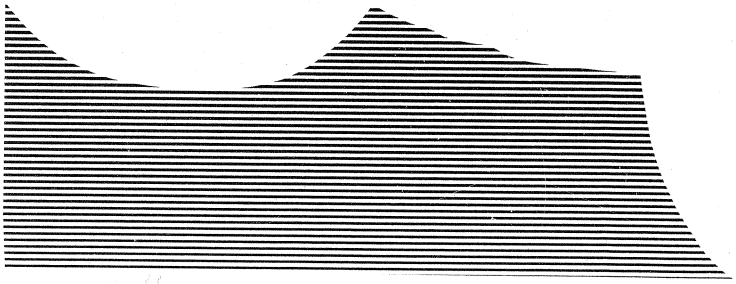
MITSUBISHI MOTORS

Service Manual

ELECTRICAL



MONTERO

Service Manual

MONTERO

1992 : 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.

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MOTOR SALES OF AMERICA, Inc.

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Printed in Japan

GROUP/SECTION INDEX M00AA--B

NOTE
For Engine, Chassis & Body, refer to ... Volume-1 "Engine, Chassis & Body"

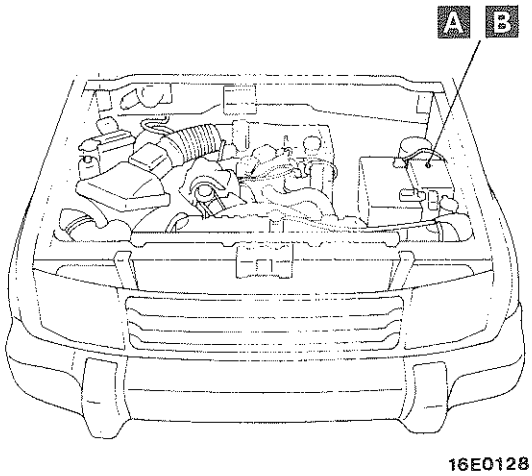
FUSIBLE LINK AND FUSE LOCATION

M16BA--

Name	Symbol	Name	Symbol
Dedicated fuse ②, ③, ⑤, ⑦, ⑧	B	Fusible link	A
Dedicated fuse ⑨	D	Multi-purpose fuse	C

NOTE
(1) For details of fusible link and fuse, refer to P.9.
(2) The "Name" column is arranged in alphabetical order.

<Engine compartment>



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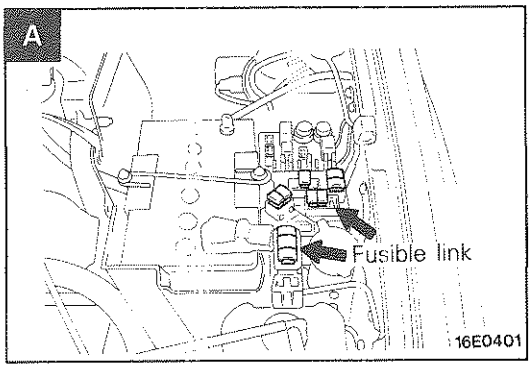

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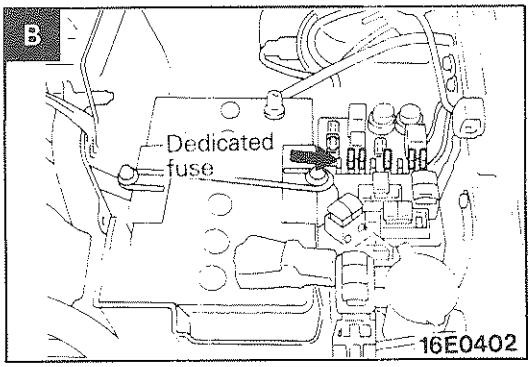

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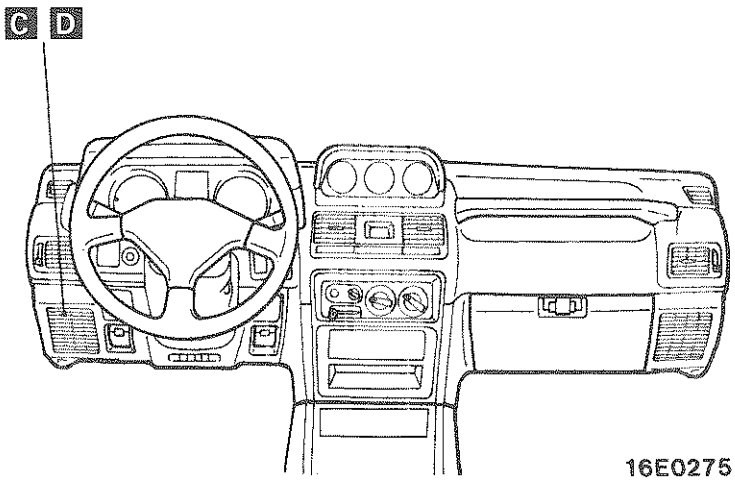

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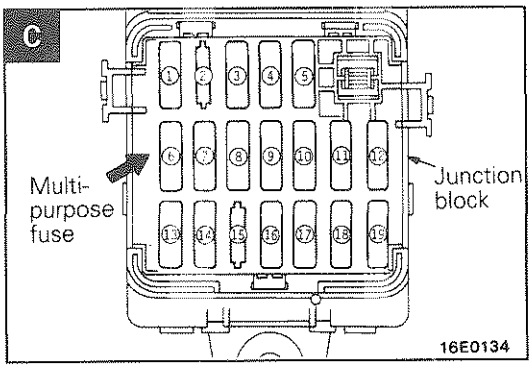

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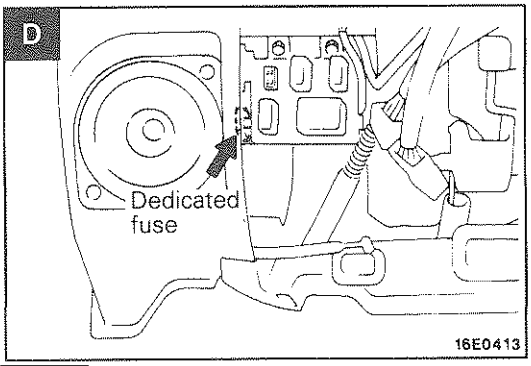

16E0413

INSPECTION TERMINAL LOCATION

Name	Symbol	Name	Symbol
Fuel pump check connector	A	Diagnosis connector	B
Ignition timing adjustment connector	A		

NOTE
The "Name" column is arranged in alphabetical order.

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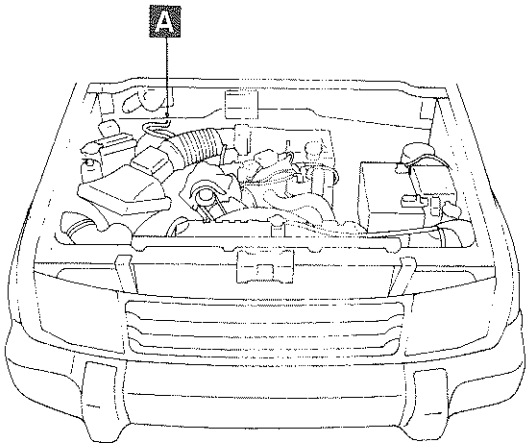

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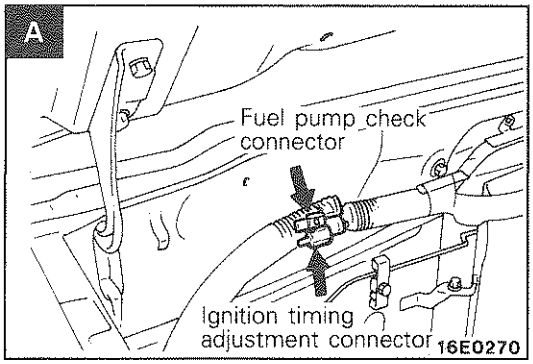

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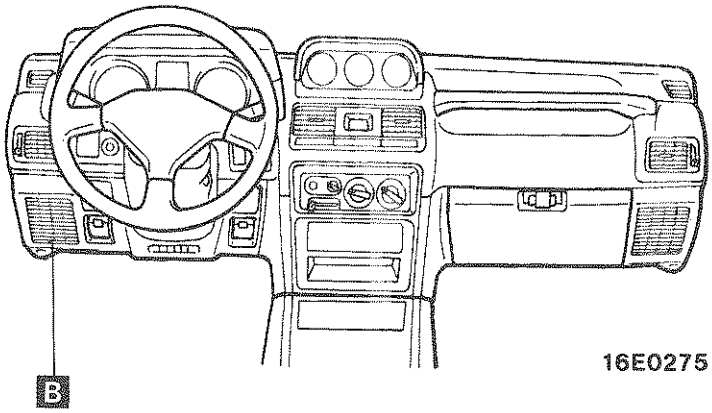

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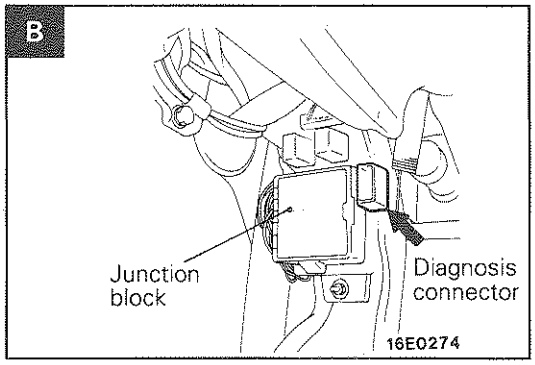
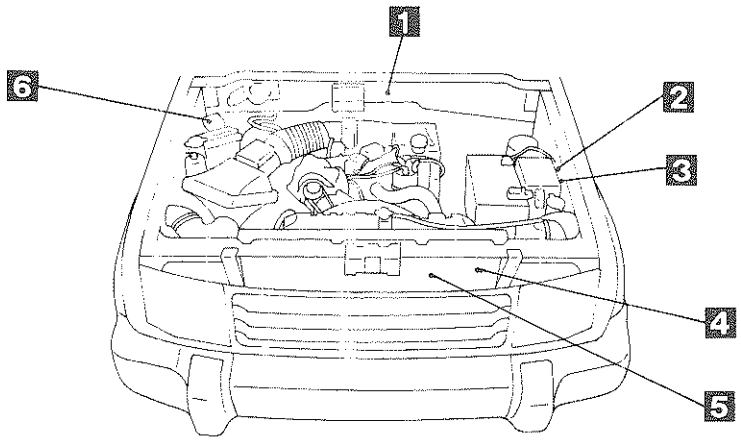


GROUNDING LOCATION

<Engine compartment>



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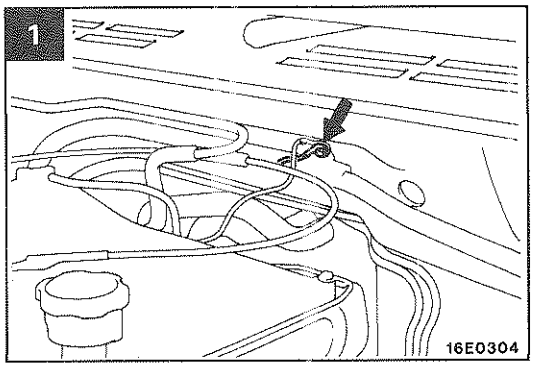

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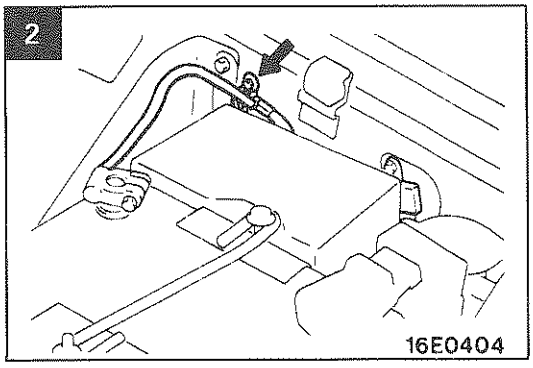

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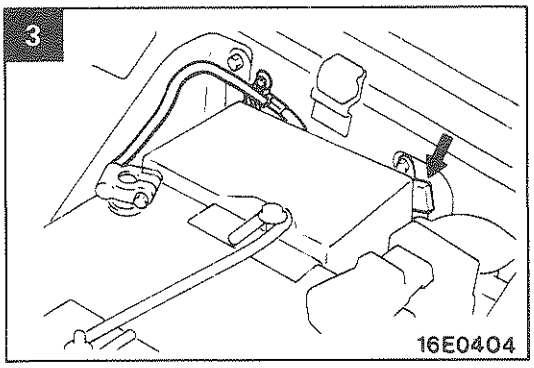

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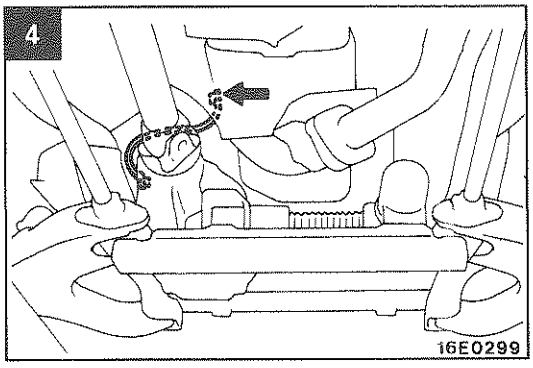

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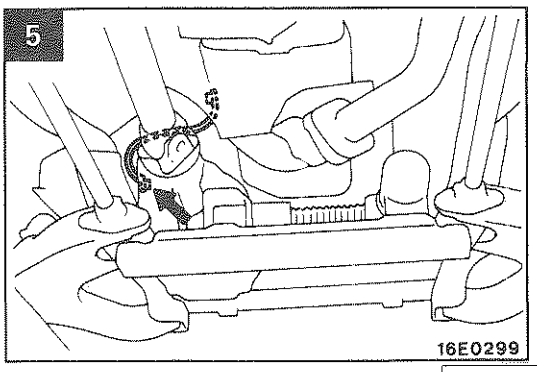

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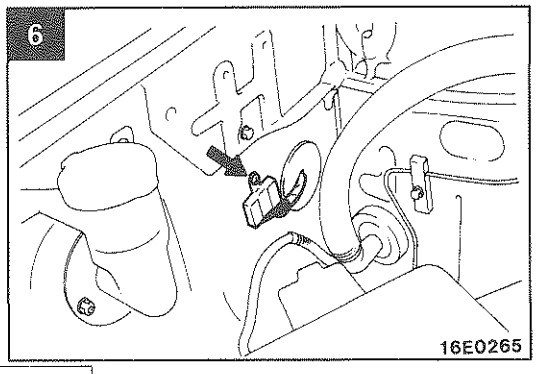

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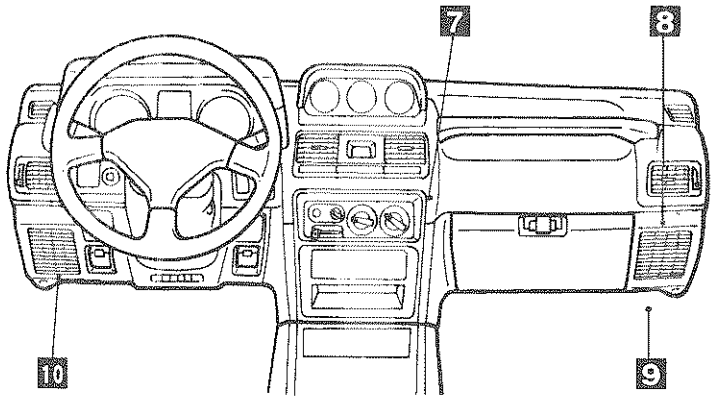

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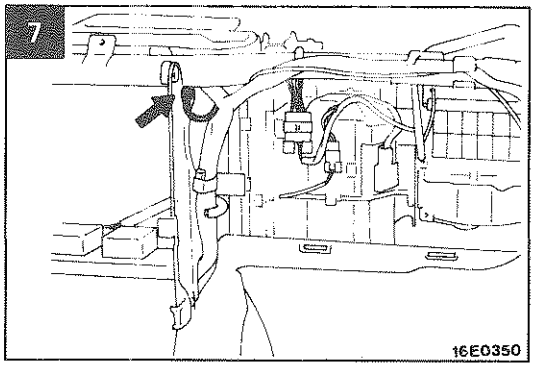
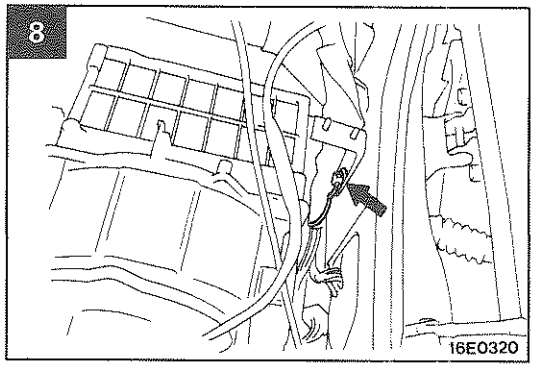
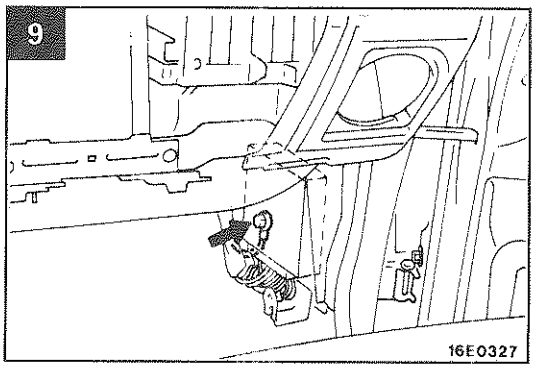
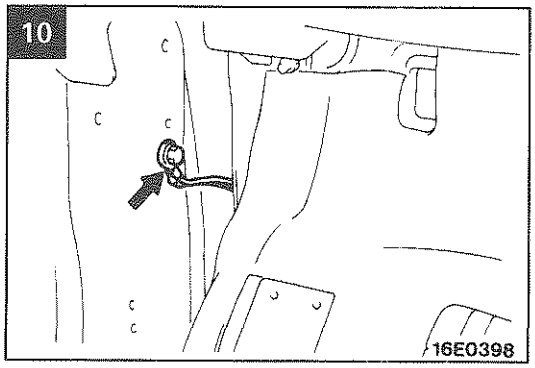
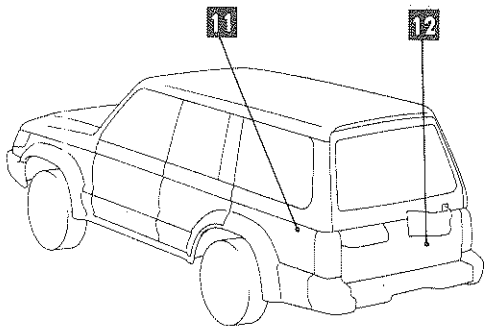








<Floor, Back door>



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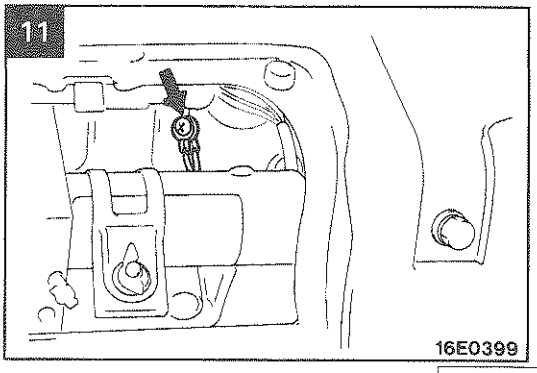
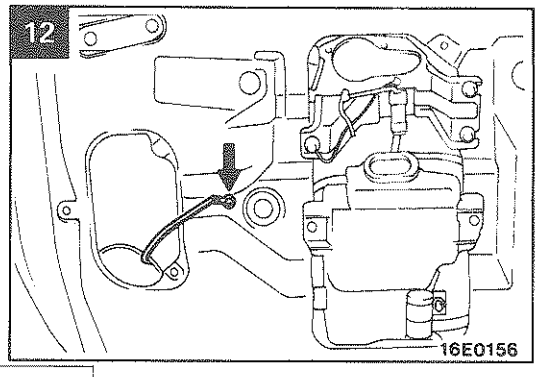


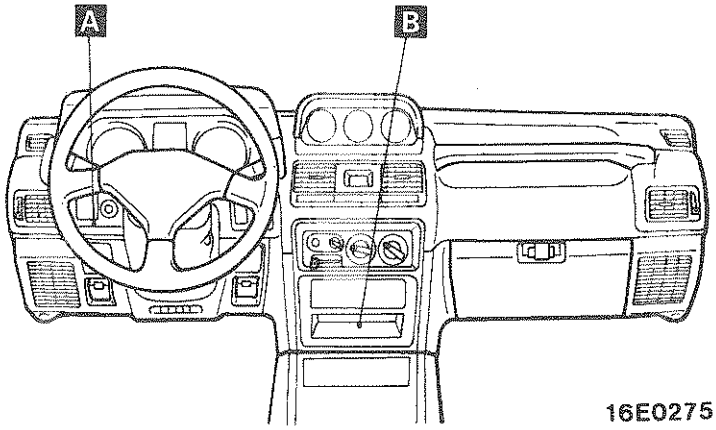


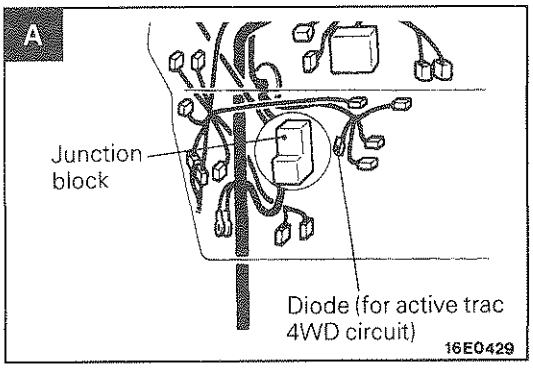
DIODE LOCATION

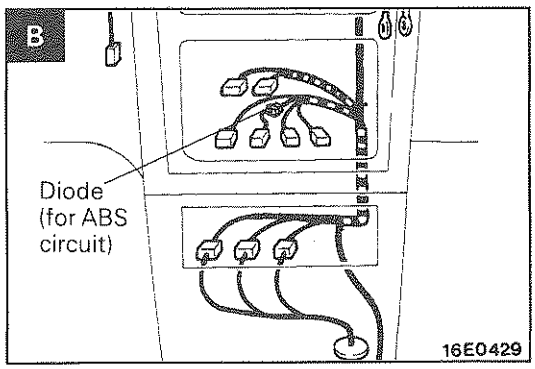
Name	Symbol	Name	Symbol
Diode (ABS circuit)	B	Diode (Active trac 4WD circuit)	A

NOTE
The "Name" column is arranged in alphabetical order.

<Interior>

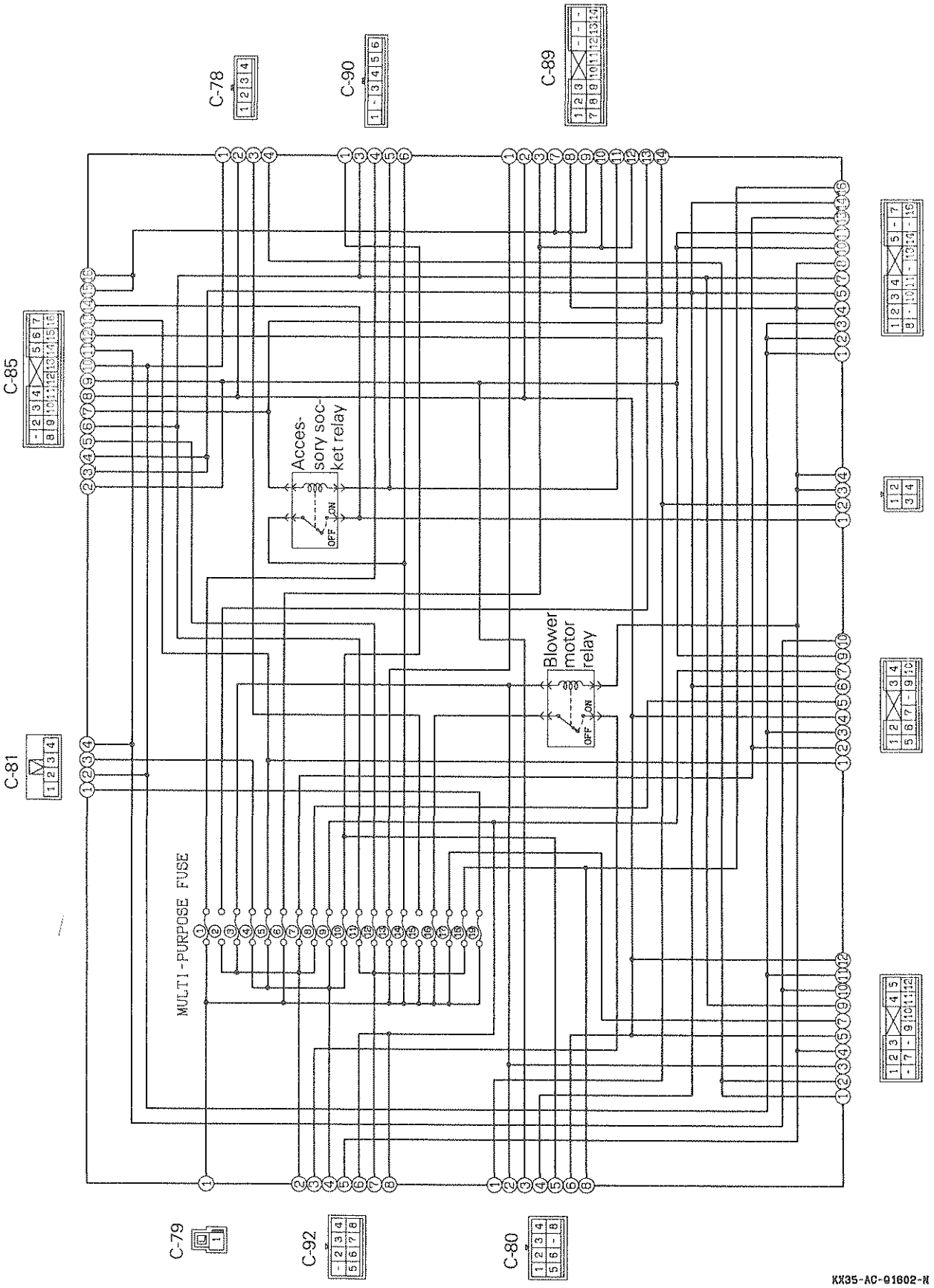






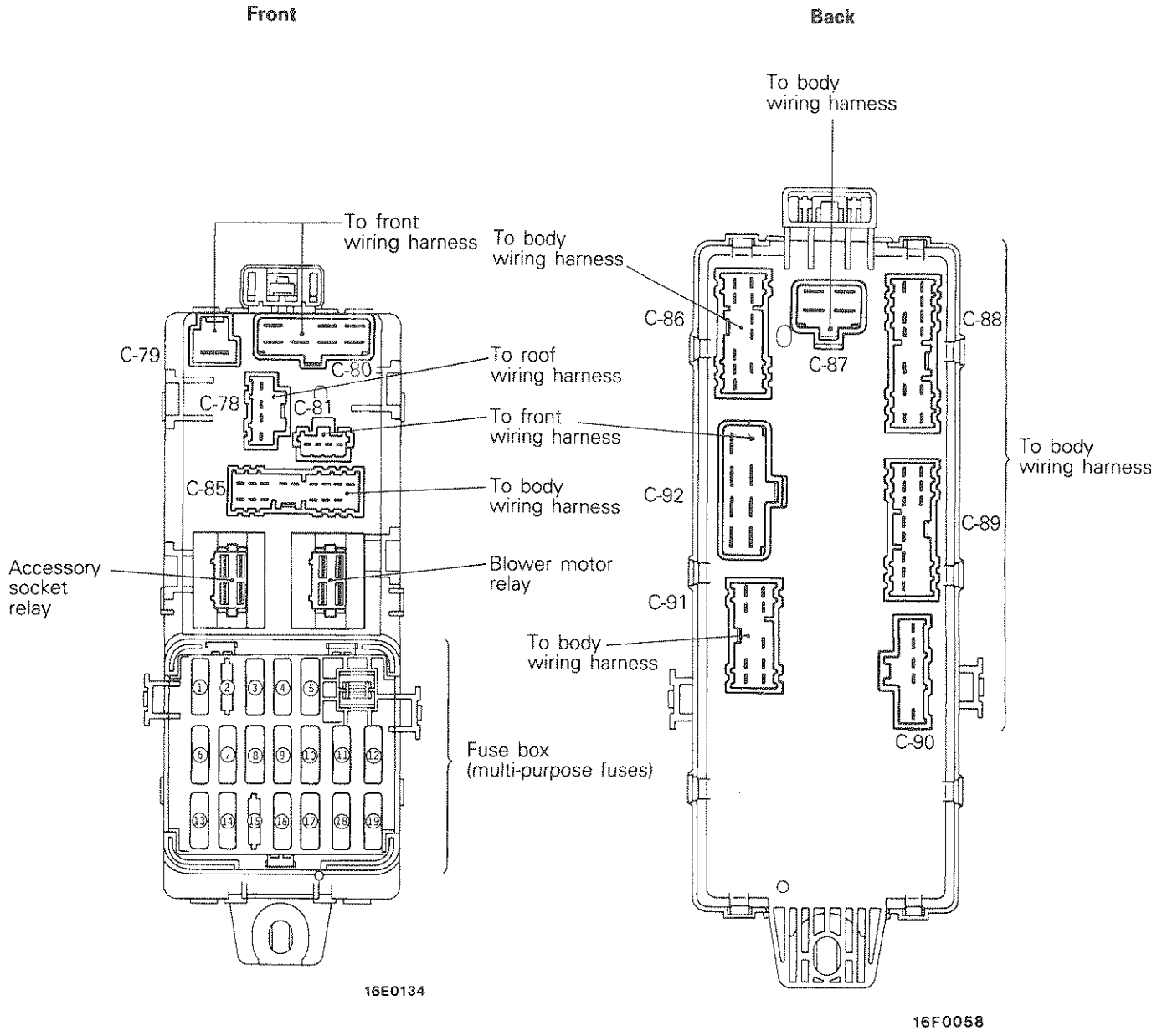
JUNCTION BLOCK

M16BC--



Remark

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


Front
Back
To front wiring harness
To body wiring harness
To roof wiring harness
To front wiring harness
To body wiring harness
Blower motor relay
Accessory socket relay
Fuse box (multi-purpose fuses)
To body wiring harness
To body wiring harness
C-79
C-80
C-78
C-81
C-85
C-86
C-87
C-88
C-92
C-89
C-91
C-90
16E0134
16F0058

CENTRALIZED JUNCTION

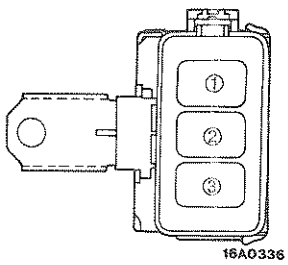
M16BB--

FUSIBLE LINK

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

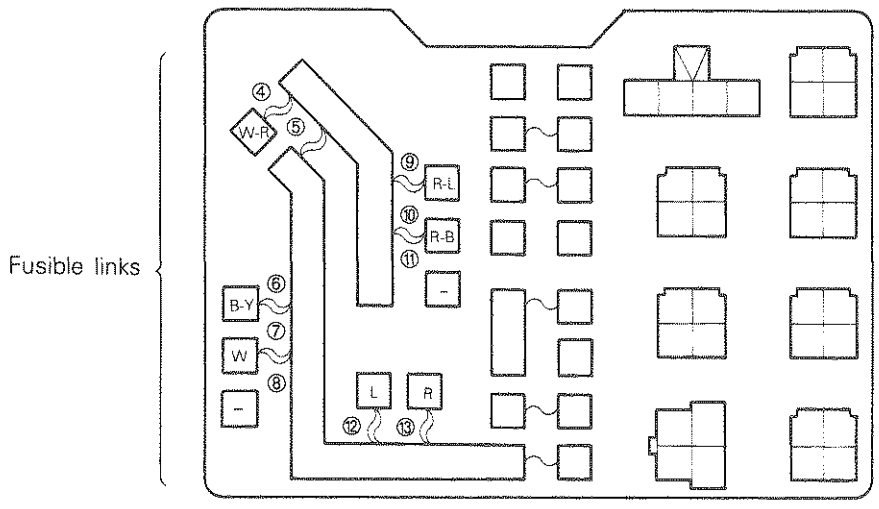
(Connected directly to battery positive terminal)

<Vehicles with ABS>



16A0336

(Relay box in engine compartment)



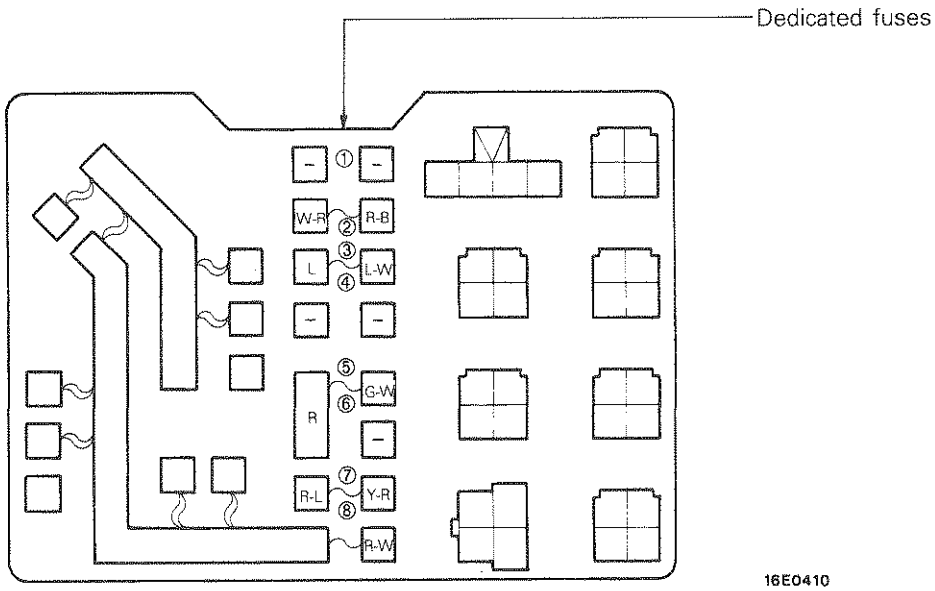
16E0410

TSB Revision

DEDICATED FUSE

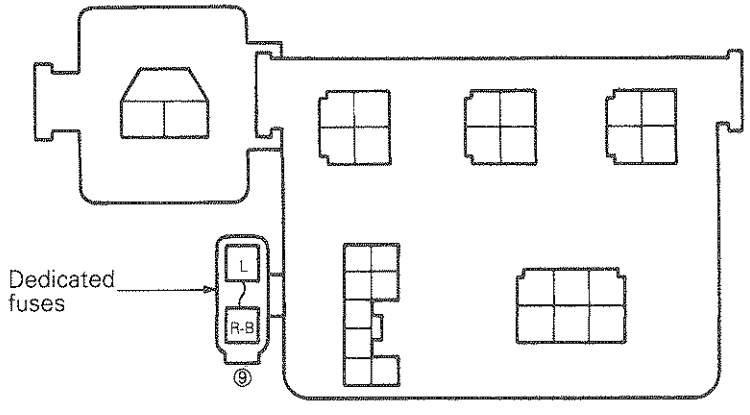
Power supply circuit	No.	Rated capacity (A)	Housing Color	Circuit
—	1	—	—	—
Battery	2	10	Red	A/C compressor circuit
Battery	3	25	Transparent	Condenser fan motor circuit
—	4	—	—	—
Tail light relay (Battery)	5	10	Red	Tail light circuit
—	6	—	—	—
Headlight relay (Battery)	7	10	Red	Upper beam indicator circuit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

(Relay box in engine compartment)



16E0410

(Relay box in passenger compartment)



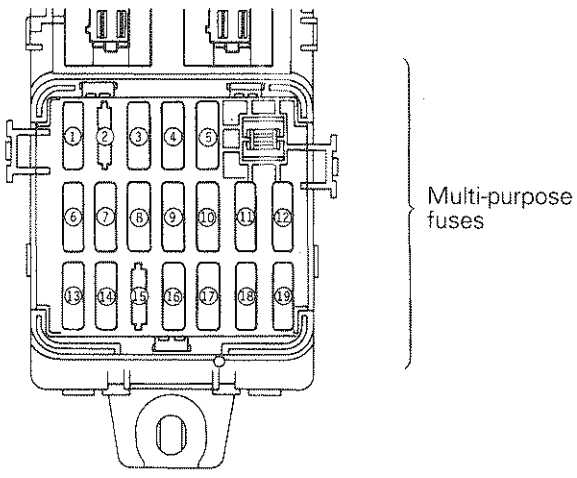
16E0409

TSB Revision

MULTI-PURPOSE FUSES

Power supply circuit		No.	Rated capacity (A)	Load circuit
Battery		1	20	—
Ignition switch	(IG2)	2	—	—
		3	10	Blower motor relay, Headlight washer relay, Defogger, Car telephone
	(ACC)	4	10	Radio, Clock
		5	15	Remote control mirror, Cigarette lighter, Accessory socket relay
Battery		6	15	Door lock relay
Ignition switch	(IG2)	7	10	Over drive relay, Variable shock absorber control unit, ABS relay, 4WD indicator control unit
		8	10	Power window relay
	(ACC)	9	15	Wiper, Washer
		10	10	Horn, Auto-cruise control unit, Sunroof
	(IG1)	11	10	Combination meter, Multi-meter, Motor antenna control unit
		12	10	Turn-signal light, Hazard light
Battery		13	10	—
		14	15	Accessory socket
		15	—	—
		16	25	Blower motor
		17	15	Stop light
Ignition	(IG1)	18	10	Back-up light, Rear differential lock control unit
Battery		19	10	Engine control unit, Room light, Map light, Cargo room light, Combination meter, Clock, Door lock relay, Radio, Auto-cruise control unit, Car telephone

(In junction block)



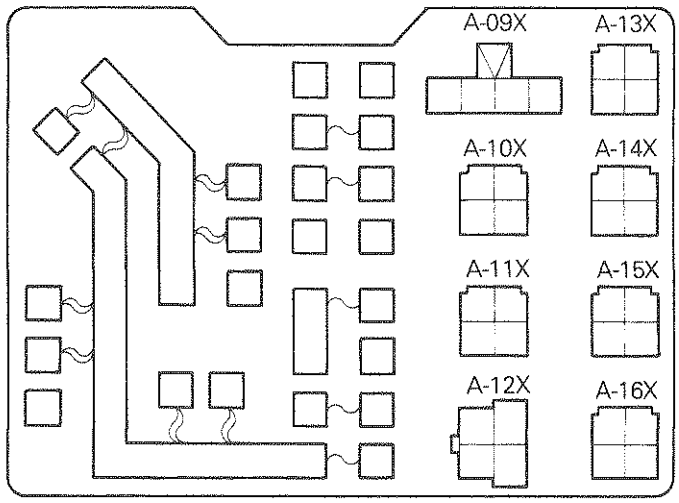
16E0134

TSB Revision

CENTRALIZED RELAY

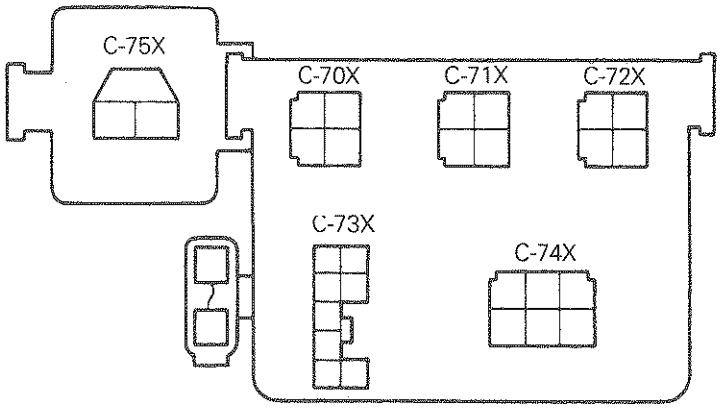
Classification		Name	Classification		Name
Relay box in engine compartment	A-09X	Storage connector	Relay box in passenger compartment	C-70X	Over drive relay
	A-10X	Headlight relay		C-71X	—
	A-11X	—		C-72X	Power window relay
	A-12X	Alternator relay		C-73X	Door lock relay
	A-13X	—		C-74X	Rear intermittent wiper relay
	A-14X	Tail light relay		C-75X	Turn and hazard flasher unit
	A-15X	Condenser fan motor relay			
	A-16X	A/C compressor relay			

(Relay box in engine compartment)



16E0410

(Relay box in passenger compartment)



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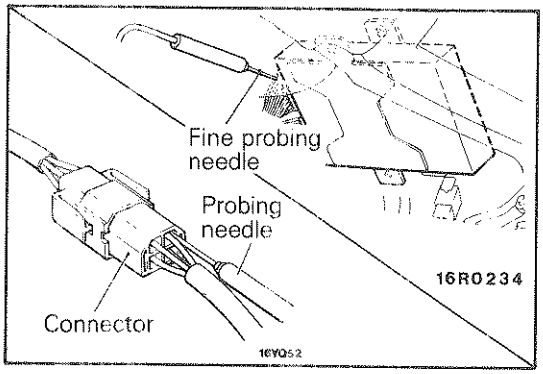
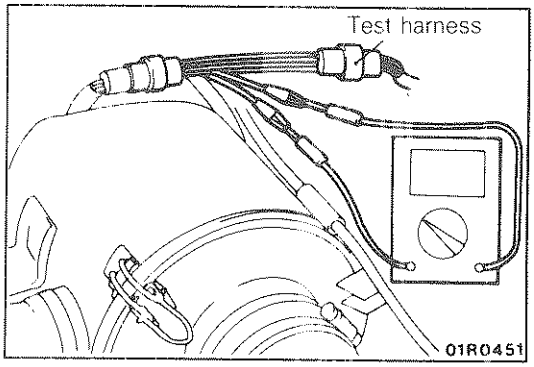
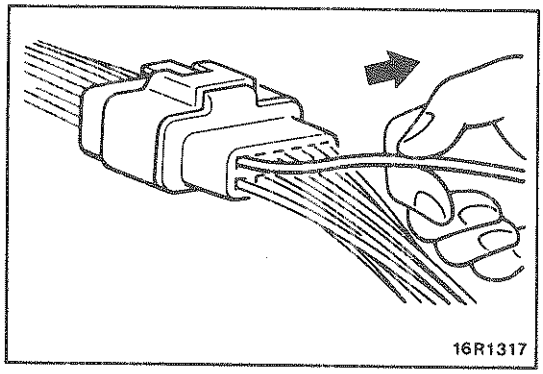
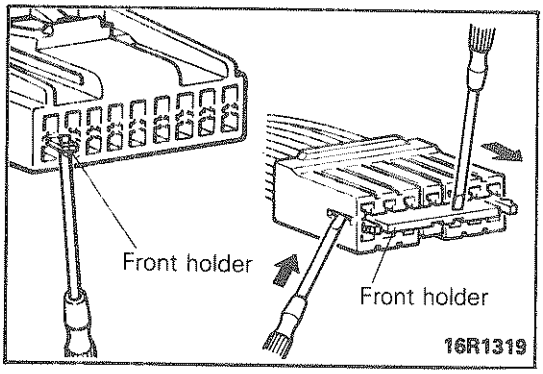
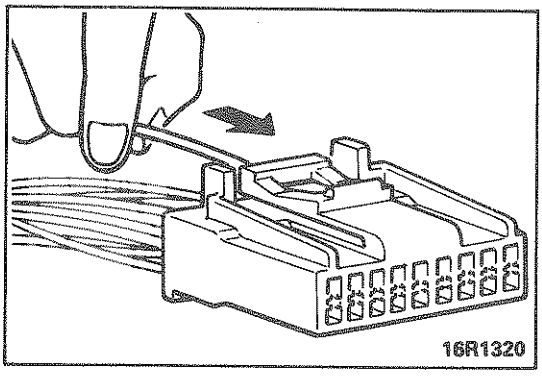
TSB Revision











INSPECTION OF HARNESS CONNECTOR
M16CAAB

CONTINUITY AND VOLTAGE TEST FOR CONNECTOR

Following procedures shall be followed for testing continuity and voltage at connector in order to prevent improper contact and deterioration of waterproof in connector.

CONVENTIONAL (NON-WATERPROOF) CONNECTOR

Check shall be done by inserting a probing needle from harness side.

WATERPROOF CONNECTOR

1. Be sure to use the special tool (test harness) when, for a waterproof connector, checking while the circuit is conductive.
   If a probe is inserted from the harness side, the waterproof capability will be lowered, thereby causing corrosion, so never do so.
2. When a connector is disconnected in order to check terminal voltage, etc., never insert a probe if the terminal to be checked is a female pin, because the forceful insertion of a probe will cause improper or incomplete contact.

CHECK FOR IMPROPER ENGAGEMENT OF TERMINAL

When terminal stopper of connector is out of order, engagement of male and female terminals becomes improper even when connector itself is engaged perfectly and terminal sometimes slips out to rear side of connector. Ascertain, therefore, that each terminal does not come off connector by pulling each harness wire.

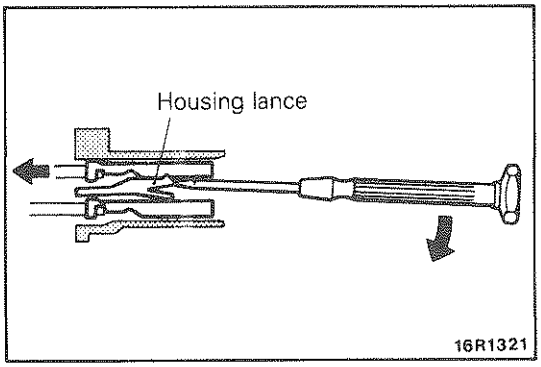
ENGAGING AND DISENGAGING OF CONNECTOR TERMINAL

Connector which gives loose engagement shall be rectified by removing female terminal from connector housing and raise its lance to establish securer engagement. Removal of connector housing and raise its lance to establish securer engagement. Removal of connector terminal used for ECI and ELC 4 A/T control circuit shall be done in the following manner.

COMPUTER CONNECTOR

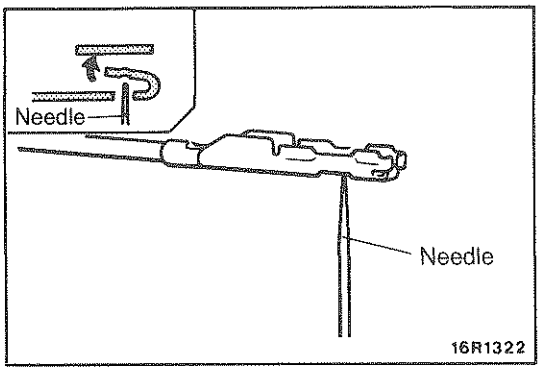
(1) Insert screwdriver [1.4 mm (.06 in.) width] as shown in the figure, disengage front holder and remove it.

(2) Insert harness of terminal to be rectified deep into connector from harness side and hold it there.



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

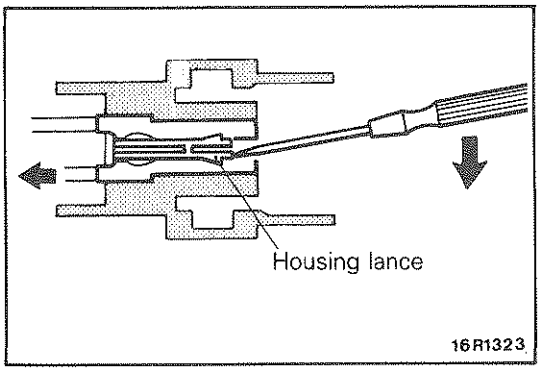
NOTE
Tool No. 753787-1 supplied by AMP can be used instead of screwdriver.

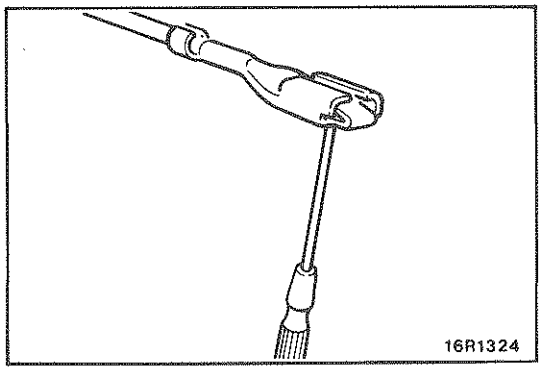


(4) Insert needle through a hole provided on terminal and raise contact point of male terminal.

ROUND WATERPROOF CONNECTOR

(1) Remove waterproof cap by using a screwdriver.
(2) Insert tip of screwdriver [1.4 mm (.06 in.) or 2.0 mm (.08 in.) width] into connector in a manner as shown in the figure, raise housing lance slightly with it and pull out harness.

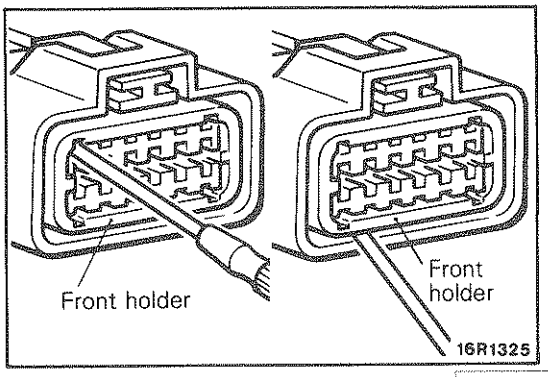


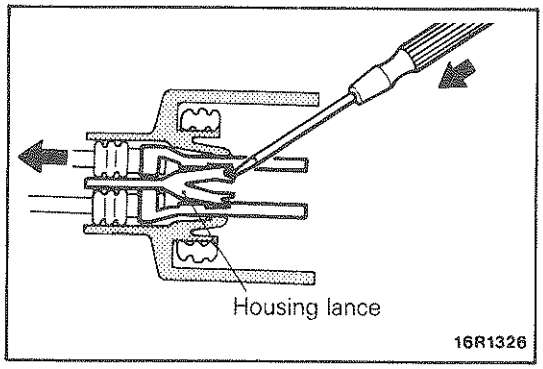


(3) Insert screwdriver through a hole provided on terminal and raise contact point of male terminal.

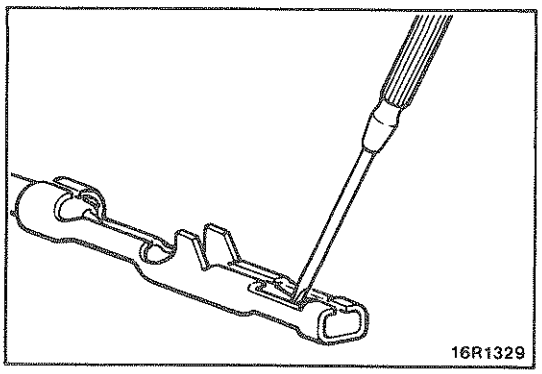
RECTANGULAR WATERPROOF CONNECTOR

(1) Disengage front holder by using a screwdriver and remove it.





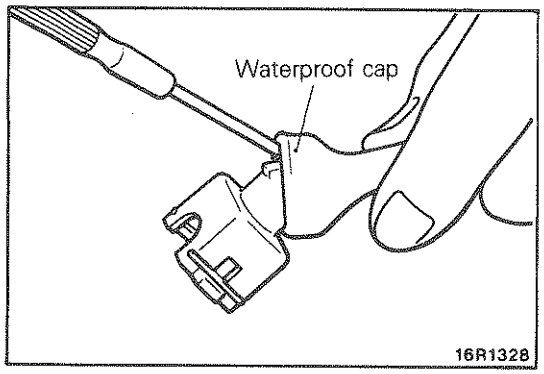
(2) Insert tip of screwdriver [*0.8 mm (.03 in.) width] into connector in a manner as shown in the figure, push it lightly to raise housing lancer and pull out harness.
*If right size screwdriver is not available, convert a conventional driver to suit the size.

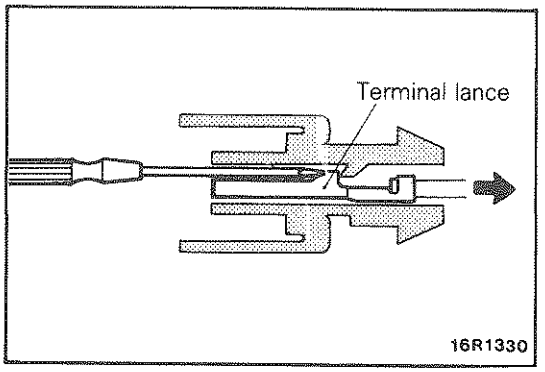


(3) Press contact point of male terminal down by holding a screwdriver [1.4 mm (.06 in.) width] in a manner as shown in the figure.

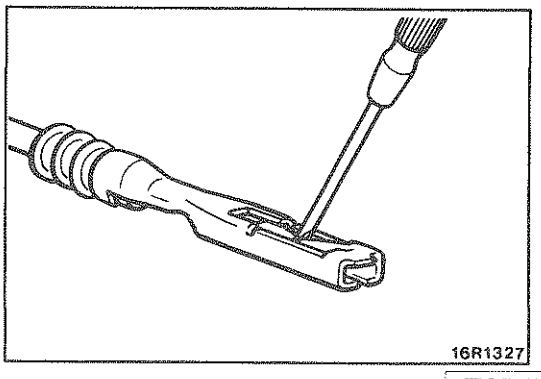
INJECTOR CONNECTOR

(1) Remove waterproof cap.





(2) Insert tip of screwdriver [1.4 mm (.06 in.) width] into connector in a manner as shown in the figure, press in terminal lance and pull out harness.



(3) Press contact point of male terminal down by holding a screwdriver [1.4 mm (.06 in.) width] in a manner as shown in the figure.

Caution
Correct lancer to be in proper condition before terminal is inserted into connector.

HOW TO DIAGNOSE

M16DAAD

The most important point in troubleshooting is to determine "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.

1 Observation of Problem Symptoms

Observe the symptom carefully. Check if there are also other problems.

2 Determination of Probable Causes

In determining the probable causes, it is necessary to check the wiring diagram to understand the circuit as a system. Knowledge of switches, relays and other parts is necessary for accurate determination. The causes of similar problems in the past must be taken into account.

3 Checking of Parts Associated with Probable Causes and Determination of Faulty Parts.

Troubleshooting is carried out by making step by step checks until the true cause is found. Always go through the procedures considering what check is to be made where for the best results.

4 Repair and Confirmation

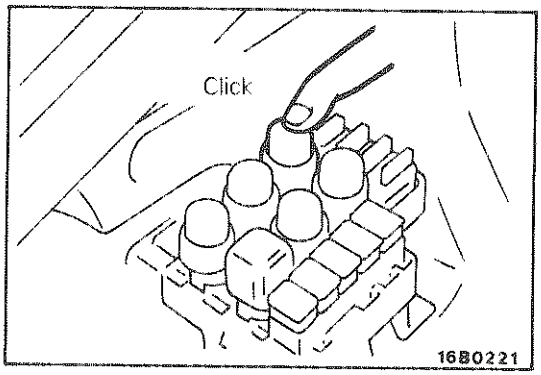
After the problems are corrected, be sure to check that the system operates correctly. Also check that new problems have not been caused by the repair.

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.

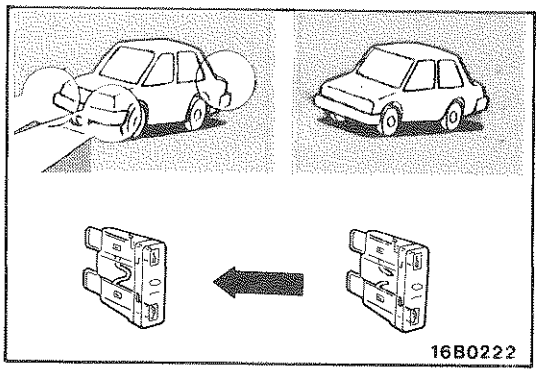
Remarks
Components of ECI, ETACS, ECS, etc. with ECU do not include 3 and 4 above. For this information, refer to a manual which includes details of these components.



INSPECTION

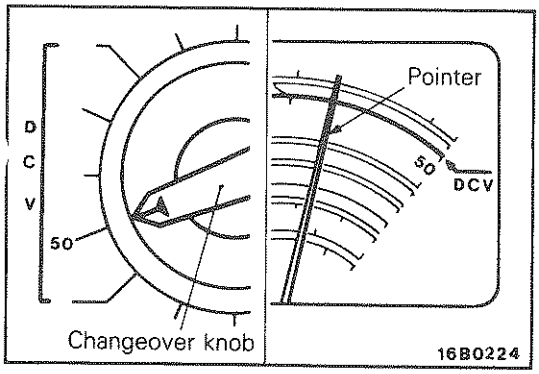
1. Visual and aural checks

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.



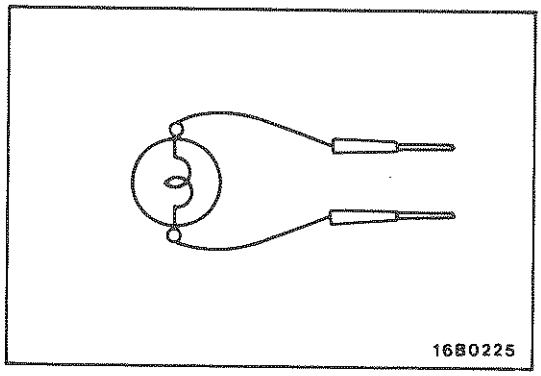
2. Simple checks

For example, if a headlight does not come on and a faulty 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 deter mine which part is responsible for the problem.



3. Checking with instruments

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

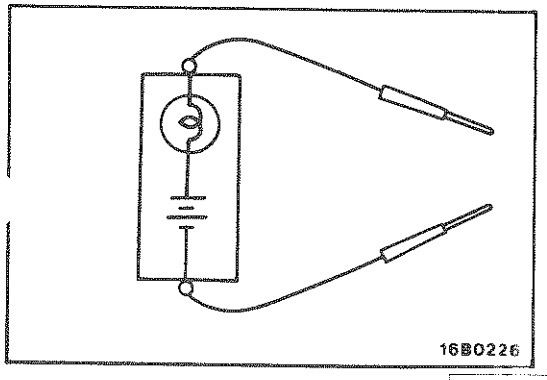


INSPECTION INSTRUMENTS

In inspection, make use of the following instruments.

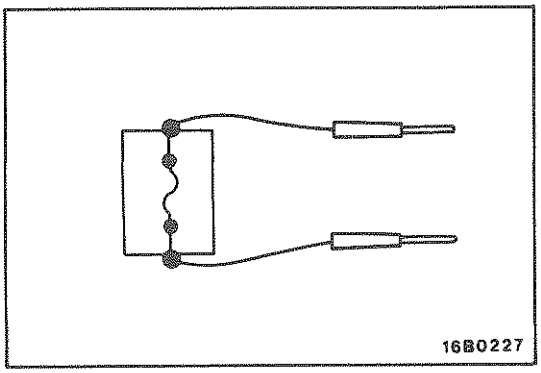
1. Test lights

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



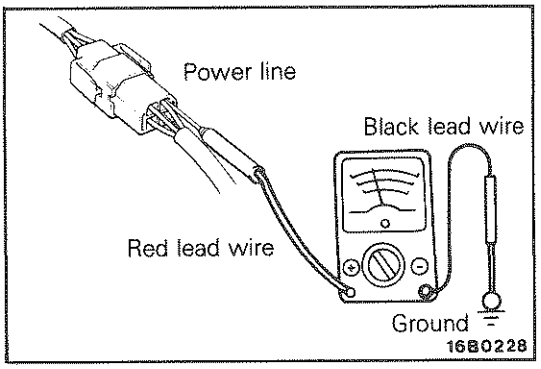
2. Self-power test light

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



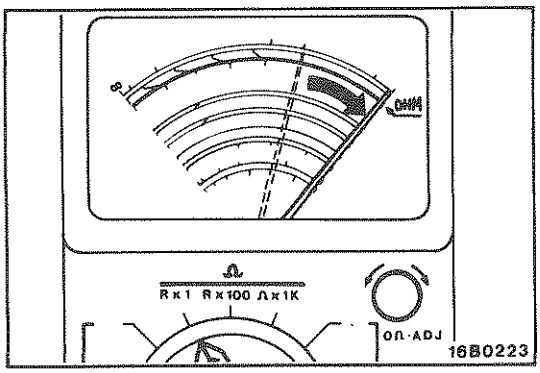
3. Jumper wire

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



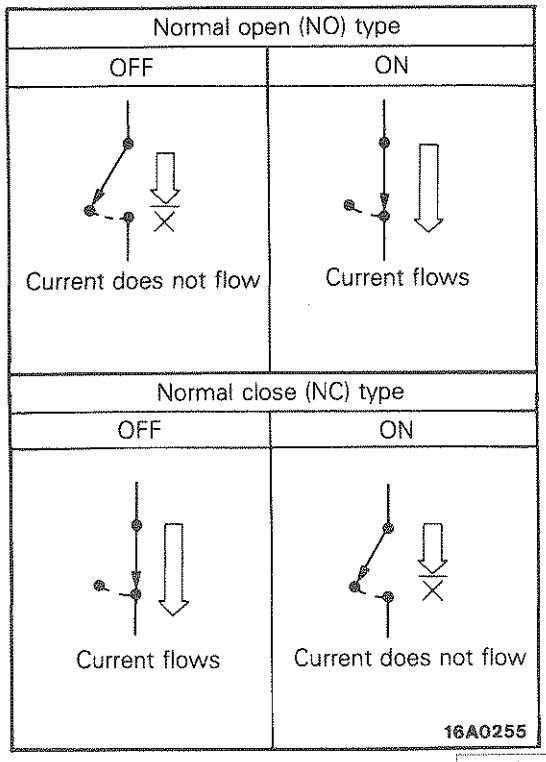
4. Voltmeter

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.

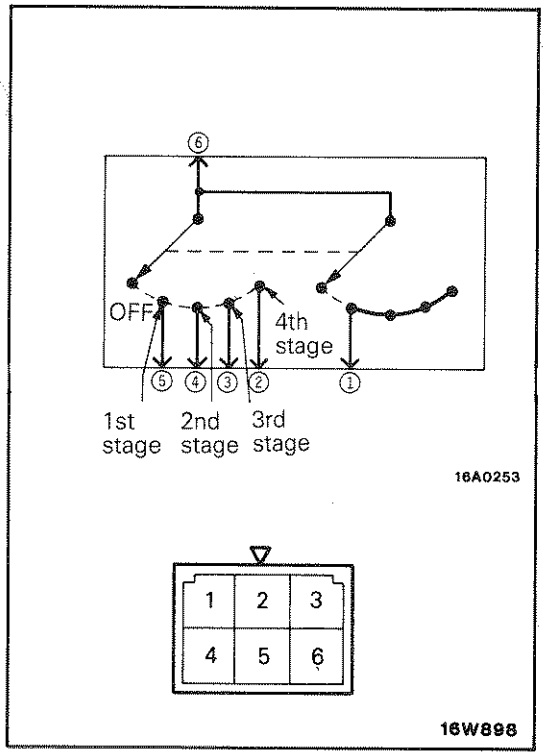


CHECKING SWITCHED

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.

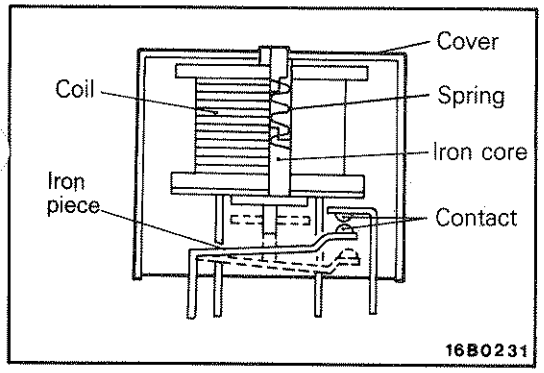


2. SWITCH CONNECTION

This figure illustrates a complex switch.
The continuity between terminals at each position is as indicated in the table below.

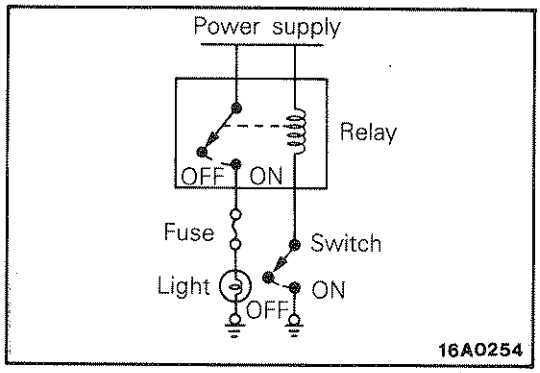
Position \ Terminal No.	1	2	3	4	5	6
OFF						
1st stage	○				○	○
2nd stage	○			○		○
3rd stage	○		○			○
4th stage	○	○				○

NOTE
○—○ denotes continuity between terminals.

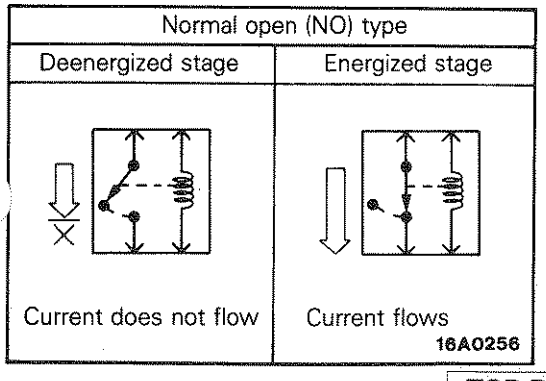


CHECKING RELAYS

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).

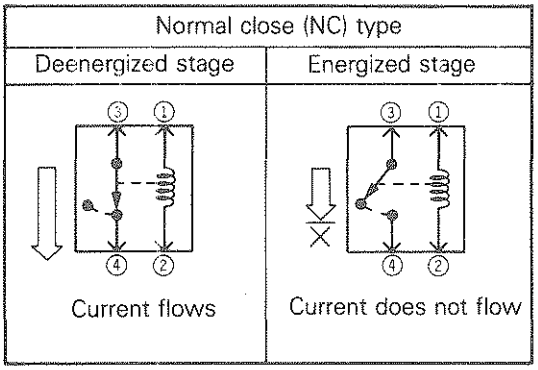


2. By using a relay, a heavy current can by turned on and off by a switch of small capacity. For example, in the circuit shown here, when the switch is turned on (closed), current flows to the coil of the relay. Then, its contact is turned on (closed) and the light comes on. The current flowing at this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

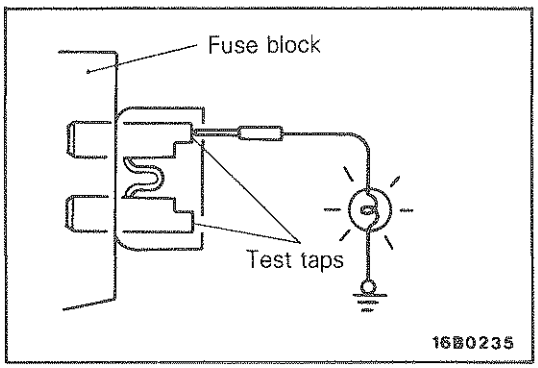


3. The relays may be classified into the normal open type and the normal close type by their contact construction.

NOTE
The deenergized state means that no current is flowing through the coil and the energized state means that current is flowing through the coil.

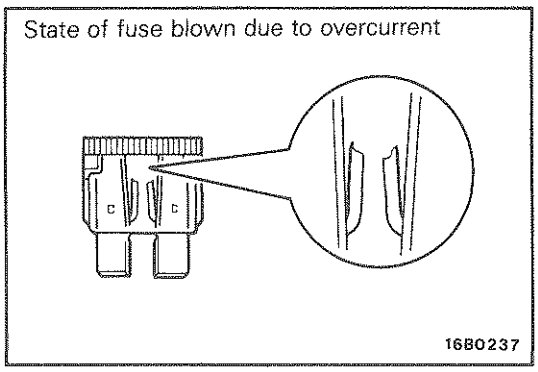


When a normal close type relay as illustrated here is checked, there should be continuity between terminals (1) and (2) and between terminals 3 and 4 when the relay is deenergized, and the continuity should be lost between terminals 3 and 4 when the battery voltage is applied to the terminals 1 and 2.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



CHECKING FUSES

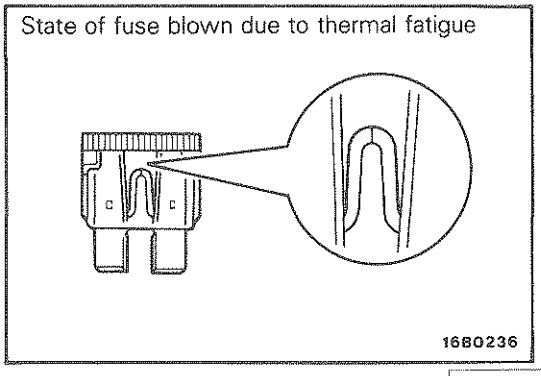
A blade type fuse has test taps provided to allow checking of the fuse itself without removing it from the fuse block. The fuse is okay if the test light comes on when its one lead is connected to the test taps (one at a time) and the other lead is grounded.
(Change the ignition switch position adequately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



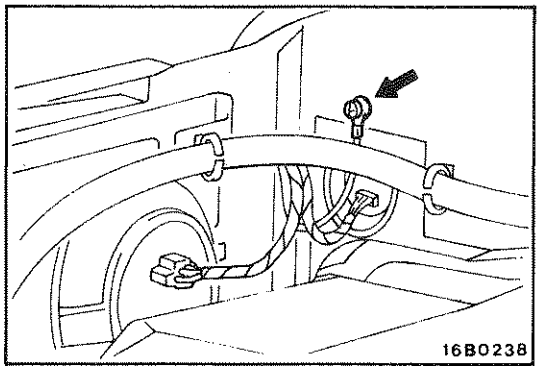
CAUTIONS IN EVENT OF BLOWN FUSE

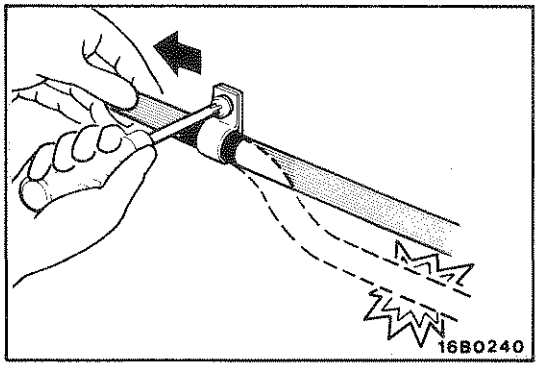
When a fuse is blown, there are two probable causes as follows: One is that it is blown due to flow of current exceeding its rating. The other is that it is blown due to repeated on/off current flowing through it. Which of the two causes is responsible can be easily determined by visual check as described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

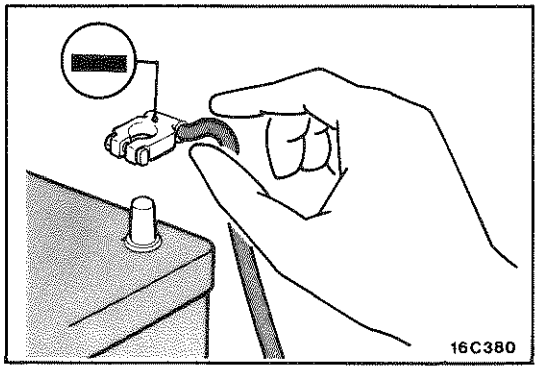
(1) Fuse blown due to current exceeding rating
The illustration shown the state of a fuse blown due to this cause. In this case, do not replace the fuse with a new one hastily since a current heavy enough to blow the fuse has flowed through it. First, check the circuit for shorting and check for abnormal electric parts. Only after the correction of such shorting or parts, fuse of the same capacity should be used as a replacement. Never use a fuse of lager capacity than the one that has blown. If such a fuse is used, electric parts or wirings 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 shown the state of a fuse blown due to repeated current on/off. Normally, this type of problem occurs after 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.







CHECKING CABLES AND WIRES

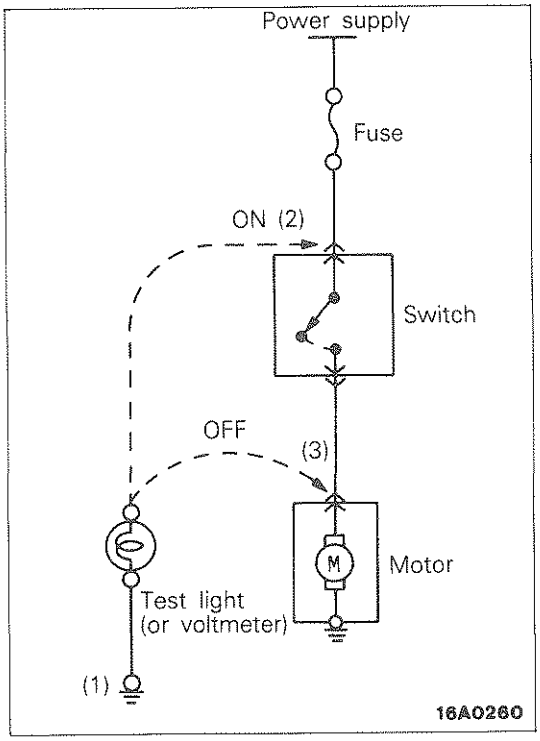
1. Check connections for looseness, rust and stains.
2. Check terminals and wires for corrosion by battery electrolyte, etc.
3. Check terminals and wires for open circuit or impending open circuit.
4. Check wire insulation and coating for damage, cracks and degrading.
5. Check conductive parts of terminals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

HANDLING ON-VEHICLE BATTERY

When checking or servicing does not require power from the on vehicle battery, be sure to disconnect the cable from the battery (−) terminal. This is to prevent problems that could be caused by shorting of the circuit. Disconnect the (−) 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 battery's negative (−) terminal is connected], warm up the engine and allow it to idle for approximately five minutes under the conditions described below, in order to stabilize engine control conditions, and then check to be sure that the idling is satisfactory.**
   Engine coolant temperature: 85–95°C (185–203°F)
   Lights, accessories: OFF
   Transmission: neutral position (Automatic transmission models: "N" or "P").
   Steering wheel: neutral (center) position

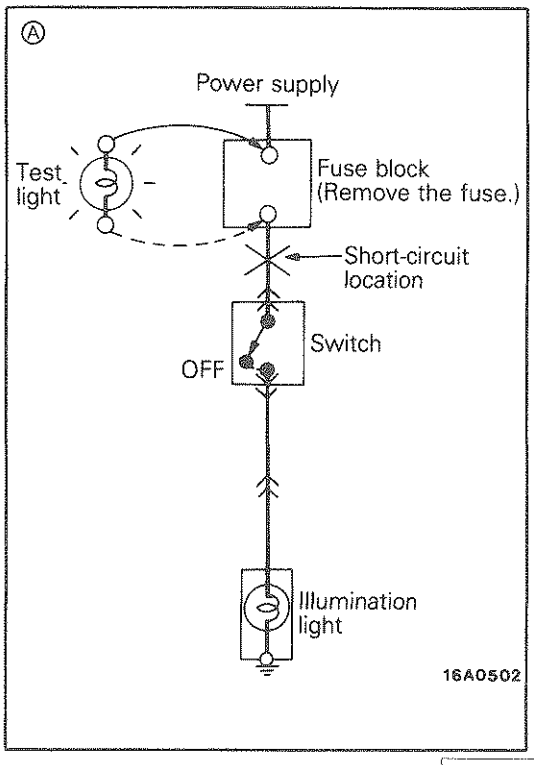


TROUBLESHOOTING

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, shortcircuit check and continuity check. Each of these methods is briefly described in the following.

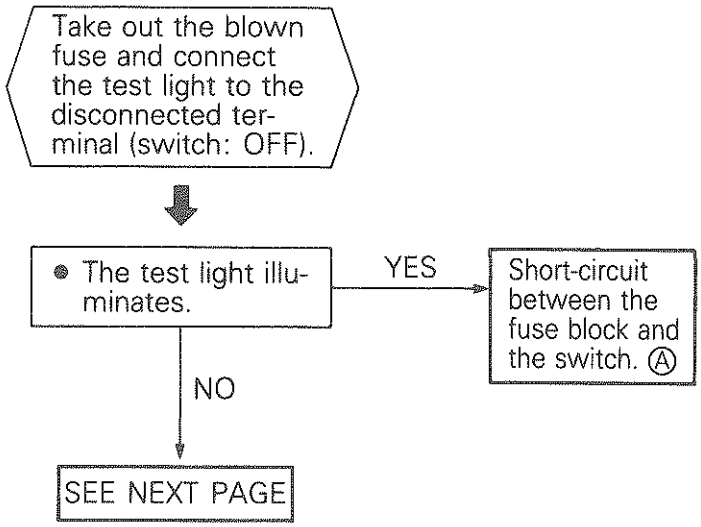
1. VOLTAGE CHECK

(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 come on 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 state, the test light should come on, or the voltmeter should indicate a voltage, with the motor starting to run.
(4) The circuit illustrated here is normal but if there is any problem such as the motor failing to run, check voltages beginning at the connector nearest to the motor unit the faulty part is identified.

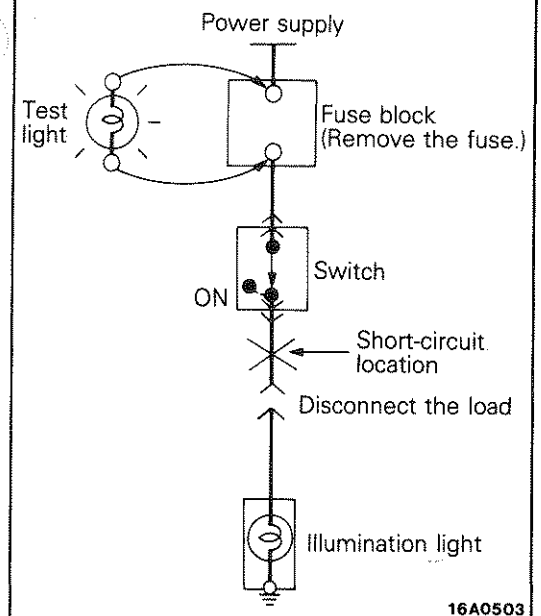


2. CHECKING SHORT-CIRCUIT

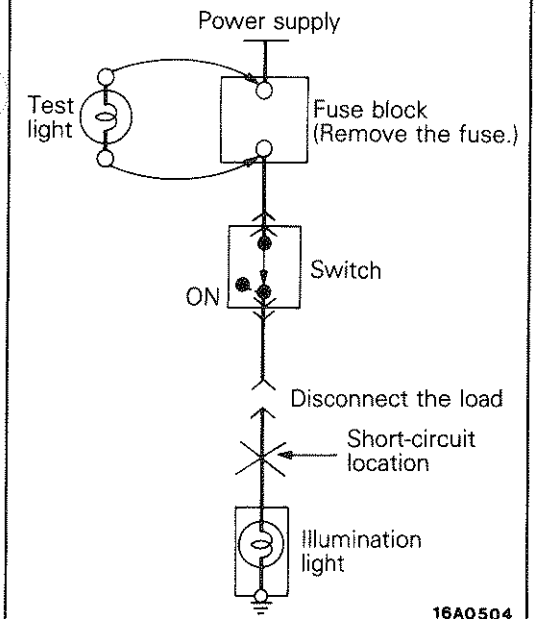
Because the fuse has blown, it is probable that there is a short-circuited circuit. Follow the procedures below to narrow down the short-circuit location.

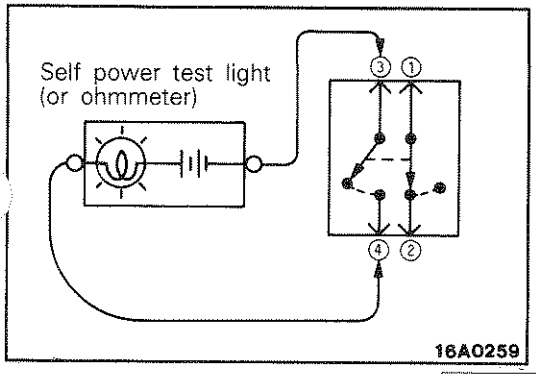


Ⓑ



Ⓒ





CONTINUED FROM PREVIOUS PAGE

Switch ON the switch. (The test light illuminates but the illumination light does not.)

Disconnect the connector of the illumination light.

• The test light remains illuminated. — YES → Short-circuit between the switch and the illumination light. Ⓑ

NO

Short-circuit between the connector and the illumination light. Ⓒ

3. CHECKING CONTINUITY

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

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

NOTES

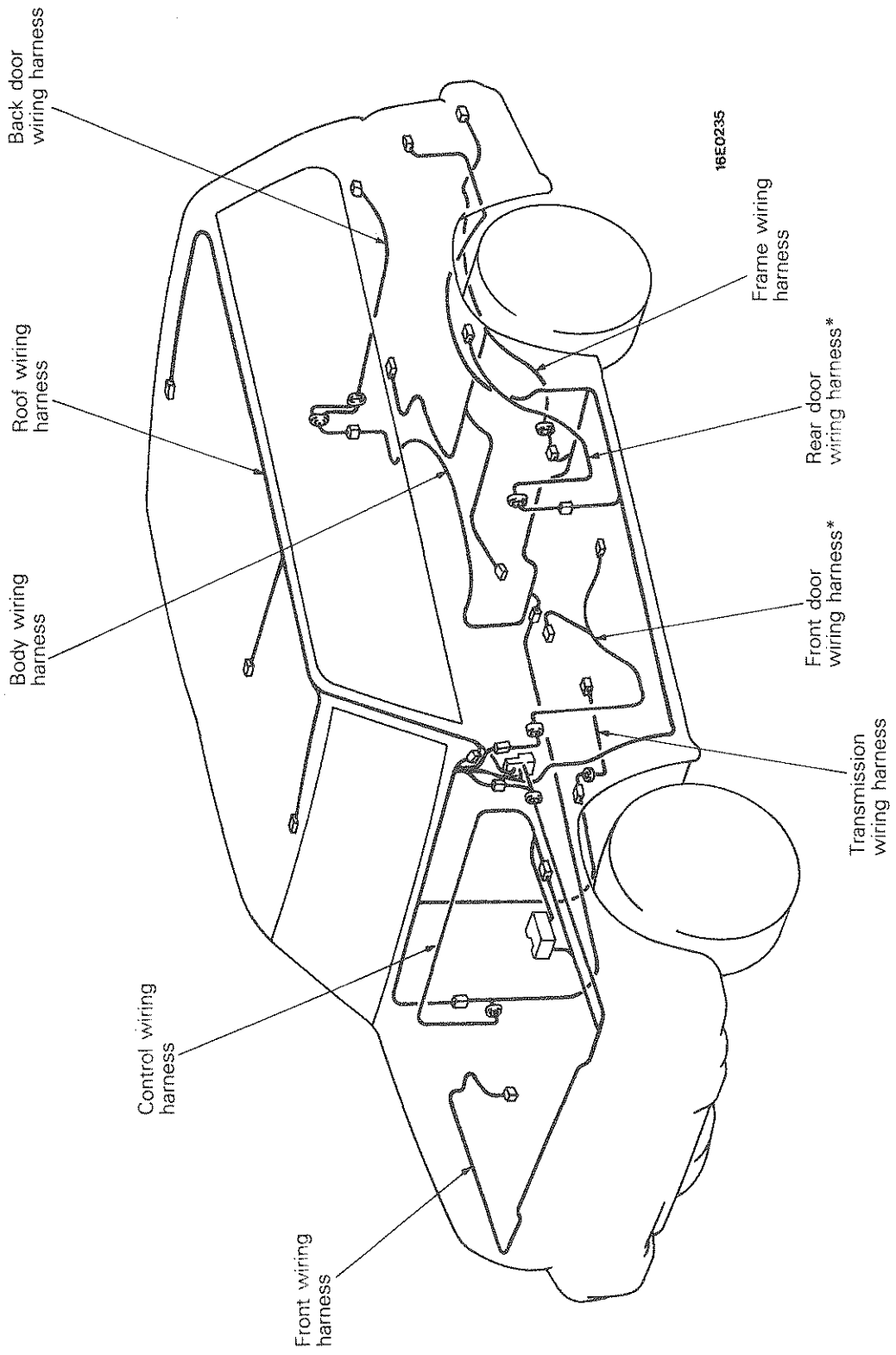
CONFIGURATION DIAGRAMS

CONTENTS

M16VA--

OVERALL CONFIGURATION DIAGRAM

M16VB--



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

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HOW TO READ CONFIGURATION DIAGRAMS

M16VCAK

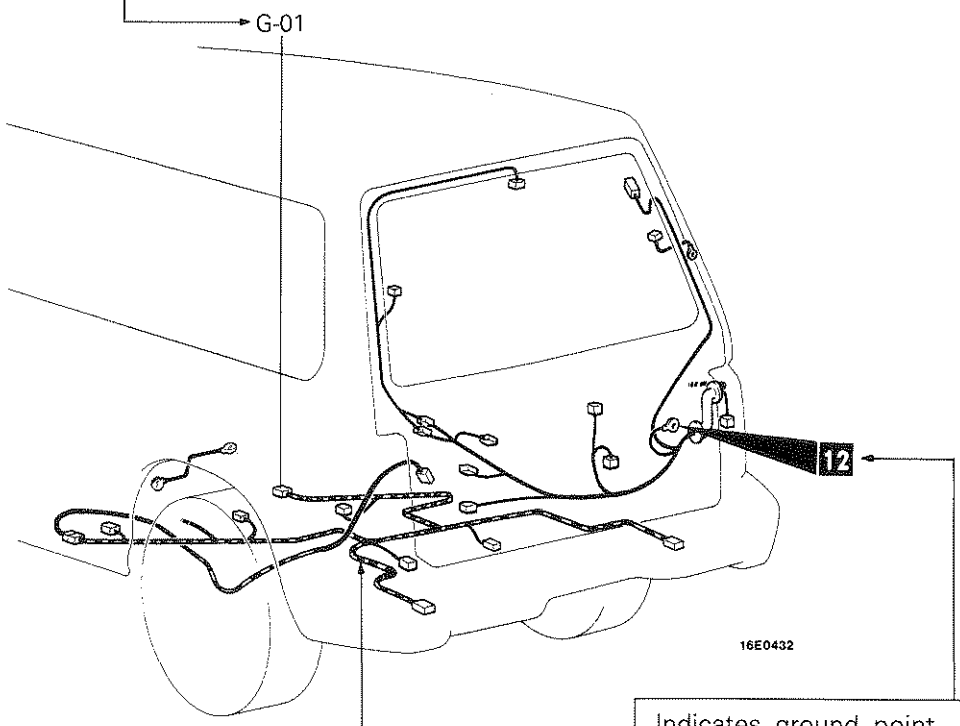
The wiring diagrams are prepares in such a way that the arrangement of connectors for each vehicle, and the routing of each harness, can be easily understood for each individual wiring section.

Indicates the connector number.
The connector number used is the same number as that used for circuit diagrams; these numbers facilitate the location of the connector positions.
The alphabet letter used as the prefix represents the wiring section in which that connector is used; subsequent numerals make up the number that indicates particular characteristics of that individual connector. As a general rule, numbers are assigned clockwise around the wiring diagram.
Note that, if there is a concentration of connectors with the same form (same number of pins), the connectors' colors are noted in order to facilitate identification.

Example: B-01 (Black)

- (Black) — Connector color
- 01 — Number indicating the connector's characteristics (series number)
- B — Symbol indicating wiring section location of the connector

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



Represents the part concealed by corrugated tubing.

Indicates ground point.
The ground number used is the same number as that used for circuit diagrams; these numbers facilitate the location of the ground points.
For detailed information concerning ground points, refer to P.4.

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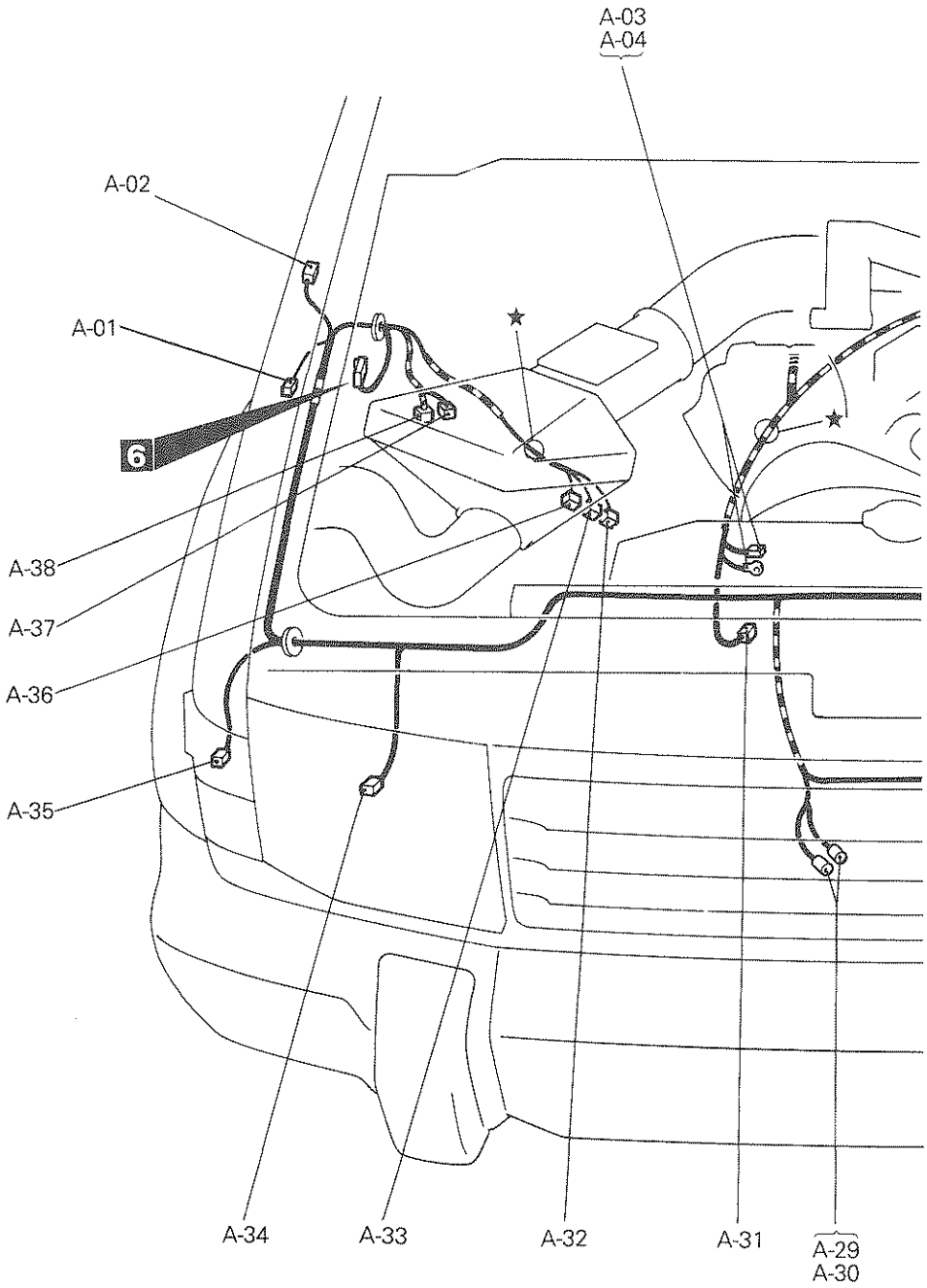
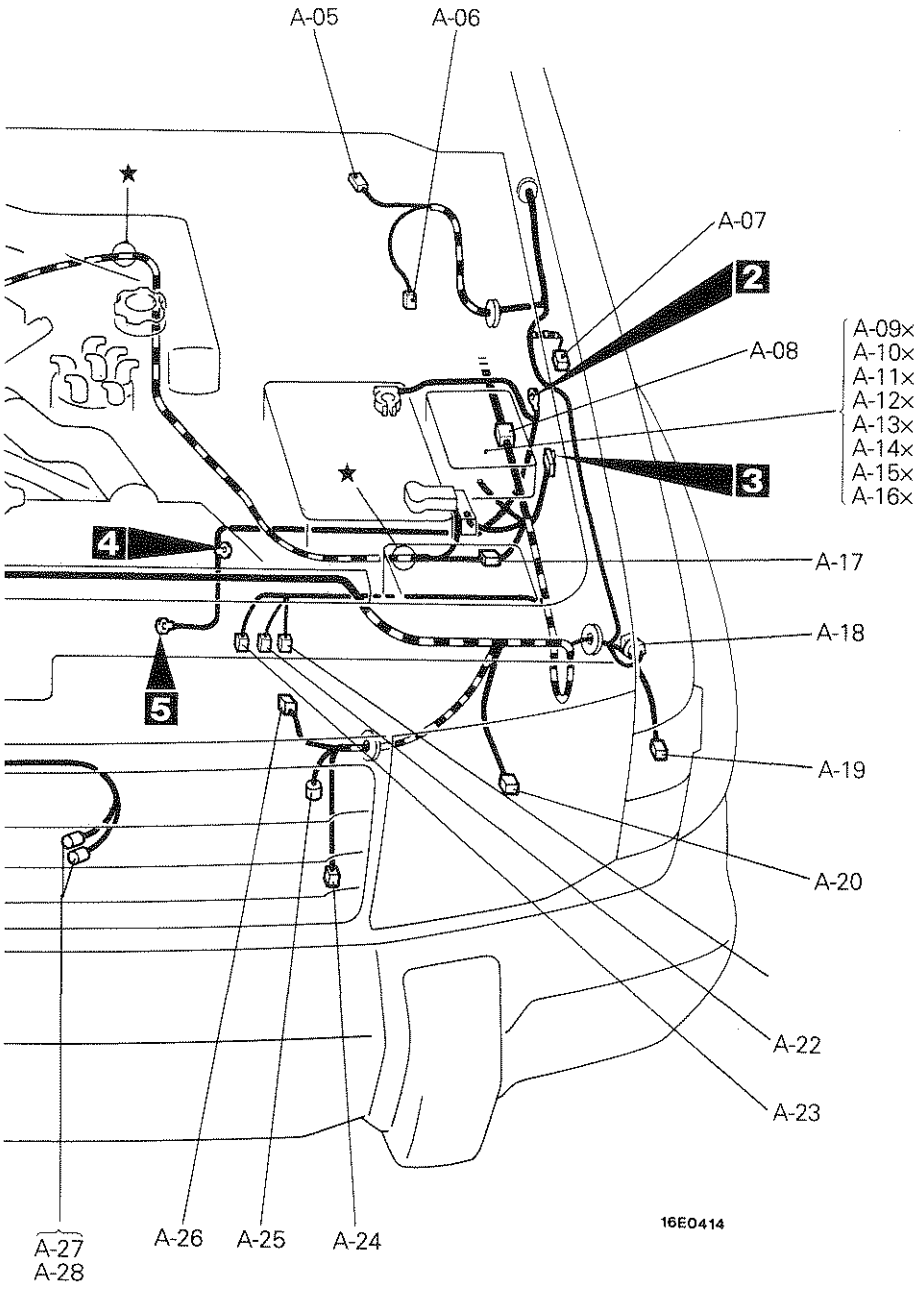
ENGINE COMPARTMENT

Connector symbol

A -01 thru -38



A-01 Headlight washer motor
A-02 Motor antenna
A-03, 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-09× thru A-16× Refer to centralized junction
A-17 Battery cable (+) and front wiring harness combination
A-18 Jumper connector
A-19 Front combination light (LH)

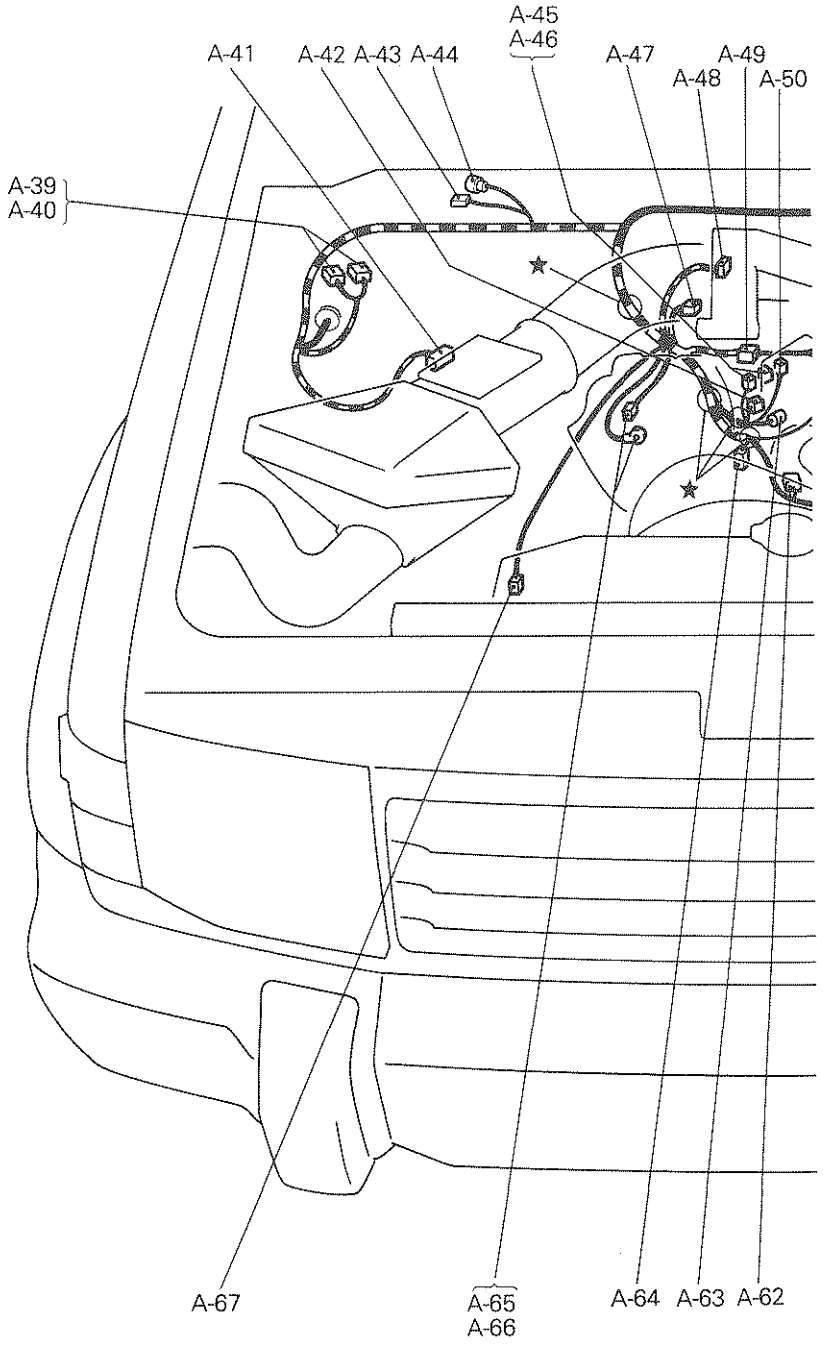


A-20 Headlight (LH)
A-21 Speed sensor (Front: LH) <ABS>
A-22 Shock absorber (Front: LH) <Remote controlled variable shock absorber>
A-23 Magnetic clutch <A/C>
A-24 Outside thermo sensor <Multi-meter>
A-25 Dual pressure switch <A/C>
A-26 Condenser fan motor <A/C>
A-27, A-28 Horn (LO)
A-29, A-30 Horn (HI)
A-31 Oil pressure switch
A-32 Speed sensor (Front: RH) <ABS>
A-33 Shock absorber (Front: RH) <Remote controlled variable shock absorber>
A-34 Headlight (RH)
A-35 Front combination light (RH)
A-36 Front wheel engage switch
A-37 Solenoid valve A
A-38 Solenoid valve B

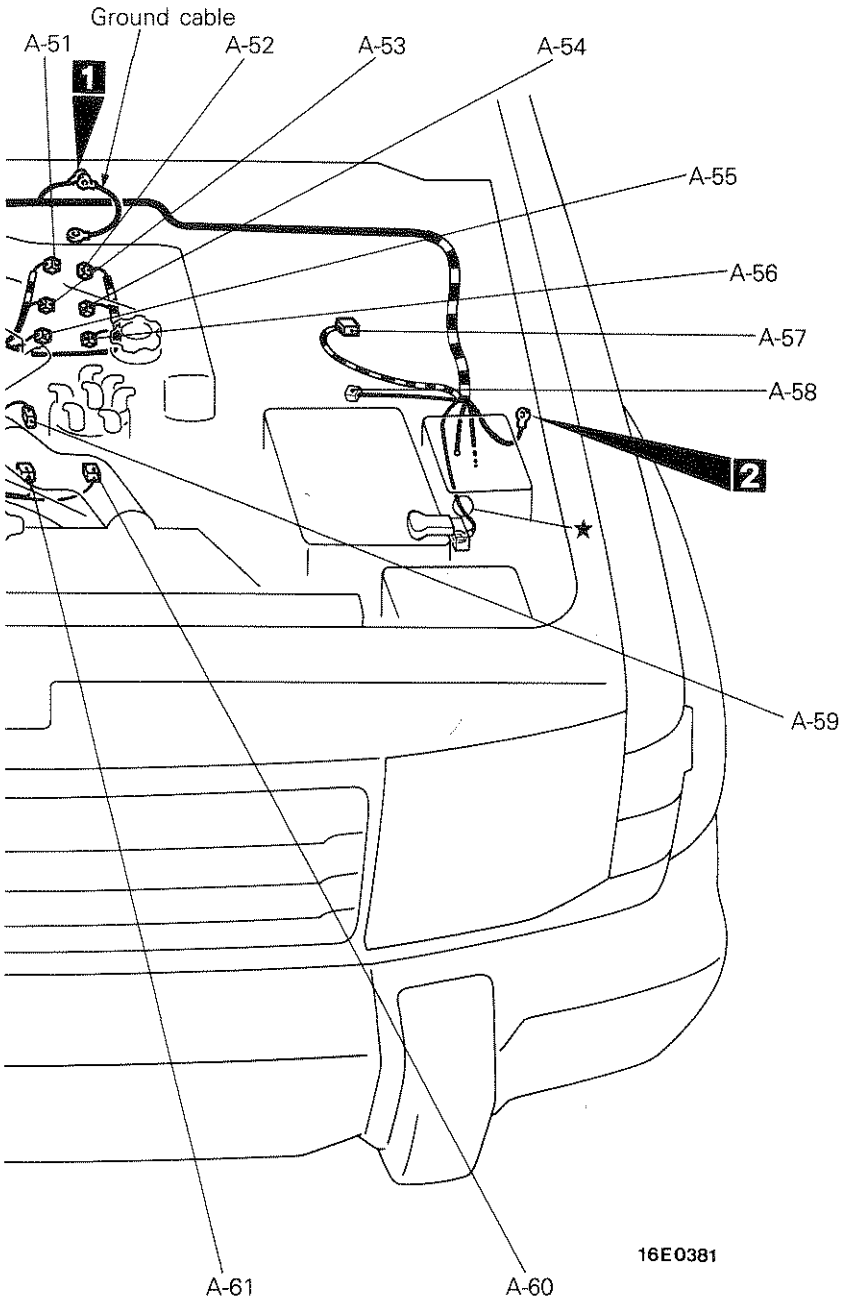
ENGINE COMPARTMENT

Connector symbol

A -39 thru -67



A-39, A-40 Hydraulic unit <ABS>
A-41 Air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor)
A-42 Power transistor
A-43 Fuel pump check connector
A-44 Ignition timing adjustment
A-45, A-46 Noise filter
A-47 Idle speed control servo
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

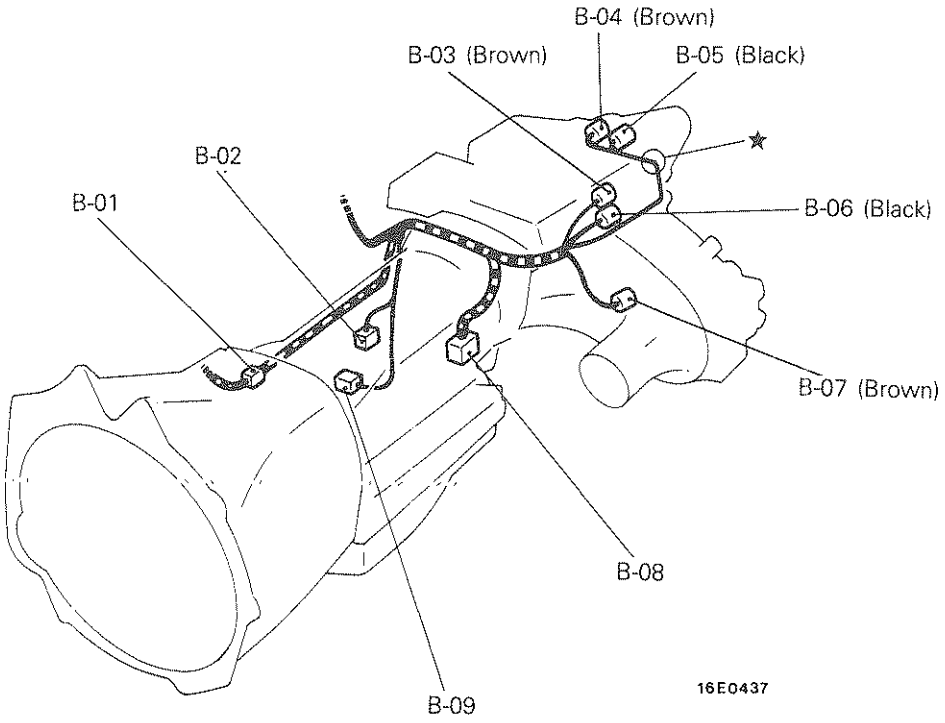


A-54 Injector No. 4
A-55 Injector No. 1
A-56 Injector No. 2
A-57 Auto-cruise control actuator
A-58 Purge control solenoid valve
A-59 Engine coolant temperature gage unit
A-60 Distributor signal generator
A-61 Engine coolant temperature switch <A/T>
A-62 Engine coolant temperature sensor
A-63 Ignition coil
A-64 Engine coolant temperature switch <A/C>
A-65, A-66 Alternator
A-67 Power steering oil pressure switch

TRANSMISSION

Connector symbol

B



B-01 Battery cable and transmission wiring harness combination
B-02 Back-up light switch <M/T>
B-03 Center differential lock detection switch
B-04 Center differential lock operation detection switch
B-05 4WD operation detection switch
B-06 2WD/4WD detection switch
B-07 High range/low range detection switch
B-08 Inhibitor switch <A/T>
B-09 Oxgen sensor

NOTES

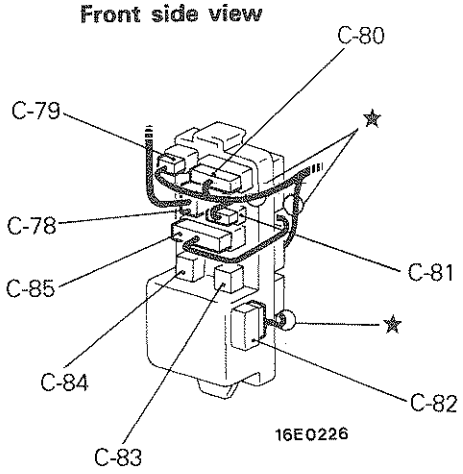
DASH PANEL

Connector Symbol

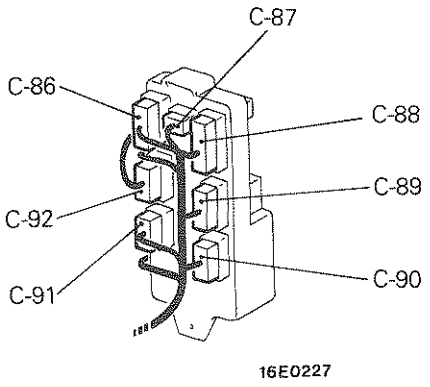
C

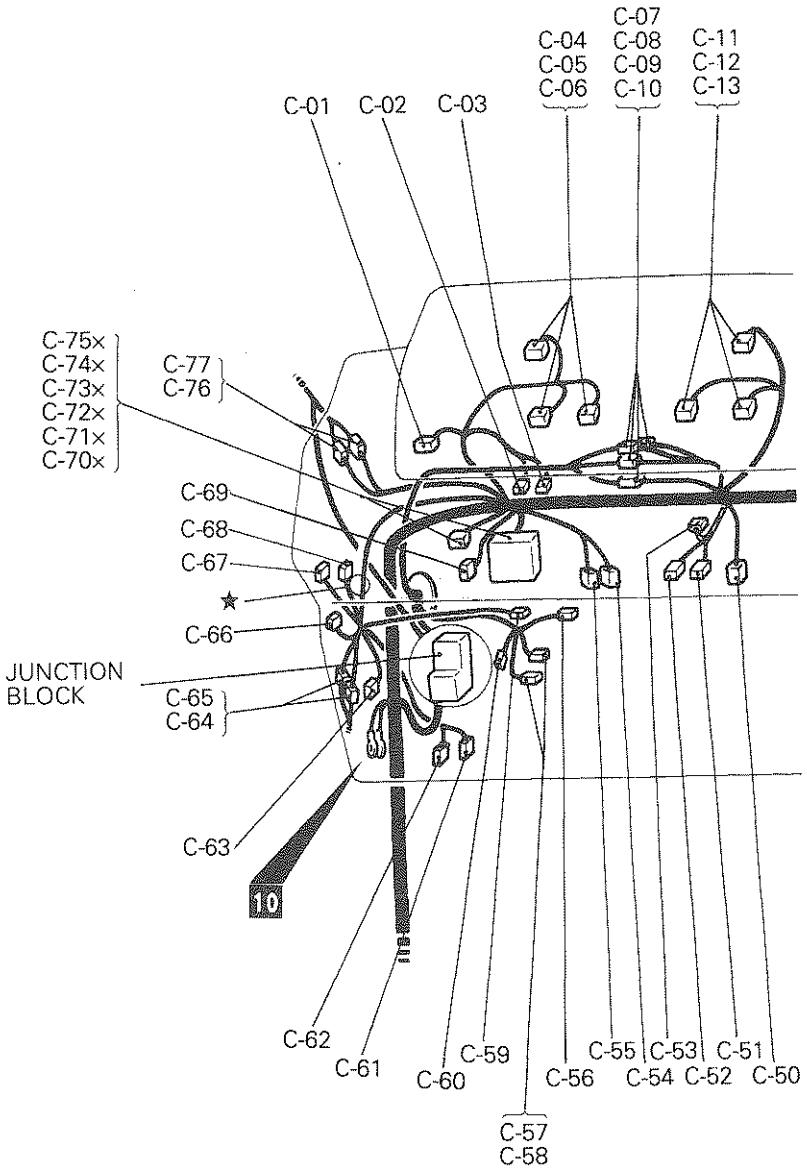
JUNCTION BLOCK

Front side view

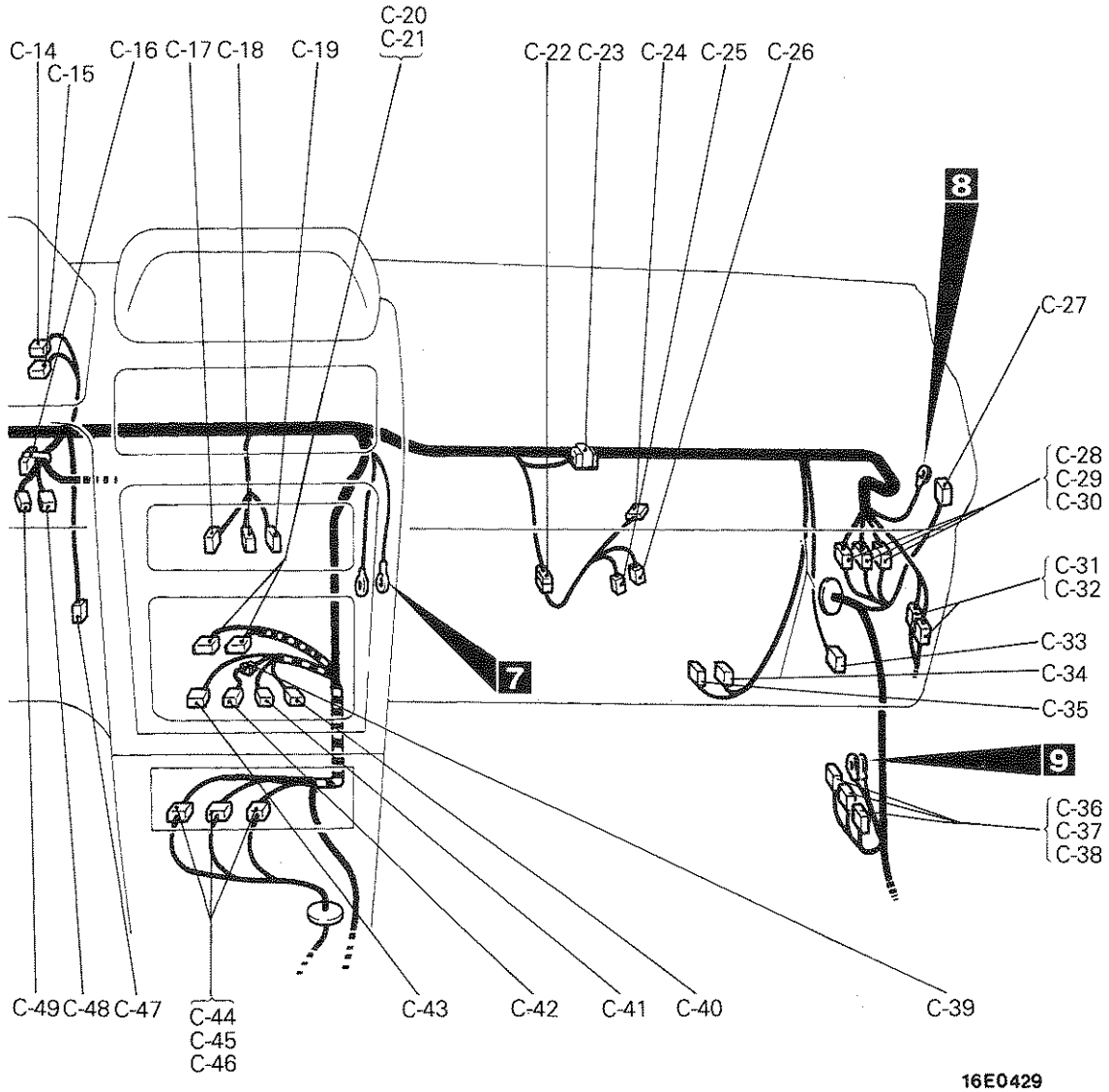


Rear side view





C-01 Auto-cruise control main switch
C-02 Remote controlled mirror switch
C-03 Rheostat
C-04, C-05, C-06 } Combination meter
C-07, C-08, C-09, C-10 } Front wiring harness and body wiring harness combination
C-11, C-12, C-13 } Combination meter
C-14 Defogger switch
C-15 Hazard light switch
C-16 No connection (for reed switch)
C-17 A/C switch
C-18 Blower motor switch
C-19 Heater control panel illumination light
C-20, C-21 } Radio
C-22 Body wiring harness and A/C wiring harness combination
C-23 No connection (for diagnosis connector)
C-24 A/C control unit
C-25 Air thermo sensor
C-26 Air inlet sensor
C-27 Engine control relay
C-28, C-29, C-30 } Control wiring harness and body wiring harness combination
C-31, C-32 } Body wiring harness and door wiring harness (RH) combination
C-33 Front speaker (RH)
C-34 Resistor
C-35 Blower motor
C-36, C-37, C-38 } Engine control unit
C-39 Diode <ABS>
C-40 Motor antenna control unit
C-41 ABS power relay
C-42 Starter relay
C-43 4WD indicator control unit
C-44, C-45, C-46 } Body wiring harness and transmission wiring harness combination
C-47 Buzzer assembly
C-48 Rear wiper and washer switch
C-49 Door lock switch



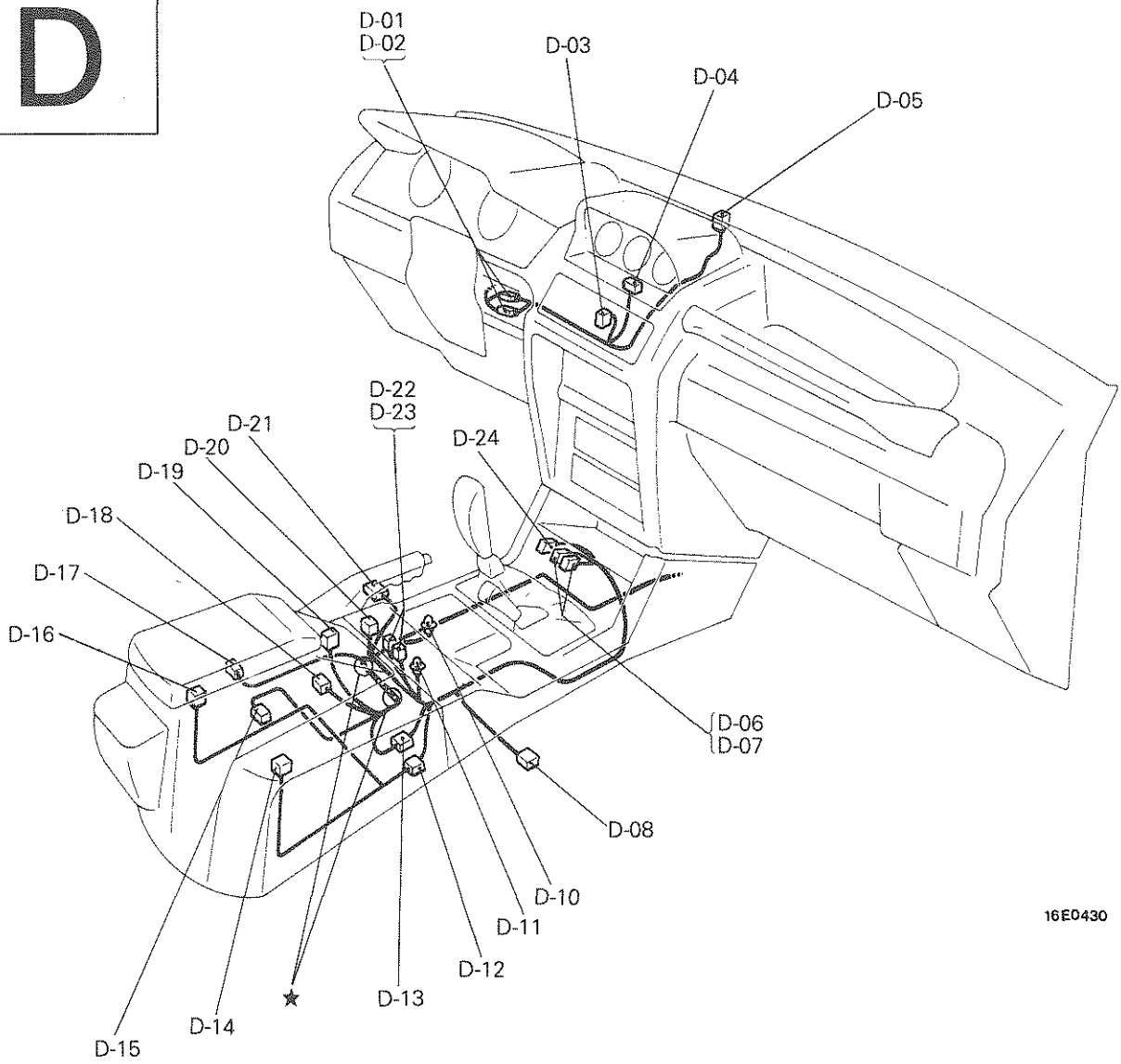
C-50 Auto-cruise control unit or spare connector
C-51 Auto-cruise control switch
C-52 Inside thermo sensor
C-53 Spare connector (for hand free microphone)
C-54 Stop light switch (2-pin) or no connection <Auto-cruise control system>
C-55 Stop light switch (4-pin) <Auto-cruise control system> or no connection
C-56 Ignition switch
C-57, C-58 Column switch
C-59 Key reminder switch
C-60 Diode <Active trac 4WD system>
C-61 Clutch switch <M/T>
C-62 Clutch switch <M/T-Auto-cruise control system>
C-63 Front speaker (RH)
C-64, C-65 Body wiring harness and wiring harness (LH) combination
C-66 Defogger relay
C-67 Headlight washer relay
C-68 Defogger timer
C-69 Dedicated fuse No. 9 <Sunroof>
C-70× thru C-75× Refer to centralized junction
C-76, C-77 Body wiring harness and roof wiring harness combination
C-78 Roof wiring harness and junction block
C-79, C-80, C-81 Front wiring harness and junction block
C-82 Diagnosis connector
C-83 Blower motor relay
C-84 Accessory socket relay
C-85 thru C-91 Body wiring harness and junction block
C-92 Front wiring harness and junction block

INSTRUMENT PANEL AND FLOOR CONSOLE

<M/T>

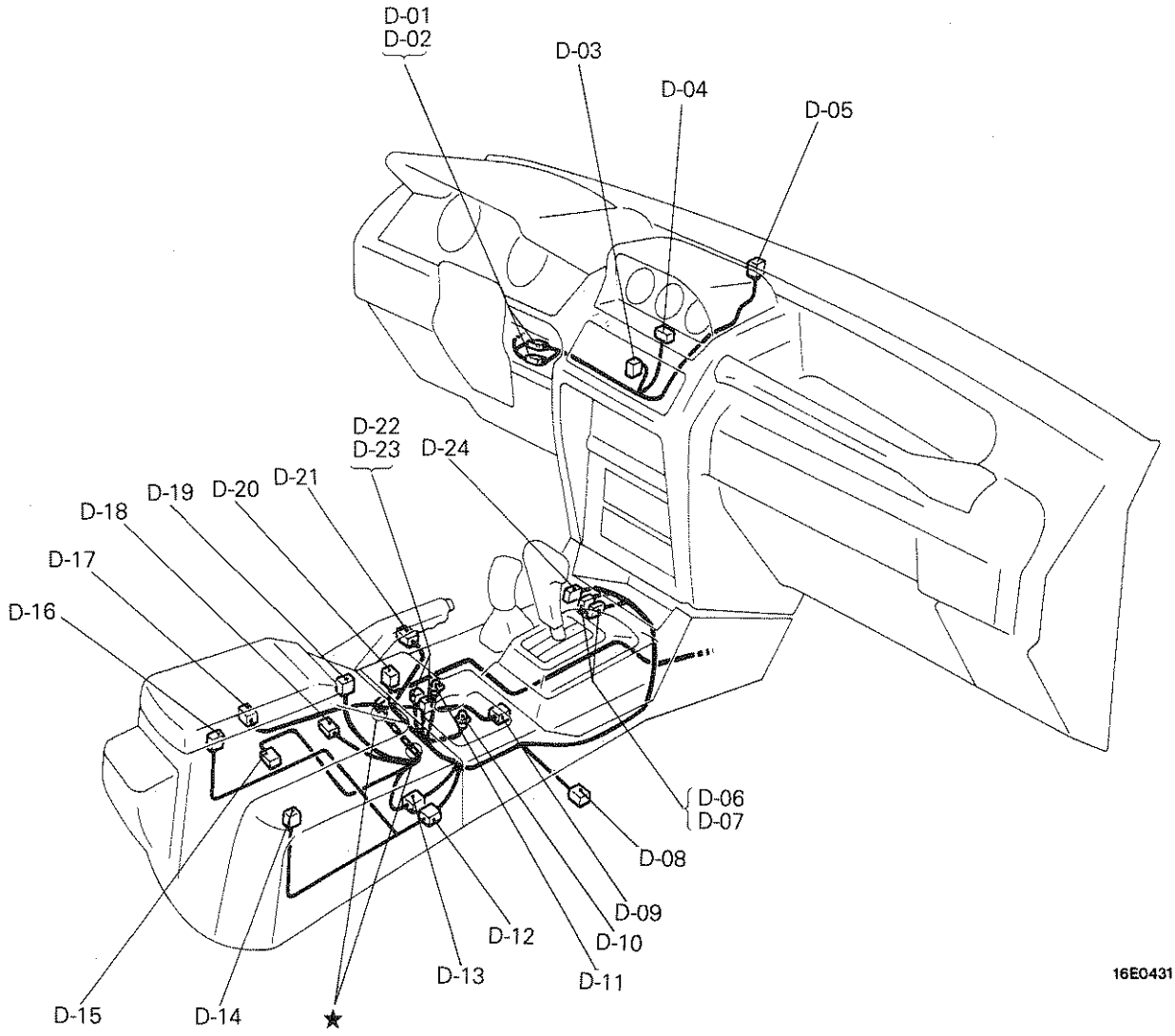
Connector symbol

D



D-01, D-02 Body wiring harness and instrument panel wiring harness combination
D-03 Clock
D-04 Multi-meter
D-05 Geomagnetic sensor
D-06, D-07 Accessory socket
D-08 No connection
D-09 –
D-10 Ashtray illumination light
D-11 Cigarette lighter illumination light
D-12 Console wiring harness and rear console wiring harness combination
D-13 Body wiring harness and console wiring harness combination
D-14 No connection
D-15 G sensor <ABS>
D-16 No connection
D-17 Seat belt switch
D-18 Parking brake switch
D-19 Shock absorber control switch
D-20, D-21 No connector
D-22, D-23 Cigarette lighter
D-24 Rear differential lock switch

<A/T>

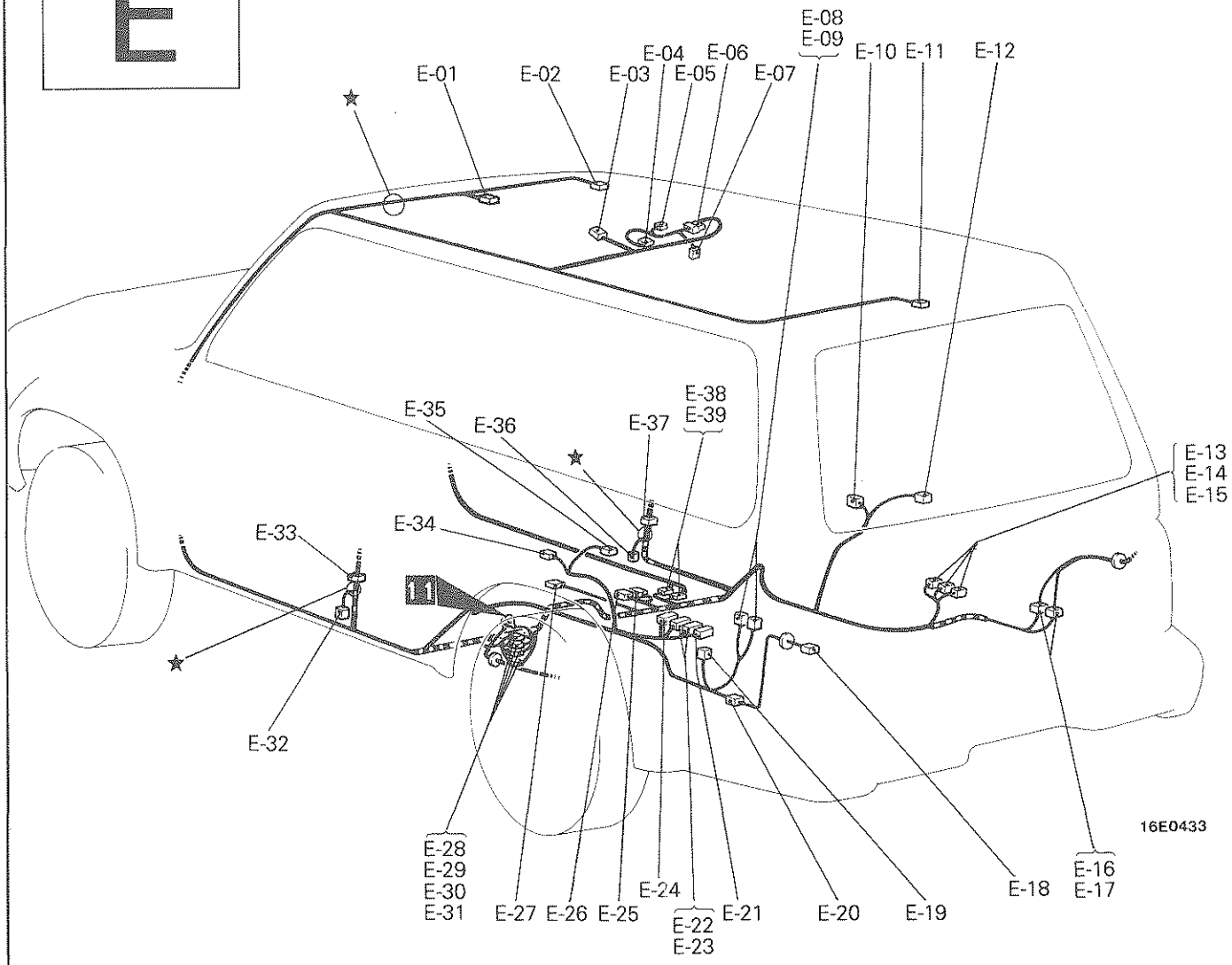


D-01, D-02 Body wiring harness and instrument panel wiring harness combination
D-03 Clock
D-04 Multi-meter
D-05 Geomagnetic sensor
D-06, D-07 Accessory socket
D-08 No connection
D-09 Overdrive switch
D-10 Ashtray illumination light
D-11 Cigarette lighter illumination light
D-12 Console wiring harness and rear console wiring harness combination
D-13 Body wiring harness and console wiring harness combination
D-14 No connection
D-15 G sensor <ABS>
D-16 No connection
D-17 Seat belt switch
D-18 Parking brake switch
D-19 Shock absorber control switch
D-20, D-21 No connector
D-22, D-23 Cigarette lighter
D-24 Rear differential lock switch

FLOOR AND ROOF

Connector Symbol

E

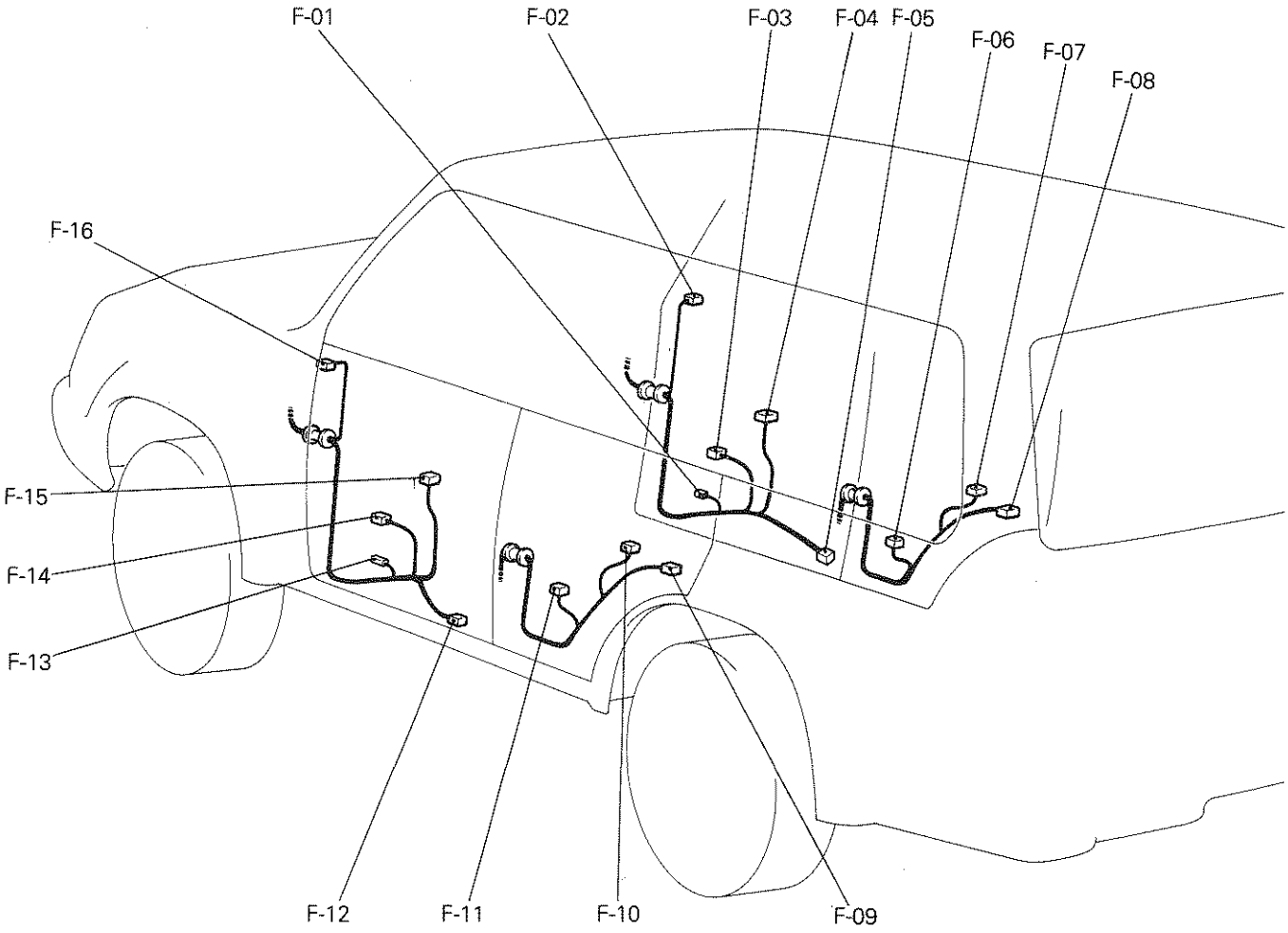


E-01 Reading light
E-02 Vanity mirror light
E-03 Dome light
E-04 Sunroof control unit
E-05 Sunroof motor
E-06 Roof wiring harness and sunroof wiring harness combination
E-07 Sunroof switch
E-08, E-09 Accessory socket
E-10 Rear door switch (RH)
E-11 Cargo space light
E-12 Rear speaker (RH)
E-13, E-14, E-15 ABS control unit
E-16, E-17 Body wiring harness and back door wiring harness combination
E-18 Rear combination light
E-19 Variable shock absorber control unit
E-20 Body wiring harness and rear combination light wiring harness combination
E-21 Spare connector (for telephone cable)
E-22 Spare connector (for hand free controller)
E-23 Jumper connector (or hand free controller)
E-24 Spare connector (for wireless telephone unit)
E-25 Rear differential lock air pump
E-26 Rear differential lock control unit
E-27 Spare connector (for telephone cable)
E-28 thru E-31 Body wiring harness and frame wiring harness combination
E-32 Front door switch (LH)
E-33 Body wiring harness and rear door wiring harness combination
E-34 Rear door switch (LH)
E-35 Rear speaker (LH)
E-36 Front door switch (RH)
E-37 Body wiring harness and rear door wiring harness combination
E-38, E-39 Body wiring harness and control wiring harness combination

DOOR

Connector Symbol

F



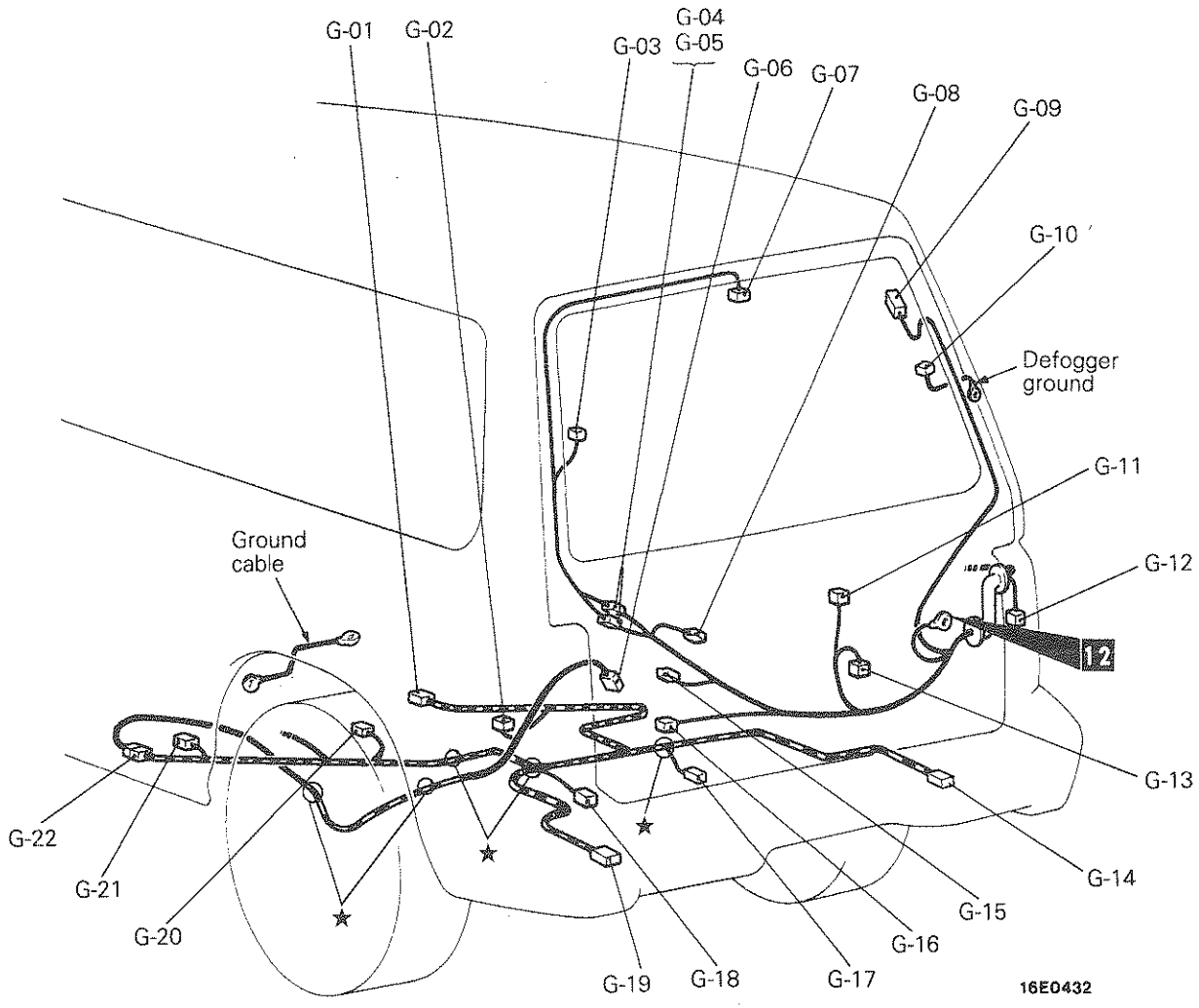
16E0434

F-01 Door speaker (RH)
F-02 Remote control mirror (RH)
F-03 Power window motor (Front: RH)
F-04 Power window sub switch (Front: RH)
F-05 Door lock actuator (Front: RH)
F-06 Power window motor (Rear: RH)
F-07 Power window sub switch (Rear: RH)
F-08 Door lock actuator (Rear: RH)
F-09 Door lock actuator (Rear: LH)
F-10 Power window sub switch (Rear: LH)
F-11 Power window motor (Rear: LH)
F-12 Door lock actuator (Front: LH)
F-13 Door speaker (LH)
F-14 Power window motor (Front: LH)
F-15 Power window main switch (Front: LH)
F-16 Remote control mirror (LH)

BACK DOOR AND REAR UNDER FLOOR

Connector symbol

G



G-01 Speed sensor (Rear: RH)
G-02 Shock absorber (Rear: RH)
<Remote control variable shock absorber>
G-03 Defogger (+)
G-04, G-05 Back door wiring harness 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 (RH)
G-13 Rear washer motor
G-14 Back-up light (RH)
G-15 License plate light
G-16 Door lock actuator (Back door)
G-17 Fuel pump
G-18 Fuel gage unit
G-19 Back-up light
G-20 Shock absorber (Rear: LH)
<Remote controlled variable shock absorber>
G-21 Speed sensor (Rear: LH) <ABS>
G-22 Frame wiring harness and position wiring harness

CIRCUIT DIAGRAMS

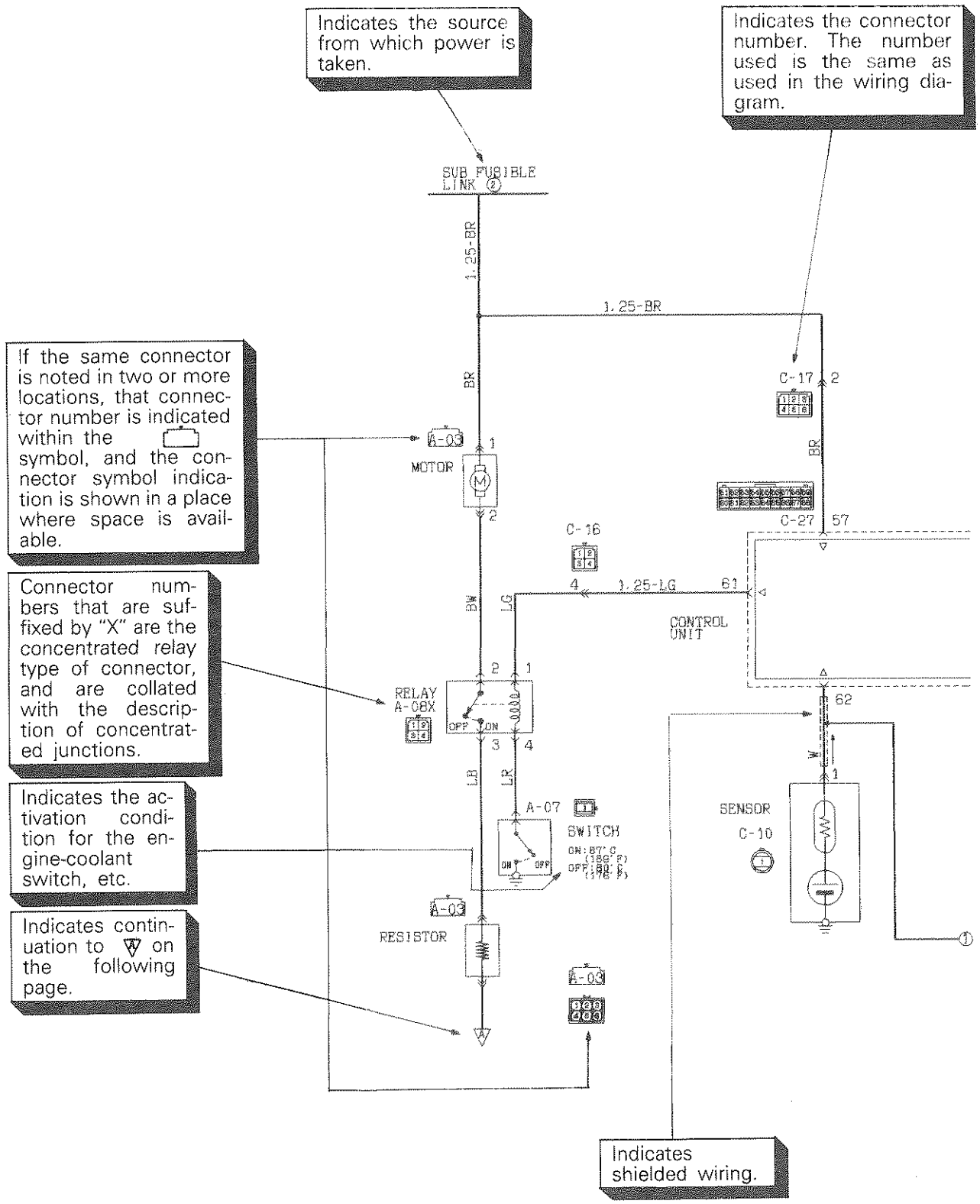
CONTENTS

M16VE--

HOW TO READ CIRCUIT DIAGRAMS

M16VGAC

The diagrams show the circuits from the fuse (or fusible link) of each system all the way to the ground point.
These diagrams are prepared in such a way that the flow of electricity is easily understood, using a layout that shows the power source at the upper part and the ground point at the lower side.



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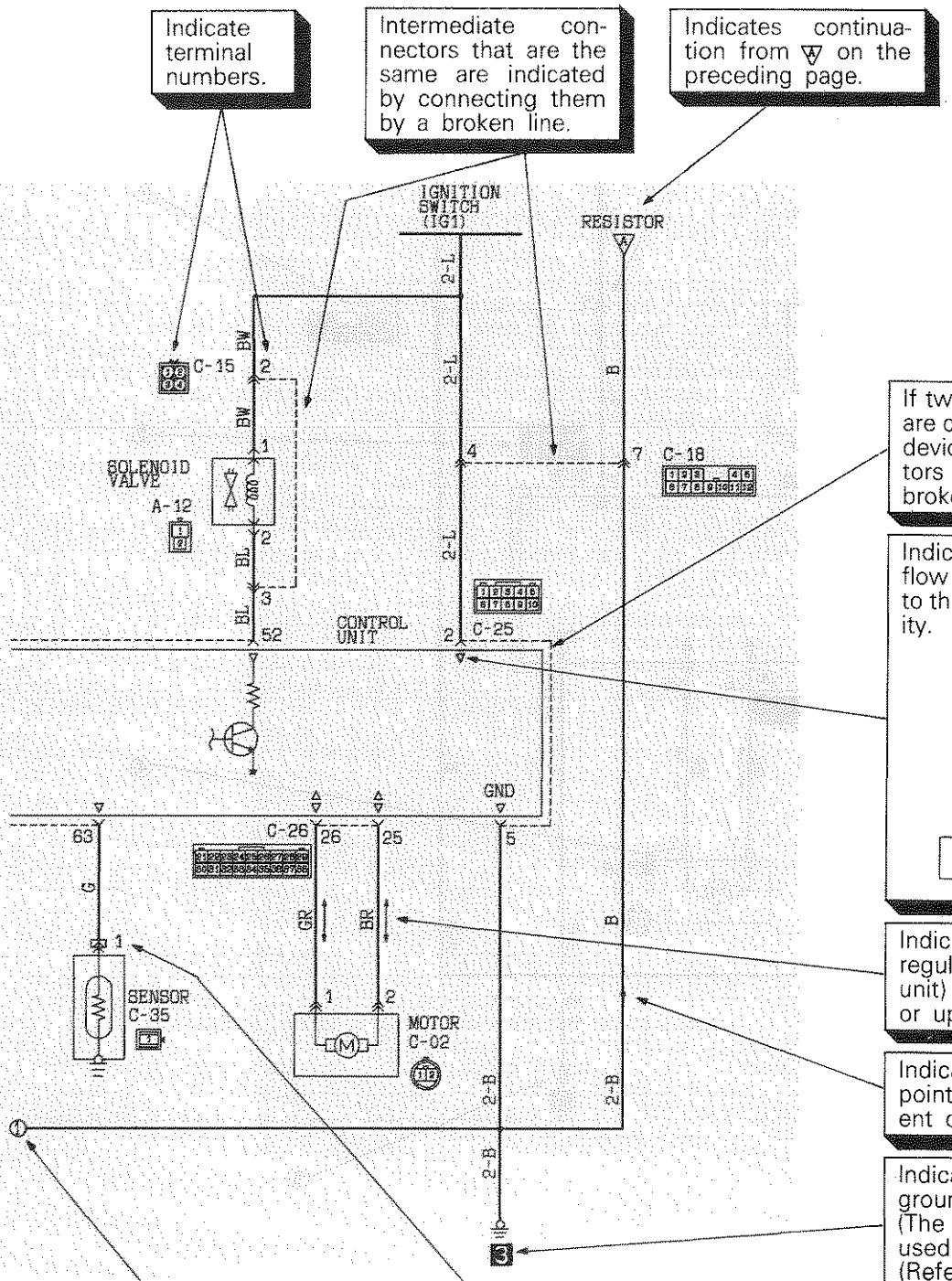


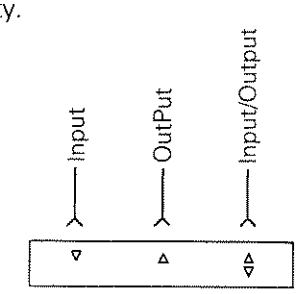
Indicate terminal numbers.

Intermediate connectors that are the same are indicated by connecting them by a broken line.

Indicates continuation from ▽ on the preceding page.

If two or more connectors are connected at the same device, identical connectors are connected by a broken line.

Indicates the direction of flow (input or output relative to the control unit) of electricity.



Indicates flow of current (as regulated by the control unit) downward from above or upward from below.

Indicates the branching point of harnesses of different diameter and/or color.

Indicates the chassis ground point.
(The number is the same as used in "GROUNDING". (Refer to P.4.)

Indicates that there is a continuation of the harness from one page to the adjoining page.

Indicates a spare terminal if for some reason the device is not equipped.

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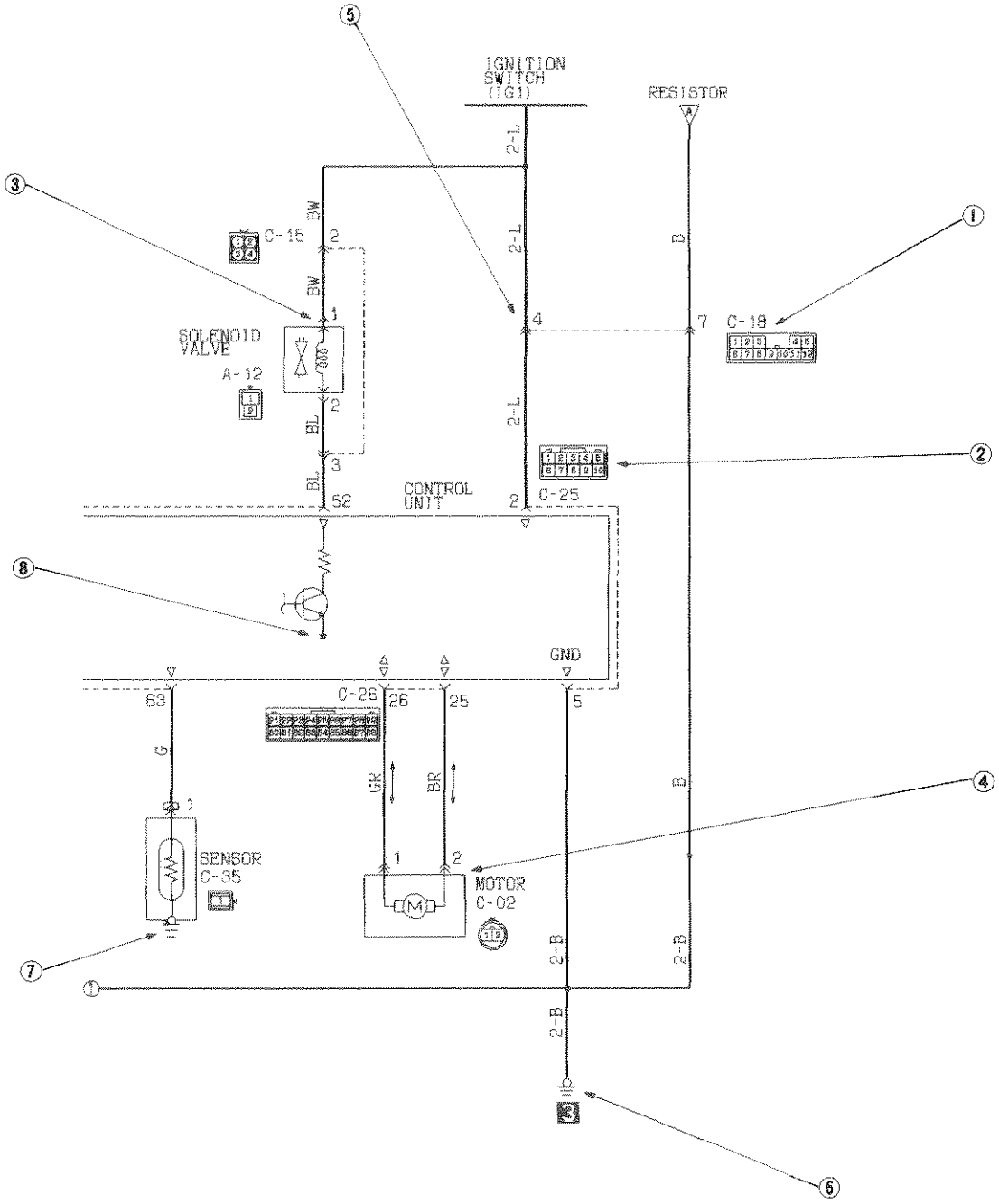
CONNECTOR/GROUND INDICATORS



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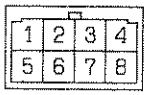
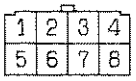
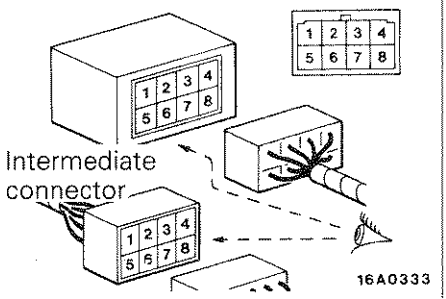
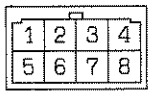
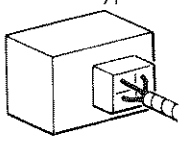
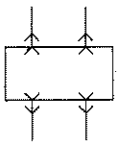
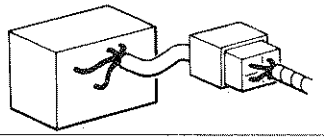
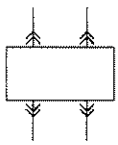
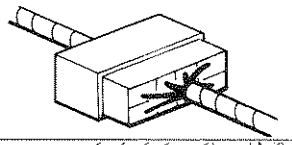
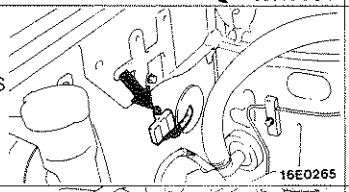
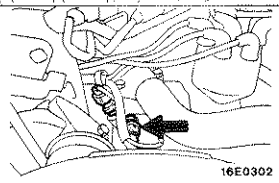
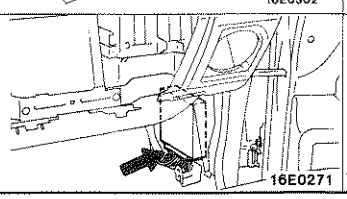
	No.	Layout indications	Symbol	Description
Connector indications	①	Male 		Male and female terminals are distinguished one from the other as shown in the illustration: connectors framed by a double line are male terminals, and those framed by a single line are female terminals.
	–	Female 		
Connector symbol indications	②	Equipment 		Symbols are shown as facing in the direction indicated in the illustration. For connections to the equipment is shown, for intermediate connectors, the symbol for the connector at the male side is shown.
Connector connection indications	③	Direct-connect type 		There are two types of connection between the equipment and the connector at the harness: the type by which there is direct plug-in to the equipment (the direct-connect type), and the type by which connection is with the harness connector at the equipment (the type with harness); these are individually identified as shown in the illustration.
	④	Type with harness 		
	⑤	Intermediate connector 		
Ground indications	⑥	Chassis ground 		There are three types of grounds: the chassis ground, the equipment ground, and the ground within the control unit; these are individually identified as shown in the illustration.
	⑦	Equipment ground 		
	⑧	Ground within control unit 		

SYMBOLS

The various devices and equipment identified in circuit diagrams are represented by the symbols described below.

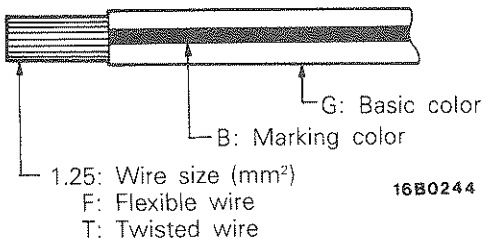
Battery	Body ground	Single bulb	Resistor	Diode	Capacitor
Fuse	Equipment ground	Dual bulb	Variable resistor	Zener diode	Crossing of wires without connection
Fusible link	Ground within ECU	Speaker	Coil	Transistor	Crossing of wires with connection
Connector (Female side / Male side)	Motor	Horn	Pulse generator	Buzzer	Chime
Thyristor	Piezo-electric element	Thermister	Light-emitting diode	Photo diode	Photo transistor

16A0252

WIRING COLOR CODES

Wire colors are identified by the following color codes.

Example: 1.25F–GB



16B0244

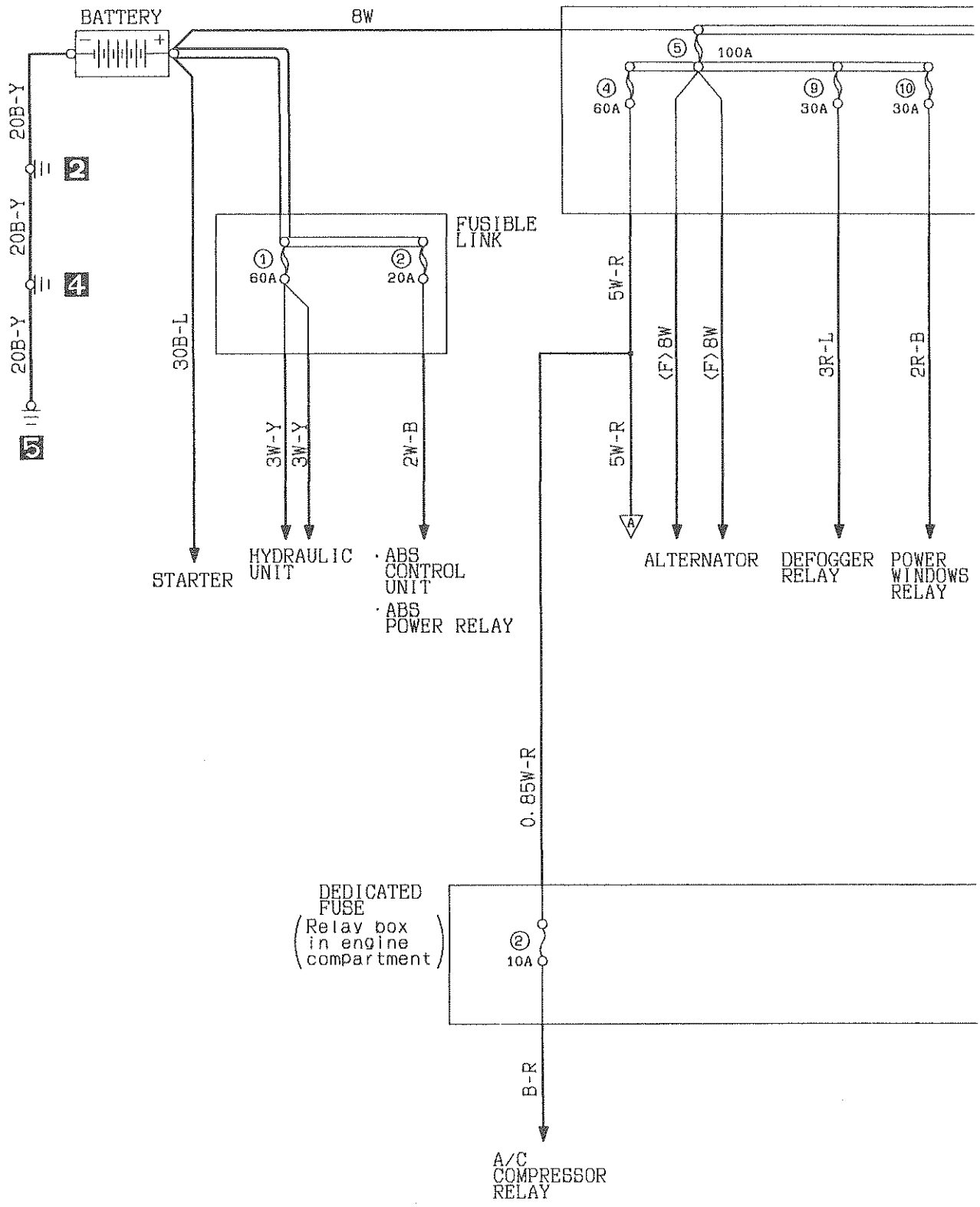
Code	Wire color	Code	Wire color
B	Black	LI	Light blue
Br	Brown	O	Orange
G	Green	P	Pink
Gr	Gray	R	Red
L	Blue	Y	Yellow
Lg	Light green	W	White
Sb	Silver		

(1) No code indicates 0.5 mm² (.0008 in.²).
(2) Cable color code in parentheses indicates 0.3 mm² (.0005 in.²).

NOTE
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.

NOTES

POWER DISTRIBUTION



KX35-AC-G0101-N

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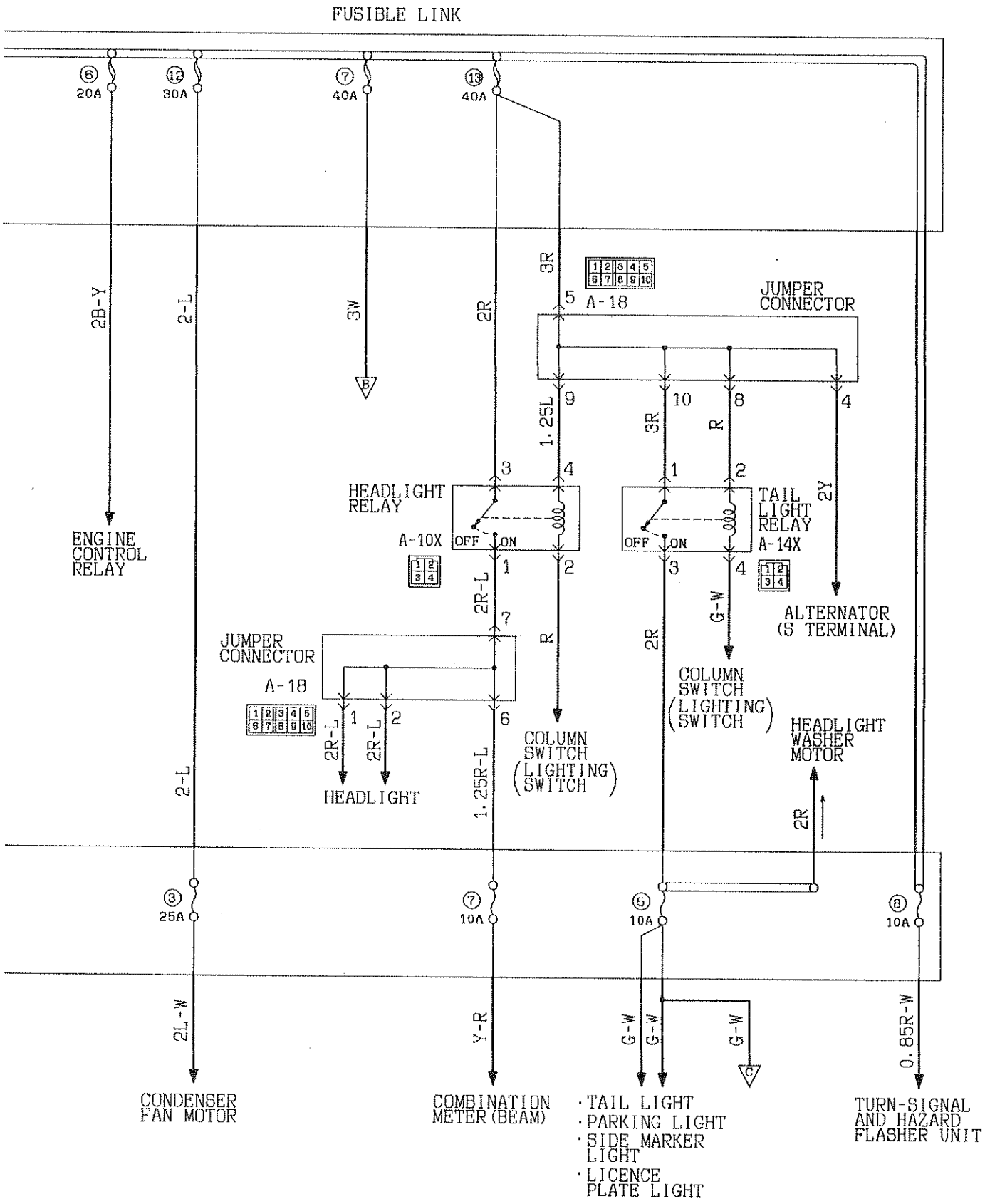
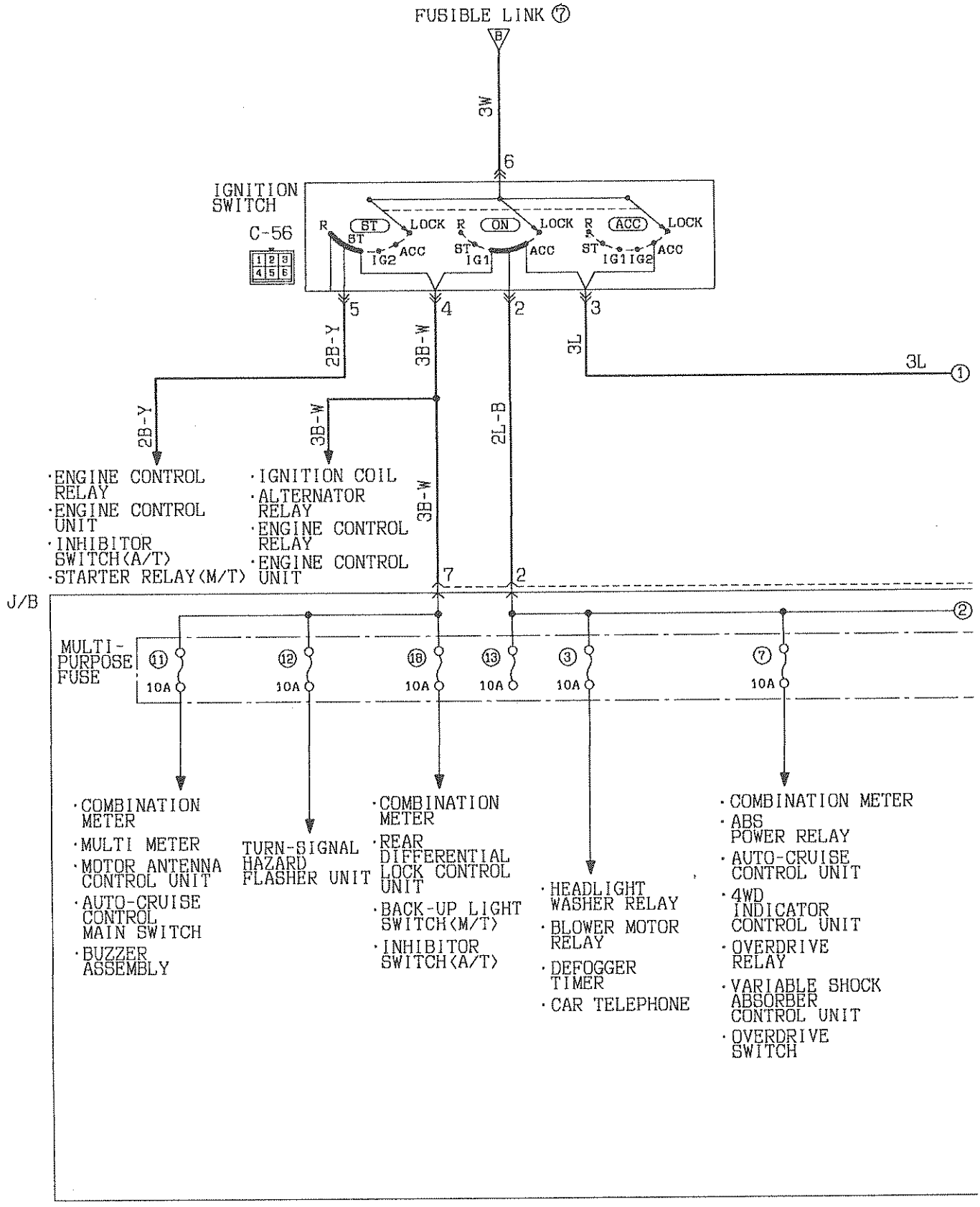

FUSIBLE LINK
⑥ 20A
⑫ 30A
⑦ 40A
⑬ 40A
2B-Y
2-L
3W
2R
3R
A-18
JUMPER CONNECTOR
1.25L
3R
R
2Y
HEADLIGHT RELAY
A-10X
OFF
ON
TAIL LIGHT RELAY
A-14X
ENGINE CONTROL RELAY
2R-L
G-W
ALTERNATOR (S TERMINAL)
JUMPER CONNECTOR
A-18
COLUMN SWITCH (LIGHTING SWITCH)
HEADLIGHT WASHER MOTOR
HEADLIGHT
1.25R-L
③ 25A
⑦ 10A
⑤ 10A
⑧ 10A
2L-W
Y-R
0.85R-W
CONDENSER FAN MOTOR
COMBINATION METER (BEAM)
· TAIL LIGHT
· PARKING LIGHT
· SIDE MARKER LIGHT
· LICENCE PLATE LIGHT
TURN-SIGNAL AND HAZARD FLASHER UNIT



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.

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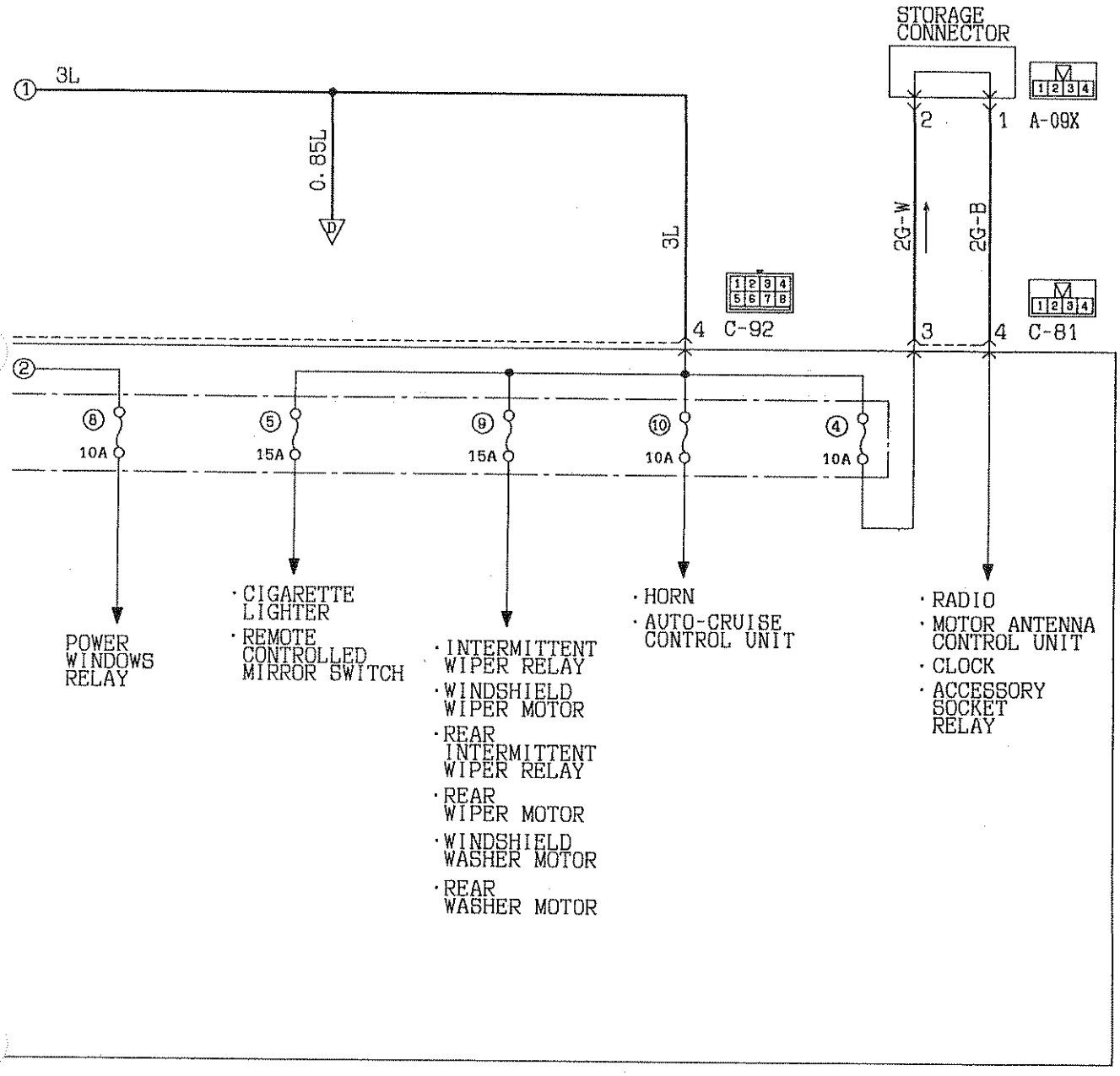
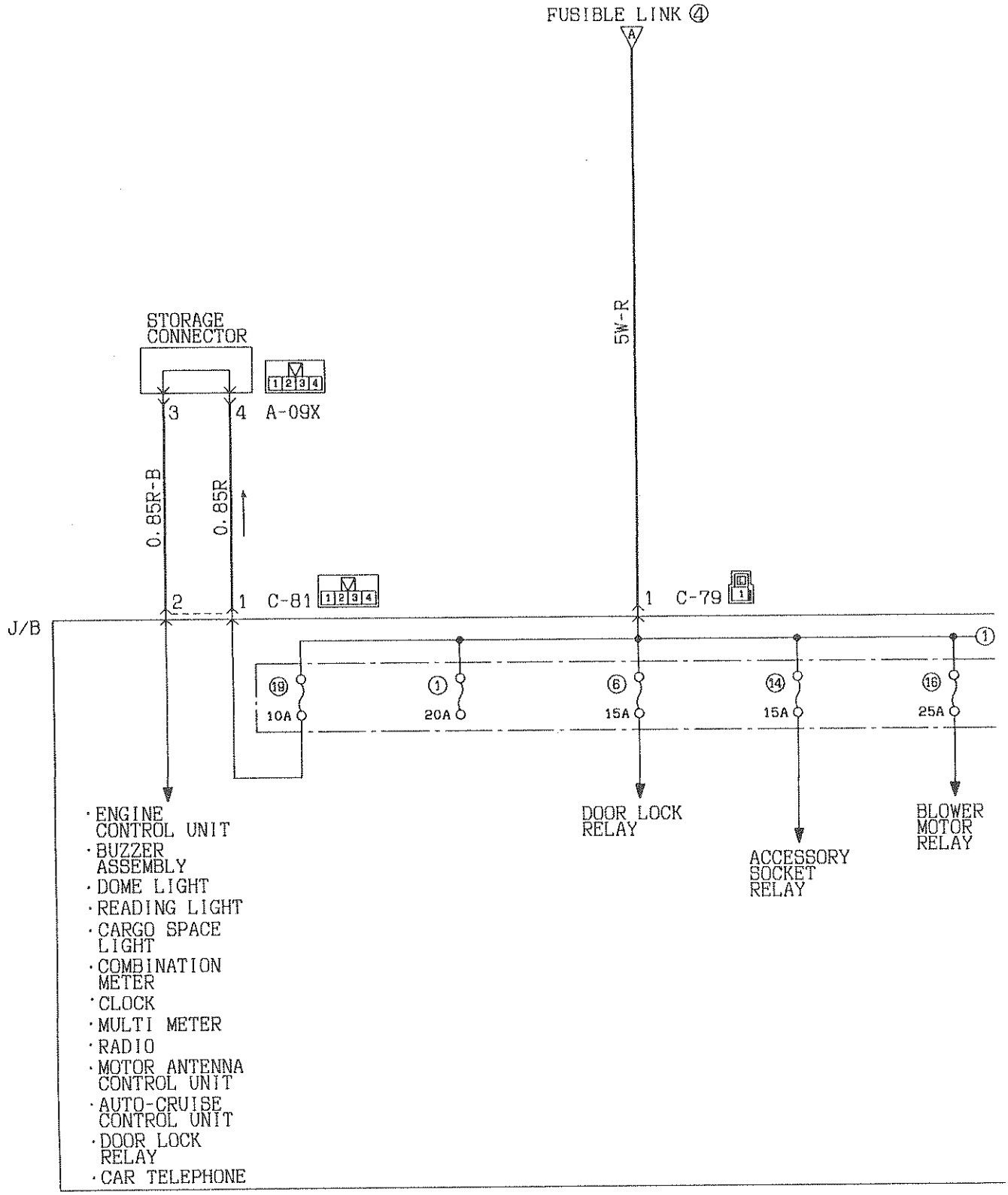
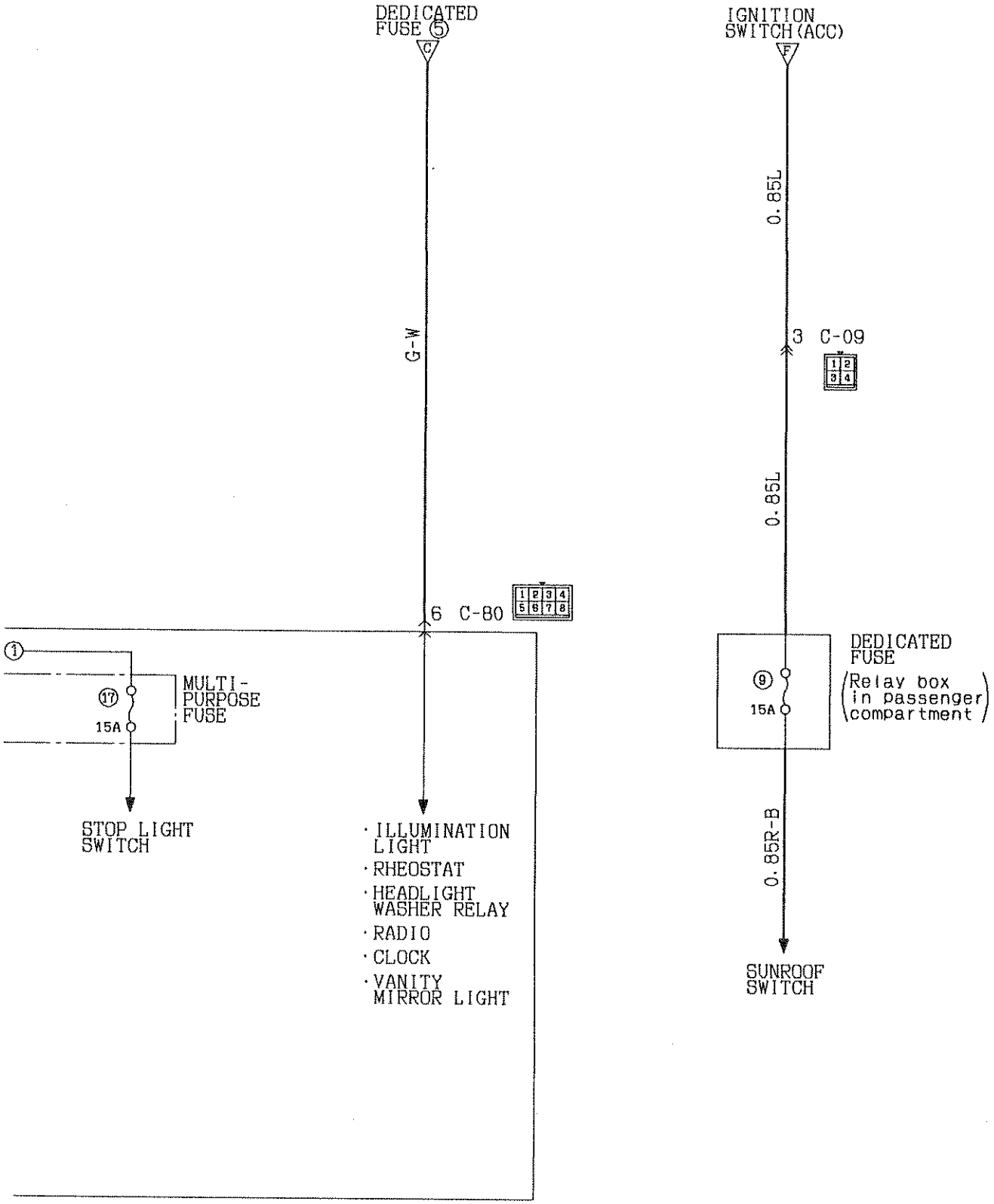

STORAGE CONNECTOR
A-09X
3L
0.85L
2G-W
2G-B
C-92
C-81
10A
15A
15A
10A
10A
· CIGARETTE LIGHTER
· REMOTE CONTROLLED MIRROR SWITCH
· INTERMITTENT WIPER RELAY
· WINDSHIELD WIPER MOTOR
· REAR INTERMITTENT WIPER RELAY
· REAR WIPER MOTOR
· WINDSHIELD WASHER MOTOR
· REAR WASHER MOTOR
· HORN
· AUTO-CRUISE CONTROL UNIT
· RADIO
· MOTOR ANTENNA CONTROL UNIT
· CLOCK
· ACCESSORY SOCKET RELAY
POWER WINDOWS RELAY



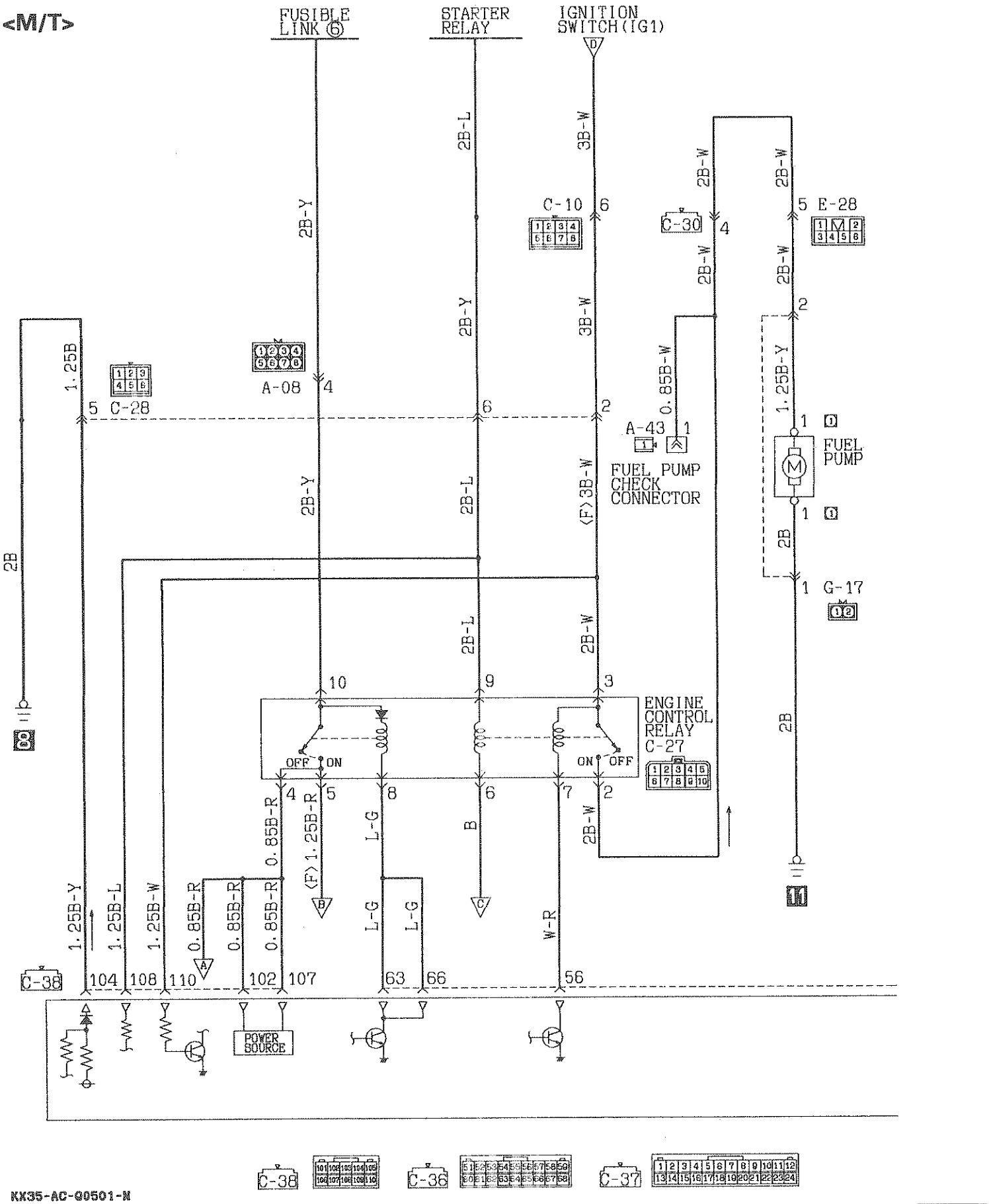
KX35-AC-90101B-N

TSB Revision


DEDICATED FUSE ⑤
C
G-W
6 C-80
IGNITION SWITCH (ACC)
F
0.85L
3 C-09
0.85L
DEDICATED FUSE
⑨
15A
(Relay box in passenger compartment)
0.85R-B
SUNROOF SWITCH
①
⑰
15A
MULTI-PURPOSE FUSE
STOP LIGHT SWITCH
· ILLUMINATION LIGHT
· RHEOSTAT
· HEADLIGHT WASHER RELAY
· RADIO
· CLOCK
· VANITY MIRROR LIGHT

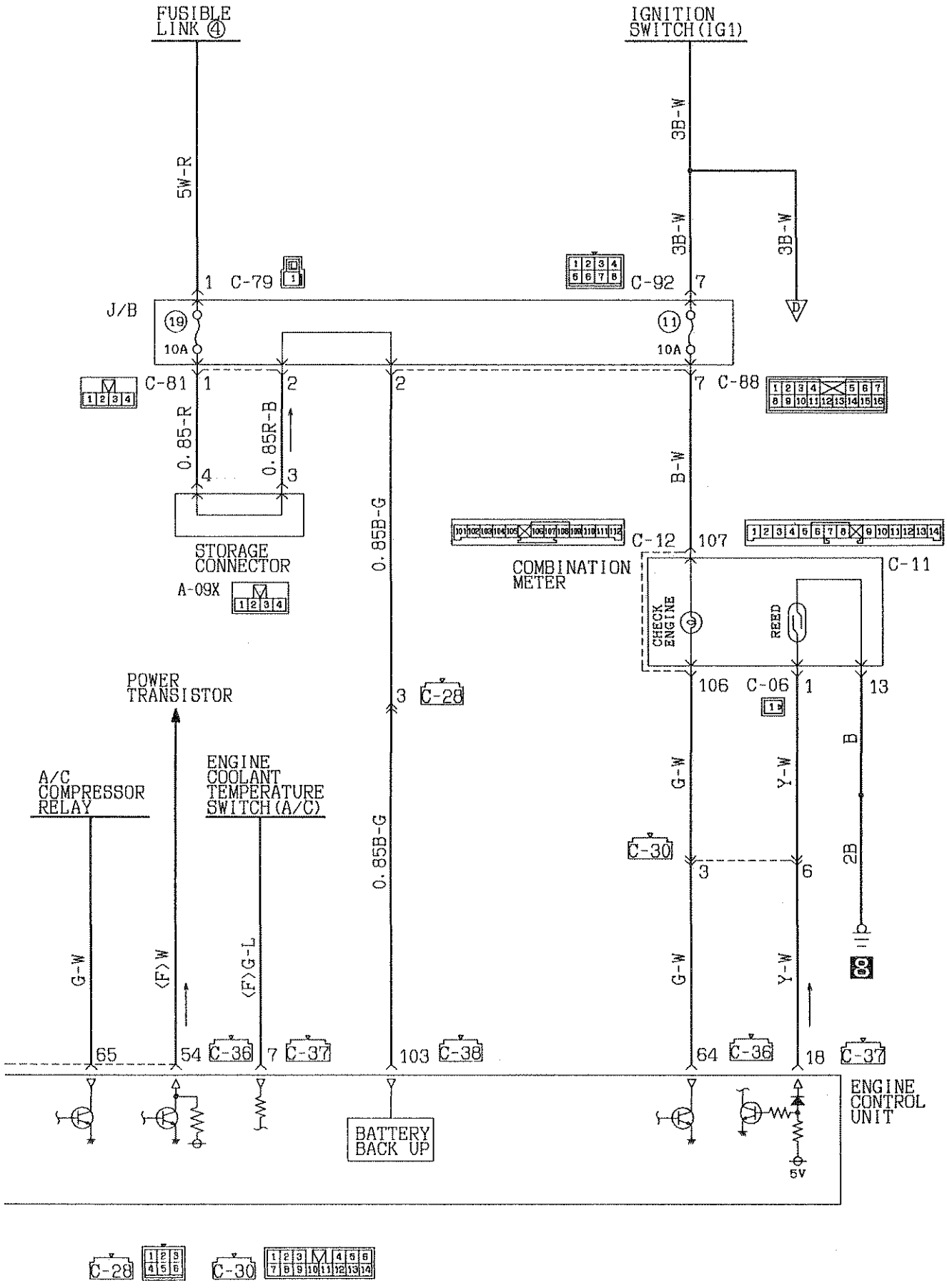
MPI SYSTEM

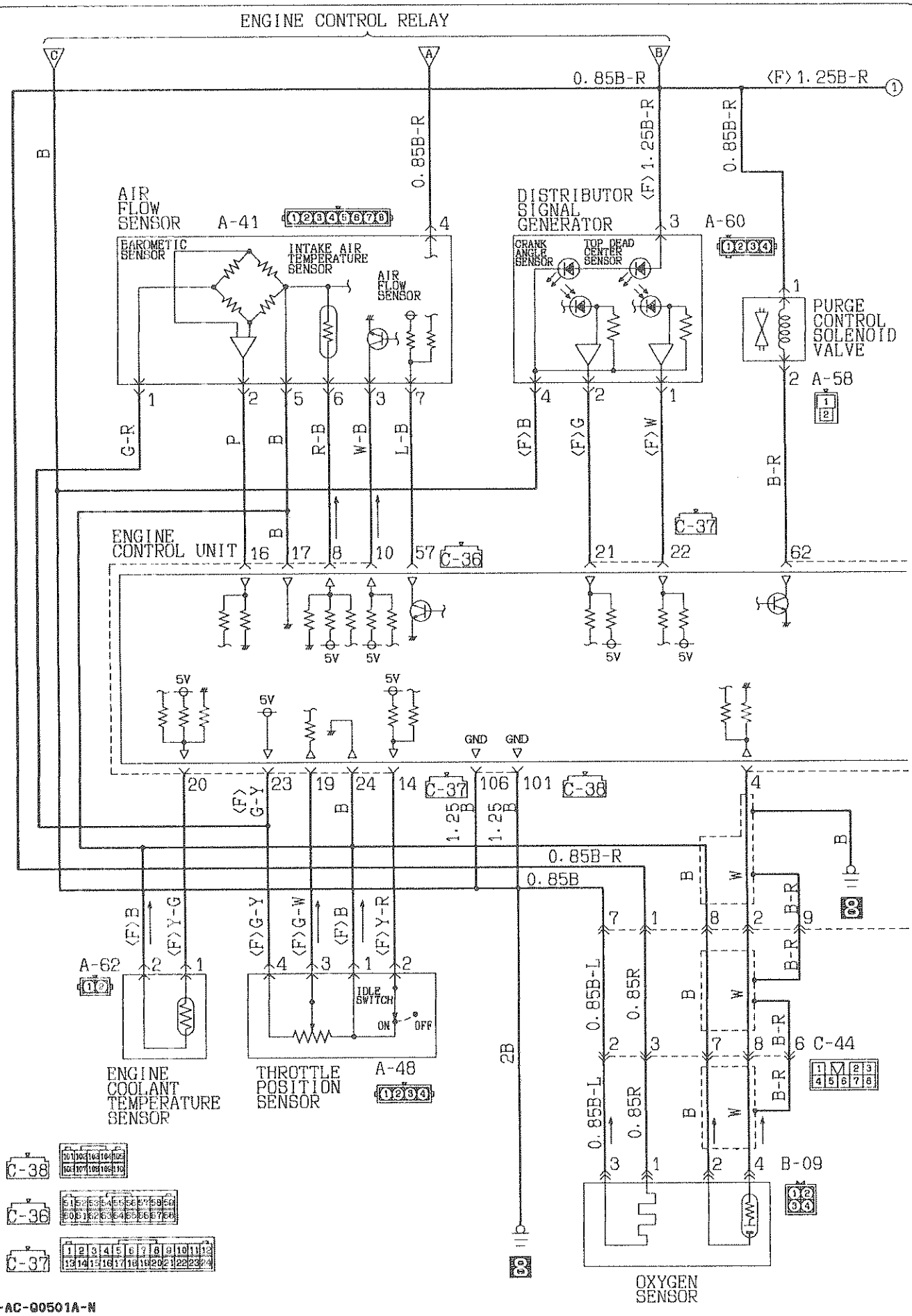
<M/T>



KK35-AC-00501-N

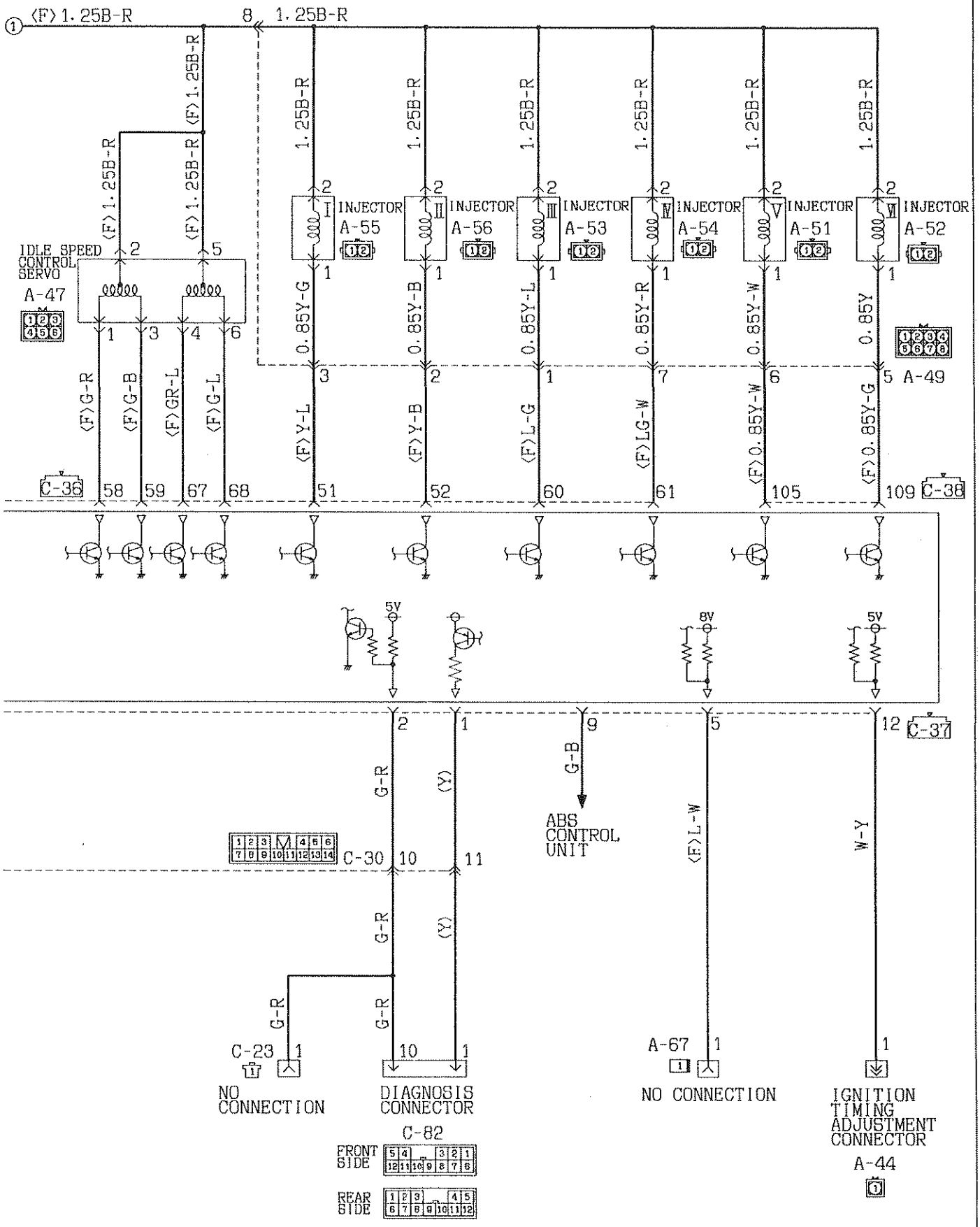
TSB Revision


FUSIBLE LINK ④
IGNITION SWITCH(IG1)
5W-R
3B-W
3B-W
3B-W
1 C-79
C-92 7
J/B
⑲
⑪
10A
10A
C-81 1 2 2 7 C-88
0.85-R
0.85R-B
B-W
4 3
STORAGE CONNECTOR
A-09X
0.85B-G
C-12 107
C-11
COMBINATION METER
CHECK ENGINE
REED
POWER TRANSISTOR
3 C-28
106 C-06 1 13
B
A/C COMPRESSOR RELAY
ENGINE COOLANT TEMPERATURE SWITCH(A/C)
G-W
Y-W
0.85B-G
C-30
3 6
2B
G-W
(F)W
(F)G-L
G-W
Y-W
65 54 C-36 7 C-37 103 C-38 64 C-36 18 C-37
BATTERY BACK UP
ENGINE CONTROL UNIT
5V
C-28
C-30



KX35-AC-00501A-N

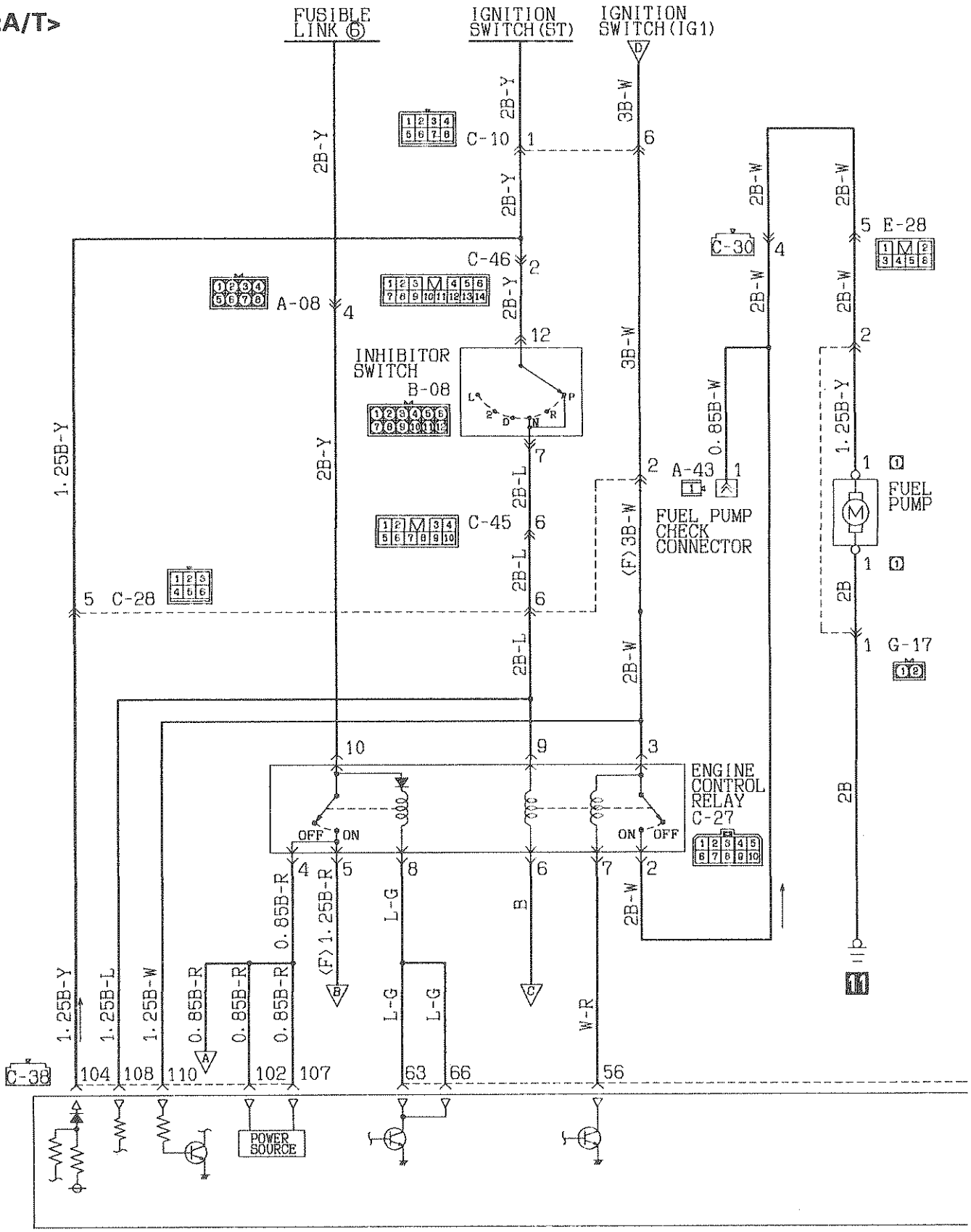
TSB Revision



TSB Revision

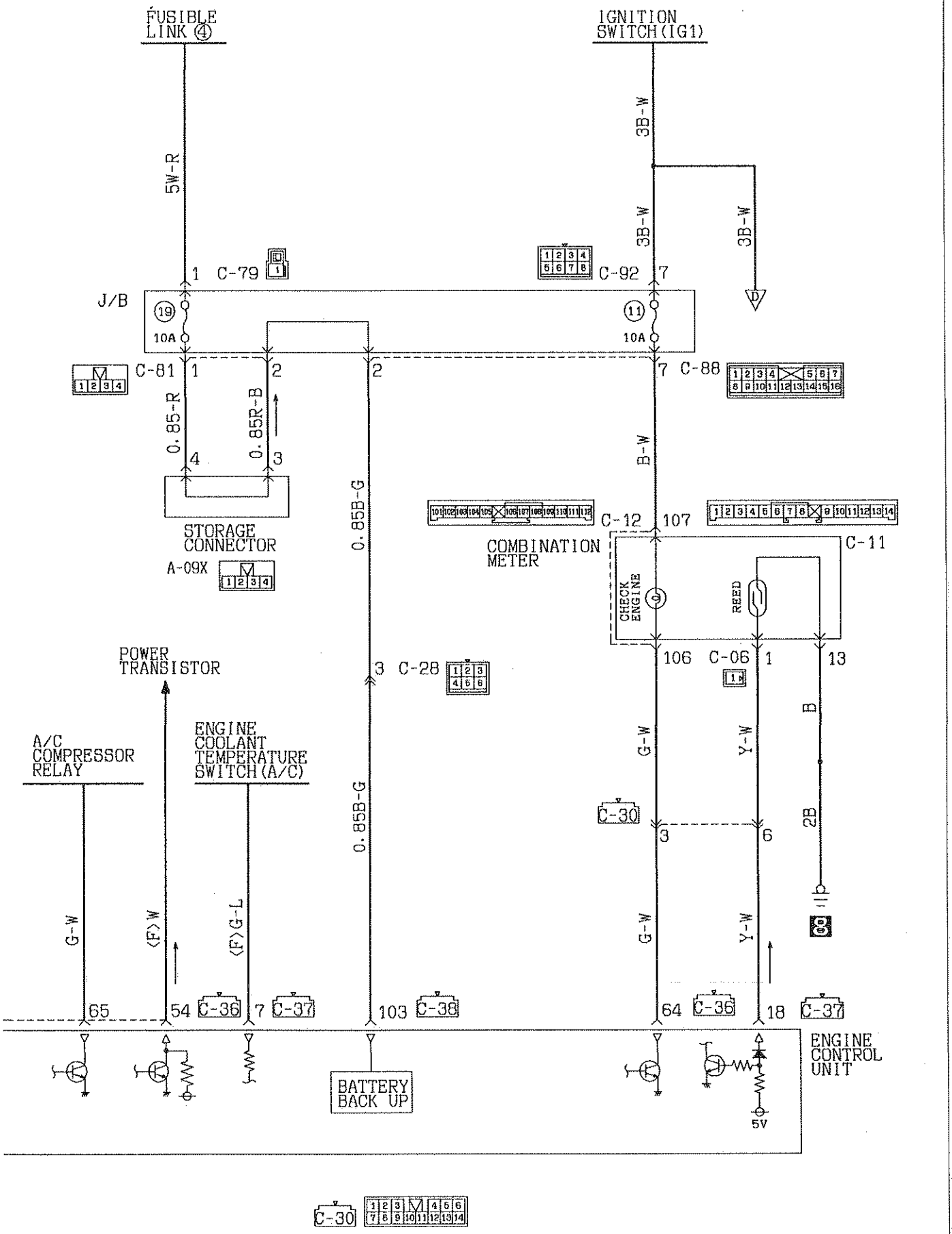
MPI SYSTEM

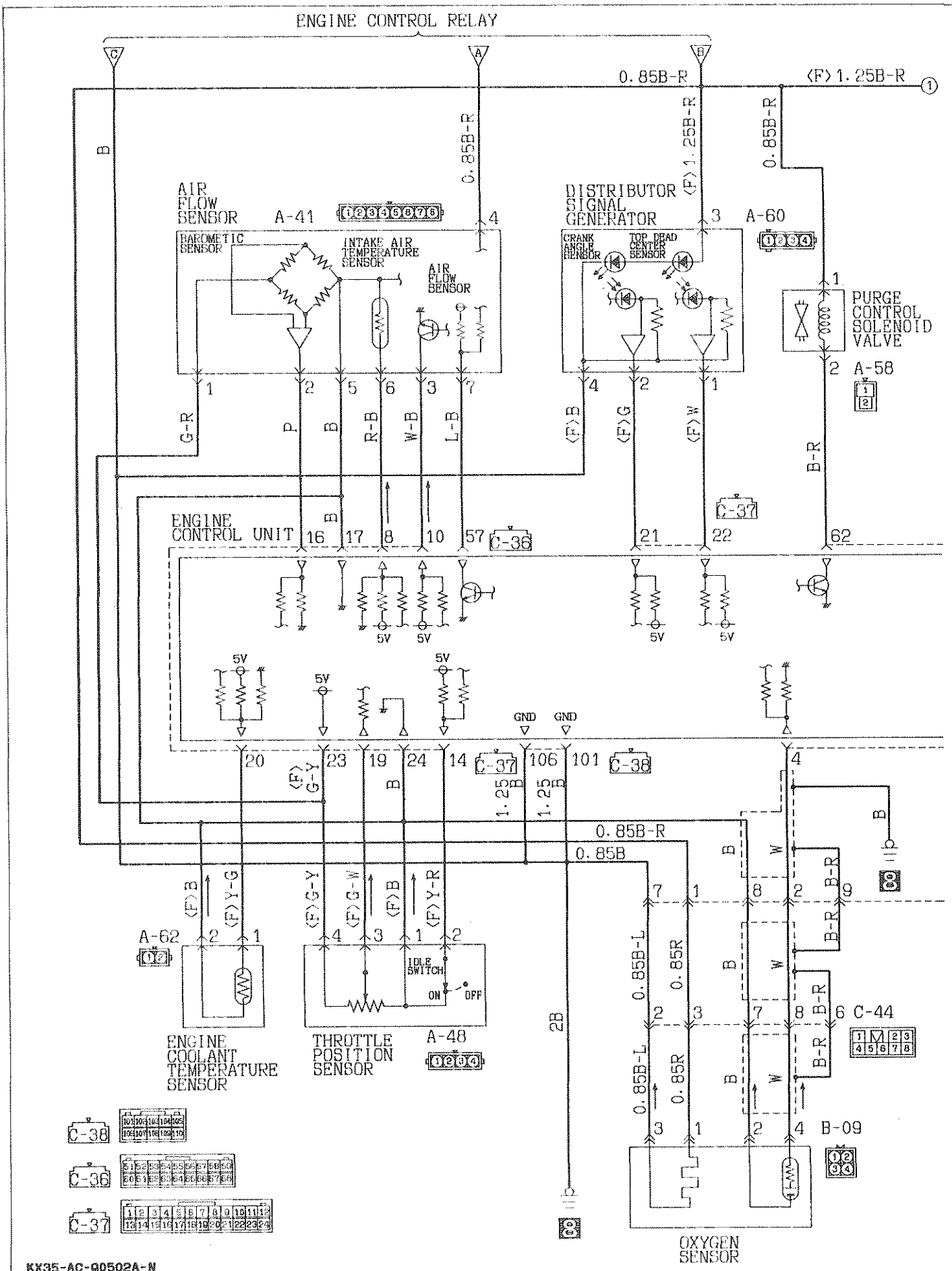
<A/T>



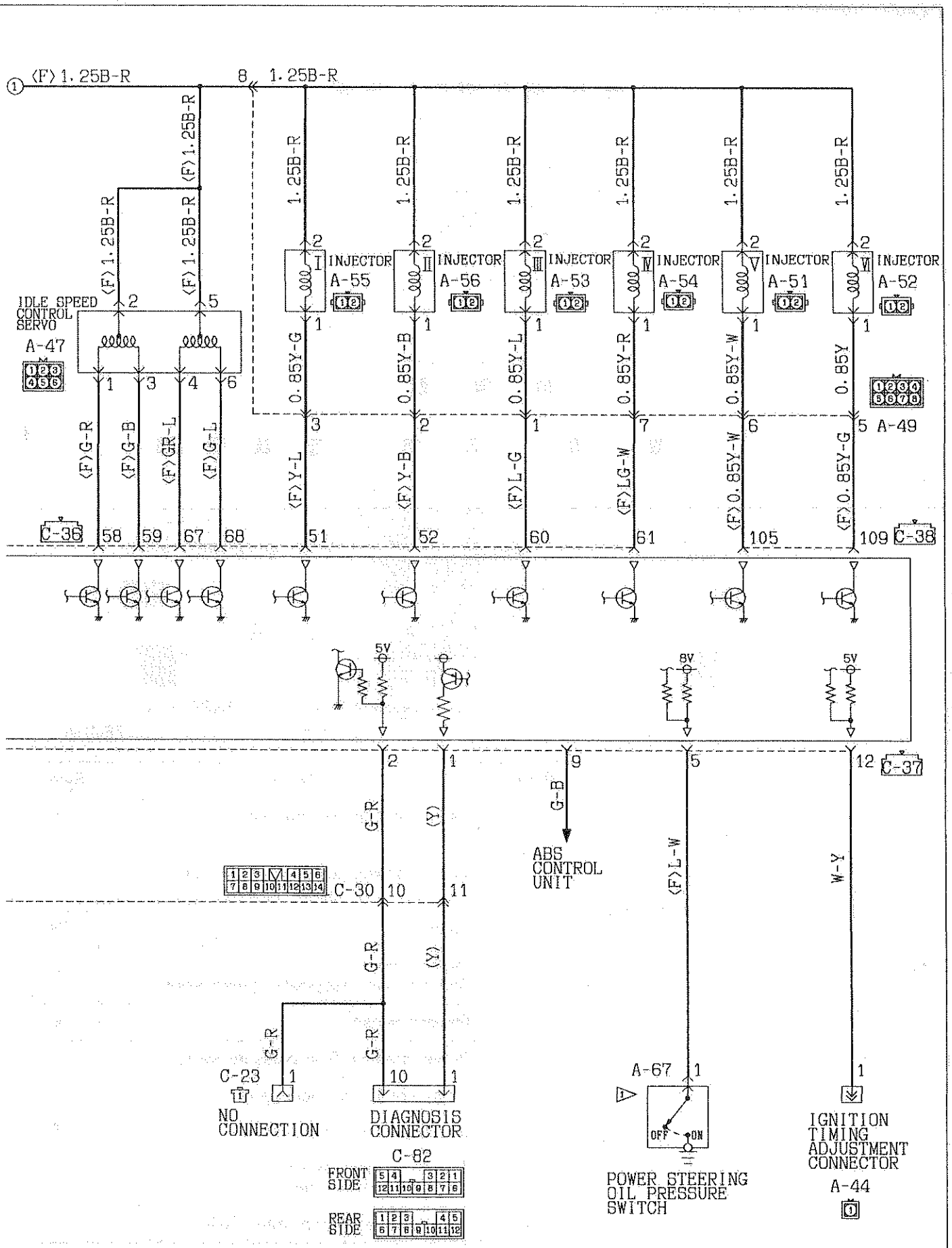
KX35-AC-00502-N

TSB Revision

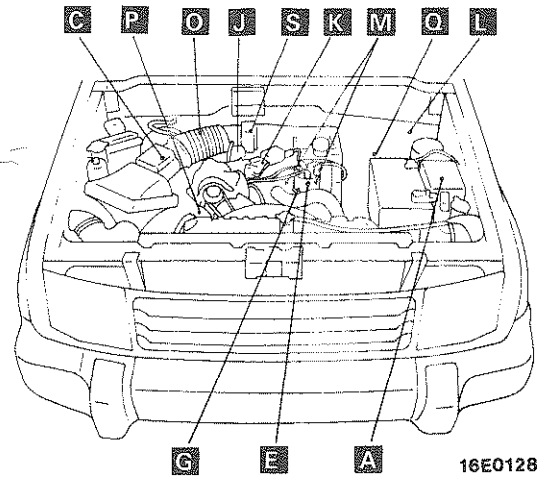

FUSIBLE LINK ④
IGNITION SWITCH(IG1)
5W-R
3B-W
3B-W
3B-W
1 C-79
C-92 7
J/B
⑲ 10A
⑪ 10A
C-81 1 2
2
7 C-88
0.85-R
0.85R-B
4 3
B-W
STORAGE CONNECTOR
A-09X
0.85B-G
C-12 107
COMBINATION METER
C-11
CHECK ENGINE
REED
POWER TRANSISTOR
3 C-28
106 C-06 1
13
B
A/C COMPRESSOR RELAY
ENGINE COOLANT TEMPERATURE SWITCH(A/C)
G-W
Y-W
C-30
3
6
2B
G-W
⟨F⟩W
⟨F⟩G-L
0.85B-G
G-W
Y-W
65 54 C-36 7 C-37
103 C-38
64 C-36 18 C-37
ENGINE CONTROL UNIT
BATTERY BACK UP
5V
C-30

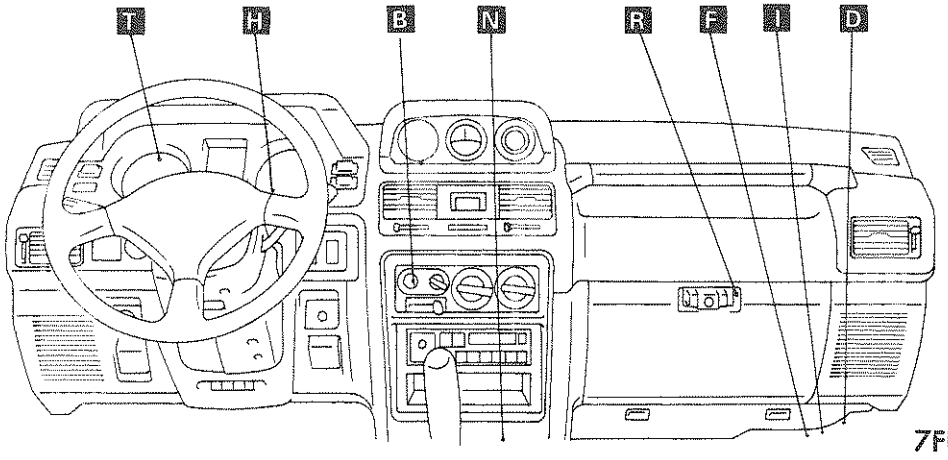


TSB Revision


(F) 1.25B-R
1.25B-R
INJECTOR A-55
INJECTOR A-56
INJECTOR A-53
INJECTOR A-54
INJECTOR A-51
INJECTOR A-52
IDLE SPEED CONTROL SERVO A-47
0.85Y-G
0.85Y-B
0.85Y-L
0.85Y-R
0.85Y-W
0.85Y
A-49
(F)G-R
(F)G-B
(F)GR-L
(F)G-L
(F)Y-L
(F)Y-B
(F)L-G
(F)LG-W
(F)0.85Y-W
(F)0.85Y-G
C-36
C-38
5V
8V
C-37
G-R
(Y)
G-B
(F)L-W
W-Y
C-30
ABS CONTROL UNIT
C-23
NO CONNECTION
DIAGNOSIS CONNECTOR
C-82
FRONT SIDE
REAR SIDE
A-67
OFF
ON
POWER STEERING OIL PRESSURE SWITCH
IGNITION TIMING ADJUSTMENT CONNECTOR
A-44

COMPONENTS LOCATION

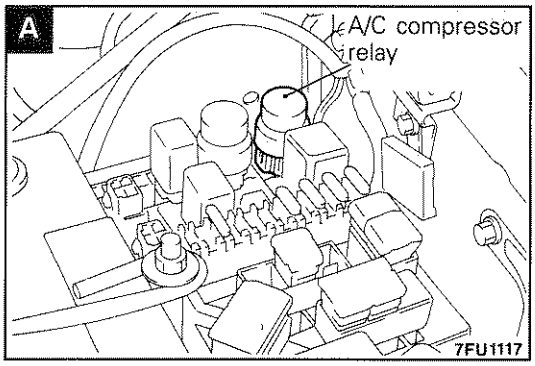




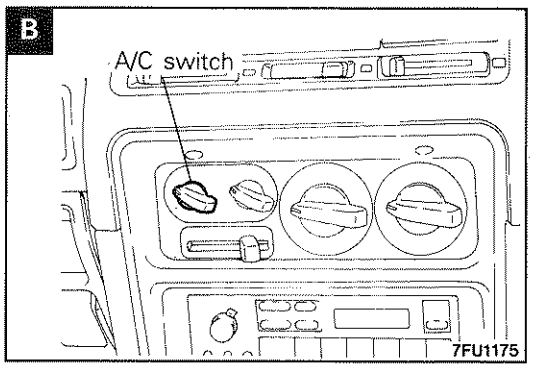
Name	Symbol	Name	Symbol
Air conditioner compressor relay	A	Ignition coil (power transistor)	K
Air conditioner switch	B	Ignition timing adjustment connector	L
Air flow sensor (With intake air temperature sensor and barometric pressure sensor)	C	Injector	M
Engine control relay	D	Inhibitor switch (Vehicles with automatic transmission)	N
Crank angle sensor	E	Oxygen sensor	O
Engine control unit	F	Power steering fluid pressure switch	P
Engine coolant temperature sensor	G	Purge control solenoid valve	Q
Check engine warning light	H	Self-diagnosis connector	R
Fuel pump check connector	I	Throttle position sensor (with idle position sensor)	S
Idle speed control servo	J	Vehicle speed sensor (reed switch)	T

NOTE
The "Name" column is arranged in alphabetical order.

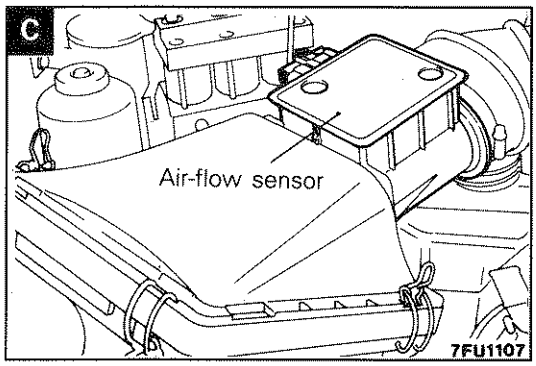
A


A/C compressor relay
7FU1117

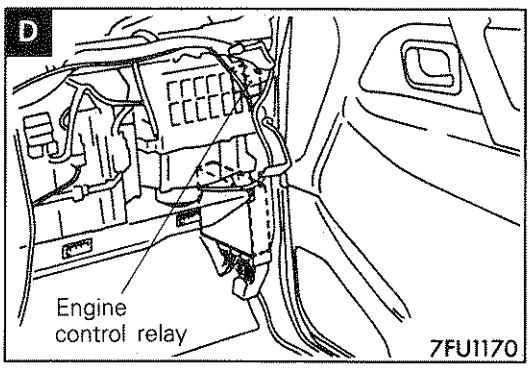
B


A/C switch
7FU1175

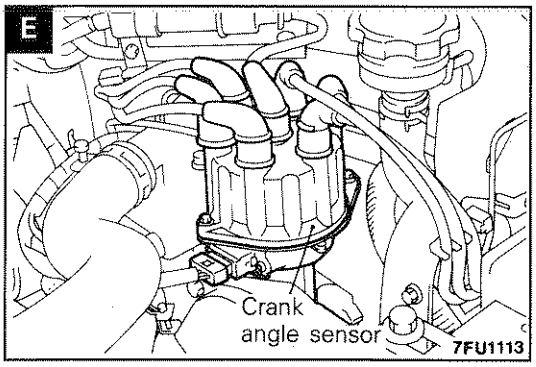
C


Air-flow sensor
7FU1107

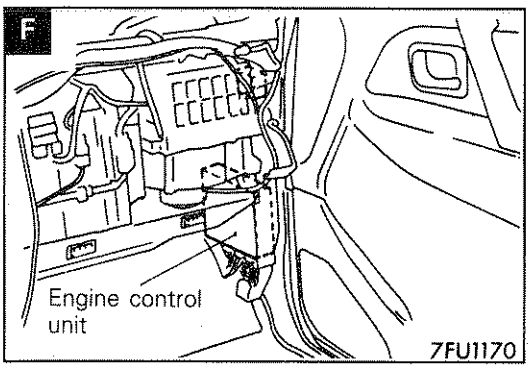
D


Engine control relay
7FU1170

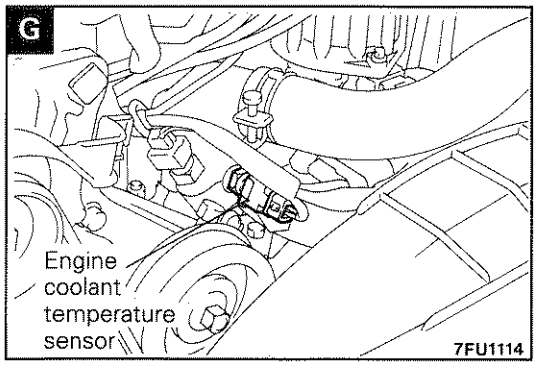
E


Crank angle sensor
7FU1113

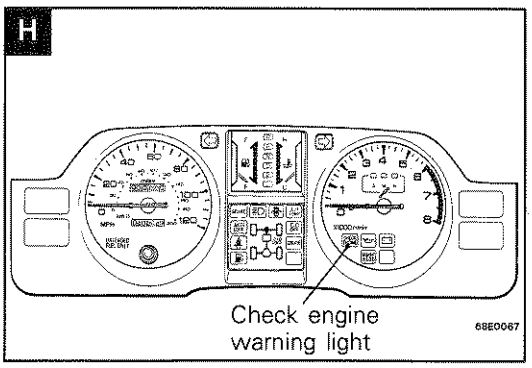
F


Engine control unit
7FU1170

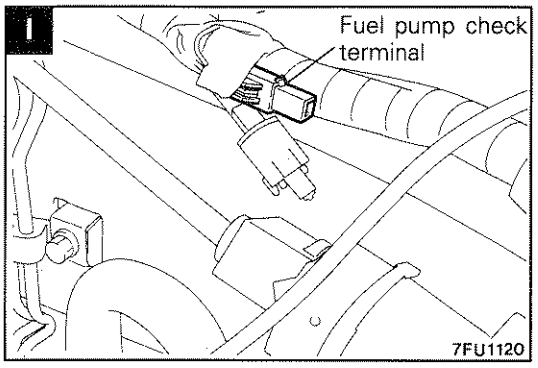
G


Engine coolant temperature sensor
7FU1114

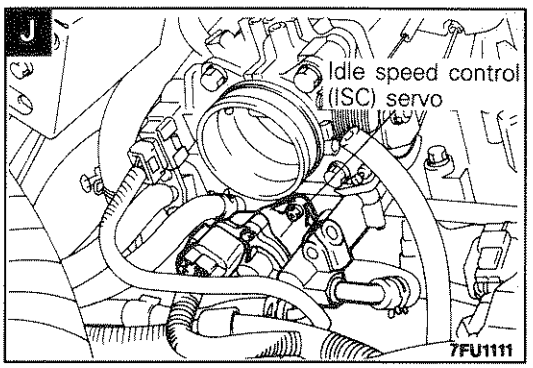
H


Check engine warning light
68E0067

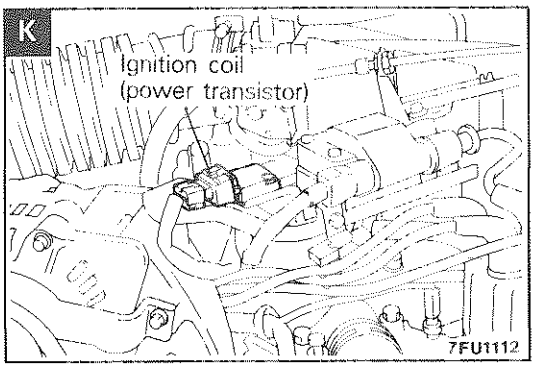
I


Fuel pump check terminal
7FU1120

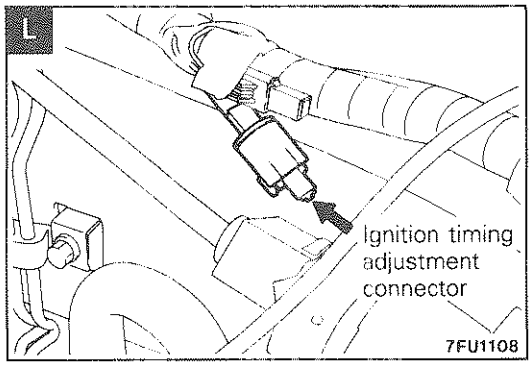
J


Idle speed control (ISC) servo
7FU1111

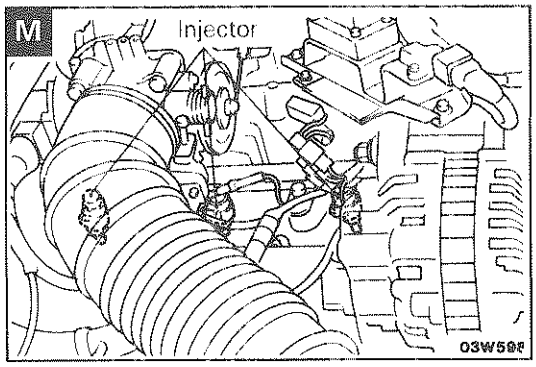
K



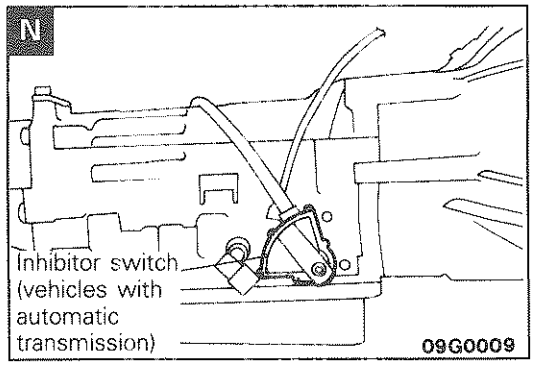
L



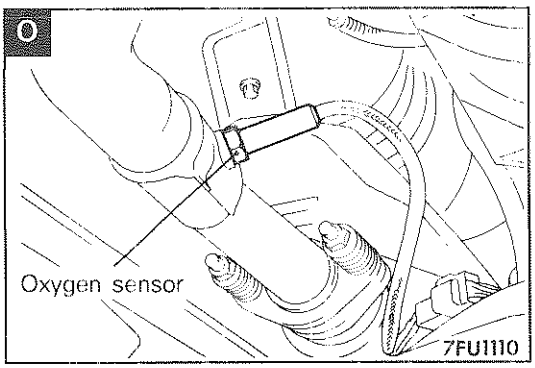
M



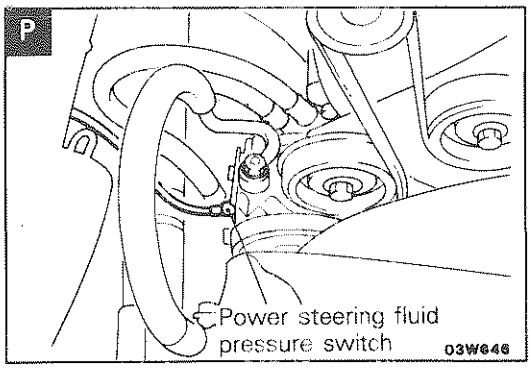
N



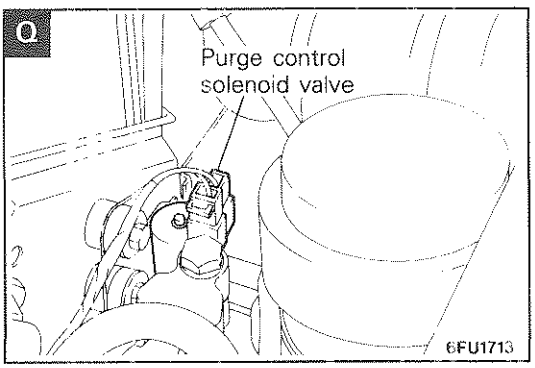
O



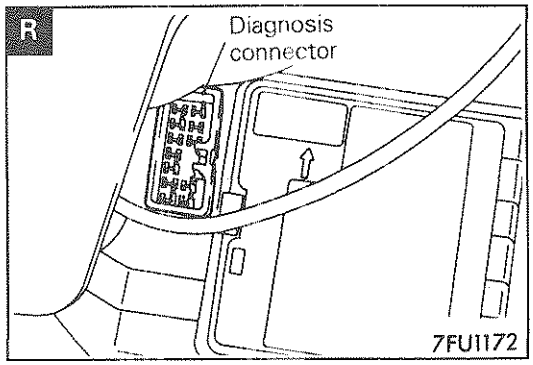
P



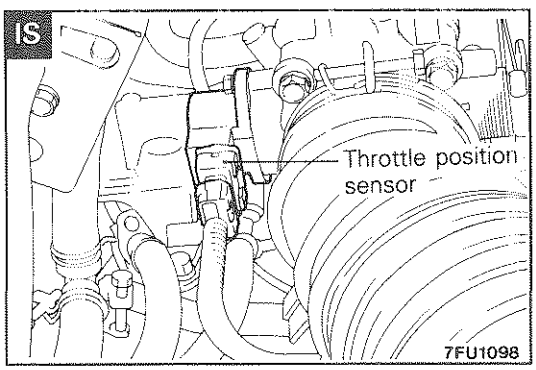
Q



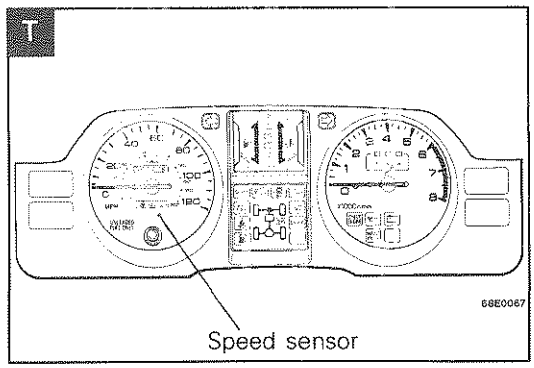
R



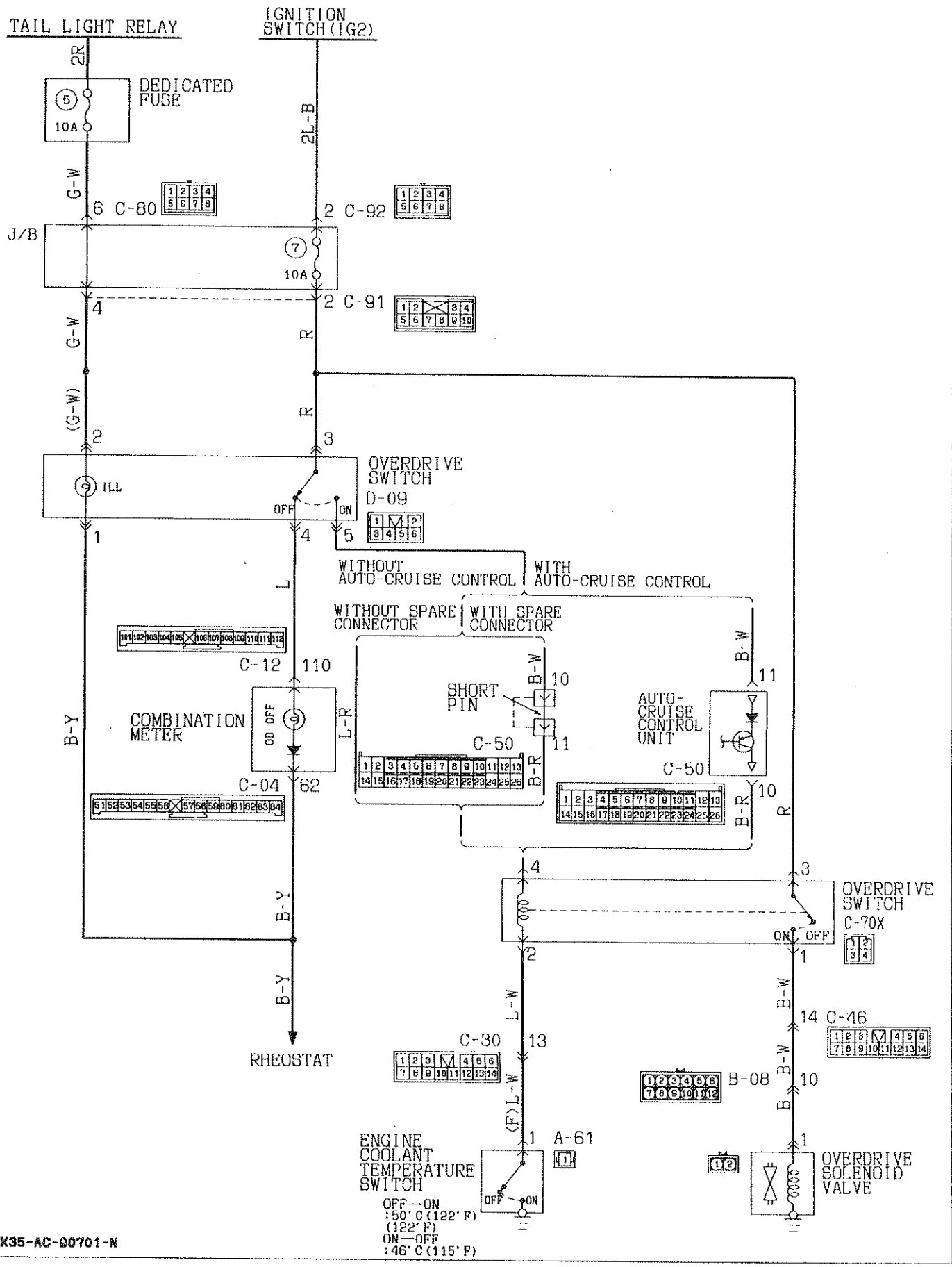
IS



T



OVERDRIVE CONTROL SYSTEM

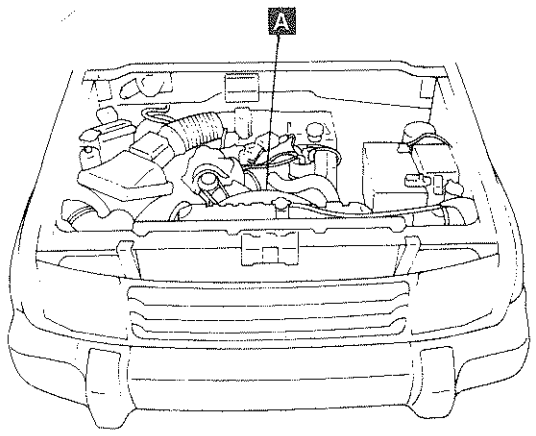


TSB Revision

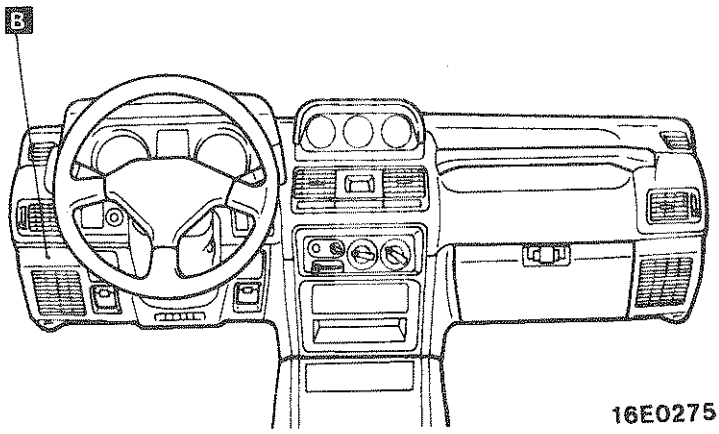
COMPONENTS LOCATION

Name	Symbol
Engine coolant temperature switch	A
Overdrive relay	B

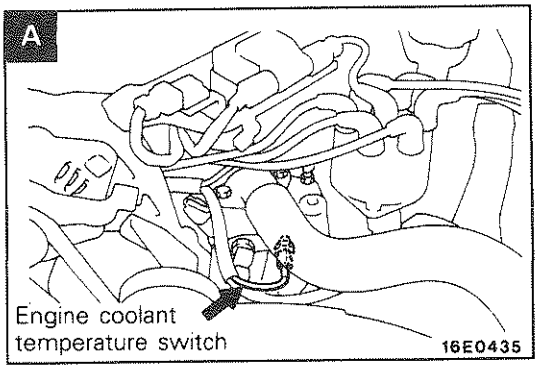
NOTE
The "Name" column is arranged in alphabetical order

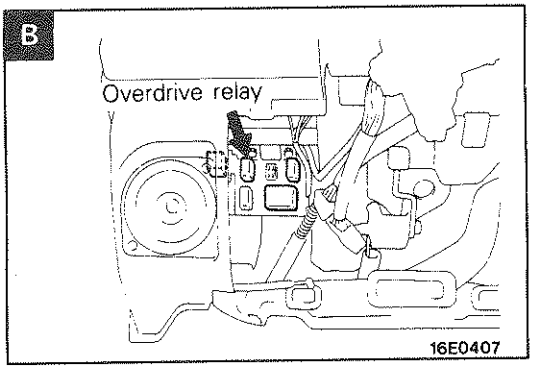


16E0128



16E0275

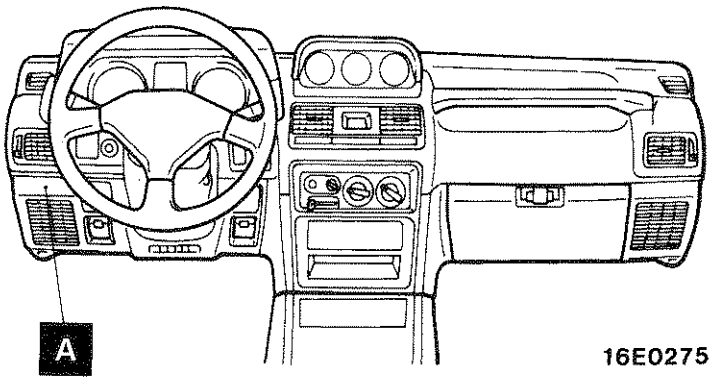


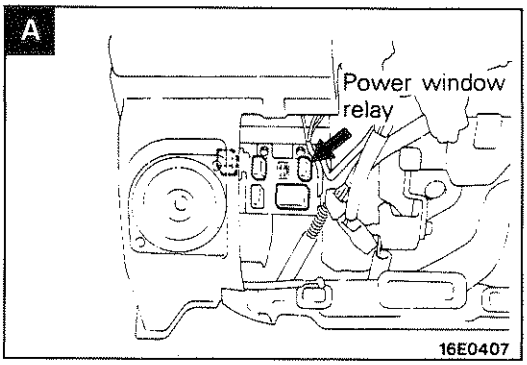


POWER WINDOW

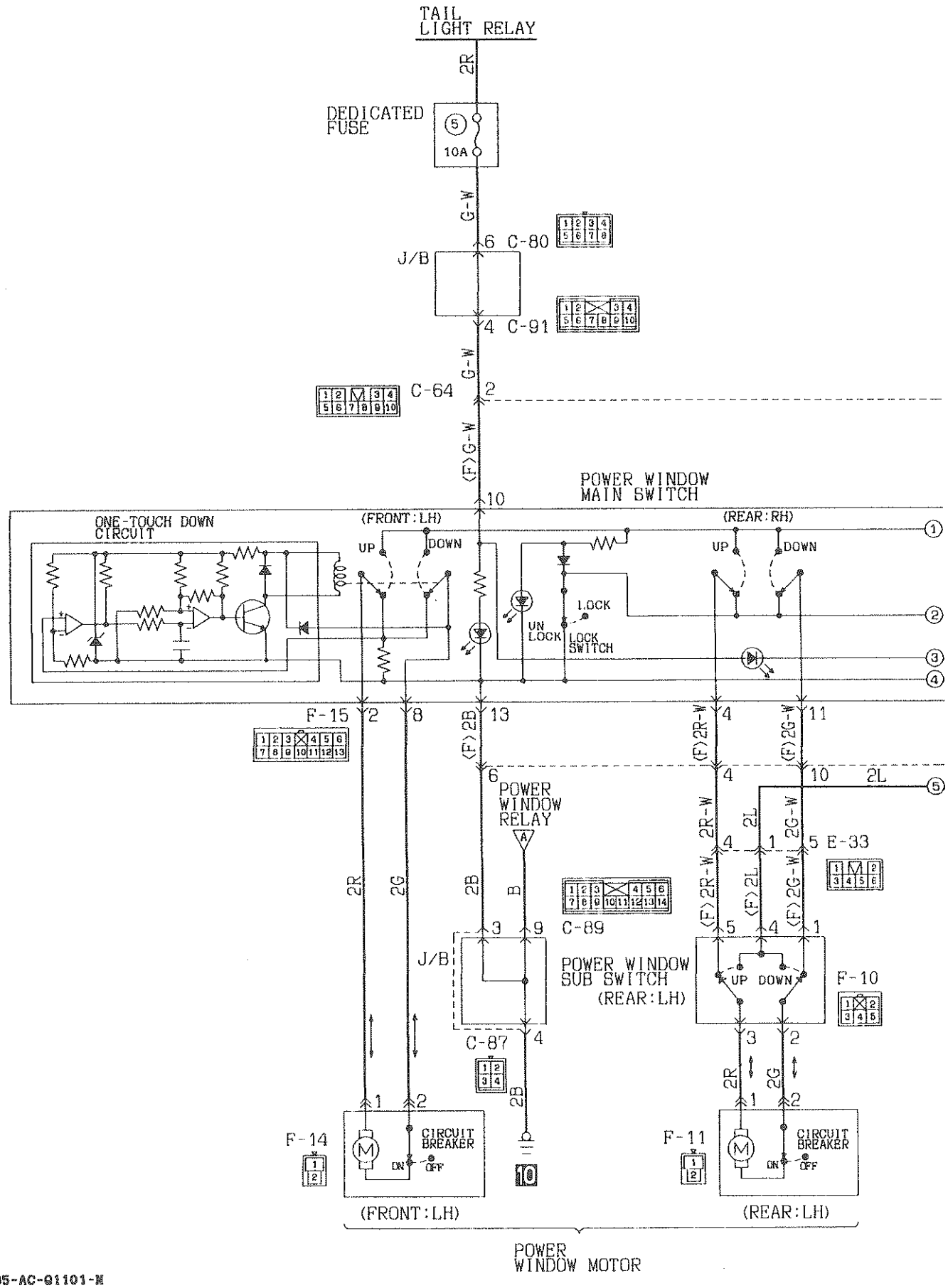
COMPONENTS LOCATION

Name	Symbol
Power window relay	A

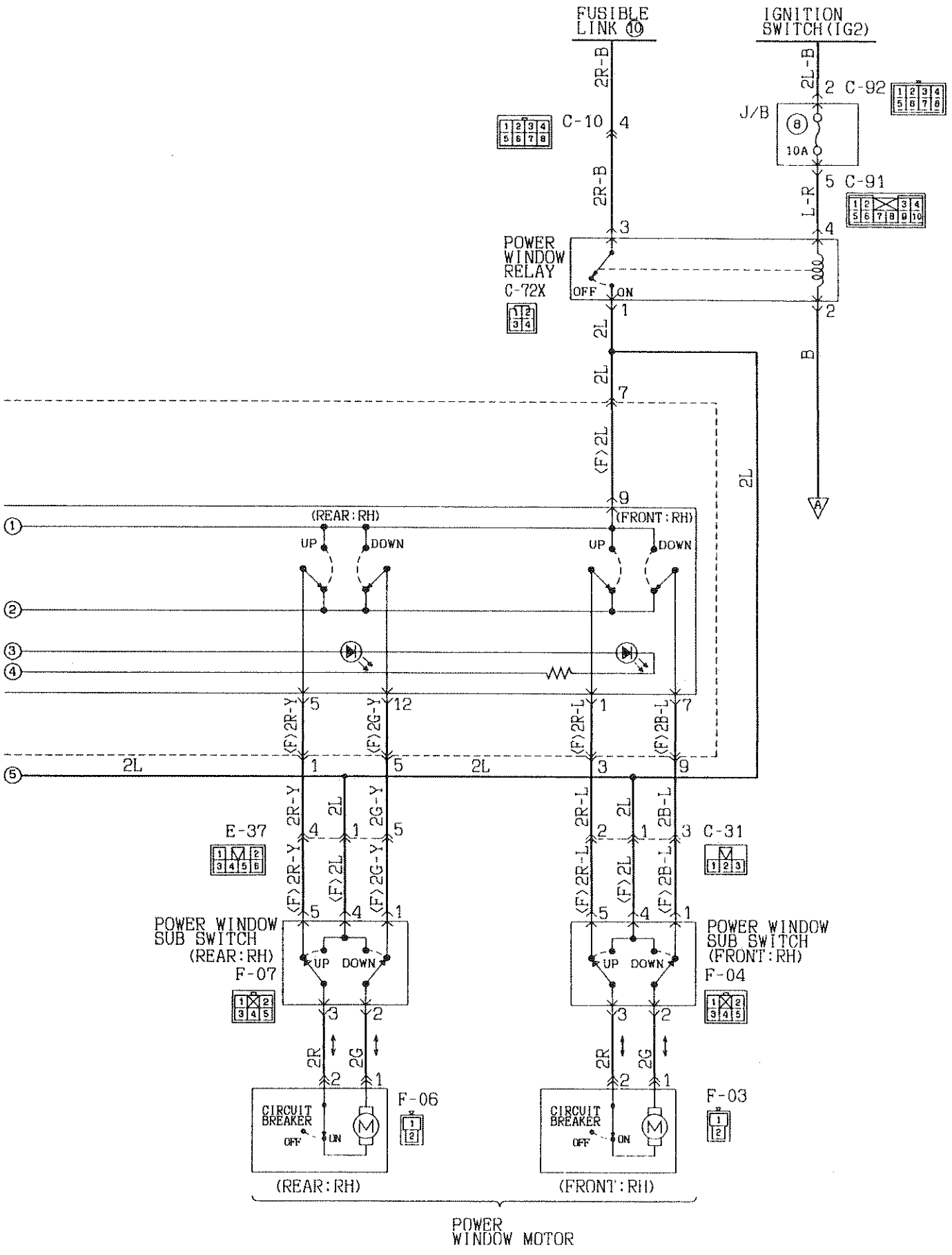




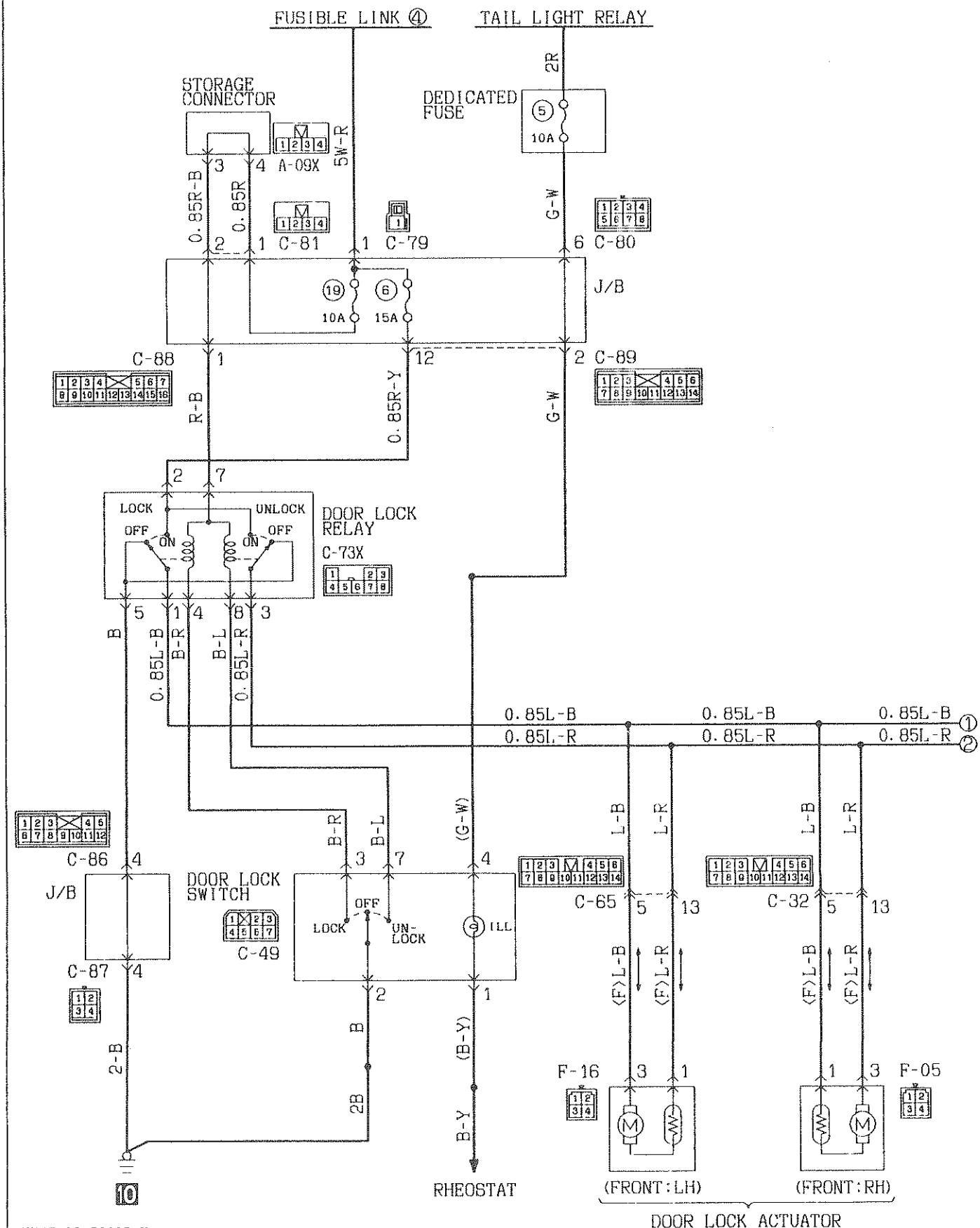
POWER WINDOW



KK35-AC-01101-M

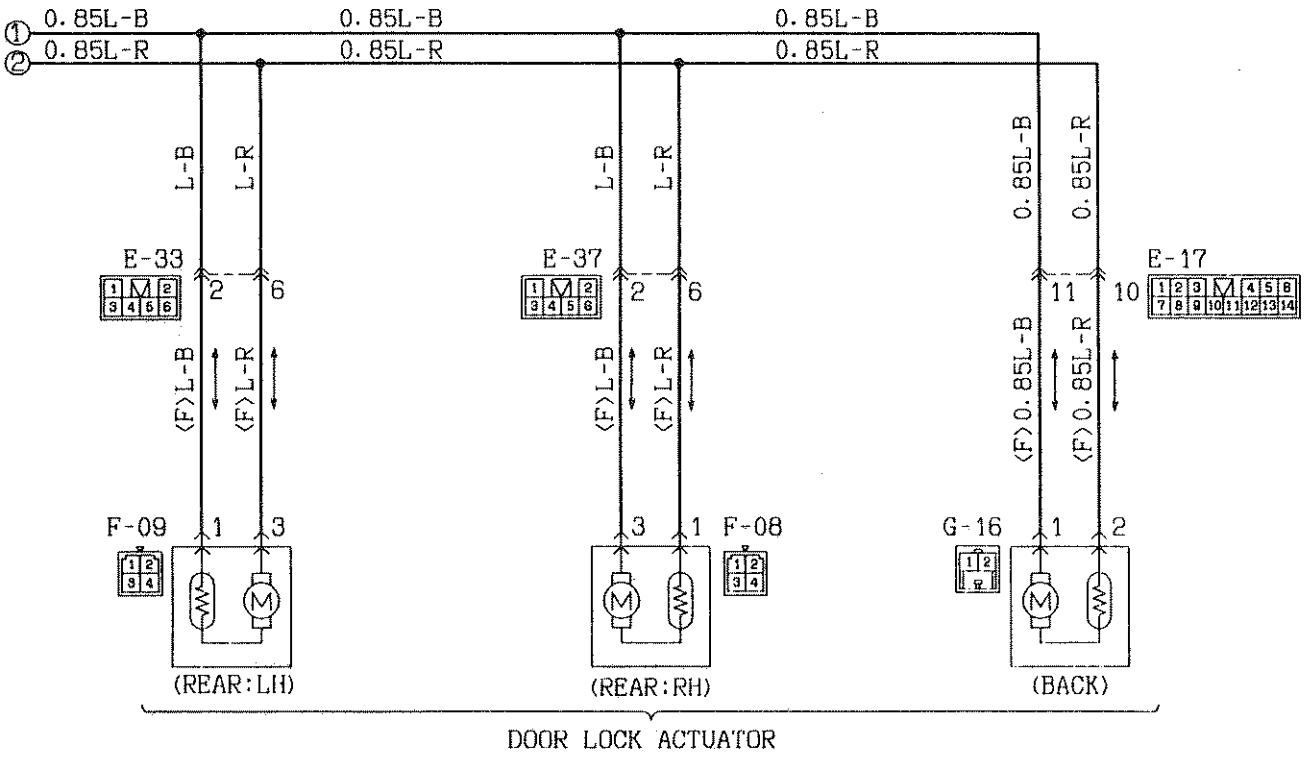

FUSIBLE LINK ⑩
IGNITION SWITCH (IG2)
2R-B
2L-B
C-10
C-92
J/B
⑧
10A
L-R
C-91
POWER WINDOW RELAY
C-72X
OFF
ON
2L
B
(F)2L
(REAR:RH)
(FRONT:RH)
UP
DOWN
(F)2R-Y
(F)2G-Y
(F)2R-L
(F)2B-L
E-37
C-31
POWER WINDOW SUB SWITCH (REAR:RH)
F-07
POWER WINDOW SUB SWITCH (FRONT:RH)
F-04
2R
2G
CIRCUIT BREAKER
F-06
F-03
(REAR:RH)
(FRONT:RH)
POWER WINDOW MOTOR

CENTRAL DOOR LOCK SYSTEM



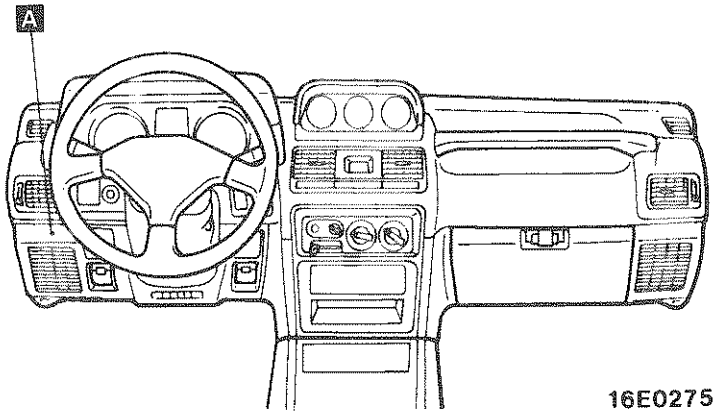
KX35-AC-01102-M

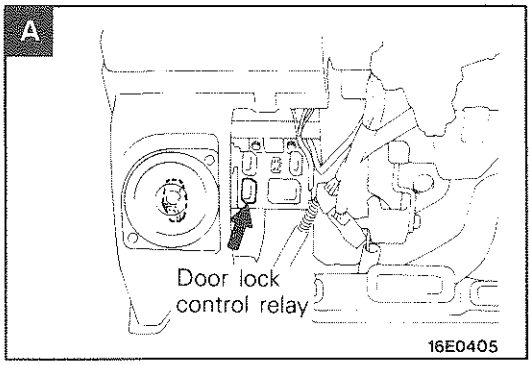
TSB Revision


0.85L-B
0.85L-R
0.85L-B
0.85L-R
0.85L-B
0.85L-R
L-B
L-R
L-B
L-R
0.85L-B
0.85L-R
E-33
E-37
E-17
2
6
2
6
11
10
(F)L-B
(F)L-R
(F)L-B
(F)L-R
(F)0.85L-B
(F)0.85L-R
F-09
1
3
3
1
F-08
G-16
1
2
(REAR:LH)
(REAR:RH)
(BACK)
DOOR LOCK ACTUATOR

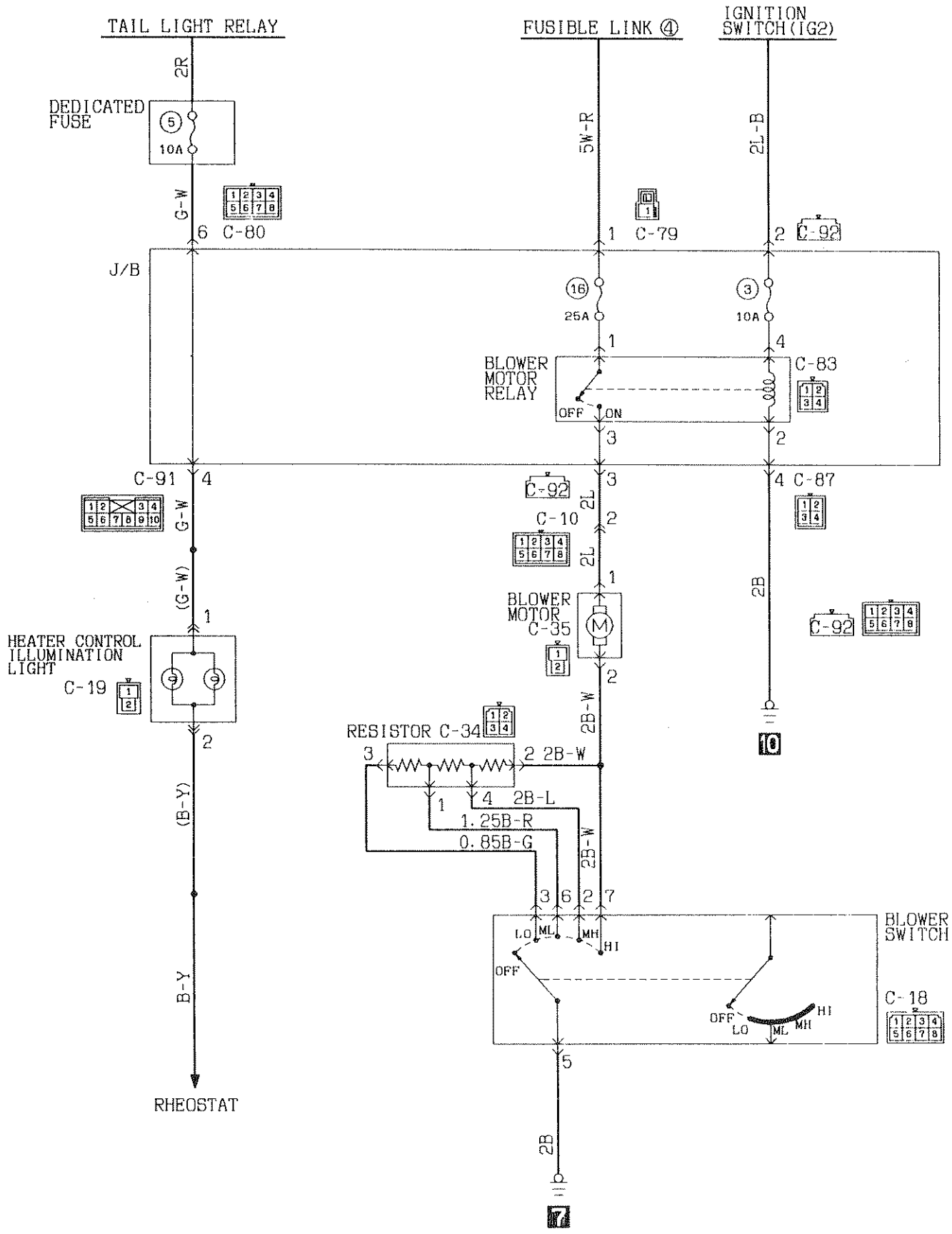
COMPONENTS LOCATION

Name	Symbol
Door lock control relay	A





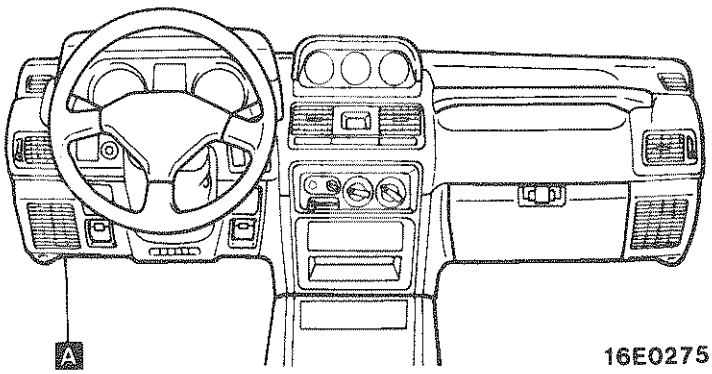
HEATER

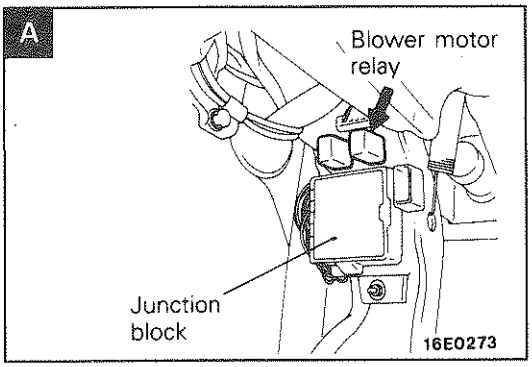


KK35-AC-01201-N

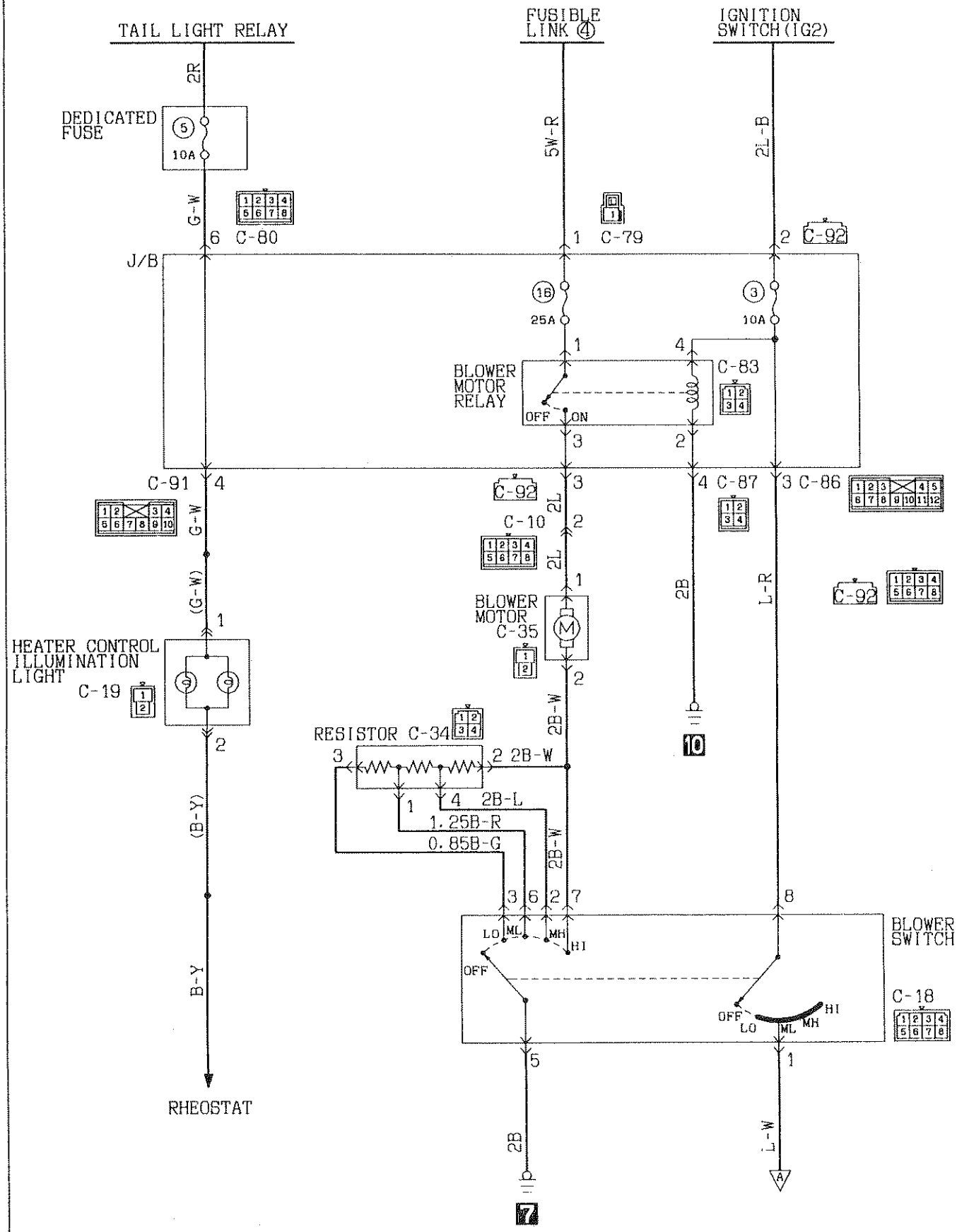
COMPONENTS LOCATION

Name	Symbol
Blower motor relay	A

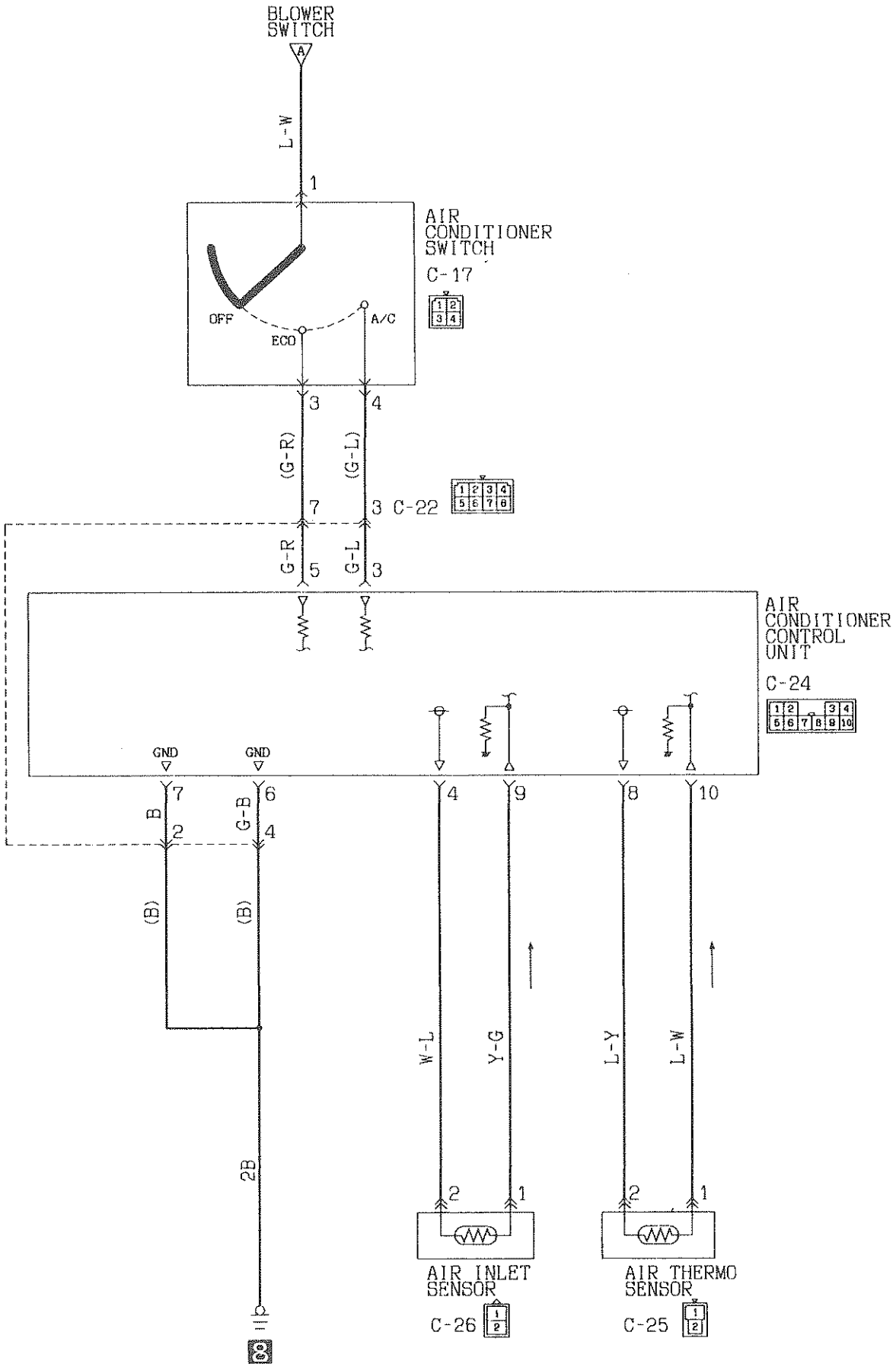




AIR CONDITIONER

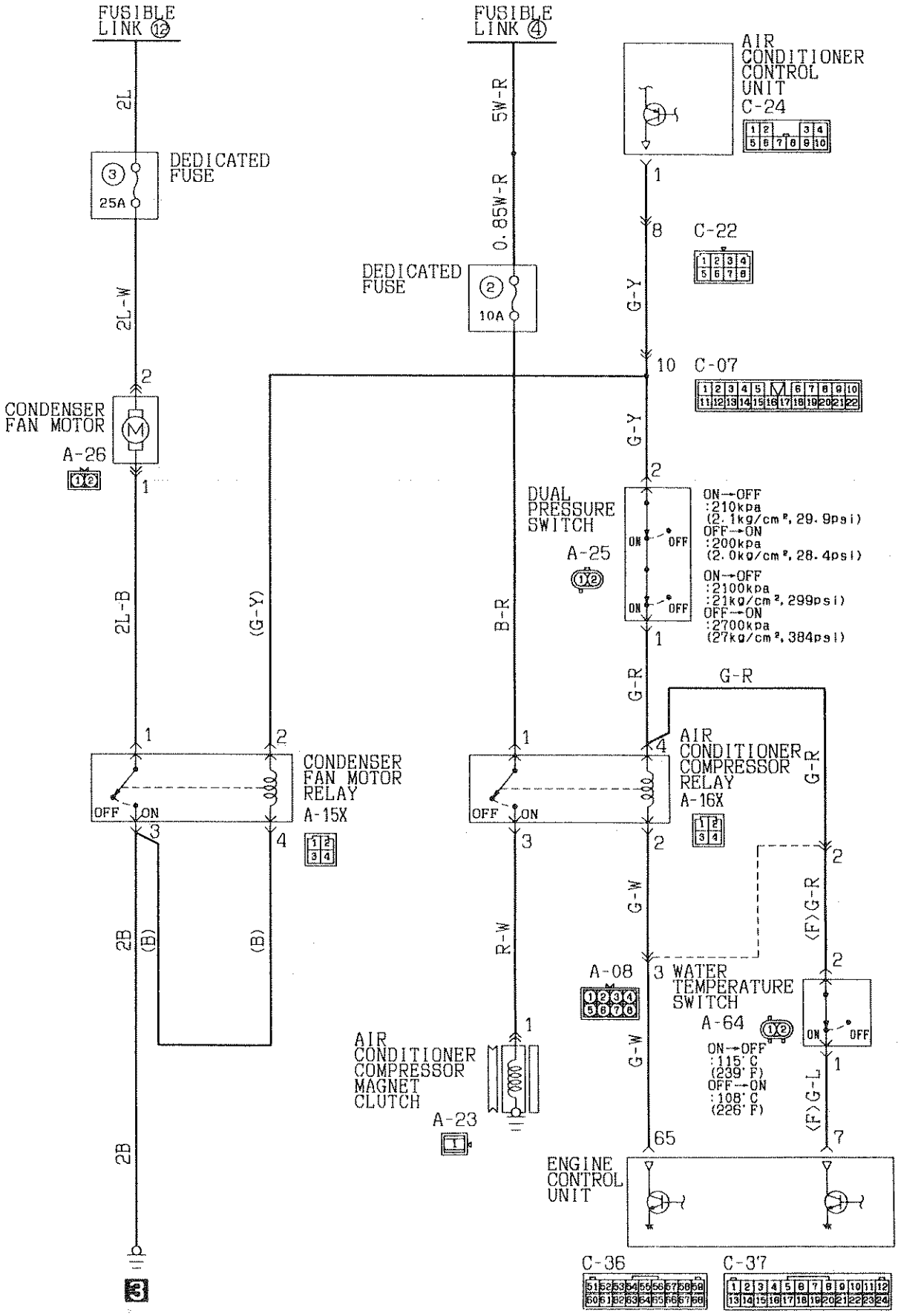


KK35-AC-01202-N



KX35-AC-01202A-N

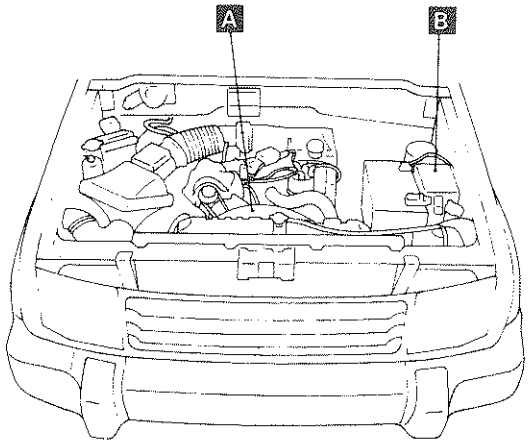
TSB Revision

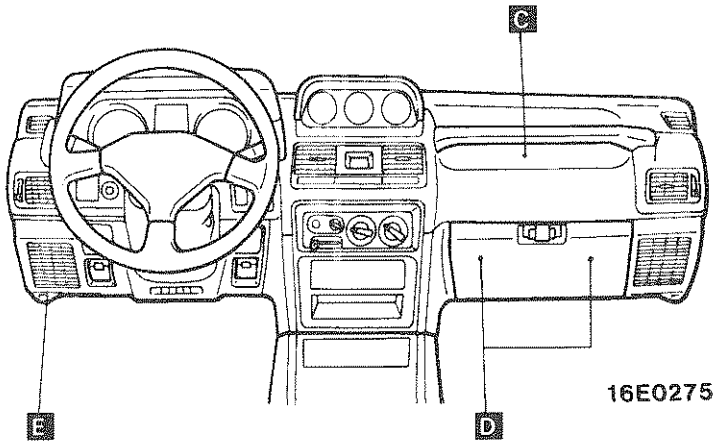

FUSIBLE LINK ⑫
FUSIBLE LINK ④
AIR CONDITIONER CONTROL UNIT
C-24
2L
5W-R
DEDICATED FUSE
③ 25A
0.85W-R
DEDICATED FUSE
② 10A
C-22
G-Y
2L-W
10
C-07
CONDENSER FAN MOTOR
A-26
G-Y
DUAL PRESSURE SWITCH
A-25
ON→OFF :210kPa (2.1kg/cm², 29.9psi)
OFF→ON :200kPa (2.0kg/cm², 28.4psi)
ON→OFF :2100kPa (21kg/cm², 299psi)
OFF→ON :2700kPa (27kg/cm², 384psi)
2L-B
(G-Y)
B-R
G-R
G-R
AIR CONDITIONER COMPRESSOR RELAY
A-16X
CONDENSER FAN MOTOR RELAY
A-15X
OFF
ON
G-R
2B
(B)
(B)
R-W
G-W
(F)G-R
A-08
3 WATER TEMPERATURE SWITCH
A-64
ON→OFF :115°C (239°F)
OFF→ON :108°C (226°F)
AIR CONDITIONER COMPRESSOR MAGNET CLUTCH
A-23
(F)G-L
2B
65
7
ENGINE CONTROL UNIT
C-36
C-37
3

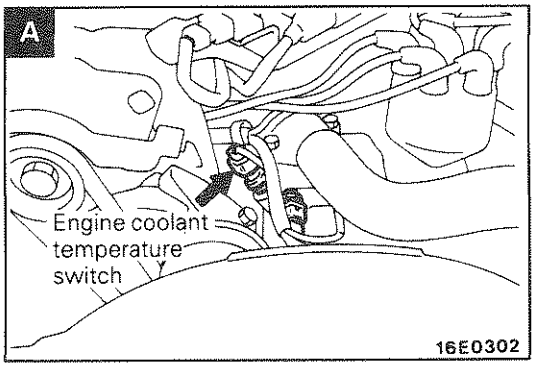
COMPONENTS LOCATION

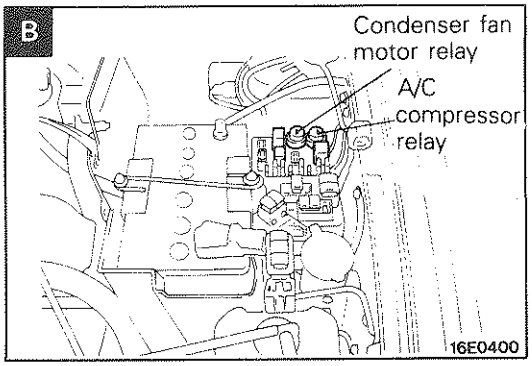
Name	Symbol	Name	Symbol
A/C compressor relay	B	Blower motor relay	E
A/C control unit	C	Condenser fan motor relay	B
Air inlet sensor	D	Engine coolant temperature switch	A
Air thermo sensor	D		

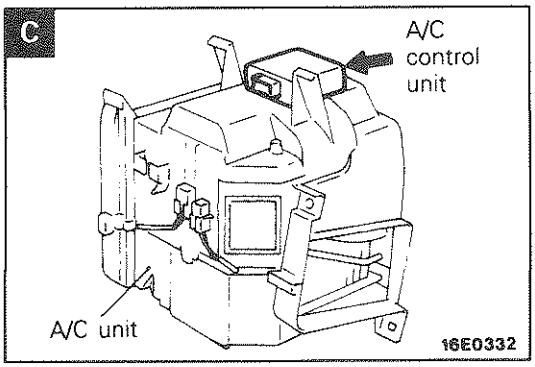
NOTE
The "Name" column is arranged in alphabetical order.





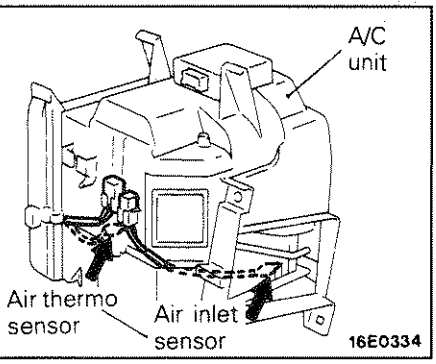




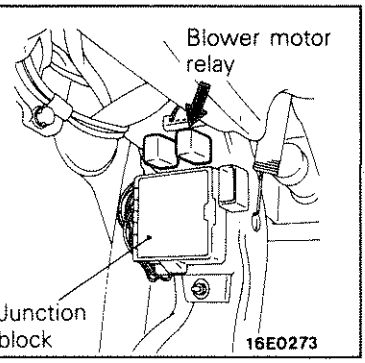


TSB Revision

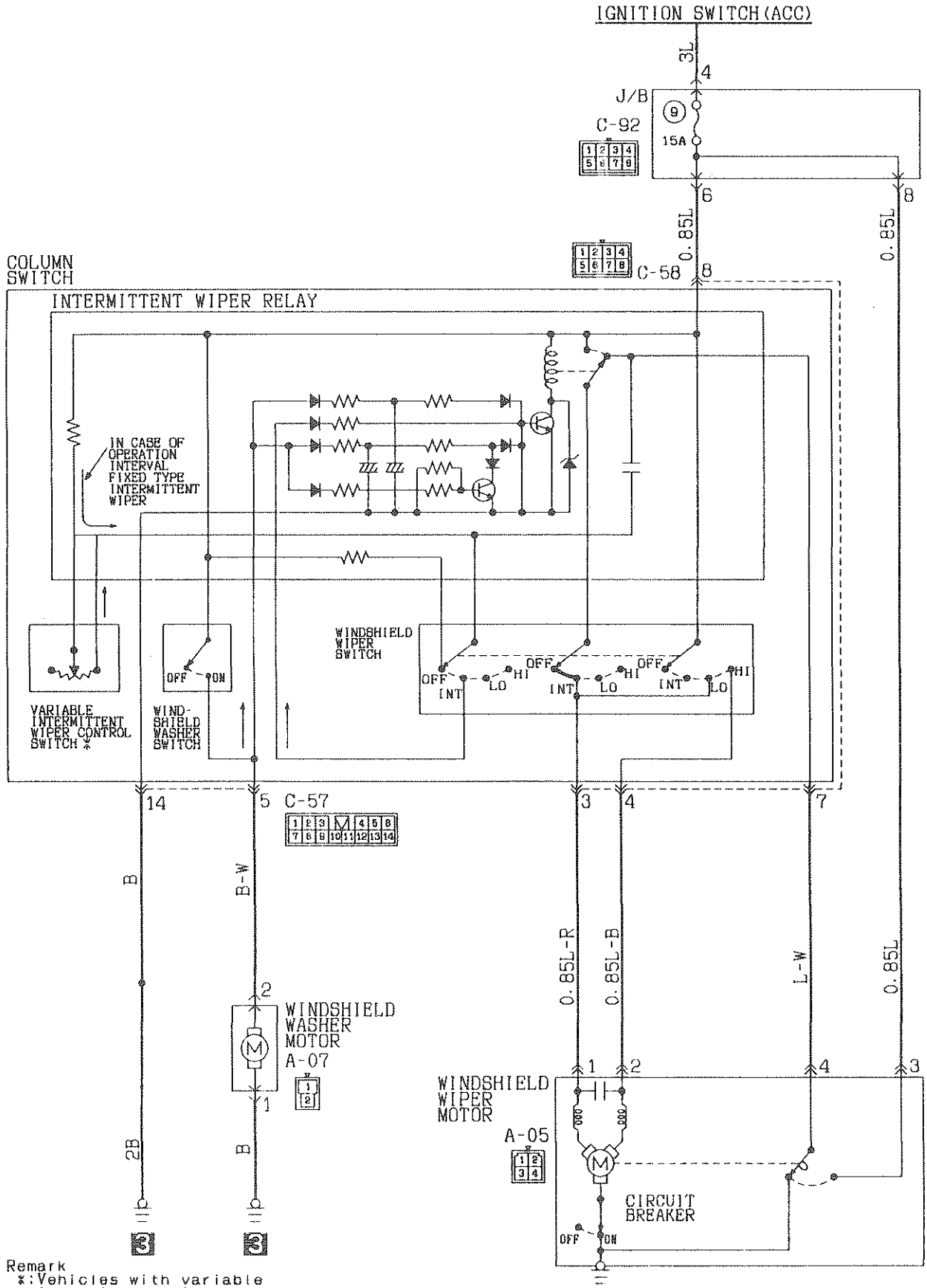
D


A/C unit
Air thermo sensor
Air inlet sensor
16E0334

E


Blower motor relay
Junction block
16E0273

WINDSHIELD WIPER AND WASHER



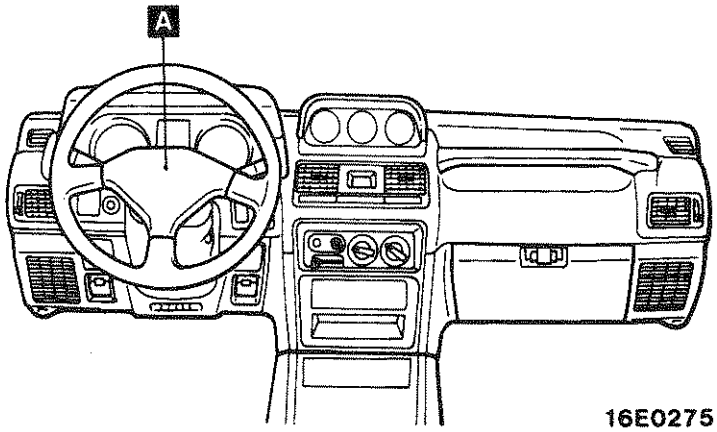
Remark
*:Vehicles with variable intermittent wiper.

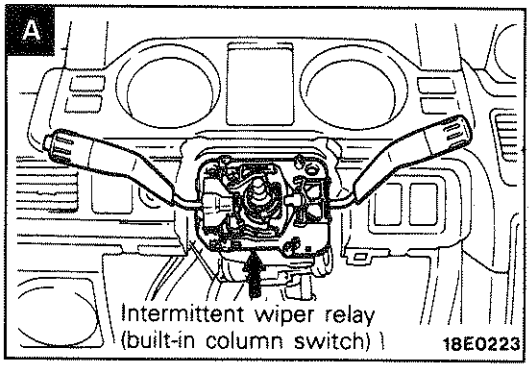
KX35-AC-01301-N

TSB Revision

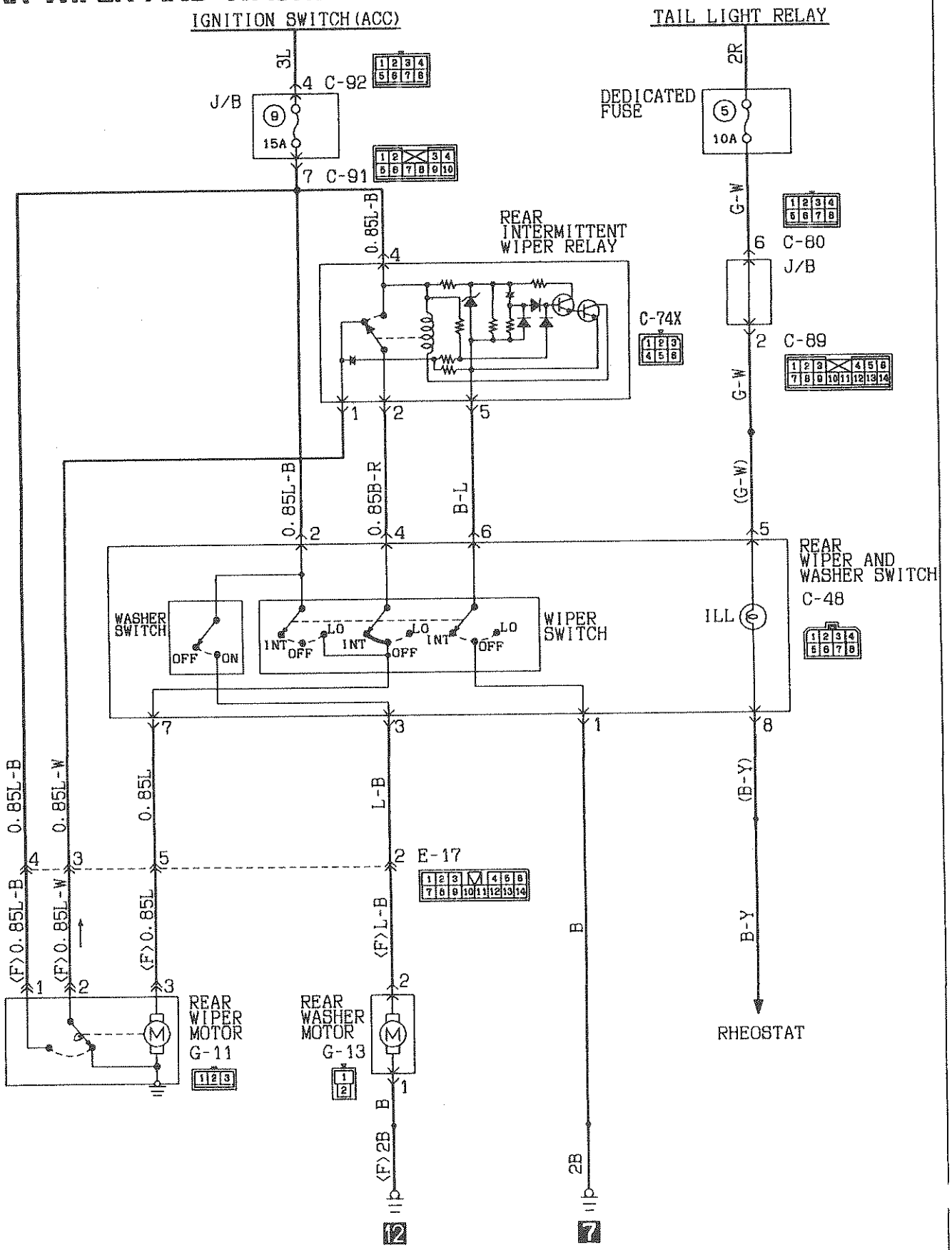
COMPONENTS LOCATION

Name	Symbol
Intermittent wiper relay	A





REAR WIPER AND WASHER

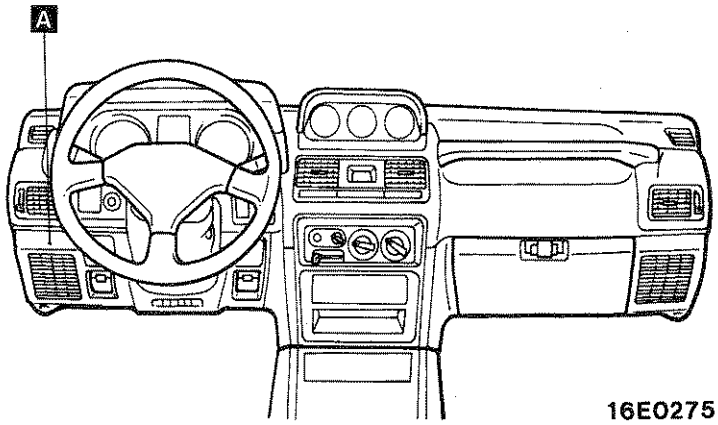


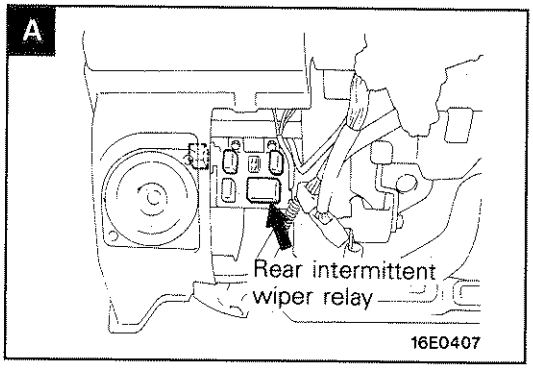
KK35-AC-01302-N

TSB Revision

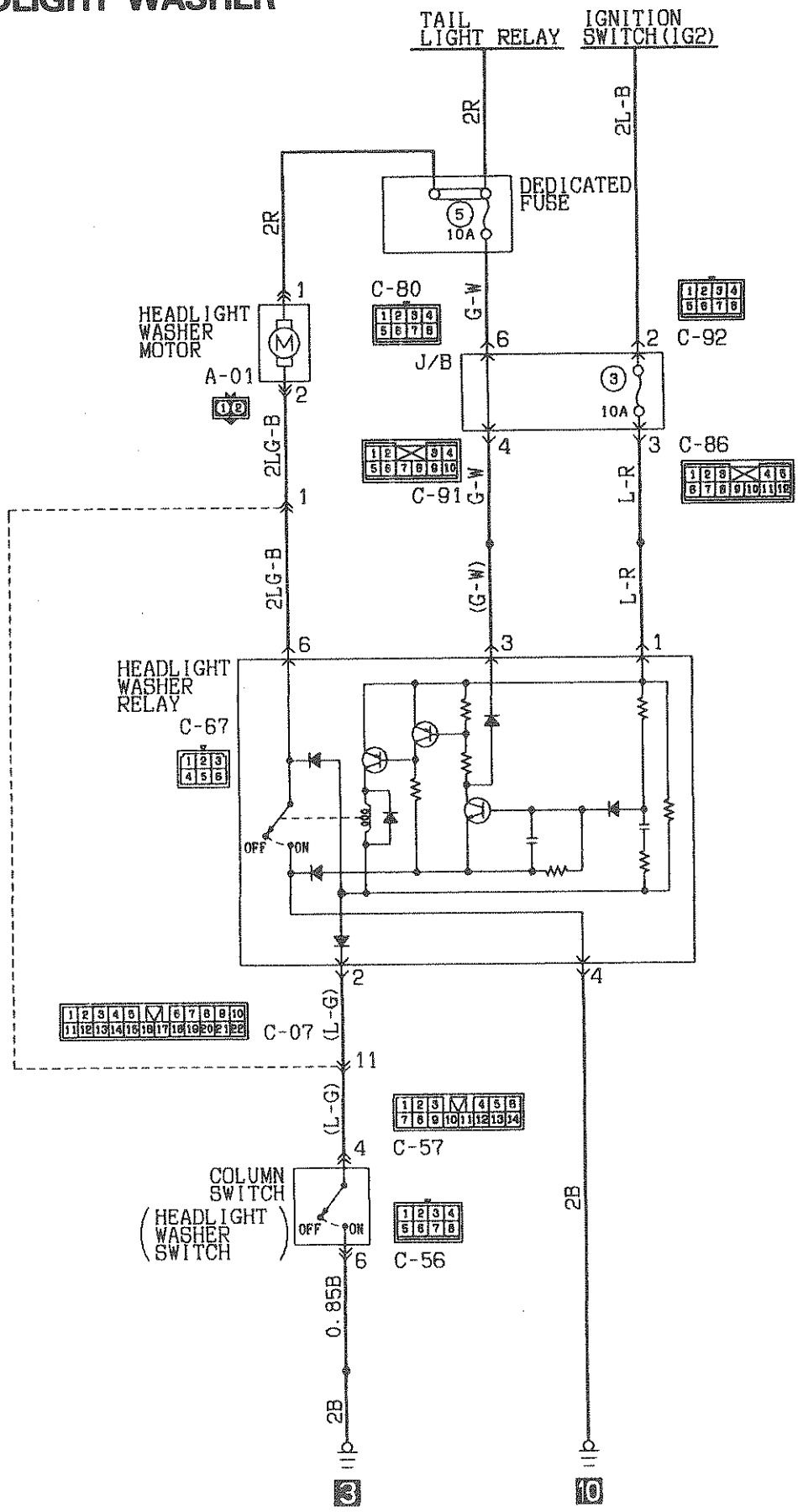
COMPONENTS LOCATION

Name	Symbol
Rear intermittent wiper relay	A





HEADLIGHT WASHER

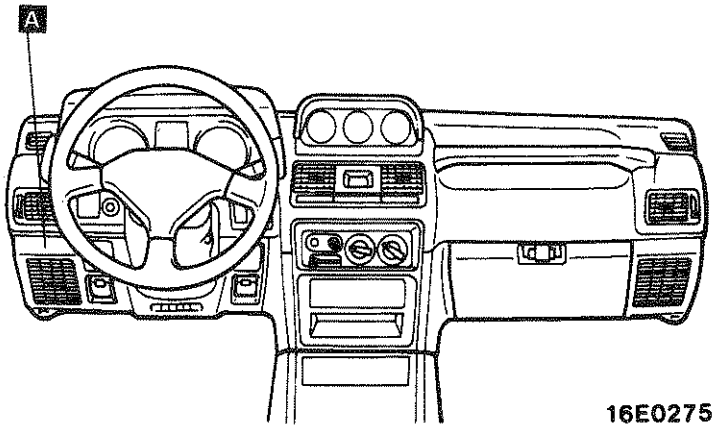


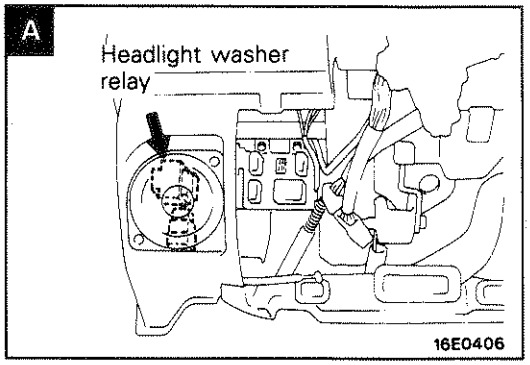
KK35-AC-01303-N

TSB Revision

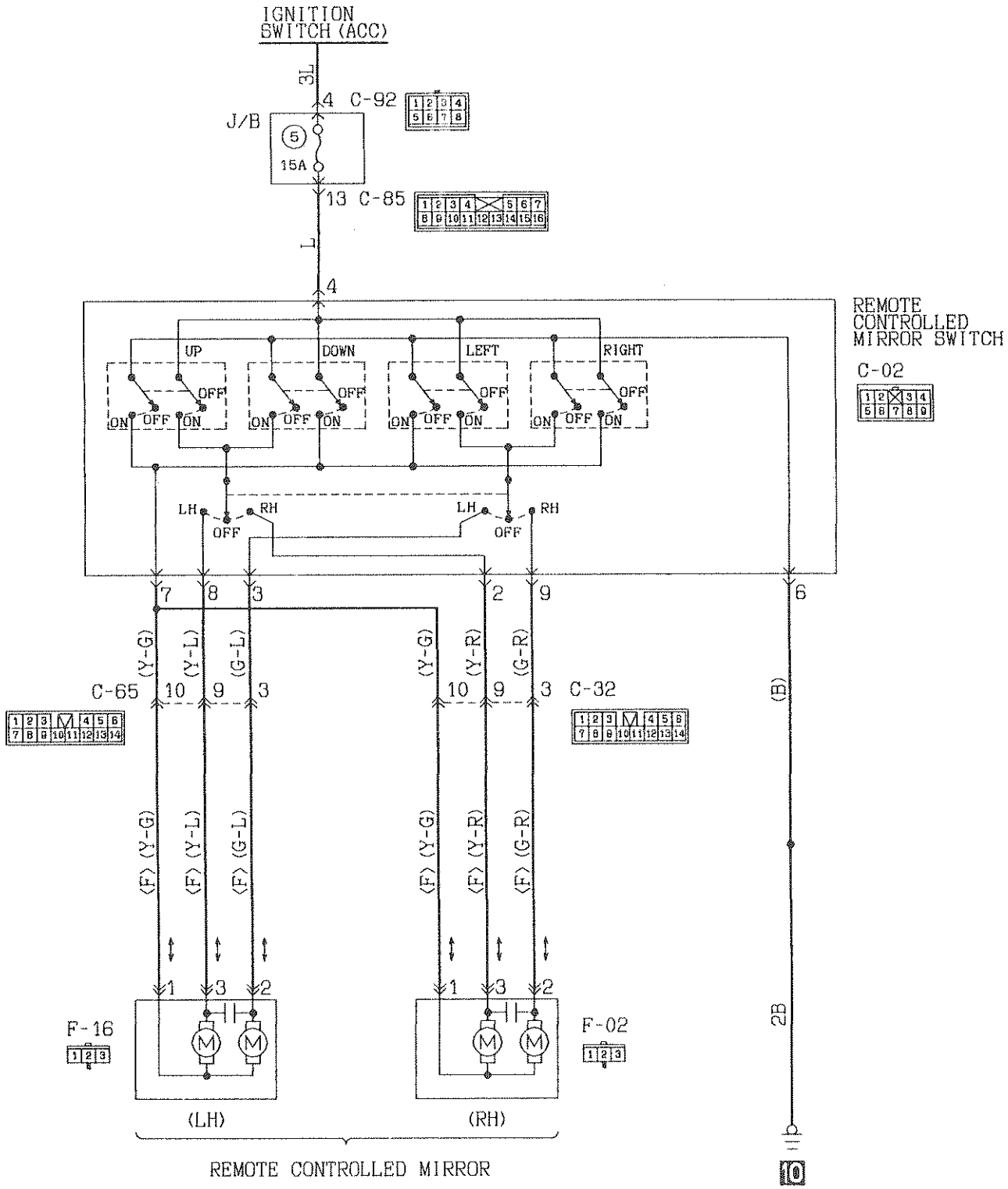
COMPONENTS LOCATION

Name	Symbol
Headlight washer relay	A



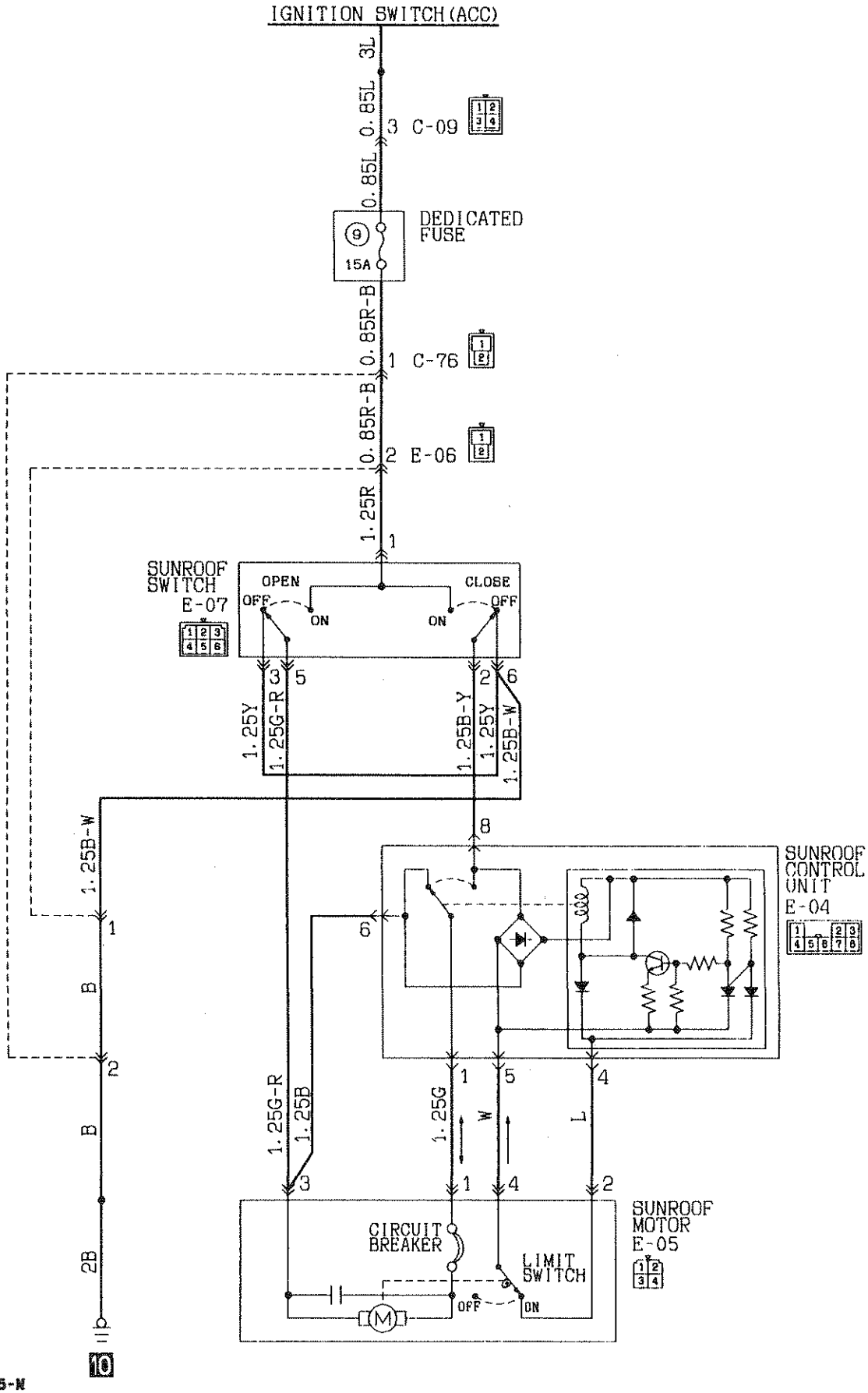


REMOTE CONTROLLED MIRROR



KK35-AC-01305-N

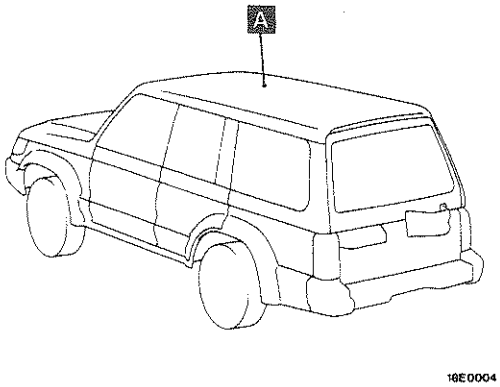
SUNROOF

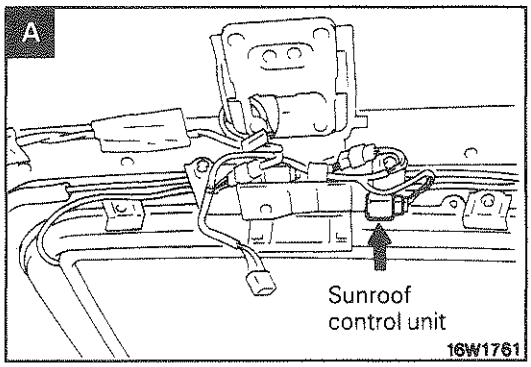


KX35-AC-01405-N

COMPONENTS LOCATION

Name	Symbol
Sunroof control unit	A

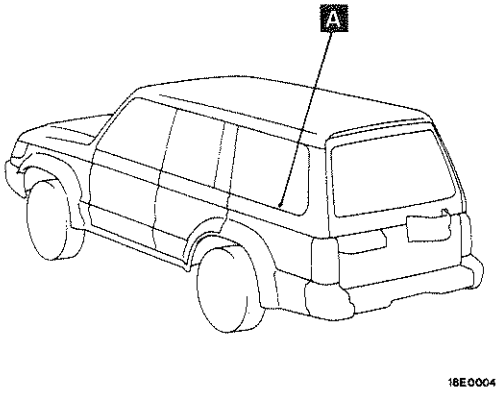


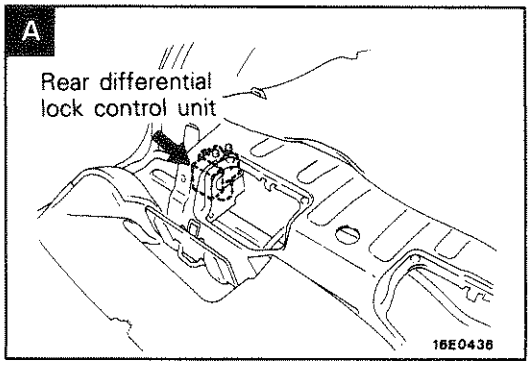


REAR DIFFERENTIAL LOCK SYSTEM

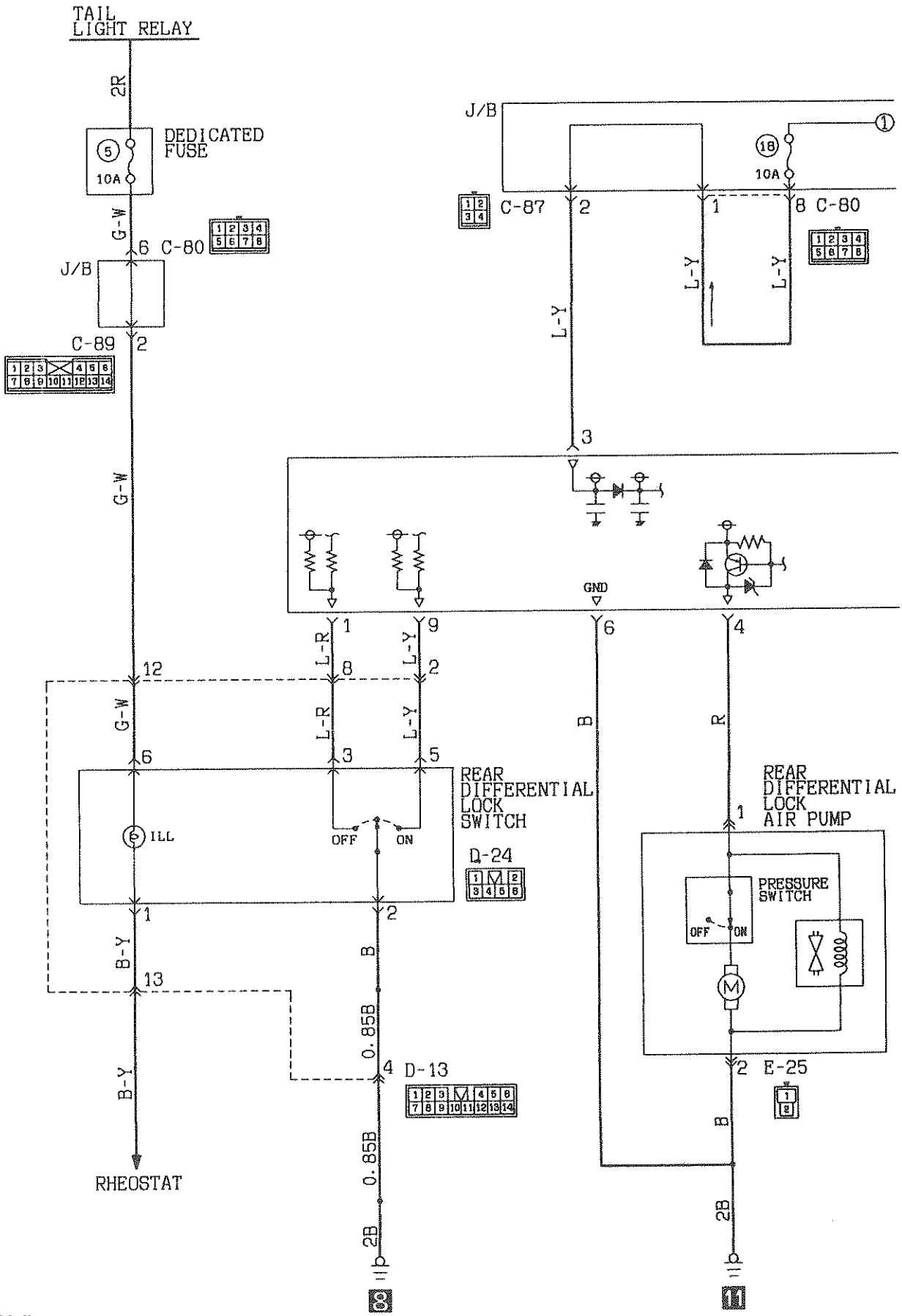
COMPONENTS LOCATION

Name	Symbol
Rear differential lock control unit	A



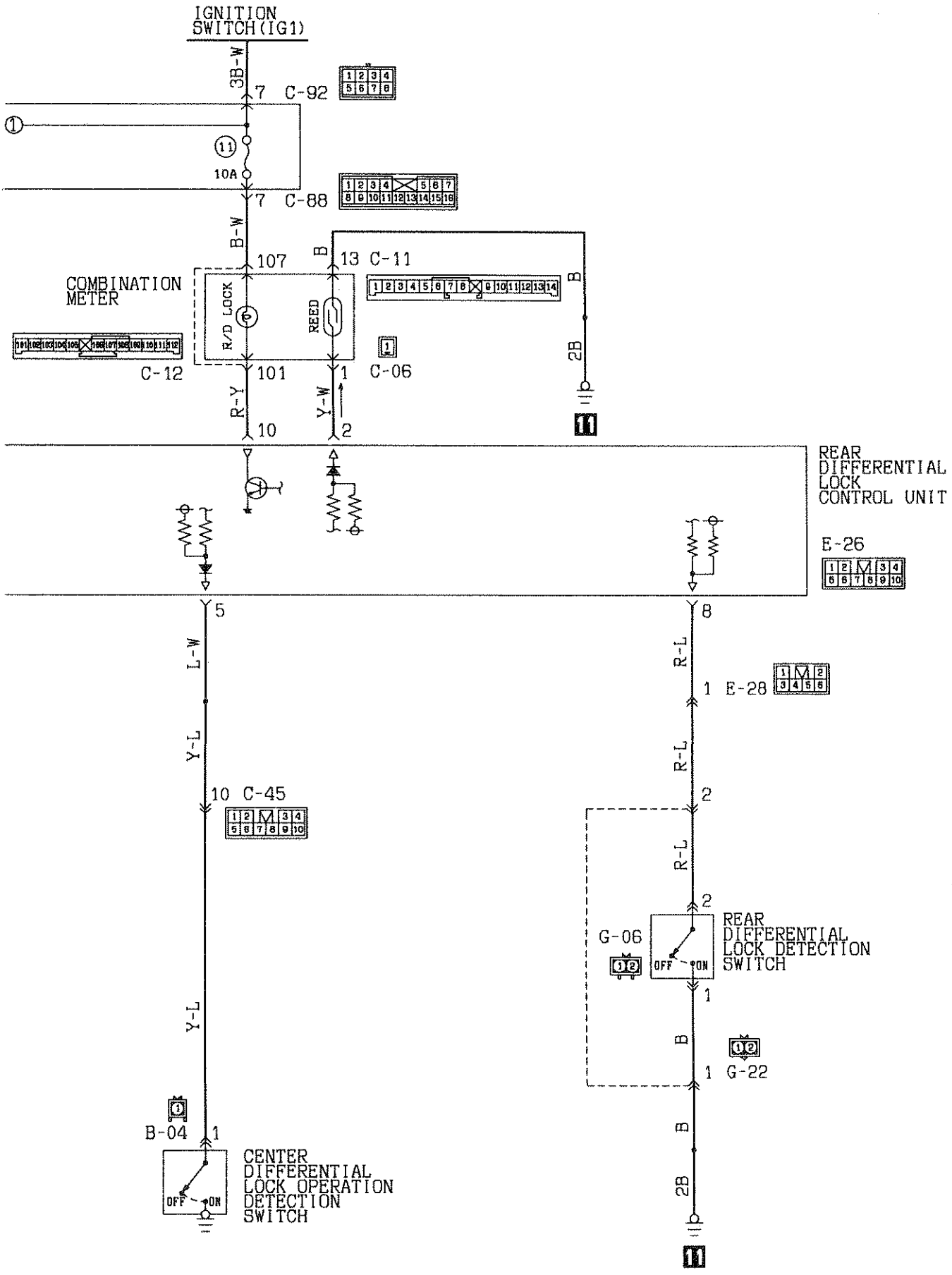


REAR DIFFERENTIAL LOCK SYSTEM

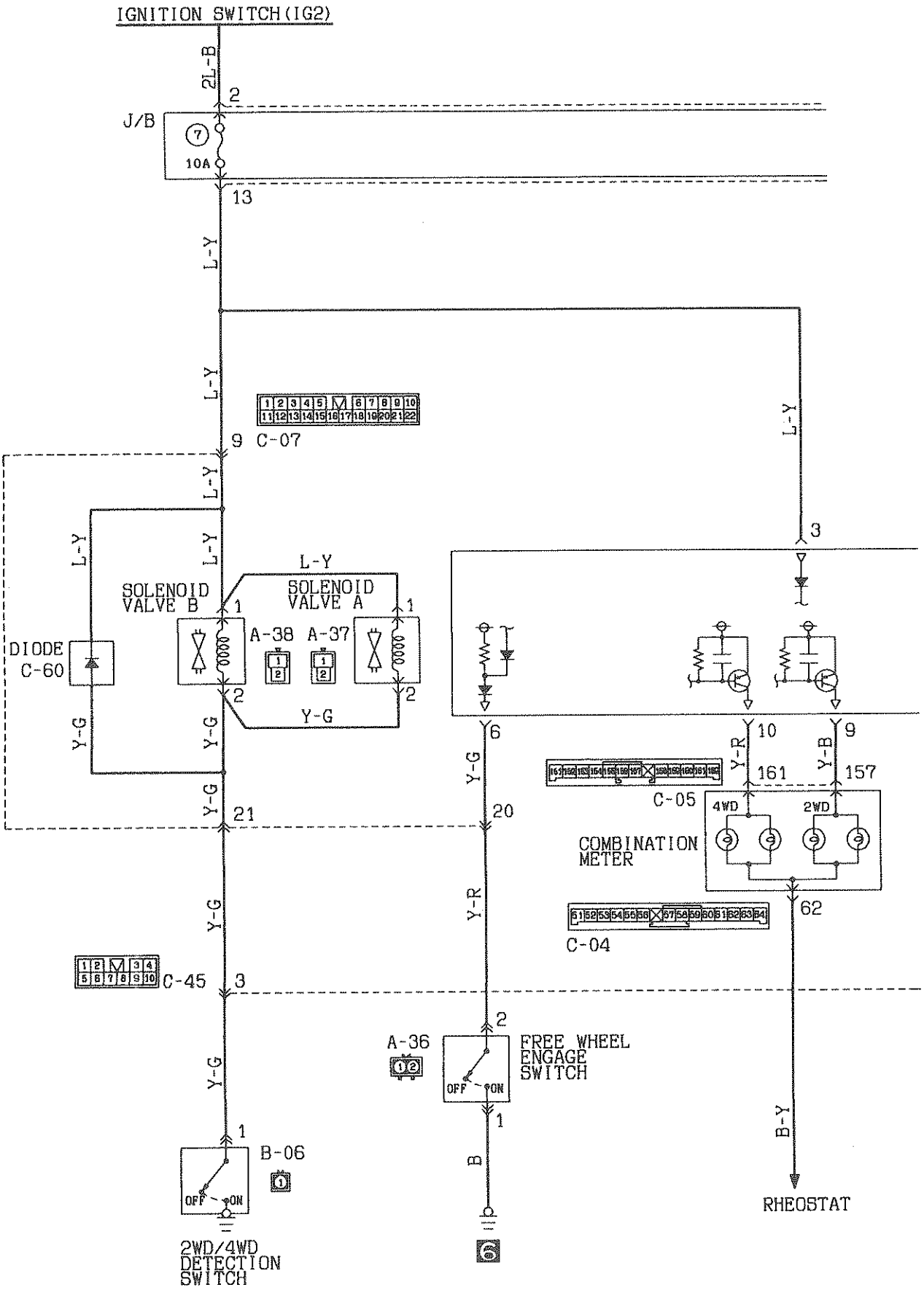


KX35-AC-01501-N

TSB Revision

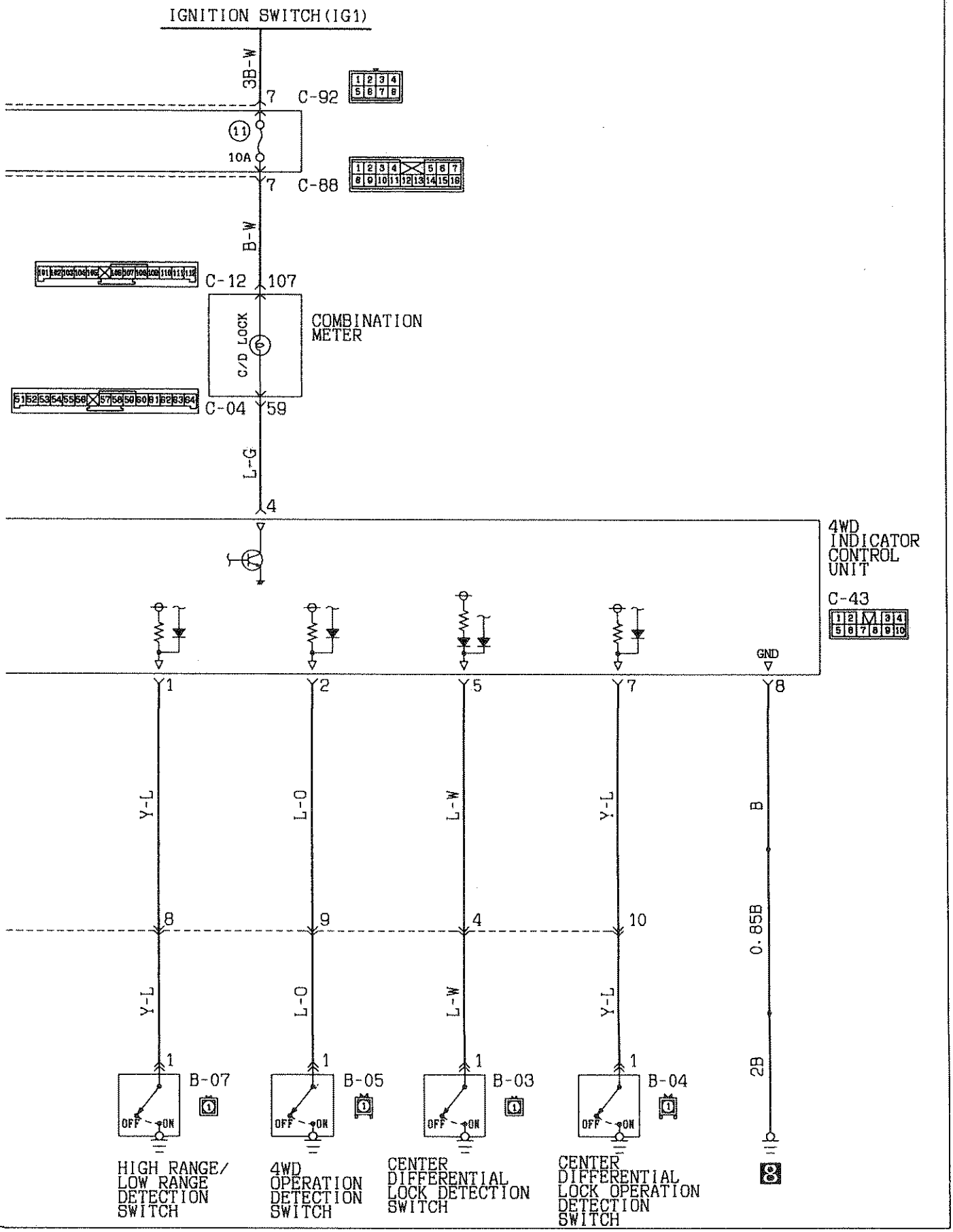

IGNITION SWITCH(IG1)
3B-W
7 C-92
10A
7 C-88
B-W
107
B
13 C-11
COMBINATION METER
R/D LOCK
REED
C-12
101
1
C-06
R-Y
Y-W
10
2
2B
REAR DIFFERENTIAL LOCK CONTROL UNIT
E-26
5
8
L-W
Y-L
R-L
1 E-28
10 C-45
2
G-06
OFF
ON
REAR DIFFERENTIAL LOCK DETECTION SWITCH
B-04
CENTER DIFFERENTIAL LOCK OPERATION DETECTION SWITCH
G-22

ACTIVE TRAC 4WD SYSTEM



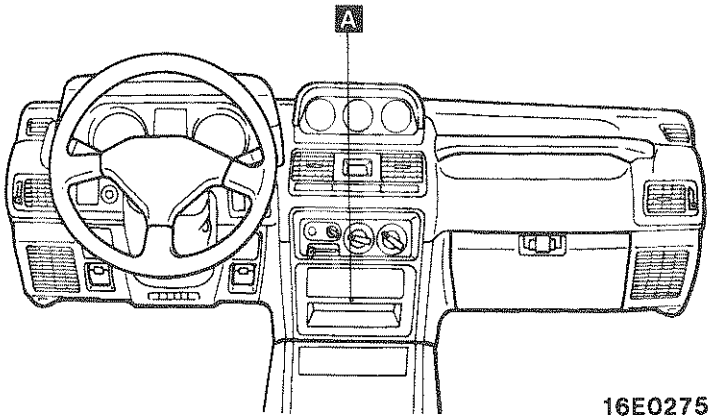
KX35-AC-01502-N

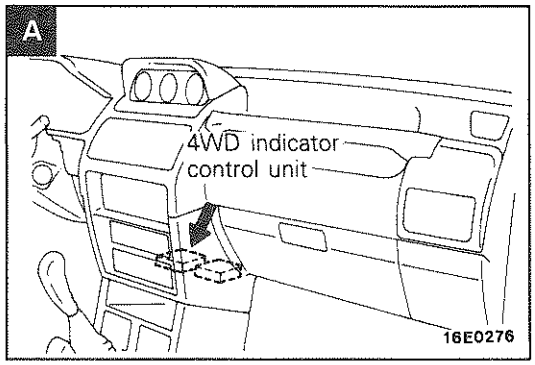
TSB Revision


IGNITION SWITCH(IG1)
3B-W
7
C-92
11
10A
7
C-88
B-W
C-12
107
C/D LOCK
COMBINATION METER
C-04
59
L-G
4
4WD INDICATOR CONTROL UNIT
C-43
GND
1
2
5
7
8
Y-L
L-O
L-W
Y-L
B
0.85B
2B
8
9
4
10
Y-L
L-O
L-W
Y-L
1
1
1
1
B-07
B-05
B-03
B-04
OFF
ON
HIGH RANGE/ LOW RANGE DETECTION SWITCH
4WD OPERATION DETECTION SWITCH
CENTER DIFFERENTIAL LOCK DETECTION SWITCH
CENTER DIFFERENTIAL LOCK OPERATION DETECTION SWITCH

COMPONENT LOCATION

Name	Symbol
4WD indicator control unit	A

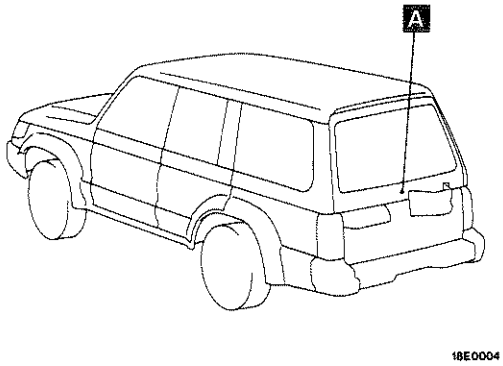


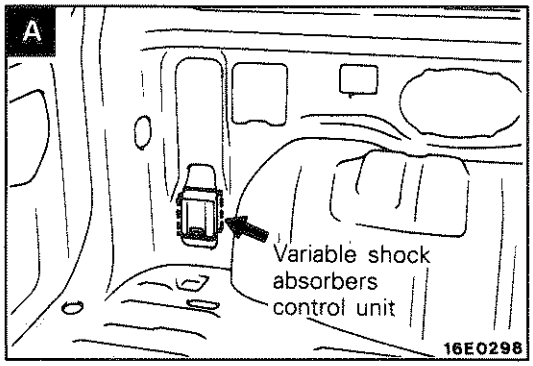


REMOTE CONTROL VARIABLE SHOCK ABSORBERS SYSTEM

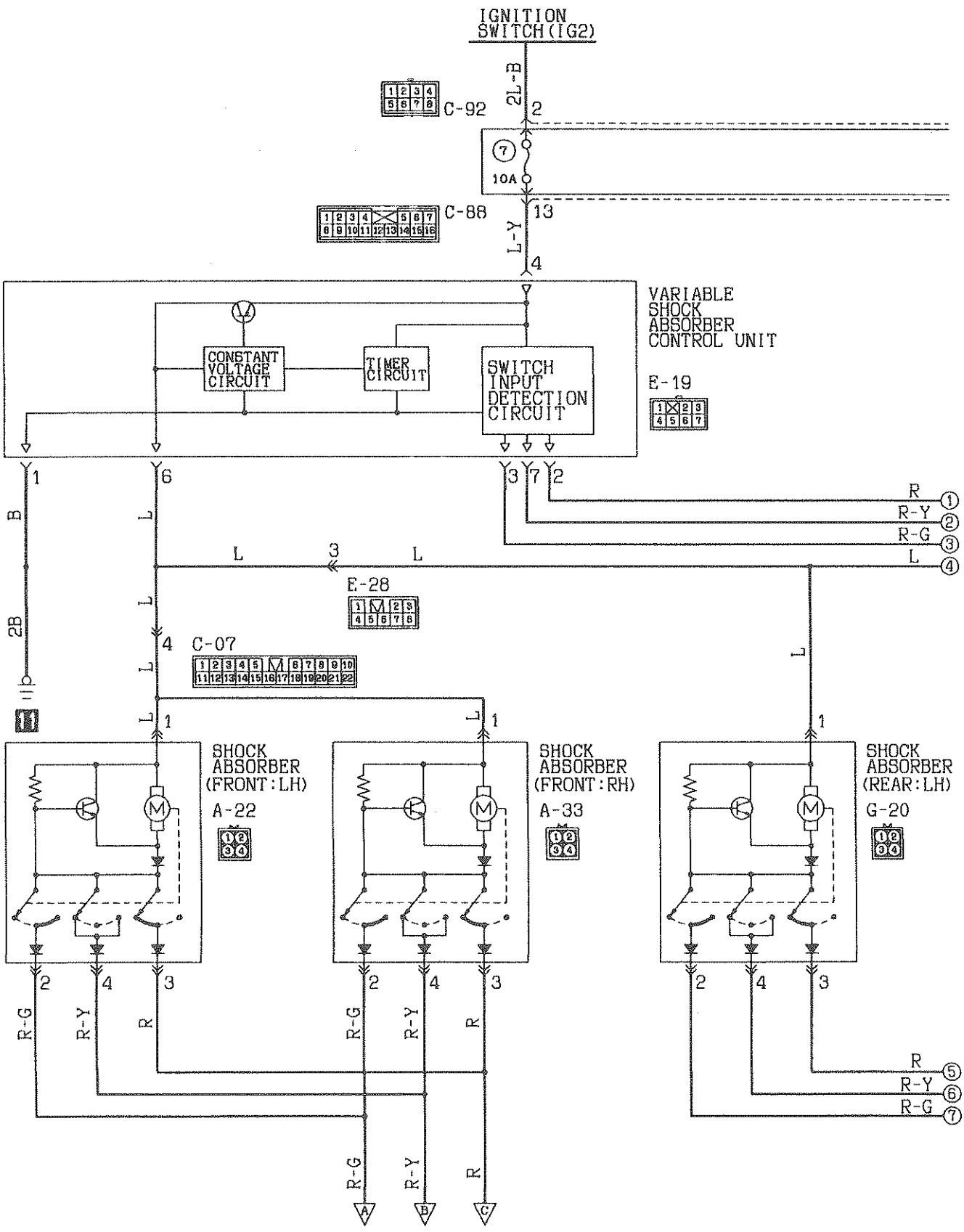
COMPONENTS LOCATION

Name	Symbol
Variable shock absorbers control unit	A



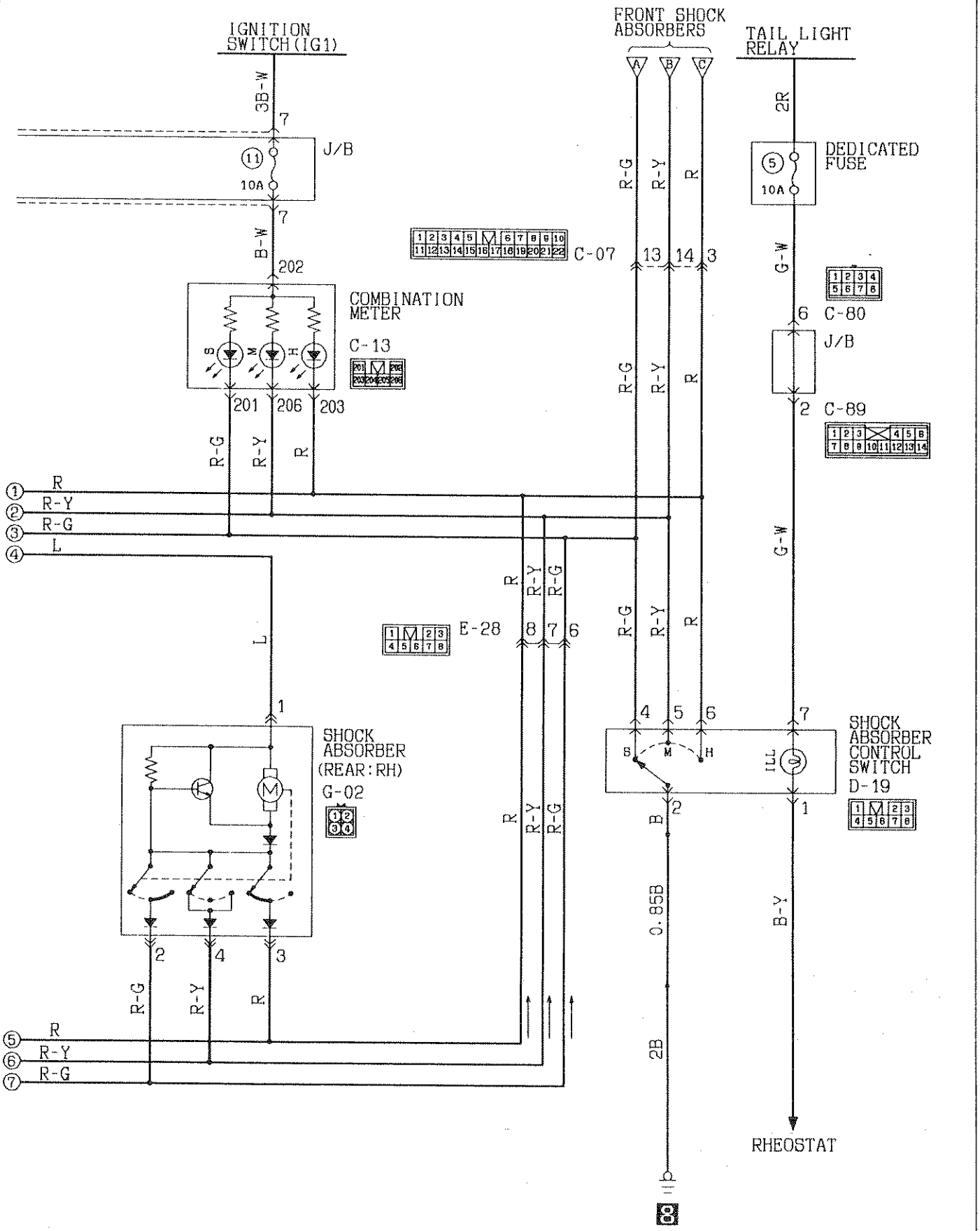


REMOTE CONTROL VARIABLE SHOCK ABSORBERS SYSTEM

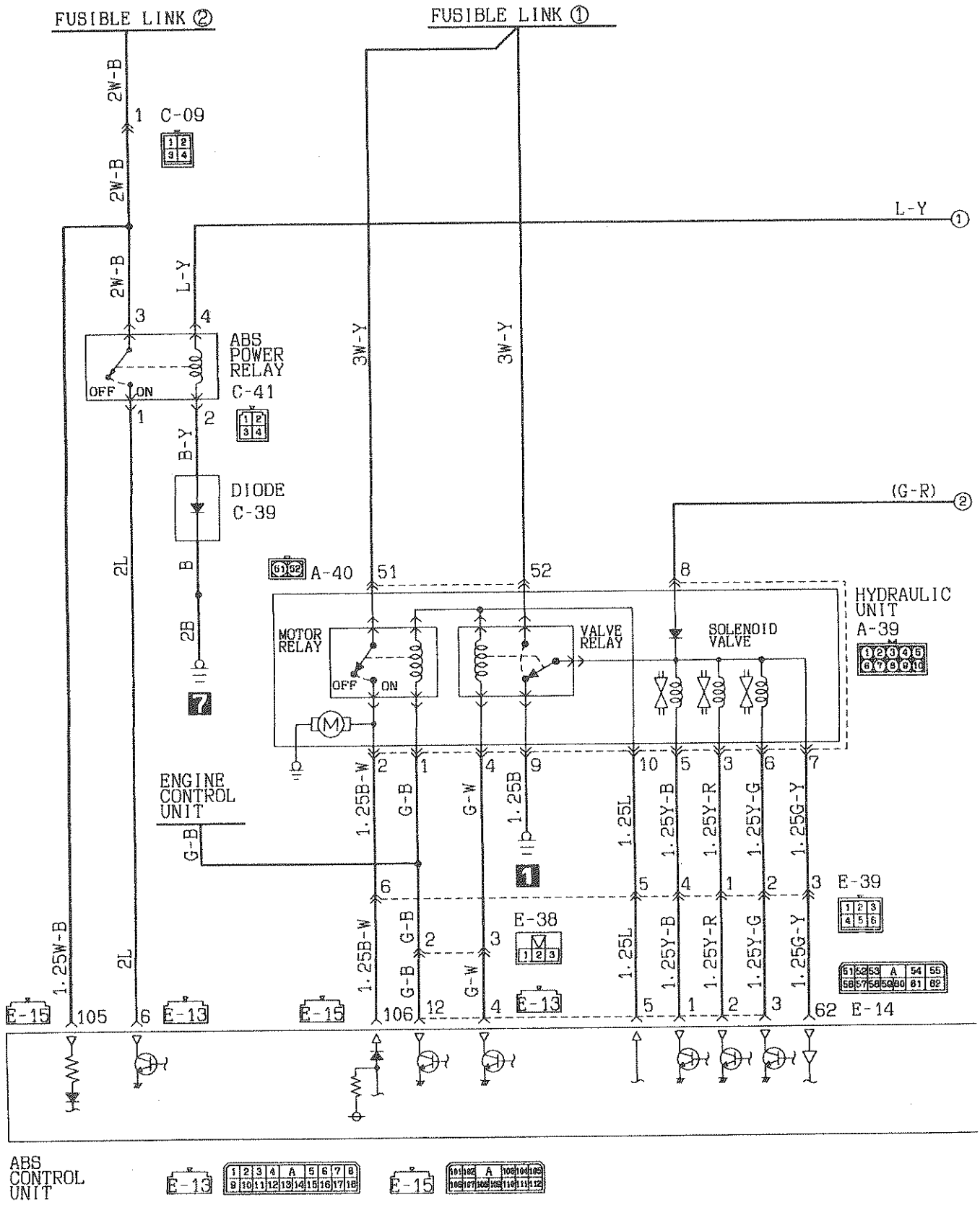


KX35-AC-01503-M

TSB Revision

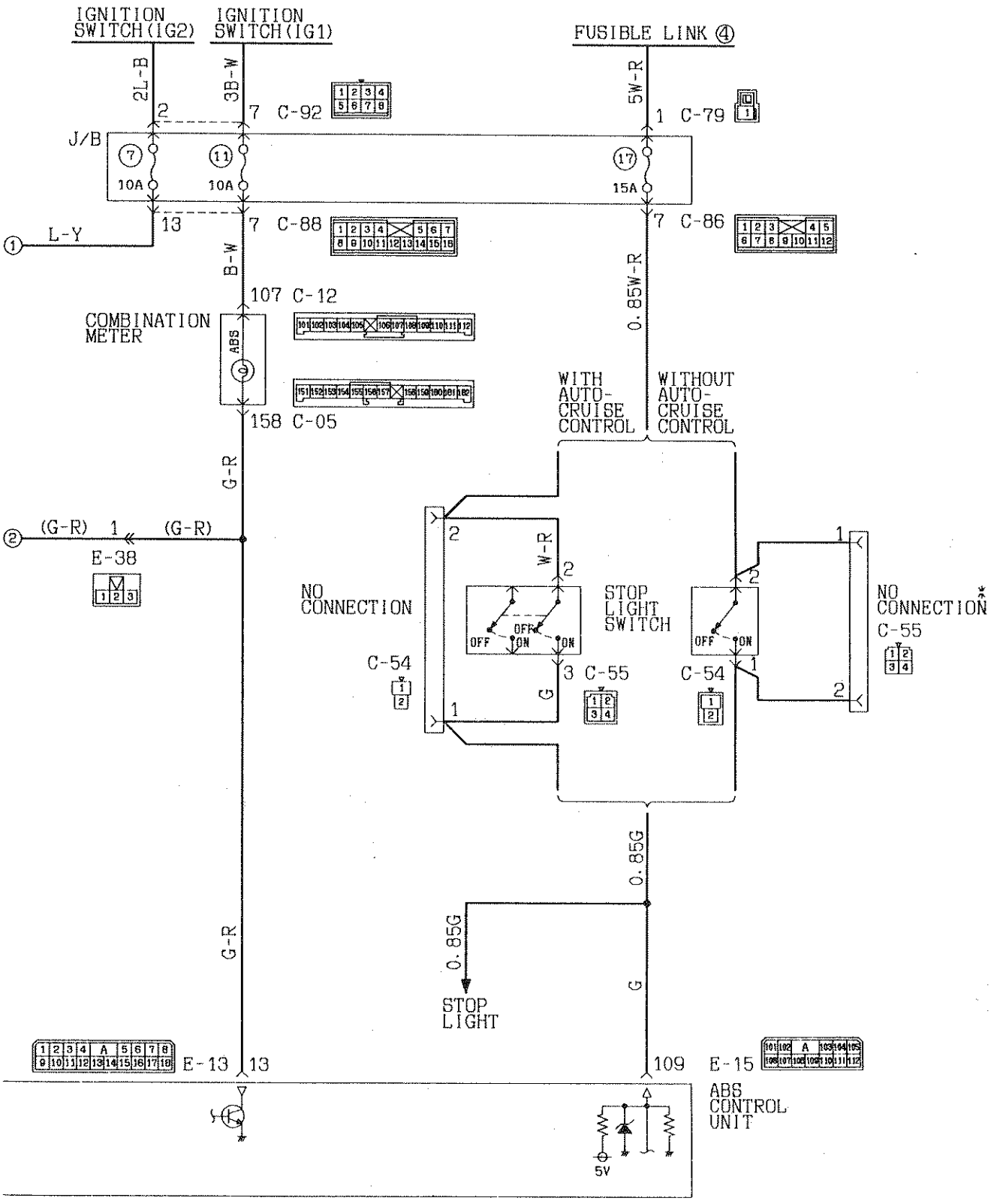

IGNITION SWITCH(IG1)
3B-W
7
J/B
11
10A
7
B-W
202
COMBINATION METER
C-13
S
M
H
201
206
203
R-G
R-Y
R
FRONT SHOCK ABSORBERS
A
B
C
C-07
13
14
3
E-28
8
7
6
TAIL LIGHT RELAY
2R
DEDICATED FUSE
5
10A
G-W
C-80
6
J/B
2
C-89
G-W
SHOCK ABSORBER (REAR:RH)
G-02
1
2
4
3
SHOCK ABSORBER CONTROL SWITCH
D-19
4
5
6
7
ILL
B
0.85B
2B
B-Y
RHEOSTAT
① R
② R-Y
③ R-G
④ L
⑤ R
⑥ R-Y
⑦ R-G

ANTI-LOCK BRAKING SYSTEM

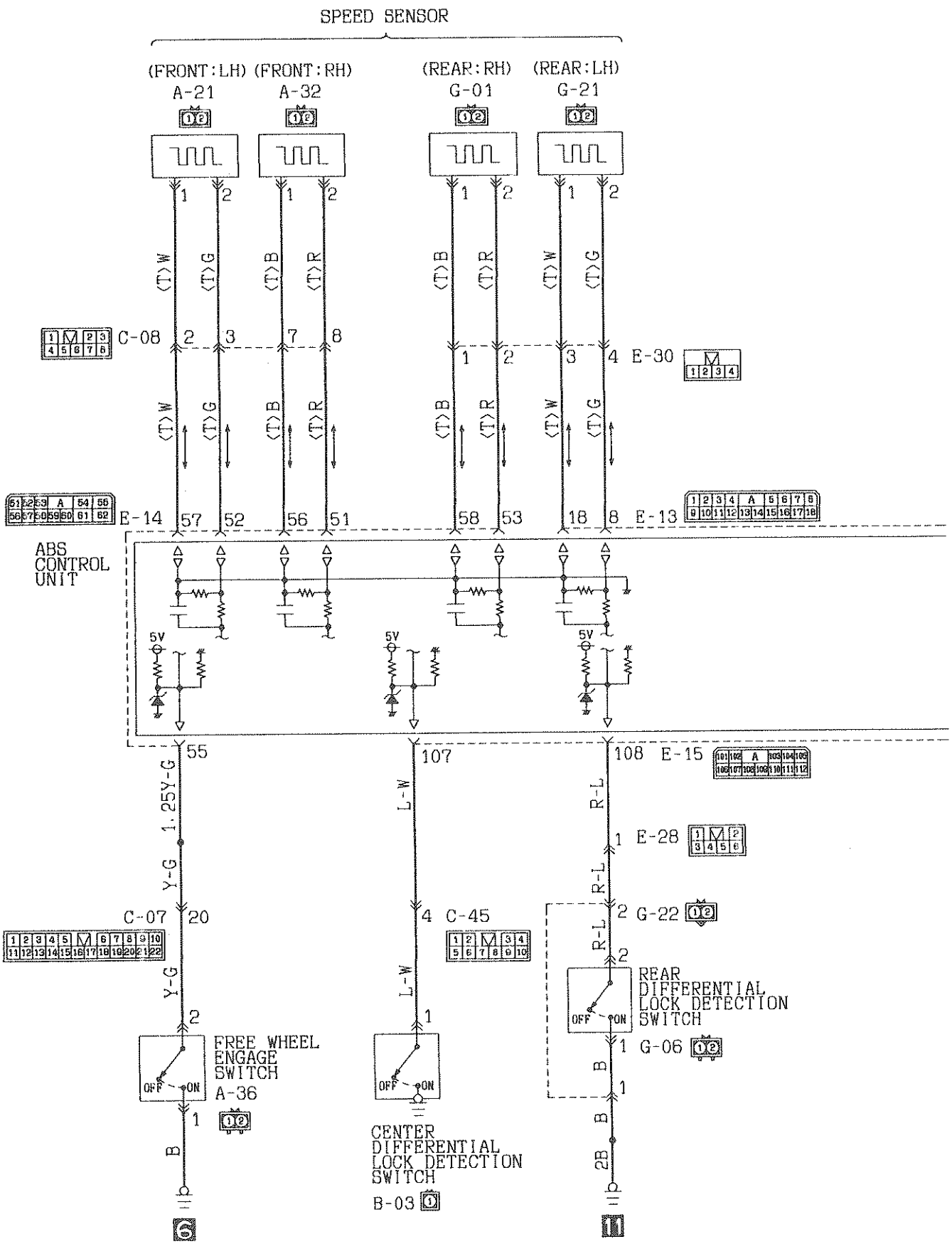


KX35-AC-01504-N

TSB Revision

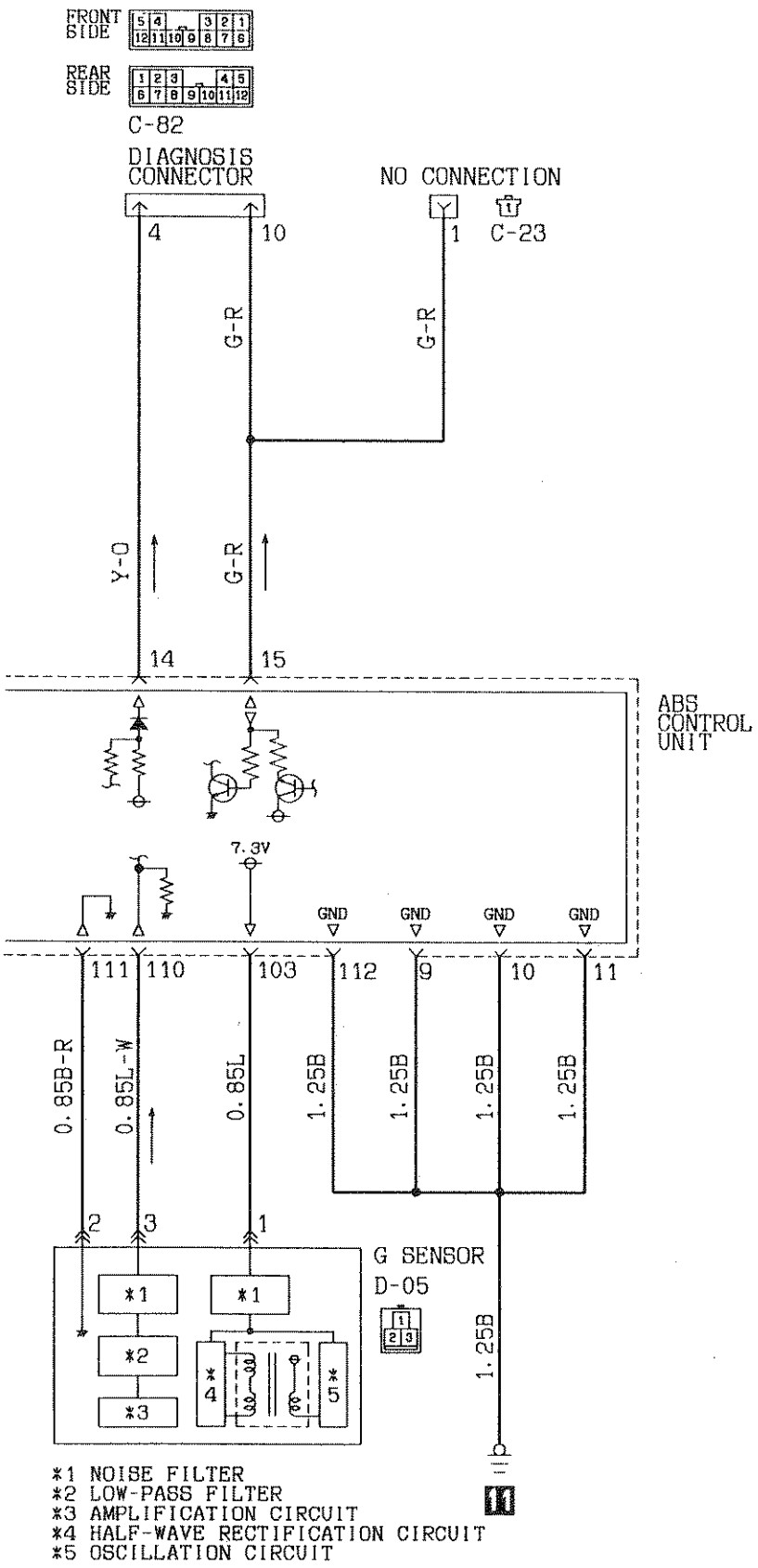


NOTE
*: Applicable for some models only



KX35-AC-01504A-N

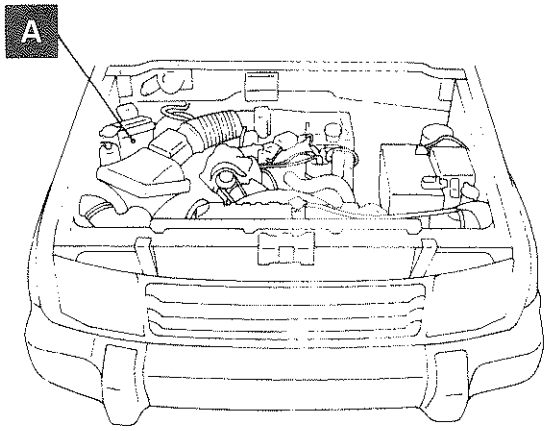
TSB Revision


FRONT SIDE
REAR SIDE
C-82
DIAGNOSIS CONNECTOR
NO CONNECTION
C-23
G-R
Y-O
ABS CONTROL UNIT
7.3V
GND
0.85B-R
0.85G-W
0.85L
1.25B
G SENSOR
D-05
*1 NOISE FILTER
*2 LOW-PASS FILTER
*3 AMPLIFICATION CIRCUIT
*4 HALF-WAVE RECTIFICATION CIRCUIT
*5 OSCILLATION CIRCUIT

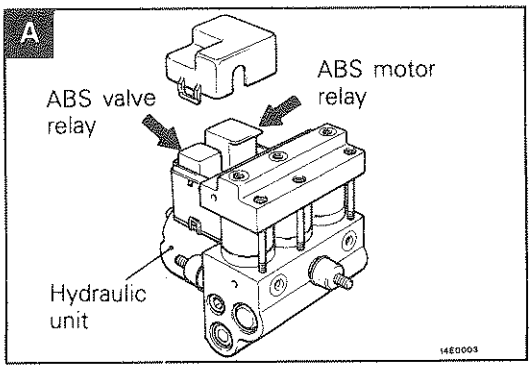
COMPONENTS LOCATION

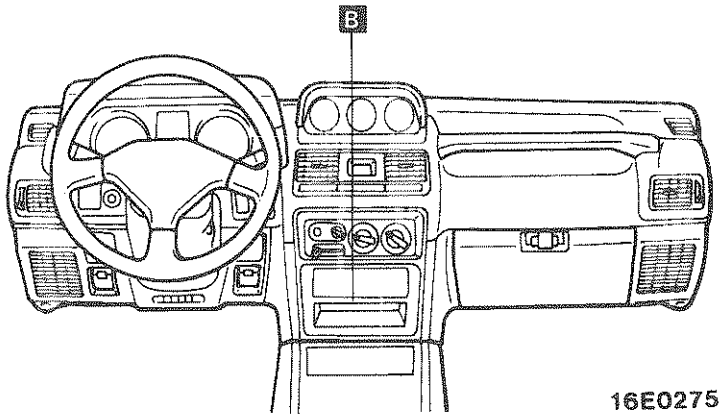
Name	Symbol	Name	Symbol
ABS control unit	C	G sensor	E
ABS motor relay	A	Speed sensor (front)	D
ABS valve relay	A	Speed sensor (rear)	F
ABS power relay	B	—	—

NOTE
The "Name" column is arranged in alphabetical order.

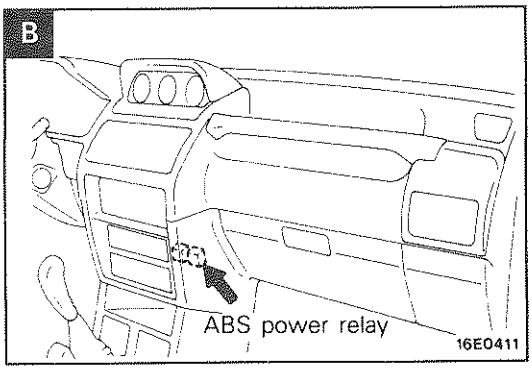


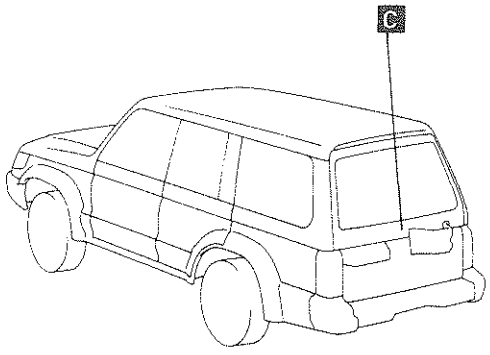
16E0128



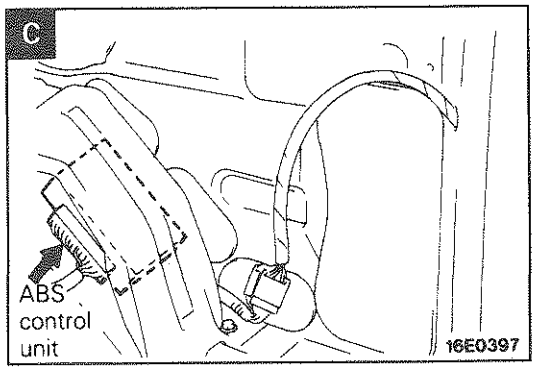


16E0275

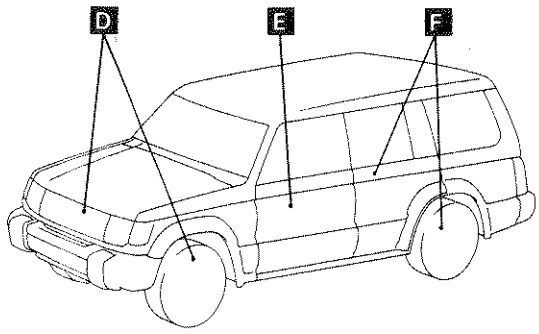




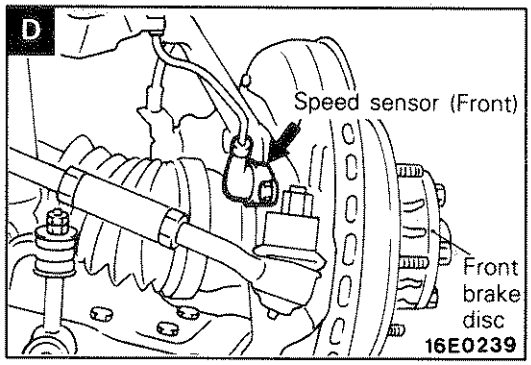
18E0004

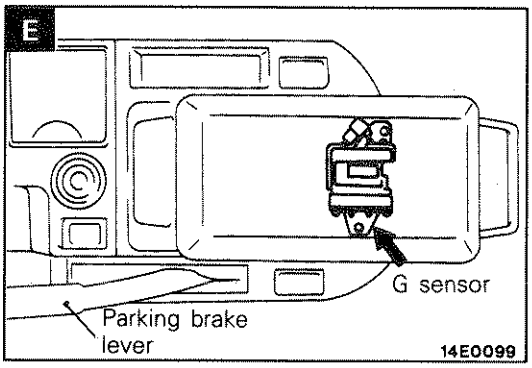


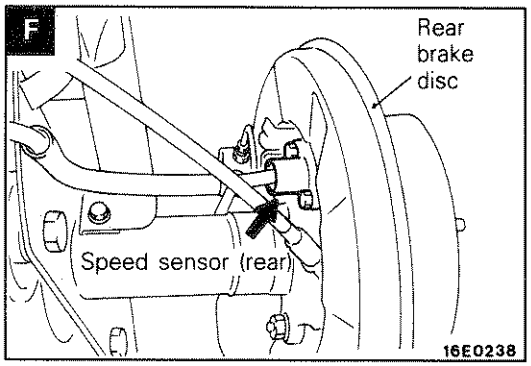
TSB Revision


D
E
F

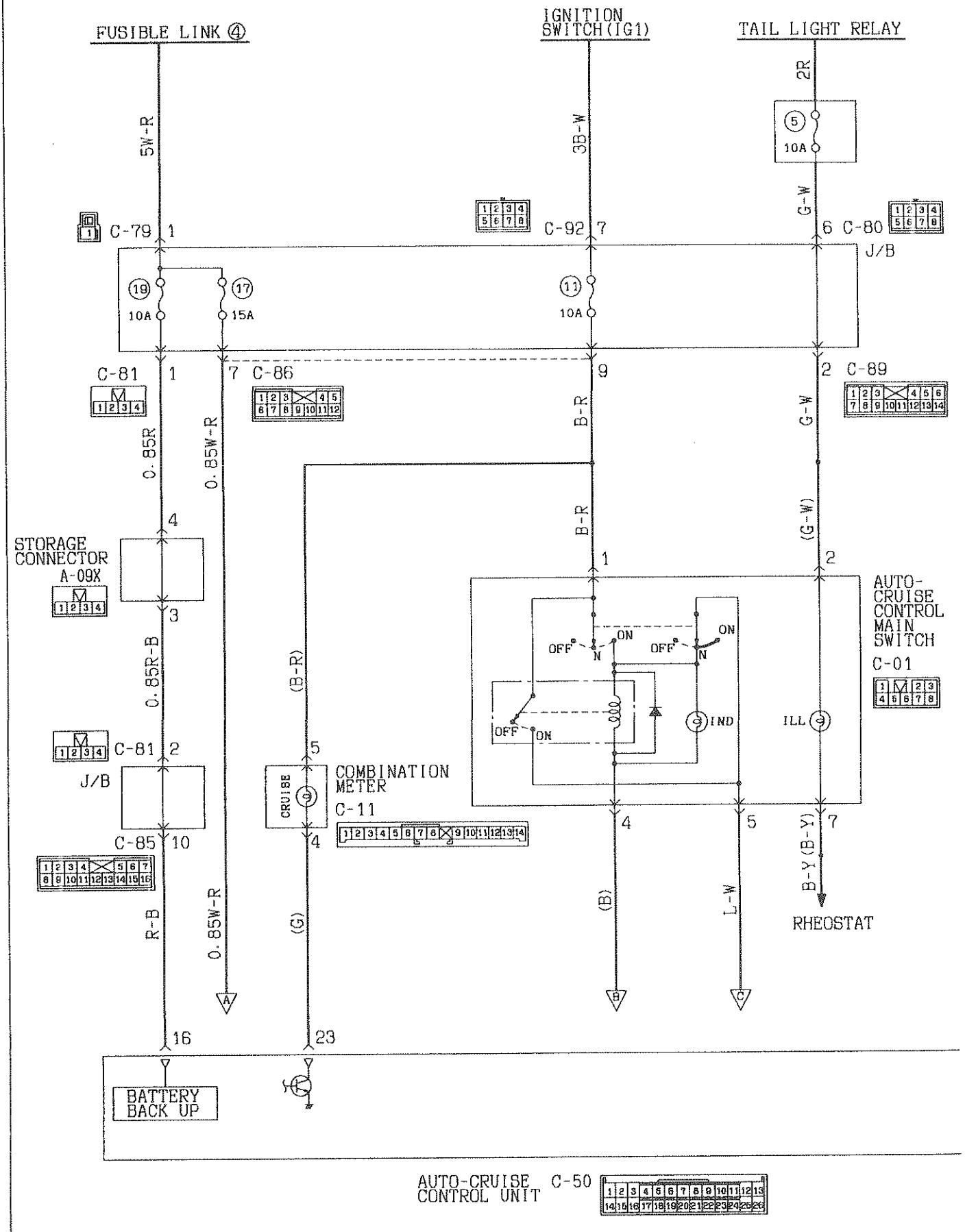
18E0003


D
Speed sensor (Front)
Front brake disc
16E0239


E
G sensor
Parking brake lever
14E0099

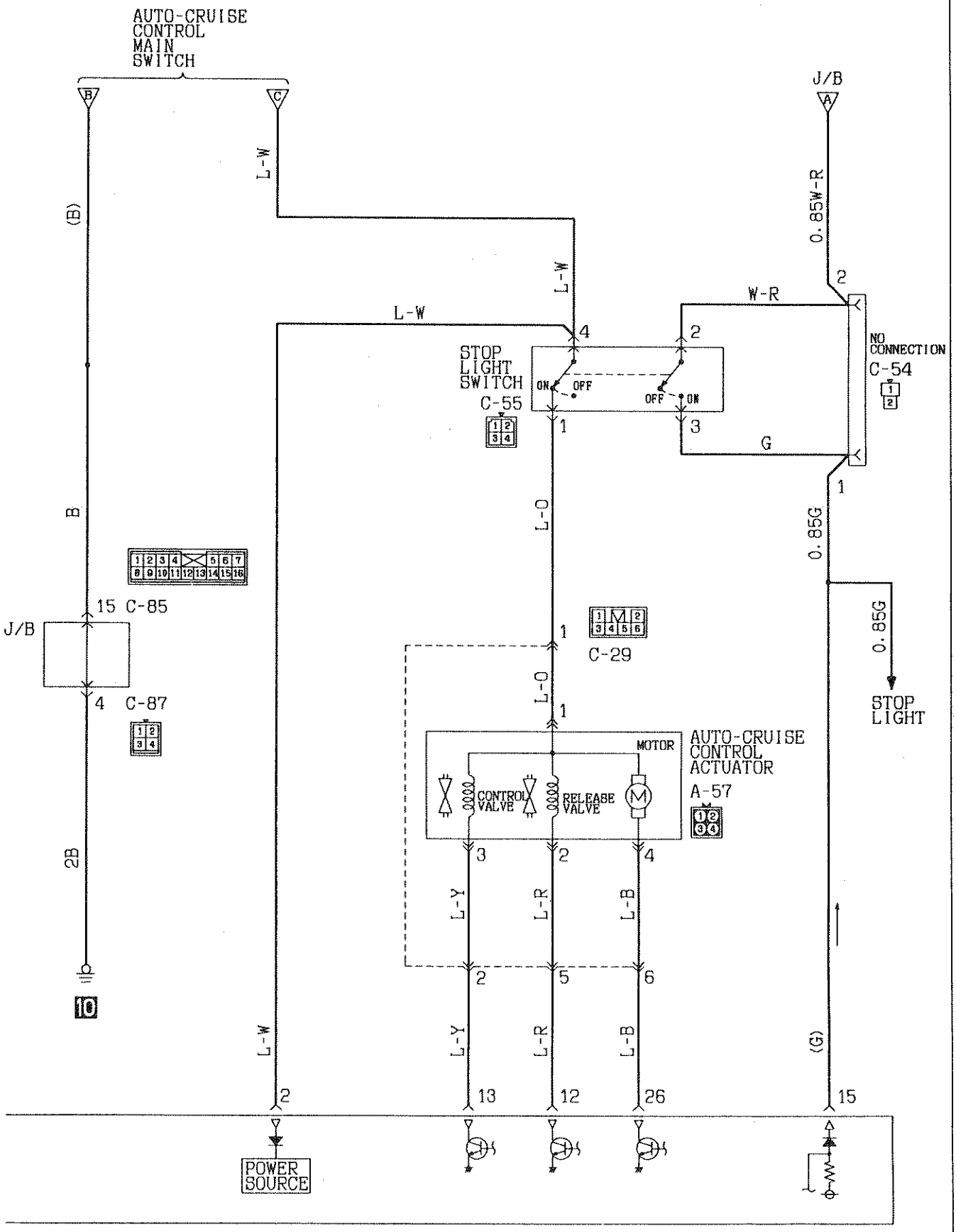

F
Rear brake disc
Speed sensor (rear)
16E0238

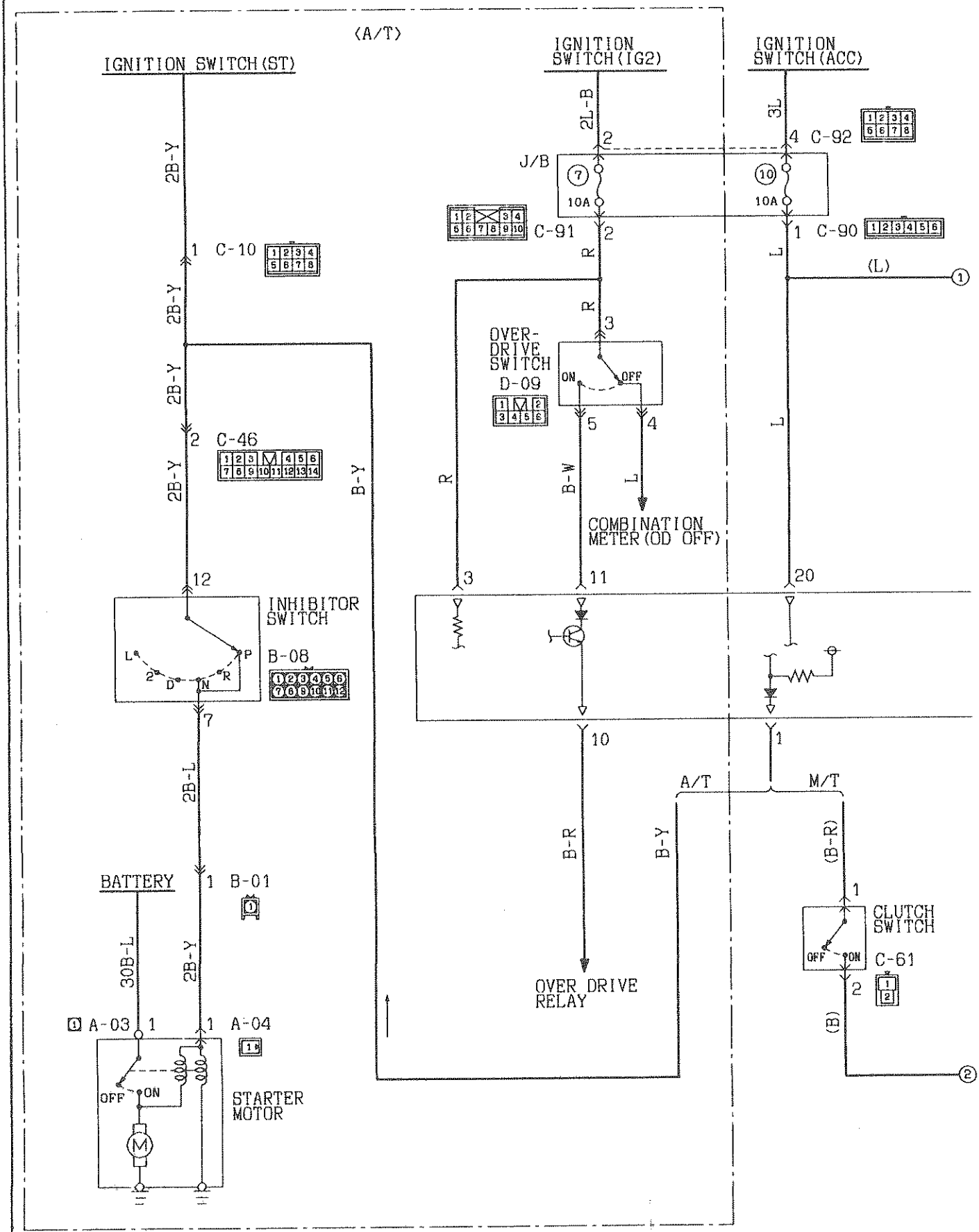
AUTO-CRUISE CONTROL SYSTEM



KK35-AC-01505-M

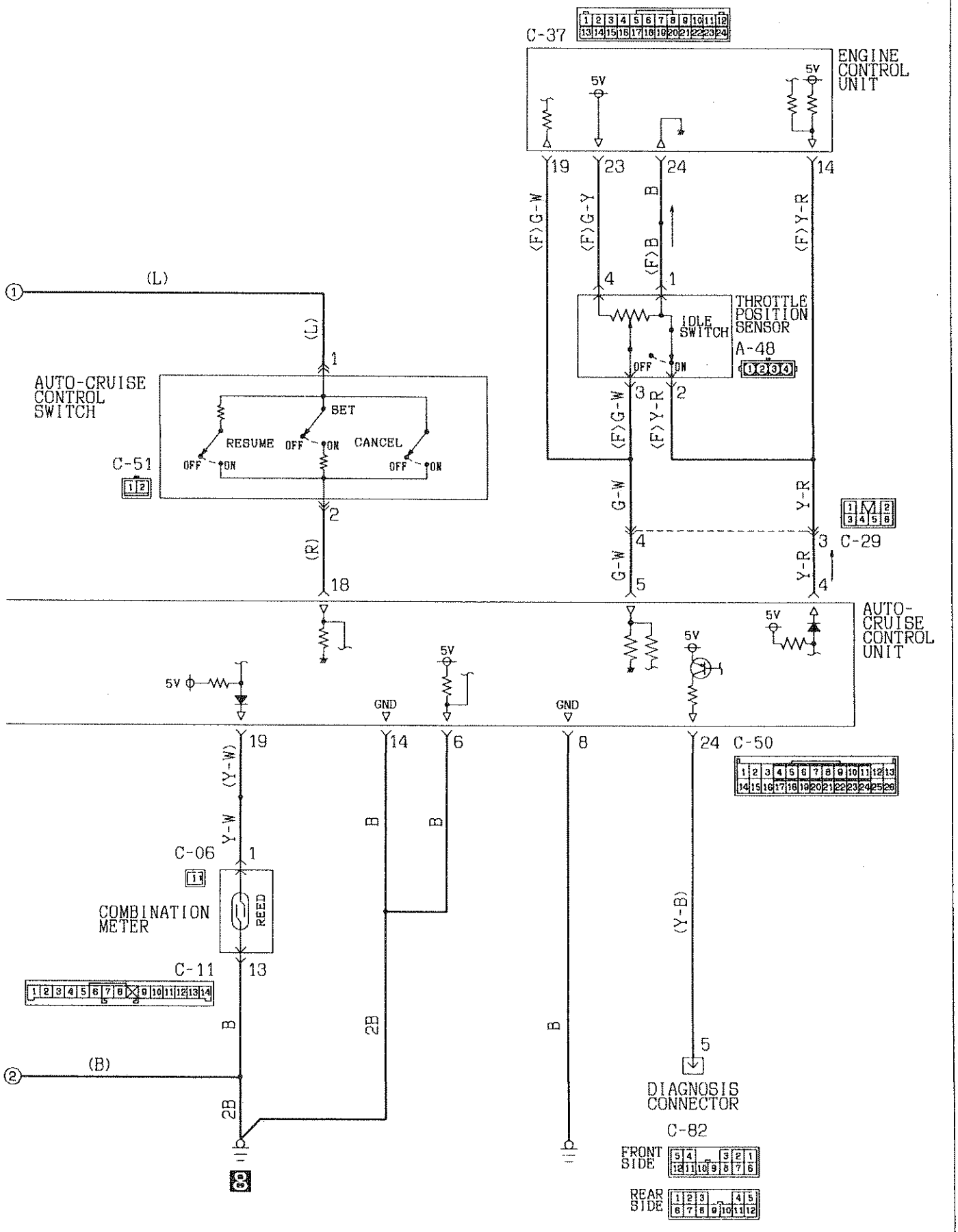
TSB Revision


AUTO-CRUISE CONTROL MAIN SWITCH
B
C
(B)
L-W
L-W
L-W
J/B
A
0.85W-R
2
W-R
NO CONNECTION
C-54
STOP LIGHT SWITCH
C-55
ON
OFF
OFF
ON
4
2
1
3
G
1
L-O
0.85G
B
15 C-85
J/B
4 C-87
1
C-29
L-O
1
0.85G
STOP LIGHT
MOTOR
AUTO-CRUISE CONTROL ACTUATOR
A-57
CONTROL VALVE
RELEASE VALVE
M
3
2
4
2B
L-Y
L-R
L-B
2
5
6
10
L-W
L-Y
L-R
L-B
(G)
2
13
12
26
15
POWER SOURCE



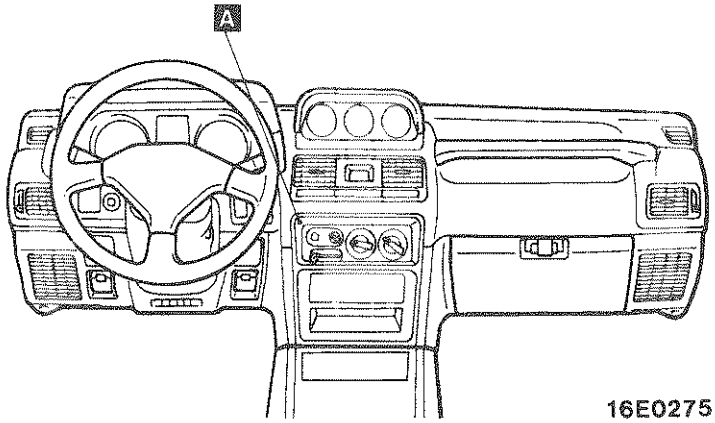
KX35-AC-01505A-N

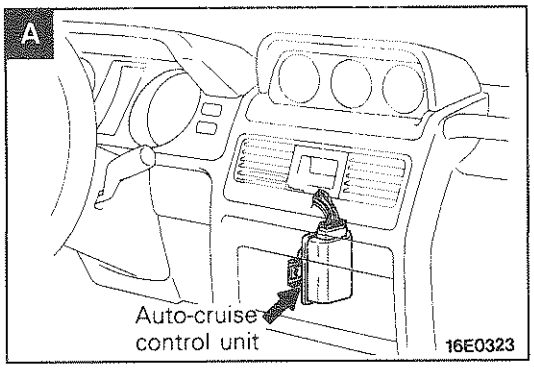
TSB Revision


C-37
ENGINE CONTROL UNIT
5V
19
23
24
14
(F)G-W
(F)G-Y
B
(F)B
(F)Y-R
4
1
THROTTLE POSITION SENSOR
IDLE SWITCH
A-48
OFF
ON
3
2
(F)G-W
(F)Y-R
(L)
1
AUTO-CRUISE CONTROL SWITCH
SET
RESUME
OFF
ON
CANCEL
C-51
2
(R)
18
G-W
Y-R
C-29
AUTO-CRUISE CONTROL UNIT
GND
19
14
6
8
24
C-50
(Y-W)
Y-W
B
C-06
REED
COMBINATION METER
C-11
13
2B
(B)
(Y-B)
5
DIAGNOSIS CONNECTOR
C-82
FRONT SIDE
REAR SIDE

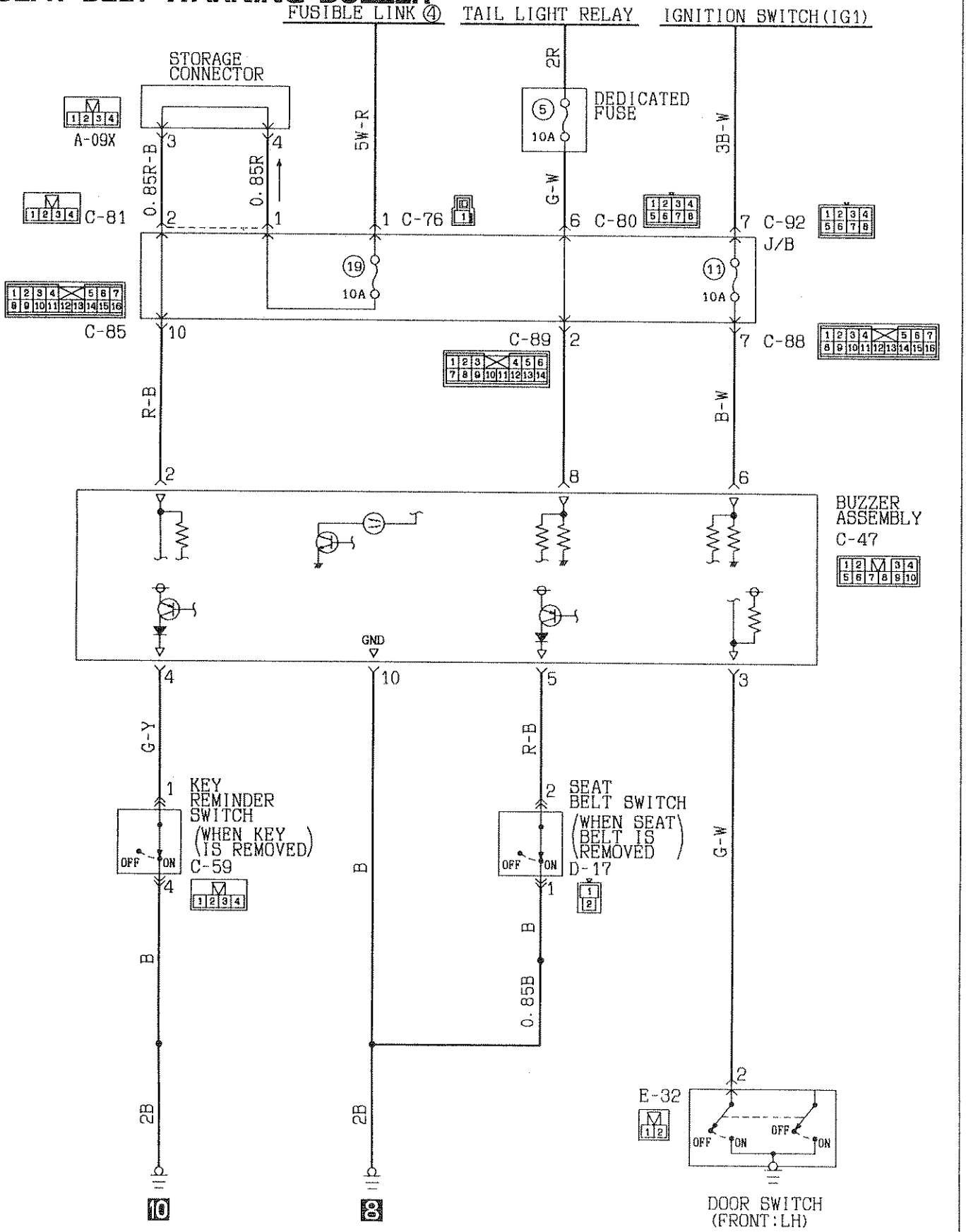
COMPONENTS LOCATION

Name	Symbol
Auto-cruise control unit	A





LIGHTING MONITOR/KEY REMINDER/ SEAT BELT WARNING BUZZER

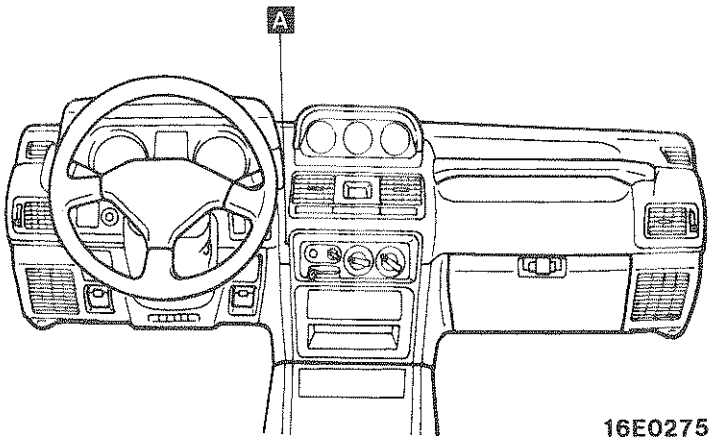


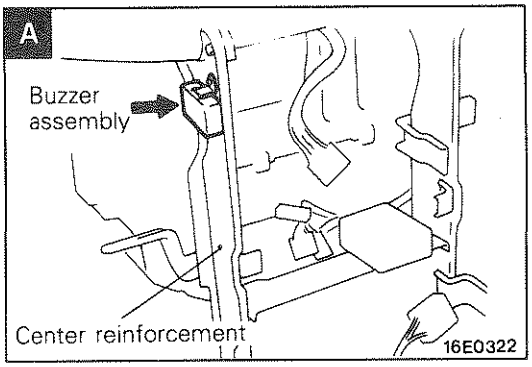
KX35-AC-01506-N

TSB Revision

COMPONENTS LOCATION

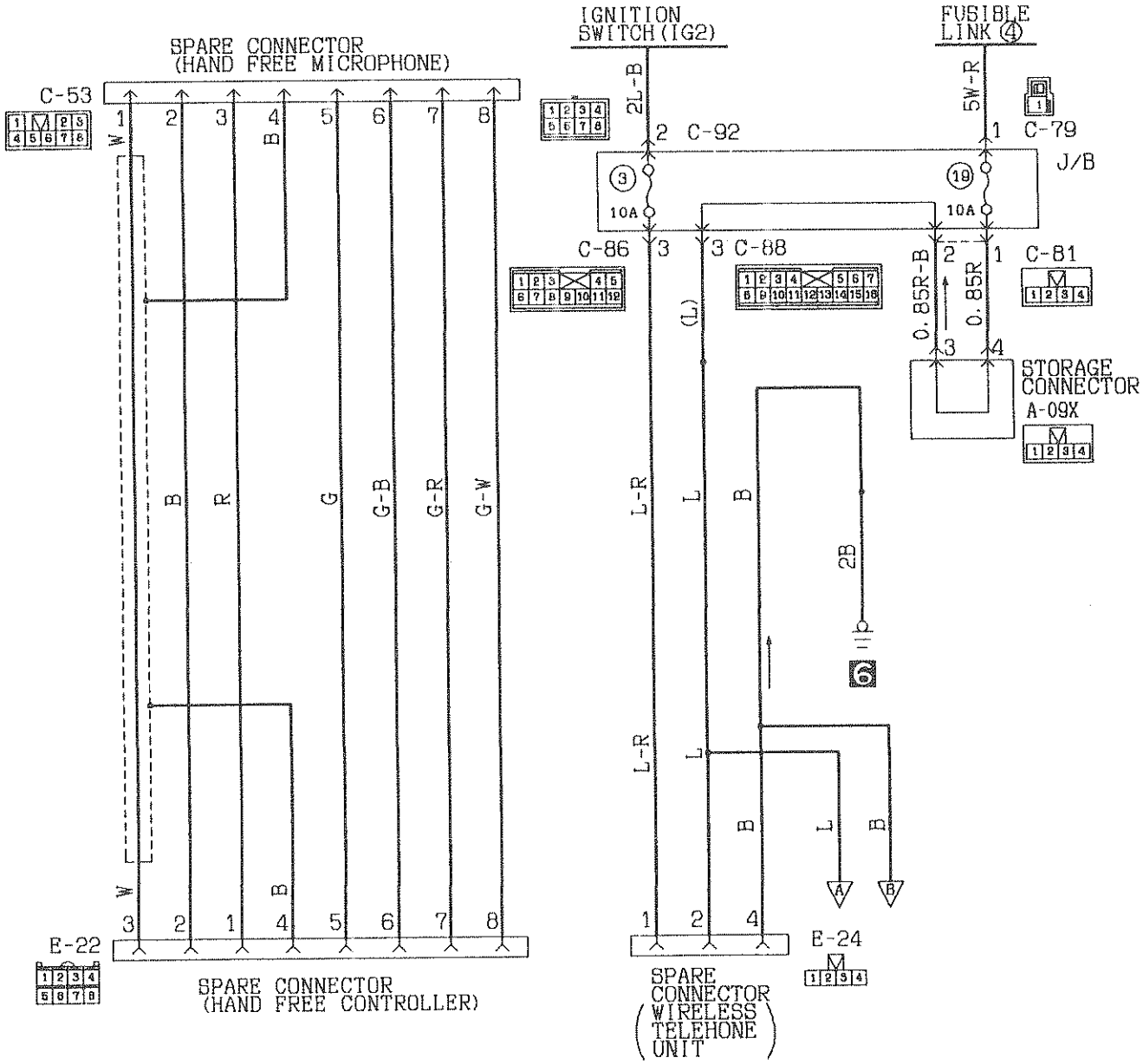
Name	Symbol
Buzzer assembly	A





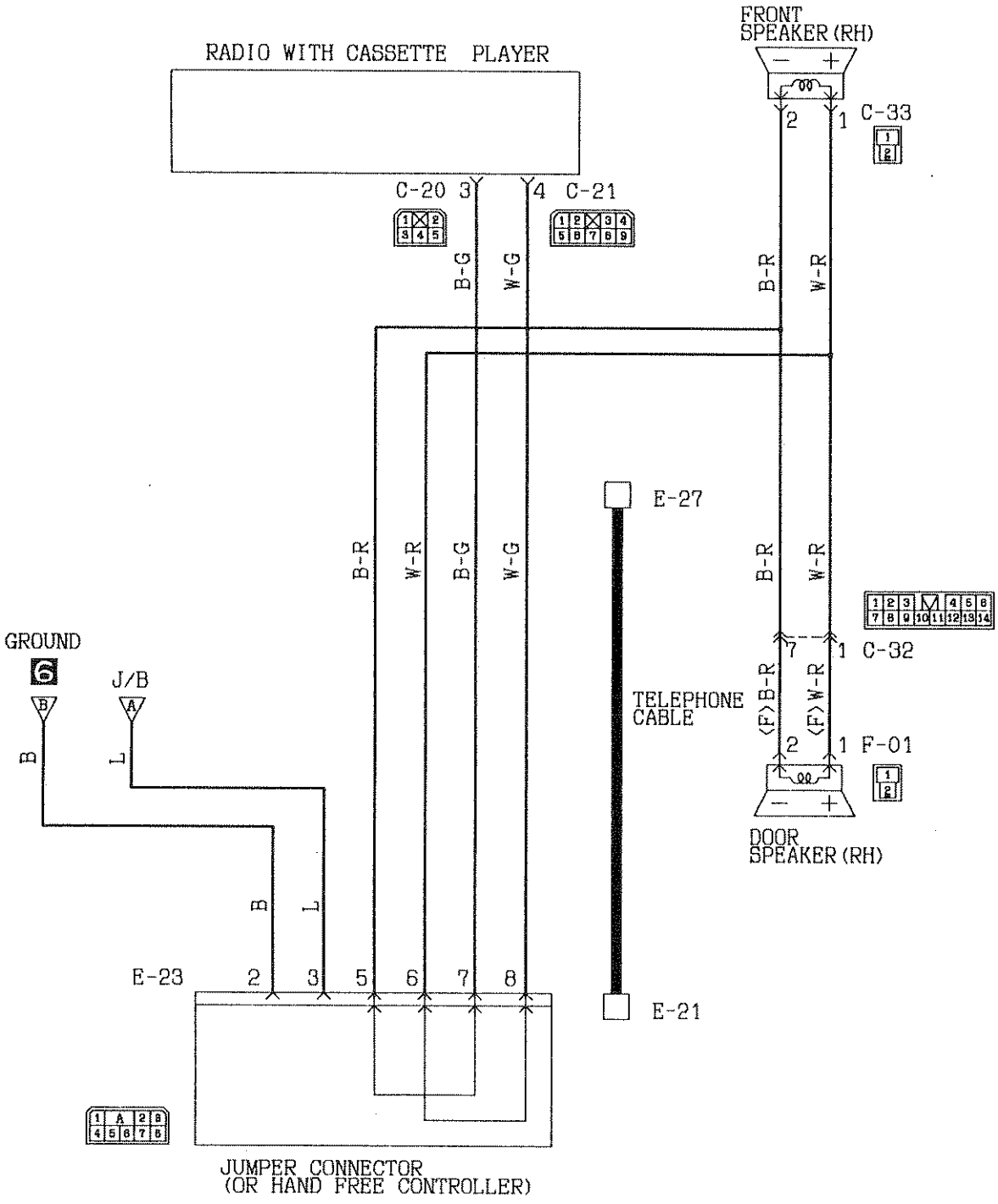
NOTES

CAR TELEPHONE (CIRCUIT ONLY)



KX35-AC-01507-N

TSB Revision


RADIO WITH CASSETTE PLAYER
FRONT SPEAKER (RH)
C-20
C-21
C-33
C-32
F-01
E-27
E-21
E-23
GROUND
J/B
TELEPHONE CABLE
DOOR SPEAKER (RH)
JUMPER CONNECTOR (OR HAND FREE CONTROLLER)
B-G
W-G
B-R
W-R
B
L
<F>B-R
<F>W-R

ENGINE ELECTRICAL

CONTENTS

CHARGING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

M16EB--

ALTERNATOR

Items		Specifications
Type		Battery voltage sensing
Rated output	V/A	12/75
Voltage regulator		Electronic built-in type

SERVICE SPECIFICATIONS

M16EC--

Items		Specifications
Alternator		
Standard values		
Regulated voltage	V	
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°C)		13.1–14.5
Slip ring O.D.	mm (in.)	22.7 (.894)
Field coil resistance	Ω	3–5
Limit		
Output current	A	Min. 52.5
Slip ring O.D.	mm (in.)	22.1 (.870)

TROUBLESHOOTING

M16EHA

OPERATION

When engine is stopped

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

When engine is being started/has started

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

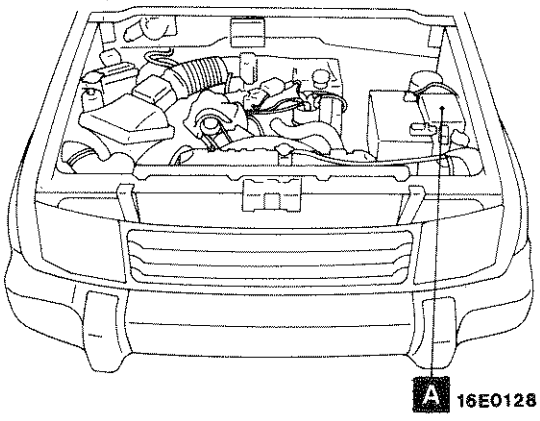
NOTE
The alternator relay functions as a back-up for the flow of electricity to the field coil if there is a disconnection or damaged wiring of the charging warning light.

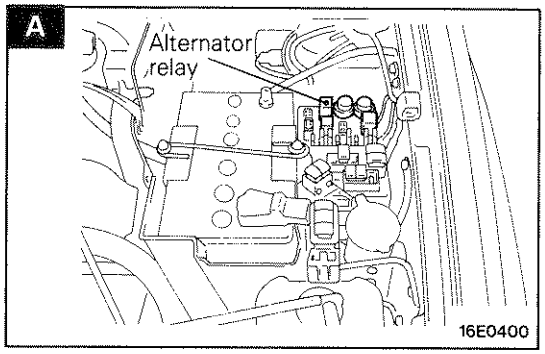
TROUBLESHOOTING HINTS

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

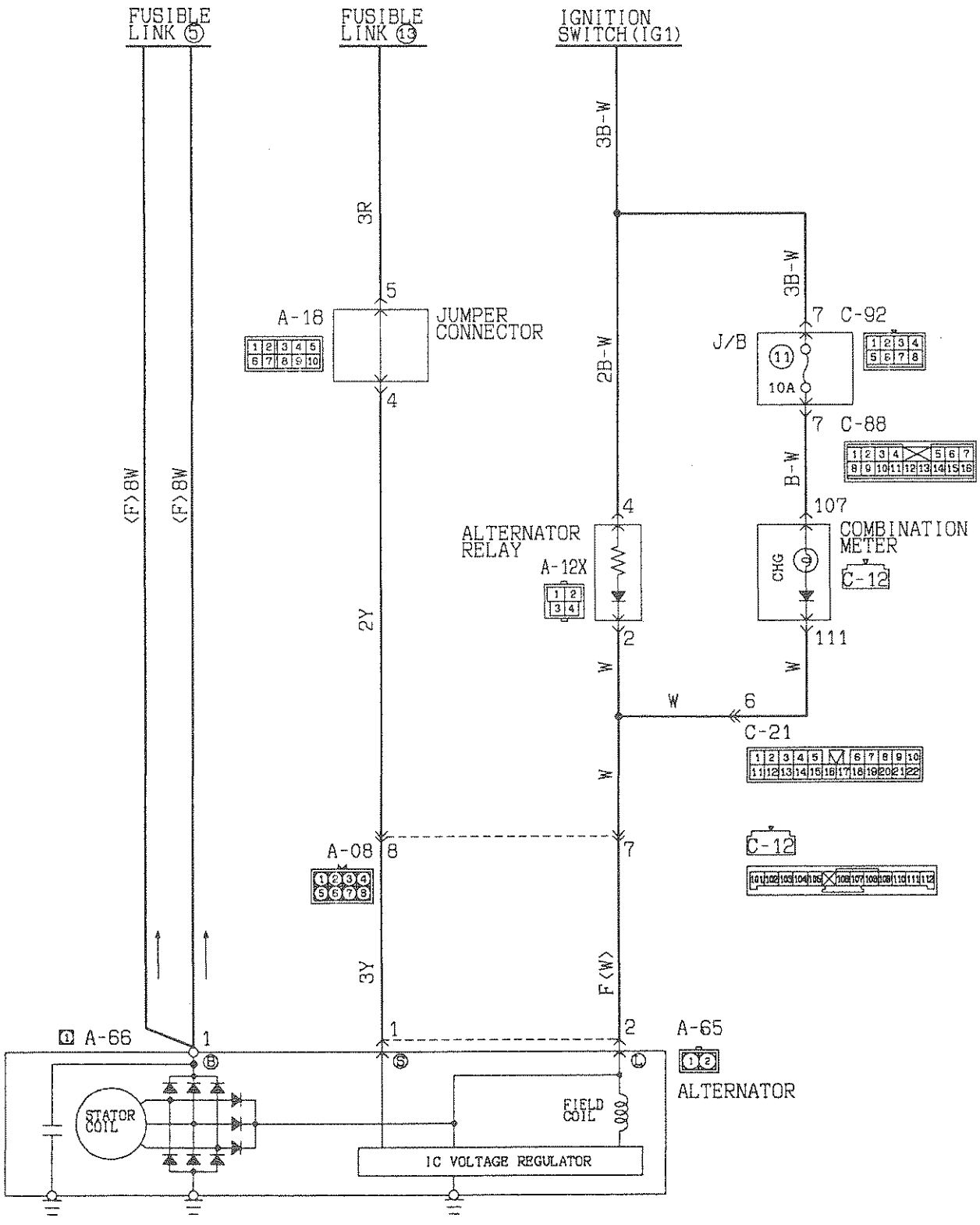
COMPONENT LOCATION

Name	Symbol
Alternator relay	A





CIRCUIT DIAGRAM



KK35-AC-00401-N

TSB Revision

SERVICE ADJUSTMENT PROCEDURES

CHARGING SYSTEM INSPECTION M16EIAN

VOLTAGE DROP TEST OF ALTERNATOR OUTPUT WIRE

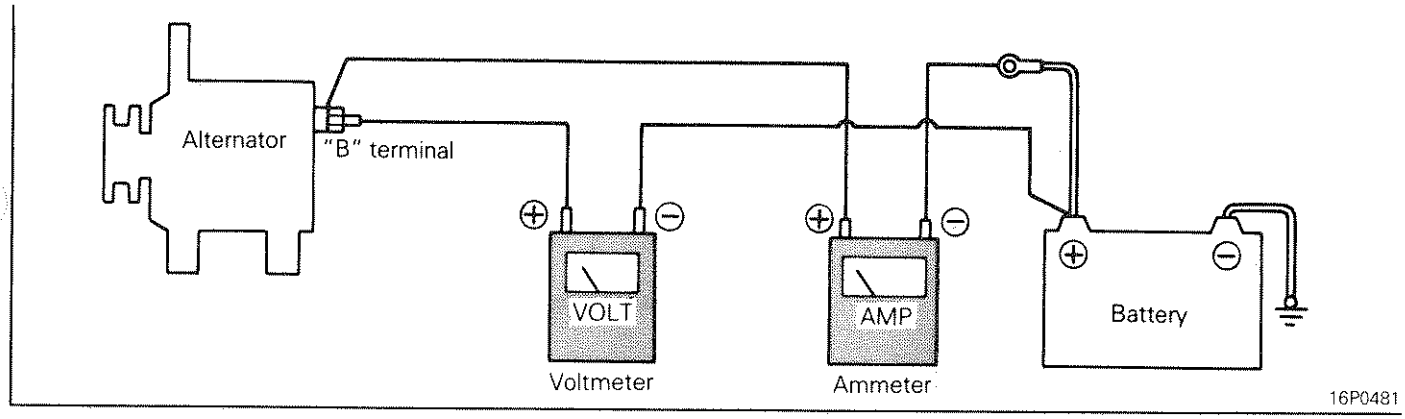
This test judges whether or not the wiring (including the fusible link) between the alternator B terminal and the battery (+) terminal is sound by the voltage drop method.

Preparation

(1) Turn the ignition switch to "OFF".
(2) Disconnect the battery ground cable.
(3) Disconnect the alternator output lead from the alternator "B" terminal.
(4) Connect a DC ammeter in series to the "B" terminal and the disconnected output lead. Connect the (+) lead of the ammeter to the "B" terminal and the (–) lead to the disconnected output wire.

NOTE
Use of a clamp type ammeter that can measure current without disconnecting the harness is preferred. The reason is that when checking a vehicle that has a low output current due to poor connection of the alternator "B" terminal, such poor connection is corrected as the "B" terminal is loosened and a test ammeter is connected in its place and as a result, causes for the trouble may not be determined.

(5) Connect a digital voltmeter between the alternator "B" terminal and battery (+) terminal. Connect the (+) lead wire of the voltmeter to the "B" terminal and the (–) lead wire to the battery (+) terminal.
(6) Connect the battery ground cable.
(7) Leave the hood open.



Test

(1) Start the engine.
(2) Turn on or off the headlights and small lights and adjust the engine speed so that the ammeter reads 20 A and read off the voltmeter indication under this condition.

Result

(1) It is okay if the voltmeter indicates the standard value.

Standard value: 0.2 V max.

(2) If the voltmeter indicates a value that is larger than the standard value, poor wiring is suspected, in which case check the wiring from the alternator "B" terminal to fusible link to battery (+) terminal. Check for loose connection, color change due to overheated harness, etc. and correct them before testing again.
(3) Upon completion of the test, set the engine speed at idle.
Turn off the lights and turn off the ignition switch.
(4) Disconnect the battery ground cable.
(5) Disconnect the ammeter and voltmeter that have been connected for the test purpose.
(6) Connect the alternator output wire to the alternator "B" terminal.
(7) Connect the battery ground cable.

OUTPUT CURRENT TEST

This test judges whether or not the alternator gives an output current that is equivalent to the nominal output.

Preparation

(1) Prior to the test, check the following items and correct as necessary.
  (a) Check the battery installed in the vehicle to ensure that it is in sound state*. The battery checking method is described in "BATTERY".

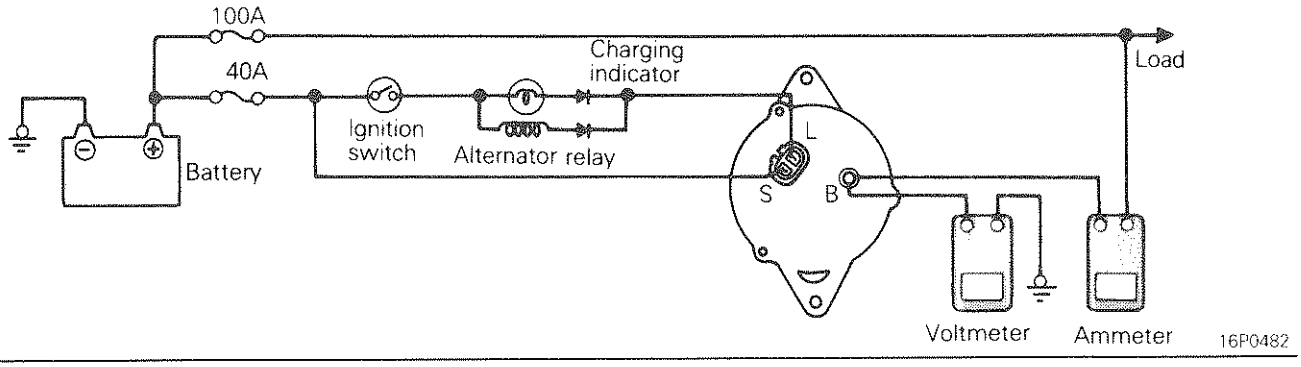
  NOTE
  *The battery that is used to test the output current should be one that has been rather discharged. With a fully charged battery, the test may not be conducted correctly due to an insufficient load.

  (b) Check tension of the alternator drive belt. The belt tension check method is described in "GROUP 11 – Service Adjustment Procedures."

(2) Turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Disconnect the alternator output wire from the alternator "B" terminal.
(5) Connect a DC ammeter in series between the "B" terminal and the disconnected output wire. Connect the (+) lead of the ammeter to the "B" terminal and connect the (–) lead wire to the disconnected output wire.

  NOTE
  Tighten each connection by bolt and nut securely as a heavy current will flow. Do not relay on clips.

(6) Connect a voltmeter (0 to 20V) between the "B" terminal and ground. Connect the (+) lead wire to the alternator "B" terminal and (–) lead wire to a sound ground.
(7) Set the engine tachometer and connect the battery ground cable.
(8) Leave the engine hood open.



Test

(1) Check to see that the voltmeter reads the same value as the battery voltage.
  If the voltmeter reads 0V, an open circuit in the wire between the alternator "B" terminal and battery (–) terminal, a blown fusible link or poor grounding is suspected.
(2) Turn on the headlight switch and start the engine.
(3) Set the headlight at high beam and the heater blower switch at HIGH, quickly increase the engine speed to 2,500 rpm and read the maximum output current value indicated by the ammeter.

  NOTE
  After the engine start up, the charging current quickly drops, therefore, above operation must be done quickly to read maximum current value correctly.

Result

(1) The ammeter reading must be higher than the limit value. If it is lower but the alternator output wire is normal, remove the alternator from the vehicle and check it.

Limit: 52.5A min.

Caution

(a) The nominal output current value is shown on the name plate affixed to the alternator body.

(b) The output current value changes with the electrical load and the temperature of the alternator itself.
Therefore, the nominal output current may not be obtained if the vehicle electrical load at the time of test is small.
In such a case, keep the headlights on to cause discharge of the battery or use lights of another vehicle as a load to increase the electrical load. The nominal output current may not be obtained if the temperature of the alternator itself or ambient temperature is too high. In such a case, reduce the temperature before testing again.

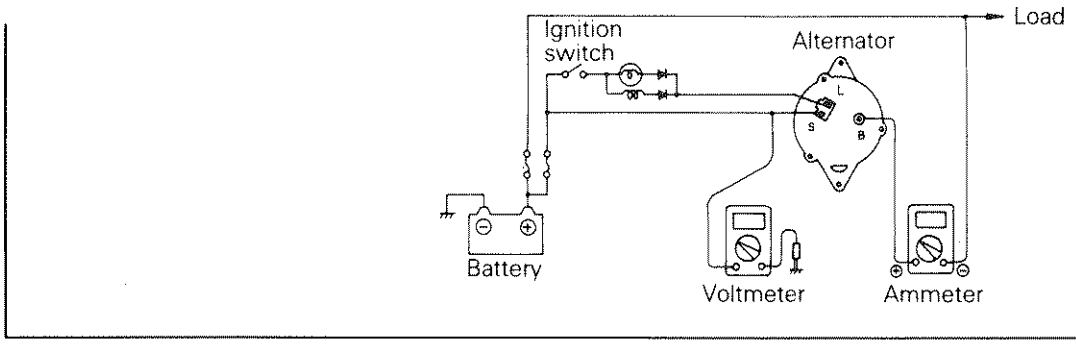
(2) Upon completion of the output current test, lower the engine speed to the idle speed and turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Remove the test ammeter and voltmeter and the engine tachometer.
(5) Connect the alternator output wire to the alternator "B" terminal.
(6) Connect the battery ground cable.

REGULATED VOLTAGE TEST

The purpose of this test is to check that the electronic voltage regulator controls the voltage correctly.

Preparation

(1) Prior to the test, check the following items and correct if necessary.
  (a) Check the battery installed on the vehicle to see that it is fully charged. For battery checking method, see "BATTERY"
  (b) Check the alternator drive belt tension. For belt tension check, see "GROUP 11 – Service Adjustment Procedures."
(2) Turn the ignition switch to "OFF".
(3) Disconnect the battery ground cable.
(4) Connect a digital voltmeter between the "S" terminal of the alternator and ground. Connect the (+) lead of the voltmeter to the "S" terminal of the alternator, inserting from the wire side of the 2-way connector and connect the (–) lead to sound ground or battery (–) terminal.



6EL252

(5) Disconnect the alternator output wire from the alternator "B" terminal.
(6) Connect a DC ammeter in series between the "B" terminal and the disconnected output wire. Connect the (+) lead of the ammeter to the "B" terminal and connect the (–) lead wire to the disconnected output wire.
(7) Set the engine tachometer and connect the battery ground cable.

Test

(1) Turn on the ignition switch and check that the voltmeter indicates the following value.
Voltage: System voltage
If it reads 0V, there is an open circuit in the wire between the alternator "S" terminal and the battery (+) or the fusible link is blown.
(2) Start the engine. Keep all lights and accessories off.
(3) Run the engine at a speed of about 2,500 rpm and read the voltmeter when the alternator output current drops to 10A or less.

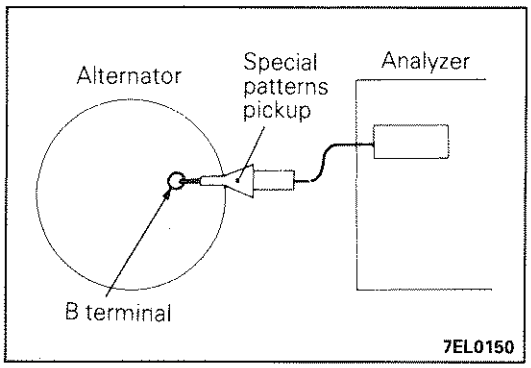
Result

(1) If the voltmeter reading agrees with the value listed in the regulating voltage table below, the voltage regulator is functioning correctly. If the reading is other than the standard value, the voltage regulator or the alternator is faulty.

Regulating voltage table

Voltage regulator ambient temperature °C (°F)	Regulating voltage V
–20 (–4)	14.2 – 15.4
20 (68)	13.9 – 14.9
60 (140)	13.4 – 14.6
80 (176)	13.1 – 14.5

(2) Upon completion of the test, set the engine speed at idle and turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Remove the test voltmeter and ammeter and the engine tachometer.
(5) Connect the alternator output wire to the alternator "B" terminal.
(6) Connect the battery ground cable.



CHECKING WITH AN ANALYZER

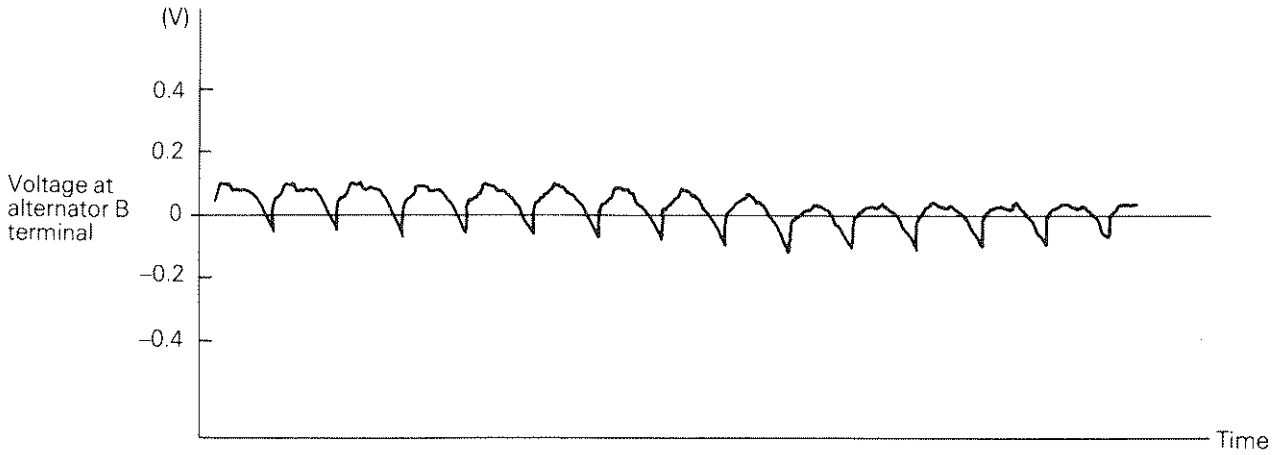
MEASUREMENT METHOD

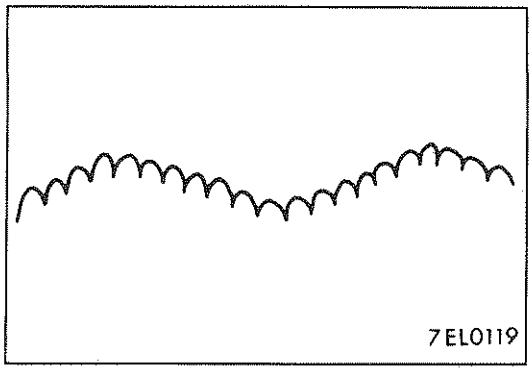
Connect the analyzer special patterns pick-up to the alternator B terminal.

STANDARD WAVEFORM

Observation Conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Raster
Engine revolutions	Idle (700 rpm)



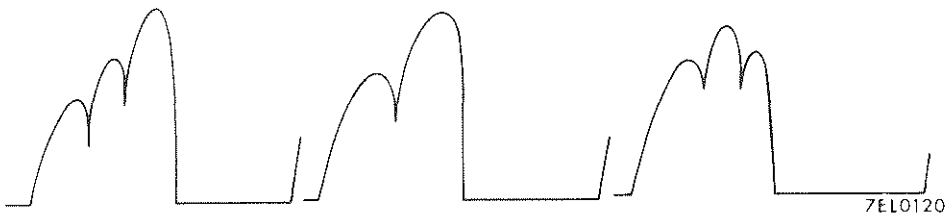
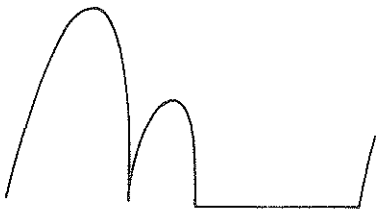
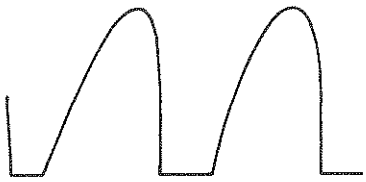


NOTE

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

EXAMPLES OF ABNORMAL WAVEFORMS

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 con 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.

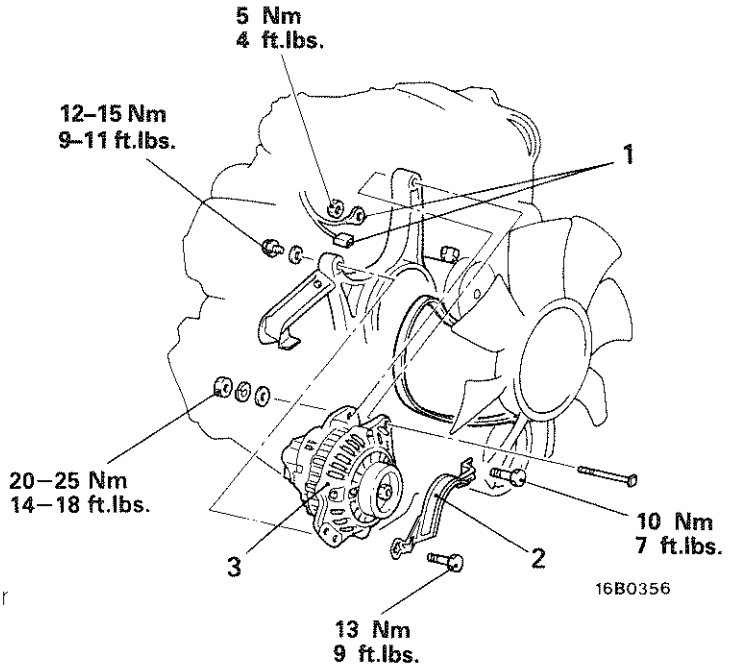
Abnormal waveforms	Problem cause
Example 1  7EL0120	• Open diode
Example 2  7EL0121	• Short in diode
Example 3  7EL0122	• Broken wire in stator coil
Example 4  7EL0123	• Short in stator coil
Example 5  NOTE: At this time, the charge light is illuminated. 7EL0124	• Open supplementary diode

ALTERNATOR

M16EJA

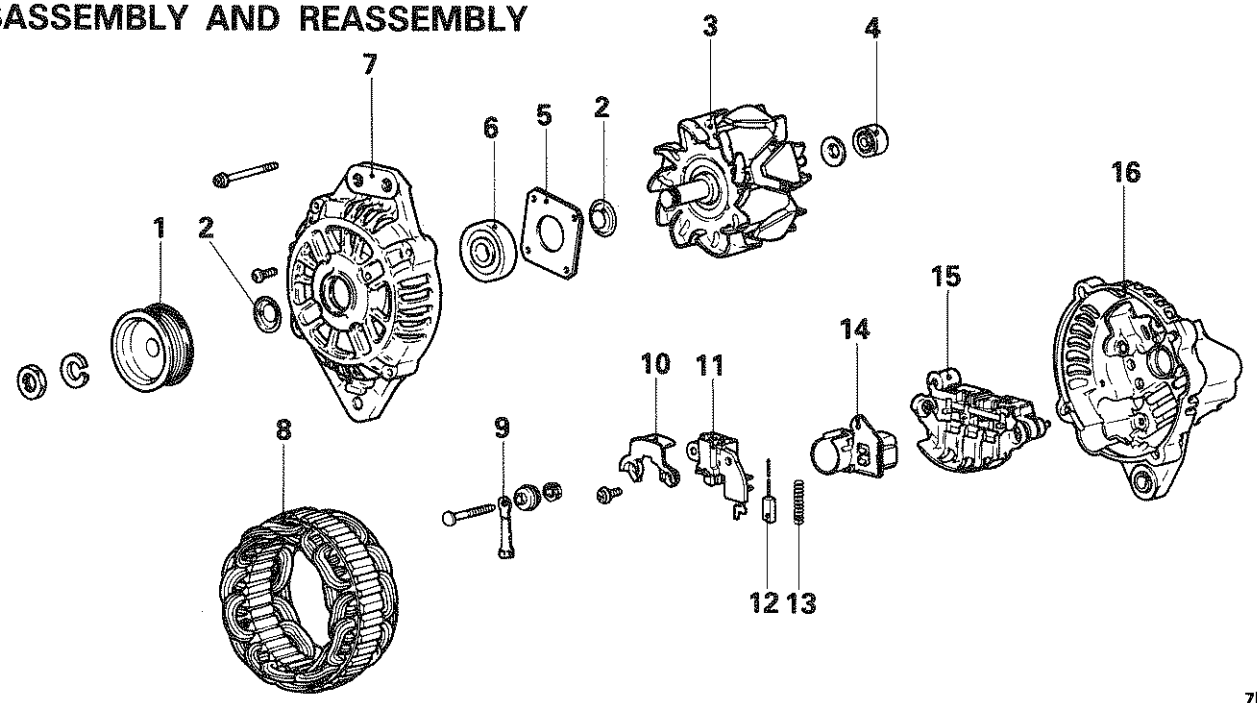
REMOVAL AND INSTALLATION

Post-installation Operation
- Adjustment of the Drive Belt Tension (Refer to GROUP 14 – Service Adjustment Procedures.)



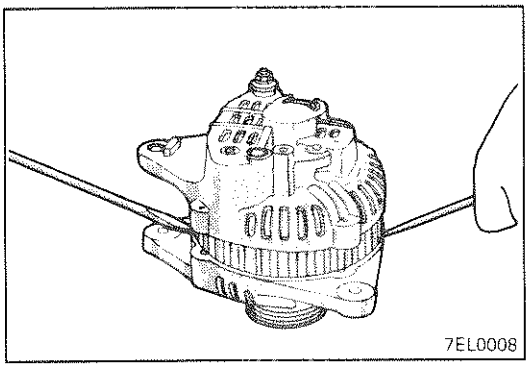
Removal steps
1. Connection for alternator connector
2. Alternator cover
3. Alternator

DISASSEMBLY AND REASSEMBLY



Disassembly steps

◆◆ 1. Pulley
2. Seal
◆◆ 3. Rotor assembly
4. Rear bearing
5. Bearing retainer
6. Front bearing
7. Front bracket
◆◆ 8. Stator
9. Terminal
10. Plate
◆◆ 11. Regulator and brush holder
12. Brush
13. Brush spring
14. Slinger
15. Rectifier assembly
16. Rear bracket

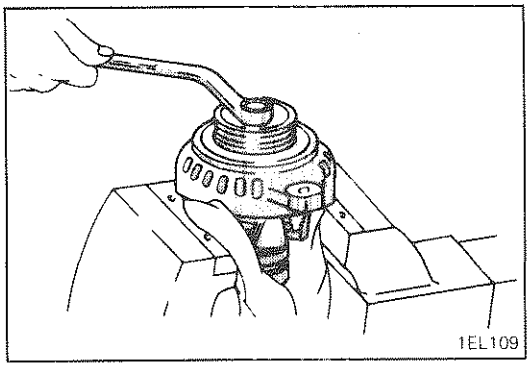


SERVICE POINTS OF DISASSEMBLY

SEPARATING THE STATOR AND FRONT BRACKET

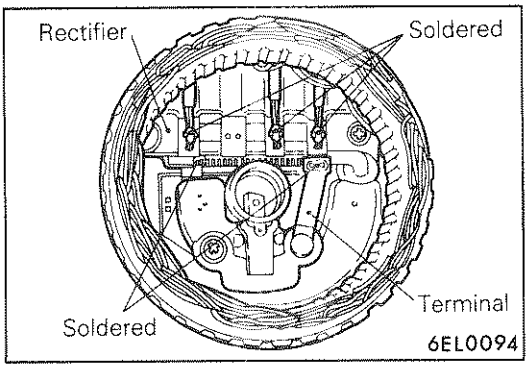
Insert plain screwdriver between front bracket and stator core and pry downward.

Caution
Do not insert screwdriver too deep, as there is danger of damage to stator coil.



1. REMOVAL OF ALTERNATOR PULLEY

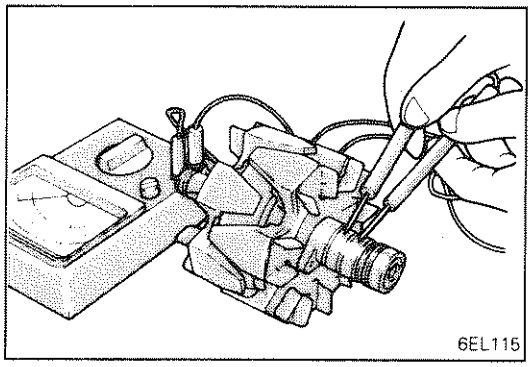
(1) Clamp the rotor in a vise with soft jaws.
(2) After removing the nut, remove the pulley and front bracket from the rotor.



8. REMOVAL OF STATOR/11. REGULATOR AND BRUSH HOLDER

(1) When removing stator, unsolder three stator leads soldered to main diodes on rectifier.
(2) When removing rectifier from brush holder, unsolder two soldered points to rectifier.

Caution
(1) When soldering or unsoldering, use care to make sure that heat of soldering iron is not transmitted to 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 to leads of diodes.

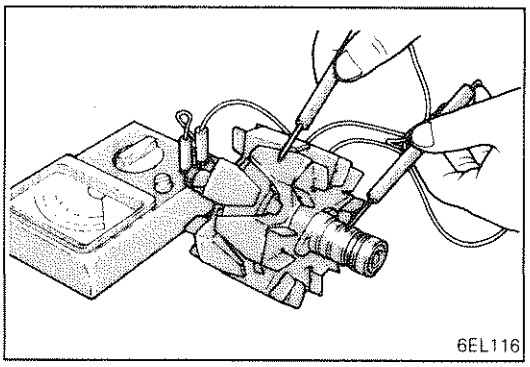


INSPECTION

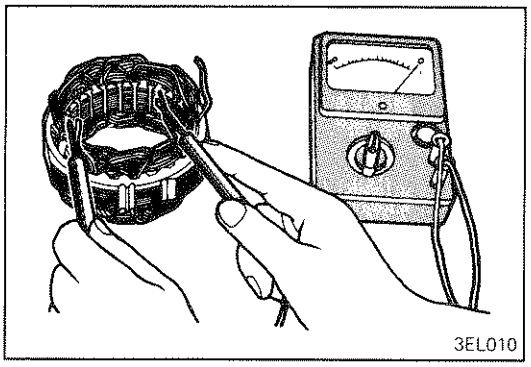
ROTOR

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

Resistance value: Approx 3–5 Ω

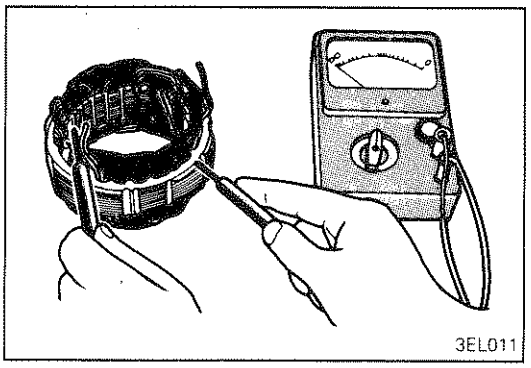


(2) Check field coil for grounding. Check to ensure that there is no continuity between slip ring and core. If there is continuity, replace rotor assembly.

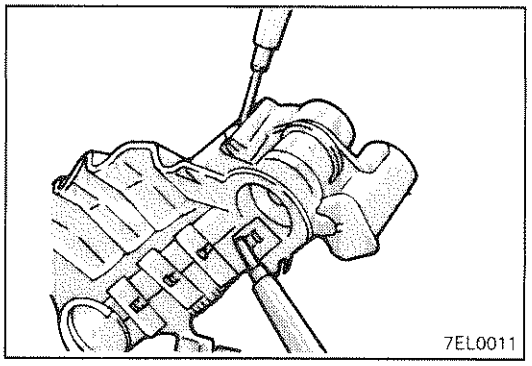


STATOR

(1) Make continuity test on stator coil. Check to ensure that there is continuity between coil leads.
If there is no continuity, replace stator assembly.



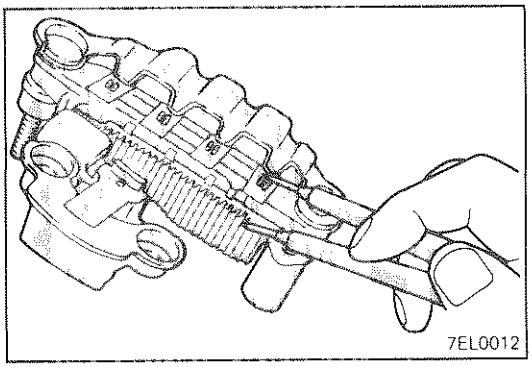
(2) Check coil for grounding. Check to ensure that there is no continuity between coil and core. If there is continuity, replace stator assembly.



RECTIFIERS

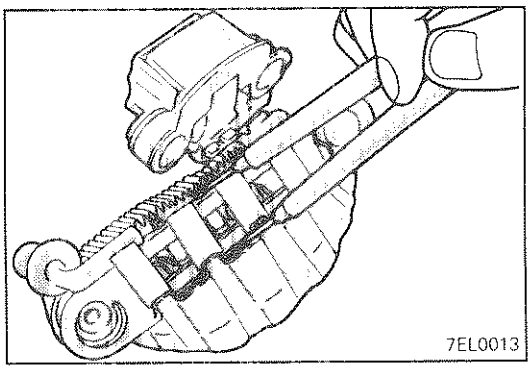
(1) Positive Rectifier Test

Check for continuity between positive rectifier and stator coil lead connection terminal with an ohmmeter. If there is continuity in both directions, diode is shorted.
Replace rectifier assembly.



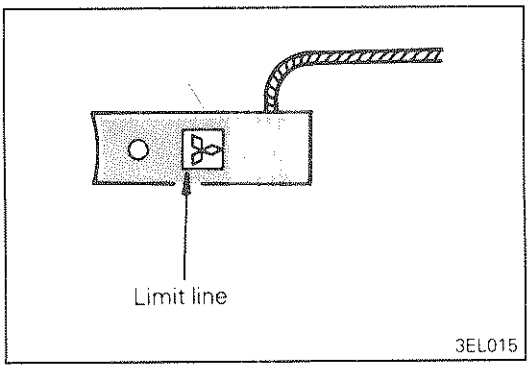
(2) Negative Rectifier Test

Check for continuity between negative rectifier and stator coil lead connection terminal. If there is continuity in both direction, diode is shorted, and rectifier assembly must be replaced.



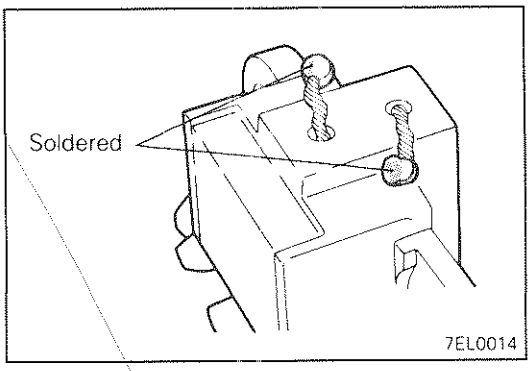
(3) Diode Trio Test

Check three diodes for continuity by connecting an ammeter to both ends of each diode. If there is no continuity in both directions, diode is faulty and heatsink assembly must be replaced.

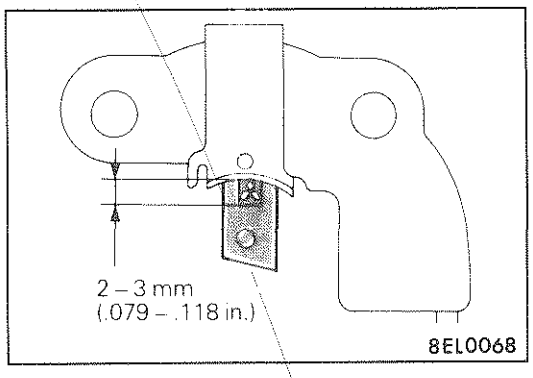


BRUSH REPLACEMENT

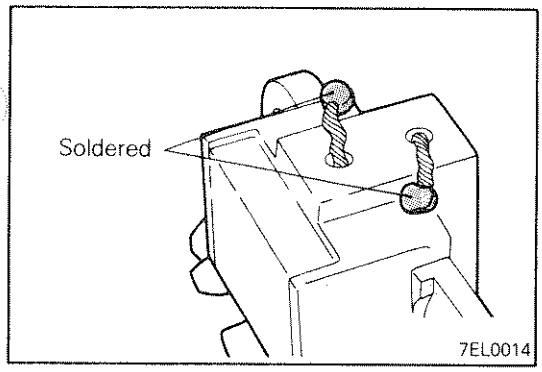
(1) Replace brush by the following procedures if it has been worn to limit line.



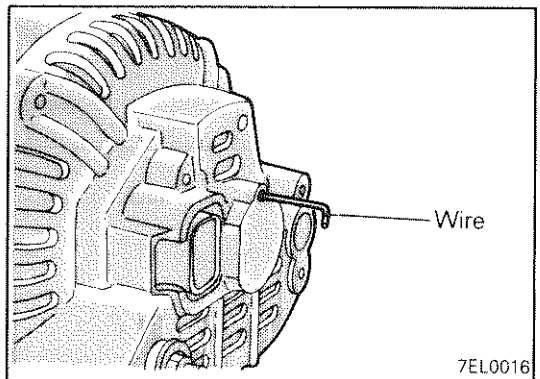
(2) Unsolder pigtail and remove old brush and spring.

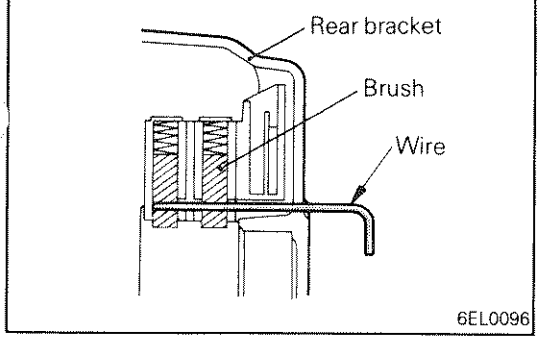


(3) Install brush spring and new brush in brush holder.
(4) Insert the brush to where there is a space 2 to 3 mm (.079 to .118 in.) between the limit line and the end of the brush holder.



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





SERVICE POINT OF REASSEMBLY

3. INSTALLATION OF ROTOR ASSEMBLY

Before rotor is attached to rear bracket, insert wire through small hole made in rear bracket to lift brush. After rotor has been installed, remove the wire.

STARTING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

M16FB--

STARTER MOTOR

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

SERVICE SPECIFICATIONS

M16FC--

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

TROUBLESHOOTING

M16FHAH

OPERATION

- For models equipped with the M/T, the clutch switch contact is switched OFF when the clutch pedal is depressed; when the ignition switch is then switched 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 switched to the "ST" position without the clutch pedal being depressed, electricity flows to the starter relay (coil), the clutch switch (contacts) and to 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 models equipped with the 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.

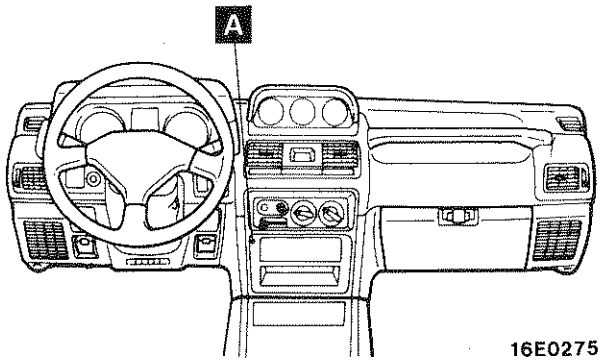
TROUBLESHOOTING HINTS

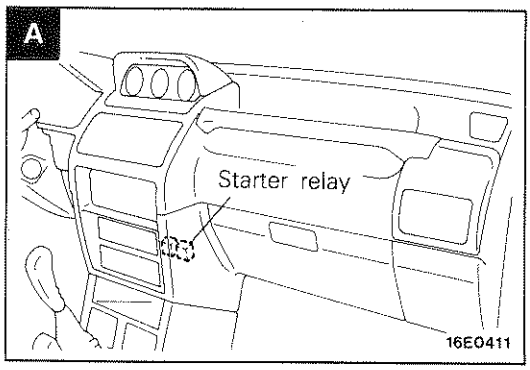
The starter motor does not operate at all.

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

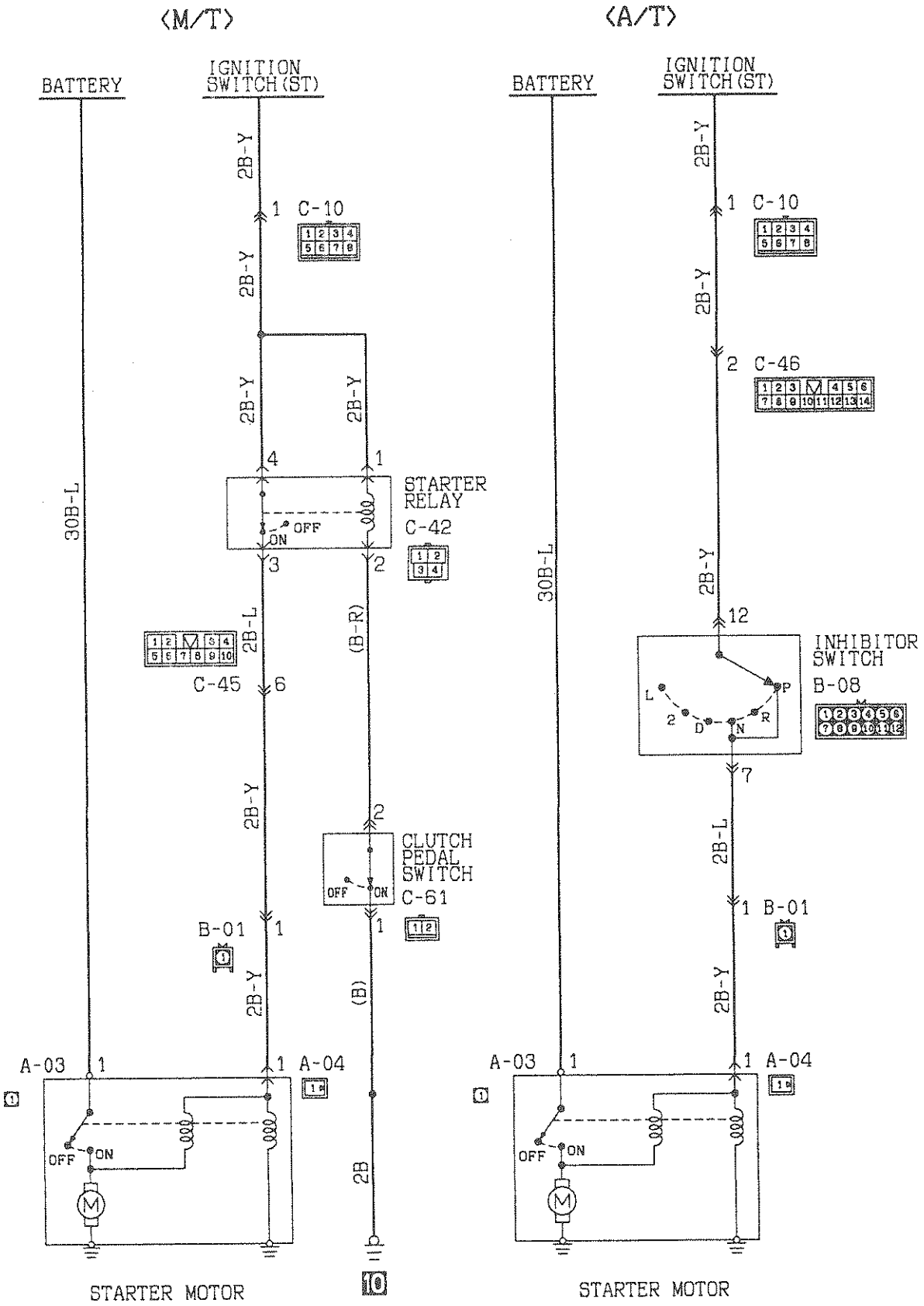
COMPONENTS LOCATION

Name	Symbol
Starter relay	A





CIRCUIT DIAGRAM

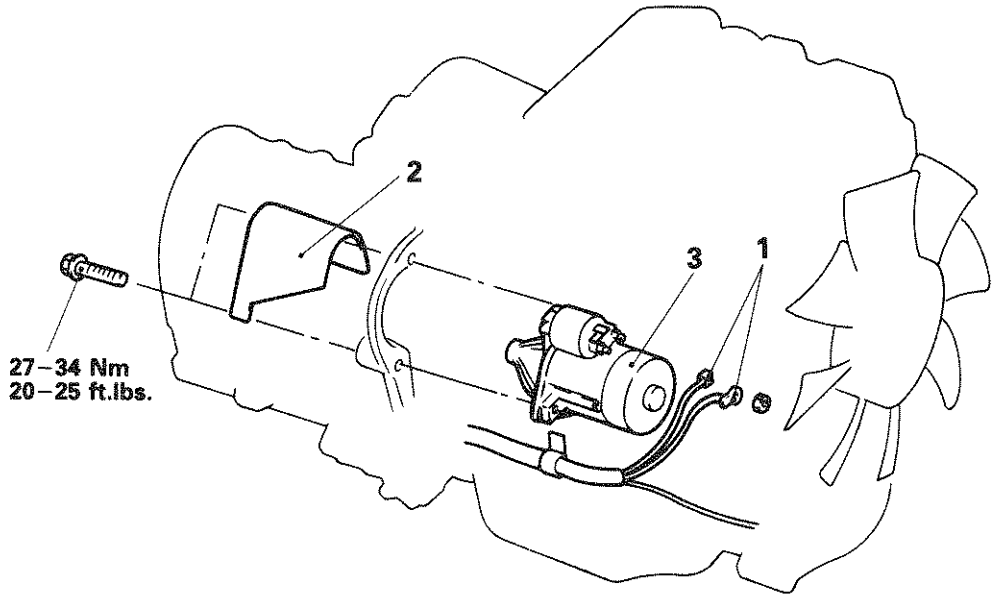


STARTER MOTOR

REMOVAL AND INSTALLATION

M16FJAW

Pre-removal and Post-installation Operation
- Draining and Refilling of Automatic Transmission Fluid (Refer to GROUP 23 – Service Adjustment Procedures.)
- Removal and Installation of Oil Cooler Tube (Refer to GROUP 23 – Transmission Oil Cooler.)



16W1694

Removal steps

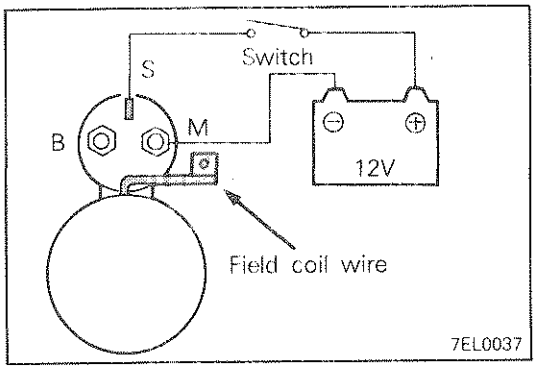
1. Connection for starter motor connector
2. Starter cover
3. Starter motor

SERVICE POINTS OF REMOVAL

3. REMOVAL OF STARTER MOTOR

Models with manual transmission
Jack up the vehicle; then remove (from below the body) the starter motor mounting bolts, and separate the starter motor from the transmission assembly.

TSB Revision

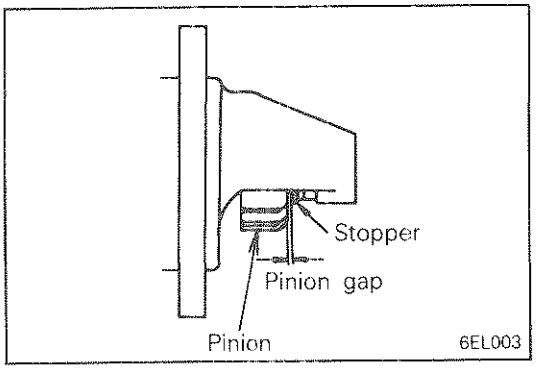


INSPECTION

PINION GAP ADJUSTMENT

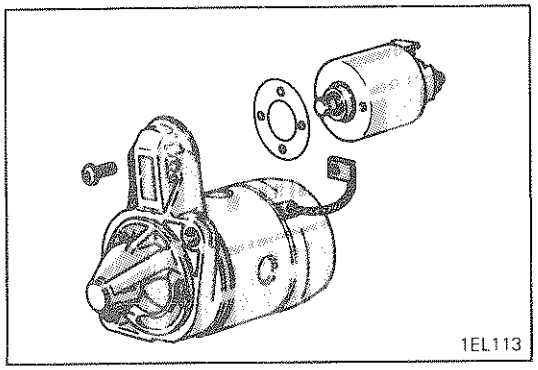
(1) Disconnect field coil wire from "M"-terminal of magnetic switch.
(2) Connect a 12V battery between "S"-terminal and "M"-terminal.
(3) Set switch to "ON", and pinion will move out.

Caution
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.



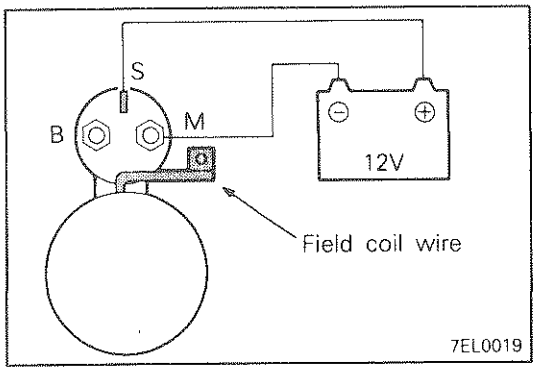
(4) Check pinion to stopper clearance (pinion gap) with a feeler gage.

Pinion gap: 0.5–2.0 mm (.020–.079 in.)



(5) If pinion gap is out of specification, adjust by adding or removing gaskets between magnetic switch and front bracket.

PULL-IN TEST OF MAGNETIC SWITCH

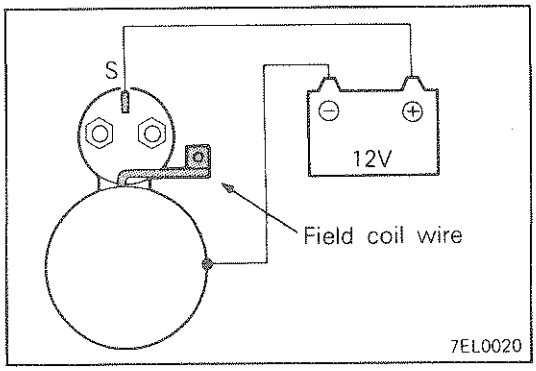


(1) Disconnect field coil wire from "M"-terminal of magnetic switch.
(2) Connect a 12V battery between "S"-terminal and "M"-terminal.

Caution
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

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

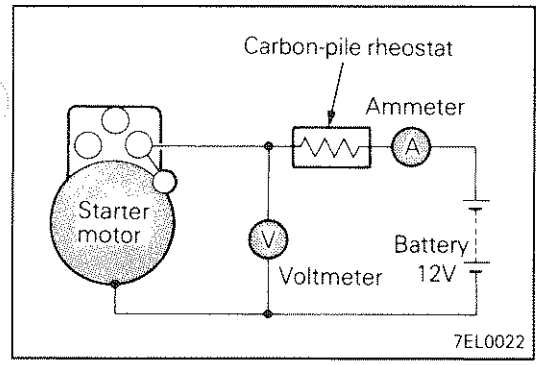
HOLD-IN TEST OF MAGNETIC SWITCH



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

Caution
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

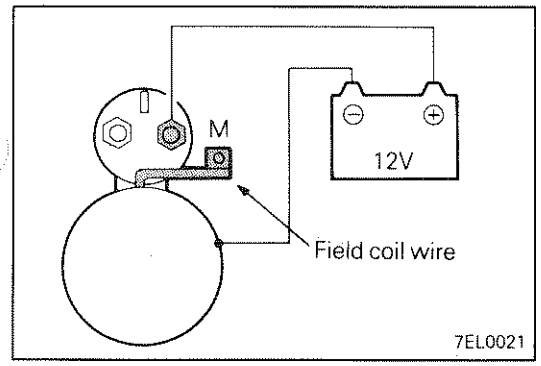
(3) If pinion remains out, everything is in order. If pinion moves in, hold-in circuit is open. Replace magnetic switch.



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 with battery positive post and starter motor terminal.
(3) Connect a voltmeter (15-volt scale) across starter motor.
(4) Rotate carbon pile to full-resistance position.
(5) Connect battery cable from battery negative post to starter motor body.
(6) Adjust rheostat until the battery 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.

Current: max. 90 Amps

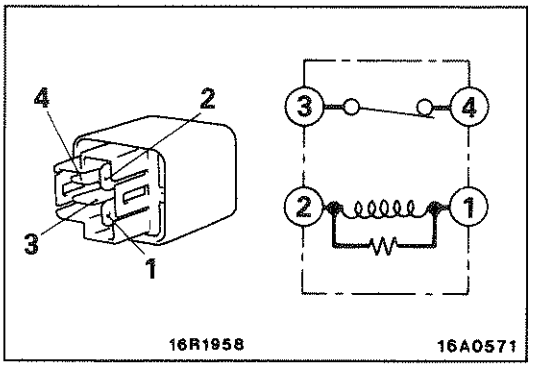


RETURN TEST OF MAGNETIC SWITCH

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

Caution
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

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

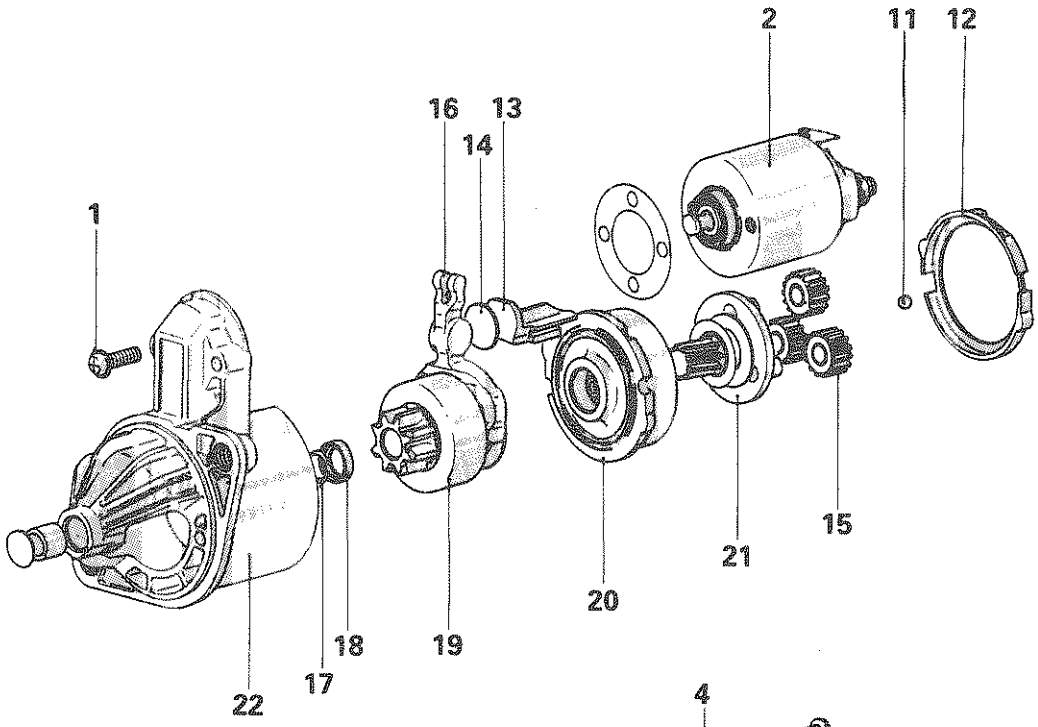


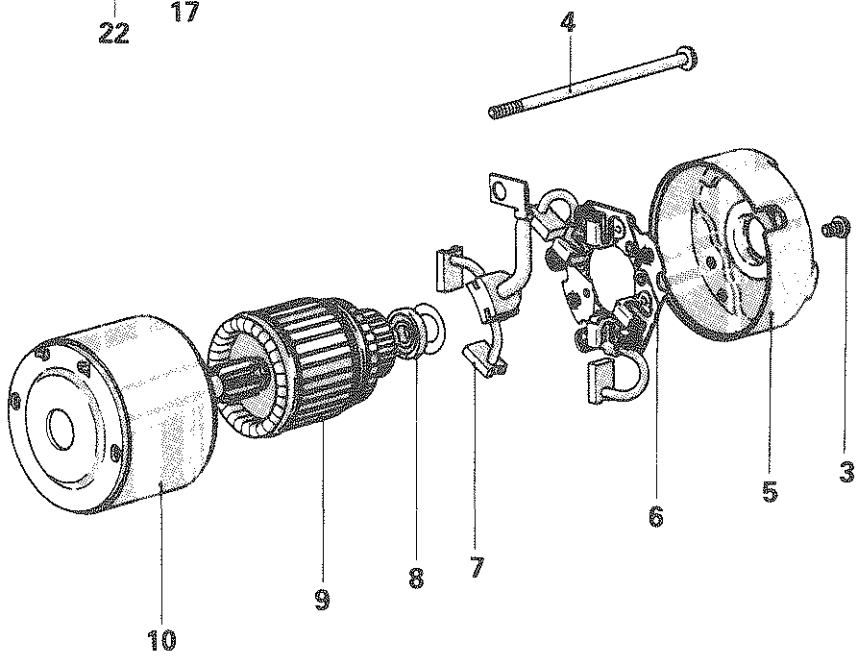
STARTER RELAY

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

Power is supplied	3–4 terminals	No continuity
Power is not supplied	3–4 terminals	Continuity
	1–2 terminals	Continuity

DISASSEMBLY AND REASSEMBLY





Disassembly steps

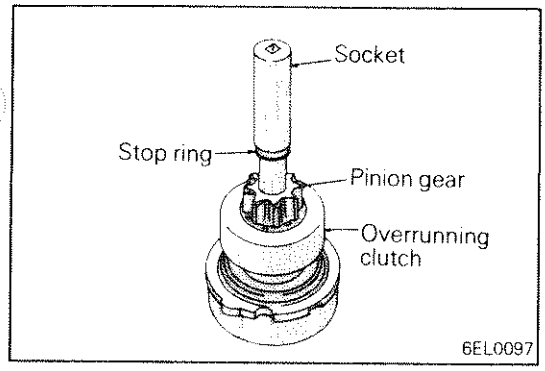
1. Screw
2. Magnetic switch
3. Screw
4. Screw
5. Rear bracket
6. Brush holder
7. Brush
8. Rear bearing
9. ◆◆ Armature
10. Yoke assembly
11. ◆◆ Ball
12. Packing A
13. Packing B
14. Plate
15. Planetary gear
16. Lever
17. ◆◆ ◆◆ Snap ring
18. ◆◆ ◆◆ Stop ring
19. Overrunning clutch
20. Internal gear
21. Planetary gear holder
22. Front bracket

6EL199

SERVICE POINTS OF DISASSEMBLY

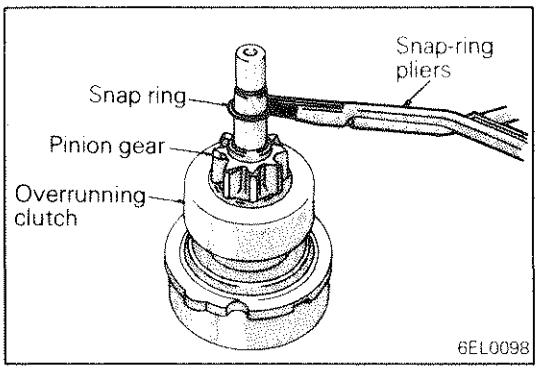
9. REMOVAL OF ARMATURE / 11. BALL

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



17. REMOVAL OF SNAP RING / 18. STOP RING

(1) Press the stop ring, by using an appropriate socket wrench, to the snap ring side.



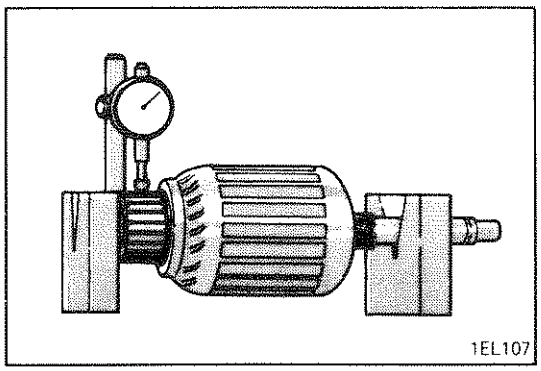
(2) After removing the snap ring (by using snap-ring pliers), remove the stop ring and the overrunning clutch.

CLEANING STARTER MOTOR PARTS

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

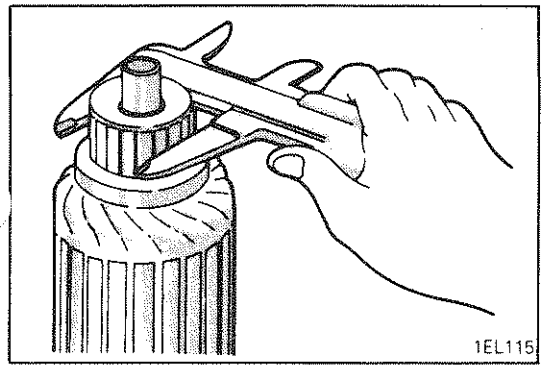
INSPECTION

CHECKING THE COMMUTATOR



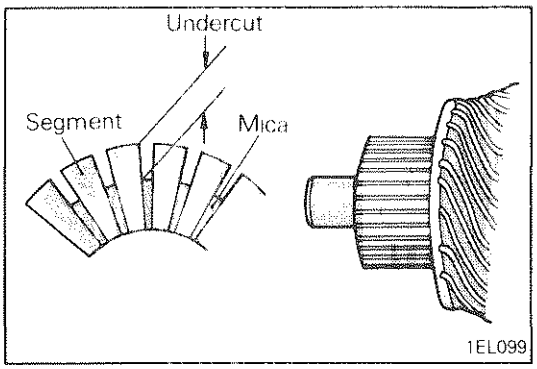
(1) Place the armature on a pair of V-blocks, and check the deflection by using a dial gage.

Standard value: 0.05 mm (.0020 in.)
Limit: 0.1 mm (.0040 in.)

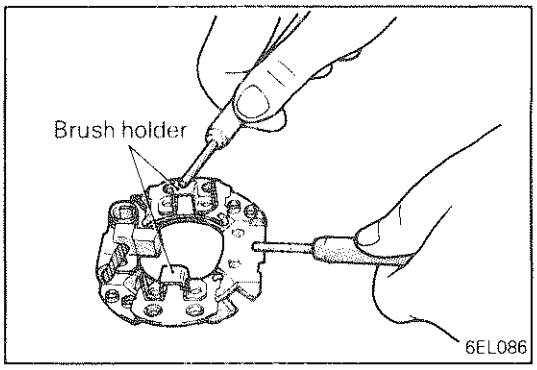


(2) Check the outer diameter of the commutator.

Standard value: 29.4 mm (1.158 in.)
Limit: 28.4 mm (1.118 in.)

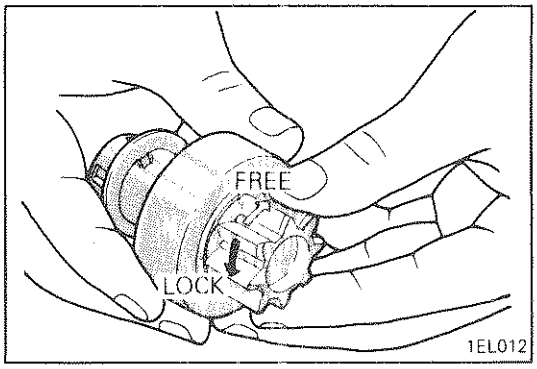


(3) Check the depth of the undercut between segments.
Standard value: 0.5 mm (.020 in.)



BRUSH HOLDER

Check for continuity between brush holder plate and brush holder.
The normal condition is non-continuity.

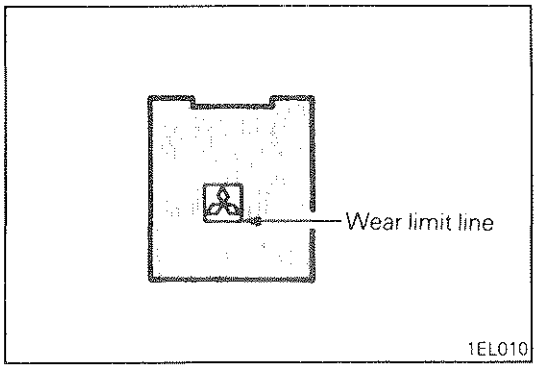


OVERRUNNING CLUTCH

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

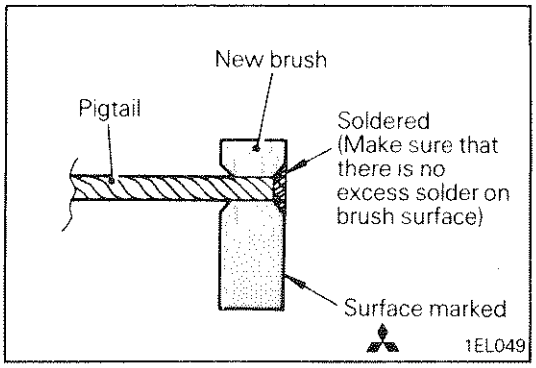
FRONT AND REAR BRACKET BUSHING

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

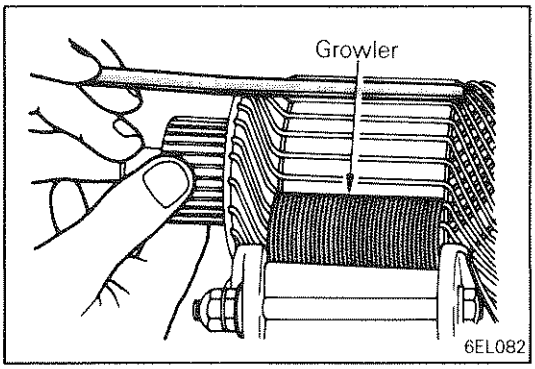


REPLACEMENT OF BRUSHES AND SPRINGS

1. Brushes that are worn beyond wear limit line, or oil-soaked, should be replaced.
2. When replacing field coil brushes, crush worn brush with pliers, taking care not to damage pigtail.



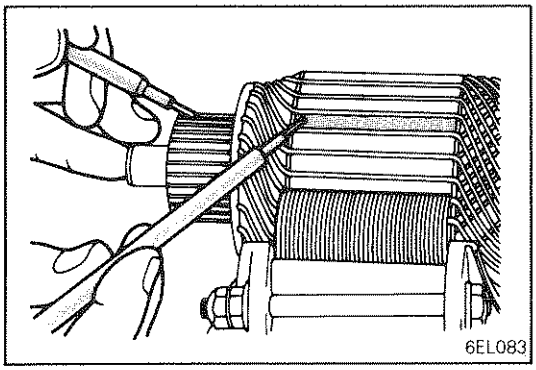
3. Sand pigtail end with sandpaper to ensure good soldering.
4. Insert pigtail into hole provided in new brush and solder it. Make sure that pigtail and excess solder do not come out onto brush surface.
5. When replacing ground brush, slide the brush from brush holder by prying retaining spring back.



TESTING ARMATURE

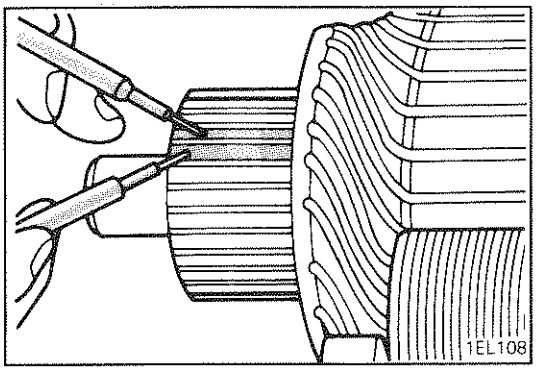
TESTING ARMATURE FOR SHORT-CIRCUIT

1. Place armature in a growler.
2. Hold a thin steel blade parallel and just above while rotating armature slowly in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace shorted armature.



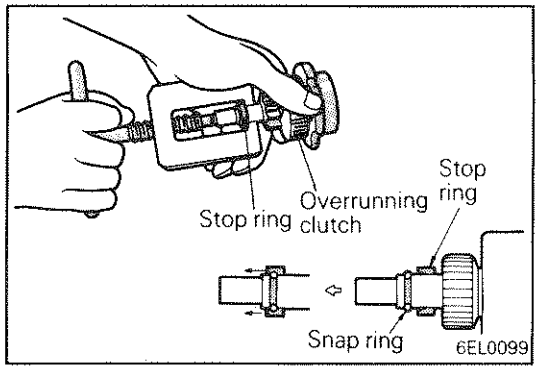
TESTING ARMATURE FOR GROUNDING

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



CHECKING FOR ARMATURE COIL WIRING DAMAGE / DISCONNECTION

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



SERVICE POINTS OF REASSEMBLY

18. INSTALLATION OF STOP RING / 17. SNAP RING

Using a suitable pulling tool, pull overrunning clutch stop ring over snap ring.

IGNITION SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

M16GB--

DISTRIBUTOR

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

IGNITION COIL

Items	Specifications
Type	Mold
Identification No.	F-504
Part No.	MD131711

SPARK PLUG

Items	Specifications
NGK	BPR5ES-11
NIPPON DENSO	W16EPR11
CHAMPION	RN11YC4

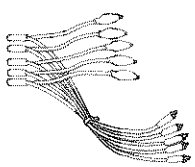
SERVICE SPECIFICATIONS

M16GC--

Items		Specifications
Standard value		
Ignition coil		
Primary coil resistance at 20°C (68°F)	Ω	.72–.88
Secondary coil resistance at 20°C (68°F)	kΩ	10.3–13.9
Spark plug gap	mm (in.)	1.0–1.1 (.039–.043)

SPECIAL TOOL

M16GG--

Tool	Number	Name	Use
	MB991348	Test harness set	Inspection of ignition primary voltage (power transistor connection)

TROUBLESHOOTING

M16GHAQ

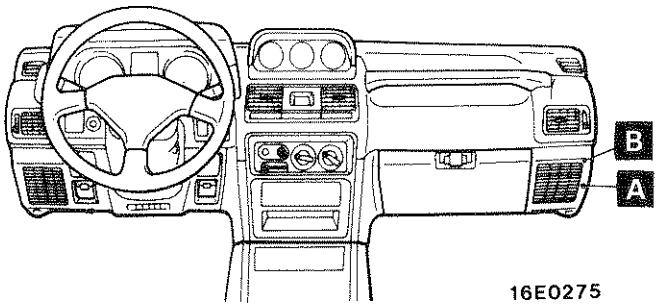
OPERATION

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

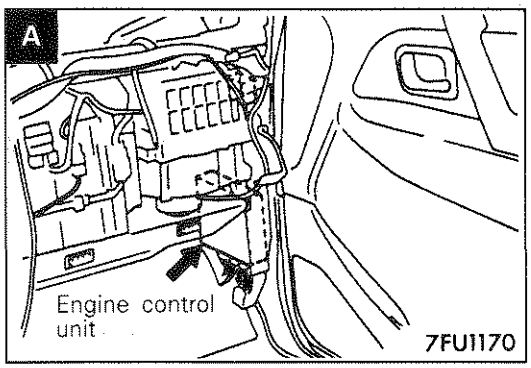
TROUBLESHOOTING HINTS

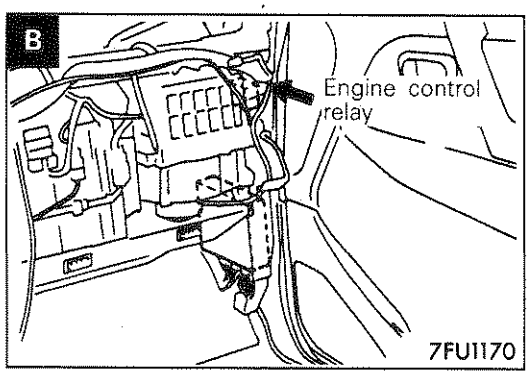
1. Engine cranks, but does not start.
   1) Spark is insufficient or does not occurs at all (on spark plug)
      - Check ignition coil.
      - Check distributor.
      - Check power transistor.
      - Check spark plugs.
      - Check spark plug cable.
   2) Spark is good.
      - Check ignition timing.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

COMPONENT LOCATION

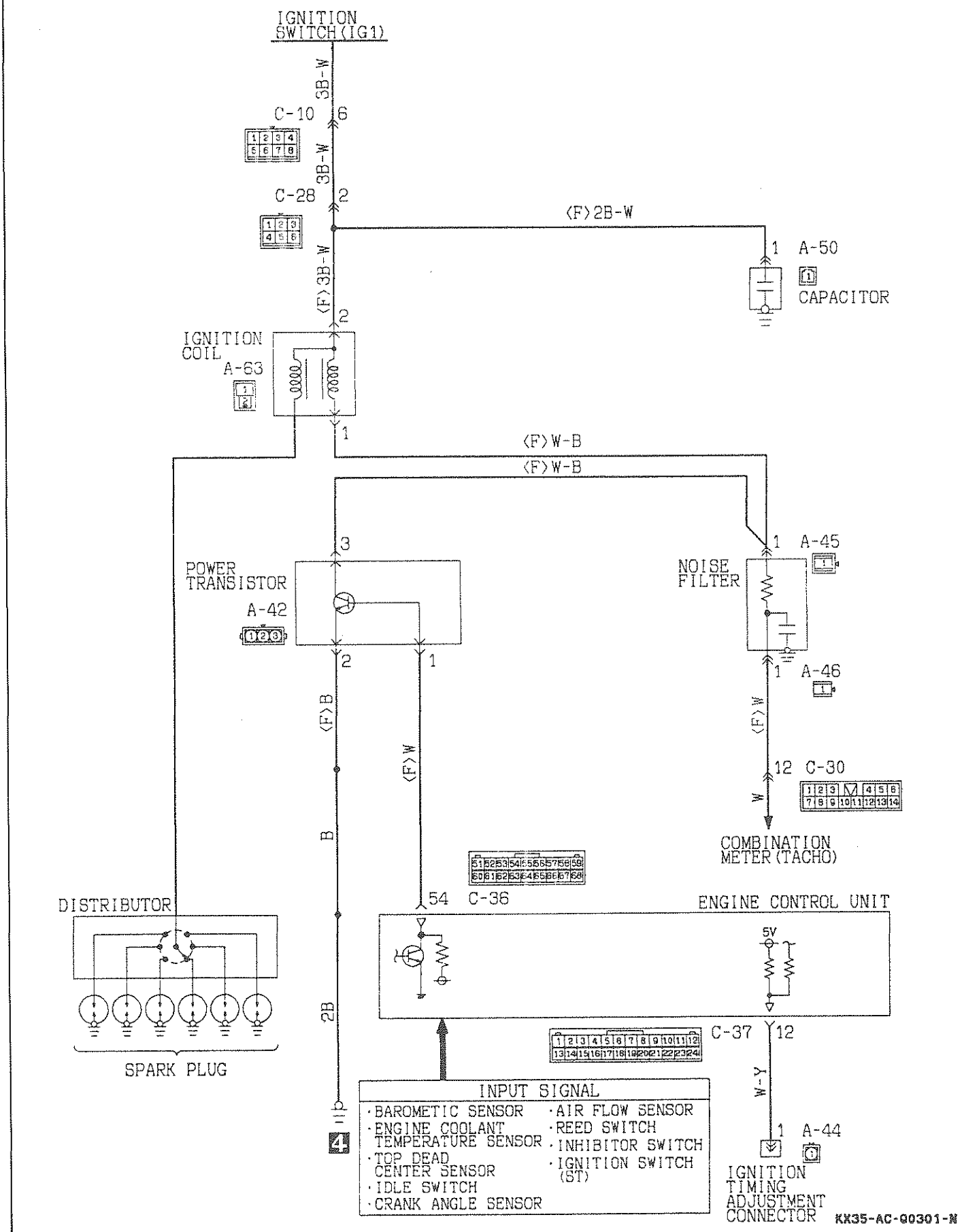


Name	Symbol
Engine control relay	B
Engine control unit	A

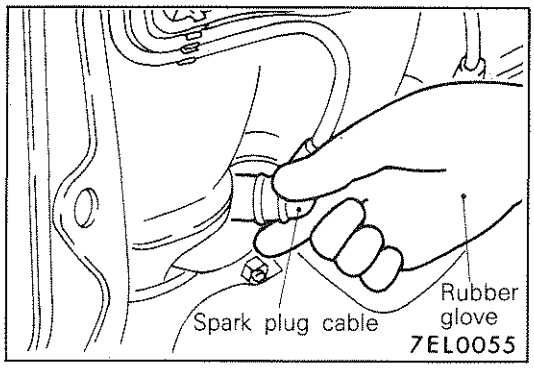


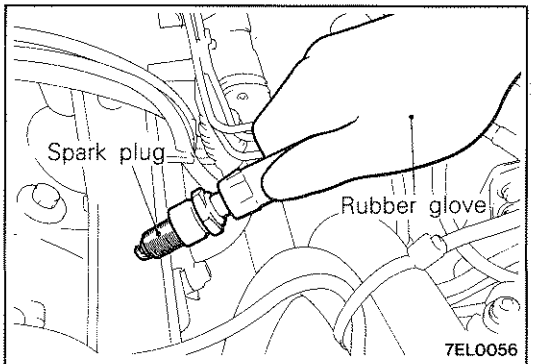


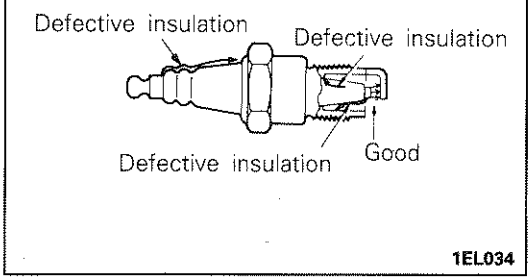
CIRCUIT DIAGRAM



TSB Revision







SERVICE ADJUSTMENT PROCEDURES

SPARK PLUG CABLE TEST M16GIGL

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

Caution
Wear rubber gloves while doing so.

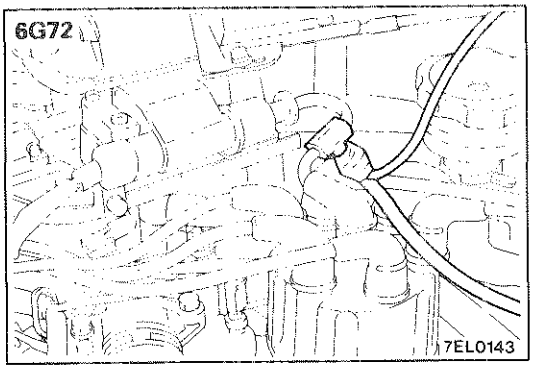
(2) If the engine performance does not change, check the resistance of the spark plug cable, and check the spark plug itself.

SPARK PLUG TEST M16GIHH

(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 to be sure that there is an electrical discharge between the electrodes at this time.

HIGH TENSION CABLE SPARK TEST M16GIKC

(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.

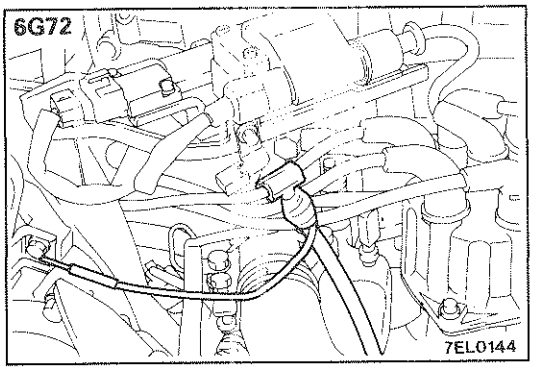


INSPECTION USING AN ANALYZER (SECONDARY AND PRIMARY IGNITION VOLTAGE WAVEFORMS) M16GINA

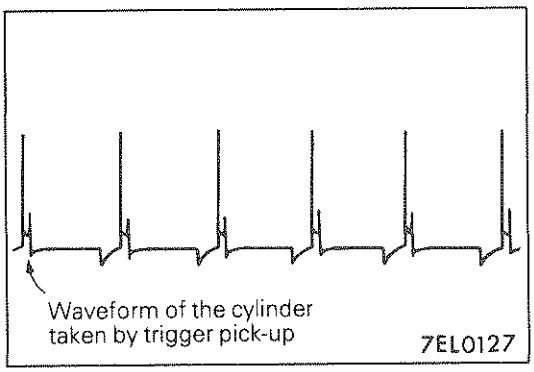
INSPECTION OF SECONDARY IGNITION VOLTAGE

MEASUREMENT METHOD

(1) Clamp the secondary pickup around high tension cable.



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

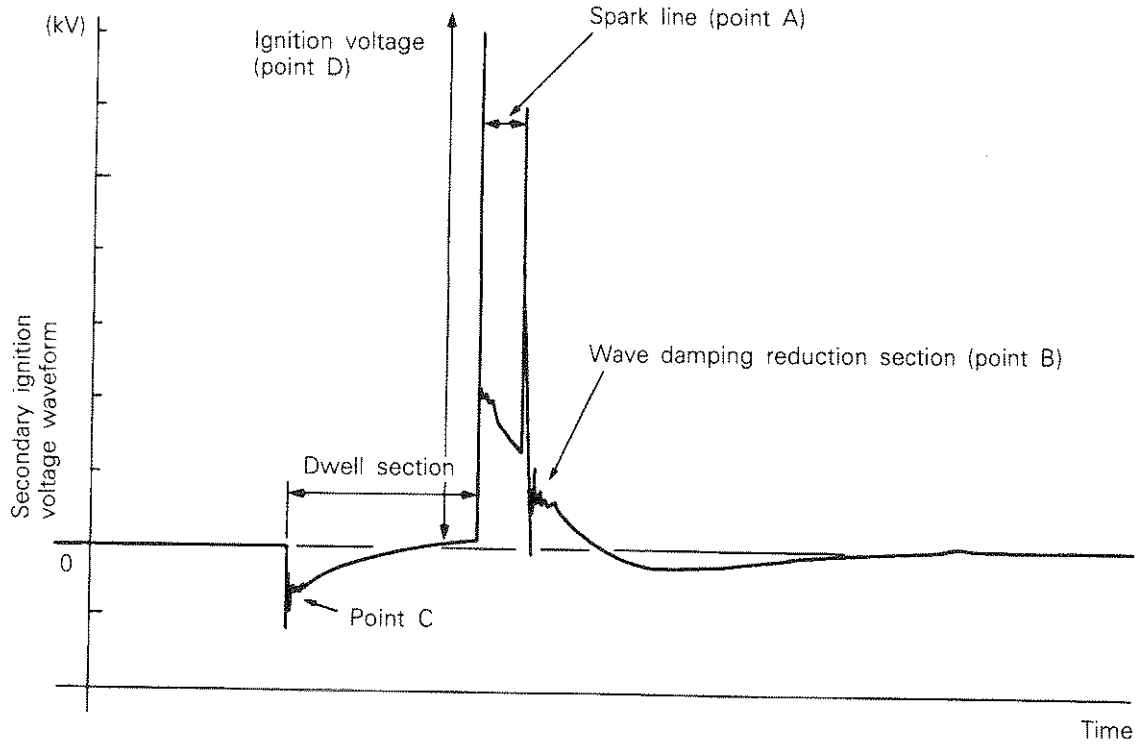


NOTE
The cylinder waveform taken by the trigger pickup appears from the left side of the screen.

STANDARD WAVEFORM

Observation Conditions

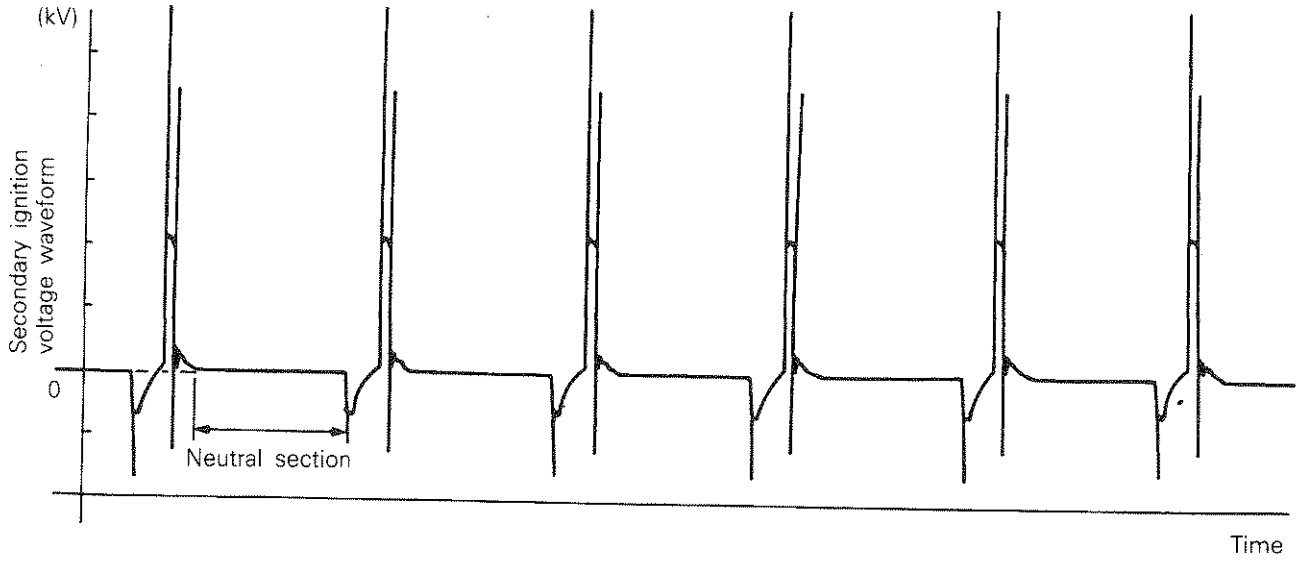
Function	Secondary
Pattern height	HIGH (or LOW)
Pattern selector	Raster
Engine revolutions	Idle (700 rpm)



7EL0128

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

PATTERN SELECTOR	DISPLAY



7EL0129

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

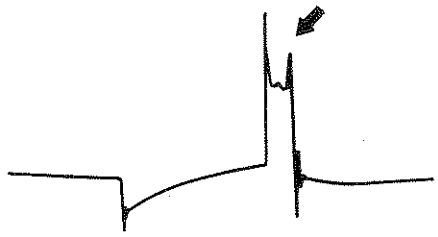
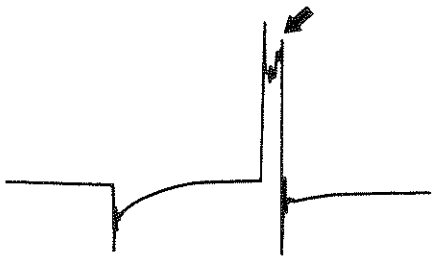
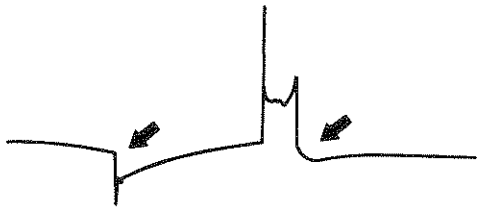
(Point C): Number of vibrations at beginning of dwell section (Refer to abnormal waveform example 5)

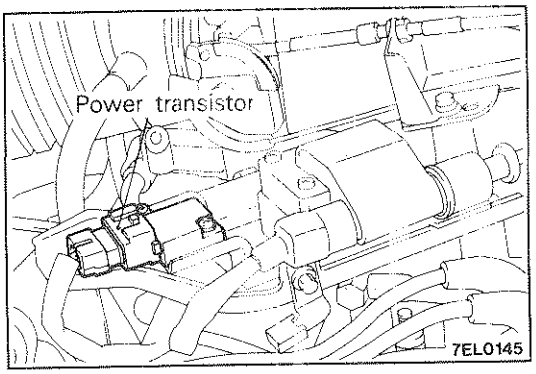
Number of vibrations	Coil
5–6 or higher	Normal
Except above	Abnormal

(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

EXAMPLES OF ABNORMAL WAVEFORMS

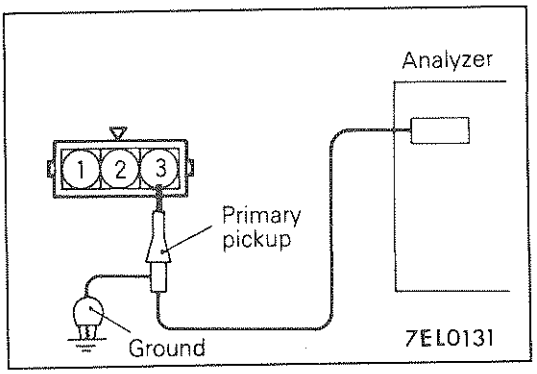
Abnormal waveform	Wave characteristics	Cause of problem
Example 1  01P0215	Spark line is high and short.	Spark plug gap is too large.
Example 2  01P0216	Spark line is low and long, and is sloping. ALso, the second half of the spark line is distorted. This could be a result of misfiring.	Spark plug gap is too small.
Example 3  01P0217	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
Example 4  01P0218	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)
Example 5  01P0219	No waves in wave damping section.	Rare short in ignition coil.



INSPECTION OF PRIMARY IGNITION VOLTAGE

MEASUREMENT METHOD

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



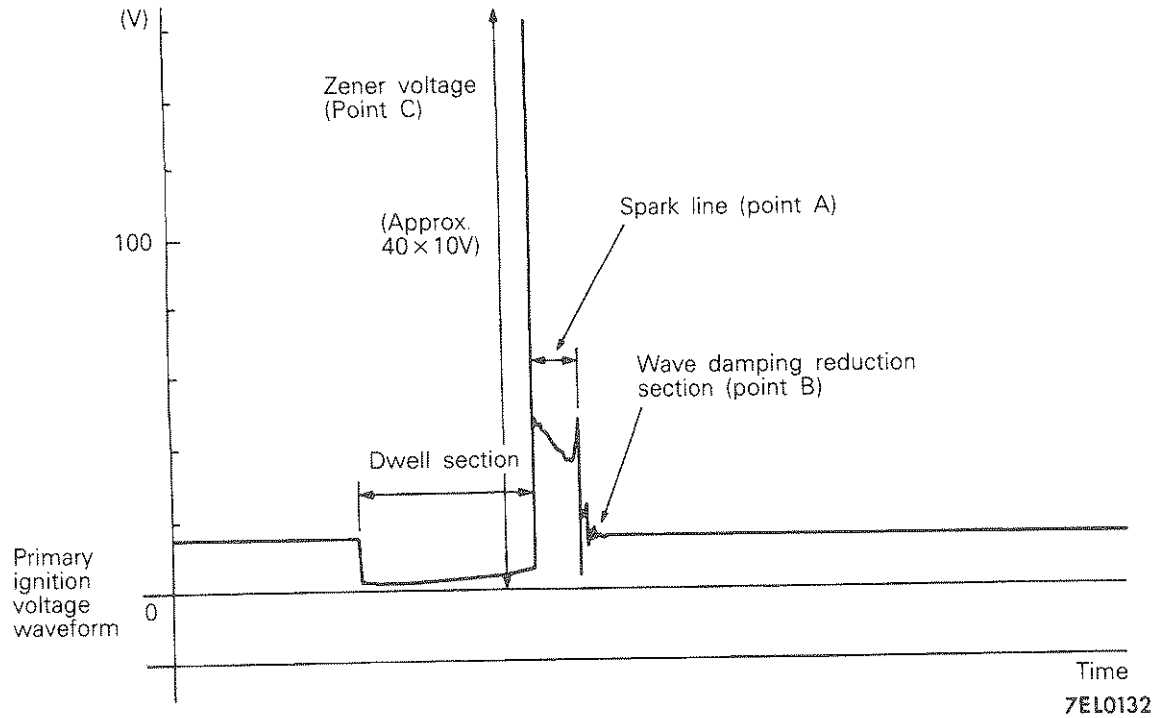
(2) Connect the primary pickup of the adjuster to the power transistor connector terminal (3).
(3) Ground the primary pickup ground terminal.
(4) Clamp the spark plug cable with the trigger pickup.

NOTE
The waveform of the cylinder clamped by the trigger pickup appears from the left side of the screen.

STANDARD WAVEFORM

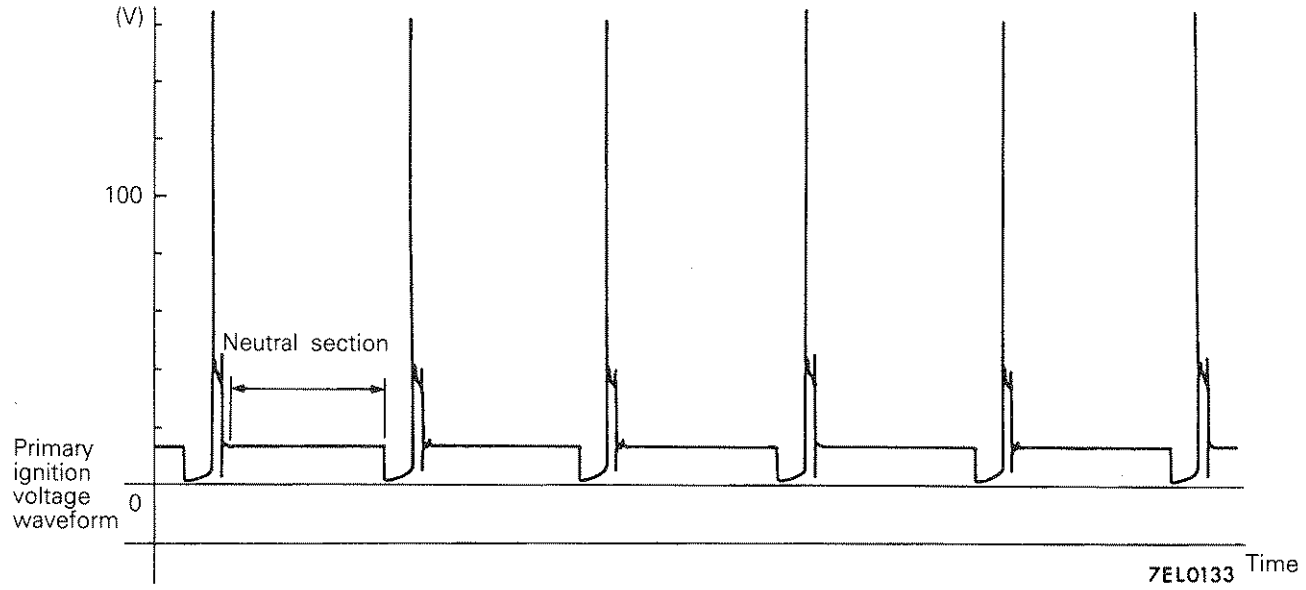
Observation Conditions

Function	Primary
Pattern height	HIGH (or LOW)
Pattern selector	Raster
Engine revolutions	Idle (700 rpm.)



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

PATTERN SELECTOR	DISPLAY



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	High tension 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	–	–	–	–

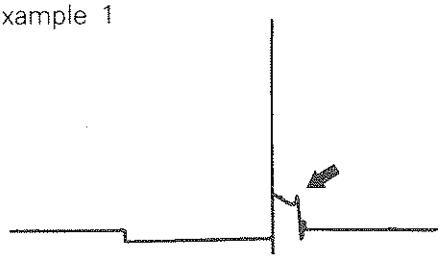
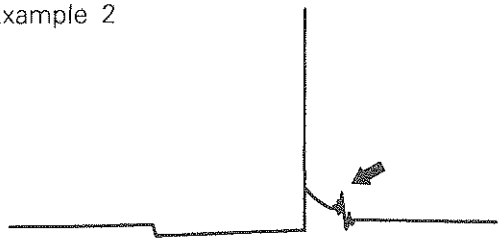
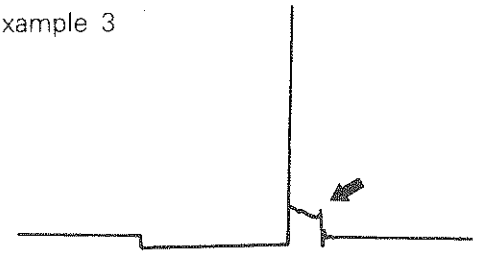
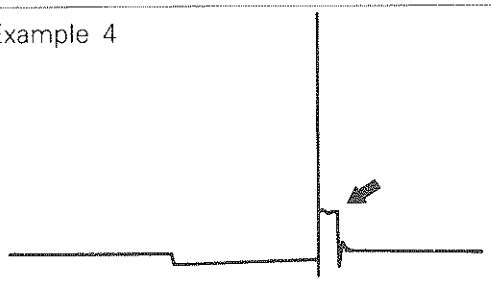
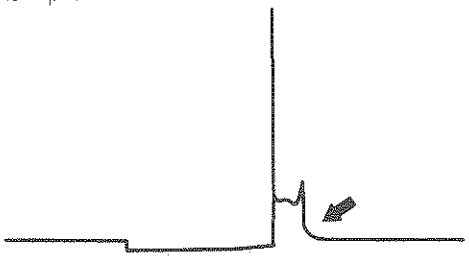
(Point B): Number of vibrations in reduction vibration section (Refer to abnormal waveform example 5)

Number of vibrations	Coil, condenser
3 or higher	Normal
Except above	Abnormal

(Point C) : Height of Zener voltage

Height of Zener voltage	Probable cause
High	Problem in Zener diode
Low	Abnormal resistance in primary coil circuit

EXAMPLES OF ABNORMAL WAVEFORMS

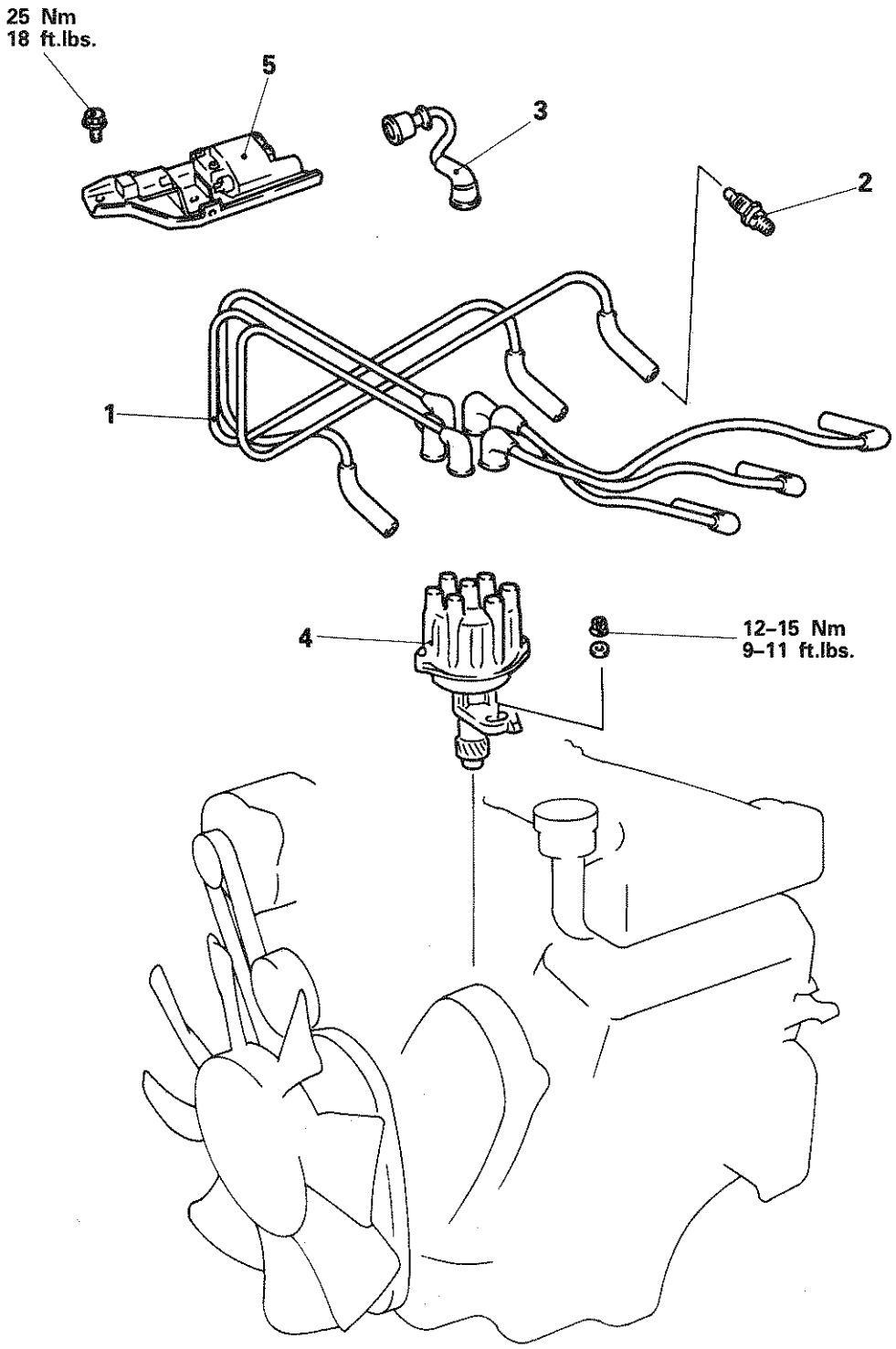
Abnormal waveform	Wave characteristics	Cause of problem
Example 1  01P0210	Spark line is high and short.	Spark plug gap is too large.
Example 2  01P0211	Spark line is low and long, and is sloping. Also, the second half of the spark line is distorted. This could be a result of mis-firing.	Spark plug gap is too small.
Example 3  01P0212	Spark line is low and long, and is sloping. However, there is almost no spark line distortion.	Spark plug gap is fouled.
Example 4  01P0213	Spark line is high and short	Spark plug cable is nearly falling off. (Causing a dual ignition)
Example 5  01P0214	No waves in wave damping section.	Rare short in ignition coil.

TSB Revision

IGNITION SYSTEM

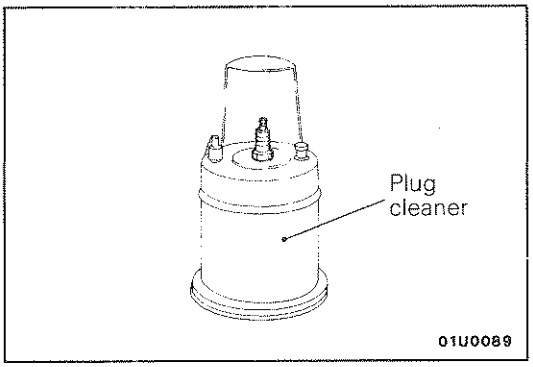
REMOVAL AND INSTALLATION

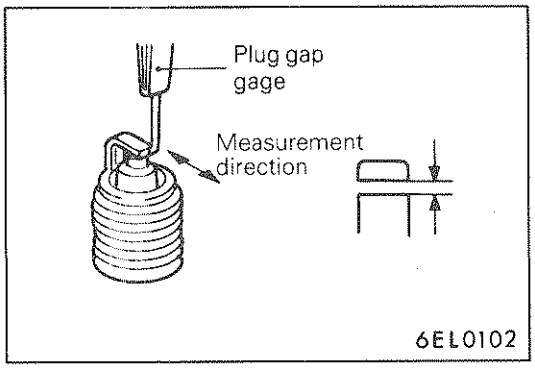
M16GJBF



7EL0061

1. Spark plug cable
2. Spark plug
3. High tension cable
4. Distributor
5. Ignition coil assembly



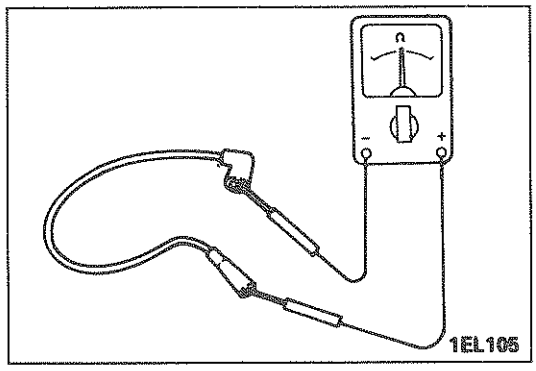


INSPECTION

SPARK PLUG

(1) Check the following items so see that electrodes are not burnt, and insulators and not broken, and how porcelain insulator is burnt.
- Broken insulators
- Warning electrodes
- Deposited carbon
  For cleaning, use a plug cleaner or wire brush. Clean porcelain insulator above 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 bum indicates too lean a fuel mixture of excessively advanced ignition timing. Also insufficient plug tightening is suspected.

(2) Clean with a plug cleaner.
Use an air gun to remove dust deposited on plug threads.
(3) Check plug gap using a plug gap gage and adjust it if is not as specified.

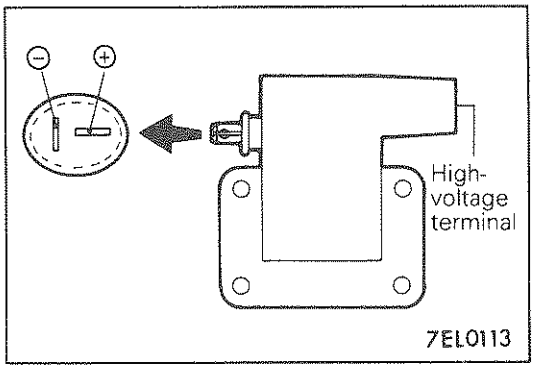


SPARK PLUG CABLE

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

Unit: kΩ

High tension cable	Spark plug cable					
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Approx. 3	9	8.5	10	9	12	10



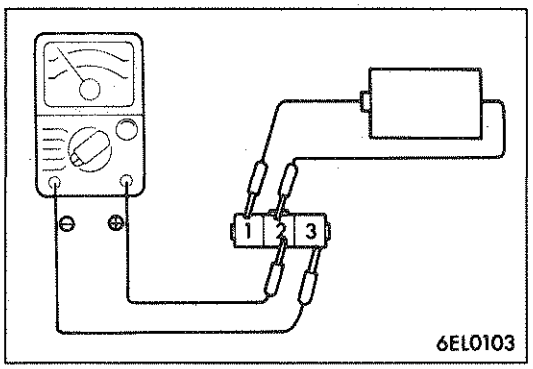
IGNITION COIL

Primary coil resistance
Measure the resistance of the positive (+) terminal and negative (–) terminal of the ignition coil.

Standard value: .72–.88 Ω

Secondary coil resistance
Measure the resistance of the positive (+) terminal and the high-voltage terminal.

Standard value: 10.3–13.9 kΩ



POWER TRANSISTOR

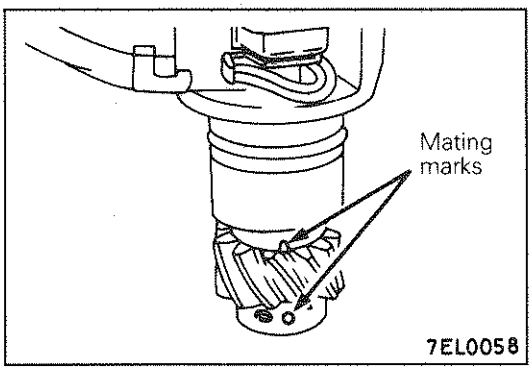
NOTE
An analog-type ohmmeter should be used.

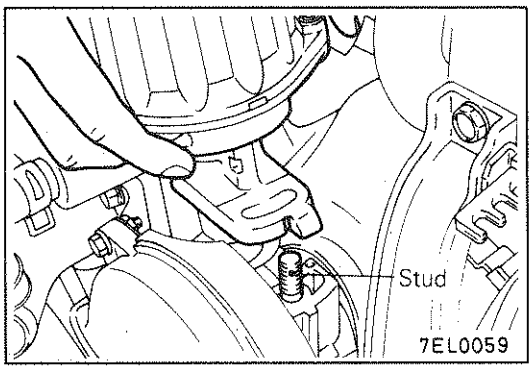
(1) Connect the negative (–) terminal of the 1.5V power supply to terminal ② of the power transistor, then check whether there is continuity between terminal ③ and terminal ② when terminal ① and the positive (+) terminal are connected and disconnected.

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 power transistor if there is a malfunction.





SERVICE POINTS OF INSTALLATION

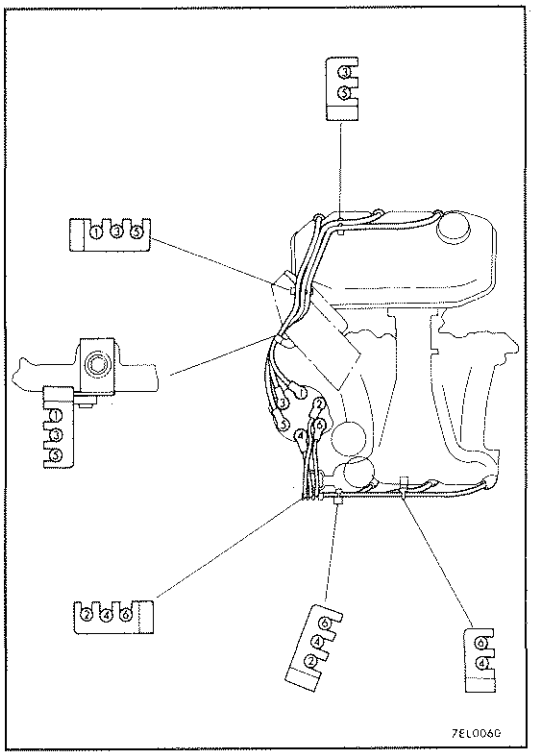
4. INSTALLATION OF DISTRIBUTOR

(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 engine while aligning the fine cut (groove or projection) of the distributor's installation flange with the center of the distributor installation stud.



1. INSTALLATION OF SPARK PLUG CABLE

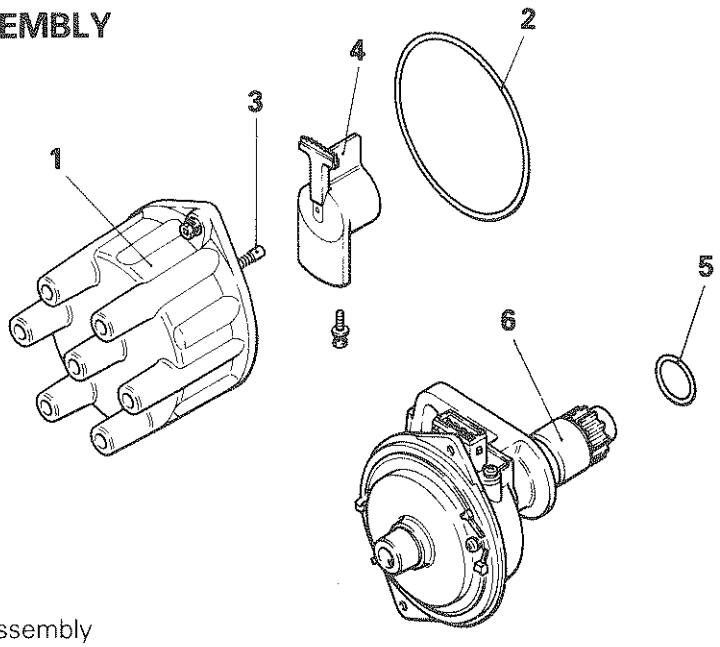
Improper arrangement of spark plug cables will induce voltage between the cables, causing miss firing and developing a surge at acceleration in high-speed operation. Therefore, be careful to arrange the spark plug cables properly by the following procedure.

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.

DISTRIBUTOR

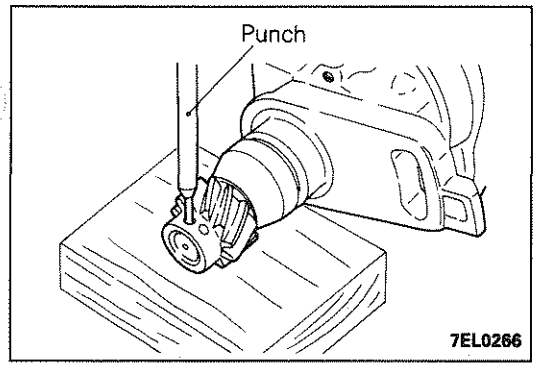
M16GKGA

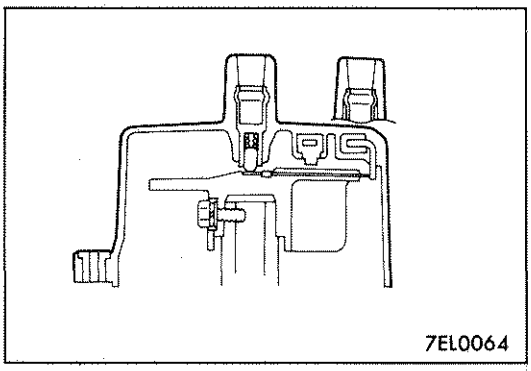
DISASSEMBLY AND REASSEMBLY



Disassembly steps

1. Distributor cap
2. O-ring
3. Contact carbon
4. Rotor
5. O-ring
◆◆ ◆◆ 6. Distributor housing assembly





SERVICE POINTS OF DISASSEMBLY

6. REMOVAL OF DRIVEN GEAR

(1) Make a mark (on the distributor shaft) for alignment with the gear.
(2) Place the drive gear on a soft base (wooden block) so that the spring pin can come out.
(3) Punch out the spring pin by using a pin punch.

INSPECTION

Check the following points; repair or replace if a problem is found.

CAP ROTOR

(1) There must be no cracking in the cap.
(2) There must be no damage to the cap's electrode or the rotor's electrode.
(3) Clean away any dirt from the cap and rotor.

SERVICE POINTS OF REASSEMBLY

Take out and clean the disassembled parts. Do not use cleaning oil or similar product for cleaning.

6. INSTALLATION OF DRIVEN GEAR

Align with the mark made at the time of disassembly, and install the driven gear to the distributor shaft.

Caution
Drive in the spring pin so that the slits are at a right angle relative to the shaft.

NOTES

CHASSIS ELECTRICAL

CONTENTS

M54AA--

BATTERY

SPECIFICATION

GENERAL SPECIFICATIONS

M54EB--

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

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

TROUBLESHOOTING

BATTERY TESTING PROCEDURE

M54EHAX

TEST STEP	RESULT ▶	ACTION TO TAKE
A0 VISUAL INSPECTION • Remove negative cable, then positive cable. • Check for dirty or corroded connections.	(OK) ▶ (OK) ▶	CLEAN terminals and clamps. GO to A1. GO to A1.
A1 LOOSE BATTERY POST • Check for loose battery post.	(OK) ▶ (OK) ▶	REPLACE battery. GO to A2.
A2 CRACKED BATTERY COVER • Remove holddowns and shields. • Check for broken/cracked case or cover.	(OK) ▶ (OK) ▶	REPLACE battery. GO to A3.
A3 TEST INDICATOR/OPEN CIRCUIT VOLTAGE TEST • Turn headlights on for 15 seconds. • Turn headlights off for 2 minutes to allow battery voltage to stabilize. • Disconnect cables. • Read open circuit voltage.	(OK) ▶ Green dot invisible and open circuit voltage under 12.4 volts (OK) ▶	CHARGE battery at 5 amps, then GO to A3. GO to A4.

TSB Revision

TEST STEP	RESULT	ACTION TO TAKE
A4 LOAD TEST • Connect a load tester to the battery. • Load the battery at the recommended discharge rate (See LOAD TEST RATE CHART) for 15 seconds. • Read voltage after 15 seconds, then remove load.	(OK) ▶ Voltage is less than minimum listed (white indicator). (OK) ▶ Voltage is more than minimum listed.	REPLACE battery. Battery OK.

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

LOAD TEST RATE CHART			
Load test (Amps)	Cranking Rating 0°F	Reserve Capacity	Application
240 amps	490 amps	123 minutes	75D26R-MF

SERVICE ADJUSTMENT PROCEDURES

BATTERY INSPECTION

M54EIBN

BATTERY VISUAL INSPECTION (1)

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

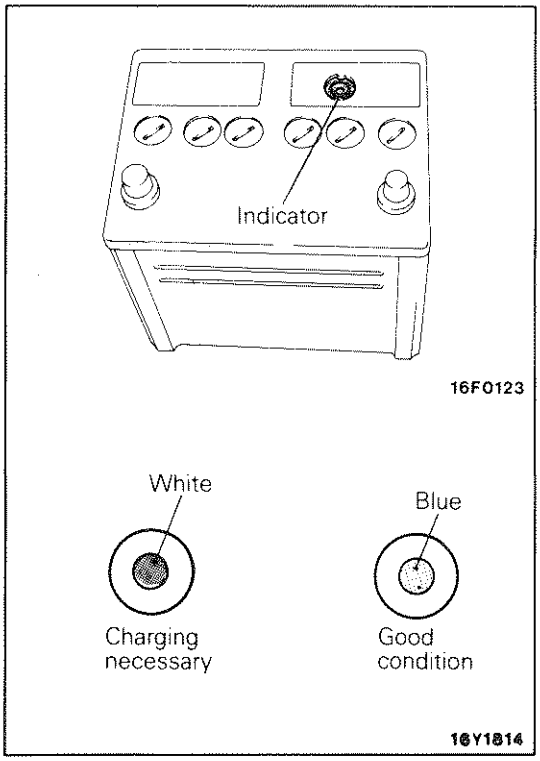
BATTERY VISUAL INSPECTION (2)

Make sure ignition switch is in Off position and all battery feed accessories are Off.

1. Disconnect ground cable from battery before disconnecting (+) cable.
2. Remove battery from vehicle.

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

3. Inspect battery carrier for damage caused by loss of acid from battery. If acid damage is present, it will be necessary to clean area with a solution of clean warm water and baking soda. Scrub area with a stiff bristle brush and wipe off with a cloth moistened with ammonia or baking soda in water.



TSB Revision

4. Clean top of battery with same solutions as described in step (3).
5. Inspect battery case and cover for cracks. If cracks are present, battery must be replaced.
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 in vehicle.
9. Connect (+) and (–) cables to battery in the order of mention.
10. Tighten the clamp nut securely.

LOAD TEST RATE CHART			
Load test (Amps)	Cranking Rating 0°F	Reserve Capacity	Application
240 amps	490 amps	123 minutes	75D26R-MF

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

NOTE
The temperature is an ambient temperature of the battery that has been exposed to for the preceding few hours.

OPEN CIRCUIT VOLTAGE TEST (3)

1. Turn headlights on for 15 seconds.
2. Turn headlights off for 2 minutes to allow battery voltage to stabilize.
3. Disconnect cables.
4. Read open circuit voltage.
5. If the open circuit voltage is under 12.4 volts, charge the battery. (See BATTERY CHARGING)

LOAD TEST (4)

1. Connect a load tester to the battery.
2. Load the battery at 15 amps for 15 seconds to remove surface charge.
3. Load the battery at the recommended discharge rate. (See LOAD TEST RATE CHART.)
4. Read voltage after 15 seconds and then remove the load.
5. If the voltage is not maintained at the minimum voltage in the LOAD TEST CHART throughout the test, the battery should be replaced.

BATTERY CHARGING M54EICM

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). Increase of electrolyte temperature above 55°C (131°F) is harmful to the battery, causing deformation of battery cell, decrease in life of battery, etc.

CHARGE RATE

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

When the dot appears or when 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

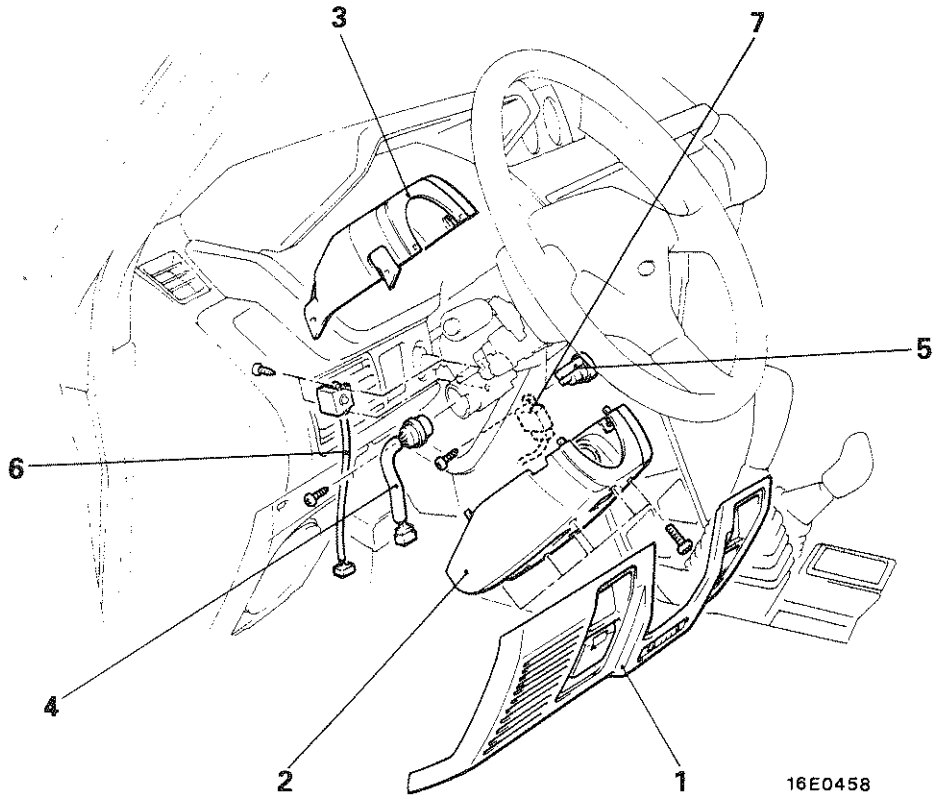
Battery	Slow Charging		Fast Charging	
75D26R-MF (490 amps)	5 amps 15 hrs.	10 amps 7.5 hrs.	20 amps 3.75 hrs.	30 amps 2.5 hrs.

IGNITION SWITCH

IGNITION SWITCH

REMOVAL AND INSTALLATION

M54GLBA



Removal steps of key reminder switch segment

1. Instrument under cover
   (Refer to GROUP 52–Instrument Panel)
2. Column cover lower
6. Key reminder switch segment

Removal steps of buzzer assembly

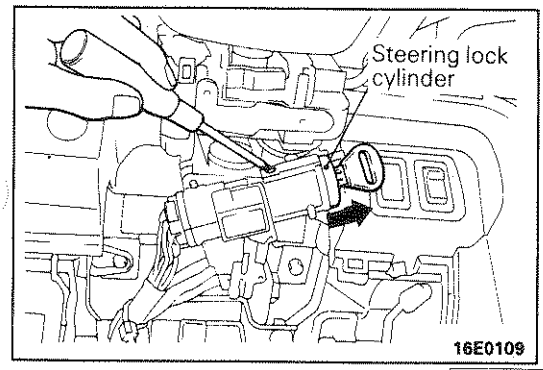
- Instrument Panel
  (Refer to GROUP 52–Instrument Panel)
7. Buzzer assembly
   (for key reminder, lighting monitor and seat belt)

Removal steps of ignition switch segment

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

Removal steps of steering lock cylinder

1. Instrument under cover
   (Refer to GROUP 52–Instrument Panel)
2. Column cover lower
5. Steering lock cylinder



SERVICE POINT OF REMOVAL

5. REMOVAL OF STEERING LOCK CYLINDER

(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 Phillips head screwdriver (small-size one) to remove the steering lock cylinder.

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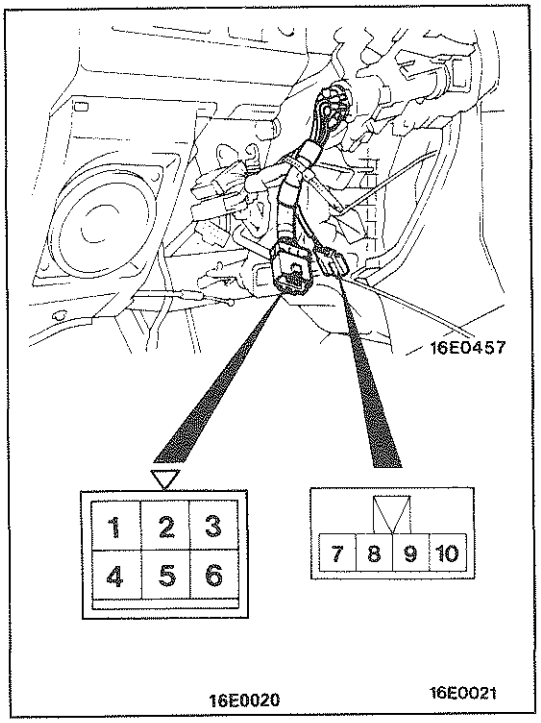


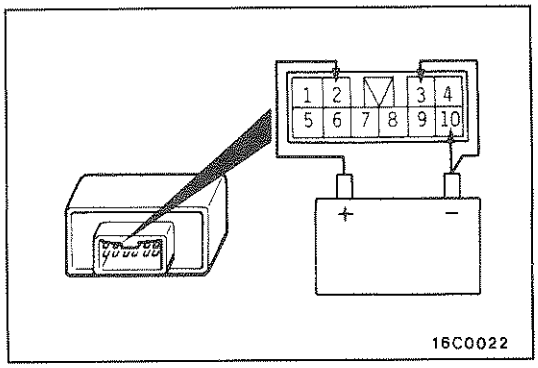
INSPECTION

IGNITION SWITCH INSPECTION

(1) Remove the instrument under cover. (Refer to GROUP 52–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 the continuity between the terminals.

Position \ Terminal	Key	Ignition switch 1	2	3	4	5	6	Key reminder switch 7	10
LOCK	Removed								
LOCK	Inserted							○—○	
ACC	Inserted			○—○			○		
ON	Inserted		○—○	○—○	○—○		○		
START	Inserted	○—○			○—○	○—○	○		

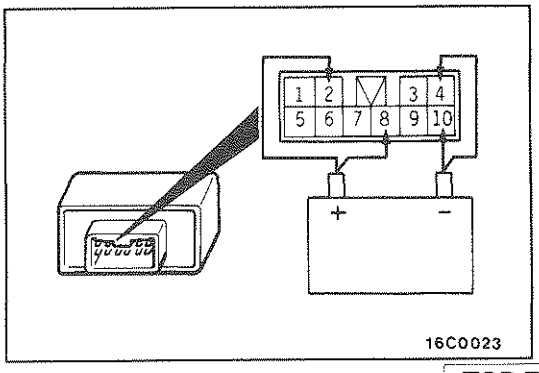
NOTE
○—○ indicates that there is continuity between the terminals.



BUZZER ASSEMBLY INSPECTION

Key Reminder Buzzer Inspection

(1) Apply the battery voltage btween the terminal No. ② and No. ⑩.
(2) Check to be sure that the buzzer sounds intermittently when the terminal No. ③ is grounded.



Lighting Monitor Buzzer Inspection

(1) Apply the battery voltage between the terminal No. ②, No. ⑧ and No. ⑩.
(2) Check to be sure that the buzzer sounds intermittently when the terminal No. ④ is grounded.

METERS AND GAGES

SPECIFICATIONS

GENERAL SPECIFICATIONS

M54HB--

METERS AND GAGES

Items	Specifications
Speedometer	
Type	Cross coil 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	Bimetal type
Altimeter	
Type	Aneroid type
Thermometer	
Type	Temperature detection type
Electronic compass	
Type	Geomagnet detection type

INDICATORS AND WARNING LIGHTS

Unit: W

Items	Specifications
Indication lights	
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
Warning lights	
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 warning light	1.12
Anti-lock braking system warning light	1.12

NOTE
The values in parentheses denote SAE trade numbers.

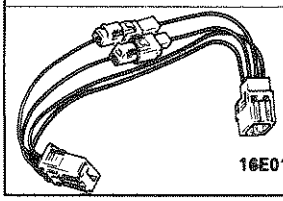
SERVICE SPECIFICATIONS

M54HC--

Items	Specifications
Standard value	
Speedometer indication error mph	
20	19–22
40	38–44
60	57–66
80	76–88
100	94–110
Tachometer indication eeror rpm	
1,000	±100
3,000	±150
5,000	±250
6,000	±300
Fuel gage unit resistance Ω	
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 Ω	
Power supply and ground	233±23.3
Power supply and fuel gage	86±8.6
Fuel gage and ground	147±14.7
Engine coolant temperature gage resistance Ω	
Power supply and engine coolant temperature gage	75±7.5
Power supply and ground	147±14.7
Engine coolant temperature gage and ground	222±22.2
Oil pressure gage resistance Ω	Approx. 50
Voltage meter resistance Ω	380–460
Inside temperature sensor and outside temperature sensor resistance Ω	
20°C (68°F)	Approx. 1,200
40°C (104°F)	Approx. 1,500

SPECIAL TOOL

M54HG--

Tool	Number	Name	Use
 16E0169	MB991416	Inspection harness	Measuring the current between N-S terminals and E-W terminals of the electronic compass

TROUBLESHOOTING

M54HHAV

1. Bearing indicator is off when moving forward

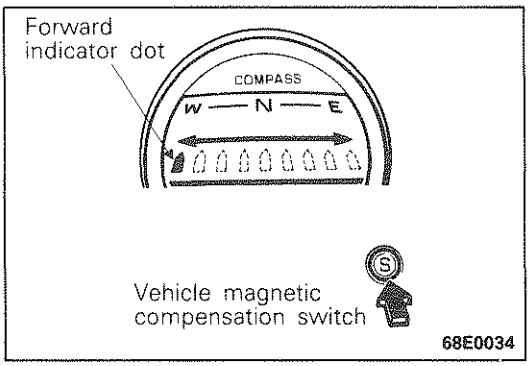
When vehicle magnetic compensation is operated, does the bearing return to normal?

No → Refer to the [Vehicle magnetic compensation cannot be made] heading (P.54-11.)

Yes →

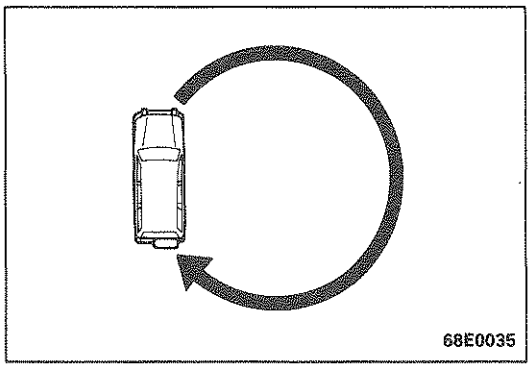
When the vehicle is running near areas that often cause magnetic disturbance, the vehicle magnetism will change, and this will cause the bearing to be off.

{ Areas that often cause magnetic disturbance are tunnels, railway crossings, railway tracks, elevated roads, buildings, and places above underground railways. }



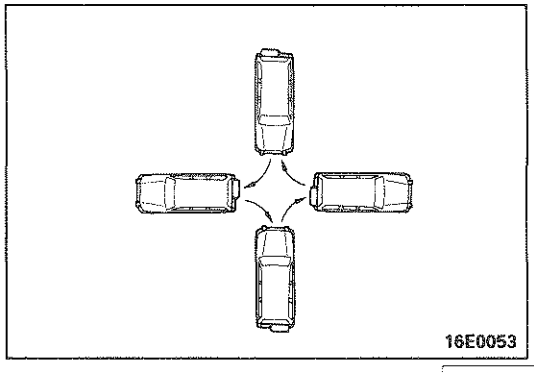
Vehicle magnetic compensation

(1) When the vehicle magnetic compensation (Azimuth adjustment) switch is pressed for 0.5 seconds or more, the direction indicator switches off, and the forward indicator dot will move step by step to the left or right.



(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.

TSB Revision

CHASSIS ELECTRICAL

CONTENTS

M54AA--

BATTERY

SPECIFICATION

GENERAL SPECIFICATIONS

M54EB--

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

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

TROUBLESHOOTING

BATTERY TESTING PROCEDURE

M54EHAX

TEST STEP		RESULT ▶	ACTION TO TAKE
A0	VISUAL INSPECTION		
• Remove negative cable, then positive cable. • Check for dirty or corroded connections.		(OK) ▶ (OK) ▶	CLEAN terminals and clamps. GO to A1. GO to A1.
A1	LOOSE BATTERY POST		
• Check for loose battery post.		(OK) ▶ (OK) ▶	REPLACE battery. GO to A2.
A2	CRACKED BATTERY COVER		
• Remove holddowns and shields. • Check for broken/cracked case or cover.		(OK) ▶ (OK) ▶	REPLACE battery. GO to A3.
A3	TEST INDICATOR/OPEN CIRCUIT VOLTAGE TEST		
• Turn headlights on for 15 seconds. • Turn headlights off for 2 minutes to allow battery voltage to stabilize. • Disconnect cables. • Read open circuit voltage.		(OK) ▶ Green dot invisible and open circuit voltage under 12.4 volts (OK) ▶	CHARGE battery at 5 amps, then GO to A3. GO to A4.

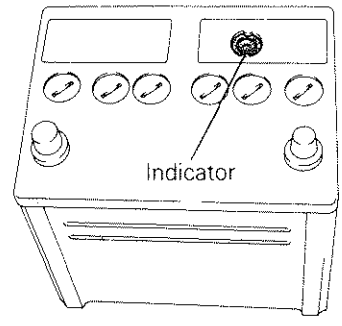
TEST STEP	RESULT	ACTION TO TAKE
A4 LOAD TEST • Connect a load tester to the battery. • Load the battery at the recommended discharge rate (See LOAD TEST RATE CHART) for 15 seconds. • Read voltage after 15 seconds, then remove load.	(OK) ▶ Voltage is less than minimum listed (white indicator).	REPLACE battery.
	(OK) ▶ Voltage is more than minimum listed.	Battery OK.

LOAD TEST CHART

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

LOAD TEST RATE CHART

Load test (Amps)	Cranking Rating 0°F	Reserve Capacity	Application
240 amps	490 amps	123 minutes	75D26R-MF



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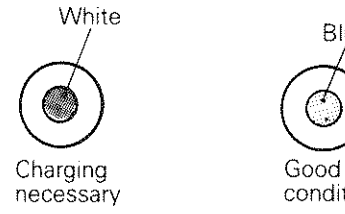


16Y1814

SERVICE ADJUSTMENT PROCEDURES

BATTERY INSPECTION

M54EIBN

BATTERY VISUAL INSPECTION (1)

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

BATTERY VISUAL INSPECTION (2)

Make sure ignition switch is in Off position and all battery feed accessories are Off.

1. Disconnect ground cable from battery before disconnecting (+) cable.
2. Remove battery from vehicle.

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

3. Inspect battery carrier for damage caused by loss of acid from battery. If acid damage is present, it will be necessary to clean area with a solution of clean warm water and baking soda. Scrub area with a stiff bristle brush and wipe off with a cloth moistened with ammonia or baking soda in water.

4. Clean top of battery with same solutions as described in step (3).
5. Inspect battery case and cover for cracks. If cracks are present, battery must be replaced.
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 in vehicle.
9. Connect (+) and (–) cables to battery in the order of mention.
10. Tighten the clamp nut securely.

LOAD TEST RATE CHART			
Load test (Amps)	Cranking Rating 0°F	Reserve Capacity	Application
240 amps	490 amps	123 minutes	75D26R-MF

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

NOTE
The temperature is an ambient temperature of the battery that has been exposed to for the preceding few hours.

OPEN CIRCUIT VOLTAGE TEST (3)

1. Turn headlights on for 15 seconds.
2. Turn headlights off for 2 minutes to allow battery voltage to stabilize.
3. Disconnect cables.
4. Read open circuit voltage.
5. If the open circuit voltage is under 12.4 volts, charge the battery. (See BATTERY CHARGING)

LOAD TEST (4)

1. Connect a load tester to the battery.
2. Load the battery at 15 amps for 15 seconds to remove surface charge.
3. Load the battery at the recommended discharge rate. (See LOAD TEST RATE CHART.)
4. Read voltage after 15 seconds and then remove the load.
5. If the voltage is not maintained at the minimum voltage in the LOAD TEST CHART throughout the test, the battery should be replaced.

BATTERY CHARGING M54EICM

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). Increase of electrolyte temperature above 55°C (131°F) is harmful to the battery, causing deformation of battery cell, decrease in life of battery, etc.

CHARGE RATE

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

When the dot appears or when 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.

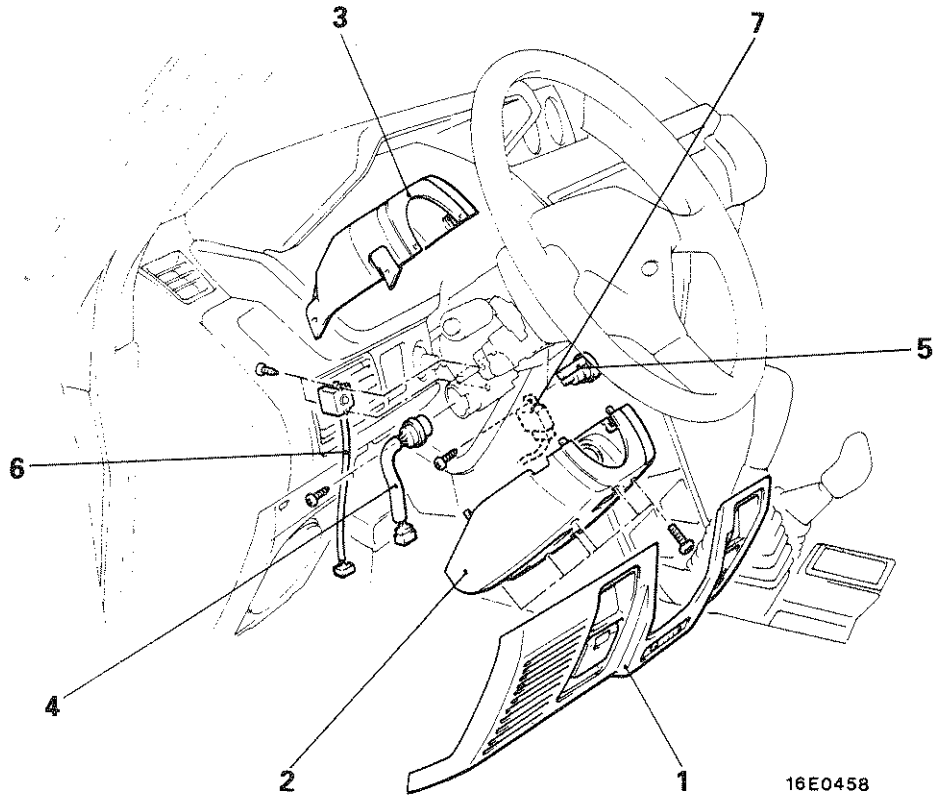
TSB Revision

IGNITION SWITCH

IGNITION SWITCH

REMOVAL AND INSTALLATION

M54GLBA



Removal steps of key reminder switch segment

1. Instrument under cover
   (Refer to GROUP 52–Instrument Panel)
2. Column cover lower
6. Key reminder switch segment

Removal steps of buzzer assembly

- Instrument Panel
  (Refer to GROUP 52–Instrument Panel)

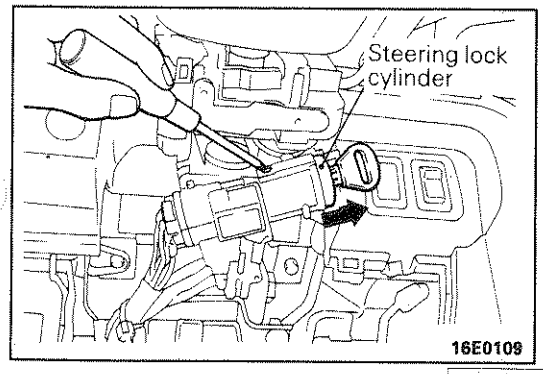
7. Buzzer assembly
   (for key reminder, lighting monitor and seat belt)

Removal steps of ignition switch segment

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

Removal steps of steering lock cylinder

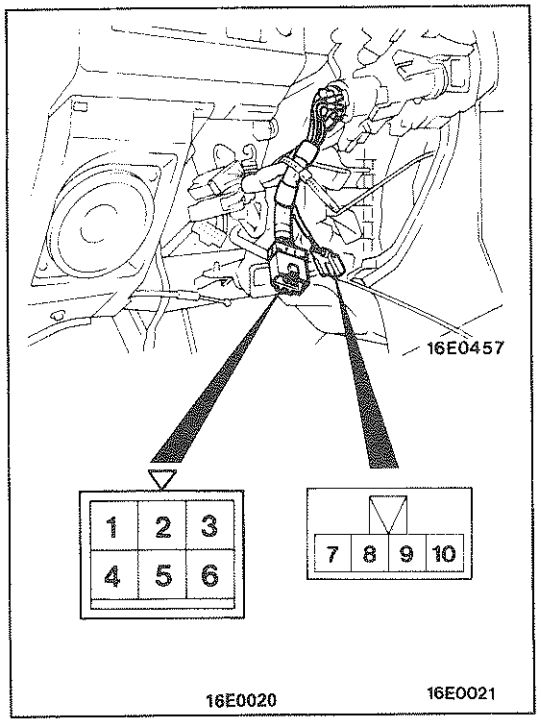
1. Instrument under cover
   (Refer to GROUP 52–Instrument Panel)
2. Column cover lower
5. Steering lock cylinder



SERVICE POINT OF REMOVAL

5. REMOVAL OF STEERING LOCK CYLINDER

(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 Phillips head screwdriver (small-size one) to remove the steering lock cylinder.



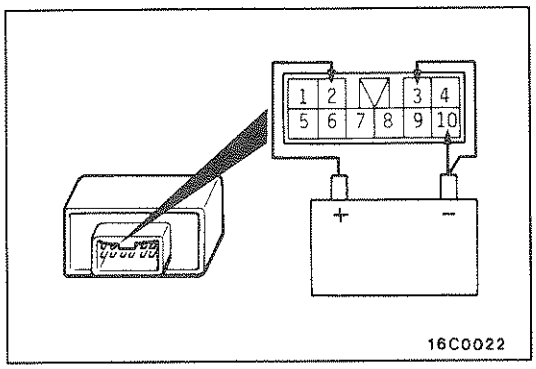
INSPECTION

IGNITION SWITCH INSPECTION

(1) Remove the instrument under cover. (Refer to GROUP 52–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 the continuity between the terminals.

Position \ Terminal	Key	Ignition switch 1	2	3	4	5	6	Key reminder switch 7	10
LOCK	Removed								
	Inserted							○—○	
ACC				○	—	—	○		
ON			○	—	○	—	○		
START		○	—	—	○	—	○		

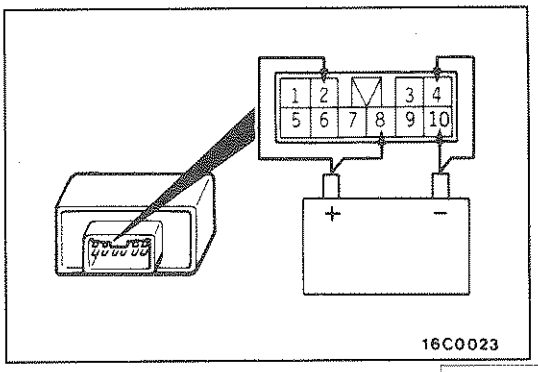
NOTE
○—○ indicates that there is continuity between the terminals.



BUZZER ASSEMBLY INSPECTION

Key Reminder Buzzer Inspection

(1) Apply the battery voltage btween the terminal No. ② and No. ⑩.
(2) Check to be sure that the buzzer sounds intermittently when the terminal No. ③ is grounded.



Lighting Monitor Buzzer Inspection

(1) Apply the battery voltage between the terminal No. ②, No. ⑧ and No. ⑩.
(2) Check to be sure that the buzzer sounds intermittently when the terminal No. ④ is grounded.

TSB Revision

METERS AND GAGES

SPECIFICATIONS

GENERAL SPECIFICATIONS

M54HB--

METERS AND GAGES

Items	Specifications
Speedometer	
Type	Cross coil 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	Bimetal type
Altimeter	
Type	Aneroid type
Thermometer	
Type	Temperature detection type
Electronic compass	
Type	Geomagnet detection type

INDICATORS AND WARNING LIGHTS

Unit: W

Items	Specifications
Indication lights	
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
Warning lights	
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 warning light	1.12
Anti-lock braking system warning light	1.12

NOTE
The values in parentheses denote SAE trade numbers.

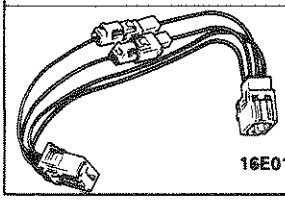
SERVICE SPECIFICATIONS

M54HC--

Items	Specifications
Standard value	
Speedometer indication error mph	
20	19–22
40	38–44
60	57–66
80	76–88
100	94–110
Tachometer indication eeror rpm	
1,000	±100
3,000	±150
5,000	±250
6,000	±300
Fuel gage unit resistance Ω	
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 Ω	
Power supply and ground	233±23.3
Power supply and fuel gage	86±8.6
Fuel gage and ground	147±14.7
Engine coolant temperature gage resistance Ω	
Power supply and engine coolant temperature gage	75±7.5
Power supply and ground	147±14.7
Engine coolant temperature gage and ground	222±22.2
Oil pressure gage resistance Ω	Approx. 50
Voltage meter resistance Ω	380–460
Inside temperature sensor and outside temperature sensor resistance Ω	
20°C (68°F)	Approx. 1,200
40°C (104°F)	Approx. 1,500

SPECIAL TOOL

M54HG--

Tool	Number	Name	Use
 16E0169	MB991416	Inspection harness	Measuring the current between N-S terminals and E-W terminals of the electronic compass

TROUBLESHOOTING

M54HHAV

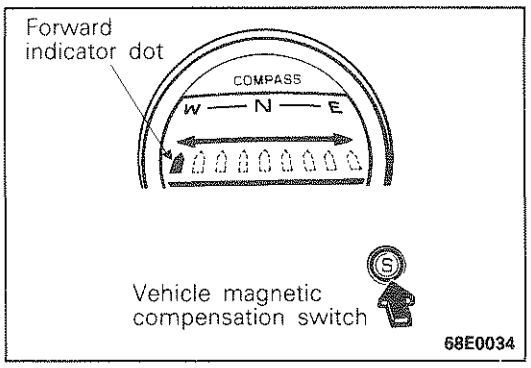
1. Bearing indicator is off when moving forward

When vehicle magnetic compensation is operated, does the bearing return to normal?

No → Refer to the [Vehicle magnetic compensation cannot be made] heading (P.54-11.)

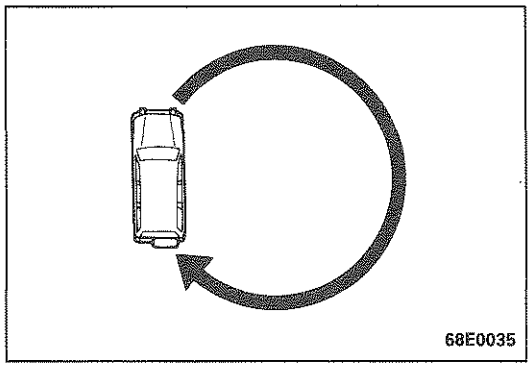
Yes → When the vehicle is running near areas that often cause magnetic disturbance, the vehicle magnetism will change, and this will cause the bearing to be off.

Areas that often cause magnetic disturbance are tunnels, railway crossings, railway tracks, elevated roads, buildings, and places above underground railways.



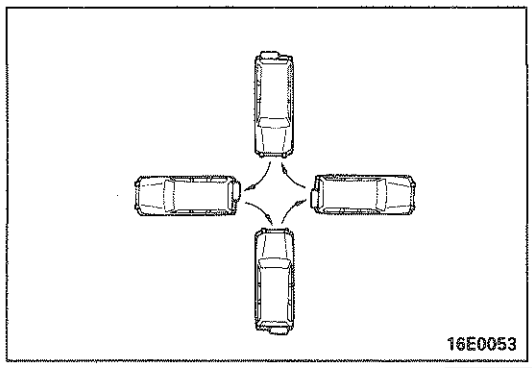
Vehicle magnetic compensation

(1) When the vehicle magnetic compensation (Azimuth adjustment) switch is pressed for 0.5 seconds or more, the direction indicator switches off, and the forward indicator dot will move step by step to the left or right.



(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.



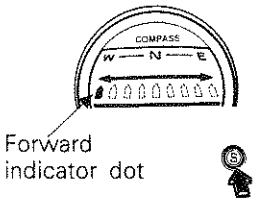
(3) If there is no place to turn the vehicle in a circle, turn the vehicle around by moving it backwards and forwards.

(4) After compensation is completed, a dot showing the current direction of movement will be illuminated.

TSB Revision

2. Vehicle magnetic compensation cannot be made

When the vehicle magnetic compensation switch is pressed, does the direction indicator switch off, and the forward indicator dot move step by step to the left or right?



68E0034

No → Replace the display unit

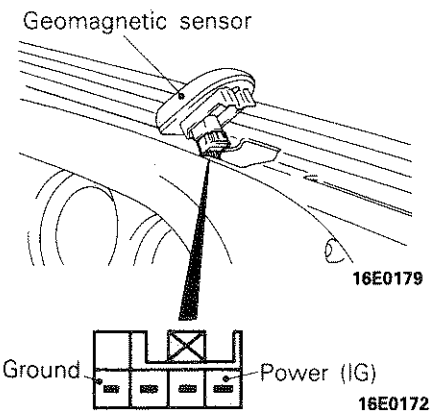
Yes

When the initial compensation direction is changed, or the vehicle position is changed, and the compensation restarts, can compensation be achieved?

Yes →
- Sometimes compensation is difficult because of the magnetic direction or the vehicle direction at the time compensation begins.
- Compensation is difficult in places where the magnetic field is being influenced by surrounding objects.

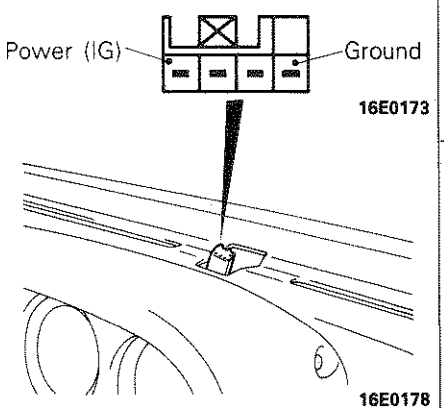
No

When the geomagnetic sensor and connector are connected, does a voltage of 10V or more show between the power and the ground terminal?



No →

When the geomagnetic sensor connector assembly is disconnected, does a voltage of 10V or more show between the power and the ground terminal?



No → Repair the harness or replace the display unit

Yes

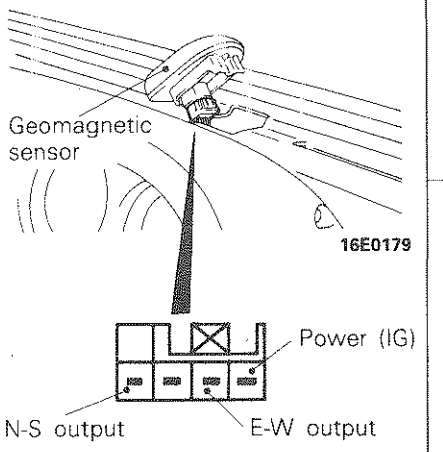
Yes → Replace the geomagnetic sensor

To next page

TSB Revision

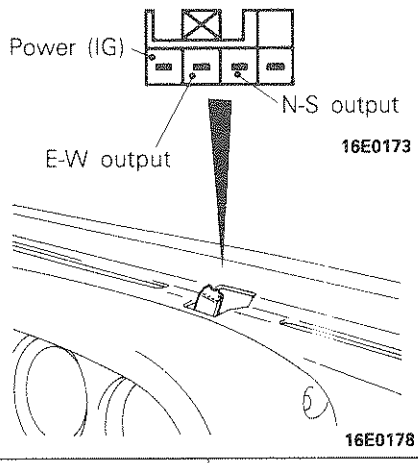
From previous page

When the geomagnetic sensor and connector are connected, does a voltage of 5V show between the power and the N-S output or between the power and the E-W output?



No

When the geomagnetic sensor connector assembly is disconnected, does a voltage of 5V show between the power and the N-S output or between the power and the E-W output?

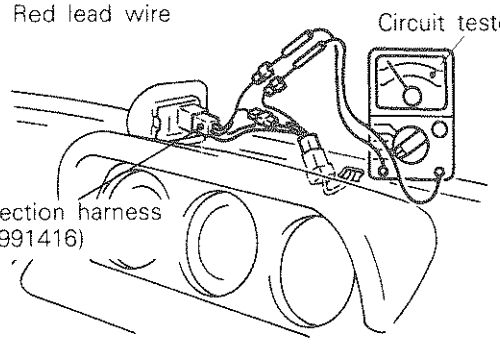


No → Repair the harness or replace the display unit

Yes → Replace the geomagnetic sensor

Yes

When using the special tool (Inspection harness: MB991416), do the maximum and minimum values for the current between the N-S terminal or the E-W terminal vary by 1mA or more when the vehicle is driven (slowly) in a circle when setting compensation?
N-S: Yellow lead wire
E-W: Red lead wire



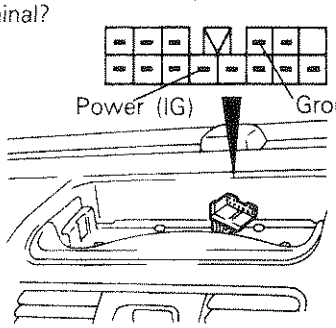
No → Repair the harness or replace the geomagnetic sensor

Yes → Replace the display unit

TSB Revision

3. Display is hard to see or no display appears

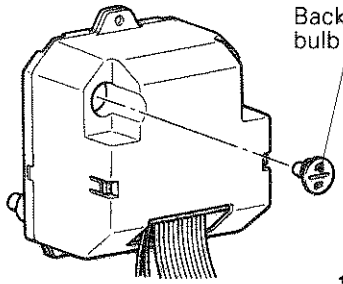
When the multi-meter assembly connector is removed, does a voltage of 10V or more show between the power and the ground terminal?



No → Repair the harness

Yes ↓

After reconnecting the connector, is the back light bulb illuminated?



No → Replace the back light bulb

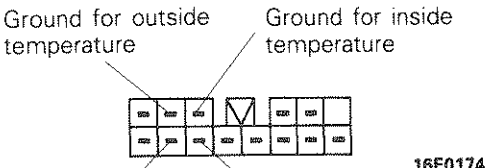
Yes ↓

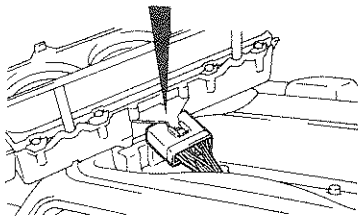
Replace the display unit

4. Discrepancy between the inside and outside temperatures and the display temperature

With the multi-meter connected to the connector, when the outside thermo sensor or the inside thermo sensor are showing the temperatures below, are the voltages between the outside temperature power and ground terminals, or between the inside temperature power and ground terminals, as shown in the table below?

Display temperature (°C(°F))	Terminal voltage (V)	
	Outside temperature	Inside temperature
0 (0)	3.42	3.42
20 (68)	2.46	2.23
40 (104)	1.61	1.43





Yes

Replace the display unit

No

Are the internal resistance values of the outside temperature sensor or inside temperature sensor at the standard values? (Refer to P.54-38.)

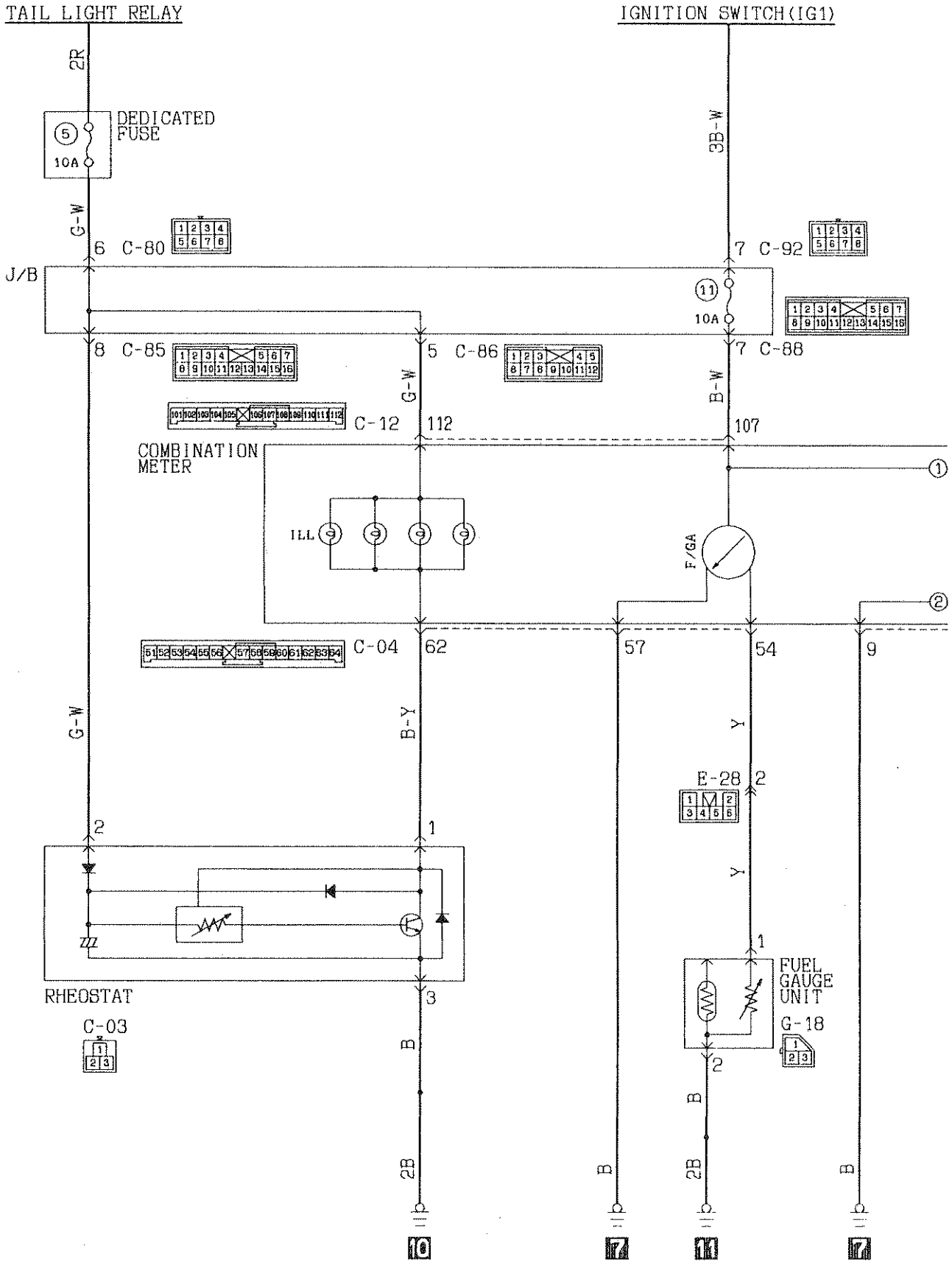
No

Replace the outside thermo sensor or inside thermo sensor

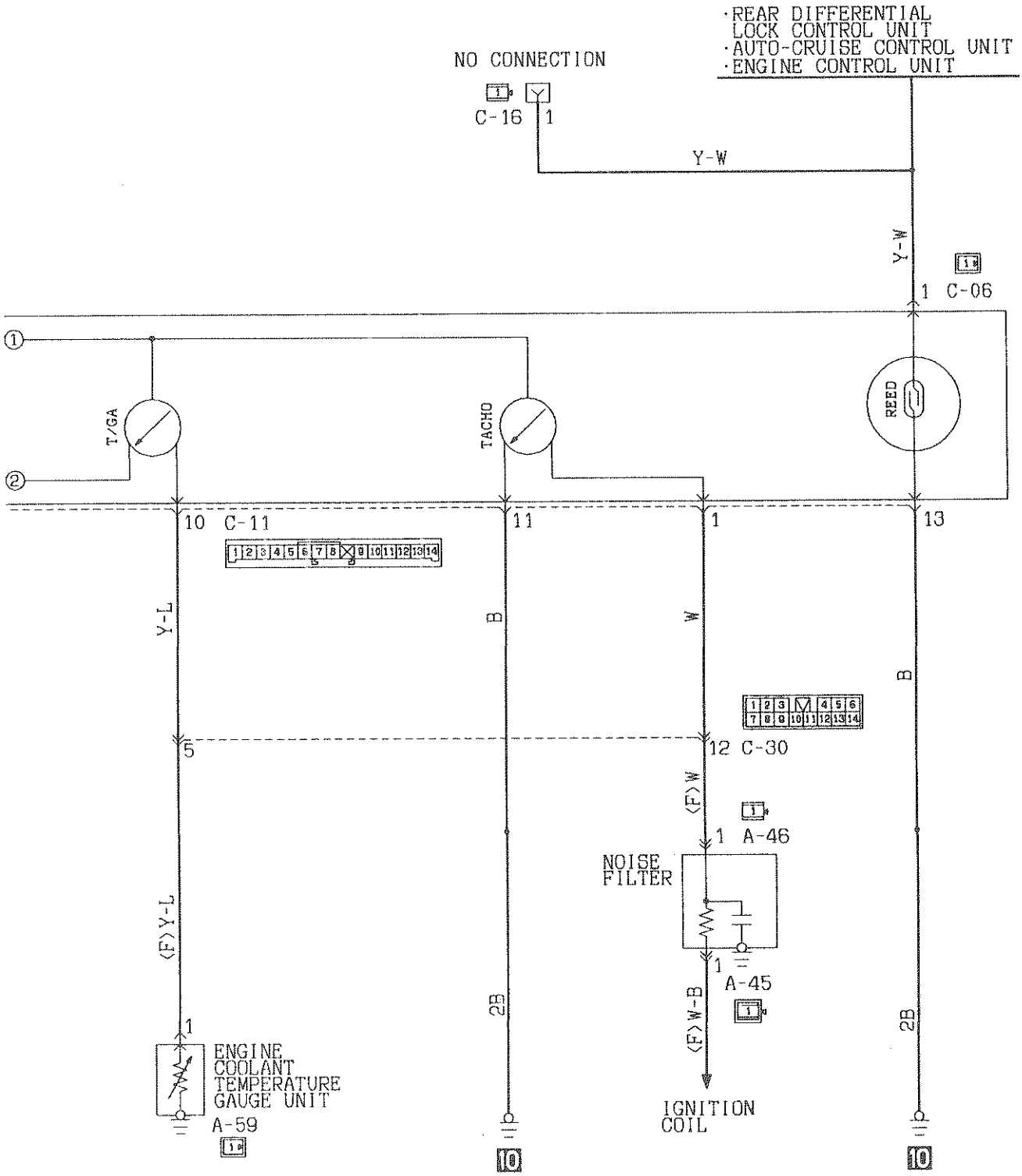
Yes

Repair the harness between the multi-meter and the outside thermo sensor or inside thermo sensor

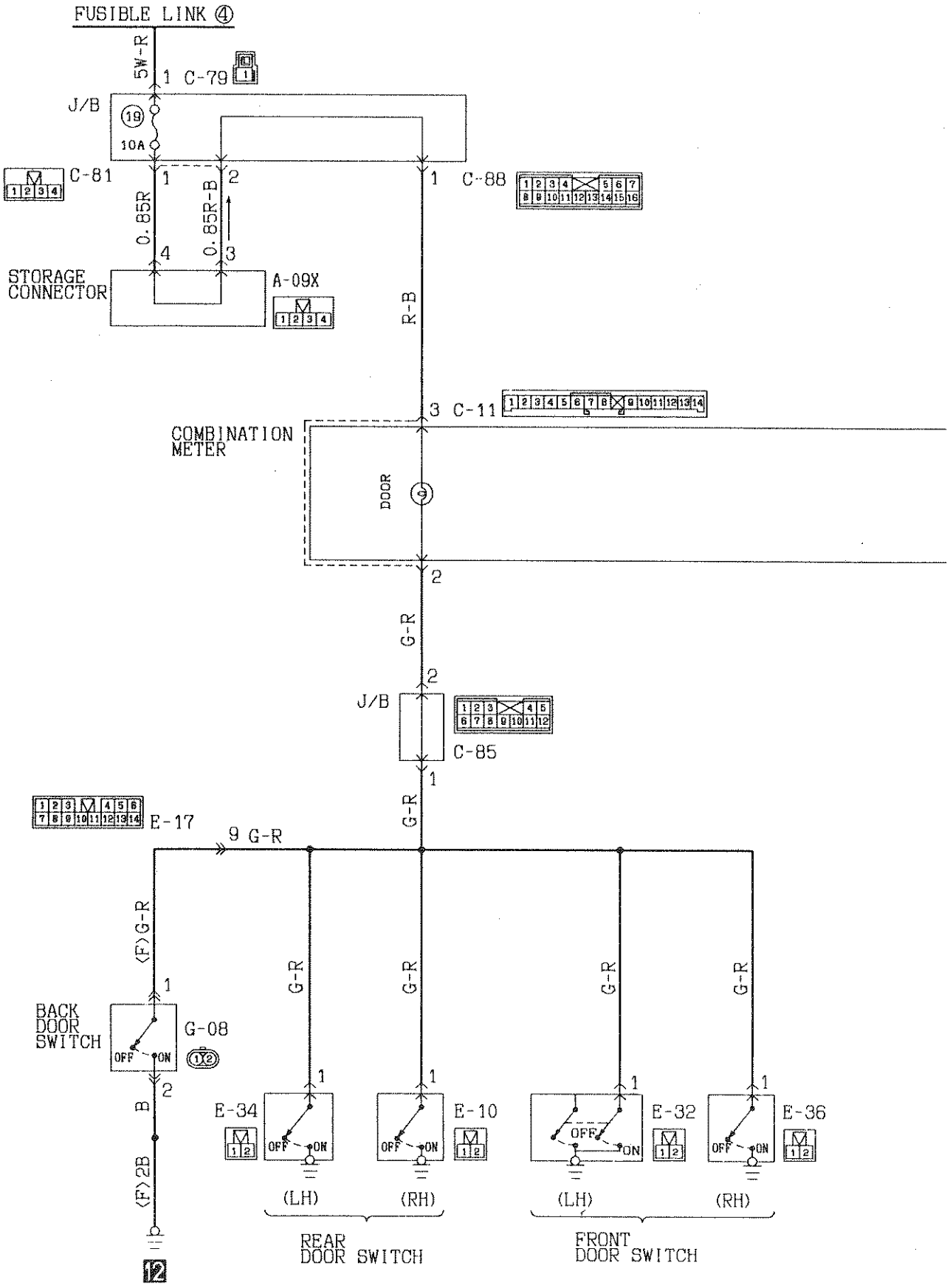
METER AND GAGE CIRCUIT



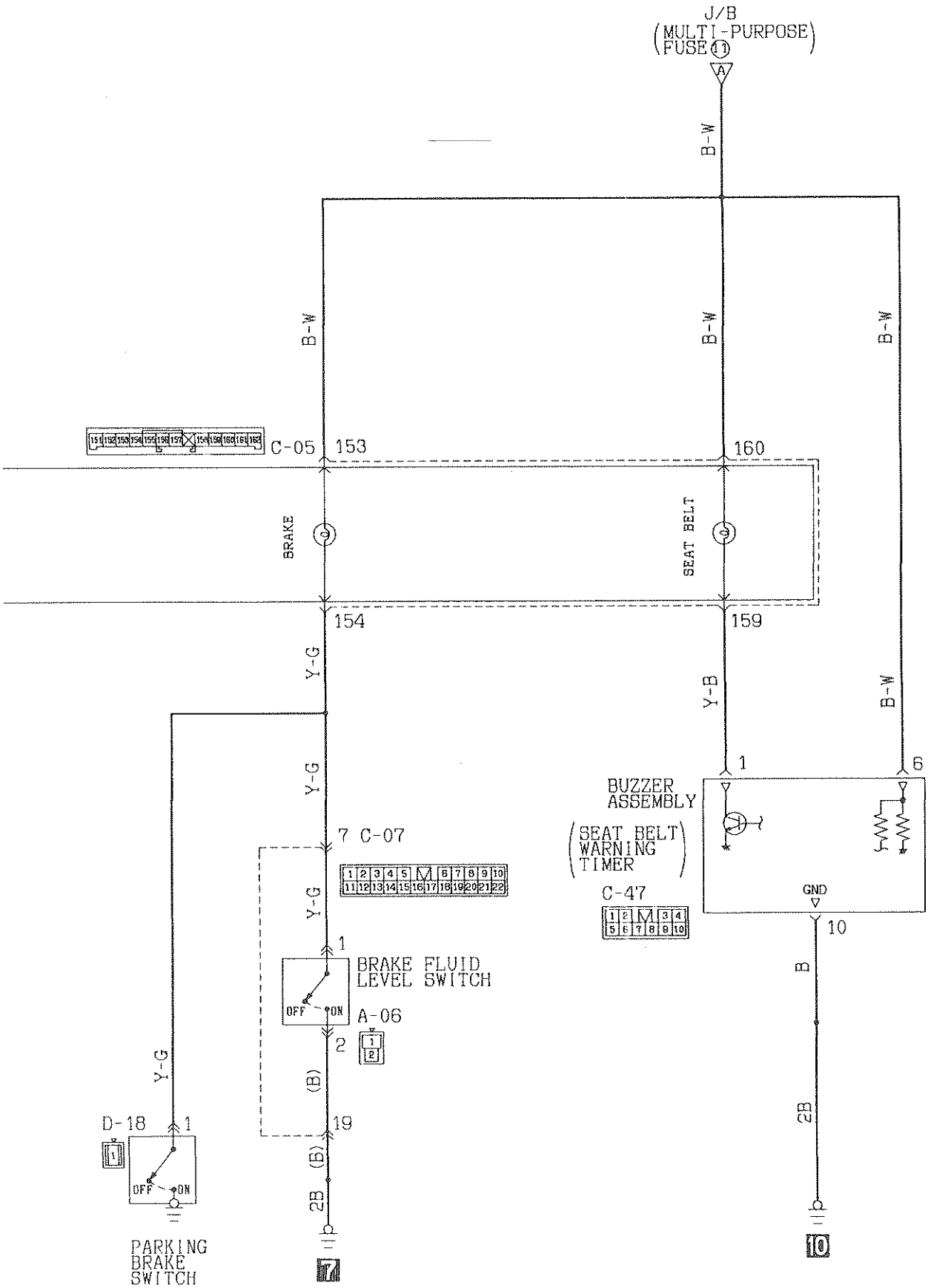
KX35-AC-01001-N

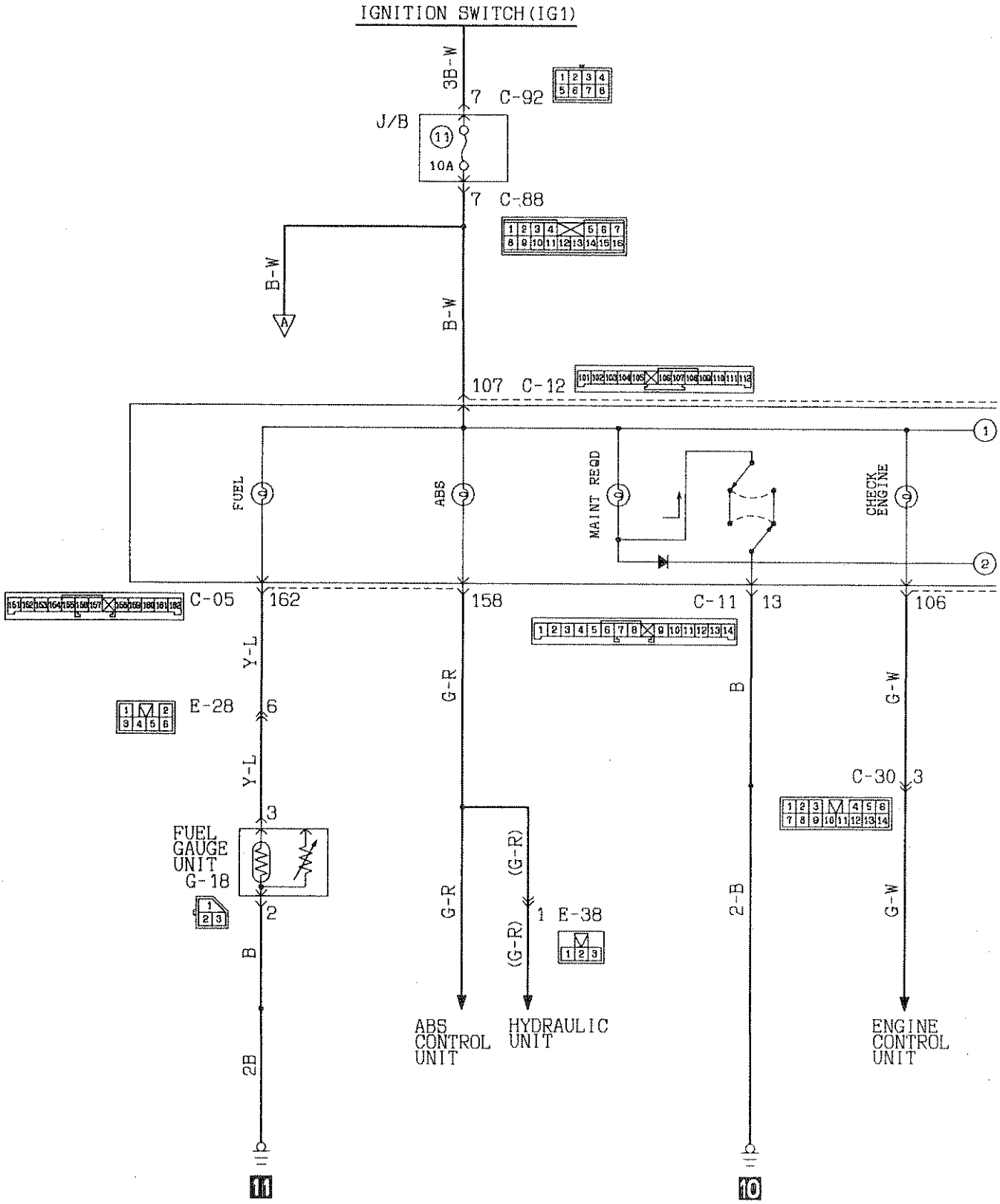

·REAR DIFFERENTIAL LOCK CONTROL UNIT
·AUTO-CRUISE CONTROL UNIT
·ENGINE CONTROL UNIT
NO CONNECTION
C-16 1
Y-W
Y-W
1 C-06
REED
T/GA
TACHO
10 C-11
11
1
13
Y-L
B
W
B
5
12 C-30
(F)W
1 A-46
NOISE FILTER
1 A-45
(F)Y-L
(F)W-B
2B
2B
ENGINE COOLANT TEMPERATURE GAUGE UNIT
A-59
IGNITION COIL

WARNING LIGHT CIRCUIT

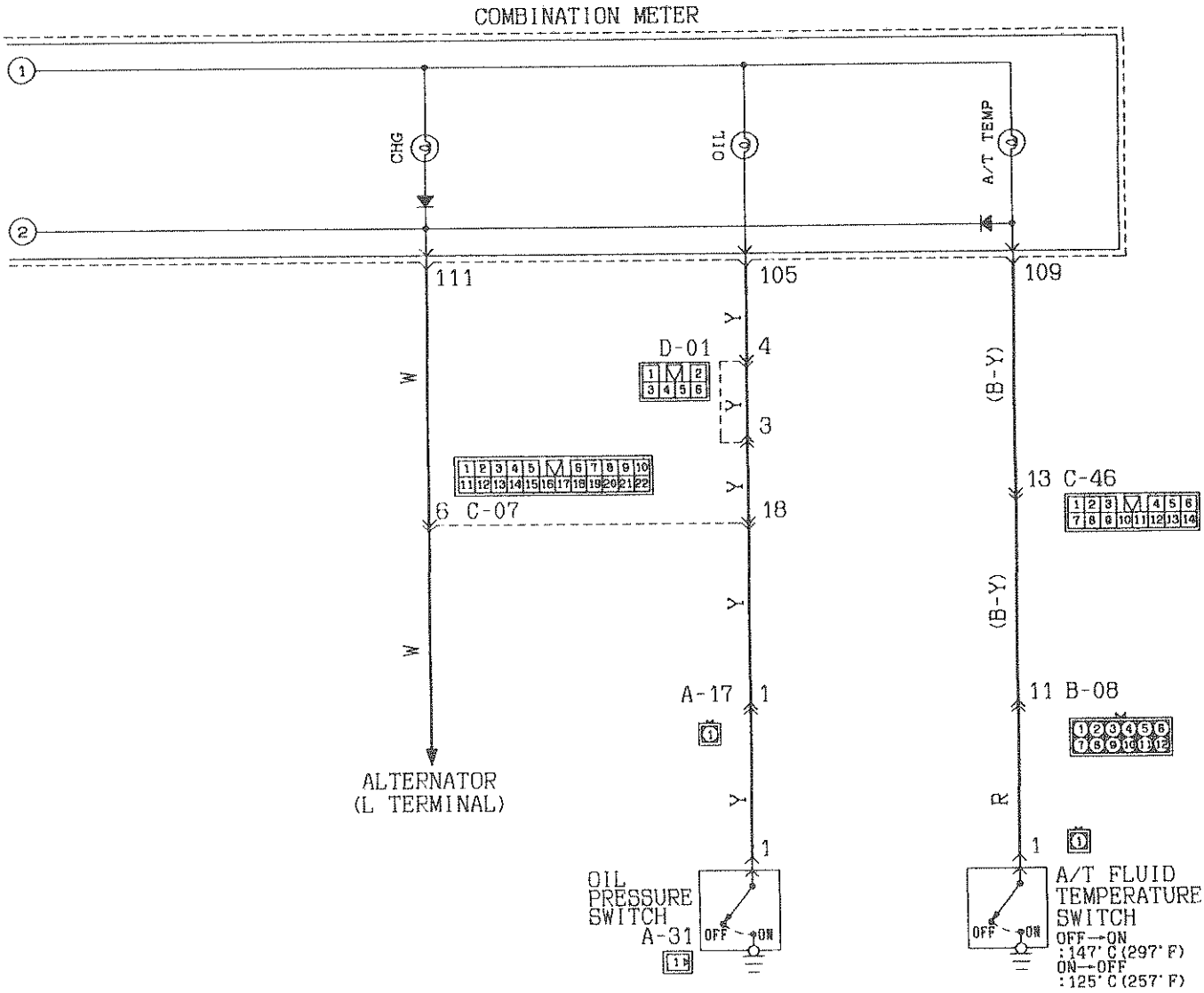


KK35-AC-01002-N

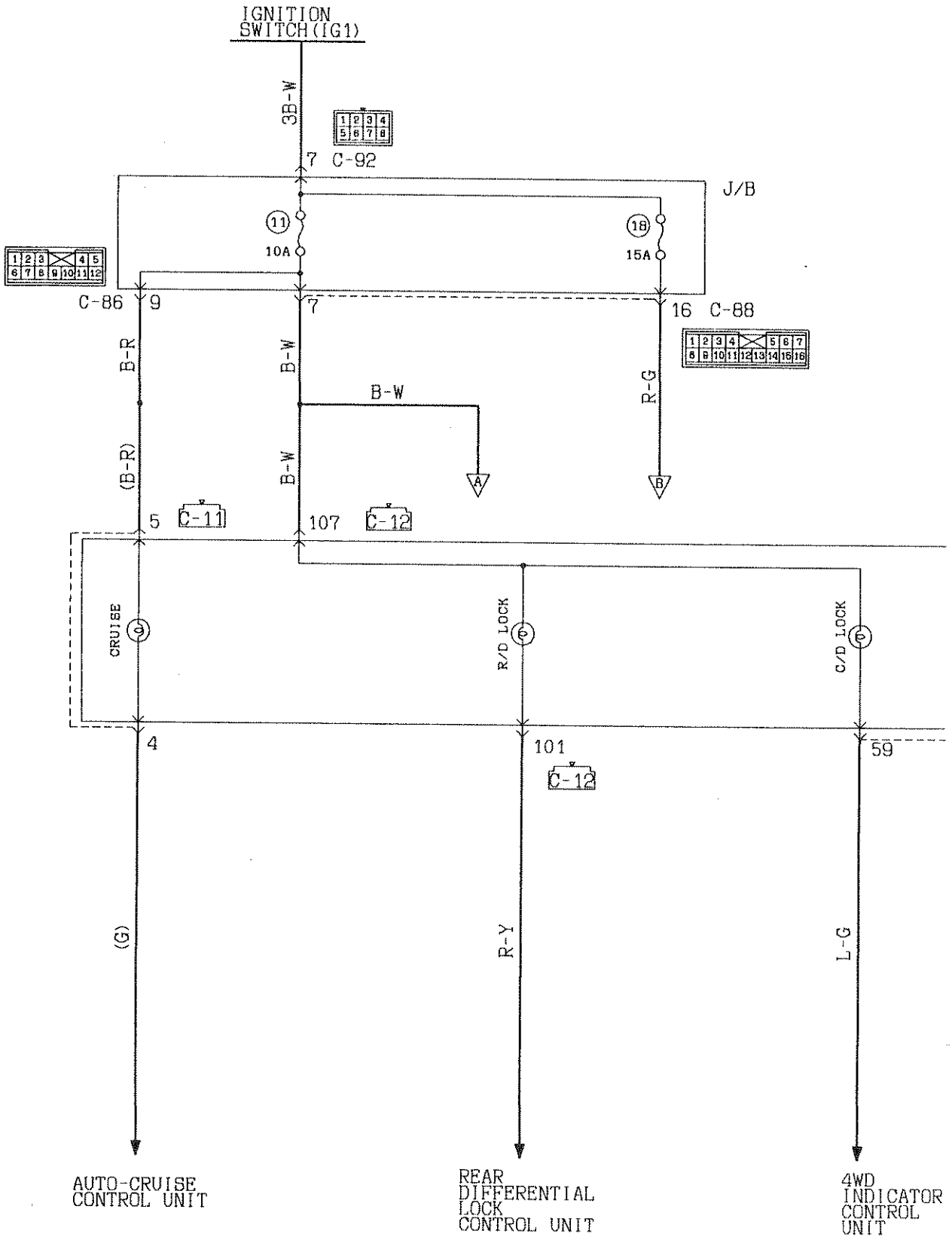

J/B
(MULTI-PURPOSE FUSE 1)
A
B-W
B-W
B-W
C-05
153
160
BRAKE
SEAT BELT
154
159
Y-G
Y-B
B-W
1
6
BUZZER ASSEMBLY
(SEAT BELT WARNING TIMER)
C-47
GND
10
B
2B
Y-G
Y-G
7 C-07
Y-G
1
BRAKE FLUID LEVEL SWITCH
OFF
ON
A-06
2
(B)
19
(B)
2B
D-18
1
OFF
ON
PARKING BRAKE SWITCH
7
10



KX35-AC-01002A-N


COMBINATION METER
CHG
OIL
A/T TEMP
111
105
109
W
Y
(B-Y)
D-01
4
3
6 C-07
18
13 C-46
A-17
1
11 B-08
ALTERNATOR
(L TERMINAL)
R
OIL
PRESSURE
SWITCH
A-31
OFF
ON
A/T FLUID
TEMPERATURE
SWITCH
OFF→ON
:147°C (297°F)
ON→OFF
:125°C (257°F)

INDICATOR LIGHT CIRCUIT



KK35-AC-Q1003-N

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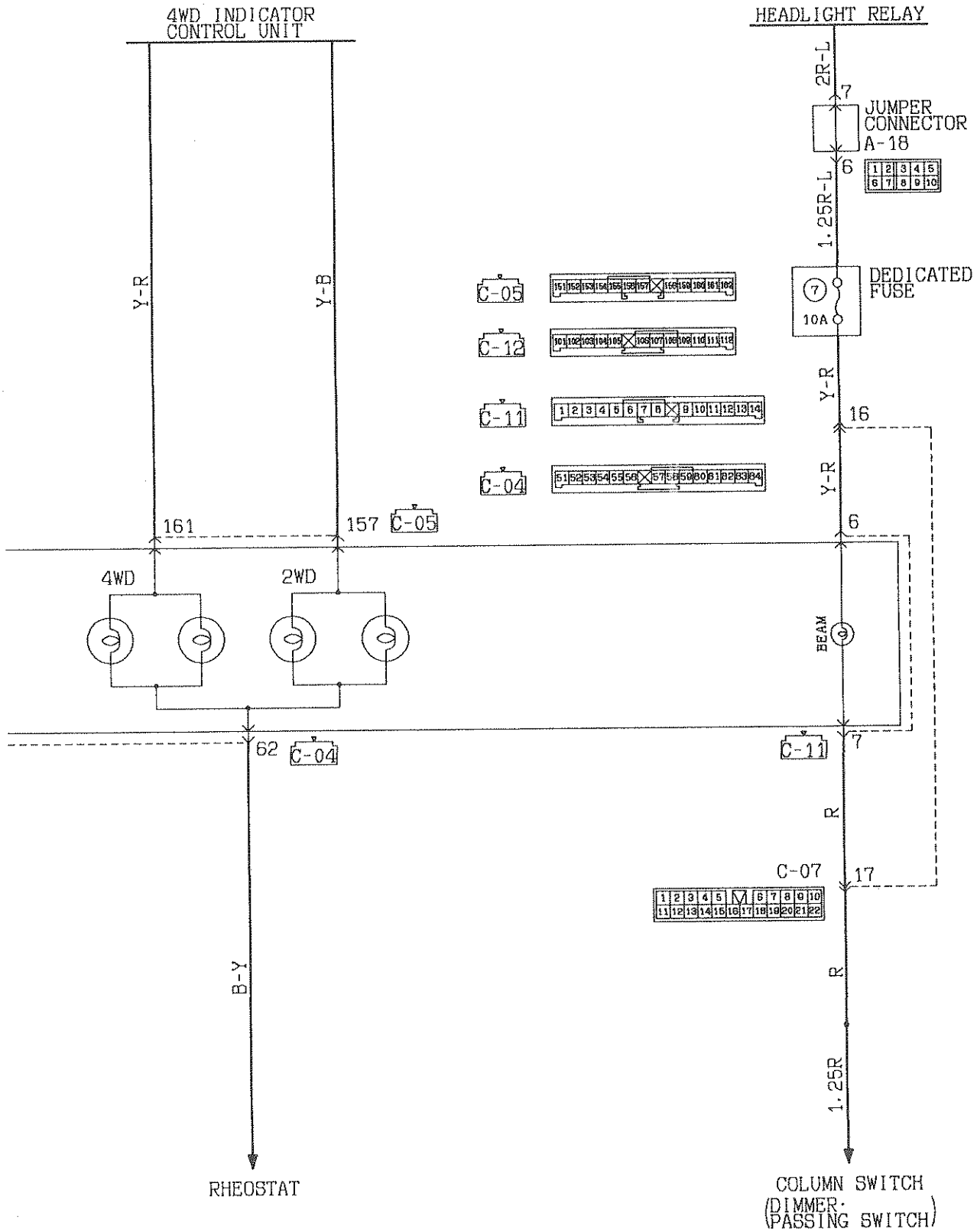
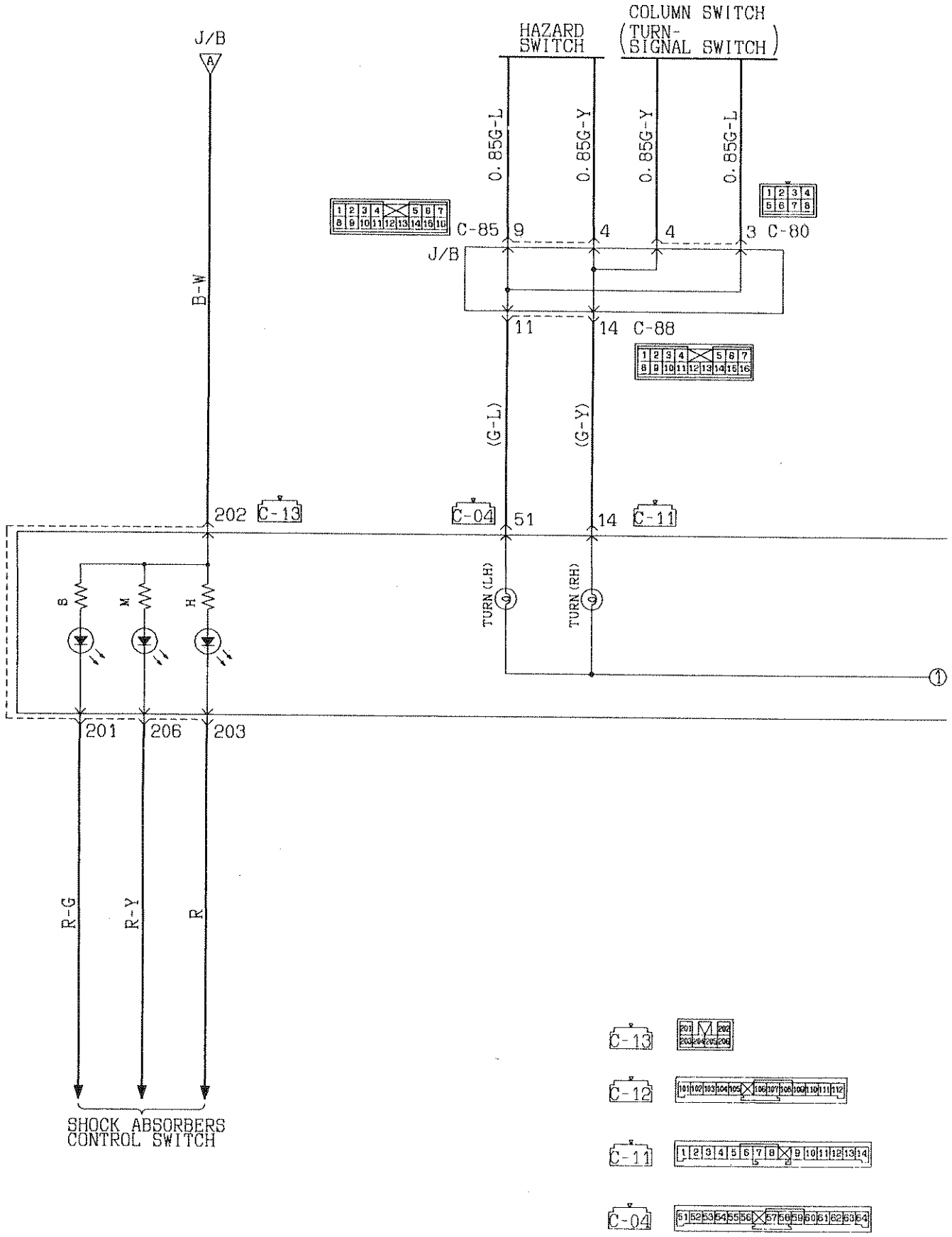
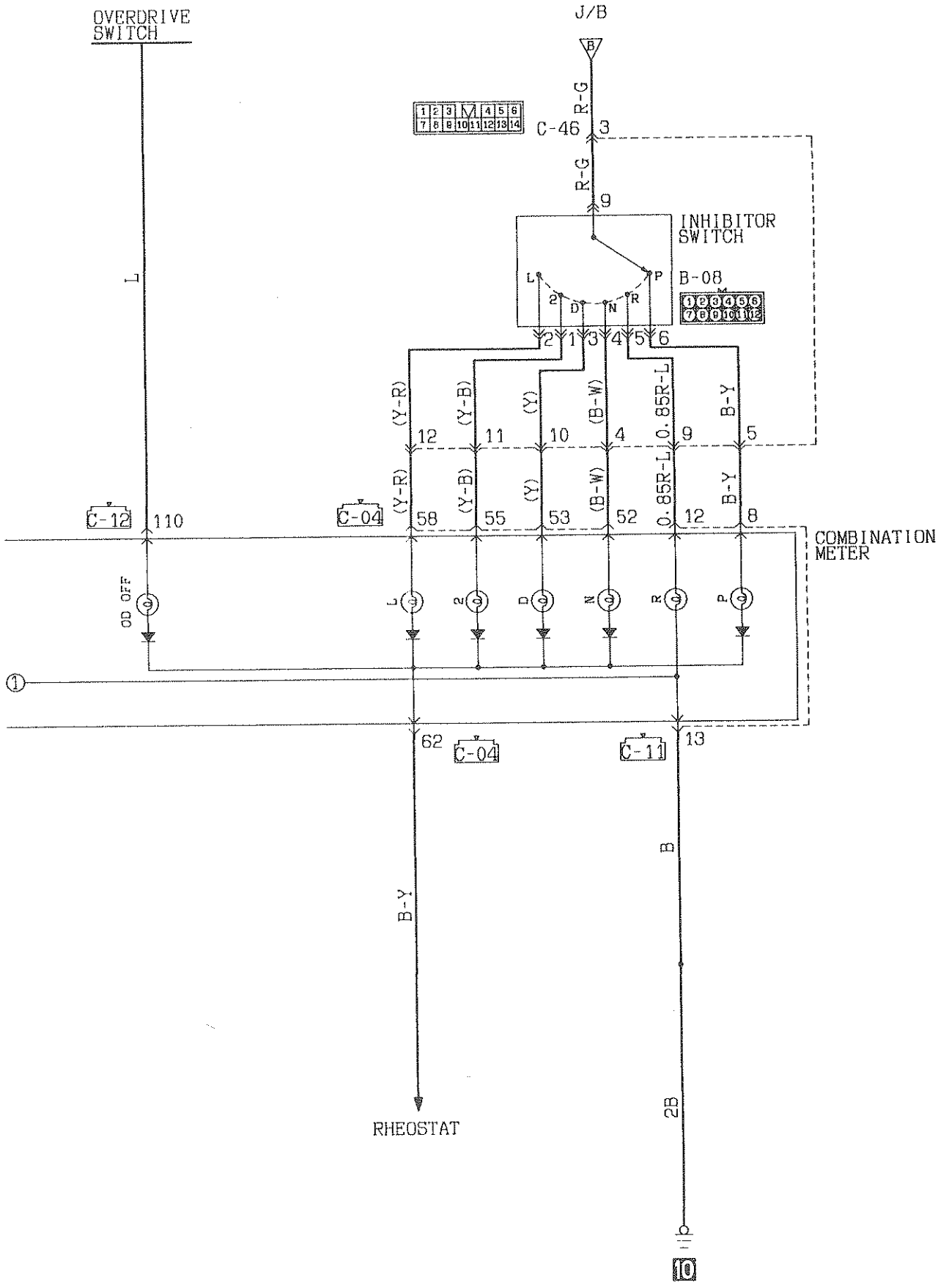

4WD INDICATOR CONTROL UNIT
HEADLIGHT RELAY
2R-L
7
JUMPER CONNECTOR A-18
6
1.25R-L
DEDICATED FUSE
10A
Y-R
Y-B
C-05
C-12
C-11
C-04
16
6
161
157 C-05
4WD
2WD
BEAM
62 C-04
C-11
7
R
C-07
17
B-Y
R
1.25R
RHEOSTAT
COLUMN SWITCH (DIMMER, PASSING SWITCH)



KX35-AC-Q1003A-N


OVERDRIVE SWITCH
J/B
B
R-G
C-46
3
9
INHIBITOR SWITCH
B-08
L
P
2
D
N
R
1
3
4
5
6
(Y-R)
(Y-B)
(Y)
(B-W)
0.85R-L
B-Y
12
11
10
4
9
5
C-12
110
C-04
58
55
53
52
12
8
COMBINATION METER
OD OFF
L
2
D
N
R
P
62
C-04
C-11
13
B
B-Y
2B
RHEOSTAT
10

COMBINATION METER

OPERATION

<Fuel gauge>

- When the ignition switch is at 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 at 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 circuit, so the gage's indicator indicates 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 MPI 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.

NOTE
For operation of indicator and warning light, refer to P.54-39 INDICATORS AND WARNING LIGHTS.

TROUBLESHOOTING HINTS

1. Speedometer does not openate on its operation is inconnect.
   - Check the speedometer cable.
   - Check the speedometer. (Refer to P.54-30)

2. Tachometer does not operate or its operation is incorrect.
   - Check the tachometer. (Refer to P.54-30)

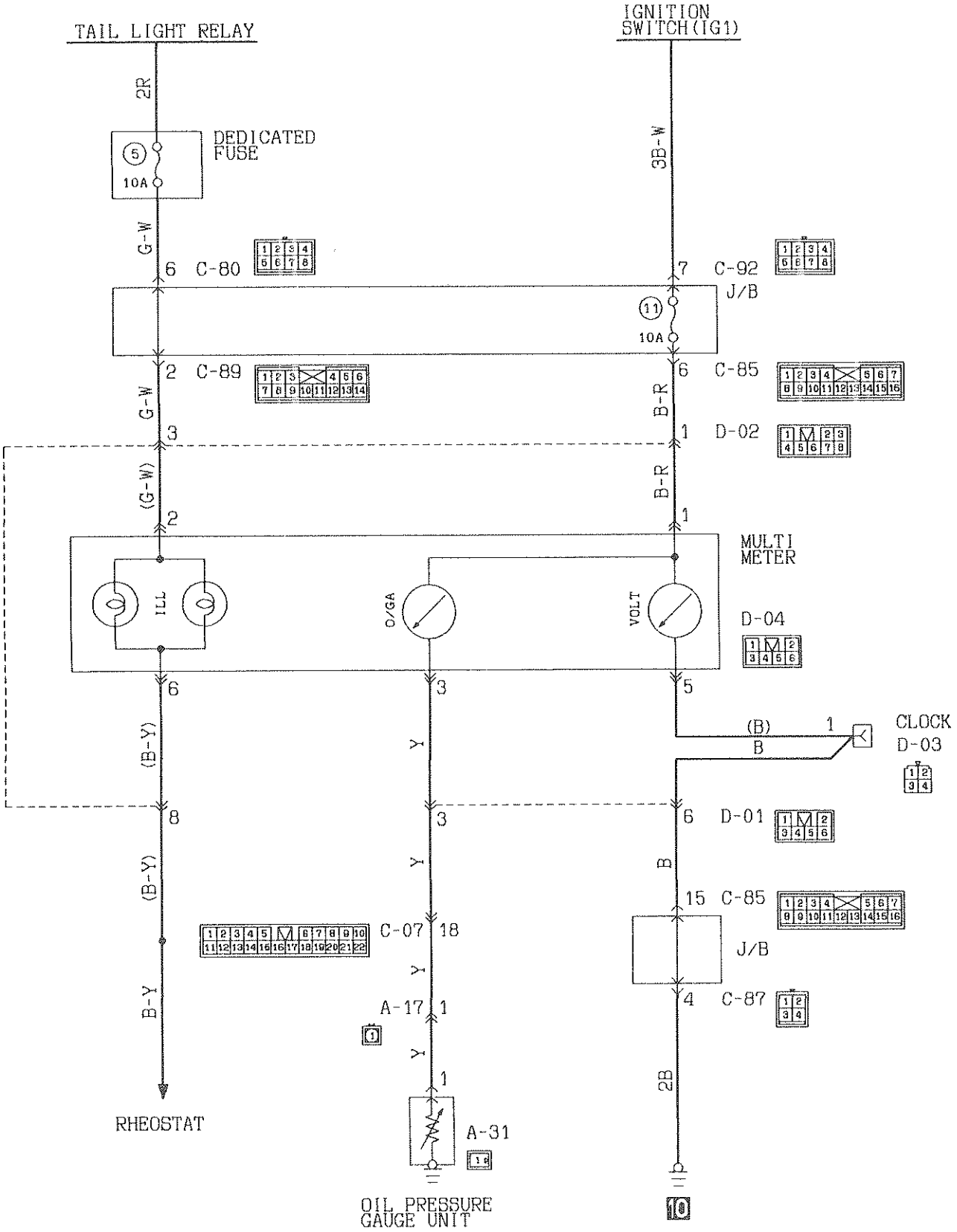
3. Fuel gage does not operate or its operation is incorrect.
   - Check the fuel gage. (Refer to P.54-31)
   - Check the fuel gage unit. (Refer to P.54-31)

4. The low fuel warning light does not illuminate even if fuel in the fuel tank is less than 11 dm^3 (2.9 gals).
   - Check the warning light bulb.
   - Check the fuel gage unit. (Refer to P.54-32)

5. The engine coolant temperature gage does not operate or its operation is incorrect.
   - Check the engine coolant temperature gage. (Refer to P.54-32)
   - Check the engine coolant temperature gage unit. (GROUP 14–Engine Coolant Temperature Gage Unit)

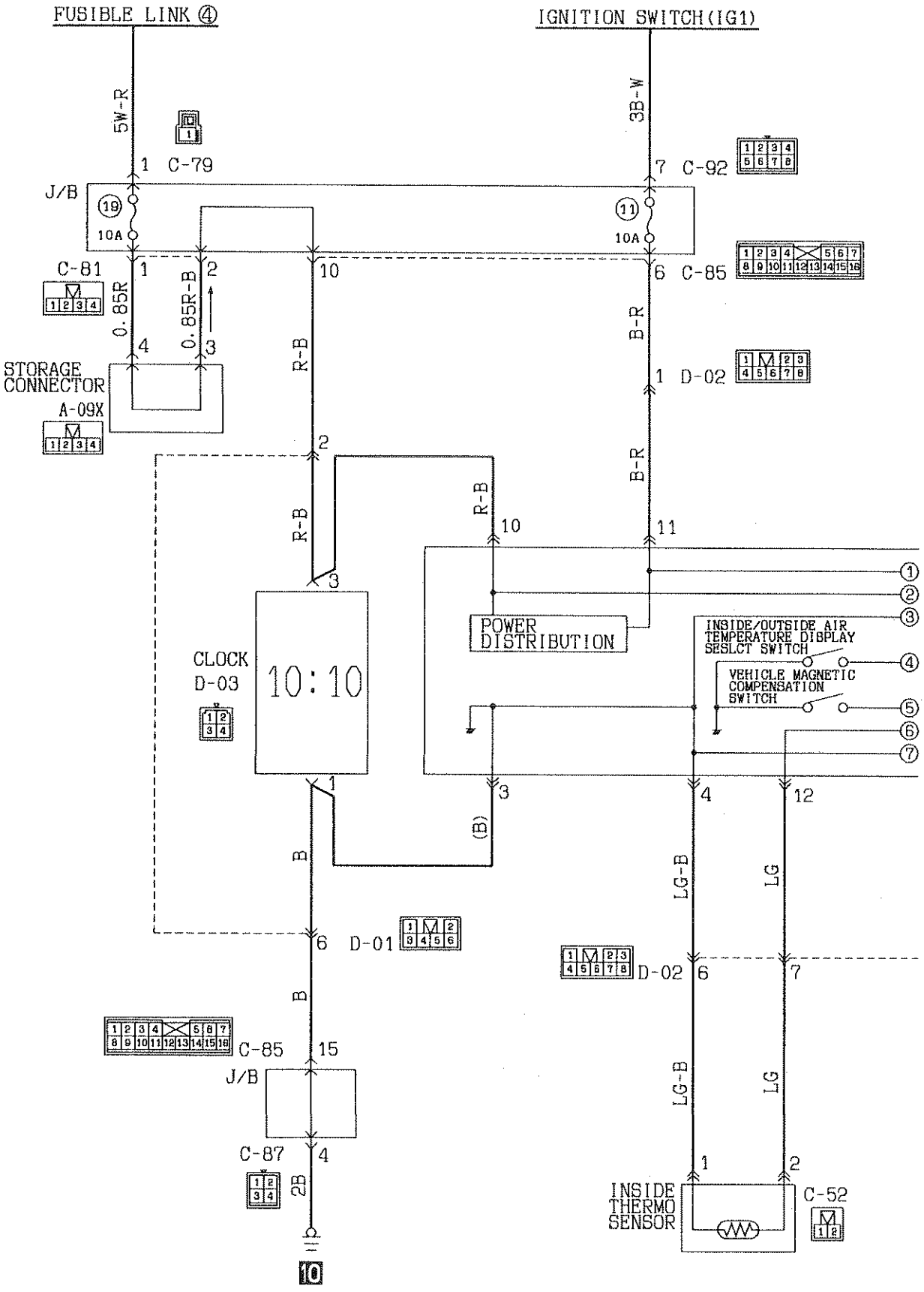
6. The illumination light does not illuminate or does not dim.
   (1) The tail light illuminates.
      - Check the rheostat. (Refer to P.54-61)
   (2) The tail light does not illuminate.
      - Check the dedicate fuse No. 5.
      - Check the tail light relay. (Refer to P.54-60)
      - Check the lighting switch. (Refer to P.54-63)

MULIT METER CIRCUIT <VEHICLES WITHOUT ELECTRONIC COMPASS>

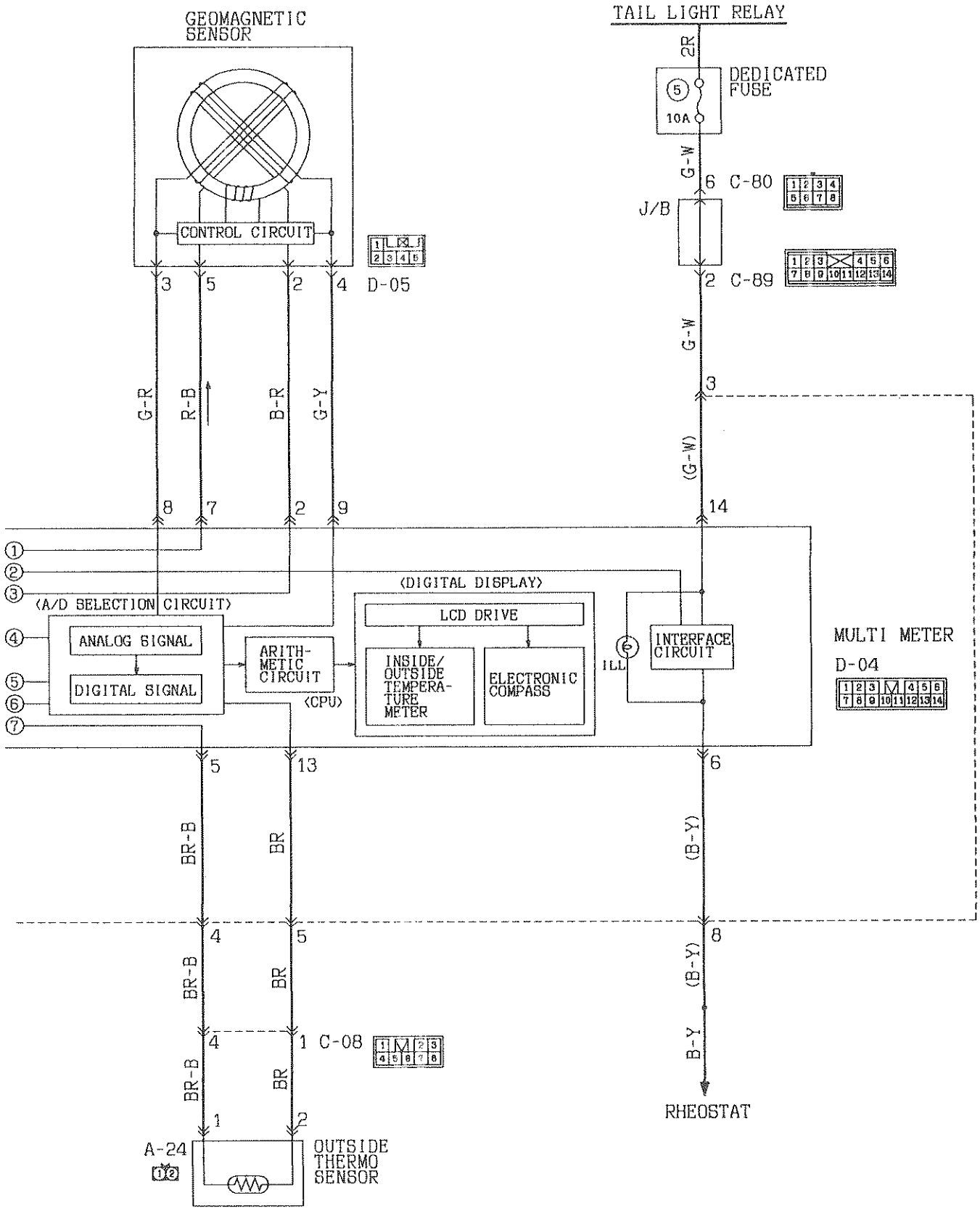


KK35-AC-01004-N

MULTI METER CIRCUIT <VEHICLES WITH ELECTRONIC COMPASS>



KX35-AC-Q1005-N


GEOMAGNETIC SENSOR
CONTROL CIRCUIT
D-05
TAIL LIGHT RELAY
2R
DEDICATED FUSE
10A
G-W
6 C-80
J/B
2 C-89
G-W
3
(G-W)
14
G-R
R-B
B-R
G-Y
8
7
2
9
①
②
③
(A/D SELECTION CIRCUIT)
④
⑤
⑥
⑦
ANALOG SIGNAL
DIGITAL SIGNAL
ARITH-METIC CIRCUIT
(CPU)
(DIGITAL DISPLAY)
LCD DRIVE
INSIDE/ OUTSIDE TEMPERA-TURE METER
ELECTRONIC COMPASS
ILL
INTERFACE CIRCUIT
MULTI METER
D-04
5
13
6
BR-B
BR
(B-Y)
4
5
8
BR-B
BR
(B-Y)
4
1 C-08
B-Y
BR-B
BR
1
2
RHEOSTAT
A-24
OUTSIDE THERMO SENSOR

MULTI-METER

OPERATION

<Oil pressure gage>

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

<Electronic compass>

- When the ignition switch is at 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.

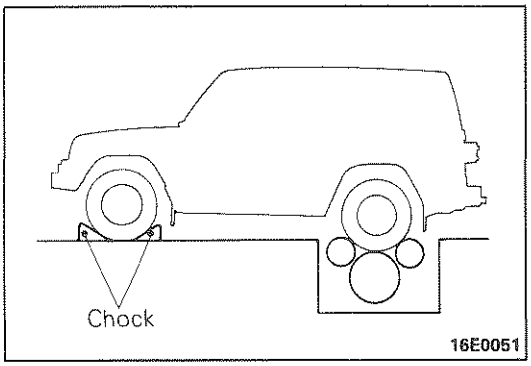
<Inside and outside thermo sensors>

- When the ignition switch is at the "ON" position, the DC signal output from the inside thermo sensor and outside thermo 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.54-25.

TROUBLESHOOTING HINTS

1. The oil pressure gage does not operate or its operation is incorrect.
   - Check the oil pressure gage. (Refer to P54-33, 36)
   - Check the oil pressure gage unit.
2. The voltmeter does not operate or its operation is incorrent.
   - Check the voltage meter. (Refer to P.54-33, 36)
3. The on-going direction display deviates.
   - Refer to P.54-10, Troubleshooting.
4. Vehicle magnetic compensation cannot be made.
   - Refer to P.54-11, Troubleshooting.
5. Display is hard to see or no display appears.
   - Refer to P.54-13, Troubleshooting.
6. There is a discrepancy between the inside and outside temperatures and the display temperatures.
   - Check the outside or inside thermo sensor (Refer to P.54-38).
   - Refer to P.54-14, Troubleshooting.



SERVICE ADJUSTMENT PROCEDURES

M54HIOA

SPEEDOMETER INSPECTION

(1) Adjust the pressure of the tires to the specified level. (Refer to GROUP 31-General Specifications.)

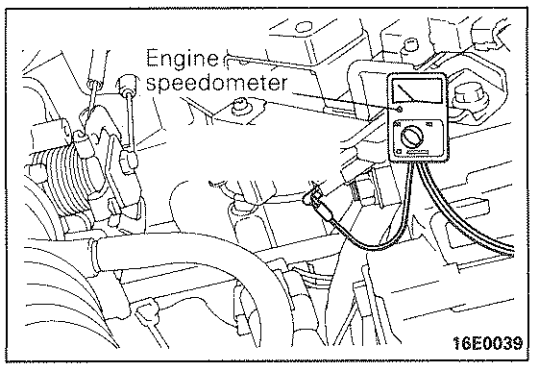
(2) Place the vehicle on a speedometer tester and chock the front wheels

Caution
Always inspect with the transfer lever in the "2H" position.

(3) Check if 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 INSPECTION

M54HIBS

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

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 if the variations are within the standard values.

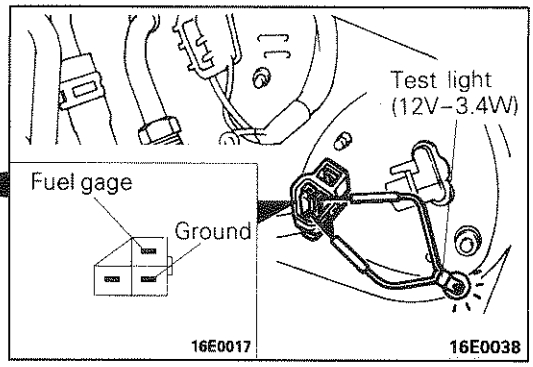
Standard value:	Engine speed rpm	Indicated variation rpm
	1000	±100
	3000	±150
	5000	±250
	6000	±300

FUEL GAGE SIMPLE INSPECTION

M54HICM

Remove the fuel gage unit assembly connector

Connect a test light to the harness side connector.

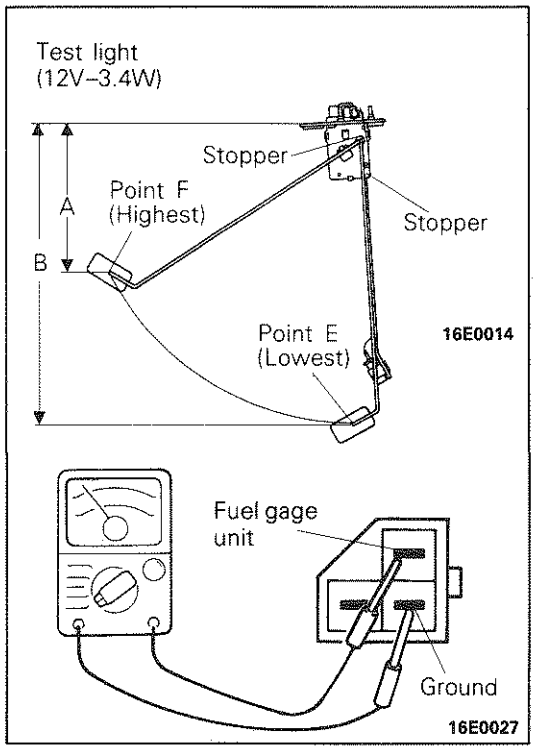


Turn the ignition switch to ON.

Check the condition of the test light and the gage.

(1) Test light is illuminated (Gage needle is not moving)	Replace the fuel gage
(2) Test light is illuminated (Gage needle is moving)	Replace the fuel gage unit
(3) Test light is not illuminated (Gage needle is not moving)	Repair the harness

M54HIIU



FUEL GAGE UNIT INSPECTION

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

Fuel Gage Unit Resistance

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

Standard value: **Point F** **3±2 Ω**
Point E **110±7 Ω**

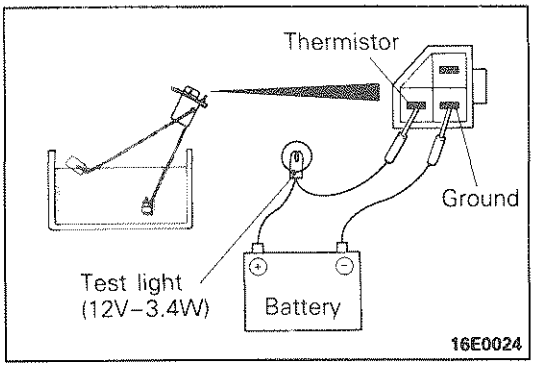
(2) Check that resistance value changes smoothly when float moves slowly between point F (highest) and point E (lowest).

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 valve: **A 119.3 mm (4.69 in.)**
B 255.0 mm (10.03 in.)

TSB Revision



FUEL LEVEL SENSOR INSPECTION M54HINA

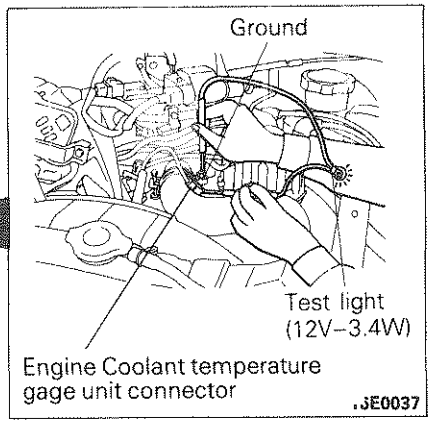
Connect fuel gage unit to battery via test light (12V-3.4W). Immerse in water. Condition good if light goes off when unit termistor is in water and lights when unit is removed from water.

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

ENGINE COOLANT TEMPERATURE GAGE SIMPLE INSPECTION M54HIDM

Remove the engine coolant temperature gage unit assembly connector.

Ground the harness connector by connecting it to a test light.



Turn the ignition switch to ON.

Check the condition of the test light and the gauge.

(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 INSPECTION M54HIKX

Refer to GROUP 14 – Engine Coolant Temperature Gage Unit.

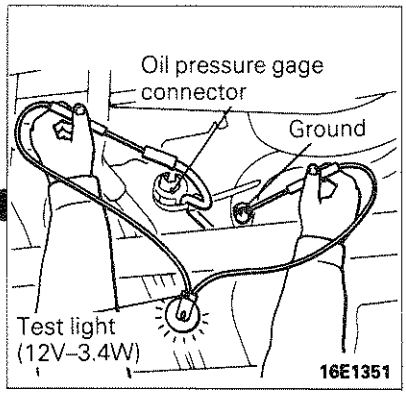
TSB Revision

OIL PRESSURE GAGE SIMPLE INSPECTION

M54HIFC

Remove the oil pressure gage unit coupling connector.

Connect the harness connector via a test light to the ground



Place the ignition switch in the ON position.

Check the test light and gage conditions.

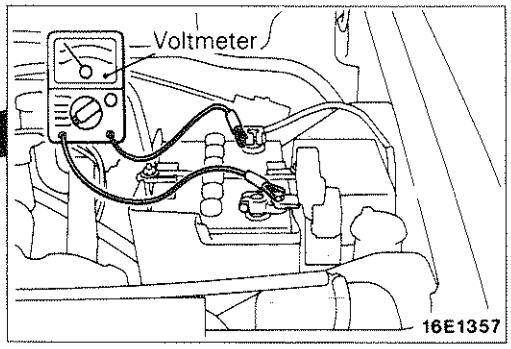
① Test light lights. (Pointer of gage does not swing.)	Replace oil pressure gage.
② Test light lights. (Pointer of gage swings.)	Replace oil pressure gage unit.
③ Test light does not light. (Pointer of gage does not swing.)	Correct harness.

VOLTAGE METER SIMPLE TEST

M54HIGF

Start engine and let it idle.

Connect voltmeter to battery.



Check voltage meter for conditions.

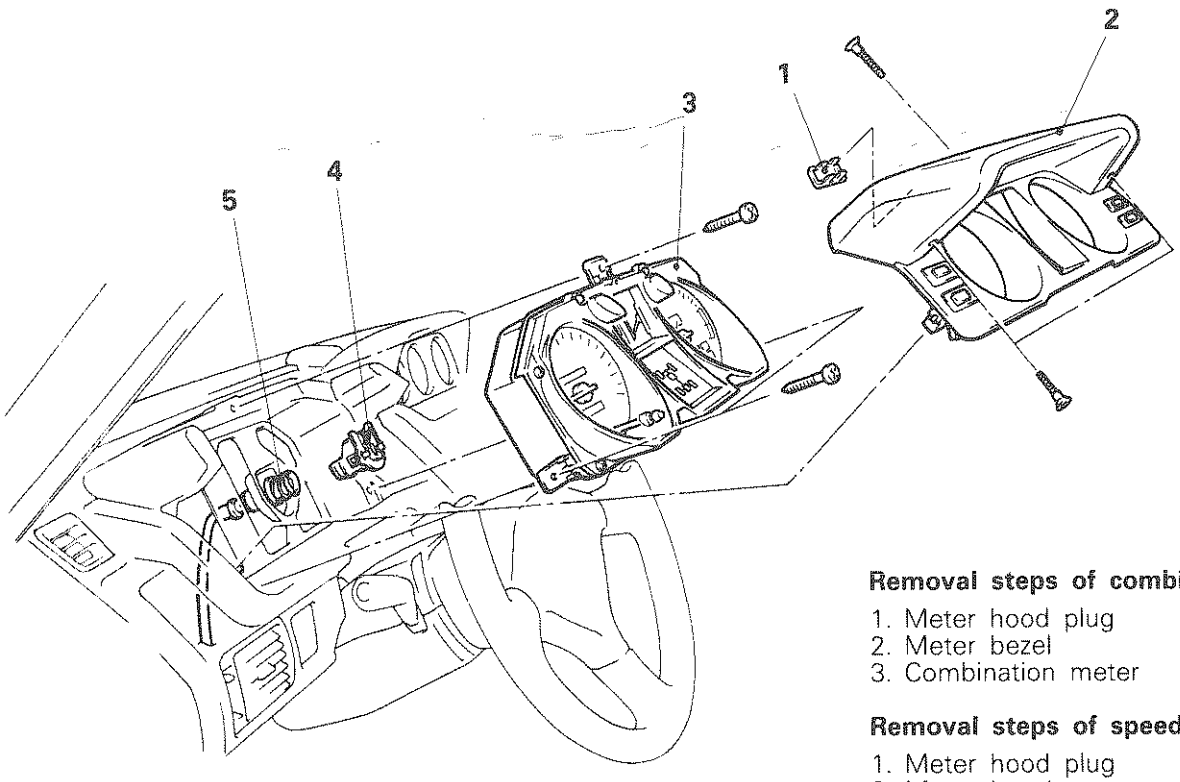
① Voltage indicated by voltmeter differs from voltage indicated by voltage meter (position indicated by pointer).	Replace gage.
② Gage does not operate.	Correct harness or replace gage.

TSB Revision

COMBINATION METER

M54HJAV

REMOVAL AND INSTALLATION



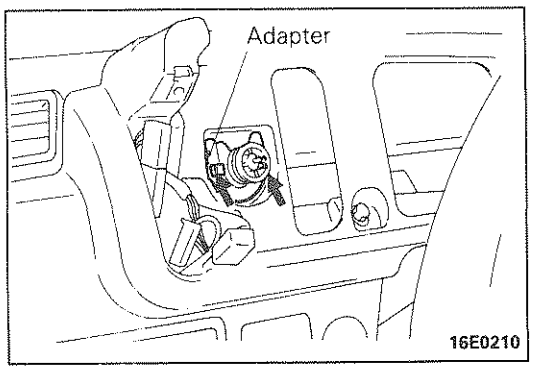
16E0125

Removal steps of combination meter

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

Removal steps of speedometer cable

1. Meter hood plug
2. Meter bezel
3. Combination meter
4. Adapter
   - Instrument panel (Refer to GROUP 52 – Instrument Panel.)
5. Speedometer cable

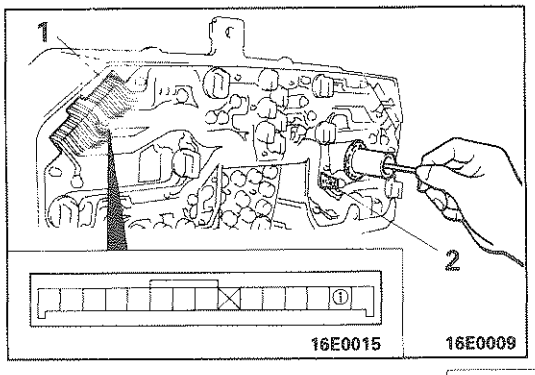


16E0210

SERVICE POINT OF REMOVAL

4. REMOVAL OF ADAPTER

(1) Disconnect the speedometer cable at the transmission end of the cable.
(2) Pull the speedometer cable slightly toward the vehicles interior, release the lock by turning the adapter to the left or right, and then remove the adapter.



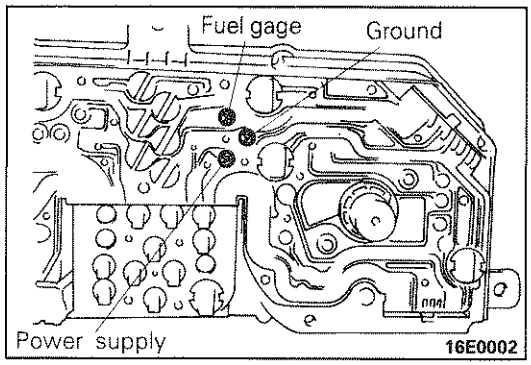
16E0015 16E0009

INSPECTION

REED SWITCH

Using an ohmmeter, check that continuity and discontinuity alternates between terminals 1 and 2 four times at every rotation of the shaft of the speedometer cable connection.

TSB Revision

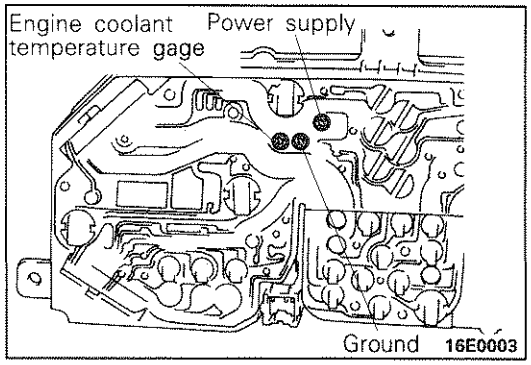


FUEL GAGE RESISTANCE

Measure resistance between terminals with an ohmmeter.

Standard value:

Power supply and ground	**233 ± 23.3 Ω**
Power supply and fuel gage	**86 ± 8.6 Ω**
Fuel gage and ground	**147 ± 14.7 Ω**



ENGINE COOLANT TEMPERATURE GAGE RESISTANCE

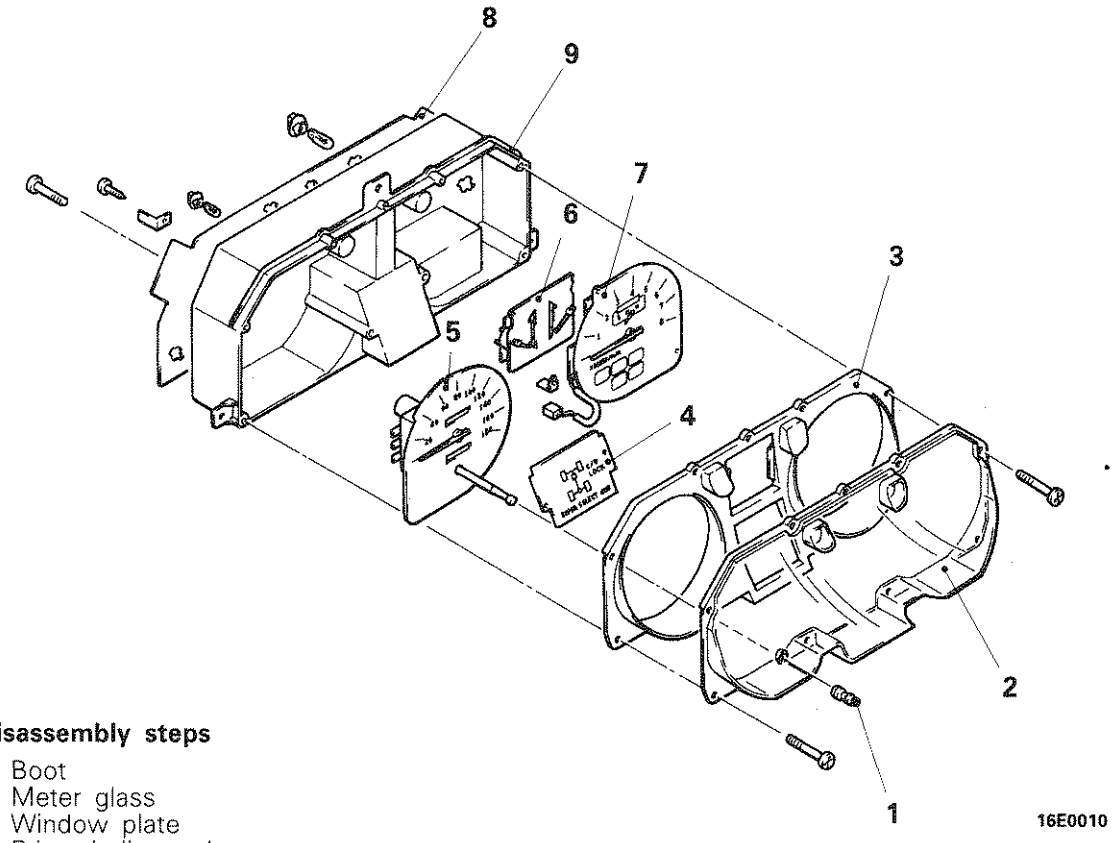
Measure resistance between terminals with an ohmmeter.

Caution
For inspection, use an ohmmeter which uses a measurement current of 4mA orless.

Standard value:

Power supply and engine coolant temperature gage	**75 ± 7.5 Ω**
Power supply and ground	**147 ± 14.7 Ω**
Engine coolant temperature gage and ground	**222 ± 22.2 Ω**

DISASSEMBLY AND REASSEMBLY



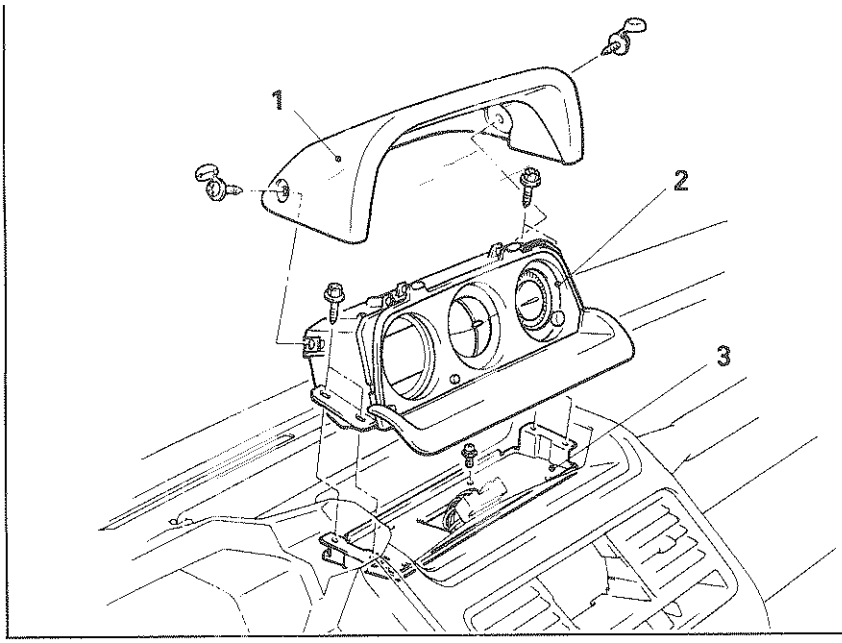
Disassembly steps

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

REMOVAL AND INSTALLATION

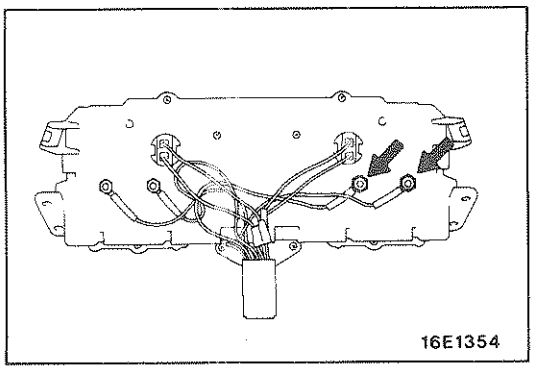
M54HJAW



Removal steps

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

16E0126

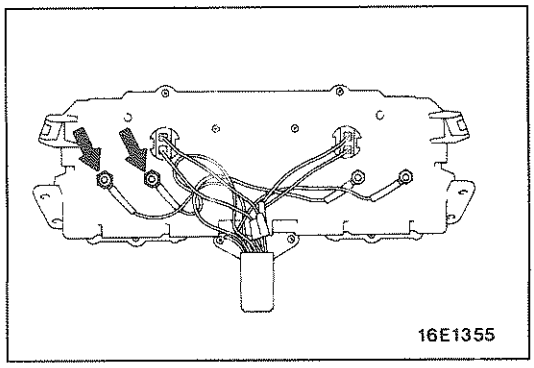


16E1354

INSPECTION

OIL PRESSURE GAGE

Measure the resistance between terminals with ohmmeter
Standard value: Approx. 50Ω



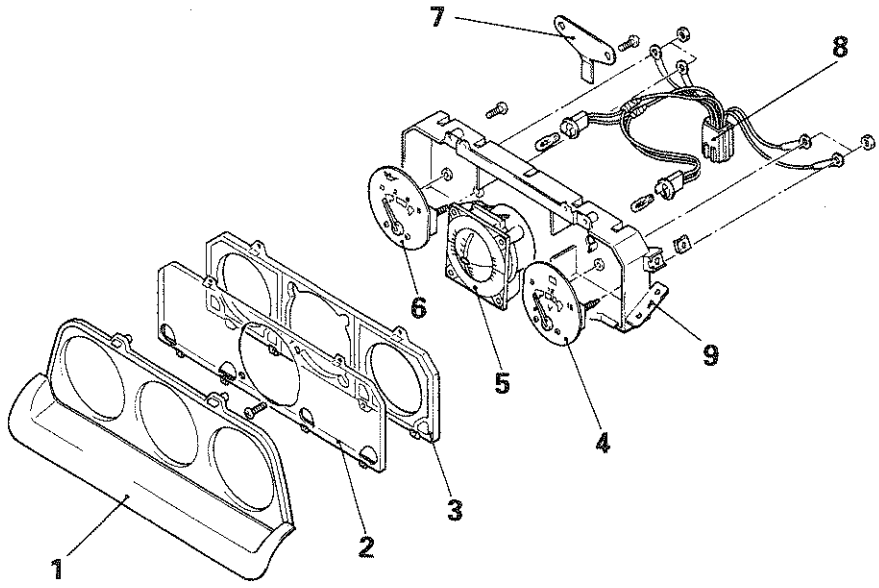
16E1355

VOLTAGE METER

Measure the resistance between terminals with ohmmeter
Standard value: 380–460Ω

DISASSEMBLY AND REASSEMBLY

<OIL PRESSURE GAGE, INCLINOMETER AND VOLTAGE METER>

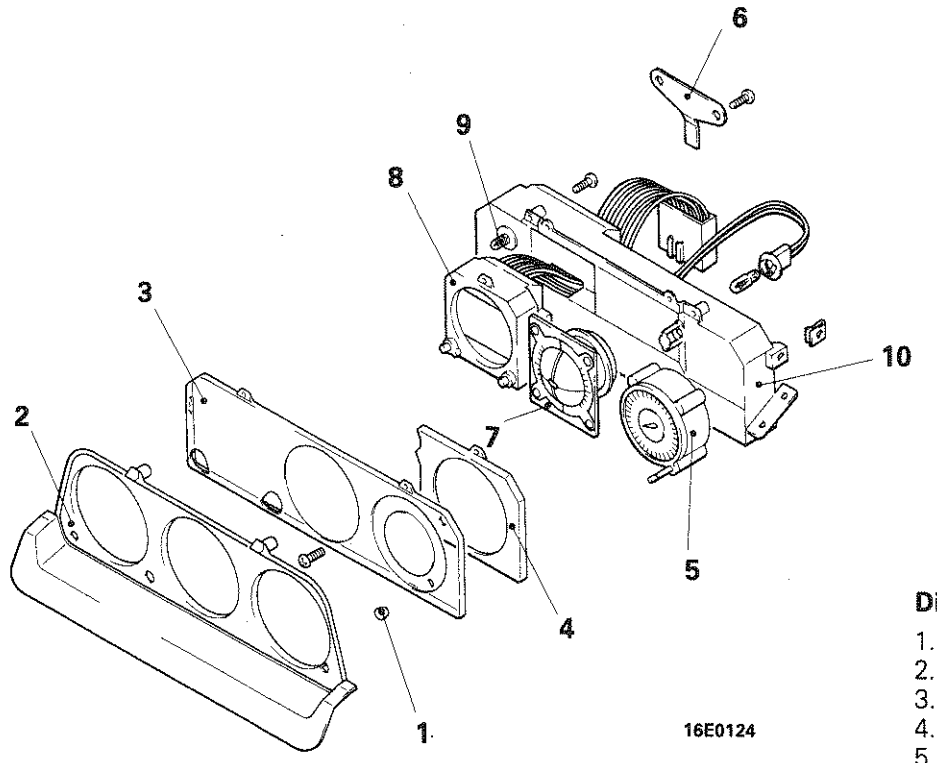


16E0396

Disassembly steps

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

<ELECTRONIC COMPASS, INCLINOMETER AND ALTIMETER>



16E0124

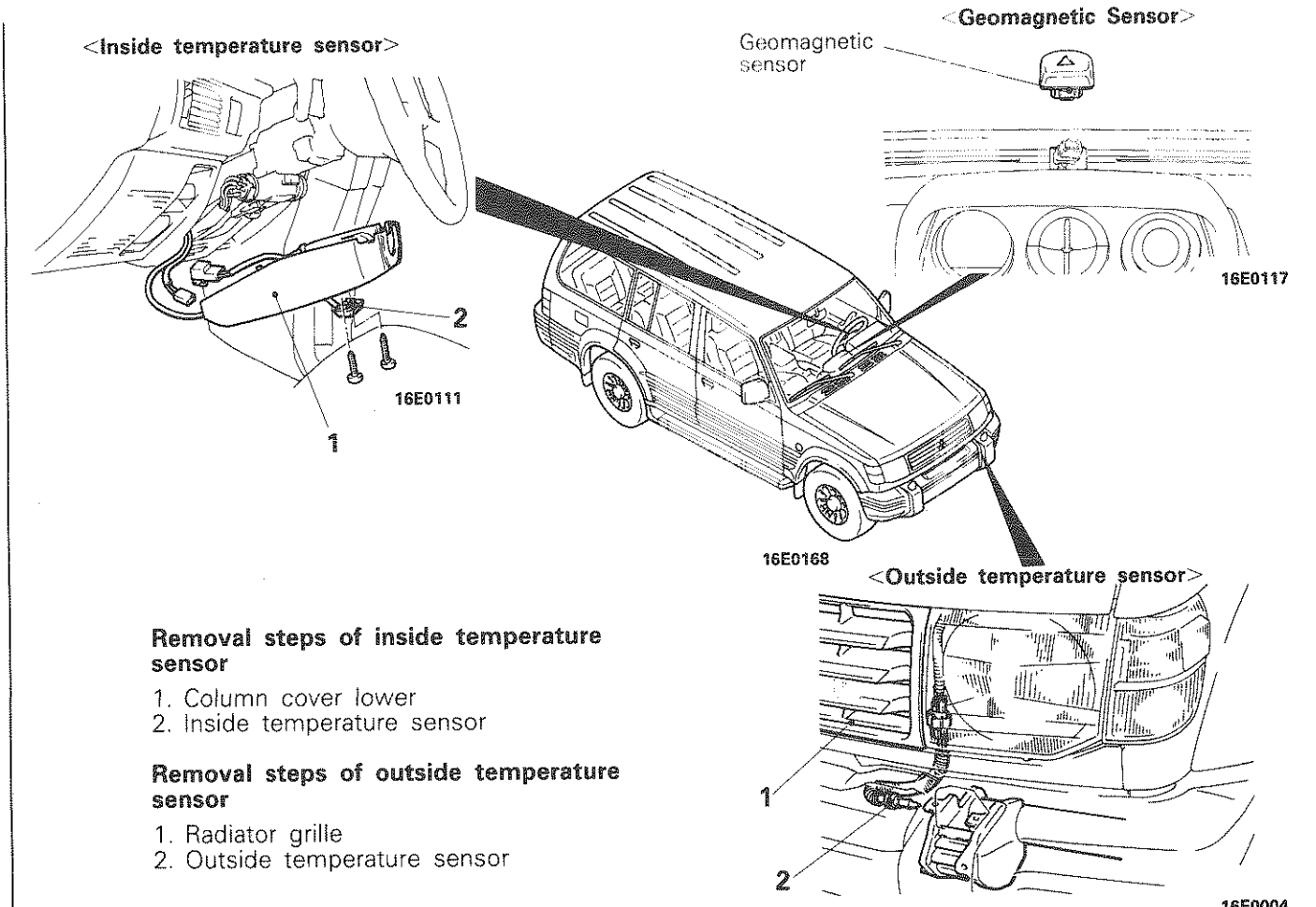
Disassembly steps

1. Knob
2. Meter garnish
3. Meter glass
4. Window plate
5. Altimeter
6. Connector bracket
7. Inclinometer
8. Electronic compass
9. Back light bulb
10. Meter case

GEOMAGNETIC SENSOR, INSIDE TEMPERATURE SENSOR AND OUTSIDE TEMPERATURE SENSOR

M54HMAA

REMOVAL AND INSTALLATION

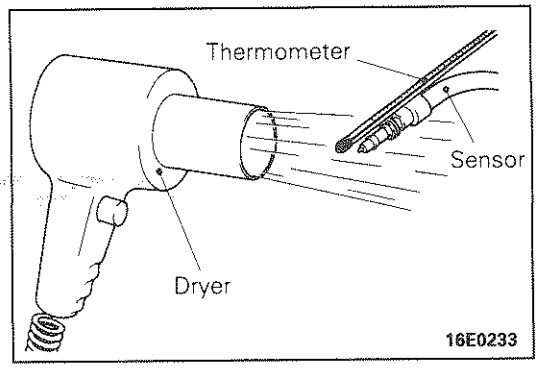


Removal steps of inside temperature sensor

1. Column cover lower
2. Inside temperature sensor

Removal steps of outside temperature sensor

1. Radiator grille
2. Outside temperature sensor



INSPECTION

OUTSIDE TEMPERATURE SENSOR AND INSIDE TEMPERATURE SENSOR

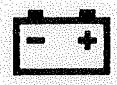
Check that the internal resistance values of the outside temperature sensor or inside temperature sensor are at the standard values when each sensor shows temperatures of 20°C (68°F) and 40°C (104°F).

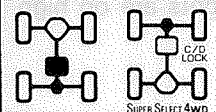
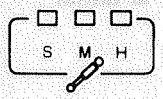
Standard value:	**20°C (68°F)**	**Approx. 1200 Ω**
	40°C (104°F)	**Approx. 500 Ω**

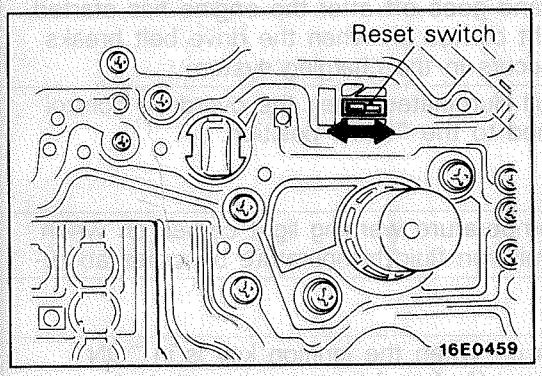
NOTE
For inspection of the geomagnetic sensor, refer to Troubleshooting (P.54-11).

INDICATORS AND WARNING LIGHTS

M54HKAZ

Symbol		Operation
	Turn signal indicator	This indicator flashes, as do the same side of turn-signal light flashes. If the turn-signal light is burnt out, the blinking of indicator slows down. This indicator is common with hazard light.
	High beam indicator	This indicator illuminates when the headlights are on high beam.
	Door-ajar warning light	This warning light comes on when the door is either open or not completely closed.
	Fasten seat belt indicator	This indicator goes on for four to eight seconds when the ignition key is in "ON" position, even if the driver has fastened his seat belt.
BRAKE	Brake warning light	This warning light comes on when the ignition key is in "ON" position, and goes off after the engine has started. This warning light comes on when the parking brake is applied or brake fluid level falls less than the specific level.
	Charging warning light	This warning light comes on when the ignition key is in "ON" position, and goes off after the engine has started. This warning light comes on when the drive belt breaks or the trouble occurs in the charging system.
O D OFF 68R0133	Overdrive indicator	This indicator will illuminates when the overdrive control switch is switched to the "OFF" position.
A/T TEMP 68W068	A/T fluid temperature warning light	This A/T fluid temperature warning light comes on when automatic transmission fluid temperature becomes abnormally high.
MAINT REQD	Maintenance required warning light	This light comes on when the ignition key is in "ON" position, and goes off after the engine has started. (Lights up after every 50,000 miles, 80,000 miles, 100,000 miles travelled.)
CHECK ENGINE	Engine warning light	This light illuminates when the ignition key is turned to the "ON" position, but should go out in a few seconds. If the light illuminates while the vehicle is moving, there is a malfunction of a component related to exhaust gases.
	Low fuel warning light	This warning light illuminates when the fuel in the fuel tank falls less than approx. 11 dm^3 (2.9 gals.)
	Oil pressure warning light	This warning light illuminates when the ignition key is in "ON" position, and goes off after the engine has started. This indicator comes on when the oil fails or the trouble occurs in the oil circulating system while driving.
CRUISE	Cruise control indicator	This indicator illuminates when the cruise control is activated.

Symbol		Operation
ANTI LOCK	Anti-lock braking system warning light	This warning light will go on when the ignition key is turned to the "ON" position, and goes out in a second. If warning light goes on after starting the engine or while driving, it indicates that the anti-lock braking system is not functioning and that only the standard brake system is in operation.
	2WD/4WD indicator	This indicator will light up when the transfer case shift lever is shifted to the four wheel driving position (either the "2H" "4H", "4HLc or the "4HLLc" position) and the ignition key is in the "ON" position.
	Variable shock absorber indicator	The indicator light of switch position (M: MEDIUM mode, S: SOFT mode and H: Hard mode) on the changeover switch illuminates when the ignition switch is turned to the "ON" position.
	Automatic transmission position indicator	When the ignition key is turned to the "ON" position, the indicator illuminates to indicate the position at which the selector lever is set.



MAINTENANCE REQUIRED SYSTEM

RESET SWITCH

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 lights bulb should be removed after the 100,000 mileage.

NOTE

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

LIGHTING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

M54IB--

Items		Specifications
Exterior lights		
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 lights		
Dome light	W	8
Reading light	W	8
Cargo space light	W	10
Vanity mirror light	W	1.5
Cigarette lighter illumination light	W	1.4 (74)
Ashtray illumination light	W	1.4 (74)

NOTE
The values in parentheses denote SAE grade numbers.

SERVICE SPECIFICATION

M54IC--

Items		Specifications
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>

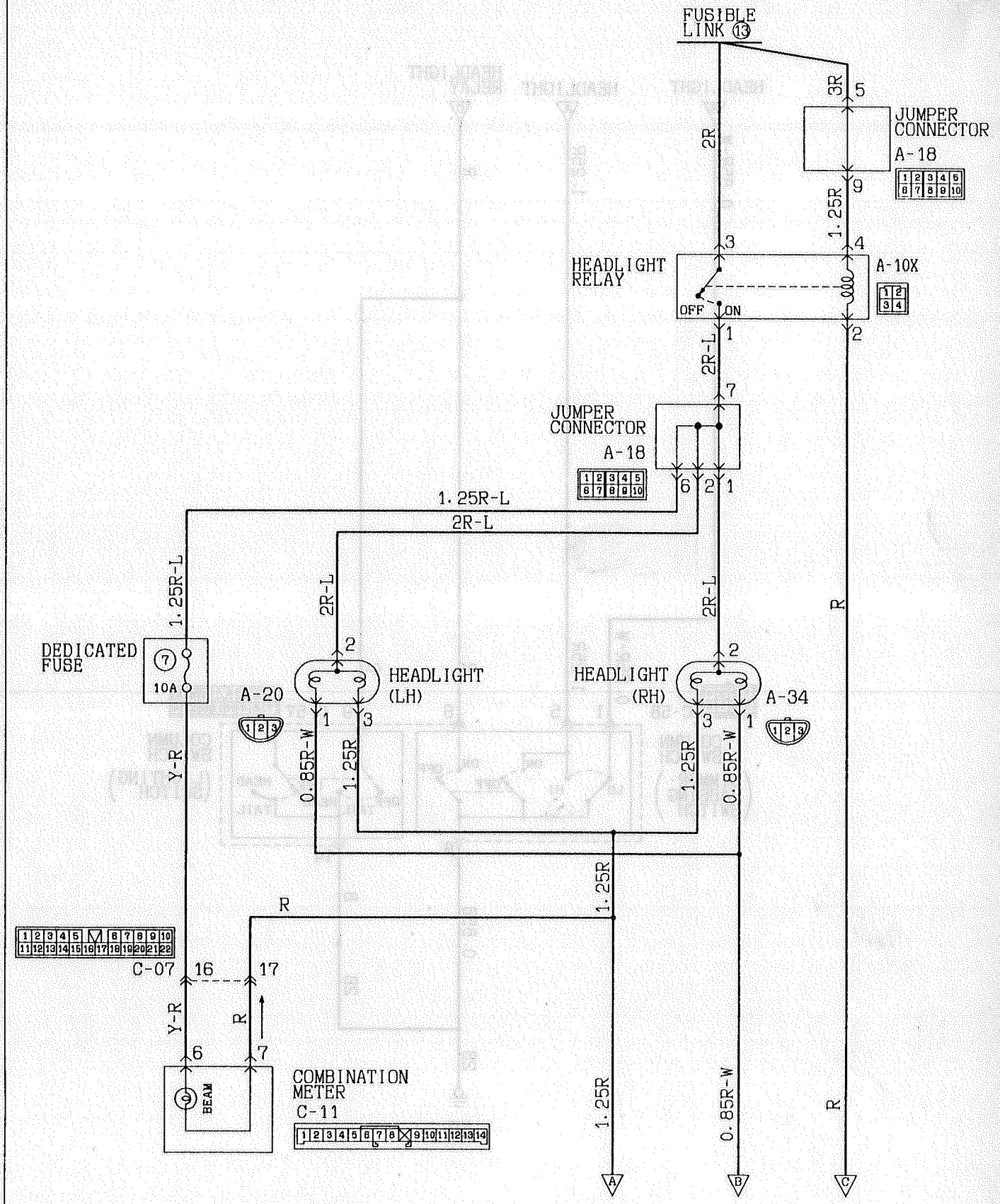
- When the high-beams are illuminated or while passing is operating, the indicator light will illuminate to inform the driver that the high-beams are illuminated.

TROUBLESHOOTING HINTS

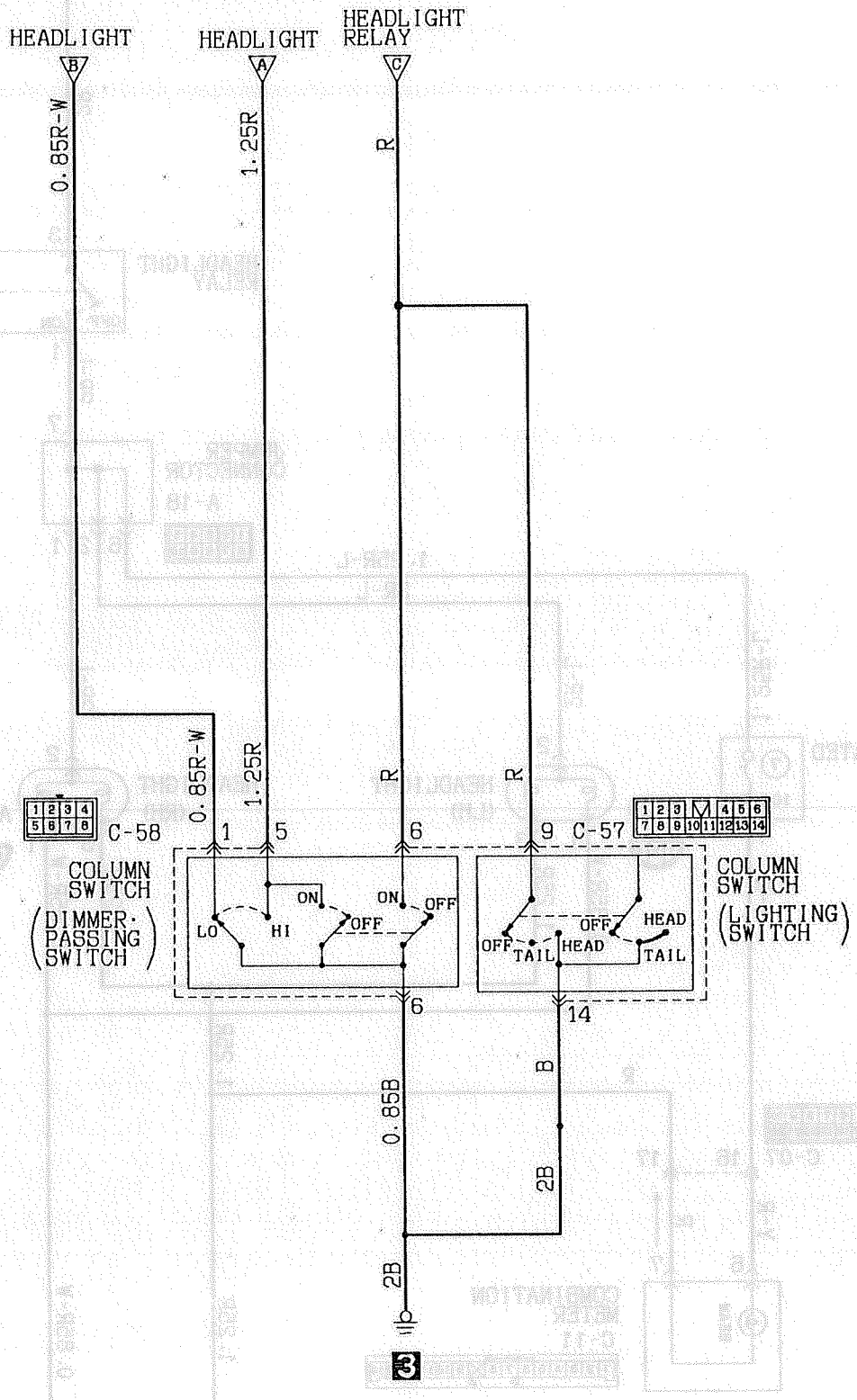
M54IB--

1. The headlights do not illuminate at all positions
   (1) The tailights illuminate.
   - Check the headlight relay. (Refer to P.54-60)
   - Check the lighting switch. (Refer to P.54-63)

   (2) Tail lights also do not illuminate or charging warning light does not turn off.
   - Check the fusible link No. ⑬
2. Low-beams (both) do not illuminate.
   - Check the dimmer switch. (Refer to P.54-63)
3. High-beams (both) do not illuminate but illuminate when the passing switch is turned to the "ON" position.
   - Check the dimmer switch. (Refer to P.54-63)
4. The high-beam indicator light does not illuminate but illuminates with the dimmer switch at "HI" position or the passing switch at "ON" position.
   - Check the dedicated fuse No. ⑦
   - Check the indicator light bulb.
5. The headlights do not illuminate even if passing but illuminate with the dimmer switch at "LO" or "HI" position and the lighting switch at "HEAD" position.
   - Check the passing switch. (Refer to P.54-63)

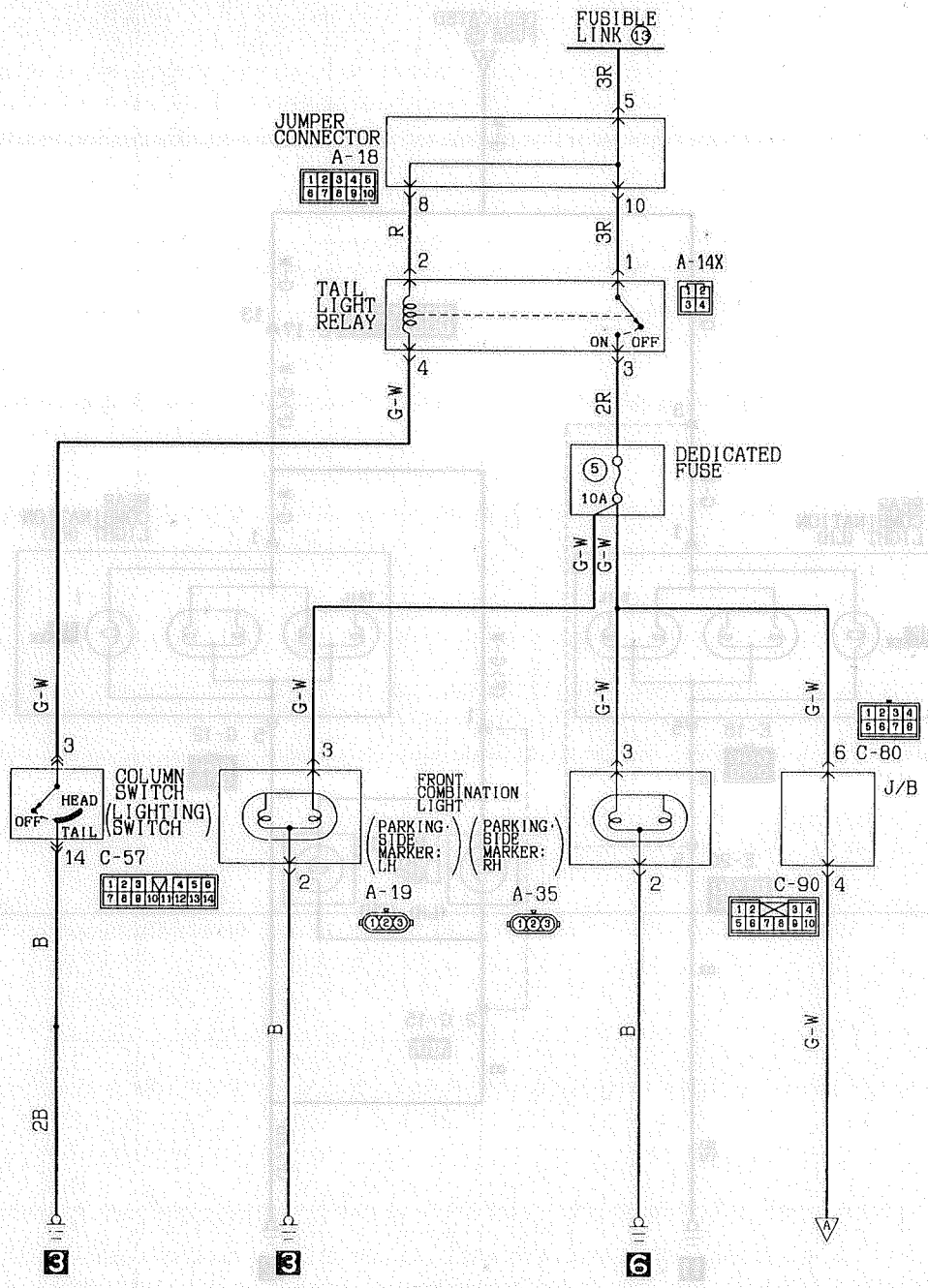


KX35-AC-Q0801-N


HEADLIGHT
HEADLIGHT
HEADLIGHT RELAY
B
A
C
0.85R-W
1.25R
R
0.85R-W
1.25R
R
R
C-58
1
5
6
9
C-57
COLUMN SWITCH (DIMMER· PASSING SWITCH)
COLUMN SWITCH (LIGHTING SWITCH)
LO
HI
ON
OFF
ON
OFF
OFF
TAIL
HEAD
OFF
HEAD
TAIL
6
14
B
0.85B
2B
2B
3

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

M541HCO



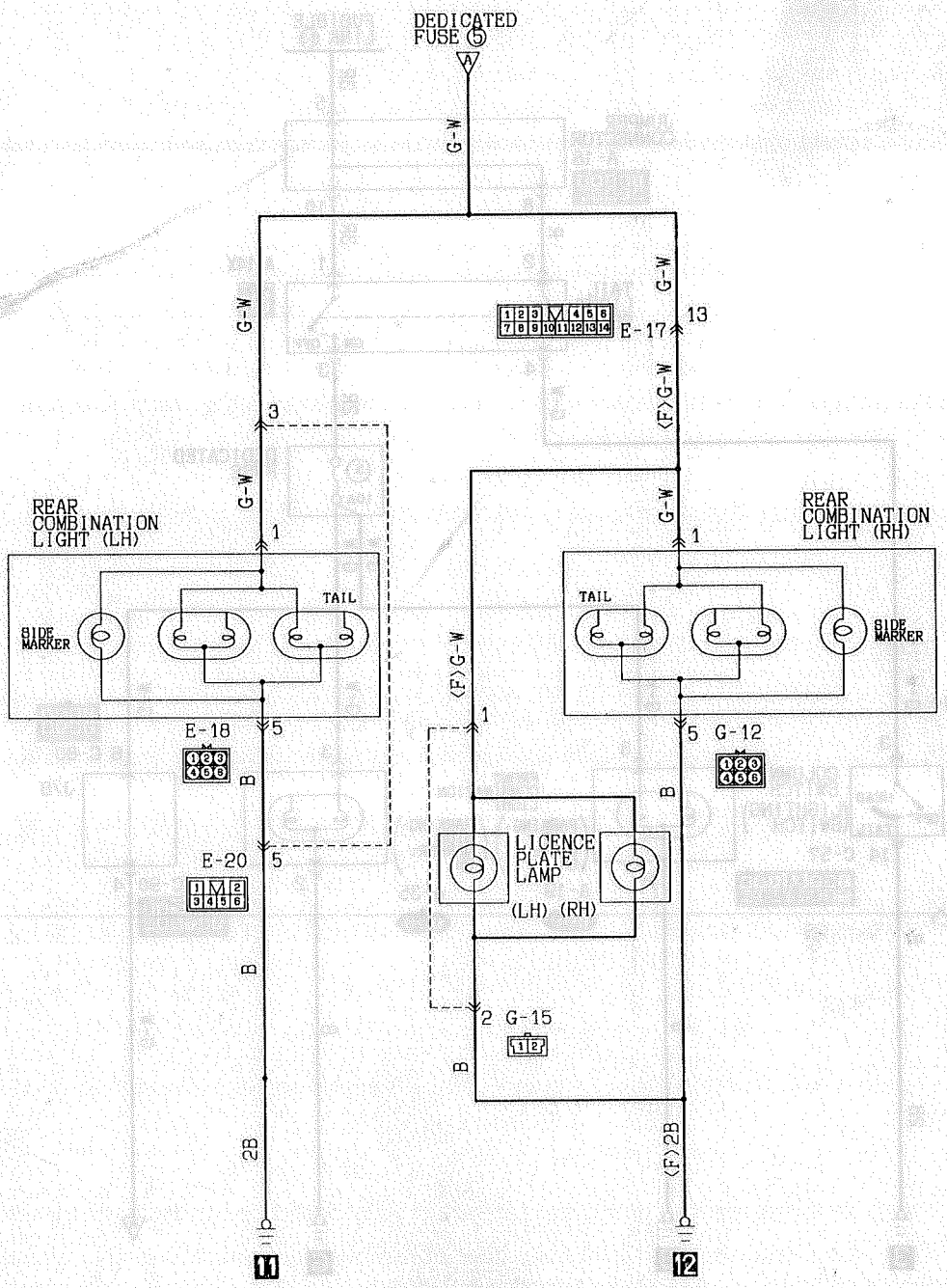
KX35-AC-00B02-N

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

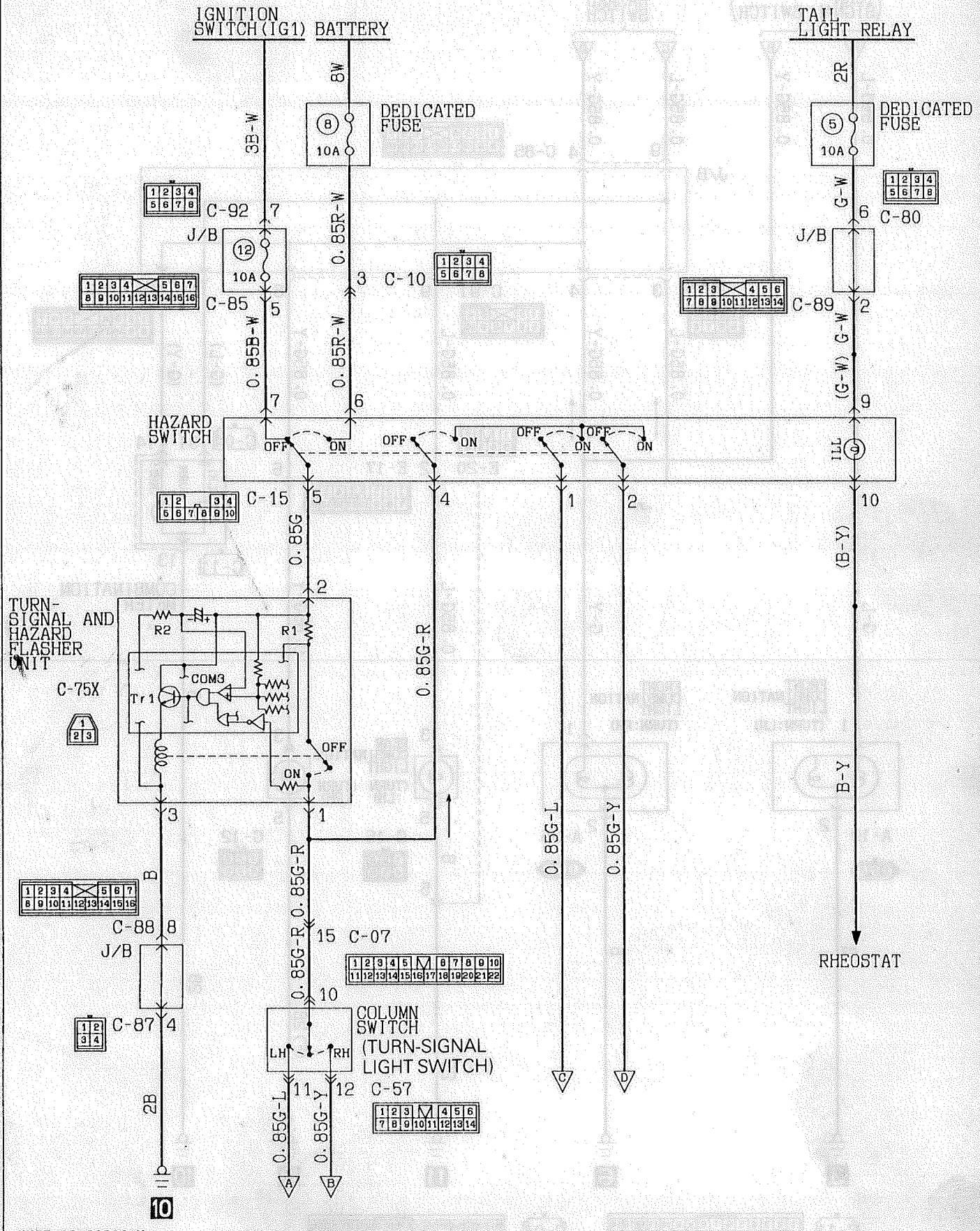
1. All lights do not illuminate.
   (1) Headlights illuminate.
   - Check the dedicated fuse No. ⑤
   - Check the tail light relay. (Refer to P.54-60)
   - Check the lighting switch. (Refer to P.54-63)

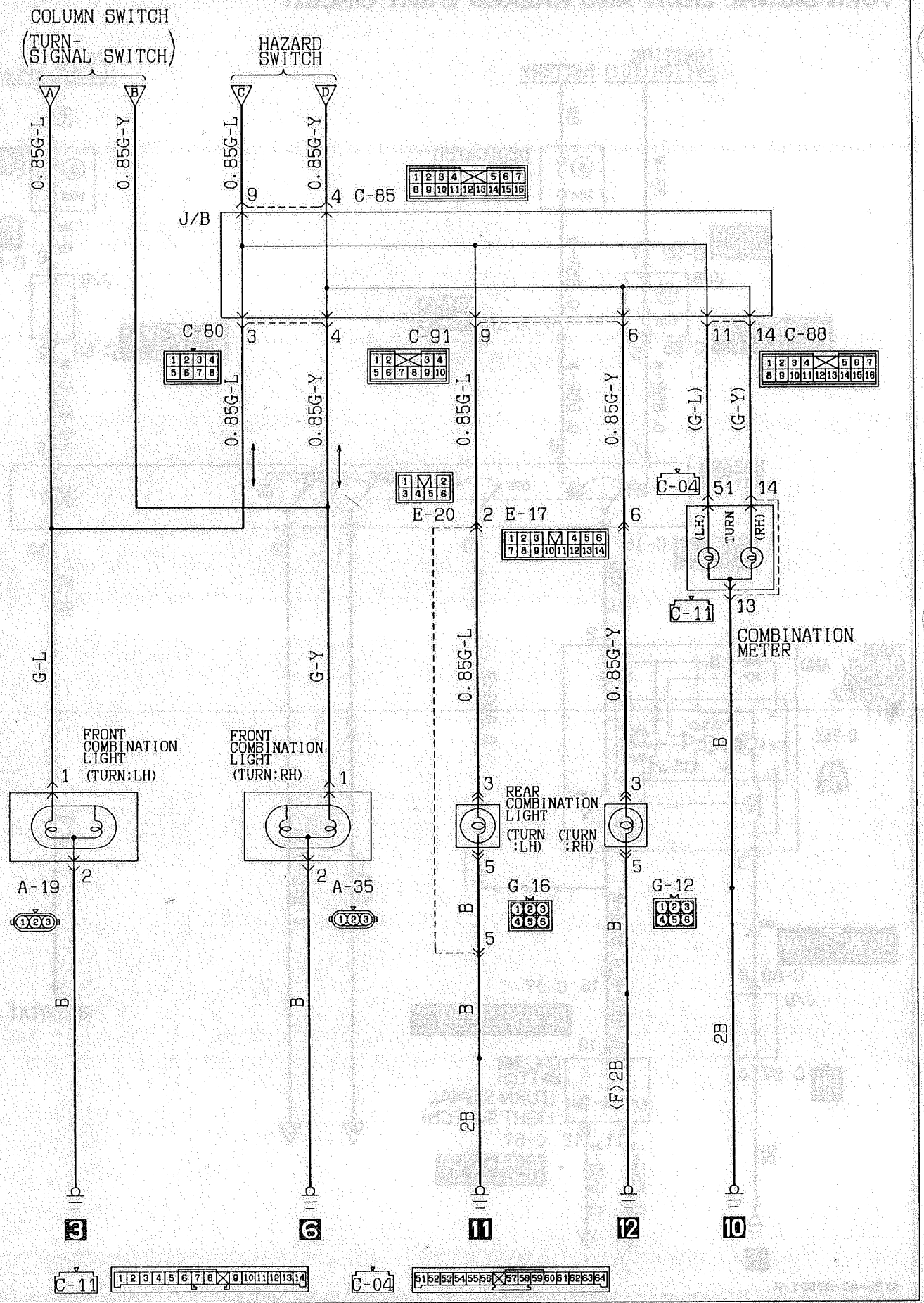


(2) The headlights also do not illuminate or charging warning light does not turn off.
- Check the fusible link No. ⑬

2. Either light does not illuminate.
- Check the bulb.
- Check the ground circuit.

TURN-SIGNAL LIGHT AND HAZARD LIGHT CIRCUIT




COLUMN SWITCH
(TURN-SIGNAL SWITCH)
HAZARD SWITCH
A
B
C
D
0.85G-L
0.85G-Y
9
4
C-85
J/B
C-80
3
4
C-91
9
6
11
14
C-88
(G-L)
(G-Y)
E-20
2
E-17
6
C-04
51
14
(LH)
TURN
(RH)
C-11
13
COMBINATION METER
G-L
G-Y
B
2B
FRONT COMBINATION LIGHT (TURN:LH)
FRONT COMBINATION LIGHT (TURN:RH)
1
2
A-19
A-35
3
5
REAR COMBINATION LIGHT
(TURN :LH)
(TURN :RH)
G-16
G-12
<F>2B
3
6
11
12
10
C-11
C-04

OPERATION

<Turn-signal light>

1. In normal operating condition

- When the ignition switch is placed in the ON position, battery voltage is applied through the hazard switch to the turn-signal and hazard flasher unit.
- When the turn-signal switch is placed in the LH (or RH) position, Tr_1 in the flasher unit turns ON, causing the relay contacts in the flasher unit to close. This results in the LH (or RH) turn-signal light and turn-signal indicator light lighting up.
- At the same time, the capacitor is charged through R_2 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 Tr_1, This opens the relay contacts and, as a result, the LH (or RH) turn-signal light and turns-signal indicator light go out.
- At the same time when Tr_1 turns OFF, the capacitor starts discharging. As soon as the capacitor completes discharging, the COM3 output is inverted again causing Tr_1 to turn ON. This results in the LH (or RH) turn-signal light and turn-signal indicator light coming on.
- These sequences of operation repeat, which results in the LH (or RH) turn-signal light and turn-signal indicator light flashing off and on.

2. When one bulb is burnt

- When either one of the turn-signal light bulbs goes out, it causes the resistance of the entire light circuit to increase, hence 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 Tr_1 becomes shorter with the resultant greater number of times the light flashes on and off.

<Hazard light>

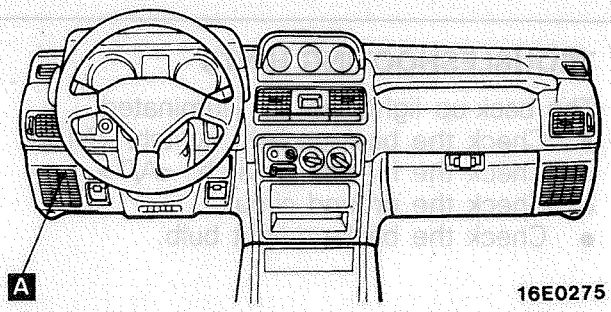
- When the hazard switch is placed in the ON position, the flasher unit relay contacts repeatedly close and open, which results in the RH and LH turn-signal lights turn-signal indicator lights, and hazard warning indicator lights flashing on and off at the same time.

Remark

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

COMPONENT LOCATION

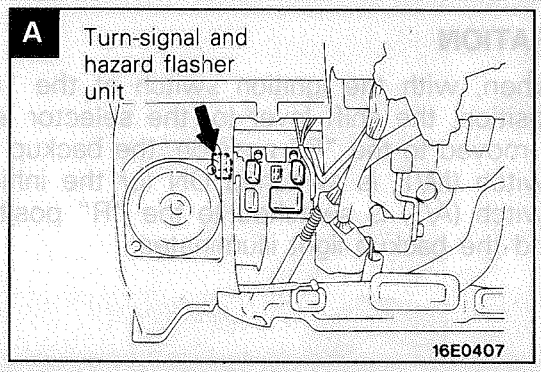
Name	Symbol
Turn-signal and hazard flasher unit	A



16E0275

TROUBLESHOOTING HINTS

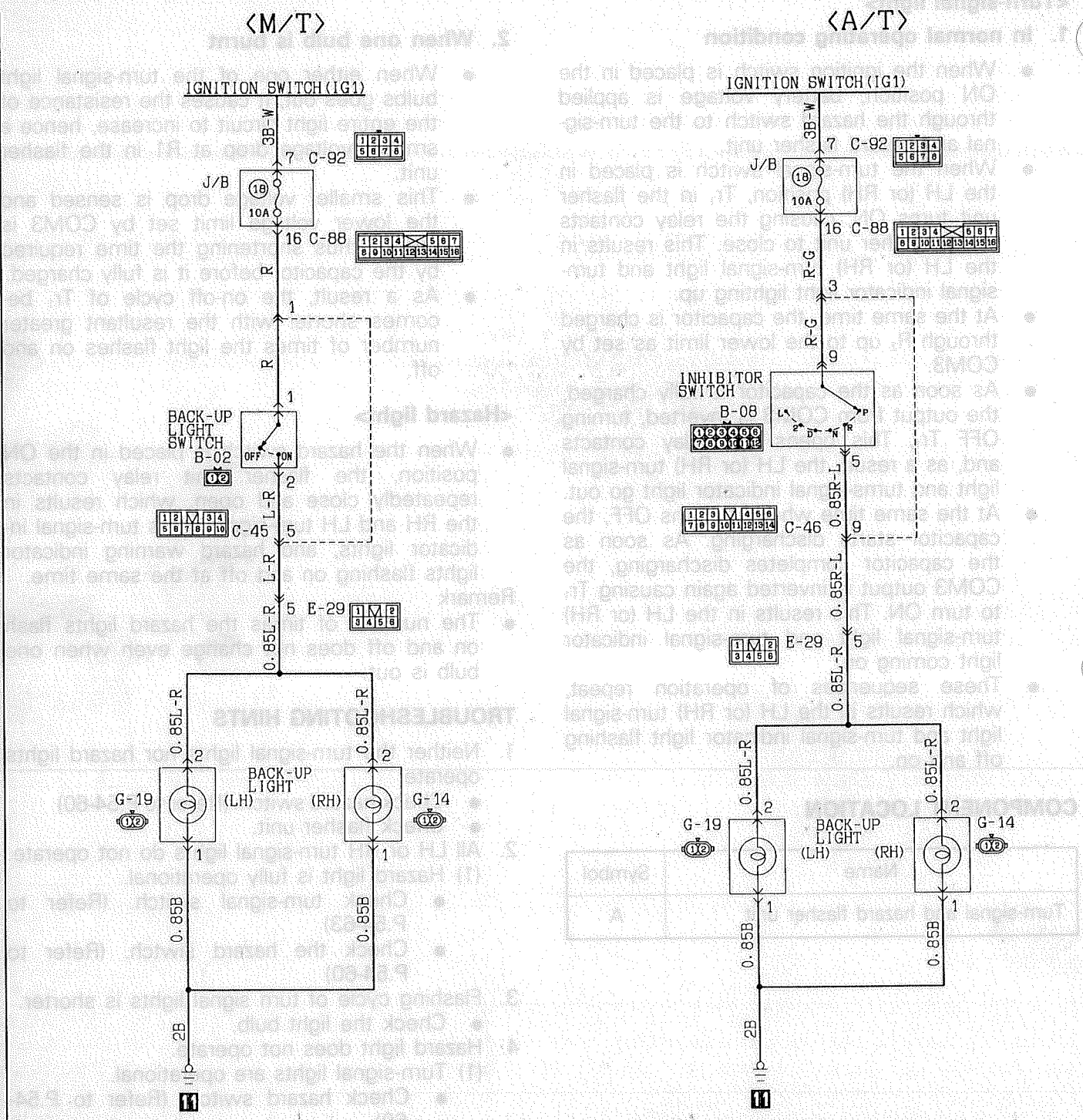
1. Neither the turn-signal lights nor hazard lights operate.
   - Check hazard switch. (Refer to P.54-60)
   - Check flasher unit.
2. All LH or RH turn-signal lights do not operate.
   (1) Hazard light is fully operational.
   - Check turn-signal switch. (Refer to P.54-63)
   - Check the hazard siwtch. (Refer to P.54-60)
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 hazard switch. (Refer to P.54-60)



16E0407

BACK-UP LIGHT CIRCUIT

M54IHDK



OPERATION

- When, with the ignition switch at the "ON" position, the shift lever (or the selector lever) is moved to the "R" position, the backup light switch (M/T) is switched ON (or the inhibitor switch (A/T) is switched to the "R" position), and the backup light illuminates.

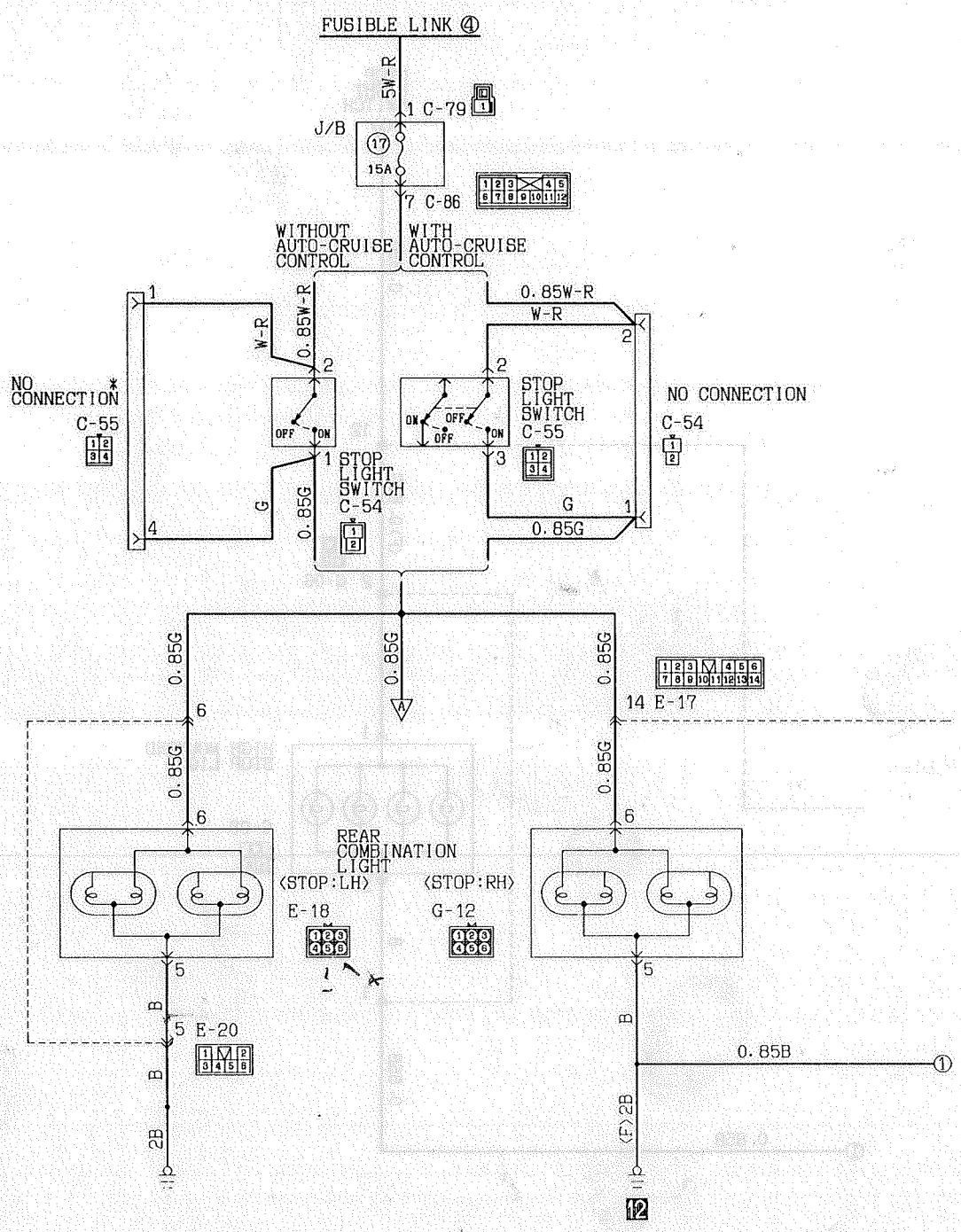
TROUBLESHOOTING HINTS

The back-up lights do not illuminated.

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

STOP LIGHT CIRCUIT

M54IHHI

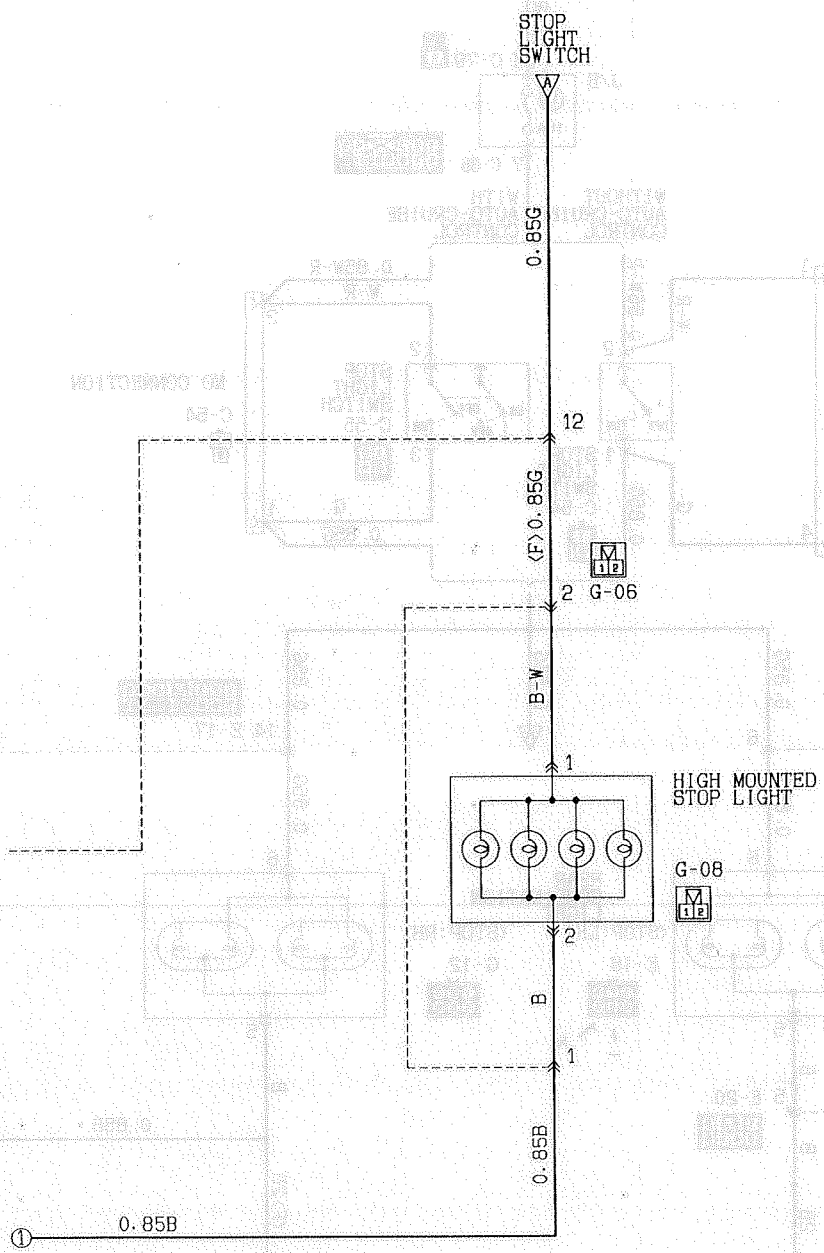


OPERATION

- The battery voltage is constantly applied to the stop light switch through the multi-purpose fuse No. ⑰.
- When the brake pedal is depressed, the sotp light switch turns to "ON", and the stop lights illuminate.

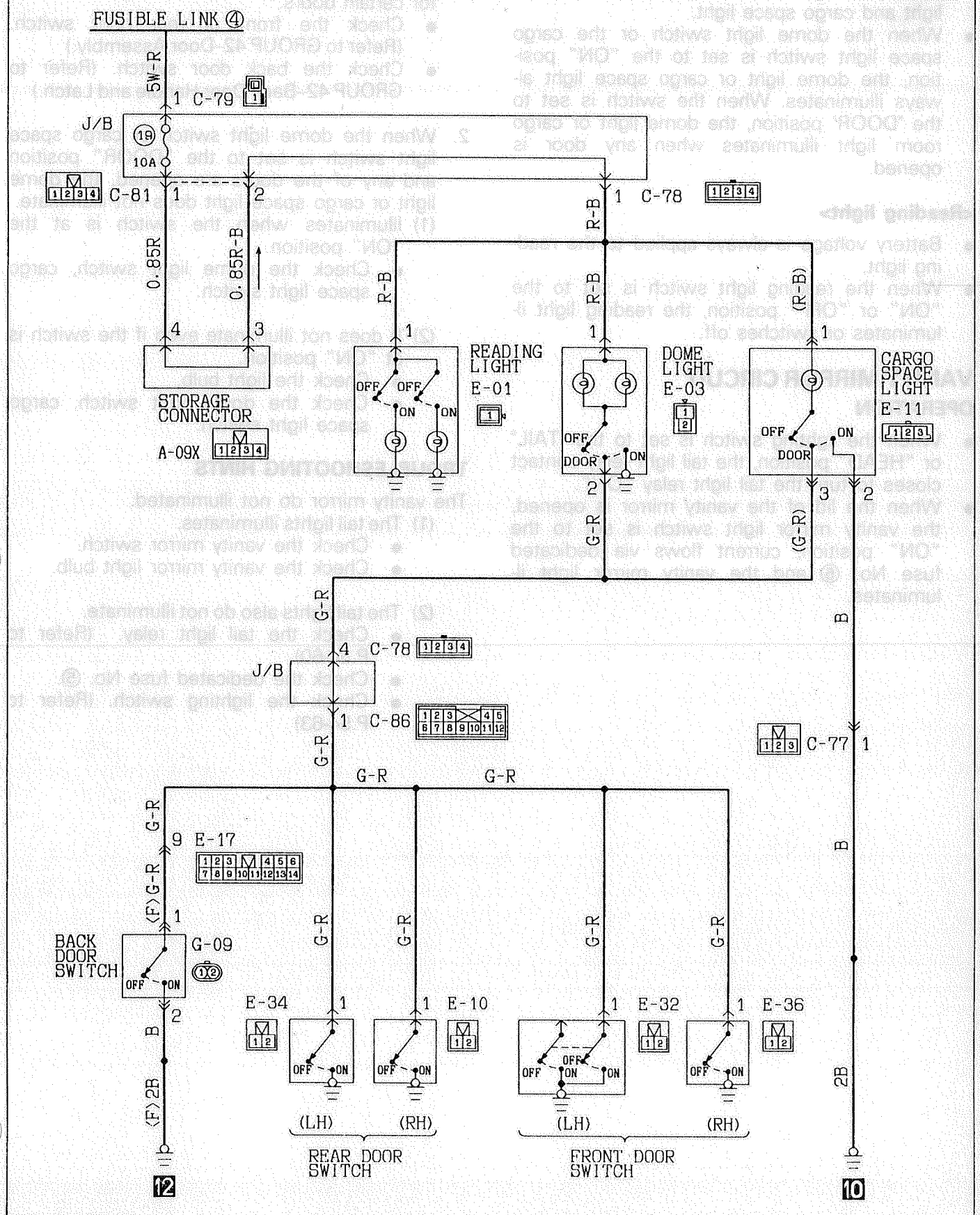
TROUBLESHOOTING HINTS

1. The stop lights do not illuminate.
   - Check the stop light switch. (Refer to GROUP 35–Brake Pedal)
   - Check the 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 35–Brake Pedal)

DOME LIGHT, CARGO SPACE LIGHT, READING LIGHT CIRCUIT



OPERATION

<Dome light, cargeo space light>

- Battery voltage is always 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 voltage is always 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.

VANITY MIRROR CIRCUIT

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.

TROUBESHOOTING HINTS

1. When any of 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. (Refer to GROUP 42–Back Door Handle and Latch.)

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, cargo space light switch.

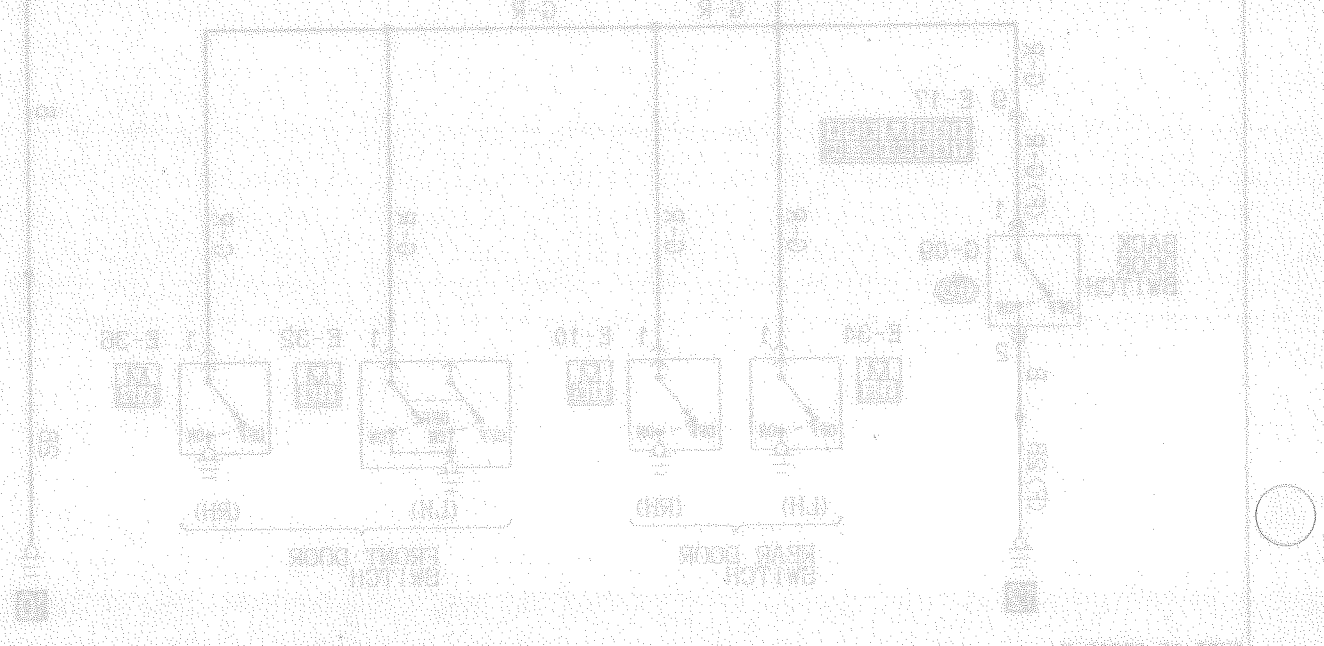
   (2) It does not illuminate even if the switch is at "ON" position.
   - Check the light bulb.
   - Check the dome light switch, cargo space light switch.

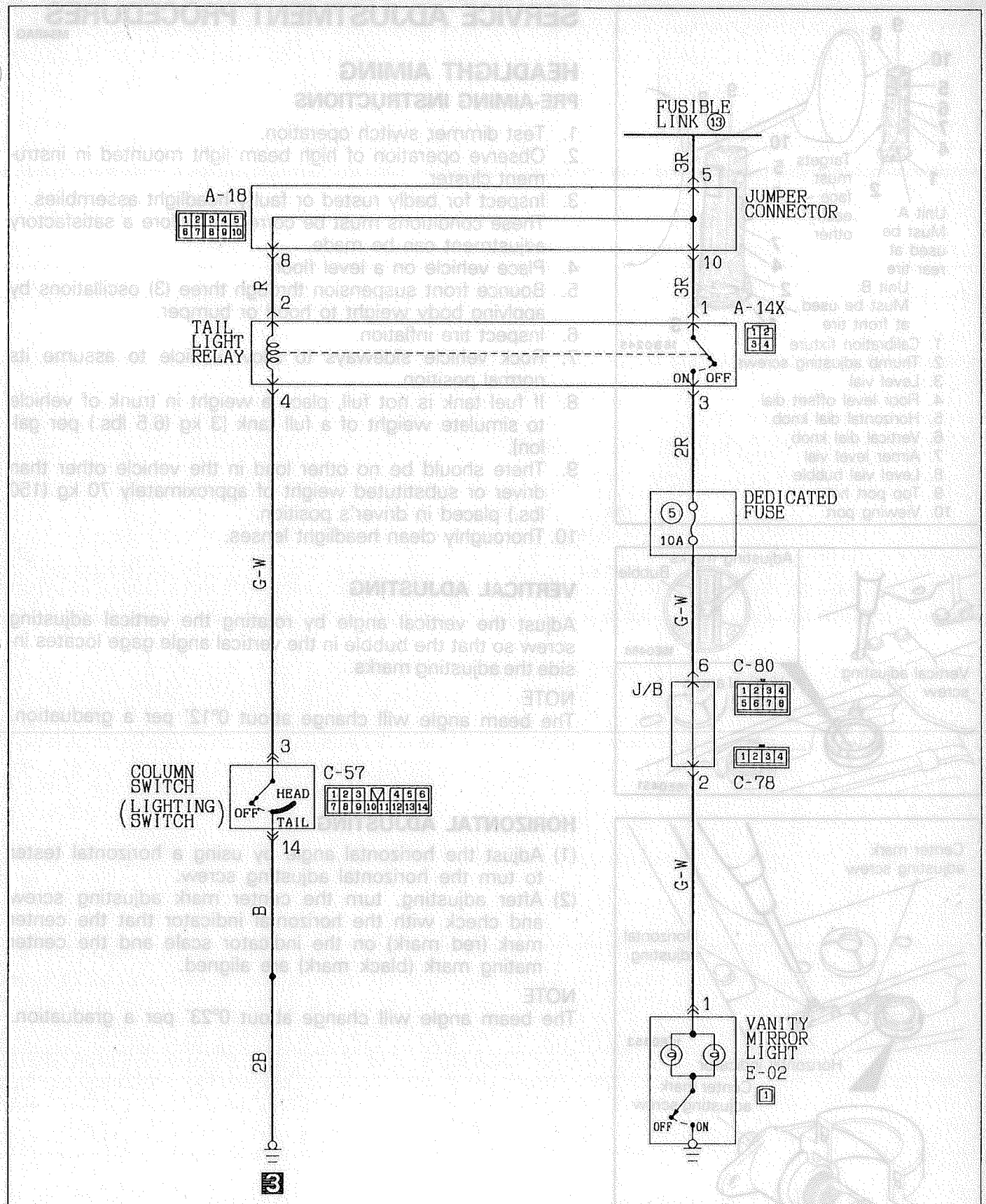
TROUBLESHOOTING HINTS

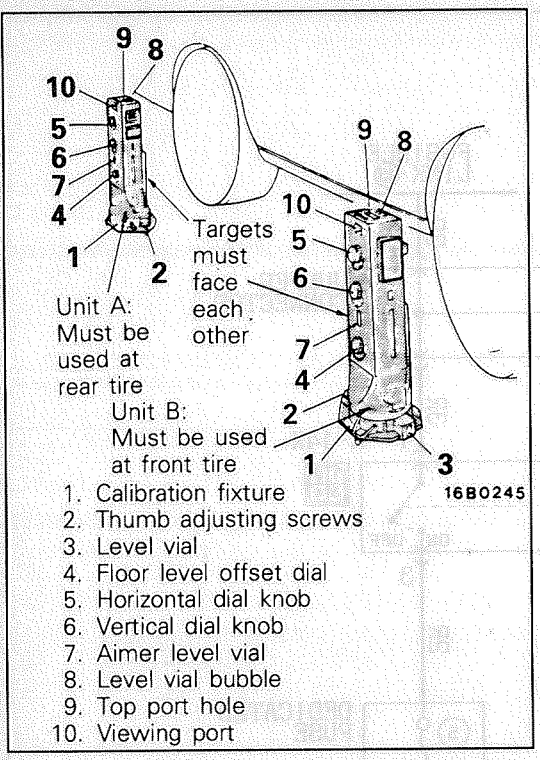
The vanity mirror do not illuminated.

(1) The tail lights illuminates.
- Check the vanity mirror switch.
- Check the vanity mirror light bulb.

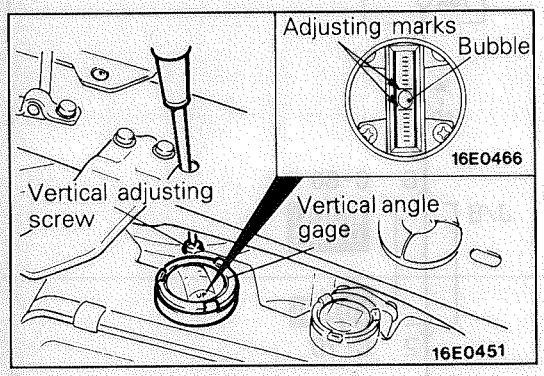
(2) The tail lights also do not illuminate.
- Check the tail light relay. (Refer to P.54-60)
- Check the dedicated fuse No. ⑤.
- Check the lighting switch. (Refer to P.54-63)

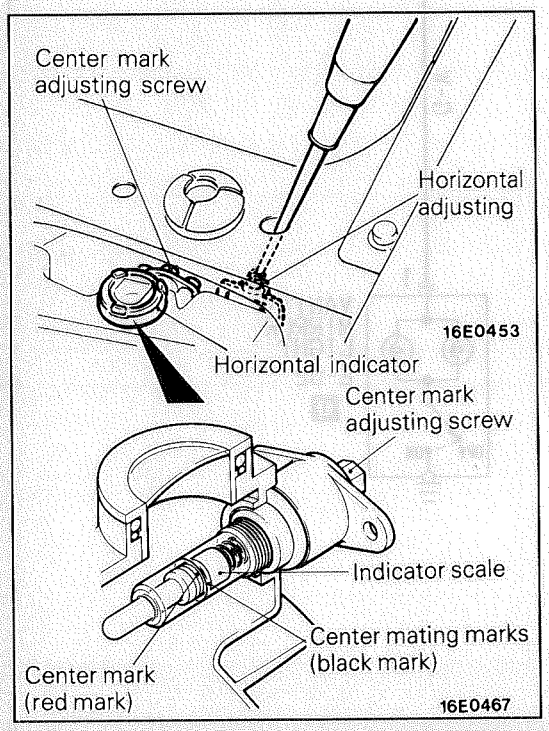



FUSIBLE LINK (13)
3R
5
A-18
JUMPER CONNECTOR
8
10
R
2
3R
1
A-14X
TAIL LIGHT RELAY
ON
OFF
4
3
2R
DEDICATED FUSE
5
10A
G-W
G-W
6
C-80
J/B
2
C-78
3
COLUMN SWITCH
(LIGHTING SWITCH)
C-57
HEAD
OFF
TAIL
14
G-W
B
1
VANITY MIRROR LIGHT
E-02
2B
OFF
ON
KX35-AC-Q0804-N



1. Calibration fixture
2. Thumb adjusting screws
3. Level vial
4. Floor level offset dial
5. Horizontal dial knob
6. Vertical dial knob
7. Aimer level vial
8. Level vial bubble
9. Top port hole
10. Viewing port





SERVICE ADJUSTMENT PROCEDURES

M54IIAG

HEADLIGHT AIMING

PRE-AIMING INSTRUCTIONS

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

VERTICAL ADJUSTING

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

NOTE
The beam angle will change about 0°12' per a graduation.

HORIZONTAL ADJUSTING

(1) Adjust the horizontal angle by using a horizontal tester to turn the horizontal adjusting screw.
(2) After adjusting, turn the center mark adjusting screw and check with the horizontal indicator that the center mark (red mark) on the indicator scale and the center mating mark (black mark) are aligned.

NOTE
The beam angle will change about 0°23' per a graduation.

LUMINOUS INTENSITY MEASUREMENT

Measure the luminous intensity of 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

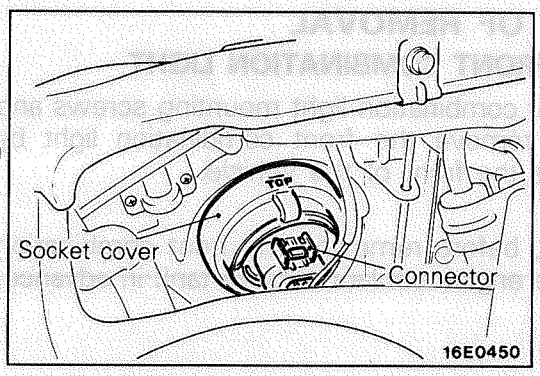
(1) When measuring the luminous intensity of headlight, keep the engine at 2,000 rpm and have the battery charged.

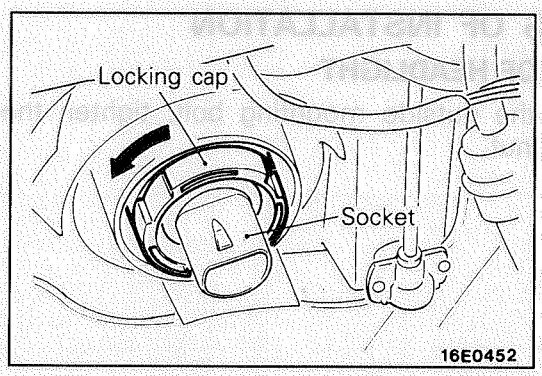
(2) If there are specific regulations for luminous intensity of headlights in the region where the gehicle is operated, make sure that the intensity conforms to the requirements of such regulations.

REPLACEMENT OF REPLACEABLE BULB M54IIGB

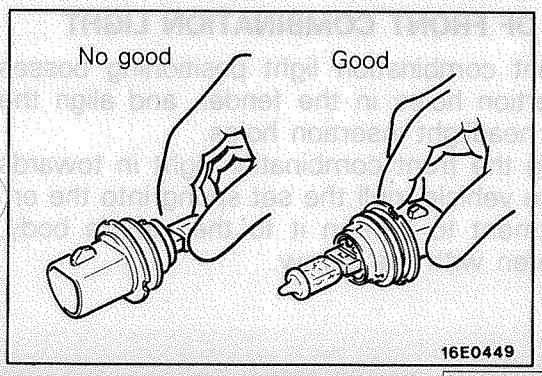
(1) Remove the engine coolant reserve tank. (Left side only)

(2) Disconnect the harness connector, and then pull out the socket cover.





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



Caution

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

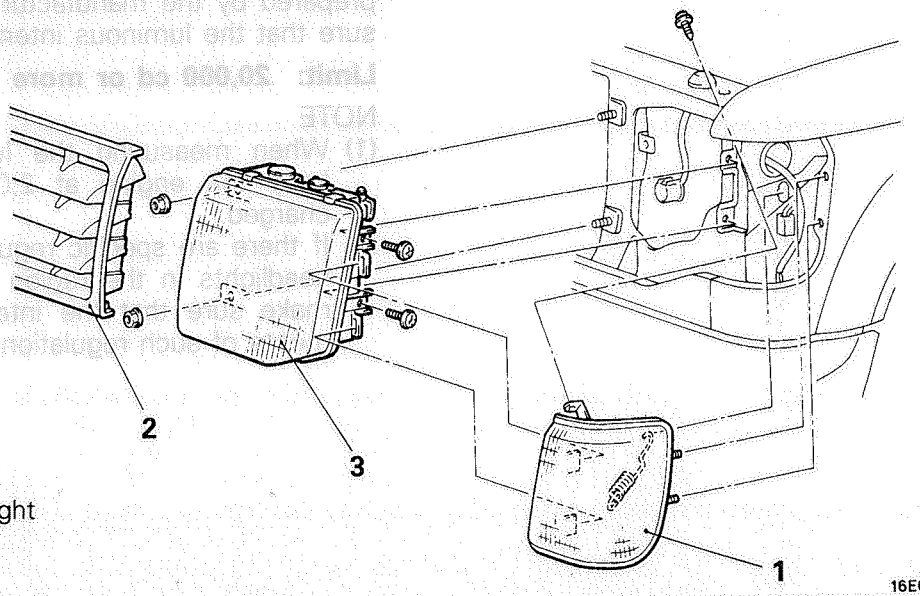
If the glass surface is dirty, be sure to clean it with alcohol, paint thinner, etc., and install it after drying it thoroughly.

(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

M54IJAS

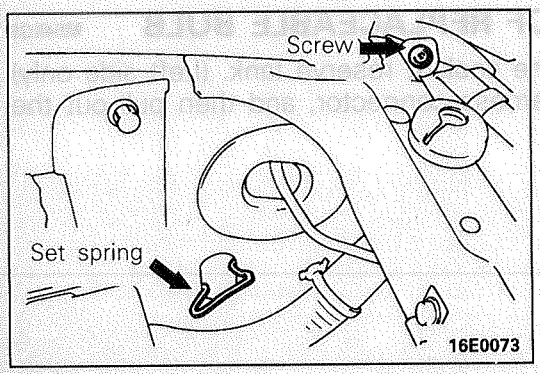
REMOVAL AND INSTALLATION



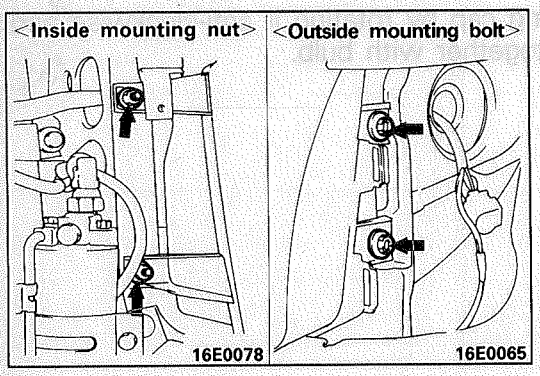
16E0456

Removal steps

1. Front combination light
2. Radiator grille
3. Headlight

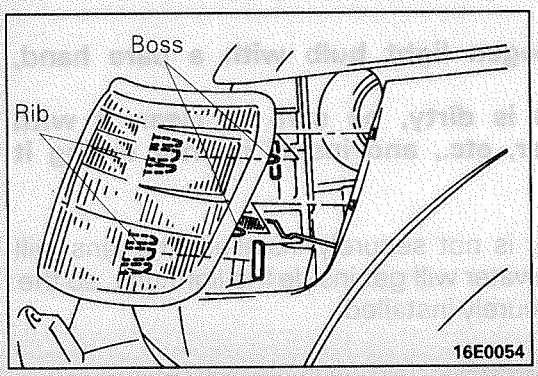


16E0073



16E0078

16E0065



16E0054

SERVICE POINT OF REMOVAL

1. REMOVAL OF FRONT COMBINATION LIGHT

Remove the front combination light mounting screws and set spring, and 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.

SERVICE POINTS OF INSTALLATION

3. INSTALLATION OF HEADLIGHT

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

1. INSTALLATION OF FRONT COMBINATION LIGHT

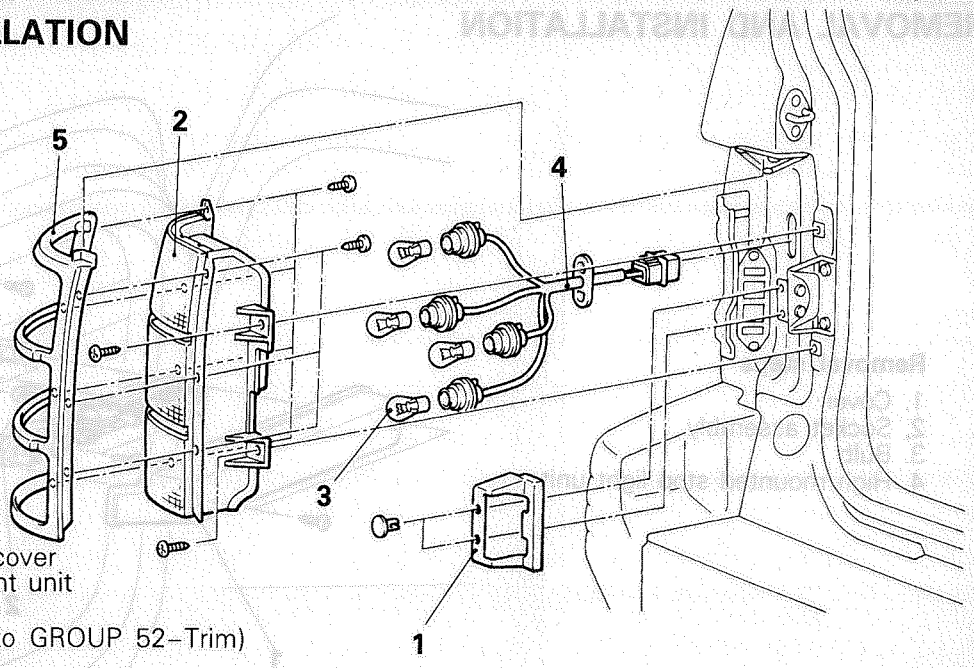
(1) Align the front combination light positioning bosses with the insertion holes in the fender, and align the ribs with the headlight insertion holes.
(2) While pushing the front combination light in towards the rear of the vehicle, pull the set spring into the engine compartment to tighten it to the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

TSB Revision

REAR COMBINATION LIGHT

M54IMAM

REMOVAL AND INSTALLATION



Removal steps

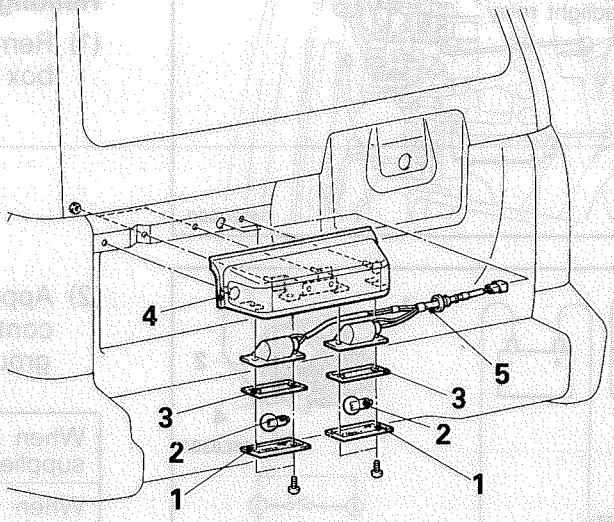
1. Back door bumper cover
2. Rear combination light unit
3. Bulb
   - Quarter trim (Refer to GROUP 52–Trim)
4. Socket assembly
5. Rear combination light bezel

16E0103

LICENSE PLATE LIGHT

M54IVAD

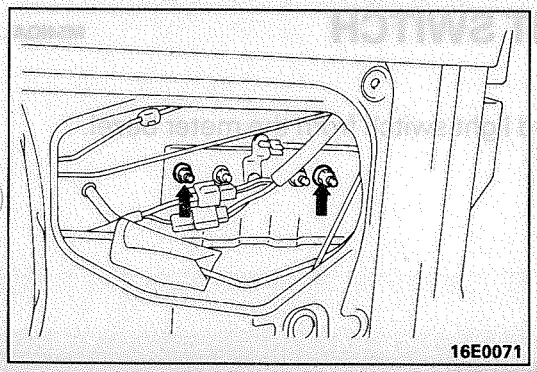
REMOVAL AND INSTALLATION



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

16E0101



16E0071

SERVICE POINT OF REMOVAL

4. REMOVAL OF LICENSE PLATE LIGHT GARNISH

(1) Take off the waterproof film and remove the license plate light garnish mounting nuts.

(2) Remove the clips with a (–) screwdriver, and remove the license plate light garnish together with the socket assembly.

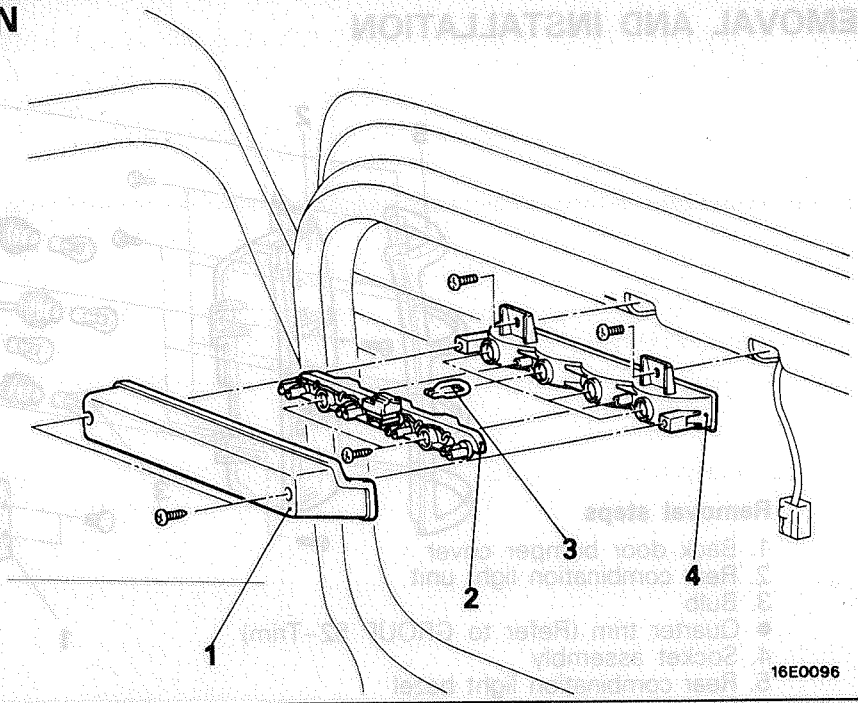
HIGH MOUNTED STOP LIGHT

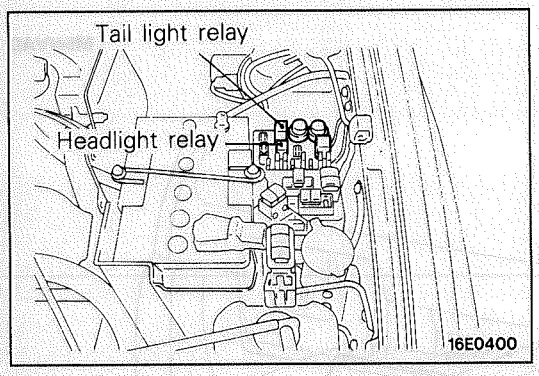
M54IKAO

REMOVAL AND INSTALLATION

Removal steps

1. Cover
2. Socket assembly
3. Bulb
4. High mounted stop light unit





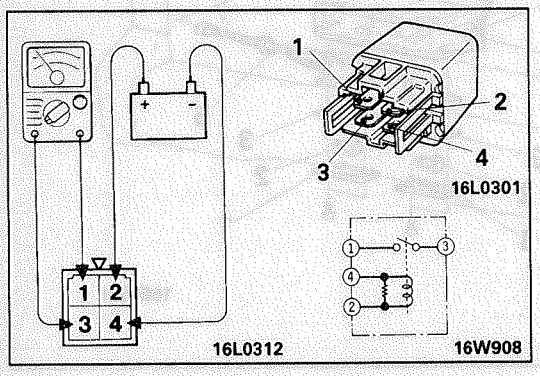
RELAY

M54ISAK

INSPECTION

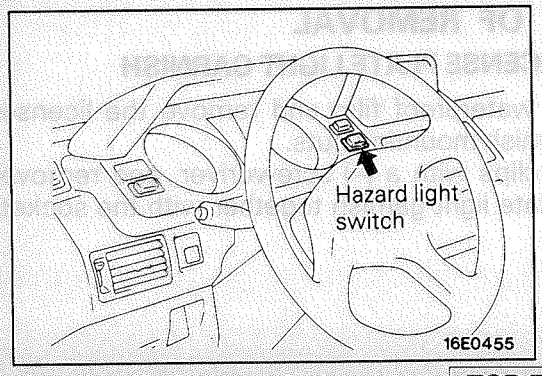
Headlight Relay, Tail Light Relay

(1) Remove the headlight relay or tail light relay from the relay box in the engine compartment.



(2) Apply battery voltage to terminal (2), and check the 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

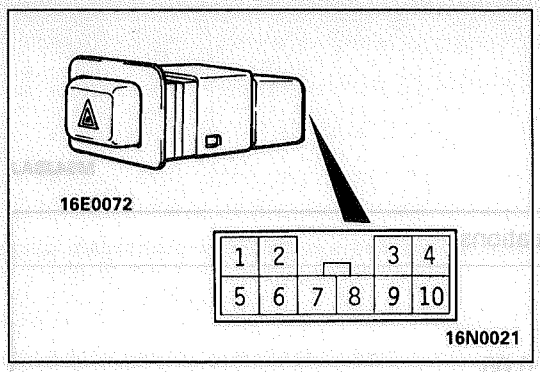


HAZARD LIGHT SWITCH

M54IQAL

INSPECTION

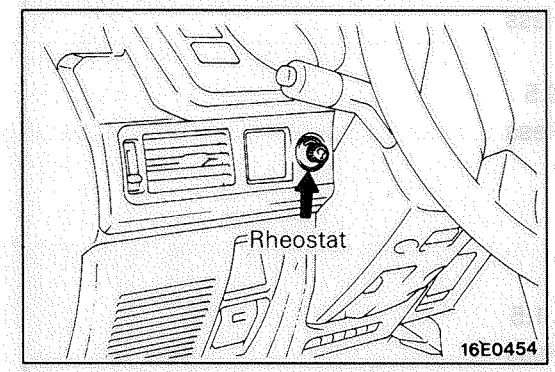
(1) Remove the hazard light switch from the meter bezel.



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

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

NOTE
○–○ indicates that there is continuity between the terminals.

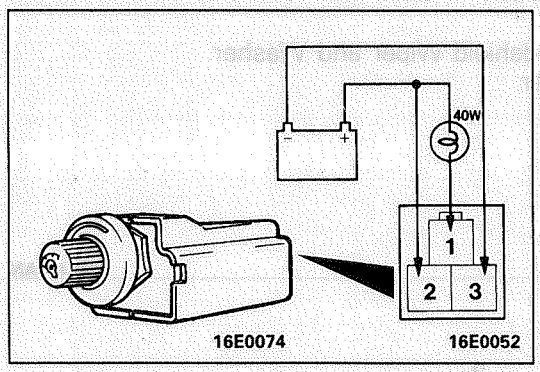


RHEOSTAT

M54IRAN

INSPECTION

(1) Instrument under cover. (Refer to GROUP 52 – Instrument Panel.)
(2) Remove the rheostat from the instrument panel.



(3) Connect the battery and the test light (40W) 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

SPECIFICATION

GENERAL SPECIFICATIONS

M54JBAJ

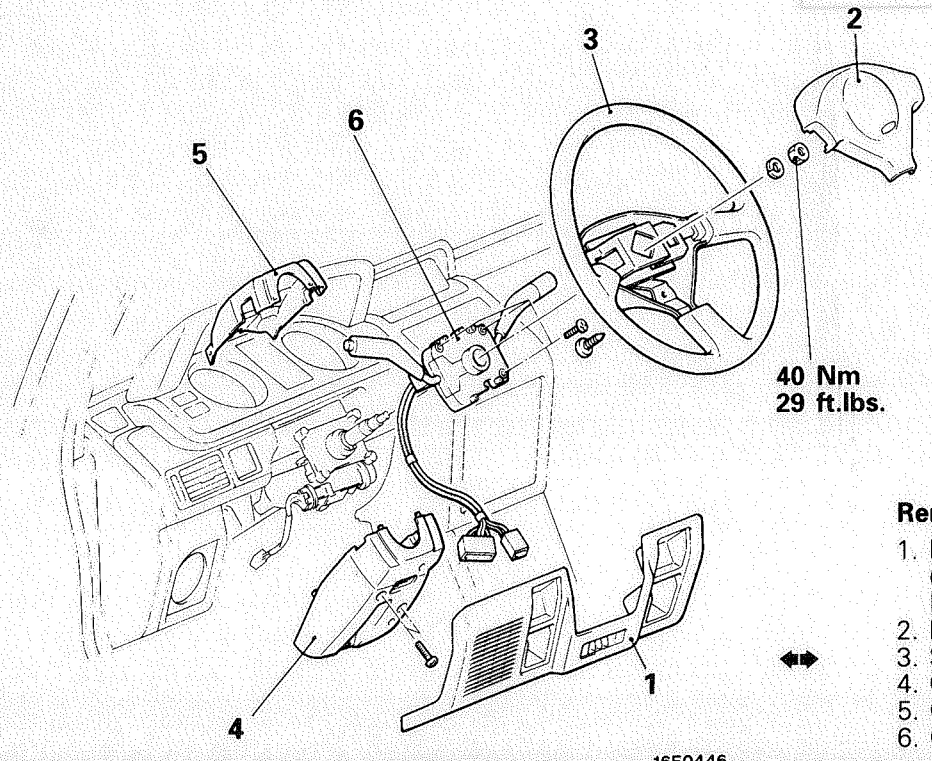
Items		Specifications
Column switch		
Lighting switch		
Rated load	A	0.22 ± 0.05
Voltage drop	V	0.2 or less
Turn-signal switch		
Rated load	A	6.6 ± 0.5
Voltage drop	V	0.2 or less
Dimmer/passing switch		
Rated load	A	
High beam		12
Low beam		10.8
Passing		22.8 ± 1.5
Voltage drop	V	0.2 or less

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

REMOVAL AND INSTALLATION

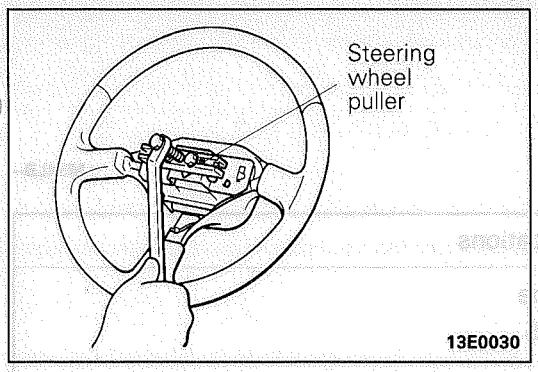
M54JJAN



16E0446

Removal steps

1. Instrument under cover (Refer to GROUP 52–Instrument Panel)
2. Horn pad
3. Steering wheel
4. Column cover lower
5. Column cover upper
6. Column switch

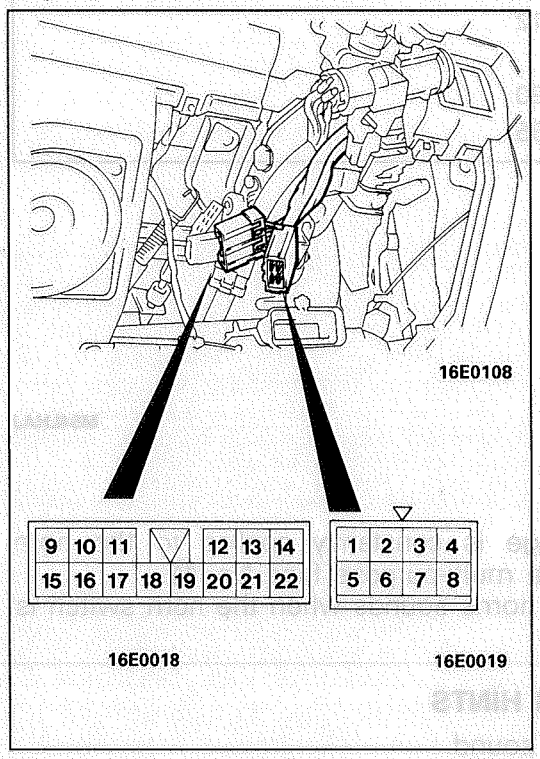


SERVICE POINT OF REMOVAL

3. REMOVAL OF STEERING WHEEL

Remove the steering wheel by using a steering wheel puller.

Caution
Do not hammer on the steering wheel to remove it; doing so may damage the collapsible mechanism.



INSPECTION

(1) Remove the instrument under cover. (Refer to GROUP 52 – Instrument Panel.)
(2) Remove the column cover lower.
(3) Disconnect the connector at the column switch.
(4) Operate the switch, and check the continuity between the terminals.

Switch position		Terminal 1	5	6	11	14	17	18	19	20	22
Lighting switch	OFF										
	TAIL				○						○
	HEAD				○	○					○
Dimmer switch	LOW BEAM	○		○							
	HIGH BEAM		○	○							
Passing switch	P_1	○	○	○		○					
	P_2		○	○		○					
Turn-signal switch	RH							○		○	
	OFF										
	LH							○			

NOTE
(1) ○—○ indicates that there is continuity between the terminals.
(2) P_1 represents the passing operation when the dimmer switch is in the "LOW BEAM" position, and P_2 represents the operation when it is in the "HIGH BEAM" position.
(3) For inspection of the windshield wiper and washer switch, refer to GROUP 51–Windshield Wiper and Washer.
(4) For inspection of the headlight washer switch, refer to GROUP 51–Headlight Washer.

HORN

SPECIFICATION

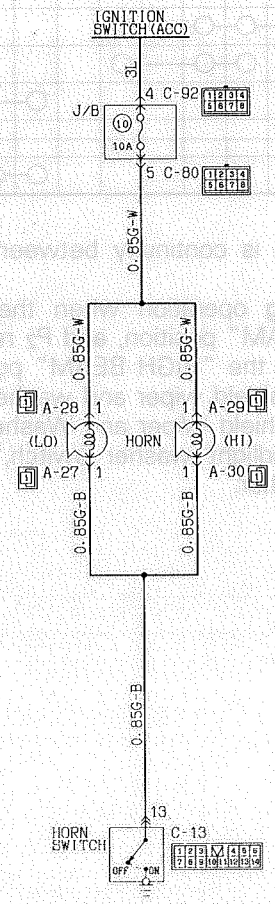
GENERAL SPECIFICATIONS

M54LB--

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

M54LHAJ



OPERATION

- The battery voltage is constantly applied to the horn switch through the multi-purpose fuse No. ⑩.
- The (LO) and (HI) horns sounds when the horn switch is turned to "ON".

TROUBLESHOOTING HINTS

1. The horns do not sound.
   - Check the horn switch.
   - Check the ground.
2. The either side hone only sounds.
   - Check the horn.

CIGARETTE LIGHTER

SPECIFICATION

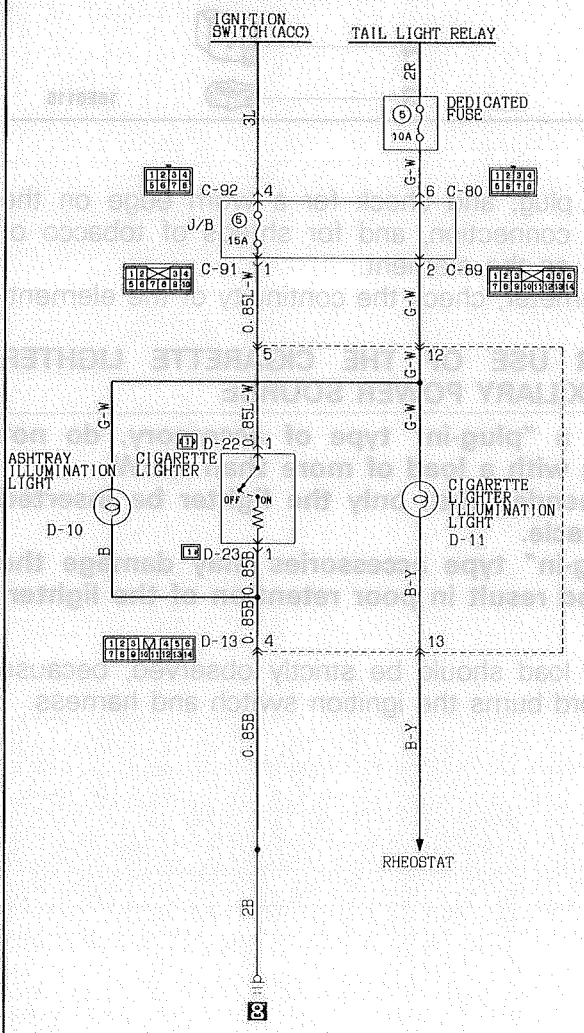
GENERAL SPECIFICATIONS

M54MB--

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

TROUBLESHOOTING

M54MHCE



OPERATION

- When the plug is inserted into the socket, turn the cigarette lighter to "ON" with plug still inserted.
- 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 does not illuminate.
   - Check the cigarette lighter. (Refer to P.54-66)
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.54-61)

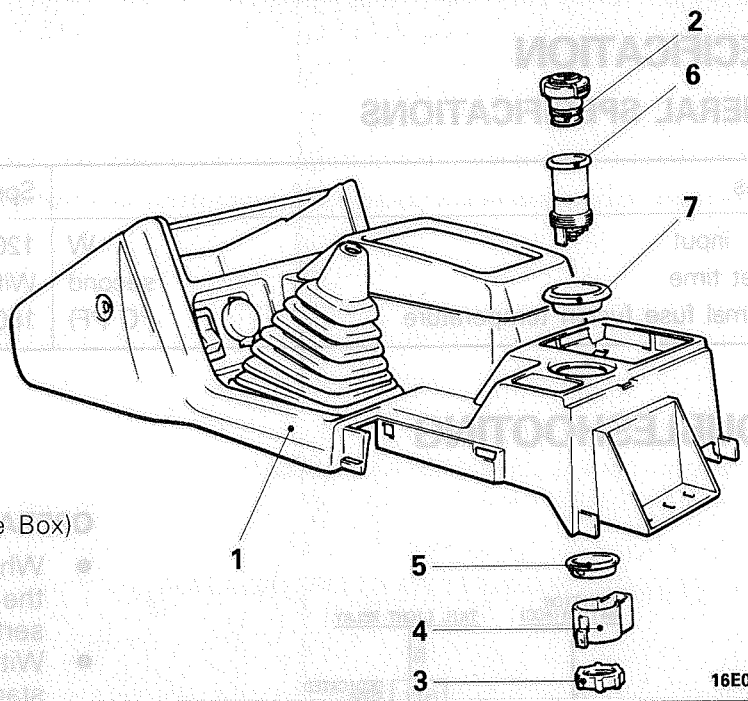
   (2) The tail lights also do not illuminate.
   - Check the dedicated fuse No. ⑤.
   - Check the tail light relay. (Refer to P.54-60)
   - Check the lighting switch. (Refer to P.54-63)
3. The ashtray illumination light does not illuminate.
   (1) The tail lights illuminate.
   - Check the bulb.

   (2) The tail lights also do not illuminate.
   - Refer to the item 2, step (2).

CIGARETTE LIGHTER

REMOVAL AND INSTALLATION

M54MJAP



Removal steps

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

INSPECTION

- 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.
- Using an ohmmeter, check the continuity of the element.

CAUTIONS FOR USE OF THE CIGARETTE LIGHTER SOCKET AS AUXILIARY POWER SOURCE

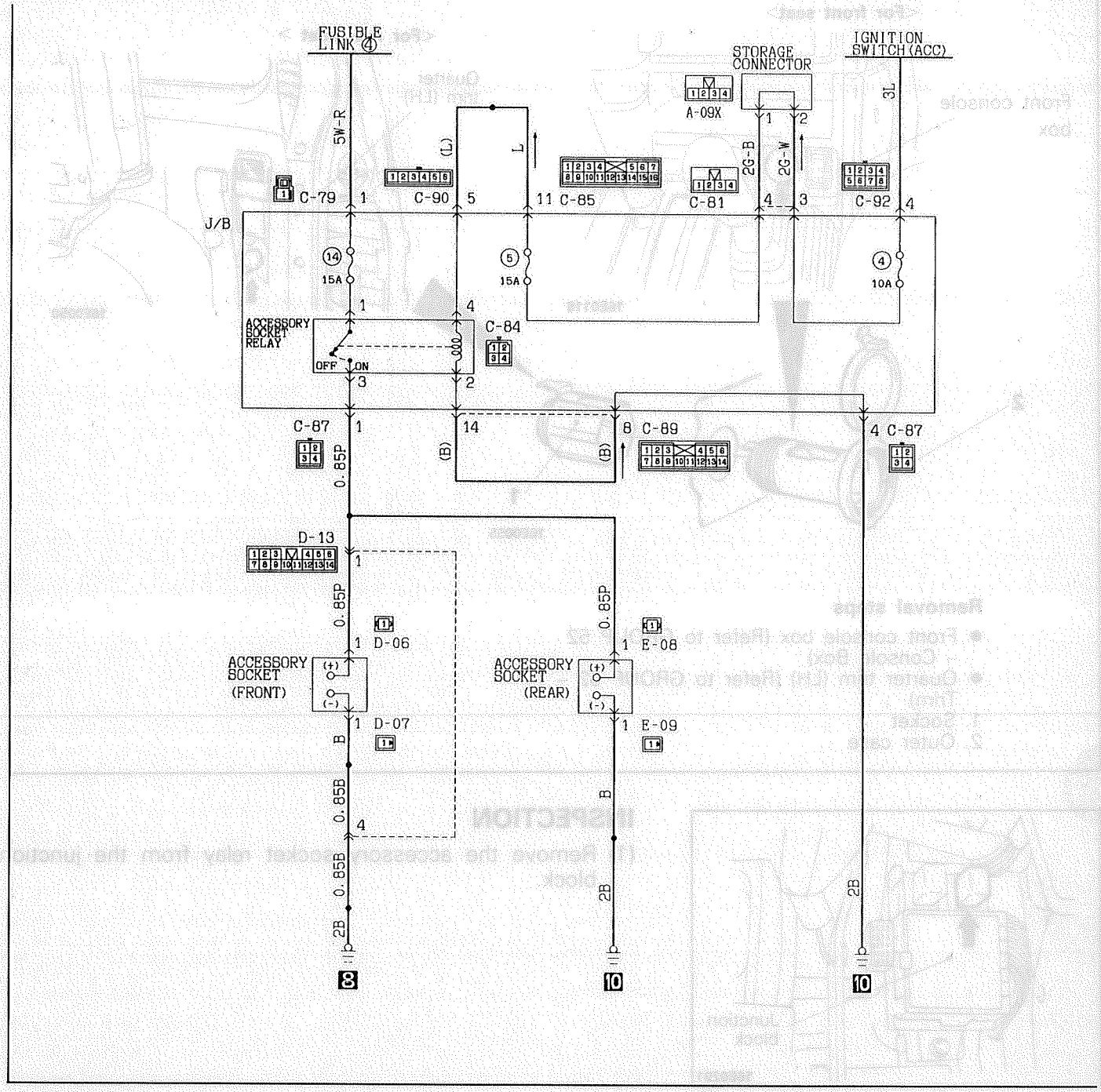
1. **When using a "plug-in" type of accessory, do not use anything with a load of more than 120W.**
2. **It is recommended that only the lighter be inserted in the receptacle.**
   Use of "plug-in" type accessories may damage the receptacle and result in poor retention of the lighter.

   NOTE
   The specified load should be strictly observed, because overloaded cord burns the ignition switch and harness.

ACCESSORY SOCKET

TROUBLESHOOTING

M54MHCF



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.

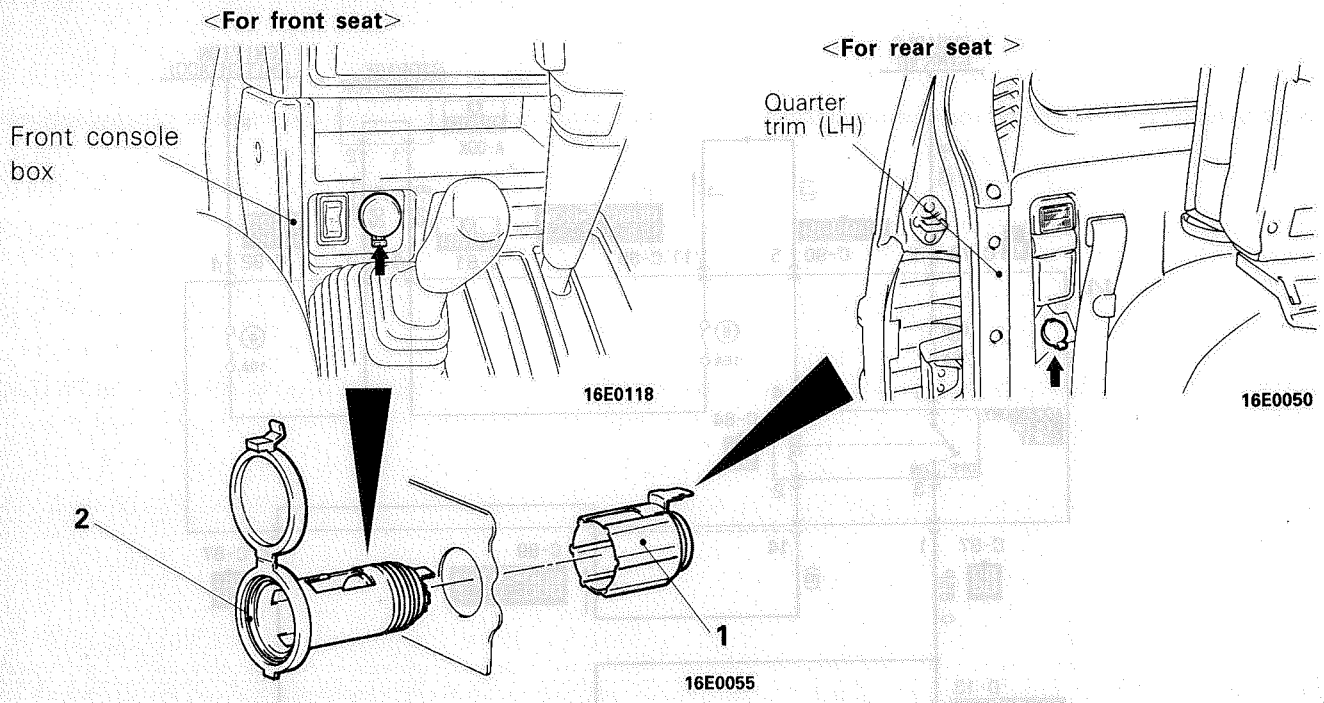
TROUBLESHOOTING HINTS

1. The inspection light or accessories cannot be used.
   - Check the accessory socket relay. (Refer to P.54-68)
   - Check the multi-purpose fuse No. ⑭.

ACCESSORY SOCKET

M54MJAQ

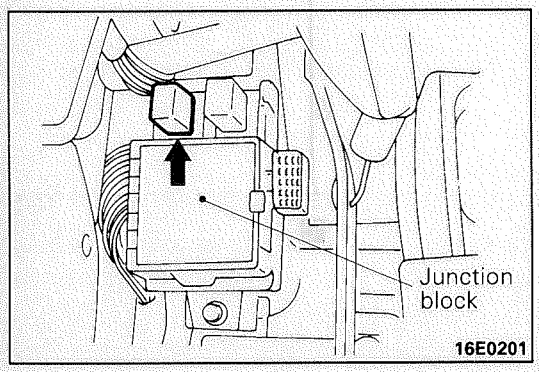
REMOVAL AND INSTALLATION



Removal steps

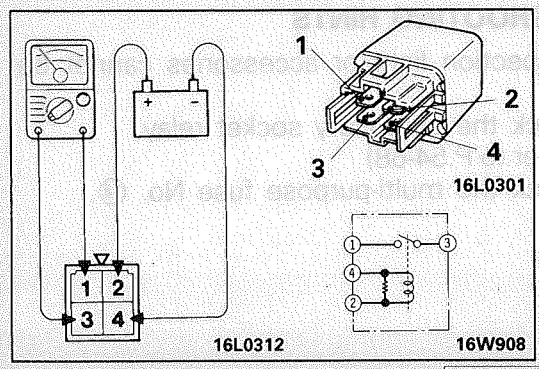
- Front console box (Refer to GROUP 52 – Console Box)
- Quarter trim (LH) (Refer to GROUP 52 – Trim)

1. Socket
2. Outer case



INSPECTION

(1) Remove the accessory socket relay from the junction block.



(2) Apply battery voltage to terminal (2), and check the 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

TSB Revision

CLOCK

SPECIFICATION

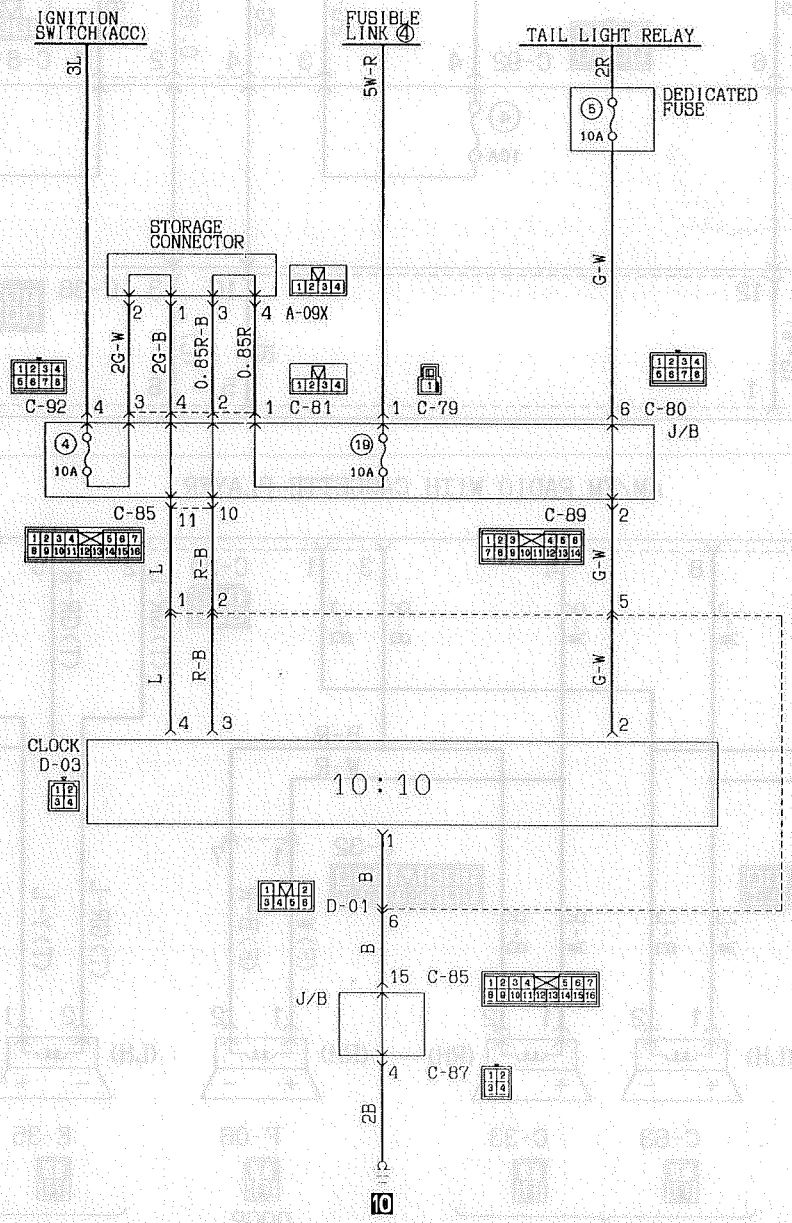
GENERAL SPECIFICATIONS

M54MB--

Item	Specification
Type	Crystal oscillator
Display method	Fluorescent digital display
Standard error (seconds/day)	±2

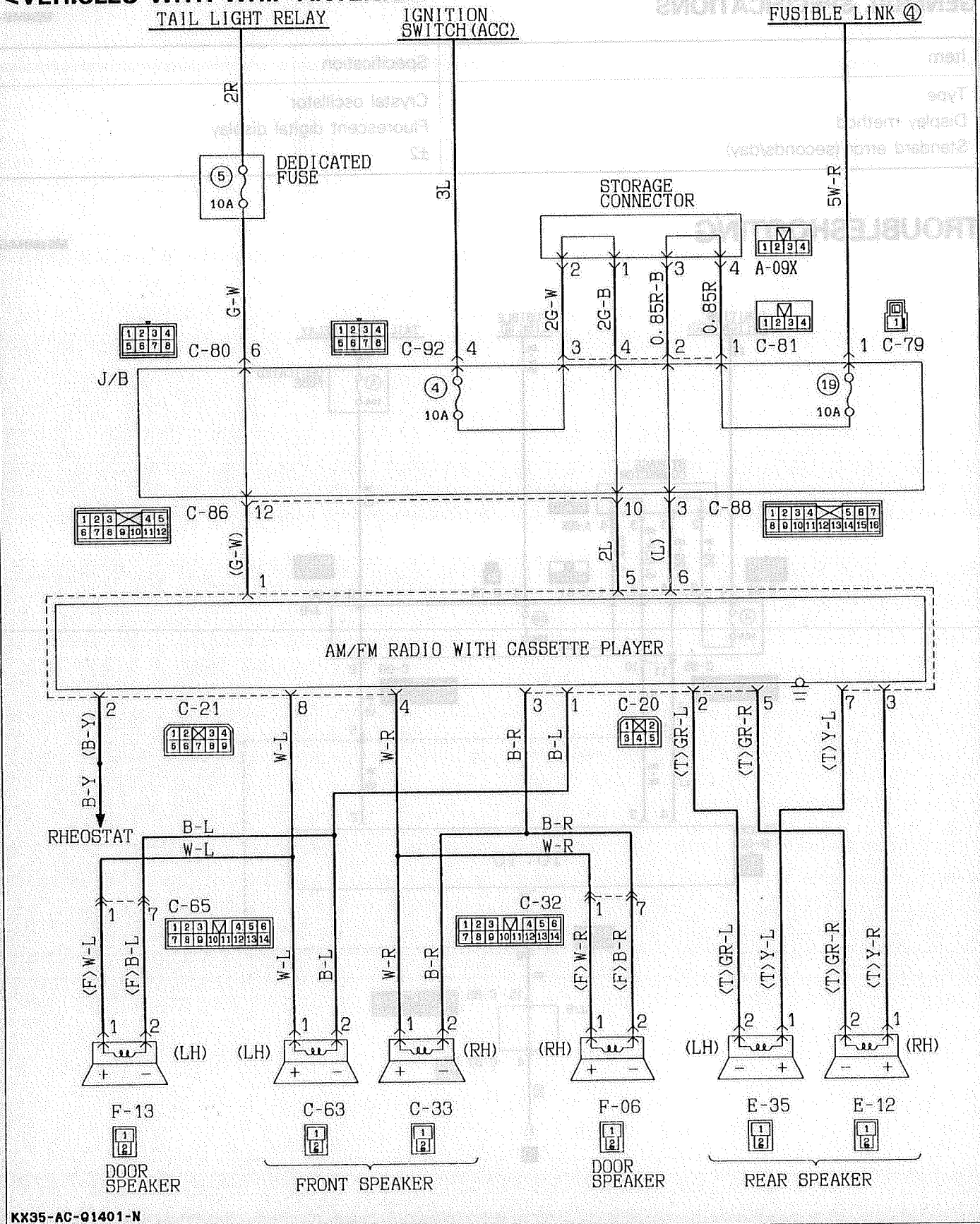
TROUBLESHOOTING

M54MHAG



AUDIO SYSTEM
TROUBLESHOOTING
<VEHICLES WITH WHIP ANTENNA>

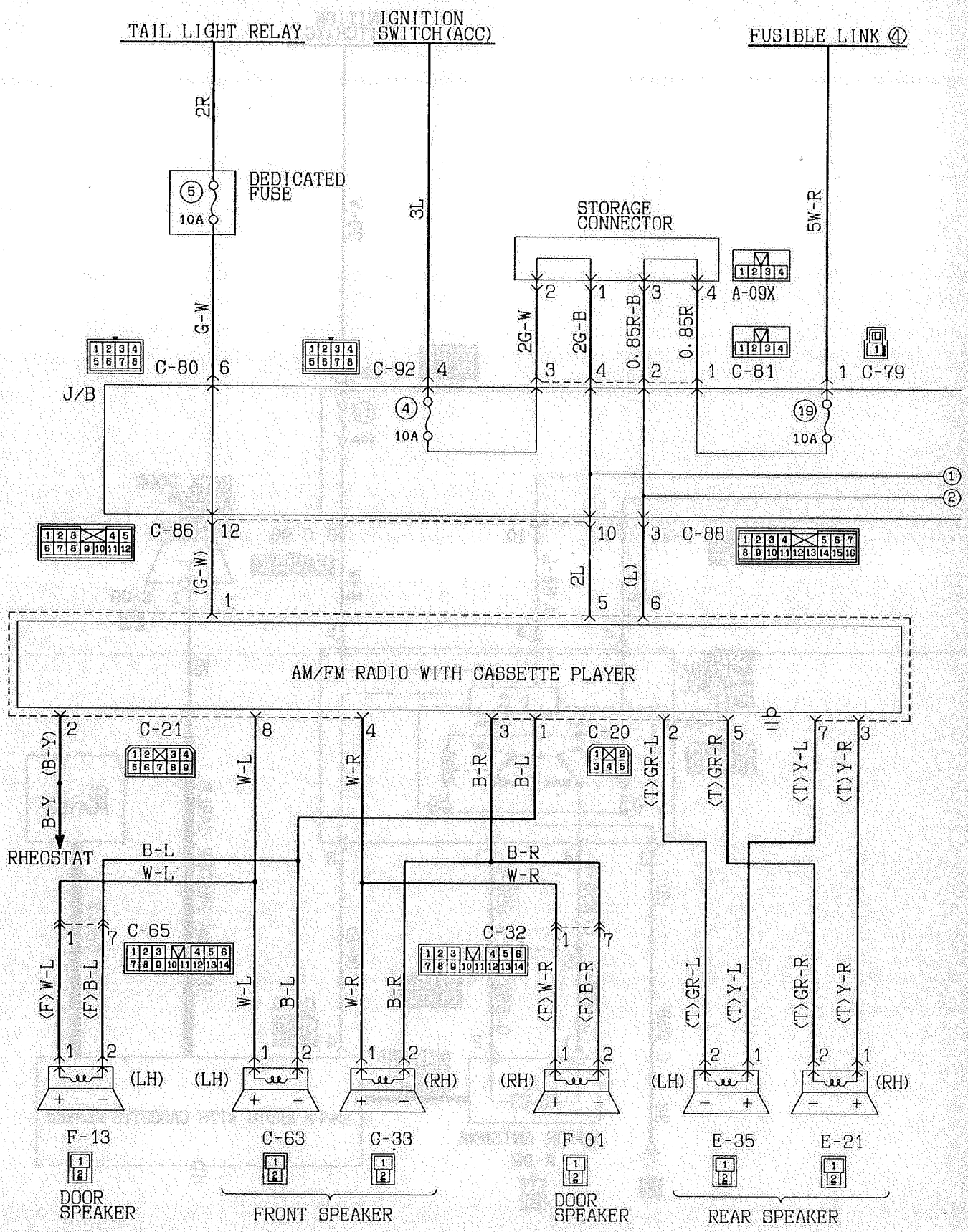
M54NHAS



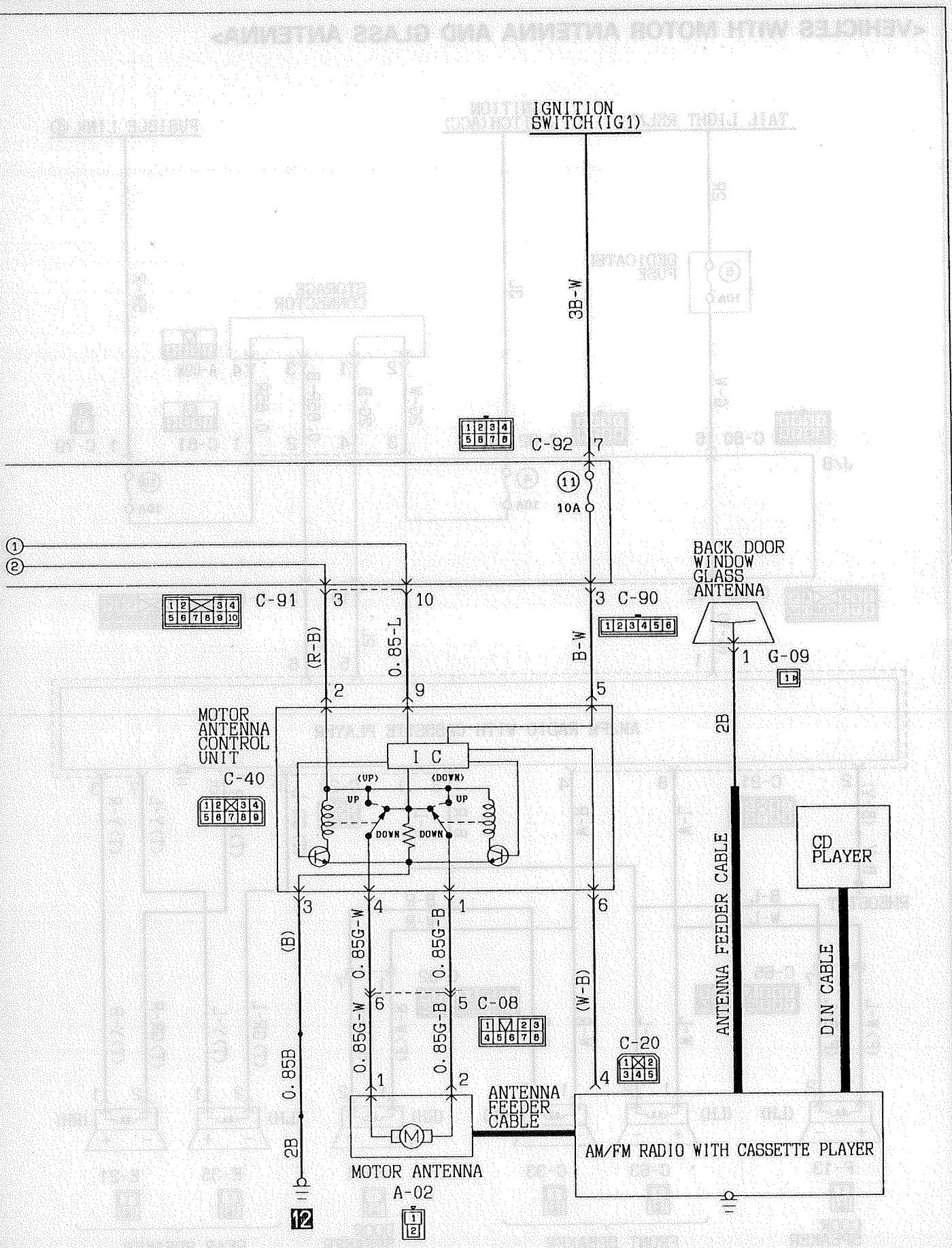
KX35-AC-Q1401-N

TSB Revision

<VEHICLES WITH MOTOR ANTENNA AND GLASS ANTENNA>



KX35-AC-Q1402-N


IGNITION SWITCH(IG1)
3B-W
C-92
7
11
10A
1
2
C-91
3
10
3 C-90
(R-B)
0.85-L
B-W
2
9
5
BACK DOOR WINDOW GLASS ANTENNA
1 G-09
MOTOR ANTENNA CONTROL UNIT
C-40
I C
(UP)
(DOWN)
UP
UP
DOWN
DOWN
2B
CD PLAYER
ANTENNA FEEDER CABLE
DIN CABLE
3
4
1
6
(B)
0.85G-W
0.85G-B
(W-B)
6
5 C-08
0.85G-W
0.85G-B
C-20
0.85B
1
2
4
ANTENNA FEEDER CABLE
2B
MOTOR ANTENNA
A-02
AM/FM RADIO WITH CASSETTE PLAYER
12

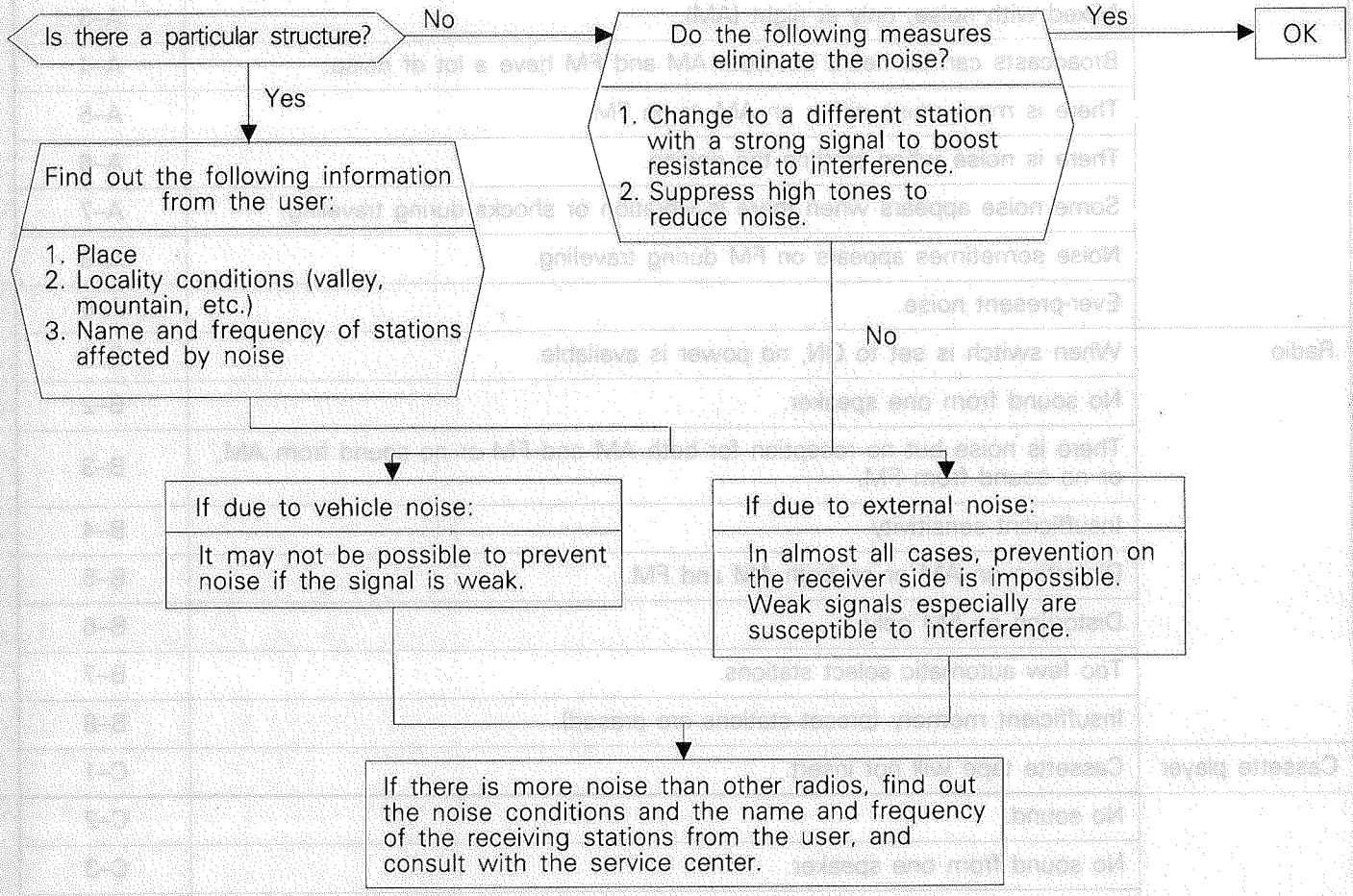
TROUBLESHOOTING CHART

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 more 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	When switch is set to ON, no power is available.	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
Cassette player	Cassette tape will not insert.	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
	Faulty auto reverse.	C–8
	Tape gets caught in mechanism.	C–9
CD player	CD will not be accepted.	D–1
	No sound.	D–2
	CD sound skips.	D–3
	Sound quality is poor.	D–4
	CD will not 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).



TSB Revision

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

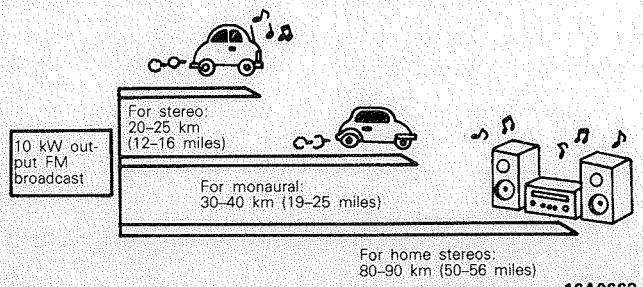
No ↓

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
About 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.

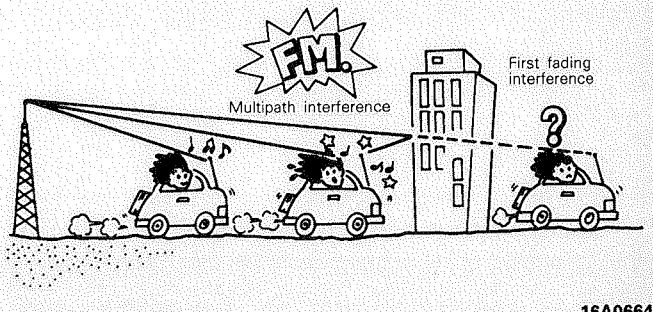
1. The signal becomes weak as the distance from the station's transmission antenna increases. Although this may vary according to the signal strength of the transmitting station and intervening geographical formations or buildings, the area of good reception is approx. 20–25 km (12–16 miles) for stereo 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

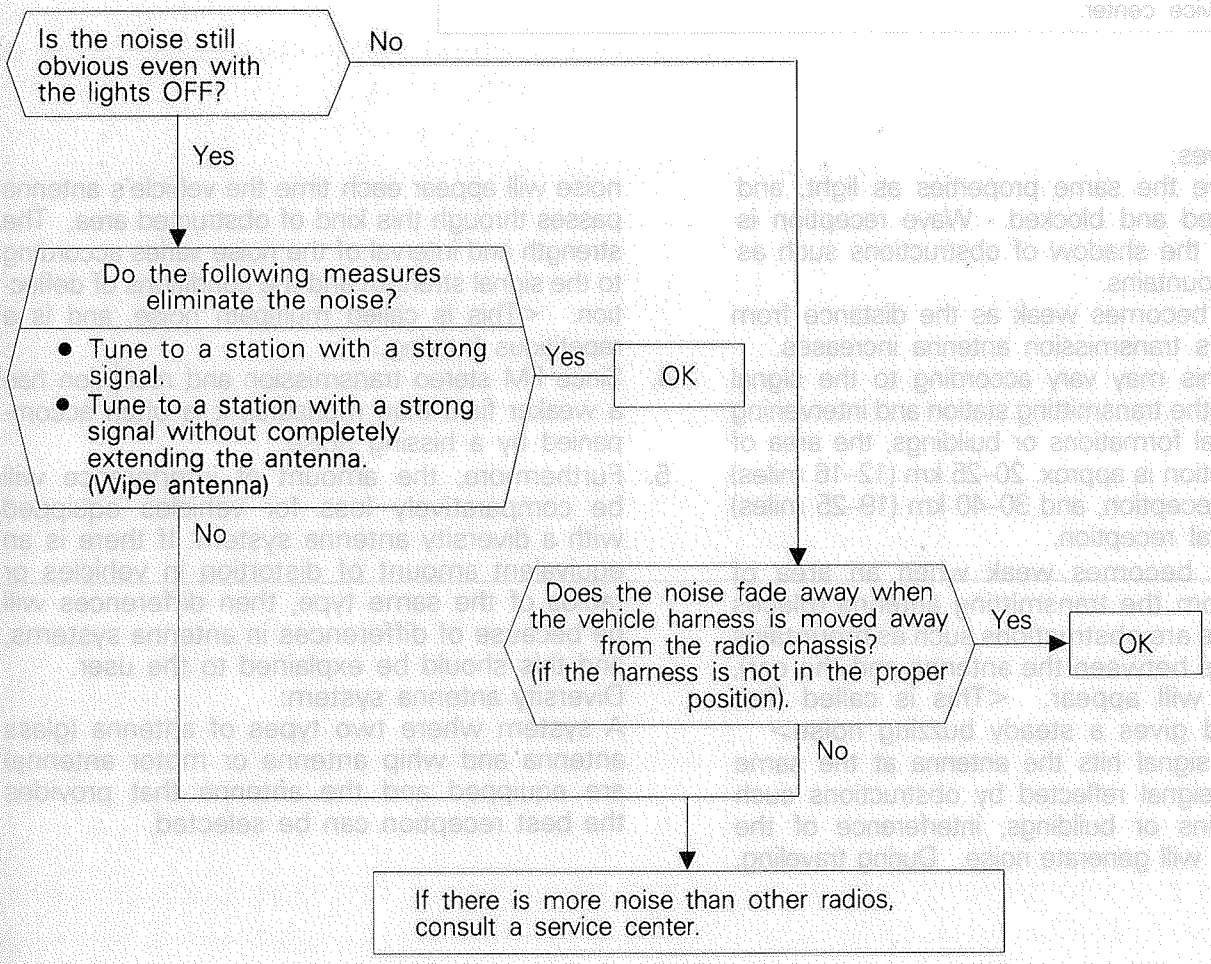


16A0664

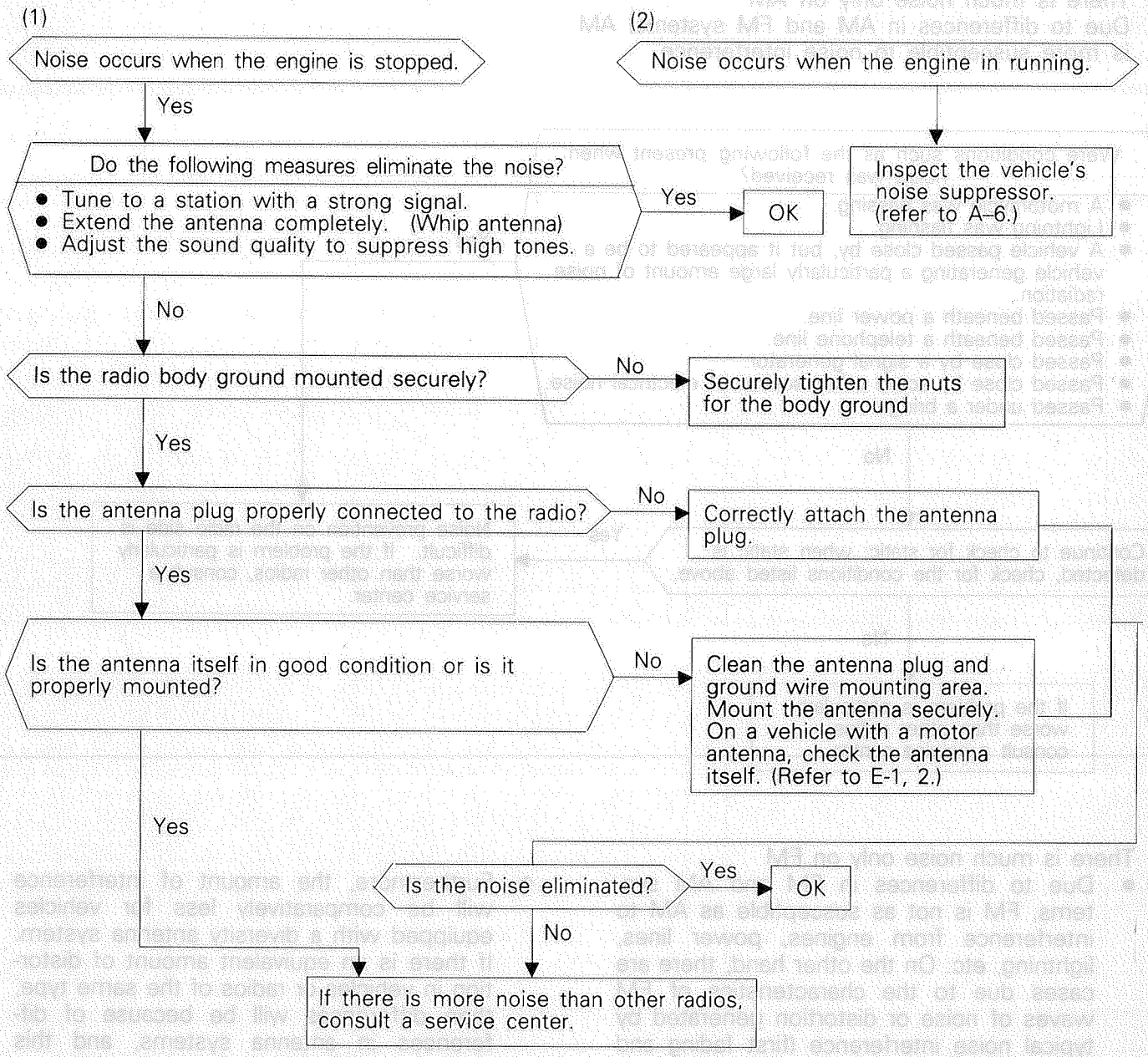
A–3	Mixed with noise, only at night (AM).

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: Alternator noise may be a cause.



A–4 Broadcast can be heard but both AM and FM have a lot of noise.

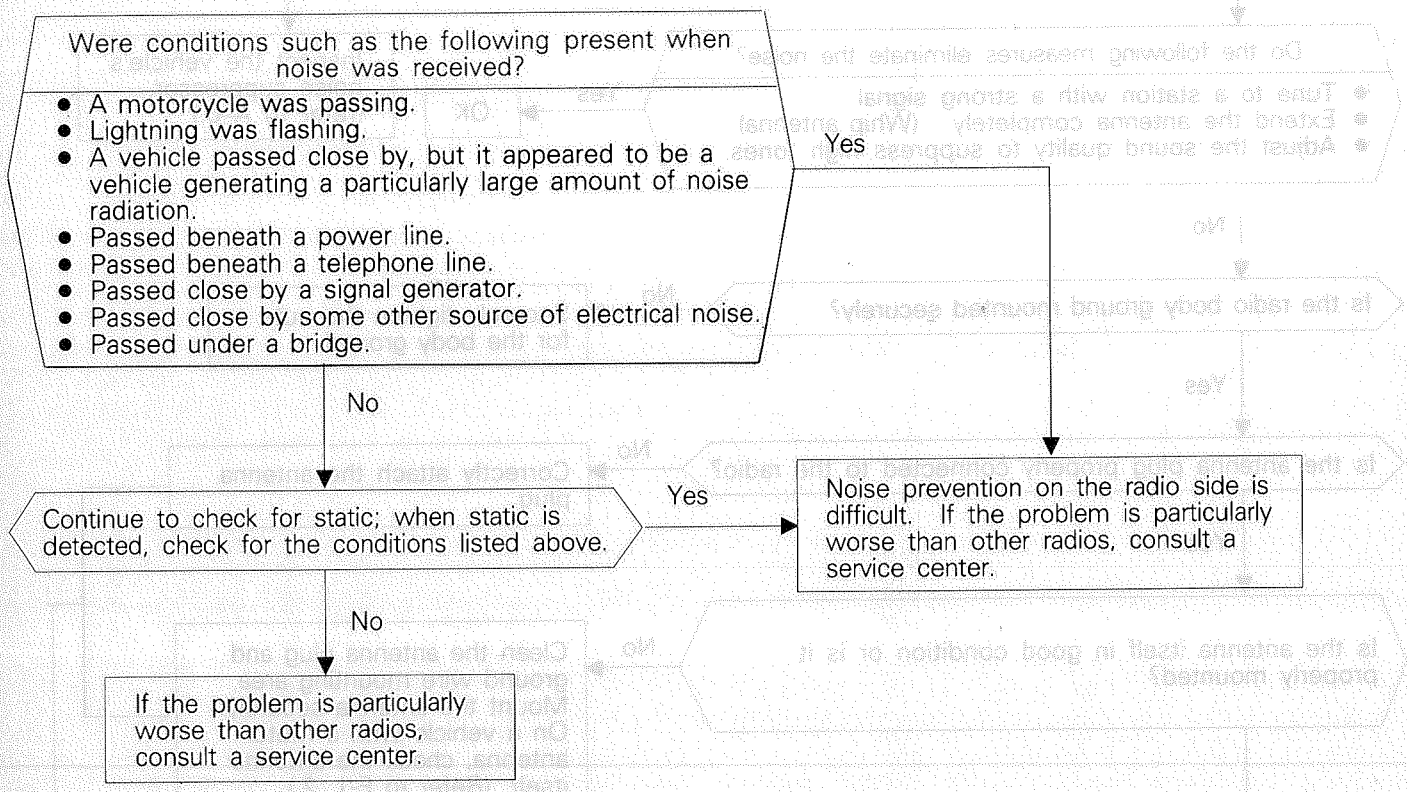


NOTE

- About 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, there are cases due to the characteristics of FM waves of noise or distortion 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.



2. There is much noise only on FM
   - Due to differences in FM and AM systems, FM is not as susceptible as AM to interference from engines, power lines, lightning, etc. On the other hand, there are cases due to the characteristics of FM waves of noise or distortion 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 or replacement	
			Noise-preventive part	Mounting place (next page)
AM, FM: Ignition noise (Popping, Snapping, Cracking, Buzzing)	• Increasing the engine speed causing the popping sound to speed up, and volume decreases. • Disappears when the ignition switch is turned to ACC.	• Mainly due to the spark plugs. • Due to the engine noise.	• Noise filter • Ground cable • Noise capacitor	1 2, 3 1
Other electrical components	–	Noise may appear as electrical components become older.	Repair or replace electrical components.	
Static electricity (Cracking, Crinkling)	• Disappears when the vehicle is completely stopped. • Severe when the clutch is engaged.	Occurs when parts or wiring move for some reason and contact metal parts of the body.	Return parts or wiring to their proper position.	
	• Various noises are produced depending on the body part of the vehicle.	Due to detachment from the body 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.	

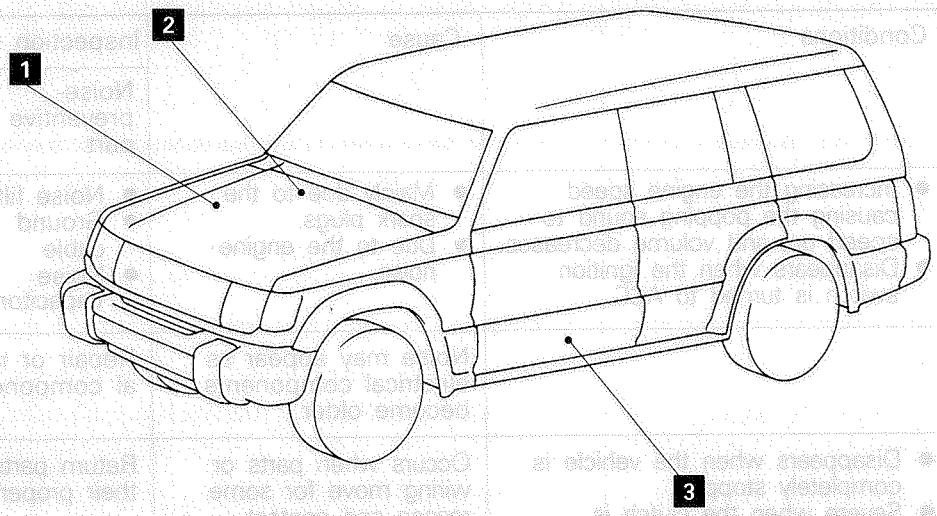
Caution

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 due this may result in misdiagnosis due to 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 D.C. current, but as the number of waves increases when it passes A.C. current, impedance (resistance against A.C.) 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 suppressed noise by grounding the noise component (A.C. or pulse signal) to the body of the vehicle.
2. Coil
   The coil passes D.C. current, but impedance rises as the number of waves increases relative to the A.C. 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 SUPPERSSOR MOUNTING LOCATION



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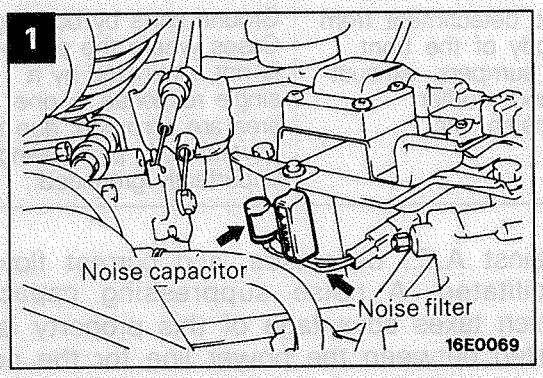
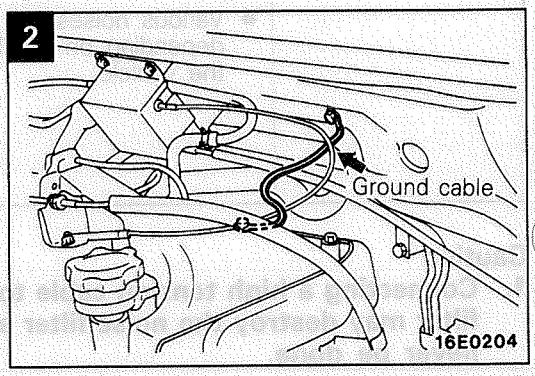
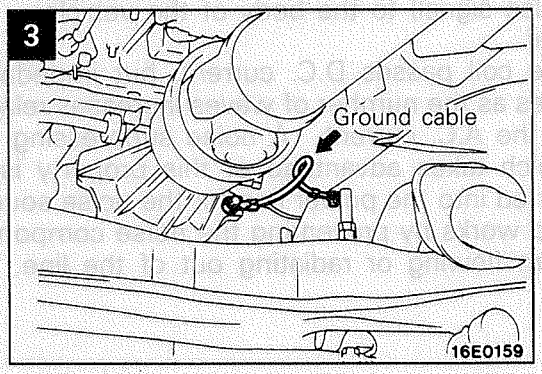
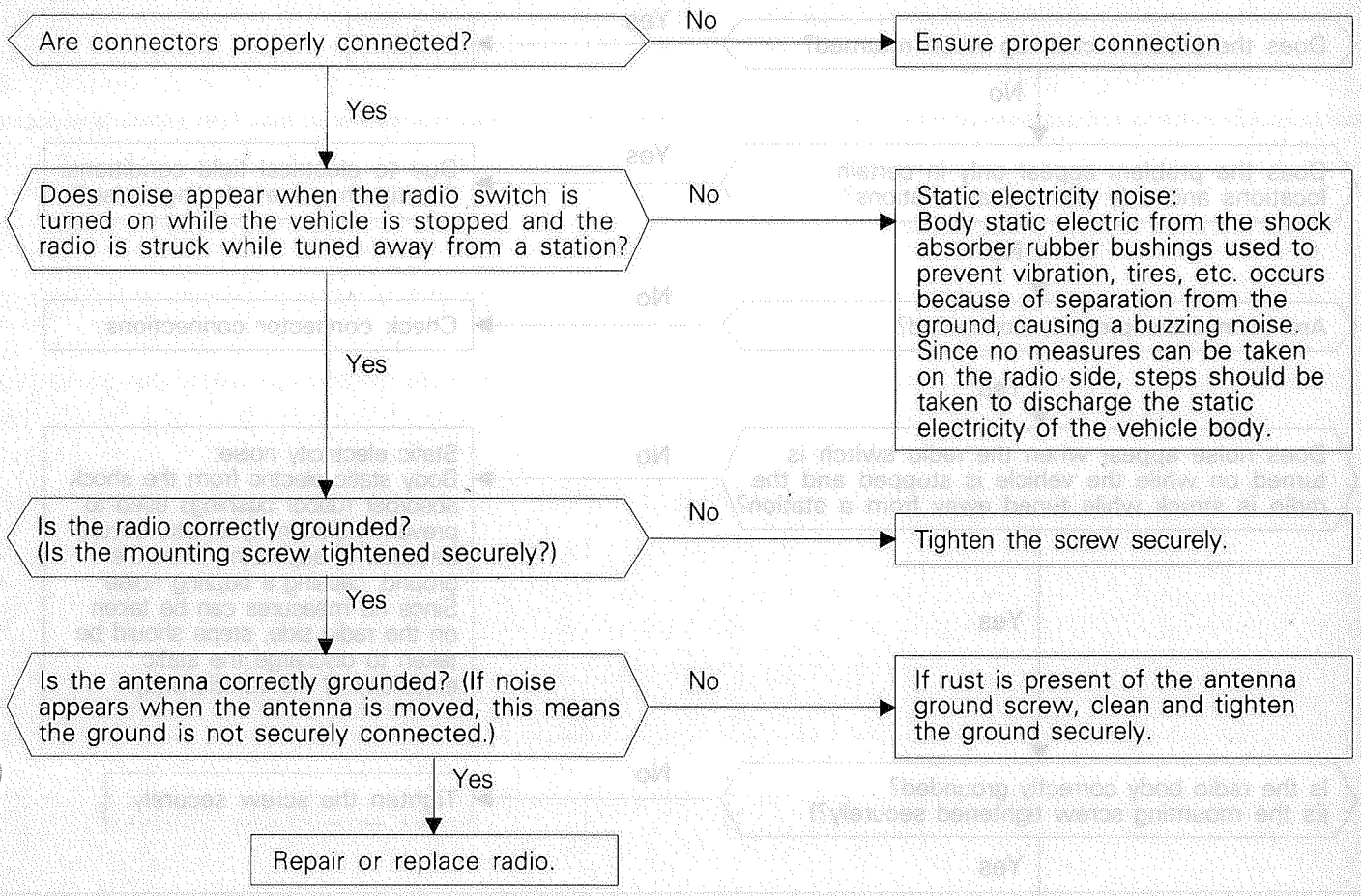


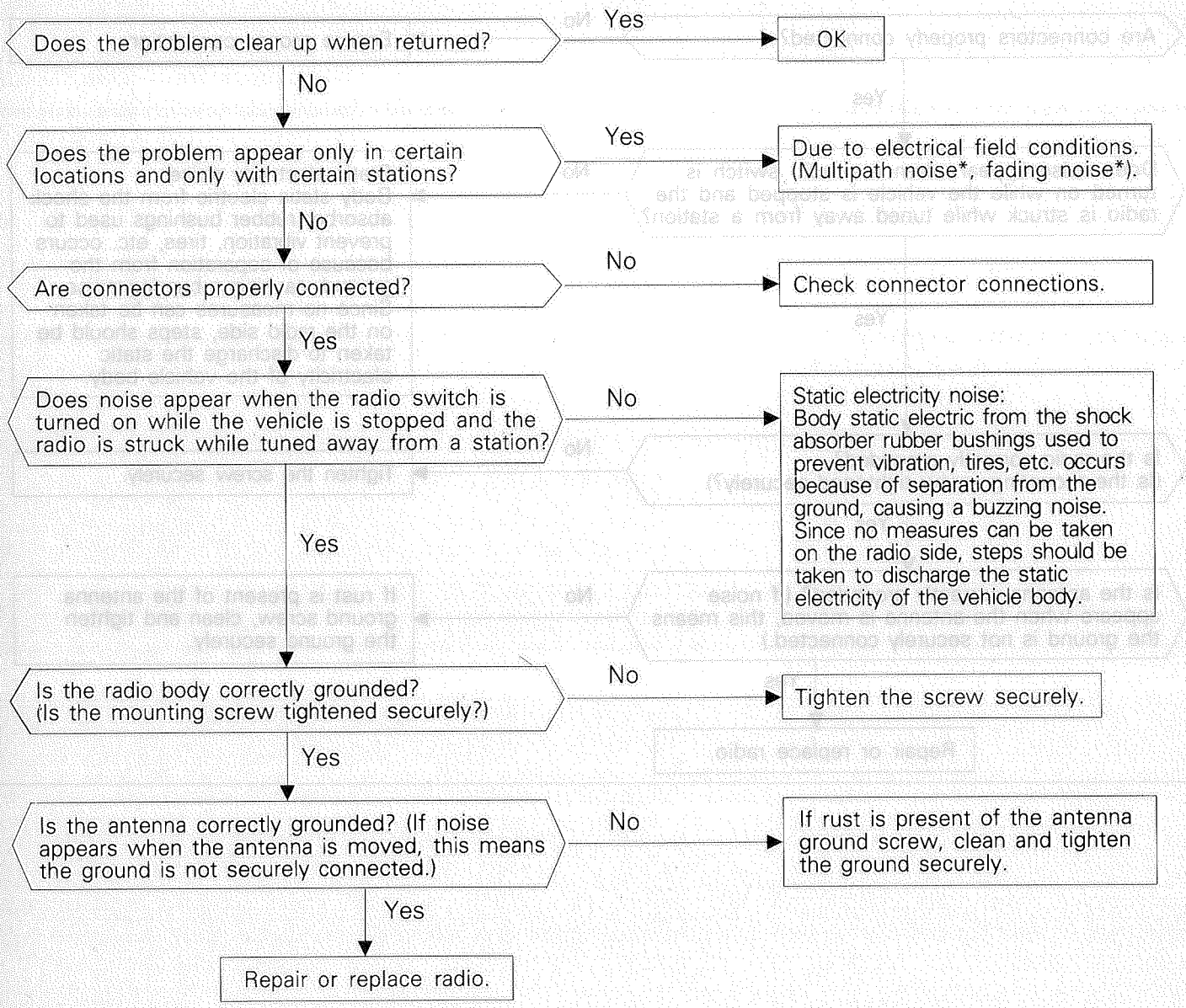




A–7 Some noise appears when there is vibration or shocks duringt traveling.



A–8 Noise sometimes appears on FM during traveling.



* About 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.

TSB Revision

A–9	Ever-present noise.

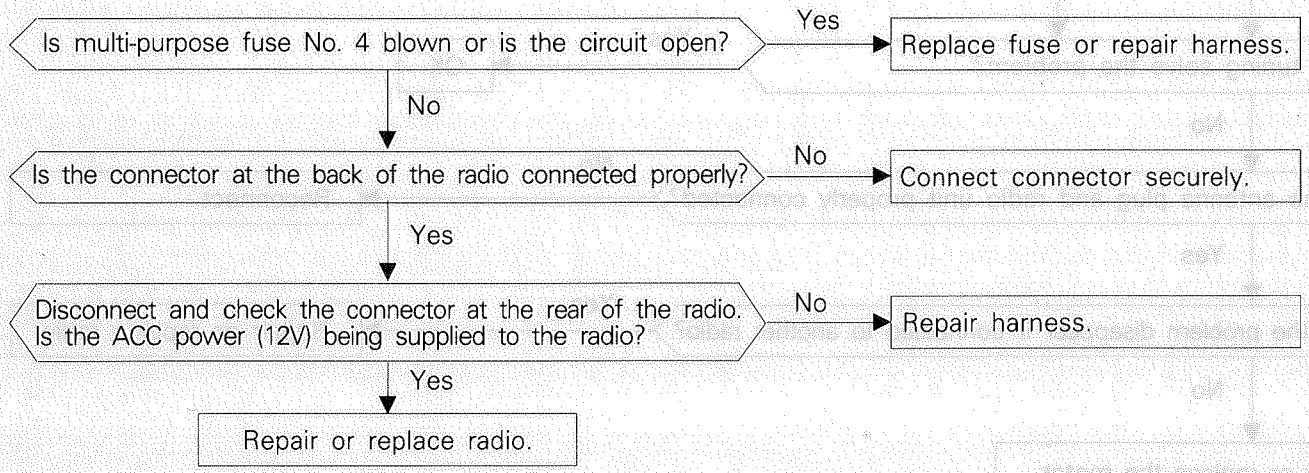
Noise is often created by the following factors, and often the radio is OK when it is checked individually.

- Traveling conditions of the vehicle
- Terrain of area traveled through
- Surrounding buildings
- Signal conditions
- Time period

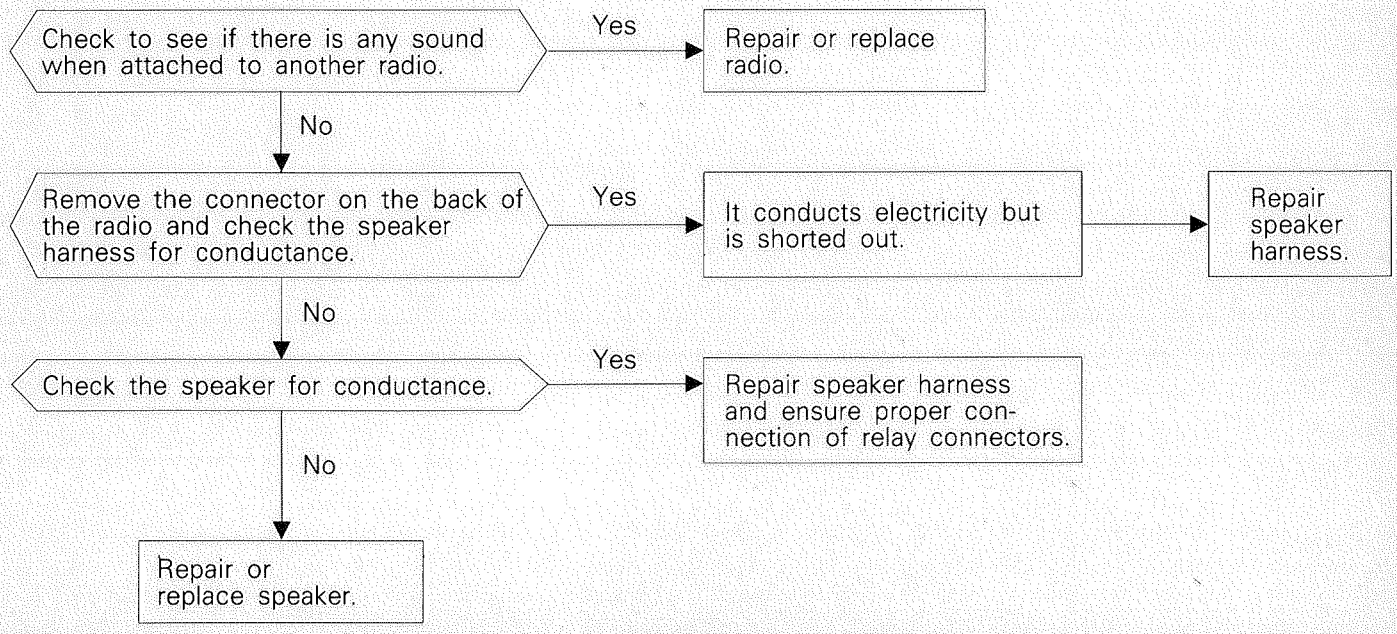
For this reason, if there are still problems with noise even after the measures described in steps A–1 to A–8 have been taken, get information on the factors listed above as well as determining whether the problem occurs with AM or FM, the station names, frequencies, etc., and contact a service center.

B. RADIO

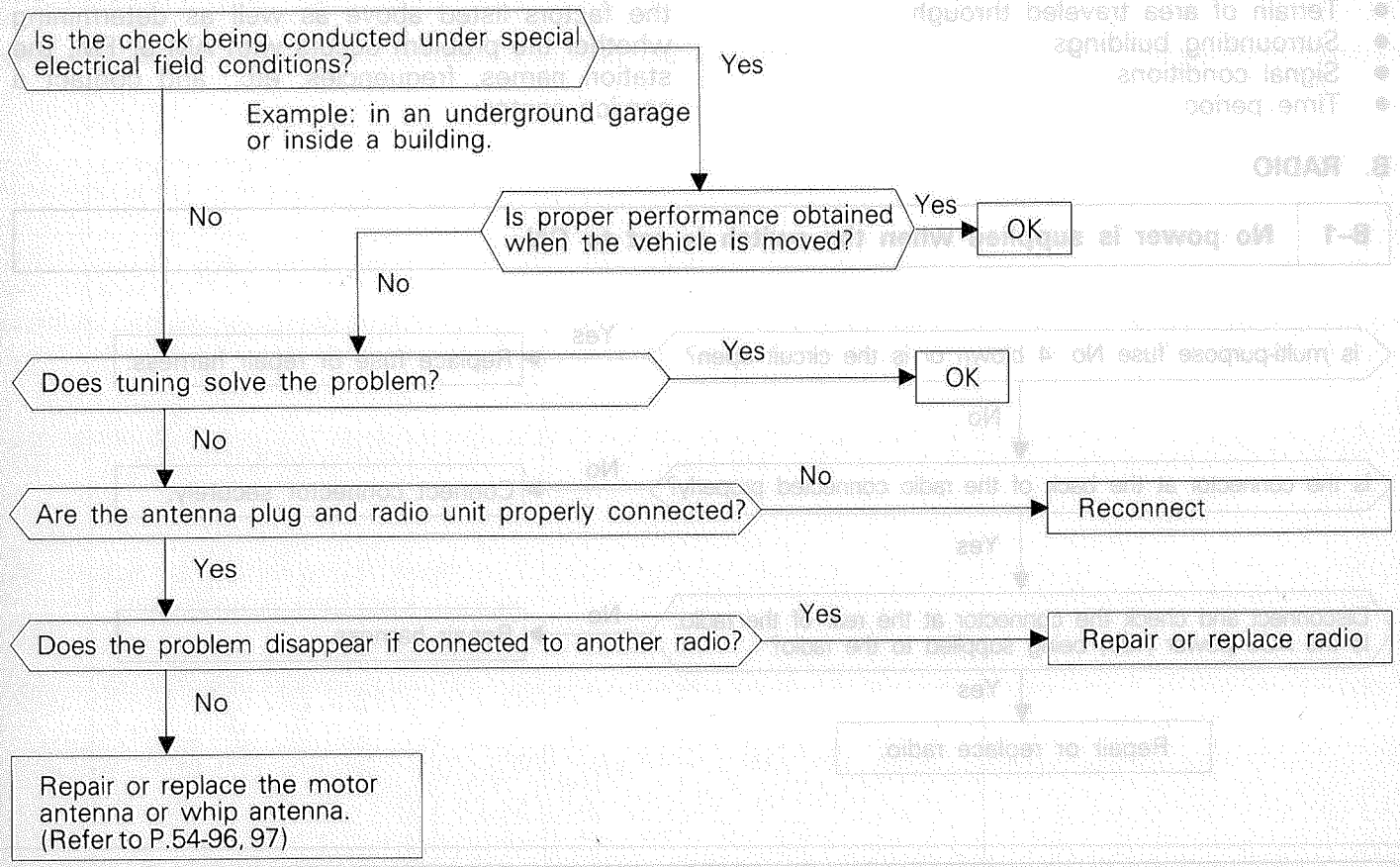
B–1	No power is supplied when the switch is set to ON.



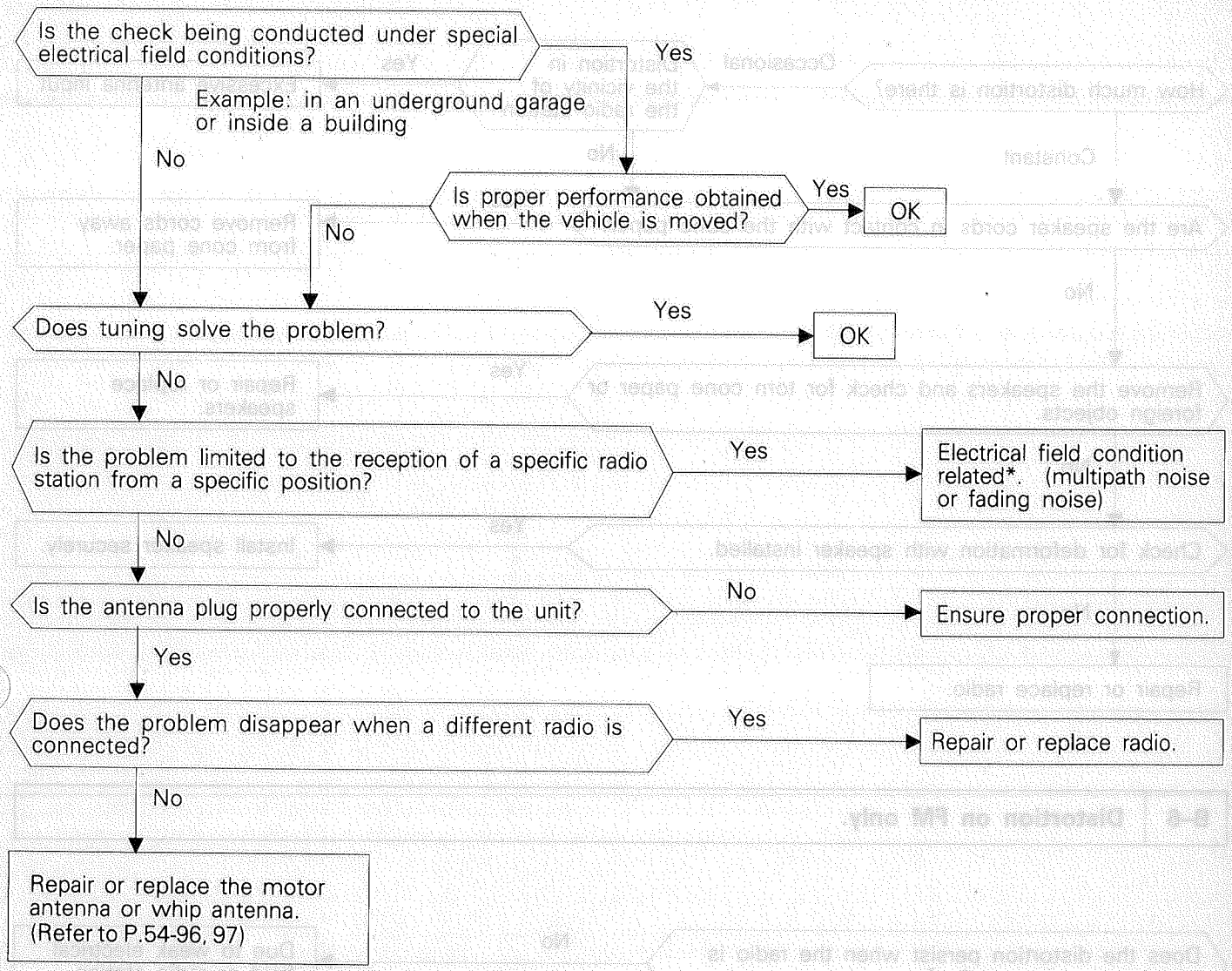
B–2	No sound from one speaker.



B–3	**There is noise but no reception for both AM and FM or no sound from AM, or no sound from FM.**

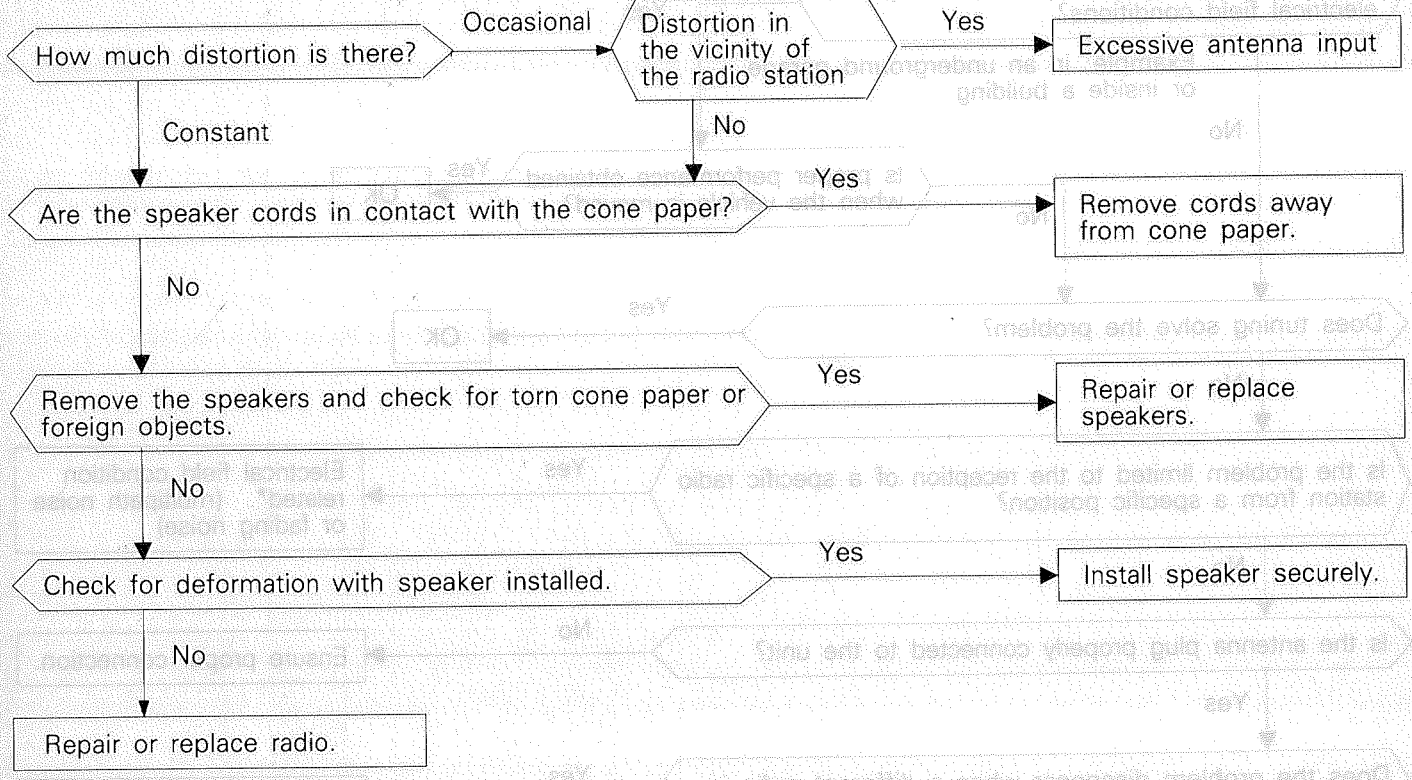


B–4 Unsufficient sensitivity.

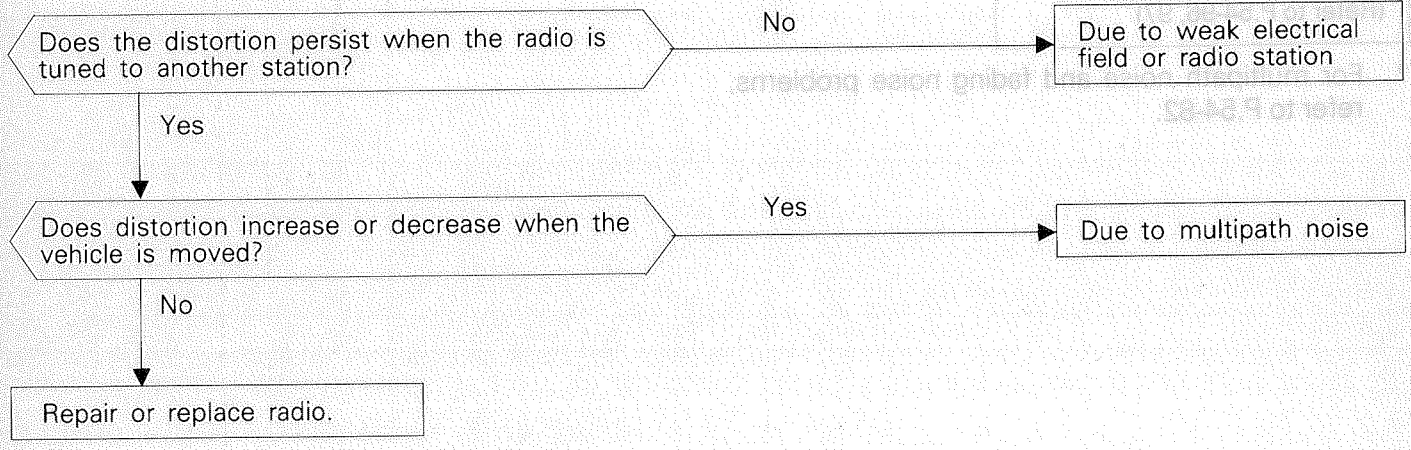


* For multipath noise and fading noise problems, refer to P.54-82.

B–5 Distortion on AM or on both AM and FM.

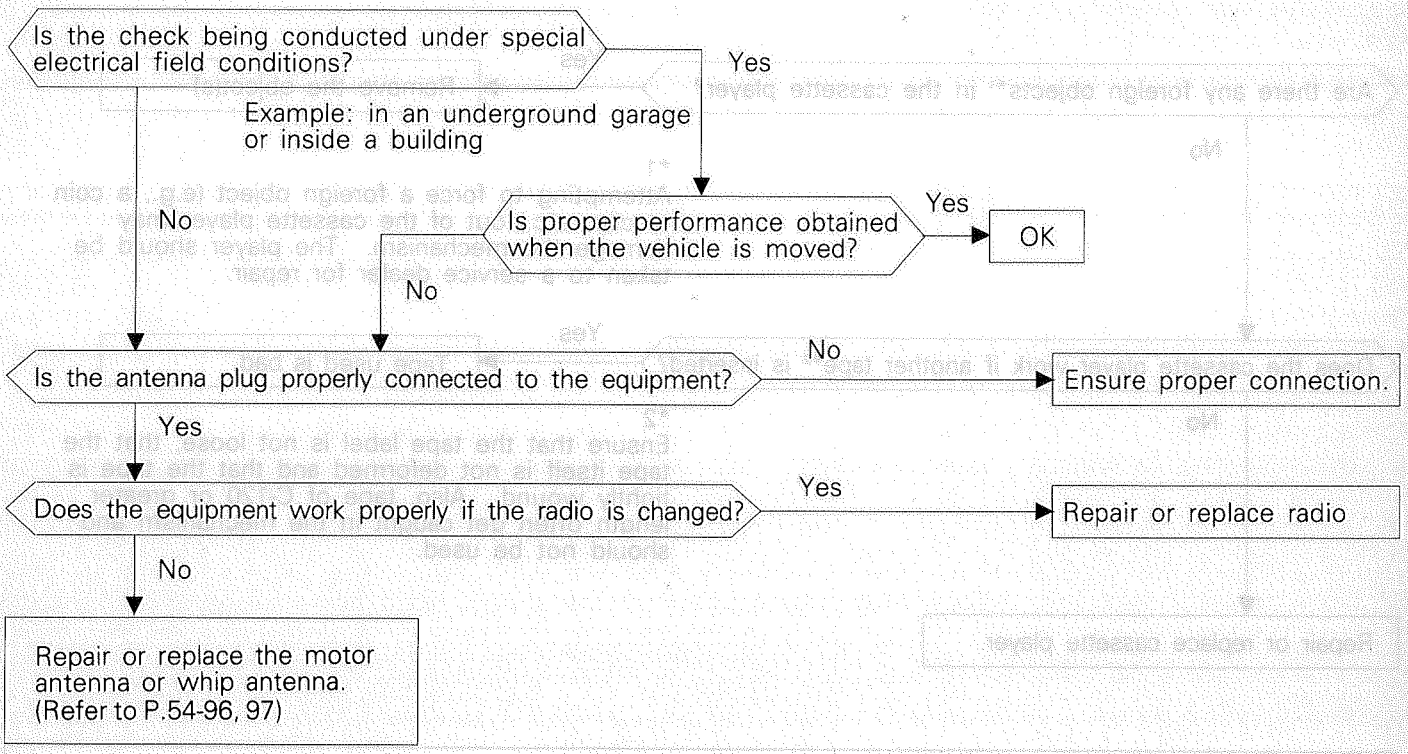


B–6 Distortion on FM only.

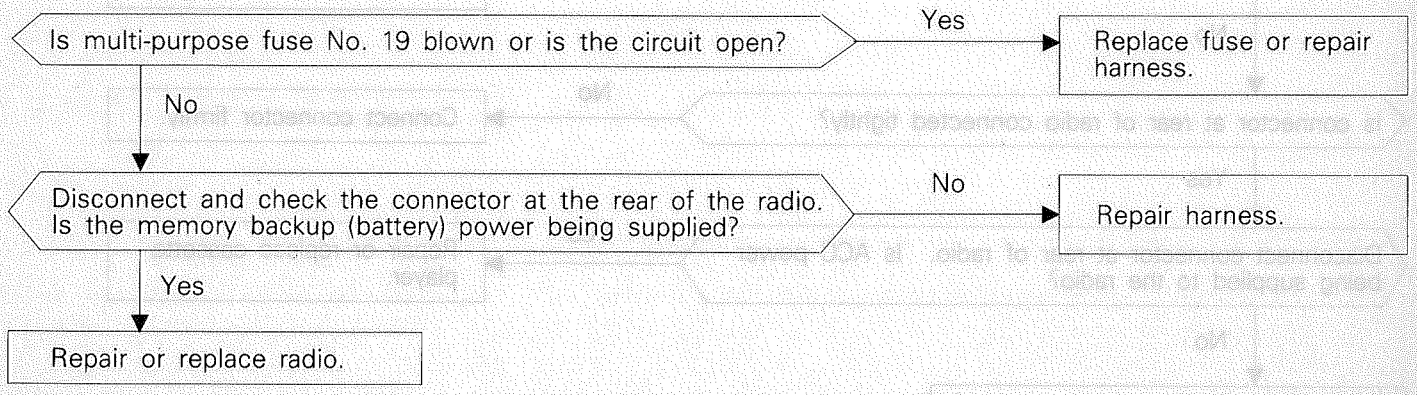


TSB Revision

B–7 Too few automatic select stations.



B–8 Insufficient memory (preset stations are erased).



C. CASSETTE PLAYER

C–1 Cassette tape will not be inserted.

Are there any foreign objects*1 in the cassette player?
- Yes → Remove the object(s)
- No → Does the cassette player work if another tape*2 is inserted?
  - Yes → Tape used is bad.
  - No → Repair or replace cassette player.

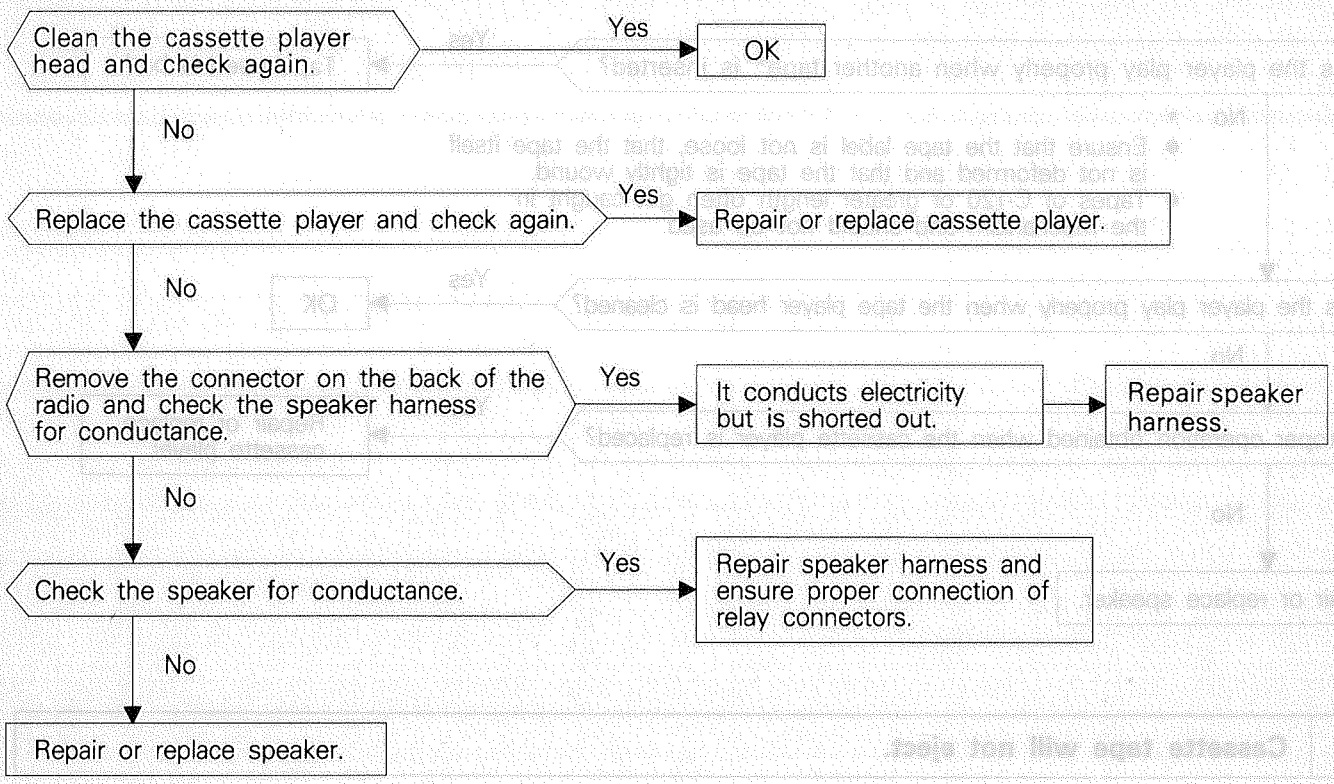
*1
Attempting to force a foreign object (e.g., a coin or clip, etc.) out of the cassette player may damage the mechanism. The player should be taken to a service dealer for repair.

*2
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tape of C-120 or greater length often get caught in the mechanism and should not be used.

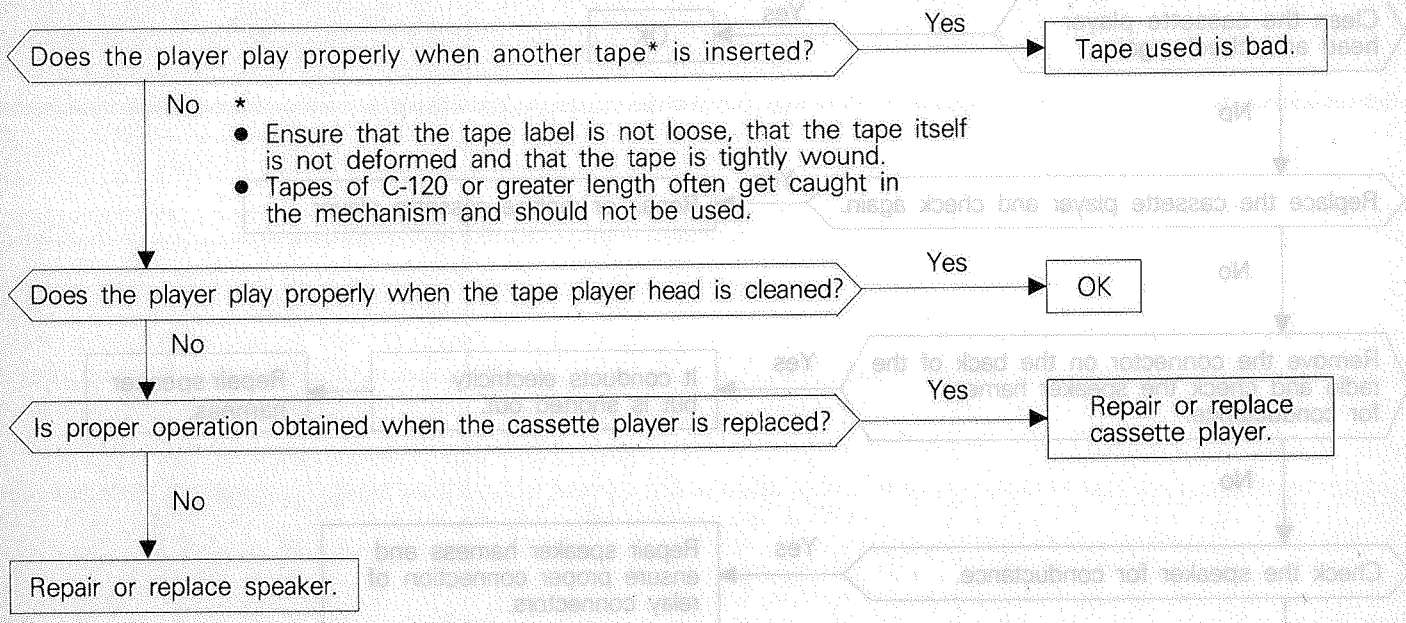
C–2 No sound (even after a tape has been inserted).

Is multi-purpose fuse No. 4 blown or is the circuit open?
- Yes → Replace fuse or repair harness.
- No → Is connector at rear of radio connected tightly?
  - No → Connect connector firmly.
  - Yes → Disconnect connector at rear of radio. Is ACC power being supplied to the radio?
    - Yes → Repair or replace cassette player.
    - No → Repair harness.

C–3 No sound from one speaker.



C–4 Sound quality is poor, or sound is weak.



C–5 Cassette tape will not eject.

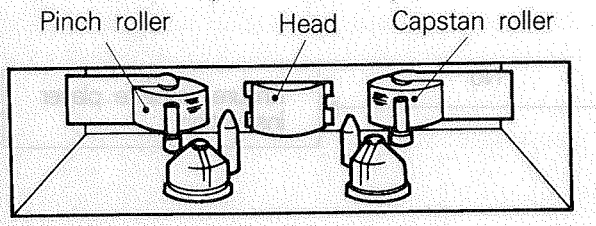
The problems covered here are all the result of the use of a bad tape (deformed or not properly tightened) or of a malfunction of the cassette player itself. Malfunctions involving the tape becoming caught in the mechanism and ruining the case are also possible, and attempting to force the tape out of the player can cuse 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.

Does the player play OK if the tape*1 is changed?
- Yes → Tape used is bad.
- No ↓

Are there any foreign objects*2 inside the cassette player?
- Yes → Remove the object(s).
- No ↓

Is the head or capstan roller dirty?



16A0668

- Yes → Clean.
- No ↓

Repair or replace cassette player.

*1
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tape of C-120 or greater length often get caught in the mechanism and should not be used.

*2
Attempting to force a foreign object (e.g., a coin or clip, etc.) out of the cassette player may damage the mechanism. The player should be taken to a service dealer for repair.

C–7 Automatic search does not work.

Does the MSS (automatic search) button*1 depress properly?
- No → Button improperly operated.
- Yes ↓

Does the player play OK if the tape *2 is changed?
- Yes → Tape used is bad.
- No ↓

Repair or replace the cassette player.

*1
- When the time between songs on a tape is less than three seconds, or when there is a three second period in the middle of a song in which the volume level is extremely low, the automatic search function may not work properly.

*2
- Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tapes of C-120 or greater length often get caught in the mechanism and should not be used.

C–8 Faulty auto reverse.

Does the player play OK if the tape* is changed?
- Yes → Tape used is bad.
- No →

*
- Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound.
- Tapes of C-120 or greater length often get caught in the mechanism and should not be used.

Does the problem only occur while the vehicle is being driven?
- No → Repair or replace cassette player.
- Yes →

Is the cassette player properly installed to the vehicle?
- No → Ensure cassette player installation.
- Yes →

Repair or replace cassette player.

C–9 Tape gets caught in mechanism*1.

*1
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.

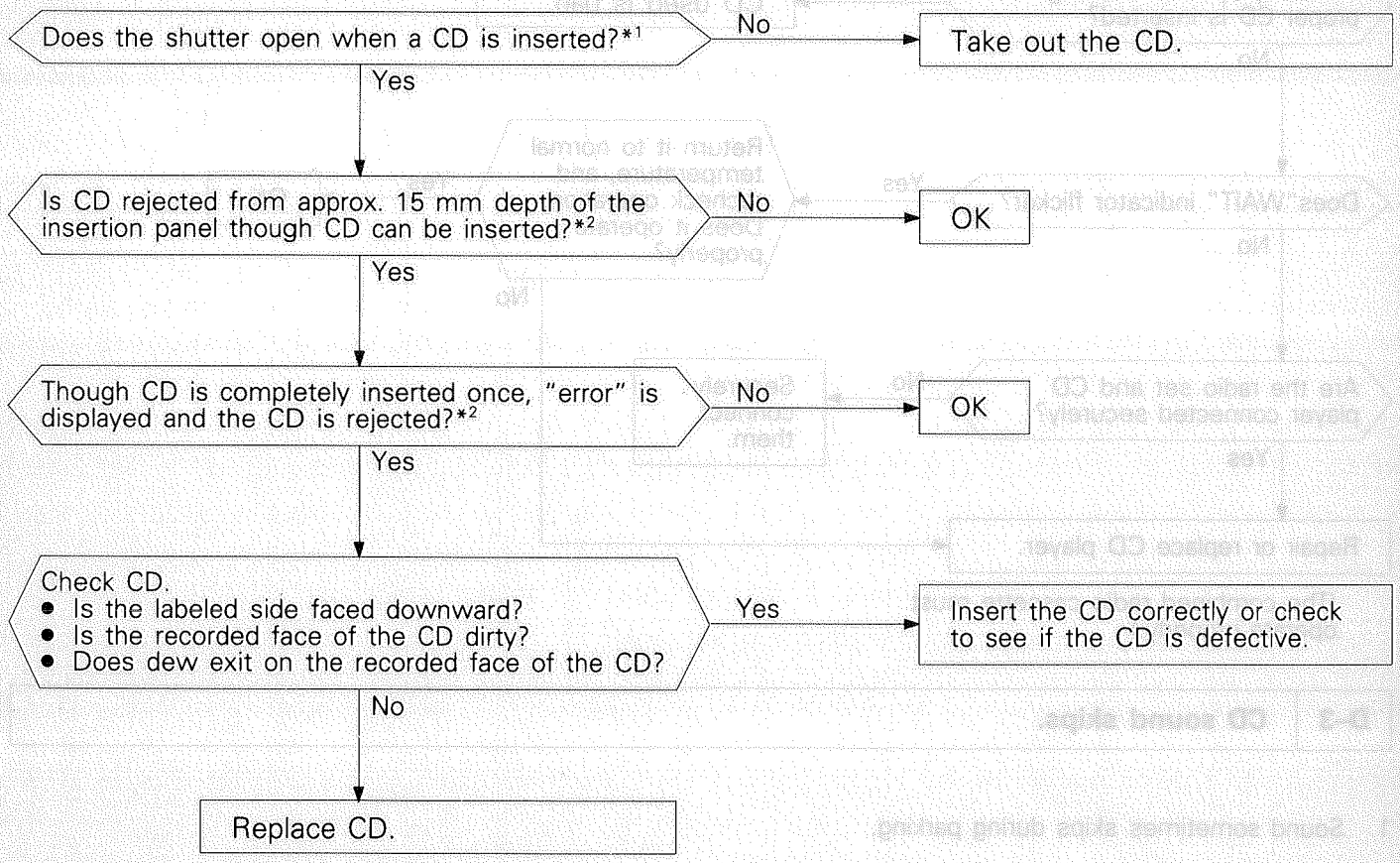
Does the player play OK if the tape *2 is changed?
- Yes → Tape used is bad.
- No →

*2
Ensure that the tape label is not loose, that the tape itself is not deformed and that the tape is tightly wound. Also, tapes of C-120 or greater length often get caught in the mechanism and should not be used.

Repair or replace cassette player.

D. CD PLAYER

D–1 CD will not be accepted.

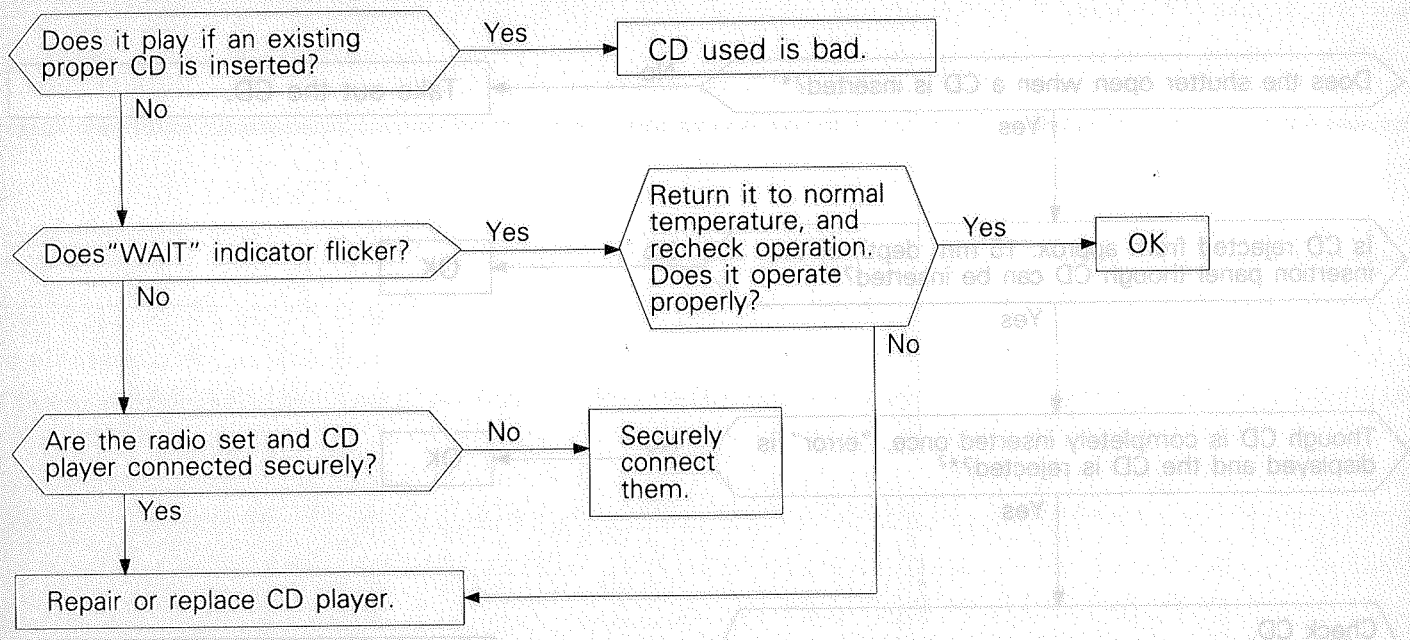


*1 If the CD is already loaded, doesn't the shutter open to allow insertion when another CD is inserted?

*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.

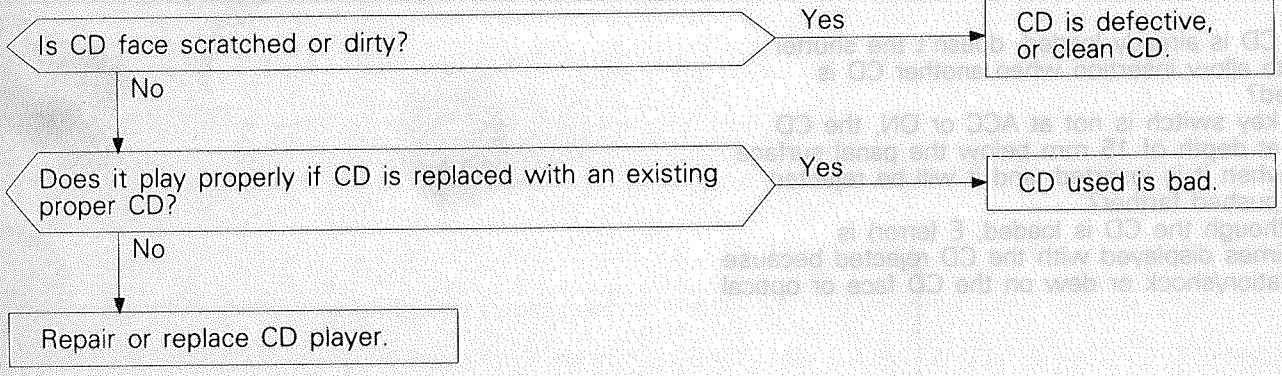
D–2 No sound.



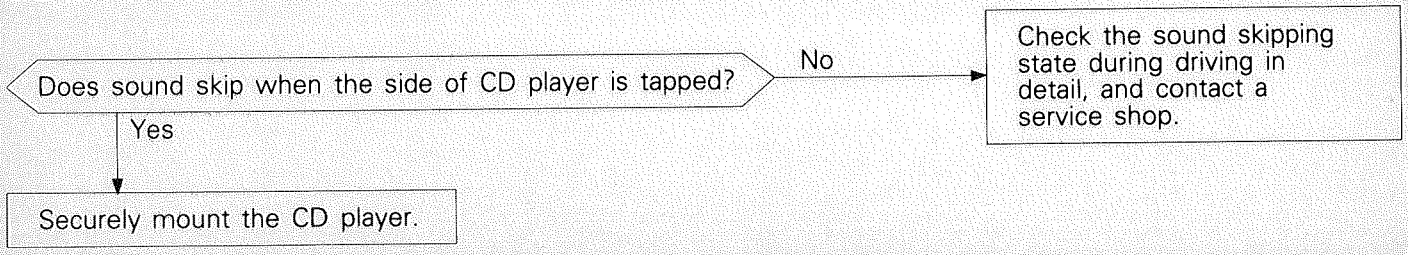
(The combined radio cassette must operate properly.)

D–3 CD sound skips.

1. Sound sometimes skips during parking.



2. Sound sometimes skips during driving.
   (Stop vehicle, and check it.)
   (Check it by using a proper CD which is free of scratch, dirt or other abnormality.)



TSB Revision

D–4 Sound quality is poor.

Does it play properly if another proper CD is loaded?
- Yes → CD used is bad.
- No → Repair or replace CD player.

D–5 CD will not be ejected.

Is the key switch (ignition key) at ACC or ON?
- No → Turn the key to ACC or ON.
- Yes → Is the combined amplifier or radio set connected securely?
  - No → Securely connect the subjected one.
  - Yes → If CD is not ejected, don't reject it. The player may be damaged. Therefore, contact a service shop for repairs.

D–6 No sound from one speaker.

Is CD player securely connected to the combined radio set?
- No → Securely connect them.
- Yes → Does it play properly if another CD player is combined?
  - Yes → Repair or replace CD player.
  - No → Repair or replace the combined radio set.

E. MOTOR ANTENNA

E-1 Motor antenna won't extend or retract.

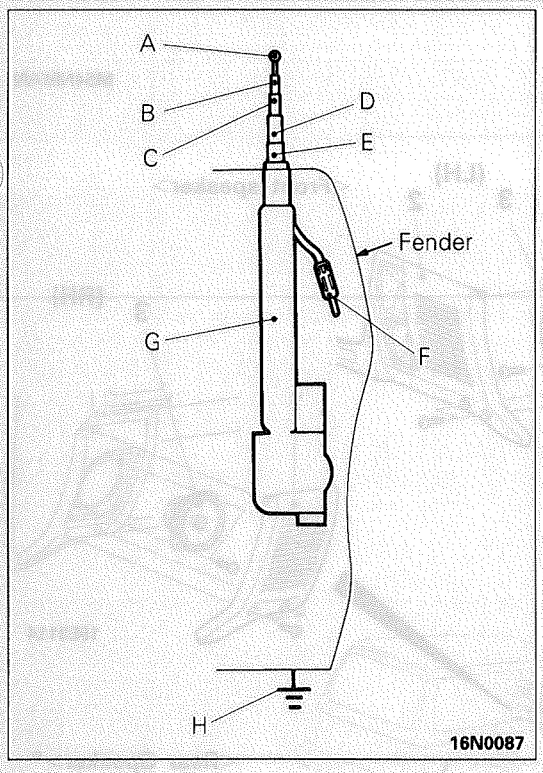
Clean and polish the surface of the antenna pole.

- Is the radio power switch ON?
  - No → Switch it ON.
  - Yes ↓
- Is voltage (approx. 12V) emitted to the radio's motor antenna terminal?
  - No → Repair or replace the radio.
  - Yes ↓
- Is the antenna bent?
  - Yes → Repair the bend, or replace the antenna pole.
  - No ↓
- Is the motor antenna control unit OK?
  - No → Replace the motor antenna control unit.
  - Yes ↓
- Is the motor OK?
  - No → Replace the motor antenna.
  - Yes ↓
- Repair the harness.

TSB Revision

E–2	Motor antenna extends and retracts but does not receive.

Is the antenna* itself OK?
- No → Repair or replace it.
- Yes → Is operation normal when a new antenna assembly is directly installed to the radio?
  - No → Refer to B. "Radio trouble shooting".
  - Yes → Replace the feeder cable or motor antenna assembly.



Checking the antenna*

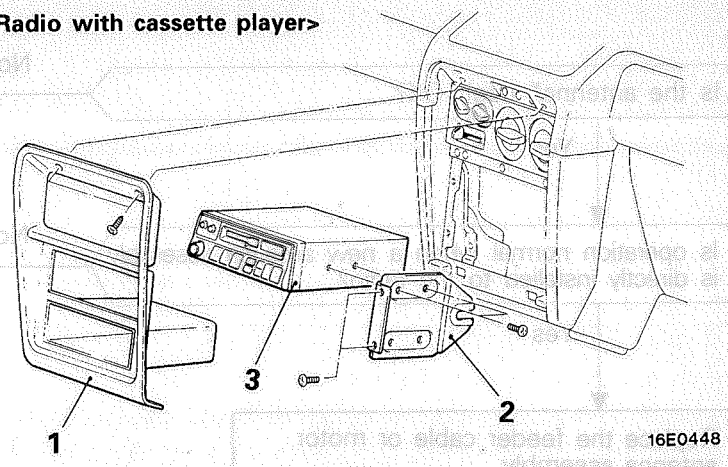
Ohmmeter measurement locations	Result
Circuits from F to A, B, C, D and E	Continuity
Circuit between G and H	Continuity
Circuits from H to A, B, C, D and E	No continuity

RADIO WITH CASSETTE PLAYER AND CD PLAYER

M54NJAT

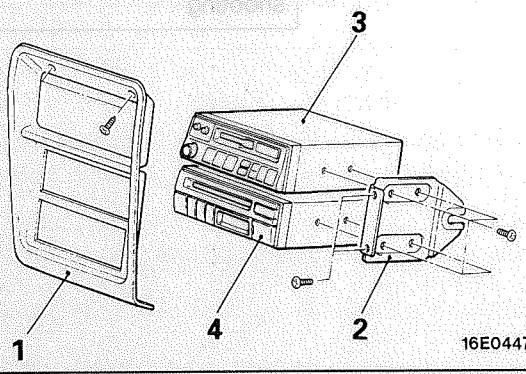
REMOVAL AND INSTALLATION

<Radio with cassette player>



16E0448

<Radio with cassette player and CD player>



16E0447

Removal steps

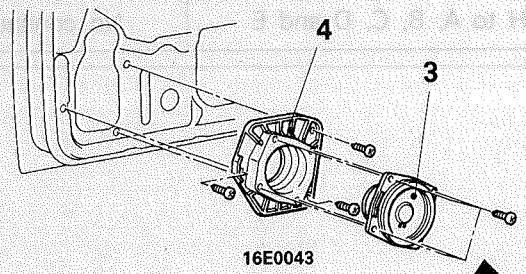
1. Audio panel
2. Bracket
3. Radio with cassette player
4. CD player

SPEAKER

M54NMAN

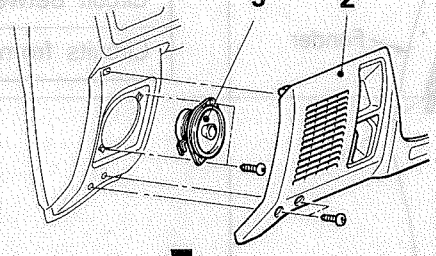
REMOVAL AND INSTALLATION

<Door speaker>*



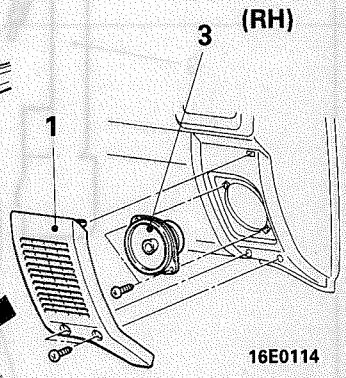
16E0043

(LH)



<Front speaker>

(RH)



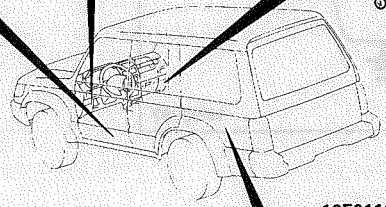
16E0114

Removal steps of front speaker

1. Instrument corner cover <RH speaker>
2. Instrument under cover <LH speaker> (Refer to GROUP 52 – Instrument Panel)
3. Speaker

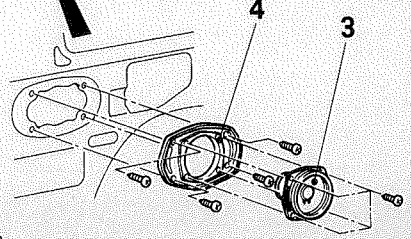
Removal steps of door speaker

- Door trim (Refer to GROUP 42 – Door Trim and Waterproof Film)
3. Speaker
4. Speaker cover



16E0116

<Rear Speaker>*



Removal steps of rear speaker

- Quarter trim (Refer to GROUP 52 – Trim)
3. Speaker
4. Speaker cover

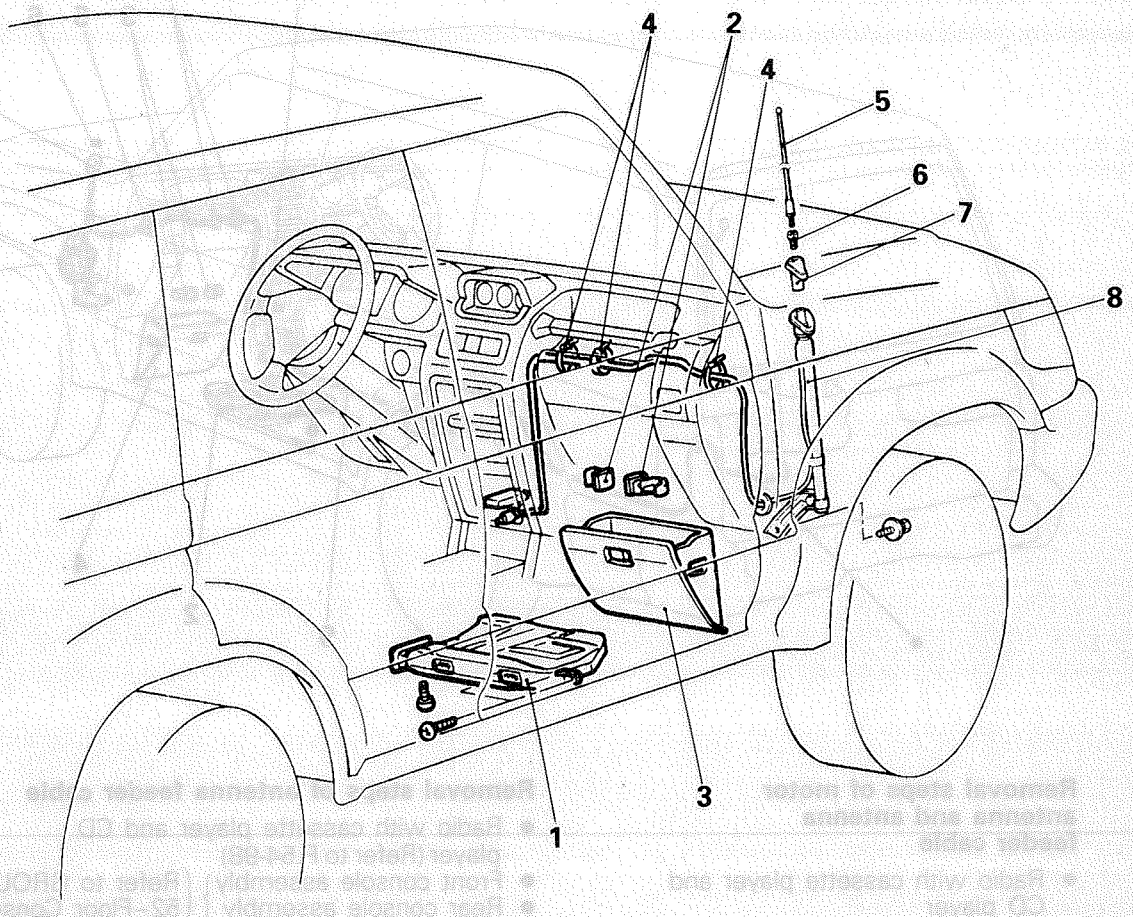
NOTE * indicates that the speakers are installed on the right side also.

16E0044

ANTENNA AND ANTENNA FEEDER CABLE <WHIP ANTENNA AND ANTENNA FEEDER CABLE>

M54NPAL

REMOVAL AND INSTALLATION



16E0442

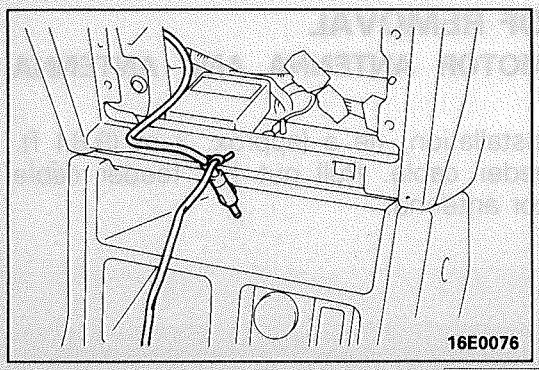
Removal steps

- Radio with cassette player and CD player (Refer to P.54-98)

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



16E0076

SERVICE POINT OF REMOVAL

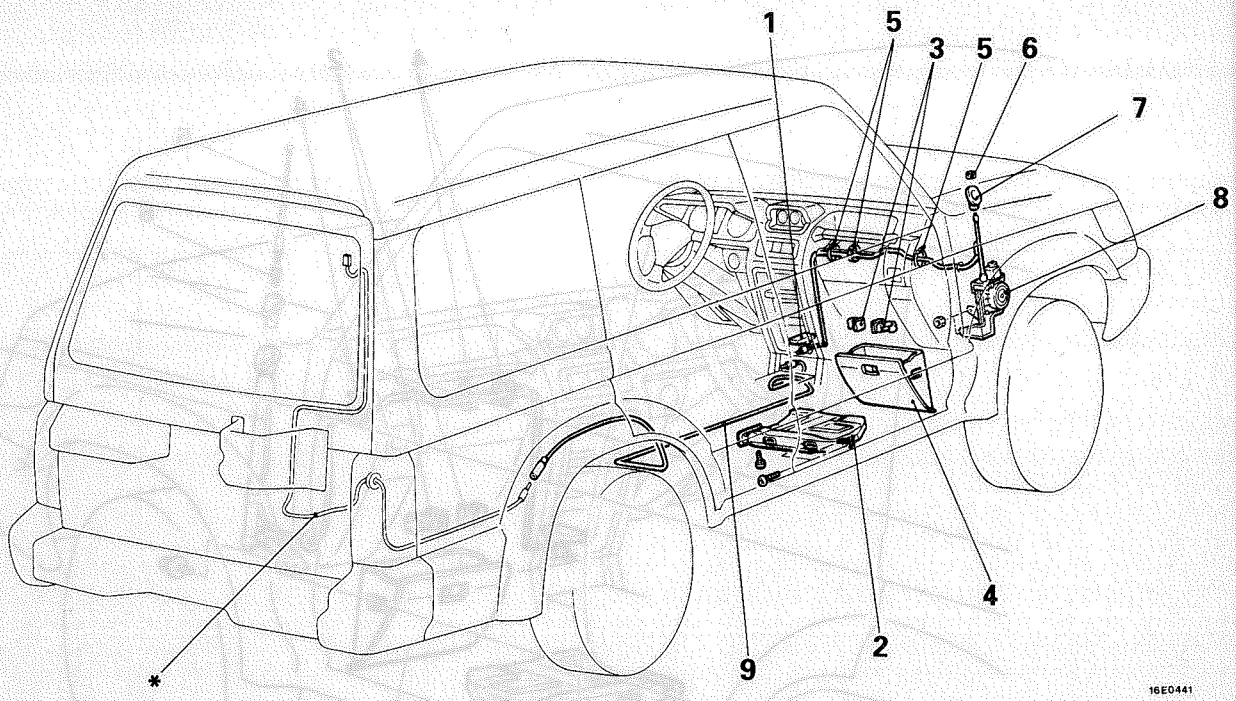
8. REMOVAL OF ANTENNA BASE AND FEEDER CABLE

For ease of the installation, tie a [approx. 3 m (9.84 ft. length)] to the feeder cable. Pull out the feeder cable together with antenna base.

<MOTOR ANTENNA AND ANTENNA FEEDER CABLE>

M54NPBK

REMOVAL AND INSTALLATION



Removal steps of motor antenna and antenna feeder cable

- Radio with cassette player and CD player (Refer to P.54-98)
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

NOTE
The antenna feeder cable marked "*" is co-binded with back door wiring harness.

Removal steps of antenna feeder cable

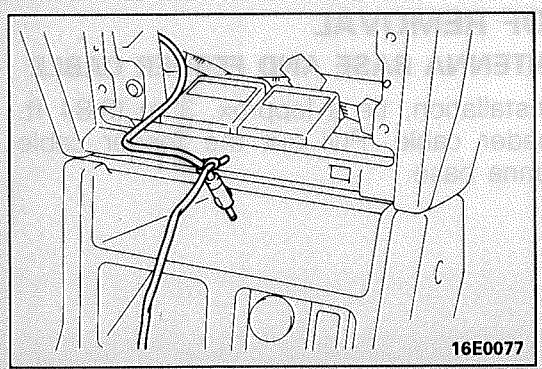
- Radio with cassette player and CD player (Refer to P.54-98)
- Front console assembly, Rear console assembly } (Refer to GROUP 52–Floor Console)
- Front seat (Passenger's side), Rear seat } (Refer to GROUP 52–Front Seat, Rear Seat)
- Cowl side trim (RH), Center pillar trim lower (RH), Quarter trim lower (RH) } (Refer to GROUP 52–Trim)

9. Antenna feeder cable

Removal steps of motor antenna control unit

- Radio with cassette player and CD player (Refer to P.54-98)

1. Motor antenna control unit

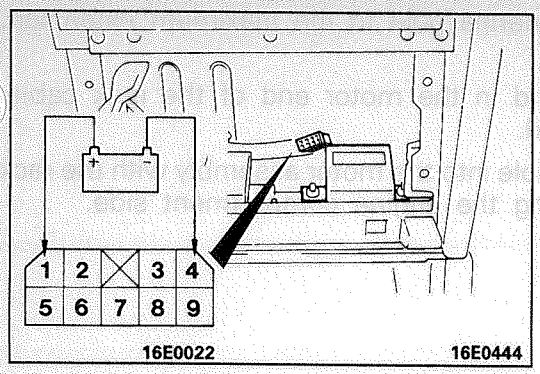


SERVICE POINT OF REMOVAL

8. REMOVAL OF MOTOR ANTENNA AND ANTENNA FEEDER CABLE

For ease of the installation, tie a [approx. 3 m (9.84 ft. length)] to the feeder cable. Pull out the feeder cable together with motor antenna.

TSB Revision

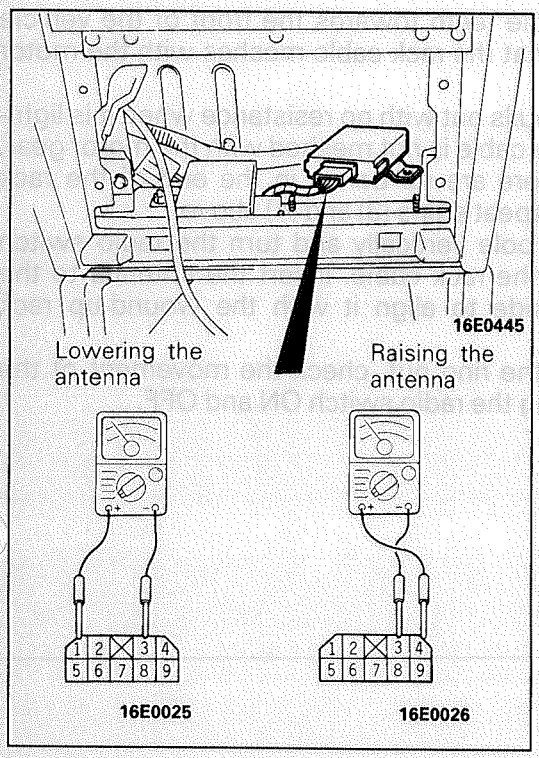


16E0022 16E0444

INSPECTION

MOTOR ANTENNA INSPECTION

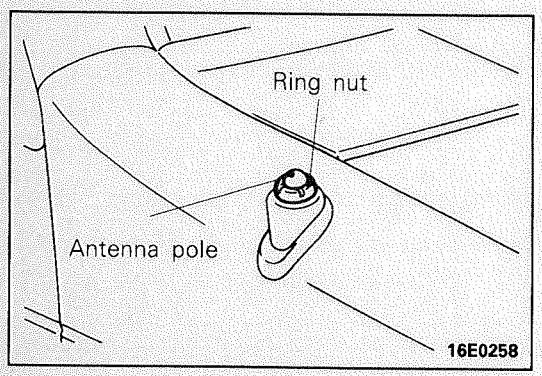
(1) Remove the radio with cassette player (Refer to P.54-98.)
(2) Remove the motor antenna control unit connector and check if the antenna goes up when the battery (+) side is connected to terminal (1), and the battery (–) side to terminal (4), and check if it goes down when the connections are reversed.



MOTOR ANTENNA CONTROL UNIT INSPECTION

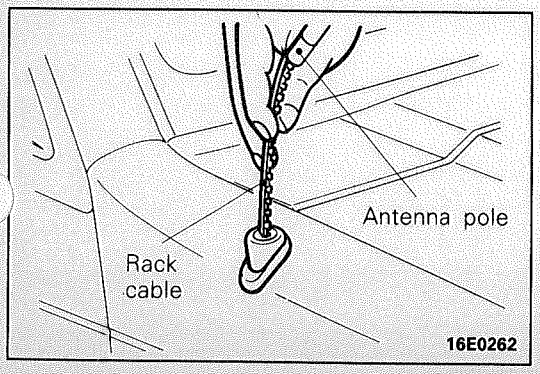
(1) Remove the radio with cassette player (Refer to P.54-98.)
(2) Remove the motor antenna control unit mounting bolt.
(3) With the ignition switch turned to ACC or ON, operate the radio switch and check the voltage between the terminals while raising and lowering the antenna.

Antenna operation direction	Measurement terminals	Voltage (V)
Lowering	1–3	10–13
Raising	4–3	10–13



ANTENNA POLE REPLACEMENT

(1) Remove the ring nut.



(2) After turning the ignition switch to ACC or ON, turn the radio switch to ON to raise the antenna pole, and remove it, together with the rack cable.

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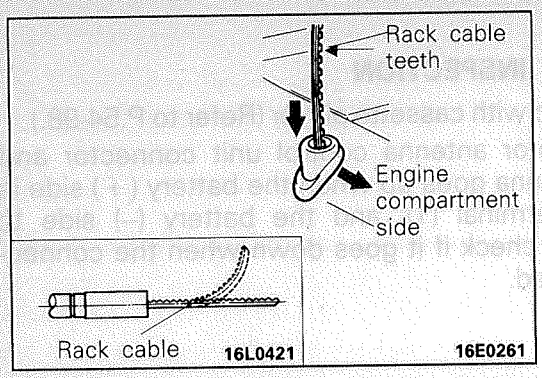
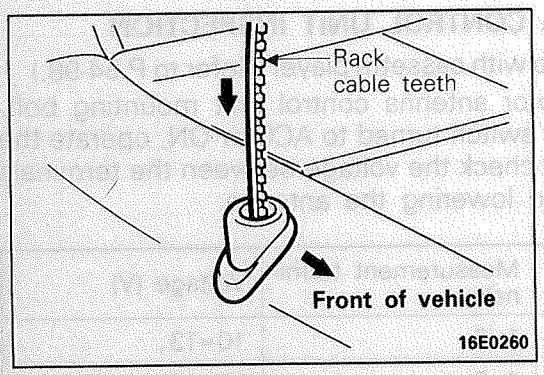


(3) Draw out the antenna pole to the maximum extension.

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.

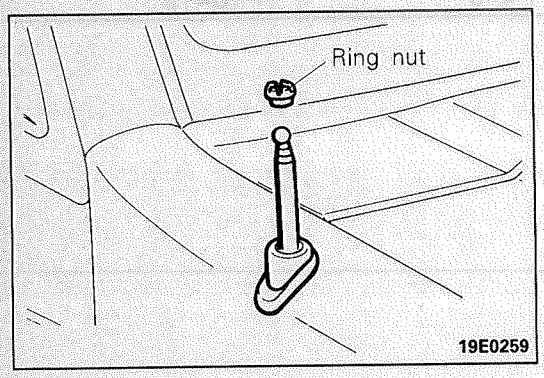


(5) Turn the rack cable teeth towards the front of the vehicle (90° to right) so that the rack cable meshes with the motor gear.

(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.

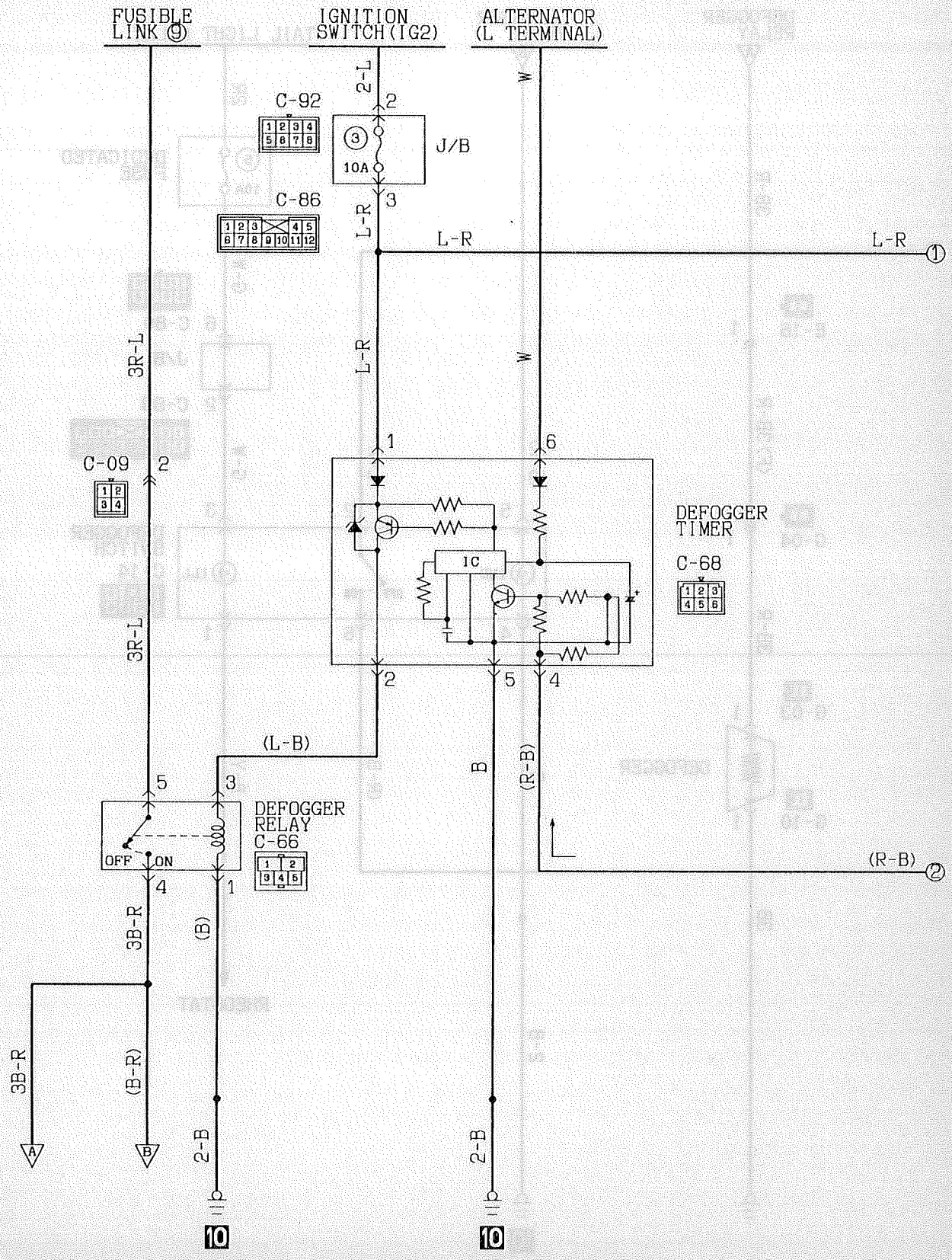
(7) Set the antenna pole vertically and turn the radio switch OFF to wind up the rack cable. Insert the antenna to the motor antenna side to align it with the wound-up rack cable.

(8) After tightening the ring nut, check the movement of the antenna by turning the radio switch ON and OFF.

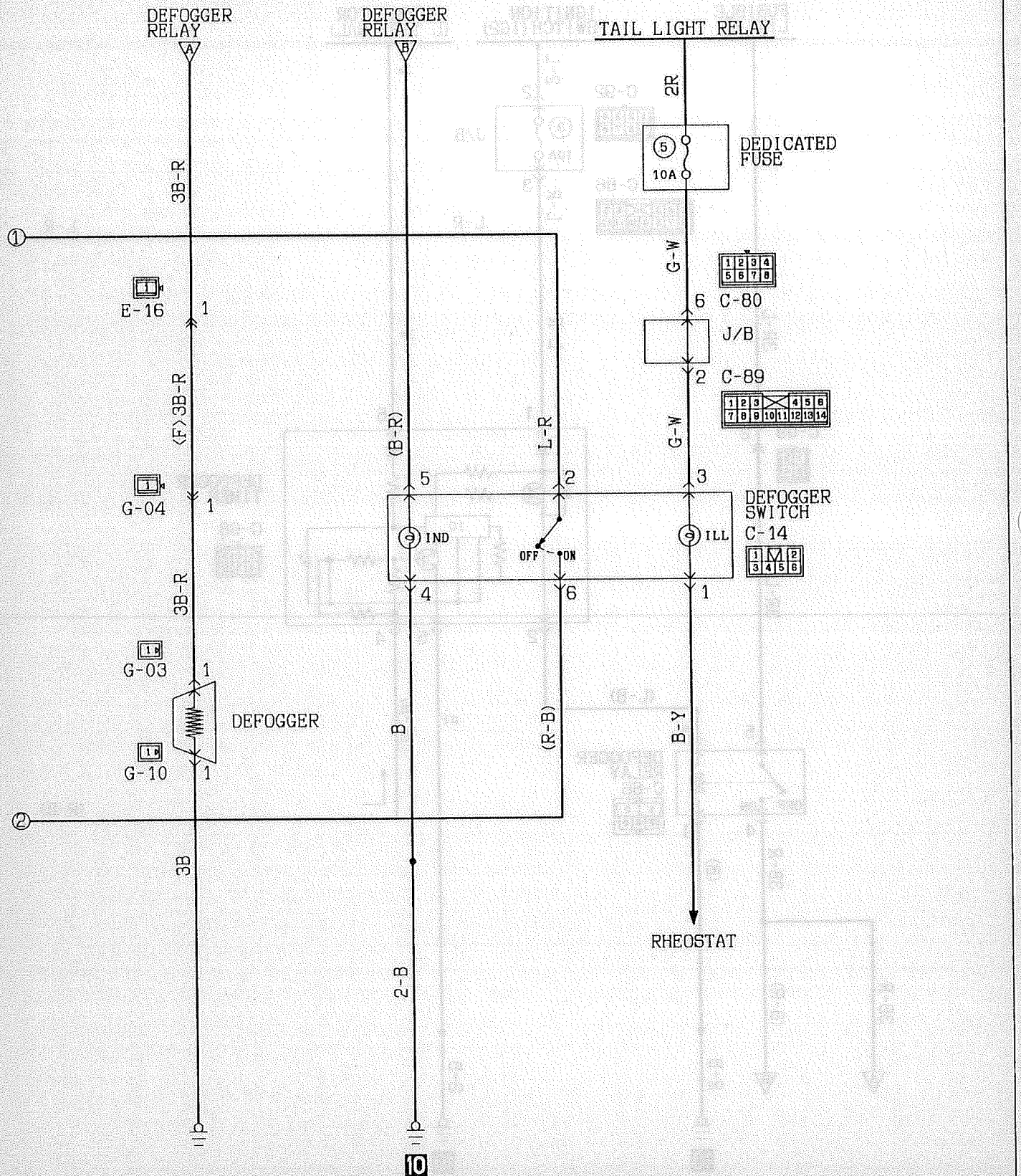


TSB Revision

BACK DOOR WINDOW DEFOGGER
TROUBLESHOOTING
BACK DOOR WINDOW DEFOGGER CIRCUIT



KX35-AC-01304-N


DEFOGGER RELAY
A
DEFOGGER RELAY
B
TAIL LIGHT RELAY
2R
5
10A
DEDICATED FUSE
3B-R
G-W
1
2
3
4
5
6
7
8
6 C-80
J/B
2 C-89
1
2
3
4
5
6
7
8
9
10
11
12
13
14
E-16
1
(F)3B-R
(B-R)
L-R
G-W
5
2
3
G-04
1
DEFOGGER SWITCH
IND
OFF
ON
ILL
C-14
1
2
3
4
5
6
3B-R
4
6
1
G-03
1
DEFOGGER
B
(R-B)
B-Y
G-10
1
3B
2-B
RHEOSTAT
10

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 alternator current (terminal L drops to 3.5V 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.

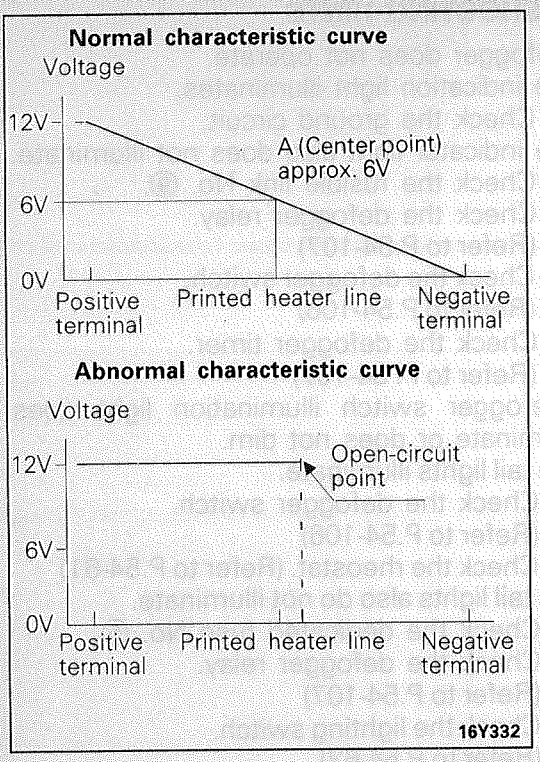
TROUBLESHOOTING HINTS

1. The defogger does not operate.
   (1) The indication light illuminates.
   - Check the ground circuit.

   (2) The indicator light also does not illuminate.
   - Check the fusible link No. ⑨.
   - Check the defogger relay. (Refer to P.54-107)
   - Check the defogger switch. (Refer to P.54-106)
   - Check the defogger timer. (Refer to P. 54-107)

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.54-106)
   - Check the rheostat. (Refer to P.54-61)

   (2) The tail lights also do not illuminate.
   - Check the dedicated fuse No. ⑤.
   - Check the defogger relay. (Refer to P.54-107)
   - Check the lighting switch. (Refer to P.54-63)



SERVICE ADJUSTMENT PROCEDURES

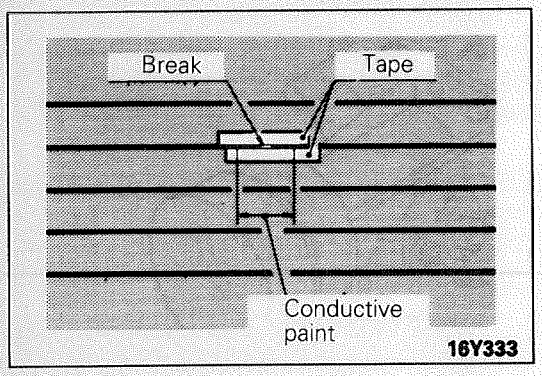
M54POAD

THE PRINTED-HEATER LINES CHECK

(1) Run engine at 2,000 r/min. Check heater element with battery at full.
(2) Turn ON rear window defogger switch. Measure heater element voltage with circuit tester at rear window glass center A.

Condition good if indicating about 6V.

(3) If 12 V is indicated at A, there is a break in the negative terminals from A.
Move test bar slowly to negative terminal to detect where voltage changes suddenly (0 V).
(4) If 0 V is indicated at A, there is a break in the positive terminals from A. Detect where the voltage changes suddenly (12 V) with the same method described.



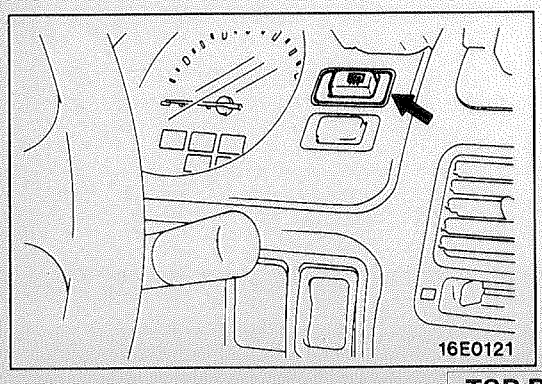
THE PRINTED-HEATER LINES REPAIR

REQUIRED MATERIALS

- Thinner
- Tape
- Conductive paint
- Lead-free gasoline
- Fine brush

(1) Clean disconnected area with lead-free gasoline. Tape along both sides of 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 break three times at 15 minute intervals.
(3) Remove tape and leave for a while before use (circuit complete).
(4) When completely dry (after 24 hours) finish exterior with a knife.

Caution
Clean glass with a soft cloth (dry or damp) along defogger heater element.



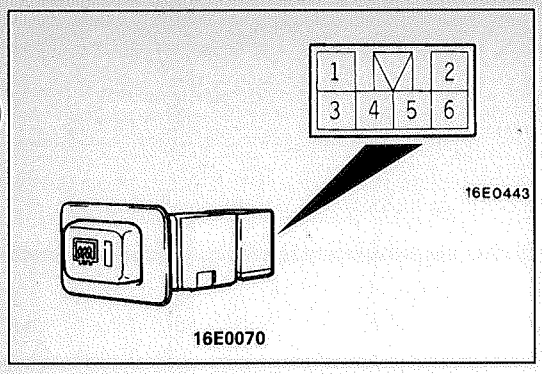
DEFOGGER SWITCH

M54PJBQ

INSPECTION

(1) Remove rear window defogger switch from the meter bezel.

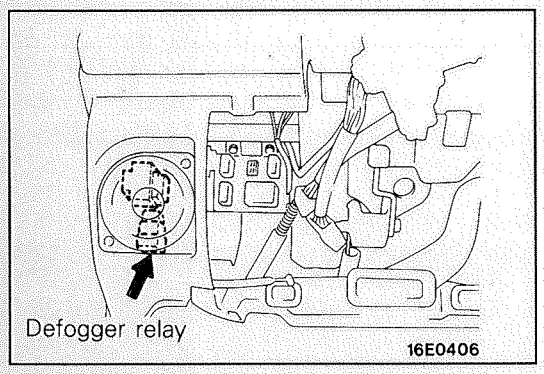
TSB Revision



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

Switch position \ Terminal	1	3	4	5	2	6
OFF		ILL		IND		
ON					○—○	

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

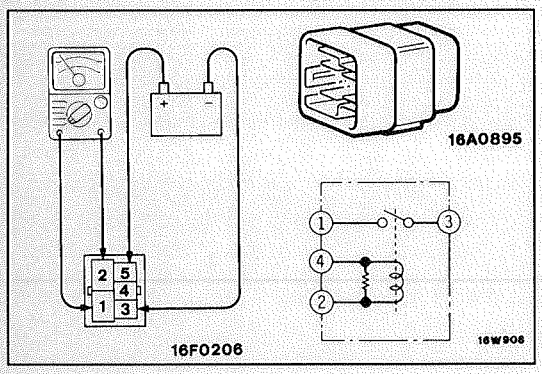


DEFOGGER RELAY

M54PLAH

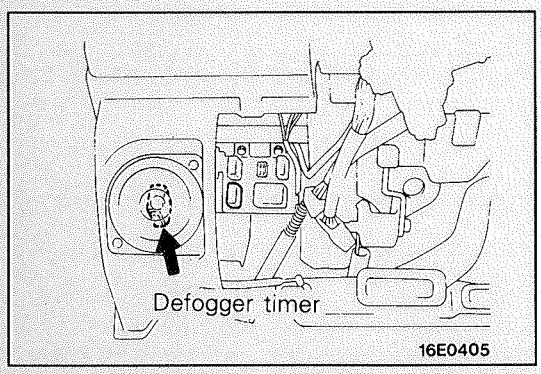
INSPECTION

(1) Remove the instrument under cover. (Refer to GROUP 52–Instrument Panel.)
(2) Remove the defogger relay from the relay bracket.



(3) Connect battery power source to terminal 5. Check circuit between terminals with terminal 3 grounded.

Power is supplied	1–2 terminals	Continuity
Power is not supplied	1–2 terminals	No continuity
	3–5 terminals	Continuity

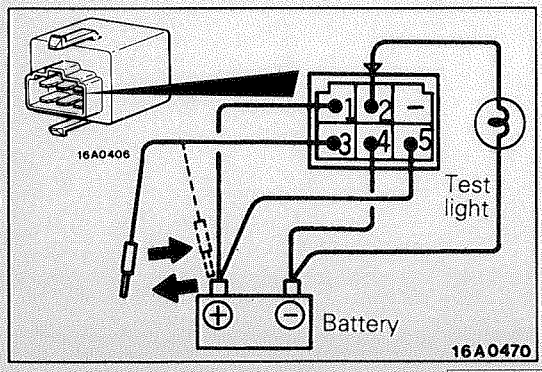


DEFOGGER TIMER

M54PPAE

INSPECTION

(1) Remove the instrument under cover. (Refer to GROUP 52–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 figure.
(4) Check to be sure that the test light illuminates for approximately eleven seconds when battery voltage is applied to terminal 3 for a few seconds.
(5) Check to be sure that the test light switches OFF when battery voltage is again applied, during the test described above, to terminal 3.

NOTES

A

B

C

D

E

F

G

H

I

J

K

L

M

O

P

Q

R

S

T

U

V

W

MONTERO Specs-At-A-Glance 1992

General	Engine code		6G72
	Engine size	cm^3 (cu.in.)	2.972 (181.3)
	Engine oil capacity, w/ filter & oil cooler	dm^3 (qts.)	6.6 (7.0)
	Cooling system capacity	dm^3 (qts.)	8.0 (8.5)
	A/T capacity	dm^3 (qts.)	7.2 (7.6)
	Power steering capacity	dm^3 (qts.)	1.06 (1.12)
Engine	Firing order		1-2-3-4-5-6
	Compression pressure	kPa (psi)	1,200 (171)
	Difference between cylinders	kPa (psi)	100 (14)
Fuel	Fuel tank capacity	dm^3 (gals.)	92 (24.3)
	Fuel pressure		
	<When vacuum hose disconnected>	kPa (psi)	330–370 (47-53)
	<When vacuum hose connected>	kPa (psi)	Approx. 270 (38)
	Basic ignition timing		5° ± 2°BTDC
	Curb idle speed	rpm	700 ± 100
	TPS voltage	V	0.40–1.00
	TPS resistance	kΩ	3.5–6.5
	Intake air temp. sensor resistance	kΩ [at 20°C (68°F)]	2.7
	Engine coolant temp. sensor resistance	kΩ	
	[at 20°C (68°F)]		2.4
	[at 80°C (176°F)]		0.3
Cooling	Radiator pressure cap opens	kPa (psi)	75–105 (11–15)
A/T	Fluid capacity	dm^3 (qts.)	7.2 (7.6)
Front Axle	Drive shaft nut torque	Nm (ft.lbs.)	50–60 (36–43)
	Caliper assembly mounting bolt torque	Nm (ft.lbs.)	90 (65)
Rear Axle	Axle shaft nut torque	Nm (ft.bls.)	50–60 (36–43)
Wheel and Tire	Tire inflation pressure	kPa (psi)	
	Vehicles with wide fender		
	<Front>		210 (29)
	<Rear>		275 (40)
	Others		
	<Front>		180 (26)
	<Rear>		240 (35)
Front Suspension	Front wheel alignment		
	<Camber>		0°40' ± 30'
	<Caster>		3°00' ± 1°00'
	<Toe-in>	mm (in.)	3.5 ± 3.5 (.14 ± .14)
Rear Suspension	Axle shaft nut torque	Nmm (ft.bls.)	50–60 (36–43)
Brakes	Front disc runout	mm (in.)	0.08 (.0031) or less
	Front disc minimum thickness	mm (in.)	22.4 (.882)
	Rear disc runout	mm (in.)	0.08 (.0031) or less
	Rear disc minimum thickness	mm (in.)	16.4 (.646)
	Rear drum inside diameter, max.	mm (in.)	198 (7.795)
	Parking brake lever stroke		4–6 notches
Exterior	Wiper blade length	mm (in.)	
	Windshield wiper		475 (18.7)
	Rear window		375 (14.8)
Heater, A/C, Ventilation	Refrigerant quantity R-12	g (oz.)	800 (28)