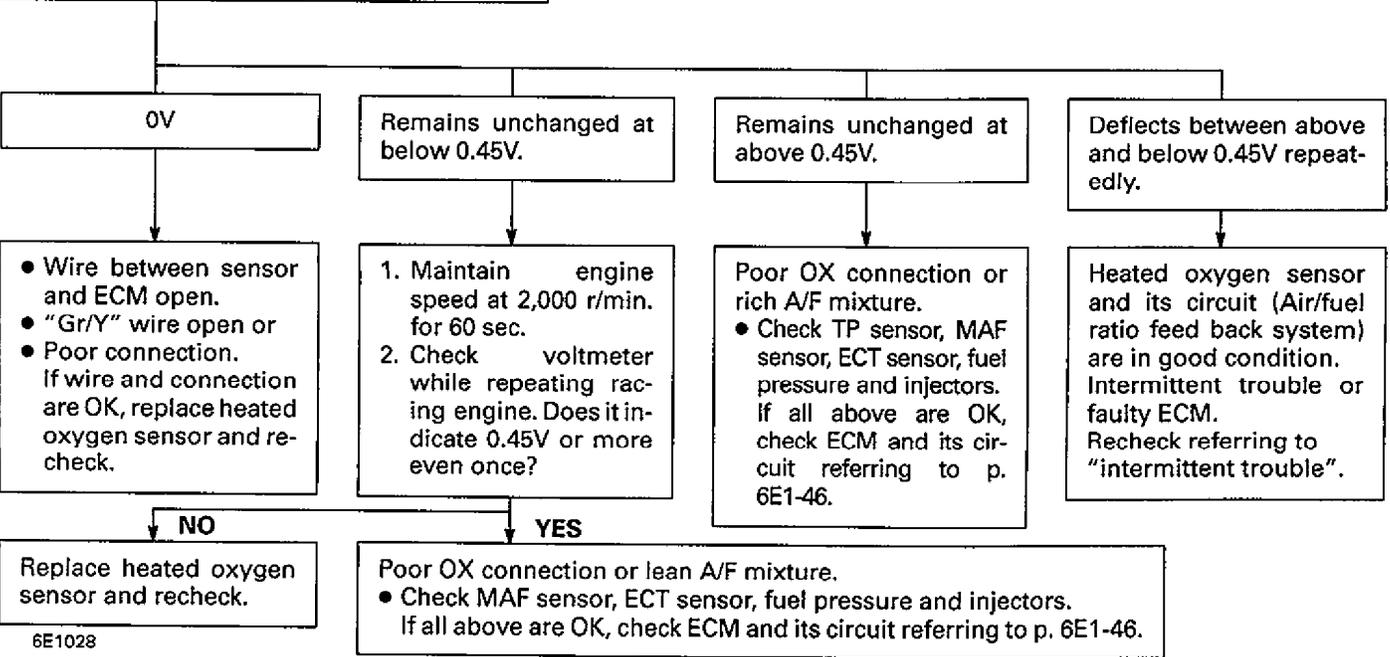


NOTE:

- Before diagnosing trouble according to flow chart given below, check to make sure that following system and parts other than Electronic Fuel Injection system are in good condition.
 - Air cleaner (clogged)
 - Vacuum leaks (air inhaling)
 - Spark plugs (contamination, gap)
 - High-tension cords (crack, deterioration)
 - Distributor rotor or cap (wear, crack)
 - Ignition timing
 - Engine compression
 - Any other system and parts which might affect A/F mixture or combustion.
- If code No. 13 and another code No. are indicated together, the latter has priority. Therefore, check and correct what is represented by that code No. first and then proceed to the following check.
- Be sure to use a voltmeter with high impedance (MΩ/V minimum) or digital type voltmeter for accurate measurement.

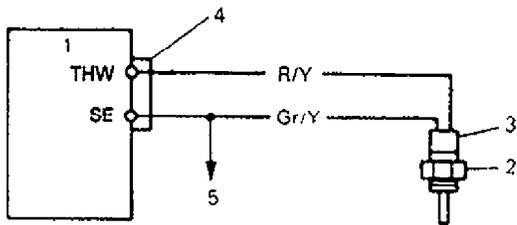
6E1026 6E1027

1. Remove ECM and connect couplers to ECM.
2. Warm up engine to normal operating temperature.
3. Connect voltmeter between OX terminal of ECM coupler and body ground.
4. Maintain engine speed at 2000 r/min. After 60 seconds, check voltmeter.



6E1028

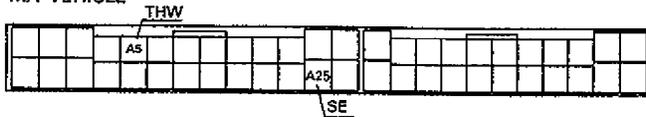
CODE NO. 14 ECT SENSOR (ENGINE COOLANT (LOW TEMPERATURE INDICATED, SIGNAL TEMP. SENSOR) CIRCUIT VOLTAGE HIGH)



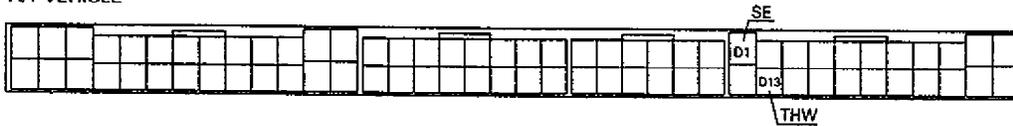
NOTE:
When Code Nos. 13, 14 and 21 are indicated together, it is possible that "Gr/Y" wire is open or SE terminal connection is poor.

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE



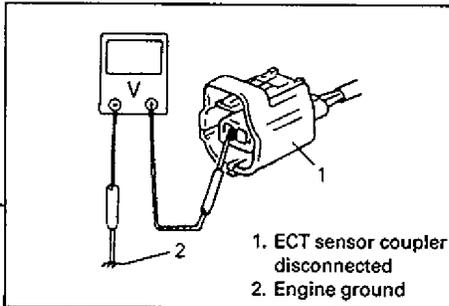
A/T VEHICLE



1. ECM
2. ECT sensor
3. Coupler
4. ECM coupler
5. To other sensors

6E1029 6E1030

1. Disconnect ECT sensor coupler with ignition switch OFF.
2. With ignition switch ON, check voltage at "R/Y" wire terminals of ECT sensor coupler. Is it about 4-5V?

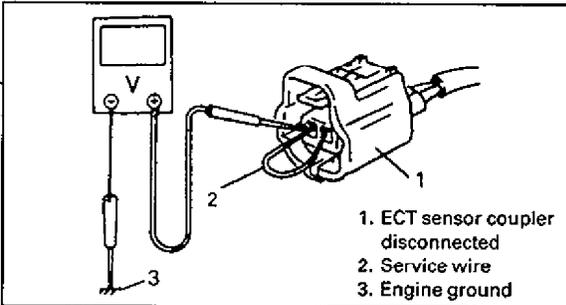


YES

NO

1. Using service wire, connect ECT sensor coupler terminals.
2. Check voltage at "R/Y" wire terminal of ECT sensor coupler with ignition switch ON. Is it below 0.15V?

"R/Y" wire open, poor THW connection or "R/Y" wire shorted to power circuit. If wire and connection are OK, substitute a known-good ECM and recheck.



NO

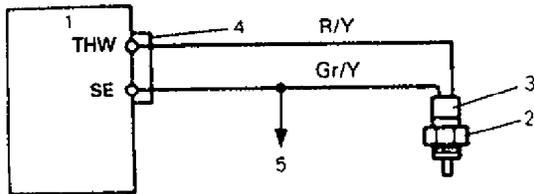
YES

"Gr/Y" wire open or poor SE connection. If wire and connection are OK, faulty ECM. Substitute a known-good ECM and recheck.

Poor ECT sensor-to-coupler connection of faulty ECT sensor. If connection and ECT sensor are OK, intermittent trouble or faulty ECM. Recheck referring to "Intermittent trouble".

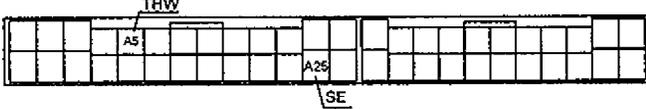
6E1031 6E1032

CODE NO. 15 ECT SENSOR (ENGINE COOLANT (HIGH TEMPERATURE INDICATED, SIGNAL TEMP. SENSOR) CIRCUIT VOLTAGE LOW)

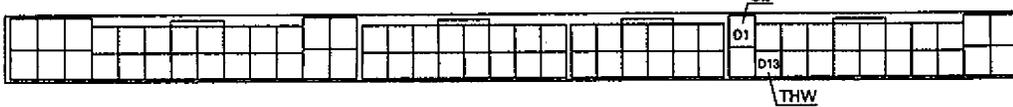


TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE



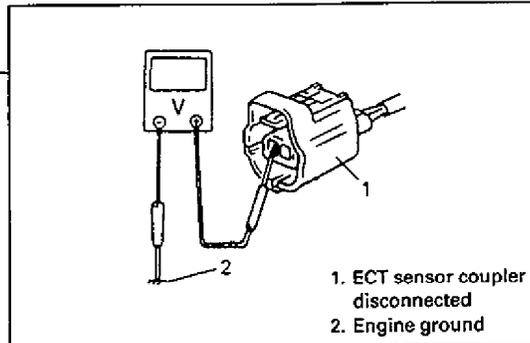
A/T VEHICLE



- 1. ECM
- 2. ECT sensor
- 3. Coupler
- 4. ECM coupler
- 5. To other sensors

6E1033 6E1034

1. Disconnect ECT sensor coupler with ignition switch OFF.
2. With ignition switch ON, is voltage applied to "R/Y" wire terminal of ECT sensor coupler 4V or more?



YES

NO

Check ECT sensor.
Is it in good condition?

"R/Y" wire shorted to "Gr/Y" wire or ground circuit.
If wire is OK, substitute a known-good ECM and recheck.

YES

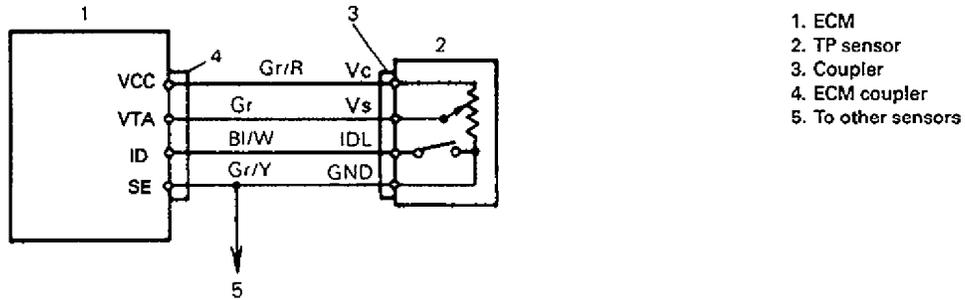
NO

Intermittent trouble or faulty ECM.
Recheck referring to "Intermittent trouble".

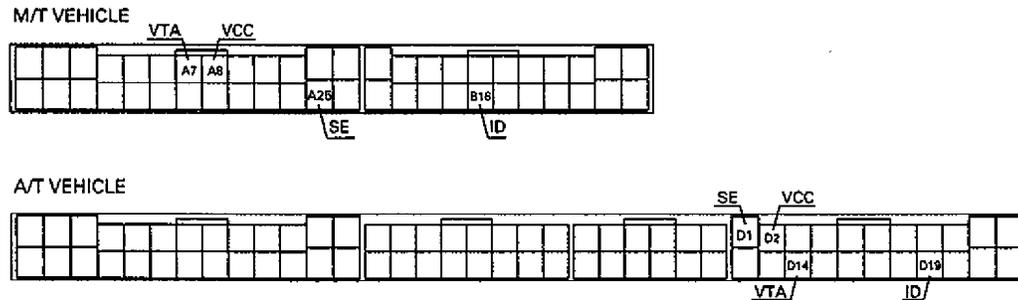
Faulty ECT sensor

6E1035

CODE NO. 21 TP SENSOR (THROTTLE POSITION SENSOR) CIRCUIT (SIGNAL VOLTAGE HIGH)



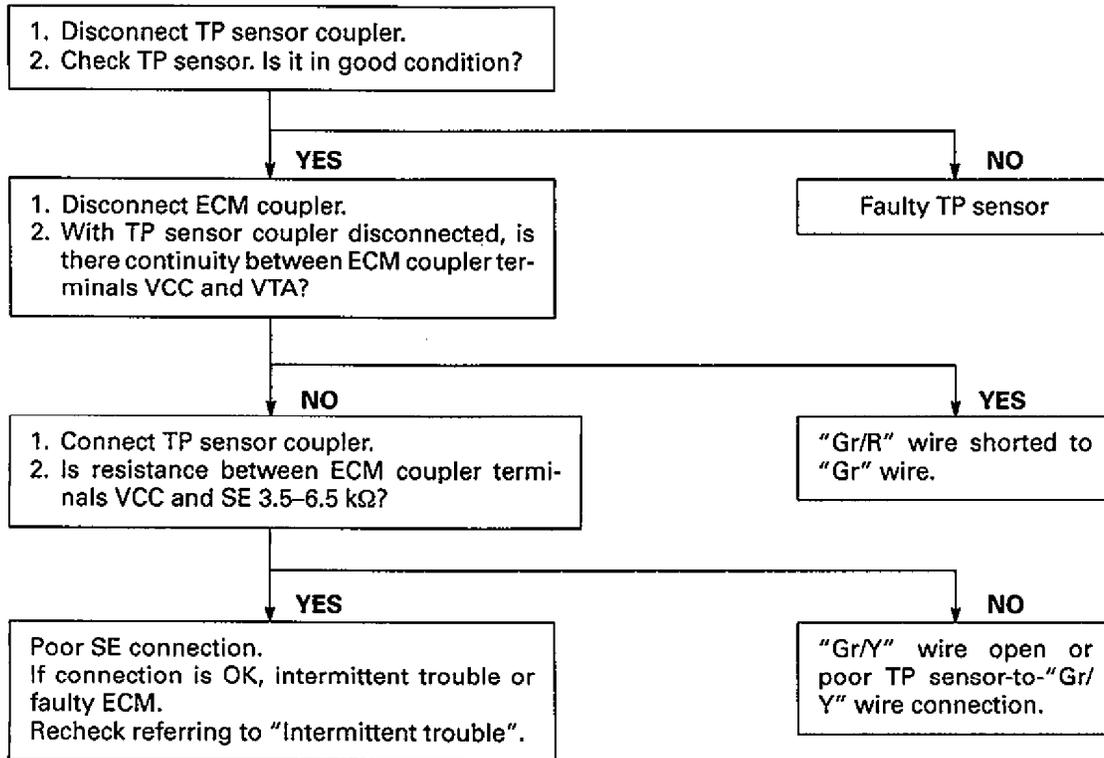
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



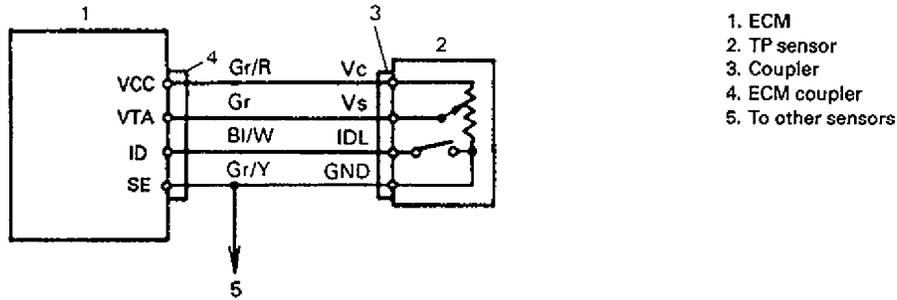
6E1036 6E1037

NOTE:

Be sure to turn OFF ignition switch for this check.

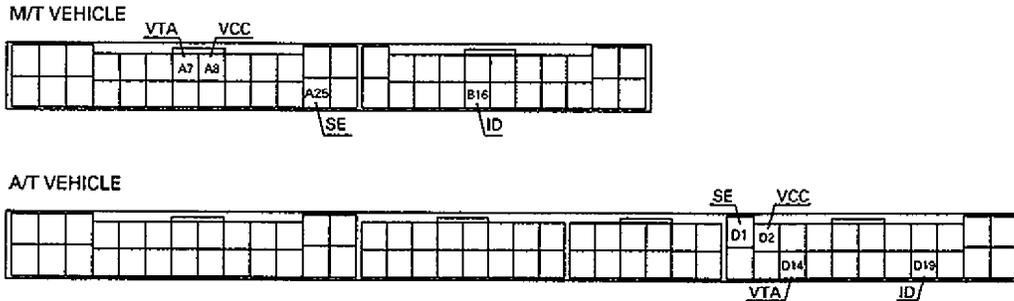


CODE NO. 22 TP SENSOR (THROTTLE POSITION SENSOR) CIRCUIT (SIGNAL VOLTAGE LOW)

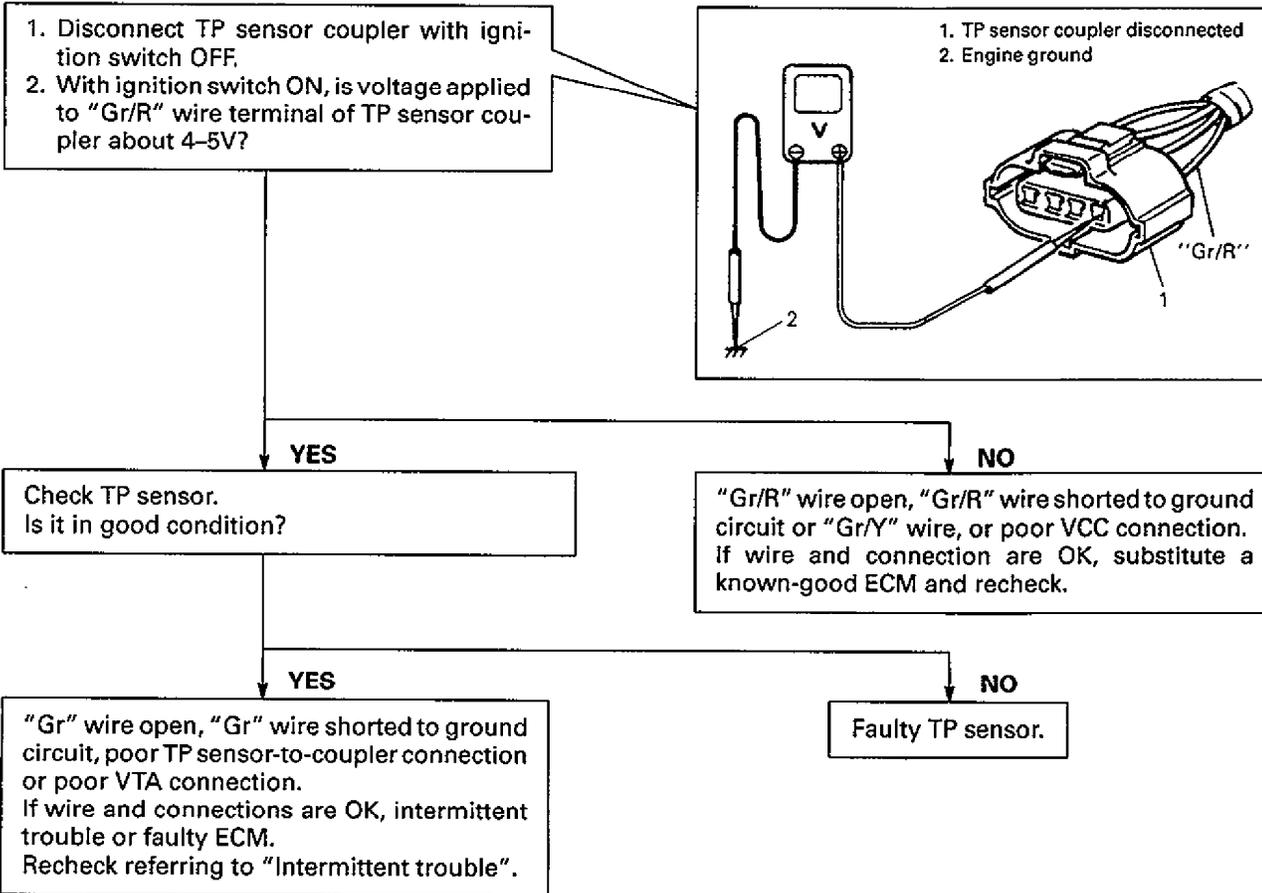


- 1. ECM
- 2. TP sensor
- 3. Coupler
- 4. ECM coupler
- 5. To other sensors

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

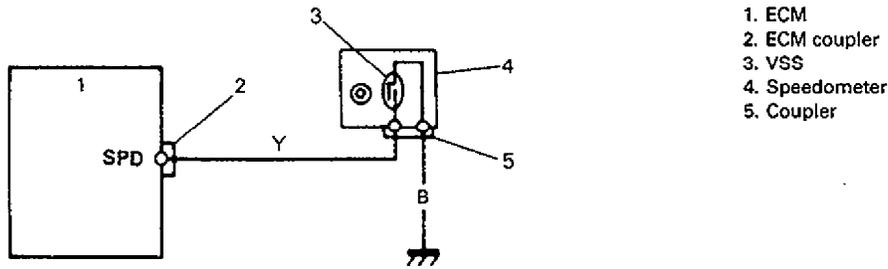


6E1038 6E1039

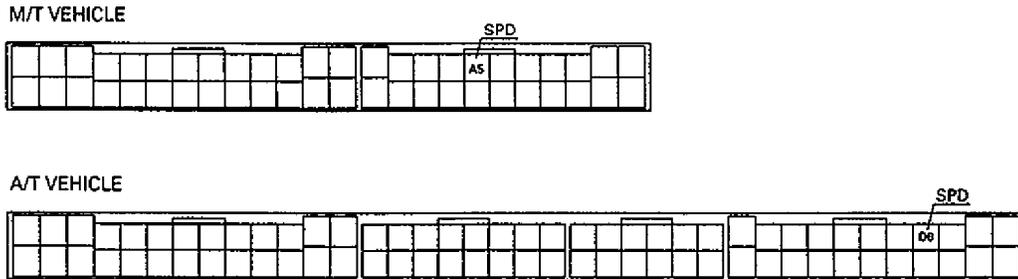


6E1040

CODE NO. 24 VSS (VEHICLE SPEED (VEHICLE SPEED SIGNAL NOT INPUTTED ALTHOUGH FUEL SENSOR) CIRCUIT IS KEPT CUT FOR LONGER THAN 5 SECONDS)

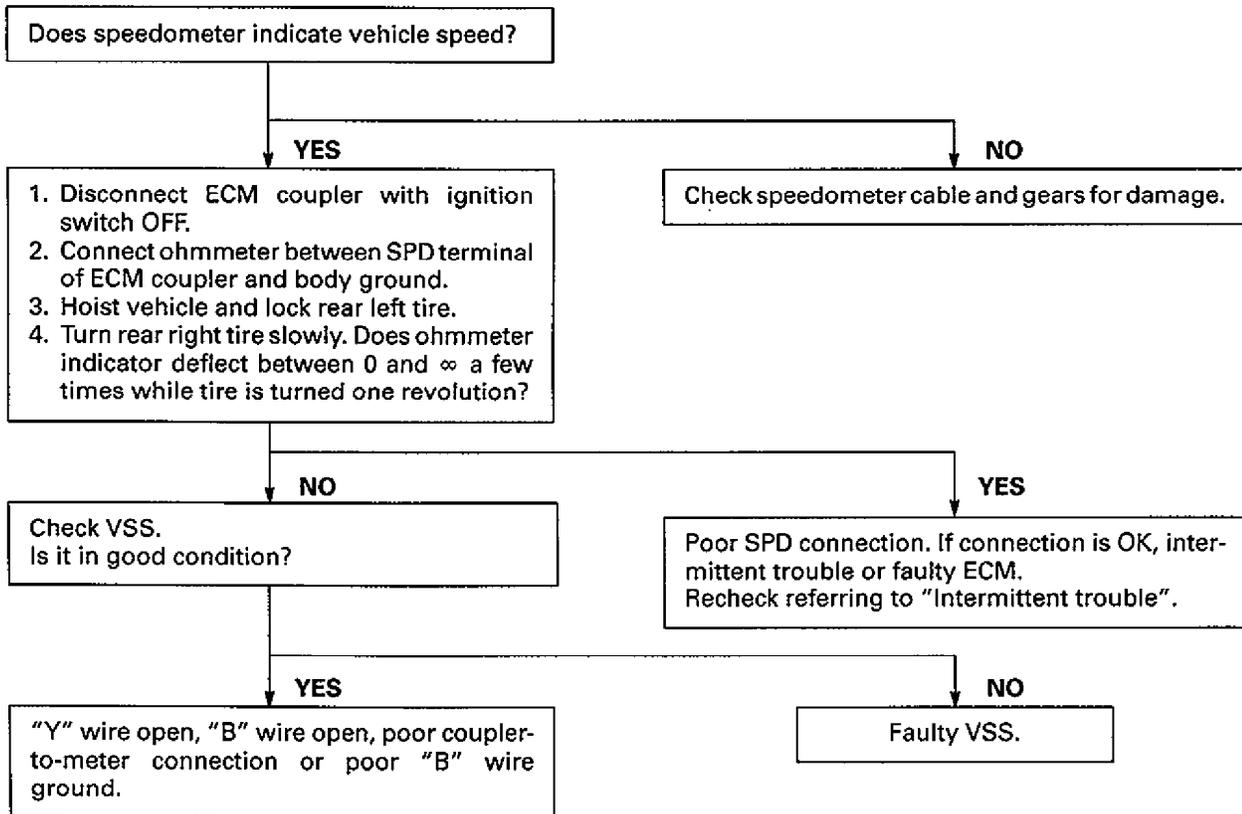


TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

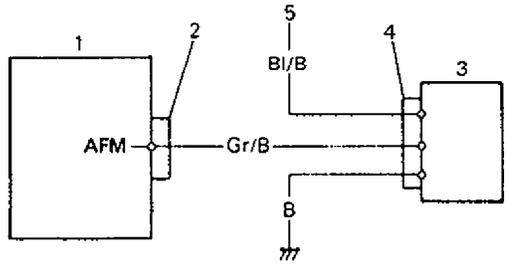


6E1041 6E1042

NOTE:
Be sure to turn OFF ignition switch for this check.

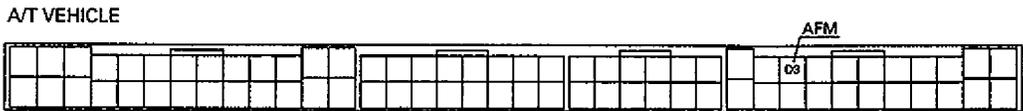


CODE NO. 33 MAF SENSOR (MASS AIR FLOW SENSOR) (LARGE SIGNAL CURRENT FLOW, SIGNAL VOLTAGE HIGH) CIRCUIT

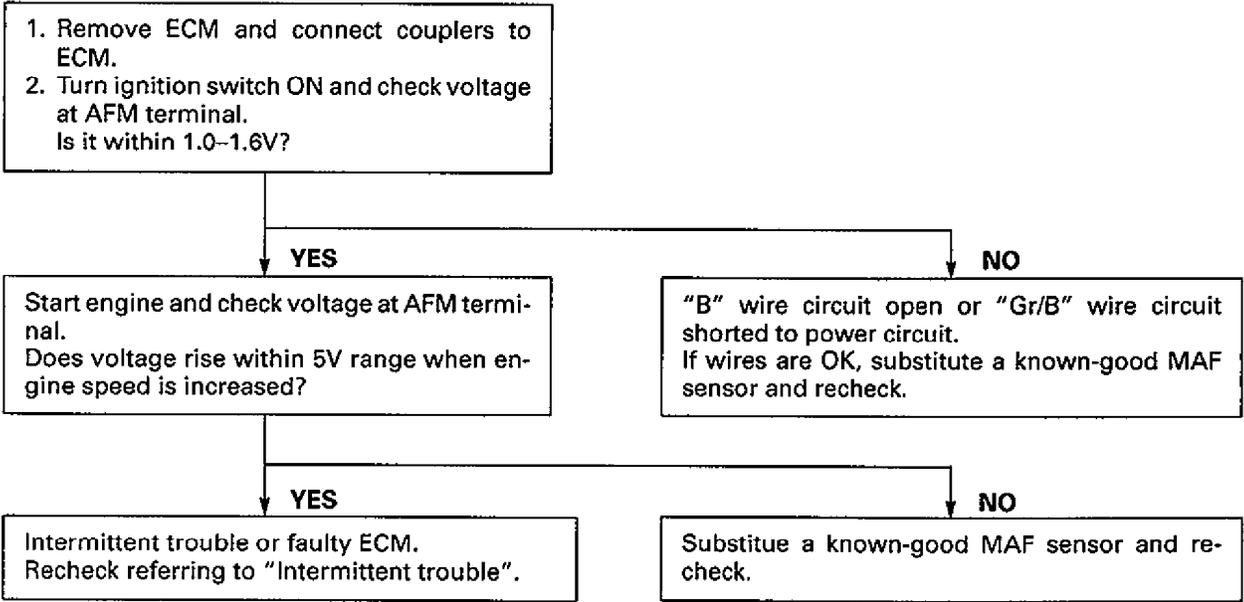


- 1. ECM
- 2. ECM coupler
- 3. MAF sensor
- 4. MAF sensor coupler
- 5. From main relay

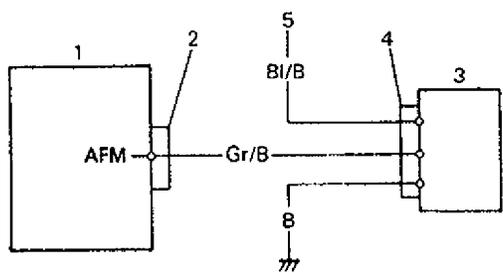
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



6E1043 6E1044

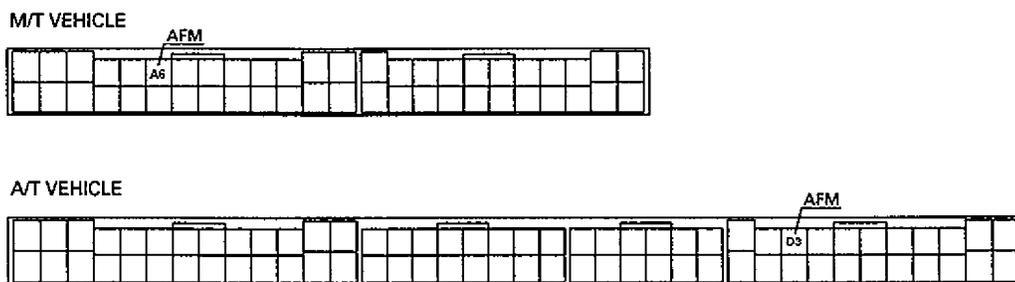


CODE NO. 34 MAF SENSOR (MASS AIR FLOW SENSOR) (SMALL SIGNAL CURRENT FLOW, SIGNAL VOLTAGE LOW) CIRCUIT



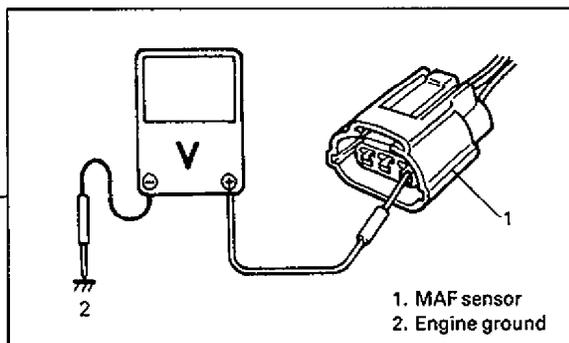
- 1. ECM
- 2. ECM coupler
- 3. MAF sensor
- 4. MAF sensor coupler
- 5. From main relay

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



6E1045 6E1046

1. Disconnect MAF sensor coupler with ignition switch OFF.
2. With ignition switch ON, is voltage applied to "BI/B" wire terminal of MAF sensor coupler about 10-14V?



YES

NO

1. Connect MAF sensor coupler with ignition switch OFF.
2. Remove ECM and connect couplers to ECM.
3. Turn ignition switch ON and check voltage at AFM terminal. Is it within 1.0-1.6V?

"BI/B" wire open.

NO

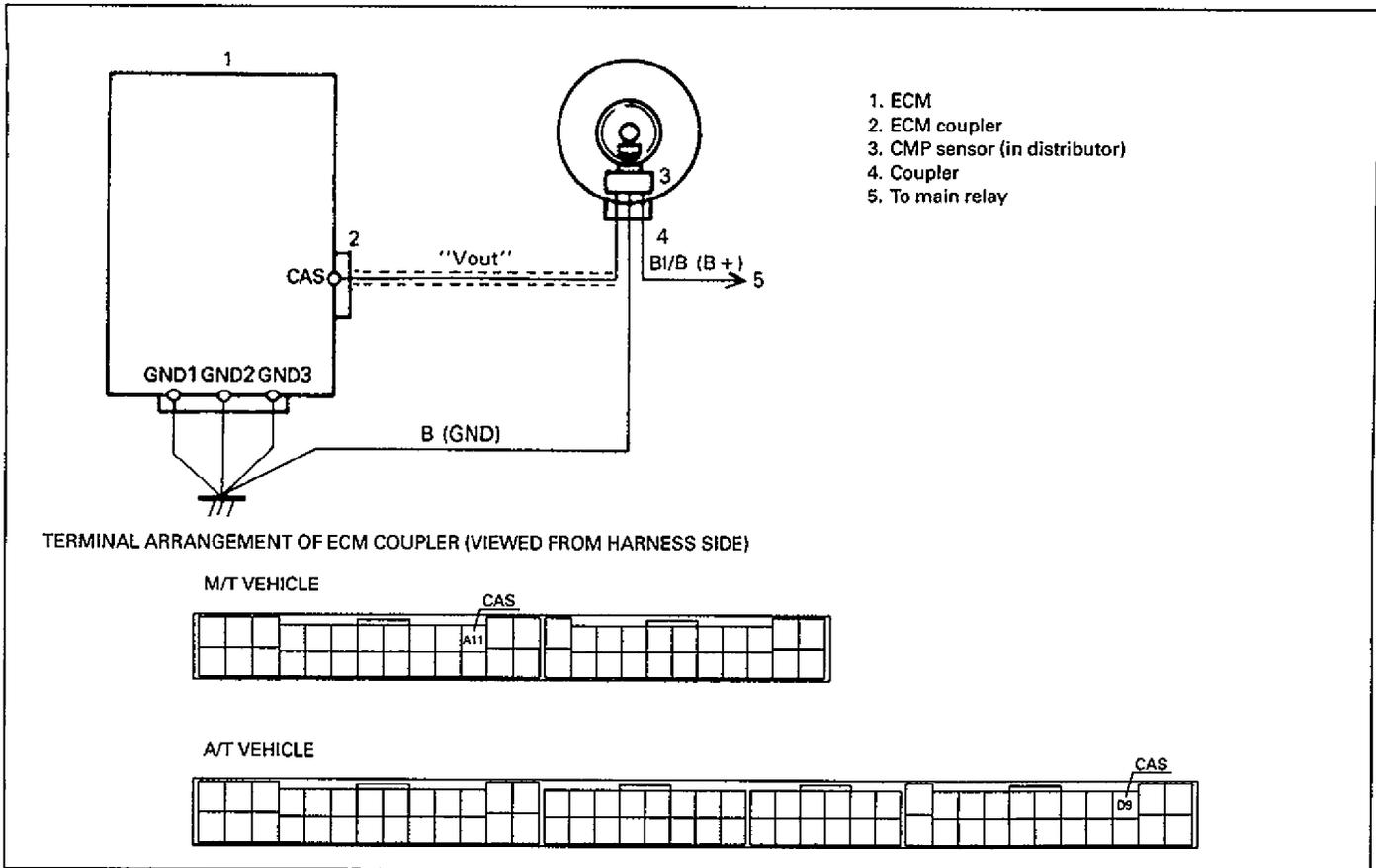
YES

Intermittent trouble or faulty ECM. Recheck referring to "Intermittent trouble".

Poor AFM connection, "Gr/B" wire open, or poor MAF sensor-to-coupler connection. If wire and connection are OK, substitute a known-good MAF sensor and recheck.

6E1047

CODE NO. 42 CMP SENSOR (CAMSHAFT (SENSOR SIGNAL NOT INPUTTED FOR POSITION SENSOR) CIRCUIT 3 SECONDS AT ENGINE CRANKING)

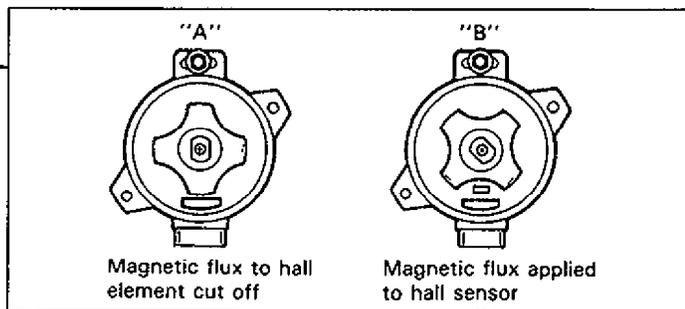


6E1048 6E1049

1. Remove ECM and connect couplers to ECM.
2. Remove distributor cap, rotor and cover. Don't remove signal rotor from shaft.
3. With ignition switch ON, check voltage at CAS terminal with signal rotor inserted between hall element and magnet ("A") and without it ("B") respectively, by turning crankshaft.

"A"	3-5V
"B"	0-1V

Is it in good condition?



NO

3-5V or more at both "A" and "B".

"Vout" wire open, "GND" circuit open, "Vin" circuit open or poor CMP sensor coupler connection. If wire and connection are OK, substitute a known-good CMP sensor and recheck.

YES

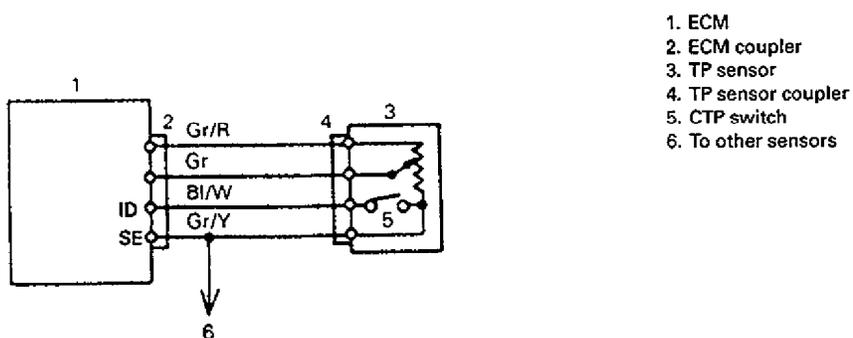
0-1V at both "A" and "B".

Poor CAS connection or "Vout" wire short to ground. If wire and connection are OK, substitute a known-good CMP sensor and recheck.

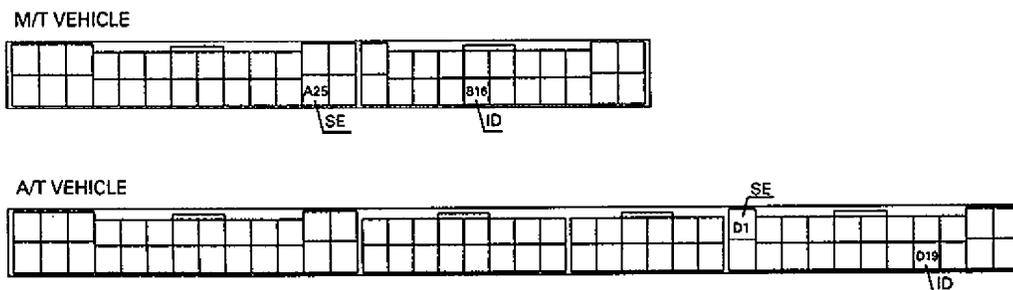
Substitute a known-good ECM and recheck.

6E1050 6E1051

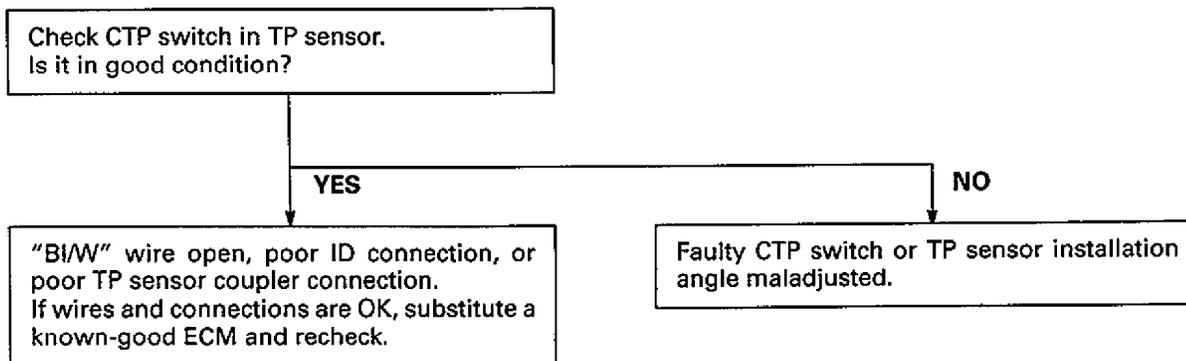
CODE NO. 44 CTP SWITCH CIRCUIT (CIRCUIT OPEN OR TP SENSOR INSTALLATION ANGLE MALADJUSTED)



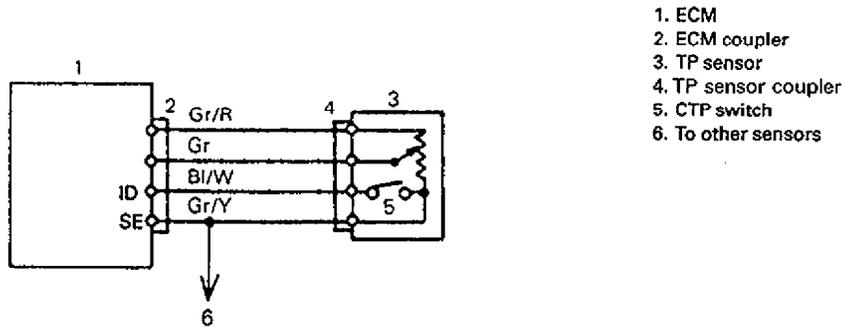
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



6E1052 6E1053

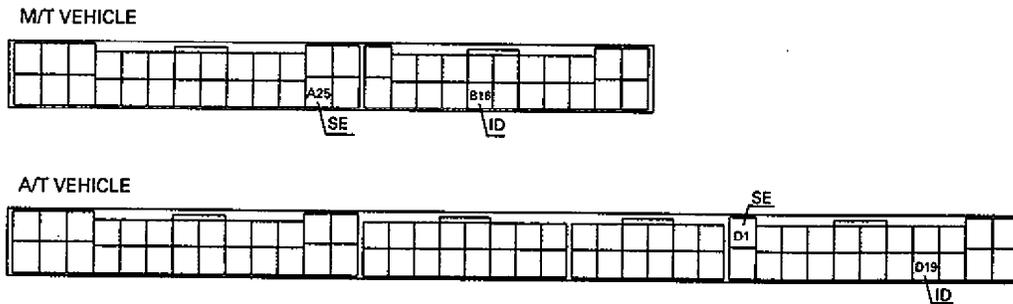


CODE NO. 45 CTP SWITCH CIRCUIT (CIRCUIT SHORT OR TP SENSOR INSTALLATION ANGLE MALADJUSTED)



- 1. ECM
- 2. ECM coupler
- 3. TP sensor
- 4. TP sensor coupler
- 5. CTP switch
- 6. To other sensors

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

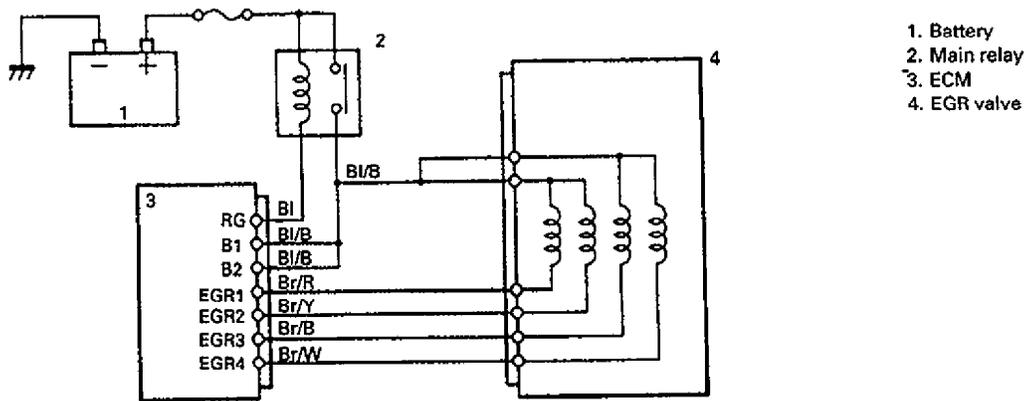


6E1054 6E1055

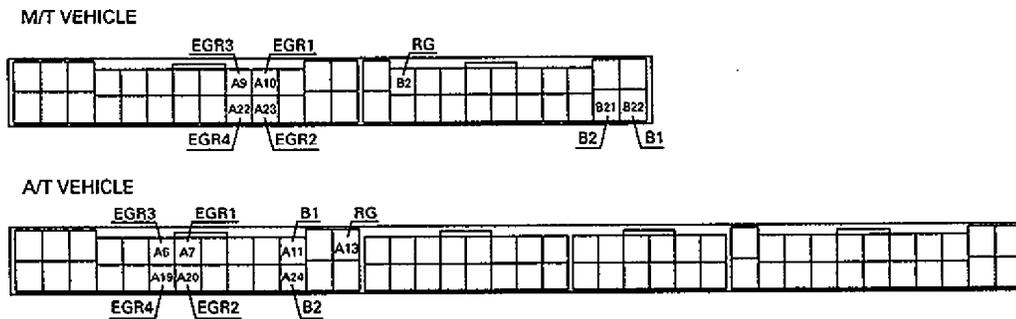
```

    graph TD
      A[Check idle switch in TP sensor.  
Is it in good condition?] -- YES --> B["BI/W" wire shorted to "Gr/Y" wire or ground.  
If wiring is OK, intermittent trouble or faulty ECM. Recheck referring to "Intermittent trouble".]
      A -- NO --> C[Faulty CTP switch or TP sensor installation angle maladjusted.]
    
```

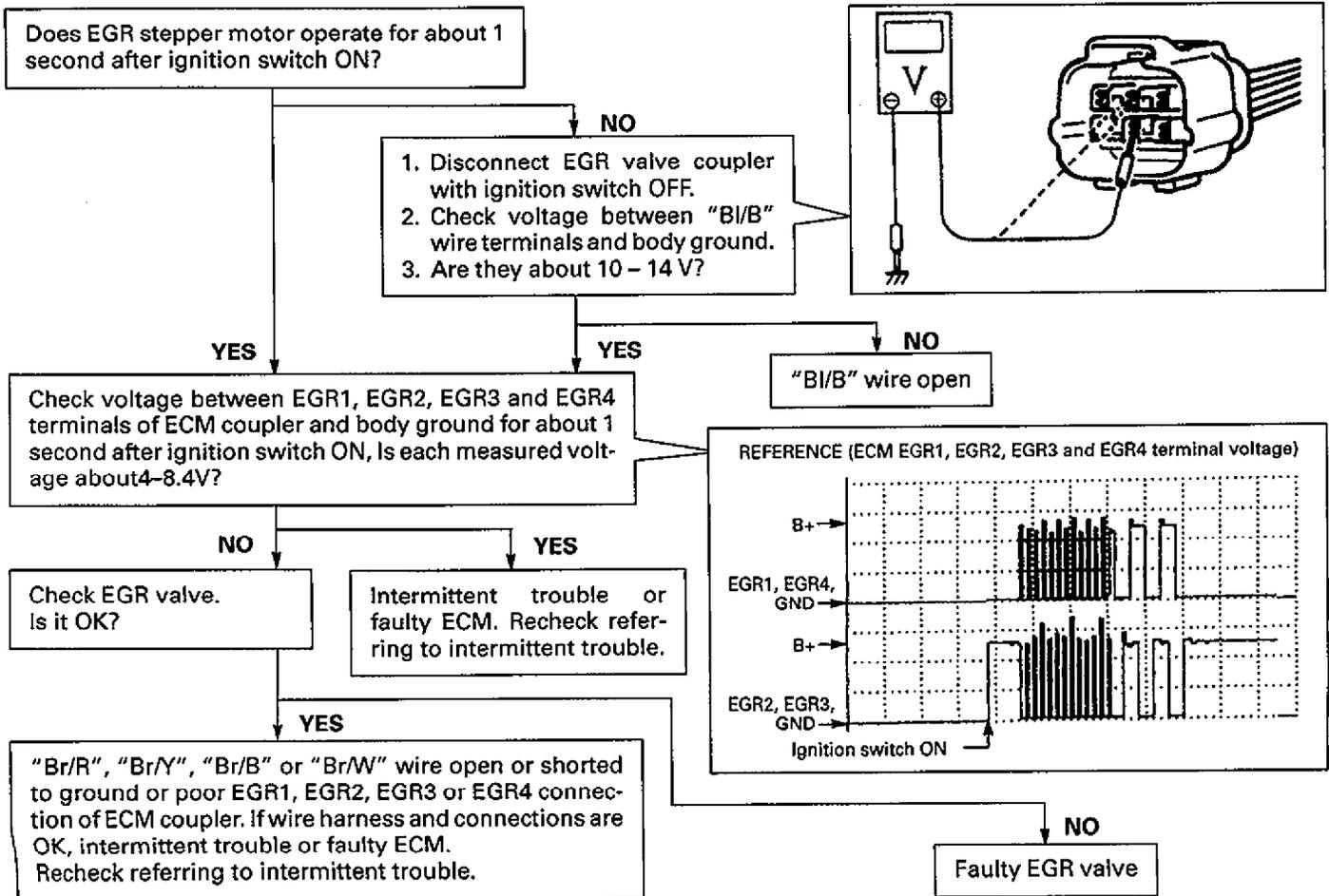
CODE NO.51 EGR VALVE (STEPPER MOTOR OR ITS CIRCUIT OPEN OR SHORT)



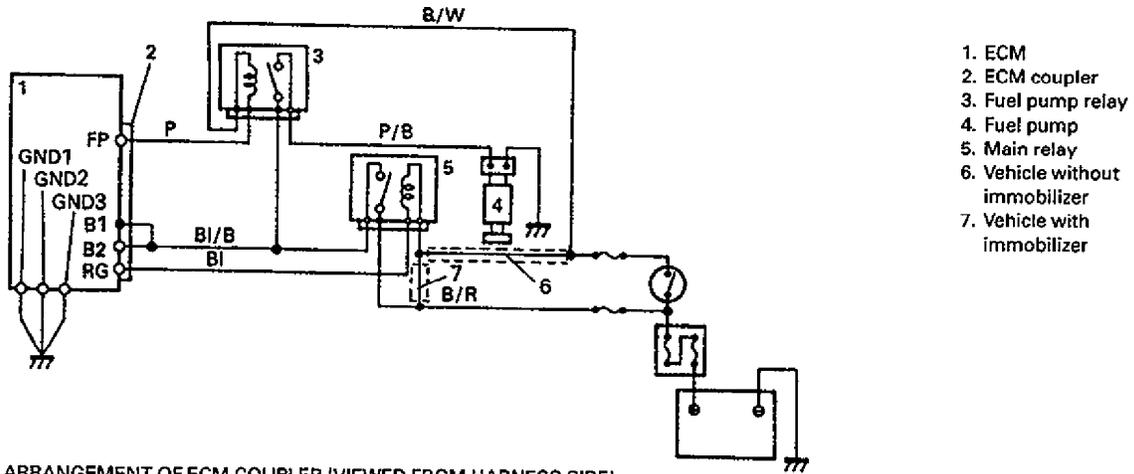
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



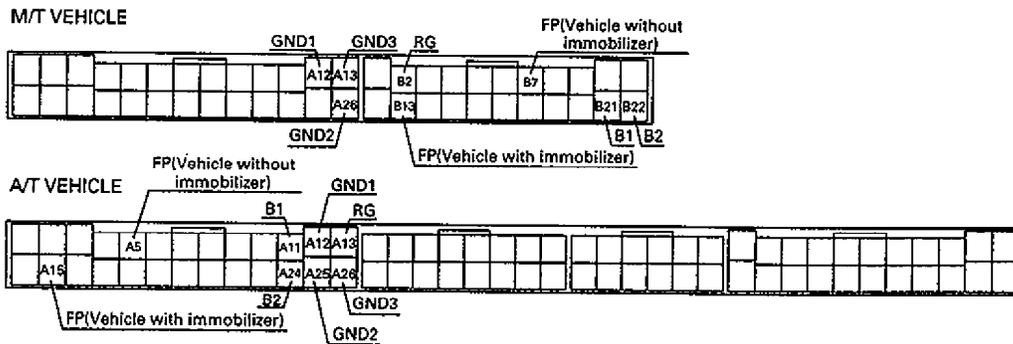
6E1056 6E1057



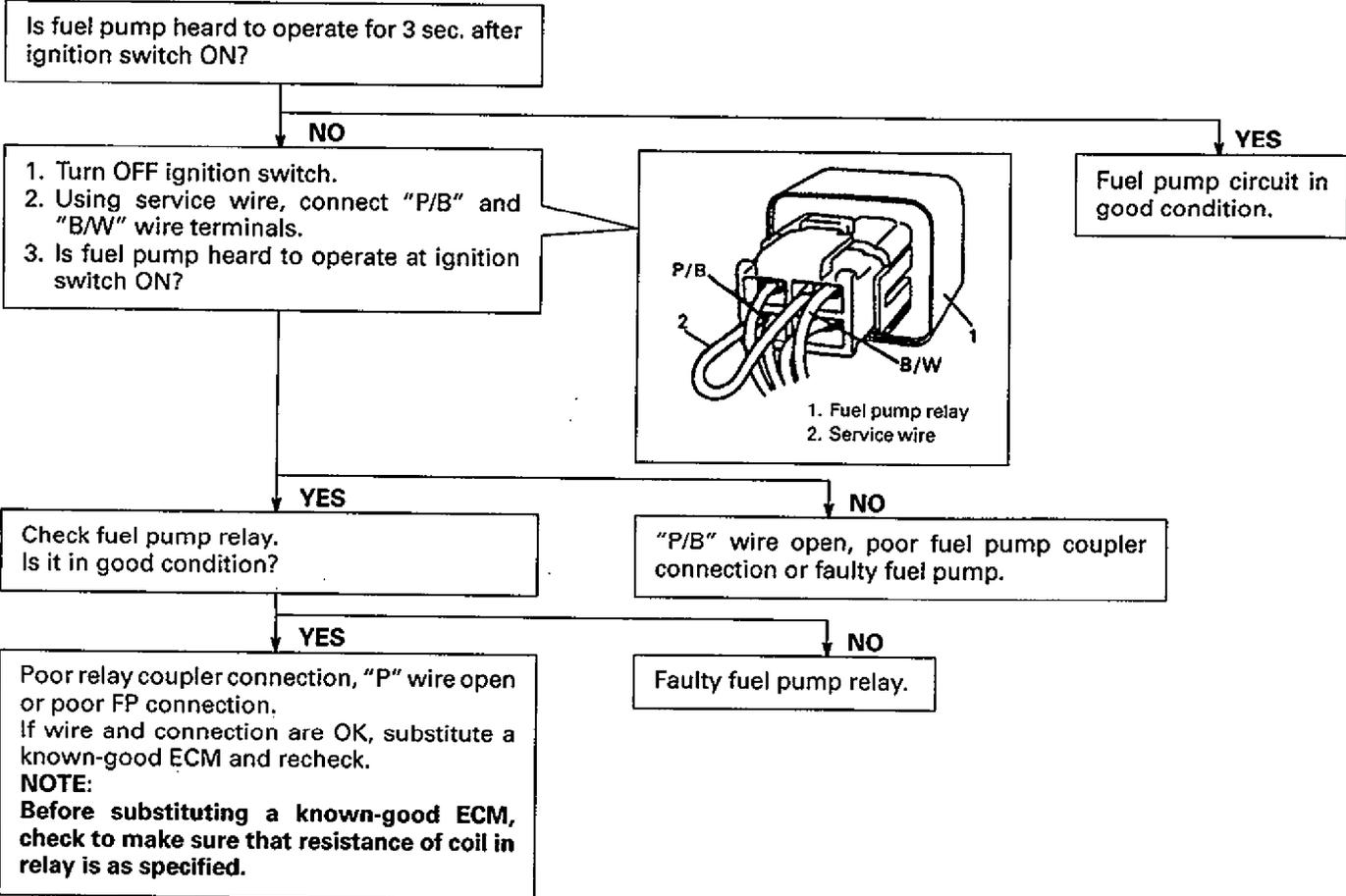
B-1 FUEL PUMP CIRCUIT CHECK



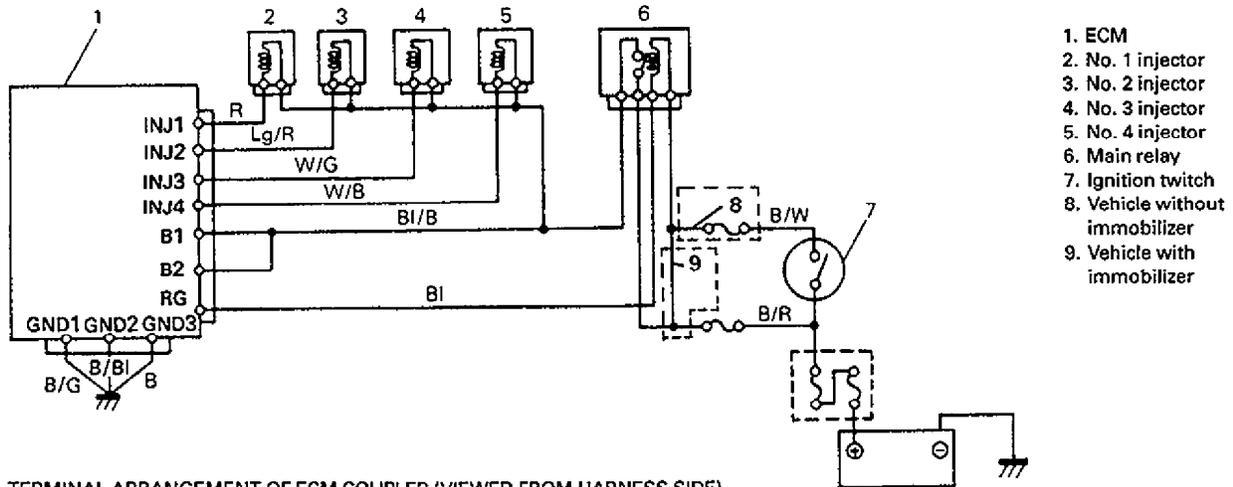
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



6E1060 .6E1061



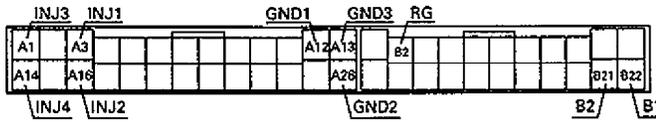
B-2 FUEL INJECTOR CIRCUIT CHECK



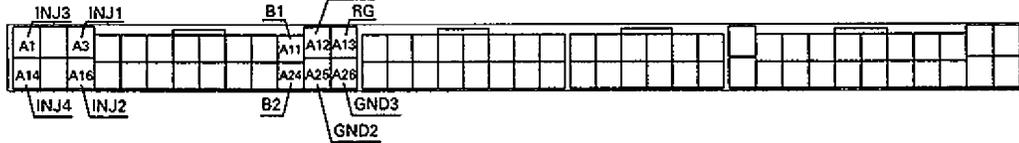
- 1. ECM
- 2. No. 1 injector
- 3. No. 2 injector
- 4. No. 3 injector
- 5. No. 4 injector
- 6. Main relay
- 7. Ignition switch
- 8. Vehicle without immobilizer
- 9. Vehicle with immobilizer

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

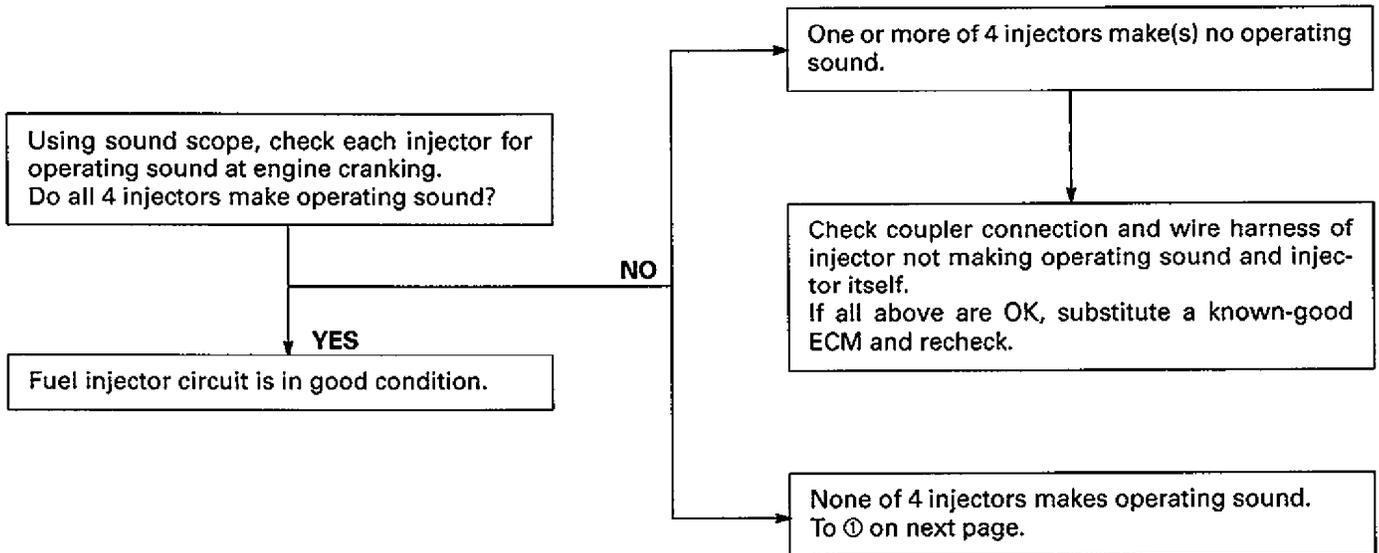
M/T VEHICLE



A/T VEHICLE

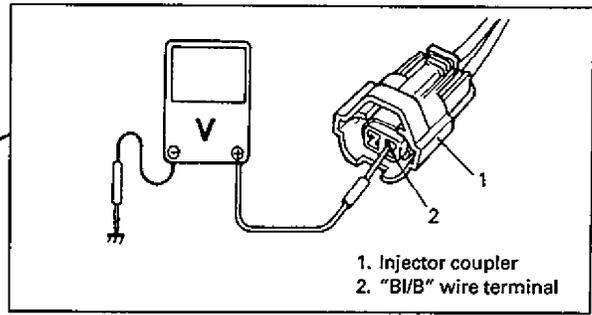


6E1063 6E1064



① None of 4 injectors makes operating sound.

1. Disconnect coupler from No.1 injector with ignition switch OFF.
 2. Check voltage at "B1/B" wire terminal with ignition switch ON.
 Is it battery voltage?



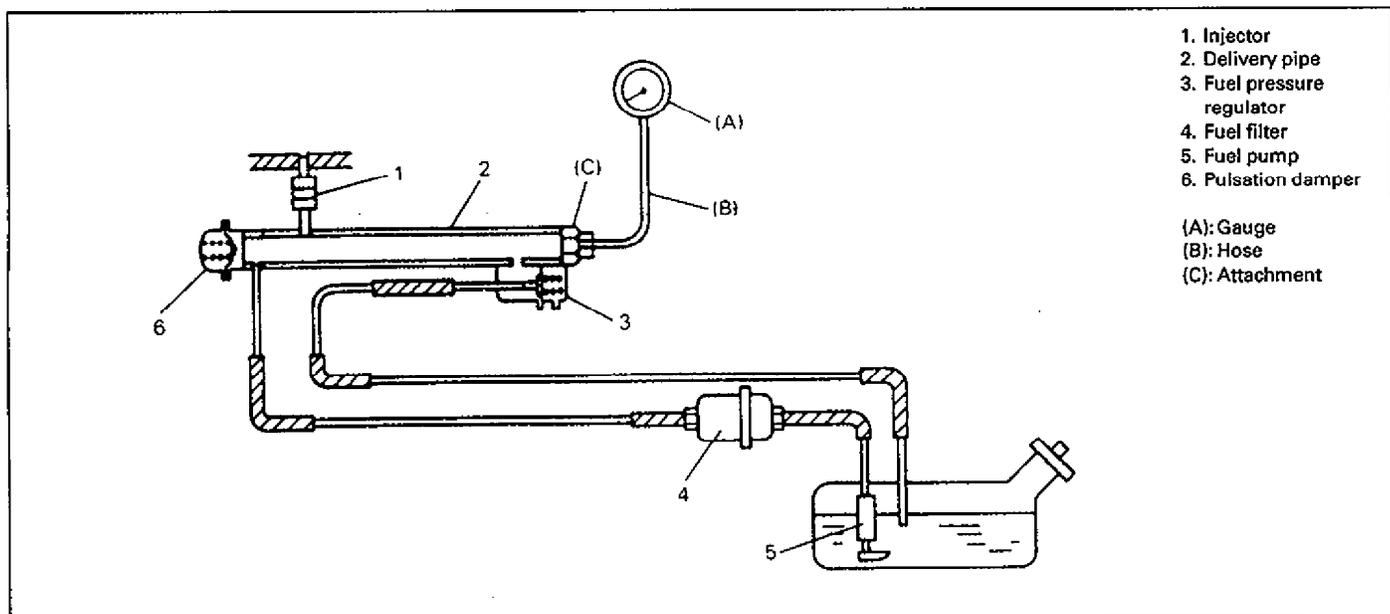
YES

NO

Power circuit open.

Disconnect ECM couplers with ignition switch OFF check all 4 injectors for resistance respectively.
 No.1 injector : INJ1 and B1/B2
 No.2 injector : INJ2 and B1/B2
 No.3 injector : INJ3 and B1/B2
 No.4 injector : INJ4 and B1/B2
 If resistance is OK, substitute a known-good ECM and recheck.

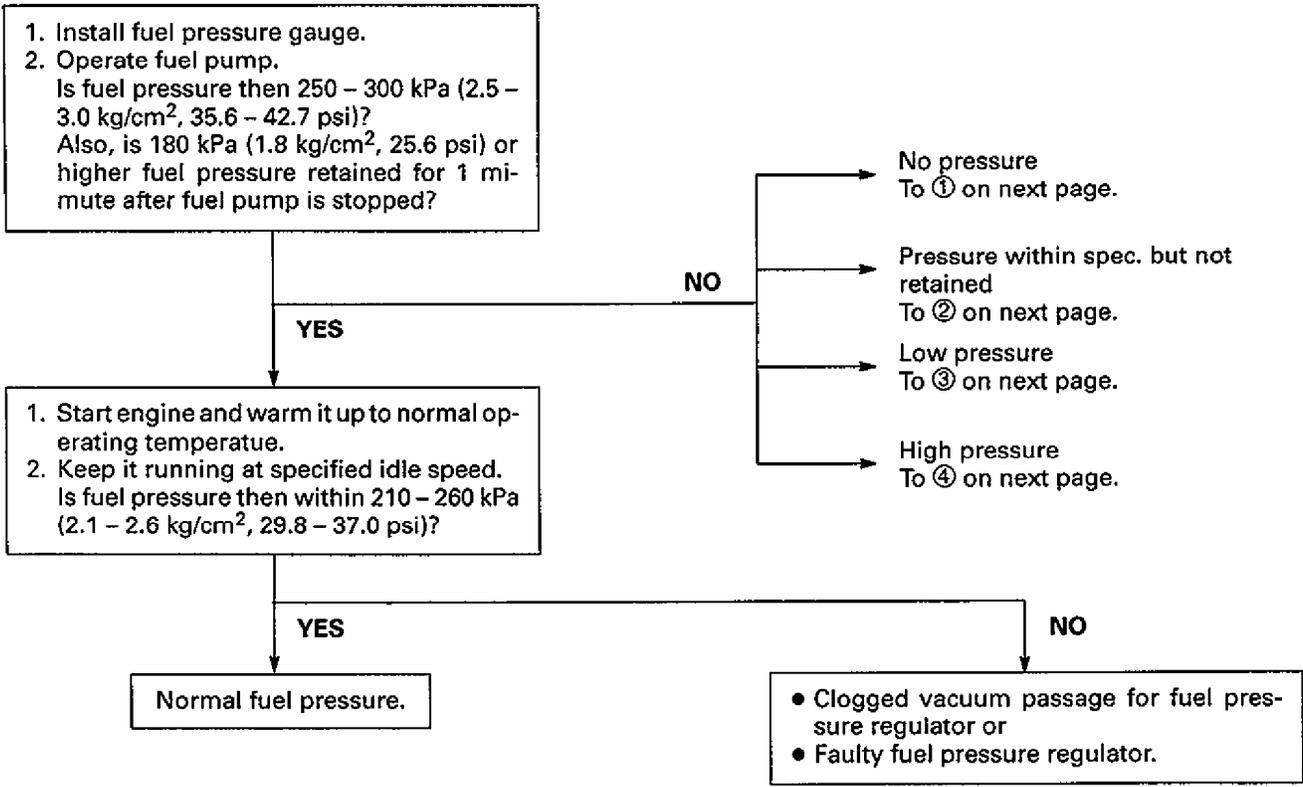
B-3 FUEL PRESSURE CHECK



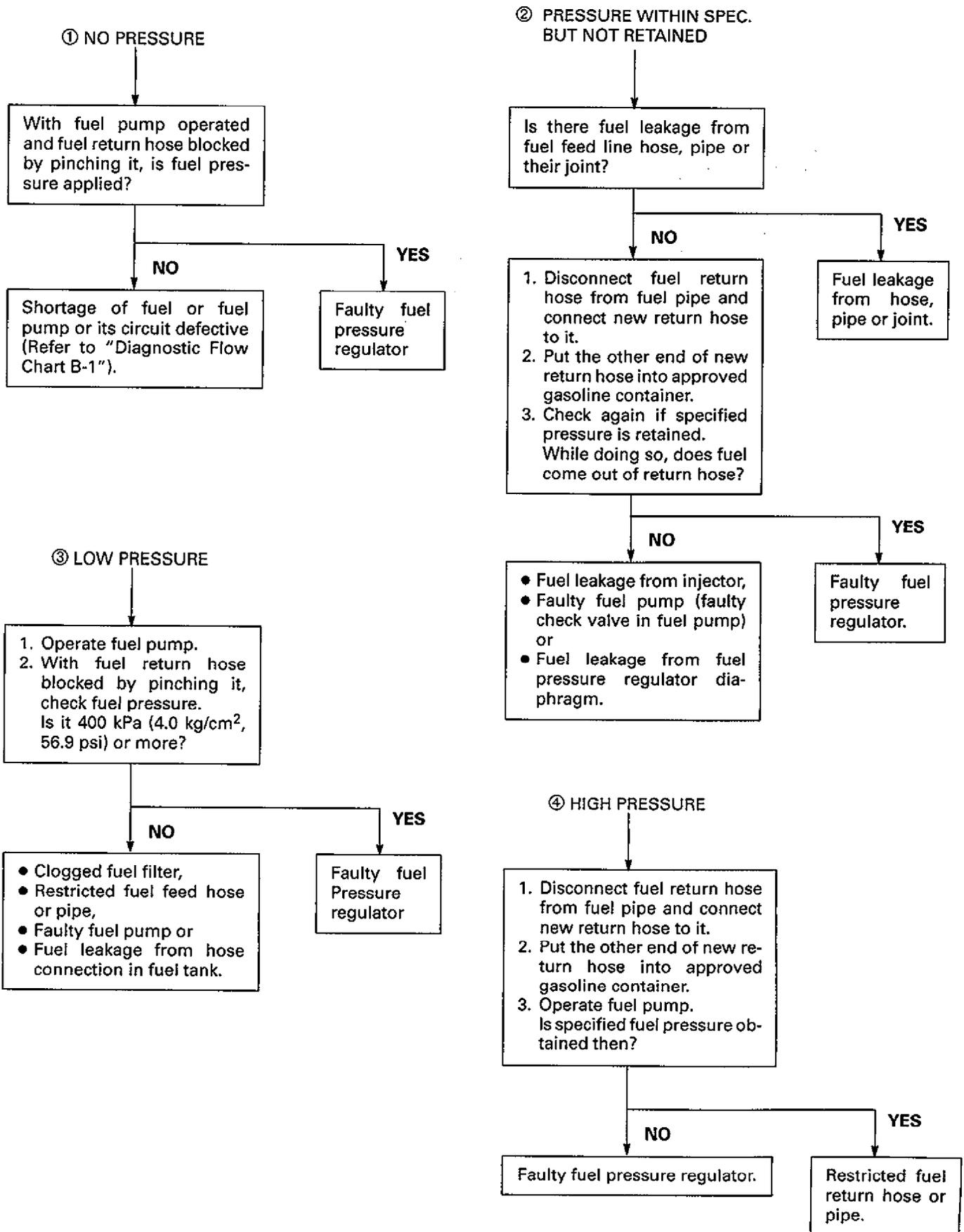
- 1. Injector
 - 2. Delivery pipe
 - 3. Fuel pressure regulator
 - 4. Fuel filter
 - 5. Fuel pump
 - 6. Pulsation damper
- (A): Gauge
 (B): Hose
 (C): Attachment

6E1065

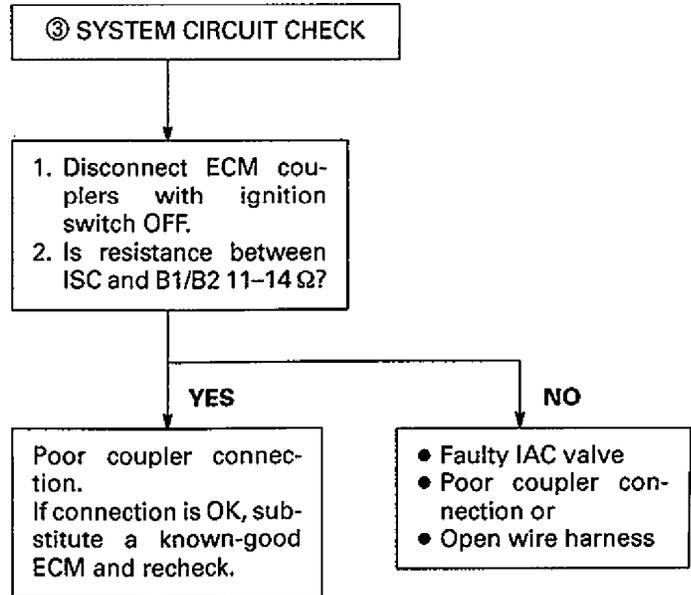
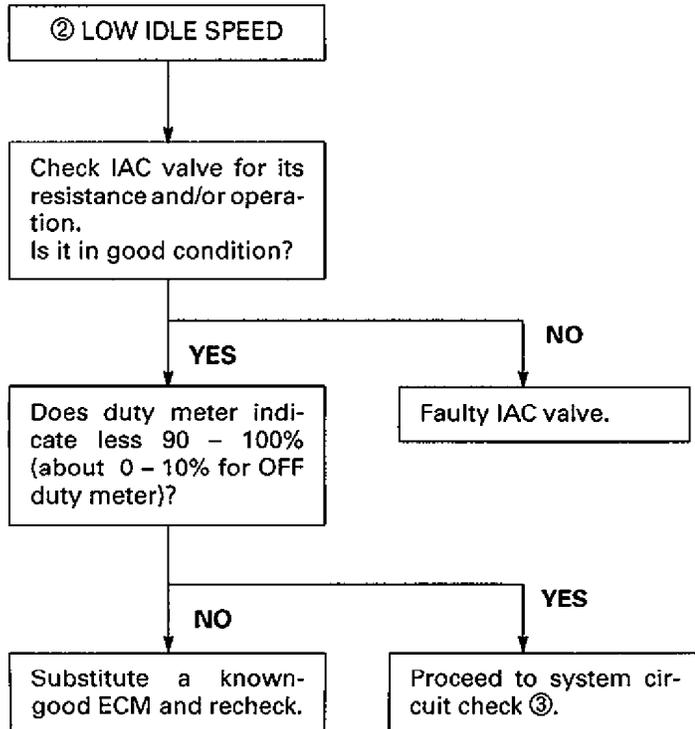
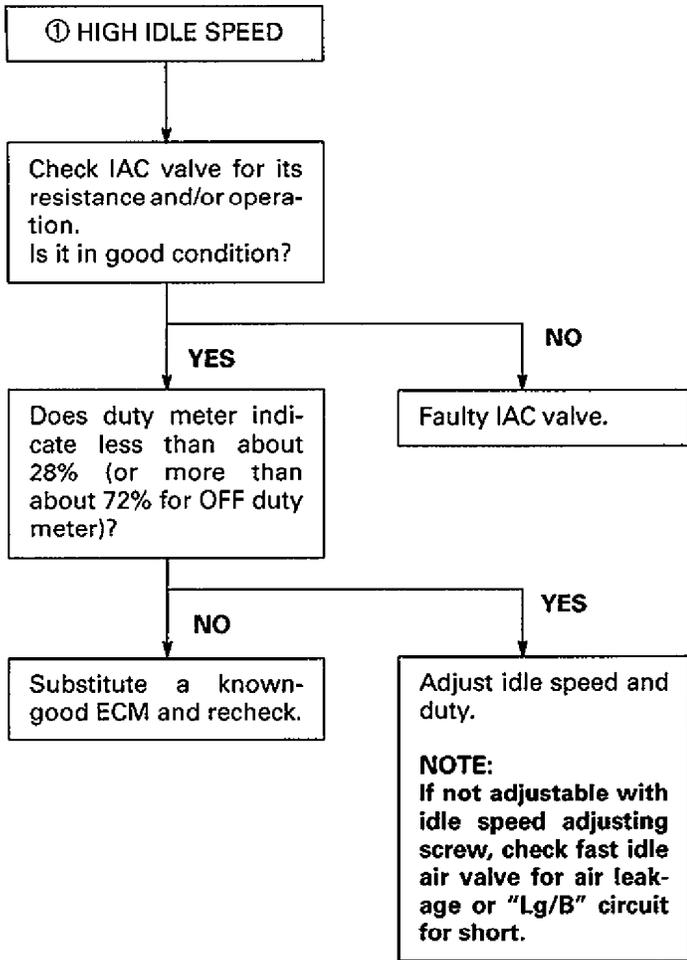
NOTE:
 Before using following flow chart, check to make sure that battery voltage is higher than 11V. If battery voltage is low, pressure becomes lower than specification even if fuel pump and line are in good condition.



B-3 FUEL PRESSURE CHECK (continued)



B-4 IDLE AIR CONTROL SYSTEM CHECK (continued)

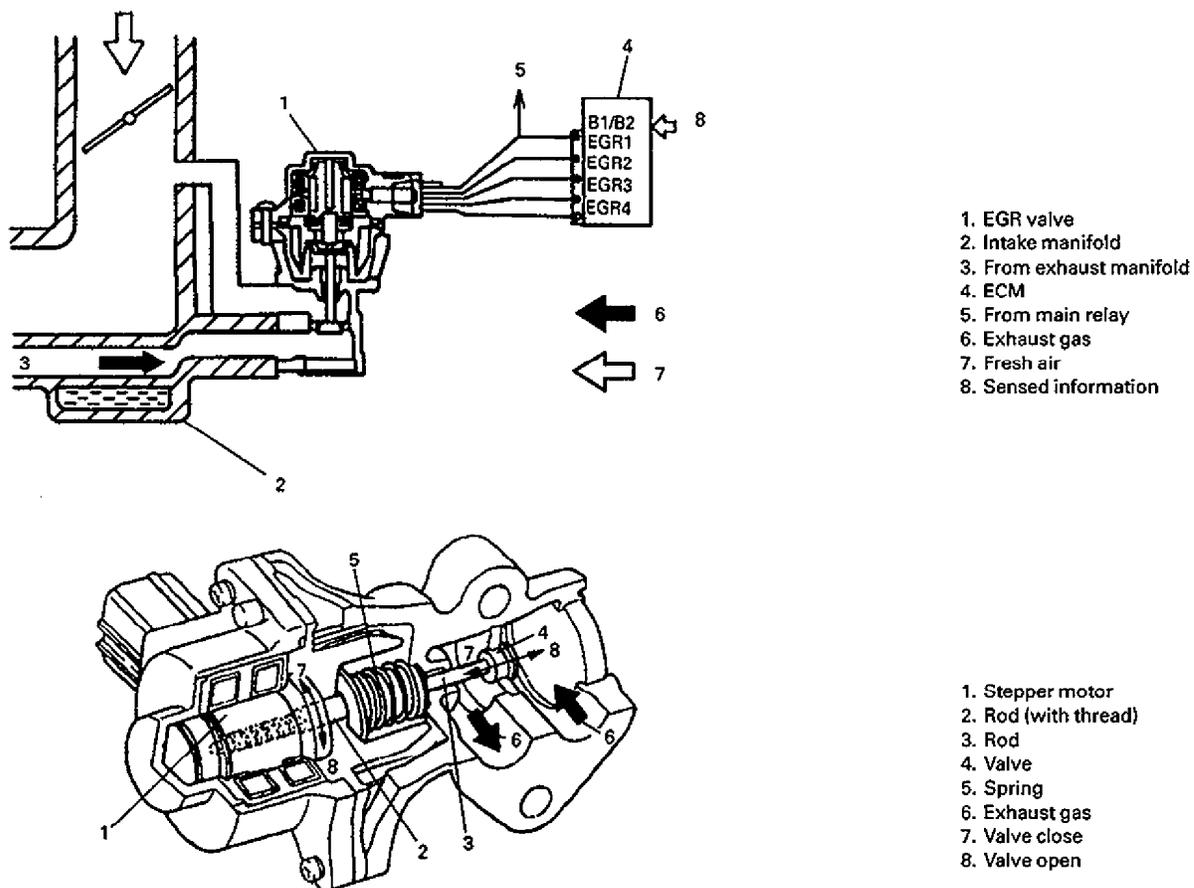


NOTE: IAC duty can be checked by using analog type voltmeter with high impedance ($M\Omega/V$ minimum), although not accurate. IAC duty to voltage relation is as follows.

ON DUTY METER INDICATION	OFF DUTY METER INDICATION	VOLTMETER INDICATION
0 (%)	100 (%)	0 (V)
28	72	$0.28 \times V_B$
50	50	$0.5 \times V_B$
100	0	V_B

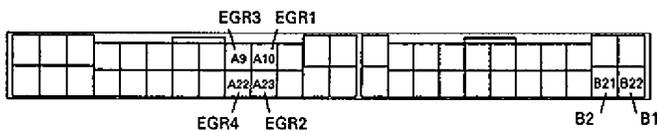
- "OFF DUTY METER" is such duty meter that indicates approx. 100% when terminal voltage is approx. "0V".
- " V_B " represents battery voltage while engine of vehicle being checked is running.

B-5 EGR SYSTEM CHECK
(Vehicle with EGR Stepper Motor)

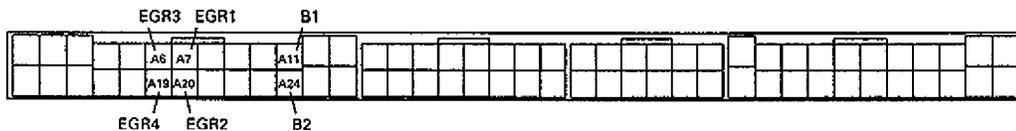


TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE



A/T VEHICLE



6E1069 6E1070 6E1071

Check EGR system by using tech-1.
Is it good condition?

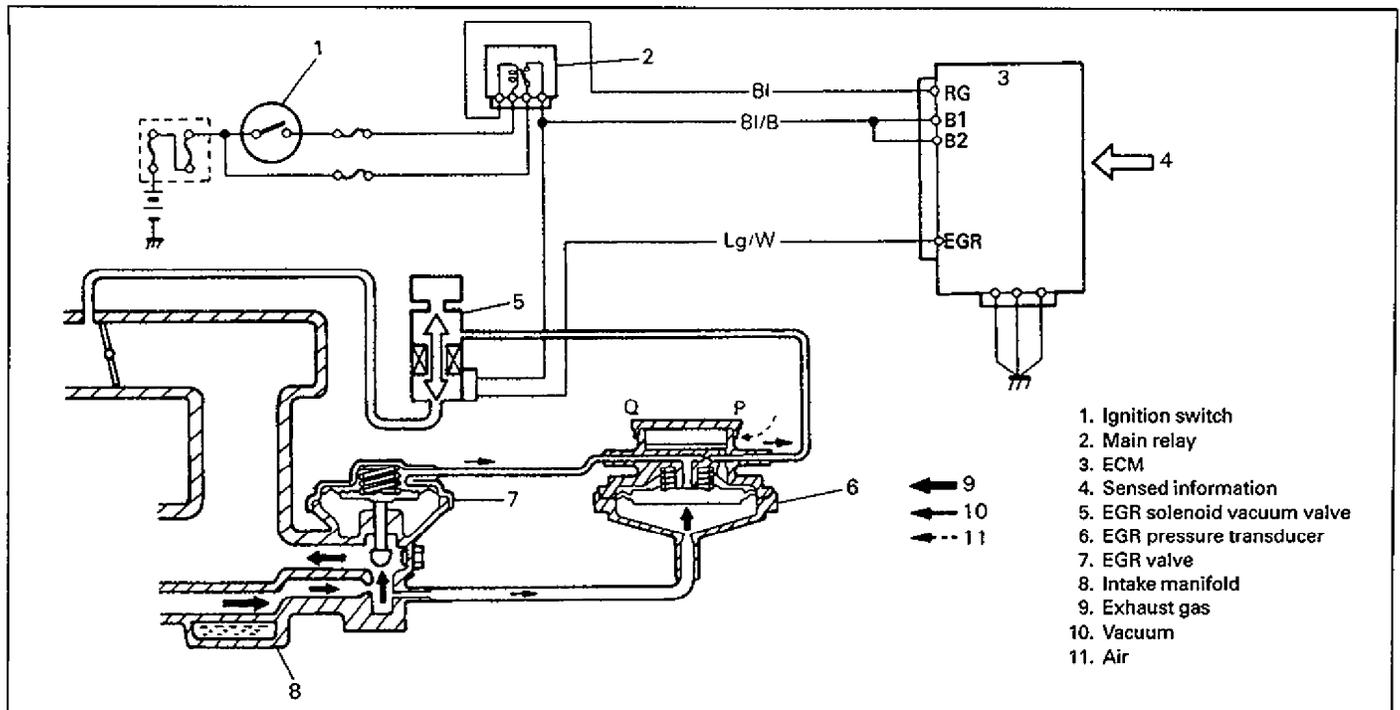
YES

EGR system is in good condition.

NO

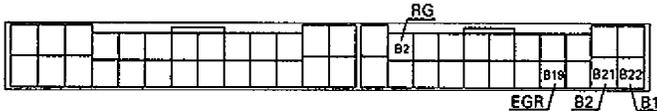
Clogged EGR pipe, stuck or faulty EGR valve or poor performance of ECT sensor, TP sensor.

B-5 EGR SYSTEM CHECK
(Vehicle with EGR Solenoid Vacuum Valve)

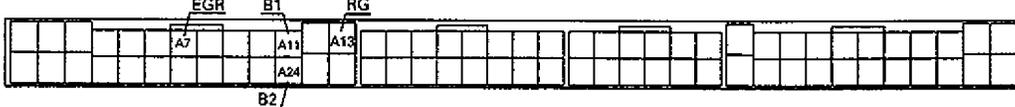


TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

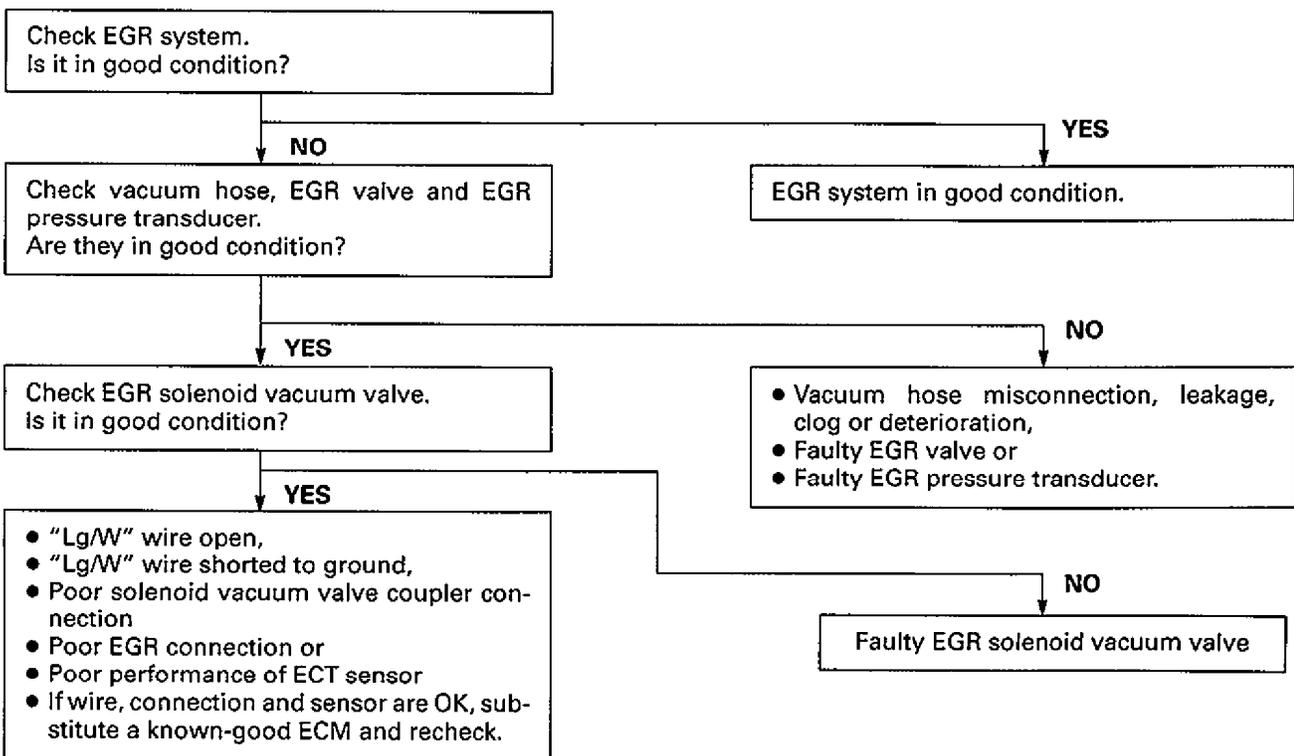
M/T VEHICLE



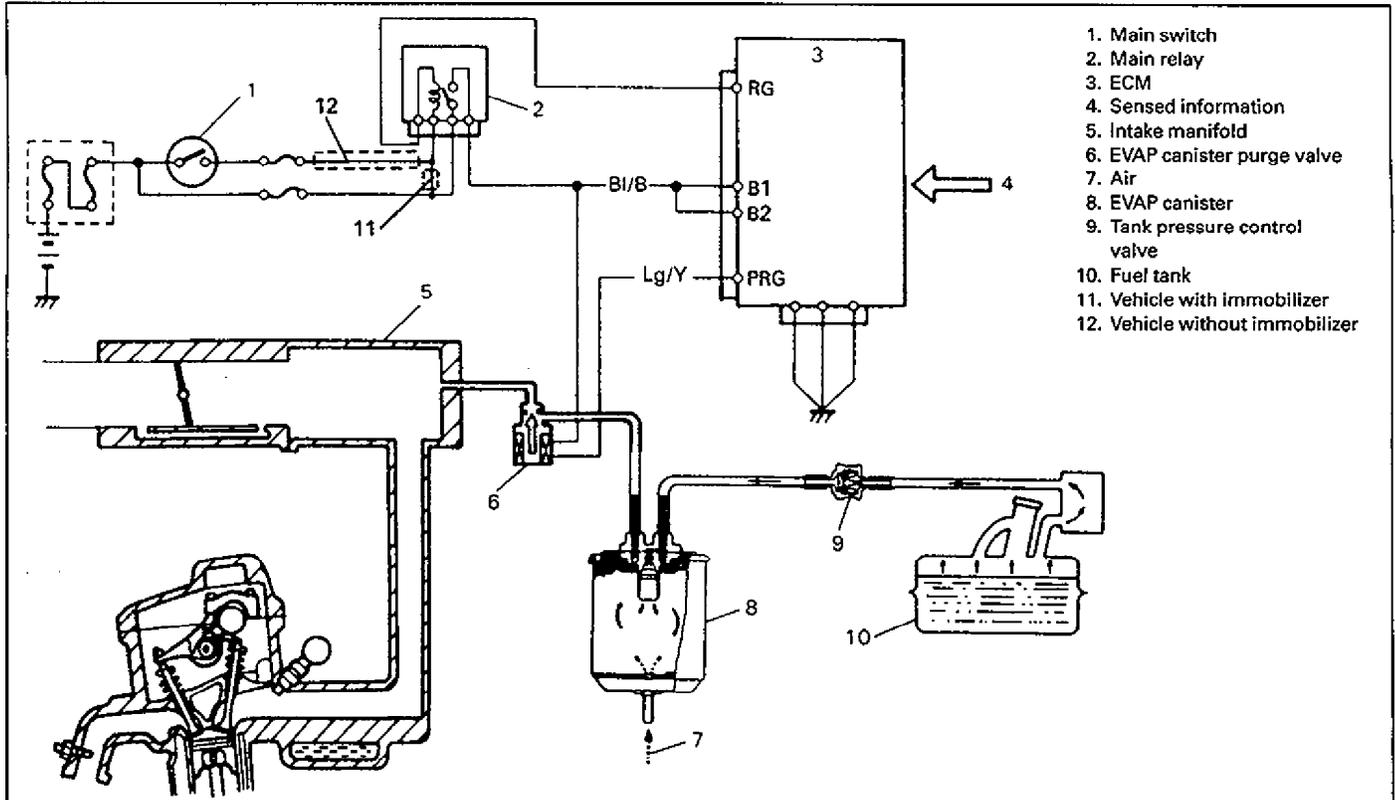
A/T VEHICLE



6E1072 6E1073



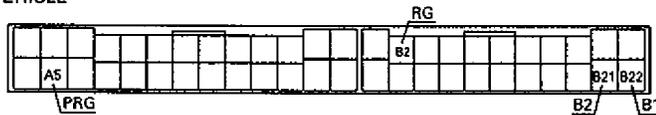
B-6 EVAPORATIVE EMISSION CONTROL SYSTEM CHECK



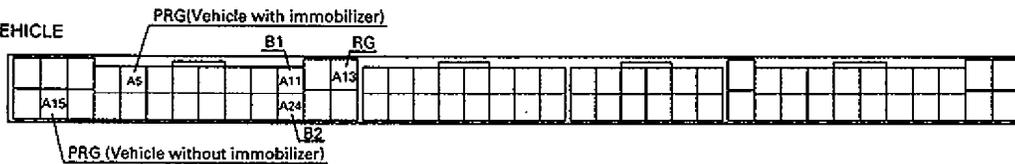
1. Main switch
2. Main relay
3. ECM
4. Sensed information
5. Intake manifold
6. EVAP canister purge valve
7. Air
8. EVAP canister
9. Tank pressure control valve
10. Fuel tank
11. Vehicle with immobilizer
12. Vehicle without immobilizer

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE



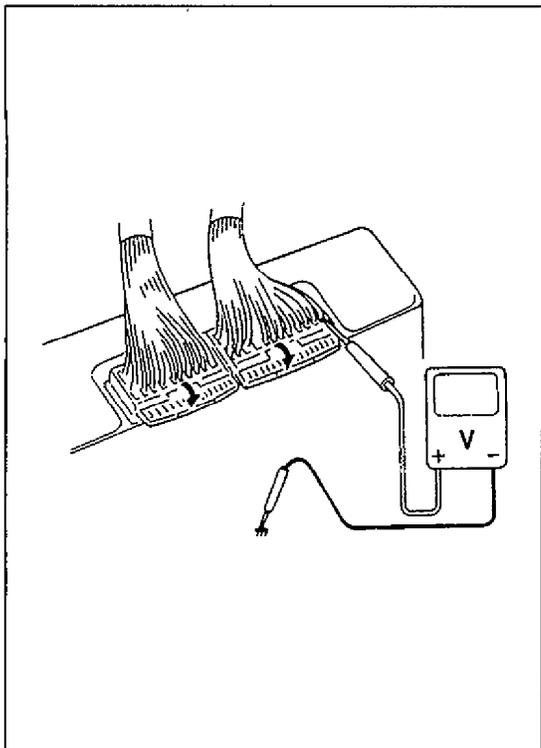
A/T VEHICLE



6E1074 6E1075

```

    graph TD
      Q1[Check canister purge system for operation.  
Is it in good condition?] -- NO --> Q2[Check vacuum passage, hoses and EVAP  
canister purge valve.  
Are they in good condition?]
      Q1 -- YES --> R1[• Canister purge system in good condition  
check EVAP canister, tank pressure control  
valve and fuel filler cap.]
      Q2 -- YES --> R2[• "Lg/Y" wire open,  
• "Lg/Y" wire shorted to ground,  
• Poor canister purge valve coupler connection,  
• Poor PRG connection or  
• Poor performance of ECT sensor  
If wire, connection and sensor are OK, substitute a known-good ECM and recheck.]
      Q2 -- NO --> R3[• Vacuum passage clogged,  
• Vacuum leakage or  
• Faulty EVAP canister purge valve.]
    
```



INSPECTION OF ECM AND ITS CIRCUITS

ECM and its circuits can be checked at ECM wiring couplers by measuring voltage and resistance.

CAUTION:

ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with couplers disconnected from it.

Voltage Check

- 1) Remove ECM from body referring to ECM REMOVAL.
- 2) Connect ECM couplers to ECM.
- 3) Check voltage at each terminal of couplers connected.

NOTE:

As each terminal voltage is affected by the battery voltage, confirm that it is 11V or more when ignition switch is ON.

6E1076

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22

A/T VEHICLE

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B9	B10	B11	B12	B13	B14	B15	B16	C7	C8	C9	C10	C11	C12	D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22

6E1077

6E1078

M/T VEHICLE

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLLOR			
INJ3	A1	W/G	Injector No.3	10 - 14V	Ignition switch ON
ISC	A2	Lg/B	Idle air control valve	10 - 14V	Ignition switch ON
INJ1	A3	R	Injector No.1	10 - 14V	Ignition switch ON
-	A4	-	Blank	-	-
THW	A5	R/Y	ECT sensor	0.5 - 0.9 V	Ignition switch ON Engine coolant temp. :80°C(176°F)
AFM	A6	Gr/B	MAF sensor	1.0 - 1.6V	Ignition switch ON
				1.7 - 2.0V	With engine running at idle speed
VTA	A7	Gr	TP sensor	0.5 - 1.2V	Ignition switch ON Throttle valve at idle position
				3.4 - 4.7V	Ignition switch ON Throttle valve at full open position
VCC	A8	Gr/R	Power source for sensors	4.75 - 5.25V	Ignition switch ON
EGR3	A9	Br/B	EGR valve (stepper motor coil 3, if equipped)	10 - 14V	Over 1 second after ignition switch ON
EGR1	A10	Br/R	EGR valve (stepper motor coil 1, if equipped)	0 - 1V	Over 1 second after ignition switch ON
CAS	A11	W	CMP sensor	Indicator deflection repeated between 0-1V and 3-5V	Ignition switch ON Crankshaft turned slowly
GND1	A12	B or B/Bl	Ground	-	-
GND3	A13	B/Bl or B/O			
INJ4	A14	W/B	Injector No.4	10 - 14V	Ignition switch ON
PRG	A15	Lg/Y	EVAP canister purge valve	10 - 14V	Ignition switch ON
INJ2	A16	Lg/R	Injector No.2	10 - 14V	Ignition switch ON
OXH	A17	P	Heated oxygen sensor heater (if equipped)	10 - 14V	Ignition switch ON
				0 - 1V	Over 3 min, after engine started Engine running at idle speed
IG	A18	B/W	Ignition switch (vehicle with immobilizer)	10 - 14V	Ignition switch ON
-	A19	-	Blank	-	-
OX	A20	R/Bl	Heated oxygen sensor (if equipped)	Indicator deflection repeated between over and under 0.45V	While engine running at 2,000 r/min for 1 minute or longer after warmed up
CO	A21	Br/W	CO adjusting resistor (if equipped)	About 5V	Ignition switch ON CO resistor disconnected
EGR4	A22	Br/W	EGR valve (stepper motor coil 4, if equipped)	0 - 1V	Over 1 second after ignition switch ON
EGR2	A23	Br/Y	EGR valve (stepper motor coil 2, if equipped)	10 - 14V	Over 1 second after ignition switch ON
SDL	A24	V/W	Data link connector	4 - 5V	Ignition switch ON
SE	A25	Gr/Y	Sensor ground	-	-
GND2	A26	B/G	Ground	-	-

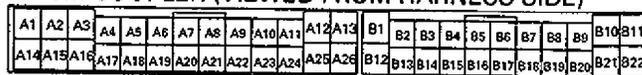
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22

M/T VEHICLE

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLLOR			
-	B1	-	Blank	-	-
RG	B2	BI	Main relay (vehicle with immobilizer)	0 - 1V	Ignition switch ON
			Main relay (vehicle without immobilizer)	10 - 14V	Ignition switch OFF
ACS	B3	Y/B	Air conditioning circuit (if equipped)	0 - 1V	Ignition switch ON
				10 - 14V	With engine running and A/C ON
-	B4	-	Blank	-	-
SPD	B5	Y	Vehicle speed sensor (in speedometer)	Indicator deflection repeated between 0 - 1V and 4 - 5V	Ignition switch ON Rear left tire turned slowly with rear right tire locked
TS	B6	BI/R	Test switch terminal	10 - 14V	Ignition switch ON
				0 - 1V	Ignition switch ON Test switch terminal grounded
FP	B7	P	Fuel pump relay (vehicle without immobilizer)	0 - 1V	For 3 seconds after ignition switch ON
				10 - 14V	After the above time
IGT	B8	O	Ignition trigger signal	0 - 1V	Ignition switch ON
				Between 0-3V	While engine cranking
MON	B9	V	Duty output terminal	-	-
STA	B10	B/Y	Engine start switch (Engine start signal)	6 - 12V	While engine cranking
				0V	Other than above
BB	B11	W	Power source for back-up circuit	10 - 14V	Ignition switch ON and OFF
-	B12	-	Blank	-	-
FP	B13	P	Fuel pump relay (vehicle with immobilizer)	0 - 1V	For 3 seconds after ignition switch ON
				10 - 14V	After the above time
ABS	B14	P/W	ABS control module	10 - 14V	Over 3 seconds after ignition switch ON
PSS	B15	BI/O	Power steering pressure switch (if equipped)	10 - 14V	Ignition switch ON
				0 - 1V	With engine running at idle speed, turning steering wheel to the right or left as far as it stops
ID	B16	BI/W	Closed throttle position switch (CTP switch)	0 - 1V	Ignition switch ON Throttle valve at idle position
				4 - 5V	Ignition switch ON Throttle valve opens larger than idle position
DN	B17	BI/Y	Diag. switch terminal	10 - 14V	Ignition switch ON
				0 - 1V	Ignition switch ON Diag. switch terminal grounded
-	B18	-	Blank	-	-
EGR	B19	Lg/W	EGR solenoid vacuum valve (if equipped)	10 - 14V	Ignition switch ON
DNL	B20	V/Y	Malfunction indicator lamp ("CHECK ENGINE" light)	0 - 1V	Ignition switch ON
				10 - 14V	Engine running
B2	B21	BI/B	Power source	10 - 14V	Ignition switch ON
B1	B22	BI/B			

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



A/T VEHICLE

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLLOR			
INJ3	A1	W/G	Injector No.3	10 - 14V	Ignition switch ON
ISC	A2	Lg/B	Idle air control valve	10 - 14V	Ignition switch ON
INJ1	A3	R	Injector No.1	10 - 14V	Ignition switch ON
-	A4	-	Blank	-	-
PRG	A5	Lg/Y	EVAP canister purge valve (vehicle with immobilizer)	10 - 14V	Ignition switch ON
FP		P	Fuel pump relay (vehicle without immobilizer)	0 - 1V 10 - 14V	For 3 seconds after ignition switch ON After the above time
EGR3	A6	Br/B	EGR valve (EGR stepper motor coil 3, if equipped)	10 - 14V	Over 1 second after ignition switch ON
EGR1	A7	Br/R	EGR valve (EGR stepper motor coil 1, if equipped)	0 - 1V	Over 1 second after ignition switch ON
EGR		Lg/W	EGR solenoid vacuum valve (if equipped)	10 - 14V	Ignition switch ON
IGT	A8	O	Ignition trigger signal	0 - 1V	Ignition switch ON
				Between 0-3V	While engine cranking
MON	A9	V	Duty output terminal	-	-
BB	A10	W	Power source for back-up circuit	10 - 14V	Ignition switch ON and OFF
B1	A11	BI/B	Power source	10 - 14V	Ignition switch ON
GND1	A12	B/O	Ground	-	-
RG	A13	BI	Main relay (vehicle with immobilizer)	0 - 1V 10 - 14V	Ignition switch ON Ignition switch OFF
			Main relay (vehicle without immobilizer)	0 - 1V	Ignition switch ON
INJ4	A14	W/B	Injector No.4	10 - 14V	Ignition switch ON
FP	A15	P	Fuel pump relay (vehicle with immobilizer)	0 - 1V 10 - 14V	For 3 seconds after ignition switch ON After the above time
				PRG	Lg/Y
INJ2	A16	Lg/R	Injector No.2	10 - 14V	Ignition switch ON
DNL	A17	V/Y	Malfunction indicator lamp ("CHECK ENGINE" light)	0 - 1V	Ignition switch ON
				10 - 14V	Engine running
-	A18	-	Blank	-	-
EGR4	A19	Br/W	EGR valve (EGR stepper motor coil 4, if equipped)	0 - 1V	Over 1 second after ignition switch ON
EGR2	A20	Br/Y	EGR valve (EGR stepper motor coil 2, if equipped)	10 - 14V	Over 1 second after ignition switch ON
OXH	A21	P	Heated oxygen sensor heater (if equipped)	10 - 14V	Ignition switch ON
				0 - 1V	Over 3 min. after engine started Engine running at idle speed
-	A22	-	Blank	-	-
SDL	A23	V/W	Data link connector	4 - 5V	Ignition switch ON
B2	A24	BI/B	Power source	10 - 14V	Ignition switch ON
GND2	A25	B/G	Ground	-	-
GND3	A26	B/O			

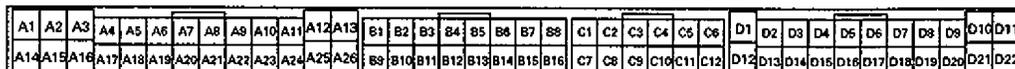
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B9	B10	B11	B12	B13	B14	B15	B16	C7	C8	C9	C10	C11	C12	D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22

A/T VEHICLE

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLLOR			
S2	B1	G/R	Shift solenoid valve B	0 - 1V	Ignition switch ON
PWL	B2	P	"POWER" indicator light	0 - 2V	Ignition switch ON Mode selector switch in Power mode
				10 - 14V	Ignition switch ON Mode selector switch in Normal mode
ODL	B3	W/B	"OD/OFF" indicator light	0 - 2V	Ignition switch ON OD cut switch ON
				10 - 14V	Ignition switch ON OD cut switch OFF
LIGHT	B4	R/Y	Lighting switch	0 - 1V	Lighting switch OFF
				10 - 14V	Lighting switch ON (small or head)
PWR	B5	O	Mode selector switch	0 - 1V	Ignition switch ON Mode selector switch in Power mode
				10 - 14V	Ignition switch ON Mode selector switch in Normal mode
L4	B6	O/W	4WD low switch	0 - 1V	Ignition switch ON Transfer lever in 4L or N position
				10 - 14V	Ignition switch ON Transfer lever in 2H or 4H position
OD	B7	O/G	OD cut switch	0 - 1V	Ignition switch ON OD cut switch ON
				10 - 14V	Ignition switch ON OD cut switch OFF
SP	B8	W	A/T vehicle speed sensor (+)	-	-
S3	B9	G/Y	TCC solenoid valve	0 - 1V	Ignition switch ON
S1	B10	G/O	Shift solenoid valve A	10 - 14V	Ignition switch ON
R	B11	R	Transmission range switch ("R" range)	0 - 1V	Ignition switch ON Selector lever in other than "R" range
				10 - 14V	Ignition switch ON Selector lever in "R" range
N	B12	BI/G	Transmission range switch ("N" range)	0 - 1V	Ignition switch ON Selector lever in other than "N" range
				10 - 14V	Ignition switch ON Selector lever in "N" range
D	B13	G	Transmission range switch ("D" range)	0 - 1V	Ignition switch ON Selector lever in other than "D" range
				10 - 14V	Ignition switch ON Selector lever in "D" range
2	B14	Y/G	Transmission range switch ("2" range)	0 - 1V	Ignition switch ON Selector lever in other than "2" range
				10 - 14V	Ignition switch ON Selector lever in "2" range
L	B15	Y/BI	Transmission range switch ("L" range)	0 - 1V	Ignition switch ON Selector lever in other than "L" range
				10 - 14V	Ignition switch ON Selector lever in "L" range
SPG	B16	O	A/T vehicle speed sensor (-)	-	-

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

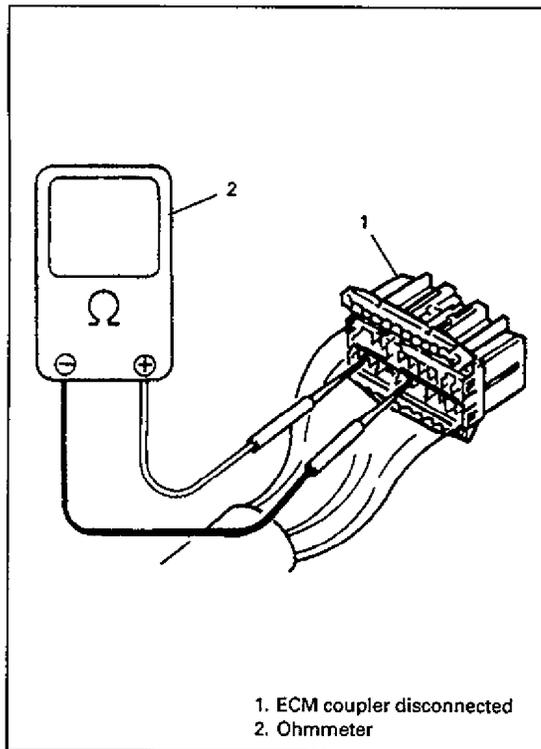


A/T VEHICLE

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLLOR			
SE	D1	Gr/Y	Sensor ground	-	-
VCC	D2	Gr/R	Power source for sensors	4.75 - 5.25 V	Ignition switch ON
AFM	D3	Gr/B	MAF sensor	1.0 - 1.6V	Ignition switch ON
				1.7 - 2.0V	With engine running at idle speed
OX	D4	R/BI	Heated oxygen sensor (if equipped)	Indicator deflection repeated between over and under 0.45V	While engine running at 2,000 r/min for 1 minute or longer after warmed up
CO	D5	Gr/W	CO adjusting resistor (if equipped)	About 5V	Ignition switch ON CO resistor disconnected
DN	D6	BI/Y	Diag. switch terminal	10 - 14V	Ignition switch ON
				0 - 1V	Ignition switch ON Diag. switch terminal grounded
ACS	D7	Y/B	Air conditioning circuit (if equipped)	10 - 14V	Ignition switch ON
				0 - 1V	With engine running A/C ON
SPD	D8	Y	Vehicle speed sensor (in speedometer)	Indicator deflection repeated between 0 -1V and 4-5V	Ignition switch ON Rear left tire turned slowly with rear right tire locked
CAS	D9	W	CMP sensor	Indicator deflection repeated between 0-1V and 3-5V	Ignition switch ON Crank shaft turned slowly
STA	D10	B/Y	Engine start switch (Engine start signal)	6 - 12V	While engine cranking
				0V	Other than above
IG	D11	B/W	Ignition switch (vehicle with immobilizer)	10 - 14V	Ignition switch ON
-	D12	-	Blank	-	-
THW	D13	R/Y	Engine coolant temp. sensor	0.5 - 0.9V	Ignition switch ON Engine coolant temp.:80°C (176°F)
VTA	D14	Gr	TP sensor	0.5 - 1.2V	Ignition switch ON Throttle valve at idle position
				3.4 - 4.7V	Ignition switch ON Throttle valve at full open position
-	D15	-	Blank	-	-
TS	D16	BI/R	Test switch terminal	10 - 14V	Ignition switch ON
				0 - 1V	Ignition switch ON Test switch terminal grounded
ABS	D17	P/W	ABS control module (if equipped)	10 - 14V	Over 3 seconds after ignition switch ON
PSS	D18	BI/O	Power steering pressure switch (if equipped)	10 - 14V	Ignition switch ON
				0 - 1V	With engine running at idle speed, turning steering wheel to the right or left as far as it stops
ID	D19	BI/W	Closed throttle position switch	0 - 1V	Ignition switch ON Throttle valve at idle position
				4 - 5V	Ignition switch ON Throttle valve opens larger than idle position
-	D20	-	Blank	-	-
BR	D21	G/W	Brake switch	10 - 14V	Brake pedal depressed
				0 - 1V	Brake pedal released
-	D22	-	Blank	-	-

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B9	B10	B11	B12	B13	B14	B15	B16	C7	C8	C9	C10	C11	C12	D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22



Resistance Check

- 1) Disconnect ECM couplers from ECM with ignition switch OFF.

CAUTION:
Never touch terminals of ECM itself or connect voltmeter or ohmmeter.

- 2) Check resistance between each pair of terminals of disconnected couplers as listed in following table.

CAUTION:

- Be sure to connect ohmmeter probe from wire harness side of coupler.
- Be sure to turn OFF ignition switch for this check.
- Resistance in table represents that when parts temperature is 20°C (68°F).

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TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

M/T VEHICLE

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22

A/T VEHICLE

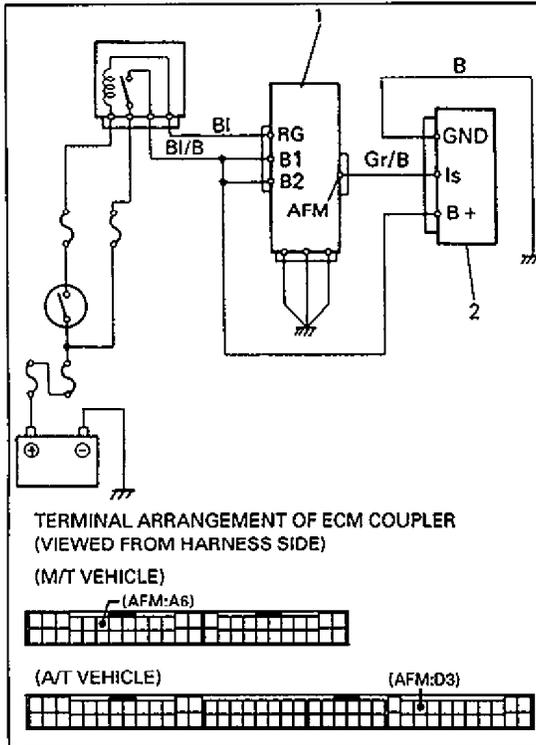
A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11
A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24	A25	A26	B9	B10	B11	B12	B13	B14	B15	B16	C7	C8	C9	C10	C11	C12	D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22

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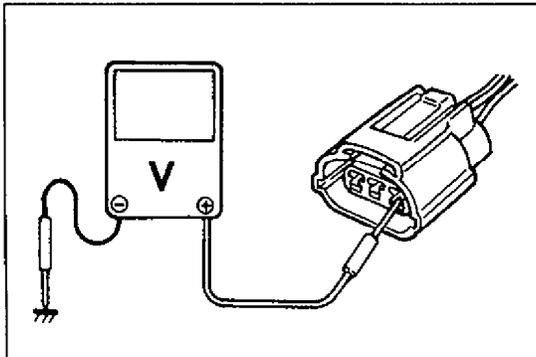
CIRCUIT	TERMINAL POSITION		STANDARD RESISTANCE	CONDITION
	M/T	A/T		
No.1 injector	A3 - B21/B22	A3 - A11/A24	12 - 17Ω	-
No.2 injector	A16 - B21/B22	A16 - A11/A24	12 - 17Ω	-
No.3 injector	A1 - B21/B22	A1 - A11/A24	12 - 17Ω	-
No.4 injector	A14 - B21/B22	A14 - A11/A24	12 - 17Ω	-
IAC valve	A2 - B21/B22	A2 - A11/A24	11 - 14Ω	-
EVAP canister purge valve	Vehicle with immobilizer	A5 - A11/A24	28 - 36Ω	-
	Vehicle without immobilizer	A15 - A11/A24		
EGR solenoid vacuum valve (if equipped)	B19 - B21/B22	A7 - A11/A24	30 - 38Ω	-
EGR valve (coil 1), if equipped	A10 - B21/B22	A7 - A11/A24	20 - 24Ω	-
EGR valve (coil 2), if equipped	A23 - B21/B22	A20 - A11/A24	20 - 24Ω	-
EGR valve (coil 3), if equipped	A9 - B21/B22	A6 - A11/A24	20 - 24Ω	-
EGR valve (coil 4), if equipped	A22 - B21/B22	A19 - A11/A24	20 - 24Ω	-

CIRCUIT	TERMINAL POSITION		STANDARD RESISTANCE	CONDITION
	M/T	A/T		
Heated oxygen sensor heater (vehicle with immobilizer)	A17 – A18	A21 – D11	11.7 – 14.3Ω	–
Heated oxygen sensor heater (if equipped) and main relay (vehicle without immobilizer)	A17 – B2	A21 – A13	67.7 – 98.3Ω	–
Fuel pump relay (vehicle with immobilizer)	B13 – A18	A15 – D11	56 – 84Ω	–
Fuel pump relay and main relay (vehicle without immobilizer)	B7 – B2	A5 – A13	112 – 168Ω	–
Main relay (vehicle with immobilizer)	B2 – B11	A13 – A10	56 – 84Ω	–
CTP switch	B16 – A25	D19 – D1	Continuity	Throttle valve at idle position
			∞ (infinity)	Throttle valve opens larger than idle position
TP sensor	A7 – A25	D14 – D1	0.3 – 2.0kΩ	Throttle valve at idle position
			2.0 – 6.5kΩ	Throttle valve at full open position
ECT sensor	A5 – A25	D13 – D1	0.29 – 0.35kΩ	Engine coolant temp. 80°C (176°F)
CO adjust resistor (vehicle without heated oxygen sensor only)	A21 – A25	D5 – D1	For resistance of CO resistor, refer to IDLE MIXTURE ADJUSTMENT	
Vehicle speed sensor (in speedometer)	B5 – Body ground	D8 – Body ground	Ohmmeter indicator deflects between 0 and ∞	Rear left wheel turned slowly with rear right wheel locked
Transmission range switch ("R" range) (vehicle with immobilizer)	–	B11 – D11	Continuity	Selector lever in "R" range
			About 10Ω	Selector lever in other than "R" range
Transmission range switch ("R" range) and fuel pump relay (vehicle without immobilizer)	–	B11 – A5	Continuity	Selector lever in "R" range
			Not continuity	Selector lever in other than "R" range
Transmission range switch ("N" range) (Vehicle with immobilizer)	–	B12 – D11	Continuity	Selector lever in "N" range
			Not continuity	Selector lever in other than "N" range
Transmission range switch ("N" range) and fuel pump relay (vehicle without immobilizer)	–	B12 – A5	Continuity	Selector lever in "N" range
			Not continuity	Selector lever in other than "N" range
Transmission range switch ("D" range) (vehicle with immobilizer)	–	B13 – D11	Continuity	Selector lever in "D" range
			Not continuity	Selector lever in other than "D" range
Transmission range switch ("D" range) and fuel pump relay (vehicle without immobilizer)	–	B13 – A5	Continuity	Selector lever in "D" range
			Not continuity	Selector lever in other than "D" range
Transmission range switch ("2" range) (vehicle with immobilizer)	–	B14 – D11	Continuity	Selector lever in "2" range
			Not continuity	Selector lever in other than "2" range
Transmission range switch ("2" range) and fuel pump relay (vehicle without immobilizer)	–	B14 – A5	Continuity	Selector lever in "2" range
			Not continuity	Selector lever in other than "2" range
Transmission range switch ("L" range) (vehicle with immobilizer)	–	B15 – D11	Continuity	Selector lever in "L" range
			Not continuity	Selector lever in other than "L" range
Transmission range switch ("L" range) and fuel pump relay (vehicle without immobilizer)	–	B15 – A5	Continuity	Selector lever in "L" range
			Not continuity	Selector lever in other than "L" range
A/T vehicle speed sensor	–	B8 – B16	369 – 451Ω	–
4WD low switch	–	B6 – Body ground	Continuity	Transfer lever in 4L or N position
			Not continuity	Transfer lever in 2H or 4H position

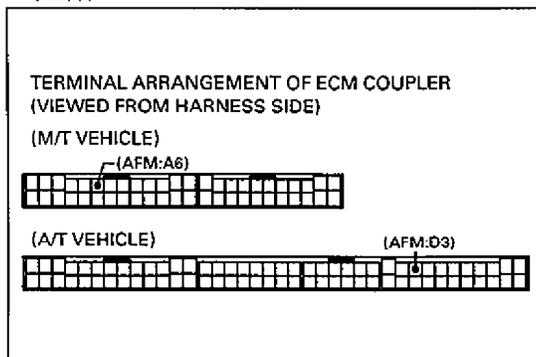
CIRCUIT	TERMINAL POSITION		STANDARD RESISTANCE	CONDITION
	M/T	A/T		
Mode selector switch	-	B5 - Body ground	Continuity	Mode selector switch in "POWER".
			Not continuity	Mode selector switch in "NORMAL".
OD cut switch	-	B7 - Body ground	Continuity	OD cut switch ON
			Not continuity	OD cut switch OFF
Shift solenoid valve A	-	B10 - Body ground	11 - 15Ω	-
Shift solenoid valve B	-	B1 - Body ground	11 - 15Ω	-
TCC solenoid valve	-	B9 - Body ground	11 - 15Ω	-



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6E1089



6E1088

ON VEHICLE SERVICE

ELECTRONIC CONTROL SYSTEM

MASS AIR FLOW SENSOR (MAF SENSOR)

Inspection

NOTE:

Use voltmeter with high-impedance (10 k Ω /V minimum) or digital type voltmeter.

- 1) Remove ECM with bracket, relays, fuse box and wire harness previously outlined.
- 2) Connect couplers to ECM.

- 3) Connect voltmeter to "B +" terminal of MAF sensor coupler disconnected and ground.
- 4) Turn ignition switch ON and check that voltage is battery voltage.
If not, check if wire harness is open or connection is poor.

- 5) Turn ignition switch OFF and connect MAF sensor coupler to MAF sensor.
- 6) Turn ignition switch ON and check voltage at AFM terminal.

Voltage: 1.0 – 1.6V

- 7) Start engine and check that voltage is lower than 5V and it rises as engine speed increases.
(Reference data: 1.7 – 2.0V at specified idle speed)

If check result is not as specified above, cause may lie in wire harness, coupler connection, MAF sensor or ECM.

SECTION 7B1**AUTOMATIC TRANSMISSION****7B1****(4 A/T)****WARNING:**

For vehicles equipped with a Supplemental Inflatable Restraint Air Bag System:

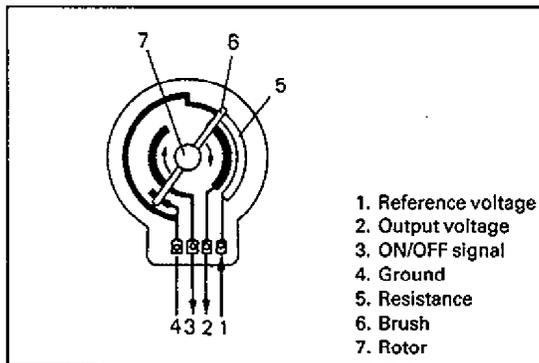
- **Service on or around Air Bag System Components or Wiring must be performed only by an authorized Suzuki dealer. Please observe all WARNINGS and SERVICE PRECAUTIONS in Section 9J under "On-Vehicle Service" and the Air Bag System Component and Wiring Location view in Section 9J before performing service on or around Air Bag System Components or Wiring. Failure to follow WARNINGS could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the air bags may be deployed by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:

For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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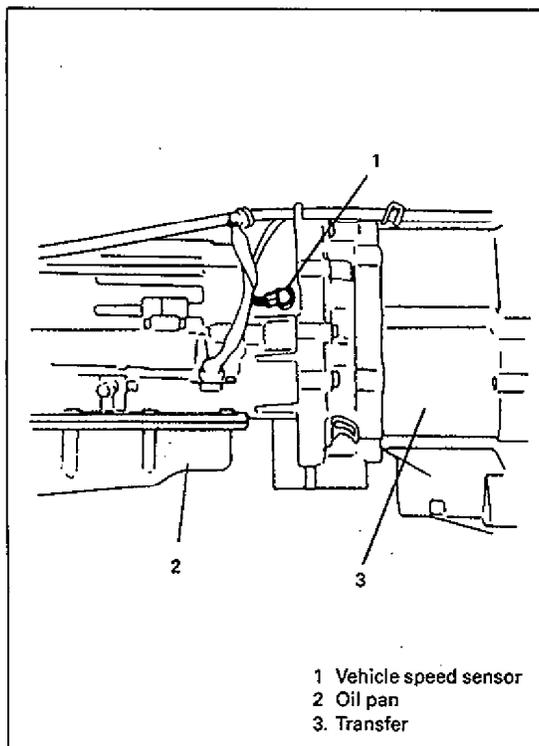


7B1004

Throttle Position Sensor

This sensor is installed to the throttle valve shaft. Throttle valve opening signal are transmitted from TP sensor to PCM as voltage signal.

PCM uses it as one of the signals to control transmission gear shift.

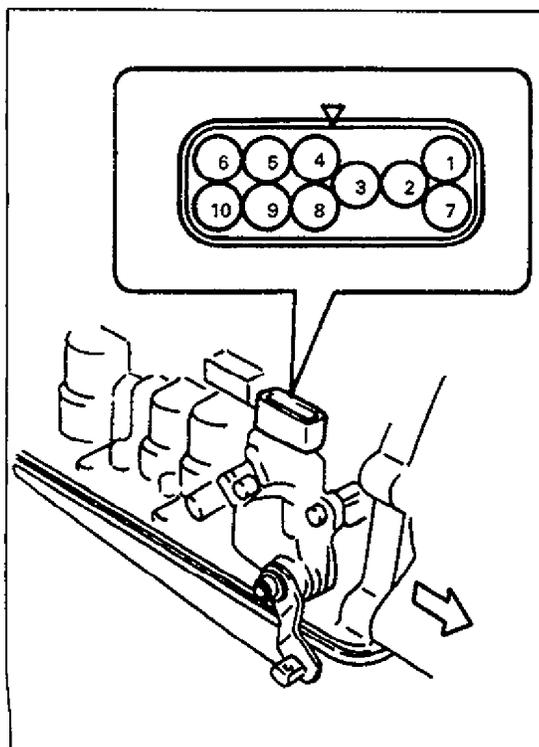


7B1005

Vehicle Speed Sensor

This sensor is a pulse generator type that detects revolution of the output shaft (vehicle speed) in the transmission case. The pulse generator is a noncontact sensor consisting of a permanent magnet, coil and gears.

As the gear of the output shaft turns, the magneflux from the permanent magnet varies and a voltage of the frequency corresponding to the rotor revolution occurs in the coil. This voltage is inputted to the PCM where PCM judges the output shaft revolution or the vehicle speed. The vehicle speed is also detected from the speed meter.

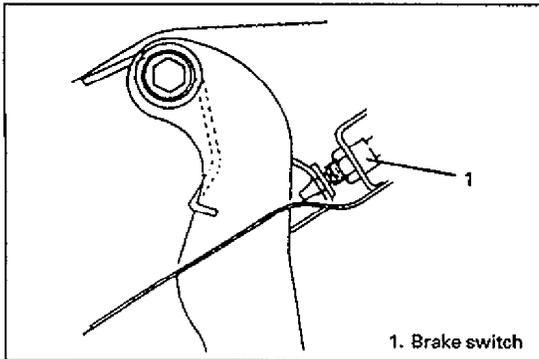


7B1006

Transmission Range Switch

A transmission range switch is provided so that the engine can be started only when the shift lever is in the "P" or "N" position.

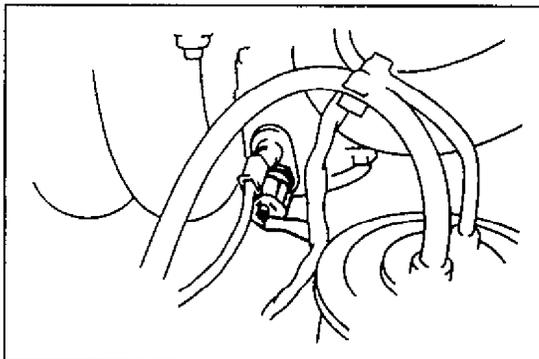
Terminal position	6	5	9	8	4	7	3	2	1
P	○—○		○—○						
R			○—○		○—○				
N	○—○		○—○			○—○			
D			○—○				○—○		
2			○—○					○—○	
L			○—○						○—○



7B1007

Brake Switch

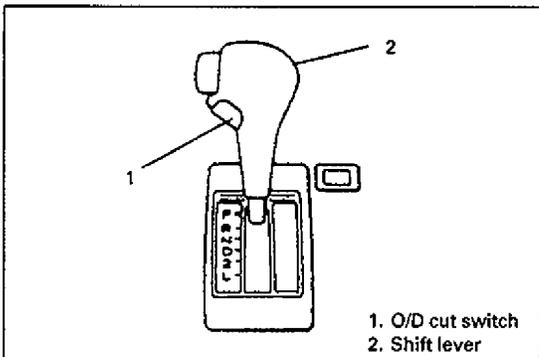
The same switch is used as the brake lamp switch. It disengages the TCC when the brake is depressed while the TCC is operating.



7B1008

Engine Coolant Temperature Sensor (ECT Sensor)

The coolant temperature sensor is used and it prevents gear change to the O/D gear and TCC operation when the engine coolant temperature is 30°C (86°F) or lower.

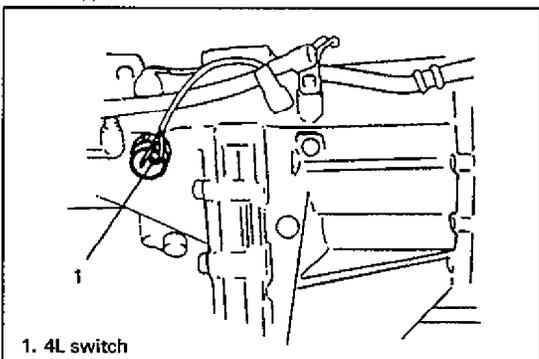


7B1009

O/D Cut Switch

The gear shift up or shift down to and from the O/D gear can be selected with this switch.

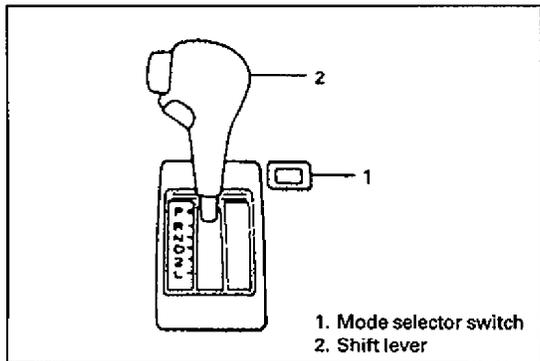
OD cut switch status	Switch position	"OD/OFF" light
ON (continuity)	Released	ON
OFF (not continuity)	Depressed	OFF



7B1010

Transfer 4L Switch

This switch detects that the 4-wheel drive low gear is engaged and prevents the gear change into O/D and lock-up.



7B1011

Mode Selector Switch

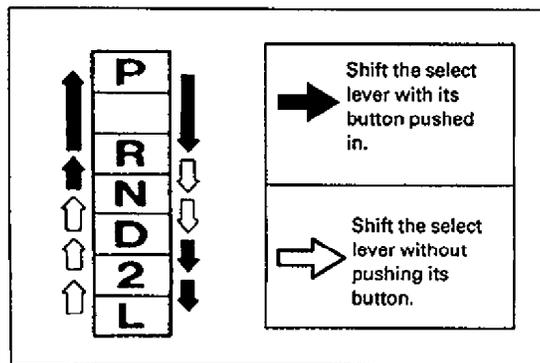
The gear shift timing, normal or power, can be selected by using this switch.

Fail Safe Function

This function is provided by the safe mechanism that assures safe driveability even when the shift solenoid valve or speed sensor fails.

The table below shows the gear position in each shift under a normal/abnormal condition.

Condition \ Shift position	Normal	Shift solenoid valve-A abnormal	Shift solenoid valve-B abnormal	Shift solenoid valves-A & B abnormal
D	1st	3rd	1st	O/D
	2nd		O/D	
	3rd			
	O/D	O/D		
2	1st	3rd	1st	3rd
	2nd		3rd	
	(3rd)			
L	1st	1st	1st	1st
	(2nd)	(2nd)		



7B1012

Change Mechanism

The same select pattern shift lever is used as the floor type and frequently used "N" and "D" ranges are made selectable freely.

AUTOMATIC GEAR SHIFT DIAGRAM

Automatic shift schedule as a result of shift control is shown below. In case that select lever shifted to L at a speed higher than 52 km/h (33 mile/h), 2nd gear operates first and then down shifts to 1st at a speed lower than that. No up shift is available in L.

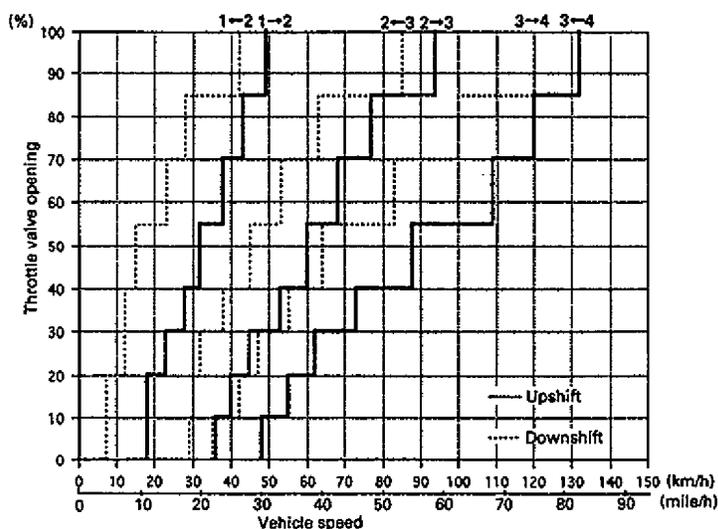
The same as, the select lever shifted to 2 at a speed higher than 100 km/h (63 mile/h), 3rd gear operates first and then down shifts to 2nd at a speed lower than that. No up shift is available in 2.

Power Mode

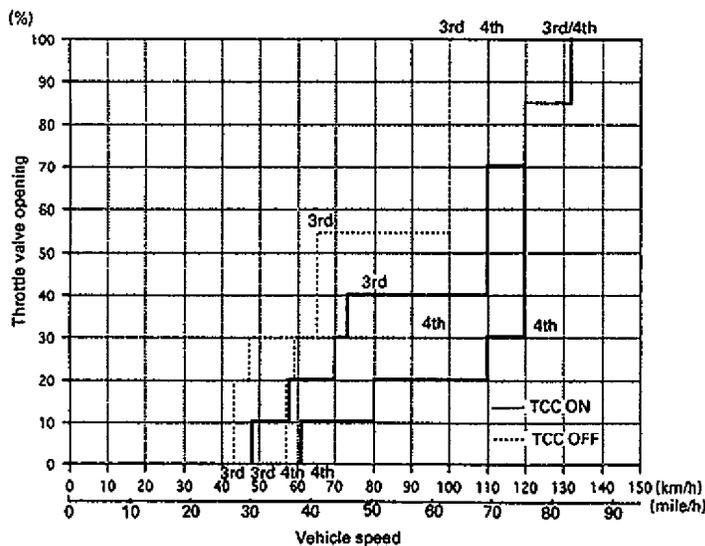
Unit: km/h
(mile/h)

Throttle opening \ Shift	1 → 2	2 → 3	3 → 4	4 → 3	3 → 2	2 → 1
Full throttle	49 (31)	94 (59)	132 (83)	120 (75)	85 (53)	42 (26)
Closed throttle	18 (11)	36 (23)	48 (30)	35 (22)	29 (18)	7 (4)

Gear Shift Diagram



TCC Lock-up Diagram

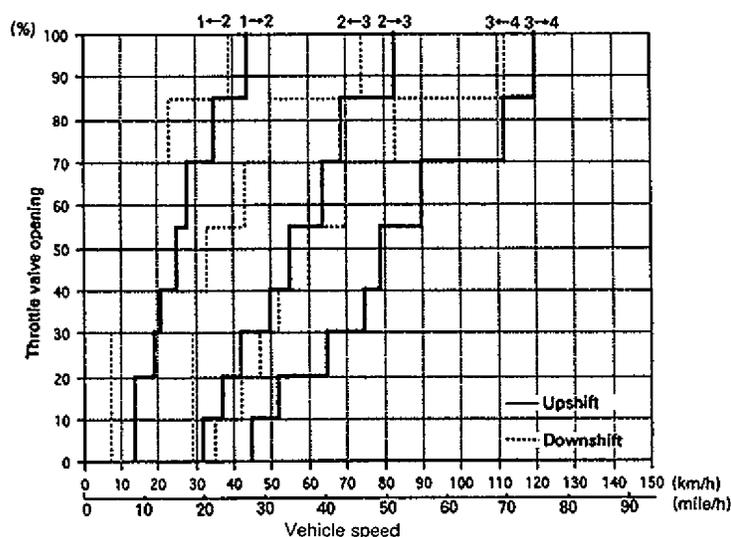


Normal Mode

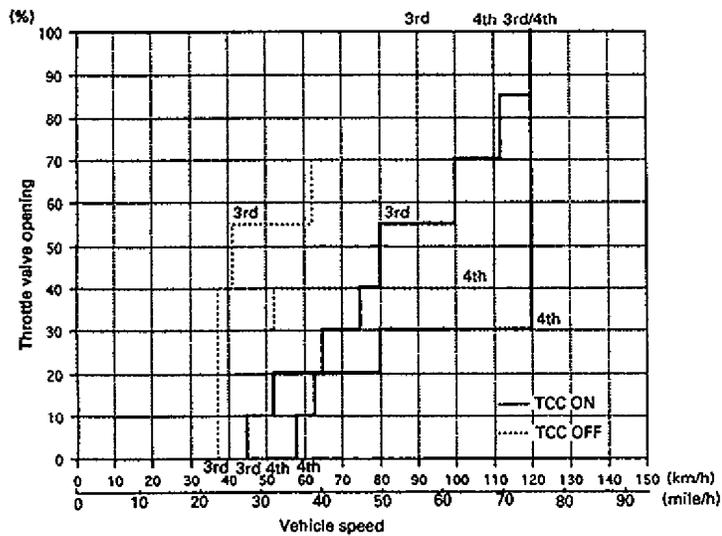
Unit: km/h
(mile/h)

Throttle opening \ Shift	1 → 2	2 → 3	3 → 4	4 → 3	3 → 2	2 → 1
Full throttle	44 (28)	83 (52)	120 (75)	112 (70)	74 (46)	39 (24)
Closed throttle	14 (9)	32 (20)	45 (28)	35 (22)	29 (18)	7 (4)

Gear Shift Diagram



TCC Lock-up Diagram



DIAGNOSIS

TRANSMISSION UNIT

MANUAL ROAD TEST

This test checks the gears being used in "L", "2" or "D" range when driven with unoperated gear shift control system. Test drive vehicle on a level road.

- 1) Disconnect coupler of shift solenoid valves on transmission.

WARNING:

To avoid the danger of being burned, do not touch the hot exhaust system when disconnecting shift solenoid valves coupler.

- 2) With selector lever in "P" range, start engine and warm it up.
- 3) With select lever in "L" range, start vehicle and accelerate to 20 km/h (12.5 mile/h). Check in this state that 1st gear is being used.
- 4) At 20 km/h (12.5 mile/h), shift select lever to 2 range and accelerate to 40 km/h (25 mile/h). Check in this state that 3rd gear is being used.
- 5) At 40 km/h (25 mile/h), shift select lever to D range and check that O/D gear is used when speed is higher than 40 km/h (25 mile/h).
- 6) After above checks, stop vehicle then engine, and connect solenoid valves coupler.

WARNING:

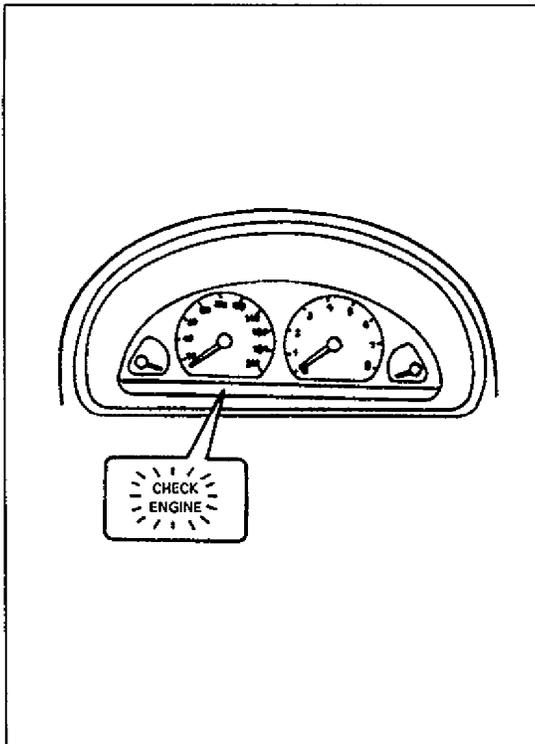
To avoid the danger of being burned, do not touch the exhaust system when connecting shift solenoid valves coupler.

- 7) Ground diagnosis switch terminal in monitor coupler, turn ON ignition switch and make sure that MIL ("CHECK ENGINE" light) indicates code No.12.

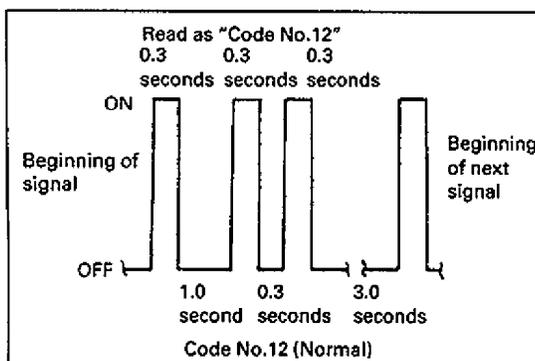
ELECTRONIC SHIFT CONTROL SYSTEM

The powertrain (engine) control module (P(E)CM) with on-board diagnostic system (self-diagnosis function) operates as described below.

When diagnosing a trouble in the electronic shift control system, use "DIAGNOSTIC FLOW CHART" and "DIAGNOSTIC TROUBLE CODE TABLE" on the following page.



7B1017



7B1018

ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION)

- When the engine is OFF and the ignition switch is turned ON, the malfunction indicator lamp ("CHECK ENGINE" light) lights for its bulb check of malfunction indicator lamp ("CHECK ENGINE" light).
- Should an abnormality have occurred in the electronic shift control system while the ignition switch is ON or the engine running, the area where the abnormality has occurred is stored in the P(E)CM memory and it remains in the memory till ignition switch is turned OFF.
- The affected area in the memory is indicated by flashing of malfunction indicator lamp ("CHECK ENGINE" light) when the diag. switch terminal is grounded.

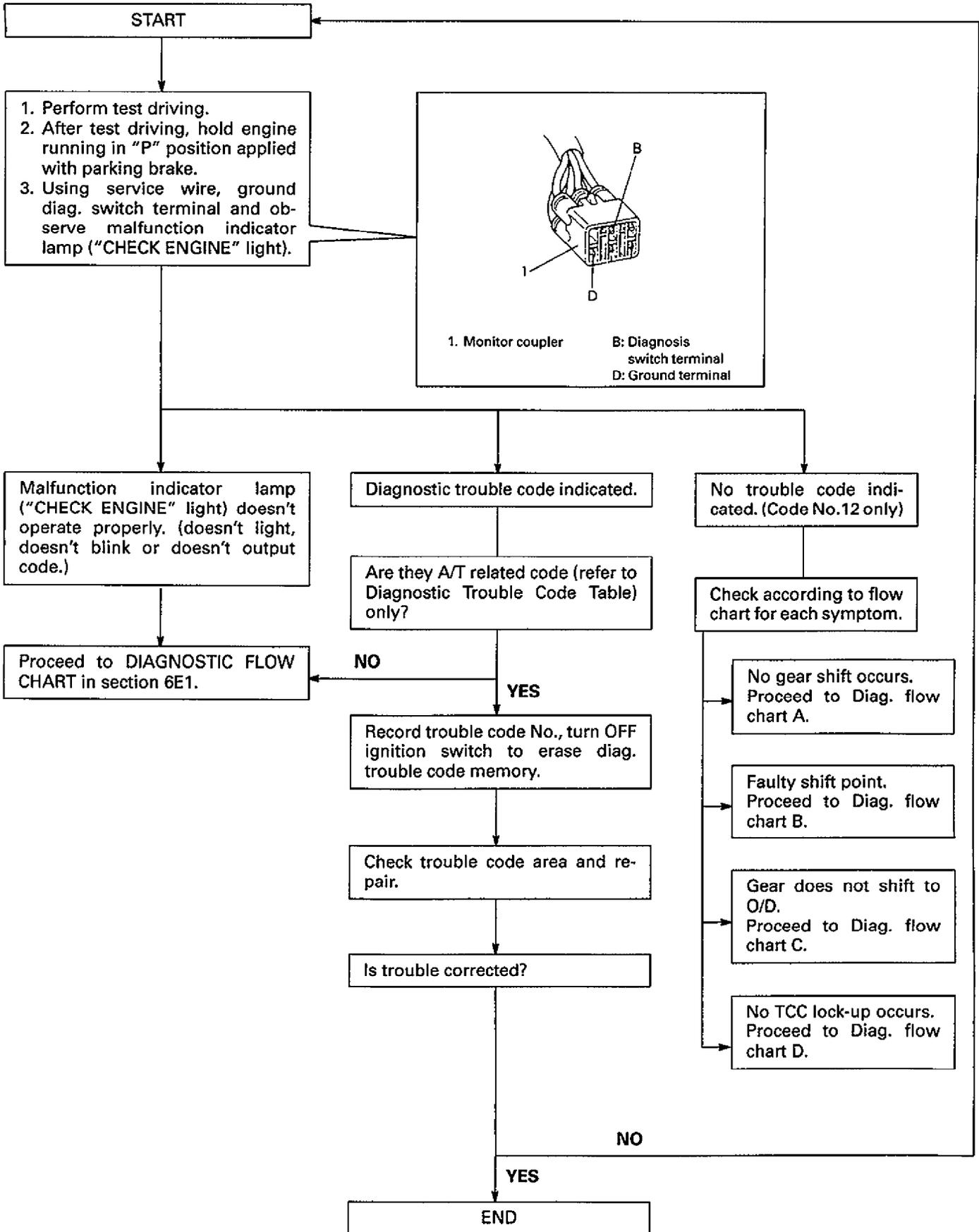
PRECAUTION IN IDENTIFYING DIAG. TROUBLE CODE

- Before checking the diag. trouble code, be sure not to turn OFF the ignition switch, disconnect the P(E)CM or battery negative cable. Or the memory will be erased.
- Each trouble code is indicated 3 times. Write it down so as not to forget it. When an abnormality exists in more than one area, their code Nos. are indicated from the smallest to larger numbers.

PRECAUTION ON TROUBLESHOOTING

- "Normal operating temperature" in the diagnostic flow chart means that the engine coolant temperature is 80°C (176°F) and A/T fluid temperature is 70–80°C (158–176°F).
- Do not connect an ohmmeter, voltmeter, etc. directly (with the coupler disconnected) to the P(E)CM terminal. It may cause damage to the P(E)CM.

DIAGNOSTIC FLOW CHART



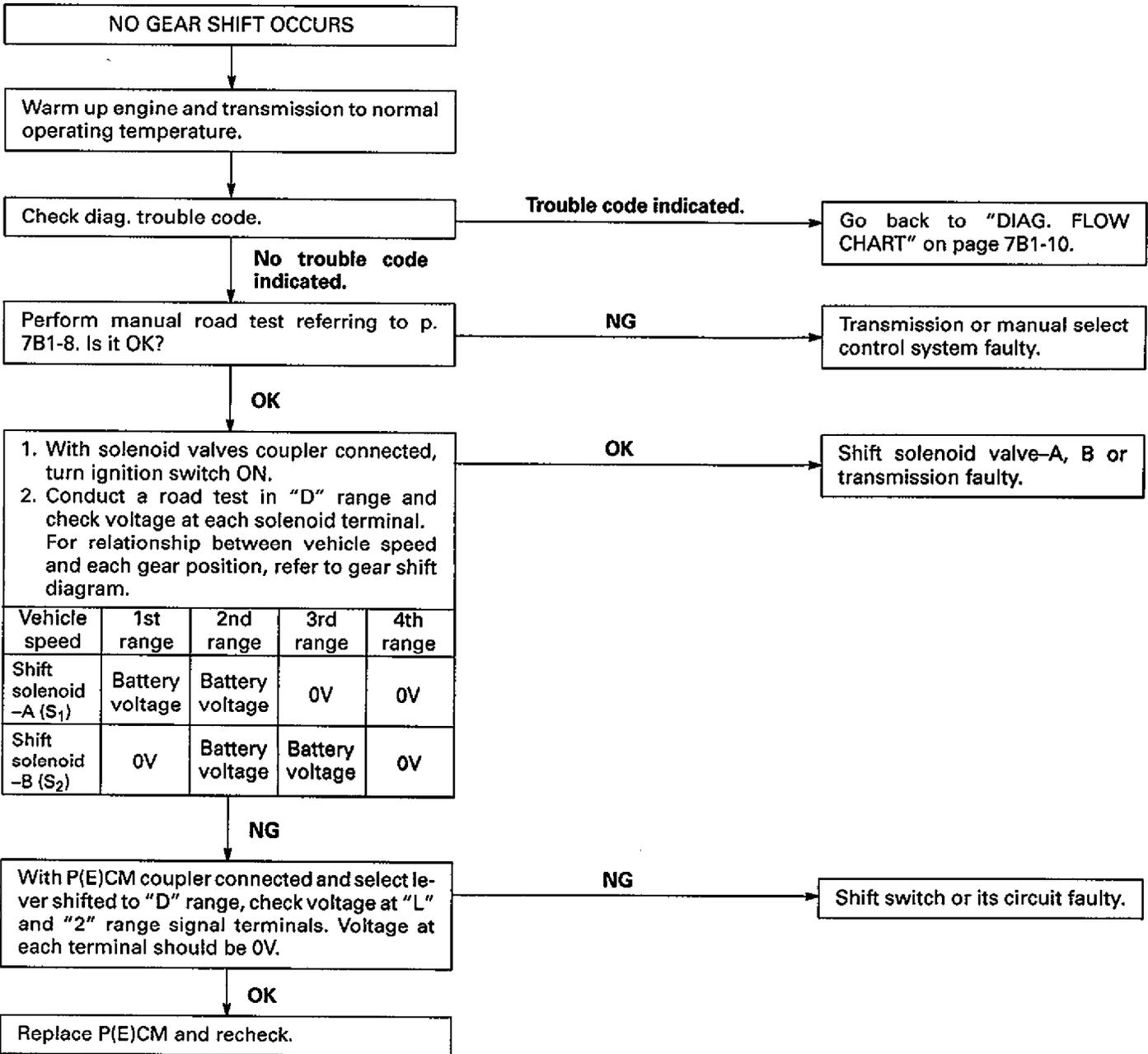
Diagnostic Trouble Code Table (A/T Related Code)

Code No.	Diagnostic Area	Diagnosis
12	-	Normal
61	Shift solenoid valve A	Shift solenoid valve A or its circuit open or shorted to power circuit.
62		Shift solenoid valve A or its circuit shorted to ground.
63	Shift solenoid valve B	Shift solenoid valve B or its circuit open or shorted to power circuit.
64		Shift solenoid valve B or its circuit shorted to ground.
65	TCC solenoid valve	TCC solenoid valve or its circuit open or shorted to power circuit.
66		TCC solenoid valve or its circuit shorted to ground.
72	Transmission range switch	Defective switch or its circuit (more than two transmission range switches of "R", "N", "D", "2" and "L" turned ON simultaneously or no transmission range switch turned ON while vehicle running).
75	A/T vehicle speed sensor	Defective sensor or its circuit. (open or short)

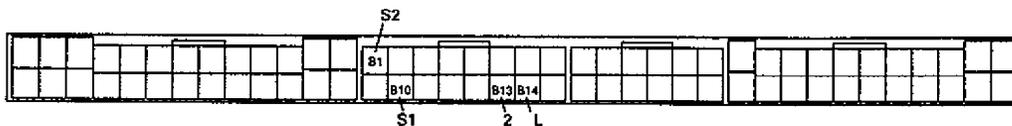
Fail-Safe Table

Code No.	Diagnostic Area	Fail-Safe Function
14	ECT sensor	After 15 min. from engine start, TCM release inhibitions of shift to OD gear and TCC lock-up.
15		
21	TP sensor	Throttle opening is controlled as closed.
22		
61	Shift solenoid valve A	Shift solenoid valve B. 1st, 2nd and 3rd gears ON, 4th (O/D) gear OFF. For shift position, refer to Fail-Safe Function in ELECTRONIC SHIFT CONTROL SYSTEM.
62		
63	Shift solenoid valve B	Shift solenoid valve A. 1st gear ON, 2nd 3rd and 4th (O/D) gears OFF. For shift position, refer to Fail-Safe Function in ELECTRONIC SHIFT CONTROL SYSTEM.
64		
65	TCC solenoid valve	TCC solenoid valve OFF.
66		
72	Transmission range switch	Priority order is "L" → "2" → "N" → "D" → "R". (When two or more signals inputted same time) Transmission range switch is controlled as "D" range. (When no signal inputted)
75	A/T vehicle speed sensor	Signal from vehicle speed sensor (in speedometer) is used.

DIAGNOSTIC FLOW CHART A

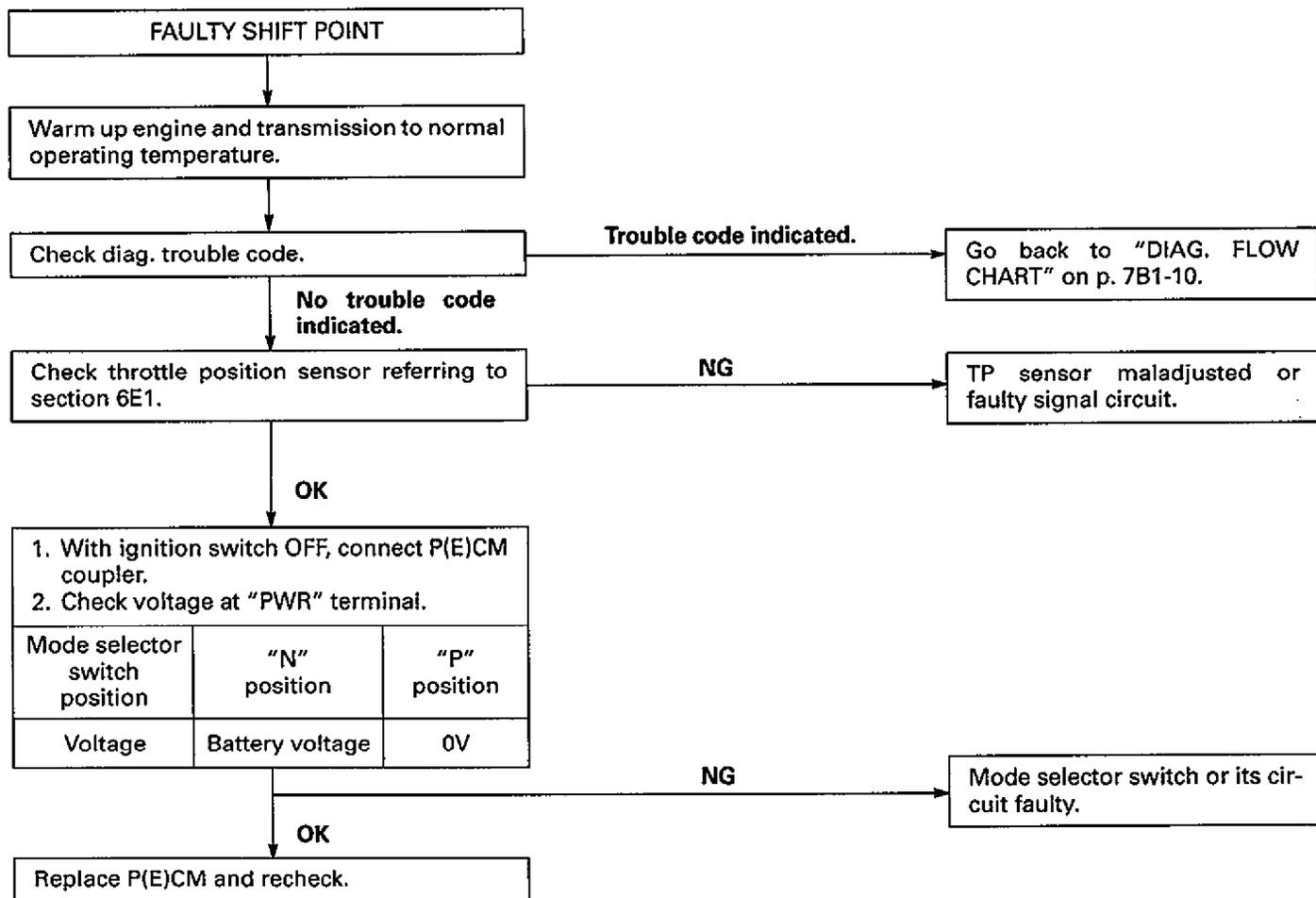


Terminal Arrangement of P(E)CM Coupler (Viewed from harness side)

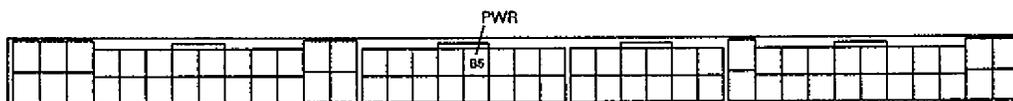


- S₁: Shift solenoid A (S₁) terminal
- S₂: Shift solenoid B (S₂) terminal
- L: "L" range signal terminal
- 2: "2" range signal terminal

DIAGNOSTIC FLOW CHART B

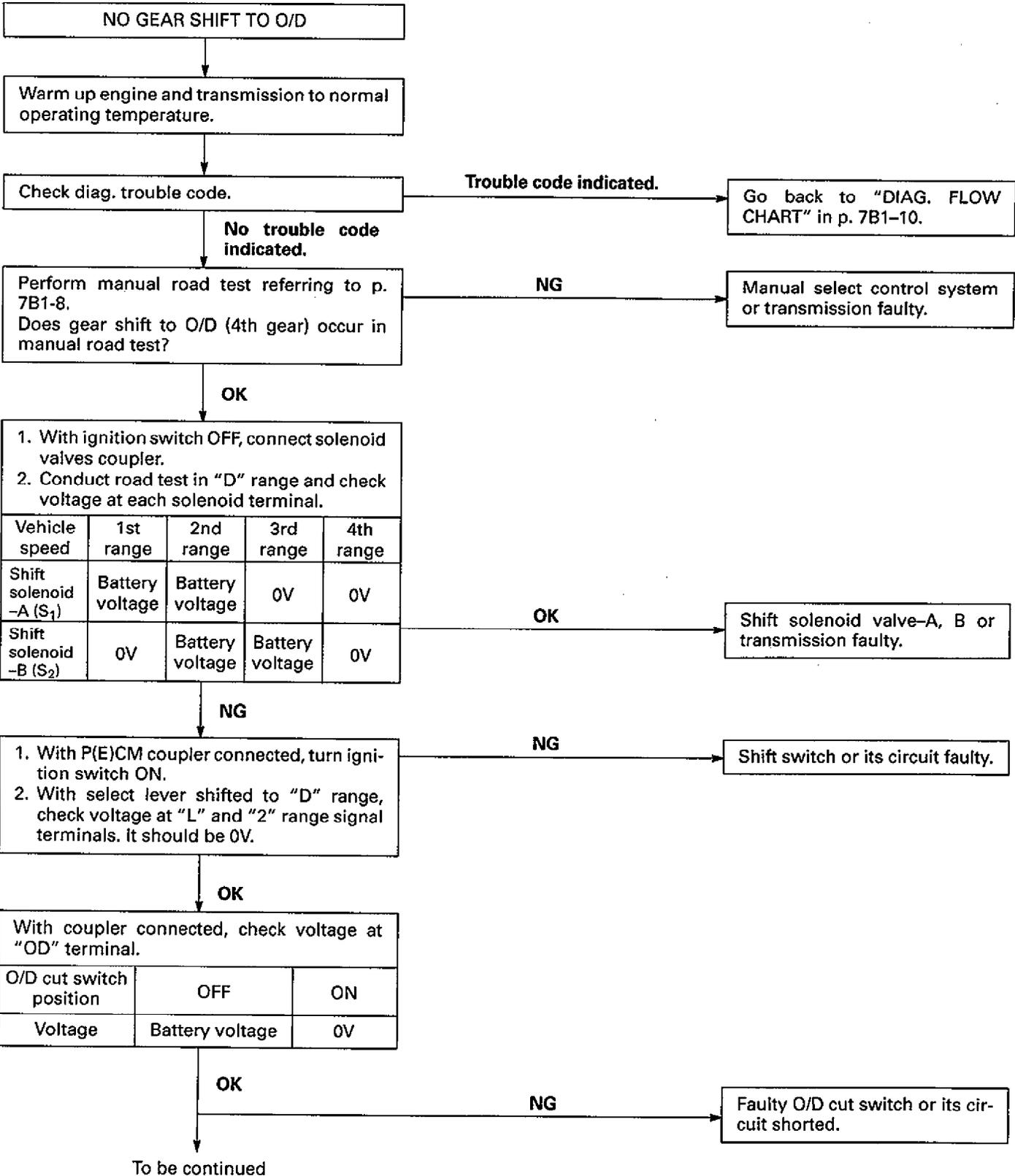


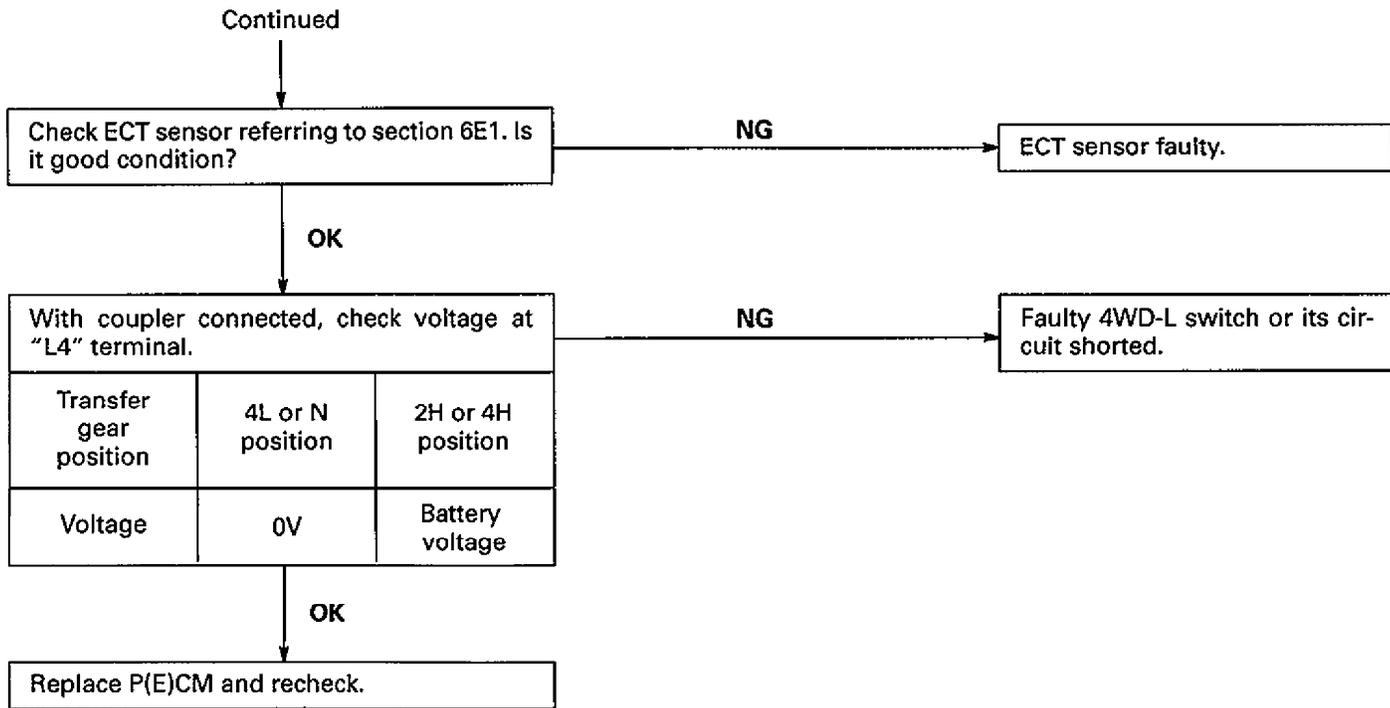
Terminal Arrangement of P(E)CM Coupler (Viewed from harness side)



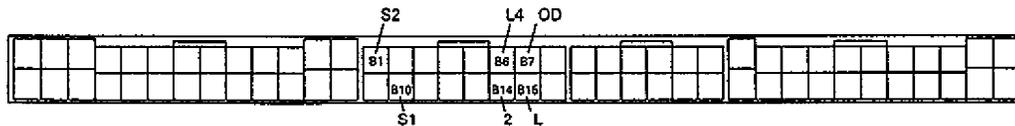
PWR : "PWR" terminal

DIAGNOSTIC CHART C



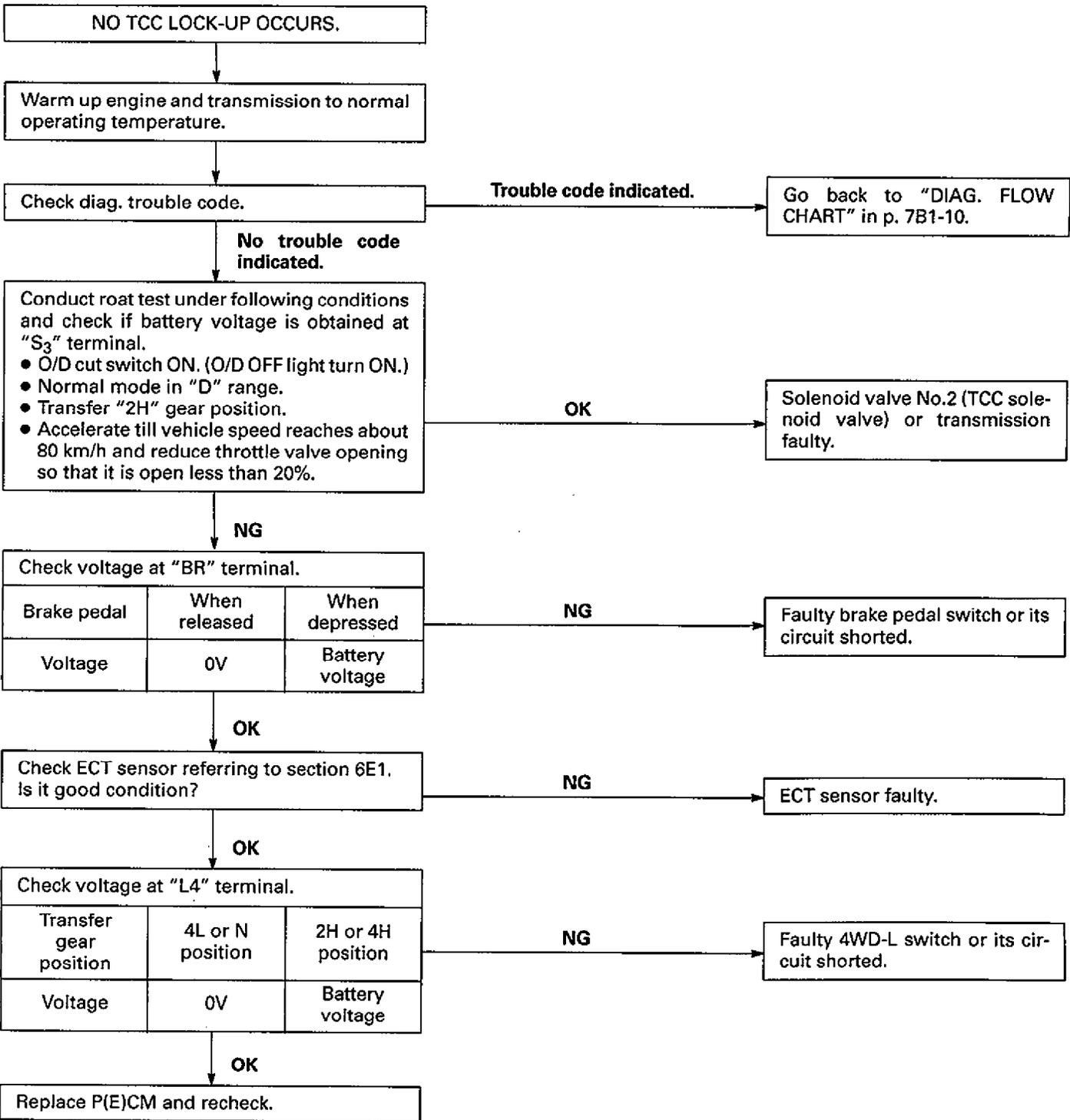


Terminal Arrangement of P(E)CM Coupler (Viewed from harness side)

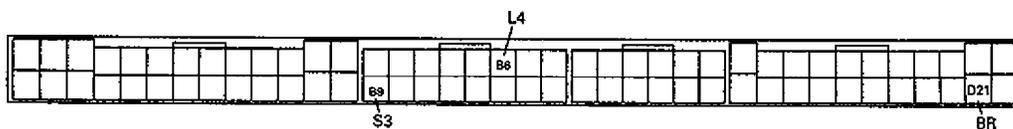


- S₁: Shift solenoid A (S₁) terminal
- S₂: Shift solenoid B (S₂) terminal
- L: "L" range signal terminal
- 2: "2" range signal terminal
- L4: 4WD low switch terminal
- OD: OD cut switch terminal

DIAGNOSTIC FLOW CHART D



Terminal Arrangement of P(E)CM Coupler (Viewed from harness side)



S3: TCC control solenoid terminal
BR: Brake switch terminal

L4: 4WD low switch terminal

GROUP2

Group2

SUZUKI

VITARA

SUPPLEMENTARY SERVICE MANUAL

FOREWORD

This SUPPLEMENTARY SERVICE MANUAL (GROUP 2) is a supplement to GROUP 1.

Applicable model:

SE416 vehicles on and after following body No.

(x) JSAETA02C01300001 (x)

(x) JSAETA02V01300001 (x)

(x) JSAETA01CTV300001 (x)

(x) JSAETA01VTV300001 (x)

TA01C-300001

TA01V-300001

Therefore, whenever servicing applicable model, consult GROUP 2 first. And for any section, item or description not found in GROUP 2, refer to GROUP 1.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricants, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others. Therefore, note that illustrations may differ from the vehicle being actually serviced. The right is reserved to make changes at any time without notice.

TABLE OF CONTENTS	SECTION
HEATING AND AIR CONDITIONING Heating and Ventilation	1A
BRAKES	5
BODY ELECTRICAL SYSTEM	8
AIR BAG SYSTEM	9J

RELATED SERVICE MANUAL

Refer to FOREWORD of GROUP 1

GROUP2

1A

5

8

9J

SUZUKI MOTOR CORPORATION

OVERSEAS SERVICE DEPARTMENT

SECTION 1A**HEATER AND VENTILATION****WARNING:**

For vehicles equipped with a Supplemental Inflatable Restraint Air Bag System:

- Service on or around Air Bag System Components or Wiring must be performed only by an authorized Suzuki dealer. Please observe all **WARNINGS** and **SERVICE PRECAUTIONS** in Section 9J under "On-Vehicle Service" and the Air Bag System Component and Wiring Location view in Section 9J before performing service on or around Air Bag System Components or Wiring. Failure to follow **WARNINGS** could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery.

Otherwise, the air bags may be deployed by reserve energy in the Sensing and Diagnostic module (SDM).

1A**NOTE:**

- For the descriptions (items) not found in this section, refer to **SECTION 1A** of the Service Manual mentioned in **FOREWORD** of this manual.
- The link mechanism of the heater varies depending on the specifications.

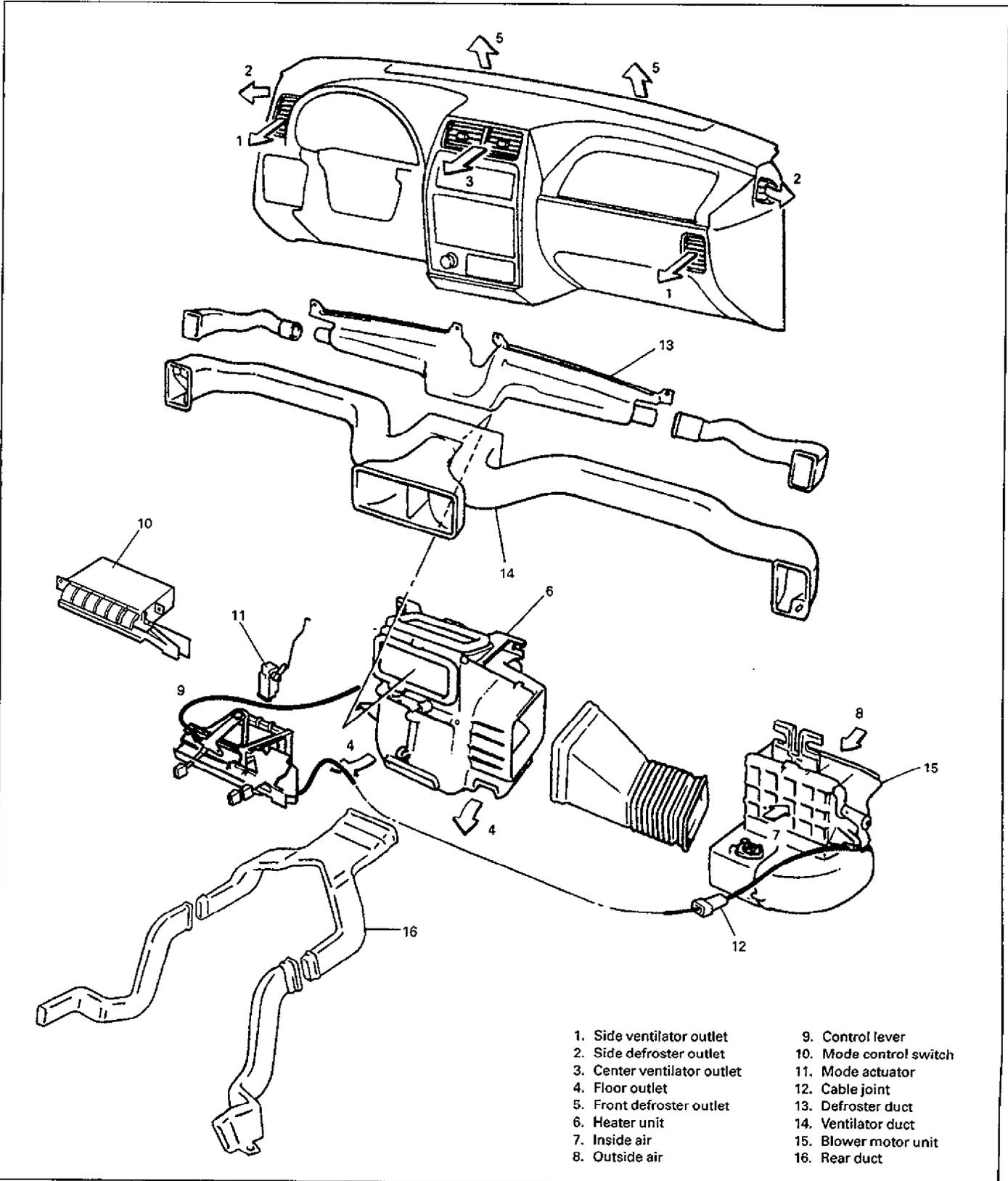
CONTENTS

GENERAL DESCRIPTION	1A- 2
HEATER CONTROL OPERATION	1A- 3
TROUBLE DIAGNOSIS	1A- 5
WIRING CIRCUIT	1A- 6
ON-VEHICLE SERVICE	1A- 7
Mode Control Switch	1A- 7
Mode Actuator	1A- 8
Heater Control Lever Assembly	1A- 9
Control Cables	1A-11

GENERAL DESCRIPTION

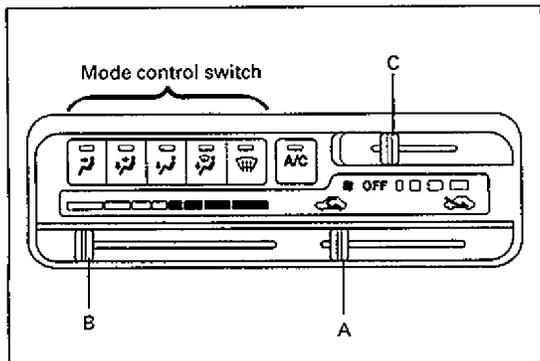
The heater, an in and out air selectable-type hot water heater, is so constructed that it is possible to assure an agreeable ventilation at all times by providing the ventilator air outlets at the center and both sides (right and left) of the instrument panel, the hot air outlet at a place close to the feet of front passengers, and the defroster air outlets at places, right and left, along the windshield glass.

The heater and ventilation consist of following parts.



HEATER CONTROL OPERATION

For mode selection, press mode control switch as desired. Then the mode actuator will move the link to change the mode.



1A-002

	VENTILATION
	BI-LEVEL
	HEAT
	HEAT & DEFROSTER
	DEFROSTER

MODE CONTROL SWITCH

BI-LEVEL () is a position used to keep cooling the head and warming the feet.

1A-003

	CIRCULATION
	FRESH AIR

CONTROL LEVER A

1A-004

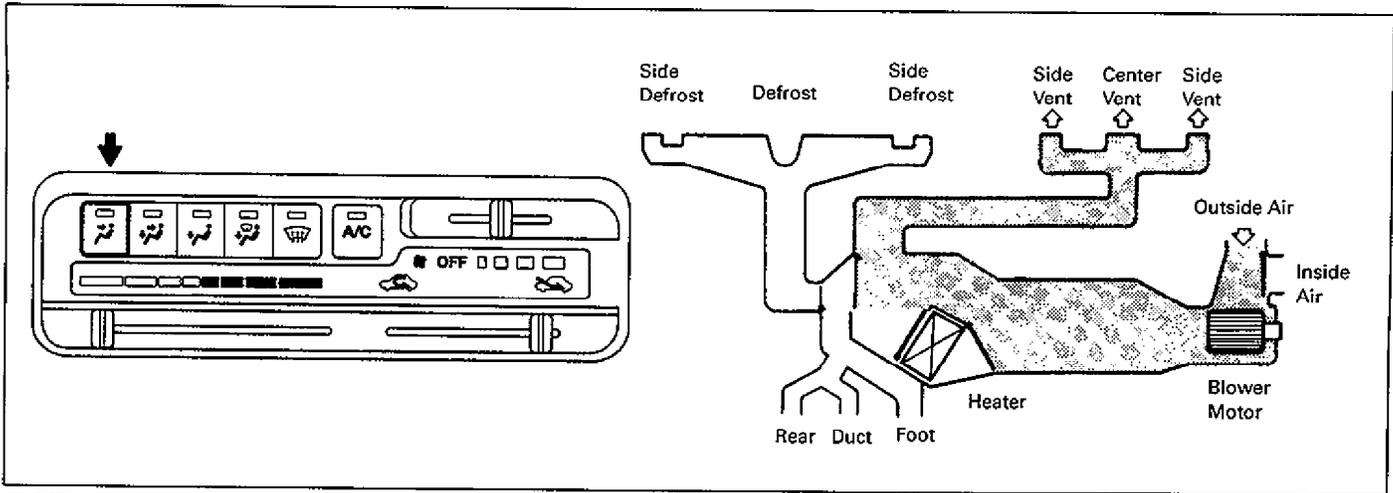
CONTROL LEVER B

A temperature control lever.
The temperature of air is controlled by this lever.
To make the heater warmer, set it to the "HOT" position.

CONTROL LEVER C

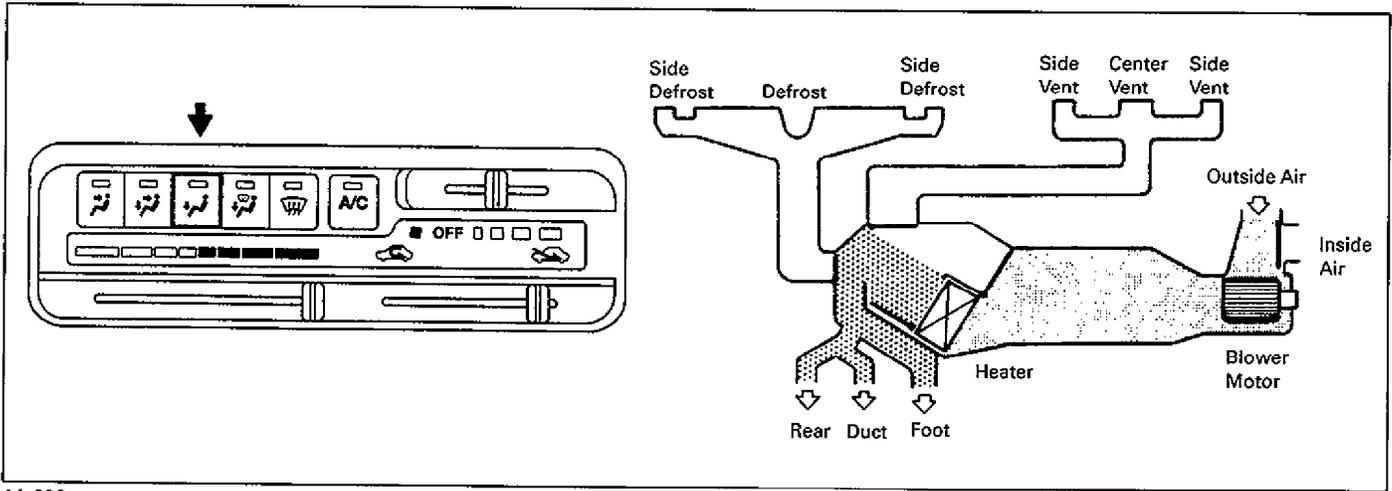
A blower speed selecting lever. The blower speed is increased as the lever is moved from left to right.

A. FORCED VENTILATION



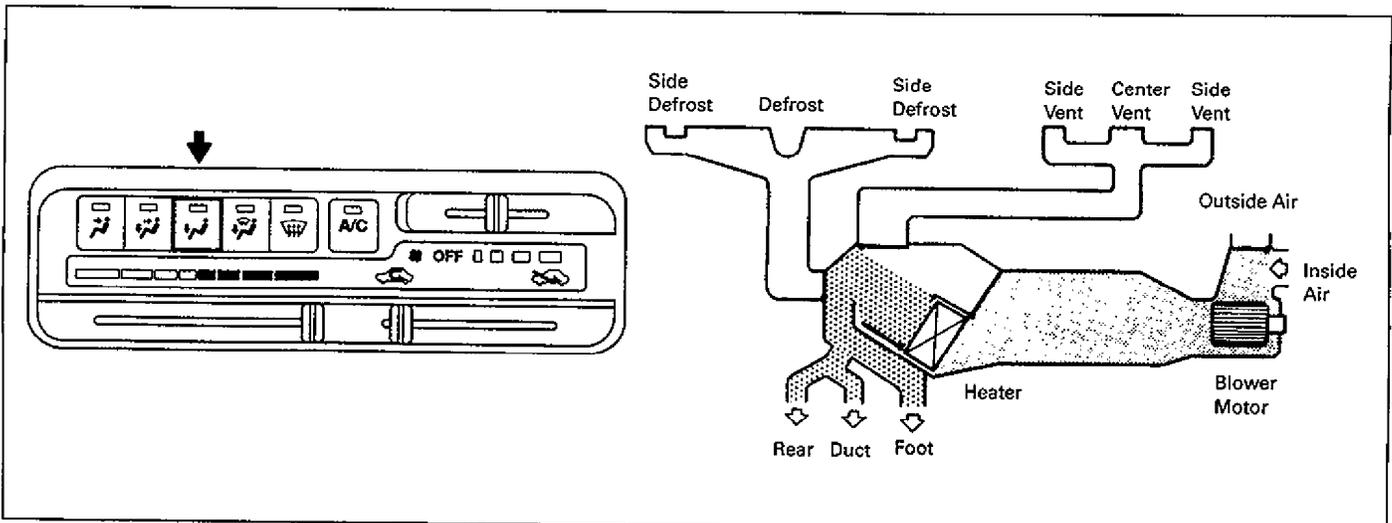
1A-005

B. OUTSIDE AIR-INTRODUCED HEATING

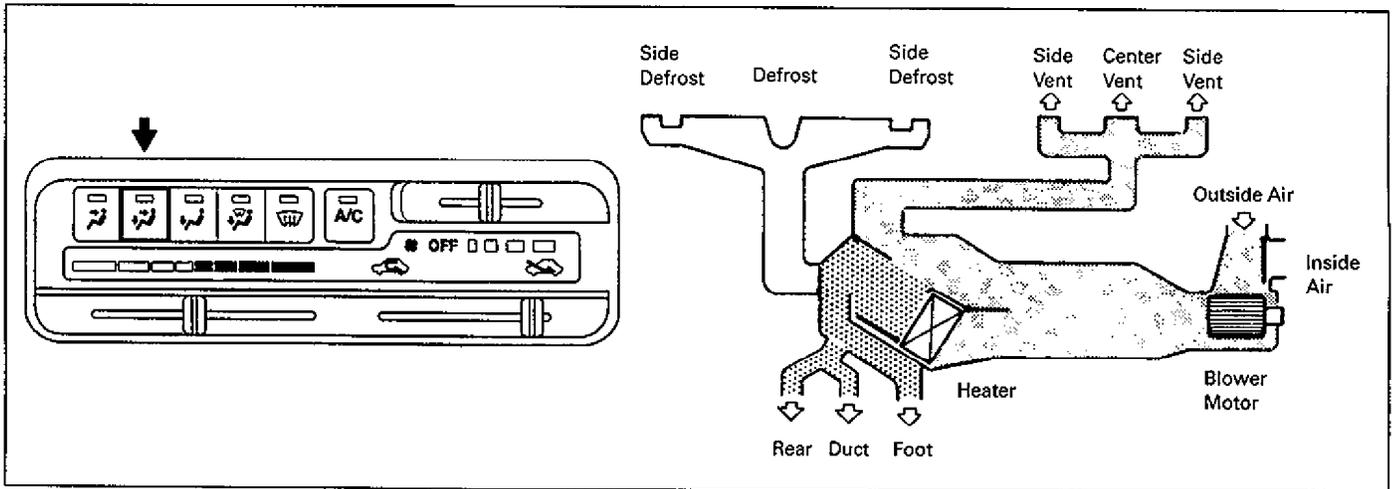


1A-006

C. INSIDE AIR-CIRCULATED HEATING



1A-007

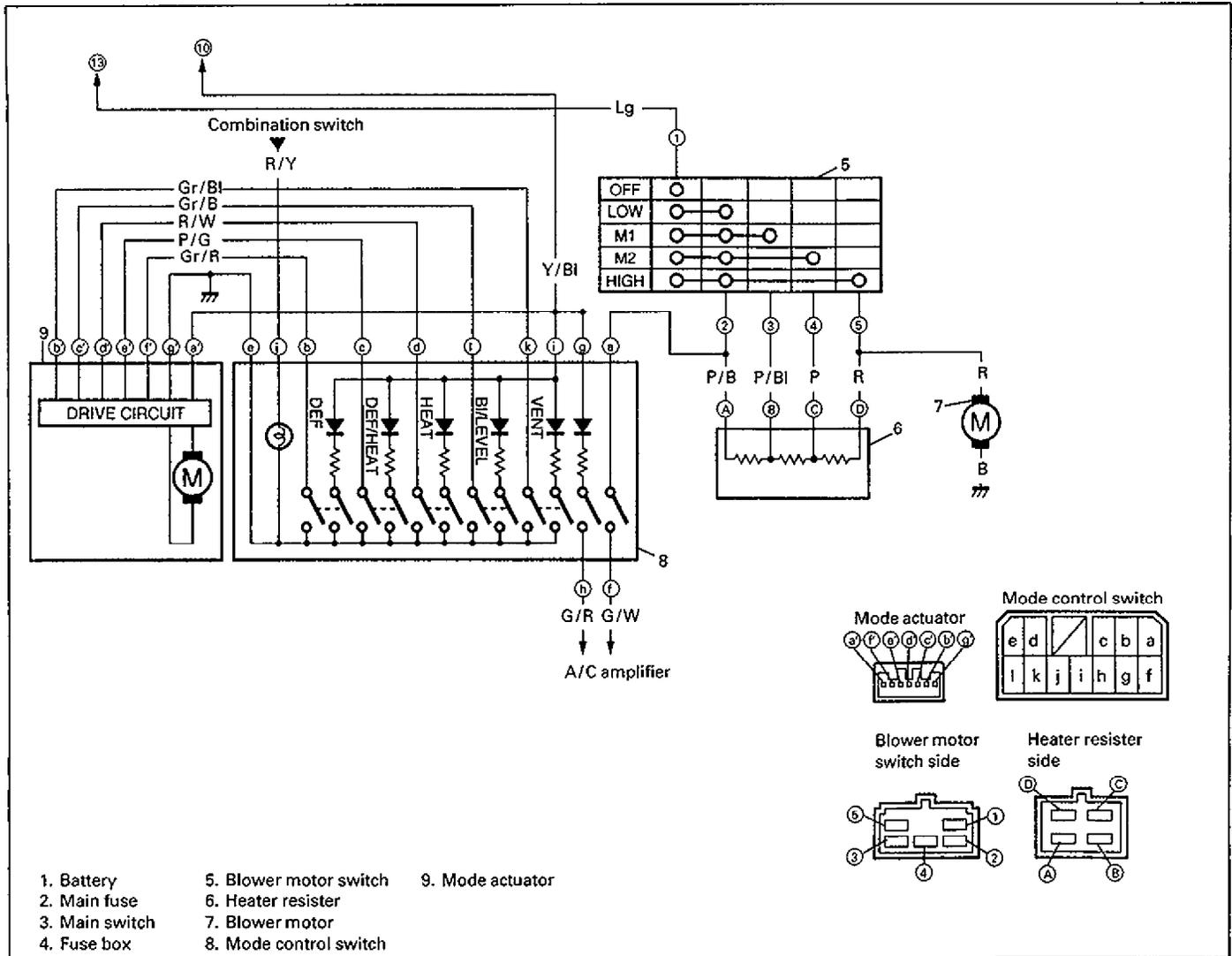
D. HEAD-COOLED/FEET-WARMED HEATING

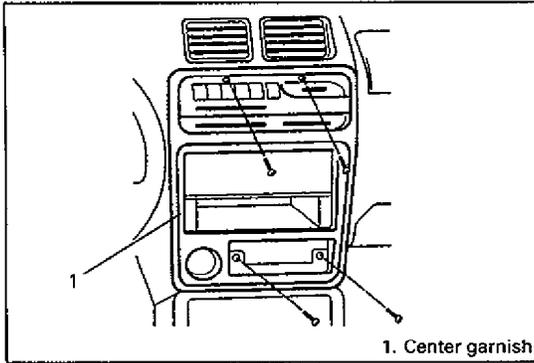
1A-008

TROUBLE DIAGNOSIS

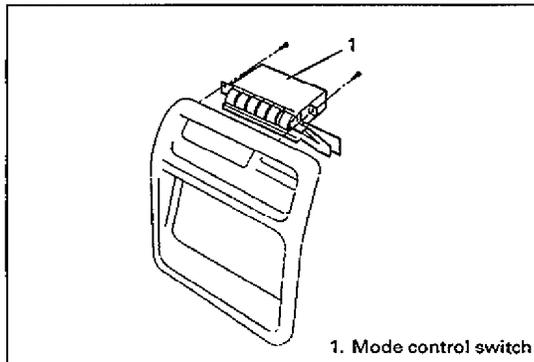
Trouble	Possible cause	Remedy
Heater blower won't work even when its switch is ON.	Blower fuse blown Blower resistor faulty Blower motor faulty Wiring or grounding faulty	Replace fuse to check for short. Check resistor. Replace motor. Repair as necessary.
Incorrect temperature output.	Control cables broken or binding Air damper broken Air ducts clogged Heater radiator leaking or clogged Heater hoses leaking or clogged	Check cables. Repair damper. Repair air ducts. Replace radiator. Replace hoses.
When mode control switch is changed, air outlet port is not changed.	Mode control switch faulty Mode actuator faulty Fuse blown Wiring or grounding faulty Air damper broken Air ducts clogged	Check and replace as necessary. Check and replace as necessary. Replace fuse to check for short. Repair as necessary. Repair damper. Repair air ducts.

WIRING CIRCUIT

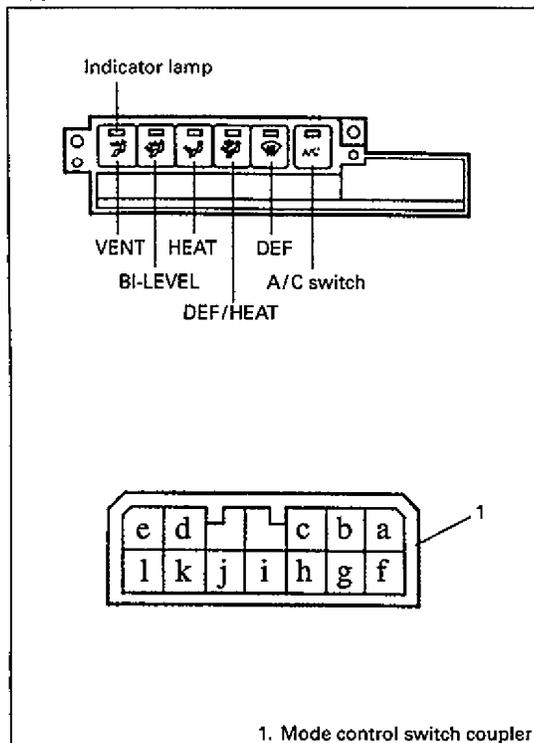




1A-010



1A-011



1A-012

ON-VEHICLE SERVICE

MODE CONTROL SWITCH

REMOVAL

- 1) Disconnect negative (-) cable at battery.
- 2) If equipped with air bag system, disable air bag system. Refer to "Disabling Air Bag System" in Section 9J.
- 3) Pull off control lever knobs.
- 4) Remove ashtray and center garnish mounting screws.
- 5) Remove center garnish with mode control switch.
- 6) Remove mode control switch from center garnish.

INSPECTION

Mode Control Switch

- Check if continuity exists between each pair of terminals listed below when mode control button is pressed.

Mode	Mode control switch terminals
VENT	e - k
BI-LEVEL	e - l
HEAT	e - d
DEF/HEAT	e - c
DEF	e - b

- With battery voltage (+) connected to terminal "i" and (-) to terminal "e", press each mode control button and check if indicator lamp lights.
- With battery voltage (+) connected to terminal "j" and (-) to terminal "e", check if illumination lamp lights.

A/C Switch (if equipped)

- Press A/C button and check if there is continuity between terminals "a" and "f".
- With battery voltage (+) connected to terminal "g" and (-) to terminal "h", press A/C button and check if indicator lamp lights.

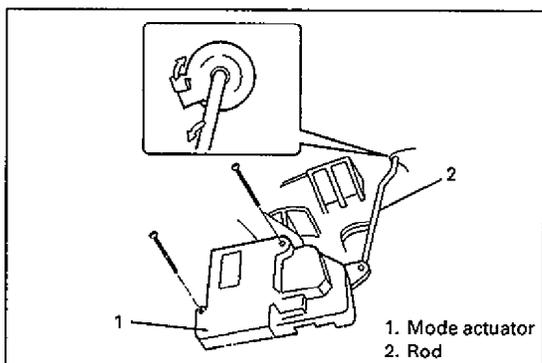
INSTALLATION

- 1) Install in reverse order of removal.
- 2) If equipped with air bag system, enable air bag system. Refer to "Enabling Air Bag System" in Section 9J.

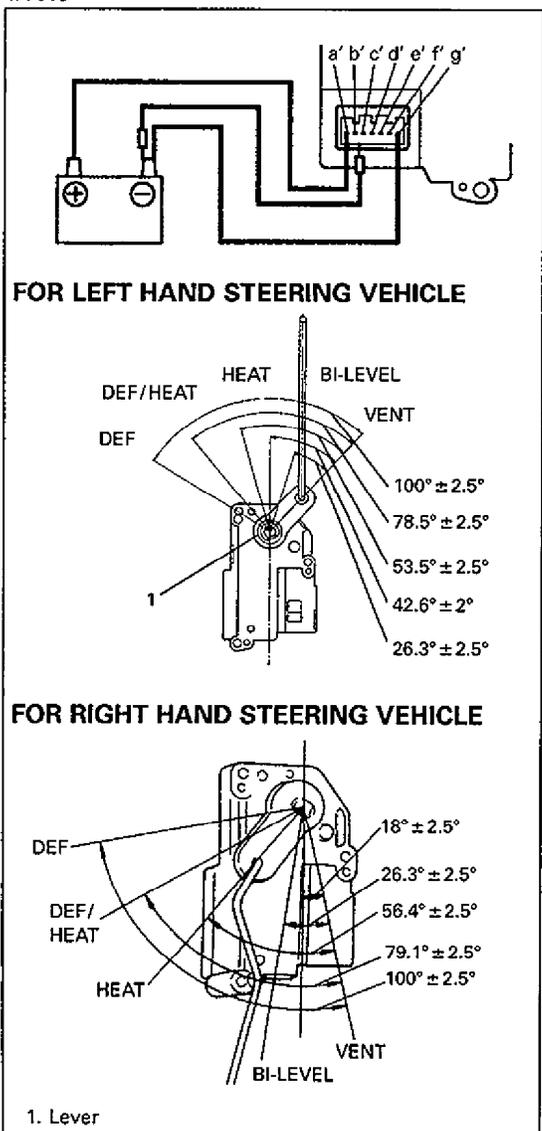
MODE ACTUATOR

REMOVAL

- 1) Disconnect negative (-) cable at battery.
- 2) If equipped with air bag system, disable air bag system. Refer to "Disabling Air Bag System" in Section 9J.
- 3) Remove ABS controller bracket with ABS controller and ICM (if equipped).
- 4) Disconnect mode actuator coupler.
- 5) Disconnect mode actuator rod from heater unit.
- 6) Remove mode actuator from heater unit.



1A-013



1A-014

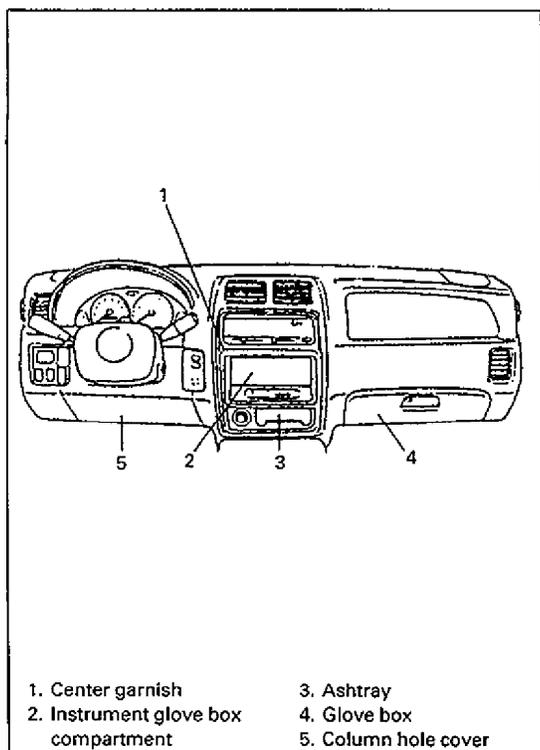
INSPECTION

- 1) Connect battery voltage (+) to terminal "a'" and (-) to terminal "g'".
- 2) Connect each terminal listed below to terminal "g'" (negative (-) terminal of battery) and check if lever rotation angle is as specified in figure at the left.

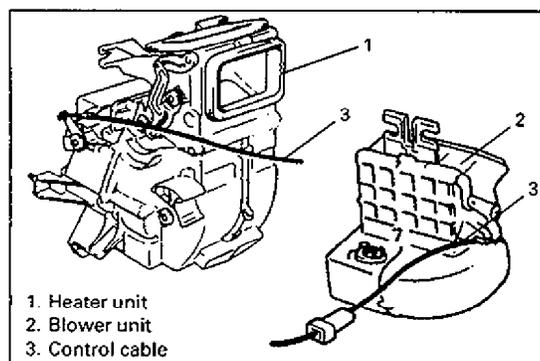
MODE	TERMINAL	
	Left hand steering vehicle	Right hand steering vehicle
VENT	f'	b'
BI-LEVEL	e'	c'
HEAT	d'	d'
DEF/HEAT	c'	e'
DEF	b'	f'

INSTALLATION

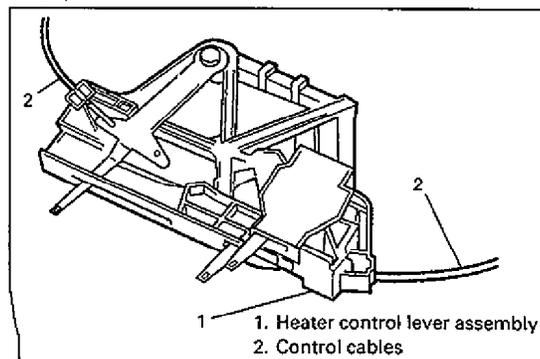
- 1) Install in reverse order of removal.
- 2) If equipped with air bag system, enable air bag system.
Refer to "Enabling Air Bag System" in Section 9J.



1A-015



1A-016



1A-017

HEATER CONTROL LEVER ASSEMBLY**REMOVAL**

- 1) Disconnect negative (-) cable at battery.
- 2) If equipped with air bag system, disable air bag system.
Refer to "Disabling Air Bag System" in Section 9J.
- 3) Pull off control lever knobs.
- 4) Remove ashtray and center garnish mounting screws.
- 5) Remove center garnish.
- 6) Remove glove box and column hole cover.
- 7) Remove instrument glove box compartment.
- 8) Disconnect control cables from blower motor unit and heater unit.
- 9) Disconnect heater blower motor switch connector.
- 10) Remove heater control lever assembly.

INSPECTION OF HEATER BLOWER MOTOR SWITCH

Check heater blower motor switch for each terminal-to-terminal continuity. For the detail refer to "WIRING CIRCUIT" earlier in this section.

	Lg	P/B	P/BI	P/G	P
LOW	○	○			
M1	○	○	○		
M2	○	○		○	
HIGH	○	○			○

Lg : Lightgreen

P/BI : Pink with Blue tracer

P : Pink

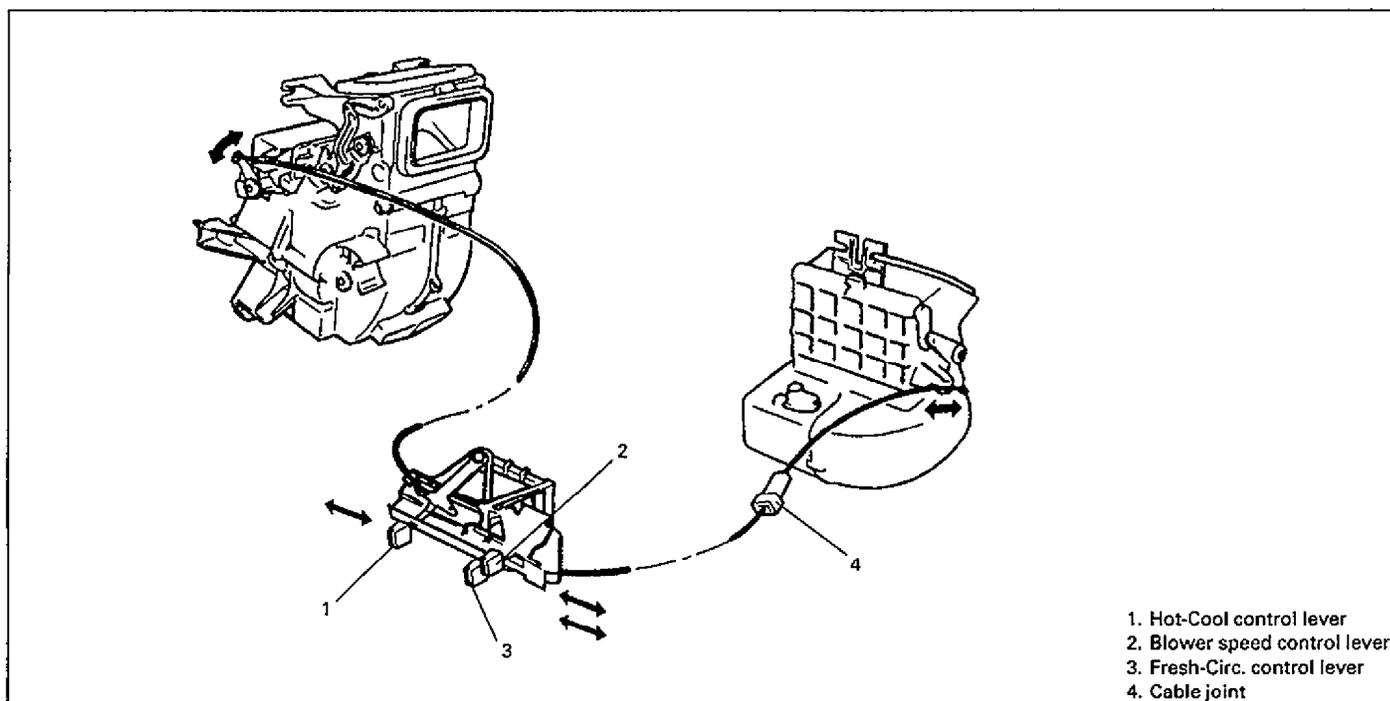
P/B : Pink with Black tracer

P/G : Pink/Green tracer

INSTALLATION

- 1) Install in reverse order of removal.
- 2) If equipped with air bag, enable air bag system.
Refer to "Enabling Air Bag System" in Section 9J.

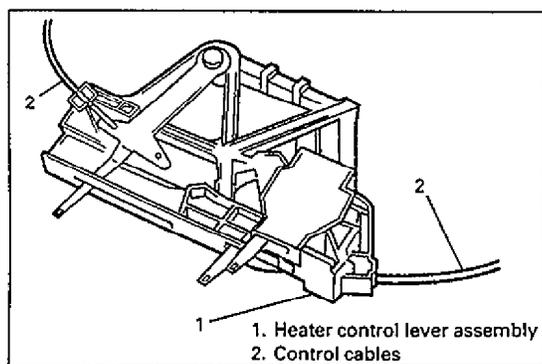
CONTROL CABLES



1A-018

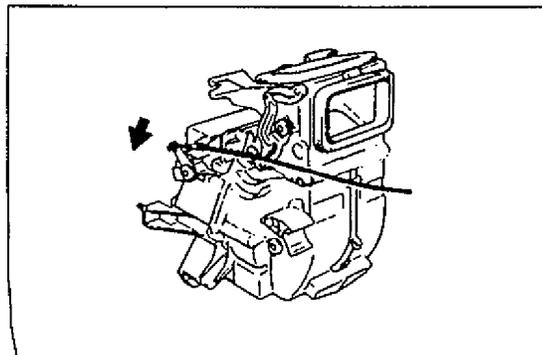
REMOVAL

- 1) Remove heater control lever assembly.
 Refer to "HEATER BLOWER MOTOR SWITCH" in this section.



1A-019

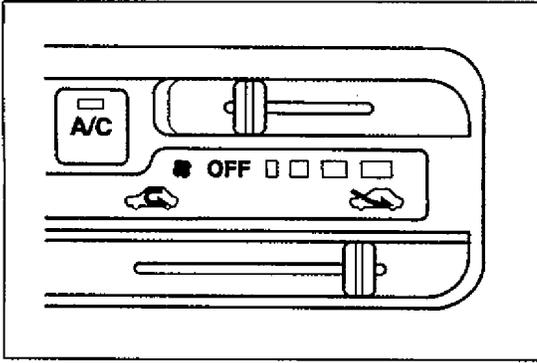
- 2) Disconnect control cables from control lever.



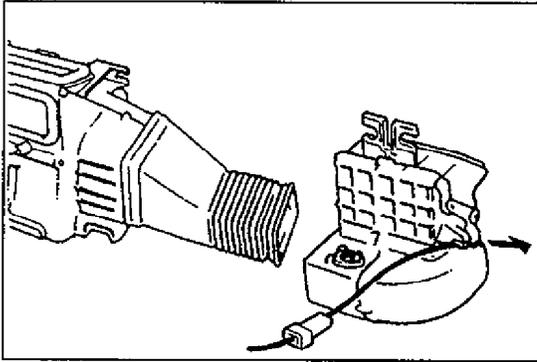
1A-020

A. Heater Control (HOT-COOL Selector) Cable

- 1) Move control lever to COOL position.
- 2) Push lever fully in arrow direction to fix cable in position, as shown.



1A-021



1A-022

B. Fresh Air Control (FRESH-CIRC Selector) Cable

1) Move control lever to FRESH position.

2) Push lever fully in arrow direction and fix cable with clamp in position as shown in left figure.

SECTION 5

BRAKES

NOTE:

- For the descriptions (items) not found in this section, refer to the same section of Service Manual mentioned in FOREWORD of this manual.
- All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

85F00-5-1-1

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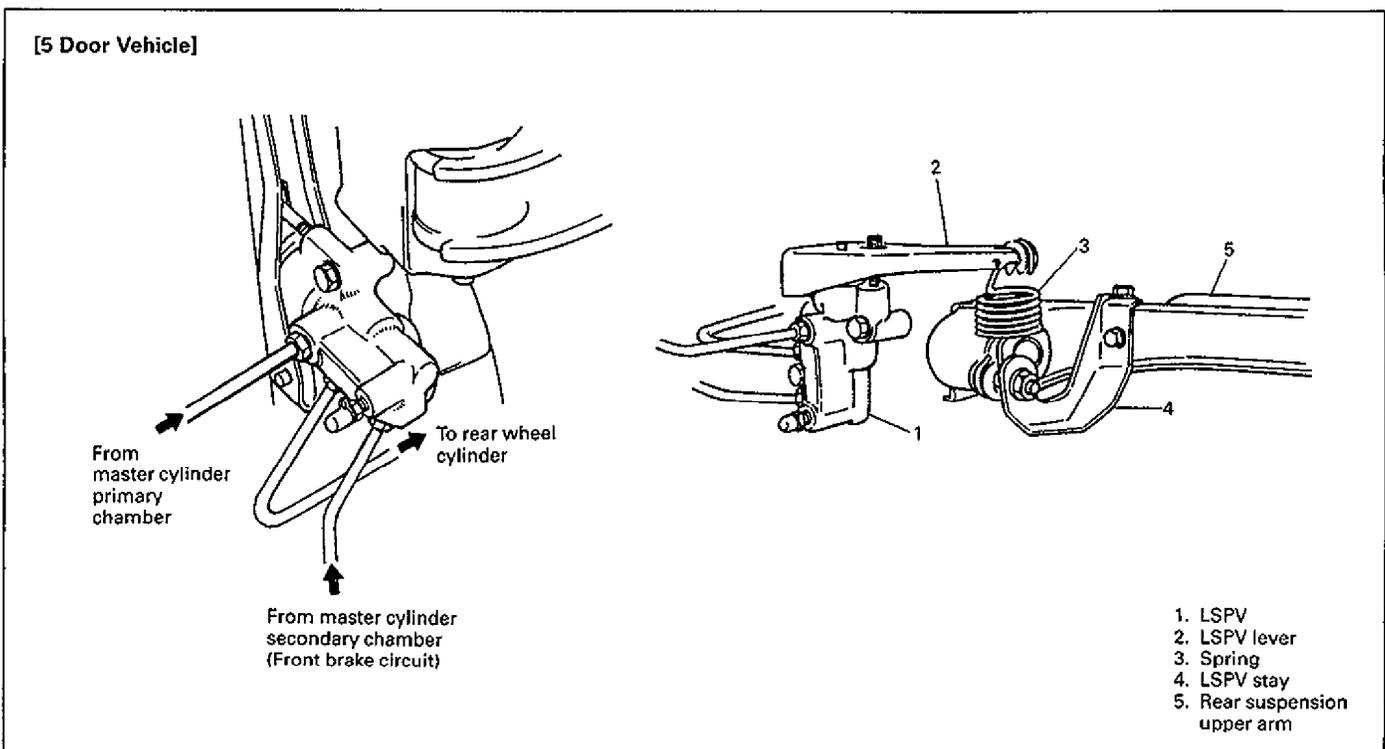
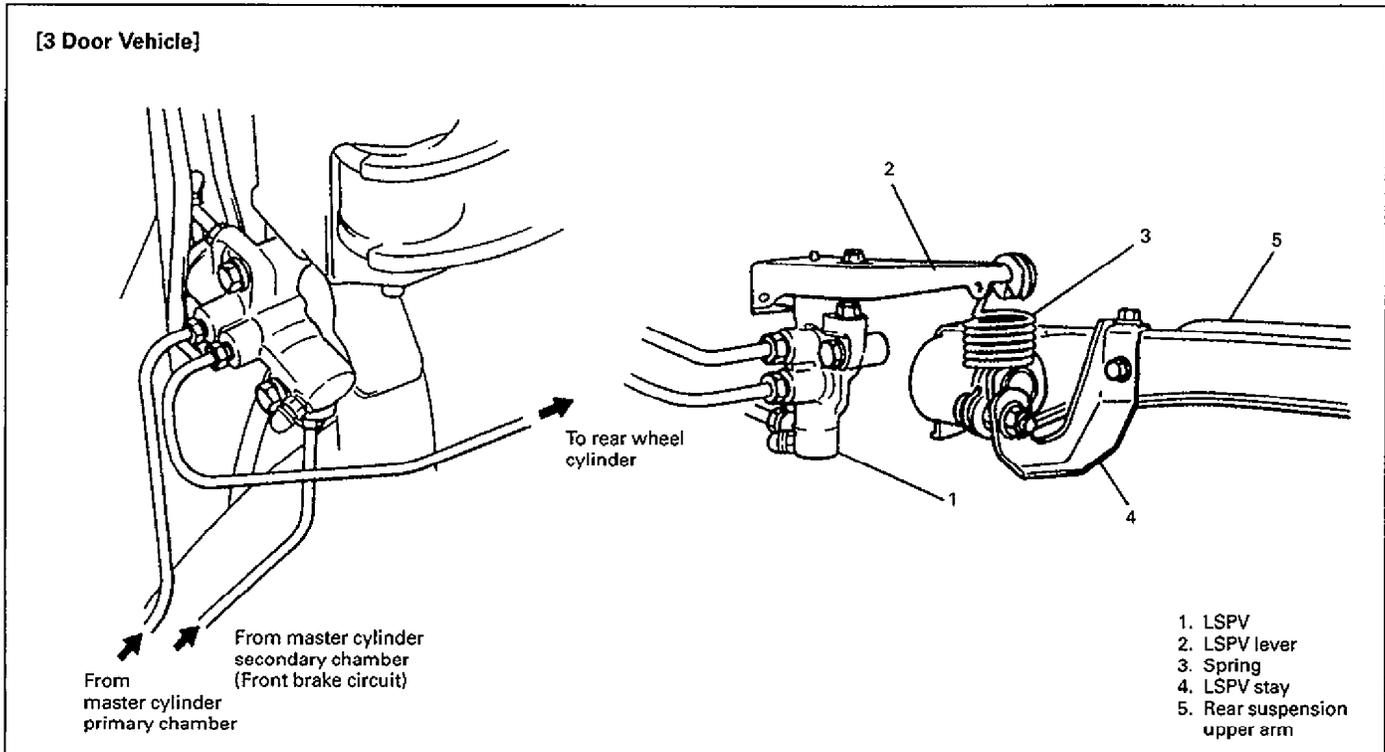
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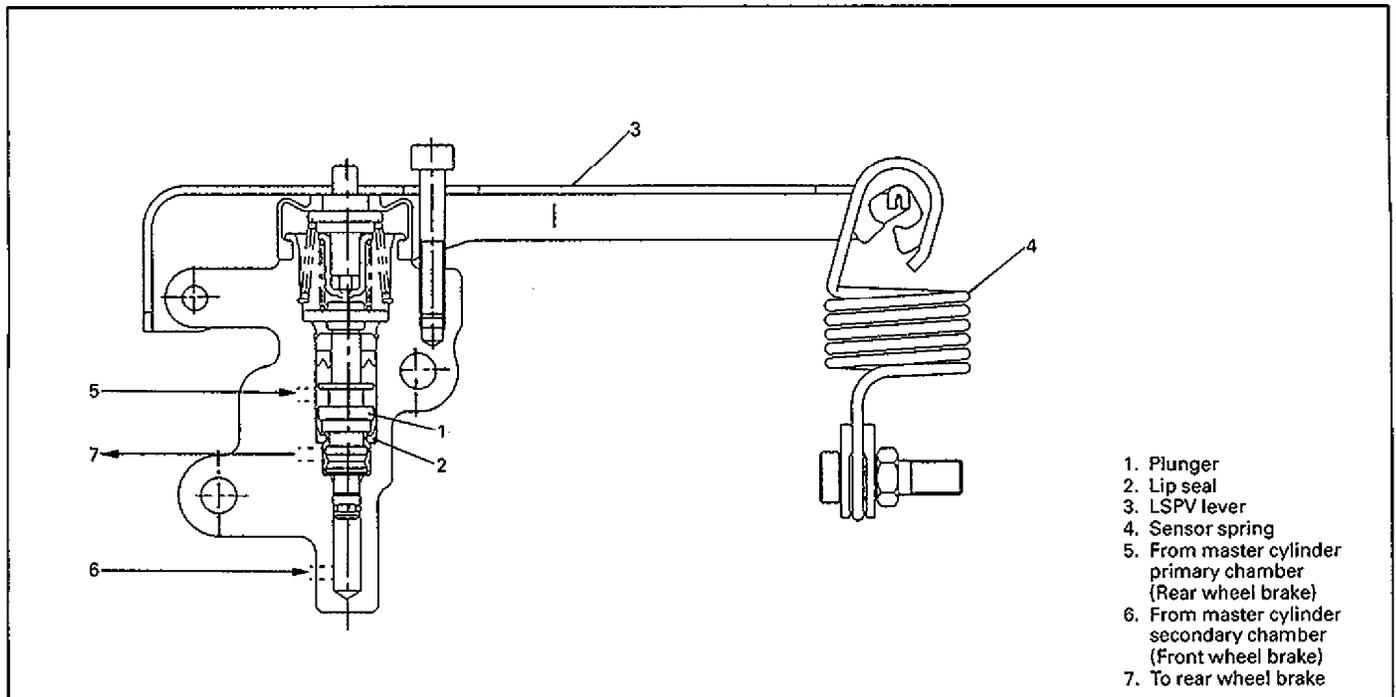
GENERAL DESCRIPTION

LSPV (Load Sensing Proportioning Valve) ASSEMBLY

As shown in figure below, LSPV is included within the brake circuit which connects the master cylinder and the rear wheel brake. It controls the hydraulic pressure applied to the rear wheel brake according to the loaded state of the vehicle (or weight of the load), whereby preventing the rear wheels from getting locked prematurely.

If the front hydraulic pressure fail to increase (failure in the front brake circuit), it is so designed that the fail-safe mechanism works and a hydraulic pressure higher than in normal condition is applied to rear wheel cylinders.



CONSTITUTION

85F00-5-13-2

OPERATION

LSPV is installed to the vehicle body, with the end of the lever at its top connected to the upper arm of the rear suspension by way of the sensor spring and the LSPV stay.

When some load is placed on the vehicle, the distance between the axle housing of the rear suspension and the vehicle body (chassis) (i.e. coil spring height) changes, whereby the sensor spring length also changes.

As the sensor spring length changes, the force affecting the plunger in LSPV by way of the lever changes so that the hydraulic characteristic suitable for the load weight becomes available.

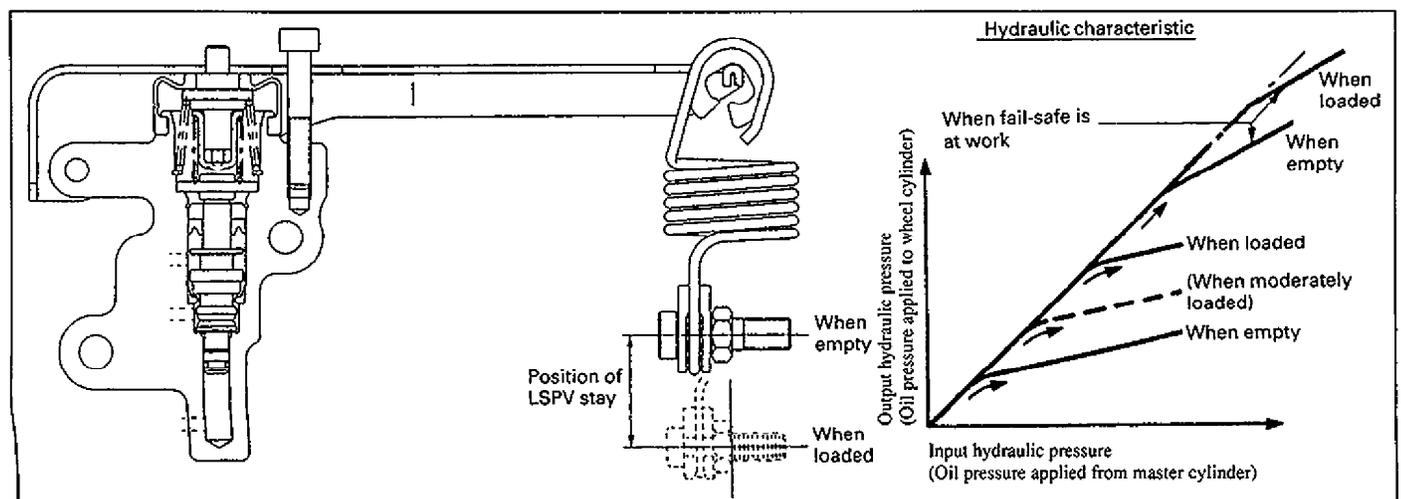
When empty

As the sensor spring is pulled by comparatively weak force, the force applied to the plunger is also small and the hydraulic characteristic takes a low bend point as shown in the graph below.

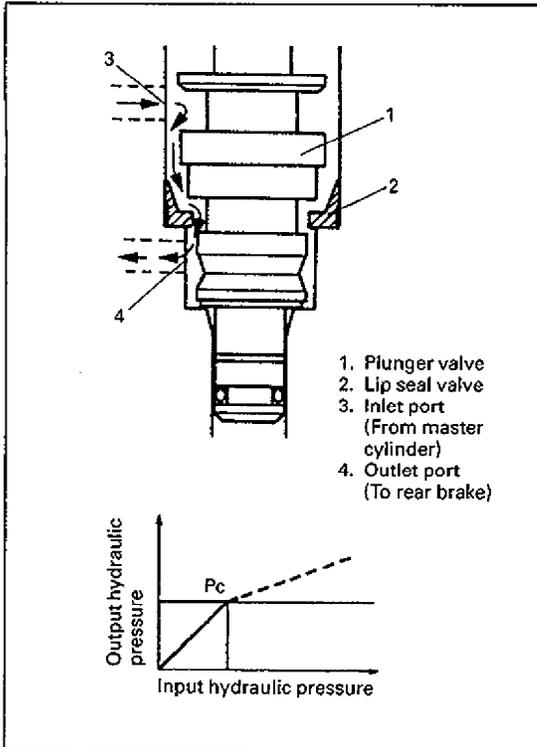
When loaded

As the sensor spring is pulled by comparatively strong force, a larger force is applied to the plunger so that the hydraulic characteristic takes a higher bend point in the graph below.

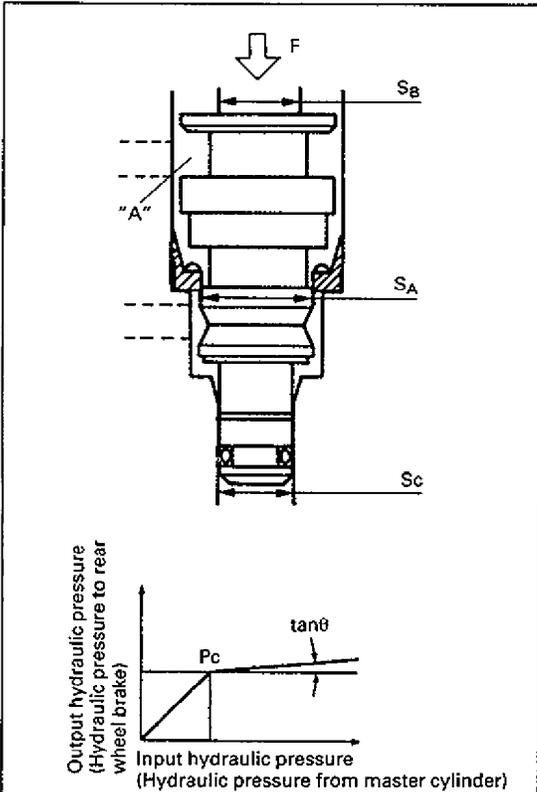
The relationship between the force applied to the plunger and the bend point in the hydraulic characteristic graph is described on the following page.



85F00-5-14-1



85F00-5-14-4



Reference:

The bend point P_c and gradient $\tan\theta$ are obtained by using the following equations.

$$P_c = \frac{F}{S_B} \quad \tan\theta = \frac{S_A - S_B - S_C}{S_A - S_C}$$

- F : Force from sensor spring
- S_A : Larger diameter sectional area of plunger
- S_B : Smaller diameter sectional area of plunger
- S_C : Sectional area of plunger to O-ring outer diameter contact

When LSPV not at work

Operation from the inoperative state till the input hydraulic pressure (fluid pressure from the master cylinder) reaches the bend point P_c in the graph as shown.

The input hydraulic pressure passes between the plunger and lip seal (valve) and without receiving any control, it is discharged through the outlet port.

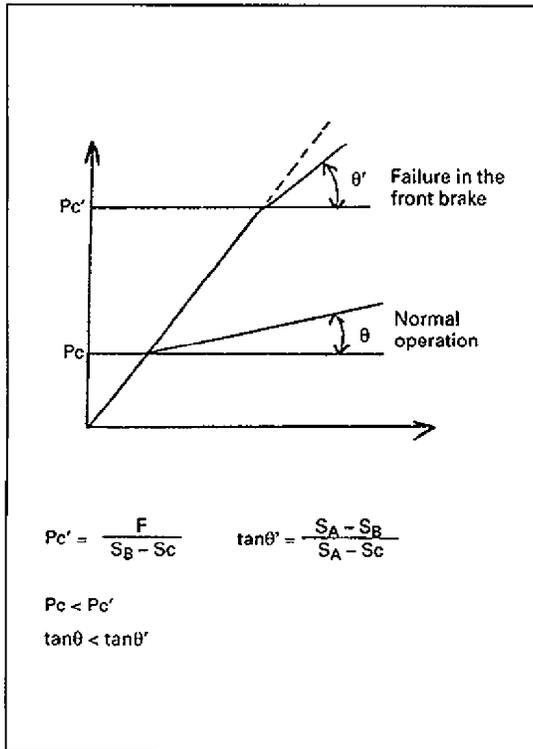
When LSPV at work

As the input hydraulic pressure increases, the force applied to the plunger grows stronger than the sensor spring force and moves the plunger upward in the figure and as a result, the valve closes the fluid passage. The hydraulic pressure then is represented by the bend point P_c in the graph.

As the incoming hydraulic pressure rises even higher, the hydraulic pressure "A" increases and pushes down the plunger, opening the fluid passage.

By repeating this operation (open/close), the valve controls the output hydraulic pressure (hydraulic pressure to the rear brake).

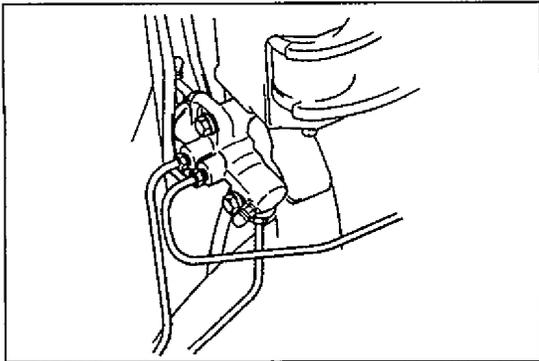
Therefore its characteristic is represented as a line with a certain gradient.



85F00-5-15-4

When fail-safe at work

When the hydraulic pressure is not applied to the front brake (secondary), the force to push up the plunger reduces by the amount corresponding to that of the front brake. This means that in order for the plunger to operate, a higher than normal hydraulic pressure is required for the rear brake (primary). Thus, a hydraulic pressure exceeding the normal level is supplied to the rear brake (rear wheel cylinder).



ON-VEHICLE SERVICE LSPV (Load Sensing Proportioning Valve) R & I

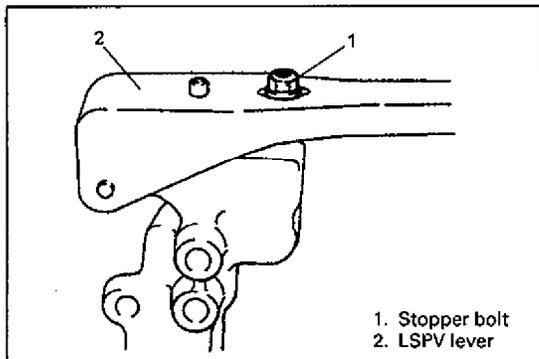
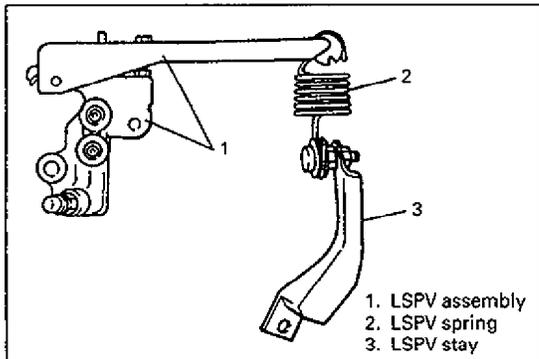
1. REMOVE AND INSTALL LSPV

REMOVAL

- 1) Clean around reservoir cap and take out fluid with syringe or such.
- 2) Hoist vehicle.
- 3) Disconnect brake pipes from LSPV.
- 4) Remove LSPV assembly from vehicle body.

NOTE:

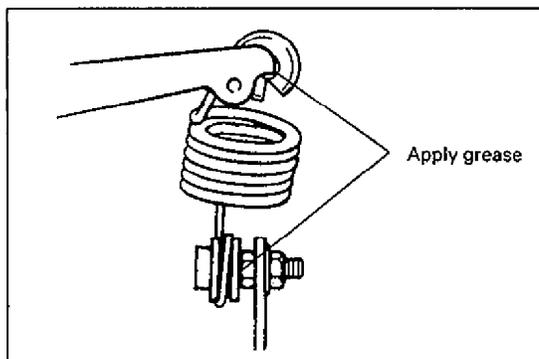
As shown in figure, LSPV assembly should be removed together with its spring and stay installed as they are.



- 5) Remove spring and stay from lever.

CAUTION:

- Stopper bolt of LSPV lever should not be loosened or tightened.
- LSPV assembly must not be disassembled. Replace with new one if defective.



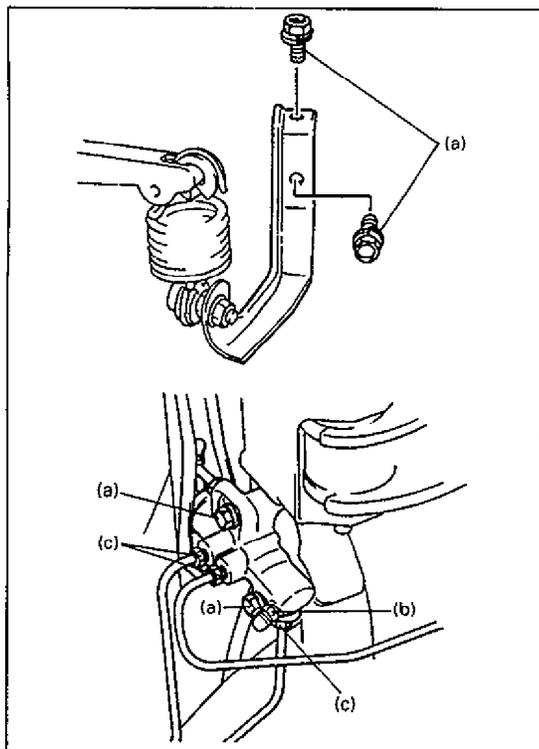
INSTALLATION

CAUTION:

Refer to above CAUTION.

Install by reversing removal procedure, noting the following.

- 1) Apply multi-purpose grease to upper and lower joint of coil spring.



- 2) Torque each bolt and nut to specification as indicated as indicated spectively in figure.

Tightening Torque

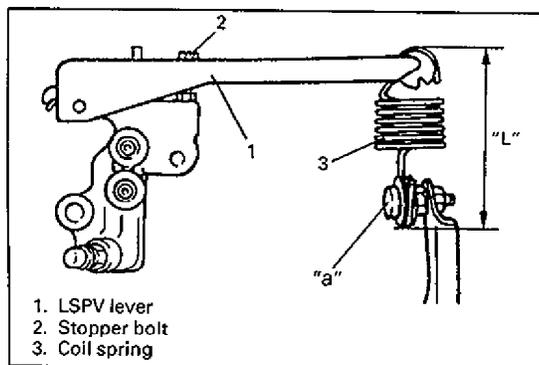
- (a): 23 N·m (2.3 kg-m, 16.5 lb-ft)
 (b): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)
 (c): 16 N·m (1.6 kg-m, 11.5 lb-ft)

- 3) Upon completion of installation, fill reservoir tank with specified fluid and bleed air from brake system.

NOTE:

Make sure to bleed air from LSPV bleeder without fail.

- 4) After bleeding air, check that LSPV is installed properly, referring to following INSPECTION & ADJUSTMENT section.



2. AFTER-INSTALLATION INSPECTION & ADJUSTMENT

Confirm the following before inspection and adjustment.

- Fuel tank is filled with fuel fully.
- Vehicle is equipped with spare tire, tools, jack and jack handle.
- Vehicle is free from any other load.

With vehicle in above conditions;

- 1) Place it on level floor.
- 2) Push up LSPV lever with finger till it contacts stopper bolt and measure length of coil spring ("L" in figure) as it is pulled.
- 3) Spring length "L" should be as specified below.

Spring length "L"

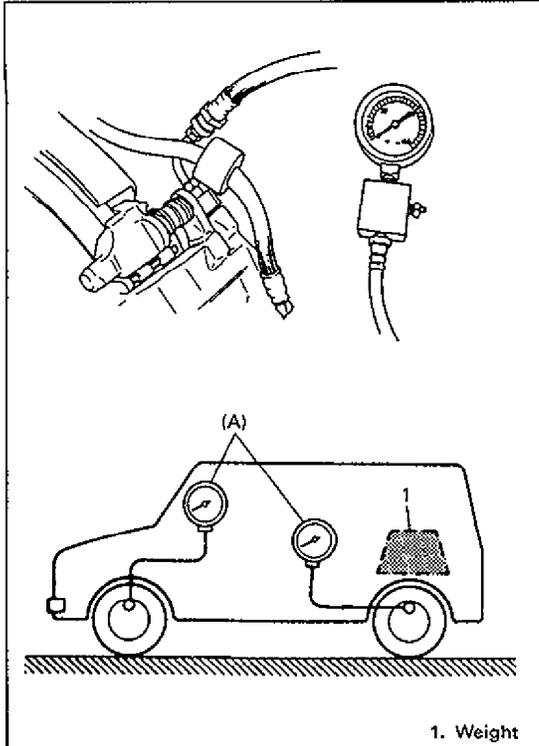
3 Door vehicle: 103 mm (4.054 in.)

5 Door vehicle: 98 mm (3.858 in.)

- 4) If it isn't, adjust it to specification by changing bolt "a" tightening positions as shown in figure. After adjustment, tighten nut to specified torque.

NOTE:

Check to make sure that LSPV body and brake pipe joints are free from fluid leakage. Replace defective parts, if any.



3. FLUID PRESSURE TEST

Test procedure for LSPV assembly is as follows.
Before testing, confirm the following.

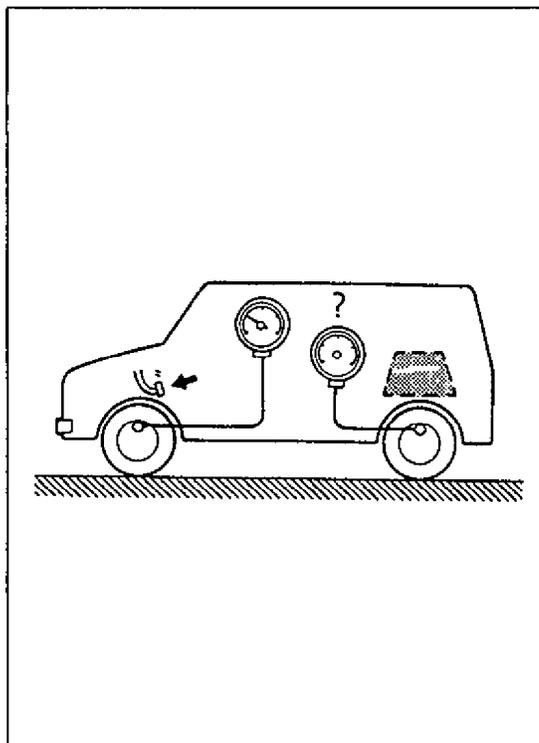
- Fuel tank is filled with fuel fully.
 - Vehicle is equipped with spare tire, tools, jack and jack handle.
- 1) Place vehicle on level floor and set 100 kg (221 lbs) weight slowly on axle housing center.
 - 2) Install pressure gauge to front and rear brake.

Special Tool

(A): 09956-02310

NOTE:

Pressure gauge should be connected to bleeder of front (left side brake) and rear brakes.



- 3) Depress brake pedal gradually till fluid pressure of front brake becomes as specified below and check corresponding pressure of rear brake then. It should be within specification given below.

Front brake	Rear brake
5000 kPa	2000 – 3200 kPa
50 kg/cm ²	23 – 29 kg/cm ²
711 psi	327 – 412 psi

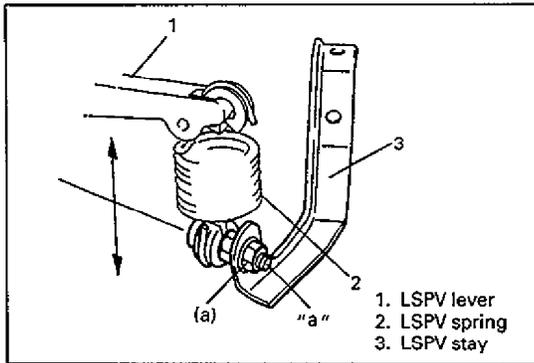
As done above, apply 100 kg/cm² pressure to front brake and check that rear brake pressure then is within specification as given below.

Front brake	Rear brake
10000 kPa	3500 – 4500
100 kg/cm ²	35 – 45 kg/cm ²
1422 psi	498 – 640 psi

- 4) If rear brake pressure is not within specification, adjust it by changing bolt "a" tightening position as follows.
 - If rear brake pressure is higher than specification, move bolt "a" upward and if it is lower, downward.
 - Repeat steps 3) and 4) until rear brake pressure is within specification.

NOTE:

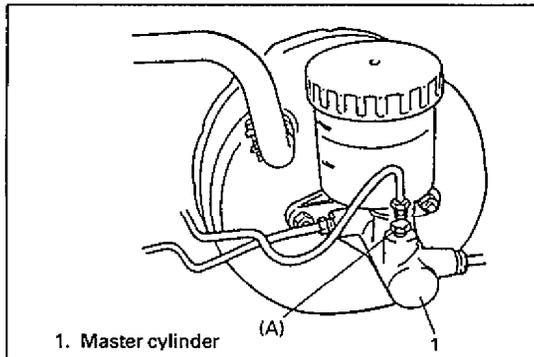
1 mm of bolt movement will result in about 2.4 kg/cm² difference in hydraulic pressure.



- After adjustment, be sure to torque nut to specification.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 16.5 lb-ft)



- 5) Disconnect brake pipe (connecting between master cylinder and right front brake) from master cylinder. Tighten plug (special tool) to master cylinder as shown below.

Special Tool

(A): 09956-02210

Depress brake pedal. If rear brake pressure is 95 – 100 kg/cm² when front brake pressure is 100 kg/cm², it means that front fail-safe system functions properly.

Front brake	Rear brake
10000 kPa	9500 – 10000 kPa
100 kg/cm ²	95 – 100 kg/cm ²
1422 psi	1350 – 1422 psi

SECTION 8

BODY ELECTRICAL SYSTEM

NOTE:

For the descriptions (items) not found in this section of this manual, refer to the same section of service manuals mentioned in FOREWORD of this manual.

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 Rear Window Wiper and Washer (If equipped) 8- 4

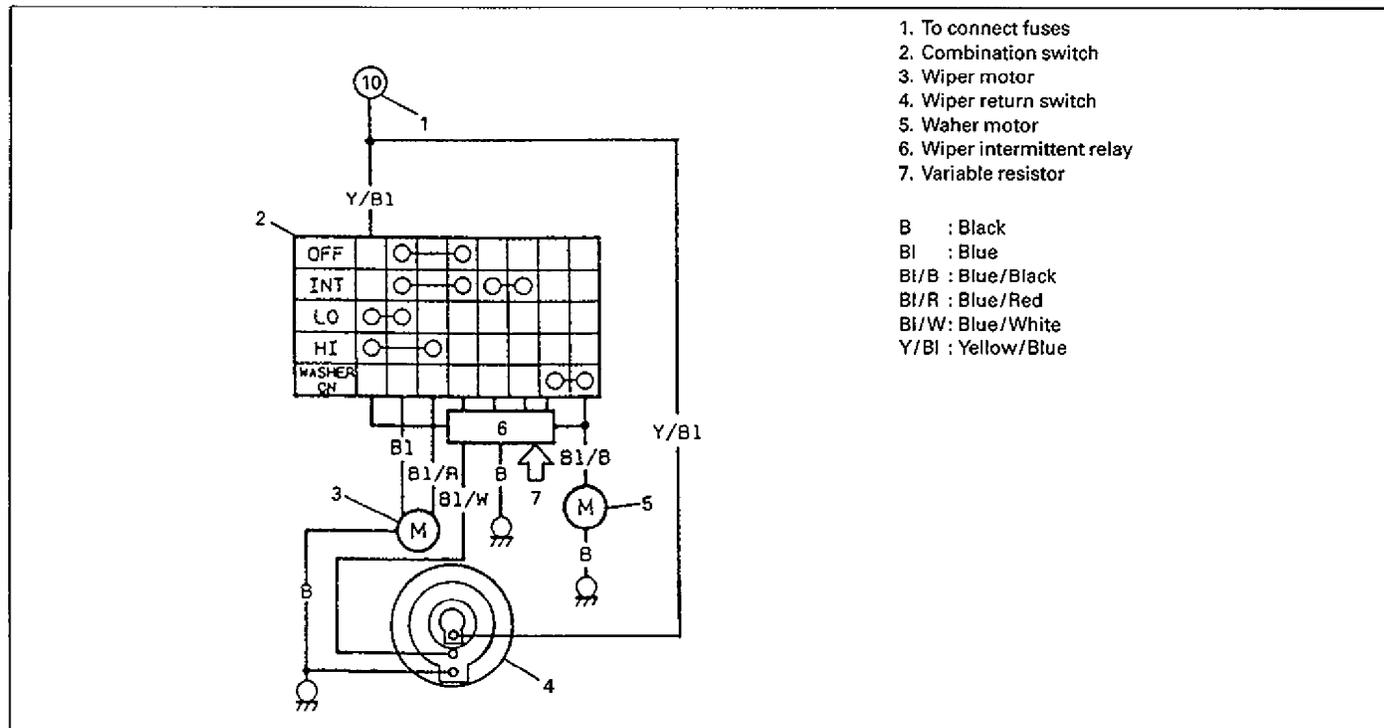
 Rear Fog Light (If equipped) 8- 7

ON-VEHICLE SERVICE

WINDSHIELD WIPERS (FRONT WIPER)

The windshield wiper is 3-speed type with variable intermittent switch and the windshield washer is equipped with a separate-type washer pump.

WIRING CIRCUIT

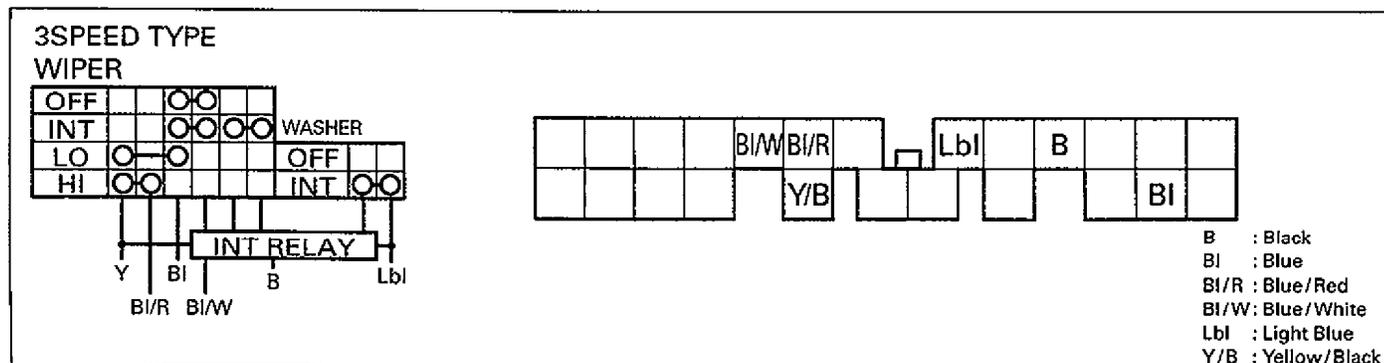


8-002

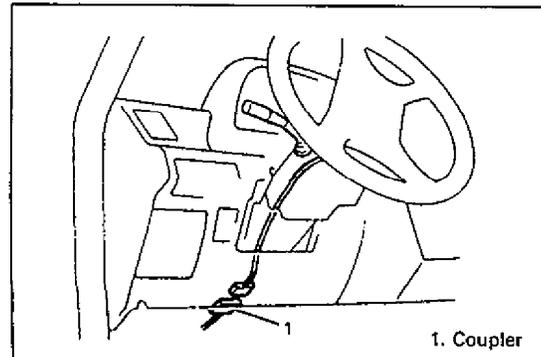
INSPECTION

A. Wiper/washer Switch

Use a circuit tester to check switch for each terminal-to-terminal continuity.



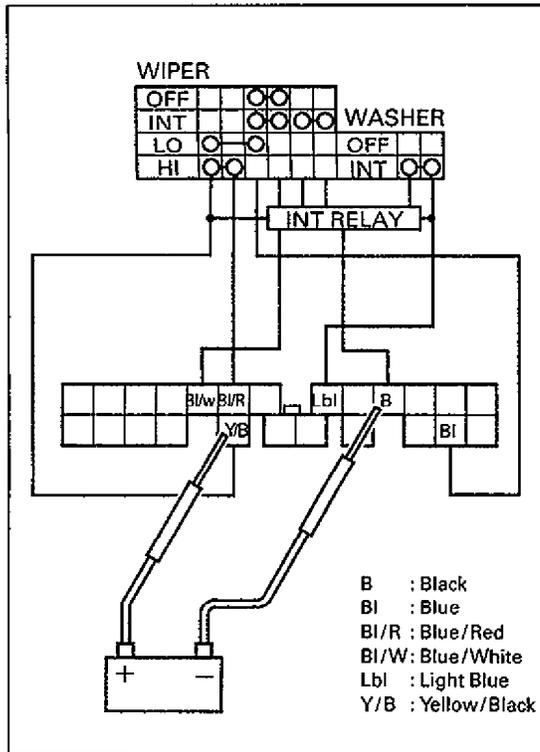
8-003



D. Intermittent Wiper Relay Circuit (If equipped)

1) Disconnect wiper & washer switch coupler.

8-004



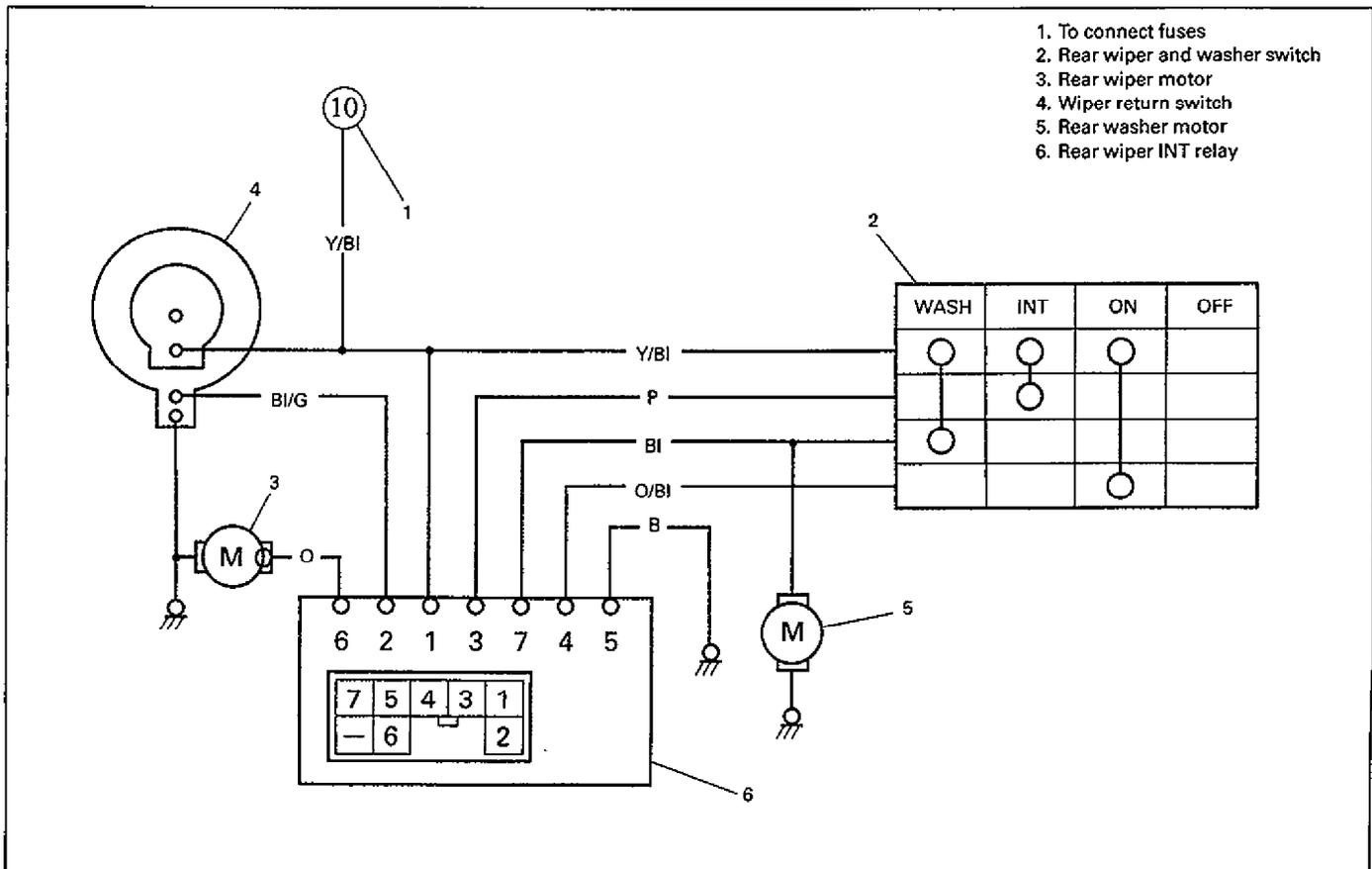
- 2) Turn wiper switch to "INT" position.
- 3) Connect (+) cord and (-) cord of 12 V battery to coupler terminals as shown left. If an operating sound is heard from relay, it is at work properly.

8-005

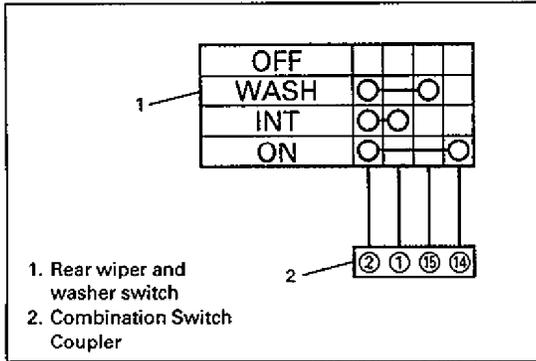
REAR WINDOW WIPER AND WASHER

The rear window wiper is of the one-speed type, and its washer is equipped with a separate-type washer pump.

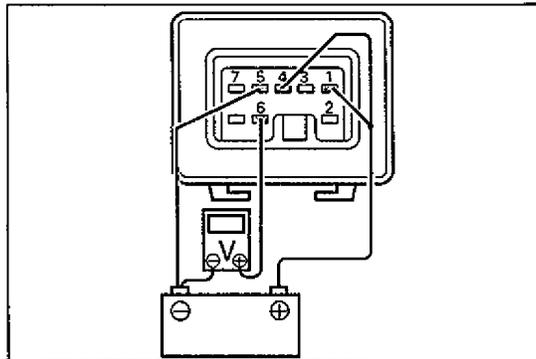
WIRING CIRCUIT



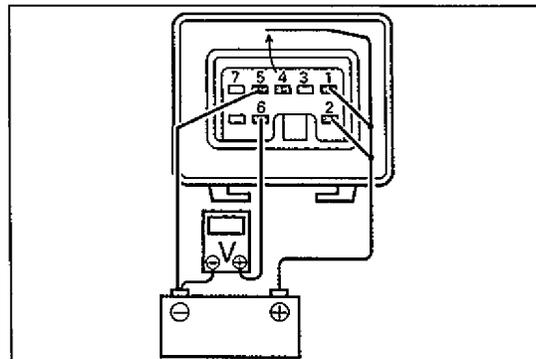
8-006



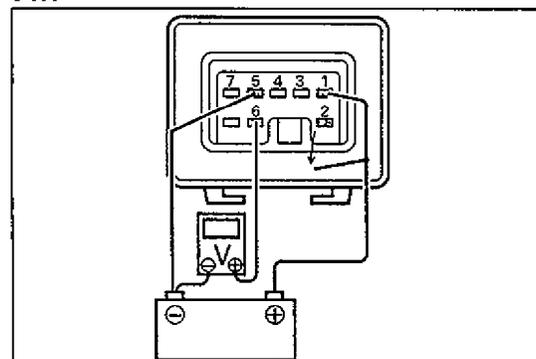
8-007



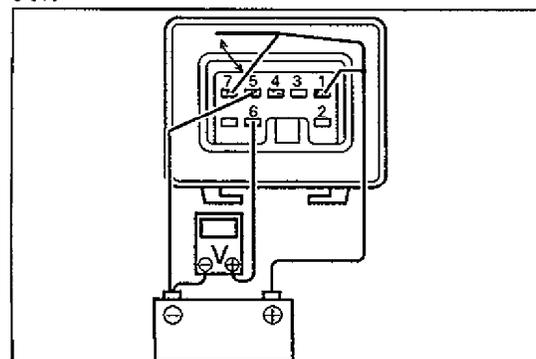
8-008



8-009



8-010



8-011

INSPECTION

A. Wiper And Washer switches

Use a circuit tester to check switches for continuity.

COUPLER

P	B	Y/BI	BI/B	B/W	B/R	Y		LbI	R	B	G/Y	G	R/W
O	BI	G/R	W		Y/B	W/B	R	W/G	G	BI	R/B		

D. Rear Wiper Intermittent Relay ON circuit.

1) Connect positive terminal of battery to terminals ① and ④ of controller, negative terminal to terminal ⑤ of controller and check voltage between terminals ⑥ and ⑤ of controller.

If measured voltage is battery voltage, controller is in good condition.

If not, replace controller.

2) Connect positive terminal of battery to terminal ② of controller, then disconnect positive terminal from terminal ④ of controller and check voltage between terminals ⑥ and ⑤ of controller.

If measured voltage is battery voltage, controller is in good condition.

If not, replace controller.

3) Disconnect positive terminal from terminal ② of controller and check voltage between terminals ⑥ and ⑤ of controller.

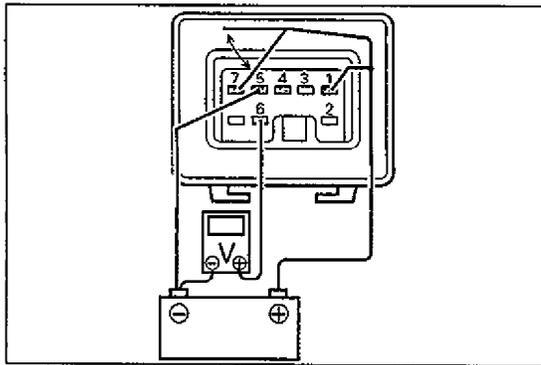
If measured voltage is about 0V, controller is in good condition.

If not replace controller.

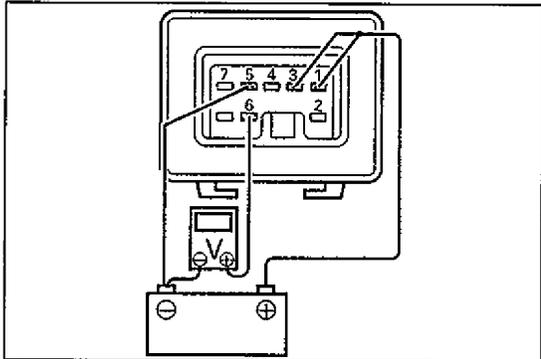
WASH circuit

1) Connect positive terminal of battery to terminal ① of controller and negative terminal to terminal ⑤ of controller. Then connect positive terminal to terminal ⑦ checking voltage between terminals ⑥ and ⑤ of controller.

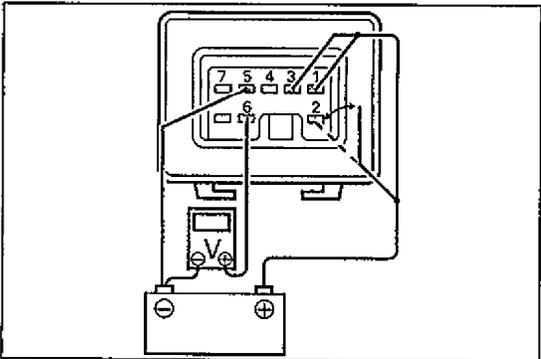
If measured voltage changes from about 0V to battery voltage in 0.6 to 1.5 seconds after connecting positive terminal to terminal ⑦, controller is in good condition. If not, replace controller.



8-012



8-013



8-014

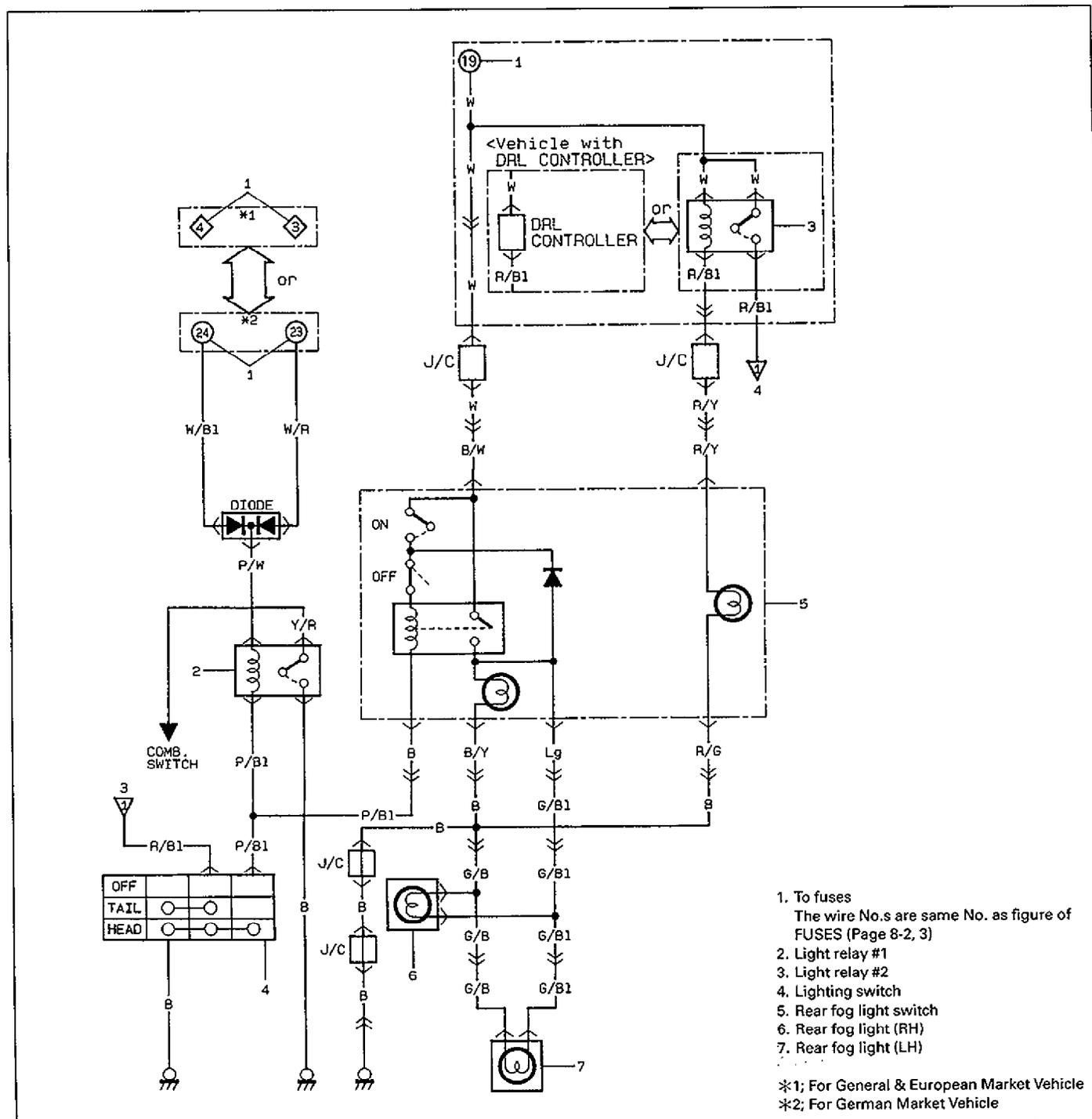
- 2) Disconnect positive terminal from terminal ⑦ checking voltage between terminal ⑥ and ⑤ of controller.
If measured voltage changes from battery voltage to about 0V 2.7 to 4.6 seconds after disconnecting positive terminal from terminal ⑦, controller is in good condition.
If not replace controller.

INT circuit

- 1) Connect positive terminal of battery to terminals ① of controller and negative terminal to terminal ⑤ of controller. Then positive terminal to terminal ③ of controller checking voltage between terminals ⑥ and ⑤ of controller.
If measured voltage changes from about 0V to battery voltage when connecting positive terminal to terminal ③, controller is in good condition.
If not replace controller.
- 2) Connect positive terminal of battery to terminal ② of controller, then disconnect positive terminal from terminal ② of controller checking voltage between terminals ⑥ and ⑤ of controller.
If measured voltage changes from battery voltage to about 0V when disconnecting positive terminal from terminal ② and about 0V to battery voltage 8 ± 2 seconds after disconnecting positive terminal from terminal ②, controller is in good condition.
If not replace controller.

REAR FOG LIGHT (If equipped)

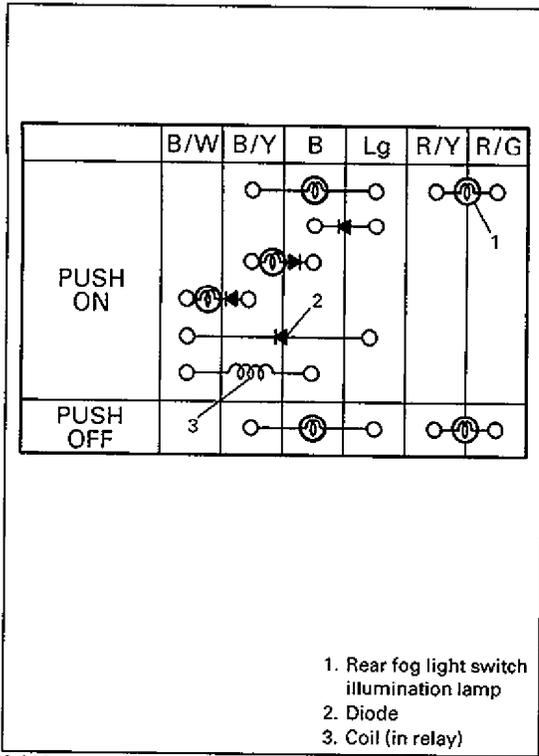
WIRING CIRCUIT



8-015

TROUBLE DIAGNOSIS

Trouble	Possible Cause	Correction
Lights do not light.	<ul style="list-style-type: none"> ● Main fuse and/or fuses blown ● Light relay faulty ● Lighting switch faulty ● Wiring or grounding faulty 	Replace main fuse and/or fuses to check for short. Replace light relay Check switch. Repair as necessary.



INSPECTION

Use a circuit tester to check rear fog light switch for continuity. Hold the switch button (ON or OFF) pushed during checking switch according to left figure.

SECTION 9J

AIR BAG SYSTEM (OPTIONAL)

WARNING:

This vehicle is equipped with a Supplemental Inflatable Restraint Air Bag System. Service on or around Air Bag System Components or Wiring must be performed only by and authorized Suzuki dealer. Please observe all WARNINGS, CAUTIONS, SERVICE PRECAUTIONS, HANDLING PRECAUTIONS and DISPOSAL PRECAUTIONS in this section and the Air Bag System Component and Wiring Location View in this section before performing service on or around Air Bag System Components or Wiring. Failure to follow WARNINGS could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.

CAUTION:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

9J

NOTE:

For the descriptions (items) not found in this section, refer to SECTION 9J of VITARA SUPPLEMENTARY SERVICE MANUAL (99501-61A10)

77E00-9J-1-1

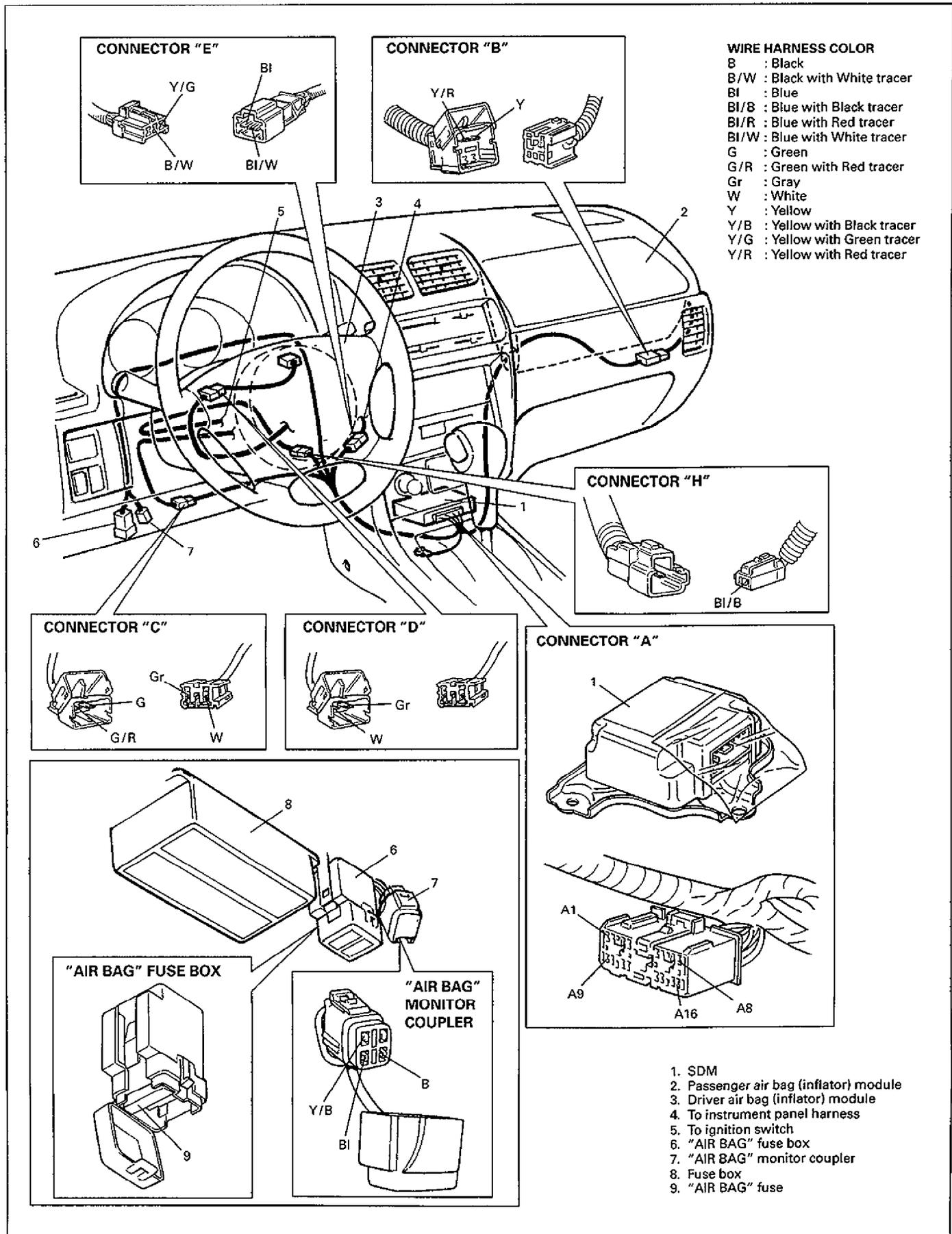
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GENERAL DESCRIPTION

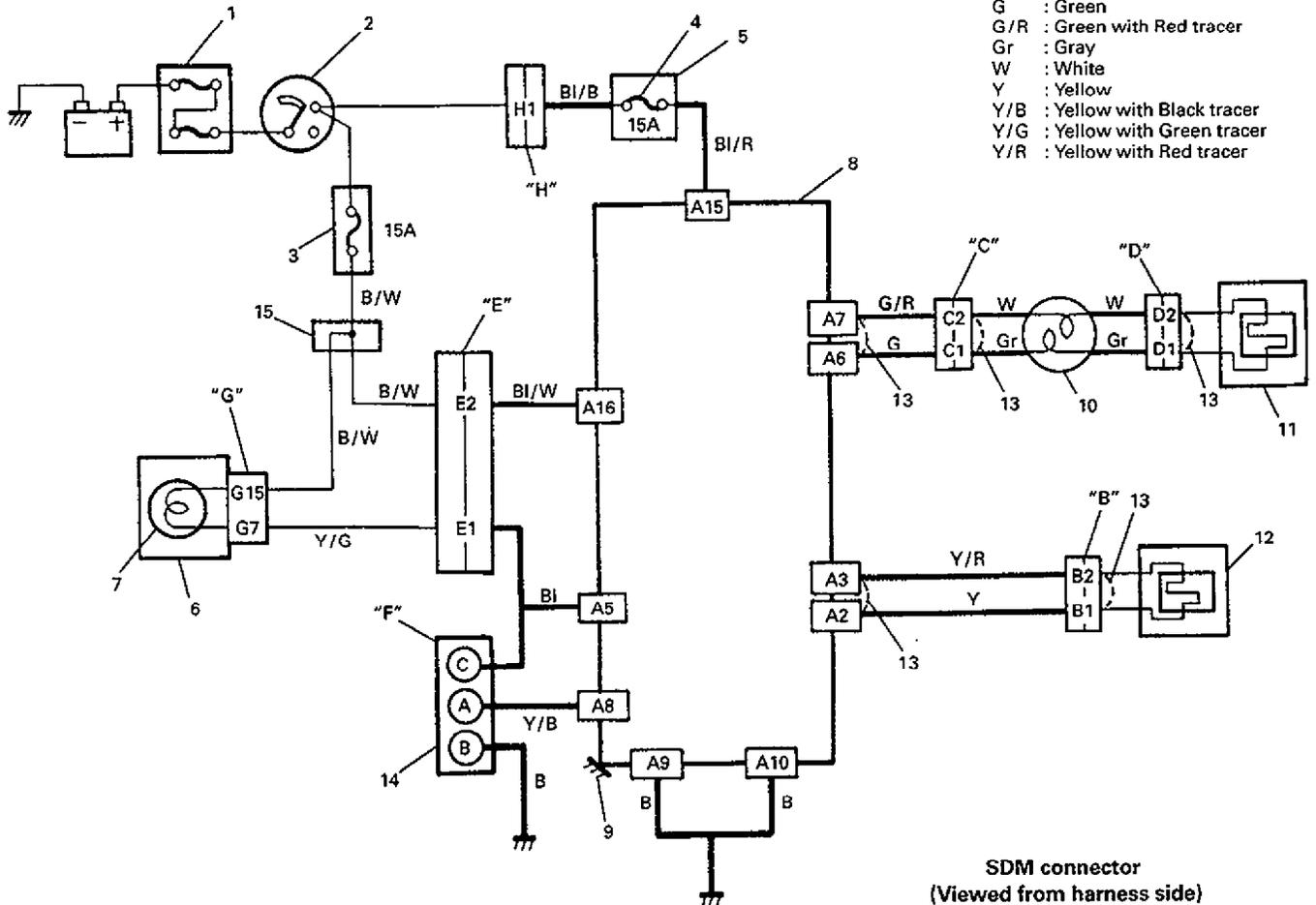
SYSTEM WIRING LOCATION VIEW AND CONNECTORS



SYSTEM WIRING DIAGRAM

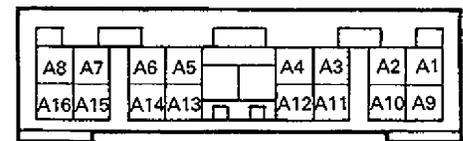
WIRE HARNESS COLOR

- B : Black
- B/W : Black with White tracer
- Bl : Blue
- Bl/B : Blue with Black tracer
- Bl/R : Blue with Red tracer
- Bl/W : Blue with White tracer
- G : Green
- G/R : Green with Red tracer
- Gr : Gray
- W : White
- Y : Yellow
- Y/B : Yellow with Black tracer
- Y/G : Yellow with Green tracer
- Y/R : Yellow with Red tracer



"A" ~ "H" : Connector
 — : Air bag harness (Covered with Yellow tube)

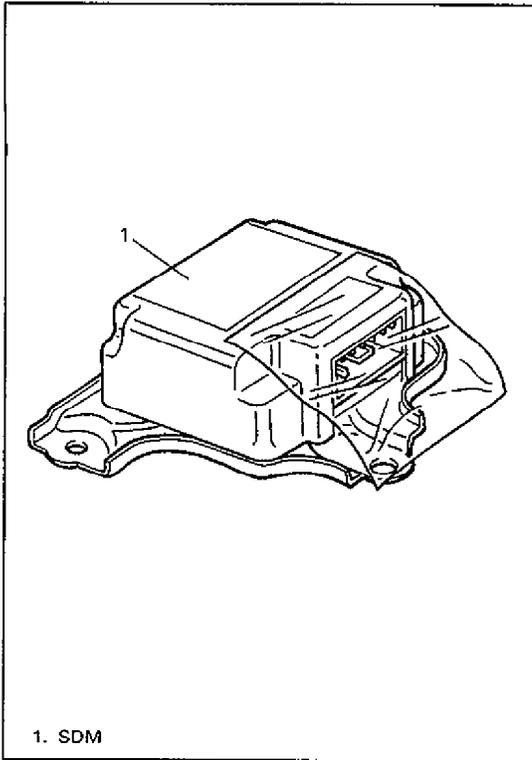
SDM connector
 (Viewed from harness side)



1. Main fuse box
2. Main switch (ignition switch)
3. Fuse box
4. "AIR BAG" fuse
5. "AIR BAG" fuse box
6. Combination meter
7. "AIR BAG" warning lamp
8. SDM
9. Case ground
10. Contact coil
11. Driver air bag (inflator) module
12. Passenger air bag (inflator) module
13. Shorting bar
14. "AIR BAG" monitor coupler
15. Joint connector

CONNECTOR "A" (SDM connector)

PIN No.	SDM TERMINATION
A2	Passenger initiator circuit Low
A3	Passenger initiator circuit High
A5	"AIR BAG" warning lamp
A6	Driver initiator circuit Low
A7	Driver initiator circuit High
A8	Diag. switch
A9	Ground
A10	Ground
A15	Ignition 1 (Power source)
A16	Ignition 2 (Power source)



77E00-9J-4-1

COMPONENT DESCRIPTION

SDM (SENSING AND DIAGNOSTIC MODULE)

WARNING:

- During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).
- Be sure to read "SERVICE PRECAUTIONS" and "HANDLING PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or un-deployment of the air bag when necessary.

CAUTION:

After detecting one time of such collision as to meet deployment conditions, the SDM must not be used. Refer to "DIAGNOSIS" when checking the SDM.

The Sensing and Diagnostic Module (SDM) is designed to perform the following functions in the air bag system:

- 1) Energy Reserve
 - The SDM maintains a Reserve energy supply to provide deployment energy after ignition voltage is lost in a frontal crash.
- 2) Frontal Crash Detection
 - The SDM monitors vehicle velocity changes to detect frontal crashes which are severe enough to warrant deployment.
- 3) Air Bag Deployment
 - When a frontal crash of sufficient force is detected, the SDM will cause enough current to flow through the air bag (inflator) modules to deploy the air bags.
- 4) Malfunction Detection
 - The SDM performs diagnostic monitoring of the air bag system electrical components and sets a diagnostic trouble code when a malfunction is detected.
- 5) Malfunction Diagnosis
 - The SDM provides air bag diagnostic trouble codes by flashing "AIR BAG" warning lamp when on-board diagnosis function is used.
- 6) Driver Notification
 - The SDM warns the vehicle driver of air bag system malfunctions by controlling the "AIR BAG" warning lamp.

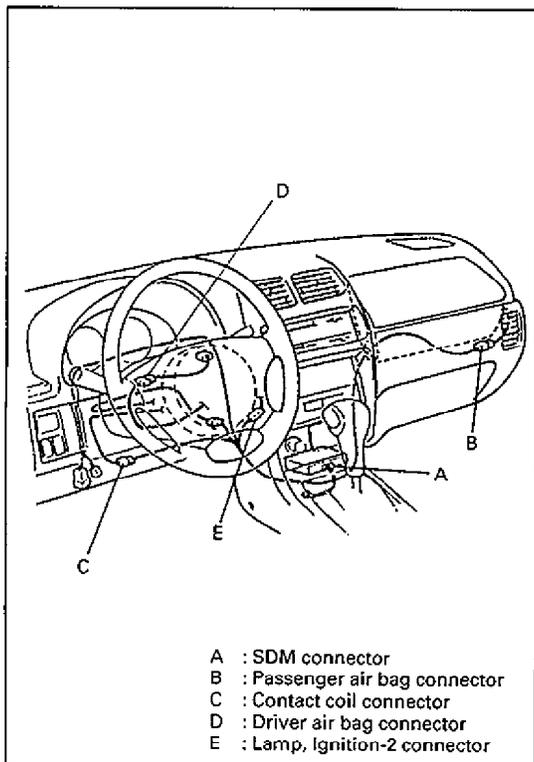
AIR BAG WIRE HARNESS AND CONNECTORS

CAUTION:

When an open in wire harness, damaged wire harness, connector or terminals is found, replace wire harness, connectors and terminals as an assembly.

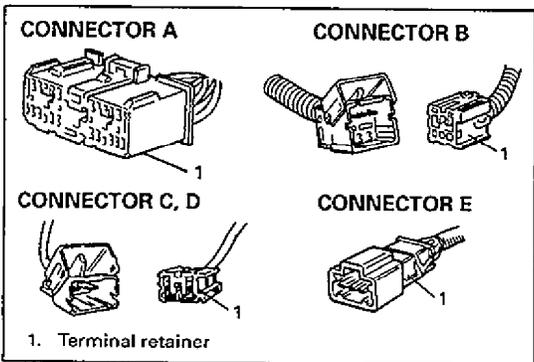
The air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

Each air bag connector has mechanism as shown below.



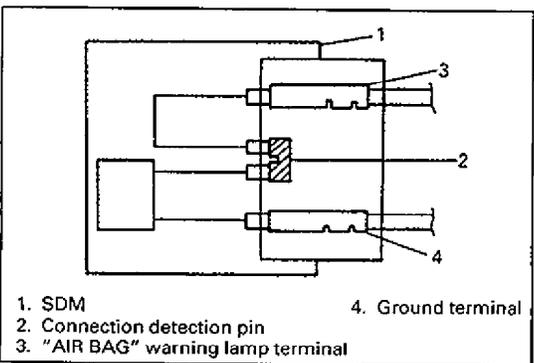
77E00-9J-5-1

No.	Item	Connector
①	Terminal lock mechanism	A, B, C, D, E
②	Electrical connection check mechanism	A
③	Connector lock mechanism	B, C, D
④	Shorting mechanism	A, B, C, D



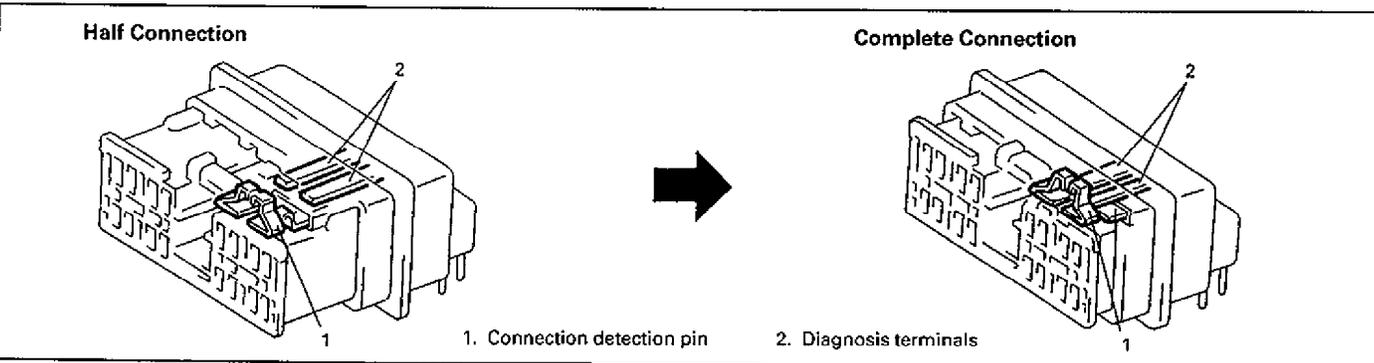
77E00-9J-5-3

① **Terminal retainer (Terminal position assurance: TPA):**
 The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

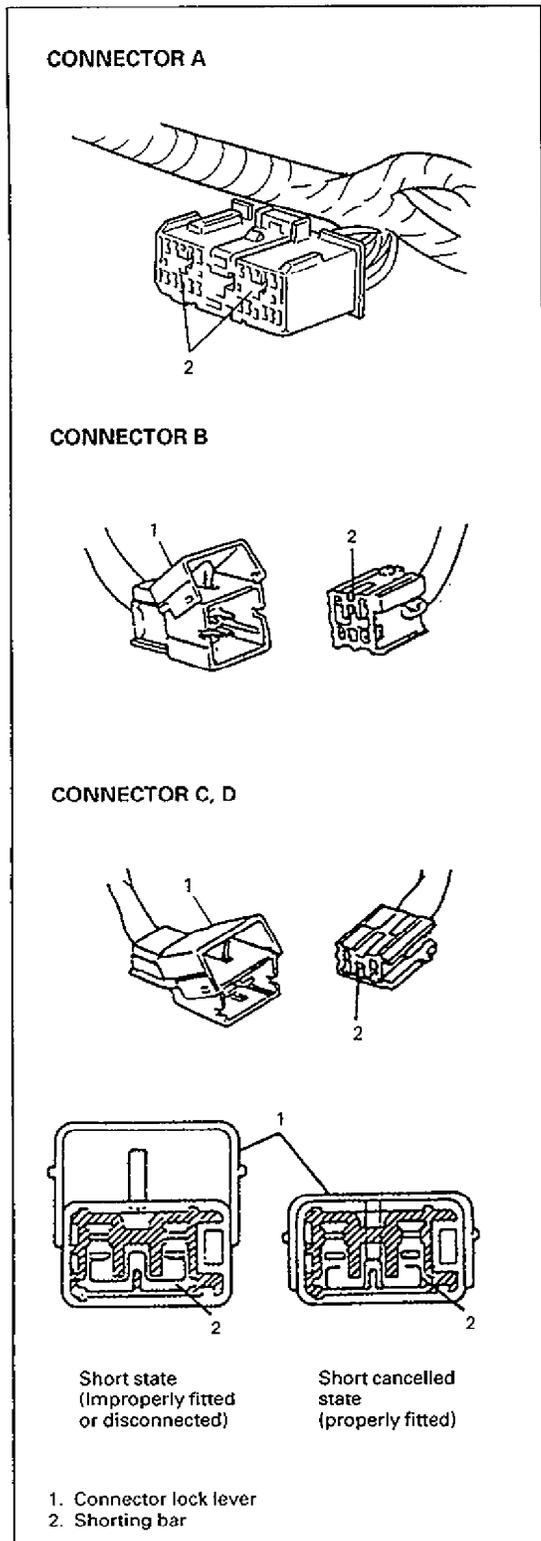


77E00-9J-5-4

② **Electrical Connection Check Mechanism:**
 This mechanism is designed to electrically check if connectors are connected correctly and completely. The electrical connection check mechanism is designed so that the connection detection pin connects with the diagnosis terminals when the connector housing lock is in the locked condition.



77E00-9J-5-5



③ **Connector lock lever:**

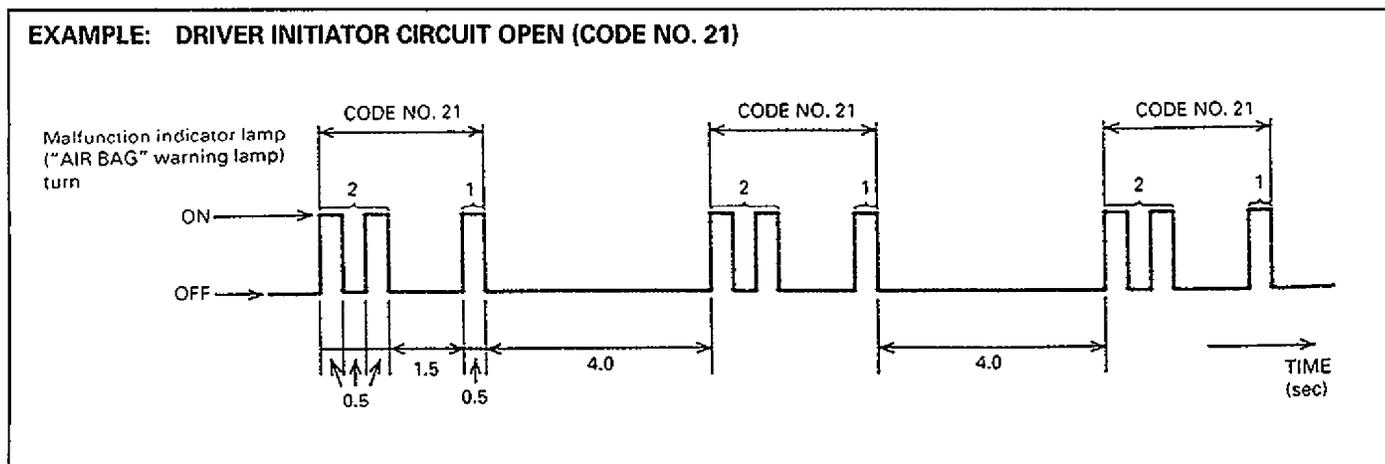
Functions of the connector lock lever are: to connect connectors securely, to cancel shorts and to lock connectors against disconnection.

④ **Shorting bar:**

Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

DIAGNOSIS

DIAGNOSTIC TROUBLE CODE TABLE

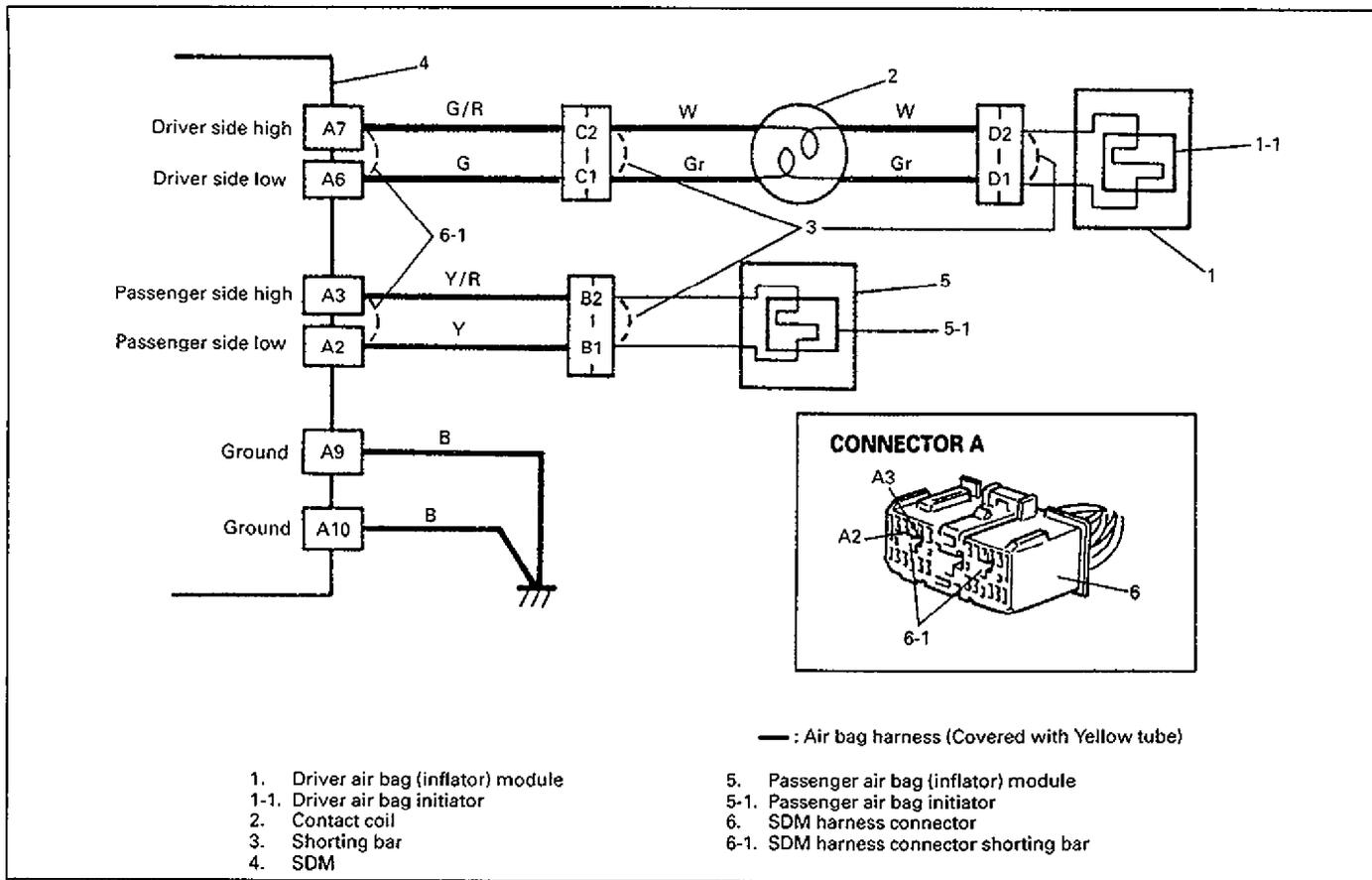


DIAGNOSTIC TROUBLE CODE		DIAGNOSIS		"AIR BAG" WARNING LAMP
NO.	MODE			
12		Normal	---	OFF
		Source voltage drop	Diagnose trouble according to "AIR BAG DIAGNOSTIC SYSTEM CHECK".	ON
16		Passenger initiator circuit shorted	Diagnose trouble according to "DIAGNOSTIC FLOW CHART" corresponding to each code No.	ON
17		Open in passenger initiator circuit		ON
21		Open in driver initiator circuit		ON
22		Driver initiator circuit shorted		ON
24		Short to ground in initiator circuit		ON
25		Short to B+ in initiator circuit		ON
71		SDM failure		ON

NOTE:

- When the "AIR BAG" warning lamp remains turned "ON" and the diagnostic trouble code in the normal code, this means a source voltage drop.
This malfunction is not stored in memory by the SDM and if the power source voltage returns to normal, after about 10 seconds the "AIR BAG" warning lamp will automatically go out.
- When 2 or more codes are indicated, the lowest numbered code will appear first.
- If a code not listed on the chart is displayed, then the SDM is faulty.

DTC 16 – PASSENGER INITIATOR CIRCUIT SHORTED



CAUTION:

- When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.

DTC WILL SET WHEN:

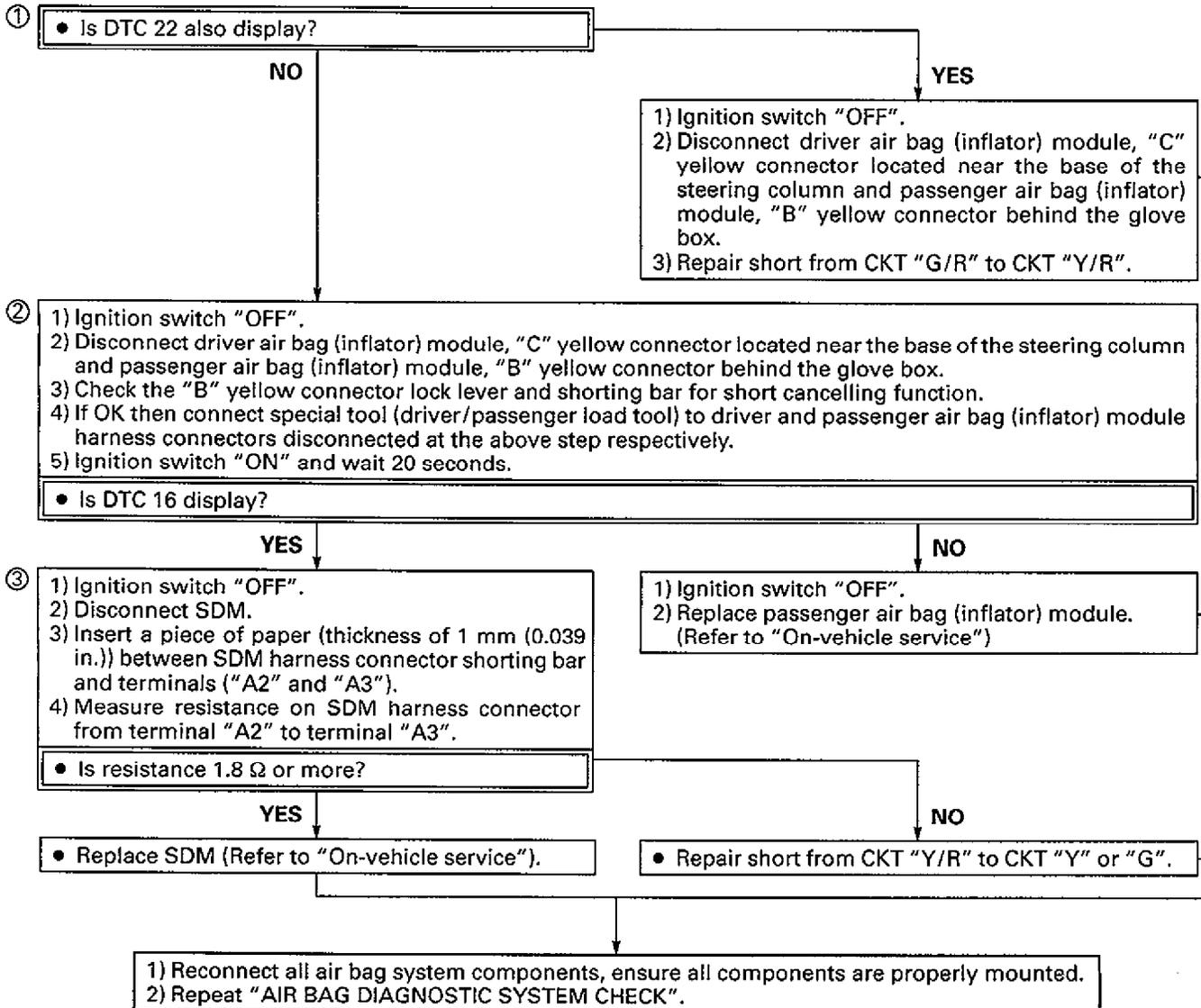
The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is below a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

- 1) DTC 16 and 22 will set simultaneously when the "Driver Side High" circuit is shorted to the "Passenger Side High" circuit due to parallel current paths.
- 2) This test determines whether the malfunction is in the passenger air bag (inflator) module circuitry or in the SDM wiring harness circuitry.
- 3) This test checks for a short from the "Passenger Side High" circuit to the "Passenger Side Low" circuit or from "Passenger Side High" or "Passenger Side Low" circuit to ground circuit.

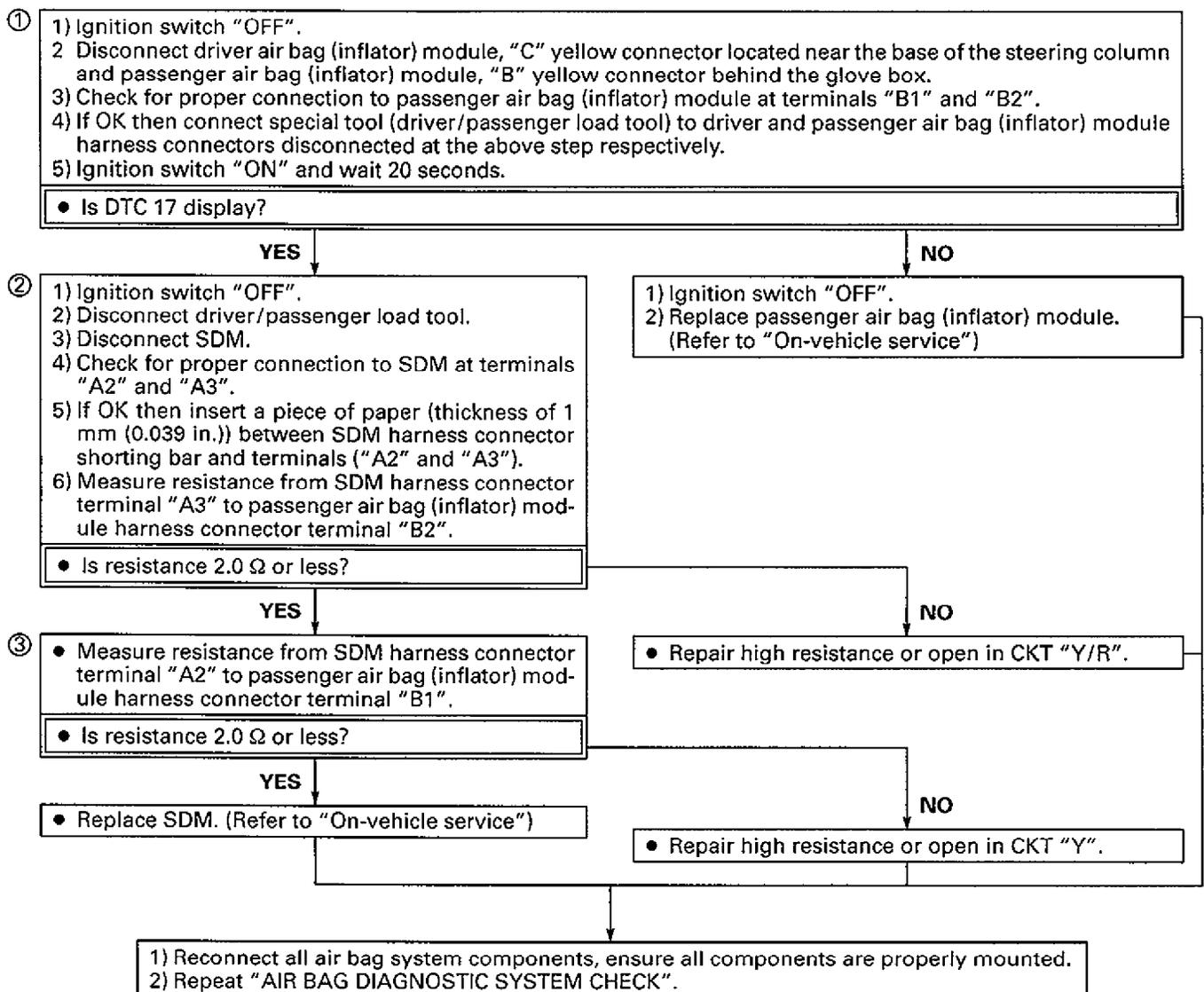
DTC 16 – PASSENGER INITIATOR CIRCUIT SHORTED

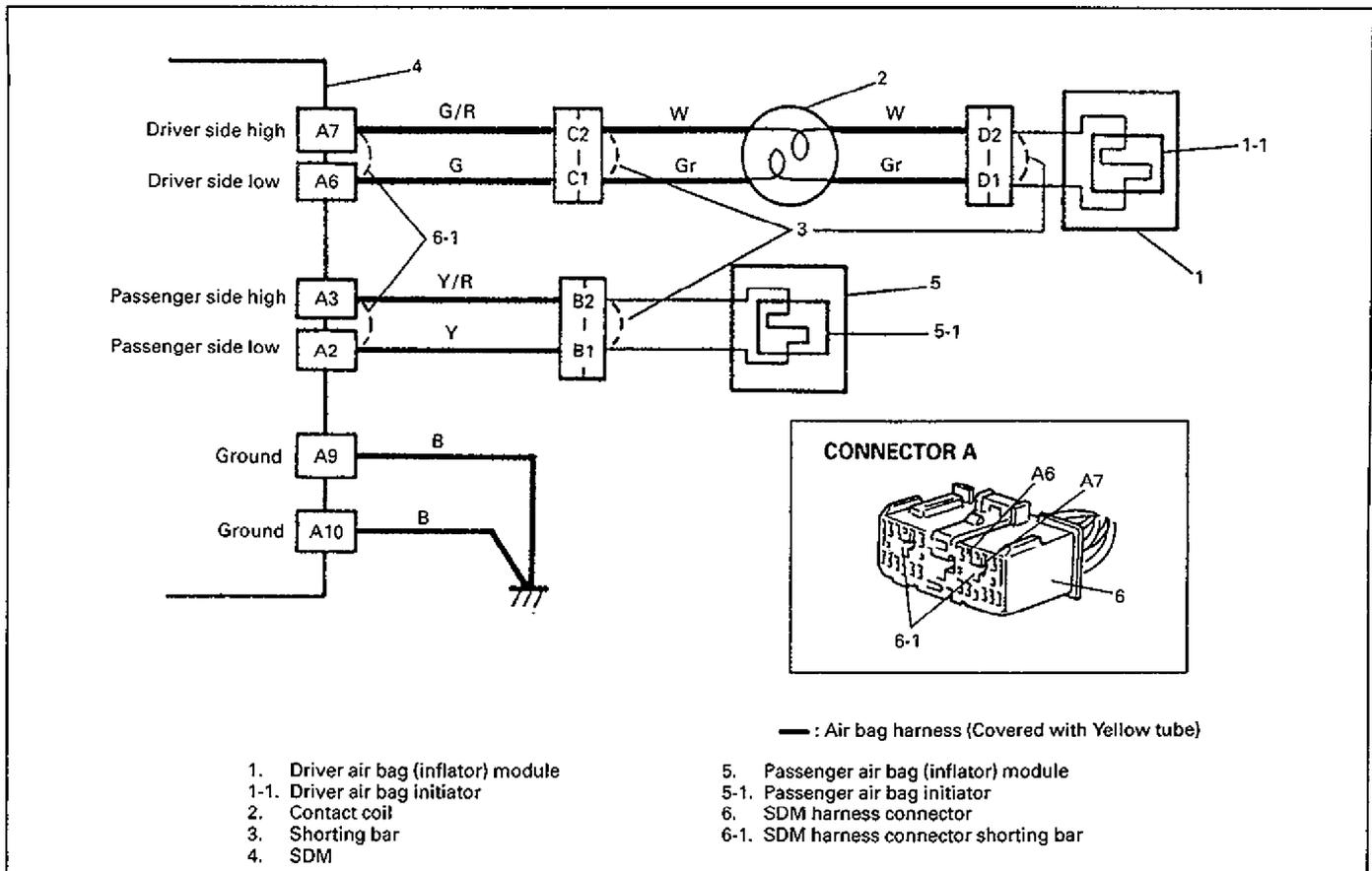
Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".



DTC 17 – PASSENGER INITIATOR CIRCUIT OPEN

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".



DTC 21 – DRIVER INITIATOR CIRCUIT OPEN**CAUTION:**

- When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.

DTC WILL SET WHEN:

The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is above a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

- 1) This test determines whether the malfunction is in the driver air bag (inflator) module circuitry or in the SDM wiring harness circuitry.
- 2) This test checks whether the malfunction is due to high resistance in CKT "G/R".
- 3) This test checks whether the malfunction is due to high resistance in CKT "G".
- 4) This test determines whether the malfunction is in the driver air bag (inflator) module or the contact coil assembly.

DTC 21 – DRIVER INITIATOR CIRCUIT OPEN

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

- ①
- 1) Ignition switch "OFF".
 - 2) Disconnect driver air bag (inflator) module, "C" yellow connector located near the base of the steering column and passenger air bag (inflator) module, "B" yellow connector behind the glove box.
 - 3) Check for proper connection to contact coil assembly connector at terminals "C1" and "C2".
 - 4) If OK then connect special tool (driver/passenger load tool) to driver and passenger air bag (inflator) module harness connectors disconnected at the above step respectively.
 - 5) Ignition switch "ON" and wait 20 seconds.

• Is DTC 21 displayed?

YES

NO

- ②
- 1) Ignition switch "OFF".
 - 2) Disconnect driver/passenger load tool.
 - 3) Disconnect SDM.
 - 4) Check for proper connection to SDM at terminals "A6" and "A7".
 - 5) If OK then insert a piece of paper (thickness of 1 mm (0.039 in.)) between SDM harness connector shorting bar and terminals ("A6" and "A7").
 - 6) Measure resistance from SDM harness connector terminal "A7" to driver air bag (inflator) module harness connector terminal "C2".

• Is resistance 2.0 Ω or less?

YES

NO

- ③
- Measure resistance from SDM harness connector terminal "A6" to driver air bag (inflator) module harness connector terminal "C1".

• Is resistance 2.0 Ω or less?

YES

NO

• Replace SDM. (Refer to "On-vehicle service")

• Repair high resistance or open in CKT "G/R".

• Repair high resistance or open in CKT "G".

- ④
- 1) Ignition switch "OFF".
 - 2) Disconnect driver/passenger load tool from driver air bag (inflator) module harness connector.
 - 3) Remove air bag (inflator) module from steering wheel. (Refer to Section 3C1)
 - 4) Connect driver/passenger load tool to air bag (inflator) module connector of contact coil on steering column.
 - 5) Reconnect driver air bag (inflator) module harness connector at the base of the steering column.
 - 6) Ignition switch "ON" and wait 20 seconds.

• Is DTC 21 displayed?

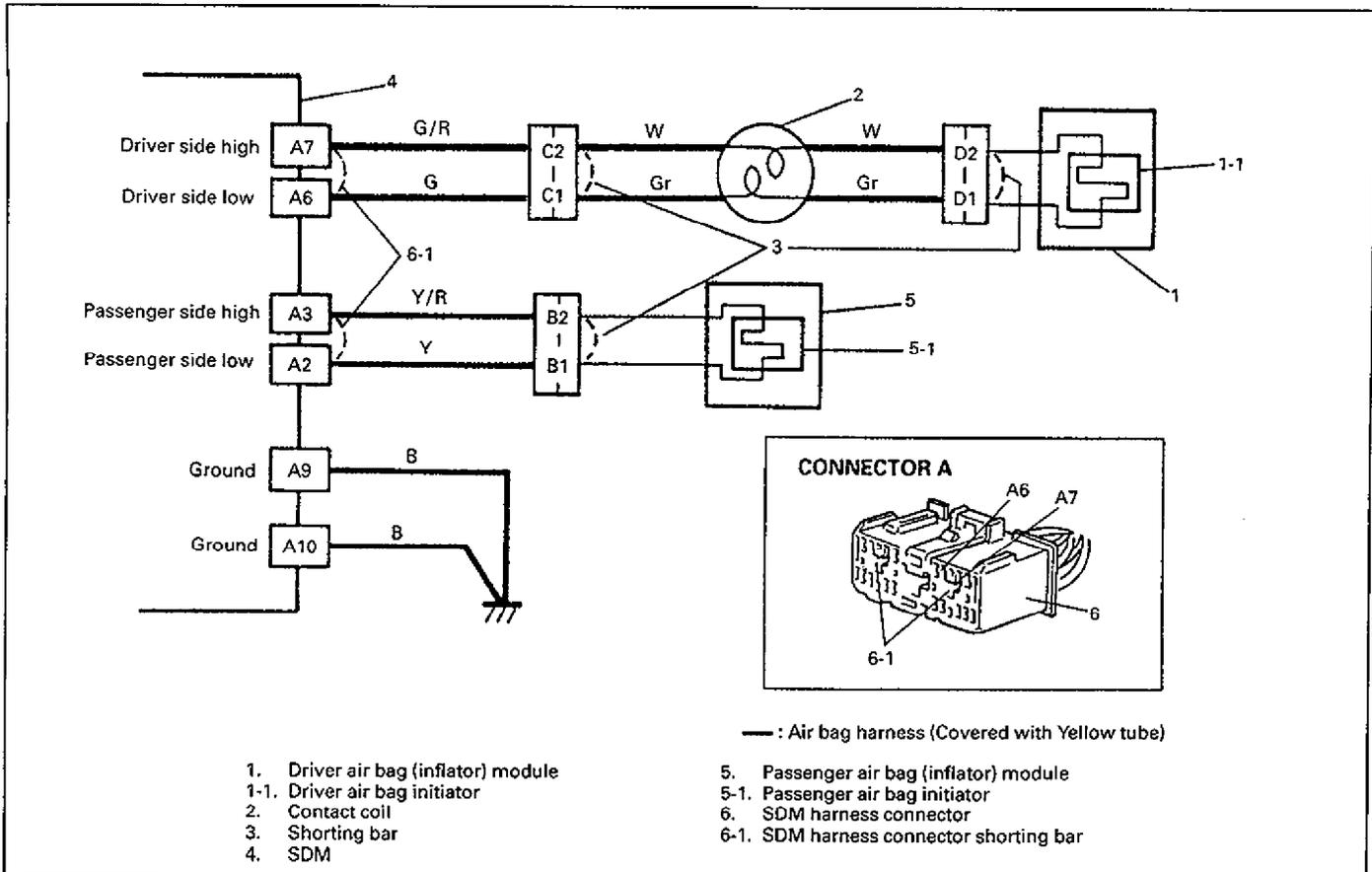
YES

NO

- 1) Ignition switch "OFF".
- 2) Replace contact coil assembly. (Refer to Section 3C1)

- 1) Ignition switch "OFF".
- 2) Replace driver air bag (inflator) module. (Refer to Section 3C1)

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

DTC 22 – DRIVER INITIATOR CIRCUIT SHORTED**CAUTION:**

- When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.

DTC WILL SET WHEN:

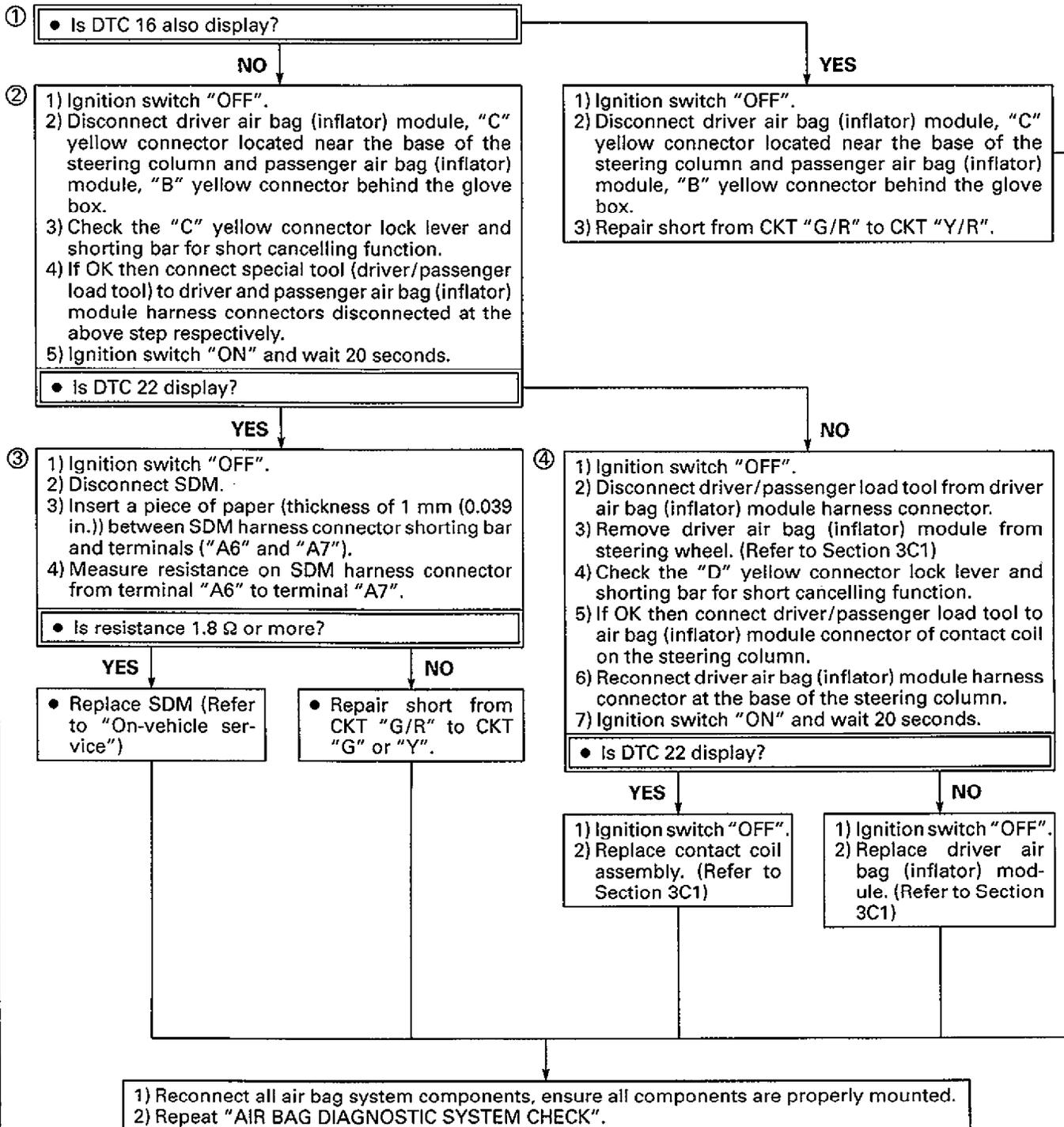
The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is below a specified value for specified time.

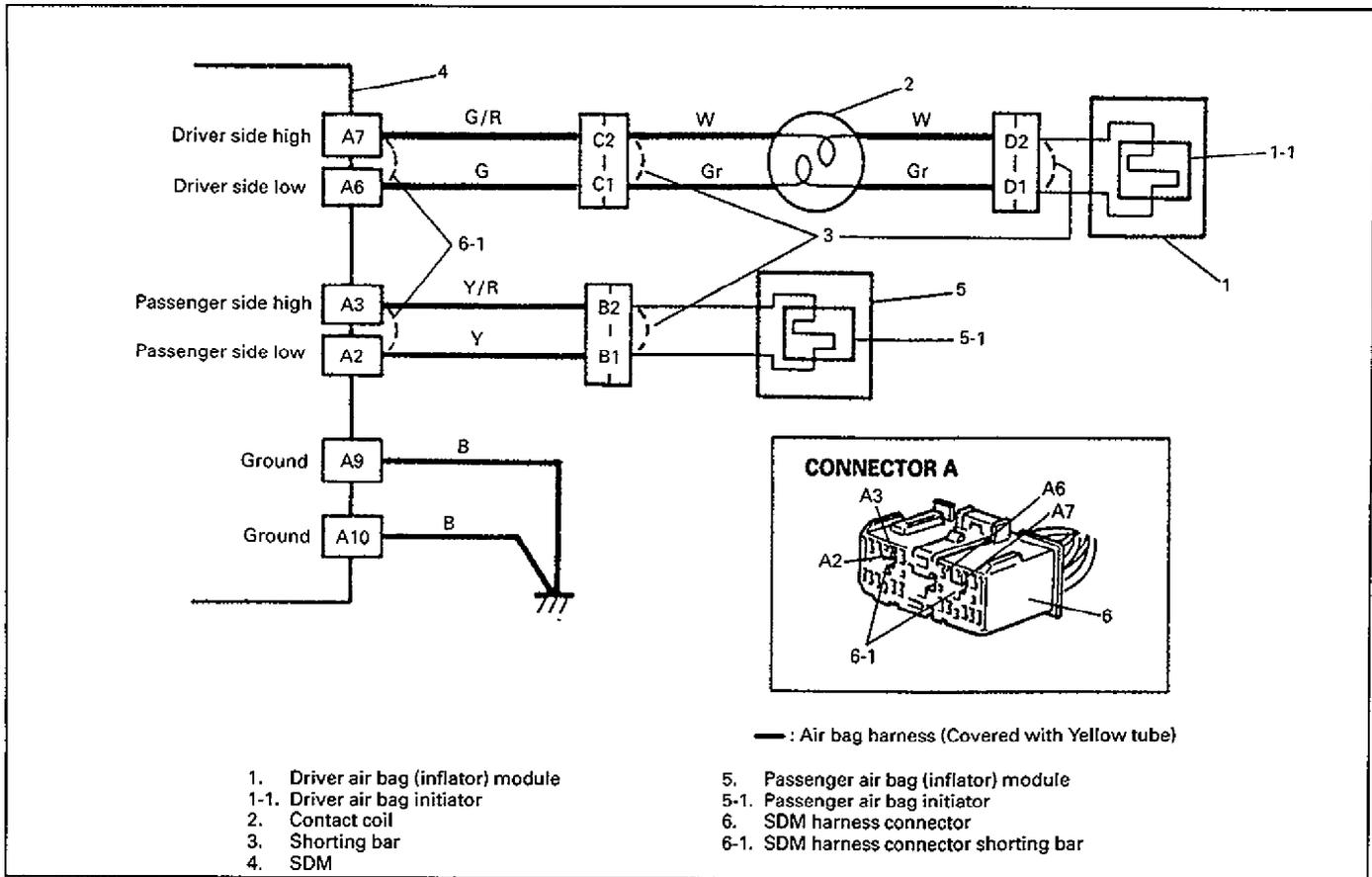
DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

- 1) DTC 16 and 22 will set simultaneously when the "Driver Side High" circuit is shorted to the "Passenger Side High" circuit due to parallel current paths.
- 2) This test determines whether the malfunction is in the driver air bag (inflator) module circuitry or in the SDM wiring harness circuitry.
- 3) This test checks for a short from the "Driver Side High" circuit to the "Driver Side Low" circuit.
- 4) This test determines whether the malfunction is in the driver air bag (inflator) module or the contact coil assembly.

DTC 22 – DRIVER INITIATOR CIRCUIT SHORTED

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".



DTC 24 – INITIATOR CIRCUIT SHORT TO GROUND**CAUTION:**

- When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.

DTC WILL SET WHEN:

The voltage measured at "Driver Side Low" and "Passenger Side Low" is below a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

- 1) This test determines whether the malfunction is occurring in the driver air bag (inflator) module circuitry.
- 2) This test determines whether the malfunction is occurring in the passenger air bag (inflator) module circuitry.
- 3) This test determines whether the malfunction is in the driver air bag (inflator) module or contact coil assembly.
- 4) This test checks for a short from "Driver Side Low" to ground.
- 5) This test checks for a short from "Passenger Side Low" to ground.

DTC 24 – INITIATOR CIRCUIT SHORT TO GROUND

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

- ①
- 1) Ignition switch "OFF".
 - 2) Disconnect driver air bag (inflator) module, "C" yellow connector located near the base of the steering column, leave passenger air bag (inflator) module connected.
 - 3) Connect special tool (driver/passenger load tool) to driver air bag (inflator) module harness connector disconnected at the above step.
 - 4) Ignition switch "ON" and wait 20 seconds.

• Is DTC 24 displayed?

YES

NO

- ②
- 1) Ignition switch "OFF".
 - 2) Disconnect passenger air bag (inflator) module, "B" yellow connector located behind the glove box.
 - 3) Connect driver/passenger load tool to passenger air bag (inflator) module harness connector, leave driver air bag (inflator) module harness connector connected to load tool.
 - 4) Ignition switch "ON" and wait 20 seconds.

• Is DTC 24 displayed?

YES

NO

- ④
- 1) Ignition switch "OFF".
 - 2) Disconnect driver/passenger load tool.
 - 3) Disconnect SDM.
 - 4) Measure resistance on SDM harness connector from terminal "A6" to terminal "A9" or "A10" (ground).

• Is resistance 1 kΩ or more?

YES

- ⑤
- Measure resistance on SDM harness connector from terminal "A2" to terminal "A9" or "A10" (ground).

• Is resistance 1 kΩ or more?

YES

• Replace SDM. (Refer to "On-vehicle service")

- 1) Ignition switch "OFF".
- 2) If wire harness is damaged, repair its cause. Replace passenger air bag (inflator) module. (Refer to "On-vehicle service")

- ③
- 1) Ignition switch "OFF".
 - 2) Disconnect driver/passenger load tool from driver air bag (inflator) module harness connector.
 - 3) Remove air bag (inflator) module from steering wheel. (Refer to Section 3C1)
 - 4) Connect driver/passenger load tool to air bag (inflator) module connector of contact coil on steering column.
 - 5) Reconnect driver air bag (inflator) module harness connector at the base of the steering column.
 - 6) Ignition switch "ON" and wait 20 seconds.

• Is DTC 24 displayed?

YES

NO

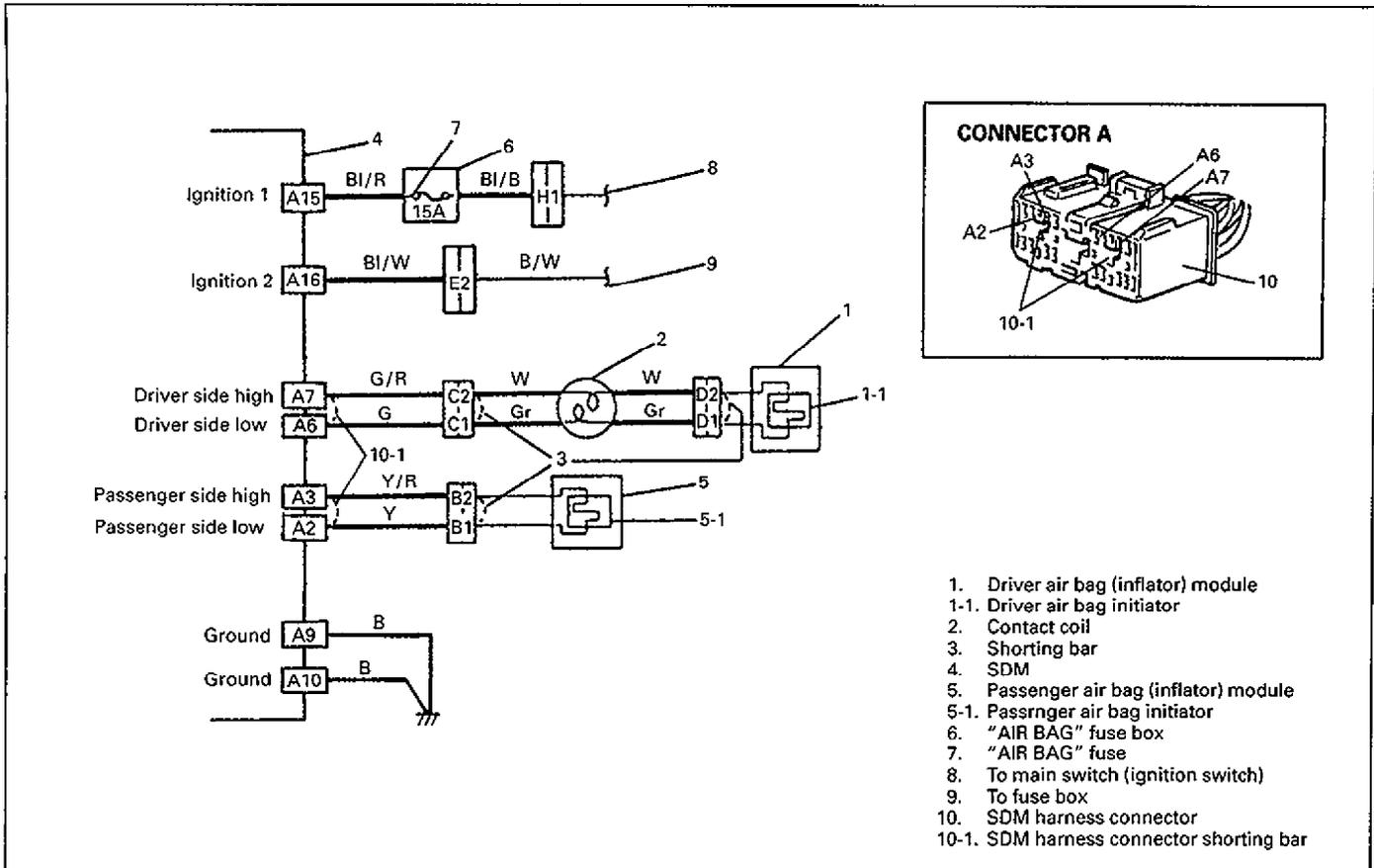
- 1) Ignition switch "OFF".
- 2) If wire harness is damaged, repair its cause. Replace contact coil assembly. (Refer to Section 3C1)

- 1) Ignition switch "OFF".
- 2) If wire harness is damaged, repair its cause. Replace driver air bag (inflator) module. (Refer to Section 3C1)

• Repair short from CKT "G" to ground.

• Repair short from CKT "Y" to ground.

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

DTC 25 – INITIATOR CIRCUIT SHORT TO IGNITION**CAUTION:**

- When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).
- When a check for proper connection is requested refer to "INTERMITTENTS AND POOR CONNECTIONS" in this section.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.

DTC WILL SET WHEN:

The voltage measured at "Driver Side Low" and "Passenger Side Low" is above a specified value for specified time.

DTC CHART TEST DESCRIPTION: Number(s) below refer to circled number(s) on the diagnostic chart.

- 1) This test determines whether the malfunction is occurring in the driver air bag (inflator) module circuitry.
- 2) This test determines whether the malfunction is occurring in the passenger air bag (inflator) module circuitry.
- 3) This test determines whether the malfunction is in the driver air bag (inflator) module or contact coil assembly.
- 4) This test checks for a short from "Driver Side High" to B+.
- 5) This test checks for a short from "Passenger Side High" to B+.

DTC 25 – INITIATOR CIRCUIT SHORT TO IGNITION

Before executing items in this chart, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK".

- ①
- 1) Ignition switch "OFF".
 - 2) Disconnect driver air bag (inflator) module, "C" yellow connector located near the base of the steering column, leave passenger air bag (inflator) module connected.
 - 3) Connect special tool (driver/passenger load tool) to driver air bag (inflator) module harness connector disconnected at the above step.
 - 4) Ignition switch "ON" and wait 20 seconds.

• Is DTC 25 displayed?

YES

NO

- ②
- 1) Ignition switch "OFF".
 - 2) Disconnect passenger air bag (inflator) module, "B" yellow connector located behind the glove box.
 - 3) Connect driver/passenger load tool to passenger air bag (Inflator) module harness connector, leave driver air bag (inflator) module harness connector connected to load tool.
 - 4) Ignition switch "ON" and wait 20 seconds.

• Is DTC 25 displayed?

YES

NO

- ④
- 1) Ignition switch "OFF".
 - 2) Disconnect driver/passenger load tool.
 - 3) Disconnect SDM.
 - 4) Ignition switch "ON".
 - 5) Measure voltage on SDM harness connector from terminal "A7" to terminal "A9" or "A10" (ground).

• Is voltage 1 volt or less?

YES

NO

- ⑤
- Measure voltage on SDM harness connector from terminal "A3" to terminal "A9" or "A10" (ground).

• Is voltage 1 volt or less?

YES

NO

• Replace SDM. (Refer to "On-vehicle service")

- ③
- 1) Ignition switch "OFF".
 - 2) Disconnect driver/passenger load tool from driver air bag (inflator) module harness connector.
 - 3) Remove air bag (inflator) module from steering wheel. (Refer to Section 3C1)
 - 4) Connect driver/passenger load tool to air bag (inflator) module connector of contact coil on steering column.
 - 5) Reconnect driver air bag (inflator) module harness connector at the base of the steering column.
 - 6) Ignition switch "ON" and wait 20 seconds.

• Is DTC 25 displayed?

YES

NO

- 1) Ignition switch "OFF".
- 2) If wire harness is damaged, repair its cause. Replace contact coil assembly. (Refer to Section 3C1)

- 1) Ignition switch "OFF".
- 2) If wire harness is damaged, repair its cause. Replace driver air bag (inflator) module. (Refer to Section 3C1)

- 1) Ignition switch "OFF".
- 2) Repair short from CKT "G/R" to B+.

- 1) Ignition switch "OFF".
- 2) Repair short from CKT "Y/R" to B+.

- 1) Reconnect all air bag system components, ensure all components are properly mounted.
- 2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK".

ON-VEHICLE SERVICE

SERVICE PRECAUTION

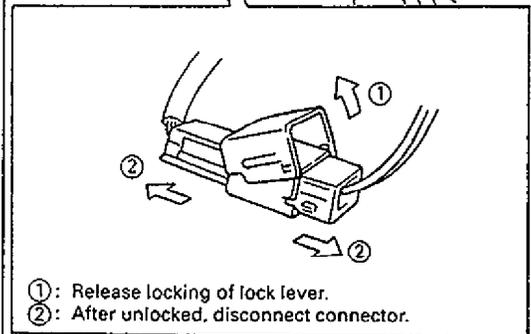
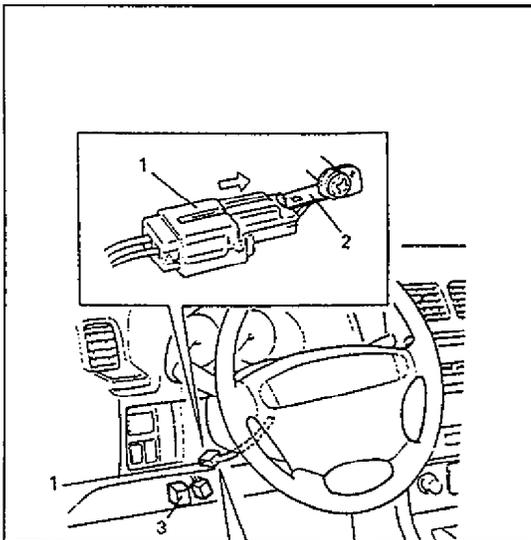
DISABLING AIR BAG SYSTEM

- 1) Turn steering wheel so that vehicle's wheels (front tires) are pointing straight ahead.
- 2) Turn ignition switch to "LOCK" position and remove key.
- 3) Remove "AIR BAG" fuse from the air bag fuse box.
- 4) Driver side:

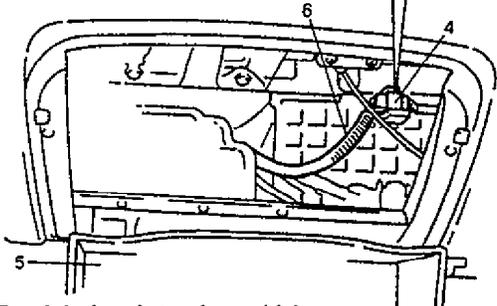
Remove steering wheel side cap (left) and disconnect Yellow connector of driver air bag (inflator) module.

Passenger side:

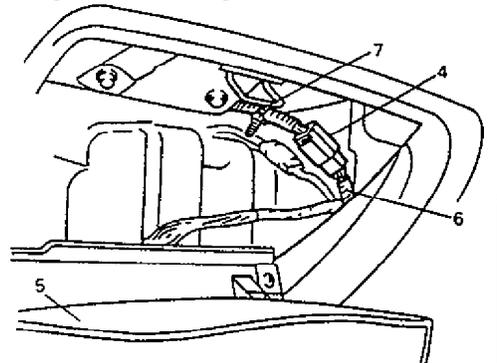
Pull out glove box while pushing its stopper from both right and left sides and disconnect Yellow connector of passenger air bag (inflator) module.



For left hand steering vehicle



For right hand steering vehicle

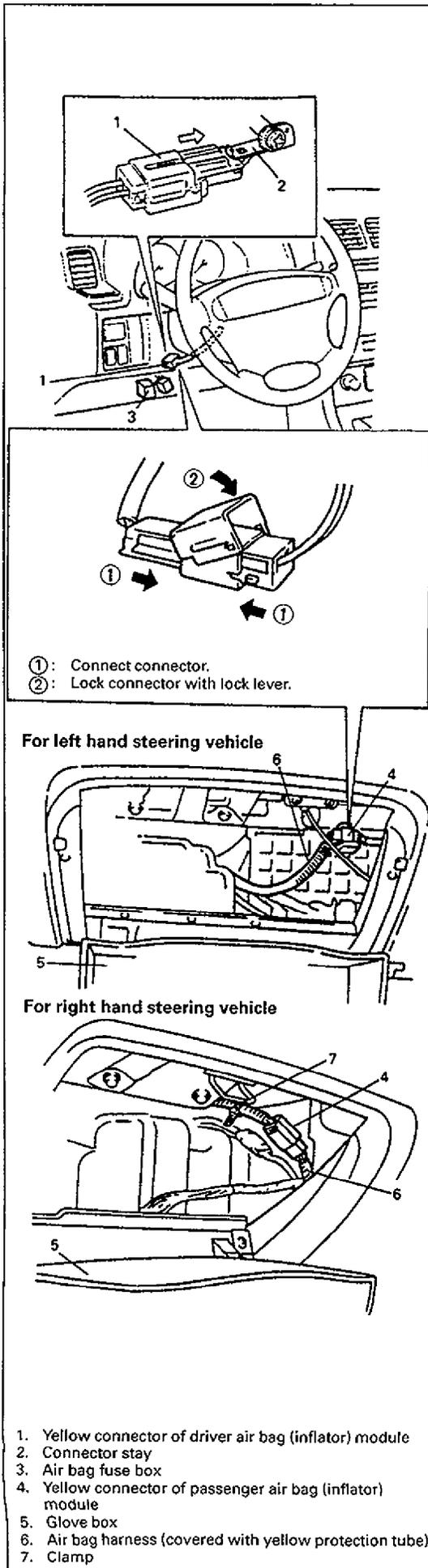


1. Yellow connector of driver air bag (inflator) module
2. Connector stay
3. Air bag fuse box
4. Yellow connector of passenger air bag (inflator) module
5. Glove box
6. Air bag harness (covered with yellow protection tube)
7. Clamp

ENABLING AIR BAG SYSTEM

- 1) Turn ignition switch to "LOCK" and remove key.
- 2) Connect yellow connector of passenger air bag (inflator) module and yellow connector of driver air bag (inflator) module respectively, and be sure to lock each connector with lock lever.
- 3) Fix connectors. (driver and passenger) respectively.
Driver air bag (inflator) module connector :
Fit onto connector stay.
Passenger air bag (inflator) module connector :
For left hand steering vehicle, fit onto connector stay.
For right hand steering vehicle, Fix air bag harness with clamp.
- 4) Install glove box and steering wheel side cap.
- 5) Install "AIR BAG" fuse to air bag fuse box.
- 6) Turn ignition switch to "ON" and verify that "AIR BAG" warning lamp comes on about 6 seconds and then turns off.

If it does not operate as described, perform the "AIR BAG DIAGNOSTIC SYSTEM CHECK" in this section.

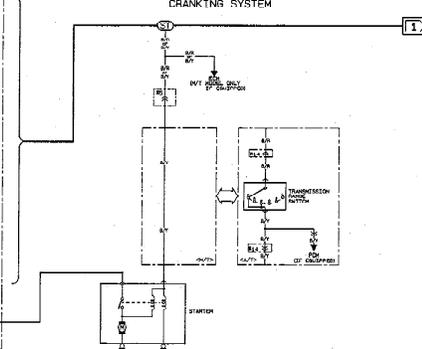
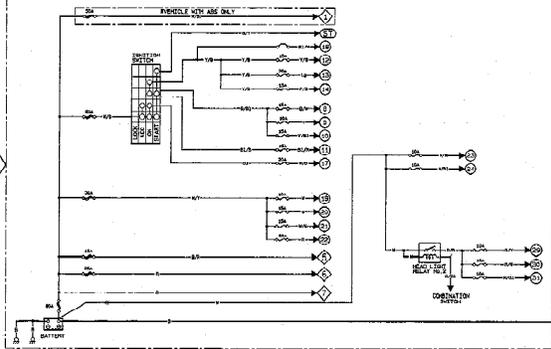
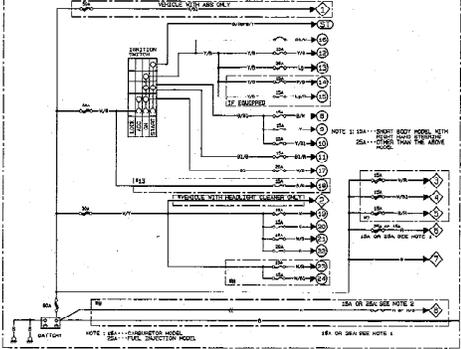


WIRING DIAGRAM

GENERAL EUROPEAN MARKET

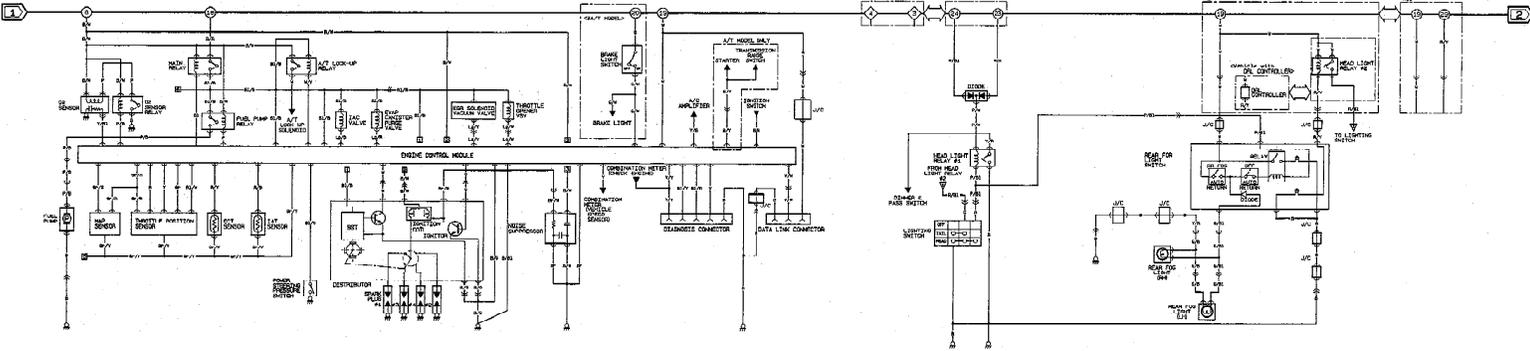
GERMAN MARKET ONLY

NOTE: 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. ... 27. ... 28. ... 29. ... 30. ... 31. ... 32. ... 33. ... 34. ... 35. ... 36. ... 37. ... 38. ... 39. ... 40. ... 41. ... 42. ... 43. ... 44. ... 45. ... 46. ... 47. ... 48. ... 49. ... 50. ... 51. ... 52. ... 53. ... 54. ... 55. ... 56. ... 57. ... 58. ... 59. ... 60. ... 61. ... 62. ... 63. ... 64. ... 65. ... 66. ... 67. ... 68. ... 69. ... 70. ... 71. ... 72. ... 73. ... 74. ... 75. ... 76. ... 77. ... 78. ... 79. ... 80. ... 81. ... 82. ... 83. ... 84. ... 85. ... 86. ... 87. ... 88. ... 89. ... 90. ... 91. ... 92. ... 93. ... 94. ... 95. ... 96. ... 97. ... 98. ... 99. ... 100. ...



ELECTRONIC FUEL INJECTION SYSTEM (1CAM 2VALVE ENGINE)

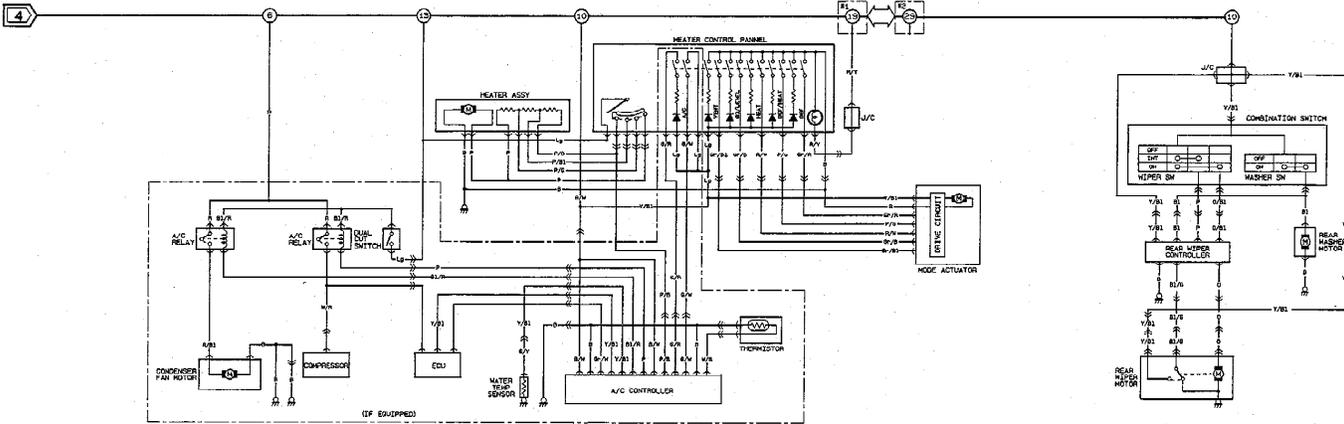
REAR FOG LIGHT



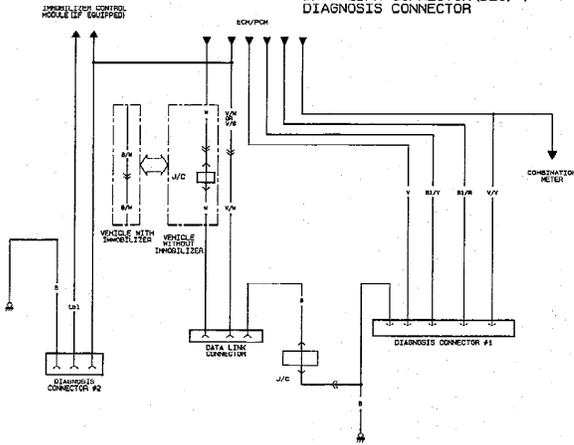
NOTE: R1...RIGHT HAND STEERING MODEL R2...LEFT HAND STEERING MODEL R3...SEVER MODEL ONLY R4...SUDDO HOOD ONLY R5...EXCEPT RUY MODEL WITH CABRESTOR R6...SUDDO HOOD ONLY R7...1600 CC VALVE ENGINE MODEL R8...1000 CC VALVE ENGINE MODEL R9...EXCEPT STROMA SHIP R10...1600 CC VALVE ENGINE MODEL R11...1000 CC VALVE ENGINE MODEL FOR GERMAN MARKET R12...OTHER THAN R11 MODEL R13...1600 CC VALVE ENGINE WITH FUEL INJECTION MODEL R14...FUEL INJECTION 444T MODEL

HEATER AND AIR CONDITIONING (FOR GROUP 2)

REAR WIPER AND WASHER<IF EQUIPPED> (FOR GROUP 2)



DATA LINK CONNECTOR (DLC) / DIAGNOSIS CONNECTOR



Prepared by

SUZUKI MOTOR CORPORATION

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