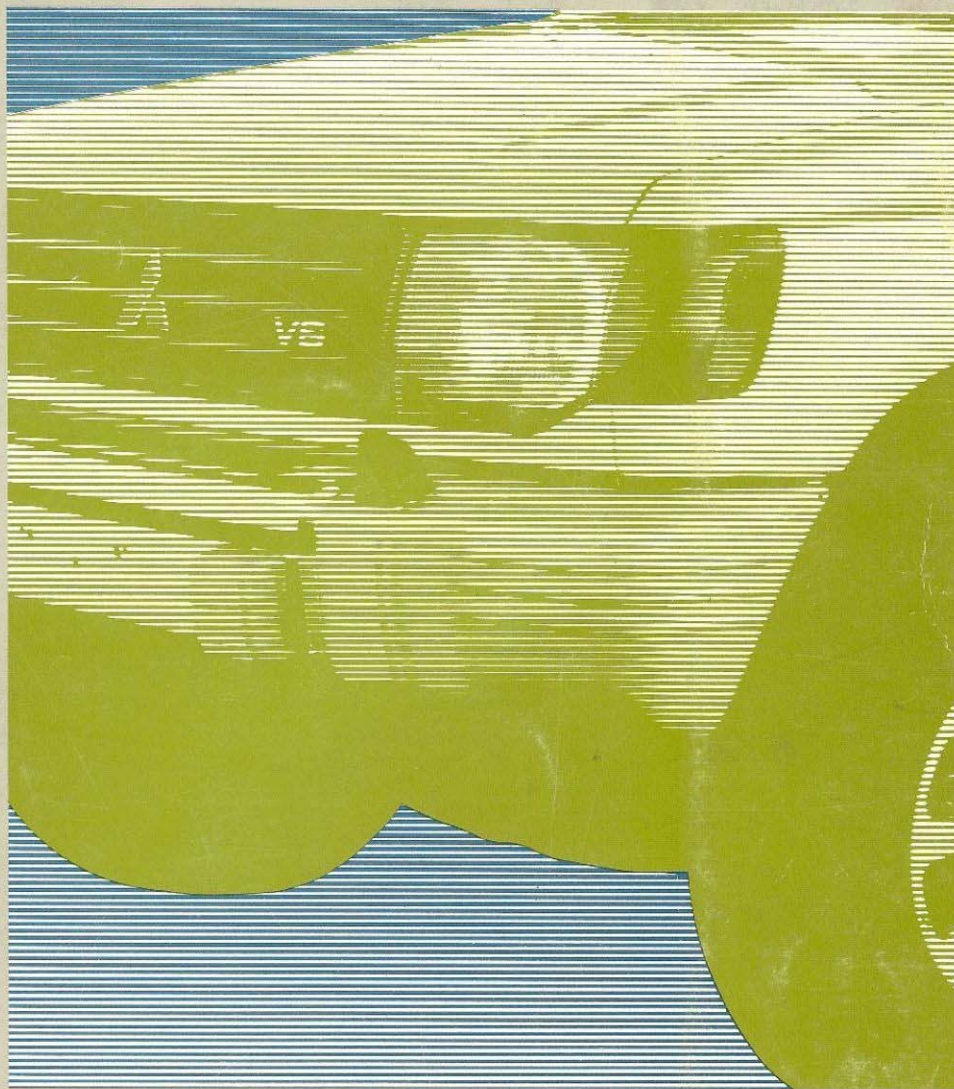




# *Service Manual*

**Vol 2**  
**ELECTRICAL**



**1996**  
**MONTERO**





# Service Manual

# MONTERO

## 1996

## Volume 2

## Electrical

### FOREWORD

This Service Manual has been prepared with the latest service information available at the time of publication. It is subdivided into various group categories and each section contains diagnosis, disassembly, repair, and installation procedures along with complete specifications and tightening references. Use of this manual will aid in properly performing any servicing necessary to maintain or restore the high levels of performance and reliability designed into these outstanding vehicles.



Mitsubishi Motors Corporation reserves the right to make changes in design or to make additions to or improvements in its products without imposing any obligations upon itself to install them on its products previously manufactured.

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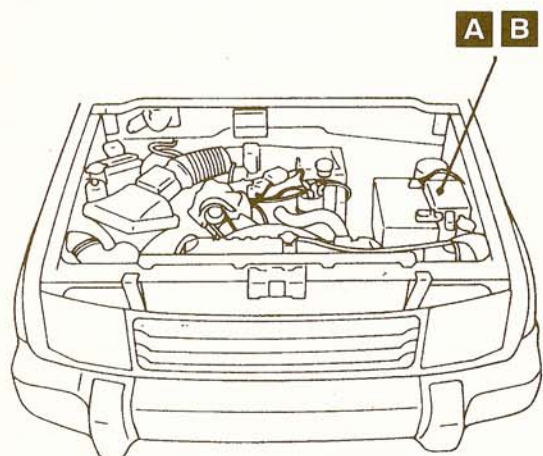
### NOTE

For information concerning all components other than the electrical system, refer to Volume 1 "Chassis & Body" (Includes Engine & Transmission Overhaul) of this paired Service Manual.

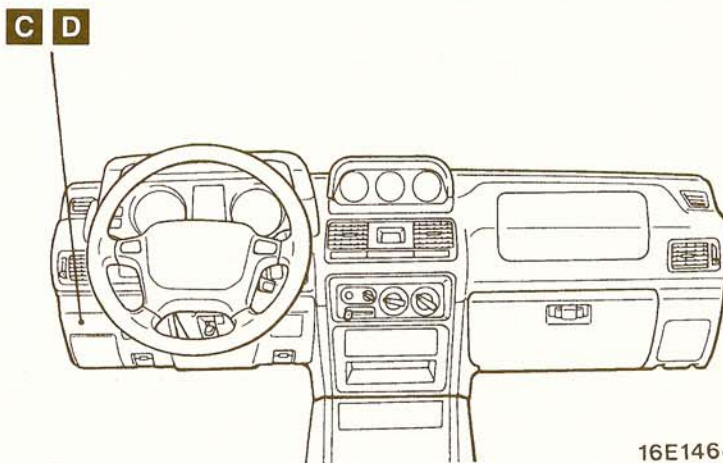
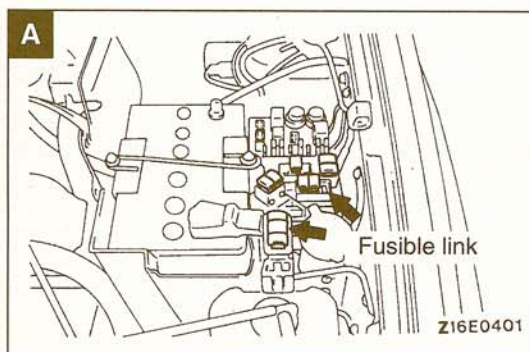
## FUSIBLE LINK, FUSE AND IOD OR STORAGE CONNECTOR LOCATION

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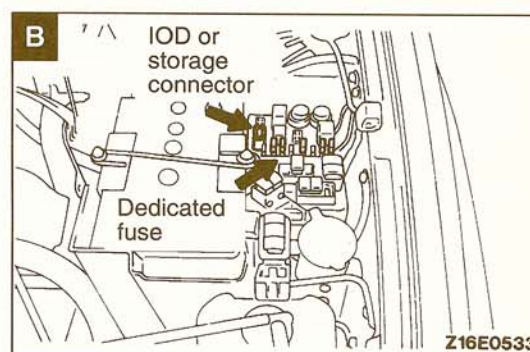
Name	Symbol	Name	Symbol
Dedicated fuse No. 2, 3, 5, 7 and 8	B	IOD or storage connector	B
Dedicated fuse No. 9	D	Multi-purpose fuse	C
Fusible link	A	—	—



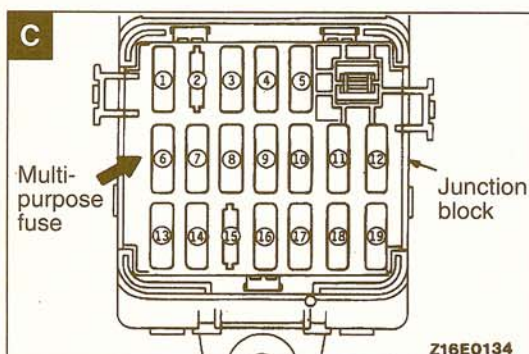
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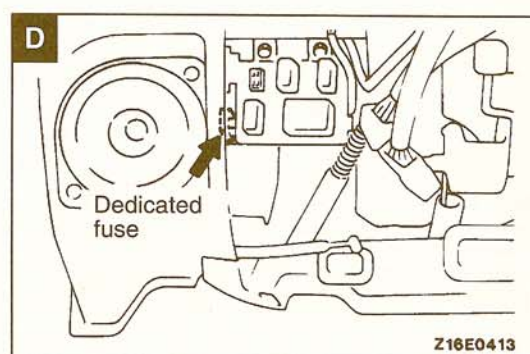
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Z16E0533



Z16E0134



Z16E0413



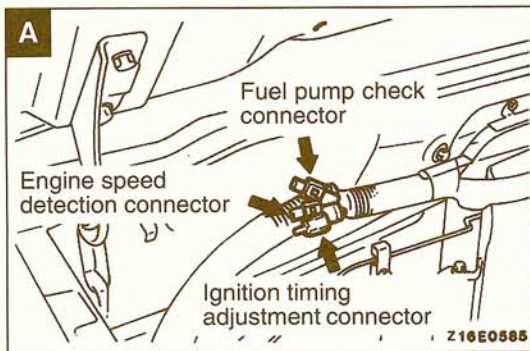
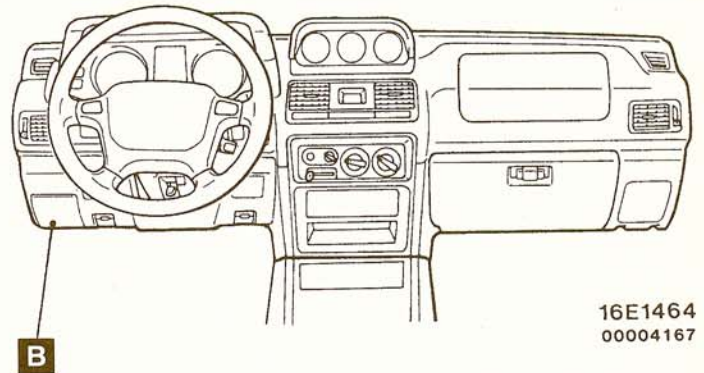
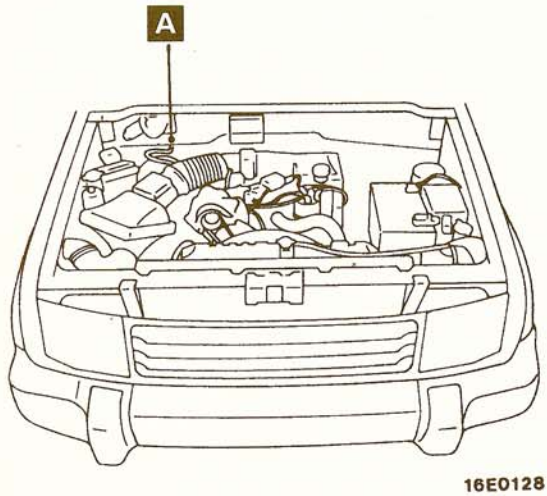
## INSPECTION TERMINAL LOCATION

70100020063

Name	Symbol	Name	Symbol
Data link connector	B	Fuel pump check connector	A
Engine speed detection connector <3.0L – 24 VALVE engine, 3.5L engine>	A	Ignition timing adjustment connector	A

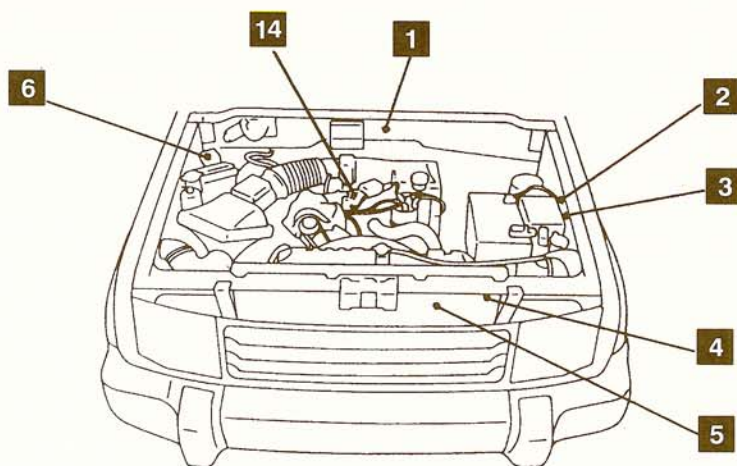
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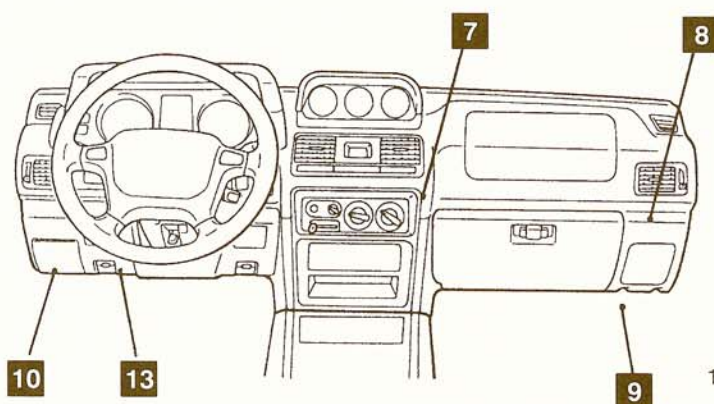


## GROUNDING LOCATION

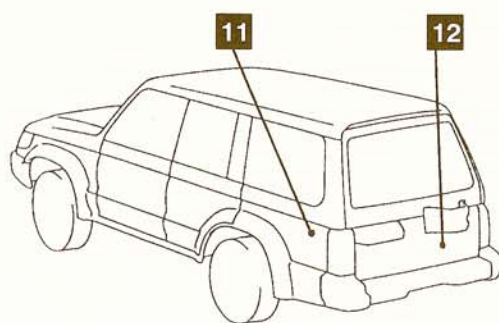
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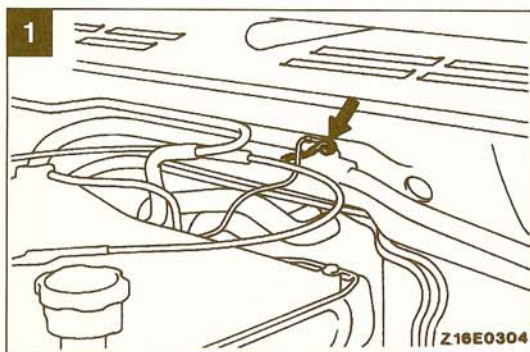
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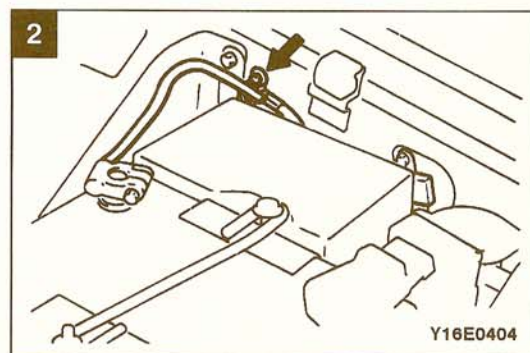
NOTE  
Same ground numbers are used in the  
circuit diagram.

18E0004

00004168

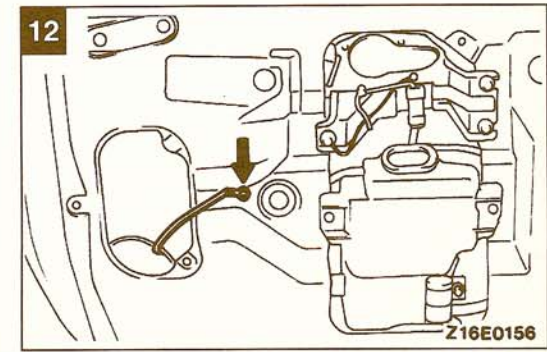
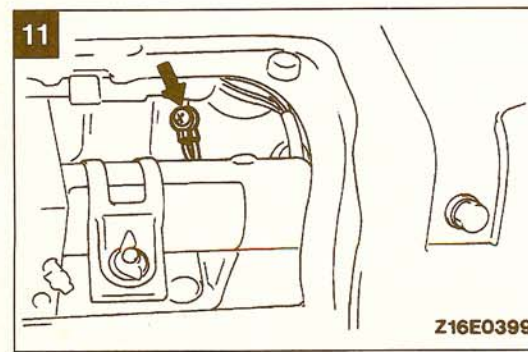
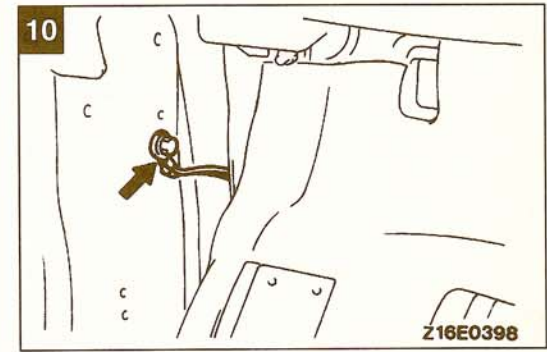
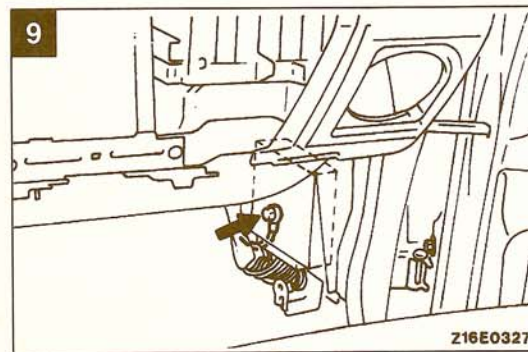
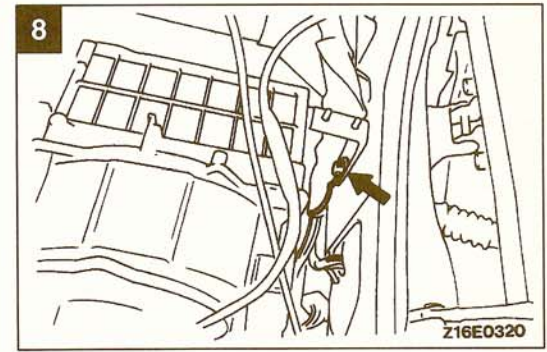
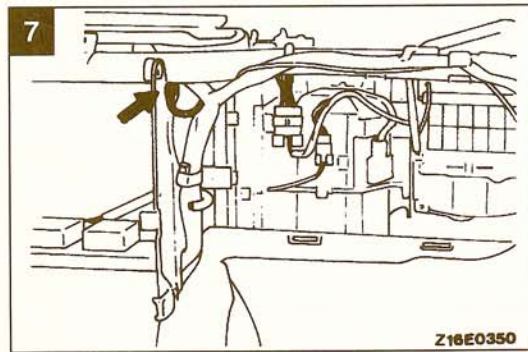
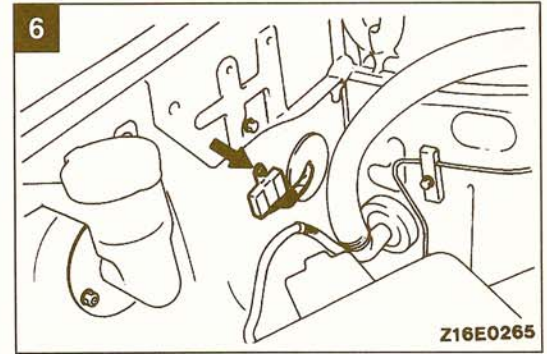
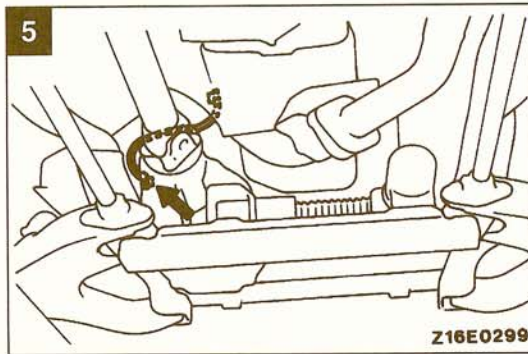
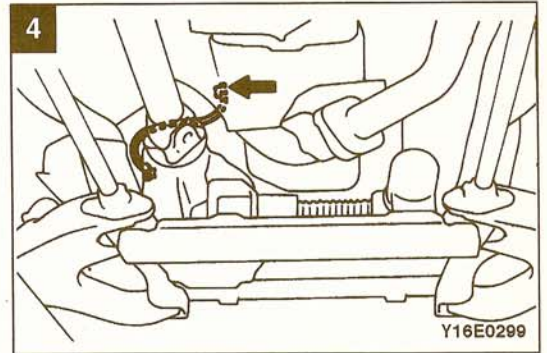
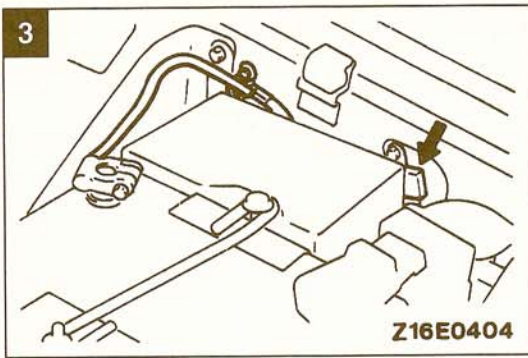


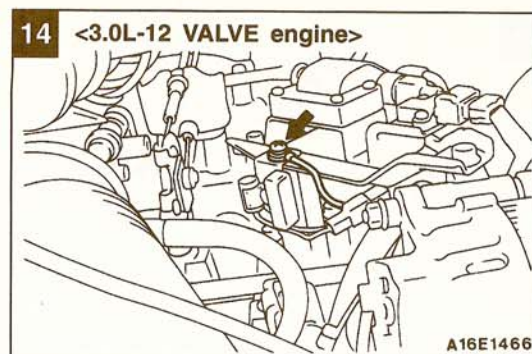
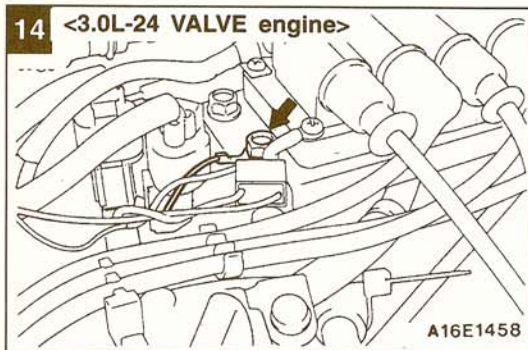
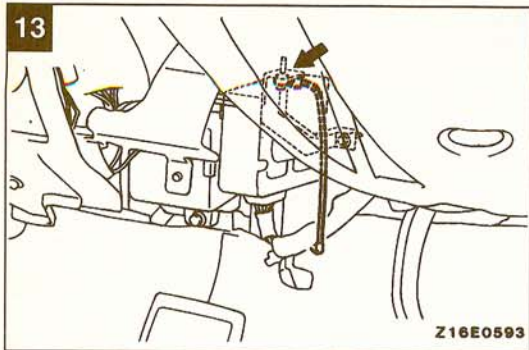
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Y16E0404









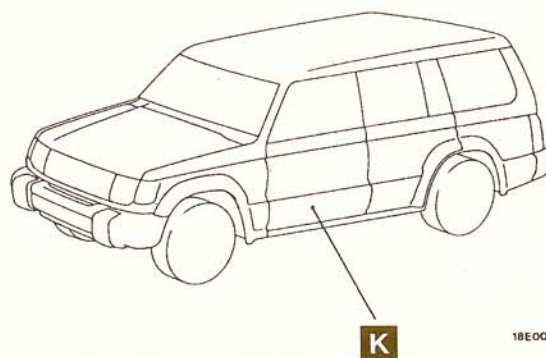
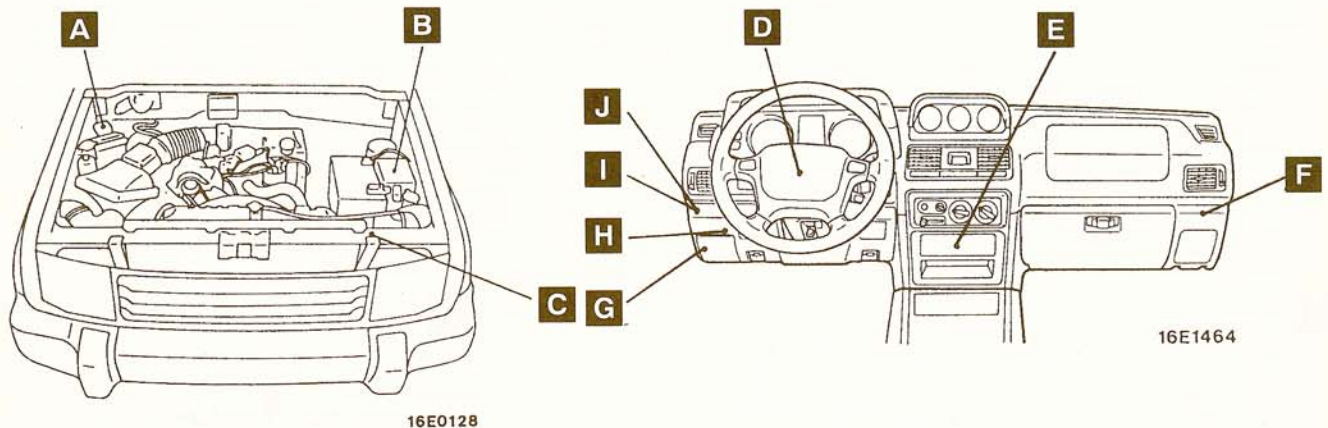
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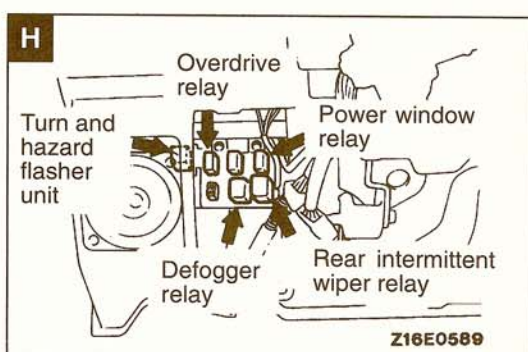
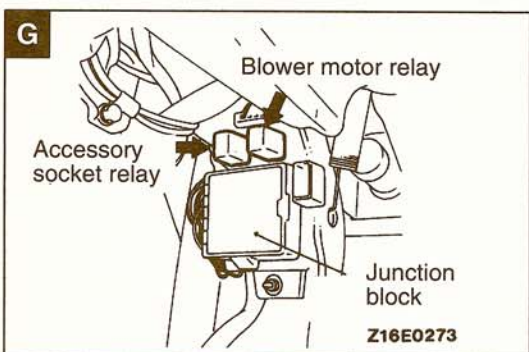
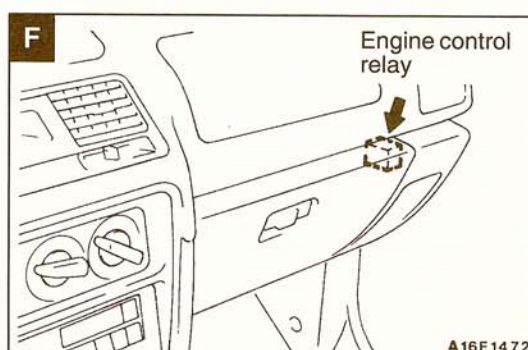
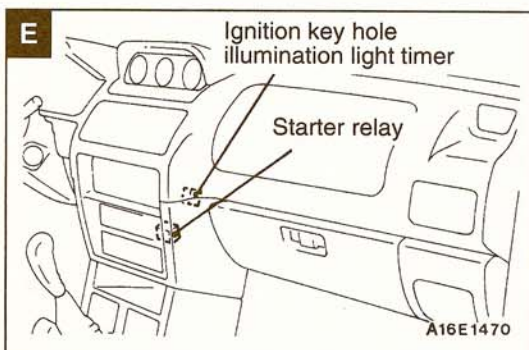
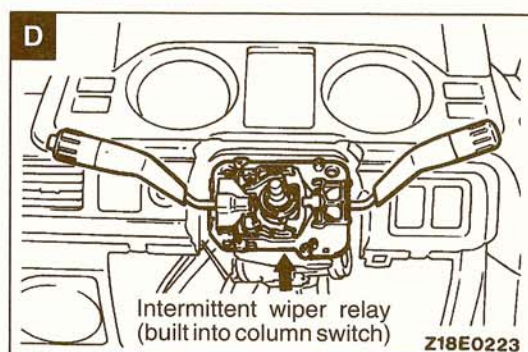
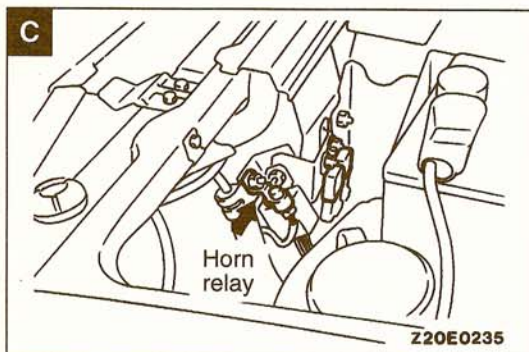
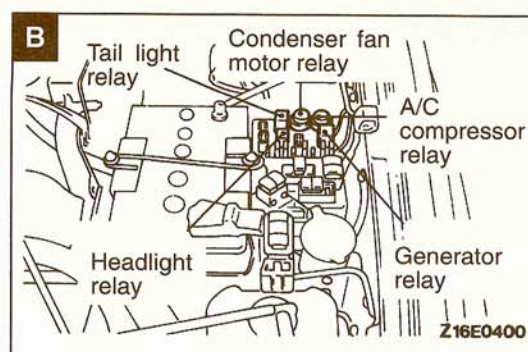
**RELAY LOCATION**

Name	Symbol	Name	Symbol
ABS relay box (with built-in motor relay and valve relay)	A	Headlight washer relay	I
A/C compressor relay	B	Horn relay	C
Accessory socket relay	G	Ignition key hole illumination light timer	E
Blower motor relay	G	Intermittent wiper relay (windshield wiper)	D
Condenser fan motor relay	B	Intermittent wiper relay (rear wiper)	H
Defogger relay	I	Overdrive relay	H
Defogger timer	J	Power seat relay box	K
Door lock relay	H	Power window relay	H
Engine control relay	F	Starter relay	E
Generator relay	B	Tail light relay	B
Headlight relay	B	Turn and hazard flasher unit	H

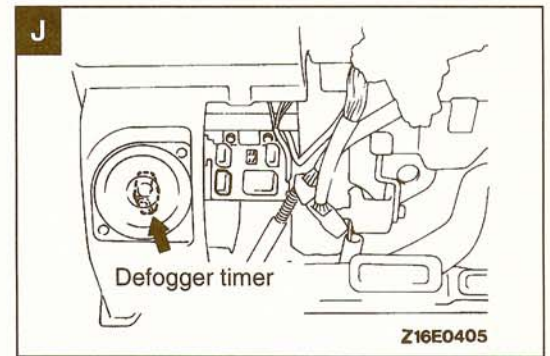
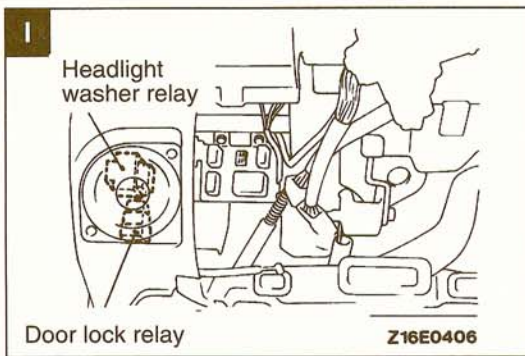
**NOTE**

The "Name" column is arranged in alphabetical order.









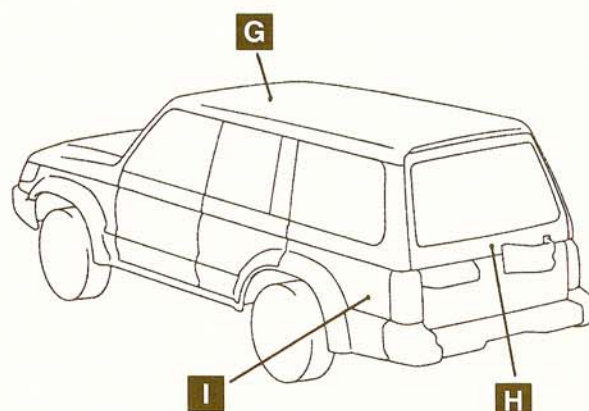
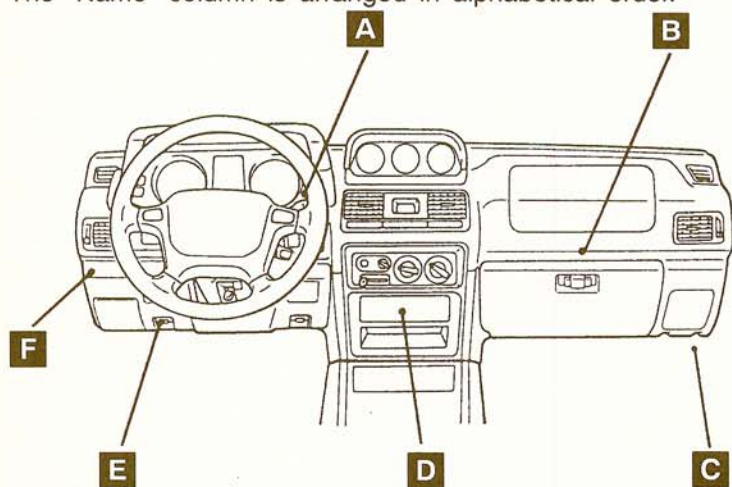
## CONTROL UNIT LOCATION

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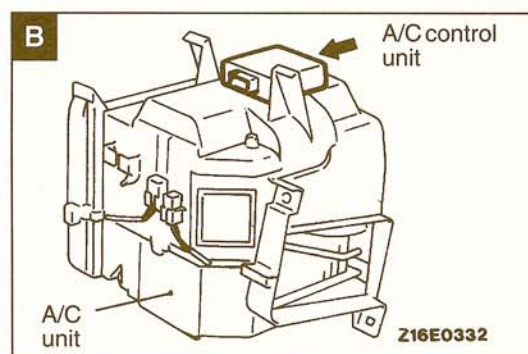
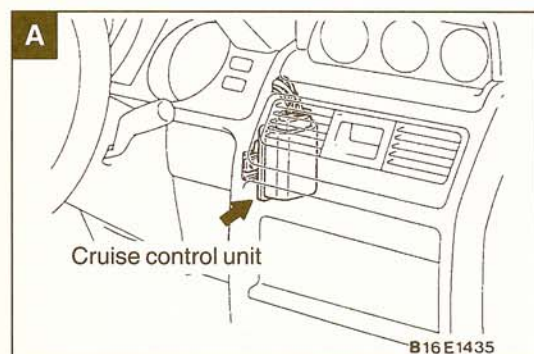
Name	Symbol	Name	Symbol
ABS control unit	H	Keyless entry control unit	H
A/C control unit	B	Motor antenna control unit	D
Cruise control unit	A	Rear differential lock control unit	I
Door lock control unit	F	SRS diagnosis unit	D
ELC 4-speed automatic transmission control module <3.0L-24 VALVE engine, 3.5L engine>	E	Sunroof control unit	G
		Variable shock absorber control unit	I
Engine control module	C	4WD indicator control unit	D

## NOTE

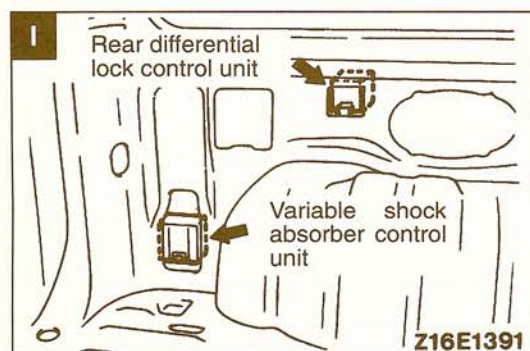
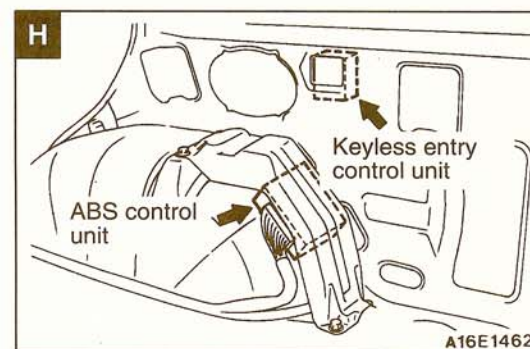
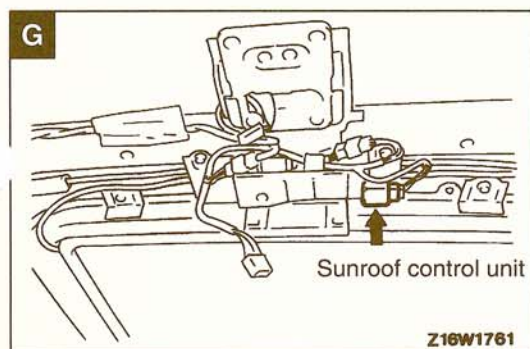
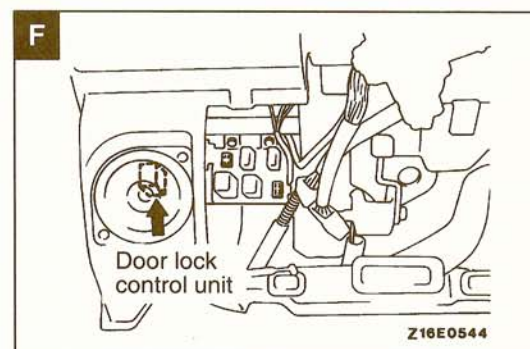
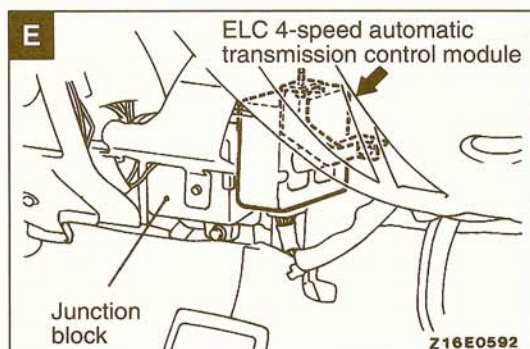
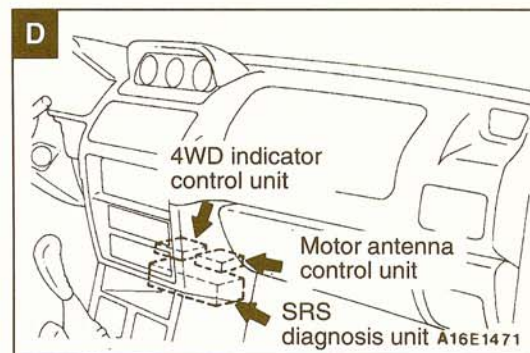
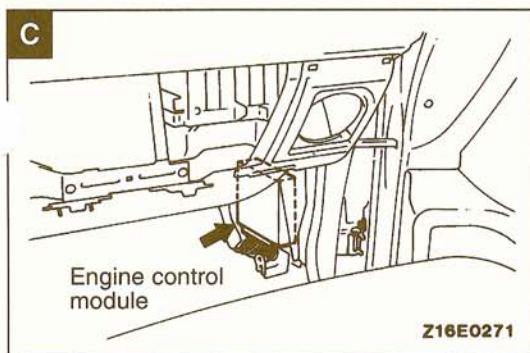
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## SENSOR LOCATION

70100060058

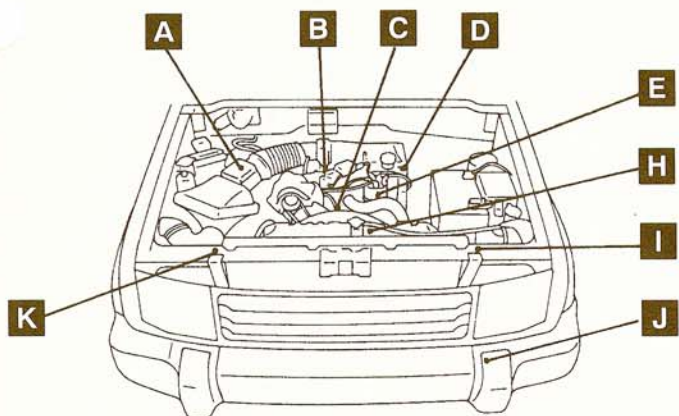
Name	Symbol	Name	Symbol
A/T fluid temperature switch <3.0L-12 VALVE engine>	R	Intake air temperature sensor	N
A/T fluid temperature switch <3.0L-24 VALVE engine, 3.5L engine>	R	Knock sensor <3.5L engine>	F
Air inlet sensor	N	Left bank heated oxygen sensor (front) <3.0L-24 VALVE engine for California>	Y
Camshaft position sensor <3.0L-12 VALVE engine>	E	Left bank heated oxygen sensor (rear) <3.0L-24 VALVE engine for California>	X
Camshaft position sensor <3.0L-24 VALVE engine>	G	Manifold differential pressure sensor <3.0L-12 VALVE engine>	D
Camshaft position sensor <3.5L engine>	G	Manifold differential pressure sensor <3.0L-24 VALVE engine for Federal>	D
Crankshaft position sensor <3.0L-24 VALVE engine>	H	Manifold differential pressure sensor <3.5L engine>	D
Crankshaft position sensor <3.0L-24 VALVE engine>	H	Outside air temperature sensor	J
Cranshaft position sensor <3.5L engine>	H	Reed switch	L
Engine coolant temperature sensor (for engine control) <3.0L-12 VALVE engine>	C	Right bank heated oxygen sensor (front) <3.0L-24 VALVE engine for California>	P
Engine coolant temperature sensor (for engine control) <3.0L-24 VALVE engine>	C	Rigth bank heated oxygen sensor (rear) <3.0L-24 VALVE engine for California>	Q
Engine coolant temperature sensor (for engine control) <3.5L engine>	C	Speed sensor (front) <ABS>	Z
Front impact sensor (L.H.) <SRS>	I	Speed sensor (rear) <ABS>	V
Front impact sensor (R.H.) <SRS>	K	Throttle position sensor	B
Fuel tank differential pressure sensor <3.0L-24 VALVE engine for California>	U	Vehicle speed sensor	W
Geomagnetic sensor (built into multi meter)	M	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor) <3.0L-12 VALVE engine>	A
G sensor <ABS>	O		
Heated oxygen sensor (front) <except 3.0L-24 VALVE engine for California>	S	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor) <3.0L-24 VALVE engine, 3.5L en- gine>	A
Heated oxygen sensor (rear) <except 3.0L-24 VALVE engine for California>	T		

## NOTE

The "Name" column is arranged in alphabetical order.

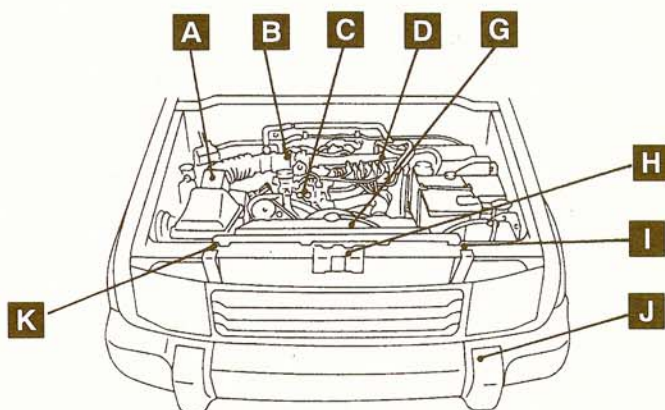


<3.0L-12 VALVE engine>



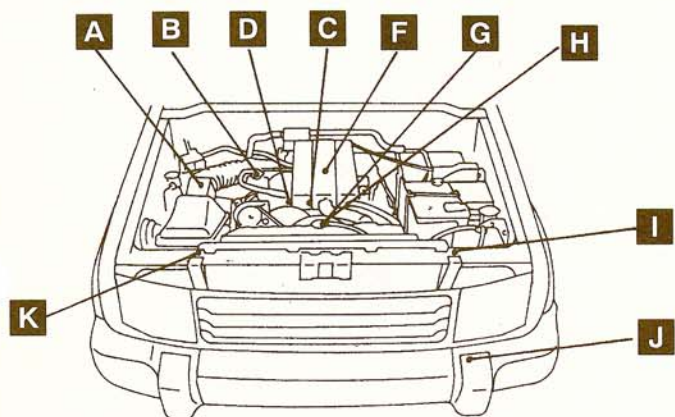
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<3.0L-24 VALVE engine>

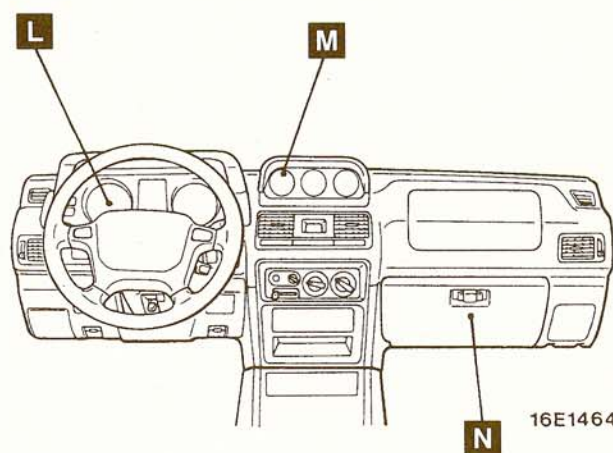


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<3.5L engine>

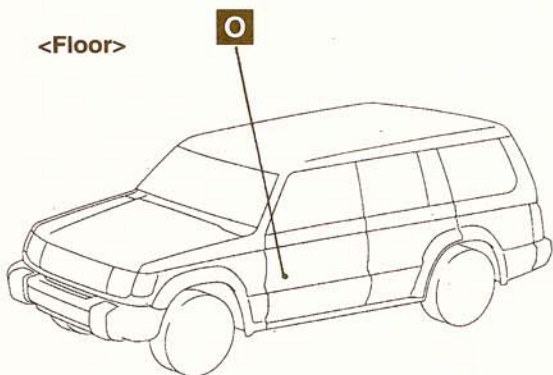


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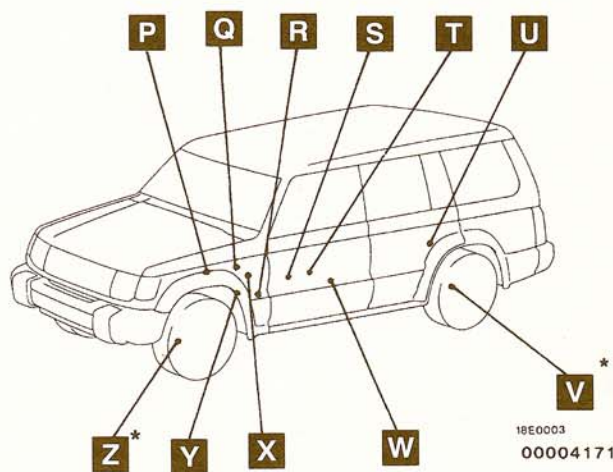
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<Floor>



18E0003

<Under floor>

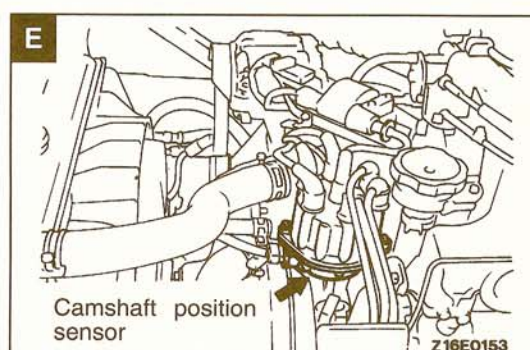
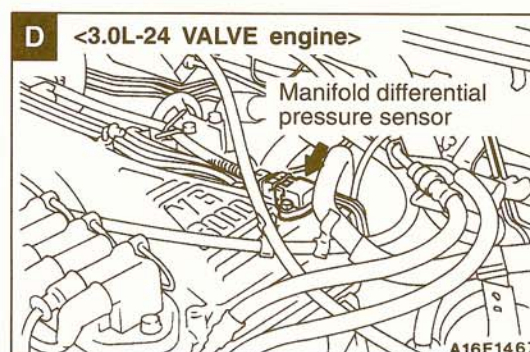
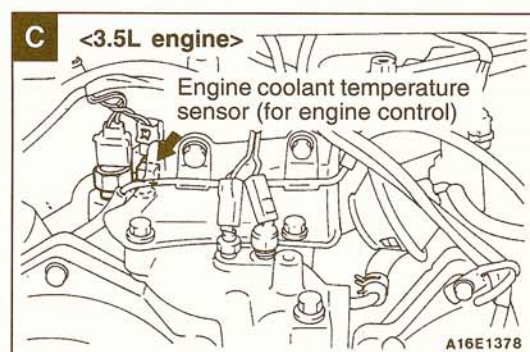
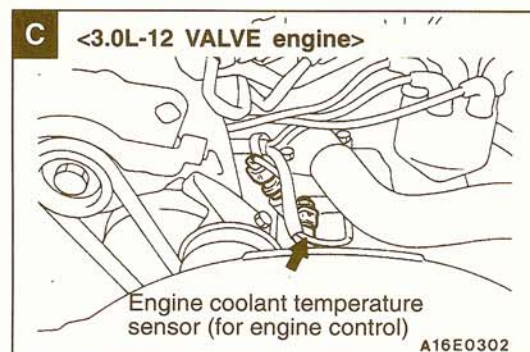
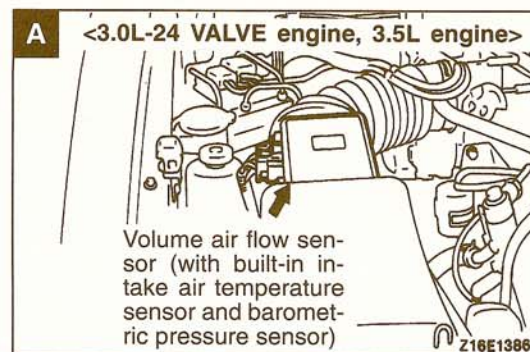
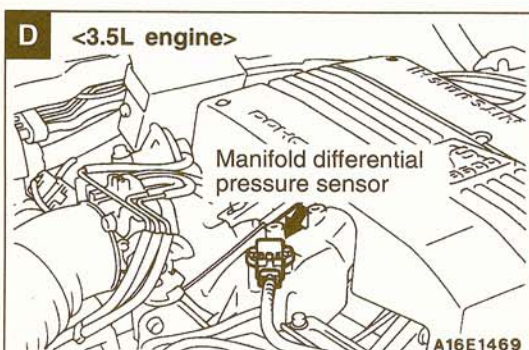
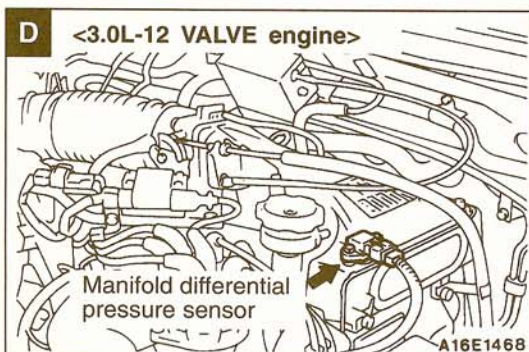
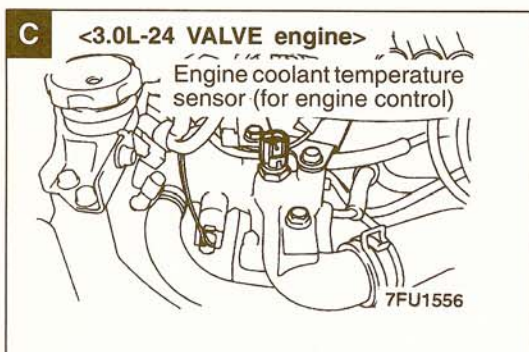
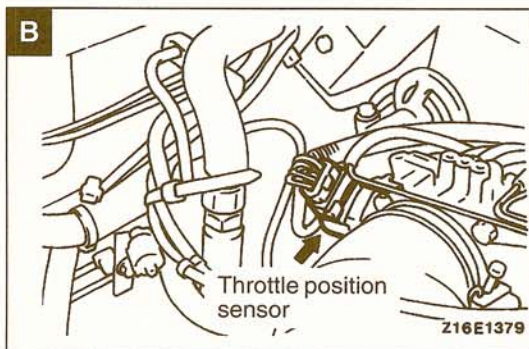
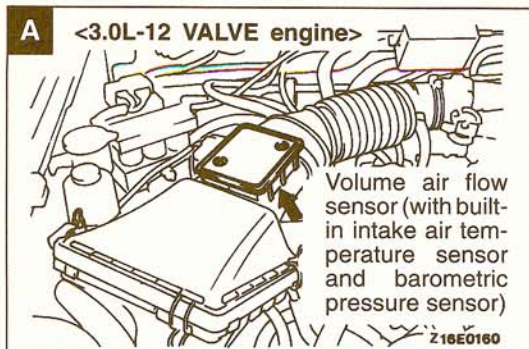


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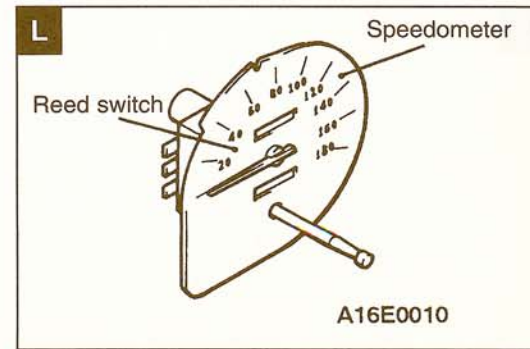
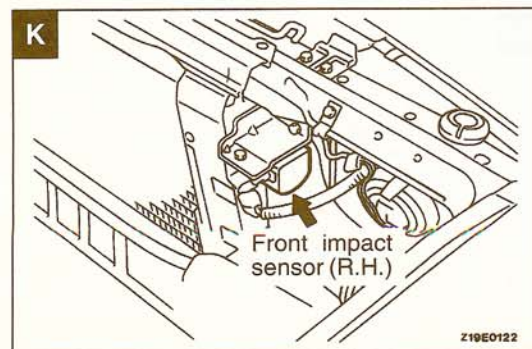
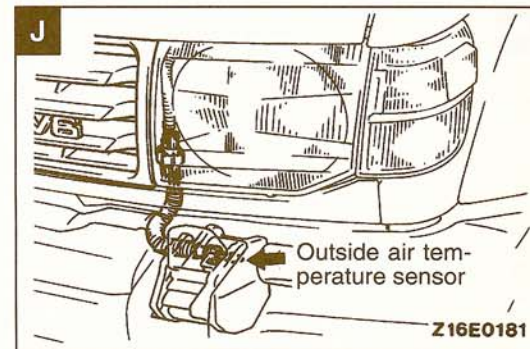
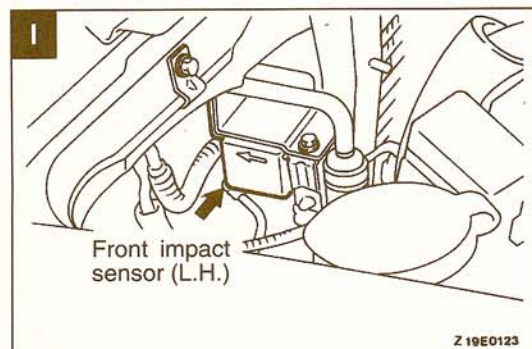
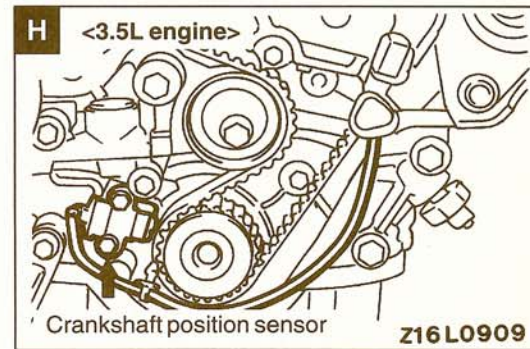
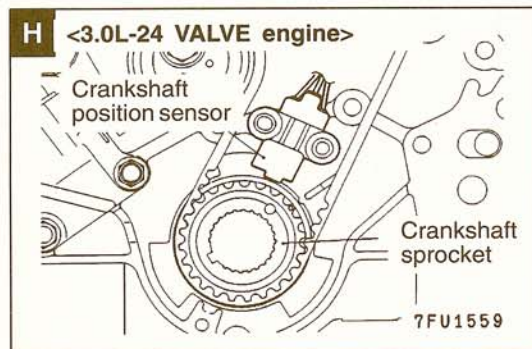
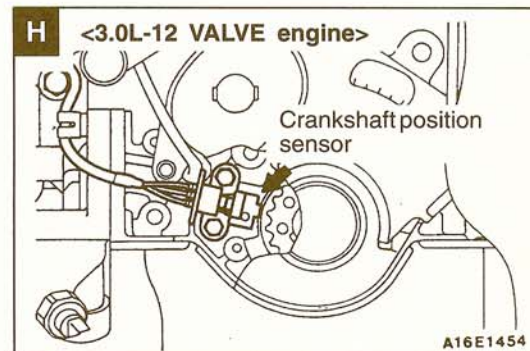
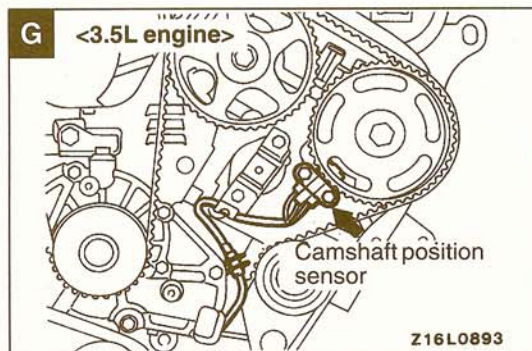
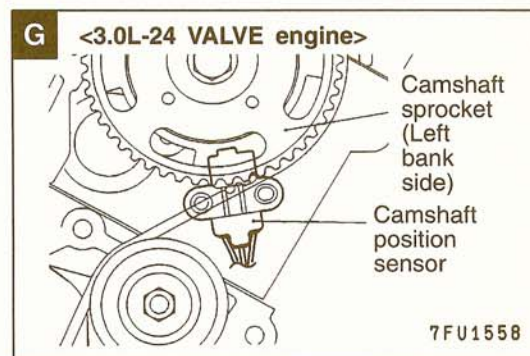
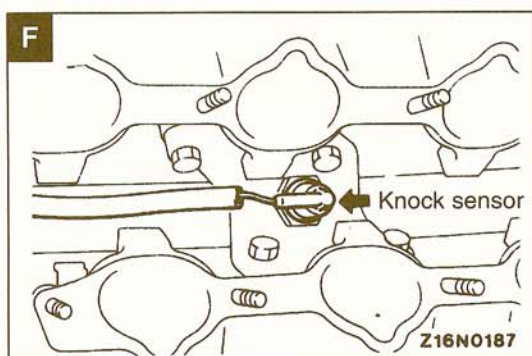
NOTE

\* indicates also equipped the right side.

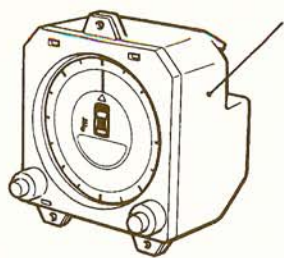






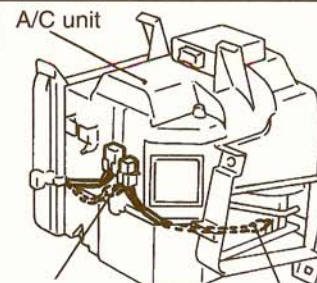




**M**

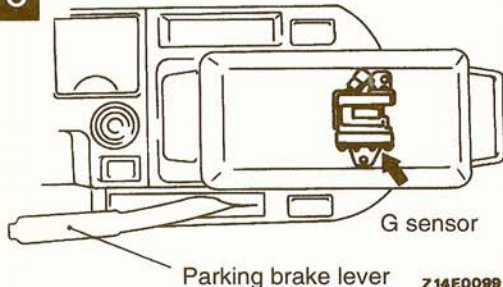
Geomagnetic sensor (built into multi meter)

A16E1465

**N**

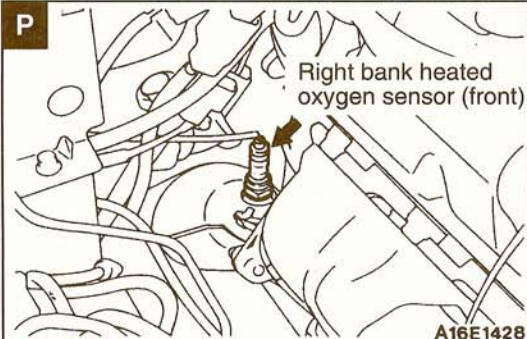
Intake air temperature sensor

Air inlet sensor  
Z16E0334

**O**

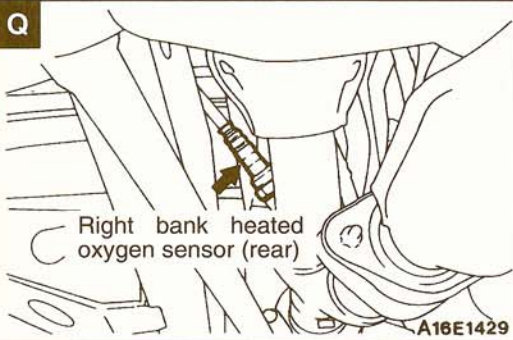
G sensor

Parking brake lever  
Z14E0099

**P**

Right bank heated oxygen sensor (front)

A16E1428

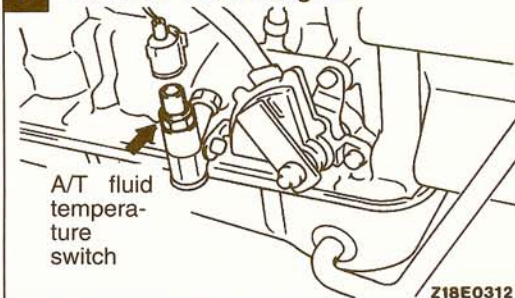
**Q**

Right bank heated oxygen sensor (rear)

A16E1429

**R**

&lt;3.0L-12 VALVE engine&gt;

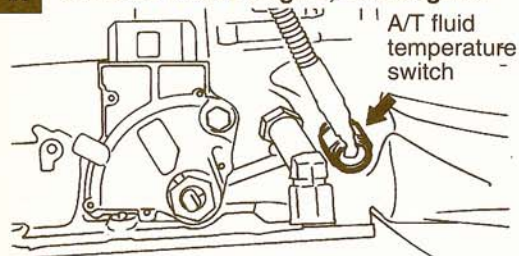


A/T fluid temperature switch

Z18E0312

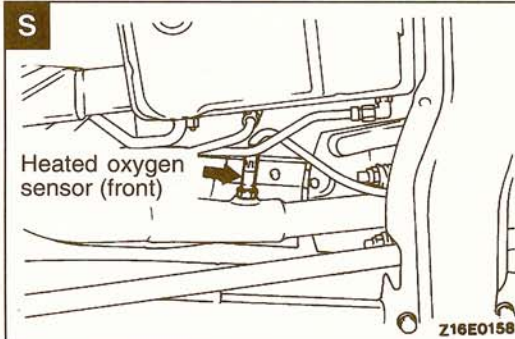
**R**

&lt;3.0L-24 VALVE engine, 3.5L engine&gt;



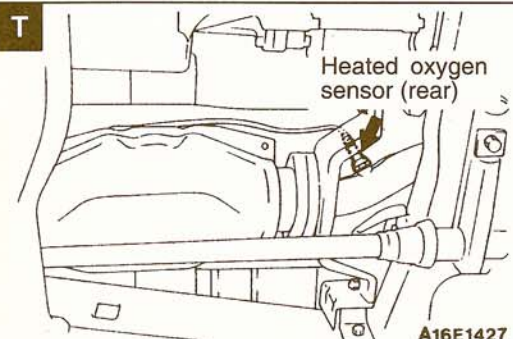
A/T fluid temperature switch

Z16E0567

**S**

Heated oxygen sensor (front)

Z16E0158

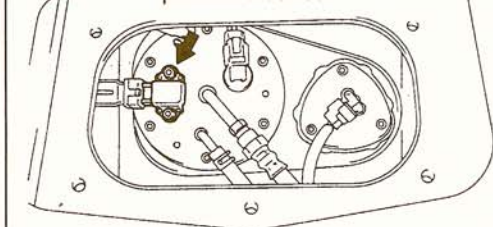
**T**

Heated oxygen sensor (rear)

A16E1427

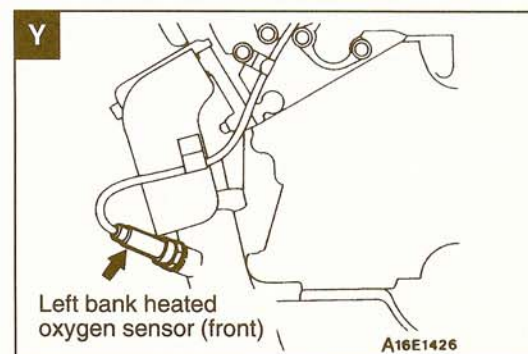
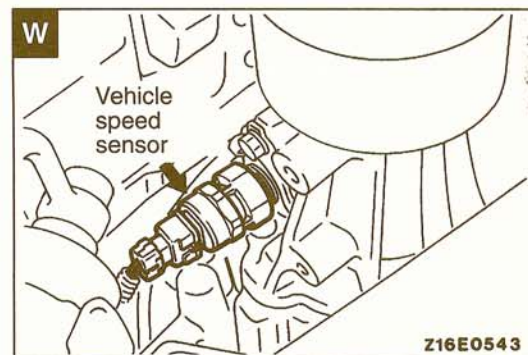
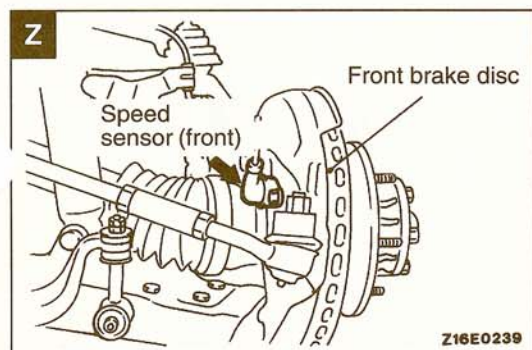
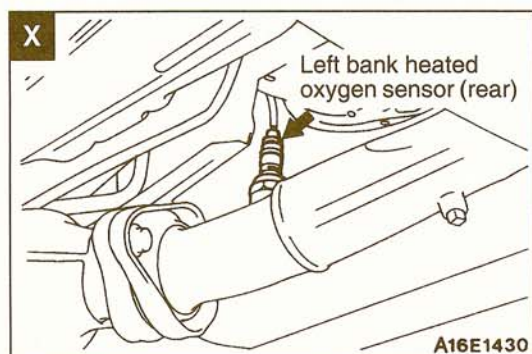
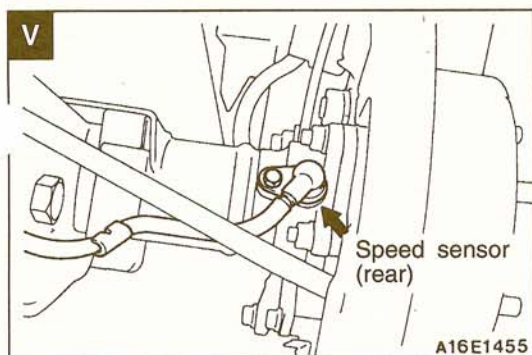
**U**

Fuel tank differential pressure sensor



A16E1456





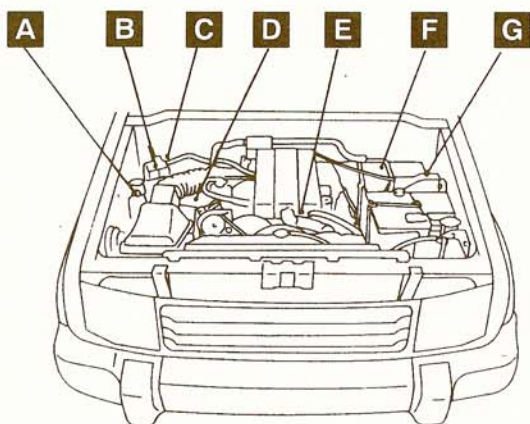
## SOLENOID, SOLENOID VALVE LOCATION

70100080054

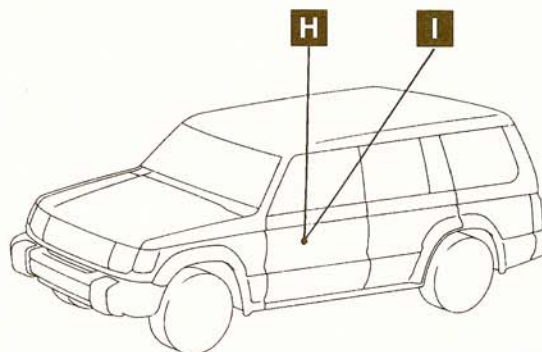
Name	Symbol	Name	Symbol
Cruise control actuator (with built-in control valve and release valve) <3.0L-24VALVE engine for California>	C	Evaporative emission purge solenoid <3.5L engine>	F
Cruise control actuator (with built-in control valve and release valve) <except 3.0L-24 VALVE engine for California>	G	Evaporative emission ventilation solenoid <3.0L-24 VALVE engine for California>	F
EGR solenoid <3.0L engine for Federal>	F	Hydraulic unit (with built-in solenoid valve)	B
EGR solenoid <3.5L engine>	A	Overdrive solenoid valve <3.0L – 12 VALVE engine-A/T>	H
Evaporative emission purge solenoid <3.0L engine for Federal>	F	Solenoid assembly <3.0L – 24 VALVE engine-A/T, 3.5L engine>	I
Evaporative emission purge solenoid <3.0L-24 VALVE engine for California>	F	Solenoid valve A,B	D
		Variable induction control solenoid <3.5L engine>	E

## NOTE

The "Name" column is arranged in alphabetical order

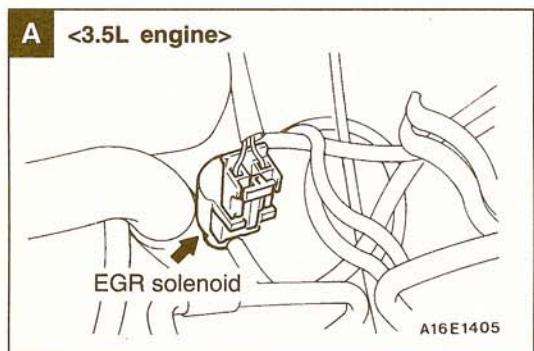


16E0570

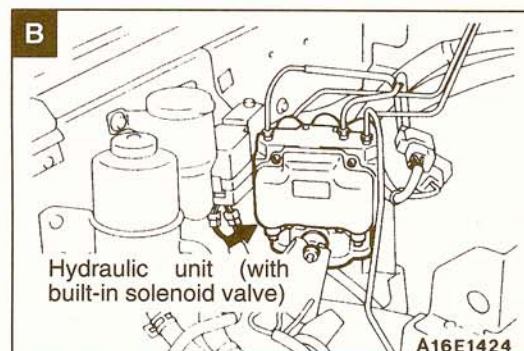


18E0003

00002516

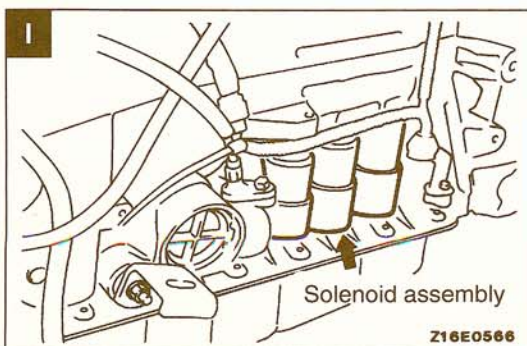
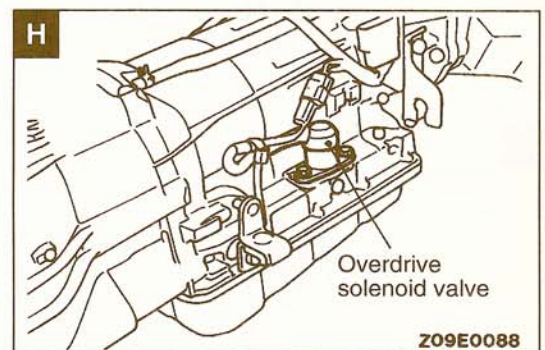
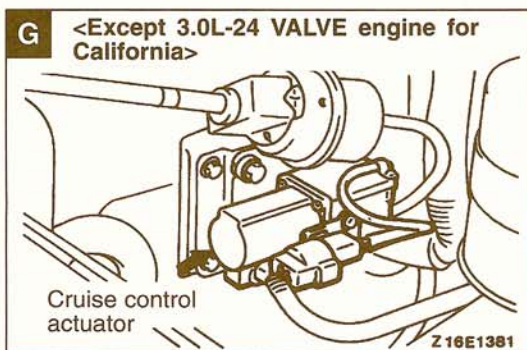
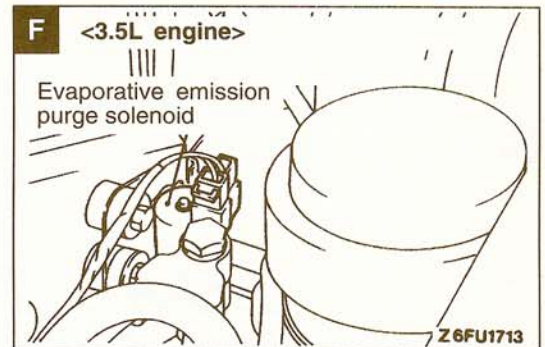
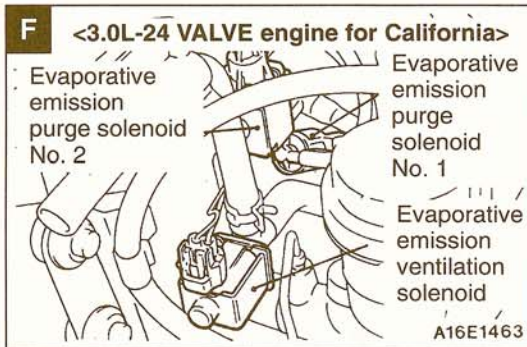
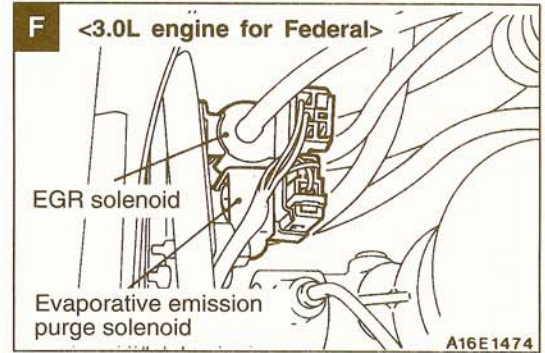
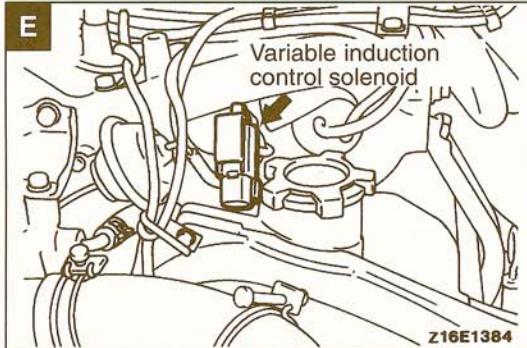
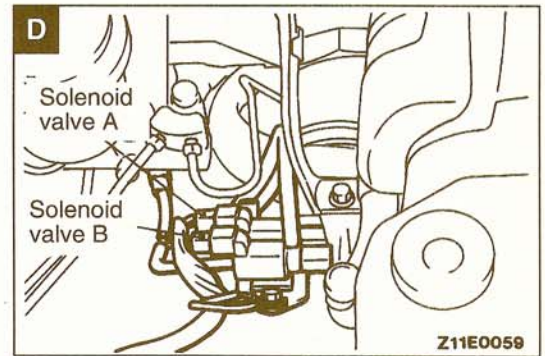
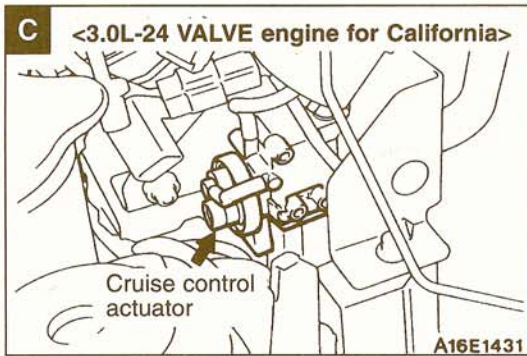


A16E1405



A16E1424





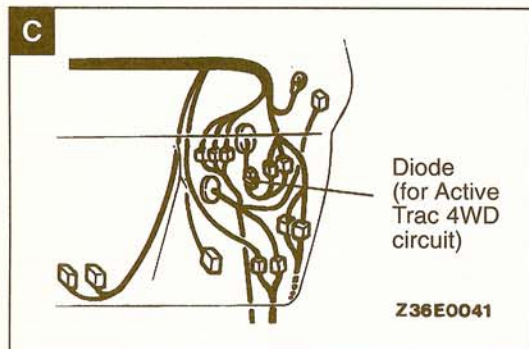
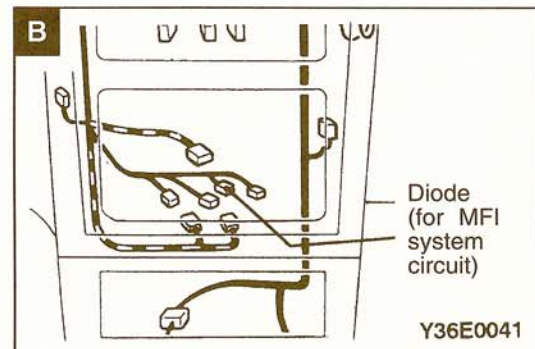
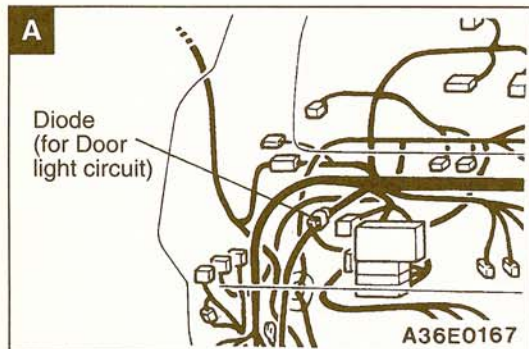
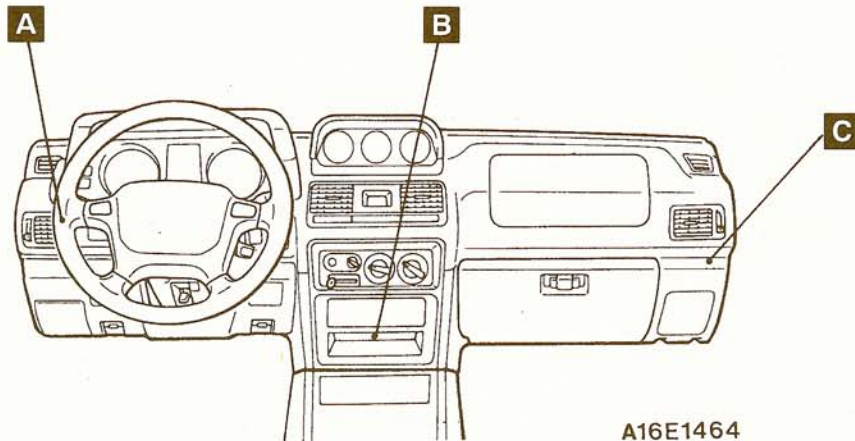
## DIODE LOCATION

70100090064

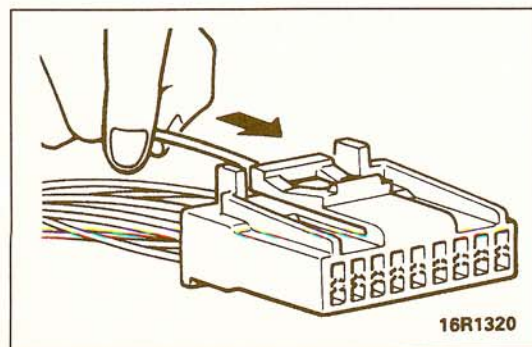
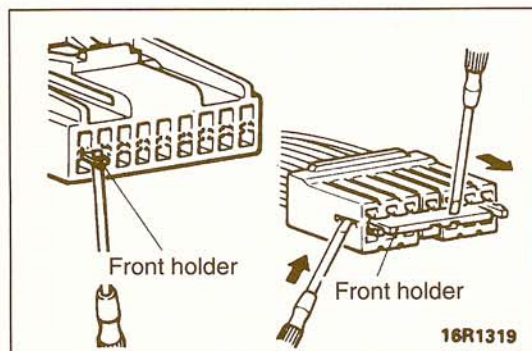
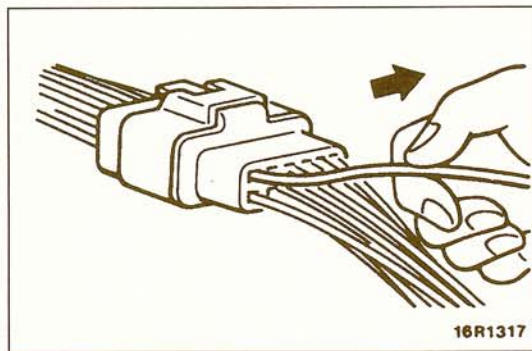
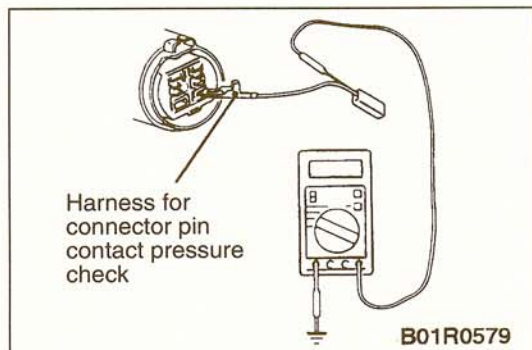
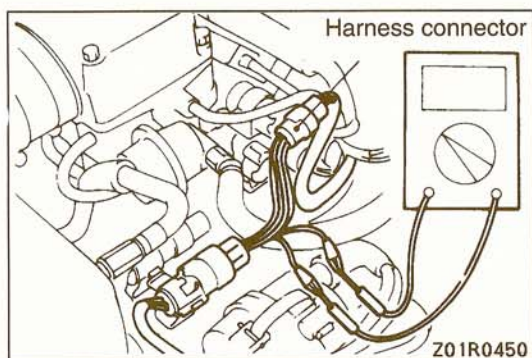
Name	Symbol	Name	Symbol
Diode (for Active Trac 4WD circuit)	C	Diode (for Door light circuit)	A
		Diode (for MFI system circuit)	B

## NOTE

The "Name" column is arranged in alphabetical order.







## HARNESS CONNECTOR INSPECTION

70100110029

### CONNECTOR CONTINUITY AND VOLTAGE TEST

When inspecting the continuity and voltage at the waterproof connector, inspect by the following procedure in order to avoid poor connector contacts and reduction of the waterproof performance of the connector.

- (1) When checking a waterproof connector with the circuit in a live state, be sure to use the special tool (harness connector). Inserting the test probe from the harness side should never be done, as it will adversely affect waterproof performance, which may lead to corrosion.
- (2) When checking the female pin with the connector disconnected, a connector pin contact pressure check harness should be used. Never force a test probe into such a terminal, as it will result in a poor contact.
- (3) When inspecting a male pin, touch the test probe directly against the pin. At this time, be careful not to cause a short-circuit between the connector pins.

### IMPROPER TERMINAL ENGAGEMENT CHECK

If the terminal stopper of the connector is malfunctioning, the engagement of the male and female terminals becomes incorrect even when the connector itself is engaged perfectly, and the terminal sometimes slips out to the rear side of the connector. Therefore, pull each harness wire to check that each terminal does not come off the connector.

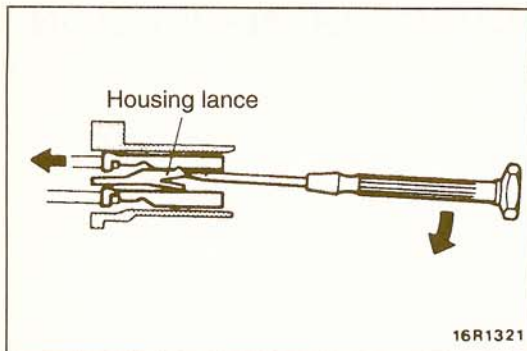
### CONNECTOR TERMINAL ENGAGEMENT AND DISENGAGEMENT

Connectors which do not connect securely should be rectified by removing the female terminal from the connector housing and raising the lance to provide a more secure connection. Removal of the connector terminal used for MFI and ELC 4 A/T control circuit should be carried out as follows.

#### COMPUTER CONNECTOR

- (1) Insert screwdriver [1.4 mm (.06 in.) width] as shown in the illustration, disengage front holder and remove it.
- (2) Fully insert the harness of the terminal to be rectified into the connector from the harness side and hold it there.

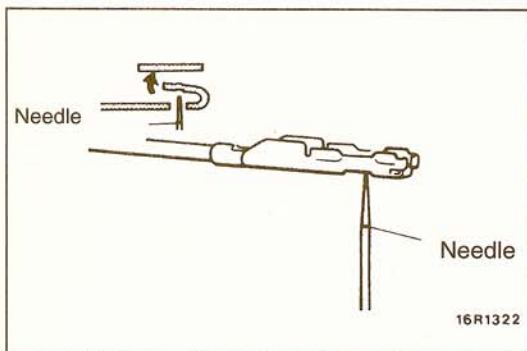




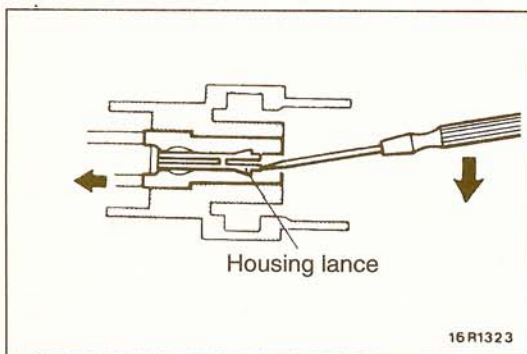
- (3) Insert the tip of a screwdriver with a width of 1.4 mm (.06 in.) into the connector as shown in the illustration, raise the housing lance slightly and pull out the harness.

**NOTE**

Tool No. 753787-1 supplied by AMP can be used instead of screwdriver.

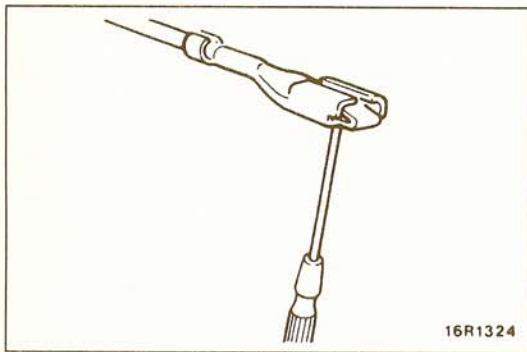


- (4) Insert a needle through the hole provided in the terminal and raise the contact point of the male terminal.

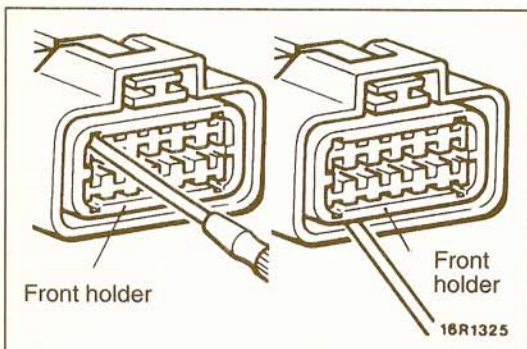


**ROUND WATERPROOF CONNECTOR**

- (1) Use a screwdriver to remove the waterproof cap.
- (2) Insert the tip of a screwdriver with a width of 1.4 mm (.06 in.) or 2.0 mm (.08 in.) into the connector as shown in the illustration, raise the housing lance slightly and then pull out the harness.



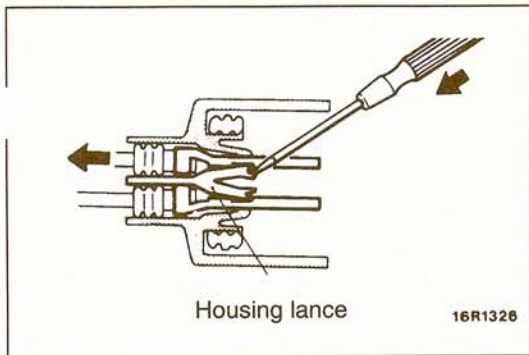
- (3) Insert the screwdriver through the hole provided in the terminal and raise the contact point of the male terminal.



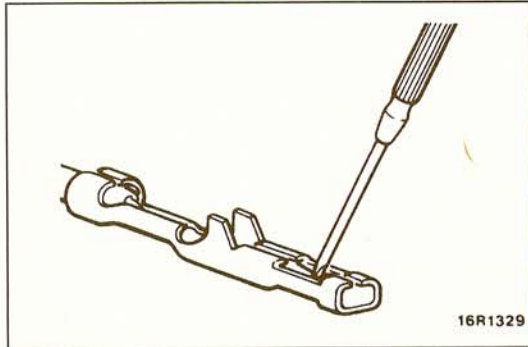
**RECTANGULAR WATERPROOF CONNECTOR**

- (1) Use a screwdriver to disengage and remove the front holder.

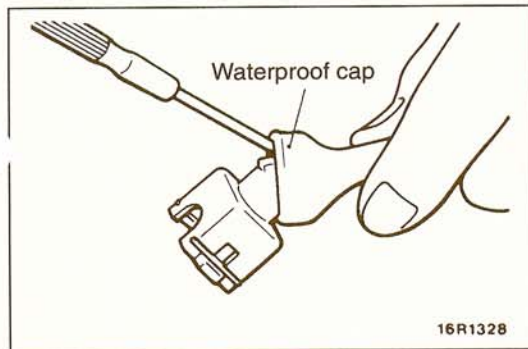




- (2) Insert the tip of a screwdriver with a width of \*0.8 mm (.03 in.) into the connector as shown in the illustration, raise the housing lance slightly and pull out the harness.  
\*If the right size of screwdriver is not available, convert a conventional driver to suit the size.

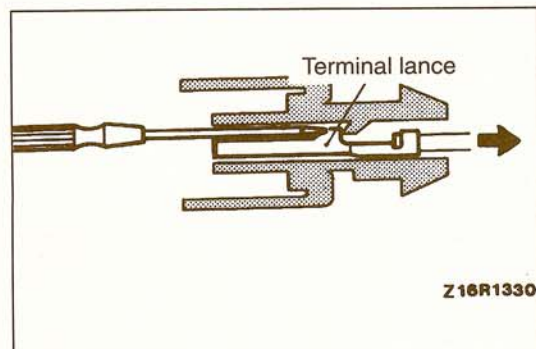


- (3) Use a screwdriver with a width of 1.4 mm (0.6 in.) to press the contact point of the male terminal down as shown in the illustration.

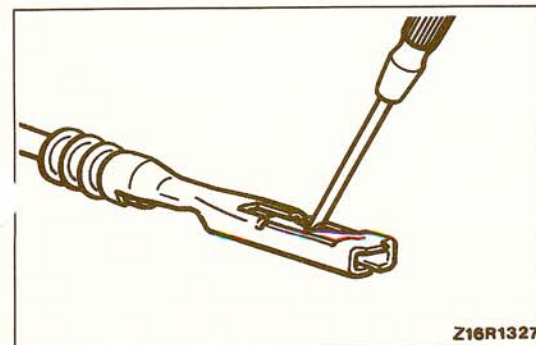


### INJECTOR CONNECTOR

- (1) Remove the waterproof cap.



- (2) Insert the tip of a screwdriver with a width of 1.4 mm (.06 in.) into the connector as shown in the illustration, push in the terminal lance and then pull out the harness.



- (3) Use a screwdriver with a width of 1.4 mm (0.6 in.) to press the contact point of the male terminal down as shown in the illustration.

### Caution

**Correct the lance so that it is in the proper condition before the terminal is inserted into the connector.**

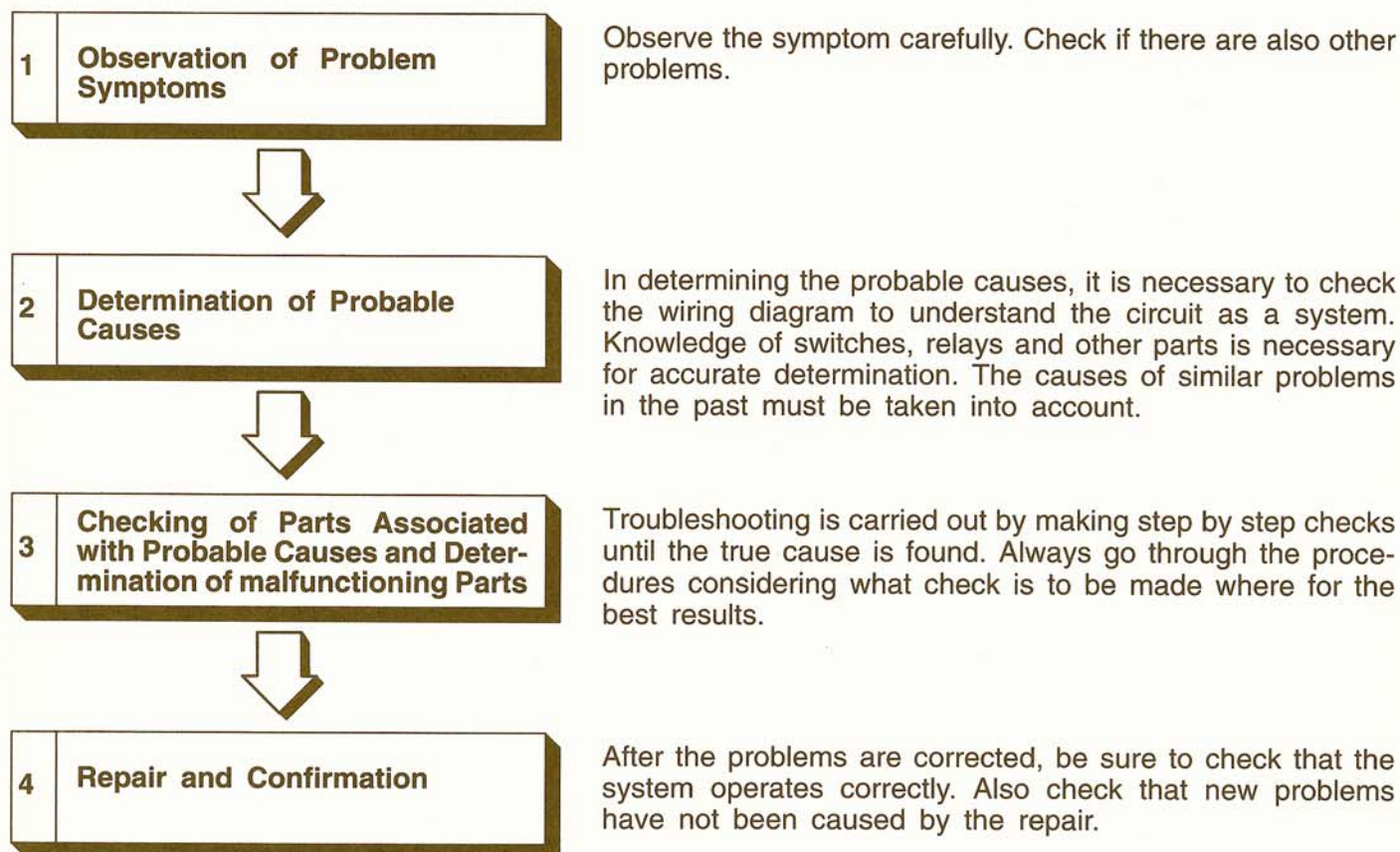
## HOW TO DIAGNOSE

70100120022

The most important point in troubleshooting is to determine the probable causes. Once the probable causes are determined, parts to be checked can be limited to those associated with such probable causes. Therefore, unnecessary checks can be eliminated. The determination of the probable causes must be based on a theory and be supported by facts and must not be based on intuition only.

### TROUBLESHOOTING STEPS

If an attempt is made to solve a problem without going through correct steps for troubleshooting, the problem symptoms could become more complicated, resulting in failure to determine the causes correctly and making incorrect repairs. The four steps below should be followed in troubleshooting.



### INFORMATION FOR DIAGNOSIS

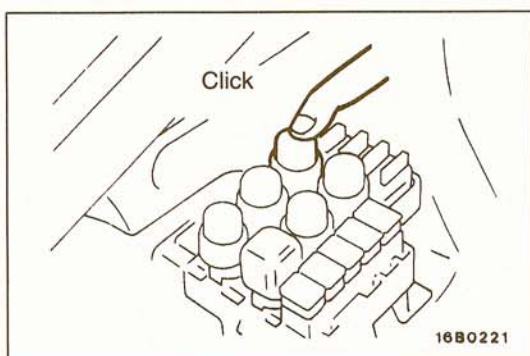
This manual contains the cable diagrams as well as the individual circuit drawings, operational explanations, and troubleshooting hints for each component required to facilitate the task of troubleshooting. The information is compiled in the following manner:

- (1) Cable diagrams show the connector positions, etc., on the actual vehicle as well as the harness path.
- (2) Circuit drawings show the configuration of the circuit with all switches in their normal positions.
- (3) Operational explanations include circuit drawings of voltage flow when the switch is operated and how the component operates in reaction.
- (4) Troubleshooting hints include numerous examples of problems which might occur, traced backward in a common-sense manner to the origin of the trouble. Problems whose origins may not be found in this manner are pursued through the various system circuits.

#### Remarks

Components of MFI, ETACS, ECS, etc. with ECM do not include 3 and 4 above. For this information, refer to a manual which includes details of these components.

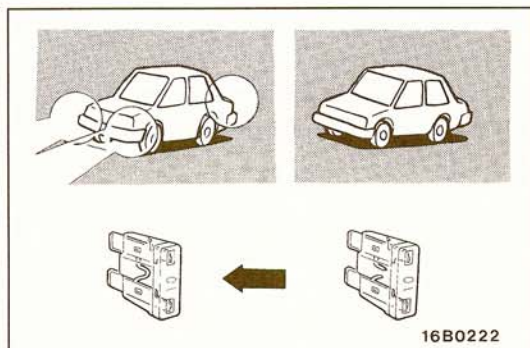




## INSPECTION

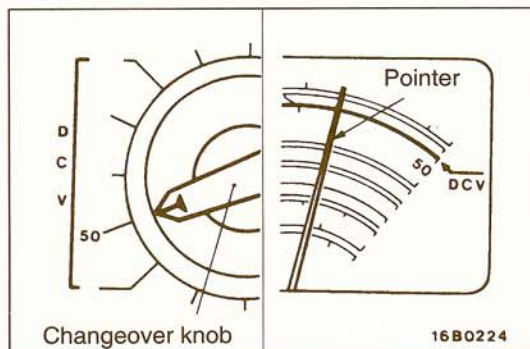
### 1. Visual and aural checks

Check relay operation, blower motor rotation, light illumination, etc. visually or aurally. The flow of current is invisible but can be checked by the operation of the parts.



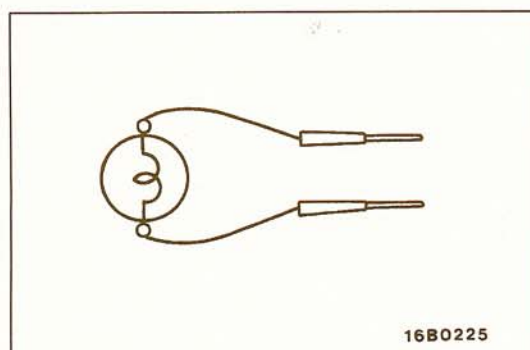
### 2. Simple checks

For example, if a headlight does not illuminate and a malfunctioning fuse or poor grounding is suspected, replace the fuse with a new one or ground the light to the body by a jumper wire to determine which part is responsible for the problem.



### 3. Checking with instruments

Use an appropriate instrument in an adequate range and read the indication correctly. You must have sufficient knowledge and experience to handle instruments correctly.

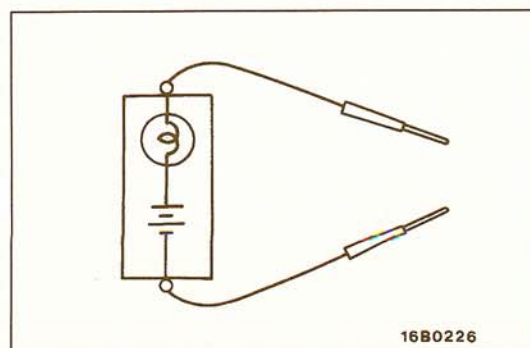


## INSPECTION INSTRUMENTS

In inspection, make use of the following instruments.

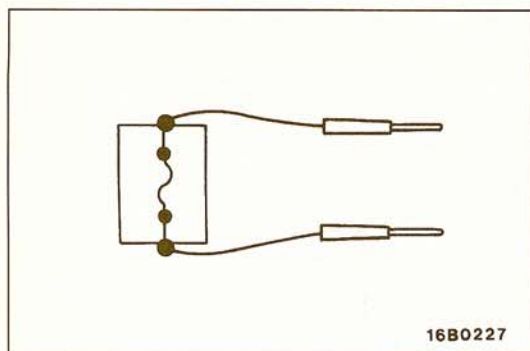
### 1. Test light

A test light consists of a 12 V bulb and lead wires. It is used to check voltages or short-circuits.



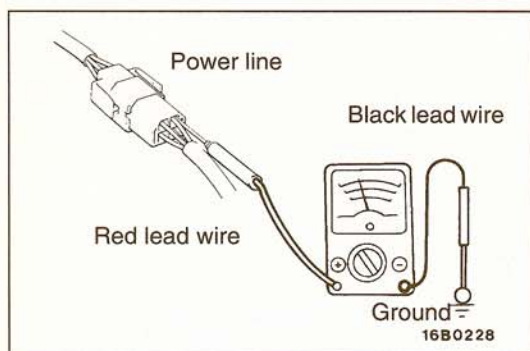
### 2. Self-power test light

A self-power test light consists of a bulb, battery and lead wires connected in series. It is used to check continuity or grounding.



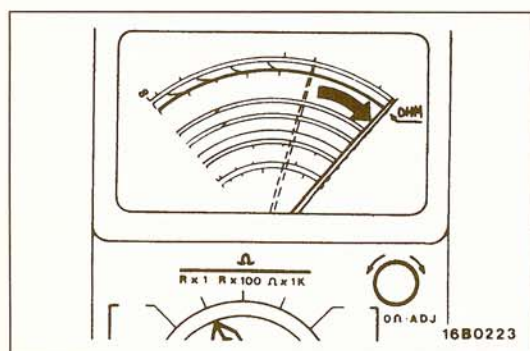
### 3. Jumper wire

A jumper wire is used to close an open circuit. Never use one to connect a power supply directly to a load.



### 4. Voltmeter

A voltmeter is used to measure the circuit voltage. Normally, the positive (red lead) probe is applied to the point of voltage measurement and the negative (black lead) probe to the body ground.



### 5. Ohmmeter

An ohmmeter is used to check continuity or measure resistance of a switch or coil. If the measuring range has been changed, the zero point must be adjusted before measurement.

Normal open (NO) type	
OFF	ON
<p>Current does not flow</p> <p>16X0690</p>	<p>Current flows</p> <p>16X0691</p> <p>00000401</p>
Normal close (NC) type	
OFF	ON
<p>Current flows</p> <p>16X0691</p>	<p>Current does not flow</p> <p>16X0690</p> <p>00000402</p>

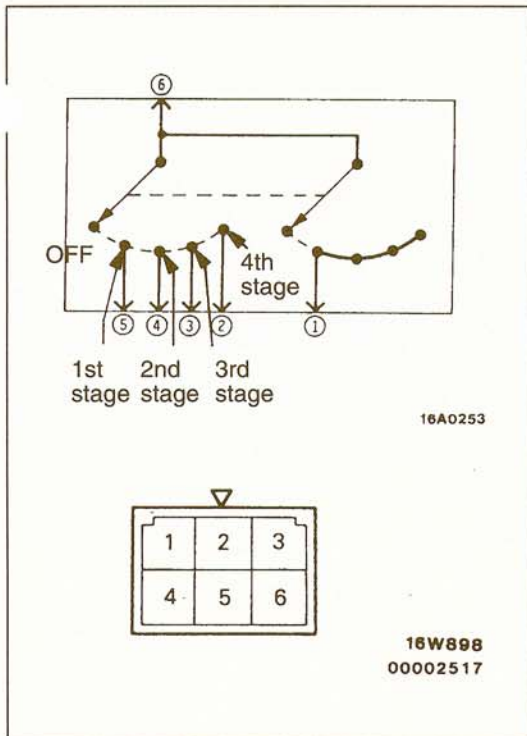
## SWITCH CHECK

In a circuit diagram, a switch is represented by a symbol and in the idle state.

### 1. Normal open or normal close switch

Switches are classified into those which make the circuit open and those which make the circuit closed when off.





## 2. SWITCH CONNECTION

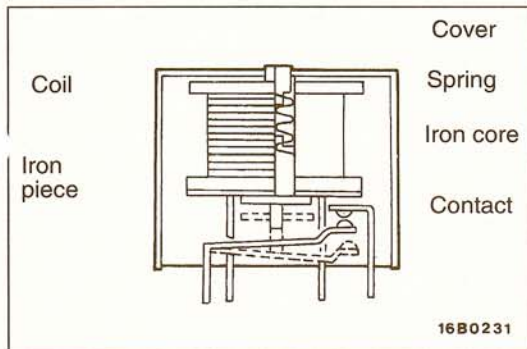
This illustration shows a complex switch.

The continuity between terminals at each position is as indicated in the table below.

Position	Terminal No.					
	1	2	3	4	5	6
OFF						
1st stage	○				○	○
2nd stage	○			○		○
3rd stage	○		○			○
4th stage	○	○				○

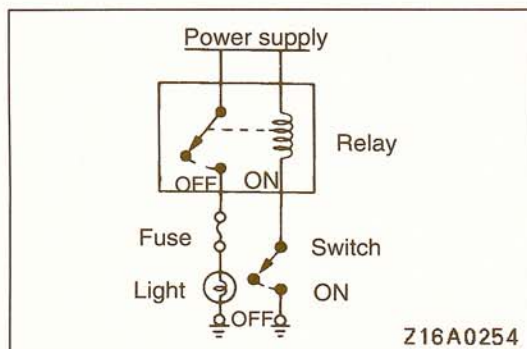
### NOTE

○—○ indicates that there is continuity between the terminals.

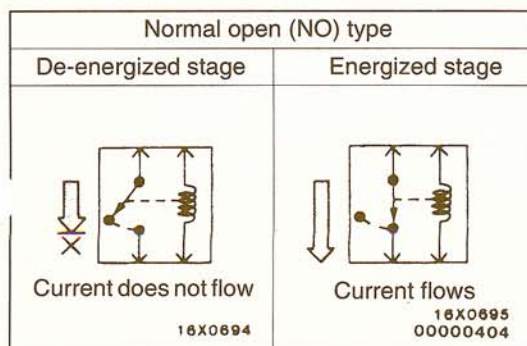


## RELAY CHECK

1. When current flows through the coil of a relay, its core is magnetized to attract the iron piece, closing (ON) the contact at the tip of the iron piece. When the coil current is turned off, the iron piece is made to return to its original position by a spring, opening the contact (OFF).



2. A large current can be turned on and off by a switch of small capacity if a relay is used. For example, in the circuit shown here, when the switch is turned on (closed), current flows to the coil of the relay. Then, its contact is turned on (closed) and the light comes on. The current flowing at this time to the switch is the relay coil current only and is very small.

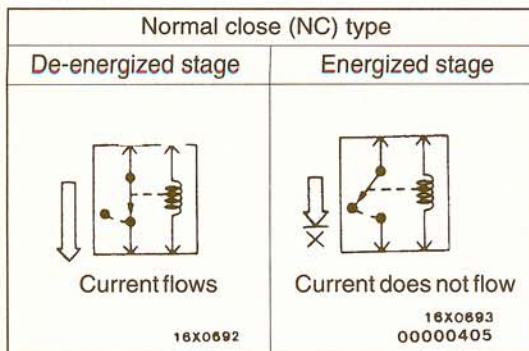


3. The relays may be classified into the normal open type and the normal close type by their contact construction.

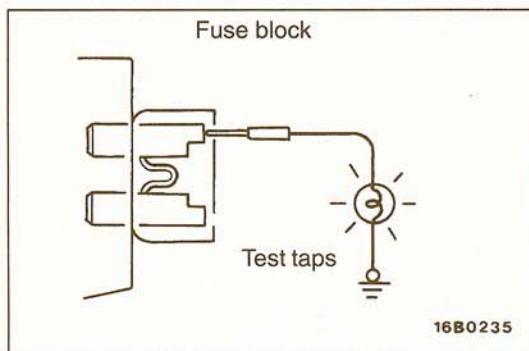
### NOTE

The de-energized state means that no current is flowing through the coil and the energized state means that current is flowing through the coil.





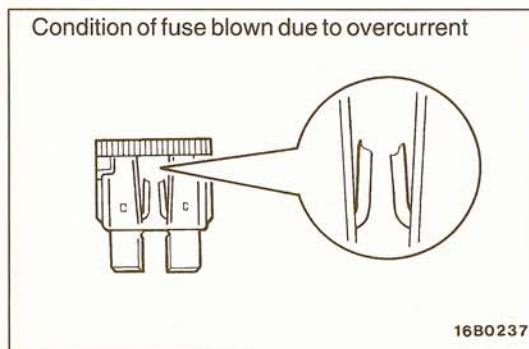
When a normal close type relay as illustrated here is checked, there should be continuity between terminals (1) and (2) and between terminals (3) and (4) when the relay is de-energized, and the continuity should be lost between terminals (3) and (4) when battery positive voltage is applied to the terminals (1) and (2). A relay can be checked in this manner and it cannot be determined if a relay is okay or not by checking its state only when it is de-energized (or energized).



## FUSE CHECK

A blade type fuse has test taps provided to allow checking of the fuse itself without removing it from the fuse block. The fuse is okay if the test light comes on when its one lead is connected to the test taps (one at a time) and the other lead is grounded.

(Change the ignition switch position so that the fuse circuit becomes live.)

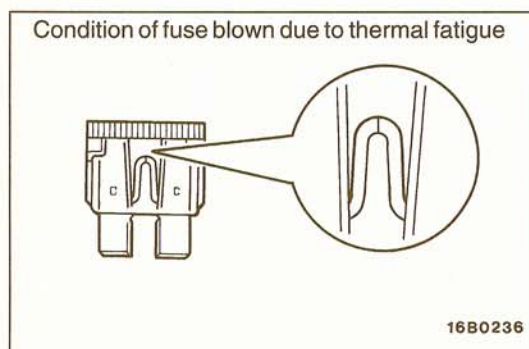


## CAUTIONS IN THE EVENT OF A BLOWN FUSE

When a fuse is blown, there are two probable causes. One is that it is blown due to flow of current exceeding its rating. The other is that it is blown due to repeated on/off current flowing through it. Which of the two causes is responsible can be easily determined by visual check as described below.

### (1) Fuse blown due to current exceeding rating

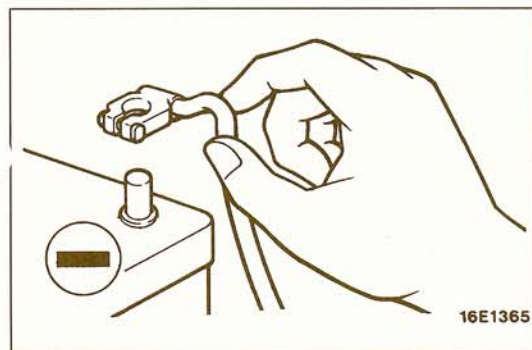
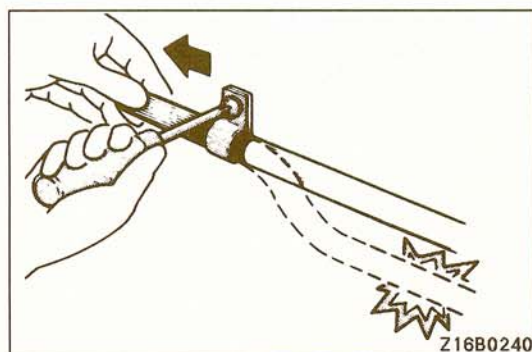
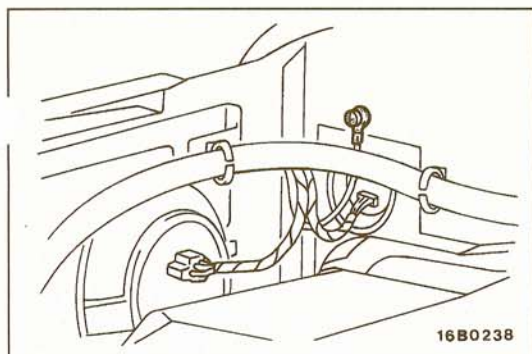
The illustration shows the state of a fuse blown due to this cause. In this case, do not replace the fuse with a new one straight away since a current heavy enough to blow the fuse has flowed through it. First, check for a short-circuit and check for abnormal electric parts. A fuse of the same capacity should be used as a replacement only after the correction of such short-circuiting or parts. Never use a fuse of larger capacity than the one that has blown. If such a fuse is used, electric parts or wiring could be damaged before the fuse blows in the event an overcurrent occurs again.



### (2) Fuse blown due to repeated current on/off

The illustration shows the condition of a fuse which has blown due to repeated current on/off. Normally, this type of problem occurs after a fairly long period of use and hence is less frequent than the above type. In this case, you may simply replace with a new fuse of the same capacity.





## CABLE AND WIRE CHECK

1. Check connections for looseness, rust and stains.
2. Check terminals and wires for corrosion by battery electrolyte, etc.
3. Check terminals and wires for open circuit or impending open circuit.
4. Check wire insulation and coating for damage, cracks and deterioration.
5. Check the conductive parts of terminals for contact with other metallic parts (vehicle body and other parts).
6. Check grounding parts to verify that there is complete continuity between the mounting bolt(s) and the vehicle body.
7. Check for incorrect wiring.
8. Check that the wiring is clamped firmly to prevent contact with sharp corners of the vehicle body, etc. or hot parts (exhaust manifold, pipe, etc.).
9. Check that the wiring is clamped firmly to secure enough clearance from the fan pulley, fan belt and other rotating or moving parts.
10. Check that the wiring between the fixed parts such as the vehicle body and the vibrating parts such as the engine are made with adequate allowance for vibrations.

## BATTERY HANDLING

When checking or servicing does not require power from the vehicle battery, be sure to disconnect the cable from the negative battery terminal. This is to prevent problems that could be caused by a short-circuit. Disconnect the negative battery terminal first and reconnect it last.

### Caution

1. **Before connecting or disconnecting the negative cable, be sure to turn off the ignition switch and the lighting switch.**  
(If this is not done, there is the possibility of semiconductor parts being damaged.)
2. **After completion of the work steps (when the negative battery terminal is connected), warm up the engine and allow it to idle for approximately 15 minutes under the conditions described below in order to stabilize engine control conditions, and then check that the idling is satisfactory.**

**Engine coolant temperature: 85–95°C (185–203°F)**

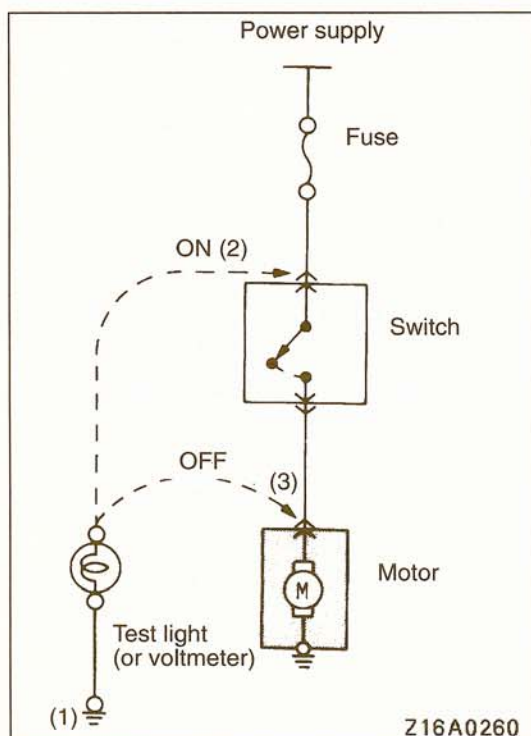
**Lights and all accessories: OFF**

**Transmission: N (P range for vehicles with A/T)**

**Steering wheel: Neutral (straight-forward) position**

**GENERAL ELECTRICAL SYSTEM CHECKS**

A circuit consists of the power supply, switch, relay, load, ground, etc. There are various methods to check a circuit including an overall check, voltage check, short-circuit check and continuity check. Each of these methods is briefly described in the following.

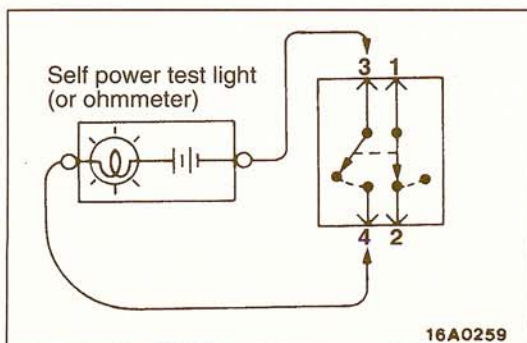
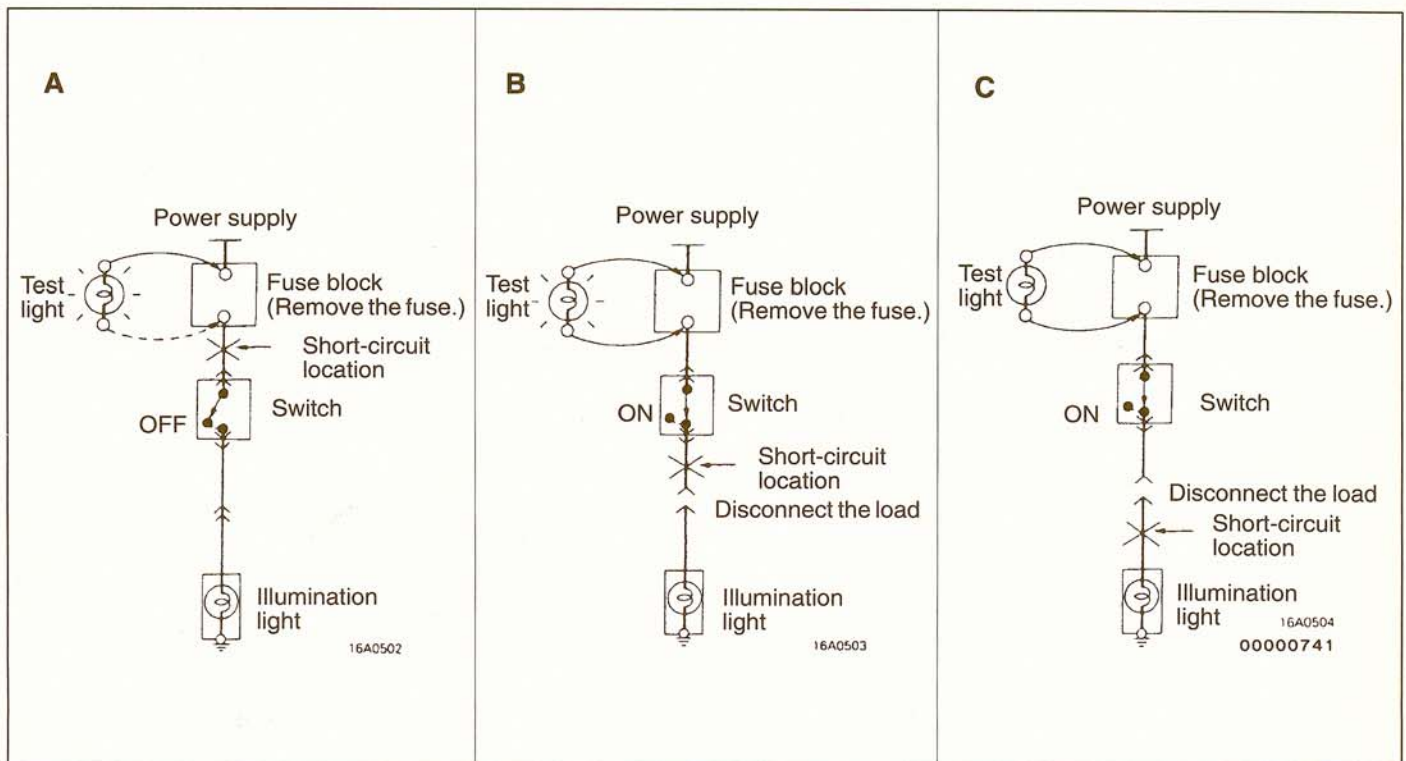
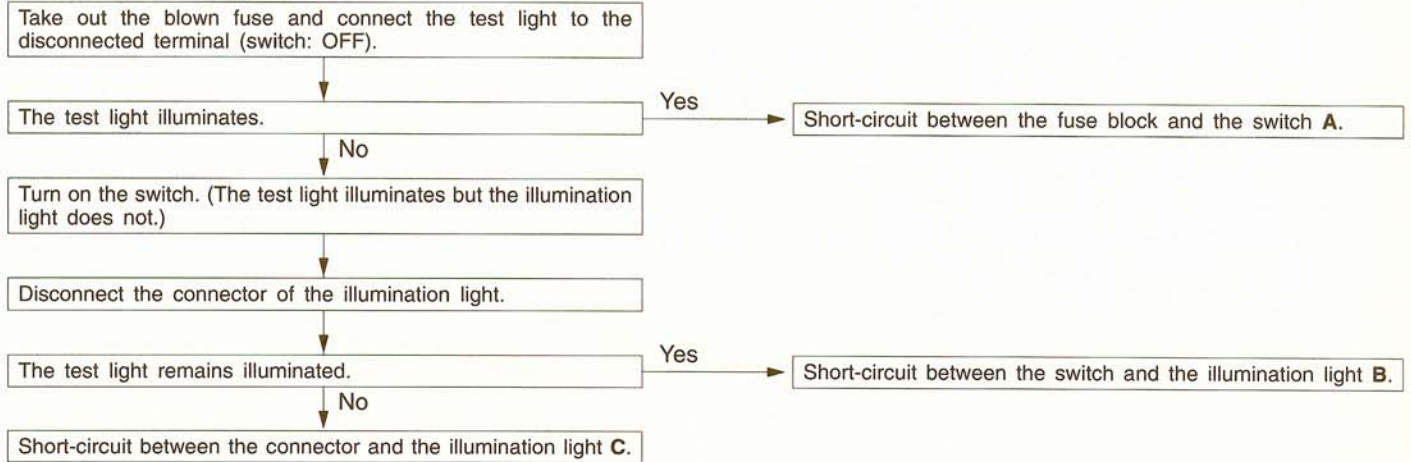
**1. VOLTAGE CHECK**

- (1) Ground one lead wire of the test light. If a voltmeter is used instead of the test light, ground the grounding side lead wire.
- (2) Connect the other lead wire of the test light to the power side terminal of the switch connector. The test light should illuminate or the voltmeter should indicate a voltage.
- (3) Then, connect the test light or voltmeter to the motor connector. The test light should not come on, or the voltmeter should indicate no voltage. When the switch is turned on in this condition, the test light should illuminate or the voltmeter should indicate a voltage when the motor starts to operate.
- (4) The circuit illustrated here is normal but if there is any problem such as the motor failing to operate, check the voltages, beginning at the connector nearest to the motor, until the malfunctioning part is identified.



## 2. SHORT-CIRCUIT CHECK

Because the fuse has blown, it is probable that there is a short circuit. Follow the procedures below to narrow down the short-circuit location.



## 3. CONTINUITY CHECK

- (1) When the switch is in the OFF position, the self power test light must illuminate or the ohmmeter should read 0 ohm only when the terminals 1 and 2 are interconnected.
- (2) When the switch is the ON position, the self power test light should come on or the ohmmeter should read 0 ohm only when the terminals 3 and 4 are interconnected.

NOTES




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# CONFIGURATION DIAGRAMS

## CONTENTS

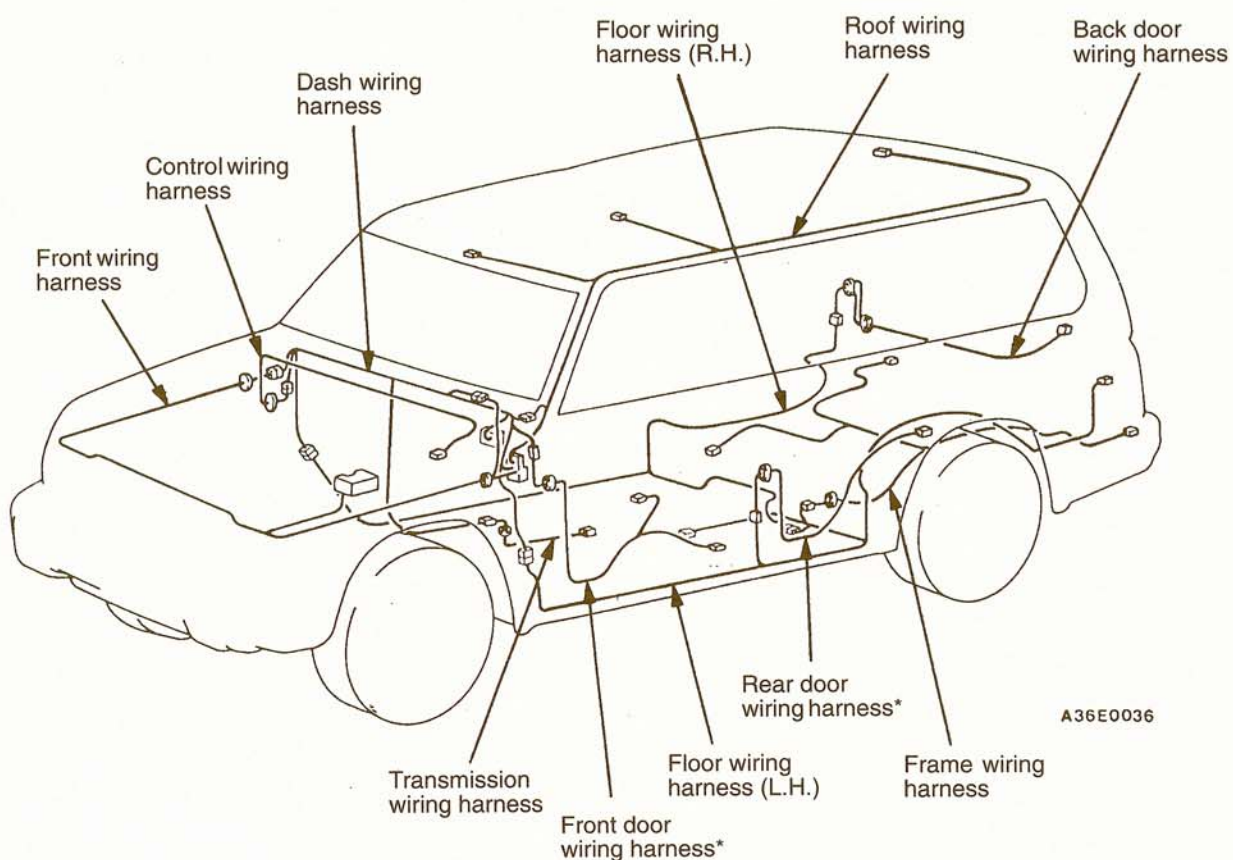
80109000050

Back Door and Rear Under Floor .....	58	Overall Configuration Diagram .....	34
Dash Panel .....	50	Transmission .....	48
Door .....	57		
Engine Compartment .....	36		
Floor and Roof .....	56		
How to Read Configuration Diagrams .....	35		
Instrument Panel and Floor Console .....	54		



## OVERALL CONFIGURATION DIAGRAM

80100010069



## Remarks

- (1) This diagram shows the main wiring harnesses.
- (2) \*: also equipped at the right side.



## HOW TO READ CONFIGURATION DIAGRAMS

80100020062

The wiring diagrams are prepared in such a way that the arrangement of connectors for each vehicle, and the routing of each harness, can be easily understood for each individual wiring section.

Indicates connector number

The same connector number is used throughout the circuit diagrams to facilitate connector location searches.

The first alphabetical symbol indicates the location site of the connector to parts in clockwise order on the diagram.

In addition, the number of connector wires and the connector color (except milk white)\* are shown for ease of retrieval.

Example:  $\underline{A-12} (\underline{2-B})$

Connector color

(milk white if no color is indicated)

Number of connector wires

Number specific to connector (serial number)

### Connector location site symbol

A: Engine compartment

B: Transmission

C: Dash panel

D: Instrument panel and floor console

E: Floor and roof

F: Door

G: Back door and rear under floor

\*: Typical connector colors

B : Black

Y : Yellow

L : Blue

G : Green

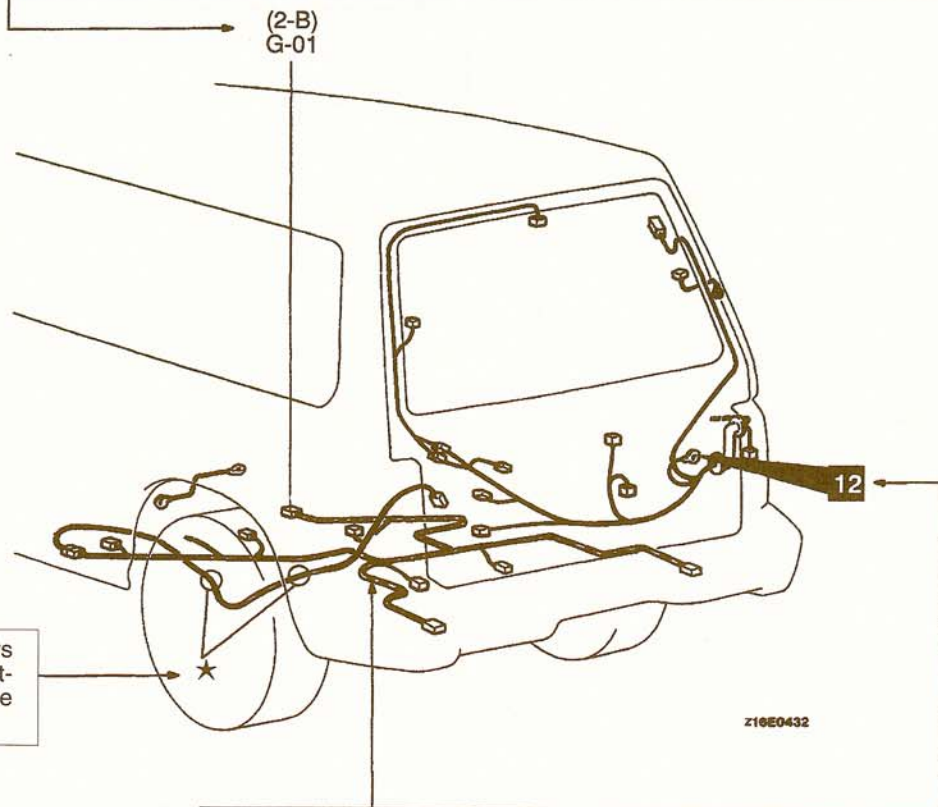
R : Red

BR: Brown

V : Violet

O : Orange

GR: Gray



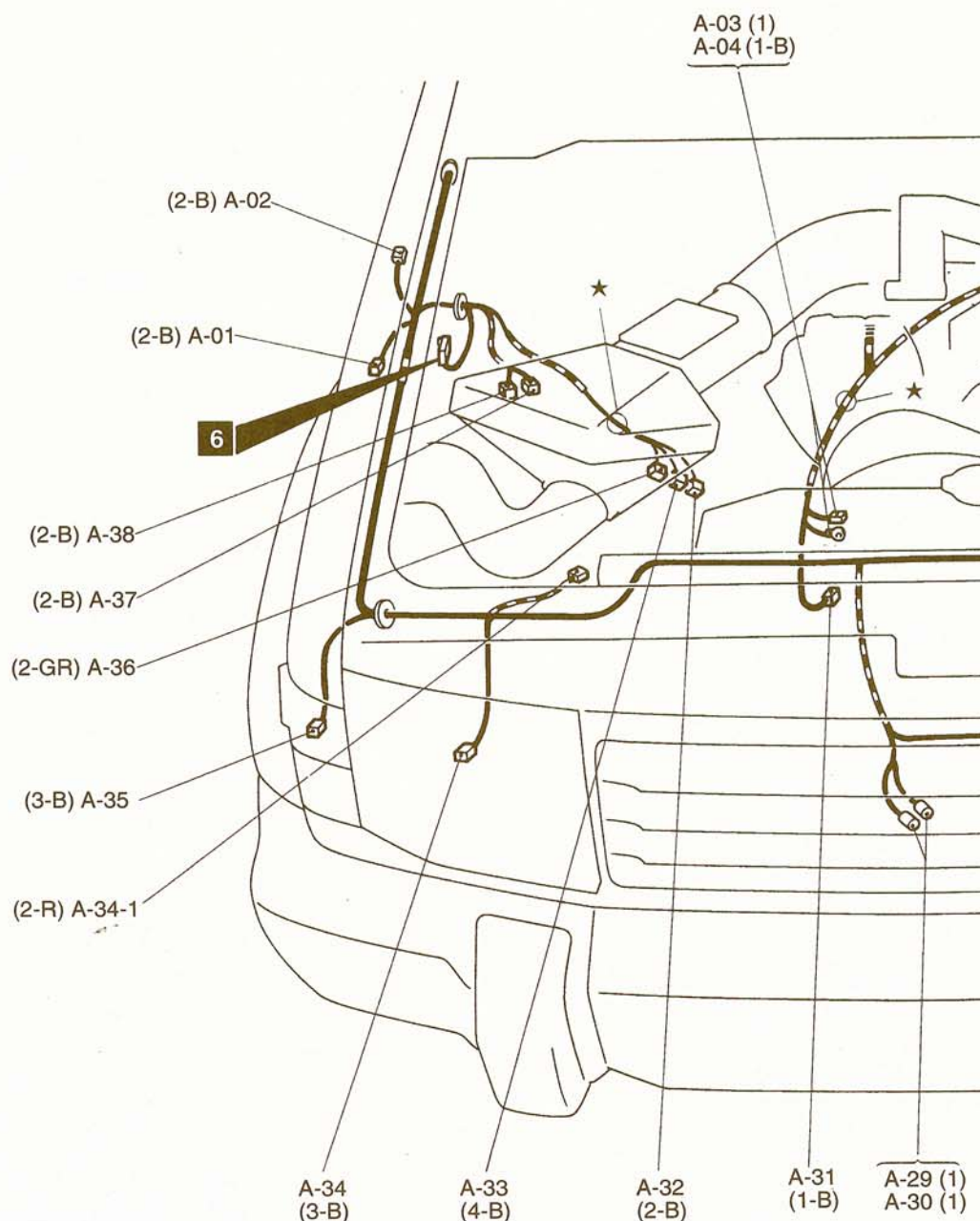
The mark ★ shows the standard mounting position of the wiring harness.

Indicates a section covered by a corrugated tube.

Indicates a ground point. Same ground number is used throughout circuit diagrams to facilitate search of ground point. For details of ground points, refer to P.4

## ENGINE COMPARTMENT &lt;3.0L-12 VALVE engine&gt;

80100030294

Connector  
symbol**A** -01  
thru  
-38

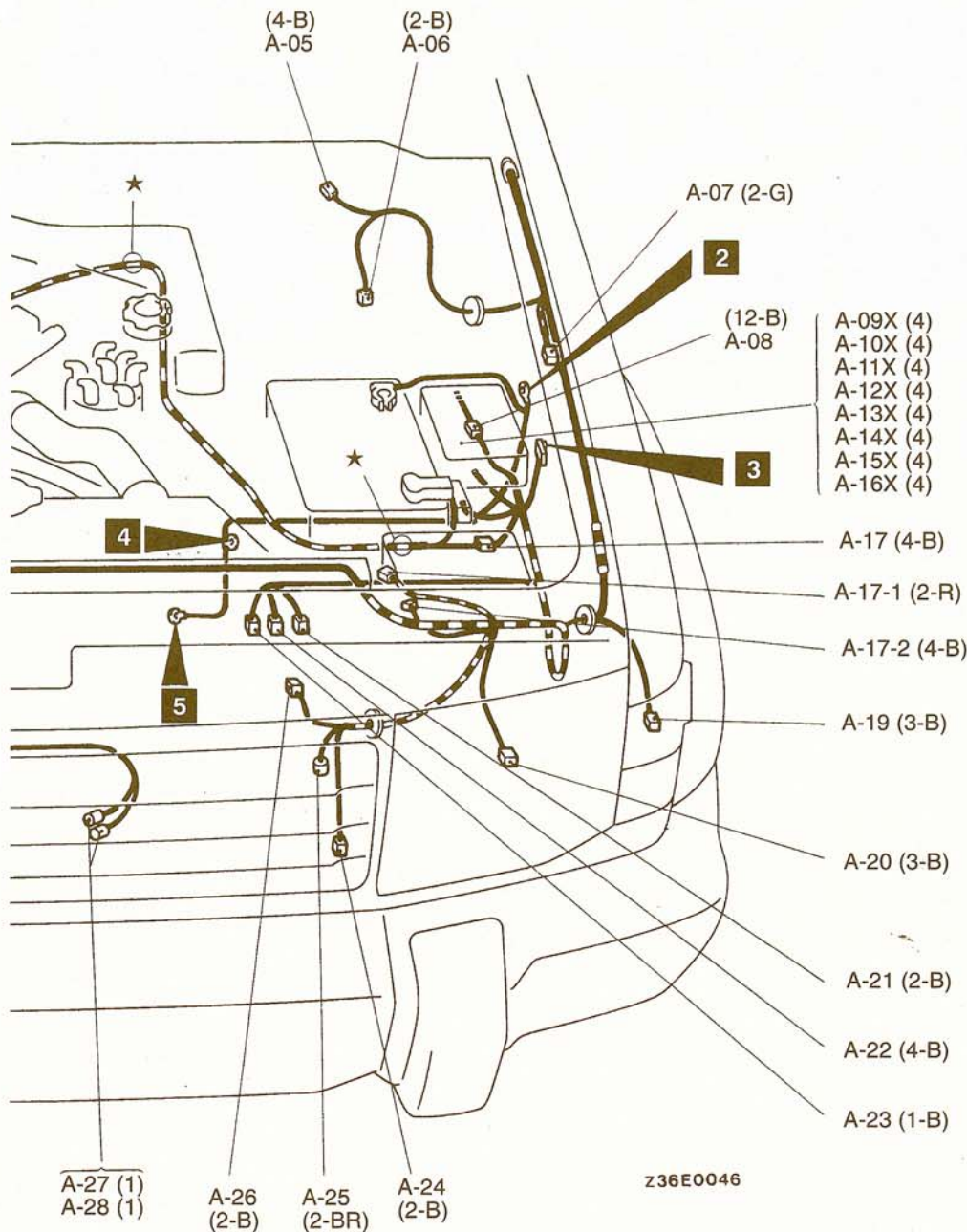
A-01 Headlight washer motor  
 A-02 Motor antenna  
 A-03 Starter  
 A-04 Starter  
 A-05 Windshield wiper motor  
 A-06 Brake fluid level switch  
 A-07 Windshield washer motor  
 A-08 Front wiring harness and control wiring harness combination

A-09X Refer to the centralized junction  
 A-10X Refer to the centralized junction  
 A-11X Refer to the centralized junction

A-12X Refer to the centralized junction  
 A-13X Refer to the centralized junction  
 A-14X Refer to the centralized junction  
 A-15X Refer to the centralized junction  
 A-16X Refer to the centralized junction  
 A-17 Positive battery cable and front wiring harness combination  
 A-17-1 Front impact sensor (L.H.)  
 A-17-2 Horn relay  
 A-19 Front combination light (L.H.)

TSB Revision



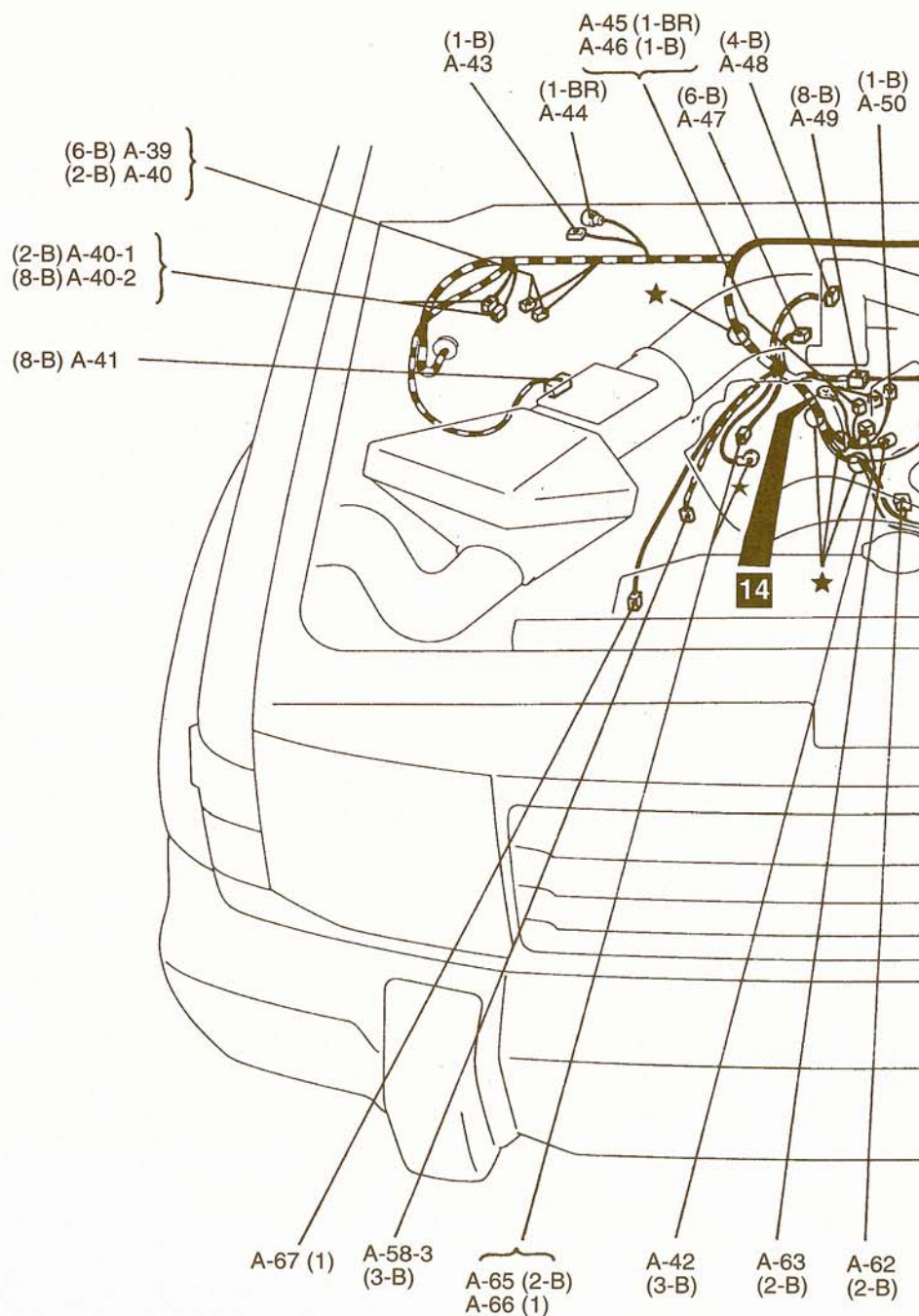


- A-20 Headlight (L.H.)
- A-21 Speed sensor (Front: L.H.) <ABS>
- A-22 Shock absorber (Front: L.H.)
- A-23 Magnetic clutch <A/C>
- A-24 Outside temperature sensor <Multi-meter>
- A-25 Dual pressure switch <A/C>
- A-26 Condenser fan motor <A/C>
- A-27 Horn (LO)
- A-28 Horn (LO)
- A-29 Horn (HI)
- A-30 Horn (HI)
- A-31 Oil pressure switch

- A-32 Speed sensor (Front: R.H.) <ABS>
- A-33 Shock absorber (Front: R.H.)
- A-34 Headlight (R.H.)
- A-34-1 Front impact sensor (R.H.)
- A-35 Front combination light (R.H.)
- A-36 Free wheel engage switch
- A-37 Solenoid valve A
- A-38 Solenoid valve B

Connector  
symbol

**A** -39  
thru  
-67



A-39 Hydraulic unit <ABS>

A-40 Hydraulic unit <ABS>

A-40-1 ABS relay box

A-40-2 ABS relay box

A-41 Volume air flow sensor  
(with built-in intake  
air temperature sensor  
and barometric pressure sensor)

A-41-1 EGR solenoid

A-42 Ignition power transistor

A-43 Fuel pump check connector

A-44 Ignition timing adjustment connector

A-45 Noise filter

A-46 Noise filter

A-47 Idle air control motor

A-48 Throttle position sensor

A-49 Control wiring harness and injection wiring harness combination

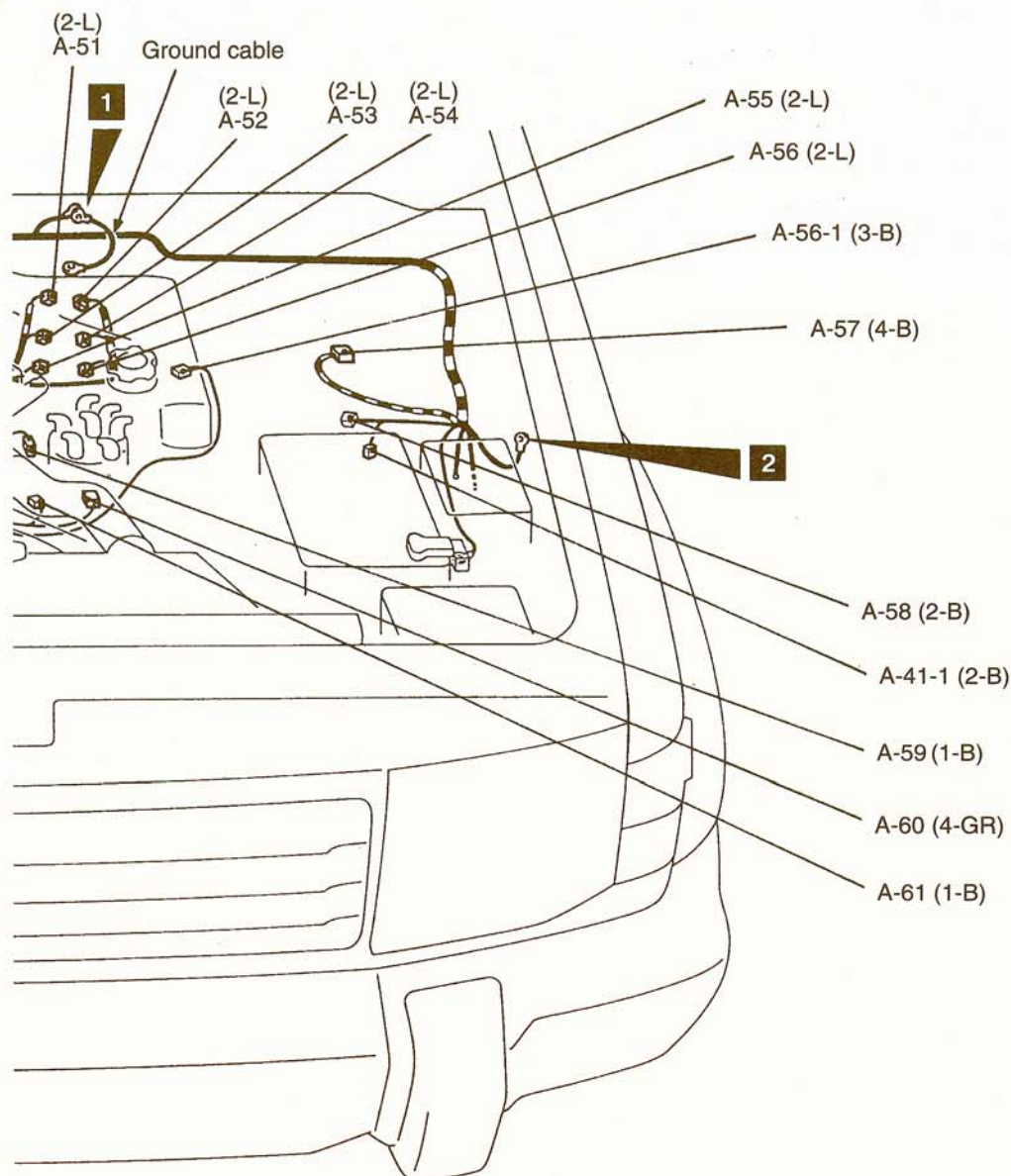
A-50 Capacitor

A-51 Injector No. 5

A-52 Injector No. 6

A-53 Injector No. 3





A36E0171

A-54 Injector No. 4  
 A-55 Injector No. 1  
 A-56 Injector No. 2  
 A-56-1 Manifold differential pressure sensor  
 A-57 Cruise control actuator  
 A-58 Evaporative emission purge solenoid  
 A-58-3 Crankshaft position sensor  
 A-59 Engine coolant temperature gage unit

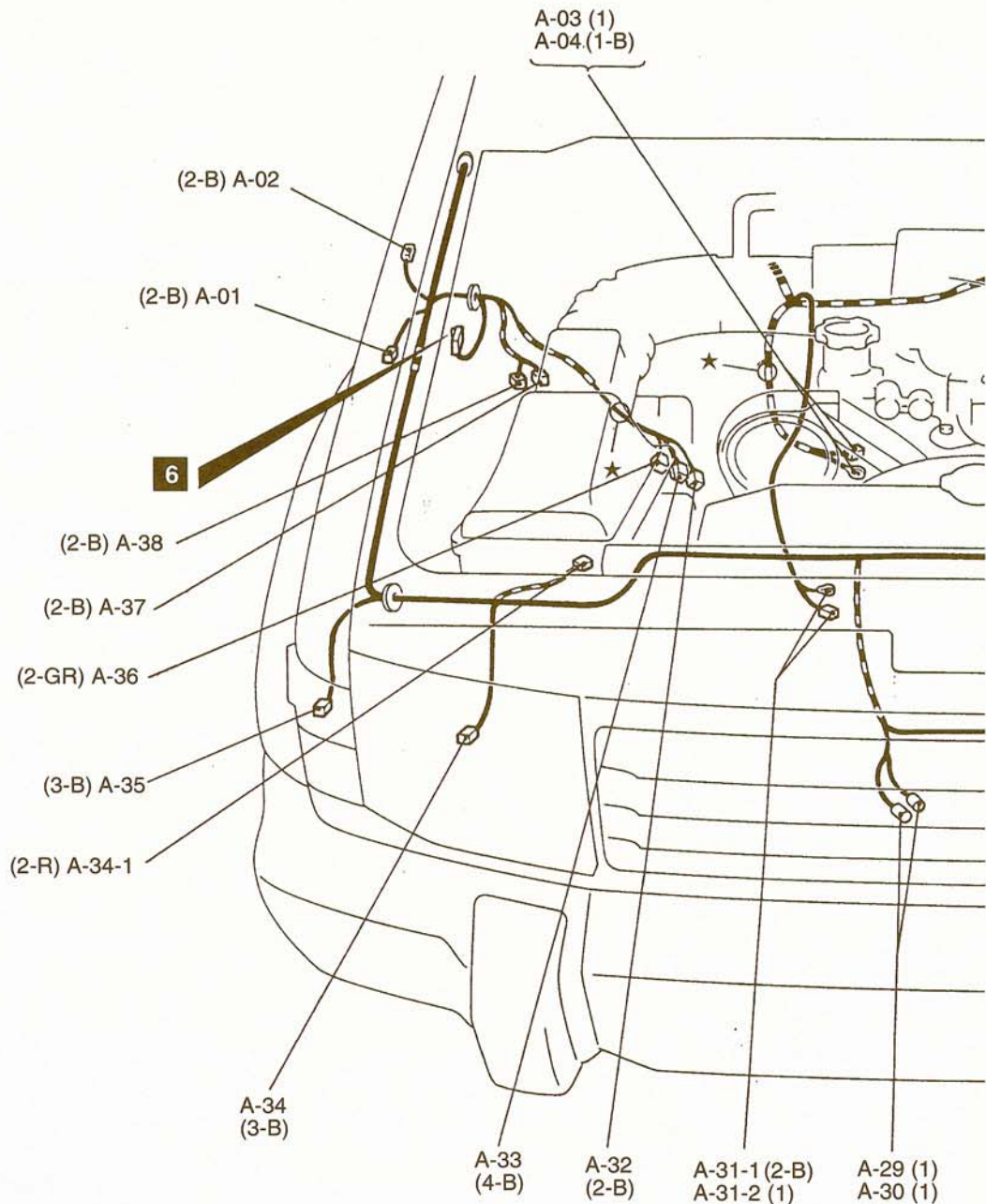
A-60 Distributor signal generator  
 A-61 Engine coolant temperature switch <A/T>  
 A-62 Engine coolant temperature sensor  
 A-63 Ignition coil  
 A-65 Generator  
 A-66 Generator  
 A-67 Power steering pressure switch

# ENGINE COMPARTMENT <3.0L-24 VALVE engine>

80100030300

Connector  
symbol

**A** -01  
thru  
-38

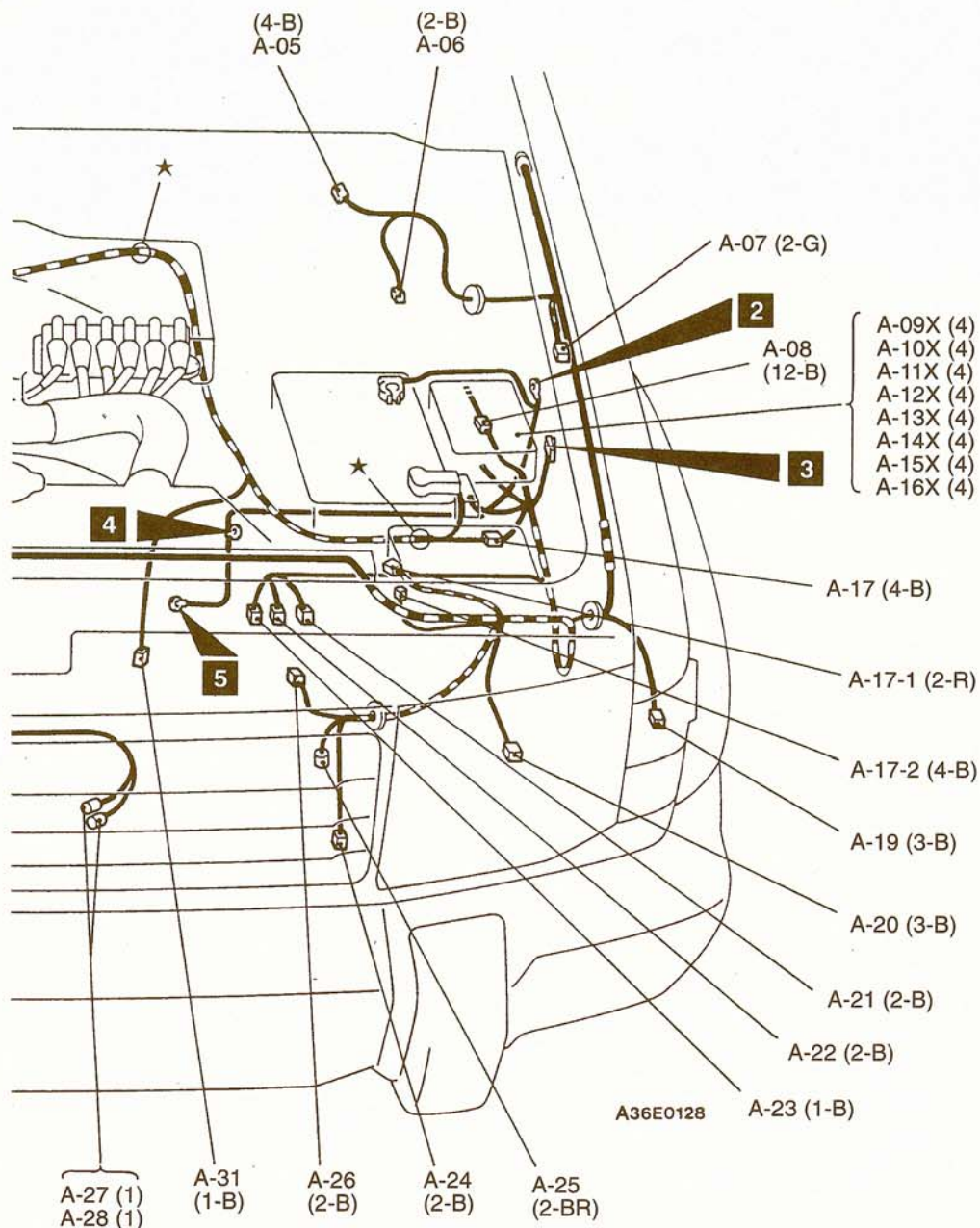


- A-01 Headlight washer motor
- A-02 Motor antenna
- A-03 Starter
- A-04 Starter
- A-05 Windshield wiper motor
- A-06 Brake fluid level switch
- A-07 Windshield washer motor
- A-08 Front wiring harness and control wiring harness combination
- A-09X Refer to the centralized junction
- A-10X Refer to the centralized junction

- A-11X Refer to the centralized junction
- A-12X Refer to the centralized junction
- A-13X Refer to the centralized junction
- A-14X Refer to the centralized junction
- A-15X Refer to the centralized junction
- A-16X Refer to the centralized junction
- A-17 Positive battery cable and front wiring harness combination
- A-17-1 Front impact sensor (L.H.)
- A-17-2 Horn relay
- A-19 Front combination light (L.H.)

TSB Revision



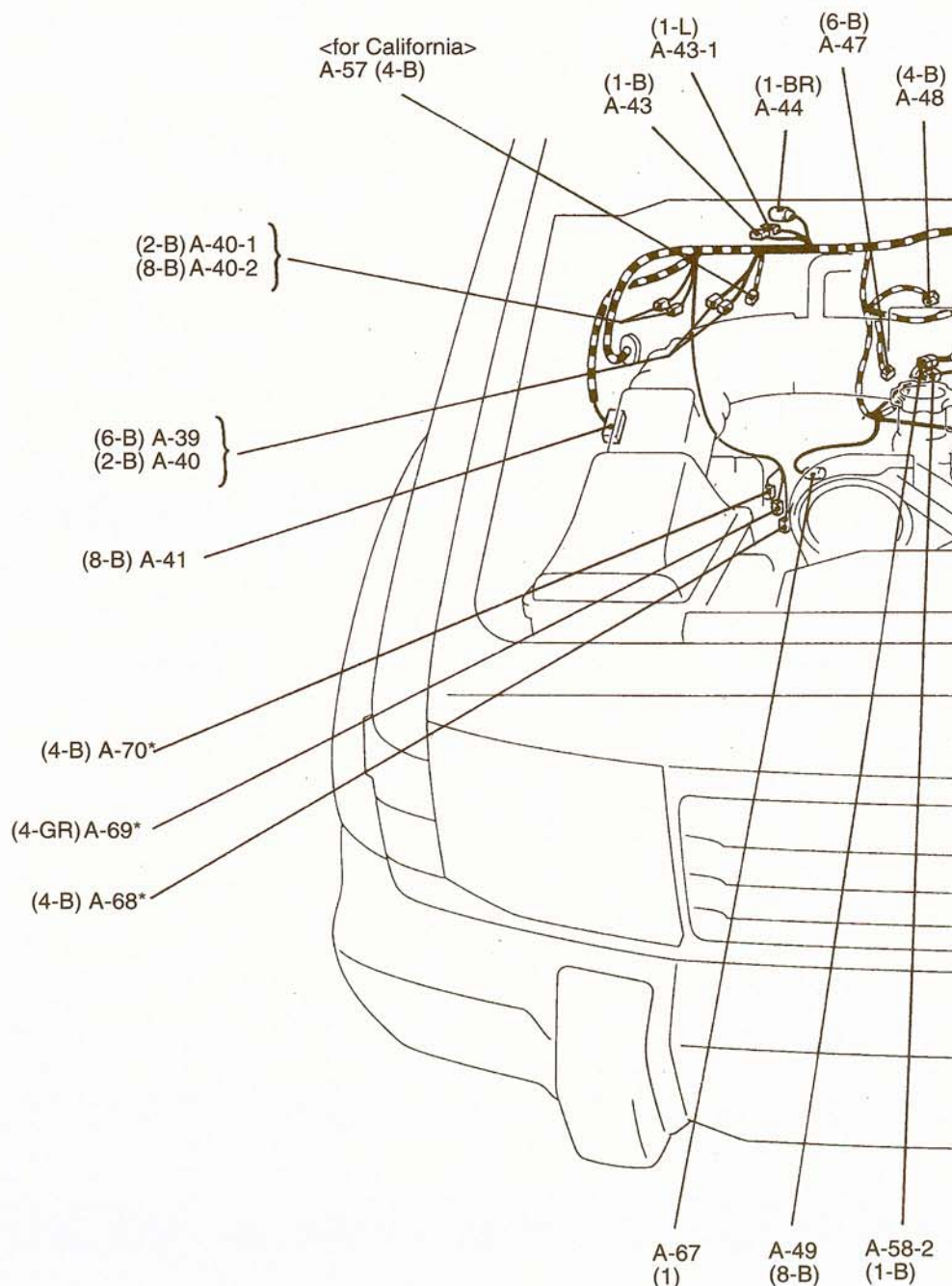


- A-20 Headlight (L.H.)
- A-21 Speed sensor (Front: L.H.) <ABS>
- A-22 Shock absorber (Front: L.H.)
- A-23 Magnetic clutch <A/C>
- A-24 Outside temperature sensor <Multi-meter>
- A-25 Dual pressure switch <A/C>
- A-26 Condenser fan motor <A/C>
- A-27 Horn (LO)
- A-28 Horn (LO)
- A-29 Horn (HI)
- A-30 Horn (HI)
- A-31 Oil pressure switch

- A-31-1 Generator
- A-31-2 Generator
- A-32 Speed sensor (Front: R.H.) <ABS>
- A-33 Shock absorber (Front: R.H.)
- A-34 Headlight (R.H.)
- A-34-1 Front impact sensor (R.H.)
- A-35 Front combination light (R.H.)
- A-36 Free wheel engage switch
- A-37 Solenoid valve A
- A-38 Solenoid valve B

# Connector symbol

**A** -39  
thru  
-70

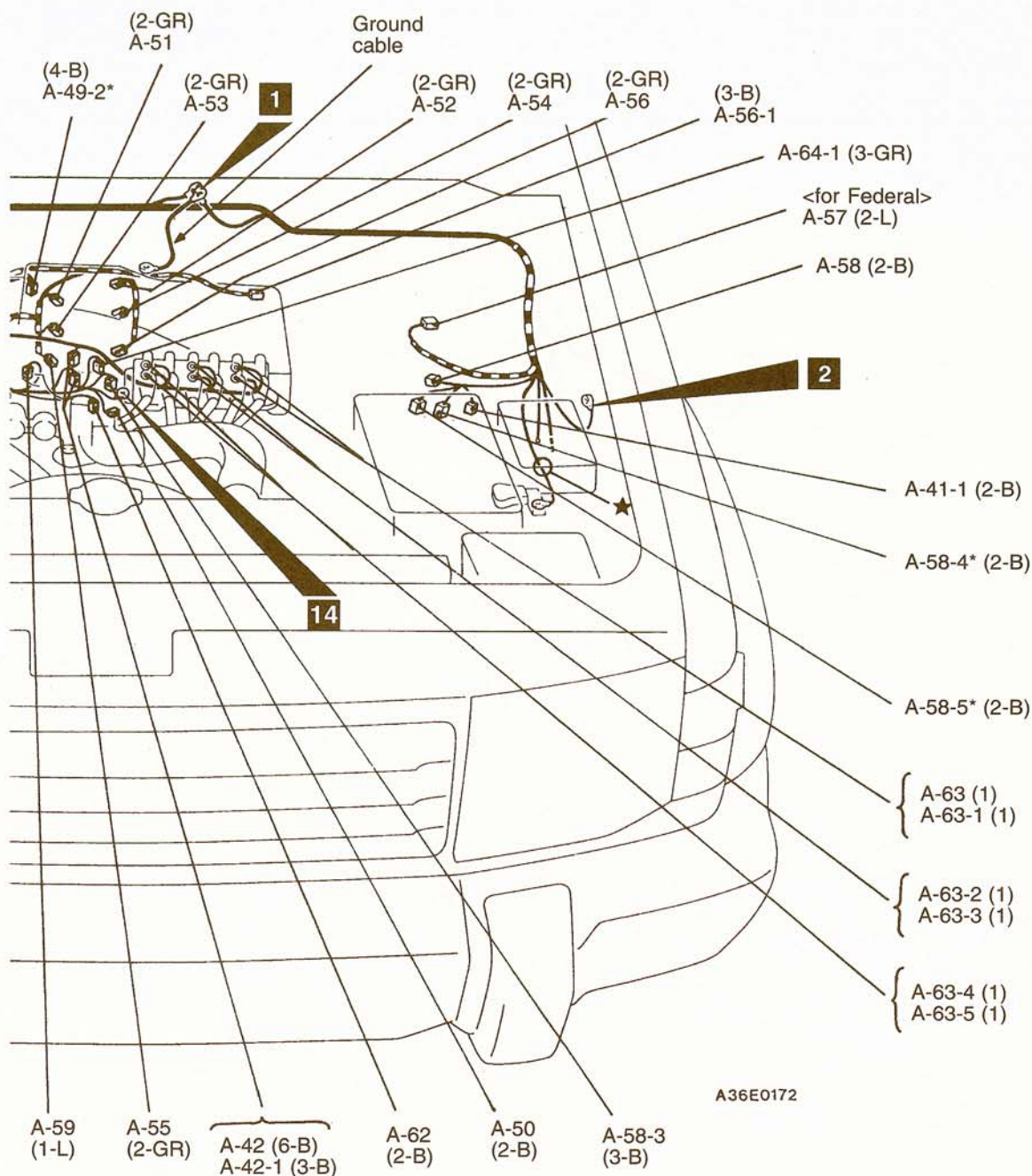


A-39 Hydraulic unit <ABS>  
A-40 Hydraulic unit <ABS>  
A-40-1 ABS relay box  
A-40-2 ABS relay box  
A-41 Volume air flow sensor  
(with built-in intake  
air temperature sensor  
and barometric pressure sensor)  
A-41-1 EGR solenoid <for Federal>  
A-42 Ignition power transistor  
A-42-1 Ignition power transistor  
A-43 Fuel pump check connector  
A-43-1 Engine speed detection connector

A-44 Ignition timing adjustment connector  
A-47 Idle air control motor  
A-48 Throttle position sensor  
A-49 Control wiring harness and injection wiring harness  
combination  
A-49-2\*Left bank heated oxygen sensor (front)  
A-50 Capacitor  
A-51 Injector No. 5  
A-52 Injector No. 6  
A-53 Injector No. 3  
A-54 Injector No. 4  
A-55 Injector No. 1  
A-56 Injector No. 2

**TSB Revision**





A36E0172

A-56-1 Manifold differential pressure sensor for Federal  
 A-57 Cruise control actuator  
 A-58 Evaporative emission purge solenoid (S)  
 A-58-2 Control wiring harness and ignition wiring harness combination  
 A-58-3 Crankshaft position sensor  
 A-58-4\* Evaporative emission purge solenoid (L)  
 A-58-5\* Evaporative emission ventilation solenoid  
 A-59 Engine coolant temperature gage unit  
 A-62 Engine coolant temperature sensor  
 A-63 Ignition coil  
 A-63-1 Ignition coil

A-63-2 Ignition coil  
 A-63-3 Ignition coil  
 A-63-4 Ignition coil  
 A-63-5 Ignition coil  
 A-64-1 Camshaft position sensor  
 A-67 Power steering pressure switch  
 A-68\* Right bank heated oxygen sensor (front)  
 A-69\* Right bank heated oxygen sensor (rear)  
 A-70\* Left bank heated oxygen sensor (rear)

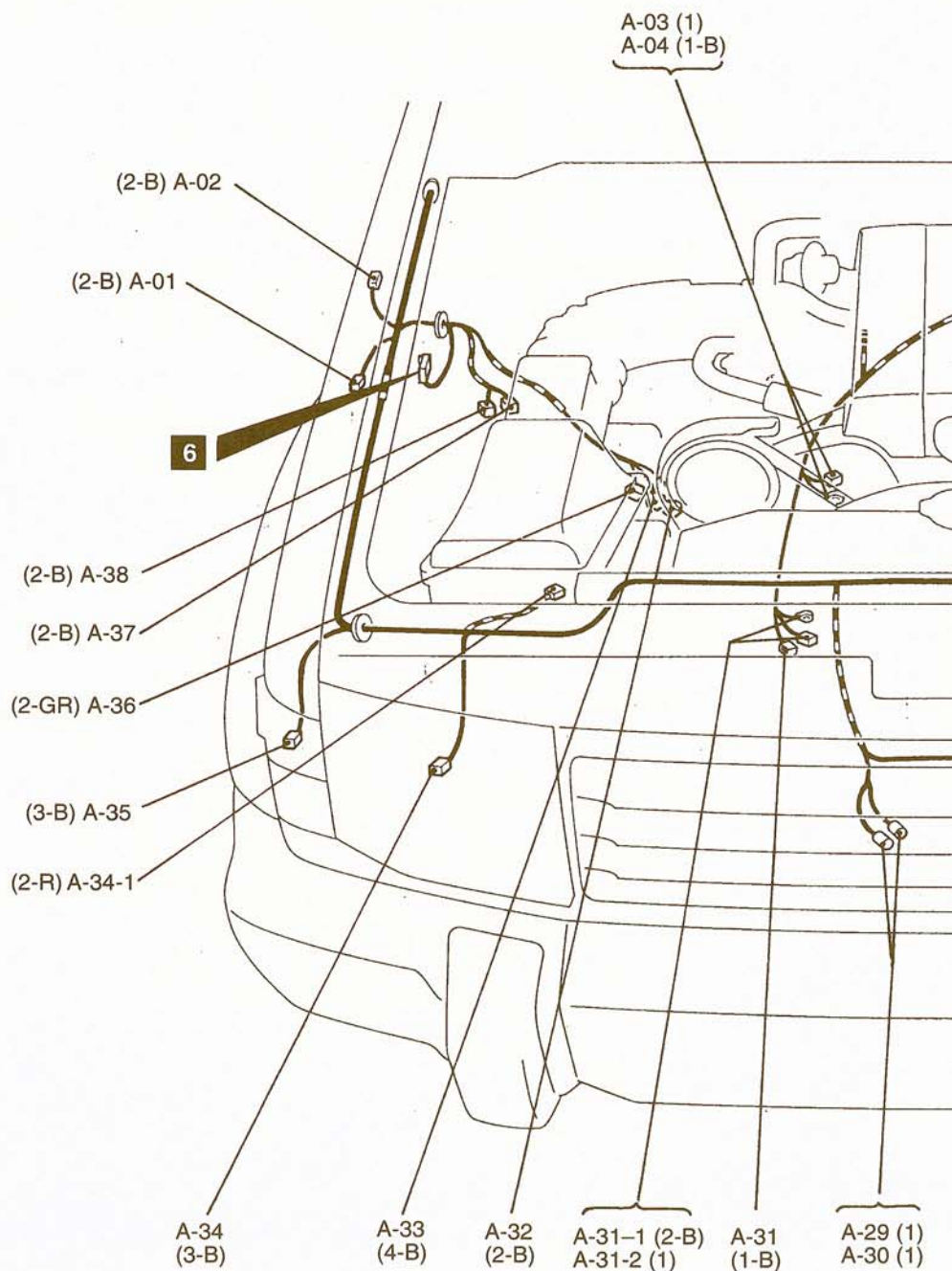
Remark  
 \*: Vehicles for California

# ENGINE COMPARTMENT <3.5L engine>

80100030317

Connector  
symbol

**A** -01  
thru  
-38



- A-01 Headlight washer motor
- A-02 Motor antenna
- A-03 Starter
- A-04 Starter
- A-05 Windshield wiper motor
- A-06 Brake fluid level switch
- A-07 Windshield washer motor
- A-08 Front wiring harness and control wiring harness combination
- A-09X Refer to the centralized junction.
- A-10X Refer to the centralized junction.

- A-11X Refer to the centralized junction.
- A-12X Refer to the centralized junction.
- A-13X Refer to the centralized junction.
- A-14X Refer to the centralized junction.
- A-15X Refer to the centralized junction.
- A-16X Refer to the centralized junction.
- A-17 Positive battery cable and front wiring harness combination
- A-17-1 Front impact sensor (L.H.)
- A-17-2 Horn relay
- A-19 Front combination light (L.H.)

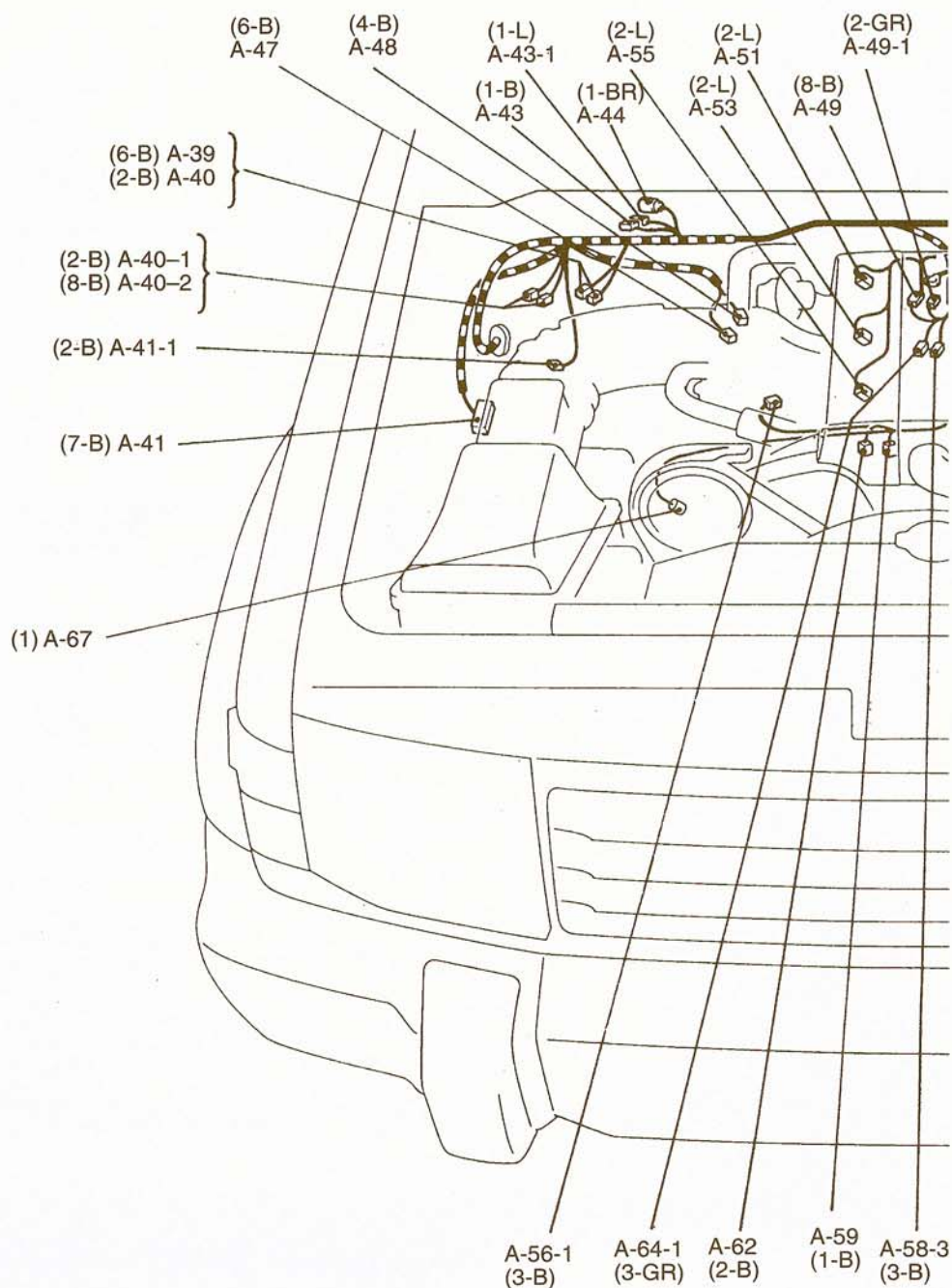
TSB Revision





# Connector symbol

**A** -39  
thru  
-67

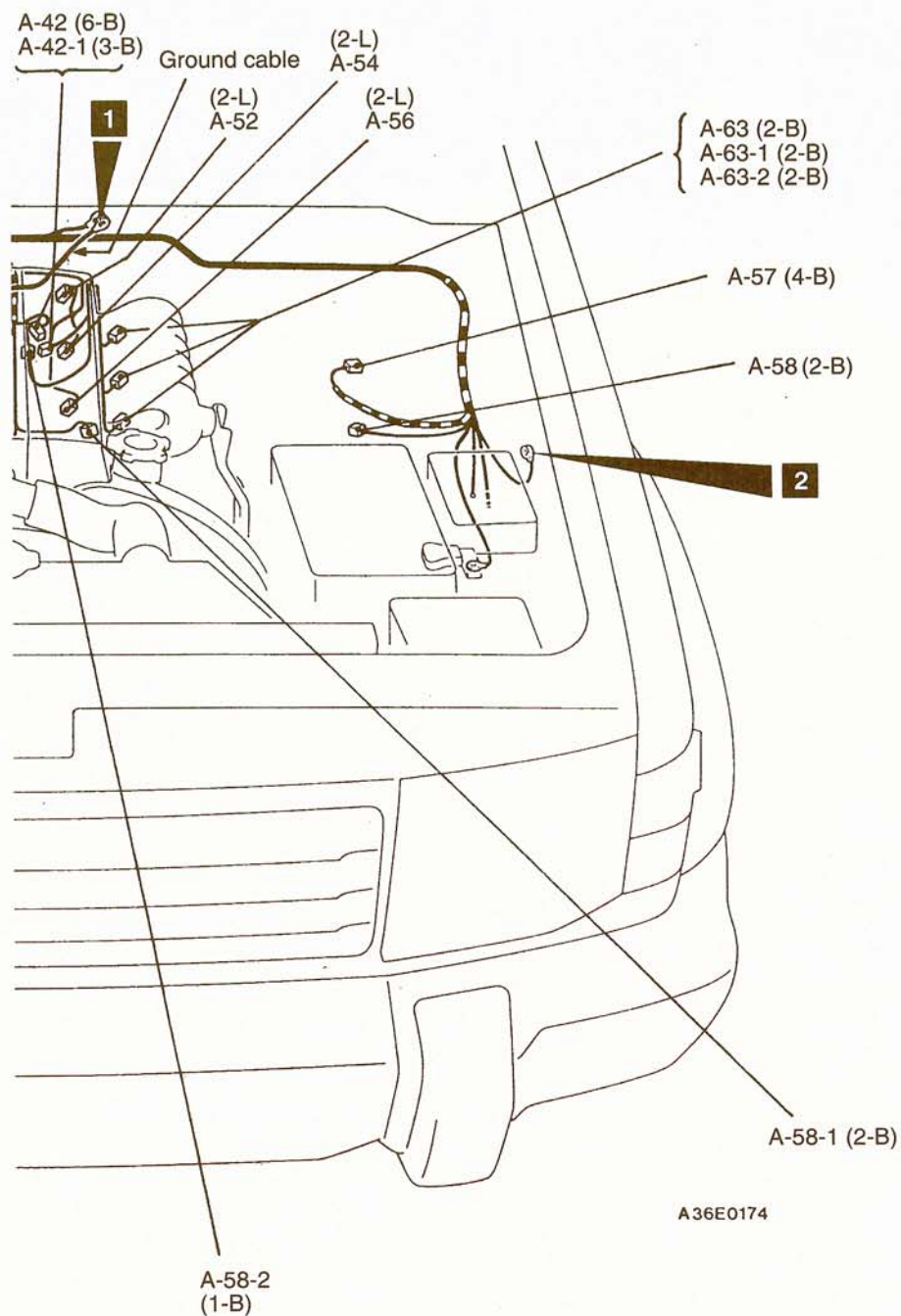


A-39 Hydraulic unit <ABS>  
A-40 Hydraulic unit <ABS>  
A-40-1 ABS relay box  
A-40-2 ABS relay box  
A-41 Volume air flow sensor  
(with built-in intake  
air temperature sensor  
and barometric pressure sensor)  
A-41-1 EGR solenoid  
A-42 Ignition power transistor  
A-42-1 Ignition power transistor  
A-43 Fuel pump check connector  
A-43-1 Engine speed detection connector

A-44 Ignition timing adjustment connector  
A-47 Idle air control motor  
A-48 Throttle position sensor  
A-49 Control wiring harness and  
injection wiring harness combination  
A-49-1 Knock sensor  
A-51 Injector No. 5  
A-52 Injector No. 6  
A-53 Injector No. 3  
A-54 Injector No. 4  
A-55 Injector No. 1  
A-56 Injector No. 2  
A-56-1 Manifold differential pressure sensor

TSB Revision





A36E0174

A-57 Cruise control actuator  
 A-58 Evaporative emission purge solenoid  
 A-58-1 Variable induction control solenoid  
 A-58-2 Control wiring harness and ignition wiring harness combination  
 A-58-3 Crankshaft position sensor  
 A-59 Engine coolant temperature gage unit

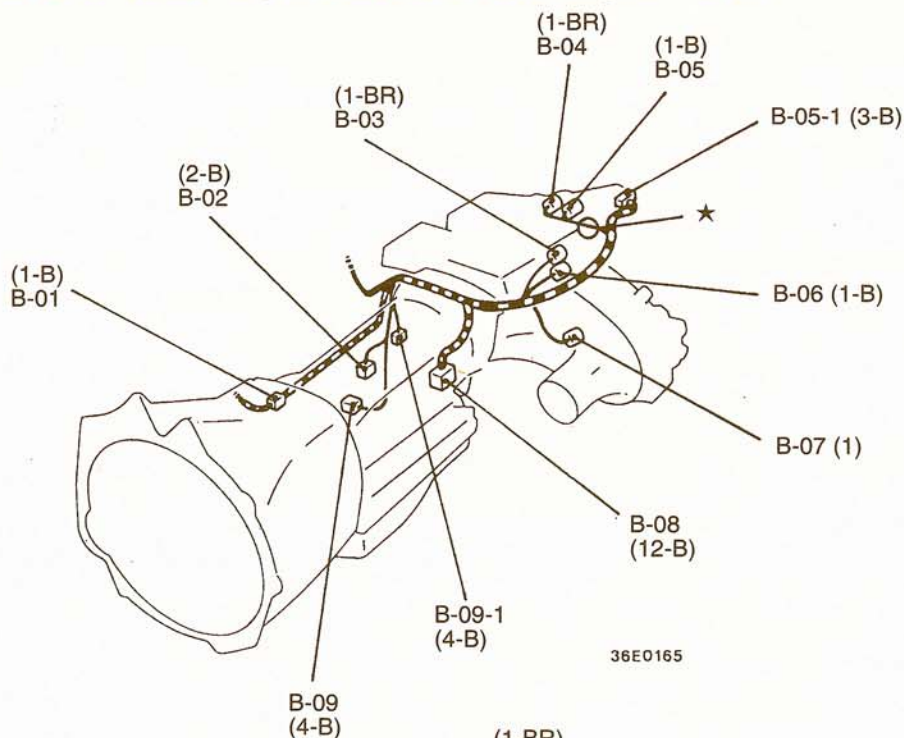
A-62 Engine coolant temperature sensor  
 A-63 Ignition coil  
 A-63-1 Ignition coil  
 A-63-2 Ignition coil  
 A-64-1 Camshaft position sensor  
 A-67 Power steering pressure switch

## TRANSMISSION

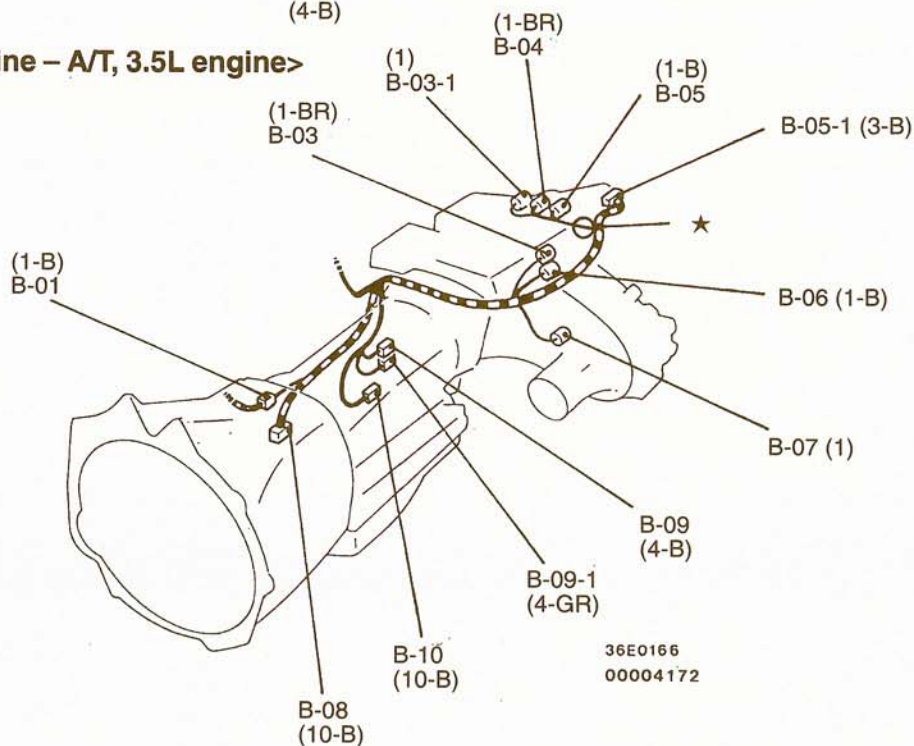
80100050016

Connector  
symbol**B**

&lt;3.0L-12 VALVE engine, 3.0L-24 VALVE engine – M/T&gt;



&lt;3.0L-24 VALVE engine – A/T, 3.5L engine&gt;



- |        |   |        |   |
|--------|---|--------|---|
| B-01   | Battery cable and transmission wiring harness combination | B-07   | High range/low range detection switch   |
| B-02   | Back-up light switch <M/T>                                | B-08   | Park/neutral position switch <A/T>  |
| B-03   | Center differential lock detection switch                 | B-09   | Heated oxygen sensor (front)  |
| B-03-1 | Low range operation detection switch                      |        | <except 3.0L-24 VALVE engine for California>  |
| B-04   | Center differential lock operation detection switch       | B-09-1 | Heated oxygen sensor (rear)   |
| B-05   | 4WD operation detection switch                            |        | <except 3.0L-24 VALVE engine for California>  |
| B-05-1 | Vehicle speed sensor                                      | B-10   | ELC 4-speed automatic transmission control solenoid <3.0L-24 VALVE engine, 3.5L engine> |
| B-06   | 2WD/4WD detection switch                                  |        |   |

TSB Revision

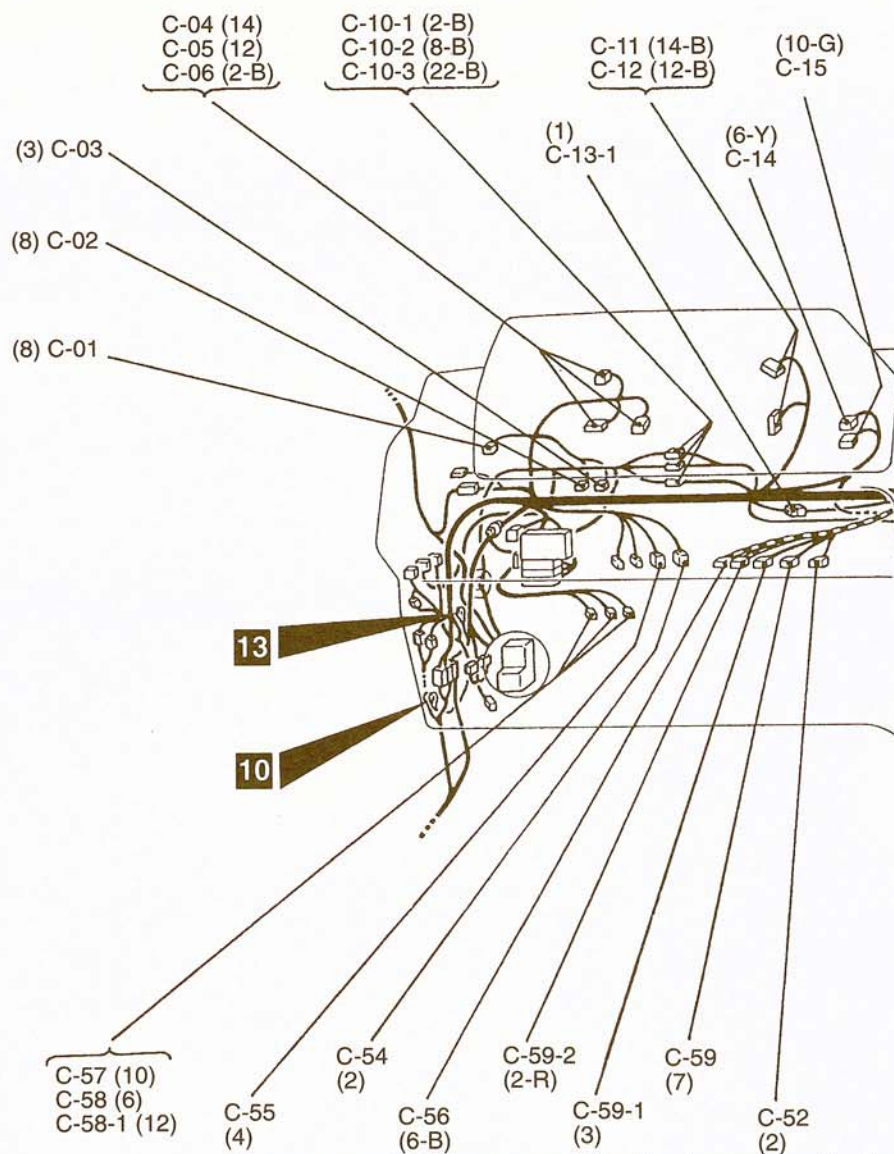
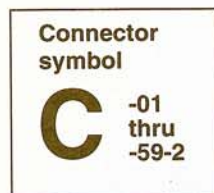


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**NOTES**

## DASH PANEL

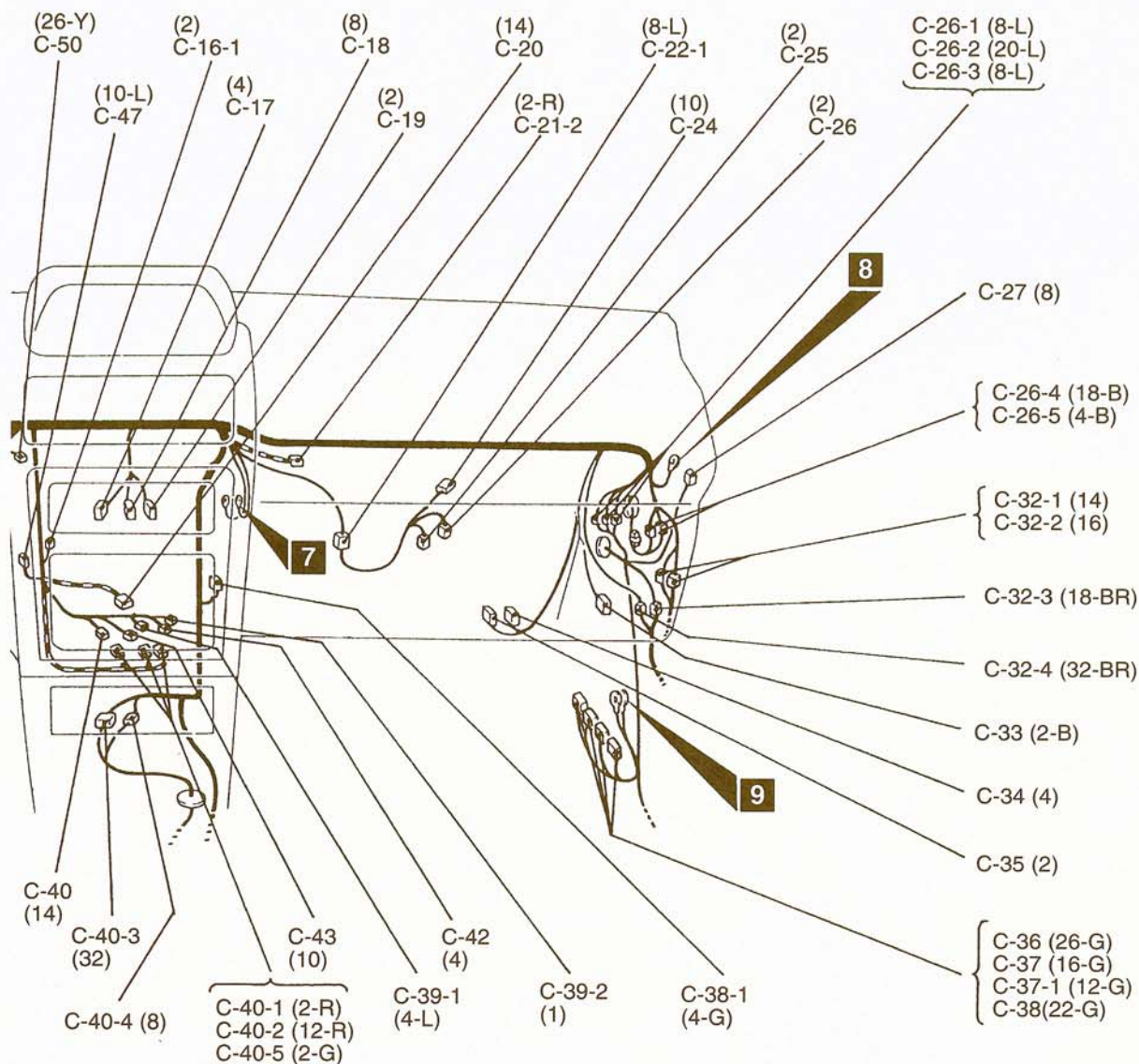
80100060118



C-01 Cruise control main switch  
C-02 Remote controlled mirror switch  
C-03 Rheostat  
C-04 Combination meter  
C-05 Combination meter  
C-06 Combination meter  
C-10-1 Front wiring harness and dash wiring harness combination  
C-10-2 Front wiring harness and dash wiring harness combination  
C-10-3 Front wiring harness and dash wiring harness combination  
C-11 Combination meter  
C-12 Combination meter  
C-13-1 Jumper connector <ABS>  
C-14 Defogger switch  
C-15 Hazard light switch  
C-16-1 No connection  
C-17 A/C switch  
C-18 Blower motor switch  
C-19 Heater control panel illumination light  
C-20 Radio  
C-21-2 Air bag module (passenger's side)  
C-32-2 Dash wiring harness and front door wiring harness (R.H.) combination

C-22-1 Dash wiring harness and A/C wiring harness combination  
C-24 A/C control unit  
C-25 Intake air temperature sensor  
C-26 Air inlet sensor  
C-26-1 Front wiring harness and dash wiring harness combination  
C-26-1 Front wiring harness and dash wiring harness combination  
C-26-2 Front wiring harness and dash wiring harness combination  
C-26-3 Front wiring harness and dash wiring harness combination  
C-26-4 Front wiring harness and dash wiring harness combination  
C-26-5 Front wiring harness and dash wiring harness combination  
C-27 Engine control relay  
C-32-1 Dash wiring harness and front door wiring harness (R.H.) combination  
C-32-2 Dash wiring harness and front door wiring harness (R.H.) combination  
C-32-3 Control wiring harness and floor wiring harness (R.H.) combination

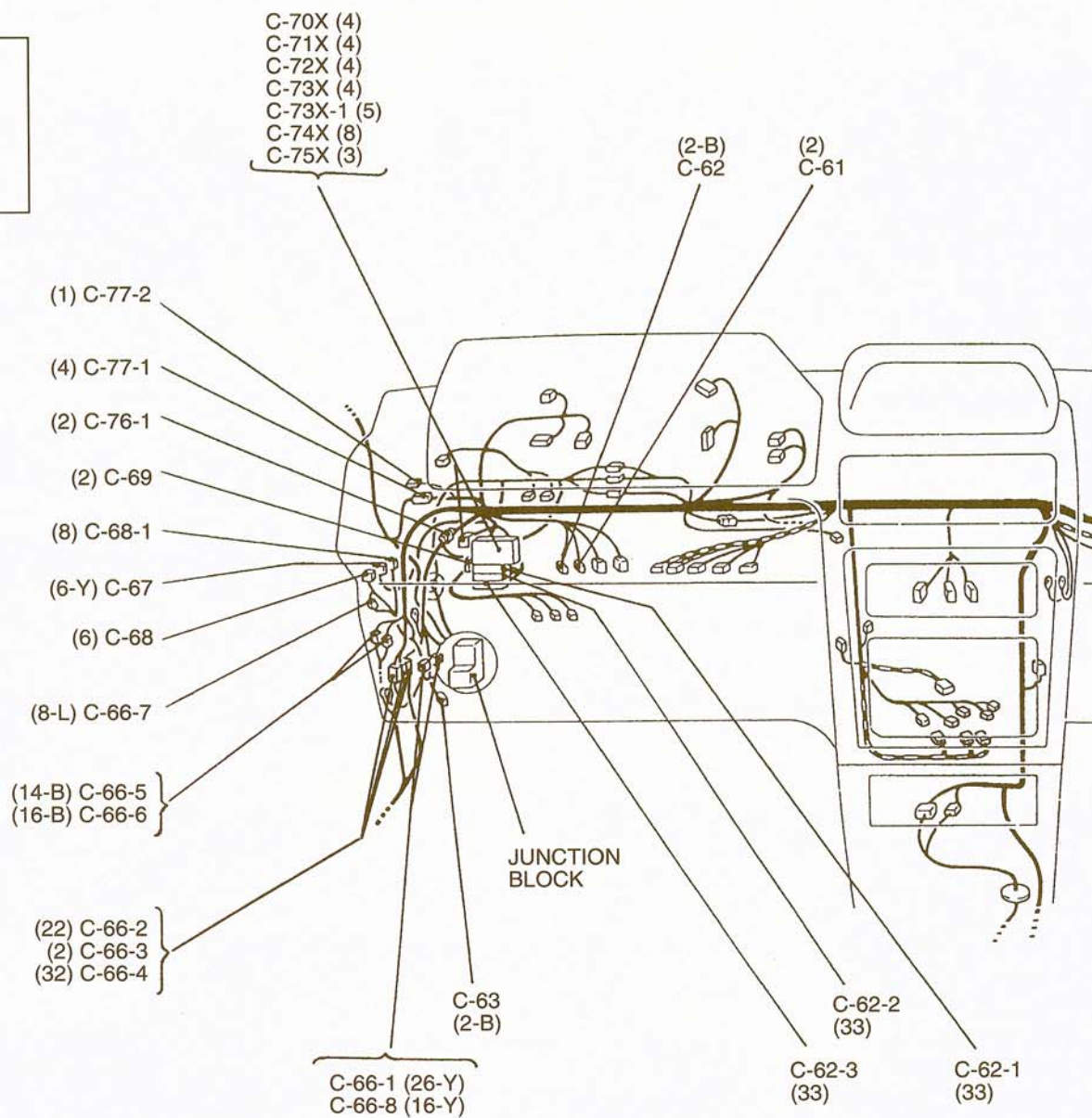
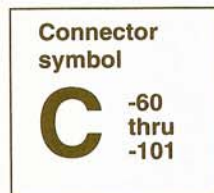




B36E0167

C-32-4 Control wiring harness and floor wiring harness (R.H.) combination  
 C-33 Front speaker (R.H.)  
 C-34 Resistor  
 C-35 Blower motor  
 C-36 Engine control module  
 C-37 Engine control module  
 C-37-1 Engine control module  
 C-38 Engine control module  
 C-38-1 Ignition key hole illumination light timer  
 C-39 Diode (for ABS circuit)  
 C-39-1 Diode (for MFI system circuit)  
 C-39-2 No connection  
 C-40 Motor antenna control unit  
 C-40-1 SRS diagnosis unit  
 C-40-2 SRS diagnosis unit  
 C-40-3 Dash wiring harness and transmission wiring harness combination  
 C-40-4 Dash wiring harness and transmission wiring harness combination

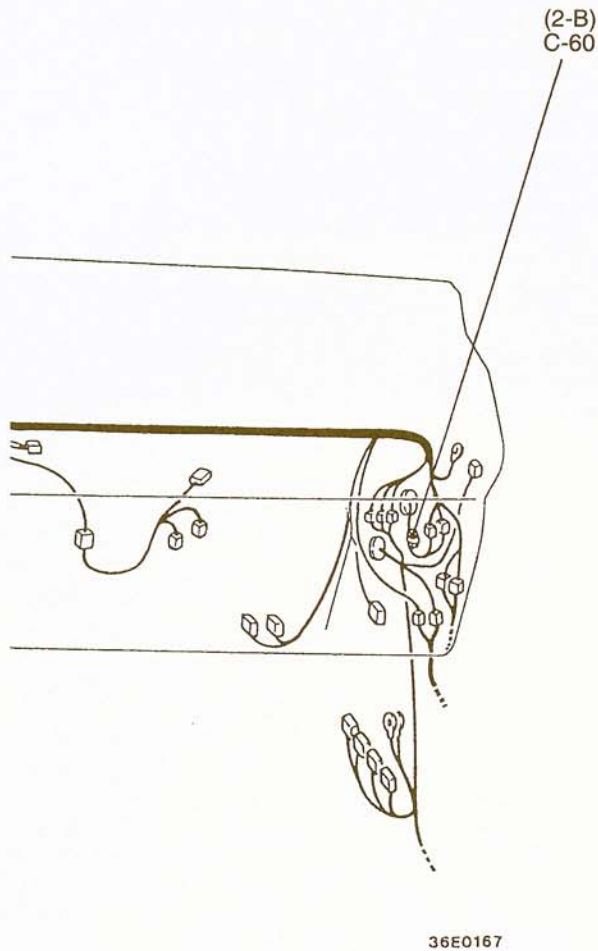
C-40-5 SRS diagnosis unit  
 C-42 Starter relay  
 C-43 4WD indicator control unit  
 C-47 Buzzer assembly  
 C-50 Cruise control unit or spare connector  
 C-52 No connection  
 C-54 Stop light switch (2-pin) or no connection  
 <Cruise control system>  
 C-55 Stop light switch (4-pin) <Cruise control system>  
 C-56 Ignition switch  
 C-57 Column switch  
 C-58 Column switch  
 C-58-1 Column switch  
 C-59 Key reminder switch  
 C-59-1 Clock spring  
 C-59-2 Clock spring



C-60 Diode (for Active Trac 4WD circuit)  
 C-61 Clutch pedal position switch <M/T>  
 C-62 Clutch pedal position switch <M/T-Cruise control system>  
 C-62-1 J/C (1)  
 C-62-2 J/C (2)  
 C-62-3 J/C (3)  
 C-63 Front speaker (L.H.)  
 C-66-1 ELC 4-speed automatic transmission control module  
 C-66-2 Dash wiring harness and floor wiring harness (L.H.) combination  
 C-66-3 Dash wiring harness and floor wiring harness (L.H.) combination  
 C-66-4 Dash wiring harness and floor wiring harness (L.H.) combination

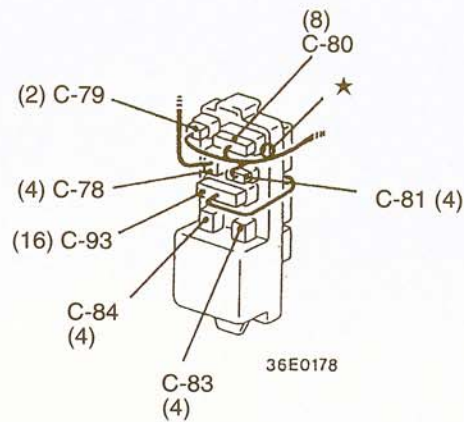
C-66-5 Dash wiring harness and front door wiring harness (L.H.) combination  
 C-66-6 Dash wiring harness and front door wiring harness (L.H.) combination  
 C-66-7 Door lock relay jumper connector  
 C-66-8 ELC 4-speed automatic transmission control module  
 C-67 Headlight washer relay  
 C-68 Defogger timer  
 C-68-1 Door lock control unit  
 C-69 Dedicated fuse No.9 (Sunroof)  
 C-70X Refer to the centralized junction.  
 C-71X Refer to the centralized junction.  
 C-72X Refer to the centralized junction.  
 C-73X Refer to the centralized junction.  
 C-73X-1 Refer to the centralized junction.



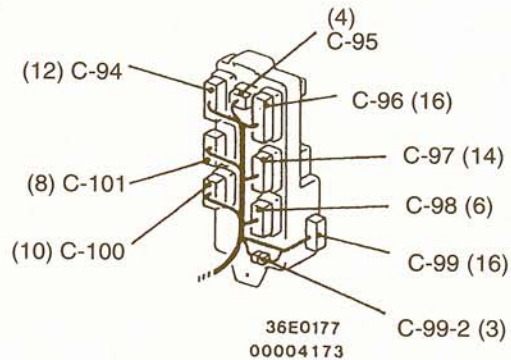


# JUNCTION BLOCK

## Front View



## Rear View



C-74X Refer to the centralized junction  
C-75X Refer to the centralized junction  
C-76-1 Diode (for Door light circuit)  
C-77-1 Roof wiring harness and dash wiring harness combination  
C-77-2 No connection  
C-78 Roof wiring harness and junction block  
C-79 Front wiring harness and junction block  
C-80 Front wiring harness and junction block  
C-81 Front wiring harness and junction block  
C-83 Bower motor relay

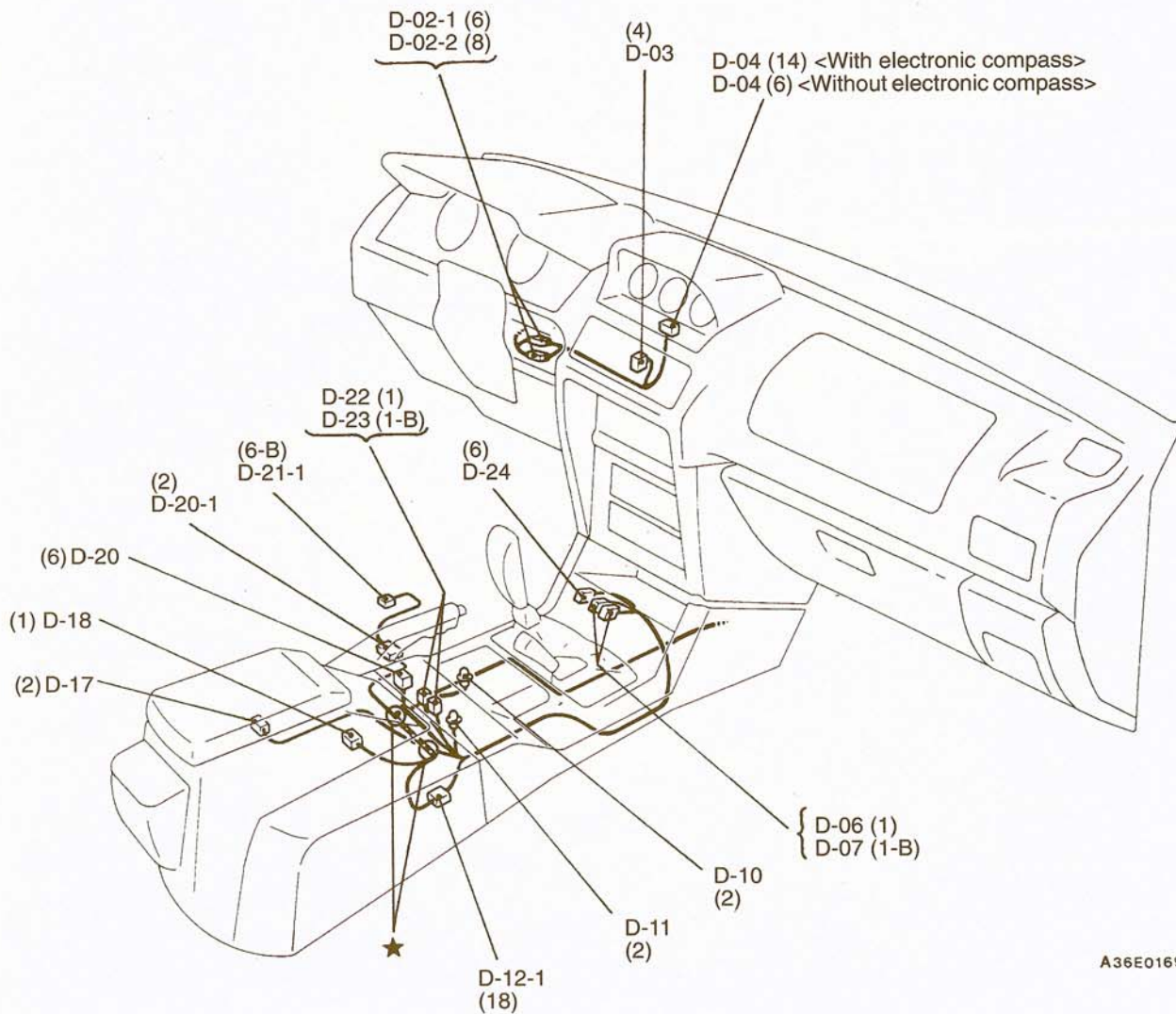
C-84 Accessory socket relay  
C-93 Dash wiring harness and junction block  
C-94 Dash wiring harness and junction block  
C-95 Dash wiring harness and junction block  
C-96 Dash wiring harness and junction block  
C-97 Dash wiring harness and junction block  
C-98 Dash wiring harness and junction block  
C-99 Data link connector  
C-99-1 Jumper connector  
C-100 Dash wiring harness and junction block  
C-101 Dash wiring harness and junction block

## INSTRUMENT PANEL AND FLOOR CONSOLE

80100080015

Connector  
symbol**D**

&lt;M/T&gt;



A36E0169

D-02-1 Dash wiring harness and instrument panel wiring harness combination  
 D-02-2 Dash wiring harness and instrument panel wiring harness combination  
 D-03 Clock  
 D-04 Multi-meter  
 D-06 Accessory socket  
 D-07 Accessory socket  
 D-10 Ashtray illumination light  
 D-11 Cigarette lighter illumination light  
 D-12-1 Dash wiring harness and console wiring harness combination

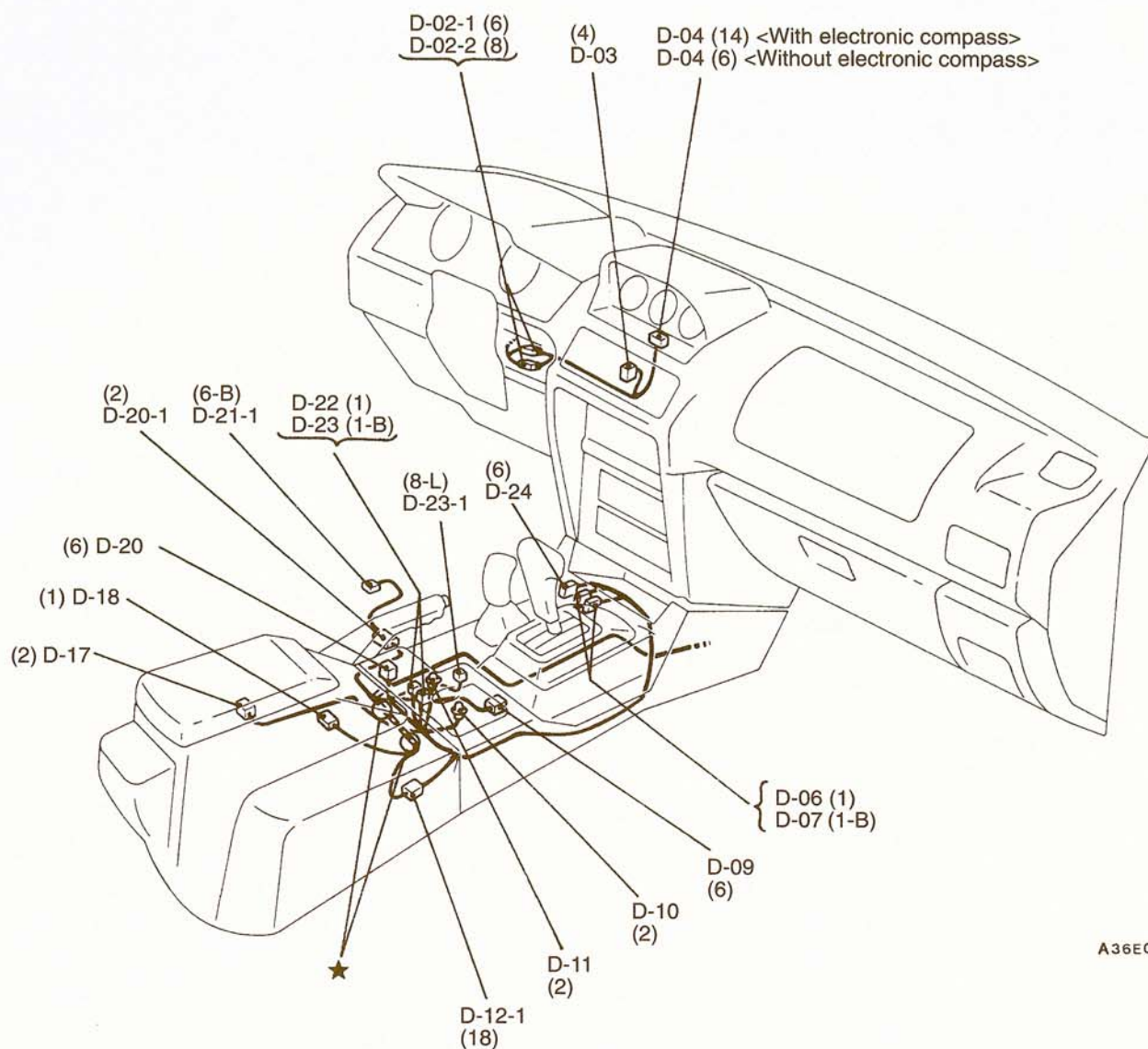
D-17 Seat belt switch  
 D-18 Parking brake switch  
 D-20 No connection  
 D-20-1 Power seat wiring harness and dash wiring harness combination  
 D-21-1 Front seat assembly <Power seat>  
 D-22 Cigarette lighter  
 D-23 Cigarette lighter  
 D-24 Rear differential lock switch

TSB Revision



<A/T>

8010080022



A36E0170

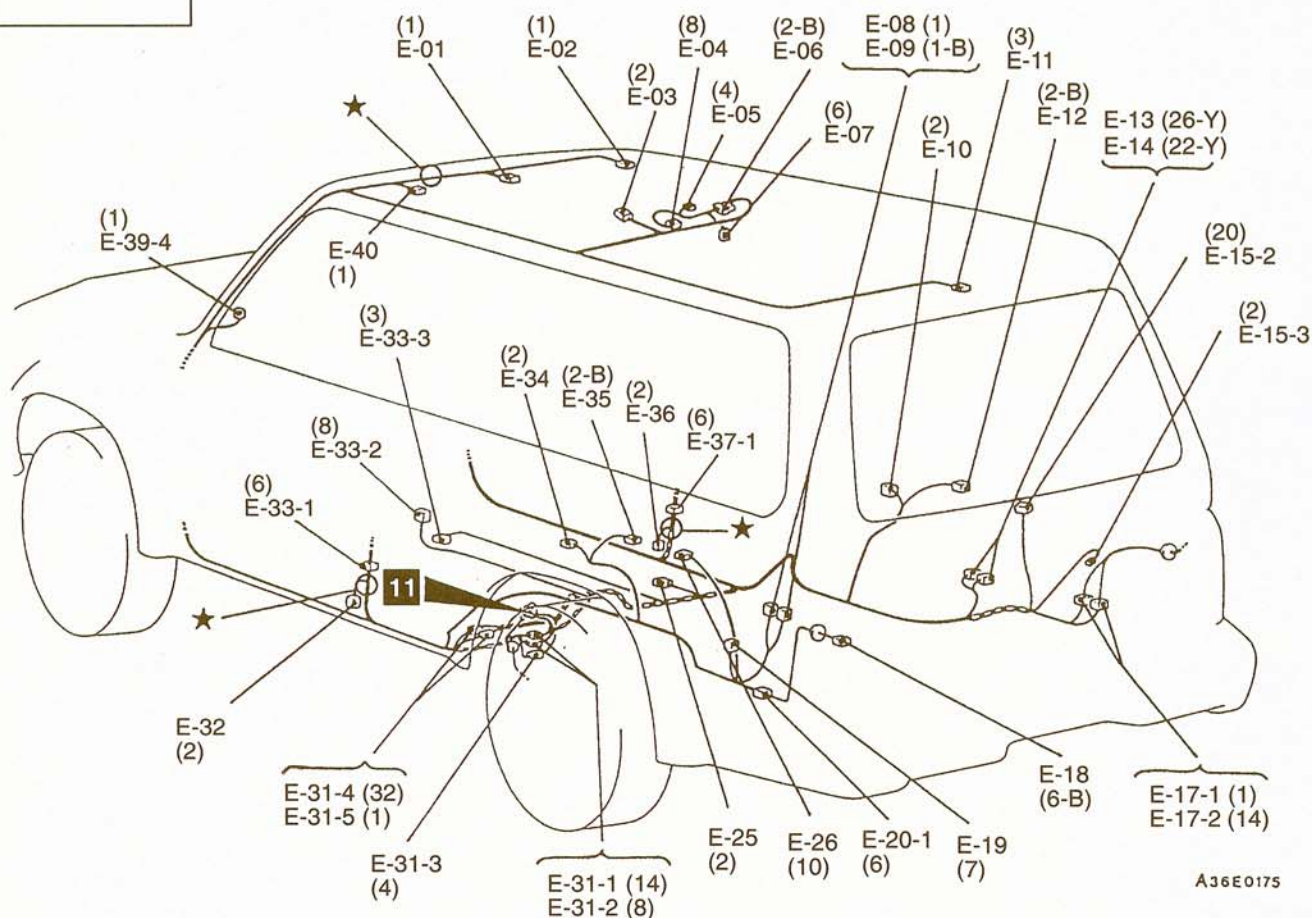
- D-02-1 Dash wiring harness and instrument panel wiring harness combination
- D-02-2 Dash wiring harness and instrument panel wiring harness combination
- D-03 Clock
- D-04 Multi-meter
- D-06 Accessory socket
- D-07 Accessory socket
- D-09 Overdrive switch
- D-10 Ashtray illumination light
- D-11 Cigarette lighter illumination light
- D-12-1 Dash wiring harness and console wiring harness combination

- D-17 Seat belt switch
- D-18 Parking brake switch
- D-20 No connection
- D-20-1 Power seat wiring harness and dash wiring harness combination
- D-21-1 Front seat assembly <Power seat>
- D-22 Cigarette lighter
- D-23 Cigarette lighter
- D-23-1 Power/hold changeover switch <ELC 4-speed automatic transmission>
- D-24 Rear differential lock switch

TSB Revision

## FLOOR AND ROOF

80100090131

Connector  
symbol**E**

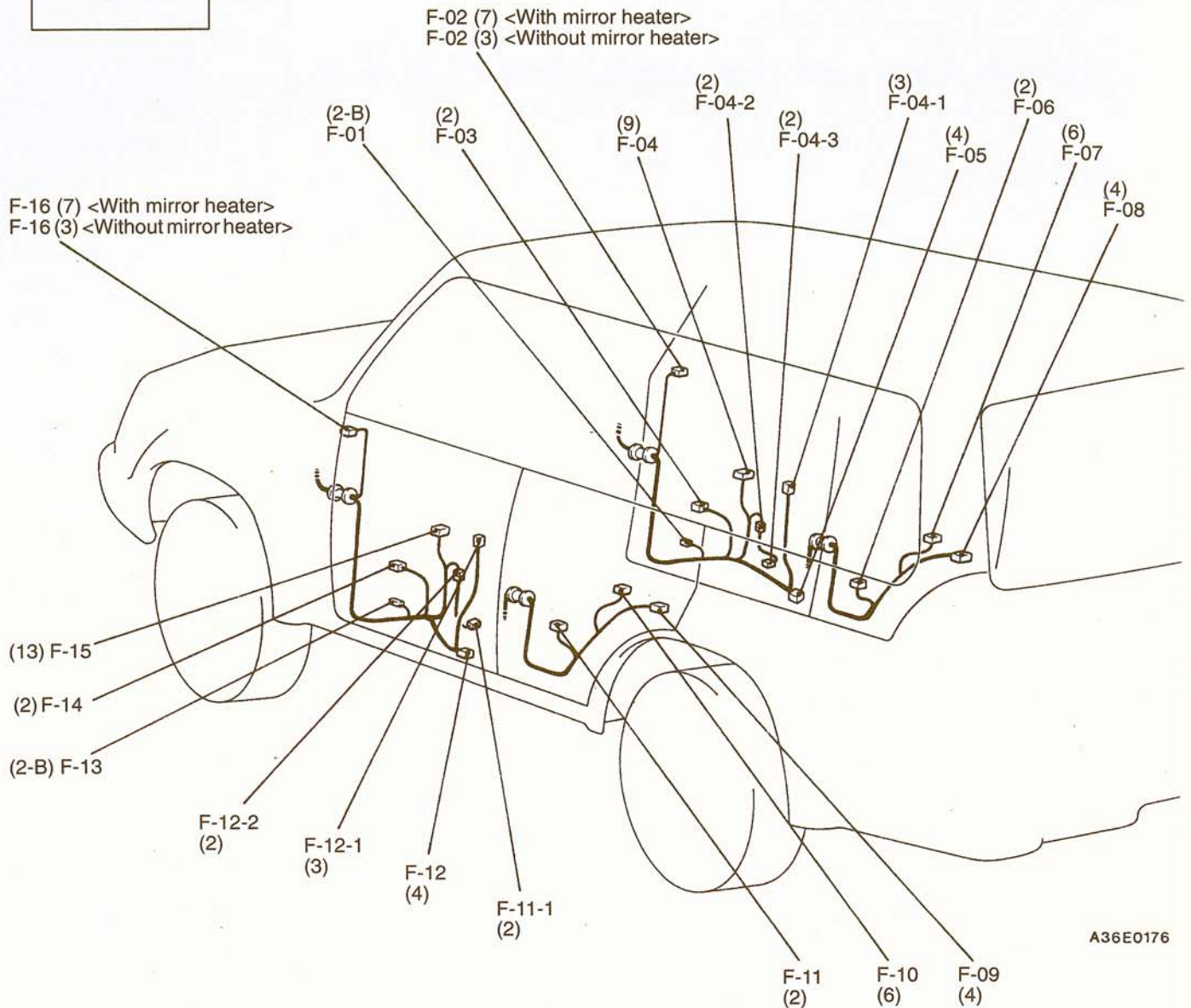
E-01 Reading light  
 E-02 Vanity mirror light (R.H.)  
 E-03 Dome light  
 E-04 Sunroof control unit  
 E-05 Sunroof motor  
 E-06 Roof wiring harness and sunroof wiring harness combination  
 E-07 Sunroof switch  
 E-08 Accessory socket  
 E-09 Accessory socket  
 E-10 Rear door switch (R.H.)  
 E-11 Cargo space light  
 E-12 Rear speaker (R.H.)  
 E-13 ABS control unit  
 E-14 ABS control unit  
 E-15-2 Keyless entry control unit  
 E-15-3 Spare connector (for CD auto changer)  
 E-17-1 Floor wiring harness (R.H.) and back door wiring harness combination  
 E-17-2 Floor wiring harness (R.H.) and back door wiring harness combination  
 E-18 Rear combination light (L.H.)  
 E-19 Variable shock absorber control unit  
 E-20 –  
 E-20-1 Floor wiring harness (L.H.) and rear combination light wiring harness combination

E-25 Rear differential lock air pump  
 E-26 Rear differential lock control unit  
 E-31-1 Floor wiring harness (L.H.) and frame wiring harness combination  
 E-31-2 Floor wiring harness (L.H.) and frame wiring harness combination  
 E-31-3 Floor wiring harness (R.H.) and frame wiring harness combination  
 E-31-4 Floor wiring harness (L.H.) and floor wiring harness (R.H.) combination  
 E-31-5 Floor wiring harness (L.H.) and floor wiring harness (R.H.) combination  
 E-32 Front door switch (L.H.)  
 E-33-1 Floor wiring harness (L.H.) and rear door wiring harness (L.H.) combination  
 E-33-2 Shock absorber control switch  
 E-33-3 G sensor <ABS>  
 E-34 Rear door switch (L.H.)  
 E-35 Rear speaker (L.H.)  
 E-36 Front door switch (R.H.)  
 E-37-1 Floor wiring harness (R.H.) and rear door wiring harness (R.H.) combination  
 E-39-4 No connection  
 E-40 Vanity mirror light (L.H.)



## DOOR

80100140089

Connector  
symbol**F**

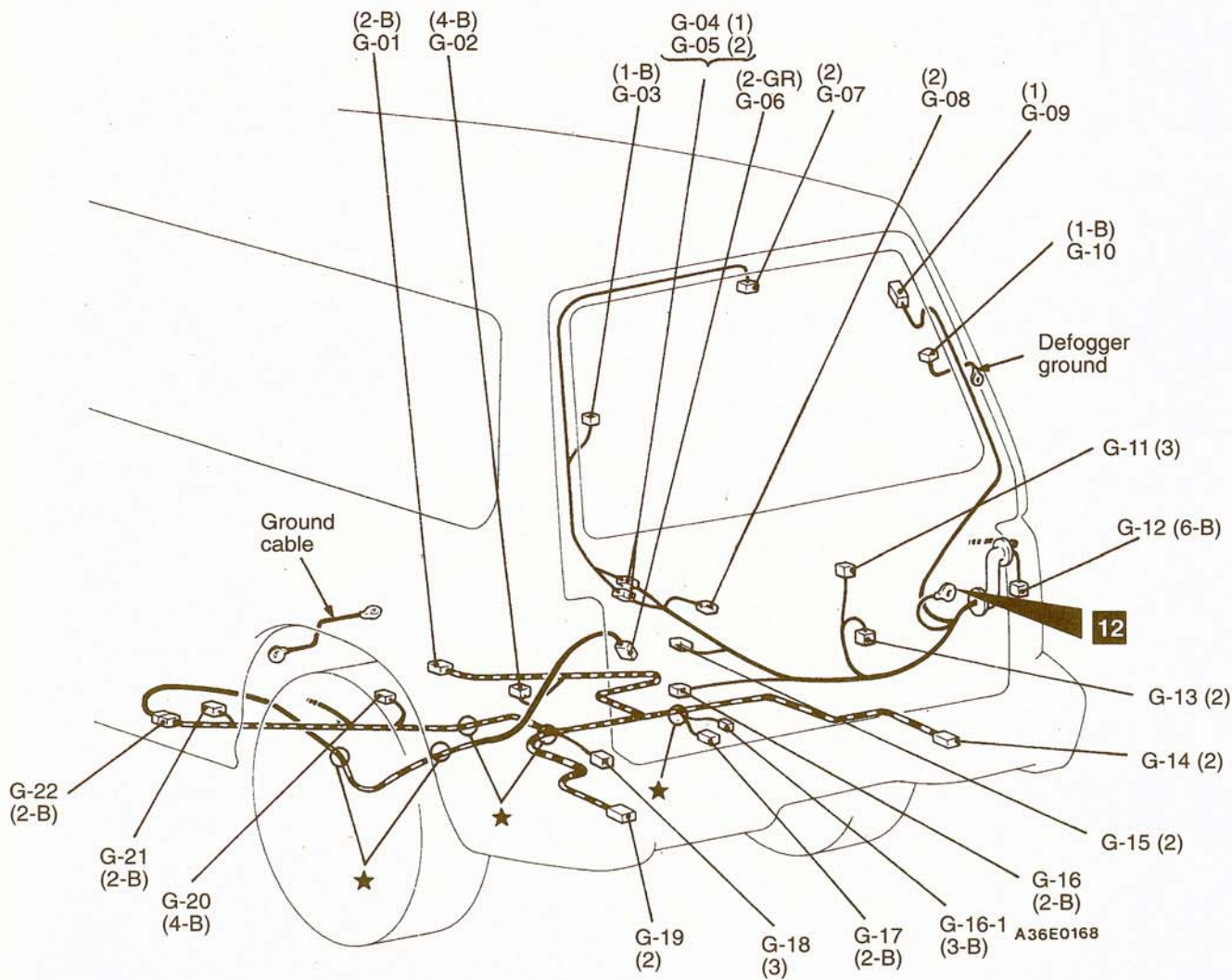
A36E0176

- |   |   |
|---|---|
| F-01 Door speaker (R.H.)  | F-10 Power window sub switch (Rear: L.H.)   |
| F-02 Remote controlled mirror (R.H.)  | F-11 Power window motor (Rear: L.H.)  |
| F-03 Power window motor (Front: R.H.)   | F-11-1 Door light (Front: L.H.)   |
| F-04 Power window sub switch and door lock switch (Front: R.H.)                   | F-12 Door lock actuator (Front: L.H.)   |
| F-04-1 Key switch (R.H.)  | F-12-1 Key switch (L.H.)  |
| F-04-2 Front door wiring harness (R.H.) and door light wiring harness combination | F-12-2 Front door wiring harness (L.H.) and door light wiring harness combination |
| F-04-3 Door light (Front: R.H.)   | F-13 Door speaker (L.H.)  |
| F-05 Door lock actuator (Front: R.H.)   | F-14 Power window motor (Front: L.H.)   |
| F-06 Power window motor (Rear: R.H.)  | F-15 Power window main switch and door lock switch (Front: L.H.)                  |
| F-07 Power window sub switch (Rear: R.H.)   | F-16 Remote controlled mirror (L.H.)  |
| F-08 Door lock actuator (Rear: R.H.)  |   |
| F-09 Door lock actuator (Rear: L.H.)  |   |

TSB Revision

## BACK DOOR AND REAR UNDER FLOOR

80100180012

Connector  
symbol**G**

- G-01 Speed sensor (Rear: R.H.) <ABS>
- G-02 Shock absorber (Rear: R.H.) <Remote controlled variable shock absorber>
- G-03 Defogger (+)
- G-04 Back door wiring harness and defogger and defogger cable
- G-05 Back door wiring harness and defogger and defogger cable
- G-06 Rear differential lock detection switch
- G-07 High mount stop light
- G-08 Back door switch
- G-09 Back door window glass antenna
- G-10 Defogger (-)
- G-11 Rear wiper motor

- G-12 Rear combination light (R.H.)
- G-13 Rear washer motor
- G-14 Back-up light (R.H.)
- G-15 License plate light
- G-16 Door lock actuator (Back door)
- G-16-1 Fuel tank pressure sensor
- G-17 Fuel pump
- G-18 Fuel gage unit
- G-19 Back-up light (L.H.)
- G-20 Shock absorber (Rear: L.H.) <Remote controlled variable shock absorber>
- G-21 Speed sensor (Rear: L.H.) <ABS>
- G-22 Frame wiring harness and position wiring harness

TSB Revision

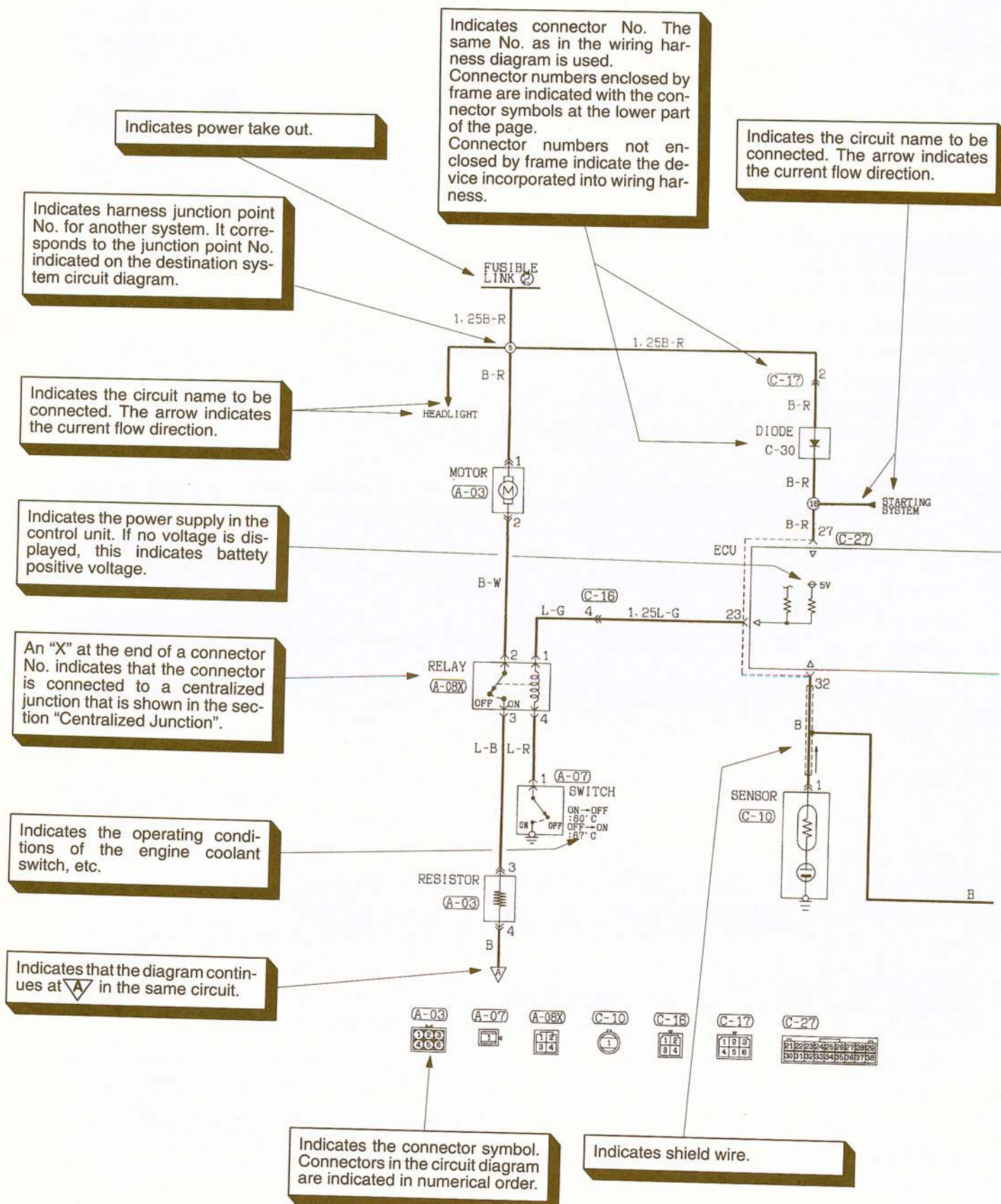


## 90109000059

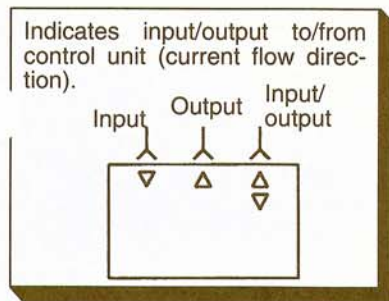
Accessory Socket .....	54-76
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Air Conditioning .....	161
Anti-lock Braking System .....	188
Automatic Transmission Position Indicator <3.0L-12 VALVE engine> .....	54-21
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Back-up Light .....	54-49
Brake Warning Light .....	54-19
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Charging System .....	16-4
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Turn-signal Light and Hazard Light .....	54-45
Vanity Mirror Light .....	54-56
Windshield Wiper and Washer .....	165

# HOW TO READ CIRCUIT DIAGRAMS

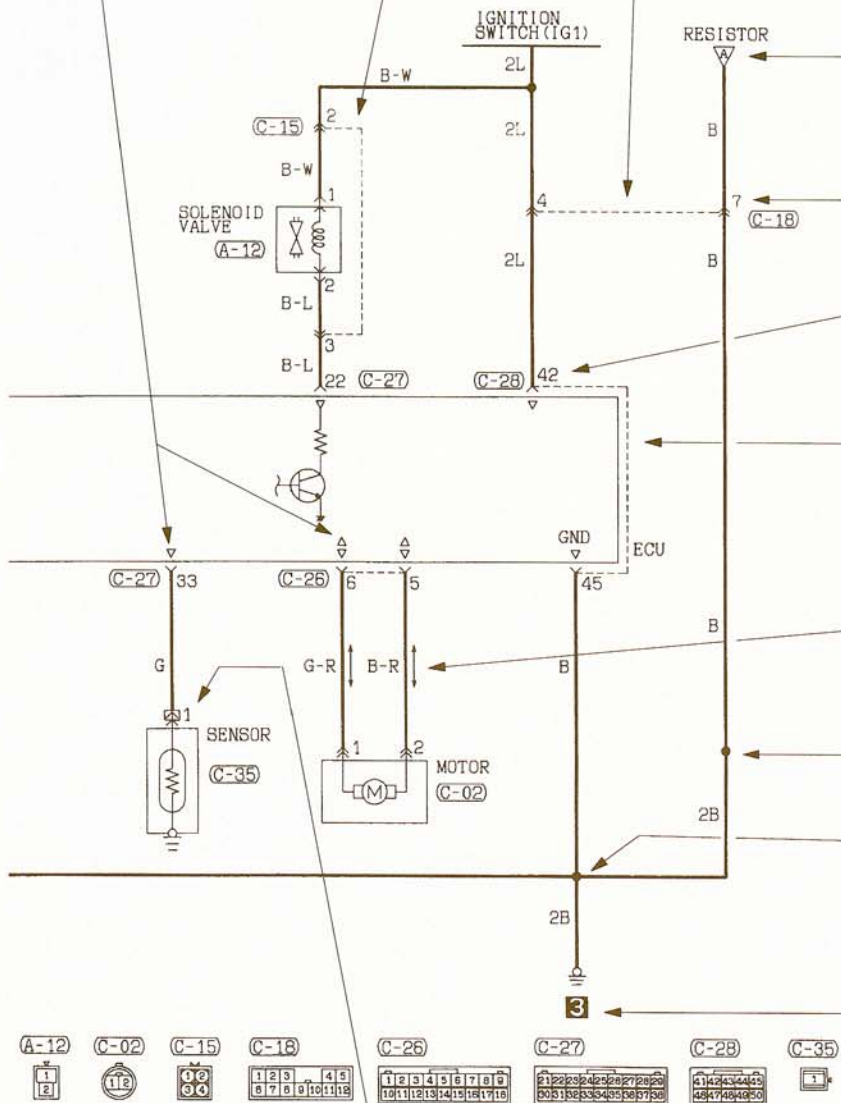
The circuit of each system from the fuse (or fusible link) to ground is shown. The power supply is shown at the top and the ground at the bottom to facilitate understanding of how the current flows.







A broken line indicates that these connectors are the same intermediate connectors.



Indicates that the diagram comes from  $\nabla$  in the same circuit.

Indicates terminal No.

In case two or more connectors are connected to the same device, markings indicating the same connector are connected by a broken line.

Indicates current flow downward or upward as controlled by the control unit.

Indicates harness junction where wire diameter or color changes.

Indicates intersections at which the lead wires are not connected.

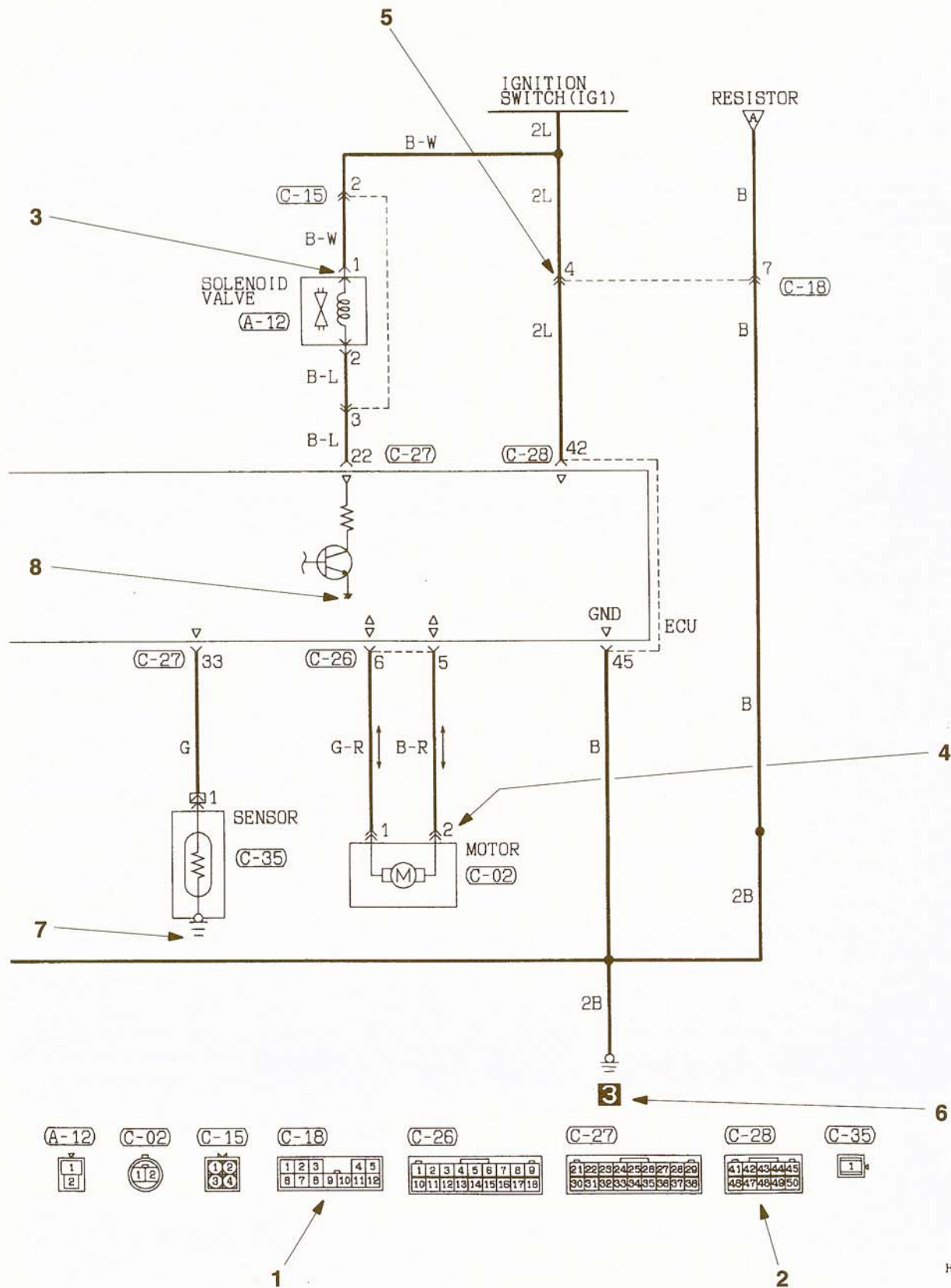
Indicates intersections at which the lead wires are connected.

Indicates vehicle body ground point. (Same No. as that of ground point in GROUNDING LOCATION).

Indicates that the terminal is a spare one if the device (sensor in this case) is not provided.

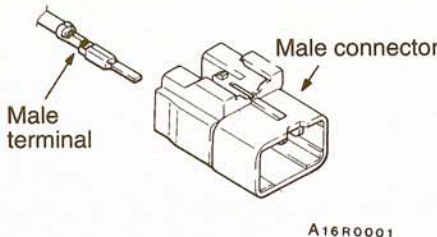

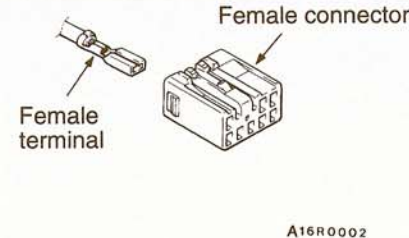

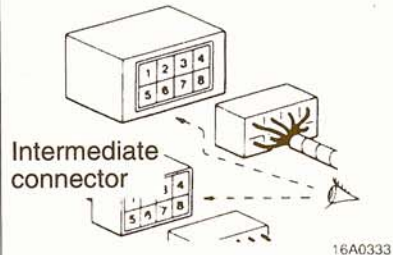



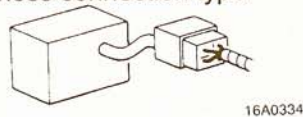
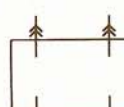
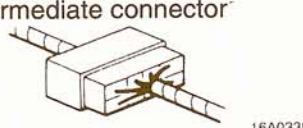

HF00M00A

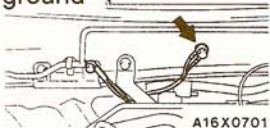





## CONNECTOR/GROUNDING INDICATIONS



HF00M00A



Item	NO.	Connector/Grounding	Symbol	Contents
Connector and terminal marking	1	 <p>Male terminal</p> <p>Male connector</p> <p>A16R0001</p>	<p>Male terminal</p> <p>↓</p> <p>WH-3</p> <p>Male connector</p>  <p>WH-1</p>	<p>The male and female terminals are indicated as shown. The connector with male terminal(s) is called as male connector and indicated by double connector contour lines. The connector with female terminal(s) is called as female connector and indicated by single connector contour line.</p>
	—	 <p>Female terminal</p> <p>Female connector</p> <p>A16R0002</p>	<p>Female terminal</p> <p>↓</p> <p>WH-4</p> <p>Female connector</p>  <p>WH-2</p>	
Connector symbol marking	2	 <p>Intermediate connector</p> <p>16A0333</p>	 <p>WH-1</p>	<p>The symbol indicates the connector as viewed from the illustrated direction. At the connection with a device, the connector symbol on the device side is shown, and for an intermediate connector, the male connector symbol is shown.</p> <p>For the data link connector, its contents differ from the previous description. Refer to "Scan tool operation instruction" in detail.</p>
Connector connection marking	3	<p>Direct connection type</p>  <p>16X0700</p>	 <p>WH-5</p>	<p>A connection between a device and connector on the harness side is either by direct insertion in the device (direct connection type) or by connection with a harness connector furnished on the device side (harness connection type). The two types are indicated as illustrated.</p>
	4	<p>Harness connection type</p>  <p>16A0334</p>	 <p>WH-6</p>	
	5	<p>Intermediate connector</p>  <p>16A0339</p>	 <p>WH-7</p>	

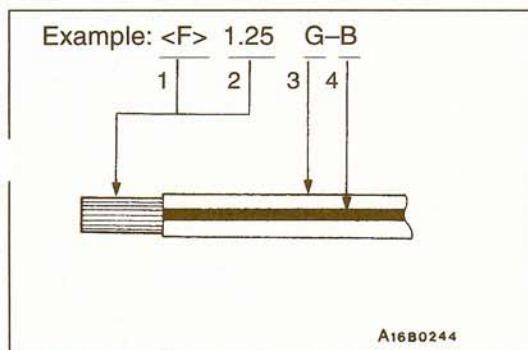
Item	NO.	Connector/Grounding	Symbol	Contents
Grounding markings	6	Body ground  A16X0701	 WH-8	Grounding is either by body ground, device ground or control unit interior ground. These are indicated as illustrated.
	7	Device ground  A16X0702	 WH-9	
	8	Ground in control unit  A16X0703	 WH-10	



## WIRE COLOR CODES

Wire colors are identified by the following color codes.

Code	Wire color	Code	Wire color
B	Black	P	Pink
BR	Brown	R	Red
G	Green	SB	Sky blue
GR	Gray	V	Violet
L	Blue	W	White
LG	Light green	Y	Yellow
O	Orange	–	–



If a cable has two colors, the first of the two color code characters indicates the basic color (color of the cable coating) and the second indicates the marking color.

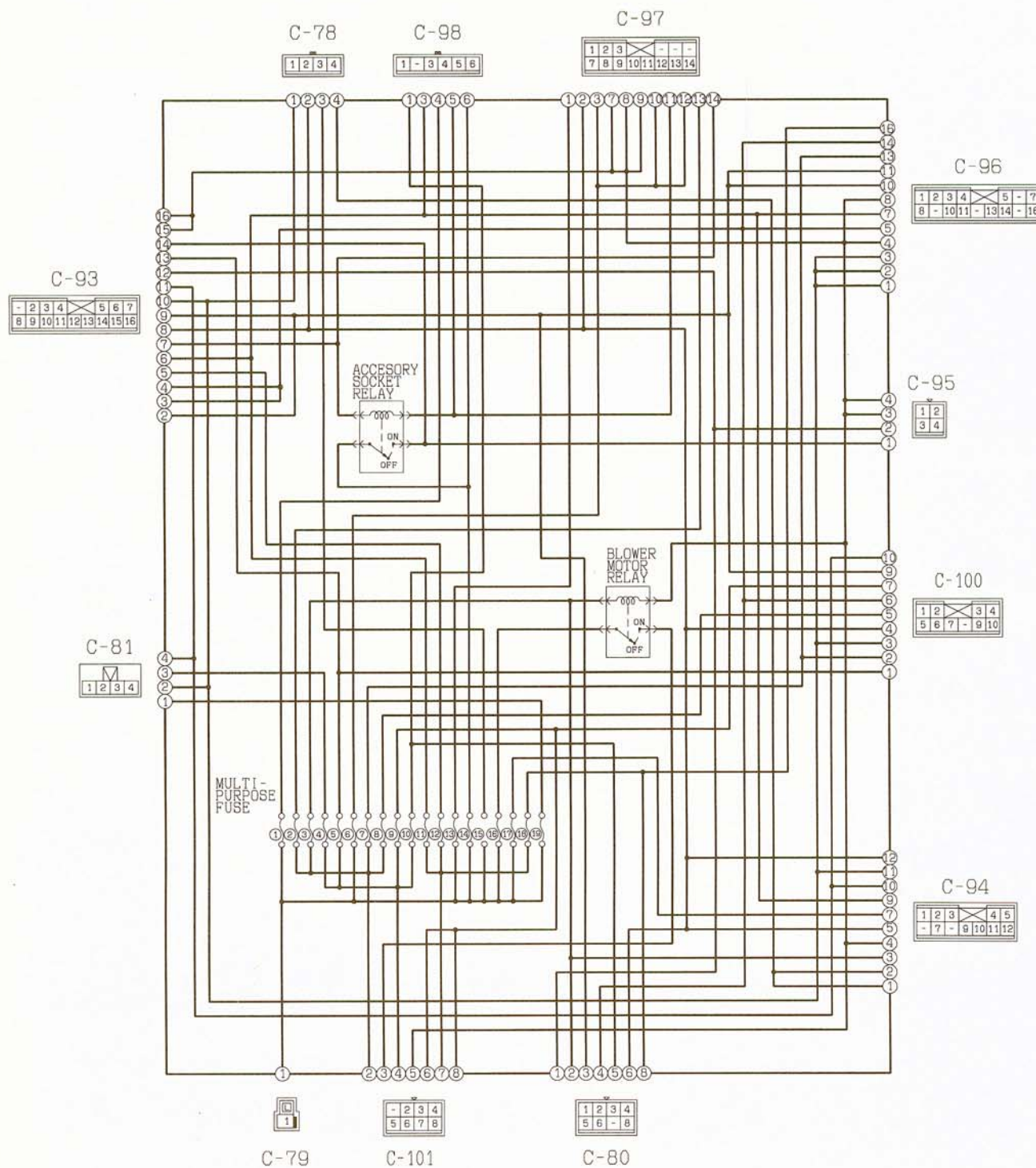
No.	Meaning
1	<F>: Flexible wire <T>: Twisted wire
2	Wire size (mm <sup>2</sup> )
3	Basic color (color of the cable cating)
4	Marking color

### NOTE

\*: No code indicates 0.5 mm<sup>2</sup> (.0008 in.<sup>2</sup>).  
Cable color code in parentheses indicates 0.3 mm<sup>2</sup> (.0005 in.<sup>2</sup>).

## JUNCTION BLOCK (J/B)

90100020108



## Remark

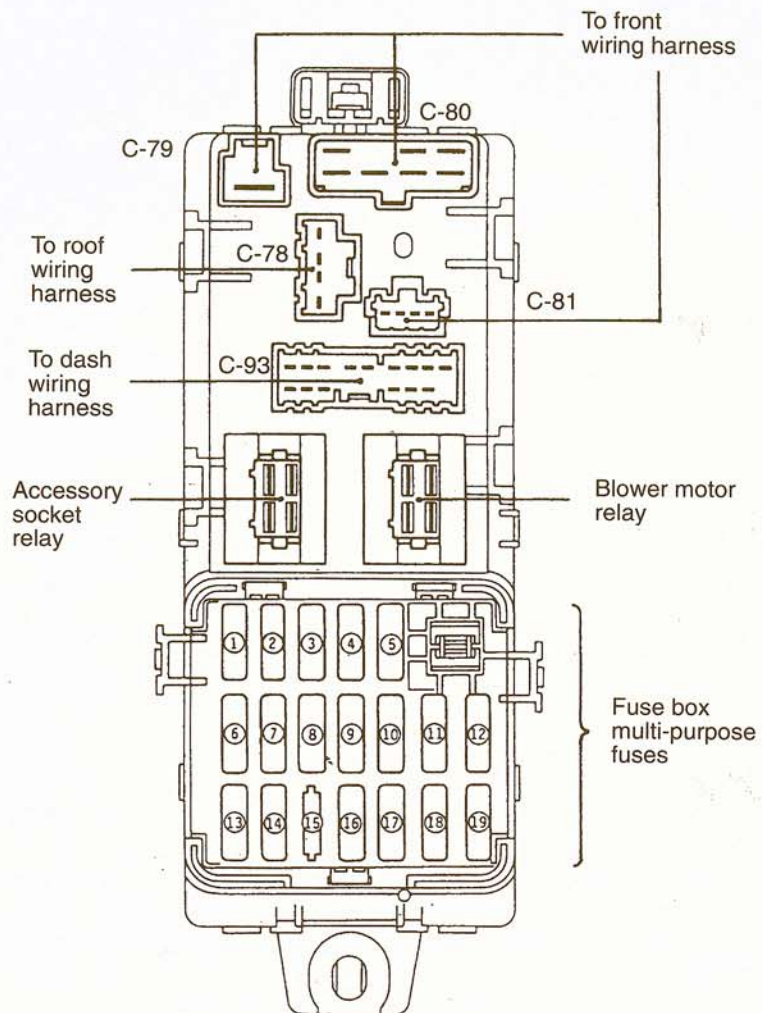
Connector numbers are keyed to the configuration diagram (dash panel) and each circuit diagram.

HQ00M04AA

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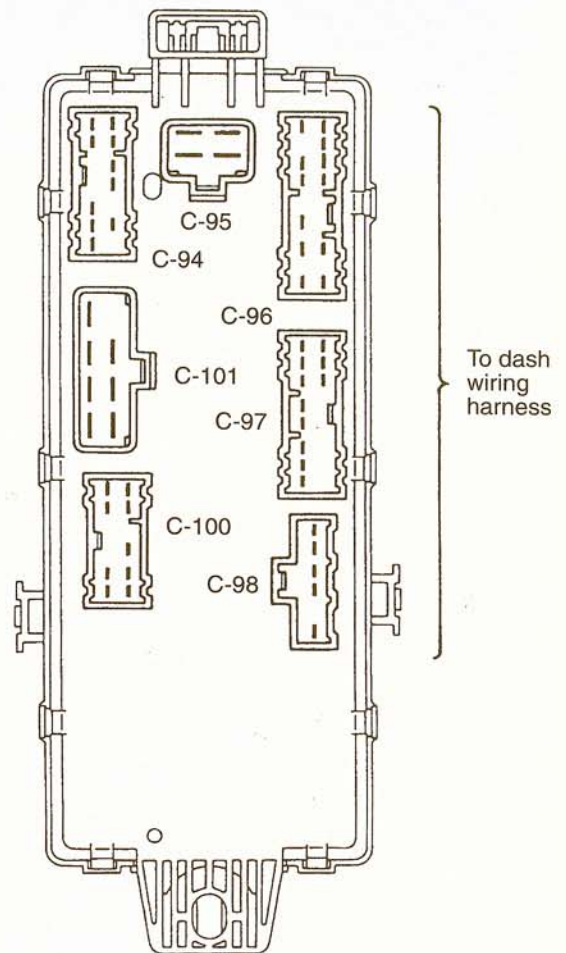


Front side



16E1368

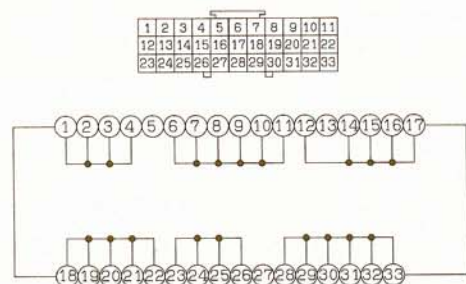
Rear side

16F0058  
00004182

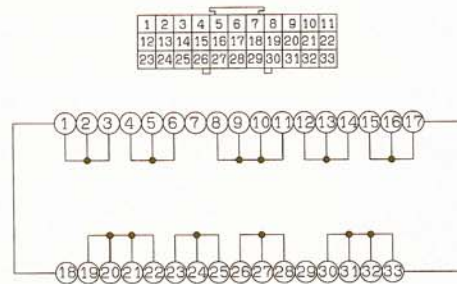
## JOINT CONNECTOR (J/C)

90101420013

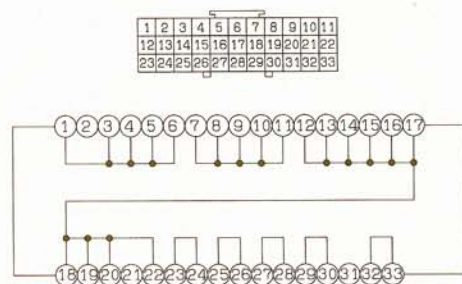
J/C (1) C-62-1



J/C (2) C-62-2



J/C (3) C-62-3



## Remark

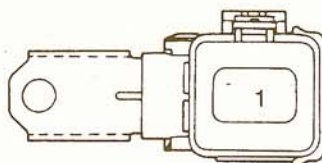
• In actual vehicles, any of the terminals connected in J/C are used.  
 The terminals described in the circuit diagram may not be identical to those of the vehicles.



**CENTRALIZED JUNCTION****FUSIBLE LINK**

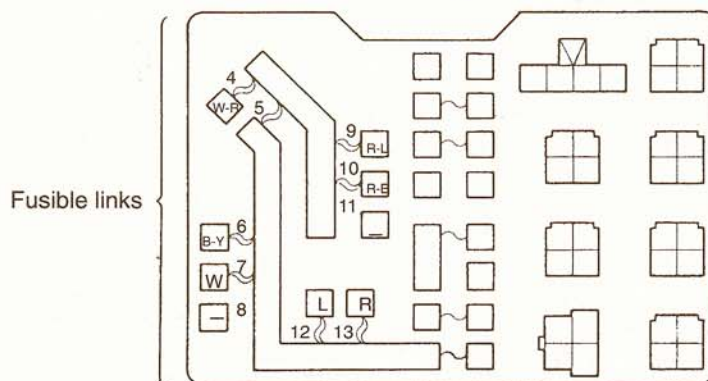
No.	Circuit	Housing color	Rated capacity (A)
1	ABS circuit (hydraulic unit power source)	Yellow	60
2	—	—	—
3	—	—	—
4	Junction block (Multi-purpose fuse No. 1, 6, 14, 16, 17 and 19) and A/C circuit	Yellow	60
5	Generator circuit	Blue	100
6	MFI circuit	Light blue	20
7	Ignition switch circuit	Green	40
8	—	—	—
9	Defogger circuit	Pink	30
10	Power window circuit, Power seat circuit	Pink	30
11	—	—	—
12	Condenser fan motor circuit	Pink	30
13	Generator, headlight and tail light circuit	Green	40

**(Connected directly to battery positive terminal)**  
**<Vehicles with ABS>**



16A0335

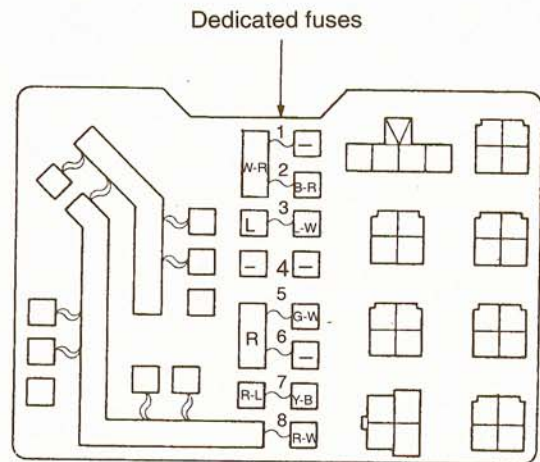
**(Relay box in engine compartment)**



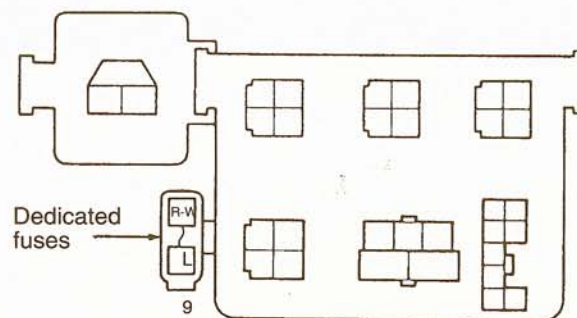
16E0410  
 00004183

**DEDICATED FUSE**

Power supply circuit	No.	Rated capacity (A)	Housing color	Circuit
—	1	—	—	—
Battery	2	10	Red	A/C compressor circuit
Battery	3	25	Transparent	Condenser fan motor circuit
—	4	—	—	—
Tail light relay (battery)	5	10	Red	Tail light circuit
—	6	—	—	—
Headlight relay (battery)	7	10	Red	Upper beam indicator circuit
Battery	8	10	Red	Hazard light circuit
Ignition switch (ACC)	9	15	Blue	Sunroof circuit

**(Relay box in engine compartment)**

16E0550

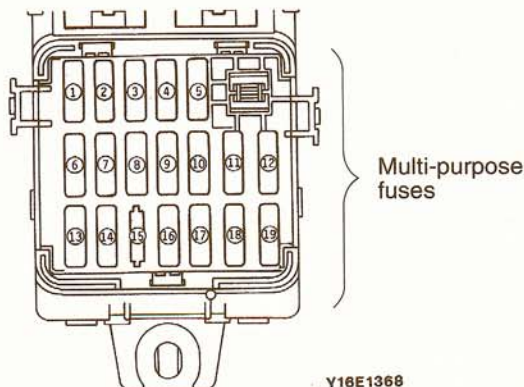
**(Relay box in passenger compartment)**16E0586  
00004184



## MULTI-PURPOSE FUSES

Power supply circuit		No.	Rated capacity (A)	Load circuit
Battery		1	20	—
Ignition switch	(IG2)	2	10	ELC-4 A/T control module, Cruise control unit
		3	10	Blower motor relay, Headlight washer relay, Defogger relay
	(ACC)	4	10	Radio, Clock, Accessory socket relay, Cruise control unit, Data link connector
		5	15	Remote controlled mirror, Cigarette lighter
Battery		6	15	Door lock relay, Door lock control unit
Ignition switch	(IG2)	7	10	Overdrive relay, Variable shock absorber control unit, 4WD indicator control unit, ABS control unit, Combination meter
		8	10	Power window relay
	(ACC)	9	15	Wiper, Washer, Sunroof
		10	10	Horn
	(IG1)	11	10	Combination meter, Multi-meter, Motor antenna control unit, Buzzer assembly
		12	10	Turn-signal light, Hazard light, SRS diagnosis unit
Battery		13	10	—
		14	15	Accessory socket
		15	—	—
		16	25	Blower motor
		17	15	Stop light
Ignition switch	(IG1)	18	10	Back-up light, Rear differential lock control unit
Battery		19	10	Engine control module, Dome light, Reading light, Cargo space light, Combination meter, Clock, Door lock relay, Radio, Cruise control unit, ELC-4A/T control module, Ignition key hole illumination light timer.

(In junction block)

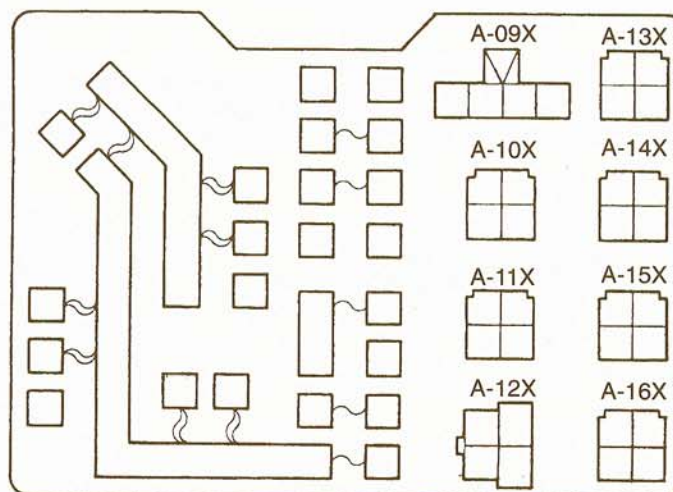


Y16E1368

## CENTRALIZED RELAY

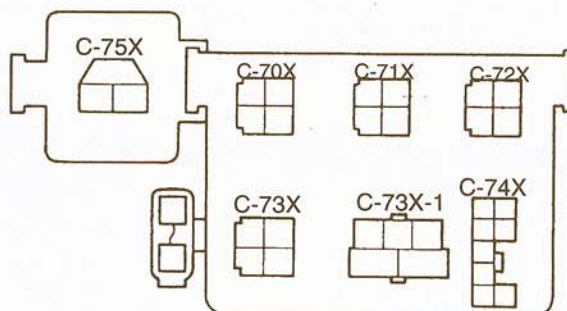
Classification		Name	Classification		Name
Relay box in engine compartment	A-09X	IOD or storage connector	Relay box in passenger compartment	C-70X	Overdrive relay
	A-10X	Headlight relay		C-71X	—
	A-11X	—		C-72X	Power window relay
	A-12X	Generator relay		C-73X	—
	A-13X	—		C-73X-1	Defogger relay
	A-14X	Tail light relay		C-74X	Rear intermittent wiper relay
	A-15X	Condenser fan motor relay		C-75X	Turn and hazard flasher unit
	A-16X	A/C compressor clutch relay			

## (Relay box in engine compartment)



16E0410

## (Relay box in passenger compartment)

16E0586  
00004185



70100130032

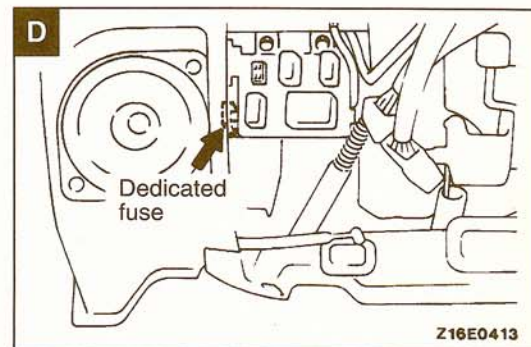
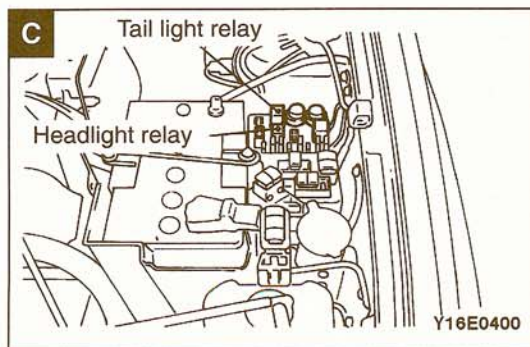
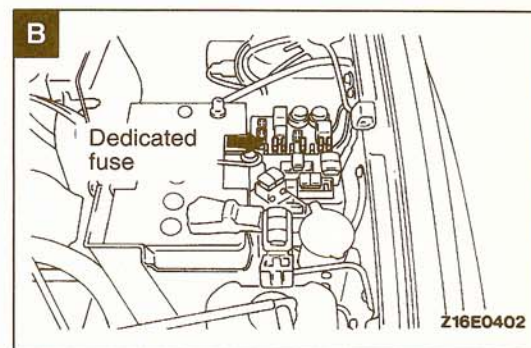
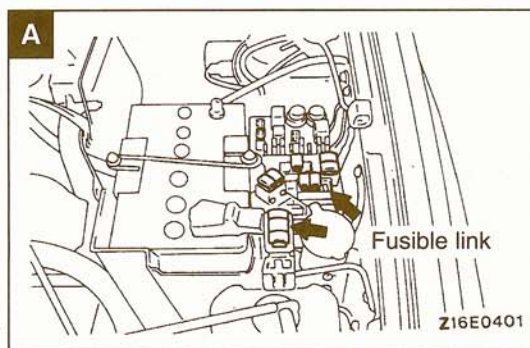
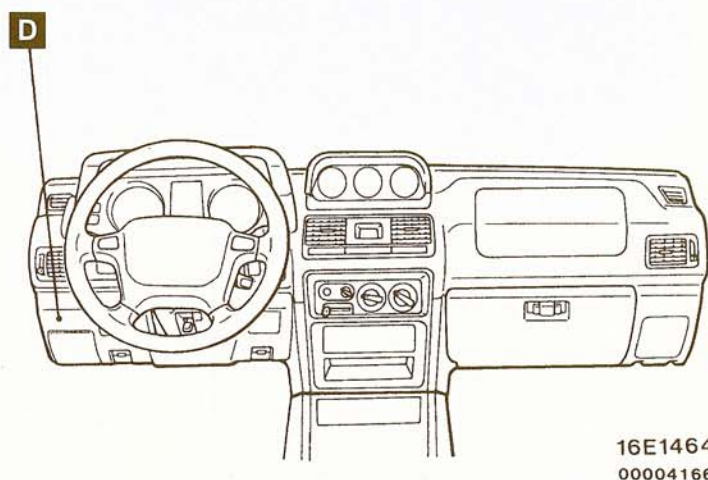
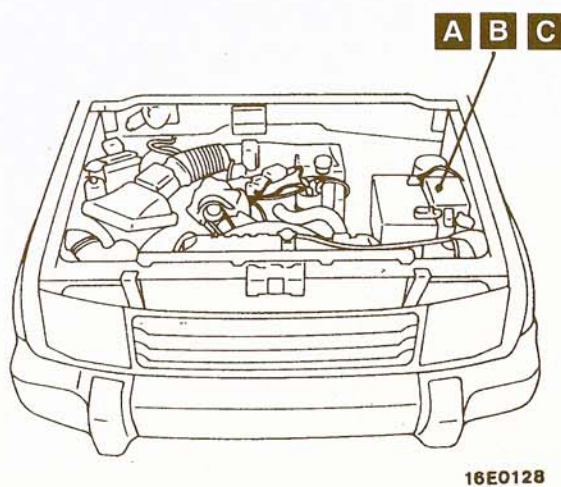
## POWER DISTRIBUTION

## COMPONENT LOCATION

Name	Symbol	Name	Symbol
Dedicated fuse No. 2, 3, 5, 7 and 8	B	Headlight relay	C
Dedicated fuse No. 9	D	Tail light relay	C
Fusible link	A	—	—

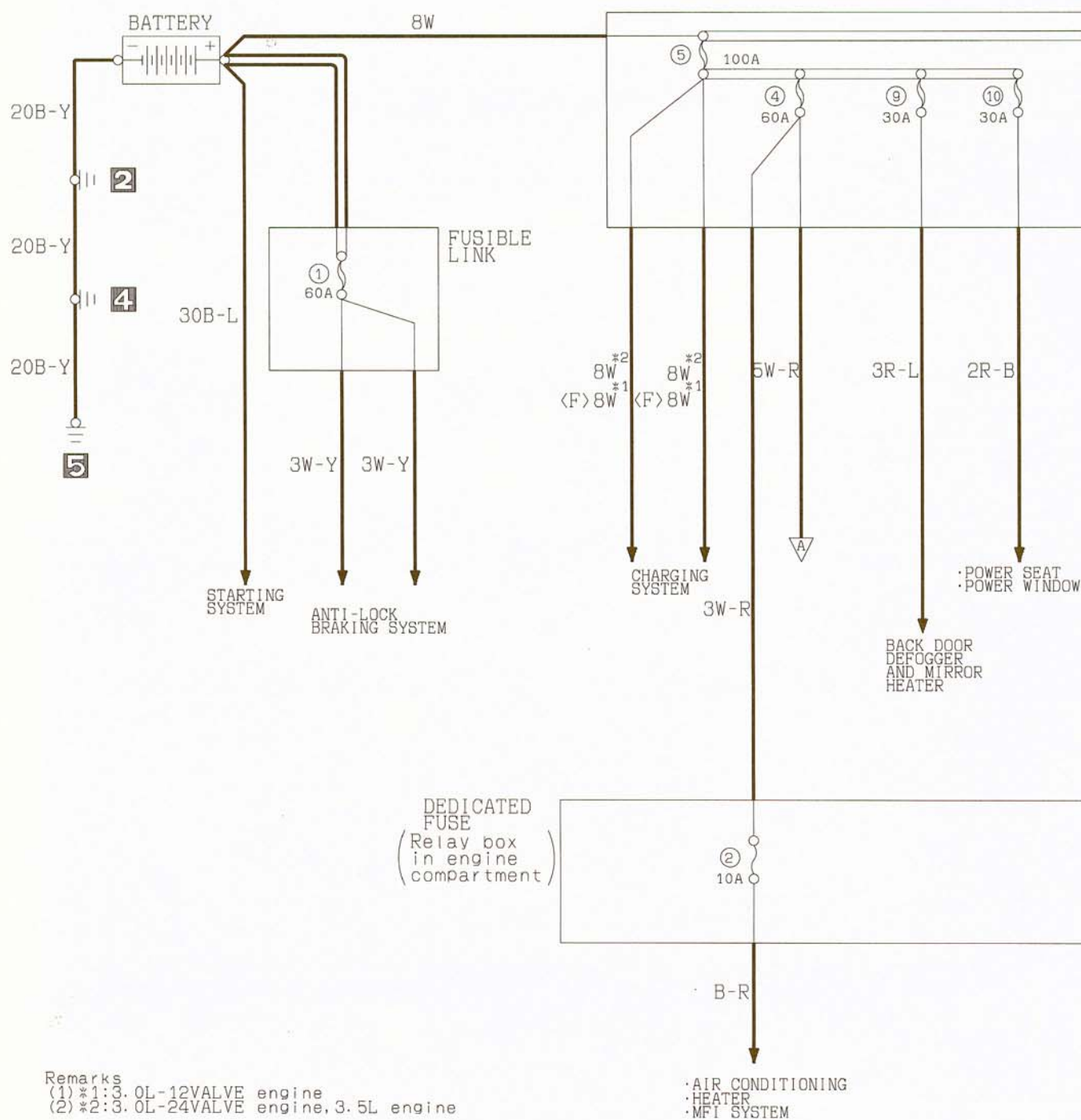
## NOTE

The "Name" column is arranged in alphabetical order.



## POWER DISTRIBUTION

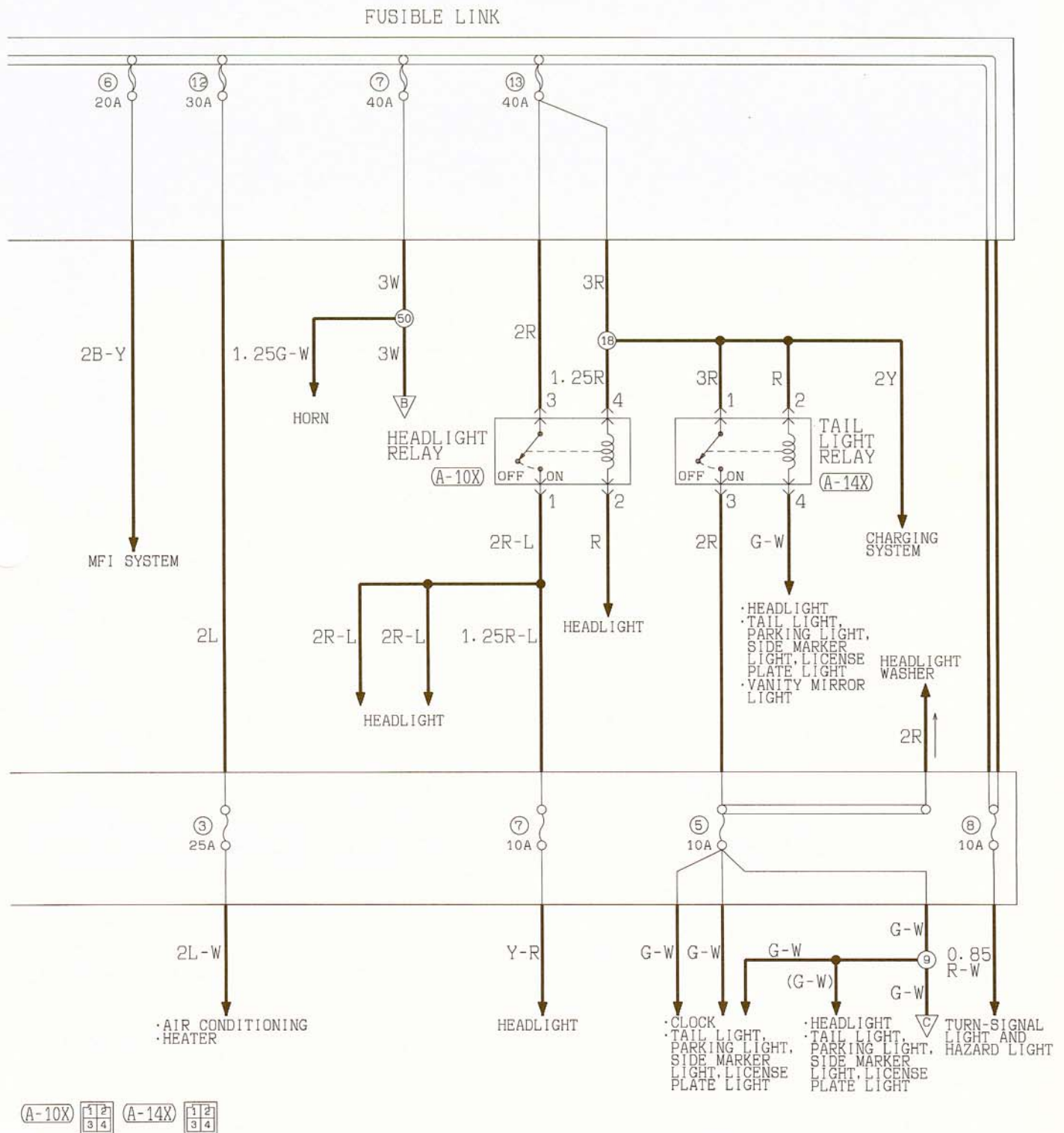
90100040081



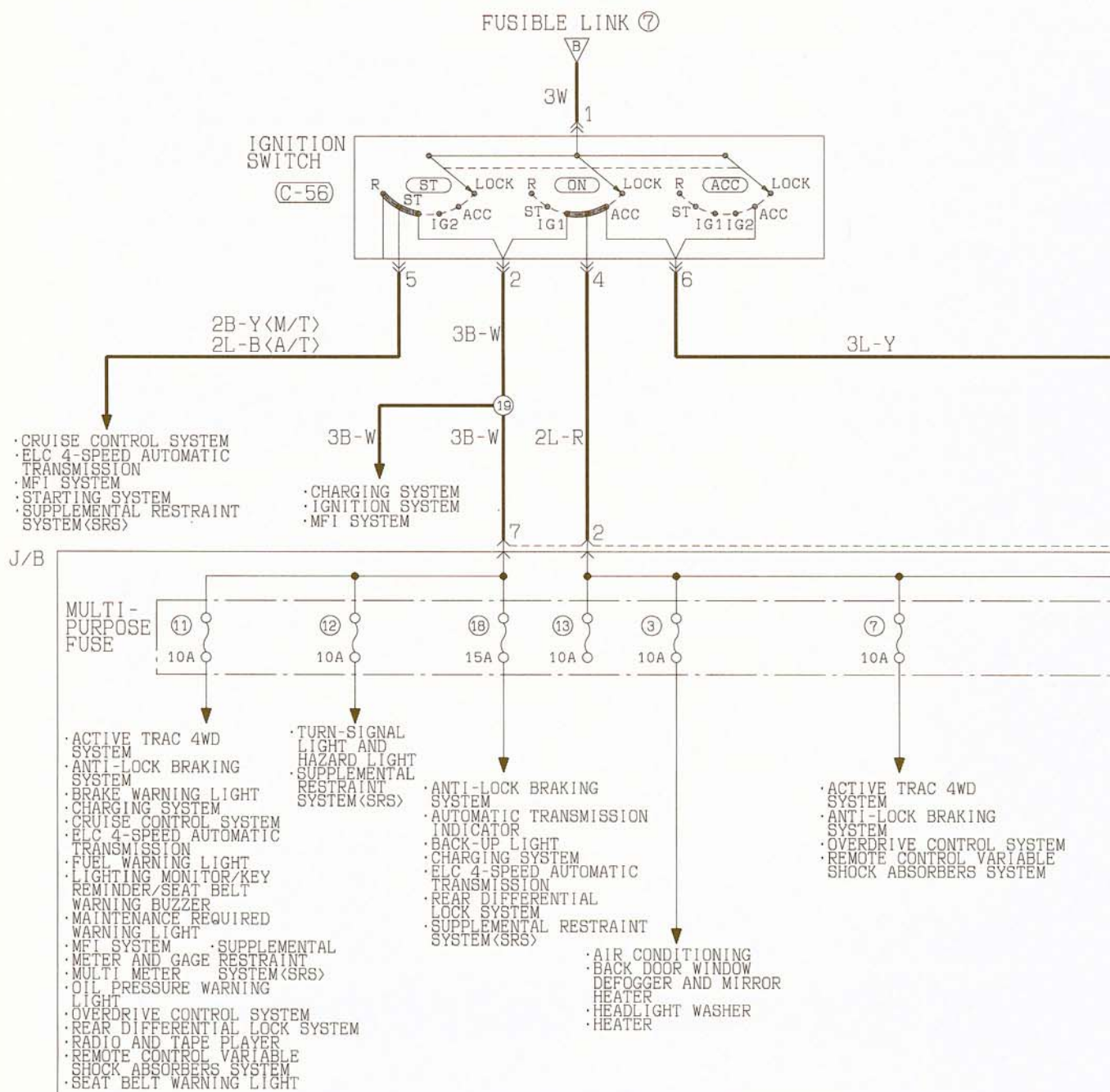
HQ00M01AA

TSB Revision





## POWER DISTRIBUTION (CONTINUED)



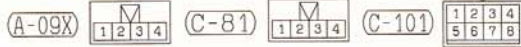
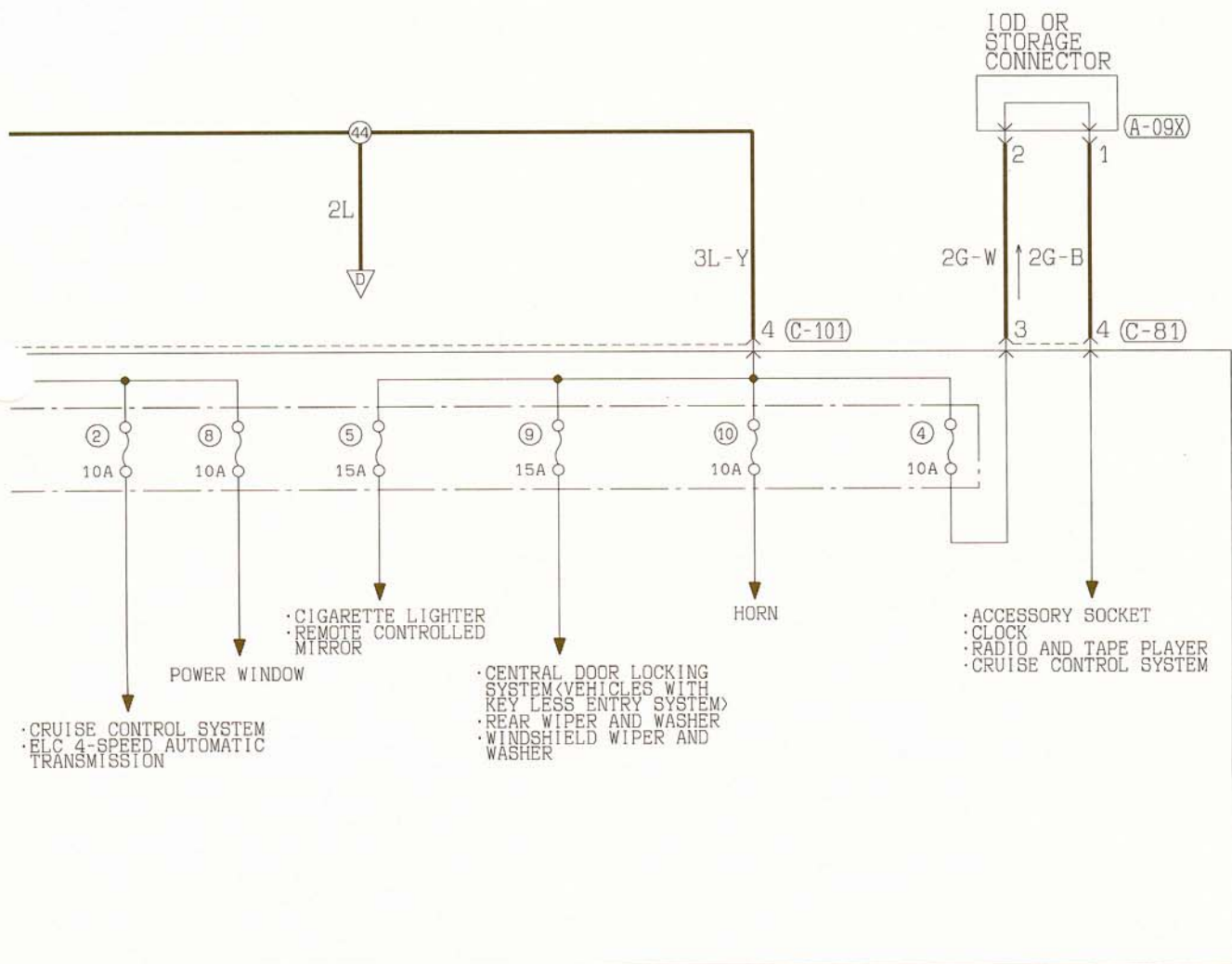
## Remark

The above circuit diagram shows the current flow at the ignition key position "ACC", "ON" and "ST" combined. Be sure trace the appropriate circuit depending on the ignition key position.

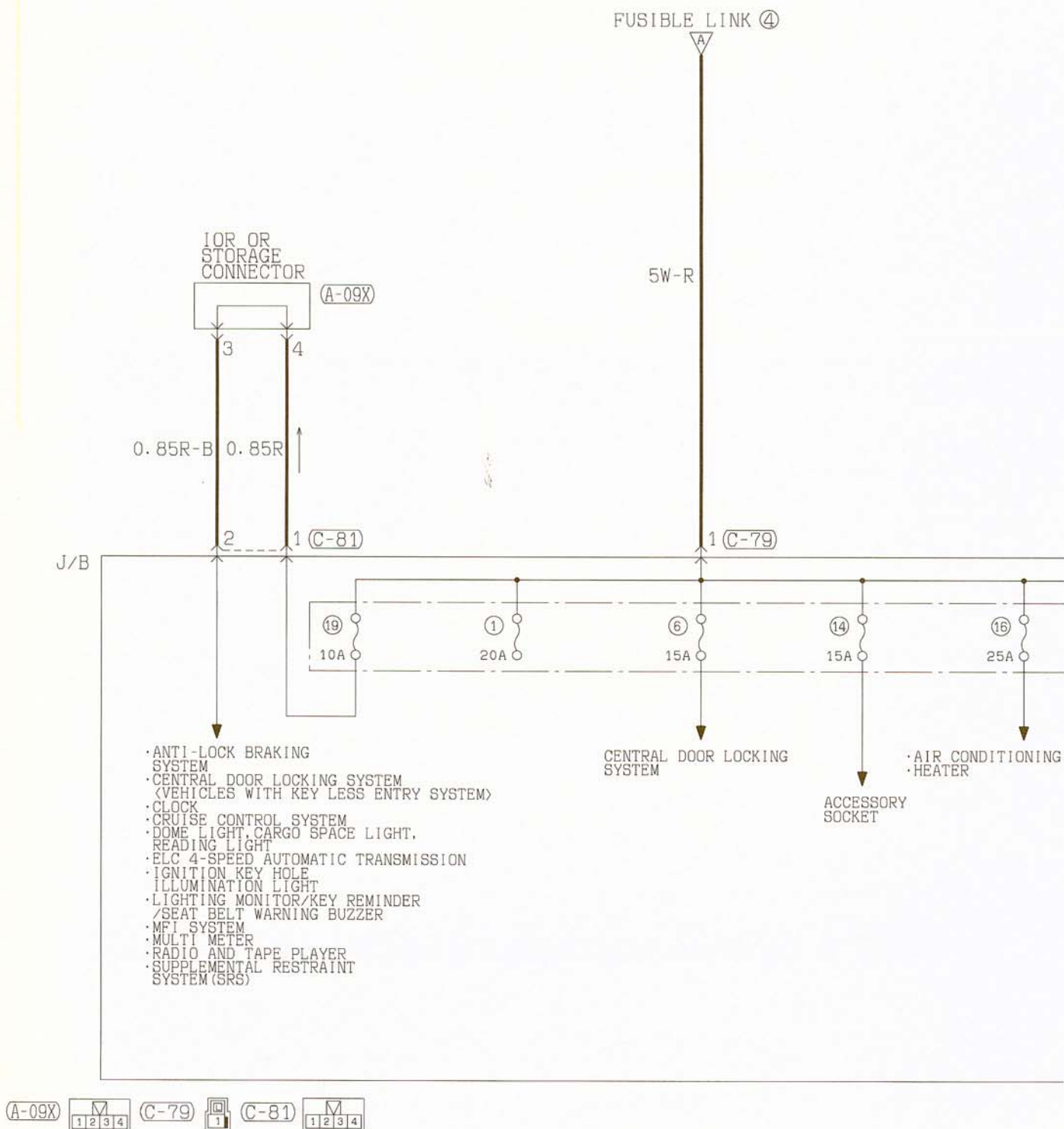
(C-56)

1	2	3
4	5	6

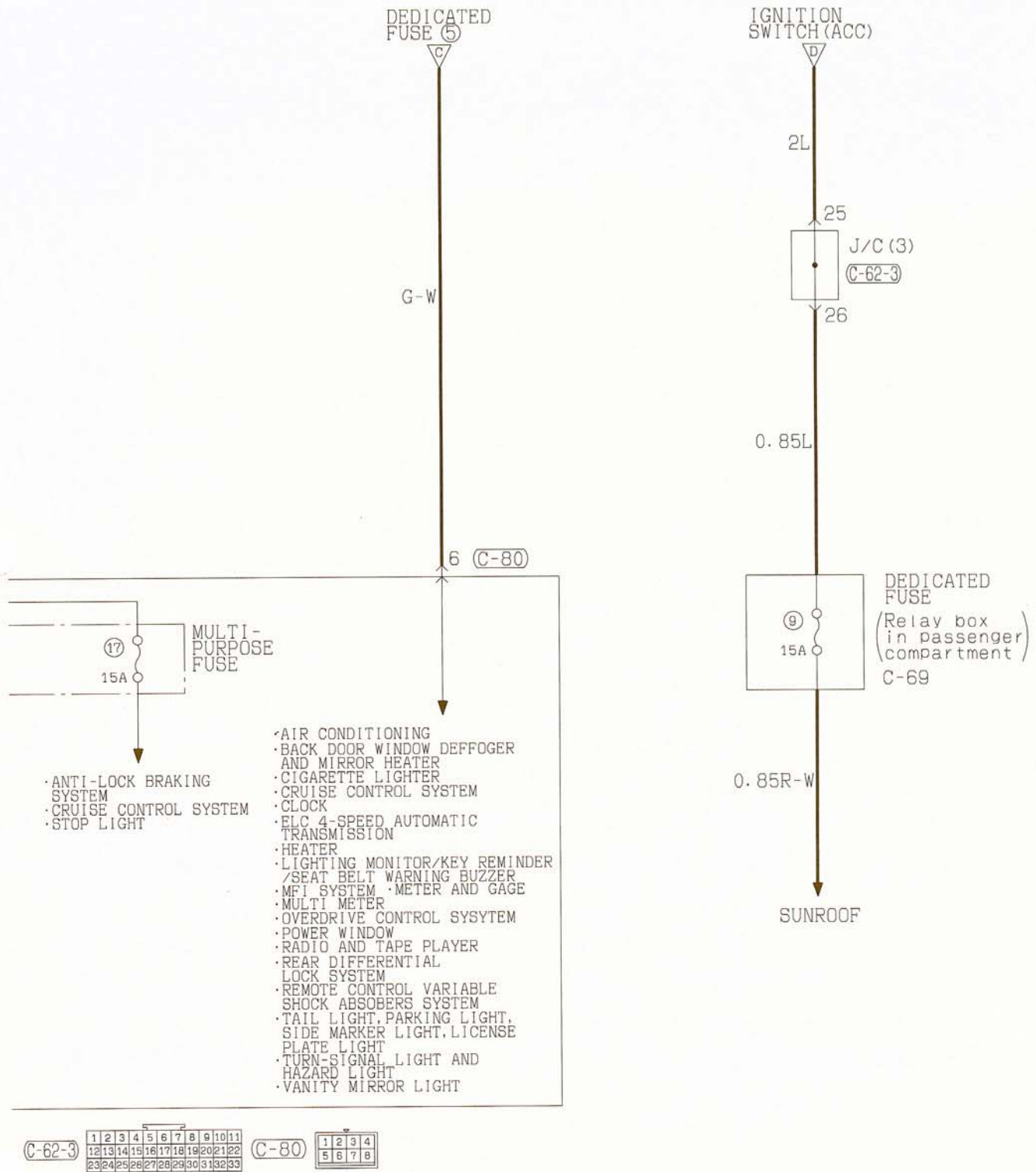




## POWER DISTRIBUTION (CONTINUED)

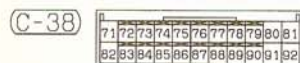
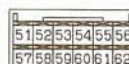
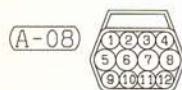
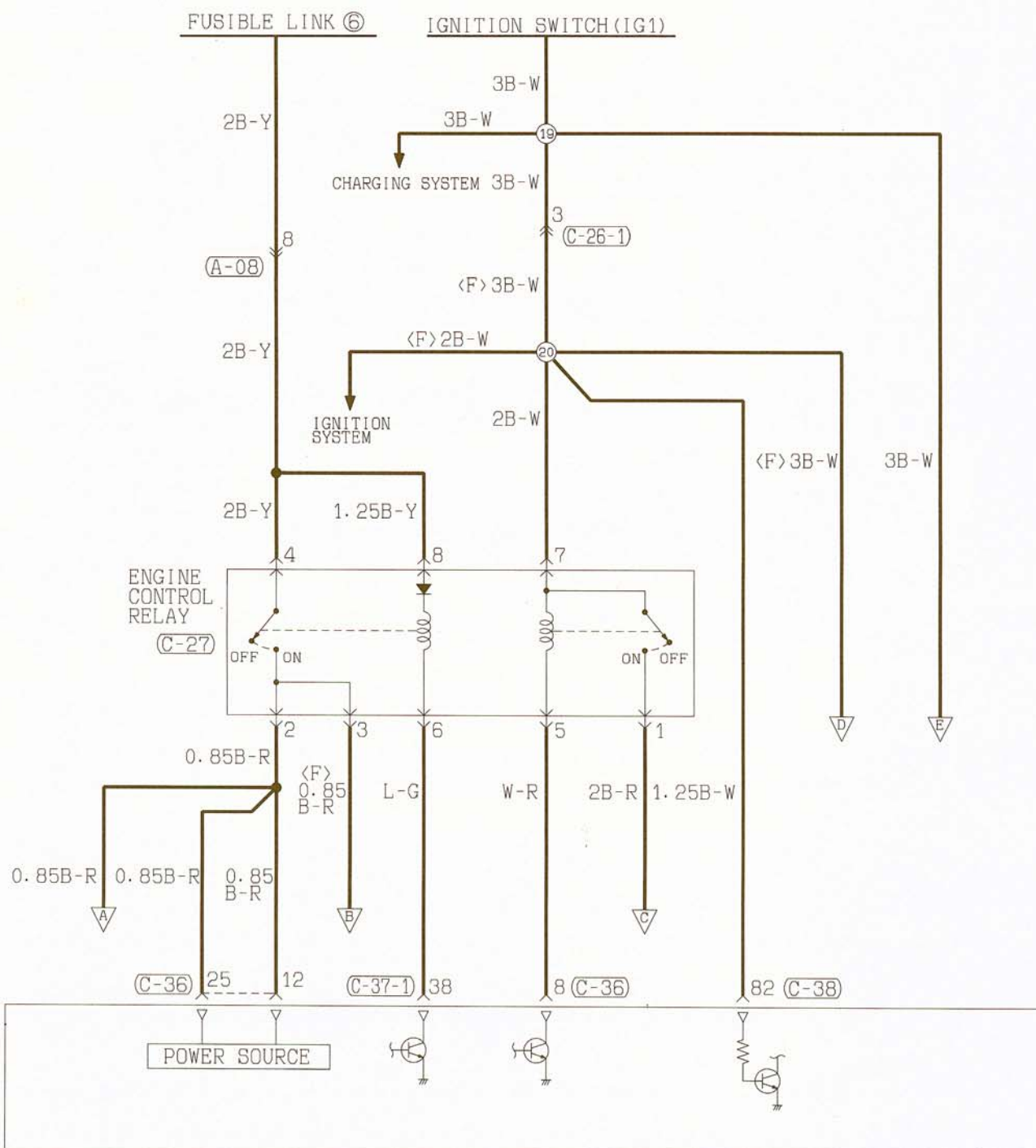




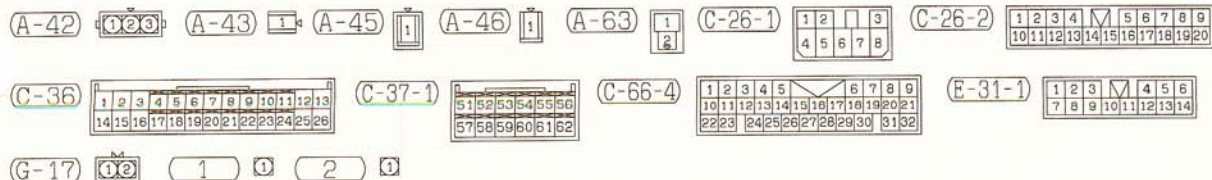


## MFI SYSTEM <3.0L-12 VALVE engine>

90100080151

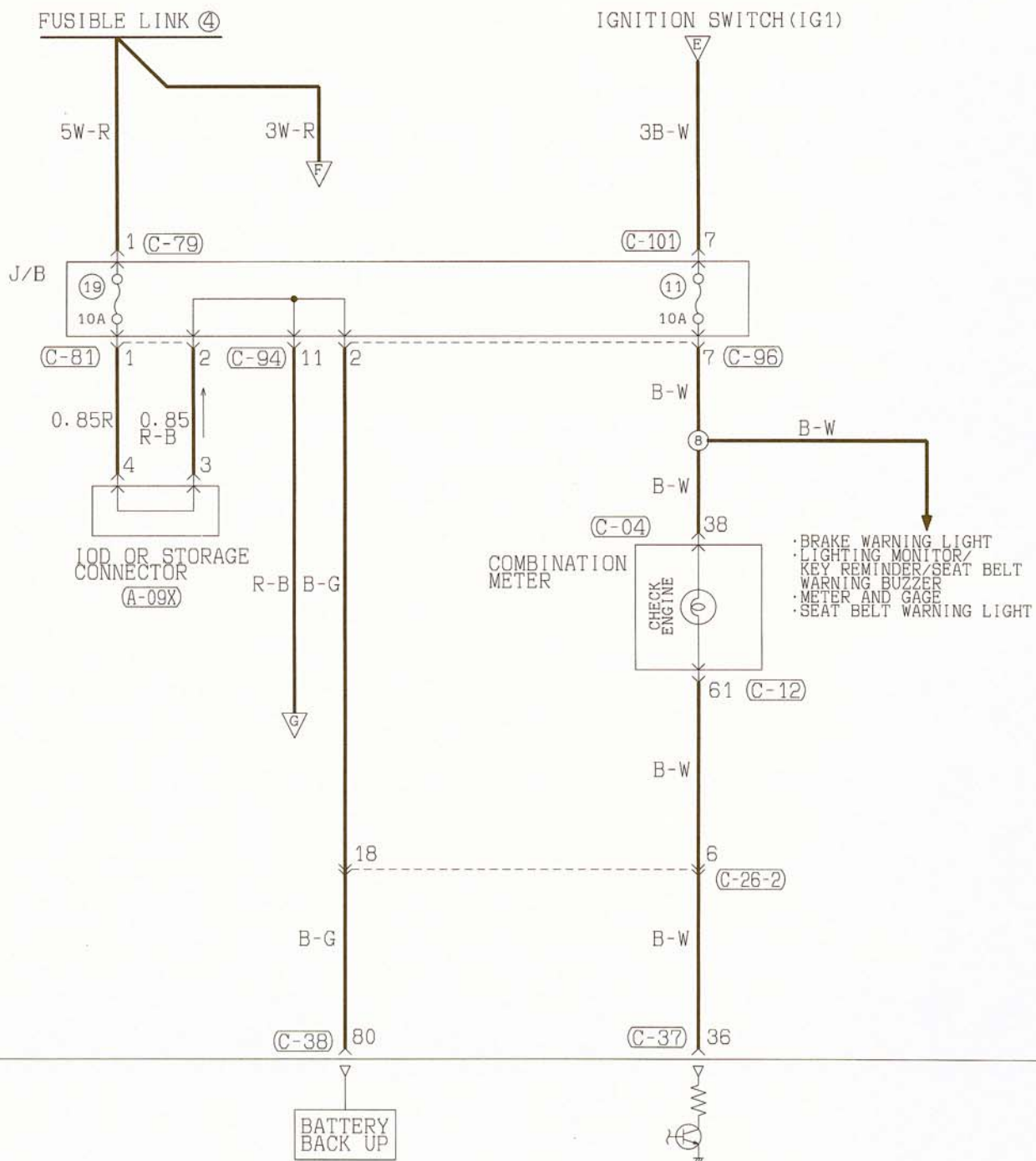






## MFI SYSTEM

## &lt;3.0L-12 VALVE engine&gt; (CONTINUED)



(A-09X) 

1	2	3	4
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 (C-04) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44
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 (C-12) 

51	52	53	54	55	56	57	58	59	60	61	62
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(C-26-2) 

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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 (C-37) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
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 (C-38) 

71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
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 (C-79) 

1
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 (C-81) 

1	2	3	4
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(C-94) 

1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

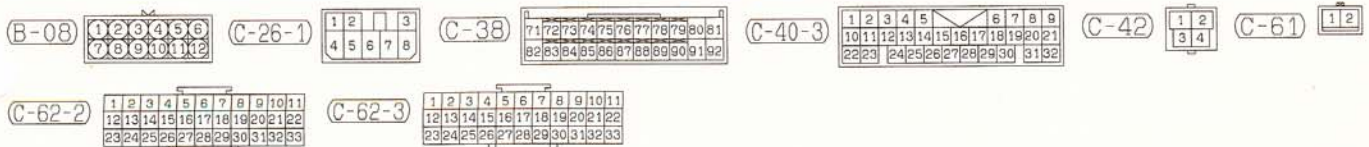
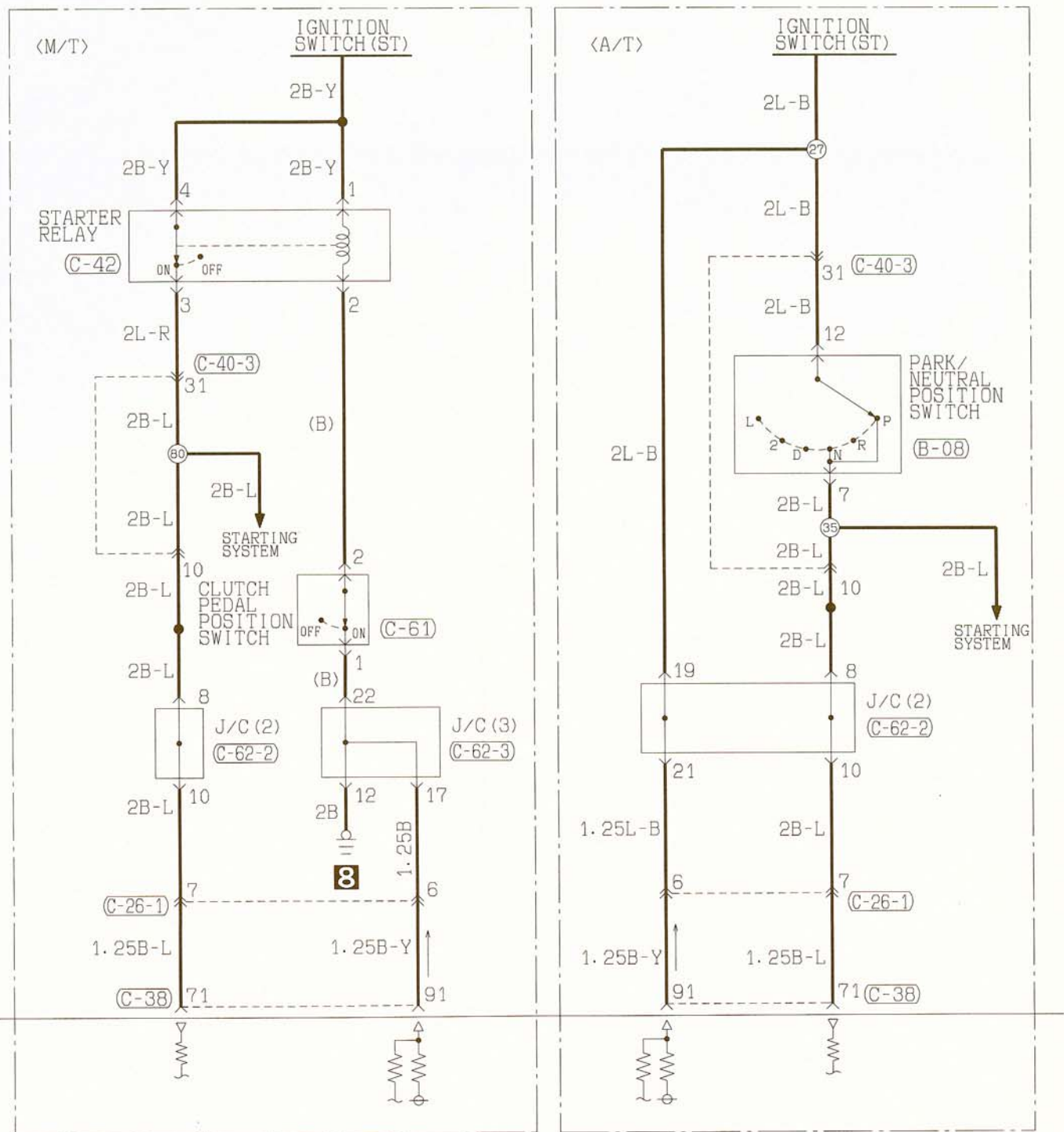
 (C-96) 

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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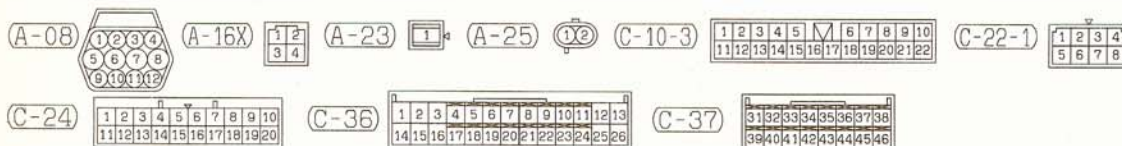
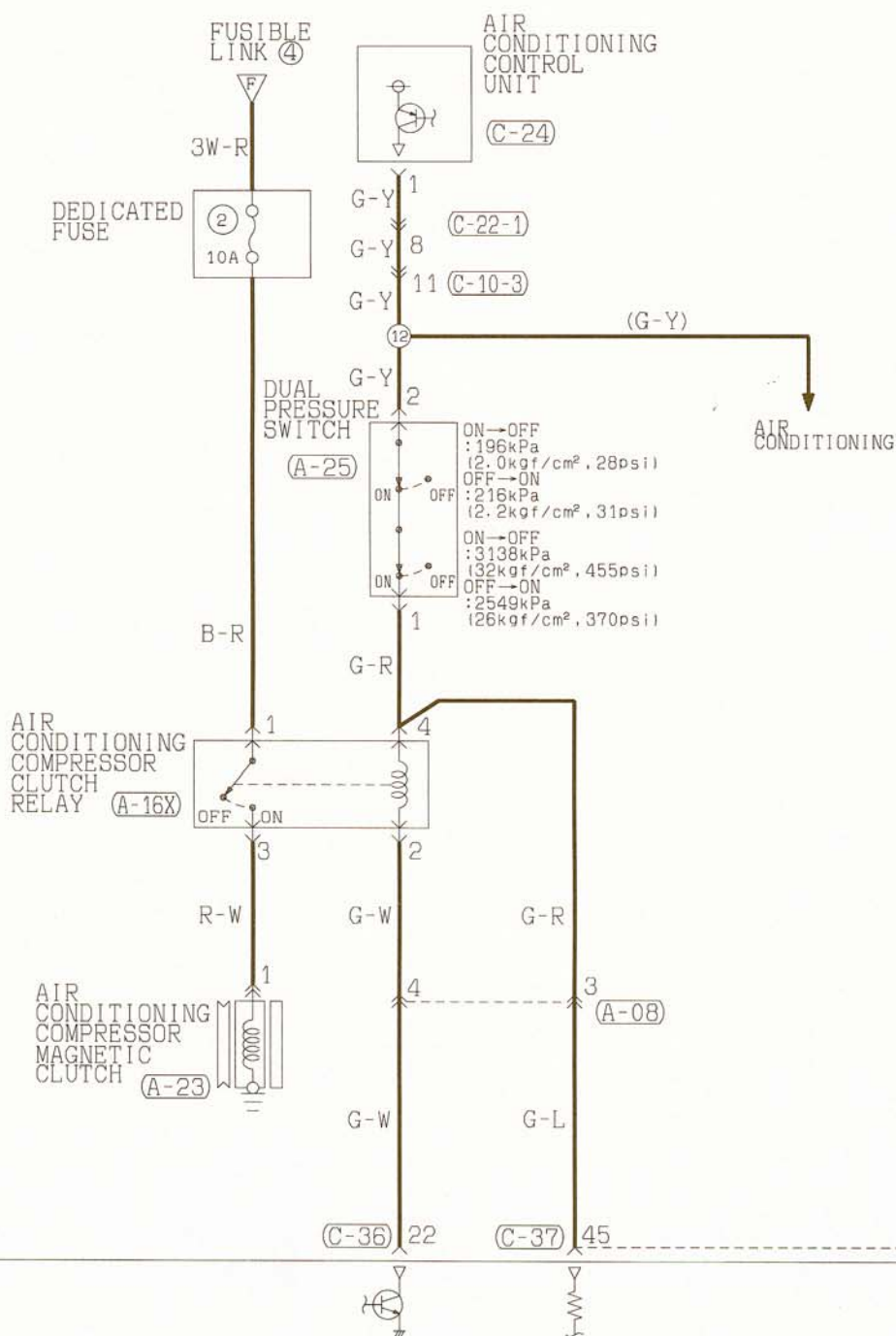
 (C-101) 

1	2	3	4	5	6	7	8
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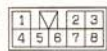




# MFI SYSTEM <3.0L-12 VALVE engine> (CONTINUED)

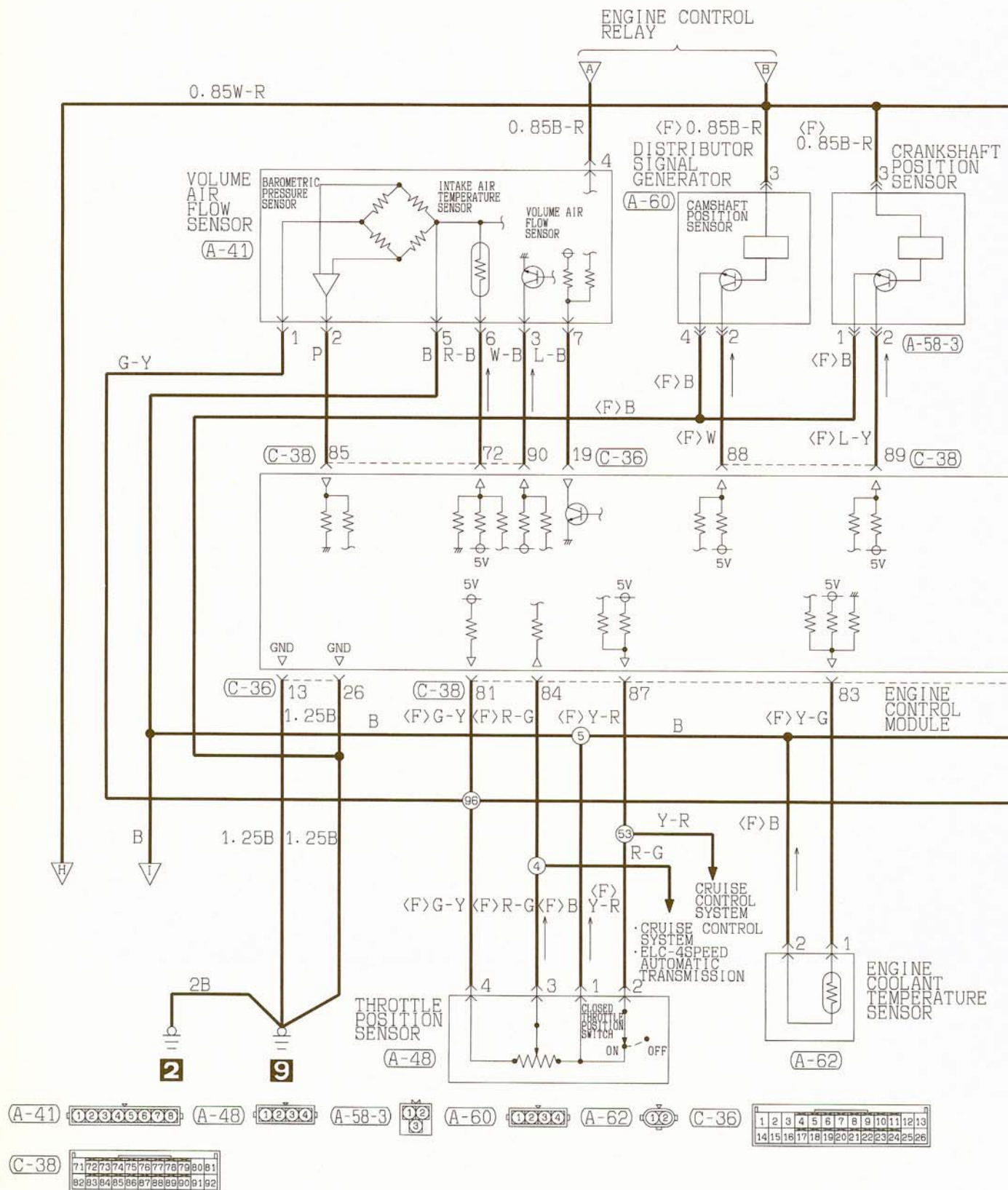




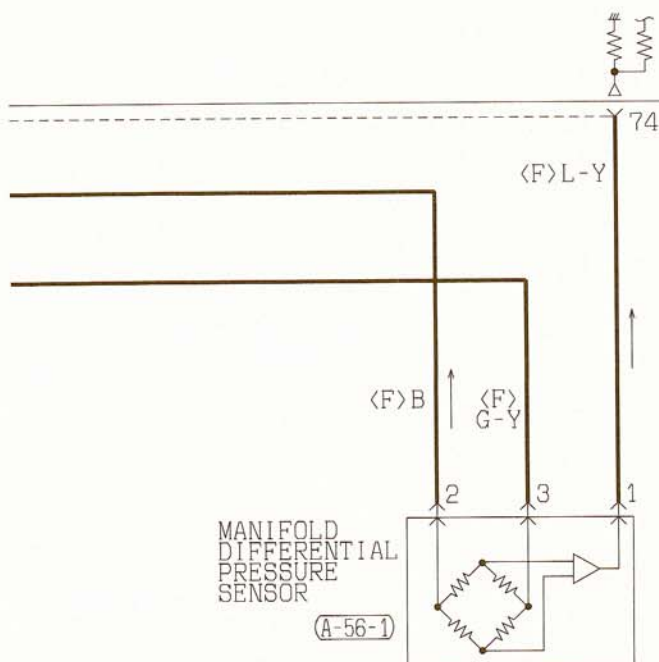
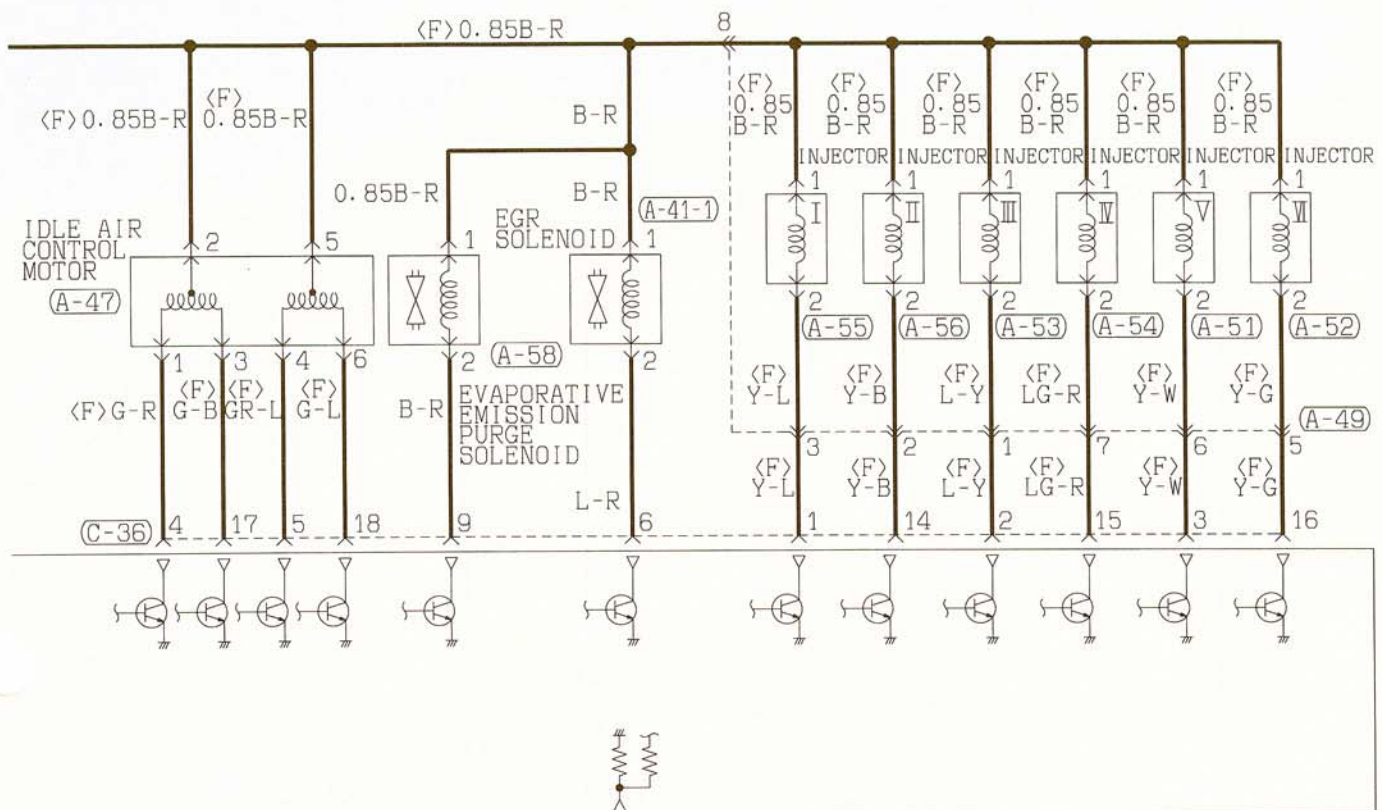


## MFI SYSTEM

## &lt;3.0L-12 VALVE engine&gt; (CONTINUED)



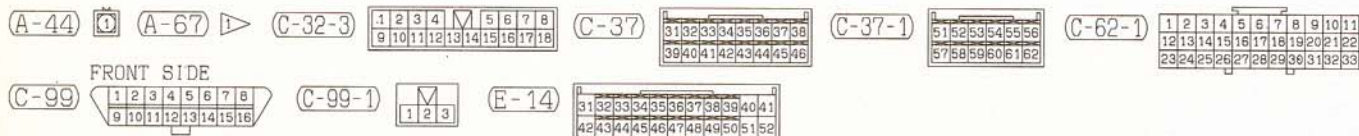
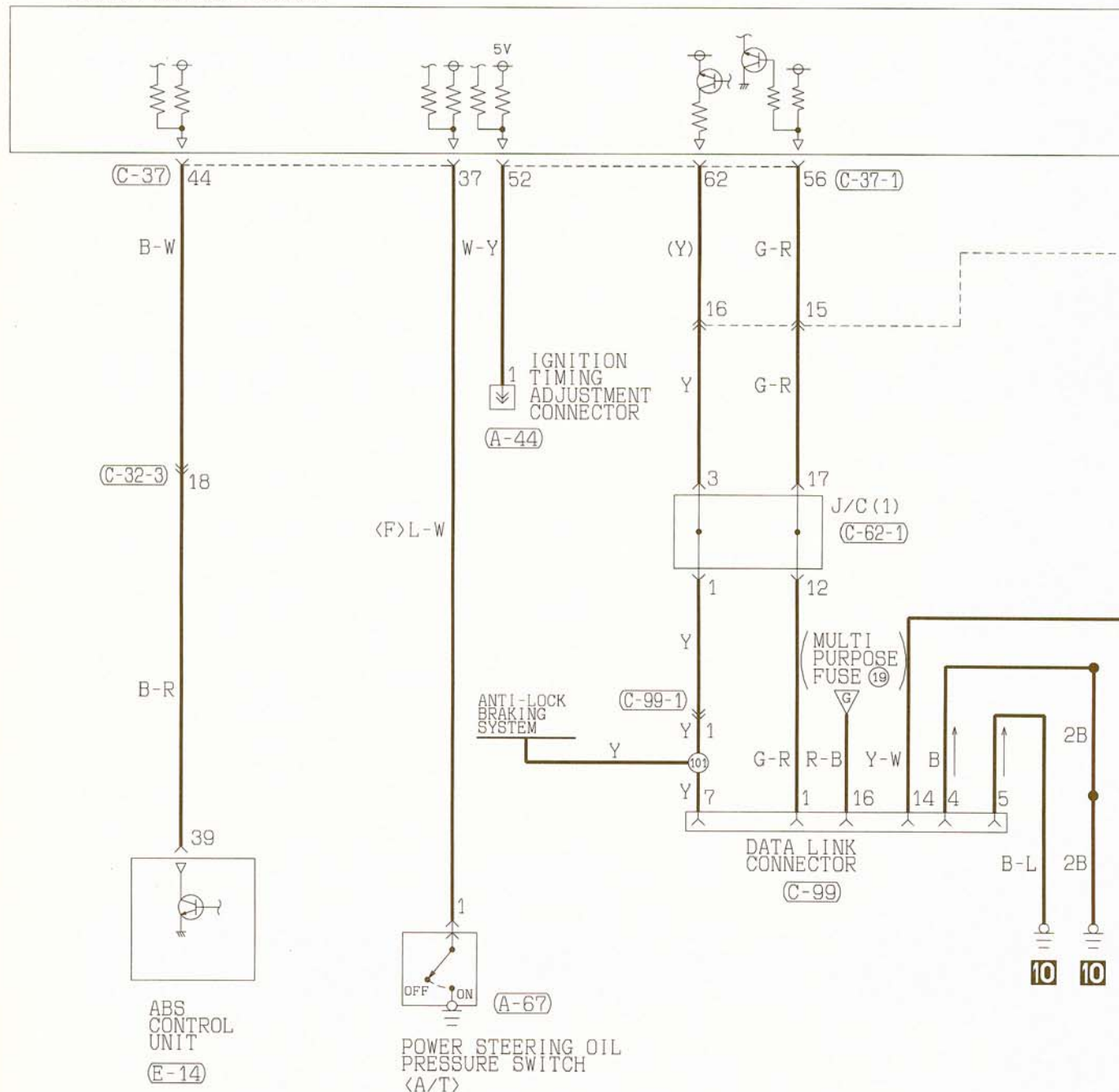




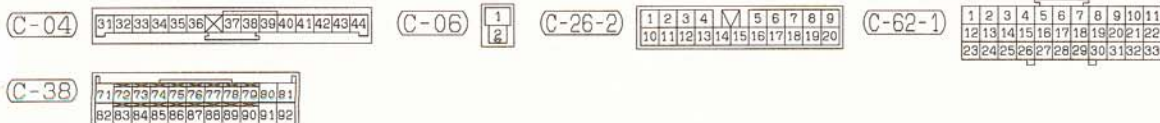
(A-41-1)	<table><tr><td>1</td><td>2</td></tr></table>	1	2	(A-47)	<table><tr><td>1</td><td>2</td><td>3</td></tr><tr><td>4</td><td>5</td><td>6</td></tr></table>	1	2	3	4	5	6	(A-49)	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td></tr></table>	1	2	3	4	5	6	7	8	(A-51)	<table><tr><td>1</td><td>2</td></tr></table>	1	2	(A-52)	<table><tr><td>1</td><td>2</td></tr></table>	1	2	(A-53)	<table><tr><td>1</td><td>2</td></tr></table>	1	2	(A-54)	<table><tr><td>1</td><td>2</td></tr></table>	1	2	(A-55)	<table><tr><td>1</td><td>2</td></tr></table>	1	2	(A-56)	<table><tr><td>1</td><td>2</td></tr></table>	1	2					
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4	5	6																																																
1	2	3	4																																															
5	6	7	8																																															
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1	2																																																	
(A-56-1)	<table><tr><td>1</td><td>2</td><td>3</td></tr></table>	1	2	3	(A-58)	<table><tr><td>1</td><td>2</td></tr></table>	1	2	(C-36)	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td></tr></table>	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	(C-37-1)	<table><tr><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td></tr><tr><td>57</td><td>58</td><td>59</td><td>60</td><td>61</td><td>62</td></tr></table>	51	52	53	54	55	56	57	58	59	60	61	62
1	2	3																																																
1	2																																																	
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																																						
51	52	53	54	55	56																																													
57	58	59	60	61	62																																													

# MFI SYSTEM <3.0L-12 VALVE engine> (CONTINUED)

## ENGINE CONTROL MODULE







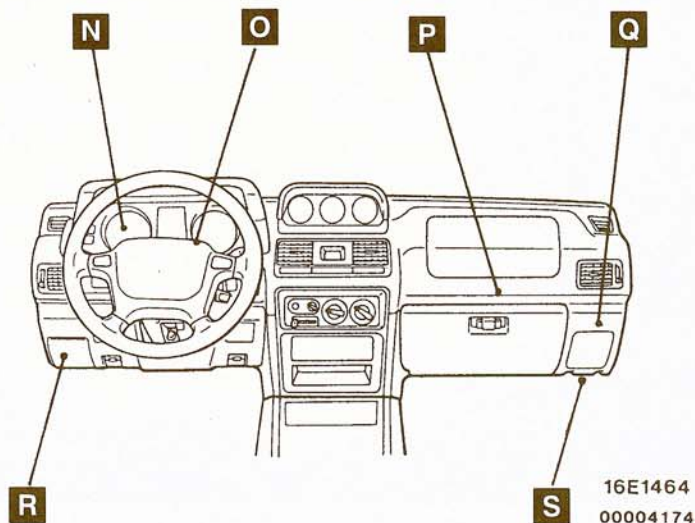
**COMPONENT LOCATION**

70100140059

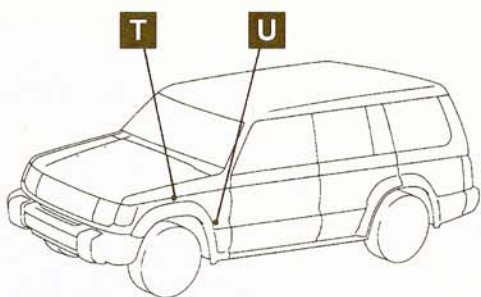
Name	Symbol	Name	Symbol
A/C compressor clutch relay	G	Heated oxygen sensor	T
A/C control unit	P	Idle air control motor	B
Camshaft position sensor	K	Ignition coil	D
Check engine/Malfunction indicator lamp	O	Ignition timing adjustment connector	A
Crankshaft position sensor	L	Ignition power transistor	D
Data link connector	R	Manifold differential pressure sensor	E
Dual pressure switch	M	Park/Neutral position switch	U
EGR solenoid	F	Power steering pressure switch	I
Engine control module	S	Throttle position sensor (with closed throttle position switch)	C
Engine control relay	Q	Reed switch	N
Engine coolant temperature sensor	J	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)	H
Evaporative emission purge solenoid	F		
Fuel pump check connector	A		

**NOTE**

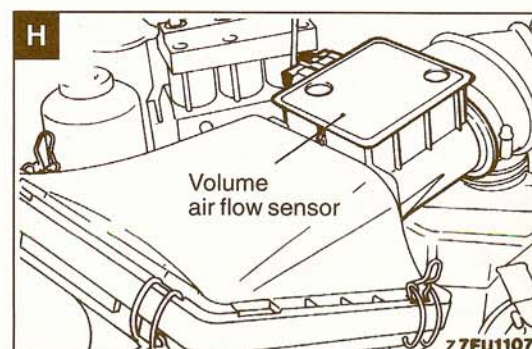
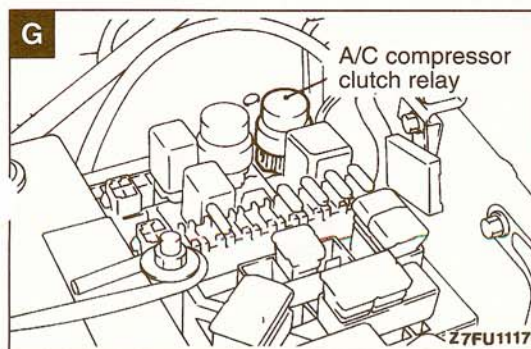
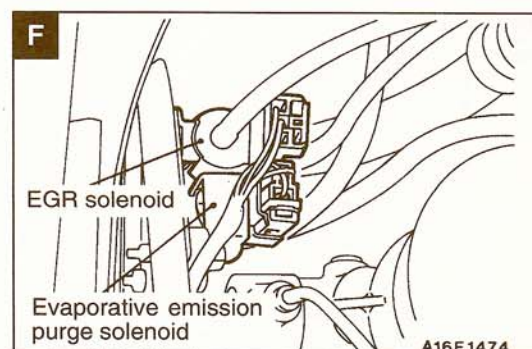
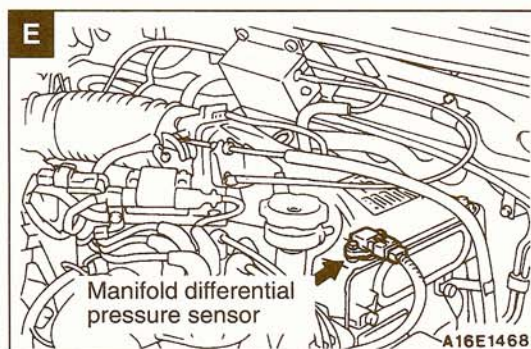
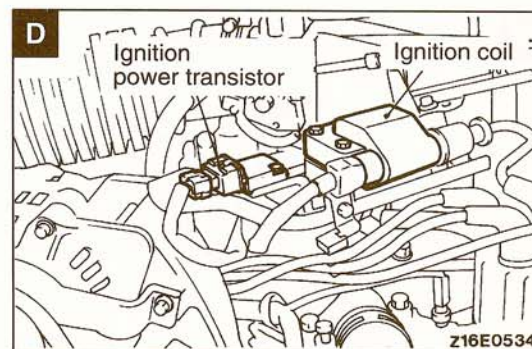
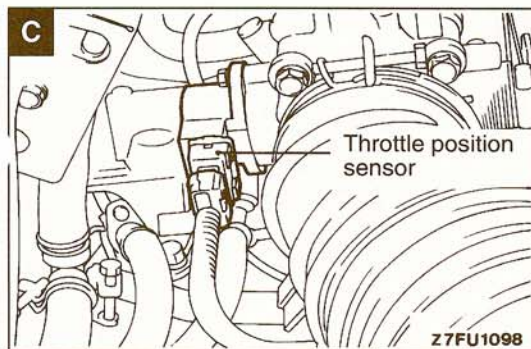
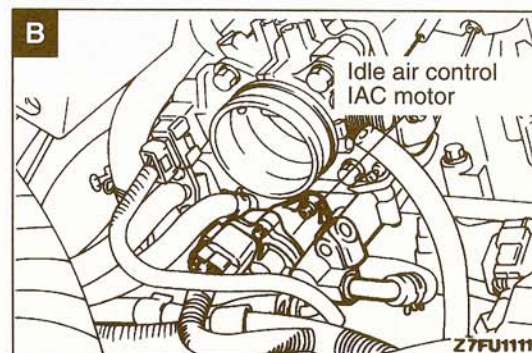
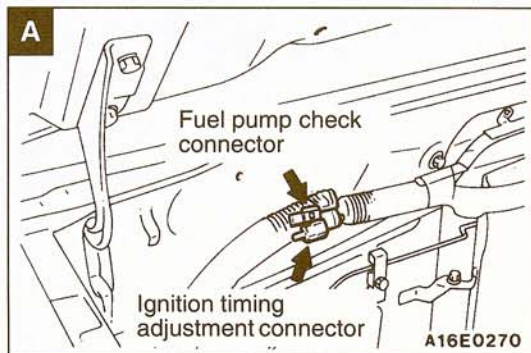
The "Name" column is arranged in alphabetical order.



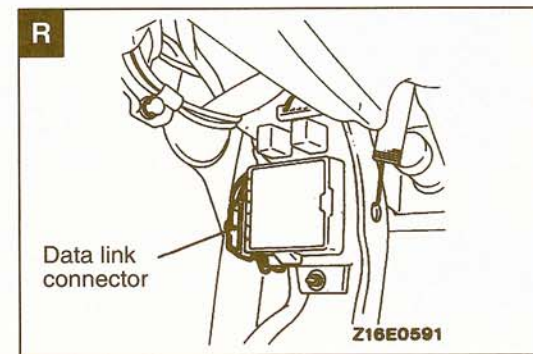
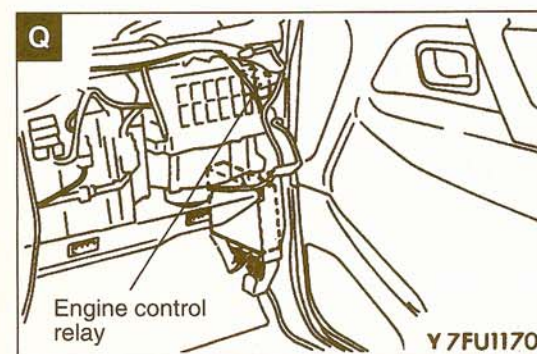
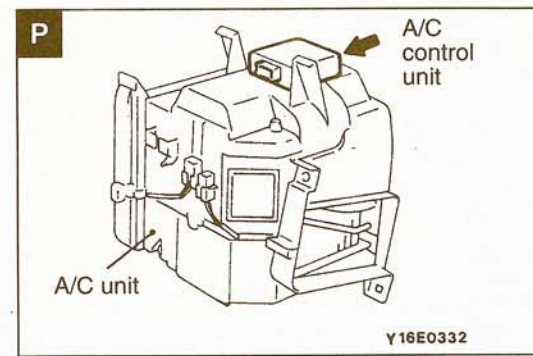
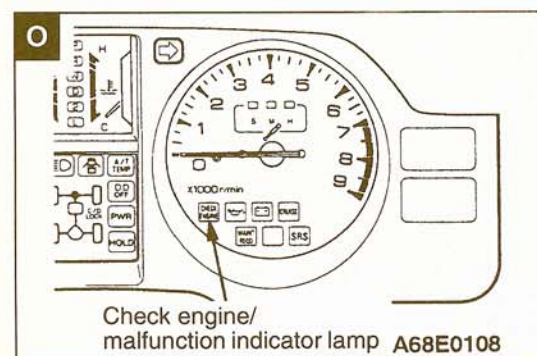
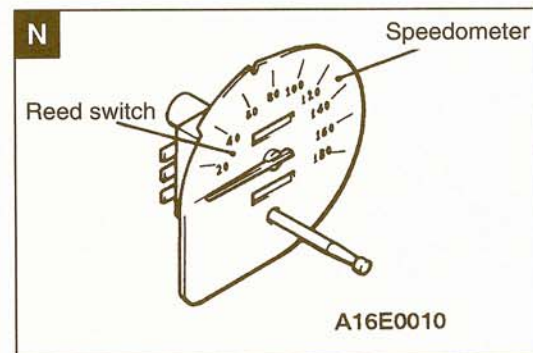
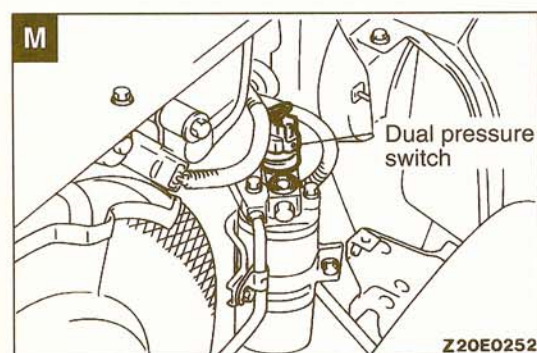
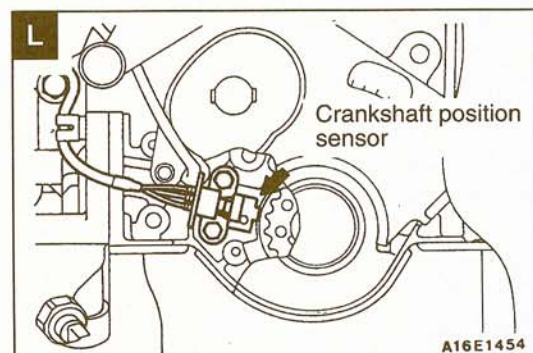
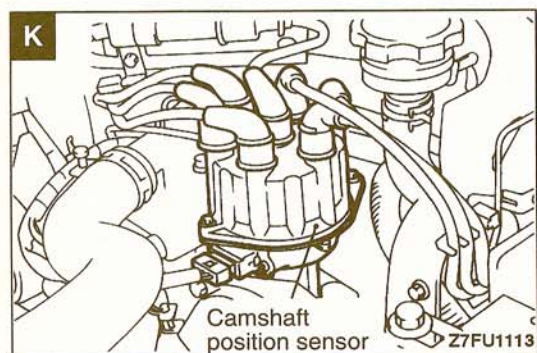
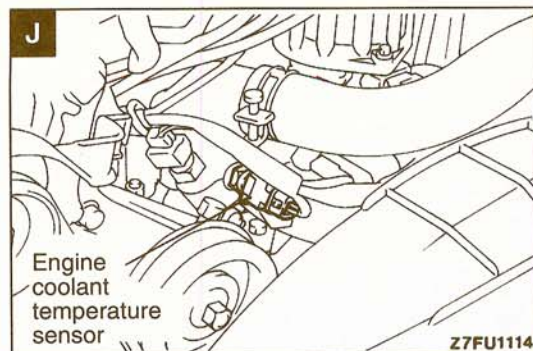
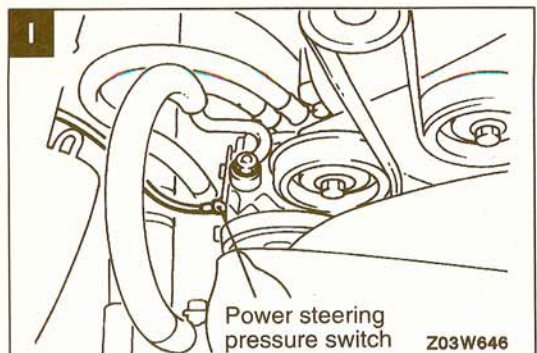




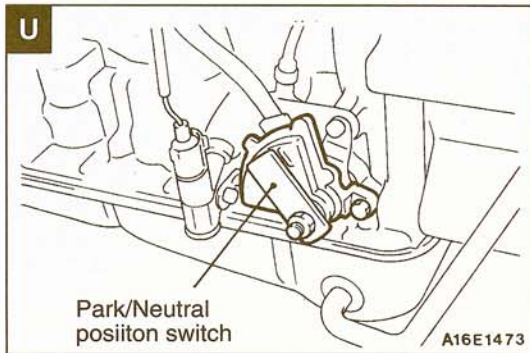
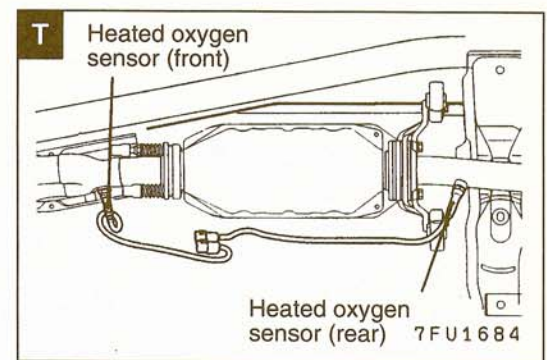
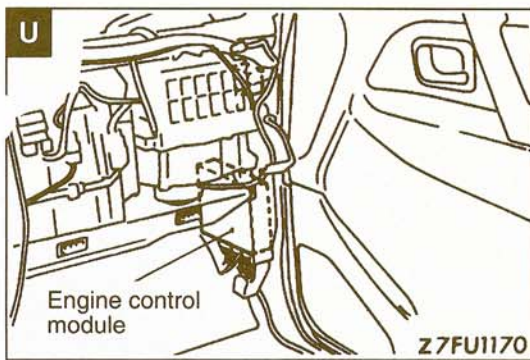
B16E0003



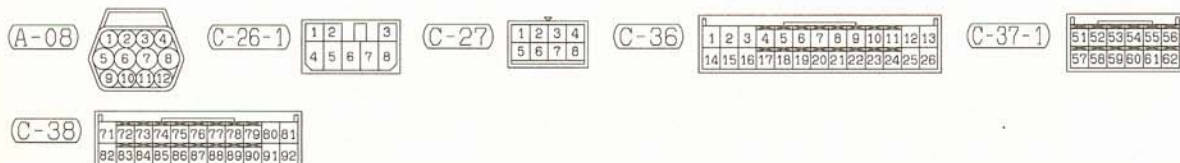




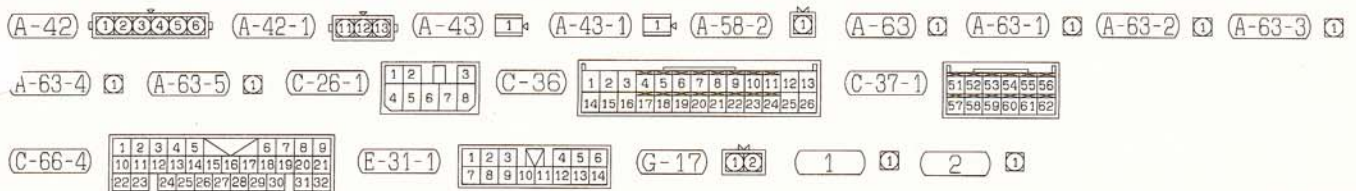
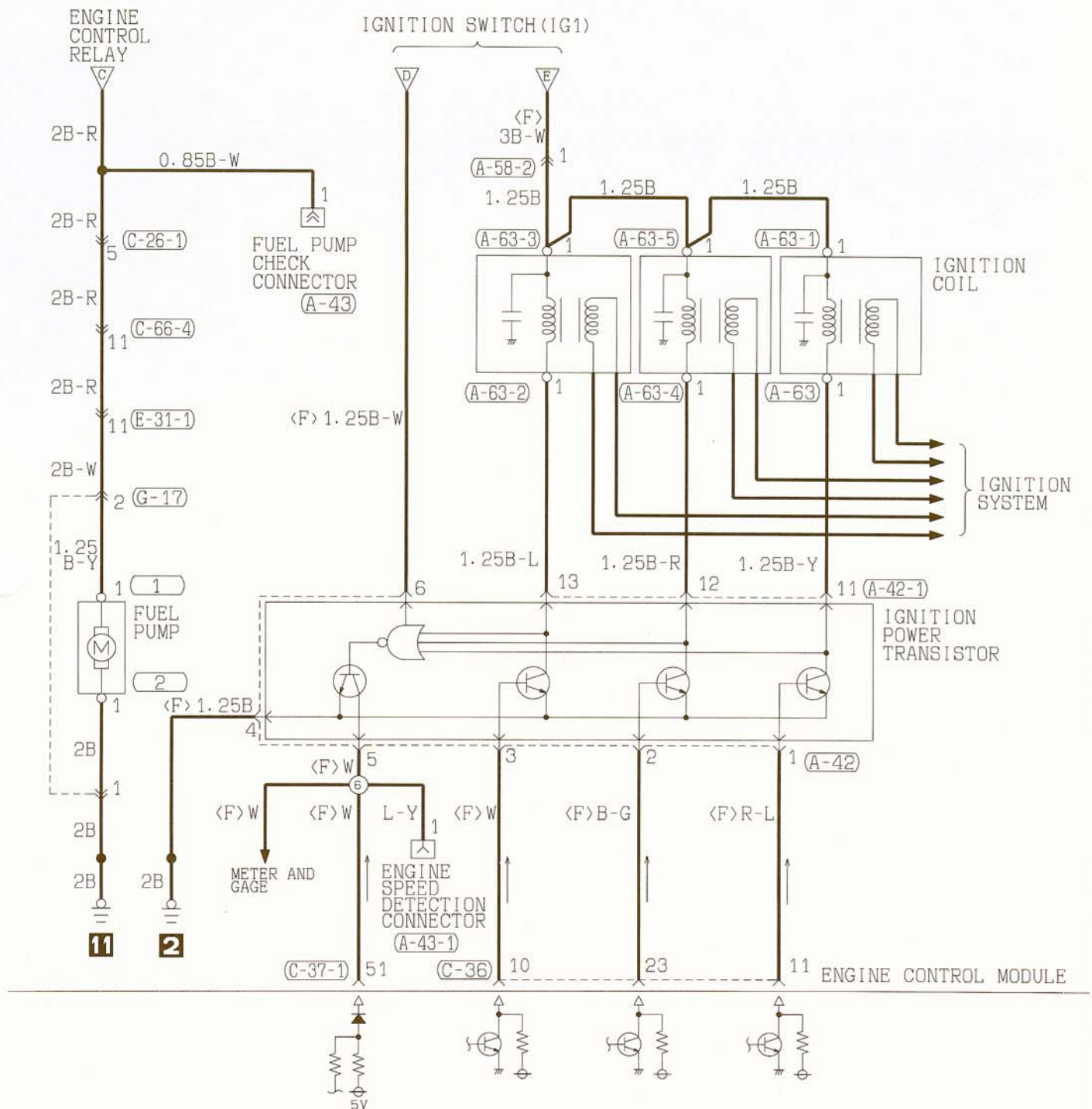




90100080168

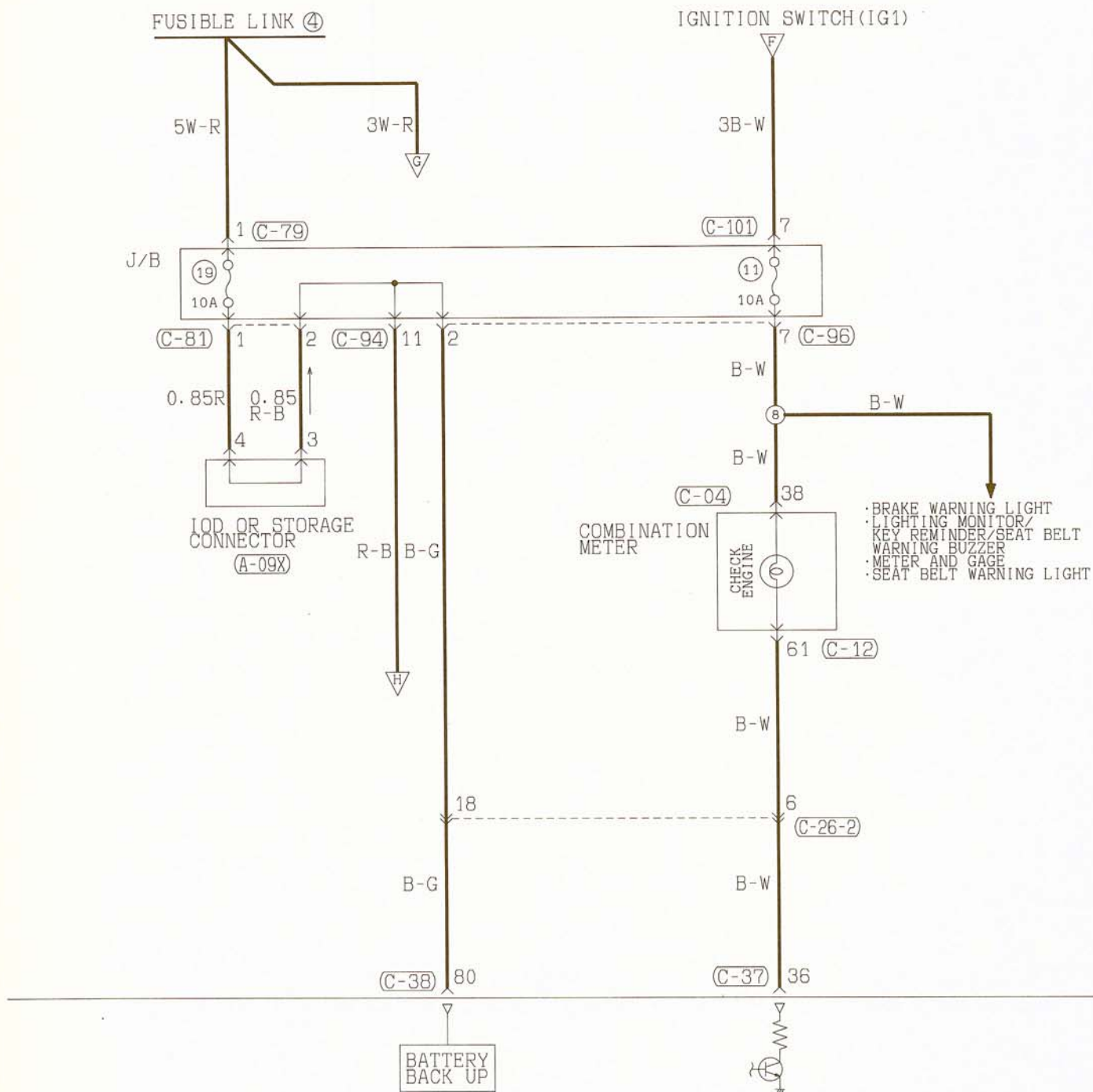






## MFI SYSTEM

## &lt;3.0L-24 VALVE engine for Federal&gt; (CONTINUED)



(A-09X) 

M
1 2 3 4

 (C-04) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44
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 (C-12) 

51	52	53	54	55	56	57	58	59	60	61	62
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(C-26-2) 

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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 (C-37) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
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 (C-38) 

71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
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 (C-79) 

1
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 (C-81) 

M
1 2 3 4

(C-94) 

1	2	3	4	5	6	7	8	9	10	11	12
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 (C-96) 

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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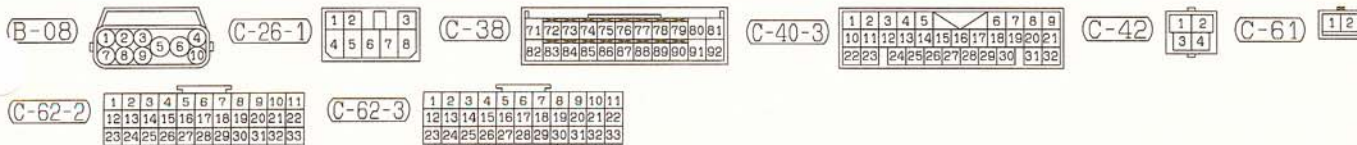
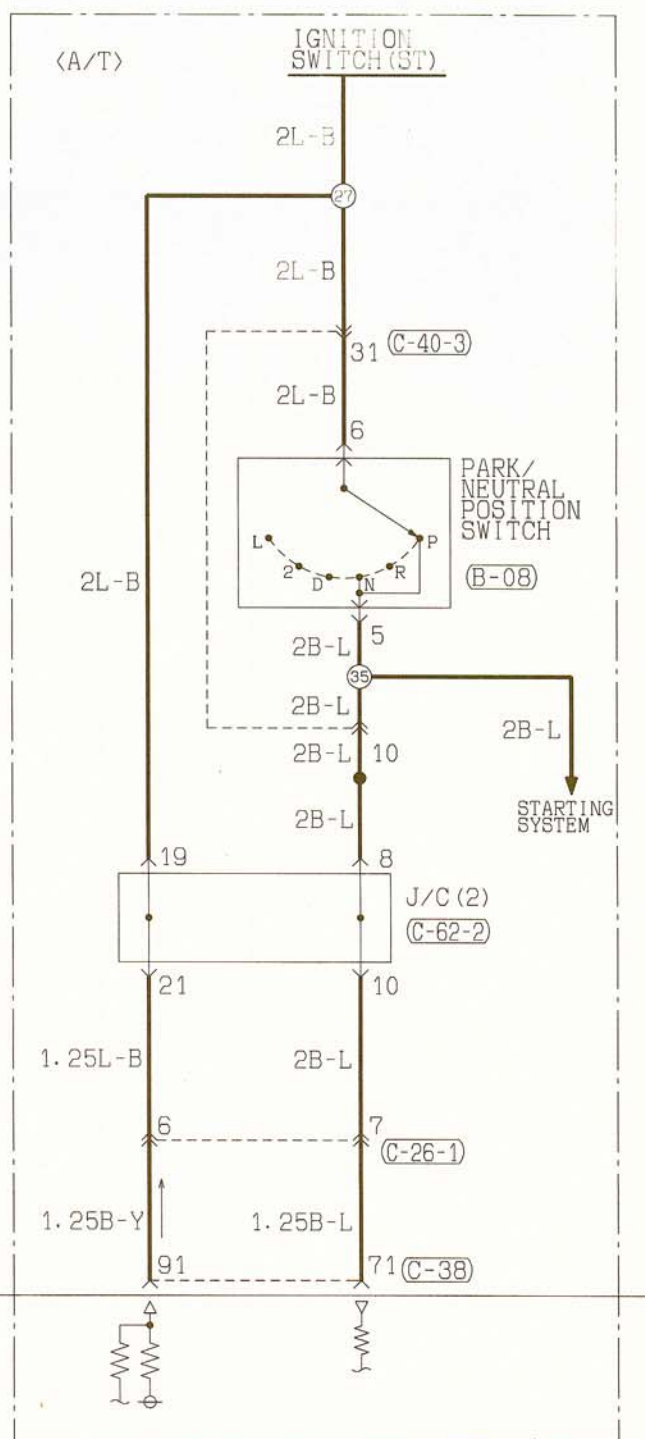
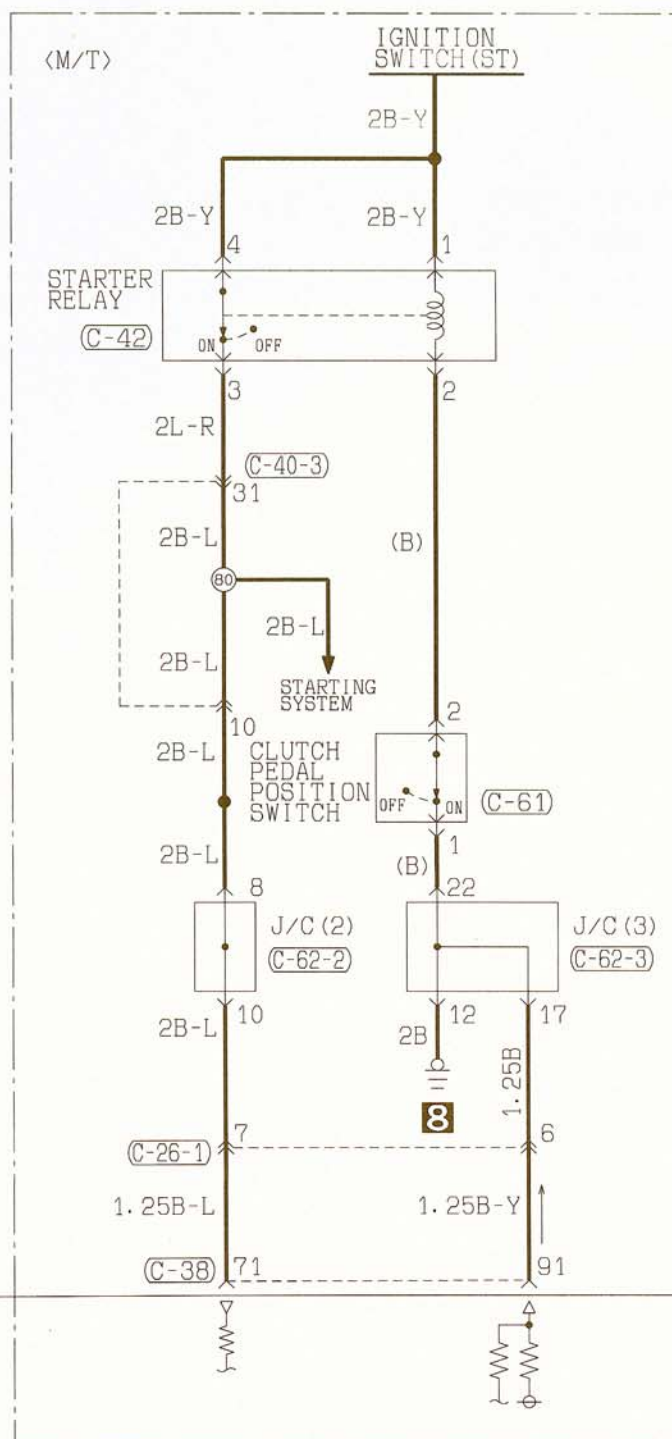
 (C-101) 

1	2	3	4	5	6	7	8
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HQ05M14BA

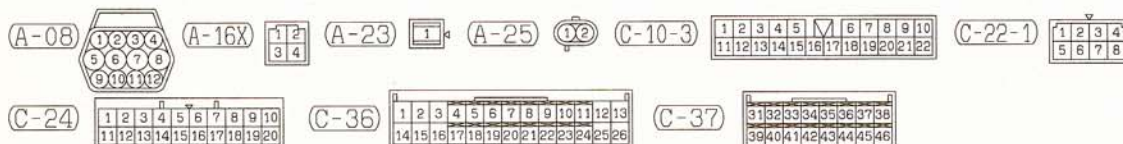
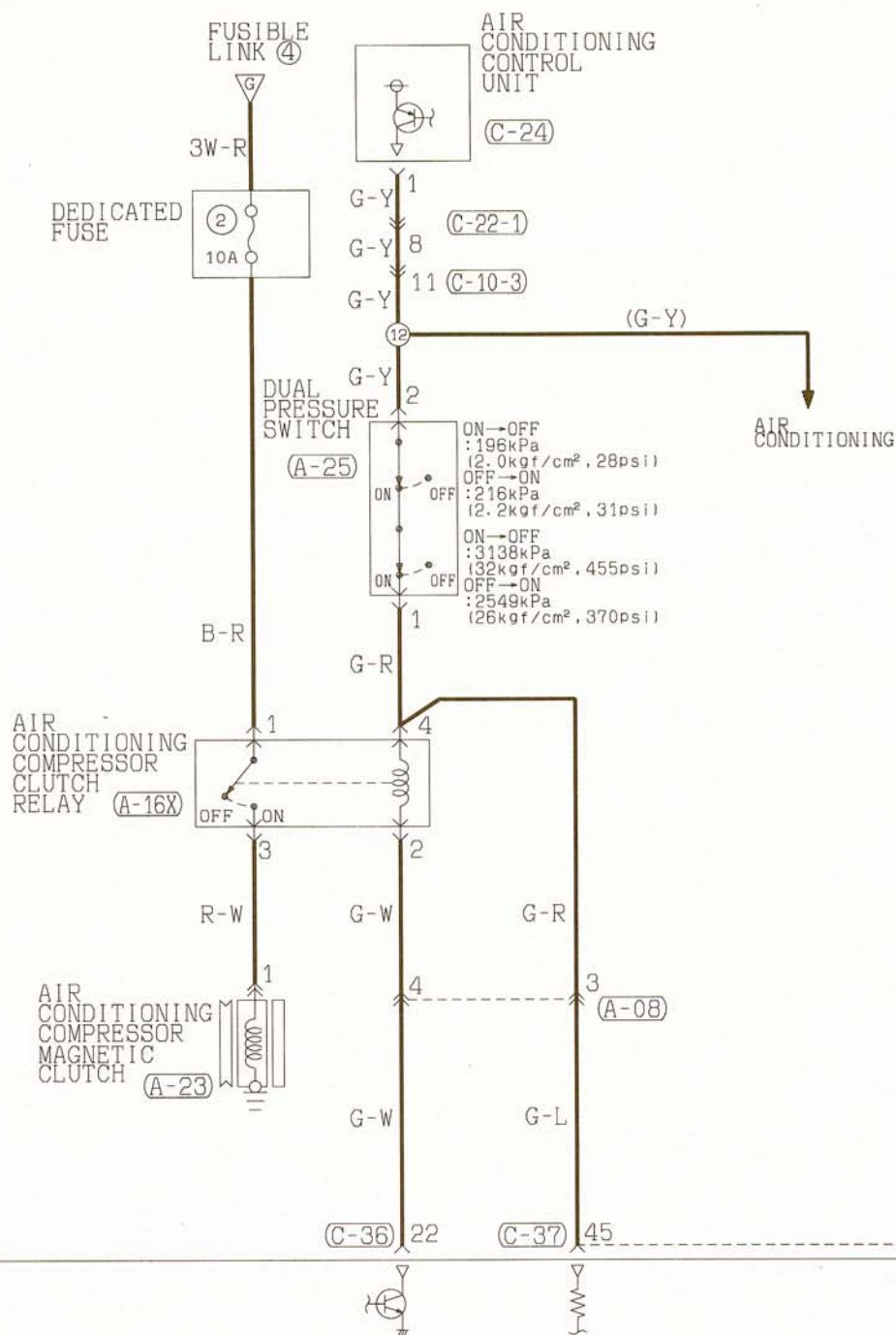
TSB Revision



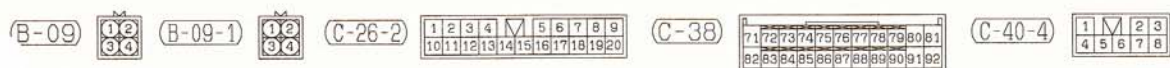


## MFI SYSTEM

## &lt;3.0L-24 VALVE engine for Federal&gt; (CONTINUED)

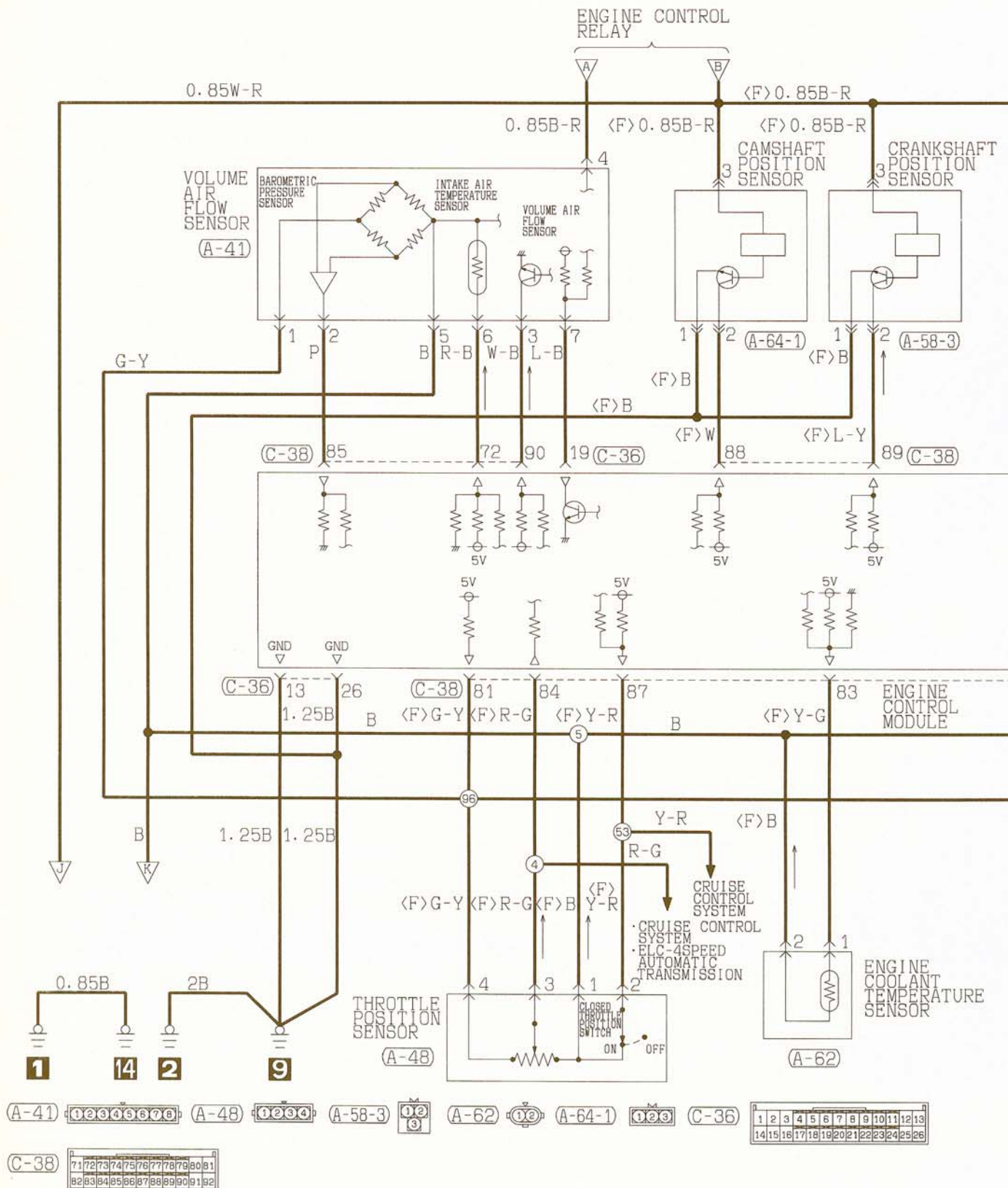




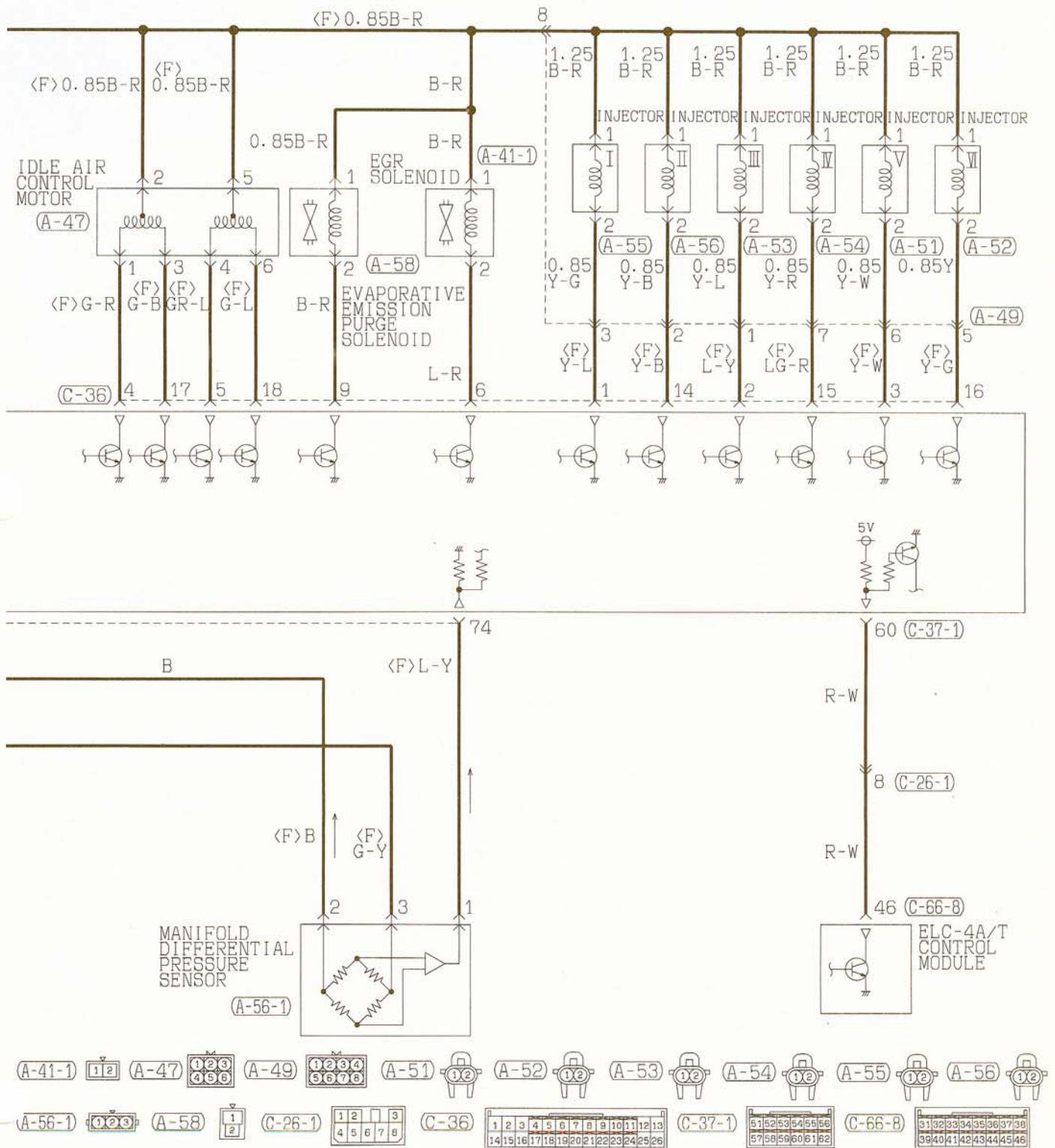


## MFI SYSTEM

## &lt;3.0L-24 VALVE engine for Federal&gt; (CONTINUED)

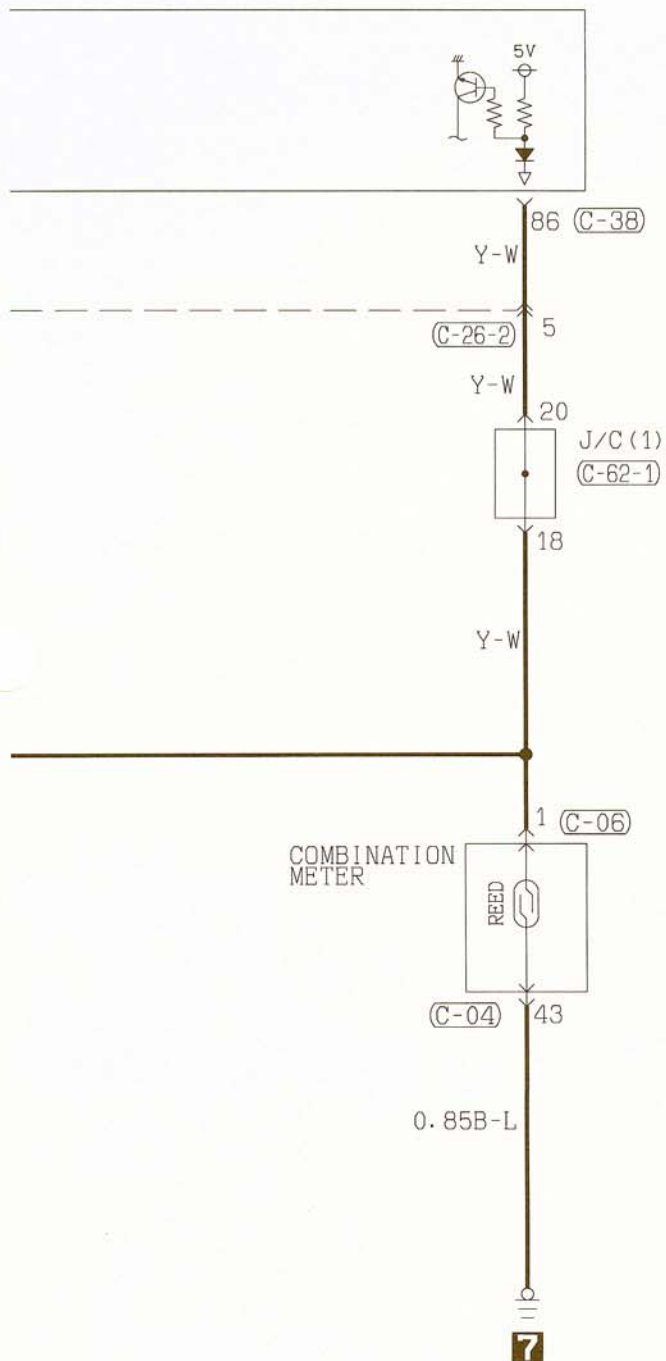












(C-04) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44
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(C-06) 

1	2
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(C-26-2) 

1	2	3	4	5	6	7	8	9		
10	11	12	13	14	15	16	17	18	19	20

(C-62-1) 

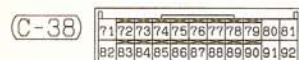
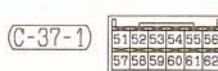
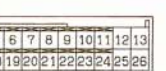
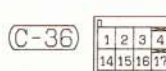
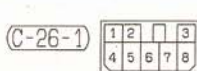
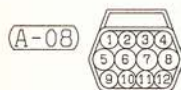
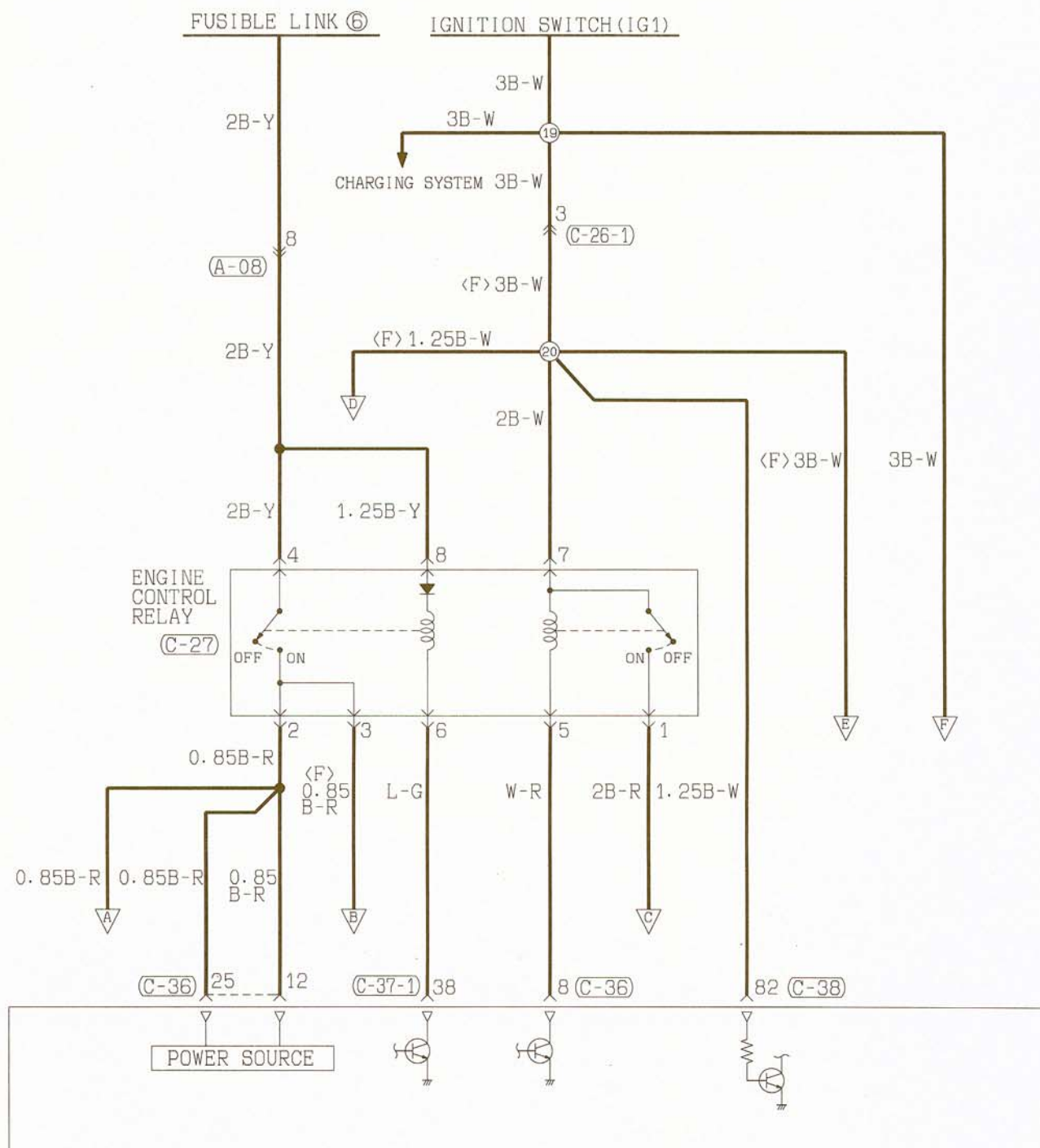
1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

(C-38) 

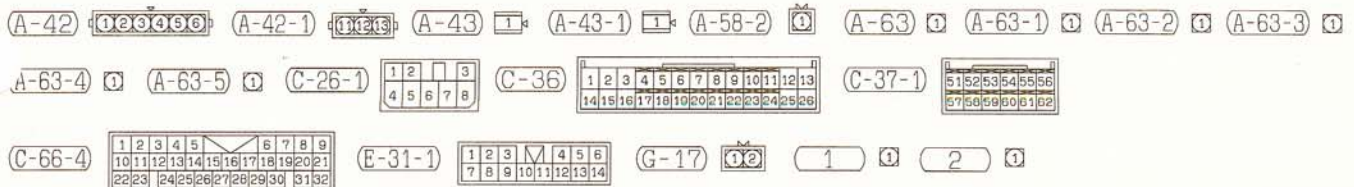
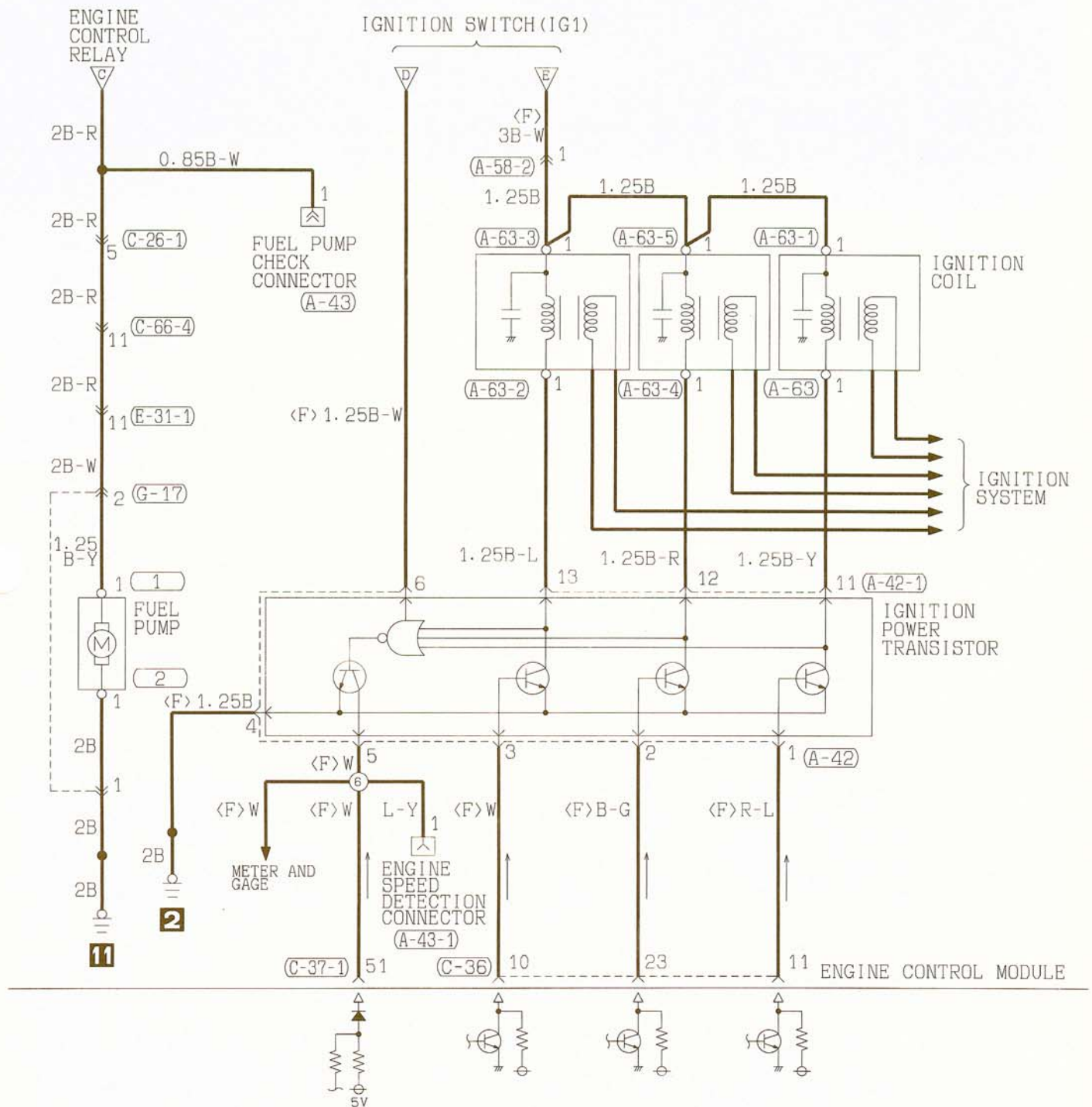
71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

# MFI SYSTEM <3.0L-24 VALVE engine for California>

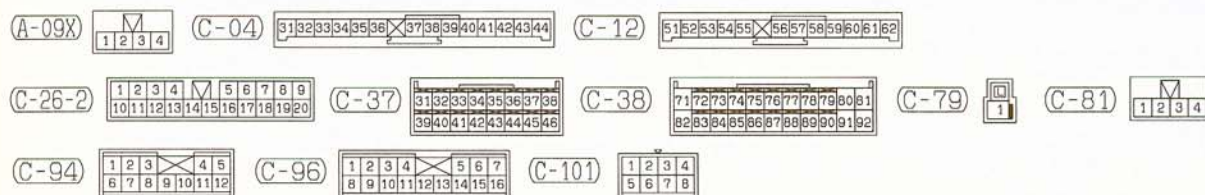
90100080175



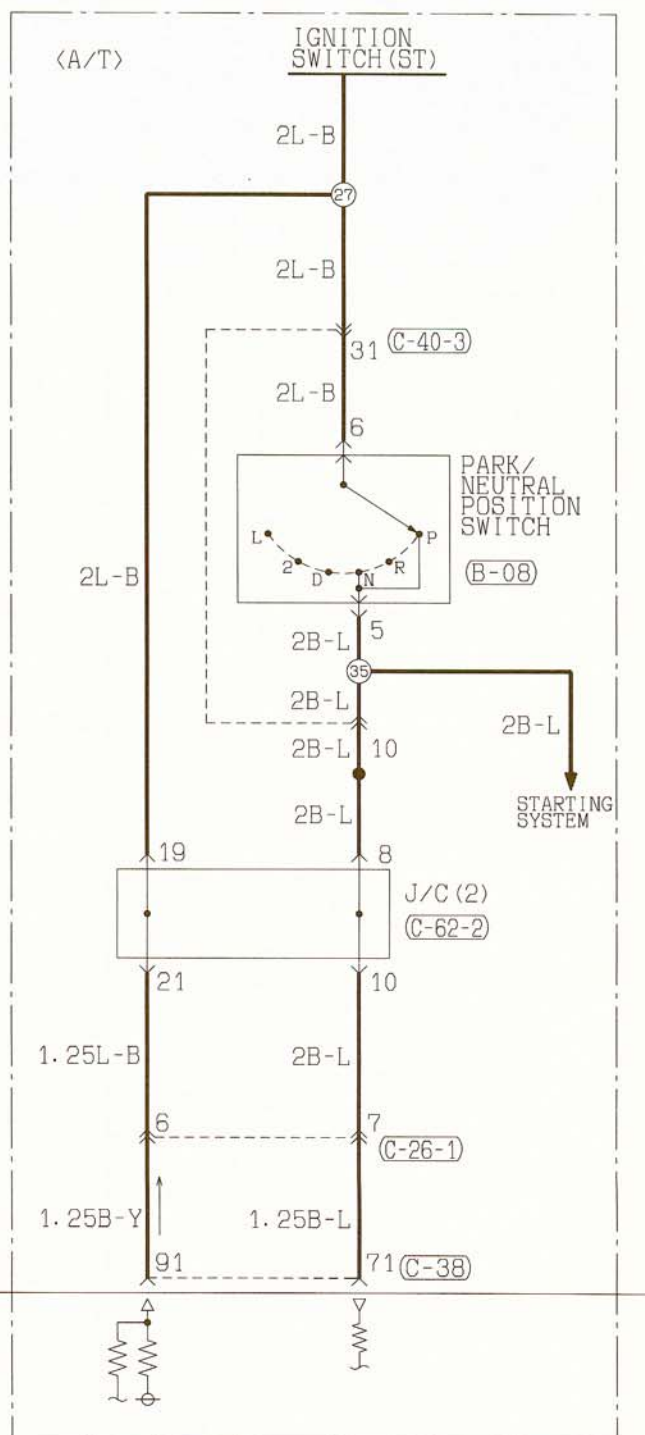




### <3.0L-24 VALVE engine for California> (CONTINUED)

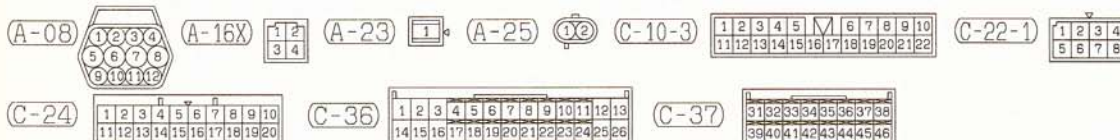
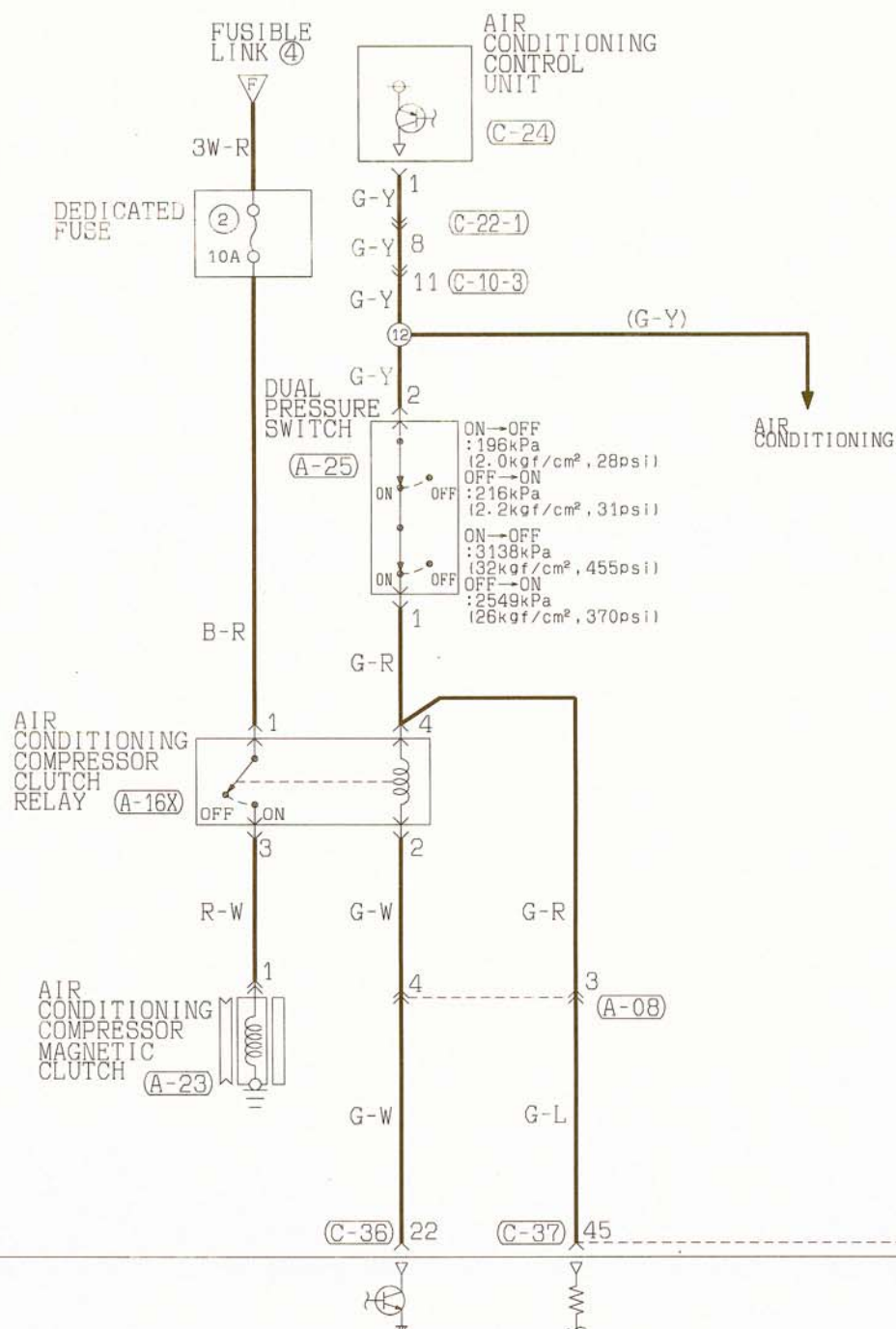




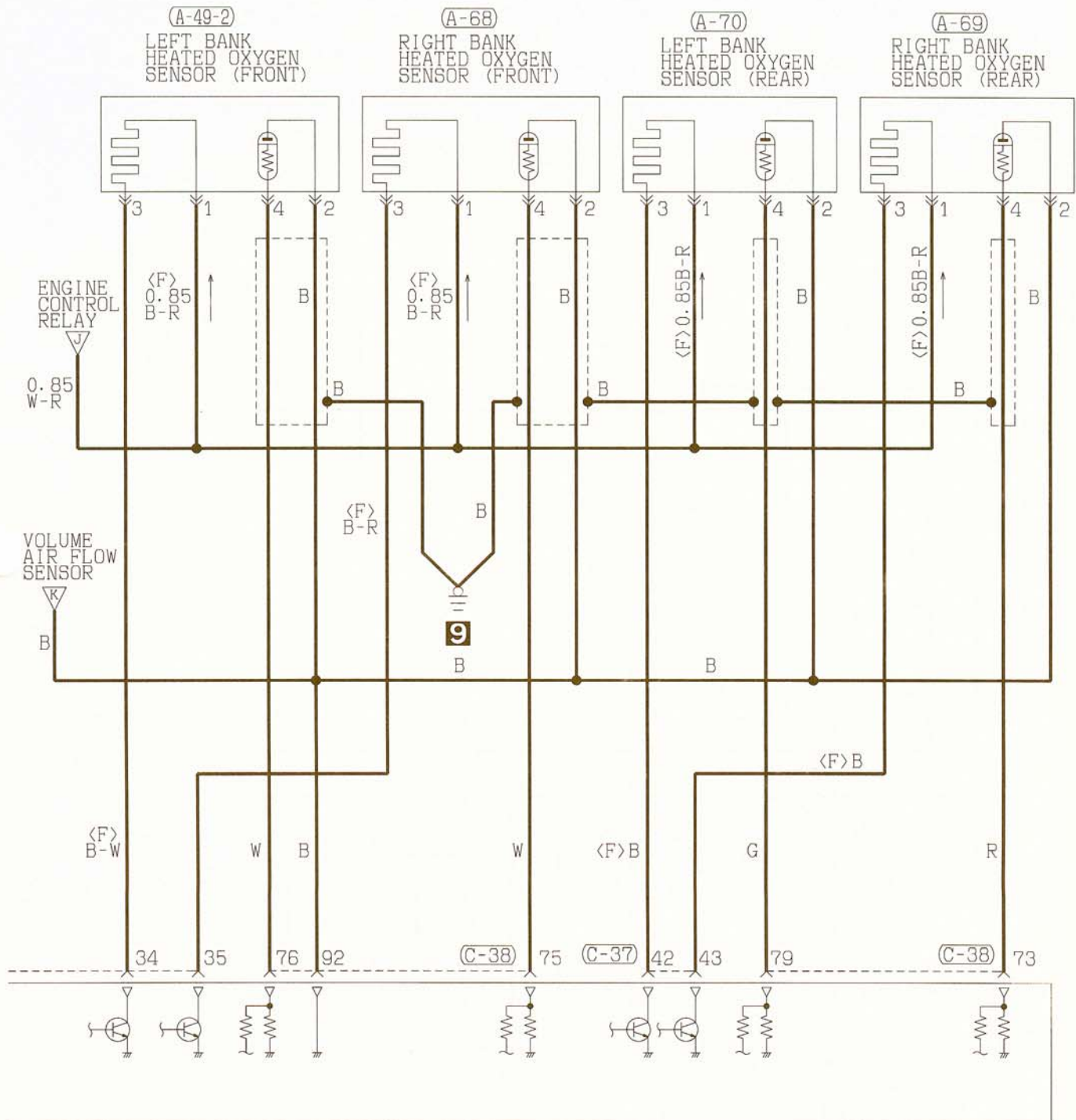


## MFI SYSTEM

## &lt;3.0L-24 VALVE engine for California&gt; (CONTINUED)





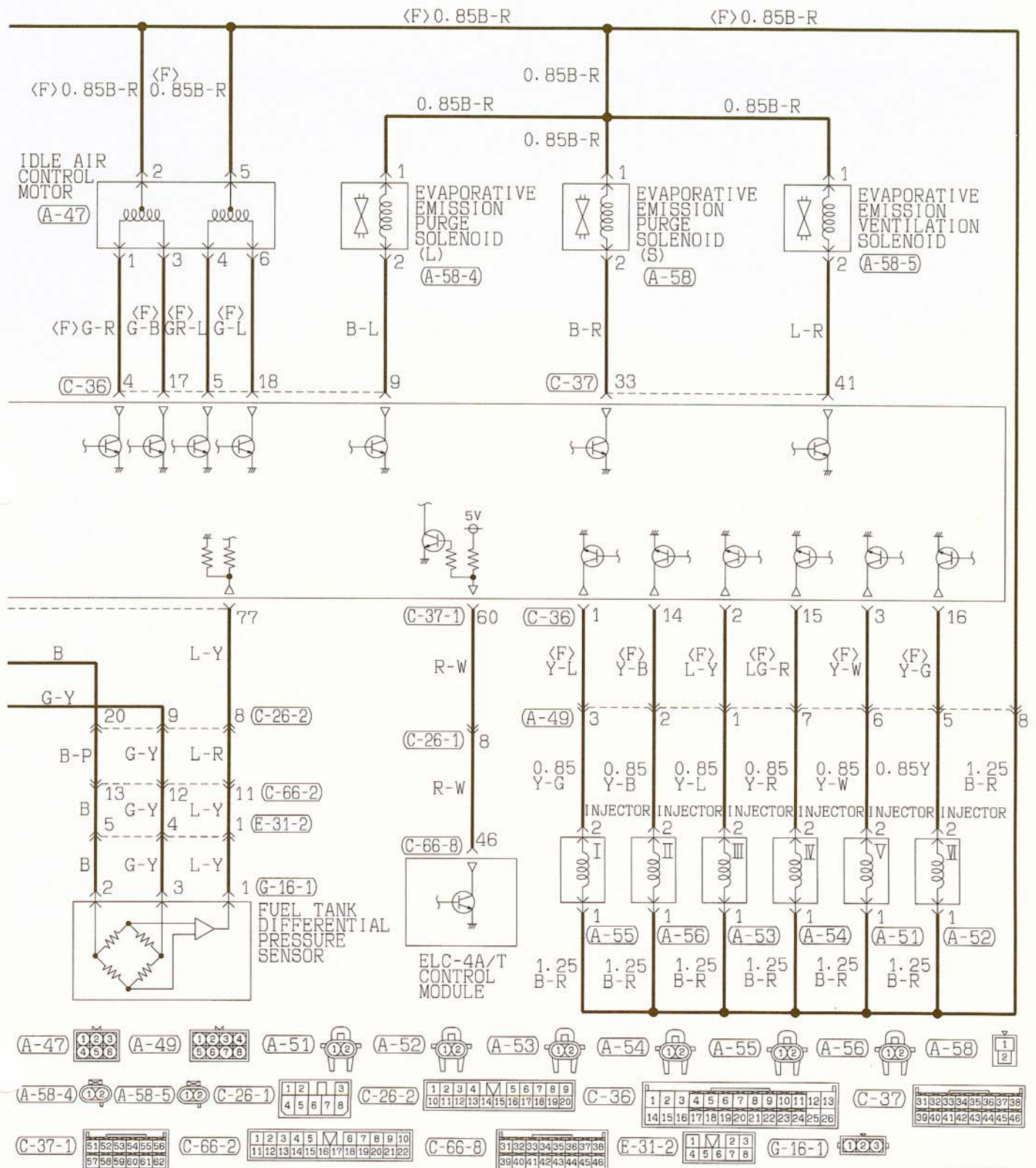


(A-49-2)	<table><tr><td>12</td><td>34</td></tr></table>	12	34	(A-68)	<table><tr><td>12</td><td>34</td></tr></table>	12	34	(A-69)	<table><tr><td>12</td><td>34</td></tr></table>	12	34	(A-70)	<table><tr><td>12</td><td>34</td></tr></table>	12	34	(C-37)	<table><tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td></tr><tr><td>39</td><td>40</td><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td></tr></table>	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	(C-38)	<table><tr><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>79</td><td>80</td><td>81</td></tr><tr><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>89</td><td>90</td><td>91</td><td>92</td></tr></table>	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
12	34																																																								
12	34																																																								
12	34																																																								
12	34																																																								
31	32	33	34	35	36	37	38																																																		
39	40	41	42	43	44	45	46																																																		
71	72	73	74	75	76	77	78	79	80	81																																															
82	83	84	85	86	87	88	89	90	91	92																																															

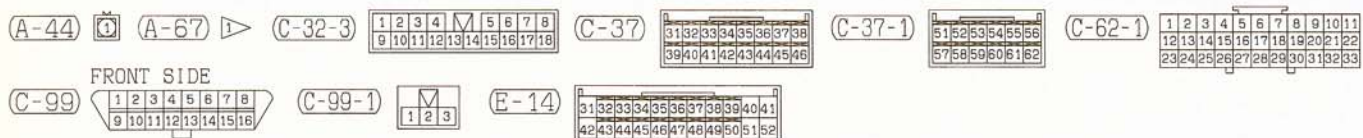
### <3.0L-24 VALVE engine for California> (CONTINUED)



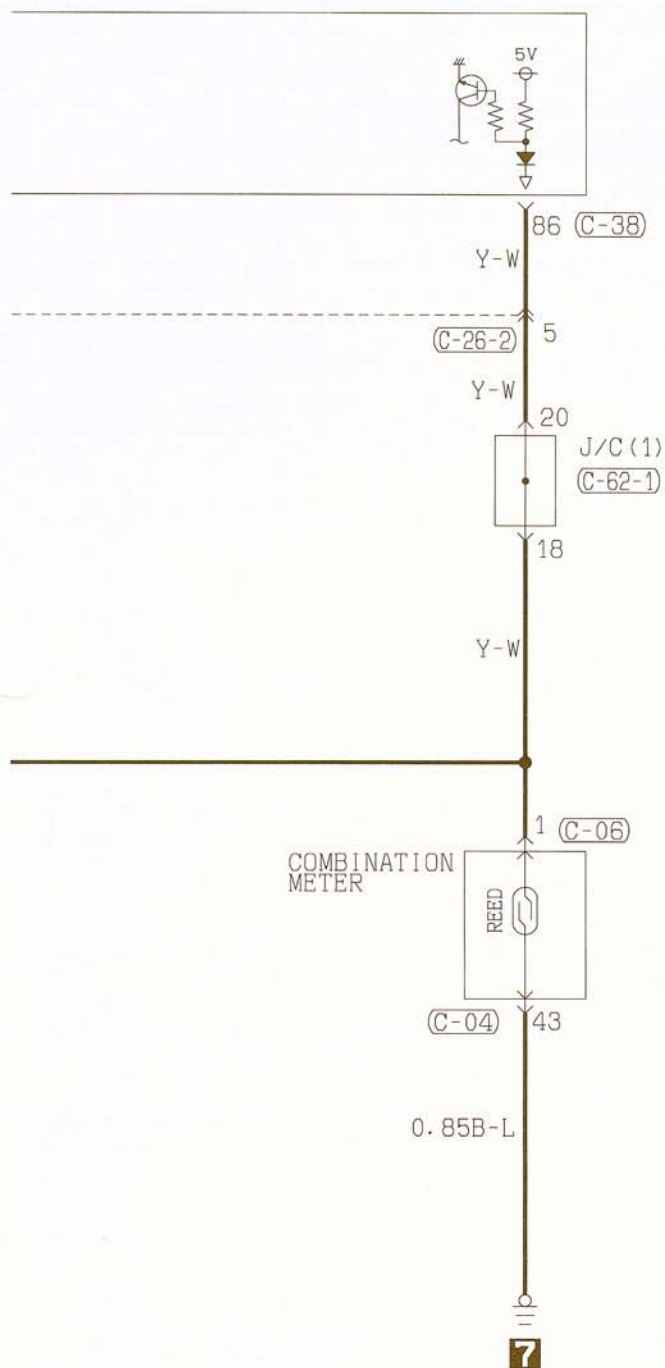




### **<3.0L-24 VALVE engine for California> (CONTINUED)**







(C-04) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44
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(C-06) 

1
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(C-26-2) 

1	2	3	4	5	6	7	8	9		
10	11	12	13	14	15	16	17	18	19	20

(C-62-1) 

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

(C-38) 

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

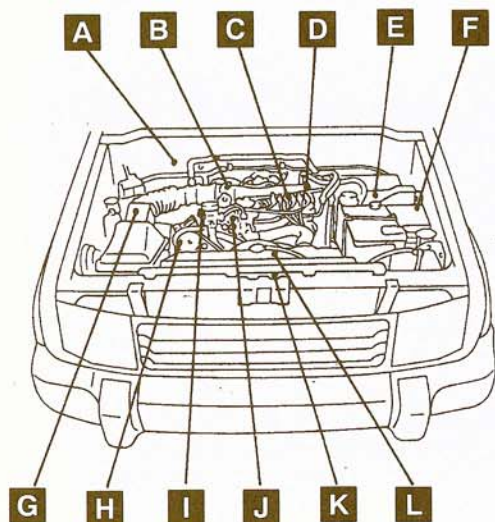
## COMPONENT LOCATION

70100140066

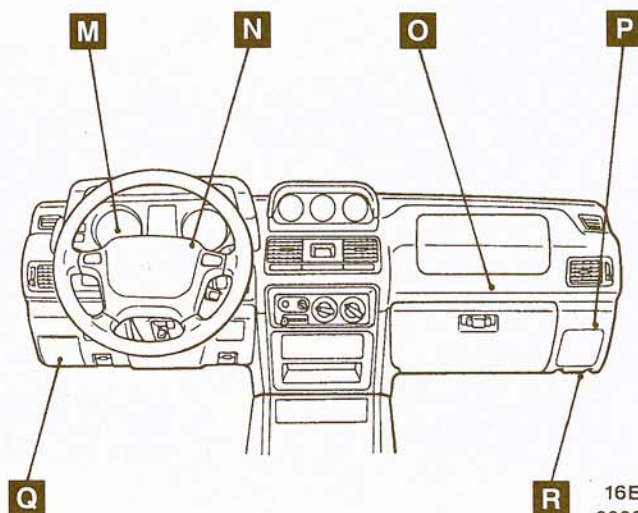
Name	Symbol	Name	Symbol
A/C compressor clutch relay	F	Fuel tank differential pressure sensor <Vehicles for California>	U
A/C control unit	O	Heated oxygen sensor <Vehicles for California>	S
Camshaft position sensor	L	Heated oxygen sensor <Vehicles for Federal>	S
Check engine/Malfunction indicator lamp	N	Idle air control motor	I
Crankshaft position sensor	K	Ignition coil (Ignition power transistor)	C
Data link connector	Q	Ignition timing adjustment connector	A
EGR solenoid <Vehicles for Federal>	E	Manifold differential pressure sensor <Vehicles for Federal>	D
Engine control module	R	Park/Neutral position switch	T
Engine control relay	P	Power steering pressure switch	H
Engine coolant temperature sensor	J	Reed switch	M
Engine speed detection connector	A	Throttle position sensor (with closed throttle position switch)	B
Evaporative emission purge solenoid <Vehicles for California>	E	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)	G
Evaporative emission purge solenoid <Vehicles for Federal>	E		
Evaporative emission ventilation solenoid <Vehicles for California>	E		
Fuel pump check connector	A		

## NOTE

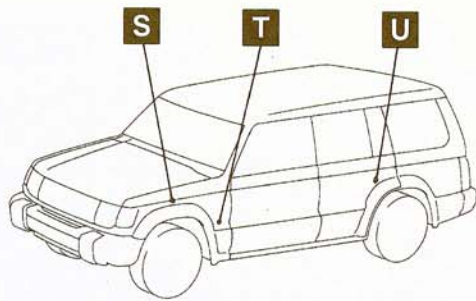
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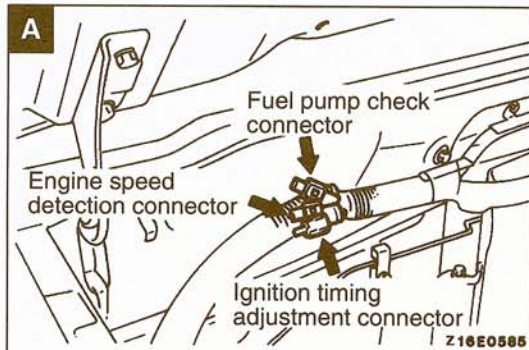
16E1432

16E1464  
00004175

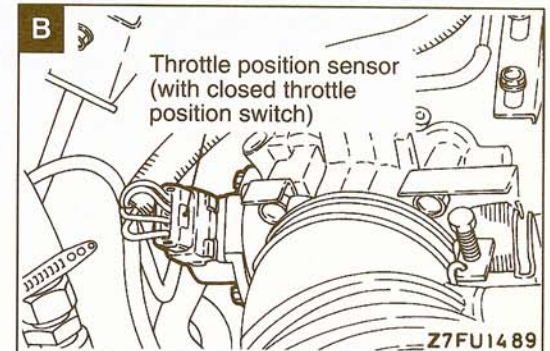




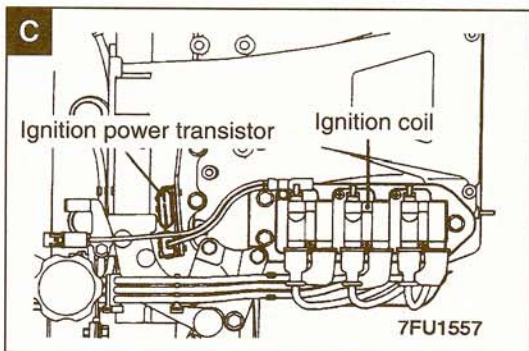
A18E0003



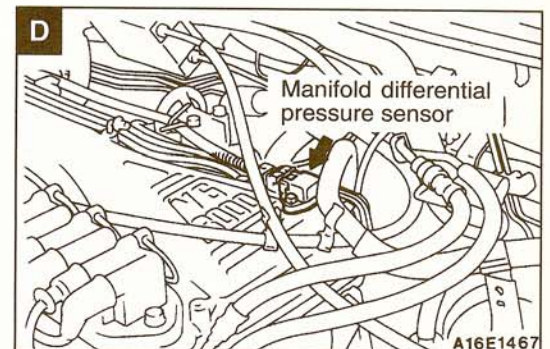
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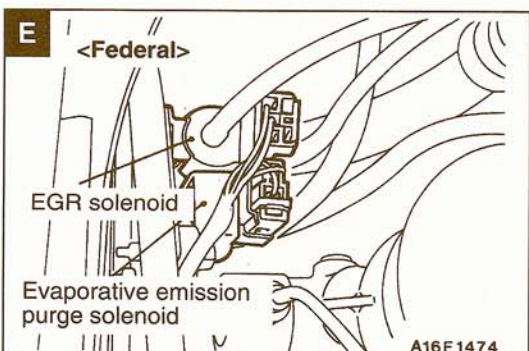
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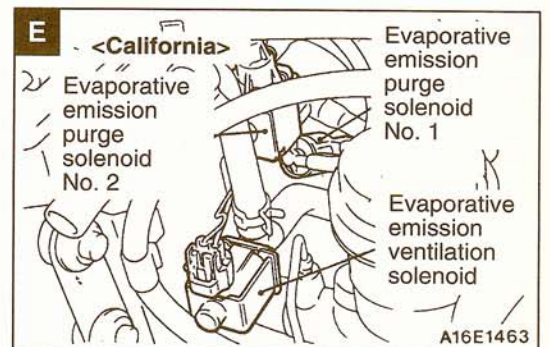
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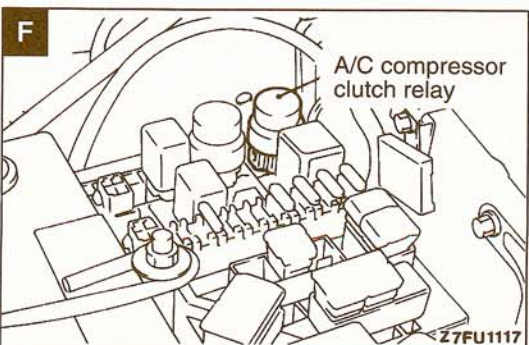
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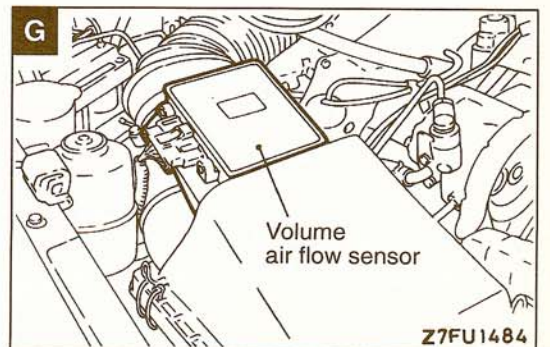
A16E1474



A16E1463

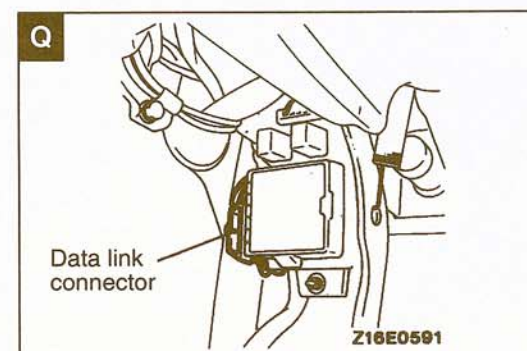
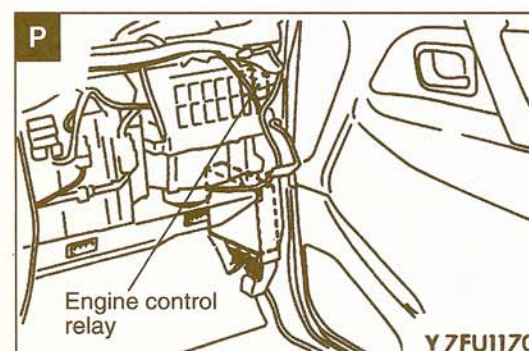
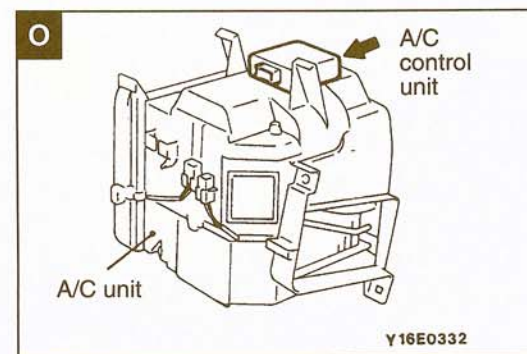
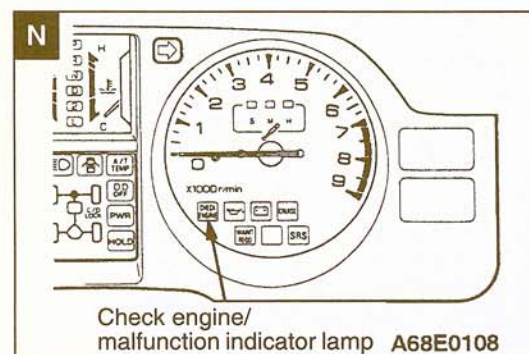
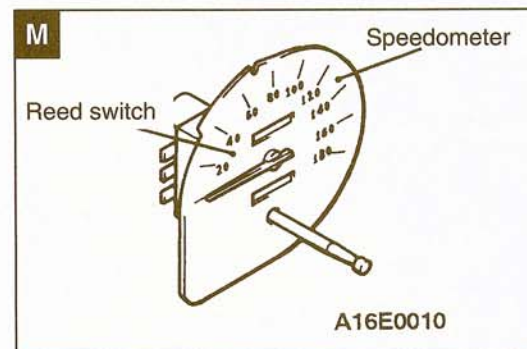
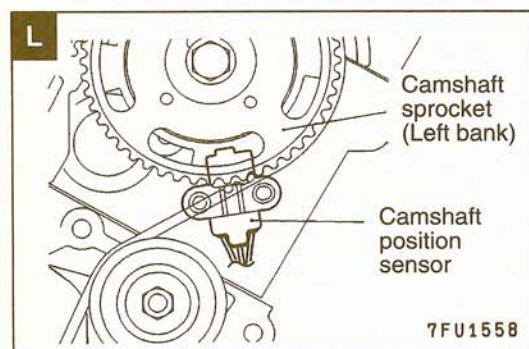
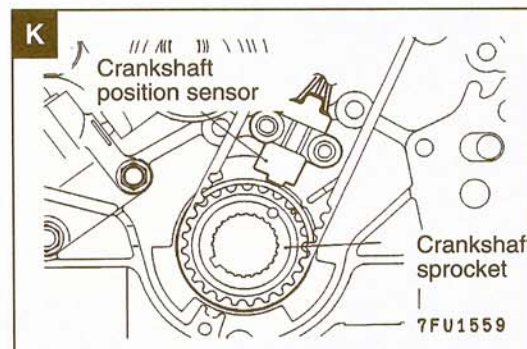
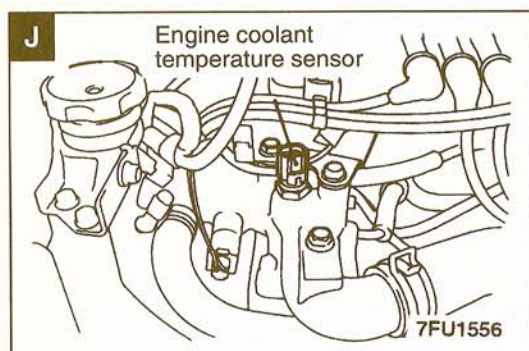
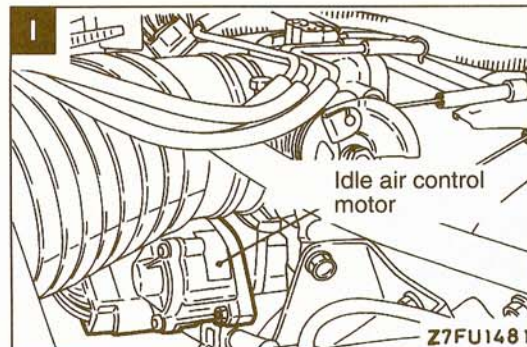
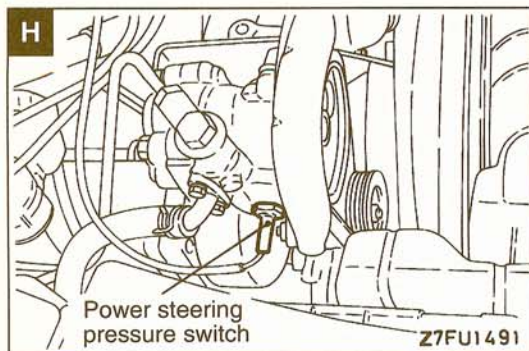


Z7FU1117

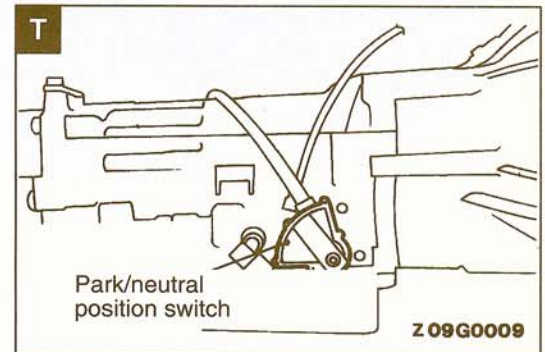
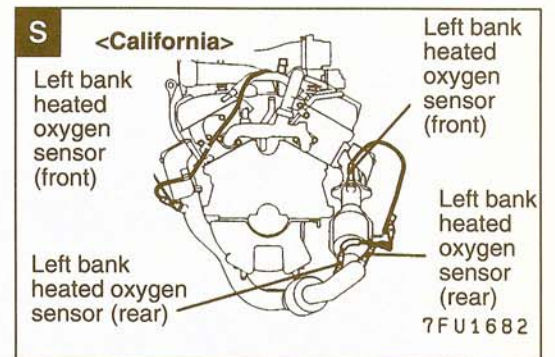
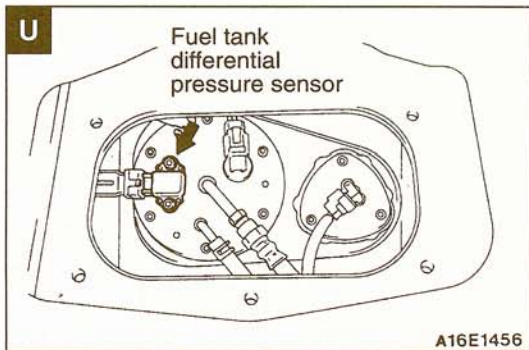
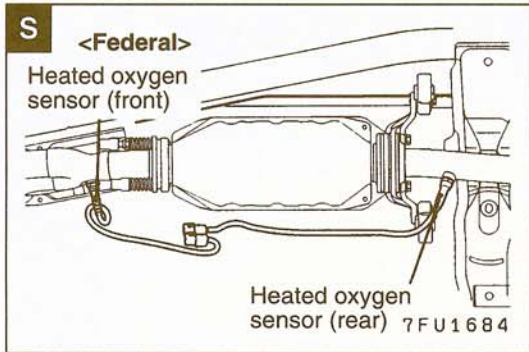
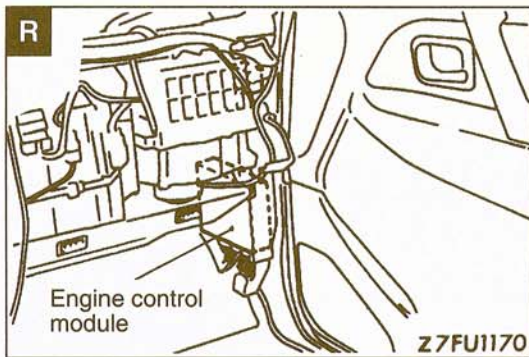


Z7FU1484



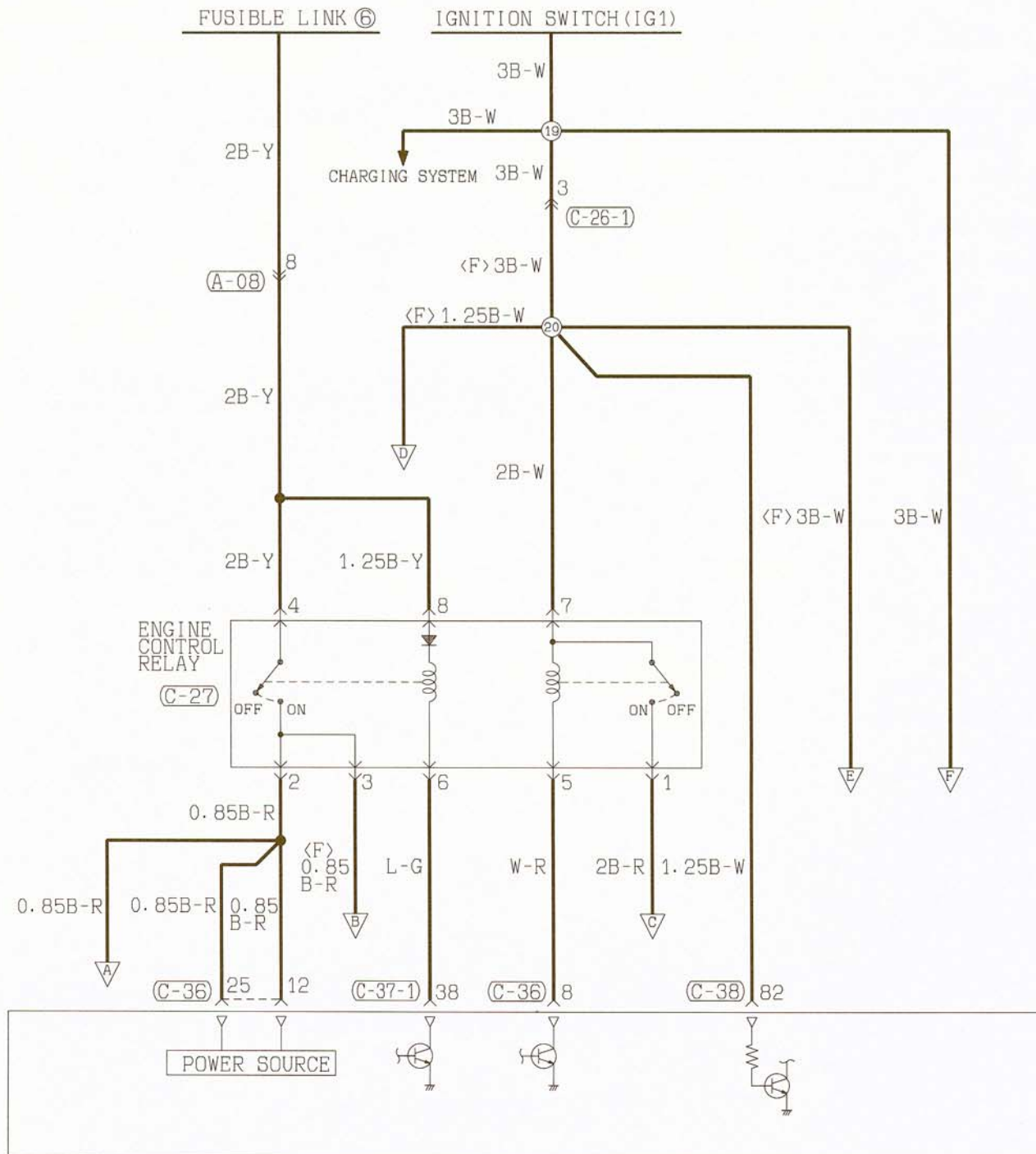




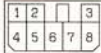


## MFI SYSTEM &lt;3.5L engine&gt;

90100080182



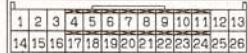
C-26-1



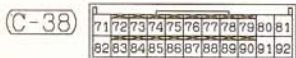
C-36



C-36



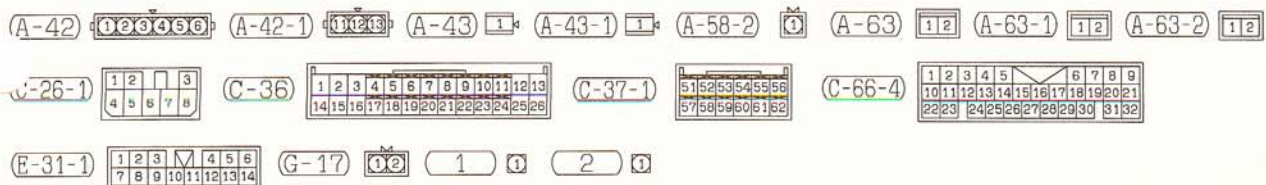
C-37-1



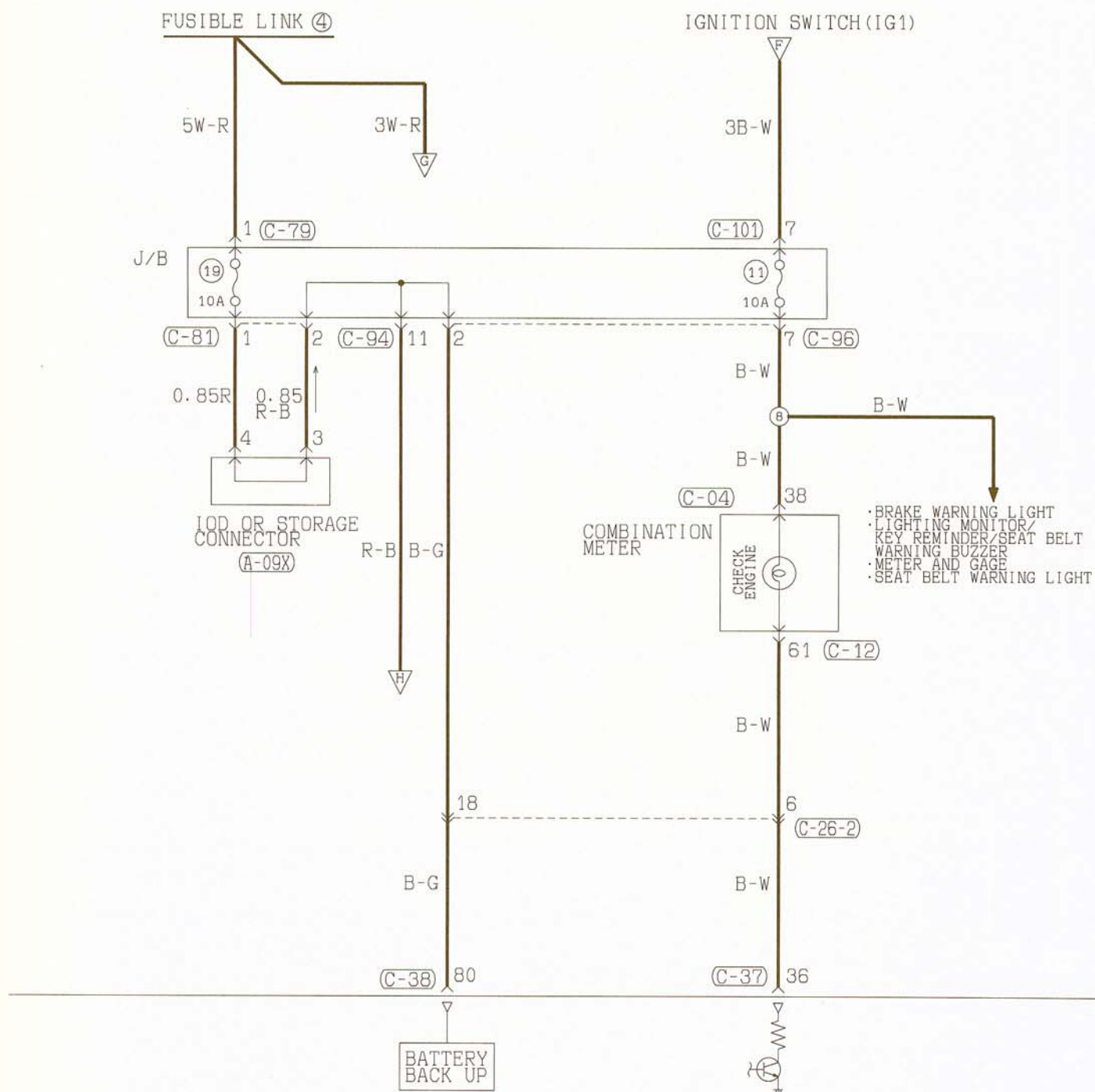
HQ05M13AA

TSB Revision





## MFI SYSTEM &lt;3.5L engine&gt; (CONTINUED)



(A-09X) 

1	2	3	4
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 (C-04) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44
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 (C-12) 

51	52	53	54	55	56	57	58	59	60	61	62
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(C-26-2) 

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
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 (C-37) 

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
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 (C-38) 

71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

 (C-79) 

1
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 (C-81) 

1	2	3	4
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(C-94) 

1	2	3	4	5	6	7	8	9	10	11	12
---	---	---	---	---	---	---	---	---	----	----	----

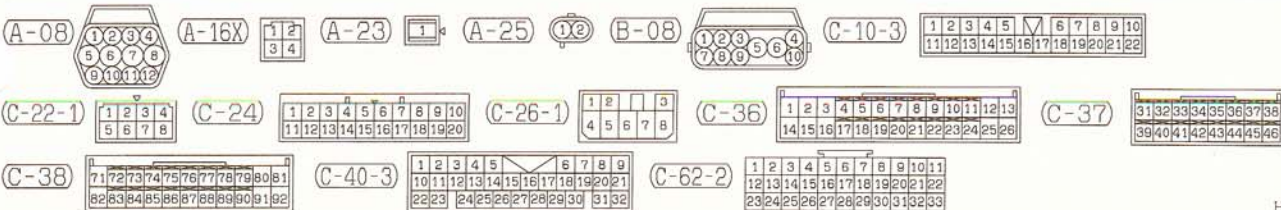
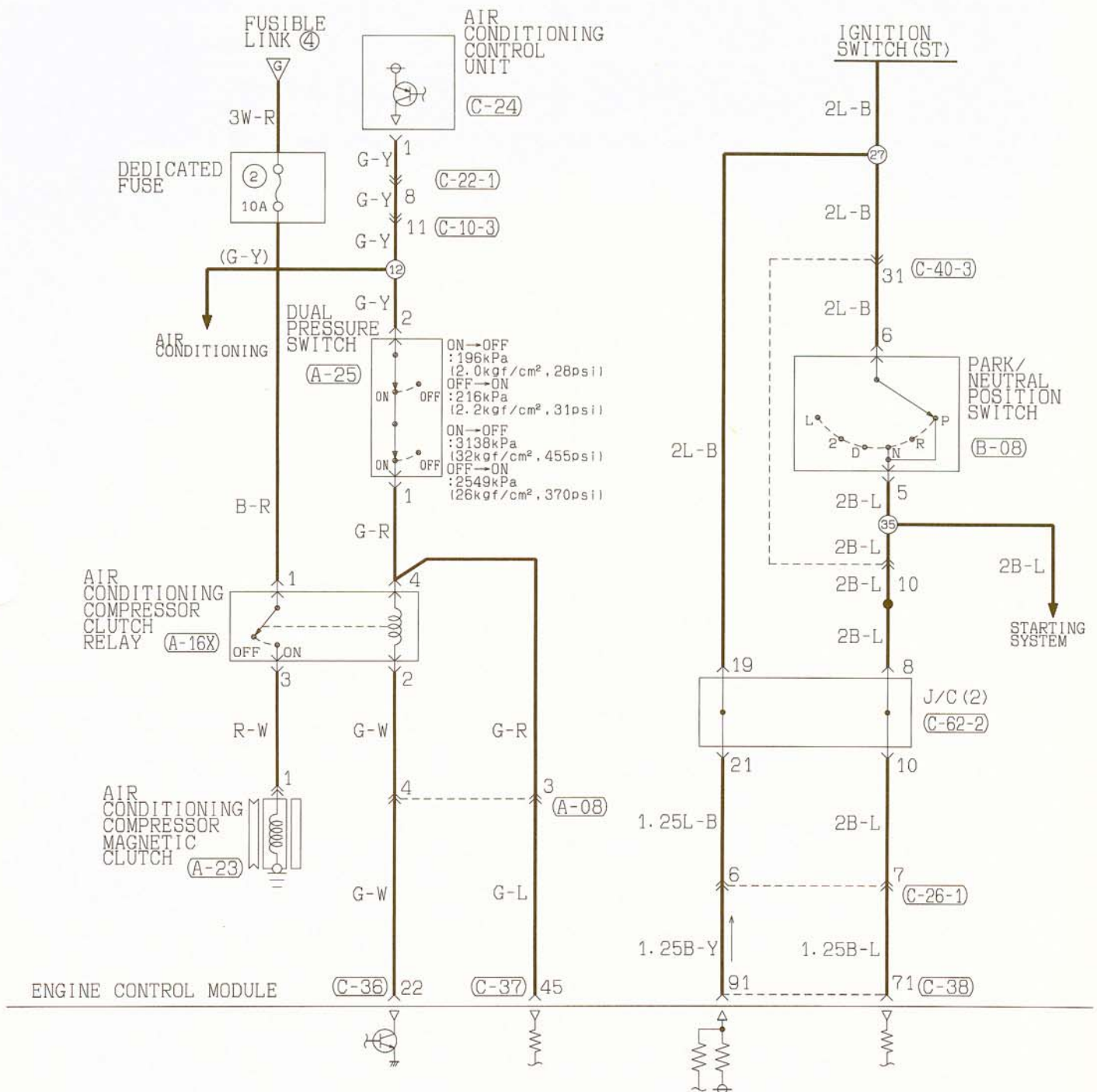
 (C-96) 

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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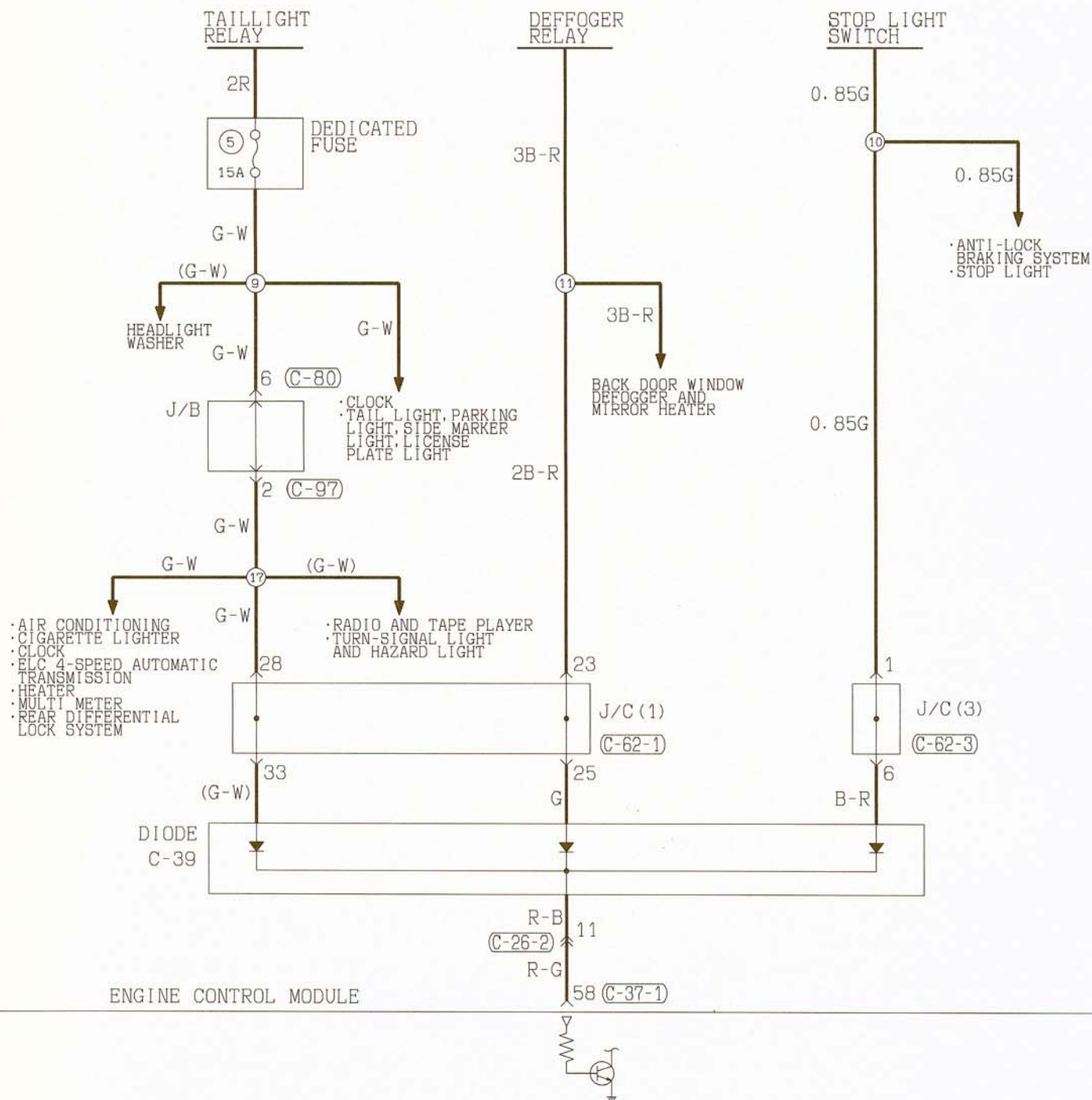
 (C-101) 

1	2	3	4	5	6	7	8
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## MFI SYSTEM &lt;3.5L engine&gt; (CONTINUED)



(C-26-2)	1 2 3 4 5 6 7 8 9
	10 11 12 13 14 15 16 17 18 19 20

(C-37-1)	51 52 53 54 55 56
	57 58 59 60 61 62

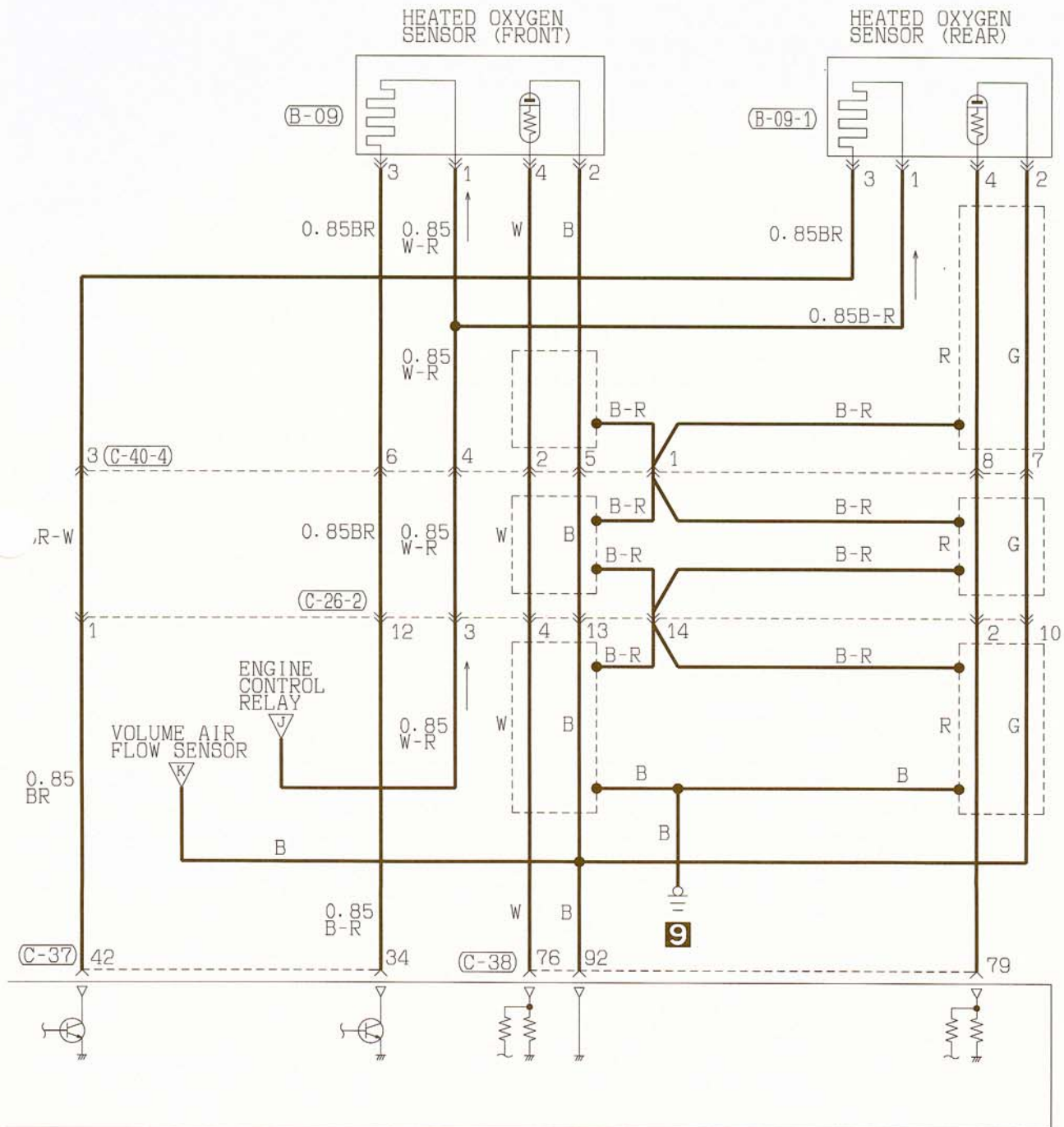
(C-62-1)	1 2 3 4 5 6 7 8 9 10 11
	12 13 14 15 16 17 18 19 20 21 22
	23 24 25 26 27 28 29 30 31 32 33

(C-62-3)	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

(C-80)	1 2 3 4
	5 6 7 8

(C-97)	1 2 3 4 5 6
	7 8 9 10 11 12 13 14



(B-09) 

1	2
3	4

(B-09-1) 

1	2
3	4

(C-26-2) 

1	2	3	4	5	6	7	8	9		
10	11	12	13	14	15	16	17	18	19	20

(C-37) 

31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46

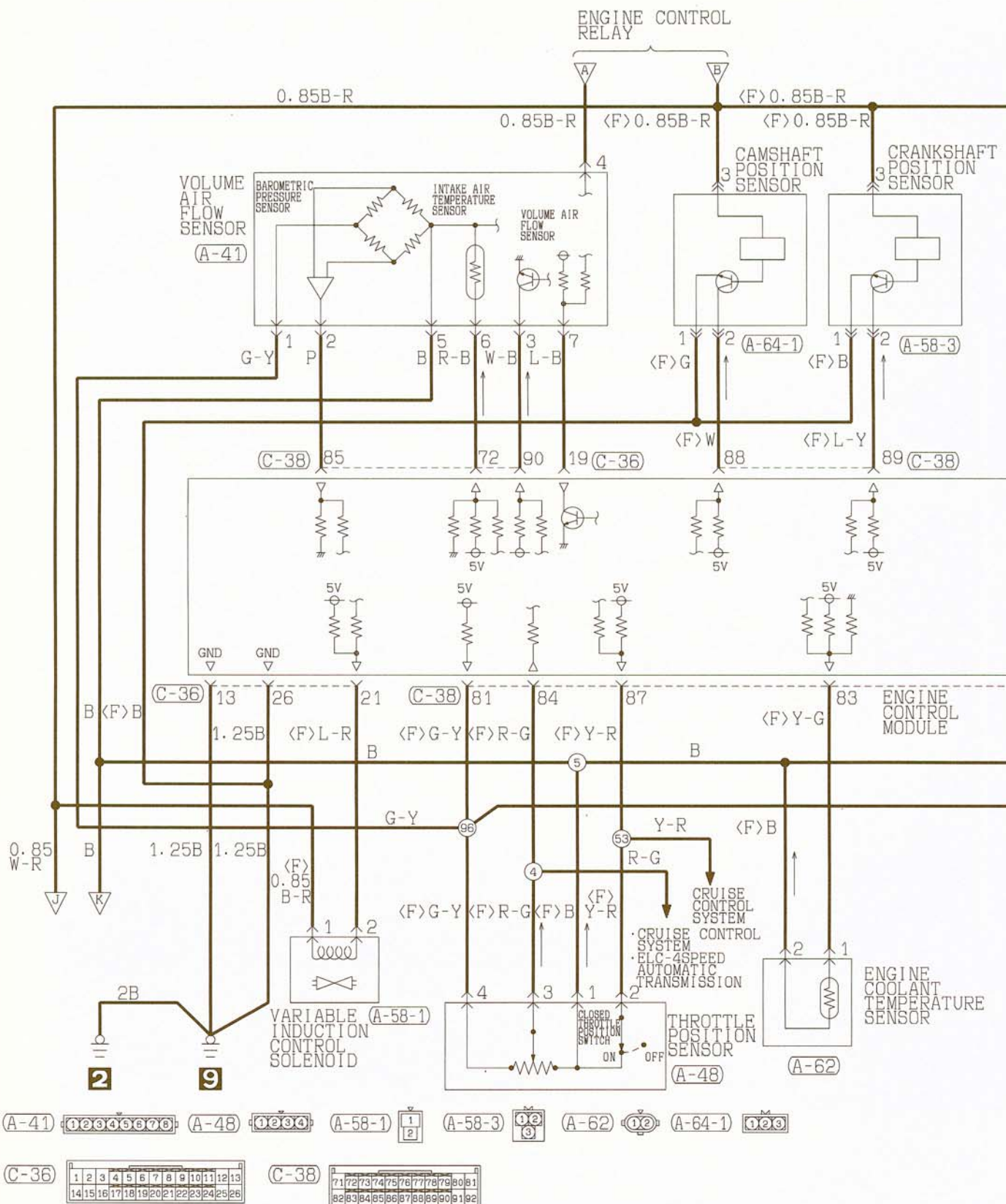
(C-38) 

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

(C-40-4) 

1	2	3		
4	5	6	7	8

## MFI SYSTEM &lt;3.5L engine&gt; (CONTINUED)

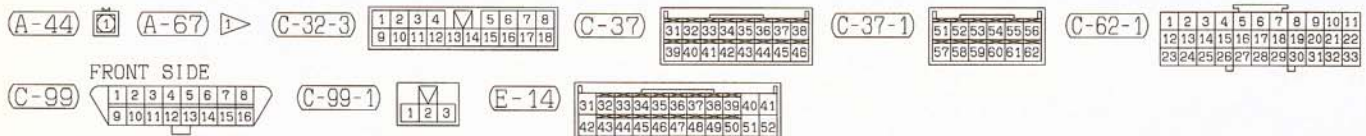
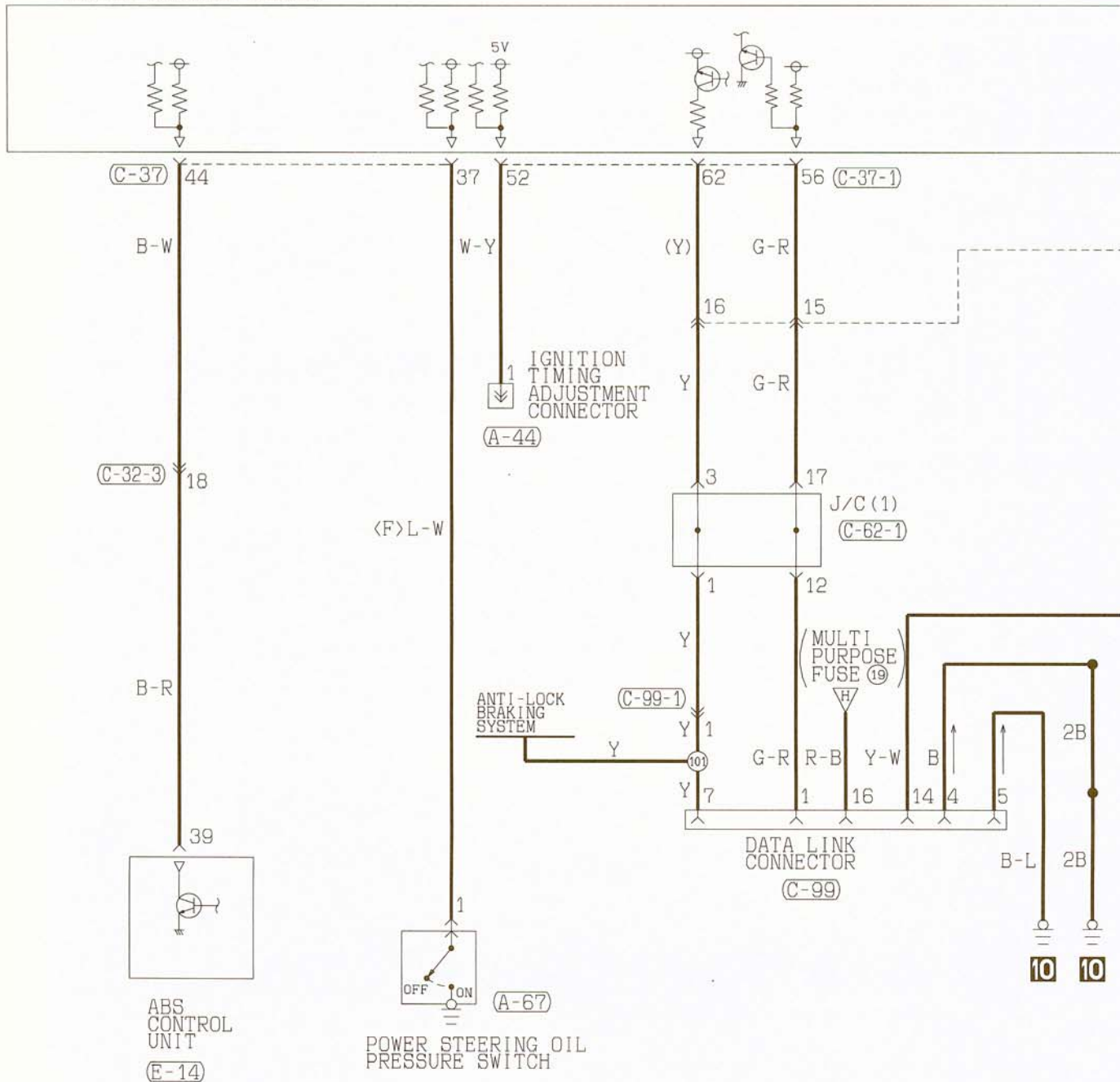




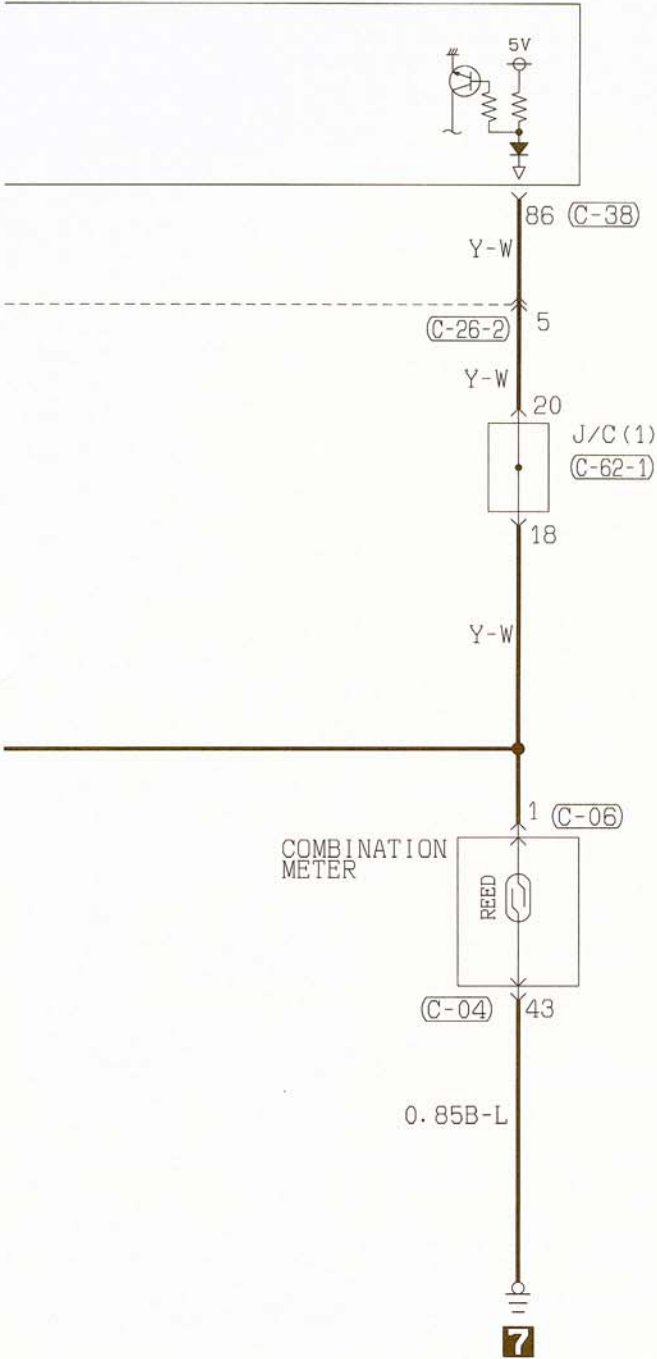


## MFI SYSTEM &lt;3.5L engine&gt; (CONTINUED)

## ENGINE CONTROL MODULE







(C-04)

31	32	33	34	35	36	37	38	39	40	41	42	43	44
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(C-06)

1
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(C-26-2)

1	2	3	4	M	5	6	7	8	9	
10	11	12	13	14	15	16	17	18	19	20

(C-62-1)

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

(C-38)

71	72	73	74	75	76	77	78	79	80	81
82	83	84	85	86	87	88	89	90	91	92

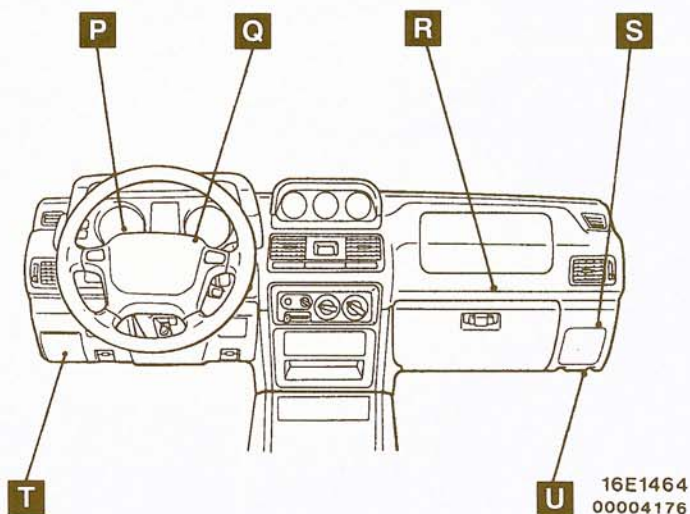
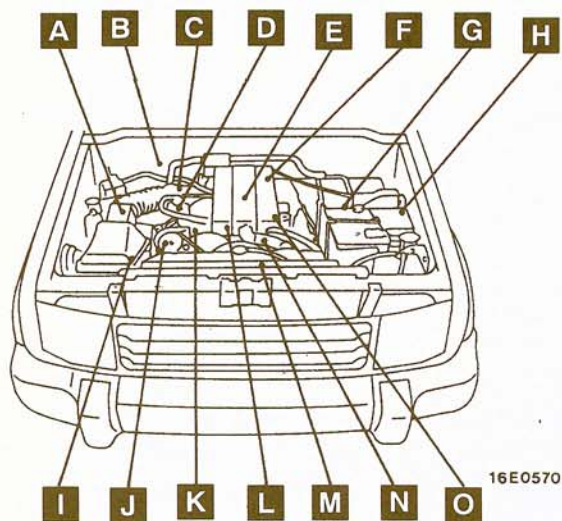
## COMPONENT LOCATION

70100140073

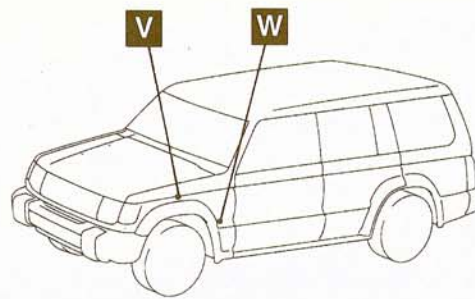
Name	Symbol	Name	Symbol
A/C compressor clutch relay	H	Idle air control motor	D
A/C control unit	R	Ignition coil (Ignition power transistor)	F
Camshaft position sensor	N	Ignition timing adjustment connector	B
Check engine/Malfunction indicator lamp	Q	Knock sensor	E
Crankshaft position sensor	M	Manifold differential pressure sensor	K
Data link connector	T	Park/Neutral position switch	W
EGR solenoid	I	Power steering pressure switch	J
Engine control module	U	Reed switch	P
Engine control relay	S	Throttle position sensor (with closed throttle position switch)	C
Engine coolant temperature sensor	L	Variable Induction control solenoid	O
Engine speed detection connector	B	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)	A
Evaporative emission purge solenoid	G		
Fuel pump check connector	B		
Heated oxygen sensor	V		

## NOTE

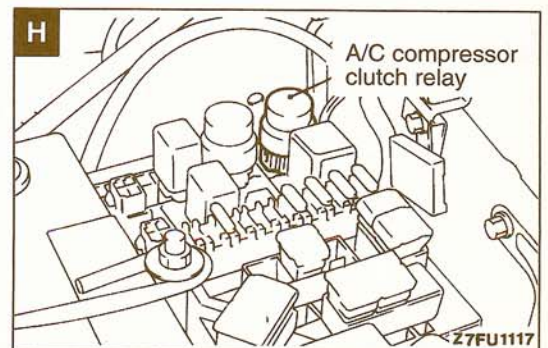
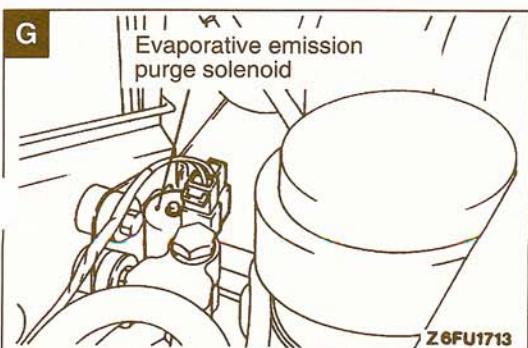
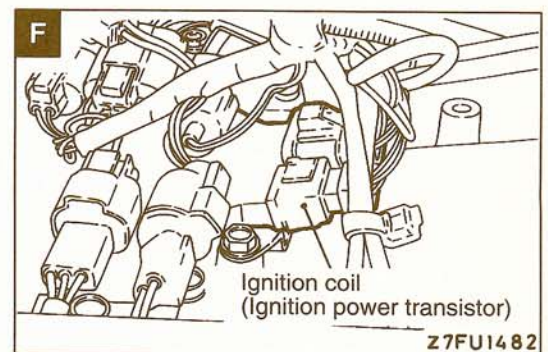
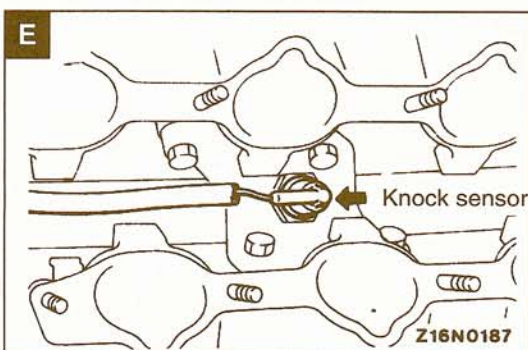
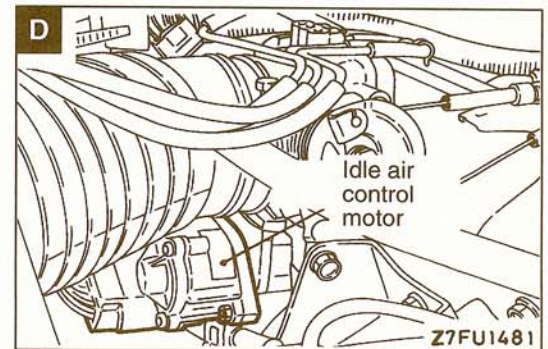
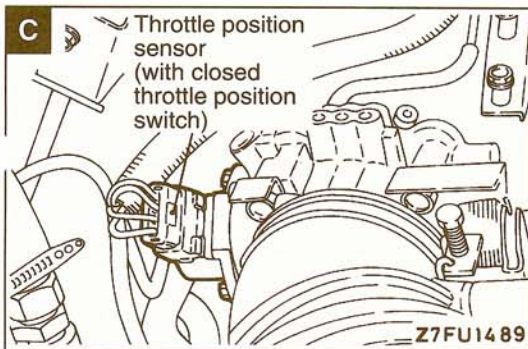
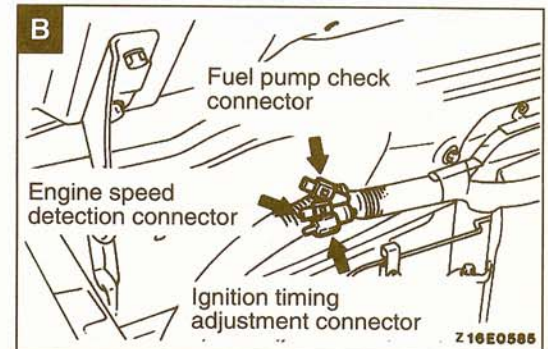
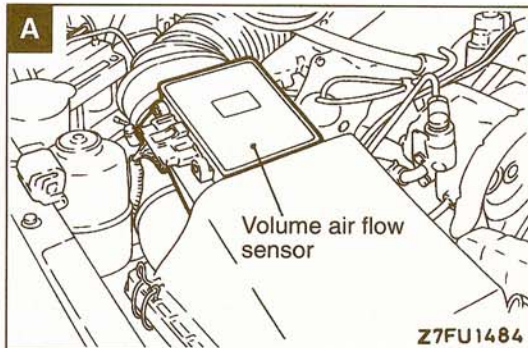
The "Name" column is arranged in alphabetical order.



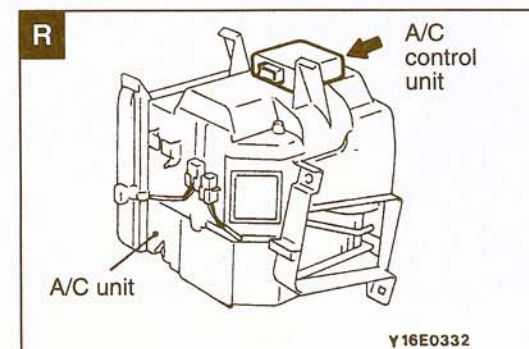
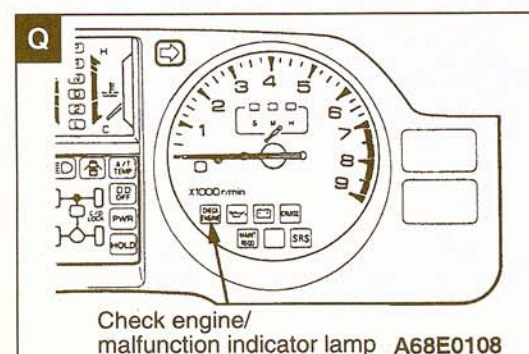
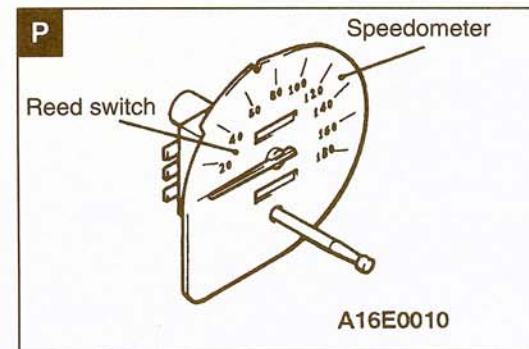
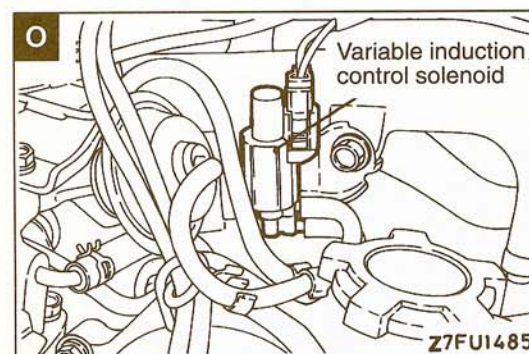
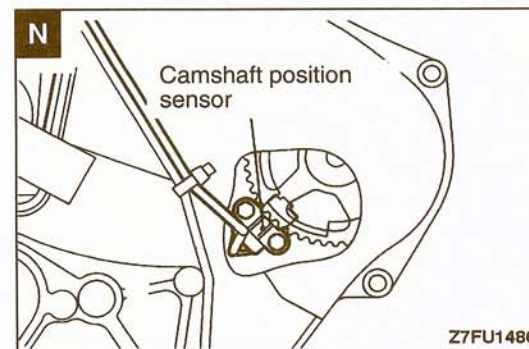
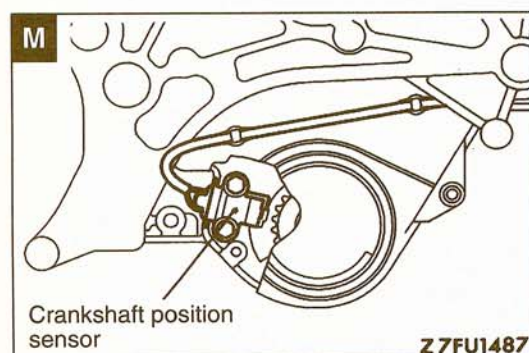
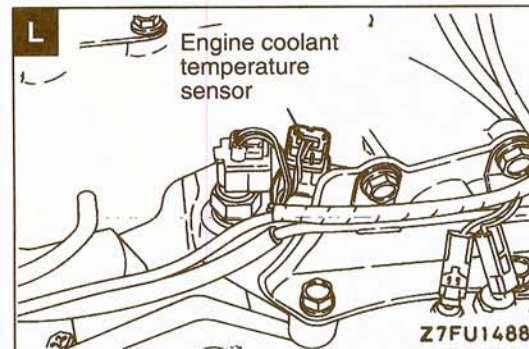
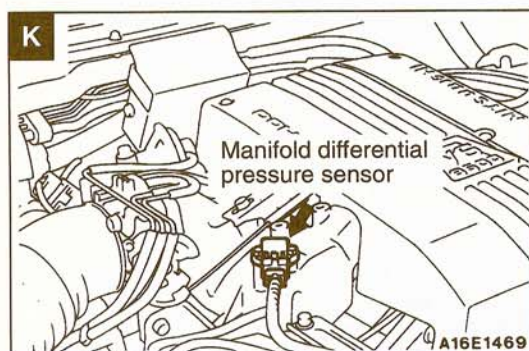
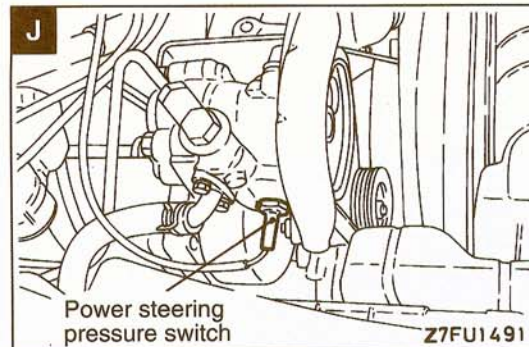
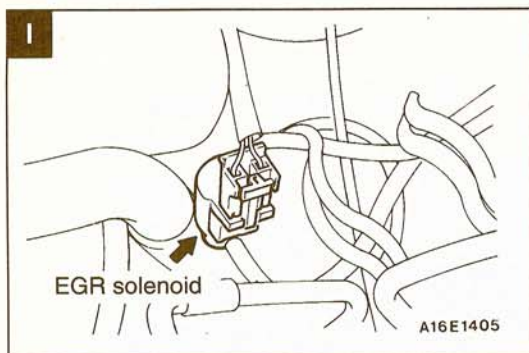




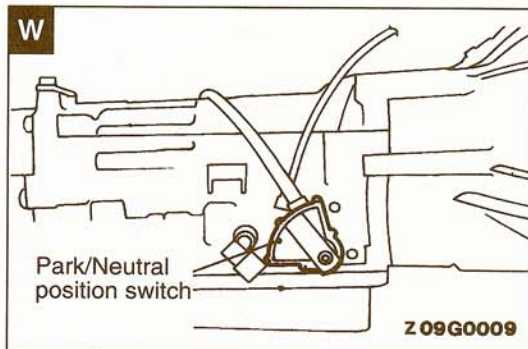
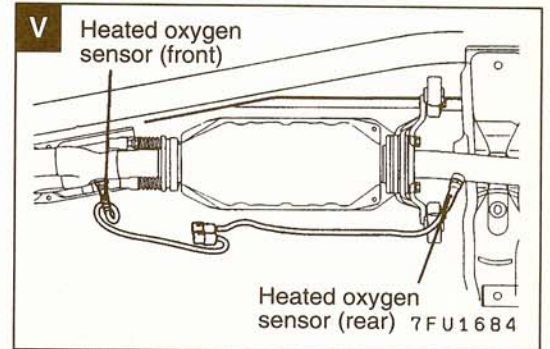
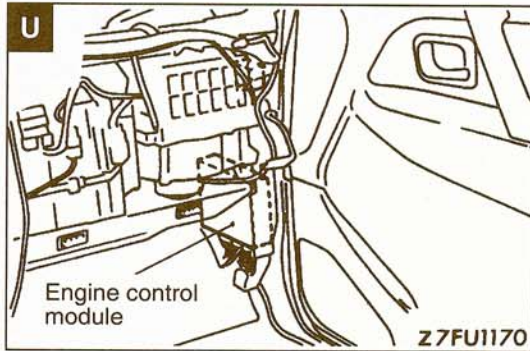
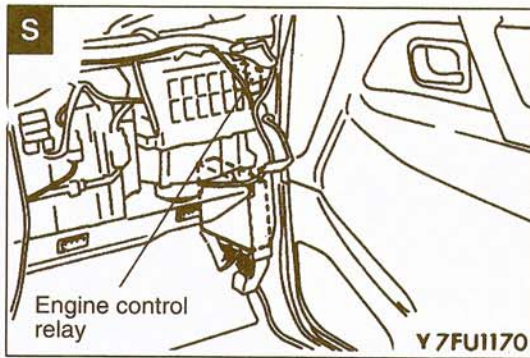
B18E0003





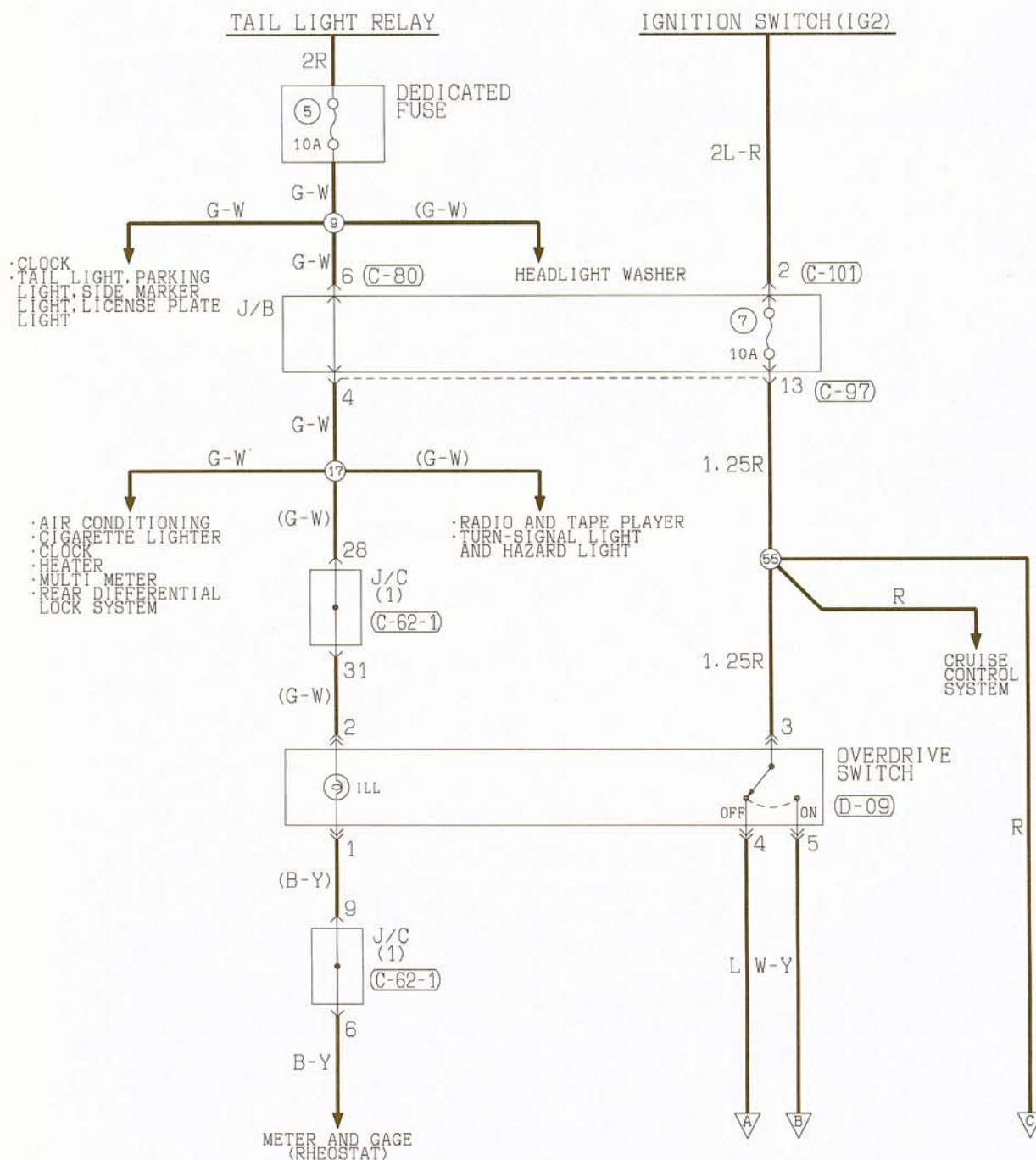






## OVERDRIVE CONTROL SYSTEM

90100130016



(C-62-1)

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

(C-80)

1	2	3	4
5	6	7	8

(C-97)

1	2	3	4
5	6	7	8
9	10	11	12

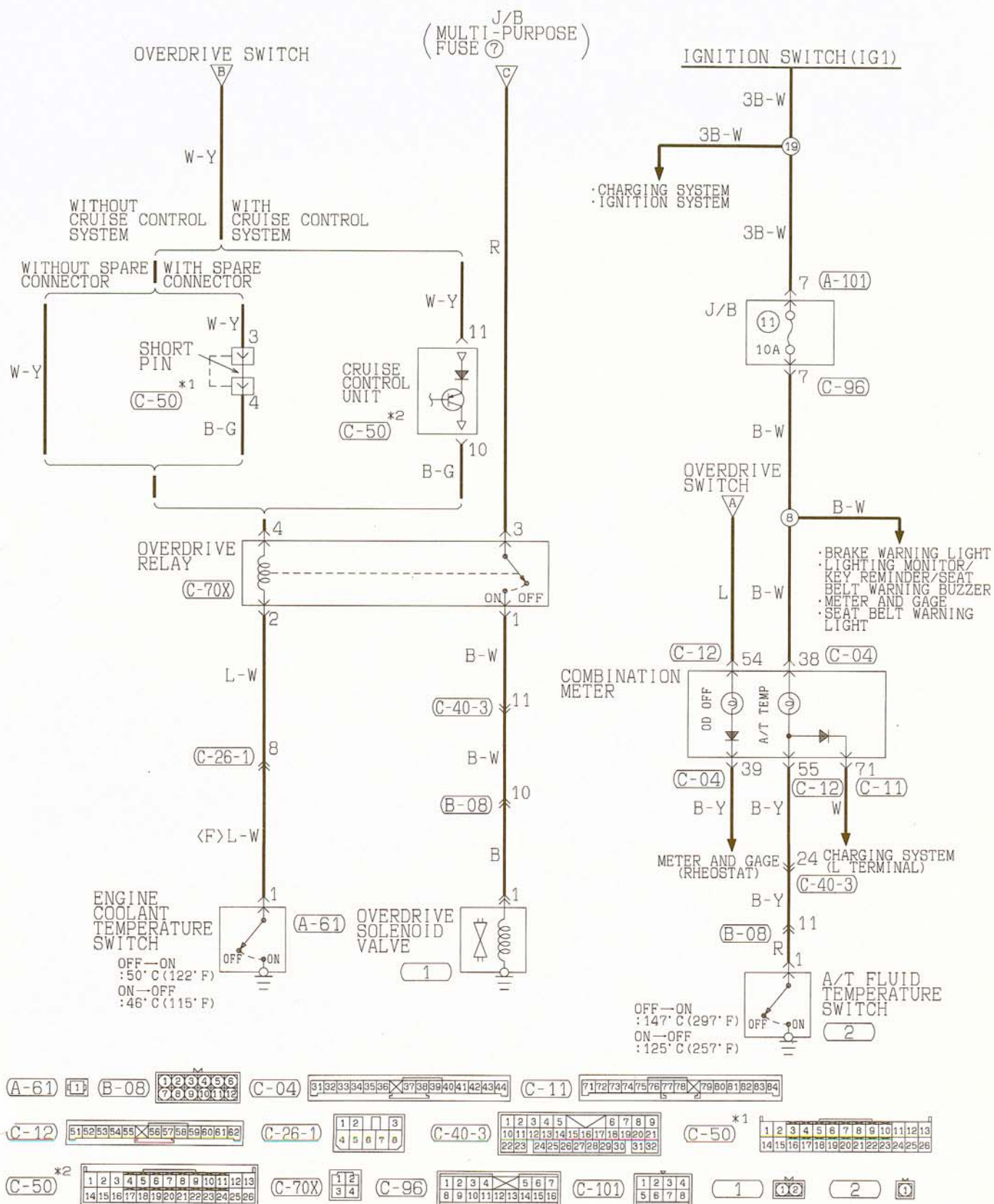
(C-101)

1	2	3	4
5	6	7	8

(D-09)

1	M	2
3	4	5





HQ07M04AB

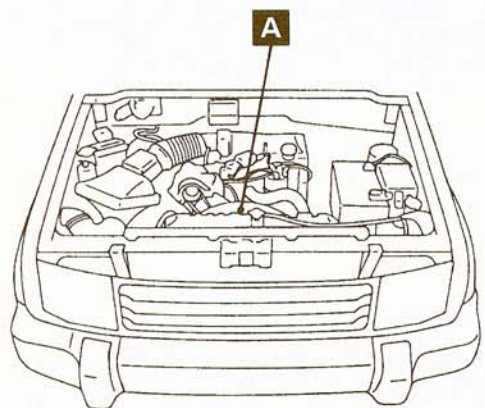
## COMPONENT LOCATION

70100450015

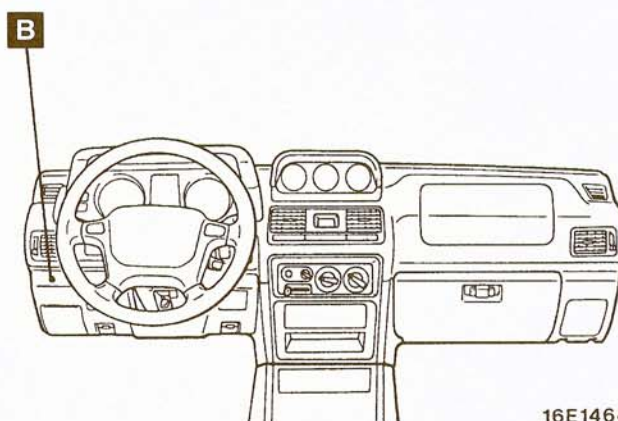
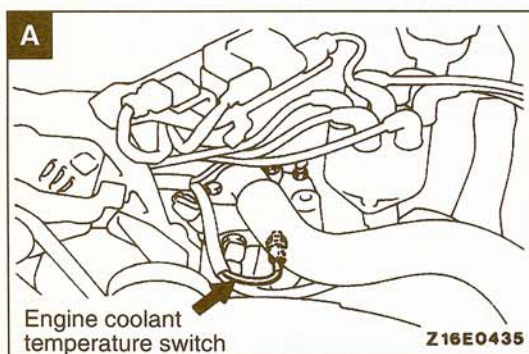
Name	Symbol
Engine coolant temperature switch	A
Overdrive relay	B

## NOTE

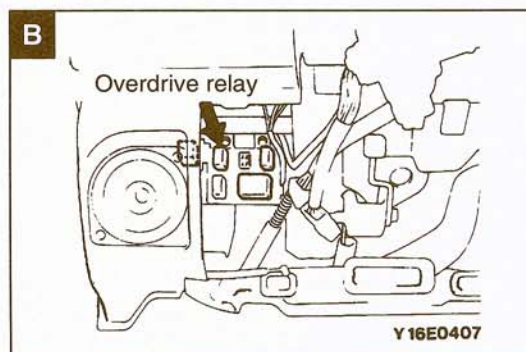
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16E0128

16E1464  
00004177

Z16E0435



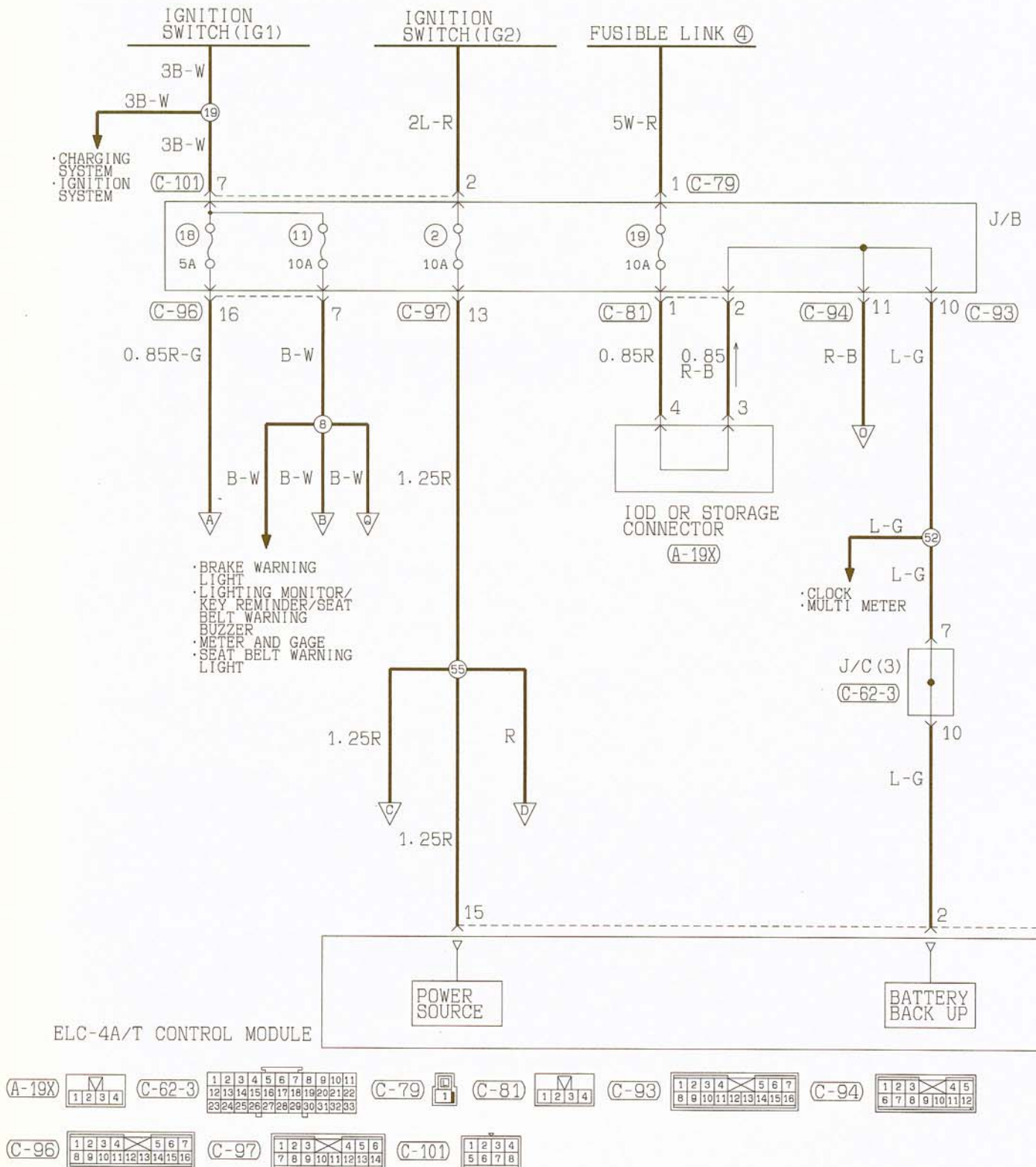
Y16E0407



NOTES

## ELC 4-SPEED AUTOMATIC TRANSMISSION

90100120075

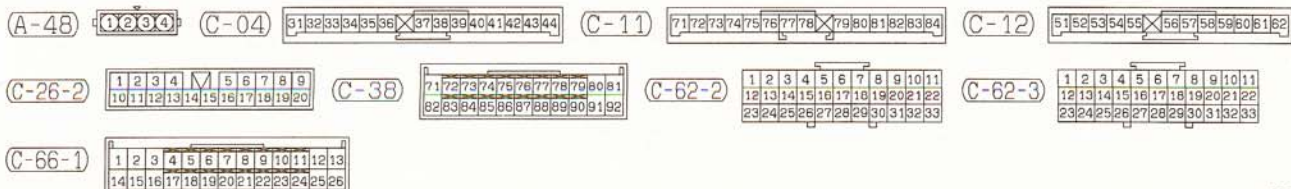
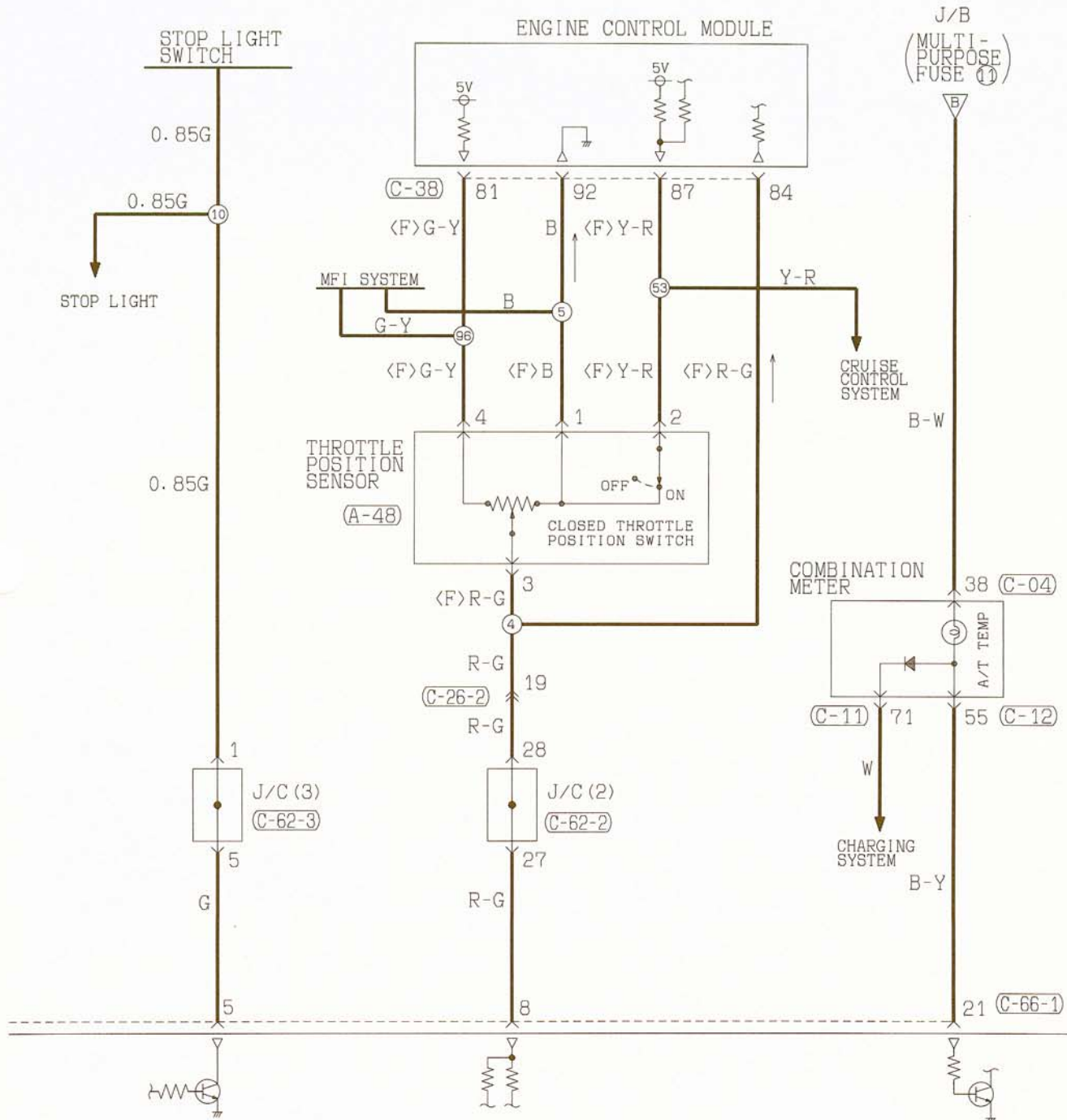


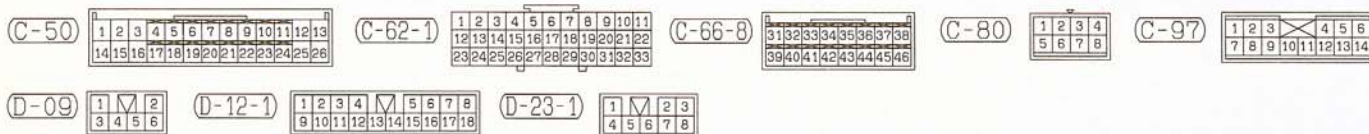
HQ07M05AA

TSB Revision

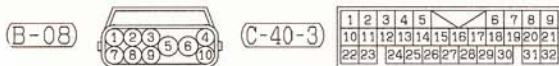
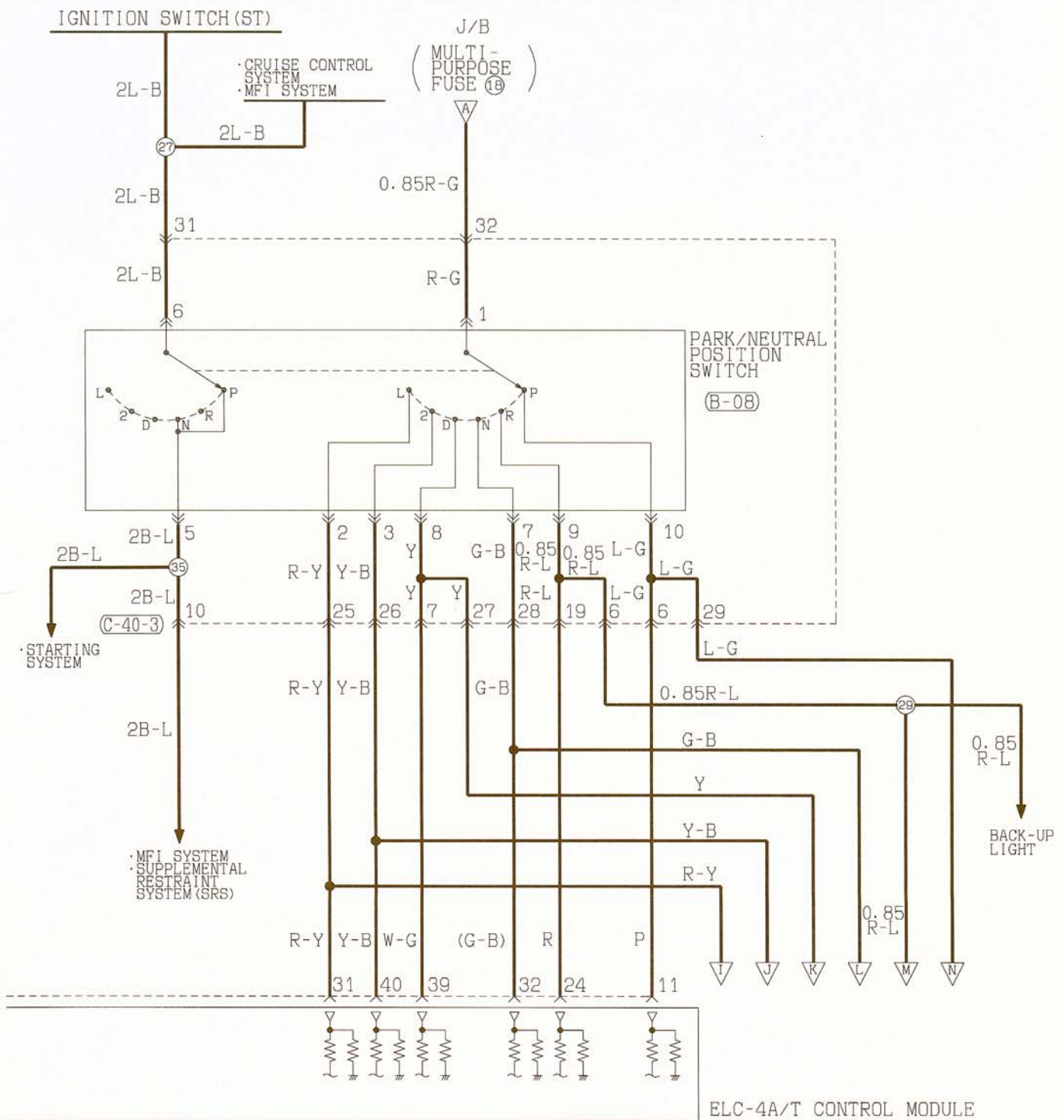
96-54-010



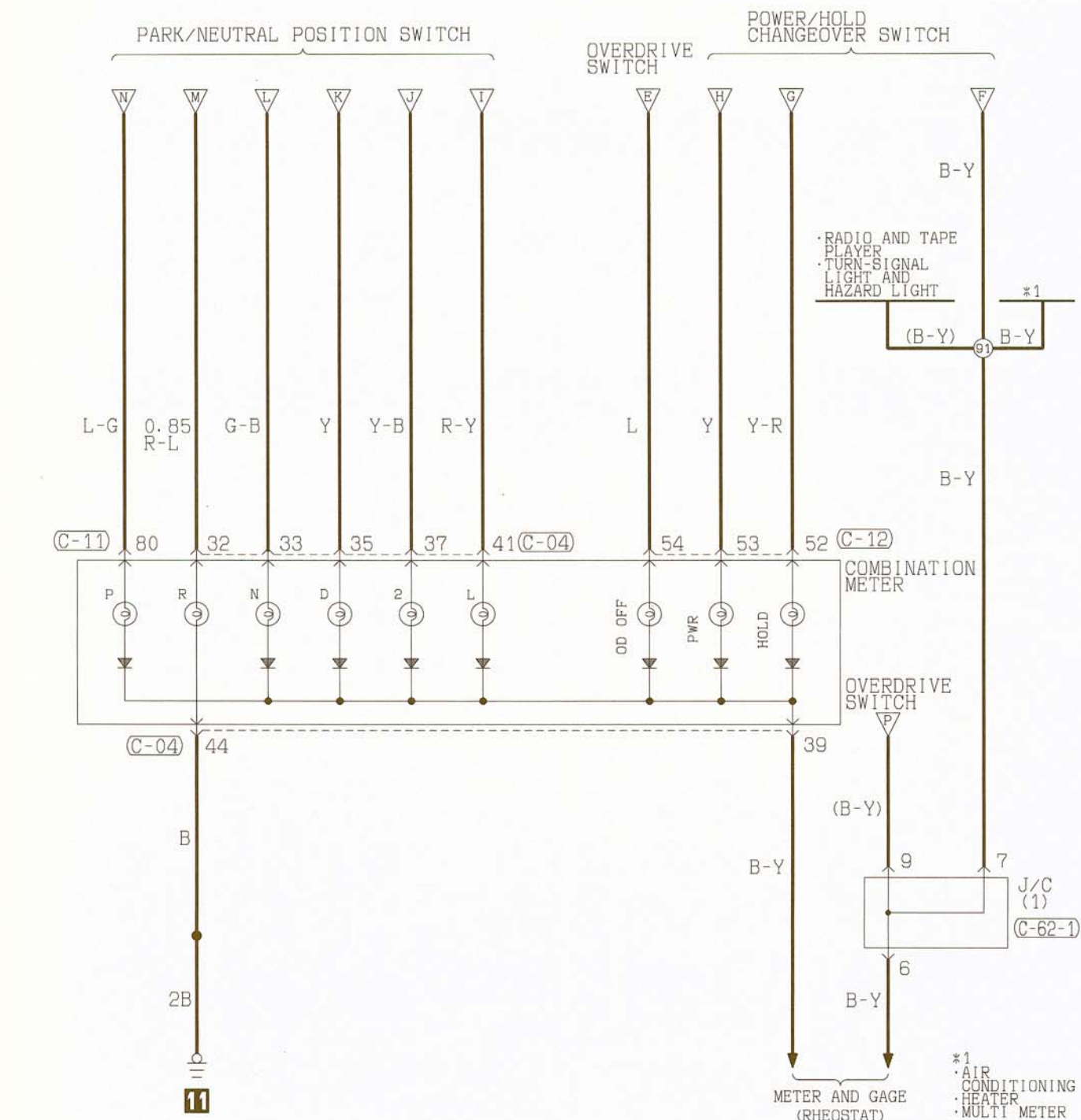


[illegible]





ELC 4-SPEED AUTOMATIC TRANSMISSION (CONTINUED)



C-04 31 32 33 34 35 36 37 38 39 40 41 42 43 44

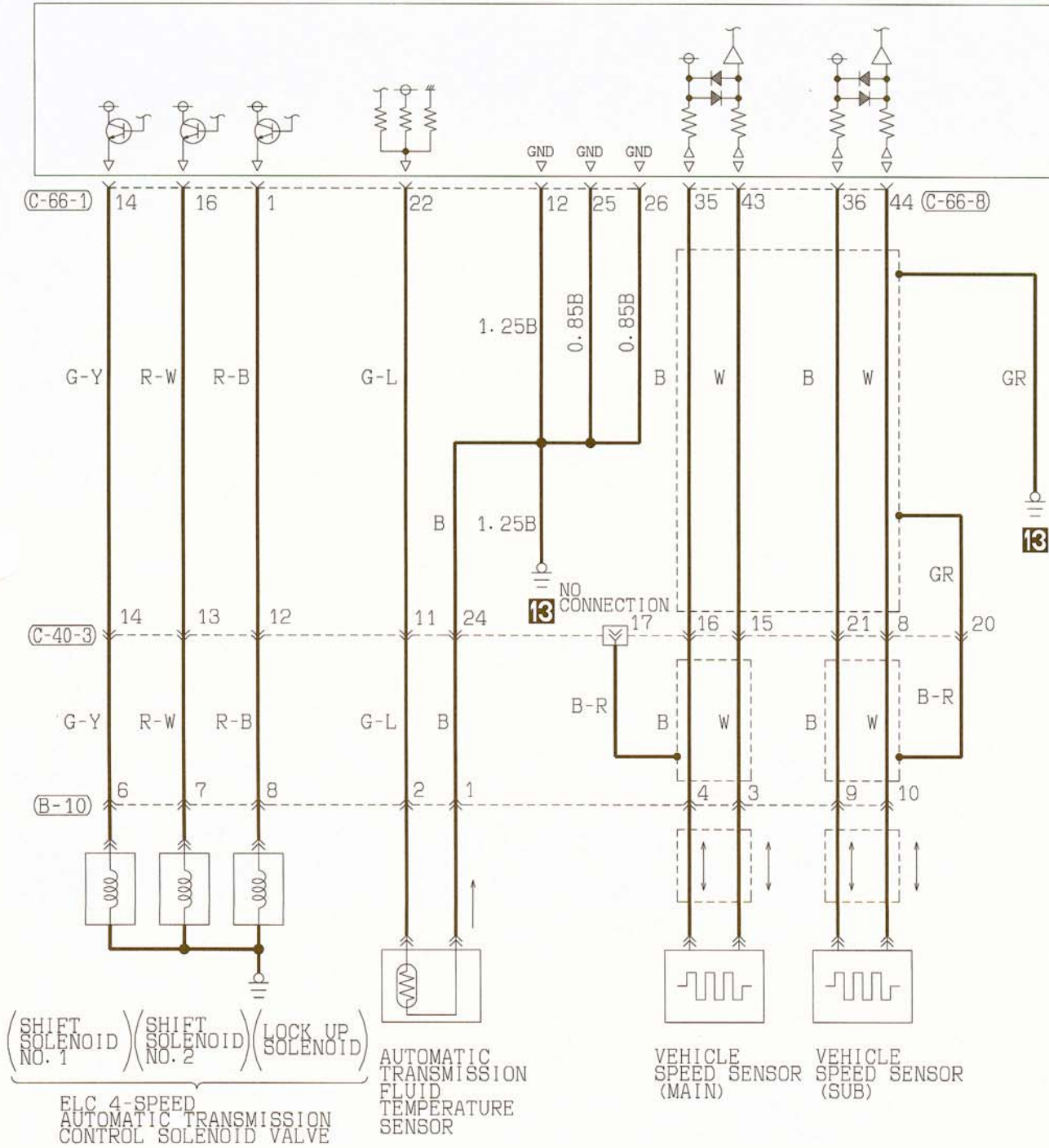
C-11 71 72 73 74 75 76 77 78 79 80 81 82 83 84

C-12 51 52 53 54 55 56 57 58 59 60 61 62

C-62-1 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



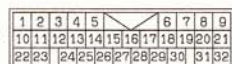
## ELC-4A/T CONTROL MODULE



(B-10)



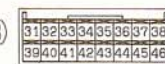
(C-40-3)



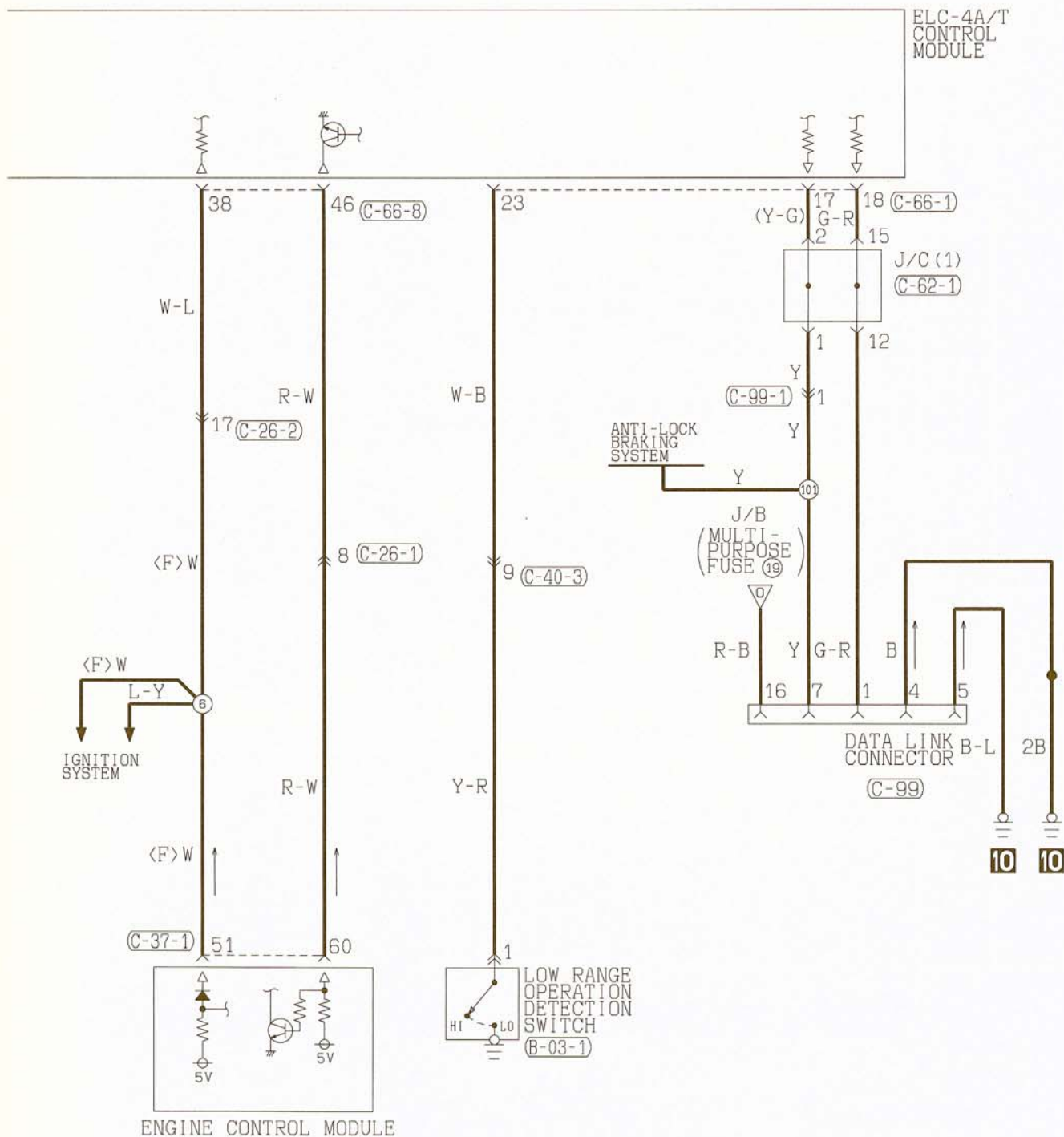
(C-66-1)



(C-66-8)



ELC 4-SPEED AUTOMATIC TRANSMISSION (CONTINUED)



(B-03-1)	(C-26-1)	(C-26-2)	(C-37-1)	(C-40-3)	(C-62-1)	(C-66-1)	(C-66-8)	(C-99-1)
1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	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	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	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	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	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



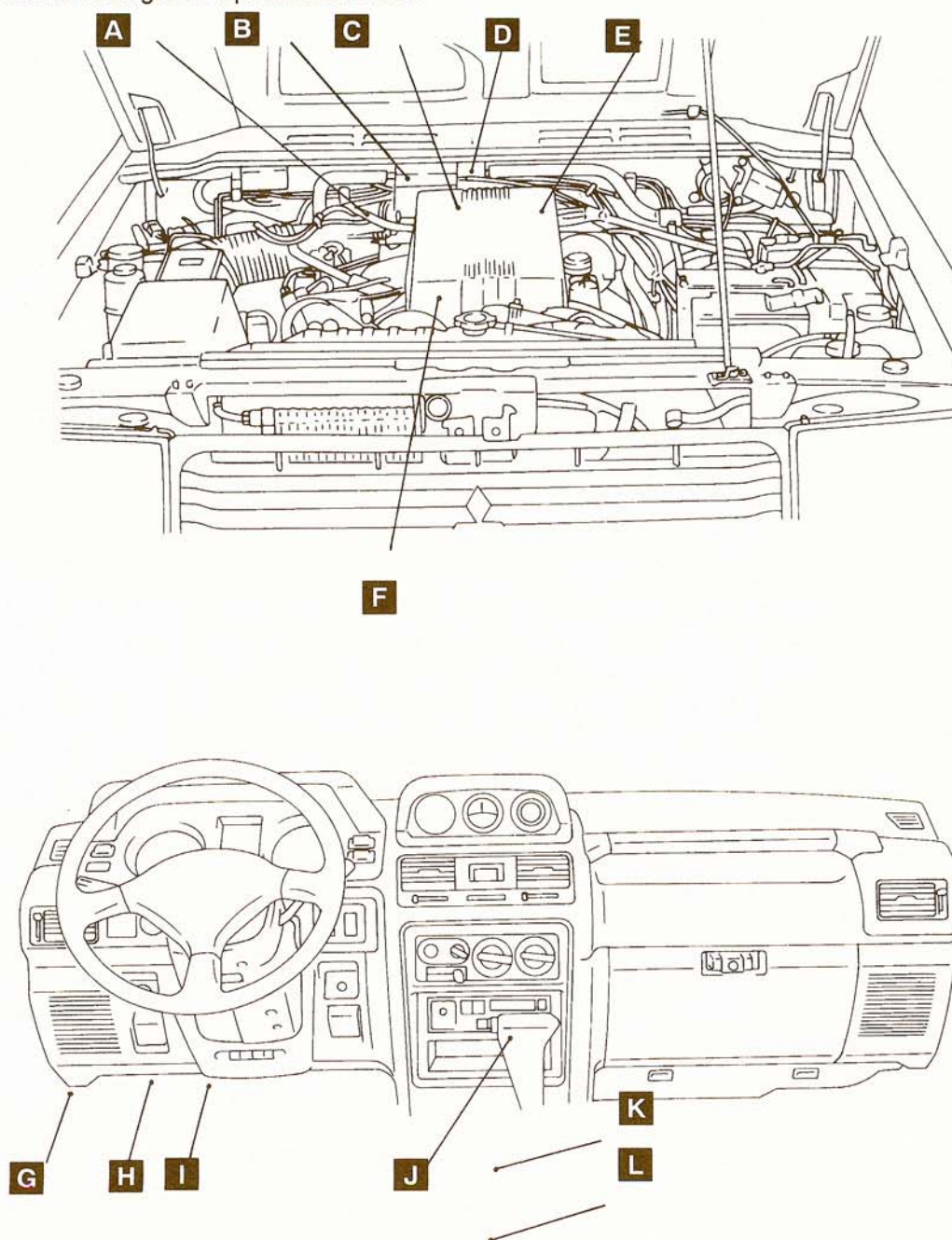
## COMPONENT LOCATION

70100160048

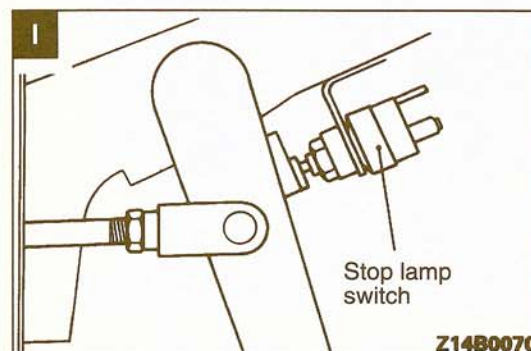
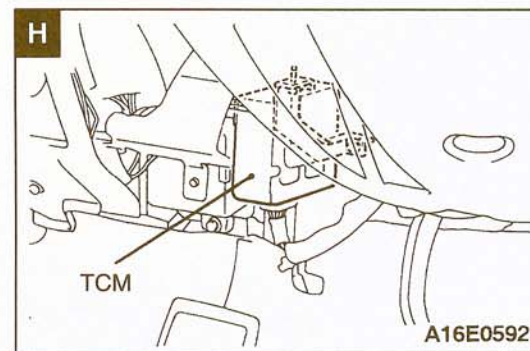
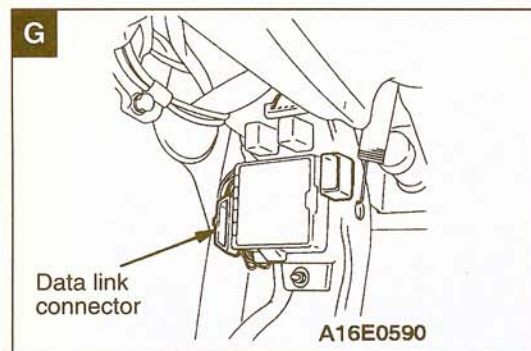
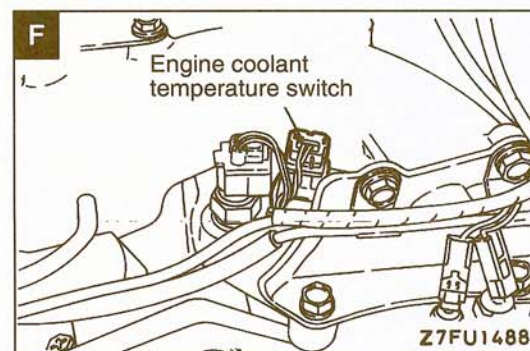
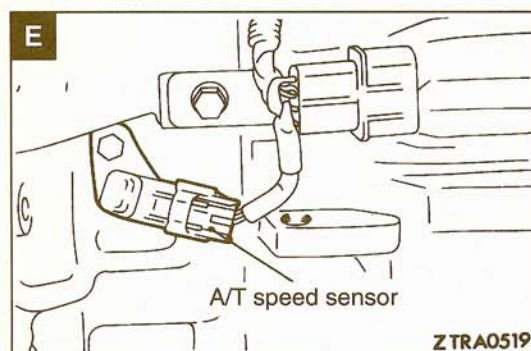
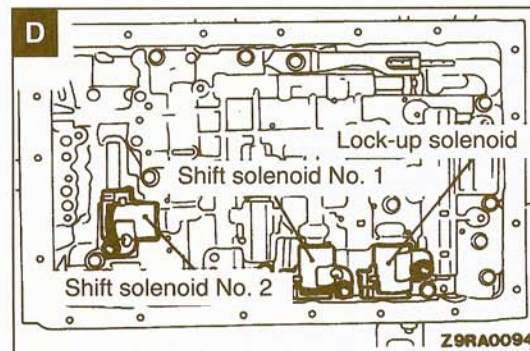
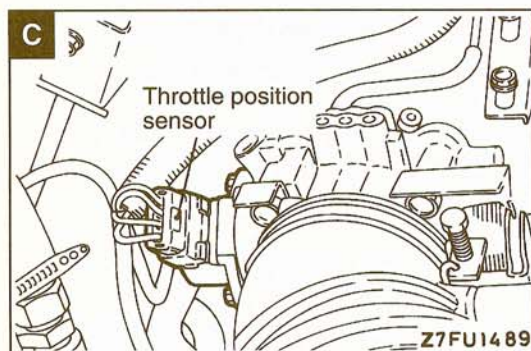
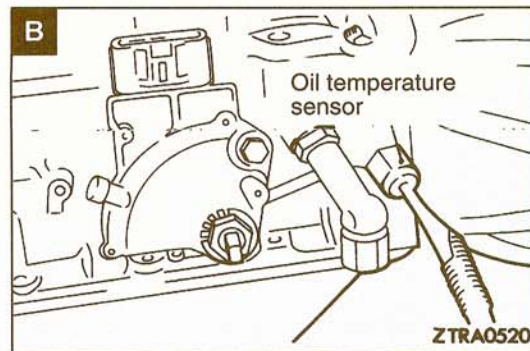
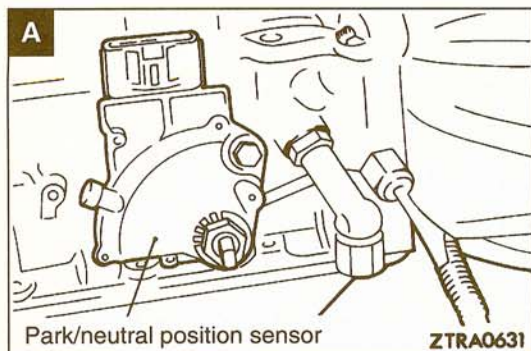
Name	Symbol	Name	Symbol
A/T speed sensor	E	Power/Hold changeover switch	K
Data link connector	G	Solenoids	D
Engine coolant temperature switch	F	Stop lamp switch	I
Overdrive switch	J	TCM	H
Oil temperature sensor	B	Throttle position sensor	C
Park/neutral position sensor	A	Vehicle speed sensor	L

## NOTE

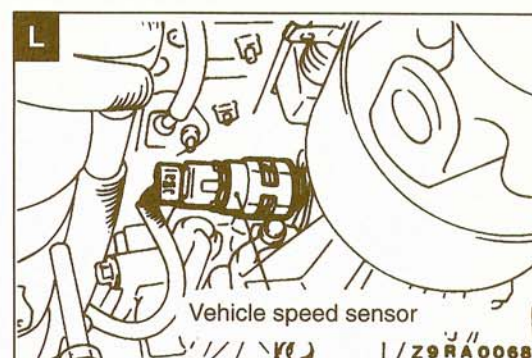
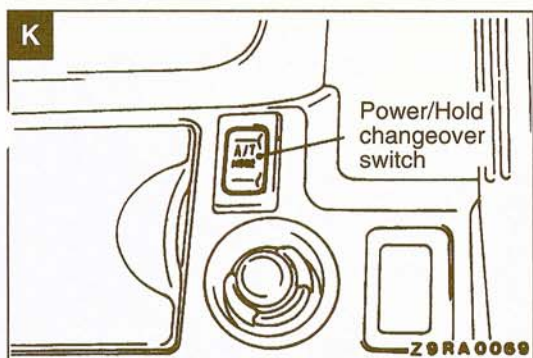
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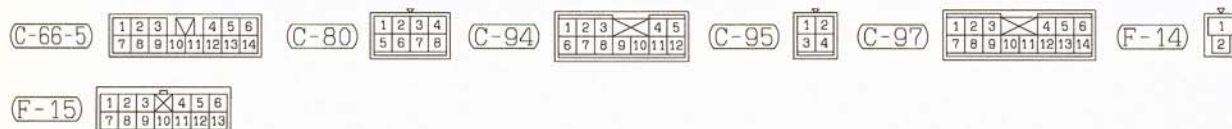




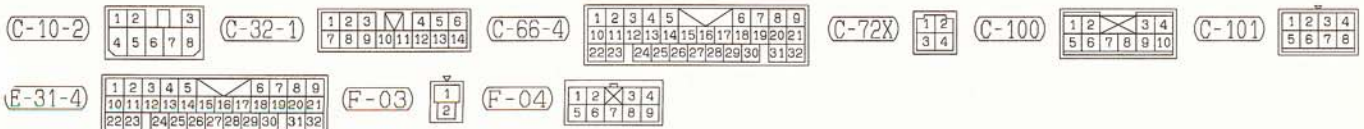




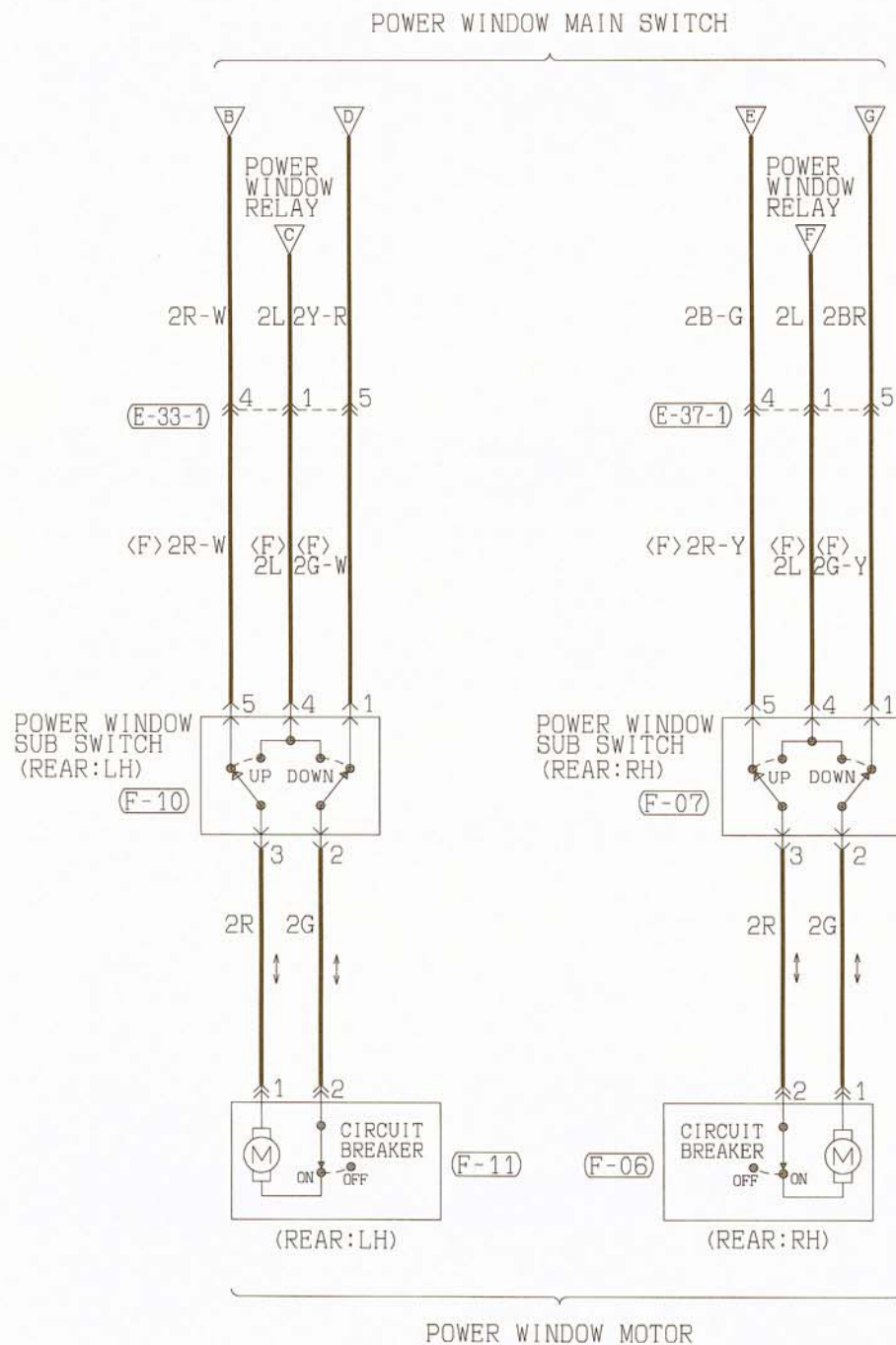
90100460061







## POWER WINDOW (CONTINUED)





**OPERATION**

- If a power-window (main or sub) switch is pressed (UP side or DOWN side) when the ignition switch is at ON, current flows through fusible link No. 10 to the power-window motor, thus causing the door window glass to close or open.
- When the power-window main switch at the driver's side is pressed all the way to the DOWN side, the switch is locked at the pressed-in position, and the power-window motor operates until the door glass is fully opened.
- When the power-window lock switch is set to the LOCK (ON) position, the power-window motor will not operate if any switch (main or sub) other than at the driver's side is operated.
- A circuit breaker is provided in the power-window motor in order to prevent damage to the motor because of excessive current.

For reference: circuit breaker characteristics  
Motor operation is restricted at high temperature [20–25°C (68–77°F)].

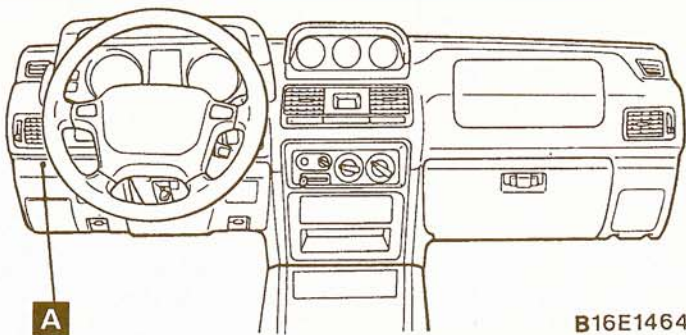
Current flow is cut by an initial current flow time of four to 40 seconds; reset occurs within 60 seconds if then left as is.

**TROUBLESHOOTING HINTS**

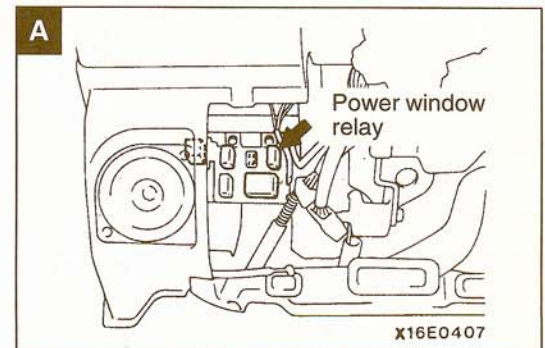
1. All door windows cannot be opened or closed.
  - Check fusible link No. 10.
  - Check the power-window relay.
2. One of the door windows cannot be opened or closed.
  - (1) Neither of the power-window switches (main or sub) operates.
    - Check the power-window main switch.
    - Check the power-window motor for the power window that does not operate.
  - (2) Either the power-window main switch or sub-switch does not operate.
    - Check the power-window main switch for the power window that does not operate.
3. The one-touch switch function only does not operate.
  - Replace the power-window main switch.

**COMPONENT LOCATION**

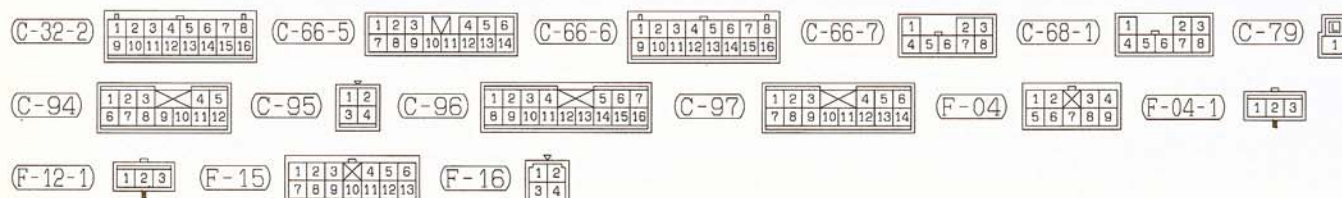
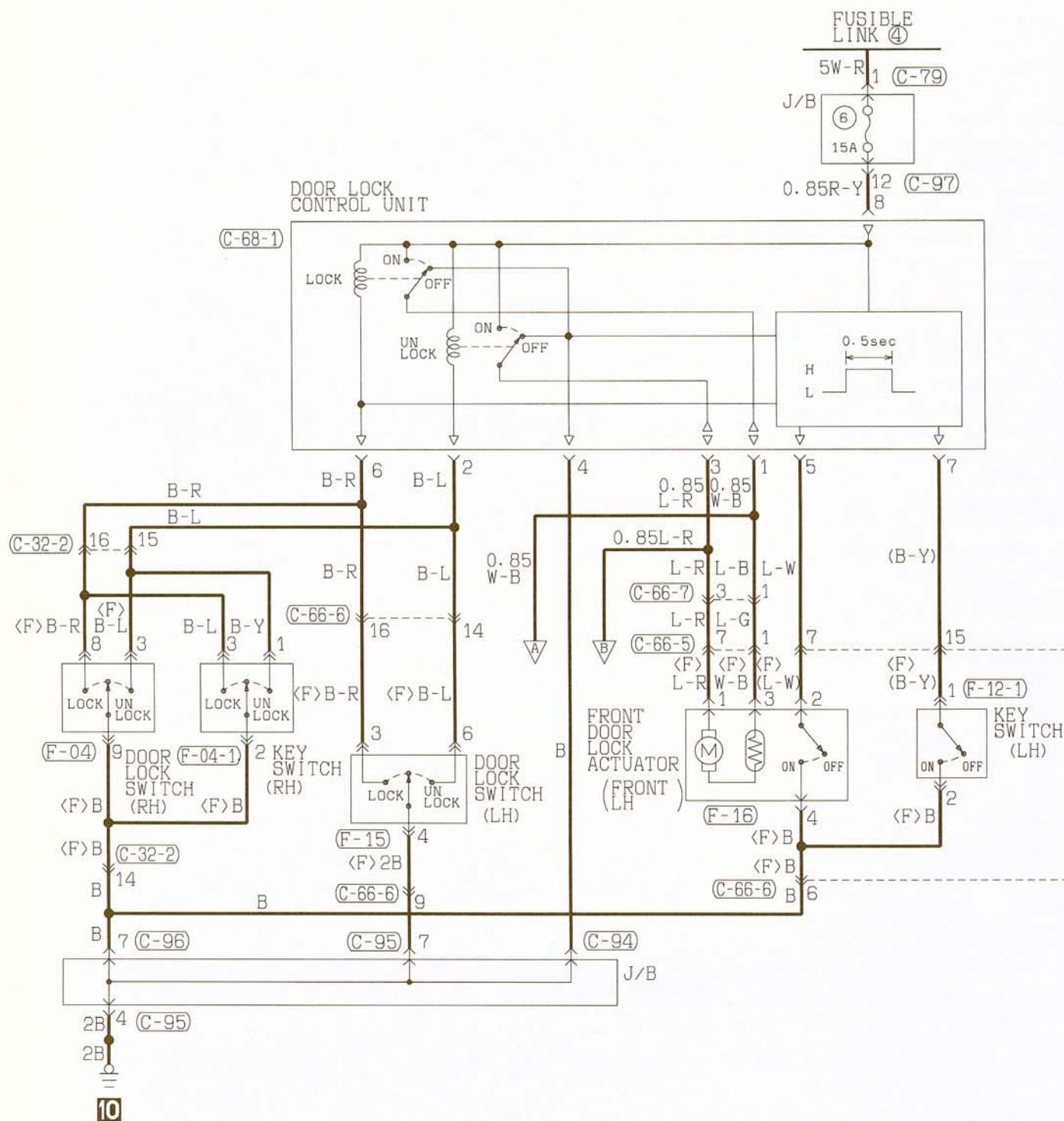
Name	Symbol
Power window relay	A



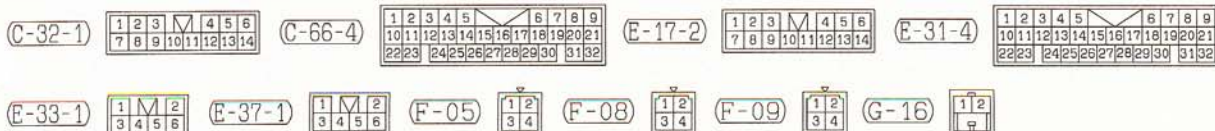
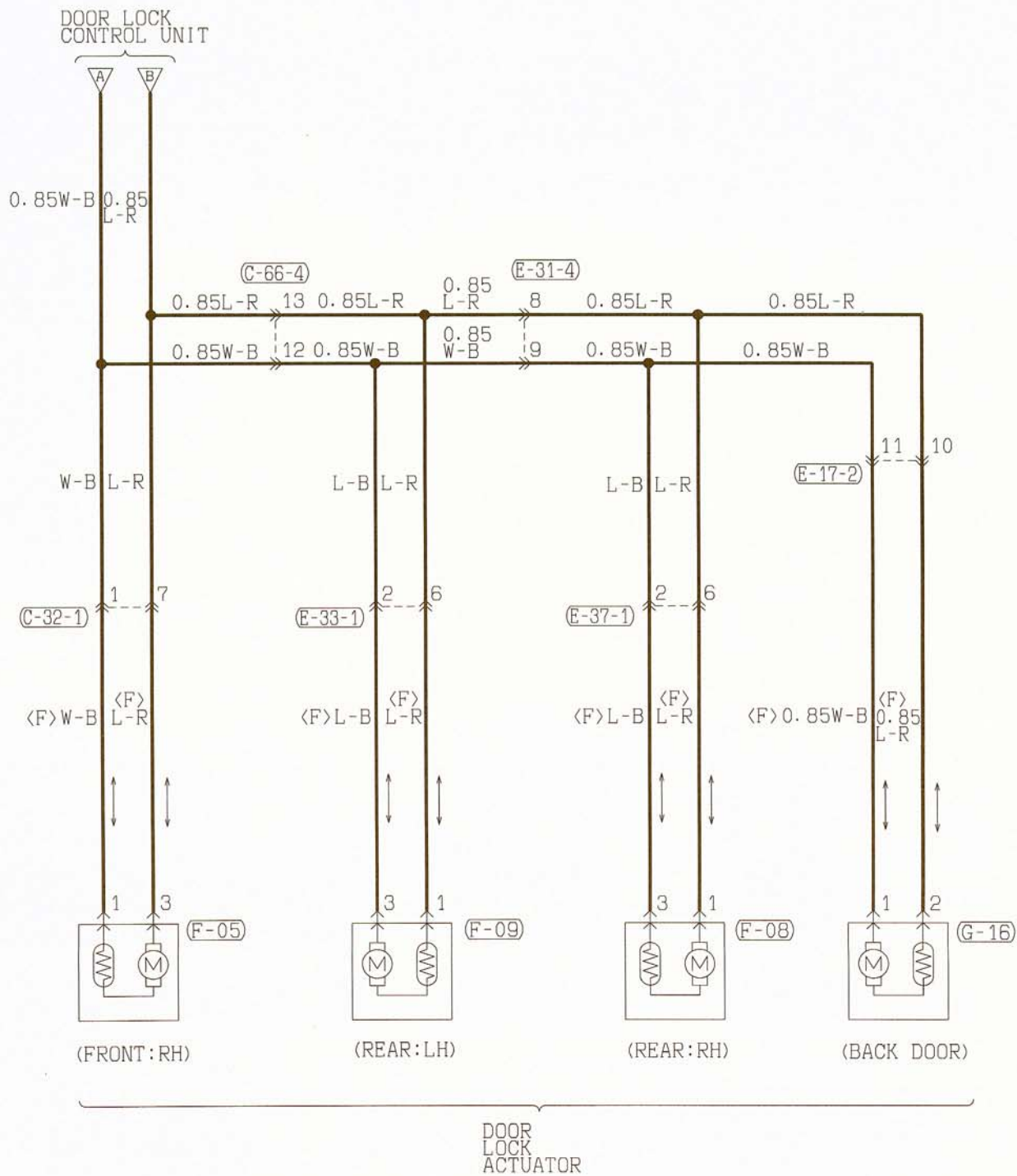
B16E1464



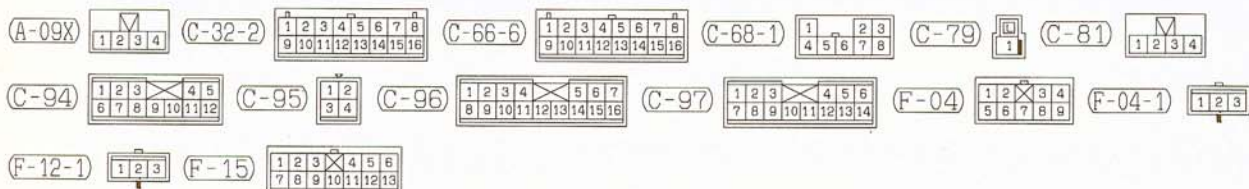
90100470149



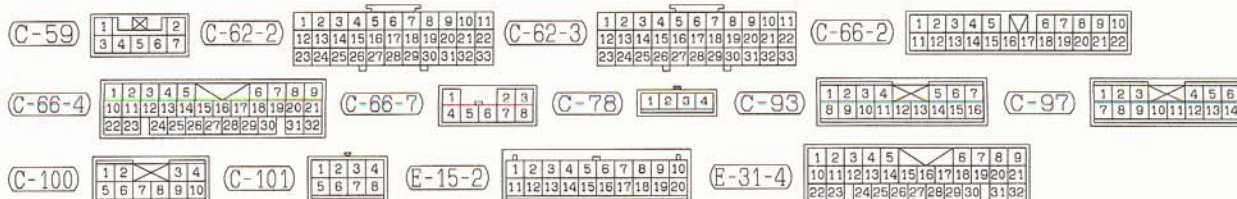
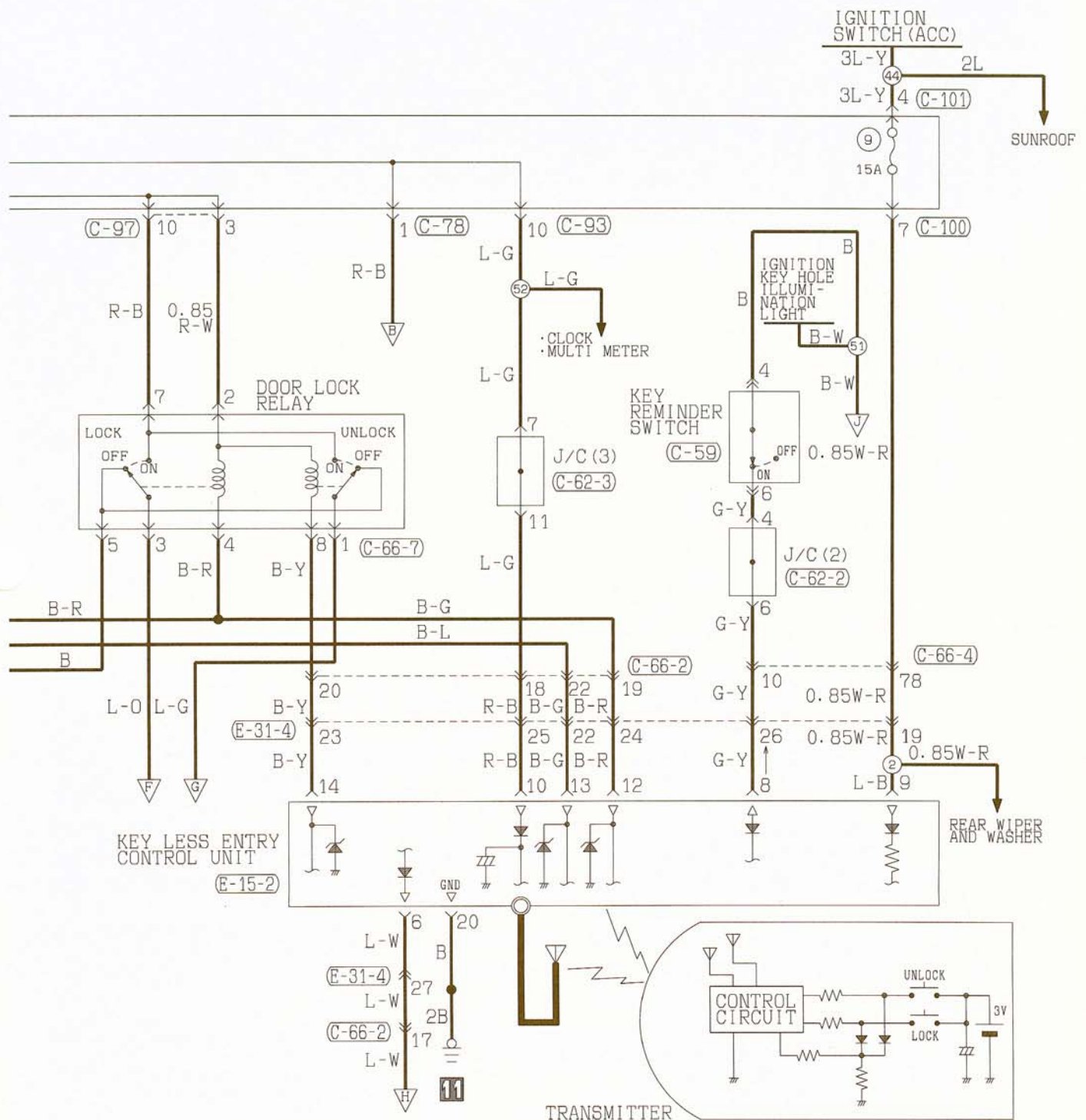




90100470156

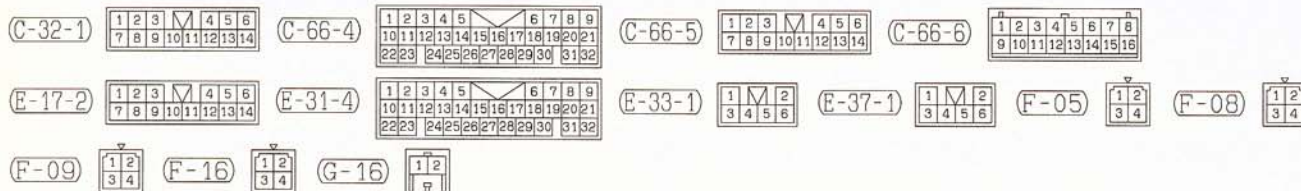
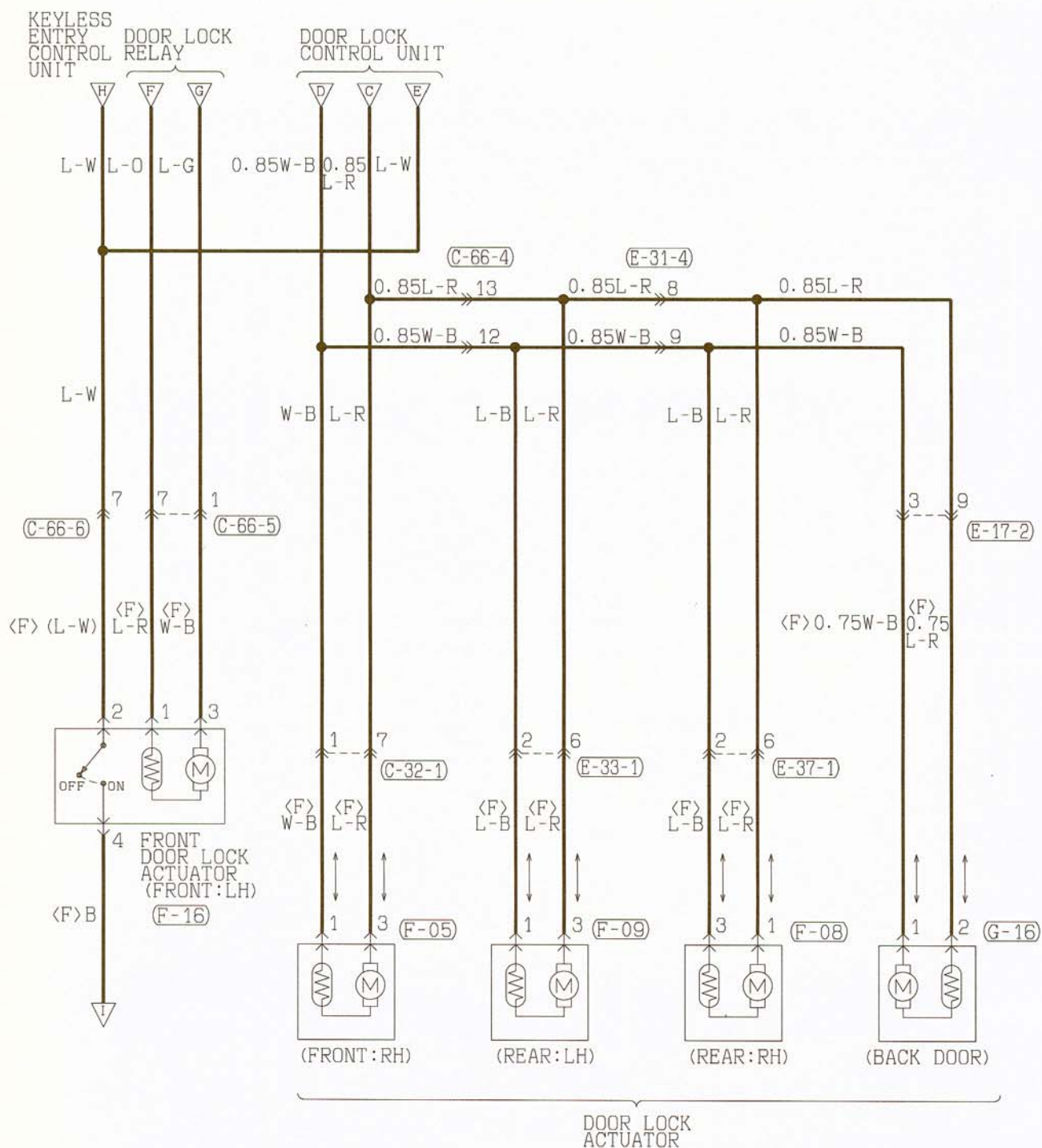






## CENTRAL DOOR LOCKING SYSTEM

&lt;Vehicles with keyless entry system&gt; (CONTINUED)







## &lt;Vehicles without keyless entry system&gt;

**OPERATION**

- When the door lock switch is set to the LOCK side (or UNLOCK side), the LOCK side (or UNLOCK side) of the door lock relay is turned ON and the door actuators of all doors operate.

**NOTE**

The door lock actuator contains a PTC thermistor to prevent damage caused by overheating of the motor. If the central door lock is frequently used, the actuator may temporarily fail to operate. If it returns to normal in a few minutes, it is normal.

**TROUBLESHOOTING HINTS**

1. Every door lock actuator does not operate.
  - Check fusible link No. 4.
  - Check multi-purpose fuses No. 19 and No. 6.
  - Check the door lock switch.
  - Check the door lock relay.
2. One of the door lock actuators fails to operate.
  - Check the actuator which fails to operate.



**<Vehicles with keyless entry system>****OPERATION**

- ▶ When the lock switch of the transmitter is pushed with all the doors and backdoor in unlocked condition, the door lock signal will be output (0V) from the keyless entry control unit terminal No. 12 to turn on (lock side) the door lock relay to lock all the doors and backdoor.
- When the transmitter unlock switch is pushed once with all the doors and backdoor in locked condition, the door unlock signal will be output (0V) from the keyless entry control unit terminal No. 14 to turn on (unlock side) the door lock relay to unlock the door of the driver's side.
- When the transmitter unlock switch is pushed once again with the same condition as above, the door unlock signal will be output (0V) from the keyless entry control unit terminal No. 13 to turn on (unlock side) the door lock control unit to unlock all the doors and backdoor.
- When the keyless entry system is operated to lock the door of the driver's side, the dome light flickering signal will be output (system voltage) twice from the keyless entry control unit terminal No. 11. And when the door of the driver's side is unlocked, the dome light illuminating signal will be output (0V) for three seconds from the keyless entry control unit terminal No. 11.

**NOTE**

Following are the functions that the keyless entry control system has in addition to the above.

- Unless any of the door is opened or closed within 30 seconds after the door has been unlocked by the keyless entry system, all the doors and backdoor will be automatically locked. Further, when a code which is different from the code that the receiver memorizes is received 30 times consecutively in a minute, the system will not operate for 10 minutes.
- The system will not operate with the ignition switch inserted and any of the doors and backdoor open.

**TROUBLESHOOTING HINTS**

1. The indicator will not light when the transmitter switch of the transmitter is pushed.
  - Check or replace the battery.
  - Replace the transmitter.
2. Though the transmitter is transmitting waves (the indicator is lit) the system does not operate.
  - Check the way the code is registered.\*
  - Check the keyless entry control unit terminal for voltage.
  - Check to see if the coaxial and ground cables of the antenna are connected.
3. Only either of the door or the backdoor can lock or unlock.
  - Check the door lock relay.
  - Check the door lock control unit.
  - Check the voltage of the keyless entry control unit terminal.
4. All the doors and the backdoor can be locked or unlocked by the transmitter, but the dome light does not flicker nor light. (The interlocking lighting of the dome light according to opening and closing of the doors, however, is normal.)
  - Check the voltage of the keyless entry control unit terminal.
  - Check the harness.

**NOTE**

\*: Carry it out when the transmitter or the keyless entry control unit has been replaced, or a defect in memory of the code has occurred.

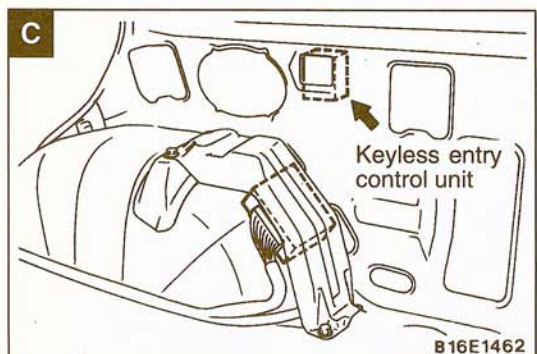
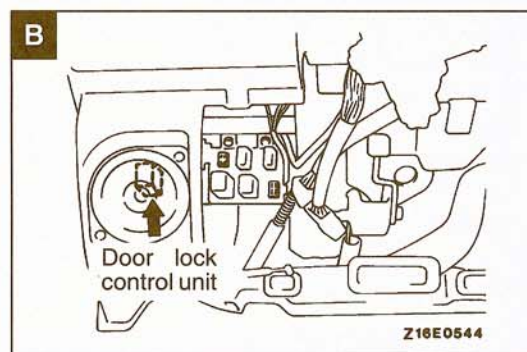
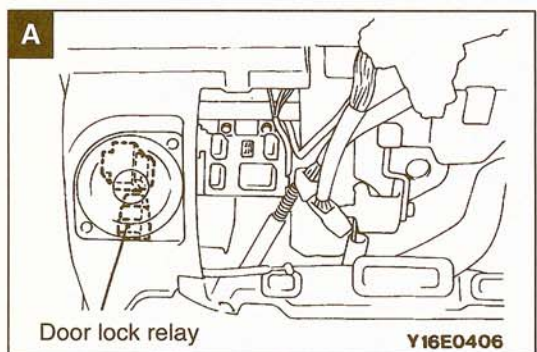
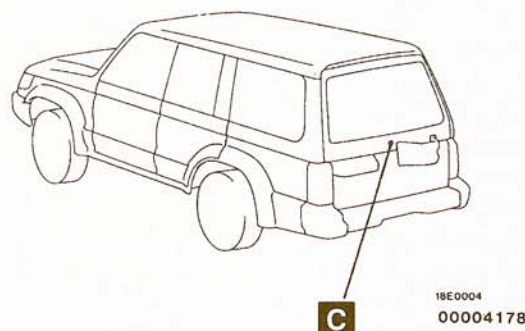
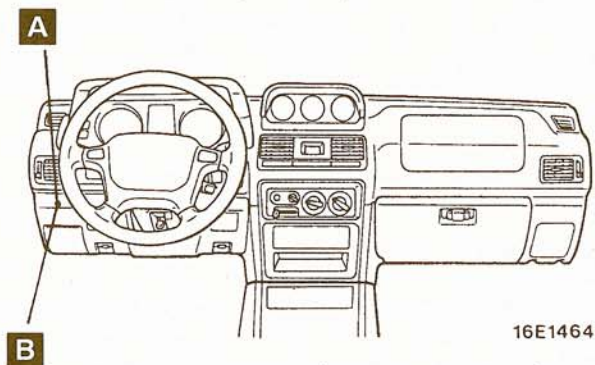
## COMPONENT LOCATION

70100420030

Name	Symbol	Name	Symbol
Door lock control unit	B	Keyless entry control unit	C
Door lock relay	A	–	–

## NOTE

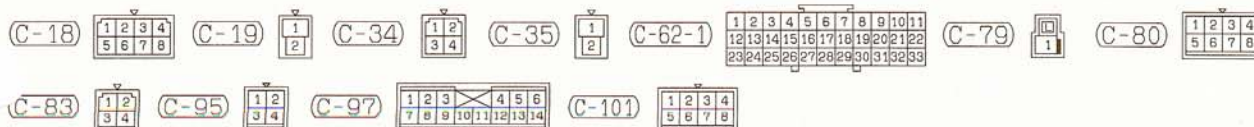
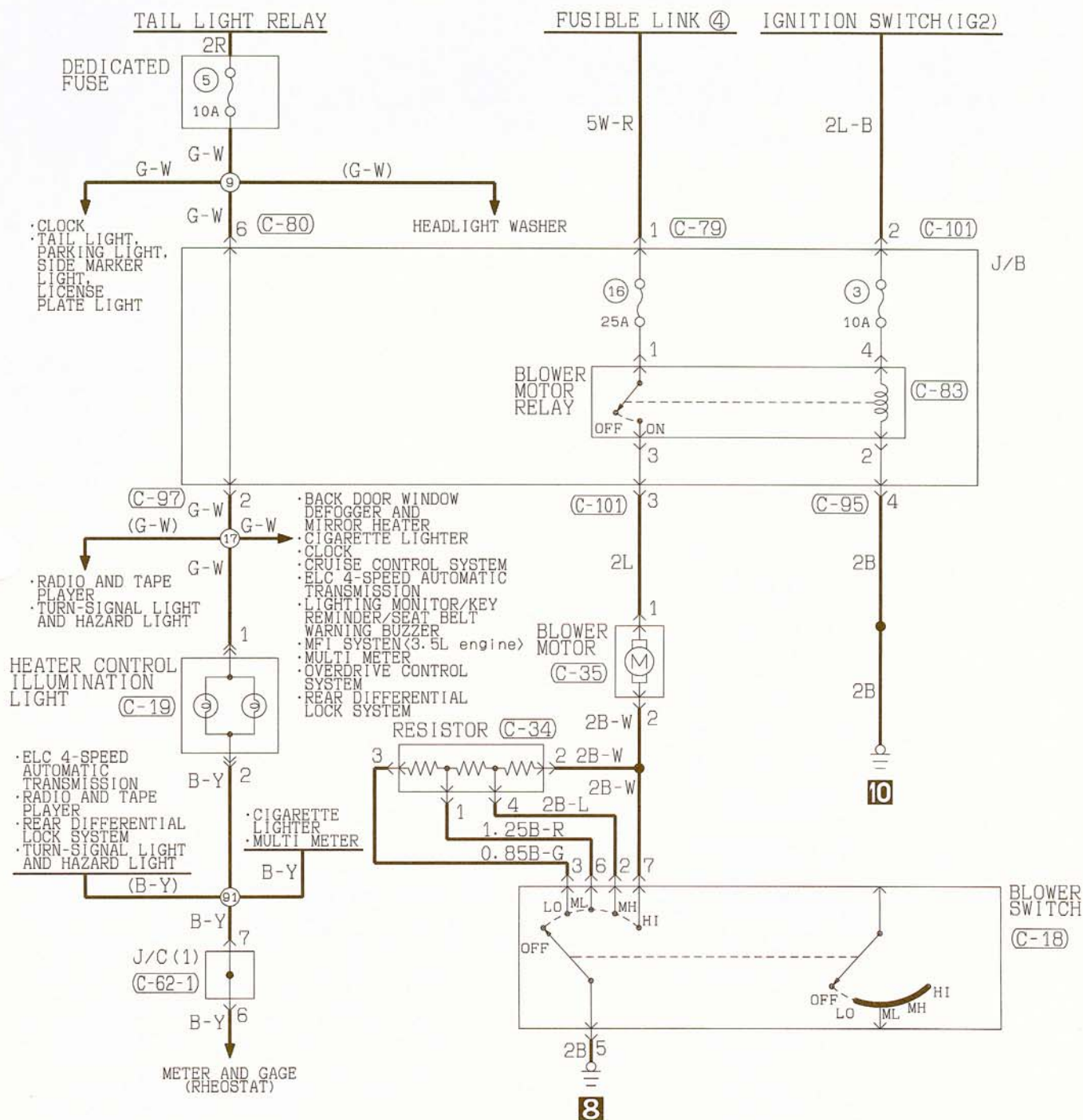
The "Name" column is arranged in alphabetical order.





## HEATER

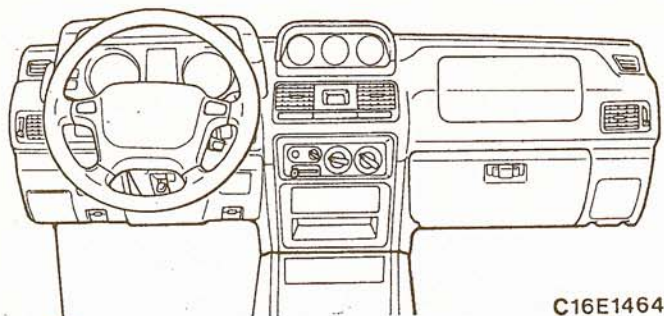
90101330026



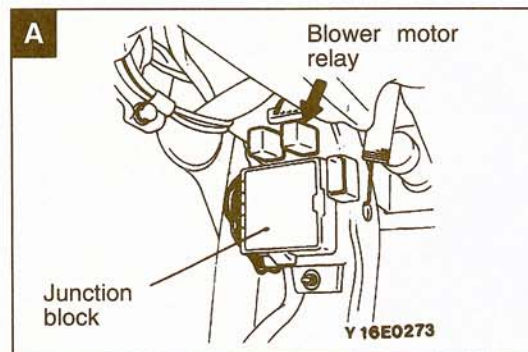
## COMPONENT LOCATION

70100460018

Name	Symbol
Blower motor relay	A



C16E1464





70100470011

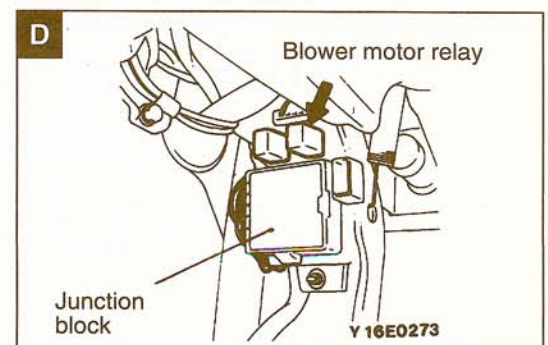
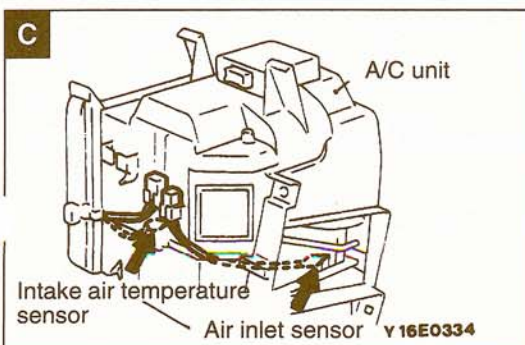
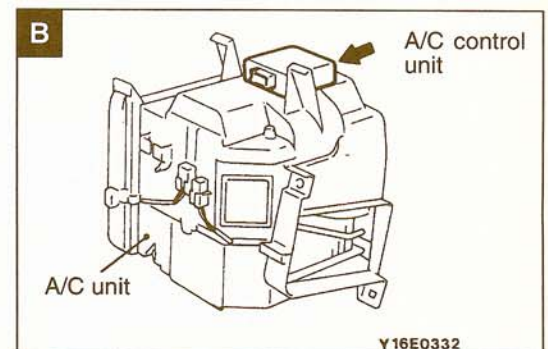
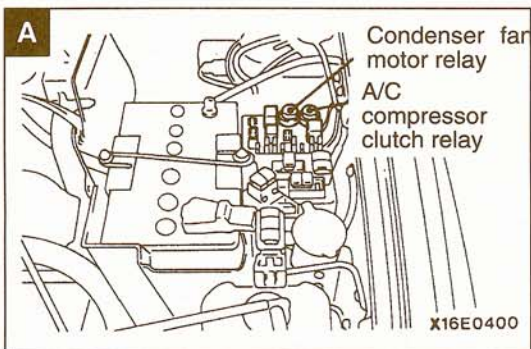
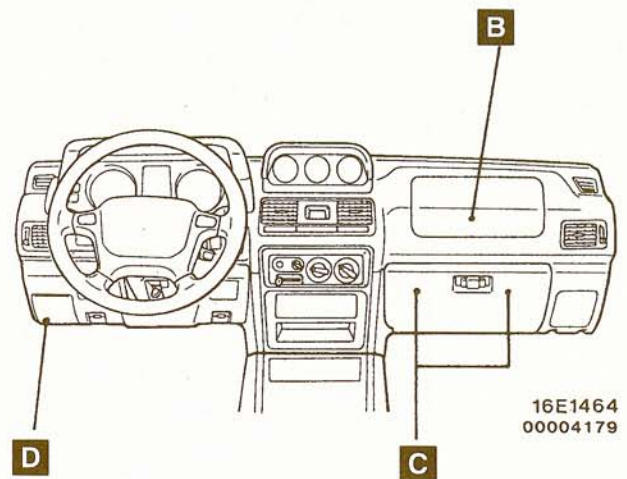
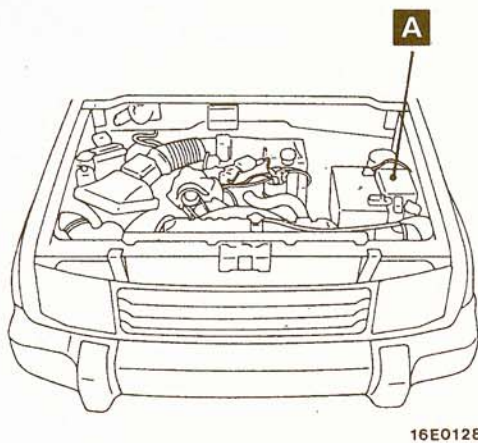
## AIR CONDITIONING

### COMPONENT LOCATION

Name	Symbol	Name	Symbol
A/C compressor clutch relay	A	Intake air temperature sensor	C
A/C control unit	B	Blower motor relay	D
Air inlet sensor	C	Condenser fan motor relay	A

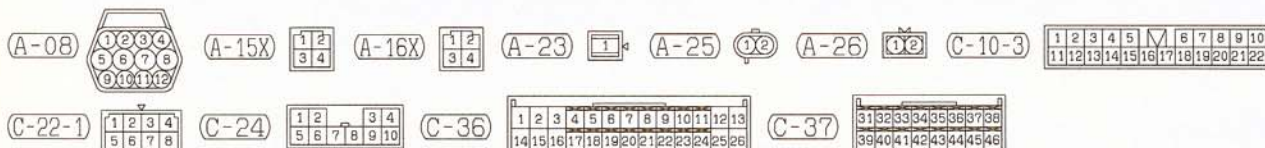
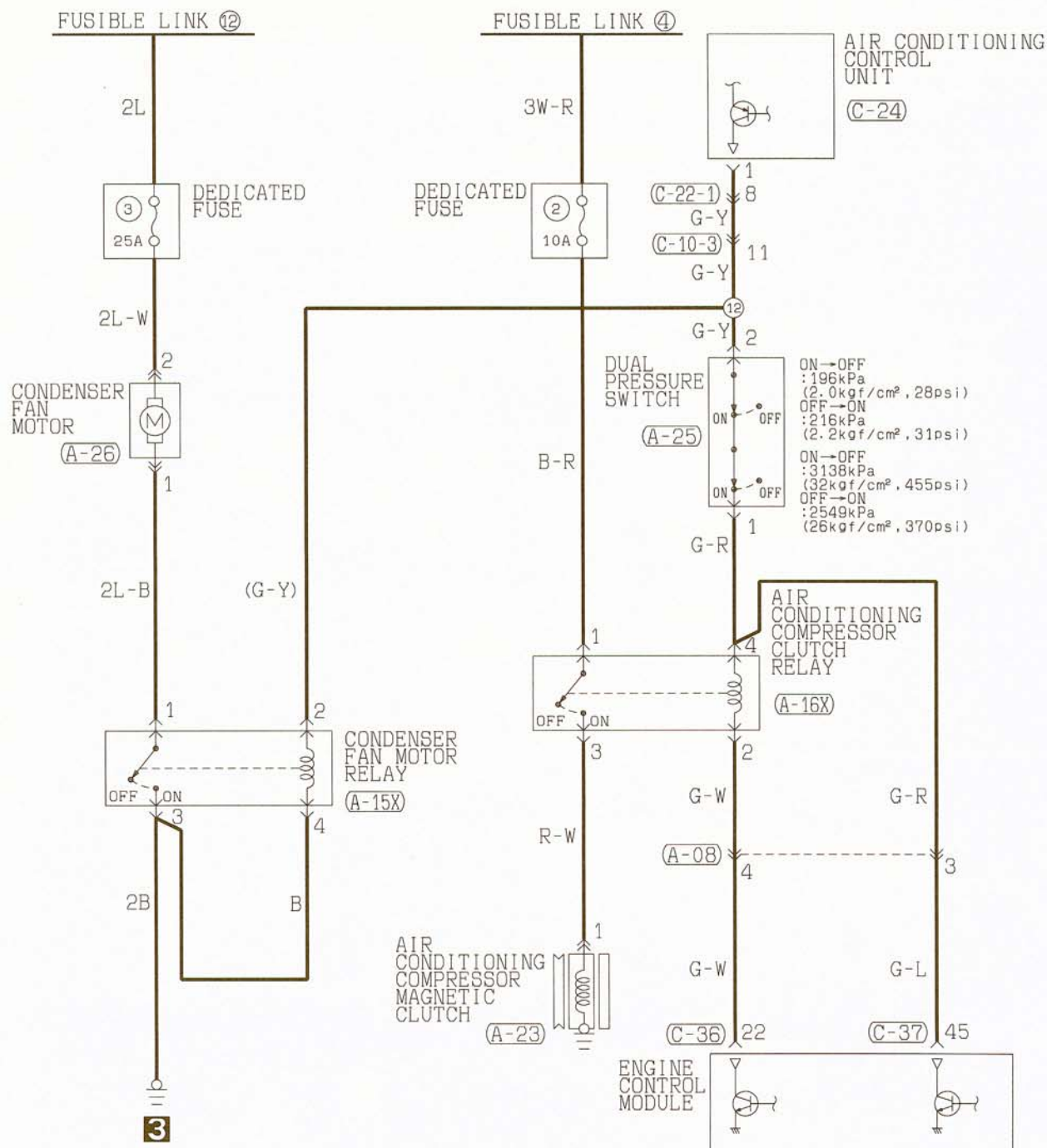
#### NOTE

The "Name" column is arranged in alphabetical order.



## AIR CONDITIONING

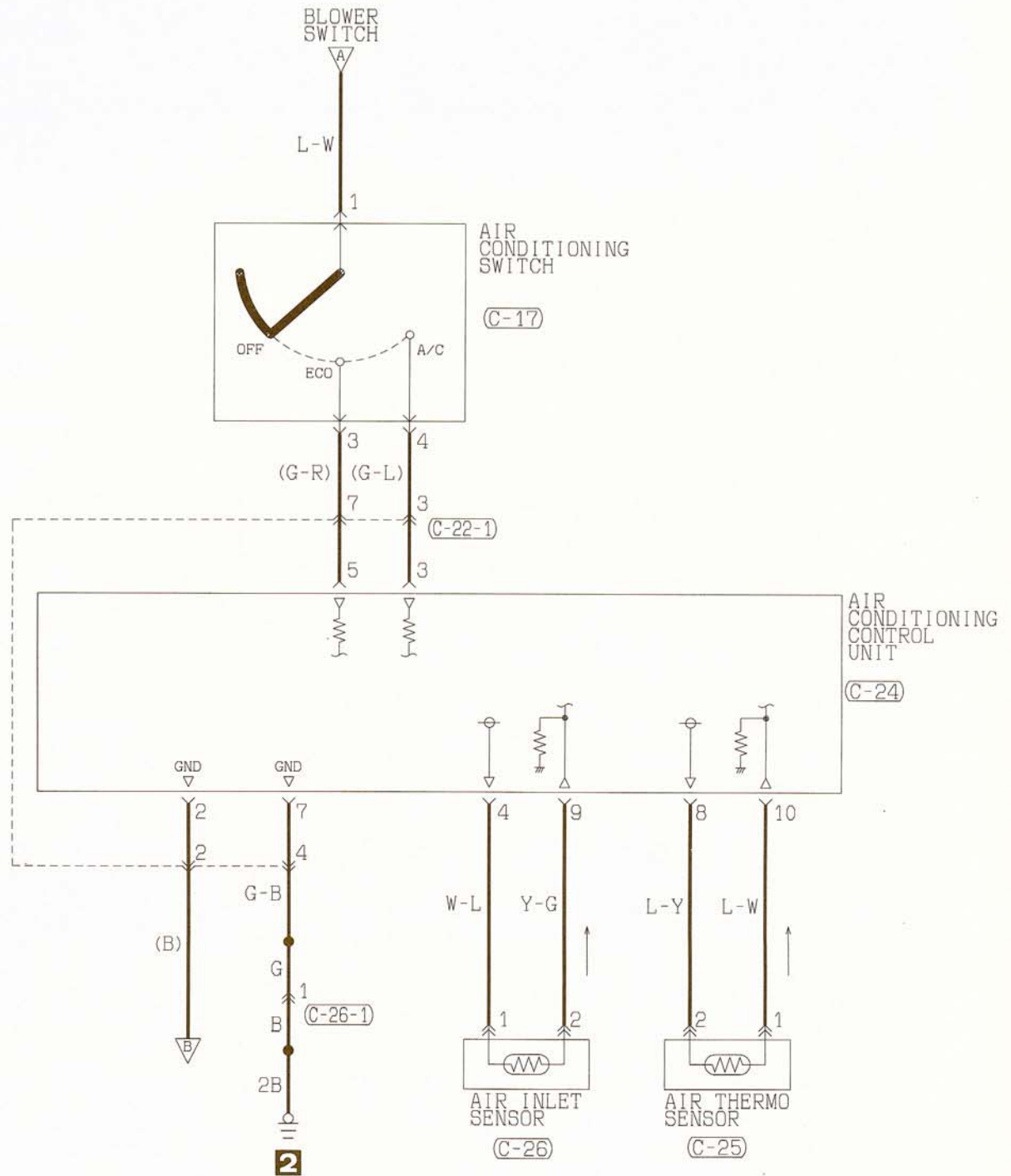
90100550027



HQ12M06BA

TSB Revision





(C-17) 

1	2
3	4

 (C-22-1) 

1	2	3	4
5	6	7	8

 (C-24) 

1	2	3	4
5	6	7	8
9	10		

 (C-25) 

1
2

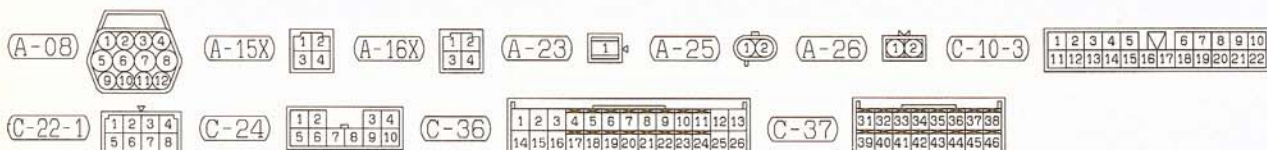
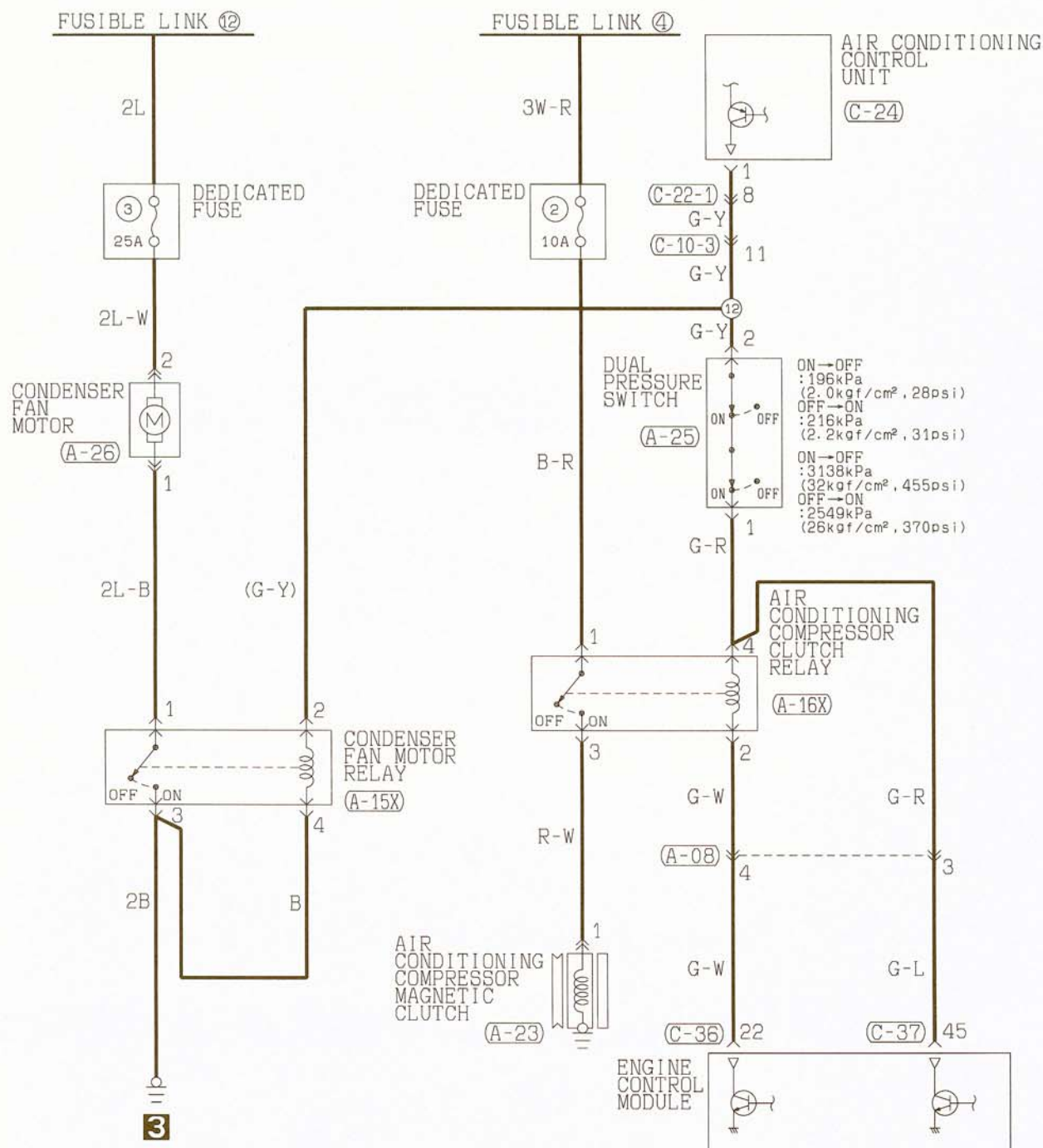
 (C-26) 

1
2

 (C-26-1) 

1	2	3
4	5	6
7	8	

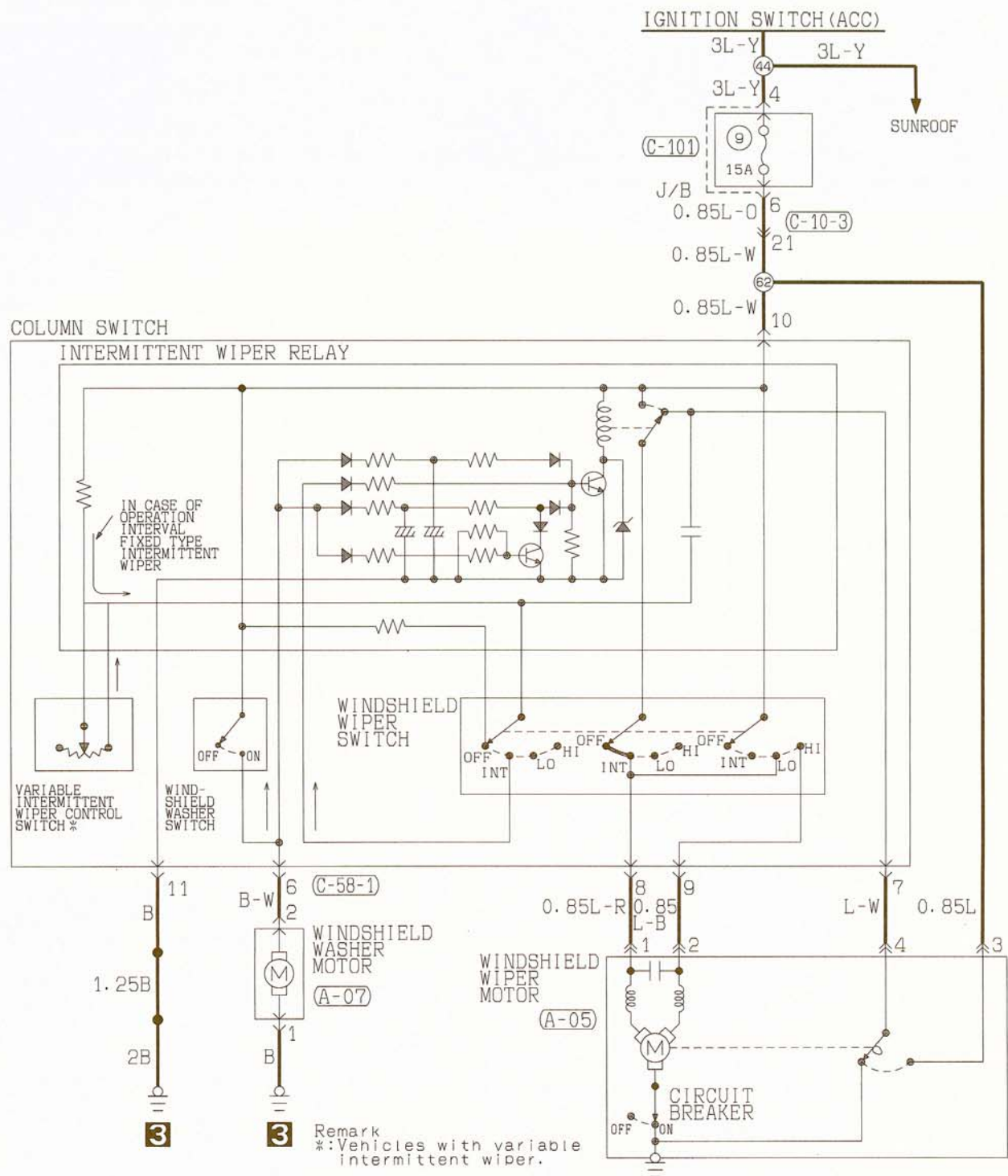
## AIR CONDITIONING (CONTINUED)





## WINDSHIELD WIPER AND WASHER

90100610060



(A-05)

1 2  
3 4

(A-07)

1  
2

(C-10-3)

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

(C-58-1)

1 2 3 4 5  
6 7 8 9 10 11 12

(C-101)

1 2 3 4  
5 6 7 8

**OPERATION****Low-speed (and high-speed) wiper operation**

- When the wiper switch is turned to LO while the ignition switch is at ACC or ON, the wipers operate continuously at low speed.
- Turning the wiper switch to HI causes the wipers to operate at high speed.

**Auto wiper stop operation**

- When the wiper switch is at OFF, the cam contacts of the wiper motor cause current to flow through the auto wiper stop circuit, allowing the wiper blades to cycle before they reach the stop positions.

**Intermittent wiper operation**

- When the wiper switch is at INT while the ignition switch is at ACC or ON, the intermittent wiper relay is energized, causing the intermittent wiper relay contacts to close and open repeatedly.
- When the contacts are closed, the wiper motor is energized.
- When the wiper motor is energized, the relay contacts open; however, the cam contacts keep the wiper motor energized until the wiper blades return to the stop positions.

**Washer-wiper operation**

- When the washer switch is turned ON, the intermittent wiper relay contacts close causing wipers to cycle two to three times.

**TROUBLESHOOTING HINTS**

1. Wipers do not operate.  
Washer does not operate either.
  - Check multi-purpose fuse No. 9.
  - Check the ground.
2. Low-speed (or high-speed) wiper only does not operate.
  - Check the wiper switch.
3. Wipers do not stop.
  - Check the wiper motor.
  - Check the intermittent wiper relay.
  - Check the wiper switch.
4. Intermittent wiper does not operate.
  - Check the terminal voltage of the steering-column switch (with built-in intermittent wiper relay) while the intermittent wiper relay is energized.

Terminal No.	Voltage	Check
8	0 V	Intermittent wiper relay or wiper switch
	Battery positive voltage	Intermittent wiper relay
	0V ↔ Battery positive voltage (alternating)	– (Normal)

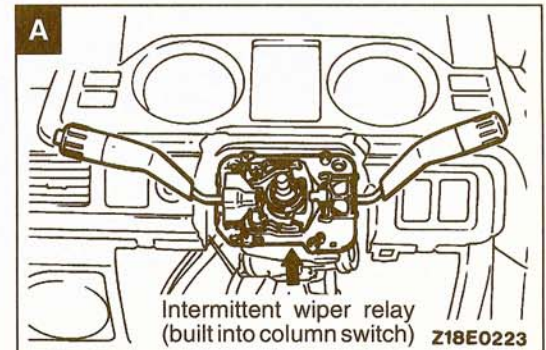
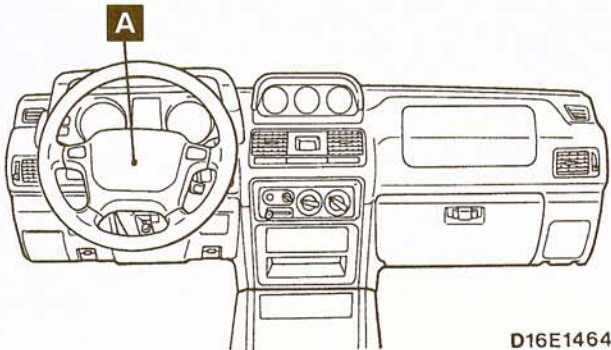
5. The length of pause for intermittent operation cannot be varied.
  - Check the variable intermittent wiper control switch.
  - Check the intermittent wiper relay.
6. Washer does not operate.
  - (1) Wiper operates during washer-wiper operation.
    - Check the washer motor.
  - (2) Washer-wiper does not operate also.
    - Check the washer switch.
7. Washer-wiper does not operate.
  - Check the intermittent wiper relay.



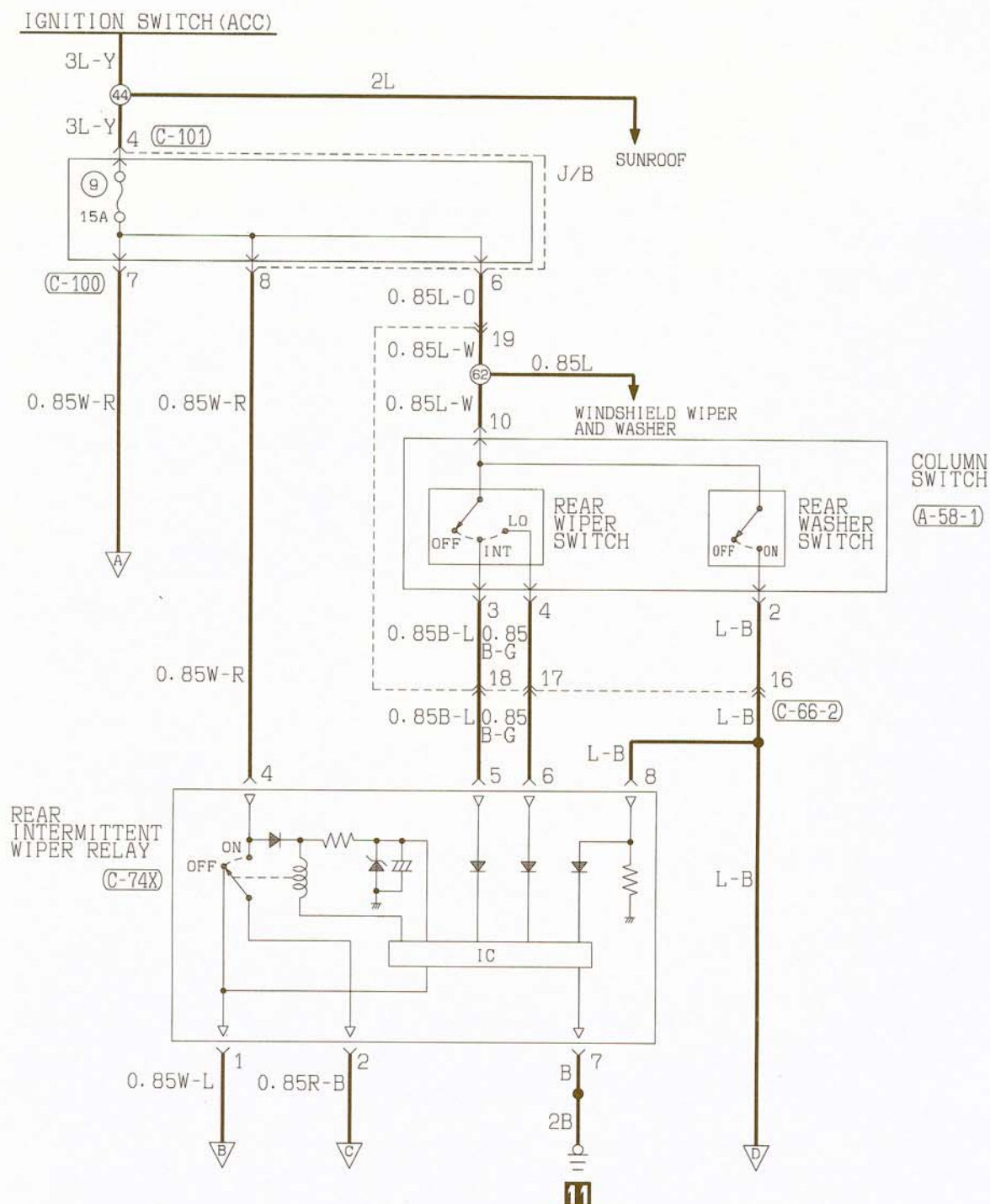
## COMPONENT LOCATION

70100190030

Name	Symbol
Intermittent wiper relay	A



## 90100620094



(A-58-1)

1	2	M	3	4	5	
6	7	8	9	10	11	12

(C-66-2)

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

(C-74X)

1		2	3
4	5	6	7

(C-100)

1	2	X		3	4
5	6	7	8	9	10

C-101

1	2	3	4
5	6	7	8





**OPERATION****Low-speed wiper operation**

- When the wiper switch is at ON while the ignition switch is at ACC or ON, the wipers operate continuously at low speed.

**Auto wiper stop operation**

- When the wiper switch is at OFF, the cam contacts of the wiper motor cause current to flow through the auto wiper stop circuit, allowing the wiper blades to cycle before they reach the stop positions.

**Intermittent wiper operation**

- When the wiper switch is at INT while the ignition switch is at ACC or ON, the intermittent wiper relay is energized, causing the intermittent wiper relay contacts to close and open repeatedly.
- When the contacts are closed, the wiper motor is energized.
- When the wiper motor is energized, the relay contacts open; however, the cam contacts keep the wiper motor energized until the wiper blades return to the stop positions.

**Washer-wiper operation**

- When the washer switch is turned ON, the intermittent wiper relay contacts close causing wipers to cycle two to three times.

**TROUBLESHOOTING HINTS**

- Wipers do not operate.
  - Washer does not operate either.
  - Check multi-purpose fuse No. 9.
  - Check the ground.
  - Check the wiper switch.
- Wipers do not stop.
  - Check the wiper motor.
  - Check the intermittent wiper relay.
  - Check the wiper switch.
- Intermittent wiper does not operate.
  - Check the terminal voltage while the intermittent wiper relay is energized.

Terminal No.	Voltage	Check
2	0 V	Intermittent wiper relay or wiper switch
	Battery positive voltage	Intermittent wiper relay
	0V ↔ Battery positive voltage (alternating)	– (Normal)

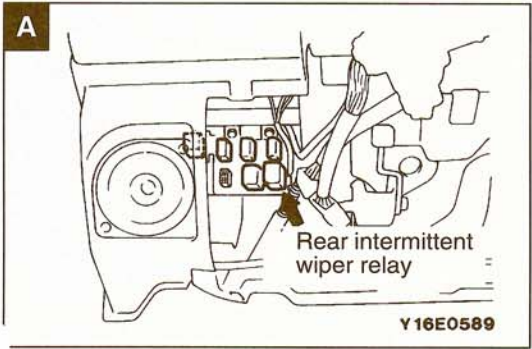
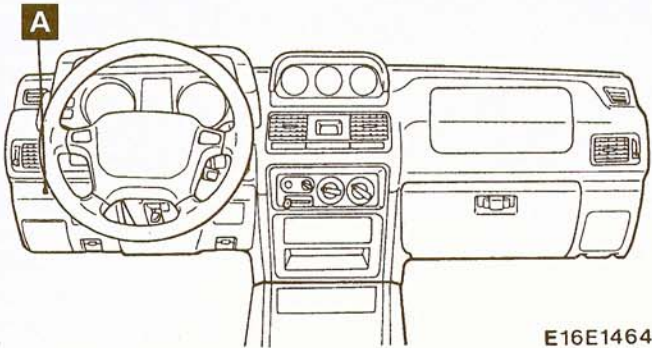
- Washer does not operate.
  - Check the washer motor.
  - Check the washer switch.



COMPONENT LOCATION

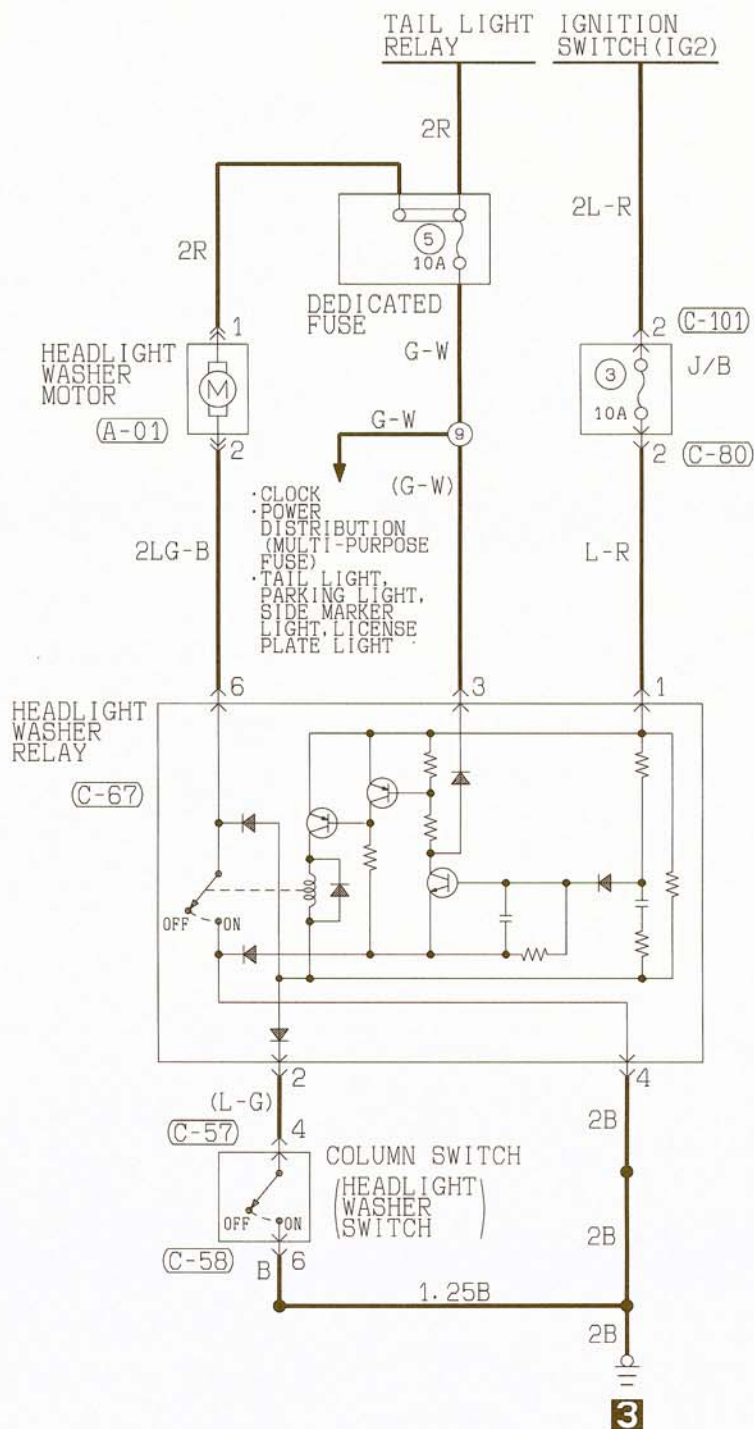
70100480014

Name	Symbol
Rear intermittent wiper relay	A



## HEADLIGHT WASHER

90100630059



(A-01) (12) (C-57) (1 2 3 4 5 6 7 8 9 10) (C-58) (1 2 3 4 5 6) (C-67) (1 2 3 4 5 6) (C-80) (1 2 3 4 5 6 7 8) (C-101) (1 2 3 4 5 6 7 8)



**OPERATION**

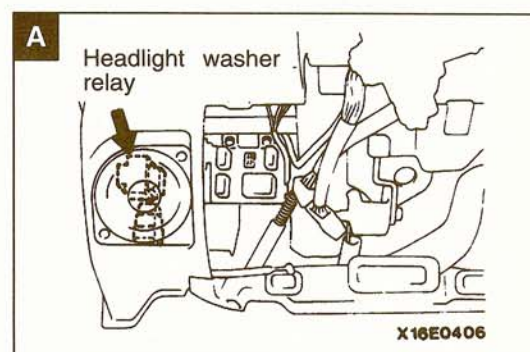
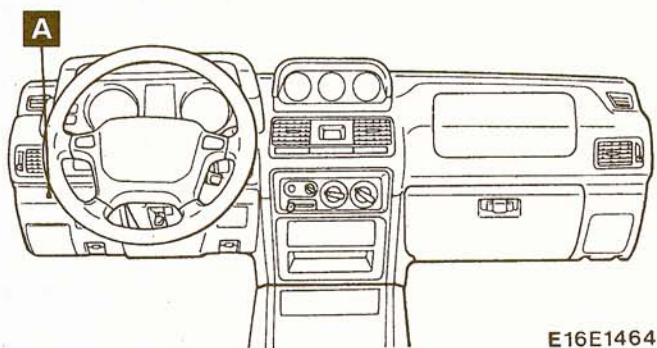
- When the headlight washer switch is turned to ON while the ignition switch is at ON and the lighting switch is at TAIL or HEAD, the headlight washer relay is energized, causing the headlight washer motor to start.

**TROUBLESHOOTING HINTS**

1. Headlight washer motor does not start.
  - (1) Washer motor does not start either.
    - Check multi-purpose fuse No. 3.
  - (2) Washer motor does not start.
    - Check the headlight washer motor.
    - Check the headlight washer relay.
    - Check the headlight washer switch.

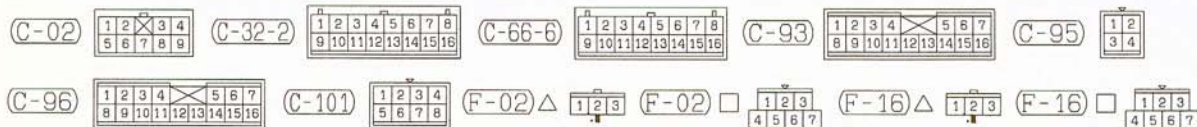
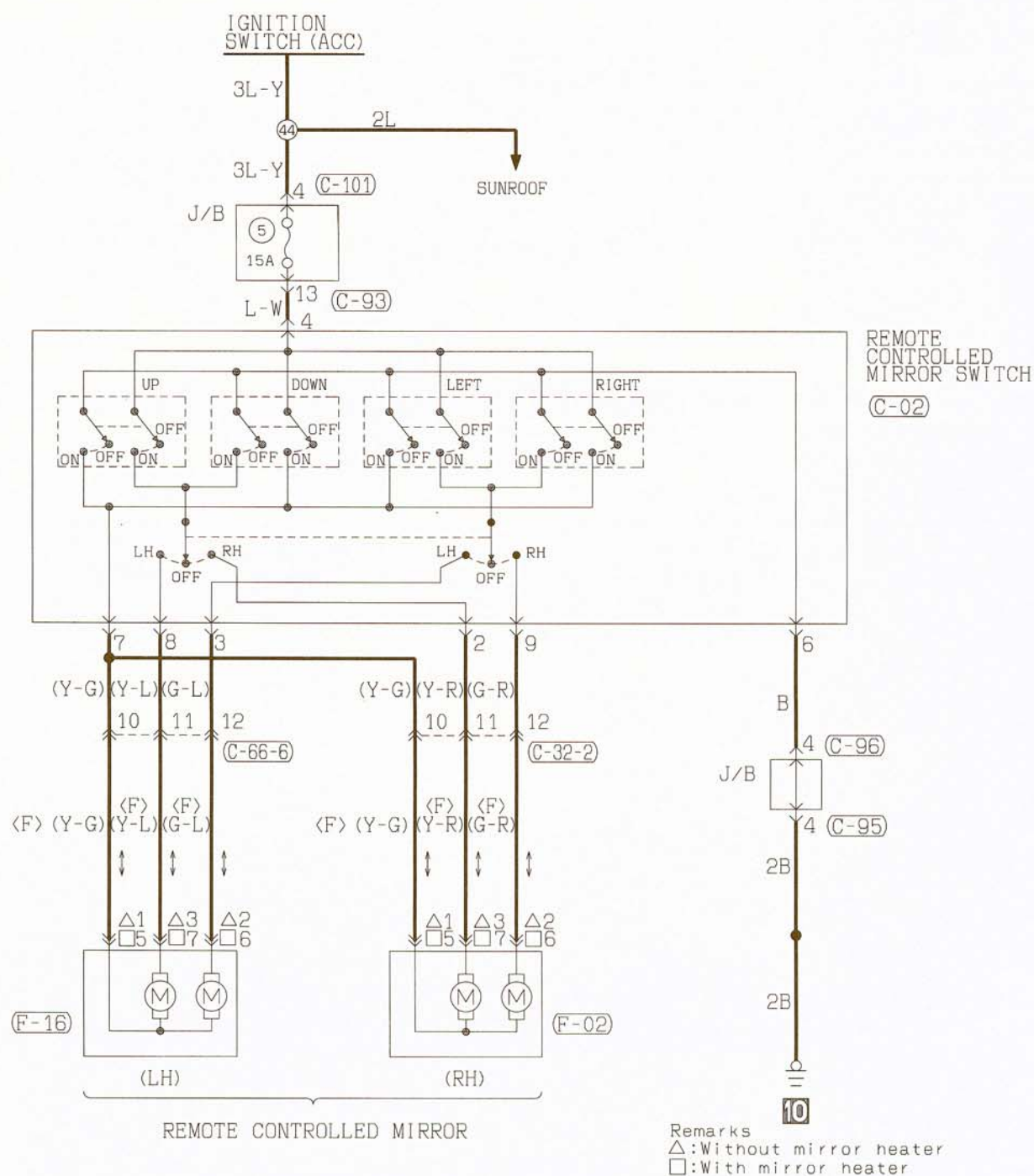
**COMPONENT LOCATION**

Name	Symbol
Headlight washer relay	A



## REMOTE CONTROLLED MIRROR

90100650079



HQ13M07AA

TSB Revision



**OPERATION**

- When the remote controlled mirror switch is operated while the ignition key is at ACC or ON, current flows through fuse No. 5, remote controlled mirror switch, remote controlled mirror, remote controlled mirror switch and ground, causing the mirror to move.

**TROUBLESHOOTING HINTS**

Neither right nor left mirror operates.

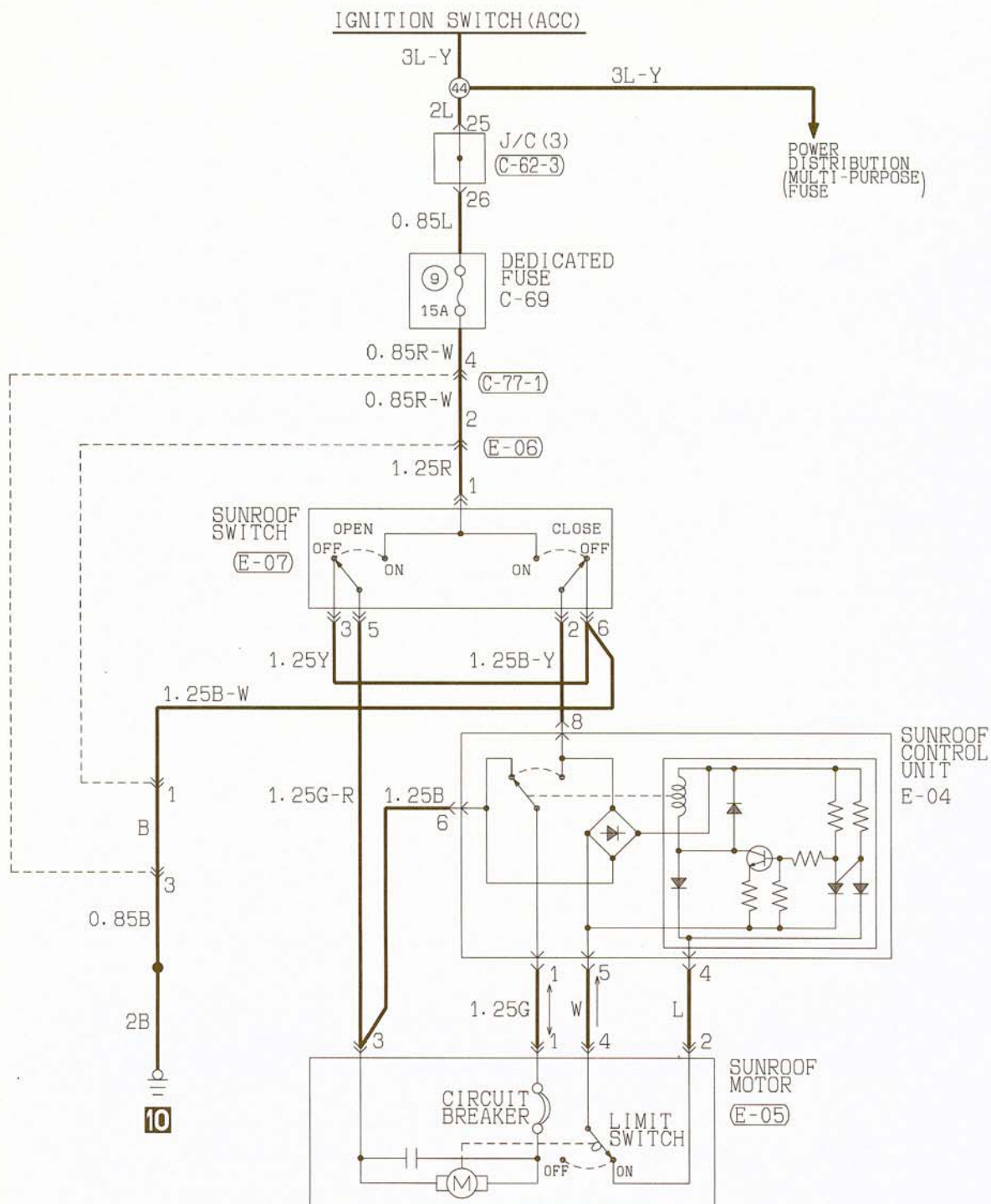
- (1) Cigarette lighter also does not operate.
  - Check multi-purpose fuse No. 5.
- (2) Cigarette lighter operates.
  - Check the remote controlled mirror switch.

**NOTE**

For troubleshooting of the heated mirror, refer to "GROUP 54 – Back door Window Defogger" <Vehicles with heated mirror>

## SUNROOF

90100990058



(C-62-3) 

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

 (C-77-1) 

1	2
3	4

 (E-04) 

1	2	3		
4	5	6	7	8

 (E-05) 

1	2
3	4

 (E-06) 

1
2

 (E-07) 

1	2	3
4	5	6



**OPERATION**

- If the ignition switch is in the “ACC” or “ON” position and the sunroof switch is pressed to the “OPEN” side, current flows to the dedicated fuse, sunroof switch, sunroof motor, control unit, sunroof switch and earth, and the sunroof opens.
- When the sunroof switch is pressed to the “CLOSE” side, current flows to the dedicated fuse, sunroof switch, control unit, sunroof motor, sunroof switch and ground, and the sunroof closes.
- The limit switch inside the sunroof motor causes the sunroof to temporarily stop approximately 135 mm (5.3 in.) before the fully open position when opening and approximately 200 mm (7.9 in.) before the fully closed position when closing.

**TROUBLESHOOTING HINTS**

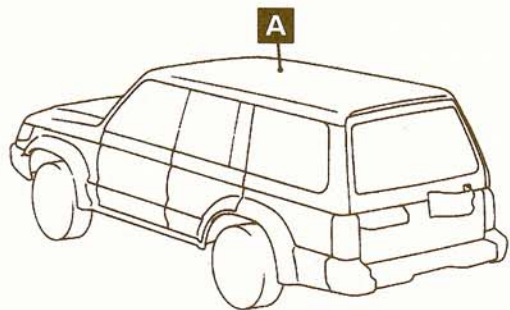
Sunroof does not operate.

- Check dedicated fuse No. 9
- Check sunroof switch
- Check sunroof motor
- Check control unit

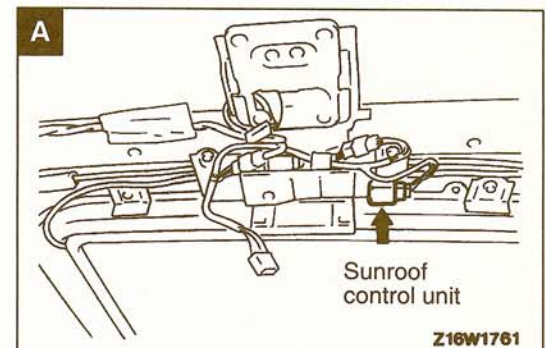
**COMPONENT LOCATION**

70100220036

Name	Symbol
Sunroof control unit	A



X18E0004

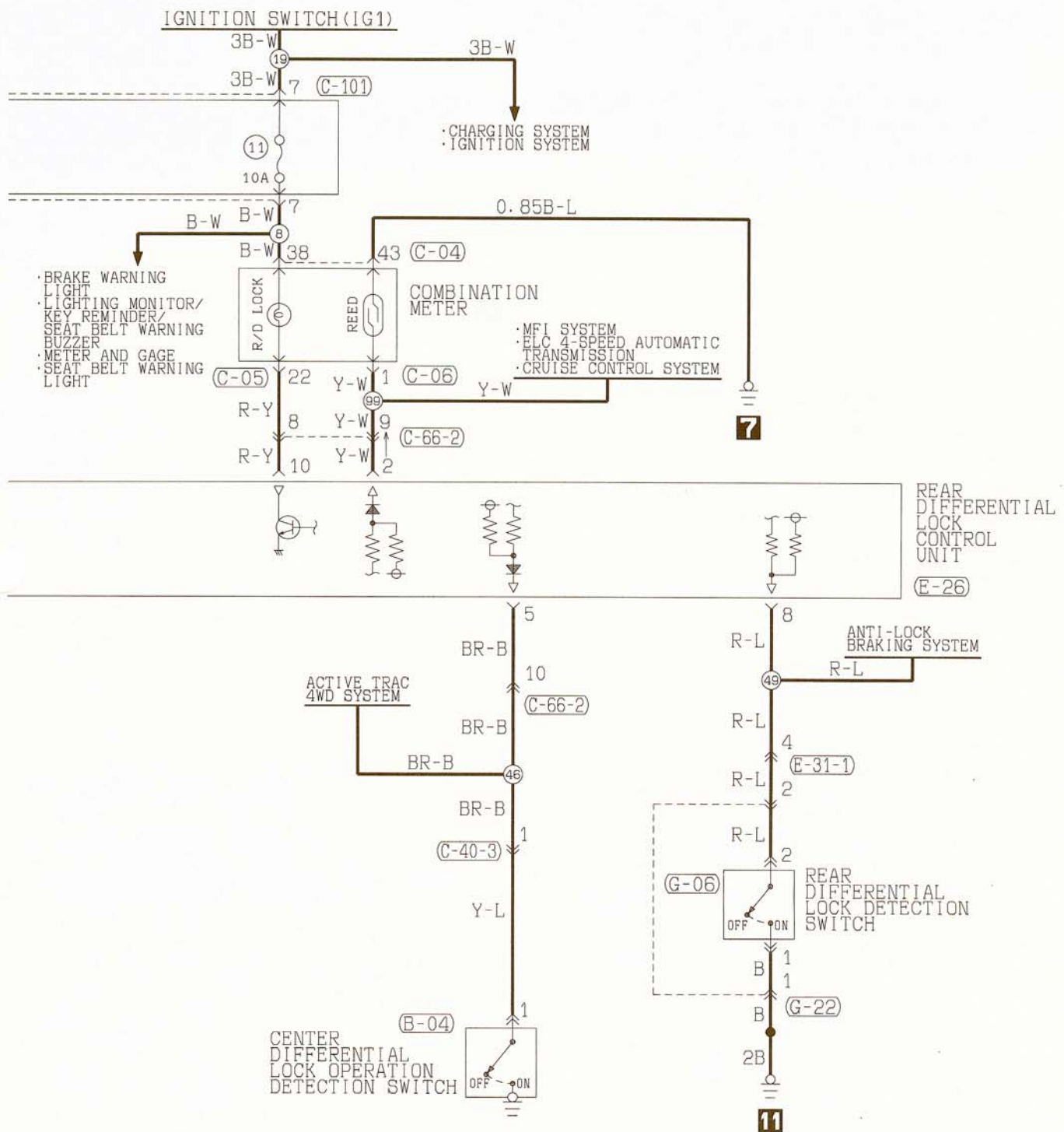







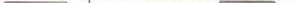





Z16W1761

90101430016





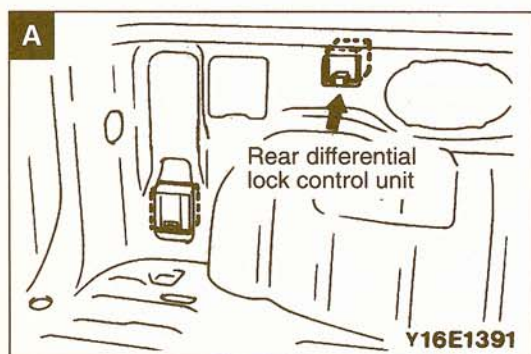
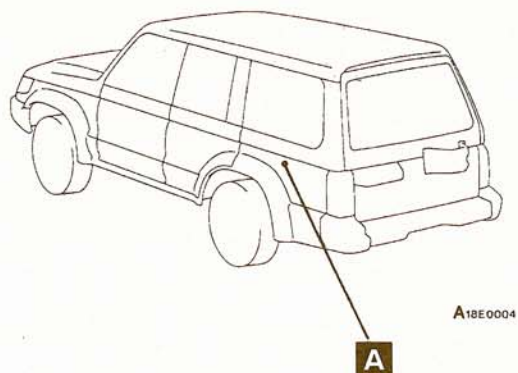


(B-04)  (C-04)  (C-05)  (C-06)  (C-40-3)   
 (C-66-2)  (C-101)  (E-26)  (E-31-1)  (G-06)  (G-22) 

## COMPONENT LOCATION

70100500017

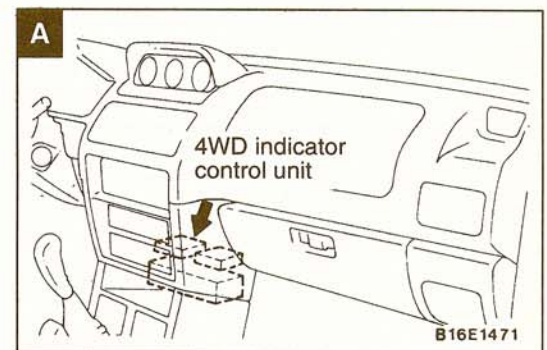
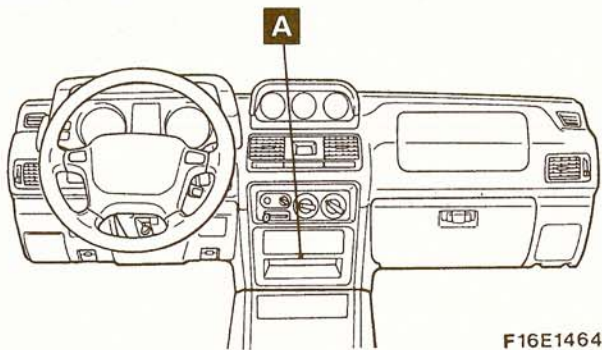
Name	Symbol
Rear differential lock control unit	A





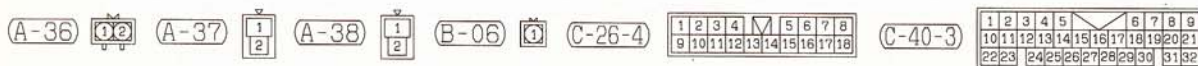
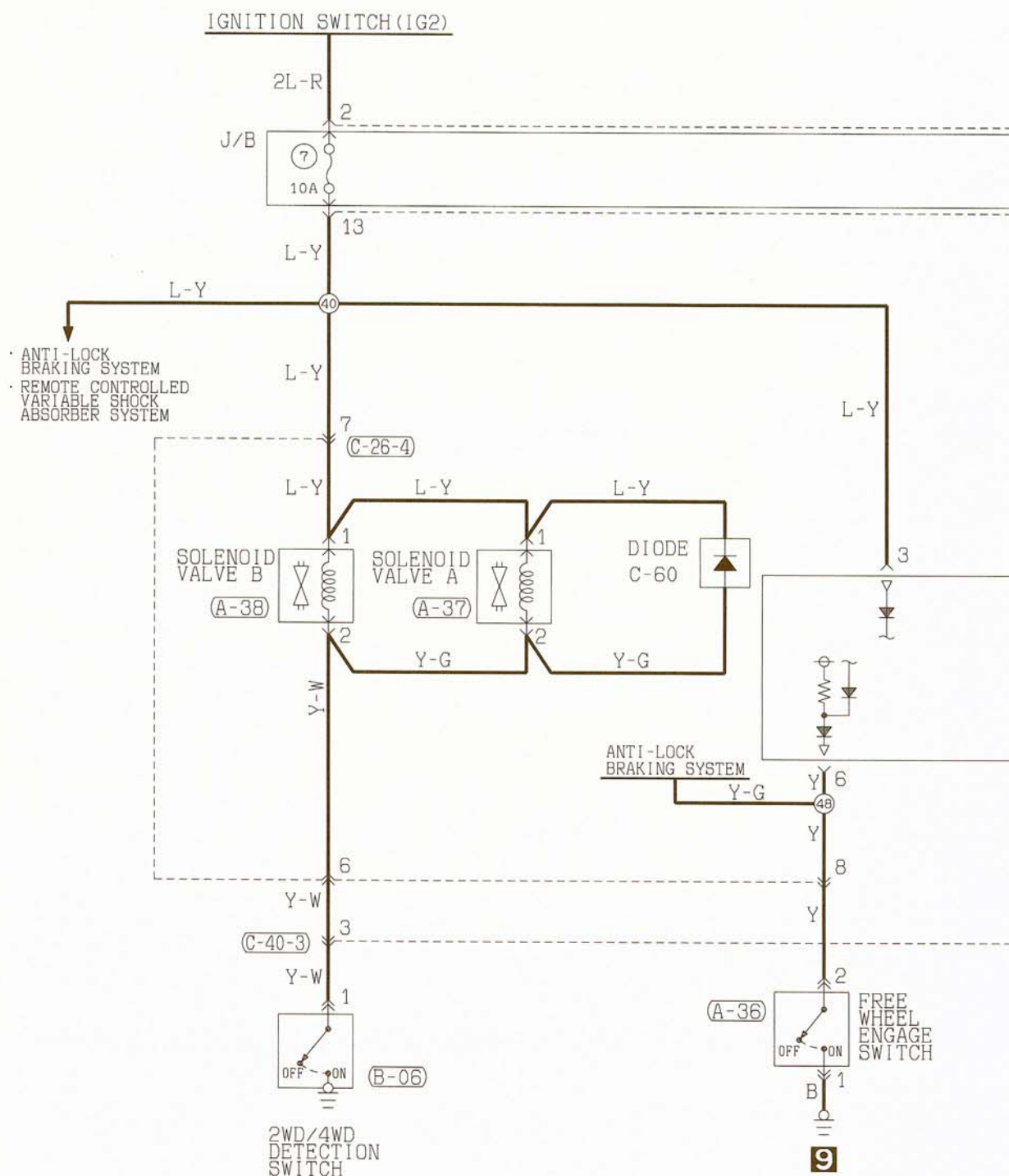
**ACTIVE TRAC 4WD SYSTEM****COMPONENT LOCATION**

Name	Symbol
4WD indicator control unit	A



## ACTIVE TRAC 4WD SYSTEM

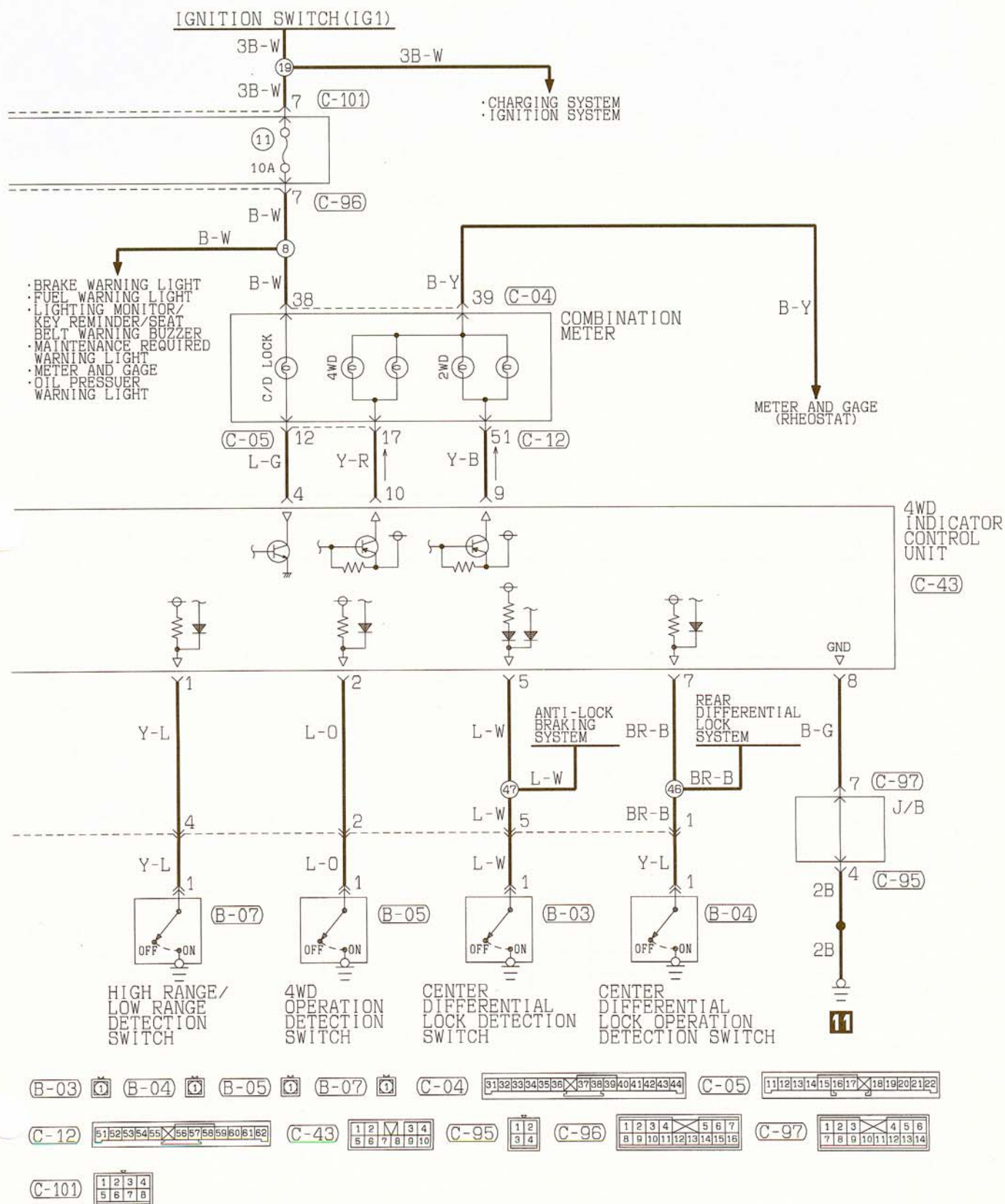
90100920019



HQ15M23AA

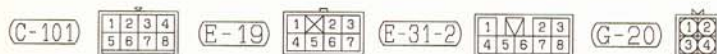
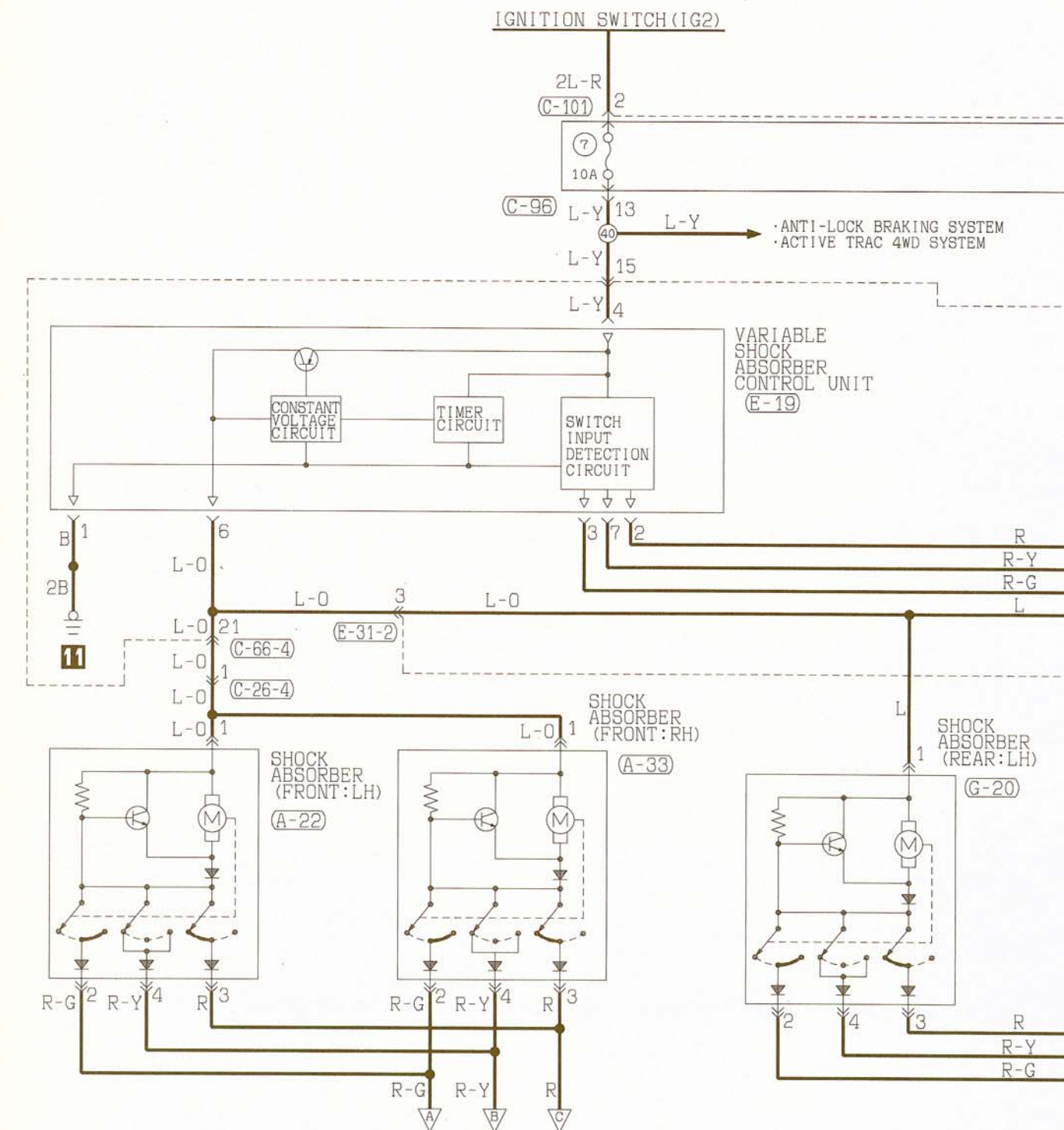
## TSB Revision





## REMOTE CONTROLLED VARIABLE SHOCK ABSORBER SYSTEM

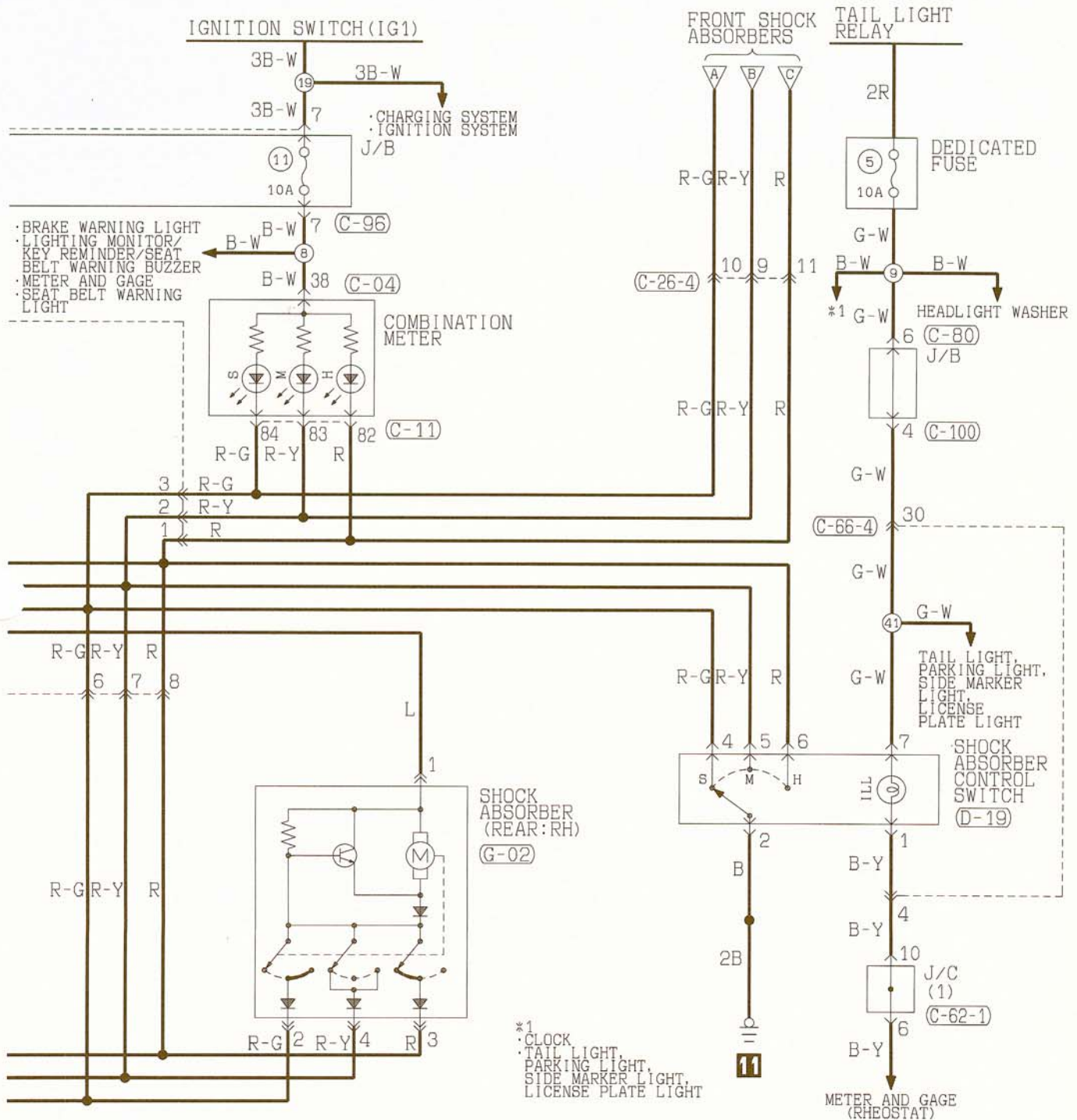
90101440019



HQ15M24AA

TSB Revision



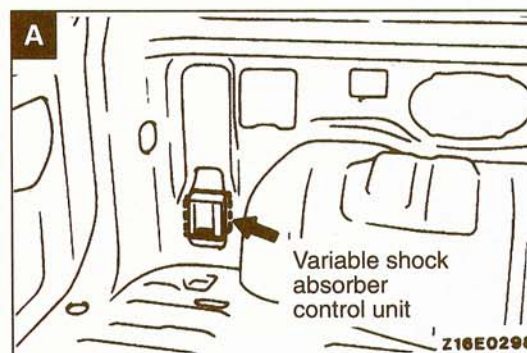
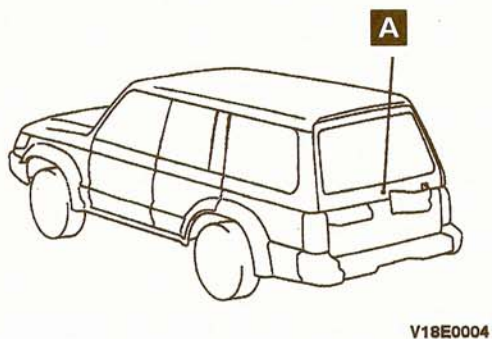


(C-04)	<table><tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td><td>41</td><td>42</td><td>43</td><td>44</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	31	32	33	34	35	36	37	38	39	40	41	42	43	44															(C-11)	<table><tr><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>79</td><td>80</td><td>81</td><td>82</td><td>83</td><td>84</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	71	72	73	74	75	76	77	78	79	80	81	82	83	84															(C-26-4)	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td></tr></table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	(C-62-1)	<table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr><tr><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td></tr><tr><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td>32</td><td>33</td></tr></table>	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
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## COMPONENT LOCATION

70100520013

Name	Symbol
Variable shock absorber control unit	A

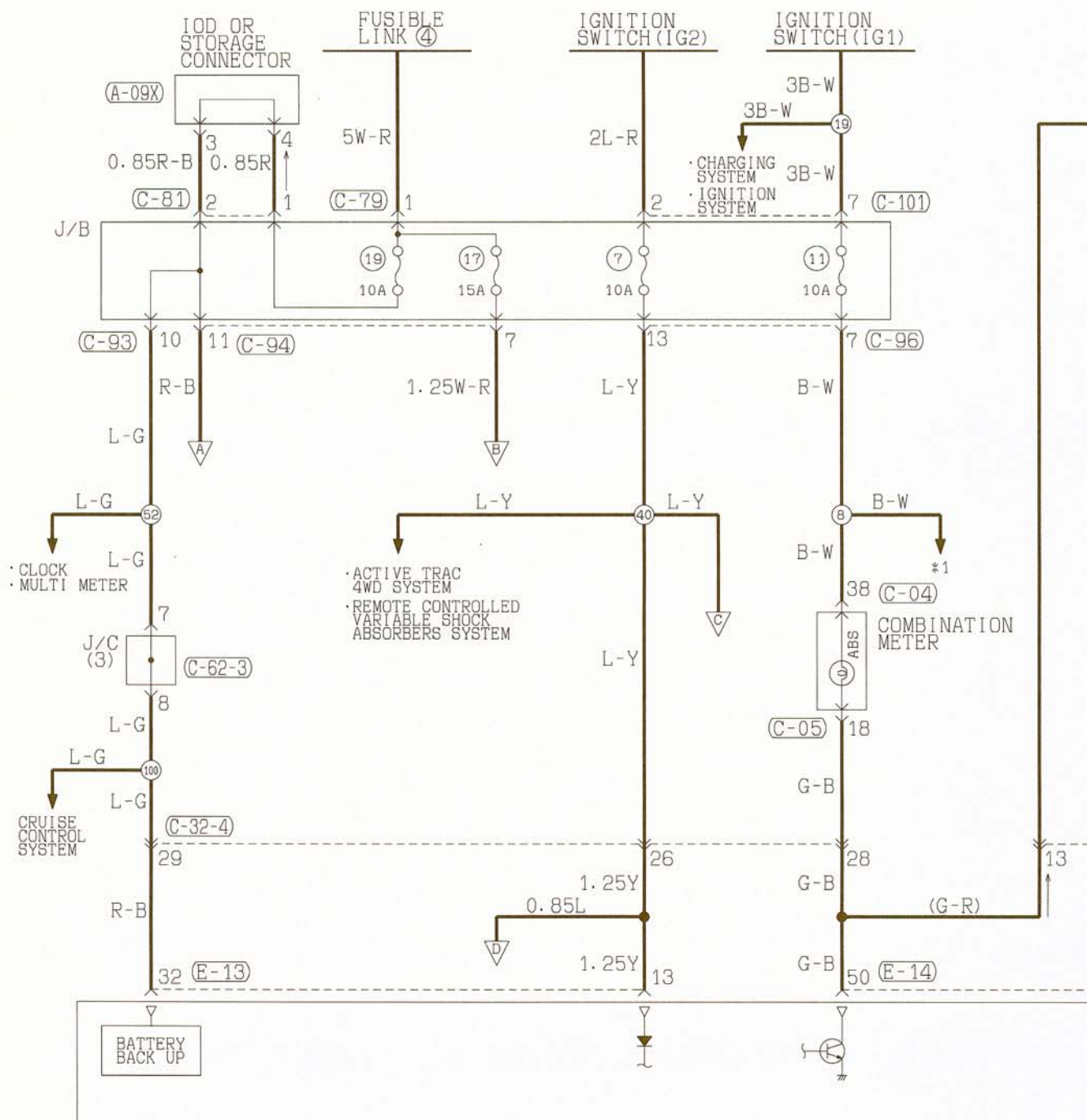


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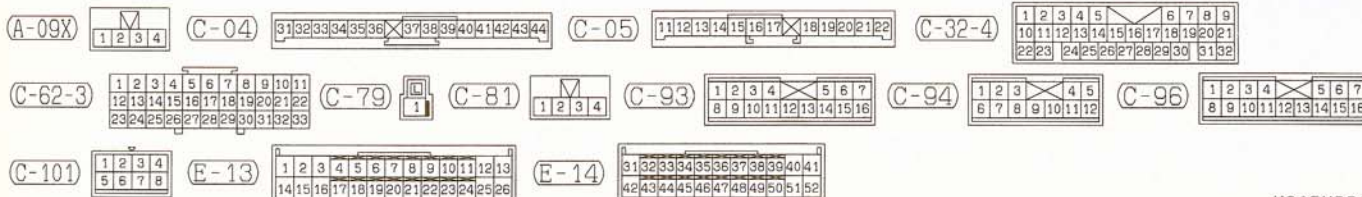


## ANTI-LOCK BRAKING SYSTEM

90100840148

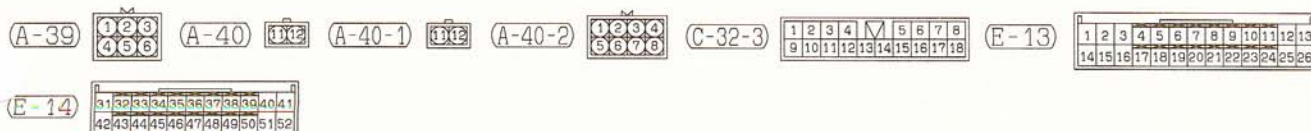


\*1  
 • BRAKE WARNING LIGHT  
 • LIGHTING MONITOR/  
 KEY REMINDER/SEAT  
 BELT WARNING BUZZER  
 • METER AND GAGE  
 • SEAT BELT WARNING  
 LIGHT

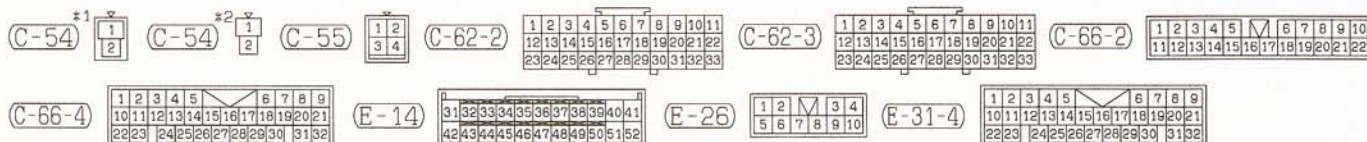
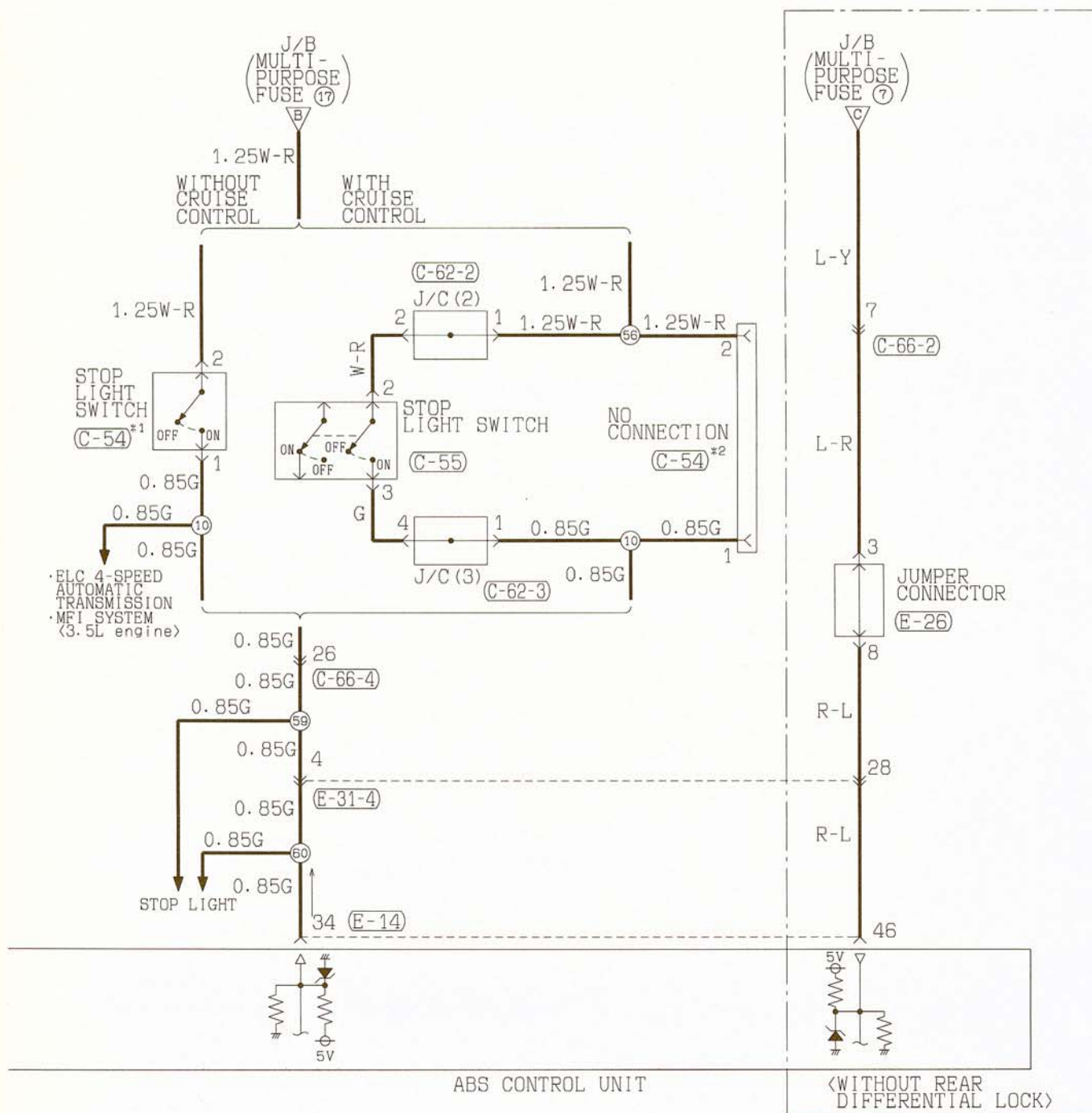


HQ15M22AA

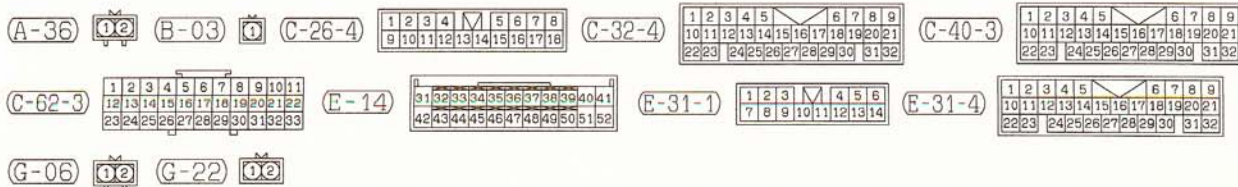
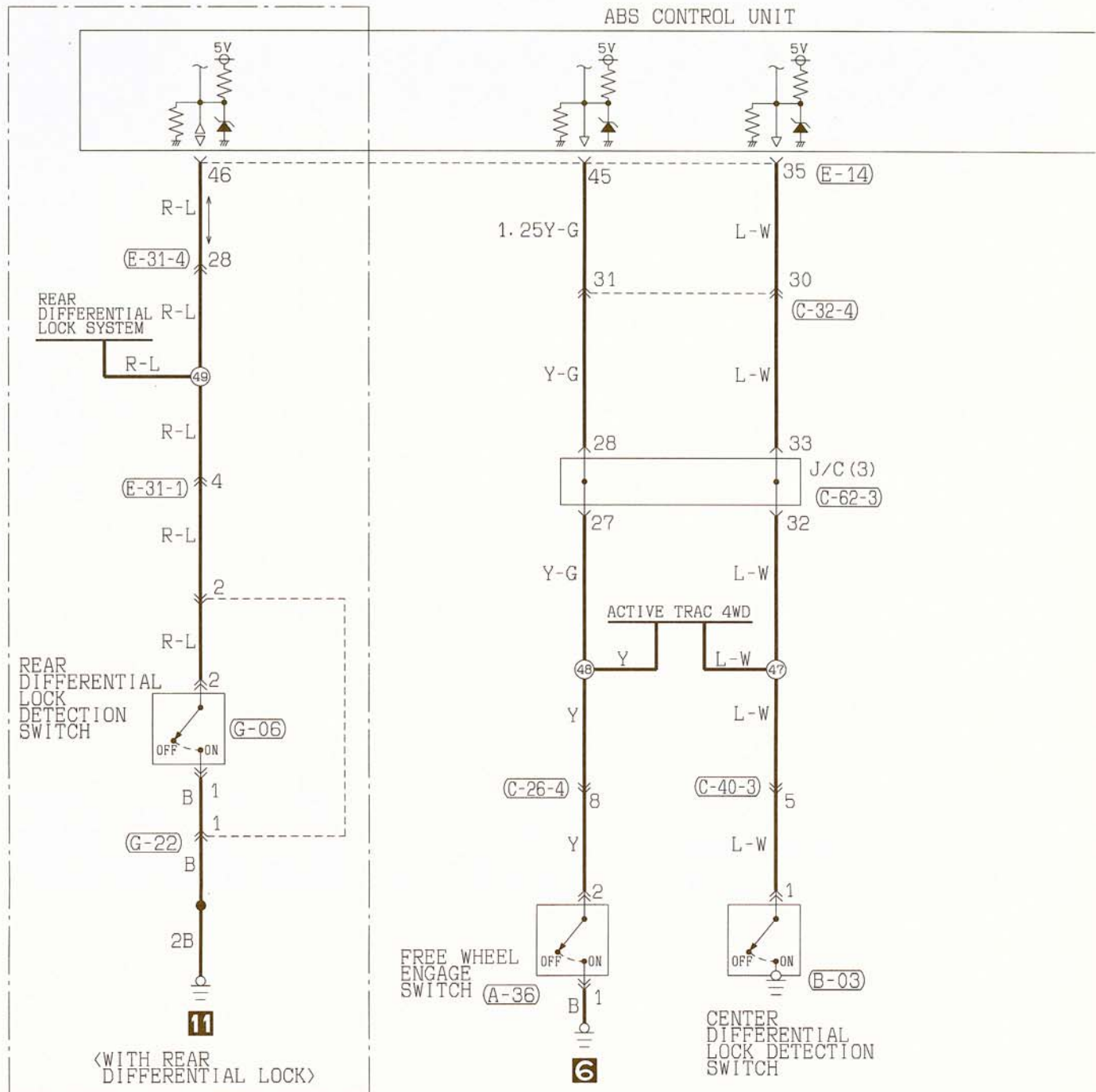
TSB Revision



ANTI-LOCK BRAKING SYSTEM (CONTINUED)

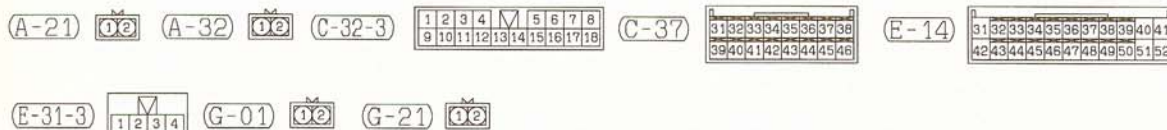
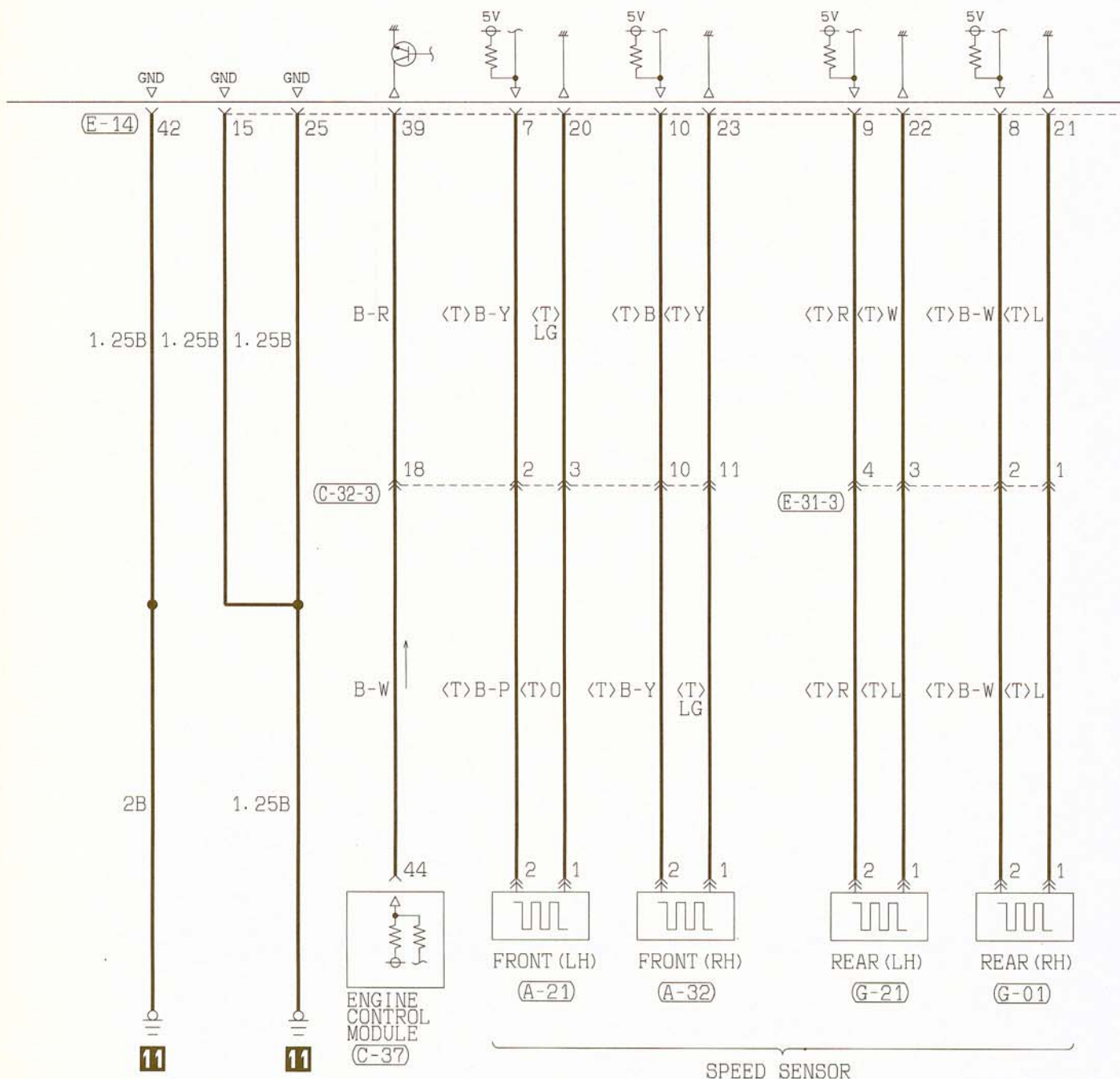


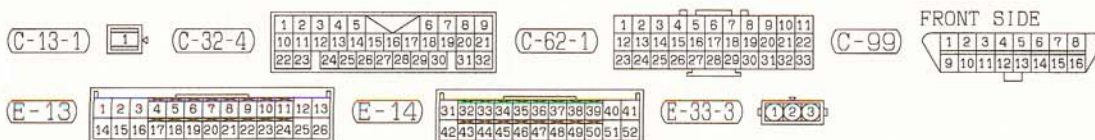
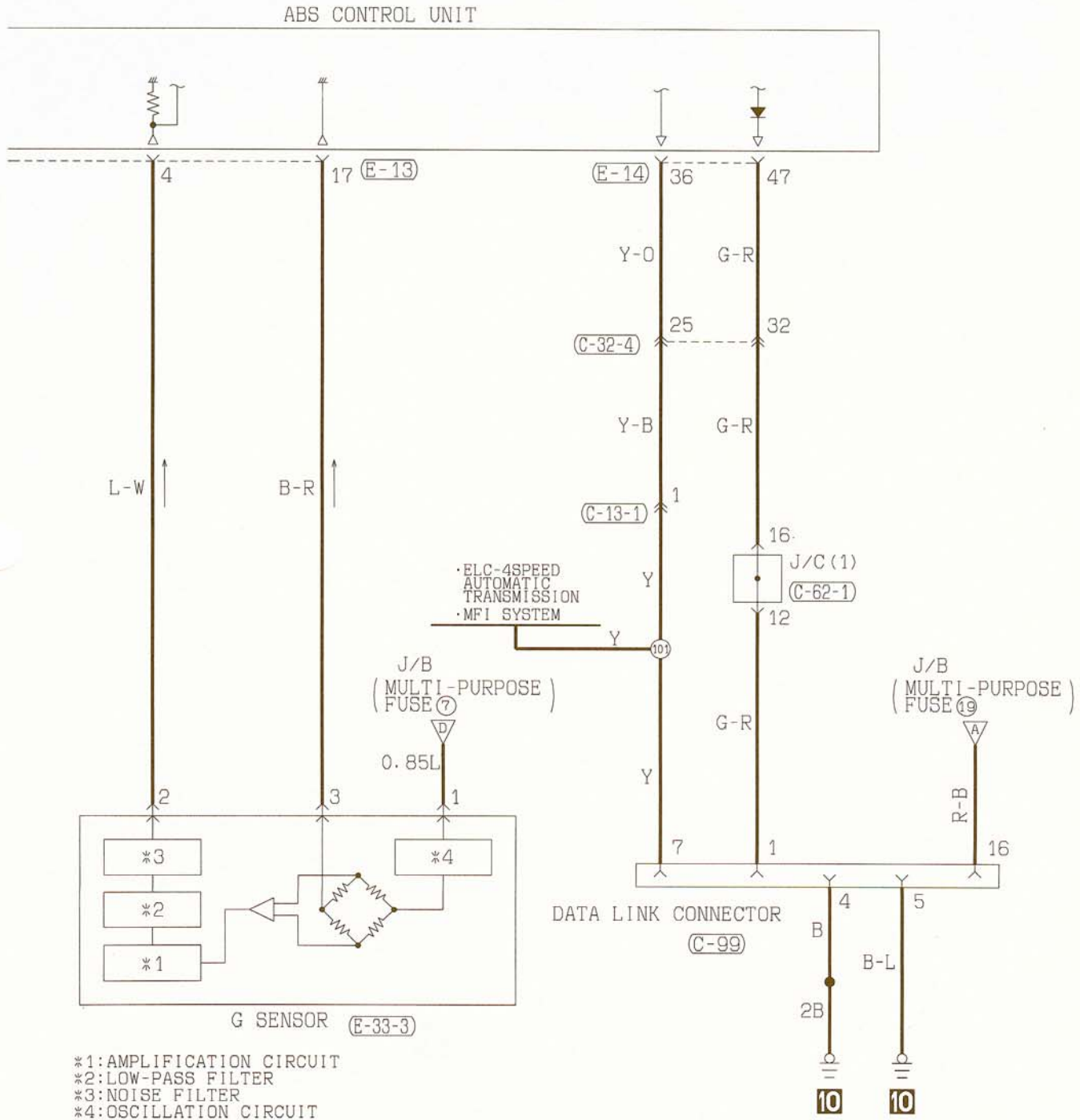




ANTI-LOCK BRAKING SYSTEM (CONTINUED)

ABS CONTROL UNIT







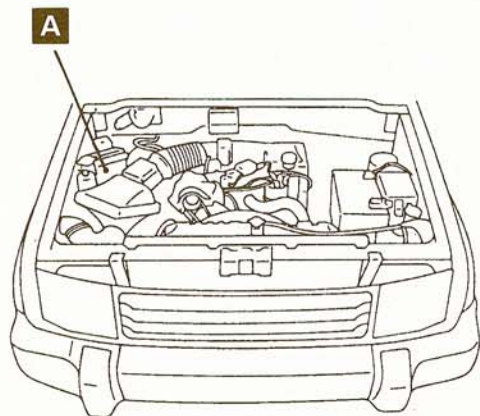
## COMPONENT LOCATION

70100200030

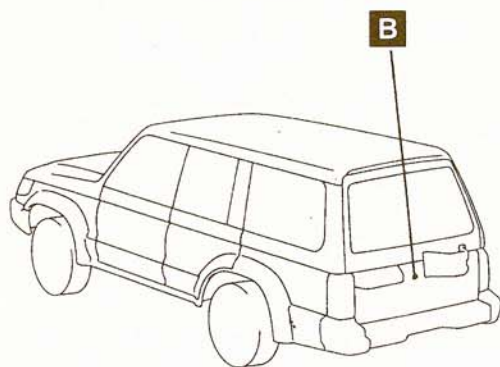
Name	Symbol	Name	Symbol
ABS control unit	B	G sensor	D
ABS relay box (with built-in motor relay and valve relay)	A	Speed sensor (front)	C
		Speed sensor (rear)	E

## NOTE

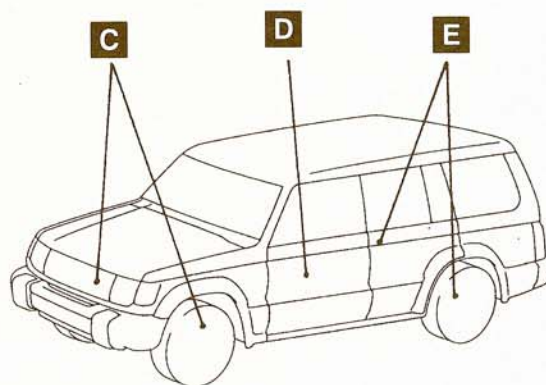
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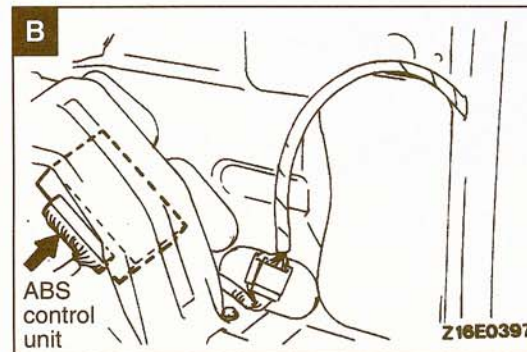
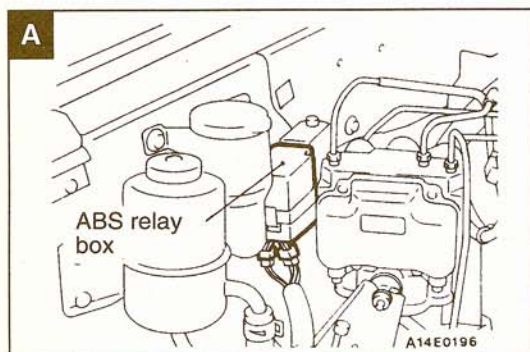
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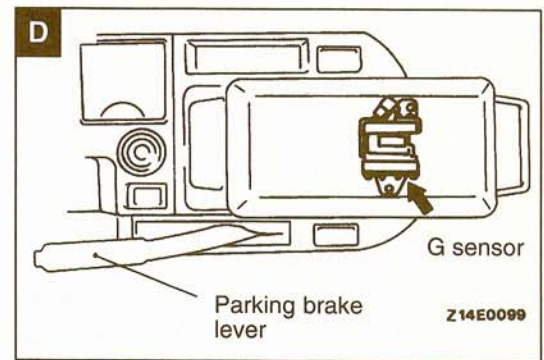
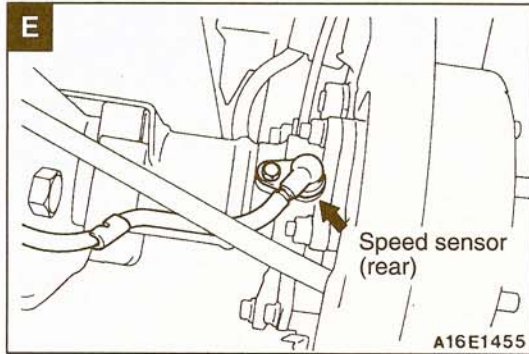
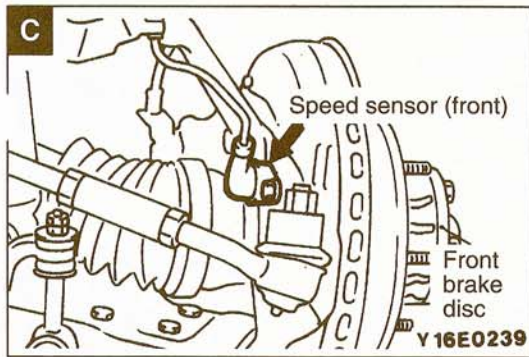


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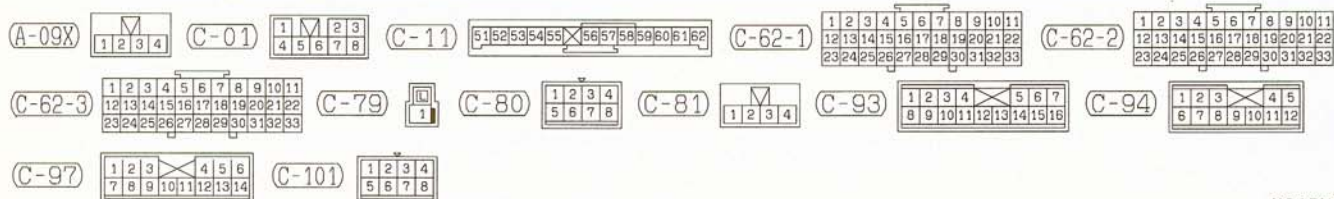


18E0003  
00004180





90100930098







**IGNITION SWITCH (ST)**

(A/T)

(IG2) (ACC)

2L-R 2L-Y

J/B

② 10A ④ 10A

(C-97) 2 3 4 (C-81) 10 11 (C-94)

ELC 4-SPEED AUTOMATIC TRANSMISSION

1.25R R

OVERDRIVE CONTROL SYSTEM

OVERDRIVE SWITCH ON OFF (D-09)

IOD OR STORAGE CONNECTOR (A-09X)

RADIO AND TAPE PLAYER

J/C (2)

C-62-1

PARK/NEUTRAL POSITION SWITCH (B-08)

MFI SYSTEM  
ELC 4-SPEED AUTOMATIC TRANSMISSION  
SUPPLEMENTAL RESTRAINT SYSTEM

BATTERY

A-03

A-04

STARTER MOTOR

CLUTCH PEDAL POSITION SWITCH (C-62) (B)

Remarks

(1)\*2:3.0L-12VALVE engine

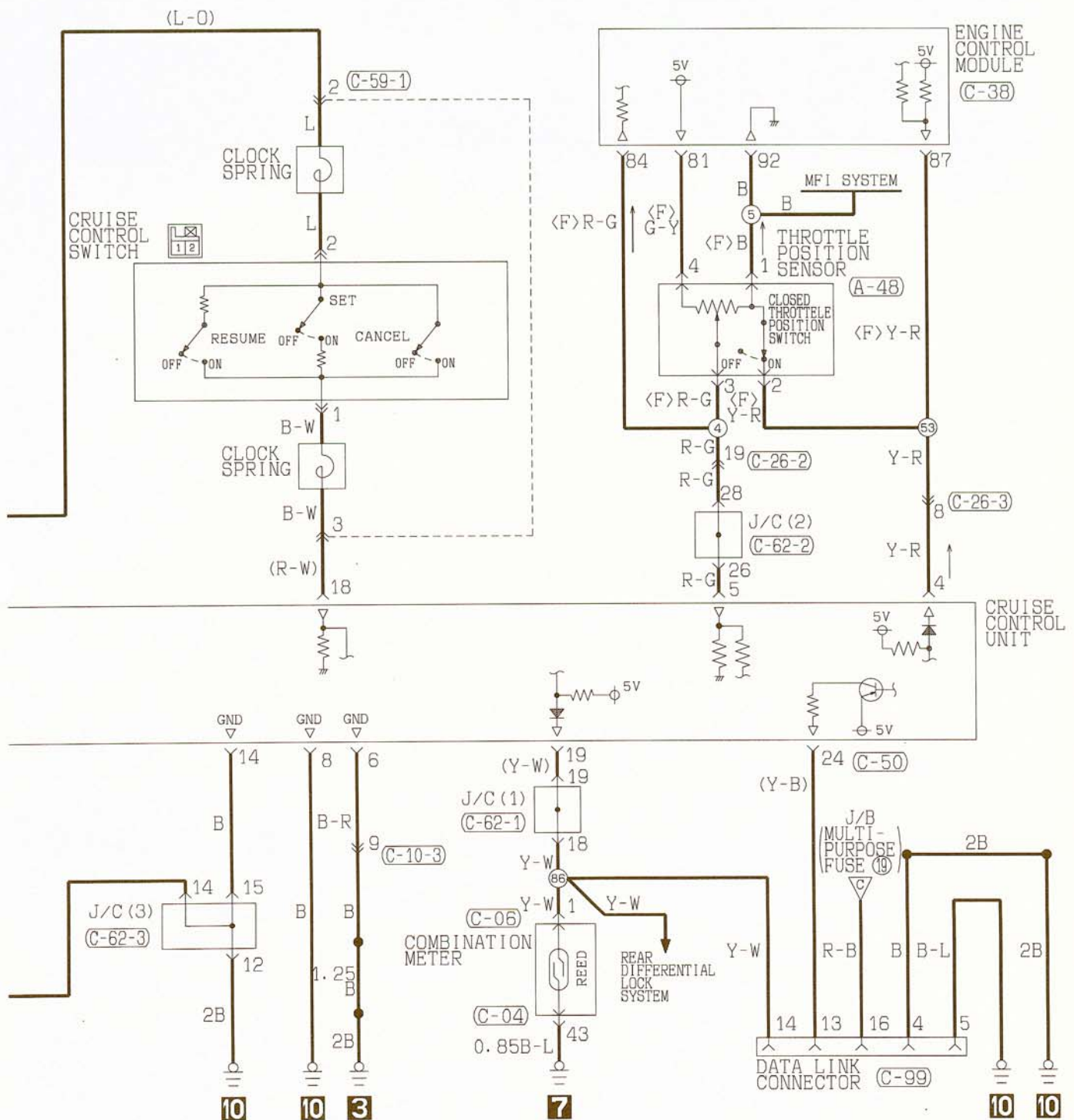
(2)\*3:3.0L-24VALVE engine, 3.5L engine

\*1  
·ELC 4-SPEED AUTOMATIC TRANSMISSION  
·OVERDRIVE CONTROL SYSTEM

(A-03) (A-04) (A-09X) (B-01) (B-08)\*1 (B-08)\*2 (C-40-3)

(C-62) (C-62-1) (C-62-2) (C-81) (C-94)

(C-97) (C-101) (D-09)



(A-48)	1 2 3 4	(C-04)	31 32 33 34 35 36 37 38 39 40 41 42 43 44	(C-06)	1 2	(C-10-3)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	(C-26-2)	1 2 3 4 5 6 7 8 9
(C-26-3)	1 2 3 4 5 6 7 8	(C-38)	71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92	(C-50)	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	(C-59-1)	1 2 3	(C-62-3)	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
(C-62-1)	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	(C-62-2)	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	(C-99)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	FRONT SIDE			

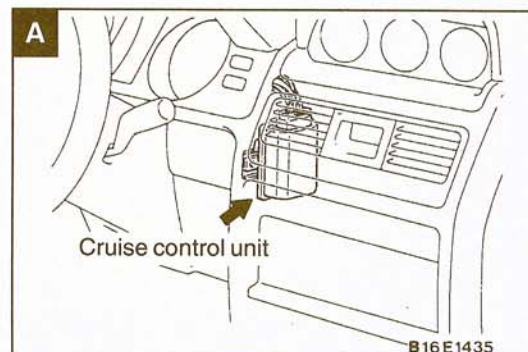
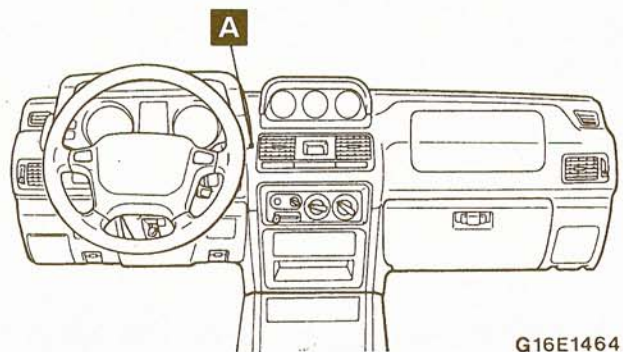
HQ15M21BB



## COMPONENT LOCATION

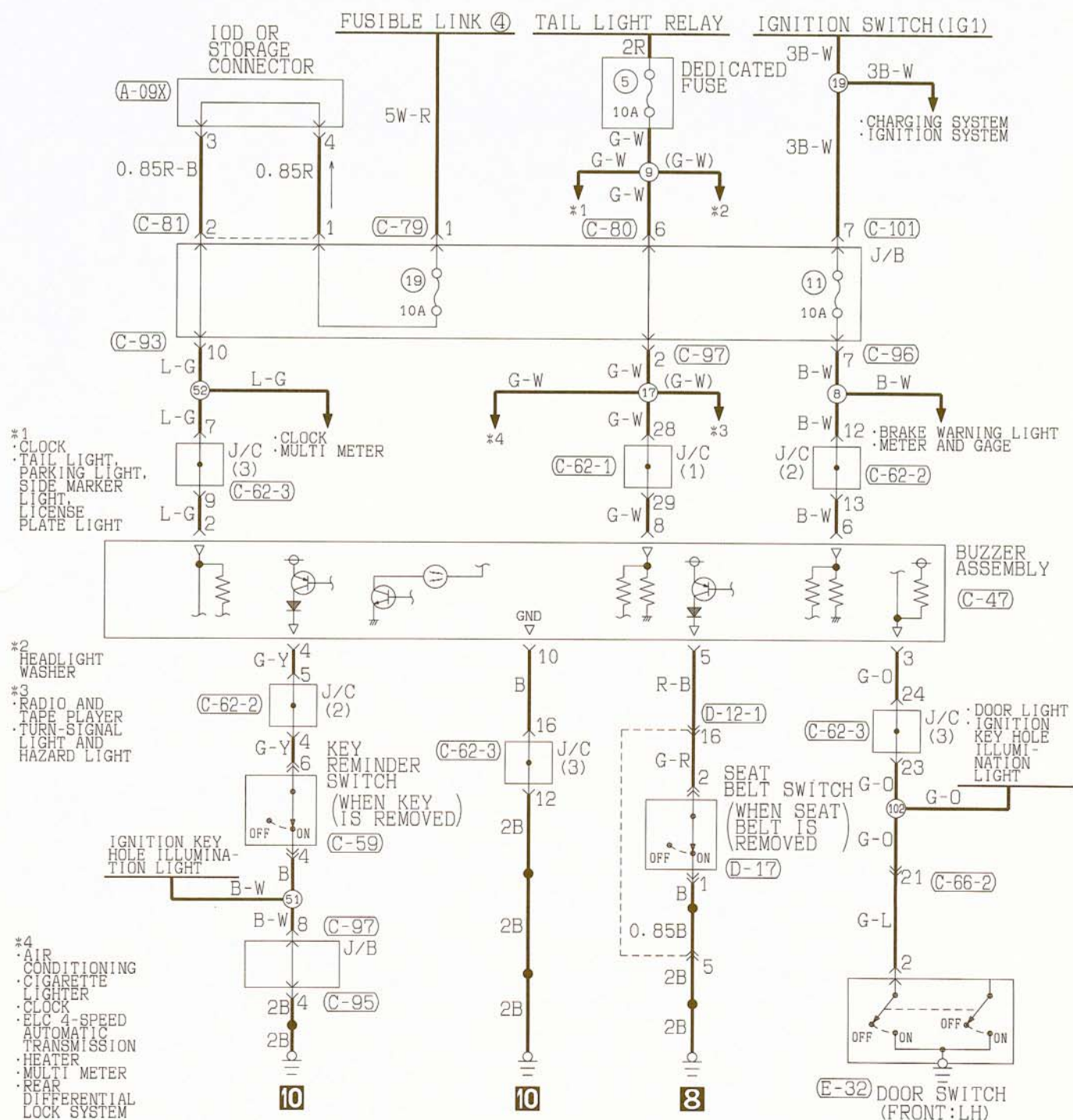
70100210040

Name	Symbol
Cruise control unit	A



# **LIGHTING MONITOR/KEY REMINDER/SEAT BELT WARNING BUZZER**

90101450012

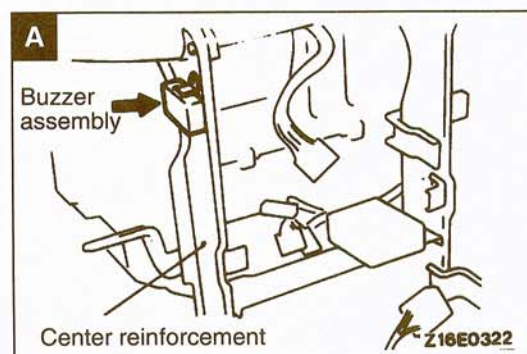
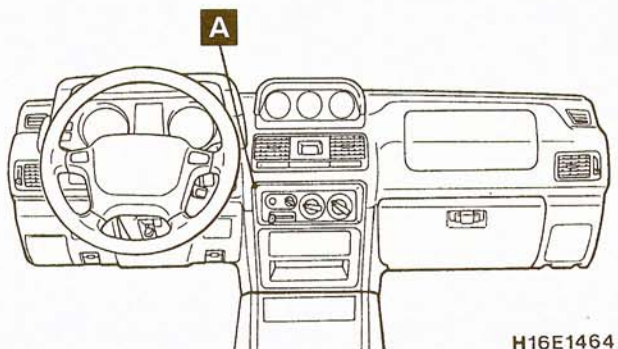


HQ15M19AA

## COMPONENT LOCATION

70100530016

Name	Symbol
Buzzer assembly	A





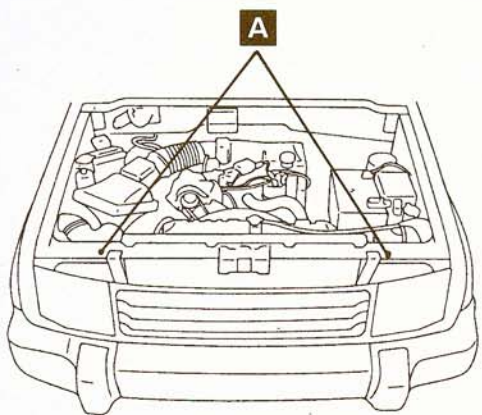
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**SUPPLEMENTAL RESTRAINT SYSTEM (SRS)****COMPONENT LOCATION**

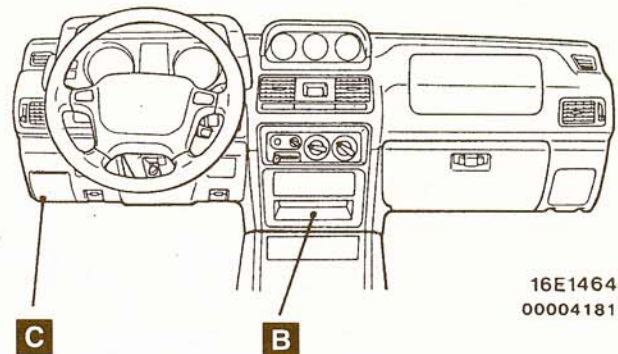
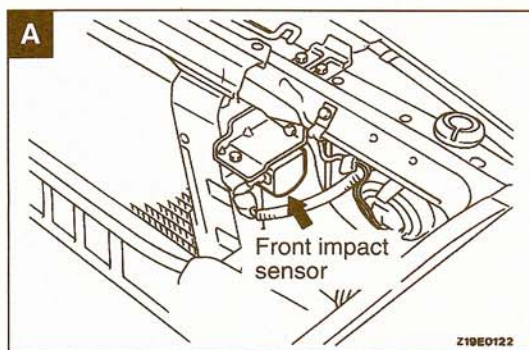
Name	Symbol
Data link connector	C
Front impact sensor	A
SRS diagnosis unit	B

**NOTE**

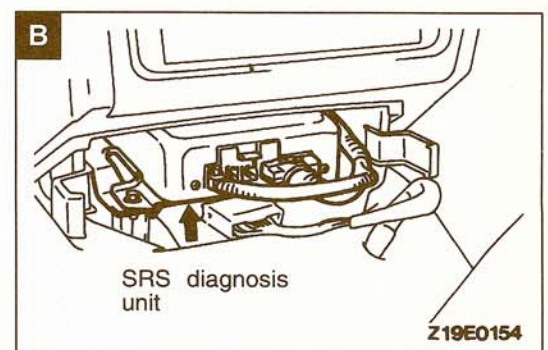
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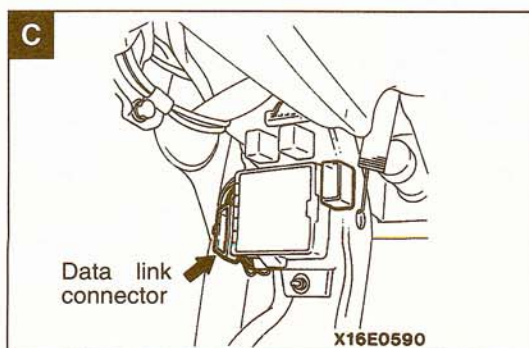
16E0128

16E1464  
00004181

Z19E0122



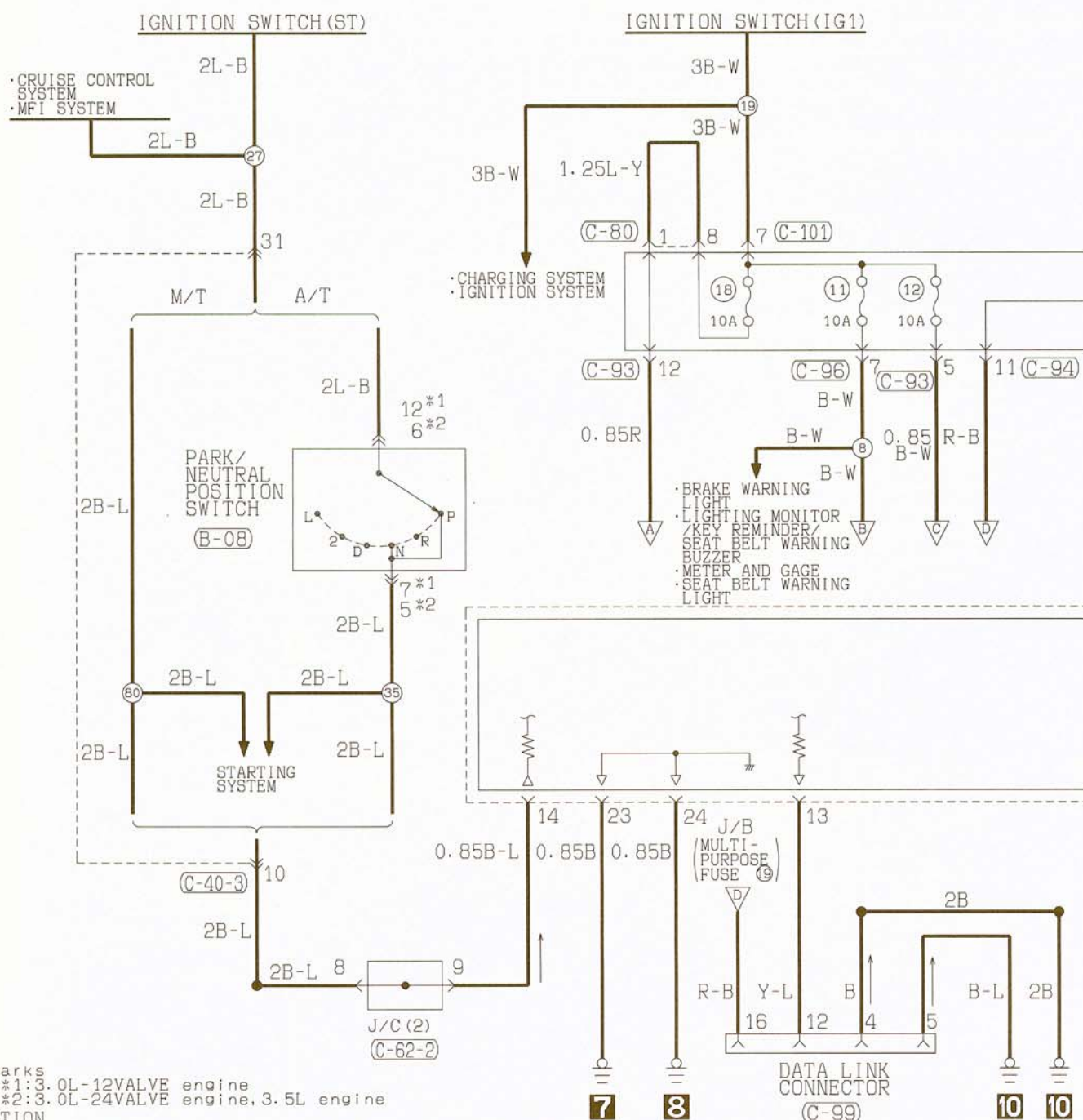
Z19E0154



X16E0590

## SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

90100970120

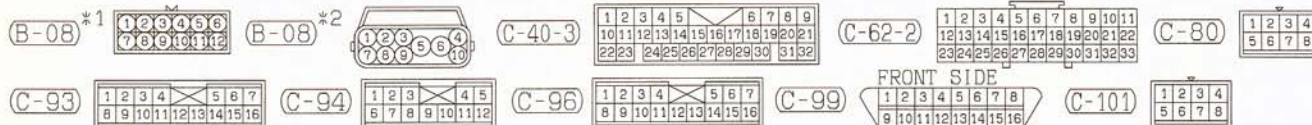


## Remarks

- (1)\*1:3.0L-12VALVE engine  
 (2)\*2:3.0L-24VALVE engine, 3.5L engine

## CAUTION

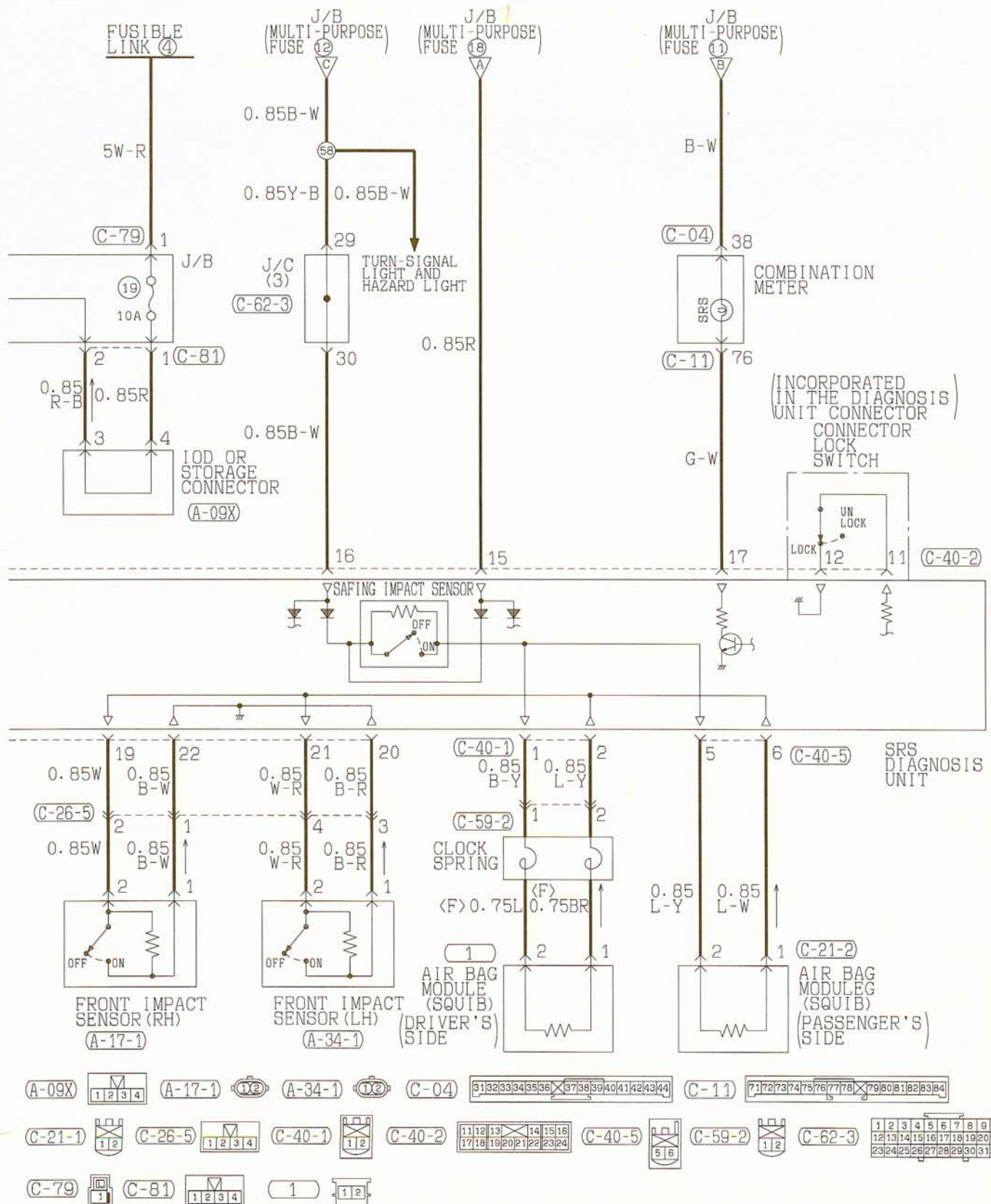
Carefully read and observe the SRS SERVICE PRECAUTIONS  
 (Refer to GROUP 52B-SRS Service Precautions) prior to any service.



HQ15M20AA

TSB Revision

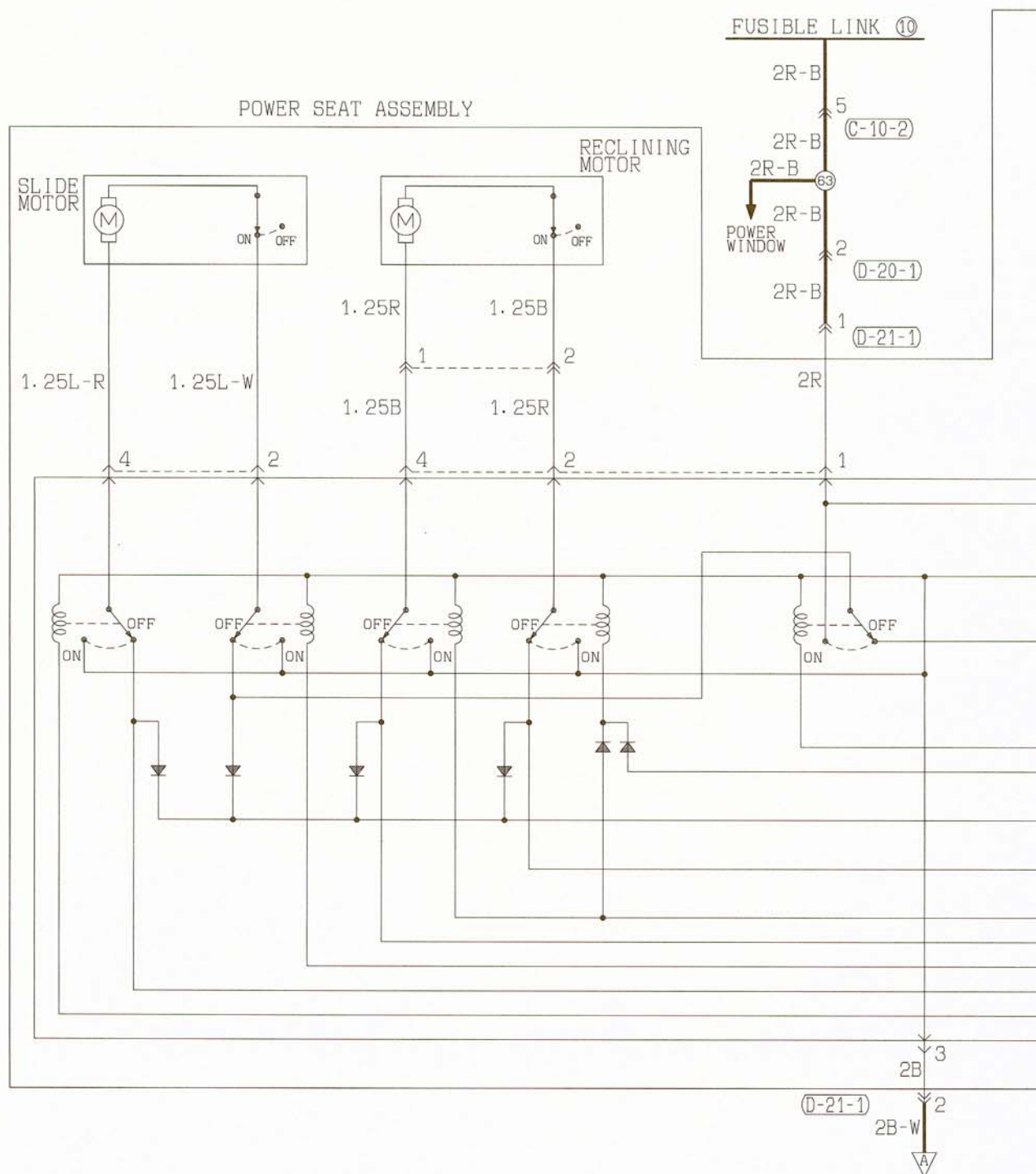






## POWER SEAT

90101040042



(C-10-2) 

1	2	3
4	5	6
7	8	

 (D-20-1) 

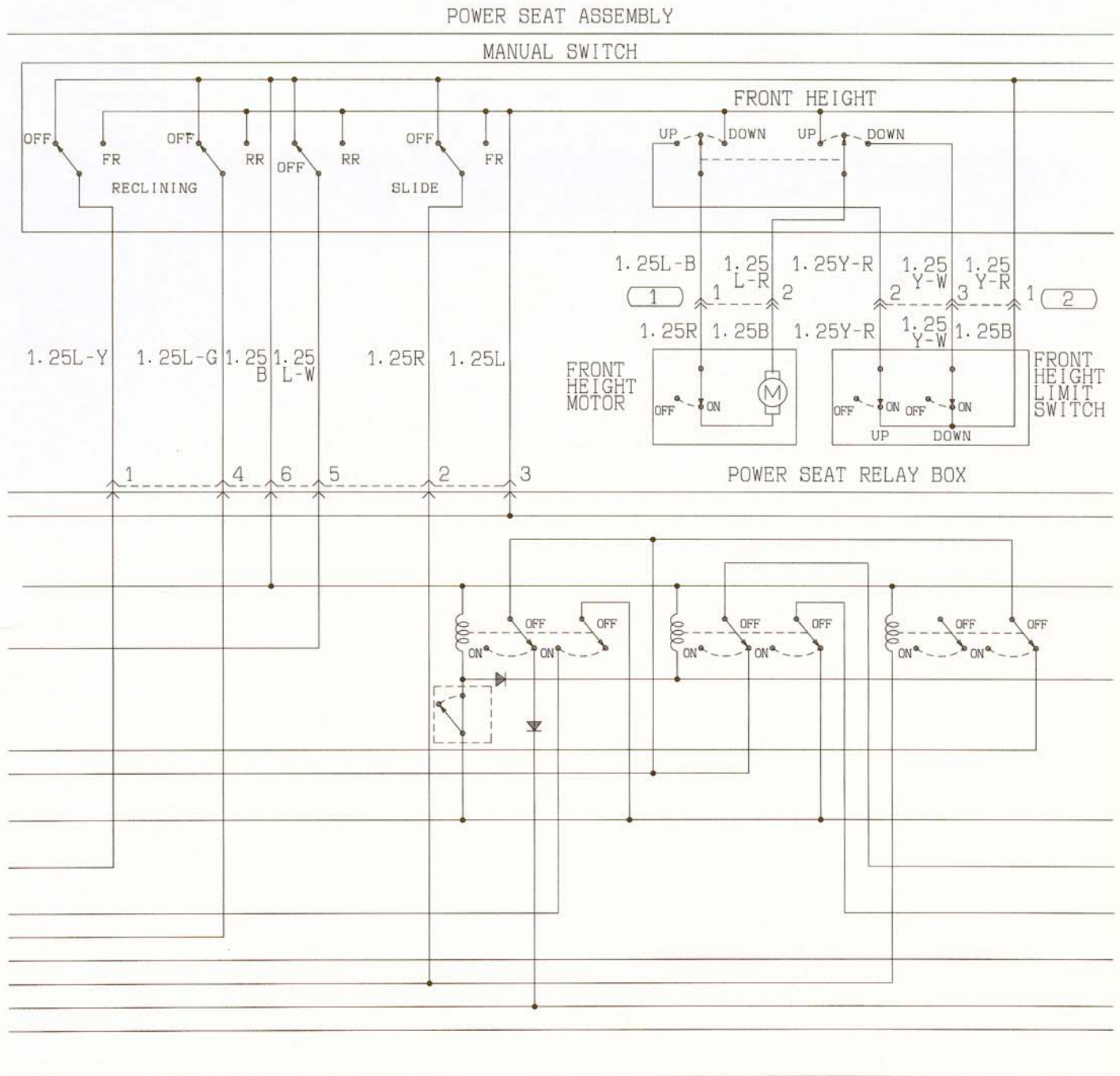
1	2
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 (D-21-1) 

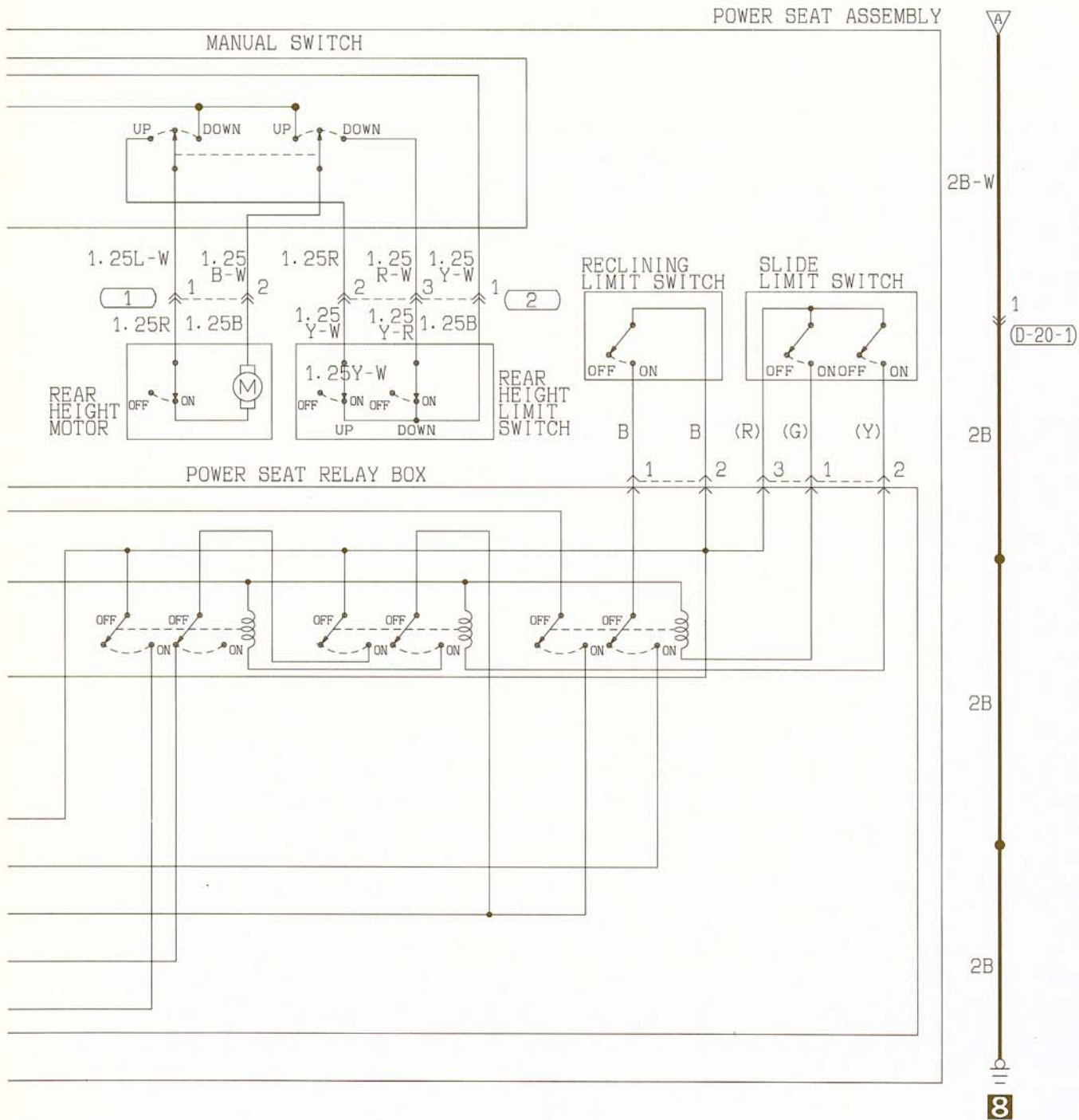
1	2
3	4
5	6

HQ15M15AA

TSB Revision



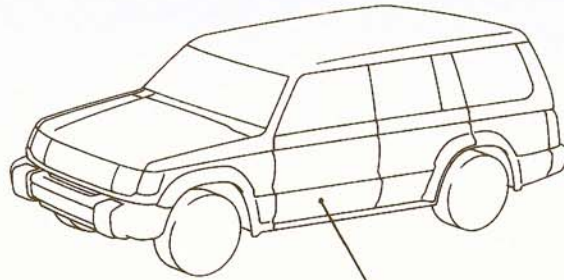
## POWER SEAT (CONTINUED)





## COMPONENT LOCATION

Name	Symbol
Power seat relay box	A



Z18E0003





# ENGINE ELECTRICAL

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1610900059

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# CHARGING SYSTEM

16100020016

## GENERAL SPECIFICATIONS

### GENERATOR

Items		Standard value
Type		Battery positive voltage sensing
Rated output V/A	3.0L-12 VALVE Engine	12/75
	3.0L-24 VALVE Engine	12/90
	3.5L Engine	12/90
Voltage regulator		Electronic built-in type

## SERVICE SPECIFICATIONS

16100030088

Items		Standard value	Limit
Regulated voltage Ambient temp. at voltage regulator	-20°C (-4°F)	14.2–15.4	–
	20°C (68°F)	13.9–14.9	–
	60°C (140°F)	13.4–14.6	–
	80°C (176°F)	13.1–14.5	–
Rotor coil resistance $\Omega$		Approx. 3–5	–
Output current		–	70% of normal output current

## TROUBLESHOOTING

### OPERATION

#### When engine is stopped

When the ignition switch is switched to the ON position, electricity flows from the generator "L" terminal to the field coil, and at the same time the charging warning light illuminates.

#### When engine is being started or has started

When the engine is started, charging voltage is applied to the generator "L" terminal, with the result that the charging warning light is extinguished. In addition, because battery positive voltage is applied to the generator "S" terminal, this battery positive voltage is monitored at the IC voltage regulator, thus switching the current to the field coil on and off and thereby controlling the output voltage of the generator. Power is supplied to each load from the generator "B" terminal.

### NOTE

The generator relay functions as a back-up for the flow of electricity to the field coil if there is a disconnection or damaged wiring of the charging warning light.

Name	Symbol
Generator relay	A

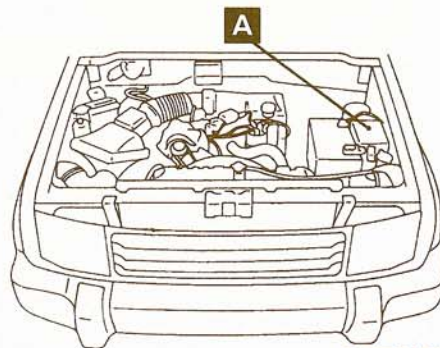
#### <Charging warning light>

- This warning light illuminates when the ignition key is in the ON position, and switches off after the engine has started. This warning light illuminates when the drive belt breaks or the trouble occurs in the charging system.

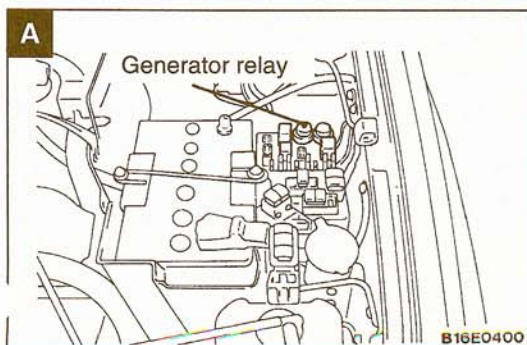
### COMPONENT LOCATION TROUBLESHOOTING HINTS

70100270031

1. Charging warning light does not illuminate when the ignition switch is turned to ON, before the engine starts.
  - Check the bulb.
2. Charging warning light does not switch off once the engine starts.
  - Check the IC voltage regulator inside the generator.
3. Discharged or overcharged battery
  - Check the IC voltage regulator inside the generator.
4. The charging warning light illuminates dimly.
  - Check the diode (inside the combination meter) for a short-circuit.



A16E0128



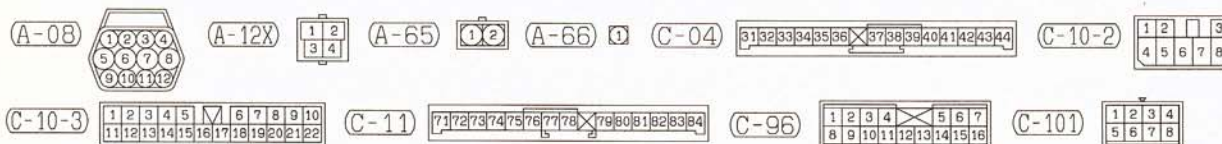
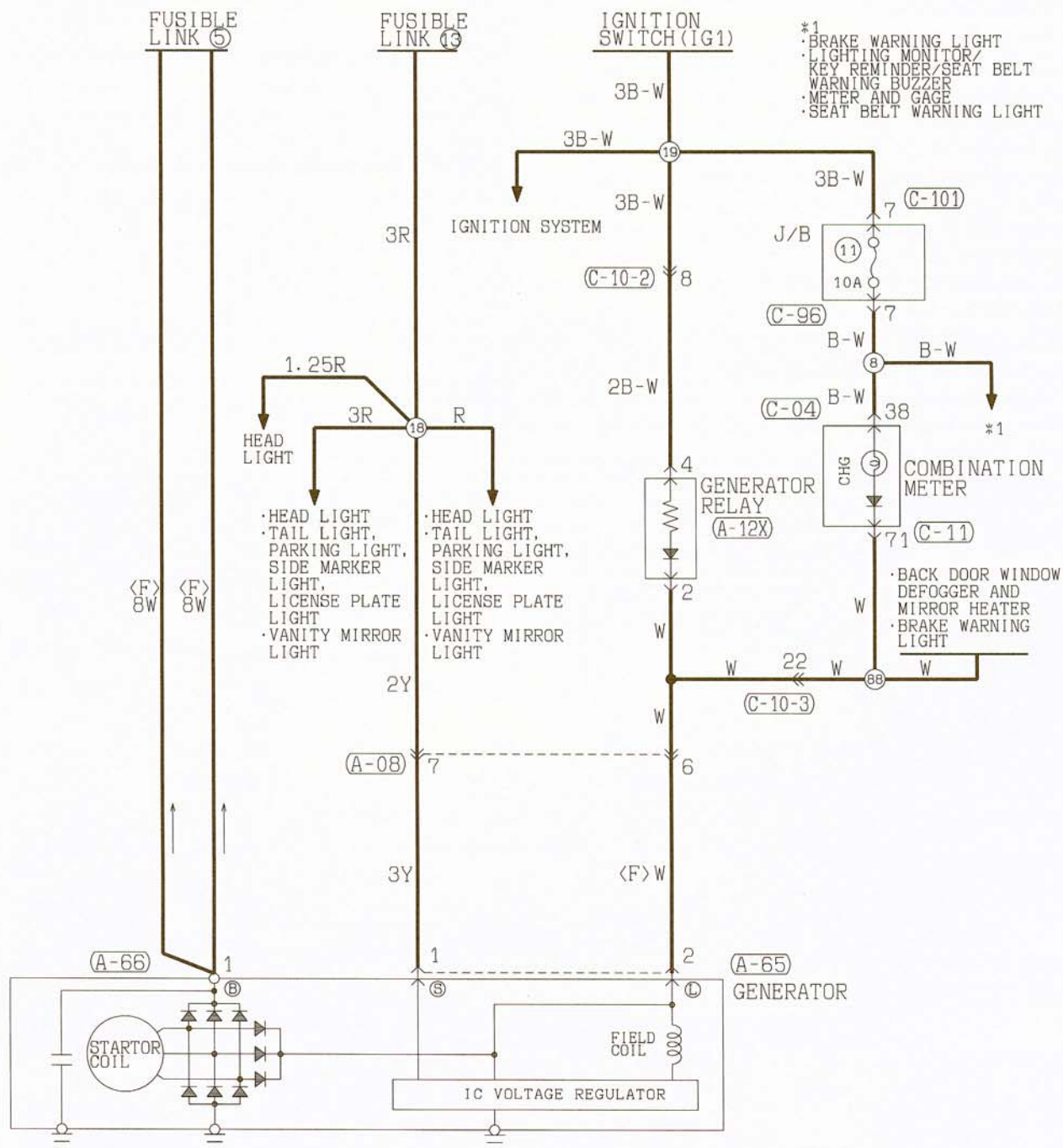
B16E0400



### CIRCUIT DIAGRAM

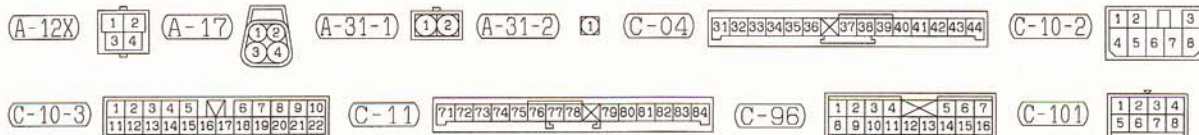
### 3.0L-12 VALVE engine

90100070165





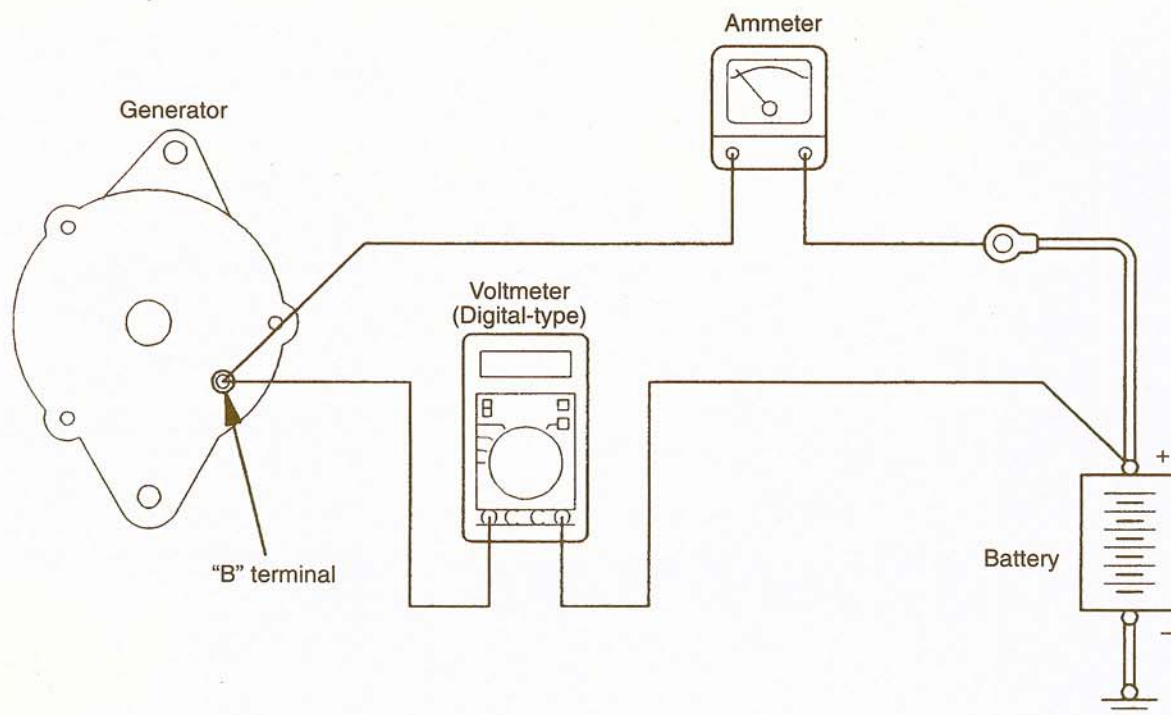
90100070172



## ON-VEHICLE SERVICE

16100090116

## GENERATOR OUTPUT LINE VOLTAGE DROP TEST



9EN0468

This test determines whether the wiring from the generator "B" terminal to the battery (+) terminal (including the fusible link) is in a good condition or not.

- (1) Always be sure to check the following before the test.
  - Generator installation
  - Generator drive belt tension (Refer to GROUP 00 – Maintenance Service.)
  - Fusible link
  - Abnormal noise from the generator while the engine is running
- (2) Turn the ignition switch to the OFF position.
- (3) Disconnect the negative battery cable.
- (4) Disconnect the generator output wire from the generator "B" terminal and connect a DC test ammeter with a range of 0 – 100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

**NOTE**

A clamp-type ammeter which enables measurements to be taken without disconnecting the generator output wire is recommended. The

reason for this is if a vehicle in which the voltage may have dropped due to an imperfect connection at the generator "B" terminal is being inspected, and the generator "B" terminal is loosened when the test ammeter is connected, the connection will be completed at this time and the possibility of finding problems will be reduced.

- (5) Connect a digital-type voltmeter between the generator "B" terminal and the battery (+) terminal. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (–) lead of the voltmeter to the battery (+) cable.)
- (6) Connect a tachometer. For the procedure for connecting the tachometer, refer to the following.
  - 3.0L-12 VALVE ENGINE: Group 11A – On-vehicle Service.
  - 3.0L-24 VALVE ENGINE: Group 11A – On-vehicle Service.
  - 3.5L ENGINE: Group 11C – On-vehicle Service.
- (7) Reconnect the negative battery cable.
- (8) Leave the hood open.
- (9) Start the engine.



- (10) With the engine running at 2500 r/min, turn the headlights and other lights on and off to adjust the generator load so that the value displayed on the ammeter is slightly above 30 A.

**Limit value: max. 0.3 V**

**NOTE**

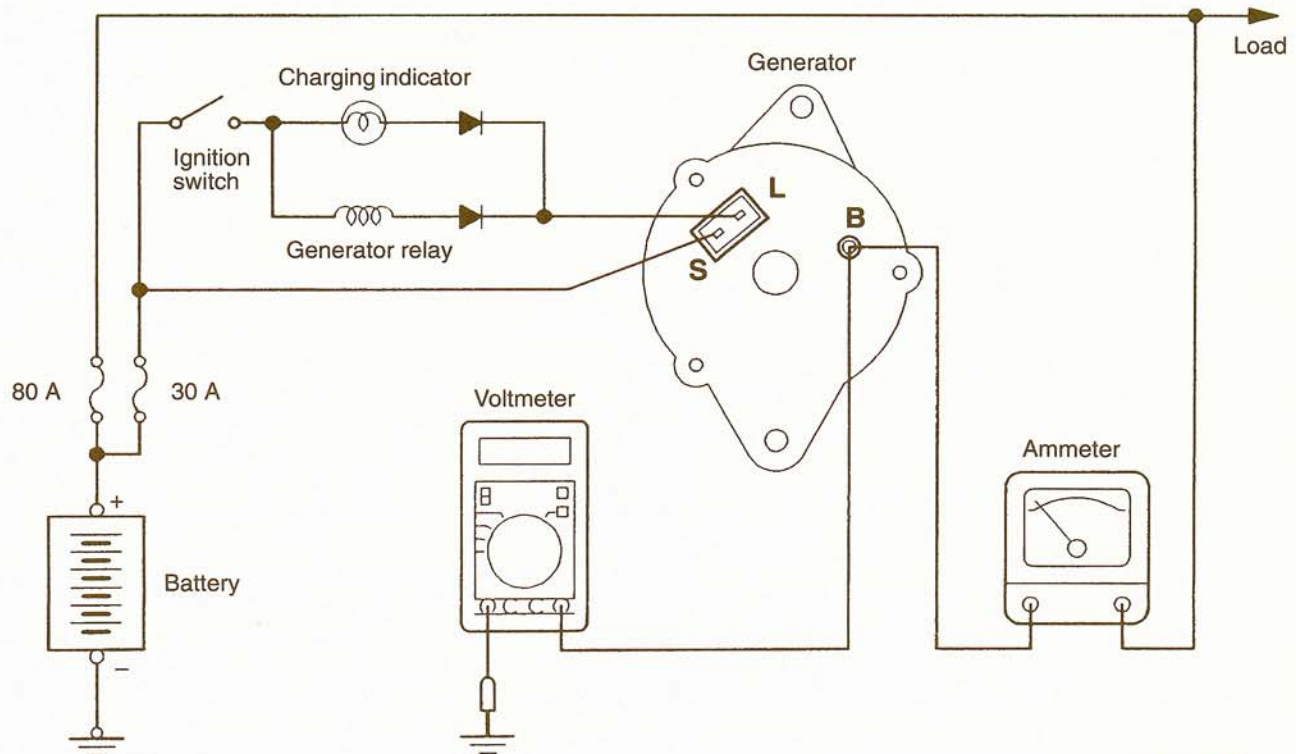
When the generator output is high and the value displayed on the ammeter does not decrease to 30A, set the value to 40A. Read the value displayed on the voltmeter at this time.

In this case the limit value becomes max. 0.4V. Adjust the engine speed by gradually decreasing it until the value displayed on the ammeter is 30 A. Take a reading of the value displayed on the voltmeter at this time.

- (11) If the value displayed on the voltmeter is above the limit value, there is probably a malfunction in the generator output wire, so check the wiring between the generator "B" terminal and the battery (+) terminal (including fusible link). If a terminal is not sufficiently tight or if the harness has become discolored due to overheating, repair and then test again.
- (12) After the test, run the engine at idle.
- (13) Turn off all lights and turn the ignition switch to the OFF position.
- (14) Disconnect the negative battery cable.
- (15) Disconnect the ammeter, voltmeter and tachometer.
- (16) Connect the generator output wire to the generator "B" terminal.
- (17) Connect the negative battery cable.

## OUTPUT CURRENT TEST

16100100116



6EN1140



This test determines whether the generator outputs normal current.

- (1) Before the test, always be sure to check the following.

- Generator installation
- Battery (Refer to GROUP 54 – Battery.)

#### NOTE

The battery to be used should be slightly discharged. The load in a fully-charged battery will be insufficient and the test may not be able to be carried out correctly.

- Generator drive belt tension (Refer to GROUP 00 – Maintenance Service.)
- Fusible link
- Abnormal noise from the generator while the engine is running

- (2) Turn the ignition switch to the OFF position.
- (3) Disconnect the negative battery cable.
- (4) Disconnect the generator output wire from the generator "B" terminal and connect a DC test ammeter with a range of 0–100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

#### Caution

**Never use clips but tighten bolts and nuts to connect the line. Otherwise loose connections (e.g. using clips) will lead to a serious accident because of high current.**

#### NOTE

A clamp-type ammeter which enables measurements to be taken without disconnecting the generator output wire is recommended.

- (5) Connect a voltmeter with a range of 0–20 V between the generator "B" terminal and the ground. (Connect the (+) lead of the voltmeter to the "B" terminal, and then connect the (–) lead of the voltmeter to the ground.)
- (6) Connect a tachometer. For the procedure for connecting the tachometer, refer to the following.
  - 3.0L-12 VALVE ENGINE: Group 11A – On-vehicle Service.
  - 3.0L-24 VALVE ENGINE: Group 11A – On-vehicle Service.
  - 3.5L ENGINE: Group 11C – On-vehicle Service.
- (7) Connect the negative battery cable.
- (8) Leave the hood open.
- (9) Check to be sure that the reading on the voltmeter is equal to the battery voltage.

#### NOTE

If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the generator "B" terminal and the battery (+) terminal.

- (10) After turning the light switch on and turning on the headlights, start the engine.
- (11) Immediately after setting the headlights to high beam and turning the heater blower switch to the high revolution position, increase the engine speed to 2,500 r/min and read the maximum current output value displayed on the ammeter.

**Limit value: 70% of nominal current output**

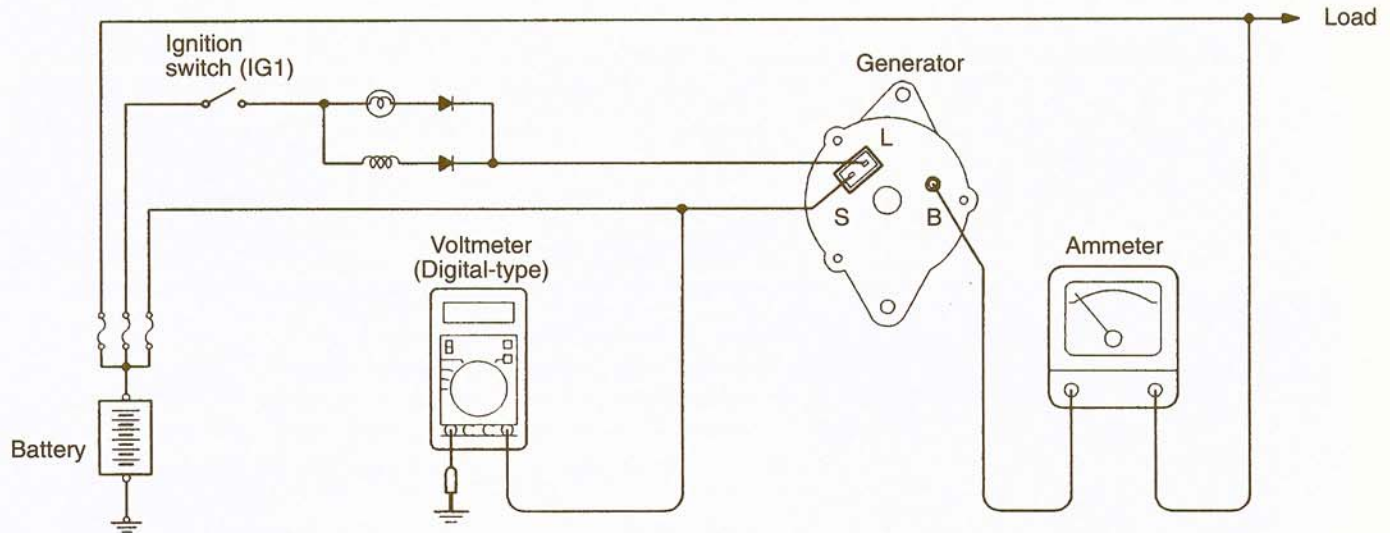
#### NOTE

- For the nominal current output, refer to the Generator Specifications.
  - Because the current from the battery will soon drop after the engine is started, the above step should be carried out as quickly as possible in order to obtain the maximum current output value.
  - The current output value will depend on the electrical load and the temperature of the generator body.
  - If the electrical load is small while testing, the specified level of current may not be output even though the generator is normal. In such cases, increase the electrical load by leaving the headlights turned on for some time to discharge the battery or by using the lighting system in another vehicle, and then test again.
  - The specified level of current also may not be output if the temperature of the generator body or the ambient temperature is too high. In such cases, cool the generator and then test again.
- (12) The reading on the ammeter should be above the limit value. If the reading is below the limit value and the generator output wire is normal, remove the generator from the engine and check the generator.
  - (13) Run the engine at idle speed after the test.
  - (14) Turn the ignition switch to the OFF position.
  - (15) Disconnect the negative battery cable.
  - (16) Disconnect the ammeter, voltmeter and tachometer.
  - (17) Connect the generator output wire to the generator "B" terminal.
  - (18) Connect the negative battery cable.



## REGULATED VOLTAGE TEST

16100110119



6EN1149

This test determines whether the voltage regulator is correctly controlling the generator output voltage.

- (1) Always be sure to check the following before the test.
  - Generator installation
  - Check to be sure that the battery installed in the vehicle is fully charged. (Refer to GROUP 54 – Battery.)
  - Generator drive belt tension (Refer to GROUP 00 – Maintenance Service.)
  - Fusible link
  - Abnormal noise from the generator while the engine is running
- (2) Turn the ignition switch to the OFF position.
- (3) Disconnect the negative battery cable.
- (4) Connect a digital-type voltmeter between the generator "S" terminal and the ground. (Connect the (+) lead of the voltmeter to the "S" terminal, and then connect the (–) lead of the voltmeter to a secure ground or to the battery (–) terminal.)
- (5) Disconnect the generator output wire from the generator "B" terminal.
- (6) Connect a DC test ammeter with a range of 0–100 A in series between the "B" terminal and the disconnected output wire. (Connect the (+) lead of the ammeter to the "B" terminal, and then connect the (–) lead of the ammeter to the disconnected output wire.)

- (7) Connect a tachometer. For the procedure for connecting the tachometer, refer to the following.
  - 3.0L-12 VALVE ENGINE: Group 11A – On-vehicle Service.
  - 3.0L-24 VALVE ENGINE: Group 11A – On-vehicle Service.
  - 3.5L ENGINE: Group 11C – On-vehicle Service.
- (8) Reconnect the negative battery cable.
- (9) Turn the ignition switch to the ON position and check that the reading on the voltmeter is equal to the battery voltage.

## NOTE

If the voltage is 0 V, the cause is probably an open circuit in the wire or fusible link between the generator "S" terminal and the battery (+) terminal.

- (10) Check to be sure that all lights and accessories are off.
- (11) Start the engine.
- (12) Increase the engine speed to 2,500 rpm.
- (13) Read the value displayed on the voltmeter when the current output by the generator becomes 10 A or less.
- (14) If the voltage reading conforms to the value in the voltage regulation table, then the voltage regulator is operating normally.
 

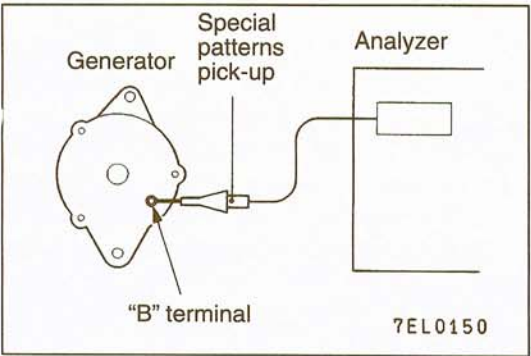
If the voltage is outside the standard value, there is a malfunction of the voltage regulator or of the generator.

## VOLTAGE REGULATION TABLE

Inspection terminal	Voltage regulator ambient temperature (°C [°F])	Standard value (V)
Terminal "S"	-20 (-4)	14.2–15.4
	20 (68)	13.9–14.9
	60 (140)	13.4–14.5
	80 (176)	13.1–14.5

- (15) After the test, lower the engine speed to the idle speed.
- (16) Turn the ignition switch to the "OFF" position.
- (17) Disconnect the negative battery cable.
- (18) Disconnect the ammeter, voltmeter and tachometer.
- (19) Connect the generator output wire to the generator "B" terminal.
- (20) Connect the negative battery cable.





**WAVE PATTERN CHECK USING AN ANALYZER**

16100120105

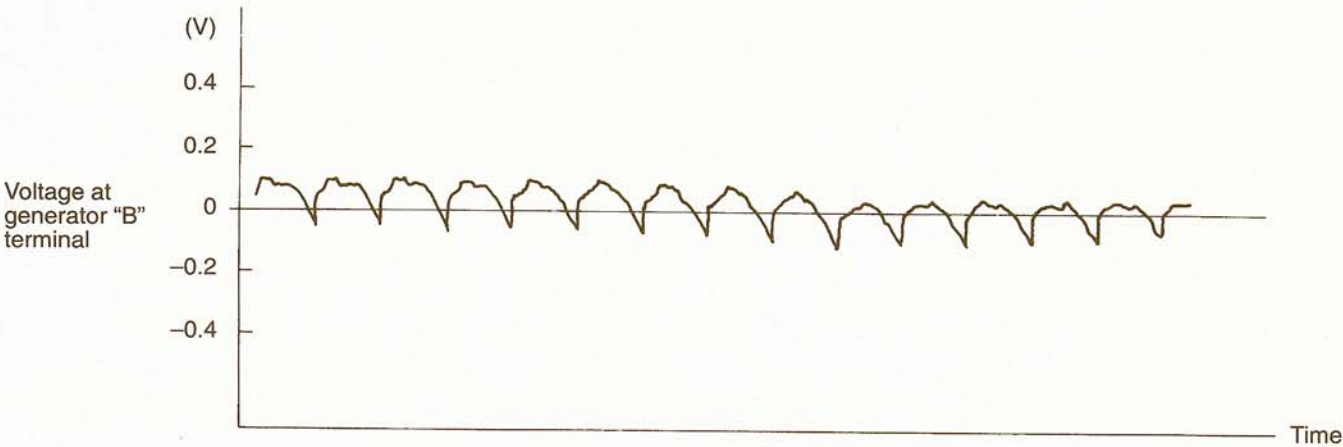
**MEASUREMENT METHOD**

Connect the analyzer special patterns pick-up to the generator "B" terminal.

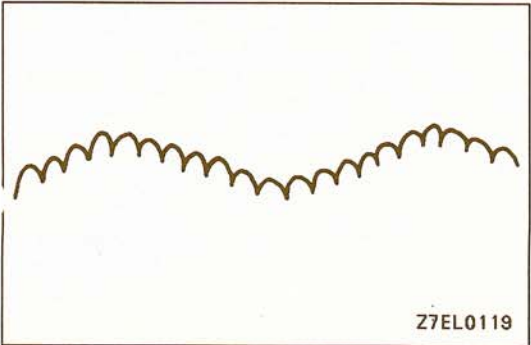
**STANDARD WAVEFORM**

**Observation Conditions**

FUNCTION	SPECIAL PATTERNS
PATTERN HEIGHT	VARIABLE
VARIABLE knob	Adjust while viewing the wave pattern
PATTERN SELECTOR	RASTER
Engine revolutions	Curb idle speed



7EL0115



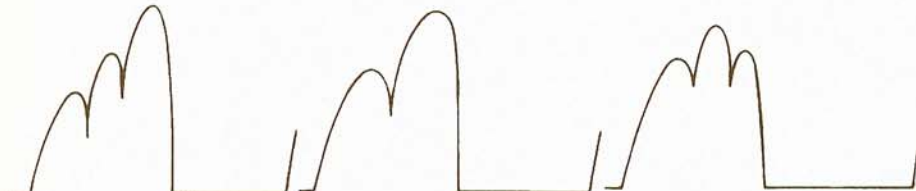




**NOTE**

Furthermore, the voltage waveform of the generator "B" terminal can undulate as shown at left. This waveform is produced when the regulator operates according to fluctuations in the generator load (current), and is normal for the generator.

## ABNORMAL WAVEFORMS EXAMPLES

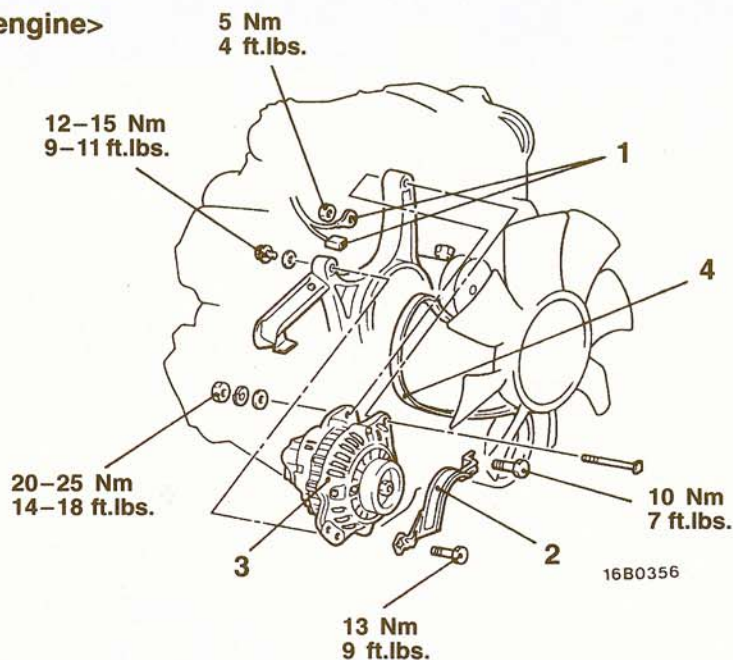
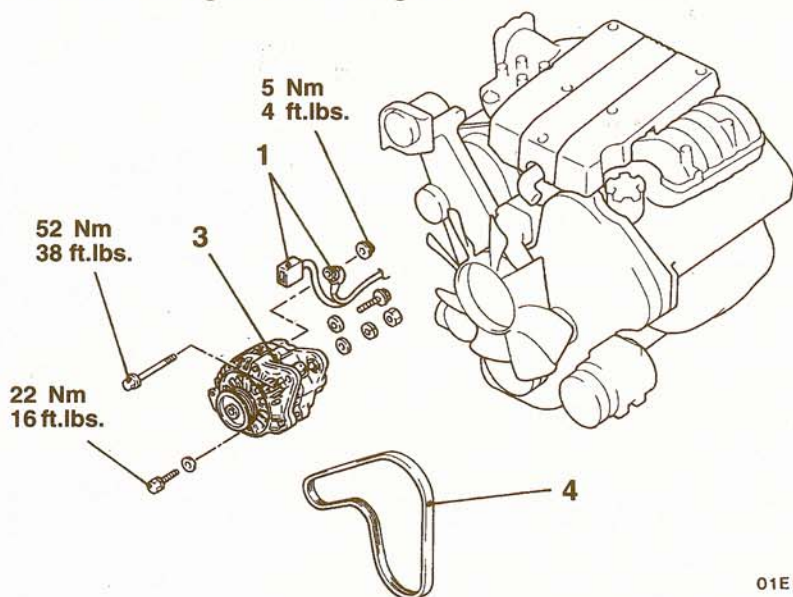
## NOTE

1. The size of the waveform patterns differs largely depending on the adjustment of the variable knob on the analyzer.
2. Identification of abnormal waveforms is easier when there is a large output current (regulator is not operating). (Waveforms can be observed when the headlights are illuminated.)
3. Check the conditions of the charge light (illuminated/not illuminated) also, and carry out a total check.

Abnormal waveforms	Probable cause
<p>Example 1</p>  <p style="text-align: right;">Z7EL0120</p>	<p>● Open circuit in diode</p>
<p>Example 2</p>  <p style="text-align: right;">Z7EL0121</p>	<p>● Short-circuit in diode</p>
<p>Example 3</p>  <p style="text-align: right;">Z7EL0122</p>	<p>● Open circuit in stator coil</p>
<p>Example 4</p>  <p style="text-align: right;">Z7EL0123</p>	<p>● Short-circuit in stator coil</p>
<p>Example 5</p>  <p>At this time, the charge light is illuminated.</p> <p style="text-align: right;">Z7EL0124</p>	<p>● Open circuit in supplementary diode</p>

**GENERATOR****REMOVAL AND INSTALLATION****Post-installation Operation**

- Drive Belt Tension Adjustment  
 <3.0L-12 VALVE ENGINE: Refer to GROUP 11A – On-vehicle Service.>  
 <3.0L-24 VALVE ENGINE: Refer to GROUP 11A – On-vehicle Service.>  
 <3.5L ENGINE: Refer to GROUP 11C – On-vehicle Service.>

**<3.0L-12 VALVE engine>****<3.0L-24 VALVE engine, 3.5L engine>**

01E0126

00002472

**Removal steps**

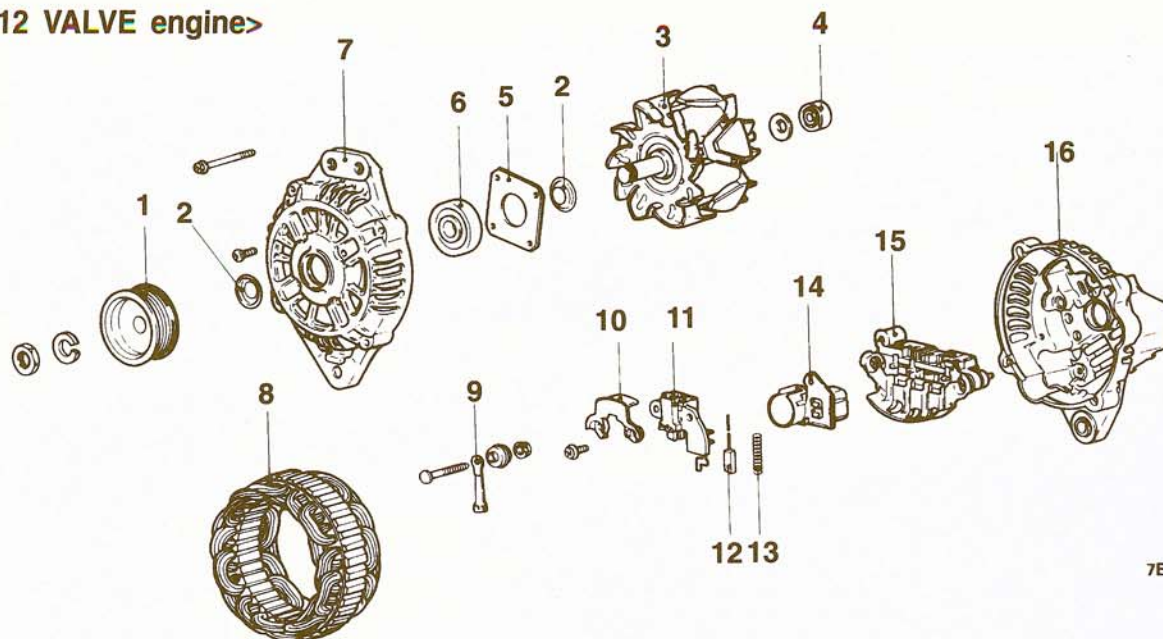
1. Connection for generator connector
2. Generator cover
3. Generator
4. Belt



## DISASSEMBLY AND REASSEMBLY

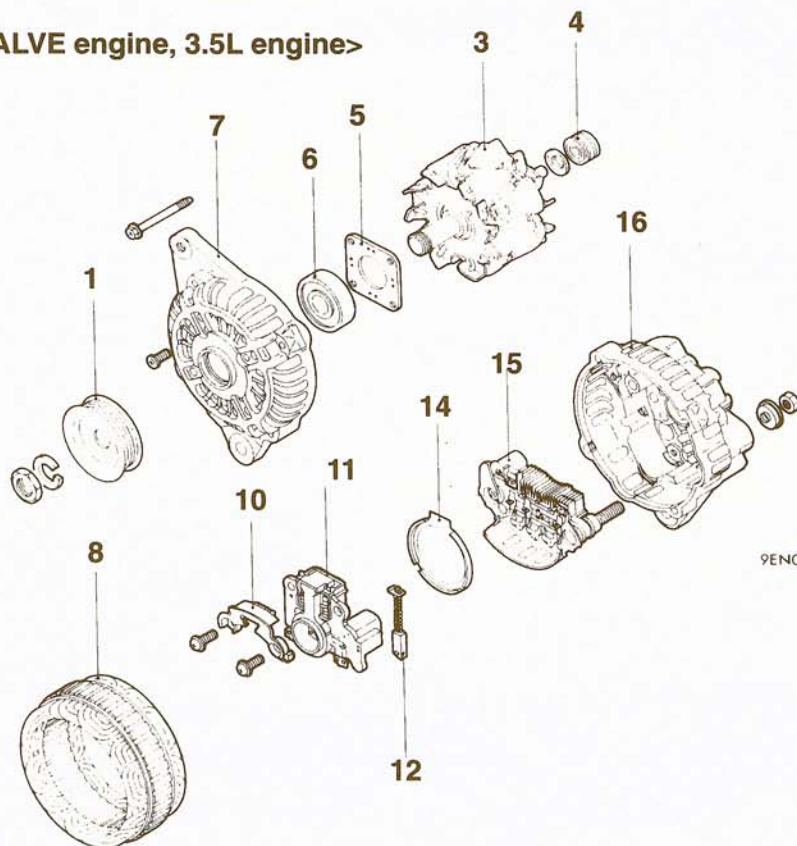
16100160107

## &lt;3.0L-12 VALVE engine&gt;



7EL0050

## &lt;3.0L-24 VALVE engine, 3.5L engine&gt;



9EN0187

00002473

Z9EN0187

## Disassembly steps

◀A▶

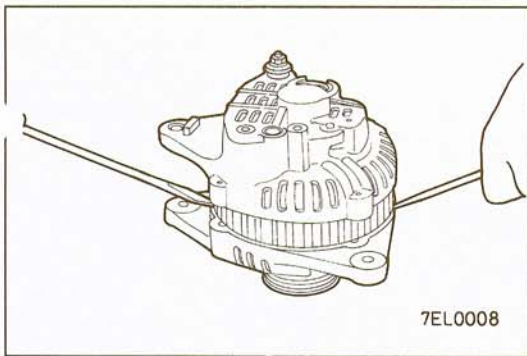
▶A◀

◀B▶

1. Pulley
2. Seal
3. Rotor assembly
4. Rear bearing
5. Bearing retainer
6. Front bearing
7. Front bracket
8. Stator

◀B▶

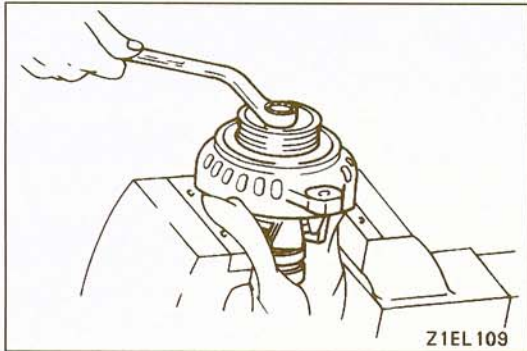
9. Terminal
10. Plate
11. Regulator and brush holder
12. Brush
13. Brush spring
14. Slinger
15. Rectifier assembly
16. Rear bracket

**DISASSEMBLY SERVICE POINTS****◀A▶ GENERATOR PULLEY REMOVAL**

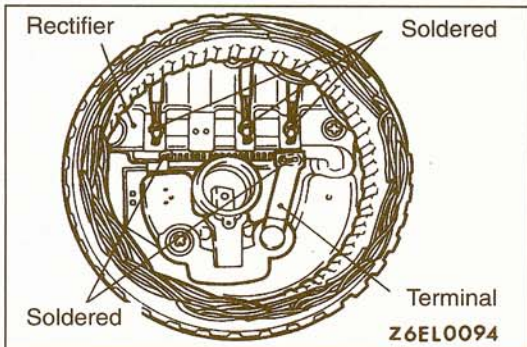
- (1) Remove the bolts.
- (2) Insert a flat-tip (–) screwdriver between the front bracket and the stator core and pry downward.

**Caution**

**Do not insert the screwdriver too deeply, as there is danger of damage to the stator coil.**



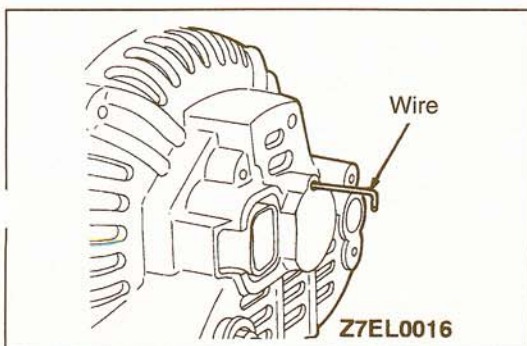
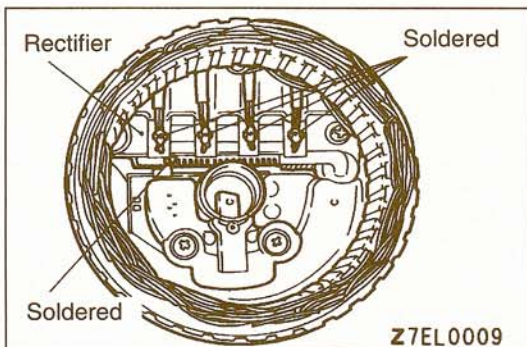
- (3) Clamp the rotor in a vise with soft jaws.
- (4) After removing the nut, remove the pulley and front bracket from the rotor.

**◀B▶ STATOR/REGULATOR AND BRUSH HOLDER REMOVAL**

- (1) When removing the stator, unsolder the three (four) stator leads which are soldered to the main diodes on the rectifier.
- (2) When removing the rectifier from the brush holder, unsolder the two soldered points of the rectifier.

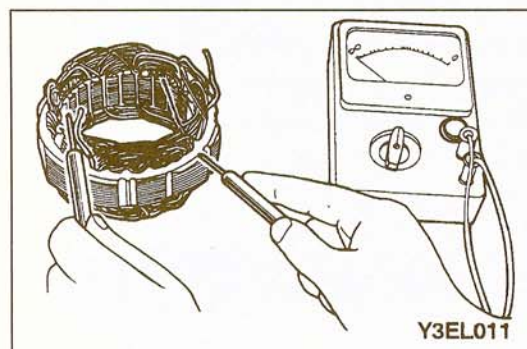
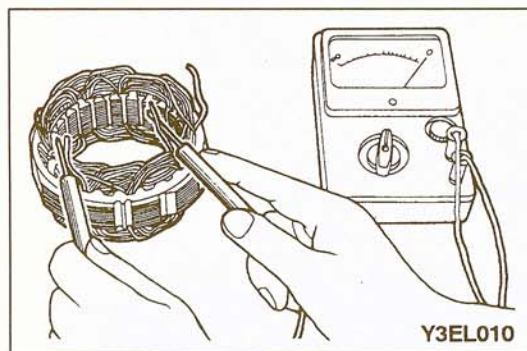
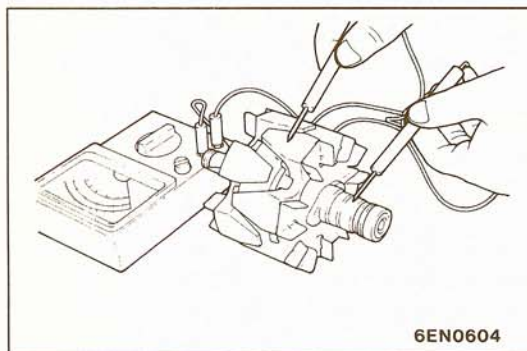
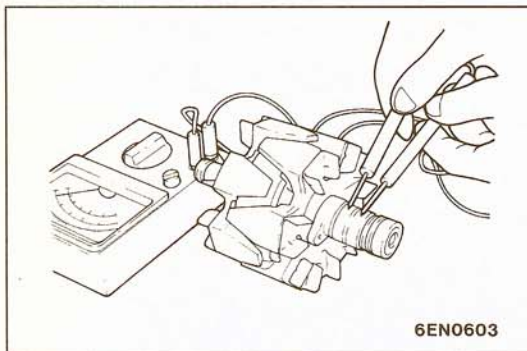
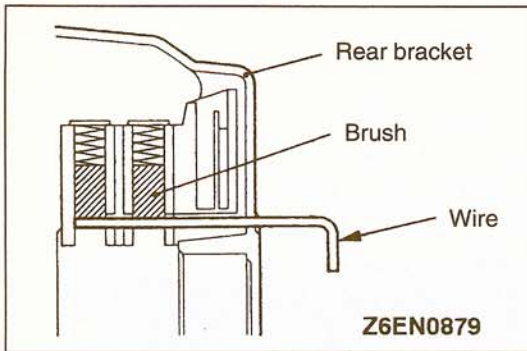
**Caution**

1. When soldering or unsoldering, make sure that the heat from the soldering iron is not transmitted to the diodes for a long period. Finish soldering or unsoldering in as short a time as possible.
2. Use care that no undue force is exerted on the leads of the diodes.

**REASSEMBLY SERVICE POINT****▶A▶ ROTOR ASSEMBLY INSTALLATION**

Before attaching the rotor to the rear bracket, insert a wire through the small hole in rear bracket to lift the brush. After installing the rotor, remove the wire.





## INSPECTION

16100170100

### ROTOR CHECK

- (1) Check the field coil for continuity. Check that there is continuity between the slip rings.  
If the resistance is extremely small, it means that there is a short-circuit. If there is no continuity or if there is a short-circuit, replace the rotor assembly.

**Resistance value: Approx 3–5  $\Omega$**

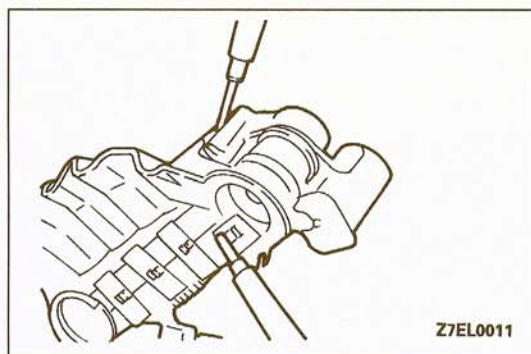
- (2) Check the grounding of the field coil. Check that there is no continuity between the slip ring and the core. If there is continuity, replace the rotor assembly.

### STATOR CHECK

- (1) Check for continuity in the stator coil. Check that there is continuity between coil leads.  
If there is no continuity, replace the stator assembly.

- (2) Check the grounding of the coil. Check that there is no continuity between the coil and the core. If there is continuity, replace the stator assembly.

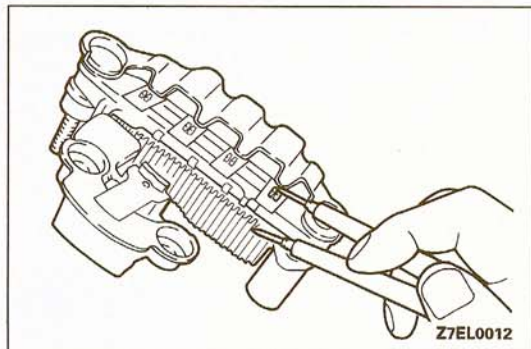




## RECTIFIERS CHECK

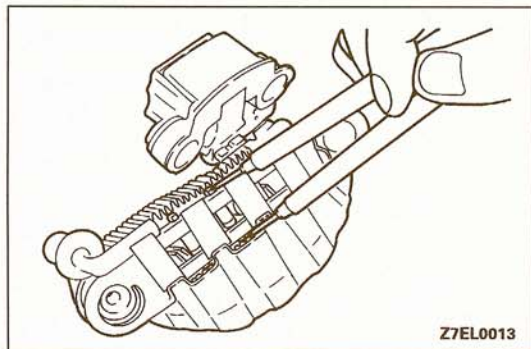
### (1) Positive Rectifier Test

Use an ohmmeter to check for continuity between the positive rectifier and the stator coil lead connection terminal. If there is continuity in both directions, the diode is shorted, so replace the rectifier assembly.



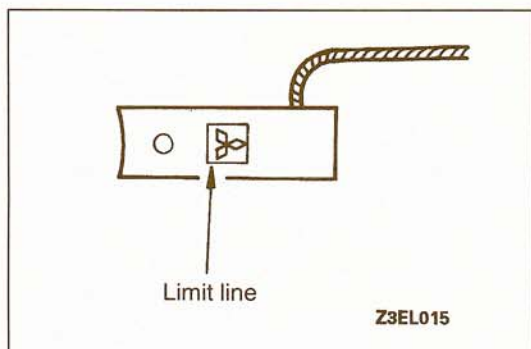
### (2) Negative Rectifier Test

Check for continuity between the negative rectifier and the stator coil lead connection terminal. If there is continuity in both directions, the diode is shorted, so replace the rectifier assembly.



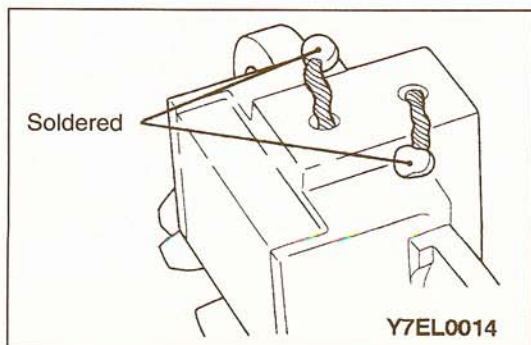
### (3) Diode Trio Test

Check three diodes for continuity by connecting an ammeter to both ends of each diode. If there is no continuity in both directions, the diode is defective, so replace the heatsink assembly.

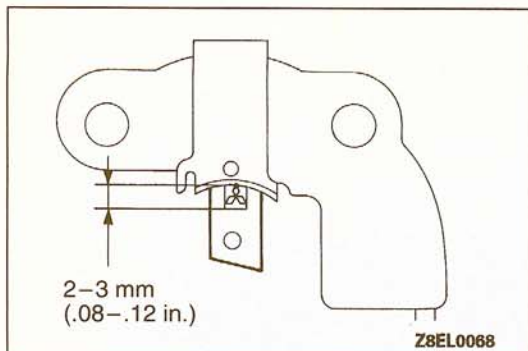


## BRUSH REPLACEMENT <3.0L-12 VALVE engine>

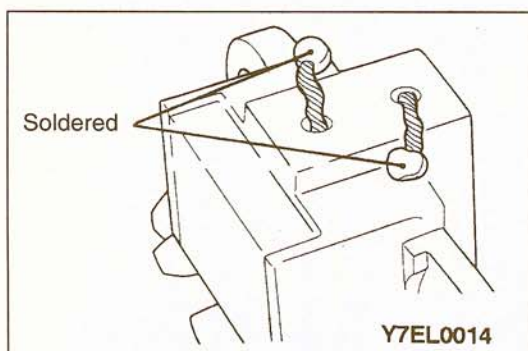
(1) If the brush has been worn to the limit line, replace it by the following procedure.



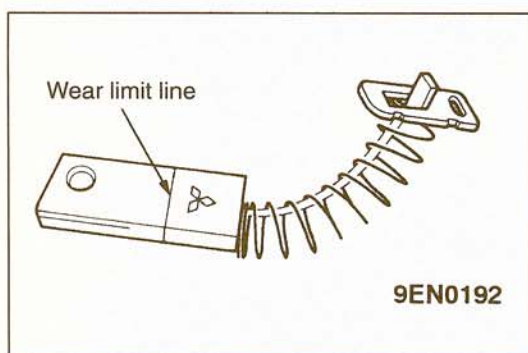
(2) Unsolder the pigtail and remove the old brush and spring.



- (3) Install the brush spring and the new brush to the brush holder.
- (4) Insert the brush into where there is a space 2 to 3 mm (.08 to .12 in.) between the limit line and the end of the brush holder.

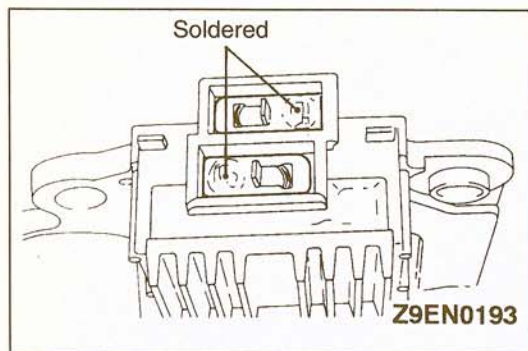


- (5) Solder the pigtail to the brush holder as shown in the illustration.

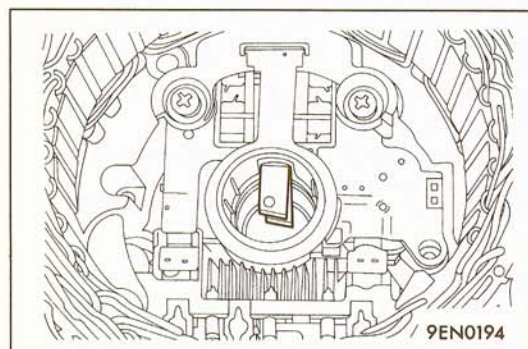


#### BRUSH CHECK <3.0L-24 VALVE engine, 3.5L engine>

- (1) If the brush is worn to the wear limit line, it must be replaced.



- (2) Unsolder the lead wire of the brush, and then remove the brush.



- (3) When installing a new brush, push the brush into the brush holder as shown in the illustration, and then solder the lead wire.



**STARTING SYSTEM**

16200020019

**GENERAL SPECIFICATIONS****STARTER MOTOR**

Items	Specifications
Type	Reduction drive
Rated output kW/V	1.2/12
No. of pinion teeth	8

**SERVICE SPECIFICATIONS**

16200030067

Items		Specifications	Limit
Free running characteristics	Terminal voltage V	11	
	Current A	90 or less	
	Speed r/min	3,000 or more	
Pinion gap mm (in.)		0.5–2.0 (.020–.079)	
Commutator runout mm (in.)		0.05 (.0020)	0.1 (.004)
Commutator diameter mm (in.)		29.4 (1.157)	28.8 (1.134)
Under-cut depth mm (in.)		0.5 (.020)	



## TROUBLESHOOTING

### OPERATION

- For vehicles equipped with M/T, the clutch pedal position switch contact is switched off when the clutch pedal is depressed; when the ignition switch is then turned to the “ST” position, electricity flows to the starter relay and the starter motor, the contact (magnetic switch) of the starter is switched on and the starter motor is activated.

#### NOTE

If the ignition switch is turned to the “ST” position without the clutch pedal being depressed, electricity flows to the starter relay (coil), the clutch pedal position switch (contacts) and to the ground, with the result that the contacts of the starter relay are switched off, and, because the power to the starter motor is thereby interrupted, the starter motor is not activated.

- For vehicles equipped with A/T, when the ignition switch is switched to the “ST” position while the selector lever is at the “P” or “N” position, the contact (magnetic switch) of the starter is switched on and the starter motor is activated.

### TROUBLESHOOTING HINTS

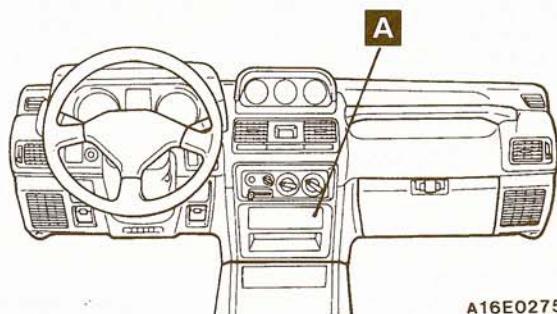
The starter motor does not operate at all.

- Check the starter (coil).
- Check for poor contact at the battery terminals and starter.
- Check the park/neutral position switch.
- Check the clutch pedal position switch.
- Check the starter relay.
- Check the key reminder switch.

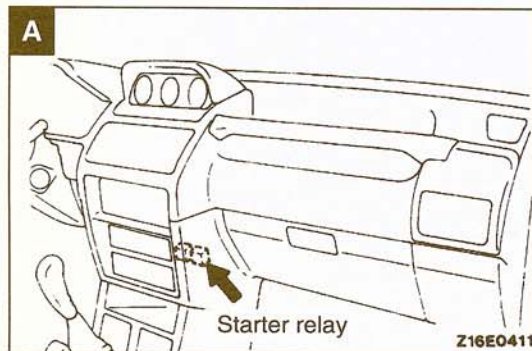
### COMPONENT LOCATION

70100280041

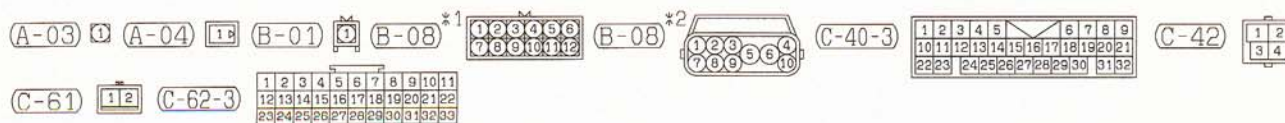
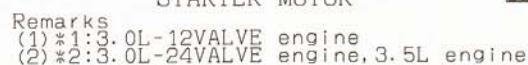
Name	Symbol
Starter relay	A



A16E0275



90100050138



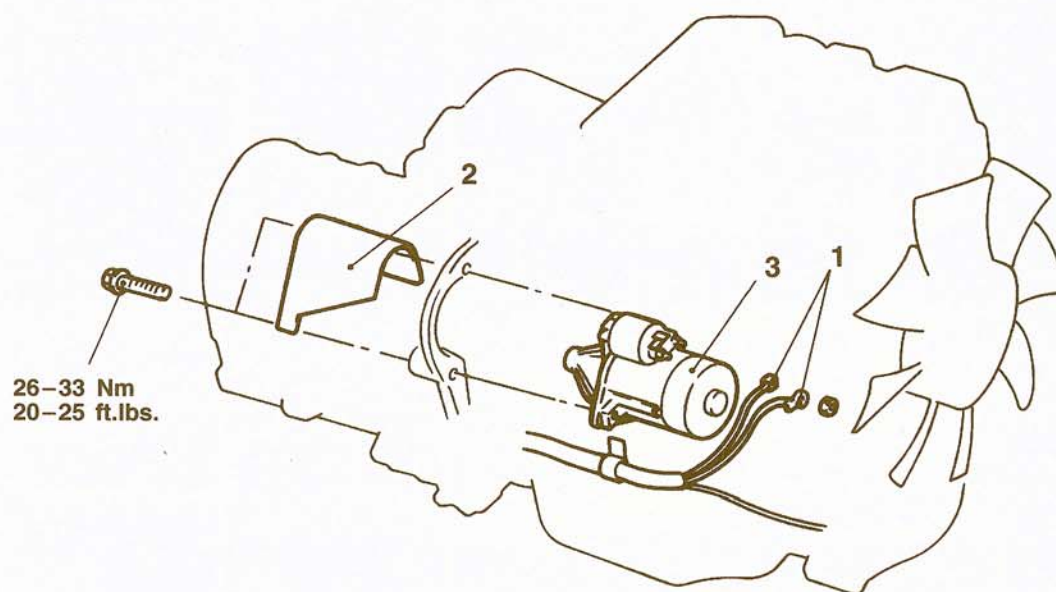
# STARTER MOTOR

16200100034

## REMOVAL AND INSTALLATION

### Pre-removal and Post-installation Operations

- Draining and Refilling of Automatic Transmission Fluid (Refer to GROUP 00 – Maintenance service.)
- Removal and Installation of Oil Cooler Tube (Refer to GROUP 23A – Transmission Fluid Cooler, Hoses and Pipes.)



### Removal steps

1. Connection for starter motor connector
2. Starter cover
3. Starter motor

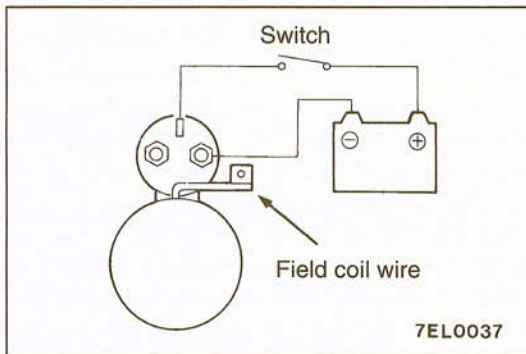


## REMOVAL SERVICE POINTS

### ◀A▶ STARTER MOTOR REMOVAL

Vehicles with manual transmission: Jack up the vehicle, remove the starter motor mounting bolts from below the body, and then separate the starter motor from the transmission assembly.



**INSPECTION**

16200110099

**PINION GAP ADJUSTMENT**

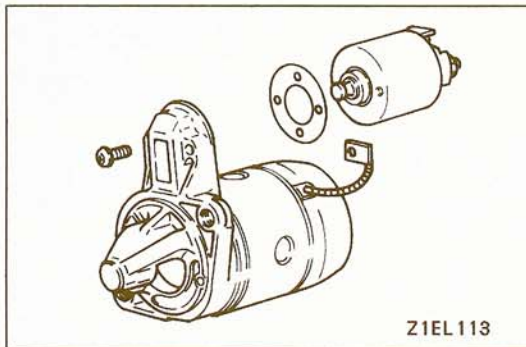
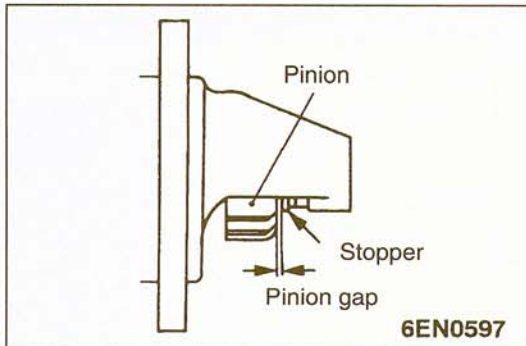
- (1) Disconnect the field coil wire from the M-terminal of the magnetic switch.
- (2) Connect a 12 V battery between the S-terminal and the M-terminal.
- (3) Turn on the switch, and the pinion will move out.

**Caution**

**This test must be performed quickly (within 10 seconds) to prevent the coil from burning.**

- (4) Use a feeler gage to check the clearance between the pinion and the stopper (pinion gap).

**Standard value: 0.5–2.0 mm (.020–.079 in.)**



- (5) If the pinion gap is outside the standard value, adjust by adding or removing gaskets between the magnetic switch and the front bracket.

**MAGNETIC SWITCH PULL-IN TEST**

- (1) Disconnect the field coil wire from the M-terminal of the magnetic switch.
- (2) Connect a 12 V battery between the S-terminal and the M-terminal.
- (3) Manually pull out the pinion as far as the pinion stopper position.

**Caution**

**This test must be performed quickly (within 10 seconds) to prevent the coil from burning.**

- (4) If the pinion moves out, the pull-in coil is good. If it doesn't, replace the magnetic switch.

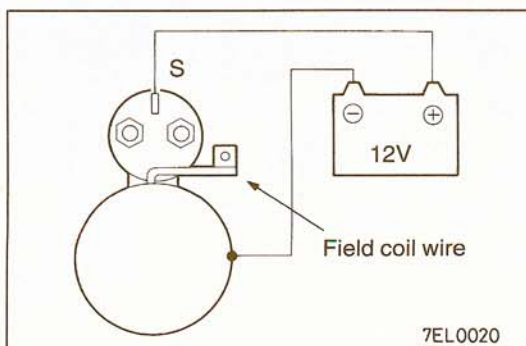
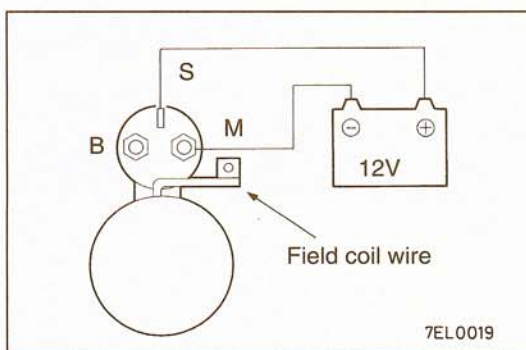
**MAGNETIC SWITCH HOLD-IN TEST**

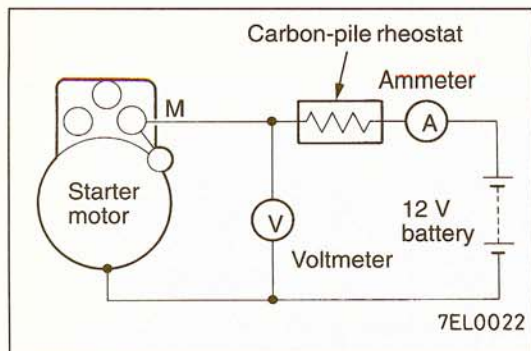
- (1) Disconnect the field coil wire from the M-terminal of the magnetic switch.
- (2) Connect a 12 V battery between the S-terminal and the body.

**Caution**

**This test must be performed quickly (within 10 seconds) to prevent the coil from burning.**

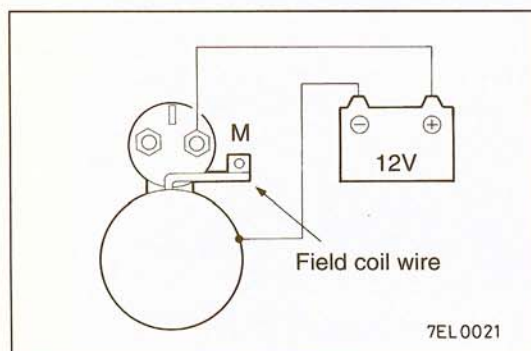
- (3) If the pinion remains out, everything is in order. If the pinion moves in, there is an open circuit in the hold-in circuit. Replace the magnetic switch.



**FREE RUNNING TEST**

- (1) Place starter motor in a vise equipped with soft jaws and connect a fully-charged 12-volt battery to starter motor as follows:
- (2) Connect a test ammeter (100-ampere scale) and carbon pile rheostat in series to the positive battery terminal and starter motor terminal.
- (3) Connect a voltmeter (15-volt scale) to the starter motor.
- (4) Rotate the carbon pile to the full-resistance position.
- (5) Connect the battery cable to the negative battery terminal and the starter motor body.
- (6) Adjust the rheostat until the battery positive voltage shown by the voltmeter is 11V.
- (7) Confirm that the maximum amperage is within the specifications and that the starter motor turns smoothly and freely.

**Standard value: 90 A or less**

**MAGNETIC SWITCH RETURN TEST**

- (1) Disconnect the field coil wire from the M-terminal of the magnetic switch.
- (2) Connect a 12 V battery between the M-terminal and the body.

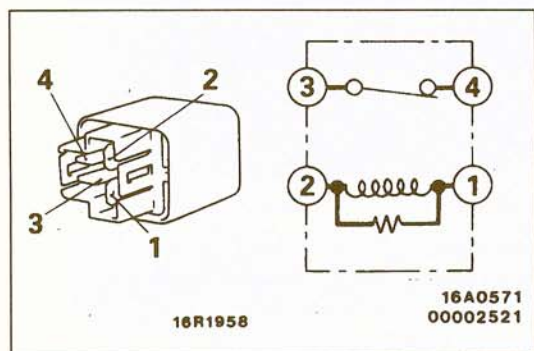
**Caution**

**This test must be performed quickly (within 10 seconds) to prevent the coil from burning.**

- (3) Pull the pinion out and then release it. If the pinion quickly returns to its original position, everything is in order. If it doesn't, replace the magnetic switch.

**Caution**

**Be careful not to get your fingers caught when pulling out the pinion.**

**STARTER RELAY**

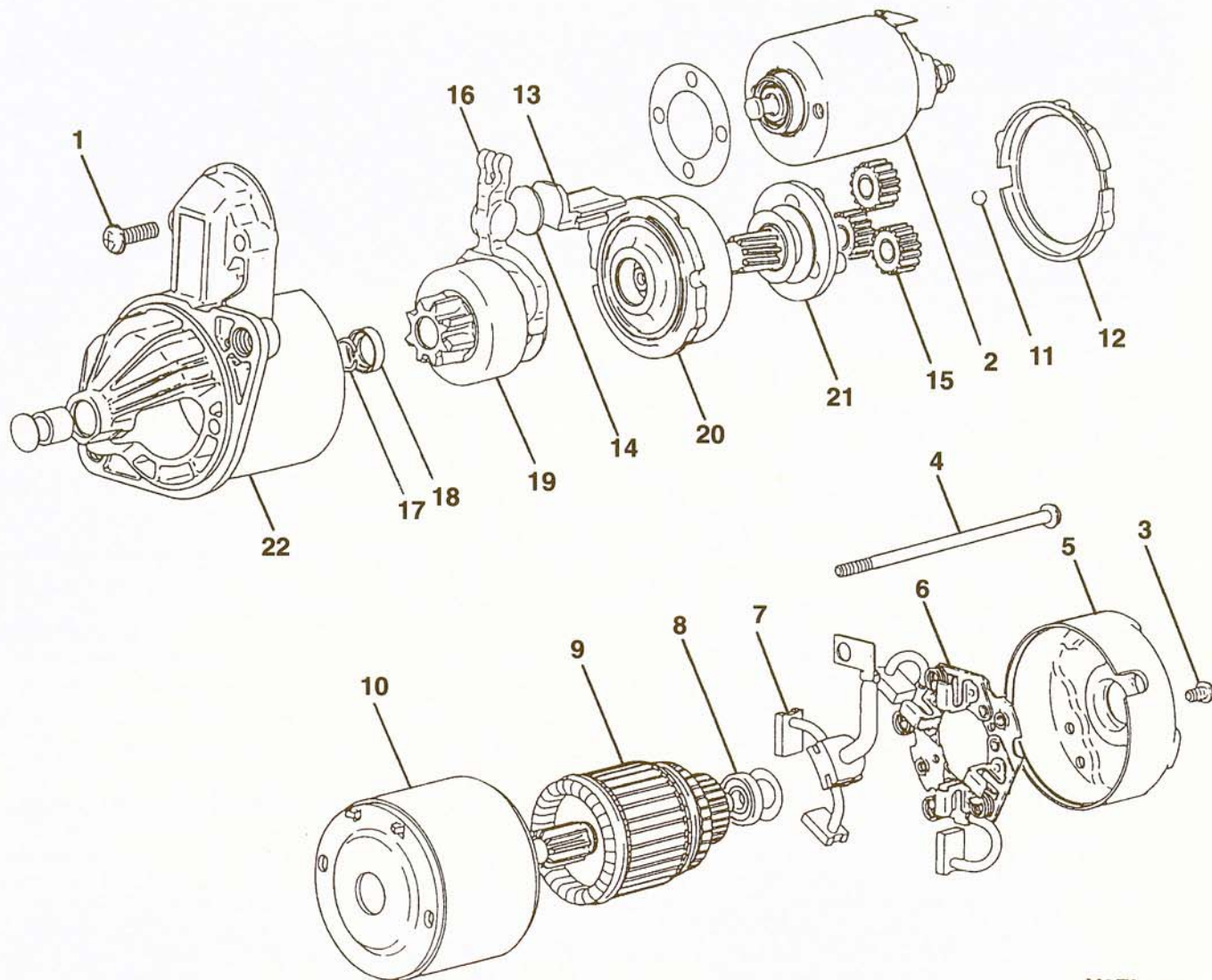
- (1) Remove the starter relay.
- (2) Connect the battery to terminal (1) and check the continuity between the terminals with terminal (2) grounded.

Power is supplied	Terminals (3)–(4)	No continuity
Power is not supplied	Terminals (3)–(4)	Continuity
	Terminals (1)–(2)	Continuity



## DISASSEMBLY AND REASSEMBLY

16200120139



Y6EL199

**Disassembly steps**

1. Screw
2. Magnetic switch
3. Screw
4. Screw
5. Rear bracket
6. Brush holder
7. Brush
8. Rear bearing
9. Armature
10. Yoke assembly
11. Ball

12. Packing A
13. Packing B
14. Plate
15. Planetary gear
16. Lever
17. Snap ring
18. Stop ring
19. Overrunning clutch
20. Internal gear
21. Planetary gear holder
22. Front bracket

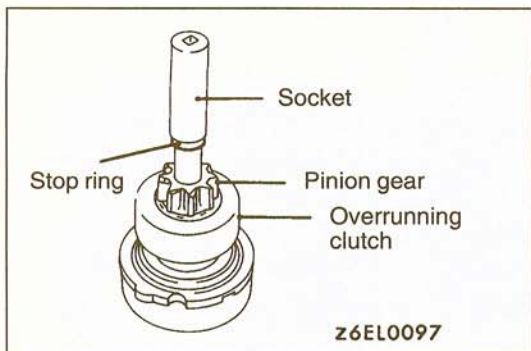
◀A▶

◀A▶

◀B▶  
◀B▶▶A▶  
▶A▶**DISASSEMBLY SERVICE POINTS****◀A▶ ARMATURE/BALL REMOVAL****Caution**

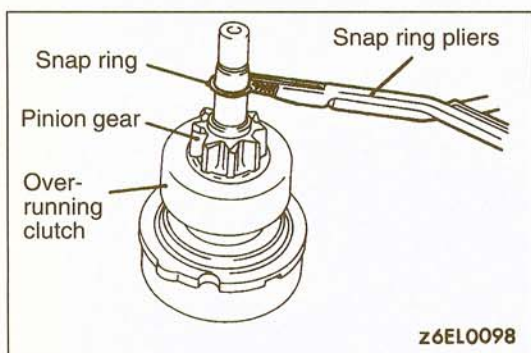
When removing the armature, take care not to lose the ball which is used as a bearing in the armature end.





### ◀B▶ SNAP RING/STOP RING REMOVAL

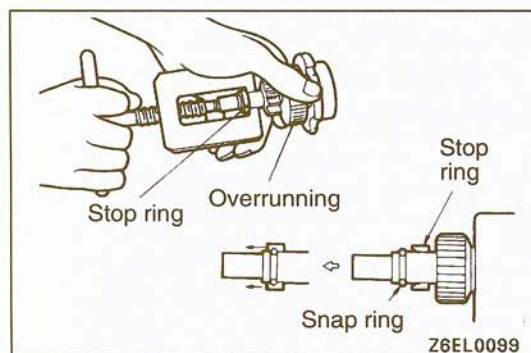
- (1) Use an appropriate socket wrench to press the stop ring into the side of the snap ring.



- (2) After removing the snap ring using snap-ring pliers, remove the stop ring and the overrunning clutch.

### CLEANING STARTER MOTOR PARTS

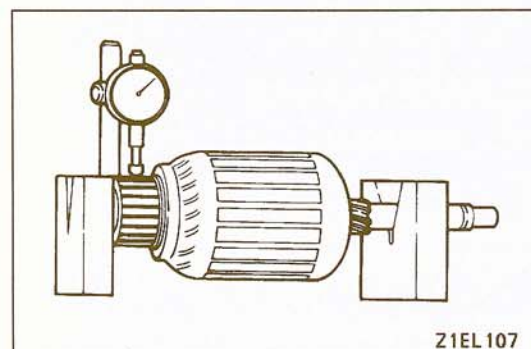
1. Do not immerse parts in cleaning solvent. Immersing the yoke and field coil assembly and/or armature will damage the insulation. Wipe these parts with a cloth only.
2. Do not immerse the drive unit in cleaning solvent. The overrunning clutch is pre-lubricated at the factory and solvent will wash lubrication from the clutch.
3. The drive unit may be cleaned with a brush moistened with cleaning solvent and wiped dry with a cloth.



### REASSEMBLY SERVICE POINTS

#### ▶A◀ STOP RING/SNAP RING INSTALLATION

Use a suitable pulling tool to pull the overrunning clutch stop ring over the snap ring.



### INSPECTION

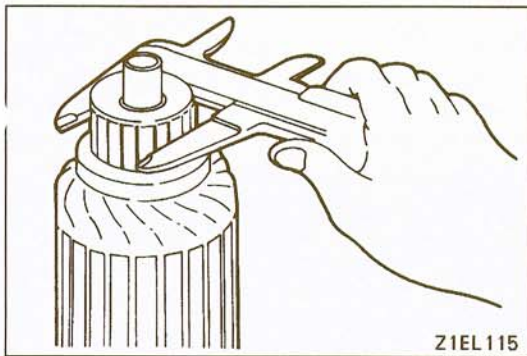
16200130132

#### COMMUTATOR CHECK

- (1) Place the armature on a pair of V-blocks, and then use a dial gage to check the deflection.

**Standard value: 0.05 mm (.0020 in.)**

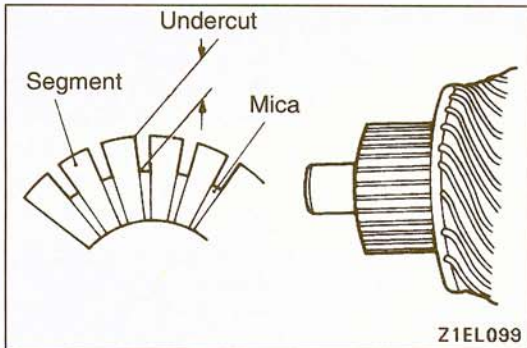
**Limit: 0.1 mm (.0040 in.)**



- (2) Check the outer diameter of the commutator.

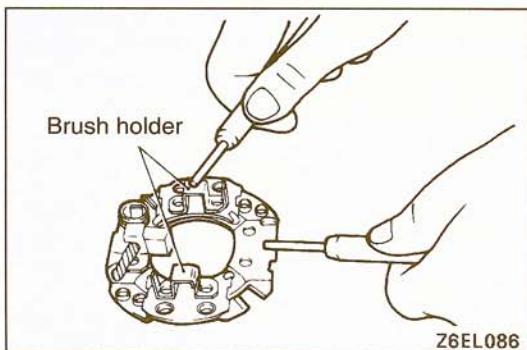
**Standard value: 29.4 mm (1.158 in.)**

**Limit: 28.4 mm (1.118 in.)**



- (3) Check the depth of the undercut between the segments.

**Standard value: 0.5 mm (.020 in.)**



#### BRUSH HOLDER CHECK

Check for continuity between the brush holder plate and the brush holder.

The normal condition is no continuity.



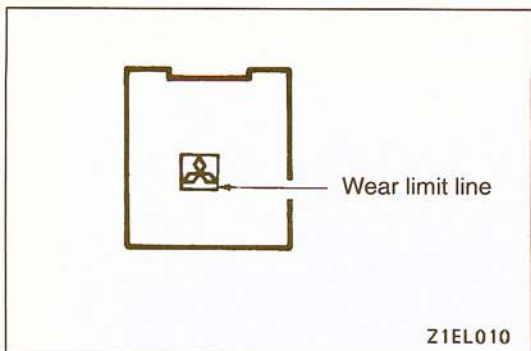
#### OVERRUNNING CLUTCH CHECK

1. While holding the clutch housing, rotate the drive pinion. The drive pinion should rotate smoothly in one direction, but should not rotate in the opposite direction. If the clutch does not function properly, replace the overrunning clutch assembly.
2. Check the pinion for wear or burrs. If the pinion is worn or burred, replace the overrunning clutch assembly. If the pinion is damaged, inspect the ring gear for wear or burrs also.

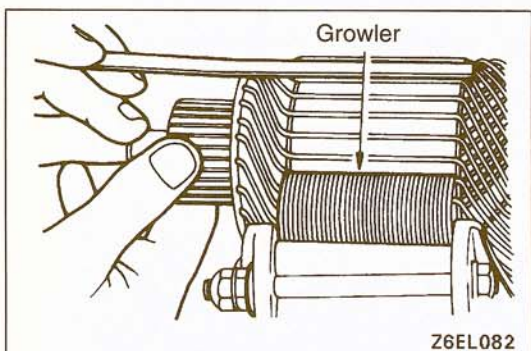
#### FRONT AND REAR BRACKET BUSHING CHECK

Check the bushing for wear or burrs. If the bushing is worn or burred, replace the front bracket assembly or the rear bracket assembly.

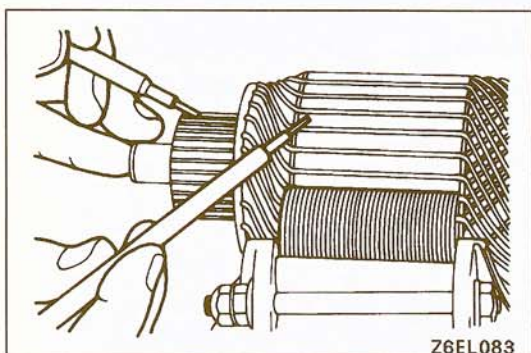


**BRUSH CHECK**

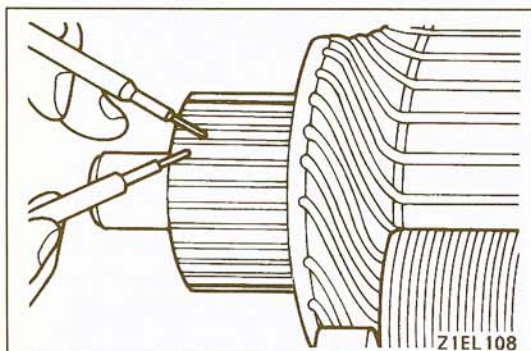
1. Brushes that are worn beyond the wear limit line, or oil-soaked should be replaced.
2. When replacing the ground brush, slide the brush out from the brush holder by prying back the retaining spring.

**ARMATURE TEST****Armature Short-circuit Test**

1. Place the armature in a growler.
2. If a thin steel blade is held parallel and just above the armature while it is rotated slowly in the growler, a shorted armature will cause the blade to vibrate and be attracted to the core. In this case, replace the shorted armature.

**Armature Coil Ground Test**

Check the insulation between the armature coil cores and the commutator segments. They are normal if there is no continuity.

**Armature Coil Open-circuit Inspection**

Check for continuity between the segments. The condition is normal if there is continuity.



# IGNITION SYSTEM

## GENERAL SPECIFICATIONS

### DISTRIBUTOR <3.0L-12VALVE engine>

Items	Specifications
Identification No.	T5T42371
Part No.	MD148008
Advance mechanism	Electronic control
Firing order	1 – 2 – 3 – 4 – 5 – 6

### IGNITION COIL

Items	3.0L-12 VALVE engine	3.0L-24 VALVE engine	3.5L engine
Type	Mold	Mold 3-coil	Mold 3-coil
Identification No.	F-504	F608	F-722
Part No.	MD131711	MD313604	MD303922

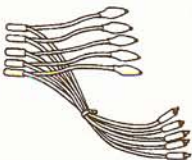
### SPARK PLUGS

Items	3.0L-12 VALVE engine	3.0L-24 VALVE engine	3.5L engine
NGK	BPR5ES-11	PFR6J-11	PFR5J-11
NIPPON DENSO	W16EPR11	PK20PR-P11	PK16PR-P11
CHAMPION	RN11YC4	–	–

## SERVICE SPECIFICATIONS

Items	Specifications
Ignition coil	3.0L-12 VALVE engine
	0.72–0.88
	3.0L-24 VALVE engine
	0.67–0.81
	3.5L engine
	0.69–0.85
Secondary coil resistance at 20°C (68°F) kΩ	3.0L-12 VALVE ENGINE
	10.3–13.9
	3.0L-24 VALVE engine
	11.3–15.3
	3.5L engine
	15.3–20.7
Spark plug gap mm (in.)	1.0–1.1 (.039–.043)

## SPECIAL TOOL

Tool	Tool number and name	Supersession	Application
	MB991348 Test harness set	–	Inspection of ignition primary voltage (ignition power transistor connection)

## TROUBLESHOOTING

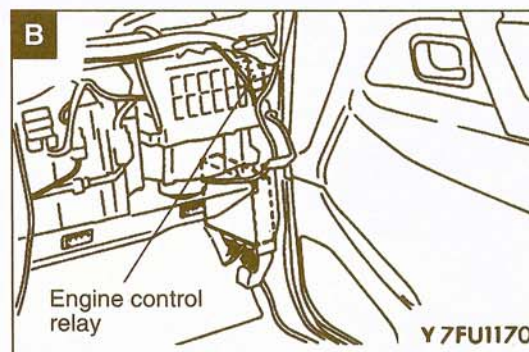
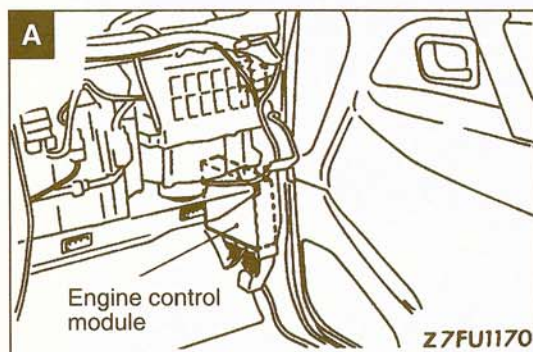
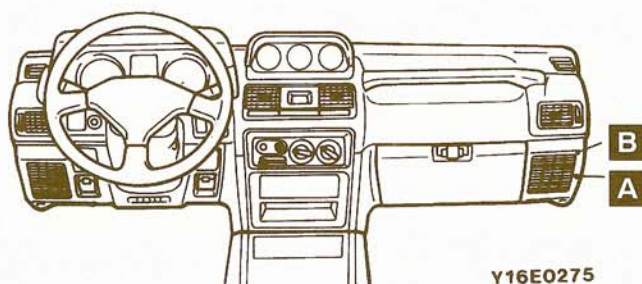
### OPERATION

- This action induces a high voltage in the secondary winding of the ignition coil. The secondary winding current produced flows from the ignition coil through the distributor and spark plug to ground, thus causing ignition in each cylinder.
- When the ignition switch is turned to ON, battery positive voltage is applied to the ignition coil primary winding.
- As the distributor shaft rotates, ignition signals are transmitted from the engine control module to the ignition power transistor.
- These signals activate the ignition power transistor to cause ignition coil primary winding current to repeatedly flow through the ignition coil negative terminal through the ignition power transistor to ground or to be interrupted.

### COMPONENT LOCATION

70100290044

Name	Symbol
Engine control relay	B
Engine control module	A



### TROUBLESHOOTING HINTS

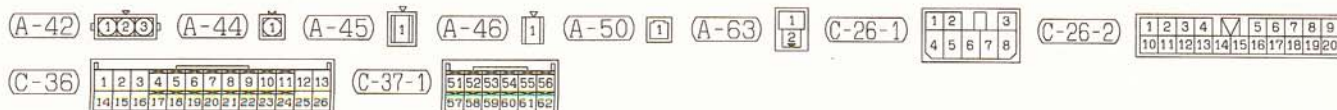
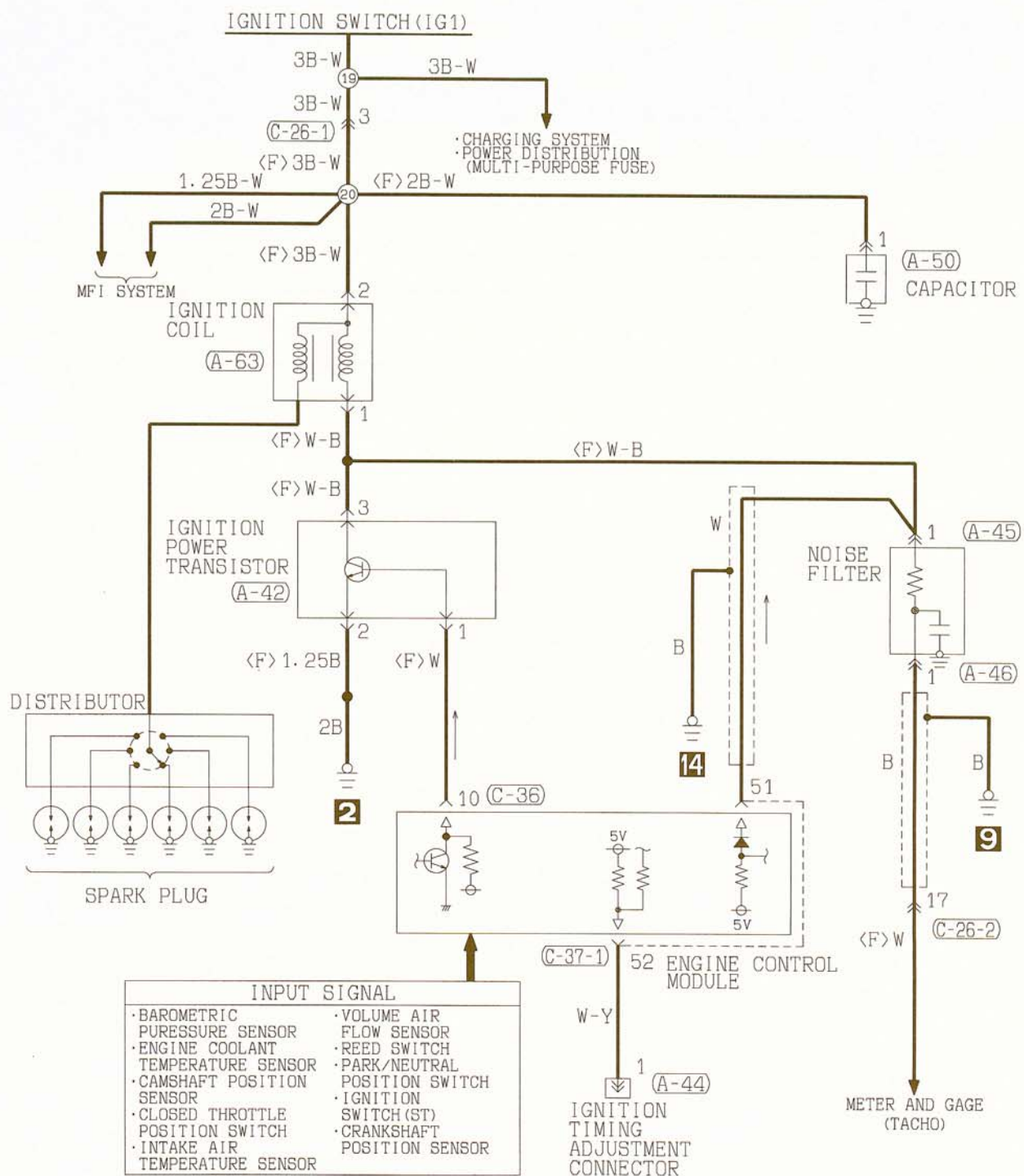
1. Engine cranks but does not start.
  - 1) Spark is insufficient or does not occur at all (on spark plug)
    - Check the ignition coil.
    - Check the distributor.
    - Check the ignition power transistor.
    - Check the spark plugs.
    - Check the spark plug cable.
  - 2) Spark is good.
    - Check the ignition timing.
2. Engine idles roughly or stalls.
  - Check the spark plugs.
  - Check the ignition timing.
  - Check the ignition coil.
  - Check the spark plug cable.
3. Poor acceleration
  - Check the ignition timing.
4. Engine overheats or consumes excessive fuel.
  - Check the ignition timing.



## CIRCUIT DIAGRAM

3.0L-12 VALVE engine

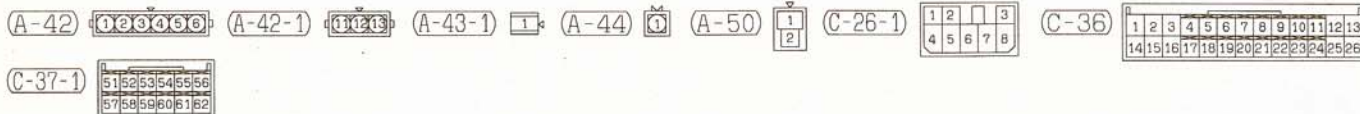
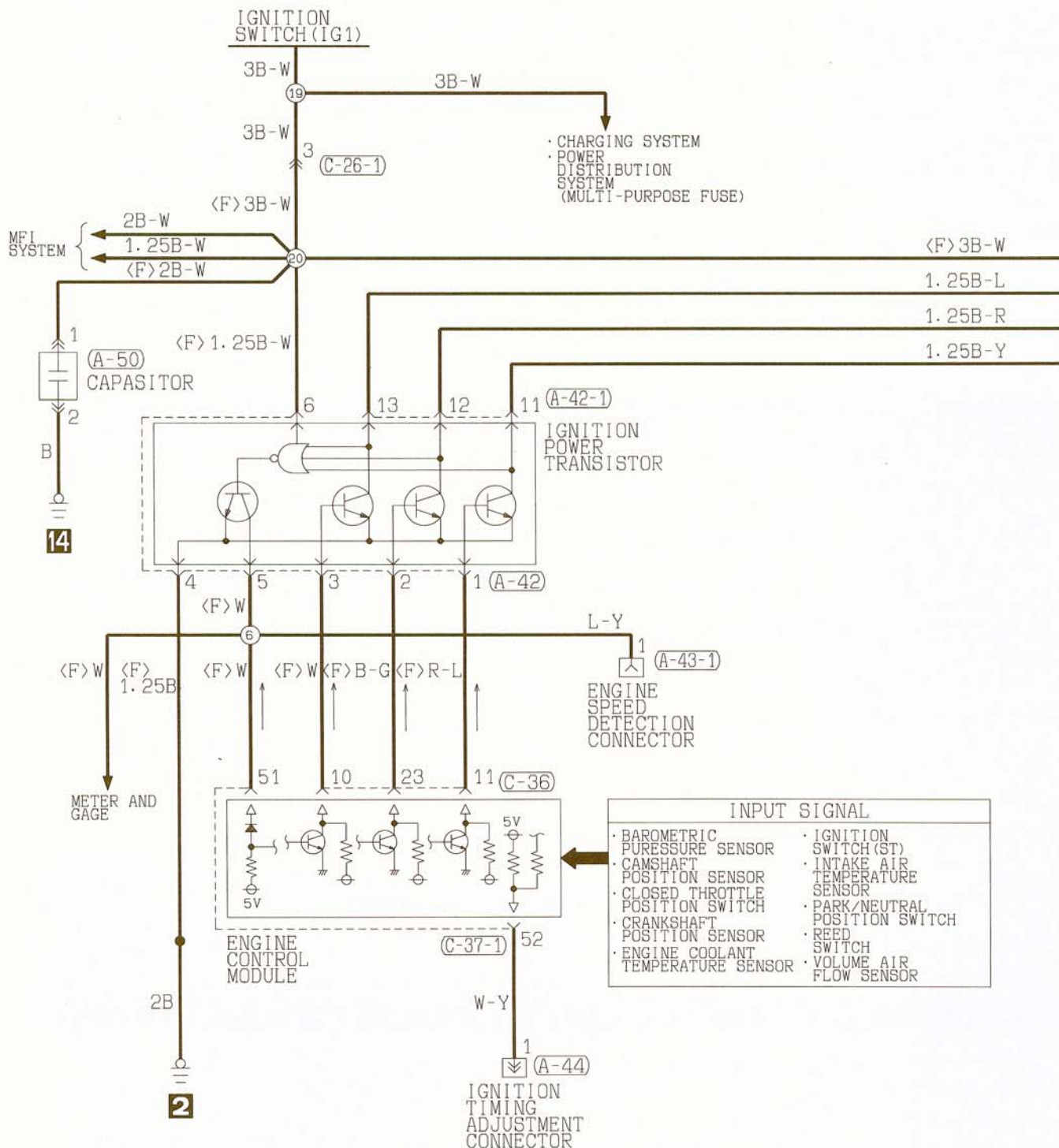
90100060117

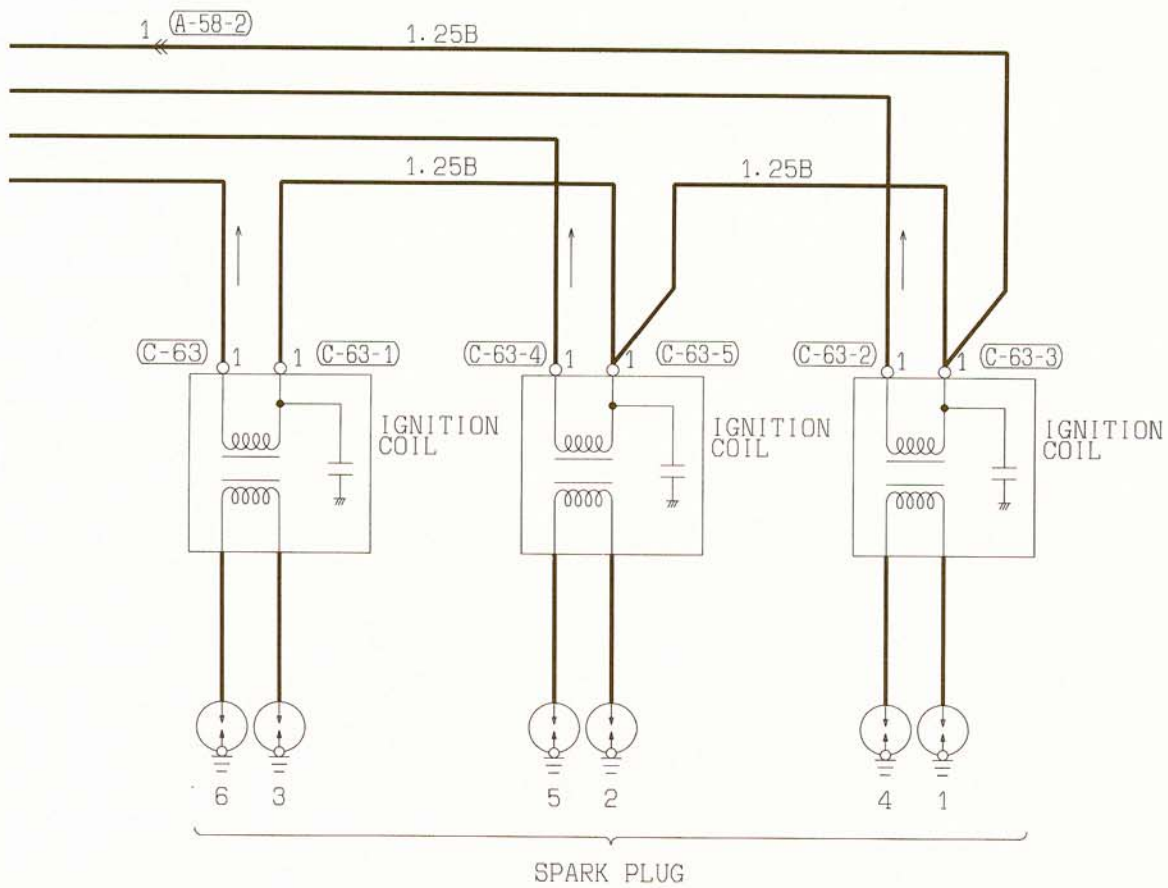




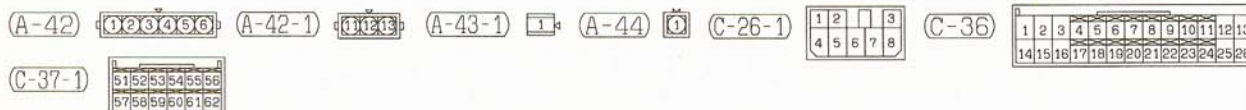
## 3.0L-24 VALVE engine

90100060124

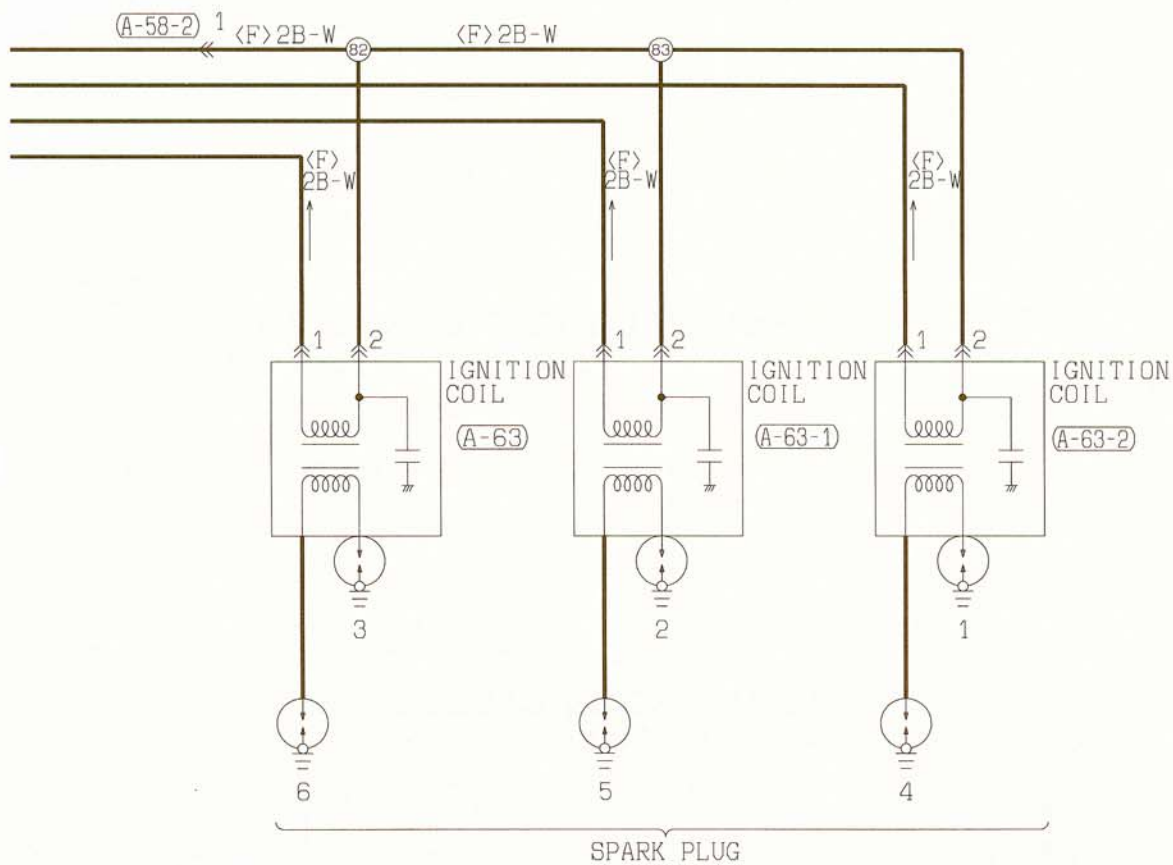








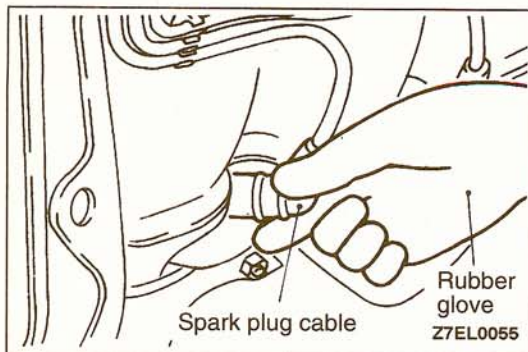
(A-58-2) (C-63) (C-63-1) (C-63-2) (C-63-3) (C-63-4) (C-63-5)







(A-58-2)  (A-63)  (A-63-1)  (A-63-2) 



## ON-VEHICLE SERVICE

16300090068

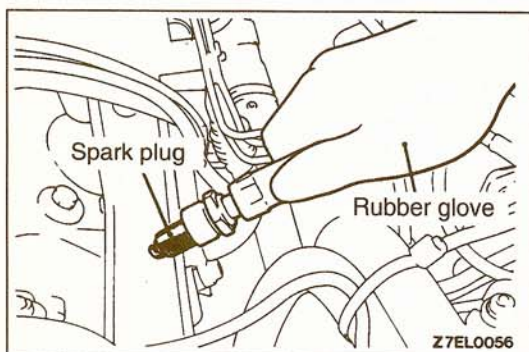
### SPARK PLUG CABLE TEST <3.0L-12 VALVE engine>

- (1) Disconnect each of the spark plug cables one at a time while the engine is idling to check whether the engine's running performance changes or not.

#### Caution

**Wear rubber gloves while doing so.**

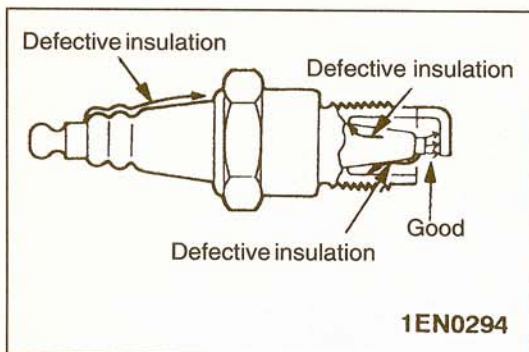
- (2) If the engine performance does not change, check the resistance of the spark plug cable, and check the spark plug itself.



### SPARK PLUG TEST <3.0L-12 VALVE engine>

16300150148

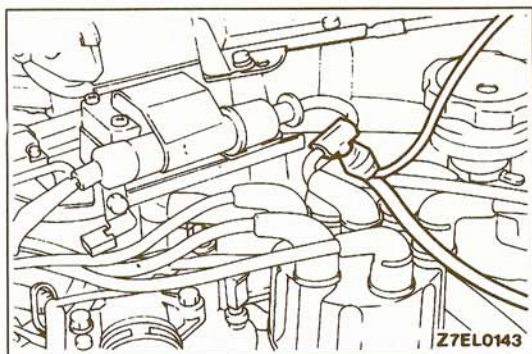
- (1) Remove the spark plug and connect to the spark plug cable.
- (2) Ground the spark plug outer electrode (body), and crank the engine.  
Check that there is an electrical discharge between the electrodes at this time.



### HIGH TENSION CABLE SPARK TEST <3.0L-12 VALVE engine>

16300160011

- (1) Disconnect the high tension cable from the distributor cap.
- (2) Hold the high tension cable about 6–8 mm (.24–.31 in.) away from engine proper (grounding portion such as cylinder block) and crank engine to verify that sparks are produced.

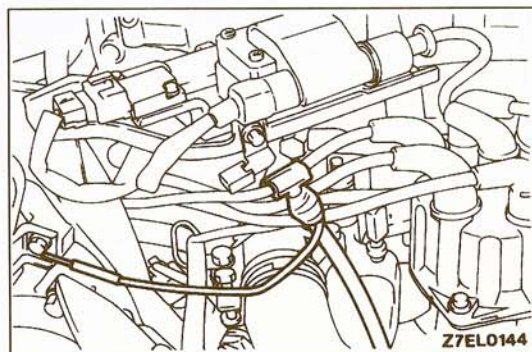
**IGNITION SECONDARY VOLTAGE WAVE PATTERN CHECK**

16300170168

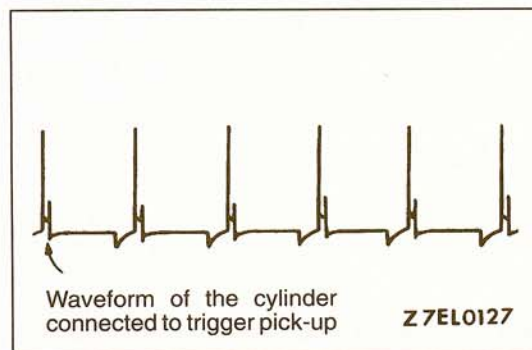
&lt;3.0L-12 VALVE engine&gt;

**MEASUREMENT METHOD**

- (1) Clamp the secondary pick-up around the high tension cable.



- (2) Clamp the spark plug cable with the trigger pick-up.  
(Basically, clamp the No. 1 cylinder spark plug cable.)

**NOTE**

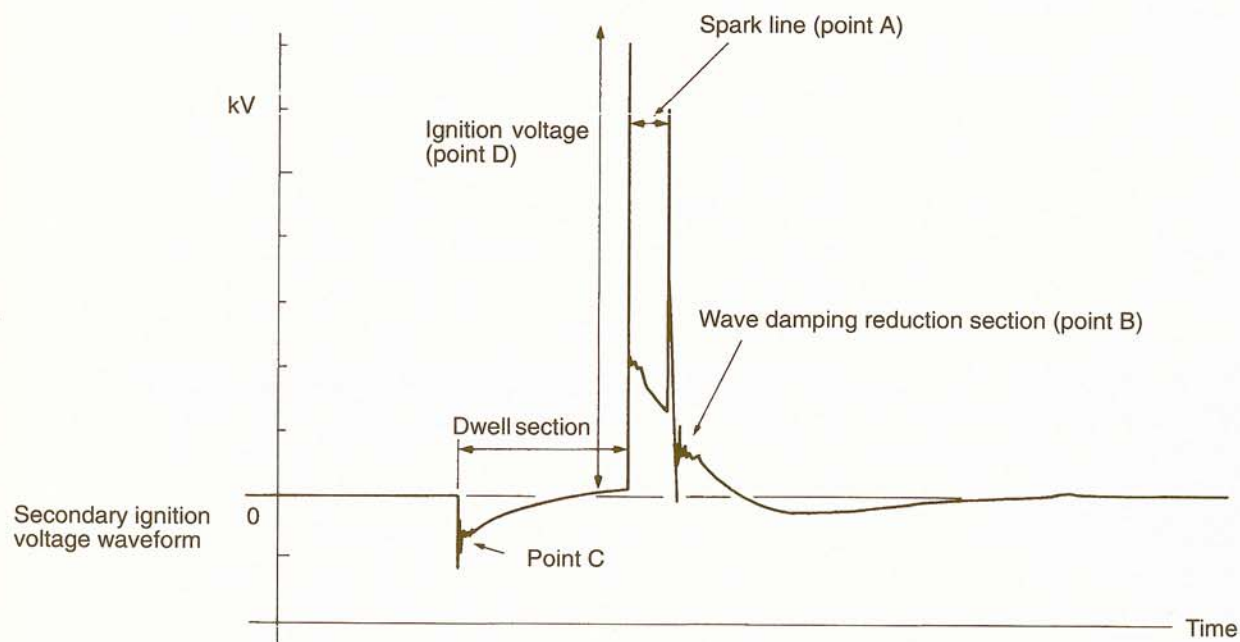
The cylinder waveform taken by the trigger pick-up appears from the left side of the screen.



## STANDARD WAVEFORM

## Observation conditions

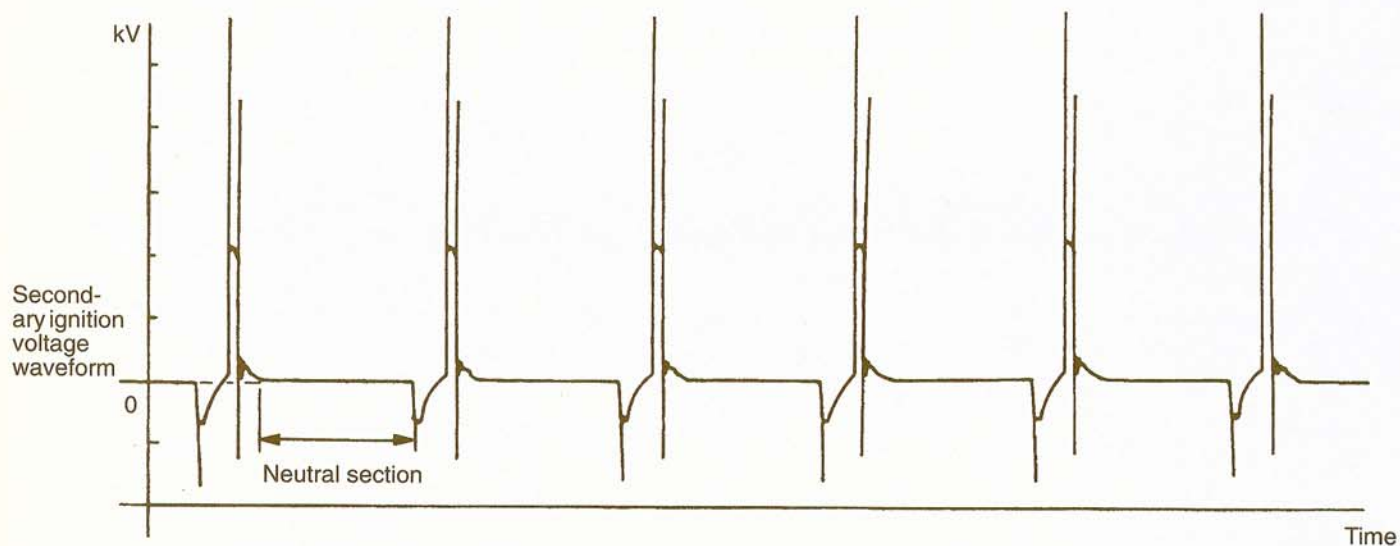
FUNCTION	SECONDARY
PATTERN HEIGHT	HIGH (or LOW)
PATTERN SELECTOR	RASTER
Engine revolutions	Curb idle speed



7EL0128

Observation conditions (Only PATTERN SELECTOR below changes from the above conditions.)

PATTERN SELECTOR	DISPLAY
------------------	---------



Y7EL0129

**WAVEFORM OBSERVATION POINTS**

(Point A): The height, length and slope of the spark line (refer to abnormal waveform examples 1, 2, 3 and 4) show the following trends.

Spark line		Plug gap	Condition of electrode	Compression pressure	Concentration of air mixture	Ignition timing	Spark plug cable
Length	Long	Small	Normal	Low	Rich	Advanced	Leak
	Short	Large	Large wear	High	Lean	Retarded	High resistance
Height	High	Large	Large wear	High	Lean	Retarded	High resistance
	Low	Small	Normal	Low	Rich	Advanced	Leak
Slope		Large	Plug is fouled	—	—	—	—

(Point B): Number of vibrations in reduction vibration section  
(Refer to abnormal waveform example 5.)

Number of vibrations	Coil and condenser
Three or more	Normal
Except above	Abnormal

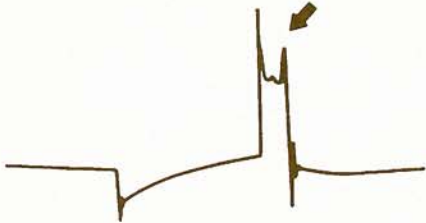

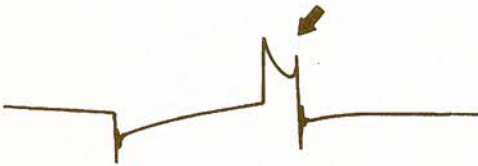

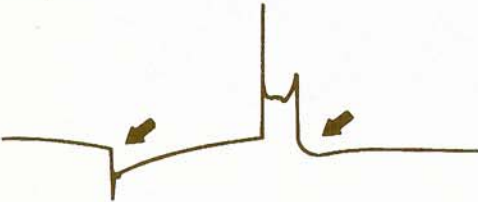
(Point C): Number of vibrations at beginning of dwell section  
(Refer to abnormal waveform example 5.)

Number of vibrations	Coil
5–6 or higher	Normal
Except above	Abnormal

(Point D): Ignition voltage height (deviation per each cylinder) shows the following trends.

Ignition voltage	Plug gap	Condition of electrode	Compression pressure	Concentration of air mixture	Ignition timing	Spark plug cable
High	Large	Large wear	High	Lean	Retarded	High resistance
Low	Small	Normal	Low	Rich	Advanced	Leak

## ABNORMAL WAVEFORMS EXAMPLES

Abnormal waveforms	Wave characteristics	Cause of problem
<p>Example 1</p>  <p>Z01P0215</p>	Spark line is high and short.	Spark plug gap is too large.
<p>Example 2</p>  <p>Z01P0216</p>	Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of misfiring.	Spark plug gap is too small.
<p>Example 3</p>  <p>Z01P0217</p>	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
<p>Example 4</p>  <p>Z01P0218</p>	Spark line is high and short. Difficult to distinguish between this and abnormal wave pattern example 1.	Spark plug cable is nearly falling off, causing a dual ignition.
<p>Example 5</p>  <p>Z01P0219</p>	No waves in wave damping section	Rare short-circuit in ignition coil.



## &lt;3.0L-24 VALVE engine, 3.5L engine&gt;

**MEASUREMENT METHOD**

- (1) Clamp the spark plug cable (No. 1, No. 3 or No. 5) with the secondary pick-up.

**NOTE**

1. Because of the two-cylinder simultaneous ignition system, the waves for two cylinders in each group appear during wave observation. However, wave observation is carried out for the cylinder (No. 1, No. 3 or No. 5) with the spark plug cable which has been clamped by the secondary pick-up.
  2. Identification of which cylinder waveform is displayed can be difficult, but the waveform of the cylinder which is clamped by the secondary pick-up will be stable, so this can be used as a reference for identification.
- (2) Clamp the spark plug cable (No. 1, No. 3 or No. 5) with the trigger pick-up.

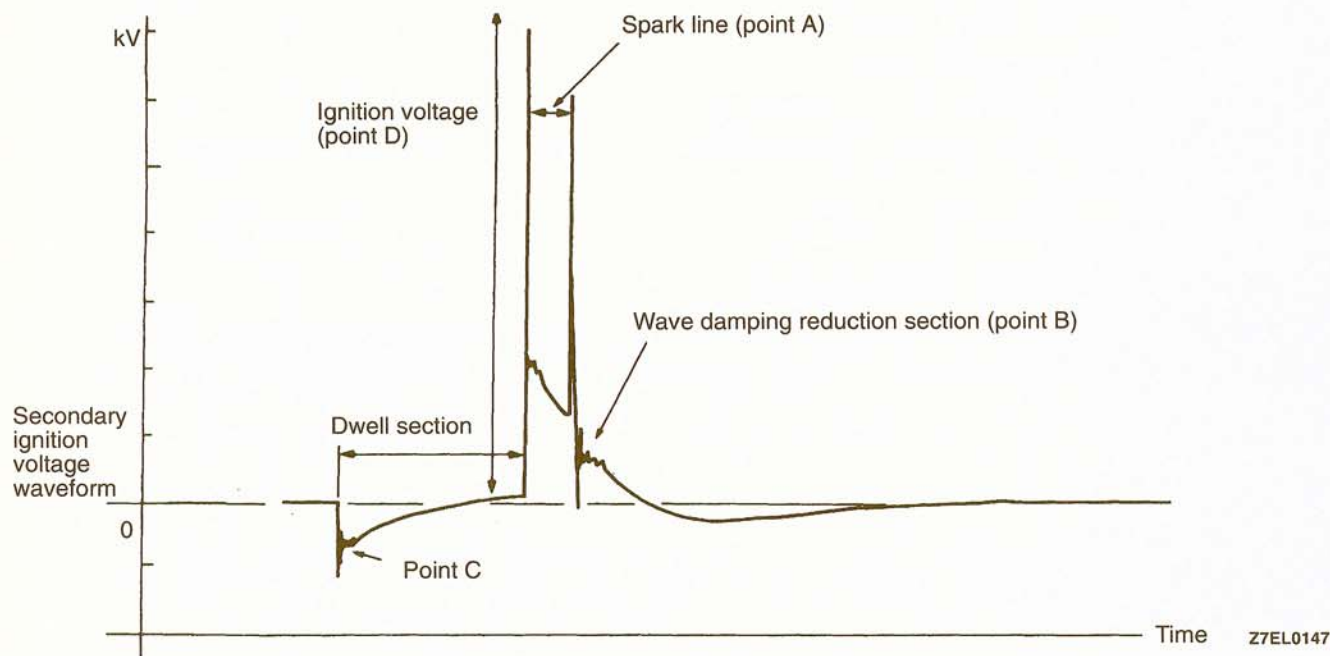
**NOTE**

Clamp the same spark plug cable as the one which has been clamped by the secondary pick-up.

## STANDARD WAVEFORM

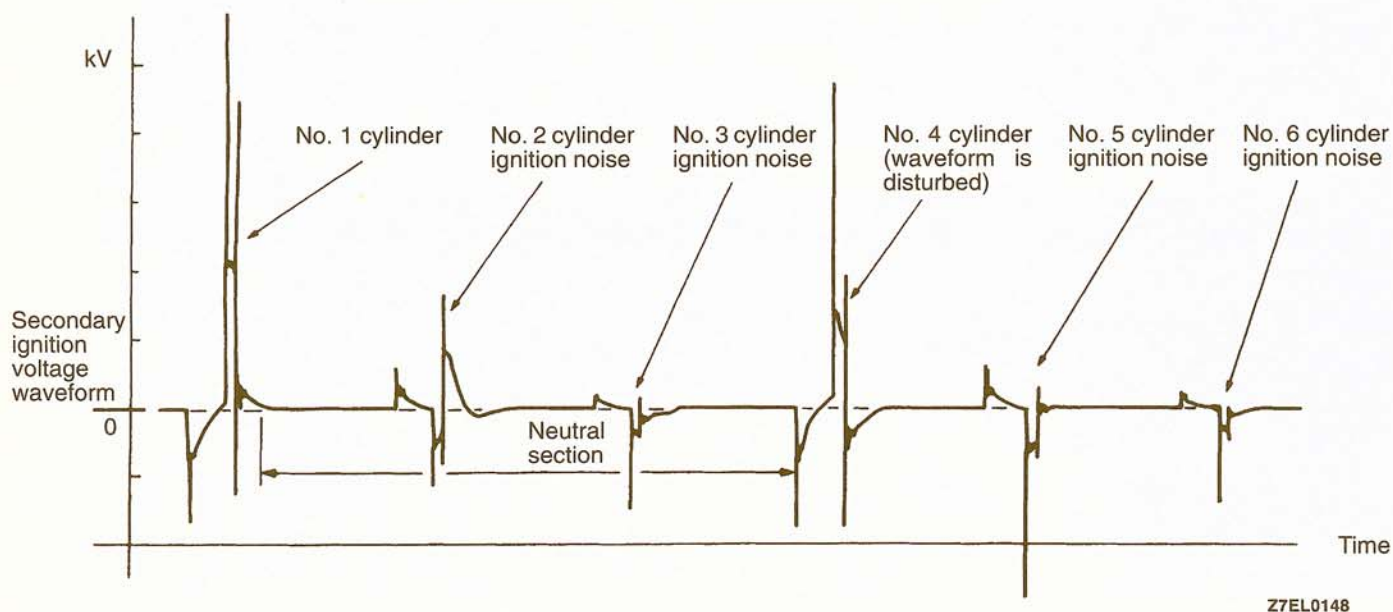
## Observation conditions

FUNCTION	SECONDARY
PATTERN HEIGHT	HIGH (or LOW)
PATTERN SELECTOR	RASTER
Engine revolutions	Curb idle speed



## Observation conditions (Only PATTERN SELECTOR below changes from the above conditions.)

PATTERN SELECTOR	DISPLAY
------------------	---------

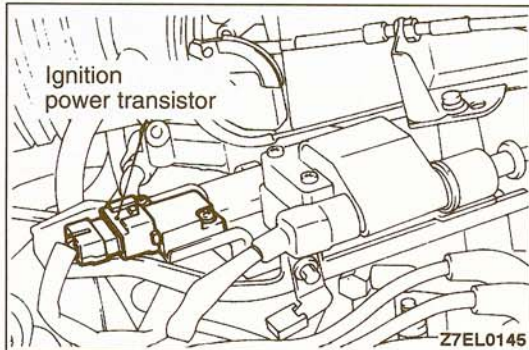


**WAVEFORM OBSERVATION POINTS**

For waveform observation points, refer to P.16-39.

**ABNORMAL WAVEFORMS EXAMPLES**

For examples of abnormal waveforms, refer to P.16-40.

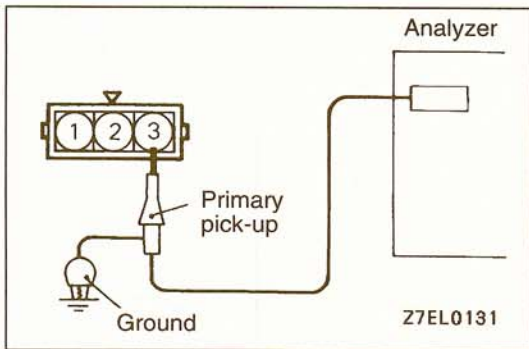
**IGNITION PRIMARY VOLTAGE WAVE PATTERN CHECK**

16300170175

<3.0L-12 VALVE engine>

**MEASUREMENT METHOD**

- (1) Remove the ignition power transistor connector and connect the special tool (Harness connector: MB991348) in between. All terminals should be connected.



- (2) Connect the primary pick-up of the adjuster to ignition power transistor connector terminal (3).
- (3) Ground the primary pick-up ground terminal.
- (4) Clamp the spark plug cable with the trigger pick-up.

**NOTE**

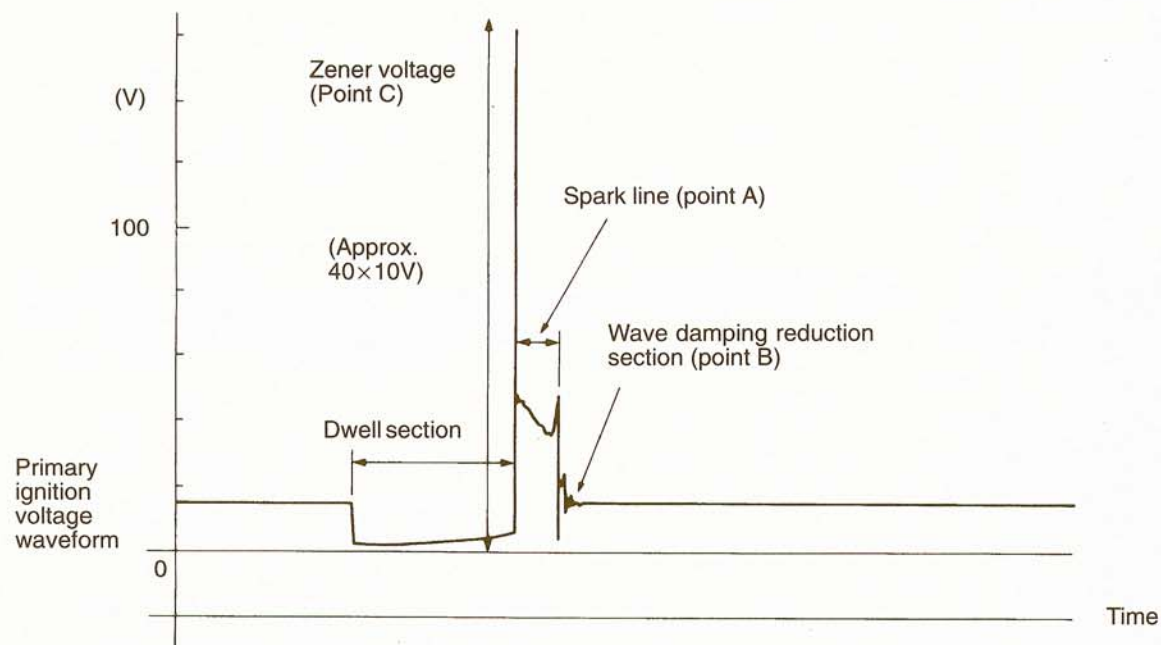
The waveform of the cylinder clamped by the trigger pick-up appears from the left side of the screen.



## STANDARD WAVEFORM

## Observation conditions

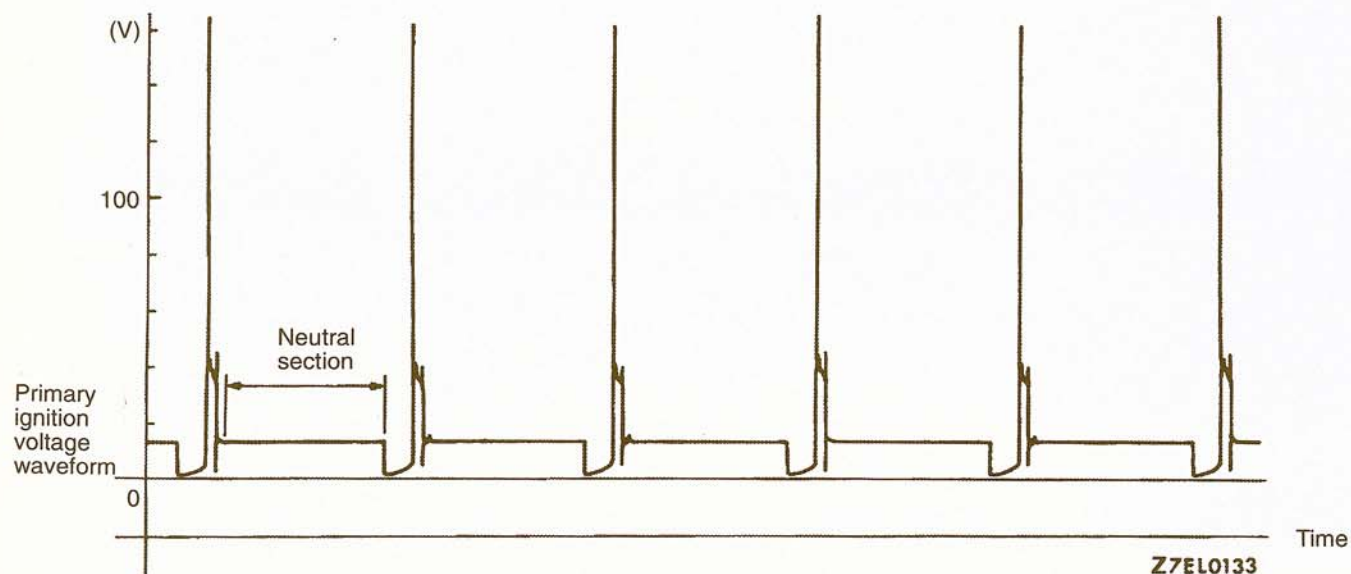
FUNCTION	PRIMARY
PATTERN HEIGHT	HIGH (or LOW)
PATTERN SELECTOR	RASTER
Engine revolutions	Curb idle speed



7EL0132

Observation conditions (Only PATTERN SELECTOR below changes from the above conditions.)

PATTERN SELECTOR	DISPLAY
------------------	---------



Z7EL0133

**WAVEFORM OBSERVATION POINTS**

(Point A): The height, length and slope of the spark line (refer to abnormal waveform examples 1, 2, 3 and 4) show the following trends.

Spark line		Plug gap	Condition of electrode	Compression pressure	Concentration of air mixture	Ignition timing	Spark plug cable
Length	Long	Small	Normal	Low	Rich	Advanced	Leak
	Short	Large	Large wear	High	Lean	Retarded	High resistance
Height	High	Large	Large wear	High	Lean	Retarded	High resistance
	Low	Small	Normal	Low	Rich	Advanced	Leak
Slope		Large	Plug is fouled	—	—	—	—


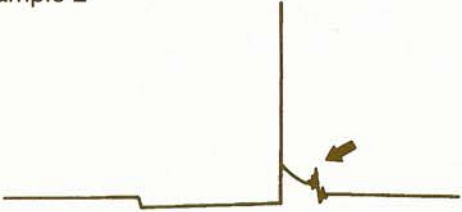
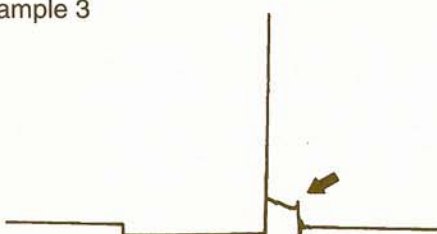
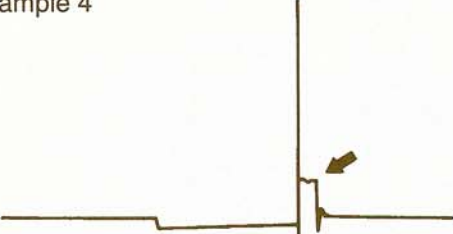
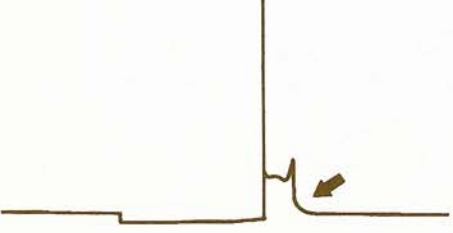
(Point B): Number of vibrations in reduction vibration section  
(Refer to abnormal waveform example 5.)

Number of vibrations	Coil and condenser
5–6 or higher	Normal
Except above	Abnormal

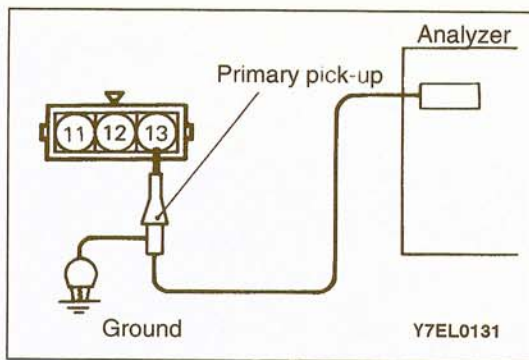
(Point C): Height of Zener voltage

Height of Zener voltage	Coil and condenser
Higher	Problem in Zener diode
Low	Abnormal resistance in primary coil circuit

## ABNORMAL WAVEFORMS EXAMPLES

Abnormal waveforms	Wave characteristics	Cause of problem
<p>Example 1</p>  <p>Z01P0210</p>	Spark line is high and short.	Spark plug gap is too large.
<p>Example 2</p>  <p>Z01P0211</p>	Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of misfiring.	Spark plug gap is too small.
<p>Example 3</p>  <p>Z01P0212</p>	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
<p>Example 4</p>  <p>Z01P0213</p>	Spark line is high and short.	Spark plug cable is nearly falling off, causing a dual ignition.
<p>Example 5</p>  <p>Z01P0214</p>	No waves in wave damping section	Rare short-circuit in ignition coil.





## &lt;3.0L-24 VALVE engine, 3.5L engine&gt;

## MEASUREMENT METHOD

- (1) Disconnect the ignition power transistor connector and connect the special tool (Harness connector: MB991348) in between. All terminals should be connected.
- (2) When observing the No. 1–No. 4 cylinder group, connect the primary pick-up of the analyzer probe to power transistor side connector terminal (13). For the No. 2–No. 5 cylinder group, connect to terminal (12) and for the No. 3–No. 6 cylinder group, connect to terminal (11).
- (3) Ground the primary pick-up ground terminal.
- (4) Clamp the spark plug cable with the trigger pick-up.

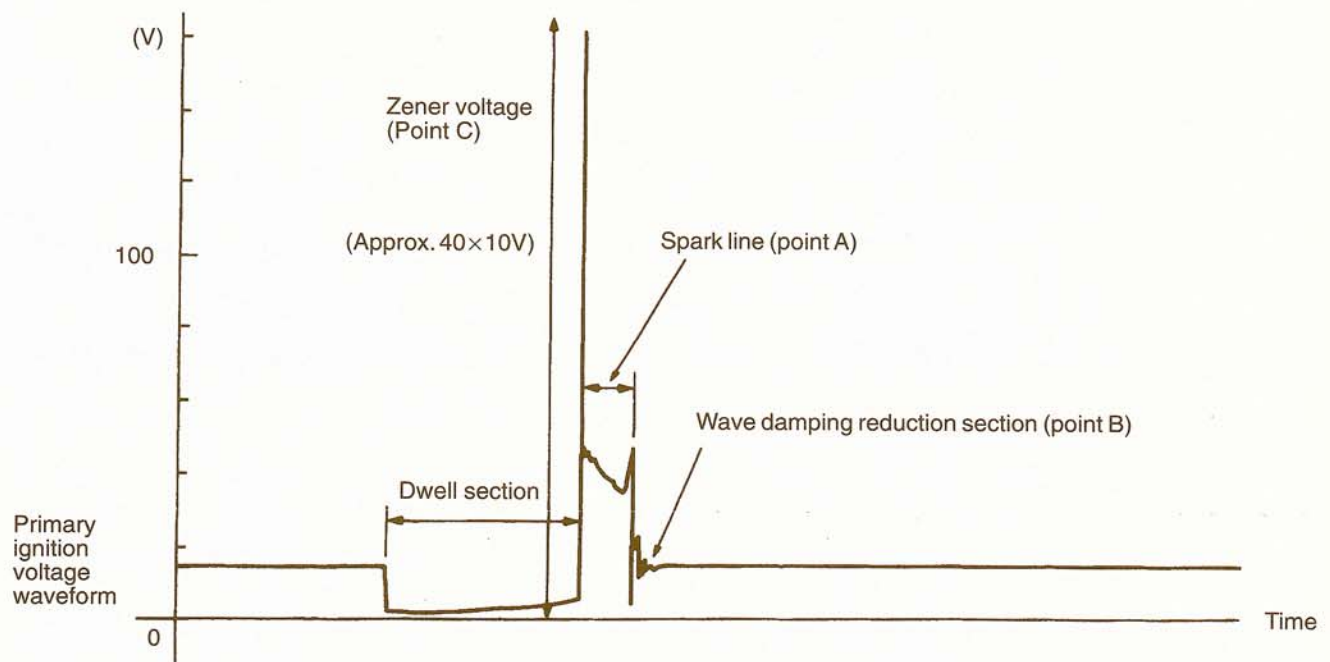
## NOTE

- (1) Clamp the spark plug cable of cylinder No. 1, No. 3 or No. 5 which belongs to the same group as the cylinder to which the primary pick-up is connected.
- (2) The waveform of any cylinder in the same group appears from the left side of the screen.

## STANDARD WAVEFORM

## Observation conditions

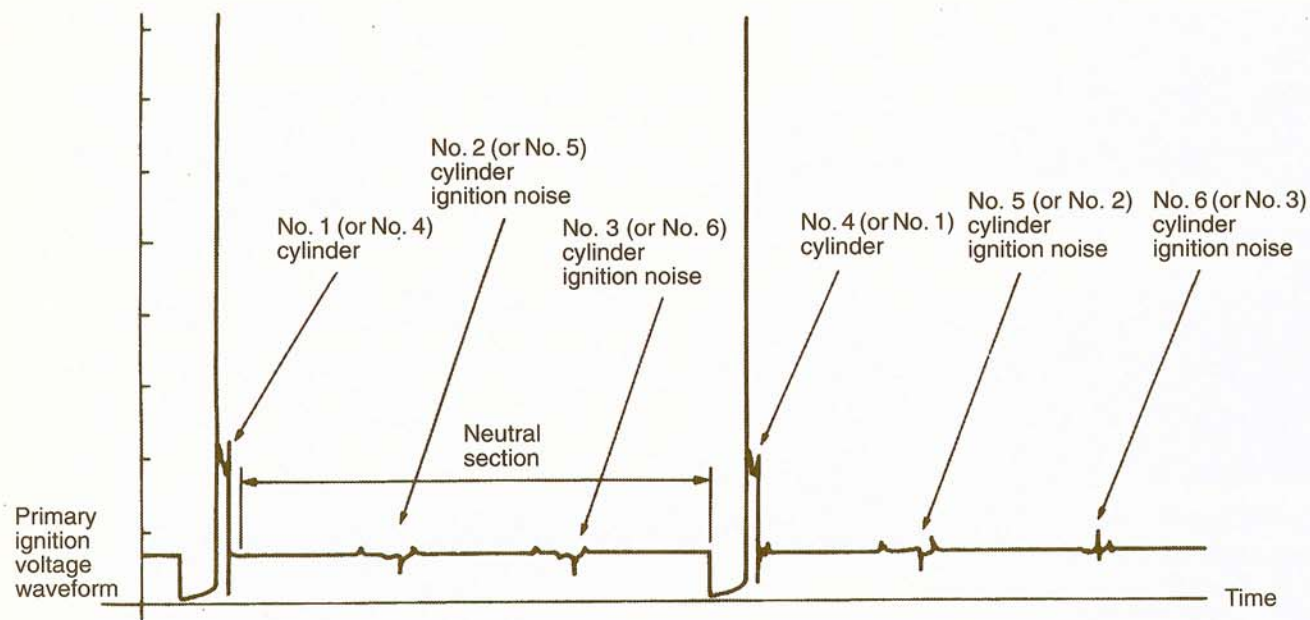
FUNCTION	SECONDARY
PATTERN HEIGHT	HIGH (or LOW)
PATTERN SELECTOR	RASTER
Engine revolutions	Curb idle speed



Z7EL0149

Observation conditions (Only PATTERN SELECTOR below changes from the above conditions.)

PATTERN SELECTOR	DISPLAY
------------------	---------



Z7EL0151

#### WAVEFORM OBSERVATION POINTS

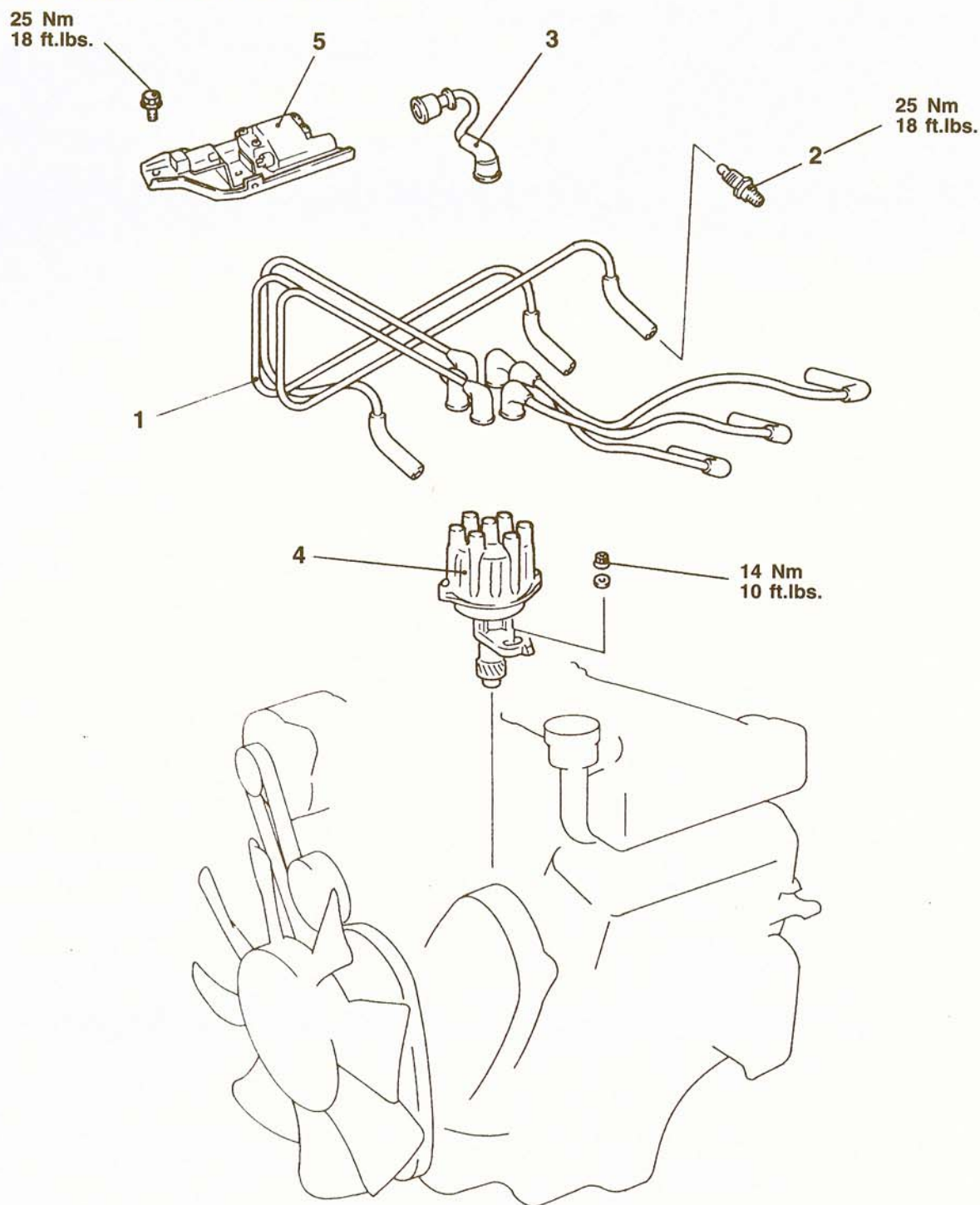
For waveform observation points, refer to P.16-45.

#### ABNORMAL WAVEFORMS EXAMPLES

For examples of abnormal waveforms, refer to P.16-46.

**IGNITION SYSTEM <3.0L-12 VALVE engine>**

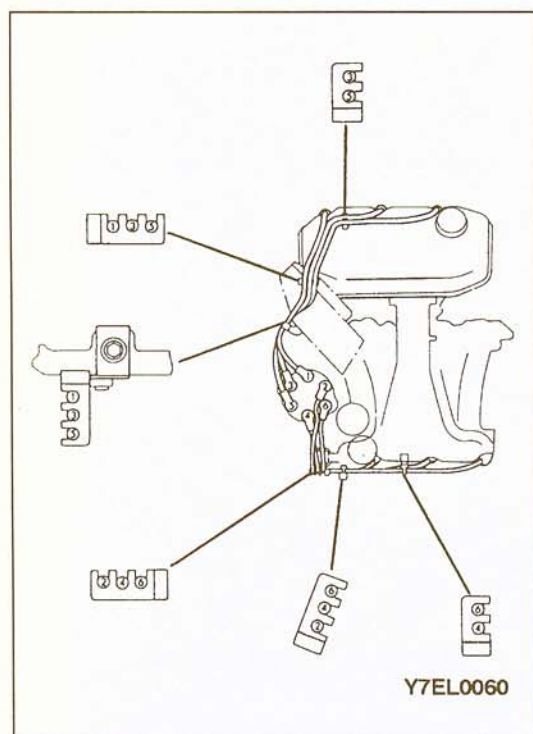
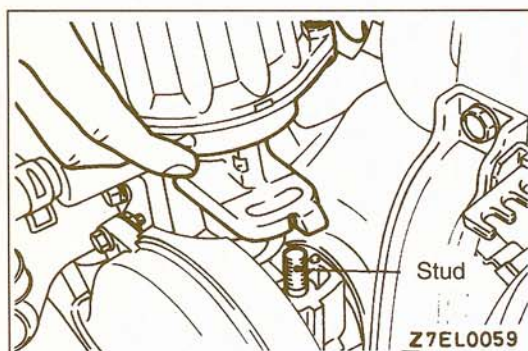
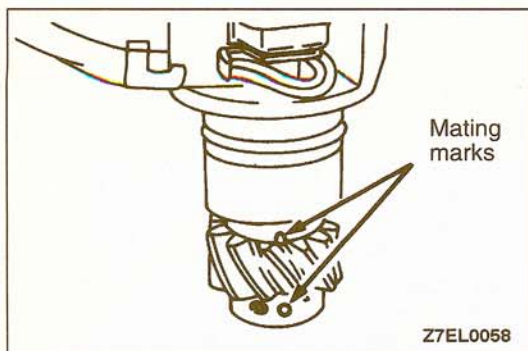
16300320075

**REMOVAL AND INSTALLATION**

Z7EL0061

- B◄ 1. Spark plug cable  
2. Spark plug  
3. High tension cable  
►A◄ 4. Distributor  
5. Ignition coil assembly





## INSTALLATION SERVICE POINTS

### ►A◄ DISTRIBUTOR INSTALLATION

- (1) Turn the crankshaft so that the No. 1 cylinder is at compression top dead center.

#### Caution

**Be careful not to turn it to the No. 4 cylinder compression top dead center by mistake.**

- (2) Align the distributor housing and gear mating marks.

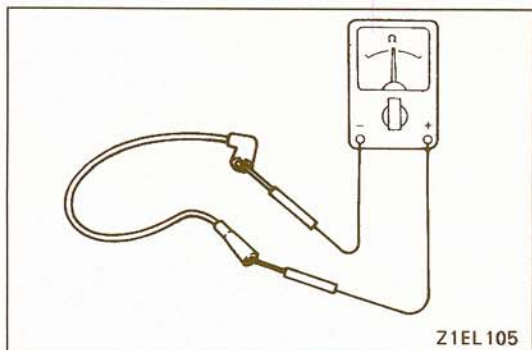
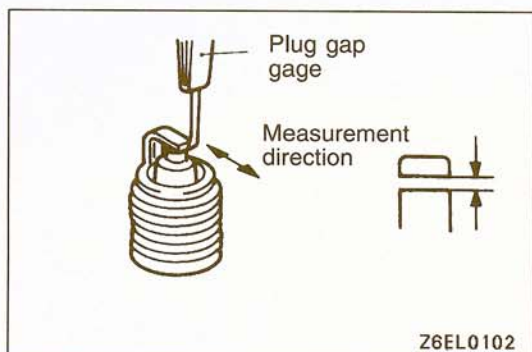
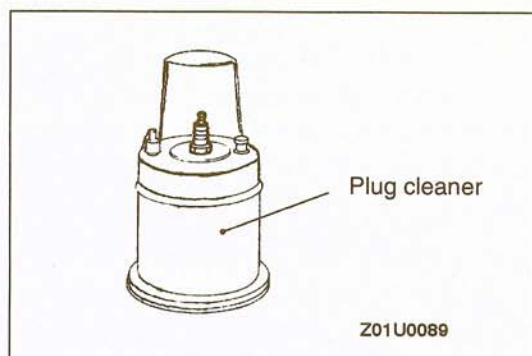
- (3) Install the distributor to the cylinder head.

### ►B◄ SPARK PLUG CABLE INSTALLATION

Improper arrangement of spark plug cables will induce voltage between the cables, causing mis-firing and development of a surge at acceleration in high-speed operation. Therefore, be careful to arrange the spark plug cables properly by the following procedure.

1. Install the spark plug cable clamps as shown in the illustration.
2. The numerals on the support and clamp indicate the spark plug cable No.
3. Pay attention to the following items when the spark plug cables are installed.
  - (1) Install the cables securely to avoid possible contact with metal parts.
  - (2) Install the cables neatly, ensuring they are not too tight, loose, twisted or kinked.

16300330016



## INSPECTION

### SPARK PLUGS

- (1) Check the following items to see that electrodes are not burnt, insulators are not broken, and to what extent the porcelain insulator is burnt.

- Broken insulators
- Worn electrodes
- Deposited carbon

For cleaning, use a plug cleaner or wire brush. Clean the porcelain insulator above the shell as well.

- Damaged or broken gasket
- Burnt condition of porcelain insulator at spark gap. Dark deposit of carbon indicates too rich a fuel mixture or extremely low air intake. Also, misfiring due to excessive spark gap is suspected. White burning indicates too lean a fuel mixture or excessively advanced ignition timing. Also insufficient plug tightening is suspected.

- (2) Clean with a plug cleaner. Use an air gun to remove the dust which is deposited on plug threads.

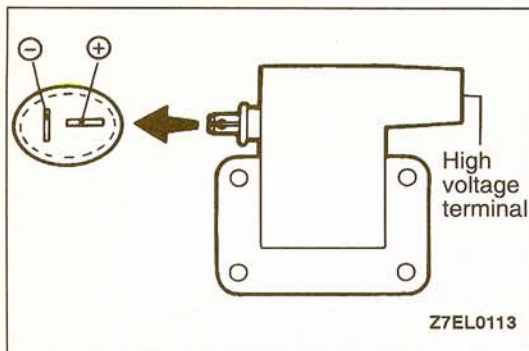
- (3) Use a plug gap gage to check the plug gap, and adjust the gap if it is not at the standard value.

### SPARK PLUG CABLE

- (1) Check the cap and coating for cracks.  
(2) Measure resistance.

**Limit: max. 22 k $\Omega$**



**IGNITION COIL****Primary Coil Resistance**

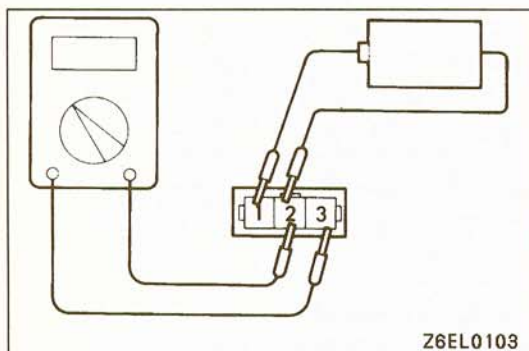
Measure the resistance at the positive (+) terminal and negative (-) terminal of the ignition coil.

**Standard value: 0.72–0.88  $\Omega$**

**Secondary Coil Resistance**

Measure the resistance at the positive (+) terminal and the high voltage terminal.

**Standard value: 10.3–13.9 k $\Omega$**

**IGNITION POWER TRANSISTOR****NOTE**

An analog-type ohmmeter should be used.

- (1) Connect the negative (-) terminal of the 1.5 V power supply to terminal (2) of the ignition power transistor, and then check whether there is continuity between terminal (3) and terminal (2) when terminal (1) and the positive (+) terminal are connected and disconnected.

**NOTE**

Connect the (-) probe of the ohmmeter to terminal (3).

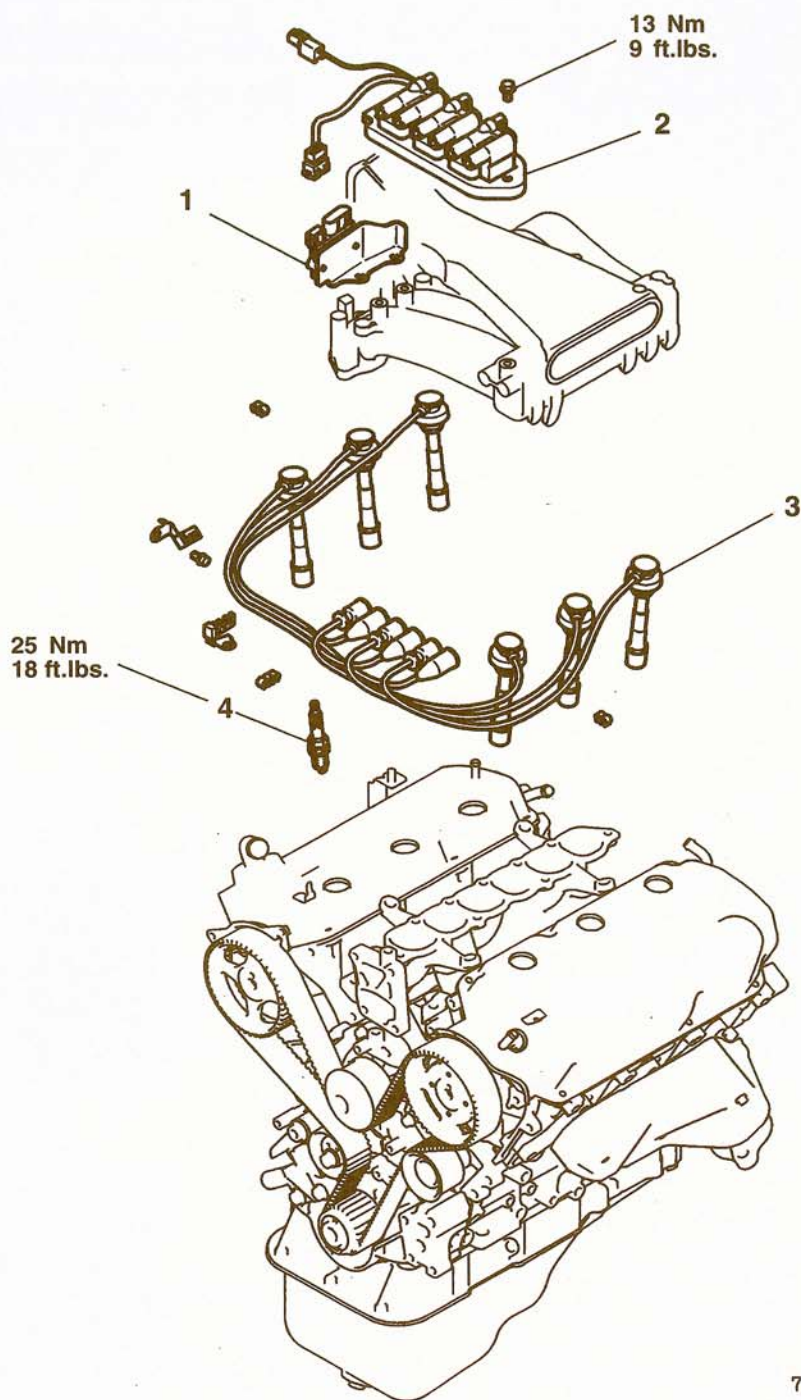
Terminal (1) and (+) terminal	Terminal (3) and terminal (2).
Connected	Continuity
Disconnected	No continuity

- (2) Replace the ignition power transistor if there is a malfunction.



**IGNITION SYSTEM <3.0L-24 VALVE engine>****REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operations**

- Air Intake Plenum Removal and Installation  
(Refer to GROUP 15 – Intake Manifold.)

**Removal steps**

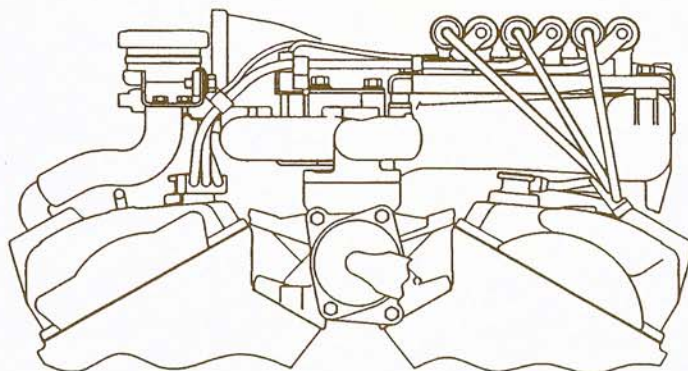
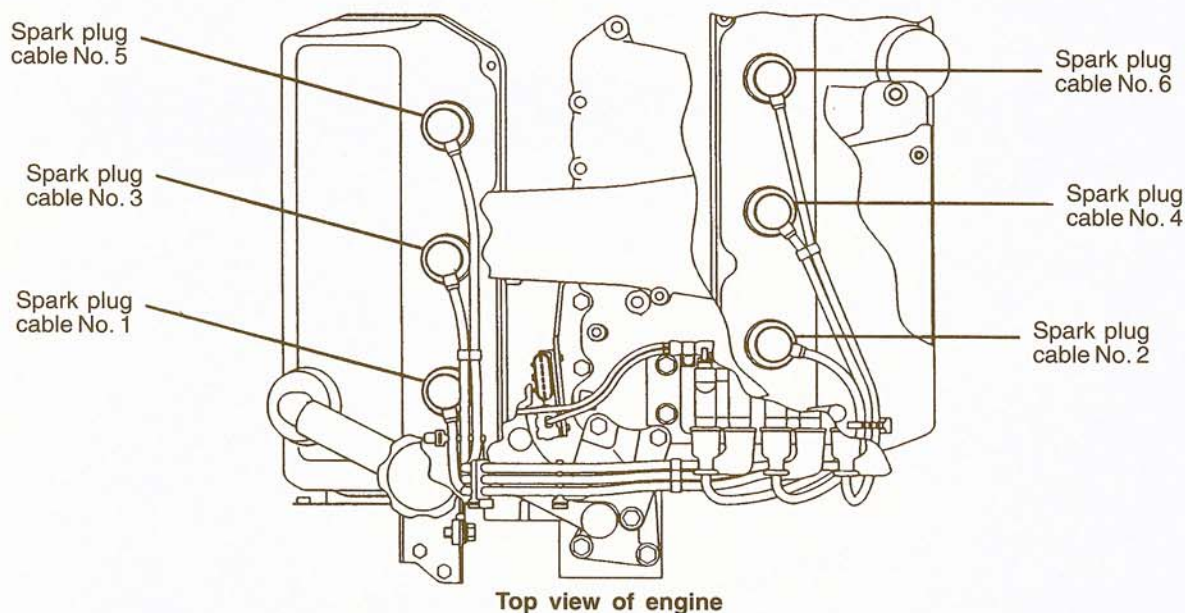
1. Ignition power transistor
2. Ignition coil

- ▶ A ◀
3. Spark plug cable
  4. Spark plug

**INSTALLATION SERVICE POINTS****▶A◀ SPARK PLUG CABLE INSTALLATION**

Improper arrangement of spark plug cables will induce voltage between the cables, causing mis-firing and developing a surge at acceleration in high-speed operation. Therefore, be careful to arrange the spark plug cables properly by the following procedure.

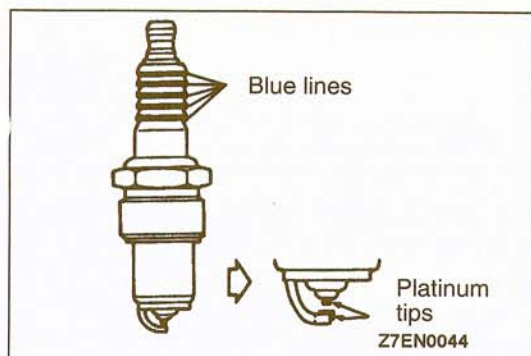
1. Install the spark plug cable clamps as shown in the illustration.
2. The numerals on the support and clamp indicate the spark plug cable No.
3. Pay attention to the following items when the spark plug cables are installed.
  - (1) Install the cables securely to avoid possible contact with metal parts.
  - (2) Install the cables neatly, ensuring they are not too tight, loose, twisted or kinked.



7EN0766



16300330023

**INSPECTION****SPARK PLUGS**

Check the plug gap and replace if the limit is exceeded.

**Standard value:** 1.0–1.1 mm (.039–.043 in.)

**Limit:** 1.3 mm (.051 in.)

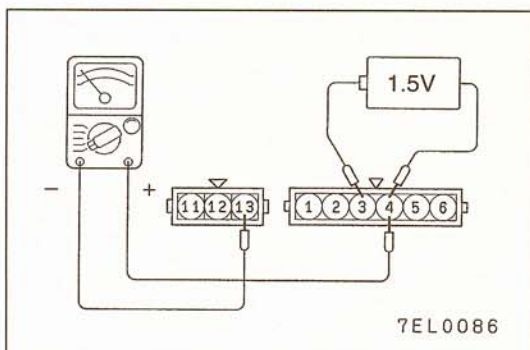
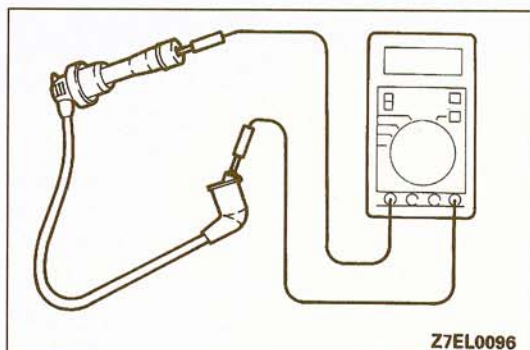
**Caution**

1. Do not attempt to adjust the gap of the platinum plug.
2. Cleaning of the platinum plug may result in damage to the platinum tips. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

**SPARK PLUG CABLE**

- (1) Check the cap and coating for cracks.
- (2) Measure resistance.

**Limit:** max. 22 k $\Omega$

**IGNITION POWER TRANSISTOR****NOTE**

An analog-type circuit tester should be used.

**No. 1–No. 4 coil side**

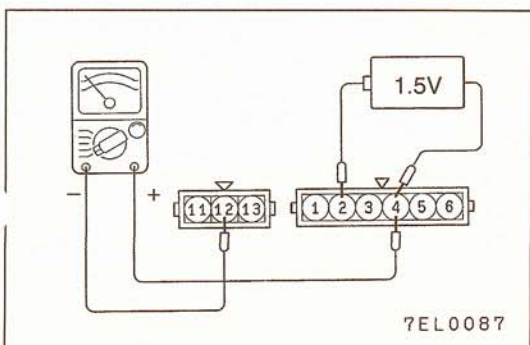
- (1) Connect the negative (–) terminal of the 1.5 V power supply to terminal (4) of the ignition power transistor, and then check whether there is continuity between terminal (13) and terminal (4) when terminal (3) and the positive (+) terminal are connected and disconnected.

**NOTE**

Connect the (–) probe of the circuit tester to terminal (13).

Terminal (3) and (+) terminal	Terminal (13) and terminal (4)
Connected	Continuity
Unconnected	No continuity

- (2) Replace the ignition power transistor if there is a malfunction.

**No. 2–No. 5 coil side**

- (1) Connect the negative (–) terminal of the 1.5 V power supply to terminal (4) of the ignition power transistor, and then check whether there is continuity between terminal (12) and terminal (4) when terminal (2) and the positive (+) terminal are connected and disconnected.

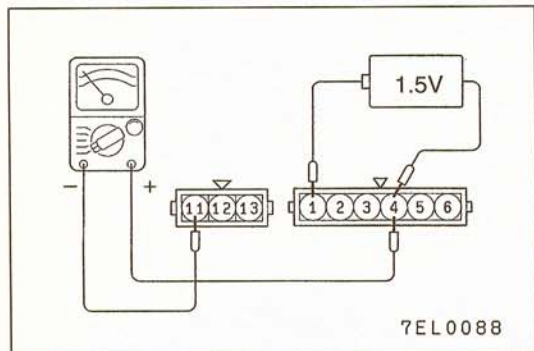
**NOTE**

Connect the (–) probe of the circuit tester to terminal (12).



Terminal (2) and (+) terminal	Terminal (12) and terminal (4)
Connected	Continuity
Unconnected	No continuity

- (2) Replace the ignition power transistor if there is a malfunction.



#### No. 3–No. 6 coil side

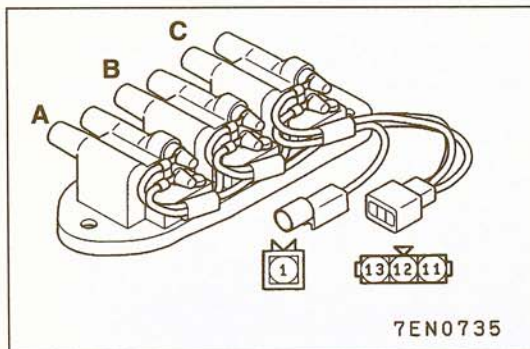
- (1) Connect the negative (–) terminal of the 1.5 V power supply to terminal (4) of the ignition power transistor, and then check whether there is continuity between terminal (11) and terminal (4) when terminal (1) and the positive (+) terminal are connected and disconnected.

#### NOTE

Connect the (–) probe of the circuit tester to terminal (11).

Terminal (1) and (+) terminal	Terminal (11) and terminal (4)
Connected	Continuity
Unconnected	No continuity

- (2) Replace the ignition power transistor if there is a malfunction.



#### IGNITION COIL

##### Primary Coil Resistance

- (1) Measure the resistance between the terminal (1) of the connector (power source) and terminals of each coil.

##### Measurement points

- A coil (at No.3 – No.6 cylinder) ..... (1) – (11)  
 B coil (at No.1 – No.4 cylinder) ..... (1) – (13)  
 C coil (at No.2 – No.5 cylinder) ..... (1) – (12)

Standard value: 0.67–0.81  $\Omega$

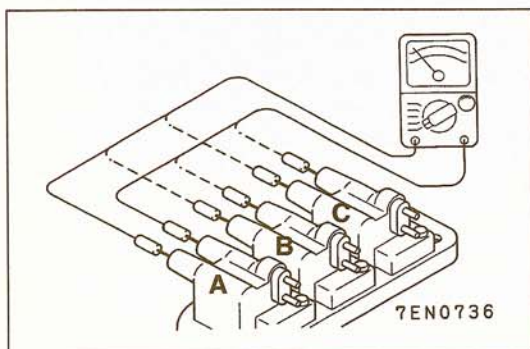
##### Secondary Coil Resistance

- (1) Measure the resistance between each terminal for a high pressure.

##### Measurement points

- No.3 – No.6 cylinder side coil ..... A coil  
 No.1 – No.4 cylinder side coil ..... B coil  
 No.2 – No.5 cylinder side coil ..... C coil

Standard value: 11.3–15.3 k $\Omega$



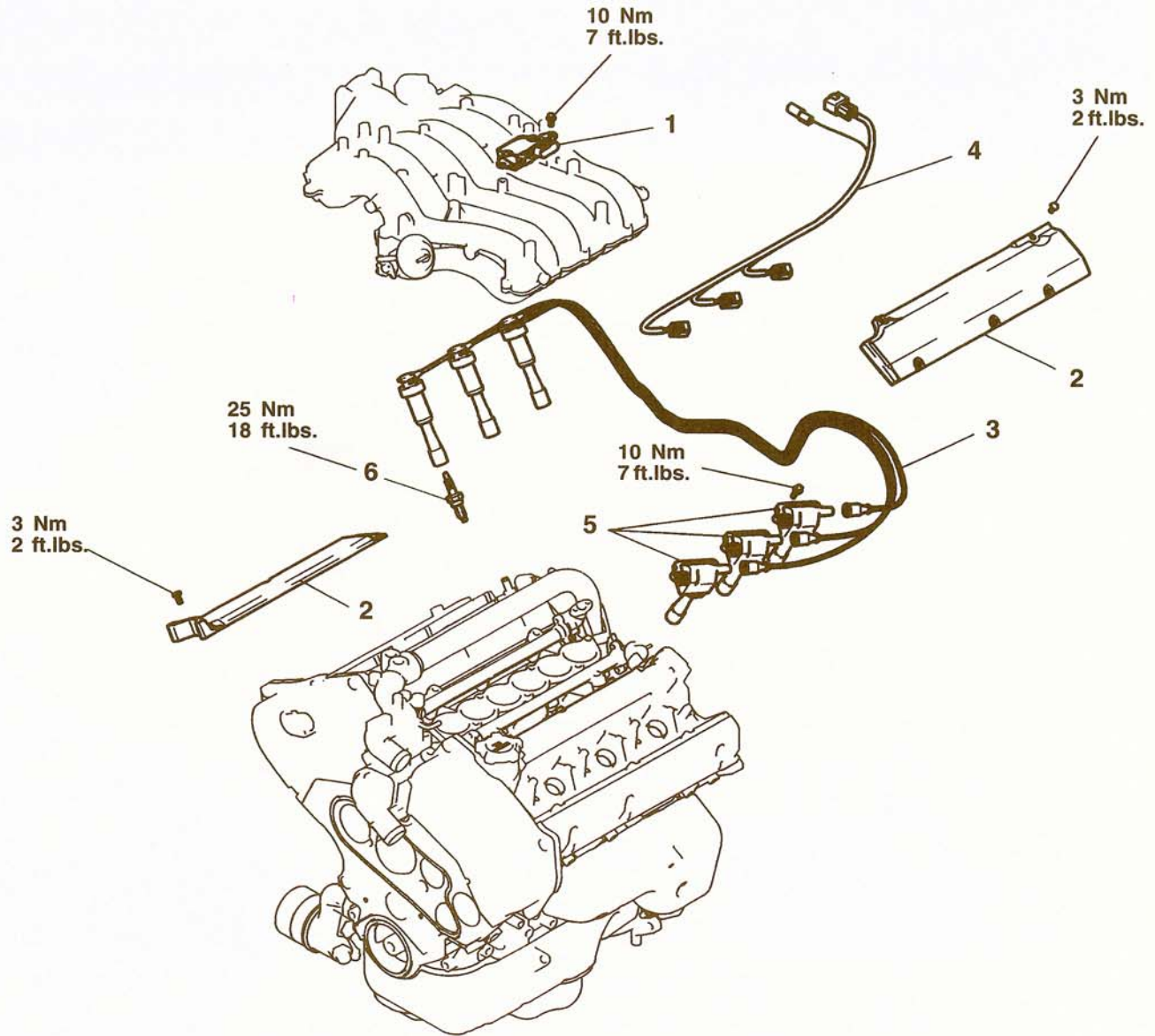
## IGNITION SYSTEM &lt;3.5L engine&gt;

16300320068

## REMOVAL AND INSTALLATION

**Pre-removal and Post-installation Operations**

- Air Intake Plenum Removal and Installation  
(Refer to GROUP 15 – Intake Manifold.)



7EN0945

**Removal steps**

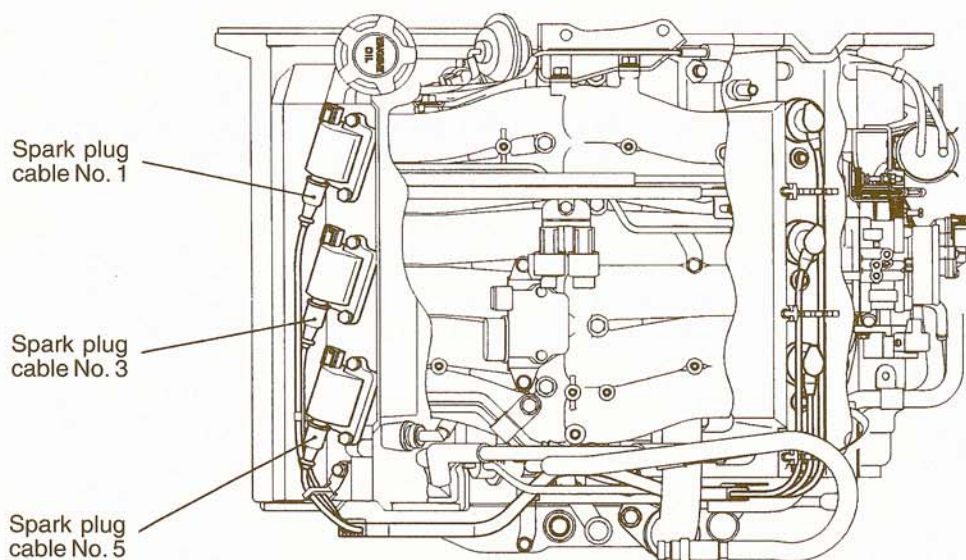
1. Ignition power transistor
2. Center cover
3. Spark plug cable
4. Harness
5. Ignition coil
6. Spark plug



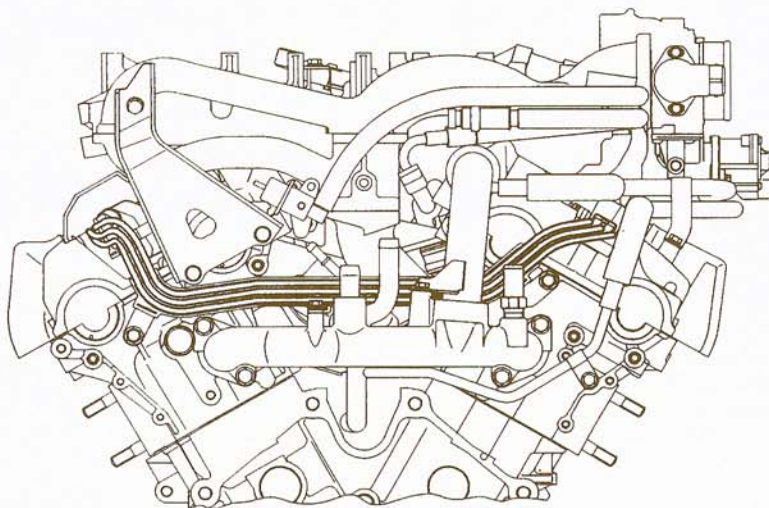
**INSTALLATION SERVICE POINTS****►A◄ SPARK PLUG CABLE INSTALLATION**

Improper arrangement of spark plug cables will induce voltage between the cables, causing mis-firing and developing a surge at acceleration in high-speed operation. Therefore, be careful to arrange the spark plug cables properly by the following procedure.

1. Install the spark plug cable clamps as shown in the illustration.
2. The numerals on the support and clamp indicate the spark plug cable No.
3. Pay attention to the following items when the spark plug cables are installed.
  - (1) Install the cables securely to avoid possible contact with metal parts.
  - (2) Install the cables neatly, ensuring they are not too tight, loose, twisted or kinked.



Top view of engine

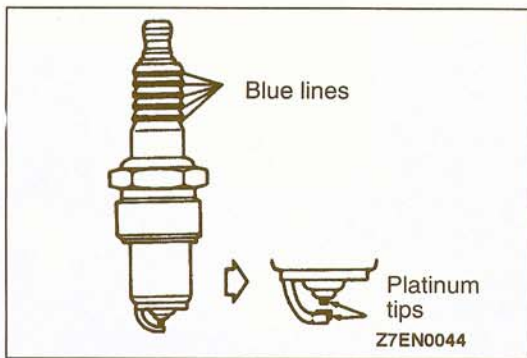


Rear view of engine

7EN0630



16300330030

**INSPECTION****SPARK PLUGS**

Check the plug gap and replace if the limit is exceeded.

**Standard value:** 1.0–1.1 mm (.039–.043 in.)

**Limit:** 1.3 mm (.051 in.)

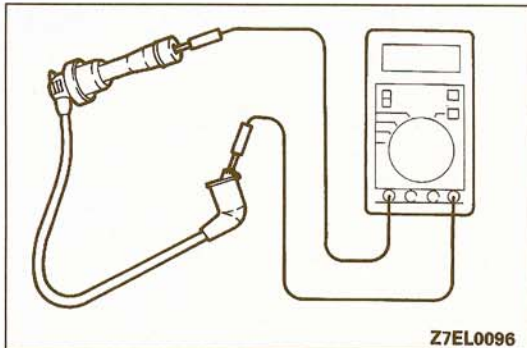
**Caution**

1. Do not attempt to adjust the gap of the platinum plug.
2. Cleaning of the platinum plug may result in damage to the platinum tips. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

**SPARK PLUG CABLE**

- (1) Check the cap and coating for cracks.
- (2) Measure resistance.

**Limit:** max. 26 k $\Omega$

**IGNITION POWER TRANSISTOR****NOTE**

An analog-type circuit tester should be used.

**No. 1–No. 4 coil side**

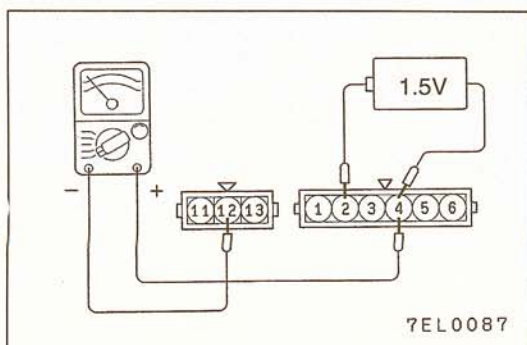
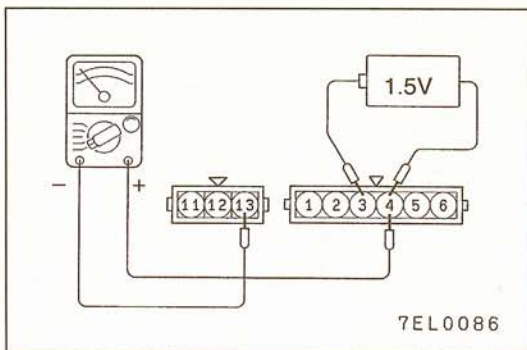
- (1) Connect the negative (–) terminal of the 1.5 V power supply to terminal (4) of the ignition power transistor, and then check whether there is continuity between terminal (13) and terminal (4) when terminal (3) and the positive (+) terminal are connected and disconnected.

**NOTE**

Connect the (–) probe of the circuit tester to terminal (13).

Terminal (3) and (+) terminal	Terminal (13) and terminal (4)
Connected	Continuity
Unconnected	No continuity

- (2) Replace the ignition power transistor if there is a malfunction.

**No. 2–No. 5 coil side**

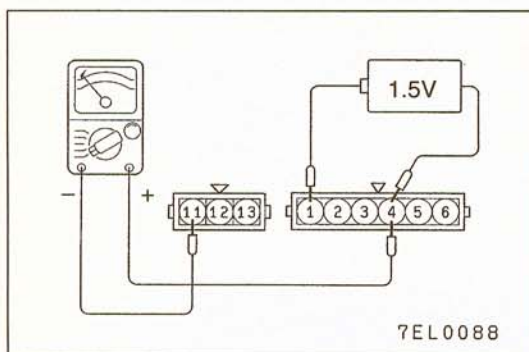
- (1) Connect the negative (–) terminal of the 1.5 V power supply to terminal (4) of the ignition power transistor, and then check whether there is continuity between terminal (12) and terminal (4) when terminal (2) and the positive (+) terminal are connected and disconnected.

**NOTE**

Connect the (–) probe of the circuit tester to terminal (12).

Terminal (2) and (+) terminal	Terminal (12) and terminal (4)
Connected	Continuity
Unconnected	No continuity

- (2) Replace the ignition power transistor if there is a malfunction.



### No. 3–No. 6 coil side

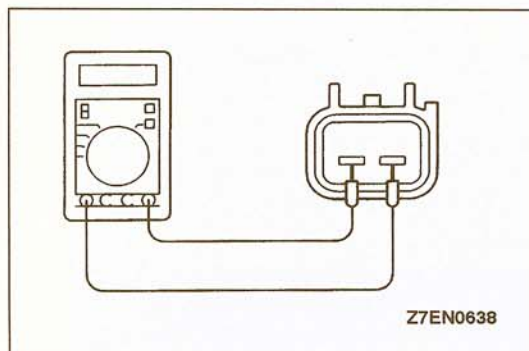
- (1) Connect the negative (–) terminal of the 1.5 V power supply to terminal (4) of the ignition power transistor, and then check whether there is continuity between terminal (11) and terminal (4) when terminal (1) and the positive (+) terminal are connected and disconnected.

#### NOTE

Connect the (–) probe of the circuit tester to terminal (12).

Terminal (1) and (+) terminal	Terminal (11) and terminal (4)
Connected	Continuity
Unconnected	No continuity

- (2) Replace the ignition power transistor if there is a malfunction.

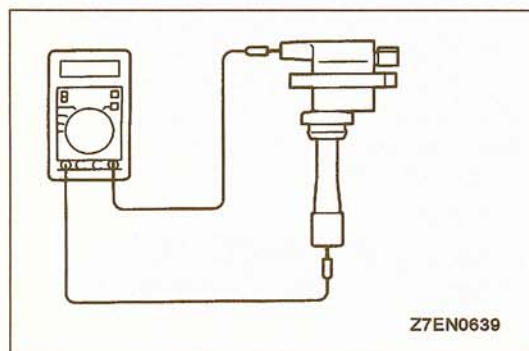


### IGNITION COIL

#### Primary Coil Resistance

Measure the resistance between the terminals for each cylinder (No. 1–No. 4, No. 2–No. 5, No. 3–No. 6) of the ignition coil as shown in the illustration.

**Standard value: 0.69–0.85 Ω**



#### Secondary Coil Resistance

Measure the resistance between the high voltage terminals for each cylinder (No. 1–No. 4, No. 2–No. 5, No. 3–No. 6) of the ignition coil as shown in the illustration.

**Standard value: 15.3–20.7 kΩ**



# CRANKSHAFT POSITION SENSOR AND CAMSHAFT POSITION SENSOR

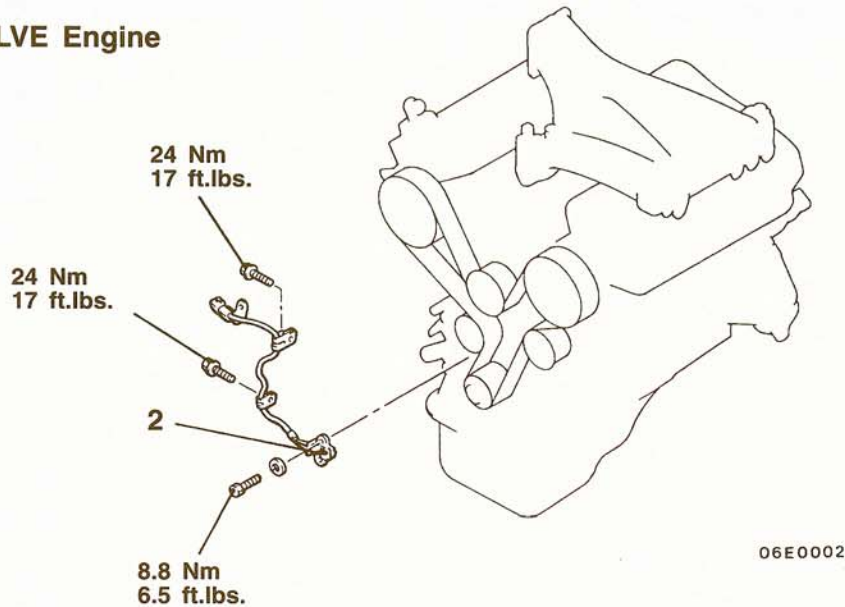
16300250060

## REMOVAL AND INSTALLATION

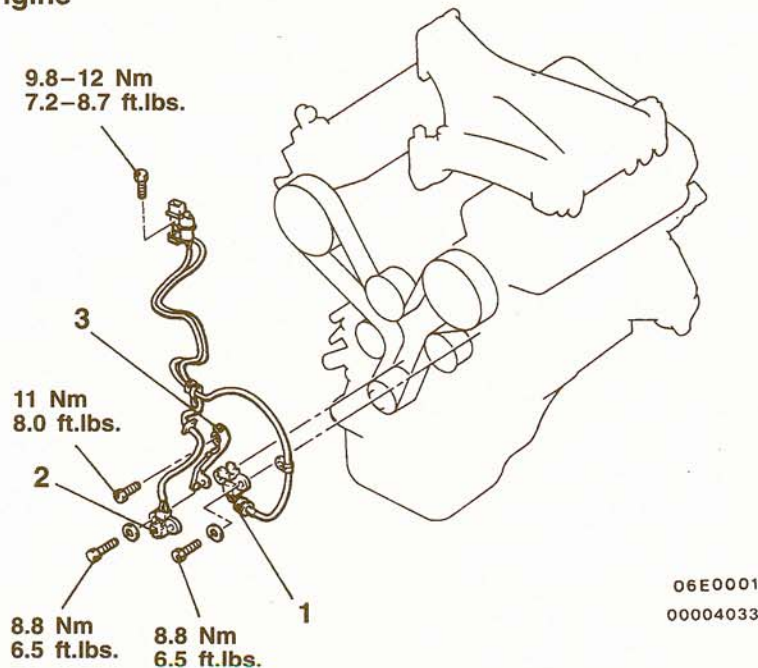
### Pre-removal and Post-installation Operations

- Timing Belt Cover Removal and Installation  
<3.0L-12 VALVE Engine> (Refer to GROUP 11A – Timing belt)  
<3.0L-24 VALVE Engine> (Refer to GROUP 11A – Timing belt)  
<3.5L Engine> (Refer to GROUP 11C – Timing belt)

### 3.0L-12 VALVE Engine



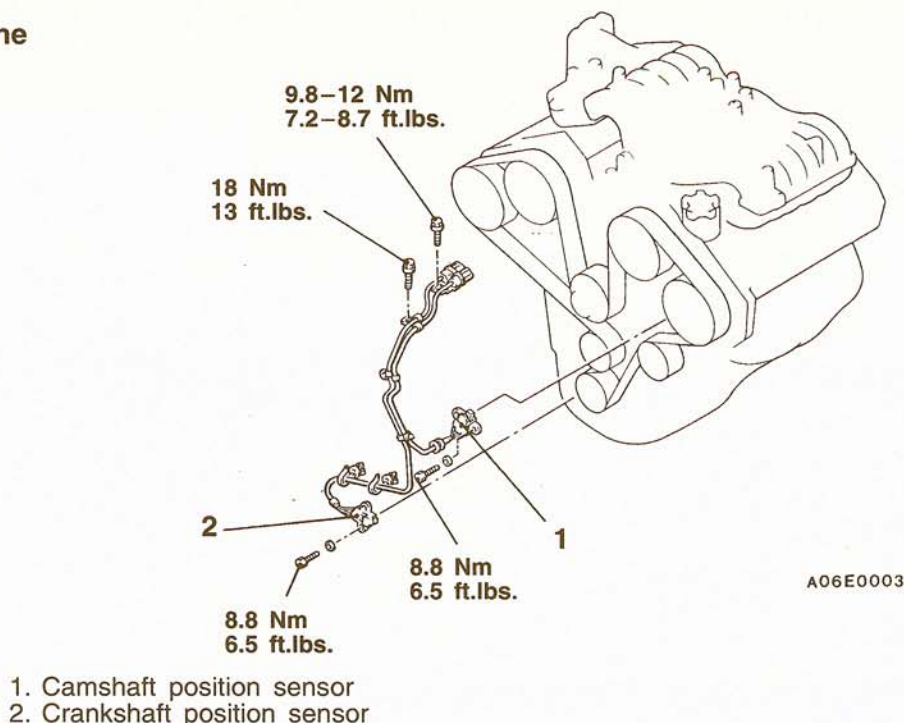
### 3.0L-24 VALVE Engine



1. Camshaft position sensor
2. Crankshaft position sensor
3. Harness protector



## 3.5L Engine

**INSPECTION**

16300260124

**CAMSHAFT POSITION SENSOR CHECK**

&lt;3.0L-12 VALVE Engine&gt;

Refer to GROUP 13A – On-vehicle Inspection of MFI Components.

&lt;3.0L-24 VALVE, 3.5L Engine&gt;

Refer to GROUP 13A – On-vehicle Inspection of MFI Components.

**CRANKSHAFT POSITION SENSOR**

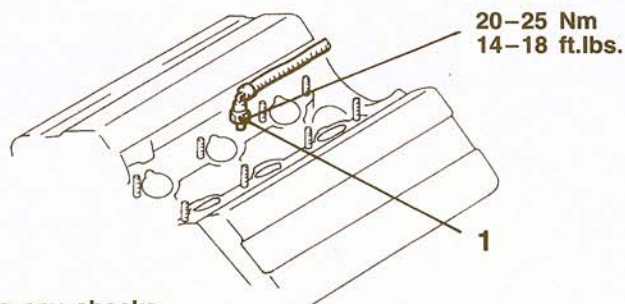
Refer to GROUP 13A – On-vehicle Inspection of MFI Components.

**KNOCK SENSOR <3.5L Engine>**

16300280052

**REMOVAL AND INSTALLATION****Pre-removal and Post-installation Operation**

- Removal and installation of intake manifold (Refer to GROUP 15 – Intake Manifold)

**Caution**

Do not subject the knock sensor to any shocks.

1. Knock sensor

**INSPECTION**

16300290055

Refer to GROUP 13A – On-vehicle Inspection of MFI Components.

# CHASSIS ELECTRICAL

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54109000051

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		..... Refer to GROUP 51	



# BATTERY

54100020018

## GENERAL SPECIFICATIONS

Items	Specifications
Type	75D26R-MF
Ampere hours (5HR) Ah	52
Cranking rating [at -18°C (0°F)] A	490
Reserve capacity min	123

### NOTE

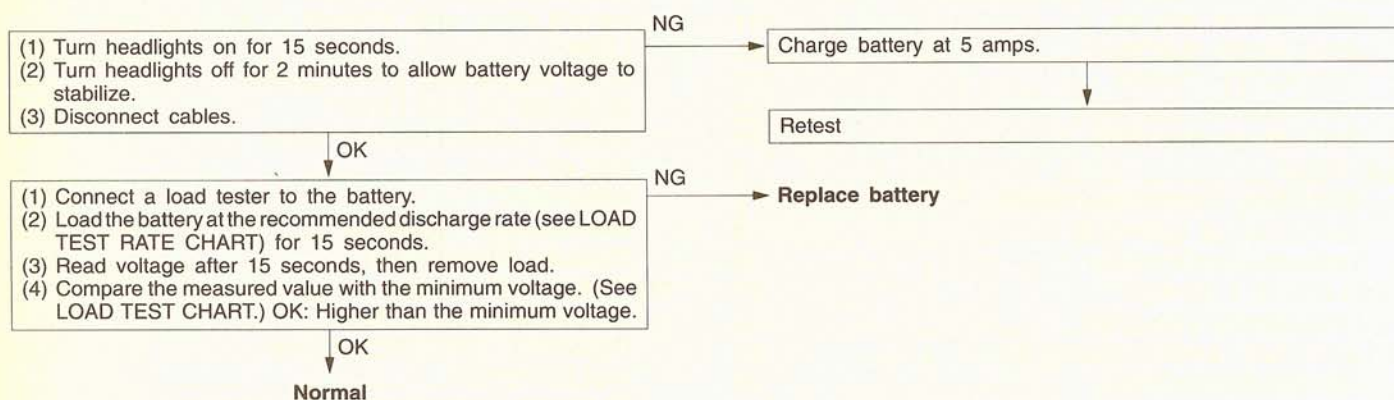
1. CRANKING RATING is the current a battery can deliver for 30 seconds and maintain a terminal voltage of 7.2 V or greater at a specified temperature.
2. RESERVE CAPACITY RATING is the amount of time a battery can deliver 25 A and maintain a minimum terminal voltage of 10.5 V at 27°C (80°F).

## TROUBLESHOOTING

54100070013

### BATTERY TESTING PROCEDURE

#### TEST STEP



#### LOAD TEST CHART

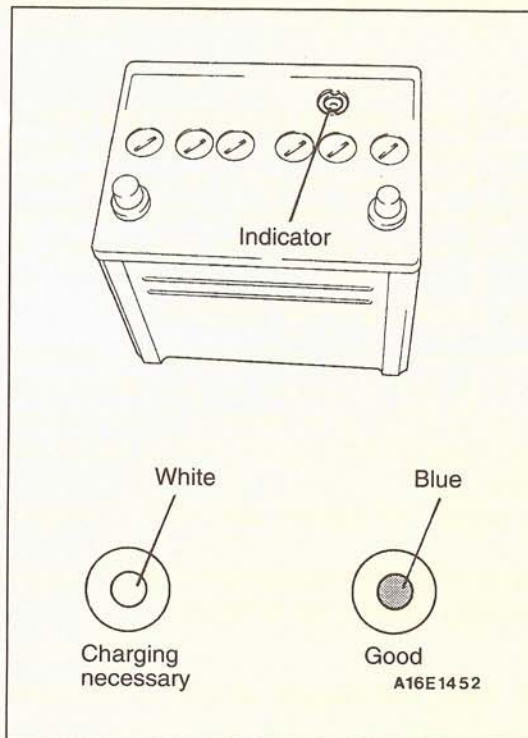
Temperature °C (°F)	21 (70) and above	16 (60)	10 (50)	4 (40)	-1 (30)	-7 (20)	-12 (10)	-18 (0)
Minimum voltage	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

#### LOAD TEST RATE CHART

Load test (AMPS)	240 amps
Cranking rating (0°F)	490 amps
Reserve capacity	123 minutes
Application	75D26R-MF



54100100033



## ON-VEHICLE SERVICE

### BATTERY INSPECTION

#### BATTERY VISUAL INSPECTION (1)

The battery contains a visual test indicator which gives a blue signal when an adequate charge level exists, and a white signal when charging is required.

#### BATTERY VISUAL INSPECTION (2)

Check that the ignition switch is in the OFF position and all battery feed accessories are off.

1. Disconnect the ground cable from the battery before disconnecting the positive battery cable.
2. Remove the battery from the vehicle.

#### Caution

**If the battery case is cracked or leaking, care should be taken to protect hands from the electrolyte. A suitable pair of rubber gloves (not the household type) should be worn when removing the battery by hand.**

3. Inspect the battery carrier for damage caused by loss of acid from the battery. If acid damage is present, it will be necessary to clean the area with a solution of clean warm water and baking soda. Scrub the area with a stiff brush and wipe off with a cloth moistened with ammonia or baking soda in water.
4. Clean the top of the battery with same solution as in step (3).
5. Check the battery case and cover for cracks. If cracks are present, replace the battery.
6. Clean the battery post with a suitable battery post cleaning tool.
7. Clean the inside surfaces of the terminal clamps with a suitable battery terminal cleaning tool. Replace damaged or frayed cables and broken terminals clamps.
8. Install the battery to the vehicle.
9. Connect the positive and negative battery cables to the battery in that order.
10. Tighten the clamp nut securely.

**BATTERY CHARGING**

54100110043

**Caution**

When batteries are being charged, an explosive gas forms beneath the cover of each cell. Do not smoke near batteries on charge or which have recently been charged. Do not break live circuits at the terminals of the batteries on charge. A spark will occur where the live circuit is broken.

**Keep all open flames away from the battery.**

Battery electrolyte temperature may temporarily be allowed to rise to 55°C (131°F). An increase in the electrolyte temperature to above 55°C (131°F) is harmful to the battery and may cause deformation of the battery cell, a decrease in the life of the battery, etc.

If the test indicator is white, the battery should be charged as outlined below.

When the dot appears or when the maximum charge shown below is reached, charging should be stopped.

**CHARGE RATE**

If the test indicator is white, the battery should be charged as outlined below.

When the dot appears or when the maximum charge shown below is reached, charging should be stopped.

**NOTE**

When the charging is performed at 5 amps, charging is virtually 100% three hours after the indicator's indication changes from white to green.

Use fast charging only in an emergency.

If the indicator does not turn to green even after the battery is charged, the battery should be replaced; do not overcharge.

**Charge Rate Chart**

Battery	Slow Charging		Fast Charging	
75D26R-MF (490 amps)	5 amps 15 hrs.	10 amps 7.5 hrs.	20 amps 3.75 hrs.	30 amps 2.5 hrs.



# IGNITION SWITCH

## TROUBLESHOOTING

### IGNITION KEY HOLE ILLUMINATION LIGHT

#### OPERATION

- When the driver's side door is opened, the door switch turns on and the ignition key hole illumination light illuminates.
- When the driver's side door is closed, the door switch turns off and the ignition key hole illumination light continues to illuminate for approximately 10 seconds due to the electrical discharge from the condenser inside the ignition key hole illumination light timer, and then the light switches off.

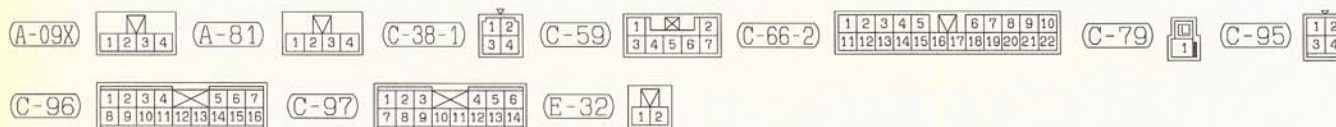
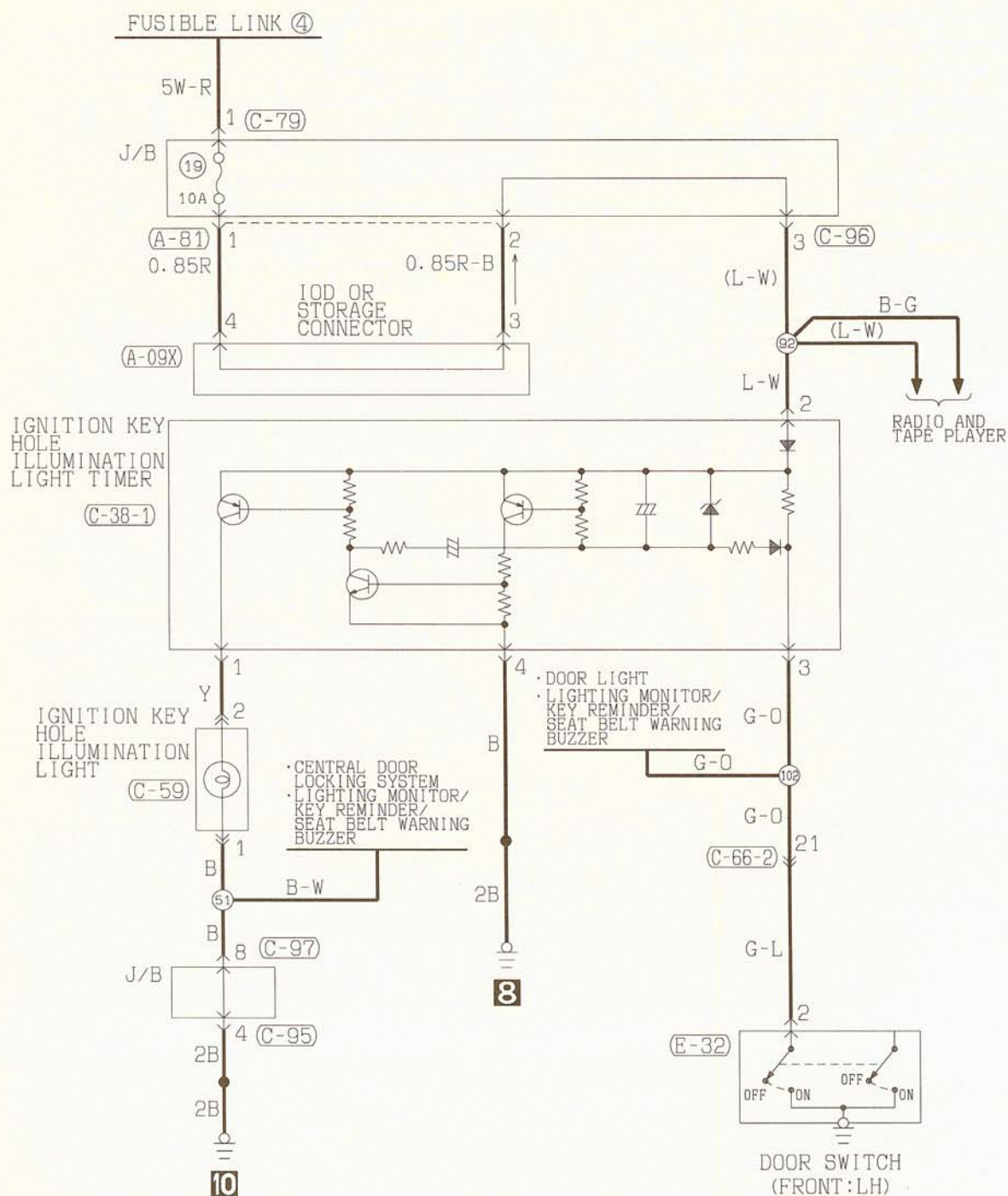
#### TROUBLESHOOTING HINTS

1. Ignition key hole illumination light does not illuminate.
  - (1) Dome light also does not illuminate.
    - Check multi-purpose fuse No. 19.
  - (2) Key reminder buzzer does not sound.
    - Check the door switch (front: L.H.). (Refer to GROUP 42 – Door Assembly.)
2. When the driver's side door is closed, the ignition key hole illumination light switches off immediately.
  - Check the ignition key hole illumination light timer. (Refer to P.54-9.)

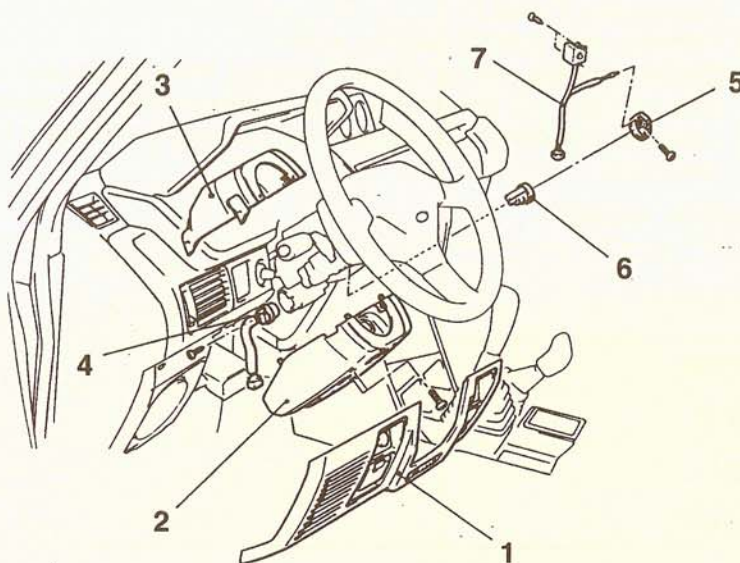


## IGNITION KEY HOLE ILLUMINATION LIGHT CIRCUIT

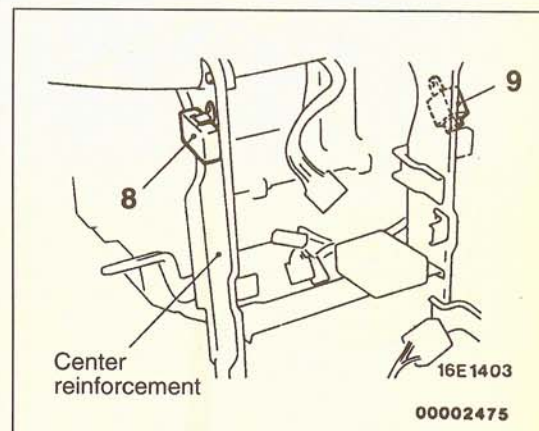
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54300210046

**IGNITION SWITCH****REMOVAL AND INSTALLATION**

16E0583

**Key reminder switch segment removal steps**

1. Knee protector  
(Refer to GROUP 52A – Instrument Panel.)
2. Column cover lower
7. Key reminder switch segment

**Buzzer assembly removal steps**

- Instrument Panel  
(Refer to GROUP 52A – Instrument Panel.)
- 8. Buzzer assembly (for key reminder, lighting monitor and seat belt)

**Ignition key hole illumination ring removal steps**

- Knee protector  
(Refer to GROUP 52A – Instrument Panel.)
- 2. Column cover lower
- 5. Ignition key hole illumination ring

**Ignition switch segment removal steps**

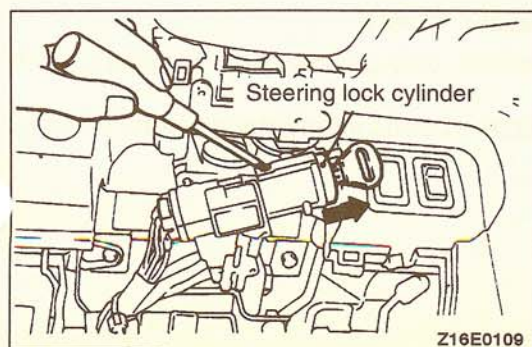
1. Knee protector  
(Refer to GROUP 52A – Instrument Panel.)
2. Column cover lower
3. Column cover upper
4. Ignition switch segment

**Steering lock cylinder removal steps**

1. Knee protector  
(Refer to GROUP 52A – Instrument Panel.)
2. Column cover lower
5. Ignition key hole illumination ring
6. Steering lock cylinder

**Key hole illumination light timer removal steps**

- Instrument Panel  
(Refer to GROUP 52A – Instrument Panel.)
- 9. Key hole illumination light timer



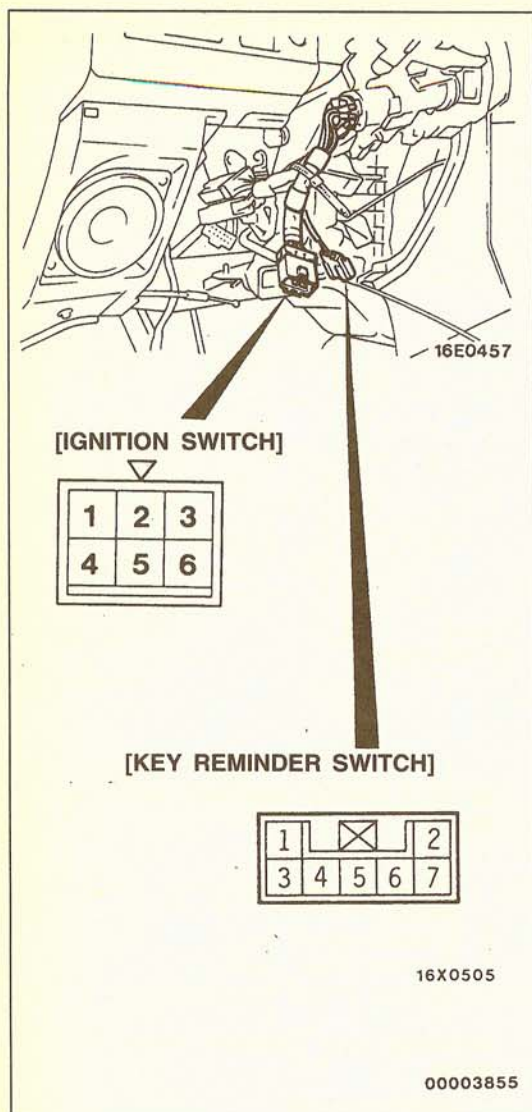
Z16E0109

**REMOVAL SERVICE POINT****◀A▶ STEERING LOCK CYLINDER REMOVAL**

- (1) Insert the ignition key into the steering lock cylinder and place the key in the ACC position.
- (2) Press the lock pin down with a small Phillips screwdriver to remove the steering lock cylinder.



54300220049

**INSPECTION****IGNITION SWITCH CHECK**

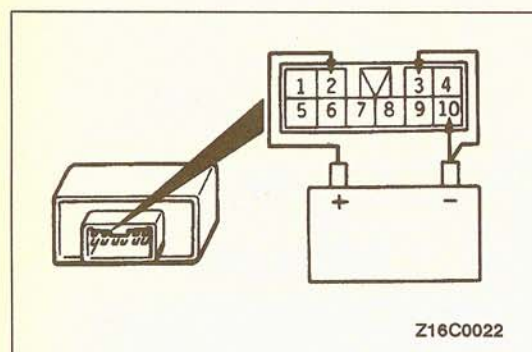
- (1) Remove the knee protector. (Refer to GROUP 52A – Instrument Panel.)
- (2) Remove the column cover lower.
- (3) Disconnect the wiring connector from the ignition switch, and connect an ohmmeter to the switch side connector.
- (4) Operate the switch and check for continuity between the terminals.

**Ignition switch**

Position	Terminal					
	1	2	3	4	5	6
LOCK						
ACC	○	—				○
ON	○	○		○		○
START	○	○	○		○	

**Key reminder switch**

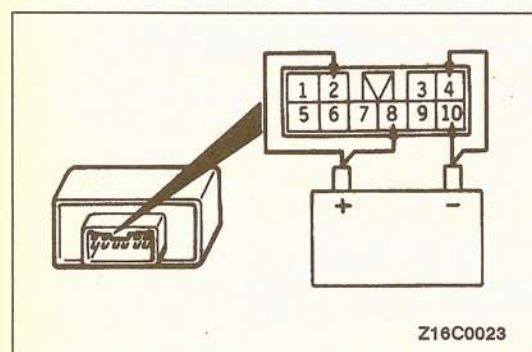
Key	Key reminder switch terminal		Key hole illumination light terminal	
	4	6	1	2
Removed	○	○	○ — (V) — ○	
Inserted				

**BUZZER ASSEMBLY CHECK**

54300540015

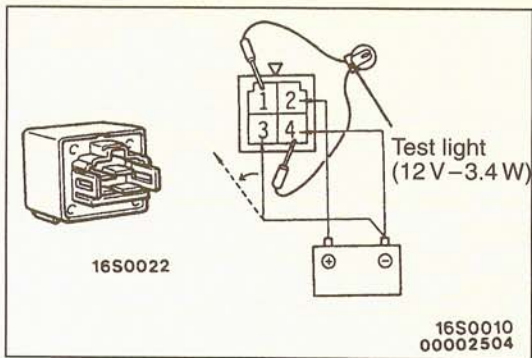
**Key Reminder Buzzer Check**

- (1) Apply battery positive voltage between terminal 2 and terminal 10.
- (2) Check that the buzzer sounds intermittently when terminal 3 is grounded.

**Lighting Monitor Buzzer Check**

- (1) Apply battery positive voltage between terminals 2, 8 and 10.
- (2) Check that the buzzer sounds intermittently when terminal 4 is grounded.



**KEY HOLE ILLUMINATION LIGHT TIMER CHECK**

54300830082

- (1) Apply battery positive voltage between terminal 2 and terminal 4.
- (2) Connect a test light between terminal 1 and terminal 4.
- (3) Check that the test light illuminates for 8–16 seconds when terminal 3 is grounded for 3 seconds or more and then disconnected from the ground.

# METERS AND GAGES

54300020014

## GENERAL SPECIFICATIONS

### METERS AND GAGES

Items		Specifications
Speedometer	Type	Electrical type
Tachometer	Type	Cross coil type
Fuel gage	Type	Cross coil type
Fuel gage unit	Type	Variable resistance type
Engine coolant temperature gage	Type	Cross coil type
Engine coolant temperature gage unit	Type	Thermistor type
Oil pressure gage	Type	Bimetal type
Oil pressure gage unit	Type	Bimetal type
Inclinometer	Type	Gravity type
	Damping system	Oil-filled system
Voltage meter	Type	Aneroid type
Altimeter	Type	Bimetal type
Thermometer	Type	Temperature detection type
Electronic compass	Type	Geo-magnet detection type

## INDICATORS AND WARNING LIGHTS

Items		Specifications
Indication lights W	Turn signal indication light	3.4 (158)
	Upper beam indication light	1.12
	Automatic transmission indication light	1.12
	Variable shock absorber indication light	Light emitting diode (LED)
	Overdrive off indication light	1.12
	4WD indication light	1.12
	Cruise control indication light	1.12
	Power/hold changeover indication light	1.12
Warning lights W	Door-ajar warning light	1.12
	Oil pressure warning light	1.12
	Charge warning light	1.12
	Automatic transmission oil temperature warning light	1.12
	Maintenance required warning light	1.12
	Low fuel warning light	3.4 (158)
	Seat belt warning light	1.12
	Brake warning light	1.12
	Check engine/malfunction indicator lamp	1.12
	Anti-lock braking system warning light	1.12
	Supplemental restraint system warning light	1.12

## NOTE

The values in parentheses denote SAE trade numbers.

## SERVICE SPECIFICATIONS

54300030048

Items		Standard value
Speedometer indication error mph	20	19–22
	40	38–44
	60	57–66
	80	76–88
	100	94–110
Tachometer indication error <3.0L–12 VALVE Engine> rpm	1,000	±100
	3,000	±150
	5,000	±250
	6,000	±300



Items		Standard value
Tachometer indication error <3.0L–24 VALVE Engine, 3.5L Engine> rpm	700	±100
	3,000	+225 –100
	5,000	+325 –125
	7,000	+400 –100
Fuel gage unit resistance $\Omega$	Float point “F”	3±2
	Float point “E”	110±7
Fuel gage unit float height mm (in.)	A (Float point “F”)	119.3 (4.69)
	B (Float point “E”)	255.0 (10.03)
Fuel gage resistance $\Omega$	Power supply and ground	115±11.5
	Power supply and fuel gage	79±7.9
	Fuel gage and ground	80±8.0
Engine coolant temperature gage resistance $\Omega$	Power supply and engine coolant temperature gage	145±14.5
	Power supply and ground	115±11.5
	Engine coolant temperature gage and ground	246±24.6
Oil pressure gage resistance $\Omega$		Approx. 50
Voltage meter resistance $\Omega$		380–460
Inside temperature sensor and outside temperature sensor resistance $\Omega$	20°C (68°F)	Approx. 1,200
	40°C (104°F)	Approx. 500

## TROUBLESHOOTING

## INSPECTION CHART FOR TROUBLE SYMPTOMS

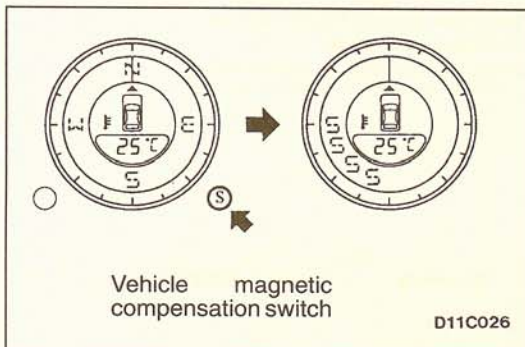
Get an understanding of the trouble symptoms and check according to the inspection procedure chart.

Trouble symptom	Inspection Procedure No.	Reference page
Bearing indicator is off when moving forward	1	54-12
Vehicle magnetic compensation cannot be made	2	54-13
Discrepancy between the outside temperature and the display temperature	3	54-13
Display is hard to see or no display appears	4	54-14

## INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

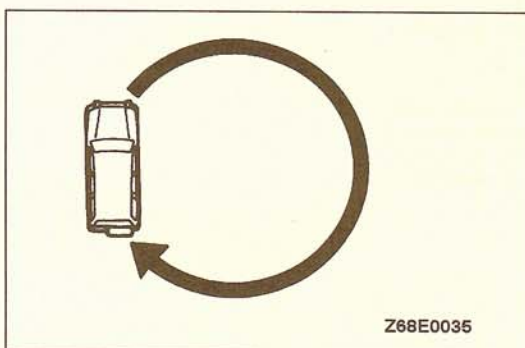
## INSPECTION PROCEDURE 1

Bearing indicator is off when moving forward	Probable cause
<p>[Comment]</p> <p>The vehicle magnetism tends to be disturbed particularly at such places as tunnel, railway crossing, area along railway, elevated road, urban area crowded with high-storied buildings, area above subway, etc. If disturbed, the driving direction marker will fluctuate.</p>	<ul style="list-style-type: none"> <li>Vehicle magnetic compensation failed</li> </ul>



## Vehicle magnetic compensation

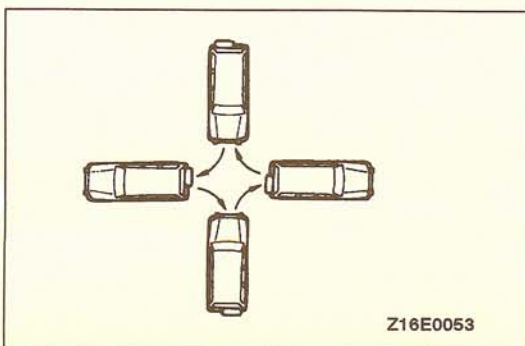
- (1) If the vehicle magnetic compensation (azimuth adjustment) switch is pressed, the letter "S" are displayed around the scale. Then when the switch is pressed 0.5 seconds or more further, the letters "S" will move clockwise and anticlockwise. This turns on the magnetic compensation mode.



- (2) If the vehicle is driven slowly in a 360° circle, compensation is automatically completed.

## NOTE

Compensation is possible if the turn is made to either the left or right.

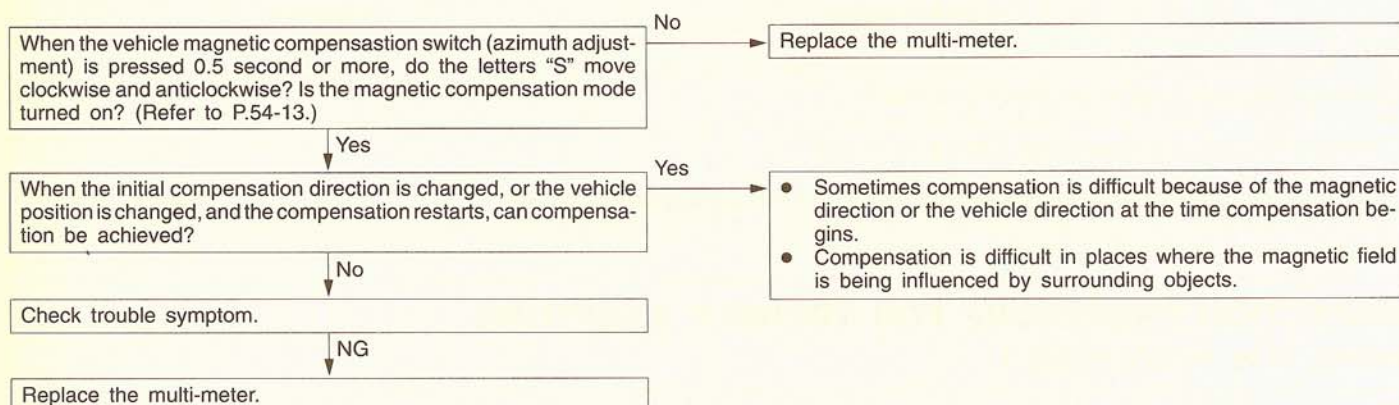


- (3) If there is no place to turn the vehicle in a circle, turn the vehicle around by moving it backwards and forwards.
- (4) After compensation is completed, a dot showing the current direction of movement will be illuminated.



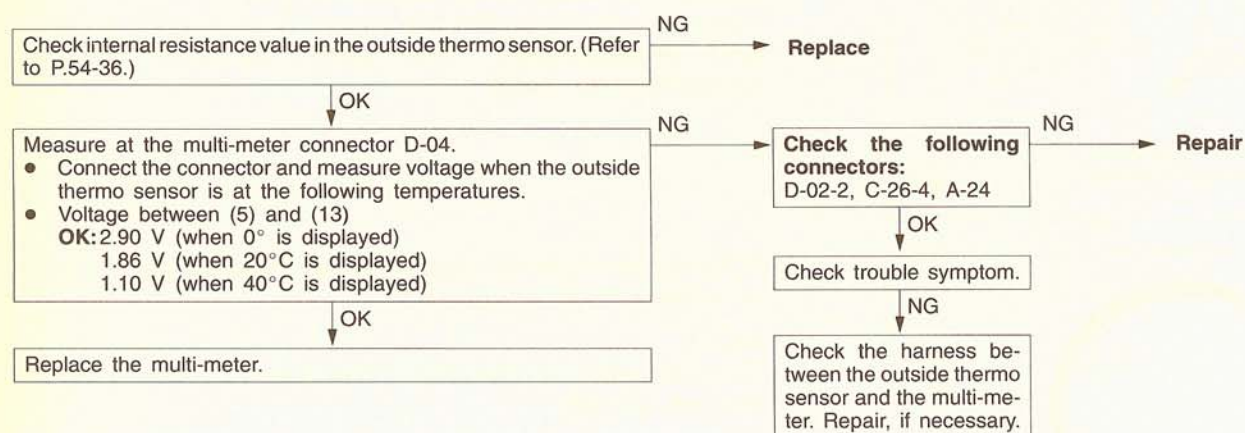
## INSPECTION PROCEDURE 2

Vehicle magnetic compensation cannot be made.	Probable cause
[Comment] The multi-meter may be defective.	<ul style="list-style-type: none"> <li>Defective multi-meter</li> </ul>



## INSPECTION PROCEDURE 3

Discrepancy between the outside temperature and the display temperature	Probable cause
[Comment] The outside thermo sensor, multi-meter, harness, or connector may be defective.	<ul style="list-style-type: none"> <li>Defective outside thermo sensor</li> <li>Defective multi-meter</li> <li>Defective harness or connector</li> </ul>





## INSPECTION PROCEDURE 4

Display is hard to see or no display appears.	Probable cause
[Comment] The multi-meter, harness, or connector may be defective.	<ul style="list-style-type: none"> <li>Defective multi-meter</li> <li>Defective harness or connector</li> </ul>

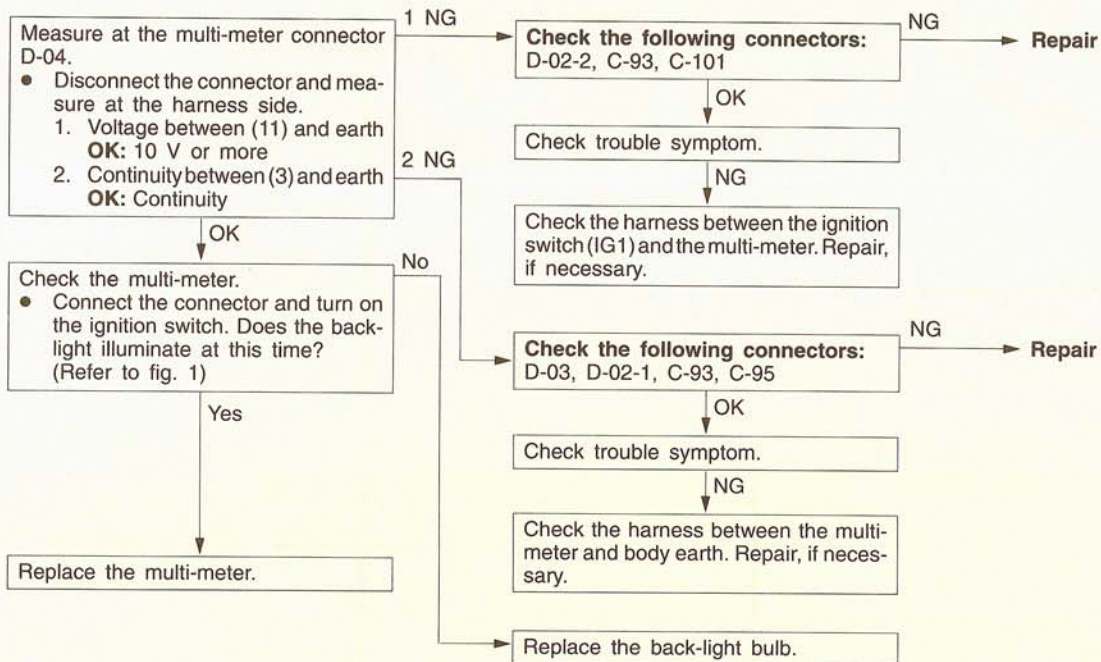
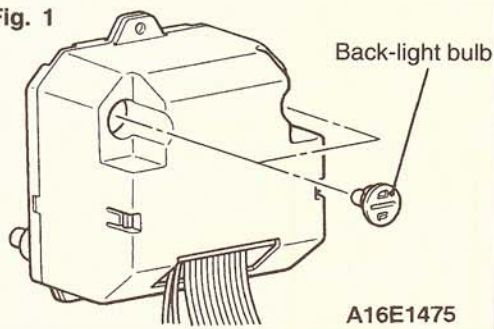
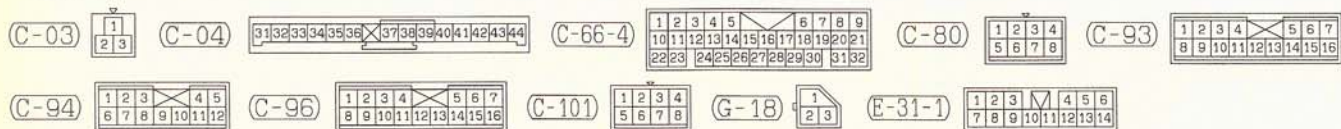
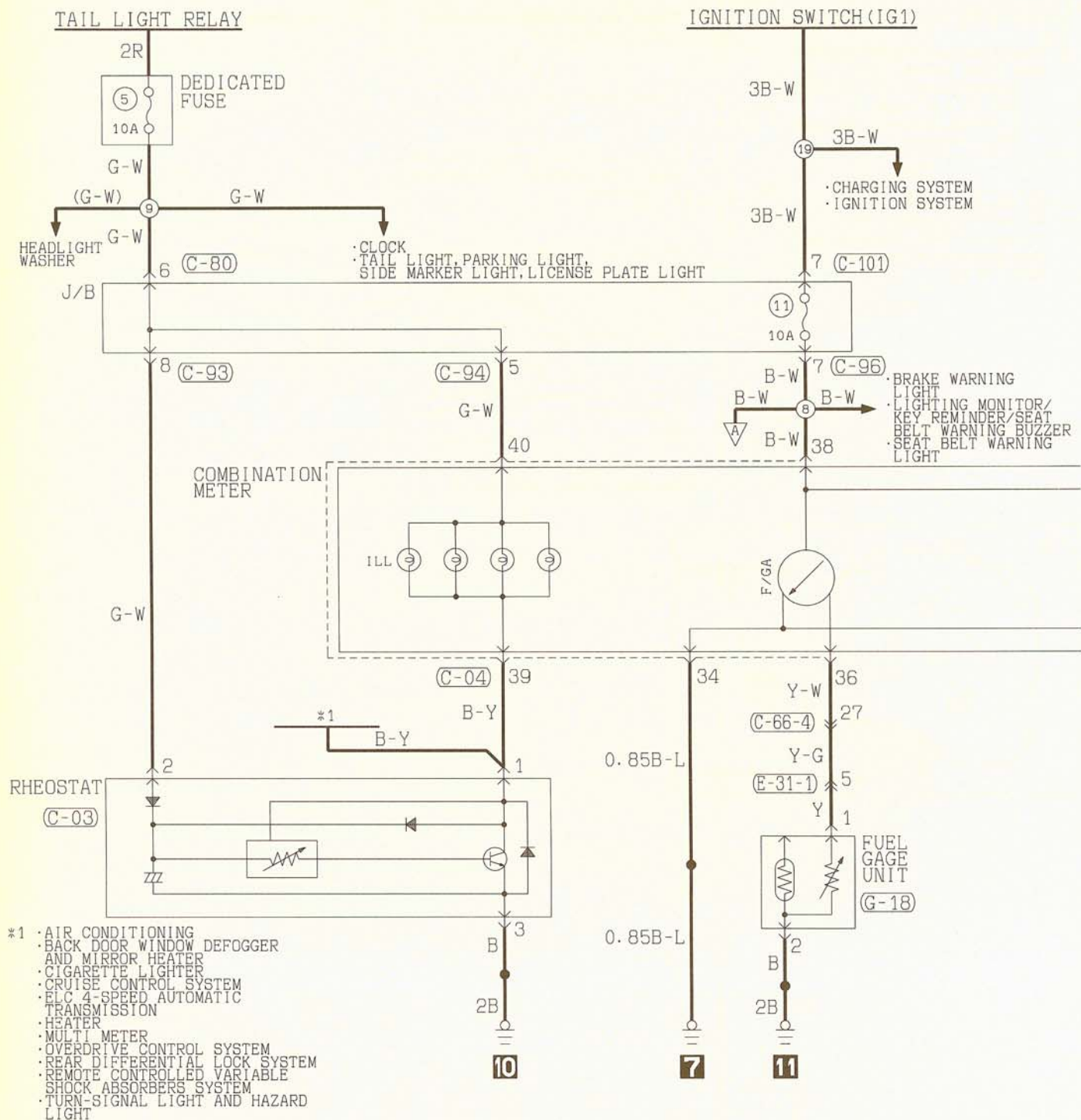


Fig. 1



## METER AND GAGE CIRCUIT

90100350078





(C-11) 

71	72	73	74	75	76	77	78	79	80	81	82	83	84
----	----	----	----	----	----	----	----	----	----	----	----	----	----

 (C-26-2) 

1	2	3	4	5	6	7	8	9		
10	11	12	13	14	15	16	17	18	19	20

 (C-40-3) 

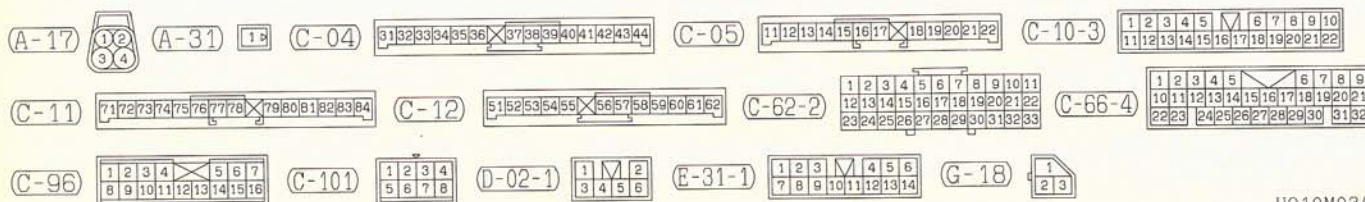
1	2	3	4	5	6	7	8	9			
10	11	12	13	14	15	16	17	18	19	20	
21	22	23	24	25	26	27	28	29	30	31	32

 (C-62-3) 

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



90101180041



The diagram illustrates the electrical circuit for a vehicle's brake system, divided into two sections: a top view (labeled 10) and a side view (labeled 7).

**Top View (10):**

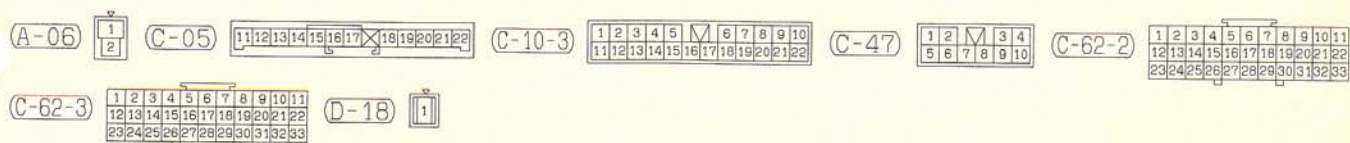
- Power Source:** J/B (MULTI-PURPOSE) (FUSE 1) connected to terminal A.
- Wiring:** B-W wire runs from terminal A through terminal 15 (C-05) to terminal 16 (Y-G).
- Brake Switch:** BRAKE switch (C-10-3) connected to terminal 16 (Y-G) and terminal 20 (Y-G).
- Brake Fluid Level Switch:** BRAKE FLUID LEVEL SWITCH (A-06) connected to terminal 20 (Y-G) and terminal 1 (OFF/ON).
- Parking Brake Switch:** PARKING BRAKE SWITCH (D-18) connected to terminal 1 (OFF/ON) and terminal 2B.
- Grounding:** Terminal 2B is connected to ground.

**Side View (7):**

- Power Source:** J/B (MULTI-PURPOSE) (FUSE 1) connected to terminal B.
- Wiring:** B-W wire runs from terminal B through terminal 12 (J/C (2)) and terminal 13 to terminal 19.
- Brake Switch:** BRAKE switch (C-10-3) connected to terminal 19 (B-W) and terminal 20 (G-R).
- Brake Fluid Level Switch:** BRAKE FLUID LEVEL SWITCH (A-06) connected to terminal 20 (G-R) and terminal 1 (OFF/ON).
- Parking Brake Switch:** PARKING BRAKE SWITCH (D-18) connected to terminal 1 (OFF/ON) and terminal 2B.
- Grounding:** Terminal 2B is connected to ground.

**Common Components:**

- Buzzer Assembly (C-47):** Connected to terminal 1 (G-R) and terminal 6 (B-W).
- Relay (C-62-2):** Connected to terminal 12 (J/C (2)) and terminal 13.
- Relay (C-62-3):** Connected to terminal 10 (GND) and terminal 16 (B).





**OIL PRESSURE WARNING LIGHT  
FUEL WARNING LIGHT  
MAINTENANCE REQUIRED WARNING LIGHT  
BRAKE WARNING LIGHT  
SEAT BELT WARNING LIGHT**

**OPERATION**

**<Oil pressure warning light>**

- This warning light illuminates when the ignition switch is at the ON position, and switches off after the engine has started. This indicator illuminates when the oil fails or a problem occurs in the oil circulating system while driving.

**<Fuel warning light>**

- This warning light illuminates when the fuel in the fuel tank falls less than approx. 11 dm<sup>3</sup> (2.9 gals.)

**<Maintenance required warning light>**

- This warning light illuminates when the ignition switch is at the ON position, and switches off after the engine has started. (Illuminates after every 50,000 miles, 80,000 miles and 100,000 miles travelled.)

**<Brake warning light>**

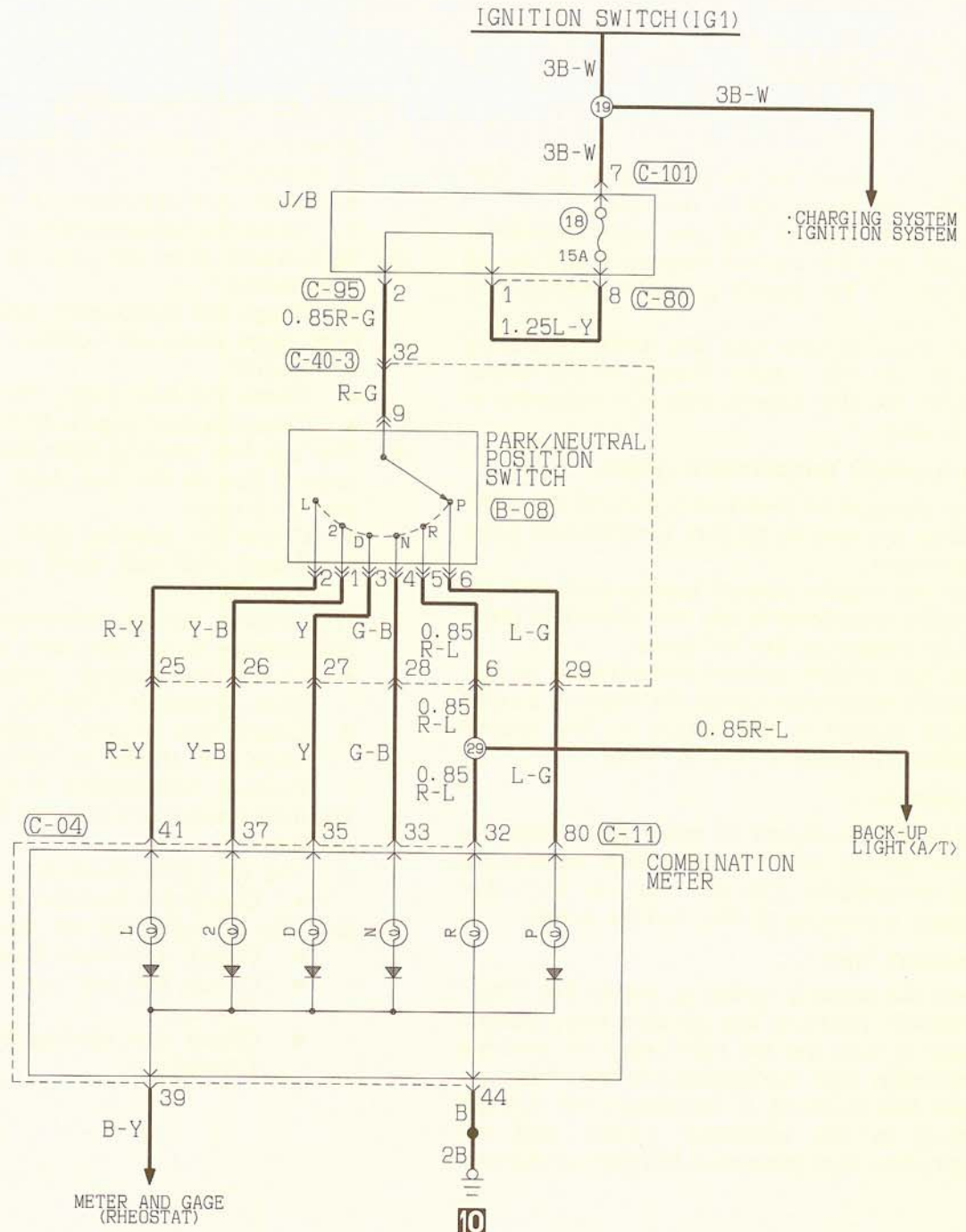
- This warning light illuminates when the ignition switch is at the ON position, and switches off after the engine has started. This warning light illuminates when the parking brake is applied or when the brake fluid level falls to less than the specified level.

**<Seat belt warning light>**

- This indicator illuminates for four to eight seconds when the ignition switch is at the ON position, even if the driver has fastened his seat belt.

# AUTOMATIC TRANSMISSION POSITION INDICATOR CIRCUIT <3.0L-12 VALVE Engine>

90101390017



(B-08)

1	2	3	4	5	6
7	8	9	10	11	12

(C-04)

31	32	33	34	35	36	37	38	39	40	41	42	43	44
----	----	----	----	----	----	----	----	----	----	----	----	----	----

(C-11)

71	72	73	74	75	76	77	78	79	80	81	82	83	84
----	----	----	----	----	----	----	----	----	----	----	----	----	----

(C-40-3)

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	

(C-80)

1	2	3	4
5	6	7	8

(C-95)

1	2
3	4

(C-101)

1	2	3	4
5	6	7	8



## AUTOMATIC TRANSMISSION POSITION INDICATOR

### OPERATION

- When the ignition key is turned to the "ON" position, the indicator illuminates to indicate the position at which the selector lever is set.

## METER AND GAGE

### OPERATION

#### <Fuel gage>

- When the ignition switch is turned to the "ON" position, the fuel gage is activated.
- When there is much fuel, the unit's resistance is small and the current flowing in the circuit is great, so the gage's indicator indicates in the F area.
- When there is little fuel, the unit's resistance is high and the current flowing in the circuit is small, so the gage's indicator indicates in the E area.

#### <Engine coolant temperature gage>

- When the ignition switch is turned to the "ON" position, the engine coolant temperature gage is activated.
- When the engine coolant temperature is high, the unit's resistance is low and there is a great flow of current in the "H" area.
- When the engine coolant temperature is low, the unit's resistance is high and there is a small flow of current in the circuit, so the gage's indicator indicates in the "C" area.

#### <Reed switch>

- Pulses are produced in accordance with the vehicle speed, and vehicle-speed signals are input to systems (the MFI system, etc.) that regulate according to the vehicle speed.

#### <Illumination light>

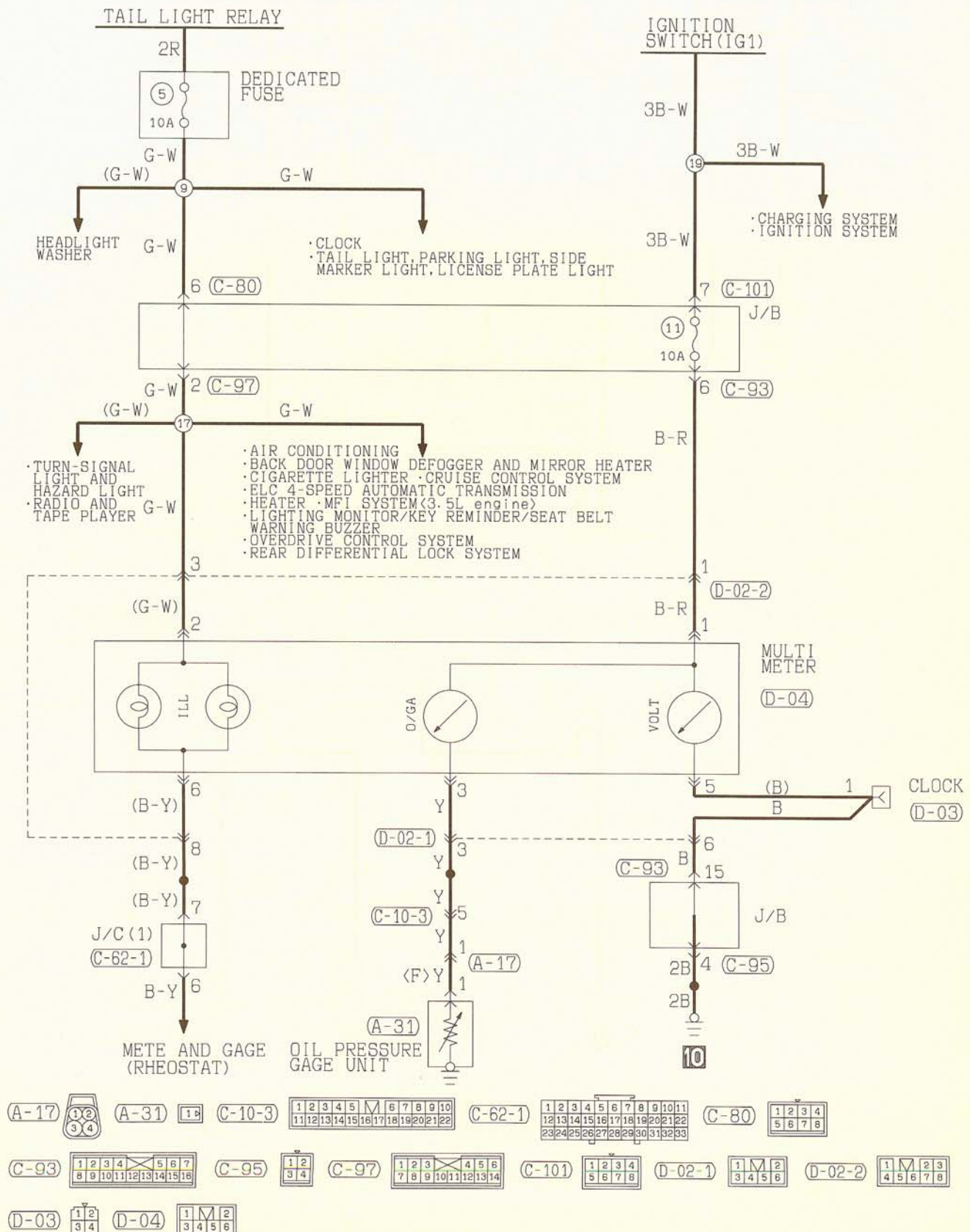
- When the lighting switch is set to the "TAIL" or "HEAD" position, the tail light relay contact closes to turn the tail light relay on and the illumination light illuminates via the rheostat.
- When the rheostat is operated, the voltage applied to the transistor varies, and the illumination light becomes brighter or darker.

### TROUBLESHOOTING HINTS

1. Speedometer does not operate or its operation is incorrect.
  - Check the speedometer cable.
  - Check the speedometer. (Refer to P.54-27.)
2. Tachometer does not operate or its operation is incorrect.
  - Check the tachometer. (Refer to P.54-27.)
3. Fuel gage does not operate or its operation is incorrect.
  - Check the fuel gage. (Refer to P.54-28.)
  - Check the fuel gage unit. (Refer to P.54-28.)
4. The low fuel warning light does not illuminate even if fuel in the fuel tank is less than 11 dm<sup>3</sup> (2.9 gals).
  - Check the warning light bulb.
  - Check the fuel level sensor. (Refer to P.54-28.)
5. The engine coolant temperature gage does not operate or its operation is incorrect.
  - Check the engine coolant temperature gage. (Refer to P.54-29.)
  - Check the engine coolant temperature gage unit. (Refer to GROUP 14 – Engine Coolant Temperature Gage Unit.)
6. The illumination light does not illuminate or does not dim.
  - (1) The tail lights illuminate.
    - Check the rheostat. (Refer to P.54-66.)
  - (2) The tail lights do not illuminate.
    - Check dedicated fuse No. 5.
    - Check the tail light relay. (Refer to P.54-65.)
    - Check the lighting switch. (Refer to P.54-67.)

## MULTI METER CIRCUIT &lt;VEHICLES WITHOUT ELECTRONIC COMPASS&gt;

90100430017



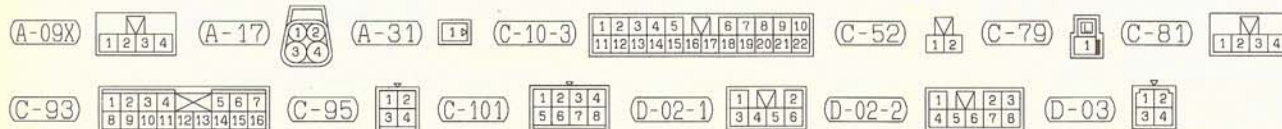
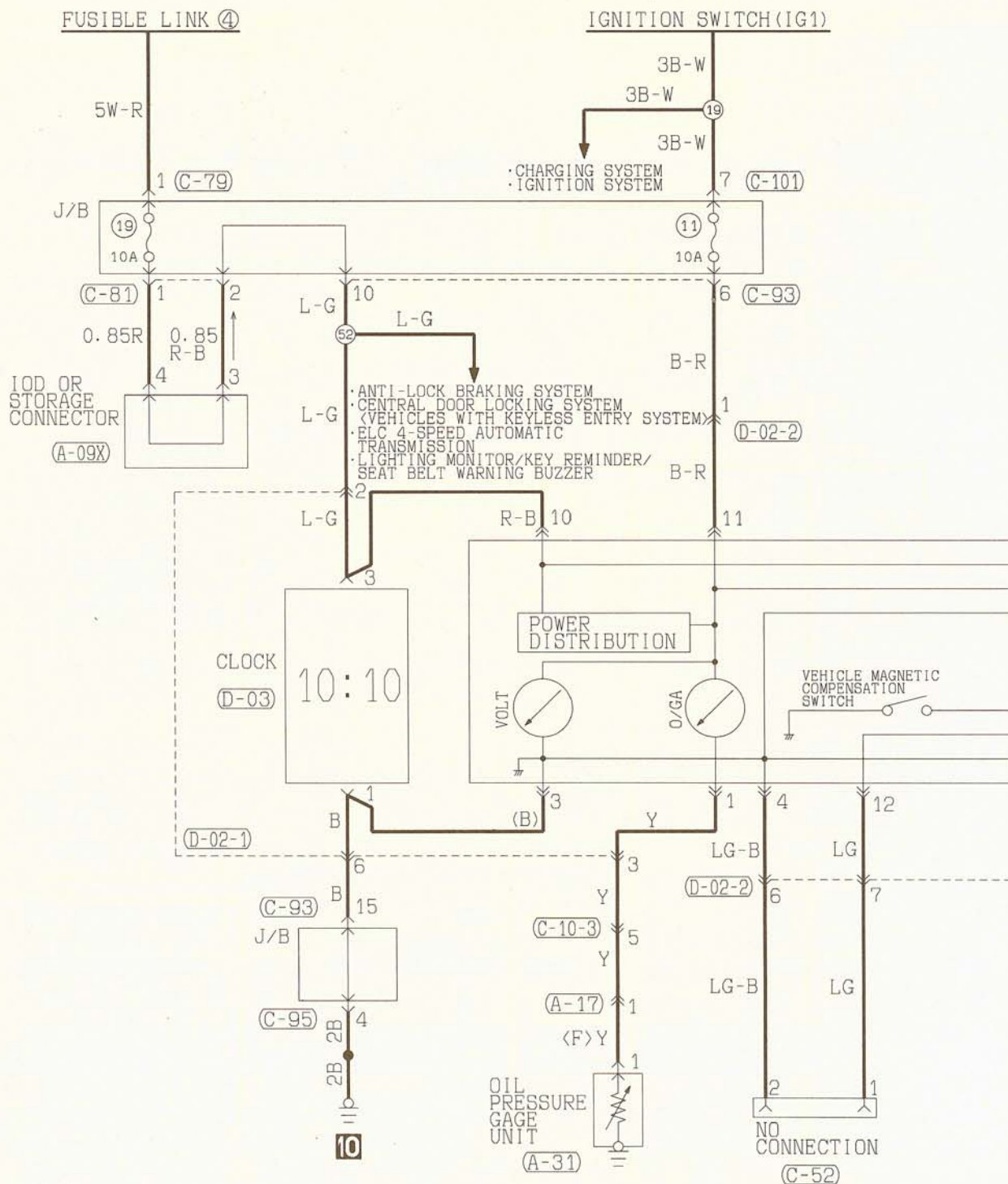
HQ10M07AA

TSB Revision

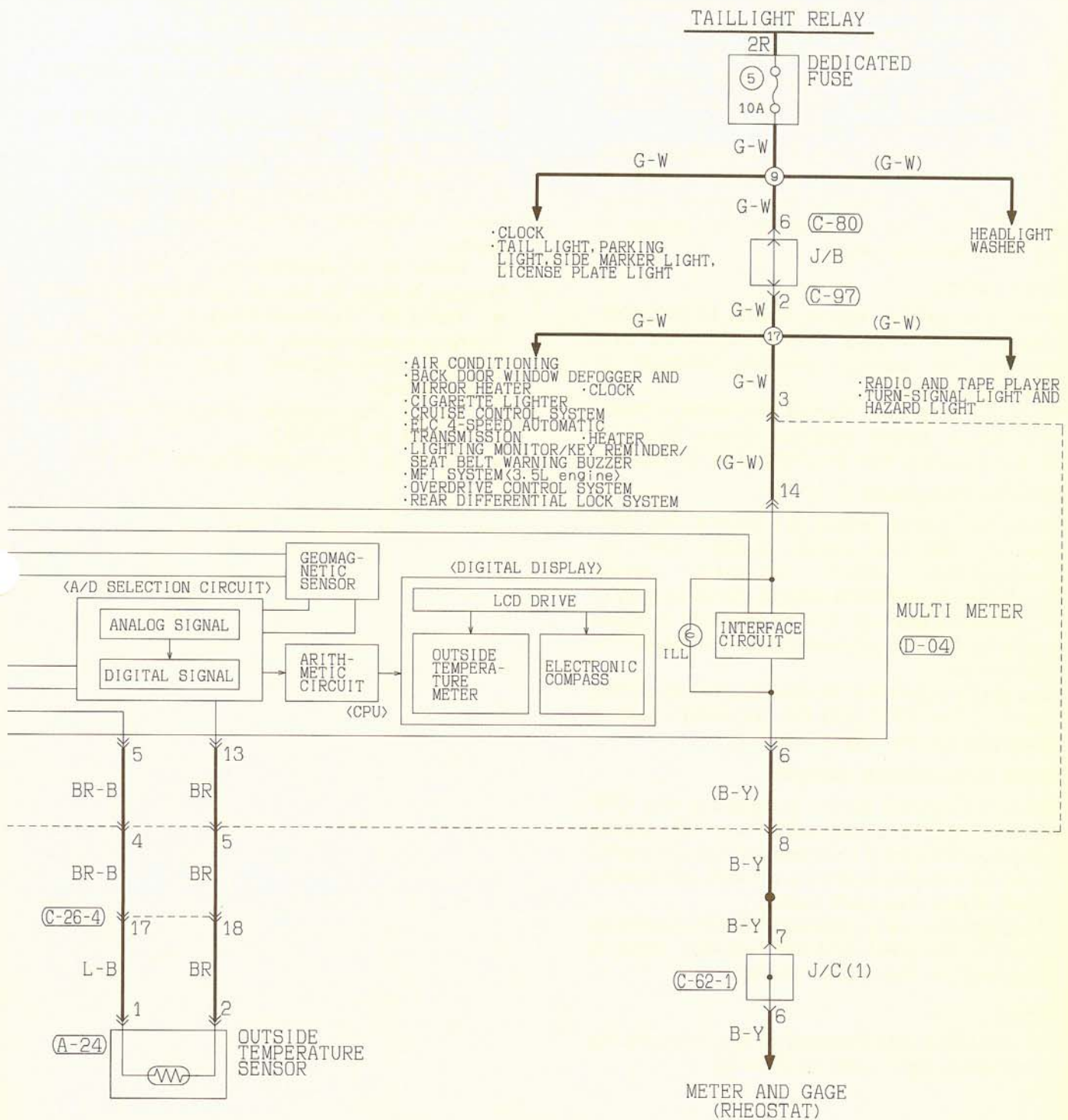


## MULTI METER CIRCUIT <VEHICLES WITH ELECTRONIC COMPASS>

90100430024







(A-24)

① ②

(C-26-4)

1	2	3	4	5	6	7	8		
9	10	11	12	13	14	15	16	17	18

(C-62-1)

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

(C-80)

1	2	3	4
5	6	7	8

(C-97)

1	2	3	4	5	6		
7	8	9	10	11	12	13	14

(D-04)

1	2	3	4	5	6		
7	8	9	10	11	12	13	14

**MULTI-METER****OPERATION****<Oil pressure gage>**

- When the ignition key is turned to the "ON" position, the oil pressure gage is activated.
- When oil pressure is high, the internal contacts of the gage unit are kept closed for a longer period of time. This causes more current to flow in the circuit, and the gage pointer swings to the high pressure side.
- When oil pressure is low, the internal contacts of the gate unit open in a shorter period of time. Therefore, there is less current flowing in the circuit, and the gage pointer swings to the low pressure side.

**<Voltage meter>**

- When the ignition key is turned to the "ON" position, the voltage meter operates and indicates a battery positive voltage of approximately 12 V.
- When the engine is started, the voltage meter indicates a battery positive voltage of 12 to 16 V, indicating that the battery is on charge.

**<Electronic compass>**

- When the ignition switch is turned to the "ON" position, the DC signal output from the Geomagnetic sensor (on-going vehicle direction output, lateral vehicle direction output) is converted from an analog signal to a digital signal by the A/D conversion circuit inside the multi-meter.
- This digital signal is evaluated by the calculating circuit in the CPU and the resulting value is displayed on the digital display.

**<Outside temperature sensor>**

- When the ignition switch is turned to the "ON" position, the DC signal output from the outside temperature sensor is converted from an analog signal to a digital signal by the A/D conversion circuit inside the multi-meter.
- This digital signal is evaluated by the calculating circuit in the CPU and the resulting value is displayed on the digital display.

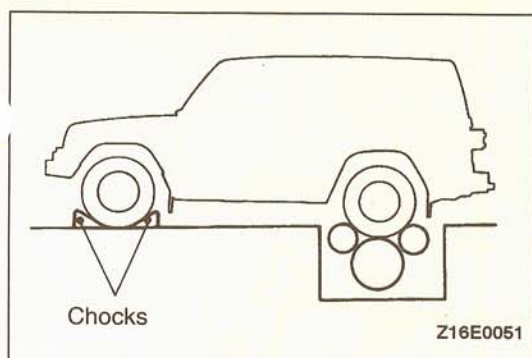
**NOTE**

For operation and troubleshooting hints for the illumination light, refer to P.54-22.

**TROUBLESHOOTING HINTS**

1. The oil pressure gage does not operate or its operation is incorrect.
  - Check the oil pressure gage. (Refer to P.54-30 and refer to P.54-35.)
  - Check the oil pressure gage unit.
2. The voltmeter does not operate or its operation is incorrect.
  - Check the voltage meter. (Refer to P.54-30 and refer to P.54-35.)
3. The on-going direction display deviates.
  - Refer to Troubleshooting on P.54-13.
4. Vehicle magnetic compensation cannot be made.
  - Refer to Troubleshooting on P.54-13.
5. Display is hard to see or no display appears.
  - Refer to Troubleshooting on P.54-13.
6. There is a discrepancy between the inside and outside temperatures and the display temperatures.
  - Check the outside temperature sensor. (Refer to P.54-38.)
  - Refer to Troubleshooting on P.54-13.





## ON-VEHICLE SERVICE

54300090046

### SPEEDOMETER CHECK

- (1) Adjust the pressure of the tires to the specified level. (Refer to GROUP 31 – General Specifications.)
- (2) Place the vehicle on a speedometer tester and chock the front wheels.

#### Caution

**Always inspect with the transfer lever in the 2H position.**

- (3) Check that the speedometer indication range is within the standard values.

#### Caution

**Do not operate the clutch suddenly or decrease speed rapidly while testing.**

**Standard value:**

Standard indication mph	Allowable range mph
20	19–22
40	38–44
60	57–66
80	76–88
100	94–110

### TACHOMETER CHECK

54300100046

- (1) Insert a paper clip in the connector from the harness side, and attach the engine speedometer to the paper clip.

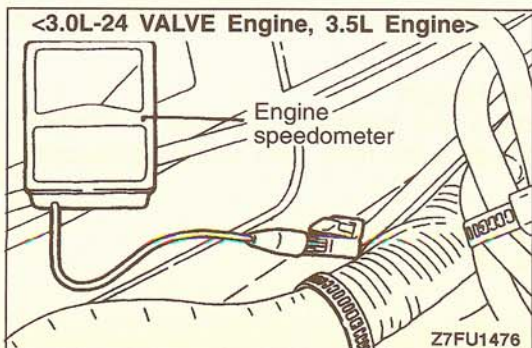
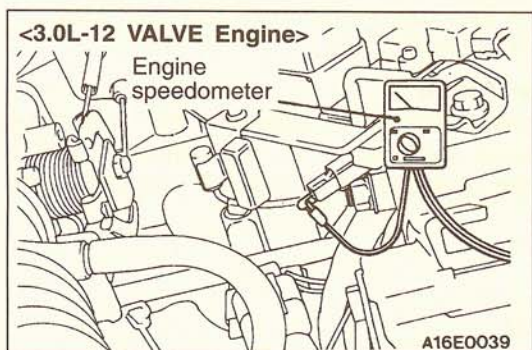
#### NOTE

For tachometer inspection, use of a fluxmeter-type engine speedometer is recommended, because a fluxmeter only needs to be clipped to the high tension cable.

- (2) Compare the readings of the engine speedometer and the tachometer at every engine speed, and check that the variations are within the standard values.

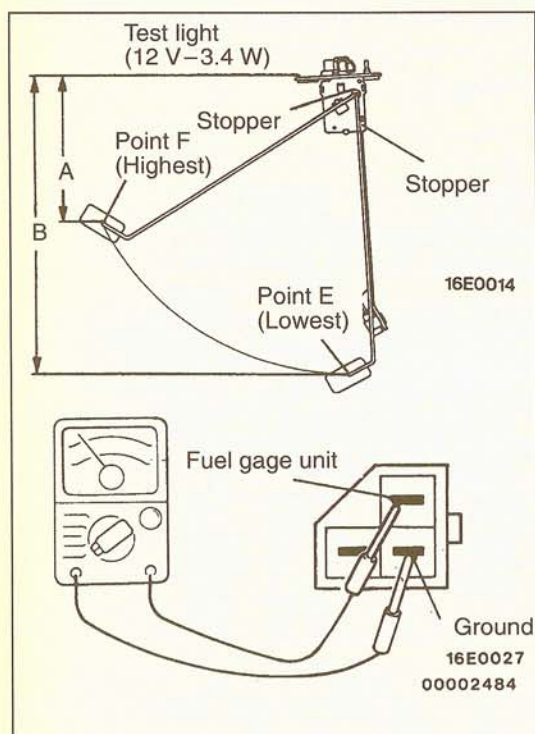
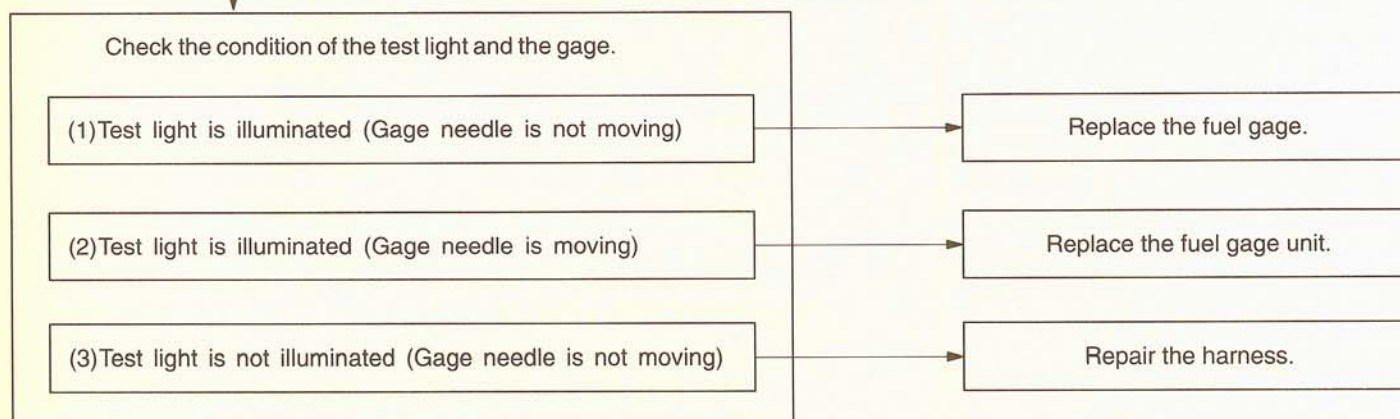
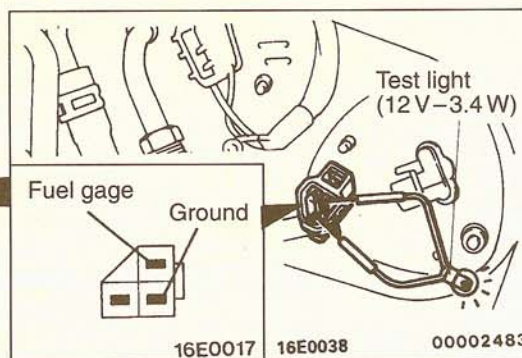
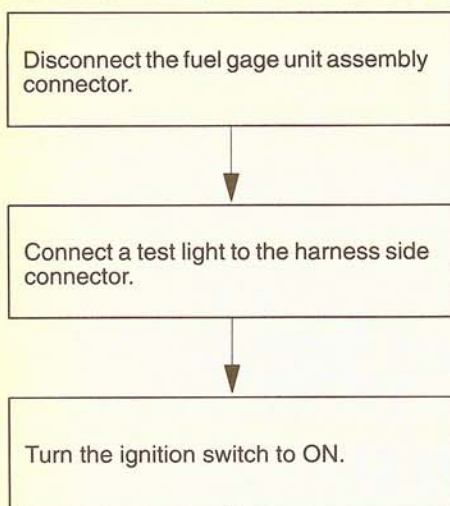
**Standard value:**

Models	Engine speed (rpm)	Indicated variation (rpm)
<3.0L-12 VALVE Engine>	1,000	±100
	3,000	±150
	5,000	±250
	6,000	±300
<3.0L-24 VALVE Engine, 3.5L Engine>	700	±100
	3,000	+225 -100
	5,000	+325 -125
	7,000	+400 -100





## FUEL GAGE SIMPLE INSPECTION



## FUEL GAGE UNIT CHECK

54300120073

To check, remove the fuel gage unit from the fuel tank.  
(Refer to GROUP 13F – Fuel Tank.)

## Fuel Gage Unit Resistance

- (1) Check that the resistance value between the fuel gage terminal and ground terminal is at the standard value when the fuel gage unit float is at point F (highest) and point E (lowest).

## Standard value:

Point F:  $3 \pm 2 \Omega$ Point E:  $110 \pm 7 \Omega$ 

- (2) Check that the resistance value changes smoothly when the float moves slowly between point F (highest) and point E (lowest).

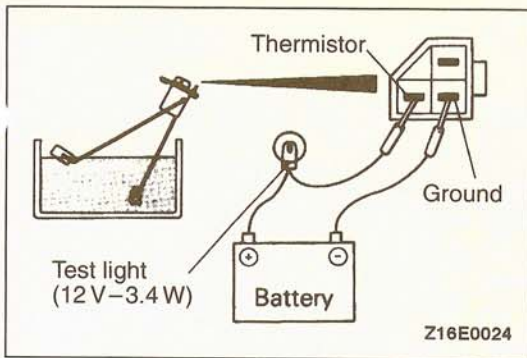
## Fuel Gage Unit Float Height

Move float and measure the height A at point F (highest) and B at point E (lowest) with float arm touching stopper.

## Standard value:

A: 119.3 mm (4.69 in.)

B: 255.0 mm (10.03 in.)

**FUEL LEVEL SENSOR CHECK**

54300130014

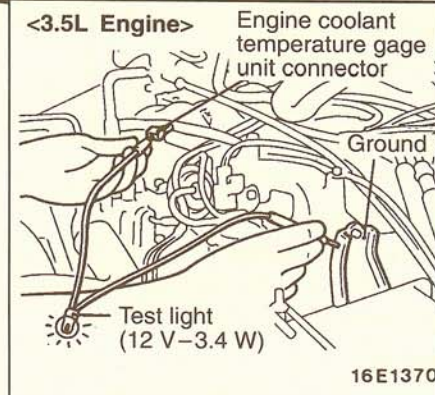
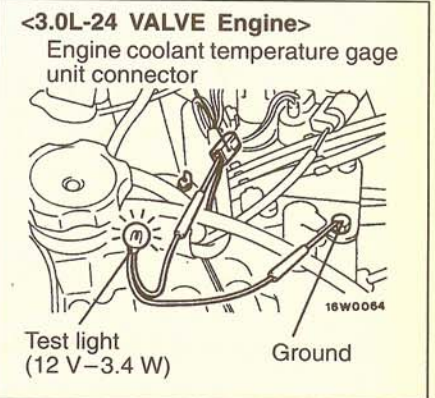
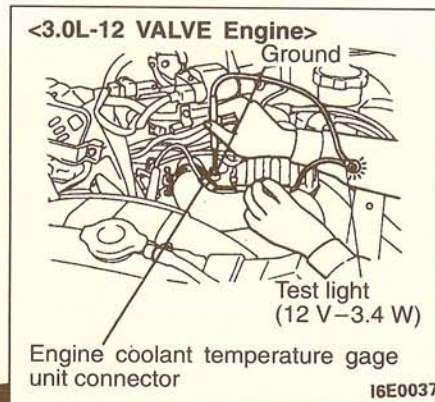
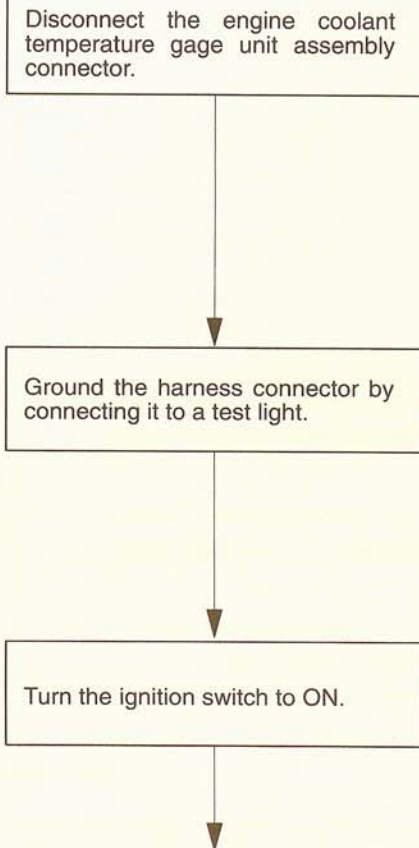
Connect the fuel gage unit to the battery via a test light (12 V–3.4 W), and then immerse the fuel gage unit in water. The condition is good if the test light switches off when the fuel gage unit thermistor is in water and illuminates when the thermistor is removed from the water.

**Caution**

After completing this test, wipe the unit dry and install it to the fuel tank.

**ENGINE COOLANT TEMPERATURE GAGE SIMPLE CHECK**

54300140062



00002831

Check the condition of the test light and the gage.

(1) Test light is illuminated (Gage needle is not moving)

Replace the engine coolant temperature gage.

(2) Test light is illuminated (Gage needle is moving)

Replace the engine coolant temperature gage unit.

(3) Test light is not illuminated (Gage needle is not moving)

Repair the harness.

**ENGINE COOLANT TEMPERATURE GAGE UNIT CHECK**

54300150058

Refer to GROUP 14 – Engine Coolant Temperature Gage Unit.

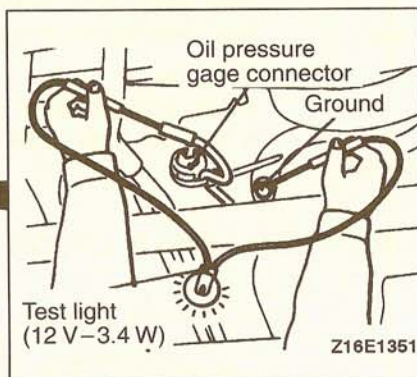


**OIL PRESSURE GAGE SIMPLE CHECK**

Disconnect the oil pressure gage unit coupling connector.

Connect the harness connector via a test light to the ground.

Turn the ignition switch to ON.



Check the condition of the test light and the gage.

Test light is illuminated (Gage needle is not moving)

Replace the oil pressure gage.

Test light is illuminated (Gage needle is moving)

Replace the oil pressure gage unit.

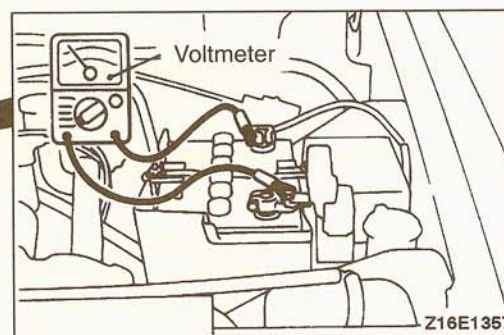
Test light is not illuminated (Gage needle is not moving)

Repair the harness.

**VOLTAGE METER SIMPLE CHECK**

Start the engine and run it at idle.

Connect a voltmeter to the battery.



Check the condition of the voltage meter.

1 Voltage indicated by voltmeter differs from voltage indicated by voltage meter (position indicated by pointer).

Replace the oil pressure gage.

2 Oil pressure gage does not operate.

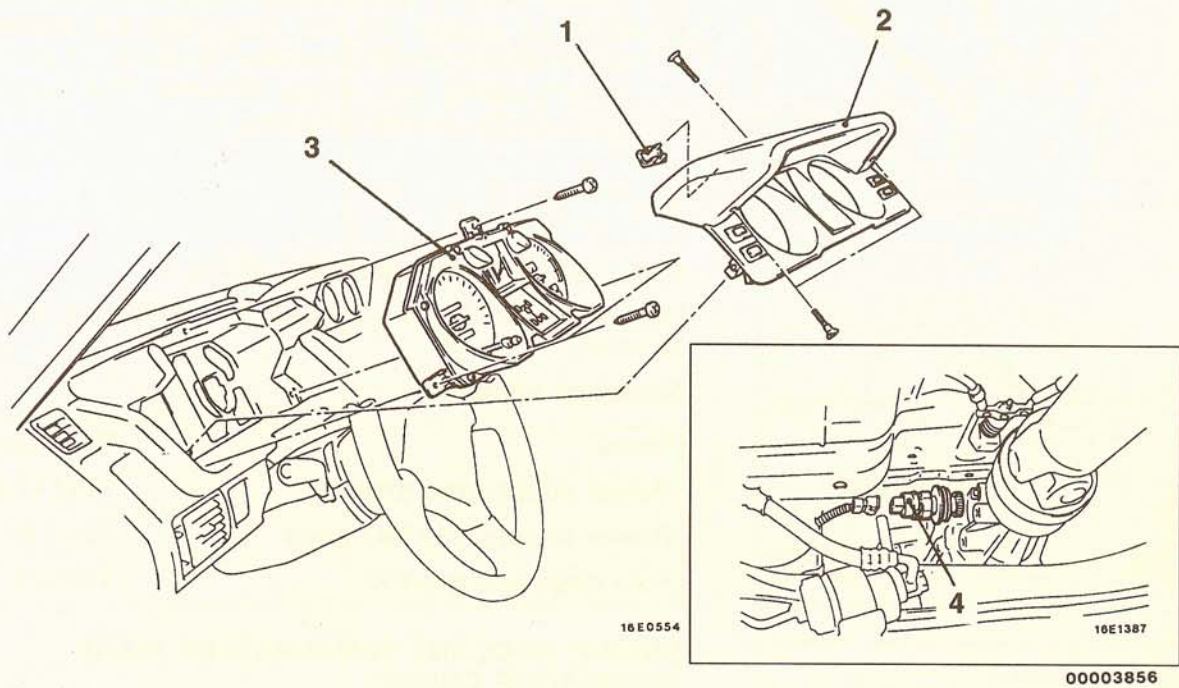
Repair the harness or replace the oil pressure gage.



## COMBINATION METER

### REMOVAL AND INSTALLATION

54300290040

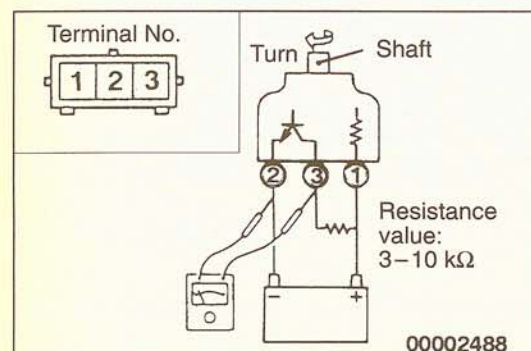
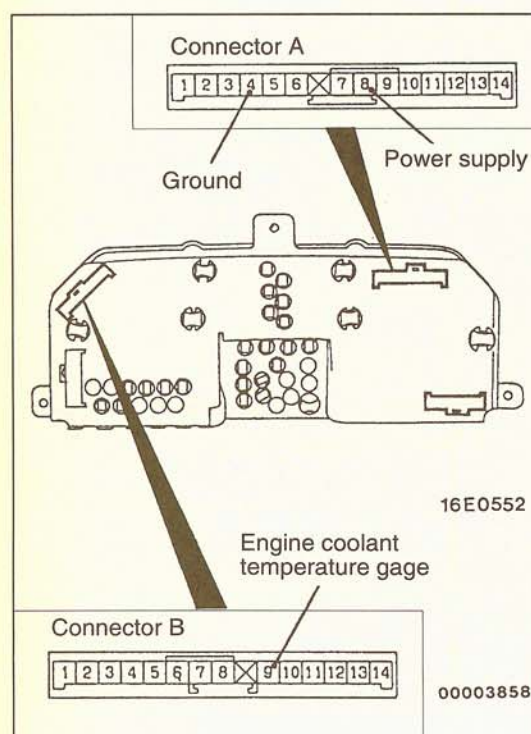
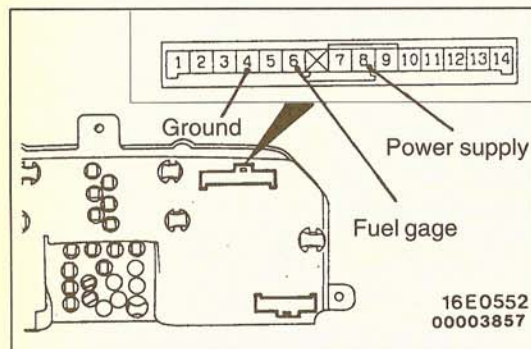
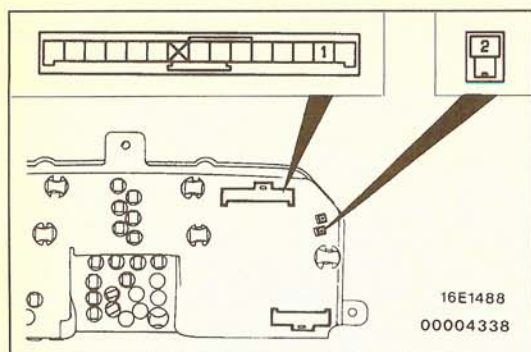


#### Combination meter removal steps

1. Meter hood plug
2. Meter bezel
3. Combination meter

#### Removal of vehicle speed sensor

4. Vehicle speed sensor



## INSPECTION

54300300057

## REED SWITCH CHECK

- (1) Check that the speedometer operates correctly.
- (2) Start the engine. Do not disconnect the connectors. Check the continuity between terminals (1) and (2) while moving slowly the vehicle forward. The continuity and discontinuity should alternate.

## FUEL GAGE RESISTANCE CHECK

54300120080

Use an ohmmeter to measure the resistance between the terminals.

Standard value:

Items	Resistance
Power supply and ground	$115 \pm 11.5 \Omega$
Power supply and fuel gage	$79 \pm 7.9 \Omega$
Fuel gage and ground	$147 \pm 14.7 \Omega$

## ENGINE COOLANT TEMPERATURE GAGE RESISTANCE CHECK

54300150065

Use an ohmmeter to measure the resistance between the terminals.

## Caution

For inspection, use an ohmmeter which uses a measurement current of 4 mA or less.

Standard value:

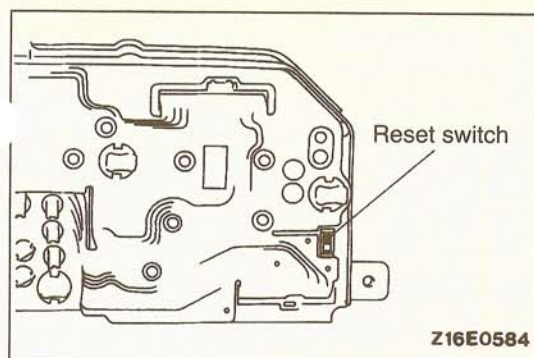
Items	Resistance
Power supply and engine coolant temperature gage	$145 \pm 14.5 \Omega$
Power supply and ground	$115 \pm 11.5 \Omega$
Engine coolant temperature gage and ground	$246 \pm 24.6 \Omega$

## VEHICLE SPEED SENSOR CHECK

54300640029

- (1) Remove the vehicle speed sensor and connect a 3–10 k $\Omega$  resistance as shown in the illustration at left.
- (2) Turn the shaft of the vehicle speed sensor and check that there is voltage between terminal (2) and terminal (3). (1 turn = 4 pulses)



**MAINTENANCE REQUIRED SYSTEM****RESET SWITCH CHECK**

54300840016

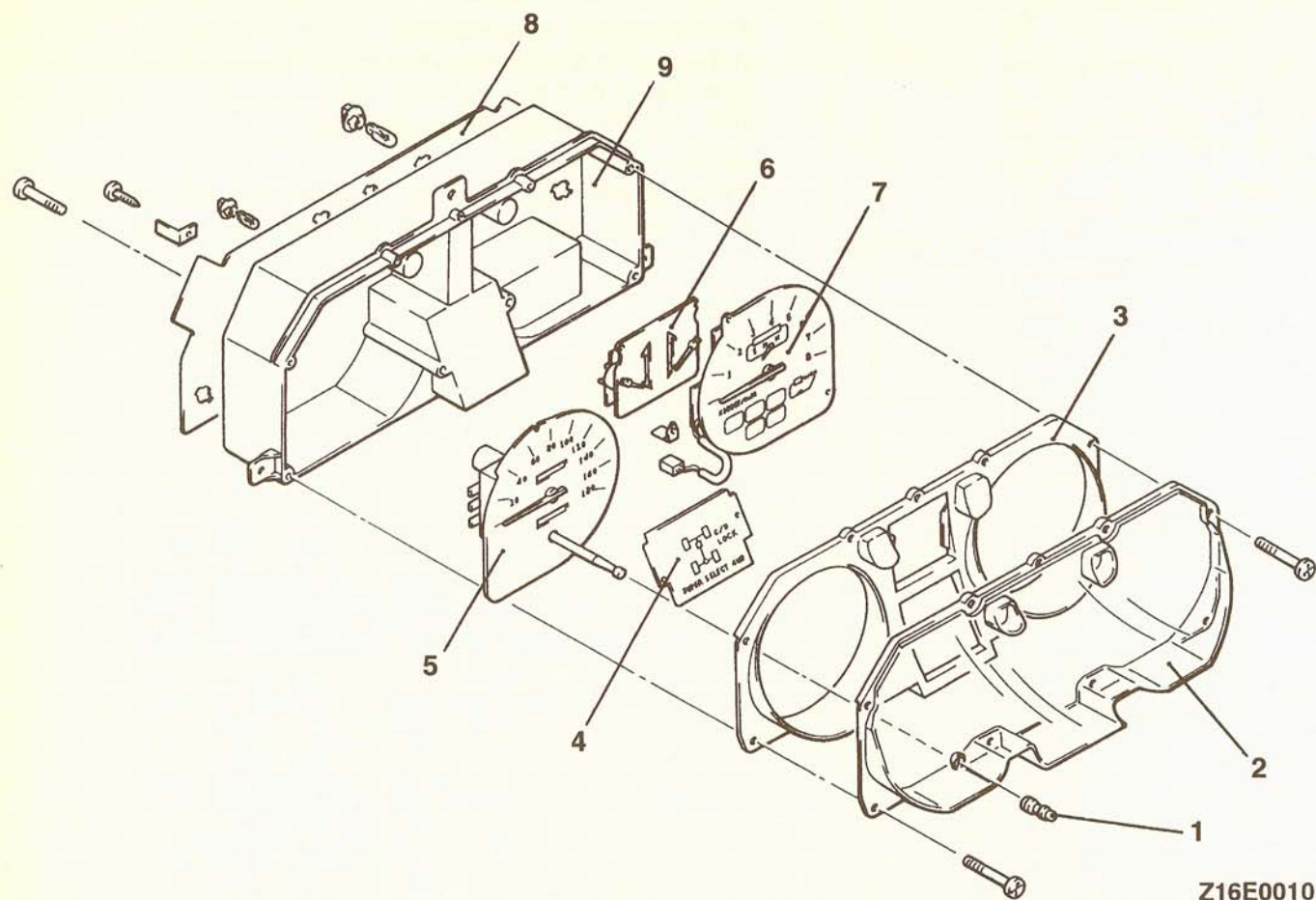
After checking is completed, use the reset switch (located at the rear of the combination meter) to switch off the warning light. Note that the warning light bulb should be removed after 100,000 miles are registered.

**NOTE**

If the speedometer is to be replaced, set the new odometer to the same reading as the odometer being removed.

## DISASSEMBLY AND REASSEMBLY

54300310036

**Disassembly steps**

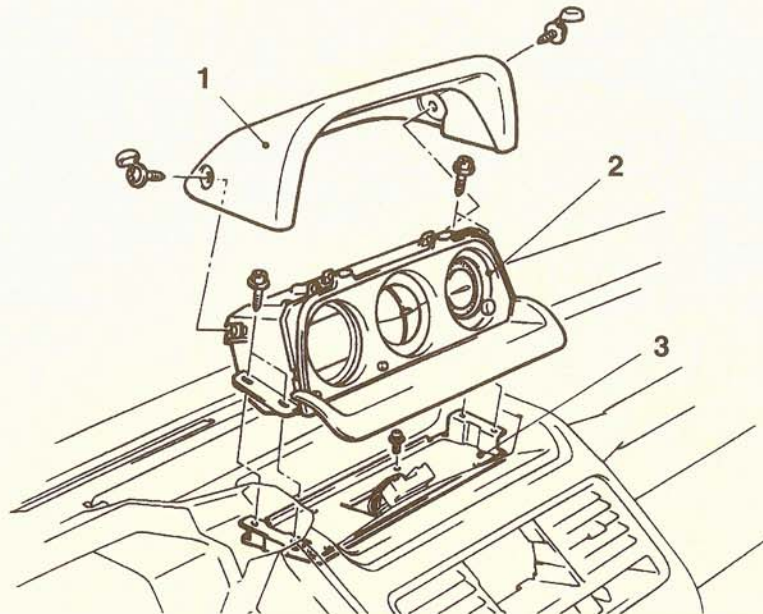
1. Boot
2. Meter glass
3. Window plate
4. Prism indicator lens
5. Speedometer

6. Fuel gage and engine coolant temperature gage
7. Tachometer
8. Printed circuit board
9. Meter case



**MULTI-METER**

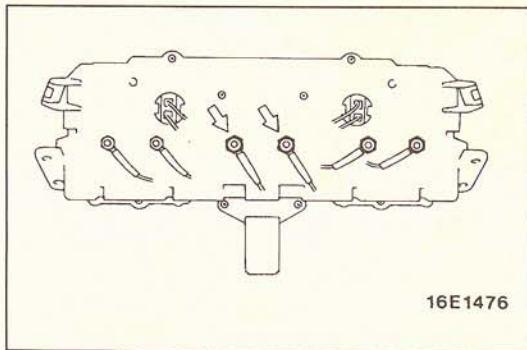
54300390016

**REMOVAL AND INSTALLATION**

Z16E0126

**Removal steps**

1. Meter hood
2. Multi-meter assembly
3. Meter mounting bracket

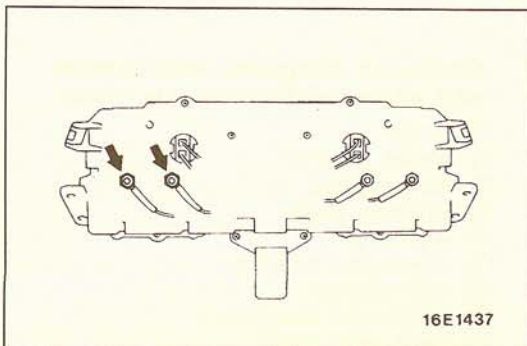
**INSPECTION**

54300400016

**OIL PRESSURE GAGE CHECK**

Use an ohmmeter to measure the resistance between the terminals.

**Standard value:** Approx. 50  $\Omega$

**VOLTAGE METER CHECK**

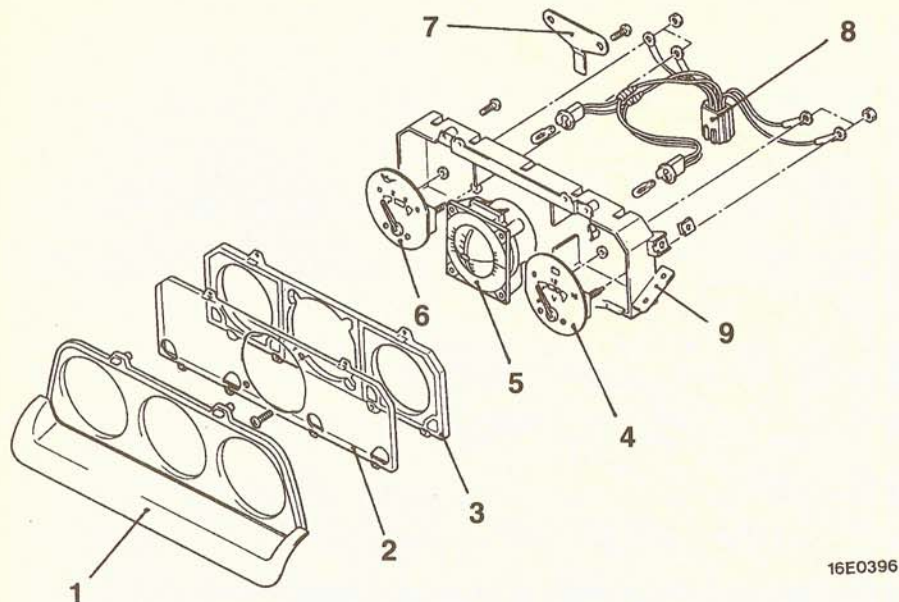
Use an ohmmeter to measure the resistance between the terminals.

**Standard value:** 380–460  $\Omega$

## DISASSEMBLY AND REASSEMBLY

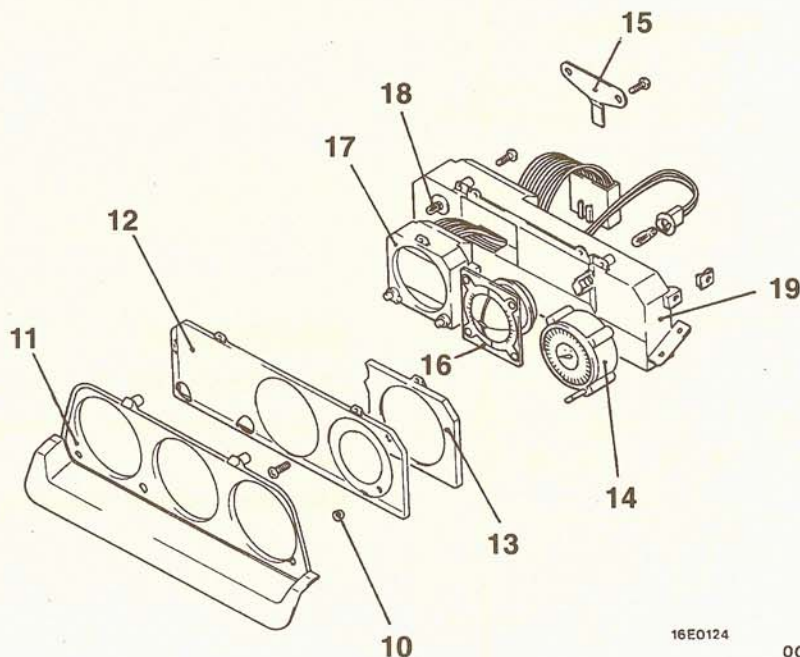
54300410019

## &lt;OIL PRESSURE GAGE, INCLINOMETER AND VOLTAGE METER&gt;



16E0396

## &lt;ELECTRONIC COMPASS, INCLINOMETER AND ALTIMETER&gt;



16E0124

00002489

## Oil pressure gage, inclinometer and voltage meter disassembly steps

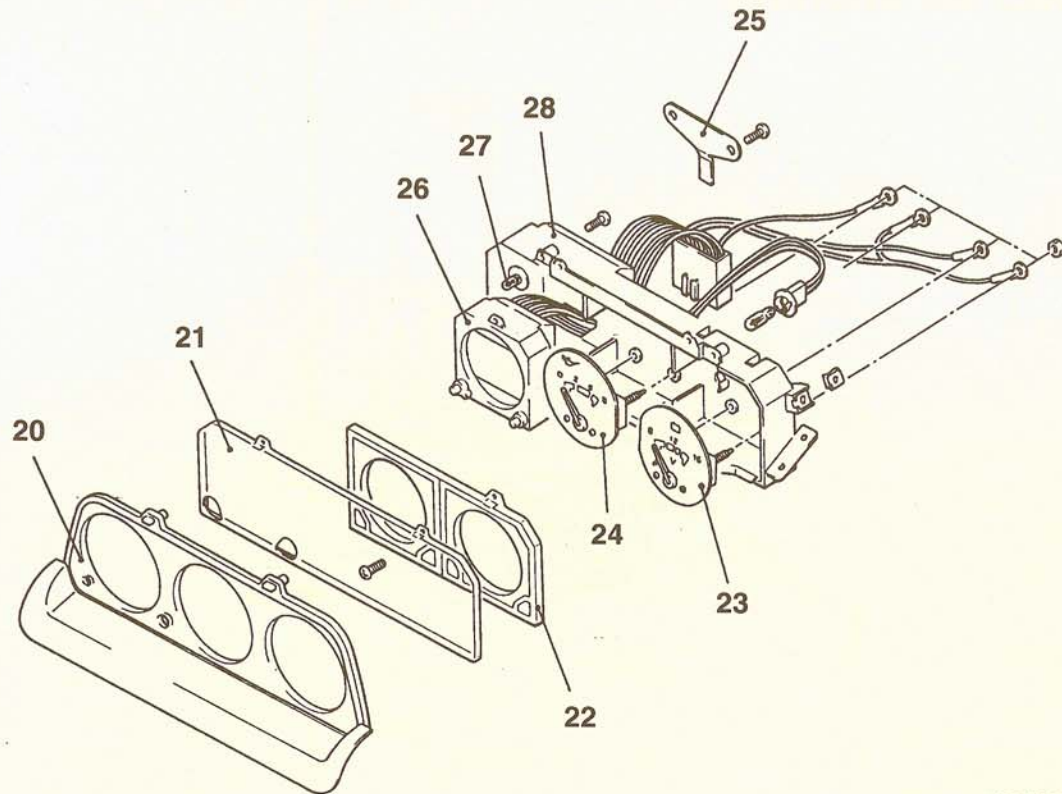
1. Meter garnish
2. Meter glass
3. Window plate
4. Voltage meter
5. Inclinator
6. Oil pressure gage
7. Connector bracket
8. Meter harness
9. Meter case

## Electronic compass, inclinometer and altimeter disassembly steps

10. Knob
11. Meter garnish
12. Meter glass
13. Window plate
14. Altimeter
15. Connector bracket
16. Inclinator
17. Electronic compass
18. Back-light bulbs
19. Meter case



## &lt;ELECTRONIC COMPASS, OIL PRESSURE GAGE AND VOLTAGE METER&gt;



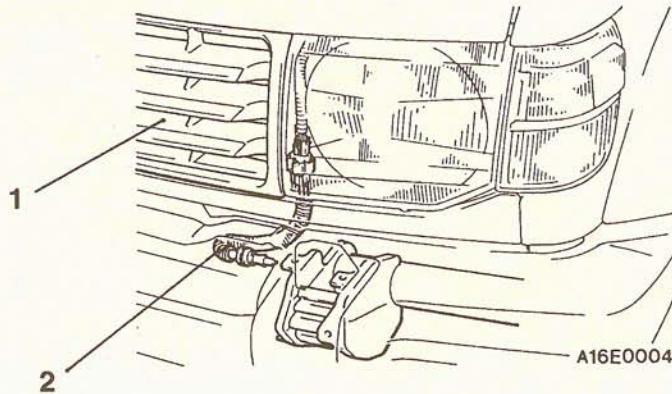
A16E1438

**Electronic compass, oil pressure  
gage and voltage meter  
disassembly step**

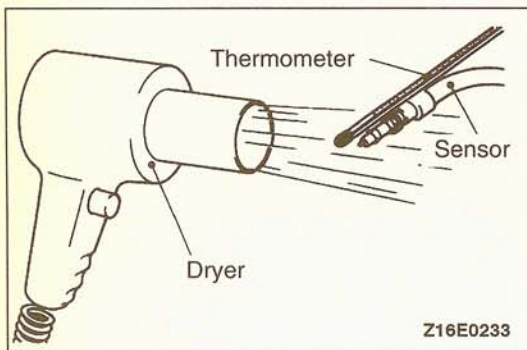
- 20. Meter garnish
- 21. Meter glass
- 22. Window plate
- 23. Voltage meter
- 24. Oil pressure gage
- 25. Connector bracket
- 26. Electronic compass
- 27. Back-light bulb
- 28. Meter case

**OUTSIDE TEMPERATURE SENSOR**

54300470017

**REMOVAL AND INSTALLATION****Outside temperature sensor removal steps**

1. Radiator grille
2. Outside temperature sensor

**INSPECTION**

54300480010

**OUTSIDE TEMPERATURE SENSOR CHECK**

Check that the internal resistance values of the outside temperature sensor are at the standard values when each sensor shows temperatures of 20°C (68°F) and 40°C (104°F).

**Standard value:**

20°C (68°F): Approx. 1,200  $\Omega$

40°C (104°F): Approx. 500  $\Omega$



# LIGHTING SYSTEM

## GENERAL SPECIFICATIONS

### Exterior lights

Items		Specifications
Headlight W		65/45
Front combination light W	Front turn-signal/Parking and front side marker light	27/8 (1157)
Rear combination light cp	Turn-signal light	32 (1156)
	Stop/tail light	32/2 (2057)
	Rear side marker light	3 (168)
Back-up light cp		32 (1156)
License plate light W		10
High-mounted stop light W		5

### Interior light

Items		Specifications
Dome light W		8
Reading light W		8
Door light W		5
Cargo space light W		10
Vanity mirror light W		1.5
Cigarette light Illumination light W		1.4 (74)
Ashtray illumination light W		1.4 (74)

#### NOTE

The values in parentheses denote SAE grade numbers.

## SERVICE SPECIFICATIONS

54200030076

Items	Limit
Headlight intensity cd	20,000 or more

## TROUBLESHOOTING

### HEADLIGHT CIRCUIT

#### OPERATION

##### <Low beam and high beam>

- When the ignition switch is at the ACC or ON position and the lighting switch is set to the HEAD position, the headlight relay contact closes to turn the headlight relay on.
- When the dimmer switch is set to the LO position, the low beams illuminate, and when it is set to the HI position, the high beams illuminate.

##### <Passing>

- If the passing switch is set to the ON position when the ignition switch is at the ACC or ON position and the lighting switch is at the OFF or TAIL position, the low beams and high beams will illuminate simultaneously when the dimmer switch is at the LO position, and the high beams will illuminate when the dimmer switch is at the HI position.

##### <High beam indicator light>

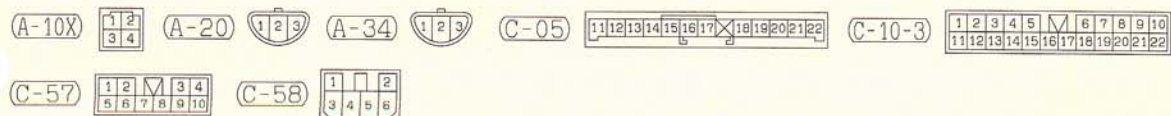
- When the high beams are illuminated or while passing is operating, the indicator light will illuminate to inform the driver that the high beams are illuminated.

#### TROUBLESHOOTING HINTS

1. The headlights do not illuminate at any positions.
  - (1) The tail lights illuminate.
    - Check the headlight relay. (Refer to P.54-65.)
    - Check the lighting switch. (Refer to P.54-67.)
  - (2) Tail lights also do not illuminate or the charging warning light does not turn off.
    - Check fusible link No. 13.
2. Both low beams do not illuminate.
  - Check the dimmer switch. (Refer to P.54-67.)
3. Both high beams do not illuminate but illuminate when the passing switch is turned to the ON position.
  - Check the dimmer switch. (Refer to P.54-67.)
4. The high beam indicator light does not illuminate but illuminates when the dimmer switch is at the HI position or when the passing switch is at the ON position.
  - Check dedicated fuse No. 7.
  - Check the indicator light bulb.
5. The headlights do not illuminate even if passing but illuminate when the dimmer switch is at the LO or HI position and the lighting switch is at the HEAD position.
  - Check the passing switch. (Refer to P.54-67.)

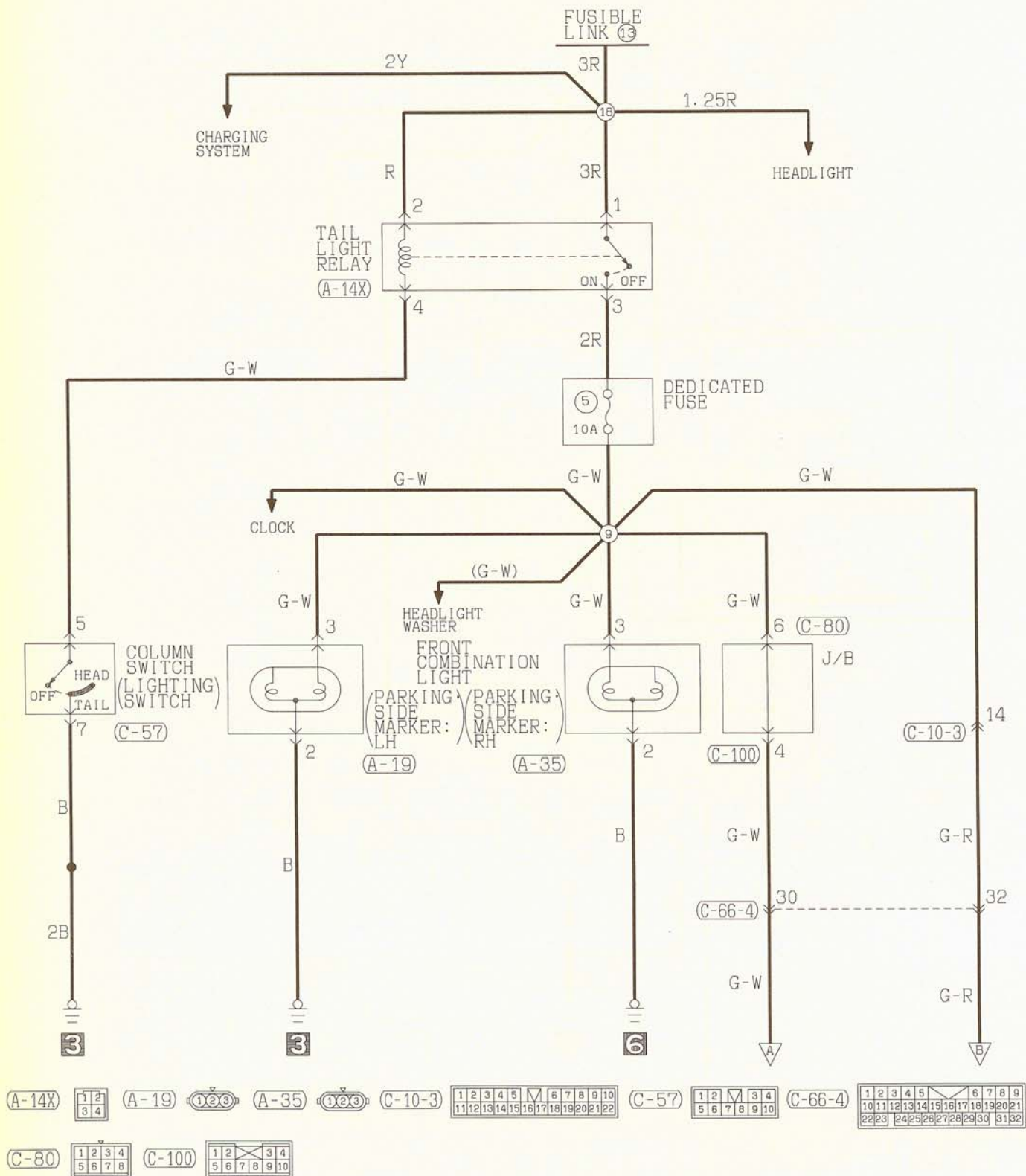


90100150104

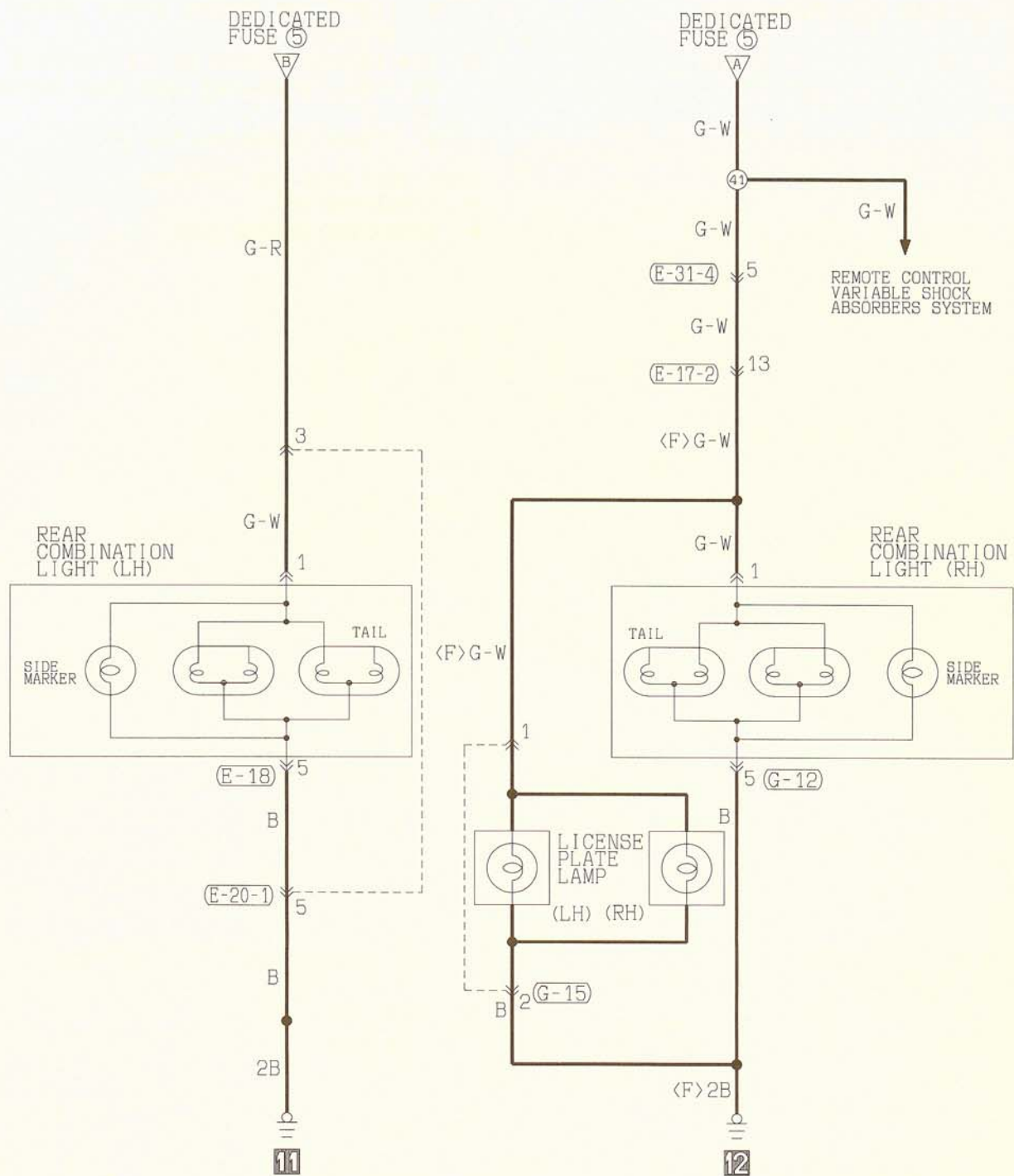


## TAIL LIGHT, PARKING LIGHT, SIDE MARKER LIGHT AND LICENSE PLATE LIGHT CIRCUIT

90101370011







E-17-2

1	2	3	M	4	5	6	
7	8	9	10	11	12	13	14

E-18

1	2	3
4	5	6

E-20-1

1	M	2	
3	4	5	6

E-31-4

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	

G-12

1	2	3
4	5	6

G-15

1	2
---	---

**OPERATION**

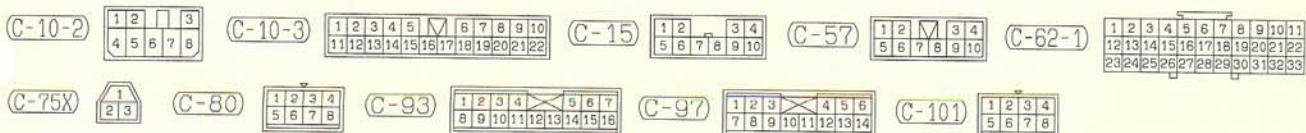
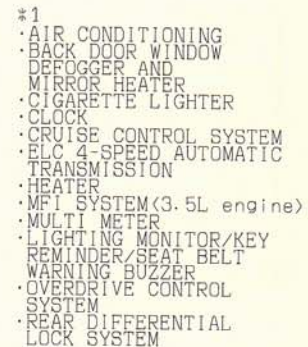
- When the lighting switch is set to the TAIL or HEAD position, the tail light relay contact closes to turn the tail light relay on.
- Current flows via dedicated fuse No. 5 and the tail lights, parking lights, side marker lights and license plate light illuminate.

**TROUBLESHOOTING HINTS**

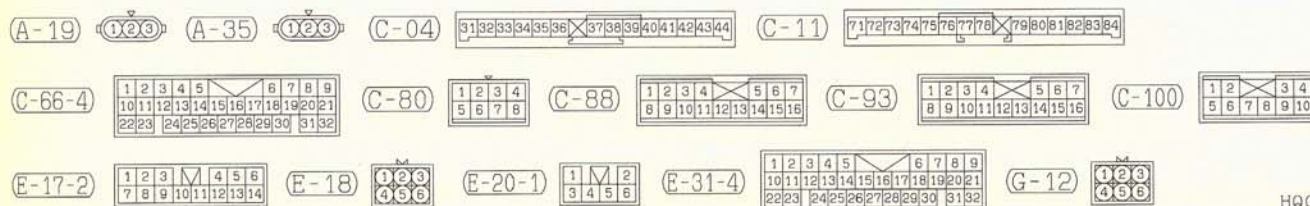
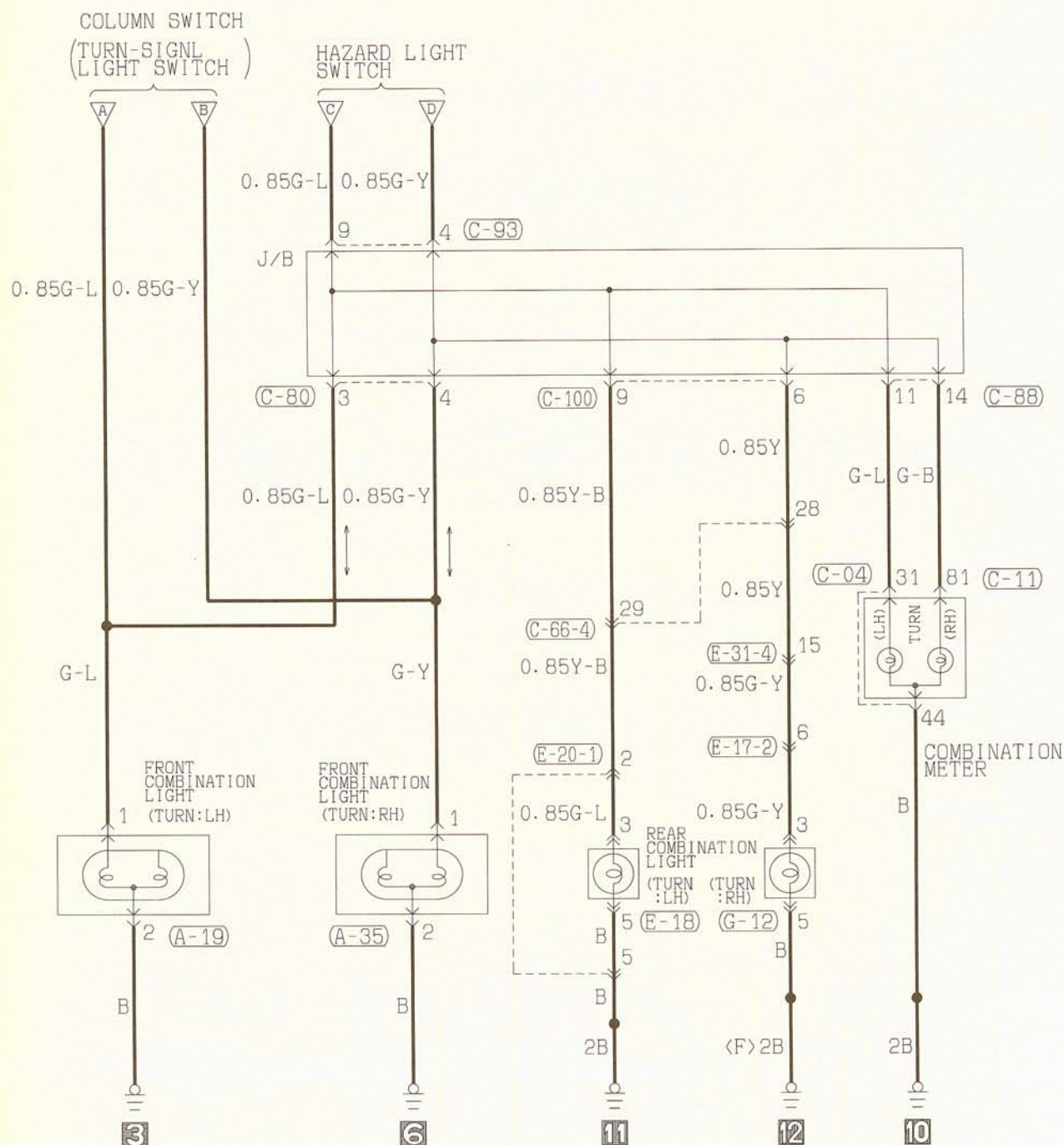
1. All lights do not illuminate.
  - (1) Headlights illuminate.
    - Check dedicated fuse No. 5.
    - Check the tail light relay. (Refer to P.54-65.)
    - Check the lighting switch. (Refer to P.54-67.)
  - (2) The headlights also do not illuminate or the charging warning light does not turn off.
    - Check fusible link No. 13.
2. Either light does not illuminate.
  - Check the bulb.
  - Check the ground circuit.



90100290059



## TURN-SIGNAL LIGHT AND HAZARD LIGHT CIRCUIT (CONTINUED)





**OPERATION****<Turn-signal light>****1. In normal operating condition**

- When the ignition switch is turned to the ON position, battery positive voltage is applied through the hazard light switch to the turn-signal and hazard flasher unit.
- When the turn-signal light switch is placed in the L.H. (or R.H.) position, Tr1 in the flasher unit turns on, causing the relay contacts in the flasher unit to close. This causes the L.H. (or R.H.) turn-signal light and turn-signal indicator light to illuminate.
- At the same time, the capacitor is charged through R2 up to the lower limit as set by COM3.
- As soon as the capacitor is fully charged, the output from COM3 is inverted, turning off Tr1. This opens the relay contacts and, as a result, the L.H. (or R.H.) turn-signal light and turn-signal indicator light switch off.
- At the same time as Tr1 turns off, the capacitor starts discharging. As soon as the capacitor completes discharging, the COM3 output is inverted again, causing Tr1 to turn on. This causes the L.H. (or R.H.) turn-signal light and turn-signal indicator light to illuminate.
- This sequences of operations occurs repeatedly, causing the L.H. (or R.H.) turn-signal light and turn-signal indicator light to flash on and off.

**2. When one bulb is burnt**

- When either one of the turn-signal light bulbs switches off, it causes the resistance of the entire light circuit to increase, resulting in a smaller voltage drop at R1 in the flasher unit.
- This smaller voltage drop is sensed and the lower voltage limit set by COM3 is raised, thus shortening the time required by the capacitor before it is fully charged.
- As a result, the on-off cycle of Tr1 becomes shorter with the result that the light flashes on and off more quickly.

**<Hazard light>**

- When the hazard light switch is placed in the ON position, the flasher unit relay contacts repeatedly close and open, which causes the R.H. and L.H. turn-signal lights, turn-signal indicator lights and hazard warning indicator lights to flash on and off at the same time.

**Remark**

- The number of times the hazard lights flash on and off does not change even when one bulb is blown.

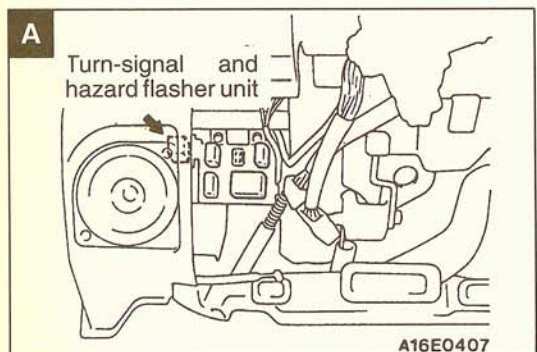
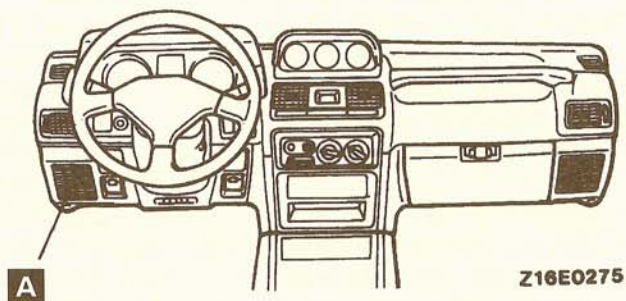
**TROUBLESHOOTING HINTS**

1. Neither the turn-signal lights nor hazard lights operate.
  - Check the hazard light switch. (Refer to P.54-65.)
  - Check the flasher unit.
2. All L.H. or R.H. turn-signal lights do not illuminate.
  - (1) Hazard light is fully operational.
    - Check the turn-signal light switch. (Refer to P.54-67.)
    - Check the hazard light switch. (Refer to P.54-65.)
3. Flashing cycle of turn-signal lights is shorter.
  - Check the light bulb.
4. Hazard light does not operate.
  - (1) Turn-signal lights are operational.
    - Check the hazard light switch. (Refer to P.54-65.)

## COMPONENT LOCATION

70100330029

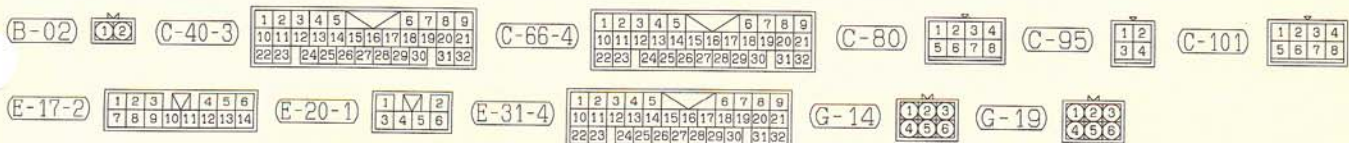
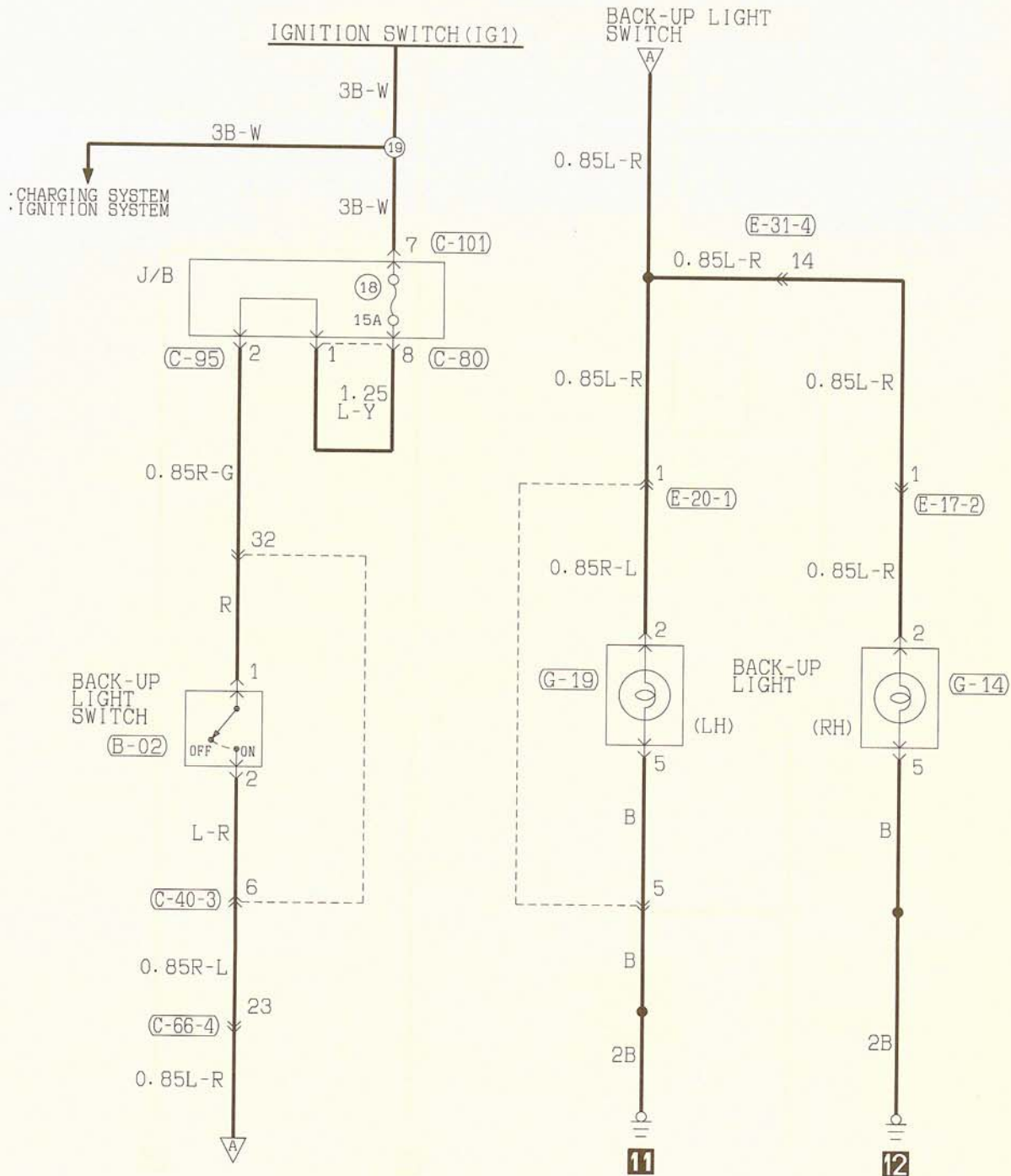
Name	Symbol
Turn-signal and hazard flasher unit	A





## BACK-UP LIGHT CIRCUIT &lt;M/T&gt;

90100310045







**OPERATION**

- When the ignition switch is turned to the ON position and the shift lever (or the selector lever) is moved to the R position (or the park/neutral position switch (A/T) is switched to the R position), the back-up light switch (M/T) is switched on and the back-up lights illuminate.

**TROUBLESHOOTING HINTS**

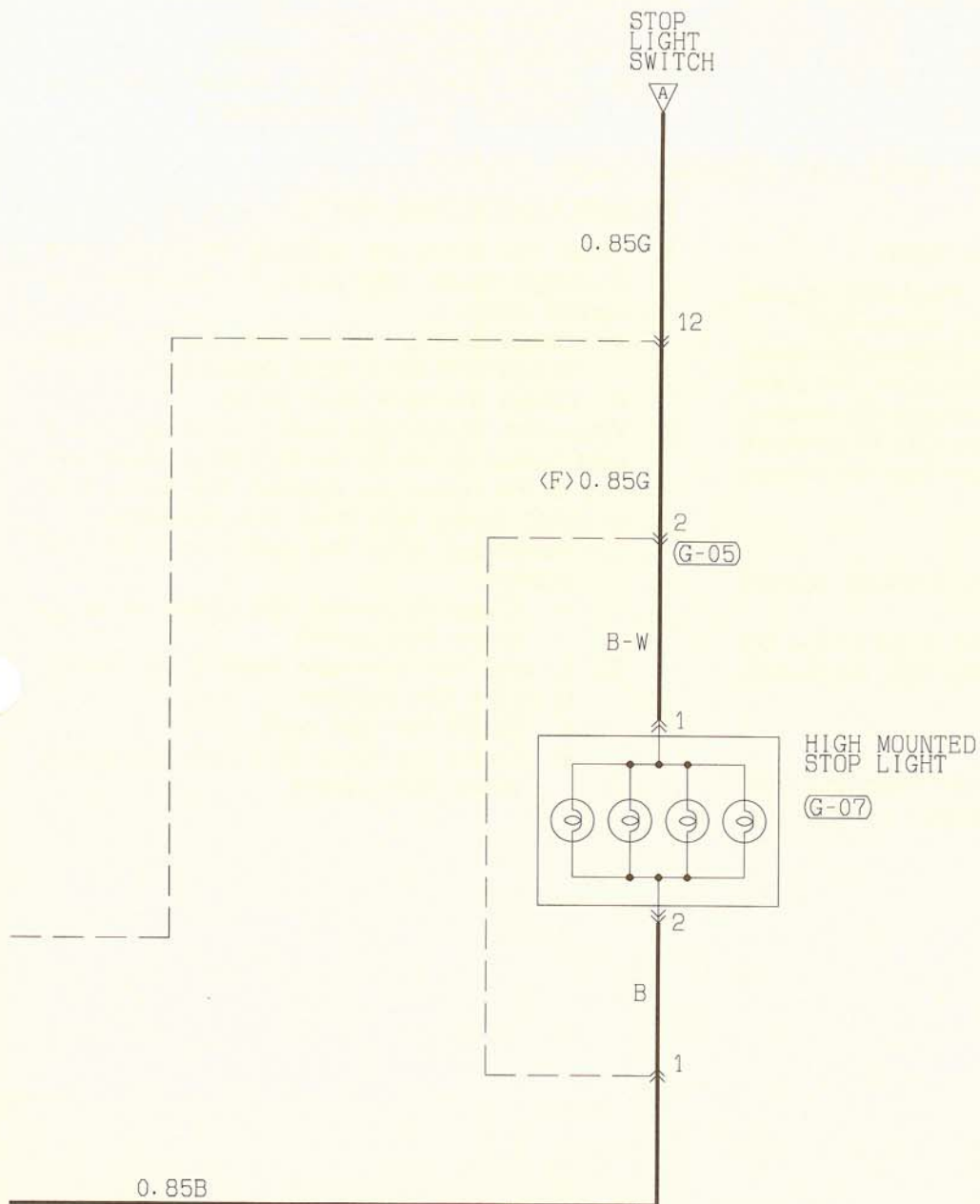
The back-up lights do not illuminate.



- Check the back-up light switch. <M/T>
- Check the park/neutral position switch. <A/T>
- Check the ground circuit.
- Check the back-up light bulb.

90100300042







(G-05)  (G-07) 

**OPERATION**

- Battery positive voltage is constantly applied to the stop light switch through multi-purpose fuse No. 17.
- When the brake pedal is depressed, the stop light switch turns on and the stop lights illuminate.

**DOME LIGHT, CARGO SPACE LIGHT AND READING LIGHT CIRCUIT****OPERATION****<Dome light and cargo space light>**

- Battery positive voltage is constantly applied to the dome light and cargo space light.
- When the dome light switch or the cargo space light switch is set to the ON position, the dome light or cargo space light always illuminates. When the switch is set to the DOOR position, the dome light or cargo room light illuminates when any door is opened.

**<Reading light>**

- Battery positive voltage is constantly applied to the reading light.
- When the reading light switch is set to the ON or OFF position, the reading light illuminates or switches off.

**<Door-ajar warning light>**

- This warning light comes on when the door is either open or not completely closed.

**TROUBLESHOOTING HINTS**

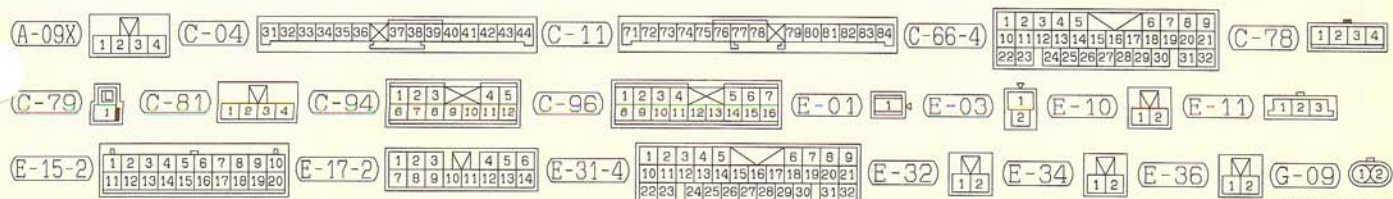
1. The stop lights do not illuminate.
  - Check the stop light switch. (Refer to GROUP 35A – Brake Pedal.)
  - Check multi-purpose fuse No. 17.
2. Either stop light does not illuminate.
  - Check the ground circuit.
3. The stop lights do not illuminate.
  - Check the stop light switch. (Refer to GROUP 35A – Brake Pedal.)

**TROUBLESHOOTING HINTS**

1. When the doors are opened, the dome light or cargo space light does not illuminate for certain doors.
  - Check the front or rear door switch. (Refer to GROUP 42 – Door Assembly.)
  - Check the back door switch.
2. When the dome light switch or cargo space light switch is set to the DOOR position and any of the doors are opened, the dome light or cargo space light does not illuminate.
  - (1) Illuminates when the switch is at the ON position.
    - Check the dome light switch or cargo space light switch.
  - (2) It does not illuminate even if the switch is at the ON position.
    - Check the light bulb.
    - Check the dome light switch or cargo space light switch.



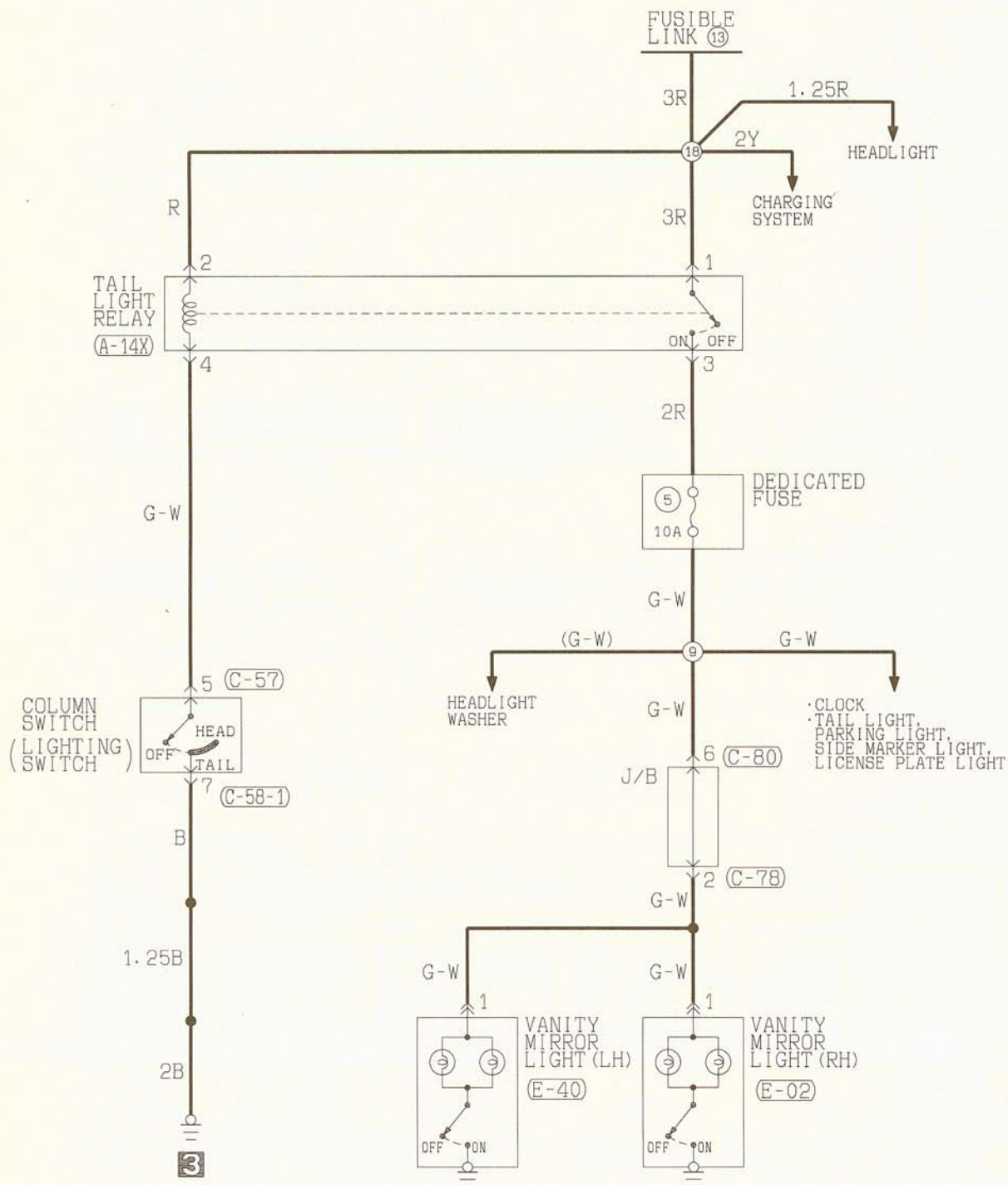
90101380014



H908M06AA

## VANITY MIRROR LIGHT CIRCUIT

90100240016



(A-14X) (1 2 3 4) (C-57) (1 2 3 4 5 6 7 8 9 10) (C-58-1) (1 2 3 4 5 6 7 8 9 10 11 12) (C-78) (1 2 3 4) (C-80) (1 2 3 4 5 6 7 8) (E-02) (1) (E-40) (1)



**OPERATION**

- When the lighting switch is set to the TAIL or HEAD position, the tail light relay contact closes to turn the tail light relay on.
- When the lid of the vanity mirror is opened, the vanity mirror light switch is set to the ON position, current flows via dedicated fuse No. 5 and the vanity mirror light illuminates.

**DOOR LIGHT CIRCUIT****OPERATION**

- Battery voltage is always applied (via fusible link No. 4 and multipurpose fuse No. 19) to the door light.
- When the door is opened, the door switch is switched ON and the door light illuminates.

**TROUBLESHOOTING HINTS**

The vanity mirror does not illuminate.

- (1) The tail lights illuminate.
  - Check the vanity mirror switch.
  - Check the vanity mirror light bulb.
- (2) The tail lights also do not illuminate.
  - Check the tail light relay. (Refer to P.54-65.)
  - Check dedicated fuse No. 5.
  - Check the lighting switch. (Refer to P.54-67.)

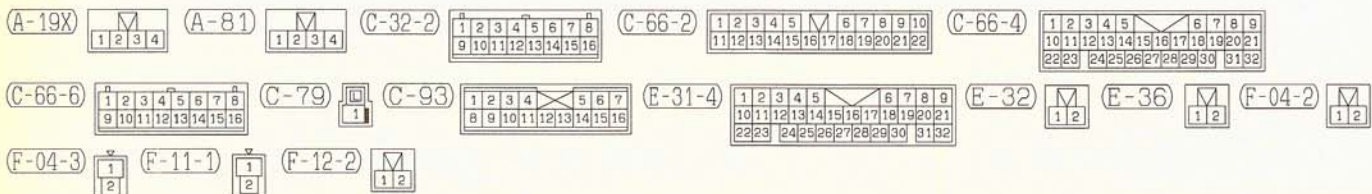
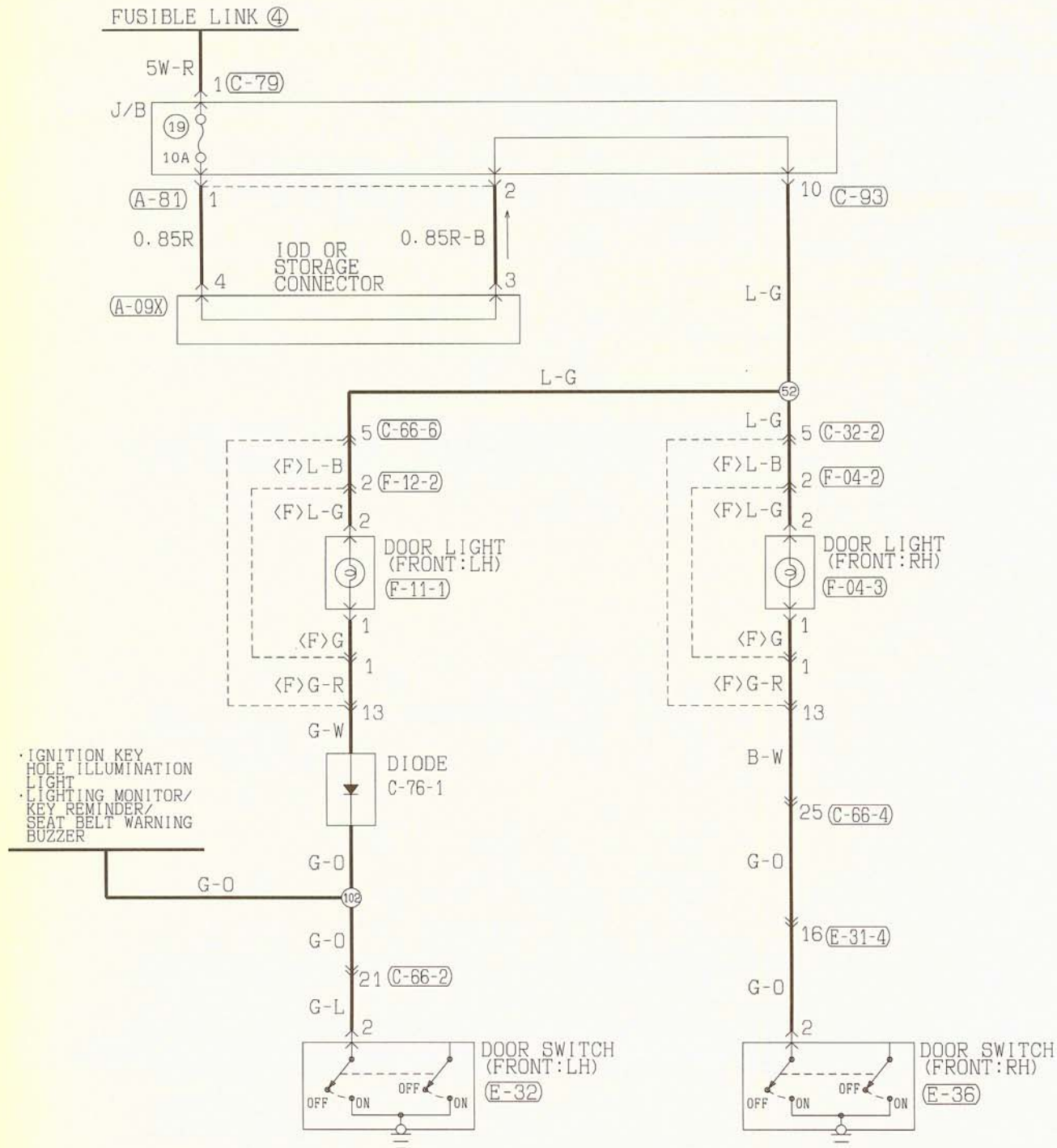
**TROUBLESHOOTING HINTS**

Some door lights does not come on.

- Check the bulb.
- Check the door switch. (Refer to GROUP 42 – Door Assembly.)

## DOOR LIGHT CIRCUIT

90100250064



H008M10AA

TSB Revision

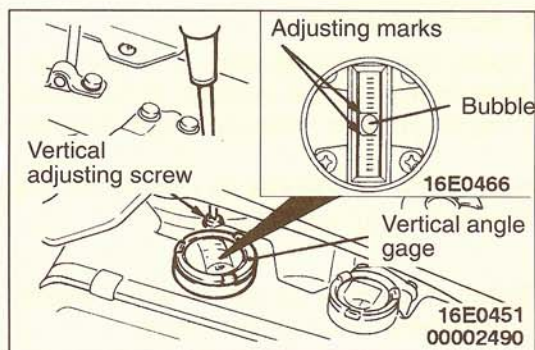


## ON-VEHICLE SERVICE

### HEADLIGHT AIMING

#### PRE-AIMING INSTRUCTIONS

1. Check for a badly rusted or malfunctioning headlight assembly.  
These conditions must be corrected before a satisfactory adjustment can be made.
2. Place the vehicle on a level floor.
3. Bounce the front suspension through three (3) oscillations by applying body weight to the hood or bumper.
4. Check the tire inflation.
5. Rock the vehicle sideways to allow the vehicle to assume its normal position.
6. If the fuel tank is not full, place a weight in the trunk of the vehicle to simulate the weight of a full tank [3 kg (6.5 lbs.) per gallon].
7. There should be no other load in the vehicle other than the driver or a substituted weight of approximately 70 kg (150 lbs.) placed in the driver's position.
8. Thoroughly clean the headlight lenses.

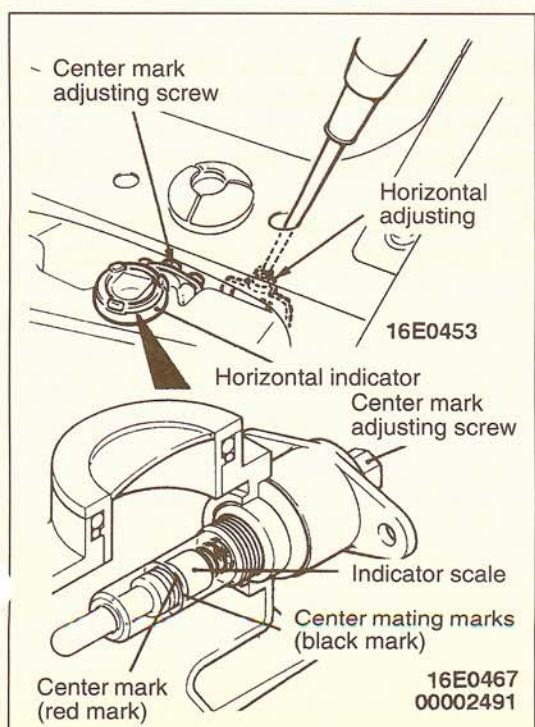


#### VERTICAL ADJUSTING

Adjust the vertical angle by rotating the vertical adjusting screw so that the bubble in the vertical angle gage is inside the adjusting marks.

#### NOTE

The beam angle will change by about  $0^{\circ}12'$  per graduation.



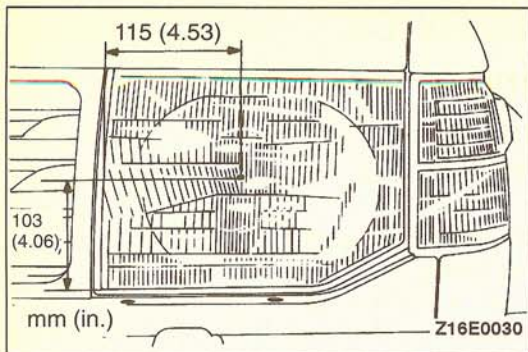
#### HORIZONTAL ADJUSTING

Adjust the horizontal angle by turning the horizontal adjusting screw until the center mark (red mark) and the center mating mark (black mark) of the horizontal indicator are aligned.

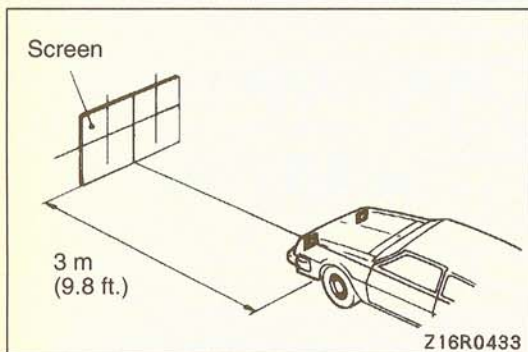
#### NOTE

The beam angle will change by about  $0^{\circ}23'$  per graduation.



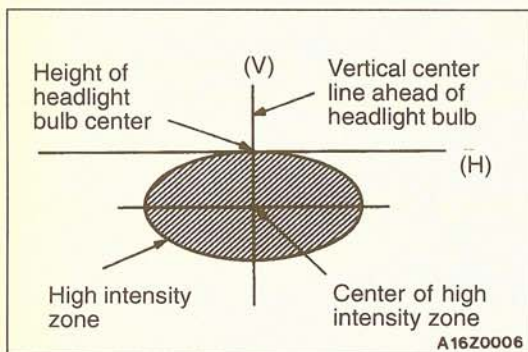
**AIMING WITH SCREEN****HEADLIGHT AIM PREPARATION**

1. Measure the center of the headlight bulb as shown in the illustration.



2. Place the vehicle on a known level floor 3 m (9.8 feet) from an aiming screen or brightly-colored wall. Four lines of adhesive tape or similar are needed on the screen or wall.

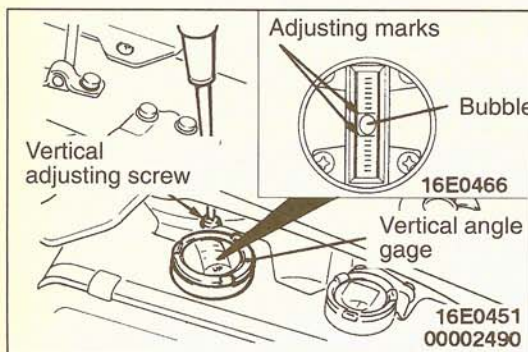
- (1) Position a vertical tape so that it is aligned with the vehicle center line.
- (2) Position a horizontal tape with reference to the center line of each of the headlight bulbs.
- (3) Position a vertical tape on the screen with reference to the center line of each of the headlight bulbs.

**VISUAL HEADLIGHT ADJUSTMENT**

1. A properly aimed lower beam will appear on the aiming screen 7.6 m (25 feet) in front of the vehicle. The shaded area as shown in the illustration indicates high intensity zone.
2. Adjust the low beam of the headlights to match the low beam pattern of the right and left headlights.

**NOTE**

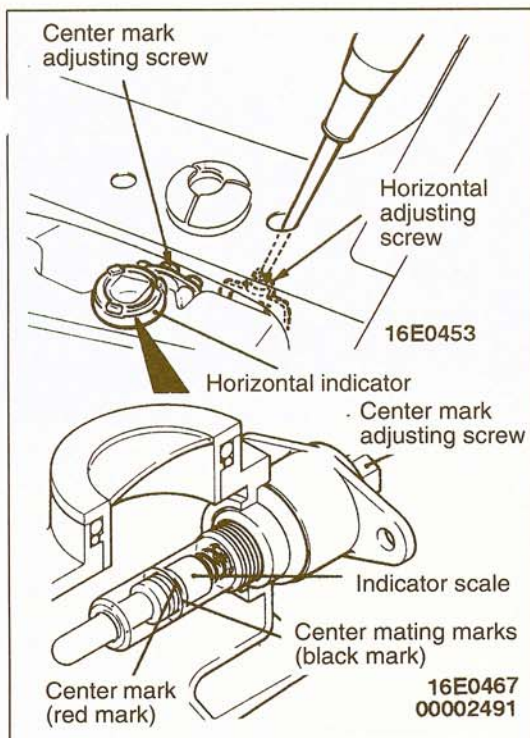
If the visual headlight adjustment at low beam is made, the adjustment at high beam is not necessary.

**Vertical Adjusting**

1. Adjust the vertical angle by rotating the vertical adjusting screw so that the bubble in the vertical angle gage locates inside the adjusting marks.
2. Check that the beam which strikes the screen matches the specified beam pattern.

If the pattern does not match, adjust the vertical angle with the vertical adjusting screw until it does match.





### Horizontal Adjusting

1. Adjust the horizontal angle by turning the horizontal adjusting screw until the center mark (red mark) and the center mating mark (black mark) of the horizontal indicator are aligned.
2. Check that the beam which strikes the screen matches the specified beam pattern.  
If the pattern does not match, adjust by the following procedure.
  - (1) Adjust the horizontal angle by turning the horizontal adjusting screw so that the beam pattern matches the specified pattern.
  - (2) Turn the center mark adjusting screw to align the center mark (red mark) and the center mating mark (black mark) of the horizontal indicator.

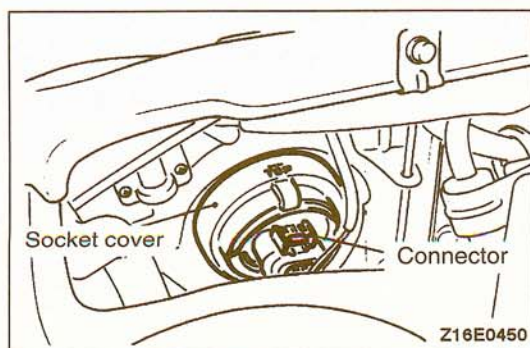
### LUMINOUS INTENSITY MEASUREMENT

Measure the luminous intensity of the headlights with a photometer in accordance with the instruction manual prepared by the manufacturer of the photometer and make sure that the luminous intensity is within the following limit.

**Limit: 20,000 cd or more**

#### NOTE

- (1) When measuring the luminous intensity of the headlights, keep the engine at 2,000 r/min and have the battery charged.
- (2) If there are specific regulations for luminous intensity of headlights in the region where the vehicle is operated, make sure that the intensity conforms to the requirements of such regulations.

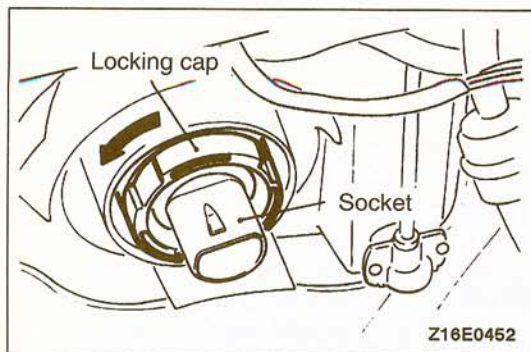


### REPLACEABLE BULB REPLACEMENT

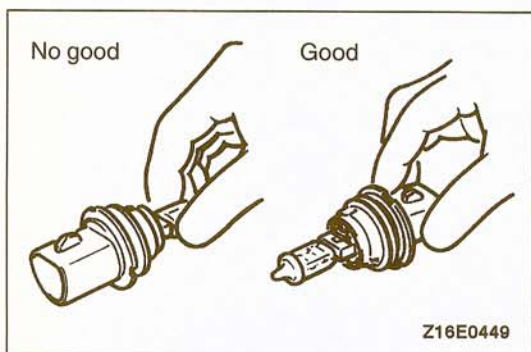
54200130066

- (1) Remove the engine coolant reserve tank (left side only).
- (2) Disconnect the harness connector, and then pull out the socket cover.





- (3) Remove the locking cap by rotating it counter-clockwise, and then draw the socket together with bulb.

**Caution**

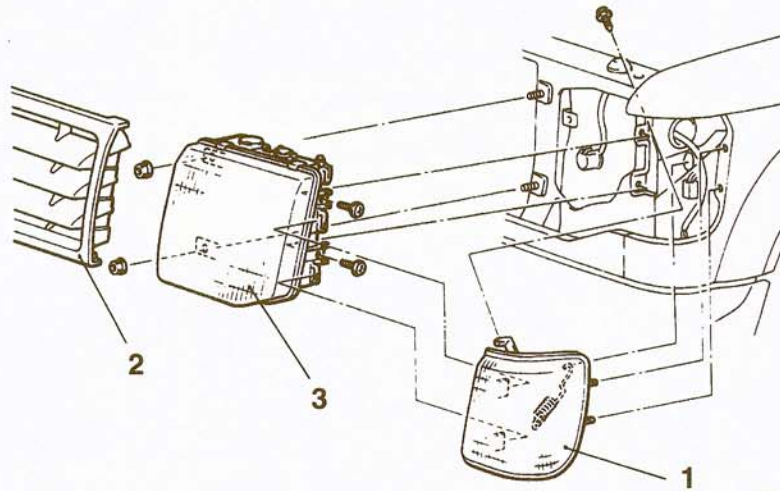
**Never hold the halogen light bulb with a bare hand, dirty glove, etc.**

**If the glass surface is dirty, be sure to clean it with alcohol, paint thinner, etc., and install it after drying it thoroughly.**

- (4) If the socket cover is not securely installed, the lens will be out of focus, or water will get inside the light unit, so the cover should be securely installed.

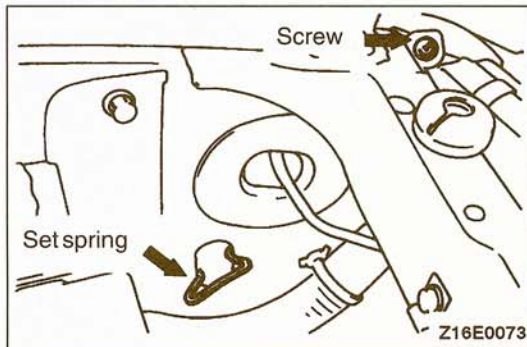
# HEADLIGHT AND FRONT COMBINATION LIGHT REMOVAL AND INSTALLATION

54200260017



## Removal steps

- ◀A▶ ▶B▶ 1. Front combination light  
▶A▶ 2. Radiator grille  
▶A▶ 3. Headlight



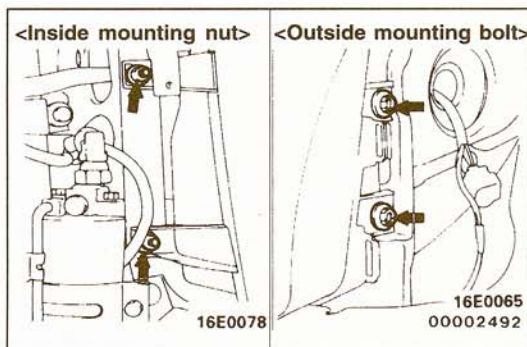
## REMOVAL SERVICE POINT

### ◀A▶ FRONT COMBINATION LIGHT REMOVAL

Remove the front combination light mounting screws and set spring, and then remove the front combination light by pulling it towards the front of the vehicle.

#### NOTE

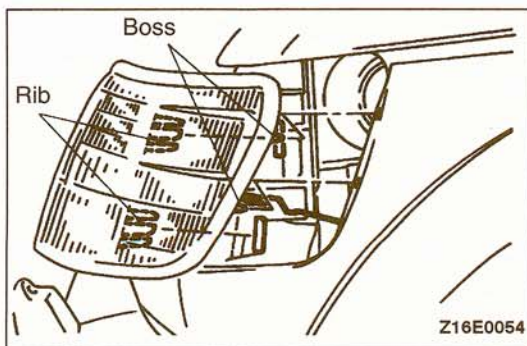
For the left side, before removing the front combination light, remove the engine coolant reserve tank in advance.



## INSTALLATION SERVICE POINTS

### ▶A▶ HEADLIGHT INSTALLATION

After tightening the outside mounting bolt, tighten the inside mounting nut.



### ▶B▶ FRONT COMBINATION LIGHT INSTALLATION

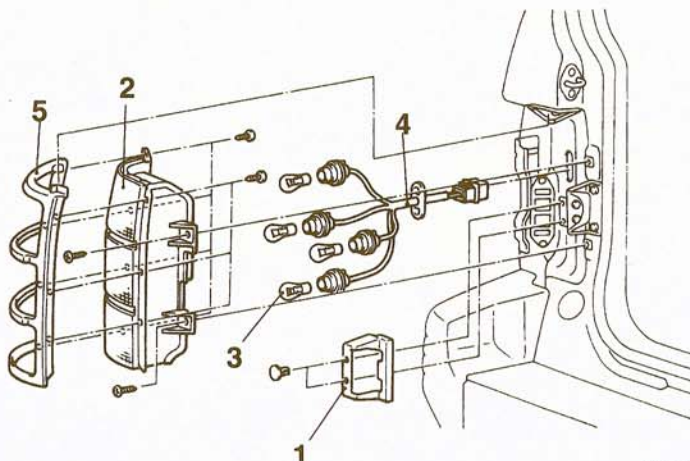
- (1) Align the front combination light positioning bosses with the insertion holes in the fender, and align the ribs with the headlight insertion holes.
- (2) While pushing the front combination light in towards the rear of the vehicle, pull the set spring into the engine compartment to tighten it to the vehicle body, and then tighten with the screw.



# REAR COMBINATION LIGHT

54200390013

## REMOVAL AND INSTALLATION



Z16E0103

### Removal steps

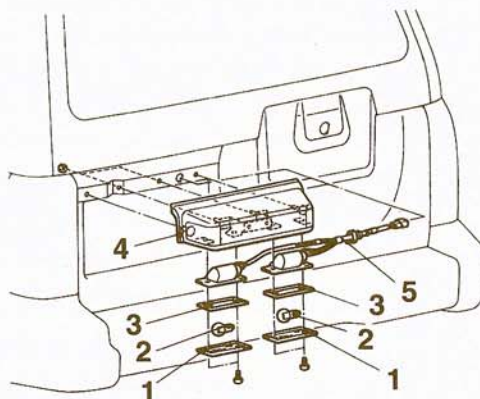
1. Back door bumper cover
2. Rear combination light unit
3. Bulb

- Quarter trim  
(Refer to GROUP 52A – Trim.)
- 4. Socket assembly
- 5. Rear combination light bezel

# LICENSE PLATE LIGHT

54200420019

## REMOVAL AND INSTALLATION

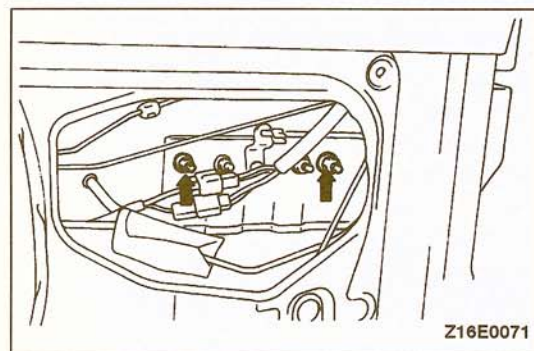


Z16E0101

### Removal steps

1. Lens
2. Bulb
3. Lens gasket

- Back door trim (Refer to GROUP 42 – Door Trim and Waterproof Film.)
- 4. License plate light garnish
- 5. Socket assembly



Z16E0071

## REMOVAL SERVICE POINT

### ◀A▶ LICENSE PLATE LIGHT GARNISH REMOVAL

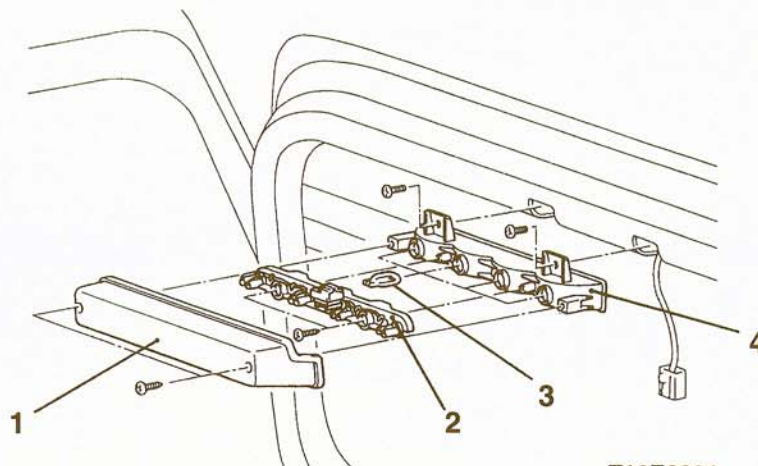
- (1) Take off the waterproof film and remove the license plate light garnish mounting nuts.
- (2) Remove the clips with a flat-tip (–) screwdriver, and then remove the license plate light garnish together with the socket assembly.



## HIGH MOUNTED STOP LIGHT

### REMOVAL AND INSTALLATION

54200510044

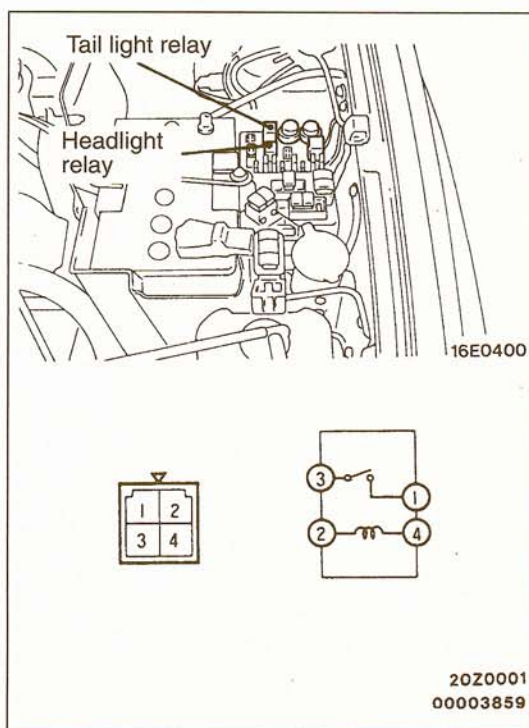


Z16E0096

#### Removal steps

1. Cover
2. Socket assembly

3. Bulb
4. High mounted stop light unit



20Z0001  
00003859

## RELAY

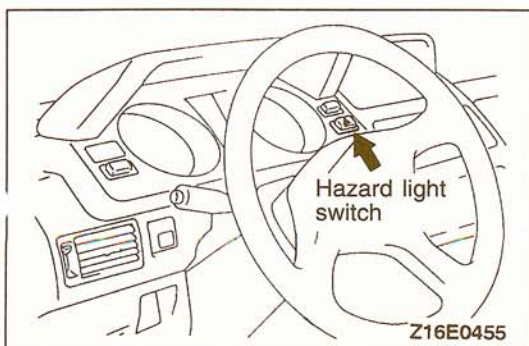
54200880015

### INSPECTION

#### Headlight Relay and Tail Light Relay Check

- (1) Remove the headlight relay or tail light relay from the relay box in the engine compartment.
- (2) Apply battery positive voltage to terminal (2), and check for continuity between the terminals when terminal (4) is grounded.

When power is supplied	Between terminals (1)–(3)	Continuity
When power is not supplied	Between terminals (1)–(3)	No continuity
	Between terminals (2)–(4)	Continuity



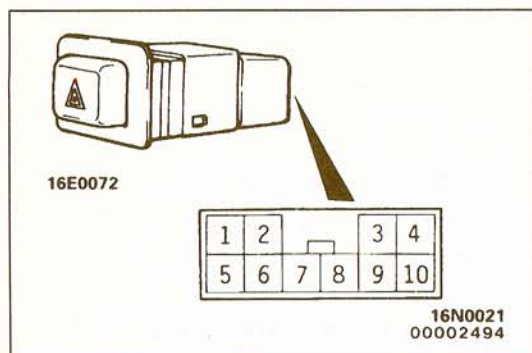
Z16E0455

## HAZARD LIGHT SWITCH

54200670056

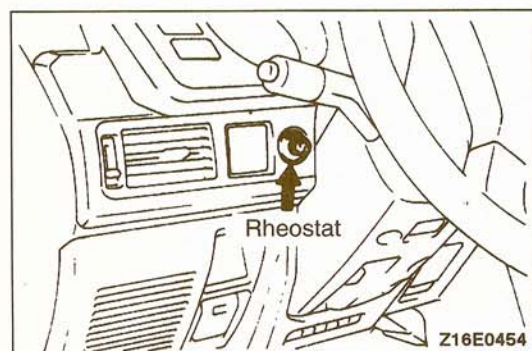
### INSPECTION

- (1) Remove the hazard light switch from the meter bezel.



- (2) Operate the switch and check for continuity between the terminals.

Switch position	Terminal									
	1	2	3	4	5	6	7	8	9	10
OFF					○		○	○	○	ILL
ON	○	○	○	○	○	○				○

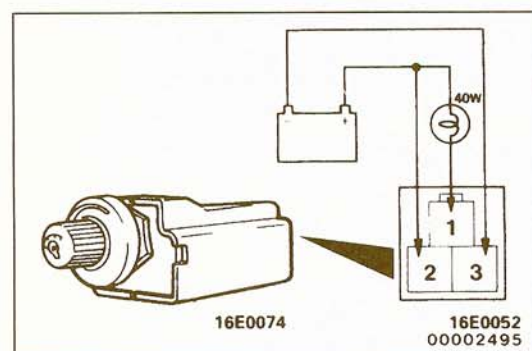


## RHEOSTAT

54200610041

### INSPECTION

- (1) Remove the knee protector. (Refer to GROUP 52A – Instrument Panel.)
- (2) Remove the rheostat from the instrument panel.



- (3) Connect the battery and the test light (40 W) as shown in the illustration.
- (4) Operate the rheostat, and if the brightness changes smoothly without switching off, then the rheostat function is normal.

# COLUMN SWITCH

54300020021

## GENERAL SPECIFICATIONS

Items		Specifications
Lighting switch	Rated load A	0.22±0.05
	Voltage drop V	0.2 or less
Turn-signal switch	Rated load A	6.6±0.5
	Voltage drop V	0.2 or less
Dimmer/passing switch	Rated load A	High beam: 12
		Low beam: 10.8
		Passing: 22.8±1.5
	Voltage drop V	0.2 or less

### NOTE

For the windshield wiper and washer switch, refer to GROUP 51 – Windshield Wiper and Washer.  
For the headlight washer switch, refer to GROUP 51 – Headlight Washer.

## COLUMN SWITCH

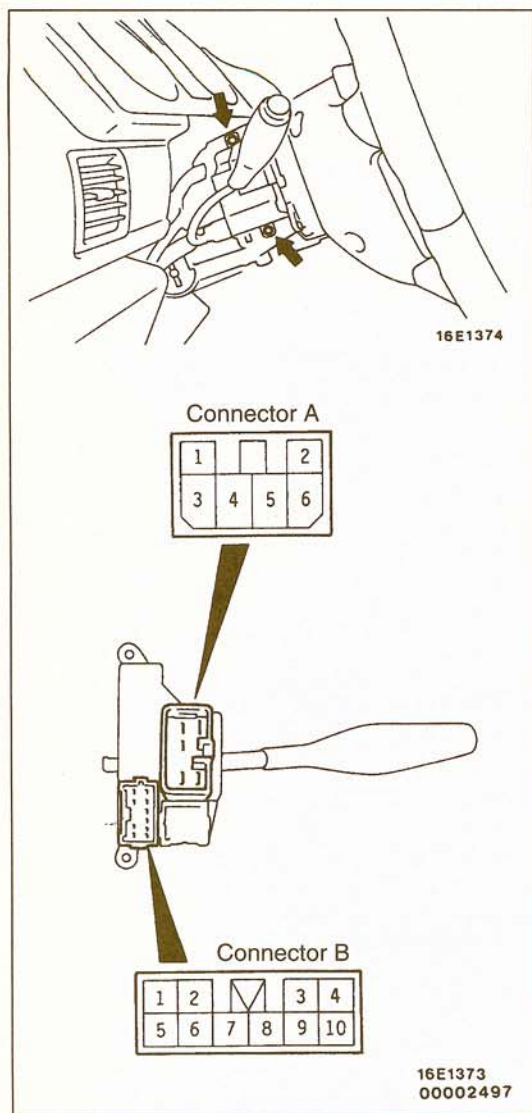
54300870015

### INSPECTION

#### Turn-signal Light and Lighting Switch Check

- (1) Remove the column cover lower.
- (2) Remove the column cover upper.
- (3) Turn the screws indicated by arrows in the illustration, and then remove the switch.
- (4) Operate the switch and check for continuity between the terminals.





## &lt;Lighting switch&gt;

Switch position	Connector A terminal	Connector B terminal		
	1	5	6	7
OFF				
TAIL		○	○	○
HEAD	○	○	○	○

## &lt;Dimmer switch&gt;

Switch position	Connector A terminal		
	3	4	6
LOW BEAM	○	○	
HIGH BEAM		○	○

## &lt;Passing switch&gt;

Switch position	Connector A terminal				
	1	2	3	4	6
P1	○	○	○	○	○
P2	○	○		○	○

## &lt;Turn-signal light switch&gt;

Switch position	Connector B terminal					
	1	3	4	8	9	10
R.H.				○	○	
OFF						
L.H.		○		○		

## NOTE

- (1) P1 represents the passing operation when the dimmer switch is in the LOW BEAM position, and P2 represents the operation when it is in the HIGH BEAM position.

**Windshield Wiper and Washer Switch Check**

Refer to GROUP 51 – Windshield Wiper and Washer

**Headlight Washer Switch Check**

Refer to GROUP 51 – Headlight Washer.

# HORN

54300020038

## GENERAL SPECIFICATIONS

Items		Specifications
Type		Flat type
Effective sounding voltage V		11.5–15
Power consumption A		3.0
Sound level dB		100–112
Fundamental frequency Hz	“Low” sound	350–390
	“High” sound	359–435

## TROUBLESHOOTING

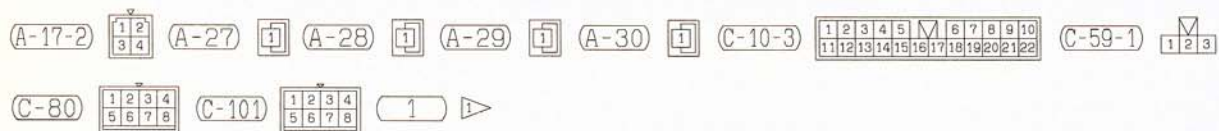
### OPERATION

- Battery positive voltage is constantly applied to the horn relay through multi-purpose fuse No. 10.
- When the horn switch is turned on, the contact point of the horn relay closes and the horn relay turns on. While the horn switch is on, the horn sounds.

### TROUBLESHOOTING HINTS

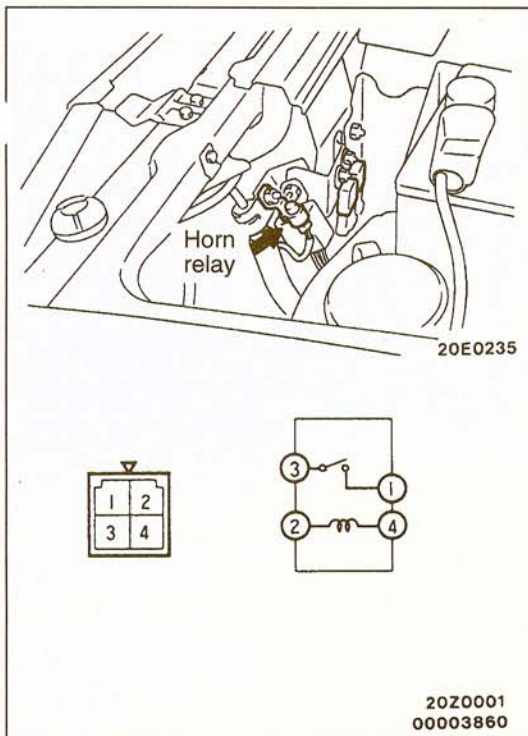
1. Horn does not sound.
  - Check multi-purpose fuse No. 10.
  - Check the horn relay.
  - Check the horn switch.
  - Check the horn.
  - Check the ground circuit.
2. Only one horn sounds.
  - Check the horn.

90100330065





54300650046



## HORN RELAY

### INSPECTION

- (1) Remove the horn relay from the engine compartment.
- (2) Apply battery positive voltage to terminal (2), and check for continuity between the terminals when terminal (4) is grounded.

When power is supplied	Between terminals (1)–(3)	Continuity
When power is not supplied	Between terminals (1)–(3)	No continuity
	Between terminals (2)–(4)	Continuity

# CIGARETTE LIGHTER

54300020045

## GENERAL SPECIFICATIONS

Items	Specifications
Max. input W	120
Reset time second	Within 18
Thermal fuse fusion temperature °C (°F)	180–250 (356–482)

## TROUBLESHOOTING

### OPERATION

- When the plug is inserted into the socket, the cigarette lighter turns on.
- Within 18 seconds after the plug element has started heating, the plug will automatically return and the cigarette lighter will switch off.
- When the lighting switch is set to the TAIL or HEAD position, the tail light relay contact closes to turn the tail light relay on.
- Current flows via dedicated fuse No. 5, and the cigarette lighter illumination light and ashtray illumination light illuminate.

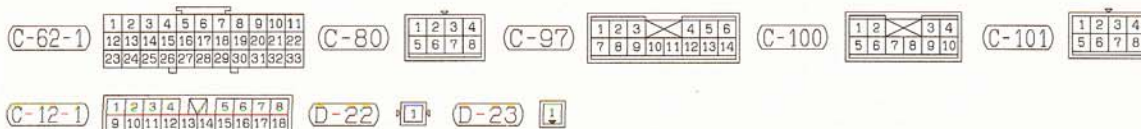
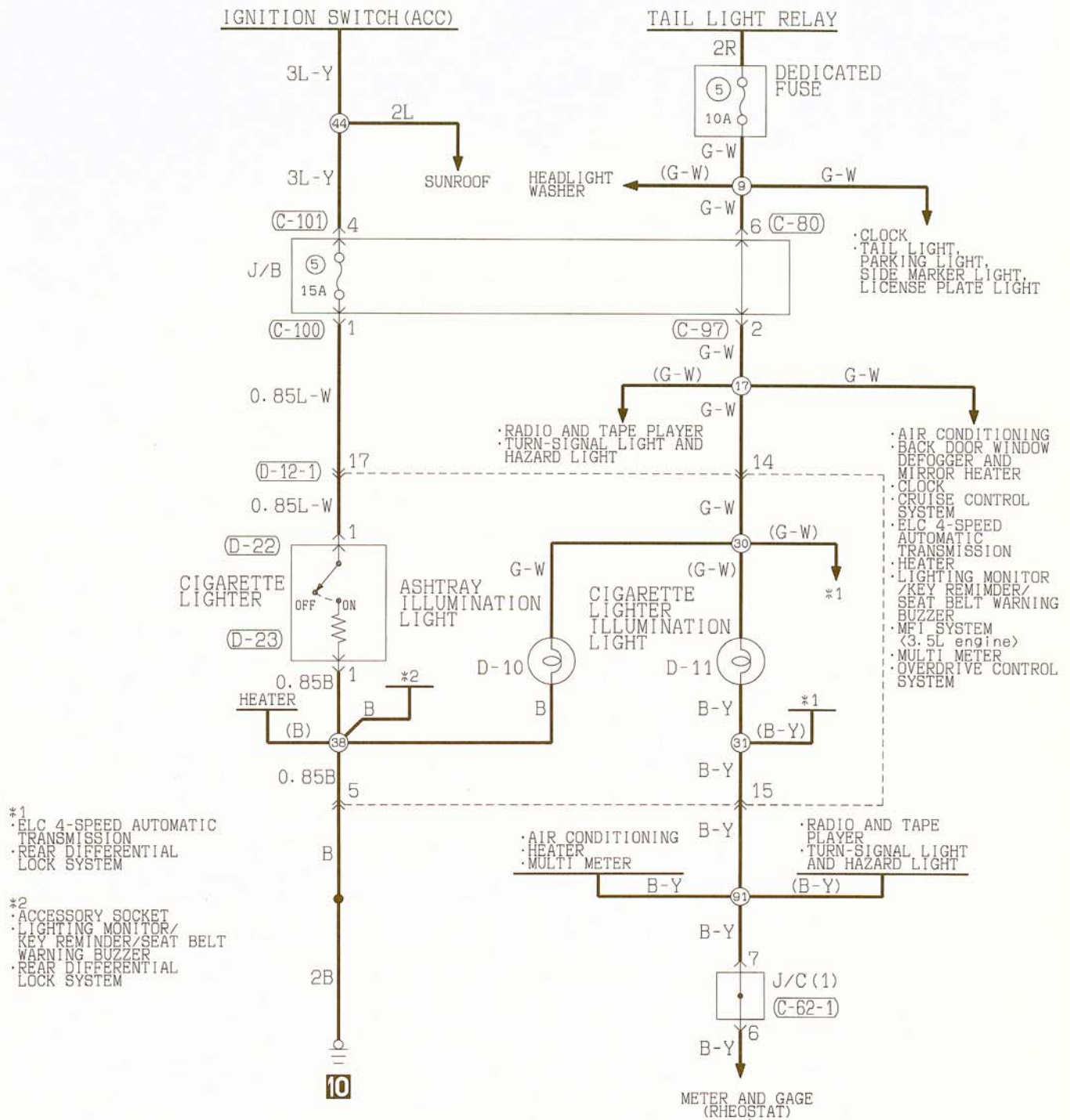
### TROUBLESHOOTING HINTS

1. The cigarette lighter illumination light does not illuminate.
  - Check the cigarette lighter (see below).
2. The cigarette lighter illumination light does not illuminate or does not dim.
  - (1) The tail lights illuminate.
    - Check the bulb.
    - Check the rheostat. (Refer to P.54-66.)
  - (2) The tail lights also do not illuminate.
    - Check dedicated fuse No. 5.
    - Check the tail light relay. (Refer to P.54-65.)
    - Check the lighting switch. (Refer to P.54-67.)
3. The ashtray illumination light does not illuminate.
  - (1) The tail lights illuminate.
    - Check the bulb.
  - (2) The tail lights also do not illuminate.
    - Refer to item 2, step (2).



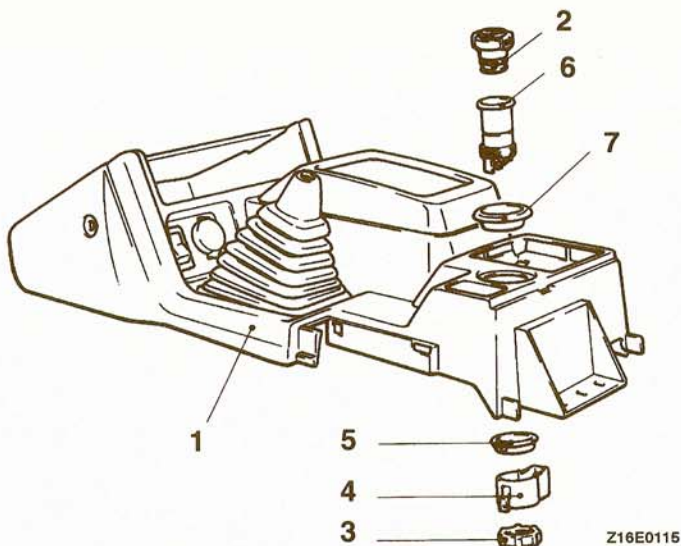
## CIGARETTE LIGHTER CIRCUIT

90100780068



**CIGARETTE LIGHTER**

54300560042

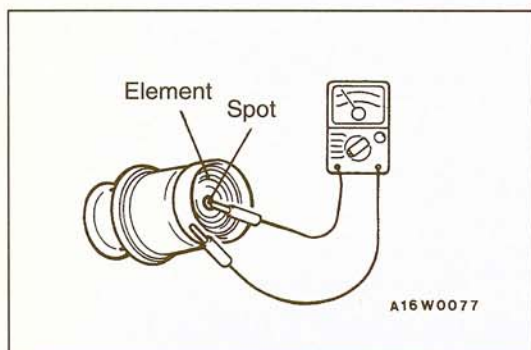
**REMOVAL AND INSTALLATION****Removal steps**

1. Front console box  
(Refer to GROUP 52A – Console Box.)
2. Plug
3. Nut
4. Outer case
5. Washer
6. Socket
7. Protector

**INSPECTION**

54300570052

- Take out the plug, and check for a worn edge on the element spot connection, and for shreds of tobacco or other material on the element.
- Use an ohmmeter to check for continuity in the element.





# ACCESSORY SOCKET

90100790016

## TROUBLESHOOTING

### OPERATION

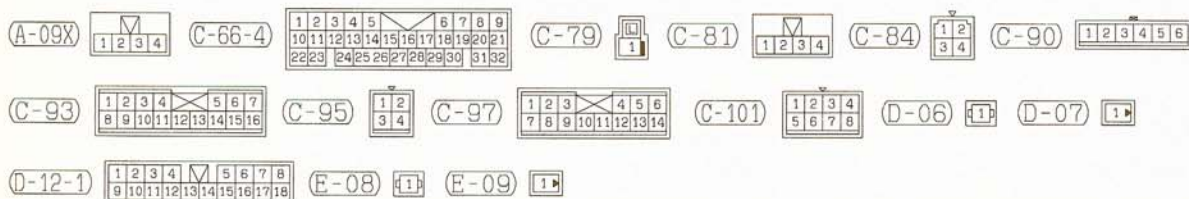
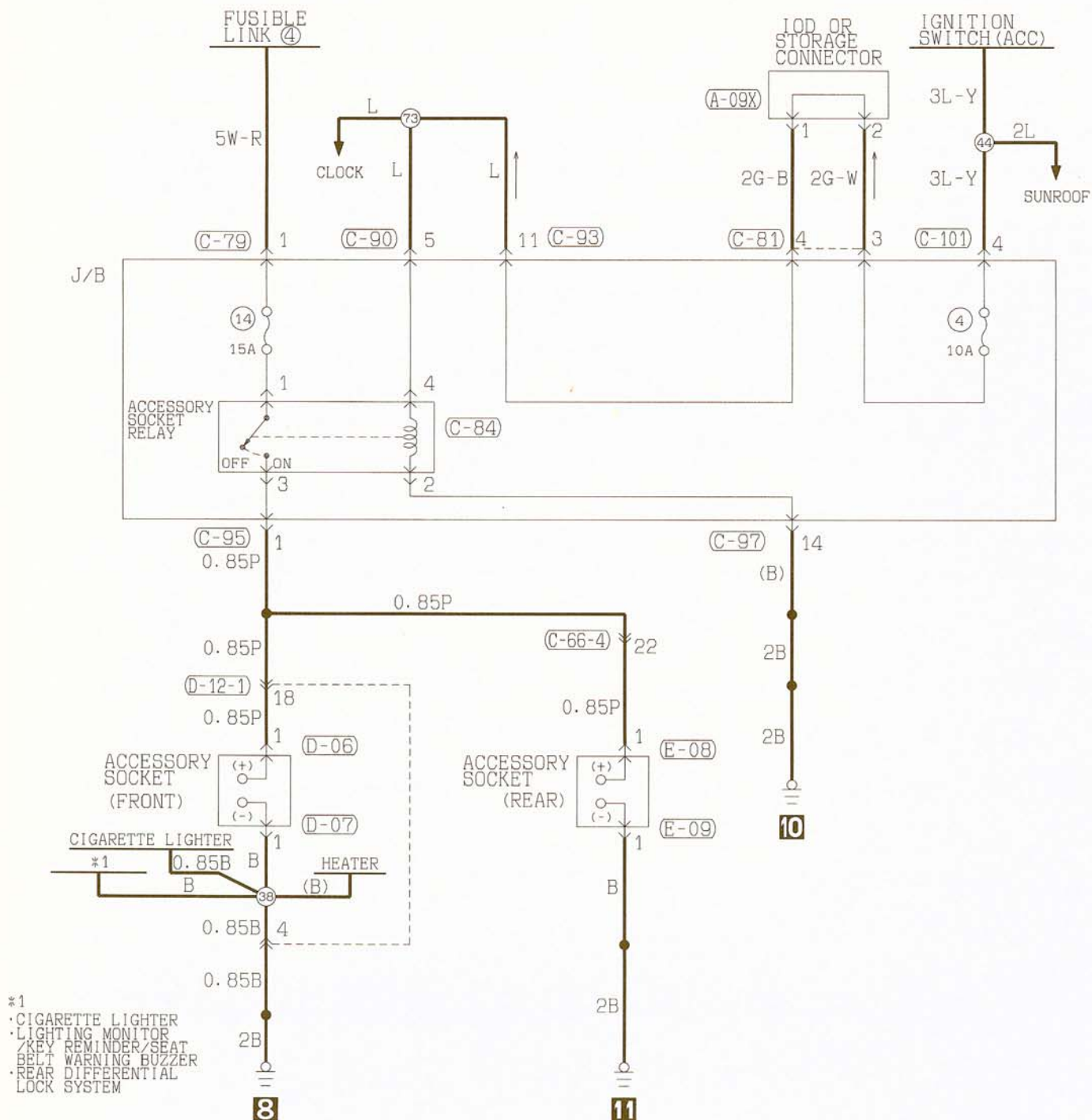
- When the ignition switch is turned to the ACC or ON position, current flows to the coil side of the accessory socket relay.
- The accessory socket relay contact closes to turn the accessory socket relay on.
- When an inspection light or plug-in type accessories are plugged into the accessory socket, the inspection light or accessories can be used.

### TROUBLESHOOTING HINTS

1. The inspection light or accessories cannot be used.
  - Check the accessory socket relay. (Refer to P.54-77.)
  - Check multi-purpose fuse No. 14.

## ACCESSORY SOCKET CIRCUIT

90100790016

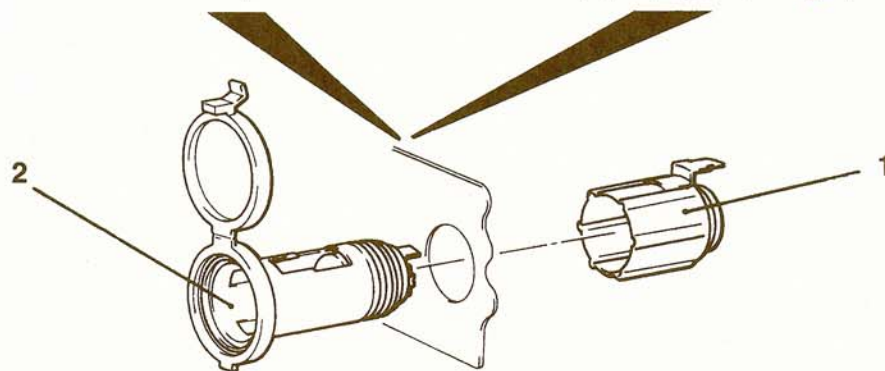
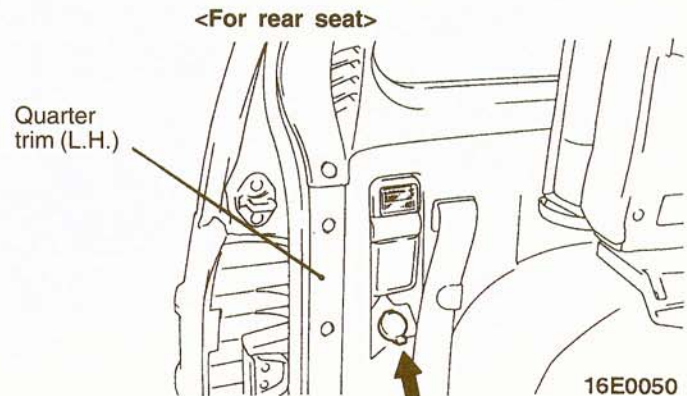
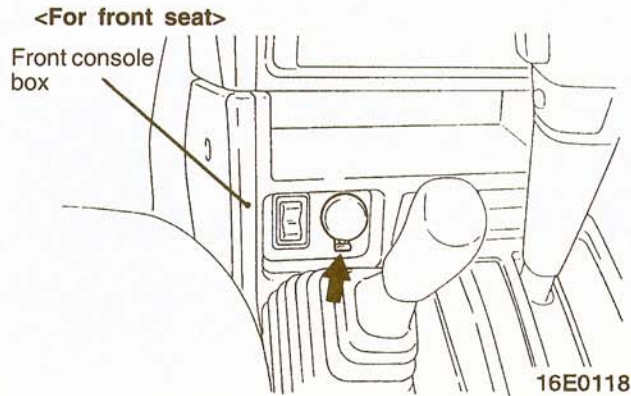


HQ14M04AA

TSB Revision



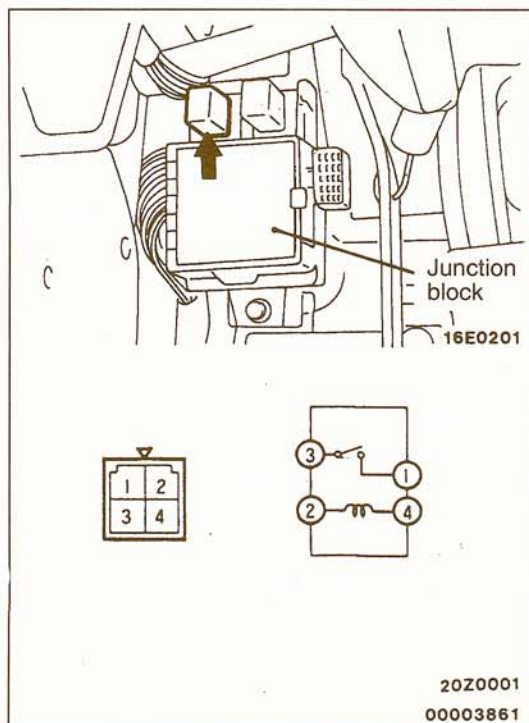
54300890011

**ACCESSORY SOCKET****REMOVAL AND INSTALLATION**

16E0055  
00002506

**Removal steps**

- Front console box (Refer to GROUP 52A – Console Box.)
  - Quarter trim (L.H.) (Refer to GROUP 52A – Trim.)
1. Socket
  2. Outer case

**INSPECTION**

54300900011

**Accessory Socket Relay Check**

- (1) Remove the accessory socket relay from the junction block.
- (2) Apply battery positive voltage to terminal (2), and check for continuity between the terminals when terminal (4) is grounded.

When power is supplied	Between terminals (1)–(3)	Continuity
When power is not supplied	Between terminals (1)–(3)	No continuity
	Between terminals (2)–(4)	Continuity

# CLOCK

54300020052

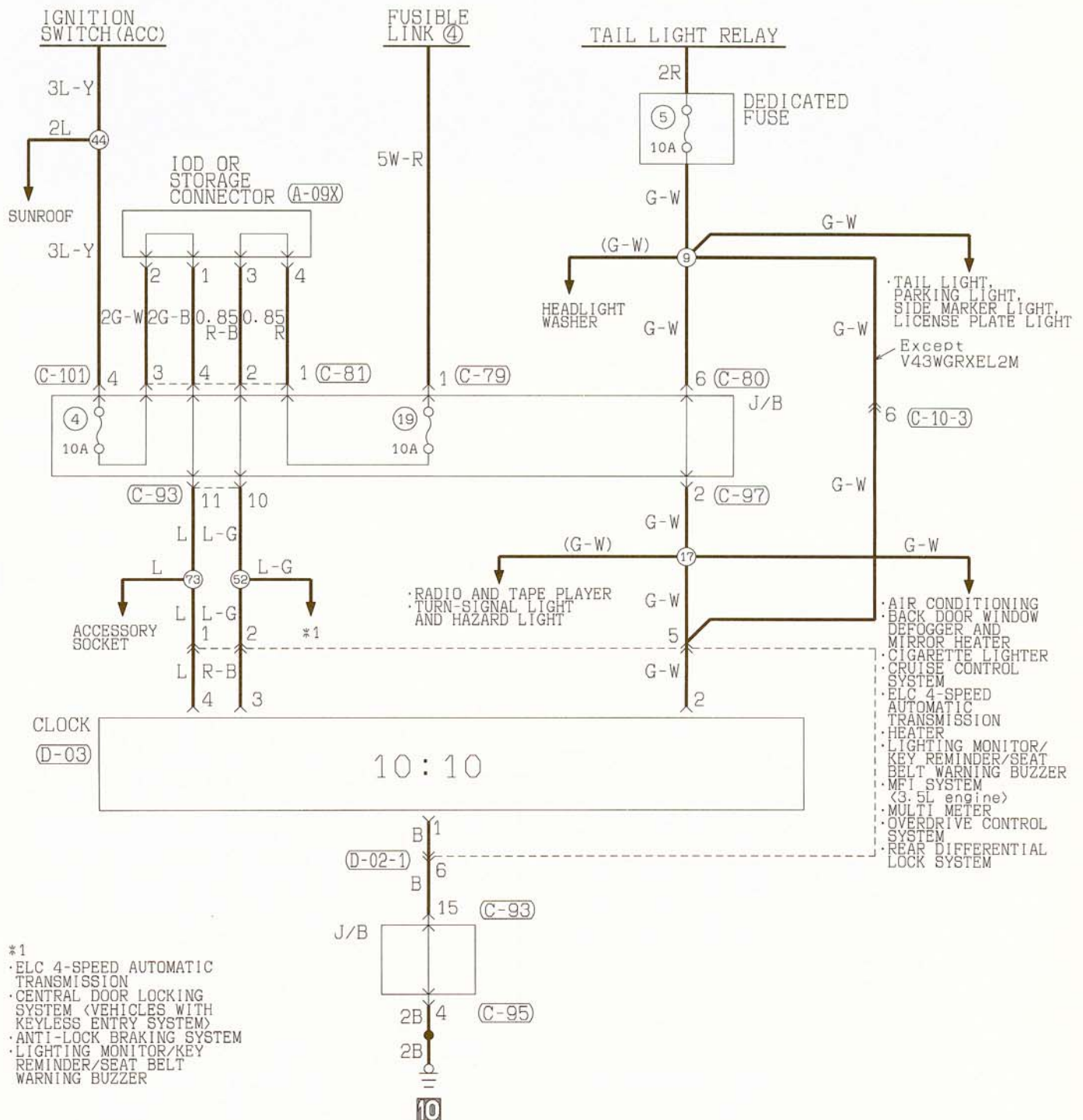
## GENERAL SPECIFICATIONS

Item	Specifications
Type	Crystal oscillator
Display method	Fluorescent digital display
Standard error (seconds/day)	$\pm 2$

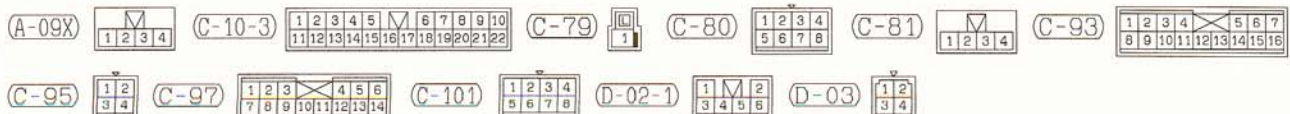
## TROUBLESHOOTING

## CLOCK CIRCUIT

90100770065



\*1  
 • ELC 4-SPEED AUTOMATIC TRANSMISSION  
 • CENTRAL DOOR LOCKING SYSTEM (VEHICLES WITH KEYLESS ENTRY SYSTEM)  
 • ANTI-LOCK BRAKING SYSTEM  
 • LIGHTING MONITOR/KEY REMINDER/SEAT BELT WARNING BUZZER



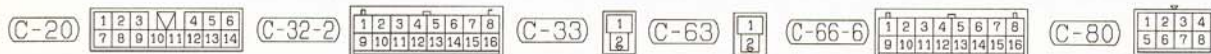
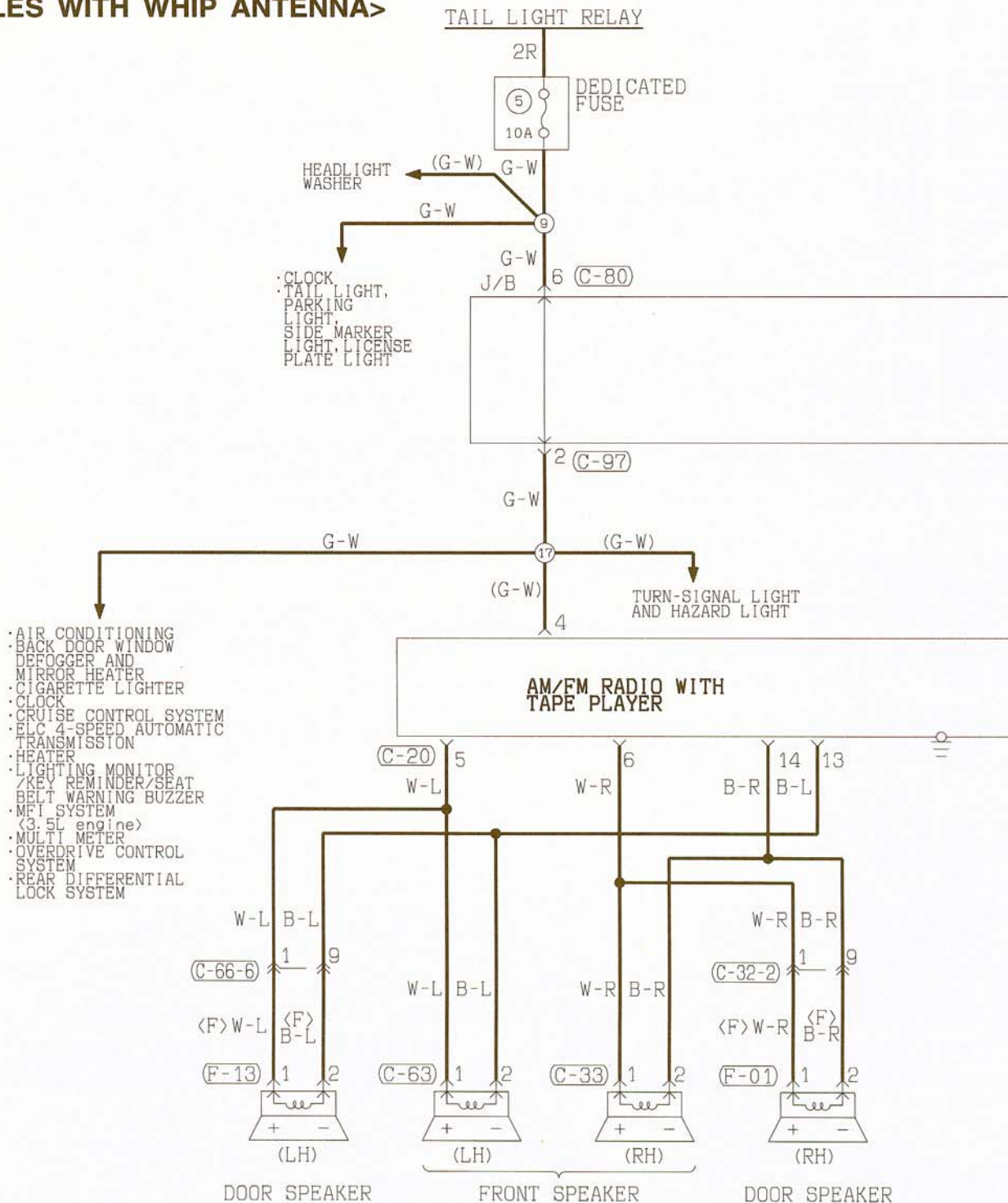


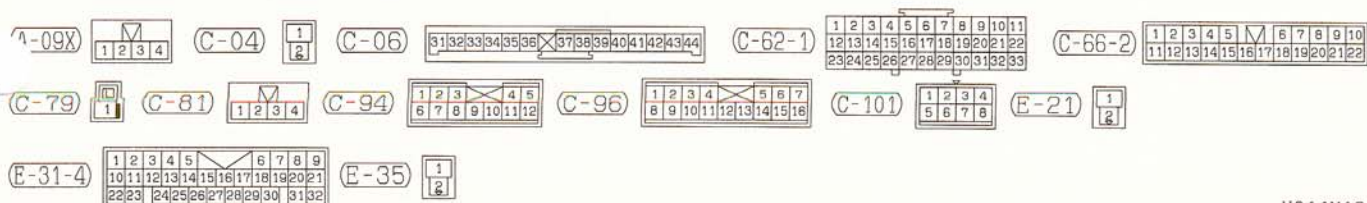
# RADIO AND TAPE PLAYER

## TROUBLESHOOTING

90100720138

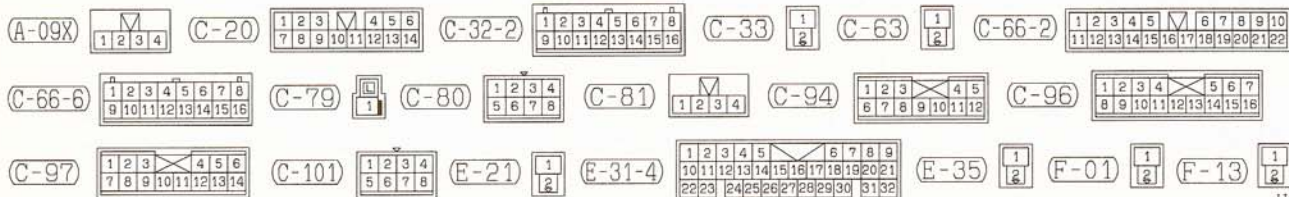
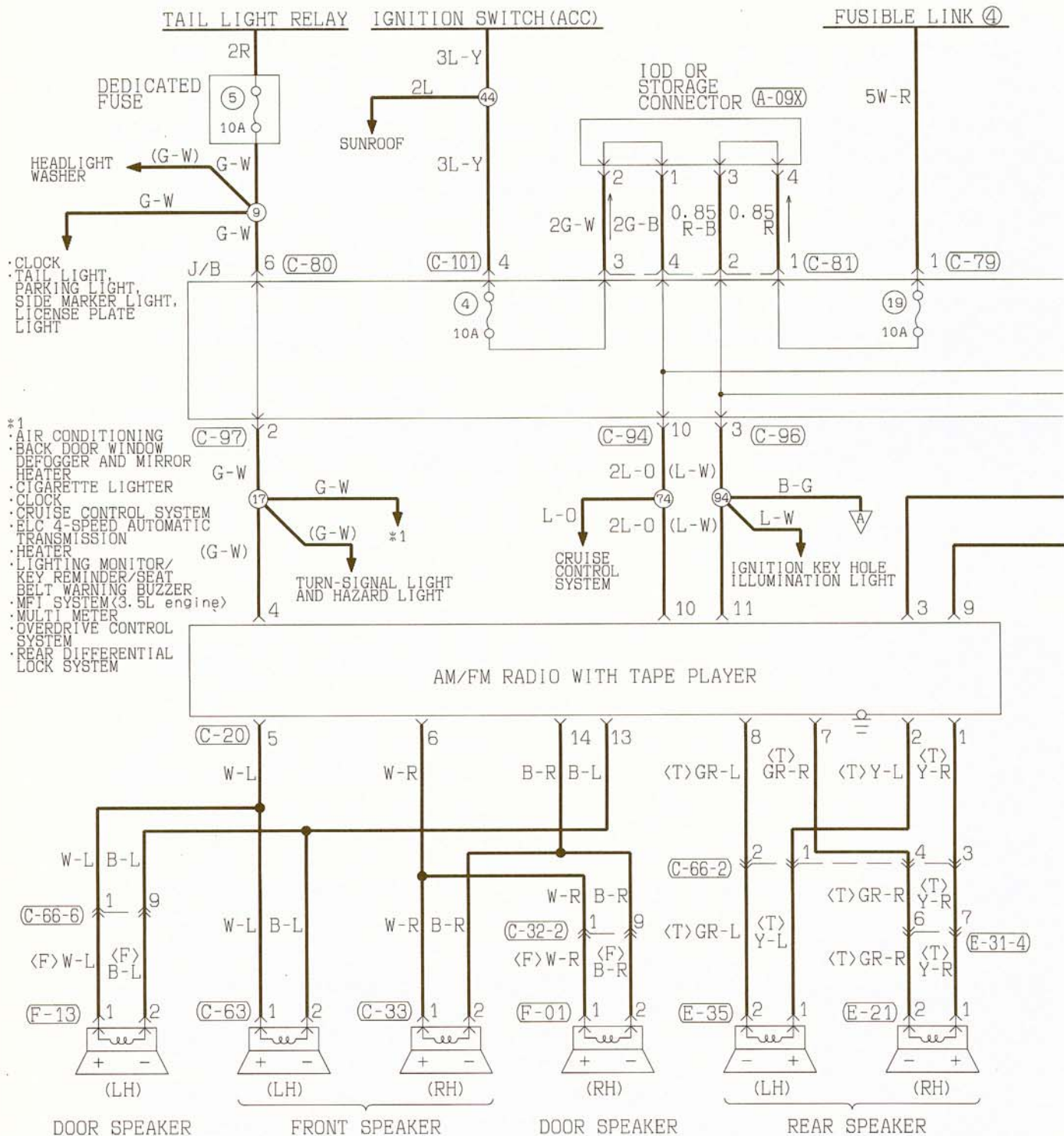
### RADIO AND TAPE PLAYER CIRCUIT <VEHICLES WITH WHIP ANTENNA>





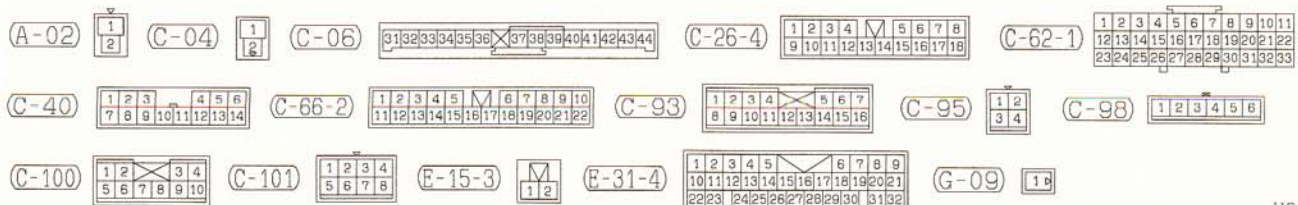
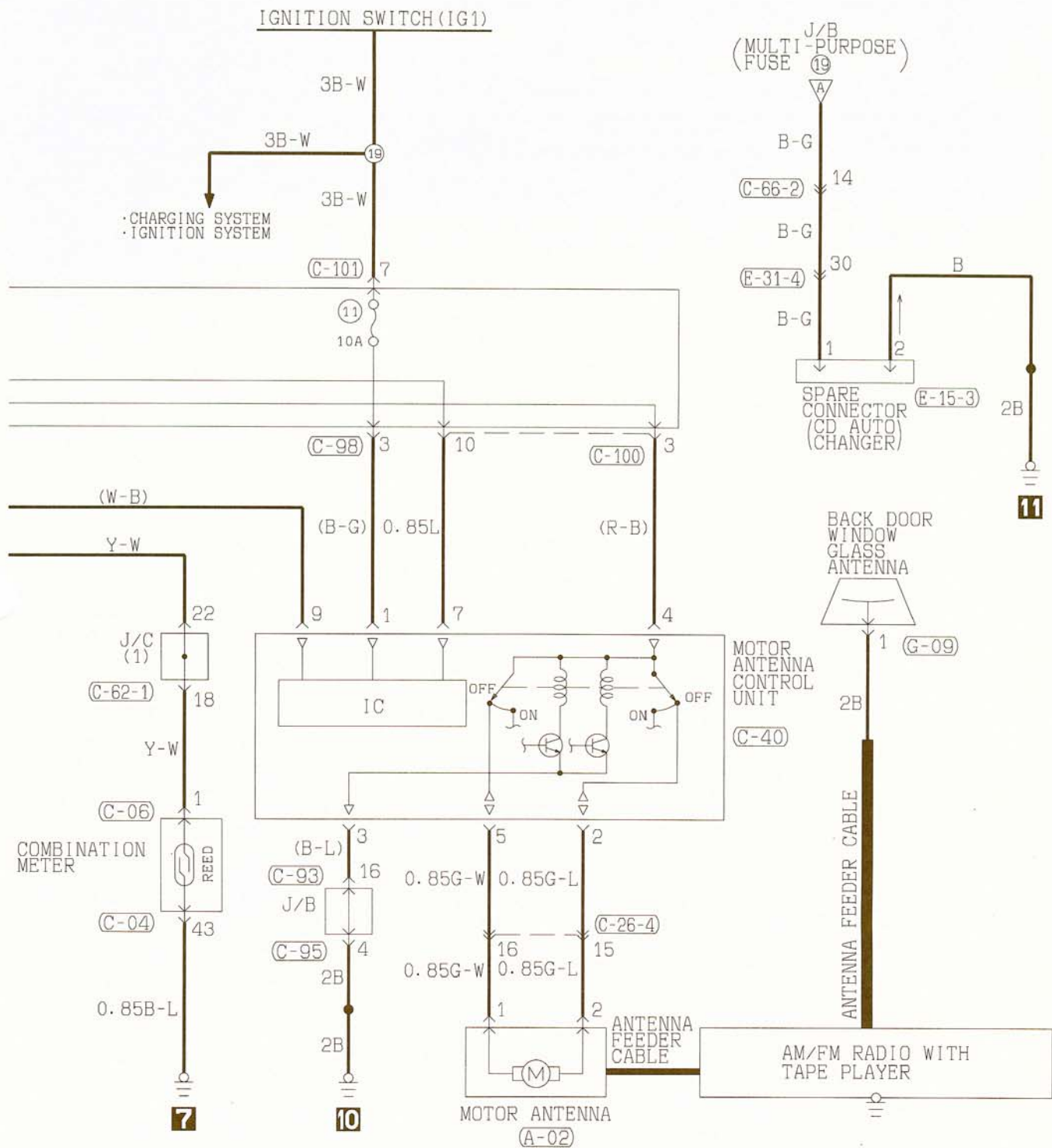
# RADIO AND TAPE PLAYER CIRCUIT <VEHICLES WITH MOTOR ANTENNA AND GLASS ANTENNA>

90100720145



HQ14M13AA





## TROUBLESHOOTING CHART

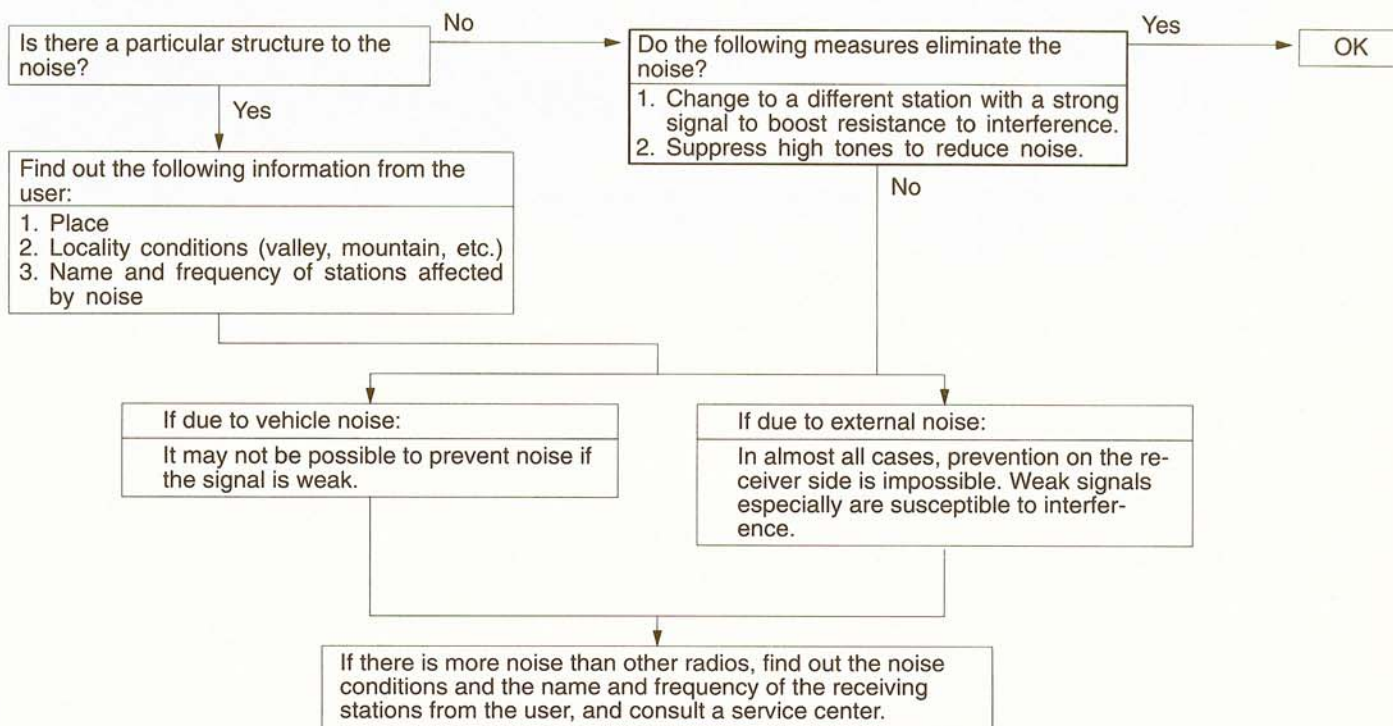
54400070050

Item	Problem symptom	Relevant chart
Noise	Noise appears at certain places when traveling (AM).	A-1
	Noise appears at certain places when traveling (FM).	A-2
	Mixed with noise, only at night (AM).	A-3
	Broadcasts can be heard but both AM and FM have a lot of noise.	A-4
	There is much noise either on AM or on FM.	A-5
	There is noise when starting the engine.	A-6
	Some noise appears when there is vibration or shocks during traveling.	A-7
	Noise sometimes appears on FM during traveling.	A-8
	Ever-present noise.	A-9
Radio	No power is supplied when the switch is turned on.	B-1
	No sound from one speaker.	B-2
	There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.	B-3
	Insufficient sensitivity.	B-4
	Distortion on AM or on both AM and FM.	B-5
	Distortion on FM only.	B-6
	Too few automatic select stations.	B-7
	Insufficient memory (preset stations are erased).	B-8
Tape player	Cassette tape cannot be inserted.	C-1
	No sound.	C-2
	No sound from one speaker.	C-3
	Sound quality is poor, or sound is weak.	C-4
	Cassette tape will not eject.	C-5
	Uneven revolution. Tape speed is fast or slow.	C-6
	Automatic search does not work.	C-7
	Malfunction of auto reverse	C-8
	Tape gets caught in mechanism.	C-9
CD player	CD is not accepted.	D-1
	No sound.	D-2
	CD sound skips.	D-3
	Sound quality is poor.	D-4
	CD cannot be ejected.	D-5
	No sound from one speaker.	D-6
Motor antenna	Motor antenna won't extend or retract.	E-1
	Motor antenna extends and retracts but does not receive.	E-2

## CHART

## A. NOISE

## A-1 Noise appears at certain places when traveling (AM).





**A-2 Noise appears at certain places when traveling (FM).**

Do the following measures eliminate the noise?

- Change to a different station with a strong signal to boost resistance to interference.
- Suppress high tones to reduce noise.

Yes

OK

No

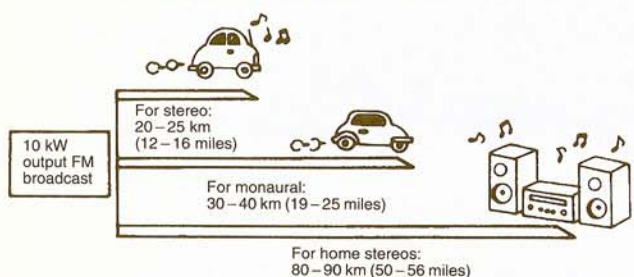
If there is more noise than other radios, find out the noise conditions and the name and frequency of the receiving stations from the user, and consult with the service center.

**NOTE****FM waves:**

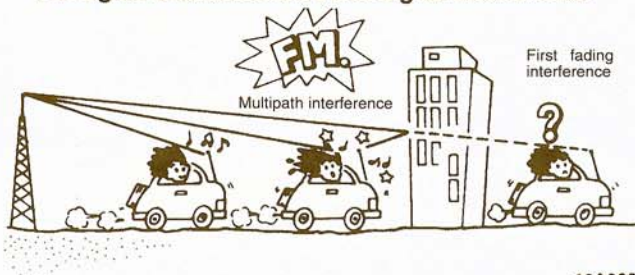
FM waves have the same properties as light, and can be deflected and blocked. Wave reception is not possible in the shadow of obstructions such as buildings or mountains.

1. The signal becomes weak as the distance from the station's transmission antenna increases. Although this may vary according to the signal strength of the transmitting station and intervening geographical formations or buildings, the area of good reception is approx. 20–25 km (12–16 miles) for stereo reception, and 30–40 km (19–25 miles) for monaural reception.
2. The signal becomes weak when an area of shadow from the transmitting antenna (places where there are obstructions such as mountains or buildings between the antenna and the car), and noise will appear. <This is called first fading, and gives a steady buzzing noise>

3. If a direct signal hits the antenna at the same time as a signal reflected by obstructions such as mountains or buildings, interference of the two signals will generate noise. During traveling, noise will appear each time the vehicle's antenna passes through this kind of obstructed area. The strength and interval of the noise varies according to the signal strength and the conditions of deflection. <This is called multipath noise, and is a repetitious buzzing.>
4. Since FM stereo transmission and reception has a weaker field than monaural, it is often accompanied by a hissing noise.
5. Furthermore, the amount of interference will be comparatively less for vehicles equipped with a diversity antenna system. If there is an equivalent amount of distortion in vehicles or radios of the same type, then differences will be because of differences in antenna systems, and this should be explained to the user. Diversity antenna system: A system where two types of antenna (glass antenna and whip antenna or motor antenna) are equipped and the antenna that provides the best reception can be selected.

**FM Broadcast Good Reception Areas**

16A0663

**FM Signal Characteristics and Signal Interference**16A0664  
00002498

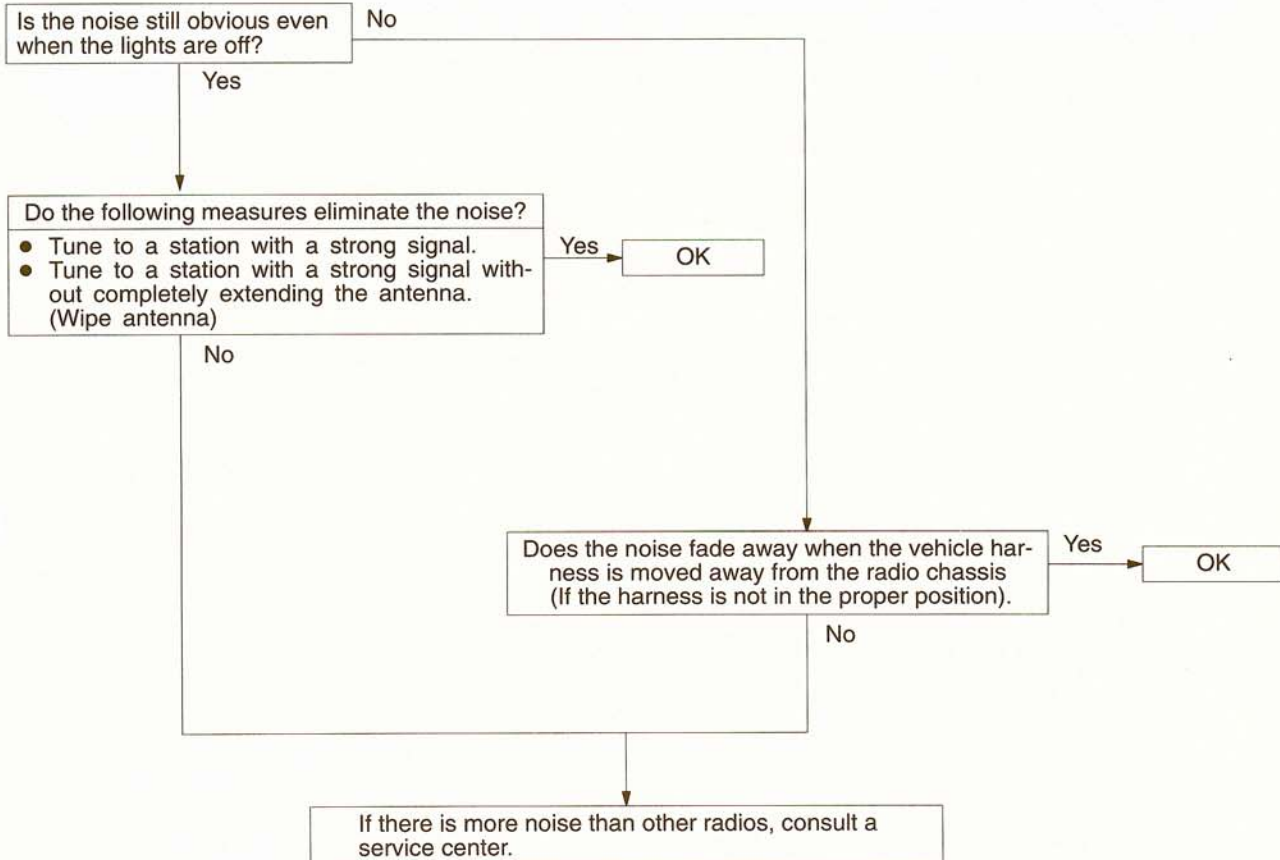
**A-3 Mixed with noise, only at night (AM).**

The following factors can be considered as possible causes of noise appearing at night.

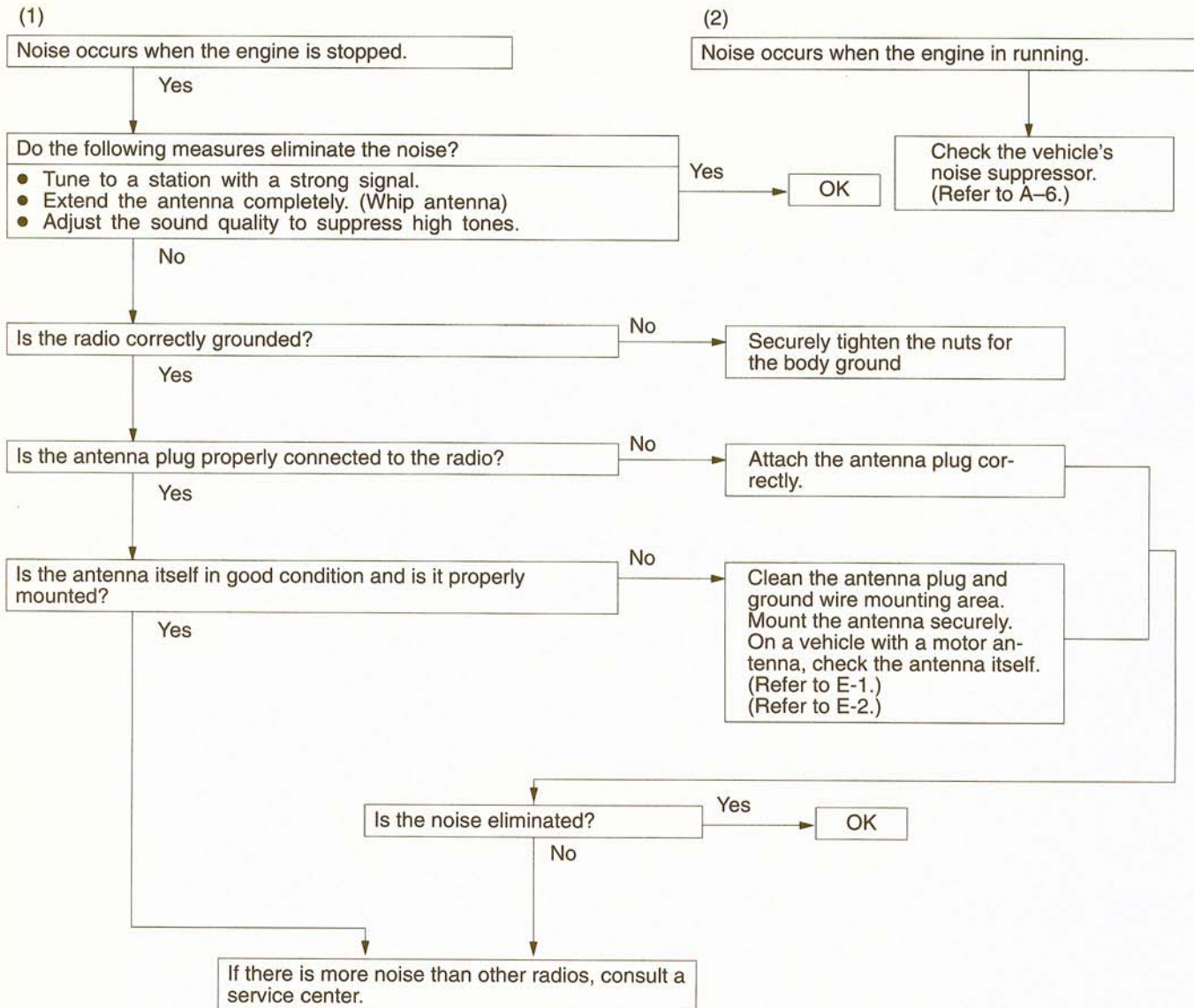
1. Factors due to signal conditions: Due to the fact that long-distance signals are more easily received at night, even stations that are received without problem during the day may experience interference in a general worsening of reception conditions. The weaker a station is the more susceptible it is to interference,

and a change to a different station or the appearance of a beating sound\* may occur. Beat sound\*: Two signals close in frequency interfere with each other, creating a repetitious high-pitched sound. This sound is generated not only by sound signals but by electrical waves as well.

2. Factors due to vehicle noise: Generator noise may be a cause.





**A-4 Broadcasts can be heard but both AM and FM have a lot of noise.****NOTE**

- Noise encountered during FM reception only  
Due to differences in FM and AM system, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, due to the characteristics of FM waves, there are sometimes cases of noise or distortion which are generated by typical noise interference (first fading and multipath). (Refer to A-2.)  
<Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

- Furthermore, the amount of interference will be comparatively less for vehicles equipped with a diversity antenna system. If there is an equivalent amount of distortion in vehicles or radios of the same type, then differences will be because of differences in antenna systems, and this should be explained to the user.  
Diversity antenna system:  
A system where two types of antenna (glass antenna and whip antenna or motor antenna) are equipped and the antenna that provides the best reception can be selected.



**A-5 There is more noise either on AM or on FM.**

1. There is much noise only on AM.  
Due to differences in AM and FM systems,  
AM is more susceptible to noise interference.

Were conditions such as the following present when noise was received?

- A motorcycle was passing.
- Lightning was flashing.
- A vehicle passed close by, but it appeared to be a vehicle generating a particularly large amount of noise radiation.
- Passed beneath a power line.
- Passed beneath a telephone line.
- Passed close by a signal generator.
- Passed close by some other source of electrical noise.
- Passed under a bridge.

Yes

No

Continue to check for static; when static is detected, check for the conditions listed above.

Yes

Noise prevention on the radio side is difficult. If the problem is particularly worse than other radios, consult a service center.

No

If the problem is particularly worse than other radios, consult a service center.

2. There is much noise only on FM.
- Noise encountered during FM reception only  
Due to differences in FM and AM system, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, due to the characteristics of FM waves, there are sometimes cases of noise or distortion which are generated by typical noise interference (first fading and multipath). (Refer to A-2.)  
<Noise (hissing) occurs in weak signal areas such as mountainous regions, but this is not due to a problem with the radio.>

- Furthermore, the amount of interference will be comparatively less for vehicles equipped with a diversity antenna system. If there is an equivalent amount of distortion in vehicles or radios of the same type, then differences will be because of differences in antenna systems, and this should be explained to the user.

Diversity antenna system:

A system where two types of antenna (glass antenna and whip antenna or motor antenna) are equipped and the antenna that provides the best reception can be selected.

## A-6 There is noise when starting the engine.

Noise-type sounds are in parentheses ( ).	Conditions	Cause	Inspection part or remedy	Mounting location
AM, FM: Ignition noise (Popping, Snapping, Cracking, Buzzing)	<ul style="list-style-type: none"> <li>Increasing the engine speed causes the popping sound to speed up and the volume to decrease</li> <li>Disappears when the ignition switch is turned to ACC.</li> </ul>	<ul style="list-style-type: none"> <li>Mainly due to the spark plugs</li> <li>Due to engine noise</li> </ul>	Noise filter	1
			Ground cable	2, 3, 4
			Noise capacitor	1
Other electrical components	—	Noise may appear as the electrical components become older.	Repair or replace the electrical components.	
Static electricity (Cracking, Crinkling)	<ul style="list-style-type: none"> <li>Disappears when the vehicle is completely stopped.</li> <li>Severe when the clutch is engaged.</li> </ul>	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.	
	<ul style="list-style-type: none"> <li>Various noises are produced depending on the body part of the vehicle.</li> </ul>	Due to removal of the front hood, bumpers, exhaust pipe and muffler, suspension, etc.	Ground parts by bonding. Cases where the problem is not eliminated by a single response to one area are common, due to several body parts being imperfectly grounded.	

**Caution**

1. **Connecting a high tension cable to the noise filter may destroy the noise filter and should never be done.**
2. **Check that there is no external noise. Since failure to do this may result in an incorrect diagnosis due to the inability to identify the noise source, this operation must be performed.**
3. **Noise prevention should be performed by suppressing strong sources of noise step by step.**

**NOTE**

1. Capacitor  
The capacitor does not pass DC current, but as the number of waves increases when it

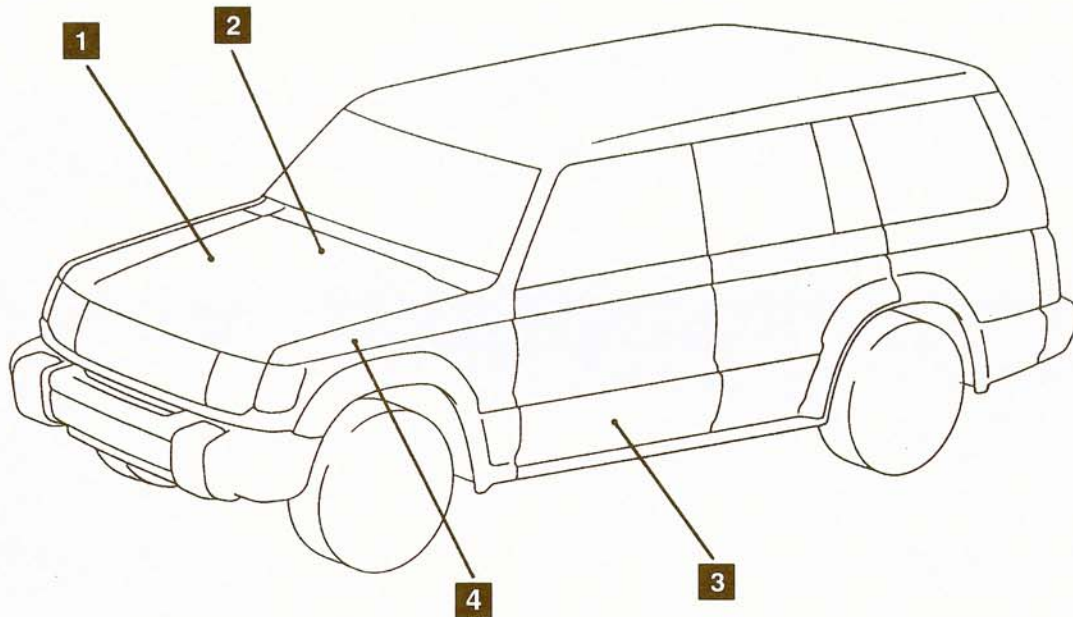
passes AC current, impedance (resistance against AC) decreases, and current flow is facilitated. A noise suppressing capacitor which takes advantage of this property is inserted between the power line for the noise source and the ground. This suppresses noise by grounding the noise component (AC or pulse signal) to the body of the vehicle.

## 2. Coil

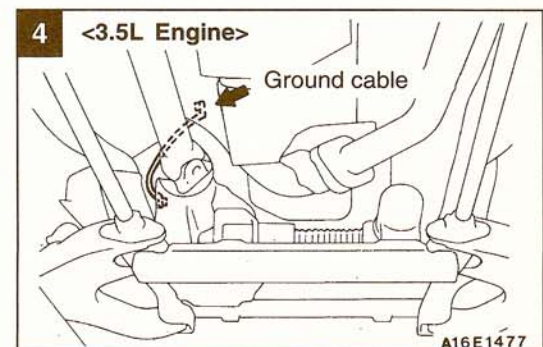
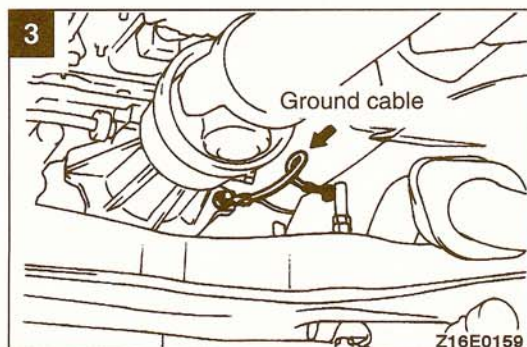
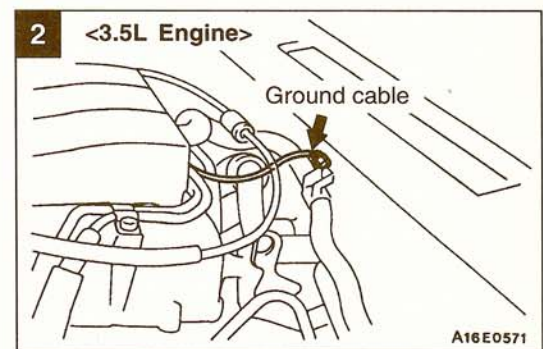
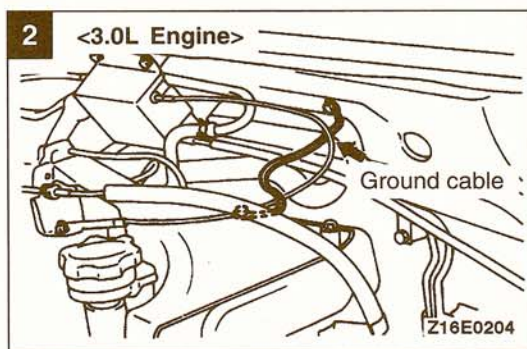
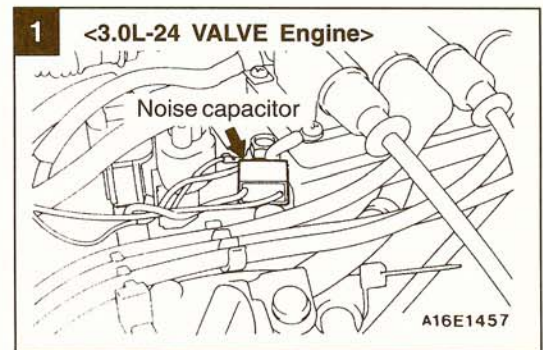
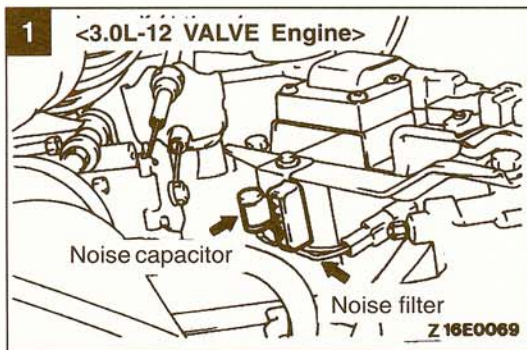
The coil passes DC current, but impedance rises as the number of waves increases relative to the AC current. A noise suppressing coil which takes advantage of this property is inserted into the power line for the noise source, and works by preventing the noise component from flowing or radiating out of the line.



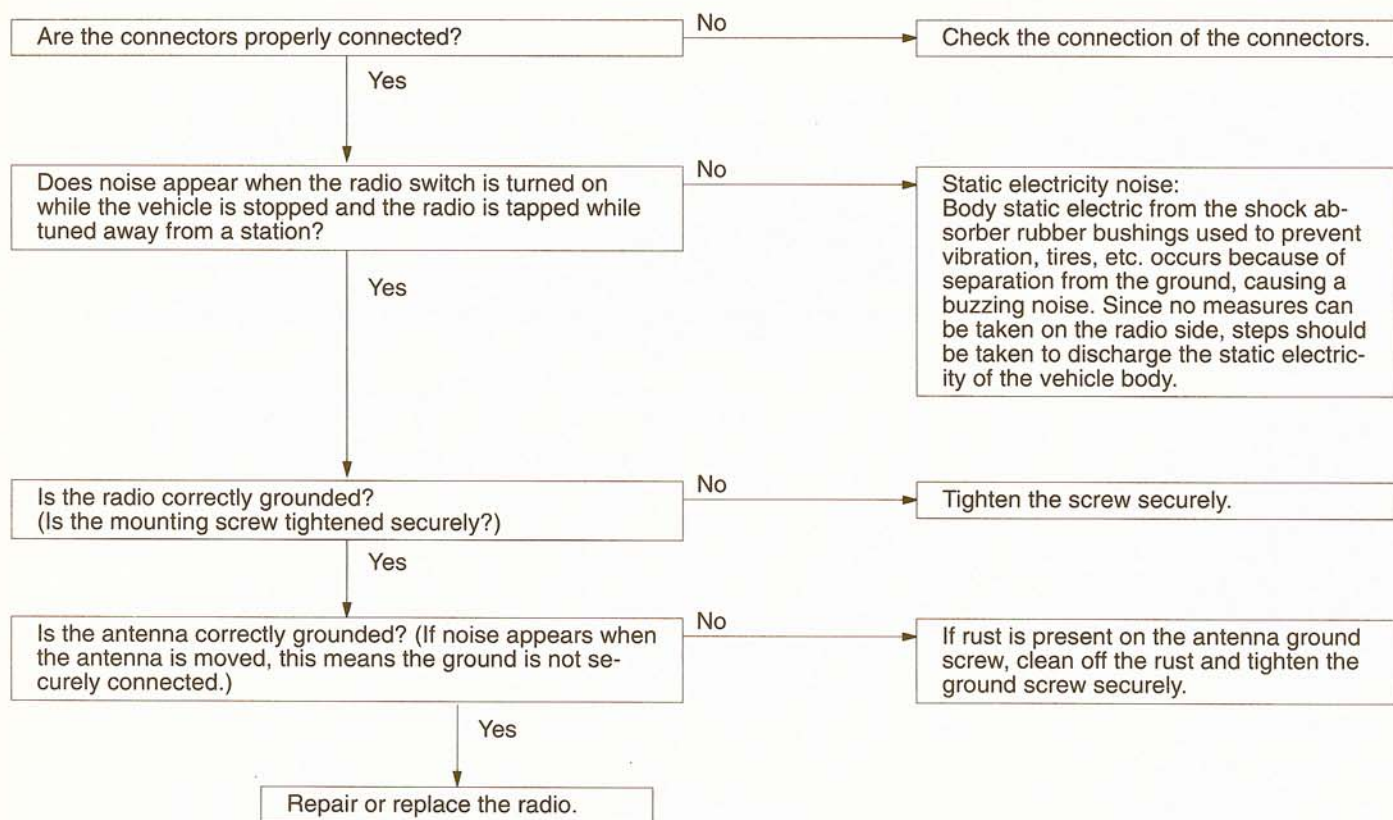
## NOISE SUPPRESSOR MOUNTING LOCATION

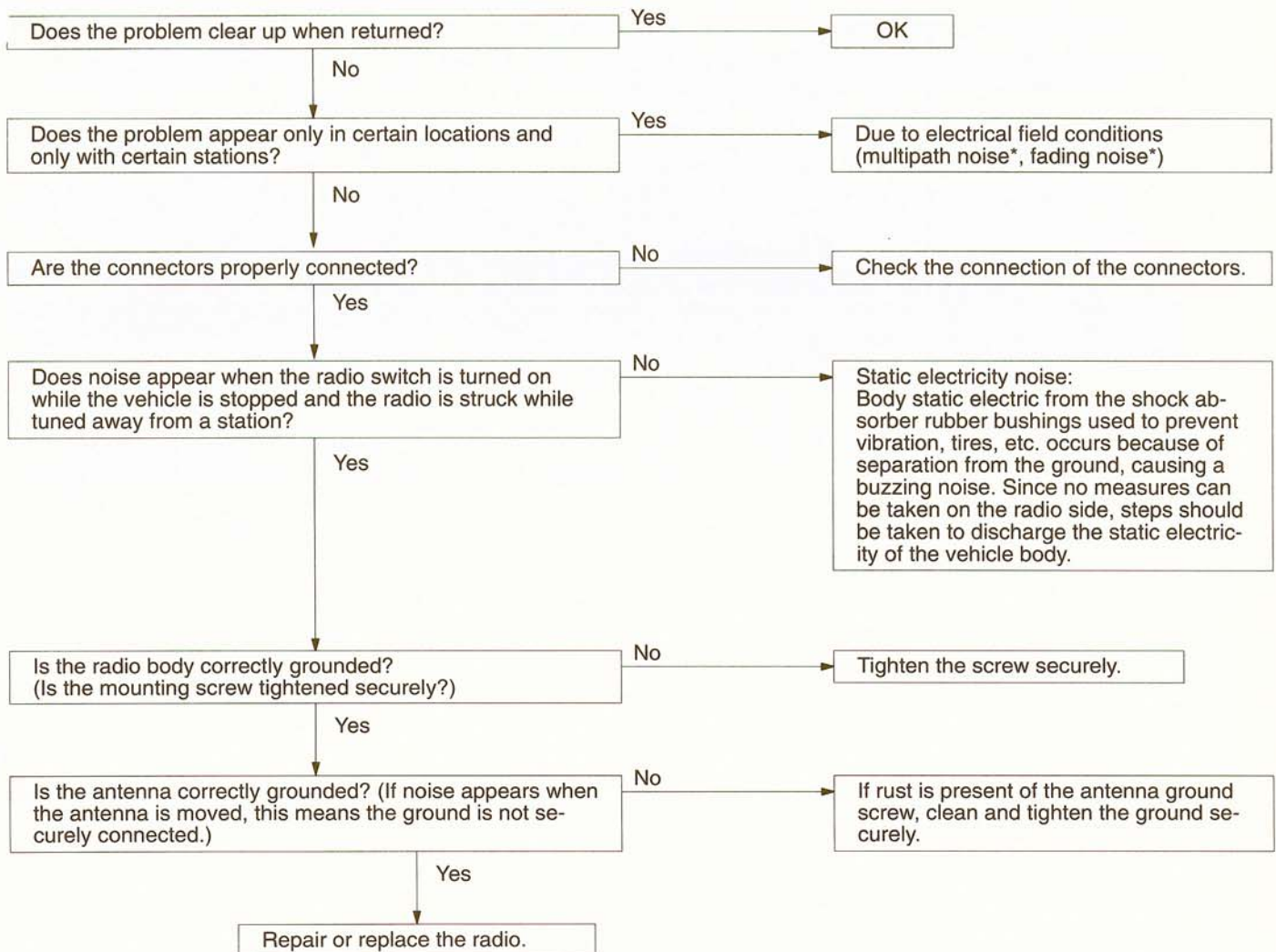


Y18E0003





**A-7 Some noise appears when there is vibration or shocks during traveling.**

**A-8 Noise sometimes appears on FM during traveling.**

\* Multipath noise and fading noise:  
Because the frequency of FM waves is extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

- Multipath noise  
This describes the echo that occurs when the broadcast signal is reflected by a large

obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).

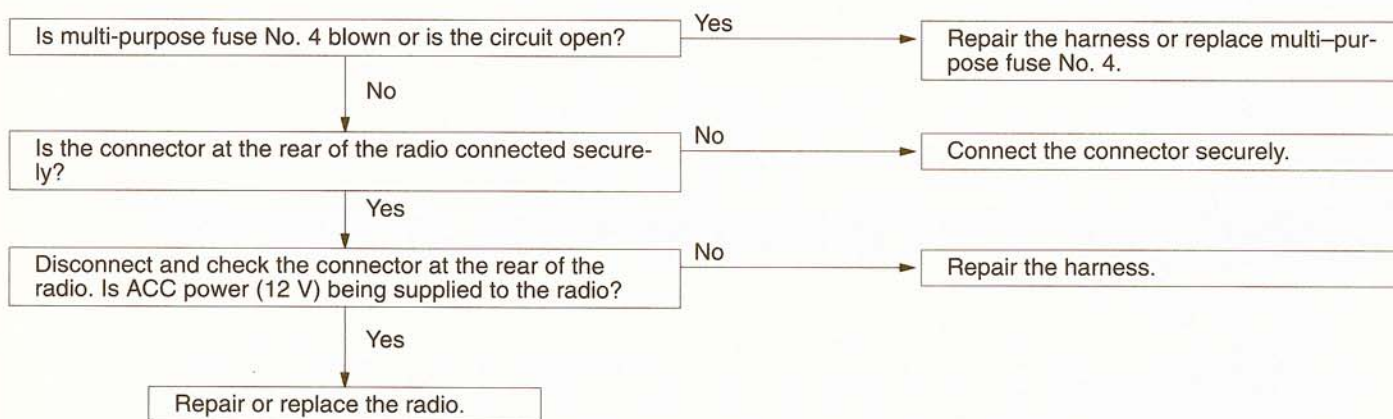
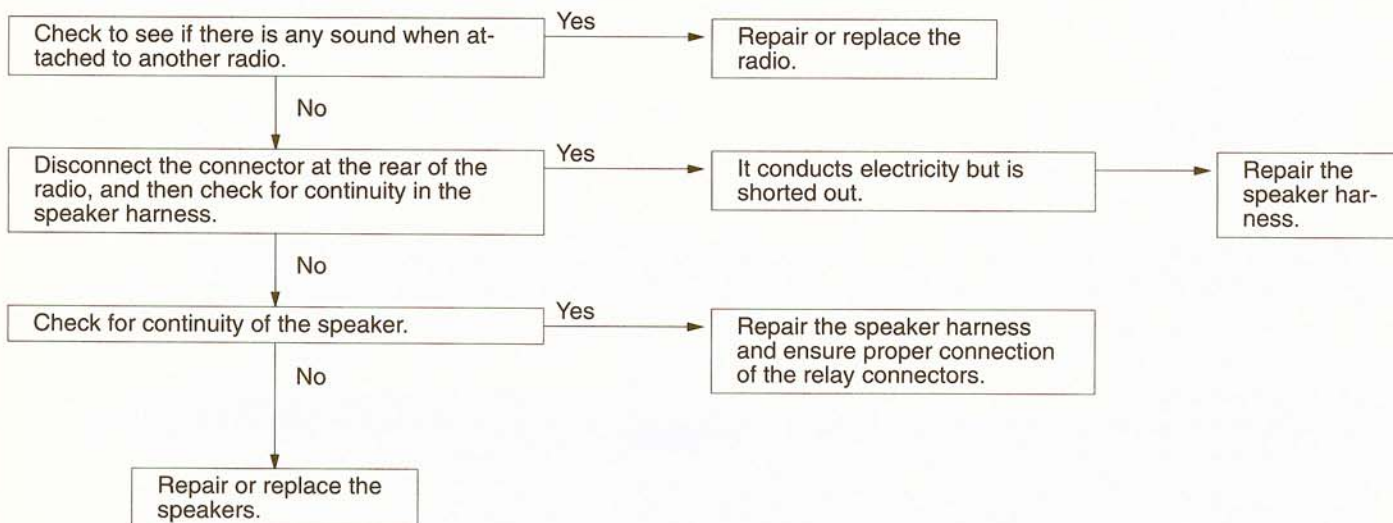
- Fading noise  
This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

**A-9 Ever-present noise.**

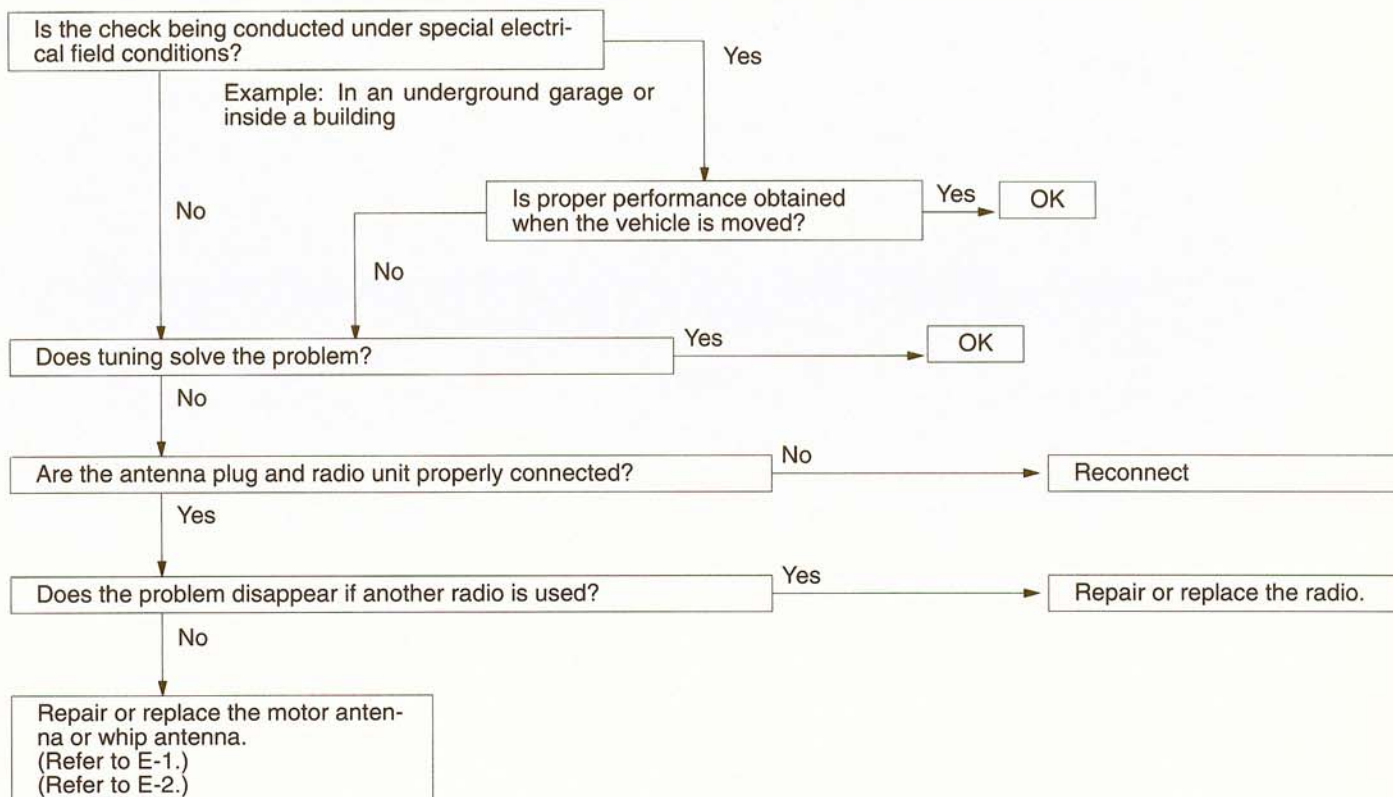
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

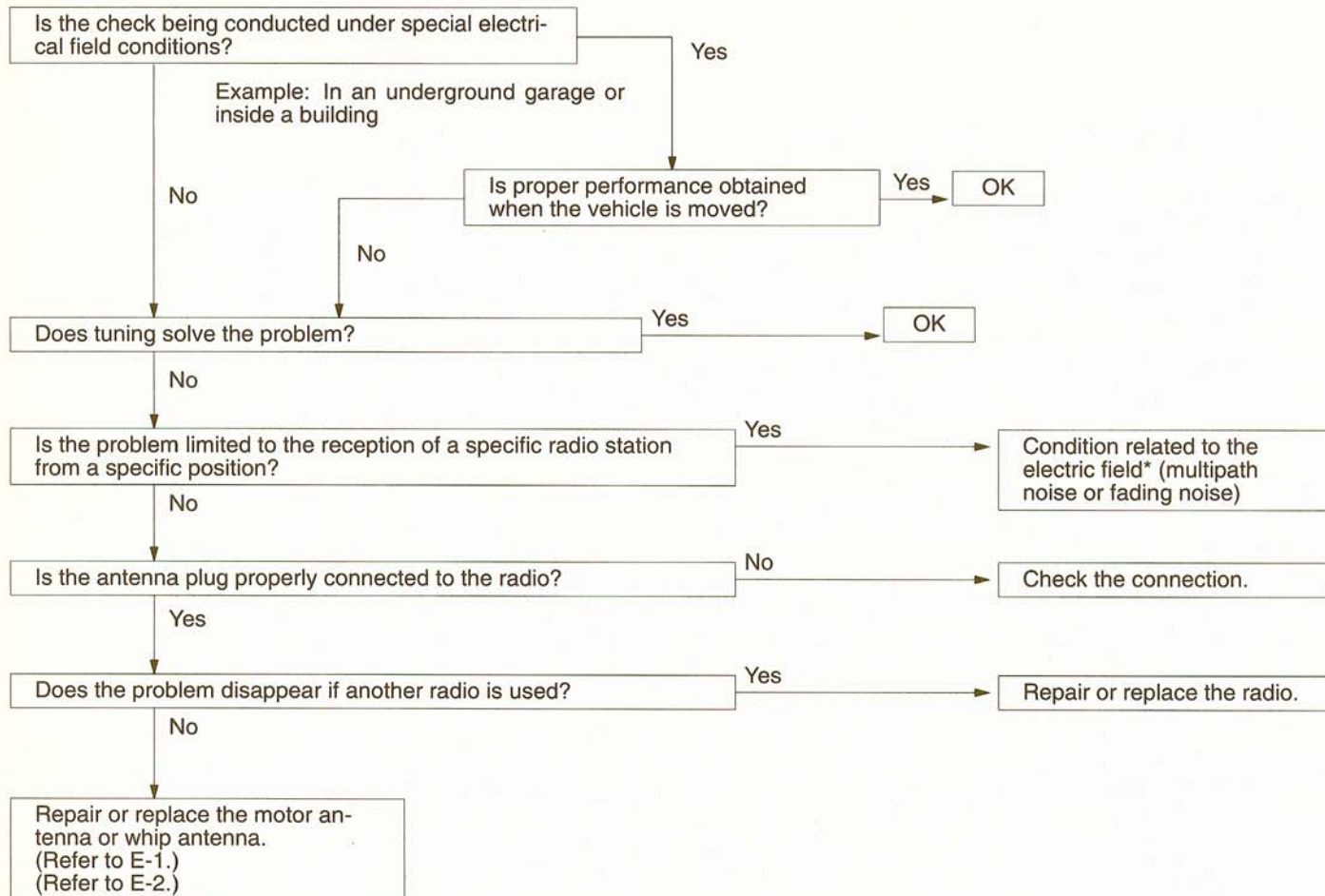
- Traveling conditions of the vehicle
- Terrain of area traveled through
- Surrounding buildings
- Signal conditions
- Time period

For this reason, if there are still problems with noise even after the measures described in steps A-1 to A-8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc., and contact a service center.

**B. RADIO****B-1 No power is supplied when the switch is turned on.****B-2 No sound from one speaker.**



**B-3 There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.**

**B-4 Insufficient sensitivity.**

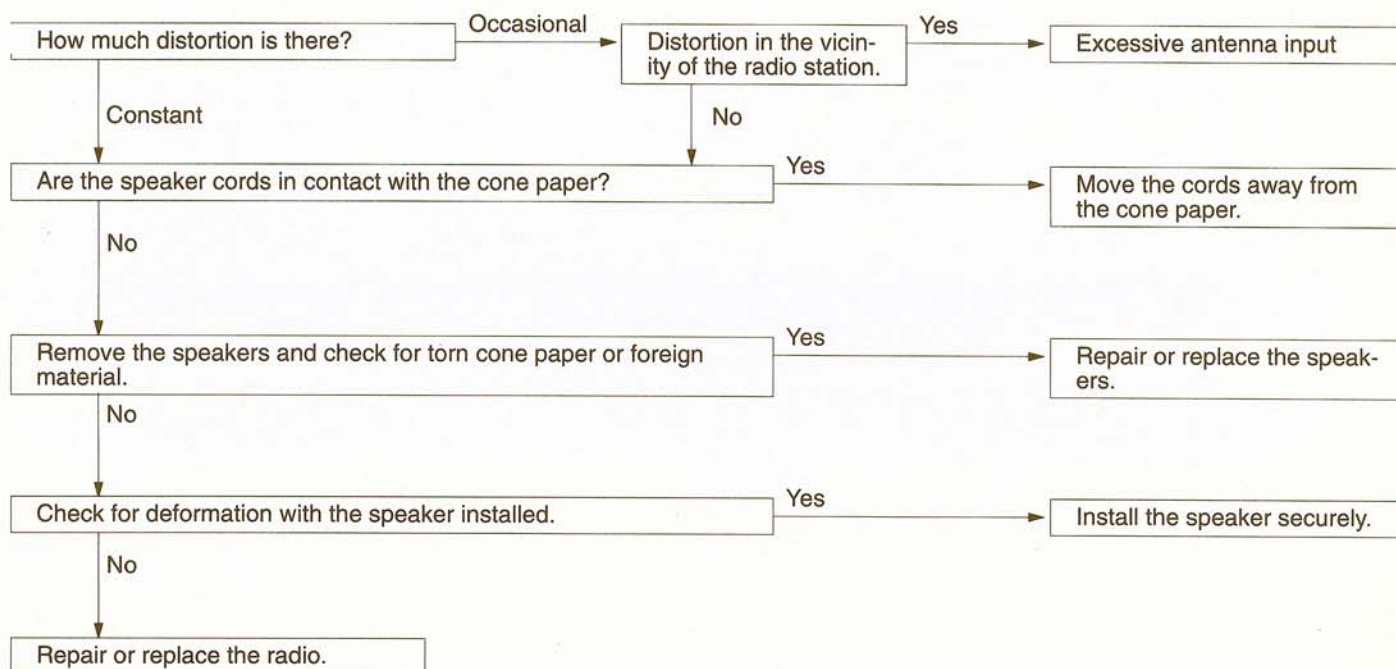
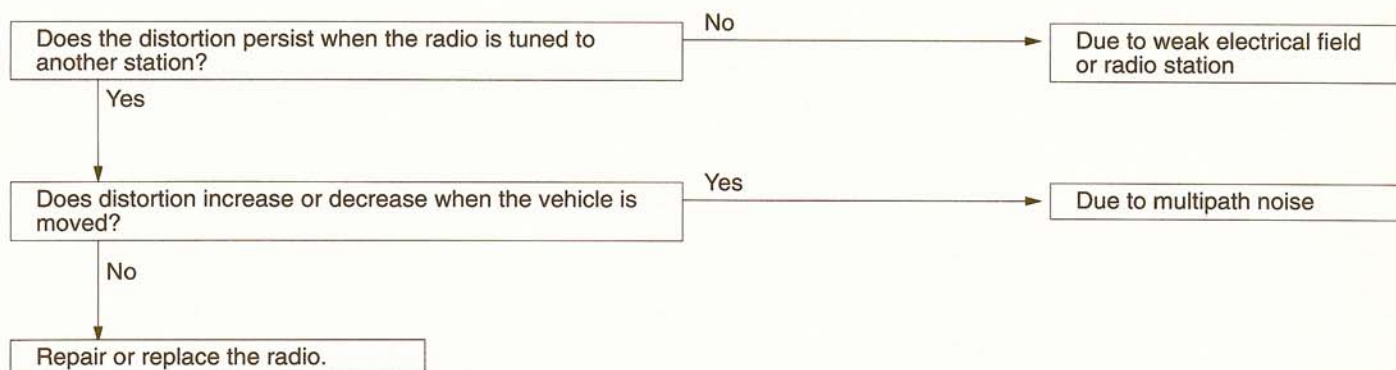
\* Multipath noise and fading noise:  
Because the frequency of FM waves is extremely high, it is highly susceptible to effects from geological formations and buildings. These effects disrupt the broadcast signal and obstruct reception in several ways.

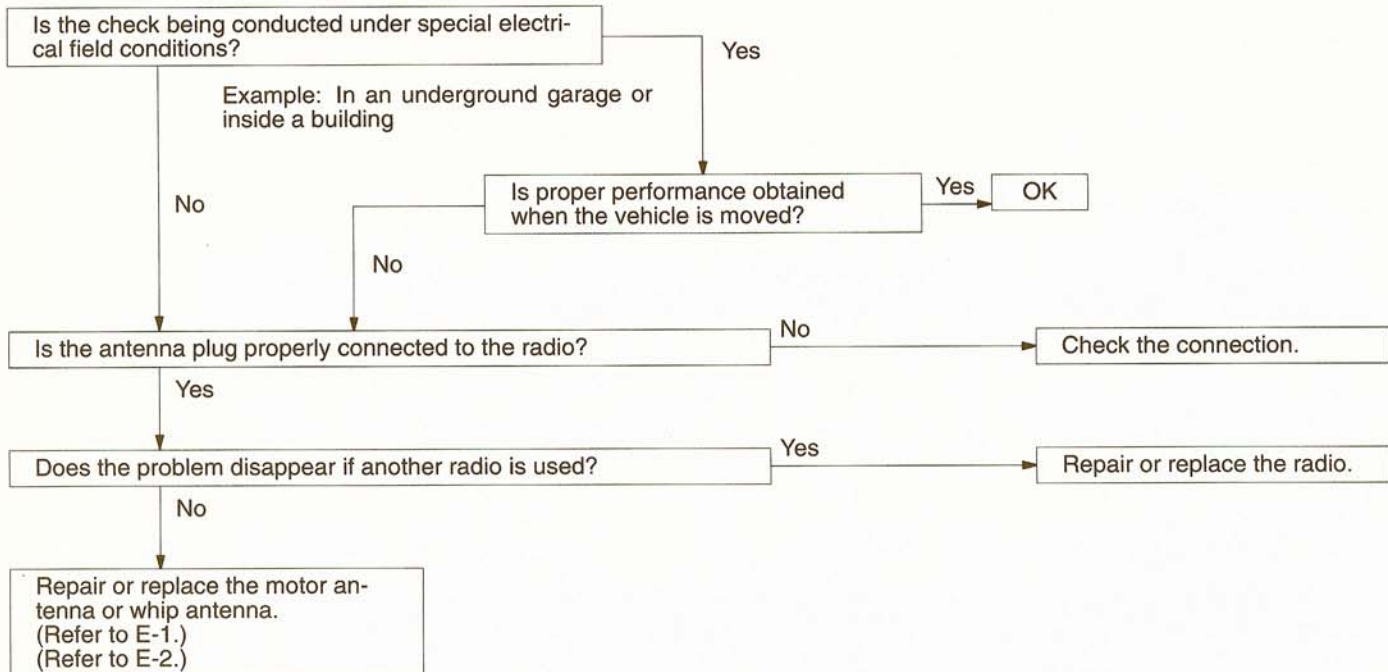
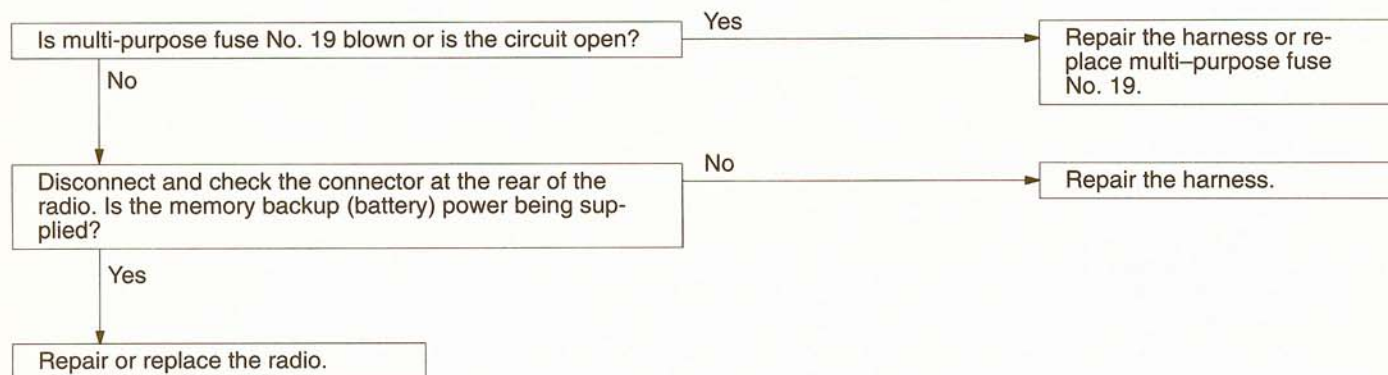
- Multipath noise  
This describes the echo that occurs when the broadcast signal is reflected by a large

obstruction and enters the receiver with a slight time delay relative to the direct signal (repetitious buzzing).

- Fading noise  
This is a buzzing noise that occurs when the broadcast beam is disrupted by obstructing objects and the signal strength fluctuates intricately within a narrow range.

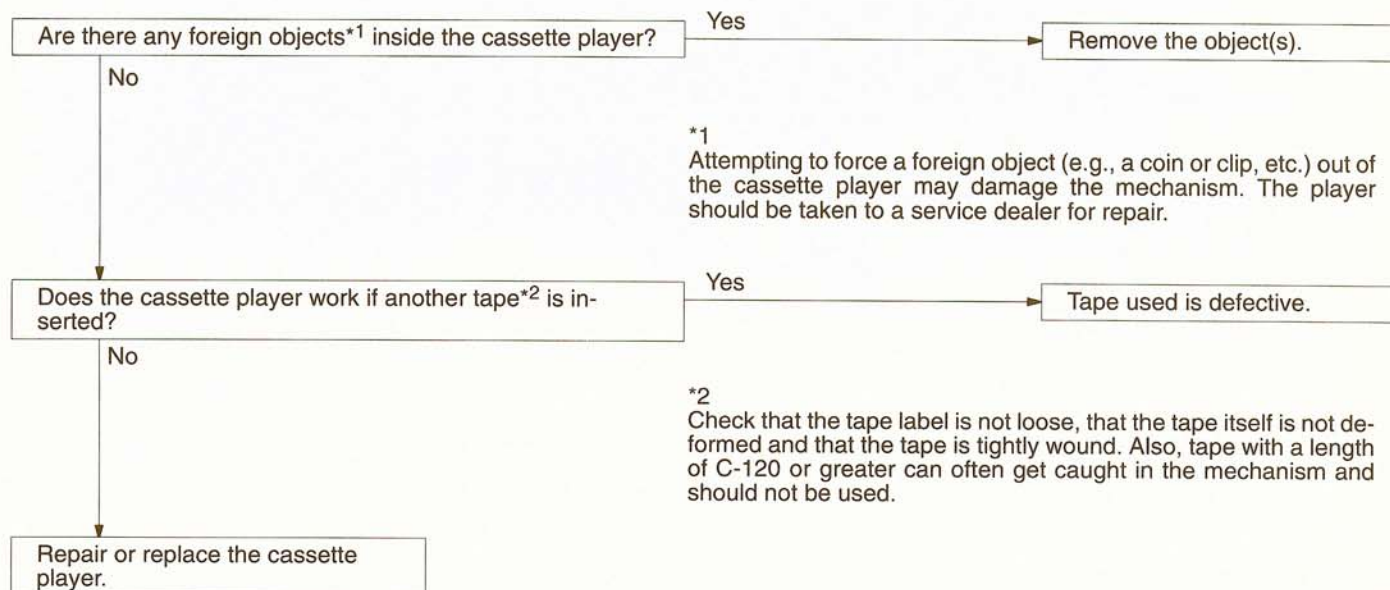
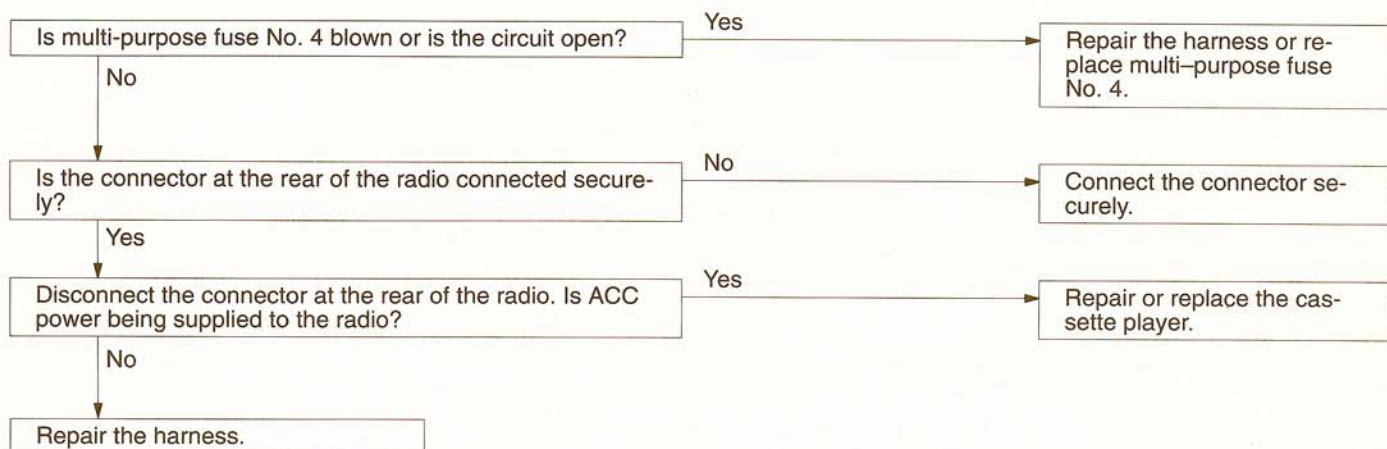


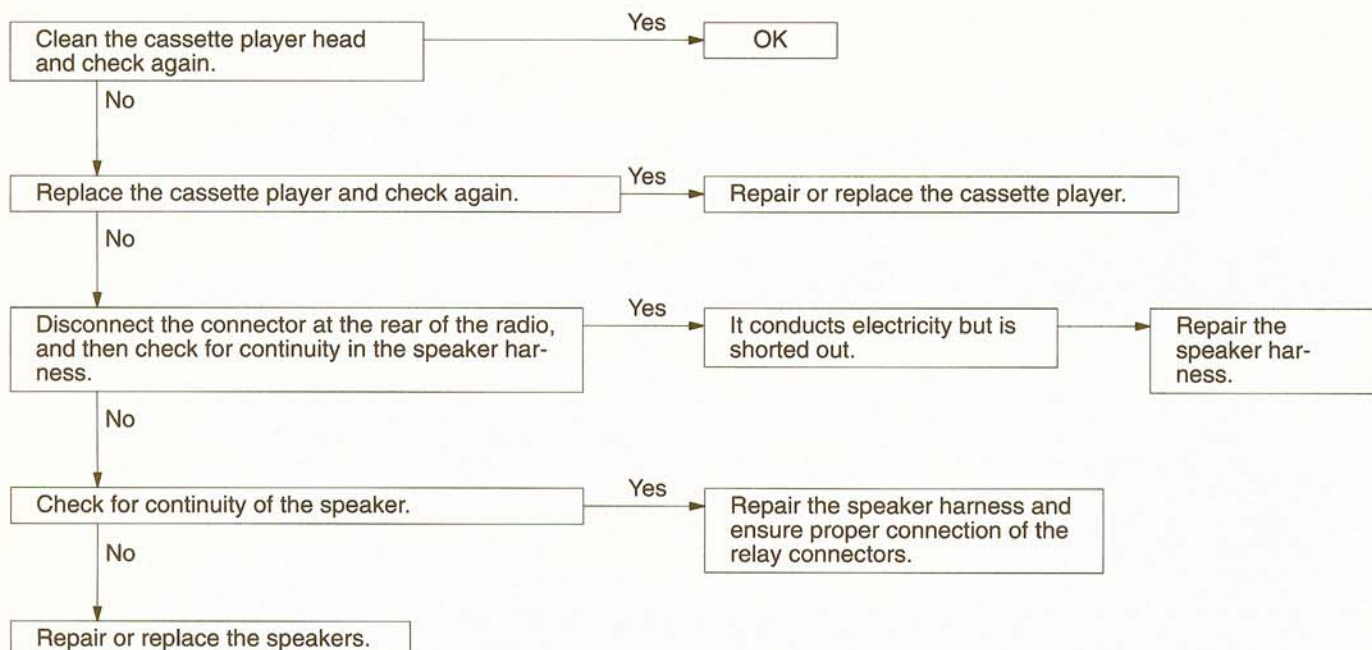
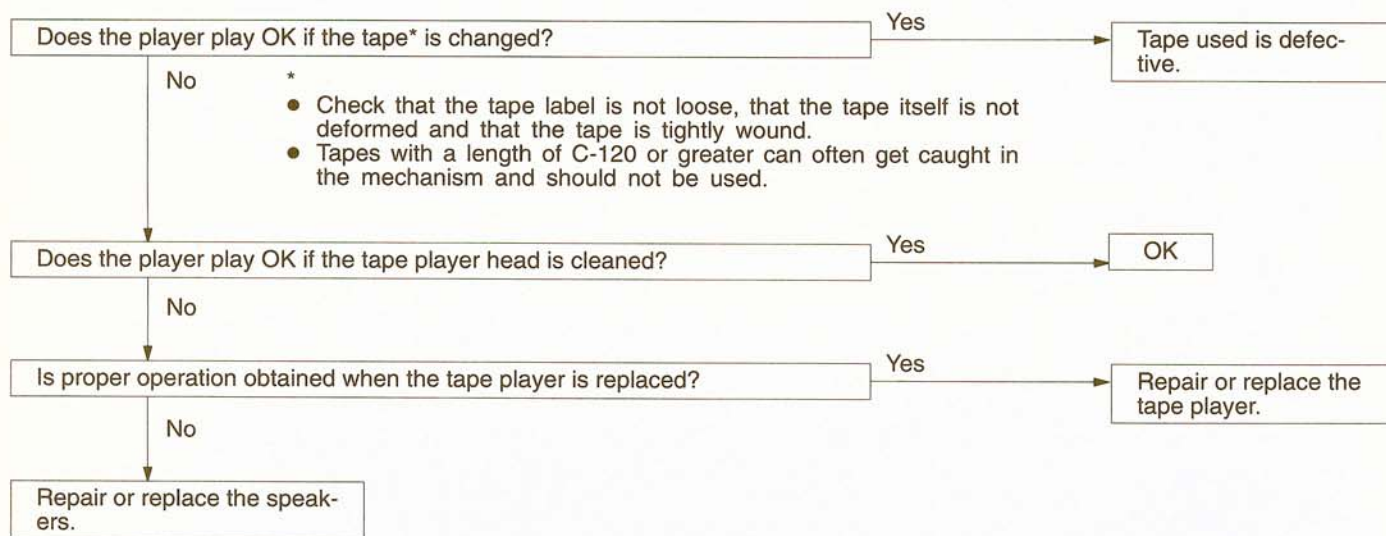
**B-5 Distortion on AM or on both AM and FM.****B-6 Distortion on FM only.**

**B-7 Too few automatic select stations.****B-8 Insufficient memory (preset stations are erased).**



## C. CASSETTE PLAYER

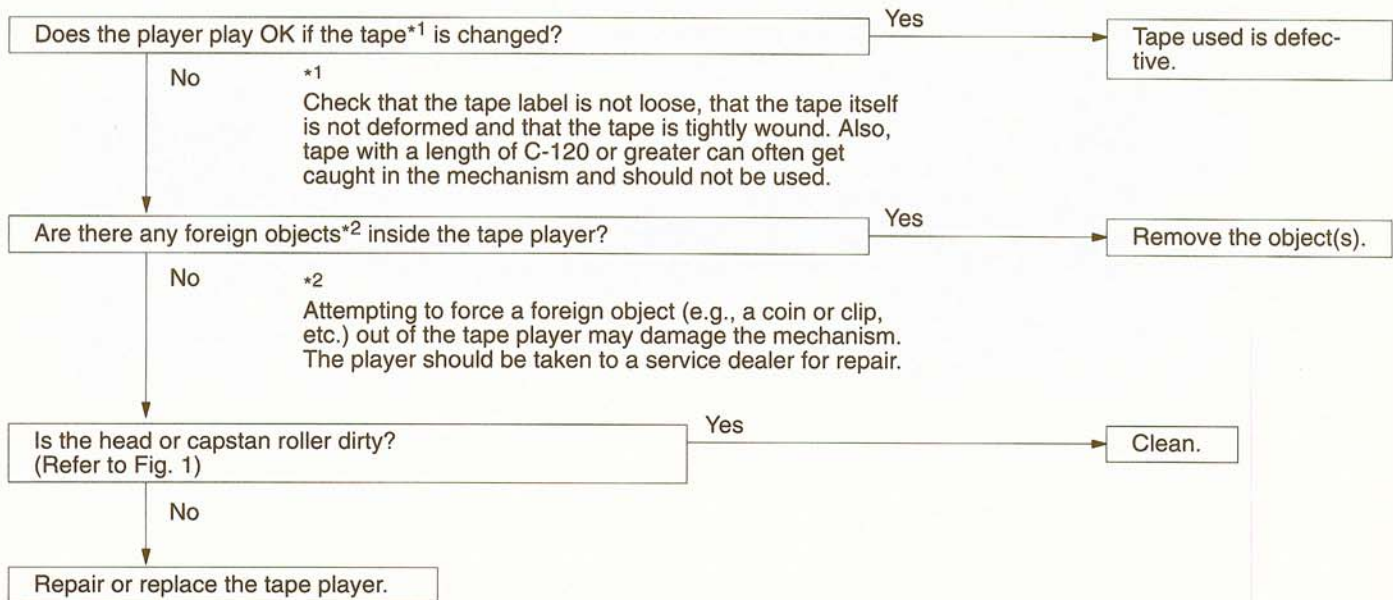
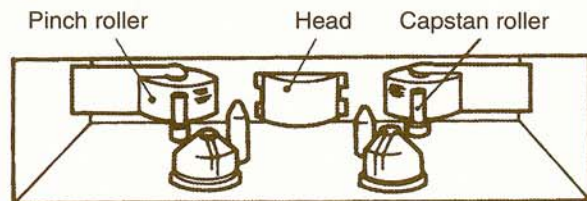
**C-1 Cassette tape cannot be inserted.****C-2 No sound (even after a tape has been inserted).**

**C-3 No sound from one speaker.****C-4 Sound quality is poor, or sound is weak.****C-5 Cassette tape will not eject.**

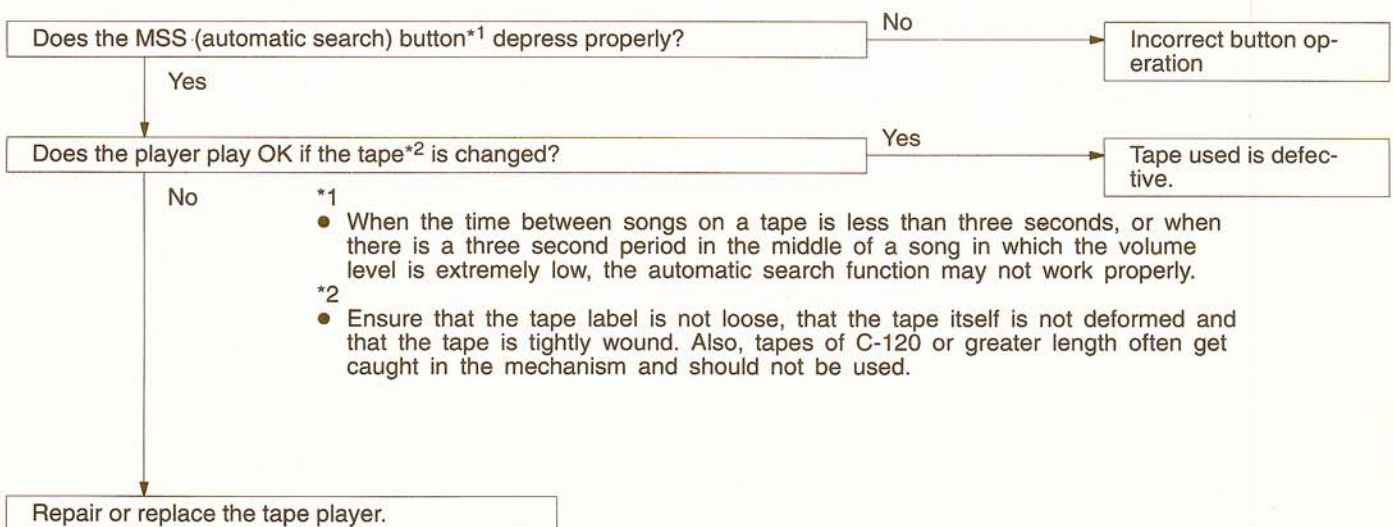
The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the cassette player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are

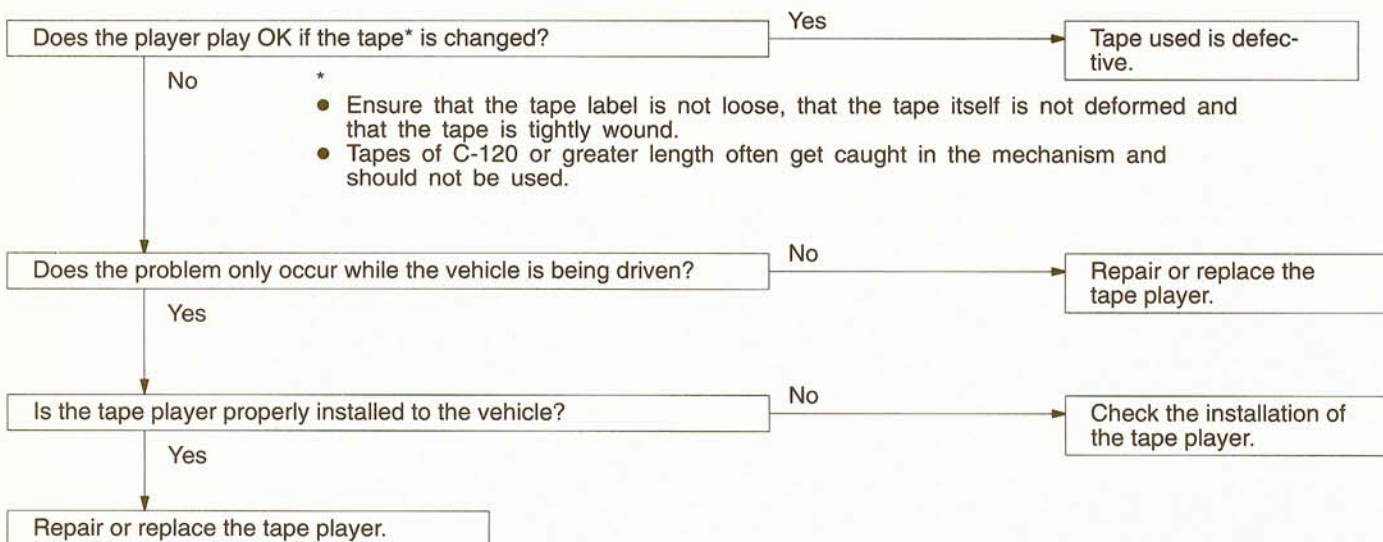
also possible, and attempting to force the tape out of the player can cause damage to the mechanism. The player should be taken to a service dealer for repair.



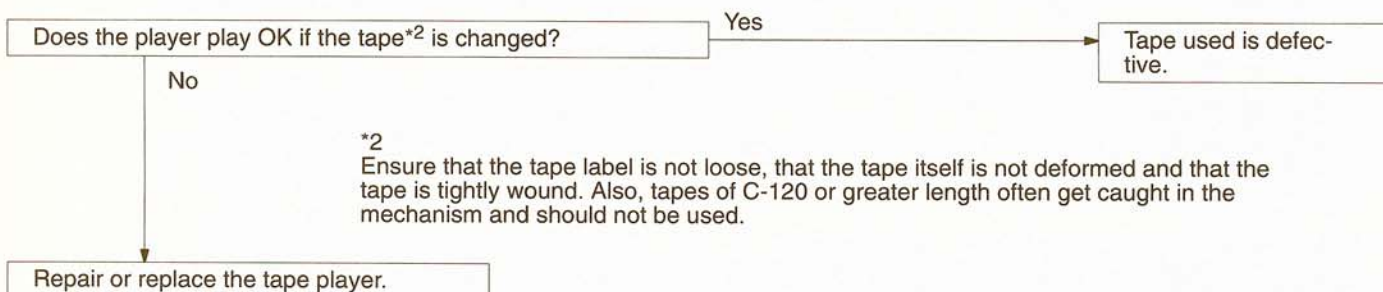
**C-6 Uneven revolution. Tape speed is fast or slow.****Fig. 1**

Z16A0668

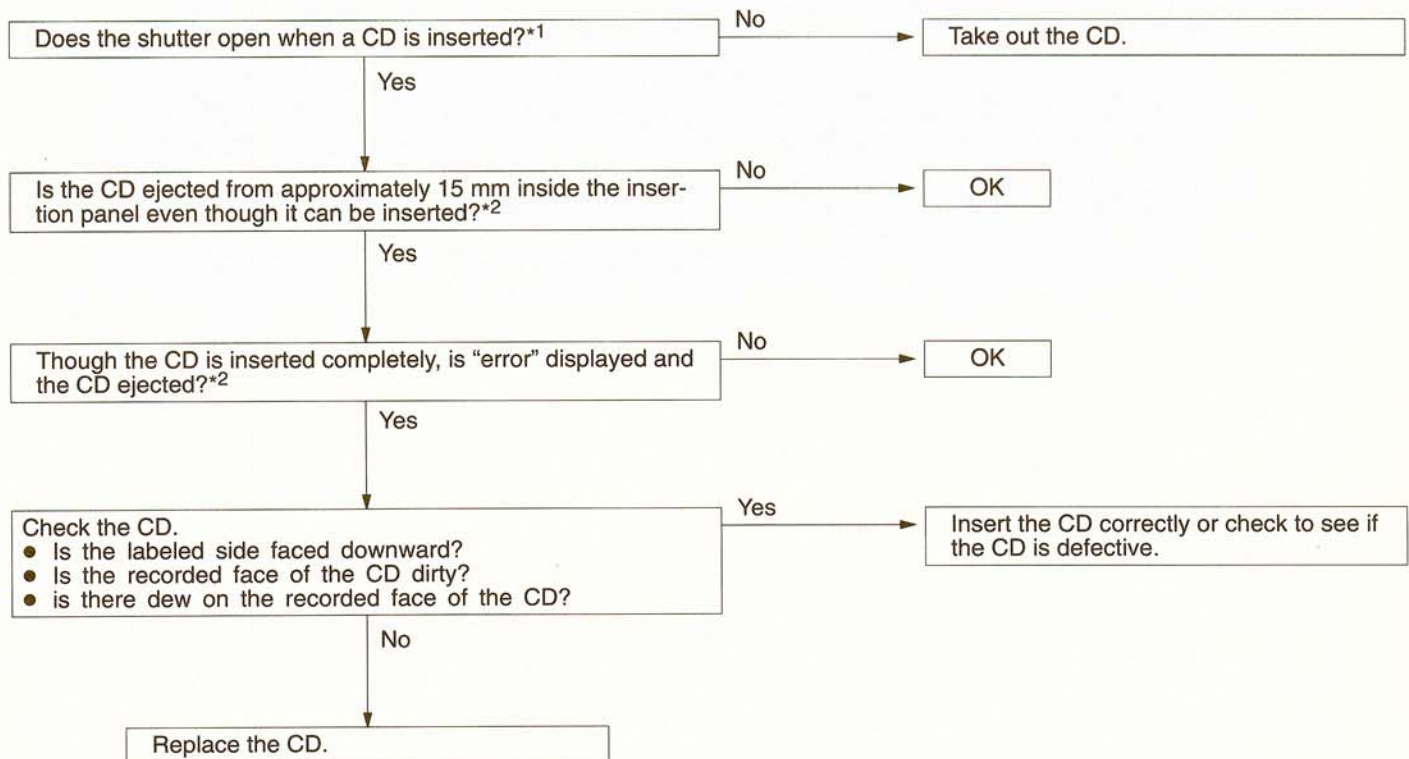
**C-7 Automatic search does not work.**

**C-8 Malfunction of auto reverse****C-9 Tape gets caught in mechanism\*<sup>1</sup>**

<sup>\*1</sup>  
When the tape is caught in the mechanism, the case may not eject. When this occurs, do not try to force the tape out as this may damage the tape player mechanism. Take the cassette to a service dealer for repair.



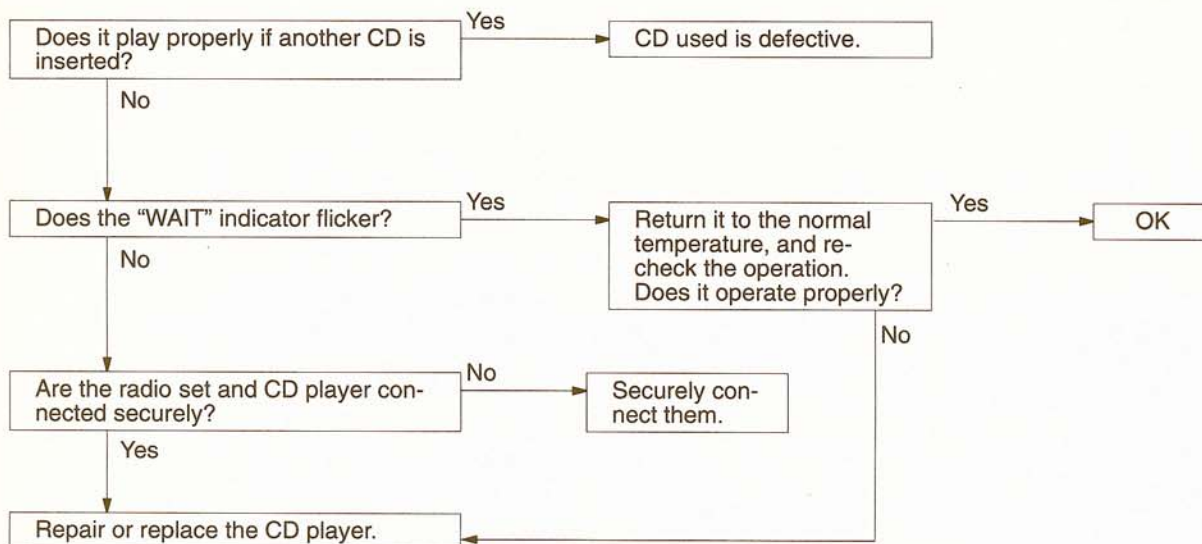


**D. CD PLAYER****D-1 CD cannot be accepted.**

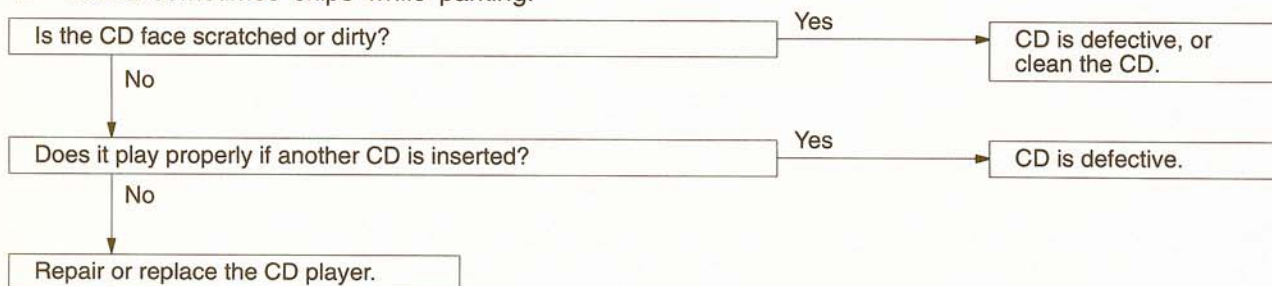
\*1 If a CD is already loaded, does the shutter not open to allow insertion when another CD is inserted?

\*2 If the key switch is not at ACC or ON, the CD stops at depth of 15 mm below the panel surface even when it is inserted, and it will be rejected when pushed farther?

\*3 Even though the CD is loaded, E (error) is sometimes displayed with the CD rejected because of vibration/shock or dew on the CD face or optical lens.

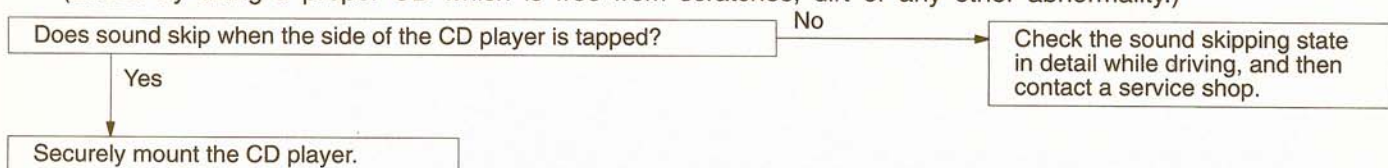
**D-2 No sound.**

(The combined radio cassette must operate properly.)

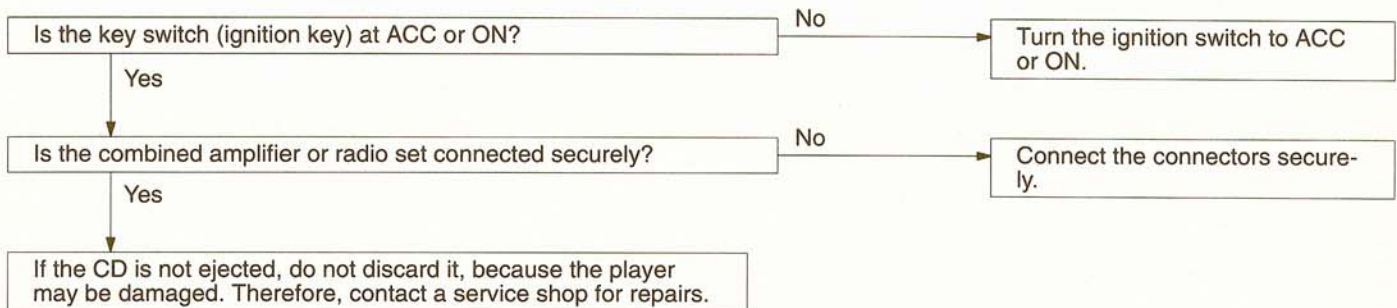
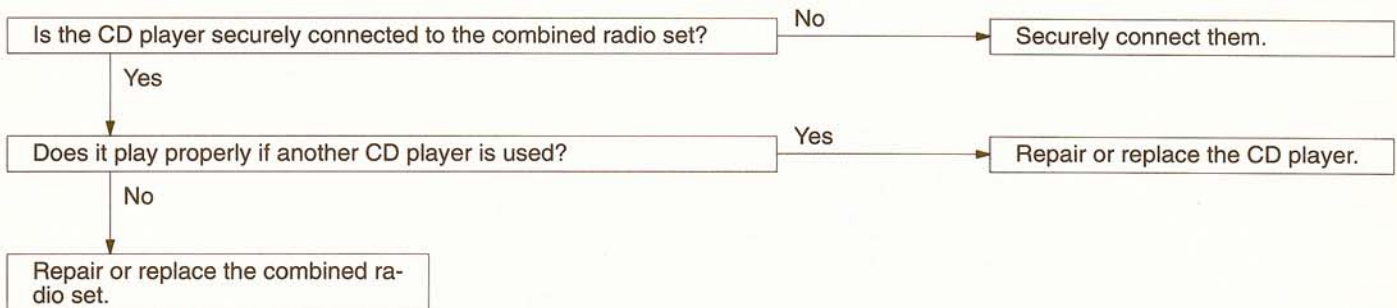
**D-3 CD sound skips.****1. Sound sometimes skips while parking.****2. Sound sometimes skips while driving.**

(Stop vehicle, and check it.)

(Check by using a proper CD which is free from scratches, dirt or any other abnormality.)



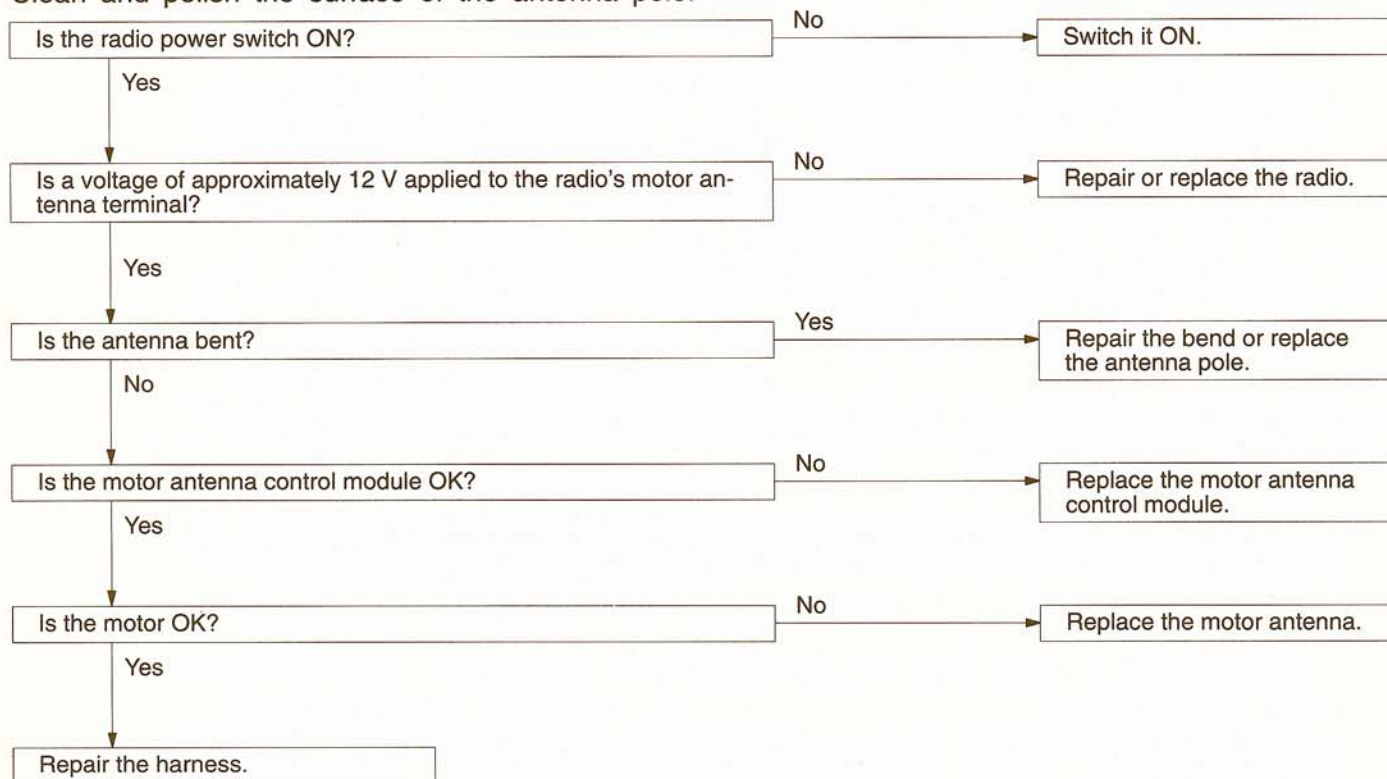


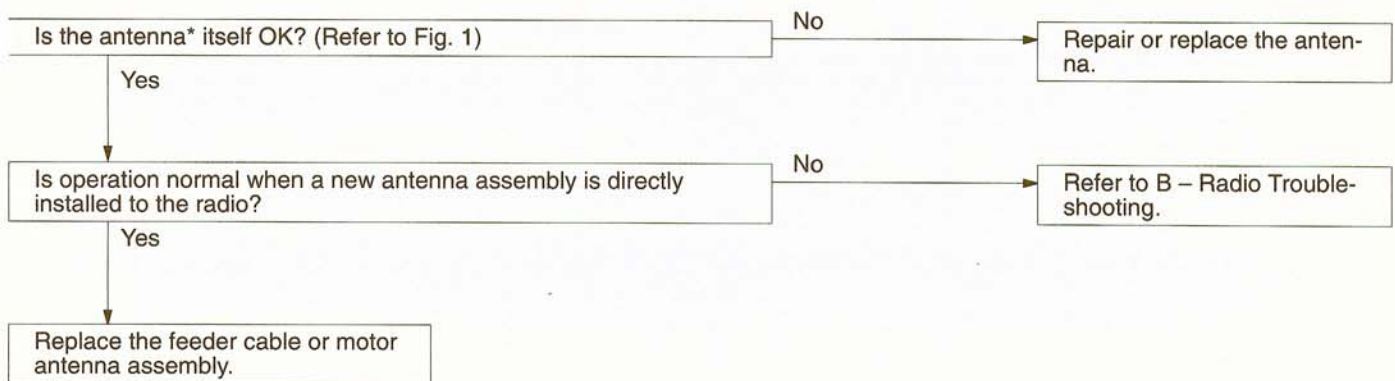
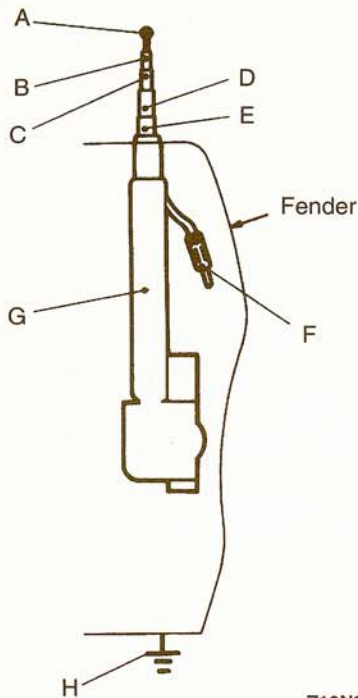
**D-4 Sound quality is poor.****D-5 CD cannot be ejected.****D-6 No sound from one speaker.**

## E. MOTOR ANTENNA

**E-1 Motor antenna won't extend or retract.**

Clean and polish the surface of the antenna pole.



**E-2 Motor antenna extends and retracts but does not receive.****Fig. 1**

Z16N0087

**Checking the antenna\***

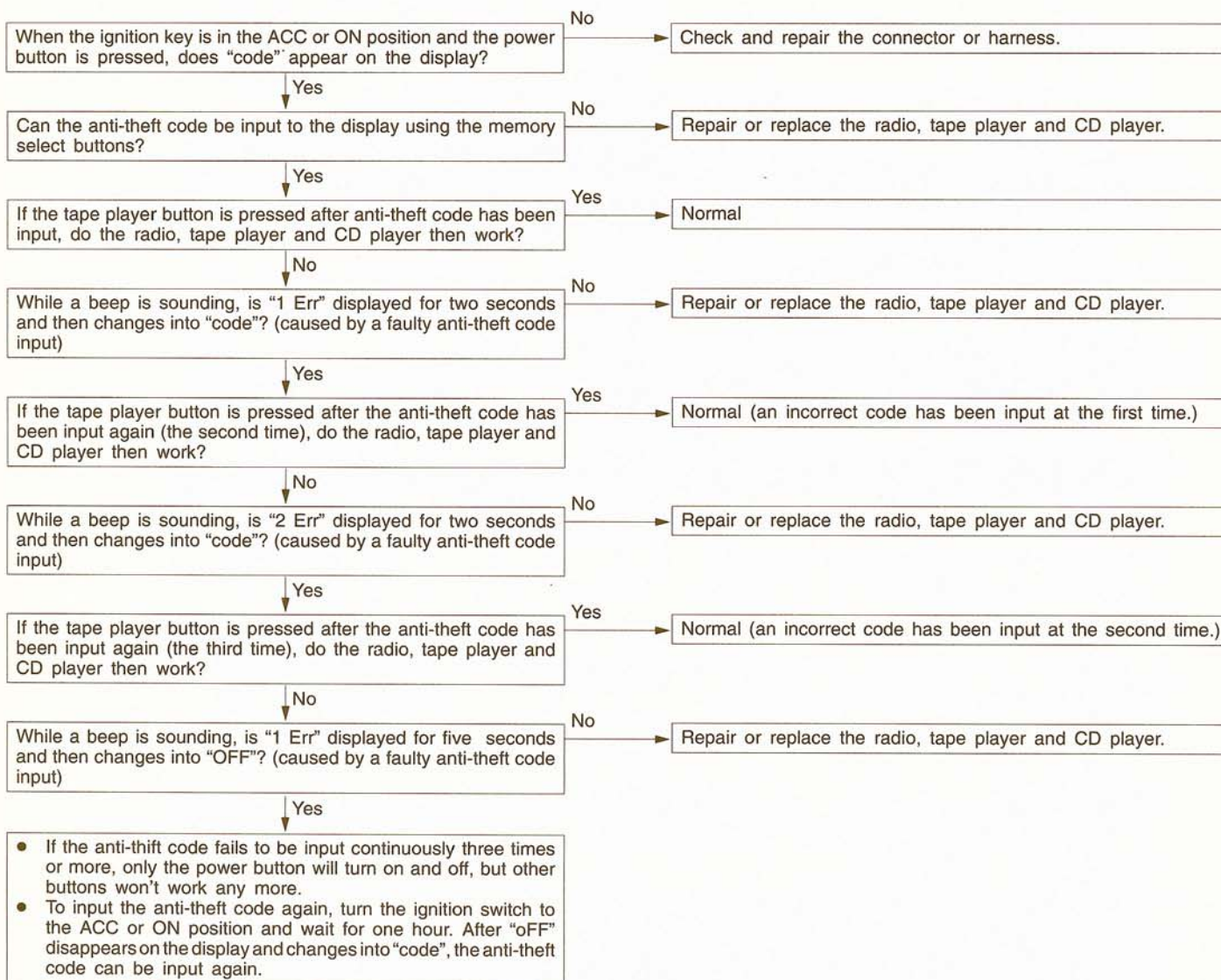
Ohmmeter measurement locations	Result
Circuits from F to A, B, C, D and E	Continuity
Circuit between G and H	Continuity
Circuits from H to A, B, C, D and E	No continuity



**ANTI-THEFT SYSTEM**

After the power supply to the radio and tape player has been interrupted for one hour or more, the anti-theft system will prevent the radio, tape player

and CD player from working, even if the power supply is restored. Problems with the anti-theft system can be found using the flow chart below.



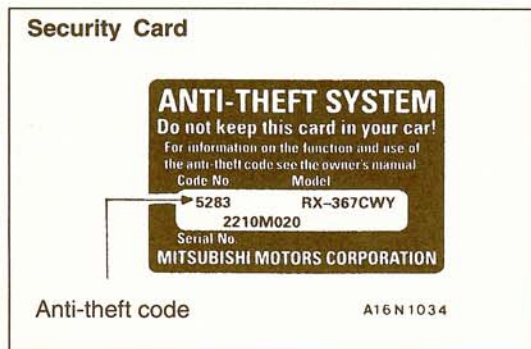
**PROCEDURE FOR INPUT OF ANTI-THEFT CODE FOR ANTI-THEFT SYSTEM**

54400440028

The radio, tape player and CD player does not work in the following states.

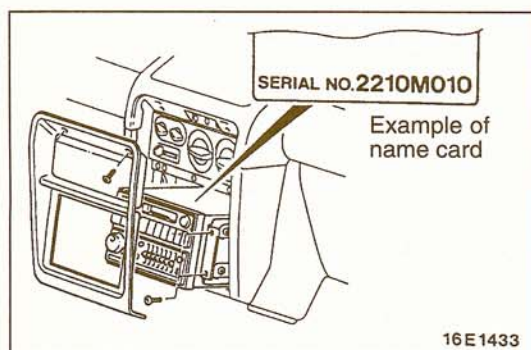
- (1) Power supply to the radio, tape player and CD player has been suspended for more than one hour continuously by removing the cable from the battery terminal or disconnecting the harness connectors.
- (2) The power supply to the radio, tape player and CD player has been suspended for more than one hour owing to blown fuse or discharged battery.
- (3) The radio, tape player and CD player has been replaced.

If the radio, tape player and CD player do not work for these causes, input the anti-theft code by the following procedure to operate it.



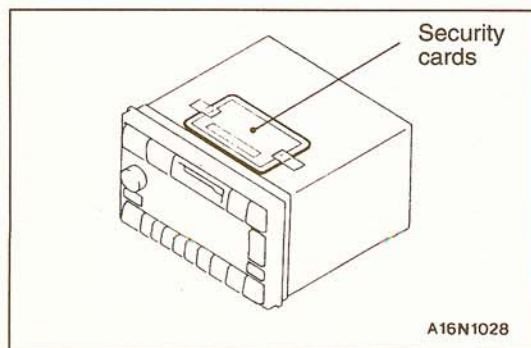
1. Using any of the following methods, confirm the anti-theft code.

- (1) Read the anti-theft code indicated on the cards retained by the user.



- (2) If the anti-theft code is unknown owing to the user's loss of the cards.

- 1) Remove the radio, tape player and CD player (Refer to P.54-111.)
- 2) Read the serial No. shown on the name card of the radio and tape player.
- 3) Look up the anti-theft code corresponding to the serial number in the serial number—anti-theft code table; or, make inquiries to Mitsubishi Motor Sales of America, Inc.

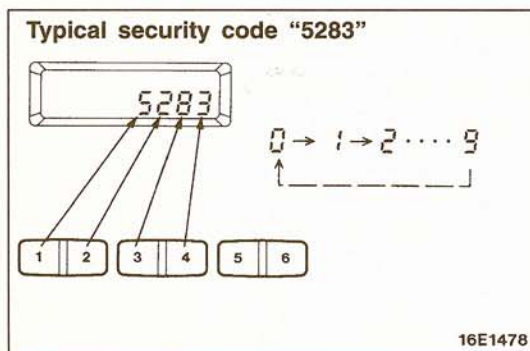
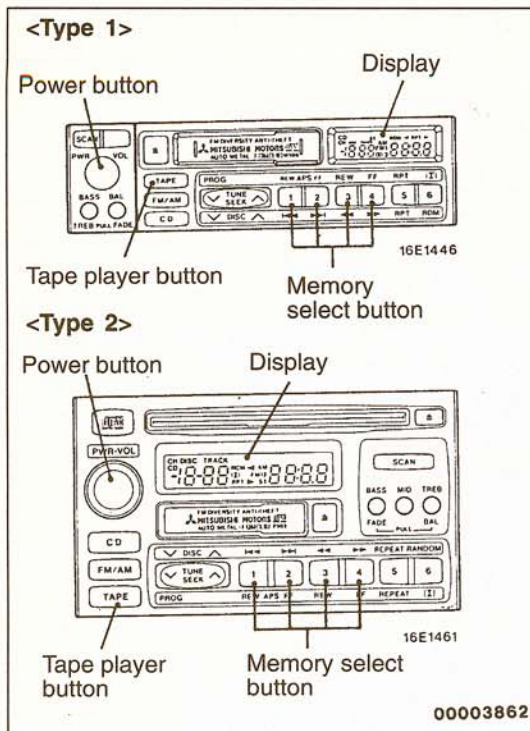


- (3) When the radio, tape player and CD player is replaced. Read the anti-theft code on the cards attached to the upper anti-theft of the replacement radio, tape player and CD player.

**NOTE**

Deliver the cards (two) to the user.





2. Return power supply for the radio, tape player and CD player to the normal state.
3. Turn the ignition key to the "ACC" position.
4. Press the Power button, and "code" will be displayed on the display.

5. Press No. 1 through No. 4 memory select buttons and set the 4-digit anti-theft code indicated on the card.

**NOTE**

Pressing the memory select button increases the number displayed.

6. Press the tape player button. After a beep is heard, the radio, tape player and CD player will be in the operating state.
7. If the input anti-theft code does not agree with that in memory, a beep sounds for two seconds. "1 Err" is displayed at that time and changes into "code". Then repeat steps 5 and 6.

**NOTE**

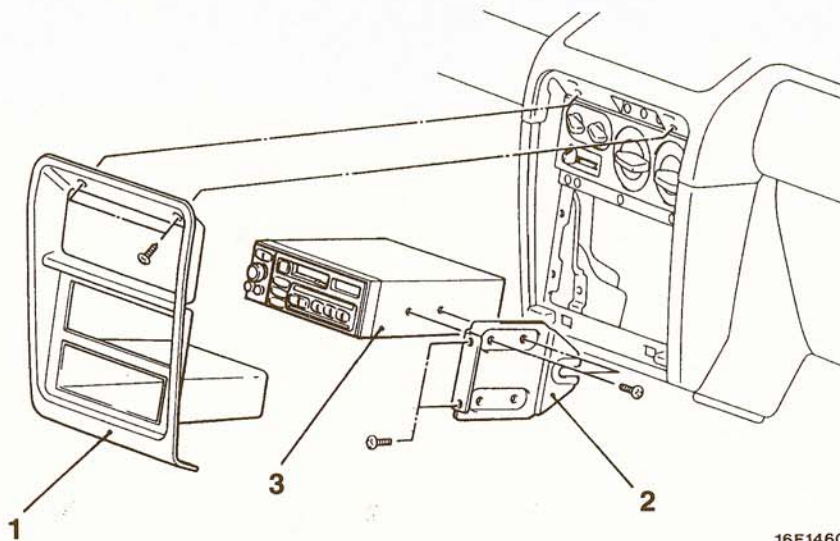
- (1) The anti-theft code can be set three times at the most.
- (2) The second error is displayed as "2 Err". If the third trial fails, a beep sounds for five seconds. "3 Err" is displayed at that time and changes into "OFF".
- (3) When setting is attempted three or more times, keeping the ignition key in the "ACC" or "ON" position for about one hour will automatically erase the "OFF" display. After the erasing, therefore, repeat step 3 and up.



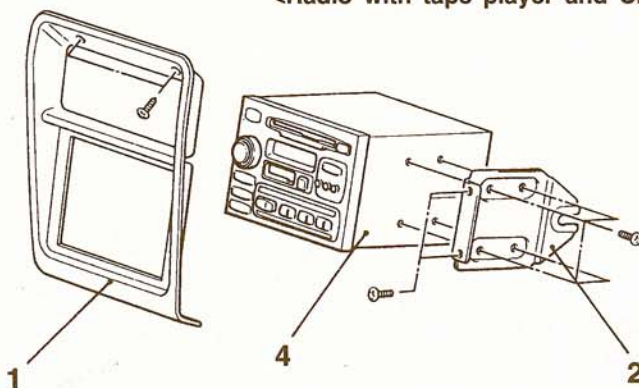
## RADIO WITH TAPE PLAYER AND CD PLAYER

### REMOVAL AND INSTALLATION

&lt;Radio with tape player&gt;

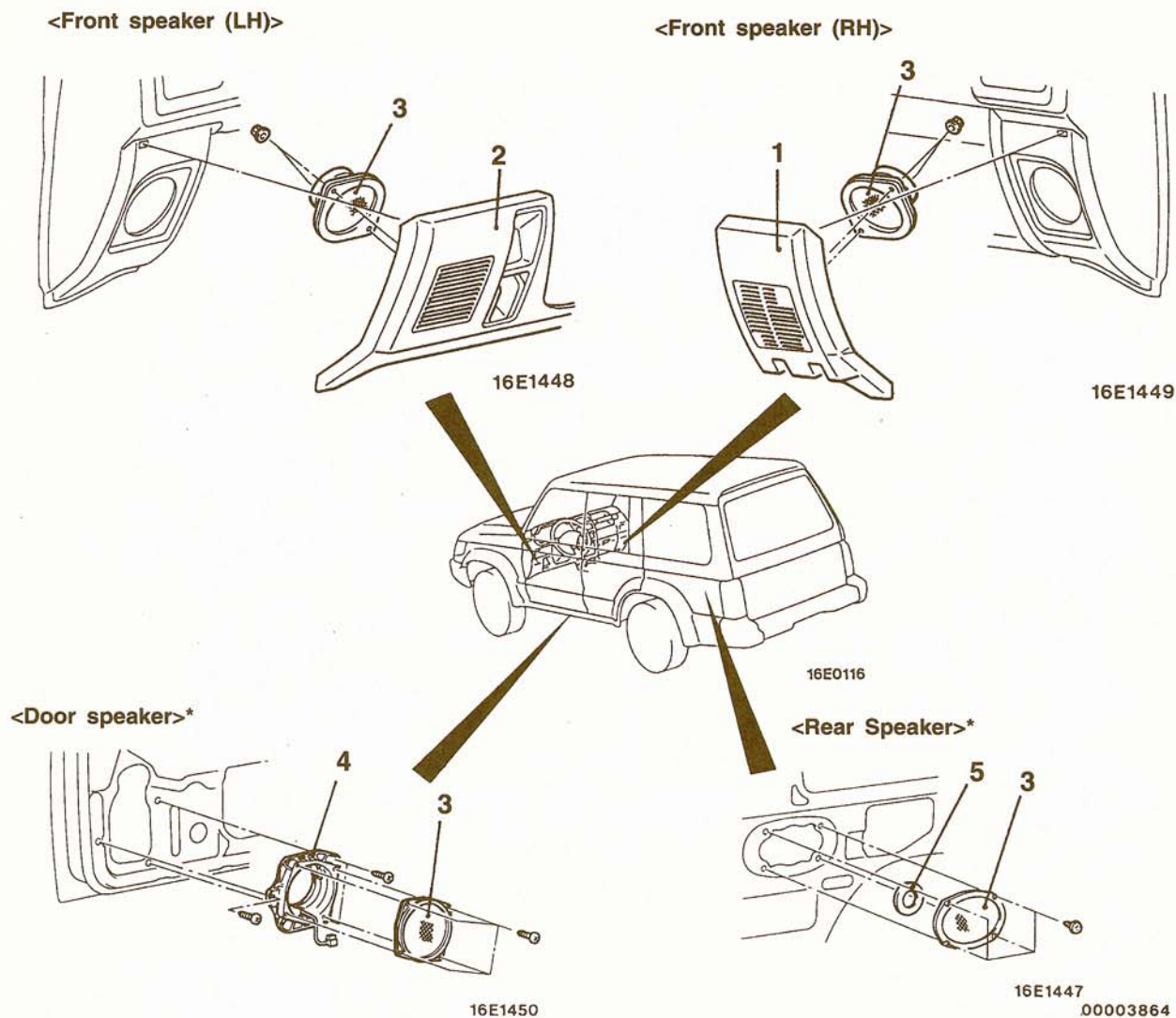


&lt;Radio with tape player and CD player&gt;



#### Removal steps

1. Audio panel
2. Bracket
3. Radio with tape player
4. Radio with tape player and CD player

**SPEAKER****REMOVAL AND INSTALLATION****Front speaker removal steps**

1. Instrument corner cover  
    <RH speaker>
2. Knee protector <LH speaker> (Refer to GROUP 52A – Instrument Panel.)
3. Speaker

**Door speaker removal steps**

- Door trim (Refer to GROUP 42 – Door Trim and Waterproof Film.)
- 3. Speaker
- 4. Speaker cover

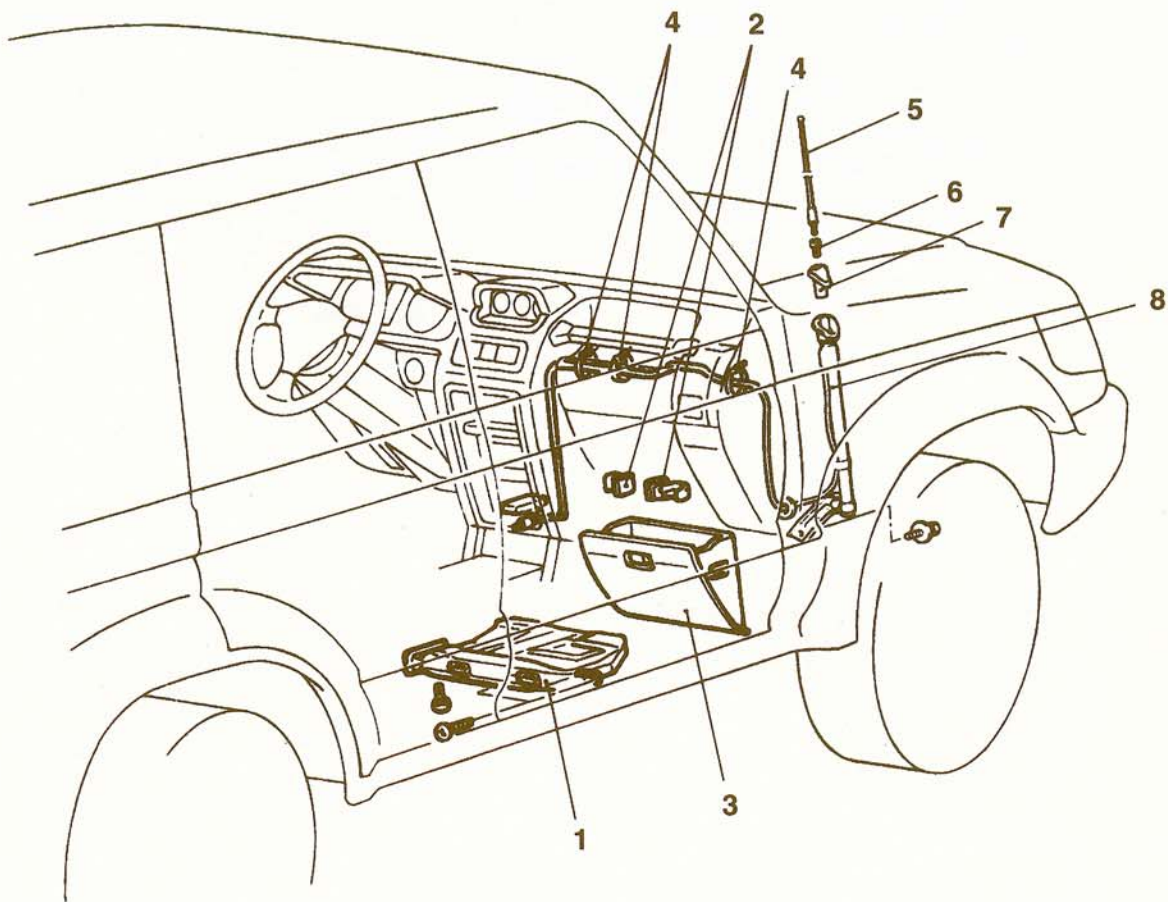
**Rear speaker removal steps**

- Quarter trim  
    (Refer to GROUP 52A – Trim.)
- 3. Speaker
- 5. Cushion

NOTE \* indicates that the speakers are installed on the right side also.



54400320018

**ANTENNA AND ANTENNA FEEDER CABLE****WHIP ANTENNA AND ANTENNA FEEDER CABLE  
REMOVAL AND INSTALLATION**

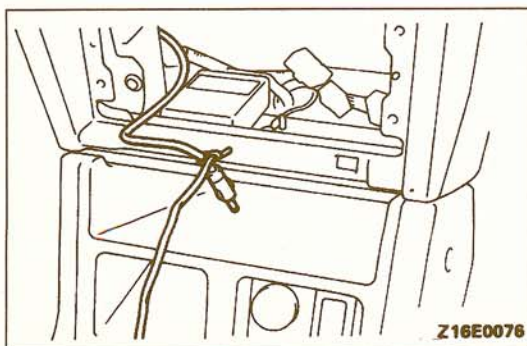
Z16E0442

**Removal steps**

- Radio with tape player and CD player  
(Refer to P.54-111.)
- 1. Foot shower duct
- 2. Glove box stopper
- 3. Glove box assembly
- 4. Cable band or tape



- 5. Antenna pole
- 6. Mounting nut
- 7. Mounting insulator and packing
- Splash shield  
(Refer to GROUP 42 – Fender.)
- 8. Antenna base and feeder cable



Z16E0076

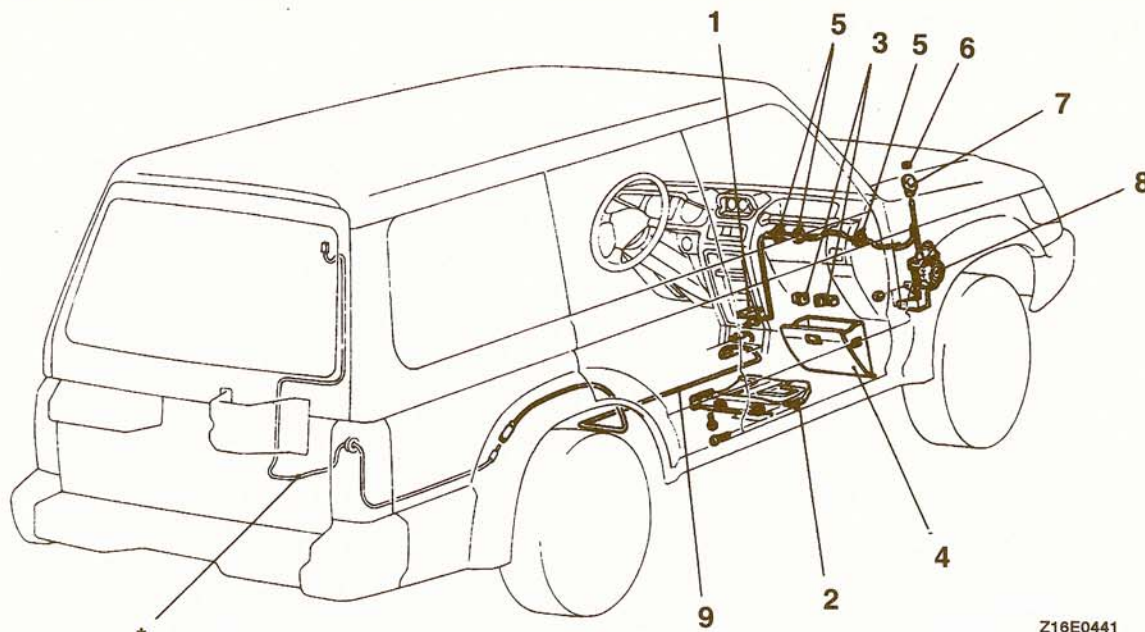
**REMOVAL SERVICE POINT****◀A▶ ANTENNA BASE AND FEEDER CABLE REMOVAL**

For ease of installation, tie a cord which is approximately 3 m (9.84 ft.) in length to the feeder cable. Pull out the feeder cable together with the antenna base.



## MOTOR ANTENNA AND ANTENNA FEEDER CABLE REMOVAL AND INSTALLATION

54400350031



Z16E0441

### Motor antenna and antenna feeder cable removal steps

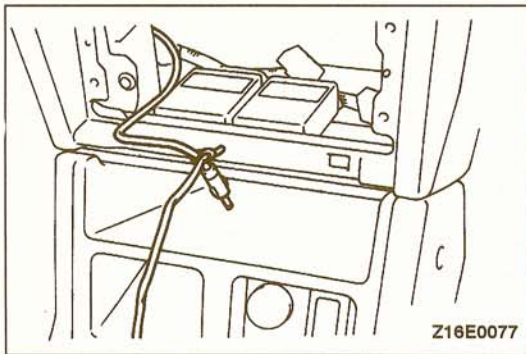
- Radio with tape player and CD player (Refer to P.54-111.)
- 2. Foot shower duct
- 3. Glove box stopper
- 4. Glove box assembly
- 5. Cable band or tape
- 6. Ring nut
- 7. Base
- 8. Motor antenna and antenna feeder cable

### Antenna feeder cable removal steps

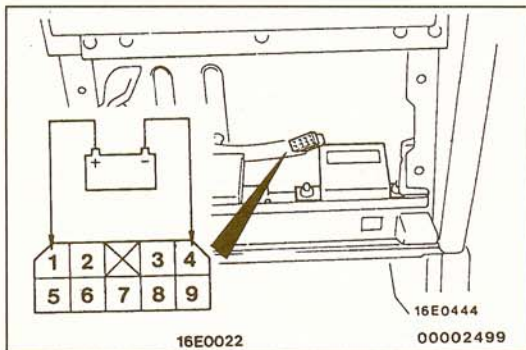
- Radio with tape player and CD player (Refer to P.54-111.)
- Front console assembly (Refer to GROUP 52A – Floor console.)
- Rear console assembly (Refer to GROUP 52A – Floor console.)
- Front seat <Passenger's side> (Refer to GROUP 52A – Front seat.)
- Rear seat (Refer to GROUP 52A – Rear seat.)
- Cowl side trim <R.H.> (Refer to GROUP 52A – Trim)
- Center pillar trim <R.H.> (Refer to GROUP 52A – Trim.)
- Quarter trim lower <R.H.> (Refer to GROUP 52A – Trim.)
- 9. Antenna feeder cable

### Motor antenna control unit removal steps

- Radio with tape player and CD player (Refer to P.54-111.)
- 1. Motor antenna control unit

**REMOVAL SERVICE POINT****◀A▶ MOTOR ANTENNA AND ANTENNA FEEDER CABLE REMOVAL**

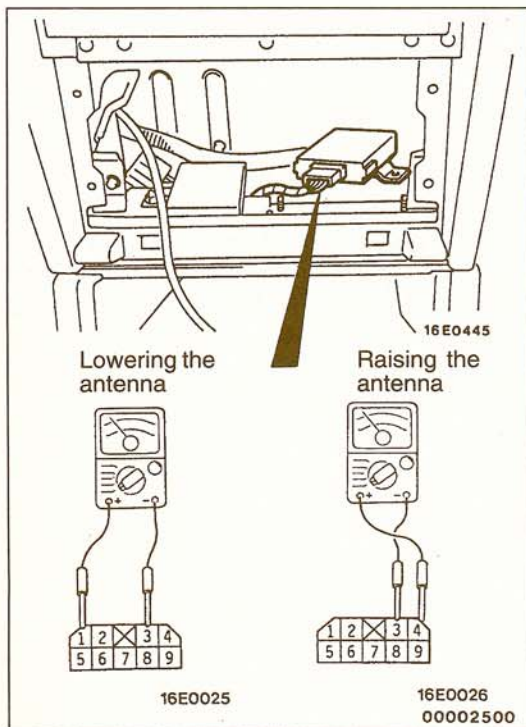
For ease of installation, tie a cord which is approximately 3 m (9.84 ft.) in length to the feeder cable. Pull out the feeder cable together with the motor antenna.

**INSPECTION**

54400360034

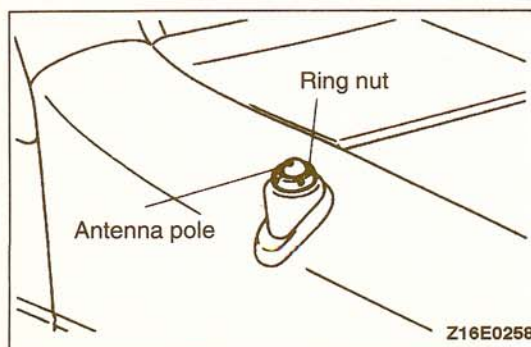
**MOTOR ANTENNA CHECK**

- (1) Remove the radio with tape player. (Refer to P.54-109.)
- (2) Disconnect the motor antenna control module connector and check that the antenna goes up when the positive battery terminal is connected to terminal (1) and the negative battery terminal is connected to terminal (4), and check that it goes down when the connections are reversed.

**MOTOR ANTENNA CONTROL UNIT CHECK**

- (1) Remove the radio with tape player. (Refer to P.54-109.)
- (2) Remove the motor antenna control unit mounting bolt.
- (3) With the ignition switch turned to ACC or ON, operate the radio switch and check the voltage between the terminals while the antenna is being raised and lowered.

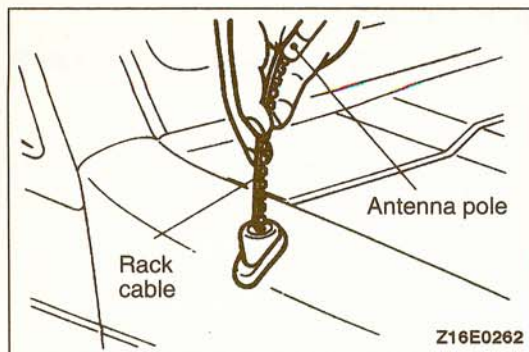
Antenna operation direction	Measurement terminals	Voltage (V)
Lowering	1-3	10-13
Raising	4-3	10-13

**ANTENNA POLE REPLACEMENT**

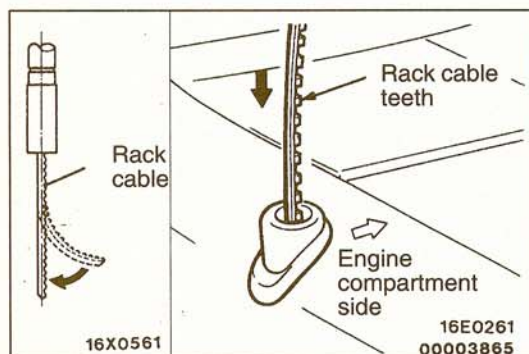
54400090049

- (1) Remove the ring nut.





- (2) After turning the ignition switch to ACC or ON, turn the radio switch on to raise the antenna pole, and then remove the antenna pole together with the rack cable.

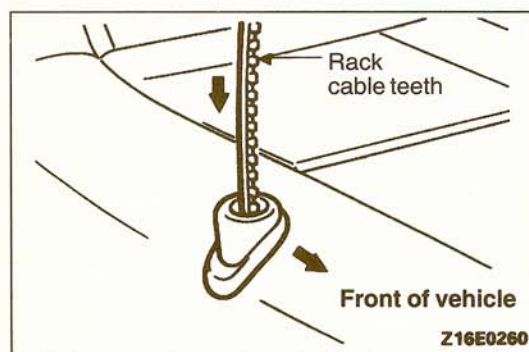


- (3) Draw out the antenna pole to the maximum extension.

**NOTE**

If there is a bend in the motor end of the rack cable, remove the bend.

- (4) Insert the rack cable into the motor assembly with the rack cable teeth facing the engine compartment side.

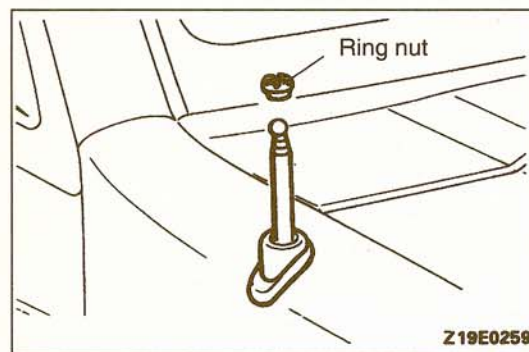


- (5) Turn the rack cable teeth towards the front of the vehicle (90° to right) so that the rack cable meshes with the motor gear.

- (6) If the rack cable pulls out with no resistance when it is lightly pulled, then the cable is not meshed with the motor gear, so check that there are no bends in the end of the rack cable, and then repeat steps (3) and (4) above.

- (7) Set the antenna pole vertically and turn off the radio switch to wind up the rack cable. Insert the antenna into the motor antenna side to align it with the wound-up rack cable.

- (8) After tightening the ring nut, check the movement of the antenna by turning the radio switch on and off.





# BACK DOOR WINDOW DEFOGGER

## TROUBLESHOOTING

### OPERATION

- When the ignition switch is at the ON position and the defogger switch is set to the ON (automatic return switch) position, current flows from the defogger timer to the coil side of the defogger relay for a period of 9 to 11 minutes.
- When the defogger relay contact closes to turn the defogger relay on and the defogger has operated for 9 to 11 seconds, the indicator light of the defogger switch illuminates at the same time to inform the driver that the defogger is operating.

### NOTE

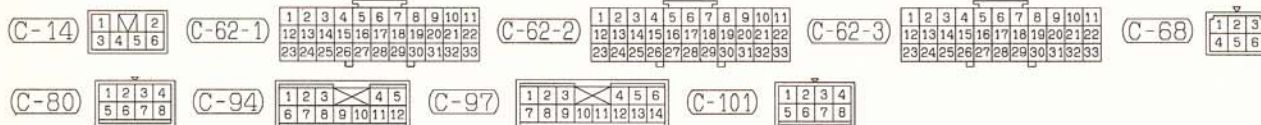
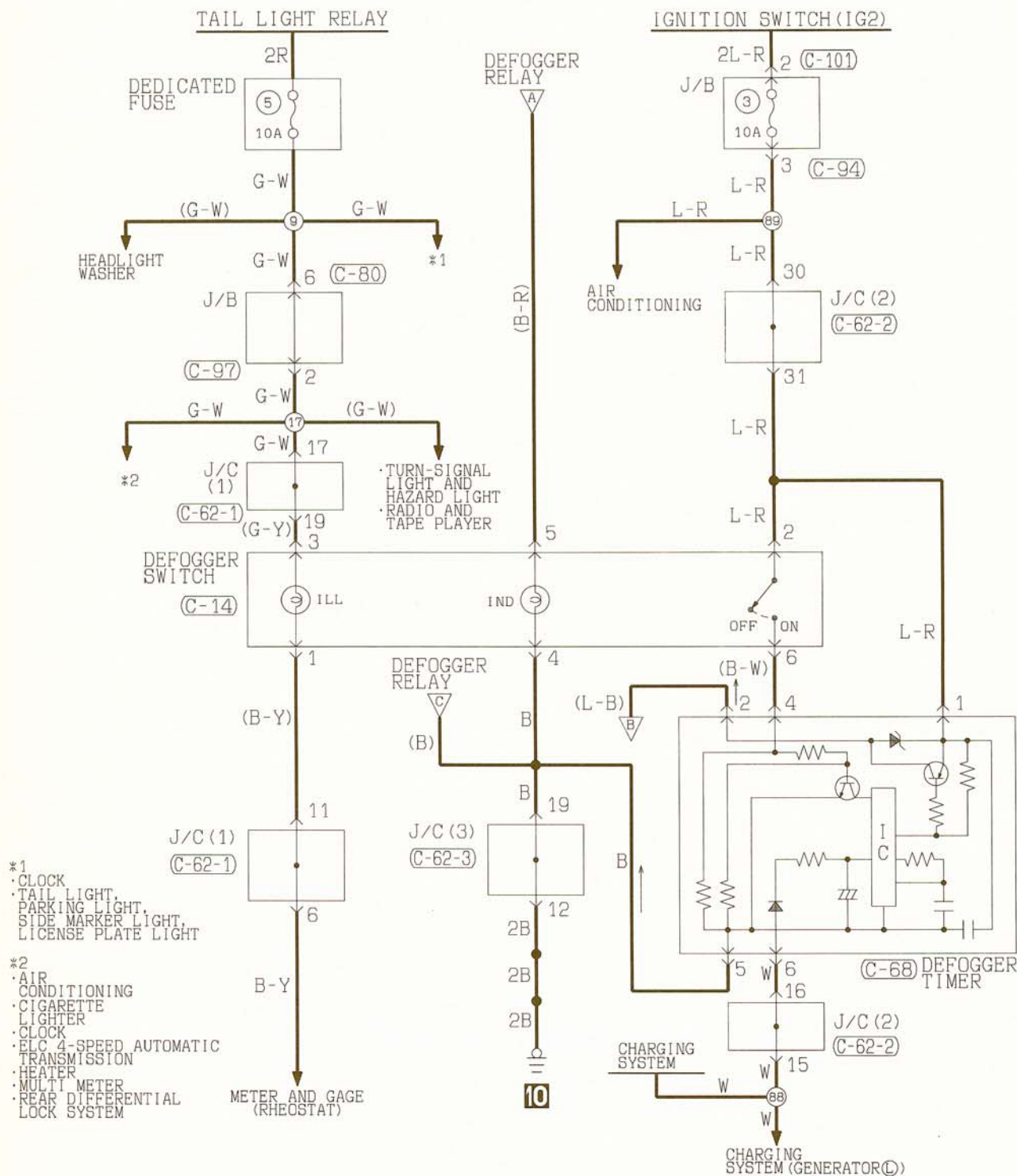
- After the defogger has operated for 9 to 11 minutes, it will automatically stop. Also, if the defogger switch is pressed again while the defogger is operating or if there is no generator current (terminal "L" drops to 3.5 V or below), the defogger will stop operating.
- When the lighting switch is set to the TAIL or HEAD position, the tail light relay contact closes to turn the tail light relay on, and the defogger switch illumination light will illuminate.

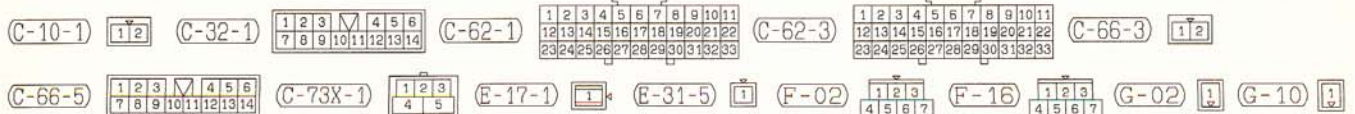
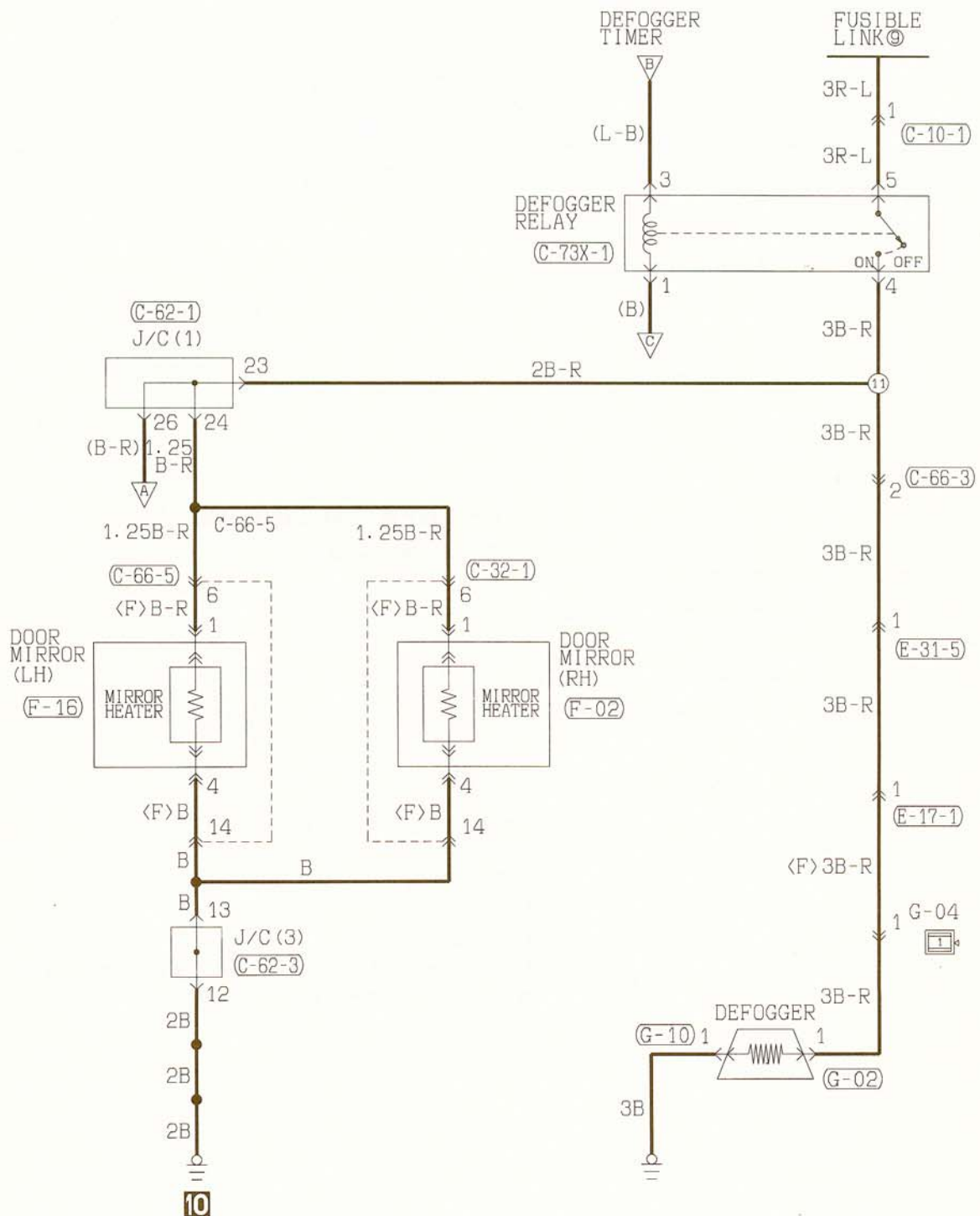
### TROUBLESHOOTING HINTS

1. The defogger does not operate.
  - (1) The indicator light illuminates.
    - Check the ground circuit.
  - (2) The indicator light also does not illuminate.
    - Check fusible link No. 9.
    - Check the defogger relay. (Refer to P.54-121.)
    - Check the defogger switch. (Refer to P.54-121.)
    - Check the defogger timer. (Refer to P.54-122.)
2. The defogger switch illumination light does not illuminate or does not dim.
  - (1) The tail lights illuminate.
    - Check the defogger switch. (Refer to P.54-121.)
    - Check the rheostat. (Refer to P.54-66.)
  - (2) The tail lights also do not illuminate.
    - Check dedicated fuse No. 5.
    - Check the defogger relay. (Refer to P.54-121.)
    - Check the lighting switch. (Refer to P.54-67.)

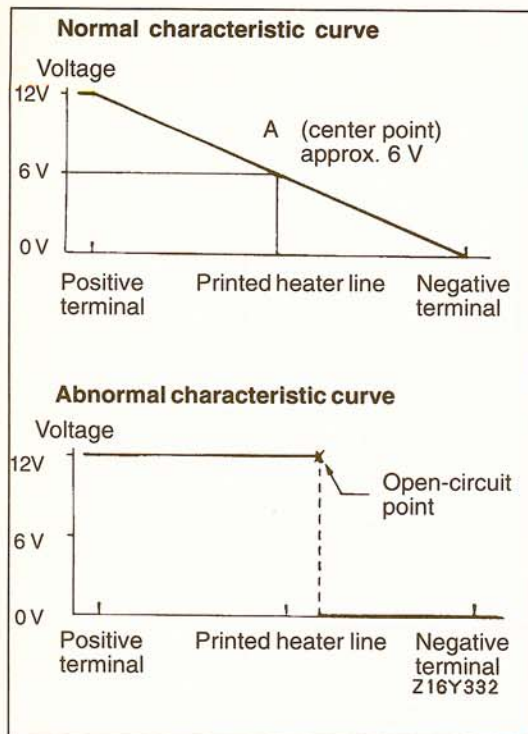
## BACK DOOR WINDOW DEFOGGER AND MIRROR HEATER

90100640083







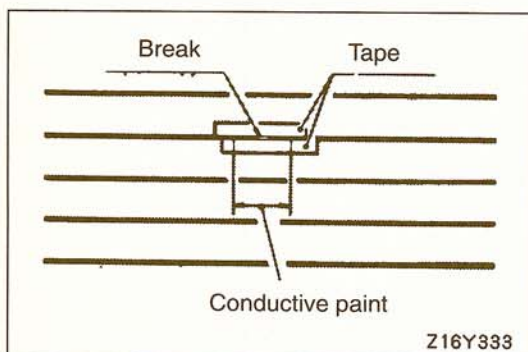


## ON-VEHICLE SERVICE

54300180040

### PRINTED-HEATER LINE CHECK

- (1) Run the engine at 2,000 r/min. Check the heater element while the battery is fully charged.
- (2) Turn the rear window defogger switch on, and then use a circuit tester to measure the heater element voltage at center A of the rear window glass. The condition is good if a voltage of approximately 6 V is indicated.
- (3) If 12 V is indicated at A, there is a break between the negative terminals and A. Move the test bar slowly to the negative terminal to find where the voltage changes suddenly (0 V).
- (4) If 0 V is indicated at A, there is a break between the positive terminals and A. Find where the voltage changes suddenly (12 V) by the same method described above.



### PRINTED-HEATER LINE REPAIR

54300190029

#### REQUIRED MATERIALS

- Thinner
  - Tape
  - Conductive paint
  - Lead-free gasoline
  - Fine brush
- (1) Clean the disconnected area with lead-free gasoline. Apply tape along both sides of the heater element.
  - (2) Mix conductive paint thoroughly. Thin the required amount of paint in a separate container with a small amount of thinner and paint over the break three times at 15-minute intervals.
  - (3) Remove the tape and leave it for a while before use (circuit complete).
  - (4) When completely dry (after 24 hours), finish the exterior with a knife.

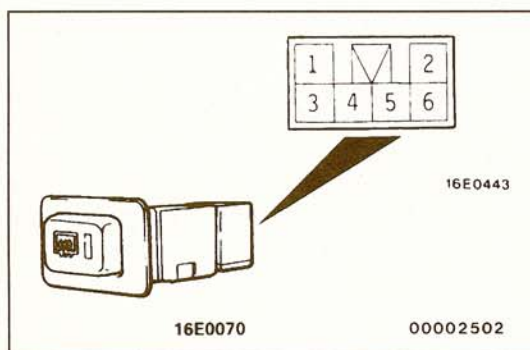
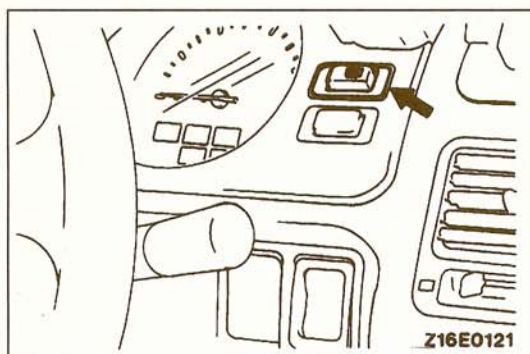
#### Caution

Clean the glass along the defogger heater element with a soft cloth (dry or damp).

54300670035

**DEFOGGER SWITCH****INSPECTION**

- (1) Remove the rear window defogger switch from the meter bezel.



- (2) Operate the switch and check for continuity between the terminals.

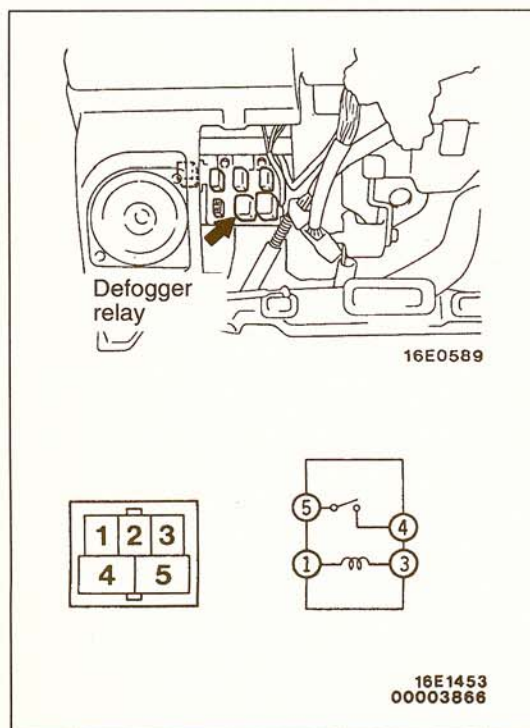
Switch position	Terminal					
	1	3	4	5	2	6
OFF	ILL 		IND 			
ON						

**DEFOGGER RELAY**

54300680045

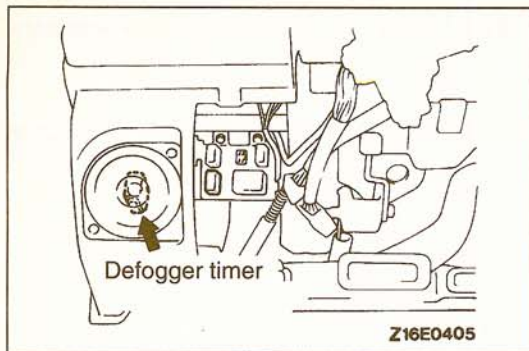
**INSPECTION**

- (1) Remove the instrument under cover. (Refer to GROUP 52A – Instrument Panel.)  
 (2) Remove the defogger relay from the relay bracket.  
 (3) Apply battery positive voltage to terminal (1), and check for continuity between the terminals when terminal (3) is grounded.



Power is supplied	terminals (4)–(5)	Continuity
Power is not supplied	Terminals (4)–(5)	No continuity
	Terminals (1)–(3)	Continuity



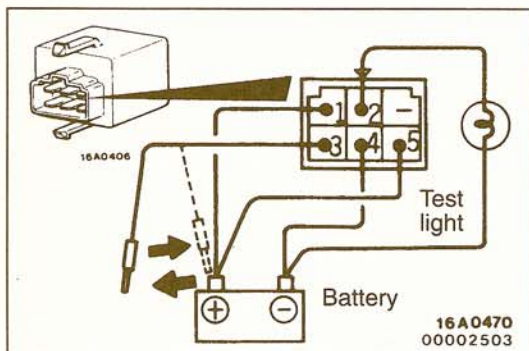


## DEFOGGER TIMER

54300850019

### INSPECTION

- (1) Remove the instrument under cover. (Refer to GROUP 52A – Instrument Panel.)
- (2) Remove the defogger timer from the relay bracket.



- (3) Connect the battery and the test light to the timer as shown in the illustration.
- (4) Check that the test light illuminates for approximately eleven seconds when battery positive voltage is applied to terminal (3) for a few seconds.
- (5) Check that the test light switches off when battery positive voltage is again applied to terminal (3) during the test described above.

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AXLE HOUSING OIL SEAL	27-15-I
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<3.0L-24 VALVE engine>	11A-46-I
<3.5L engine>	11C-17-I
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# MONTERO Specs-At-A-Glance

<b>00</b>	<b>General</b>	Engine		3.0L-12VALVE	3.0L-24VALVE	3.5L
		Engine size	cm <sup>3</sup> (cu.in.)	2,972 (181.3)	2,972 (181.3)	3,497 (213.4)
		Engine oil capacity, w/ filter & oil cooler	dm <sup>3</sup> (qts.)	4.9 (5.2)	4.9 (5.2)	4.9 (5.2)
		Cooling system capacity	dm <sup>3</sup> (qts.)	9.5 (10.0)	9.5 (10.0)	9.5 (10.0)
		A/T capacity	dm <sup>3</sup> (qts.)	7.2 (7.6)	8.5 (9.0)	8.5 (9.0)
		Power steering capacity	dm <sup>3</sup> (qts.)	1.06 (1.12)	1.06 (1.12)	1.06 (1.12)
<b>11</b>	<b>Engine</b>	Firing order		1-2-3-4-5-6	1-2-3-4-5-6	1-2-3-4-5-6
		Compression pressure	kPa (psi)	1,200 (171)	1,200 (171)	1,200 (171)
		Difference between cylinders	kPa (psi)	100 (14)	100 (14)	100 (14)
<b>13</b>	<b>Fuel</b>	Fuel tank capacity	dm <sup>3</sup> (gals.)	92 (24.3)	92 (24.3)	92 (24.3)
		Fuel pressure				
		<When vacuum hose disconnected>	kPa (psi)	330-370 (47-53)	330-370 (47-53)	330-370 (47-53)
		<When vacuum hose connected>	kPa (psi)	Approx. 270 (38)	Approx. 270 (38)	-
		Basic ignition timing		5° ± 2° BTDC	5° ± 3° BTDC	5° ± 3° BTDC
		Curb idle speed	rpm	700 ± 100	700 ± 100	700 ± 100
		TPS voltage	V	0.40-1.00	0.40-1.00	0.40-1.00
		TPS resistance	kΩ	3.5-6.5	3.5-6.5	3.5-6.5
		Intake air temp. sensor resistance	kΩ [at 20°C (68°F)]	2.7	2.7	2.7
		Engine coolant temp. sensor resistance	kΩ			
		[at 20°C (68°F)]		2.4	2.4	2.4
		[at 80°C (176°F)]		0.3	0.3	0.3
<b>14</b>	<b>Engine Cooling</b>	Radiator pressure cap opens	kPa (psi)	75-105 (11-15)	75-105 (11-15)	75-105 (11-15)
<b>23A</b>	<b>A/T</b>	Fluid capacity	dm <sup>3</sup> (qts.)	7.2 (7.6)	8.5 (9.0)	8.5 (9.0)
<b>26</b>	<b>Front Axle</b>	Drive shaft nut torque	Nm (ft.lbs.)	49-58 (36-43)	49-58 (36-43)	49-58 (36-43)
		Caliper assembly mounting bolt torque	Nm (ft.lbs.)	88 (65)	88 (65)	88 (65)
<b>27</b>	<b>Rear Axle</b>	Axle shaft nut torque	Nm (ft.lbs.)	49-58 (36-43)	49-58 (36-43)	49-58 (36-43)
<b>31</b>	<b>Wheel and Tire</b>	Tire inflation pressure	kPa (psi)			
		Vehicles with wide fender				
		31 × 10.50R15LT <Front>		210 (30)	210 (30)	210 (30)
		<Rear>		275 (40)	275 (40)	310 (45)
		265/70R15 110H <Front>		180 (26)	180 (26)	180 (26)
		<Rear>		200 (29)	200 (29)	220 (32)
		Others				
		P235/75R15 <Front>		180 (26)	180 (26)	-
		<Rear>		240 (35)	240 (35)	-
<b>33A</b>	<b>Front Suspension</b>	Front wheel alignment				
		<Camber>		0°40' ± 30'	0°40' ± 30'	0°40' ± 30'
		<Caster>		3°00' ± 1°00'	3°00' ± 1°00'	3°00' ± 1°00'
		<Toe-in>	mm (in.)	3.5 ± 3.5 (.14 ± .14)	3.5 ± 3.5 (.14 ± .14)	3.5 ± 3.5 (.14 ± .14)
<b>34</b>	<b>Rear Suspension</b>	Axle shaft nut torque	Nm (ft.lbs.)	49-58 (36-43)	49-58 (36-43)	49-58 (36-43)
<b>35</b>	<b>Brakes</b>	Front disc runout	mm (in.)	0.08 (.0031) or less	0.08 (.0031) or less	0.08 (.0031) or less
		Front disc minimum thickness	mm (in.)	22.4 (.882)	22.4 (.882)	25.4 (1.0)
		Rear disc runout	mm (in.)	0.08 (.0031) or less	0.08 (.0031) or less	0.08 (.0031) or less
		Rear disc minimum thickness	mm (in.)	16.4 (.646)	16.4 (.646)	16.4 (.646)
		Rear drum inside diameter, max.	mm (in.)	198 (7.795)	198 (7.795)	198 (7.795)
		Parking brake lever stroke		4-6 notches	4-6 notches	4-6 notches
<b>51</b>	<b>Exterior</b>	Wiper blade length	mm (in.)			
		Windshield wiper		475 (18.7)	475 (18.7)	475 (18.7)
		Rear window		375 (14.8)	375 (14.8)	375 (14.8)
<b>55</b>	<b>Heater,A/C,Ventilation</b>	Refrigerant quantity	g (oz.)	600-650 (21-23)	600-650 (21-23)	600-650 (21-23)