# STARION Service Manual 1988



Volume 2

**Electrical** 

# Service Manual STARION

1988: Volume 2

#### **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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#### **GROUP / SECTION INDEX**

| Introduction  |
|---|
| Electrical  |
| Electrical System Parts Location  Relay, Control Unit, Sensor, Diode Inspection Terminal, Fusible Link, Fuse, Grounding |
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| Wiring Harness  |
| Charging System   |
| Starting System   |
| Ignition System   |
| Meters and Gauges   |
| Lighting System   |
| Wiper and Washer System   |
| Horn  |
| Accessory   |
| Audio System  |
| Rear Window Defogger  |
| ETACS   |

#### NOTE:

For Engine, Chassis & Body, refer to ... Volume 1

"Engine, Chassis & Body".

#### HOW TO USE THIS MANUAL

NOOBAAF

#### CONTENTS

The preceding page contains GROUP INDEX which lists the group title and group number.

#### PAGE NUMBERS

All page numbers consist of two sets of digits separated by a dash. The digits preceding the dash identify the number of the group. The digits following the dash represent the consecutive page number within the group. The page numbers can be found on the top left or right of each page.

#### **TEXT**

Unless otherwise specified, each service procedure covers all models. Procedures covering specific models are identified by the model codes or similar designation (engine type, transmission type, etc.). A description of these designations is covered in this unit under "VEHICLE IDENTIFICATION".

#### SERVICE PROCEDURES

The service steps are arranged in numerical order and attentions to be paid in performing vehicle service are described in detail in SERVICE POINTS.

### DEFINITION OF TERMS STANDARD VALUE

Indicates the value used as the standard for judging the quality of a part or assembly on inspection or the value to which the part or assembly is corrected and adjusted. It is given by tolerance.

#### LIMIT

Shows the standard for judging the quality of a part or assembly on inspection and means the maximum or minimum value within which the part or assembly must be kept functionally or in strength. It is a value established outside the range of standard value.

Indicates tightening torque.

Repair kit or set parts are shown. (Only very frequently used parts are shown.)

Removal steps:

The numbers before part names correspond to numbers in the illustration, and indicate the order of removal.

Disassembly steps:

The numbers before part names correspond to numbers in the illustration, and indicate the order of disassembly.

Installation steps:

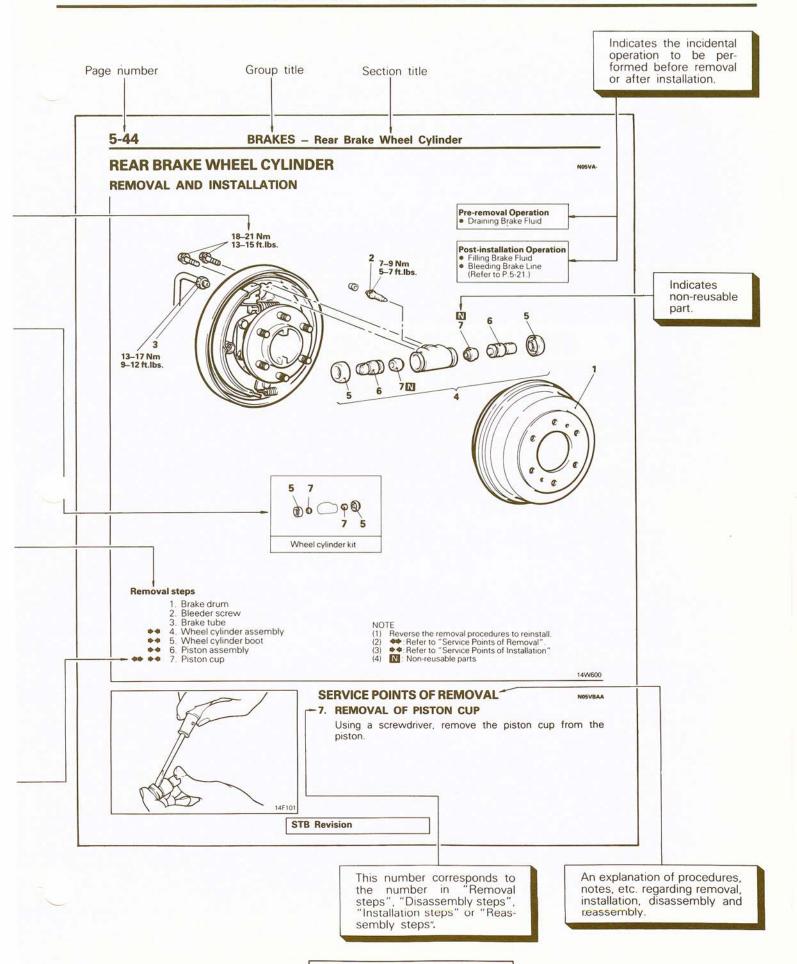
This is provided if installation cannot be made in the reverse order of "Removal steps"; omitted if installation in the reverse order of "Removal steps" is possible.

Reassembly steps:

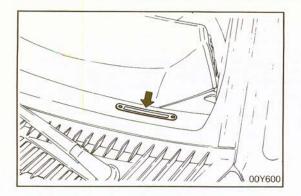
This is provided if reassembly cannot be made in the reverse order of "Disassembly steps"; omitted if reassembly in the reverse order of "Disassembly steps" is possible.

Classification of SERVICE POINTS

- Removal
- Installation
- Disassembly
- Reassembly



**STB** Revision



#### VEHICLE IDENTIFICATION

N00CA--

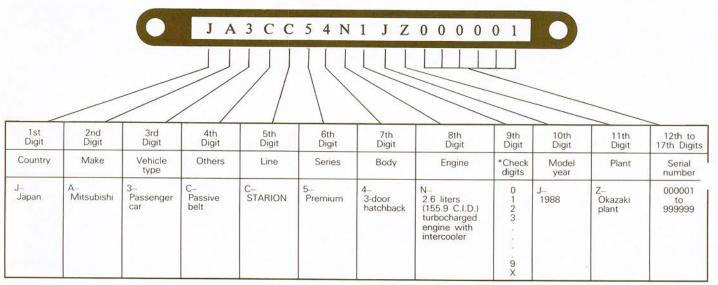
#### VEHICLE IDENTIFICATION NUMBER LOCATION

The vehicle identification number (V.I.N.) is located on a plat attached to the left top side of the instrument panel and visible through the windshield.

#### VEHICLE IDENTIFICATION CODE CHART PLATE

MOOCE.

All vehicle identification numbers contain 17 digits. The vehicle number is a code which tells country, make, vehicle type, etc.



NOTE

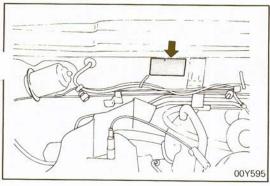
#### **VEHICLE IDENTIFICATION NUMBER LIST**

N00CC- -

| V.I.N.<br>(except sequence number)                       | Brand<br>(Package) | Destination                                      | Engine<br>displacement         | Models code  |
|--|--------------------|--|--------------------------------|--|
| JA3CC54N□JZ<br>JA3CC54N□JZ<br>JA3CC54N□JZ<br>JA3CC54N□JZ | Mitsubishi         | Federal<br>California*<br>Federal<br>California* | 2.555 liters<br>(155.9 C.I.D.) | A187AMNFGLF<br>A187AMNFGLH<br>A187AMRFGLF<br>A187AMRFGLH |

<sup>\*</sup> Can also be sold in Federal states.

<sup>\* &</sup>quot;Check digit" means a single number or letter X used to verify the accuracy of transcription of vehicle identification number.



# MITSUBISHI MOTORS CORPORATION MODEL O TRANS AXLE COLOR, TRIM 3

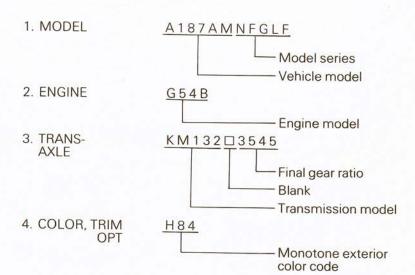
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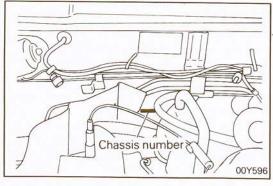
#### VEHICLE INFORMATION CODE PLATE

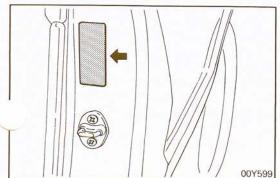
IOOCD

Vehicle information code plate is riveted onto the firewall in the engine compartment.

The plate shows model code, engine model, transmission model, final gear ratio, and body color code.





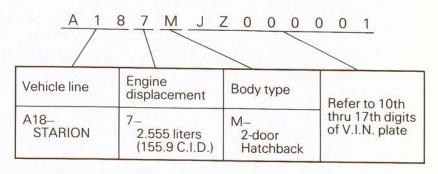


## CHASSIS NUMBER STAMPING LOCATION

NOOCE- -

The chassis number is stamped on the top center of the firewall located in the engine compartment.

#### CHASSIS NUMBER CODE CHART

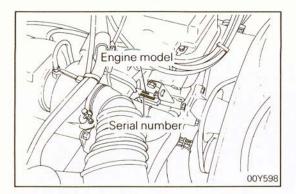


#### **VEHICLE SAFETY CERTIFICATION LABEL**

NOOCF--

The vehicle safety certification label is attached to face of left door pillar.

This label indicates the month and year of manufacture, Gross Vehicle Weight Rating (G.V.W.R.), Gross Axle Weight Rating (G.A.W.R.) front and rear, and Vehicle Identification Number (V.I.N.).



#### **ENGINE MODEL STAMPING**

NOOCG-

The engine model number is stamped at the right front side on the top edge of the cylinder block as shown in the following:

| Engine model | Engine displacement         |
|--------------|-----------------------------|
| G54B         | 2.555 liters (155.9 C.I.D.) |

The engine serial number is stamped near the engine model number, and the serial number cycles, as shown below.

| Engine serial number | Number cycling        |
|----------------------|-----------------------|
| AA0201 to YY9999     | AA0201 → AA9999 ¬     |
|                      | AB0001 ——— → AY9999 ¬ |
|                      | BA0001 ————→ YY9999   |

#### **BODY COLOR CODE**

NOOCH-

| Exterior code | Body color        |
|---------------|-------------------|
| H84           | Silver (Metallic) |
| L83           | Gray (Metallic)   |
| R04           | Red               |
| W09           | White             |
| X15           | Black             |

# 

#### THEFT PROTECTION

NO0CIAA

To provide protection against theft, the vehicle identification number (V.I.N.) is stamped on or its label is affixed to the following major engine, transmission parts and body outer panels.

Engine cylinder block, transmission housing, fender, quarter panel, hood, rear hatch and bumpers.

The theft protection label is also affixed to each of major body outer panels for servicing, while the same information as the theft protection label is stamped on the engine and transmission for servicing.

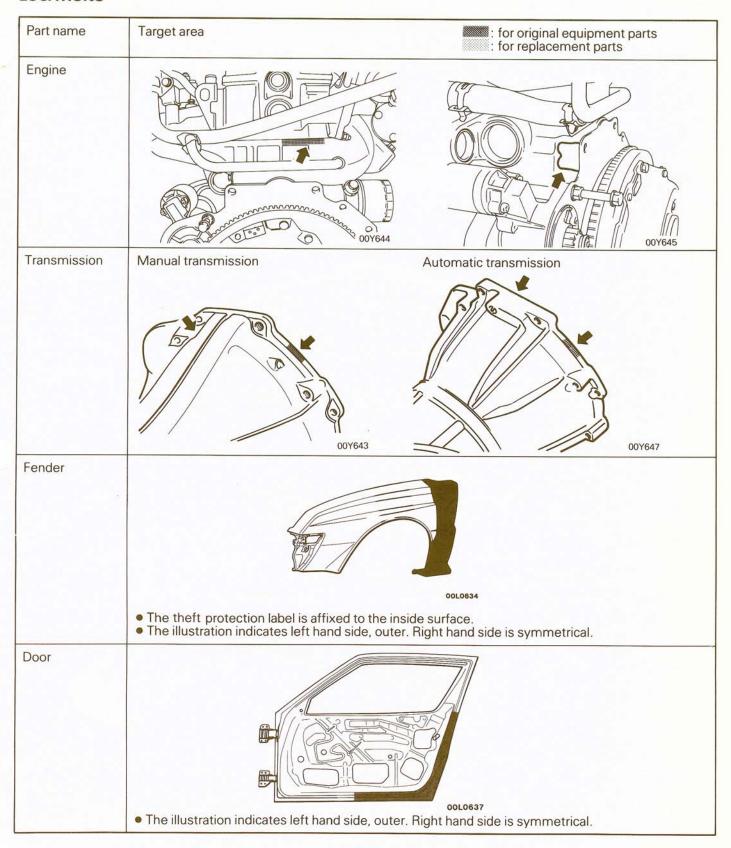
#### Caution

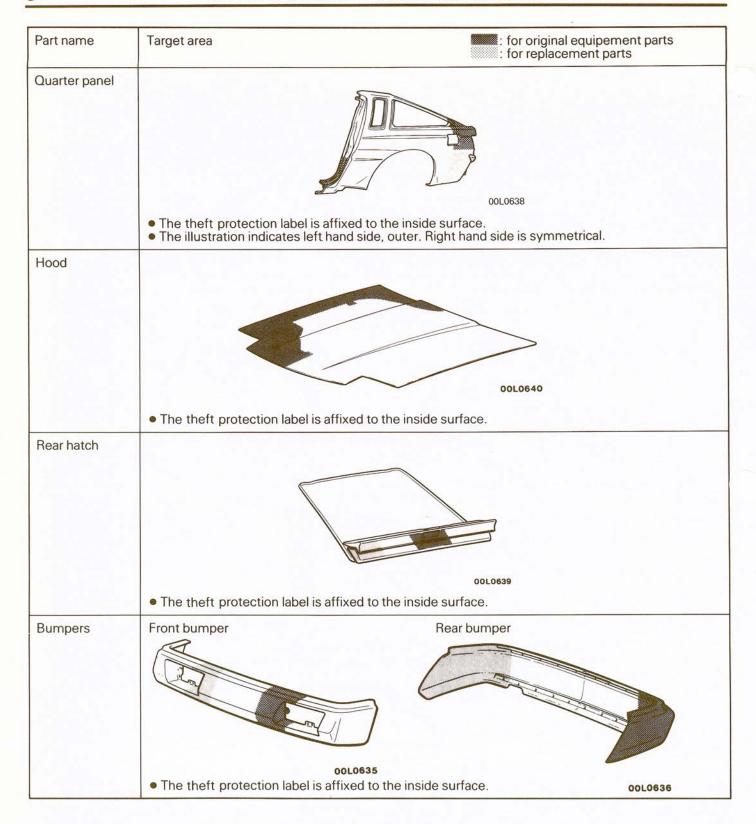
- Affix masking tape to the theft protection label before repainting the original part. After painting, be sure to remove the masking tape.
- 2. The theft protection label on the service part has masking tape affixed to it. Therefore, paint the part as is and remove the masking tape after painting.
- Do not remove the theft protection label from the original or service part.

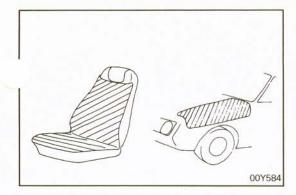
**STB Revision** 

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#### **LOCATIONS**







#### PRECAUTIONS BEFORE SERVICE

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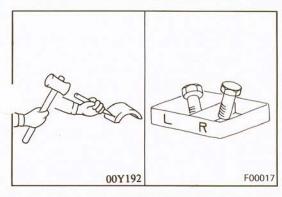
#### PROTECTING VEHICLE

If there is a likelihood of damaging painted or interior parts during service operations, protect them with suitable covers (such as seat covers, fender covers, etc.).



#### REMOVAL AND DISASSEMBLY

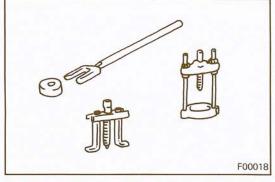
When checking a malfunction, find the cause of the problem. If it is determined that removal and/or disassembly is necessary, perform the work by following the procedures contained in this Service Manual.



If punch marks or mating marks are made to avoid error in assembly and to facilitate the assembly work, be sure to make them in locations which will have no detrimental effect on performance and/or appearances.

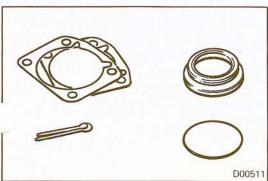
If an area having many parts, similar parts, and/or parts which are symmetrical right and left is disassembled, be sure to arrange the parts so that they do not become mixed during the assembly process.

- 1. Arrange the parts removed in the proper order.
- 2. Determine which parts are to be reused and which are to be replaced.
- 3. If bolts, nuts, etc., are to be replaced, be sure to use only the exact size specified.



#### SPECIAL TOOLS

If other tools are substituted for the special tools to do service or repair work, there is the danger that vehicle parts might be damaged, or the technician might be injured; therefore, be sure to use the special tool whenever doing any work for which the use of one is specified.



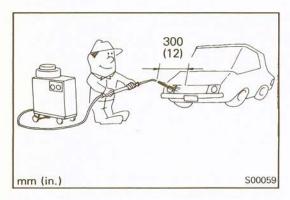
#### PARTS TO BE REPLACED

If any of the following parts are removed, they must be replaced with new parts.

- 1. Oil seals
- 2. Gaskets (except rocker cover gasket)
- 3. Packings
- 4. O-rings
- 5. Lock washers
- 6. Cotter pins
- 7. Self-locking nuts

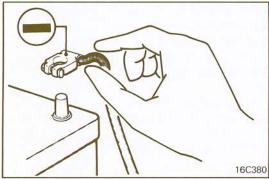
#### PARTS

When replacing parts, use Mitsubishi genuine parts.



#### **VEHICLE WASHING**

If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to maintain the spray nozzle at a distance of at least 300 mm (12 in.) from any plastic parts and all opening parts (doors, luggage compartment, sunroof, etc.).



#### SERVICING ELECTRICAL SYSTEM

1. When servicing the electrical system, pay attention to the following.

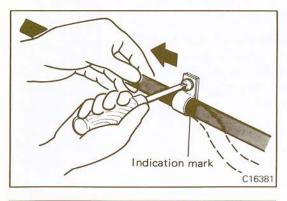
Never attempt to modify an electrical unit or to change wirings, which may otherwise cause not only a vehicle failure but a vehicle fire due to over-capacity load short-circuit.

2. Before servicing the electrical system, disconnect the negative cable terminal from the battery.

#### Caution

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.)

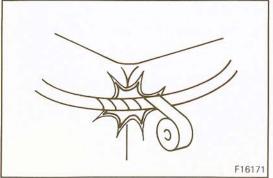


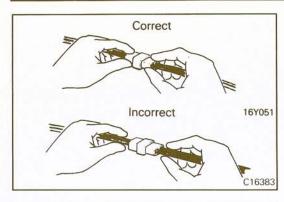
#### **WIRING HARNESSES**

 Secure the wiring harnesses by using clamps. However, for any harness which passes to the engine or other vibrating parts of the vehicle, allow some slack within a range that does not allow the engine vibrations to cause the harness to come into contact with any of the surrounding parts. Then secure the harness by using a clamp.

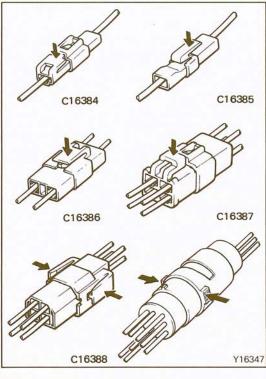
In addition, if a mounting indication mark (yellow tape) is on a harness, secure the indication mark in the specified location.

2. If any section of a wiring harness contacts the edge of a part, or a corner, wrap the section of the harness with tape or something similar in order to protect it from damage.

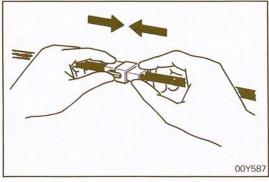




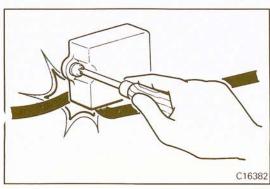
3. When disconnecting a connector, be sure to pull only the connector, not the harness.



4. Disconnect connectors which have catches by pressing in the direction indicated by the arrows in the illustration.

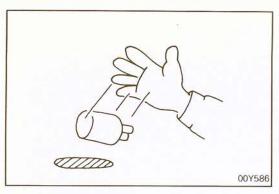


5. Connect connectors which have catches by inserting the connectors until they snap.

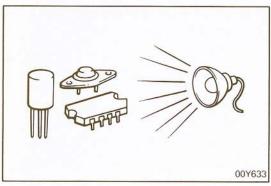


#### **ELECTRICAL COMPONENTS**

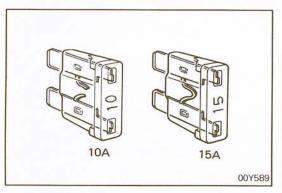
1. When installing any of the vehicle parts, be careful not to pinch or damage any of the wiring harnesses.



Sensors, relays, etc., are sensitive to strong impacts. Handle them with care so that they are not dropped or mishandled.



3. The electronic parts used for relays, etc., are sensitive to heat. If any service which causes a temperature of 80°C (176°F) or more is performed, remove the part or parts in question before carrying out the service.



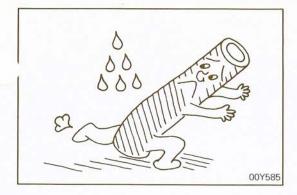
| Manainal             | SAE    | Permissible current   |       |  |
|----------------------|--------|-----------------------|-------|--|
| Nominal gauge No.    |        | In engine compartment | Other |  |
| 0.3 mm <sup>2</sup>  | AWG 22 | _                     | 5A    |  |
| 0.5 mm <sup>2</sup>  | AWG 20 | 7A                    | 13A   |  |
| 0.85 mm <sup>2</sup> | AWG 18 | 9A                    | 17A   |  |
| 1.25 mm <sup>2</sup> | AWG 16 | 12A                   | 22A   |  |
| 2.0 mm <sup>2</sup>  | AWG 14 | 16A                   | 30A   |  |
| 3.0 mm <sup>2</sup>  | AWG 12 | 21A                   | 40A   |  |
| 5.0 mm <sup>2</sup>  | AWG 10 | 31A                   | 54A   |  |

#### **FUSES AND FUSIBLE LINKS**

1. If a blown-out fuse is to be replaced, be sure to use only a fuse of the specified capacity. If a fuse of a capacity larger than that specified is used, parts may be damaged and the circuit may not be protected adequately.

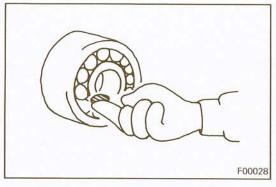
#### Caution

- 1. If a fuse is blown-out, be sure to eliminate the cause of the problem before installing a new fuse.
- Check the condition of fuse holders. If rust or dirt is found, clean metal parts with a fine-grained sandpaper until proper metal-to-metal contact is made. Poor contact of any fuse holder will often lead to voltage drop or heating in the circuit and could result in improper circuit operation.
- 2. If additional optional equipment is to be installed in the vehicle, follow the procedure listed in the appropriate instruction manual; however, be sure to pay careful attention to the following points:
  - (1) In order to avoid overloading the wiring, take the electrical current load of the optional equipment into consideration, and determine the appropriate wire size.
  - (2) Where possible, route the wiring through the existing harnesses.
  - (3) If an ammeter or similar instrument is to be connected to a live-wire circuit, use tape to protect the wire, use a clamp to secure the wire, and make sure that there is no contact with any other parts.
  - (4) Be sure to provide a fuse for the load circuit of the optional equipment.



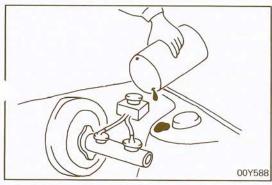
#### **TUBES AND OTHER RUBBER PARTS**

Be careful to avoid spilling any gasoline, oil, etc., because if it adheres to any tubes or other rubber parts, they might be adversely affected.



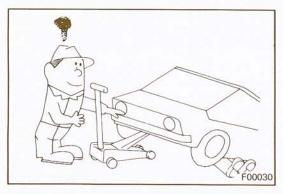
#### **LUBRICANTS**

In accordance with the instructions in this Service Manual, apply the specified lubricants in the specified locations during assembly and installation.



#### **BRAKE FLUID**

Be careful to avoid spilling any brake fluid on painted surfaces, because the paint coat might be discolored or damaged.



#### DOING SERVICE WORK IN GROUPS OF TWO OR MORE TECHNICIANS

If the service work is to be done by two or more technicians working together, extra caution must be taken.

#### NOTE ON INSTALLATION OF RADIO EQUIPMENT

OOEA

The computers of the electronic control system has been designed so that external radio waves will not interfere with their operation.

However, if antenna or cable of amateur transceiver etc. is routed near the computers, it may affect the operation of the computers, even if the output of the transceiver is no more than 25W.

To protect each of the computers from interference by transmitter (hum, transceiver, etc.), the following should be observed.

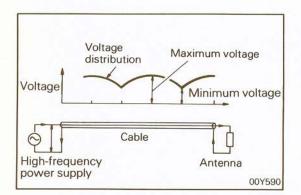
- 1. Install the antenna on the roof or rear bumper.
- Because radio waves are emitted from the coaxial cable of the antenna, keep it 200 mm (8 in.) away from the computers and the wiring harness. If the cable must cross the wiring harness, route it so that it runs at right angles to the wiring harness.
- 3. The antenna and the cable should be well matched, and the standing-wave ratio\* should be kept low.
- 4. A transmitter having a large output should not be installed in the vehicle.
- 5. After installation of transmitter, run the engine at idle, emit radio waves from the transmitter and make sure that the engine is not affected.

#### \*STANDING-WAVE RATIO

If an antenna and a cable having different impedances are connected, the input impedance Zi will vary in accordance with the length of the cable and the frequency of the transmitter, and the voltage distribution will also vary in accordance with the location.

The ratio between this maximum voltage and minimum voltage is called the standing-wave ratio. It can also be represented by the ratio between the impedances of the antenna and the cable.

The amount of radio waves emitted from the cable increases as the standing-wave ratio increases, and this increases the possibility of the electronic components being adversely affected.



#### **TOWING AND HOISTING**

NOOGA--

#### WRECKER TOWING

- 1. This vehicle cannot be towed with sling-type equipment.
- 2. If a vehicle is towed from the front, use wheel lift or flat bed equipment.
- 3. If a vehicle is towed from the rear, use flat bed equipment.

#### SAFETY PRECAUTIONS

- Any loose or protruding parts of damaged vehicle such as hoods, doors, fenders, trim, etc., should be secured prior to moving the vehicle.
- 2. Operator should refrain from going under a vehicle such as hood, doors, fenders, trim, etc., unless the vehicle is adequately supported by safety stands.
- 3. Never allow passengers to ride in a towed vehicle.
- 4. State and local rules and regulations must be followed when towing a vehicle.

#### HOISTING

#### POST TYPE

Special care should be taken when raising the vehicle on a frame contact type hoist. The hoist must be equipped with the proper adapters in order to support the vehicle at the proper locations. (Next page)

Conventional hydraulic hoists may be used after determining that the adapter plates will make firm contact with the front/rear crossmembers.

#### **FLOOR JACK**

A regular floor jack may be used under the front/rear cross-members.

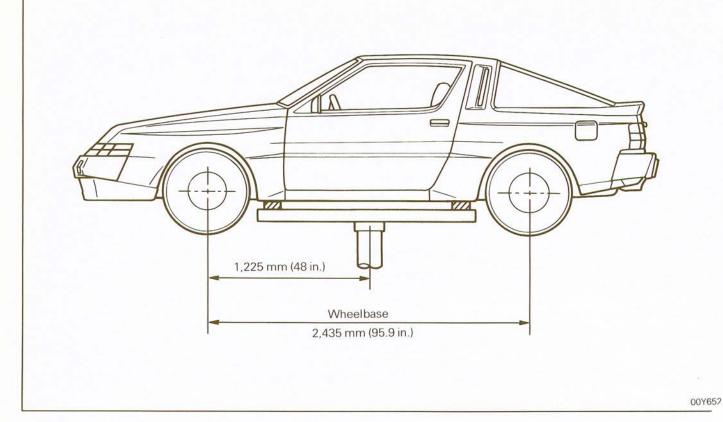
#### Caution

- A floor jack must never be used on any part of the underbody.
- Do not attempt to raise one entire side of the vehicle by placing a jack midway between front and rear wheels. This practice may result in permanent damage to the body.

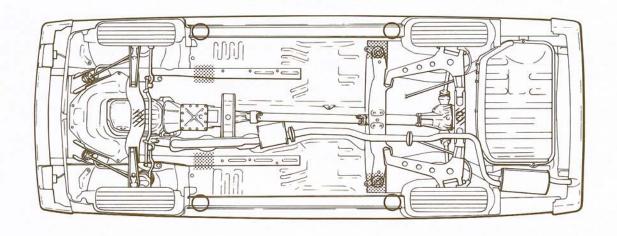
#### **EMERGENCY JACKING**

Jack receptacles are located at the body sills to accept the scissors jack supplied with the vehicle for emergency road service. Always block opposite wheels and jack on level surface.

#### FRAME CONTACT SUPPORT LOCATION



#### LIFTING, JACKING SUPPORT LOCATION



Frame contact hoist

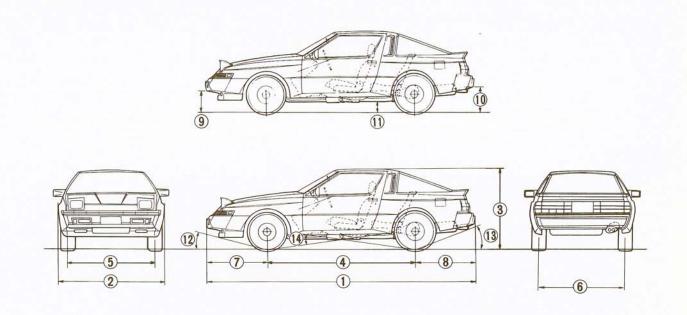
Floor jack

Twin post hoist or scissors jack (emergency) locations

00Y196

#### **GENERAL DATA AND SPECIFICATIONS**

NOOHA--



00Y653

| Items                   |               |     | A187AMNFGLF<br>A187AMNFGLH | A187AMRFGLF<br>A187AMRFGLH |
|-------------------------|---------------|-----|----------------------------|----------------------------|
| Vehicle dimensions m    | m (in.)       |     |                            |                            |
| Overall length          |               | 1   | 4,400 (173.2)              | 4,400 (173.2)              |
| Overall width           |               | 2   | 1,735 (68.3)               | 1,735 (68.3)               |
| Overall height          |               | 3   | 1,275 (50.2)               | 1,275 (50.2)               |
| Wheel base              |               | 4   | 2,435 (95.9)               | 2,435 (95.9)               |
| Tread                   | Front         | (5) | 1,465 (57.7)               | 1,465 (57.7)               |
|                         | Rear          | 6   | 1,455 (57.3)               | 1,455 (57.3)               |
| Overhang                | Front         | 7   | 970 (38.2)                 | 970 (38.2)                 |
|                         | Rear          | 8   | 995 (39.2)                 | 995 (39.2)                 |
| Height at curb mass (v  | vt.)          |     |                            |                            |
| Front bumper to gro     | ound          | 9   | 355 (14.0)                 | 355 (14.0)                 |
| Rear bumper to gro      | und           | 10  | 370 (14.6)                 | 370 (14.6)                 |
| Minimum running grou    | und clearance | 11  | 115 (4.5)                  | 115 (4.5)                  |
| Angle of approach       |               | 12  | 16°                        | 16°                        |
| Angle of departure      |               | 13  | 19°                        | 19°                        |
| Ramp breakover angle    |               | 14  | 12°                        | 12°                        |
| Vehicle weights kg (lbs | s.)           |     |                            |                            |
| Curb weight             |               |     | 1,402 (3,090)              | 1,432 (3,157)              |
| Gross vehicle weight r  | rating        |     | 1,840 (4,056)              | 1,840 (4,056)              |
| Gross axle weight ratio | ng Front      |     | 885 (1,951)                | 885 (1,951)                |
|                         | Rear          |     | 955 (2,105)                | 995 (2,105)                |
| Seating capacity        |               |     | 5                          | 5                          |

| Items                      |        | A187AMNFGLF<br>A187AMNFGLH         | A187AMRFGLF<br>A187AMRFGLH         |
|----------------------------|--------|------------------------------------|------------------------------------|
| Engine                     |        |                                    |                                    |
| Model No.                  |        | G54B with turbo                    | G54B with turbo                    |
| Type                       |        | In line OHC                        | In line OHC                        |
| Number of cylinders        |        | 4                                  | 4                                  |
| Bore mm (in.)              |        | 91.1 (3.59)                        | 91.1 (3.59)                        |
| Stroke mm (in.)            |        | 98.0 (3.86)                        | 98.0 (3.86)                        |
| Piston displacement cm³ (C | D)     | 2,555 (155.9)                      | 2,555 (155.9)                      |
| Compression ratio          |        | 7.0                                | 7.0                                |
| Firing order               |        | 1-3-4-2                            | 1-3-4-2                            |
| Basic ignition timing      |        | 10° BTDC                           | 10° BTDC                           |
| Manual transmission        |        |                                    |                                    |
| Model No.                  |        | KM132                              |                                    |
| Type                       |        | 5-speed manual                     |                                    |
| Gear ratio 1:              | t      | 3.369                              | _                                  |
| 21                         | d      | 2.035                              | z <del></del> .                    |
| 31                         | d      | 1.360                              | _                                  |
| 4                          | h      | 1.000                              | -                                  |
| 51                         | h      | 0.856                              |                                    |
| R                          | everse | 3.578                              | 1-1                                |
| Automatic transmission     |        |                                    |                                    |
| Model No.                  |        |                                    | JM600                              |
| Туре                       | _      |                                    | 4-speed automatic                  |
| Gear ratio 1:              | t      |                                    | 2.458                              |
| 21                         | d      |                                    | 1.458                              |
| 31                         | 777    | -                                  | 1.000                              |
| 41                         |        |                                    | 0.686                              |
| R                          | everse | \ <del>=</del> -                   | 2.182                              |
| Final drive gear ratio     |        | 3.545                              | 3.545                              |
| Clutch                     |        |                                    |                                    |
| Туре                       |        | Dry-single disc & diaphragm spring | Dry-single disc & diaphragm spring |

| Items              |       |   |  |   | AMRFGLF<br>AMRFGLH                               |  |
|--------------------|-------|---|--|---|--|--|
| hassis             |       |   |  |   |  |  |
| Tire               |       | Front<br>205/55VR16<br>or<br>225/50VR16<br>Radial | Rear<br>225/50VR16<br>or<br>245/45VR16<br>Radial | Front<br>205/55VR16<br>or<br>225/50VR16<br>Radial | Rear<br>225/50VR16<br>or<br>245/45VR16<br>Radial |  |
| Front suspension   |       |   |  |   |  |  |
| Type               |       | Independent strut                                 |  | Independent strut                                 |  |  |
| Rear suspension    |       |   |  |   |  |  |
| Type               |       | Independ  | ent strut  | Independ  | ent strut  |  |
| Brakes             |       |   |  |   |  |  |
| Type               | Front | Di  | sc   | Di  | sc   |  |
|                    | Rear  | Di  | sc   | Di  | sc   |  |
| Power steering     |       |   |  |   |  |  |
| Gear type          |       |   | al type<br>ng ball nut)                          | Integra<br>(Recirculatir                          |  |  |
| Gear ratio         |       | 14.3 (Constant ratio gear) 14.3 (Constant ratio   |  |   |  |  |
| Fuel tank capacity |       | 75 liters (                                       | 19.8 gals.)                                      | 75 liters (                                       | 75 liters (19.8 gals.)                           |  |

#### **TIGHTENING TORQUE**

NOOJA--

| Description                                   | Head mark 4           |                        | He                                 | Head mark (7)   |  |
|---|-----------------------|------------------------|------------------------------------|---|--|
|   | Nm                    | ft.lbs.                | Nm                                 | ft.lbs.   |  |
| Thread for general purposes (size x pitch) mm |                       |                        |                                    |   |  |
| 6 x 1.0                                       | 3.0 - 3.9             | 2.2 - 2.9              | 4.9 – 7.8                          | 3.6 - 5.8   |  |
| 8 x 1.25                                      | 7.9 – 12              | 5.8 – 8.7              | 13 – 19                            | 9.4 – 14  |  |
| 10 x 1.25                                     | 16 – 23               | 12 – 17                | 27 – 39                            | 20 – 29   |  |
| 12 x 1.25                                     | 29 – 43               | 21 – 32                | 47 – 72                            | 35 – 53   |  |
| 14 x 1.5                                      | 48 – 70               | 35 – 52                | 77 – 110                           | 57 – 85   |  |
| 16 x 1.5                                      | 67 – 100              | 51 – 77                | 130 – 160                          | 90 – 120  |  |
| 18 x 1.5                                      | 100 – 150             | 74 – 110               | 180 – 230                          | 130 – 170   |  |
| 20 x 1.5                                      | 150 – 190             | 110 – 140              | 260 – 320                          | 190 – 240   |  |
| 22 x 1.5                                      | 200 – 260             | 150 – 190              | 340 – 430                          | 250 – 320   |  |
| 24 x 1.5                                      | 260 – 320             | 190 – 240              | 420 – 550                          | 310 – 410   |  |
| Items   | Nm                    | ft.lbs.                | Remarks                            |   |  |
| Taper thread for pipes (size)                 |                       |                        |                                    |   |  |
| PT 1/8  | 7.9 – 12<br>16 – 19   | 5.8 – 8.7<br>12 – 14   | Internal thread<br>Internal thread |   |  |
| PT 1/4  | 19 – 30<br>34 – 45    | 14 – 22<br>25 – 33     | Internal thread<br>Internal thread |   |  |
| PT 3/8  | 39 – 54<br>58 – 73    | 29 – 40<br>43 – 54     | Internal thread<br>Internal thread |   |  |
| Taper thread for dry sealed pipes (size)      |                       |                        |                                    | 1-1-1-1   |  |
| NPTF 1/16                                     | 4.9 – 7.8<br>7.9 – 12 | 3.6 – 5.8<br>5.8 – 8.7 | Internal thread<br>Internal thread |   |  |
| NPTF 1/8                                      | 7.9 – 12<br>16 – 19   | 5.8 – 8.7<br>12 – 14   |                                    | Internal thread: Aluminum<br>Internal thread: Cast iron |  |
| NPTF 1/4                                      | 19 – 30<br>34 – 45    | 14 – 22<br>25 – 33     | Internal thread<br>Internal thread |   |  |

# **ELECTRICAL**

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#### **ELECTRICAL SYSTEM PARTS LOCATION**

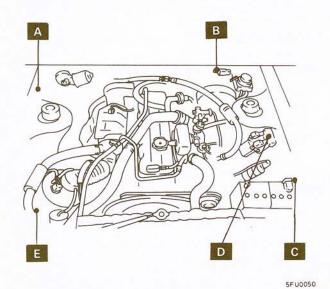
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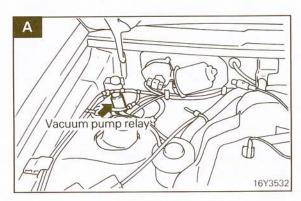
#### **RELAY · CONTROL UNIT**

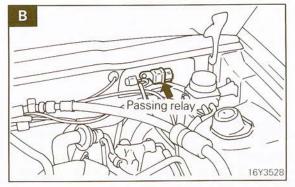
| Name                                   | Symbol |
|--|--------|
| Automatic air conditioner control unit | Н      |
| Automatic seat belt control unit       | L      |
| Blower motor high speed relay          | 1      |
| Blower motor starter cutout relay      | T      |
| Blower relay                           | G      |
| Condenser fan motor relay              | D      |
| Defogger relay                         | С      |
| Door lock relay                        | F      |
| Door unlock relay                      | F      |
| ECI control relay                      | J      |
| ECI control unit                       | J      |
| Fog light relay                        | E      |
| Hazard flasher unit                    | F      |
| Lighting relay                         | С      |
| Magnet clutch relay                    | D      |
| Motor antenna relay                    | N      |
| Overdrive relay                        | F      |

| Name                                   | Symbol |
|--|--------|
| Passing control relay                  | K      |
| Passing relay (for theft-alarm system) | В      |
| Pop-up relay                           | С      |
| Power window relay                     | С      |
| Radiator fan air conditioner relay     | D      |
| Radiator fan motor relay               | Е      |
| Rear brake lock-up control relay       | F      |
| Rear brake lock-up control unit        | 0      |
| Rear intermittent wiper relay          | Р      |
| Speed control unit                     | N      |
| Starter inhibitor relay                | С      |
| TAC unit                               | М      |
| Theft-alarm horn relay                 | D      |
| Turn signal flasher unit               | F      |
| Vacuum pump relay                      | А      |
| Wiper relay                            | С      |

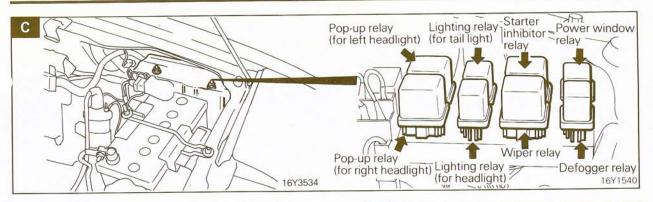
#### **ENGINE COMPARTMENT**

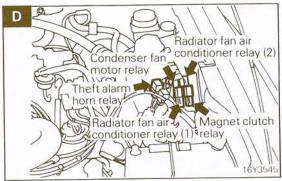


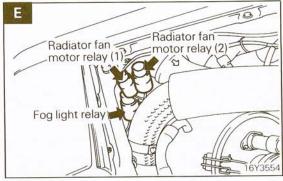




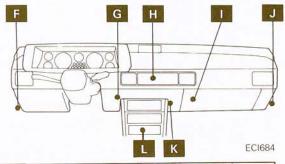
**STB Revision** 

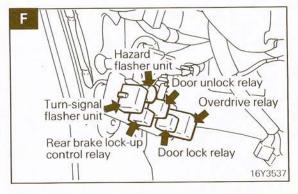


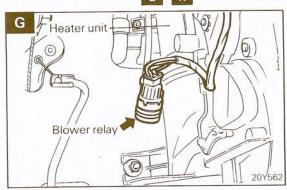


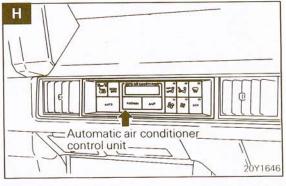


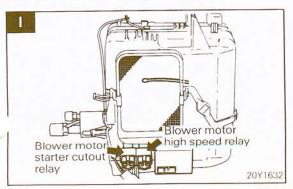
#### **INSTRUMENT PANEL**

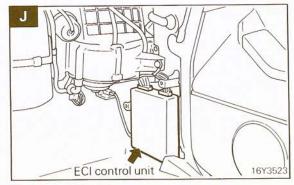


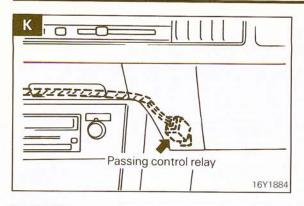




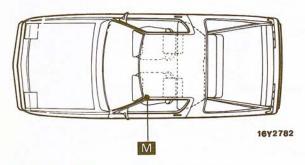




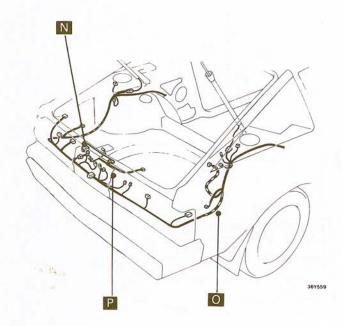


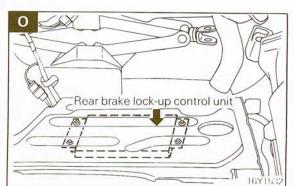


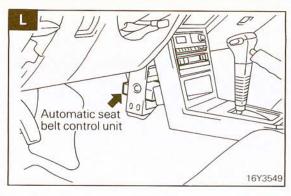
#### **FLOOR**



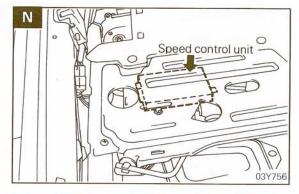
#### LUGGAGE COMPARTMENT

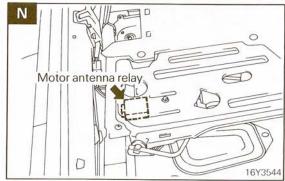


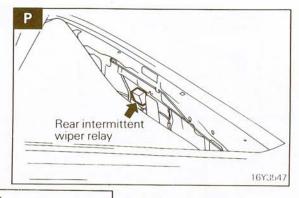










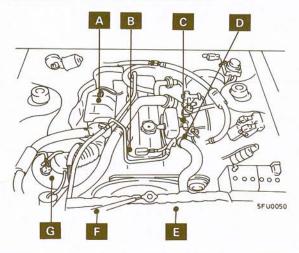


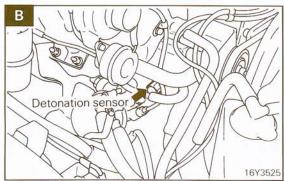
#### **SENSOR**

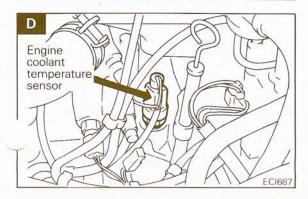
| Name                              | Symbol |
|-----------------------------------|--------|
| Air flow sensor                   | G      |
| Detonation sensor                 | В      |
| Engine coolant temperature sensor | D      |
| Foot area temperature sensor      | J      |
| G-sensor                          | L      |

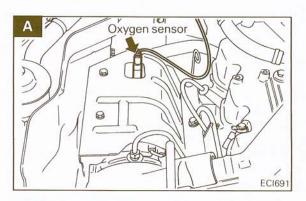
| Name                        | Symbol |
|-----------------------------|--------|
| Interior temperature sensor | K      |
| Oxygen sensor               | А      |
| Photo sensor                | Н      |
| Thermistor                  | 1      |
| Thermosensor No. 1          | F      |
| Thermosensor No. 2          | E      |
| Throttle position sensor    | С      |

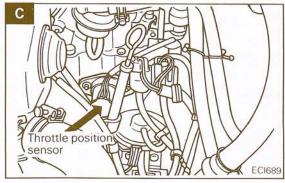
#### **ENGINE COMPARTMENT**

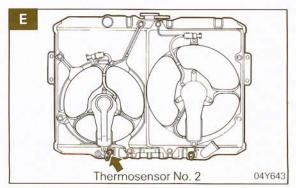


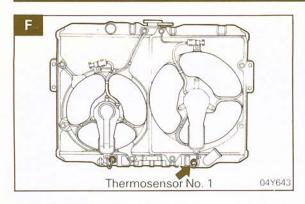




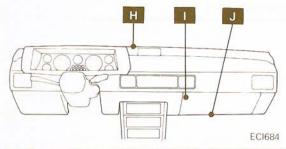


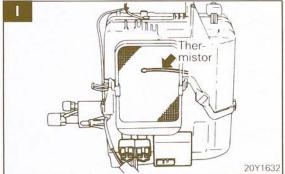




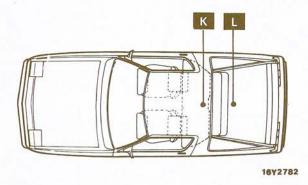


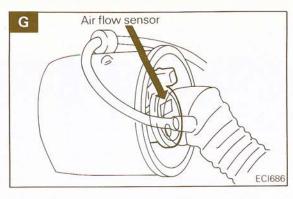
**INSTRUMENT PANEL** 

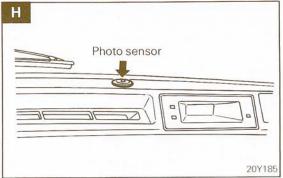


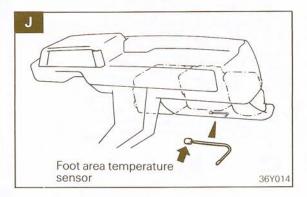


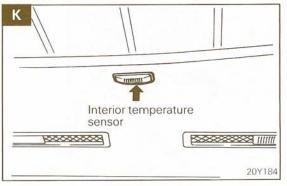
ROOF, LUGGAGE COMPARTMENT

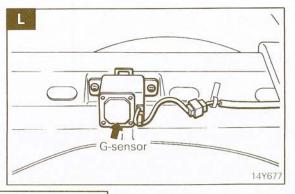






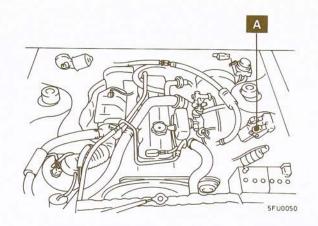






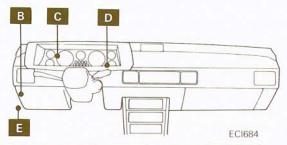
#### DIODE

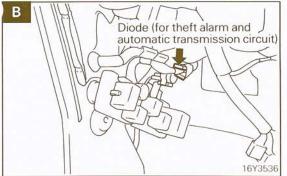
#### **ENGINE COMPARTMENT**

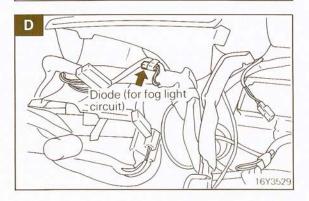


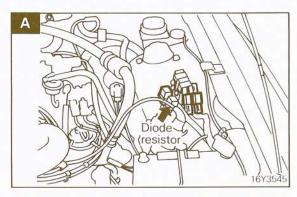
| Name   | Symbol |
|--|--------|
| Diode (for fog light circuit)                              | D      |
| Diode (for rear brake lock-up control circuit)             | E      |
| Diode (for theft-alarm and automatic transmission circuit) | В      |
| Diode (for theft-alarm system circuit)                     | С      |
| Diode resistor   | А      |

#### **INSTRUMENT PANEL**

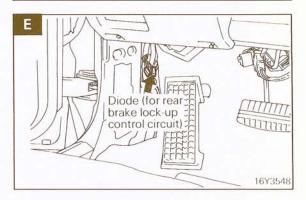




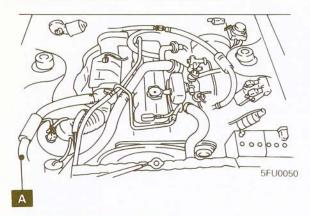






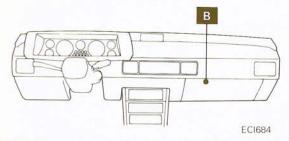


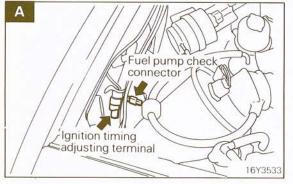
# INSPECTION TERMINAL ENGINE COMPARTMENT

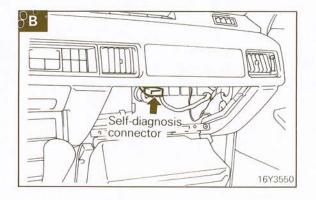


| Name  | Symbol |
|---|--------|
| Fuel pump check connector   | А      |
| Ignition timing adjusting terminal  | А      |
| Self-diagnosis connector<br>(for ECI system, automatic speed<br>control system automatic air<br>conditioning and ETACS) | В      |

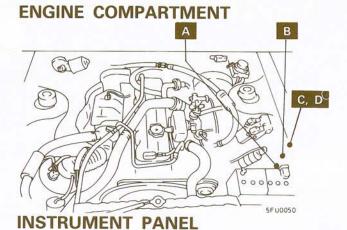
#### **INSTRUMENT PANEL**



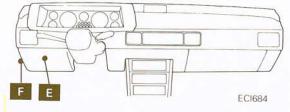


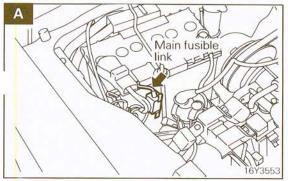


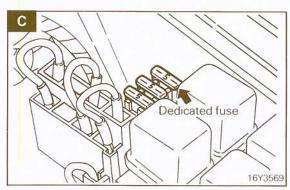
#### **FUSIBLE LINK, FUSE**

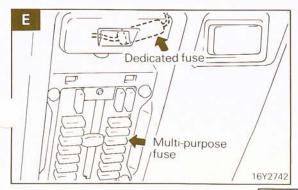


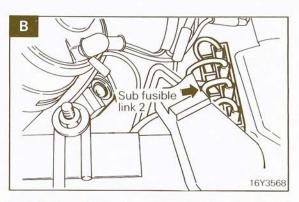
| Name  | Symbol |
|---|--------|
| Circuit breaker<br>(for automatic seat belt)            | F      |
| Dedicated fuse  | С      |
| Dedicated fuse<br>(for heated remote controlled mirror) | Е      |
| Main fusible link                                       | А      |
| Multi-purpose fuse                                      | E      |
| Sub fusible link 1                                      | D      |
| Sub fusible link 2                                      | В      |

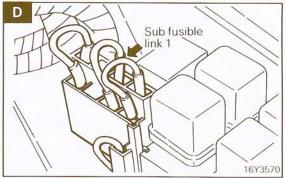


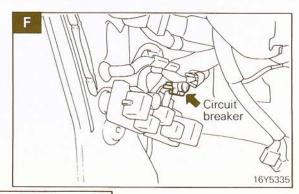






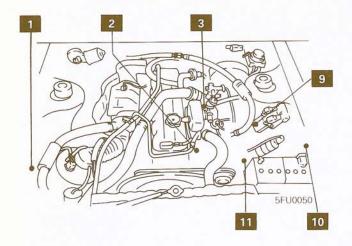




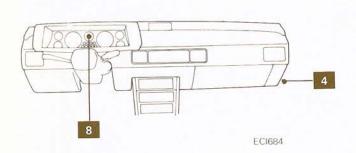


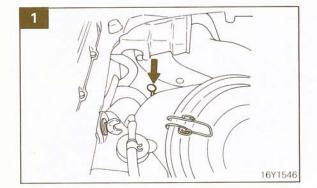
#### GROUNDING

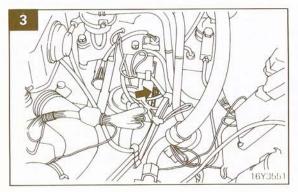
#### **ENGINE COMPARTMENT**



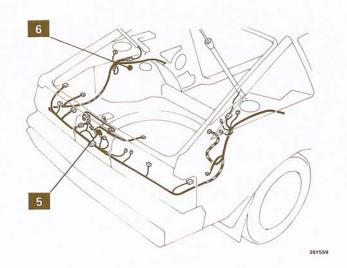
**INSTRUMENT PANEL** 



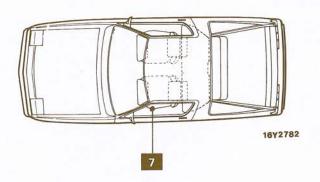


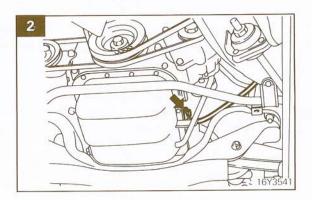


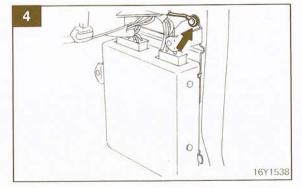
#### LUGGAGE COMPARTMENT

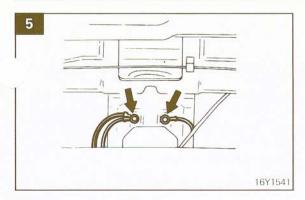


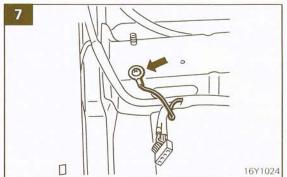
**FLOOR** 

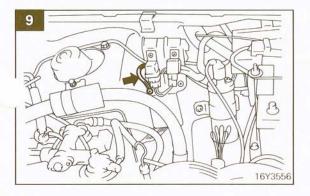


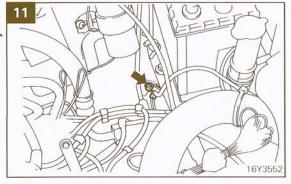


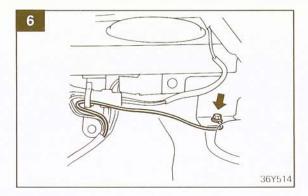


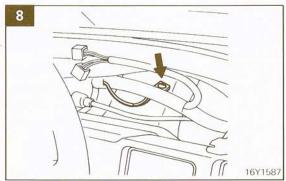


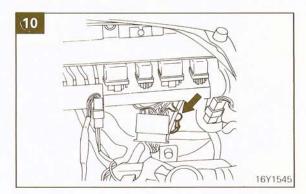


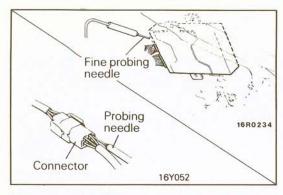


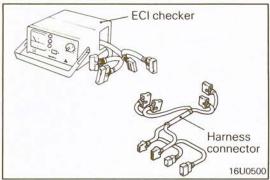


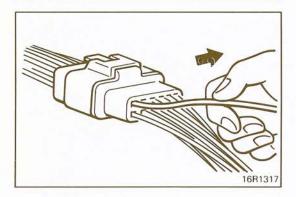












#### INSPECTION OF **HARNESS** CONNECTOR

N08CAA^

#### CONTINUITY AND VOLTAGE TEST FOR CONNEC-TOR

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

#### Caution

Do not insert probing needle from harness side as it will deteriorate waterproof and cause for rusting.

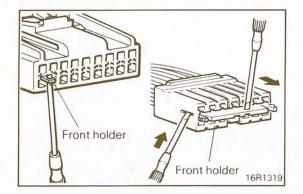
To inspect the energized circuit, use the ECI checker.

#### CHECK FOR IMPROPER ENGAGEMENT OF TER-MINAL

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 termin sometimes slips out to rear side of connector. Ascertain, therefore, that each terminal does not come off connector by pulling each harness wire.

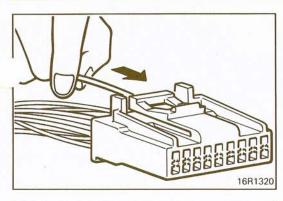
#### **ENGAGING AND DISENGAGING OF CONNECTOR TERMINAL**

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.

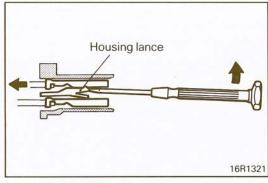


#### COMPUTER CONNECTOR

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



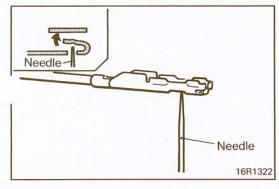
(2) Insert harness of terminal to be rectified deep into connector from harness side and hold it there.



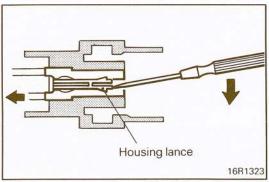
(3) Insert tip of screwdriver [1.4 mm (.06 in.) width] into connector in a manner as shown in the figure, raise housing lance slightly with it and pull out harness.

#### NOTE

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



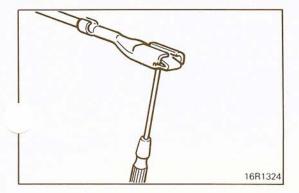
(4) Insert needle through a hole provided on terminal and raise contact point of male terminal.



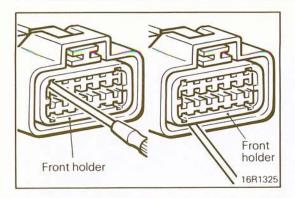
#### ROUND WATERPROOF CONNECTOR

(1) Remove waterproof cap by using a screwdriver.

(2) Insert tip of screwdriver [14 mm (.06 in.) or 20 mm (.08 in.) width] as shown in the figure, raise housing lance slightly with it and pull out harness.

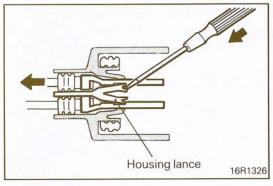


(3) Insert screwdriver through a hole provided on terminal and raise contact point of male terminal.

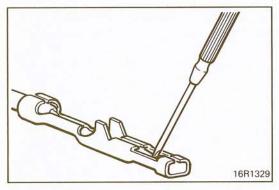


#### RECTANGULAR WATERPROOF CONNECTOR

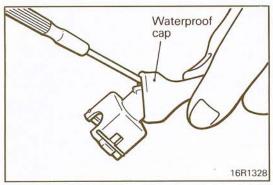
(1) Disengage front holder by using a screwdriver and remove it.



- (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.

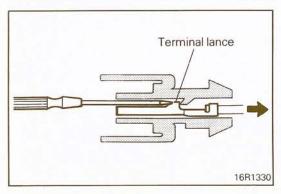


(3) Press contact point of male terminal down by holding a screwdriver [1.4 mm (.06 in.) width] in a manner as shown in the figure.

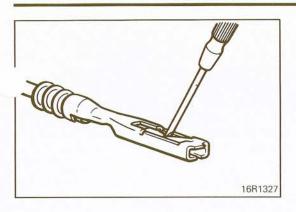


#### INJECTOR CONNECTOR

(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.

# WIRING HARNESS

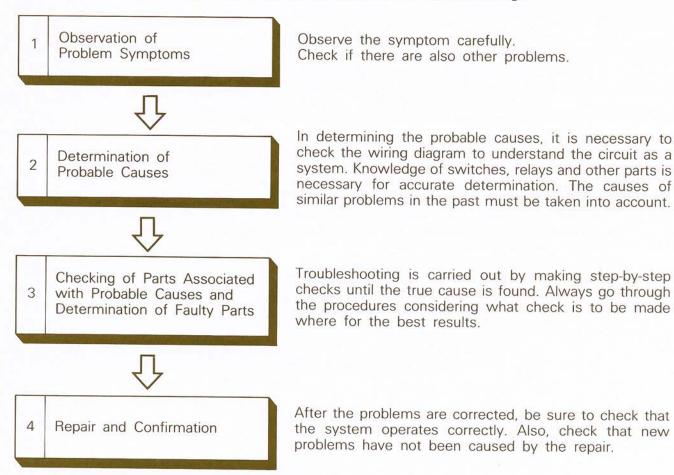
N08DAAA

# **TROUBLESHOOTING**

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.



Information for diagnosis

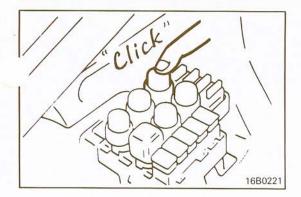
This manual contains the cable diagrams as well as the individual circuit drawings, operational explanations, and troubleshooting hints for each component required to facilitate the task of troubleshooting. The information is compiled in the following manner:

- (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.

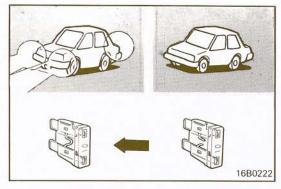
STB Revision



#### INSPECTION

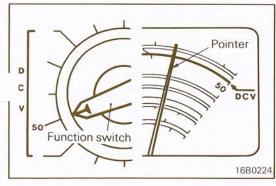
#### 1. VISUAL AND AURAL CHECKS

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.



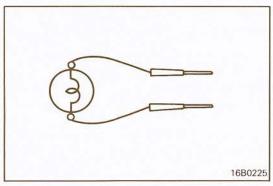
#### 2. SIMPLE CHECKS

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 determine which part is responsible for the problem.



#### 3. CHECKING WITH INSTRUMENTS

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

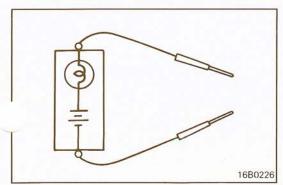


#### **INSPECTION INSTRUMENTS**

In inspection, make use of the following instruments.

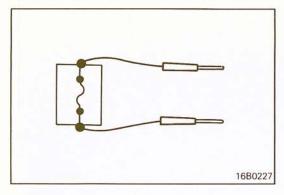
#### 1. TEST LAMPS

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



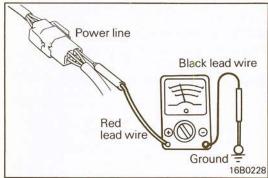
#### 2. SELF-POWER TEST LAMP

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



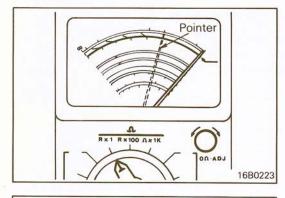
#### 3. JUMPER WIRE

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



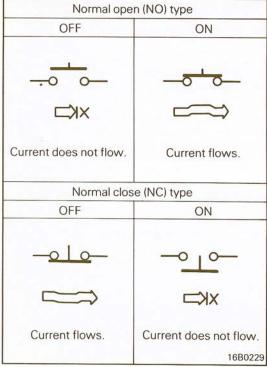
#### 4. VOLTMETER

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



#### 5. OHMMETER

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

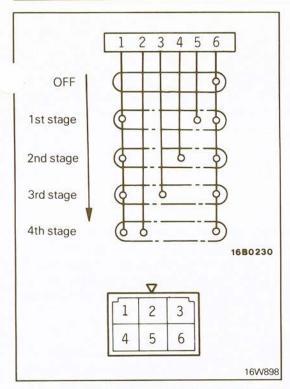


#### **CHECKING SWITCHES**

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.

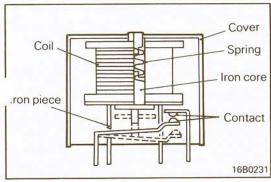


#### 2. SWITCH CONNECTION

This figure illustrates a complex switch. The switch plates indicated by solid lines move in the direction of the arrow when operated. The continuity between terminals at each position is as indicated in the table below.

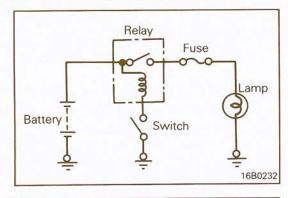
| Terminal No. Position | 1  | 2 | 3   | 4   | 5 | 6  |
|-----------------------|----|---|-----|-----|---|----|
| OFF                   |    |   |     |     |   |    |
| 1st stage             | 0- |   |     |     | 0 | -0 |
| 2nd stage             | 0- |   |     | -0- |   | -0 |
| 3rd stage             | 0  |   | -0- |     |   | -0 |
| 4th stage             | 0  | 0 |     |     |   | 0  |

NOTE: O-O denotes continuity between terminals.



#### **CHECKING RELAYS**

 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).



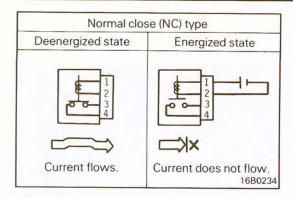
2. By using a relay, a heavy current can be turned on and off by a switch of small capacity. For example, in the circuit shown here, when the switch is turned on (closed), current flows to the coil of the relay.

Then, its contact is turned on (closed) and the lamp comes on. The current flowing at this time to the switch is the relay coil current only and is very small.

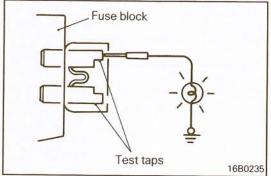
- 3. The relays may be classified into the normal open type and the normal close type by their contact construction.

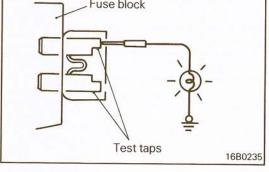
NOTE

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 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).





# State of fuse blown due to overcurrent 16B0237

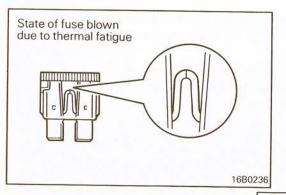
#### CHECKING FUSES

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 lamp 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.)

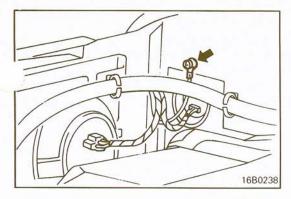
#### CAUTIONS IN EVENT OF BLOWN FUSE

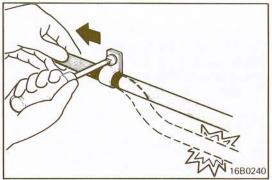
When a fuse is blown, there are two probable causes as follows: One is that it is blown due to flow of current exceeding its rating. The other is that it is blown due to repeated on/off current flowing through it. Which of the two causes is responsible can be easily determined by visual check as described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

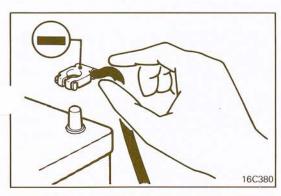
(1) Fuse blown due to current exceeding rating The illustration shows the state of a fuse blown due to this cause. In this case, do not replace the fuse with a new one hastily since a current heavy enough to blow the fuse has flowed through it. First, check the circuit for shorting and check for abnormal electric parts. Only after the correction of such shorting or parts, should fuse of the same capacity be used as a replacement. Never use a fuse of larger 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.

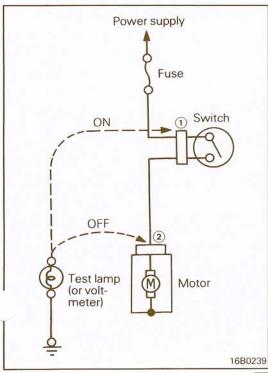


(2) Fuse blown due to repeated current on/off The illustration shows the state of a fuse blown due to repeated current on/off. Normally, this type of problem occurs after fairly long period of use and hence is less frequent than the above type. In this case, you may simply replace with a new fuse of 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.).
- 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  $\Theta$  terminal. This is to prevent problems that could be caused by shorting of the circuit.

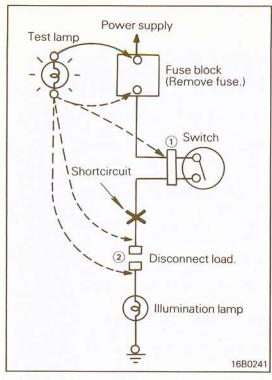
Disconnect the  $\Theta$  terminal first and reconnect it last.

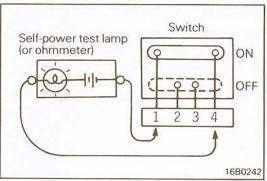
#### TROUBLESHOOTING

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 lamp. If a voltmeter is used instead of the test lamp, ground the grounding side lead wire.
- (2) Connect the other lead wire of the test lamp to the power side terminal of the connector ①. The test lamp should come on, or the voltmeter should indicate a voltage.
- (3) Then, connect the test lamp or voltmeter to the connector ②. The test lamp should not come on, or the voltmeter should indicate no voltage. When the switch is turned on in this state, the test lamp 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 trouble such as the motor failing to run, check voltages beginning at the connector nearest to the motor until the faulty part is identified.





#### 2. CHECKING SHORTCIRCUITS

- (1) Remove the blown fuse and connect the test lamp to the disconnected terminal. The test lamp should not come on.
- (2) Connect a lead wire of the test lamp to the power side of the connector (1). The test lamp should not come on.
- (3) Connect a lead wire of the test lamp to the load side of the connector ①. The test lamp should come on and the load lamp should also come on.
- (4) Disconnect the load at the connector ② and connect the test lamp lead wire to the load side of the connector ②. The test lamp should come on and the load lamp should also come on.
- (5) Connect the test lamp lead wire to the switch side of the connector (2). The test lamp should come on.
- (6) If the test conforms to any of the above conditions, there is a shortcircuit in the wiring between the connector (1) and the connector (2).

#### 3. CHECKING CONTINUITY

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

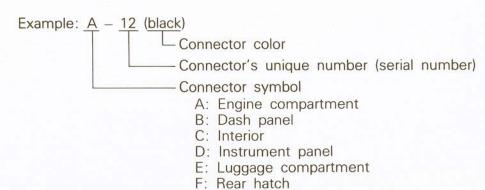
# **HOW TO READ WIRING DIAGRAMS**

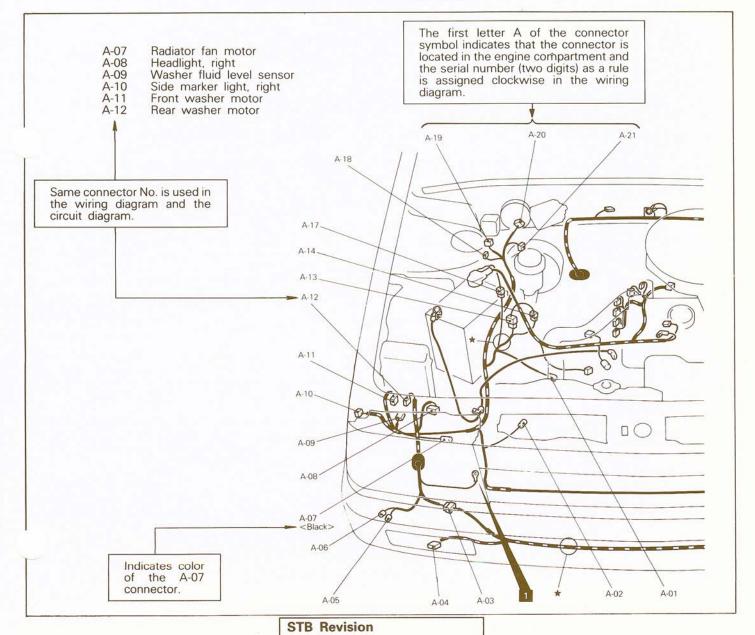
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#### **HOW TO READ CONFIGURATION DIAGRAMS**

Connector symbols

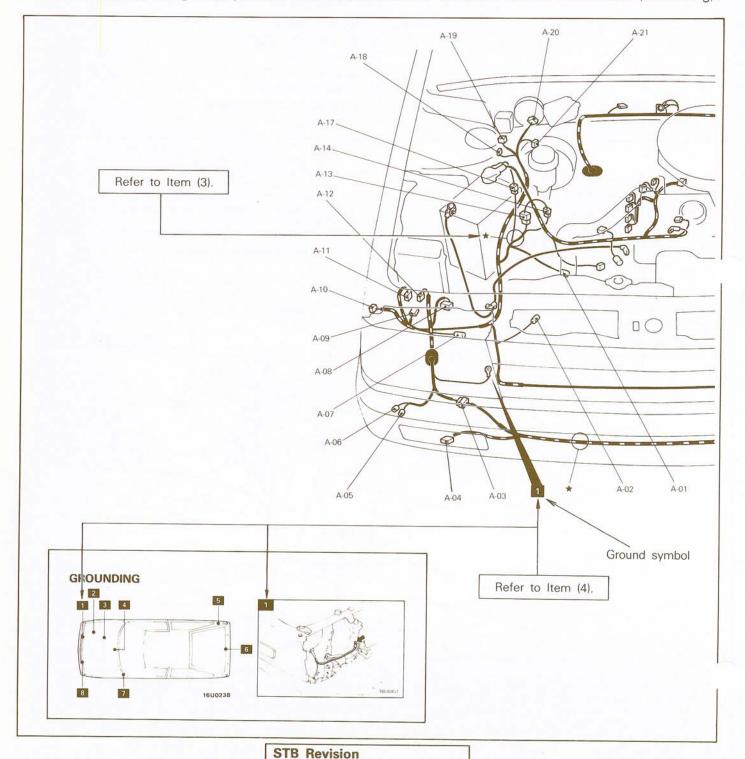
A wiring diagram shows the installed condition of each connector in a schematic style. The connectors are shown and classified as follows, depending on their locations and are marked by connector symbols. In case connectors of the same shape (same number of wires) are centralized, their colors are indicated for identification.





- (2) Identification of connectors differing according to different vehicle specifications With regard to wiring harness connectors, the inter-device or -wiring harness connectors which vary in shape or position on different vehicle specifications are given the specification-dependent connector identification symbol (lower case alphabet) after a serial number. For detailed information on this specification-dependent symbol, refer to Item (8) under "HOW TO REAL CIRCUIT DIAGRAMS".
- (3) Indication of standard mounting positions of harnesses

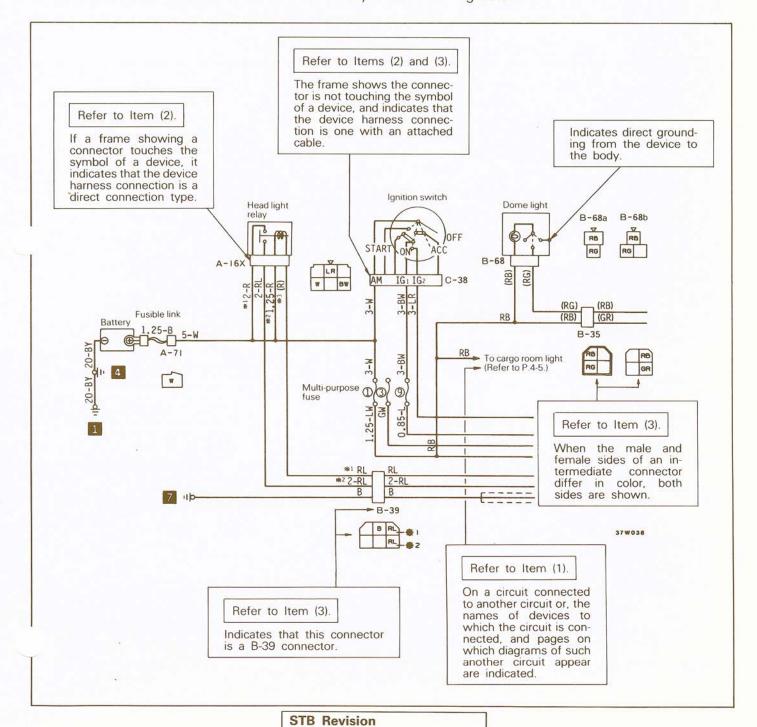
  The standard mounting positions of harnesses are shown with the mark ★ in wiring harness configuration diagrams.
- (4) Indication of ground point
  The position of ground points are shown in wiring harness configuration diagrams. For detailed information on the ground portion, refer to ELECTRICAL SYSTEM PARTS LOCATION (Grounding).



#### **HOW TO READ CIRCUIT DIAGRAMS**

The circuit diagrams are functionally separated.

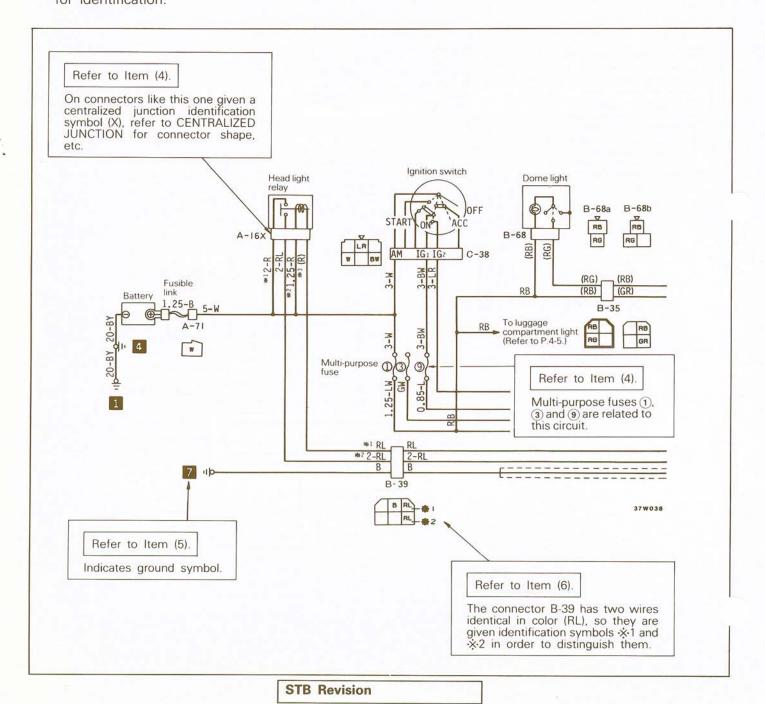
- (1) Indication of circuit connected to another circuit.
  When the circuit in a circuit diagram is connected to another circuit in a different diagram, the page number of that different diagram is indicated so that it can be referred to.
- (2) Indication of device connections The circuit diagram shows whether a device harness connection is one with an attached cable or is a direct connection type.
- (3) Indication of connectors in circuit diagrams
  A connector in a circuit diagram is shown in a frame and is assigned a connector symbol. This symbol corresponds to the symbol in a wiring harness configuration diagram so that the connector location can be known easily. An intermediate connector has its female side only shown as a rule. However, both of the male and female sides are shown when they differ in wiring color.



(4) Indication of fuses, fusible links and centralized relays The fuses and fusible links in a circuit diagram are indicated by a wave symbol and a double wave symbol, respectively. At a centralized junction, the fuses are given fuse numbers and centralized relays are given connector symbols.

Example of centralized junction symbol: A - 01 X Centralized junction indication symbol Connector's unique number (serial number) Connector symbol

- (5) Indication of ground point
  The ground point in a circuit diagram is marked by a GND symbol, making it possible for you to refer to a
  wiring harness configuration diagram and to ELECTRICAL SYSTEM PARTS LOCATION (Grounding).
- (6) Indication of wires In a circuit diagram, the wire diameter and wire color are shown for each wire. If there are several wires of the same color in a connector, their wire color indication symbols should be such symbols as ❖1 and ❖2 for identification.



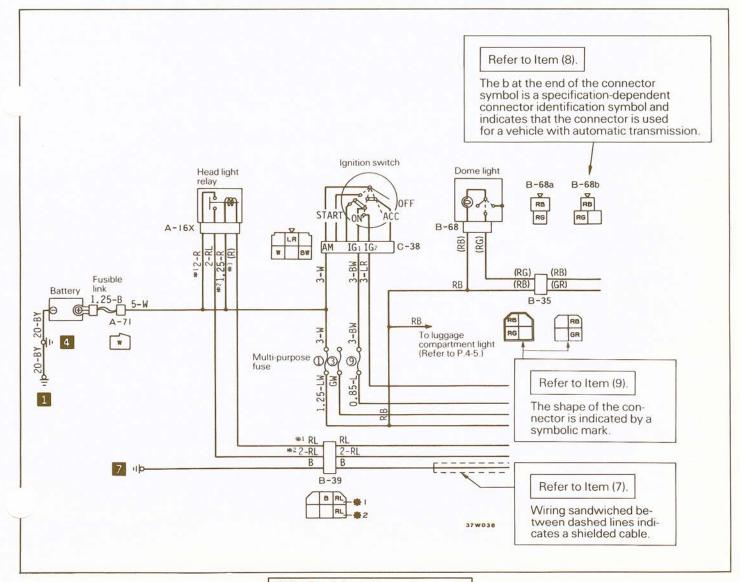
- (7) Indication of shielded cables
  - A shielded cable used, for example, in an electronic control circuit for prevention of malfunctions that may otherwise be caused by radio interference is indicated by a solid line sandwiched between dashed lines (======).
- الار Indication of specification-dependent connectors

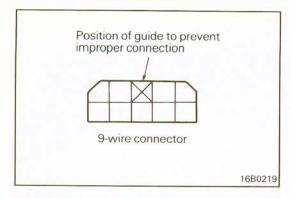
With regard to harness connectors, the inter-device and -harness connectors which vary in shape or position on different vehicle specifications, such as those with rear wipers and turbocharger and those without turbocharger, are given a specification-dependent connector identification symbols (lower case alphabet) following the connector symbol.

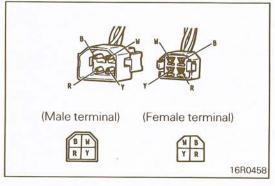
Example: A-01a Specification-dependent connector identification symbol

- a. Vehicle with manual transmission
- b. Vehicle with automatic transmission
- c. Vehicle with rear glass intermittent wiper
- d. Vehicle without rear glass intermittent wiper
- e. Vehicle with heated remote controlled mirror
- f. Vehicle without heated remote controlled mirror
- (9) Shapes of connectors

The connector shapes are indicated by simplified symbolic marks. For distinction between male and female connectors, refer to IDENTIFYING CONNECTORS.



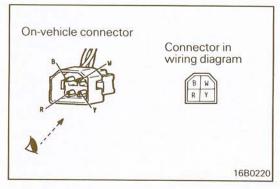




#### **IDENTIFYING CONNECTORS**

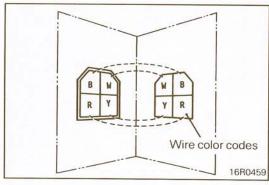
In circuit diagrams, the connectors are indicated by symbolic marks which show the number of their wires and whether they are male or female connectors.

- (1) Number of connector wires
  The number of divisions in the connector diagram indicates
  the number of wires. A cross in a division, however,
  indicates the position of a guide to prevent improper
  connection. The connector shown here, therefore, is a
  9-wire connector.
- (2) Identification of male and female connectors Connectors drawn with double outer lines are male, and those with single outer lines are female.



(3) Connector direction

The connector marks show on-vehicle connectors as viewed from the direction shown here.



Double lines indicate male

Double lines indicates number of wires

Output

Double lines indicates number of wires

36K037

(4) Identification of connector terminals The color codes of a pair of connectors (male and female), if viewed at their joining surfaces, will appear symmetrical as illustrated here. When the connectors are connected, their joining surfaces are put together in the way a book is closed, so the terminals of identical codes are connected together.

#### NOTE

The color codes of male and female connectors are not always identical.

(5) Identification of sealed connectors Identification of round, sealed connectors (water-proof pin terminal connectors) used in radiator fan motor circuits turbo circuits, etc. is accomplished by the same method as described above.

## SYMBOLIC MARKS

Various equipment is indicated symbolically in circuit diagrams as shown below.

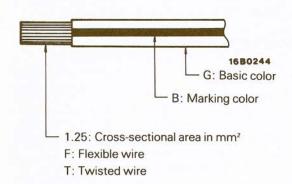
| Battery      | Body ground      | Single bulb | Resistor          | Diode       | Capacitor                            |  |
|--------------|------------------|-------------|-------------------|-------------|--------------------------------------|--|
| 0 0          | <u>\$</u>        | 6           | J.                | <b>†</b>    | ‡                                    |  |
| Fuse         | Equipment ground | Dual bulb   | Variable resistor | Zener diode | Crossing of wires without connection |  |
| Fusible link | Motor            | Speaker     | Coil              | Transistor  | Crossing of lines with connection    |  |

16B0243

#### **WIRE COLOR CODES**

Wire colors are identified by the following color codes.

Example: 1.25F-GB



(1) When cross-sectional area is not indicated,

the area is 0.5 mm². Cross-sectional area, indicated by ( ) in cable color, is 0.3 mm<sup>2</sup>.

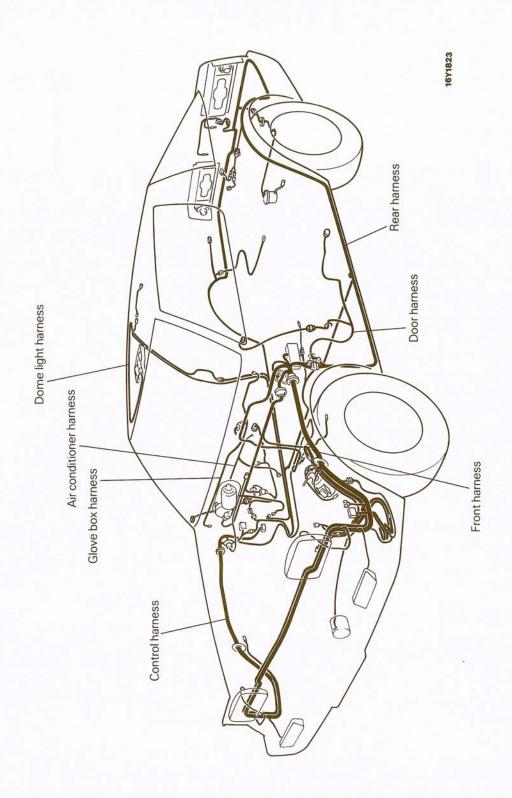
| Code | Wire color  | Code | Wire color |  |
|------|-------------|------|------------|--|
| В    | Black       | LI   | Light blue |  |
| Br   | Brown       | 0    | Orange     |  |
| G    | Green       | Р    | Pink       |  |
| Gr   | Gray        | R    | Red        |  |
| L    | Blue        | Y    | Yellow     |  |
| Lg   | Light green | W    | White      |  |

#### NOTE

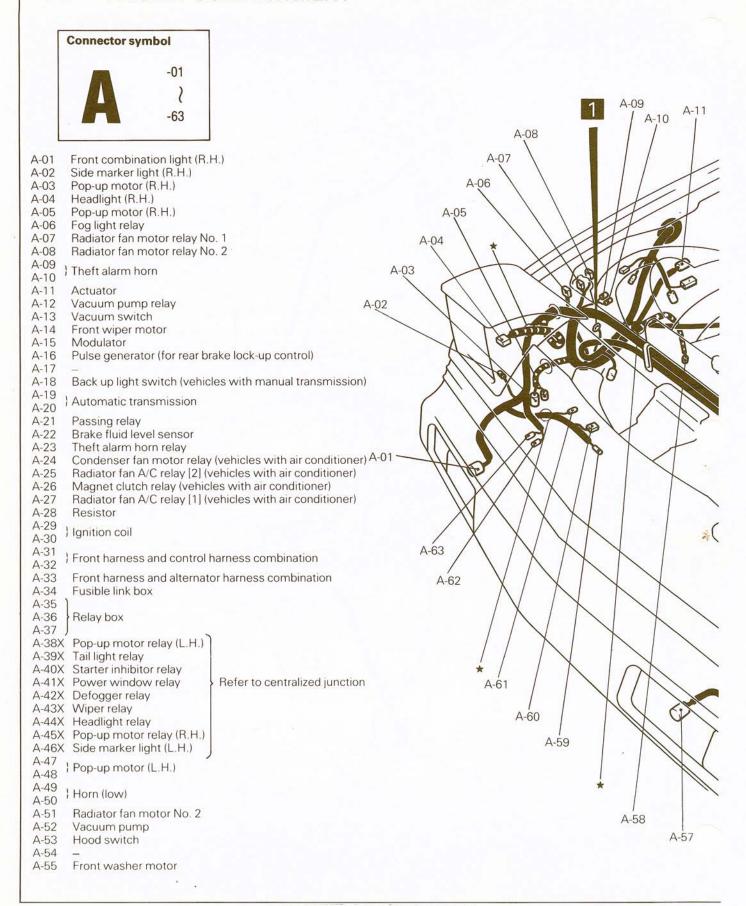
If a cable has two colors, the first of the two color code characters indicates the basic color (color of the cable coating) and the second indicates the marking color.

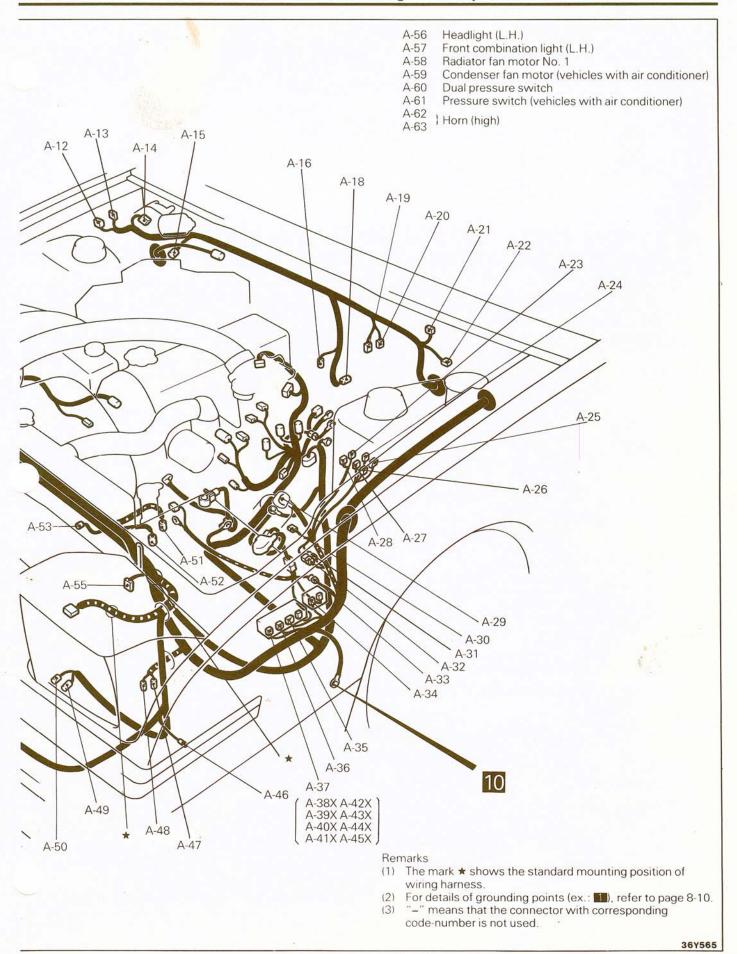
# **Wiring Harness Overview**

N08DC--



#### 1-1 ENGINE COMPARTMENT





#### 1-2 ENGINE COMPARTMENT

# Connector symbol -64 -93

A-64 Resistor

A-65 Fuel pump check connector

A-66 Ignition timing adjusting terminal

A-67 Air-flow sensor

A-68 Oxygen sensor

A-69 Injector (large)

A-70 Injector (small)

A-71 Motor position sensor

A-72 Idle speed control servo

A-73 | Starter motor

A-75 Ground

A-76 Throttle position sensor

A-77 Electronic spark control igniter

A-78 Magnet clutch

A-79 Ignition coil

A-80 Main fusible link

A-81 Fusible link box

A-82 Relay box

A-83 | Alternator

A-84 A-85 Oil pressure gau

A-85 Oil pressure gauge unit A-86 Detonation sensor

A-86 Detonation sensor

A-87 Secondary air control solenoid valve

A-88 EGR control solenoid valve

A-89 . Engine coolant temperature switch

A-90 Engine coolant temperature sensor

A-91 Engine coolant temperature gauge unit

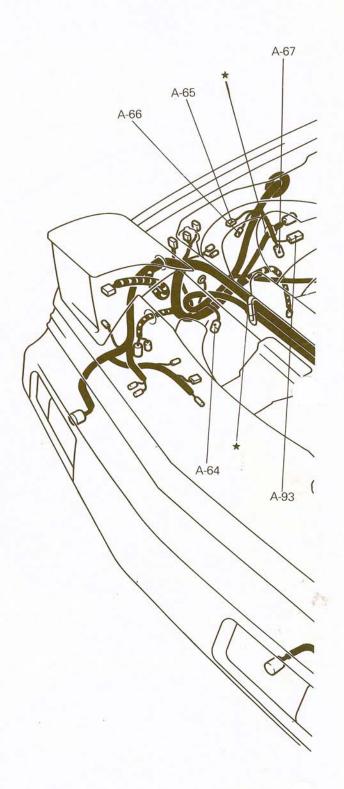
A-92 Distributor signal generator

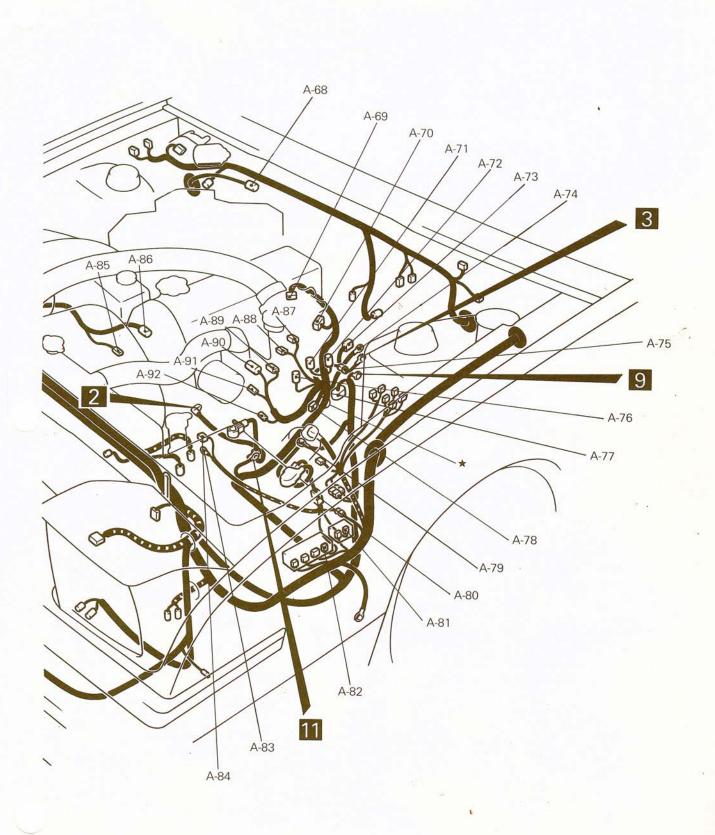
A-93 Waste gate solenoid valve

#### Remarks

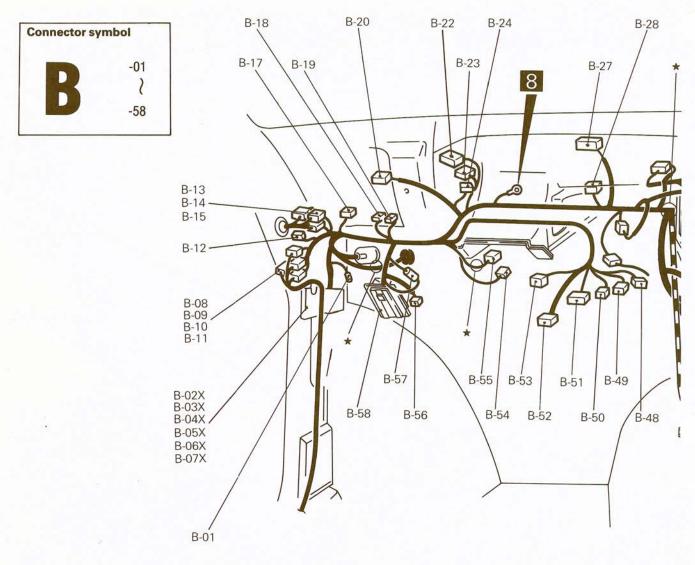
 The mark ★ shows the standard mounting position of wiring harness.

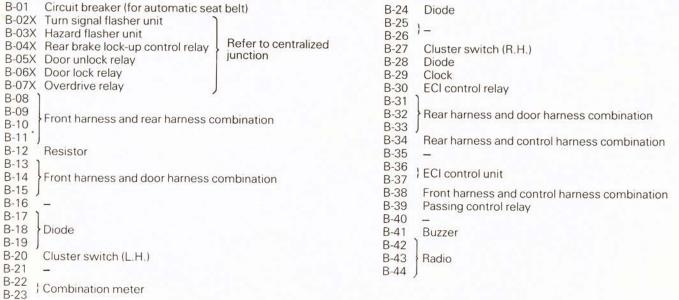
(2) For details of grounding points (ex.: 21), refer to page 8-10.

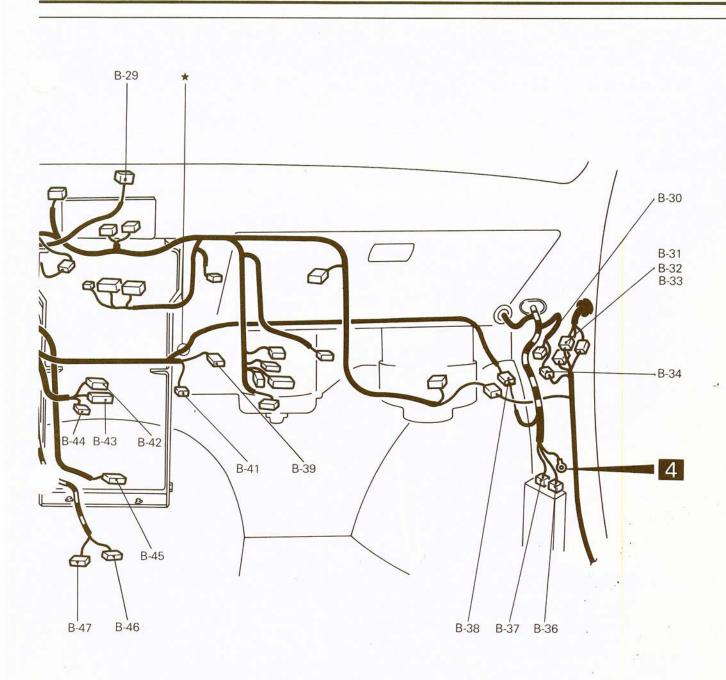




#### 2-1 DASH PANEL





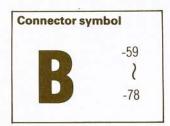


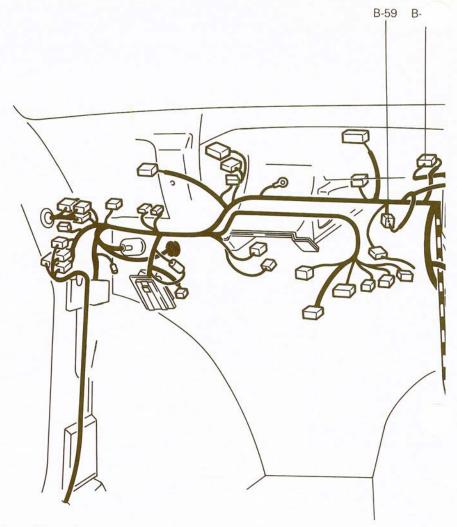
- B-45 Automatic seat belt control unit
- Overdrive switch B-46
- Overdrive switch illumination light B-47
- B-48 Ignition switch
- B-49 Light monitor and key remind switch
- B-50 Radio remote control switch
- B-51 Column switch
- B-52 Kickdown switch (Vehicles with automatic transmission)
- B-53 Speed control switch
- B-54 Stop light switch
- B-55 Clutch switch (Vehicles with manual transmission)
- B-56 Cancel switch
- B-57 Dedicated fuse (for heated remote controlled mirror)
- B-58 Fuse box

- (1) The mark ★ shows the standard mounting position of wiring harness.
- For details of grounding points (ex.: 18), refer to page 8-10. "—" means that the connector with corresponding (3)
  - code-number is not used.

36Y563

#### 2-2 DASH PANEL





B-59 Blower relay of front harness and air conditioner harness combination
 B-60 Heater switch or front harness and air conditioner harness combination
 B-61 Photo sensor
 B-62 Heater control panel illumination light or front harness and air conditioner harness combination

B-63 B-64 Servo motor

B-65

B-66 Vacuum solenoid valve

B-67 Blower motor starter cutout relay

B-68 Vacuum solenoid valve

B-69 Foot area temperature sensor

B-70 Power transistor

B-71 No connection or air conditioner harness and rear harness combination

B-72 Light controller

B-73 Blower motor high speed relay

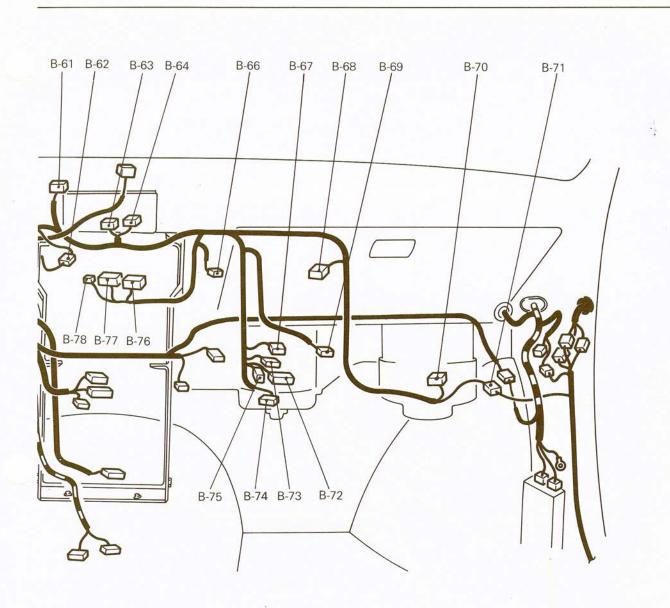
B-74 Air-flow sensor

B-75 Automatic air conditioner self-diagnosis connector

B-76

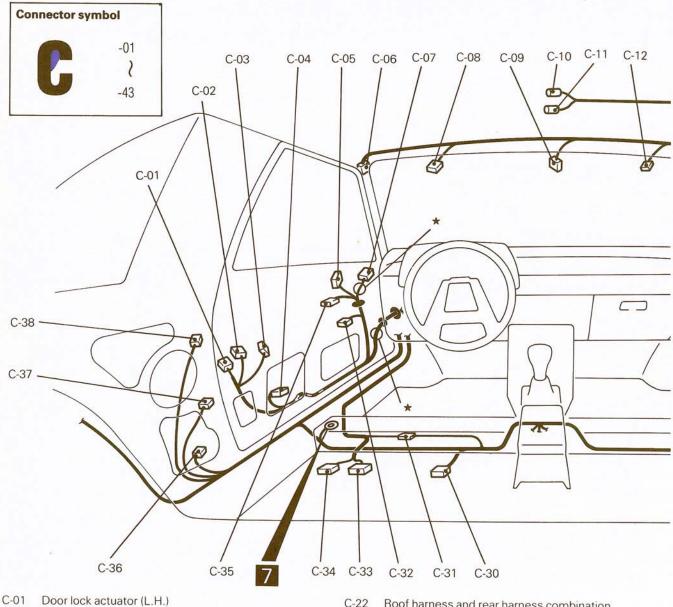
B-77 | Automatic air conditioner control unit

B-78



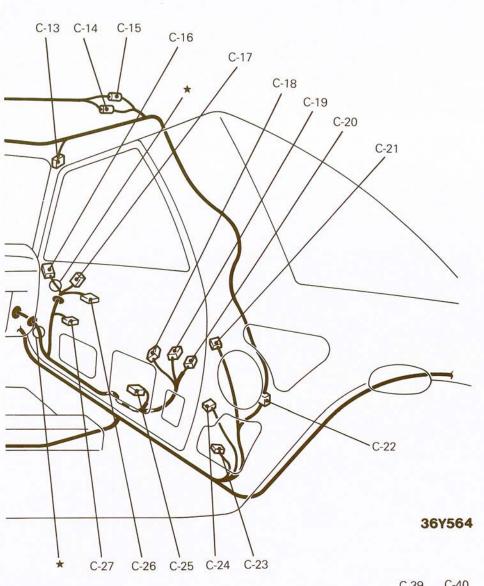
Remark "-" means that the connector with corresponding code-number is not used.

#### 3 INTERIOR



- C-02 Door lock switch (L.H.) C-03 Door key cylinder unlock switch (L.H.) C-04 Door light (L.H.) Power window switch (L.H.) C-05 C-06 Release switch (L.H.) C-07 Remote-controlled mirror (L.H.) Vanity mirror light (L.H.) C-08 C-09 Dome light C-10
- Interior temperature sensor C-11 C-12 Vanity mirror light (R.H.)
- C-13 Release switch (R.H.) C-14 } Joint harness and roof harness combination C-15
- C-16 Remote-controlled mirror (R.H.)
- C-17 Power window switch (R.H.) C-18 Door key cylinder unlock switch (R.H.)
- C-19 Door lock switch (R.H.)
- C-20 Door lock actuator (R.H.) Fasten switch (R.H.) C-21

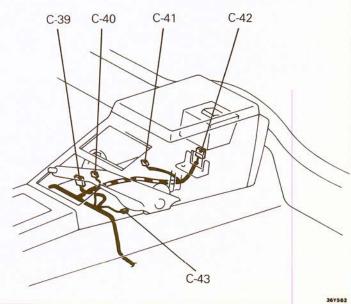
- Roof harness and rear harness combination C-22
- C-23 Door switch (R.H.) C-24 Motor (R.H.)
- Door light (R.H.) C-25
- C-26 Door speaker (R.H.) C-27 Power window motor (R.H.)
- C-28
- C-29
- C-30 Buckle switch
- C-31 Front harness and rear harness combination
- Power window motor (L.H.) C-32
- C-33 TAC unit C-34
- C-35 Door speaker (L.H.) Door switch (L.H.) C-36
- C-37 Motor (L.H.)
- C-38 Fasten switch (L.H.)
- C-39 Remote-controlled mirror switch
  - Spool release indicator light



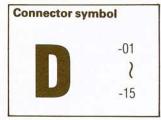
- Spool release lever switch Ashtray illumination light C-41
- C-42
- C-43 Parking brake switch

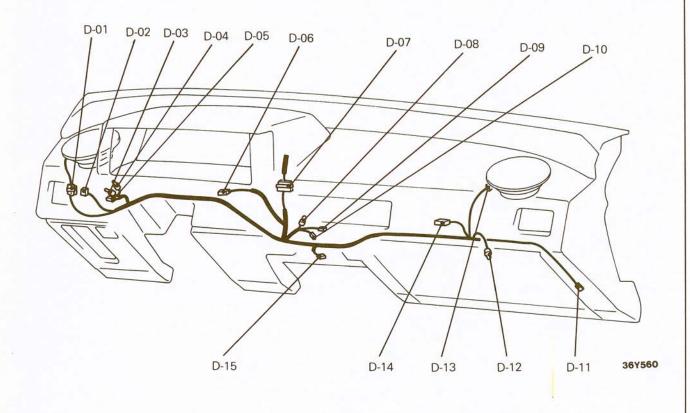


- (1) The mark ★ shows the standard mounting position of wiring harness.
- (2) For details of grounding points (ex.: 77), refer to page 8-10.



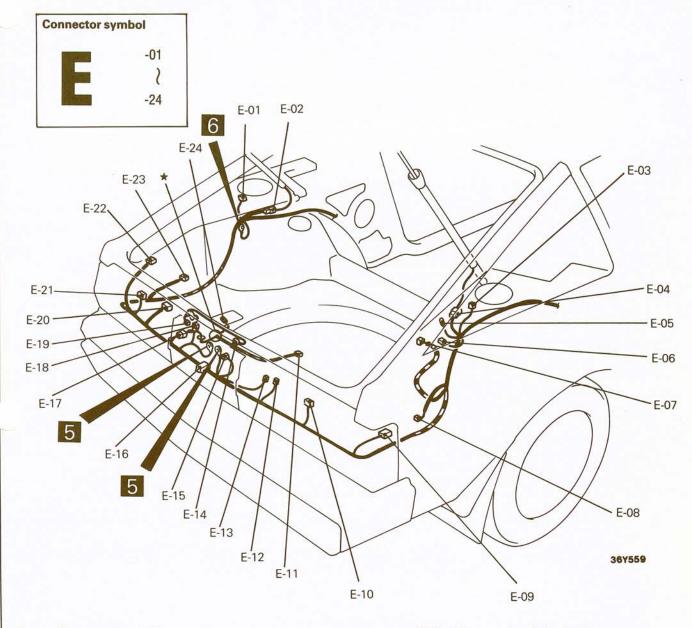
# **4 INSTRUMENT PANEL**





D-01 Front speaker (L.H.) D-02 Dimmer control switch D-03 D-04 Defogger switch D-05 Rear wiper and washer switch D-06 Front harness and glove box harness combination D-07 D-08 ] D-09 Cigarette lighter D-10 / Glove box switch D-11 D-12 Glove box illumination light Front speaker (R.H.) D-13 D-14 Self-diagnosis connector D-15 Ashtray illumination light

# 5 LUGGAGE COMPARTMENT



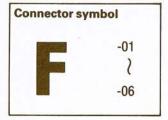
- E-01 Rear speaker (L.H.)
- E-02 Rear harness and stay switch (L.H.) combination
- E-03 Rear speaker (R.H.)
- E-04 Rear harness and stay switch (R.H.) combination
- E-05 Condenser
- E-06 Luggage compartment light
- E-07 G sensor
- E-08 Rear washer motor
- E-09 Rear brake lock-up control unit
- E-10 Rear combination light (R.H.)
- E-11 Fuel gauge unit
- E-12 Rear hatch switch
- E-13 Rear hatch key cylinder unlock switch
- c-14 License plate light (R.H.)
- ·15 Rear intermittent wiper relay
- c-16 Joint connector
- E-17 Rear harness and fuel gauge unit harness combination
- E-18 Rear harness and license plate light harness combination

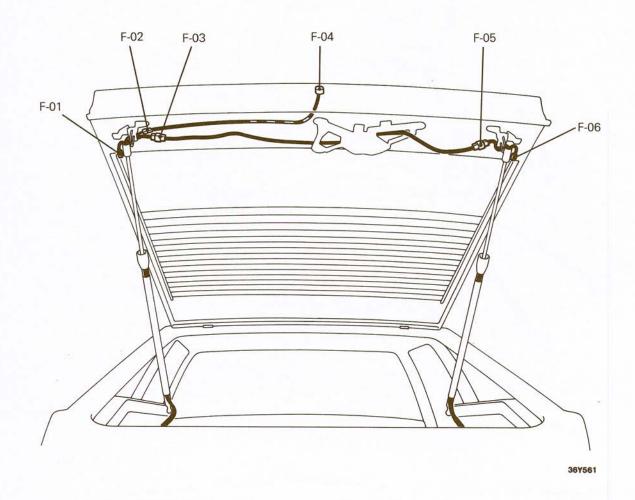
- E-19 License plate light (L.H.)
- E-20 Motor antenna relay
- E-21 Rear combination light (L.H.)
- E-22 Motor antenna
- E-23 Speed control unit
- E-24 Fuel pump

#### Remarks

- The mark \* shows the standard mounting position of wiring harness.
- (2) For details of grounding points (ex.: 6), refer to page 8-10.

## 6 REAR HATCH





F-01 Stay switch (L.H.) and rear window defogger combination

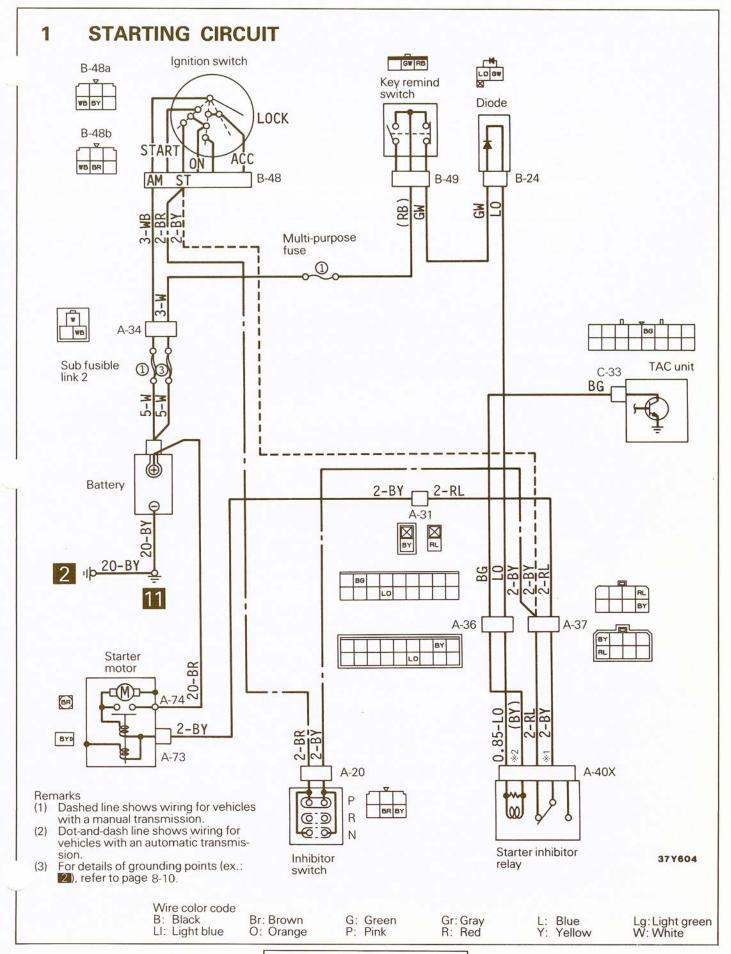
F-02 Stay switch (L.H.) and high mounted stop light harness combination

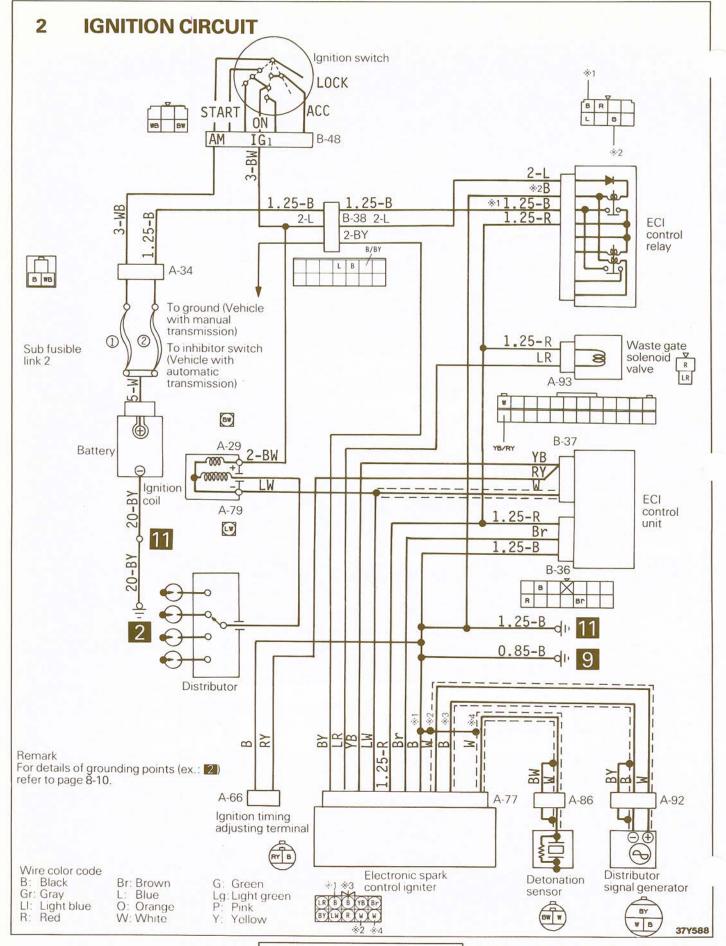
F-03 Stay switch (L.H.) and rear wiper motor combination

F-04 High mounted stop light

F-05 Stay switch (R.H.) and rear wiper motor combination

F-06 Stay switch (R.H.) and rear window defogger combination

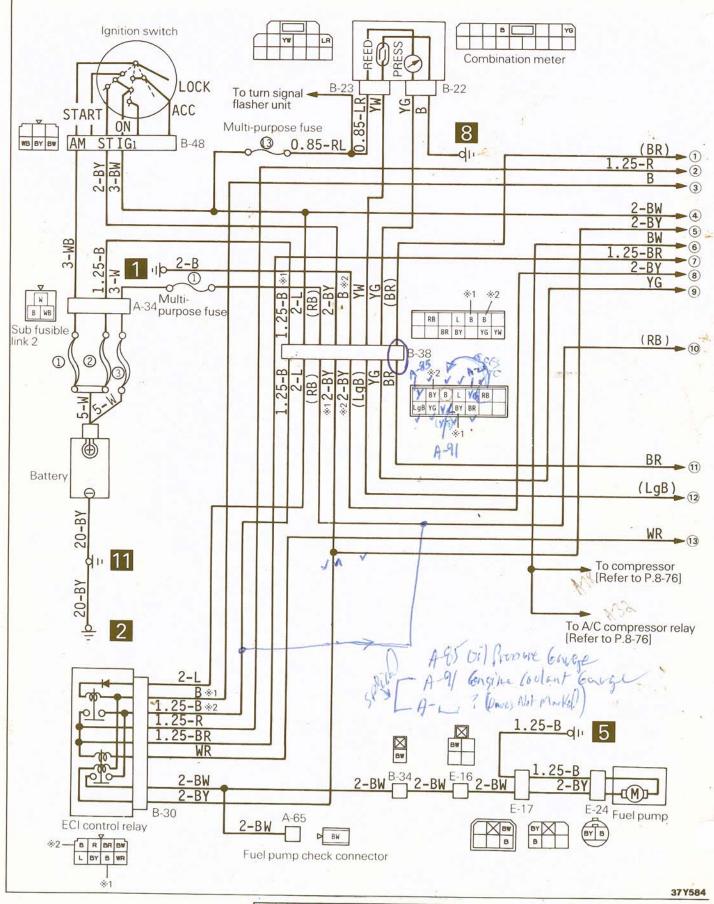


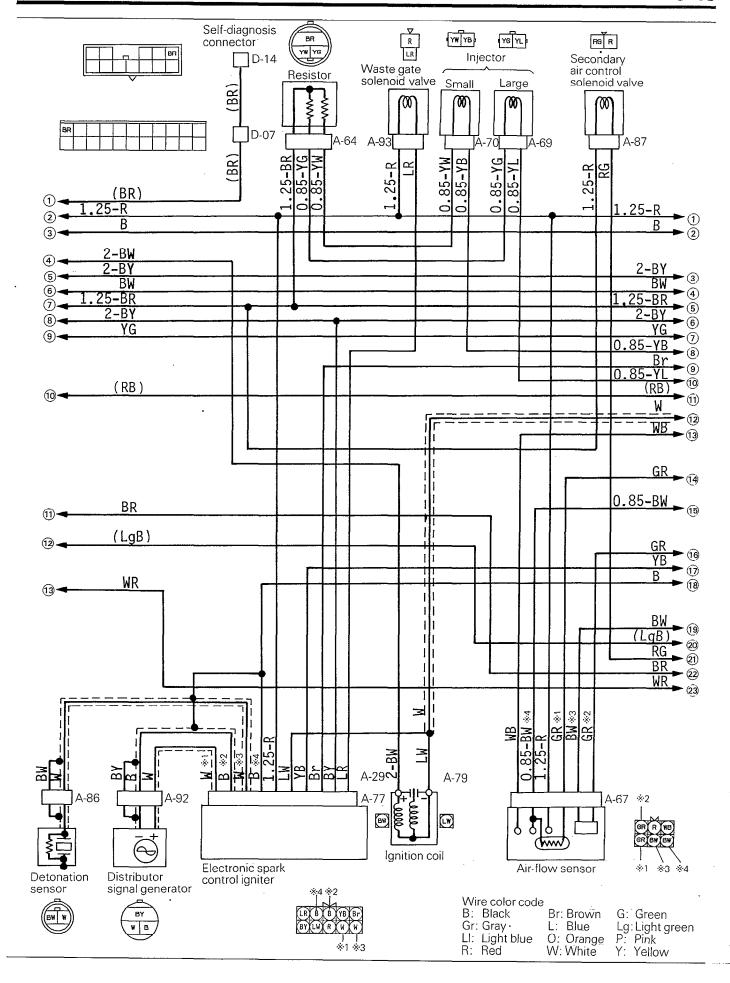


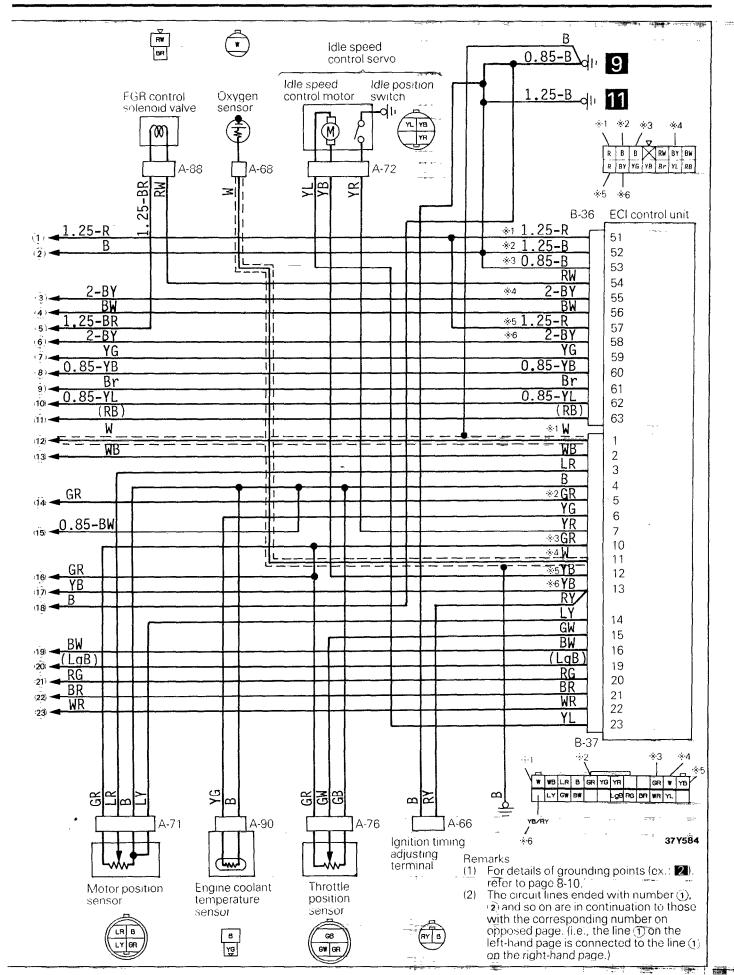
**STB** Revision

#### 3 **CHARGING CIRCUIT** Ignition switch Sub fusible link 2 LOCK START ON ACC AM IG1 B-48 3-BW 3-WB A-80 13) Multi-purpose fuse Main fusible .85-RL $\bigoplus$ 0.85-RL To turn signal flasher unit Battery 0.85-LR 20-BY WY B-23 Combination meter 1 20-BY Resistor To tail light relay A-33[ 2-WG WY WG W A-83 A-84 For details of grounding points (ex.: 2), refer to page 8-10. Wire color code B: Black Br: Brown G: Green Lg: Light green P: Pink Gr: Grav L: Blue LI: Light blue R: Red O: Orange -IC regulator W: White Y: Yellow Alternator 37Y602

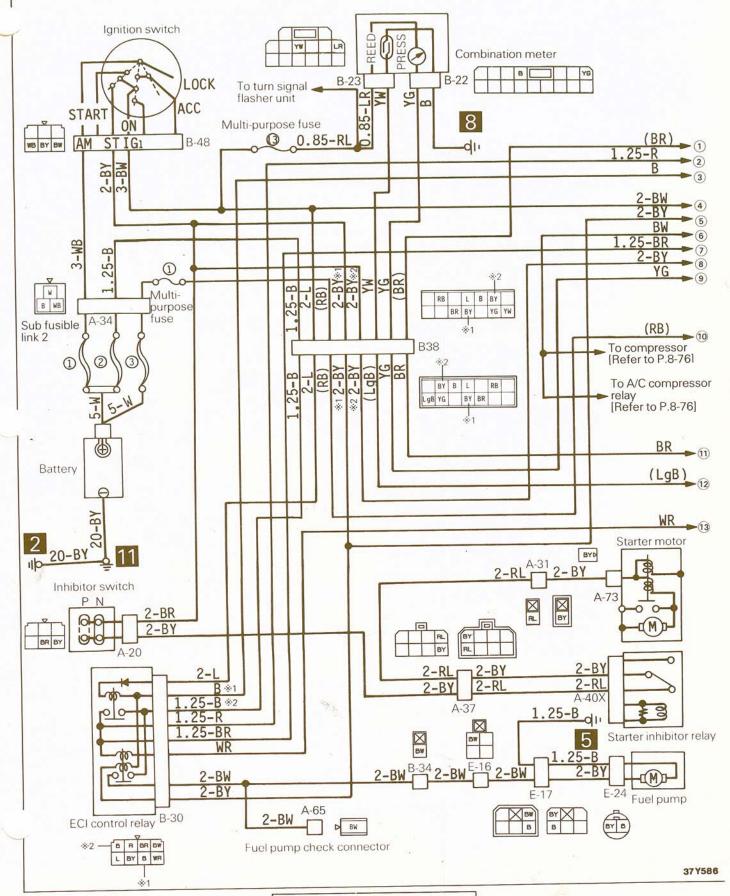
# 4-1 ECI SYSTEM CIRCUIT (Vehicles with Manual Transmission)

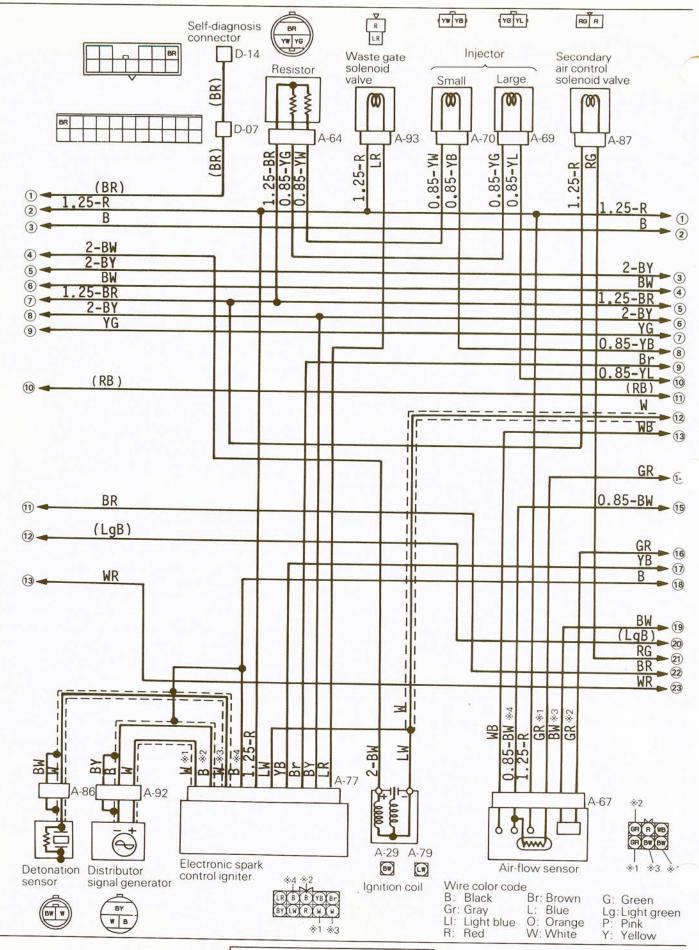


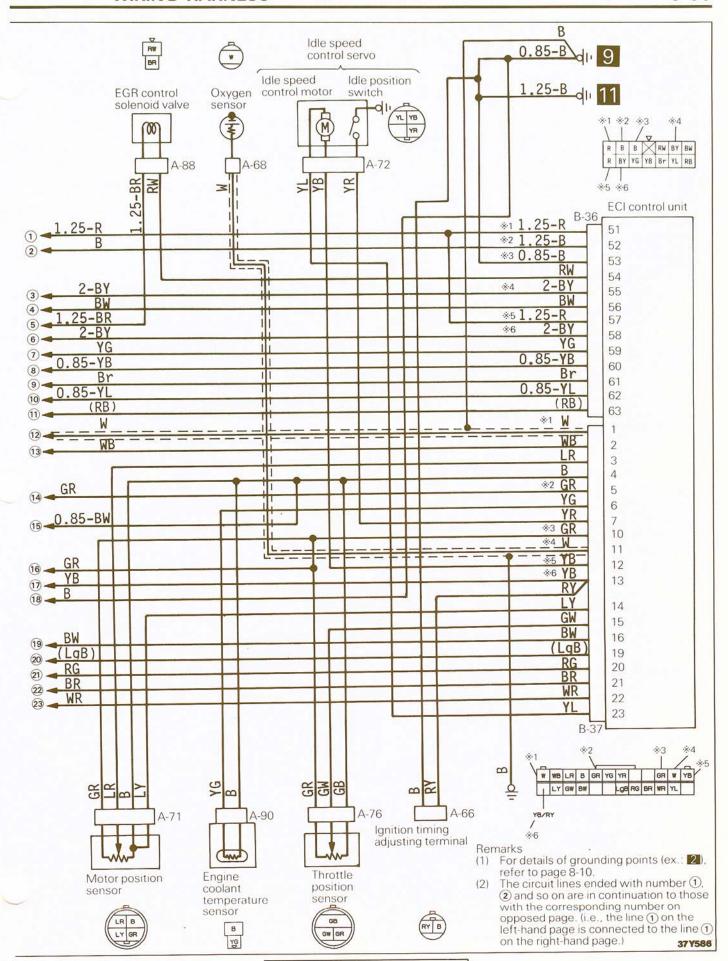




# 4-2 ECI SYSTEM CIRCUIT (Vehicles with Automatic Transmission)



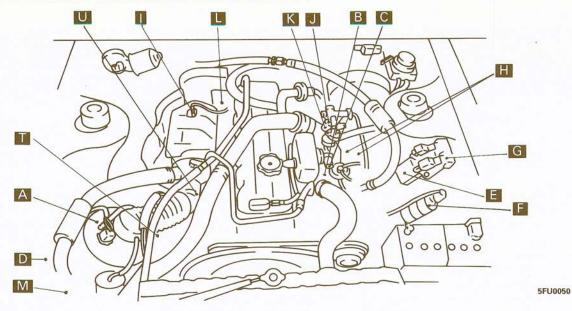


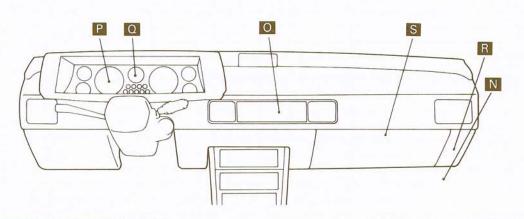


## **ECI SYSTEM CIRCUIT CONTROL PARTS LAYOUT**

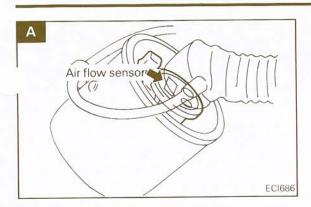
N14ED-B

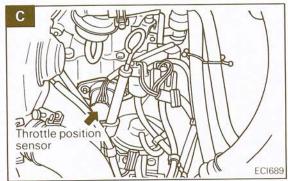
ECI684

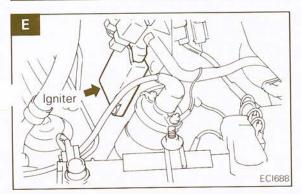


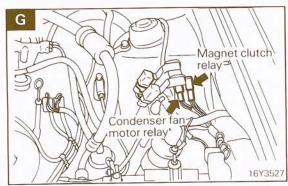


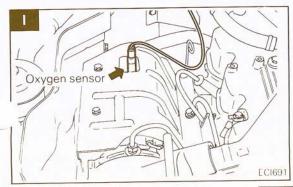
| Name  | Symbol | Name   | Symbol |
|---|--------|--|--------|
| Air conditioner relay   | G      | Fuel pump check terminal, ignition timing adjusting terminal | D      |
| Air conditioner switch  | 0      | Igniter  | E      |
| Air flow sensor (with built-in atmospheric pressure sensor and intake air temperature sensor) | А      | Inhibitor switch (vehicles with an automatic transmission)   | L      |
| Boost meter   | Q      | Injector   | J      |
| Control relay   | R      | ISC motor (idle switch, motor position sensor)               | K      |
| Detonation sensor   | U      | Oxygen sensor  | Ī      |
| Diagnosis terminal  | S      | Resister   | M      |
| ECU   | N      | Throttle position sensor (TPS)                               | С      |
| EGR control solenoid valve, secondary air control solenoid valve                              | Н      | Vehicle speed sensor (reed switch)                           | Р      |
| Engine coolant temperature sensor   | В      | Waste gate solenoid valve                                    | Т      |
| Engine speed sensor (ignition coil ⊖)   | F      |  |        |

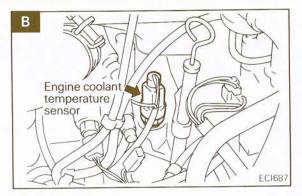


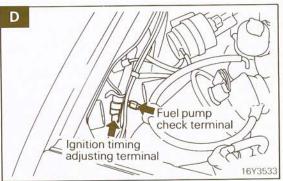


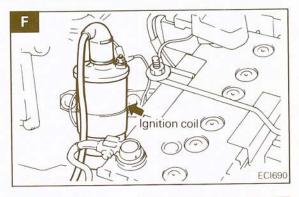


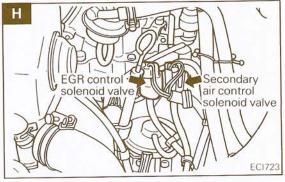




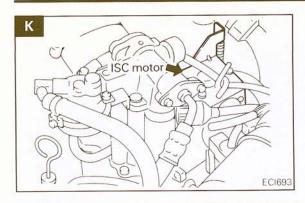


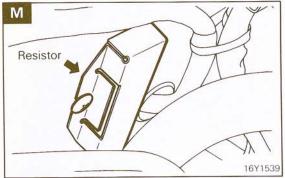


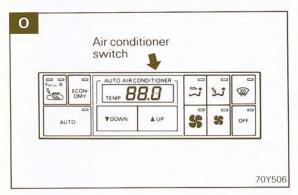


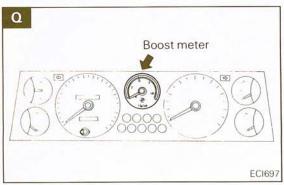


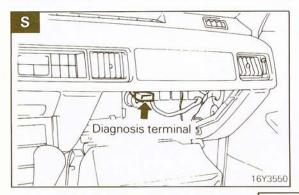


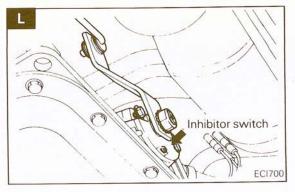


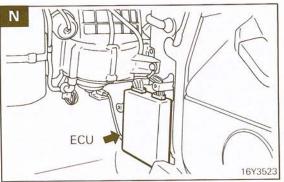


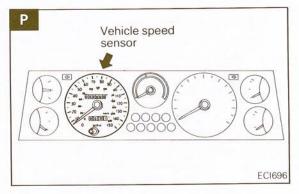


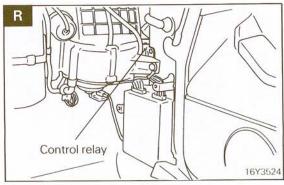


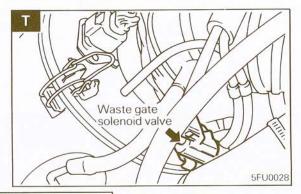


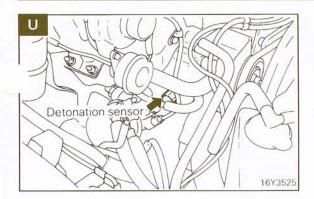


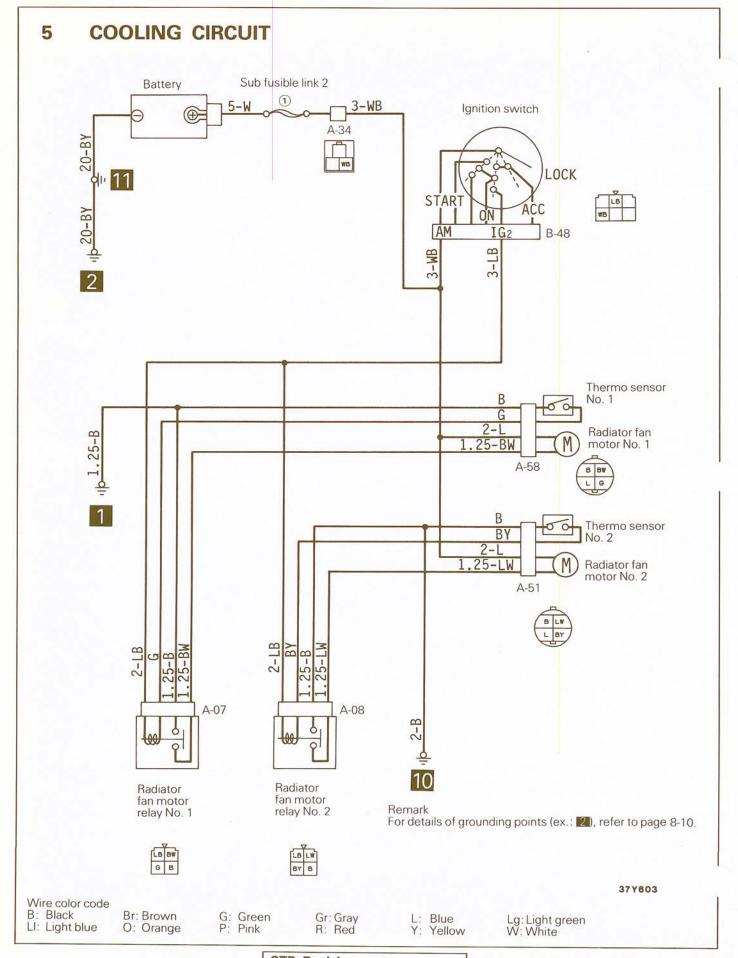


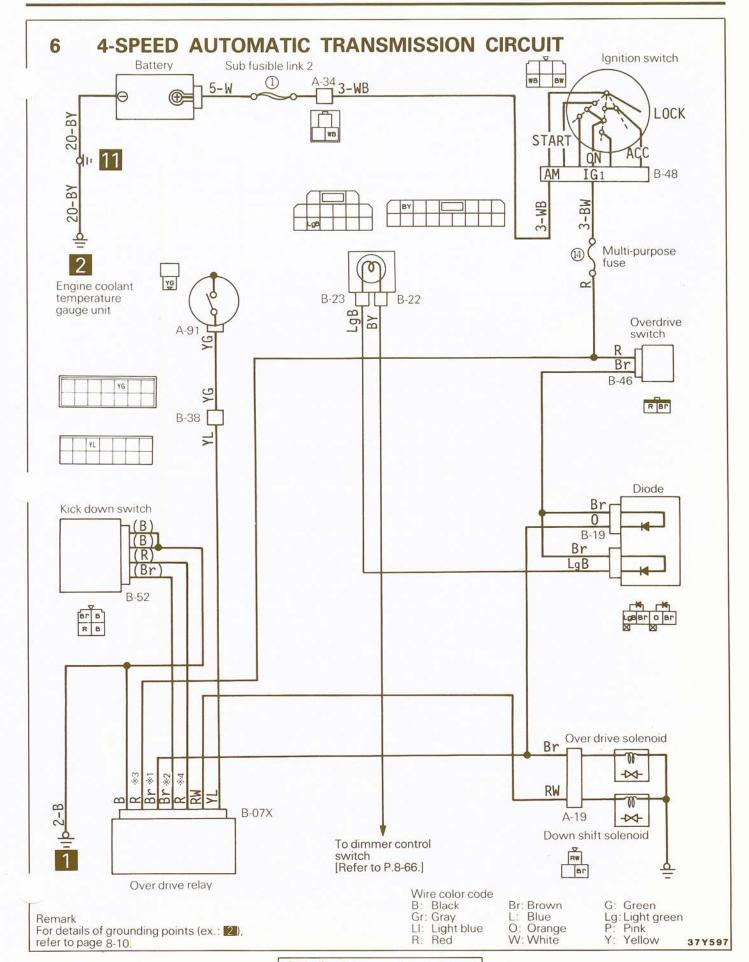


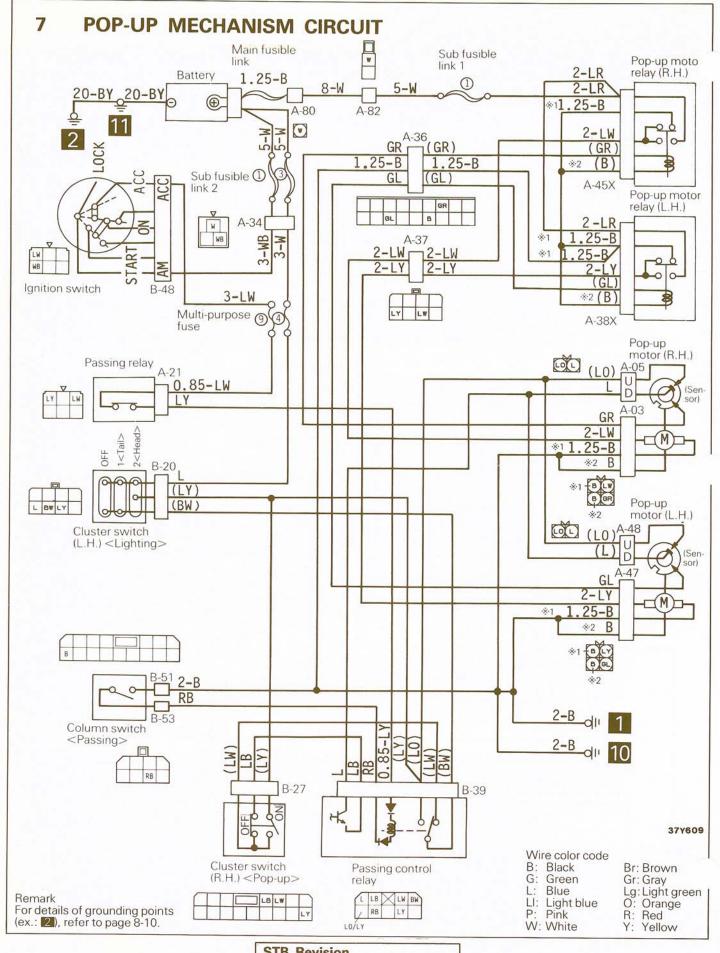


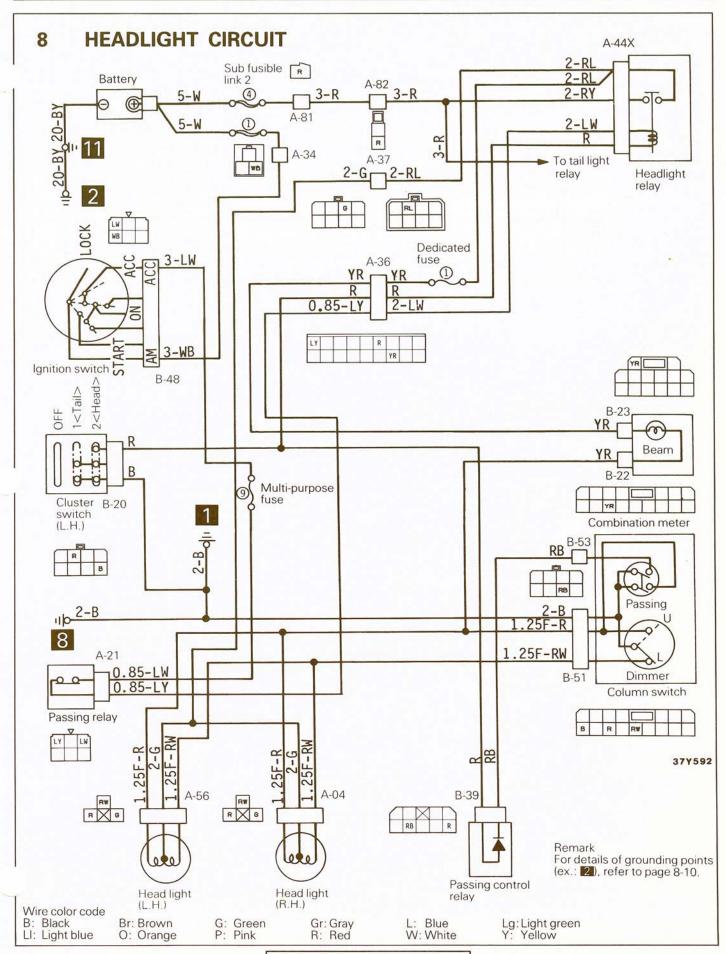


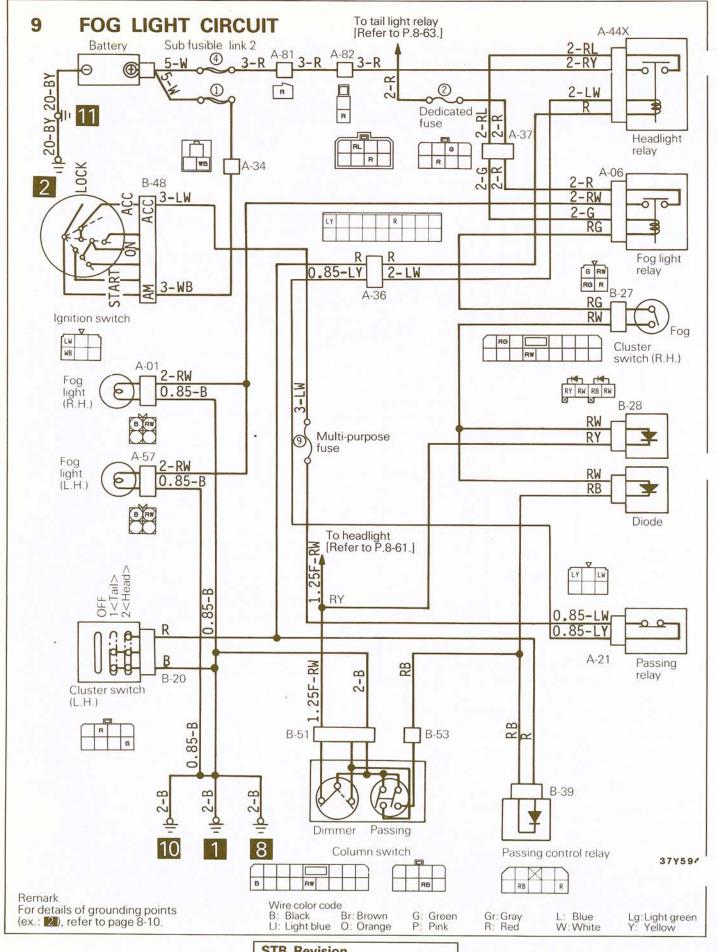


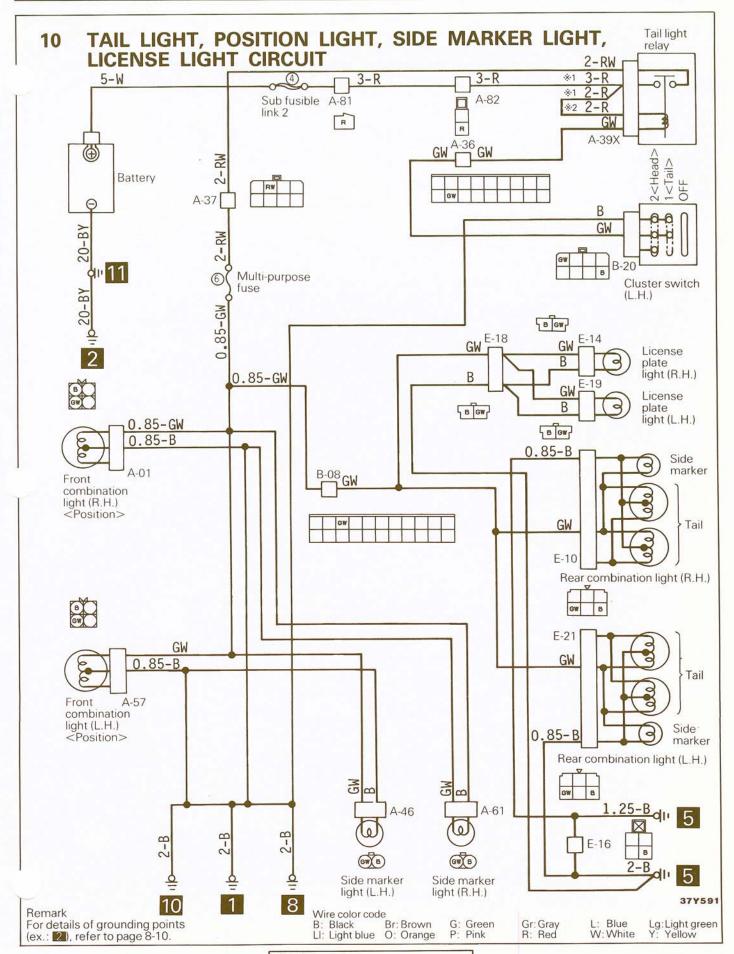


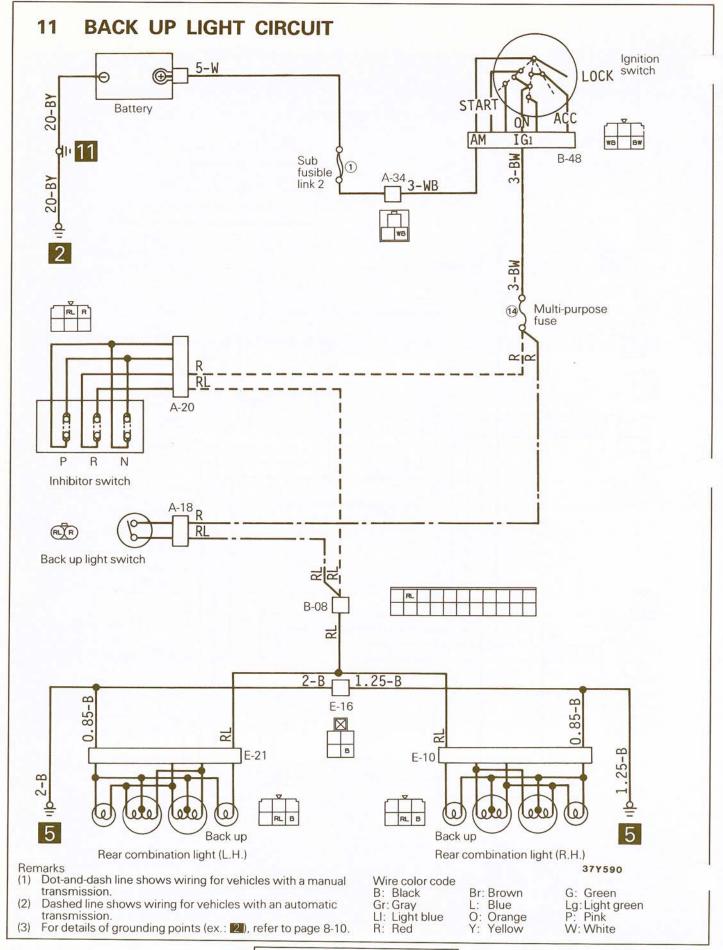


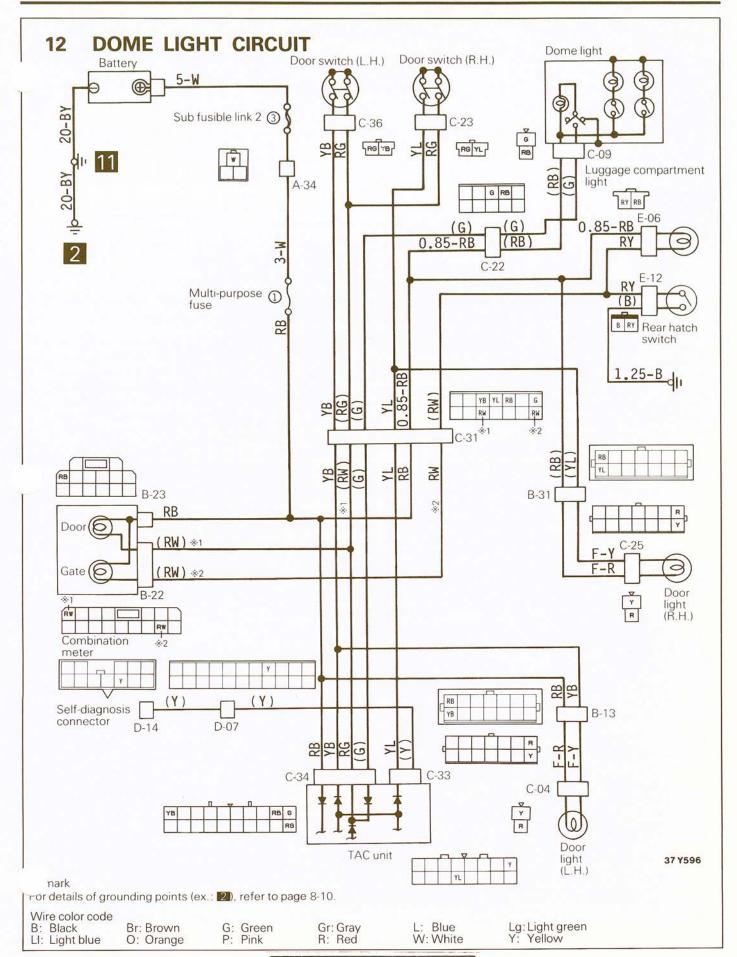


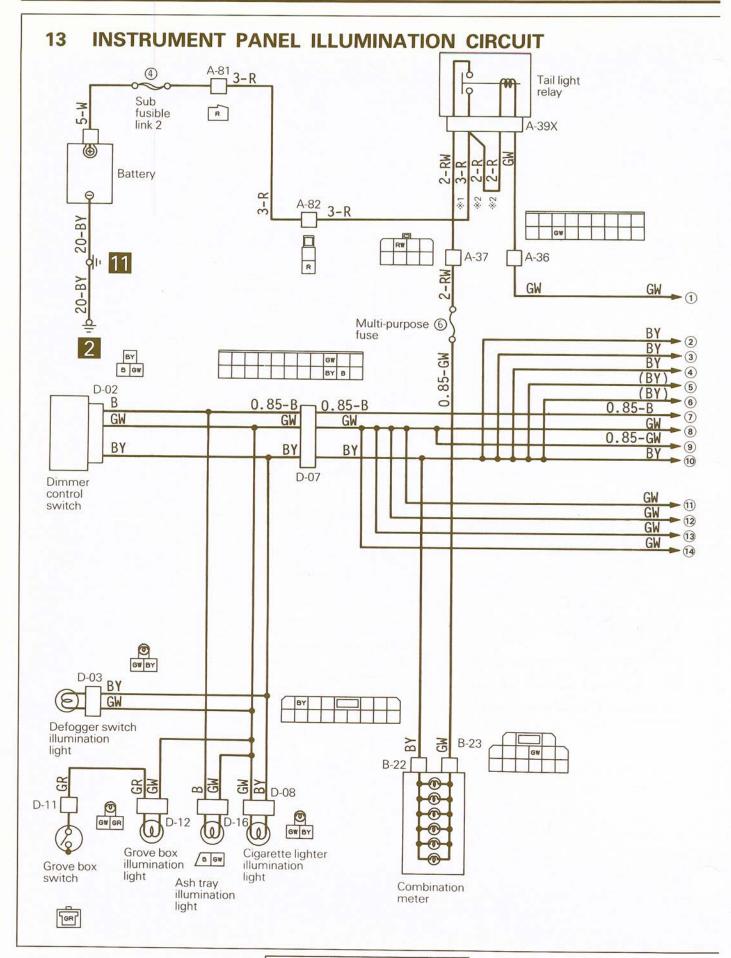


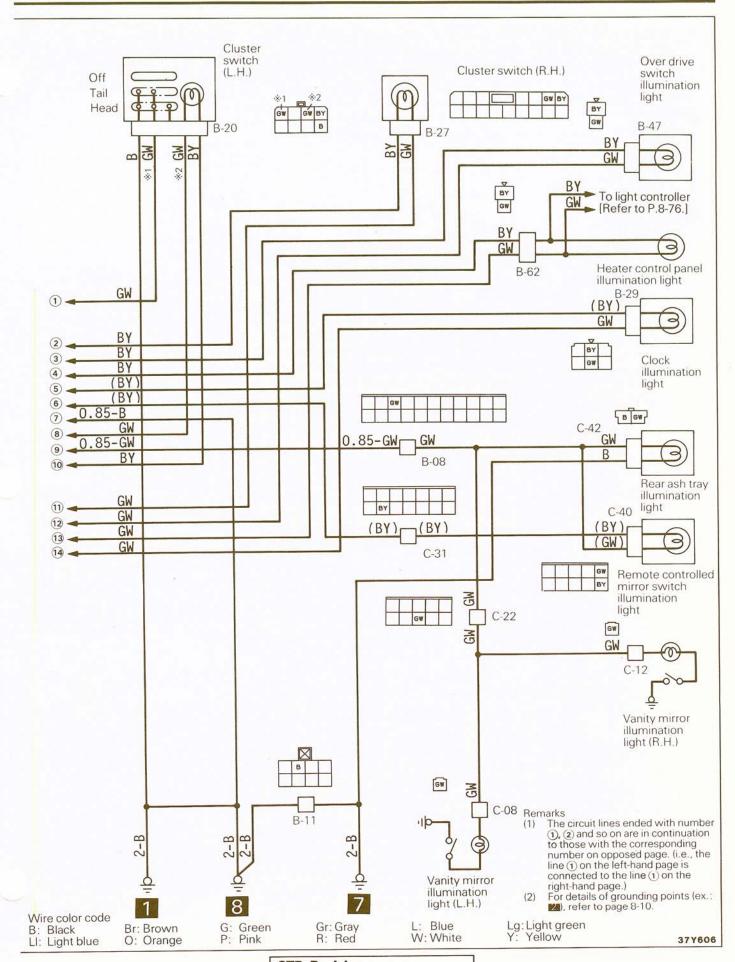


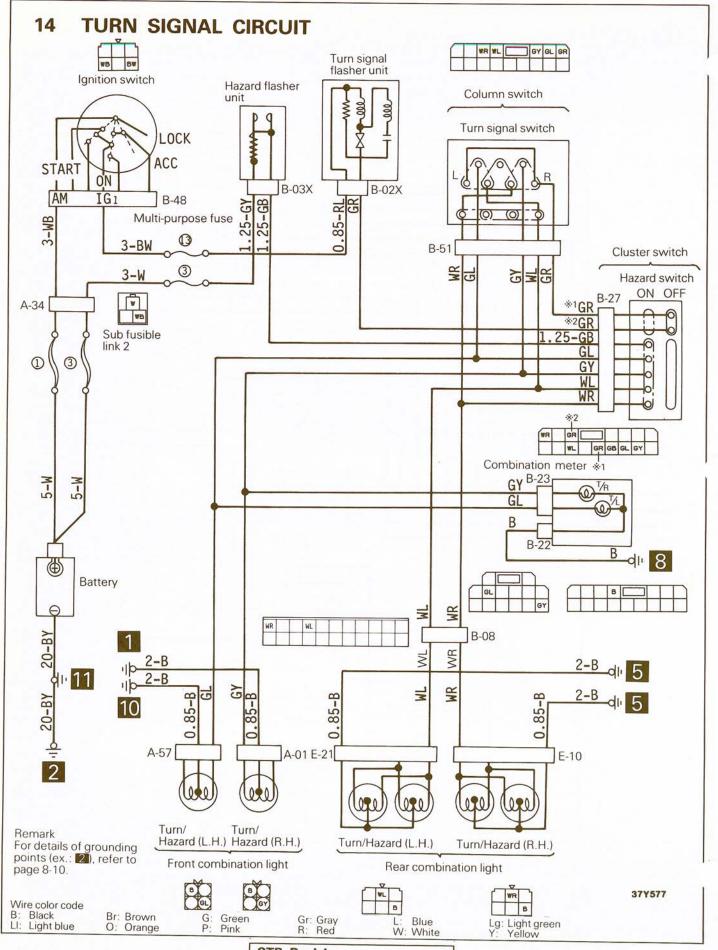


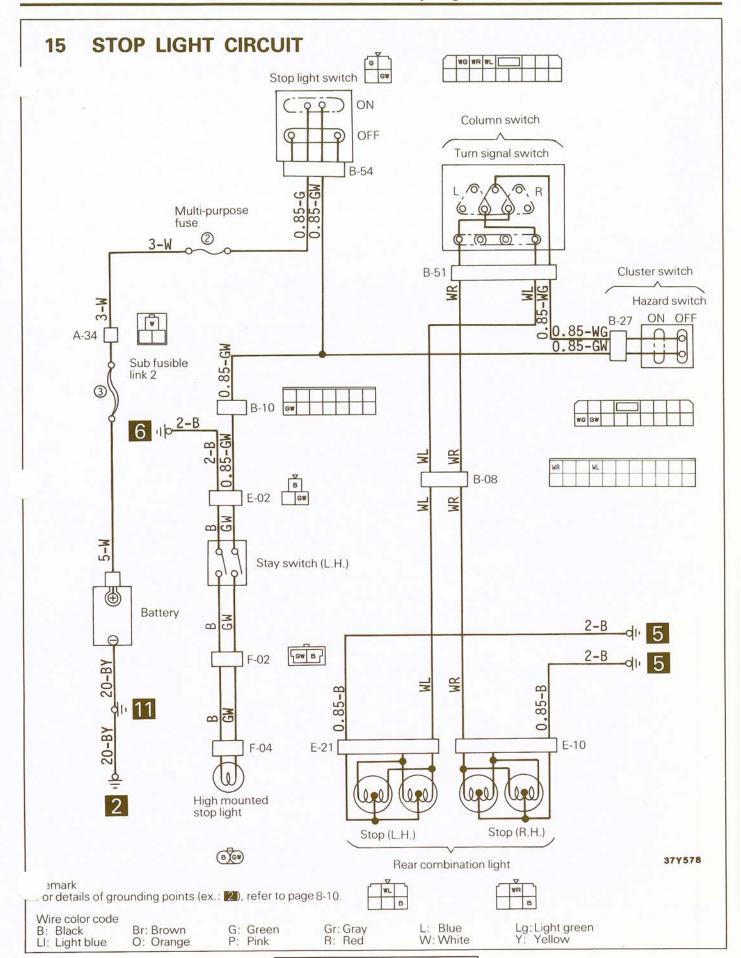




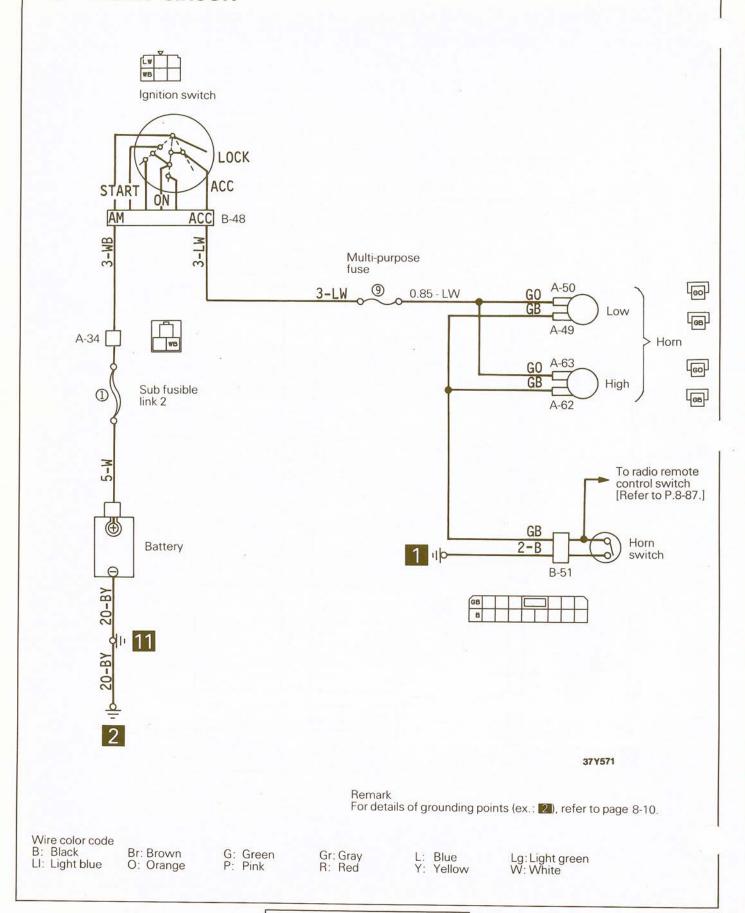


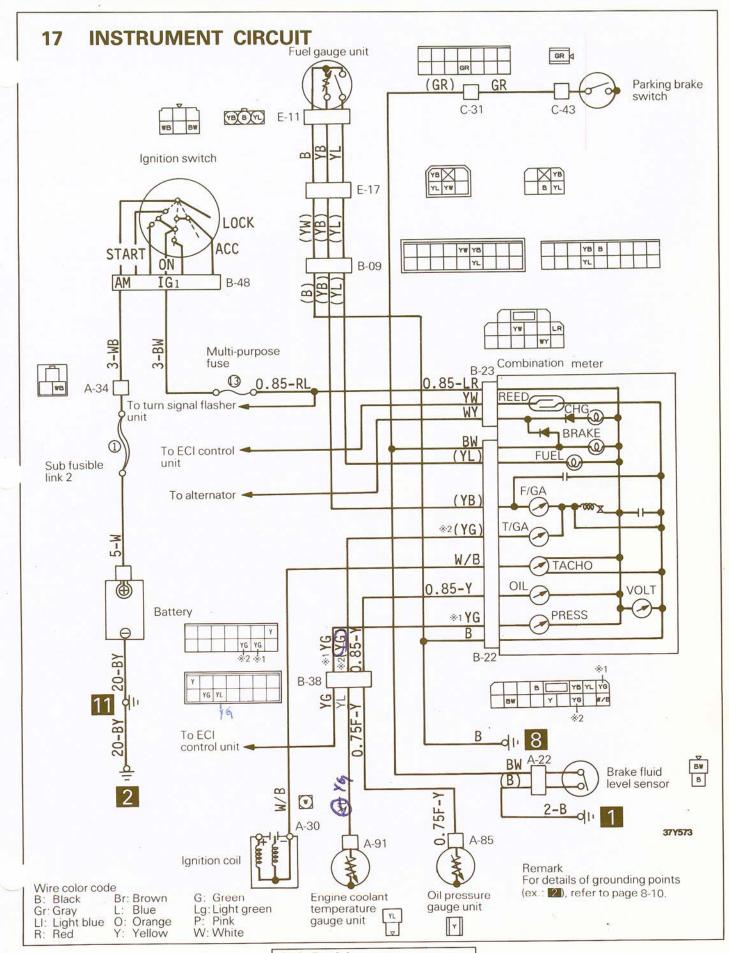


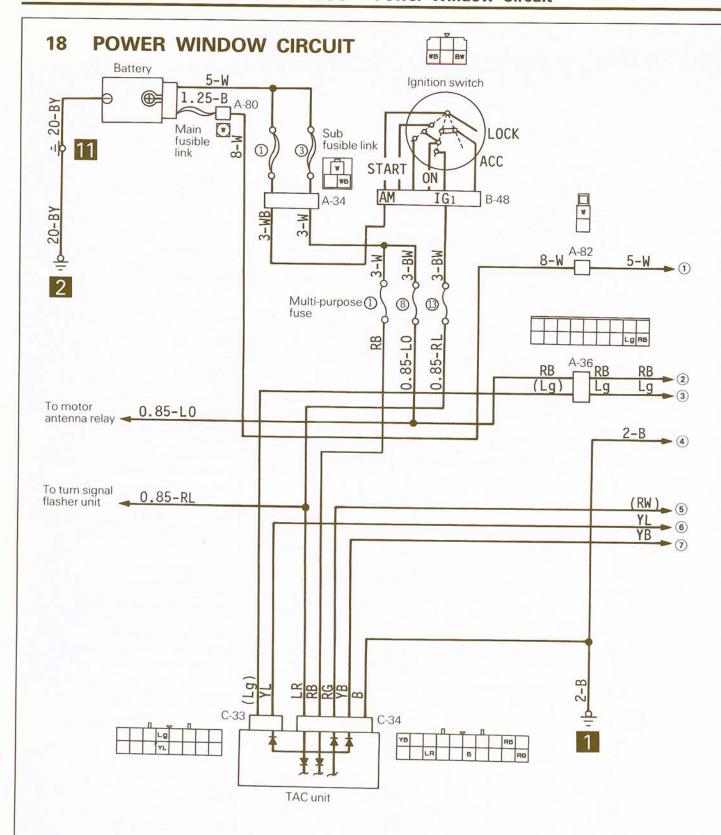




## 16 HORN CIRCUIT







#### Remarks

For details of grounding points (ex.: 2), refer to page 8-10.
 The circuit lines ended with number 1, 2 and so on are in continuation to those with the corresponding number on

continuation to those with the corresponding number on opposed page. (i.e., the line 1) on the left-hand page is connected to the line 1) on the right-hand page.)

Wire color code

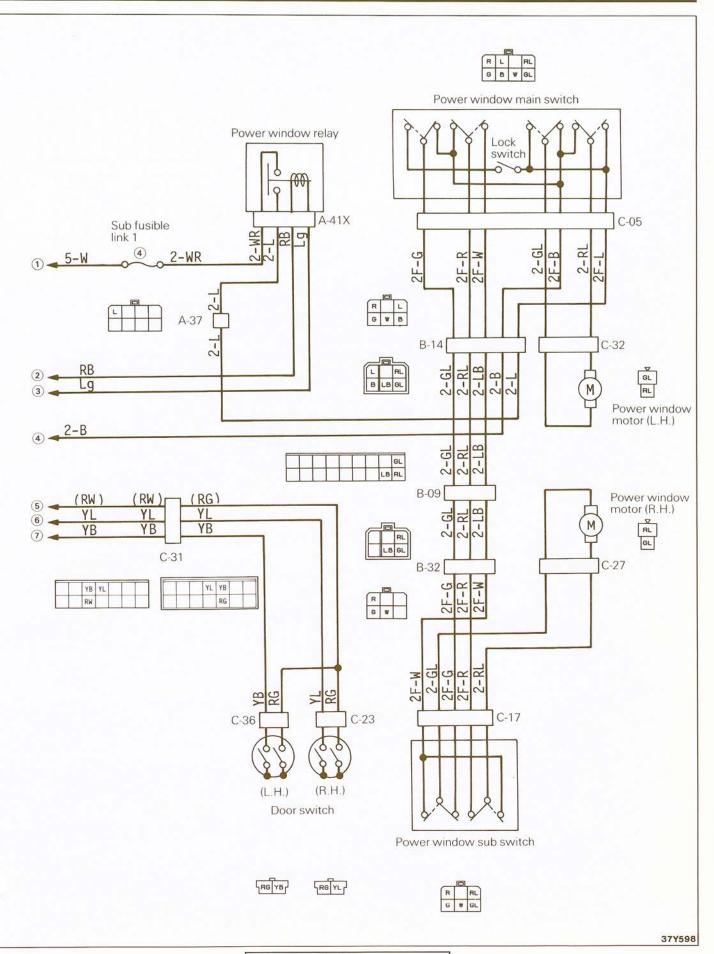
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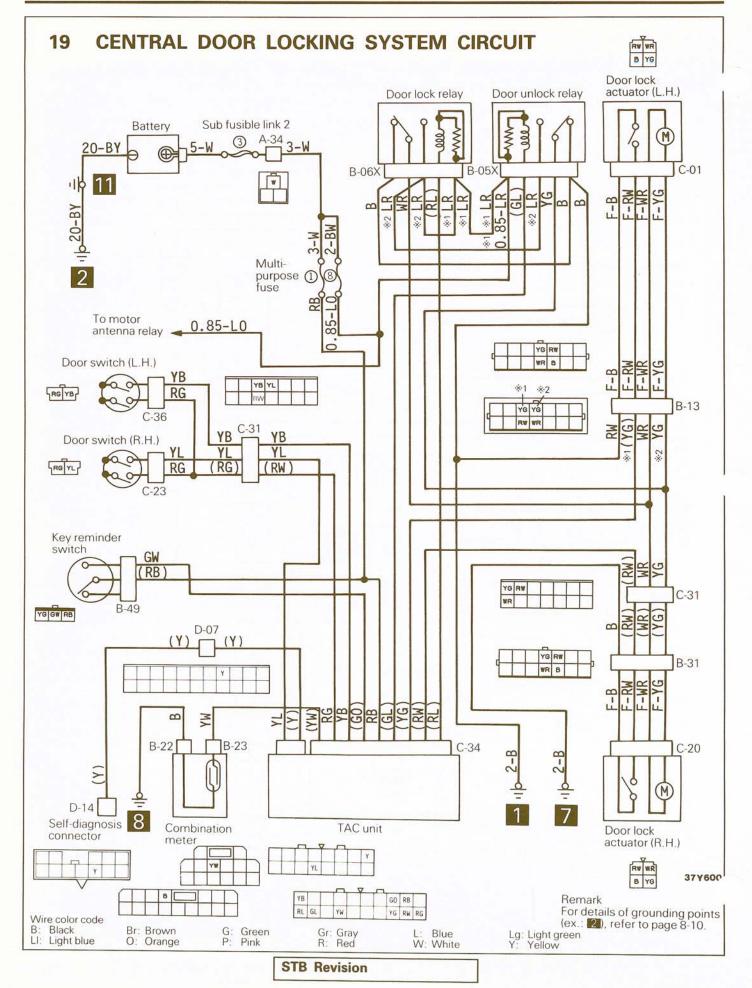
R: Red

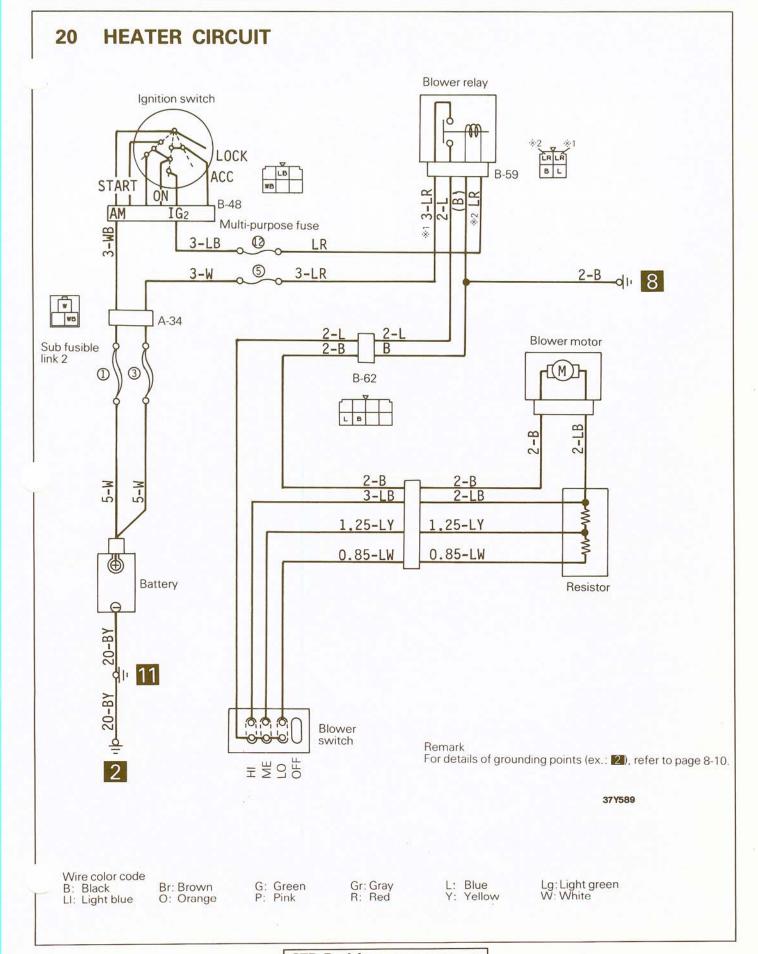
Gr: Gray Ll: Light blue L: Blue O: Orange W: White

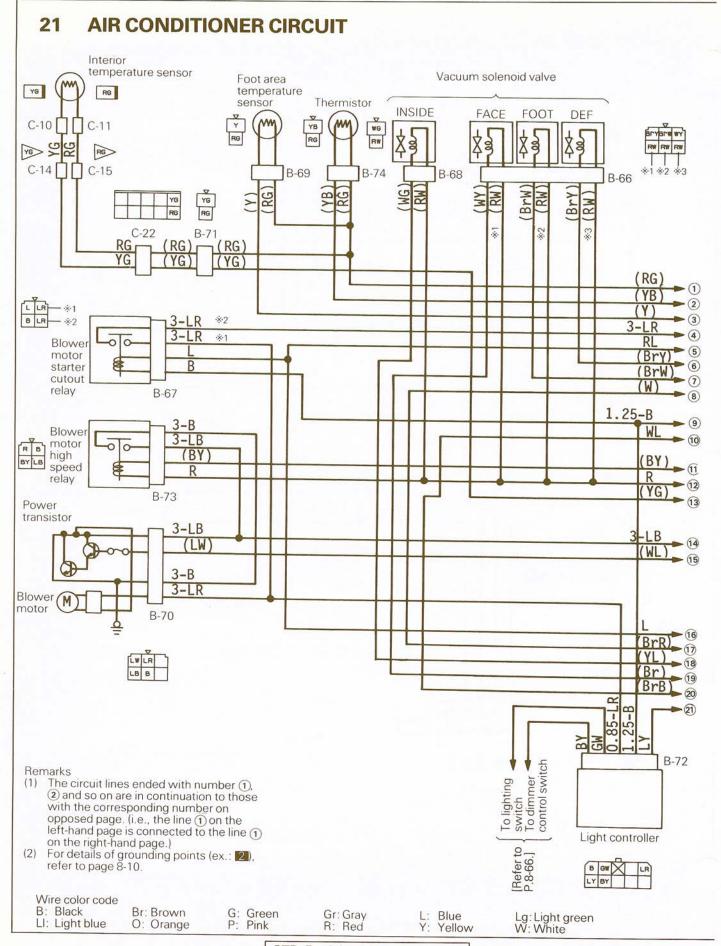
Br: Brown

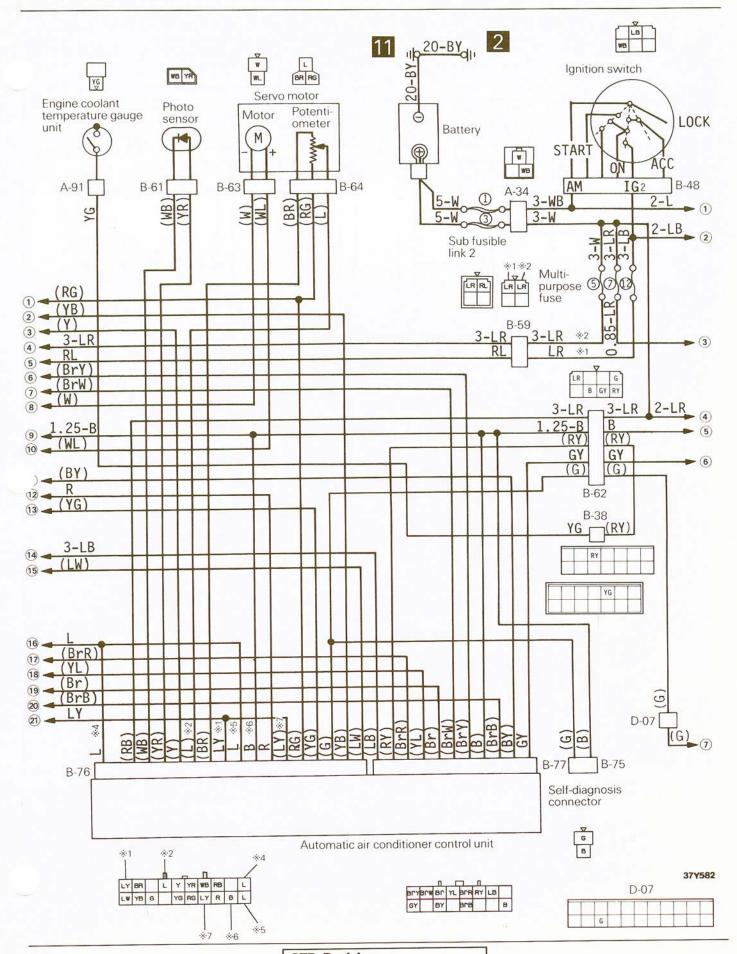
G: Green Lg:Light green P: Pink Y: Yellow

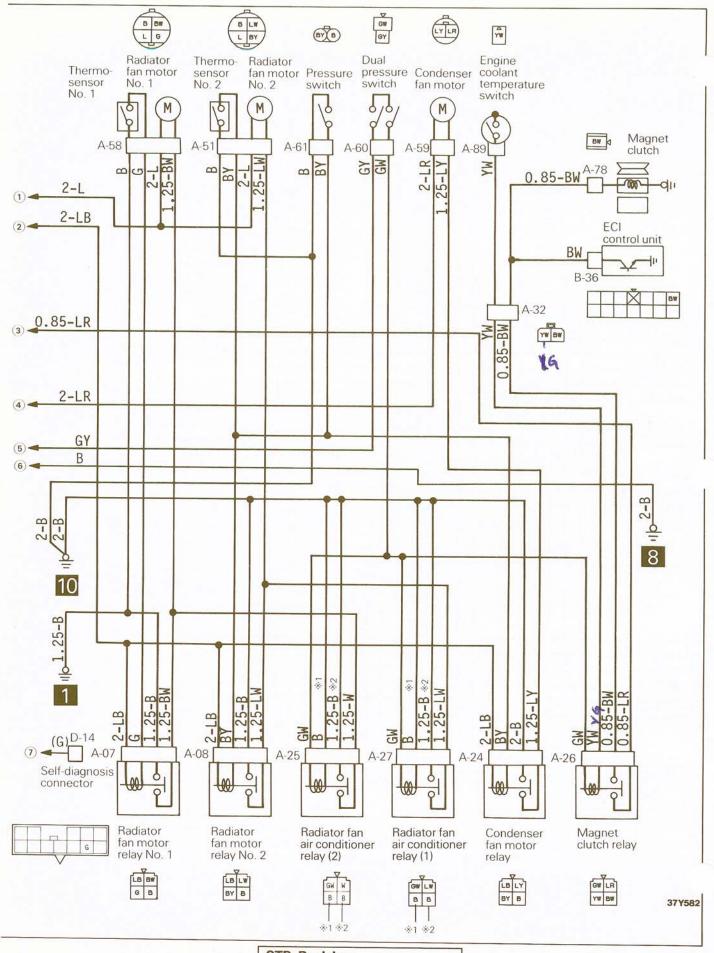






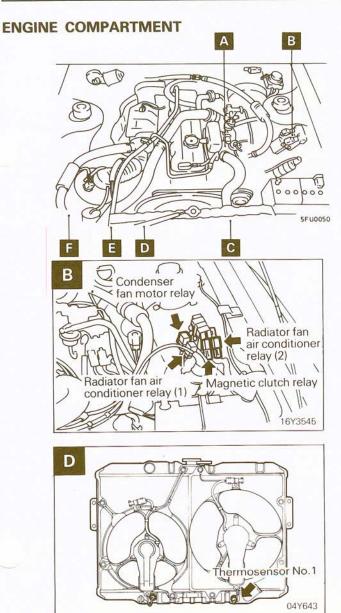


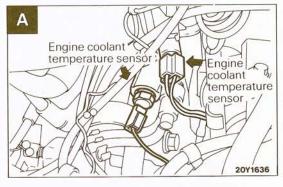


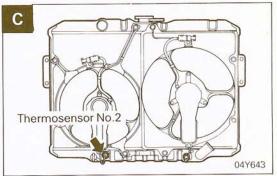


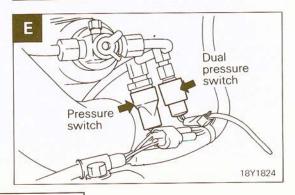
### **AUTOMATIC AIR CONDITIONING SYSTEM CONTROL PARTS LAYOUT**

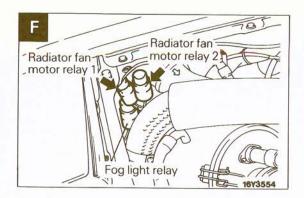
| Name   | Symbol | Name   | Symbo |
|--|--------|--|-------|
| utomatic air conditioner control unit              | Н      | Magnetic clutch relay                        | В     |
| Automatic air conditioner self-diagnosis connector | J      | Photo-sensor                                 | G     |
| Blower motor high speed relay                      | М      | Power transistor                             | K     |
| Blower motor starter cutout relay                  | М      | Pressure switch                              | Е     |
| Condenser fan motor relay                          | В      | Radiator fan, air conditioner relay (1), (2) | В     |
| Dual pressure switch                               | E      | Radiator fan motor relay 1, 2                | F     |
| Engine coolant temperature sensor                  | А      | Solenoid valve No. 1                         | K     |
| Engine coolant temperature switch                  | А      | Solenoid valve No. 2, No. 3, No. 4           | T.    |
| Foot area temperature sensor                       | L      | Thermistor                                   | М     |
| Interior temperature sensor                        | N      | Thermosensor No. 1                           | D     |
| Light controller                                   | М      | Thermosensor No. 2                           | С     |



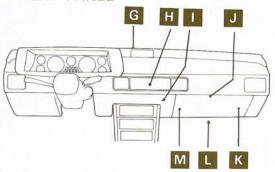


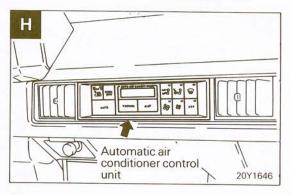


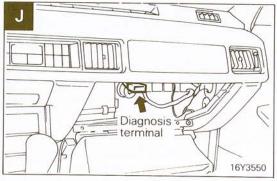


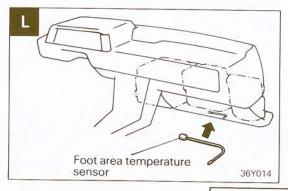


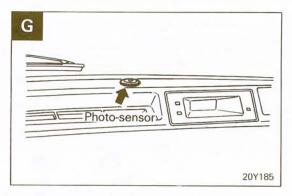
### **INSTRUMENT PANEL**

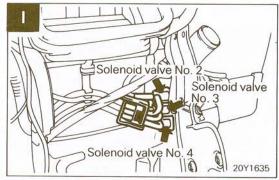


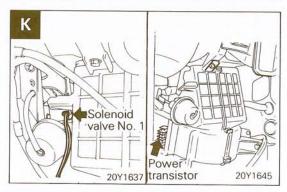


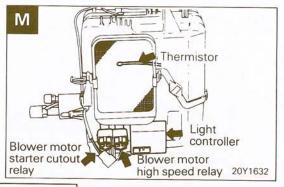




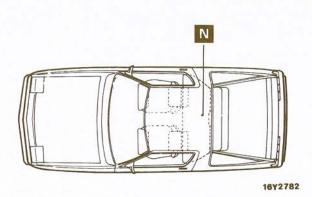


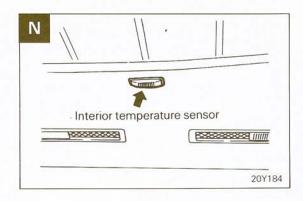


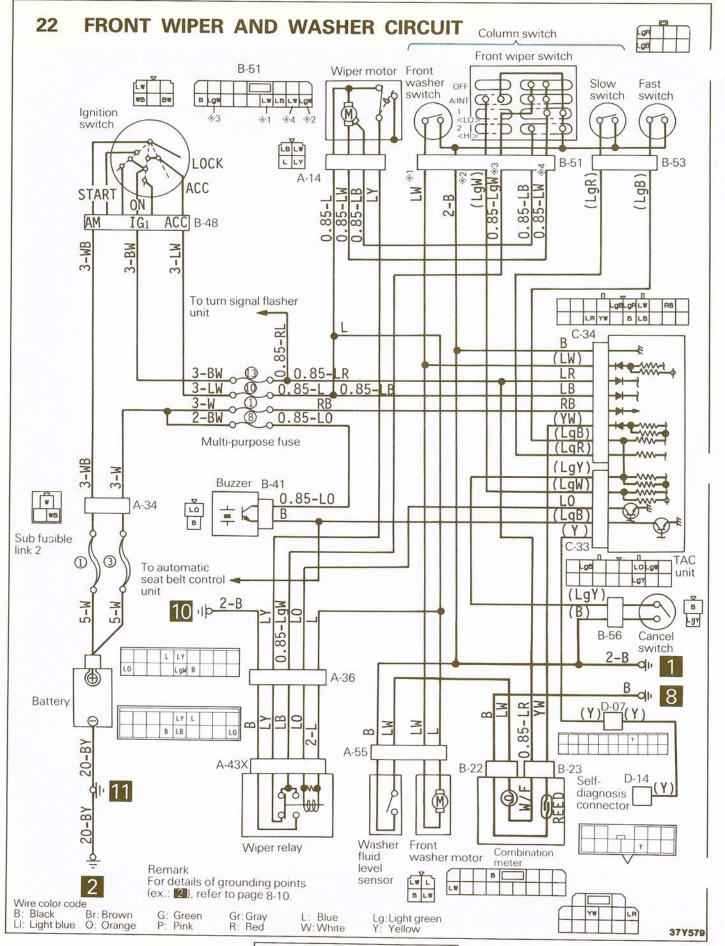


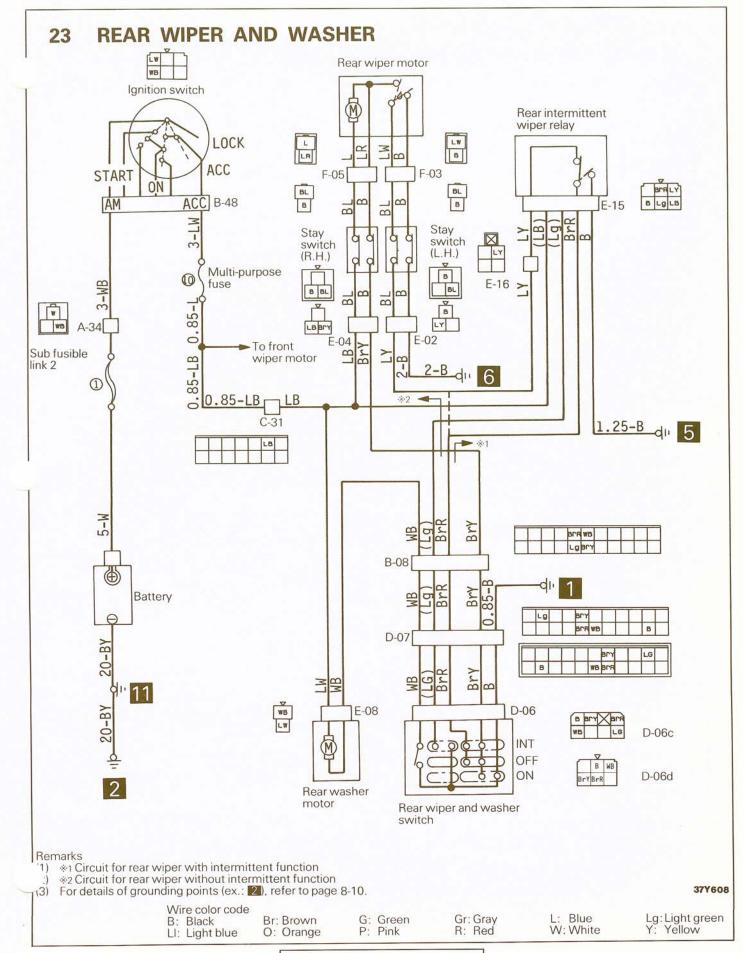


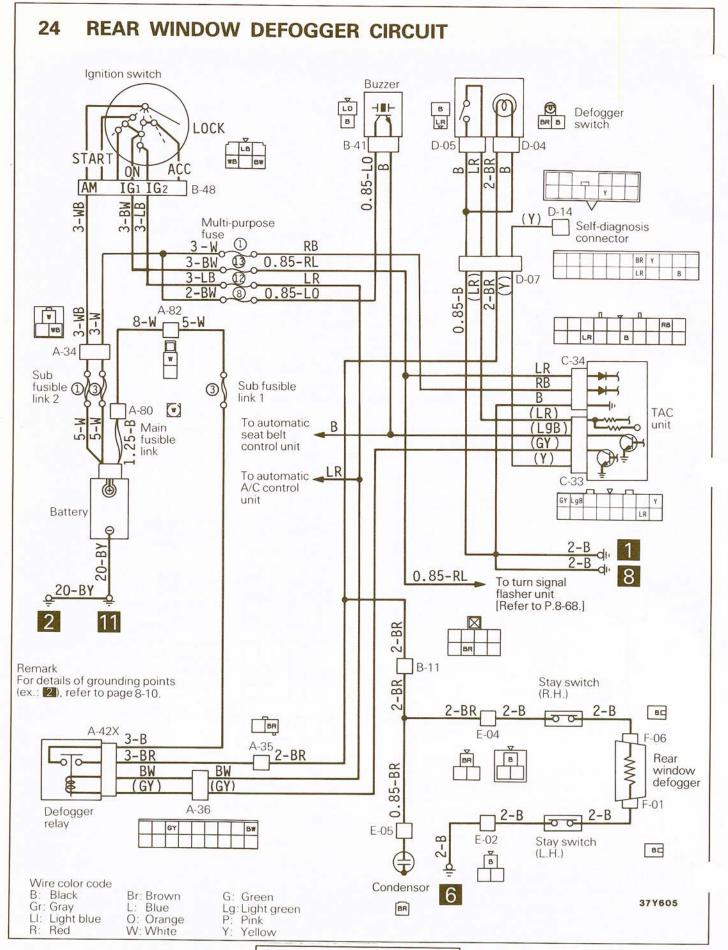
ROOF



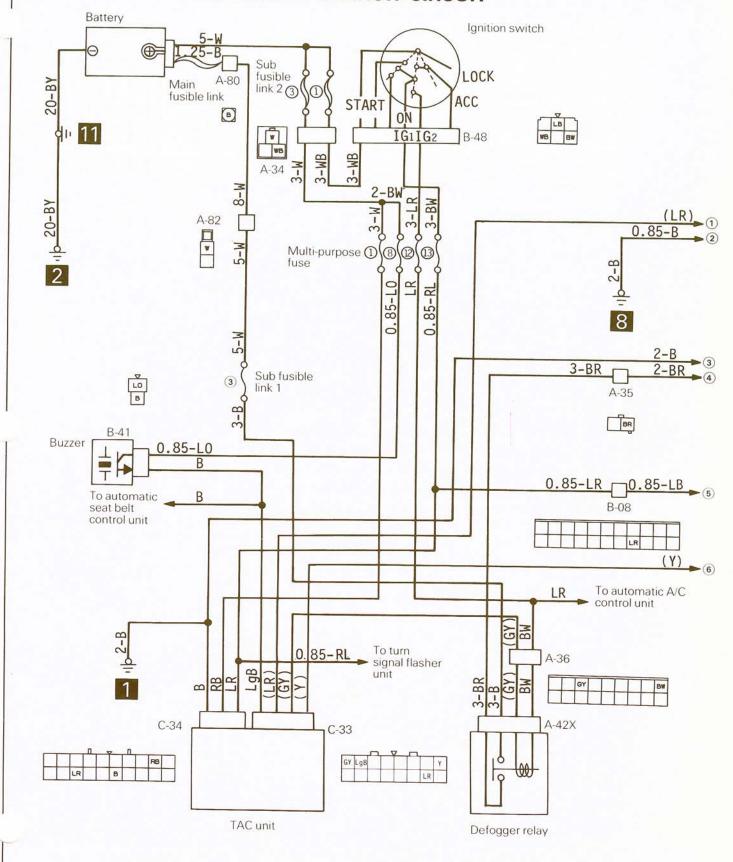


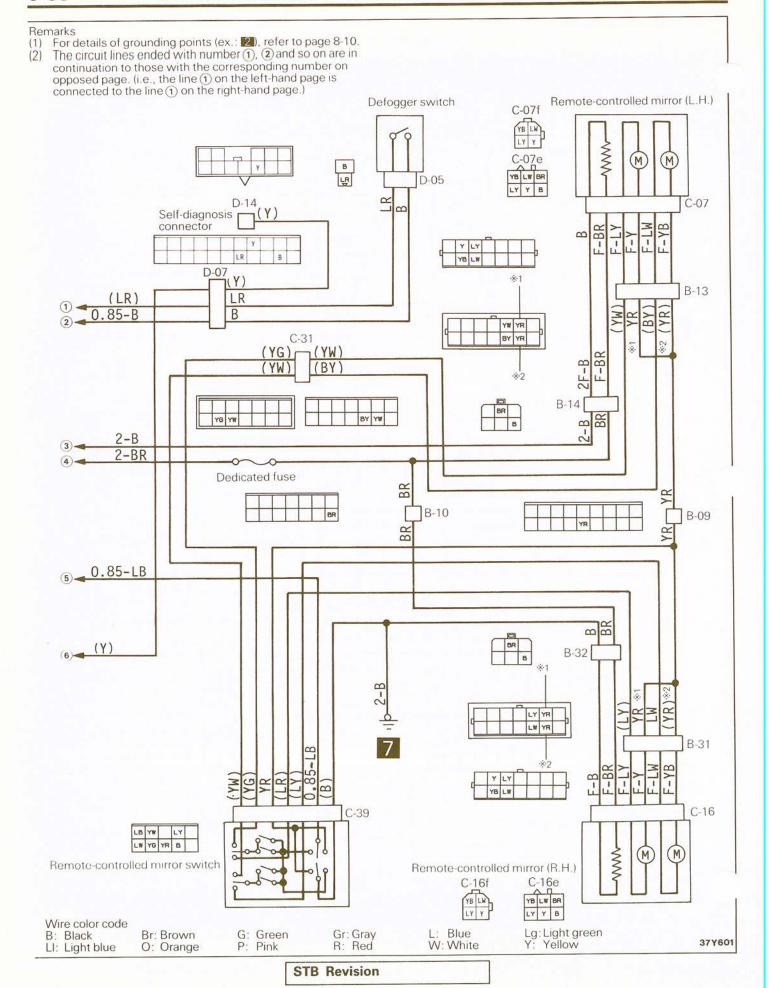


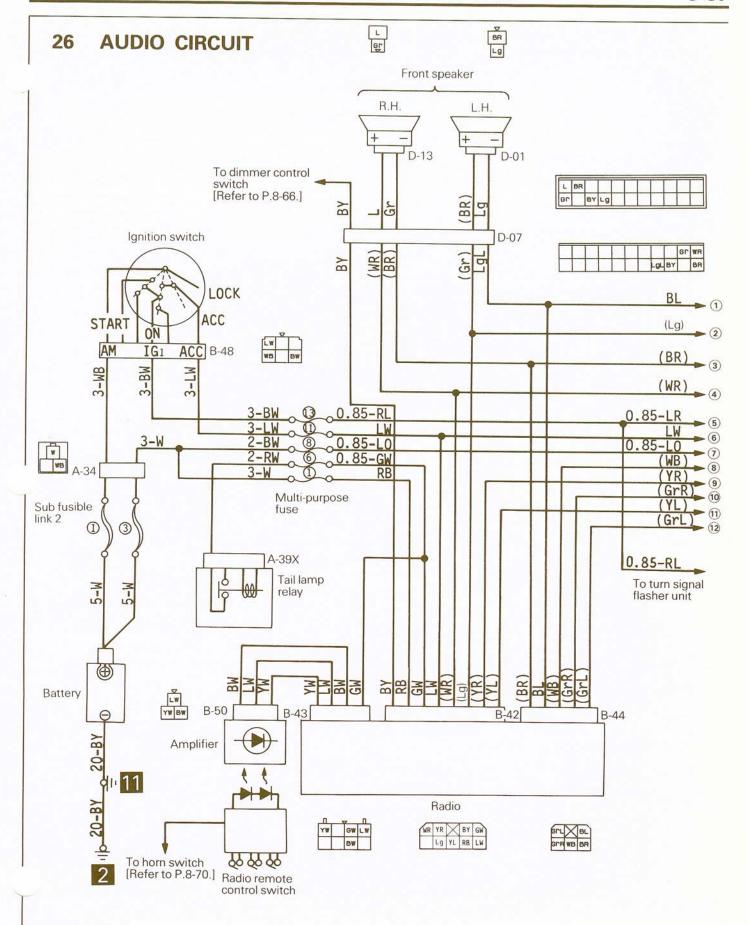


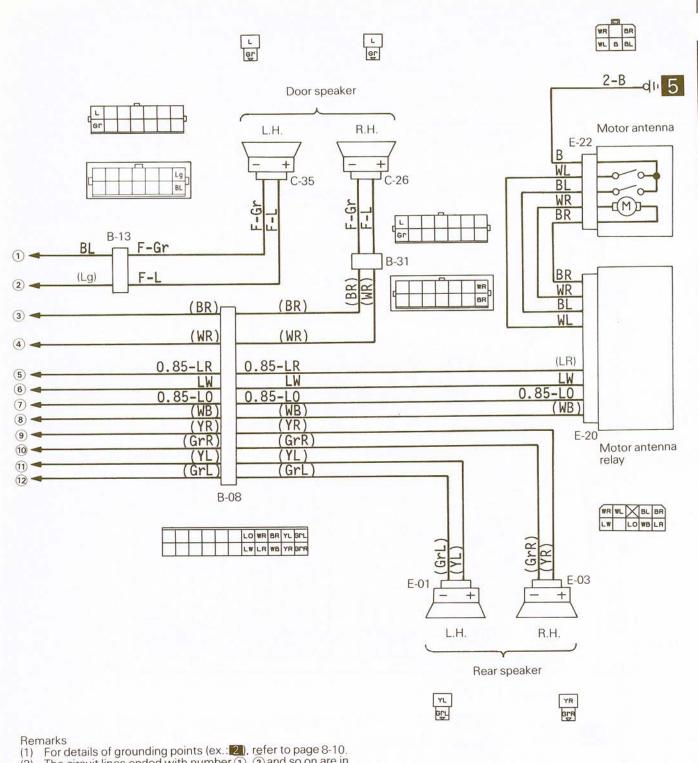


## 25 REMOTE CONTROLLED MIRROR CIRCUIT









For details of grounding points (ex.: 2), refer to page 8-10.
 The circuit lines ended with number ①, ② and so on are in continuation to those with the corresponding number on opposed page. (i.e., the line ① on the left-hand page is connected to the line ① on the right-hand page.)

Wire color code

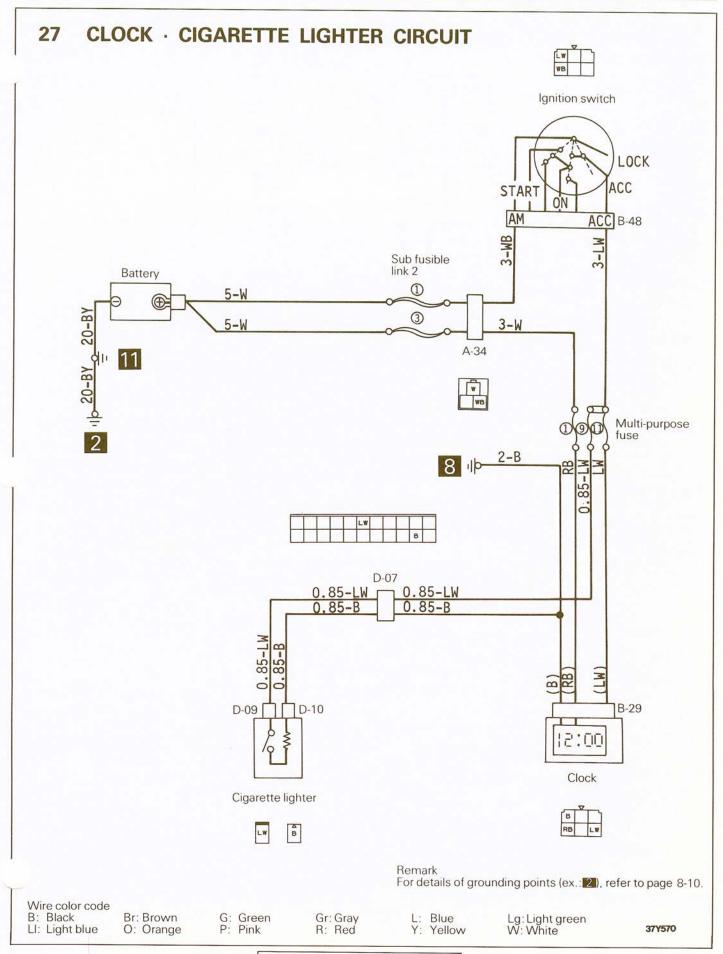
B: Black

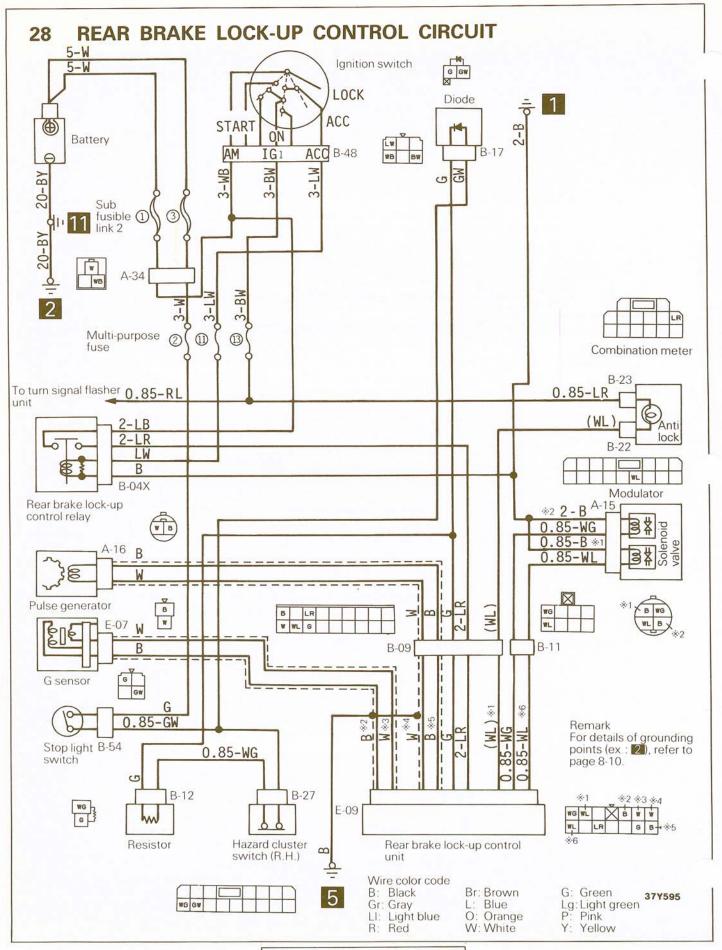
LI: Light blue

k Br: Brown t blue O: Orange G: Green P: Pink

Gr: Gray R: Red L: Blue Y: Yellow Lg: Light green W: White

37Y572



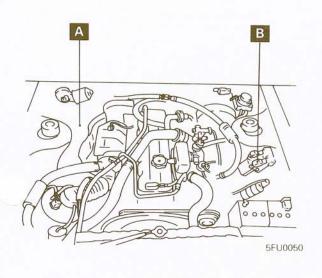


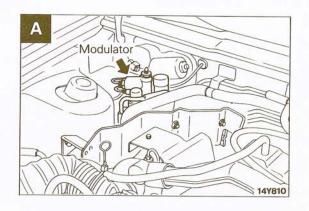
**STB** Revision

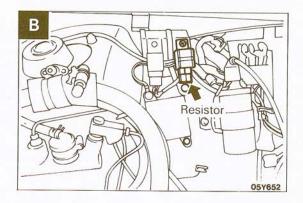
# REAR BRAKE LOCK-UP CONTROL SYSTEM - CONTROL PARTS LAYOUT

| Name            | Symbol | Name                             | Symbol |
|-----------------|--------|----------------------------------|--------|
| G-sensor        | F      | Rear brake lock-up control relay | С      |
| Modulator       | А      | Rear brake lock-up control unit  | Е      |
| Pulse generator | D      | Resistor                         | В      |

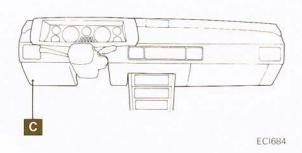
# **ENGINE COMPARTMENT**

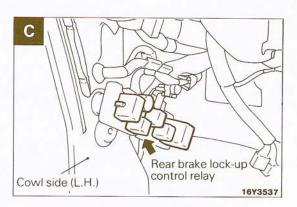


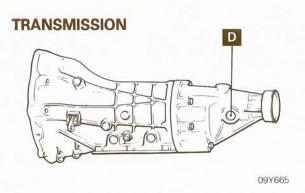


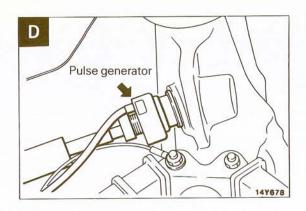


#### INSTRUMENT PANEL

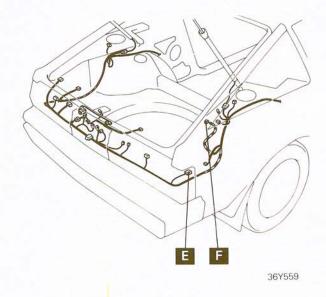


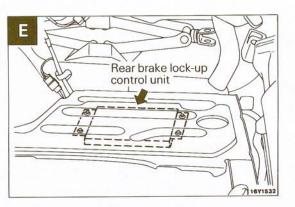


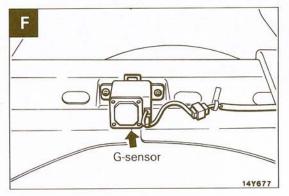


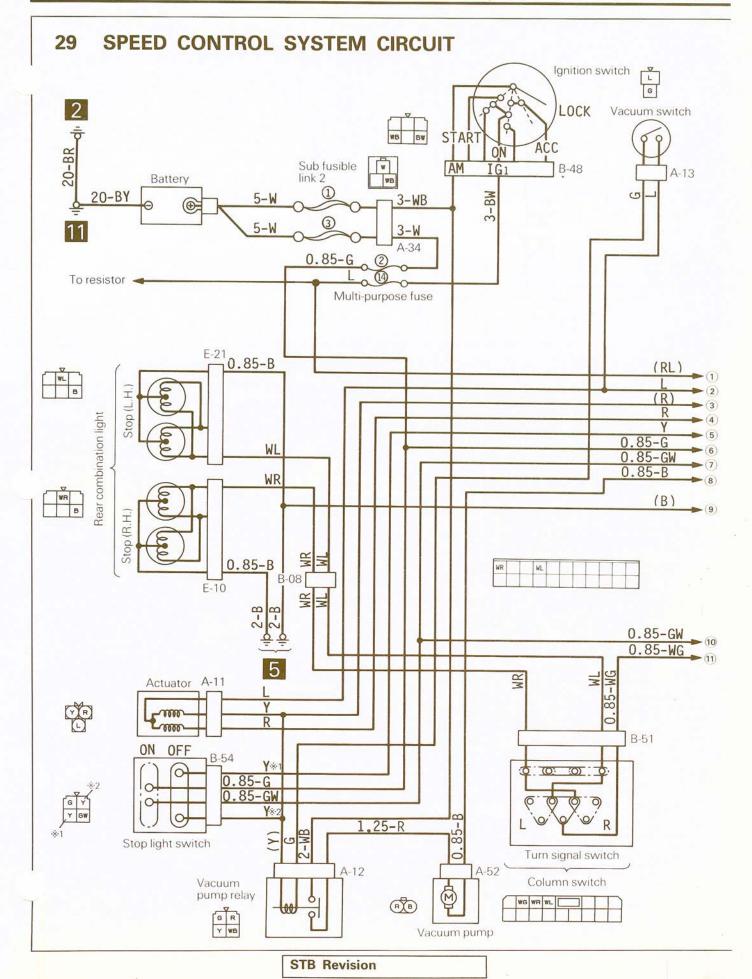


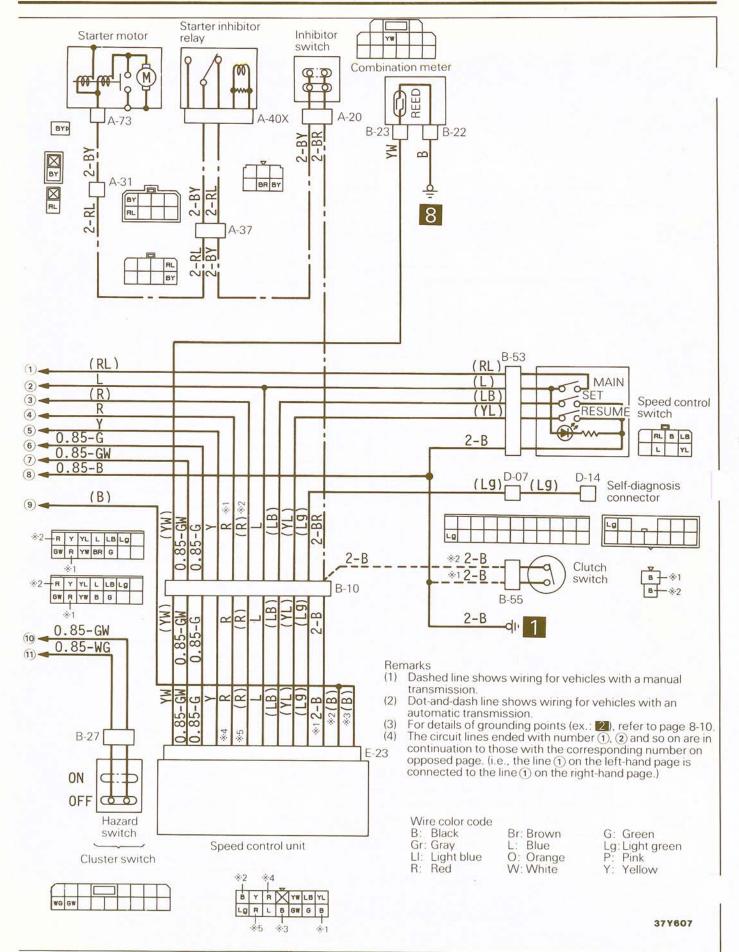
## LUGGAGE COMPARTMENT









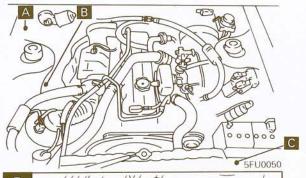


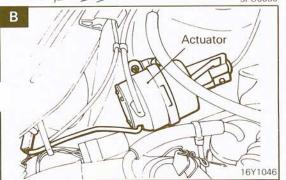
# **AUTOMATIC SPEED CONTROL SYSTEM CONTROL PARTS LAYOUT**

N14ED-A

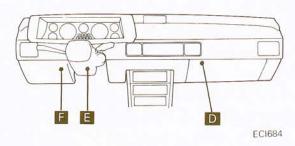
| Name   | Symbol | Name                          | Symbol |
|--|--------|-------------------------------|--------|
| ctuator  | В      | Electronic control unit (ECU) | G      |
| Brake switch   | Е      | Vacuum pump                   | С      |
| Clutch switch<br>(Vehicles with manual transmission) | F      | Vacuum pump relay             | A      |
| Diagnosis terminal                                   | D      | Vacuum switch                 | А      |

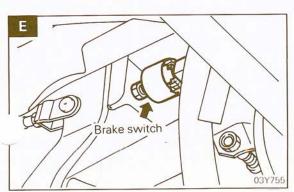
# **ENGINE COMPARTMENT**

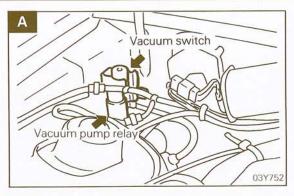


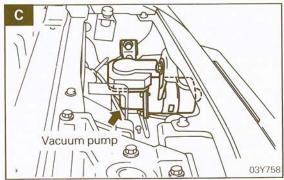


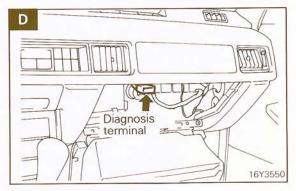
# INSTRUMENT PANEL

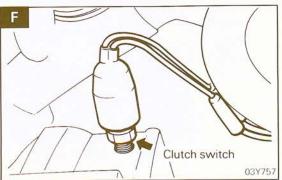




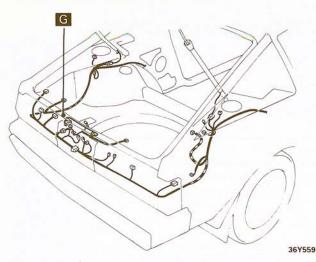


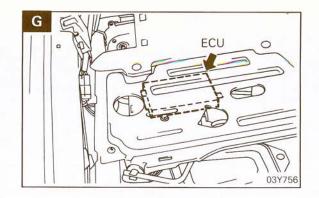


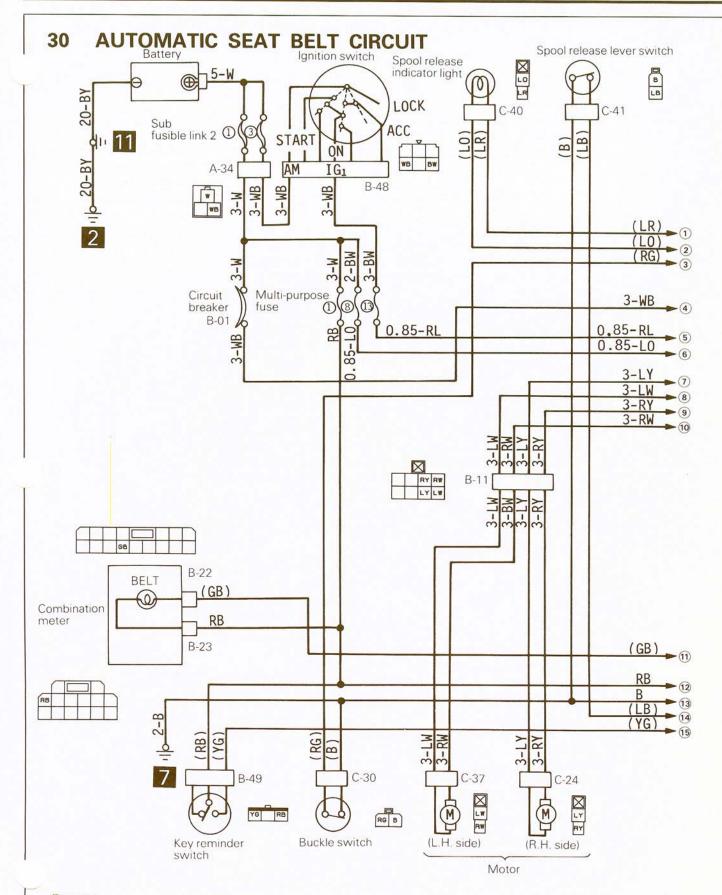




# LUGGAGE COMPARTMENT

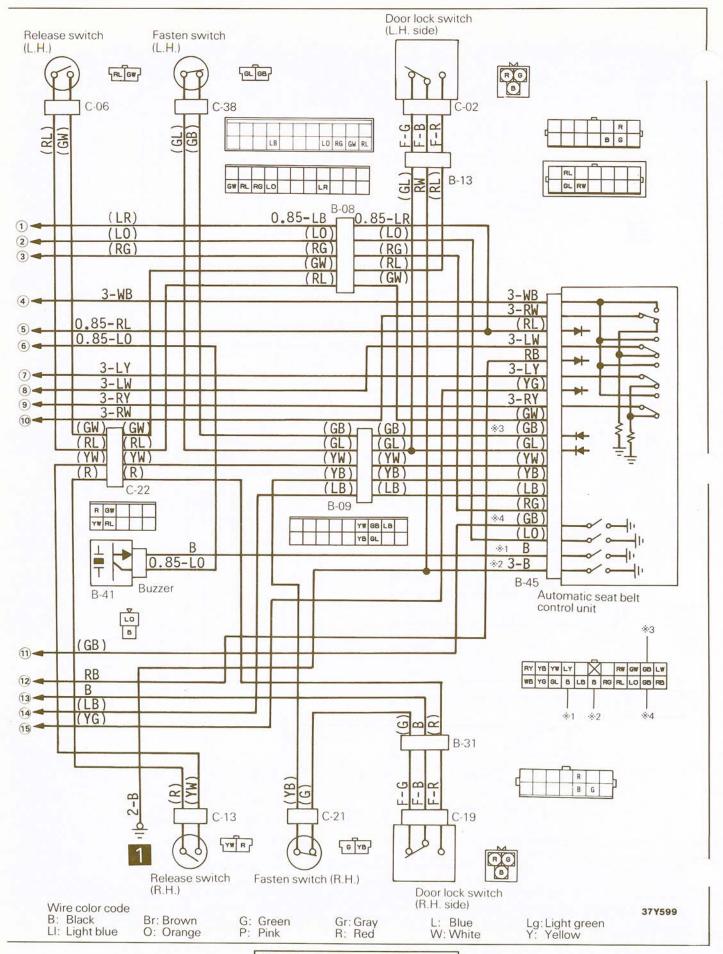


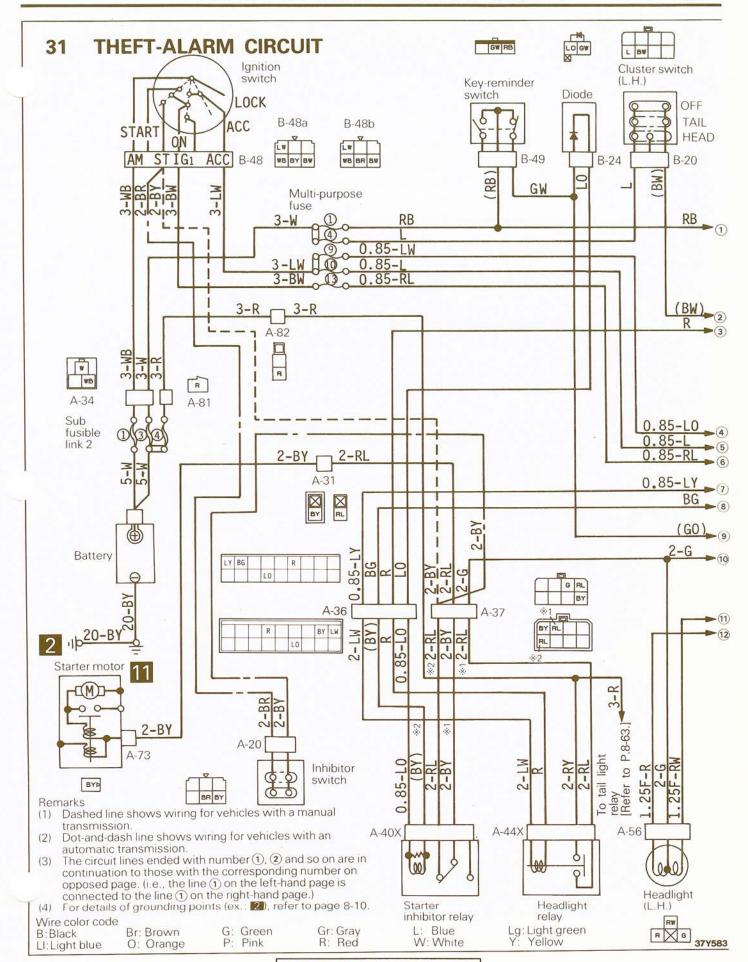


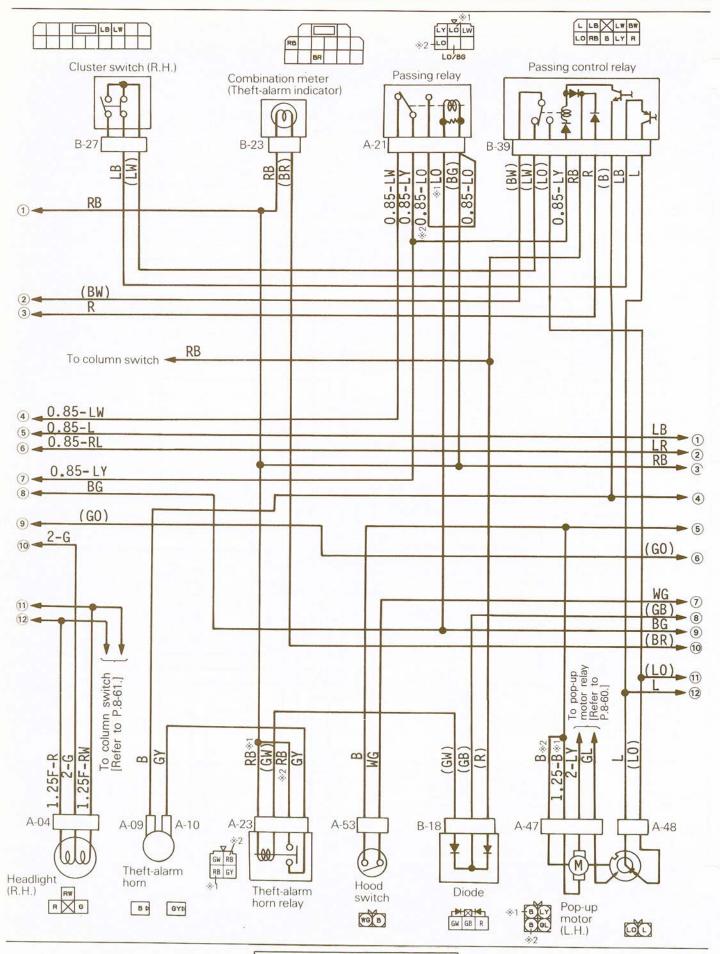


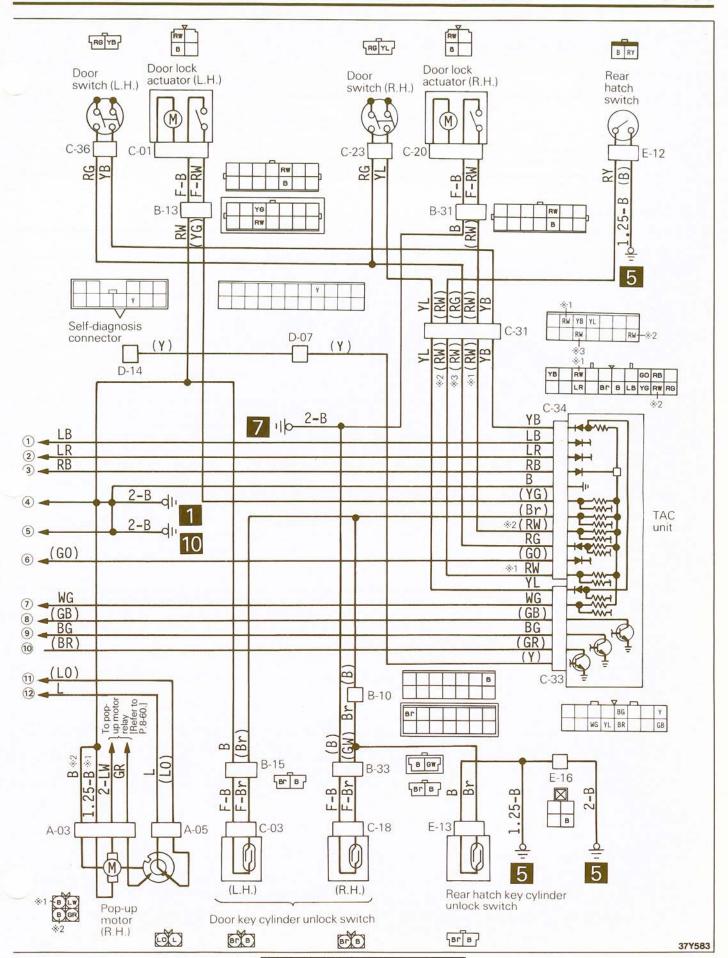
Remarks

The circuit lines ended with number 1, 2 and so on are in continuation to those with the corresponding number on opposed page. (i.e., the line ① on the left-hand page is connected to the line ① on the right-hand page.) For details of grounding points (ex.: 2), refer to page 8-10.









# 32 CENTRALIZED JUNCTION

#### Main Fusible Link

| Name :                                 | Mira salar | Size |        |
|--|------------|------|--------|
| Item                                   | Wire color | mm²  | in.²   |
| Pop-up, Defogger, Power window circuit | Black      | 1.25 | 0.0019 |

## Sub Fusible Link 1

| Manage 1             | NIe | \A/ina calar | Size |        |
|----------------------|-----|--------------|------|--------|
| ltem                 | No. | Wire color   | mm²  | in.²   |
| Pop-up circuit       | 1   | Green        | 0.5  | 0.0008 |
| Defogger circuit     | 3   | Green        | 0.5  | 0.0008 |
| Power window circuit | 4   | Green        | 0.5  | 0.0008 |

## Sub Fusible Link 2

| Itom               | NI  | 10/:       | Size |          |
|--------------------|-----|------------|------|----------|
| Item               | No. | Wire color | mm²  | in.²     |
| Ignition circuit   | 1   | Red        | 0.85 | 0.0013   |
| ECI system circuit | 2   | Brown      | 0.3  | . 0.0005 |
| Battery circuit    | 3   | Red        | 0.85 | 0.0013   |
| Headlight circuit  | 4   | Green      | 0.5  | 0.0008   |

#### **Dedicated Fuse**

| Item                                    | No. | Rated capacity A |
|---|-----|------------------|
| High beam circuit                       | 1   | 5                |
| Fog light circuit                       | 2   | 15               |
| Heated remote controlled mirror circuit | _   | 5                |

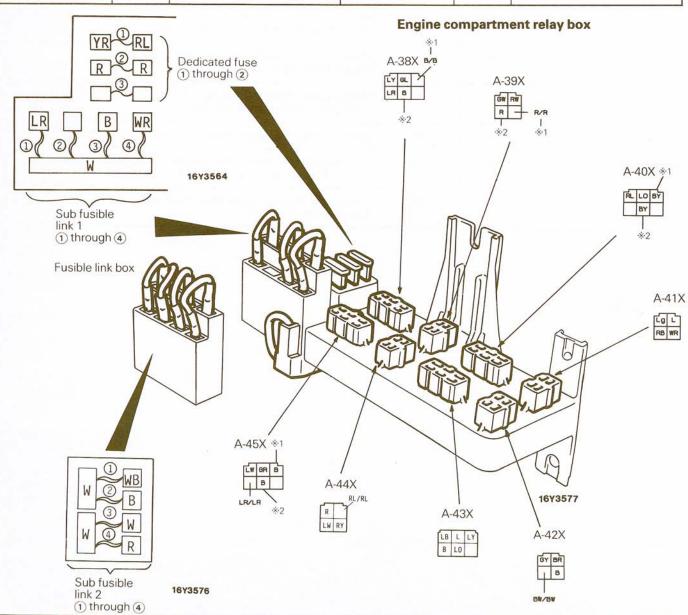
## Circuit Breaker

| Item                        | Rated capacity A |
|-----------------------------|------------------|
| Automatic seat belt circuit | 20               |

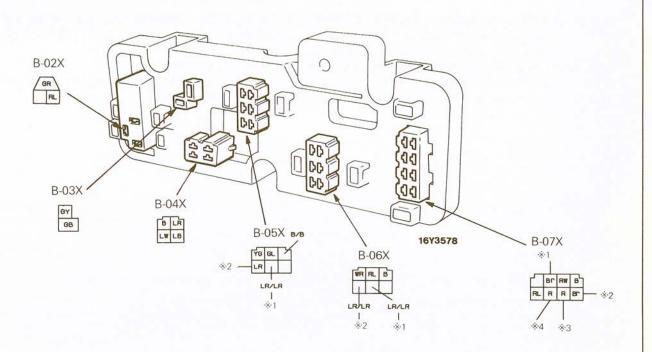
| Power supply circuit  | Fuse No. | Rated<br>capacity<br>A | Load circuit   |
|-----------------------|----------|------------------------|--|
| Battery               | 1        | 10                     | Dome light, Luggage compartment light,<br>Automatic seat belt, Clock, Radio, Door light,<br>ETACS, Theft alarm |
|                       | 2        | 15                     | Stop light, Speed control unit   |
|                       | 3        | 15                     | Hazard   |
|                       | 4        | 10                     | Pop-up motor   |
|                       | 5        | 20                     | Blower motor   |
| Tail light relay      | 6        | 15                     | Position light, Illumination light, Tail light,<br>License plate light   |
| Battery               | 7        | 10                     | Magnet clutch  |
|                       | 8        | 15                     | Power antenna, Central door lock,<br>Power window relay, Alarm buzzer  |
| Ignition switch       | 9        | 15                     | Horn, Cigarette lighter, Headlight relay   |
| (ACC)                 | 10       | 15                     | Wiper motor, Washer motor, ETACS,<br>Rear intermittent wiper relay   |
|                       | 11       | 10                     | Radio, Clock, Power antenna,<br>Rear brake lock-up control relay   |
| Ignition switch (IG2) | 12       | 10                     | Blower relay, Defogger relay, Air conditioner  |
| Ignition switch (IG1) | 13       | 10                     | Turn-signal light, Meter and gauge, Remote controlled mirror, Power antenna, ETACS, Automatic seat belt        |
|                       | 14       | 10                     | Alternator, Back-up light, Overdrive relay,<br>Speed control switch  |

## Centralized Relay, etc.

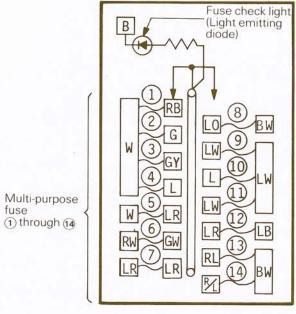
| Identification symbol   |       | Part name                 | Identification symbol  |       | Part name                 |
|-------------------------|-------|---------------------------|--|-------|---------------------------|
| Relay box in            | A-38X | Pop-up motor relay (L.H.) | A CONTRACTOR OF THE PART OF TH | B-02X | Turn-signal flasher unit  |
| engine compart-<br>ment | A-39X | Tail light relay          | interior   | B-03X | Hazard flasher unit       |
|                         | A-40X | Starter inhibitor relay   |  | B-04X | Rear brake lock-up contro |
|                         | A-41X | Power window relay        |  |       | relay                     |
|                         | A-42X | Defogger relay            |  | B-05X | Door unlock relay         |
|                         | A-43X | Wiper relay               |  | B-06X | Door lock relay           |
|                         | A-44X | Headlight relay           |  | B-07X | Overdrive relay           |
|                         | A-45X | Pop-up motor relay (R.H.) |  |       | _                         |

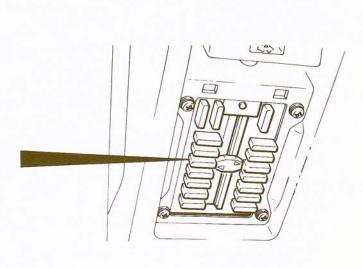


### Interior relay box



#### Interior fuse box





16Y3563

20Y809

# **CHARGING SYSTEM**

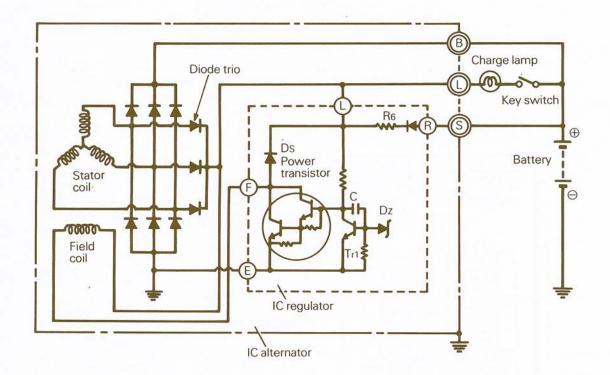
# **GENERAL INFORMATION**

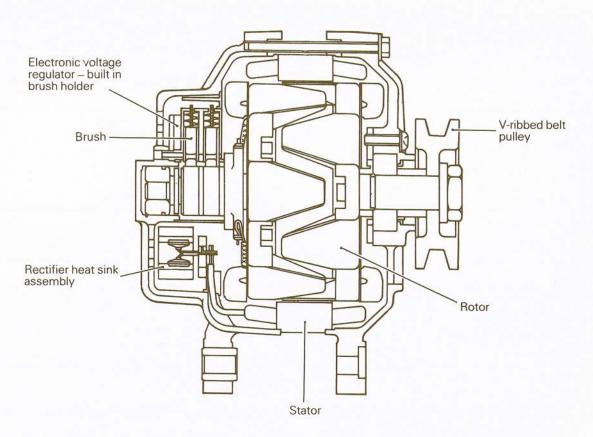
NOSEAA"

The charging system includes a battery, alternator with regulator, charging indicator lamp and wires. The alternator has six built-in rectifiers (three positive and three negative), each rectifying AC current to DC current. Therefore, DC current appears at the alternator "B" terminal.

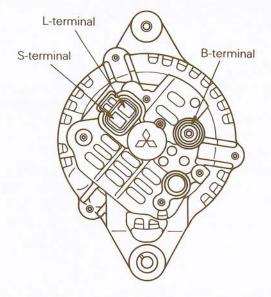
This alternator regulates charging voltage by detecting battery voltage.

The main components of the alternator are rotor, stator, rectifiers, capacitors, brushes, bearings and V-ribbed belt pulley. The brush holder has a built-in electronic voltage regulator.

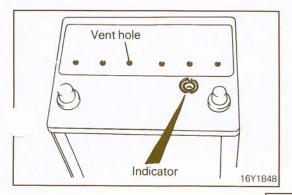








6EL211



# MAINTENANCE-FREE TYPE BATTERY

- The maintenance-free battery is, as the name implies, totally maintenance free and has no removable battery cell caps.
- 2. Water never needs to be added to the maintenance-free battery.
- 3. The battery is completely sealed, except for small vent holes in the cover.

# **SPECIFICATIONS**

#### N08FB- -

## **GENERAL SPECIFICATIONS**

# **ALTERNATOR**

| Items              | Specifications           |
|--------------------|--------------------------|
| Туре               | Battery voltage sensing  |
| Identification No. | A2T49977                 |
| Part No.           | MD125569                 |
| Rated output       | 12V – 75A                |
| Voltage regulator  | Electronic built-in type |

#### **BATTERY**

| Items                                | Specifications |  |
|--------------------------------------|----------------|--|
| Type                                 | 55B24R-MF      |  |
| Ampere hours (5HR) Ah                | 36             |  |
| Cranking rating [at –17.8°C (0°F)] A | 420            |  |
| Reserve capacity min.                | 75             |  |

#### NOTE

1. CRANKING RATING is the current a battery can deliver for 30 seconds and maintain a terminal voltage of 7.2 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 26.7°C (80°F).

# **SERVICE SPECIFICATIONS**

N08EC--

| Items                              |              | Specifications |
|------------------------------------|--------------|----------------|
| Standard value                     | /            |                |
| 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°F) | 13.1 – 14.5    |
| Slip ring O.D. mm (in.)            |              | 23 (.906)      |
| Field coil resistance $\Omega$     |              | 3.1            |
| Limit                              |              | AC TO TYP      |
| Output current A                   |              | Min. 52        |
| Slip ring O.D. mm (in.)            |              | 22.2 (.874)    |

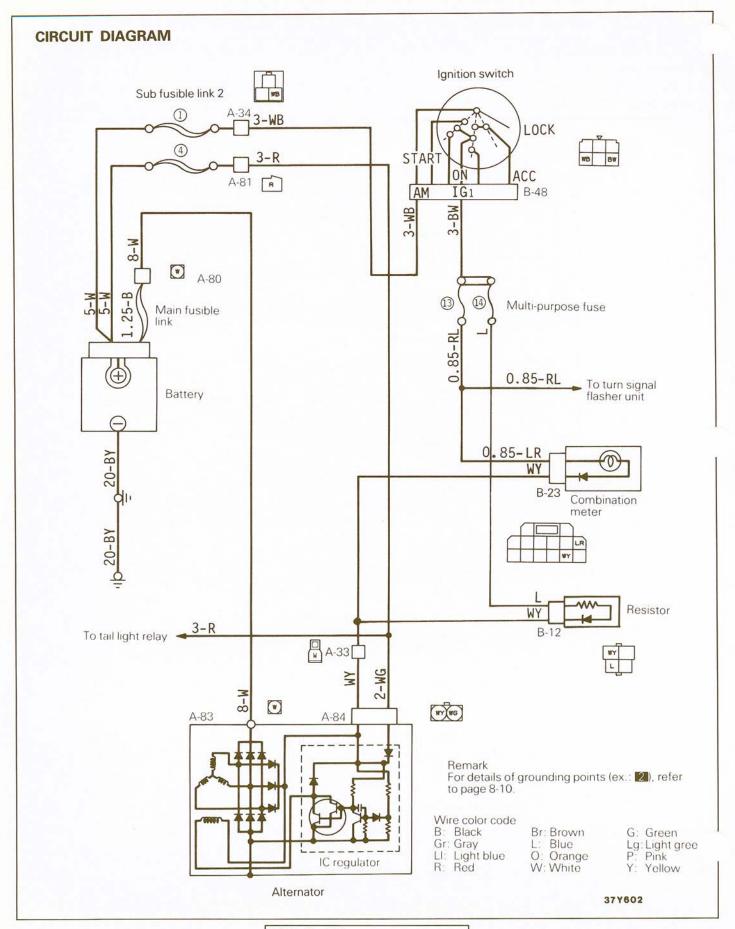
**STB** Revision

# **TORQUE SPECIFICATIONS**

N08ED--

| Items                           | Nm      | ft.lbs. |
|---------------------------------|---------|---------|
| Alternator support bolt and nut | 20 – 25 | 14 – 18 |
| Alternator brace bolt           | 12 – 15 | 9-10    |
| Discharge hose                  | 20 – 25 | 14 – 18 |
| Suction hose                    | 30 – 34 | 22 – 26 |

# **TROUBLESHOOTING**



#### **OPERATION**

N08EHAC

## **Before Engine Starts**

 First, when the ignition switch is turned to "ON", and before the engine starts, current flows through fuse No. 7, charging indicator light, then to alternator, and ground, causing the charging indicator light to go on.

## When Alternator is Generating Current

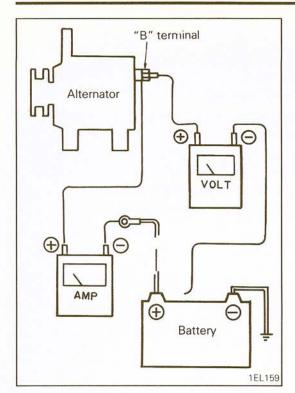
- Once the engine starts, battery voltage is applied to alternator S terminal. The battery voltage imposed on this terminal is monitored by the IC voltage regulator, and according to the voltage detected, the IC voltage regulator regulates the alternator field coil current, thus controlling the current the alternator generates.
- Once the alternator starts generating current, a voltage, slightly higher than battery voltage is applied to L terminal. This prevents current from flowing to the charging indicator light and the light goes off.
- At alternator B terminal, a load current proportional to the battery voltage is produced and is sent to any load.

#### Remarks

The alternator relay is to ensure charging the battery even when the charging indicator light bulb is burnt out.

#### TROUBLESHOOTING HINTS

- Charging indicator light does not go on when the ignition switch is turned to "ON", before the engine starts
  - Check the bulb.
- 2. Charging indicator light fails to go off once the engine starts
  - · Check drive belt tension.
  - Check the IC voltage regulator.
- 3. Discharged or overcharged battery
  - · Check the IC voltage regulator.



# SERVICE ADJUSTMENT PROCEDURES

# CHARGING SYSTEM INSPECTION VOLTAGE DROP TEST OF ALTERNATOR OUTPUT WI

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

# Preparation

- (1) Turn the ignition switch to "OFF".
- (2) Disconnect the battery GND cable.
- (3) Disconnect the alternator output lead from the alternator "B" terminal.
- (4) Connect a DC ammeter (0 to 100A) 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 disconneting 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 the battery (+) terminal.
- (6) Connect the battery ground cable.
- (7) Leave the hood open.

#### Test

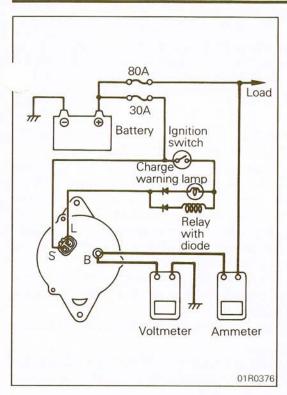
- (1) Start the engine.
- (2) Turn on or off the headlights and clearance lights and adjust the engine speed so that the ammeter reads 20A and read off the voltmeter indication under this condition.

#### Result

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

### Standard value: 0.2V 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 """ 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 7 COOLING".
- (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 (0 to 100A) in series between the "B" terminal and the disconnected output wire. Connect the (+) lead wire of the ammeter to the alternator "B" terminal and 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 rely on clips.

- (6) Connect a voltmeter (0 to 20V) between the "B" terminal and ground. Connect the (+) lead wire of the voltmeter 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 startup, 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 value: 52 A min.

NOTE:

- (1) The nominal output current value is shown on the nameplate affixed to the alternator body.
- (2) 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.

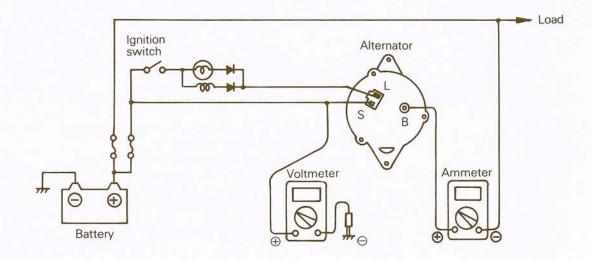
- (2) Upon completion of the output current test, lower the engine speed to the idle speed and turn off the ignition switch.
- (3) Disconnect the battery ground cable.
- (4) Remove the test ammeter and voltmeter and the engine tachometer.
- (5) Connect the alternator output wire to the alternator "B" 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 7 COOLING".
- (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.



- (5) Disconnect the alternator output wire from the alternator "B" terminal.
- (6) Connect a DC ammeter (0 to 100A) in series between the "B" terminal and the disconnected output wire. Connect the (+) lead wire of the ammeter to the alternator "B terminal and 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: Battery 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.

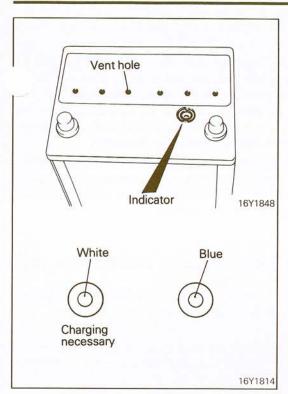
#### Result

(1) If the voltmeter reading agrees with the value listed in the following regulating voltage table, 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) | Regulated voltage<br>[Standard value] |
|---|---------------------------------------|
| -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) After the test, lower the engine speed to idle speed and turn the ignition switch to "OFF".
- (3) Disconnect the battery ground cable.
- (4) Remove the test voltmeter, ammeter and engine tachometer.
- (5) Connect the alternator output lead to alternator "B" terminal.
- (6) Connect the battery ground cable.



# BATTERY INSPECTION BATTERY VISUAL INSPECTION (1)

N08EIBA

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.

- 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.
- 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.

#### **BATTERY CHARGING**

N08EICA

#### Caution

When batteries are being charged, an explosive gas forms beneath the cover of each cell. Do not smoke near batter 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

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

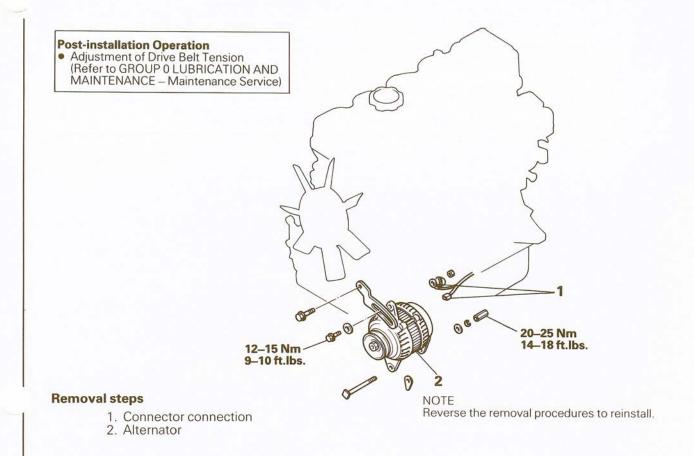
#### Charge Rate Chart

| Battery          | 55B24R<br>MF<br>(420 amps) |  |
|------------------|----------------------------|--|
| Slow<br>Charging | 5 amps<br>10 hrs.          |  |
|                  | 10 amps<br>5 hrs.          |  |
| Fast<br>Charging | 20 amps<br>2.5 hrs.        |  |
|                  | 30 amps<br>1.5 hrs.        |  |

# ALTERNATOR

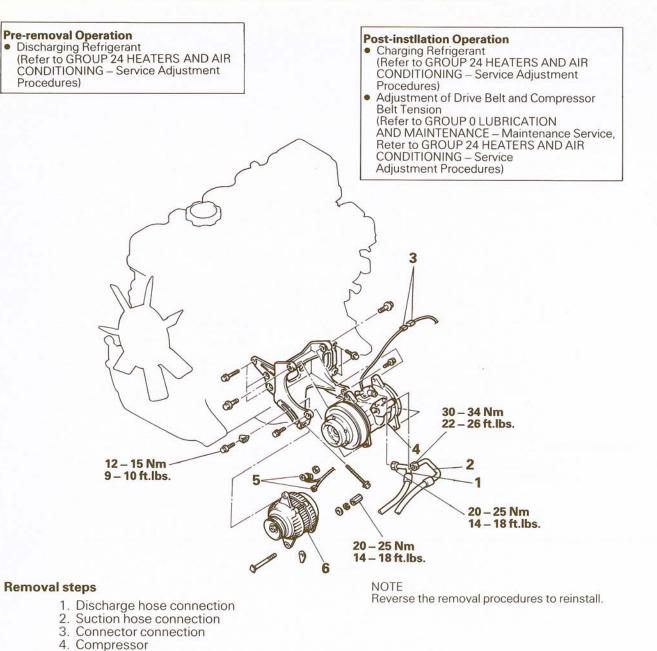
N08EJAD

# **REMOVAL AND INSTALLATION (Vehicles without Air Conditioner)**



16W1565

# **REMOVAL AND INSTALLATION (Vehicles with Air Conditioner)**



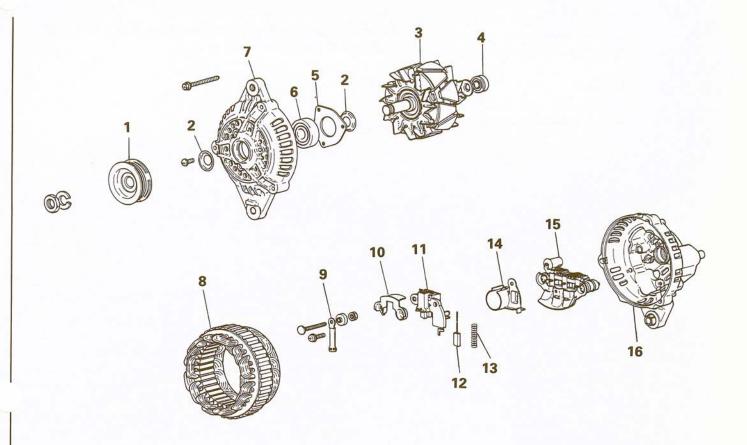
16W1566

5. Connector connection

6. Alternator

# **ALTERNATOR**

# **DISASSEMBLY AND REASSEMBLY**



## Disassembly steps

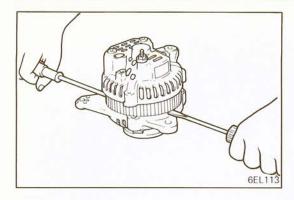
- 1. Pulley
- 2. Seal
- 3. Rotor assembly
  - 4. Rear bearing
  - 5. Bearing retainer6. Front bearing

  - 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

#### NOTE

- (1) Reverse the disassembly procedures to reassemble.
  (2) : Refer to "Service Points of Disassembly".
  (3) : Refer to "Service Points of Reassembly".



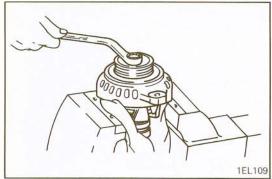
# SERVICE POINTS OF DISASSEMBLY

NOTE

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

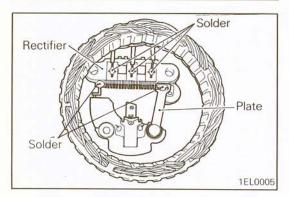
#### Caution

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



#### 1. REMOVAL OF PULLEY

Clamp the rotor in a vise with soft jaws.

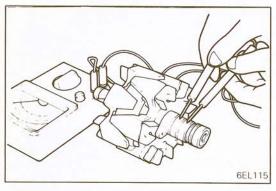


#### 11. REMOVAL OF REGULATOR AND BRUSH HOLDER

- (1) Unsolder three stator leads soldered to main diodes on rectifier.
- (2) Unsolder two soldered points to rectifier.

#### Caution

- When soldering or unsoldering, use care to make sure that heat of soldering iron is no 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.



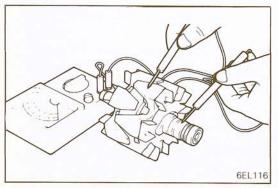
# **INSPECTION**

### ROTOR

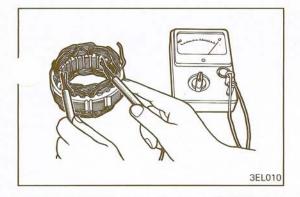
 Check rotor coil for continuity. Check to ensure that there is continuity between slip rings.
 If resistance is extremely small, it means that there is a

short. If there is no continuity or if there is short circuit, replace rotor assembly.

Standard value: 3.1  $\Omega$ 

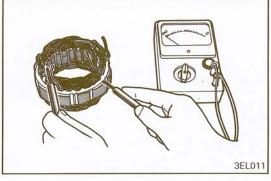


 Check rotor coil for grounding. Check to ensure that there is no continuity between slip ring and core. If there is continuity, replace rotor assembly.

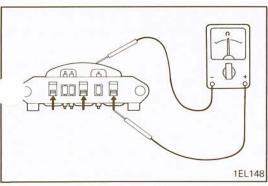


#### STATOR

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



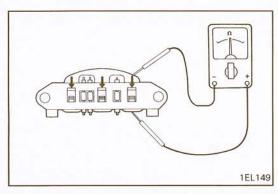
 Check coil for grounding. Check to ensure that there is no continuity between coil and core. If there is continuity, replace stator assembly.



#### RECTIFIERS

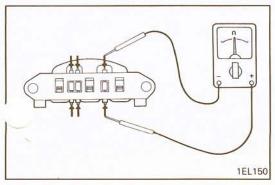
#### **Positive Rectifier Test**

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



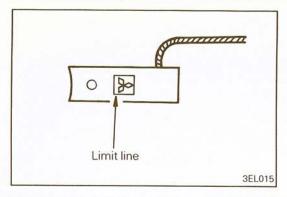
#### **Negative Rectifier Test**

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.



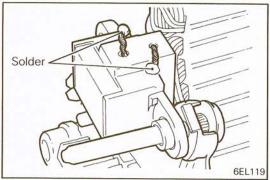
#### DIODE TRIO TEST

Check three diodes for continuity by connecting a circuit tester to both ends of each diode. If there is continuity or no continuity in both directions, diode is defective and heatsink assembly must be replaced.

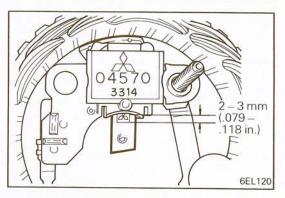


#### **BRUSH REPLACEMENT**

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

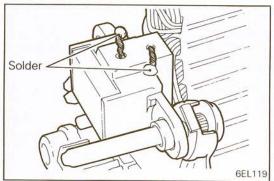


(2) Unsolder the pigtail and remove old brush and spring.

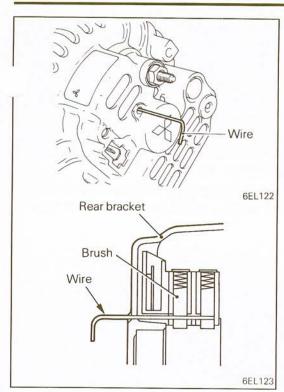


(3) Install the brush spring and new brush in the brush holder.

(4) Push in the brush for a brush limit line to brush holder end distance of 2 to 3 mm (.079 to .118 in.).



(5) While holding the position of step (4), solder the pigtail to the brush holder terminal.



# 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

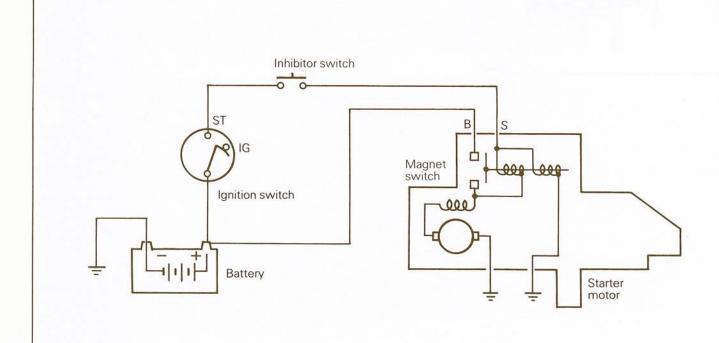
N08FAAF

# **GENERAL INFORMATION**

Starting system circuit includes a battery, starter motor, magnet switch, ignition switch, inhibitor switch (vehicle with automatic transaxle only), connection wires and battery cable.

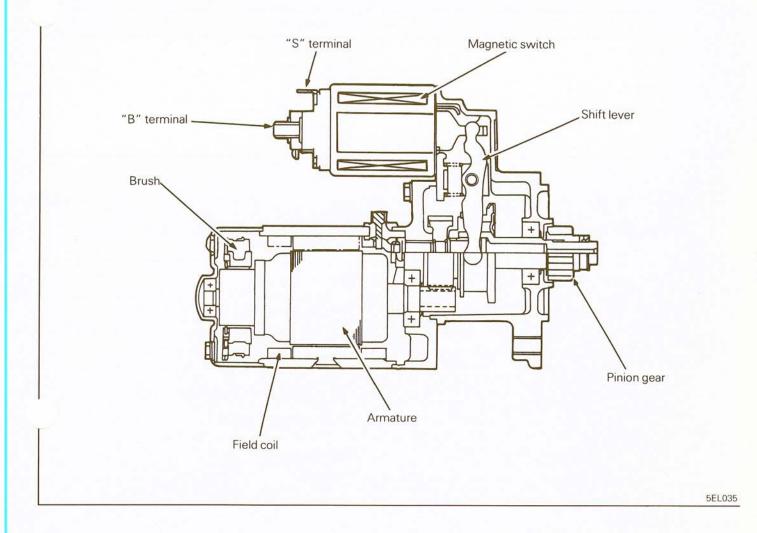
When ignition switch is turned to "START" position, current flows to energize solenoid windings of starter motor. As a result, solenoid plunger and clutch shift lever operate to cause clutch pinion to engage with ring gear. At the same time, magnet switch contacts close to crank starter motor.

Running clutch pinion gear overruns to prevent damage that could be caused by overrunning of starter armature when engine is started immediately. When engine is started, ignition switch must be turned back to "ON" position to prevent damage to starter motor.



1EL151

# STARTER MOTOR



# SPECIFICATIONS GENERAL SPECIFICATIONS

N08FB--

| Items               | Specifications |  |
|---------------------|----------------|--|
| Starter motor       |                |  |
| Type                | Reduction type |  |
| Identification No.  | M2T53085       |  |
| Part No.            | MD072585       |  |
| Rated output kw/V   | 1.2 / 12       |  |
| No. of pinion teeth | 9              |  |

# **SERVICE SPECIFICATIONS**

N08FC--

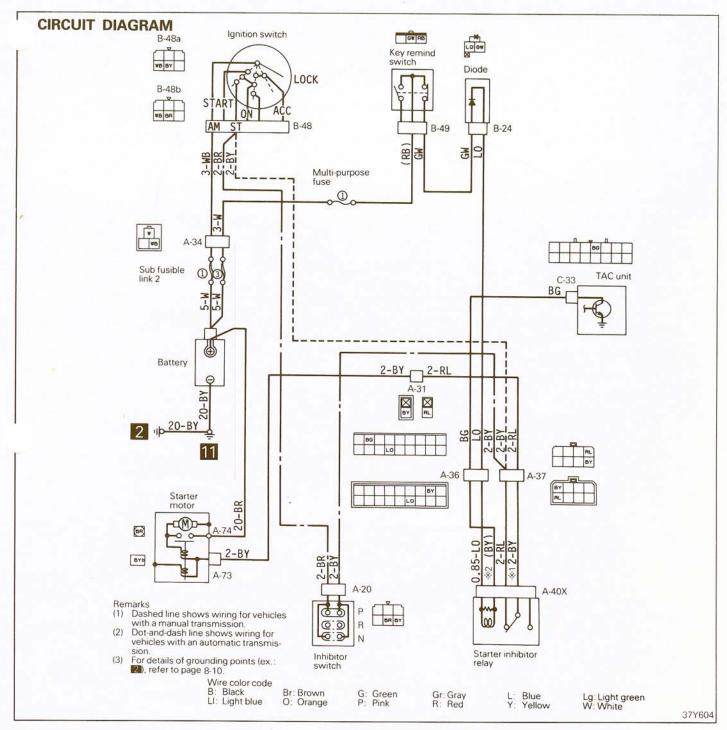
| Items                        | Specifications          |
|------------------------------|-------------------------|
| Standard value               |                         |
| Free running characteristics |                         |
| Terminal voltage V           | 11.5                    |
| Current A                    | Max. 100                |
| Speed rpm                    | Min. 3,000              |
| Under-cut depth mm (in.)     | 0.5 (.020)              |
| Commutator diameter mm (in.) | 32 (1.26)               |
| Commutator runout mm (in.)   | 0.05 (.0020)            |
| Pinion gap mm (in.)          | 0.5 – 2.0 (.020 – .079) |
| Limit                        |                         |
| Commutator diameter mm (in.) | 31.4 (1.236)            |
| Commutator runout mm (in.)   | 0.1 (.004)              |

# **TORQUE SPECIFICATIONS**

N08FD--

| Items                        | Nm      | ft.lbs. |
|------------------------------|---------|---------|
| Starter motor mounting bolts | 27 – 34 | 20 – 25 |

#### TROUBLESHOOTING



#### **OPERATION**

#### N08FHAB

- When the ignition switch is turned to "START" with the inhibitor switch in "P" or "N" position (automatic transmission vehicles), current flows through the inhibitor switch, starter inhibitor relay (contacts) and starter coil to ground. This closes the contacts of the starter switch (magnetic switch).
- Closing the magnetic switch contacts completes the circuit from the battery to magnetic switch to starter motor and ground, so that the starter motor starts rotating.

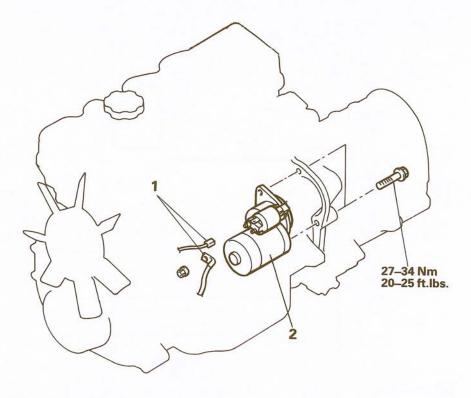
#### TROUBLESHOOTING HINTS

- 1. Starter motor does not turn over
  - Starter motor operating sound is heard for an instant
    - Check starter motor for condition of its magnetic switch.
  - 2) Starter motor does not operate at all
    - Check starter motor coils.
- 2. Starter motor does not stop
  - Check starter motor for condition of its magnetic switch.

# STARTER MOTOR

N08FJAD

#### REMOVAL AND INSTALLATION



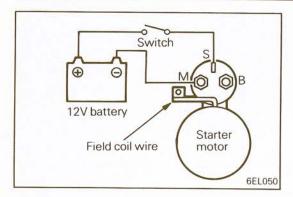
#### Removal steps

- 1. Connector connection
- 2. Starter motor

#### NOTE

- (1) Reverse the removal procedures to reinstall.
  (2) ★◆: Refer to "Service Points of Installation".

16W1564



# Reduction drive type Pinion Amount □ of travel (Pinion gap)

#### INSPECTION

#### PINION GAP ADJUSTMENT

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

#### Caution

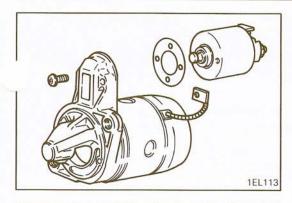
This test must be performed quickly (in less than 10 seconds) to prevent coil from burning.

4. Lightly push back the pinion, and measure the amount of travel, which represents the pinion gap. Adjust the thickness (number) of washers at switch area so that the gap becomes standard value.

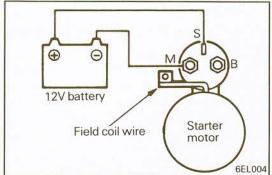
Standard value: 0.5 - 2.0 mm (.020 - .079 in.)

**STB** Revision

DEL003



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



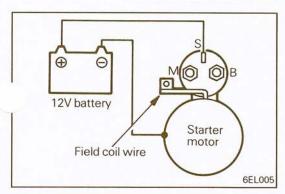
#### **PULL-IN TEST OF MAGNETIC SWITCH**

- 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.



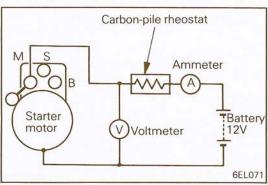
#### HOLD-IN TEST OF MAGNETIC SWITCH

- 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.

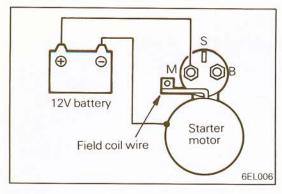


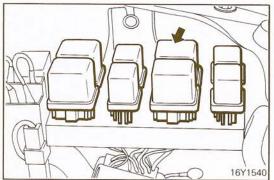
#### FREE RUNNING TEST

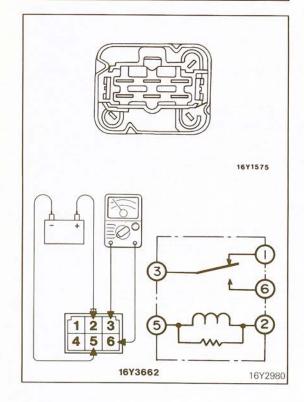
- Place starter motor in a vise equipped with soft jaws and connect a fully-charged 12-volt battery to starter motor as follows:
- Connect a test ammeter (100-ampere scale) and carbon pile rheostat in series with battery positive post and starter motor terminal.
- 3. Connect a voltmeter (15-volt scale) across starter motor.
- 4. Rotate carbon pile to full-resistance position.
- Connect battery cable from battery negative post to starter motor body.
- Adjust rheostat until battery voltage shown on the voltmeter reads 11.5 volts.
- Confirm that the maximum amperage draw is within the specifications and that the starter motor turns smoothly and freely.

#### Standard value:

Terminal voltage 11.5V Current Max. 100A Speed Min. 3,000 rpm







#### RETURN TEST OF MAGNETIC SWITCH

- 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 INHIBITOR RELAY

(1) Remove the starter inhibitor relay from the relay box in the engine compartment.

(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 5 is earthed.

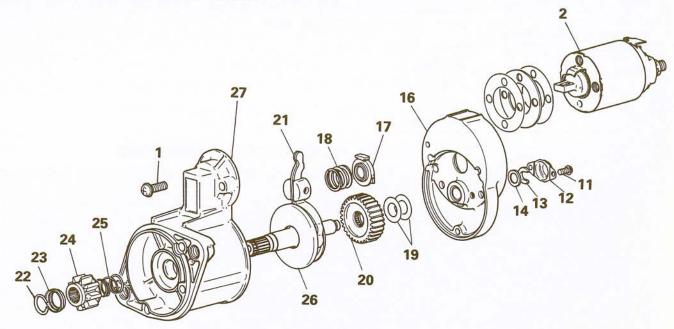
| Voltage applied     | Terminals 3 – 6 | Conductive     |
|---------------------|-----------------|----------------|
| Voltage not applied | Terminals 3 – 6 | Non-conductive |
|                     | Terminals 1 – 3 | Conductive     |
|                     | Terminals 2 – 5 |                |

# SERVICE POINT OF INSTALLATION

#### 2. INSTALLATION OF STARTER MOTOR

Clean both surfaces of starter motor flange and rear plate.

# STARTER MOTOR DISASSEMBLY AND REASSEMBLY

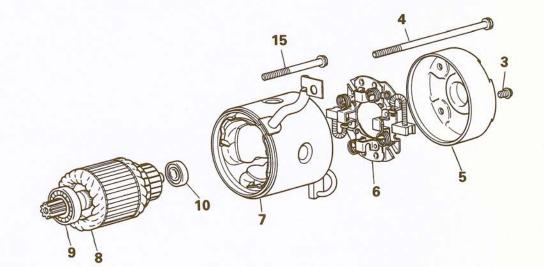


#### Disassembly steps

- 1. Screw
- Magnetic switch
   Screw
- 4. Screw
- 5. Rear bracket
- 6. Brush holder
- 7. Yoke assembly
- 8. Armature
- 9. Front bearing
- 10. Rear bearing
- 11. Screw
- 12. Cover
- 13. Retaining ring14. Washer

  - 15. Screw
  - 16. Center bracket

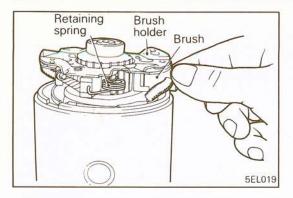
  - 17. Spring seat18. Lever spring
  - 19. Adjusting washer
  - 20. Gear
  - 21. Lever
- 22. Snap ring
- 23. Stop ring24. Pinion gear25. Spring26. Pinion shaft assembly
  - 27. Front bracket



NOTE

- Reverse the disassembly procedures to reassemble.

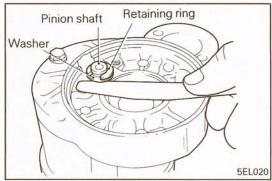
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#### SERVICE POINTS OF DISASSEMBLY

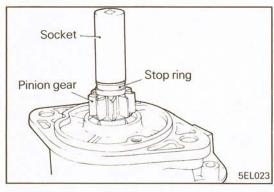
#### 6. REMOVAL OF BRUSH HOLDER

Slide the two brushes from brush holder by prying retaining springs back.



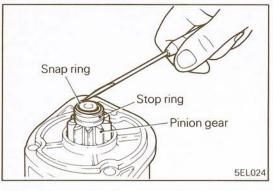
#### 13. REMOVAL OF RETAINING RING

Measure the pinion shaft end play using feeler gauge for reassembly.



#### 22. REMOVAL OF SNAP RING

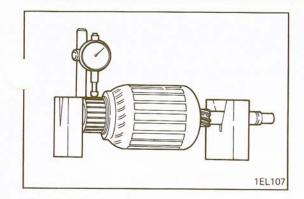
(1) Press the stop ring off the snap ring with suitable socket.



(2) Remove the snap ring with screwdriver.

#### **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 overrunning clutch in cleaning solvent. Overrunning clutch is pre-lubricated at the factory and solvent will wash lubrication from clutch.
- 3. The overrunning clutch may be cleaned with a brusing moistened with cleaning solvent and wiped dry with a cloth.



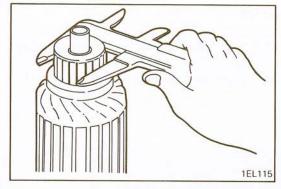
#### INSPECTION

#### INSPECTION OF COMMUTATOR

(1) Place the armature in a pair of "V" blocks and check the runout with a dial indicator.

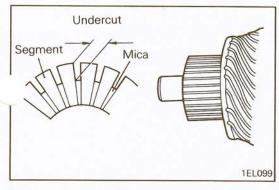
Standard value: 0.05 mm (.0020 in.)

Limit: 0.1 mm (.004 in.)



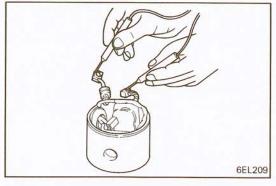
(2) Measure the commutator outer diameter.

Standard value: 32 mm (1.26 in.) Limit: 31.4 mm (1.236 in.)



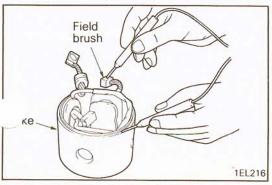
(3) Check the undercut depth between segments.

Standard value: 0.5 mm (.020 in.)



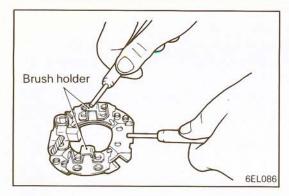
#### TESTING FIELD COIL FOR GROUNDING

Check the continuity between field brushes. If there is continuity, the field coil is in order.



#### TESTING FIELD COIL FOR GROUNDING

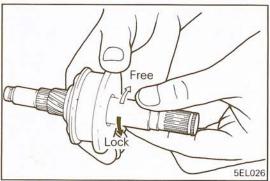
Check the continuity between field coil brush and yoke. If there is no continuity, the field coil is in order.



#### **BRUSH HOLDER**

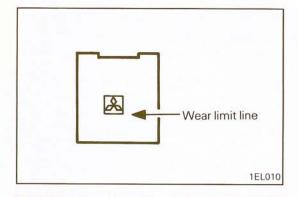
Check the continuity between brush holder plate and brush holder.

If there is no continuity, the brush holder is in order.



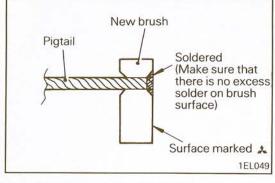
#### **OVERRUNNING CLUTCH**

- (1) While holding clutch housing, rotate the pinion. Drive pinion should rotate smoothly in one direction, but should not rotate in opposite direction.
- (2) Check the pinion for wear and damage.

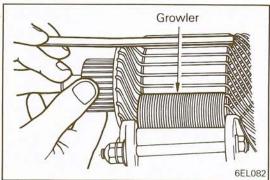


#### **BRUSHES AND SPRINGS - REPLACEMENT**

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

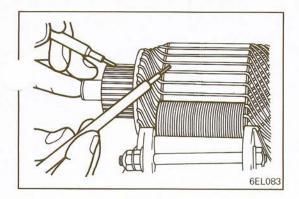


- 3. Sand pigtail end with sandpaper to ensure good soldering.
- Insert pigtail into hole provided in new brush and solder it. Make sure that pigtail and excess solder do not come out onto brush surface.
- 5. When replacing ground brush, slide the brush from brush holder by prying retaining spring back.



# TESTING ARMATURE TESTING ARMATURE FOR SHORT-CIRCUIT

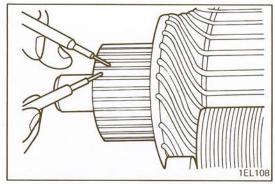
- 1. Place armature in a growler.
- 2. Hold a thin steel blade parallel and just above while rotating armature slowly in growler. A shorted armature will cause blade to vibrate and be attracted to the core. Replace shorted armature.



#### **TESTING ARMATURE FOR GROUNDING**

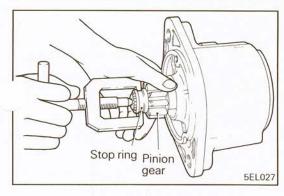
Check the insulation between each commutator segment and armature coil core.

If there is no continuity, the insulation is in order.



#### TESTING ARMATURE COIL FOR CONTINUITY

Check the continuity between segments. If there is continuity, the coil is in order.



## SERVICE POINT OF REASSEMBLY 23. REASSEMBLY OF STOP RING

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

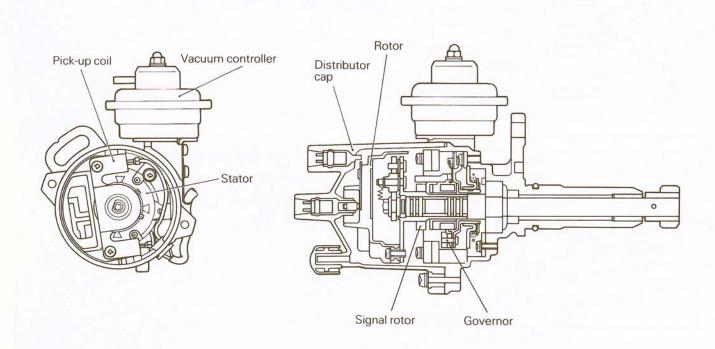
# **IGNITION SYSTEM**

N08GABB

# **GENERAL INFORMATION**

The ignition system consists of a battery, distributor (with built-in signal generator), electronic spark control (ESC) ignitor, electronic control unit, ignition coil, spark plug cables, high tension cable, ignition switch and connection wires.

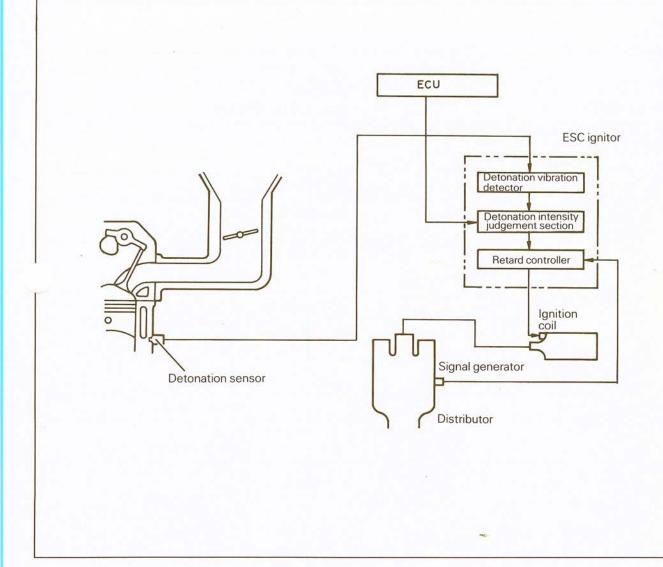
The distributor consists of the signal generator (signal rotor and pick up coil), timing advance controller (governor and vacuum controller) and distributor (rotor and distributor cap).



5EL036

The ignition timing control device has an ordinary governor and a vacuum timing control unit with timing retard feature in the distributor to prevent detonation during engine turbocharging. This timing device causes the timing to be retarded when a positive pressure acts on the diaphragm of the ordinary vacuum advance unit to turbocharging.

... order to prevent detonation in high load region for engine protection, a detonation prevention device is also used. Namely, a detonation sensor detects vibration of the mount, and the control circuit in the ignitor detects detonation and judges its intensity, according to which the curcuit retards the ignition timing to prevent detonation.



N08GB--

# **SPECIFICATIONS**

# **GENERAL SPECIFICATIONS**

#### DISTRIBUTOR

| Items              | Specifications          |
|--------------------|-------------------------|
| Туре               | Contact point less type |
| Identification No. | T4T63373G               |
| Part No.           | MD119754                |
| Firing order       | 1 - 3 - 4 - 2           |

#### **IGNITION COIL**

| Items                         | Specifications      |  |
|-------------------------------|---------------------|--|
| Type                          | Oil filled          |  |
| Identification No. / Part No. | LB – 119 / MD025703 |  |

#### **DETONATION SENSOR**

| Items                                 | Specifications                             |
|---------------------------------------|--|
| Identification No. / Part No.<br>Type | E1T15071 / MD063724 Piezo-electric element |

#### **ESC IGNITER**

| Items                         | Specifications      |
|-------------------------------|---------------------|
| Identification No. / Part No. | E2T16771 / MD125748 |

#### SPARK PLUG

| Items                  | Identification No.  | Manufacturer   |
|------------------------|---|--|
| Factory installed plug | BUR7EA-11<br>W22EPR-S11   | NGK<br>NIPPON DENSO  |
| Alternate plug         | BPR7ES-11<br>BP7ES-11<br>W22EPR-U10<br>W22EP-U10<br>RN7YC4<br>N7YC4 | NGK<br>NGK<br>NIPPON DENSO<br>NIPPON DENSO<br>CHAMPION<br>CHAMPION |

#### **IGNITION SWITCH**

| Items                              | Specifications       |  |
|------------------------------------|----------------------|--|
| Ignition switch                    |                      |  |
| Load capacity A                    |                      |  |
| AM-ACC                             | 15                   |  |
| AM-IG1                             | 12                   |  |
| AM-IG2                             | 20                   |  |
| AM-ST                              | 15                   |  |
| AM-R                               | 15                   |  |
| Voltage drop (under actual load) V | 0.1 or less          |  |
| Key reminder switch                | [60212] BAA ASSAUGAN |  |
| Load capacity W                    | 1                    |  |
| Voltage drop V                     | 0.2 or less          |  |
| Light monitor switch               | Particular Programs  |  |
| Load capacity W                    | 1                    |  |
| Voltage drop V                     | 0.2 or less          |  |

# **SERVICE SPECIFICATIONS**

N08GC--

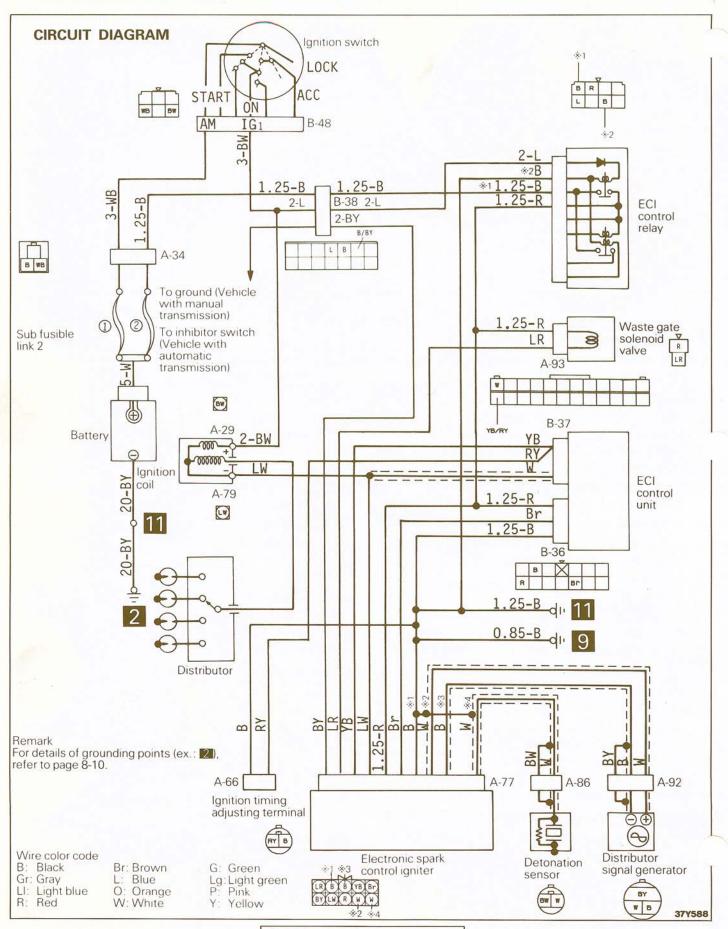
| tems   | Specifications          |
|--|-------------------------|
| Standard value   |                         |
| Basic ignition timing at curb idle speed                         | 10° ± 2°BTDC            |
| Actual ignition timing at curb idle speed for high-altitude only | 15° BTDC                |
| Distributor  |                         |
| Governor crank deg/rpm   |                         |
| Initial  | 0/1,200                 |
| Middle   | 10/2,000                |
| Final  | 33/6,000                |
| Vacuum crank deg/mmHg  |                         |
| Initial  | 0/80                    |
| Middle   | 12/150                  |
| Final  | 23/280                  |
| Ignition coil  |                         |
| Primary resistance $\Omega$                                      | 1.12 – 1.38             |
| Secondary resistance $k\Omega$                                   | 9.4 – 12.7              |
| Spark plug gap mm (in.)  |                         |
| NGK, CHAMPION  | 1.0 – 1.1 (.039 – .043) |
| NIPPON DENSO   |                         |
| W22EP-U10, W22EPR-U10  | 0.9 – 1.0 (.035 – .039) |
| Other type   | 1.0 – 1.1 (.039 – .043) |

## **TORQUE SPECIFICATIONS**

N08GD--

| tems                     | Nm      | ft.lbs. |
|--------------------------|---------|---------|
| Spark plug               | 20 – 30 | 15 – 21 |
| Distributor mounting nut | 10 – 12 | 7-9     |

# **TROUBLESHOOTING**



#### **OPERATION**

N08GHA

- When the ignition switch is turned to "ON", battery voltage is applied to the ignition coil primary winding.
- As the distributor shaft rotates, the igniter opens and closes the circuit repeatedly causing ignition coil primary winding current to flow through the ignition coil negative terminal and igniter to ground, or be interrupted.
- This action induces high voltage in the ignition coil secondary winding. From the ignition coil, the secondary winding current produced flows through the distributor and spark plug to ground, thus causing ignition in each cylinder.

Remarks

For discussion regarding the ignition timing control, refer to GROUP 14, FUEL SYSTEM in Technical Description.

#### TROUBLESHOOTING HINTS

- 1. Engine cranks, but does not start
  - Spark is insufficient or no spark occurs at all (on spark plug)
    - Check ignition coil.
    - Check distributor.
    - Check power transistor.
    - Check spark plugs.
  - 2) Spark is good
    - Check the ignition timing.
- 2. Engine idles roughly or stalls
  - Check spark plugs.
  - Check ignition timing.
  - Check ignition coil.
- 3. Poor acceleration
  - Check ignition timing.
- 4. Engine overheats or consumes excessive fuel
  - Check ignition timing.

## SERVICE ADJUSTMENT PROCEDURES

INOCIAC

# IGNITION TIMING IGNITION TIMING ADJUSTMENT

Adjustment conditions:

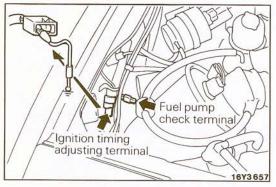
Coolant temperature:  $85-95^{\circ}\text{C}$  ( $185-205^{\circ}\text{F}$ ) Lamps and all accessories: Off Transmission: N (Neutral)

Set Parking Brake

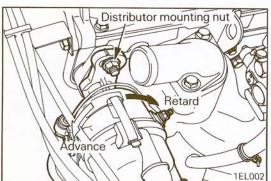
Connect tachometer and timing light.
 Start engine and run at curb idle speed.

Curb idle speed rpm

 $850 \pm 100$ 



3. When checking the basic ignition timing at high altitude [more than 1,200 m (3,900 ft.)], stop the engine and disconnect the water-proof female connector from the ignition timing connector. Connect a lead wire with an alligator clip to the ignition timing adjusting terminal aground it.



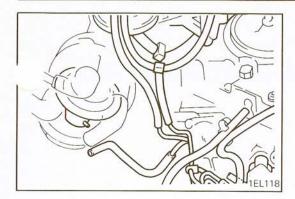
4. Check basic ignition timing and adjust if necessary.

Basic ignition timing: 10° ± 2°BTDC

- 5. To adjust ignition timing, loosen distributor mounting nut and turn distributor housing.
- 6. After adjustment, securely tighten mounting nut.

7. In case of checking at high altitude, stop the engine and disconnect the grounding wire connected in step 3 to restore the original condition of the ignition timing adjusting terminal. Then, restart the engine and check to see that the ignition timing has been advanced from the basic to actual one.

Actual ignition timing: 15°BTDC



#### **IGNITION SYSTEM INSPECTION**

N08GIDA

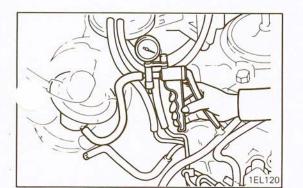
#### 1. Inspection of Centrifugal Timing Device

- (1) Set tachometer and timing light.
- (2) Set parking brake, start engine and run idle.
- (3) Disconnect vacuum hose from vacuum controller.
- (4) While slowly increasing engine speed, check timing advance.

It is okay if timing advances smoothly as engine speed increases.

| Symptom  | Probable cause                                 |
|--|--|
| Timing advance too large                         | Deteriorated governor spring                   |
| Timing advance too sharp                         | Broken spring                                  |
| Timing advance too small or hysteresis too large | Governor weight or cam not operating correctly |

- (5) If any of the above symptoms is observed, disassemble and check distributor.
- (6) After the check, turn ignition switch to "OFF".
- (7) Remove tachometer and timing light.



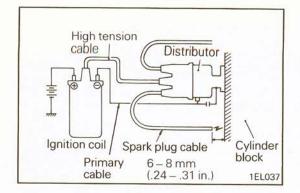
#### 2. Inspection of Vacuum Timing Device

- (1) Set timing light.
- (2) Set parking brake, start engine and run idle.
- (3) Disconnect vacuum hose from vacuum controller and connect a vacuum pump to its nipple.
- (4) Apply a vacuum to the vacuum controller gradually and check timing advance.It is okay if timing advances smoothly as negative

pressure increases.

| Symptom  | Probable cause                       |
|--|--------------------------------------|
| Timing advance too large                         | Weakened vacuum controller spring    |
| Timing advance too sharp                         | Broken spring                        |
| Timing advance too small or hysteresis too large | Breaker base not operating correctly |
| No timing advance at all                         | Broken diaphragm                     |

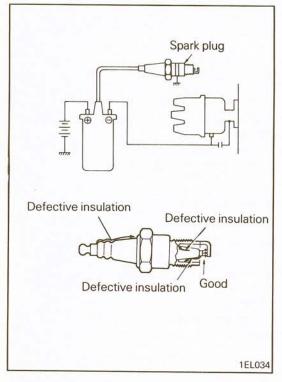
- (5) If any of the above symptoms is observed, disassemble and check distributor.
- (6) Turn ignition switch to "OFF".
- (7) Disconnect vacuum pump and connect vacuum hose to the nipple of vacuum controller.
- (8) Remove timing light.



#### SPARK PLUG CABLE TEST

MUSCICA

Hold the spark plug 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.



#### **SPARK PLUG TEST**

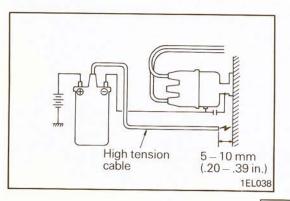
NOOONIA

Connect the spark plug to the high tension cable, ground outer electrode (main body), and crank engine. In the atmosphere, only short sparks are produced because of small discharge gap. If the spark plug is good, however, sparks will occur in discharge gap (between electrodes). In a defective spark plug, no sparks will occur because of leak of insulation puncture.

# SPARK TEST - ENGINE CANNOT BE CRANKED

If spark test is performed by cranking while the catalyst is hot, unburned gas will be supplied to the catalyst, and this is not desirable to the catalyst.

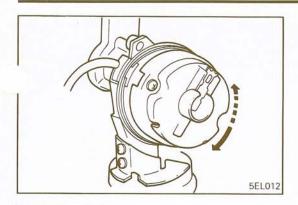
For this reason, use the following methods which allow spark test to be performed without cranking.



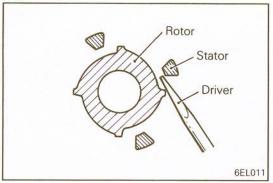
HEI TYPE DISTRIBUTOR

Method 1

Hold the high tension cable as shown.



Then remove the distributor cap, turn the rotor in the normal direction (clockwise) by hand until it is blocked, and then return it to its original position. Spark can be produced by moving the projection of the signal rotor close to the stator in this manner.



#### Method 2

Remove the cap and rotor. Quickly move a screwdriver in and out through the gap between the governor base and housing, and spark can be produced as in Method 1.

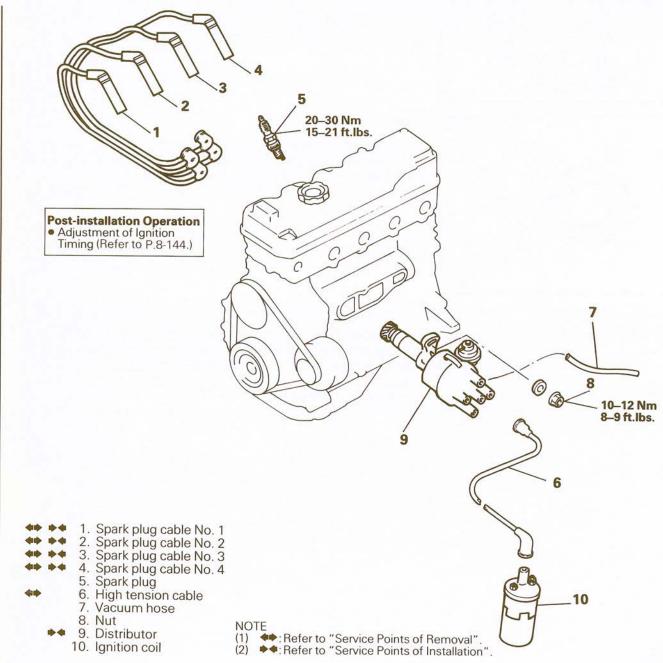
#### Method 3

Remove the distributor from the engine (do not disconnect the primary cable). While holding the distributor housing in contact with the engine (to complete the ground circuit), turn the distributor shaft, and spark can be produced as when the engine is cranked.

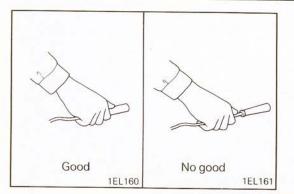
# **IGNITION SYSTEM**

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# **REMOVAL AND INSTALLATION**



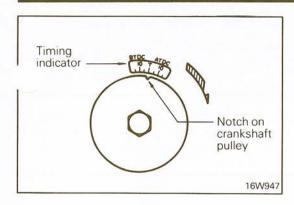
5EL038



## SERVICE POINTS OF REMOVAL

1. 2. 3. 4. REMOVAL OF SPARK PLUG CABLE / 6. HIGH TENSION CABLE

Be sure to pull by the cable cap, not by the cable.



#### 9. REMOVAL OF DISTRIBUTOR

Before removing the distributor, position the piston in No. 1 cylinder at the top dead center on compression stroke by the following procedure.

(1) Remove the cap from the distributor.

(2) Turn the crankshaft until the distributor rotor lines up with the No. 1 spark plug cable electrode on the distributor cap.

(3) Align the notch on the crank shaft pulley with the timing mark "T" on the timing indicator to set the engine so that the piston in No. 1 cylinder is at the compression top dead center.

# **INSPECTION AND CLEANING OF SPARK PLUGS**

(1) Disconnect spark plug cable from plug.

(2) Using a plug wrench, remove all plugs from cylinder head.

#### Caution

Use care not to allow foreign matter to enter through plug holes.

(3) Check the following items to see that the electrodes are not damaged and are in soundly burnt state and insulators are not damaged.

Damage of insulators

Wearing of electrodes

Carbon deposit
 For cleaning, use a plug cleaner or wire brush. Also clean cord-side insulator.

Damage of gasket

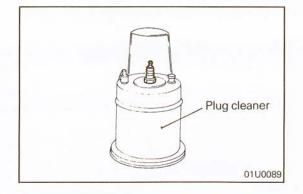
Burnt condition of insulator.

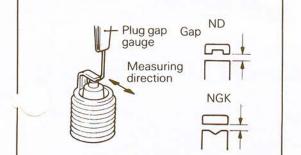
Dark deposit of carbon indicates too thick mixture or insufficient intake air. Also, misfiring due to too large plug gap is suspected.

White burn indicates too lean mixture or too fast ignition timing. Also insufficient plug tightening is suspected.

(4) Clean with a plug cleaner.

Use an air gun to remove dust deposited on plug threads.





(5) Check plug gap using a plug gap gauge and adjust if it is not as specified.

Standard value:

NGK, CHAMPION

1.0 - 1.1 mm (.039 - .043 in.)

NIPPON DENSO

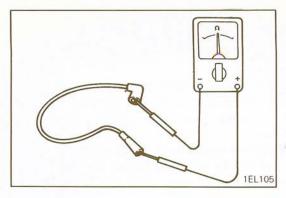
W22EP-U10, W22EPR-U10

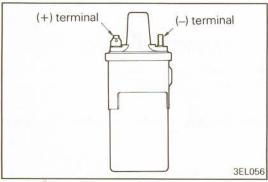
0.9 - 1.0 mm (.035 - .039 in.)

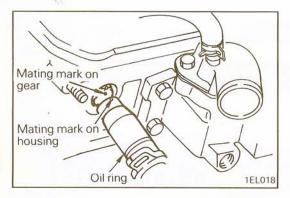
Other type

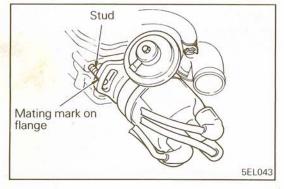
1.0 - 1.1 mm (.039 - .043 in.)

01R0119









#### INSPECTION OF SPARK PLUG CABLES

- (1) Check the caps and coatings for cracks.
- (2) Measure resistance.

Unit.

| High             | Spark plug cable |            |            |            |  |  |
|------------------|------------------|------------|------------|------------|--|--|
| tension<br>cable | No. 1            | No. 2      | No. 3      | No. 4      |  |  |
| Approx. 10       | Approx. 10       | Approx. 12 | Approx. 13 | Approx. 15 |  |  |

#### INSPECTION OF IGNITION COIL

Measurement of resistance of primary coil
 Measure resistance between terminals (+) and (–) of
 ignition coil.

Standard value: 1.12 – 1.38  $\Omega$ 

Measurement of resistance of secondary coil
 Measure resistance between terminals (+) of ignition coil
 and high tension terminal.

Standard value: 9.4 - 12.7  $k\Omega$ 

#### SERVICE POINTS OF INSTALLATION

#### 9. INSTALLATION OF DISTRIBUTOR

- (1) Check the distributor oil ring for damage and seat it securely in the distributor housing groove.
- (2) Align mating mark on distributor housing with mark on distributor driven gear.

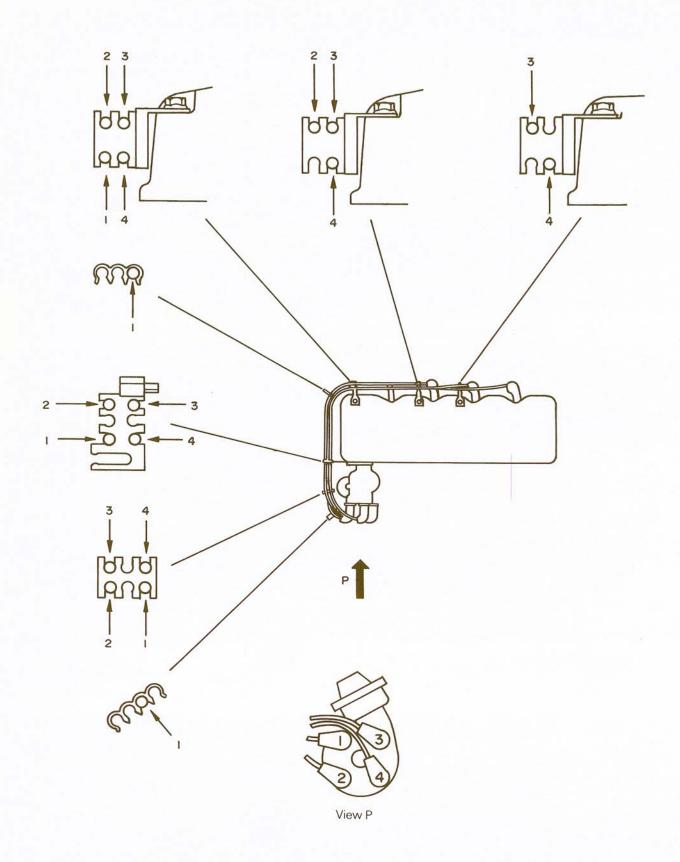
(3) Install distributor to cylinder head while aligning mating mark on distributor attaching flange with center of distributor installing stud and tighten nut.

#### 1. 2. 3. 4. 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.

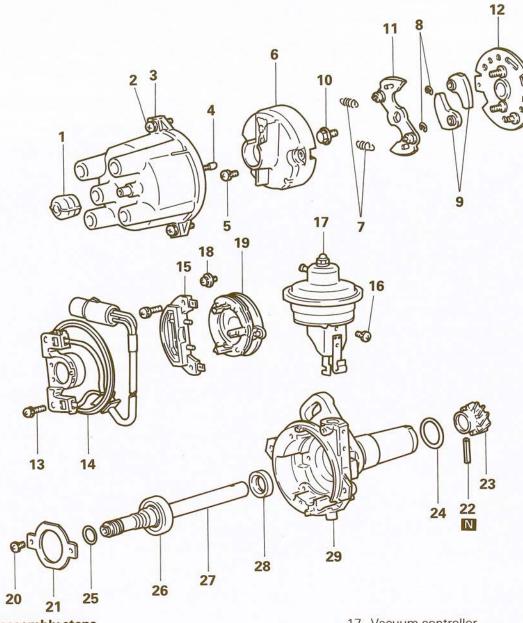
## SPARK PLUG CABLE INSTALLATION



# **DISTRIBUTOR**

# **DISASSEMBLY AND REASSEMBLY**

N08GKFA



#### Disassembly steps

- 1. Breather
- 2. Screw
- 3. Cap
- Contact carbon
- 5. Screw
- 6. Rotor
- 7. Governor spring
  - 8. Snap ring
  - 9. Governor weight
- 10. Retaining bolt
  - 11. Governor plate
  - 12. Governor base and signal rotor assembly
    - 13. Screw
    - 14. Pick-up coil
    - 15. Frame or ignitor
    - 16. Screw

- 17. Vacuum controller
- 18. Screw
- 19. Stator
  - 20. Screw
- 21. Plate
- 22. Spring pin 23. Driven gear
  - 24. O-ring
  - 25. Washer
  - 26. Bearing

  - 27. Shaft 28. Oil seal
  - 29. Housing

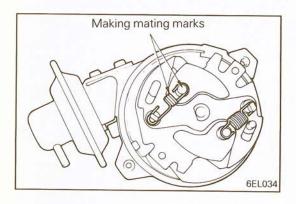
#### NOTE

- (1) Reverse the disassembly procedures to reassemble.
  (2) ♠: Refer to "Service Points of Disassembly".
  (3) ♠•: Refer to "Service Points of Reassembly".
  (4) N: Non-reusable parts

6EL0020

#### SERVICE POINTS OF DISASSEMBLY

Before servicing be sure to lightly clamp distributor in a vice equipped with soft jaws.

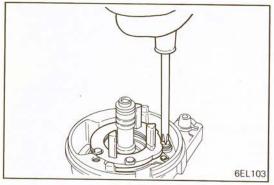


#### 7. REMOVAL OF GOVERNOR SPRING

Make marks on either pair of governor pin and spring for reference at reassembly.

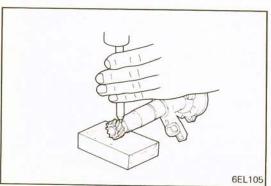
#### 10. REMOVAL OF RETAINING BOLT

Be very careful when loosening the retaining bolt, because it is coated with screw-lock cement.



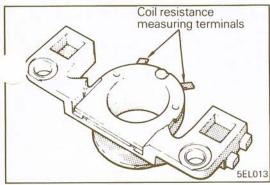
#### 19. REMOVAL OF STATOR

Do not place the removed stator in an area where it might attract iron filings or pieces.



#### 22. REMOVAL OF SPRING PIN

- (1) Mark location of driven gear on distributor shaft.
- (2) Place driven gear on soft vise (wood block) so that spring pin can be removed.
- (3) Using a pin punch, remove spring pin.



# 母



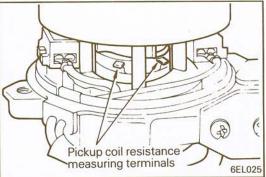
PICK-UP COIL

(1) Using an ohmmeter, measure resistance of pickup coil.

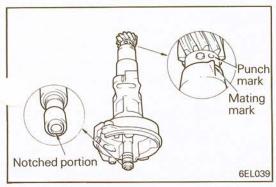
Resistance value: 920 - 1,120  $\Omega$ 

Caution

Do not insert tester probe into igniter connecting terminals, as damage to terminals could result.



(2) When coil resistance is to be measured without disassembling distributor assembly, insert tester probes through portions shown in illustration.

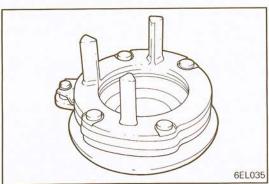


#### SERVICE POINTS OF REASSEMBLY

#### 23. INSTALLATION OF DRIVEN GEAR / 22. SPRING PIN

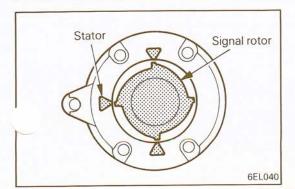
(1) Install driven gear into distributor shaft at previously marked location. Then install new roll pin.

(2) Align punch mark on gear with mating mark on housing, check to ensure that notched portion of shaft end is positioned as shown, and then install a pin to secure the gear to the shaft.



#### 19. INSTALLATION OF STATOR

Before the stator is installed, check to ensure that there are no iron filings or iron pieces on the stator.

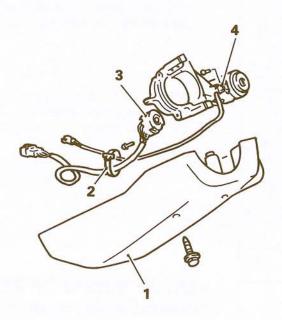


#### 12. INSTALLATION OF GOVERNOR BASE AND SIGNAL ROTOR ASSEMBLY

After the governor assembly has been installed, turn the shaft to confirm that the projection of the signal rotor does not touch the stator.

# IGNITION SWITCH REMOVAL AND INSTALLATION

N08GLAD



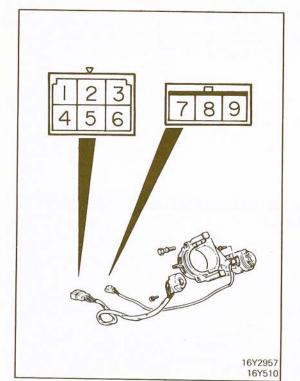
#### Removal steps

- 1. Lower column cover
- 2. Cable bands
- 3. Ignition switch
- 4. Key remind switch

NOTE

Installation procedure is a reversal of removal procedure.

16Y2988



#### INSPECTION

- (1) Remove the knee protector.
- (2) Disconnect the ignition switch connector.
- (3) Operate the switch, and check the continuity between the terminals.

| Posi          | Terminal | Ignition switch |     |   |   | Key<br>remind<br>switch |    |    |   |   |
|---------------|----------|-----------------|-----|---|---|-------------------------|----|----|---|---|
| Posi-<br>tion | Key      | 6               | 3   | 4 | 2 | 5                       | 1  | 7  | 8 | 9 |
| LOCK          | Removed  |                 |     |   |   |                         |    | 0- | 0 |   |
| ACC           | Inserted | 0               | -0  |   |   |                         |    |    |   |   |
| ON            |          | 0               | -0- | 0 | 0 |                         |    | 0  |   |   |
| START         |          | 0-              |     | 0 |   | -0-                     | -0 |    |   | - |

NOTE

O-O indicates that there is continuity between the terminals.

N08HB- -

# **METERS AND GAUGES**

# **PECIFICATIONS**

# GENERAL SPECIFICATIONS METERS AND GAUGES

| Items                                 | Specifications   |  |  |
|---------------------------------------|--|--|--|
| Speedometer                           |  |  |  |
| Type                                  | Rotary magnet type   |  |  |
| Tachometer                            | The state of the s |  |  |
| Type                                  | Pulse type   |  |  |
| Fuel gauge                            |  |  |  |
| Туре                                  | Bi-metal type<br>(for 7V built-in constant voltage relay)  |  |  |
| Fuel gauge unit                       |  |  |  |
| Туре                                  | Variable resistance type   |  |  |
| Engine coolant temperature gauge      |  |  |  |
| Type                                  | Bi-metal type (7V operation)   |  |  |
| Engine coolant temperature gauge unit |  |  |  |
| Type                                  | Thermistor type  |  |  |
| Oil pressure gauge                    |  |  |  |
| Type                                  | Bi-metal type  |  |  |
| Oil pressure gauge unit               |  |  |  |
| Туре                                  | Bi-metal type  |  |  |
| oltmeter                              |  |  |  |
| Type                                  | Moving iron type   |  |  |
| Pressure meter                        |  |  |  |
| Type                                  | Moving coil type   |  |  |

# **INDICATORS**

| Items   | Specifications |  |  |
|---|----------------|--|--|
| Turn signal indicator W                               | 3.4 [158]      |  |  |
| Rear hatch-ajar warning indicator W                   | 1.4 [74]       |  |  |
| Rear brake lock-up control system failure indicator W | 1.4 [74]       |  |  |
| Washer fluid level warning indicator W                | 1.4 [74]       |  |  |
| Low-fuel warning indicator W                          | 3.4 [158]      |  |  |
| Fasten seat belt warning indicator W                  | 1.4 [74]       |  |  |
| Door-ajar warning indicator W                         | 1.4 [74]       |  |  |
| High beam indicator W                                 | 1.4 [74]       |  |  |
| Brake warning indicator W                             | 1.4 [74]       |  |  |
| Overdrive indicator W                                 | 1.4 [74]       |  |  |
| Charge warning indicator W                            | 1.4 [74]       |  |  |
| Theft-alarm indicator W                               | 1.4 [74]       |  |  |

NOTE The values in parenthesis denote SAE grade numbers.

### **SERVICE SPECIFICATIONS**

N08HC--

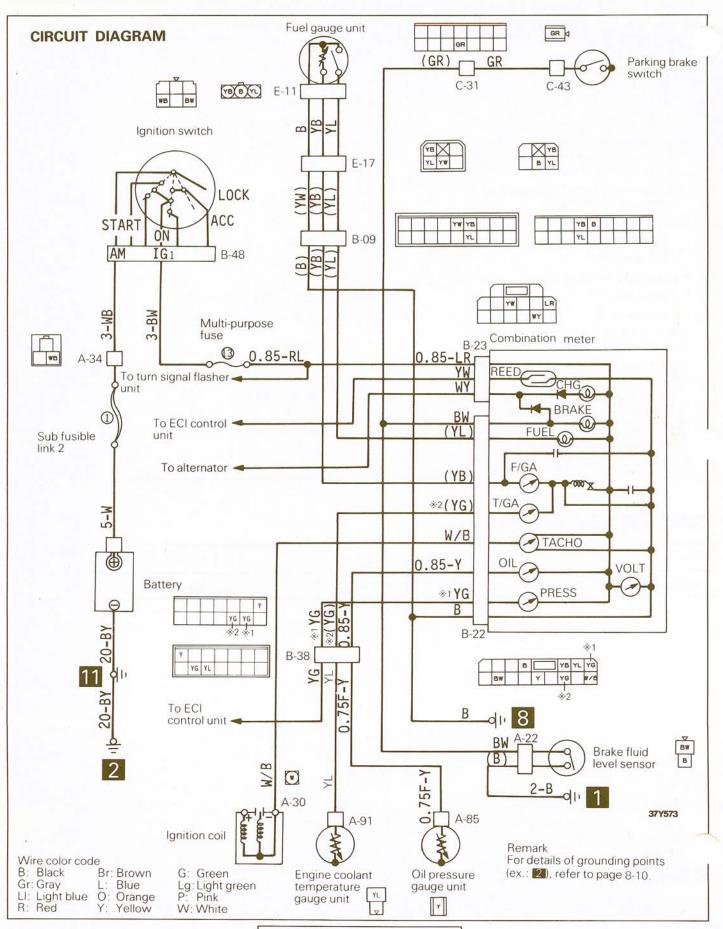
| tems   | Specifications            |
|--|---------------------------|
| andard value   |                           |
| Tachometer indication error rpm                            |                           |
| 1,000 rpm  | ±100                      |
| 3,000 rpm  | ±150                      |
| 5,000 rpm  | ±250                      |
| Fuel gauge resistance value $\Omega$                       |                           |
| Between power source terminal (1) and ground terminal (2)  | 62 – 78                   |
| Between 7V terminal (3) and fuel gauge unit terminal (4)   | 49 – 61                   |
| Fuel gauge unit resistance value $\Omega$                  |                           |
| Float point "F"  | 1-5                       |
| Float point "E"  | 103 – 117                 |
| Fuel gauge unit float position mm (in.)                    |                           |
| Float point "F"  | 34.4 – 38.2 (1.35 – 1.50) |
| Float point "E"  | 234 – 238 (9.21 – 9.37)   |
| Engine coolant temperature gauge resistance value $\Omega$ | 49 – 61                   |
| Engine coolant temperature gauge unit resistance value     |                           |
| When engine coolant temperature is 70°C (158°F) $\Omega$   | 90.5 – 117.5              |
| Oil pressure gauge resistance value $\Omega$               | 37 – 47                   |
| Voltmeter indication error at 12.5 V V                     | ±1                        |
| Pressure meter resistance value $\Omega$                   | 30 – 56                   |

### **TORQUE SPECIFICATIONS**

N08HD--

| Item                                  | Nm      | ft.lbs. |
|---------------------------------------|---------|---------|
| Engine coolant temperature gauge unit | 30 – 39 | 22 – 28 |

### **TROUBLESHOOTING**



**STB Revision** 

### N08HHAC

### Fuel Gauge

- When the ignition switch is turned to "ON", current flows through fuse No. 13, fuel gauge, fuel gauge unit and ground, operating the fuel gauge.
- When fuel level is high, the fuel gauge unit internal resistance is small so that the current passing through the circuit is relatively large. This causes the gauge pointer to swing towards "F".
- When fuel level becomes low, the unit internal resistance is increased, so only a small current flows in the circuit and the gauge pointer swings towards "E".
- Inside the fuel gauge, there is a voltage limiter which functions to maintain a constant output voltage (at 7 V) to the gauge units (fuel gauge unit and engine coolant temperature gauge unit.)

### **Engine Coolant Temperature Gauge**

- When the ignition switch is turned to "ON", current flows through fuse No. 13, engine coolant temperature gauge, engine coolant temperature gauge unit, and ground, operating the engine coolant temperature gauge.
- When coolant temperature is high, the gauge unit internal resistance is small so that the current passing through the circuit is relatively large. This causes the gauge pointer to swing towards "H".
- When coolant temperature is low, the unit internal resistance is increased so a small current flows in the circuit, and the gauge pointer swings towards "C".

### Oil Pressure Gauge

- When the ignition switch is in the "ON" position, current flows through fuse No. 13, oil pressure gauge, oil pressure gauge unit, and ground, causing the oil pressure gauge to operate.
- When oil pressure is high, the internal contacts of the gauge unit are kept closed for a longer period of time. This causes more current to flow in the circuit, and the gauge pointer swings to the high pressure side.
- When oil pressure is low, the internal contacts of the gauge unit open in a shorter period of time. Therefore, there is less current flowing in the circuit and the gauge pointer swings to the low pressure side.

### **Low-Fuel Warning Light**

- When the ignition switch is turned to "ON", current flows through fuse No. 13, low-fuel warning light, fuel level sensor, and ground.
- If the fuel level falls below the preset level, the fuel level sensor, which normally is submerged in fuel, is exposed to air, and its resistance becomes small, in turn causing the warning light to go on.

### **Brake Warning Light**

- When the ignition switch is turned to "ON" and before the engine starts, current flows through fuse No. 13, brake warning light, alternator, and ground. The brake warning light goes on and stays on until the engine starts. The light goes off once the engine starts. — Burnt-out bulb check.
- If the brake fluid level falls below the preset level or the parking brake is applied, the brake fluid level sensor switch or the parking brake switch contacts close. This causes current to flow through the brake warning light and brake fluid level sensor or parking brake switch to ground, causing the warning light to go on.

### SERVICE ADJUSTMENT PROCEDURES

мовыка

### SPEEDOMETER INSPECTION

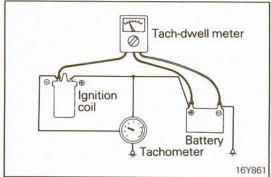
NOTE

If there is a special regulation for speedometer indicator difference in the area where the car is operated, be sure to meet the requirement of the regulation.

- 1. Adjust tire inflation pressure to the standard value. (Refer to GROUP 22 WHEELS AND TIRES General Specifications.)
- Use speedometer tester to make sure that the speedometer indicator difference.

### Caution

When speedometer indication error is checked with a speedometer tester, apply chocks to the driven wheels to prevent the car from running away.



# Fuel gauge unit Test light (12V–3.4W) Harness side connector 16Y2992

### **TACHOMETER INSPECTION**

NINGHIDE

Connect a tacho-dwell meter. Compare the tacho-dwell meter reading with the tachometer reading at each engine speed and check that the error is within the standard value.

Standard value: 1,000 rpm ±100 rpm 3,000 rpm ±150 rpm 5,000 rpm ±250 rpm

### Caution

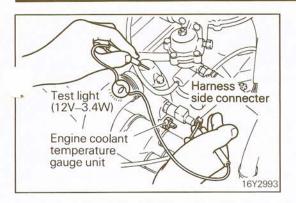
The tachometer is the negative ground type, and therefore should not be connected in reverse to the battery. If the tachometer is connected in reverse, transistors and diodes will be damaged.

### **FUEL GAUGE SIMPLE TEST**

N08HICA

- 1. Disconnect the wiring connector from the fuel gauge unit inside the luggage compartment.
- 2. Ground the connector at the harness through a test light.
- 3. Turn the ignition key to the ON position.
- 4. Check to be sure that the test light flashes or lights steadily and the fuel gauge operates.
- 5. If both the test light and gauge operate, the circuit to the gauge unit is normal and the gauge unit itself is faulty. If the test light flashes or lights steadily but the gauge does not operate, the gauge is faulty.

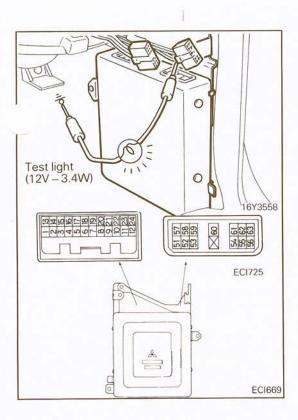
If neither the test light nor the gauge operates, the fuel gauge circuit is faulty.



### ENGINE COOLANT TEMPERATURE GAUGE SIM-PLE TEST

- 1. Disconnect the wiring connector from the engine coolant temperature gauge unit inside the engine compartment.
- 2. Ground the connector at the harness through a test light.
- 3. Turn the ignition key to the ON position.
- 4. Check to be sure that the test light flashes or lights steadily and the engine coolant temperature gauge operates.
- 5. If both the test light and gauge operate, the circuit to the gauge unit is normal and the gauge unit itself is faulty. If the test light flashes or lights steadily but the gauge does not operate, the gauge is faulty. If neither the test light nor the gauge operates, the engine

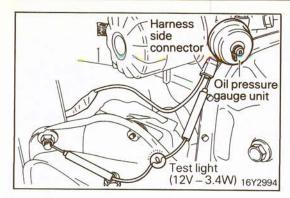
coolant temperature gauge circuit is faulty.



### PRESSURE METER SIMPLE TEST

- 1. Disconnect connectors from ECI control unit located on the R.H. cowl side.
- 2. Ground the terminal number 59 of the ECI control unit through the test light.
- 3. Turn the ignition key to the ON position.
- 4. Check to be sure that the test light flashes or lights steadily and the pressure meter operates.
- 5. If both the test light and meter operate, the circuit to the control unit is normal and the control unit itself is faulty. If the test light flashes or lights steadily but the meter does not operate, the meter is faulty.

If neither the test light nor the meter operates, the pressure meter circuit is faulty.



### **OIL PRESSURE GAUGE SIMPLE TEST**

MOSHIER

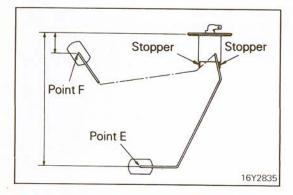
- 1. Disconnect the wiring connector from the oil pressure gauge unit inside the engine compartment.
- 2. Ground the connector at the harness through a test lig!
- 3. Turn the ignition key to the ON position.
- 4. Check to be sure that the test light flashes or lights steadily and the oil pressure gauge operates.
- 5. If both the test light and gauge operate, the circuit to the gauge unit is normal and the gauge unit itself is faulty. If the test light flashes or lights steadily but the gauge does not operate, the gauge is faulty. If neither the test light nor the gauge operates, the oil pressure gauge circuit is faulty.

### **VOLTMETER INSPECTION**

N08HIGB

- 1. Connect the (+) terminal of the checking voltmeter to the S terminal of the alternator and ground the (-) terminal.
- 2. Crank the engine and compare indications to check that the error is within the standard value.

Standard value: at 12.5 V ±1V



# Point F Point E 16Y2874 16Y2835

### **FUEL GAUGE UNIT INSPECTION**

N08HIIE

To inspect the fuel gauge unit, replace the unit from fuel tank.

### FUEL GAUGE UNIT FLOAT POSITION CHECK

Move the float and measure the float position at points "F" and "E" when the float arm contacts the stopper.

Standard value:

POINT F: 34.4 - 38.2 mm (1.35 - 1.50 in.) POINT E: 234 - 238 mm (9.21 - 9.37 in.)

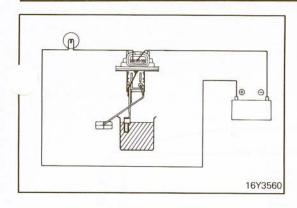
### FUEL GAUGE UNIT RESISTANCE CHECK

1. Check that the resistance between terminals 2 and 3 is within the standard value when the fuel gauge unit float is between positions "F" and "E".

Standard value:

Point "F": 1 – 5  $\Omega$ Point "E": 103 – 117  $\Omega$ 

2. Also check that the resistance changes smoothly when the float is moved to "F" and "E".



### FUEL LEVEL SENSOR CHECK

- 1. Connect the gauge unit with a test light to the battery, and immerse it in the water.
- 2. The lamp should be off while thermistor of the gauge unit is beneath the water, and should illuminate when the unit is taken out of the water.

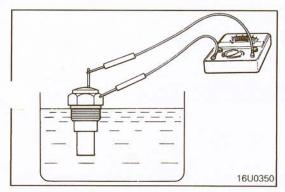
### NOTE

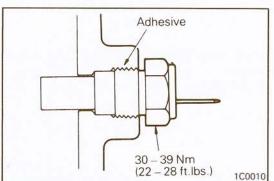
If there is a malfunction, replace the fuel gauge as an

### Caution

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

After the check, install the fuel gauge unit on the fuel tank and apply sealant to the portion where the floor plug is to be installed and then install the plug.





### **ENGINE COOLANT TEMPERATURE GAUGE UNIT** INSPECTION

To inspect the engine coolant temperature gauge unit, remove the unit from the manifold.

### ENGINE COOLANT TEMPERATURE GAUGE UNIT RESIST-ANCE CHECK

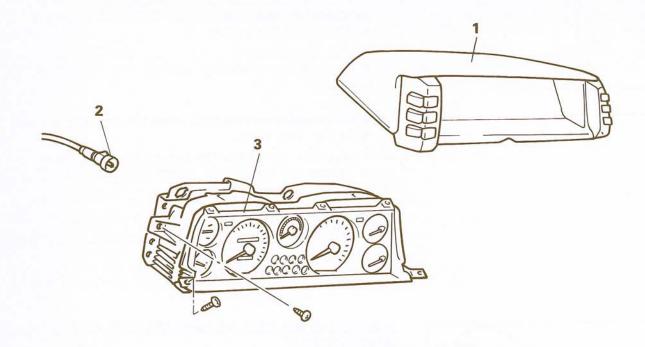
Immerse the gauge unit in hot water at 70°C (158°F) and measure the resistance value with an ohmmeter.

Standard value: 90.5 - 117.5  $\Omega$ 

After inspection, apply adhesive to the threaded portion of the engine coolant temperature gauge unit and then install the unit on the manifold.

### **METERS AND GAUGES** REMOVAL AND INSTALLATION

N08HJAE



### Removal steps

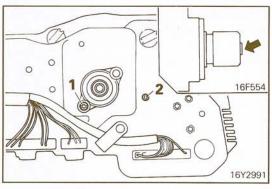
- 1. Meter hood
- 2. Speedometer cable connection
- 3. Meter assembly

### NOTE

- Reverse the removal procedures to reinstall.

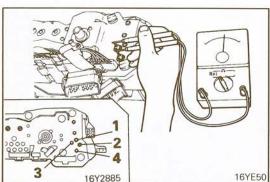
  Refer to "Service Points of Installation".

16Y3562



### INSPECTION REED SWITCH

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



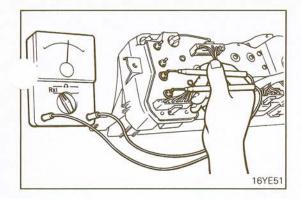
### **FUEL GAUGE**

Measure the resistance value between the terminals by using an ohmmeter.

### Standard value:

Between terminals No. 1 and No. 2: 62 - 78  $\Omega$ Between terminals No. 3 and No. 4: 49 - 61  $\Omega$ 

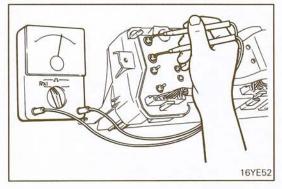
STB Revision



### **ENGINE COOLANT TEMPERATURE GAUGE**

Measure the resistance value between the terminals with an ohmmeter.

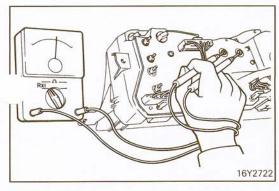
Standard value: 49 - 61  $\Omega$ 



### OIL PRESSURE GAUGE

Measure the resistance value between the terminals with an ohmmeter.

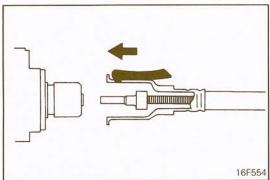
Standard value: 37 - 47  $\Omega$ 



### PRESSURE METER

Measure the resistance value between the terminals with an ohmmeter.

Standard value: 30 - 56  $\Omega$ 



### SERVICE POINT OF INSTALLATION

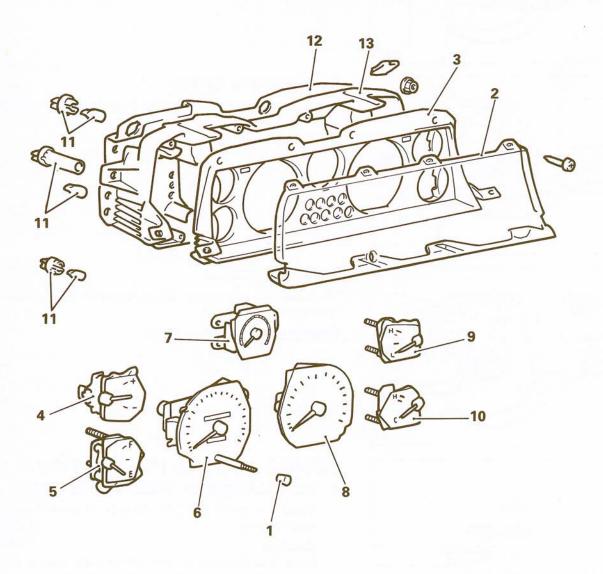
### 2. INSTALLATION OF SPEEDOMETER CABLE

Insert the cable until its stopper properly fits to the meter side groove.

### Caution

Poor installation of the cable may cause a fluctuating meter pointer, or noise and a damaged harness inside the instrument panel.

### **DISASSEMBLY AND REASSEMBLY**



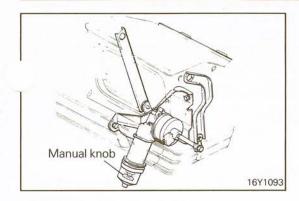
### Disassembly steps

- 1. Trip counter knob
- Meter glass
   Window plate
- 4. Voltmeter
- 5. Fuel gauge
- 6. Speedometer 7. Pressure meter
- 8. Tachometer
- 9. Oil pressure gauge10. Engine coolant temperature gauge
- 11. Lamp bulb and socket
- 12. Printed board
- 13. Meter case

NOTE

Reverse the disassembly procedures to reassemble.

16Y2989



# LIGHTING SYSTEM

### **GENERAL INFORMATION**

N08IAAA

The right and left headlights are driven up and down by independent motors and linkages. Manual knobs are also provided which, in the event of electric trouble, allow the headlights to be manually raised or lowered.

# SPECIFICATIONS GENERAL SPECIFICATIONS

N08IB- -

| Items                                     | Specifications |  |
|---|----------------|--|
| Exterior light                            |                |  |
| Headlight W                               | 65/55 [6052]   |  |
| Front combination light W                 |                |  |
| Turn-signal                               | 27 [1156]      |  |
| Position light                            | 5 [168]        |  |
| Fog light                                 | 35             |  |
| Front side marker light W                 | 3.8 [194]      |  |
| Rear combination light W                  |                |  |
| Turn-signal, stop and tail light          | 27/8 [1157]    |  |
| Rear side marker light                    | 8 [67]         |  |
| Back-up light                             | 27 [1156]      |  |
| License plate light W                     | 8 [67]         |  |
| High mounted stop light W                 | 18             |  |
| Interior light                            |                |  |
| Dome light W                              | 10             |  |
| Spot light W                              | 6              |  |
| Door light W                              | 5              |  |
| Luggage compartment light W               | 5              |  |
| Combination meter illumination light W    | 3.4 [158]      |  |
| Glove box illumination light W            | 3.4 [158]      |  |
| Accessory box illumination light W        | 1.4 [74]       |  |
| Cigarette lighter illumination light W    | 3              |  |
| Heater knob illumination light W          | 3.8 [194]      |  |
| Heater panel illumination light W         | 1.4 [74]       |  |
| Rear defogger switch illumination light W | 1.4 [74]       |  |
| Cluster switch illumination light W       | 1.4 [74]       |  |
| Ashtray illumination light W              | 1.4 [74]       |  |
| Vanity mirror light W                     | 1.5            |  |

NOTE

The values in parentheses denote SAE grade numbers.

| Items                                      | Specifications  |
|--|-----------------|
| Cluster switch                             |                 |
| Lighting switch                            |                 |
| Rated load A                               | 0.3             |
| Voltage drop (at 12.8V and the rated load) | V 0.1 or less   |
| Pop-up switch                              |                 |
| Rated load A                               | 0.6             |
| Voltage drop (at 12V and the rated load) V | 0.1 or less     |
| Hazard switch                              |                 |
| Rated load A                               |                 |
| FR-HZ, FL-HZ, RR-HZ, RL-HZ                 | 4.2 – 4.8       |
| SS-ST                                      | 8.6 – 9.4       |
| TB-TS                                      | 6.7 – 7.3       |
| Voltage drop (at 12V and the rated load) V | 0.1 or less     |
| Fog light switch                           |                 |
| Rated load A                               | 0.3             |
| Voltage drop (at 12V and the rated load) V | 0.1 or less     |
| Column switch                              |                 |
| Turn-signal switch                         |                 |
| Rated load A                               | 4.2 – 4.8       |
| TB-FL, TB-FR                               | 2.2 - 2.8       |
| TB-RL, TB-RR                               | 4.2 – 4.8       |
| ST-RL, ST-RR                               | 4.2 – 4.8       |
| Voltage drop (at 12V and the rated load) V | 0.2 or less     |
| Dimmer switch                              |                 |
| Rated load A                               |                 |
| Upper beam                                 | 14.9 – 15.7     |
| Lower beam                                 | 7.4 – 10.2      |
| Voltage drop (at 12V and the rated load) V | 0.2 or less     |
| Passing switch                             |                 |
| Rated load A                               |                 |
| Upper beam                                 | 14.9 – 15.7     |
| Lower beam                                 | 0.17 – 0.27     |
| Voltage drop (at 12V and the rated load) V | 0.2 or less     |
| Windshield wiper switch                    |                 |
| Rated load A                               | 0.5             |
| Voltage drop (at 12V and the rated load) V | 0.2 or less     |
| Windshield washer switch                   |                 |
| Rated load A                               | 3               |
| Voltage drop (at 12V and the rated load) V | 0.5 or less     |
| Dimmer control switch                      |                 |
| Type                                       | Electronic type |
| Rated load W                               | 40              |

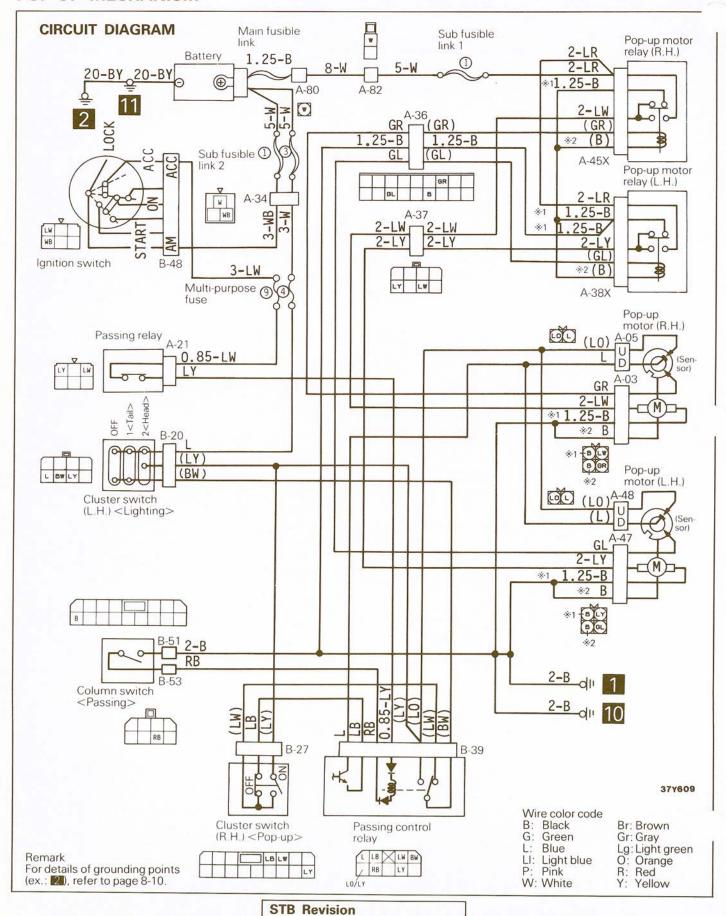
### **SERVICE SPECIFICATIONS**

N08IC- -

| Items                  | Specifications |
|------------------------|----------------|
| mit                    |                |
| Headlight intensity cd | 20,000 or more |

### **TROUBLESHOOTING**

### **POP-UP MECHANISM**



### NO8IHAA

### Functions of the Lighting Switch

- Battery voltage is always applied to the lighting switch through fuse No. 4.
- When the lighting switch is set at the "2" position, current flows through the pop-up motor (sensor), pop-up motor relay (coil), and ground, closing the pop-up motor relay contacts.
- After flowing through the closed pop-up motor relay contacts, current flows through the pop-up motor to ground.

The pop-up motor starts operating to raise the retractable headlight.

- Once the pop-up motor has revolved up to its UP limit, the sensor inside the motor switches its contact from the UP side to the DOWN side.
- This operation of the sensor causes the circuit leading to the pop-up motor relay (coil) to open and the pop-up motor stops, maintaining the retractable headlight in its raised position.
- When the lighting switch is set at the "OFF" or "1" position, current flows through the lighting switch, passing control relay, pop-up switch, passing control relay, pop-up motor (sensor), pop-up motor relay (coil), and ground, closing the pop-up motor relay contacts.

After flowing through the closed pop-up motor relay contacts, current flows through the pop-up motor to ground. The pop-up motor begins operating to retract the headlight.

 Once the pop-up motor has revolved up to its DOWN limit, the sensor inside the motor switches its contact from the DOWN side to the UP side, and the motor stops, maintaining the headlight in its retracted position.

### Functions of the Pop-up Switch

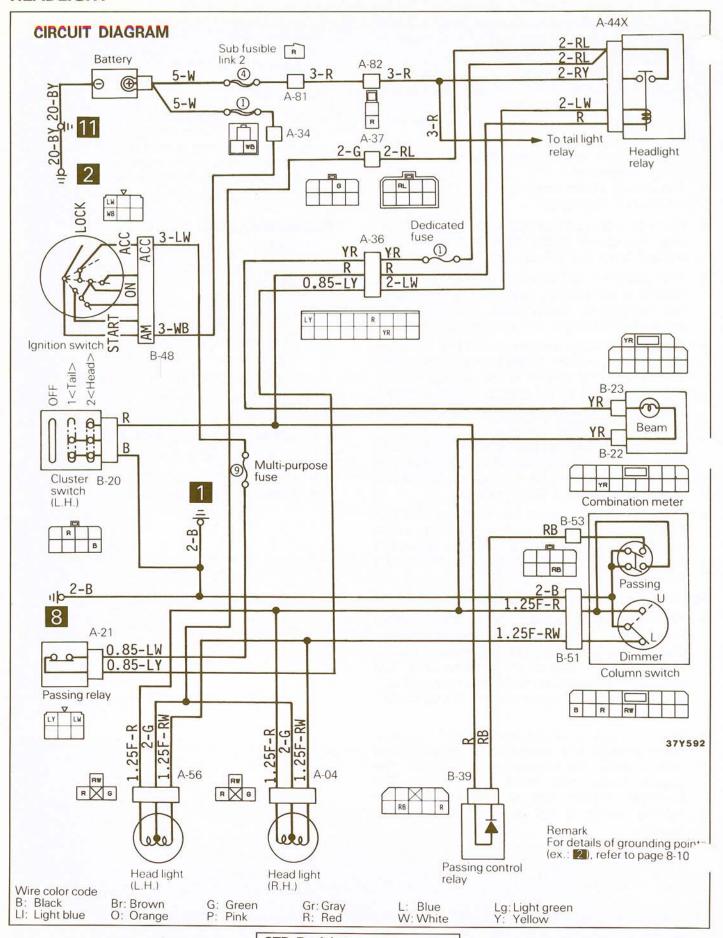
- When the pop-up switch is set at "ON", current flows through fuse No. 4, lighting switch, passing control relay, pop-up switch, pop-up motor (sensor), pop-up motor relay (coil), and ground. The retractable headlights rises just as it does when the lighting switch is set at the "2" position.
- When the pop-up switch is set at "OFF", current flows through the pop-up switch, the passing control relay, the pop-up motor (sensor), the pop-up motor relay (coil), and ground. The headlight retracts just as it does when the lighting switch is set at the "OFF" or "1" position.

### **Functions of the Passing Switch**

- By setting the passing switch at the "ON" position while the ignition switch is turned to "ACC" or "ON", current flows through fuse No. 9, passing relay, passing control relay, passing switch, and ground, closing the passing control relay contacts.
- Once the passing control relay contacts have closed, current flows through fuse No. 4, lighting switch, passing control relay, pop-up motor (sensor), pop-up motor relay (coil), and ground, and the retractable headlight rises just as it does when the lighting switch is set at "2".

- 1. Headlights do not rise
  - 1) They rise only when the lighting switch is operated.
    - Check the pop-up switch.
    - Check the passing control relay.
  - They rise only when the pop-up switch is operated
    - Check the lighting switch.
- 2. Headlights do not retract
  - · Check the pop-up switch.
  - Check the passing control relay.
- 3. One headlight does not move
  - Check the pop-up motor relay.
  - Check the pop-up motor.

### **HEADLIGHT**



STB Revision

N08IHBC

### Switching Between Low Beam and High Beam

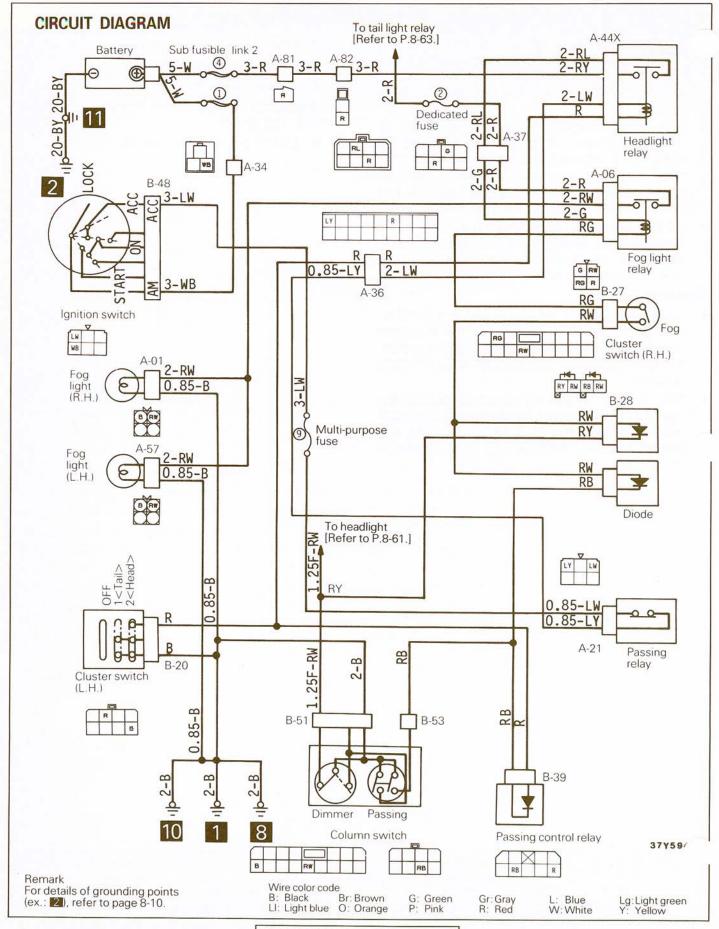
- When the lighting switch is set at the "2" position while the ignition switch is at the "ACC" position, current flows through fuse No. 9, passing relay, headlight relay (coil), lighting switch, and ground, closing the headlight relay contacts.
- If the dimmer switch is set at the "low" (or "high") position while the above-mentioned condition is obtained, current flows through the headlight relay (contacts), headlight, dimmer switch, and ground, causing the headlight low beam filament (or high beam filament) to go on.
- When current is flowing to the high beam filament of the headlight, current is also flowing to the high beam indicator through a dedicated fuse, causing the indicator to light.

### Signaling Passing

- When the passing switch is set at the "ON" position current flows through the headlight relay (coil), passing control relay, passing switch, and ground, causing the headlight relay contacts to close.
- After flowing through the closed contacts of the headlight relay, current flows through the headlight (high beam filament), passing switch, and ground, and the headlight high beam filaments go on.

- Low beam filaments (or high beam filaments) do not go on for both headlights
  - Check the dimmer switch.
- 2. Only one headlight goes on
  - · Check the bulb.
- Headlights do not switch between low beam and high beam
  - · Check the dimmer switch.

### **FOG LIGHT**

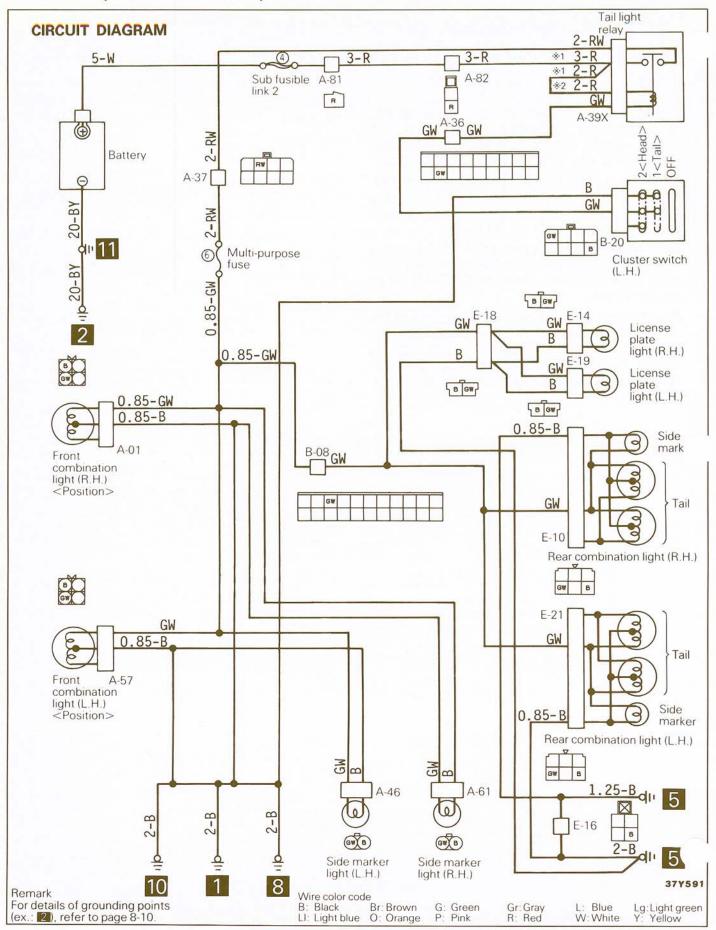


N08IHIA

- By setting the lighting switch at the "2" position when the ignition switch is at the "ACC" or "ON" position, the headlight relay contacts close. Refer to OPERATION for the headlights.
- If the fog light switch is set at the "ON" position when the dimmer switch is at the "low" position, current flows through the headlight relay (contacts), fog light relay (coil), fog light switch, diode, dimmer switch, and ground, causing the fog light relay contacts to close.
- Once the fog light relay contacts have closed, current flows through the dedicated fuse, fog light relay (contacts), fog lights, and ground, causing the fog lights to go on.
- If the passing switch is set at the "ON" position while the fog lights are illuminated, the headlight relay contacts close. Refer to OPERATION of the headlights.
- After flowing through the closed contacts of the headlight relay, current flows through the fog light relay (coil), fog light switch, diode, passing switch, and ground, causing the fog light relay contacts to close, which turns on the fog lights.

- 1. Only the right or left fog lights go on
  - Check the bulb.
- 2. Fog lights do not go on when the passing switch is set at "ON".
  - Check the diode.

### TAIL LIGHT, POSITION LIGHT, SIDE MARKER LIGHT AND LICENSE PLATE LIGHT



N08IHCC

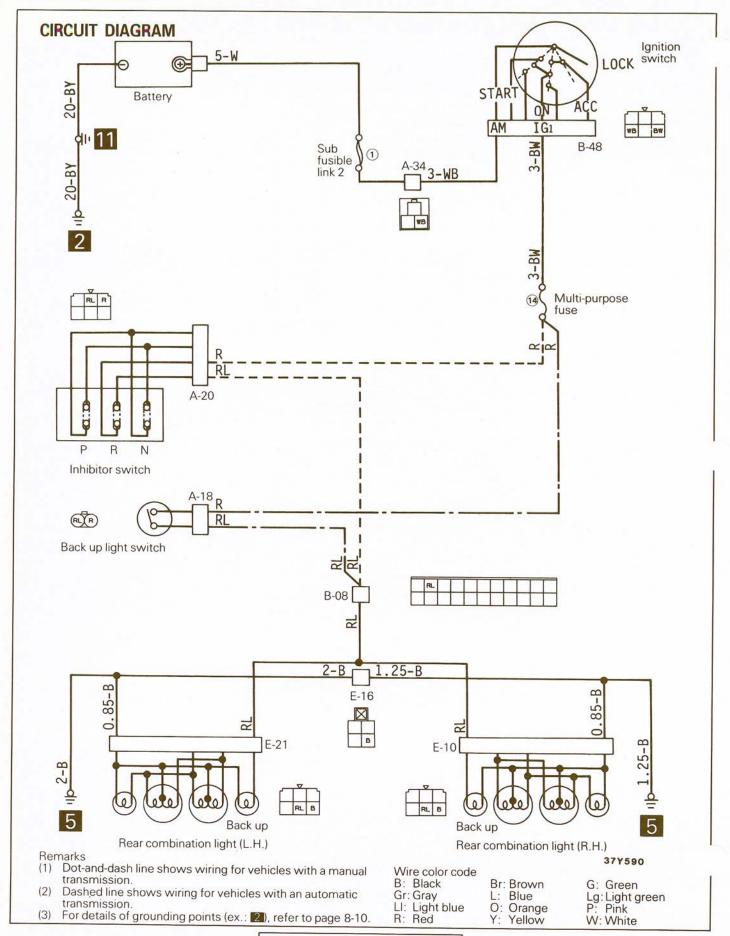
- Battery voltage is always applied to the lighting switch through sub fusible link.
  - When the lighting switch is at the "1" or "2" position, current flows through the tail light relay (coil), lighting switch and ground, causing the tail light relay contacts to close.
- When the tail light relay contacts close, current flows through tail light relay (contacts), fuse No. 6, each light, and ground, causing each light go on.

### TROUBLESHOOTING HINTS

Only, one light does not go on

Check bulb.

### **BACK UP LIGHT**

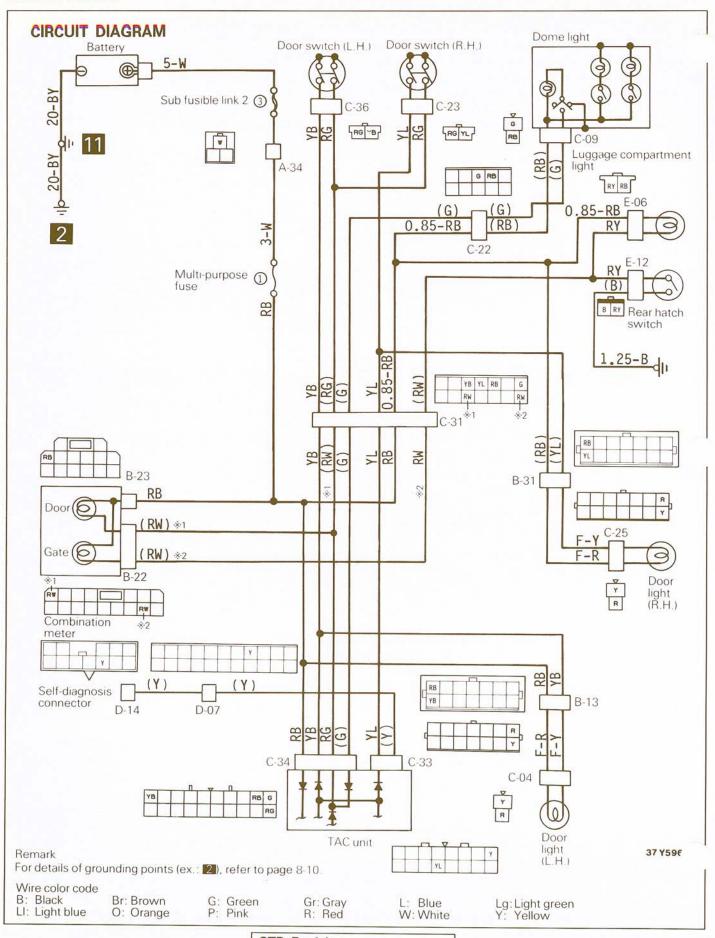


NO8IHD/

• When the gearshift lever is moved to the "R" position, with the ignition switch turned to "ON", the backup light switch (manual transmission vehicles) or inhibitor switch (automatic transmission vehicles) is closed, allowing current to flow through fuse No. 14, backup light switch or inhibitor switch, backup lights, and ground. This causes the backup lights to go on.

- 1. Only one backup light does not go on
  - Check bulb.
- 2. Backup lights fail to go off
  - Check backup light switch. Manual transmission vehicles
  - Check inhibitor switch. Automatic transmission vehicles

### DOME LIGHT



STB Revision

N08IHEC

### **Dome Light**

- Battery voltage is always applied to the dome light through fuse No. 1.
- When the dome light switch is set at "ON", current flows through fuse No. 1, dome light, and ground, causing the dome light to go on.

For the operation of the delayed switch-off dome light, refer to the "ETACS" section.

### Door-Ajar Warning Light

- Battery voltage is always applied to the door-ajar warning light through fuse No. 1.
- Once any door is opened or remains ajar, the door switch contacts close causing current to flow through fuse No. 1, door-ajar warning light, door switch, and ground so the door-ajar warning light goes on.

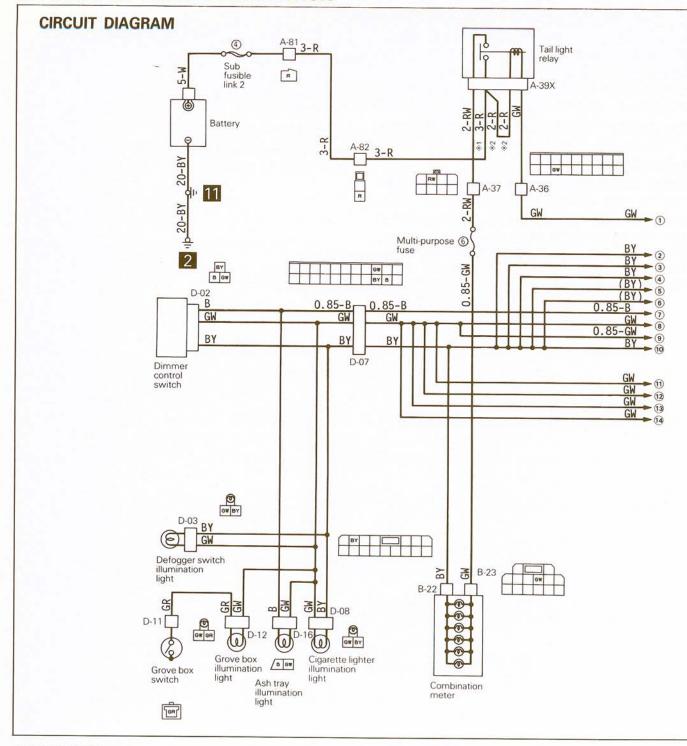
### TROUBLESHOOTING HINTS

Dome light does not come on

- 1) Clock also does not operate
  - Check fuse.
- Dome light does not come on even when door is opened with dome light switch at "DOOR" position
  - Check bulb.

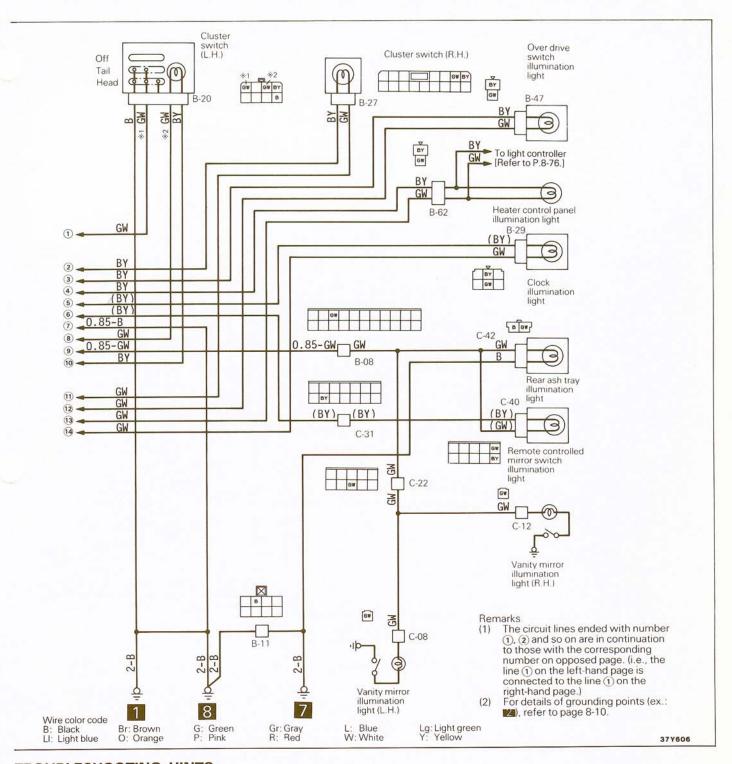
For the operation of the delayed switch-off dome light, refer to the "ETACS" section.

### INSTRUMENT PANEL ILLUMINATION



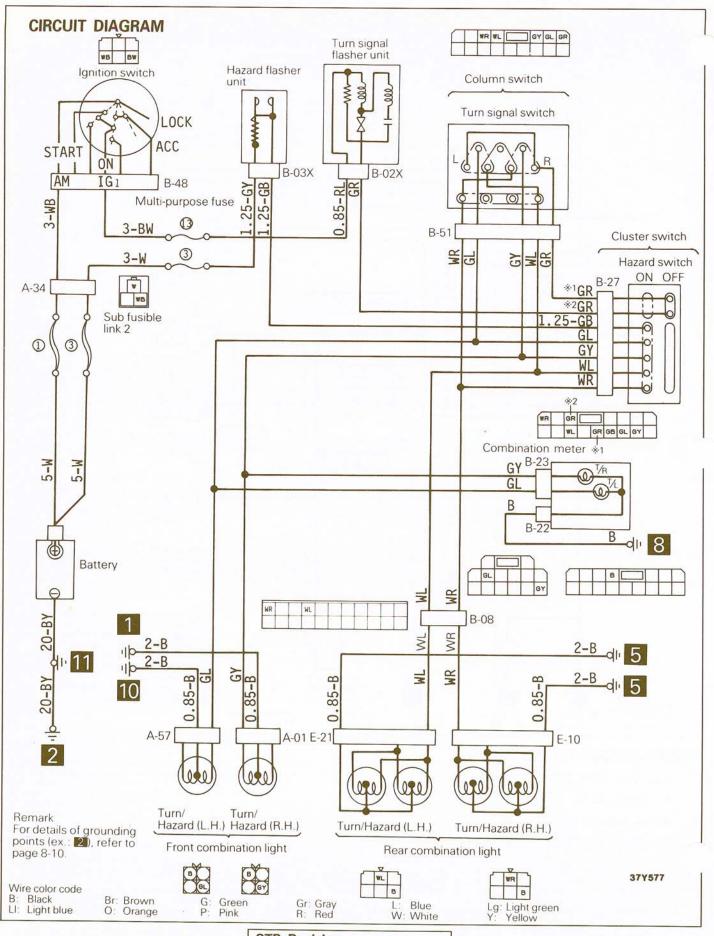
OPERATION

- Battery voltage is always applied to the lighting switch through the fusible link.
- When the lighting switch is at the "1" or "2" position, current flows through the tail light relay (coil), lighting switch, and ground, causing the tail light relay contacts to close.
- When the tail light relay contacts close, current flows through the tail light relay (contacts), fuse No. 12 lighting switch, each illumination light, dimmer control switch (partial circuit), and ground, causing the illumination lights to go on.



- 1. Only one light does not come on
  - Check bulb.
- 2. Lights cannot be dimmed
  - · Check dimmer control switch.

### TURN SIGNAL



STB Revision

### N08IHGC

### **Turn Signal Lights**

- When the turn signal light switch is at "L.H.", with the ignition switch turned to "ON", current flows through fuse No. 13, flasher unit, hazard warning light switch, turn signal lights (L.H.), and ground, causing the flasher unit to alternately close and open its contacts.
- As the contacts repeatedly open and close, the turn signal lights (L.H.) flash.
- The turn signal indicator light (L.H.) flashes at the same time as do the turn signal lights.
- When the turn signal light switch is at "R.H.", the turn signal lights (R.H.) and turn signal indicator light flash in the same way as when the switch is at "L.H.".

### Remarks

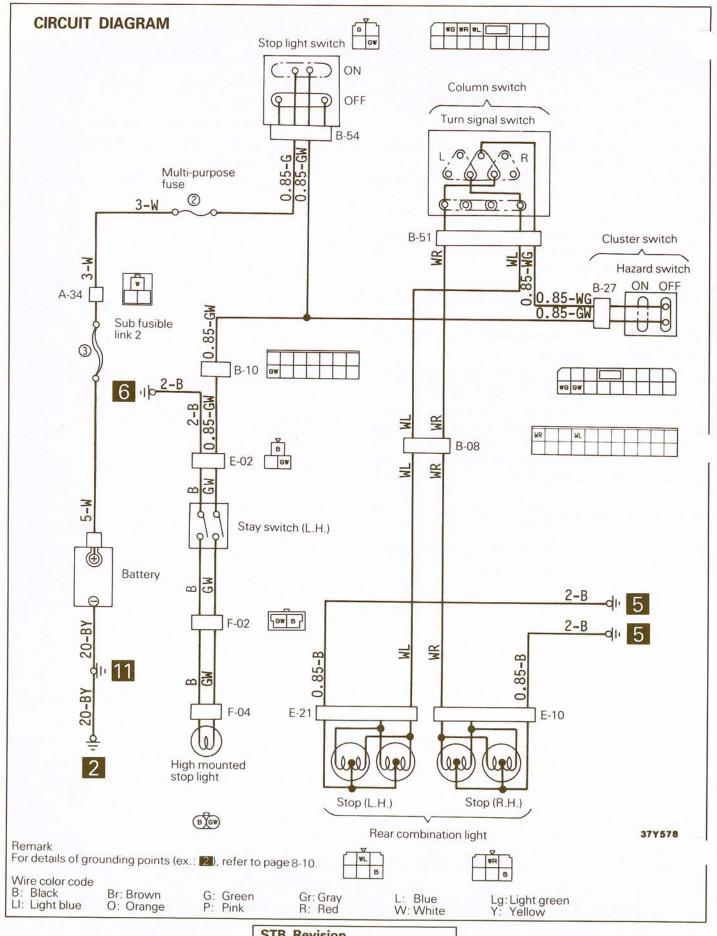
If one or more turn signal light bulbs are burnt out, the flasher unit keeps the indicators illuminated, to warn the driver that bulb replacement is required.

### **Hazard Warning Lights**

- Battery voltage is always applied to the hazard warning light switch through fuse No. 3.
- When the hazard warning light switch is turned "ON", current flows through fuse No. 3, flasher unit, hazard warning light switch, right and left turn signal lights, and ground, causing the flasher unit contacts to close and open repeatedly.
- As the contacts repeatedly open and close, all of the turn signal lights flash.
- Both turn signal indicator lights flash at the same time as do the turn signal lights.

- Turn signal lights do not work neither when turn signal switch nor hazard warning light switch is operated
  - Check hazard warning light switch.
- 2. Turn signal lights do not flash
  - 1) Stop lights go on
    - Check the turn signal light switch.
  - 2) Neither the turn signal lights nor the stop lights operate
    - Check the hazard warning light switch.

### STOP LIGHT

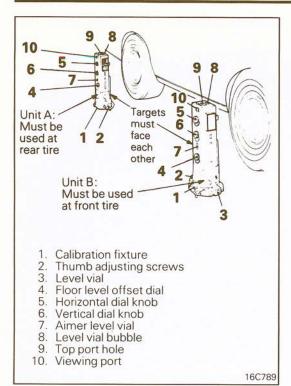


NO8IHHA

 Battery voltage is always applied to the stop light switch through fuse No. 2.

When the brake pedal is depressed for braking, the stop light switch contacts are closed so that current flows through fuse No. 2, stop light switch, hazard warning light switch, turn signal light switch, stop lights, and ground, causing the stop lights to go on.

- 1. One stop light does not light
  - Check bulb.
- 2. Stop lights fail to go off
  - Check stop light switch.



### SERVICE ADJUSTMENT PROCEDURES

NOSHAR

## HEADLIGHT AIMING PRE-AIMING INSTRUCTIONS

1. Test dimmer switch operation.

- 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.

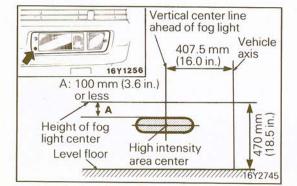
### LUMINOUS INTENSITY MEASUREMENT

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 vehicle is operated, make sure that the intensity conforms to the requirements of such regulations.



### FOG LIGHT AIMING

N08IIEA

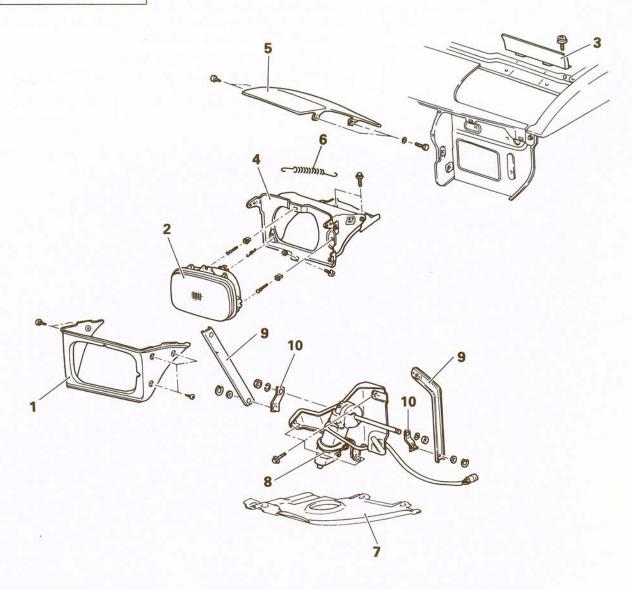
- 1. Place vehicle on a known level floor 7.6 m (25 feet) from aiming screen or light colored wall.
- 2. Use adjusting screw to adjust the top end of high intensity zone to dimension A.

### **HEADLIGHT**

### N08IJAD

### REMOVAL AND INSTALLATION

Post-installation Operation
Aiming Headlights
(Refer to P.8-190.)



### Removal steps

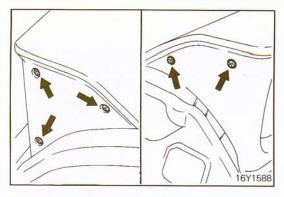
- 1. Headlight bezel
- 2. Headlight assembly
  3. Headlight hood protector
  4. Headlight housing assembly
  5. Headlight hood
- 6. Spring7. Air guide panel8. Pop-up motor assembly
  - 9. Link
- 10. Arm

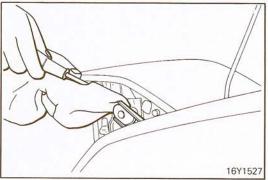
### NOTE

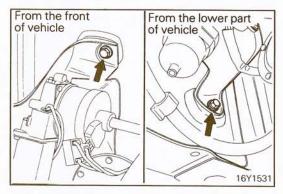
- Reverse the removal procedures to reinstall.

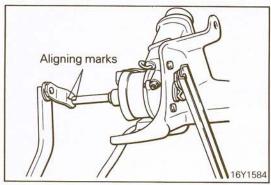
  The Refer to "Service Points of Removal".

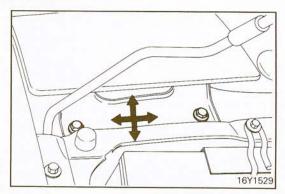
  Refer to "Service Points of Installation".











### SERVICE POINTS OF REMOVAL

### 1. REMOVAL OF HEADLIGHT BEZEL

(1) Raise the headlights by using the pop-up switch. Disconnect the negative (–) battery terminal.

### Caution

Because there is the danger of burning the coil of the headlight relay by a reverse flow of power if the headlight switch is used to raise the headlights and the negative terminal of the battery is disconnected, be sure to always raise the headlights, in this condition, by using the pop-up switch.

(2) Remove the headlight bezel.

### 4. REMOVAL OF HEADLIGHT HOUSING ASSEMBLY

Remove the headlight housing assembly and the linkage coupling part.

NOTE

Remove the linkage coupling part while holding the headlight hood by hand.

### 7. REMOVAL OF AIR GUIDE PANEL

Refer to GROUP 23 BODY - Air Parts.

### 8. REMOVAL OF POP-UP MOTOR

Remove the pop-up motor together with the horn.

### 10. REMOVAL OF ARM

Put aligning marks on the arm and motor shaft before the arm is removed.

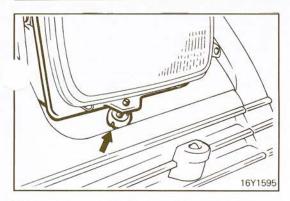
NOTE

When replacing the arm, put an alignment mark to a new arm in the same location as made in the old arm.

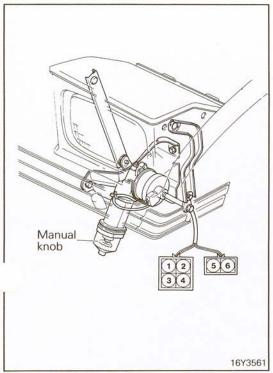
### SERVICE POINT OF INSTALLATION

### 4. INSTALLATION OF HEADLIGHT HOUSING ASSEMBLY

(1) Use the elliptical hole in the headlight hood to adjust the clearance between the headlight hood and the fender, and between the headlight hood and the header panel, so that they are equal.



- (2) Irregularity between the headlight housing assembly and the fender, and between the assembly and the header panel, can be eliminated by using the stopper bolt in the headlight housing assembly to make the necessary adjustment.
- (3) Couple the linkage.



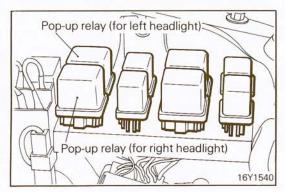
# INSPECTION POP-UP MOTOR

- (1) Disconnect the wiring connector from the pop-up motor, and connect an ohmmeter to the motor side connector.
- (2) Run the motor by the manual knob and check the continuity between the terminals.

| Terminal<br>Headlight | 6        | 5 | 3 | 1  | 2 | 4        |
|-----------------------|----------|---|---|----|---|----------|
| UP                    | <b>—</b> |   | 0 | 0- | 0 | <b>—</b> |
| Down                  |          | - | 0 | 0- | 0 | <b>+</b> |

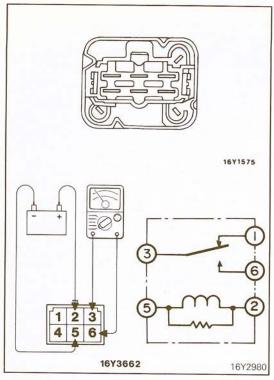
NOTE

- (1) indicates that there is continuity between the terminals.
- (2) ⊕ (plus), and ⊖ (minus) indicate ohmmeter test bar connection.



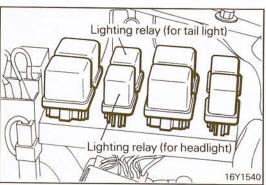
### **POP-UP RELAY**

(1) Remove the pop-up relay from the relay box in the engine compartment.



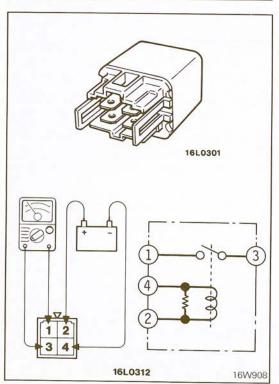
(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 5 is earthed.

| Voltage applied        | Terminals 3 – 6 | Conductive     |
|------------------------|-----------------|----------------|
| Voltage not<br>applied | Terminals 3 – 6 | Non-conductive |
|                        | Terminals 1 – 3 | Conductive     |
|                        | Terminals 2 – 5 | 2              |



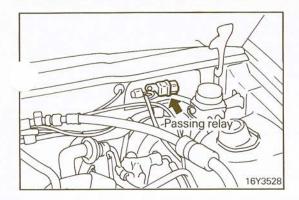
### LIGHTING RELAY

(1) Remove the lighting relay from the relay box in the engine compartment.



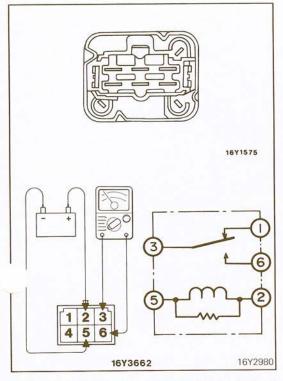
(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 4 is earthed.

| Voltage applied     | Terminals 1 – 3 | Conductive     |
|---------------------|-----------------|----------------|
| Voltage not applied | Terminals 1 – 3 | Non-conductive |
|                     | Terminals 2 – 4 | Conductive     |



#### **PASSING RELAY**

(1) Remove the passing relay.



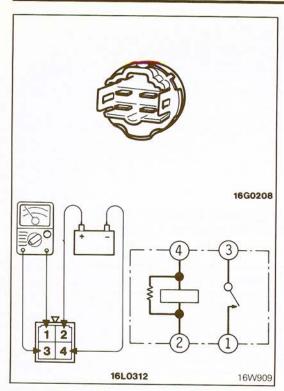
(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 5 is earthed.

| Voltage applied                           | Terminals 3 – 6 | Conductive     |  |  |
|---|-----------------|----------------|--|--|
| Voltage applied<br>Voltage not<br>applied | Terminals 3 – 6 | Non-conductive |  |  |
|   | Terminals 1 – 3 | Conductive     |  |  |
|   | Terminals 2 – 5 |                |  |  |



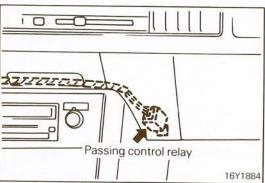
#### FOG LIGHT RELAY

(1) Remove the fog light relay.



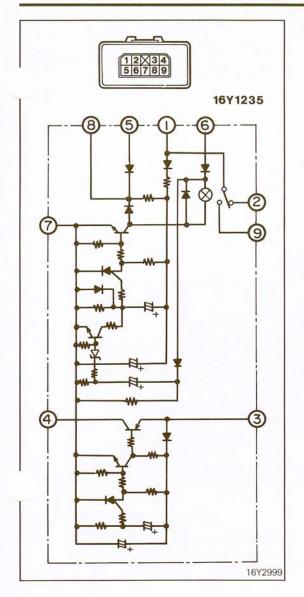
(2) Check continuity between terminals when the battery voltage is applied to terminal 2, and terminal 4 is grounded.

| Voltage applied     | Terminals 1 – 3 | Conductive     |
|---------------------|-----------------|----------------|
| Voltage not applied | Terminals 1 – 3 | Non-conductive |
| аррпец              | Terminals 2 – 4 | Conductive     |



#### PASSING CONTROL RELAY

(1) Remove the passing control relay.



(2) Check continuity between terminals when the battery voltage is applied to terminal 6, and terminal 8 is grounded.

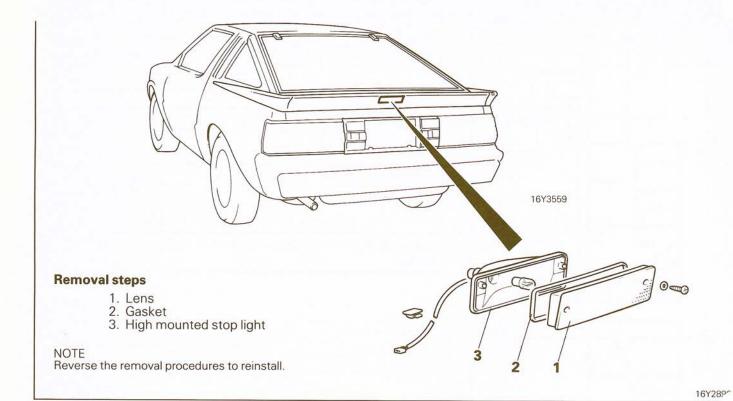
| Voltage applied         | Terminals 1 – 9 | Conductive     |
|-------------------------|-----------------|----------------|
| /oltage not Termapplied | Terminals 1 – 9 | Non-conductive |
| аррнео                  | Terminals 1 – 2 | Conductive     |
|                         | Terminals 5 – 8 |                |

(3) Check continuity between terminals 3 and 4 when the battery voltage is applied to terminal 3, and terminal 7 is grounded.

| Voltage applied     | Terminals 3 – 4 | Conductive for approx. 4 seconds and non-conductive afterwards. |
|---------------------|-----------------|---|
| Voltage not applied | Terminals 3 – 4 | Non-conductive  |

# HIGH MOUNTED STOP LIGHT REMOVAL AND INSTALLATION

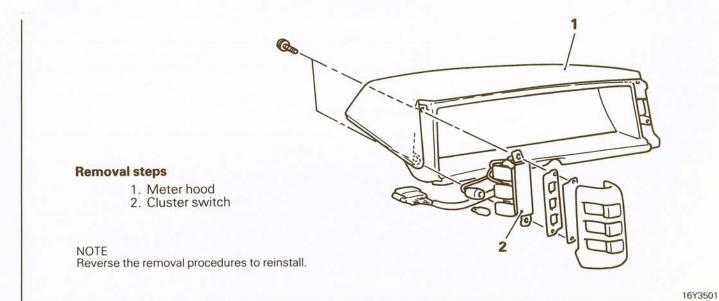
N08IKAC



**STB Revision** 

# CLUSTER SWITCH REMOVAL AND INSTALLATION

NOSINAA

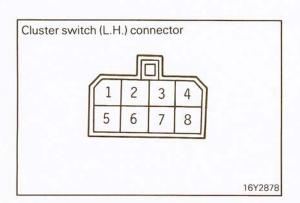


#### **INSPECTION**

- (1) Remove the meter hood.
- (2) Disconnect the cluster switch connector.
- (3) Operate the switch and check the continuity between the terminals.

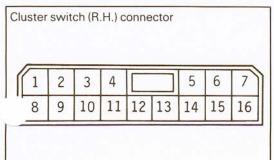
NOTE

O-O indicates that there is continuity between the terminals.



#### LIGHTING SWITCH

| Switch position Terminal | 1  | 2  | 3  | 4  | 5  | 6  | 7   | 8  |
|--------------------------|----|----|----|----|----|----|-----|----|
| OFF                      |    |    |    |    |    |    | 0-  | 0  |
| TAIL                     | 06 | Do |    | 0- | 0  |    | 0-  | 0  |
| HEAD                     |    |    | 0- | 0  | -0 | 0- | -0- | -0 |



#### **HAZARD SWITCH**

| Switch position | 9 | 10  | 11  | 12 | 5  | 7 | 14 | 15 | 16 |
|-----------------|---|-----|-----|----|----|---|----|----|----|
| OFF             |   |     |     | 0- | -0 |   |    | 0- | 0  |
| ON              | 0 | -0- | -0- |    |    | 0 | 0  |    |    |

**STB Revision** 

#### FOG LIGHT SWITCH

| Terminal Switch position | 6 | 13 |
|--------------------------|---|----|
| OFF                      |   |    |
| ON                       | 0 |    |

#### POP-UP SWITCH

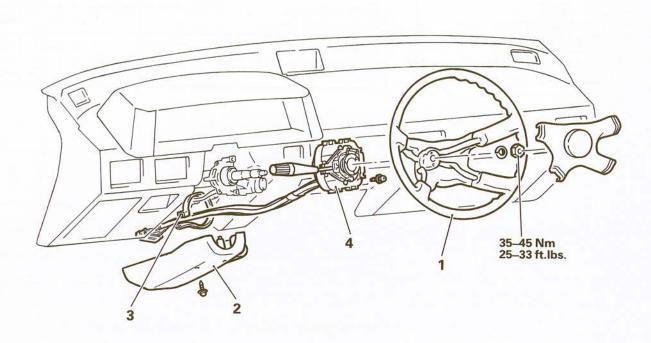
| Terminal Switch position | 3 | 4  | 8 |
|--------------------------|---|----|---|
| OFF                      | 0 | -0 |   |
| ON                       | 0 |    |   |

#### **ILLUMINATION**

| Terminal | 1   | 2            |
|----------|-----|--------------|
|          | 0 ( | <b>9</b> ——○ |

### **COLUMN SWITCH** REMOVAL AND INSTALLATION

N08IPAE



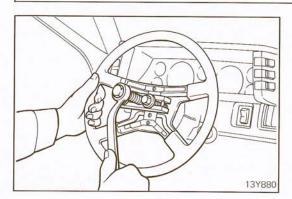
#### Removal steps

- Steering wheel
- 2. Lower column cover
- 3. Cable bands
- 4. Column switch

#### NOTE

- (1) Reverse the removal procedures to reinstall.(2) : Refer to "Service Points of Removal".

13Y3500



#### SERVICE POINT OF REMOVAL

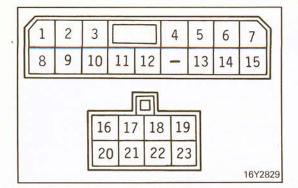
1. REMOVAL OF STEERING WHEEL

Remove the steering wheel.

#### INSPECTION

- (1) Remove the knee protector.
- (2) Disconnect the column switch connector.
- (3) Operate the switch and check the continuity between the terminals.

O-O indicates that there is continuity between the terminals.



#### **TURN-SIGNAL SWITCH**

| Switch position | 1 | 2 | 3   | 4  | 5  | 6  |
|-----------------|---|---|-----|----|----|----|
| Right side      | 0 |   | -0- | 0- | -0 |    |
| Neutral         |   |   |     | 0- | 0  | -0 |
| Left side       | 0 | 0 |     | -0 | 0- | -0 |

#### **DIMMER/PASSING SWITCH**

| Switch position | Terminal | 12 | 13 | 15            | 21 |
|-----------------|----------|----|----|---------------|----|
| Dimmer          | Lower    | 0- |    | <del></del> 0 |    |
| switch          |          |    | 0- | <del></del> 0 |    |
| Passing sw      | vitch    |    | 0- | 0             | 0  |

#### WINDSHIELD WIPER AND WASHER SWITCH

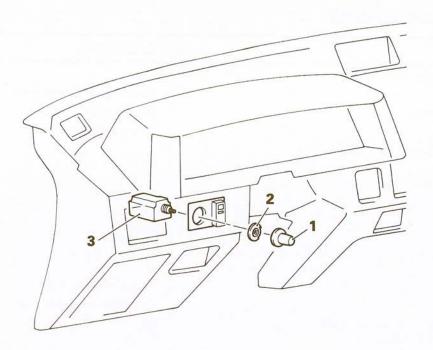
| Switch position | Terminal | 8  | 17 | 9  | 10 | 14 | 11 | 23 | 1′ |
|-----------------|----------|----|----|----|----|----|----|----|----|
| Wiper           | OFF      |    |    | 0- |    | 0  |    |    |    |
| switch          | A/INT    | 0- | 0  | 0- |    | 0  |    |    |    |
|                 | 1        |    | 0- | -0 |    |    |    |    |    |
|                 | 2        |    | 0- |    | 0  |    |    |    |    |
| Washer          | OFF      |    |    |    |    |    |    |    |    |
| switch          | ON       |    | 0- |    |    |    | 0  |    |    |
| FAST            | OFF      |    |    |    |    |    |    |    |    |
|                 | ON       |    | 0- |    | 1  |    |    | 0  |    |
| SLOW            | OFF      |    |    |    |    |    |    |    |    |
|                 | ON       |    | 0- |    |    |    |    |    | C  |

#### HORN SWITCH

| Terminal Switch position | 7  | 15 |
|--------------------------|----|----|
| OFF                      |    |    |
| ON                       | 0- |    |

# DIMMER CONTROL SWITCH REMOVAL AND INSTALLATION

N08IRAC



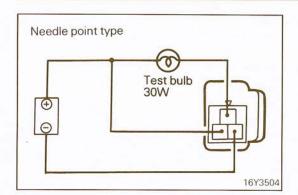
#### Removal steps

- 1. Knob
- 2. Ring nut
- 3. Dimmer control switch

NOTE

Reverse the removal procedures to install

16Y3503



## INSPECTION CONTINUITY TEST

- (1) Remove the dimmer control switch from the instrument panel, and then connect the battery and the test bulb as shown in the illustration.
- (2) If the light intensity of the test bulb changes smoothly, without any flickering, when the dimmer control switch knob is turned, then it can be assumed that the dimmer control switch is functioning properly.

## **WIPER AND WASHER SYSTEM**

### **SPECIFICATIONS**

#### **GENERAL SPECIFICATIONS**

NO8KL

| Items  | Specifications                     |
|--|------------------------------------|
| Windshield wiper motor                       |                                    |
| Type   | Permanent-magnet type              |
| Speed control system                         | Third brush system                 |
| Braking system                               | Dynamic brake system               |
| Rpm at load of 1 Nm (0.72 ft.lbs.) rpm       |                                    |
| Low speed                                    | $47 \pm 5$                         |
| High speed                                   | 69 ± 7                             |
| Limited torque Nm (ft.lbs.)                  |                                    |
| Low speed                                    | 18 (13)                            |
| High speed                                   | 16 (12)                            |
|  | 10 (12)                            |
| Rear wiper motor                             |                                    |
| Motor type                                   | Ferrite magnet type                |
| Braking system                               | Dynamic braking system             |
| Rpm under load [at 0.6 Nm (0.4 ft.lbs.)] rpm | 45 – 53                            |
| Nominal torque Nm (ft.lbs.)                  | 12 (9)                             |
| No-load current A                            | 2 or less                          |
| Windshield wiper blade                       |                                    |
| Wiping angle                                 |                                    |
| Driver's side                                | 79° ± 1.5°                         |
| Passenger's side                             | 107° ± 1.5°                        |
| Wiper blade length mm (in.)                  | 484 (19)                           |
| Rear wiper blade                             |                                    |
| Wiping angle                                 | 107°                               |
| Length of wiper blade mm (in.)               | 459 (18.0)                         |
| Windshield washer motor and pump             |                                    |
| Motor type                                   | Direct current ferrite magnet type |
| Pump type                                    | Centrifugal type                   |
| Power consumption A                          | 3.5 or less                        |
| Time of continuous use sec.                  | 3.3 01 1633                        |
| With washer fluid                            | Max. 60                            |
| Empty operation                              | Max. 20                            |
| Nozzle jet pressure kPa (psi)                | 78 (11.3)                          |
| Tank capacity lit. (qts.)                    | 2.5 (2.6)                          |
|  | 2.0 (2.0)                          |
| Rear washer motor and pump                   |                                    |
| Motor type                                   | Direct current ferrite magnet type |
| Pump type                                    | Centrifugal type                   |
| Power consumption A                          | 3.5 or less                        |
| Allowable period of continuous use sec.      | 500                                |
| With washer fluid                            | 60                                 |
| Empty operation                              | 30                                 |
| Nozzle jet-spray pressure kPa (psi)          | 78 (11.3)                          |
| Tank capacity lit. (qts.)                    | 1.1 (1.1) or more                  |

**STB Revision** 

| Items                                      | Specifications |  |
|--|----------------|--|
| Rear wiper and rear washer switch          |                |  |
| Rear wiper switch                          | 3              |  |
| Rear washer switch                         | 5              |  |
| Voltage drop (at 12V and the rated load) V | 0.2 or less    |  |
| Rear intermittent wiper relay              |                |  |
| Intermittent time sec.                     | 6-10           |  |

### **SERVICE SPECIFICATIONS**

N08KC--

| Items   | Specifications      |
|---|---------------------|
| Windshield wiper blade stopping position (distance between blade tip and front deck garnish) mm (in.) | 13 (.5)             |
| Rear wiper blade stopping position (distance between blade tip and hatch garnish) mm (in.)            | 45 – 55 (1.8 – 2.2) |

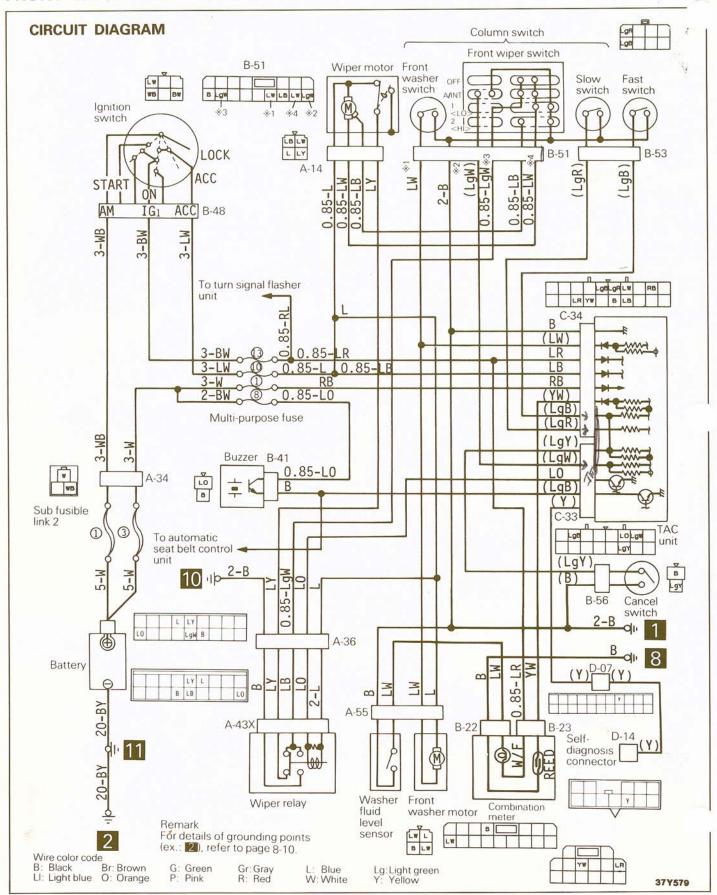
#### **TORQUE SPECIFICATIONS**

N08KD--

| Items                                     | Nm      | ft.lbs.    |
|---|---------|------------|
| Windshield wiper arm locking nut          | 10 – 16 | 7.2 – 11.6 |
| ndshield wiper pivot shaft installing nut | 10 – 16 | 7.2 – 11.6 |
| Rear wiper arm locking nut                | 6-9     | 4.3 - 6.5  |
| Rear wiper pivot shaft installing nut     | 10 – 16 | 7.2 – 11.6 |
| Rear wiper motor mounting nut             | 6-9     | 4.3 – 6.5  |

## TROUBLESHOOTING

#### FRONT WIPER AND WASHER



#### **OPERATION**

N08KHAC

#### Wiper Low-speed and High-speed Operation

- When the wiper switch is at "1" with the ignition switch at either "ACC" or "ON", current flows through fuse No. 10, wiper motor (lowspeed brush), wiper switch and ground; the wipers operate at low speed.
- When the wiper switch is at "2", current flows through fuse No. 10, wiper motor (high-speed brush), wiper switch, and ground; the wipers operate at high speed.

#### Wiper Automatic Stopping Operation

- When the wiper switch is set at "OFF" position to stop the wipers, current flows through the wiper motor (low-speed brush), wiper switch, wiper relay (contacts) wiper motor (cam contacts), and ground, causing the wiper motor to continue operation until the wiper blades return to their park positions.
- Once the wiper blades have reached park positions, the wiper motor cam moves to open its contacts. This interrupts flow of current to ground, and the wiper motor stops.

#### **Washer Operation**

When the washer switch is "ON", with the ignition switch in either "ACC" or "ON", current flows rough fuse No. 10 washer motor, washer switch, .d ground; the washer motor operates.

#### Washer Fluid Level Indicator Light

When the washer fluid level drops below the preset level while the ignition switch at "ON", the washer fluid level sensor closes its contacts, causing current to flow through fuse No. 13, washer fluid level sensor, and ground, and in turn, the washer fluid level indicator light goes on.

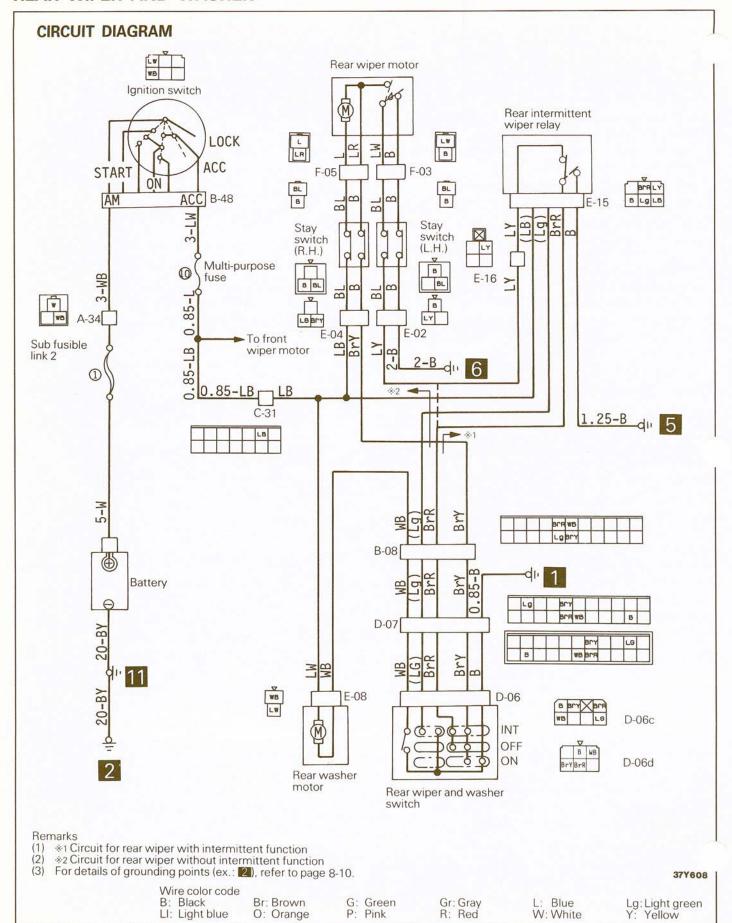
For the operation of the intermittent wipers and washer-interlocked wipers, refer to the "ETACS" section.

#### TROUBLESHOOTING HINTS

- 1. Wipers do not operate
  - 1) Washer also does not operate
    - Check fuse.
    - Check connection to ground.
- 2. Wipers do not work in either low-speed or high-speed mode
  - Check wiper switch.
- 3. Wipers fail to stop
  - Check wiper motor.

For troubleshooting hints for the intermittent wipers and washer-interlocked wipers, refer to the "ETACS" section.

#### REAR WIPER AND WASHER



NOSKHER

#### **OPERATION**

#### Wiper Operation

 When the wiper switch is at "ON" with the ignition switch at either "ACC" or "ON", current flows through fuse No. 10, stay switch, wiper motor, wiper switch and ground; the wiper operate.

#### Wiper Automatic Stopping Operation

- When the wiper switch is set at "OFF" to stop the wipers, current flows through the wiper motor, wiper switch, intermittent wiper relay (contacts), wiper motor (cam contacts), and ground, causing the wiper motor to continue operation until the wiper blade returns to its park positions.
- Once the wiper blade has reached park position, the wiper motor cam moves to open its contacts. This interrupts flow of current to ground, and the wiper motor stops.

#### Wiper Intermittent Operation

- With the ignition switch at "ACC" or "ON", battery voltage is applied to the intermittent wiper relay through fuse No. 10.
- When the wiper switch is at "INT", current flows through the intermittent wiper relay, wiper switch, and ground, and the wiper relay internal contacts close and open repeatedly.
- While the contacts are closed, current flows through the stay switch, wiper motor, wiper switch, intermittent wiper relay (contacts), and ground, causing the wiper motor to operate.
- When the wiper motor starts operating, the relay internal contacts open, causing current to flow through the wiper motor (cam contacts), and ground. This keeps the wiper motor operating until the wiper blades return to their park positions.
- Once the wiper blades have reached park positions, the wiper motor cam moves to open its contacts. This interrupts flow of current to ground so the wiper motor stops.

#### Washer Operation

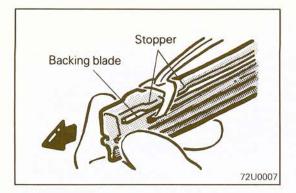
When the washer switch is "ON", with the ignition switch in either "ACC" or "ON", current flows through fuse No. 10, washer motor, washer switch, and ground; the washer motor operates.

#### TROUBLESHOOTING HINTS

- 1. Wipers do not operate
  - 1) Washer also does not operate
    - Check fuse.
    - Check for ground connection.
- 2. Wipers do not operate in intermittent mode
  - Check intermittent wiper relay terminal voltage with relay energized.

| Terminal | Voltage  | Check location           |
|----------|--|--------------------------|
| 2        | OV   | Wiper switch             |
|          | 12V  | Intermittent wiper relay |
|          | Changes betweeen<br>0 V and 12 V<br>repeatedly | – (Normal)               |

- 3. Wipers fail to stop
  - Check wiper motor.

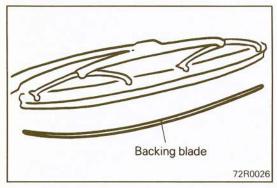


### SERVICE ADJUSTMENT PROCEDURES

N08KIAA

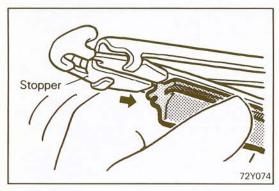
## REPLACEMENT OF WIPER BLADE RUBBER WINDSHIELD WIPER

1. Pull out the rubber and backing blade from the stopper side.



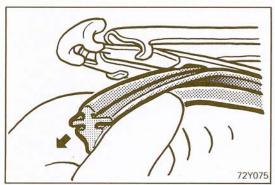
2. Remove the backing blade from the rubber.

 To attach a new rubber, assemble the rubber and backing blade, insert from the direction opposite the stopper, and secure by the stopper. Note that, because the backing blade is curved, installation should be as shown in the figure.



#### **REAR WIPER**

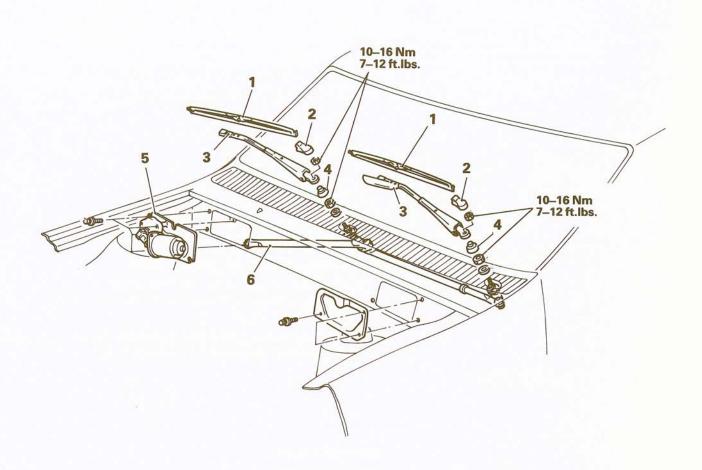
1. Pull out one side of the wiper blade rubber from the stopper.



- 2. Pull out the wiper blade rubber, and then remove the blade
- 3. Installation of the new blade rubber is the reverse procedure of removal.

## **WINDSHIELD WIPERS** REMOVAL AND INSTALLATION

N08KJAC



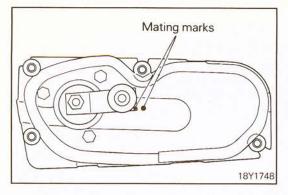
#### Removal steps

- 1. Wiper blade

- Wiper blade
   Head cover
   Wiper arm
   Shield cap
   Wiper motor
  - 6. Wiper linkage

#### NOTE

- (1) Reverse the removal procedures to reinstall.
  (2) ♠ : Refer to "Service Points of Removal".
  (3) ♠ : Refer to "Service Points of Installation".

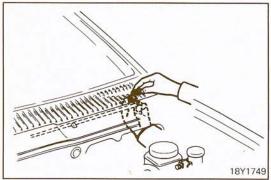


#### SERVICE POINT OF REMOVAL

#### 5. CAUTION OF WIPER MOTOR

#### Caution

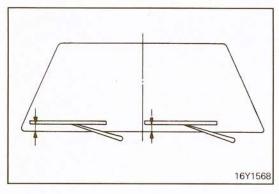
Because the installation angle of the crank arm and t motor has been set, do not remove them unless it is necessary to do so. If they must be removed, remove them only after marking their mounting positions.



#### SERVICE POINTS OF INSTALLATION

#### 6. INSTALLATION OF WIPER LINKAGE

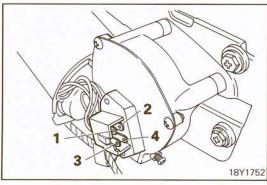
When the passenger side pivot shaft is installed, use the access hole exposed by removal of cowl top outer cover from the front deck.



#### 3. INSTALLATION OF WIPER ARM

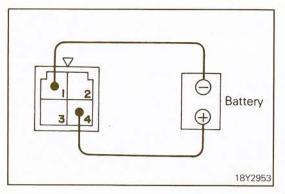
Install the wiper arms on the pivot shafts so that the stopping position of the wiper blades is in agreement with the standard value.

Standard value (distance between blade tip and frc deck center garnish): 13 mm (.5 in.)



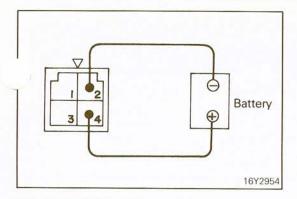
## INSPECTION WIPER MOTOR

Disconnect the wiring connector from the wiper motor and connect battery to the wiper motor connector to check that the wiper motor runs.



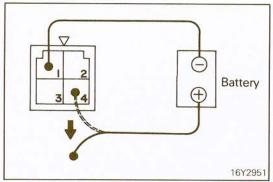
#### LOW SPEED OPERATION CHECK

Connect battery (+) to terminal 4 and battery (-) to terminal 1 and check that the motor runs at low speed.



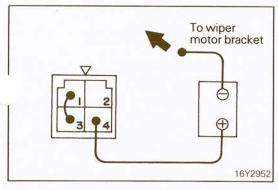
#### HIGH SPEED OPERATION CHECK

Connect battery (+) to terminal 4 and battery (-) to terminal 2 and check that the motor runs at high speed.

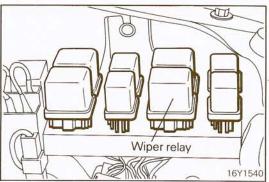


#### AUTOMATIC STOP OPERATION CHECK

- (1) Connect battery (+) to terminal 4 and battery (-) to terminal 1 to run the motor at low speed.
- (2) Disconnect terminal 4 during operation to stop the motor.

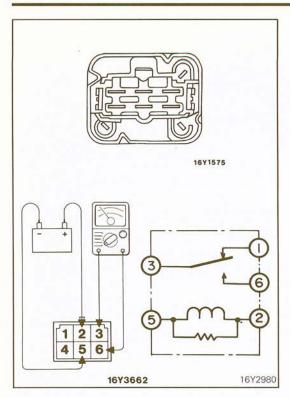


(3) Connect terminal 1 to terminal 3 and connect battery (+) to terminal 4 and battery (-) to the wiper motor bracket to check that the motor starts to run at low speed and then stops.



#### **WIPER RELAY**

(1) Remove the wiper relay.

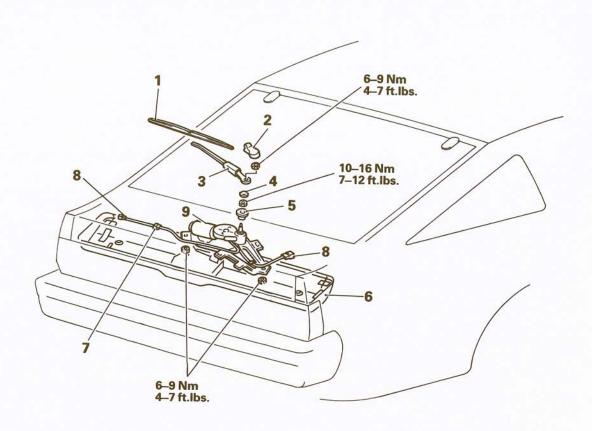


(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 5 is earthed.

| Voltage applied       | Terminals 3 – 6 | Conductive     |
|-----------------------|-----------------|----------------|
| Voltage not applied   | Terminals 3 – 6 | Non-conductive |
| applied Terminals 1 - |                 | Conductive     |
|                       | Terminals 2 – 5 |                |

**REAR WIPER** REMOVAL AND INSTALLATION

N08KKAB



#### Removal steps

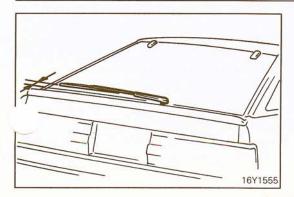
- 1. Wiperblade
- 2. Head cover 3. Wiper arm
- - 4. Shield cap
  - 5. Collar

  - 6. Tailgate trim
  - 7. Harness clip
  - 8. Wiper motor connector
  - 9. Wiper motor

NOTE

- (1) Reverse the removal procedures to reinstall.
  (2) . Refer to "Service Points of Installation".

18Y1750



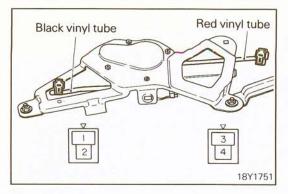
#### SERVICE POINT OF INSTALLATION

#### 3. INSTALLATION OF WIPER ARM

Mount the wiper arm on the pivot shaft so that the stopping position of the wiper blade is in agreement with the standard value.

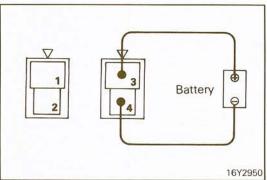
Standard value (distance between blade tip and tailgate garnish): 45 - 55 mm (1.8 - 2.2 in.)

**STB Revision** 



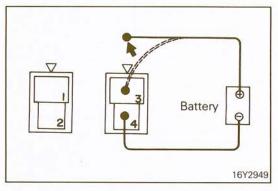
## INSPECTION WIPER MOTOR

Disconnect the wiring connector from the wiper motor ar 'connect battery to the wiper motor connector to check that wiper motor runs.



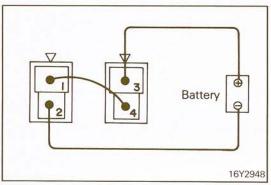
#### **OPERATION CHECK**

Connect battery (+) to terminal 3 and battery (-) to terminal 4 to check that the motor runs.

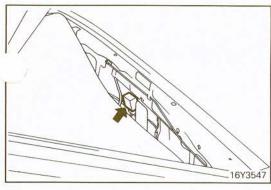


#### AUTOMATIC OPERATION CHECK

- (1) Connect battery (+) and battery (-) to terminal 3 and terminal 4, respectively, to run the motor.
- (2) While the motor is running, disconnect terminal 3 to stop the motor.



(3) Connect terminal 1 to terminal 4 and connect battery (+) and battery (-) to terminal 3 and terminal 2, respectively, to check that the motor starts to run again and then stops.



# Test light 16Y3538

#### REAR INTERMITTENT WIPER RELAY

Remove the rear intermittent wiper relay from the rear end

#### CONTINUITY CHECK

Check to see that there is continuity between terminals 1 and

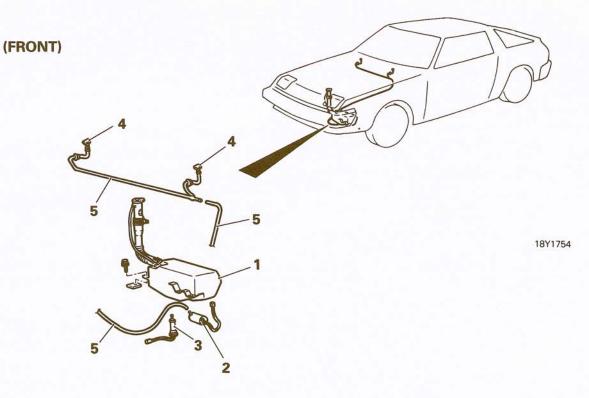
#### INTERMITTENT OPERATION CHECK

- (1) Connect the battery and the test light to the relay, as shown in the figure.
- (2) The condition is normal if, when the battery's negative (-) terminal is connected to terminal 5, the test light illuminates at the same time.

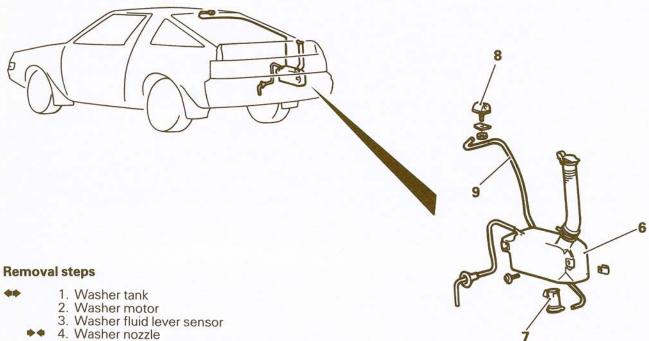
### **WINDOW WASHER**

N08KLBA

#### REMOVAL AND INSTALLATION



#### (REAR)

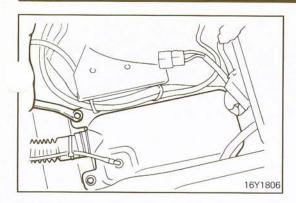


- - 5. Washer tube
- 6. Washer tank
  - 7. Washer motor
- 8. Nozzle
  - 9. Washer tube

NOTE

- (1) : Refer to "Service Points of Removal".
   (2) : Refer to "Service Points of Installation".

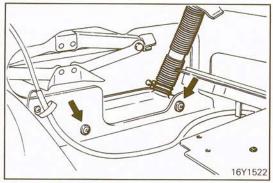
18Y1755



#### SERVICE POINTS OF REMOVAL

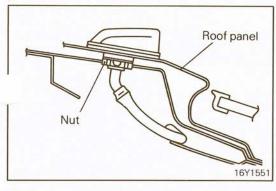
#### 1. REMOVAL OF WASHER TANK

- (1) Remove the battery and the battery tray.
- (2) Remove the washer tank mounting bolt.
- (3) Remove the washer tank.



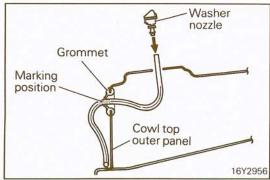
#### 6. REMOVAL OF WASHER TANK

- (1) Remove the right rear side trim, the high floor side panel, and the high floor side frame.
- (2) Remove the washer tank mounting screws, and then take out the tank.



#### 8. REMOVAL OF WASHER NOZZLE

- (1) Remove the roll bar trim.
- (2) Remove the nut, and then remove the nozzle.



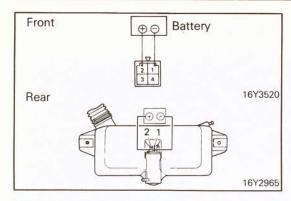
#### SERVICE POINT OF INSTALLATION

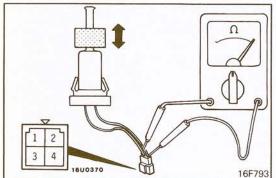
#### 4. INSTALLATION OF WASHER NOZZLE

After the grommet is installed, pull out the washer tube until the marking position is slightly visible.

NOTE

Make sure that the washer tube is routed between the wiper link rod and cowl top outer panel.





## INSPECTION WASHER MOTOR

- (1) With the washer motor installed to the washer tank, fill the washer tank with water.
- (2) Connect the battery (+) and (–) cables to terminals 2 and 1 respectively to see that the washer motor runs and water is injected.

#### WASHER FLUID LEVEL SENSOR

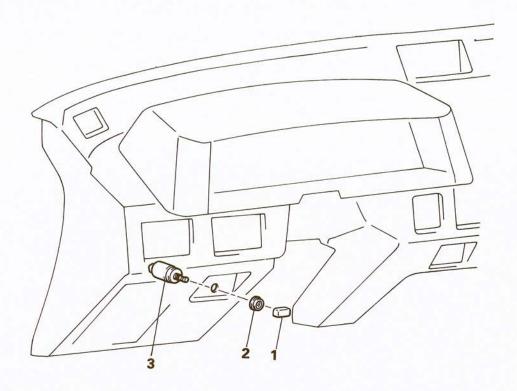
- (1) Remove the washer fluid level sensor from the washer tank.
- (2) Connect ohmmeter to the connector of washer fluid level sensor.
- (3) Move the float up and down.
- (4) Make sure that when the float is raised, there is no continuity and when it is lowered, there is continuity.

## WINDSHIELD WIPER AND WASHER SWITCH

N08KMAC

For removal, inspection and installation, refer to LIGHTING SYSTEM – Column Switch (P.8-201).

## **CANCEL SWITCH REMOVAL AND INSTALLATION**



#### Removal steps

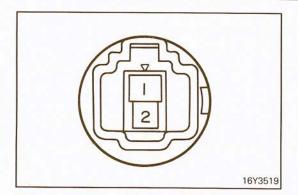
- 1. Button

2. Ring nut 3. Cancel switch

NOTE

Reverse the removal procedures to reinstall.

16Y3599



#### INSPECTION

- (1) Remove the cancel switch from the instrument panel and connect an ohmmeter to the switch side connector.
- (2) Operate the switch and check the continuity between the terminals.

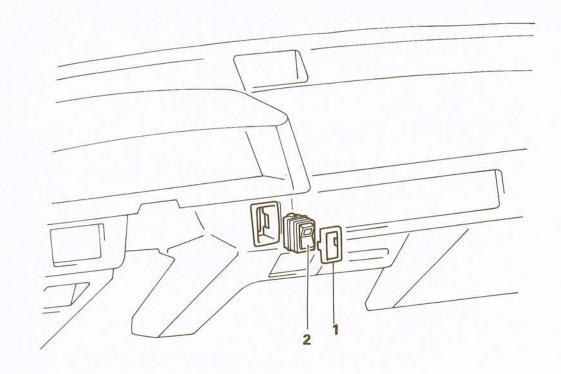
| Terminal         | 1 | 2             |
|------------------|---|---------------|
| When free (OFF)  |   |               |
| When pushed (ON) | 0 | <del></del> 0 |

NOTE

O-O indicates that there is continuity between the terminals.

### REAR WIPER AND WASHER SWITCH REMOVAL AND INSTALLATION

N08KOAA



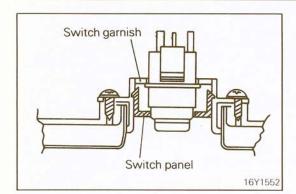
#### Removal steps

- 1. Switch panel
- 2. Rear wiper and washer switch

#### NOTE

- (1) Reverse the removal procedures to reinstall.(2) : Refer to "Service Points of Removal".

18Y1756



#### SERVICE POINT OF REMOVAL

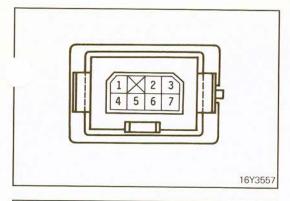
1. REMOVAL OF SWITCH PANEL

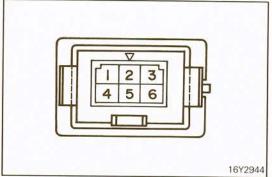
Remove the switch panel from the instrument panel.

#### INSPECTION

- (1) Remove the rear wiper and washer switch from instrument
- (2) Operate the switch, and check the continuity between the terminals.

## WIPER AND WASHER SYSTEM - Rear Wiper and Washer Switch 8-223





### With intermittent wiping feature

| Terminal Switch | 2  | 1  | 3  | 4  | 7 | 5  | 6   |
|-----------------|----|----|----|----|---|----|-----|
| ON & WASH       | 0  |    | 0  |    | 0 |    |     |
| ON              | 0- |    | 0  |    |   |    |     |
| OFF             | 0- | 0  | -  |    |   | 06 | 9-0 |
| INT             | 0— | -0 | 0- | -0 |   |    |     |
| INT & WASH      | 0  | -0 | 0- | 0  | 0 |    |     |

### Without intermittent wiping feature

| Switch position Terminal | 5  | 6  | 2            | 1  |
|--------------------------|----|----|--------------|----|
| WASH                     |    |    | 0-           |    |
| OFF                      | 0- | -0 |              |    |
| ON                       |    | 0  |              |    |
| ON & WASH                |    | 0  | <del>-</del> | -0 |

## **HORN**

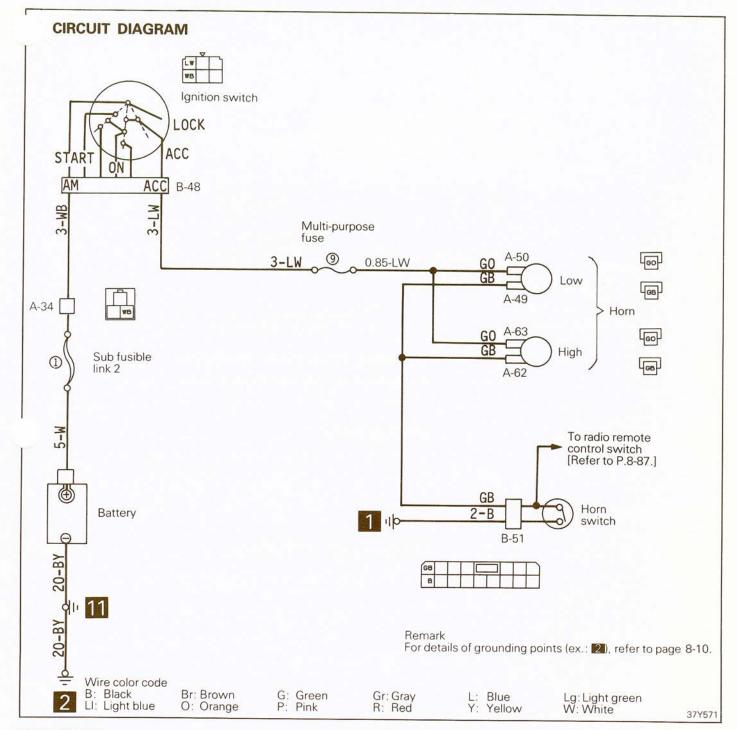
## **SPECIFICATIONS**

#### N08'

### **GENERAL SPECIFICATIONS**

| Items                        | Horn      | Theft-alarm horn |
|------------------------------|-----------|------------------|
| Туре                         | Flat type | Flat type        |
| Effective sounding voltage V | 10 – 14.5 | 11 – 14.5        |
| Power consumption A          | 1.5 – 3.0 | 1.5 – 3.0        |
| Sound level dB               | 100 – 115 | 100 – 115        |
| Fundamental frequency Hz     |           |                  |
| Low sound                    | 335 – 365 | 350 – 390        |
| High sound                   | 400 – 430 | _                |

#### **TROUBLESHOOTING**



#### **OPERATION**

N08LHA

 When the horn switch is turned on, with the ignition switch at "ACC" or "ON", current flows through fuse No. 9, horn switch, and ground, causing the horns to sound.

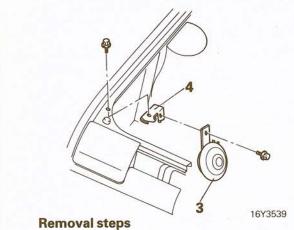
#### TROUBLESHOOTING HINTS

One or other horn does not sound

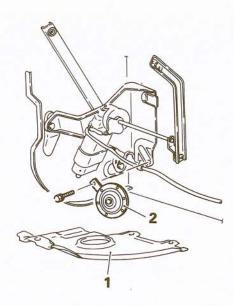
Check horn.

HORN

#### **REMOVAL AND INSTALLATION**



- 40
- 1. Air guide panel
- 2. Horn
- 3. Theft-alarm horn
- Horn bracket



NOTE

- (1) Reverse the removal procedures to reinstall.
  - 2) \*: Refer to "Service Points of Removal".

16Y3506

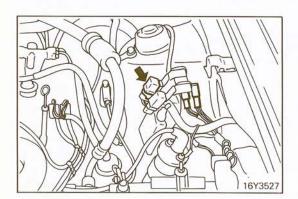
#### SERVICE POINT OF REMOVAL

1. REMOVAL OF AIR GUIDE PANEL

Refer to GROUP 23 BODY - Air Parts.

#### **INSPECTION**

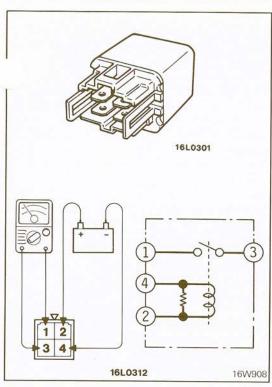
- Check horn adjustment screw for looseness.
- Check the inside of the horn for lodged water, dirt or other foreign matter.



#### THEFT-ALARM HORN RELAY

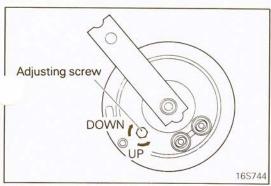
N08LTAD

(1) Remove the theft-alarm horn relay.



(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 4 is earthed.

| Voltage applied     | Terminals 1 – 3 | Conductive     |
|---------------------|-----------------|----------------|
| Voltage not applied | Terminals 1 – 3 | Non-conductive |
| аррпец              | Terminals 2 – 4 | Conductive     |



#### HORN ADJUSTMENT

- Secure the horn bracket in a vice, and then connect a 12V battery.
- 2. Sound the horn, and adjust it by turning the adjusting screw.
  - (1) The sound volume is too low:
    Turn the adjusting screw in the "UP" direction within a range of about 180°, and then lock it in position when a satisfactory sound volume has been obtained.
  - (2) The sound volume is too loud:

    Turn the adjusting screw 20° to 30° in the "DOWN" direction, and then lock it in position when a satisfactory sound volume has been obtained.
  - (3) Horn will not sound:

    Turn the adjusting screw slightly in the "UP" direction until the horn sounds, find a satisfactory sound volume by continuing to turn the screw within a range of 180°, and then lock the screw in place.

    If a satisfactory volume cannot be obtained, replace the horn.

#### Caution

After the adjustment, apply lacquer to prevent the adjusting screw from becoming loose.

## **ACCESSORY**

## **SPECIFICATIONS**

180M

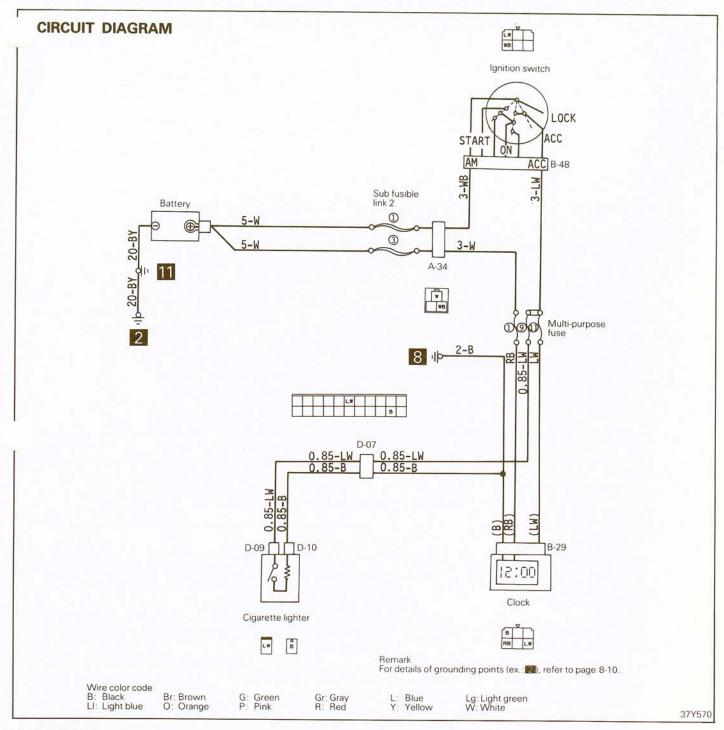
## GENERAL SPECIFICATIONS CIGARETTE LIGHTER

| Items                      | Specifications |
|----------------------------|----------------|
| Maximum current (at 12V) A | 10             |
| Return time second         | 18 or less     |

#### CLOCK

| Items          | Specifications                 |
|----------------|--------------------------------|
| Туре           | Crystal oscillating type       |
| Display method | Liquid crystal digital display |

#### **TROUBLESHOOTING**



#### **OPERATION**

#### Clock

 Current always flows through the circuit connecting fuse No. 1, clock, and ground, to operate the clock.

When the ignition switch is at "ACC" or "ON", current flows through fuse No. 11, clock and ground, causing the time to display on the clock.

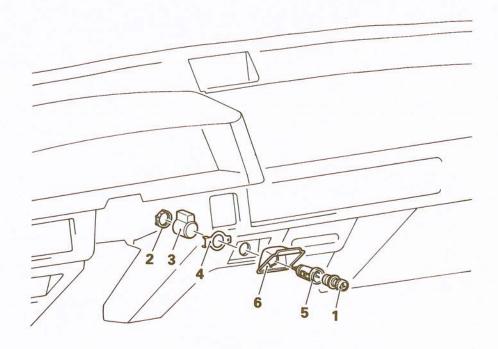
#### Cigarette Lighter

 When the cigarette lighter is pushed in with the ignition switch at "ACC" or "ON", the lighter contacts close, causing current to flow through fuse No. 9, cigarette lighter, and ground, and the cigarette lighter element glows.

N08MHAA

# CIGARETTE LIGHTER REMOVAL AND INSTALLATION

N08MJAD



#### Removal steps

- 1. Plug
- 2. Fixing ring
- Socket case
- 4. Plate
- 5. Socket
- 6. Protector

NOTE

Reverse the removal procedures to reinstall.

16Y3507

#### 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 element for continuity.
- Check that there is no dirt on the surface of the socket that contacts the plug.

## 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.

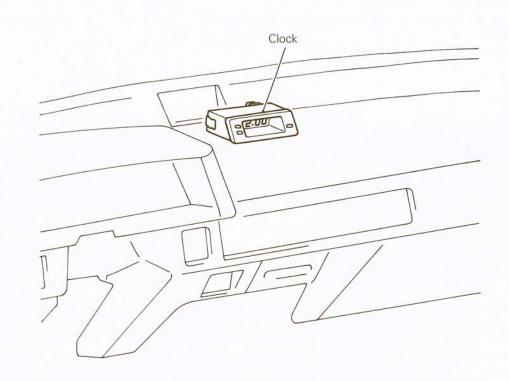
#### NOTE

The specified load should be strictly observed, because overload could burn the ignition switch and harness.

**CLOCK** 

N08MKAC

## **REMOVAL AND INSTALLATION**



16Y3508

## **AUDIO SYSTEM**

## **SPECIFICATIONS**

## **GENERAL SPECIFICATIONS**

N081

| Items                            | Specifications                                      |  |
|----------------------------------|---|--|
| Radio<br>Model<br>Receiving band | AR-6377PY AM/FM (Automatic station search)          | RX-321Y<br>AM/FM<br>(Automatic station search)   |
| Tape player<br>Model             | GX-21AY   | – (integral with radio)  |
| Speaker                          |   |  |
| Instrument panel                 |   |  |
| Model                            | SR-10YQ8-UJL  | SR-10YQ8-UJL   |
| Rated input power                | 15W (Max. 20W)                                      | 15W (Max. 20W)   |
| Door                             | ALL ACTIONS AND | 19.20 (19.40 (19 |
| Model                            | SR-13SA8-UJ   | SR-13SA8-UJ  |
| Rated input power                | 15W (Max. 30W)                                      | 15W (Max. 30W)   |
| Rear shelf                       |   |  |
| Model                            | SR-16SA4-UJ   | SR-16SA4-UJ  |
| Rated input power                | 15W (Max. 30W)                                      | 15W (Max. 30W)   |
| Antenna                          |   |  |
| Туре                             | Whip antenna  | Telescoping power antenna  |

## **TROUBLESHOOTING**

## **NOISE SOURCES**

#### *)URCE OF ELECTRICAL SYSTEM NOISE*

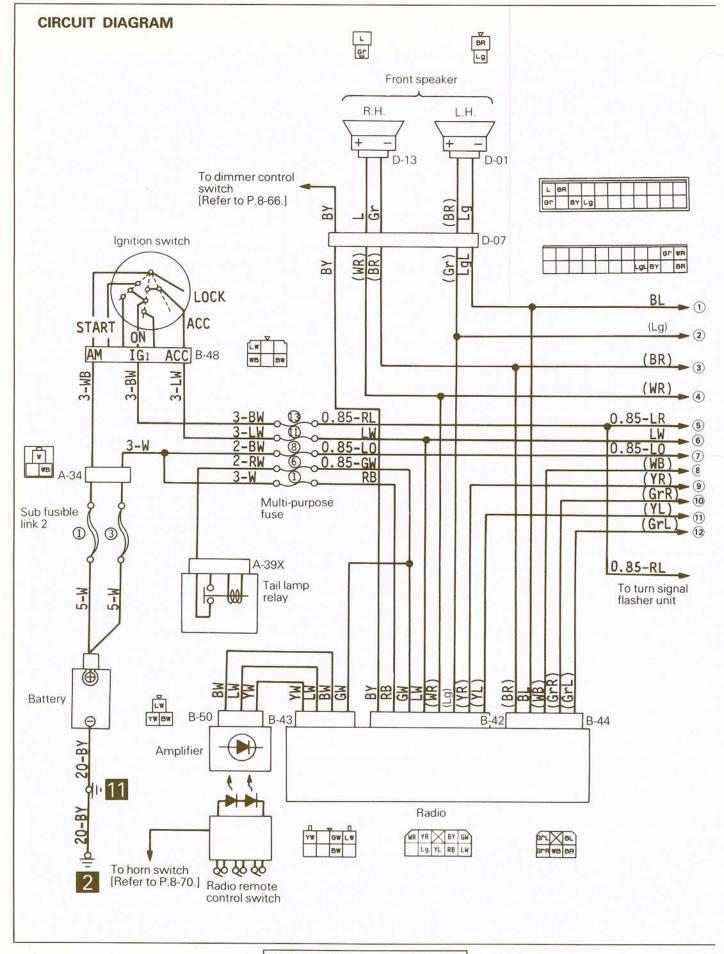
| Ignition system        | Power generation system  | Other electrical device   |
|------------------------|--|---|
| (1) Spark plug         | (1) Ripple at contact between alternator armature and carbon brush | (1) Armature of wiper, blower and other                         |
| (2) High tension cable | (2) Spark from voltage regulator contact                           | motors  |
| 124/24                 |  | (2) Starter and switch when starting engine                     |
| (3) Distributor        |  | (3) Contact of fuel pump  |
|                        |  | (4) Spark from changeover switch                                |
|                        |  | (5) Horn  |
|                        |  | (6) Contact of turn signal                                      |
|                        |  | (7) Loose contact of wiring harness                             |
|                        |  | (8) Static electricity generated by tire<br>or generator V-belt |
|                        |  | (9) Electric fuel pump  |
|                        |  | (10) Voltage stability unit for instrument                      |

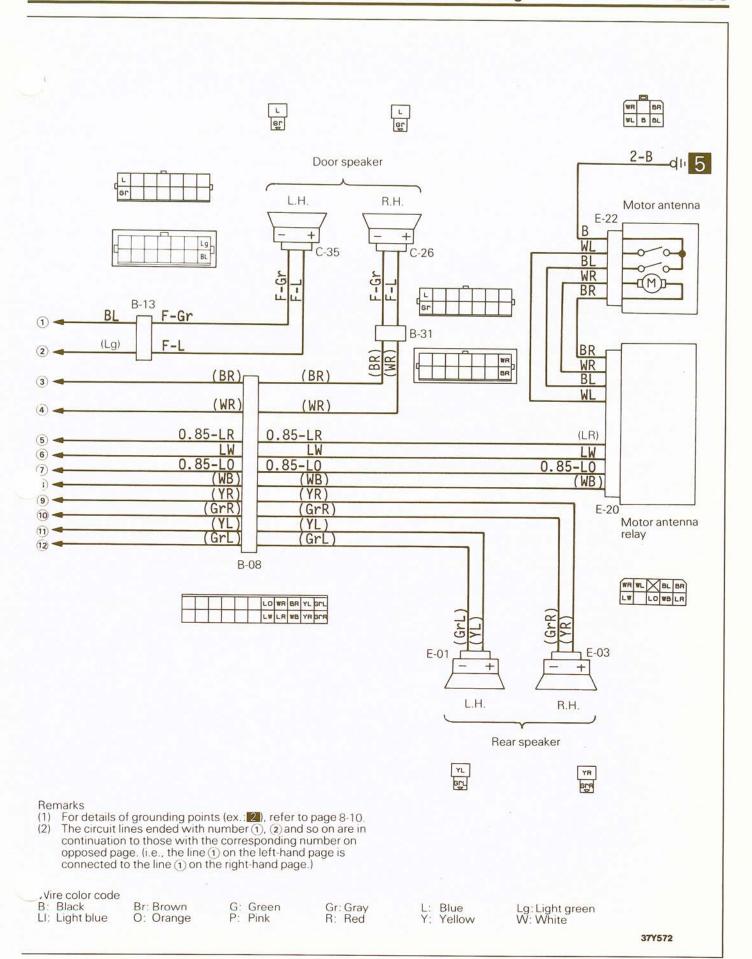
#### NOISE SOURCE OF VEHICLE EQUIPMENT

| Kind of noise           | Equipment                      | Symptom of noise generation   |
|-------------------------|--------------------------------|---|
| Whistling sound         | Alternator                     | Noise increases when accelerator pedal is depressed and it subsides soon after engine is stopped.     |
| Scratching sound        | Coolant temperature gauge unit | Noise is produced while engine is running and it persists for a while after engine shutdown.          |
|                         | Fuel gauge unit                | Noise is produced at sudden acceleration, driving on rough road or when ignition key is placed to ON. |
| Jarring                 | Oil pressure switch            | Noise is produced with engine operation and no noise is made when engine is idling.                   |
| Wish-wash,<br>wish-wash | Flasher relay                  | Noise is produced with operation of turn signal light.  |
| Buzz, click             | Horn                           | Noise is made when horn button is pressed or released.  |
| Whinning                | Wiper motor                    | Noise is generated with the wiper speed.  |
|                         | Washer motor                   | Noise is made when washer is operated.  |

**STB Revision** 

N08NH- -





#### **OPERATION**

#### N08NHAC

#### **Audio**

- When the radio power switch is turned on with the ignition switch at "ACC" or "ON", current flows through fuse No. 5, radio, and ground, causing the radio to operate.
- For an electronically tuned radio, battery voltage is always supplied for use of the memory and other functions in the radio.

#### **Power Antenna**

#### ANTENNA MAST EXTENSION OPERATION

- Battery voltage is always applied to the motor antenna relay through fuse No. 8.
- When the radio power switch is turned on with the ignition switch at "ACC" or "ON", current flows through fuse No. 11, radio, motor antenna relay, limit switch (UP), and ground.
- As a result of the above condition, current flows through fuse No. 8, motor antenna relay, motor, limit switch (UP), and ground, and the antenna mast starts to extend.
- Once the mast is fully extended, the limit switch (UP) contacts open to interrupt the circuit, and the mast stops extending.

#### ANTENNA MAST RETRACTION OPERATION

- When the radio power switch is turned off, current flows through fuse No. 11, motor antenna relay, limit switch (DOWN), and ground.
- As a result of the above condition, current flows through fuse No. 8, motor antenna relay, motor, limit switch (DOWN), and ground, and the mast begins to retract.
- Once the mast is completely retracted, the limit switch (DOWN) contacts open to interrupt the circuit, stopping the mast from further retraction.

#### Radio Remote Control

- If any desired radio remote control switch is pressed when the ignition switch is set at the "ACC" or "ON" position, current flows throu fuse No. 9, horn, radio remote control switc.., and ground.
- The controller generates the electric signals that are specific to the pressed switch, and the LED goes on and off (blinks) accordingly.
- The photo diode located on the steering column receives light emitted from the LED and converts it into electric signals. The signals are amplified by the amplifier and sent to the radio.
- The detector inside the radio decodes the electric signals and causes the radio to operate as commanded by the signals.

#### TROUBLESHOOTING HINTS

#### Audio

- 1. Radio does not operate
  - 1) Clock also does not operate
    - · Check fuse.
  - 2) Clock is operating
    - Check radio.
- 2. One speaker produces no sound
  - · Check that speaker.

#### **Power Antenna**

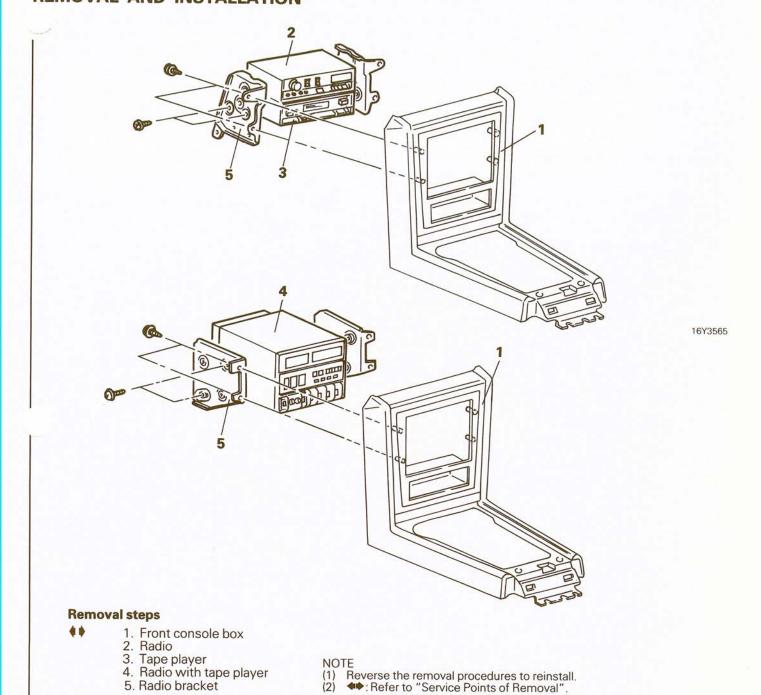
Antenna mast does not extend/retract

- 1) Radio also does not operate
  - · Check the fuse
- 2) Radio operates
  - Check the motor antenna relay.
  - Check the motor antenna.

# RADIO AND TAPE PLAYER REMOVAL AND INSTALLATION

N08NJAD

16Y3566



## SERVICE POINT OF REMOVAL

1. REMOVAL OF FRONT CONSOLE BOX

Refer to GROUP 23 BODY - Floor Console.

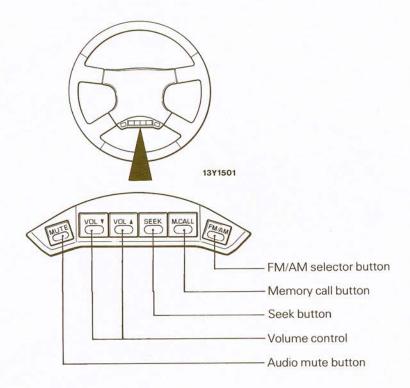
## RADIO REMOTE CONTROL

N08NRAA

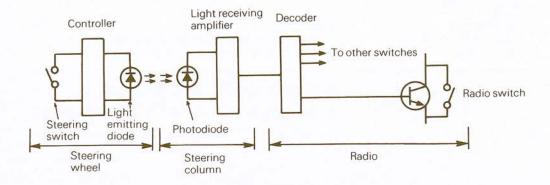
### OUTLINE

Radio remote-control is used relatively frequently while driving, the radio switch has been incorporated at center of the steering wheel for remote control of the radio. In order for the radio switch to be able to rotate as a unit with the steering wheel as it is turned, a system of light transmission which employs infra-red rays is used between the steering wheel and the steering wheel column so that there is no interference with the operation of the steering wheel.

#### CONSTRUCTION AND OPERATION



70Y528



16Y2547

1. When the radio switch in the steering wheel is pressed, the controller emits a corresponding electrical signal.

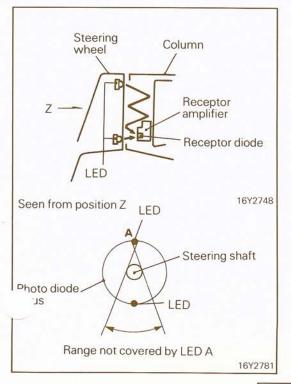
#### Reference

The electrical signal used in this radio remote-control system is called a Pulse coordinate modulation code. The correspondence with the switch keys is as described below.

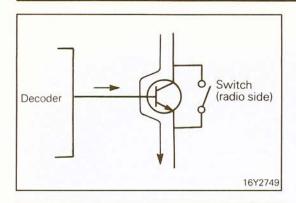
Pulse coordinate modulation

| Key input (command) | Pulse coordinate modulation |                |                |    |                |                |    |    |
|---------------------|-----------------------------|----------------|----------------|----|----------------|----------------|----|----|
|                     | Ko                          | K <sub>1</sub> | K <sub>2</sub> | Do | D <sub>1</sub> | D <sub>2</sub> | Дз | D4 |
| MUTE                | 0                           | 0              | 0              | 0  | 1              | 1              | 0  | 0  |
| VOL-                | 0                           | 0              | 0              | 1  | 0              | 0              | 1  | 0  |
| VOL +               | 0                           | 0              | 0              | 0  | 0              | 0              | 1  | 0  |
| SEEK                | 0                           | 0              | 0              | 1  | 0              | 0              | 0  | 0  |
| M. CALL             | 0                           | 0              | 0              | 1  | 1              | 1              | 0  | 0  |
| FM/AM               | 0                           | 0              | 0              | 1  | 1              | 0              | 0  | 0  |

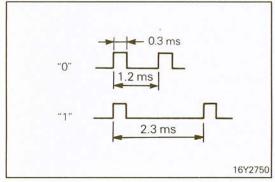
2. The infra-red ray LED flashes according to that signal.



3. The infra-red ray beam reaches the photo-diode in the column either directly or indirectly due to reflection. Note that two LEDs are located 180°C apart to assure that the infrared beams reach all around the column. This is to provide a back up LED if the first one is in the "shadow" of the steering shaft.



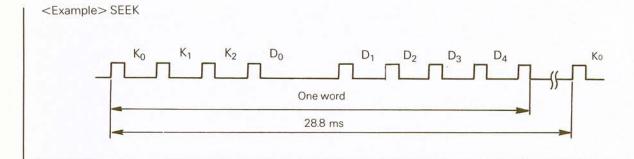
- 4. The beam signal received is converted back to an electrical signal by the receptor amplifier, and is amplified and demodulated.
- This amplified and demodulated signal is decoded by the decoder, after which the corresponding electronic switce (transistor) is switched ON.



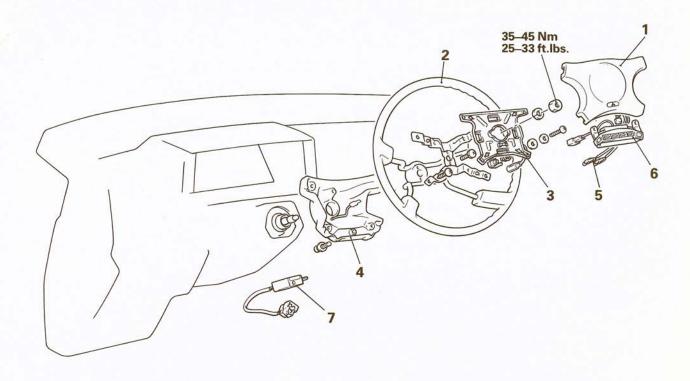
#### NOTE

- (1) Code "0" sets a two-pulse interval to 1.2 msec., and code "1" sets it to 2.3 msec.
- (2) One expression of the transmission command is composed of 8 bits, and is transmitted in a cycle of 28.8 msec. while there is key input.
- (3) K<sub>0</sub> K<sub>2</sub> are codes used to distinguish the signals of this system from those used for remote control of VTRs, TVs, air conditioners, video disc players, audio equipment, etc. so that there is no mis-operation.

16Y2751



### REMOVAL AND INSTALLATION



#### Removal steps

- Steering wheel pad
   Steering wheel
- 3. Horn switch
- 4. Lower cover
  - 5. L. E. D. assembly 6. Radio remote control assembly
  - 7. Amplifier

#### NOTE

- (1) Reverse the removal procedures to reinstall.
- \*\*: Refer to "Service Points of Removal".

  \*\*: Refer to "Service Points of Installation".

16Y3664

#### SERVICE POINTS OF REMOVAL

5. LED ASSEMBLY

Caution

Be careful not to dirty or stain the LED.

7. AMPLIFIER

Caution

Be careful not to dirty or stain the photo-diode.

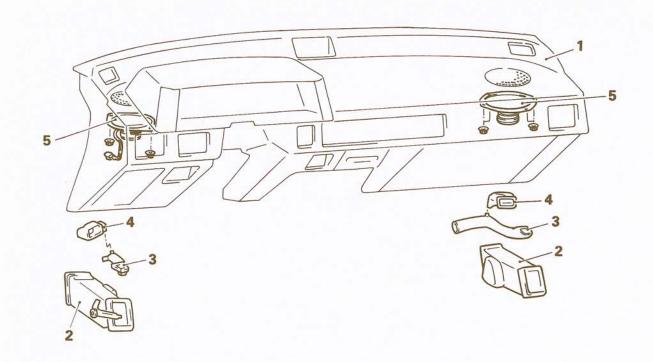
#### SERVICE POINT OF INSTALLATION

5. LED ASSEMBLY

Securely install the LED into the lower cover.

**FRONT SPEAKER REMOVAL AND INSTALLATION** 

**NOSNMAD** 



#### Instrument panel speaker removal steps

- 1. Instrument panel
- 2. Defroster duct
- 3. Demister duct
- 4. Demister nozzle
- 5. Speaker

#### NOTE

- (1) Reverse the removal procedures to reinstall.(2) : Refer to "Service Points of Removal".

16Y3511

## SERVICE POINT OF REMOVAL

1. REMOVAL OF INSTRUMENT PANEL

Refer to GROUP 23 BODY - Instrument Panel.

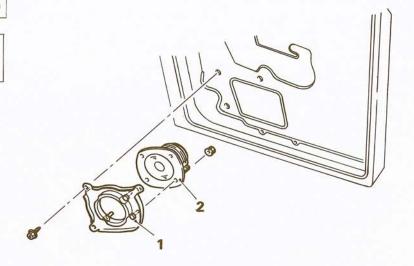
## **DOOR SPEAKER REMOVAL AND INSTALLATION**

**NOSNNAA** 

Pre-removal Operation
Removal of Door Trim
(Refer to GROUP 23 BODY – Door Trim)

Post-installation Operation

● Installation of Door Trim
(Refer to GROUP 23 BODY – Door trim)



#### Door speaker removal steps

- Speaker bracket
   Speaker

NOTE

Reverse the removal procedures to reinstall.

16Y3512

## REAR SPEAKER

N08NOAC

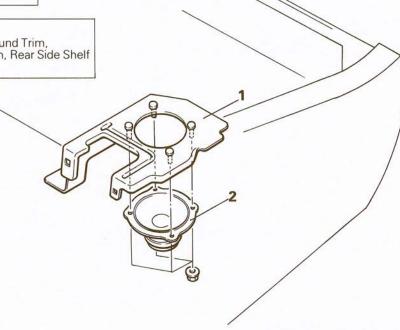
### REMOVAL AND INSTALLATION

**Pre-removal Operation** 

 Removal of Quarter Trim, Wrap Round Trim, Rear End Trim, Trunk Room Side Trim, Rear Side Shelf (Refer to GROUP 23 BODY – Trims)

#### Post-installation Operation

 Installation of Quarter Trim, Wrap Round Trim, Rear End Trim, Trunk Room Side Trim, Rear Side Shelf (Refer to GROUP 23 BODY – Trims)



#### Removal steps

- 1. Rear shelf bracket
- 2. Speaker

#### NOTE

Reverse the removal procedures to reinstall.

16Y2893

## **POWER ANTENNA**

N08NPBB

### **OPERATION**

The power antenna extends or retracts the antenna mast as follows:

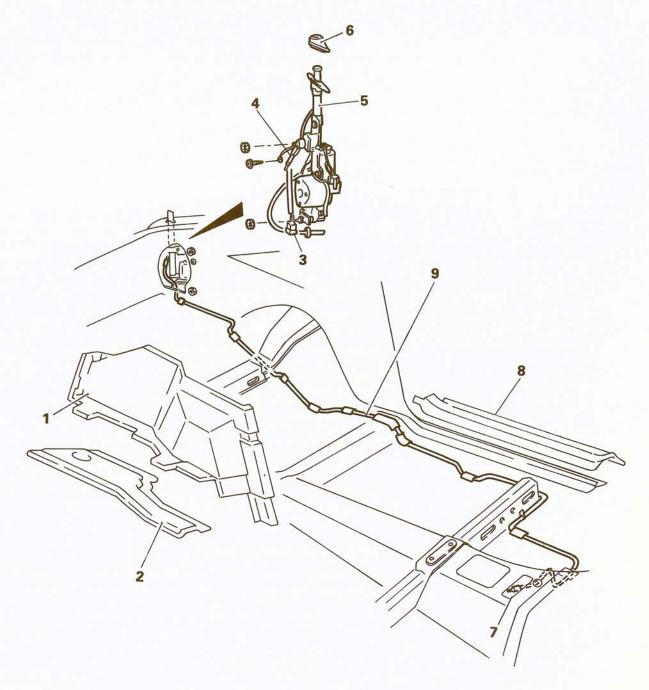
| Ignition key position | Radio switch | Tape player | Antenna mast      |
|-----------------------|--------------|-------------|-------------------|
| ACC or ON             | OFF → ON     | OFF         | Extended          |
|                       | ON → OFF     | OFF         | Retracted         |
|                       | OFF          | ON          | Remains retracted |
| LOCK                  | ON           | -           | Retracted         |

-: No operations required

#### NOTE

Before operating the radio, make sure that there is no person near the antenna.

## REMOVAL AND INSTALLATION



#### Removal steps

- Trunk room side trim
   High floor side panel
   Connector connection
  - 4. Feeder wire connection
  - 5. Motor antenna assembly
  - 6. Grommet
  - Front Seat, Rear Seat and Floor Console (Refer to GROUP 23 BODY Seat and Floor Console)
  - 7. Feeder wire to radio connection
  - 8. Scuff plate
  - 9. Feeder wire

NOTE

- Reverse the removal procedures to reinstall.
   Refer to "Service Points of Removal".

16Y3514

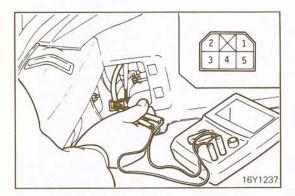
#### SERVICE POINTS OF REMOVAL

#### 2. REMOVAL OF HIGH FLOOR SIDE PANEL

Make sure that the antenna mast is retracted before this operation. Disconnect the antenna relay before removing the high floor side panel.

#### 8. REMOVAL OF SCUFF PLATE

Refer to GROUP 23 BODY - Trims.



## INSPECTION

#### **MOTOR ANTENNA**

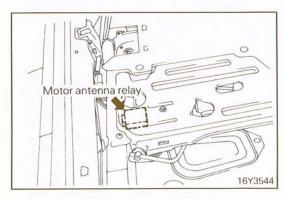
Following inspections should be made with the harness connector connected.

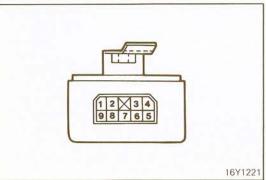
- (1) With the (+) power connected to the terminal (1) and the (-) power to the terminal (2), check that the antenna mast extends. With the connection reversed, check that the antenna mast retracts.
- (2) Under the following antenna mast conditions, check continuity between terminals.

| Antenna Terminal mast position | 3 | 4 | 5 |
|--------------------------------|---|---|---|
| Fully extended                 |   | 0 |   |
| Fully retracted                | 0 |   |   |
| During extension/retraction    | 0 | 0 | 0 |

NOTE

O-O indicates that there is continuity between the terminals.

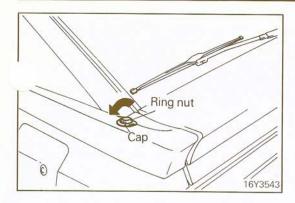




#### **MOTOR ANTENNA RELAY**

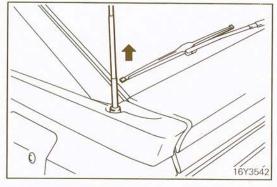
With the harness connector connected and the antenna mast extending/retracting, check the antenna relay voltage.

| Antenna mast ex  | tending |               |
|------------------|---------|---------------|
| Terminal (1)     |         | -1  to + 1  V |
| Terminal (4)     |         | 10 to 13V     |
| Antenna mast ref | racting |               |
| Terminal (1)     |         | 10 to 13V     |
| Terminal (4)     |         | -1  to + 1  V |



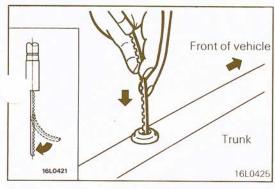
## MAST ASSEMBLY WITH CABLE REPLACEMENT

1. Remove the ring nut and cap.



2. Turn on the radio to operate the power antenna.

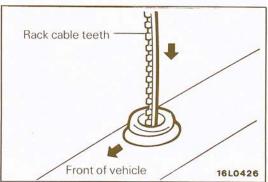
3. Draw out the antenna mast when the mast assembly is fully extended.



4. Fully extend the antenna mast of a new mast assembly. Insert the rack cable in the motor assembly with the rack teeth towards the outside of the vehicle, as shown.

NOTE

Before inserting the rack cable, straighten its end as shown if it is bent.



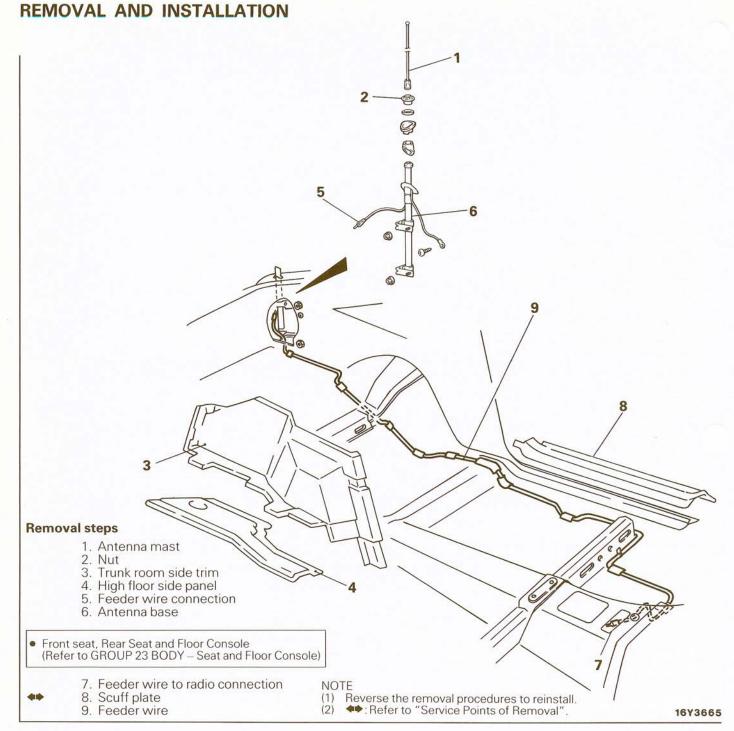
5. Turn the rack cable through 90° clockwise to face its teeth towards the front of the vehicle so that they will engage with the motor gear.

NOTE

If the rack cable comes out without resistance when it is pulled lightly, the rack teeth are not engaged with the motor gear. Repeat Steps 4 and 5 above to reinsert the rack cable after straightening the cable.

- 6. Hold the antenna mast upright, and turn off the radio to reel up the rack cable.
- 7. After installing the cap and ring nut, turn the radio on and off to make sure that the antenna mast extends and retracts smoothly.

## WHIP ANTENNA



## SERVICE POINT OF REMOVAL

#### 8. REMOVAL OF SCUFF PLATE

Refer to GROUP 23 BODY - Trims.

## **NOISE SUPPRESSION**

N08NQAC

- 1. Noise interfering with radio reception may be roughly classified as follows:
  - (1) Noise produced by the vehicle itself
    Noise from the ignition circuit, alternator circuit, etc.
  - (2) Noise generated in the radio itself
    Thermal noise from transistors, IC, resistor, etc.

(3) Atmospheric noise
Noise from other cars, neon signs, etc.

2. The radio has devices to suppress noise of the radio itself and atmospheric noise, but it is difficult to eliminate them completely. Noise produced by the vehicle includes whining from the alternator system, and a strong, impulsive, fast popping noise from the ignition system.

## PREVENTION OF IGNITION CIRCUIT NOISE

A resistance-equipped cable is used for the high-tension cable in order to prevent noise; however, if any noise from the ignition circuit does occur, check the tightness and ground connection of the terminal of the noise suppression capacitor, and, if necessary, check the noise suppression capacitor.

#### Caution

Be careful not to connect the noise filter to the hightension cable; doing so could damage the noise filter.

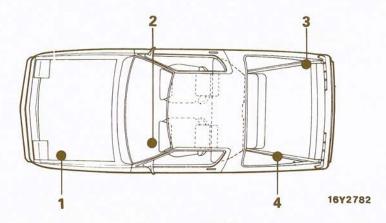
#### PREVENTION OF OTHER CIRCUIT NOISE

- For other noises, take necessary corrective actions in accordance with the following items and the NOISE SUPPRESION CHART.
- 2. Polish the grounding cable terminal, and connect it properly.
- 3. Polish the power antenna ground terminal, and connect it properly.
- 4. Ground electric parts completely.
- 5. Keep the antenna cable and speaker lead wire away from other electric wiring.

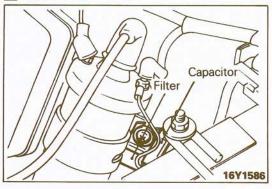
## **NOISE SUPPRESSION CHART**

| Symptom  | Noise source                        | Remedy  |
|--|-------------------------------------|---|
| Unusual noise related to engine speed                                | Engine                              | Securely ground the engine, frame and/or body and engine hood.  |
|  |                                     | Engine Ground wire  |
|  |                                     | 16E710  |
| "Clatter" noise related<br>to the flashing of turn-<br>signal lights | Turn-signals                        | Connect a 0.5 $\mu\text{F}$ noise-suppression capacitor to the B terminal of the flasher unit.  |
|  |                                     | Flasher unit  0.5 μF noise-suppression  |
|  |                                     | capacitor   |
|  |                                     | 16E712  |
| Abnormal noise when the horn is operated                             | Horn                                | <ol> <li>Connect a 0.5 μF noise-suppression capacitor to the + B-terminal of the horn.</li> <li>For an FM radio, connect an LC filter to the horn terminals.</li> </ol>   |
|  |                                     | Horn LC filter  |
|  |                                     | 16E713  |
| Noise when the wind-<br>shield washer operates                       | Washer motor                        | <ol> <li>Connect a 0.5 μF noise-suppression capacitor between the terminal of the washer motor and the power source wire.</li> <li>For an FM radio, connect an LC filter between the terminal of the washer motor and the power source wire.</li> </ol> |
|  |                                     | LC filter   |
|  |                                     | 16F671  |
| Unusual noise when the engine is started                             | Coolant tempera-<br>ture gauge unit | Connect a 0.1 $\mu\text{F}$ noise-suppression capacitor to the terminal of the coolant temperature gauge unit.  |
|  |                                     | 0.1 μF noise-suppression capacitor  |
|  |                                     | 16F   |

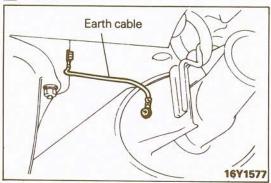
## NOISE SUPPRESSOR LOCATION



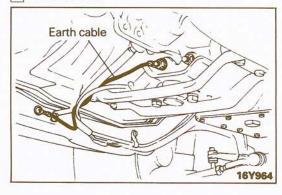
#### 1 Ignition coil



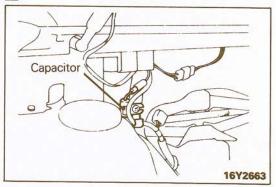
#### 3 Main muffler



#### 2 Transmission



#### 4 Rear shelf bracket



## **REAR WINDOW DEFOGGER**

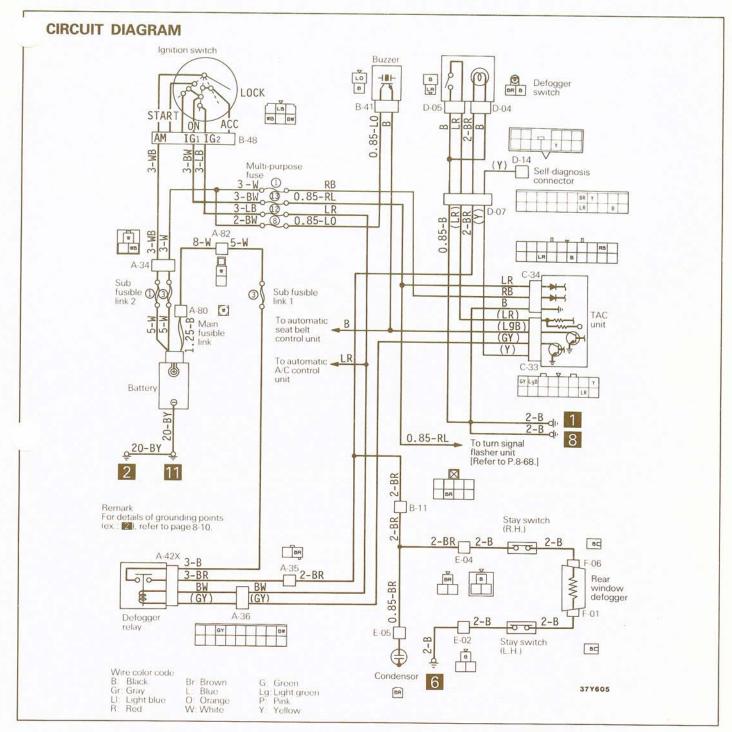
## **SPECIFICATIONS**

#### N08F

## **GENERAL SPECIFICATIONS**

| Items                             | Specifications               |  |
|-----------------------------------|------------------------------|--|
| Rear window defogger switch       |                              |  |
| Type                              | Push type (automatic return) |  |
| Rated current A                   | 12                           |  |
| Indicator light W                 | 1.4                          |  |
| Rear window glass with defogger   |                              |  |
| No. of printed heater lines       | 16                           |  |
| Power consumption [20°C (68°F)] W | 200 – 250                    |  |

## **TROUBLESHOOTING**



#### **OPERATION**

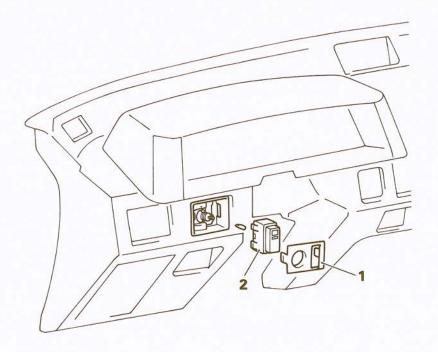
Refer to ETACS.

#### TROUBLESHOOTING HINTS

Refer to ETACS.

## **DEFOGGER SWITCH** REMOVAL AND INSTALLATION

N08PJBC



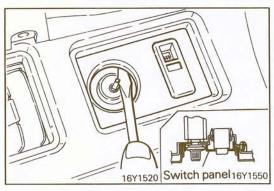
#### Removal steps

- 1. Switch panel
- 2. Rear window defogger switch

#### NOTE

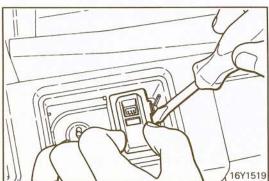
- (1) Reverse the removal procedures to reinstall.(2) : Refer to "Service Points of Removal".

16Y3516



#### SERVICE POINTS OF REMOVAL

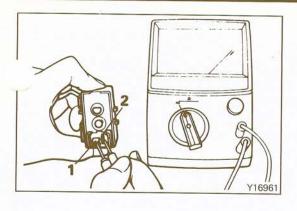
- 1. REMOVAL OF SWITCH PANEL
  - (1) Remove the dimmer control switch knob.
  - (2) Remove the switch panel.



### 2. REMOVAL OF REAR WINDOW DEFOGGER SWITCH

Remove the rear window defogger switch by pressing the tabs of the switch.

**STB Revision** 



#### INSPECTION

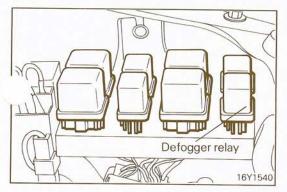
### REAR WINDOW DEFOGGER SWITCH

- (1) Remove the rear window defogger switch from the instrument panel and connect an ohmmeter to the switch side connector.
- (2) Operate the switch and check the continuity between the terminals.

| Terminal | 1  | 2 |
|----------|----|---|
| OFF      |    |   |
| ON       | 0- |   |

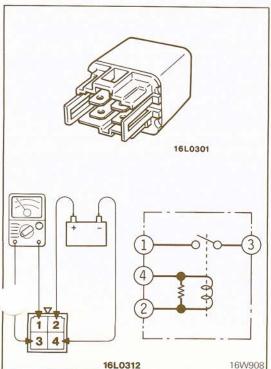
NOTE

O-O indicates that there is continuity between the terminals.



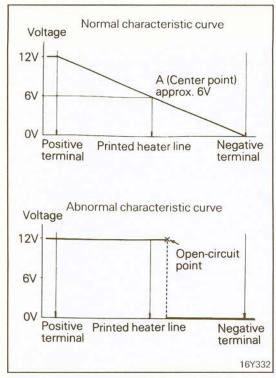
#### **DEFOGGER RELAY**

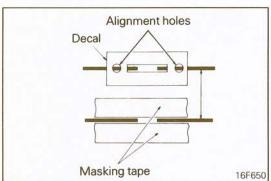
(1) Remove the defogger relay from the relay box in the engine compartment.



(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 4 is earthed.

| Voltage applied     | Terminals 1 – 3             | Conductive |
|---------------------|-----------------------------|------------|
| Voltage not applied | Terminals 1 – 3 Non-conduct |            |
|                     | Terminals 2 – 4             | Conductive |





## PRINTED HEATER LINES

N08PKAA

## **INSPECTION**

- The printed heater lines should be tested while the engi is running at 2,000 rpm and the battery is being chargea.
- 2. Turn the defogger switch to the "ON" position, and use voltmeter to measure the voltage of each printed heater line at the rear window glass center point "A".
- 3. If all of the heater lines indicate approximately 6V, the rear window printed heater lines are functioning properly.
- 4. If a voltage of 12V is indicated at point "A", the heater line is broken between point "A" and the negative (–) terminal. Move the test probe gradually toward the negative (–) terminal, and search for the place where there is a sudden change in the voltage (to 0V).
- 5. This place where the voltage suddenly changes indicates the location of the broken heater line.
- 6. If 0V is indicated at point "A", the heater line is broken between point "A" and the positive (+) terminal. Find the point where there is a sudden change in the voltage (to 12V), as described in step 4. above.

#### REPAIR

- 1. Prepare the following items:
  - Conductive paint
  - Paint thinner
  - Masking tape, decal, etc.
  - Unleaded gasoline
  - Thin brush

Wipe the glass adjacent to the broken heater line, clean with unleaded gasoline, and bond a decal or masking tape as shown.

- Shake the electroconductive paint container well, and remove the amount of paint needed. Dilute it with a small quantity of paint thinner, and apply three coats with the brush at intervals of about 15 minutes.
- 3. Remove the tape or decal and leave the repaired defogger unused for a while before supplying power.
- 4. For a better finish, scrape away excess deposits with a knife after drying is complete (one day later).

#### Caution

After repair, clean the glass with a soft dry shop towel or wipe along the printed heater line with a slightly moistened shop towel.

## **ETACS**

| IIVL | JEX .  | N08QA  |
|------|--|--|
| 275  | INTERMITTENT WIPERS (Vehicle-speed-correlative type) | 270  |
|      | OUTLINE  | 257  |
|      | POWER WINDOW TIMER                                   | 281  |
| 279  | THEFT-ALARM SYSTEM                                   | 283  |
| 277  |  |  |
| 298  |  |  |
| 294  |  |  |
|      | 275<br>274<br>279<br>277<br>298                      | 275 (Vehicle-speed-correlative type) OUTLINE POWER WINDOW TIMER THEFT-ALARM SYSTEM WASHER-INTERLOCKED WIPERS 277 298 |

## OUTLINE

N08QBAB

THE ETACS (Electronic Time and Alarm Control System) provides various timer and alarm facilities through centralized control by an electronic control unit (ECU).

The ECU incorporates two microcomputers; one of these is used exclusively for control of the theft-alarm system, and the other is used for control of various other functions.

An outline of the various functions of the ETACS is provided below.

## 1. INTERMITTENT WIPERS (VEHICLE-SPEED-CORRELATIVE TYPE)

The interval time is automatically changed in accordance with increases or decreases of the vehicle speed.

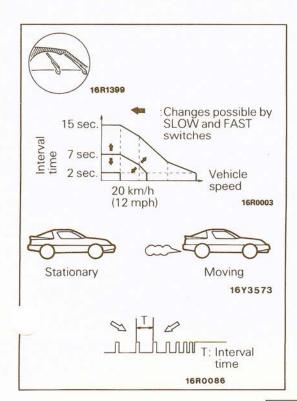
The continuous response action is canceled when the CANCEL switch is switched ON, and the wipers are then the manual, variable-intermittent type.

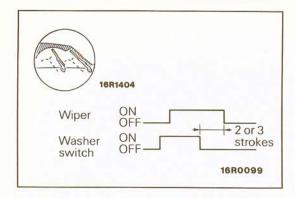
The initial interval setting is seven seconds; this can be changed by using the SLOW and FAST switches.

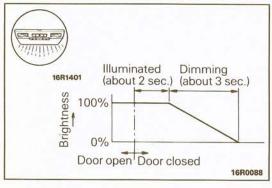


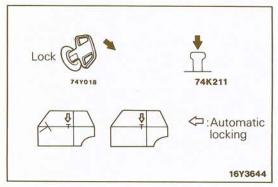
#### NOTE

- (1) The washer-interlocked wiper operation has priority.
- (2) When the SLOW, FAST or CANCEL switch is switched ON, the buzzer sounds for about 0.1 second.









#### 2. WASHER-INTERLOCKED WIPERS

When the washer switch is switched ON while the ignition key is at the ON or ACC position, the wipers operate; after the washer switch is switched OFF, the wipers wipe two three times and then stop.

| Inp                          | out                  | Output      |                   |  |
|------------------------------|----------------------|-------------|-------------------|--|
| Ignition switch<br>(ACC, ON) | Operation conditions | Wiper relay | Wiper motor drive |  |
| Washer switch                | Operation start      |             |                   |  |

#### 3. DELAYED SWITCH-OFF DOME LIGHT

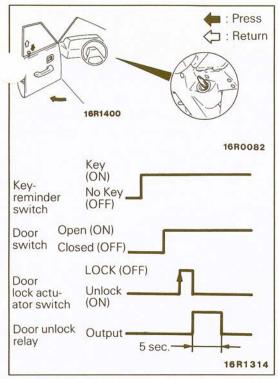
When the dome light switch is at the position linked to the doors, the light will remain illuminated for approximately two seconds after the doors are closed, and will then begin to gradually dim, finally switching OFF completely.

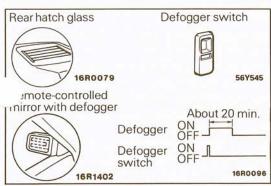
|             | Input  | Output     |
|-------------|--|------------|
| Door switch | Illumination<br>by switch ON<br>Starts dimming by<br>switching ON to OFF | Dome light |

#### 4. CENTRAL DOOR LOCKING SYSTEM

Both doors can be locked (or unlocked) by locking 'unlocking) either one door.

|                                 | Input   | Output   |  |
|---------------------------------|---|--|--|
| Door lock<br>actuator<br>switch | Signal change to LOCK→<br>UNLOCK or UNLOCK→<br>LOCK | Door lock relay or door<br>unlock relay<br>(LOCK or UNLOCK activa-<br>tion output) |  |





#### 5. DOOR LOCK PREVENTION WHEN KEY IS NOT RE-MOVED

If the doors are locked with the ignition key still in the ignition key cylinder, the door locking is canceled in order to prevent the doors from becoming locked when the ignition key has been forgotten in the ignition key hole.

Output is stopped if the key is removed (from the ignition key cylinder) during unlocking or the door is closed. Does not function while vehicle is moving.

#### NOTE

This function has priority over the central door locking system.

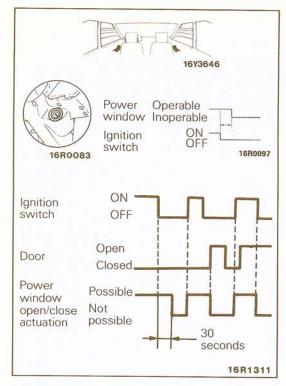
|  | Output                    |  |
|--|---------------------------|--|
| Vehicle-speed sensor Vehicle speed sensing |                           | Door unlock relay<br>(UNLOCK activation<br>output) |
| Key-reminder<br>switch                     | Presence of key           |  |
| Door switch                                | Door condition            |  |
| Front door<br>lock actuator<br>switch      | Lock-activation detection |  |

#### 6. DEFOGGER TIMER

When the defogger switch is switched ON while the ignition key is at ON, the defogger will function for approximately 20 minutes at the rear hatch glass and the remote-controlled mirror with defogger.

Defogging will stop if the switch is pressed again (to OFF) before the 20 minutes have elapsed.

| Ir                    | nput                 | Output                               |
|-----------------------|----------------------|--------------------------------------|
| Ignition switch<br>ON | Operation conditions | Defogger output                      |
| Defogger switch       | Start or reset       | Defogger relay<br>(operation output) |



#### 7. POWER WINDOW TIMER

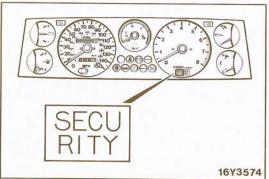
The power windows can be operated for about 30 seconds after the ignition key is turned to OFF.

They stop, however, if a front door is opened.

#### NOTE

If the ignition key is turned to OFF while either (or both) door is open, the power window delay timer will not function, and the power windows cannot be operated.

| Input                |                            | Output                                |  |  |
|----------------------|----------------------------|---------------------------------------|--|--|
| Ignition switch (ON) | Compulsory actuation input | Power window<br>relay<br>(approx. 30- | Power window motor operation made possible |  |
| Door switch          | Timer stop condition       | second output)                        |  |  |

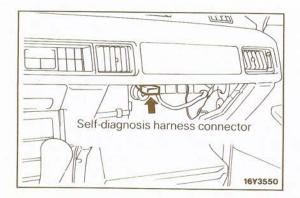


#### 8. THEFT-ALARM SYSTEM

This system is designed to protect the vehicle itself and its contents against unauthorized forced entry after all doors, the rear hatch and the hood have been closed and locked. If an unauthorized forced entry occurs, the starter circuit will not function, and, moreover, visible and audible alarr. will result as the headlights illuminate and the horn sounds. Confirmation of the system's setting is provided by temporal illumination of the security light. (For additional detailed information, refer to the section on P.8-283 concerning the theft-alarm system.)

#### NOTE

The interruption of the starter circuit will be maintained, once the system has been activated, until it is deactivated. If, however, the key is used, starting is possible even if the alarm is not deactivated.

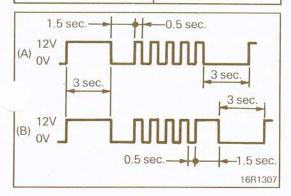


#### 9. INPUT SIGNALS CHECK SYSTEM

The electronic control unit (ECU) of the ETACS provides the input-check function for checking whether or not the signals from the switches and sensors are correctly input to the ECU.

The function checking signal is output as a certain fixed pattern from the exclusive ETACS terminal of the s diagnosis harness connector located at the upper part or the glove compartment. (For information concerning checking procedures, refer to P.8-294.)

| Inp                                | out        | Output  |  |  |
|------------------------------------|------------|---|--|--|
| Door<br>witch                      | All doors  | 200 – 300 msec.   |  |  |
| A/INT swit                         | tch        | 60 msec.  |  |  |
| CANCELS                            | witch      | 60 msec.  |  |  |
| Defogger                           | switch     | 60 msec.  |  |  |
| Key-remin                          | der switch | 200 msec.   |  |  |
| Vehicle-speed sensor (reed switch) |            | Flashing at 60 msec<br>intervals (For approx<br>one second) |  |  |
| Door lock                          | Left       | 200 – 300 msec.   |  |  |
| actuator<br>switch                 | Right      | 200 – 300 msec.   |  |  |
| Key cylinde<br>switch              | er unlock  | 60 msec.  |  |  |
| Rear hatch switch                  |            | 200 msec.   |  |  |
| Hood swite                         | ch         | 200 msec.   |  |  |



(1) The input-check system can be activated when, with the ignition key at OFF (LOCK condition), one of the doors is open (door switch ON).

(2) When the ECU detects a change from a HIGH signal to a ground signal when a sensor or input switch shown in the table at the left is actuated, a HIGH signal (12V) is output from the self-diagnosis terminal for a period of 60 to 300 msec.

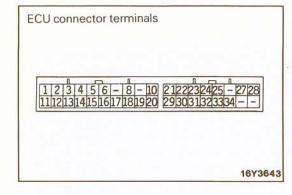
(3) By checking this by the movement of the needle of a voltmeter, it is possible to determine whether or not the input circuit of that sensor or switch is normal.

NOTE

(1) The door switch can be checked when one door is opened while all doors are closed. Other Switches and sensors can be checked by opening either door and leaving the ECU in the started condition.

(2) The FAST, SLOW, CANCEL and defogger switches can be checked, other than by this check, by checking for the buzzer sound at the time of switch ON.

(4) To check the harness between the ECU and the self-diagnosis harness connector, check to be sure that the voltage of the terminal for the ETACS is output as shown by the (A) or (B) patterns in the figure at the left when the ignition key is switched ON (at the ACC or ON position.)



# ETACS COMPUTER INPUT/OUTPUT SIGNALS

#### 1. POWER SUPPLY AND GROUND CIRCUIT

| Name         | Terminal No. | Voltage level |
|--------------|--------------|---------------|
| Battery (+B) | 2            | Н             |
| GROUND (GND) | 15           | L             |

NOTE

H and L in the voltage level column indicate the terminal voltage of each signal.

H: Battery voltage

 $H': 5 \pm 0.7V$ 

L: Ground voltage (0.8V or less)

#### 2. INPUT SIGNALS

Input signals (to the computer) corresponding to the ON/OFF condition of each of the switches and sensors are as shown in the table below.

Note that the checking should be done with a door open or the ignition key at the ON position, otherwise the correct voltage measurement might not be obtained.

| Input name           | Input name Terminal No. Switch operation and condition |                                     | Voltage<br>level | Input signal waveform |             |
|----------------------|--|-------------------------------------|------------------|-----------------------|-------------|
| ACC                  | 14   | Ignition switch                     | ON or ACC        | Н                     | ON          |
|                      |  |                                     | LOCK             | L                     | OFF 16R0919 |
| IG1                  | 18   | Ignition switch                     | ON               | H                     |             |
|                      |  |                                     | ACC or<br>LOCK   | L                     | <u>↑</u>    |
| Wiper (A/INT) switch | 22   | Switch at position other than A/INT | OFF              | H'                    | ON _        |
|                      |  | Switch at A/INT position            | ON               | L                     | OFF 16R0016 |
| FAST switch          | 6  |                                     | OFF              | H'                    | <b>^</b>    |
|                      |  | Press the switch                    | ON               | L                     | 1           |
| SLOW switch          | 5  | -                                   | OFF              | H'                    |             |
|                      |  | Press the switch                    | ON               | L                     | T           |
| CANCEL switch 31     | 31   | ON/OFF alternately                  | OFF              | H'                    |             |
|                      |  | each time switch is pressed         | ON               | L                     | T           |
| Reed switch or       | 17   | ON/OFF interval time changes        | OFF              | H'                    | ON JULE     |
| pulse generator      |  | corresponding to vehicle speed      | ON               | L                     | OFF 16R001  |

STB Revision

| Inpu                                | t name    | )     | Termi-<br>nal No.     | Switch operation and co                        | ndition | Voltage<br>level | Input signal<br>waveform |  |
|-------------------------------------|-----------|-------|-----------------------|--|---------|------------------|--------------------------|--|
| 'asher switch                       |           | 4     |                       | OFF  | H'      | OFF              |                          |  |
|                                     |           |       | Press the switch      | ON   | L       | ON 16R0016       |                          |  |
| Door switch                         | n (left)  |       | 10                    | Closing of doors                               | OFF     | H'               |                          |  |
|                                     |           |       | -                     | Opening of doors                               | ON      | L                |                          |  |
| Door switch                         | n (right) |       | 33                    | Closing of door                                | OFF     | H'               | _                        |  |
|                                     |           |       |                       | Opening of door                                | ON      | L                | T                        |  |
| Door switch                         | 1         |       | 11                    | Closing of all doors                           | OFF     | H'               |                          |  |
| (all doors)                         |           |       |                       | Opening of either door                         | ON      | L                | 1                        |  |
| Door lock actuator<br>switch (left) |           | 13    | Lock                  | OFF  | H'      | ^                |                          |  |
|                                     |           |       | Unlock                | ON   | L       | 1                |                          |  |
| Door lock actuator                  |           | 12    | Lock                  | OFF  | H'      | ^                |                          |  |
| switch (righ                        | t)        |       |                       | Unlock   | ON      | L                | <b>↑</b>                 |  |
| Key-remind                          | er switc  | ch    | 3                     | Insertion of ignition key                      | OFF     | H'               | <b>A</b>                 |  |
|                                     |           |       |                       | Removal ignition key                           | ON      | L                |                          |  |
| Defogger sv                         | witch     |       | 30                    | ON/OFF alternately each time switch is pressed | OFF     | H'               | <b>A</b>                 |  |
|                                     |           |       |                       | each time switch is pressed                    | ON      | L                | 1 Fall-in                |  |
| Rear hatch :                        | switch    |       | 8                     | Closing of rear hatch                          | OFF     | H'               | <b>A</b>                 |  |
|                                     |           |       | Opening of rear hatch | ON   | L       | T I              |                          |  |
| Hood switc                          | h         |       | 34                    | Closing of hood                                | OFF     | H'               | <b>^</b>                 |  |
|                                     |           |       | Opening of hood       | ON   | L       |                  |                          |  |
| Key cylin-<br>der unlock            | Door      | Left  | 16                    | -  | OFF     | H'               |                          |  |
| switches                            |           | Right |                       | Turn the key cylinder to the unlocked side     | ON      | L                | 1                        |  |
|                                     | Rear      | hatch |                       | the unlocked side                              |         |                  |                          |  |

#### 3. OUTPUT SIGNALS

Signals output from the computer in accordance with changes of input signals are as shown in the table below.

(1) Wiper relay drive (terminal No.23)

| Co                           | andition of input side |     | Output signal waveform and its operation |             |  |
|------------------------------|------------------------|-----|--|-------------|--|
| Co                           | endition at input side |     | Output signal                            | Wiper relay |  |
| Ignition key<br>at ON or ACC | Wiper switch at A/INT  |     | "  | OFF         |  |
|                              |                        |     | Interval time                            | ON          |  |
|                              | Washer switch          | OFF | Washer switch                            | OFF         |  |
|                              |                        | ON  | H2.5 to 3.8 sec                          | ON          |  |

#### (2) Buzzer drive (terminal No.27)

| Co                           | ondition at input side          | Output signal waveform and its operation |          |         |
|------------------------------|---------------------------------|--|----------|---------|
| Co                           | matton at input side            | Output signal                            | Buzzer   |         |
| Ignition key<br>at ON or ACC | Defogger, FAST,<br>SLOW, CANCEL | OFF                                      | Н —      | OFF     |
| at ON OF ACC                 | switch                          | ON                                       | 0.1 sec. | 0023 ON |

## (3) Dome light control (terminal No.1)

| Condition at input side      |                      |            | Output signal waveform and its operation |            |  |  |
|------------------------------|----------------------|------------|--|------------|--|--|
| Col                          | nation at input side |            | Output signal                            | Dome light |  |  |
| Dome light<br>switch at door | Door switch          | ON         | Door open Door closed                    | ON         |  |  |
| position                     |                      | ON → OFF L | 2 sec. +                                 | Dim → OFF  |  |  |
|                              |                      |            | 3 sec 16R0021                            | OFF        |  |  |

## (4) Door lock relay drive (terminal No.20)

| Condition at input side                |                  |             | Output signal waveform and its operation |          |                 |  |
|--|------------------|-------------|--|----------|-----------------|--|
|  |                  |             | Output signal                            |          | Door lock relay |  |
| Except when key-<br>reminder switch at | Door lock        | ON (unlock) | Н  |          | OFF             |  |
| OFF, and door<br>switch at ON          | (left and right) | OFF (lock)  | L  | 0.5 sec. | ON              |  |

#### (5) Door unlock relay drive (terminal No.19)

| Condition at input side |                           |                                       | Output signal waveform and its operation |   |  |  |
|-------------------------|---------------------------|---------------------------------------|--|---|--|--|
|                         |                           |                                       | Output signal                            | Door unlock relay   |  |  |
| Door lock               | ON (unlock)               | Н                                     | 5 sec                                    | OFF   |  |  |
| (left and right)        | OFF (lock)                | L                                     |  | ON  |  |  |
|                         | Door lock actuator switch | Door lock actuator switch ON (unlock) | Door lock actuator switch ON (unlock) H  | Door lock actuator switch  Output signal  ON (unlock) H  5 sec. |  |  |

## (6) Defogger relay and defogger indicator light drive (terminal No.28)

\*I/L: Indicator light

| Condition at input side |                 |     | Output signal waveform and its operation |         |                   |  |
|-------------------------|-----------------|-----|--|---------|-------------------|--|
|                         |                 |     | Output signal                            |         | Defogger and *I/L |  |
| Ignition key at ON      | Defensessitely  | OFF | н —                                      |         | OFF               |  |
| at ON                   | Defogger switch | ON  | L  | 16R0026 | ON                |  |

#### NOTE

Defogger switch will be switched OFF after left ON for 20 minutes.

## (7) Power window relay (terminal No.25)

| Condition at input side                   |                 |          | Output signal waveform and its operation |   |                    |  |
|---|-----------------|----------|--|---|--------------------|--|
|   |                 |          |  | Output signal                               | Power window relay |  |
| )-second period                           | Ignition switch | OFF      |  | Ignition Ignition<br>switch ON I switch OFF | OFF                |  |
| after ignition key<br>turned to ON or OFF |                 | ON → OFF | Н  | 30 sec.                                     | ON (30-sec.)       |  |
|   |                 | ON       | L  | 16R0025                                     | ON                 |  |

#### NOTE

When a door is opened during timer (30-second) operation, timer operation will stop and power windows can't be operated.

#### (8) Security light control (terminal No.32)

| Condition at input aids                           | Output signal waveform and its operation |  |  |  |
|---|--|--|--|--|
| Condition at input side                           | Output signal                            | Security light                         |  |  |
| Ignition key removed;<br>all doors keyless-locked | Н —                                      | Illumination off                       |  |  |
| all doors keyless-locked                          | 20 sec. 16R0022                          | Off after<br>20 second<br>illumination |  |  |

## (9) Theft alarm horn and headlight drive (terminal No.29)

| Condition at input side   |     |   | Output signal waveform and its operation |                                  |  |
|---|-----|---|--|----------------------------------|--|
|   |     |   | Output signal                            | Horn and headligh                |  |
| After security light illumination OFF,                                      | OFF | Н | <del>`</del>                             | 3-minute repeated ON/OFF at 1 Hz |  |
| doors and rear hatch can be opened without key, and also hood can be opened | ON  | L | 3 min.                                   | 50% duty                         |  |
|   |     |   | Key cylinder unlock switch 16R1413       |                                  |  |

NOTE

Deactivated by switching ON of key cylinder unlock switch.

(10)Starter inhibitor relay and passing relay drive (terminal No.24)

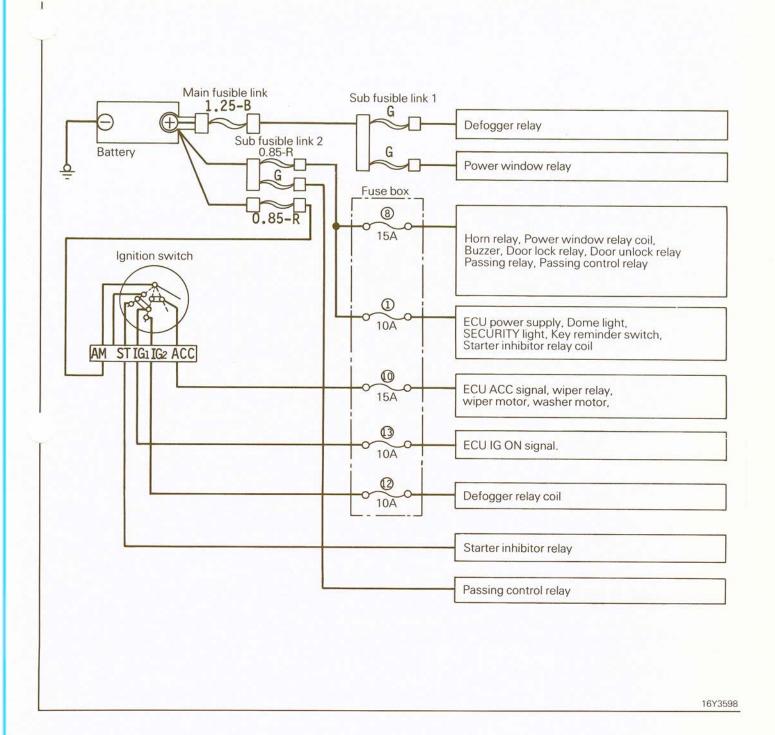
| Condition at input side   | Output signal waveform and its operation   |   |  |  |
|---|--|---|--|--|
| Condition at input side   | Output signal                              | Starter inhibitor relay and passing relay |  |  |
| After security light illumination OFF, doors and rear hatch can be opened | н — —                                      | OFF                                       |  |  |
| without key, and also hood can be opened                                  | COFF ON Key cylinder unlock switch 16R0026 | ON  |  |  |

NOTE

Deactivated by switching ON of key cylinder unlock switch.

# **ETACS-RELATED FUSES AND CIRCUITRY USED**

N08QDAB



# **FUNCTIONS AND RELATED PARTS OF ETACS**

N08QEAA

| COMPONENT   | 0           |           |             |                                  |                       |                |              |                |                | INPU             | Γ                     |       |       |            |                      |       |       |      |                       |
|---|-------------|-----------|-------------|----------------------------------|-----------------------|----------------|--------------|----------------|----------------|------------------|-----------------------|-------|-------|------------|----------------------|-------|-------|------|-----------------------|
|   | ronic conti | onic cont |             | Electronic control<br>unit (ECU) |                       | gnition switch |              |                | umn<br>itch    |                  |                       |       |       |            | Door<br>switch       |       |       | actu | lock<br>lator<br>itch |
|   | Elect       | unit (    |             | ignitio                          |                       |                |              |                |                |                  |                       |       |       |            |                      |       |       |      |                       |
| FUNCTION  | CPU 1       | CPU 2     | ON position | ACC position                     | Wiper switch (A/INT)* | SLOW switch*   | FAST switch* | Washer switch* | CANCEL switch* | Defogger switch* | Vehicle-speed sensor* | L.H.* | R.H.* | All doors* | Key-reminder switch* | L.H.* | R.H.* |      |                       |
| Intermittent wipers<br>(Vehicle-speed-<br>correlative type) | 0           |           | 0           | 0                                | 0                     | 0              | 0            |                | 0              |                  | 0                     |       |       |            |                      |       |       |      |                       |
| Washer-interlocked wipers                                   | 0           |           | 0           | 0                                |                       |                |              | 0              |                |                  |                       |       |       |            |                      |       |       |      |                       |
| Delayed switch-<br>off dome light                           | 0           |           |             |                                  |                       |                |              |                |                |                  |                       |       |       | 0          |                      |       |       |      |                       |
| Central door<br>locking system                              | 0           |           |             |                                  |                       |                |              |                |                |                  |                       | 0     | 0     |            |                      | 0     | C     |      |                       |
| Door lock prevention when key is not removed                | 0           |           |             |                                  |                       |                |              |                |                |                  | 0                     | 0     | 0     |            | 0                    | 0     | 0     |      |                       |
| Defogger timer  | 0           |           | 0           |                                  |                       |                |              |                |                | 0                |                       |       |       |            |                      |       |       |      |                       |
| Power window timer  | 0           |           | 0           |                                  |                       |                |              |                |                |                  |                       | 0     | 0     |            |                      |       |       |      |                       |
| Theft-alarm system  |             | 0         | 0           | 0                                |                       |                |              |                |                |                  |                       | 0     | 0     | 0          |                      | 0     | 0     |      |                       |

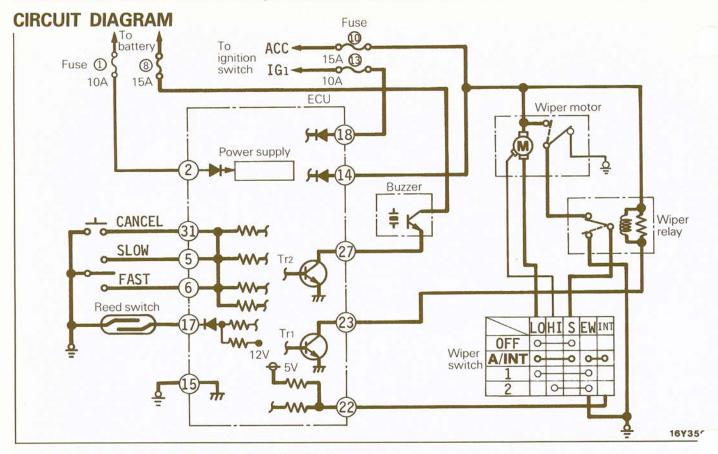
NOTE

The \* symbol indicates an input switch or sensor checkable by input-check function. For information concerning input-check procedures, refer to P.8-294.

|                             | INPUT              |              |                           |                             |            |                                       |                                      |   | 0  | UTPL                            | JT                                |                               |                                   |                              |                          |
|-----------------------------|--------------------|--------------|---------------------------|-----------------------------|------------|---------------------------------------|--------------------------------------|---|--|---------------------------------|-----------------------------------|-------------------------------|-----------------------------------|------------------------------|--------------------------|
| Key cylinder unlock switch* | Rear hatch switch* | Hood switch* | Wiper relay (Wiper motor) | Operation indication buzzer | Dome light | Door unlock reay (Door lock actuator) | Door lock relay (Door lock actuator) | Defogger relay (Defogger, remote-controlled mirror with defogger) | Power window relay<br>(Power window motor) | Security light (for anti-theft) | Passing control relay (Headlight) | Horn relay (Theft-alarm horn) | Starter inhibitor relay (Starter) | Passing relay (Pop-up motor) | Troubleshooting page No. |
|                             |                    |              | 0                         | 0                           |            |                                       |                                      |   |  |                                 |                                   |                               |                                   |                              | 8-271                    |
|                             |                    |              | 0                         |                             |            |                                       |                                      |   |  |                                 |                                   |                               |                                   |                              | 8-273                    |
|                             |                    |              |                           |                             | 0          |                                       |                                      |   |  |                                 |                                   |                               |                                   |                              | 8-274                    |
|                             |                    |              |                           |                             |            |                                       | 0                                    |   |  |                                 |                                   |                               |                                   |                              | 8-276                    |
|                             |                    | 34           |                           |                             |            | 0                                     |                                      |   |  |                                 |                                   |                               |                                   |                              | 8-278                    |
|                             |                    |              |                           | 0                           |            |                                       |                                      | 0   |  |                                 |                                   |                               |                                   |                              | 8-280                    |
|                             |                    |              |                           |                             |            |                                       |                                      |   | 0  |                                 |                                   |                               |                                   |                              | 8-282                    |
| 0                           | 0                  | 0            |                           |                             |            |                                       |                                      |   |  | 0                               | 0                                 | 0                             | 0                                 | 0                            | 8-289                    |

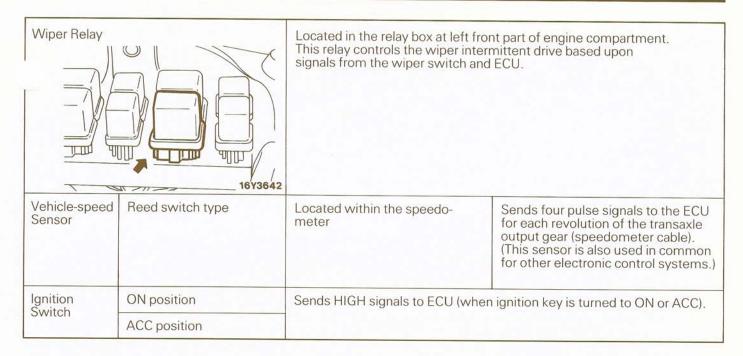
# **INTERMITTENT WIPERS (VEHICLE-SPEED-CORRELATIVE TYPE)**

N08QFAB



# COMPONENT PARTS AND FUNCTION

| Electronic Control Unit (ECU) |                                  | Located at the underside of the driver's seat. Based upon input signals from the various switches and sensors, the ECU controls the wiper control and buzzer by switching ON and OFF transistors Tr1 and Tr2. (This unit is also used in common for control of other ETACS functions.) |   |  |  |  |  |
|-------------------------------|----------------------------------|--|---|--|--|--|--|
| Column<br>Switch              | Wiper switch<br>(A/INT position) | This switch is used for intermitted. When the wiper switch is set to sent to the ECU.  | This switch is used for intermittent activation of the wiper control. When the wiper switch is set to the A/INT position, the ground signal is sent to the ECU. |  |  |  |  |
|                               | SLOW switch                      | Lengthens intermittent time.   | Automatic-return type switches; ON when turned and OFF when re-   |  |  |  |  |
|                               | FAST switch                      | Shortens intermittent time.  | leased.   |  |  |  |  |
| CANCEL switch                 |                                  | Switches to vehicle-speed-correlative/non-correlative.   | Automatic-return type switches;<br>ON when pressed and OFF when<br>released.  |  |  |  |  |
| Buzzer                        |                                  | Located at the inside, right of th<br>Activated by ECU when SLOW,<br>input; power is supplied from fu  | Located at the inside, right of the center console. Activated by ECU when SLOW, FAST or CANCEL switch ON (L) signal input; power is supplied from fuse No. 8.   |  |  |  |  |

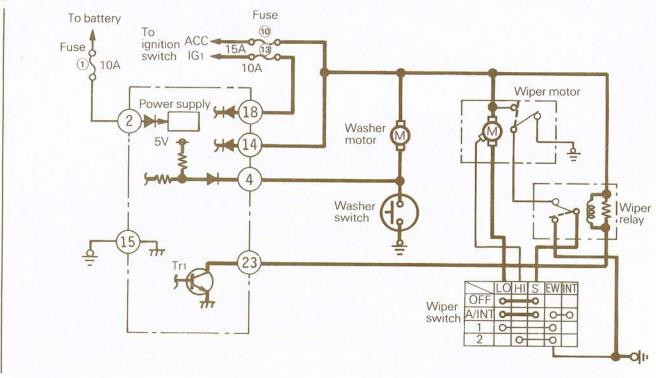


# TROUBLESHOOTING GUIDE

| Trouble Symptom   | Cause  | Check method   | Remedy  |  |
|---|--|--|---|--|
| No wiper operation when wiper switch is set to A/INT position. (Wipers operate, however,  | Damaged or disconnected wiring of A/INT switch input circuit               | If input checks (P.8-294) indicate a malfunction, check by using check | Repair the harness or replace the wiper switch  |  |
| then wiper switch is at position<br>(low speed).]   | Damaged or disconnected wiring of A/INT switch                             | chart No.3 (P.8-301).  |   |  |
|   | Damaged or disconnected wiring of ignition switch ACC or ON input circuits | Check by using check chart No.2 (P.8-300).                             | Replace the fuse or repair the harness.         |  |
|   | Damaged or disconnected wiring of wiper relay drive circuit                | Check by using check chart No.5 (P.8-303).                             | Repair the harness or replace the wiper relay   |  |
|   | Malfunction of the wiper relay   |  |   |  |
|   | Damaged or disconnected wiring of wiper motor low-speed drive circuit      | Check by using check chart No.4 (P.8-302).                             | Repair the harness or replace the wiper switch. |  |
|   | Malfunction of the ECU   |  | Replace the ECU.                                |  |
| Wipers don't stop when wiper switch set to OFF.   | Short-circuit of A/INT switch input circuit                                | After checking A/INT switch input (P.8-295),                           | Repair the harness or replace the wiper         |  |
| (When wipers are operating at low speed)  NOTE If the wipers continue non-stop operation at high speed, there is a short-circuit at the high speed side of the wiper motor. | Short-circuit of A/INT switch  | check by using check chart No.3 (P.8-301).                             | switch.   |  |
|   | Short-circuit of wiper relay drive circuit                                 | Check by using check chart No.5 (P.8-303).                             | Repair the harness.                             |  |
|   | Short-circuit of wiper motor low-speed drive circuit                       | Check by using check chart No.4 (P.8-302).                             | Repair the harness.                             |  |
|   | Malfunction of the ECU   | -  | Replace the ECU.                                |  |

| Trouble Symptom   | Cause   | Check method   | Remedy  |  |
|---|---|--|---|--|
| No intermittent operation when wiper switch is set to A/INT   | Short-circuit of FAST switch input circuit  | If input checks (P.8-294) indicate a malfunction,  | Repair the harness or replace the FAST                                      |  |
| wipers operate at low speed)<br>(Wipers stop, however,<br>when wiper switch is set to OFF).                                     | Short-circuit of FAST switch  | check by using check chart No.6 (P.8-304).   | switch.   |  |
|   | Malfunction of the ECU  |  | Replace the ECU.  |  |
| No change of intermittent opera-<br>tion time interval when SLOW or<br>FAST switch is operated (time                            | Damaged wiring of FAST and/or SLOW switch input circuit                                 | If input checks (P.8-294) indicate a malfunction, check by using check                       | Repair the harness or replace the FAST and or SLOW switch.                  |  |
| interval remains at about 7 seconds)  | Damaged wiring of FAST and/or SLOW switch   | - chart No.6 (P.8-304).  |   |  |
|   | Malfunction of the ECU  |  | Replace the ECU.  |  |
| Intermittent operation time interval do not correlate with vehicle speed when wiper switch is set to the A/INT position and the | Damaged or disconnected wiring, or short-circuit, of vehicle-speed sensor input circuit | If input checks (P.8-294) indicate a malfunction, check by using check chart No.7 (P.8-305). | Repair the harness or replace the vehicle speed sensor.                     |  |
| CANCEL switch is pressed. (The buzzer does not sound when the CANCEL switch is  | pes not sound Malfunction of the vehicle-   |  |   |  |
| pressed.)   | Short-circuit of CANCEL switch input circuit  | If input checks (P.8-294) indicate a malfunction,  | Repair the harness or replace the CANCEL switch.                            |  |
|   | Short-circuit of CANCEL switch  | check by using check chart No.6 (P.8-304).   | SWILCH.   |  |
|   | Malfunction of the ECU  |  | Replace the ECU.  |  |
| When the CANCEL switch is pressed during intermittent operation of wipers correlated to vehicle speed, correlation continues.   | Damaged or disconnected wiring, or short-circuit, of CANCEL switch input circuit        | If input checks (P.8-294) indicate a malfunction check by using check chart No.6 (P.8-304).  | Repair the harness or replace the CANCEL switch.                            |  |
|   | Damaged or disconnected wiring, or short-circuit, of CANCEL switch                      |  |   |  |
|   | Malfunction of the ECU  | -  | Replace the ECU.  |  |
| No buzzer sound when SLOW,<br>FAST and CANCEL switches are<br>operated.   | Malfunction of the SLOW,<br>FAST and/or CANCEL<br>switch                                | If input checks (P.8-294) indicate a malfunction, check by using check chart No.6 (P.8-304). | Repair the harness or<br>replace the SLOW,<br>FAST and/or CANCEL<br>switch. |  |
|   | Damaged or disconnected wiring of buzzer drive circuit                                  | Check by using check chart No.8 (P.8-306).   | Repair the harness or replace the buzzer.                                   |  |
|   | Malfunction of the buzzer   |  |   |  |
|   | Malfunction of the ECU  |  | Replace the ECU.  |  |

# WASHER-INTERLOCKED WIPERS CIRCUIT DIAGRAM



### 16Y3588

# COMPONENT PARTS AND FUNCTION

| Electronic Control Unit (ECU) |              | Wiper control relay is controlled based upon wiper switch ON (L) signals (transistor Tr1)   |  |
|-------------------------------|--------------|---|--|
| Washer Switch                 |              | This is an automatic-reset type switch. It is ON when pressed, and OFF when released. When switched ON, washer motor is activated and a ground signal is sent to the ECU. |  |
| Washer Motor                  |              | Washer fluid is sprayed from the washer nozzles when the washer switch is ON, (There is no direct relationship with ETACS control.)                                       |  |
| Wiper Relay                   |              | Switched ON by signals from the ECU, thus forming the wiper motor's low speed circuit and activating the wipers. (When the wiper switch is at the OFF or A/INT position.) |  |
| Ignition Switch               | ON position  | Sends HIGH signals to the ECU (when ignition key is turned to ON or   |  |
|                               | ACC position | ACC), to activate the system.   |  |

# TROUBLESHOOTING GUIDE

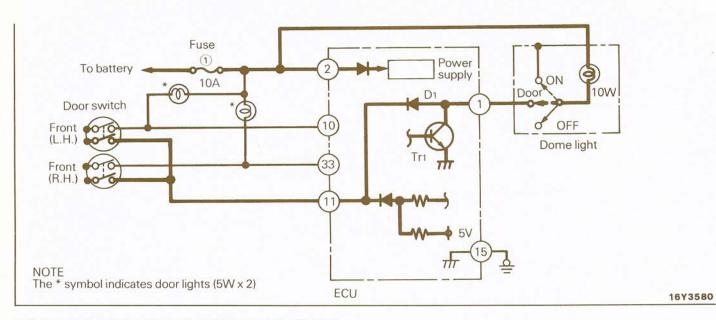
| Trouble Symptom   | Cause  | Check method                                | Remedy                    |
|---|--|---|---------------------------|
| No wiper operation when washer switch set to ON. "Viper intermittent operon and washer function is normal, however, | Damaged or disconnected wiring of washer switch input circuit          | Check by using check chart No. 9 (P.8-307). | Repair the harness.       |
|   | Damaged wiring between LO and S terminals of wiper switch OFF position | Check the wiper<br>switch (P.8-202).        | Replace the wiper switch. |
| at the A/INT position of the wiper switch.)   | Malfunction of the ECU   | -   | Replace the ECU.          |

ECU: Electronic Control Unit

**STB** Revision

# DELAYED SWITCH-OFF DOME LIGHT CIRCUIT DIAGRAM

N08QGAB



# COMPONENT PARTS AND FUNCTION

| Electronic Control Unit (ECU) | When the door is open (door switch ON), the ground circuit (diode D1) of the dome light is formed; after the door is closed (door switch OFF), the dome light illumination gradually dims and then disappears. (Transistor Tr1 changes gradually from ON to OFF.) |
|-------------------------------|---|
| Door Switch (All doors)       | Located at body side at all door openings. Switched ON when door is opened, and switched OFF when door is closed.  Because the two door switches are connected in parallel, HIGH signals are sent to the ECU only when all doors are closed (door switches OFF).  |
| Dome Light                    | Illuminates the vehicle interior. When the dome light switch is at the DOOR position, illumination and non-illumination are controlled by the ECU of the ETACS. Power is supplied, via fuse No.1, directly from the battery.                                      |

# TROUBLESHOOTING GUIDE

| Trouble Symptom  | Cause   | Check method                                 | Remedy                                 |  |
|--|---|--|--|--|
| With the dome light switch set to DOOR position, the   | Damaged or disconnected wiring of door switch (all doors) input circuit | Check by using check chart No. 10 (P.8-308). | Repair the harness.                    |  |
| ight doesn't illuminate when<br>iny door is opened (The dome<br>ight illuminates, however,<br>when the dome light switch | Damaged or disconnected wiring of dome light drive circuit              | Check by using check chart No. 11 (P.8-309). | Repair the harness.                    |  |
| is at the ON position.)  | Malfunction of the ECU  |  | Replace the ECU.                       |  |
| With the dome light switch set to the DOOR position,   | Short-circuit of door switch (all doors) input circuit                  | Check by using check chart No. 10 (P.8-308). | Repair the harness or replace the door |  |
| the light remains illuminated when all doors are closed.   | Short-circuit of door switch  |  | switch.                                |  |
| (The dome light illumination is switched OFF, however, when the dome light switch  | Short-circuit of dome light drive circuit                               | Check by using check chart No. 11 (P.8-309). | Repair the harness                     |  |
| is set to the OFF position.)   | Malfunction of the ECU  | _  | Replace the ECU.                       |  |

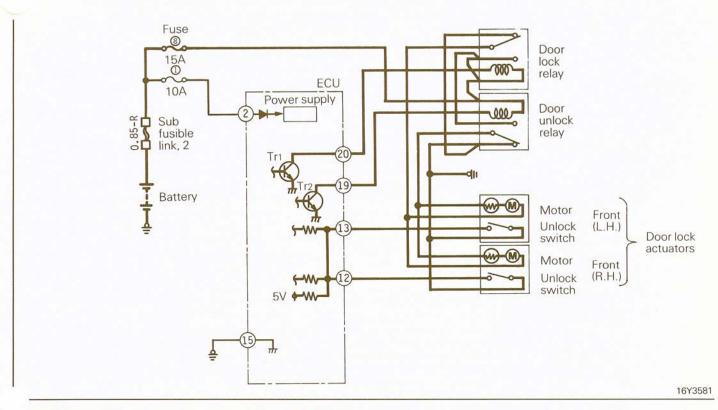
ECU: Electronic Control Unit

**STB Revision** 

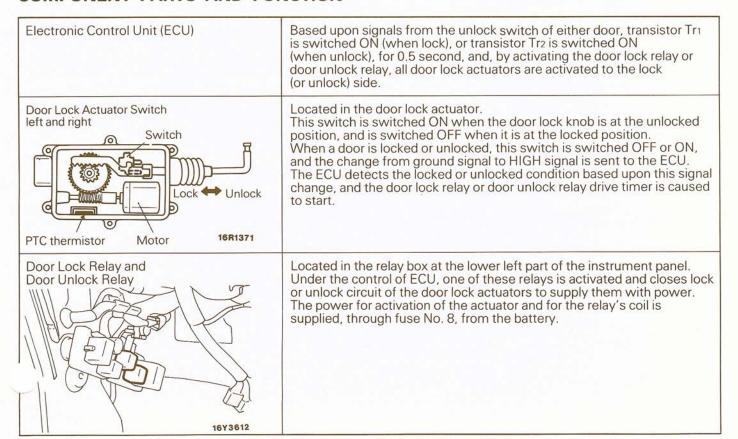
# **CENTRAL DOOR LOCKING SYSTEM**

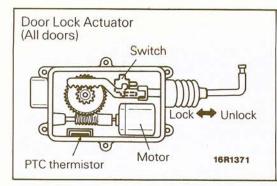
CIRCUIT DIAGRAM

N08QIAA



# COMPONENT PARTS AND FUNCTION





Located at the locking mechanism of each door.

These are motor-type actuators; according to the door lock or unlock

relay opertion, they make door lock or unlock motion. In addition, a PTC thermistor is located in series in the motor circuit;

when the motor load is excessive, it functions as a fuse to protect the motor.

Note that the PTC thermistor again becomes conductive if there is a decrease to the ordinary temperature.

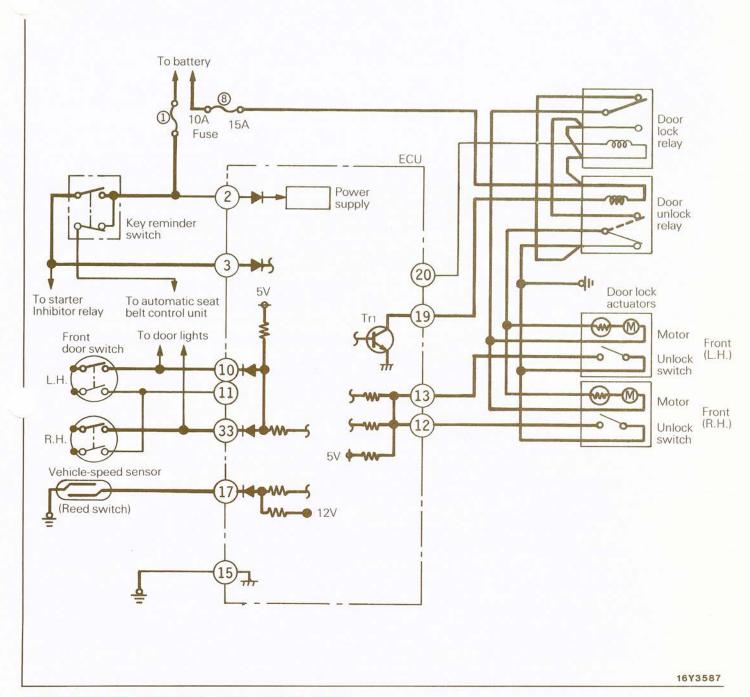
PTC: Positive Temperature Coefficient

# TROUBLESHOOTING GUIDE

| Trouble Symptom   | Cause   | Check method   | Remedy  |  |
|---|---|--|---|--|
| Central door locking system<br>doesn't function when<br>door lock knob is pressed<br>down or pulled up. | Damaged or disconnected wiring, or short-circuit, of door actuator switch input circuit         | If input checks (P.8-294) indicate a malfunction, check by using check chart No. 13 (P.8-311). | Repair the harness or replace the door lock actuator.                   |  |
|   | Malfunction of the front door lock actuator switch  |  |   |  |
|   | Damaged or disconnected wiring of the door lock relay or door unlock relay power-supply circuit | Check by using check chart No. 14 (P.8-312).   | Repair the harness or replace the fuse.                                 |  |
|   | Fuse 8 is fused.  |  |   |  |
|   | Damaged or disconnected wiring of door lock relay or door unlock relay drive circuit            | Check by using check chart No. 15 (P.8-313).   | Repair the harness or replace the door lock relay or door unlock relay. |  |
|   | Malfunction of the door lock relay or door unlock relay   |  |   |  |
|   | Damaged or disconnected wiring of door lock actuator drive circuit                              | Check by using check chart No. 16 (P.8-314).   | Repair the harness or replace the door lock actuator.                   |  |
|   | Malfunction of the door lock actuator   |  |   |  |
|   | Malfunction of the ECU  |  | Replace the ECU.  |  |

# DOOR LOCK PREVENTION WHEN KEY IS NOT REMOVED CIRCUIT DIAGRAM

N08QJAA



# **COMPONENT PARTS AND FUNCTION**

Electronic Control Unit (ECU)

Based upon input signals from the vehicle-speed sensor, door switches, key-reminder switch and door lock actuator switches, under certain condition, transistor Tr1 is switched ON for approximately five seconds to activate door unlock relay so door locking with the ignition key left in the ignition switch is prevented.

NOTE

This function has priority over the central door locking system.

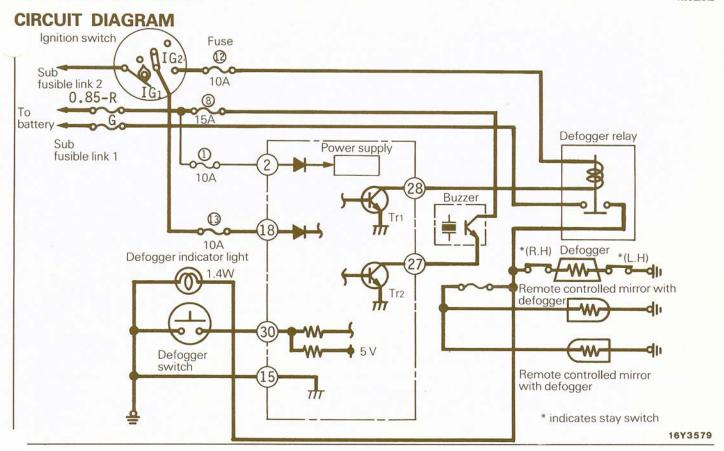
| Vehicle-speed Sensor                          | Sends vehicle-speed signals to the ECU. This function is inhibited when the ECU detects the vehicle speed.   |
|---|--|
| Door switch<br>(left and right)               | Detects the open/closed condition of the doors. The left and right door switch input circuit within the ECU is a wired OR circuit; when both (left and right) doors are closed (door switch OFF) HIGH signals are sent to the ECU; if either door is open (door switch ON), ground signals are sent to the ECU.  |
| Key-reminder Switch                           | Located in the ignition key cylinder. A two-way switch is incorporated within the cylinder; a switch that switches ON, and a switch that switches OFF when the ignition key is inserted into the key cylinder. With this system, switch ON occurs when the key is inserted into the key cylinder, and switch OFF occurs when it is taken out from the cylinder. If the key is left in the cylinder, HIGH signals from the battery, via fuse ①, are sent to the ECU. (ECU terminal No. 3) |
| Door Lock Actuator Switch<br>(left and right) | When an attempt is made to lock a door, the switch changes from ON to OFF, and HIGH signal is sent to the ECU.   |
| Door Unlock Relay                             | This relay is activated by the ECU; it activates the door lock actuator to the unlock side.  |
| Door Lock Actuator<br>(All doors)             | These actuators are activated by the door unlock relay; they function to unlock the doors. NOTE When these actuators are caused to operate many times continuously, the protection circuit whithin the actuators functions, inhibiting operation.  |

# TROUBLESHOOTING GUIDE

| Trouble Symptom   | Cause   | Check method   | Remedy   |  |
|---|---|--|--|--|
| When the following conditions are present, the door lock knob, even if locked, will not function to unlock.           | Damaged or disconnected wiring of key-reminder switch input circuit | If input checks (P.8-294) indicate a malfunction, check by using check chart No. 17 (P.8-316). | Repair the harness or replace the key-reminder switch. |  |
| <ul> <li>Key inserted.<br/>(key-reminder switch OFF)</li> </ul>   | Damaged or disconnected wiring of key-reminder switch               |  |  |  |
| <ul> <li>Door open.<br/>(door switch ON)</li> <li>Vehicle stationary.<br/>(No vehicle-speed signal input.)</li> </ul> | Damaged or disconnected wiring of door switch input circuit         | If input checks (P.8-294) indicate a malfunction, check by using check                         | Repair the harness or replace the front door switch.   |  |
| (The central door locking system, however, functions normally.)   | Damaged or disconnected wiring of door switch                       | - chart No. 12 (P.8-310).  |  |  |
|   | Malfunction of the ECU  |  | Replace the ECU.                                       |  |

# **DEFOGGER TIMER**

N08QKAB



# COMPONENT PARTS AND FUNCTION

| Electronic Control Unit (ECU)  Ignition Switch (ON position) |                          | The defogger relay is controlled by the switch-on of transistor Tr1, based on input signals of the defogger switch, thus causing the defogger and Remote-controlled mirror with defogger to operate for about 20 minutes. In addition, when there is switch-on input, the buzzer is activated for about 0.1 second by the switch-on of transistor Tr2.  |
|--|--------------------------|---|
|  |                          | Sends HIGH signals to ECU (when ignition key is turned to ON).  |
| Column<br>Switch   | Defogger switch          | Starts or resets the defogger timer. This is an automatic-reset type switch; it is switched ON when pressed, and switched OFF when released.  |
|  | Defogger indicator light | Illuminates when the defogger relay is ON, and stops illumination when it is OFF. Power is supplied, via fusible link (sub. 1) and the defogger relay, from the battery.  |
|  | Buzzer                   | Activated by ECU when defogger switch ON (L) signal is input. Power is supplied, when the ignition key is at ACC or ON, from fuse No.8.   |
| Defogger Relay   |                          | Located the relay box at the left-front of the engine compartment. Activated by the ECU, the defogger relay conducts current to the heaters of the defogger and the remote-controlled mirror with defogger. The power for the relay coil is supplied, when IG2 is ON, through the sub fusible link 1. The power for activation of the defogger is supplied, via fuse No.12, from the battery. |
| efogger  |                          | The defogger is conductive when the defogger relay is ON, and functions to defog the rear hatch glass.  |

| Remote-controlled Mirror with Defogger | The defoggers for door mirrors are conductive when the defogger relay is ON, and function to defog the door mirrors. |  |  |
|--|--|--|--|
| Stay Switch                            | The stay switch closes the defogger and rear wiper circuits when the re hatch is opened.                             |  |  |

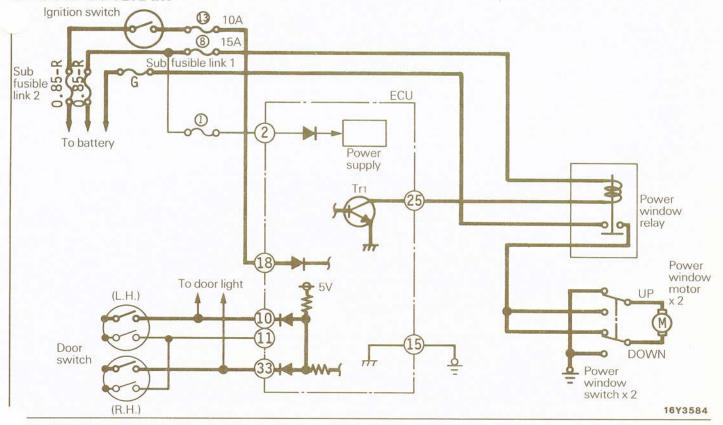
# TROUBLESHOOTING GUIDE

| Trouble Symptom  | Cause  | Check method  | Remedy   |  |
|--|--|---|--|--|
| The defogger (or the defogger for door mirror) does not function when the defogger switch is pressed. (The rear hatch is closed and defogger indicator light illuminates.) | Damaged or disconnected wiring of defogger   | Check by using check chart No.18 (P.8-318).   | Repair the harness or replace.   |  |
|  | Damaged or disconnected wiring of defogger for door mirror   |   | Repair the harness.  |  |
|  | Malfunction of the defogger or the remote-controlled mirror with defogger                                  | Check the defogger (or<br>the remote-controlled<br>mirror with defogger).<br>(P.8-256, P.23-78) | Replace the defogger<br>or the remote-controlle<br>mirror with defogger<br>or repair the heater line |  |
| The defogger and the defogger for door mirror do not function when the defogger switch is  | Damaged or disconnected wiring of ignition switch ON input circuit   | Check by using check chart No.2 (P.8-300).  | Replace the fuse or repair the harness.  |  |
| pressed.<br>(The indicator light does not illuminate.)   | Damaged or disconnected wiring of defogger switch input circuit  | If input checks (P.8-294) indicate a malfunction, check by using check                          | Repair the harness or replace the defogger switch.   |  |
|  | Malfunction of the defog-<br>ger switch  | chart No.19 (P.8-320).  |  |  |
|  | Damaged or disconnected wiring of defogger relay power supply circuit                                      | Check by using check chart No.20 (P.8-321).   | Repair the harness.  |  |
|  | Damaged or disconnected wiring of the defogger relay drive circuit, or a malfunction of the defogger relay | Check by using check chart No.21 (P.8-322).   | Repair the harness or replace the defogger relay.  |  |
|  | Malfunction of the ECU   |   | Replace the ECU.   |  |
| Defogger continues to operate while the ignition key is at the ON position.  | Short-circuit of defogger relay drive circuit  | Check by using check chart No.21 (P.8-322).   | Repair the harness or replace the defogger   |  |
| (The indicator light remains illuminated when the defogger switch is pressed.)   | Poor contact of the defogger relay points  |   | relay.   |  |
|  | Malfunction of the ECU   |   | Replace the ECU.   |  |
| Buzzer does not sound when the defogger switch is pressed.   | Damaged or disconnected wiring of defogger switch input circuit  | If input checks (P.8-294) indicate a malfunction, check by using check                          | Repair the harness or replace the defogger switch.   |  |
|  | Malfunction of the defogger switch   | chart No.19 (P.8-320).  |  |  |
|  | Damaged or disconnected wiring of buzzer drive circuit   | Check by using check chart No.8 (P.8-306).  | Repair the harness or replace the buzzer.  |  |
|  | Malfunction of the buzzer  |   |  |  |
|  | Malfunction of the ECU   | 040   | Replace the ECU.   |  |

# **POWER WINDOW TIMER**

N08QLAB

# **CIRCUIT DIAGRAM**



# **COMPONENTS PARTS AND FUNCTION**

| Electronic Control Unit (ECU)                  | The ECU switches transistor Tr1 ON when the ignition key is at the ON position, and for about 30 seconds after the ignition key is turned to the OFF position, thus maintaining the power window relay in the ON condition.  Note that the timer is stopped if a door is opened during timer operation (about 30 seconds). |
|--|--|
| Ignition Switch (ON position)                  | Sends HIGH signals to the ECU (when the ignition key is at ON only), for system compulsory activation input and timer start condition.   |
| Door Switch<br>(left and right)                | Detect the open/closed condition of the doors. These switches are switched ON when the doors are opened, and send ground signals to the ECU. When these signals are input during the 30-second operation time of the delay timer, the ECU switches OFF transistor Tr1 thus switching OFF the power window relay.           |
| Power Window Relay                             | Located in the relay box at the left front part of the engine compartment. This relay is activated by the ECU; power is supplied, via fuse No.8, from the battery. In addition, when this relay is ON, power is supplied to the power window circuit, via the sub fusible link 1 from the battery.                         |
| Power Window Switches<br>/ Power Window Motors | These switches and motors are activated when the power window relay is switched ON; the direction of conductivity to the motors is switched by the operation of each switch, thus opening and closing the windows.   |

# TROUBLESHOOTING GUIDE

| Trouble Symptom  | Cause  | Check method                                | Remedy   |
|--|--|---|--|
| Power windows do not operate with ignition key at the ON position.   | Damaged or disconnected wiring of power window motor drive circuit   | Check by using check chart No.22 (P.8-323). | Repair the harness or replace the power window switch and motor. |
|  | Damaged or disconnected wiring of ignition switch ON input circuit   | Check by using check chart No.2 (P.8-300).  | Replace the fuse or repair the harness.                          |
|  | Damaged or disconnected wiring of power window relay drive circuit   | Check by using check chart No.23 (P.8-324). | Repair the harness or replace the power window relay.            |
|  | Malfunction of the ECU   | _   | Replace the ECU.   |
| Operation of the power window is possible after the ignition key is turned to OFF, but the power window operation does not stop when, within 30 seconds, | Malfunction of a door<br>switch, or damaged or<br>disconnected wiring of<br>the door switch input<br>circuit | Check by using check chart No.12 (P.8-310). | Repair the harness or replace the door switch                    |
| the door is opened.  | Malfunction of the ECU   | -   | Replace the ECU.   |
| The power windows can be operated even though the timer  | Short-circuit of power window relay drive circuit  | Check by using check chart No.23 (P.8-324). | Repair the harness.  |
| operation time (about 30 seconds) after the ignition key is turned to OFF has  | Malfunction of power window relay points   | Check the power window relay (P.23-69).     | Replace the power window relay.                                  |
| passed.  | Malfunction of the ECU   | _   | Replace the ECU.   |

# THEFT-ALARM SYSTEM

N08QNAB

# OUTLINE

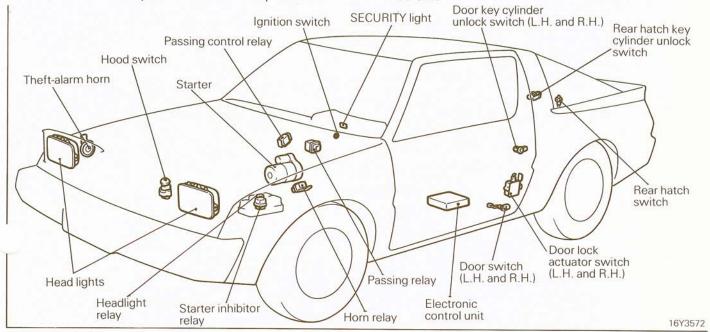
nen the theft-alarm system has been armed by a fixed sequence for locking the doors, if thereafter any cor, the rear hatch or the hood is opened in an unauthorized way, the horn will sound intermittently for a period of approximately three minutes, and, at the same time, the headlights will flash on and off, thus providing audible and visual warning signals.

Furthermore, the starter circuit is interrupted in such a way that the engine cannot be started, if the ignition key is not used. Note that this system is controlled by the electronic control unit (ECU) as one function of the

ETACS

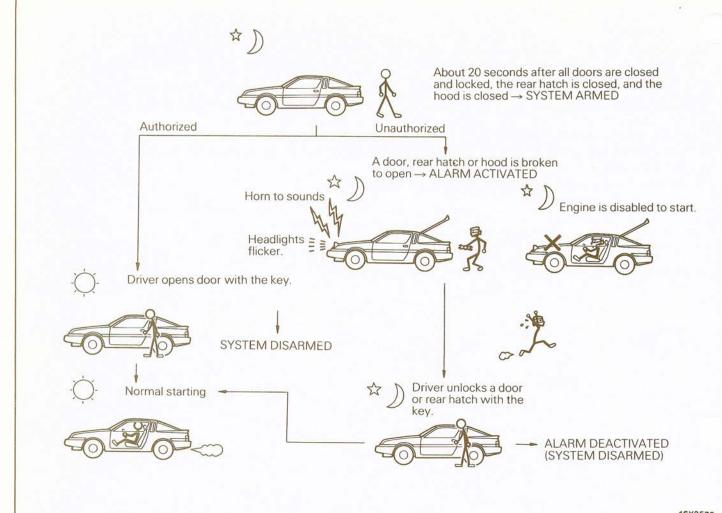
This ECU includes an independent (separate from the control of the other ETACS functions) microcomputer for the exclusive use of the theft-alarm system. This microcomputer arms, disarms, activates and deactivates the alarm system.

The system is composed of the components described below.



|                                       | Input               |                                   |                         | Output  |
|---------------------------------------|---------------------|-----------------------------------|-------------------------|---|
| Ignition switch<br>(ACC or ON)        |                     | Armed or disarmed condition       | SECURITY light          | Indicates armed condition.  |
| Door switch (left and right)          |                     | Armed or activated condition      | Horn relay              | Activates theft-alarm horn when activated.  |
| Door lock actuator switch (All doors) |                     | Armed or disarmed condition       | Passing relay           | When activated, this relay activates the passing control relay for raising the headlights activates the headlight relay, and turns on the headlights. |
| Door switch (All doors)               |                     | Armed or activated condition      | Starter inhibitor relay | Opens starter circuit, making starting impossible, when activated.  |
| Hood switch                           | h                   | Activated condition               |                         |   |
| Pear hatch s                          | switch              |                                   |                         |   |
| ey<br>cylinder<br>unlock<br>switch    | Left and right door | Disarmed or deactivated condition |                         |   |
|                                       | Rear hatch          | Deactivated condition             |                         |   |

# **OPERATION**



# 16Y3575

### 1. ARMING THE SYSTEM

After the following procedures have been completed, the SECURITY light illuminates for about 20 seconds, and when illumination stops, the system is armed.

- (1) Pull out the ignition key from the key cylinder.
- (2) Open a door. (The other door is closed.)
- (3) Use the keyless-locking method to lock the door.

  (The central door locking system will then function to lock all doors.)

# NOTE

- (1) The system is not armed, and therefore does not function, if the key is used to lock the doors.
- (2) Even after the system has been armed, if the key is used to open the rear hatch, the system will not be activated; when the rear hatch is then closed, moreover, the system will be armed.
- (3) In order to prevent the system's alarm from being accidentally activated by someone remaining in the vehicle, the system is disarmed when, while the SECURITY light is illuminated, a door is unlocked.
- (4) If a door is locked by the keyless method but, in error, a door is not completely or securely closed, the system will be disarmed. If this happens, the doors must be locked once again by the keyless method.
- (5) If the doors are locked while a door is not closed completely, the SECURITY light will go out af 20 seconds, but the system is not armed. If this happens, the doors must be locked once again the keyless method.
- (6) If a door is unlocked with the key while the SECURITY light is illuminated, the system will not be armed.

# 2. DISARMING THE SYSTEM

(1) The system will be disarmed if the key is used to unlock a door.

(2) If the system is armed while the driver is still in the vehicle, the system can be disarmed by inserting the ignition key and turning it to the ACC or ON position.

NOTE

Except when the key is used to unlock the rear hatch, once the system has been disarmed, it cannot be re-armed except by following the arming sequence.

# 3. ACTIVATING THE ALARM

(1) If an attempt is made to open a door, the rear hatch or the hood, without using the key, while the system is armed, the horn will sound intermittently and the headlights will flash on and off for approximately three minutes.

Furthermore, the starter circuit is interrupted at this time also, making starting of the engine

impossible.

(2) If a further attempt at forcible entry is made after the first three-minute alarm has finished, the three-minute alarm will be activated again.

NOTE

- (1) The interruption of the starter circuit will be maintained, once the system has been activated, until it is deactivated. If, however, the key is used, starting is possible even if the alarm is not deactivated.
- (2) An alarm start initiated by an opening of the rear hatch or the hood is limited to when all doors are closed and locked, or the second unauthorized entry after the alarm has occurred one time.

# 4. DEACTIVATING THE ALARM

The alarm is deactivated and the system is disarmed when a door or rear hatch is unlocked with the key. NOTE

Once the alarm has started, the system cannot be deactivated even if the ignition key is turned to the ACC or ON position.

# CHECKING THE SYSTEM OPERATION

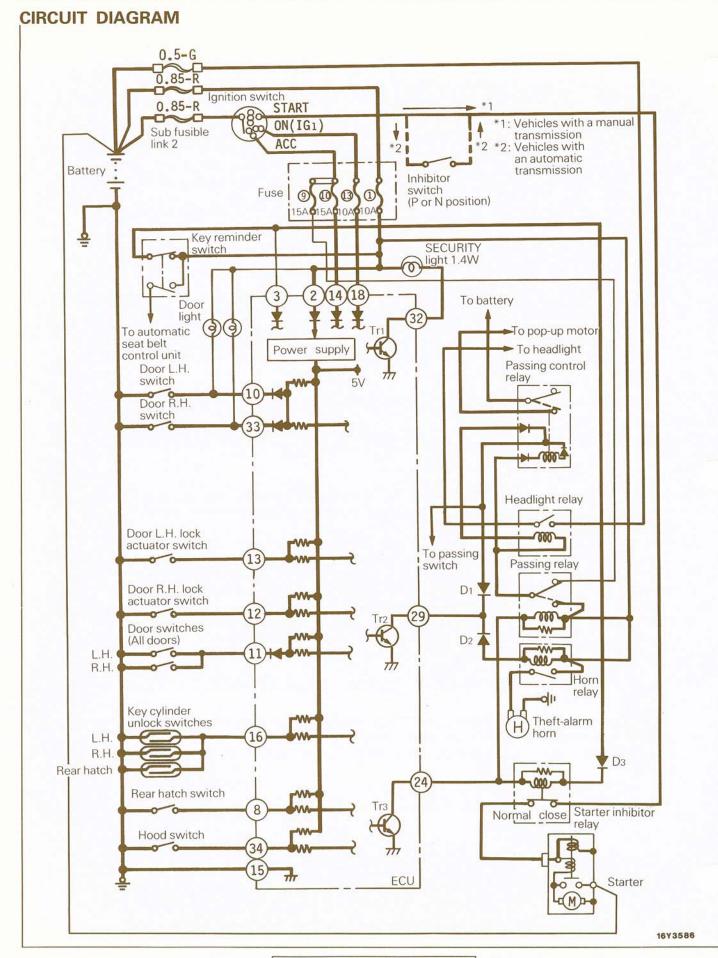
The activation/operation of the system can be checked by following the steps below.

- (1) Turn the ignition key to the ON position and then use the power-window switch to fully open the window at the driver's seat side.
- (2) Turn the ignition key to the LOCK position and then remove the key from the ignition.
- (3) Open only the driver's door, and close all the other doors, as well as the hood and the rear hatch.

(4) Lock the driver's door by the keyless lock method.

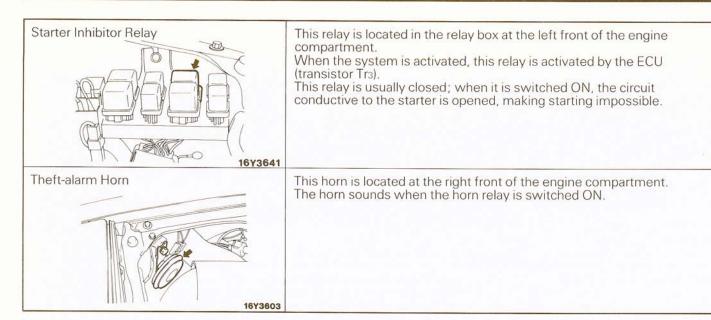
- (5) All doors will then be locked, and the SECURITY light (within the combination meter) will illuminate; check to be sure that illumination stops in about 20 seconds.
- (6) After about two seconds have passed after the SECURITY light illumination stopped, reach through the window of the driver's door, pull up the lock lever to unlock the door, and then open the door.
- (7) Check to be sure that, when the door is opened, the horn starts sounding and the headlights flash on and off.
- (8) To stop the alarm, insert the key into the door's key cylinder and turn the key to the unlock position. NOTE

To check the alarm for the opening of the rear hatch or hood, open the rear hatch (or the hood) by using the remote rear hatch release lever (or the hood release lever), located at the driver's seat side either before the alarm is activated by the opening of a door, or after the finish of the first three-minute alarm.



# **COMPONENT PARTS AND FUNCTION**

| Electronic Control Unit (ECU)   | Controls the system based on the various input signals. Control steps  1 Arming the system 2 Disarming the system 3 Activating the alarm 4 Deactivating the alarm  Located at the combination meter. The SECURITY light illuminates when the alarm system is set to arm; the illumination stops after about 20 seconds, thus informing the driver that the system is now armed. The illumination ON/OFF of this light are controlled by the ECU (transistor Tr1), and power is supplied, through fuse No.1, from the battery. |  |  |
|---|---|--|--|
| SECURITY Light  SECURITY Light  SECURITY Light                                    |   |  |  |
| Key Cylinder Unlock Switch (Doors) (Rear hatch)  Magnetic Magnetic shield 16Y3604 | Located at the key cylinders of the doors and the rear hatch. When the key is inserted into the cylinder and turned to a fixed angle or more toward the unlock position, a ground signal is sent to the ECU. The ECU functions to disarm or deactivate the system according to this signal.   |  |  |
| Rear Hatch Switch   | Located in the lock mechanism for the rear hatch. The switch detects the open/close condition of the rear hatch. When the rear hatch is opened, an ON (ground) signal is sent to the ECU, and, when it is closed, an OFF (HIGH) signal is sent to the ECU, for arming, disarming or activating the system.  |  |  |
| Hood Switch   | Located at the front left of the hood. It detects the open/close condition of the hood. When the hood is opened, this switch is ON, and a ground signal is sent to the ECU. If the signal is input to the ECU when the system is in the armed condition, the ECU functions to activate the alarm.   |  |  |
| Horn Relay  | Located at the left part of the engine compartment. The relay is activated by the ECU (transistor Tr2) when the system is activated to alarm.  When this relay is ON, the theft-alarm horn begins to sound. The power for this relay is supplied, through the fuse No.1, from the battery.  |  |  |
| Passing Relay   | Located at the left front of the dash panel. When the system is in its activated state, this relay is activated on command from the ECU (transistor Tr3). When this relay is activated, the circuit to the passing control relay and headlight relay is completed. The power for this relay is supplied, through the fuse No.1, from the battery.   |  |  |

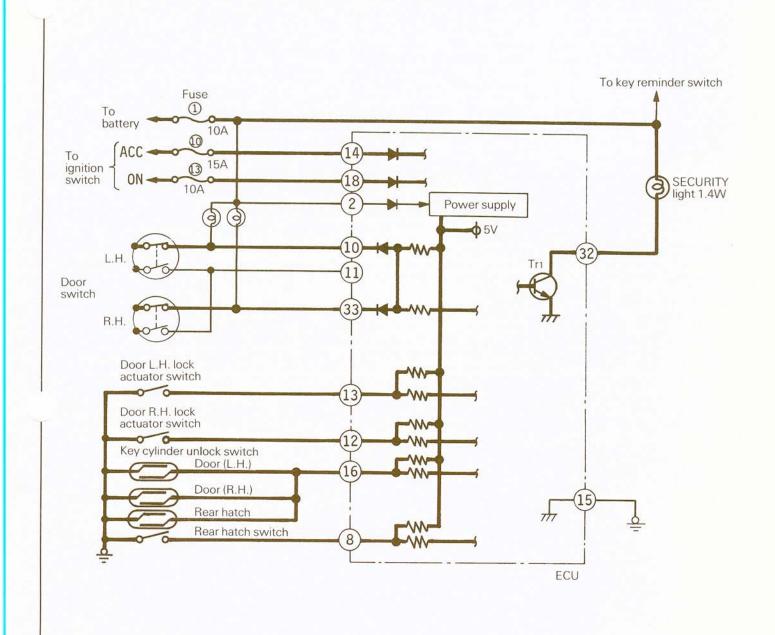


The following components also constitute the theft-alarm system.

| Door Switch                                   | Left         | These switches detect the open/close condition of the doors. (This is a condition for arming the system.)  |  |  |
|---|--------------|--|--|--|
|   | Right        | One of these switches is located at each door. They detect the open or closed condition of the doors, and when any one of them is opened, a ground signal is sent to the ECU.  When this signal is input while the system is armed, the ECU functions to activate the alarm.   |  |  |
|   | All doors    |  |  |  |
| Door Lock Act<br>(left and right)             | uator Switch | These switches detect the locked/unlocked condition of the doors. (This is a condition for arming or disarming the system.)  |  |  |
| Ignition ON position                          |              | This switch sends a HIGH signal to the ECU when the ignition key is  |  |  |
| Switch  | ACC position | at the ON or ACC position. (This is a condition when arming or disarming the system.)  |  |  |
| Key-reminder Switch<br>(for lighting monitor) |              | When the system is activated, the starter circuit is inhibited. By inserting the key in the ignition switch, the power to the starter inhibitor relay is cut, and the engine can be started.   |  |  |
| Headlight Relay                               |              | This relay, in the same way as the horn relay, is activated by the ECU (transistor Tr <sub>2</sub> ) when the system is activated and the alarm starts. When this relay is switched ON, the headlights (upper or lower) are switched ON.  This relay's power is supplied, through the sub-fusible link from the battery. |  |  |
| Passing Control Relay                         |              | Located at the center of the instrument panel inside. This relay is activated by the ECU (transistor Tr <sub>2</sub> ) when the system is in its activated state and the passing control relay is closed, thus completing the circuit beginning with fuse No. 1. This causes the headlights to rise and flash.           |  |  |

# TROUBLESHOOTING GUIDE

# 1. ARMING / DISARMING RELATIONSHIP

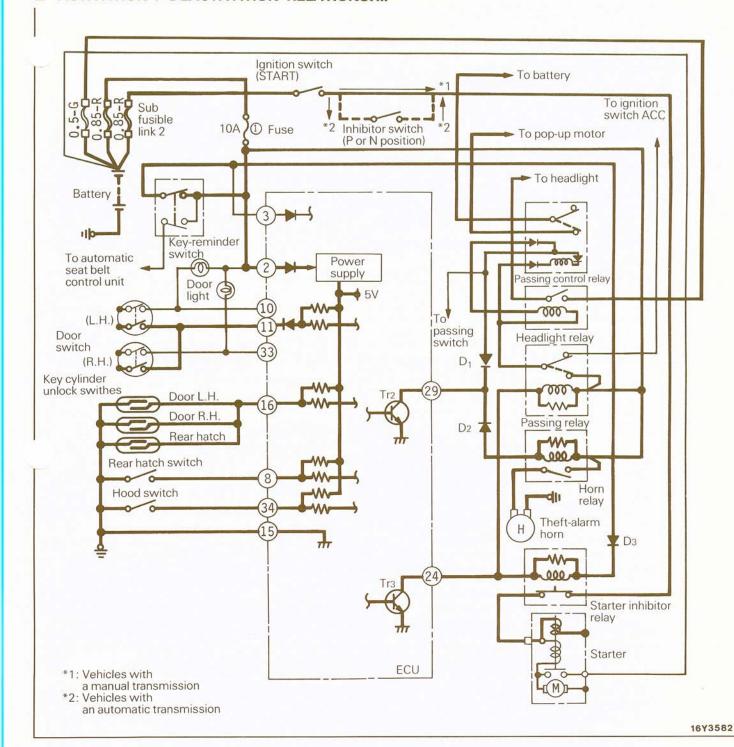


16Y3585

| Trouble symptom  | Cause   | Check method                                 | Remedy   |
|--|---|--|--|
| The system is not armed<br>(The SECURITY light doesn't<br>illuminate, and the alarm  | Damaged or disconnected wiring of ECU power supply circuit  | Check by using check chart No. 1 (P.8-299).  | Replace the fuse No.1 or repair the harness.   |
| doesn't function.) 'ne central door locking, stem functions normally. If the central locking system does not function normally, refer to P.8-276.) | Damaged or disconnected wiring of door switch input circuit | Check by using check chart No. 12 (P.8-310). | Repair the harness or replace the door switch. |

| Trouble symptom  | Cause   | Check method   | Remedy   |  |
|--|---|--|--|--|
| The arming procedures are followed, but the SECURITY light does not illuminate. (There is an alarm, however, | Damaged or disconnected wiring of SECURITY light power supply or drive circuit        | Check by using check chart No. 25 (P.8-326).   | Replace the fuse No. 1 or repair the harness.              |  |
| when an alarm test is conducted after about 20 seconds have pas-   | Blown SECURITY light bulb   |  | Replace the bulb.  |  |
| sed.)  | Malfunction of the ECU  | _  | Replace the ECU.   |  |
| The alarm sounds in error when, while the system is armed, the rear hatch lock is unlocked by using the key. | Damaged or disconnected wiring of rear hatch key cylinder unlock switch input circuit | If input checks (P.8-294) indicate a malfunction, check by using check chart No. 24 (P.8-325). | Repair the harness or replace the rear hatch key cylinder. |  |
|  | Malfunction of the rear<br>hatch key cylinder unlock<br>switch                        |  |  |  |
|  | Malfunction of the ECU  | -  | Replace the ECU.   |  |
| The system is not disarmed when, while armed, a door is opened by using the key. (Alarm sounds in error.)    | Damaged or disconnected wiring of door key cylinder unlock switch input circuit       | If input checks (P.8-294) indicate a malfunction, check by using check chart No. 24 (P.8-325). | Repair the harness or replace the key cylinder.            |  |
|  | Malfunction of the door key cylinder unlock switch                                    |  |  |  |
|  | Malfunction of the ECU  | <u> </u>   | Replace the ECU.   |  |

# 2. ACTIVATION / DEACTIVATION RELATIONSHIP



| Trouble symptom  | Cause   | Check method   | Remedy |
|--|---|--|--------|
| There is no alarm when, as an alarm test, a door is opened without using the key. (The arming and disarming are mal, and the alarm is ivated when the rear hatch or hood is opened.) | Damaged or disconnected<br>wiring of door switch<br>(all doors) input circuit | f door switch indicate a malfunction, check by using check |        |
|  | Malfunction of the door switch  | - chart No. 10 (P.8-308).                                  |        |
|  |   | Malfunction of the ECU.                                    |        |

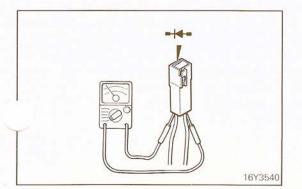
| Trouble symptom   | Cause   | Check method  | Remedy  |
|---|---|---|---|
| There is no alarm when, as an alarm test, the rear hatch is opened without using the key. (The alarm is activated,  | Damaged or disconnected wiring of rear hatch switch input circuit   | If input checks (P.8-294) indicate a malfunction, check by using check chart No. 26 (P.8-327).  | Repair the harness or replace the rear hatch switch.            |
| however, by opening a door.)  | Malfunction of the rear hatch switch  |   |   |
|   | Malfunction of the ECU  | -   | Replace the ECU.  |
| There is no alarm when, as an alarm test, the hood is opened from within the vehicle. (The alarm is activated,  | Damaged or disconnected wiring of hood switch input circuit   | If input checks (P.8-294), indicate a malfunction, check by using check chart No. 27 (P.8-328). | Repair the harness or replace the hood switch.                  |
| however, by opening a door.)  | Malfunction of the hood switch  |   |   |
|   | Malfunction of the ECU  |   | Replace the ECU.  |
| Engine would not start. [Engine starting is possible when the starter inhibitor relay is in the switched-off (normally closed) condition, with the ECU harness connector disconnected.]   | There is a short-circuit of<br>the starter inhibitor relay<br>drive circuit and a short-<br>circuit of the key-reminder<br>switch at the same time. | Check by using check chart No. 28 (P.8-330).  | Repair the harness,<br>and replace the key-<br>reminder switch. |
| The headlights flashes on and off without popping-up when, as an alarm test, a door or the rear hatch is opened without using the key or the hood is opened from within the vehicle. (The headlights can, however, be popped-up and flashed by the passing switch.) | Damaged or disconnected wiring of passing relay power supply circuit  | Check by using check chart No.29 (P.8-332).   | Repair the harness or replace the passing relay.                |
| When, as a test of the alarm,<br>a door or the rear hatch is<br>opened without using the key,<br>or the hood is opened from   | Damaged or disconnected wiring of passing relay drive circuit   | Check by using check chart No. 28 (P.8-330).  | Repair the harness or replace the passing relay                 |
| within the vehicle, the theft<br>alarm horn sounds but the<br>headlights neither rise nor   | Damaged or disconnected wiring of passing relay power supply circuit  | Check by using check chart No. 29 (P.8-332).  |   |
| flash.<br>The headlights can, however,<br>pe switched ON by using the<br>passing switch.)   | Damaged or disconnected wiring of diode D <sub>1</sub>  | Check by using check chart No. 30 (P.8-333).  | Repair the harness or replace the diode (D1)                    |

| Trouble Symptom  | Cause  | Check method   | Remedy  |  |
|--|--|--|---|--|
| The headlights flash during an alarm test, but the theft-alarm horn does not sound.  | Damaged or disconnected wiring of horn relay drive circuit                 | Check by using check chart No. 30 (P.8-333).   | Repair the harness or replace the diode D2 or the horn relay. |  |
|  | Damaged or disconneted wiring of diode D <sub>2</sub> .                    |  |   |  |
|  | Malfunction of the horn relay  |  |   |  |
|  | Damaged or disconnected wiring of horn relay power supply circuit          | Check by using check chart No. 31 (P.8-334).   |   |  |
|  | Damaged or disconnected wiring of theft-alarm horn drive circuit           | Check by using check chart No. 32 (P.8-336).   | Repair the harness or replace the theft-alarm horn.           |  |
|  | Malfunction of the theft-<br>alarm horn                                    |  |   |  |
| The system is not deactivated when, during an alarm test in which the alarm is intentionally activated, the door or rear hatch | Damaged or disconnected wiring of key cylinder unlock switch input circuit | If input checks (P.8-294) indicate a malfunction, check by using check chart No. 24 (P.8-325). | Repair the harness or replace the key cylinder.               |  |
| is unlocked by using the key.<br>(The system also cannot be disarmed.)   | Malfunction of the key cylinder unlock switch                              |  |   |  |
|  | Malfunction of the ECU   | _  | Replace the ECU.  |  |
| The theft-alarm horn sounds when the passing switch is operated with the ignition switch at ACC or ON position.                | Short-circuit of diode D <sub>1</sub>                                      | Check the diode.   | Replace the diode D <sub>1</sub> .                            |  |

### ECU: Electronic Control Unit

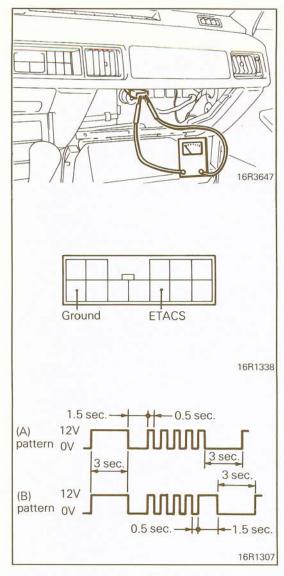
### NOTE

- (1) If there is abnormally excessive play in the installation of the key cylinder unlock switch of the trunk and for doors, or if there is improper installation, or if there is a malfunction of the switch itself, the signals to disarm the system and to deactivate the alarm won't be sent to the ECU. In this instance, after the system has been armed the alarm will be activated even if the door is opened by using the
- (2) If there is a malfunction of the key cylinder unlock switch system (damaged or disconnected wiring, or short-circuit), thus making it necessary to prevent an incorrect (accidental) alarm, the system should not be armed by using the key to lock when all the doors are closed.



# Inspection of Diode

Using the ohmmeter, check the continuity by contacting the probes to the diode connector for two directions. If the continuity exists only in one direction, the diode is normal. If the continuity exists in both directions, or there is no continuity, the diode is faulty.



# INSPECTION PROCEDURE BY INPUT CHECK SYSTEM

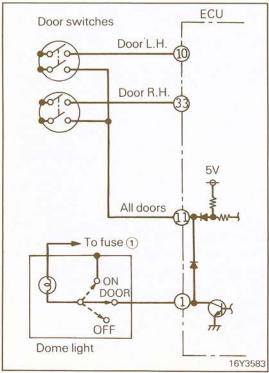
- 1. Open the glove compartment and connect a voltmet between terminal for "ETACS" and terminal for ground.
- 2. Check to be sure that voltage should be output repeatedly in the (A) or (B) pattern shown in the figure at the left when the ignition key is turned to the ON or ACC position.

### NOTE

If there is no output of a voltage pattern at all, check the ECU power-supply and ground circuits as described in check chart No. 1 (Refer to P.8-299).

If there is still no output of voltage pattern despite the fact that the power-supply circuit is normal, check for a disconnected or damaged harness of the diagnosis output terminal, or a short-circuit.

Check each switch or sensor separately, as described below.



# 1. DOOR SWITCHES (ALL DOORS)

- (1) Turn the ignition key to LOCK.
- (2) Set the dome light switch to the DOOR position.
- (3) Check to be sure that the dome light is switched OFF when all doors are closed.

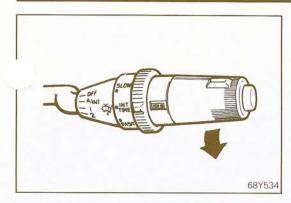
### NOTE

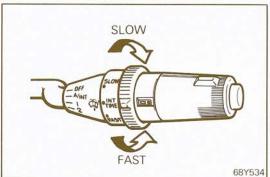
If the dome light remains illuminated even though all doors are closed, either there is a short-circuit at one of the door switches, or there is a malfunction of the ECU.

- (4) With all doors closed, open only the left door. Check to be sure that, at the moment when the door is opened, the dome light lights and the indication of the voltmeter connected to the diagnosis terminal moves by about 2V or more.
  - If it does not, the problem is damaged or disconnected wiring of the left door's door switch input circuit.
- (5) Check the right door in the same way.

### NOTE

If a malfunction is found as a result of the input checking, check according to check chart No. 10 (P.8-308).





### 2. A/INT SWITCH

- (1) Turn the ignition key to the LOCK position and open the doors.
- (2) Check to be sure that the indication of the voltmeter connected to the diagnosis terminal moves by about 2V or more when the wiper switch is set to the A/INT position.
- (3) If it does not, check as described in check chart No. 3 (Refer to P.8-301).

# 3. FAST/SLOW SWITCH

- (1) Turn the ignition key to ON.
- (2) Check to be sure that the buzzer sounds when the FAST or SLOW switch is switched ON. If the buzzer does not sound although the buzzer circuit

is normal, the problem is damaged or disconnected wiring, or a short-circuit, of the FAST or SLOW switch input circuit.

# NOTE

- (1) The buzzer circuit can be considered to be normal if the buzzer sounds when another switch (CANCEL or defogger) is used.
- (2) If a malfunction is found as a result of the input checking, check according to check chart No. 6 (Refer to P.8-304).





### 4. CANCEL SWITCH

- (1) Turn the ignition key to ON.
- (2) Check to be sure that the buzzer sounds when the CANCEL switch is pushed.
- (3) If there is a malfunction of the buzzer circuit, check to be sure that the indication of the voltmeter connected to the diagnosis terminal moves by about 2V or more by pushing the CANCEL switch with the ignition key in LOCK position and a door opened.

### NOTE

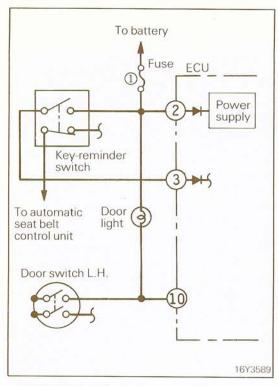
If a malfunction is found as a result of the input checking, check according to check chart No. 6 (Refer to P.8-304).

### 5. DEFOGGER SWITCH

Check in the same way as CANCEL switch as shown above.

### NOTE

If a malfunction is found as a result of the input checking, check according to check chart No. 19 (Refer to P.8-320).

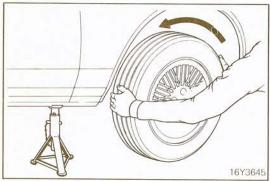




- (1) Turn the ignition key to the LOCK position and open one of the doors.
- (2) Check to be sure that the indication of the voltme connected to the diagnosis terminal moves by about 2 v or more when the ignition key is taken from the key cylinder.
- (3) If it does not, check as described in check chart No. 17 (Refer to P.8-316).

NOTE

Check the key-reminder switch by cheking to be sure that the alarm buzzer sounds when the lighting switch is switched ON while the ignition key is not inserted, or when the left door is opened while the ignition key is inserted; by making these checks, the key-reminder switch itself can be checked.



# 7. VEHICLE-SPEED SENSOR

- (1) Turn the ignition key to the LOCK position and open one of the doors.
- (2) Jack up the rear end and check to be sure that the indication of the voltmeter connected to the diagnos terminal moves by about 2V for one second or mo, when a tire is rotated at a speed of one rotation per second.
- (3) If it does not, check as described in check chart No. 7 (Refer to P.8-305).



- (1) Remove the ignition key and open one of the doors.
- (2) Check to be sure that the indication of the voltmeter connected to the diagnosis terminal moves by about 2V or more when the door lock lever of the left door is set from the locked condition to the unlocked condition.

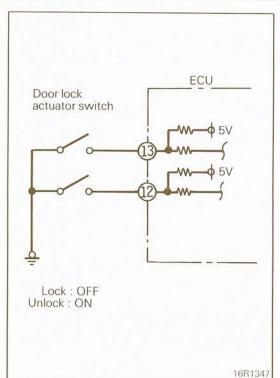
NOTE

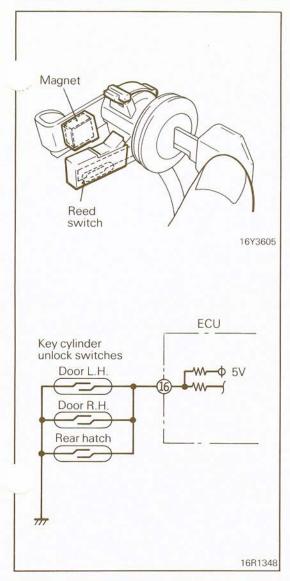
If the central door locking system functions at this time, the left door actuator switch can be considered to be normal without making an input check.

(3) Check the right door in the same way.

NOTE

If a malfunction is found as a result of the input checking, check according to check chart No. 13 (Refer to P.8-311).



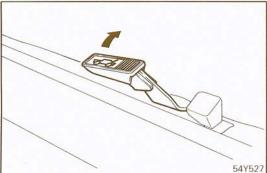




- (1) Turn the ignition key to the LOCK position and open one of the doors.
- (2) Check to be sure that the indication of the voltmeter connected to the diagnosis terminal moves by about 2V or more when the key is inserted into the left door's key cylinder and turned to the unlocked position. If it does not, the problem is damaged or disconnected wiring, or a short-circuit, of the left door's key cylinder unlock switch input circuit.
- (3) Check the right door lock and the rear hatch in the same way.

NOTE

- If there is a short-circuit of the key cylinder unlock switch input circuit, all key cylinder input checks will be no good.
- (2) If a malfunction is found as a result of the input checking, check according to check chart No. 24 (Refer to P.8-325).



# 54Y542

### 10. REAR HATCH SWITCH

- (1) Turn the ignition key to the LOCK position and open one of the doors.
- (2) Check to be sure that the indication of the voltmeter connected to the diagnosis terminal moves by about 2V or more when the rear hatch is opened by using the remote rear hatch release lever (located at the driver's seat side).
- (3) If it does not, check as described in check chart No. 26 (Refer to P.8-327).

# 11. HOOD SWITCH

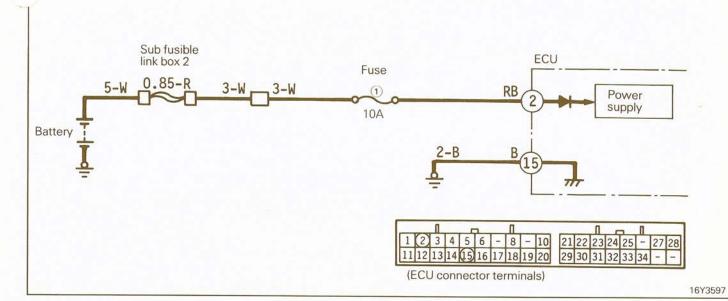
- (1) Turn the ignition key to the LOCK position and open one of the doors.
- (2) Check to be sure that the indication of the voltmeter connected to the diagnosis terminal moves by about 2V or more when the engine hood is opened by using the hood release lever.
- (3) If it does not, check as described in check chart No. 27 (Refer to P.8-328).

# CHECKING CIRCUIT INDEX OF CHECK CHART

N08QOAB

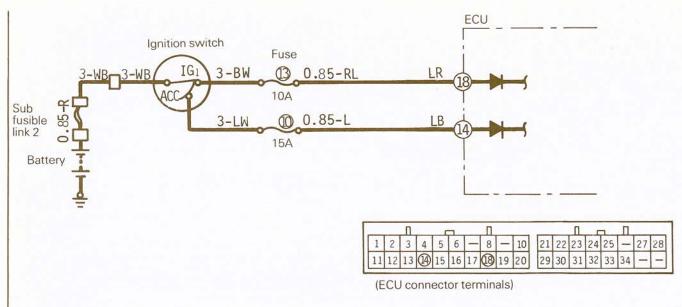
| Chart No. | Circuit name   | Page N |
|-----------|--|--------|
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| 3         | A/INT switch input circuit   | 8-301  |
| 4         | Wiper motor drive circuit  | 8-302  |
| 5         | Wiper relay drive circuit  | 8-303  |
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| 31        | Horn relay power-supply circuit  | 8-334  |
| 32        | Theft-alarm horn drive circuit   | 8-336  |

# 1. ECU Power Supply and Ground Circuit



| Step | Check method                                 |  | Judgement  |                                |   |                     |
|------|--|--|------------|--------------------------------|---|---------------------|
|      | Condition                                    | Check object                                       | Normal     | Malfunction                    | Cause                                     | Remedy              |
| 1    |  | Battery<br>voltage                                 | OV         | Fuse ① damaged or disconnected | Replace the fuse.                         |                     |
|      |  |  |            |                                | Harness damaged or disconnected           | Repair the harness. |
| 2    | Disconnect<br>ECU's<br>harness<br>connector. | Continuity of ECU<br>ground circuit<br>(15-Ground) | Continuity | $\infty \Omega$                | Harness dam-<br>aged or discon-<br>nected | Repair the harness. |

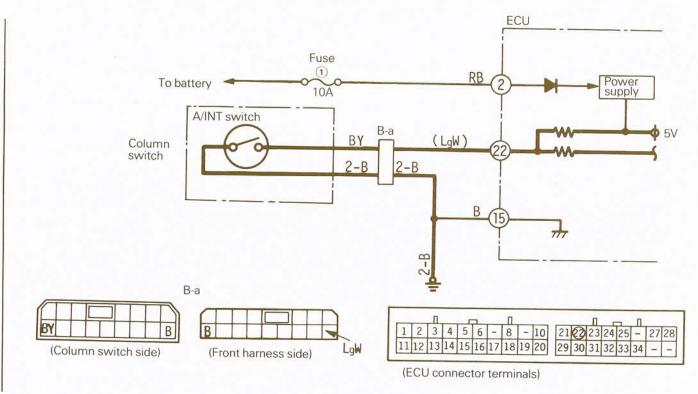
# 2. Ignition Switch (ON, ACC) Input Circuit



16Y3633

| Step | Check method                               |                                     | Judgement          |                                 | 0  |                     |
|------|--|-------------------------------------|--------------------|---------------------------------|--|---------------------|
|      | Condition                                  | Check object                        | Normal             | Malfunction                     | - Cause                                  | Remedy              |
| 1    |  | ECU terminal voltage<br>(14-Ground) | Battery<br>voltage | OV                              | Fuse @ dam-<br>aged or discon-<br>nected | Replace the fuse.   |
|      |  |                                     |                    |                                 | Harness damaged or disconnected          | Repair the harness. |
| 2    | IG SW: ON ECU terminal voltage (18-Ground) | Battery<br>voltage                  | OV                 | Fuse 13 damaged or disconnected | Repair the harness.                      |                     |
|      |  |                                     |                    |                                 | Harness damaged or disnon-<br>nected     | Repair the harness. |

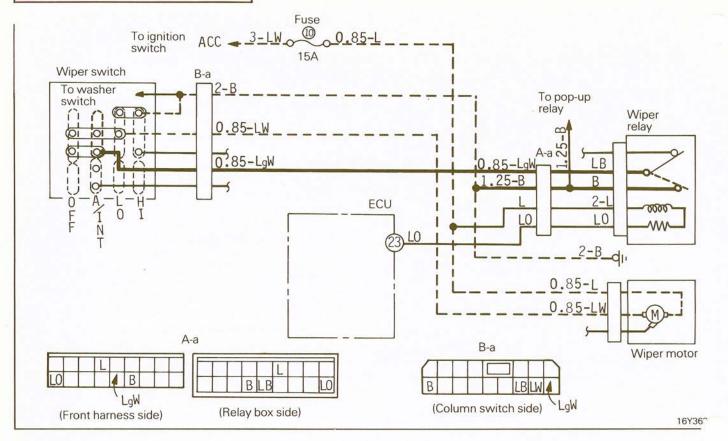
# 3. A/INT Switch Input Circuit



16Y3629

| Step | Check method   |   | Judgement                                      |  |                                 |                                |
|------|--|---|--|--|---------------------------------|--------------------------------|
|      | Condition  | Check object                                  | Normal   | Malfunction  | Cause                           | Remedy                         |
| 1    | IG SW: OFF B-a Connector (column switch side) terminals (BY-B)  Continuity between B-a connector (column switch side) terminals (BY-B) | B-a connector (col-                           | $\Omega \propto \leftrightarrow \Omega \Omega$ | Remains $\infty \Omega$ .  | A/INT switch or harness         | Replace the part or repair the |
|      |  |   | Remains $0\Omega$ .                            | damaged or<br>disconnected,<br>or short-<br>circuit  | harness. (Refer<br>to P.8-201.) |                                |
| 2    | IG SW: OFF B-a connector: ECU connector: separation A/INT switch: ON ↔ OFF   | $\Omega \Omega \leftrightarrow \Omega \Omega$ | Remains $\infty \Omega$ .                      | Damaged or dis-<br>connected wir-<br>ing of B-a con-<br>nector B line, or<br>of LgW line<br>between ECU<br>and B-a | Repair the harness.             |                                |
|      |  |   | Remains $0\Omega$ .                            | Short-circuit of<br>LgW line<br>between ECU<br>and A-a   | Repair the harness.             |                                |

# 4. Wiper Motor Drive Circuit



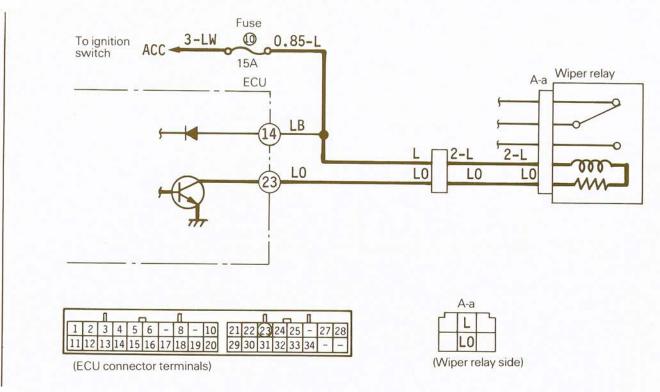
# NOTE

The check table shown below is based upon the assumption that the circuit indicated by the broken line (- - - -) in the figure above is normal. [The wipers operate normally when the wiper switch is at the "1" (low speed) position.]

| Step | Check method   |  | Judgement            |                                 | C   |   |
|------|--|--|----------------------|---------------------------------|---|---|
|      | Condition  | Check object   | Normal               | Malfunction                     | Cause                                     | Remedy  |
| 1    | Wiper switch: A-<br>A/INT ↔ OFF B-   | Continuity between<br>A-a connector and<br>B-b connector<br>(LgW-LW) | $\Omega \sim \Omega$ | Remains $0\Omega$ .             | Malfunction of<br>the wiper<br>switch     | Replace the wiper<br>switch. (Refer to<br>P.8-201.) |
|      |  |  |                      | Remains $\infty \Omega$ .       | Harness dam-<br>aged or discon-<br>nected | Repair the harness.                                 |
| 2    | Separate the ECU's harness connector; then short-circuit terminal No. 23 (body harness side LO line) to activate the wiper relay. IG SW: ACC | A-a connector and  | 0Ω                   | $\infty\Omega$                  | Malfunction of the wiper relay            | Replace the wiper relay.                            |
|      |  |  |                      | Harness damaged or disconnected | Repair the harness.                       |   |

IG SW: Ignition Switch, ECU: Electronic Control Unit

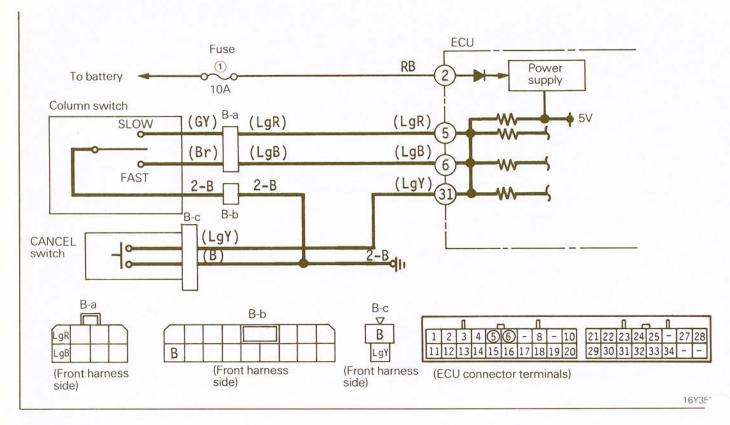
# 5. Wiper Relay Drive Circuit



16Y3596

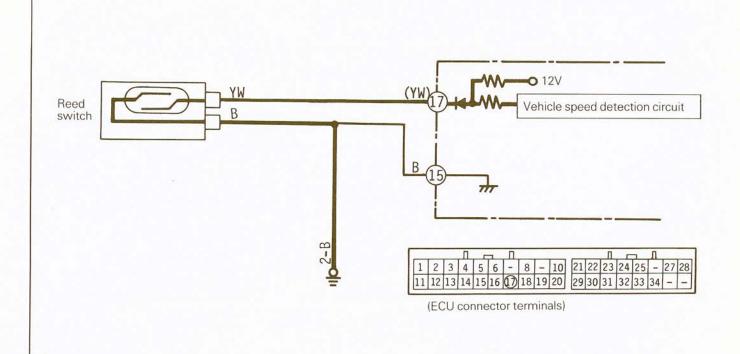
| Step | Check method                                     |  | Judgement          |   |  | D .                             |
|------|--|--|--------------------|---|--|---------------------------------|
| Step | Condition  | Check object   | Normal             | Malfunction   | Cause  | Remedy                          |
| 1    | IG SW: ACC                                       | A-a connector (har-<br>ness side) terminal<br>voltage (L-Ground) | Battery<br>voltage | OV  | Fuse (10) damaged or disconnected                              | Replace the fuse.               |
|      |  |  |                    |   | Harness dam-<br>aged or discon-<br>nected, or<br>short-circuit | Repair the harness.             |
| 2    | Separate the ECU's harness connector. IG SW: ACC | voltage  | Battery<br>voltage | OV  | Damaged or dis-<br>connected wir-<br>ing of relay coil         | Repair the wiper control relay. |
|      |  |  |                    | Harness (LO<br>line) damaged<br>or discon-<br>nected, or<br>short-circuit | Repair the harness.  |                                 |

### 6. SLOW, FAST, CANCEL Switch Input Circuit



| Ct   | Che   | ck method  | Judg                                    | gement  | Course   | Remedy  |
|------|---|--|---|---|--|---|
| Step | Condition   | Check object   | Normal                                  | Malfunction   | Cause  | Hemedy  |
| 1    | B-a, B-b B-a, B-b or B-c connector: SLOW: GY-Group in the section of the section | connector terminals<br>  SLOW: GY-Ground<br>  FAST: Br-Ground                | $0\Omega \leftrightarrow \infty \Omega$ | Remains $\infty \Omega$ .   | Damaged or dis-<br>connected wir-<br>ing of switch or<br>harness                       | Replace the column<br>switch or CANCEL<br>switch (refer to<br>P.8-201, 221) or<br>repair the harness. |
|      |   |  |   | Remains $0\Omega$ .   | Short-circuit of switch or harness   |   |
| 2    | IG SW: OFF B-a, B-b or B-c connector: connection ECU connector: separation FAST, SLOW or CANCEL SW: ON ↔ OFF  Continuity between the ECU terminal and ground (SLOW: 5-Ground CANCEL: 31-Ground )  | the ECU terminal and ground (SLOW: 5-Ground FAST: 6-Ground CANCEL: 31-Ground | $\Omega \hookrightarrow \infty \Omega$  | Remains $\infty \Omega$ .   | Damaged or disconnected wiring between ECU and B-a (LgR or LgB) or B-c (LgY) connector |   |
|      |   |  |   | Remains $\infty \Omega$ .   | Damaged or dis-<br>connected wiring<br>of B-b (B) or<br>B-c (B) connector              |   |
|      |   |  | Remains $0\Omega$ .                     | Short-circuit be-<br>tween ECU and<br>B-a or B-c (LgR,<br>LgB or LgY) |  |   |

# 7. Vehicle-speed Sensor Circuit

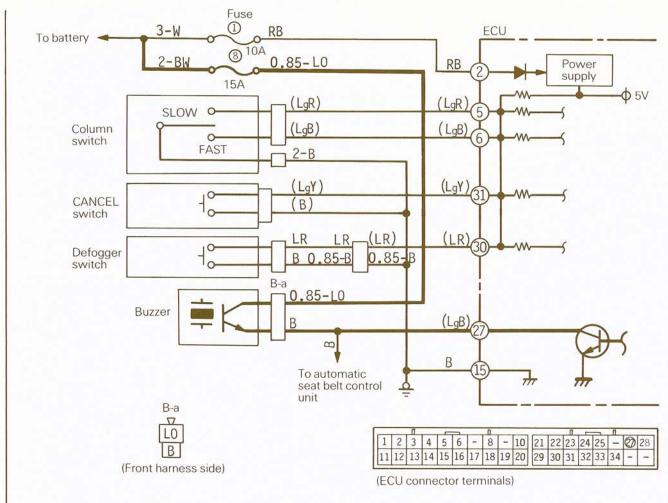


16Y3635

| Step | Check method  |  | Judgement       |   | 6   |        |
|------|---|--|-----------------|---|---|--------|
| Step | Condition   | Check object                                   | Normal          | Malfunction   | Cause   | Remedy |
| 1    | Disconnect the speedometer cable where con-  Continuity between ground and ECU terminal when inner cable of speedo- | $\Omega\Omega \leftrightarrow \infty\Omega$    | $\infty \Omega$ | Reed switch or<br>harness dam-<br>aged or discon-<br>nected | Replace the speedo<br>meter (refer to<br>P.8-166) or repair<br>the harness. |        |
|      | nected to the<br>transmission.<br>IG SW: OFF<br>ECU connec-<br>tor:<br>separation                                   | meter cable is<br>turned slowly<br>(17-Ground) |                 | ΟΩ  | Reed switch or<br>harness short-<br>circuit                                 |        |

IG SW: Ignition Switch, ECU: Electronic Control Unit

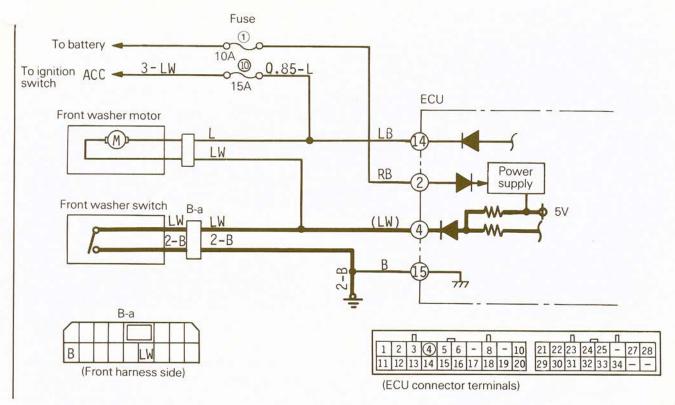
#### 8. Buzzer Circuit



16Y3634

| Cton | Check method   |                            | Jud                | Judgement                       |  | Remedy              |
|------|--|----------------------------|--------------------|---------------------------------|--|---------------------|
| Step | Condition  | Check object               | Normal             | Malfunction                     | Cause  | nemedy              |
| 1    | Separate the B-a connector (front harness side) terminal voltage (LO-Ground) | (front harness side) ter-  | Battery<br>voltage | OV                              | Fuse (8) damaged or disconnected   | Replace the fuse.   |
|      |  |                            |                    | Harness damaged or disconnected | Repair the harness.  |                     |
| 2    | Connect the B-a connector. Separate the ECU's harness connector.             | connector terminal voltage | Battery<br>voltage | OV                              | Damaged or dis-<br>connected wir-<br>ing of harness<br>between B-a<br>connector<br>and ECU | Repair the harness. |
|      |  |                            |                    | Malfunction of the buzzer       | Check the buzzer.<br>(Refer to P.23-124  |                     |

#### 9. Washer Switch Input Circuit

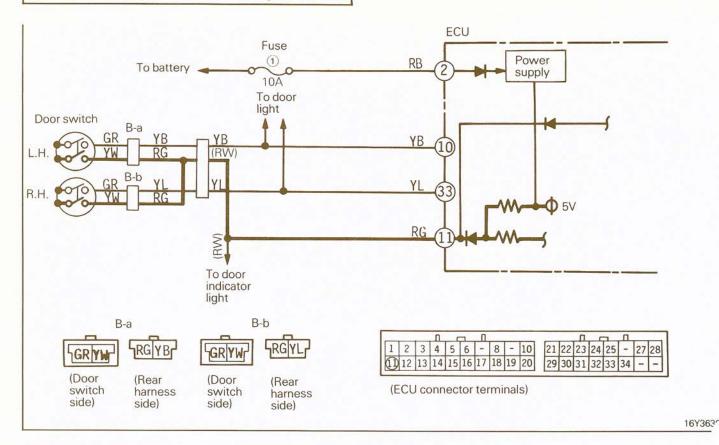


16Y3632

| Cton | Check method  |                             | Judgement                                      |   |   | Downada  |
|------|---|-----------------------------|--|---|---|--|
| Step | Condition   | Check object                | Normal   | Malfunction   | - Cause   | Remedy   |
| 1    | IG SW: OFF B-a connector: separation Washer switch: ON ↔ OFF  Continuity between B-a connector terminals (LW-B)                                   | B-a connector ter-          | $\Omega \propto \leftrightarrow \Omega \Omega$ | Remains $\infty \Omega$ .                           | Washer switch<br>or harness dam-<br>aged or discon-<br>nected                             | Replace the washer<br>switch (refer to<br>P.8-201) or repair<br>the harness. |
|      |   |                             | Remains $0\Omega$ .                            | Washer switch<br>or harness<br>short-circuit        |   |  |
| 2    | IG SW: OFF B-a connector: connection ECU connector: separation Washer switch: ON ↔ OFF  Continuity between the ECU terminal and ground (4-Ground) | the ECU terminal and ground | $\Omega \hookrightarrow \Omega$                | Remains $\infty \Omega$ .                           | Damaged or disconnected wiring of B-a connector (B line) or between ECU and B-a (LW line) | Repair the harness.  |
|      |   |                             | Remains $0\Omega$ .                            | Short-circuit be-<br>tween ECU and<br>B-a (LW line) |   |  |

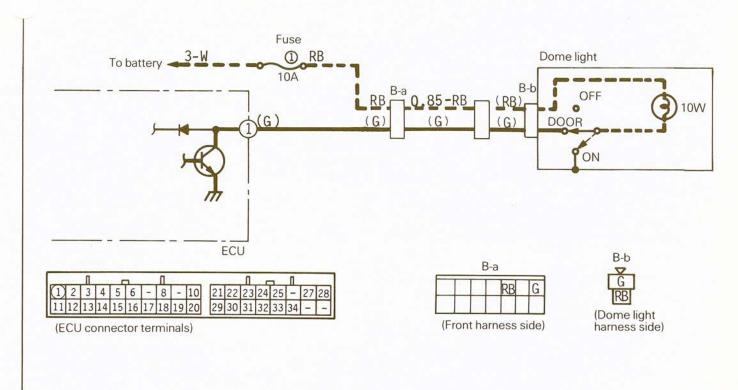
IG SW: Ignition Switch, ECU: Electronic Control Unit

#### 10. Door Switch (All Doors) Input Circuit



| Step | Check method   |   | Judgement                                      |                           |   | Damadu   |
|------|--|---|--|---------------------------|---|--|
| Step | Condition  | Check object  | Normal   | Malfunction               | - Cause   | Remedy   |
| 1    | connectors: E<br>separation n  | Continuity between<br>B-a and B-b con-<br>nector terminals<br>(YW-Ground) | $\Omega \hookrightarrow \Omega$                | Remains $\infty \Omega$ . | Door switch or<br>harness dam-<br>aged or discon-<br>nected | Replace the door<br>switch (refer to<br>P.23-62) or repair<br>the harness. |
|      |  |   |  | Remains $0\Omega$ .       | Door switch or<br>harness short-<br>circuit                 |  |
| 2    | B-a and B-b connectors: connection ECU connector: separation Door switch: ON ↔ OFF | the ECU terminal and each door  | $\Omega \propto \leftrightarrow \Omega \Omega$ | Remains $\infty \Omega$ . | Harness dam-<br>aged or discon-<br>nected                   | Repair the harness   |
|      |  |   | Remains $0\Omega$ .                            | Harness short-<br>circuit |   |  |

## 11. Dome Light Drive Circuit



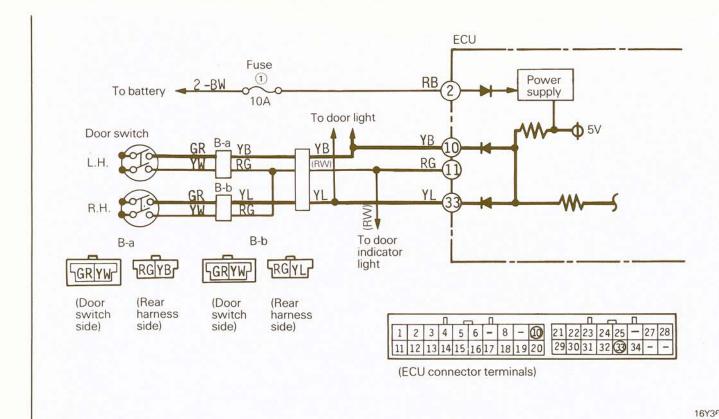
16Y3618

#### NOTE

The check table shown below is based upon the assumption that the circuit (when dome light switch ON) indicated by the broken line (- - - -) in the figure above is normal.

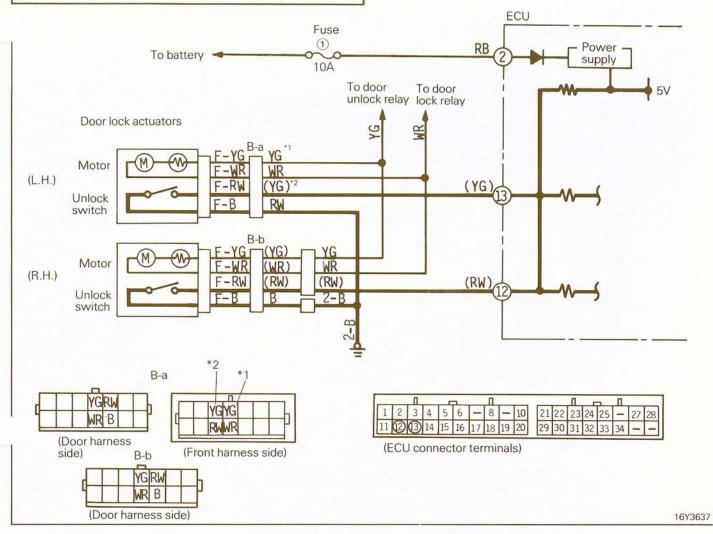
| Ctan | Check method   |   | Jud                            | gement  |   | Daniel  |
|------|--|---|--------------------------------|---|---|---|
| Step | Condition  | Check object                            | Normal                         | Malfunction   | - Cause   | Remedy  |
| 1    | ECU connector: separation Dome light switch: DOOR ↔ OFF          | (rear harness side)<br>terminal voltage | Battery<br>voltage ↔<br>0V     | Remains<br>0V.  | Malfunction of<br>dome light<br>switch, or dam-<br>aged or discon-<br>nected wiring,<br>short-circuit, or<br>of the harness<br>(G) between<br>B-a and B-b | Replace the dome light or repair the harness. |
|      |  |   | Remains<br>battery<br>voltage. | Malfunction of<br>the dome light<br>switch<br>(short-circuit) | Replace the dome light switch.  |   |
| 2    | ECU<br>connector:<br>separation<br>Door light<br>switch:<br>Door | ECU terminal<br>voltage<br>(1-Ground)   | Battery<br>voltage             | OV  | Harness dam-<br>aged or discon-<br>nected   | Repair the harness.                           |

#### 12. Door Switch (L.H. and R.H.) Input Circuit



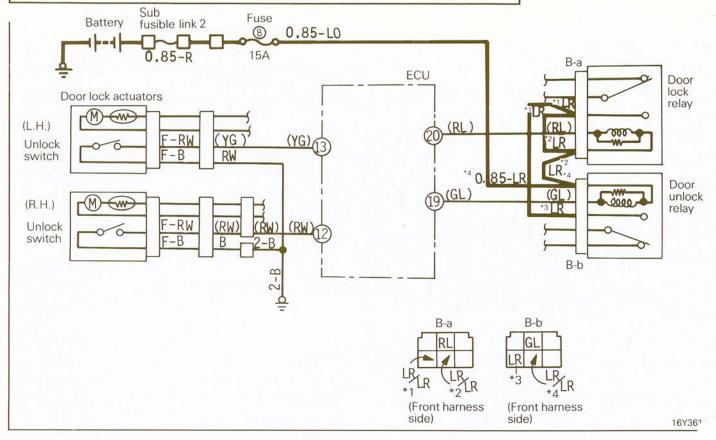
| Cton | Check method  |   | Judgement                                      |                           | Course  | Remedy   |
|------|---|---|--|---------------------------|---|--|
| Step | Condition   | Check object  | Normal   | Malfunction               | Cause   | Remedy   |
| 1    | B-a and B-b<br>connector:<br>separation<br>Door switch:<br>ON ↔ OFF   | Continuity be-<br>tween B-a and B-b<br>connector terminals<br>(GR-Ground) | $\Omega\Omega \leftrightarrow \infty\Omega$    | Remains $\infty \Omega$ . | Door switch or<br>harness dam-<br>aged or discon-<br>nected | Replace the door<br>switch (refer to<br>P.23-62) or repair<br>the harness. |
|      |   |   |  | Remains $0\Omega$ .       | Door switch or<br>harness short-<br>circuit                 |  |
| 2    | B-a and B-b connector: connection ECU connector: separation Door switch: ON ↔ OFF  Continuity between ECU terminal and left and right door switches ground Left door switch: (10-Ground) Right door switch: (33-Ground) | ECU terminal and<br>left and right door                                   | $\Omega \propto \leftrightarrow \Omega \Omega$ | Remains $\infty \Omega$ . | Harness dam-<br>aged or discon-<br>nected                   | Repair the harness.  |
|      |   |   | Remains $0\Omega$ .                            | Harness short-<br>circuit |   |  |

## 13. Door Lock Actuator Switch Input Circuit



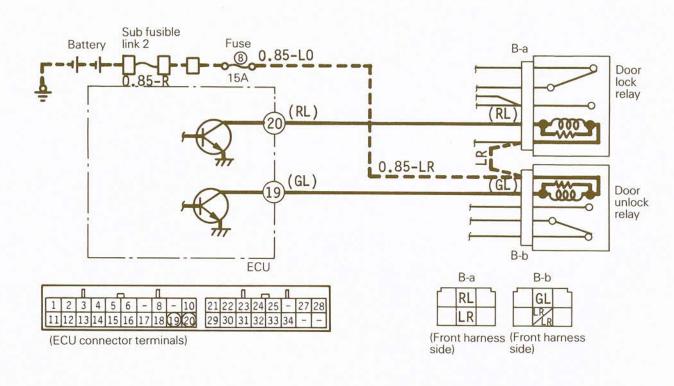
| Cana | Check method   |   | Judgement                       |                           | 0  | Domody   |
|------|--|---|---------------------------------|---------------------------|--|--|
| Step | Condition  | Check object  | Normal                          | Malfunction               | Cause  | Remedy   |
| 1    | B-a or B-b<br>connectors:<br>separation<br>Unlock<br>switch:<br>ON ↔ OFF             | Continuity between<br>B-a or B-b con-<br>nector terminals<br>(RW-Ground)                        | $\Omega \hookrightarrow \Omega$ | Remains $\infty \Omega$ . | Unlock switch<br>or harness dam-<br>aged or discon-<br>nected  | Check the unlock<br>switch (refer to<br>P.23-72) or repair<br>the harness. |
|      |  |   |                                 | Remains $0\Omega$ .       | Unlock switch<br>or harness<br>short-circuit   |  |
| 2    | B-a and B-b connectors: connection ECU connector: separation Unlock switch: ON ↔ OFF | Continuity between<br>the ECU terminal<br>and ground<br>Left: (13-Ground)<br>Right: (12-Ground) | $0U \leftrightarrow \infty U$   | Remains $\infty \Omega$ . | Damaged or disconnected wiring of B-a and B-b connector (RW or B line) or between ECU and B-a or B-b (YG or RW line) | Repair the harness.  |

# 14. Door Lock Relay and Door Unlock Relay Power-supply Circuit



| Ct   | Check method                       |  | Judgement          |             | Causa   | Devel               |
|------|------------------------------------|--|--------------------|-------------|---|---------------------|
| Step | Condition                          | Check object   | Normal             | Malfunction | Cause   | Remedy              |
|      | B-a and B-b connectors: separation | B-a and B-b con-<br>nector (front<br>harness side)         | Battery<br>voltage | OV          | Fuse ® damaged or disconnected                    | Replace the fuse.   |
|      |                                    | terminal voltage  1LR-Ground LR-Ground LR-Ground LR-Ground |                    |             | Harness damaged or disconnected, or short-circuit | Repair the harness. |

### 15. Door Lock Relay and Door Unlock Relay Drive Circuit



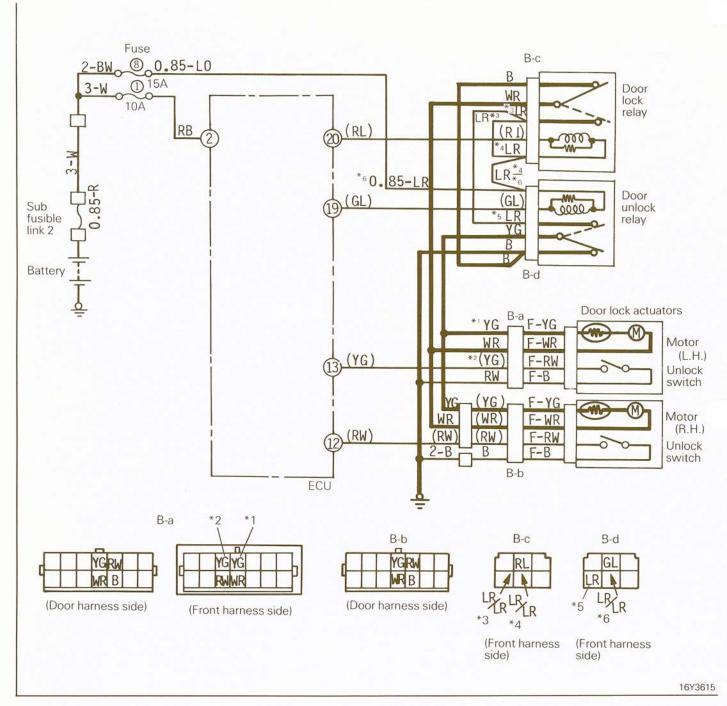
16Y3594

#### NOTE

The check table shown below is based upon the assumption that the circuit (door lock relay and door unlock relay power-supply circuit) indicated by the broken line (- - - -) in the figure above is normal. (Refer to check chart No. 14.)

| Ct   | Check method                |  | Judgement          |             | Course   |  |
|------|-----------------------------|--|--------------------|-------------|--|--|
| Step | Condition                   | Check object   | Normal             | Malfunction | Cause  | Remedy   |
| 1    | Separate the ECU connector. | ECU terminal<br>voltage<br>Door lock relay:<br>(20-Ground) | Battery<br>voltage | 0V          | Damaged or<br>disconnected<br>wiring of relay<br>coil                                | Replace the door lock relay and door unlock relay. |
|      |                             | Door unlock relay:<br>(19-Ground)                          |                    |             | Harness (RL<br>line or GL line)<br>damaged or dis-<br>connected, or<br>short-circuit | Repair the harness.                                |

#### 16. Door Lock Actuator Drive Circuit



#### NOTE

For the check chart shown hereafter, check the circuits described by the heavy lines in the diagram above by forcing the activation of the door lock relay and the door unlock relay.

Measurements of voltage should be made quickly; the time of continuous motor conductivity (relay ON) should not exceed five seconds.

(continued on next page)

### (1) LOCK side

(continued from previous page)

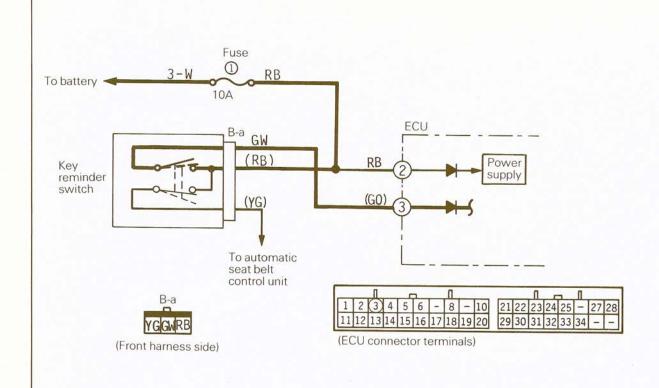
| Cton | Che   | eck method   | Jud                | gement                                    |   | B. (1) (1) (1)  |
|------|---|--|--------------------|---|---|---|
| Step | Condition   | Check object   | Normal             | Malfunction                               | Cause                                       | Remedy  |
| 1    | Separate the ECU's har-<br>ness connec-<br>tor; then  | B-a, B-b and B-c<br>connector (front<br>harness side)<br>terminal voltage  | Battery<br>voltage | OV  | Malfunction of<br>the door lock<br>relay    | Replace the door lock relay.  |
|      | short-circuit<br>terminal<br>No. 20 (front<br>harness side<br>RL line), and<br>activate the<br>door lock<br>relay.        | (WR-Ground)  (WR-Ground)  (Output Description of the control of th |                    | Harness dam-<br>aged or discon-<br>nected | Repair the harness.                         |   |
| 2    | B-a and B-b connectors: separation  Continuity between B-a and B-b connectors (door harness side) terminals (YG-WR)       | B-a and B-b<br>connectors (door<br>harness side)   | Ω                  | $\infty \Omega$                           | Malfunction of<br>the door lock<br>actuator | Replace the door<br>lock actuator.<br>(Refer to GROUP 23<br>BODY – Door.) |
|      |   |  |                    | Harness dam-<br>aged or discon-<br>nected | Repair the harness.                         |   |
| 3    | B-a and B-b connectors: separation  Continuity between B-a and B-b connectors (front harness side) and ground (YG-Ground) | B-a and B-b con-<br>nectors (front   | ΟΩ                 | $\infty \Omega$                           | Malfunction of<br>the door unlock<br>relay  | Replace the door unlock relay.  |
|      |   |  |                    | Harness dam-<br>aged or discon-<br>nected | Repair the harness.                         |   |

JU: Electronic Control Unit

### (2) UNLOCK side

| C    | Check method  |  | Jud                | gement         | Cause                                       | Remedy  |                              |
|------|---|--|--------------------|----------------|---|---|------------------------------|
| Step | Condition   | Check object   | Normal             | · Malfunction  | Cause                                       | Hemedy  |                              |
| 1    | Separate the<br>ECU's har-<br>ness connec-  | B-a, B-b and B-d<br>connector (front<br>harness side)  | Battery<br>voltage |                | Malfunction of<br>the door unlock<br>relay  | Replace the door unlock relay.  |                              |
|      | tor; then short-circuit terminal No. 19 (front harness side GL line), and activate the door unlock relay. | terminal voltage<br>(YG-Ground)  |                    |                | Harness dam-<br>aged or discon-<br>nected   | Repair the harness.   |                              |
| 2    | B-a and B-b<br>connectors:<br>separation  | Continuity between<br>B-a and B-b<br>connectors (door<br>harness side)<br>terminals<br>(YG-WR) | ΟΩ                 | $\infty\Omega$ | Malfunction of<br>the door lock<br>actuator | Replace the door<br>lock actuator.<br>(Refer to GROUP 23<br>BODY – Door.) |                              |
| 3    | B-a and B-b<br>connectors:<br>separation  | Continuity between<br>B-a and B-b con-<br>nectors (front                                       | ΟΩ                 | Ω              | $\infty\Omega$                              | Malfunction of<br>the door lock<br>relay                                  | Replace the door lock relay. |
|      |   | harness side) and<br>ground<br>(WR-Ground)   |                    |                | Harness damaged or disconnected             | Repair the harness.   |                              |

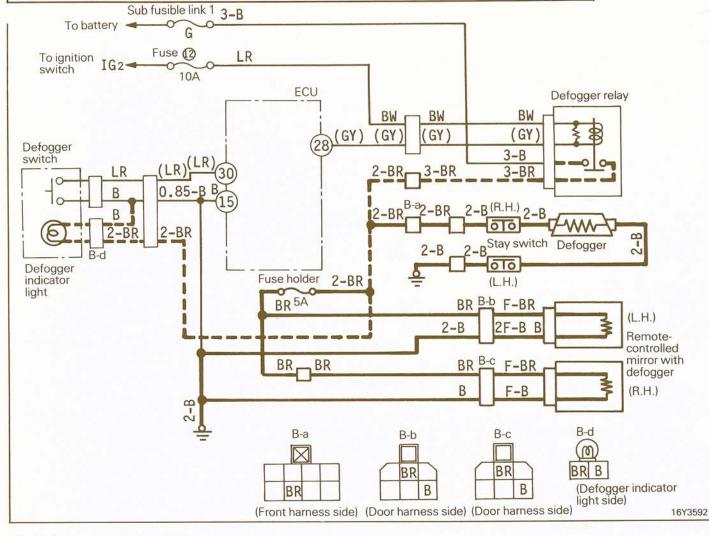
# 17. Key-reminder Switch Input Circuit



16Y36

| Step | Che   | ck method   | Juo                | lgement  |   |   |
|------|---|---|--------------------|--|---|---|
| Steh | Condition   | Check object  | Normal             | Malfunction  | Cause   | Remedy  |
| 1    | Separate the<br>B-a connec-<br>tor.   | B-a connector<br>(front harness side)<br>terminal voltage<br>(RB-Ground)                                    | Battery 0V voltage | OV   | Fuse ① damaged or disconnected                                  | Replace the fuse.   |
|      |   | (TD Ground)   |                    | Harness damaged or disconnected                                | Repair the harness.   |   |
| 2    | B-a connector:<br>connection<br>Key-reminder<br>switch:<br>OFF (key) ↔        | nnection ey-reminder vitch:  FF (key) ↔  (front harness side) terminal voltage (GW-Ground)  Battery voltage | Battery            | Remains<br>0V.   | Damaged or<br>disconnected<br>wiring of key-<br>reminder switch | Replace the key-<br>reminder switch.<br>(Refer to P.8-156.) |
|      | ON (No key)   |   |                    | Harness dam-<br>aged or discon-<br>nected, or<br>short-circuit | Repair the harness.   |   |
| 3    | Separate the<br>ECU connec-<br>tor.<br>Key-reminder<br>switch: ON<br>(No key) | ECU connector<br>terminal voltage<br>(3-Ground)   | Battery<br>voltage | oV   | Harness dam-<br>aged or discon-<br>nected, or<br>short-circuit  | Repair the harness.   |

# 18. Defogger Circuit (Defogger and Remote-controlled Mirror with Defogger)



(1) Defogger indicator light

| 0.   | Check method   |  | Jud  | Judgement  |  | Remedy              |
|------|--|--|--|--|--|---------------------|
| Step | Condition  | Check object                                     | Normal   | Malfunction  | - Cause  | Herriday            |
| 1    | IG SW: ON<br>Defogger<br>switch: ON  | B-d connector<br>terminal voltage<br>(BR-Ground) | Battery<br>voltage   | 0V   | Harness dam-<br>aged or discon-<br>nected, or<br>short-circuit | Repair the harness. |
| 2    | 2 IG SW: ON Defogger switch: ON B-d connector terminal voltage (B-Ground)  Battery voltage | OV   | Damaged or<br>disconnected<br>wiring of defog-<br>ger indicator<br>light | Replace the defog-<br>ger indicator light<br>bulb. |  |                     |
|      |  |  |  |  | Harness damaged or disconnected, or short-circuit              | Repair the harness. |

IG SW: Ignition Switch

NOTE

This check is based upon the assumption that the defogger function is normal, and that only the indicator light does not illuminate

(continued on next page)

**STB Revision** 

(continued from previous page)

#### NOTE

This check table shown below is based upon the assumption that the circuit indicated by the broken line (- - -) the figure on the previous page is normal. (The indicator light should illuminate when the defogger switch is ressed.)

#### (2) Defogger

| Step | Check method  |  | Judgement          |  |  |                   |
|------|---|--|--------------------|--|--|-------------------|
| Step | Condition   | Check object                                     | Normal             | Malfunction  | Cause  | Remedy            |
| 1    | IG SW: ON<br>Defogger<br>switch :ON   | B-a connector<br>terminal voltage<br>(BR-Ground) | Battery<br>voltage | OV   | Harness dam-<br>aged or discon-<br>nected  | Replace the fuse. |
| 2    | IG SW: OFF B-a connector: separation  Continuity between the B-a connector and ground (BR-Ground) | Continuity exists                                | $\infty\Omega$     | Damaged or<br>disconnected<br>wiring of<br>defogger    | Repair the heated<br>line. (Refer to<br>P.8-256.)  |                   |
|      |   |  |                    | Harness damaged or disconnected or damaged stay switch | Repair the harness<br>or check the stay<br>switch. Refer to<br>Group 23 BODY –<br>Stay Switch. |                   |

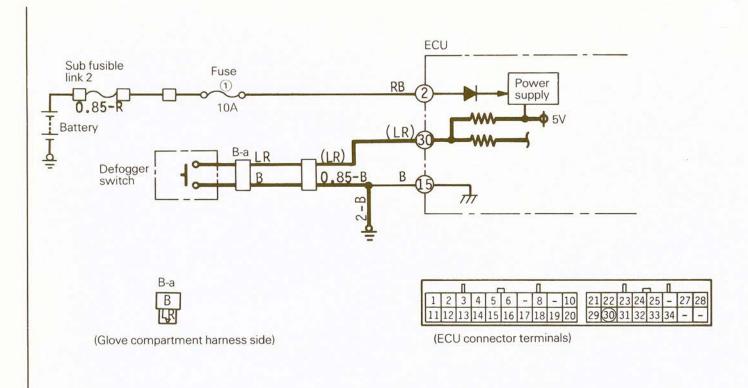
IG SW: Ignition Switch

### (3) Remote-controlled mirror with defogger

| ^tep | Che  | eck method  | Jud                  | gement          |  |                          |
|------|--|---|----------------------|-----------------|--|--------------------------|
| tep  | Condition  | Check object  | Normal               | Malfunction     | Cause  | Remedy                   |
| 1    | IG SW: ON<br>Defogger<br>switch: ON                  | B-b or B-c connector<br>terminal voltage<br>(BR-Ground)   | Battery<br>voltage   | OV              | Damaged fuse<br>holder   | Replace the fuse holder. |
|      | SWITCH. OIV  | (Bit dication)  |                      |                 | Harness dam-<br>aged or discon-<br>nected                              | Replace the harness.     |
| 2    | B-b or B-c<br>connector:<br>separation               | Continuity between<br>the B-b or B-c<br>connector<br>(door harness side)<br>terminals<br>(BR-B) | Continuity<br>exists | $\infty\Omega$  | Malfunction of<br>the remote-<br>controlled<br>mirror with<br>defogger | Replace the mirror.      |
|      |  |   |                      |                 | Harness damaged or disconnected  | Repair the harness.      |
| 3    | IG SW: OFF<br>B-b or B-c<br>connector:<br>separation | Continuity between<br>the B-b or B-c con-<br>nector and ground<br>(B-Ground)                    | ΟΩ                   | $\infty \Omega$ | Harness dam-<br>aged or discon-<br>nected                              | Repair the harness.      |

IG SW: Ignition Switch

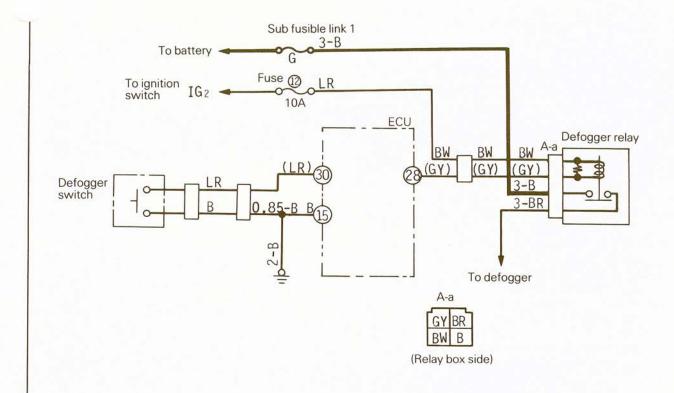
#### 19. Defogger Switch Input Circuit



16Y361

| C+   | Check method  |   | Jud   | gement   | Cause  | Remedy   |
|------|---|---|---|--|--|--|
| Step | Condition   | Check object                            | Normal                                      | Malfunction  | Cause  | Hemedy   |
| 1    | B-a connector: separation Defogger switch: ON ↔ OFF  Continuity between B-a connector terminals (LR-B)          | B-a connector terminals                 | $\Omega\Omega \leftrightarrow \infty\Omega$ | Remains $\infty \Omega$ .                            | Defogger<br>switch or har-<br>ness damaged<br>or disconnected  | Replace the defog-<br>ger switch (refer to<br>P.8-254) or repair<br>the harness. |
|      |   |   | Remains $0\Omega$ .                         | Defogger<br>switch or har-<br>ness short-<br>circuit |  |  |
| 2    | ECU connector: separation Defogger switch: ON ↔ OFF  Continuity between the ECU terminal and ground (30-Ground) | the ECU terminal and ground (30-Ground) | $\Omega \hookrightarrow \Omega$             | Remains $\infty \Omega$ .                            | Damaged or dis-<br>connected wir-<br>ing of B-a con-<br>nector B line or<br>LR line between<br>ECU and B-a | Repair the harness   |
|      |   |   | Remains $0\Omega$ .                         | Short-circuit of<br>LR line between<br>ECU and B-a   |  |  |

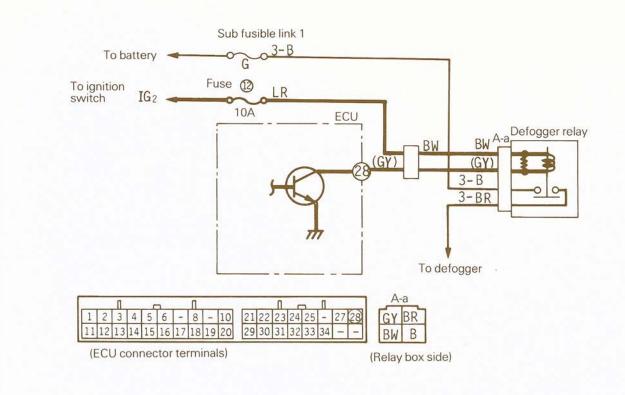
# 20. Defogger Relay Power-supply Circuit



16Y3625

| Step | Check method                      |                                | Judgement |                              | C   |                     |
|------|-----------------------------------|--------------------------------|-----------|------------------------------|---|---------------------|
| Step | Condition                         | Check object                   | Normal    | Malfunction                  | Cause   | Remedy              |
| 1    | A-a connector (body harness side) | Battery<br>voltage             | OV        | Fusible link<br>G-wire blown | Replace the fusible link.                         |                     |
|      | separation                        | terminal voltage<br>(B-Ground) |           |                              | Harness damaged or disconnected, or short-circuit | Repair the harness. |

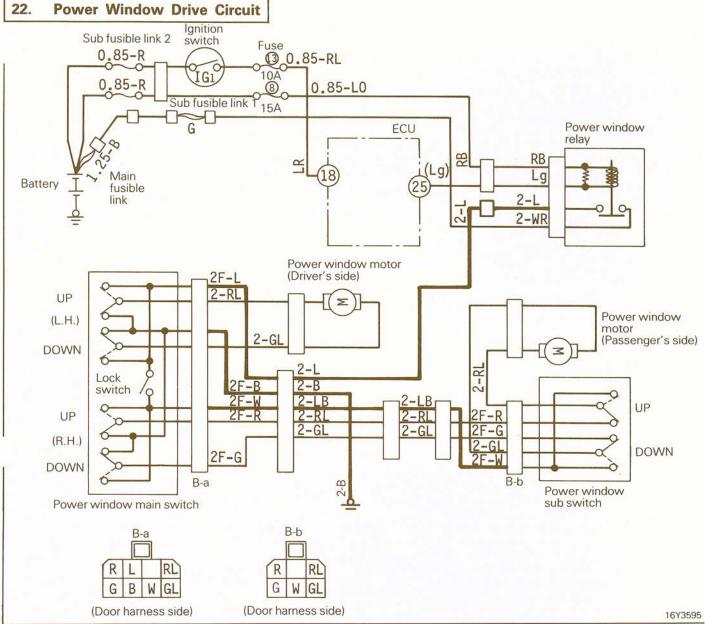
## 21. Defogger Relay Drive Circuit



16Y3F

| C    | Check method                              |                                 | Judgement          |   | Cause  | Remedy                           |
|------|---|---------------------------------|--------------------|---|--|----------------------------------|
| Step | Condition                                 | Check object                    | Normal             | Malfunction                                       | Cause  | Herriedy                         |
| 1    | ECU connector:                            | A-a connector (relay box side)  | Battery OV voltage | OV  | Fuse 12<br>blown   | Replace the fuse.                |
|      | separation<br>IG SW: ON                   | terminal voltage<br>(BW-Ground) |                    |   | Harness dam-<br>aged or discon-<br>nected, or<br>short-circuit | Repair the harness.              |
| 2    | ECU connector:<br>separation<br>IG SW: ON | voltage voltage (28-Ground)     |                    | OV  | Damaged wir-<br>ing of defog-<br>ger relay coil                | Replace the defog-<br>ger relay. |
|      |   |                                 |                    | Harness damaged or disconnected, or short-circuit | Repair the harness.  |                                  |

IG SW: Ignition Switch, ECU: Electronic Control Unit



| Ct   | Check method                        |  | Judgement          |                | Cause                                     | Domadu              |
|------|-------------------------------------|--|--------------------|----------------|---|---------------------|
| Step | Condition                           | Check object   | Normal             | Malfunction    | Cause                                     | Remedy              |
| 1    | IG SW: ON<br>Lock switch:<br>NORMAL | B-a and B-b<br>connector (door<br>harness side)<br>terminals voltage<br>B-a: (L-Ground)<br>B-b: (W-Ground) | Battery<br>voltage | OV             | Harness dam-<br>aged or discon-<br>nected | Repair the harness. |
| 2    | B-a connector:<br>separation        | Conitnuity between<br>the B-a connector<br>(door harness side)<br>and ground<br>(B-Ground)                 | ΟΩ                 | $\infty\Omega$ | Harness damaged or disconnected           | Repair the harness. |

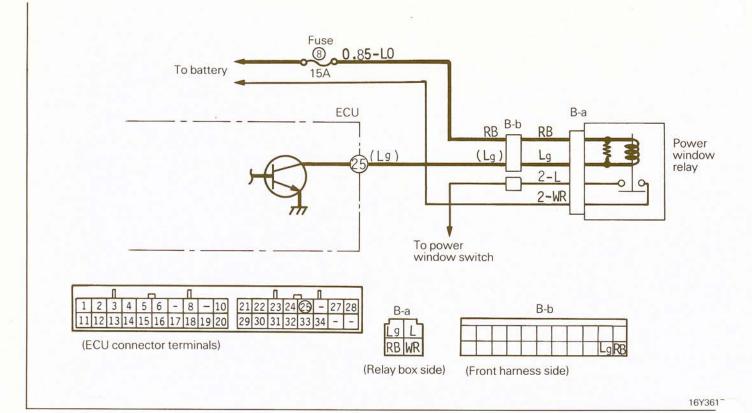
SW: Ignition Switch

NOTE

For information concerning the checking of the power window switch itself, refer to the section regarding the doors in GROUP 23 BODY.

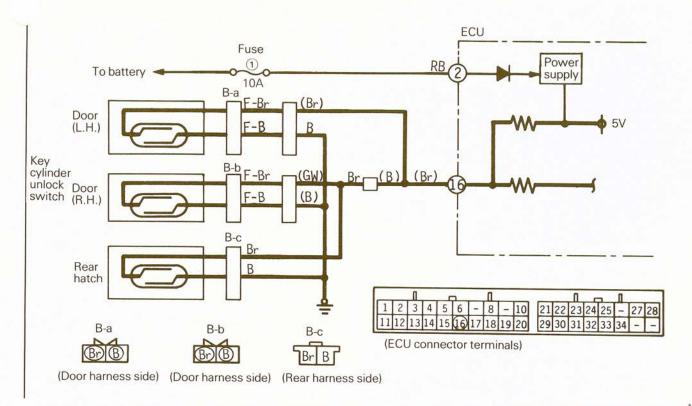
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# 23. Power Window Relay Drive Circuit



| Cton | Check method  |   | Jud                | gement   | C   |                                 |
|------|---|---|--------------------|--|---|---------------------------------|
| Step | Condition   | Check object  | Normal             | Malfunction  | Cause   | Remedy                          |
| 1    | ECU connector (front harness side) separation (RB-Ground)  B-b connector (front harness side) voltage | Fuse (8) damaged or disconnected                      | Replace the fuse.  |  |   |                                 |
|      |   | (NB-Glouliu)  |                    |  | Harness damaged or disconnected, or short-circuit | Repair the harness.             |
| 2    | tor: (relay separation termin   | B-a connector<br>(relay box side)<br>terminal voltage | Battery<br>voltage | OV   | Damaged or dis-<br>connected wir-<br>ing of coil  | Replace the power window relay. |
|      |   | (Lg-Ground)   |                    | Harness dam-<br>aged or discon-<br>nected, or<br>short-circuit | Repair the harness.                               |                                 |
| 3    | ECU connector: separation   | ECU connector<br>terminal voltage<br>(25-Ground)      | Battery<br>voltage | 0V   | Harness damaged or disconnected, or short-circuit | Repair the harness.             |

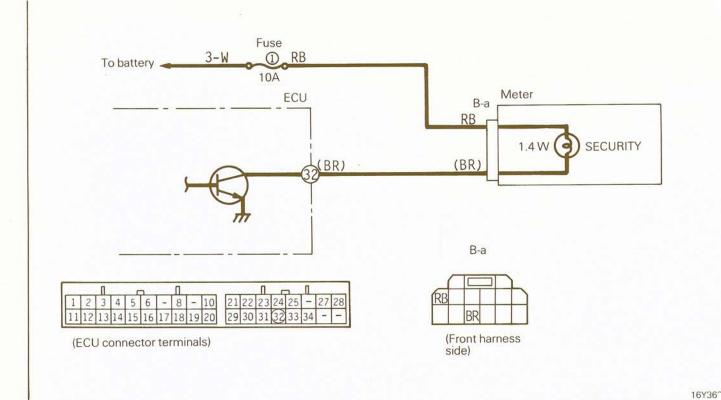
# 24. Key Cylinder Unlock Switch Input Circuit



16Y3622

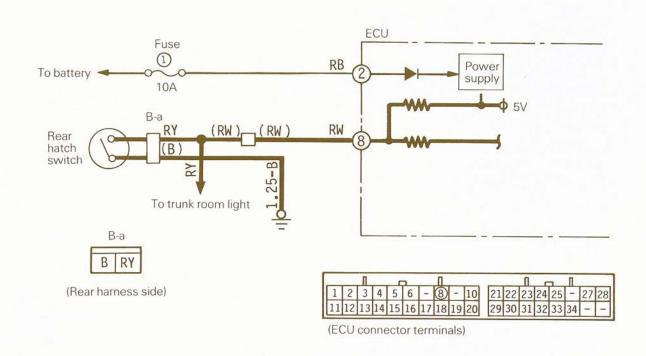
| Ctan | Check method   |  | Judgement                               |   |   |  |
|------|--|--|---|---|---|--|
| Step | Condition  | Check object   | Normal                                  | Malfunction   | Cause   | Remedy   |
| 1    | ECU connector:<br>separation                           | the ECU terminal and ground when the key is inserted into the key cylinder | $\Omega \propto \leftrightarrow \Omega$ | $\infty \Omega$   | Key cylinder un-<br>lock switch or<br>harness dam-<br>aged or discon-<br>nected | Replace the key<br>cylinder unlock<br>switch (refer to<br>P.23-74) or repair<br>the harness. |
|      | and slowly turned to<br>the unlock side<br>(16-Ground) |  | ΟΩ                                      | Key cylinder un-<br>lock switch or<br>harness short-<br>circuit |   |  |

## 25. SECURITY Light Drive Circuit



| C.   | Check method                 |   | Jud                | gement      | Cause  | Remedy              |
|------|------------------------------|---|--------------------|-------------|--|---------------------|
| Step | Condition                    | Check object  | Normal             | Malfunction | Cause  | Hernedy             |
| 1    | ECU connector: separation    | B-a connector<br>(front harness side)<br>terminal voltage               | Battery<br>voltage |             | Fuse ① damaged or disconnected                                       | Replace the fuse.   |
|      |                              | (RB-Ground)   |                    |             | Harness damaged or disconnected, or short-circuit                    | Repair the harness. |
| 2    | ECU connector:<br>separation | B-a connector<br>(body harness side)<br>terminal voltage<br>(BR-Ground) | Battery<br>voltage | OV          | Damaged or dis-<br>connected wir-<br>ing of SECUR-<br>ITY light bulb | Replace the bulb.   |
|      |                              |   |                    |             | Harness damaged or disconnected                                      | Repair the harness. |
| 3    | ECU connector: separation    | ECU terminal<br>voltage<br>(32-Ground)                                  | Battery<br>voltage | 0V          | Harness damaged or disconnected, or short-circuit                    | Repair the harness. |

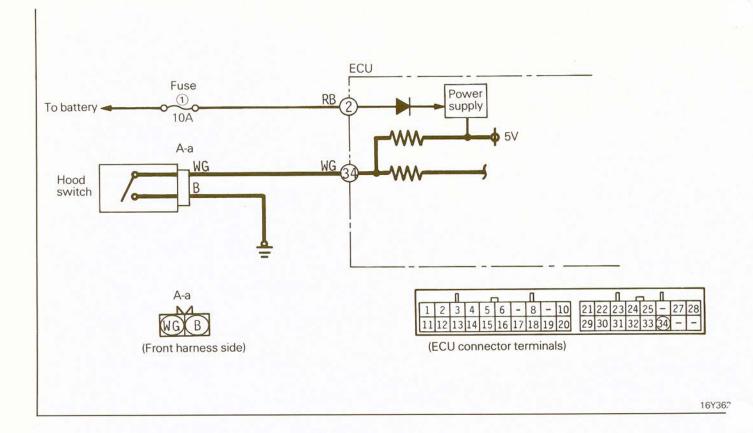
## 26. Rear Hatch Switch Input Circuit



16Y3628

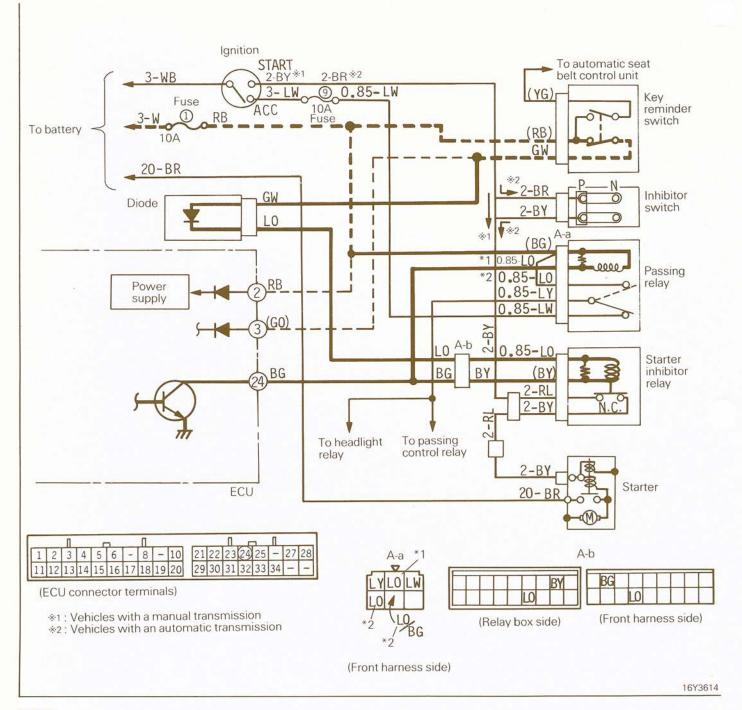
| Cton | Check method   |  | Judgement                                      |  |  |   |
|------|--|--|--|--|--|---|
| Step | Condition  | Check object   | Normal   | Malfunction  | Cause  | Remedy  |
| 1    | B-a connector: separation Rear hatch switch: ON ↔ OFF  | Continuity between<br>B-a connector<br>terminals<br>(RY-B) | $\Omega \propto \leftrightarrow \Omega \Omega$ | Remains $\infty \Omega$ .                          | Rear hatch<br>switch or har-<br>ness damaged<br>or discon-<br>nected                             | Replace the rear<br>hatch switch<br>(refer to P.23-39)<br>or repair the<br>harness. |
|      |  |  |  | Remains $0\Omega$ .                                | Rear hatch<br>switch or<br>harness short-<br>circuit   |   |
| 2    | ECU connector: separation B-a connector: connection Rear hatch switch: ON ↔ OFF  Continuity between the ECU terminal and ground (8-Ground) | the ECU terminal and ground                                | $\Omega\Omega \leftrightarrow \infty\Omega$    | Remains $\infty \Omega$ .                          | Damaged or dis-<br>connected wir-<br>ing of B-a con-<br>nector RW line<br>between ECU<br>and B-a | Repair the harness  |
|      |  |  | Remains $0\Omega$ .                            | Short-circuit of<br>RB line between<br>ECU and B-a |  |   |

## 27. Hood Switch Input Circuit



| Step | Check method   |  | Judgement                                   |                           |   |   |
|------|--|--|---|---------------------------|---|---|
| Step | Condition  | Check object   | Normal                                      | Malfunction               | Cause   | Remedy                                      |
| 1    | A-a connector:<br>separation<br>Hood switch:<br>ON ↔ OFF                 | Continuity between<br>the A-a connector<br>(hood switch side)<br>terminal (WG-B) | $0\Omega \leftrightarrow \infty\Omega$      | Remains $\infty \Omega$ . | Hood switch<br>damaged or<br>disconnected                                     | Replace the hood switch (refer to P.23-33). |
|      |  |  |   | Remains $0\Omega$ .       | Hood switch short-circuit   |   |
| 2    | ECU connector: separation A-a connector: connection Hood switch ON ↔ OFF | Continuity between<br>the ECU terminal<br>and ground<br>(34-Ground)              | $\Omega\Omega \leftrightarrow \infty\Omega$ | Remains $\infty \Omega$ . | Damaged or dis-<br>connected wir-<br>ing of WG line<br>between ECU<br>and A-a | Repair the harness.                         |
|      |  |  |   | Remains $0\Omega$ .       | Short-circuit of<br>WG line between<br>ECU and A-a                            |   |

#### 28. Passing Relay and Starter Inhibitor Relay Drive Circuit



#### NOTE

The check table shown on the next page is based upon the assumption that the circuit (ECU power supply and ground circuit and key-reminder switch input circuit) indicated by the broken line (- - - -) in the figure above is normal. (Refer to check chart No. 1 and 19.)

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# (1) Passing relay

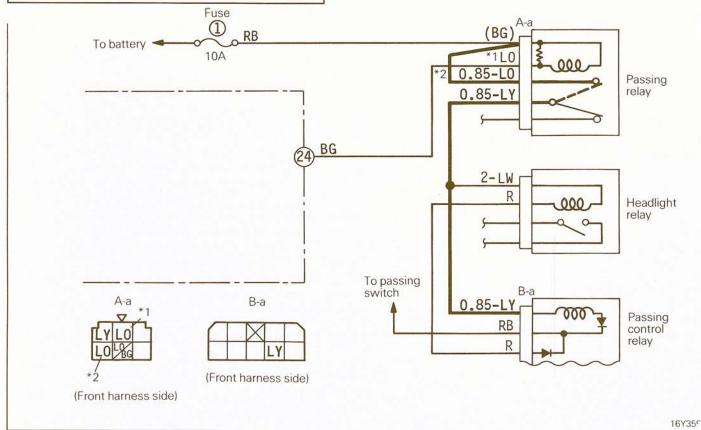
| step | Check method                                    |  | Judgement          |  |  |                     |
|------|---|--|--------------------|--|--|---------------------|
| step | Condition                                       | Check object   | Normal             | Malfunction  | Cause  | Remedy              |
| 1    | A-a connector:<br>separation                    | A-a connector<br>(front harness side)<br>terminal voltage<br>(BG-Ground) | Battery<br>voltage | OV   | Damaged or<br>disconnected<br>harness        | Repair the harness. |
| 2    | ECU connector: ECU terminal voltage (24-Ground) | Battery<br>voltage   | OV                 | Damaged or dis-<br>connected wir-<br>ing of relay coil | Check the passing relay. (Refer to P.8-195.) |                     |
|      | tor:<br>connection                              |  |                    |  | Damaged or<br>disconnected<br>harness        | Repair the harness. |

ECU: Electronic Control Unit

## (2) Starter inhibitor relay

| Step | Che  | eck method                         | Judgement          |                                       | 0                                     | 1622 64 T  |
|------|--|------------------------------------|--------------------|---------------------------------------|---------------------------------------|--|
| Step | Condition  | Check object                       | Normal             | Malfunction                           | Cause                                 | Remedy   |
| 1    | ECU connector:   | A-b connector (front harness side) | Battery            | 0V                                    | Damaged diode D3                      | Replace the diode.                                     |
|      | separation<br>A-b connec-<br>tor:<br>separation  | terminal voltage<br>(LO-Ground)    | voltage            |                                       | Damaged or<br>disconnected<br>harness | Repair the harness.                                    |
| 2    | A-b connector: separation  Continuity between A-b connector terminals (relay box side) (LO-BY) | A-b connector terminals            | ΟΩ                 | $\infty \Omega$                       | Damaged relay coil                    | Check the starter inhibitor relay. (Refer to P.8-132.) |
|      |  |                                    |                    | Damaged or<br>disconnected<br>harness | Repair the harness.                   |  |
| 3    | ECU connector: separation A-b connector: connection Key-reminder switch: ON (No key)           | ECU terminal voltage (24-Ground)   | Battery<br>voltage | OV                                    | Damaged or<br>disconnected<br>harness | Repair the harness.                                    |

### 29. Passing Relay Power-supply Circuit



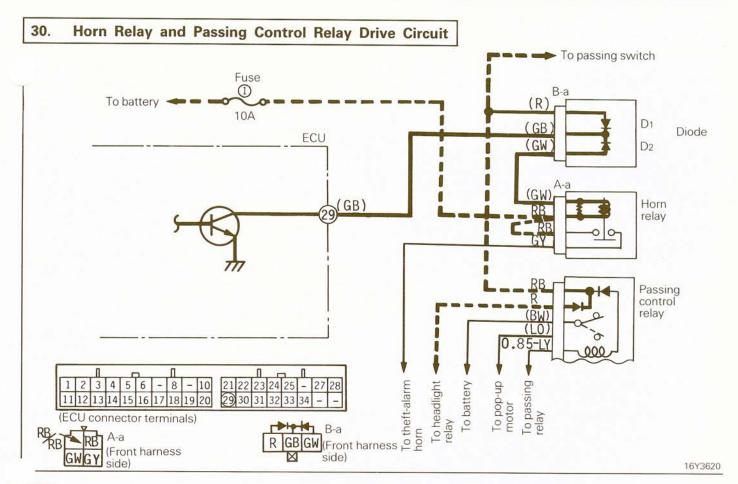
#### NOTE

The check table shown below is based upon the assumption that the passing relay drive circuit is normal. [Refer to check chart No. 28. In addition, the headlights (high beam) should go on when the passing switch is turned on with ignition switch ACC or ON.]

| Step | Check method  |  | Judgement          |             |   | Discounting  |
|------|---|--|--------------------|-------------|---|--|
|      | Condition   | Check object                                     | Normal             | Malfunction | Cause                                     | Remedy   |
| 1    | ECU connector:  | A-a connector<br>(front harness side)            | Battery<br>voltage | OV          | Fuse 1<br>blown                           | Replace the fuse 1.                                |
|      | A-a connector:<br>separation  | terminal voltage<br>(LO-Ground)                  |                    |             | Harness damaged or disconnected           | Repair the harness.                                |
| 2    | A-a connector:  | B-a connector<br>terminal voltage<br>(LY-Ground) | Battery<br>voltage | OV          | Passing relay<br>malfunction              | Check the passing<br>relay. (Refer to<br>P.8-195.) |
|      | Disconnect<br>the ECU har-<br>ness connector<br>and short the<br>terminal (24)<br>(front harness<br>side, BG line)<br>to drive the<br>passing relay.<br>B-a connec-<br>tor:<br>separation |  |                    |             | Harness dam-<br>aged or discon-<br>nected | Repair the harness.                                |

ECU: Electronic Control Unit

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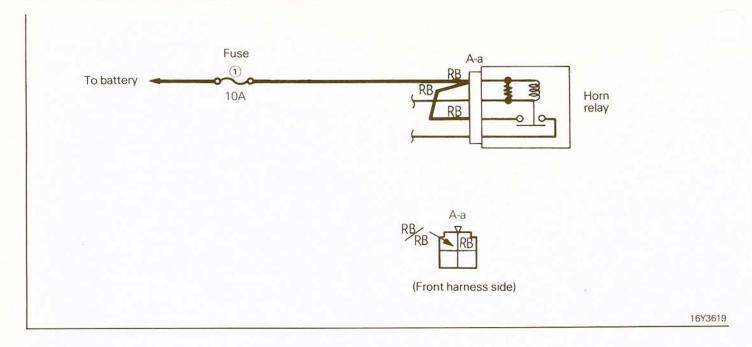


#### NOTE

The check table shown below is based upon the assumption that the circuit indicated by the broken line (- - - -) in the figure above is normal. [Refer to check chart No. 31. In addition, the headlights (high beam) should go on when the passing switch is turned on with ignition switch ACC or ON.]

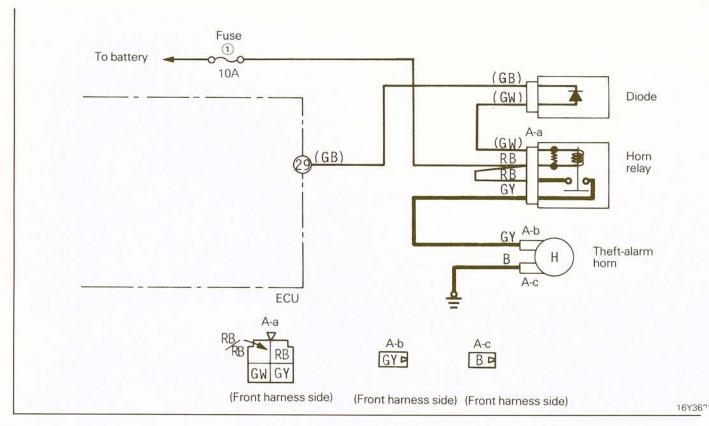
| Step | Check method               |  | Judgement          |             |   |   |
|------|----------------------------|--|--------------------|-------------|---|---|
| Step | Condition                  | Check object   | Normal             | Malfunction | Cause   | Remedy  |
| 1    | tor: (fron separation term | A-a connector<br>(front harness side)<br>terminal voltage                | Battery<br>voltage | OV          | Damaged relay<br>coil                             | Check the horn<br>relay. (Refer to<br>P.8-226.) |
|      |                            | (GW-Ground)  |                    |             | Damaged or disconnected harness                   | Repair the harness.                             |
| 2    | tor: (                     | B-a connector<br>(front harness side)<br>terminal voltage<br>(GB-Ground) | Battery<br>voltage | OV          | Damaged diode<br>D <sub>1</sub> or D <sub>2</sub> | Replace the diode.                              |
|      |                            |  |                    |             | Damaged or disconnected harness                   | Repair the harness.                             |
| 3    | ECU connector: separation  | ECU terminal<br>voltage<br>(29-Ground)                                   | Battery<br>voltage | 0V          | Damaged or<br>disconnected<br>harness             | Repair the harness.                             |

## 31. Horn Relay Power-supply Circuit



| Step | Check method                 |                                       | Judgement          |             | 6                               |                     |
|------|------------------------------|---------------------------------------|--------------------|-------------|---------------------------------|---------------------|
|      | Condition                    | Check object                          | Normal             | Malfunction | Cause                           | Remedy              |
| 1    | A-a connector:<br>separation | A-a connector<br>(front harness side) | Battery<br>voltage | OV          | Fuse ① blown                    | Replace the fuse.   |
|      | Separation                   | terminal voltage<br>(RB-Ground)       |                    |             | Damaged or disconnected harness | Repair the harness. |

### 32. Theft-alarm Horn Drive Circuit



#### NOTE

The checks described below are based upon the assumption that the horn relay circuit is normal. (Refer to check chart No. 30 and No. 31.)

| Cton | Che   | eck method                                       | Jud                | gement      | Cause                                     | Remedy  |
|------|---|--|--------------------|-------------|---|---|
| Step | Condition   | Check object                                     | Normal             | Malfunction |   |   |
| 1    | Separate the ECU's harness connector; then short-circuit terminal No. 29 (front harness side GB line), and activate the horn relay. | A-a connector<br>terminal voltage<br>(GY-Ground) | Battery<br>voltage | OV          | Malfunction of<br>the horn relay          | Check the horn<br>relay. (Refer to<br>P.8-226.) |
| 2    | Separate the ECU's harness connector; then short-circuit terminal No. 29 (front harness side GB line), and activate the horn relay. | A-b connector<br>terminal voltage<br>(GY-Ground) | Battery<br>voltage | OV          | Harness dam-<br>aged or discon-<br>nected | Repair the harness.                             |

ECU: Electronic Control Unit

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| ^+ep | Check method   |   | Judgement                              |   | 0  |                     |
|------|--|---|--|---|--|---------------------|
| ep   | Condition  | Check object                                | Normal                                 | Malfunction                               | Cause  | Remedy              |
| 3    | ECU's har-<br>ness connec-<br>(B-Ground)   | Horn sounds. (OV)  Horn doesn's sound. (OV) | 1.000000000000000000000000000000000000 | Malfunction of<br>the theft-alarm<br>horn | Replace the theft-<br>alarm horn.                |                     |
|      | tor; then short-circuit terminal No. 29 (front harness side GB line), and activate the horn relay. |   | (00)                                   | Battery<br>voltage                        | Damaged or disconnected wiring of ground circuit | Repair the harness. |

