1988

IMPORT SERVICE MANUAL

Volume – 2

Electrical

RAM RAIDER

CHRYSLER MOTORS

SAFETY NOTICE

CAUTION

ALL SERVICE AND REBUILDING INSTRUCTIONS CONTAINED HERE-IN ARE APPLICABLE TO, AND FOR THE CONVENIENCE OF, THE AUTOMOTIVE TRADE ONLY. All test and repair procedures on components or assemblies in non automotive applications should be repaired in accordance with instructions supplied by the manufacturer of the total product.

Proper service and repair is important to the safe, reliable, operation of all motor vehicles. The service procedures recommended and described in this publication were developed for professional service personnel and are effective methods for performing vehicle repair. Following these procedures will help assure efficient economical vehicle performance and service reliability. Some of these service procedures require the use of special tools designed for specific procedures. These special tools should be used when recommended throughout this publication.

Special attention should be exercised when working with spring or tension loaded fasteners and devices such as E-Clips, Circlips, Snaprings etc. as careless removal can cause personal injury. Always wear safety goggles whenever working on vehicles or vehicle components.

It is important to note that this publication contains various **Cautions** and **Warnings.** These should be carefully read in order to minimize the risk of personal injury, or the possibility that improper service methods may damage the vehicle or render it unsafe. It is important to note these **Cautions** and **Warnings** cover only the situations and procedures Chrysler Motors has encountered and recommended. Chrysler Motors could not possibly know, evaluate, and advise the service trade of all conceivable ways that service may be performed or of the possible hazards of each. Consequently Chrysler Motors has not undertaken any such broad service review. Accordingly, anyone who uses a service procedure or tool that is not recommended in this publication must assure oneself thoroughly that neither personal safety nor vehicle safety be jeopardized by the service methods they select.

Service Manual

RAM RAIDER

1988

Volume-2
Electrical

FOREWORD

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

CHRYSLER MOTORS

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

Printed in Japan

GROUP/SECTION INDEX N00AA-B

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

HOW TO USE THIS MANUAL

N00BAAAa

CONTENTS

The preceding page contains the 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 incidental operation to be performed before removal or after installation

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 ROINTS
: Removal
: Installation
: Disassembly
: Reassembly

Page number

Group title

Section title

THERMOSTAT

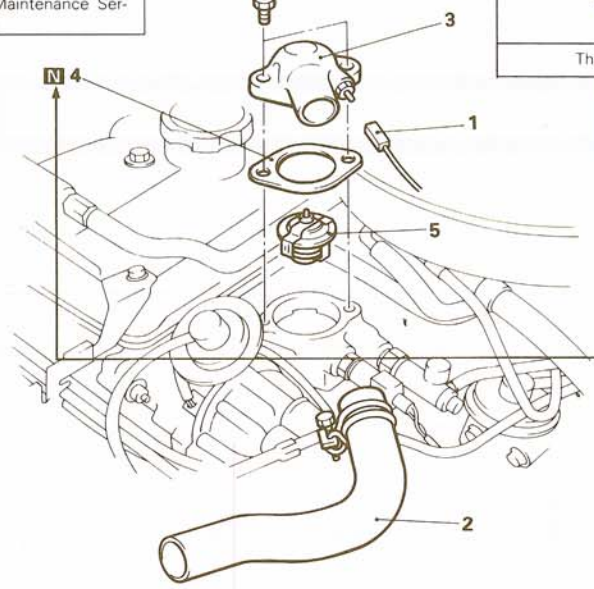
REMOVAL AND INSTALLATION

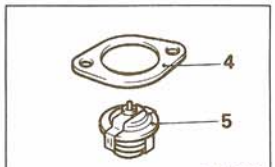
Indicates tightening torque

Pre-removal Operation
- Draining of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)

Post-installation Operation
- Supplying of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)

17–20 Nm
13–14 ft.lbs.





Thermostat kit

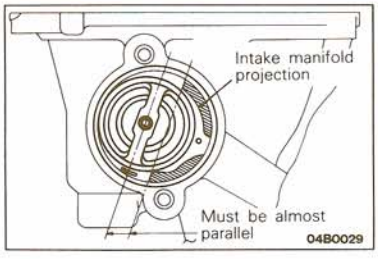
Repair kit or set parts are shown. (Only very frequently used parts are shown.)

Indicates non-reusable part.

Removal steps

1. Connection of engine coolant temperature switch connector (Vehicles with an air conditioner)
2. Connection of radiator upper hose
3. Water outlet fitting
4. Water outlet fitting gasket
5. ◆◆ Thermostat

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆ : Refer to "Service Points of Installation"
(3) N : Non-reusable parts



SERVICE POINTS OF INSTALLATION

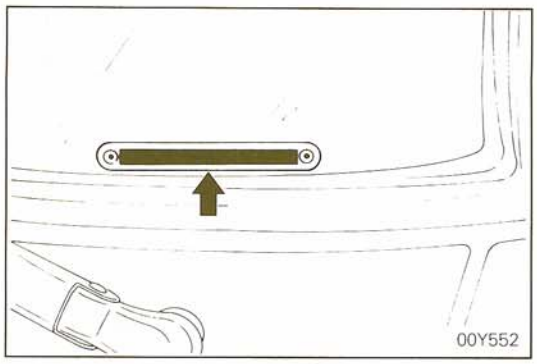
5. INSTALLATION OF THERMOSTAT

Install the thermostat to the intake manifold as illustrated.

Caution
The thermostat flange fits over the manifold seat; ensure that the thermostat is not installed at an angle.

This number corresponds to the number in "Removal steps", "Disassembly steps", "Installation steps" or "Reassembly steps".

An explanation of procedures, notes, etc. regarding removal, installation, disassembly and reassembly.



VEHICLE IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER LOCATION

N00CA--

The vehicle identification number (V.I.N.) is located on a plate attached to the left top side of the instrument panel.

VEHICLE IDENTIFICATION CODE CHART PLATE

N00CB-A

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

1st digit	2nd digit	3rd digit	4th digit	5th digit	6th digit	7th digit	8th digit	9th digit	10th digit	11th digit	12th thru 17th digit
Country	Make	Vehicle type	Others	Line	Price class	Body	Engine	Check digit	Model year	Plant	Serial number
J- Japan	B- Dodge	4- Multi-purpose vehicle (MPV) 7-Truck	F- 4001-5000 lbs. and with hydraulic brakes	J- RAM RAIDER	2- Low 4- High 5- Premium	3- 3-door metal-top or van	E- 2.6 liters (155.9 C.I.D.)	0 1 2 3 . . . . 9 X	J- 1988 year	J- Nagoya –3	000001 to 999999

NOTE

*"Check digit" means a single number or letter X used to verify the accuracy of transcription of vehicle indentification number.

VEHICLE IDENTIFICATION NUMBER LIST

FEDERAL

N00CC-A

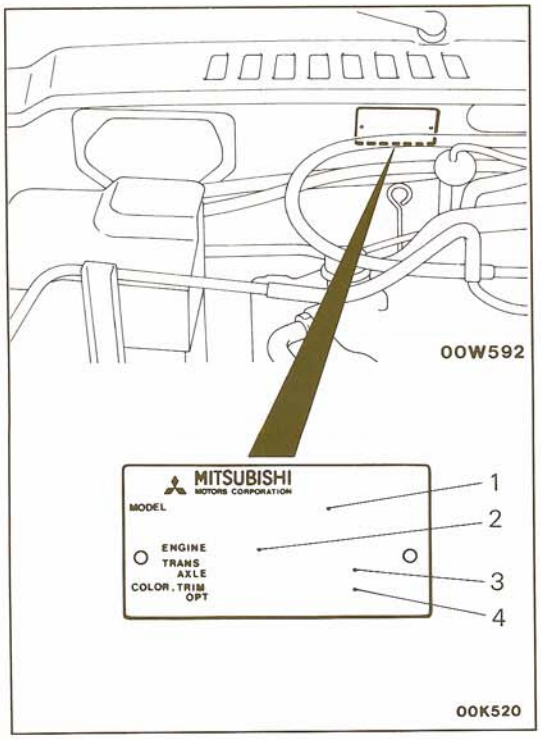
VIN (except sequence number)	Brand	Engine displacement	Model code
JB7FJ43E □ JJ JB7FJ43E □ JJ	Dodge RAM RAIDER	2.555 liters (155.9 C.I.D.)	L042GTNJL2 L042GTRJL2

CALIFORNIA (Can also be sold in Federal states.)

VIN (except sequence number)	Brand	Engine displacement	Model code
JB7FJ43E □ JJ JB7FJ43E □ JJ	Dodge RAM RAIDER	2.555 liters (155.9 C.I.D.)	L042GTNJL7 L042GTRJL7

CANADA

VIN (except sequence number)	Brand	Engine displacement	Model code
JB4FJ53E □ JJ JB4FJ53E □ JJ	Dodge RAM RAIDER	2.555 liters (155.9 C.I.D.)	L042GVNJL3 L042GVRJL3



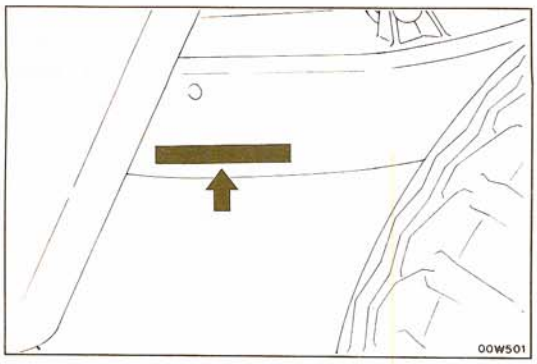
VEHICLE INFORMATION CODE PLATE

N00CD-A

Vehicle information code plate is riveted on the cowl top outer panel in the engine compartment.
The plate shows model code, engine model, transmission model, and body color code.

1. MODEL — L042G VNJL3
   - VNJL3 — Model series
   - L042G — Vehicle model
2. ENGINE — G54B
   - G54B — Engine model
3. TRANS AXLE — KM145
   - KM145 — Transmission model
4. COLOR, TRIM OPT — B76
   - B76 — Montone exterior color code
   - B07B76H43
     - B07 — Two-tone color code
     - H43 — Exterior code

Two-tone exterior is shown by the exterior code followed by the two color codes.



CHASSIS NUMBER

STAMPING LOCATION

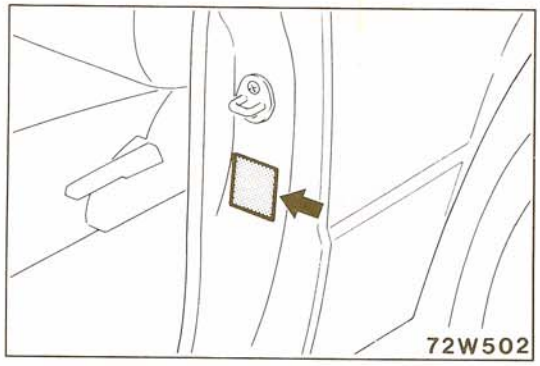
N00CE-A

The chassis number is stamped on the side of the frame near the right rear shock absorber.

CHASSIS NUMBER CODE CHART

L04 2 V JJ000001

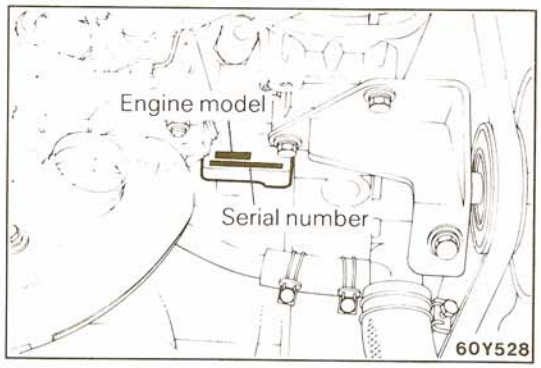
Vehicle line	Engine displacement	Body type	
L04- RAM RAIDER	2- 2.555 liters (155.9 C.I.D.)	V- 3-door metal-top T- Van	Refer to 10th thru 17th digits of V.I.N. plate



VEHICLE SAFETY CERTIFICATION LABEL

N00CF--

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.), front and rear Gross Axle Weight Rating (G.A.W.R.), and Vehicle Identification Number (V.I.N.).



ENGINE MODEL STAMPING

N00CG--

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.)

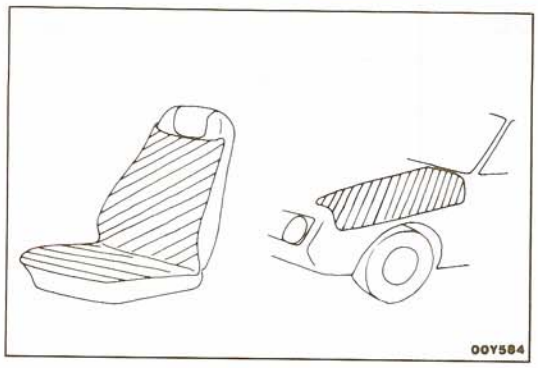
The engine serial number is stamped near the engine model number, and the serial number cycles, as shown below.

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

BODY COLOR CODE

N00CH-A

Exterior code	Body color
Monotone	
B76	Dark blue (Metallic)
H84	Silver (Metallic)
K78	Gold (Metallic)
R82	Red
T85	Light blue (Metallic)
W09	White
X15	Black
Two-tone	
B2A T86H84	Dark blue (Metallic)/ Silver (Metallic)
H5X H84X15	Silver (Metallic)/ Black
R2H R82H84	Red/ Silver (Metallic)
X97 X15 K78	Black/ Gold (Metallic)



PRECAUTIONS BEFORE SERVICE

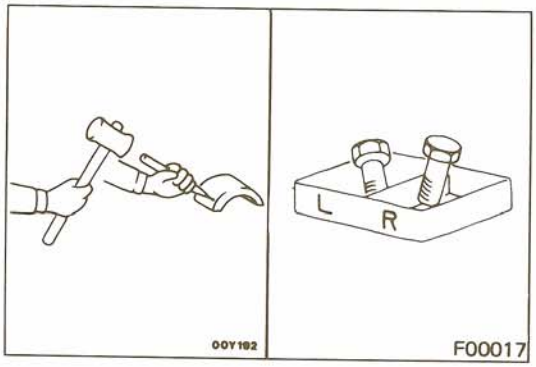
PROTECTING THE VEHICLE

N00DAAD

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.).

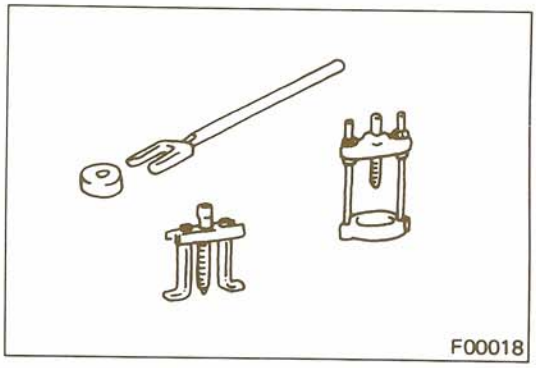
REMOVAL AND DISASSEMBLY

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 Workshop Manual.



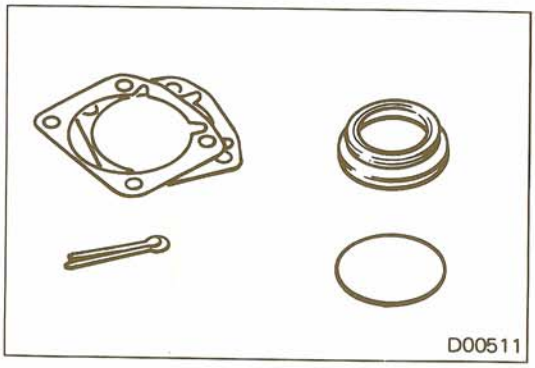
If punch marks or mating marks are made to avoid error in assembly and facilitate the assembly work, be sure to make them in locations which will have no detrimental effect on performance and/or appearances.
If an area having many parts, similar parts, and/or parts which are symmetrical right and left 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 mechanic might be injured; therefore, be sure to use the special tool whenever doing any work for which the use of one is specified.



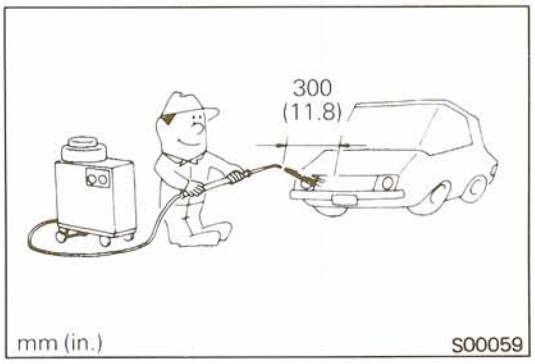
PARTS TO BE REPLACED

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

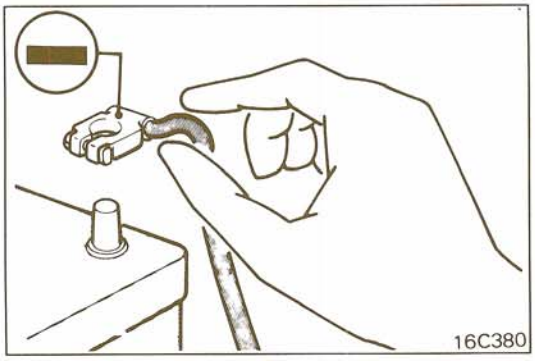
PARTS

When replacing parts, use MOPAR genuine parts.



VEHICLE WASHING

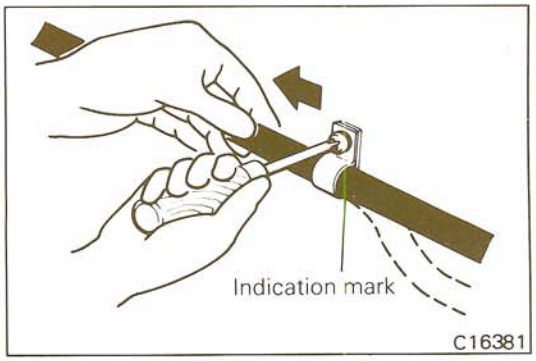
If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to maintain the spray nozzle at a distance of at least 300 mm (11.8 in.) from any plastic parts and all opening parts (doors, luggage compartment, etc.).



SERVICING THE ELECTRICAL SYSTEM

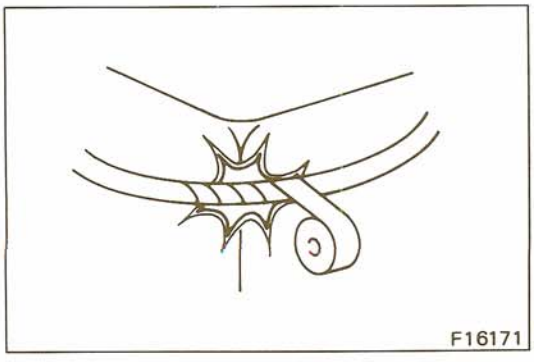
When servicing the electrical system, disconnect the negative cable terminal from the battery.

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.)

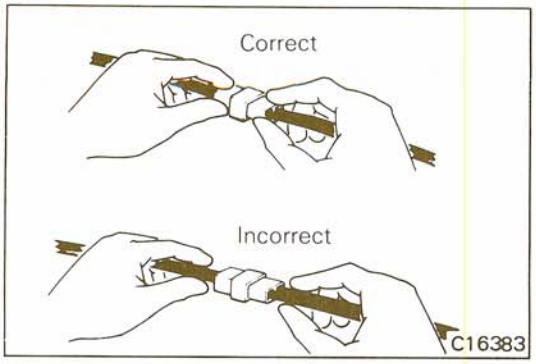


WIRING HARNESSES

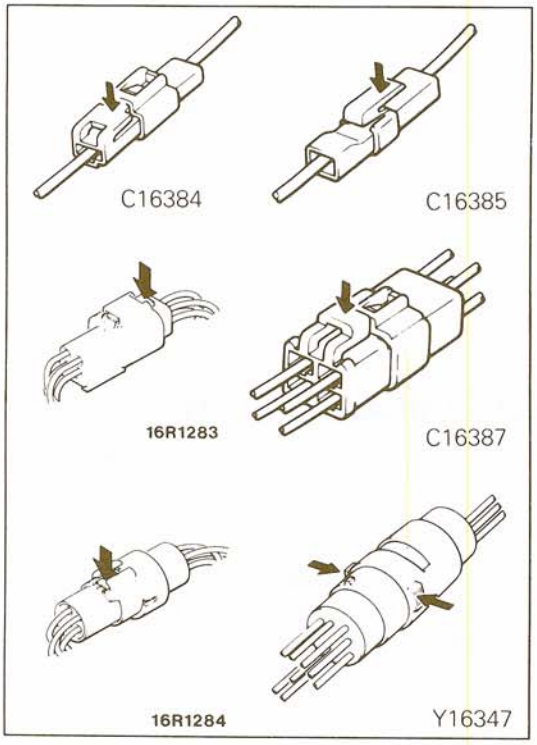
1. Secure the wiring harnesses by using clamps so that there is no slack. However, for any harness which passes to the engine or other vibrating parts of the vehicle, allow some slack within a range that does not allow the engine vibrations to cause the harness to come into contact with any of the surrounding 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.



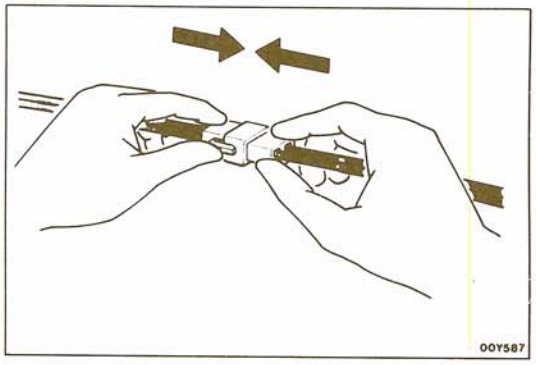
2. If any section of a wiring harness contacts the edge of a part, or a corner, wrap the section of the harness with tape or something similar in order to protect it from damage



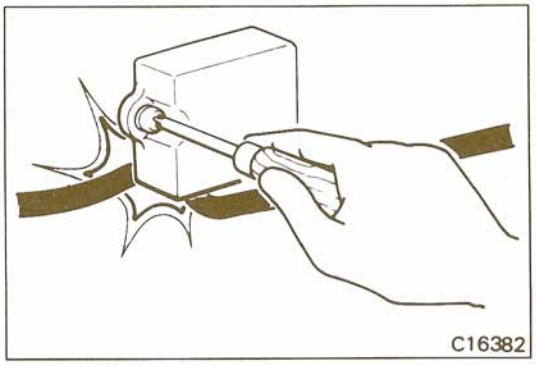
3. When disconnecting a connector, be sure to pull only the connector, not the harness.



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

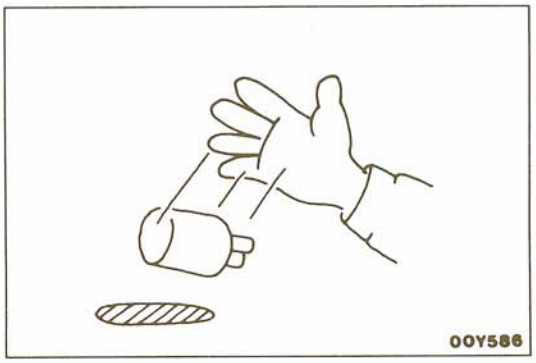


5. Connect connectors which have catches by inserting the connectors until they snap.

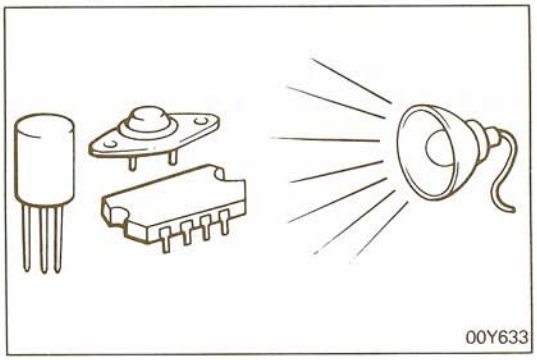


ELECTRICAL COMPONENTS

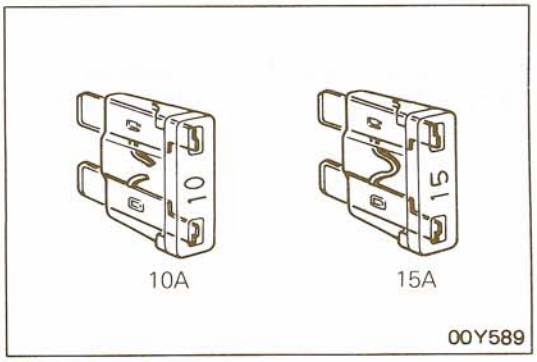
1. When installing any of the vehicle parts, be careful not to pinch or damage any of the wiring harnesses.



2. 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.



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
If a fuse is blown-out, be sure to eliminate the cause of the problem before installing a new fuse.

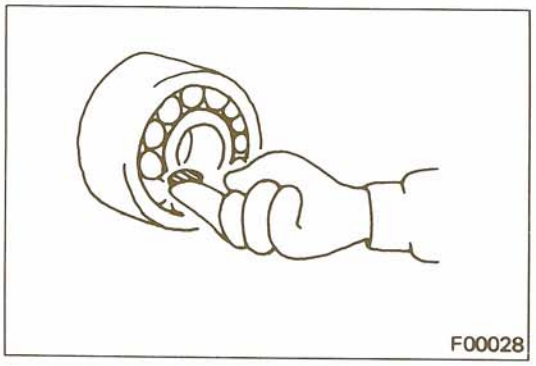
Nominal size	SAE gauge No.	Permissible current	
		In engine compartment	Other areas
0.3 mm²	AWG 22	–	5A
0.5 mm²	AWG 20	7A	13A
0.85 mm²	AWG 18	9A	17A
1.25 mm²	AWG 16	12A	22A
2.0 mm²	AWG 14	16A	30A
3.0 mm²	AWG 12	21A	40A
5.0 mm²	AWG 10	31A	54A

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.

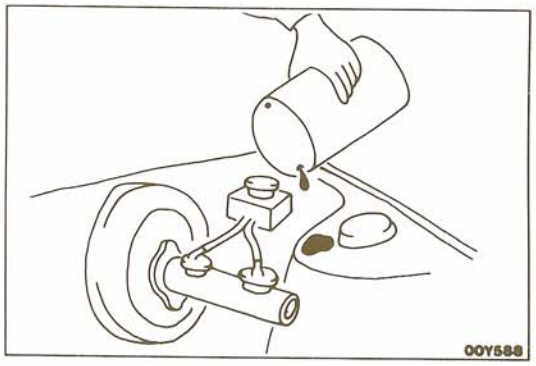
TUBES AND OTHER RUBBER PARTS

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.



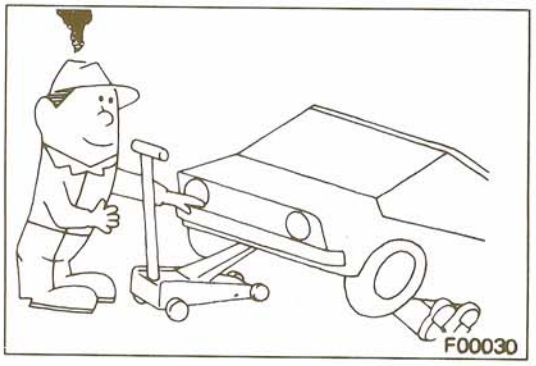
LUBRICANTS

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



BRAKE FLUID

Be careful to avoid spilling any brake fluid, because if it adheres to the vehicle body, the paint coat might be discolored.



DOING SERVICE WORK IN GROUPS OF TWO OR MORE TECHNICIANS

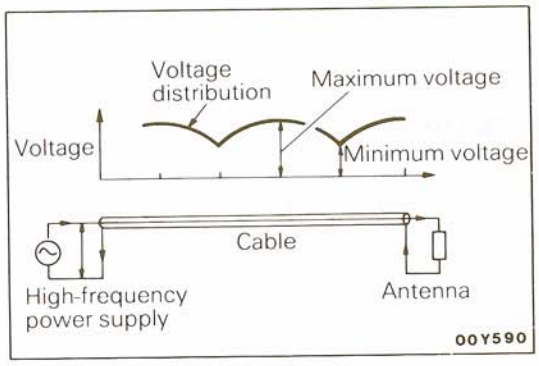
If the service work is to be done by two or more technicians extra caution must be taken.

NOTE ON INSTALLATION OF RADIO EQUIPMENT

N00EA--

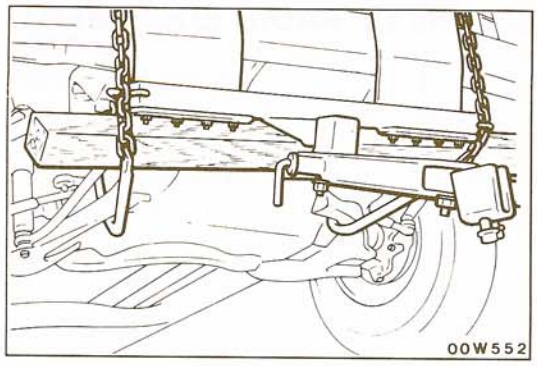
The computers of the electronic control system has been designed so that external radio waves will not interfere with their operation.
However, if antenna or cable of amateur transceiver etc. is routed near the computers, it may affect the operation of the computers, even if the output of the transceiver 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.
2. 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

N00GA--

This vehicle can only be towed from the front with conventional sling-type equipment and tow chain with grab hooks.
If a vehicle is towed from the rear, use a tow dolly.
A lumber spacer (4" x 4" x 55" wood beam) should be placed forward of under guard and under towing hook/shipping tie down hook.
Then, attach J-hook to the lower arm.
A safety chain system must be used. This system must be completely independent of the primary lifting and towing attachment. Care must be taken in the installation of safety chains to insure they do not cause damage to bumper, painted surfaces or lights.

LIFTING-GROUND CLEARANCE

Towed vehicle should be raised until wheels are a minimum of 10 cm (4 in.) from the ground. Be sure there is adequate ground clearance at the opposite end of the vehicle, especially when towing over rough terrain or when crossing sharp rises such as curbs. If necessary, ground clearance can be increased by removing the wheels from the lifted end of the disabled vehicle and carrying the lifted end closer to the ground. A 20 cm (8 in.) ground clearance must be maintained between brake drums and ground.

FRONT TOWING PICKUP

The vehicle may be towed on its rear wheels for extended distances, provided the parking brake is released.
Make cartain the transmission remains in "NEUTRAL".

SAFETY PRECAUTIONS

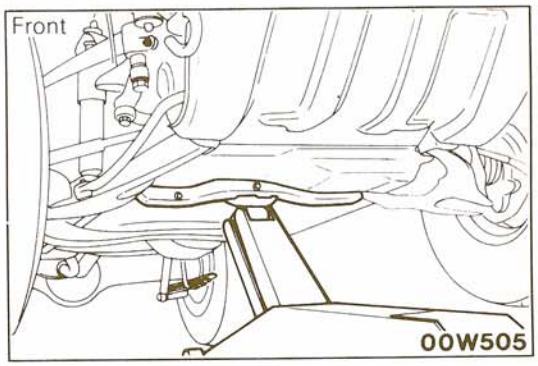
The following precautions should be taken when towing the vehicle.

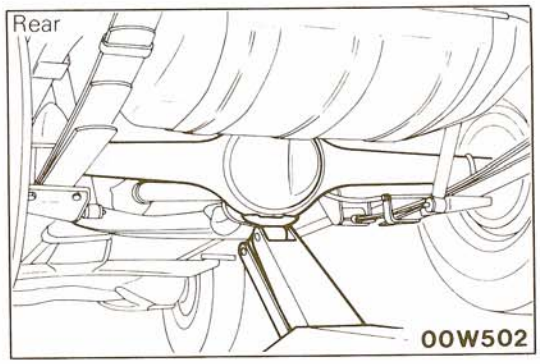
1. Remove exhaust tips and any other optional equipment, that interface with the towing sling. Padding (heavy shop towel or carpeting) should be placed between the towing sling cross bar and any painted surfaces, and bumper surfaces.
2. A safety chain system completely independent of the primary lifting and towing attachment must be used.
3. Any loose or protruding parts of damaged vehicle such as hoods, doors, fenders, trim, etc., should be secured prior to moving the vehicle.
4. Operator should refrain from going under a vehicle unless the vehicle is adequately supported by safety stands.
5. Never allow passengers to ride in a towed vehicle.
6. 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. (See next page)
Conventional hydraulic hoists may be used after determining that the adapter plates will make firm contact with the side frame.





FLOOR JACK

A regular floor jack may be used under the front crossmember or rear axle housing.

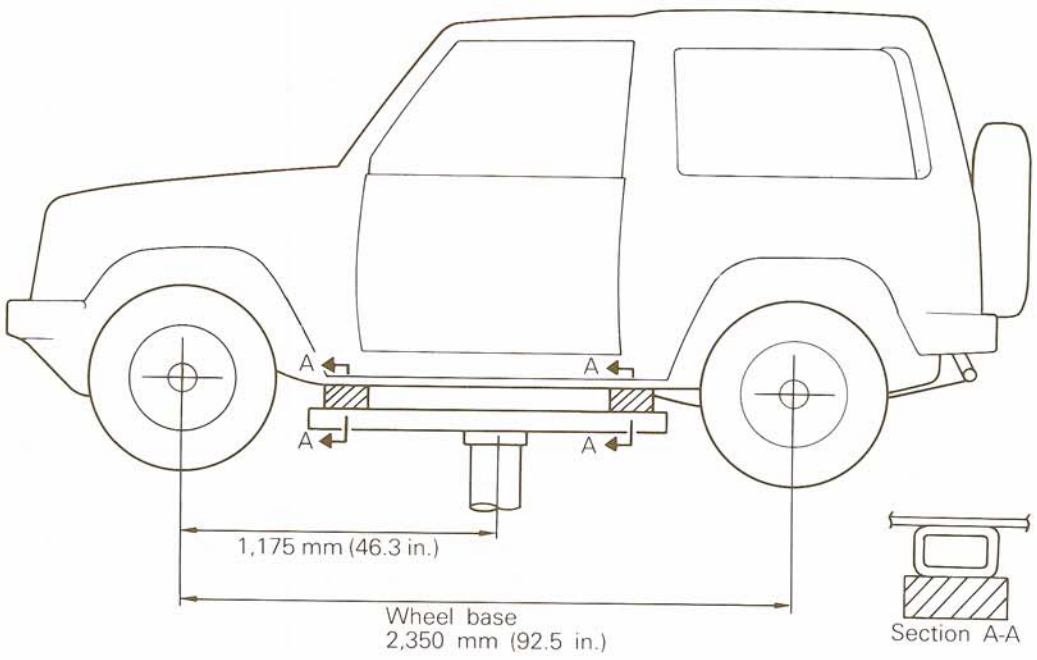
Caution

1. **A floor jack must never be used on any part of the underbody.**
2. **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 No. 2 crossmember and rear axle housing to accept the jack supplied with the vehicle for emergency road service. Always block the opposite wheels and jack only on a level surface.

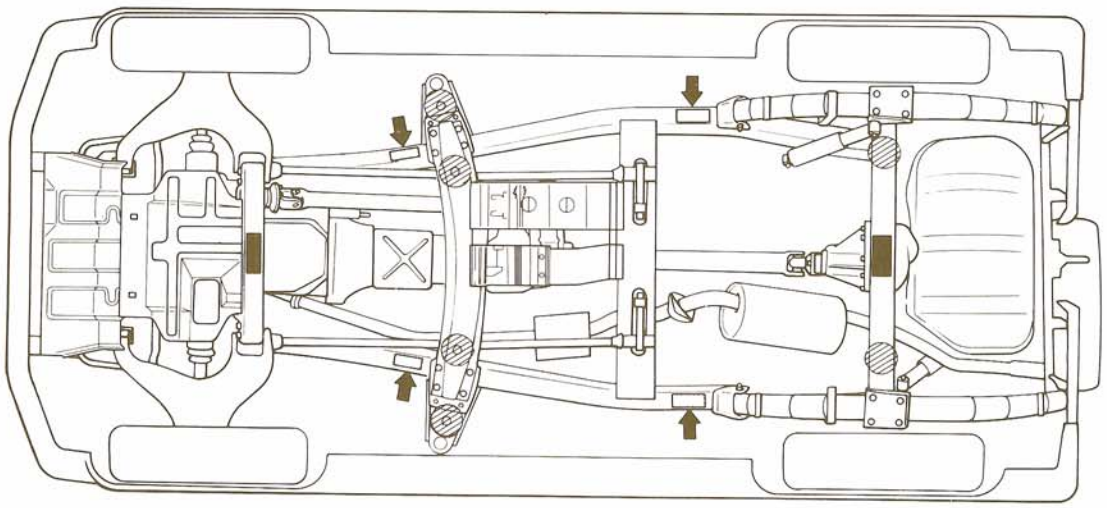
FRAME CONTACT SUPPORT LOCATIONS



NOTE
The locations of the support point shown as Section A-A are the same as those of the twin post hoist shown in the illustration (00W588) below.

00W553

LIFTING AND JACKING SUPPORT LOCATIONS



Twin post hoist

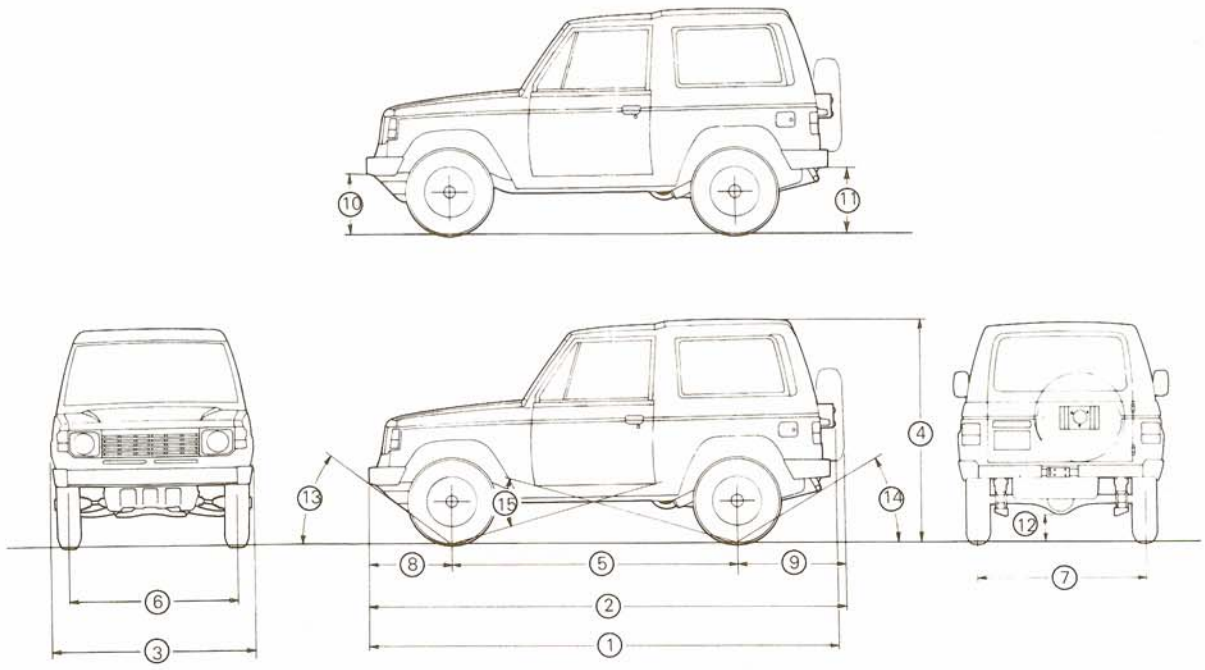
Floor jack

Emergency jacking (jack supplied with the vehicle)

00W588

GENERAL DATA AND SPECIFICATIONS

N00HA-A



00W556

Description			L042G	VNJL3	VRJL3	TNJL2/7	TRJL2/7
Vehicle dimensions	mm (in.)						
Overall length							
Without spare tire			①	3,960 (155.9)	3,960 (155.9)	3,960 (155.9)	3,960 (155.9)
With spare tire			②	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)
Overall width			③	1,680 (66.1)	1,680 (66.1)	1,680 (66.1)	1,680 (66.1)
Overall height			④	1,840 (72.4)	1,840 (72.4)	1,850 (72.8)	1,850 (72.8)
Wheelbase			⑤	2,350 (92.5)	2,350 (92.5)	2,350 (92.5)	2,350 (92.5)
Tread		Front	⑥	1,400 (55.1)	1,400 (55.1)	1,400 (55.1)	1,400 (55.1)
		Rear	⑦	1,375 (54.1)	1,375 (54.1)	1,375 (54.1)	1,375 (54.1)
Overhang		Front	⑧	745 (29.3)	745 (29.3)	745 (29.3)	745 (29.3)
		Rear	⑨	900 (35.4)	900 (35.4)	900 (35.4)	900 (35.4)
Height at curb weight	(wt.)						
Front bumper to ground			⑩	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)
Rear bumper to ground			⑪	440 (17.3)	440 (17.3)	440 (17.3)	440 (17.3)
Minimum running ground clearance			⑫	210 (8.3)	210 (8.3)	210 (8.3)	210 (8.3)
Angle of approach			⑬	38°	38°	38°	38°
Angle of departure			⑭	28°	28°	28°	28°
Ramp breakover angle			⑮	21°	21°	21°	21°
Vehicle weights	kg (lbs.)						
Curb weight				1,485 (3,273)	1,510 (3,329)	1,445 (3,185)	1,470 (3,240)
Gross vehicle weight rating				1,910 (4,210)	1,910 (4,210)	1,910 (4,210)	1,910 (4,210)
Gross axle weight rating		Front		1,100 (2,425)	1,100 (2,425)	1,100 (2,425)	1,100 (2,425)
		Rear		1,450 (3,197)	1,450 (3,197)	1,450 (3,197)	1,450 (3,197)
Seating capacity				4	4	2	2

Description		L042G	VNJL3	VRJL3	TNJL2/7	TRJL2/7
Engine						
Model No.			G54B	G54B	G54B	G54B
Type			In-line OHC	In-line OHC	In-line OHC	In-line OHC
Number of cylinders			4	4	4	4
Bore			91.1 mm (3.59 in.)	91.1 mm (3.59 in.)	91.1 mm (3.59 in.)	91.1 mm (3.59 in.)
Stroke			98.0 mm (3.86 in.)	98.0 mm (3.86 in.)	98.0 mm (3.86 in.)	98.0 mm (3.86 in.)
Piston displacement			2,555 cm^3 (155.9 CID)	2,555 cm^3 (155.9 CID)	2,555 cm^3 (155.9 CID)	2,555 cm^3 (155.9 CID)
Compression ratio			8.7	8.7	8.7	8.7
Firing order			1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Basic ignition timing			7° BTDC ± 2°	7° BTDC ± 2°	7° BTDC ± 2°	7° BTDC ± 2°
Transmission & transfer case						
Model No.			KM145	KM148	KM145	KM148
Type			5-speed manual	4-speed automatic	5-speed manual	4-speed automatic
Cear ratio						
Transmission	1st		3.967	2.826	3.967	2.826
	2nd		2.136	1.493	2.136	1.493
	3rd		1.360	1.000	1.360	1.000
	4th		1.000	0.688	1.000	0.688
	5th		0.856	–	0.856	–
	Reverse		3.578	2.703	3.578	2.703
Transfer case	High		1.000	1.000	1.000	1.000
	Low		1.944	1.944	1.944	1.944
Final ring gear ratio			4.625	4.625	4.625	4.625
Clutch						
Type			Dry single disc & diaphragm spring	–	Dry single disc & diaphragm spring	–
Chassis						
Tire size			P225/75R15			
Front suspension						
Type			Independent double-wishbone			
Rear suspension						
Type			Rigid axle			
Brakes						
Type	Front		Disc			
	Rear		Drum (Leading and trailing)			
Power steering						
Gear type			Integral type (Recirculating ball nut)			
Gear ratio			16.4			
Fuel tank capacity	liter (gal.)		60 (15.9)			

TIGHTENING TORQUE

N00JA--

Description	Head mark ④		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	160–320	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

Description	Nm	ft.lbs.	Remarks
Taper thread for pipes (size)			
PT 1/8	7.9–12	5.8–8.7	Internal thread: Aluminum
	16–19	12–14	Internal thread: Cast iron
PT 1/4	19–30	14–22	Internal thread: Aluminum
	34–45	25–33	Internal thread: Cast iron
PT 3/8	39–54	29–40	Internal thread: Aluminum
	58–73	43–54	Internal thread: Cast iron
Tape thread for dry sealed pipes (size)			
NPTF 1/16	4.9–7.8	3.6–5.8	Internal thread: Aluminum
	7.9–12	5.8–8.7	Internal thread: Cast iron
NPTF 1/8	7.9–12	5.8–8.7	Internal thread: Aluminum
	16–19	12–14	Internal thread: Cast iron
NPTF 1/4	19–13	14–22	Internal thread: Aluminum
	34–45	25–33	Internal thread: Cast iron

ELECTRICAL

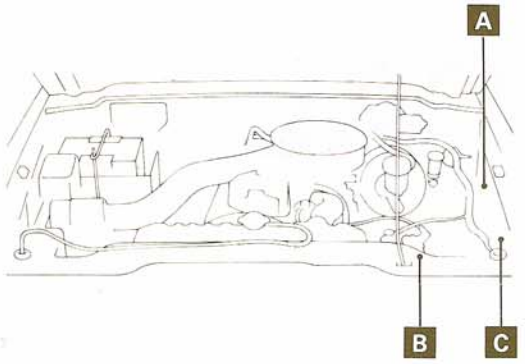
CONTENTS

N08AA--

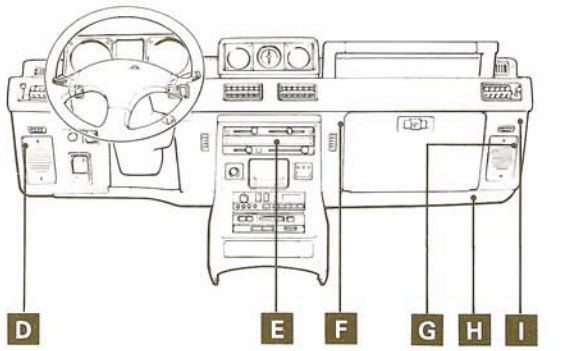
ELECTRICAL SYSTEM PARTS LOCATION

N08BAB-A

RELAY AND CONTROL UNIT

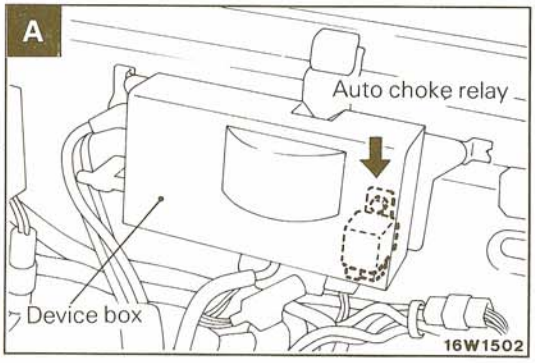


16W1601



68W599

Items	Symbol
Air conditioner relay	F
Auto choke relay	A
Automatic free-wheeling hub indicator control unit	I
Condensor blower motor relay	B
Defogger timer unit	G
Feed back carburetor control unit	H
Hazard warning flasher unit	D
Headlight washer relay	D
Heater relay	E
Intermittent wiper relay	D
Intermittent rear wiper relay	G
Light control relay	C
Over drive relay	G
Seat belt warning timer	D
Turn-signal flasher unit	D



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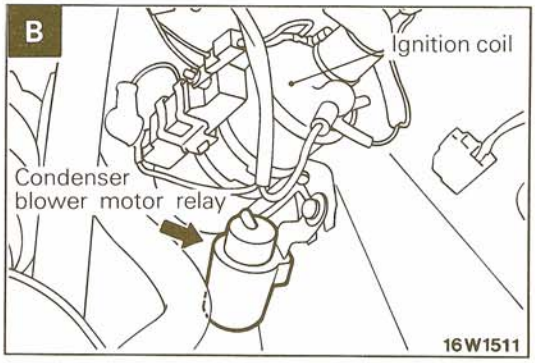

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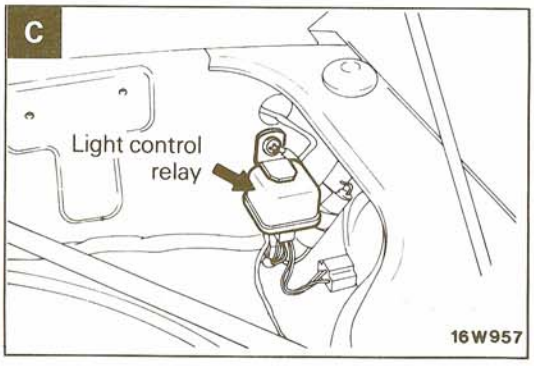
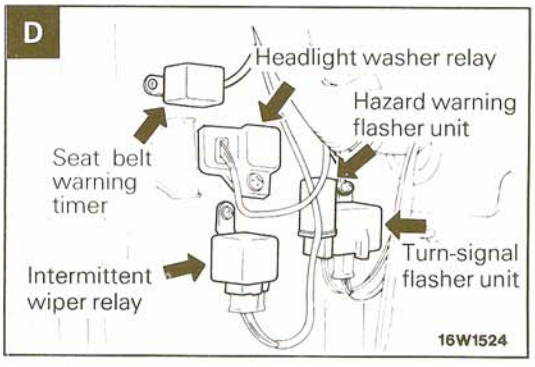
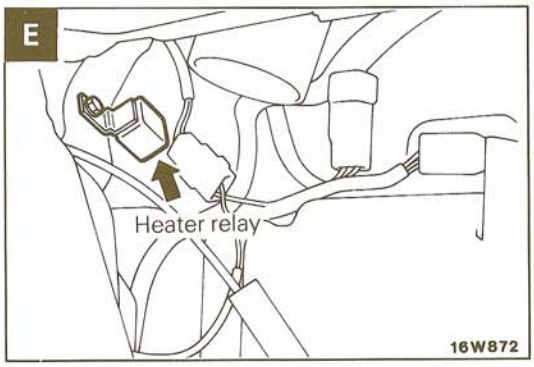


16W957

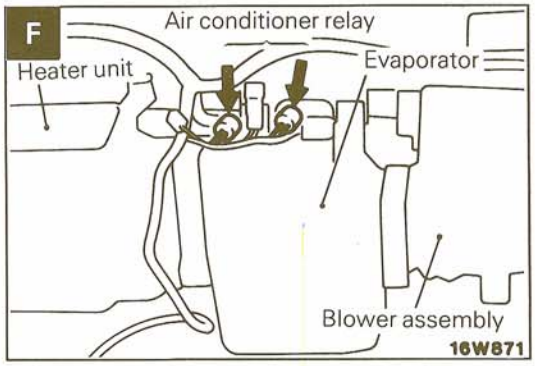


16W1524

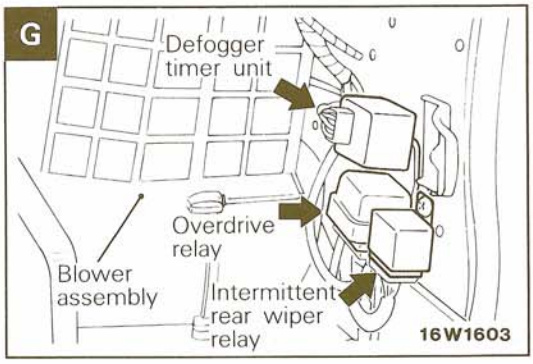
E


Heater relay
16W872

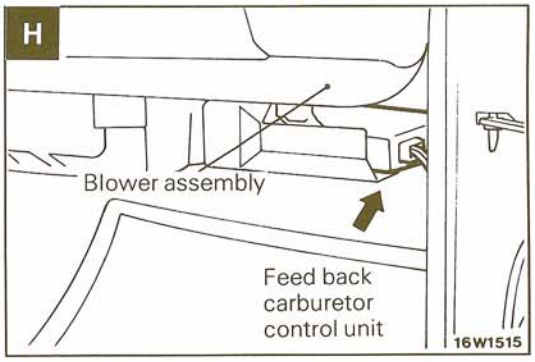
F


Air conditioner relay
Heater unit
Evaporator
Blower assembly
16W871

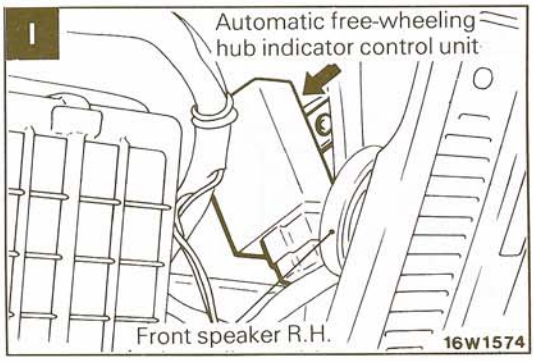
G


Defogger timer unit
Overdrive relay
Blower assembly
Intermittent rear wiper relay
16W1603

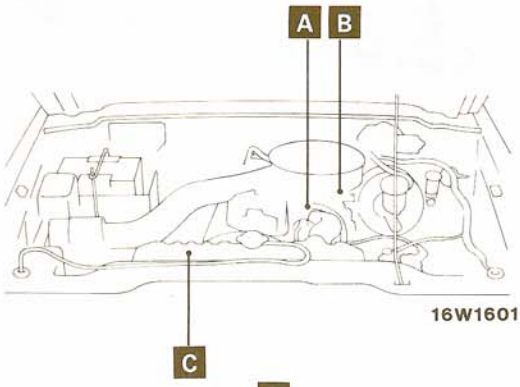
H

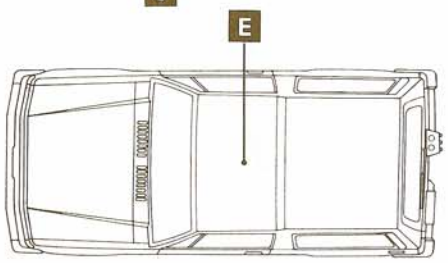

Blower assembly
Feed back carburetor control unit
16W1515

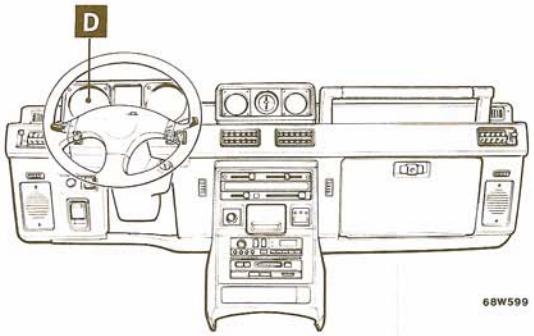
I


Automatic free-wheeling hub indicator control unit
Front speaker R.H.
16W1574

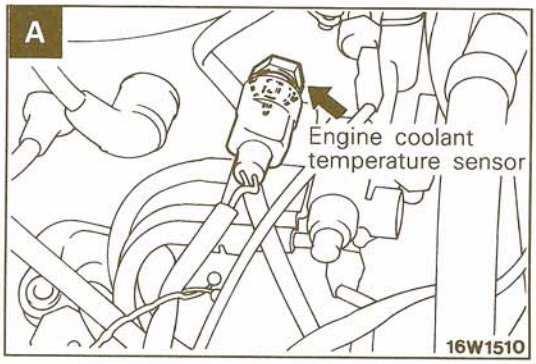
SENSOR

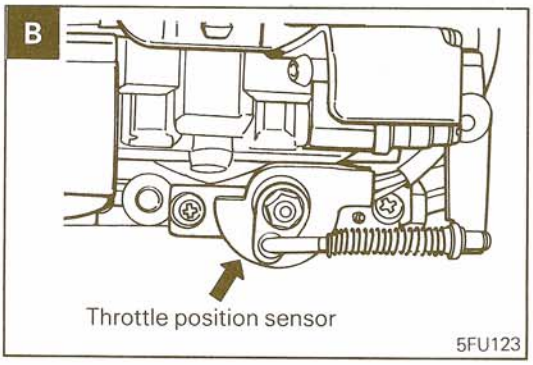


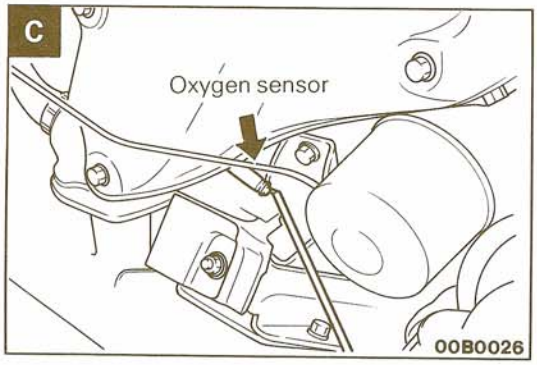


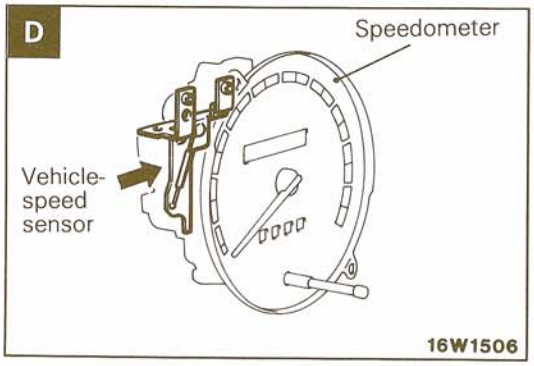


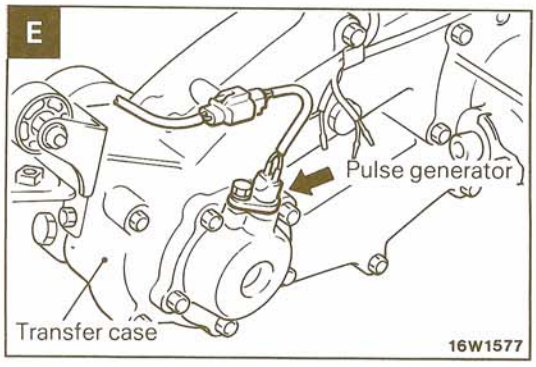
Items	Symbol
Engine coolant temperature sensor	A
Oxygen sensor	C
Pulse generator	E
Throttle position sensor	B
Vehicle-speed sensor	D



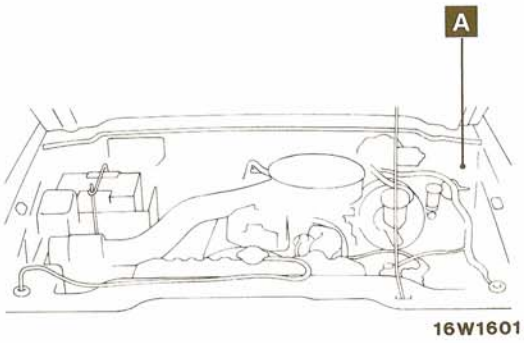


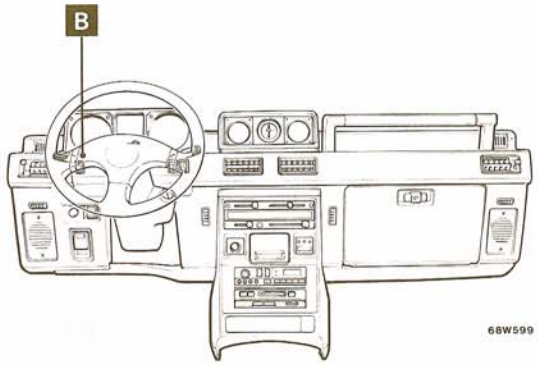




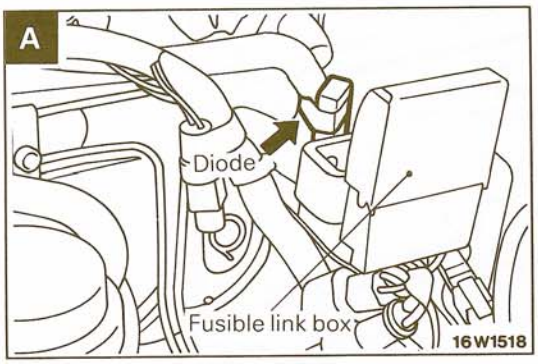


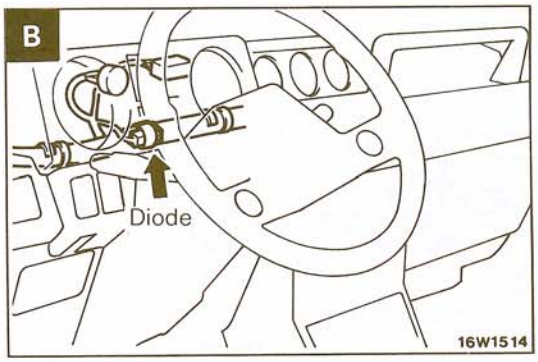
DIODE



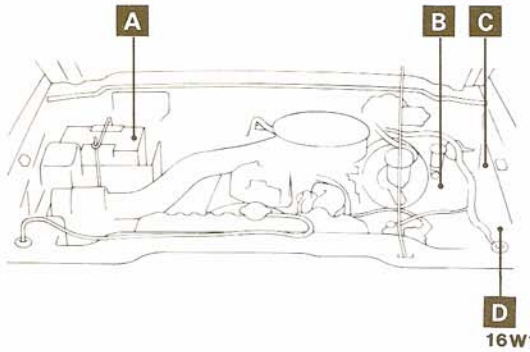


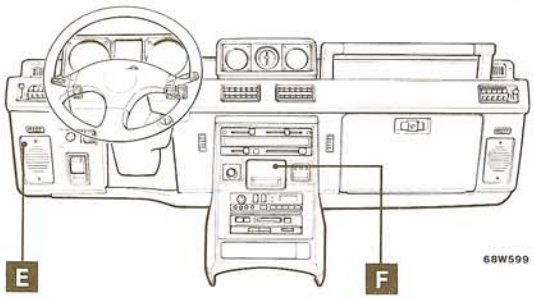
Items	Symbol
Diode (for automatic transmission oil temperature warning light)	A
Diode (for maintenance required warning light)	B





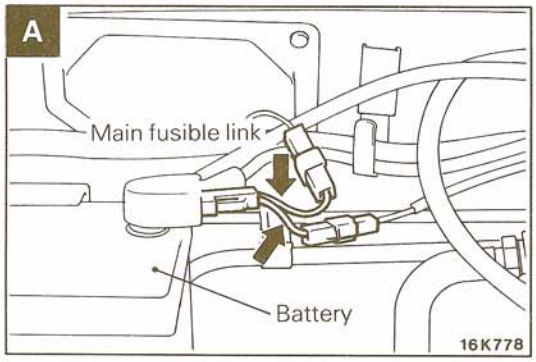
FUSIBLE LINK AND FUSE

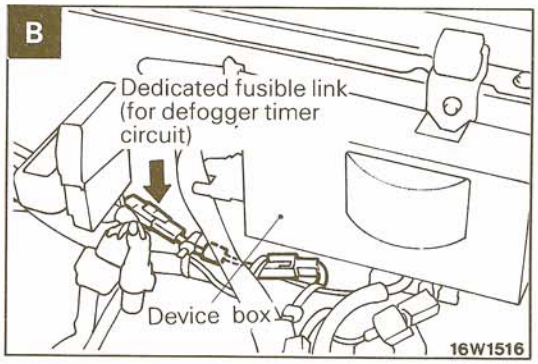


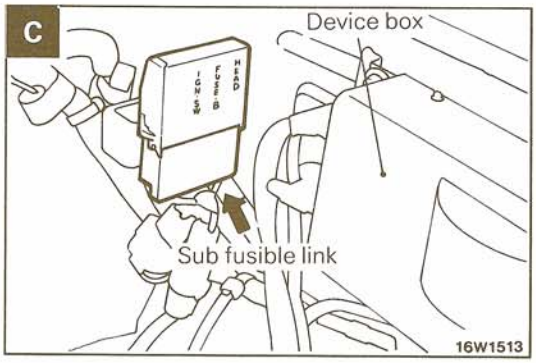


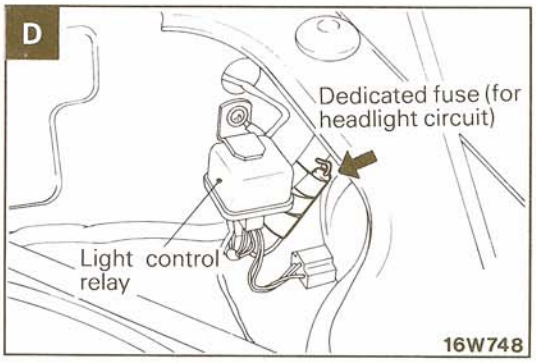
Items	Symbol
Dedicated fuse (for air conditioner circuit)	F
Dedicated fuse (for headlight circuit)	D
Dedicated fusible link (for defogger time circuit)	B
Main fusible link	A
Multipurpose fuse	E
Sub fusible link	C

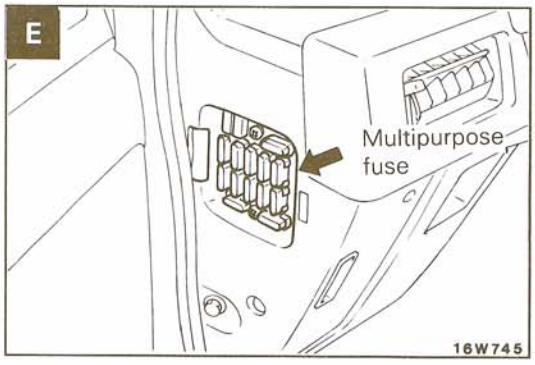
NOTE
For detailed information concerning the fusible links and fuses, refer to the section regarding CENTRALIZED JUNCTION (P.8-67, 68)

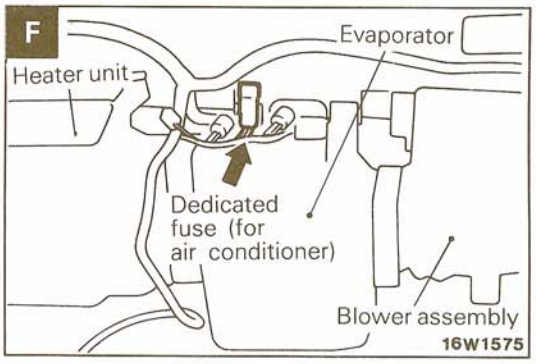




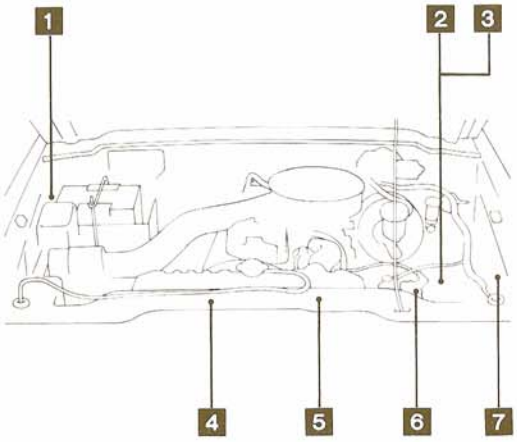




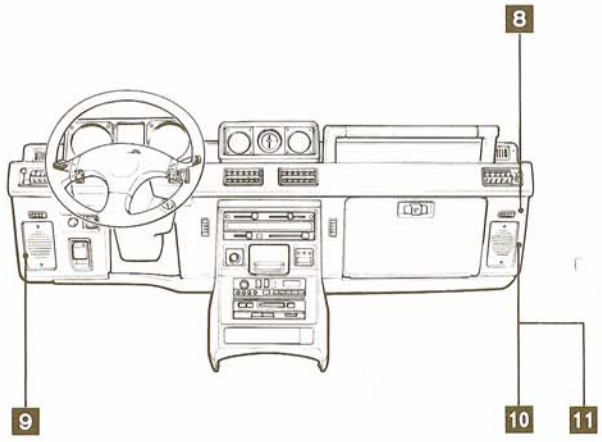




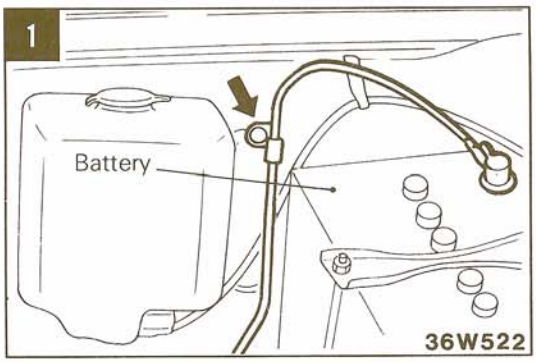
GROUNDING



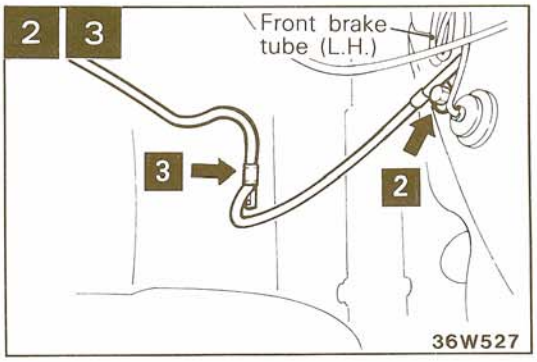
16W1601



68W599



36W522



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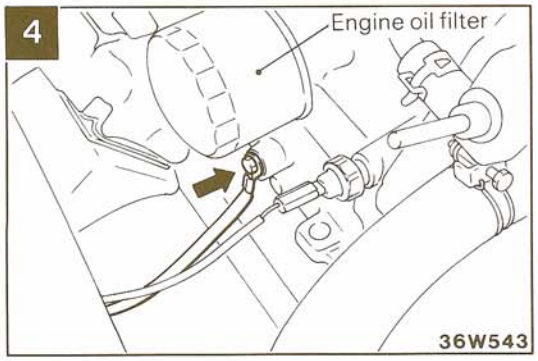

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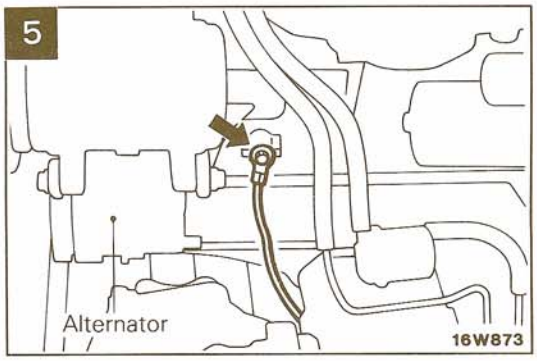
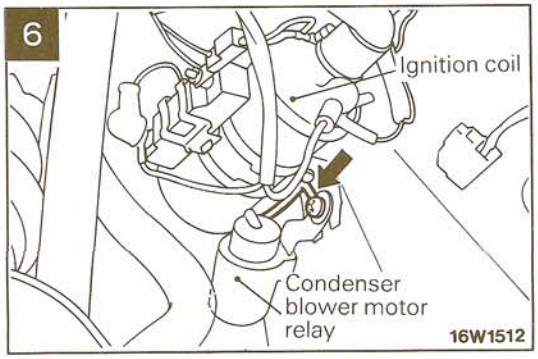
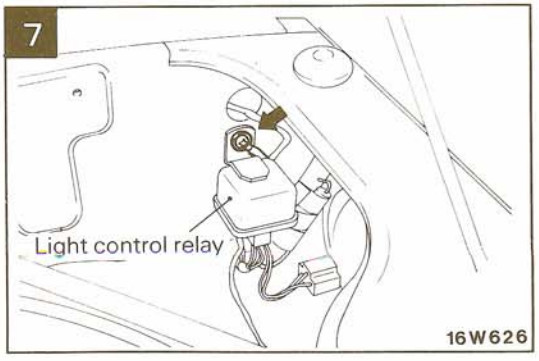


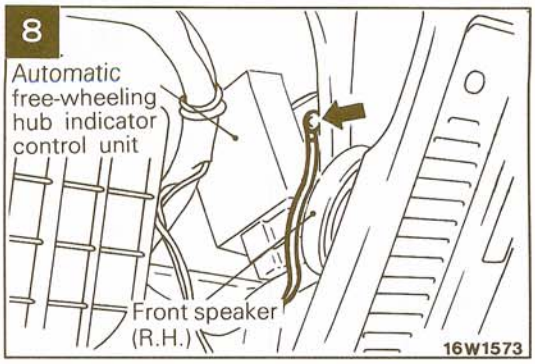
16W873

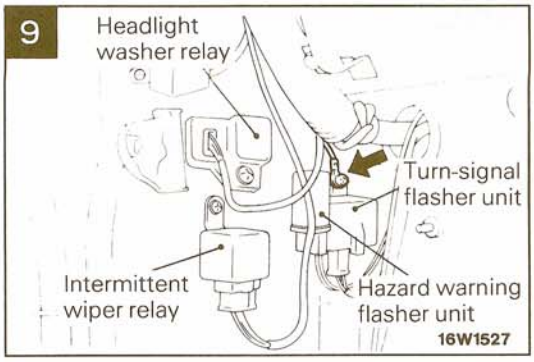


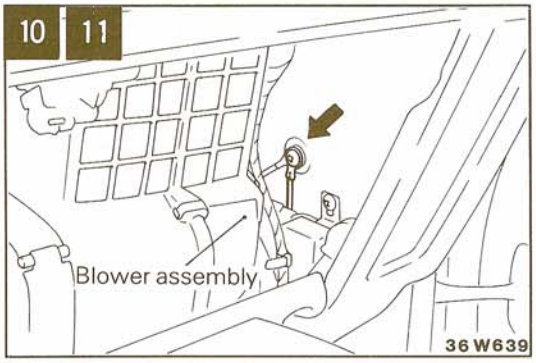
16W1512

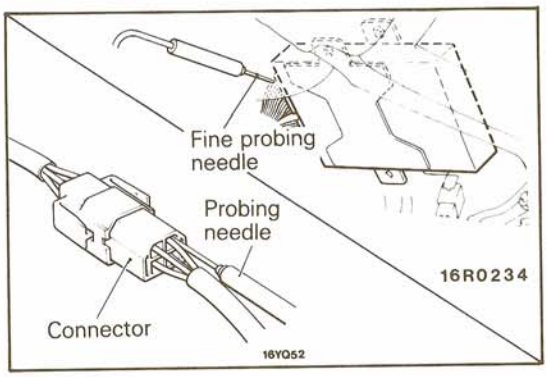


16W626


8
Automatic free-wheeling hub indicator control unit
Front speaker (R.H.)
16W1573


9
Headlight washer relay
Turn-signal flasher unit
Intermittent wiper relay
Hazard warning flasher unit
16W1527


10 11
Blower assembly
36W639



INSPECTION OF HARNESS CONNECTOR

N08CAAA

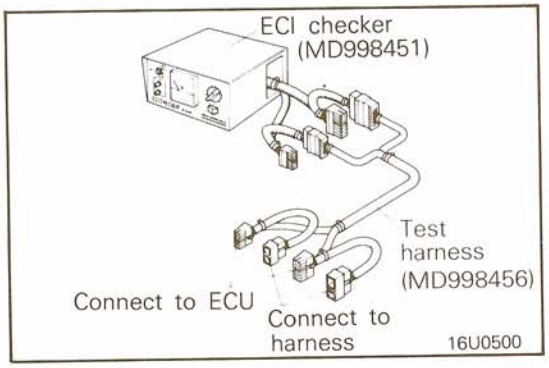
CONTINUITY AND VOLTAGE TEST FOR CONNECTOR

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

CONVENTIONAL (NON-WATERPROOF) CONNECTOR

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

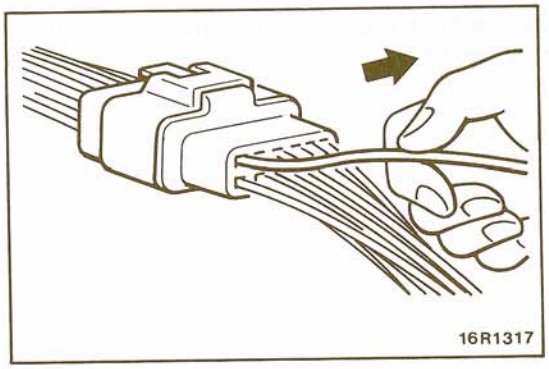
WATER PROOF CONNECTOR



Caution

Do not insert probing needle from harness side as it will deteriorates waterproof and cause for rusting. To inspect the energized circuit, use the ECI checker.

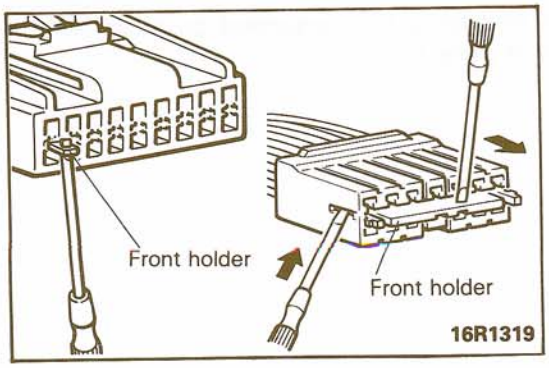
CHECK FOR IMPROPER ENGAGEMENT OF TERMINAL



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

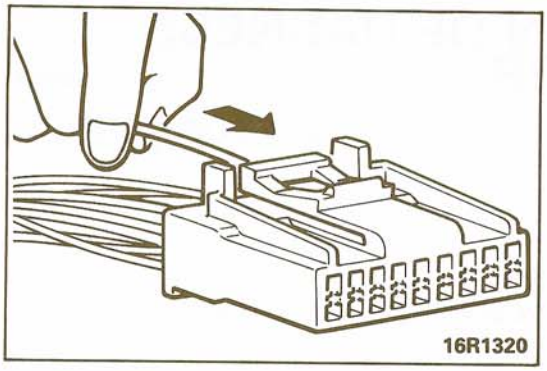
ENGAGING AND DISENGAGING OF CONNECTOR TERMINAL

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

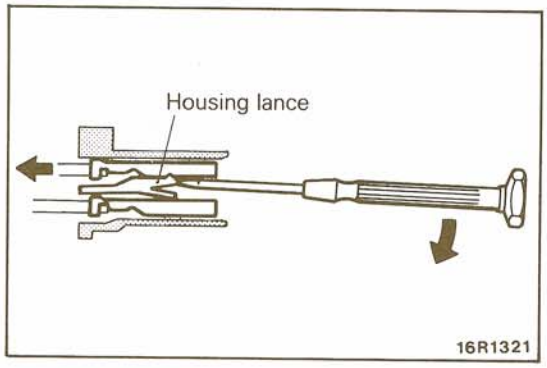


COMPUTER CONNECTOR

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

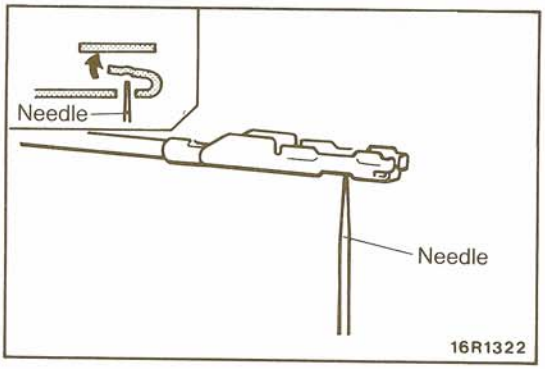


(2) Insert harness of terminal to be rectified deep into connector from harness side and hold it there.

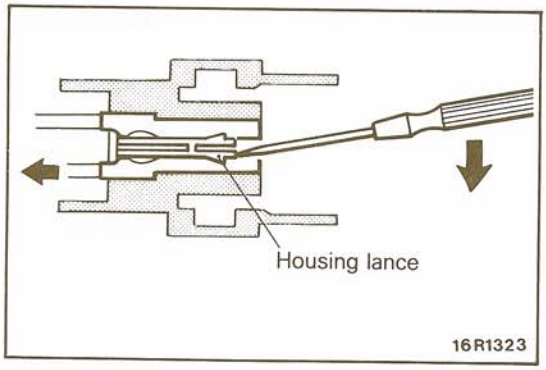


(3) Insert tip of screwdriver [1.4 mm (.06 in.) width] into connector in a manner as shown in the figure, raise housing lance slightly with it and pull out harness.

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

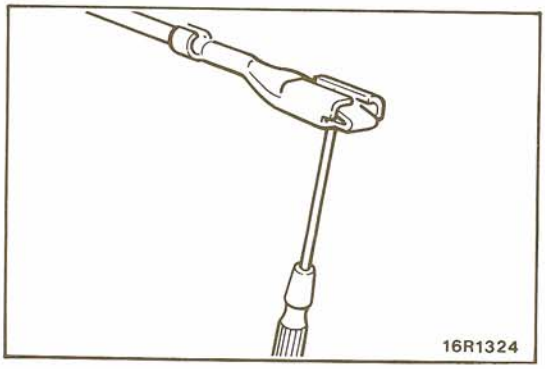


(4) Insert needle through a hole provided on terminal and raise contact point of male terminal.

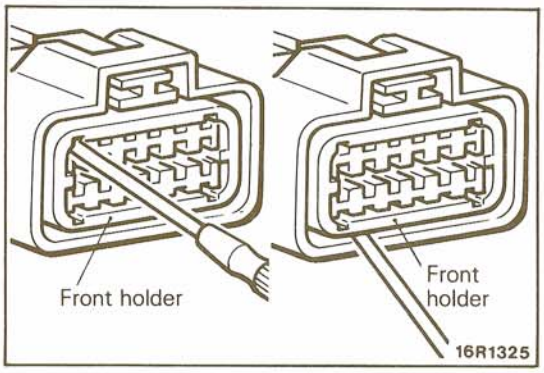


ROUND WATERPROOF CONNECTOR

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

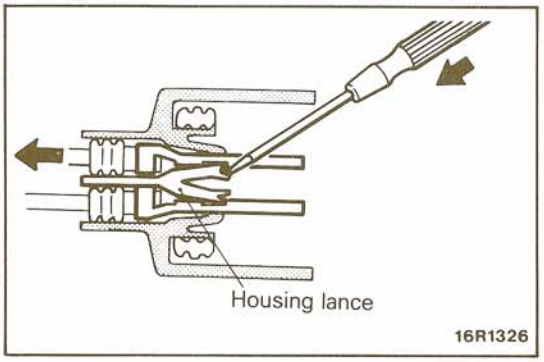


(3) Insert screwdriver through a hole provided on terminal and raise contact point of male terminal.

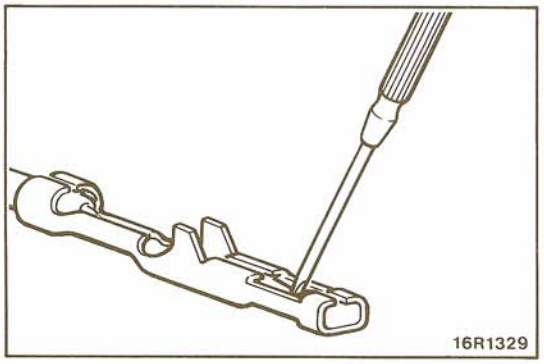


RECTANGULAR WATERPROOF CONNECTOR

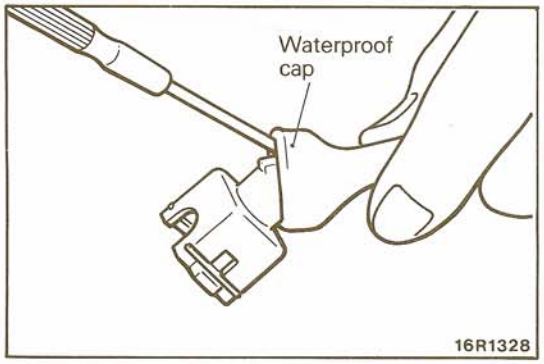
(1) Disengage front holder by using a screwdriver and remove it.



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

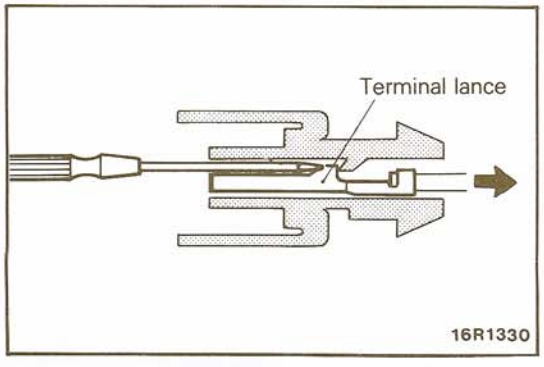


(3) Press contact point of male terminal down by holding a screwdriver [1.4 mm (.06 in.) width] in a manner as shown in the figure.

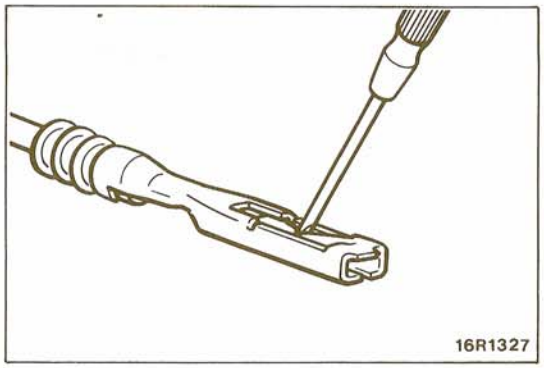


INJECTOR CONNECTOR

(1) Remove waterproof cap.



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



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

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

WIRING HARNESS

TROUBLESHOOTING

N08DAAA

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

TROUBLESHOOTING STEPS

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

1 Observation of Problem Symptoms

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

2 Determination of Probable Causes

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

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

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

4 Repair and Confirmation

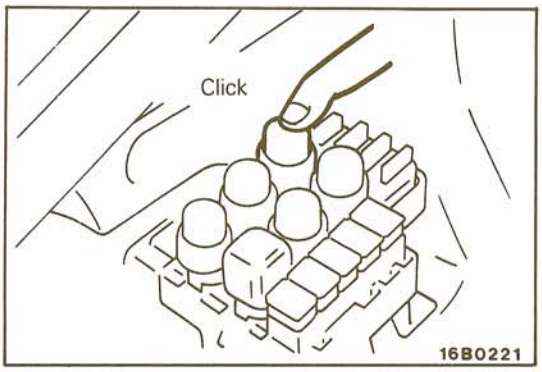
After the problems are corrected, be sure to check that the system operates correctly. Also check that new problems have not been caused by the repair.

INFORMATION FOR DIAGNOSIS

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

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

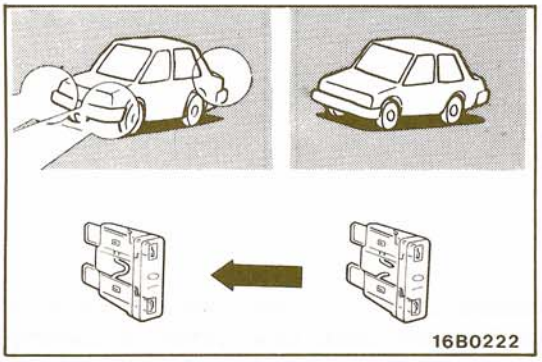
Remarks
Components of ECI, ETACS, ECS, etc. with ECU do not include 3 and 4 above. For this information, refer to a manual which includes details of these components.



INSPECTION

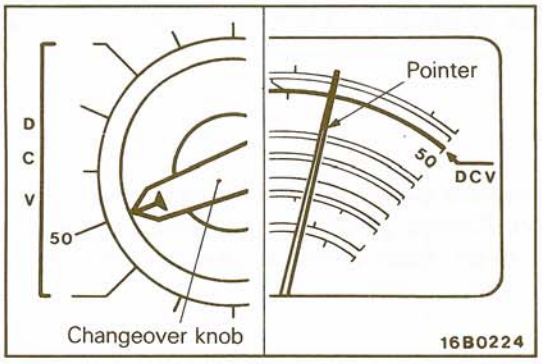
1. Visual and aural checks

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



2. Simple checks

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



3. Checking with instruments

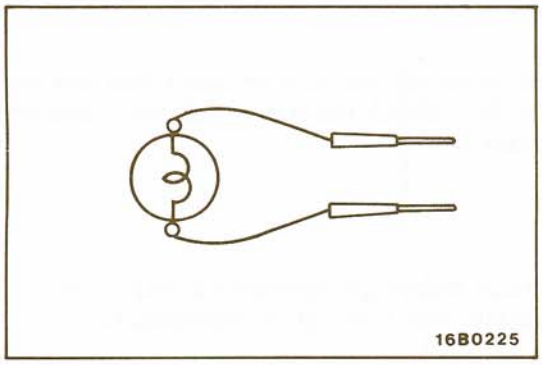
Use an appropriate instrument in an adequate range and read the indication correctly. You must have sufficient knowledge and experience to handle instruments correctly.

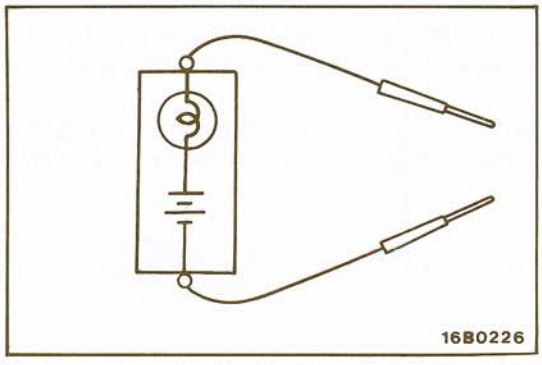
INSPECTION INSTRUMENTS

In inspection, make use of the following instruments.

1. Test lamps

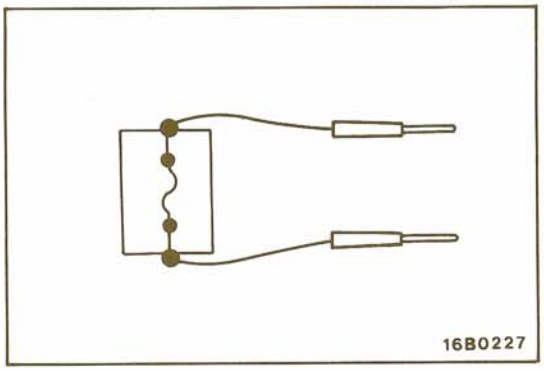
A test lamp consists of a 12 V bulb and lead wires. It is used to check voltages or shortcircuits.





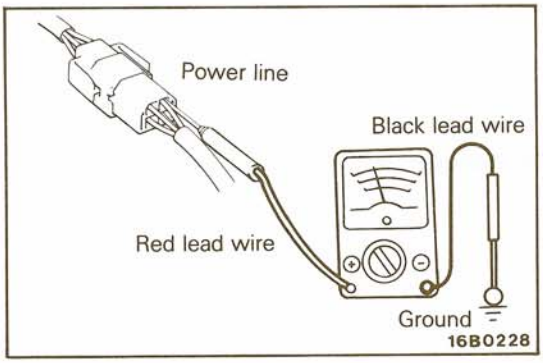
2. Self-power test light

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



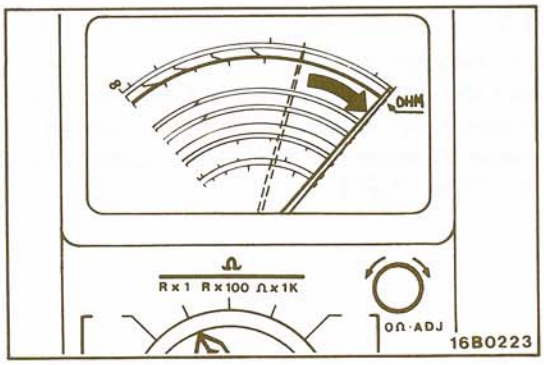
3. Jumper wire

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



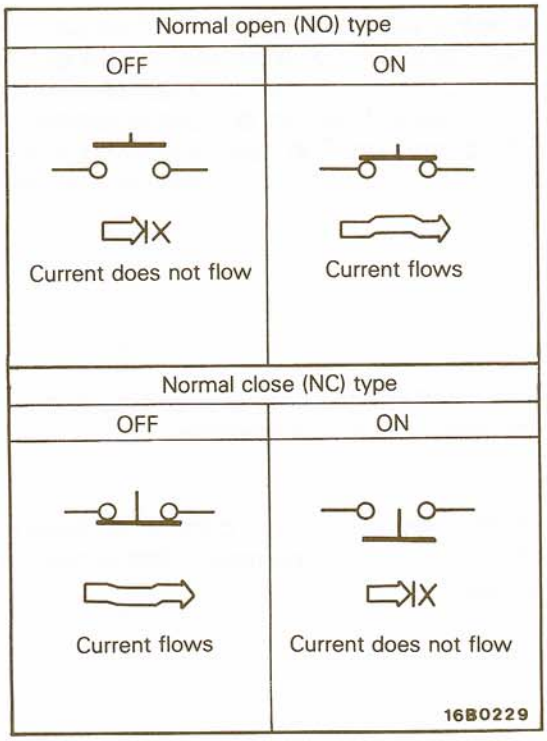
4. Voltmeter

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



5. Ohmmeter

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

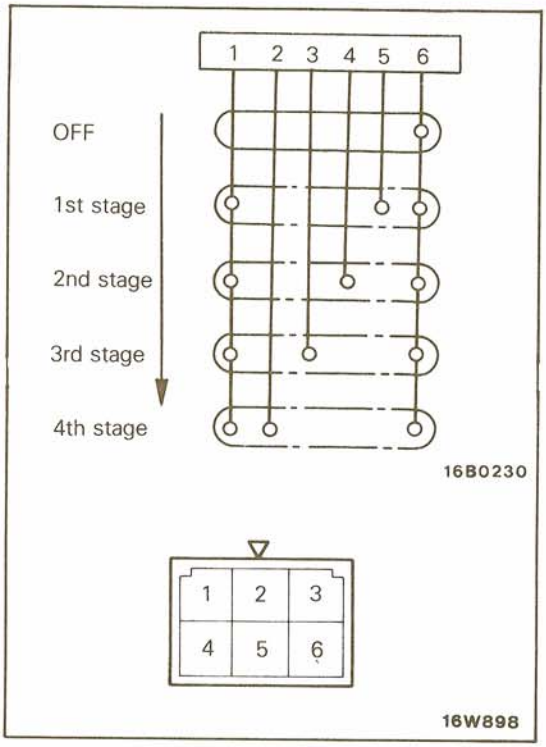


CHECKING SWITCHES

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.

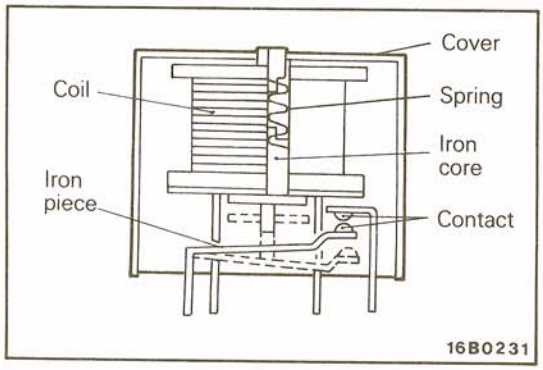


2. SWITCH CONNECTION

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.

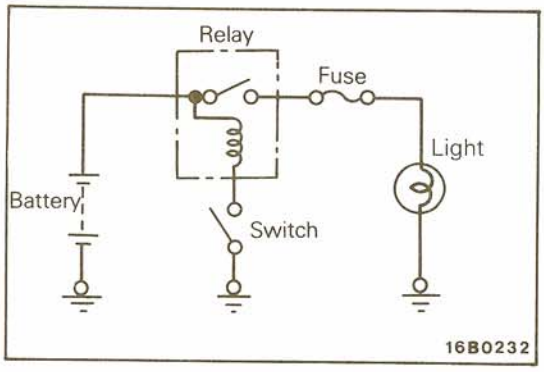
Position \ Terminal No.	1	2	3	4	5	6
OFF						
1st stage	○				○	○
2nd stage	○			○		○
3rd stage	○		○			○
4th stage	○	○				○

NOTE
○—○ denotes continuity between terminals.

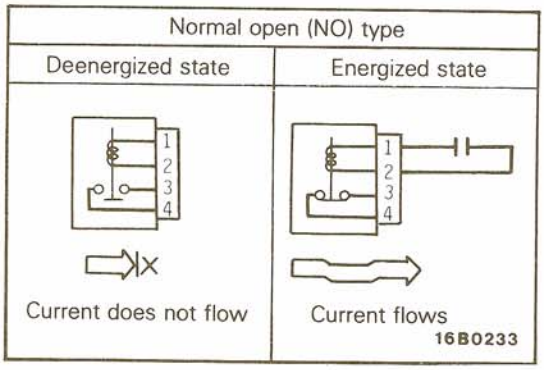


CHECKING RELAYS

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

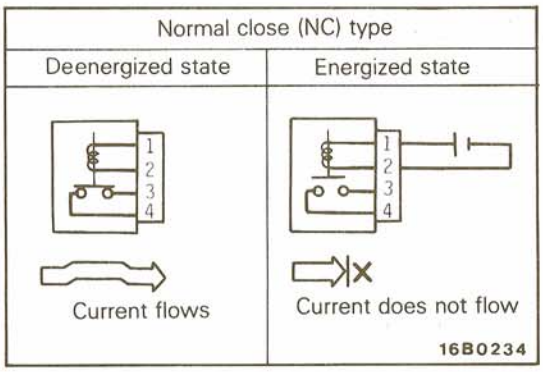


2. By using a relay, a heavy current can be turned on and off by a switch of small capacity. For example, in the circuit shown here, when the switch is turned on (closed), current flows to the coil of the relay. Then, its contact is turned on (closed) and the light comes on. The current flowing at this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

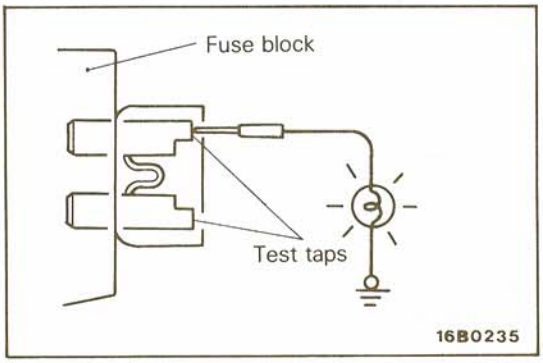


3. The relays may be classified into the normal open type and the normal close type by their contact construction.

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

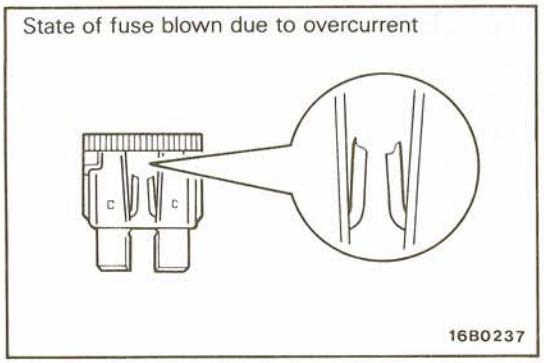


When a normal close type relay as illustrated here is checked, there should be continuity between terminals (1) and (2) and between terminals 3 and 4 when the relay is deenergized, and the continuity should be lost between terminals 3 and 4 when the battery voltage is applied to the terminals 1 and 2.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



CHECKING FUSES

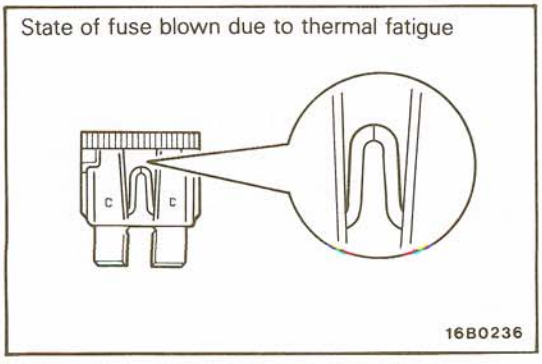
A blade type fuse has test taps provided to allow checking of the fuse itself without removing it from the fuse block. The fuse is okay if the test light comes on when its one lead is connected to the test taps (one at a time) and the other lead is grounded.
(Change the ignition switch position adequately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



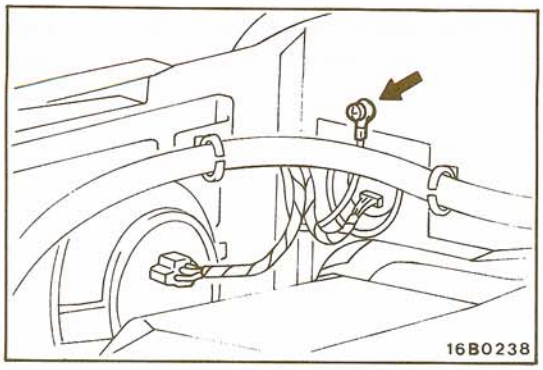
CAUTIONS IN EVENT OF BLOWN FUSE

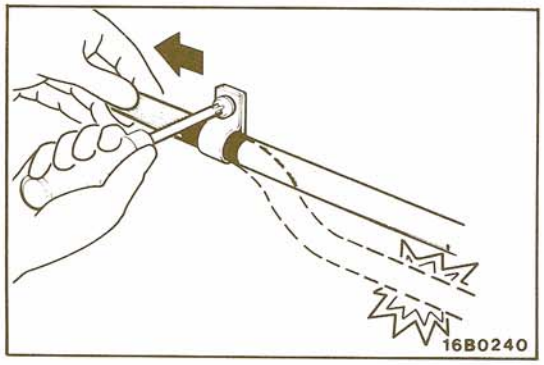
When a fuse is blown, there are two probable causes as follows : One is that it is blown due to flow of current exceeding its rating. The other is that it is blown due to repeated on/off current flowing through it. Which of the two causes is responsible can be easily determined by visual check as described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

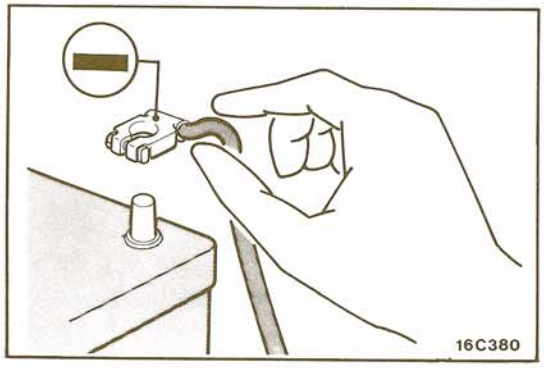
(1) Fuse blown due to current exceeding rating
The illustration shows the state of a fuse blown due to this cause. In this case, do not replace the fuse with a new one hastily since a current heavy enough to blow the fuse has flowed through it. First, check the circuit for shorting and check for abnormal electric parts. Only after the correction of such shorting or parts, fuse of the same capacity should be used as a replacement. Never use a fuse of lager capacity than the one that has blown. If such a fuse is used, electric parts or wirings could be damaged before the fuse blows in the event an overcurrent occurs again.

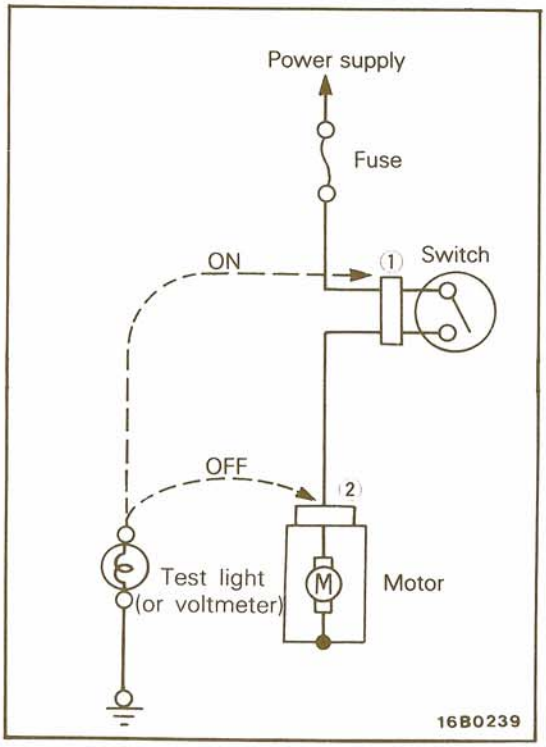


(2) Fuse blown due to repeated current on/off
The illustration shows the state of a fuse blown due to repeated current on/off. Normally, this type of problem occurs after fairly long period of use and hence is less frequent than the above type. In this case, you may simply replace with a new fuse of 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.).
9. Check that wirings are clamped firmly to secure enough clearance from the fan pulley, fan belt and other rotating or moving parts.
10. Check that the wirings between the fixed parts such as the vehicle body and the vibrating parts such as the engine are made with adequate allowance for vibrations.

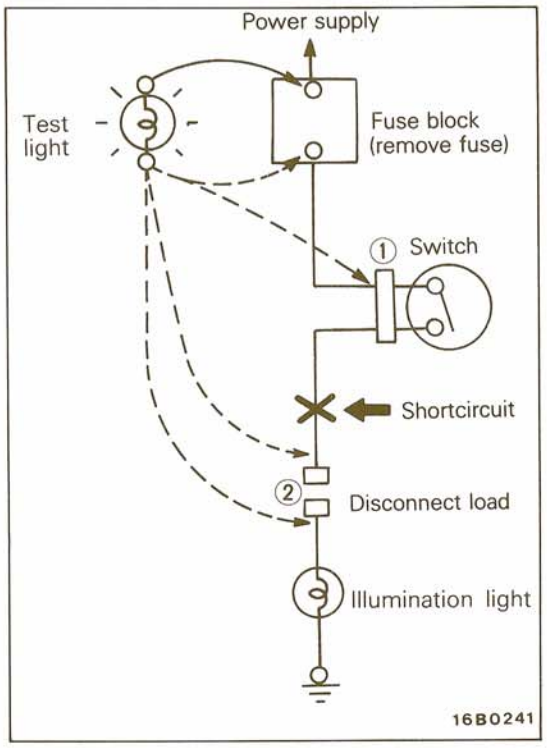
HANDLING ON-VEHICLE BATTERY

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

TROUBLESHOOTING

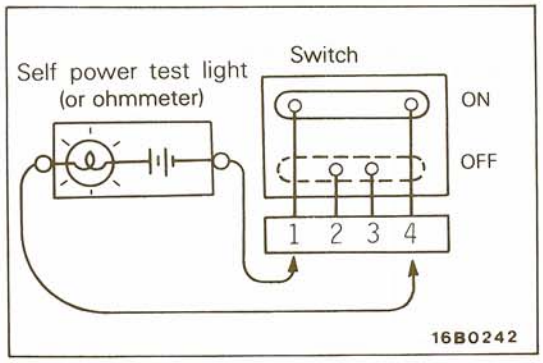
A circuit consists of the power supply, switch, relay, load, ground, etc. There are various methods to check a circuit including an overall check, voltage check, shortcircuit check and continuity check. Each of these methods is briefly described in the following.

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



2. CHECKING SHORTCIRCUITS

(1) Remove the blown fuse connect the test light to the disconnected terminal. The test light should not come on.
(2) Connect a lead wire of the test light to the power side of the connector ①. The test light should not come on.
(3) Connect a lead wire of the test light to the load side of the connector ①. The test light should come on and the load light should also come on.
(4) Disconnect the load at the connector ② and connect the test light lead wire to the load side of the connector ②.
The test light should come on and the load light should also come on.
(5) Connect the test light lead wire to the switch side of the connecotr ②. The test light 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 light should come on or the ohmmeter should read 0 Ω only when the terminals 2 and 3 are interconnected.
(2) When the switch is in the ON position, the self power test light should come on or the ohmmeter should read 0 Ω only when the terminals 1 and 4 are interconnected.

HOW TO READ WIRING DIAGRAMS

N08DBAE

HOW TO READ CONFIGURATION DIAGRAMS

(1) 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.

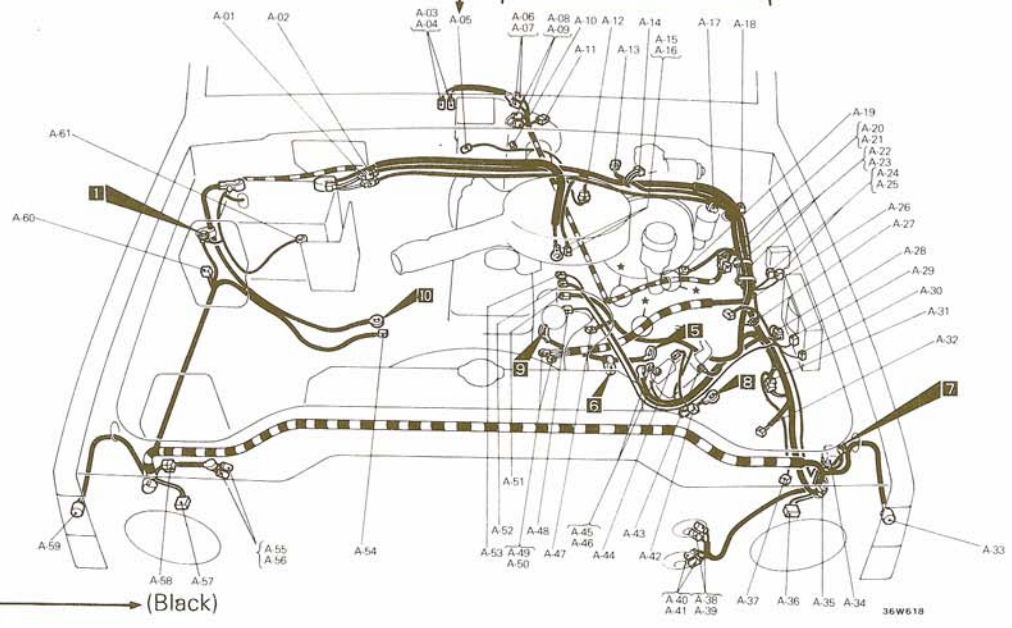
Example : A–12 (Black)

- Connector color
- Connector's unique number (serial number)
- Connector symbol
  - A : Engine compartment
  - B : Interior and frame
  - C : Instrument panel

A-01, A-02 } Main fusible link
A-03, A-04 } 4WD indicator switch
A-05 Automatic transmission oil temperature switch

Same connector No. is used in the wiring diagram and the circuit diagram.

The first letter A of the connector symbol indicates that the connector is located in the engine compartment and the serial number. (two digits) as a rule is assigned clockwise in the wiring diagram.



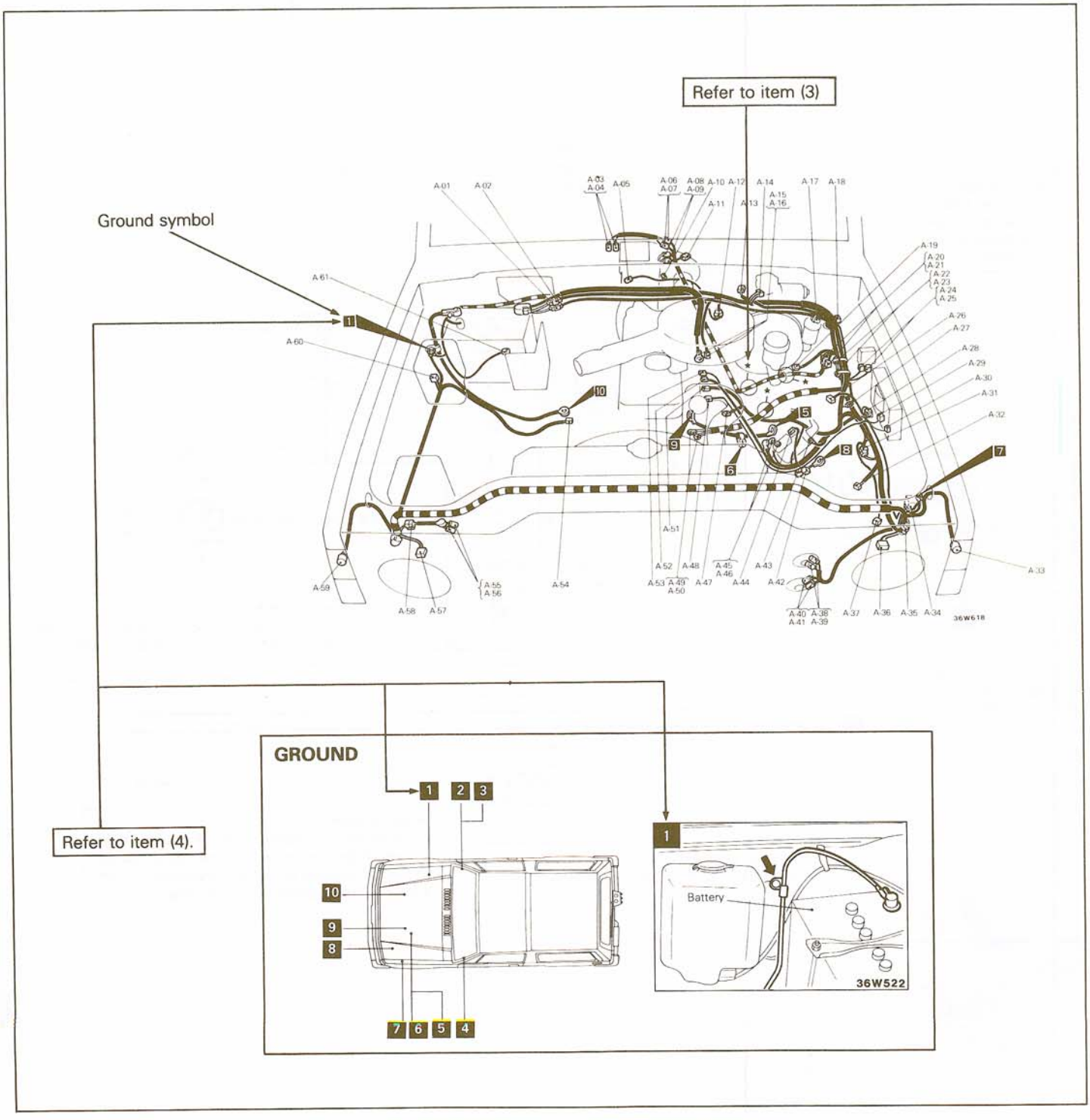
(Black)

Indicates color of the A-58 connector.

(2) Identification of connectors differing according to different vehicle specifications
Without 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 READ 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).



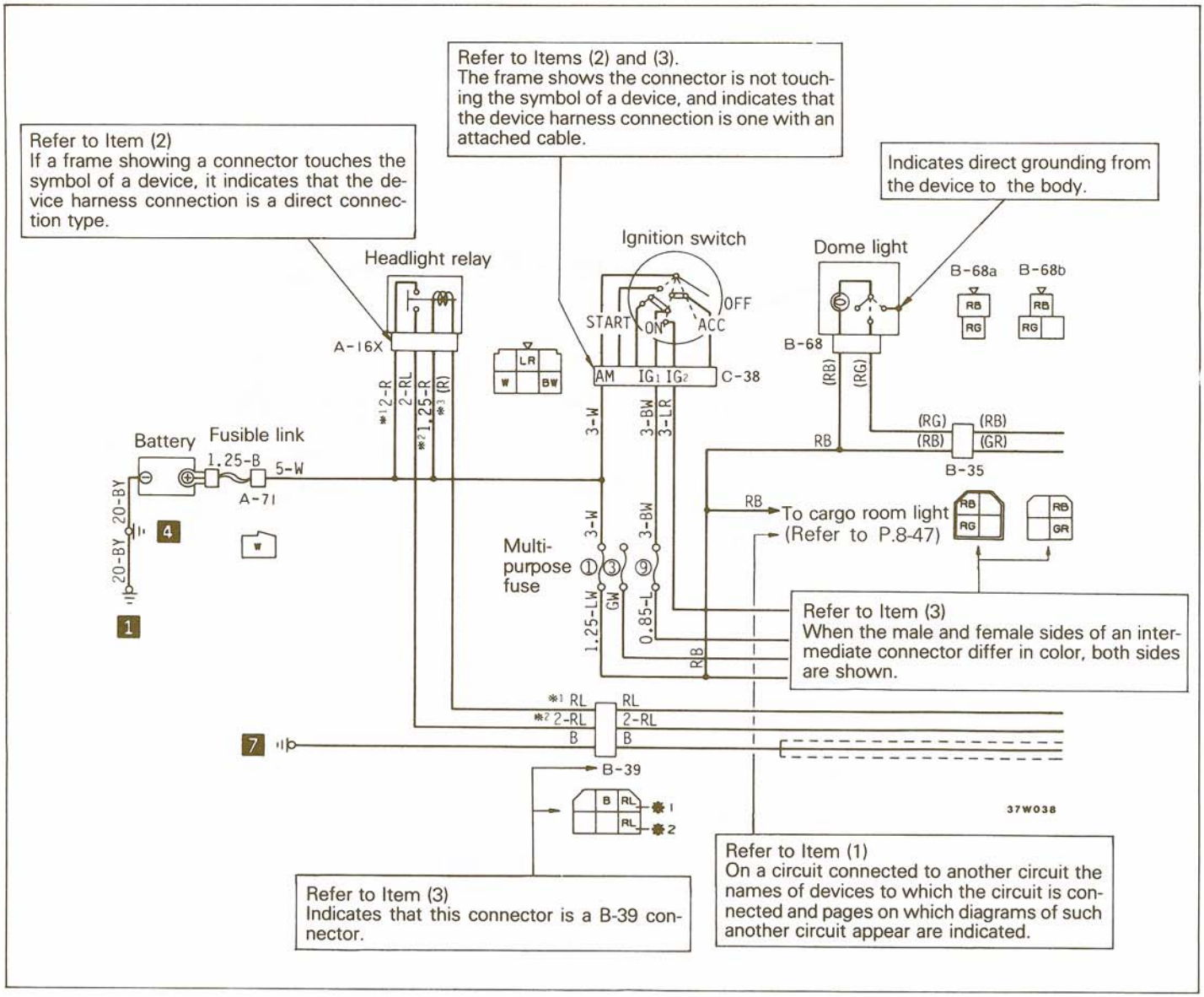
HOW TO READ CIRCUIT DIAGRAMS

The circuit diagrams are functionally separated.

(1) Indication of circuit connected to another circuit
When the circuit in a circuit diagram 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.

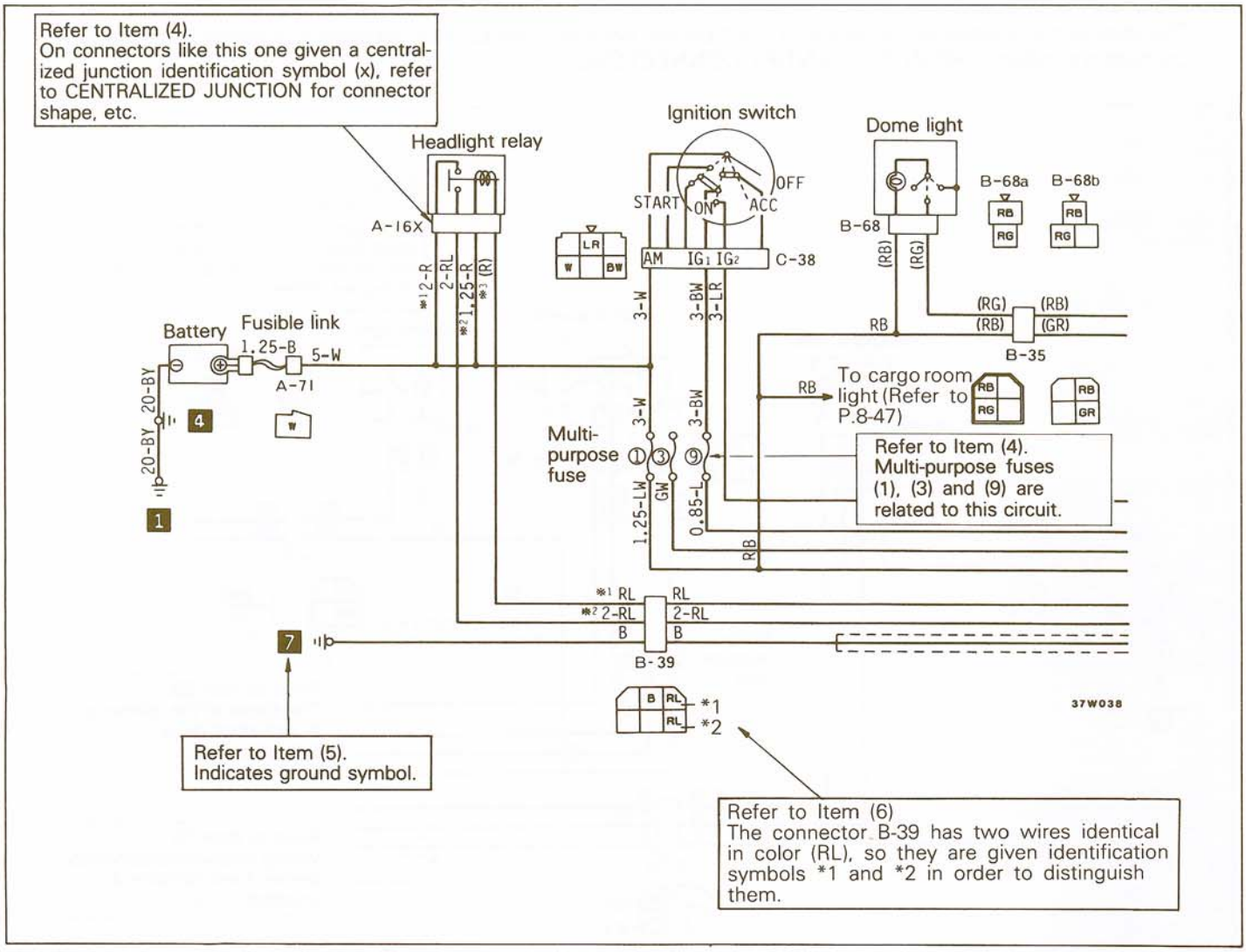


(4) Indication of fuses, fusible links and centralized relays
The fuses and fusible links in a circuit diagram are indicated by a wave symbol (~) and a double wave symbol (≈), respectively. At a centralized junction, the fuses are given fuse numbers and centralized relays are given connector symbols.

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

(5) Indication of ground point
The ground point in a circuit diagram is marked by a ground 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.

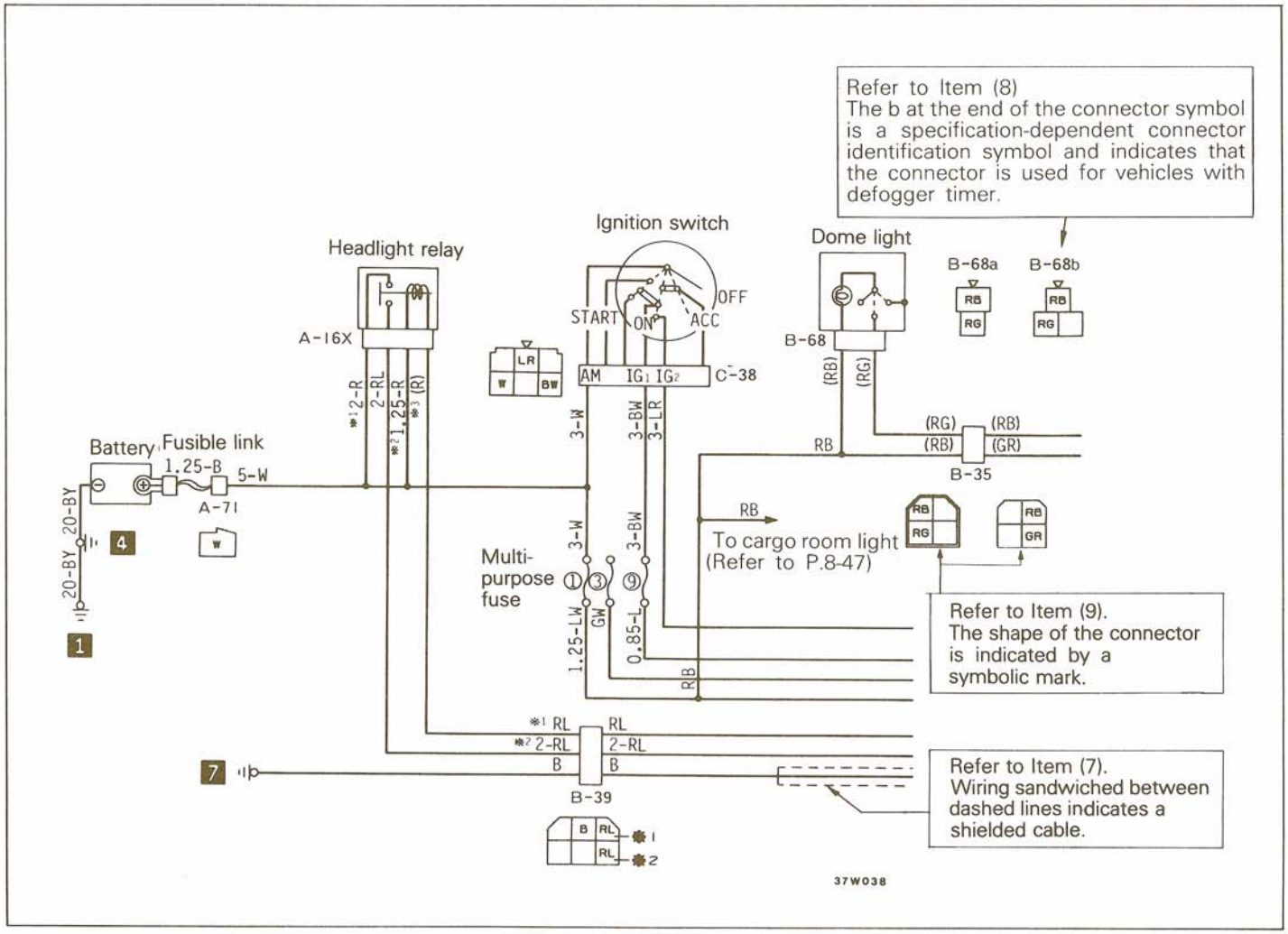


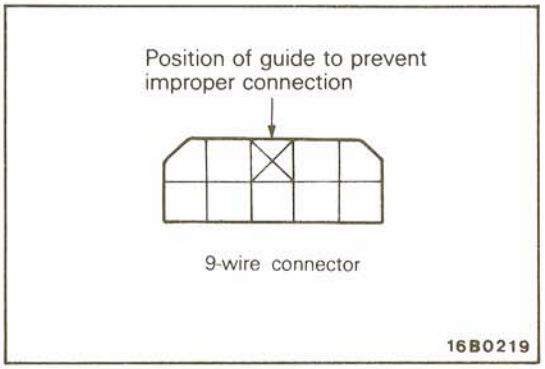
(7) Indication of shielded cables
A shielded cable used , for example, in an electronic control circuit for prevention of malfunctions that may otherwise be caused by radio interference is indicated by a solid line sandwiched between dashed lines (═══).

(8) 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 symbol (lower case alphabet) following the connector symbol.

Example: A – 01a
└ Specification – dependent connector identification symbol
a : Vehicles without defogger timer
b : Vehicles with defogger timer

(9) Shapes of connectors
The connector shapes are indicated by simplified symbolic marks. For distinction between male and female connectors, refer to HOW TO IDENTIFY CONNECTORS.

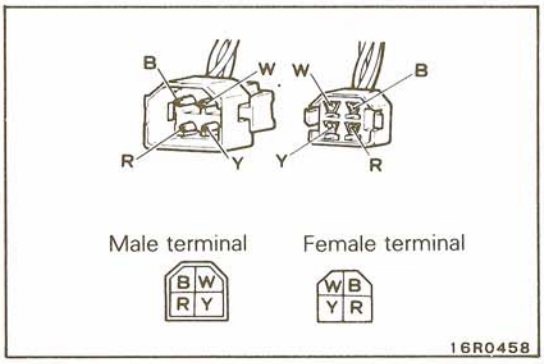




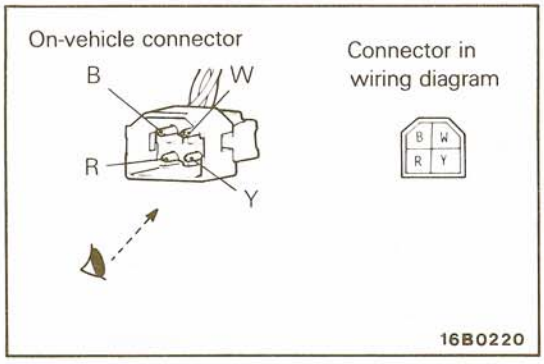
IDENTIFYING CONNECTORS

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.

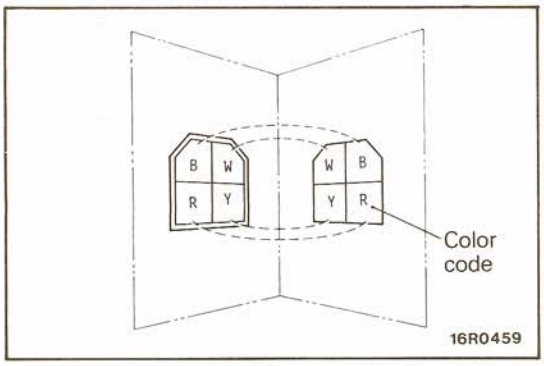
(1) Number of connector wires
The number of divisions in the connector diagram indicates the number of wires. A cross in a division, however, indicates the position of a guide to prevent improper connection. The connector shown here, therefore, is a 9-wire connector.



(2) Identification of male and female connectors
Connectors drawn with double outer lines are male, and those with single outer lines are female.

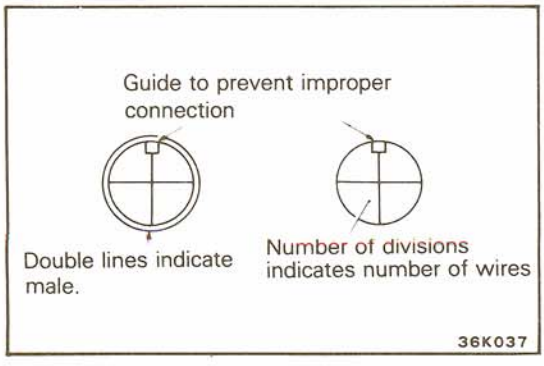


(3) Connector direction
The connector marks show on-vehicle connectors as viewed from the direction shown here.



(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.

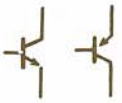
NOTE
The color codes of male and female connectors are not always identical.



(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

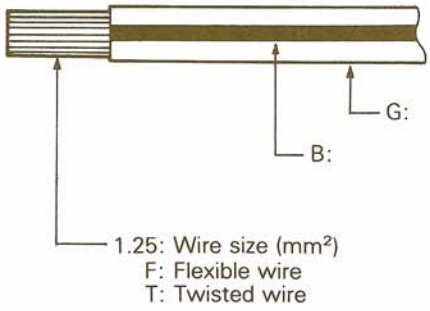
Various equipment is indicated symbolically in circuit diagrams as shown below.

Battery 	Body ground 	Single bulb 	Resistor 	Diode 	Capacitor 
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 

WIRE COLOR CODES

Wire colors are identified by the following color codes.

Example: 1.25 - GB



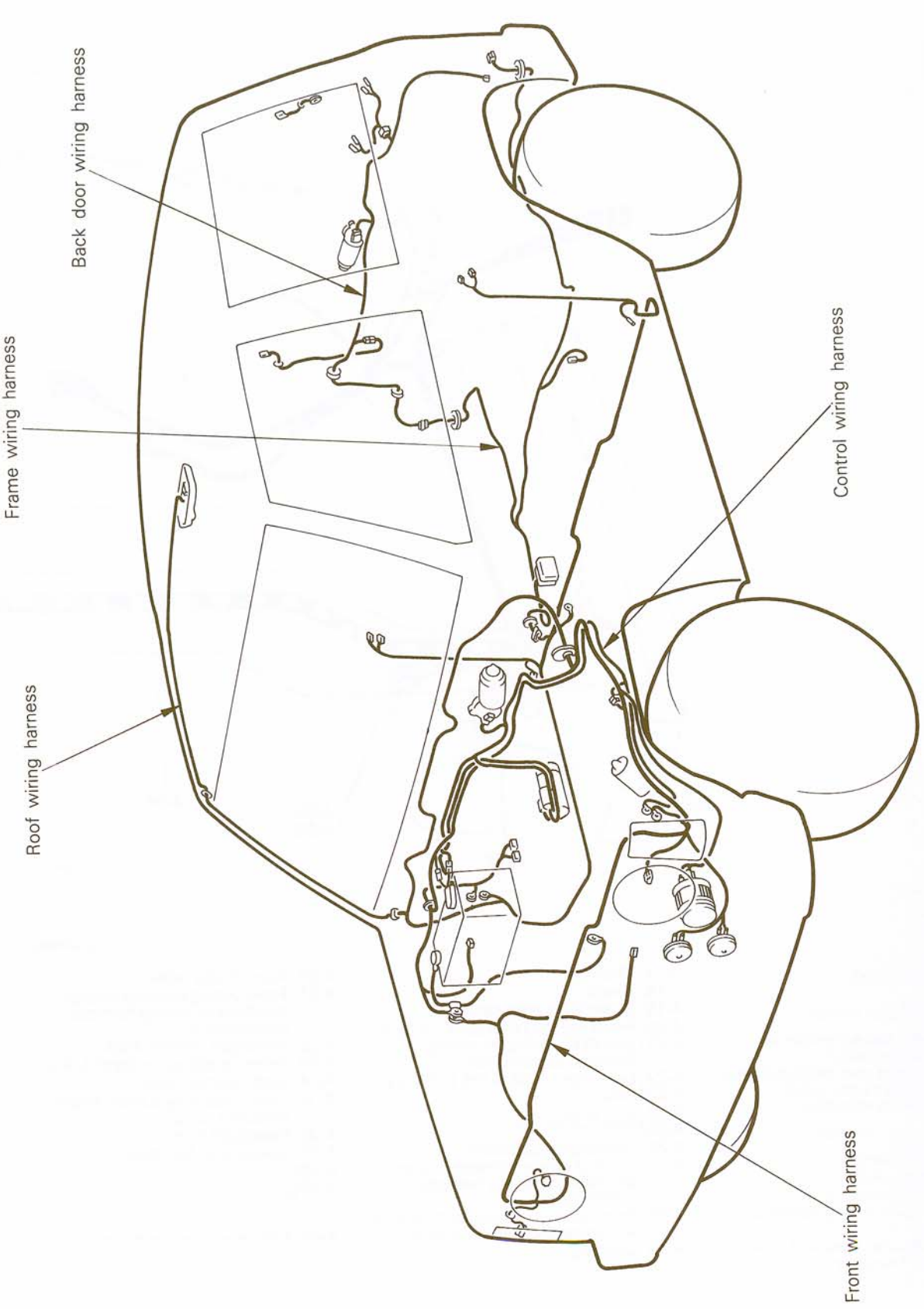
(1) No code indicates 0.5 mm² (.0008 in.²).
(2) Cable color code in parantheses indicates 0.3 mm² (.0005 in.²).

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

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.

OVERALL WIRING DIAGRAM

N08DC-A

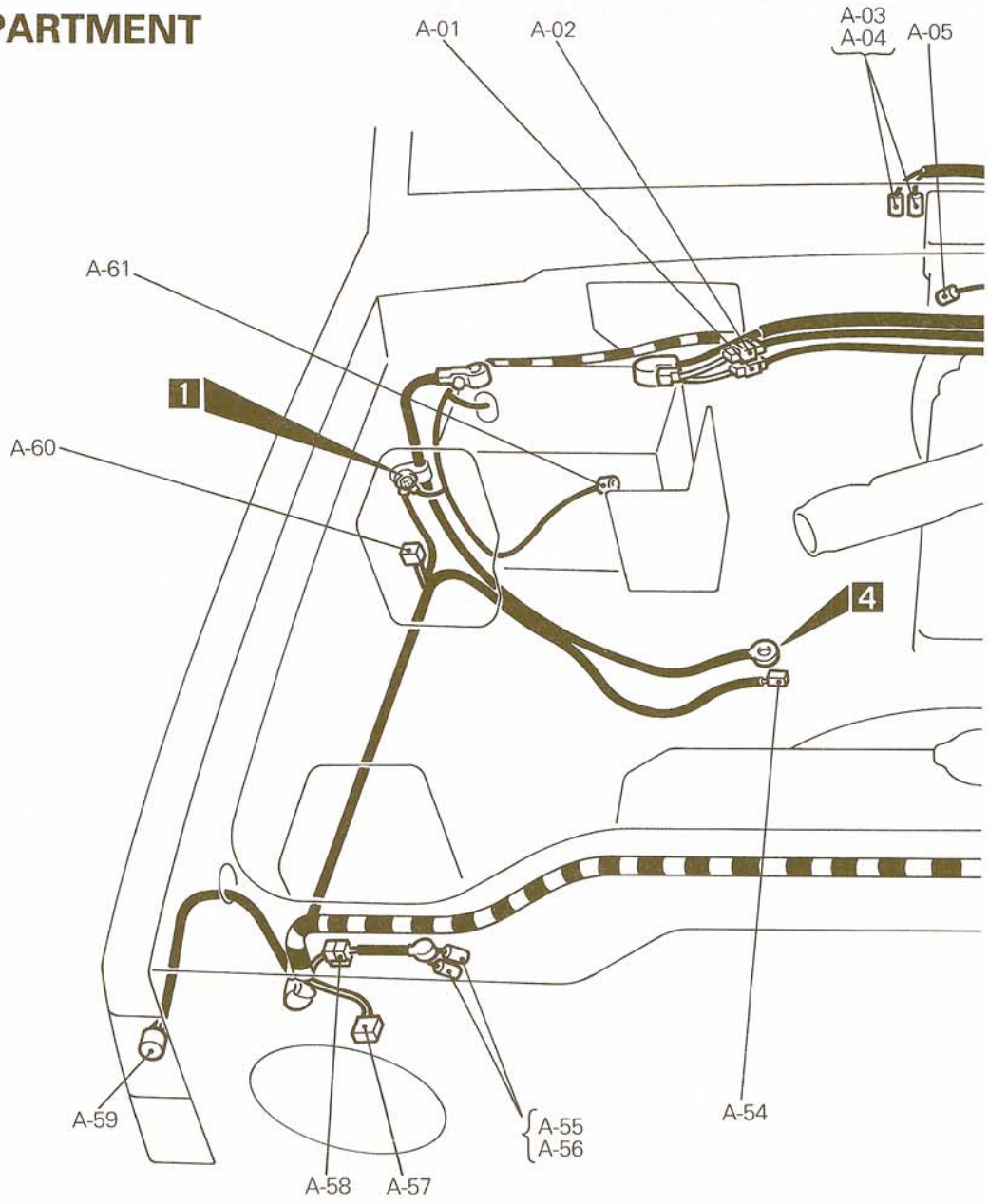


Remark
This diagram shows the main wiring harnesses.

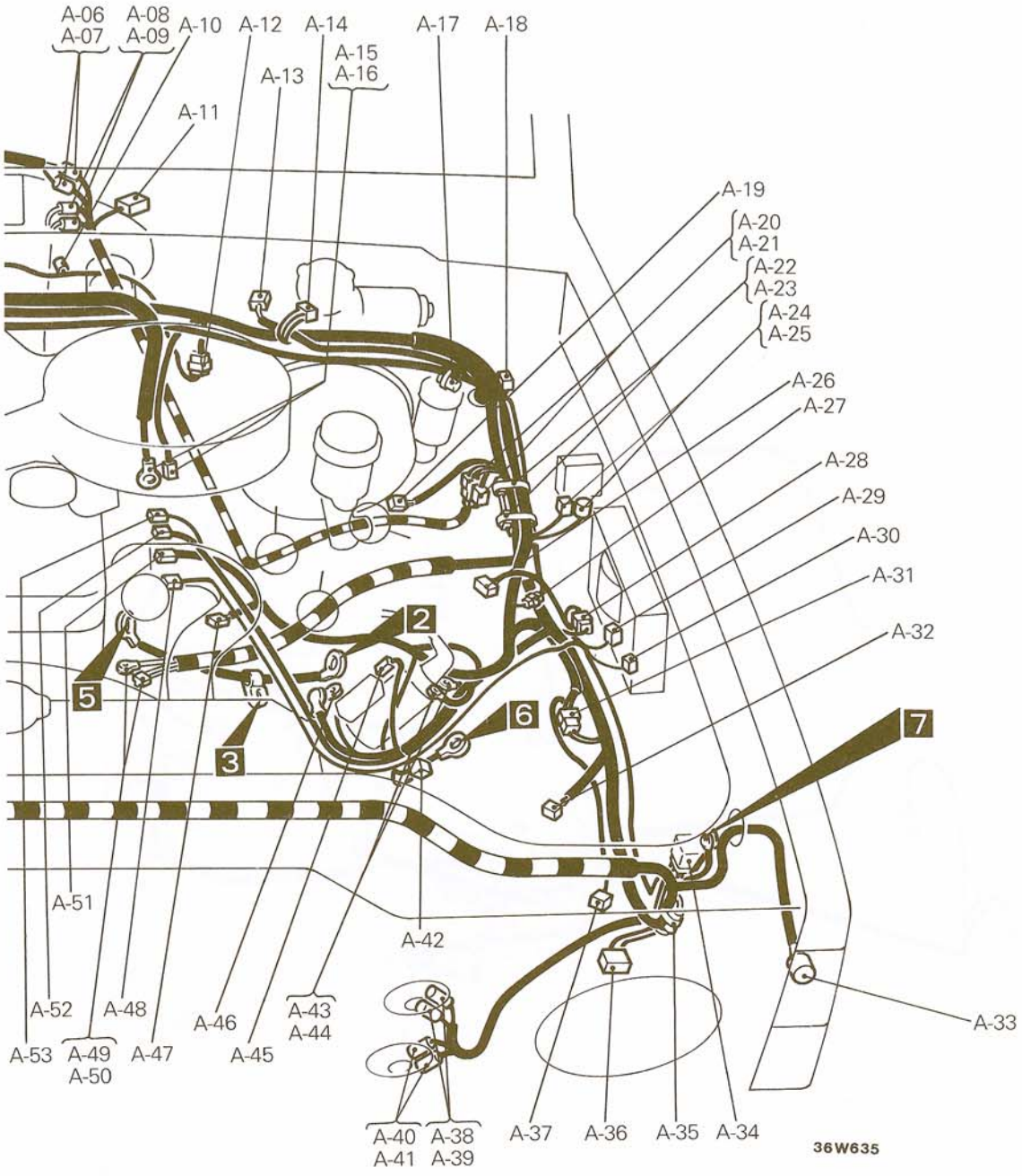
1 ENGINE COMPARTMENT

Connector symbol

A



A-01, A-02 Main fusible link
A-03, A-04 4WD indicator switch
A-05 Automatic transmission oil temperature switch
A-06, A-07 Back-up light and 4WD indicator wiring harness and cord assembly combination
A-08, A-09 Back-up light switch
A-10 OD-OFF solenoid
A-11 Pulse generator
A-12 Front wiring harness and transmission wiring harness combination
A-13 Air conditioner solenoid valve
A-14 Front wiper motor
A-15, A-16 Starter
A-17 Checker
A-18 Diode
A-19 Brake fluid level sensor
A-20, A-21 Front harness and back-up light and 4WD indicator wiring harness combination
A-22, A-23 Dedicated fusible link (L042GV only)
A-24, A-25 Sub fusible link
A-26 Carburetor assembly
A-27 Control wiring harness and air conditioner wiring harness combination
A-28 Front wiring harness and control wiring harness combination
A-29 Device box
A-30 Auto choke relay
A-31 Front wiring harness and air conditioner wiring harness combination
A-32 Headlight washer motor
A-33 Front combination light (L.H.)
A-34 Light control relay
A-35 Dedicated fuse (Upper beam indicator circuit)
A-36 Headlight (L.H.)
A-37 Condenser fan motor
A-38, A-39, A-40, A-41 Horn
A-42 Condenser fan motor relay



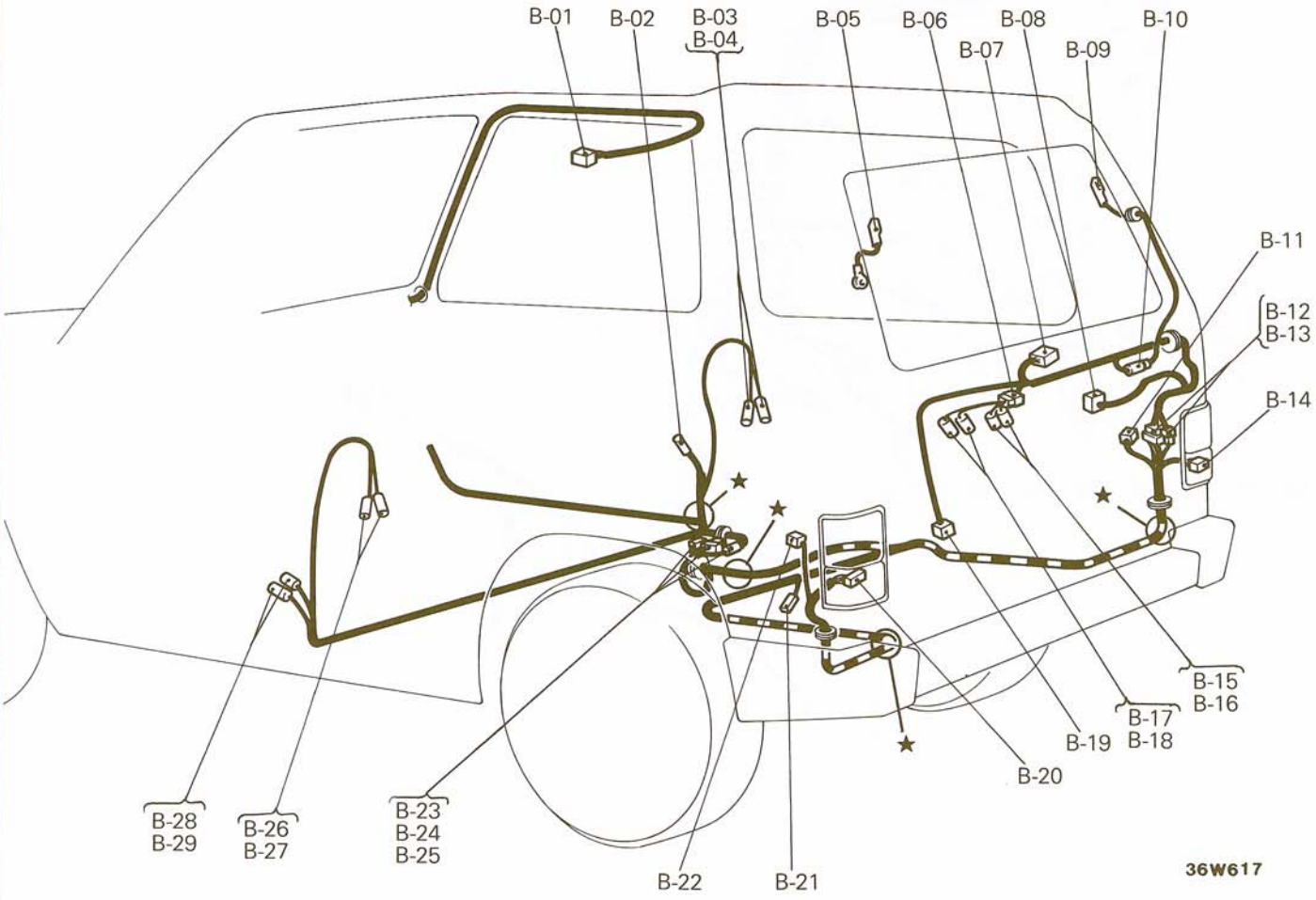
A-43
A-44
A-45
A-46 } Ignition coil
A-47 Magnetic clutch
A-48 Water temperature sensor (FBC circuit)
A-49
A-50 } Alternator
A-51 Engine coolant temperature switch (Air conditioner circuit)
A-52 Engine coolant temperature gauge unit
A-53 Engine coolant temperature switch (OD control circuit)
A-54 Oil pressure gauge unit
A-55
A-56 } Low pressure switch
A-57 Headlight (R.H.)
A-58 Front harness and air conditioner wiring harness combination
A-59 Front combination light (R.H.)
A-60 Front washer motor
A-61 Oxygen sensor

Remarks
(1) The mark ★ shows the reference mounting position of wiring harness.
(2) For information concerning the ground points (example: 1), refer to P.8-7.

2 INTERIOR AND FRAME

Connector symbol

B



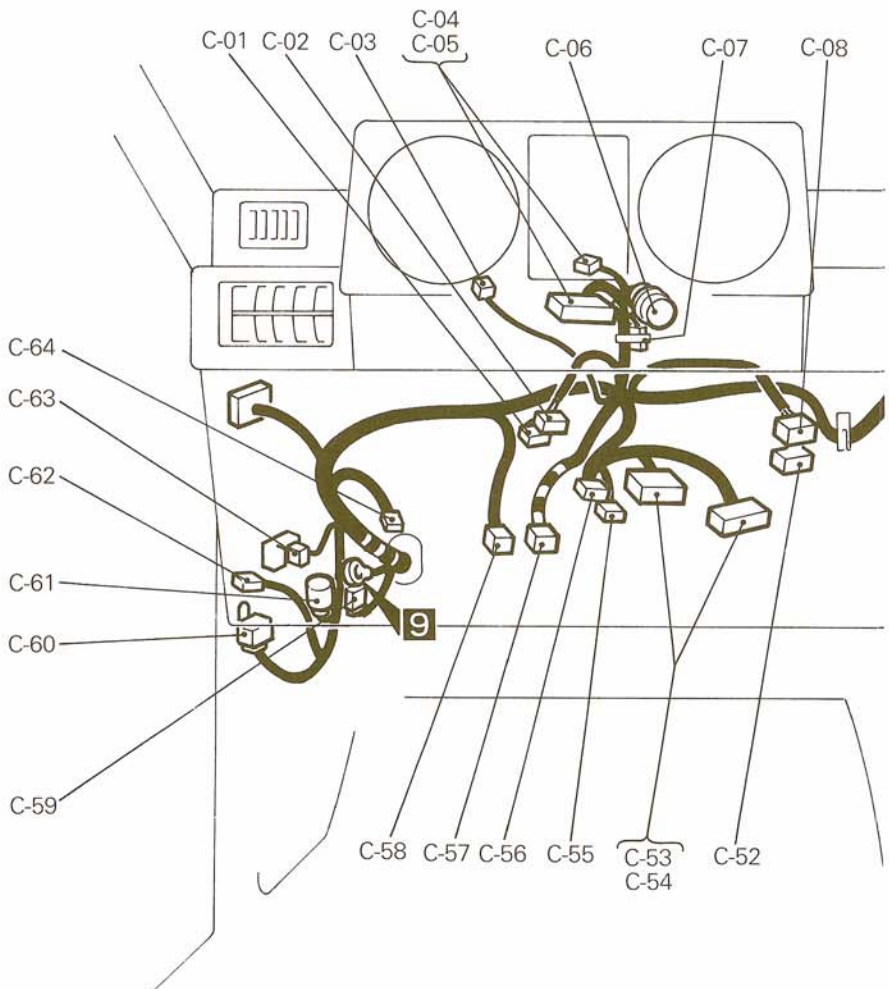
B-01 Dome light
B-02 Door switch (R.H.)
B-03, B-04 Rear speaker (R.H.)
B-05 Defogger (–)
B-06 Back door wiring harness and license plate light wiring harness combination
B-07 Rear wiper motor
B-08 Rear washer motor
B-09 Defogger (+)
B-10 Back door wiring harness and defogger cable (+) combination
B-11 Rear side marker light (R.H.)
B-12, B-13 Frame wiring harness and back door wiring harness combination
B-14 Rear combination light (R.H.)
B-15, B-16 License plate light (R.H.)
B-17, B-18 License plate light (L.H.)
B-19 Back door lock actuator
B-20 Rear combination light (L.H.)
B-21 Fuel gauge unit
B-22 Rear side marker light (L.H.)
B-23, B-24, B-25 Front wiring harness and frame wiring harness combination
B-26, B-27 Rear speaker (L.H.)
B-28, B-29 Door switch (L.H.)

Remark
The mark ★ shows the reference mounting position of wiring harness.

3 INSTRUMENT PANEL

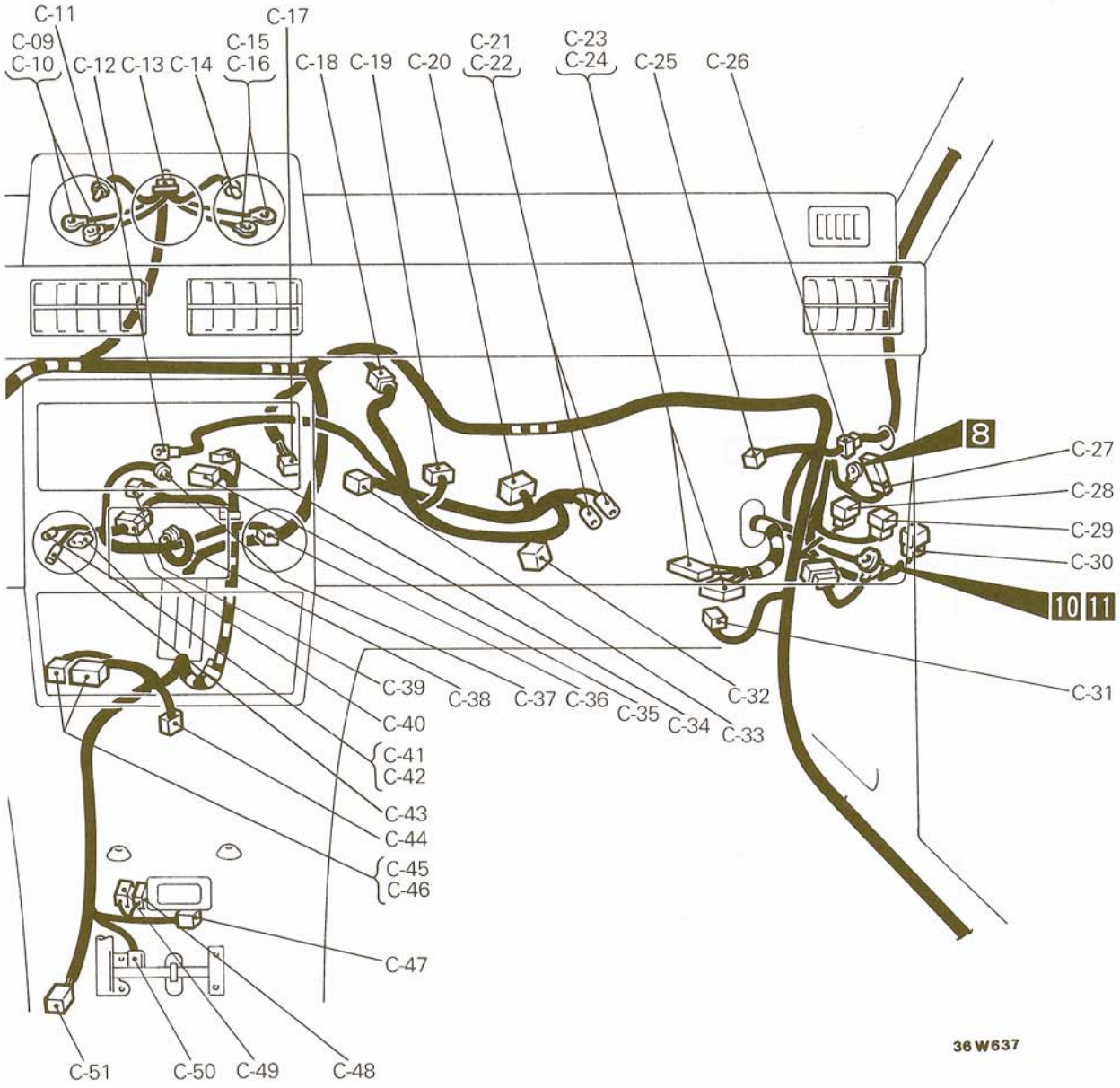
Connector symbol

C



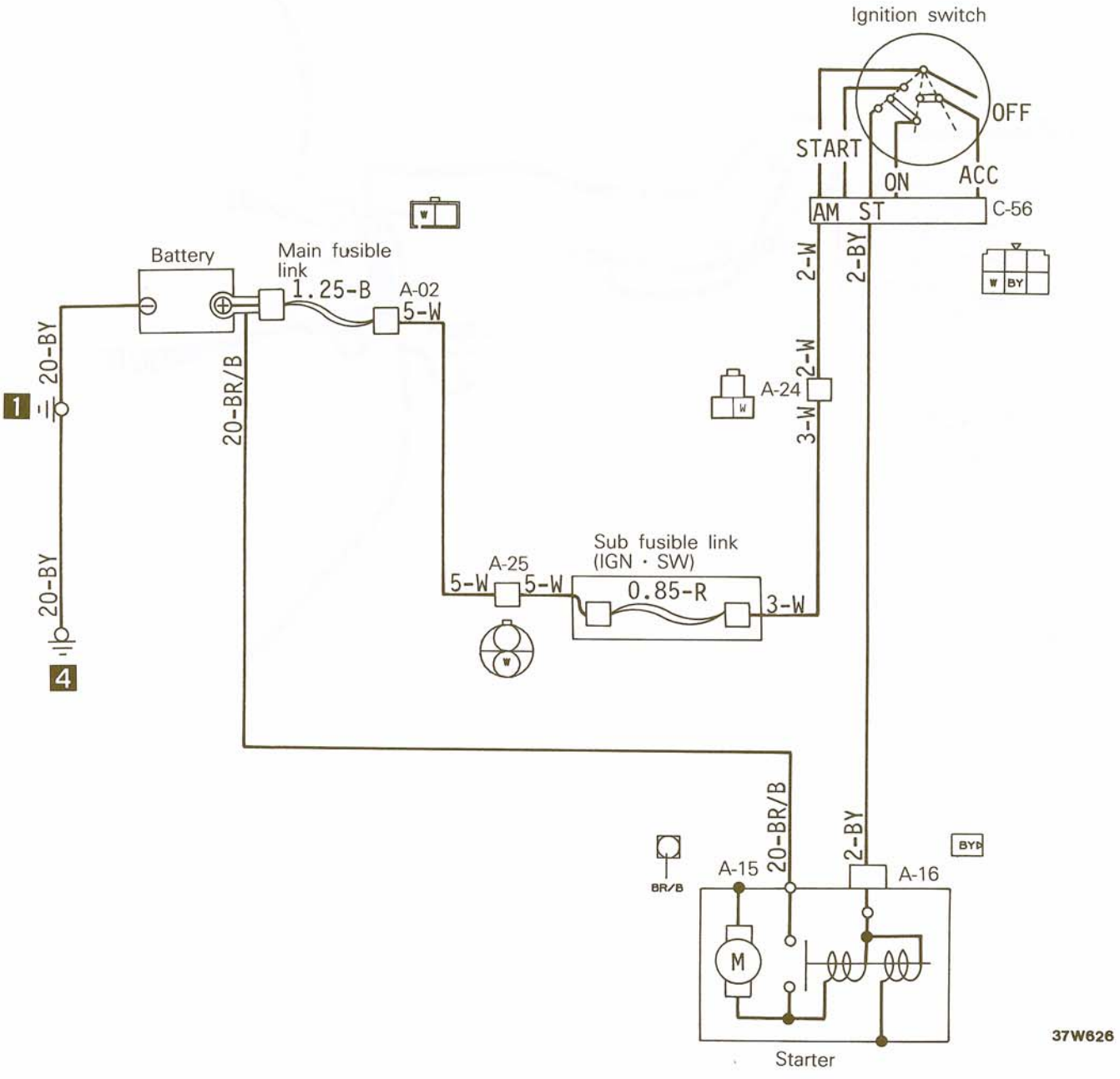
Remarks
For information concerning the ground points (example: 1), refer to P.8-7.

C-01 Back door lock switch
C-02 Defogger switch
C-03 key reminder and seat belt warning buzzer
C-04, C-05, C-06 } Combination meter
C-07 Diode
C-08 Rear wiper and washer switch
C-09, C-10 } Oil pressure gauge
C-11 Combination gauge illumination light
C-12 Blower switch
C-13 Combination guage wiring harness and front wiring harness combination
C-14 Combination gauge illumination light
C-15, C-16 } Voltage meter
C-17 Heater relay
C-18 Air conditioner wiring harness and front wiring harness combination
C-19, C-20 } Air conditioner relay
C-21, C-22 } Thermostat
C-23, C-24 } Feed back carburetor control unit
C-25 Front speaker (R.H.)
C-26 Front wiring harness and roof wiring harness combination
C-27 Automatic free-wheeling hub indicator control unit
C-28. Defogger timer unit
C-29 OD OFF relay
C-30 Intermittent rear wiper relay
C-31 Blower motor resistor
C-32 Dedicated fuse(Air conditioner circuit)
C-33 Air conditioner switch
C-34 Heater control knob illumination light
C-35 Blower switch
C-36 Clock
C-37 Heater control panel illumination light
C-38 Ashtray illumination light
C-39 Air conditioner switch illumination light
C-40 Front wiring harness and center panel wiring harness combination

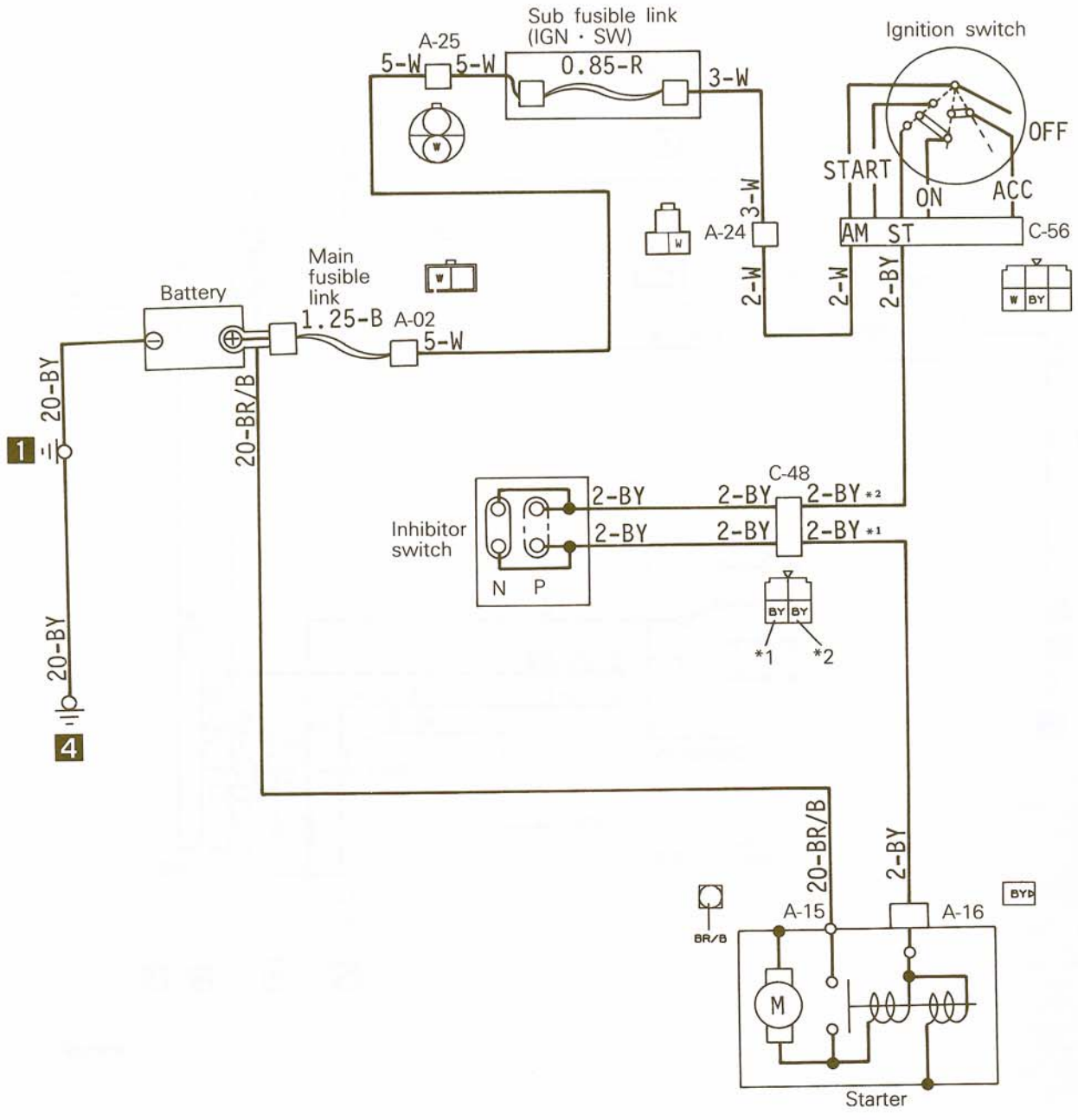


C-41, C-42 } Cigarette lighter
C-43 Cigarette lighter illumination light
C-44 Spare terminal (ACC)
C-45, C-46 } Radio
C-47 Shift position illumination light
C-48 Inhibitor switch
C-49 OD-OFF switch
C-50 Parking brake switch
C-51 Seat belt switch
C-52 Hazard switch
C-53, C-54 } Column switch
C-55 Key reminder switch
C-56 Ignition switch
C-57 Stop light switch
C-58 Dimmer control switch
C-59 Turn-signal flasher unit
C-60 Intermittent wiper relay
C-61 Hazard flasher unit
C-62 Seat belt warning timer
C-63 Headlight washer motor relay
C-64 Front speaker(L.H.)

1 STARTING CIRCUIT (VEHICLES WITH A MANUAL TRANSMISSION)



(VEHICLES WITH AN AUTOMATIC TRANSMISSION)



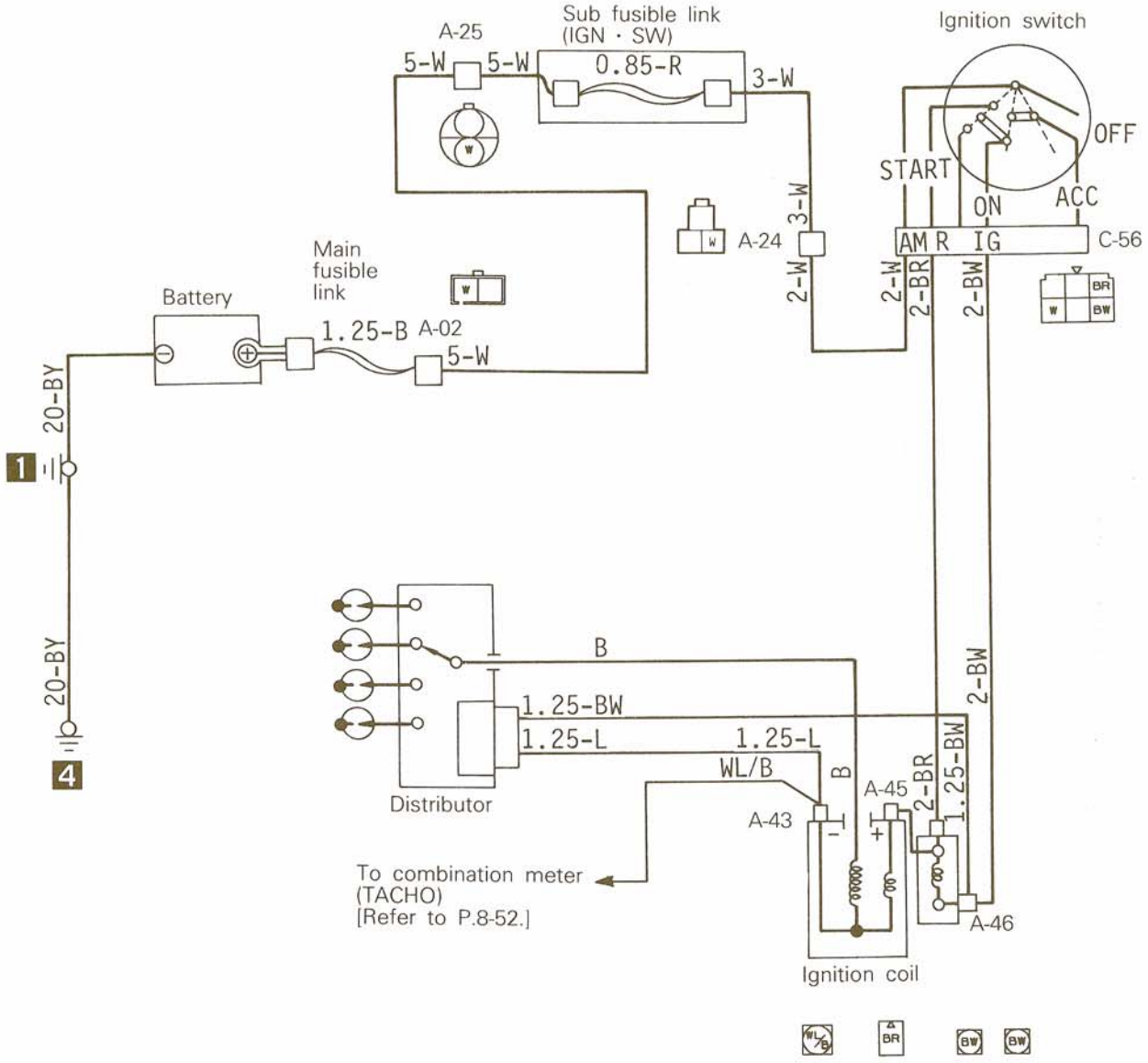
37W613

Remark
For information concerning the ground points (example: 1),
refer to P.8-7.

Wiring color code

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

2 IGNITION CIRCUIT

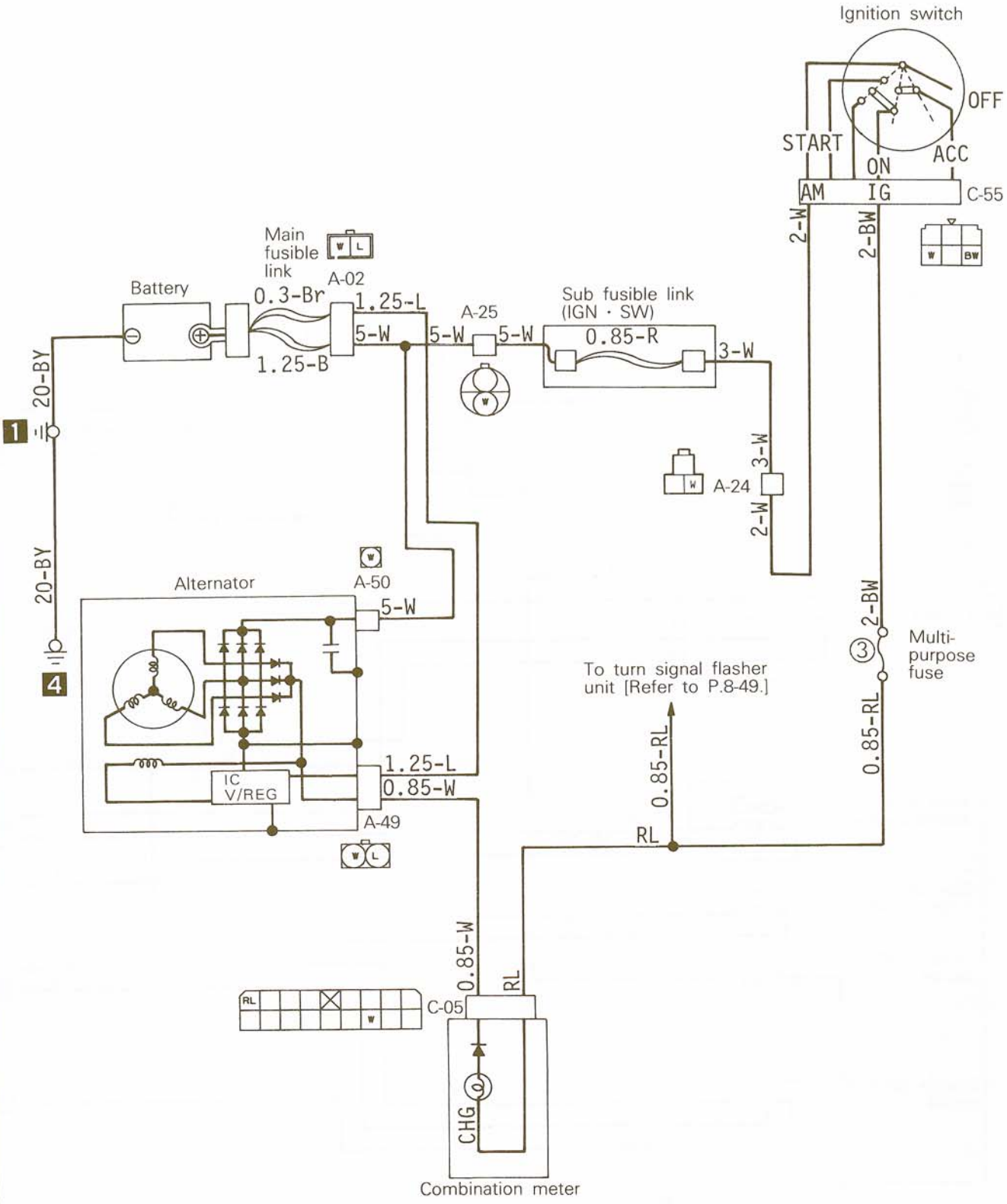


Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

3 CHARGING CIRCUIT



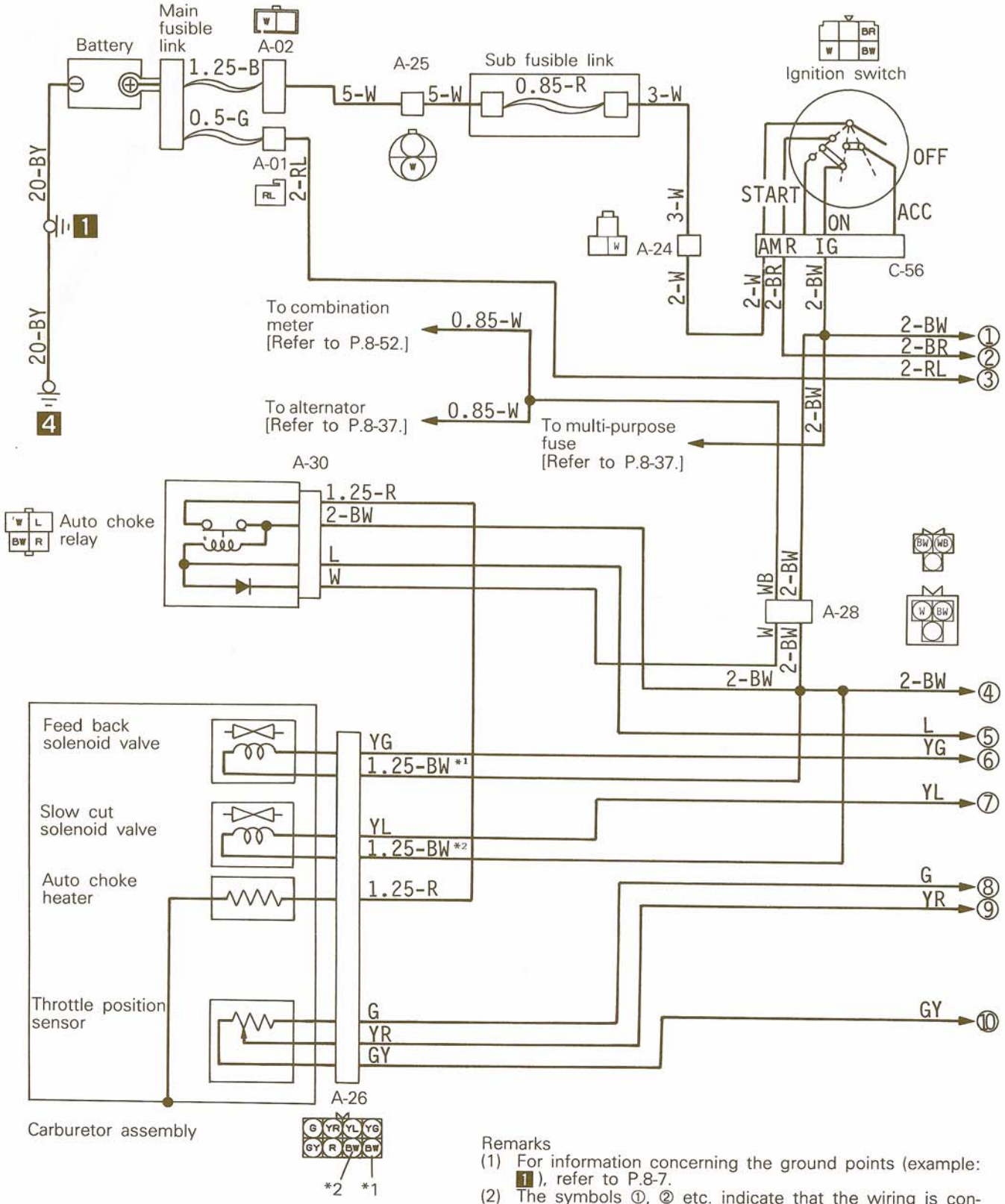
Remark
For information concerning the ground points (example: 1), refer to P.8-7.

37W605

Wiring color code

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

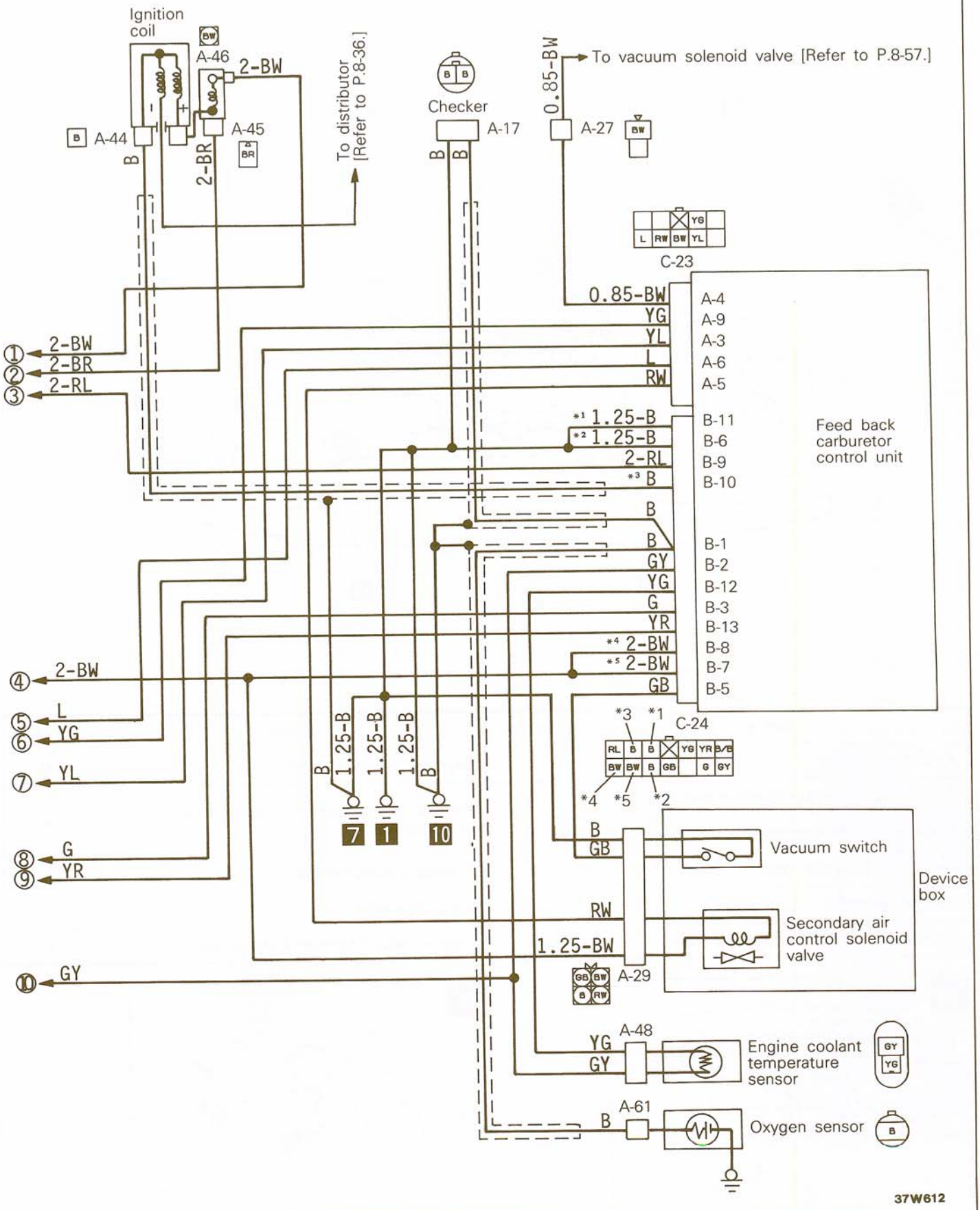
4 FEED BACK CARBURETOR CIRCUIT



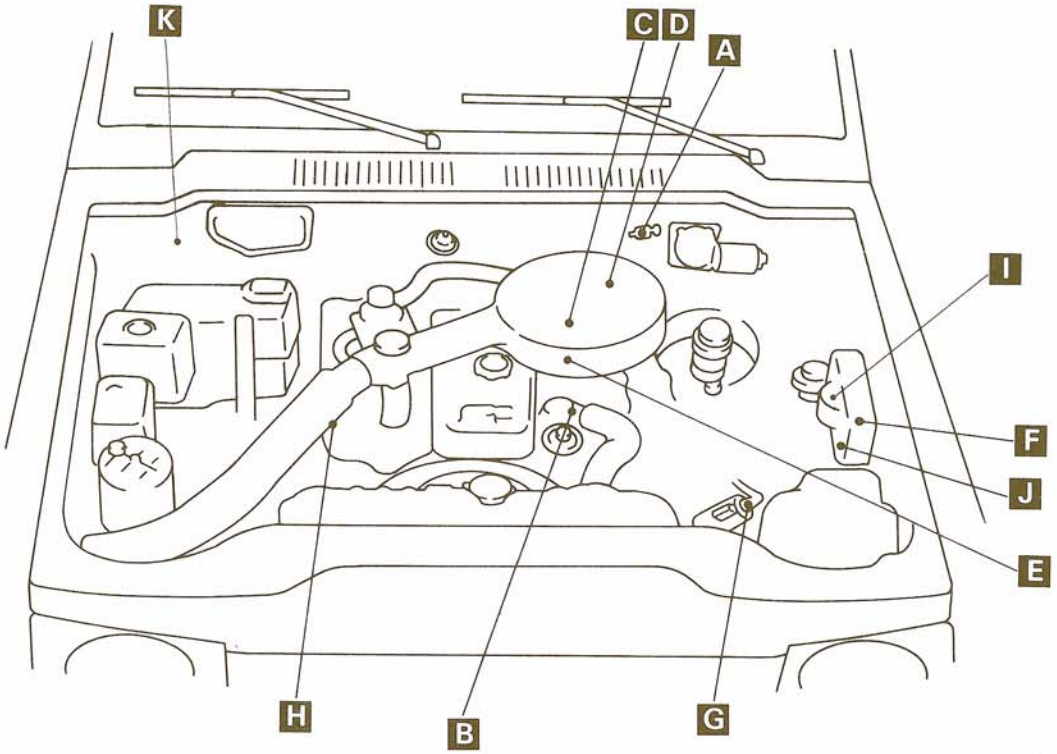
Remarks

(1) For information concerning the ground points (example: 1), refer to P.8-7.

(2) The symbols ①, ② etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page. (In other words, ① on the right page is connected to ① on the left page.)

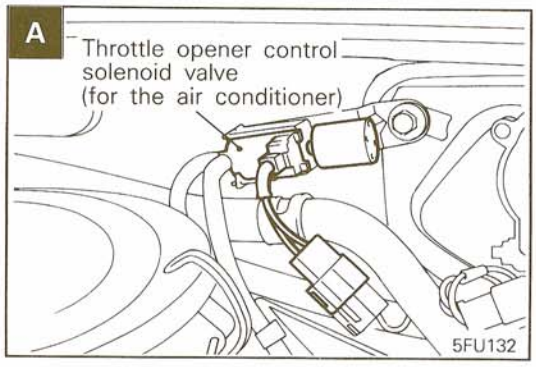

Ignition coil
A-46
2-BW
A-44
A-45
2-BR
B
To distributor [Refer to P.8-36.]
Checker
A-17
0.85-BW
To vacuum solenoid valve [Refer to P.8-57.]
A-27
C-23
0.85-BW
YG
YL
L
RW
A-4
A-9
A-3
A-6
A-5
①
②
③
2-BW
2-BR
2-RL
*1 1.25-B
*2 1.25-B
2-RL
*3 B
B-11
B-6
B-9
B-10
Feed back carburetor control unit
B
B
GY
YG
G
YR
B-1
B-2
B-12
B-3
B-13
*4 2-BW
*5 2-BW
GB
B-8
B-7
B-5
④
⑤
⑥
⑦
2-BW
L
YG
YL
1.25-B
1.25-B
1.25-B
B
7
1
10
*3
*1
C-24
*4
*5
*2
⑧
⑨
G
YR
B
GB
Vacuum switch
Device box
RW
1.25-BW
Secondary air control solenoid valve
⑩
GY
A-29
A-48
YG
GY
Engine coolant temperature sensor
A-61
B
Oxygen sensor
37W612

LAYOUT OF COMPONENTS (FBC)

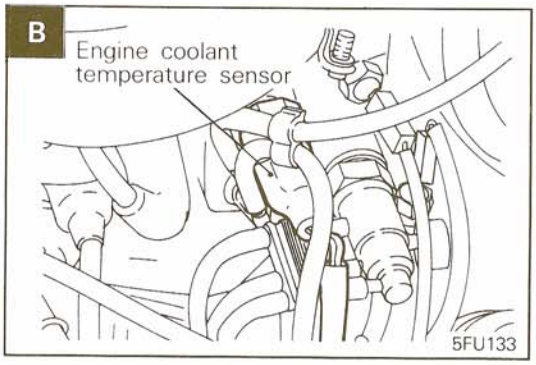


5FU131

Items	Symbol	Items	Symbol
Auto choke relay	J	Slow-cut solenoid valve	D
Engine speed sensor (Ignition coil ⊖)	G	Throttle opener control solenoid valve (for the air conditioner)	A
Feed back carburetor control unit	K		
Feed back solenoid valve	C	Throttle position sensor	E
Oxygen sensor	H	Vacuum switch	F
Secondary air control solenoid valve	I	Engine coolant temperature sensor	B

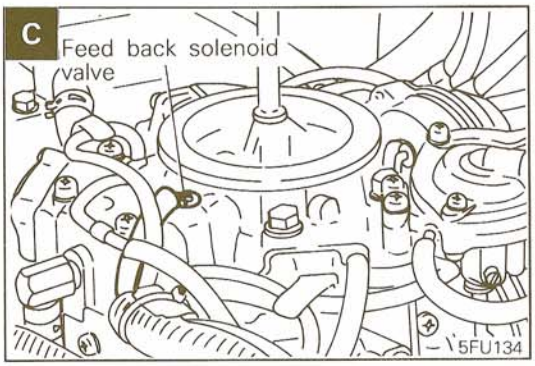


5FU132

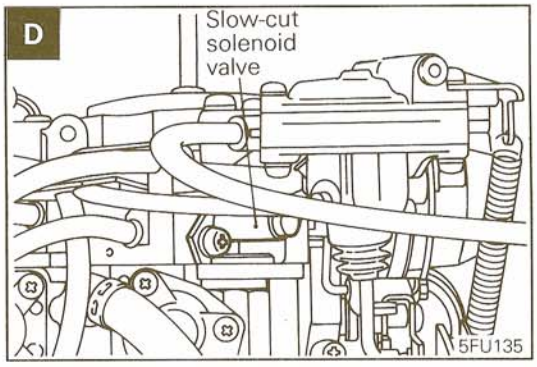


5FU133

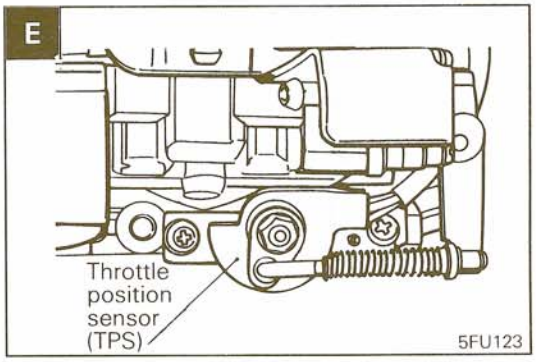
C


Feed back solenoid valve
5FU134

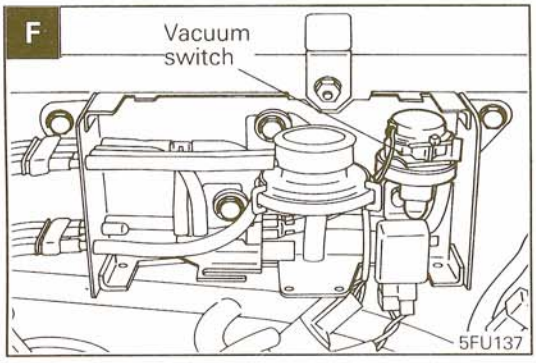
D


Slow-cut solenoid valve
5FU135

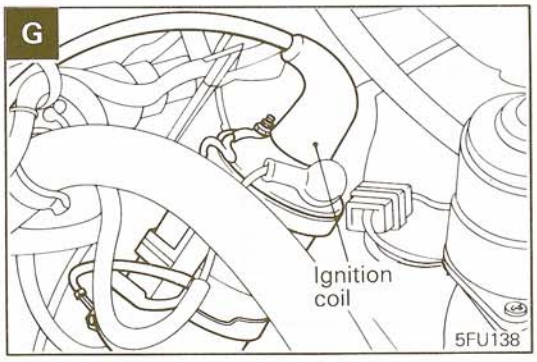
E


Throttle position sensor (TPS)
5FU123

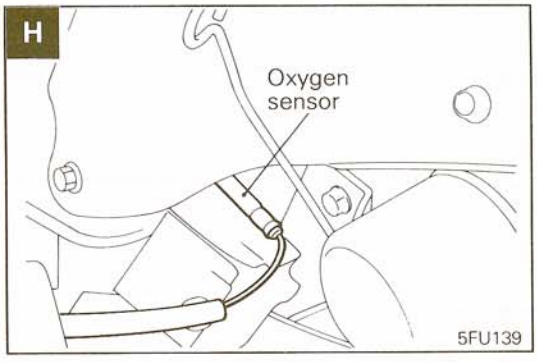
F


Vacuum switch
5FU137

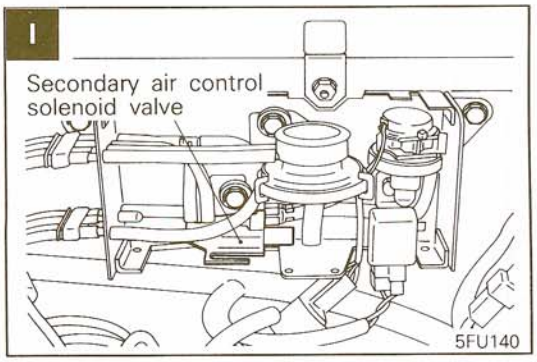
G


Ignition coil
5FU138

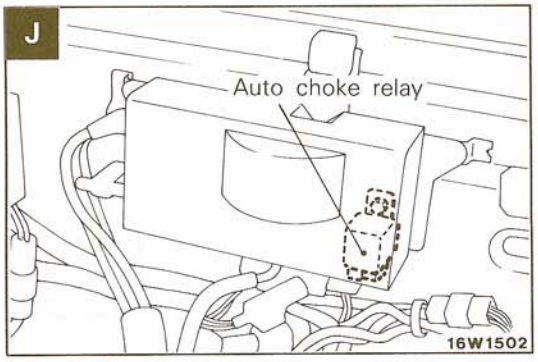
H


Oxygen sensor
5FU139

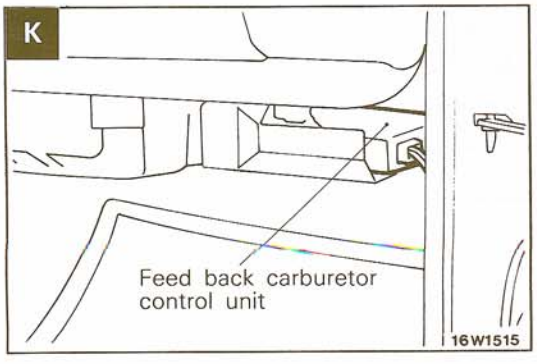
I


Secondary air control solenoid valve
5FU140

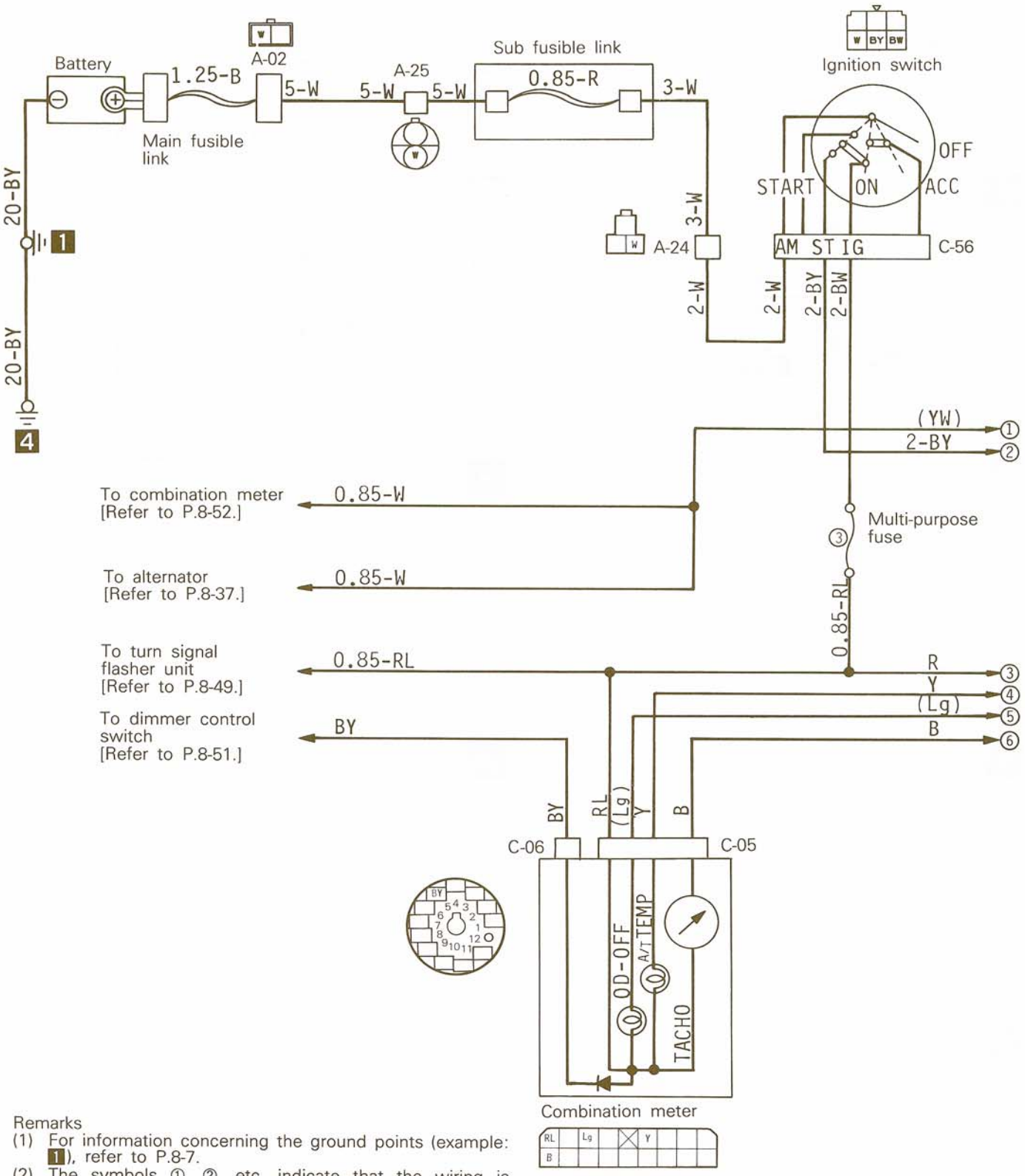
J


Auto choke relay
16W1502

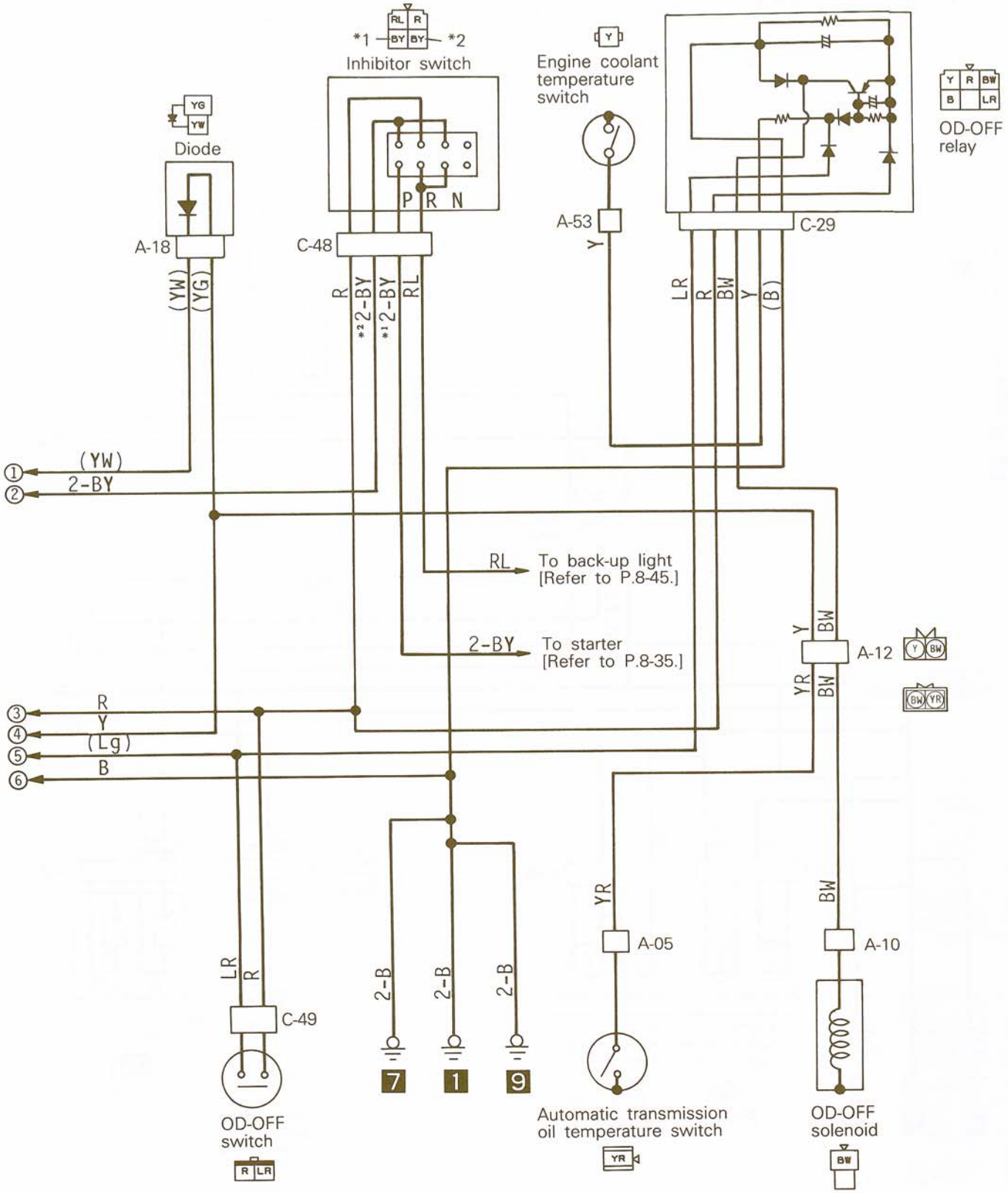
K


Feed back carburetor control unit
16W1515

5 OVERDRIVE CONTROL SYSTEM CIRCUIT



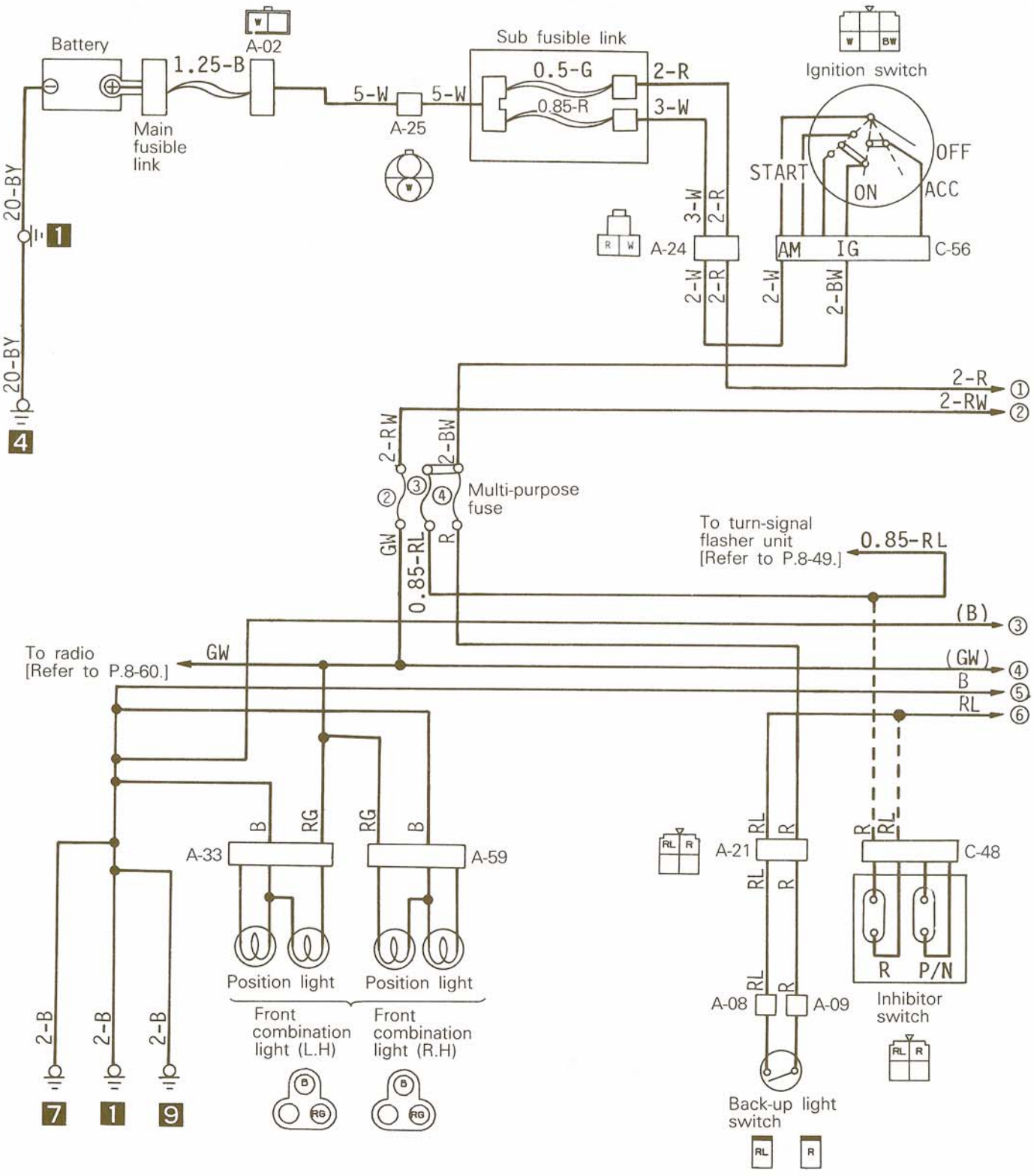
Remarks
(1) For information concerning the ground points (example: 1), refer to P.8-7.
(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)



Wiring color code
B: Black Br: Brown G: Green Gr: Gray L: Blue Lg: Light green
LI: Light blue O: Orange P: Pink R: Red Y: Yellow W: White

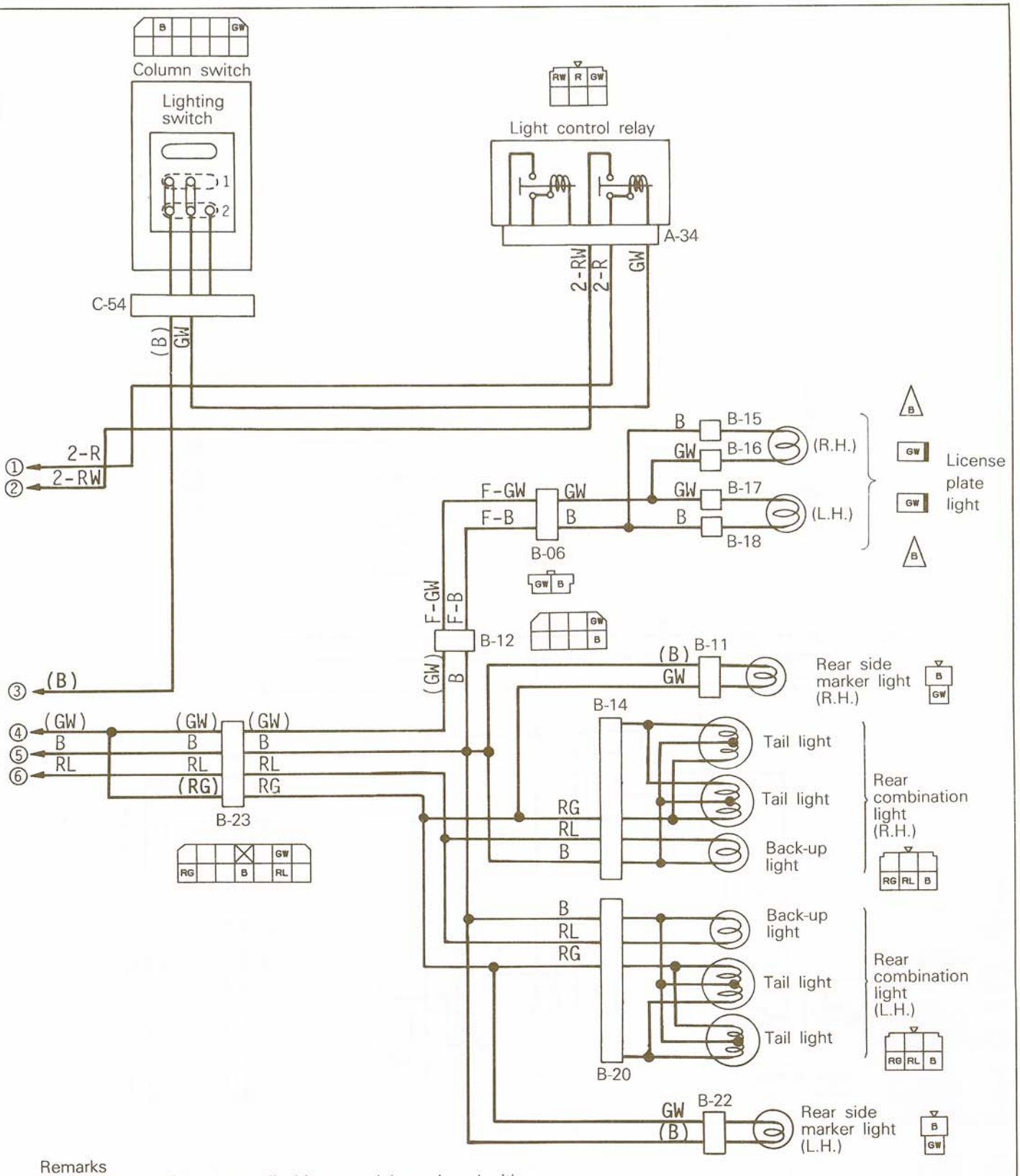
37W619

6 TAIL LIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND BACK-UP LIGHT CIRCUIT



Wiring color code

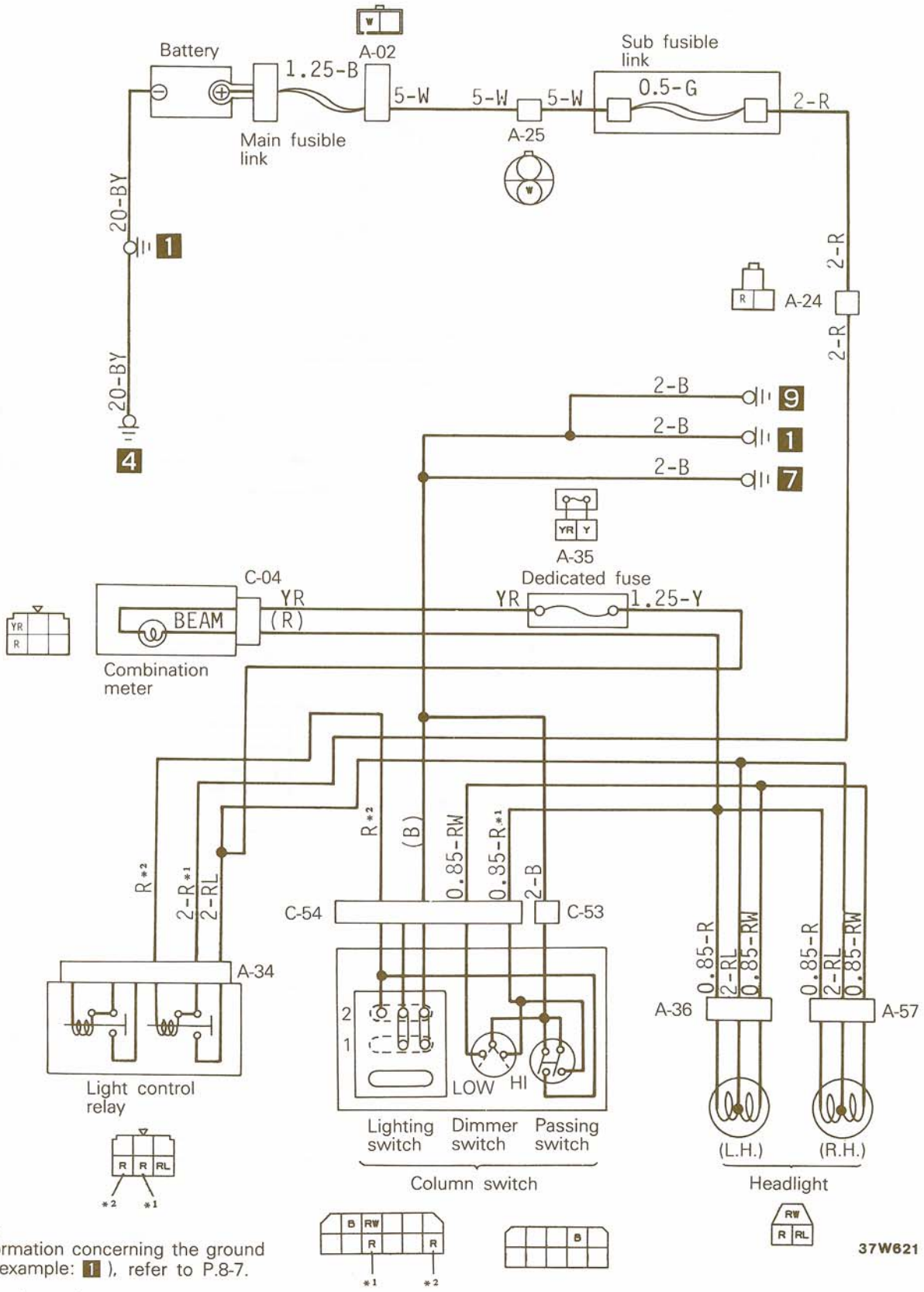
B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
LI: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White



Remarks
(1) The broken lines are applicable to models equipped with an automatic transmission.
(2) For information concerning the ground points (example: 1), refer to P.8-7.
(3) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

37W623

7 HEADLIGHT CIRCUIT

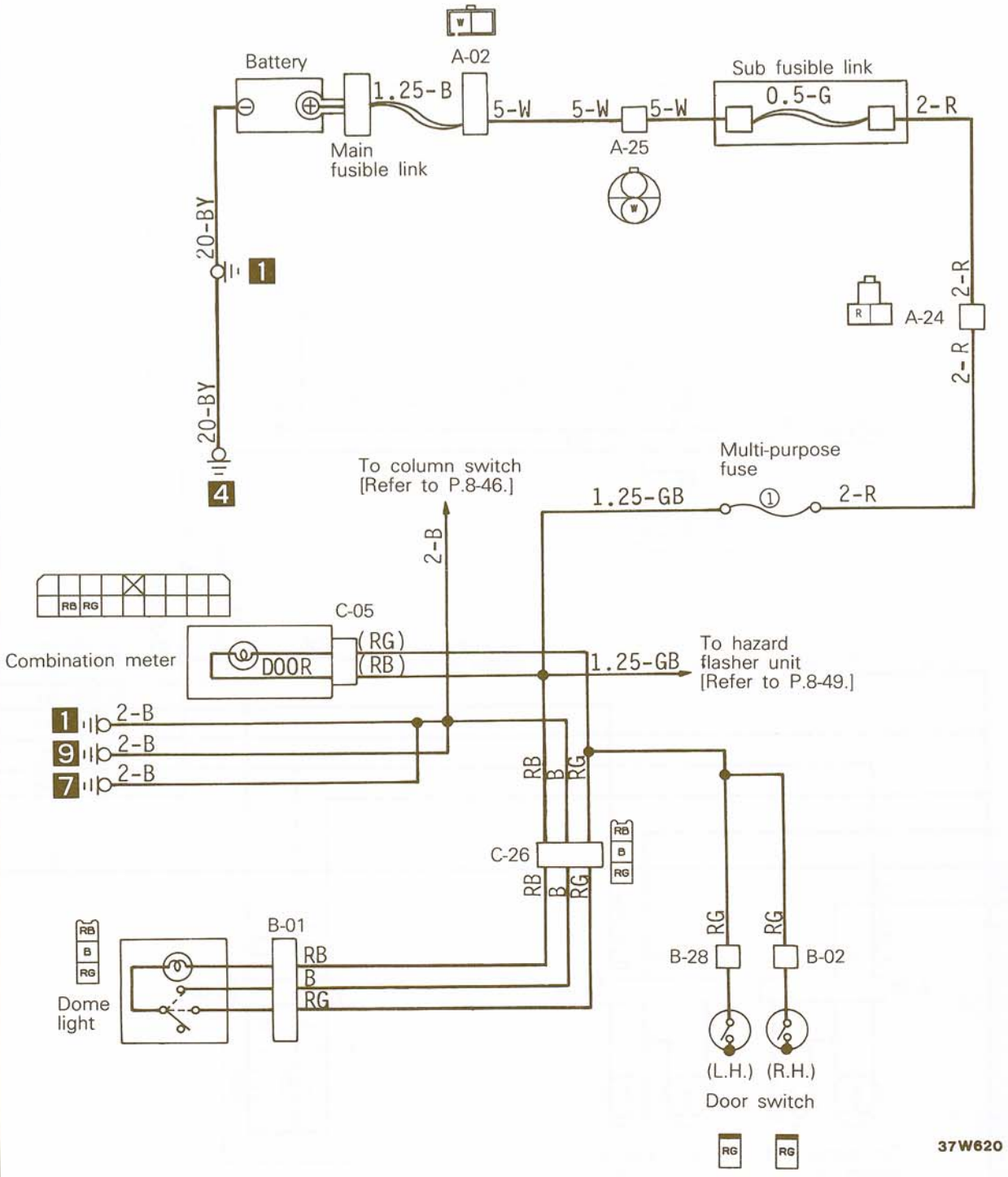


Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

8 DOME LIGHT CIRCUIT

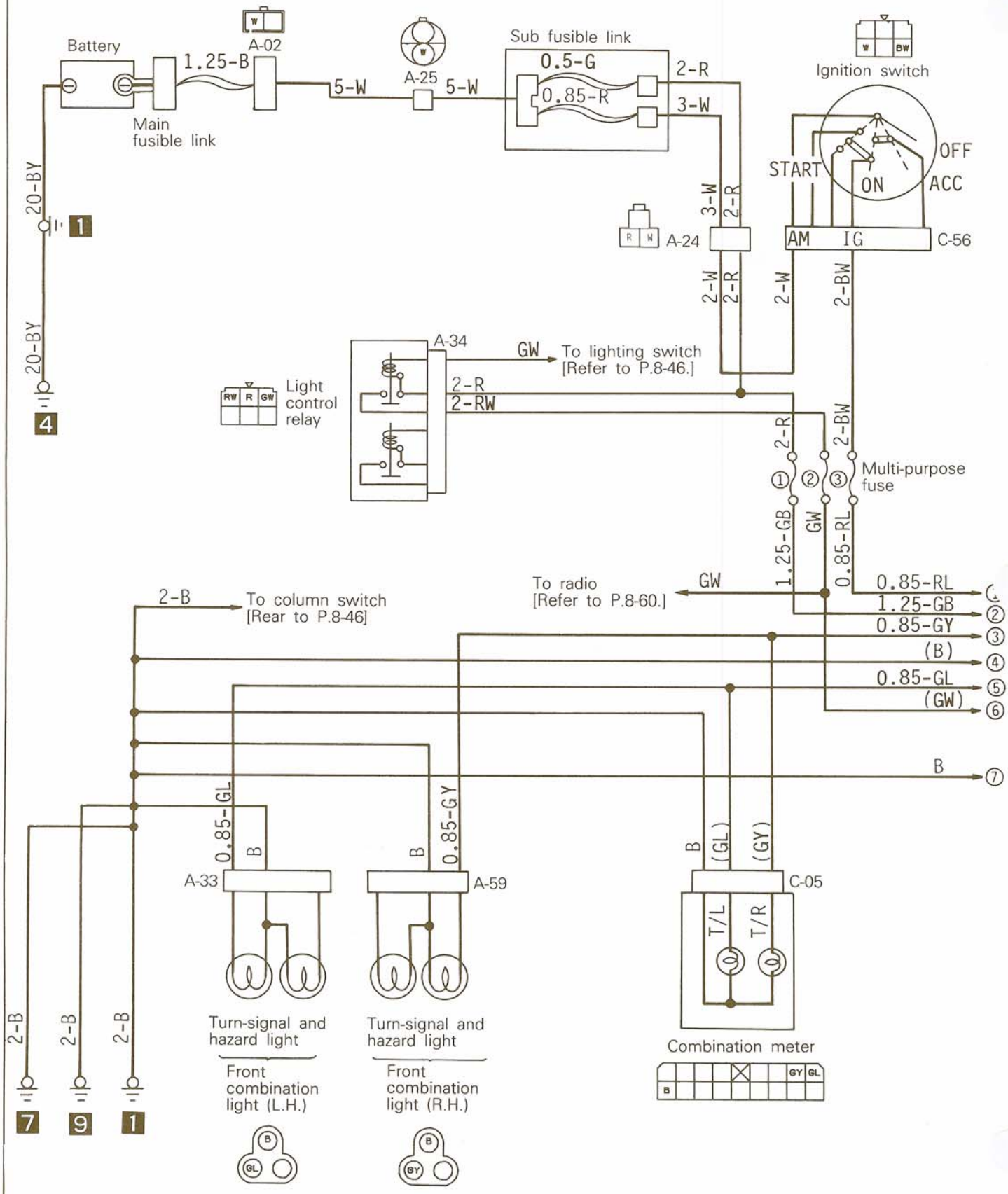


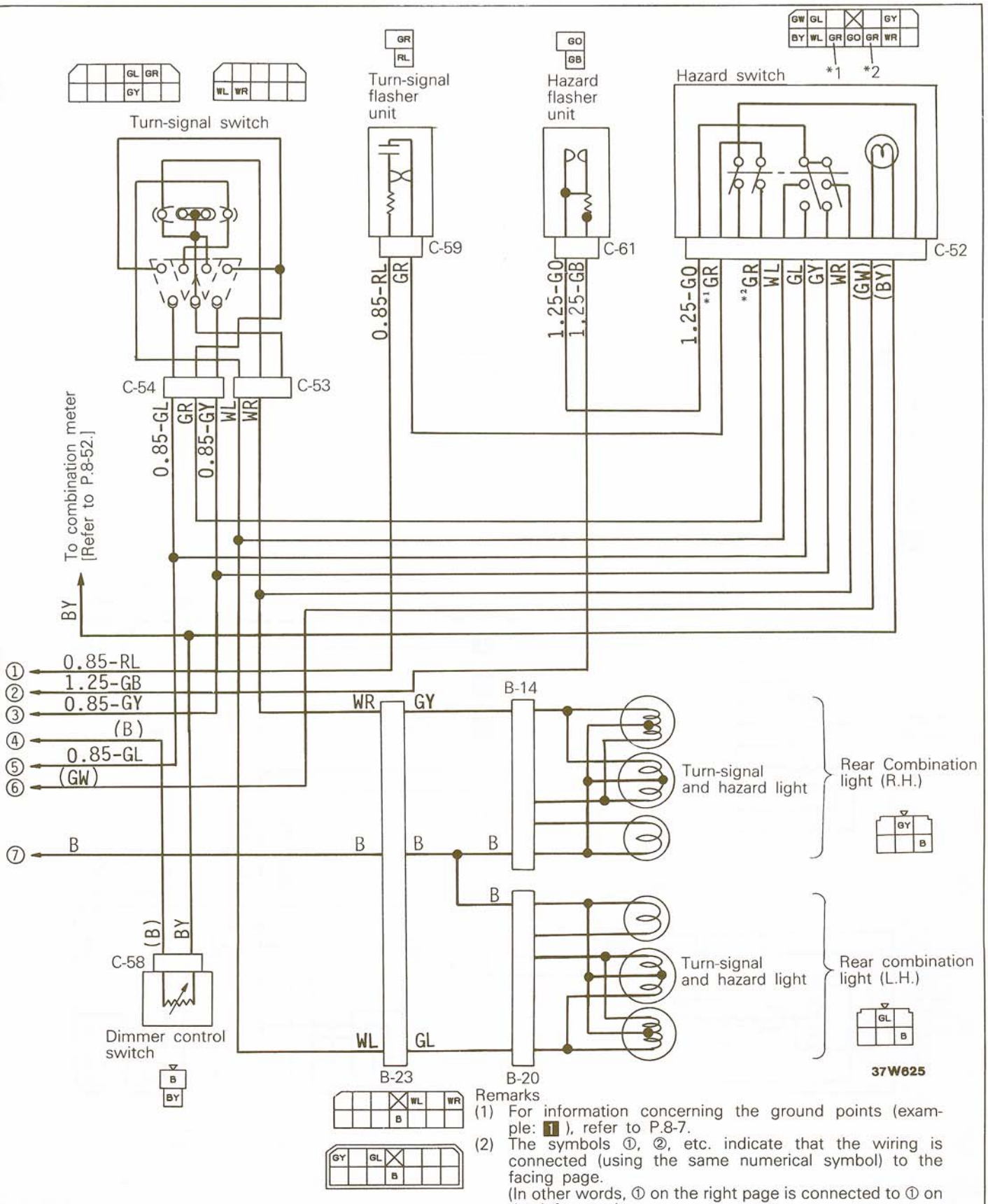
Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

9 TURN-SIGNAL AND HAZARD LIGHT CIRCUIT





Remarks

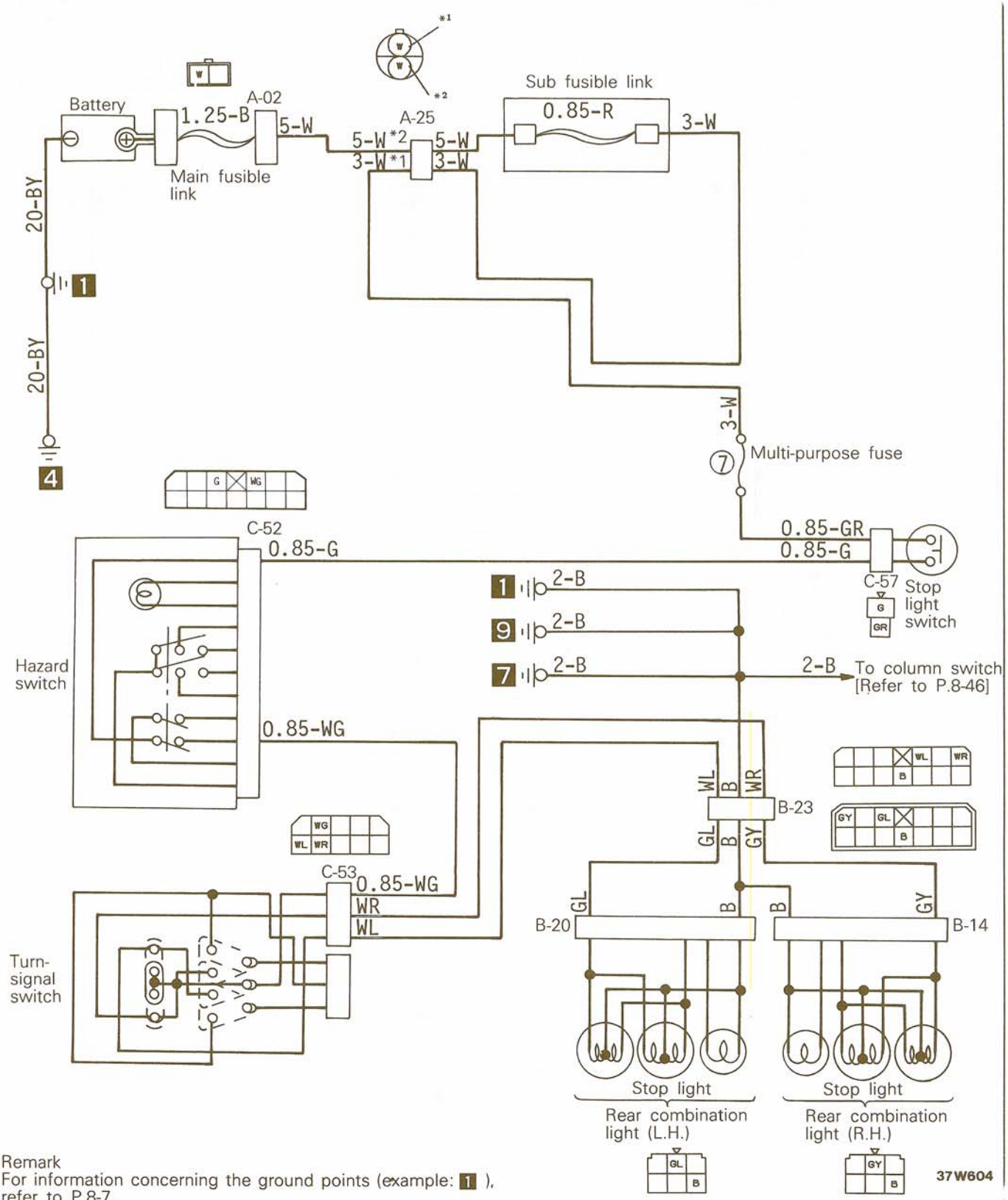
(1) For information concerning the ground points (example: 1), refer to P.8-7.

(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

Wiring color code

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

10 STOP LIGHT CIRCUIT

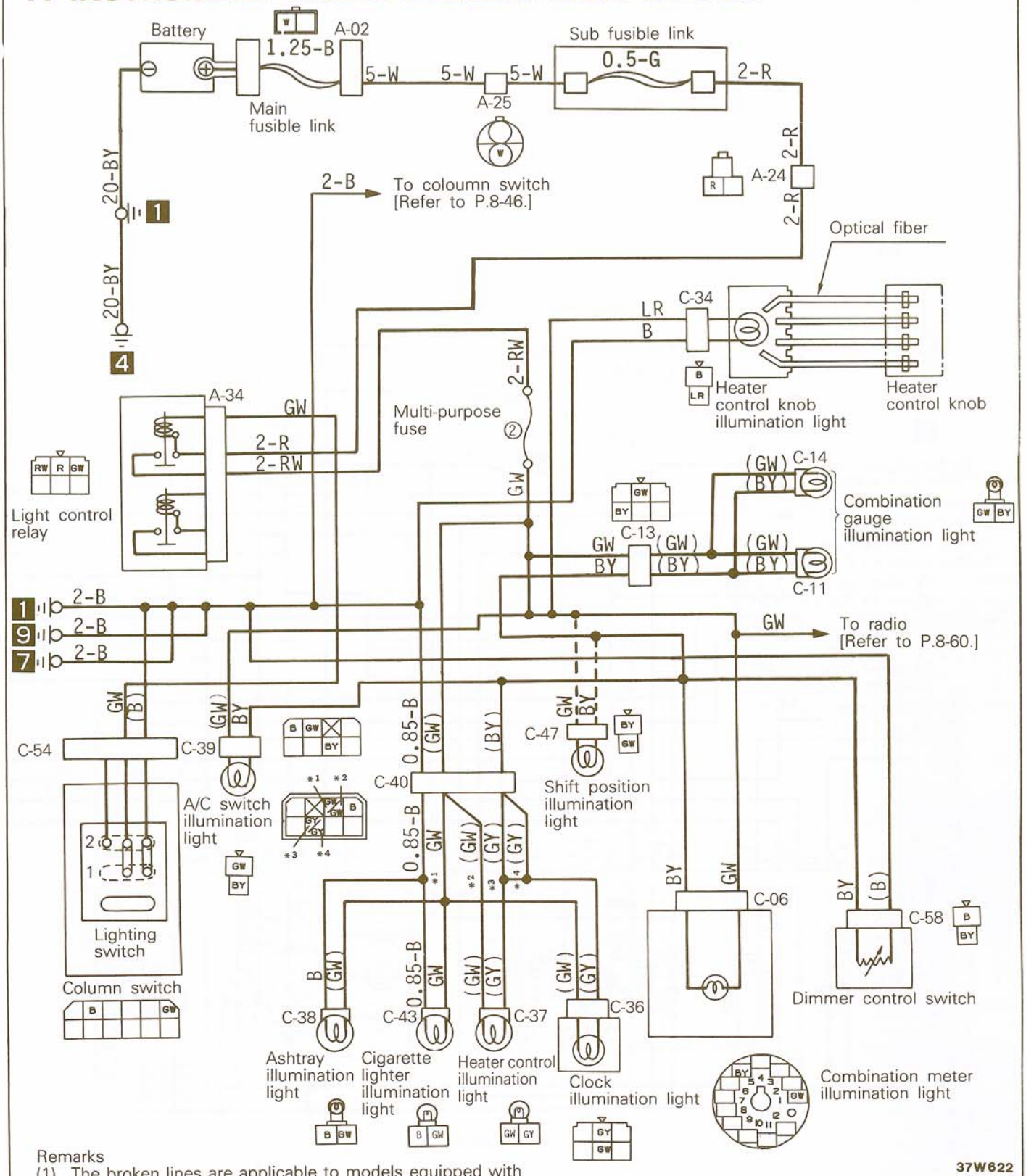


Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

11 INSTRUMENT PANEL ILLUMINATION CIRCUIT

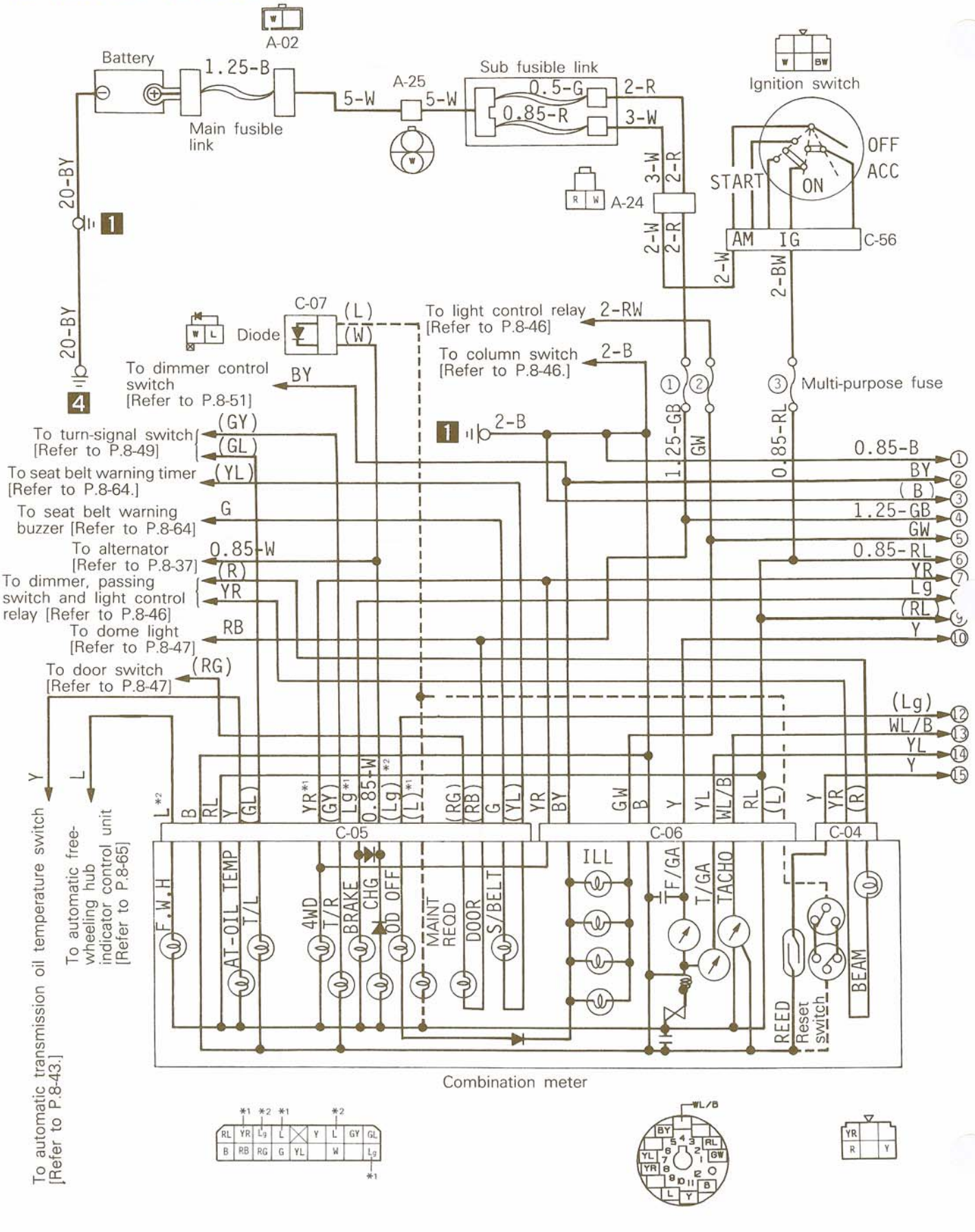


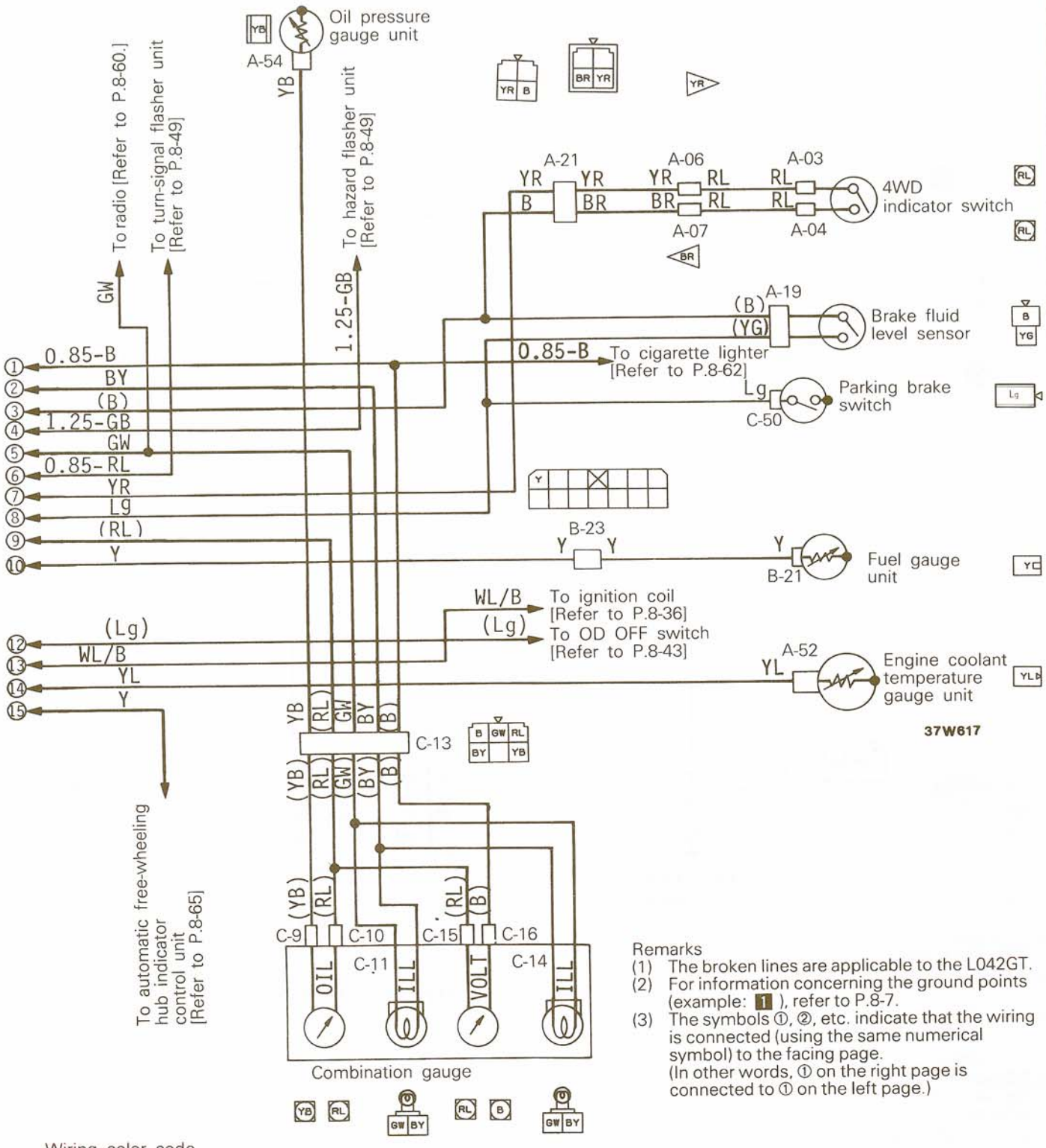
Remarks
(1) The broken lines are applicable to models equipped with an automatic transmission.
(2) For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

12 METER CIRCUIT



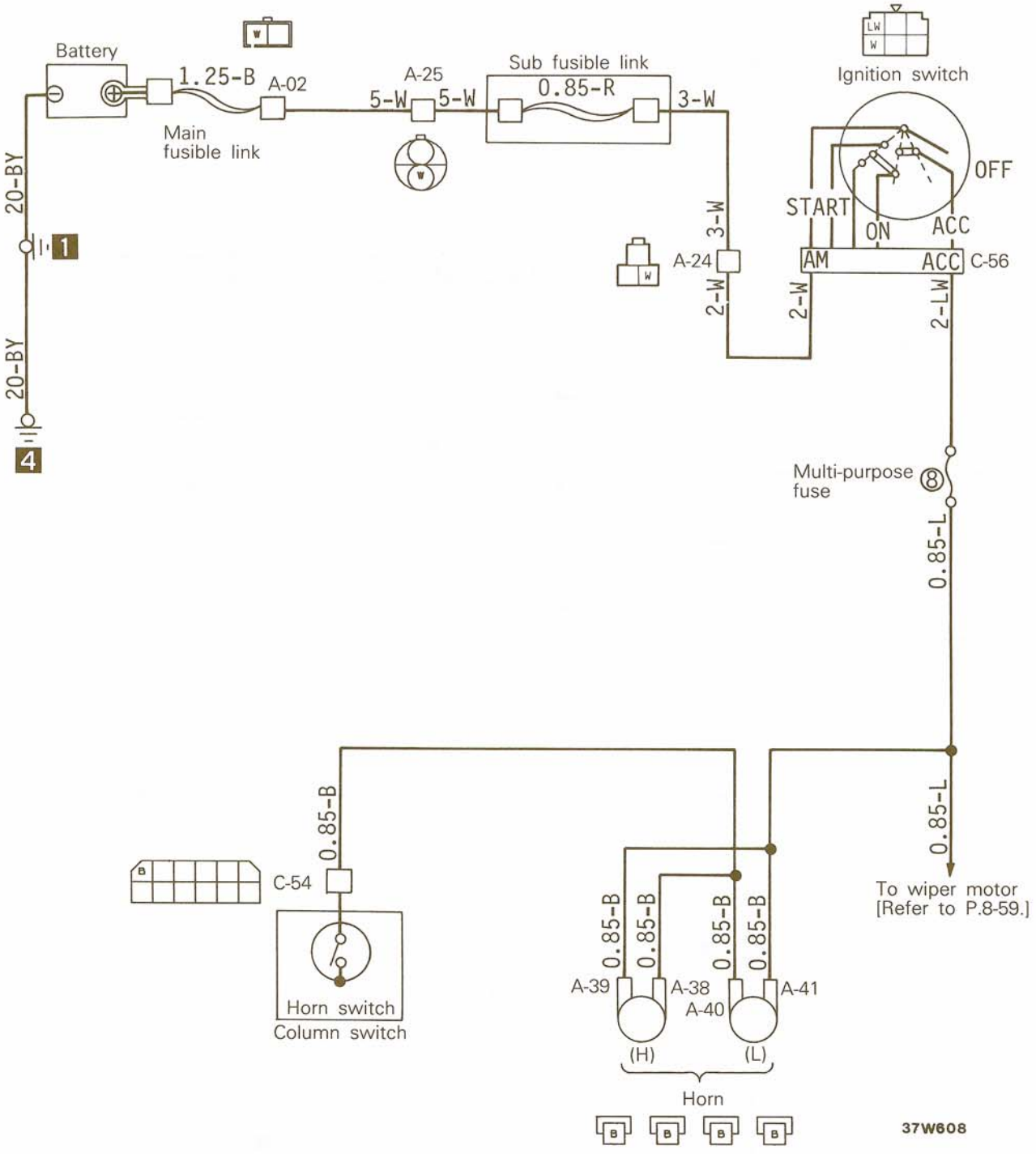


Remarks
(1) The broken lines are applicable to the L042GT.
(2) For information concerning the ground points (example: 1), refer to P.8-7.
(3) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page. (In other words, ① on the right page is connected to ① on the left page.)

Wiring color code

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

13 HORN CIRCUIT

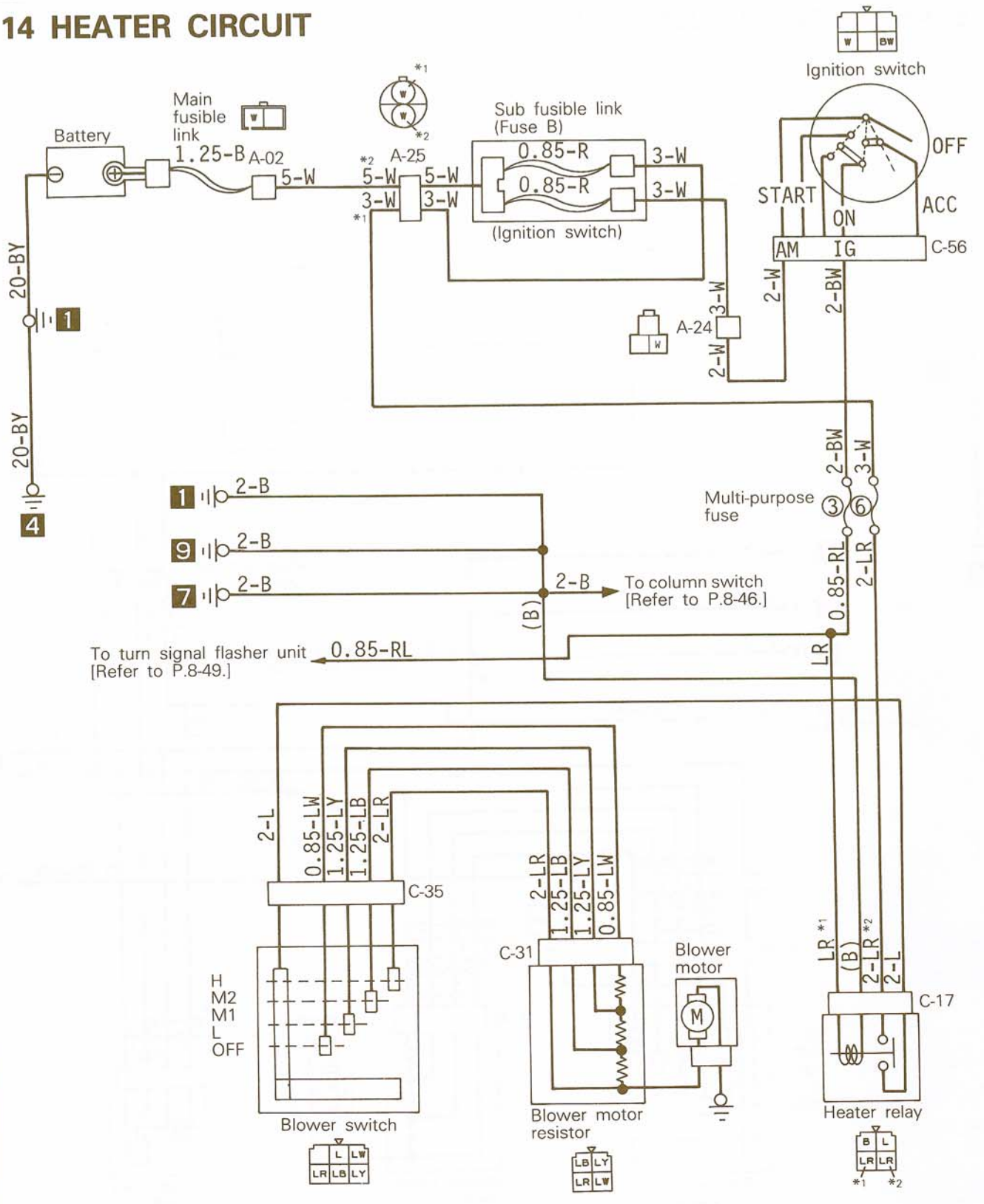


Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

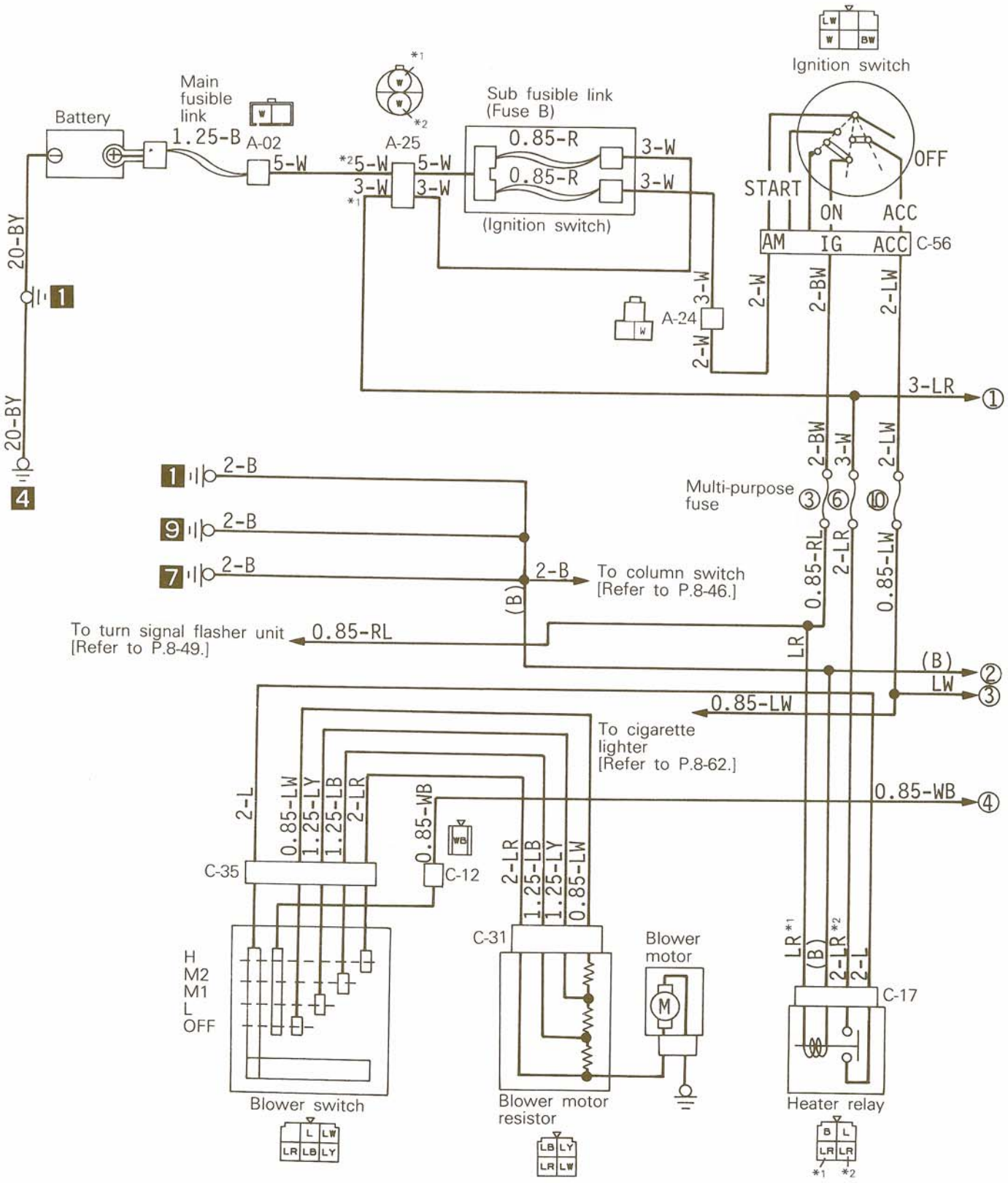
14 HEATER CIRCUIT



Remark
For information concerning the ground points (example: 1), refer to P.8-7.
Wiring color code

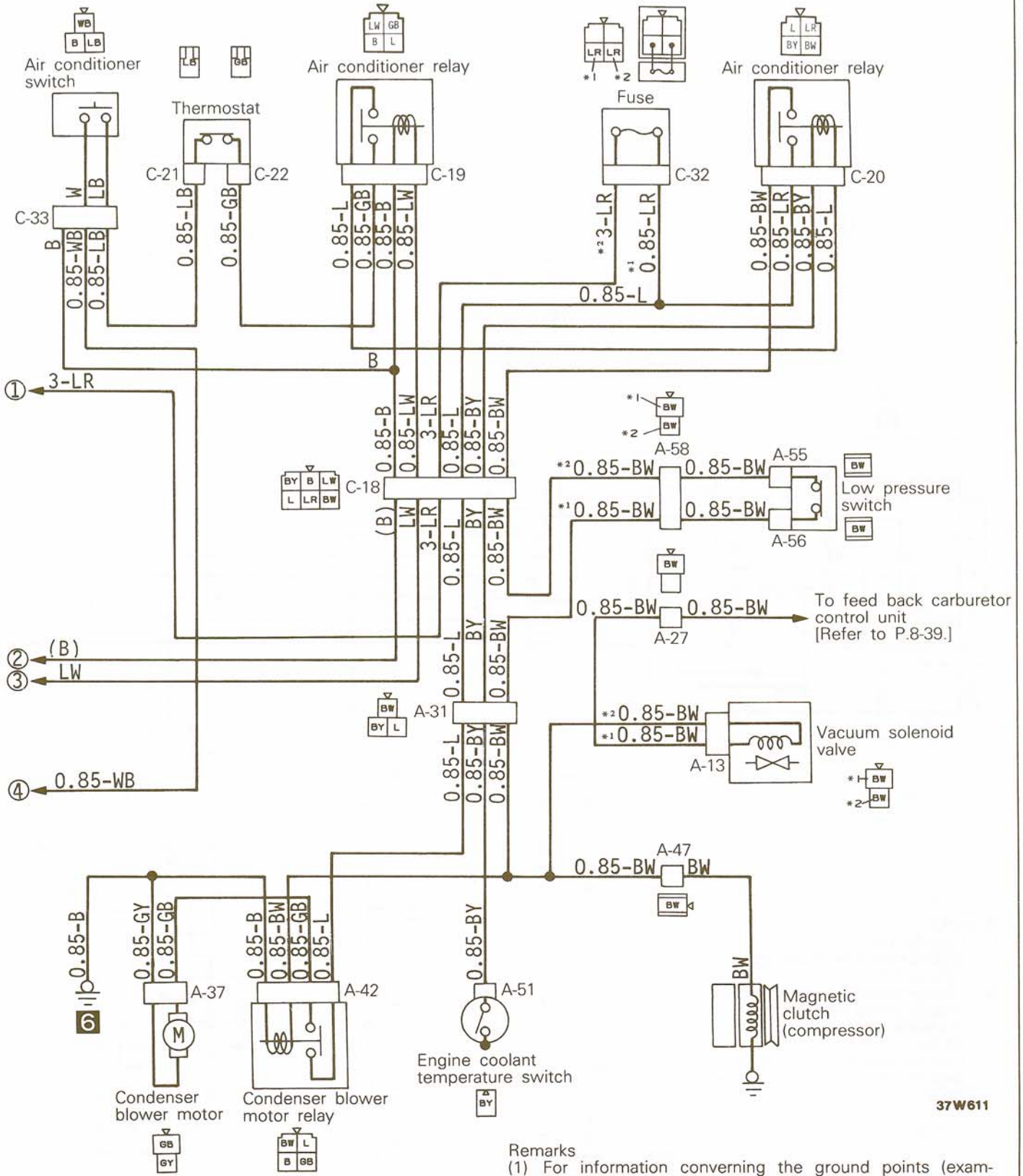
B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
LI: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

15 AIR CONDITIONER CIRCUIT



Wiring color code

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

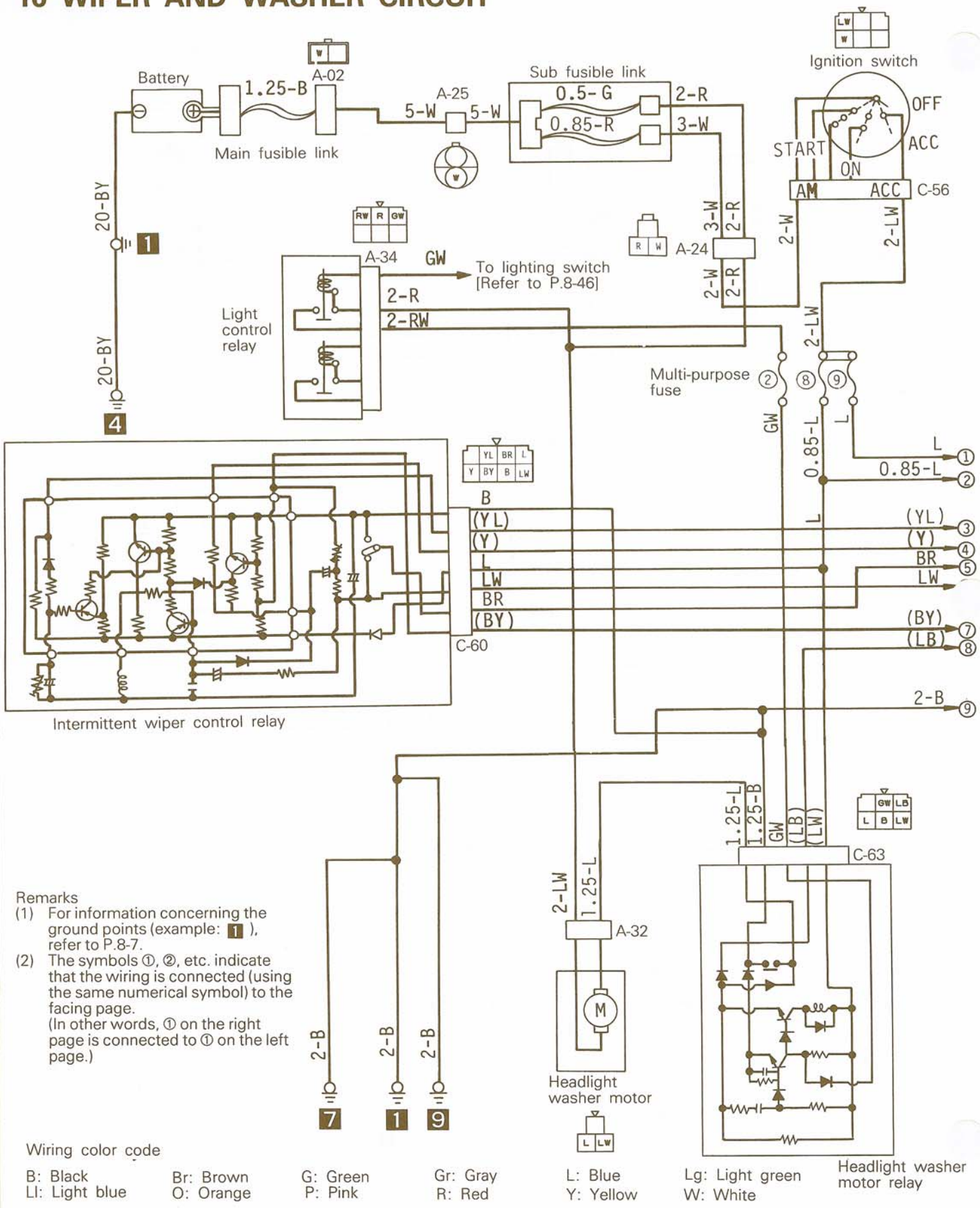


Remarks

(1) For information converning the ground points (example:(1)1), refer to P.8-7.

(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page. (In other words, ① on the right page is connected to ① on the left page.)

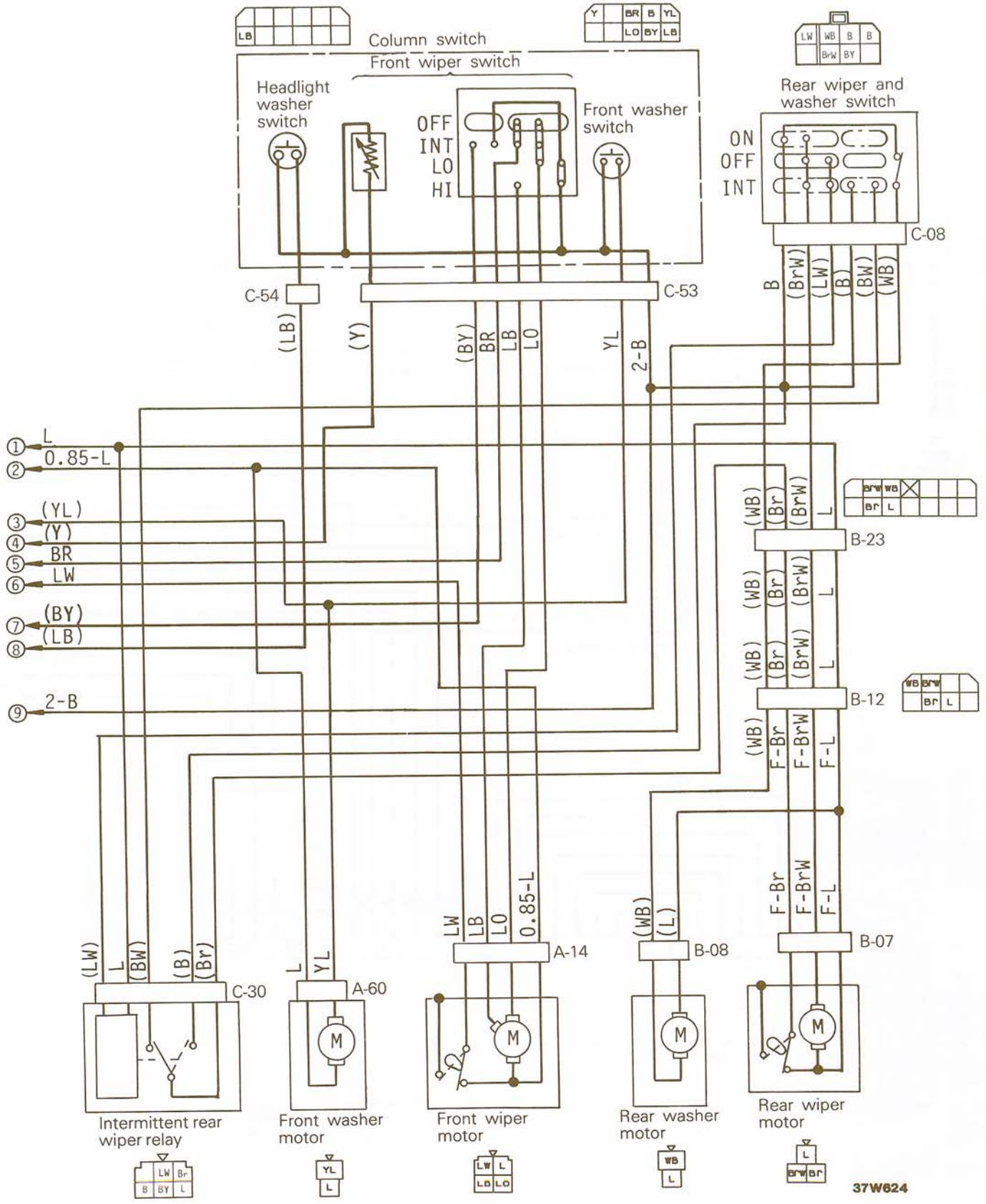
16 WIPER AND WASHER CIRCUIT



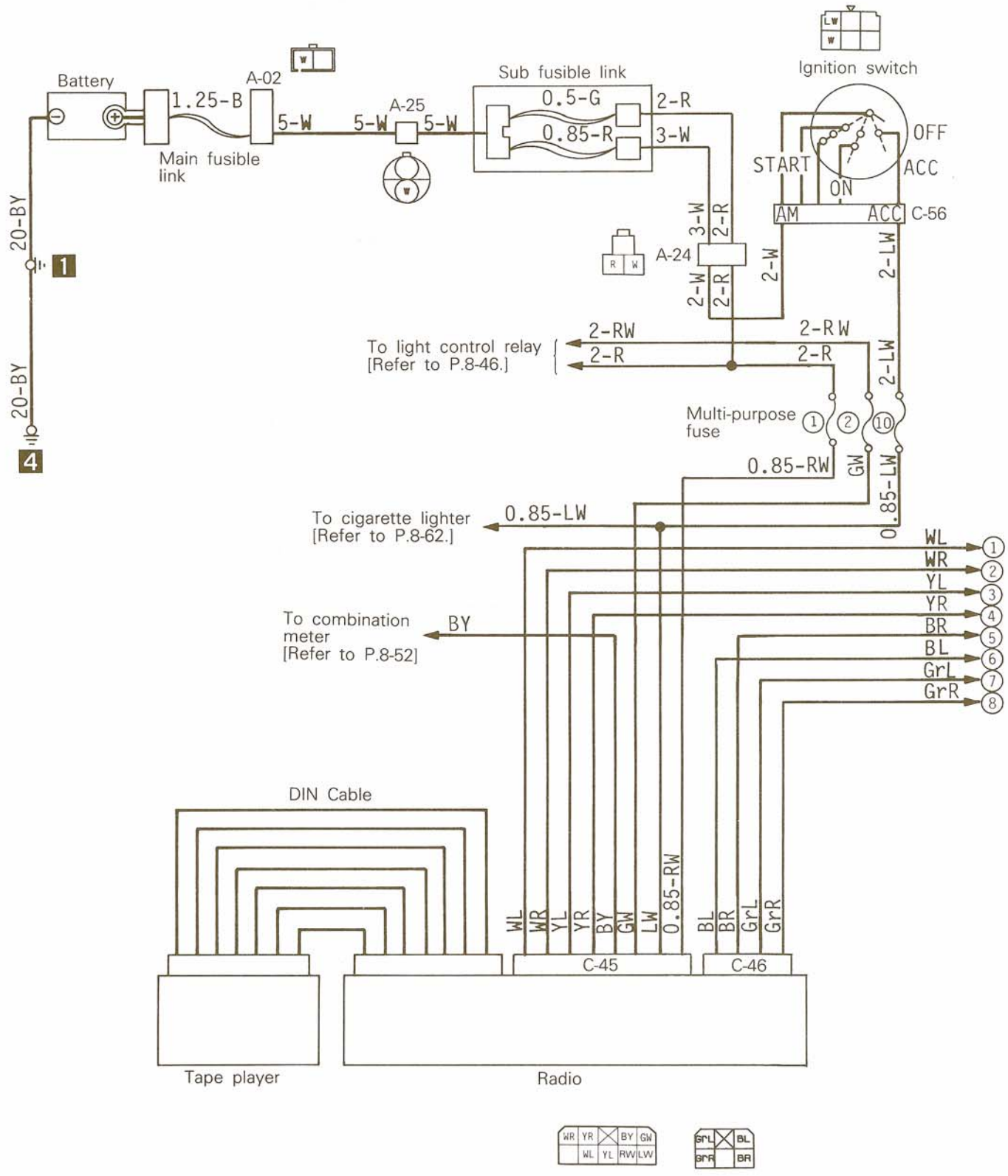
Remarks
(1) For information concerning the ground points (example: 1), refer to P.8-7.
(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

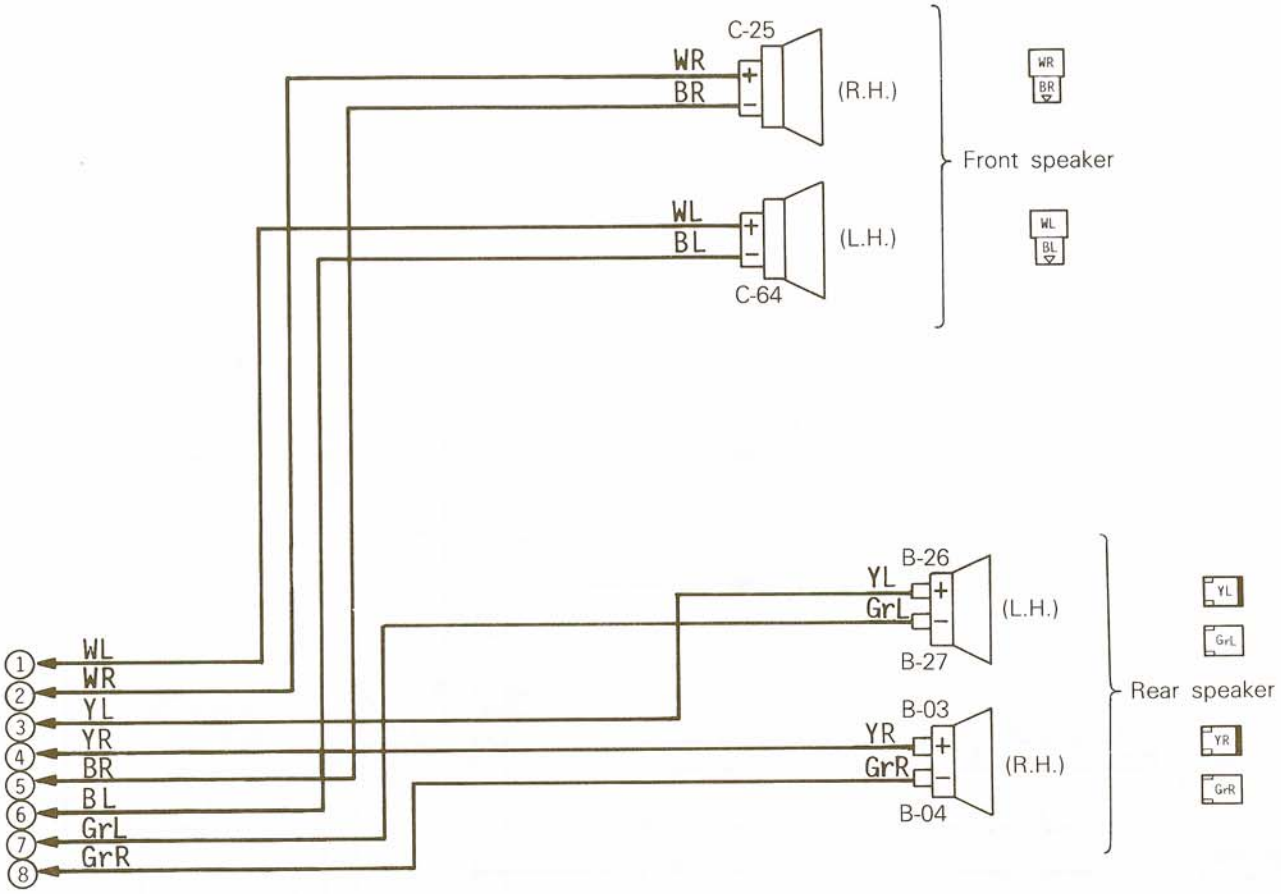
Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green	
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White	


Column switch
Front wiper switch
Headlight washer switch
OFF
INT
LO
HI
Front washer switch
Rear wiper and washer switch
ON
OFF
INT
C-08
C-54
C-53
(LB)
(Y)
(BY)
BR
LB
LO
YL
2-B
B
(BrW)
(LW)
(B)
(BW)
(WB)
① L
② 0.85-L
③ (YL)
④ (Y)
⑤ BR
⑥ LW
⑦ (BY)
⑧ (LB)
⑨ 2-B
B-23
B-12
B-08
B-07
A-14
C-30
A-60
(LW)
(BW)
(B)
(Br)
(L)
F-Br
F-BrW
F-L
0.85-L
Intermittent rear wiper relay
Front washer motor
Front wiper motor
Rear washer motor
Rear wiper motor
37W624

17 RADIO/CASSETTE DECK CIRCUIT





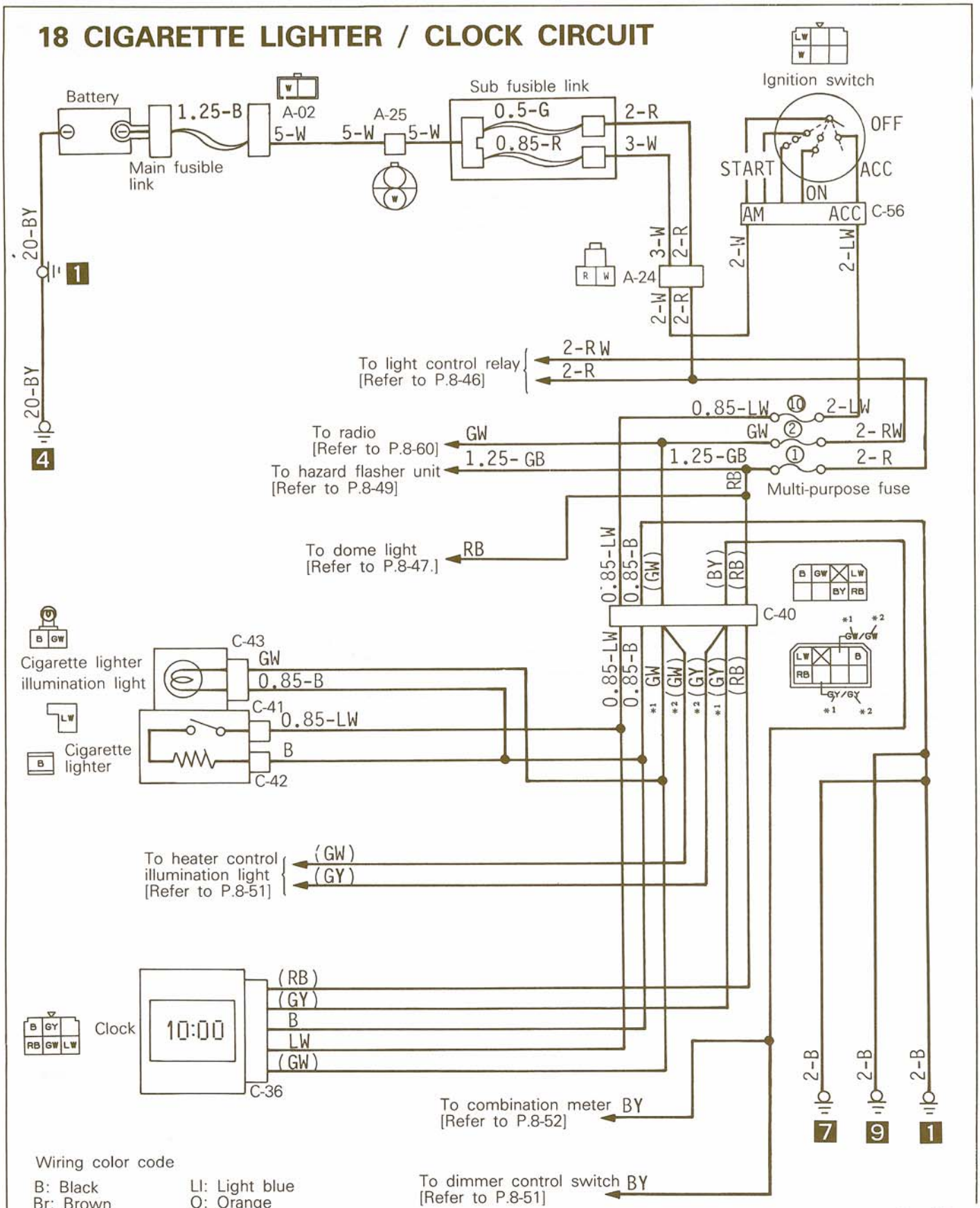
37W618

Remarks
(1) For information concerning the ground points (example: 1), refer to P.8-7.
(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

Wiring color code

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

18 CIGARETTE LIGHTER / CLOCK CIRCUIT



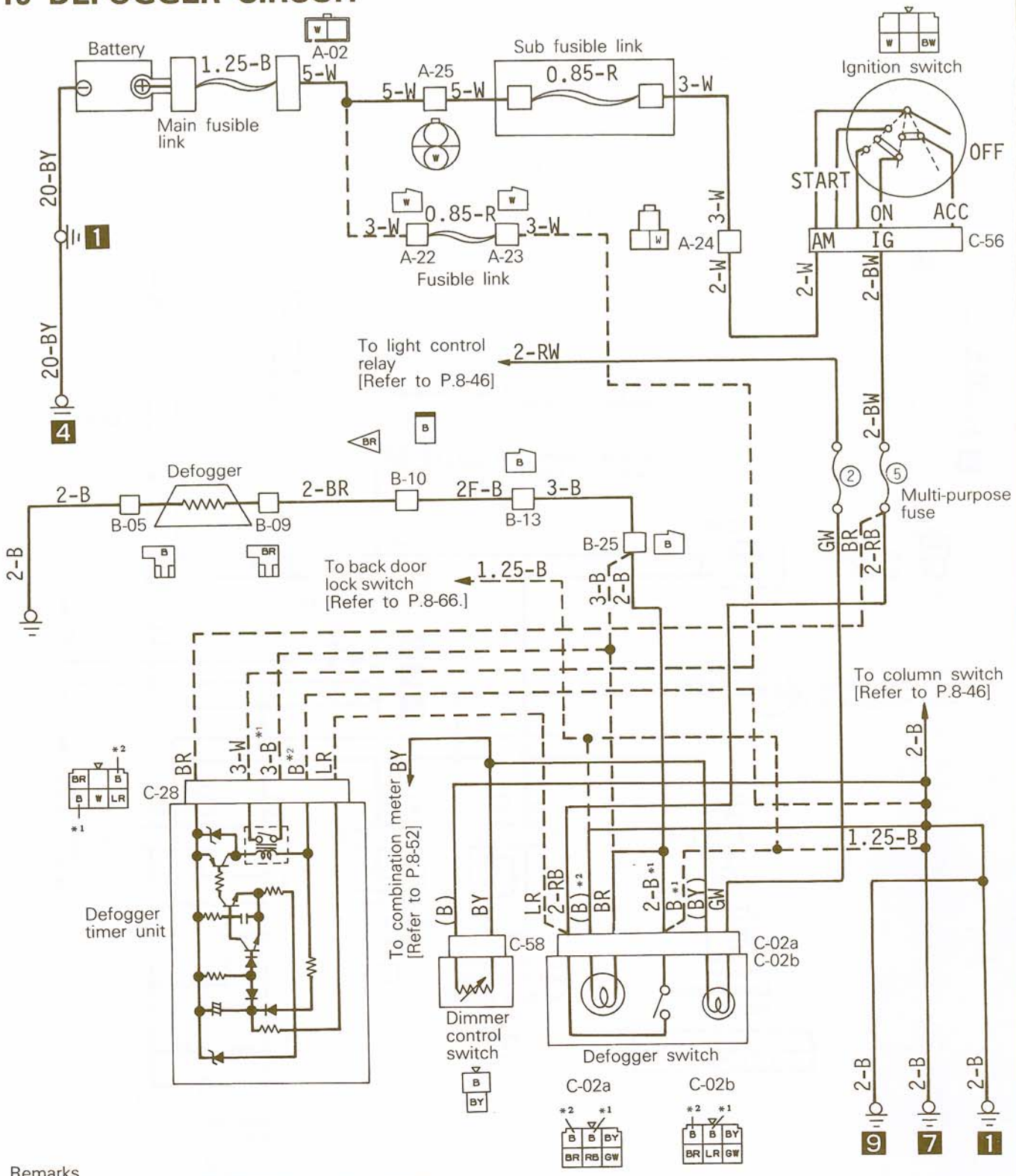
Wiring color code

B: Black	Ll: Light blue
Br: Brown	O: Orange
G: Green	P: Pink
Gr: Gray	R: Red
L: Blue	Y: Yellow
Lg: Light green	W: White

37W615

Remark
For information concerning the ground points (example: 1), refer to P.8-7.

19 DEFOGGER CIRCUIT



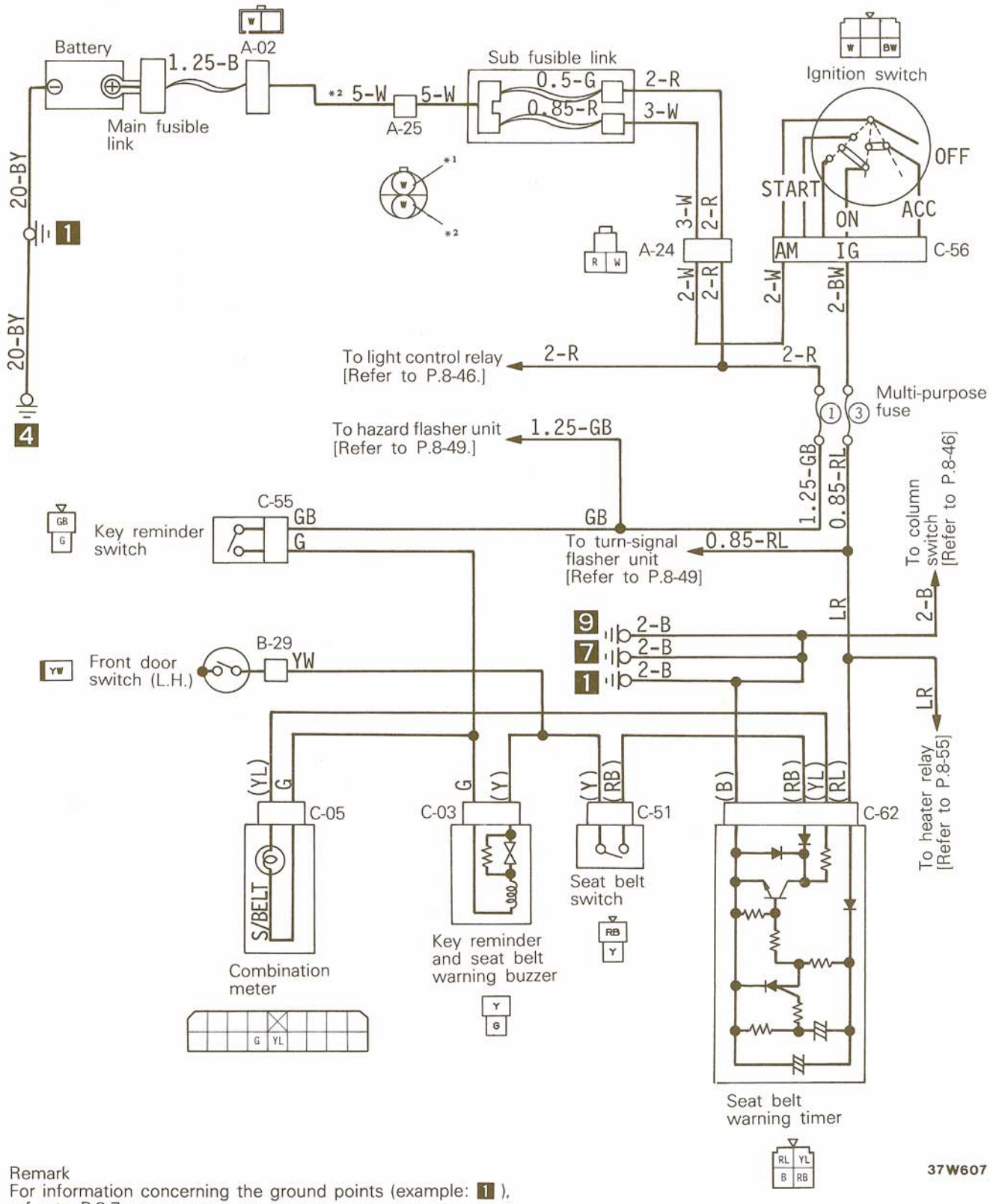
Remarks
(1) The broken lines are applicable to the L042GV.
(2) For information concerning the ground points (example: 1), refer to P.8-7.

37W606

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

20 BUZZER CIRCUIT

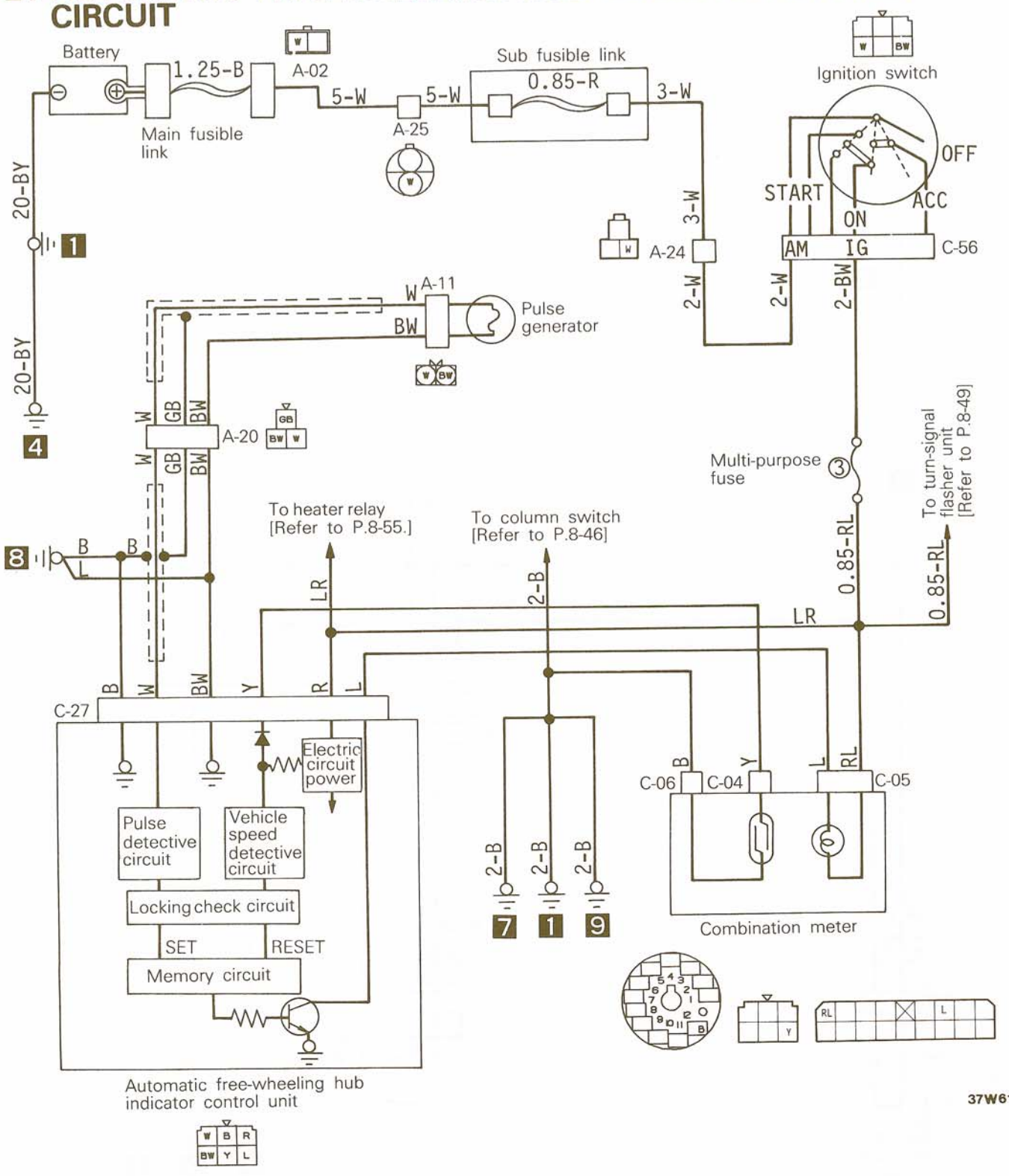


Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

21 AUTOMATIC FREE-WHEELING HUB INDICATOR SYSTEM CIRCUIT

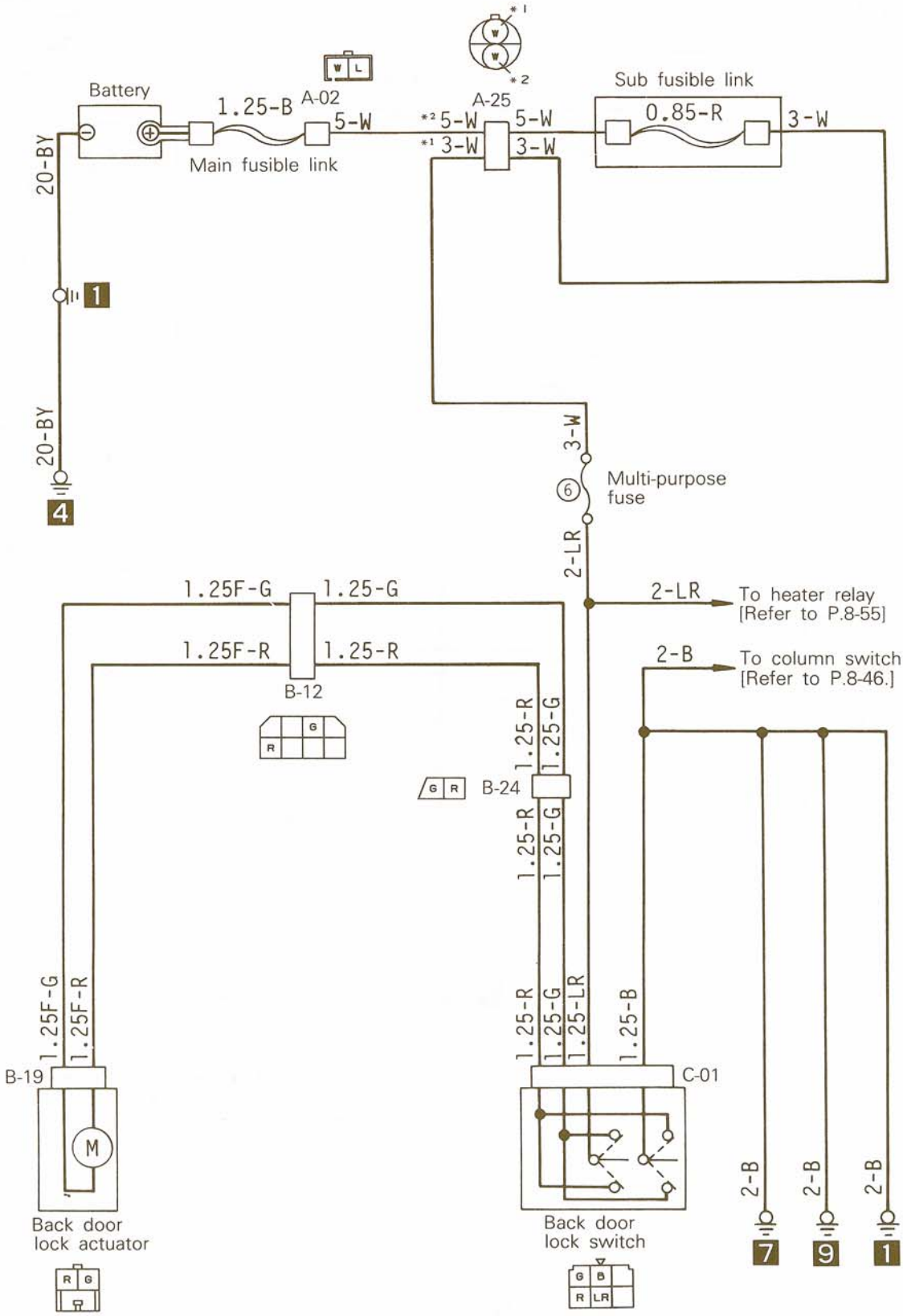


Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

23 BACK DOOR LOCK CIRCUIT



37W602

Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

CENTRALIZED JUNCTION

Main Fusible Link

Item \ Circuit	Main circuit	Alternator circuit	Feed back carburetor control circuit
Cable color	Black	Brown	Green
Fusible link size mm²(in.²)	1.25 (.0019)	0.3 (.0005)	0.5 (.0008)
Permissible continuous current A	40	19	27
Fusing current A	190	65	100

Sub Fusible Link

Item \ Circuit	Lighting circuit	Stop light, door lock and heater circuit	Ignition circuit
Cable color	Green	Red	Green
Fusible link size mm²(in.²)	0.5 (.0008)	0.85 (.0013)	0.5 (.0008)
Permissible continuous current A	27	34	27
Fusing current A	100	150	100

Dedicated Fusible Link

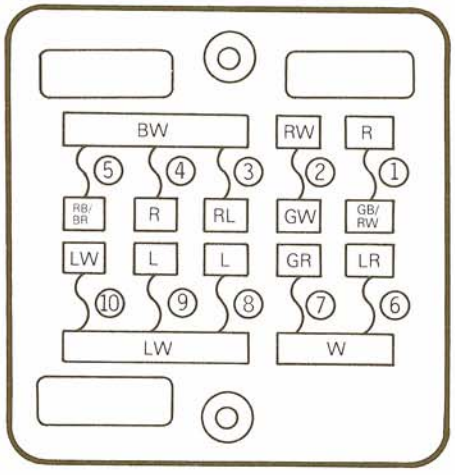
Item \ Circuit	Defogger circuit
Cable color	Red
Fusible link size mm²(in.²)	0.85 (.0013)
Permissible continuous current A	34
Fusing current A	150

Dedicated Fuse

Item \ Circuit	Upper beam indicator circuit	Air conditioner circuit
Rated capacity A	5	20

Multi-purpose Fuse

Power supply circuit	Fuse No.	Rated capacity A	Applicable circuits
Battery	1	20	Clock, Dome light, Hazard warning flashers, Key-reminder switch, Buzzer
Headlight relay	2	10	Tail lights, License plate lights, Illumination lights, Headlight washer relay, Position lights
Ignition switch (IG)	3	10	Heater relay, Seat belt warning timer, Turn-signal lights, Alternator, Seat belt switches, Fuel and water temperature gauges, Oil pressure gauge, Voltage meter, Indicator and warning lights, Inhibitor switch, Automatic free-wheeling hub indicator control unit, OD-OFF relay
	4	10	Back-up lights
	5	15	Rear window defogger
Battery	6	20	Heater, Back door lock
	7	15	Stop lights
Ignition switch (ACC)	8	15	Windshield wipers and washer, Headlight washer relay, Intermittent wiper relay, Horn
	9	10	Rear window wiper and washer
	10	15	Cigarette lighter, Radio, Tape player, Clock (ACC), Spare terminal, Air conditioner relay



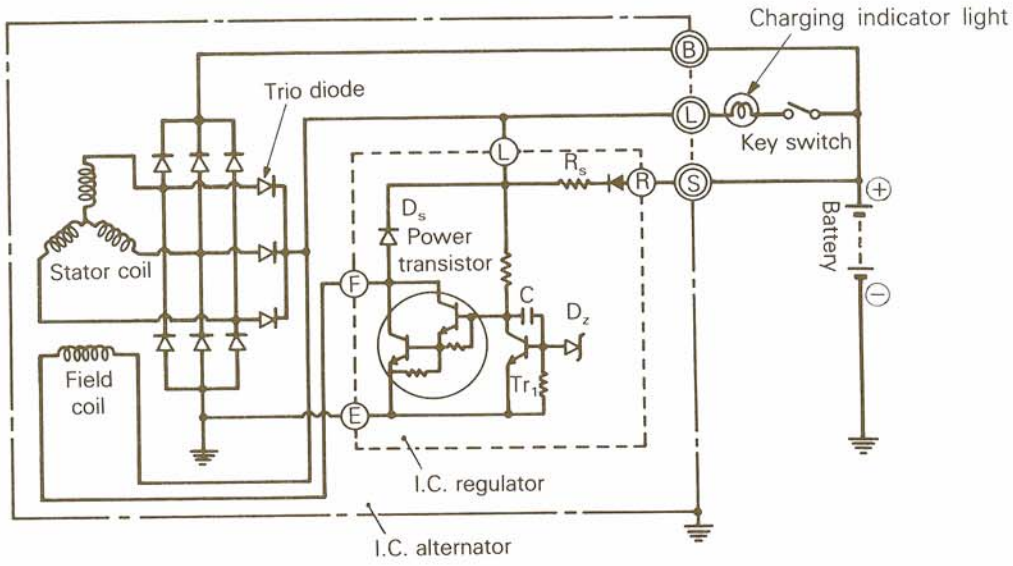
37W594

CHARGING SYSTEM

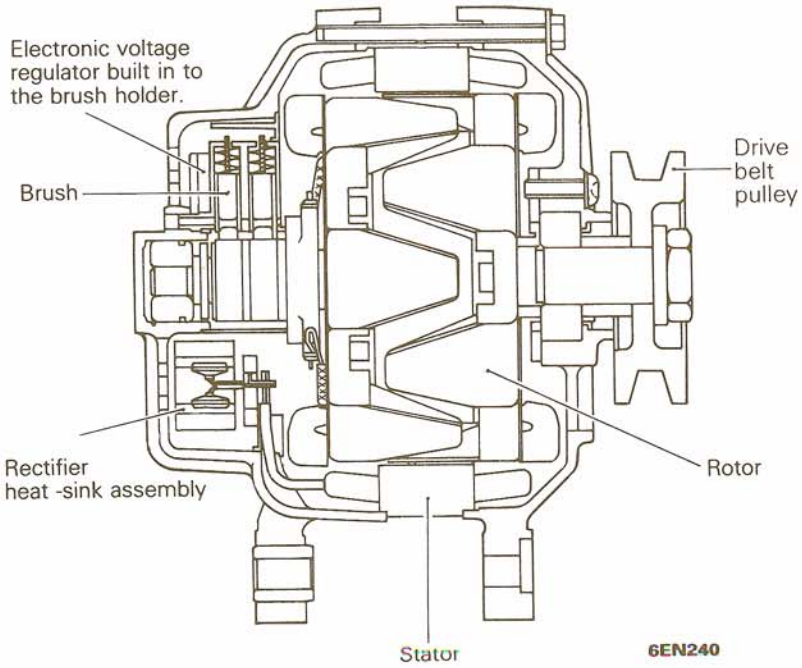
GENERAL INFORMATION

N08EAAD

The charging system comprises battery, alternator with regulator, charging indicator light and wire.
The alternator has 6 built in rectifiers (3 positive and 3 negative), which rectify alternating current to direct current. Accordingly, the alternator terminal B is D/C. Furthermore the alternator regulates the charge voltage through the use of battery voltage detection system.
The main parts of the alternator are: rotor, stator, rectifier, condenser, brush, bearing, drive belt pulley and a brush holder with built in electronic voltage regulator.



6EL239



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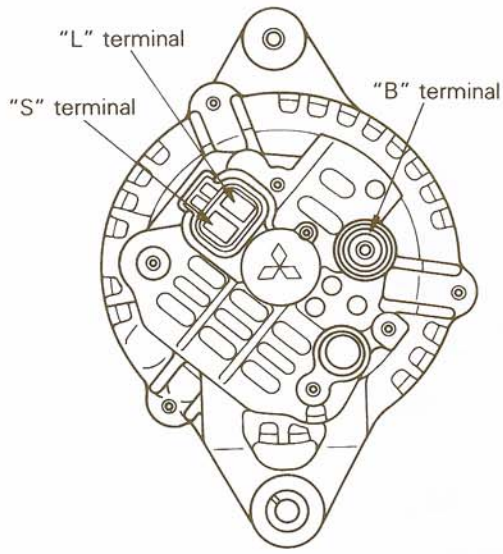
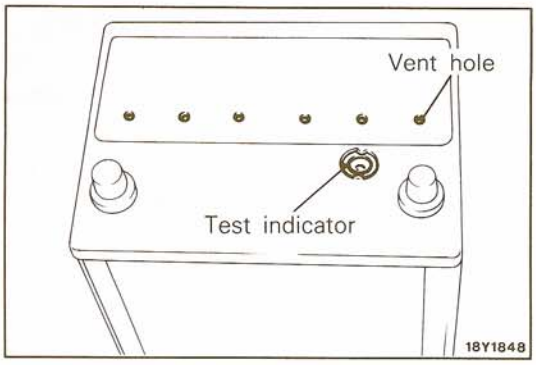


6EN211



MAINTENANCE FREE TYPE BATTERY

The maintenace-free battery is, as the name implies, totally maintenance free and has no removable battery cell caps. Water never needs to be added to the maintenace-free battery.

The battery is completely sealed, except for small vent holes in the cover. These vent holes allow what small amount of gasses are produced in the battery to escape. The special chemical composition inside the battery reduces the production of gas to an extremely small amount at normal charging voltages. The battery contains a visual test indicator which indicates the condition of the battery.

SPECIFICATIONS

GENERAL SPECIFICATIONS

ALTERNATOR

N08EB-A

Items	Specifications
Type	Battery voltage sensing
Model No.	A2TO3477
Part No.	MD110318
Rated output V/A	12 / 50
Voltage regulator	Electronic built-in type

BATTERY

Items	Federal/california	Canada
Type	55B24R (S)-MF	65D23R-MF
Ampere hours (5 HR) Ah	40	53
Cranking rating [at – 17.8°C (0°F)] A	433	420
Reserve capacity min.	79	111

NOTES
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 25 A and maintain a minimum terminal voltage of 10.5 at 26.7°C (80°F).

SERVICE SPECIFICATIONS

N08EC--

Items	Specifications
Standard values	
Regulated voltage V	
Ambient temp. at voltage regulator	
– 20°C (– 4°F)	14.2–15.4
20°C (68°F)	13.9–14.9
60°C (140°F)	13.4–14.6
80°C (176°F)	13.1–14.5
Slip ring O.D. mm (in.)	23 (.906)
Field coil resistance Ω	3.1
Limit	
Output current A	Min. 35
Slip ring O.D. mm (in.)	22.2 (.874)

TORQUE SPECIFICATIONS

N08ED--

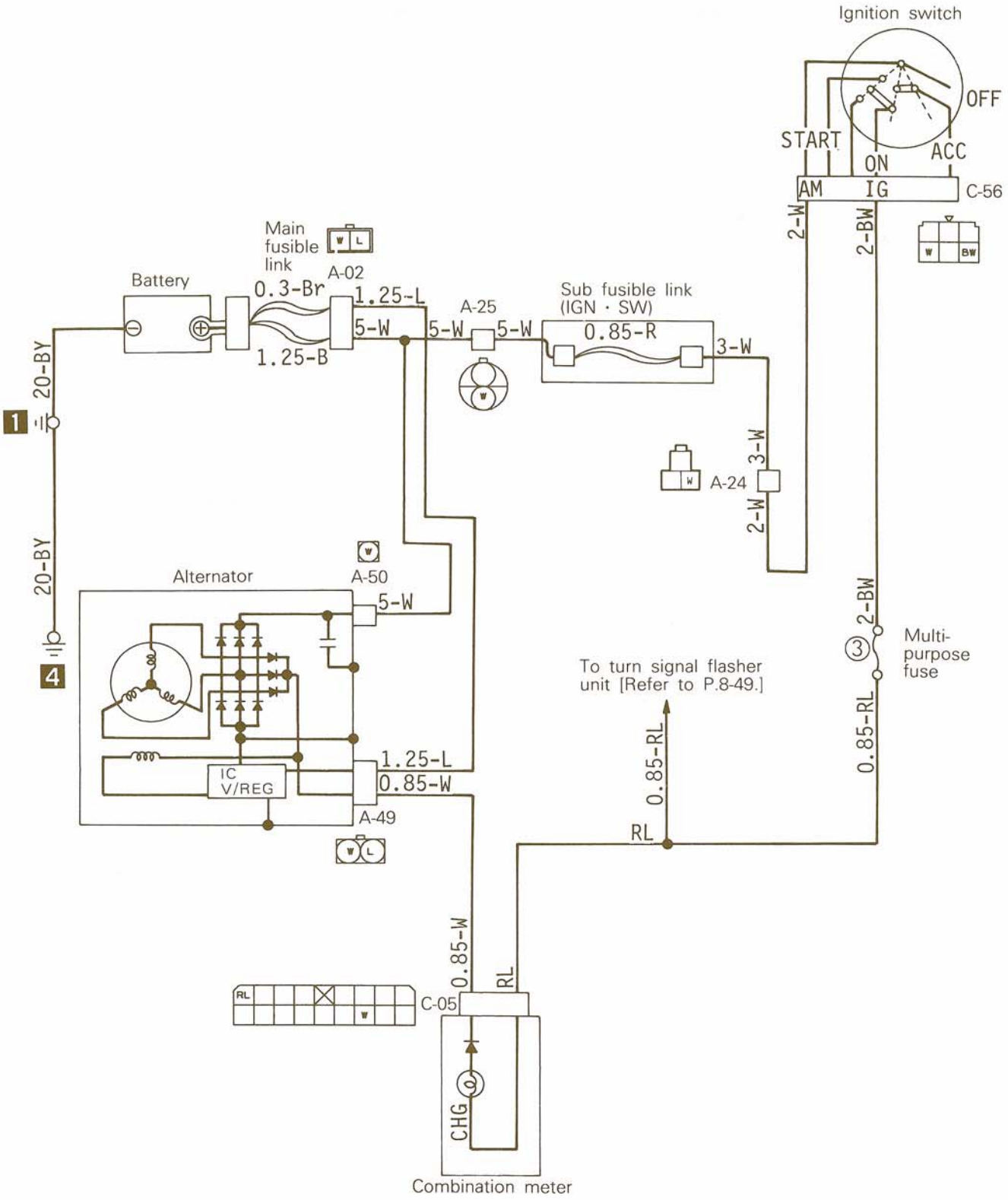
Items	Nm	ft.lbs.
Alternator brace bolt	12–15	9–11
Alternator support bolt nut	20–22	14–16
High pressure hose nut	20–25	14–18
Low pressure hose nut	30–35	22–25

TROUBLESHOOTING

N08EHAD

Symptom	Probable cause	Remedy
Charging warning indicator does not light with ignition switch "ON" and engine off.	Fuse blown	Check fuses
	Light burned out	Replace light
	Wiring connection loose	Tighten loose connections
	Electronic voltage regulator faulty	Replace voltage regulator
Charging warning indicator does not go out with engine running (Battery requires frequent recharging)	Drive belt loose or worn	Adjust tension or replace drive belt
	Battery cables loose, corroded or worn	Repair or replace cables
	Fuse blown	Check fuses
	Fusible link blown	Replace fusible link
	Electronic voltage regulator or alternator faulty	Test alternator
	Wiring faulty	Repair wiring
Run-down battery	Drive belt loose or worn	Adjust tension or replace drive belt
	Wiring connection loose or open circuit	Tighten loose connection or repair wiring
	Fusible link blown	Replace fusible link
	Poor grounding	Repair
	Electronic voltage regulator or alternator faulty	Test alternator
	Decrease in life of battery	Replace battery
Overcharge	Electronic voltage regulator faulty	Replace voltage regulator

CIRCUIT DIAGRAM



37W605

Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

OPERATION

Before engine starts

- First, when the ignition switch is turned to "ON", and before the engine starts, current flows through fuse No. 3, 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

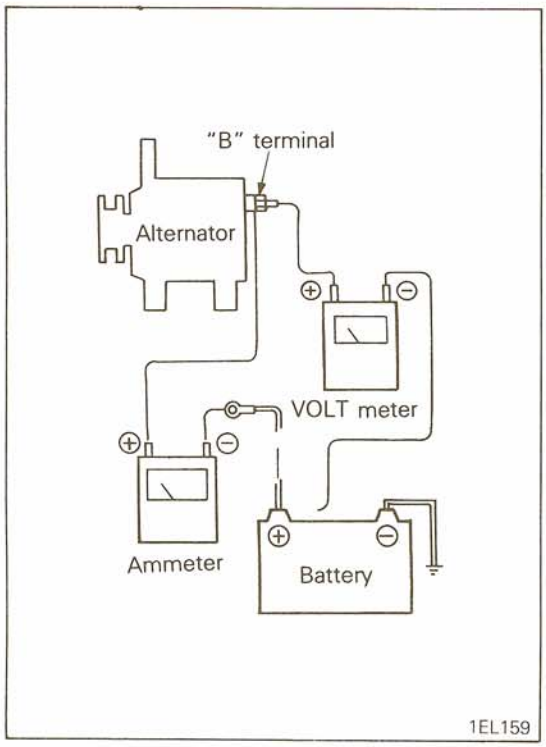
1. Charging indicator light does not go on when the ignition switch is turned to "ON", before the engine starts
   - Check the bulb.
2. Charging indicator light fails to go off once the engine starts
   - Check drive belt tension.
   - Check the IC voltage regulator.
3. Discharged or overcharged battery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

SERVICE ADJUSTMENT PROCEDURES
N08EIABa

CHARGING SYSTEM INSPECTION

VOLTAGE DROP TEST OF ALTERNATOR OUTPUT WIRE

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



Preparation

(1) Turn the ignition switch to "OFF".
(2) Disconnect the battery ground cable.
(3) Disconnect the alternator output lead from the alternator "B" terminal.
(4) Connect a DC ammeter (0 to 100 A) in series to the "B" terminal and the disconnected output lead. Connect the (+) lead of the ammeter to the "B" terminal and the (−) lead to the disconnected output wire.

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

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

Test

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

Result

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

Standard value : 0.2 V max.

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

OUTPUT CURRENT TEST

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

Preparation

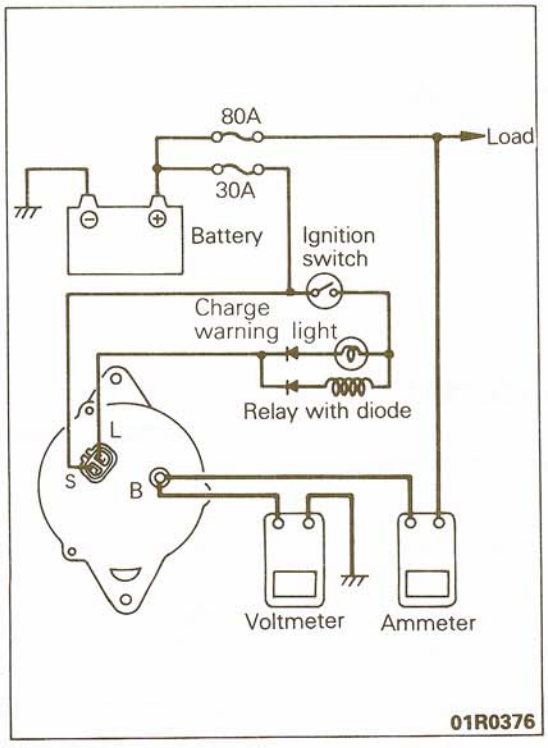
(1) Prior to the test, check the following items and correct as necessary.

(a) Check the battery installed in the vehicle to ensure that it is in sound state*. The battery checking method is described in "BATTERY".

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

(b) Check tension of the alternator drive belt. The belt tension check method is described in "GROUP 7 COOLING – Service Adjustment Procedures".

(2) Turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Disconnect the alternator output wire from the alternator "B" terminal.



(5) Connect a DC ammeter (0 to 100 A) in series between the "B" terminal and the disconnected output wire. Connect the (+) lead of the ammeter to the "B" terminal and connect the (–) lead wire to the disconnected output wire.

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

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

Test

(1) Check to see that the voltmeter reads the same value as the battery voltage.
If the voltmeter reads 0 V, 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 2500 rpm and read the maximum output current value indicated by the ammeter.

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

Result

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

Limit value : 31 A min.

Caution

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 abmient temperature is too high. In such a case, reduce the temperature before testing again.**

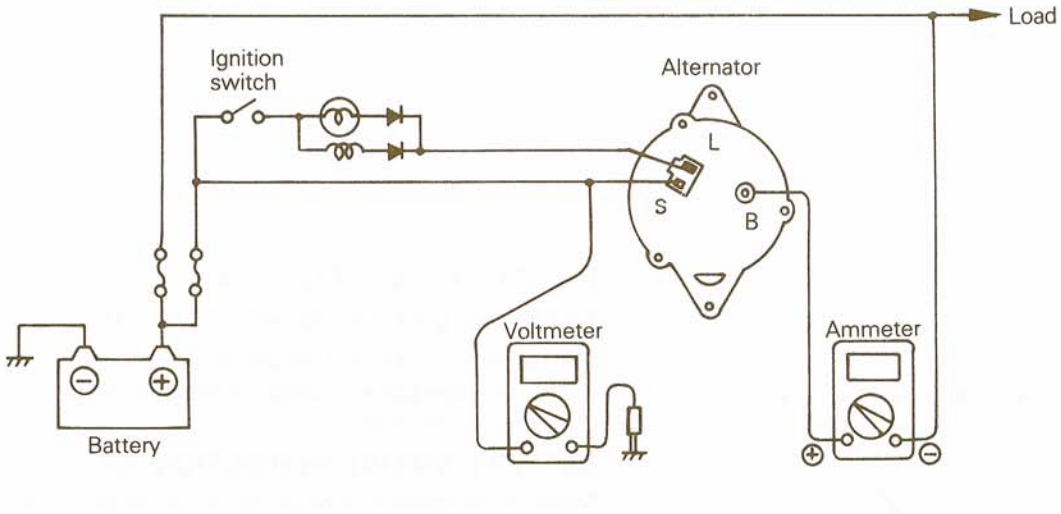
(2) Upon completion of the output current test, lower the engine speed to the idle speed and turn off the ignition switch.
(3) Disconnect the battery ground cable.
(4) Remove the test ammeter and voltmeter and the engine tachometer.
(5) connect the alternator output wire to the alternator "B" terminal.
(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 – Service Adjustment Procedures".
(2) Turn the ignition switch to "OFF".
(3) Disconnect the battery ground cable.
(4) Connect a digital voltmeter between the "S" terminal of the alternator and ground. Connect the (+) lead of the voltmeter to the "S" terminal of the alternator, inserting from the wire side of the two way connector and connect the (–) lead sound ground or battery (–) terminal.



(5) Disconnect the alternator output wire from the alternator "B" terminal.
(6) Connect a DC ammeter (0 to 100 A) in series between the "B" terminal and the disconnected output wire. Connect the (+) lead of the ammeter to the "B" terminal and connect the (–) lead wire to the disconnected output wire.
(7) Set the engine tachometer and connect the battery ground cable.

Test

(1) Turn on the ignition switch and check that the voltmeter indicates the following value.

Voltage : Battery voltage

If it reads 0 V, 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 2500 rpm and read the voltmeter when the alternator output current drops to 10 A or less.

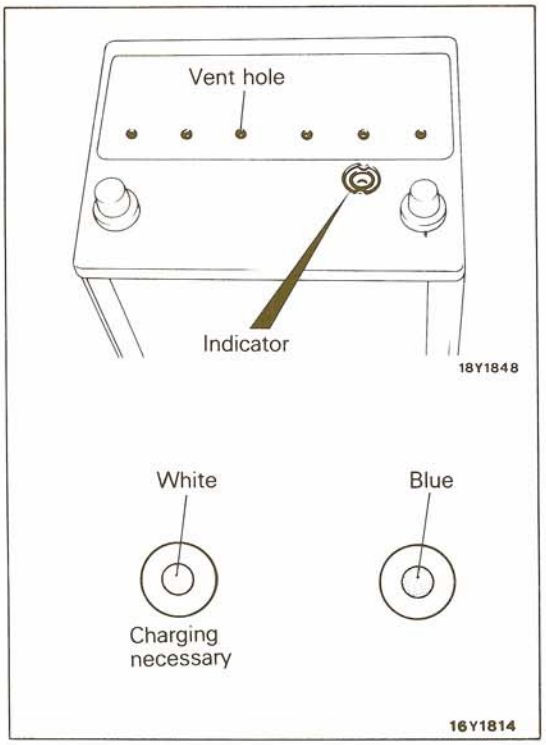
Result

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

Regulating voltage table

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

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



BATTERY INSPECTION

N08EIBAa

BATTERY VISUAL INSPECTION (1)

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

BATTERY VISUAL INSPECTION (2)

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

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

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

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

BATTERY CHARGING

N08EICDa

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

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

CHARGE RATE

If the test indicator is white, the battery should be charged as outlined below.
When the dot appears or when maximum charge shown below is reached, charging should be stopped.

NOTE
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 (S)-MF (433 amps)	65D23R-MF (420 amps)
Slow Charging	5 amps 10 hrs.	5 amps 10 hrs.
	10 amps 5 hrs.	10 amps 5 hrs.
Fast Charging	20 amps 2.5 hrs.	20 amps 2.5 hrs.
	30 amps 1.5 hrs.	30 amps 1.5 hrs.

ALTERNATOR

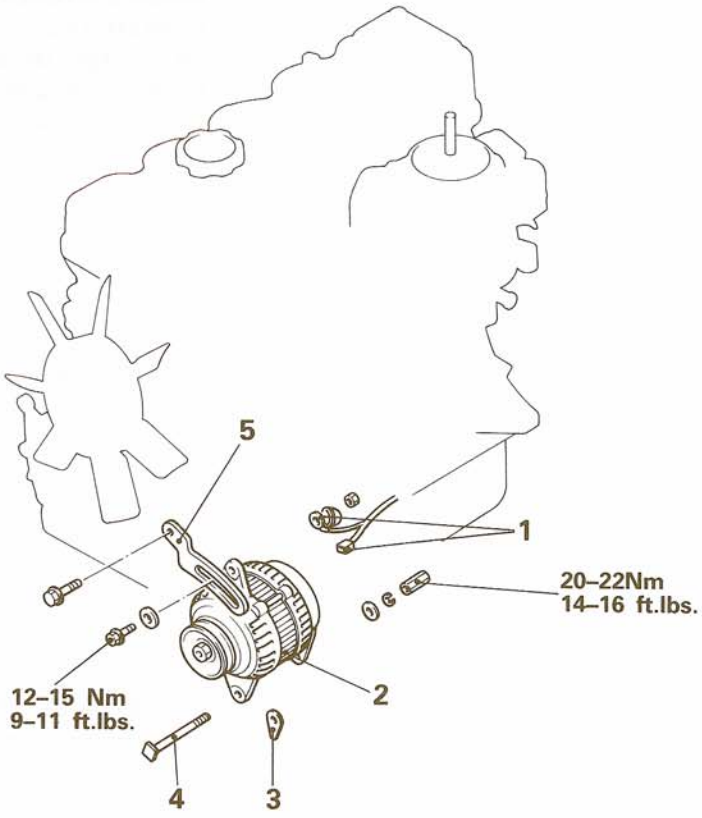
REMOVAL AND INSTALLATION (Vehicles without Air Conditioner)

N08EJAK

Post-installation Operation
- Adjustment of the Drive Belt Tension (Refer to GROUP 7 COOLING-Service Adjustment Procedures)

Removal steps

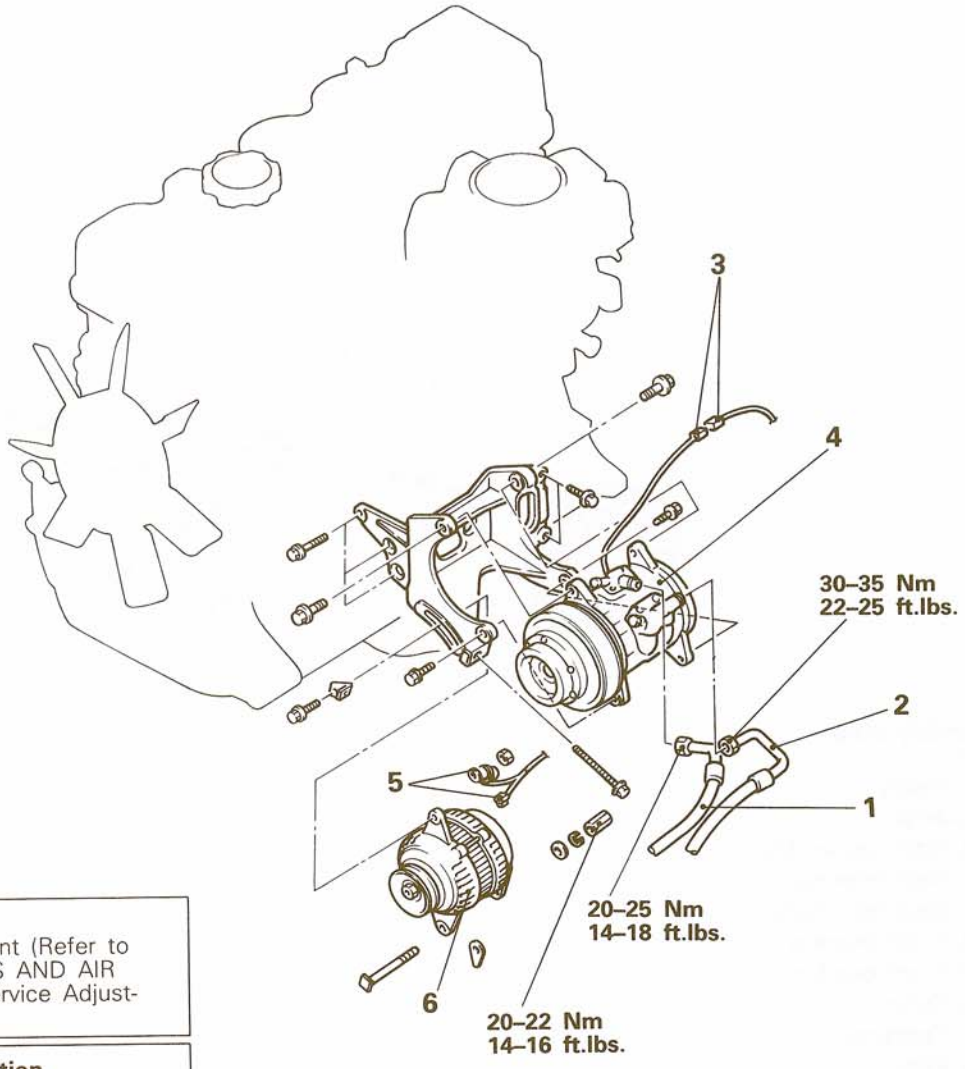
1. Connection of alternator connector
2. Alternator
3. Shim
4. Support bolt
5. Brace



NOTE
Reverse the removal procedures to reinstall.

16W1565

REMOVAL AND INSTALLATION (Vehicles with Air Conditioner)



Pre-removal Operation
- Draining of Refrigerant (Refer to GROUP 24 HEATERS AND AIR CONDITIONING – Service Adjustment Procedures)

Post-installation Operation
- Charging of Refrigerant (Refer to GROUP 24 HEATERS AND AIR CONDITIONING – Service Adjustment Procedures)
- Adjustment of Drive Belt Tension (Refer to GROUP 7 COOLING and GROUP 24 HEATERS AND AIR CONDITIONING – Service Adjustment Procedures)

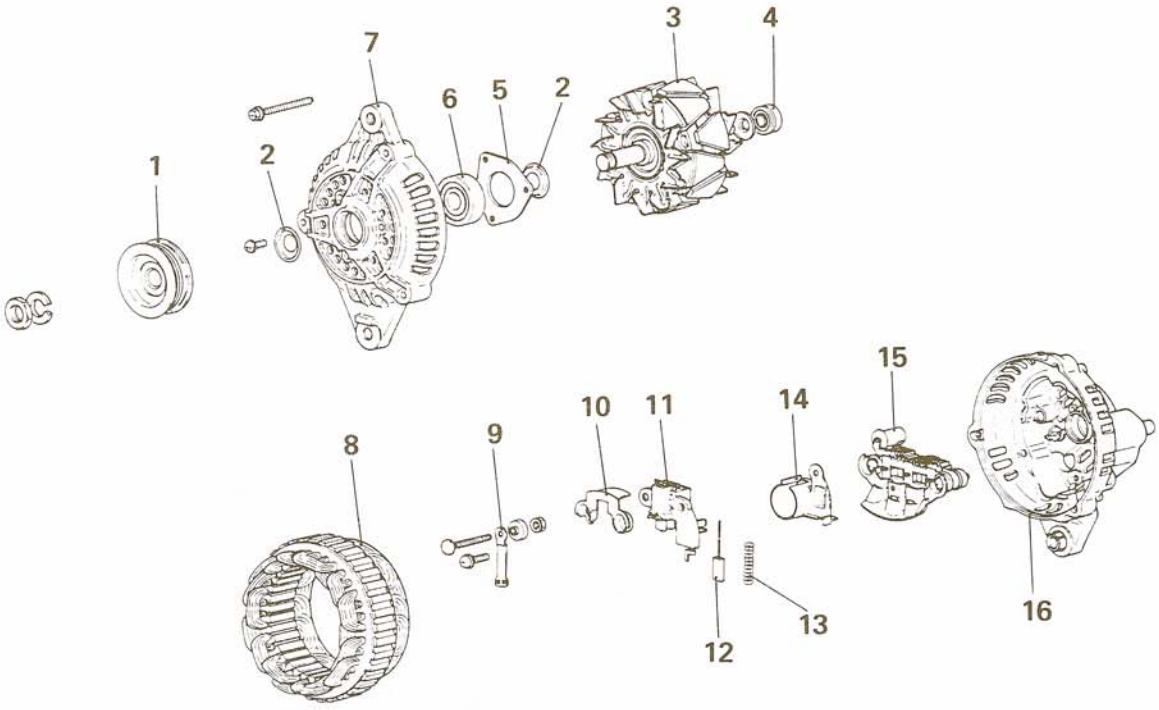
16W1566

Removal steps

1. Connection of high pressure hose
2. Connection of low pressure hose
3. Connection of compressor connector
4. Compressor
5. Connection of alternator connector
6. Alternator

NOTE
Reverse the removal procedures to reinstall.

DISASSEMBLY AND REASSEMBLY

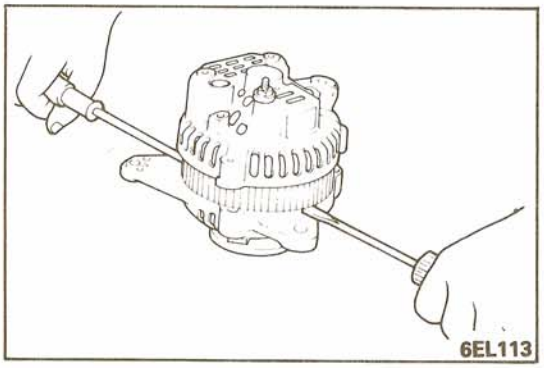


1EL096

Disassembly steps

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

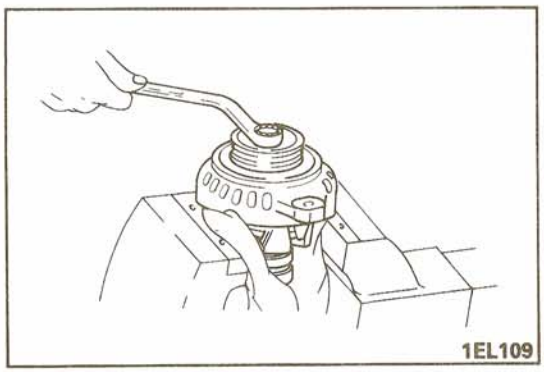
NOTE
(1) Reverse the disassembly procedures to reassemble.
(2) ◆◆ : Refer to "Service Points of Disassembly".
(3) ◆◆ : Refer to "Service Points of Reassembly".



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.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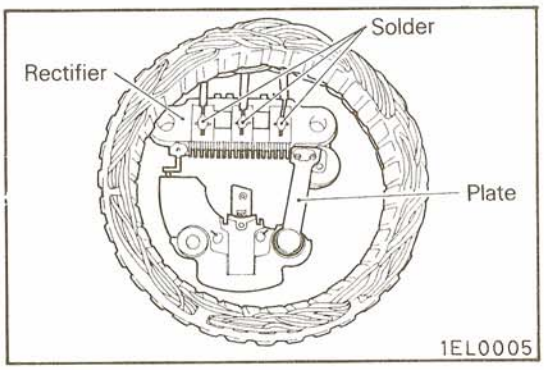
1. REMOVAL OF PULLEY

Clamp the rotor in a vise with soft jaws.



1EL0005

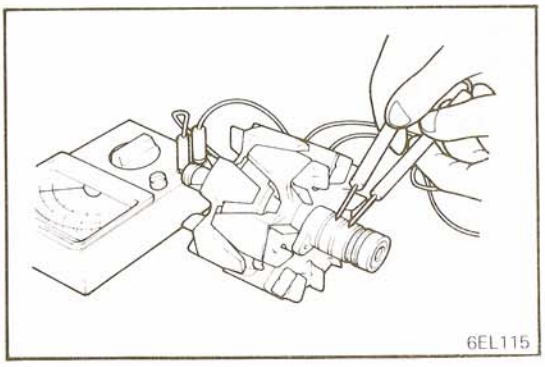
11. REMOVAL OF REGULATOR AND BRUSH HOLDER

(1) Unsolder three stator leads soldered to main diodes on rectifier.

(2) Unsolder two soldered points to rectifier.

Caution

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

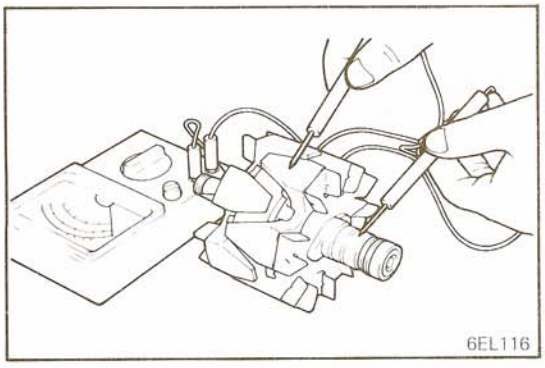

6EL115

INSPECTION

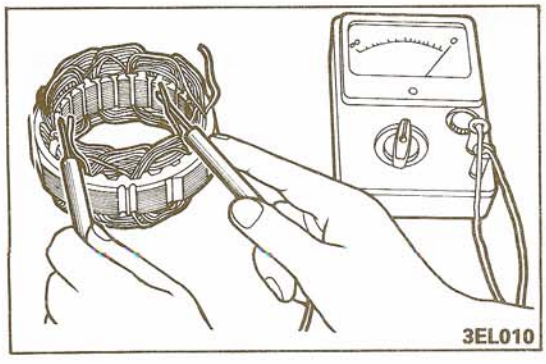
ROTOR

- 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 Ω

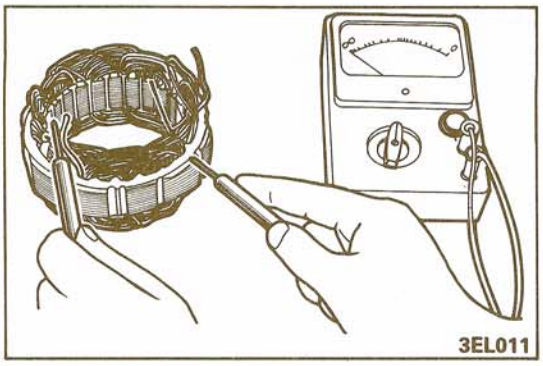

6EL116

- 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.

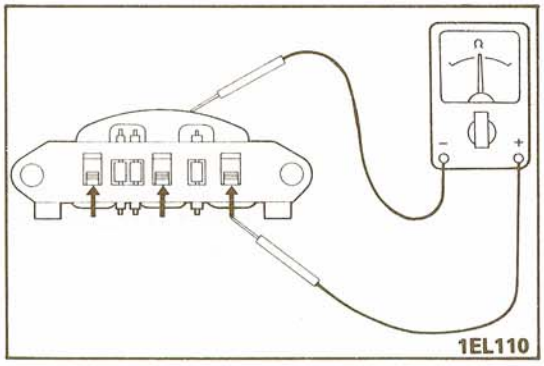

3EL010

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.

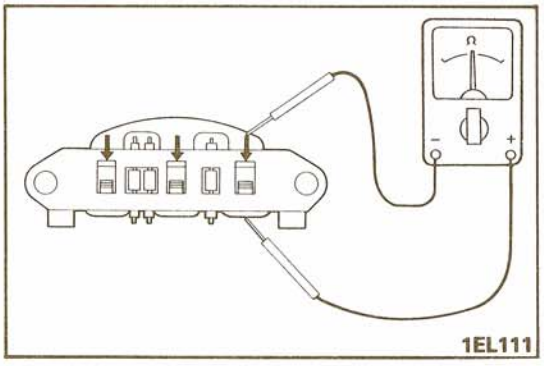


- Check coil for grounding. Check to ensure that there is no continuity between coil and core. If there is continuity, replace stator assembly.

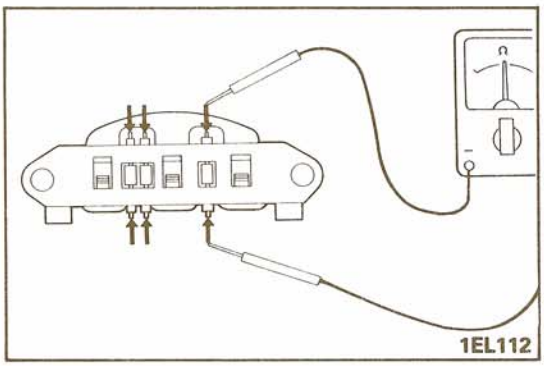


RECTIFIERS

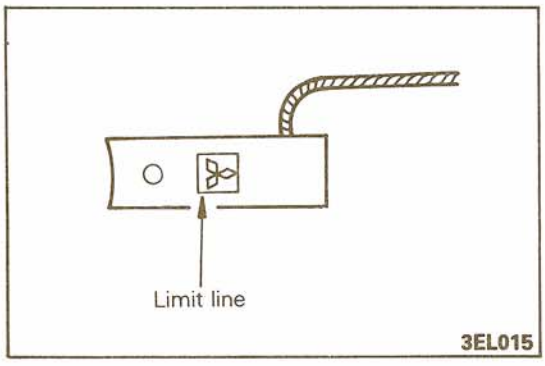
- **Positive rectifier test**
  Check for continuity between positive rectifier and stator coil lead connection terminal with a circuit tester. If there is continuity in both directions, diode is shorted.
  Replace rectifier assembly.



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

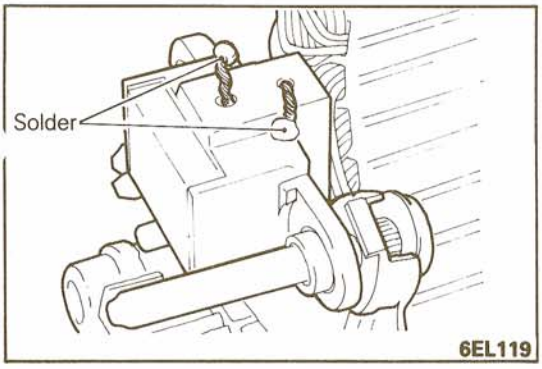


- **Diode trio test**
  Check three diodes for continuity by connecting a circuit tester to both ends of each diode. If there is no continuity or no continuity in both directions, diode is defective and heatsink assembly must be replaced.

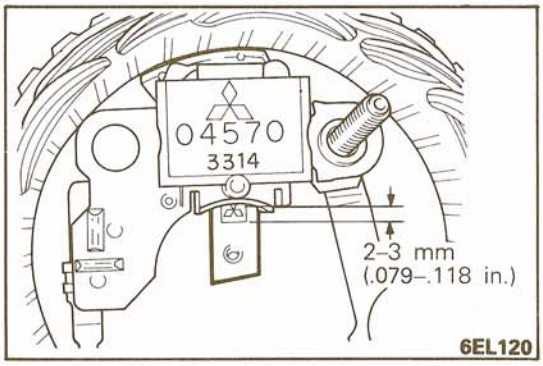


REPLACEMENT OF BRUSH

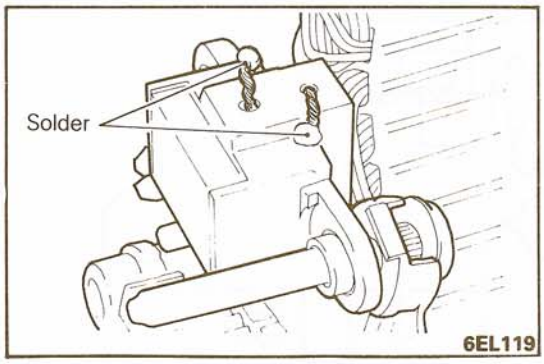
A brush worn away to the limit is replaced using the procedure below.



(1) Remove the pigtail solder and take out the old brush and spring.



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

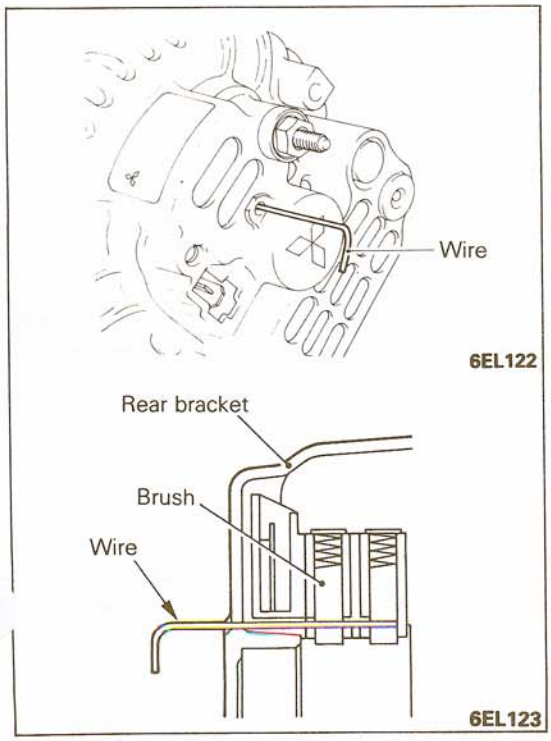


(4) While maintaining the position of the step, solder the pigtails to the end of the brush holder.

SERVICE POINTS OF REASSEMBLY

3. REASSEMBLY OF ROTOR ASSEMBLY

Perform reassembly in reverse procedure of disassembly, 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

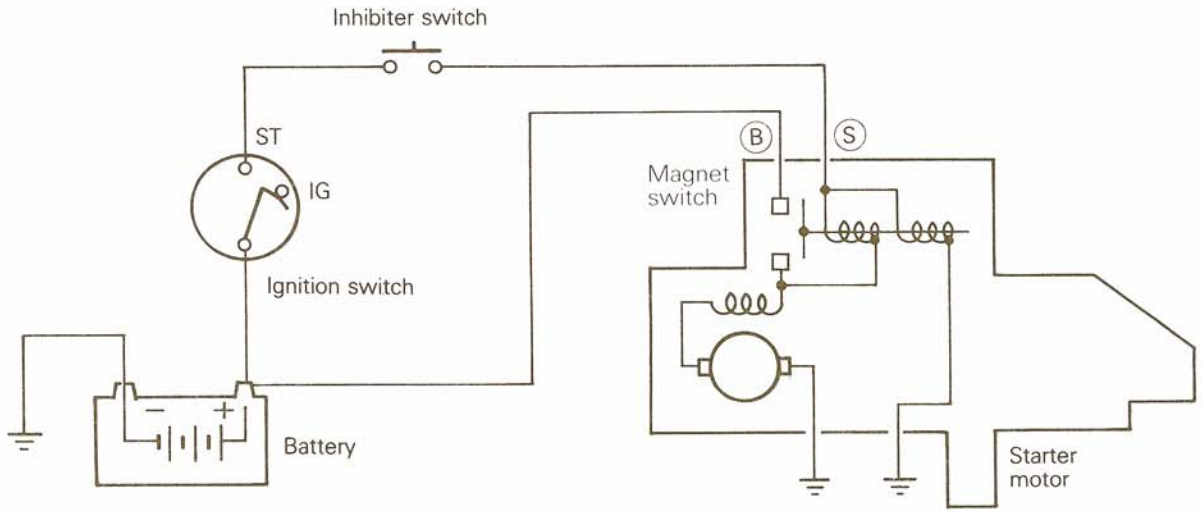
N08FAAO

GENERAL INFORMATION

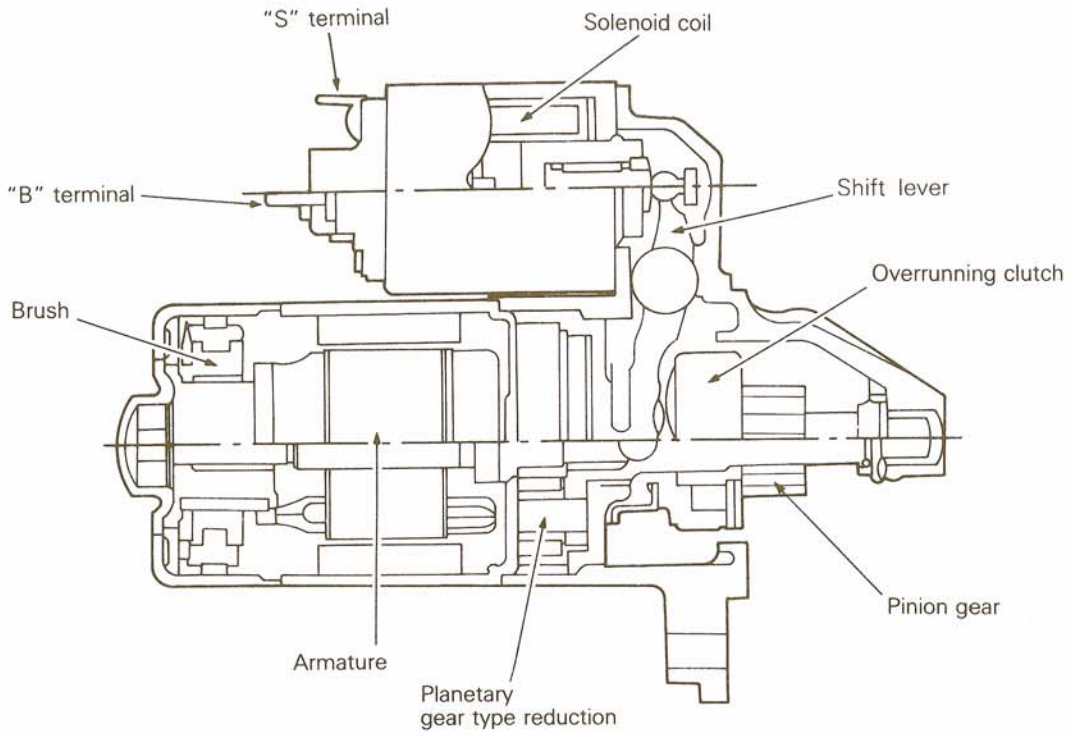
Starting system circuit includes a battery, starter motor, magnet switch, ignition switch, inhibitor switch (vehicle with automatic transaxle only), connection wires and battery cable.

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 amature 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


"S" terminal
Solenoid coil
"B" terminal
Shift lever
Overrunning clutch
Brush
Pinion gear
Armature
Planetary
gear type reduction

6EN241

SPECIFICATIONS

GENERAL SPECIFICATIONS

N08FB--

Items	Specifications
Starter motor	
Type	Reduction drive
Model No.	MIT70481
Part No.	MD099667
Rated output kW/V	1.2/12
No. of pinion teeth	8

SERVICE SPECIFICATIONS

N08FC--

Items	Specifications
Standard values	
Starter motor	
Free running characteristics	
Terminal voltage V	11
Current A	Max. 90
Speed r.p.m	Min. 3000
Under-cut depth mm (in.)	0.5 (.020)
Commutator diameter mm (in.)	29.4 (1.157)
Pinion gap mm (in.)	0.5–2.0 (.020–.079)
Commutator runout mm (in.)	0.05 (.0020)
Limit	
Commutator diameter mm (in.)	28.8 (1.134)
Commutator runout mm (in.)	0.1 (.004)

TORQUE SPECIFICATIONS

N08FD--

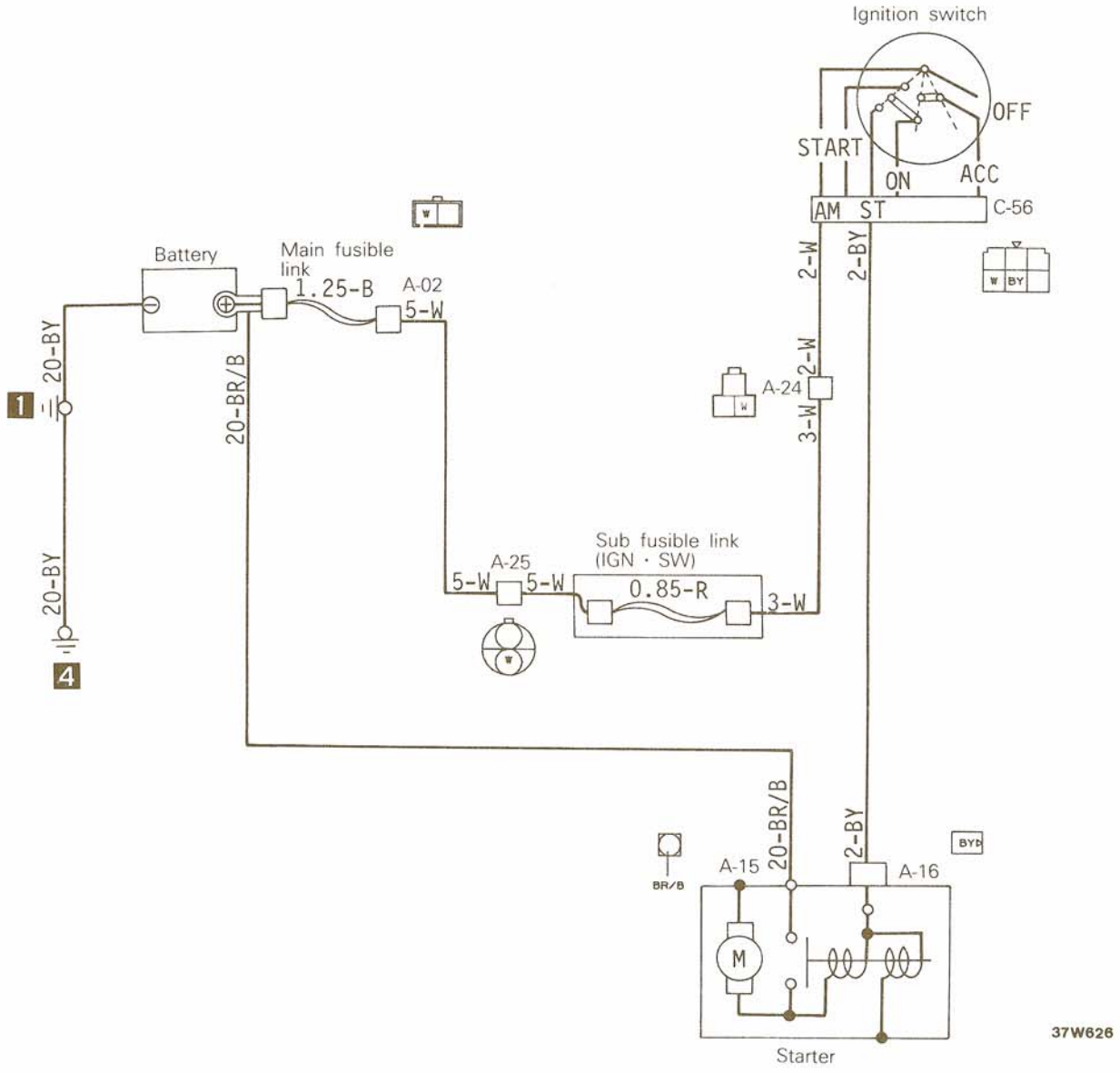
Items	Nm	ft.lbs.
Starter motor mounting bolts	27–34	20–24

TROUBLESHOOTING

N08FHAC

Symptom	Probable cause	Remedy
Engine will not crank	Battery charge low	Check battery specific gravity Charge or replace battery
	Battery cables loose, corroded or worn	Repair or replace cables
	Inhibitor Switch faulty (Vehicle with automatic transmission only)	Adjust or replace switch
	Fusible link blown	Replace fusible link
	Starter motor faulty	Repair starter motor
	Ignition switch faulty	Replace ignition switch
Engine cranks slowly	Battery charge low	Check battery specific gravity Charge or replace battery
	Battery cables loose, corroded or worn	Repair or replace cables
	Starter motor faulty	Repair starter motor
Starter keeps running	Starter motor faulty	Repair starter motor
	Ignition switch faulty	Replace ignition switch
	Short in wiring	Repair wiring
Starter spins but engine will not crank	Pinion gear teeth broken or starter motor faulty	Repair starter motor
	Ring gear teeth broken	Replace flywheel ring gear or torque converter

CIRCUIT DIAGRAM
Vehicles with a manual Transmission



Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

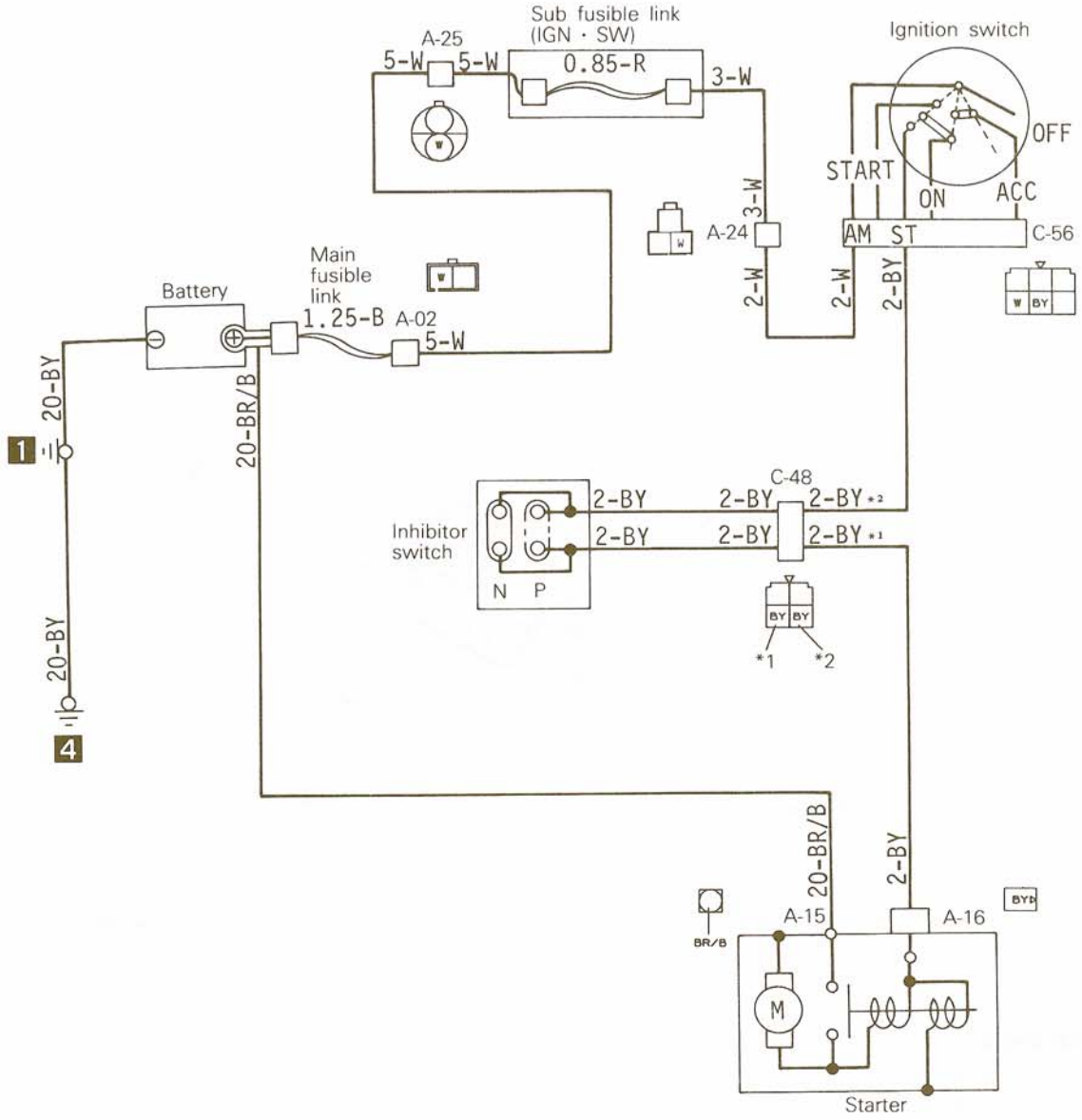
OPERATION

- 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 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
   1) 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.

Vehicles with an Automatic Transmission



Remark
For information concerning the ground points (example: 1), refer to P.8-7.

37W613

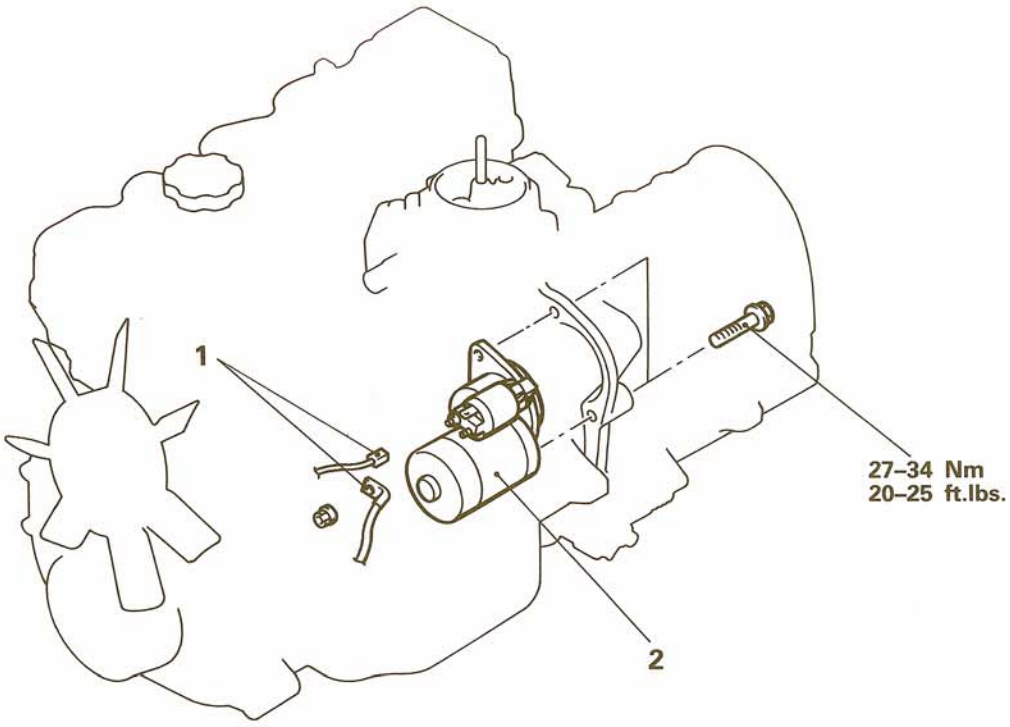
Wiring color code

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

STARTER MOTOR

REMOVAL AND INSTALLATION

N08FJAJ



16W1596

Removal steps

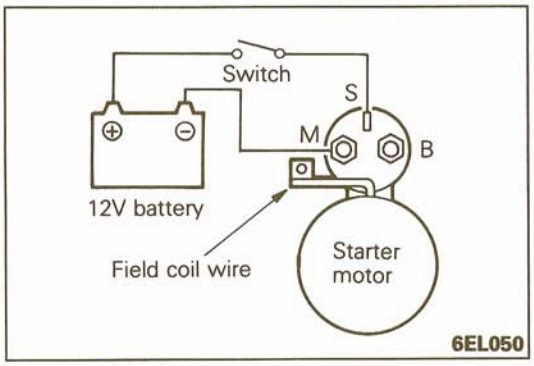
1. Connection of starter motor connector
◆◆ 2. Starter motor

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

SERVICE POINTS OF REMOVAL

2. REMOVAL OF STARTER MOTOR

(1) Models with manual transmission
Jack up the vehicle; then remove (from below the body) the starter motor mounting bolts, and separate the starter motor from the transmission assembly.
(2) Models with automatic transmission
① Remove (from the engine compartment) the starter motor lower mounting bolt.
② Jack up the vehicle; then remove (from below the body) the starter motor upper mounting bolt, and separate the starter motor from the transmission assembly.

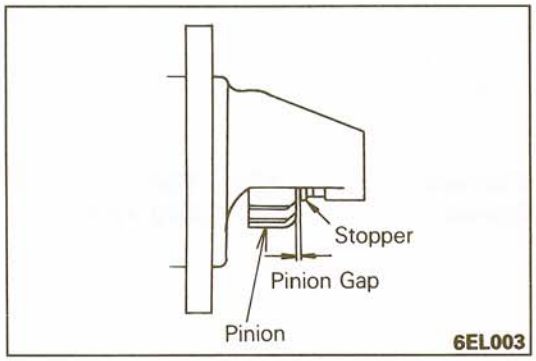


INSPECTION

PINION GAP ADJUSTMENT

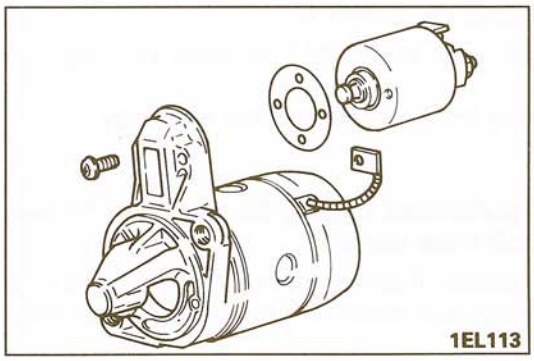
1. Disconnect field coil wire from "M" -terminal of magnetic switch.
2. Connect a 12V battery between "S" -terminal and "M" -terminal.
3. Set switch to "ON", and pinion will move out.

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



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

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

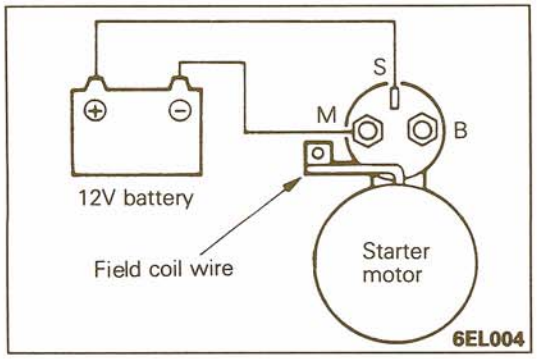


5. If pinion gap is out of specification, adjust by adding or removing gaskets between magnetic switch and front bracket.

PULL-IN TEST OF MAGNETIC SWITCH

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

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

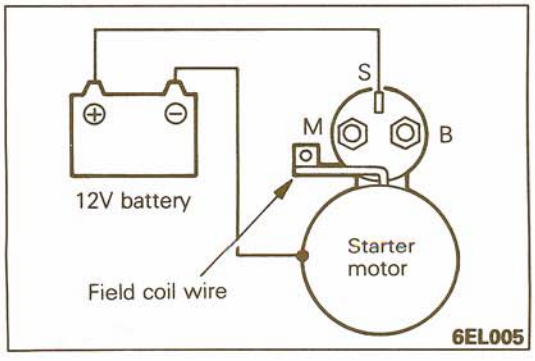


3. If pinion moves out, then pull-in coil is good. If it doesn't, replace magnetic switch.

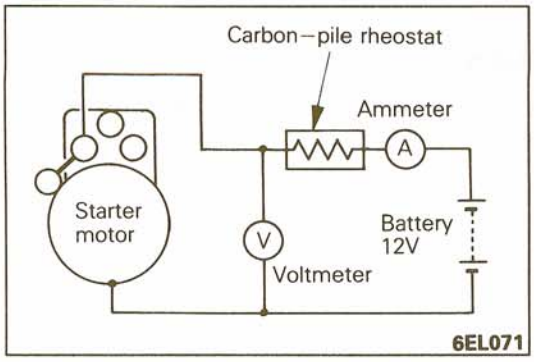
HOLD-IN TEST OF MAGNETIC SWITCH

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

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



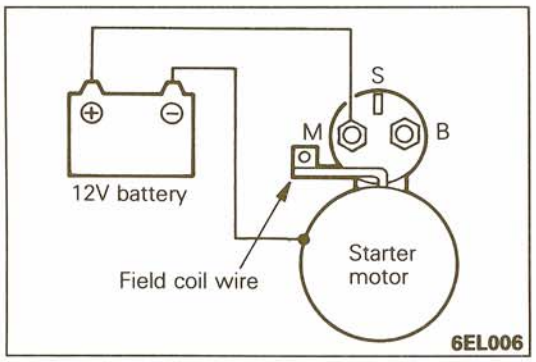
3. If pinion remains out, everything is in order. If pinion moves in, hold-in circuit is open. Replace magnetic switch.



FREE RUNNING TEST

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

Standard value : Current Max. 90A
Speed Min. 3,000 rpm



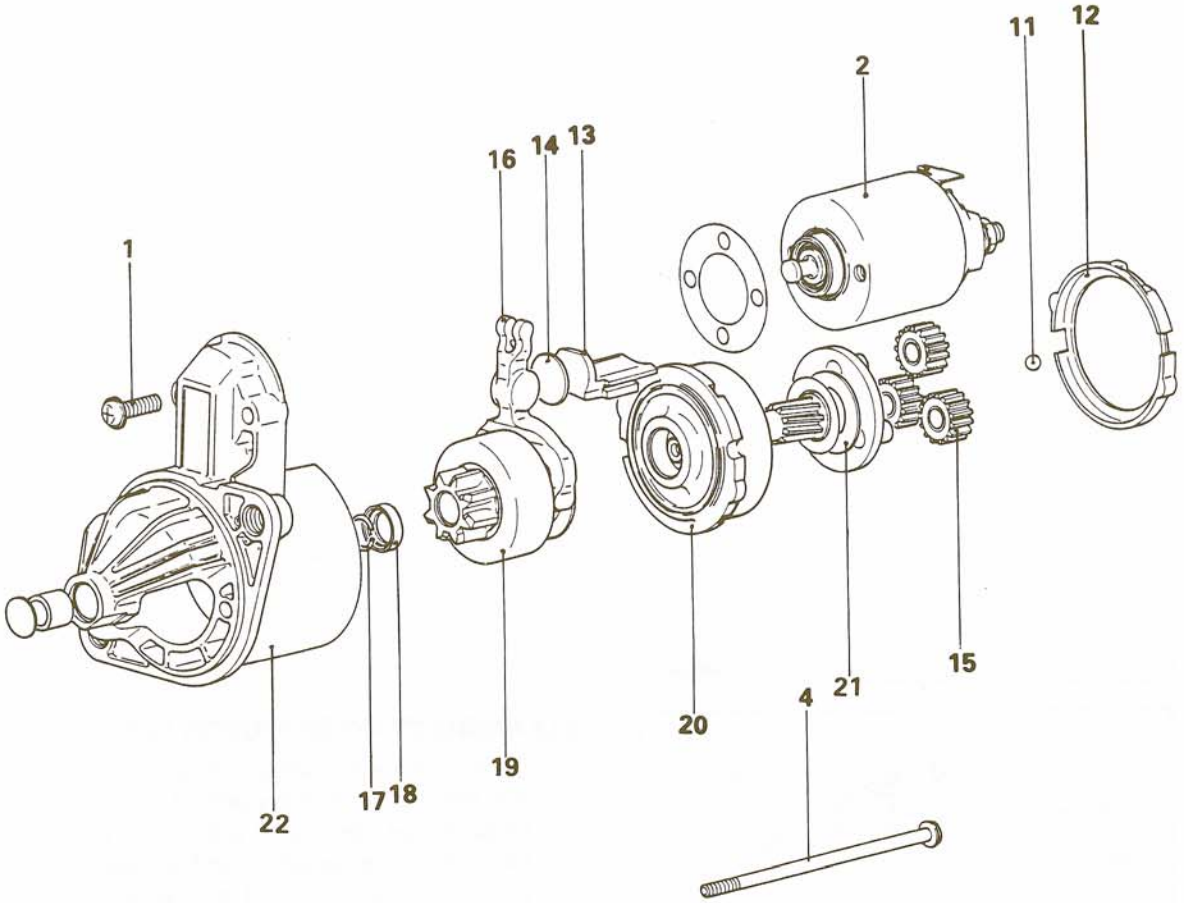
RETURN TEST OF MAGNETIC SWITCH

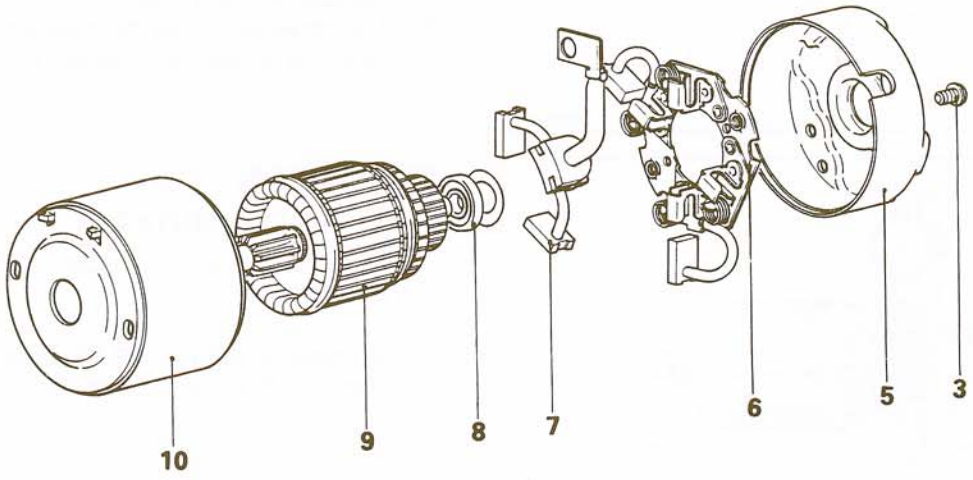
1. Disconnect field coil wire from "M" terminal of magnetic switch.
2. Connect a 12V battery between M-terminal and body.

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

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

DISASSEMBLY AND REASSEMBLY





6EL199

Disassembly steps

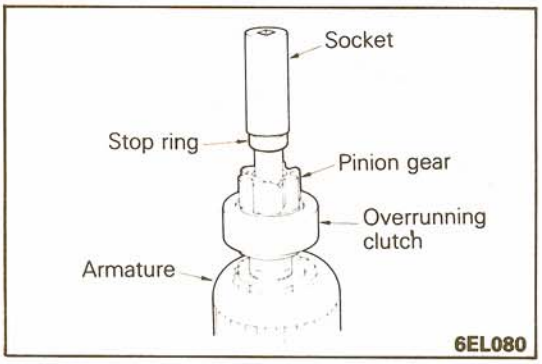
1. Screw
2. Magnetic switch
3. Screw
4. Screw
5. Rear bracket
6. Brush holder
7. Brush
8. Rear bearing
9. ◆■ Armature
10. Yoke assembly
11. ◆■ Ball
12. Packing A
13. Packing B
14. Plate
15. Planetary gear
16. Lever
17. ◆■ ■◆ Snap ring
18. ◆■ ■◆ Stop ring
19. Over running clutch
20. Internal gear
21.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

9. CAUTION OF ARMATURE/11. BALL

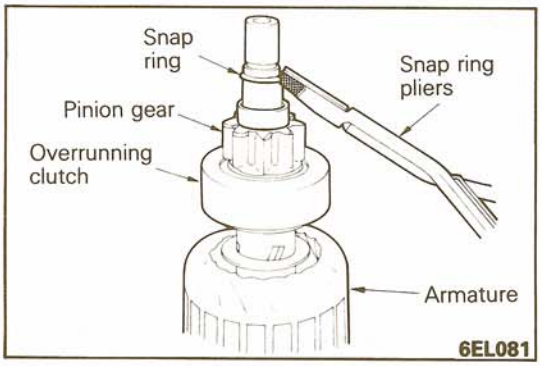
When removing the armature, do not lose the ball which acts as a bearing for the armature and tip.



17. DISASSEMBLY OF SNAP RING/18. STOP RING

(1) Push the stop ring towards the snap ring using the proper socket.

(2) After removal of the snap ring with the snap ring pliers, remove the stop ring and the over-running clutch.



CLEANING STARTER MOTOR PARTS

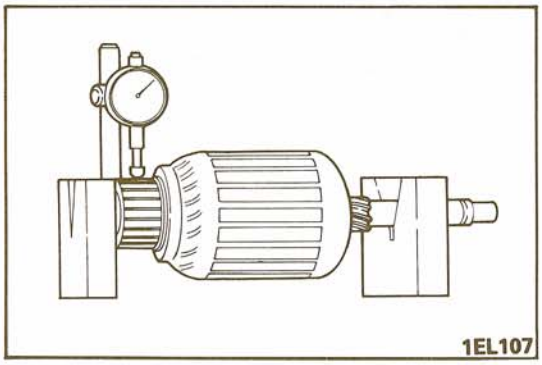
1. Do not immerse parts in cleaning solvent. Immersing the yoke and field coil assembly and/or armature will damage insulation. Wipe these parts with a cloth only.
2. Do not immerse drive unit in cleaning solvent. Overrunning clutch is pre-lubricated at the factory and solvent will wash lubrication from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

INSPECTION

CHECKING COMMUTATOR

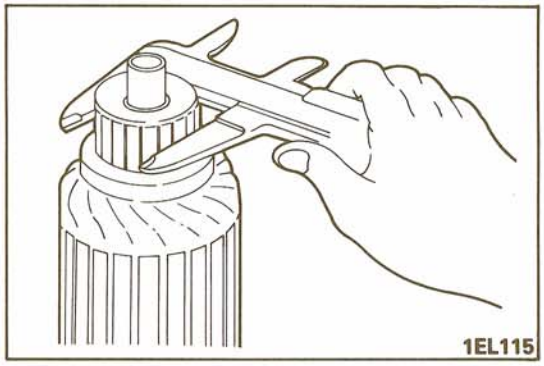
(1) Place the armature on a pair of V blocks and check run-out with a dial gauge.

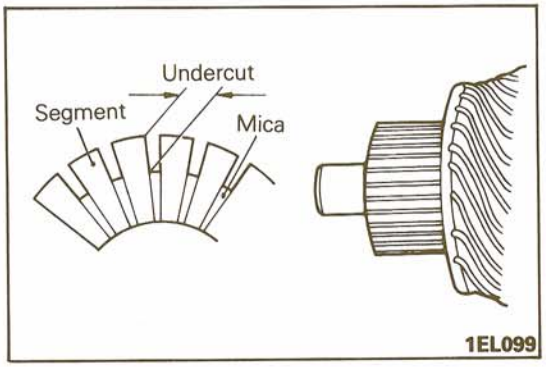
Standard value : 0.05 mm (.0020 in.)
Limit : 0.1 mm (.004 in.)



(2) Check the outer diameter.

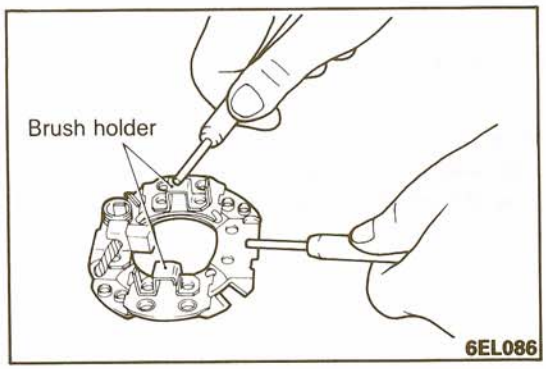
Standard value : 29.4 mm (1.157 in.)
Limit : 28.8 mm (1.134 in.)





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

Standard value : 0.5 mm (.020 in.)



BRUSH HOLDER

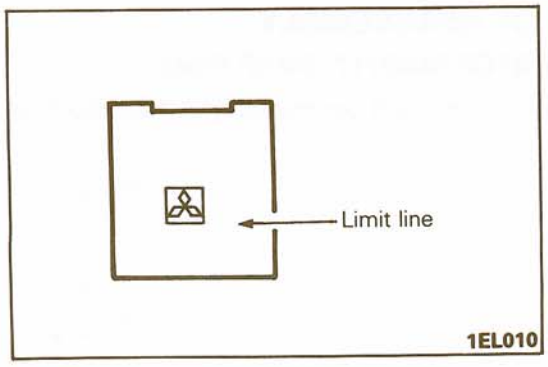
Check conductivity between the brush holder plate and brush holder. If there is no conductivity this is normal.

OVERRUNNING CLUTCH

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

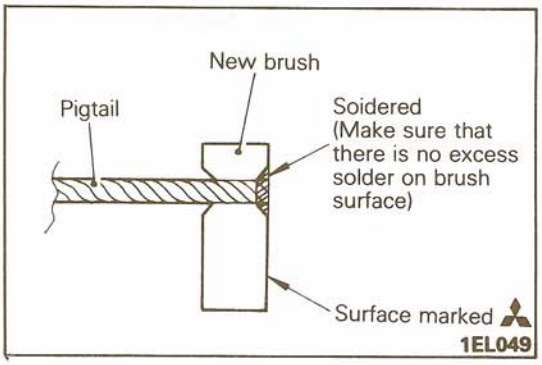
FRONT AND REAR BRACKET BUSHING

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

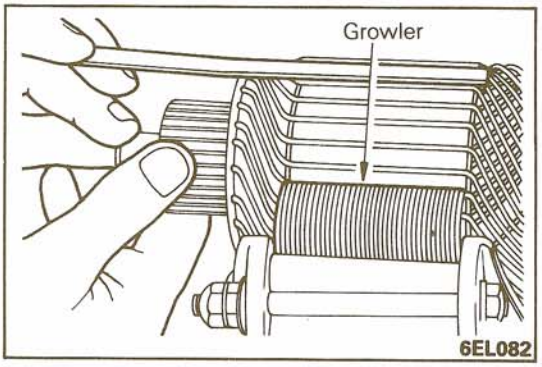


REPLACEMENT OF BRUSHES AND SPRINGS

1. Brushes that are worn beyond 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.



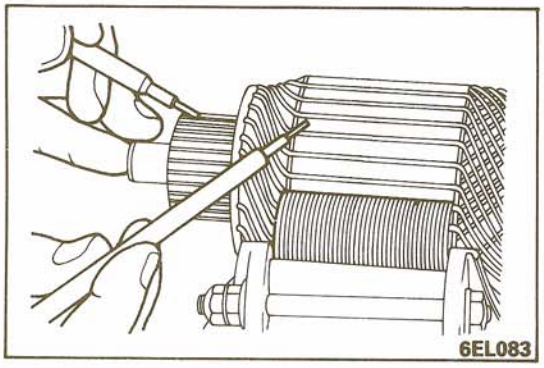
3. Sand pigtail end with sandpaper to ensure good soldering.
4. Insert pigtail into hole provided in new brush and solder it. Make sure that pigtail and excess solder do not come out onto brush surface.
5. When replacing ground brush, slide the brush from brush holder by prying retaining spring back.



TESTING ARMATURE

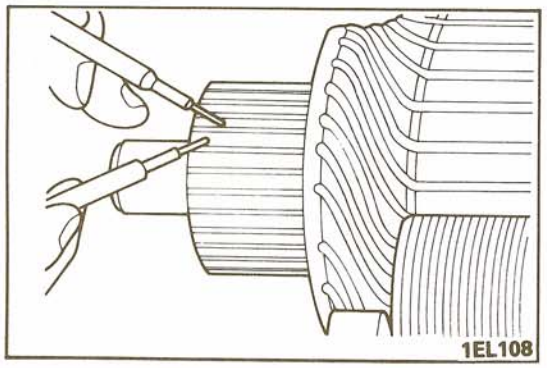
TESTING ARMATURE FOR SHORT-CIRCUIT

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



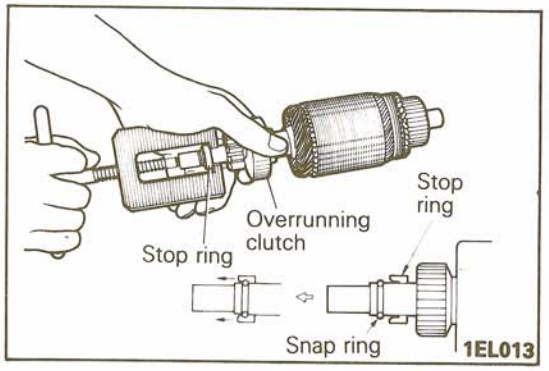
TESTING ARMATURE FOR GROUNDING

Check the insulation in the space between the segments of the commutator and the armature and coil core. If there is no conductivity this is normal.



CHECKING CIRCUIT BREAK BETWEEN ARMATURE AND COIL

Check conductivity between each segment. If there is conductivity this is normal.



SERVICE POINTS OF REASSEMBLY

18. REASSEMBLY OF STOP RING/17. SNAP RING

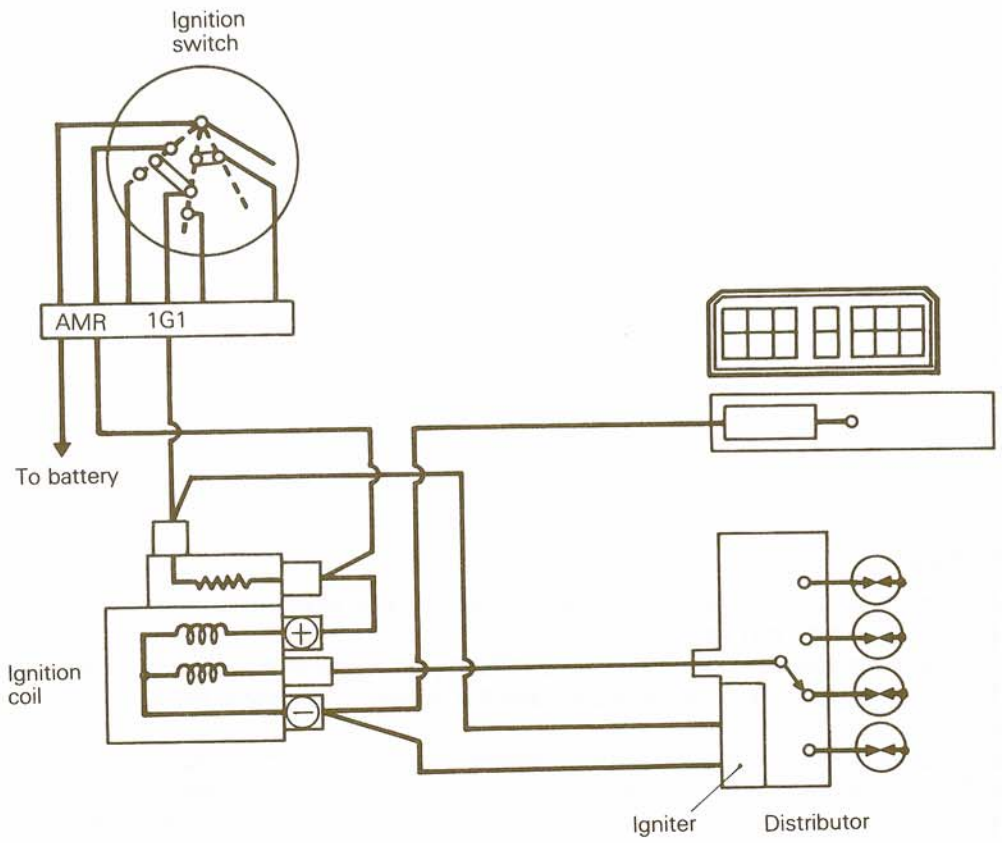
Using a suitable pulling tool, pull overrunning clutch stop ring over snap ring.

IGNITION SYSTEM

GENERAL INFORMATION

N08GAAB

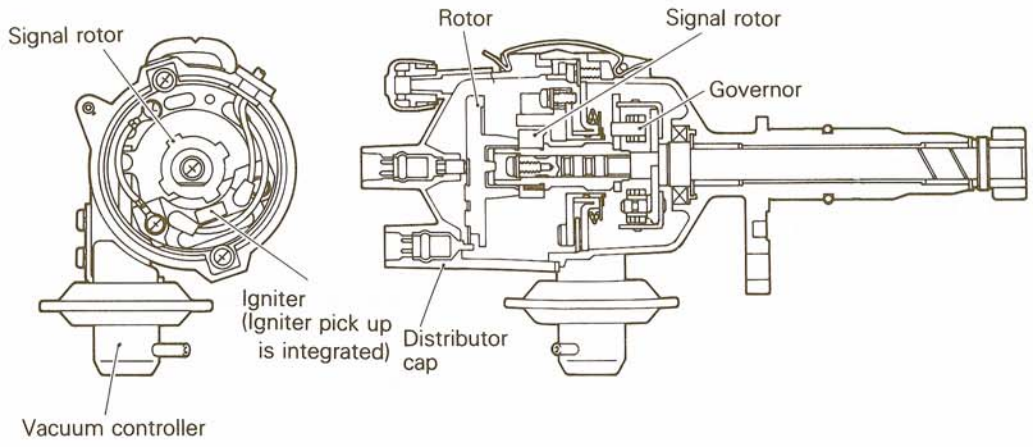
The ignition system consists of battery, distributor, (igniter-integrated) ignition coil, spark plug, high tension cable, ignition switch and connecting wire.



1EL117

The distributor is composed of signal generator (signal rotor and igniter internalized pickup), linear current control unit (igniter) advance control unit (governor and vacuum controller) and distribution unit (rotor plus distributor cap).

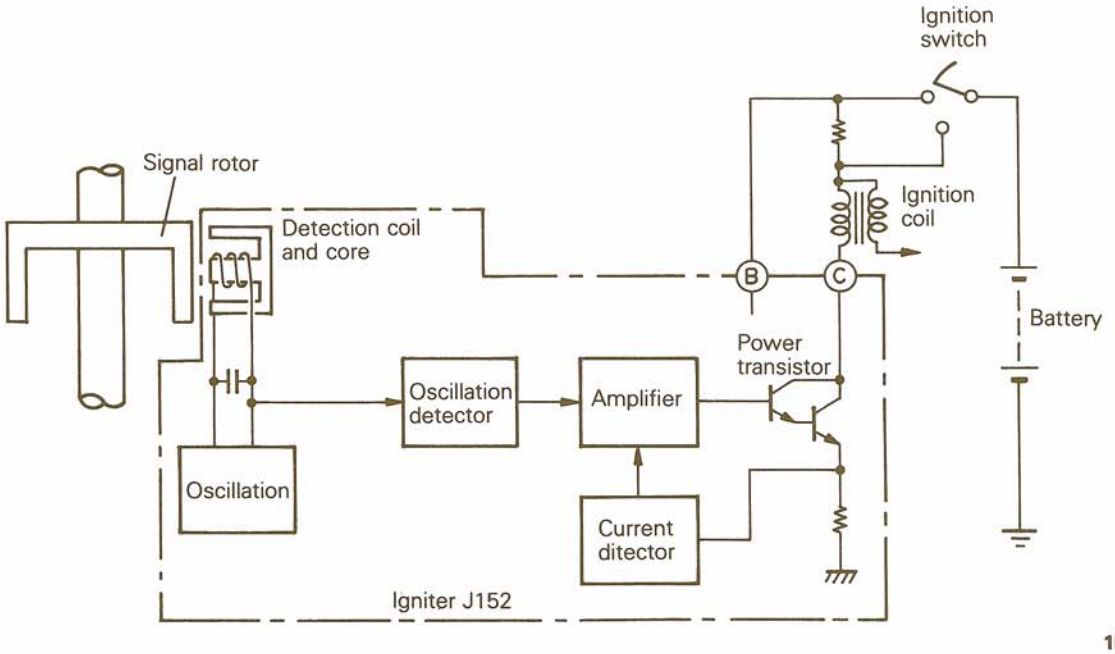
DISTRIBUTOR



1EL153

IGNITER OPERATION

(1) When the signal rotor revolves a projection inside the signal rotor alternately moves away from and faces towards the core detector inside the igniter.
(2) When the projection is separated from the core, an oscillating electrical circuit begins to oscillate, and when it faces, magnetic flux issuing from the core moves across the inside of the signal rotor, so when loss increases, oscillation ceases.
(3) This oscillation introduces power to the oscillation detector circuit, and after output is amplified it drives the power transistor. During oscillation (when the projection and core are apart) electricity flowing through the ignition coil and when oscillation stops (when the projection and core are facing) the electric current is interrupted.
(4) The electrical detection circuit, in preventing excessive electrical flow to the power transistor, protects the transistor.



1EL154

SPECIFICATIONS

GENERAL SPECIFICATIONS

DISTRIBUTOR

N08GB-A

Items	Federal, Canada	California
Type	Contact pointless type	Contact pointless type
Model No.	T3T65474	T3T65571
Part No.	MD111112	MD110264
Igniter	Built-in type	Built-in type
Firing order	1-3-4-2	1-3-4-2

IGNITION COIL

Items	Specifications
Type	Oil filled
Model No.	E-089
Part No.	MD073079

SPARK PLUG

Items	Model No.	Manifacturer
Factory installed plug	W20EPR-11 W20EPR-S11	NIPPON DENSO
	BUR6EA-11	NGK
Alternate plug	BP6ES-11 BPR6ES-11	
	RN9YC4 N9YC4	CHAMPION
	W20EPR-U10 W20EP-U10	NIPPON DENSO

SERVICE SPECIFICATIONS

N08GC-A

Items	Specifications
Basic ignition timing at curb idle speed	7°BTDC
Distributor	
Federal, Canada	
Governor (crank deg/rpm)	
Initial	0/1600
Middle	9/2800
Final	19/6000
Vacuum (crank deg/mmHg)	
Initial	0/80
Middle	8/150
Final	20/360
California	
Governor (crank deg/rpm)	
Initial	0/1600
Middle	9/2800
Final	19/6000
Vacuum (crank deg/mmHg)	
Initial	0/80
Middle	8/150
Final	20/360
Idle advance (crank deg/mmHg)	
Initial	0/60
Final	5/80
Ignition coil	
Primary resistance at 20°C (68°F) Ω	1.1–1.3
Secondary resistance at 20°C (68°F) kΩ	14.5–19.5
External resistor resistance at 20°C (68°F) Ω	1.22–1.48
Spark plug gap mm (in.)	
NGK, CHAMPION	1.0–1.1 (.039–.043)
NIPPON DENSO	
W20EP-U10, W20EPR-U10	0.9–1.0 (.035–.039)
Other type	1.0–1.1 (.039–.043)

TORQUE SPECIFICATIONS

N08GD--

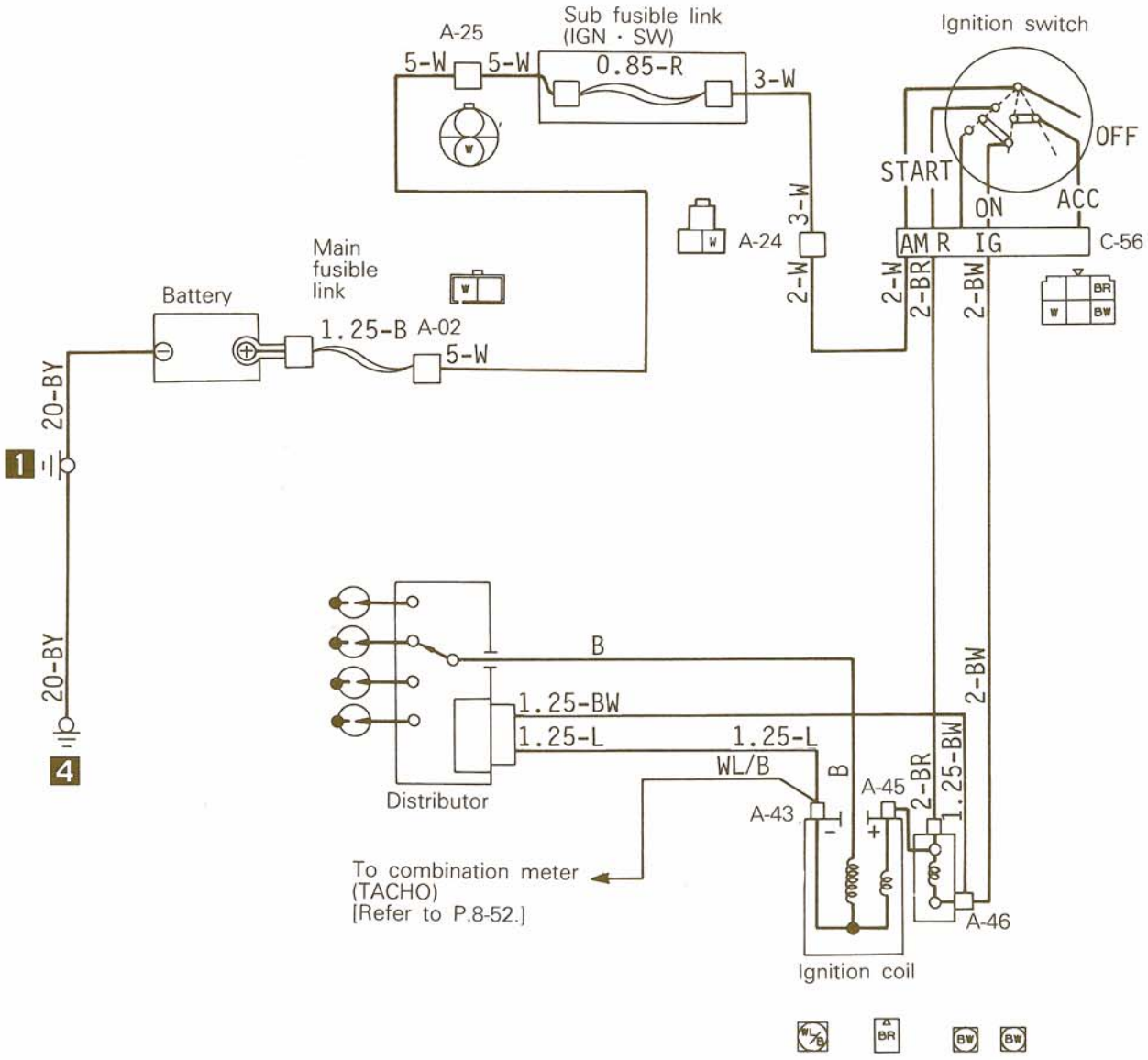
Items	Nm	ft.lbs.
Spark plug	20–30	15–21

TROUBLESHOOTING

N08GHAC

Symptom	Probable cause	Remedy
Engine will not start or hard to start (cranks OK)	Incorrect ignition timing	Adjust ignition timing
	Ignition coil faulty	Inspect ignition coil
	Ignition faulty	Inspect igniter
	Distributor faulty	Inspect distributor
	High tension cord faulty	Inspect high tension cord
	Spark plugs faulty	Replace plugs
	Ignition wiring disconnected or broken	Inspect wiring
Rough idle or stalls	Spark plugs faulty	Replace plugs
	Ignition wiring faulty	Inspect wiring
	Incorrect ignition timing	Adjust ignition timing
	Ignition coil faulty	Inspect ignition coil
	Ignition faulty	Inspect igniter
	High tension cord faulty	Inspect high tension cord
Engine hesitates/poor acceleration	Spark plugs faulty	Replace plugs
	Ignition wiring faulty	Inspect wiring
	Incorrect ignition timing	Adjust timing
Poor gasoline mileage	Spark plugs faulty	Replace plugs
	Incorrect ignition timing	Adjust ignition timing
Engine overheats	Incorrect ignition timing	Adjust ignition timing

CIRCUIT DIAGRAM



Remark
For information concerning the ground points (example: 1),
refer to P.8-7.

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

OPERATION

- 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 ingiter 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
   (1) 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

CHECKING IGNITION TIMING

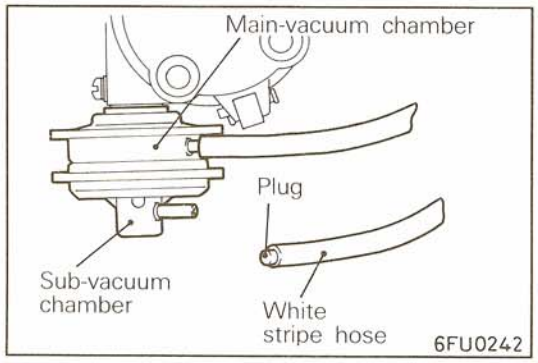
N08GIBB

IGNITION TIMING ADJUSTMENT

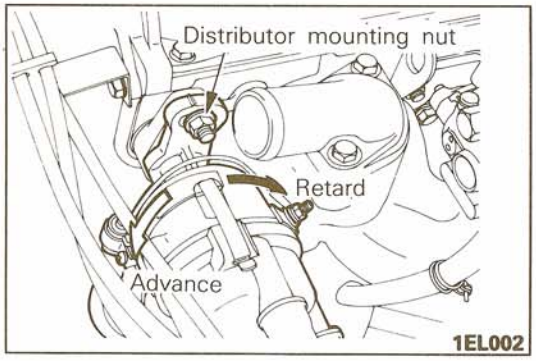
Adjustment conditions:
- Coolant temperature: 85–95° (185–205°F)
- Lamps and all accessories: Off
- Transmission: N (Neutral)
- Set Parking Brake

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

	Curb idle speed rpm
First 500 km (300 mile)	725^{+150}_{-100}
After 500 km (300 mile)	800 ± 100



3. When checking the basic ignition timing at high altitude [at a height of 1,200 m (3,900 ft.) or more] disconnect the vacuum hose (white stripe) from the sub-vacuum chamber of the distributor and plug the hose end.
   Federal/california and high-altitude vehicles for federal.

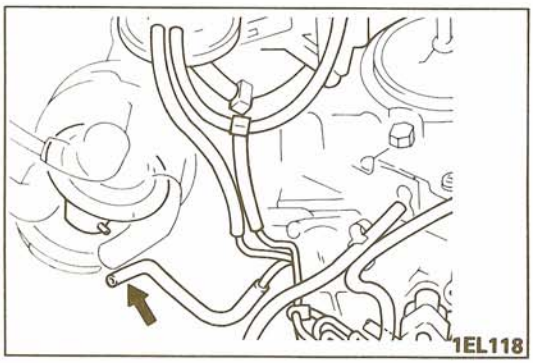


4. Check basic ignition timing and adjust if necessary.

   Basic ignition timing: 7° ± 2°BTDC

5. To adjust ignition timing, loosen distributor mounting nut and turn distributor housing.
6. After adjustment, securely tighten mounting nut.
7. If the check is made at high altiutde, after connecting the vacuum hose (disconnected at step 3) to its original position, check to be sure that the ignition timing is advanced to the actual ignition timing.

   Actual ignition timing: 12°BTDC



CHECKING IGNITION SYSTEM

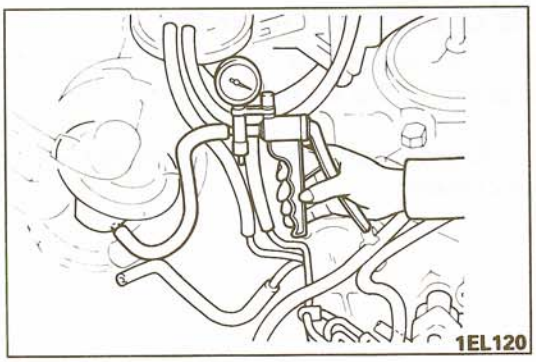
N08DIDB

CHECKING CENTRIFUGAL ADVANCE EQUIPMENT

1. Set the tachometer and timing light.
2. Start the engine and allow it to idle.
3. Pull out vacuum hose from vacuum controller.
4. Check the advance while slowly raising RPM. If the advance is smooth when accompanying the increasing RPM, this is normal.

Symptom	Assumed causes
Excessive advance	Weakness of the governor spring
Sudden advance rise	Broken spring
Insufficient advance or large hysteresis	Impaired movement of the governor weight or cam.

5. If the malfunction indicators above are confirmed, dismantle and check the distributor.
6. After checking, let the engine idle and then turn the ignition switch to OFF.
7. Remove the tachometer and timing light.

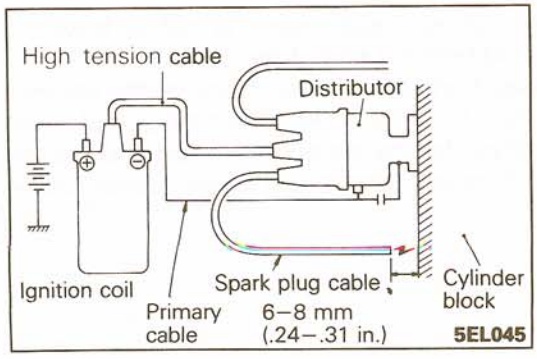

1EL120

CHECKING NEGATIVE PRESSURE ADVANCE EQUIPMENT

1. Set the timing light.
2. Start the engine and allow it to idle.
3. Pull out the vacuum hose from vacuum controller and attach vacuum pump to nipple.
4. Check the advance while slowly applying negative pressure to the vacuum pump. If the advance is smooth when accompanying the increase in negative pressure, this is normal.

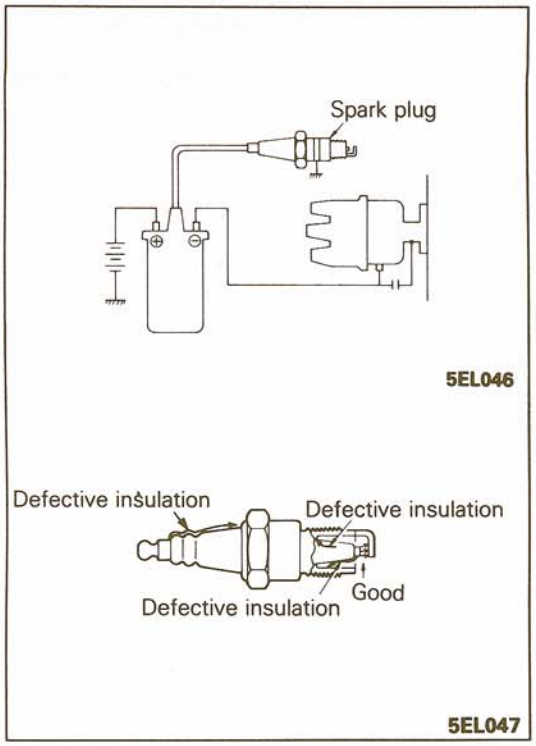
Symptom	Assumed causes
Excessive advances	Weakness of vacuum controller spring
Sudden advance rise	Broken spring
Insufficient advance or large hysteresis	Impaired movement of breaker base
No advance	Broken diaphragm

5. If the malfunction indicators above are confirmed, dismantle and check the distributor.
6. Allow the engine to idle and then turn the ignition switch to OFF.
7. Remove the vacuum pump and attach the vacuum hose to the vacuum controller nipple.
8. Remove the timing light.



SPARK PLUG CABLE TEST N08GIGB

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.



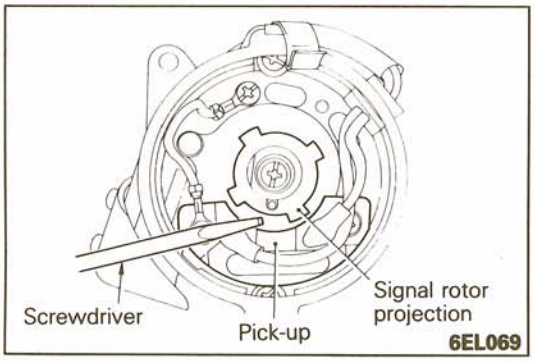
SPARK PLUG TEST

N08GIHB

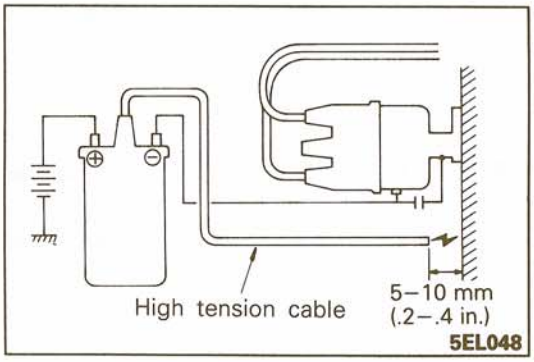
Connect the spark plug to the high tension cable, ground outer electrode (main body), and crank engine. In the atmosphere, only short sparks are produced because of small discharge gap. If the spark plug is good, however, sparks will occur in discharge gap (between electrodes). In a defective spark plug, 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.



1. Remove the distributor cap.
2. Check signal rotor position in relation to the pick-up. If it is not the position shown in the illustration, turn the crankshaft manually so that the projection of the signal rotor is moved away from the center part of the pick-up. In order words, the signal rotor should be positioned so that current can flow to the ignition coil.

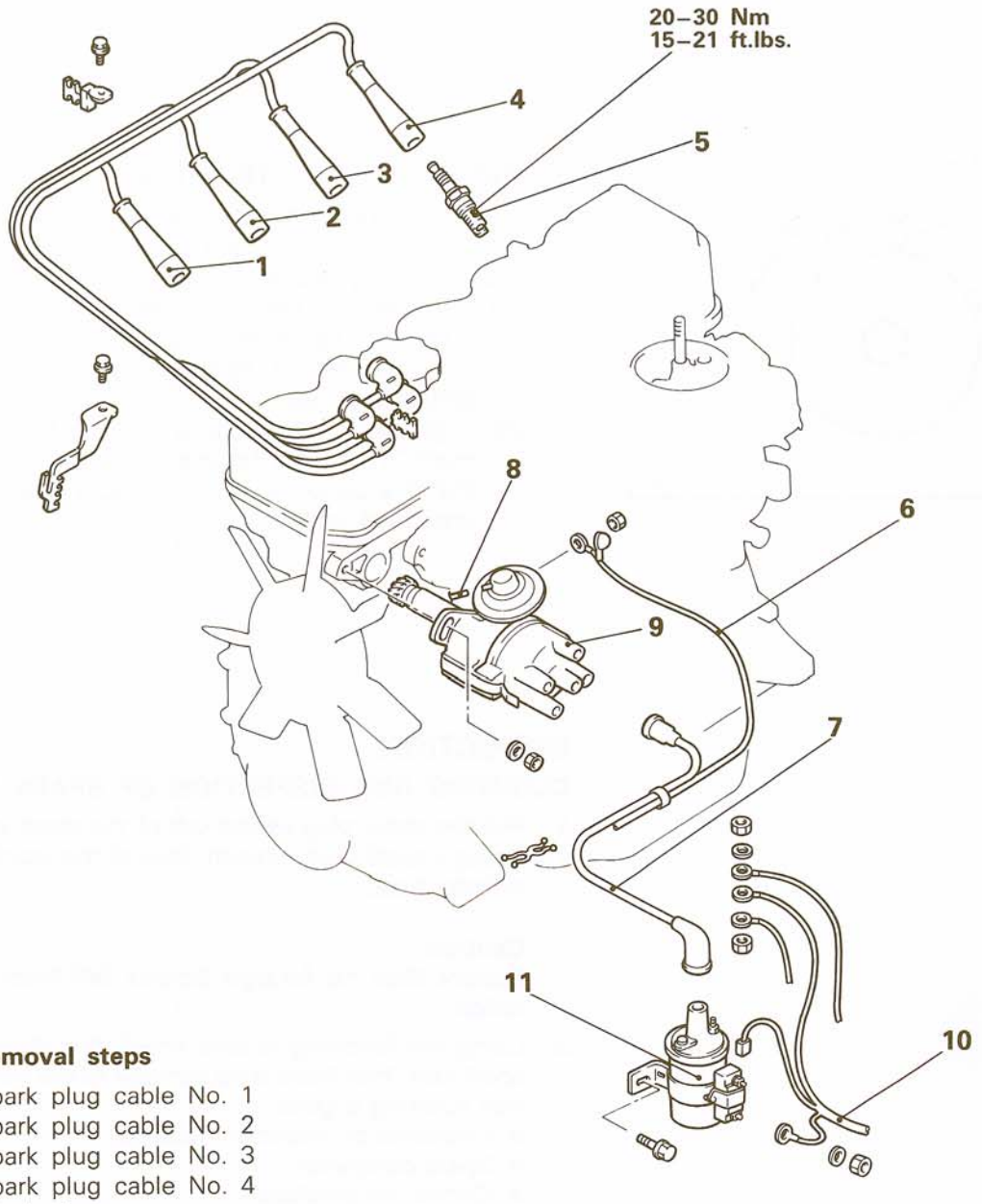


3. Disconnect the high tension cable from the center tower of the distributor cap, and hold the end of the cable about 5 – 10 mm (.2 – .4 in.) away from the cylinder block of the engine.
4. Turn the ignition switch to "ON". Then, when a piece of metal (the tip of a screwdriver for instance) is inserted into the detection coil of the pick-up and then moved away, a spak can be generated.

IGNITION SYSTEM

REMOVAL AND INSTALLATION

N08GJAEa



16W1563

Spark plug removal steps

- ◀■▶ ▶■◀ 1. Spark plug cable No. 1
- ◀■▶ ▶■◀ 2. Spark plug cable No. 2
- ◀■▶ ▶■◀ 3. Spark plug cable No. 3
- ◀■▶ ▶■◀ 4. Spark plug cable No. 4
- 5. Spark plug

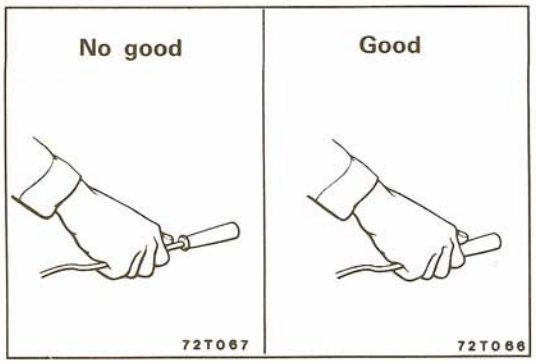
Distributor removal steps

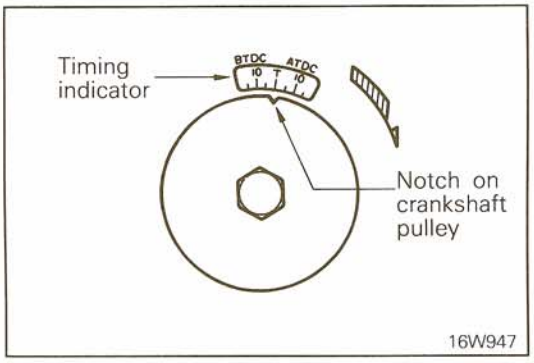
- ◀■▶ ▶■◀ 1–4. Spark plug cables
- 6. Connection of distributor connector
- ◀■▶ 7. High tension cable
- 8. Connection of vacuum hose
- ◀■▶ ▶■◀ 9. Distributor

Ignition coil removal steps

- ◀■▶ 7. High tension cable
- 10. Connection of ignition coil connector
- 11. Ignition coil

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◀■▶ : Refer to "Service Points of Removal".
(3) ▶■◀ : Refer to "Service Points of Installation".





SERVICE POINTS OF REMOVAL

1–4. CAUTION OF SPARK PLUG CABLES/7. HIGH TENSION CABLE

The cable is to be pulled out by grasping the cap part.

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 crankshaft 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.

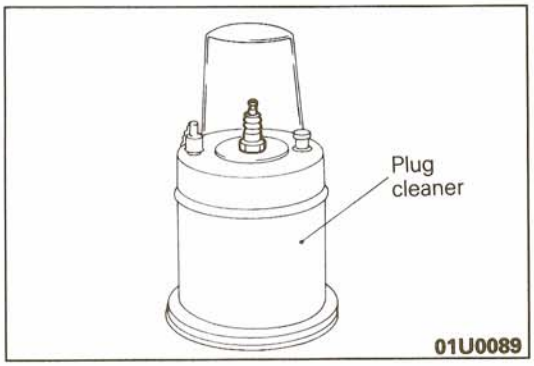
INSPECTION

CLEANING AND INSPECTION OF SPARK PLUGS

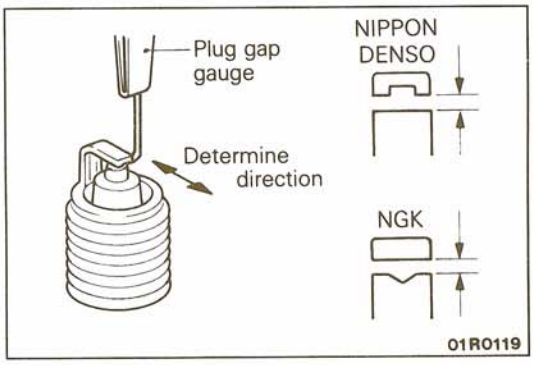
1. Pull the spark plug cables out of the spark plugs.
2. Using a spark plug wrench, take all the spark plugs out of the cylinder head.

Caution
Ensure that no foreign bodies fall from the spark plug holes.

3. Using the following criteria check that there is no electrode spark loss, that there is no damage to the outer insulation, and that sparking is good.
   - Existence of insulation damage
   - Spark dissipation
   - Carbon accumulation
     Using either plug cleaner or wire brush, clean both the upper part and the glass part.
   - Damage to or breakage of gaskets
   - Spark action in spark glass area
     In cases where there are black deposits due to carbon, this indicates excessive passage of mixed gases so that air intake becomes extremely deficient.
     Owing to the excessively large spark gap, spark loss and so on can be expected.
     In case of white scorching, this indicates an excessively thin gas mixture and prolongment of sparking time, which suggests poorly fitted plugs.



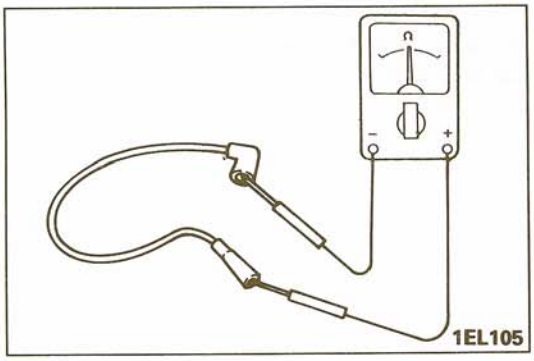
4. Clean with plug cleaner. Sand which has accumulated in the screw thread of the plugs is blown out by compressed air.



5. Using the plug gap gauge, check whether the plug gap reading is normal, and if not, adjust it.

Standard value :

NGK, CHAMPION	**1.0-1.1 mm (.039–.043 in.)**
NIPPON DENSO	
W20EP-U10, W20EPR-U-10	**0.9–1.0 mm (.035–.039 in.)**
Other type	**1.0–1.1 mm (.039–.043 in.)**

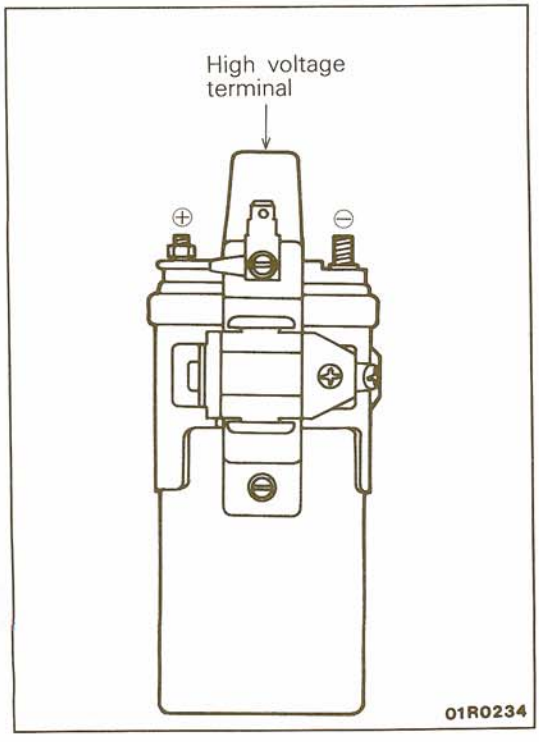


CHECKING SPARK PLUG CABLE

(1) Check that there are no cracks in the cap or in the insulating coating.
(2) Check the resistance value.

kΩ

High tension cable	Spark plug cable			
	No. 1	No. 2	No. 3	No. 4
7	9	11	13	14



CHECKING THE IGNITION COIL

(1) Measurement of the resistance of the external resistor
Measure the resistance of the external resistor.

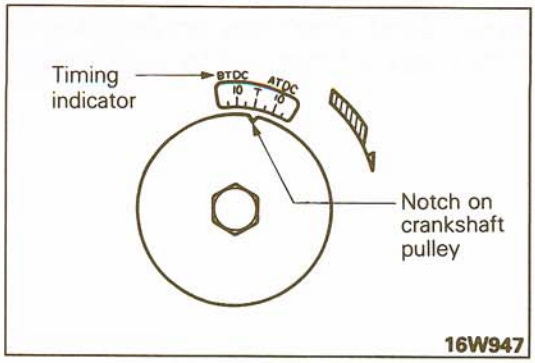
Standard value : 1.22–1.48 Ω

(2) Measurement of the resistance of the primary coil
Measure the resistance between the positive (+) terminal and the negative (–) terminal of the ignition coil.

Standard value : 1.1–1.3 Ω

(3) Measurement of the resistance of the secondary coil
Measure the resistance between the high voltage terminal and the positive (+) terminal of the ignition coil.

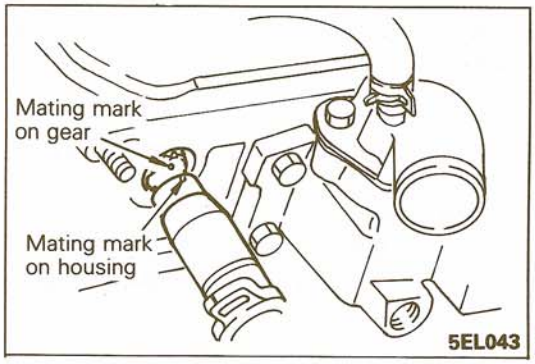
Standard value : 14.5–19.5 kΩ



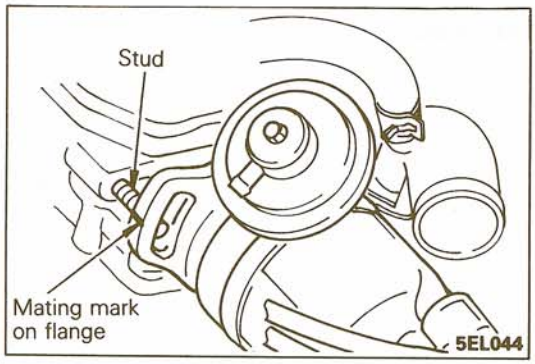
SERVICE POINTS OF INSTALLATION

9. INSTALLATION OF DISTRIBUTOR

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



(2) Align mating mark on distributor housing with mating mark on distributor driven gear.



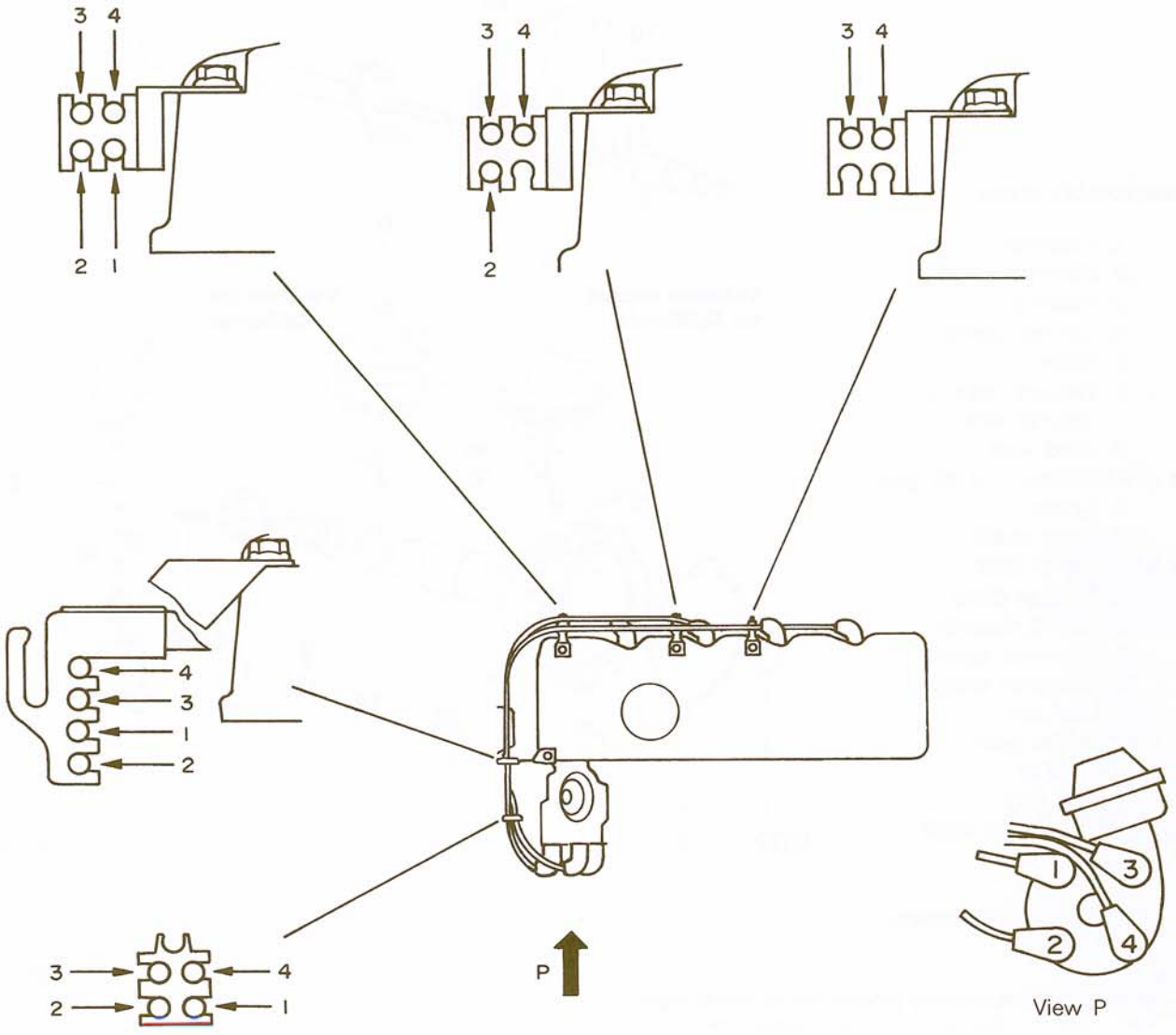
(3) Install distributor to cylinder head while aligning mating mark on distributor attaching flange with center of distributor installing stud and tighten nut.

1–4. 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

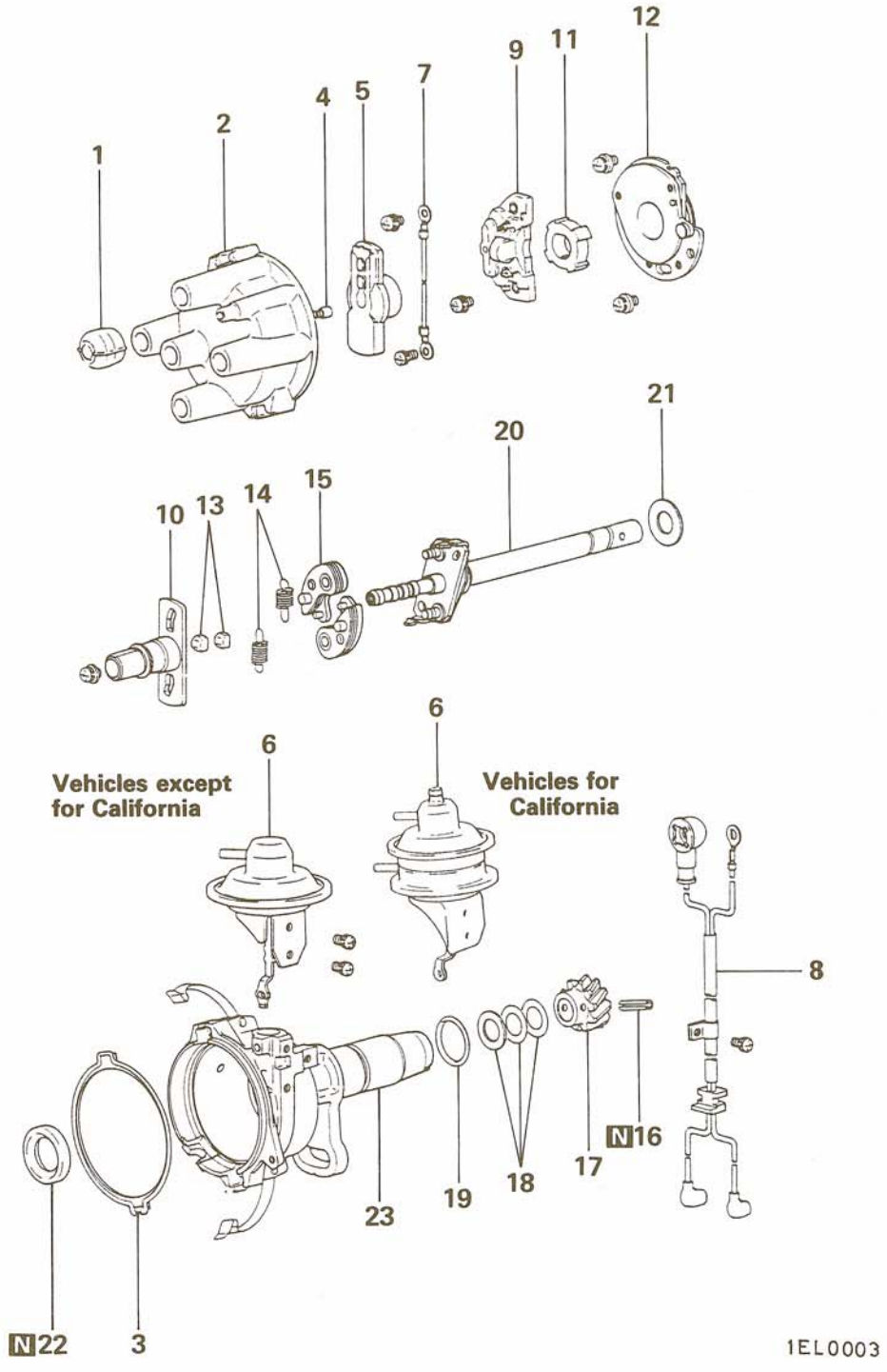


5EL04

DISTRIBUTOR

N08GKDB

DISASSEMBLY AND REASSEMBLY



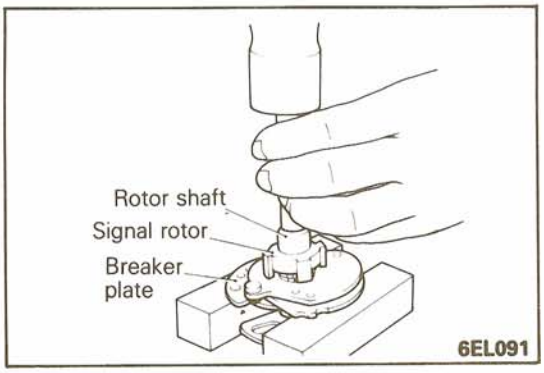
Disassembly steps

1. Breather
2. Distributor cap
3. Packing
4. Contact carbon
5. Rotor
6. Vacuum control
7. Ground wire
8. Lead wire

◆◆ Adjustment of air gap

9. Igniter
10. Rotor shaft ◆◆
11. Signal rotor ◆◆◆◆
12. Breaker plate ◆◆
13. Spring retainer ◆◆
14. Governor spring ◆◆
15. Governor weight
16. Lock pin
17. Driven gear ◆◆◆◆
18. Washer
19. "O" ring
20. Distributor shaft
21. Washer
22. Oil seal
23. Distributor housing

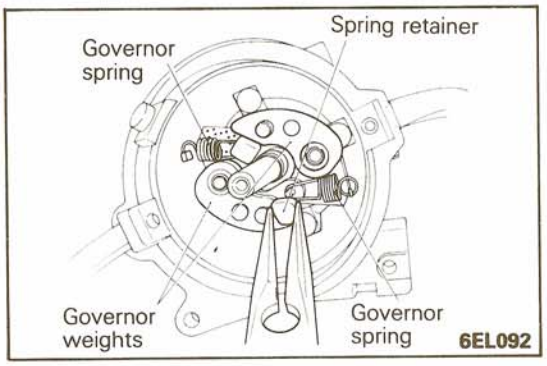
NOTE
(1) Reverse the disassembly procedures to reassemble.
(2) ◆◆ : Refer to "Service Points of Disassembly".
(3) ◆◆ : Refer to "Service Points of Reassembly".
(4) N : Non-reusable parts



SERVICE POINTS OF DISASSEMBLY

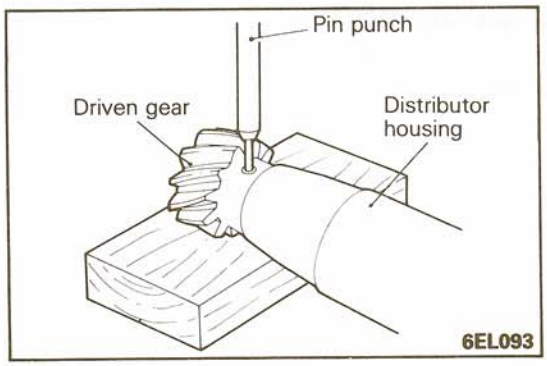
10. DISASSEMBLY OF ROTOR SHAFT/11. SIGNAL ROTOR

Place igniter base on soft base (wooden block) and lightly tap rotor shaft to remove it from signal rotor.



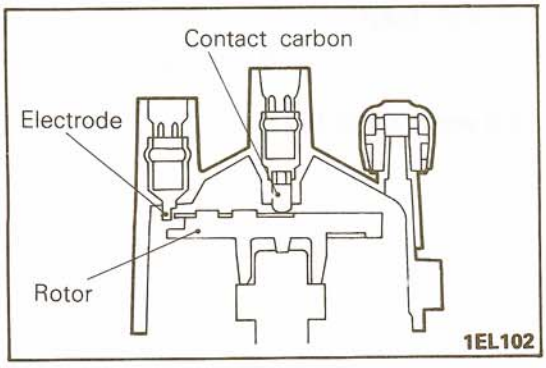
13. DISASSEMBLY OF SPRING RETAINER/14. GOVERNOR SPRING

Remove two spring retainers with pliers and then remove two governor springs.



17. DISASSEMBLY OF DRIVEN GEAR

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



INSPECTION

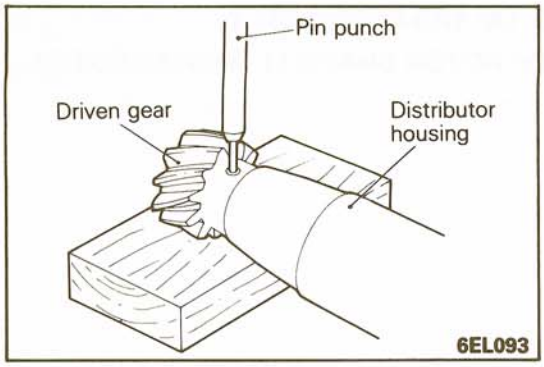
Check according to the following provisions and repair or replace anything faulty.

CAP ROTOR

(1) Ensure there are no cracks in the cap.
(2) Ensure that the electrodes of the cap and of the rotor are undamaged.
(3) Wipe off any dirt from the cap or the rotor.

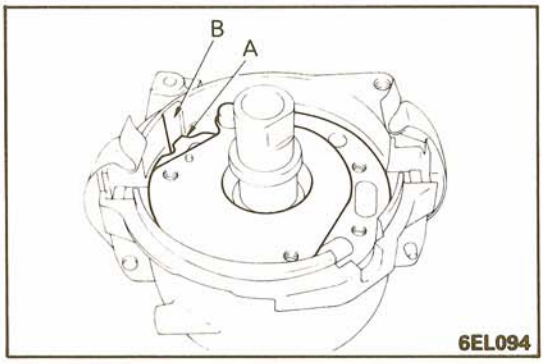
SERVICE POINTS OF REASSEMBLY

Before servicing be sure to clean and inspect all parts.



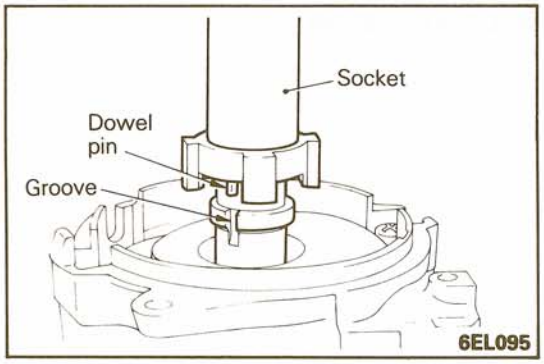
17. REASSEMBLY OF DRIVEN GEAR

Install driven gear into distributor shaft at previously marked location.



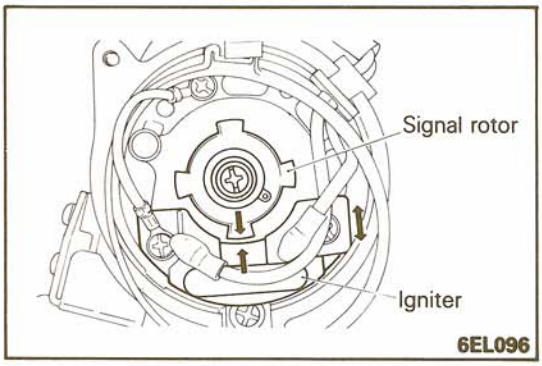
12. REASSEMBLY OF BREAKER PLATE

Install igniter base to housing. Position the igniter base so that the projection (A) fits into the groove (B).



11. REASSEMBLY OF SIGNAL ROTOR

Install signal rotor to rotor shaft. Position the signal rotor so that the dowel pin fits into the groove.



- **ADJUSTMENT OF AIR GAP**

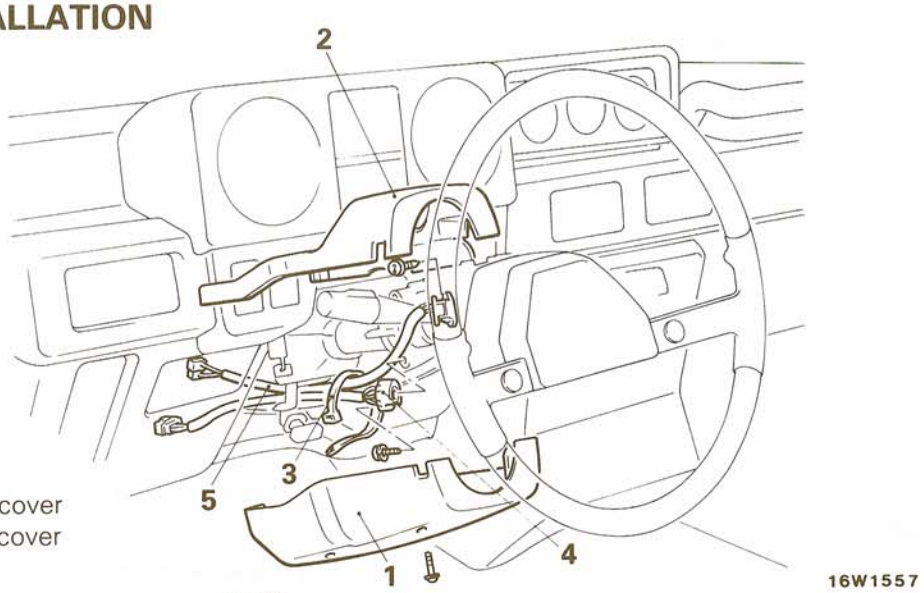
Adjust air gap between signal rotor and pick-up of igniter.

Standard value : 0.8 mm (.0315 in.)

IGNITION SWITCH

REMOVAL AND INSTALLATION

N08GLAK

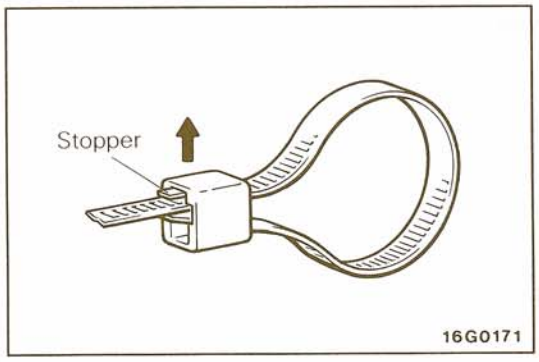


16W1557

Removal steps

1. Lower column cover
2. Upper column cover
3. ◆◆ Cable band
4. Ignition switch
5. Key remaind switch

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

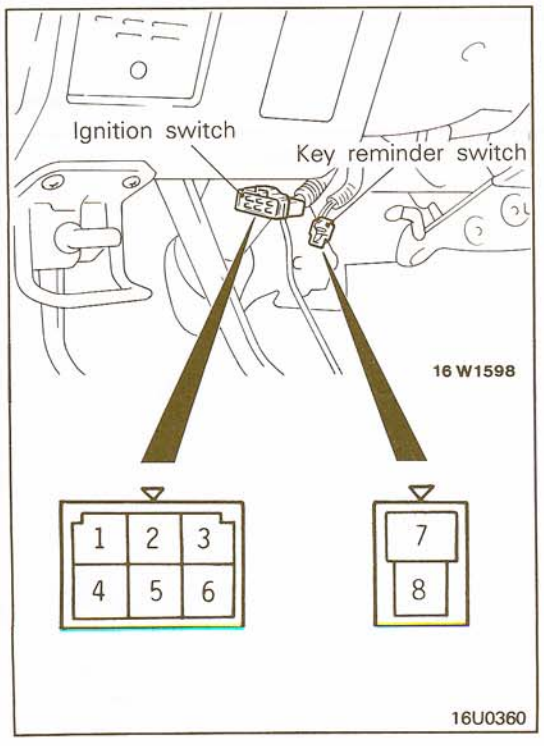


16G0171

SERVICE POINTS OF REMOVAL

3. REMOVAL OF CABLE BAND

Push up stopper and remove cable band.



16U0360

INSPECTION

(1) Disconnect the wiring connector from the ignition switch, and connect an ohmmeter to the switch side connector.
(2) Operate the switch, and check the continuity between the terminals.

Terminal / Position	Key	Ignition switch						Key remind switch	
		4	2	3	6	1	5	7	8
LOCK	Removed								
	Inserted							○—○	○—○
ACC				○—○					
ON		○——		○——	○				
START		○——			○——	○——	○		

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

METERS AND GAUGES

SPECIFICATIONS

GENERAL SPECIFICATIONS

METERS AND GAUGES

N08HB--

Items	Specifications
Speedometer	
Type	Electromagnetic type
Tachometer	
Type	Pulse type
Detection source	Ignition coil
Fuel gauge	
Type	Bimetal type (voltage limiter incorporated for 7V)
Fuel gauge unit	
Type	Variable resistance type
Engine coolant temperature gauge	
Type	Bimetal type (7V operation)
Engine coolant temperature gauge unit	
Type	Thermistor type
Oil pressure gauge	
Type	Bimetal type
Oil pressure gauge unit	
Type	Bimetal type
Inclinometer	
Type	Gravity type
Damping system	Oil-filled system
Voltage meter	
Type	Bimetal type

INDICATOR AND WARNING LIGHTS

N08HC-A

Items	Specifications
Turn signal indicator lights W	1.4 (74)
High beam indicator light W	1.4 (74)
Door-ajar warning light W	1.4 (74)
Fasten seat belt indicator light W	1.4 (74)
Brake warning light W	1.4 (74)
Charging warning light W	1.4 (74)
4WD indicator light W	1.4 (74)
Maintenance required warning light W	1.4 (74)
A/T oil temperature warning light W	1.4 (74)
Overdrive indicator light W	1.4 (74)
Free-wheeling hub indicator light W	1.4 (74)

NOTE
The values in parentheses denote SAE grade numbers.

BUZZER

Items	Specifications
Range of voltage used V	10–16
While buzzing (Terminal voltage at 13 V)	
Sound pressure dB	53 ± 7
Fundamental frequency Hz	900 ± 150

SERVICE SPECIFICATIONS

N08HC--

Items	Specifications
Standard values	
Tachometer indication error r/min	
1,000 r/min	± 100
3,000 r/min	± 150
5,000 r/min	± 250
Fuel gauge resistance value Ω	
Between terminals 1 (power supply) and 2 (fuel gauge unit)	55
Between terminals 2 (fuel gauge unit) and 3 (ground)	165
Between terminals 1 (power supply) and 3 (ground)	110
Fuel gauge unit resistance value Ω	
Float point "F"	1–5
Float point "E"	103–117
Fuel gauge unit float position mm (in.)	
Float point "F"	11–13 (.43–.51)
Float point "E"	180–182 (7.09–7.17)
Engine coolant temperature gauge resistance value Ω	
Between terminals 1 (power supply) and 2 (water temperature gauge unit)	55
Engine coolant temperature gauge unit resistance value Ω [at 70°C (158°F)]	90.5–117.5
Oil pressure gauge resistance value Ω	45–55
Voltage meter indication error V	
10V	± 0.5
16V	± 0.5

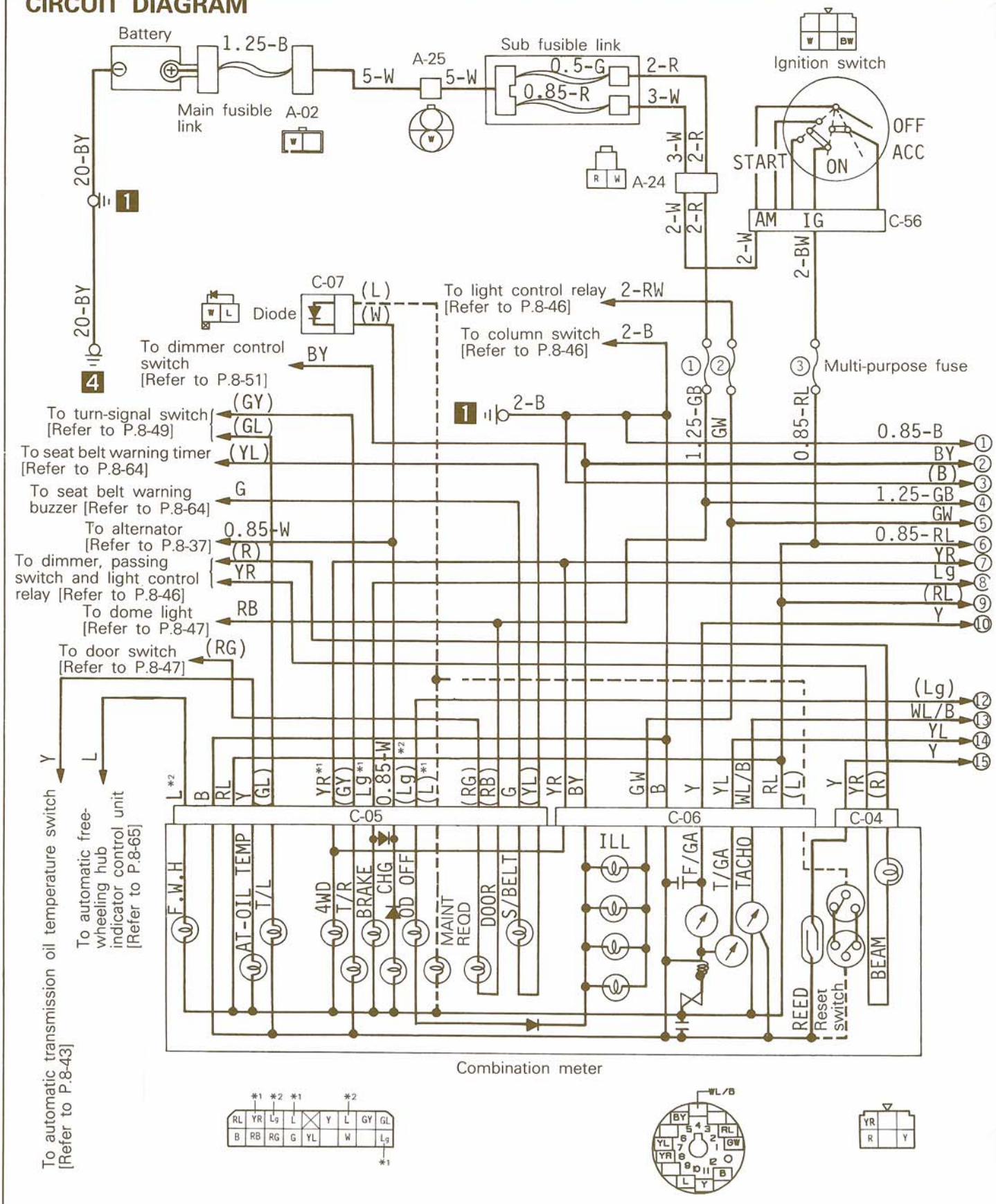
TORQUE SPECIFICATIONS

N08HD--

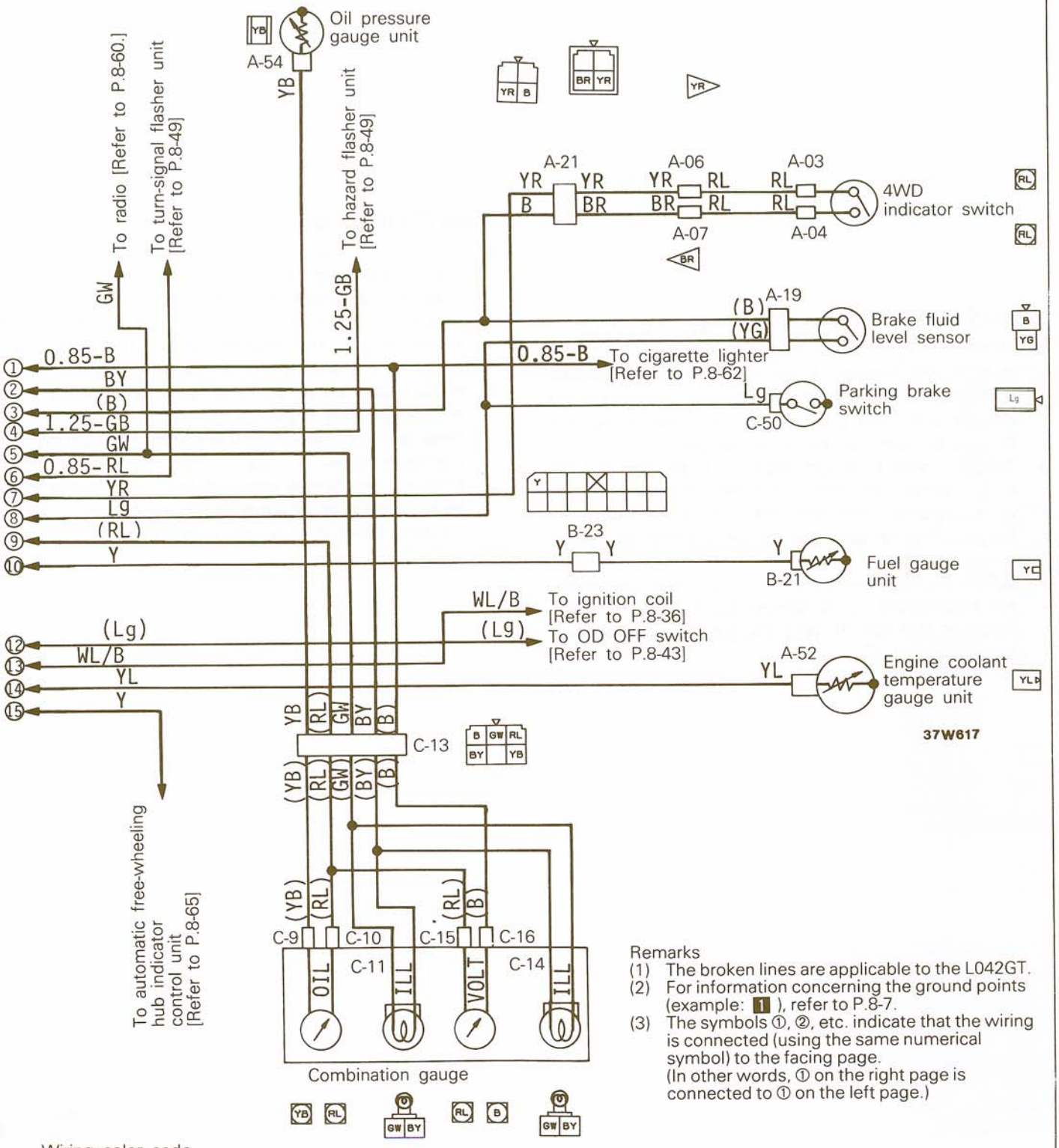
Items	Nm	ft.lbs.
Water temperature gauge unit	8–10	6–7

TROUBLESHOOTING

CIRCUIT DIAGRAM



N08HHAB



Remarks
(1) The broken lines are applicable to the L042GT.
(2) For information concerning the ground points (example: 1), refer to P.8-7.
(3) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page. (In other words, ① on the right page is connected to ① on the left page.)

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

OPERATION

Fuel Gauge

- When the ignition switch is turned to "ON", current flows through fuse No. 3 fuel gauge, fuel gauge unit and ground, in turn 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 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. 3, engine coolant temperature gauge, engine coolant temperature gauge unit, and ground, in turn, 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

- With the ignition key at the "ON" position, current flows to fuse No. 3, oil-pressure gauge, the Oil-pressure gauge unit, and ground, and the oil-pressure gauge is activated.
- When the oil pressure is high, the contacts (within the unit) close for a long time, with the result that the amount of current flowint through the circuit is great, and the gauge's indicator indicates at the high-pressure area.
- When the oil pressure is low, the contacts (within the unit) open for a short time, with the result that the amount of current flowing through the circuit is low, and the gauge's indicator indicates at the low-pressure area.

Brake Warning Light

- When the ignition switch is turned to "ON" and before the engine starts, current flows through fuse No. 3, brake warning lihgt, 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

SPEEDOMETER INSPECTION N08HIAF

NOTE
If there is a special regulation for speedometer indicator difference in the area where the vehicle 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.)
2. Use speedometer tester to check indicator difference.

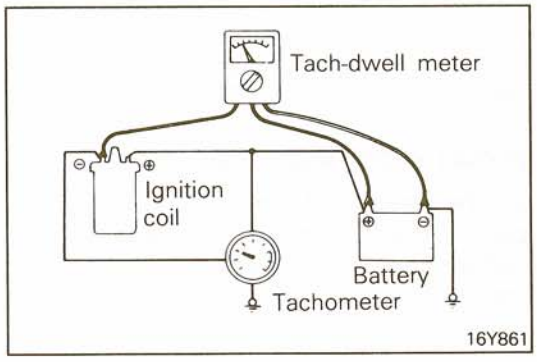
Caution
When checking with speedometer tester, block nonoperating wheels to prevent vehicle moving.

TACHOMETER INSPECTION N08HIBA

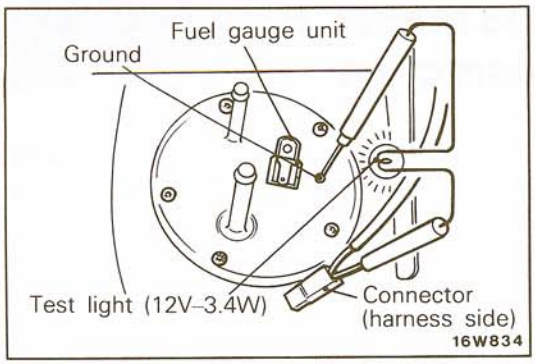
Connect a tach-dwell meter, and then compare the meter readings at various engine speeds with the values indicated on the tachometer.

Standard value:

1,000 r/min	**±100 r/min**
3,000 r/min	**±150 r/min**
5,000 r/min	**±250 r/min**



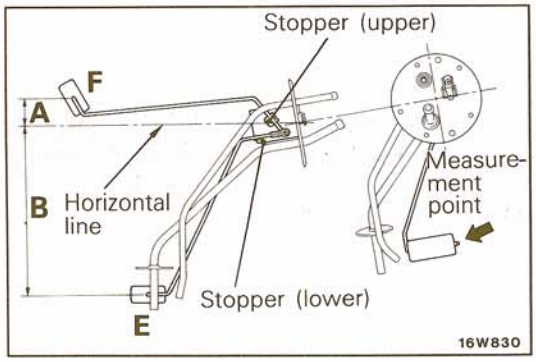
Caution
The tachometer is the negative-ground type, and therefore should not be connected in reverse polarity to the battery. If the tachometer is connected in reverse polarity, the transistors and diodes will be damaged.

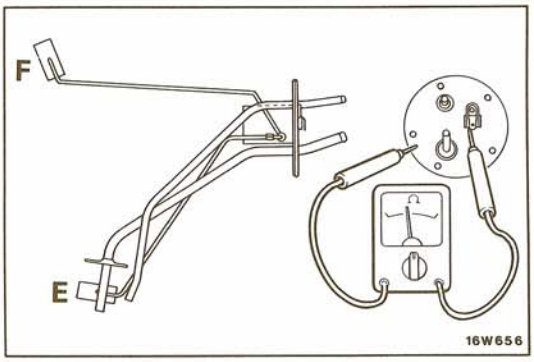


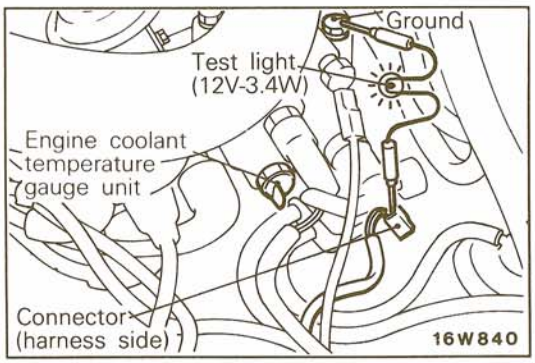
FUEL GAUGE SIMPLE TEST

N08HICE

(1) Disconnect, from below the vehicle, the wiring connector from the fuel gauge unit.
(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 and the fuel gauge indicator moves.
(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 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.







FUEL GAUGE UNIT INSPECTION

N08HIIFa

To check the fuel gauge unit, first remove it from the fuel tank. For detailed information concerning installation of the fuel gauge unit, refer to GROUP 4, FUEL SYSTEM – Fuel Tank.

FUEL GAUGE UNIT FLOAT POSITION CHECK

Check to be sure that the height of the fuel gauge float (relative to the center part of the fuel gauge unit) is within the standard value range when the float is at the "F" position (upper limit) and "E" position (lower limit).

Standard value:
A 11–13 mm (.43–.51 in.)
B 180–182 mm (7.09–7.17 in.)

FUEL GAUGE UNIT RESISTANCE CHECK

Confirm that the resistances when the float of the fuel gauge unit is at the "F" position (top) and the "E" position (bottom) are within the standard value ranges.

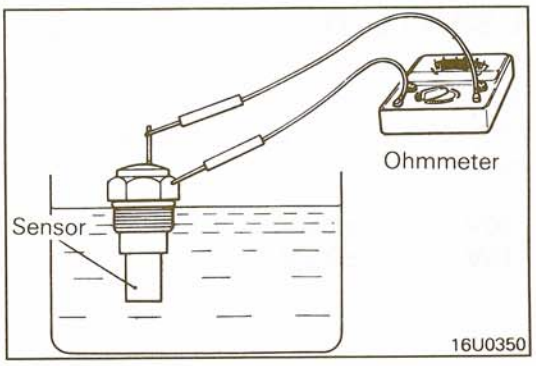
Standard value:
Float position "F" point 1–5 Ω
Float position "E" points 103–117 Ω

ENGINE COOLANT TEMPERATURE GAUGE SIMPLE TEST

N08HIDBa

(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 and the engine coolant temperature gauge indicator moves.

(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 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.



ENGINE COOLANT TEMPERATURE GAUGE UNIT INSPECTION

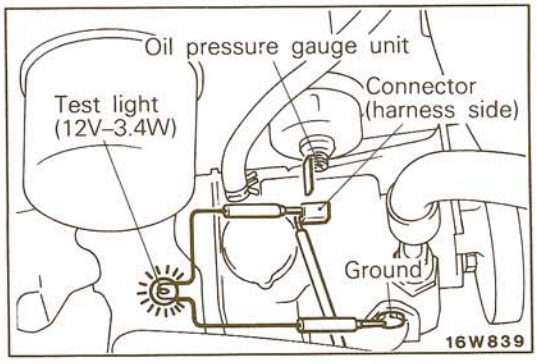
N08HIKDa

To check the engine coolant temperature gauge unit, first remove it from the intake manifold.
For detailed information concerning installation of the engine coolant temperature gauge unit, refer to GROUP 11, INTAKE AND EXHAUST SYSTEM–Intake Manifold.

ENGINE COOLANT TEMPERATURE GAUGE UNIT RESISTANCE 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 Ω**

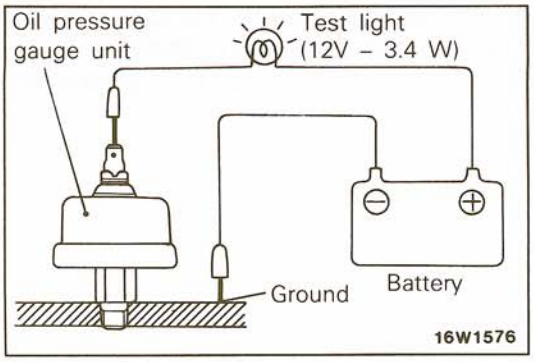


OIL PRESSURE GAUGE SIMPLE TEST

N08HIFA

(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 light.
(3) Turn the ignition key to the ON position.
(4) Check to be sure that the test light illuminates steadily and the indicator of the oil pressure gauge moves.

(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 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.



OIL PRESSURE GAUGE UNIT CURRENT CHECK

N08HILE

(1) Disconnect the wiring connector from the oil pressure gauge unit inside the engine compartment.
(2) Apply battery voltage (through the test light) to the gauge unit side terminal.
(3) Check to be sure that the test light switches OFF when the engine is stopped, and that it flashes while the engine is running.

VOLTAGE METER SIMPLE TEST

N08HIGC

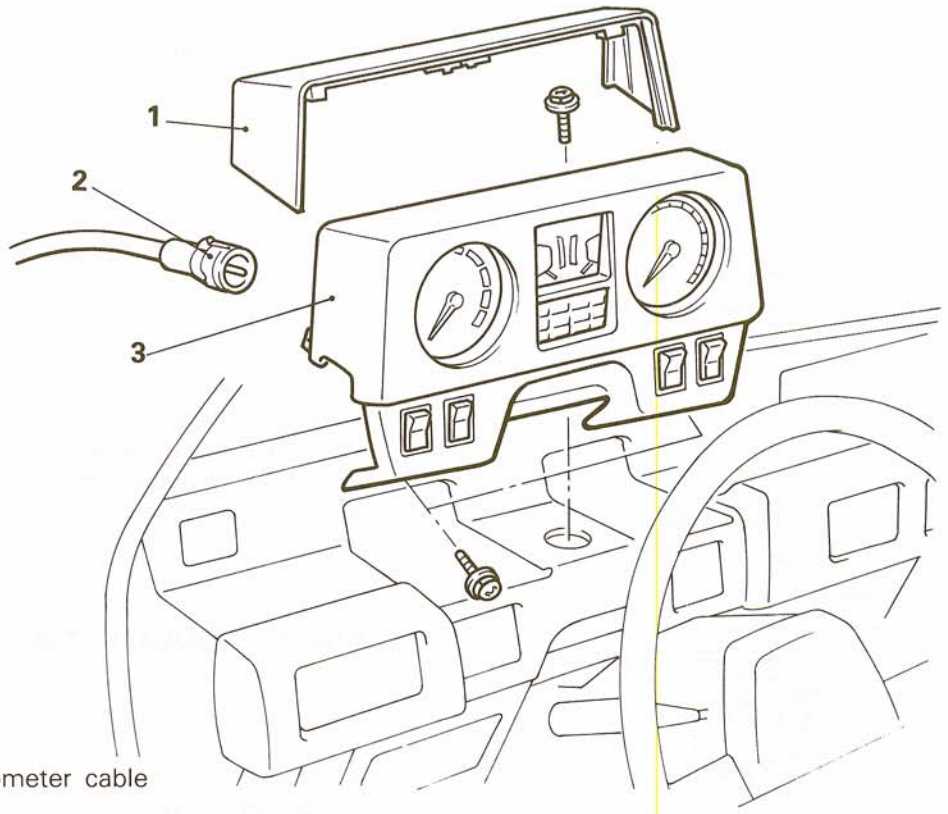
(1) Connect a voltmeter for testing.
(2) Turn the ignition key to the ON position.
(3) Compare the readings of the voltmeter for testing and of the vehicle's voltage meter.

Standard value : 10V ±0.5V
16V ±0.5V

COMBINATION METER

REMOVAL AND INSTALLATION

N08HJAFa

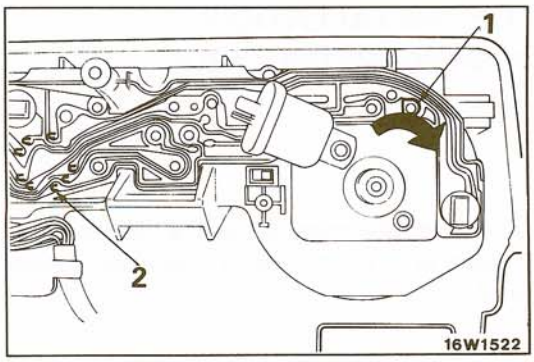


Removal steps

1. Meter cover
2. ➡◀ Connection of speedometer cable
3. Meter assembly

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ➡◀ : Refer to "Service Points of Installation".

16W1553

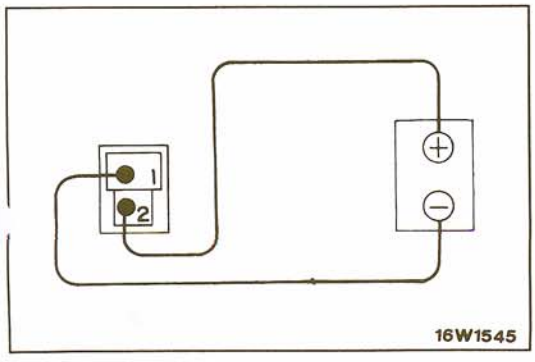


16W1522

INSPECTION

REED SWITCH

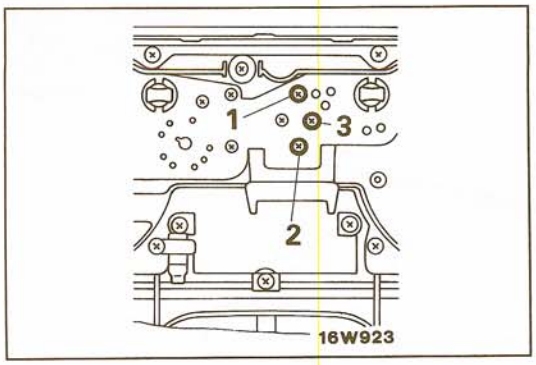
Using an ohmmeter, check that continuity and discontinuity alternate between terminals 1 and 2 four times at every rotation of the shaft of the speedometer cable connection.



16W1545

BUZZER

Check to be sure that buzzer sounds when the battery's positive (+) terminal is connected to terminal 2 and the battery's negative (−) terminal is connected to terminal 1.

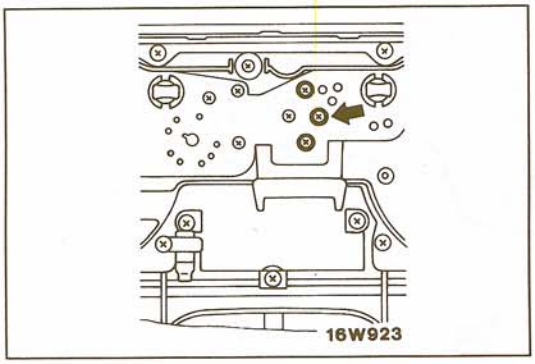


FUEL GAUGE

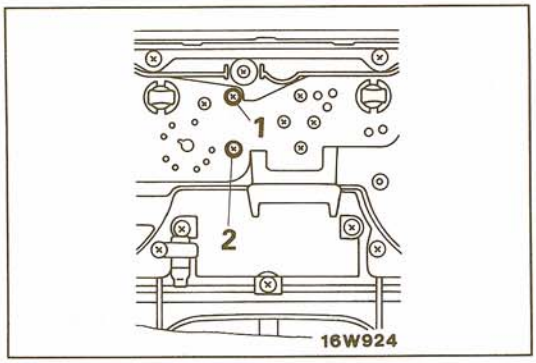
Measure the resistance value between the terminals by using an ohmmeter.

Standard value :

1–2 terminals:	**55 Ω**
2–3 terminals:	**165 Ω**
1–3 terminals:	**110 Ω**



Caution
If there is a malfunction of the ground contact of the voltage regulator even once during vehicle operation, the excessive current flowing through the heat coil of the engine coolant temperature gauge and the fuel gauge will cause permanent distortion of the bimetal, resulting in the indications being consistently lower than the actual value. For this reason, therefore, be sure to make the earth contact securely.

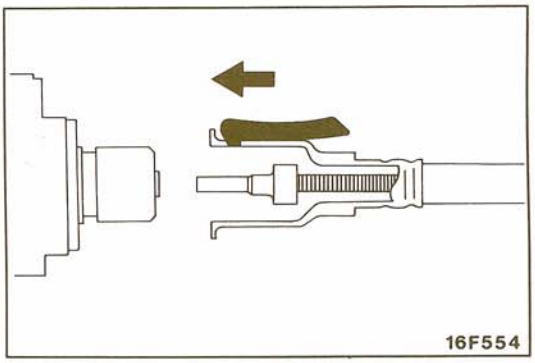


ENGINE COOLANT TEMPERATURE GAUGE

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

Standard value:

Bimetal type	
1–2 terminals:	**55 Ω**



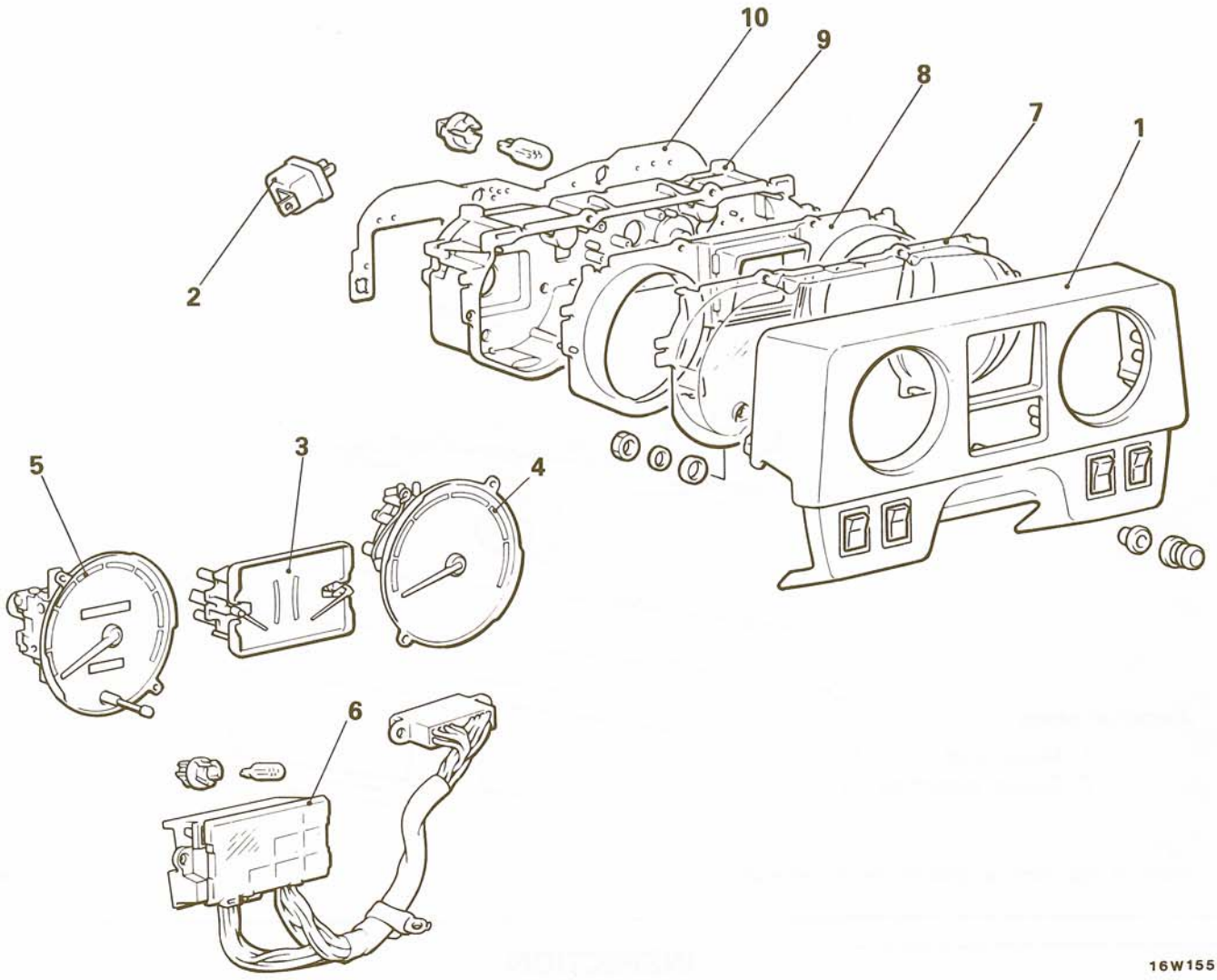
SERVICE POINTS OF INSTALLATION

2. INSTALLATION OF SPEEDOMETER CABLE

Insert the cable until its stopper properly fits. to the speedometer 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



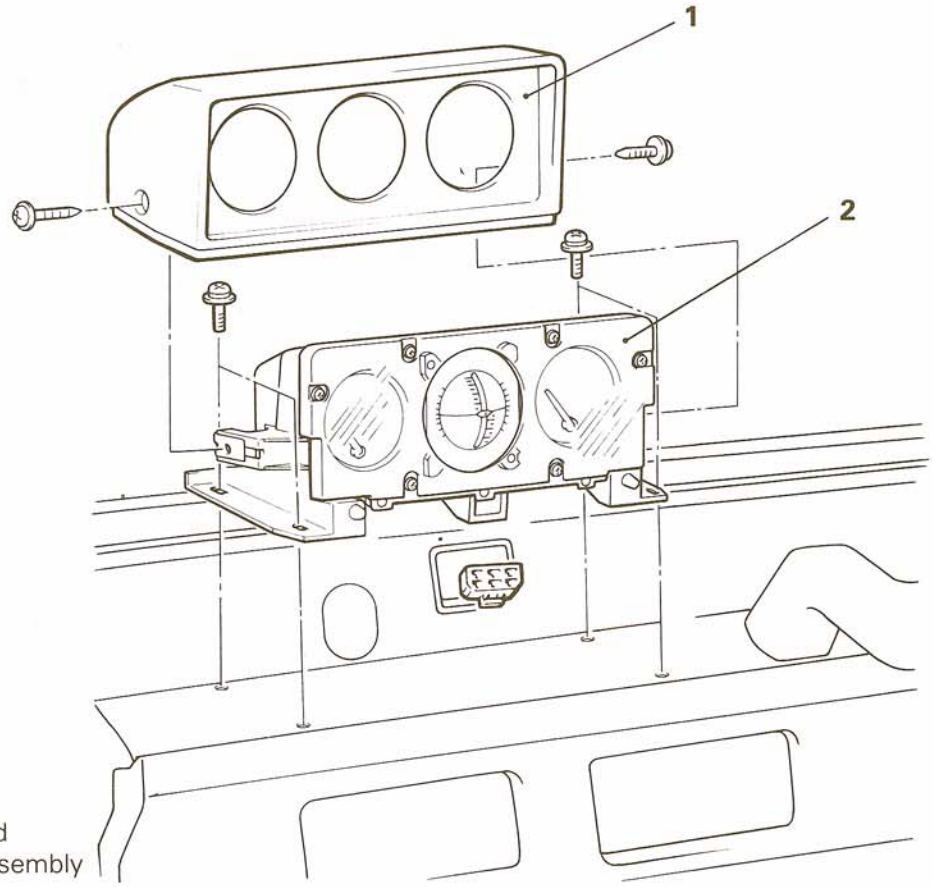
16W1554

Disassembly steps

1. Meter cover
2. Buzzer
3. Fuel and engine coolant temperature gauge
4. Tachometer
5. Speedometer
6. Indicator panel
7. Meter glass
8. Window plate
9. Meter case
10. Printed circuit boad

NOTE
Reverse the disassembly procedures to reassemble.

3-METER UNIT
REMOVAL AND INSTALLATION

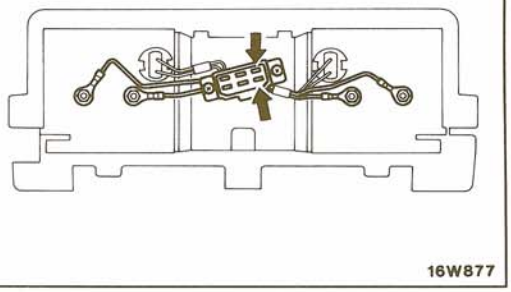


Removal steps

1. Meter pad
2. Gauge assembly

NOTE
Reverse the removal procedures to reinstall.

16W1560

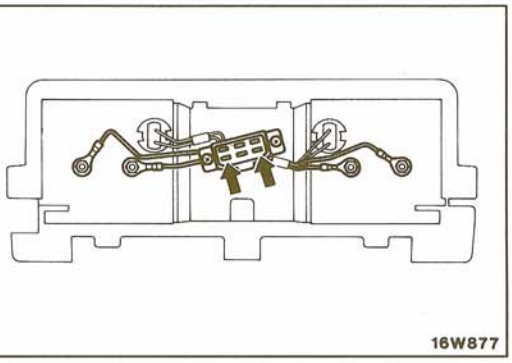


16W877

INSPECTION
OIL PRESSURE GAUGE

Measure the resistance value between the terminals with an ohmmeter.

Standard value : Approx. 50 Ω

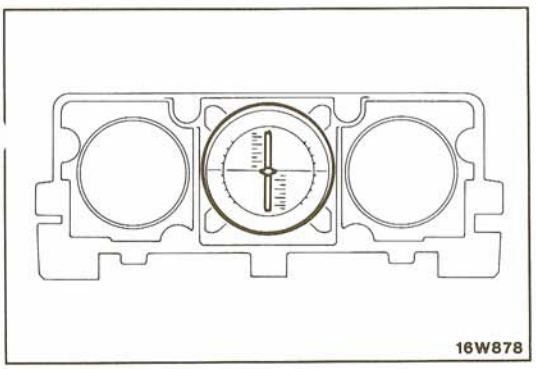


16W877

VOLTAGE METER

Measure the resistance value between the terminals with an ohmmeter.

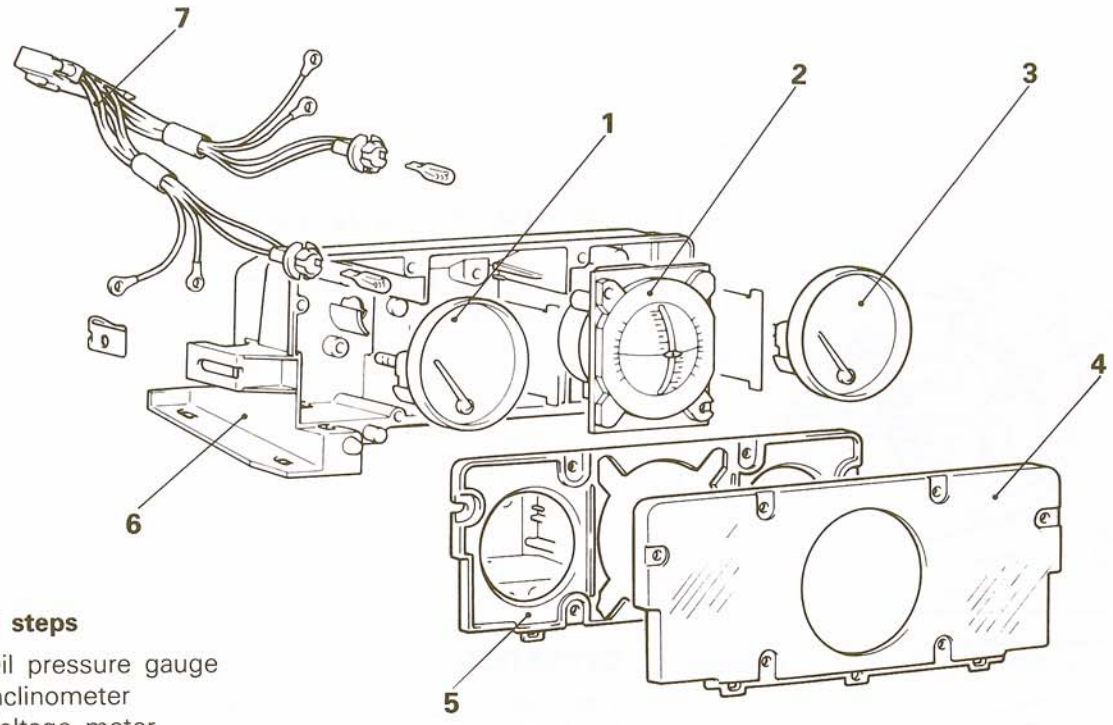
Standard value : 380–460Ω



INCLINOMETER

(1) Check to be sure that operation is smooth when the inclinometer is tilted up/down and to the left and right.
(2) The inclinometer can be considered to be in good condition if the pointer indicates the spherical dial horizontal center line when the meter case is placed on a level surface.

DISASSEMBLY AND REASSEMBLY

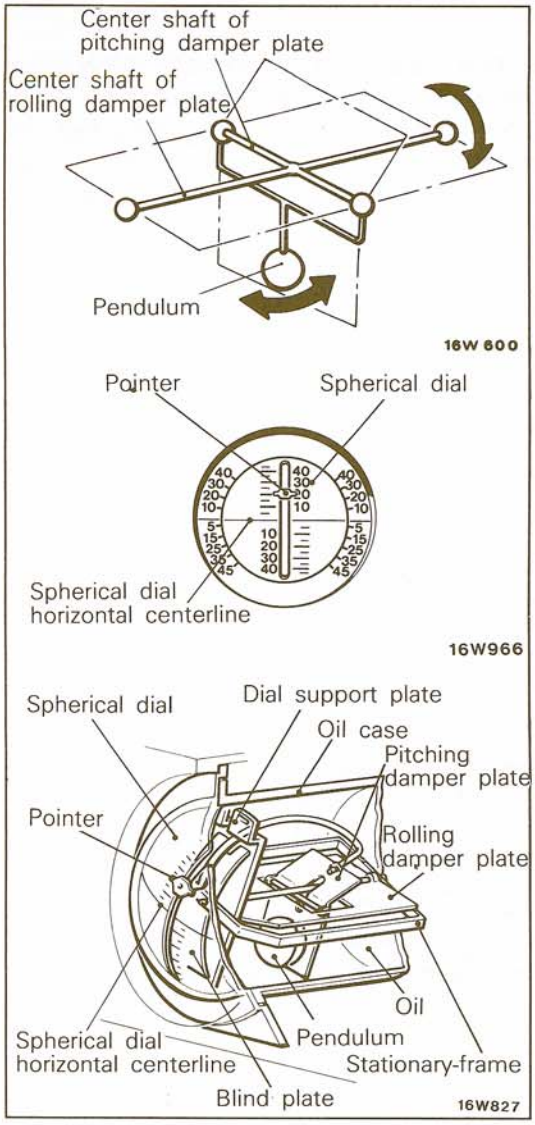


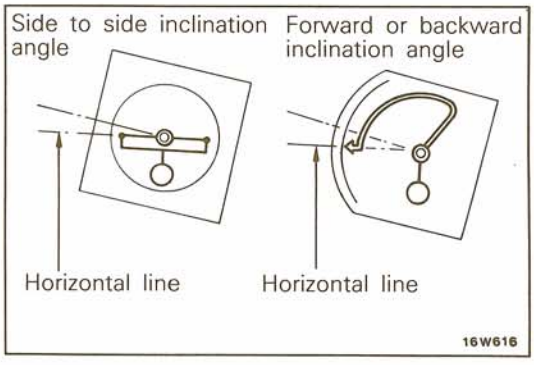
Disassembly steps

1. Oil pressure gauge
2. Inclinometer
3. Voltage meter
4. Meter glass
5. Window plate
6. Meter case
7. Meter harness

NOTE
Reverse the disassembly procedures to reassemble.

16W1561





INCLINOMETER

OUTLINE

The inclinometer is an instrument which indicates the forward or backward inclination (pitching) or side to side inclination (rolling) of vehicle.
Motion of a pendulum in the system is displayed on the system. The pitching and rolling pointer is supported by a double support mechanism in which the rolling fulcrum is supported in such a way as to be rotative around the case and the pitching fulcrum supported on the rolling system

CONSTRUCTION

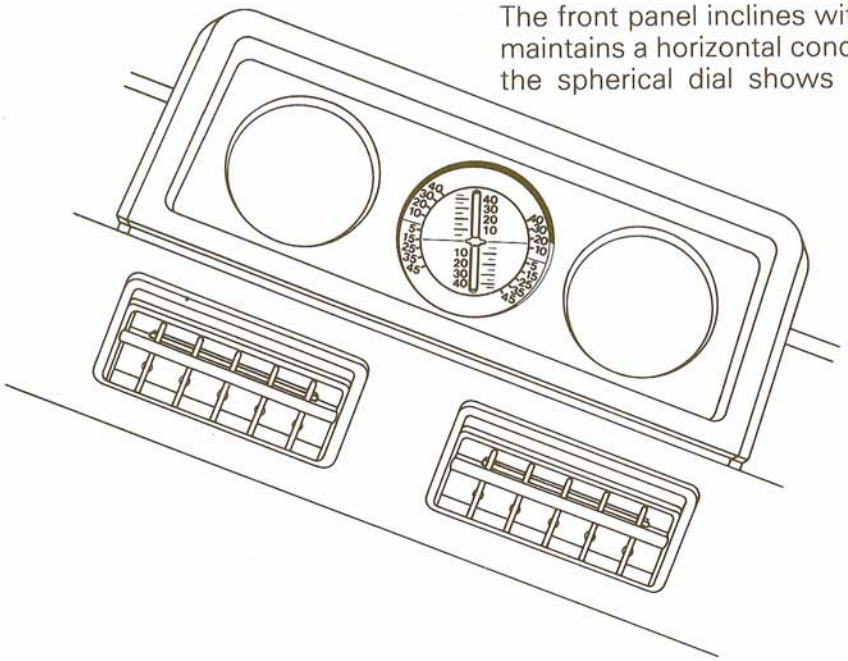
The inclinometer consists of an outer case which inclines with the vehicle, a pointer which is provided in an oil case and always maintains a level position, and a spherical dial. The spherical dial is coupled through the dial support plate to the rolling damper plate. The rolling damper plate is swivel bearing coupled to a stationary frame by the center axis, so it can incline side-to-side, but is always held in a level position by a pendulum. The pointer is coupled with the pitching damper plate.
Since the pitching damper plate is swivel bearing coupled to the rolling damper plate by the center axis, it can incline forward and backward, but is always maintained in a level position by the pendulum.

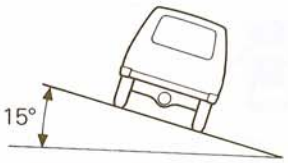
OPERATION

The side-to-side inclination angle should be read on a scale of the front panel as indicated by the horizontal centerline of the spherical dial, whereas the forward or backward inclination angle should be read on a scale of the spherical dial as indicated by the pointer.

Side-to-Side Inclination

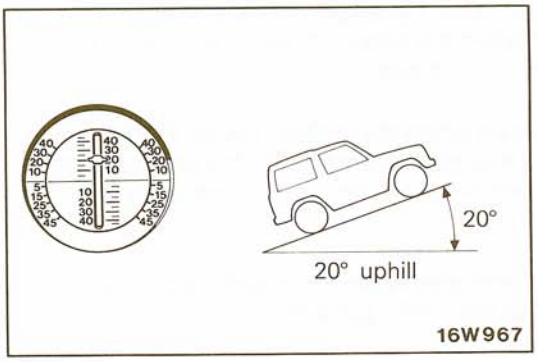
The front panel inclines with the vehicle, but the spherical dial maintains a horizontal condition, so the horizontal centerline of the spherical dial shows the side-to-side inclination angle.





Inclined 15° to right

16W969

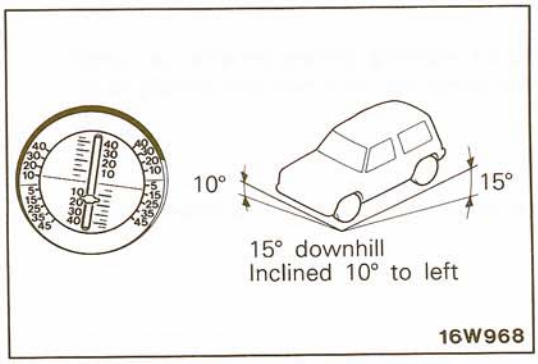


20° uphill

16W967

Forward or Backward Inclination

The spherical dial inclines forward or backward with the vehicle, but the pointer maintains a level position, so the pointer indicates the forward or backward inclination angle.



15° downhill
Inclined 10° to left

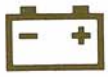
16W968

Combined Forward or Backward and Side-to-Side Inclination

The forward or backward inclination angle and the side-to-side inclination angle are indicated by the pointer and spherical dial.

INDICATORS AND WARNINGS

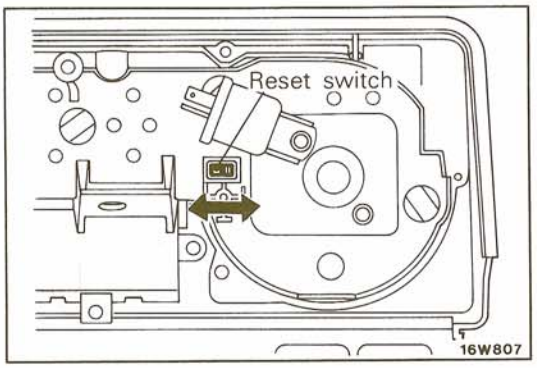
N08HKAI

Symbol		Operation
	Turn-signal indicator	This indicator flashes, as do the same side of turn-signal light flashes. If the turn-signal light is burnt out, the blinking of indicator slows down. This indicator is common with hazard light.
	High beam indicator	This indicator illuminates when the headlights are on high beam.
	Door-ajar warning light	This warning comes on when the door is either open or not completely closed.
	Fasten seat belt indicator	This indicator goes on for four to eight seconds when the ignition key is in "ON" position, even if the driver has fastened his seat belt.
BRAKE *1 	Brake warning light	This warning comes on when the ignition key is in "ON" position, and goes off after the engine has started. This warning comes on when the parking brake is applied or brake fluid level falls less than the specific level.
	Charging warning light	This warning comes on when the ignition key in "ON" position, and goes off after the engine has started. This warning comes on when the drive belt breaks or the trouble occurs in the charging system.
O D OFF 68R0133	Overdrive indicator	This indicator will illuminates when the overdrive control switch is switched to the "OFF" position.
A/T TEMP 68W068	A/T oil temperature warning light	This A/T oil temperature warning comes on when automatic transmission fluid temperature becomes abnormally high.
WHEEL LOCK 68W080	Free-wheeling hub indicator	This indicator comes on when the automatic free-wheeling hubs are locked.
	4WD indicator	This indicator will light up when the transfer case shift lever is shifted to the four wheel driving position (either the "4H" or the "4L" position) and the ignition key is in the "ON" position.
*2MAINT REQD	Maintenance required warning light	The maintenance required warning light will illuminate every 50,000 miles of driving. When this occurs, bring the vehicle to an authorized dealter to have the EGR system checked.

NOTE

*1 indicates vehicles for Canada.

*2 indicates vehicles other than those destined for Canada.



MAINTENANCE REQUIRED SYSTEM

RESET SWITCH

After checking is completed, use the reset switch (located at the rear of the combination meter) to switch OFF the warning light. Note that the warning light's bulb should be removed after the 100,000 mile inspection.

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

LIGHTING SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

EXTERIOR AND INTERIOR LIGHTS

N08IB--

Items	Specifications
Exterior lights	
Headlights W	60/50 60/55
Front combination lights cp	
Turn-signal lights	32
Front side marker and position lights	2
Rear combination lights cp	
Turn-signal light	32/3
Stop and tail lights	32/3
Back-up lights	32
Rear side marker lights W	3.8 (194)
Licence plate lights W	6
Interior lights	
Dome light W	10
Heater panel illumination light W	1.4 (74)
Combination meter and gauge illumination light W	3.4 (158)
Cigarette lighter illumination light W	1.4 (74)
Ashtray illumination light W	1.4 (74)
Shift illumination light (automatic transmission) W	1.4 (74)

NOTE
The values in parentheses denote SAE grade numbers.

HAZARD WARNING SWITCH

Items	Specifications
Voltage drop (at 12V the rated load) V	0.1 or less

DIMMER CONTROL SWITCH

Items	Specifications
Type	Variable-resistance type
Rated load Ω	15 (Min.)–26.6 (Max.)
Voltage drop (at 14V the rated load) V	0.15 or less

SERVICE SPECIFICATIONS

N08IC--

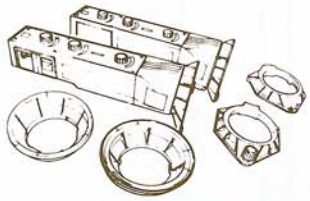
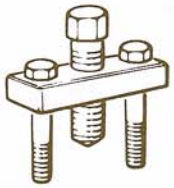
Items	Specifications
Limit	
Headlight intensity cd	20,000 or more

TORQUE SPECIFICATIONS

N08ID--

Items	Nm	ft.lbs.
Steering wheel lock unt	35–45	25–33

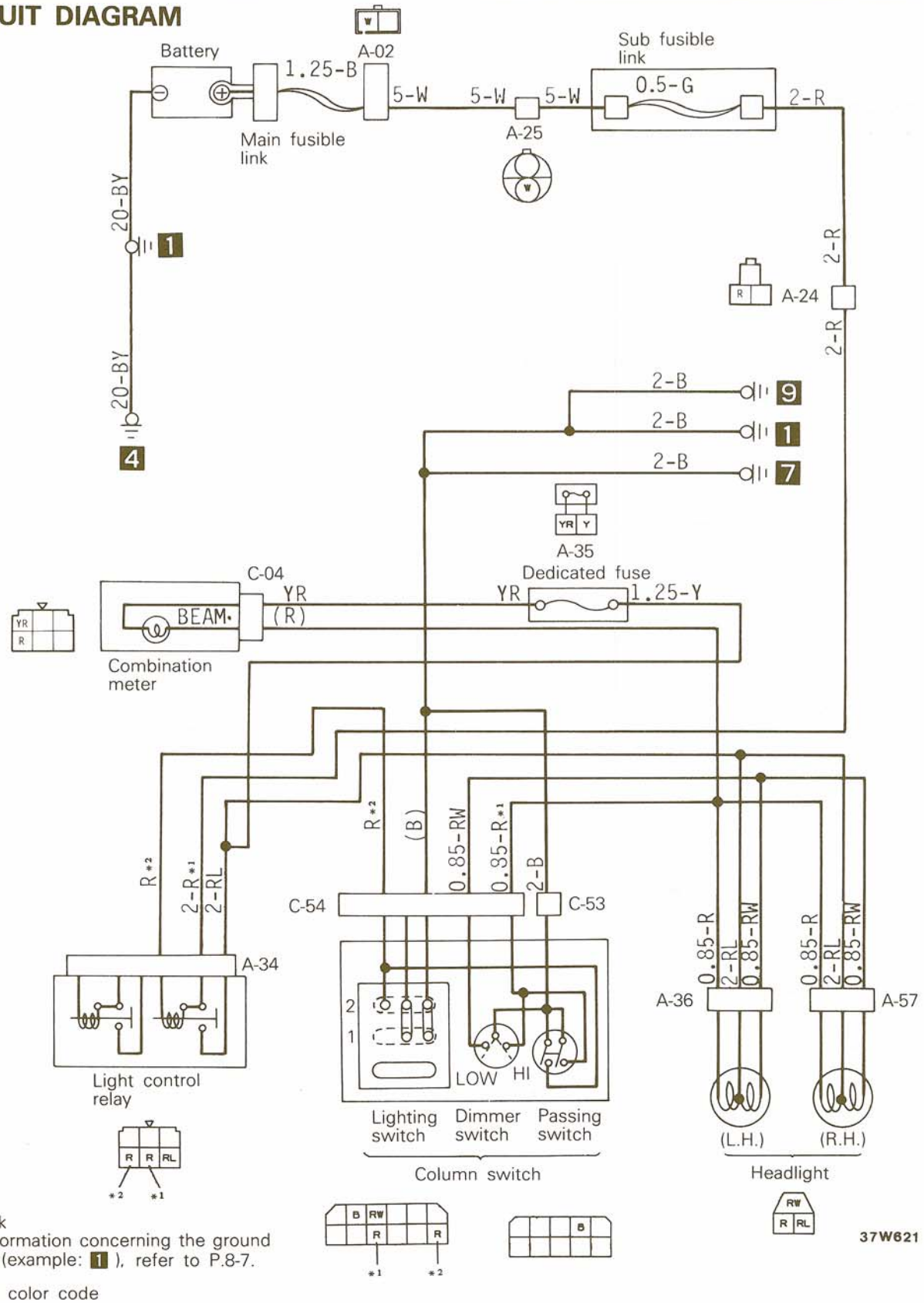
SPECIAL TOOLS

Tool (Number and name)	Use	Tool (Number and name)	Use
C-4466 Headlight aimer 	Aiming of headlight	DT-1001-A Steering wheel puller 	Removal of steering wheel

TROUBLESHOOTING
HEAD LIGHTS

N08IHBB

CIRCUIT DIAGRAM



Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

OPERATION

Low-beam (and hight-beam) operation

- Battery voltage is always applied, through the light-control relay, to the lighting switch.
- When, in this condition, the dimmer switch is set to LOW (or HIGH), current flows to the light-control relay (Contacts), the headlights, the dimmer switch, and ground, and the low beam (or high beam) illuminates.
- At the same time (when the high beam illuminates), the high beam indicator light is illuminated through the dedicated fuse.

Passing/overtaking signal

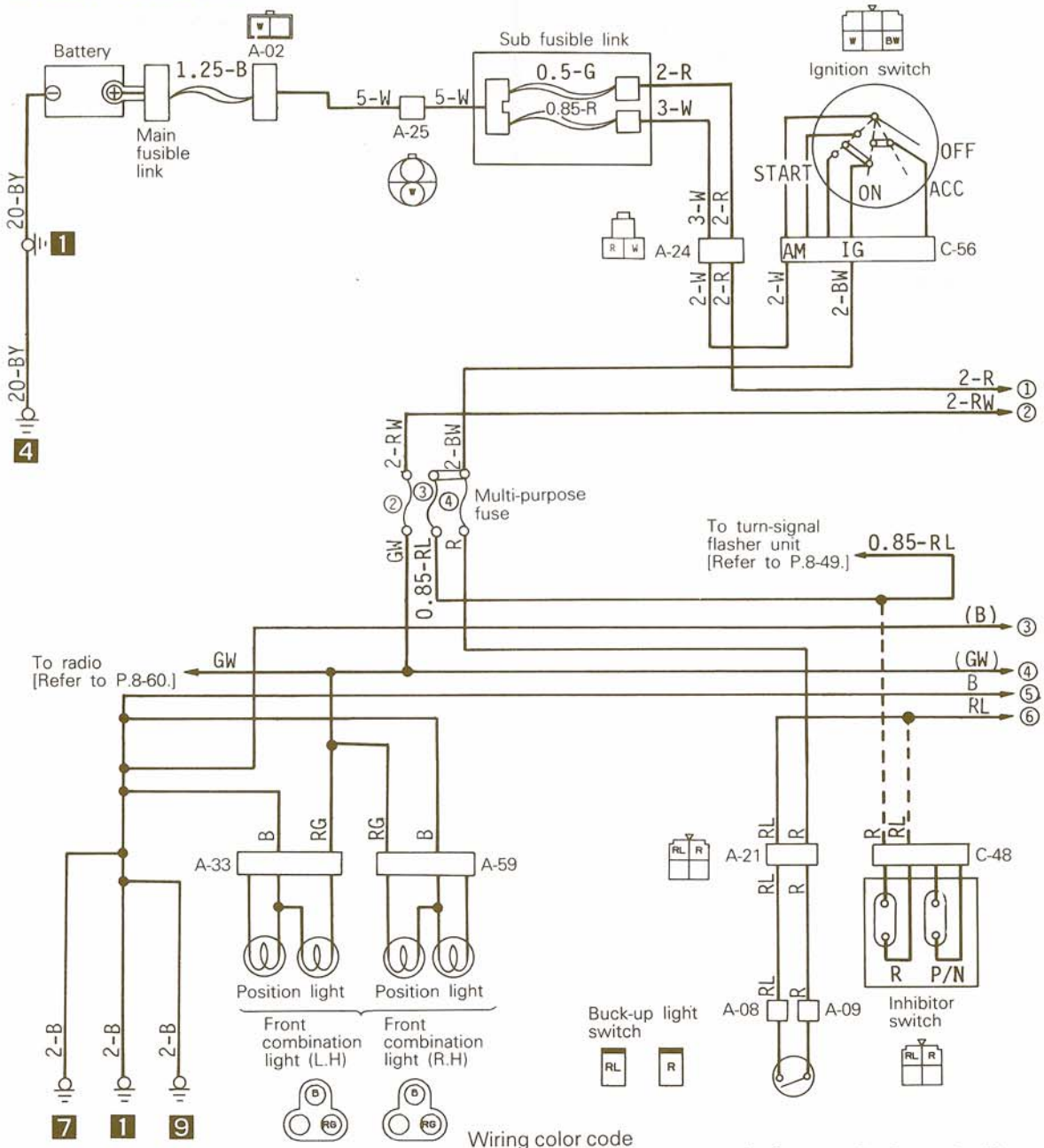
- When the passing-signal switch is set to ON, current flows to the light-control relay (coil), the passing-signal switch, and ground, and the contacts of the light-control relay colse.
- When this happens, current flows to the headlight relay (contacts), the headlights (high filaments), the passing-signal switch, and ground, and the headlights' high beam illuminates.

TROUBLESHOOTING HINTS

1. The low beam (or high beam) doesn't illuminate on both (left/right) sides.
   - Check the dimmer switch.
2. The headlamp at one side only doesn't illuminate.
   - Check the bulb.
3. No switching can be made from low beam to high beam, or vice-versa.
   - Check the dimmer switch.

TAIL LIGHT, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT AND BACK-UP LIGHT

CIRCUIT DIAGRAM



Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
LI: Light blue	O: orange	P: Pink	R: Red	Y: Yellow	W: White

TAIL LIGHTS, POSITION LIGHT, REAR SIDE MARKER LIGHT, LICENSE PLATE LIGHT

OPERATION

- Battery voltage is always applied, through the light-control relay, to the lighting switch.
- When the lighting switch is at "1" or "2" position, current flows through, light control relay lighting switch, fuse No. 2, each light, and ground, casing each light go on.

TROUBLESHOOTING HINTS

Only one light does not go on

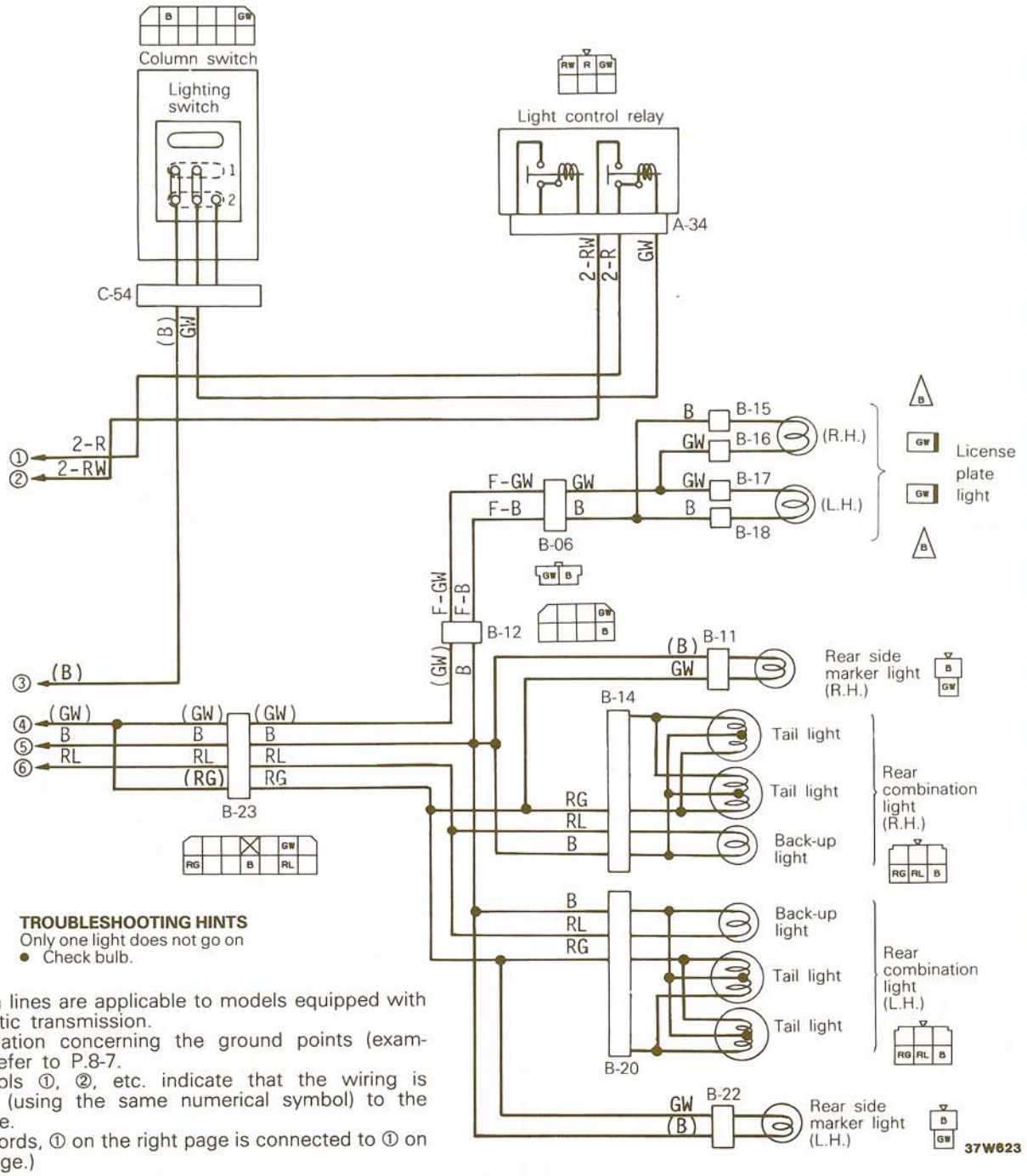
- Check bulb.

BACKUP LIGHTS

OPERATION

- When the gearshift lever is moved to "R" positon, with the igntition switch turned to "On ", the backup light switch (manual trnasmission vehicles) or inhibitor switch (automatic trnsmis-

N08IHCB



TROUBLESHOOTING HINTS
Only one light does not go on
- Check bulb.

Remarks
(1) The broken lines are applicable to models equipped with an automatic transmission.
(2) For information concerning the ground points (example: 1), refer to P.8-7.
(3) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

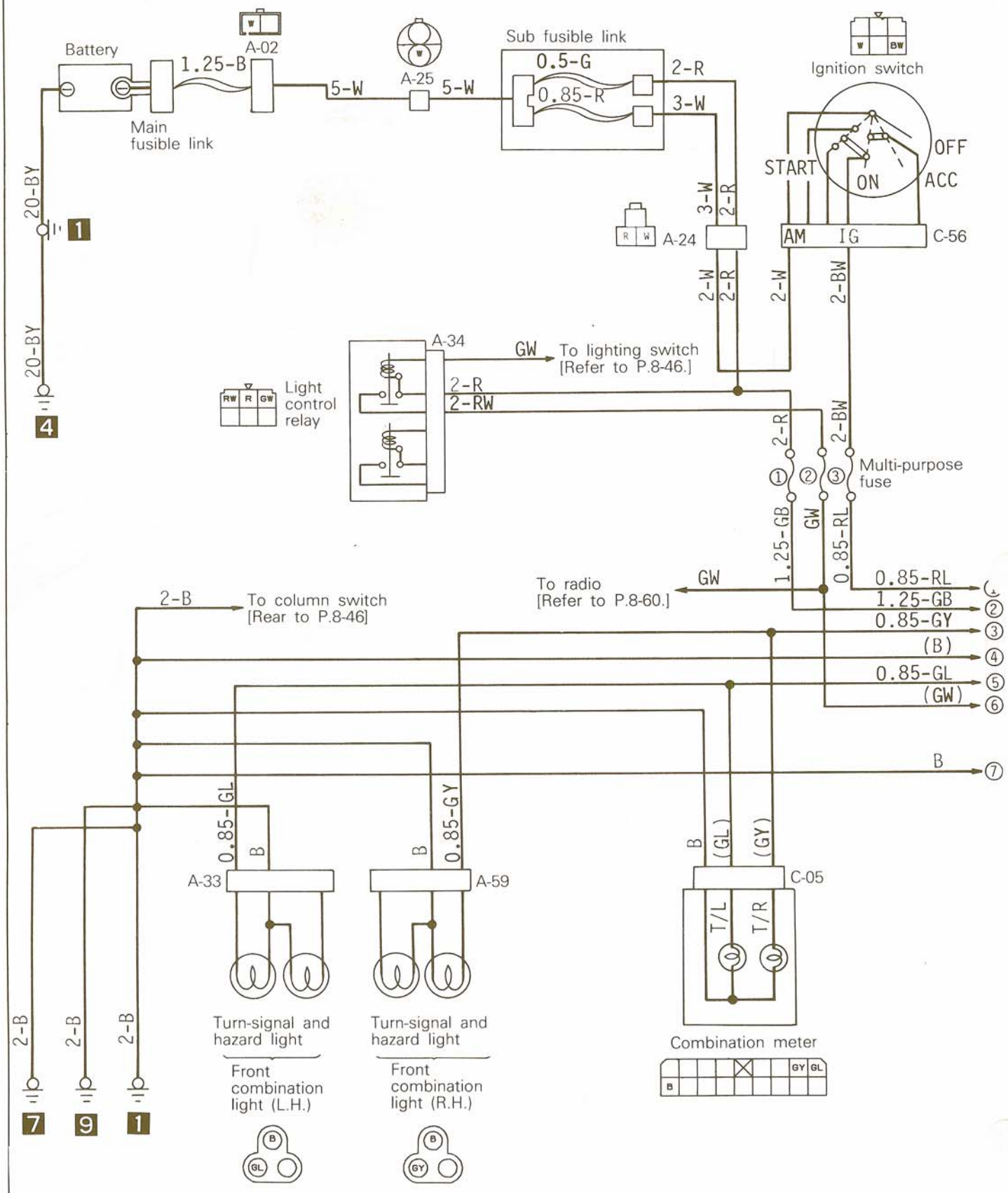
sion vehicles) is colsed, allowing current to flow through fuse No. 4 (manual transmission vehicles), 3 (automatic transmission vehicles), backup light switch or inhibitor switch, backup lights, and ground. This causes the backup lights to go on.

TROUBLESHOOTING HINTS

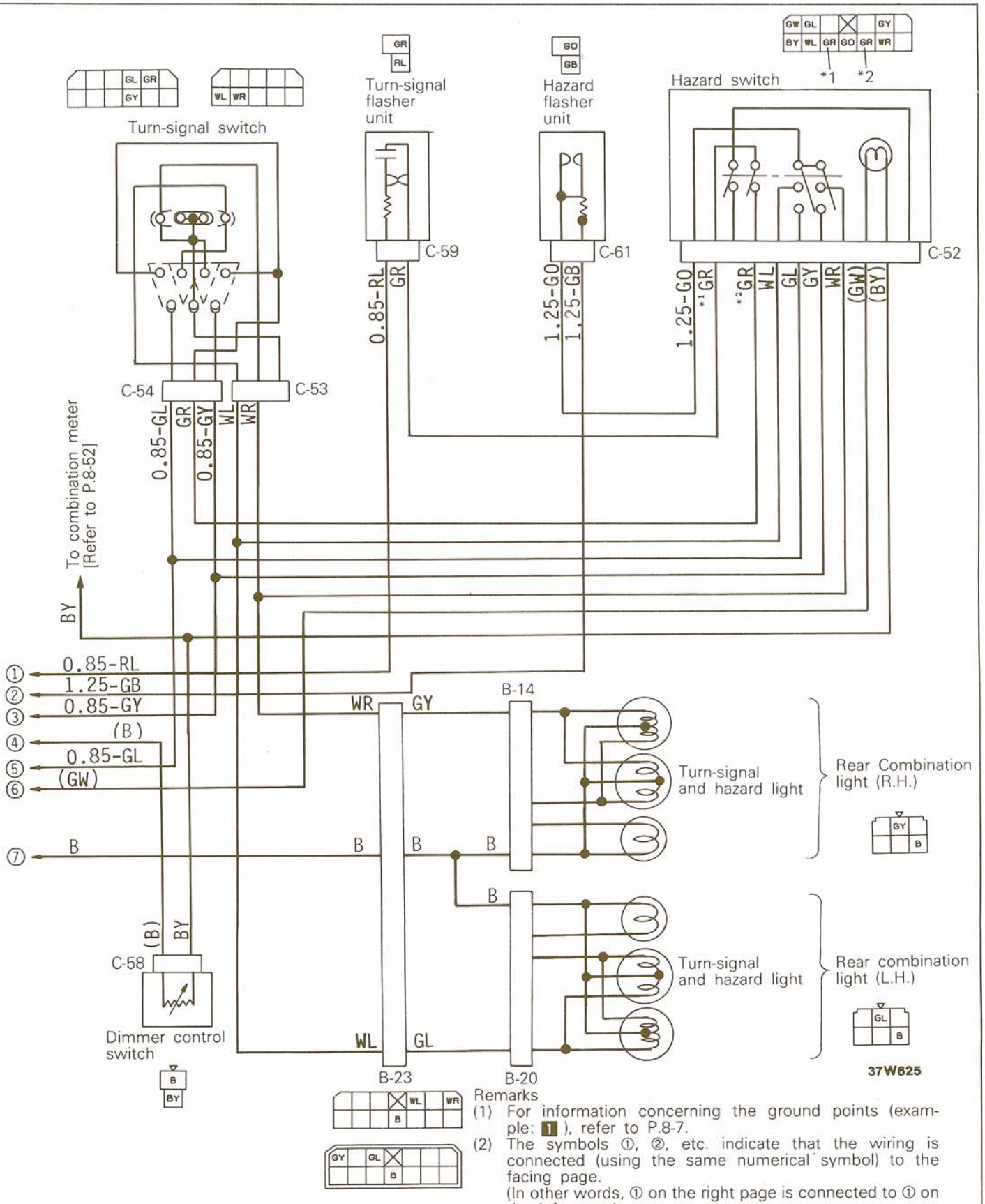
1. Only one backup light does not go on
   - Check bulb.
2. Backup light fail to go off
   - Check backup light switch. — Manual trnasmission vehicles.
   - Check inhibitor switch. — Automatic transmission vehicles

TURN-SIGNAL AND HAZARD LIGHT

CIRCUIT DIAGRAM



N08IHGB



Remarks

(1) For information concerning the ground points (example: 1), refer to P.8-7.

(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

Wiring color code

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

OPERATION

Turn signal Lights

- When the turn signal light switch is at "L.H.", with the igniion switch turned to "ON", current flows through fuse No. 3, turn signal flasher unit, hazard switch, turn signal switch, turn signal light (L.H.)and ground, causing the flasher unit to alternately close and open its contacts.
- The turn-ginal lights (left side) are caused to flash ON and OFF by repeated ON and OFF action of the contacts.
- 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 turn signal flasher unit remains steadily illuminated to warn the driver that bulb replacement is required.

Hazard Warning Lights

- Battery voltage is always applied to the hazard switch through fuse No. 1.
- When the hazard switch is turned "ON", current flows through fuse No. 1 hazard flasher unit , hazard switch, right and left turn signal lights, and ground, causing the hazard flasher unit contacts to close and open repeatedly.
- All turn-singnal lights are caused to flash ON and OFF by repeated On and OFF action of the contacts.
- Both turn signal indicator lights flash at the same time as do the turn signal lights.

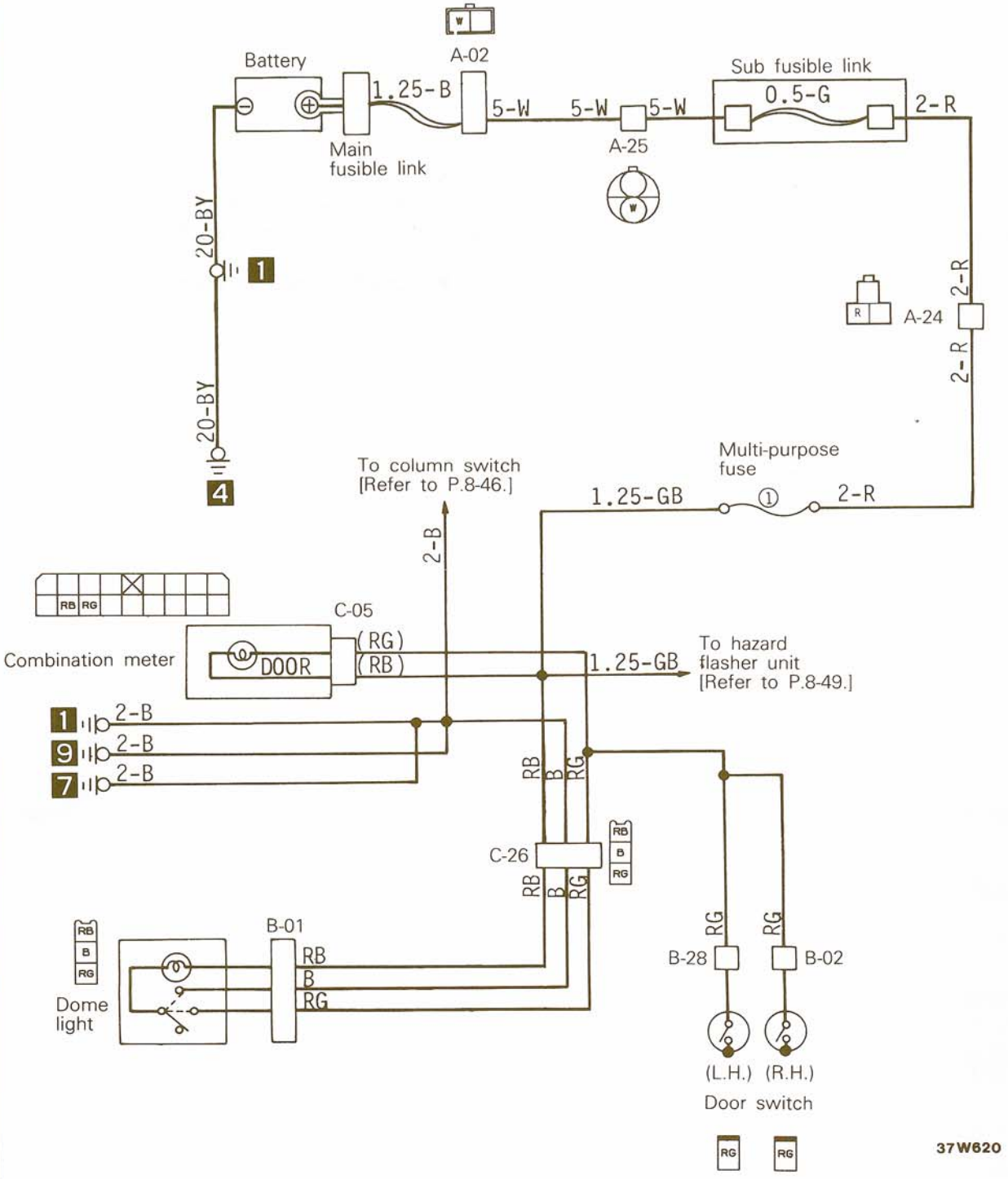
TROUBLESHOOTING HINTS

1. Turn signal lights do not work neither when turn signal switch nor hazard switch is oprated
   - Check hazard warning light switch.
2. The turn-singnal lights don't flash ON and OFF.
   (1) The stop lights illuminate.
   - Check the turn-signal light switch.
   (2) The stop lights do not illuminate.
   - Check the hazard-warning light switch.

DOME LIGHT

N08IHEB

CIRCUIT DIAGRAM



Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

OPERATION

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.
- When the dome light switch is set at "DOOR", battery voltage is applied to the door switchs.
- If any door is opened with the dome light seitch set at "Door", the door switch contats colse, causing current to flow through fuse, dome No.1 light, door switch, and ground so the dome light goes on.

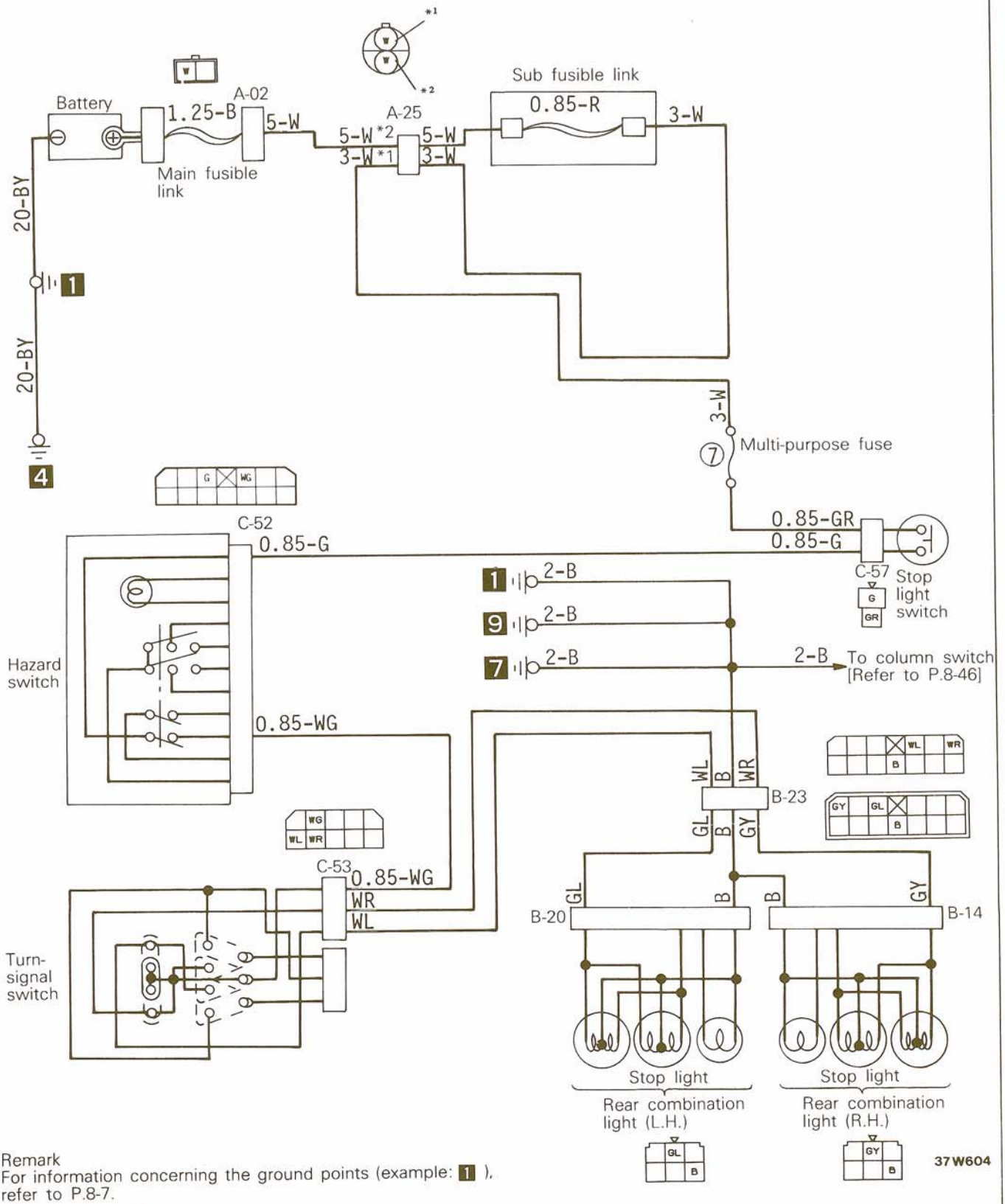
TROUBLESHOOTING HINTS

1. Dome light does not come on
   (1) Clock also does not operate
      - Check fuse.
   (2) Dome light does not come on even when door is opened with dome light switch at "DOOR" position
      - Check bulb.
2. Dome light does not come on when one or more doors are opened even with dome light seitch at "DOOR" positon
      - Check dome light switch.
3. Dome light does not come on when one door is opened even with dome light switch in "DOOR" position
      - Check dome light switch.

STOP LIGHT

N08IHHB

CIRCUIT DIAGRAM



Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

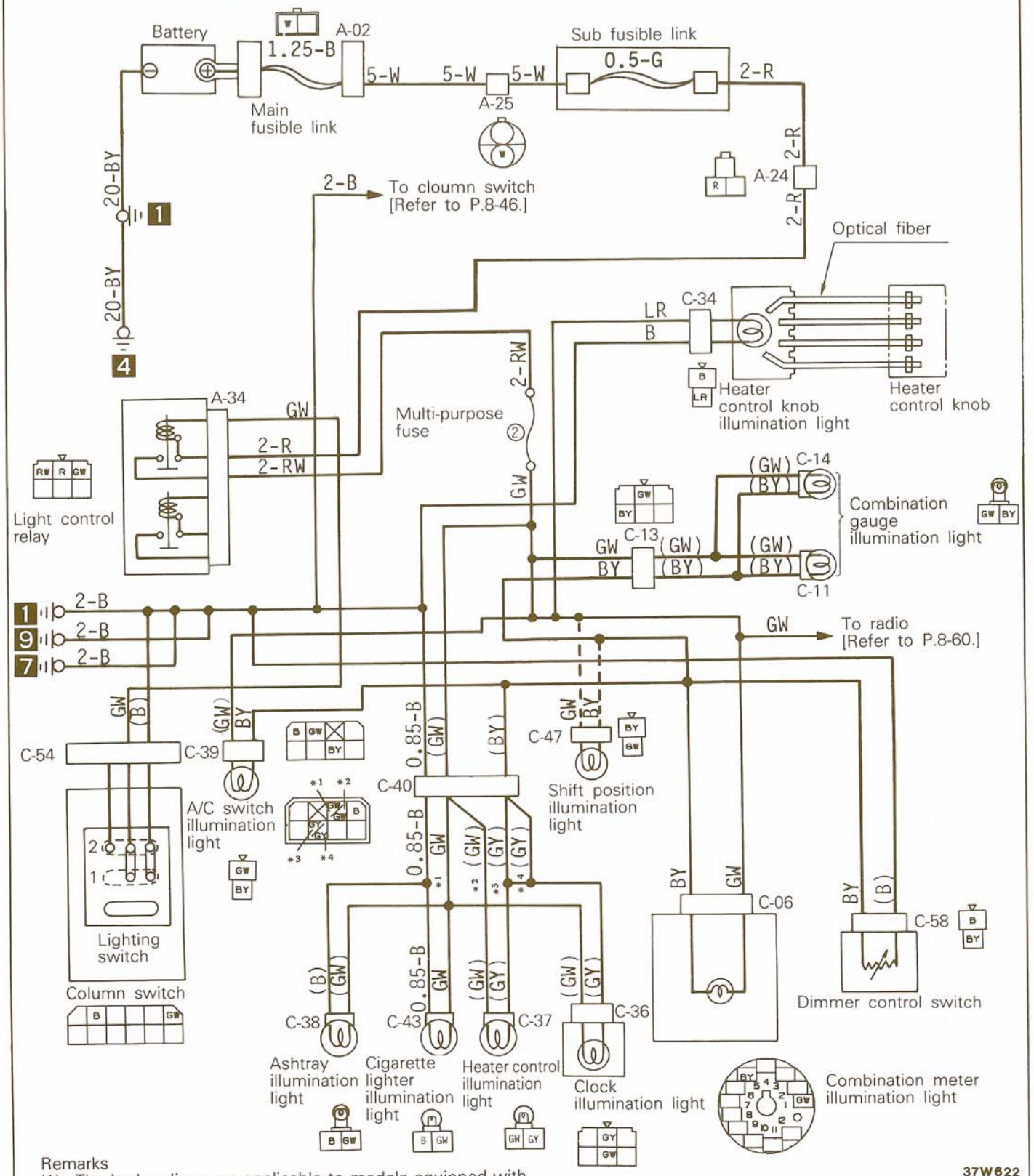
OPERATION

- Battery voltage is always applied to the stop light switch through fusw No. 7.
- When the brake pedal is depressed for braking, the stop light switch contacts are closed so that current flows through fuse No. 7, stop light switch, hazad switch, turn signal switch, stop lights, and ground, causing the stop lights to go on.

TROUBLESHOOTING HINTS

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

INSTRUMENT PANEL ILLUMINATION CIRCUIT



Remarks
(1) The broken lines are applicable to models equipped with an automatic transmission.
(2) For information concerning the ground points (example: 1), refer to P.8-7.

37W622

Wiring color code

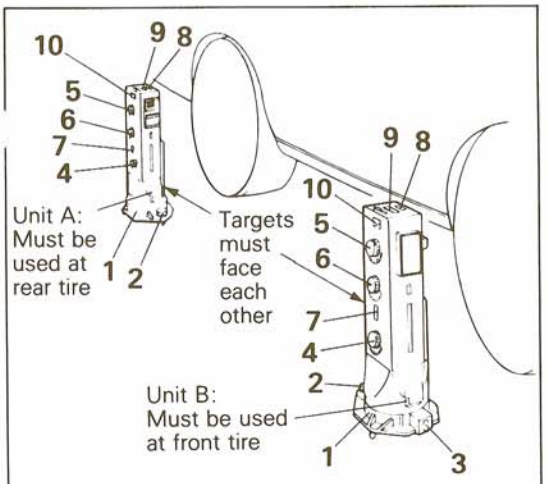
B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

OPERATION

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

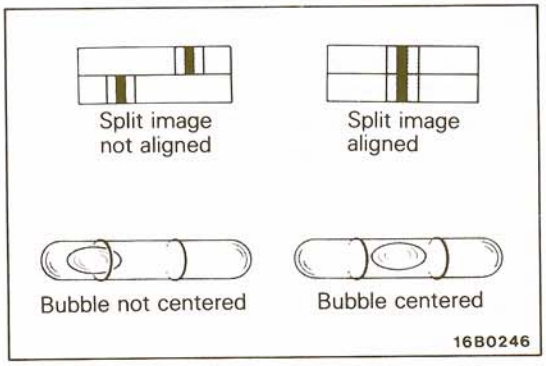
TROUBLESHOOTING HINTS

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



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

16B0245



16B0246

SERVICE ADJUSTMENT PROCEDURES

HEADLIGHT AIMING

N08IIAC

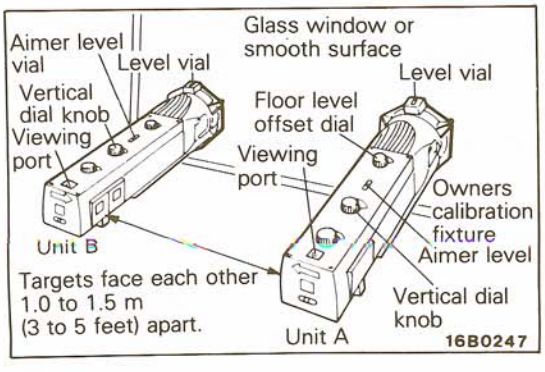
PRE-AIMING INSTRUCTIONS

1. Test dimmer switch operation.
2. Observe operation of high beam indicator 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. Jounce 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. Throughly clean headlight lenses.

COMPENSATING THE AIMERS (C—4466) FOR FLOOR SLOPE

The floor level offset dial must coincide with the floor slope for accurate aiming. Calibration fixtures are included with the aimers.

1. Attach one calibration fixture to each aimer. Fixtures will easily snap into position on aimer when properly positioned.
2. Place aimers at center line of each wheel on one side of vehicle. Unit A must be placed at rear wheel with target facing forward. Unit B must be placed at front wheel with target facing rearward.
3. Adjust thumb adjusting screw on each calibration fixture by turning either clockwise or counterclockwise until level vial bubble registers in a centered level position.
4. Look into top port hole of Unit A. Turn horizontal knob until split image is aligned.
5. Transfer plus or minus reading indicated on horizontal dial to floor level offset dial on each aimer. Press floor level dial inward to set reading.
6. Remove calibration fixtures from both units.



16B0247

TESTING AIMER CALIBRATION

The aimer calibration may be off due to extended use. Calibration fixtures used in conjunction with aimers can be used to check and adjust aimers.

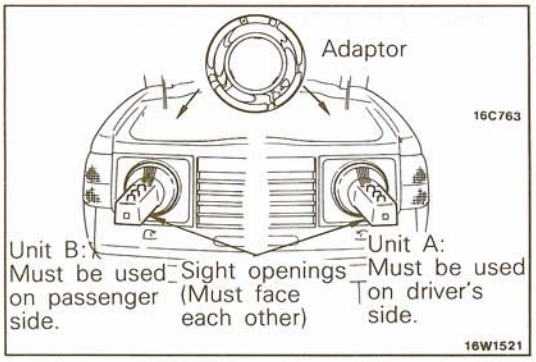
1. Turn thumb adjusting screw on each calibration fixture until it is approximately the same distance as the supporting posts.
2. Attach calibration fixtures to each unit with level vials on top.
3. Locate a true vertical plate glass window or smooth surface and secure aimers 1.0 to 1.5 m (3 to 5 feet) apart so split image targets can be located in viewing ports.

4. Set floor level dial at zero.
5. Rotate thumb adjusting screws on each calibration fixture until level vials on fixtures are centered.
6. With both calibration level vials centered turn vertical dial knobs on each aimer until aimer level vials are centered. If aimer vertical dial pointers read between 1/2 up and 1/2 down, aimers are within allowable vertical tolerance. Recalibrate units if beyond these limits.

Vertical dial pointer reading (on each aimer) :
1/2 up to 1/2 down

7. Adjust horizontal dial knob on each aimer until split image targets align. If aimer horizontal dial pointers read between 1 left and 1 right, the aimers are within allowable tolerance limits. Recalibrate units if beyond these limits.

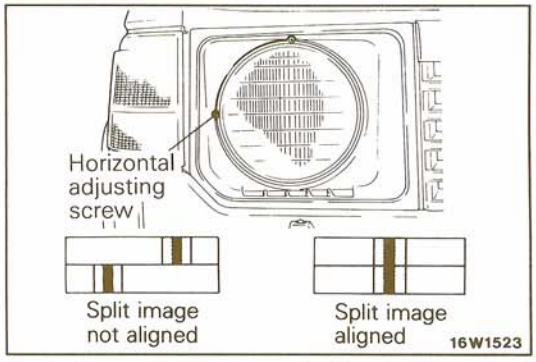
Horizontal dial pointer reading (on each aimer) :
1 left to 1 right



MOUNTING AIMERS

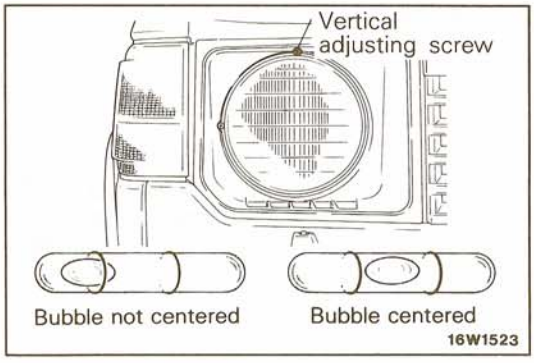
1. Snap proper adaptor into position on each aimer making full contact with aimer mounting flange.
2. Position aimers on headlights by pushing piston handle forward, engaging rubber suction cup. Immediately pull back piston handle until locks in place.

NOTE
Steel inserts are molded into position on the adaptor to insure accuracy. These inserts must be in contact with the three guide points on the lights when the aimers are properly positioned.



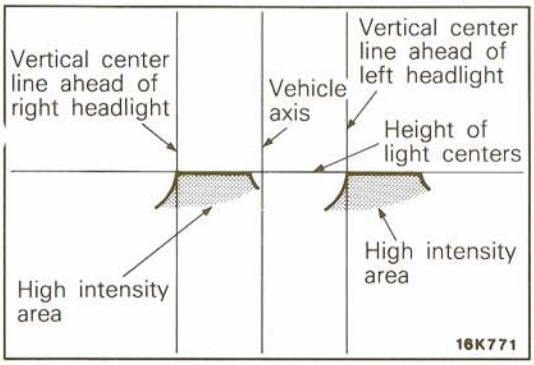
HORIZONTAL ADJUSTMENT

1. Set horizontal dial to zero.
2. Check to see that the split image target lines are visible in the viewing port. If necessary, rotate each aimer slightly to locate the target.
3. Turn horizontal screw on side of headlight until split image of target line appears in mirrors as one solid line. To remove "backlash", make final adjustment by turning adjusting screw in a clockwise direction.
4. Repeat the last three steps on opposite headlight.



VERTICAL ADJUSTMENT

1. The vertical dial should be set at zero. (For passenger vehicles "0" setting is generally required. For special settings, consult local state laws.)
2. Turn vertical adjusting screw until the level bubble is centered between the lines.
3. Repeat the last two steps on the opposite headlight.
4. Re-check target alignment on both aimers and readjust horizontal aim if necessary.
5. Remove aimers by pressing "vacuum release" button located in piston handle.



AIMING WITH SCREEN

HEADLIGHT AIM PREPARATION

Place vehicle on a known level floor 7.6 m (25 feet) from aiming screen or light colored wall. Four lines of adhesive tape or like are required on screen or wall:

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

VISUAL HEADLIGHT ADJUSTMENT

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

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.

Luminous intensity at the center of high intensity zone for high beam.

Limit : 20,000 cd or more

NOTE

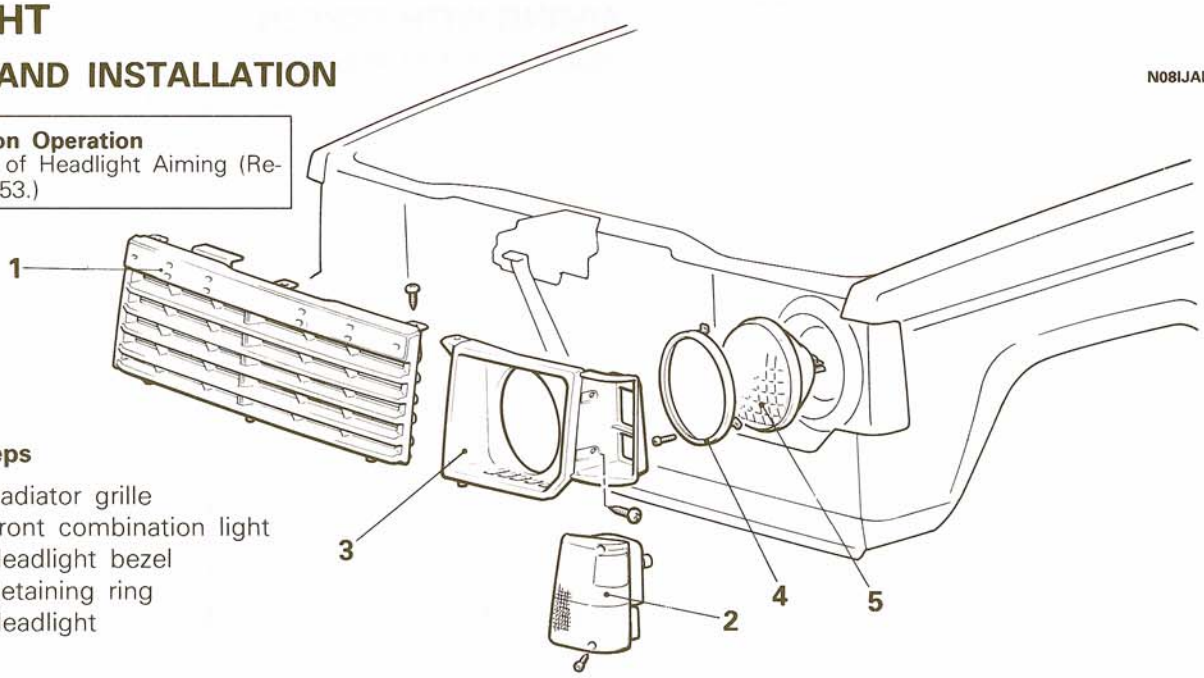
1. When measuring the luminous intensity of headlight, keep the engine at 2,000 rpm and have the battery charged.
2. If there are specific regulations for luminous intensity of headlights in the region where the vehicle is operated, make sure that the intensity conforms to the requirements of such regulations.

HEADLIGHT

REMOVAL AND INSTALLATION

N08IJAE

Post-installation Operation
- Adjustment of Headlight Aiming (Refer to P.8-153.)

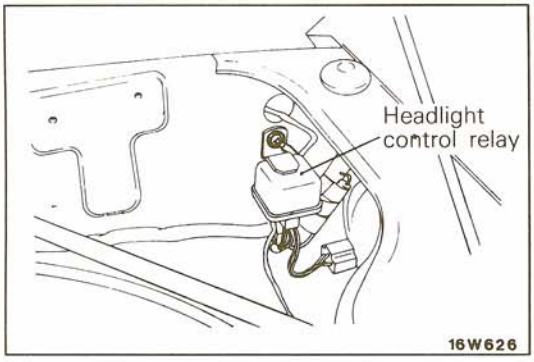


Removal steps

1. Radiator grille
2. Front combination light
3. Headlight bezel
4. Retaining ring
5. Headlight

NOTE
Reverse the removal procedure to reinstall.

16W963

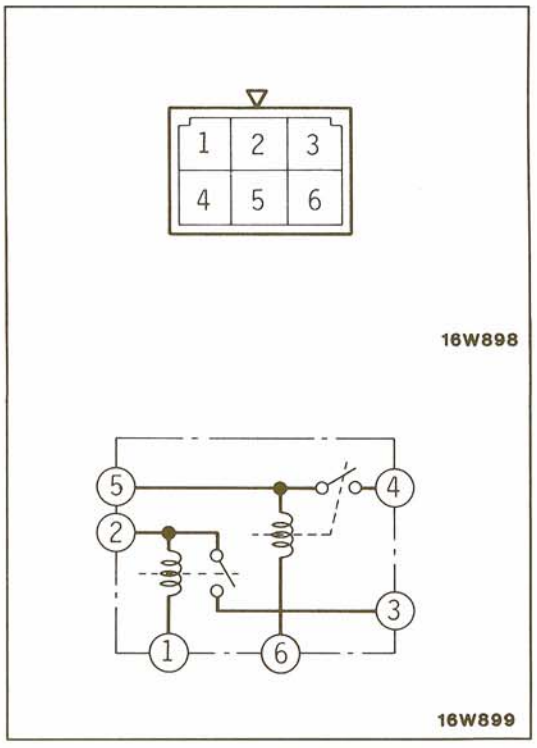


16W626

INSPECTION

HEADLIGHT CONTROL RELAY

Remove the headlight control relay from the inner side of the left fender shield.
For models equipped with headlight washers, remove the headlight washer tank, and then remove the headlight control relay.



16W898

16W899

Check for continuity between the terminals while power is being supplied and while it is not.

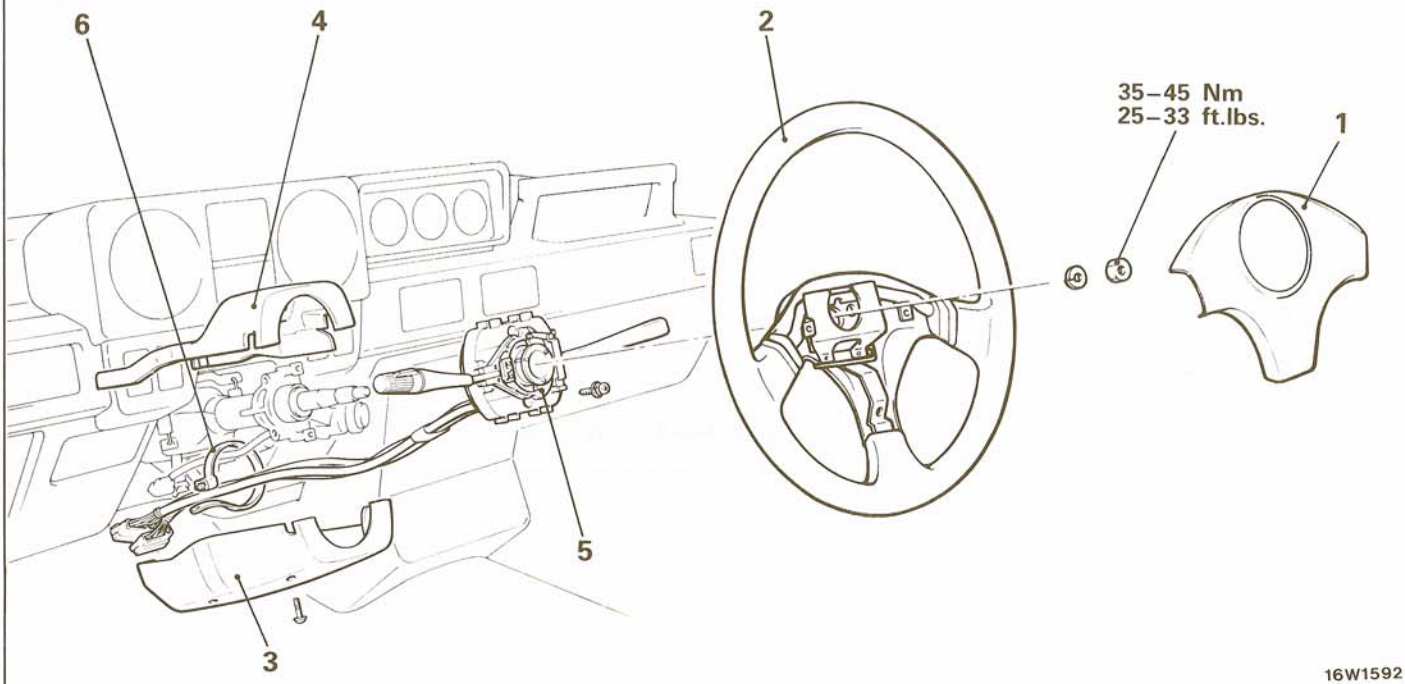
Terminal	1	2	3	4	5	6
Battery voltage not applied	○	○			○	○
Battery voltage applied	⊖	⊕ ○	○	○	⊕ ○	⊖

NOTE
(1) ○—○ indicates that there is continuity between the terminals.
(2) ⊕---⊖ indicates the connection with the power supply.

COLUMN SWITCH

REMOVAL AND INSTALLATION

N08IPAFa

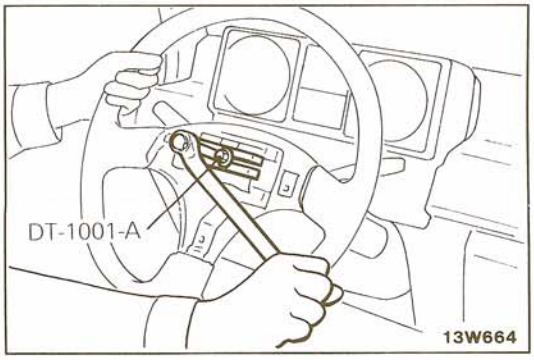


16W1592

Removal steps

1. Steering wheel center pad
◆◆ 2. Steering wheel
3. Lower column cover
4. Upper column cover
5. Column switch
6. Cable band

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

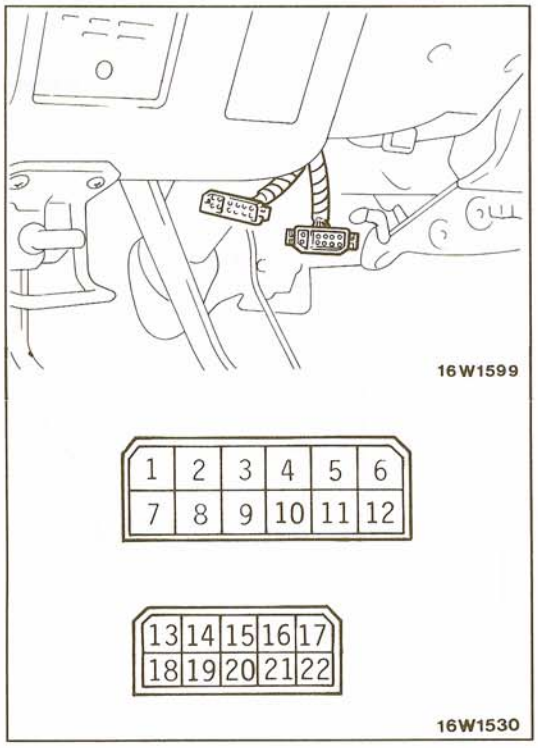


SERVICE POINTS OF REMOVAL

2. REMOVAL OF STEERING WHEEL

Remove the steering wheel by using the special tool.

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



INSPECTION

Remove the steering lower cover, and then detach the connector of the column switch from the wiring harness. Operate the switch and check the continuity between the terminals.

LIGHTING SWITCH

Switch position \ Terminal	1	7	5
OFF			
≡D○	○		○
≡D	○	○	○

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

DIMMER•PASSING SWITCH

Switch position \ Terminal	14	4	10	7
D_1	○	○		
D_2	○		○	
P_1	○ ○	○	 ○	 ○
P_2	○ ○		○ ○	 ○

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

TURN SIGNAL SWITCH

Switch position \ Terminal	2	22	21	16
Left	○	○	○	○
Neutral		○	○	○
Right	○	 ○	○	 ○

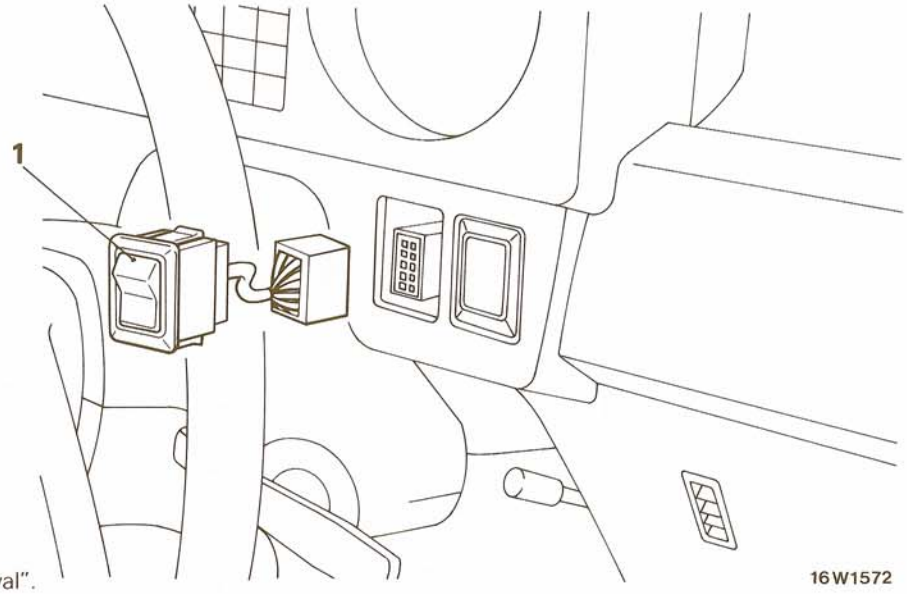
NOTE

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

HAZARD WARNING SWITCH

REMOVAL AND INSTALLATION

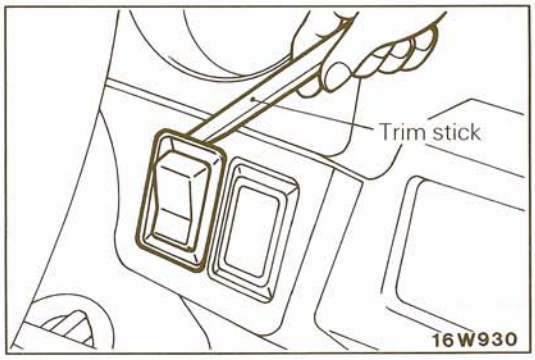
N08IQACa



16W1572

◆◆ 1. Hazard warning switch

NOTE
◆◆ : Refer to "Service Point of Removal".

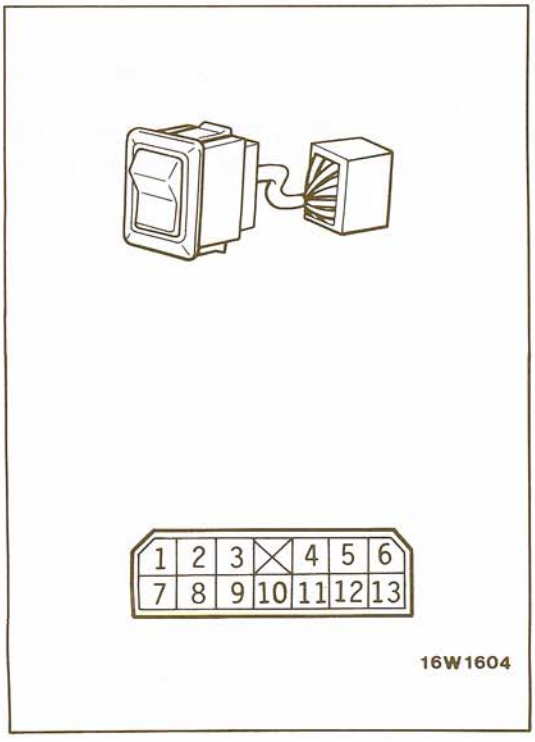


16W930

SERVICE POINTS OF REMOVAL

1. HAZARD WARNING SWITCH

Insert the trim stick into the switch and pry the switch to remove it from the instrument panel.



16W1604

INSPECTION

Operate the switch and check the continuity between the terminals.

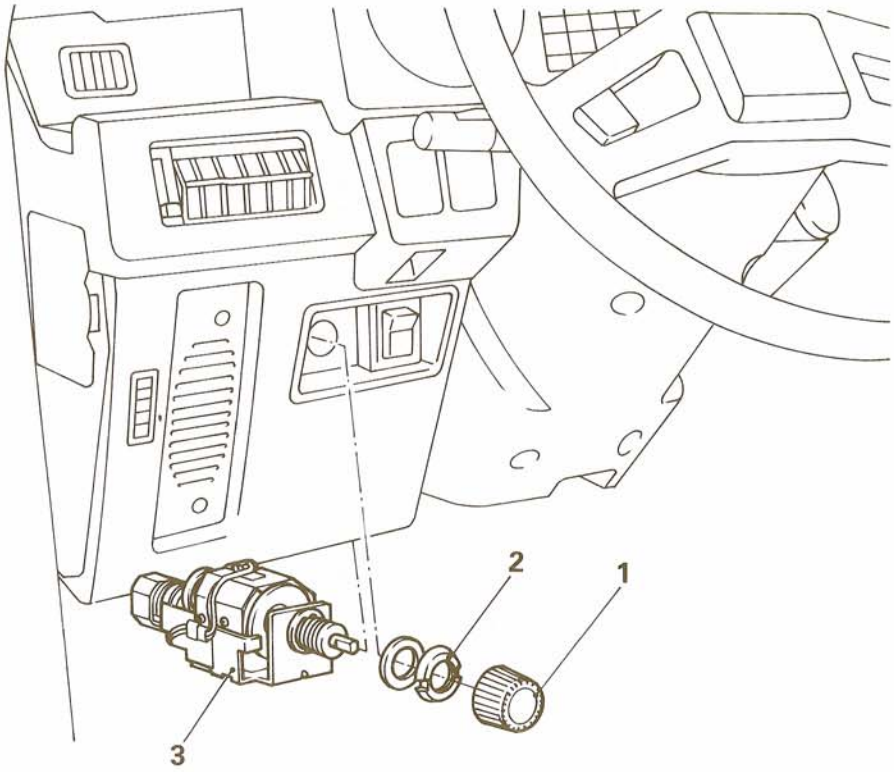
Switch position \ Terminal	10	11	4	3	9	12	5	2	8	6	Indicator light	13
OFF		○	○–○		○					○	○	○
ON	○					○	○	○	○	○	○	○

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

DIMMER CONTROL SWITCH

REMOVAL AND INSTALLATION

N08IRAB

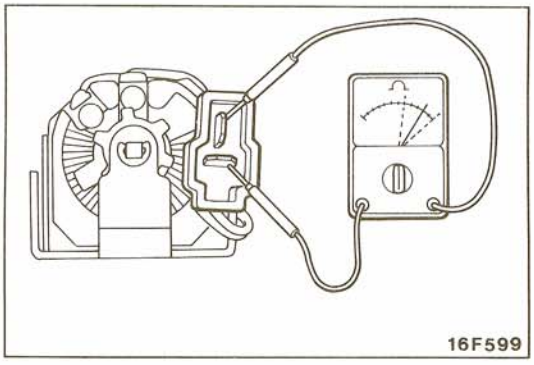


Removal steps

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

NOTE
Reverse the removal procedures to reinstall.

16W936



16F599

INSPECTION

(1) Measure the continuity between the dimmer control switch terminals with an ohmmeter.
(2) If the resistance value varies smoothly between 0 and 10 Ω throughout the entire operation range, the dimmer control switch is functioning properly.

WIPER AND WASHER SYSETM

SPECIFICATIONS

GENERAL SPECIFICATIONS

WINDSHIELD WIPERS AND WASHER

N08KB--

Items	Specifications
Windshield wiper motor	
Type	Permanent-magnet type
Speed control system	Third brush system
Braking system	Dynamic brake system
Revolution no load rpm	
Low speed	50 ± 5
High speed	75 ± 13
Nominal torque Nm (ft.lbs.)	13 (9)
Windshield wiper blade	
Wiping angle	
Driver's side	85.5°
Passenger's side	114°
Wiper blade length mm (in.)	396–401 (15.6–15.8)
Window 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.	
With washer fluid	Max. 20
Nozzle jet pressure kPa (psi)	70 (12.8) or more
Tank capacity lit. (qts.)	1.5 (1.6) or more
Intermittent wiper relay	
Intermittent time sec.	1.5 ± 0.7–10.5 ± 3
Delay time in washer moving sec.	0.4–1.2
Working load W	60

HEADLIGHT WASHER

Items	Specifications
Washer motor and pump	
Motor type	Ferrite magnet type
Pump type	Centrifugal type
Power consumption A	21 or less
Nozzle injection pressure kPa (psi)	180 (25.6) or more
Tank capacity lit. (qts.)	3.5 (3.7)
Headlight washer control unit	
Time setting sec.	0.52
Check valve	
Valve opening and closing pressure kPa (psi)	49–108 (7.1–15.6)

COLUMN SWITCH

Items	Specifications
Wiper-washer switch	
Wiper switch	
Rated load A	
Low	3.5
Intermittent	0.17–0.27
High	4.5
Lock	18
Voltage drop (at 12V and the rated load) V	0.2 or less
Washer switch	
Rated load A	3
Voltage drop (at 12V and the rated load) V	0.5 or less
Headlight washer switch	
Rated load A	0.5
Voltage drop (at 12V and the rated load) V	0.2 or less

REAR WIPER AND WASHER

Items	Specifications
Wiper motor	
Motor type	Ferrite magnet type
Braking system	Dynamic braking sytem
Revolution under no-load rpm	40 ± 5
Nominal torque Nm (ft.lbs.)	8 (6)
Wiper blade	
Wiping angle	108°
Blade length mm (in.)	380–385 (15.0–15.2)
Window 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.	
With washer fluid	Max. 60
Empty operation	Max. 20
Nozzle jet-spray pressure kPa (psi)	78 (11.4) or more
Tank capacity lit. (qts.)	1.1 (1.2) or more

REAR WIPER AND WASHER SWITCH

Items	Specifications
Rated load A	
Wiper switch	3
Washer switch	5
Voltage drop (at 12V and the rated load) V	0.1 or less

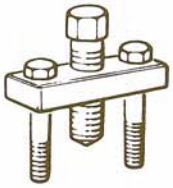
TORQUE SPECIFICATIONS

N08KD--

Items	Nm	ft.lbs.
Windshield wiper pivot shaft installing nut	10–16	7–12
Windshield wiper arm locking nut	10–16	7–12
Windshield wiper motor	7–10	5–7
Steering wheel lock nut	35–45	25–33
Rear wiper pivot shaft installing nut	8–12	6–9
Rear wiper arm locking nut	7–10	5–7
Rear wiper motor	7–10	5–7

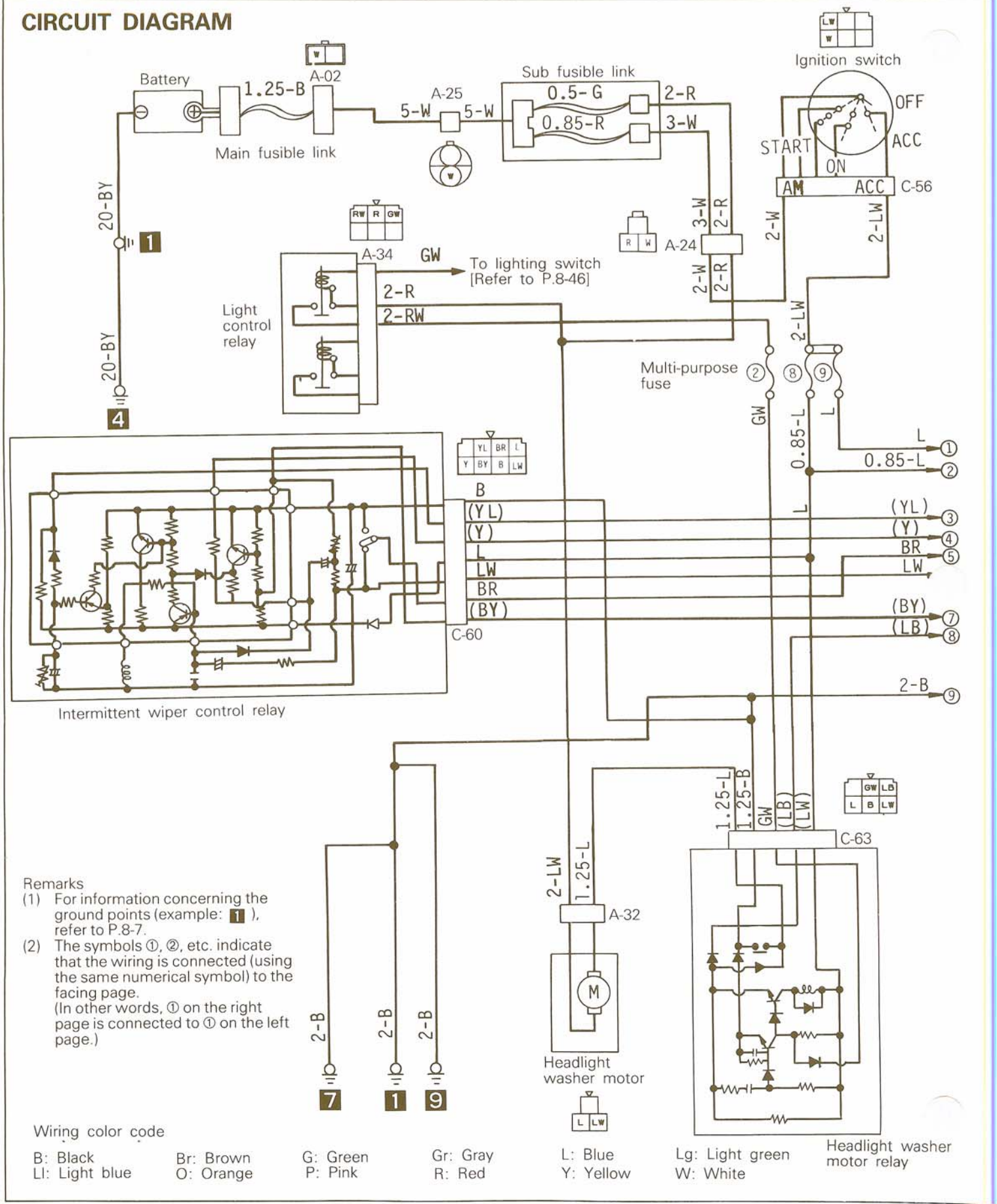
SPECIAL TOOLS

N08KG-A

Tool (Number and name)	Use
DT-1001-A Steering wheel puller 	Removal of steering wheel

TROUBLESHOOTING

CIRCUIT DIAGRAM

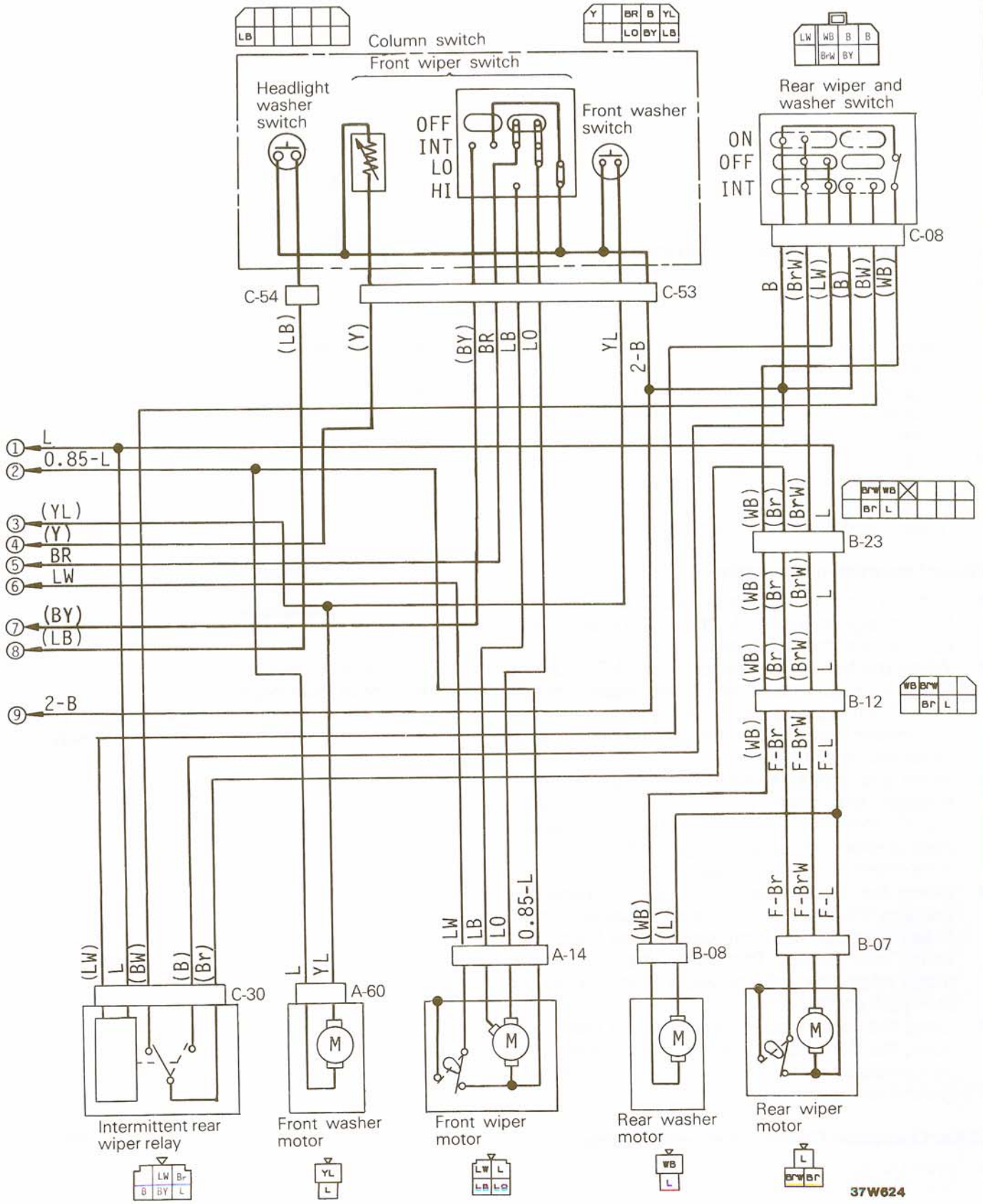


Remarks
(1) For information concerning the ground points (example: 1), refer to P.8-7.
(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green	W: White
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow		

N08KHAB


Column switch
Front wiper switch
Headlight washer switch
OFF
INT
LO
HI
Front washer switch
Rear wiper and washer switch
ON
OFF
INT
C-08
C-54
C-53
(LB)
(Y)
(BY)
BR
LB
LO
YL
2-B
B
(BrW)
(LW)
(B)
(BW)
(WB)
① L
② 0.85-L
③ (YL)
④ (Y)
⑤ BR
⑥ LW
⑦ (BY)
⑧ (LB)
⑨ 2-B
B-23
B-12
B-08
B-07
A-14
A-60
C-30
(WB)
(Br)
(BrW)
F-Br
F-BrW
F-L
(L)
LW
0.85-L
(LW)
(BW)
(Br)
Intermittent rear wiper relay
Front washer motor
Front wiper motor
Rear washer motor
Rear wiper motor
37W624

WINDSHIELD WIPERS AND WASHER

OPERATION

Wiper Low-speed and High-speed Operation

- When the front wiper switch is at "LO" with the ignition switch at either "ACC" or "ON", current flows through fuse No. 8, front wiper motor (low-spped brush), front wiper switch and ground; the wipers operate at low speed.
- When the front wiper switch is at "HI", current flows through fuse No. 8, front wiper motor (high-speed brush), front wiper switch, and ground; the wipers operate at high speed.

Wiper Automatic Stopping Operation

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

Wiper Intermittent operation

- With the ignition switch at "ACC" or "ON", battery voltage is applied to the intermittent wiper control relay through fuse No. 8.
- When the front wiper switch is at "INT", current flows through the intermittent wiper control relay, front wiper switch, and ground, and the intermittent wiper control relay internal contacts close and open repeatedly.
- While the contacts are closed, current flows through the front wiper motor (low-speed brush), front wiper switch, intermittent wiper control relay (contacts), and ground, causing the front wiper motor to operate.
- When the front wiper motor starts operating, the relay internal contacts open, causing current to flow through the front wiper motor (cam contacts), and ground. This keeps the front wiper motor operating until the wiper blades return to their park positions.
- Once the wiper blades have reached park positions, the front wiper motor cam moves to open its contacts. This interrupts flow of current to ground so the front wiper motor shops.

Wiper Operation Coordinated with Washer

- With the ignition key at the "ACC" or "ON" position, voltage is supplied, thrugh fuse No. 8 and the front washer motor, to the front washer switch.
- When the front washer switch is switched ON, current flows to fuse No. 8, the front washer motor, the front washer switch, and ground, and, at the same time that the front washer operates, the intermittent wiper control relay is switched ON, and current flows to fuse No. 8, the front wiper motor (low-speed brushes), the front wiper switch, the intermittent wiper control relay, and ground, and the front wiper motor is activated.

TROUBLESHOOTING HINTS

1. Wipers do not operate
   (1) Washer also does not operate
      - Check fuse.
      - Check for ground connection.
2. Wipers do not operate at low speed (or high speed)
   - Check front wiper switch.
3. Wipers do not poerate in intermittent mode
   - Check intermittent wiper control relay terminal voltage with relay energized.

Terminal	Voltage	Check location
3	0 V	Front wiper switch
	12 V	Intermittent wiper control relay
	Changes between 0 V and 12 V repeatedly	– (Normal)

4. Wipers fail to stop
   - Check front wiper motor.
5. Wipers do not operate coordinated with washer
   - Check intermittent wiper control relay.

OPERATION

Wiper Operation

- When the wiper switch is at "ON" with the ignition switch at either "ACC" or "ON", currnet flows through fuse No. 9, rear wiper motor rear wiper switch and ground; the wiper operate.

REAR WIPERS AND WASHER

OPERATION

Wiper Automatic Stopping Operation

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

Wiper Intermittent Operation

- With the ignition switch at "ACC" or "ON", battery voltage is applied to the intermittent rear wiper relay through fuse No. 9.
- When the rear wiper switch is at "INT", current flows through the intermittent rear wiper relay, rear wiper switch, and ground, and the intermittent rear wiper relay internal contacts close and open repeatedly.
- While the contacts are closed, current flows through the rear wiper motor, rear wiper switch, intermittent rear wiper relay (contacts), and ground, causing the rear wiper motor to operate.
- When the rear wiper motor starts operating, the relay intermal contacts open, causing current to flow through the rear wiper motor (cam contacts), and ground. This keeps the rear wiper motor operating until the wiper blade return to their park positions.
- Once the wiper blade has reached park positions, the rear wiper motor cam moves to open its contacts. This interrupts flow of current to ground so the wiper motor shops.

Rear washer operation

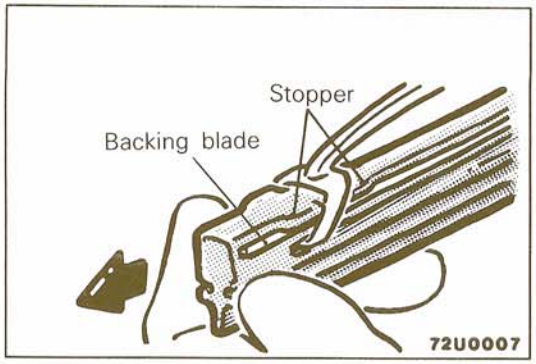
- With the ignition key at the "ACC" or "ON"position, voltage is applied, through fuse No. 9 and the rear washer motor, to the rear washer switch.
- When the rear washer switch is switched ON, currenat flows to fuse No.9, the rear washer motor,the rear washer switch, and ground, and the rear washer begins operation.

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
3	0 V 12 V Changes between 0 V and 12 V repeatedly	Rear wiper switch Intermittent wiper relay - (Normal)

3. Wipers fail to stop
   - Check wiper motor.

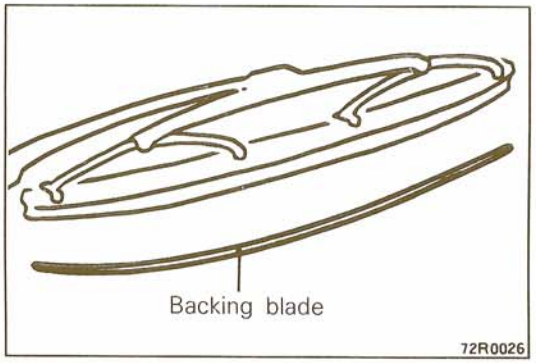


SERVICE ADJUSTMENT PROCEDURES

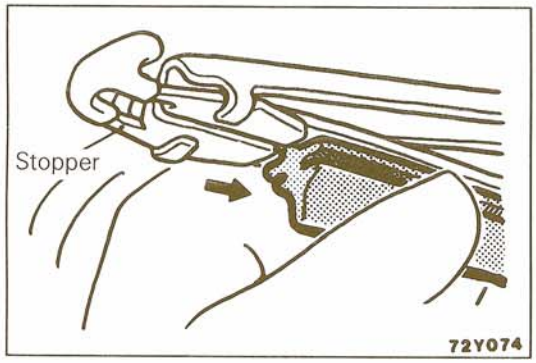
WIPER BLADE RUBBER REPLACEMENT N08KIAA

WINDSHIELD WIPER

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

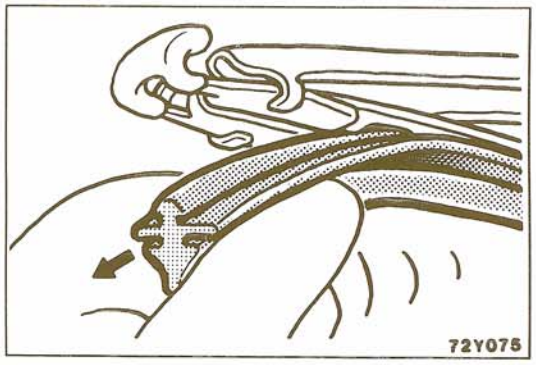


2. Remove the backing blade from the rubber.
3. To attach a new rubber, assemble the rubber and backing blade, insert from the direction opposite the stopper, and secure by the stopper. Note that, because the backing blade is curved, installation should be as shown in the figure.



REAR WIPER

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

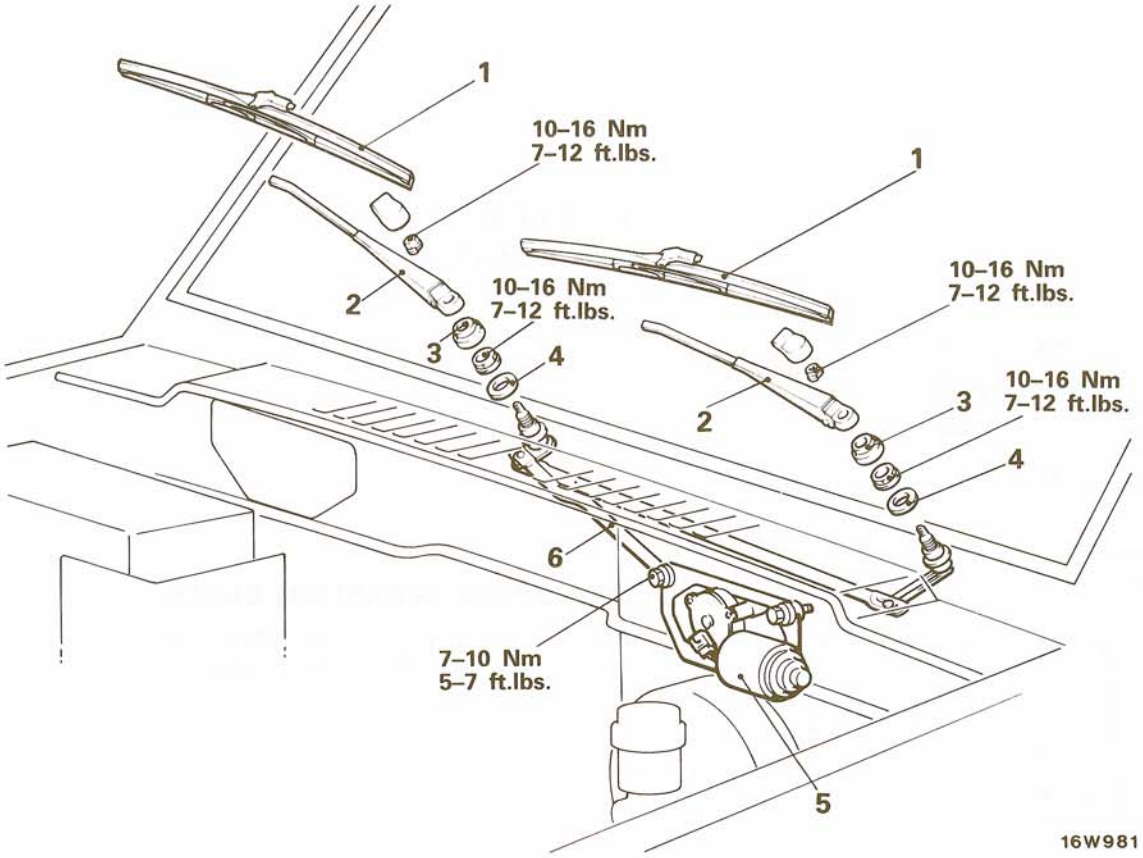


2. Pull out the wiper blade rubber, and then remove the blade rubber.
3. Installation of the new blade rubber is the reverse procedure of removal.

WINDSHIELD WIPERS

REMOVAL AND INSTALLATION

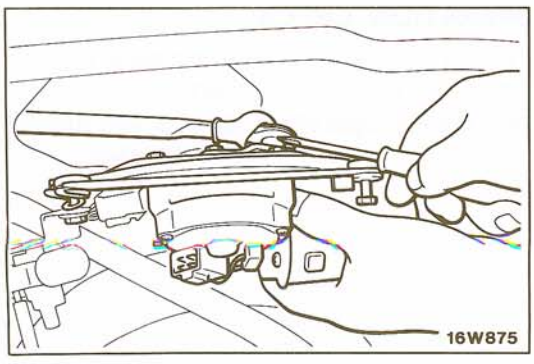
N08KJAD



Removal steps

1. Wiper blades
2. Wiper arms
3. Wiper pivot shield caps
4. Wiper pivot collars
5. Wiper motor
6. Wiper link

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

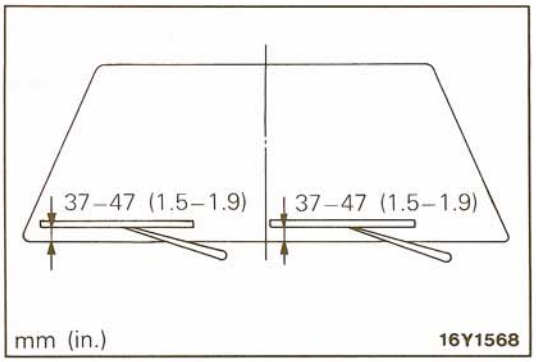


SERVICE POINTS OF REMOVAL

5. WIPER MOTOR

Uncouple the linkage and motor (with the wiper motor pulled slightly outward).

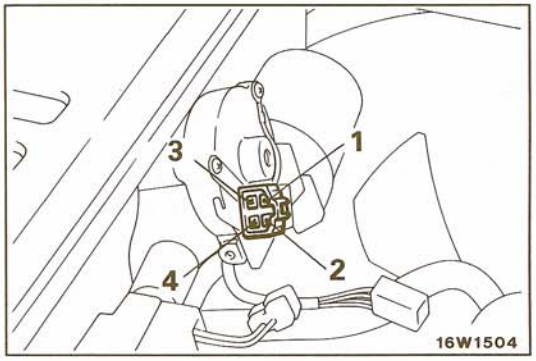
Caution
Because the installation position of the crank arm and the motor determine the wiper auto stop angle, do not disassemble them unless it is necessary to do so. If the crank arm must be removed from the motor, remove it only after marking their mounting positions.



SERVICE POINTS OF INSTALLATION

2. INSTALLATION OF WIPER ARMS

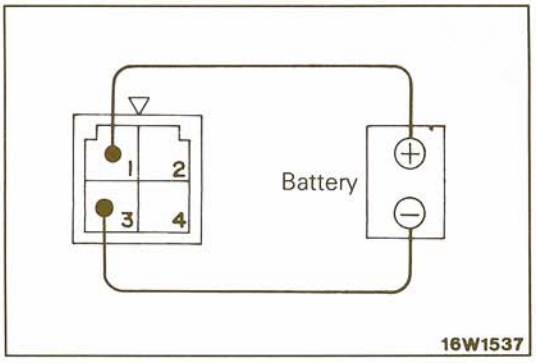
Install the wiper arm to the pivot shaft so that the wiper blade's stop position is the position shown in the illustration.



INSPECTION

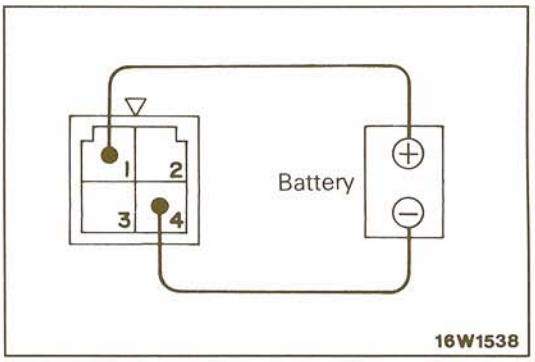
WIPER MOTOR

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



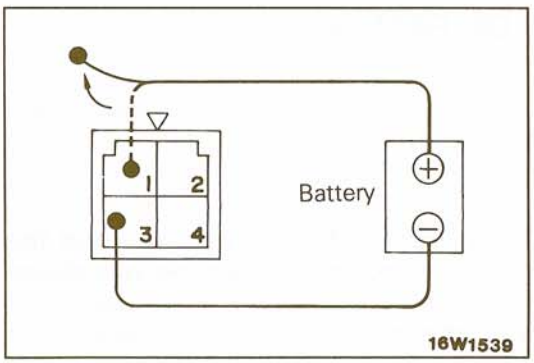
LOW SPEED OPERATION CHECK

Connect battery (+) to terminal 1 and battery (−) to terminal 3 and check that the motor runs at low speed.



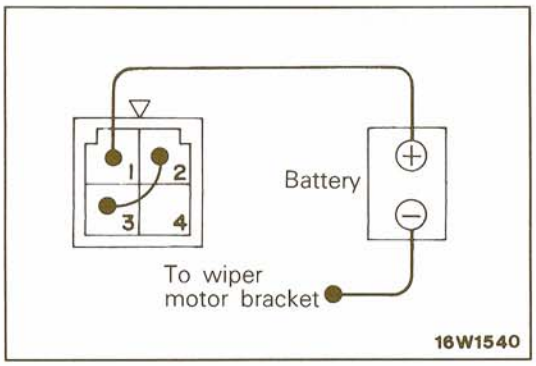
HIGH SPEED OPERATION CHECK

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

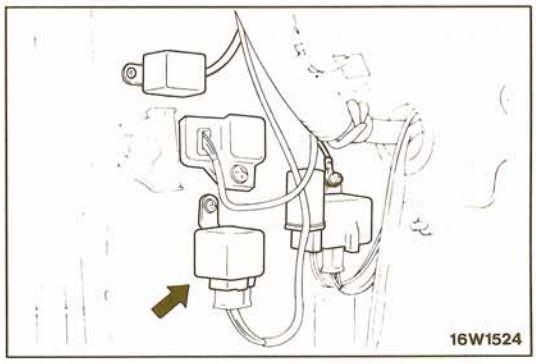


AUTOMATIC STOP OPERATION CHECK

(1) Connect battery (+) to terminal 1 and battery (−) to terminal 3 to run the motor at low speed.
(2) Disconnect terminal 1 during operation to stop the motor.

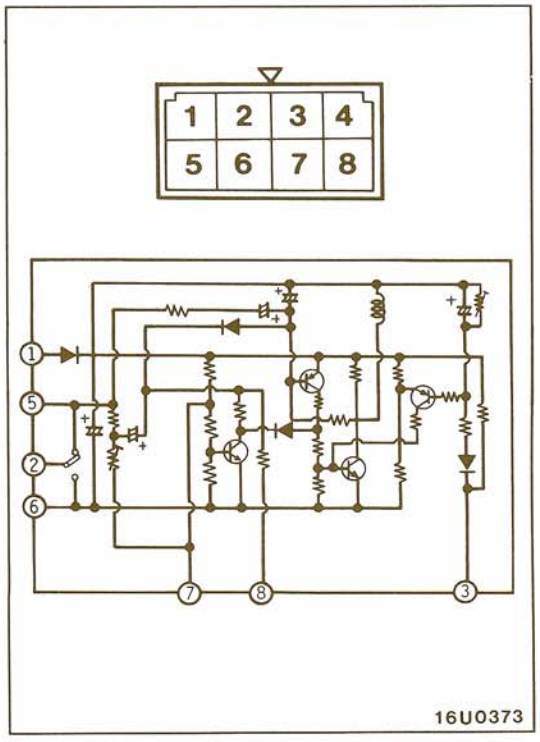


(3) Connect terminal 2 to terminal 3 and connect battery (+) to terminal 1 and battery (−) to the wiper motor bracket to check that the motor starts to run at low speed and then stops.



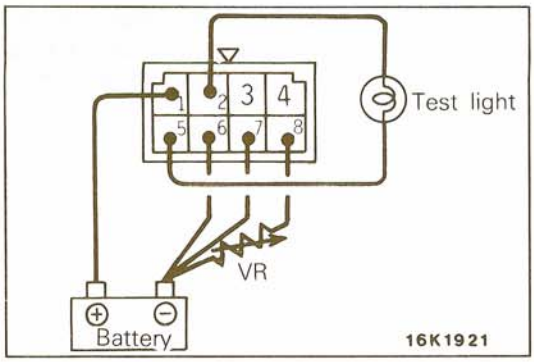
INTERMITTENT WIPER RELAY

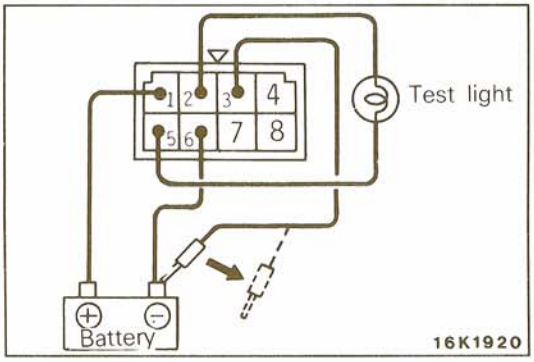
Remove the intermittent wiper relay (located at the upper part of the left side cowl side trim).



CONTINUITY CHECK

Check to see that there is continuity between terminals 2 and 5.





INTERMITTENT OPERATION CHECK

(1) Connect the battery and the test light to the relay, as shown in the figure.
(2) Insert a variable resistance between terminal 8 and battery (–) (VR = 0–50 kΩ)
(3) The condition is normal if, when the battery's negative (–) terminal is connected to terminal 7, the test light illuminates at the same time, and thereafter, in accordance with the value of the variable resistance, stops illumination (approx. 1.5 sec. – approx. 10.5 sec.) and then illuminates (approx. 1 sec.) over and over again.

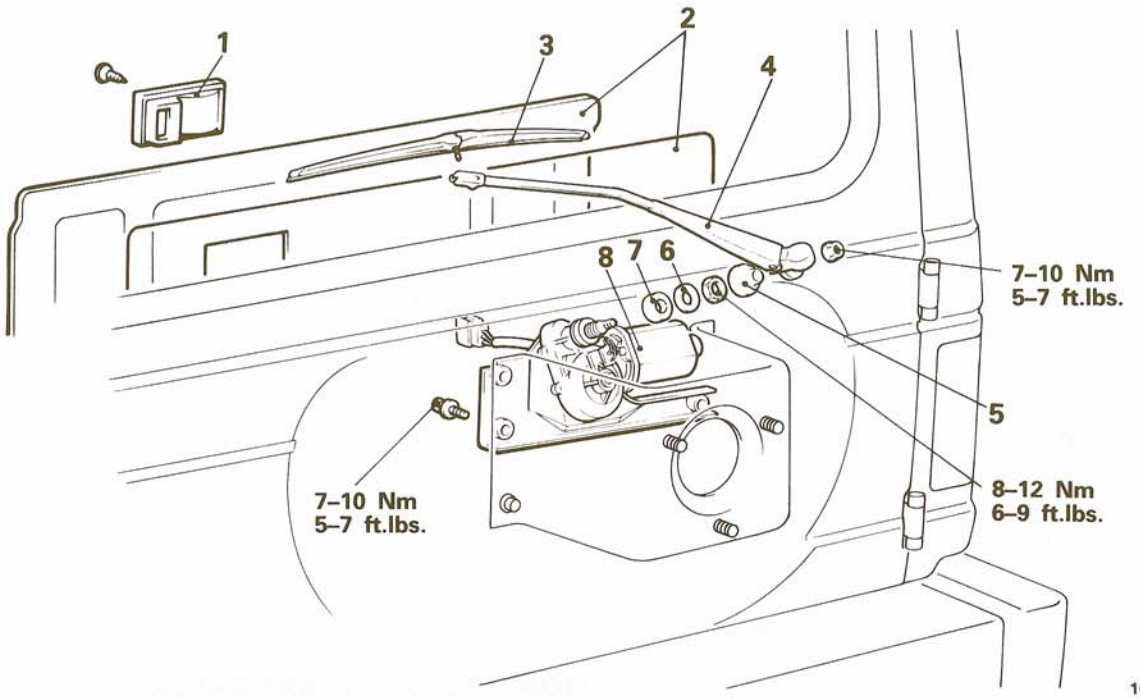
WASHER INTERLOCK OPERATION CHECK

(1) Connect the battery and the test light to the relay, as shown in the figure.
(2) When terminal 3 is connected to the battery's negative (–) terminal, the test light will illuminate approximately 1 second thereafter, and then there will be a release for about seconds after connecting to the battery's negative (–) terminal.
(3) The condition is normal if about 3 seconds thereafter the test light stops illumination.

REAR WIPER

REMOVAL AND INSTALLATION

N08KKAC



16W982

Removal steps

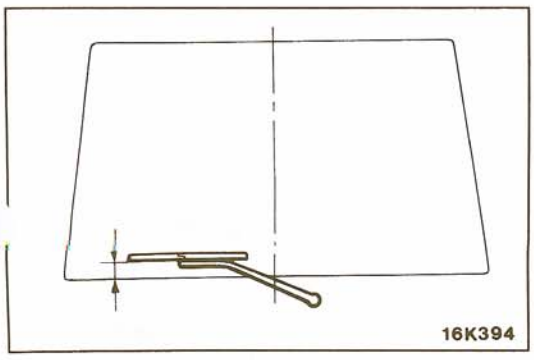
1. Inside handle cover
2. Back door trim and waterproof film
3. Wiper blade
4. Wiper arm
5. Wiper pivot cap
6. Wiper pivot washer
7. Wiper pivot packing
8. Wiper motor

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

SERVICE POINTS OF REMOVAL

2. REMOVAL OF BACK DOOR TRIM AND WATERPROOF FILM

Refer to GROUP 23 BODY – Back Door Trim and Waterproof Film.



16K394

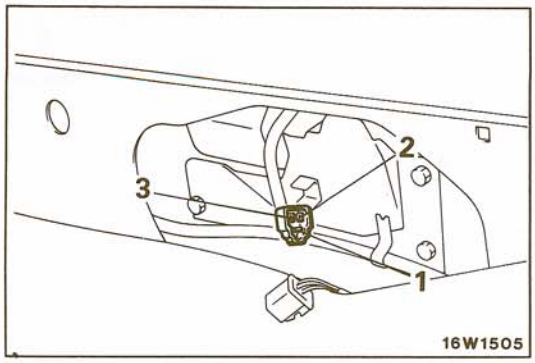
SERVICE POINTS OF INSTALLATION

3. INSTALLATION OF WIPER BLADE

Install the wiper arm so that the wiper blade is parallel to the lower edge of the window glass.

2. INSTALLATION OF BACK DOOR TRIM AND WATERPROOF FILM

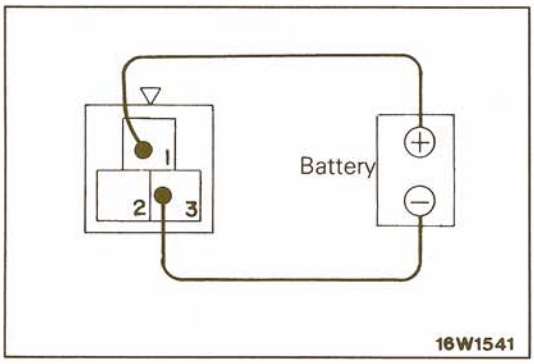
Refer to GROUP 23 BODY – Back Door Trim and Waterproof Film.



INSPECTION

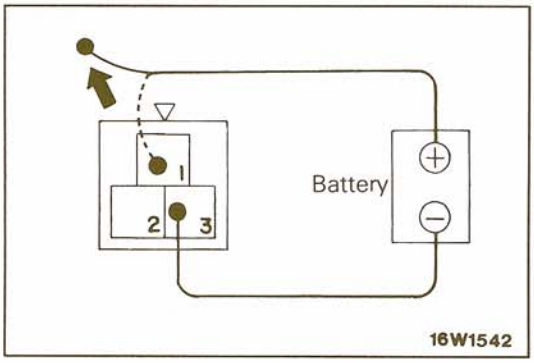
WIPER MOTOR

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



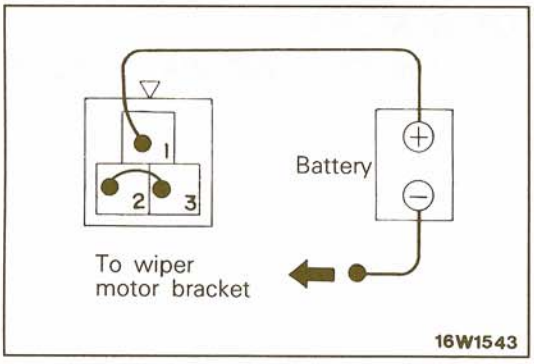
OPERATION CHECK

Connect battery (+) to terminal 1 and battery (−) to terminal 3 to check that the motor runs.



AUTOMATIC OPERATION CHECK

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

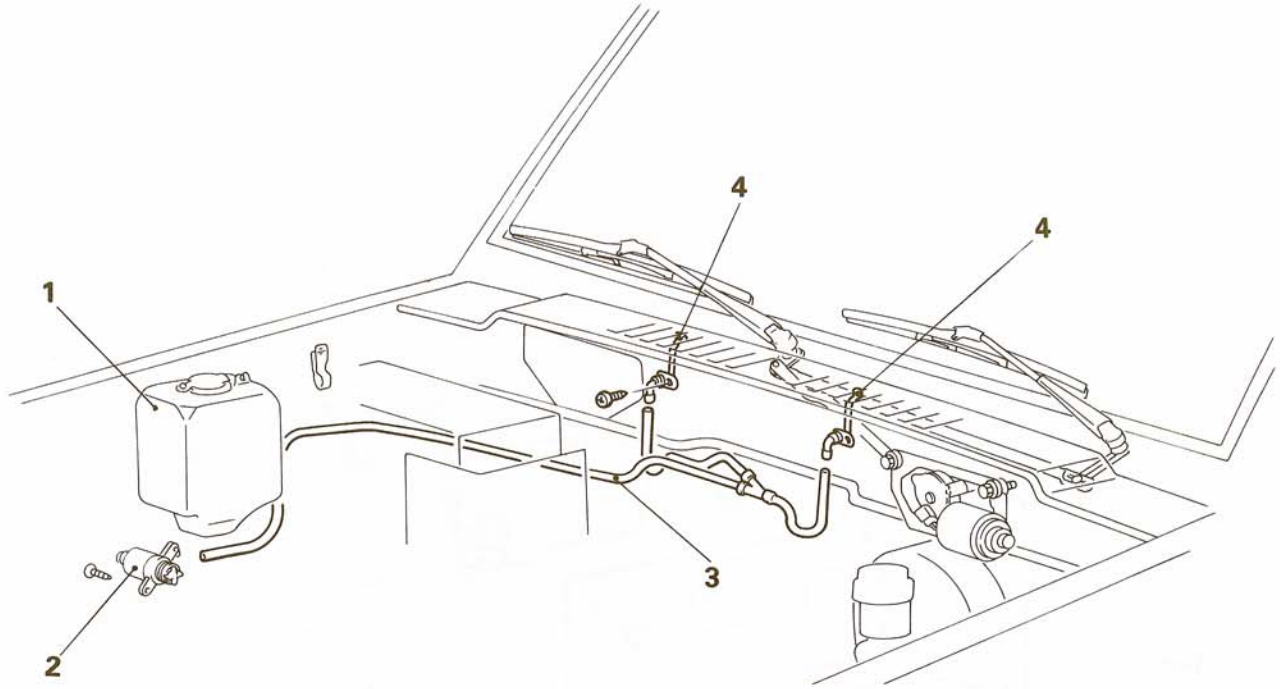


(3) Connect terminal 2 to terminal 3 and connect battery (+) to terminal 1 and battery (−) to wiper motor bracket to check that the motor starts to run again and then stops.

WINDSHIELD WASHER

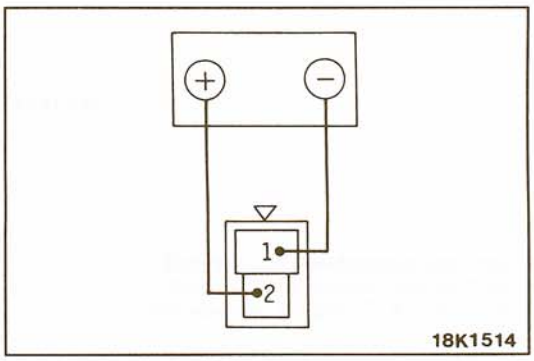
REMOVAL AND INSTALLATION

N08KLAD



16W1556

1. Windshild washer tank
2. Washer motor and pump
3. Washer tube
4. Washer nozzle



18K1514

INSPECTION

WASHER MOTOR AND PUMP

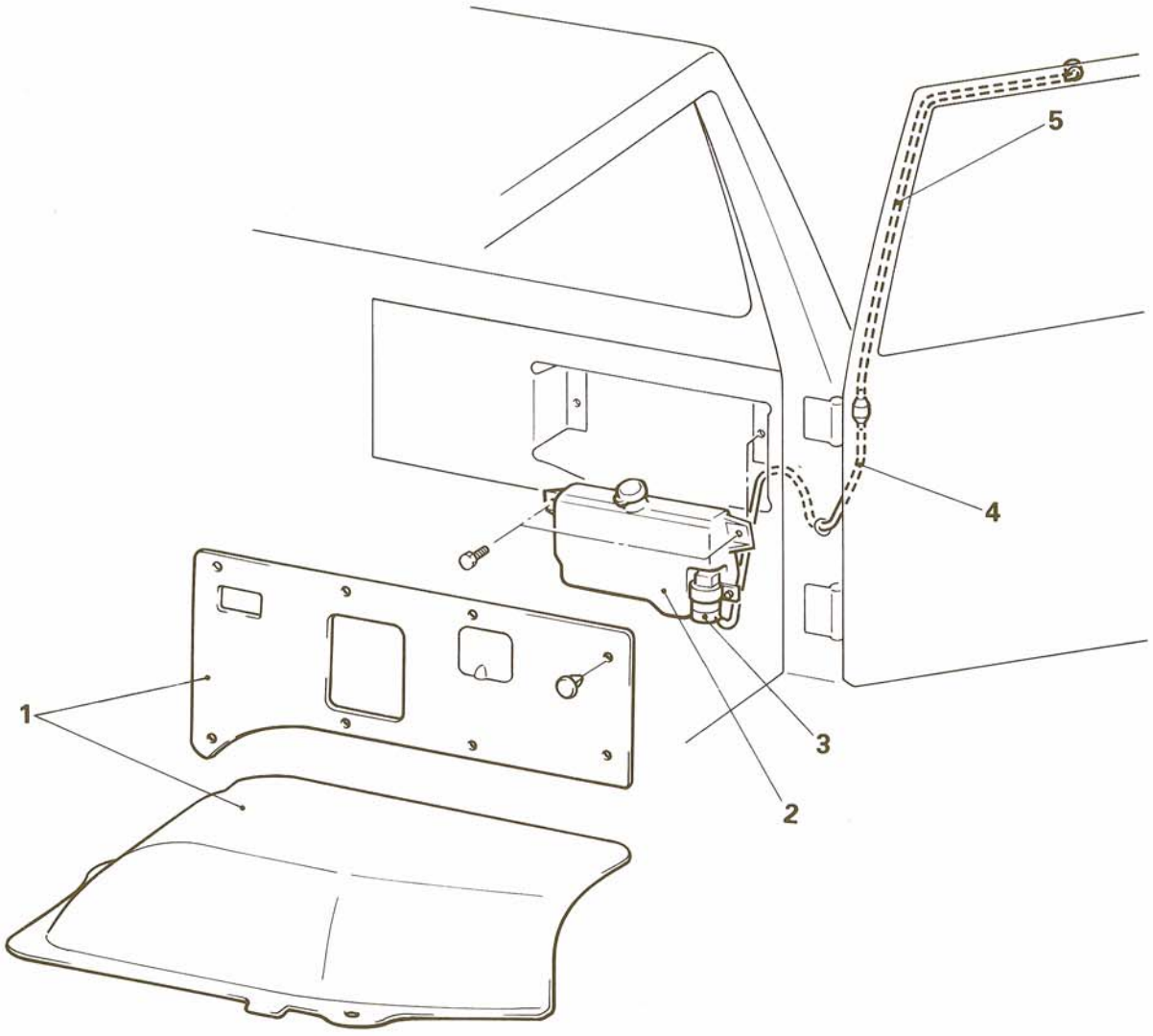
Make the check while the motor is installed to the washer tank.

(1) Check to be sure that there is washer fluid in the washer tank.
(2) Check to be sure that the washer motor operates and the fluid is forced out under pressure when the battery's positive (+) terminal is connected to terminal 2 and the negative (−) terminal is connected to terminal 1.

REAR WASHER

REMOVAL AND INSTALLATION

N08KLCA



16W1559

Removal steps

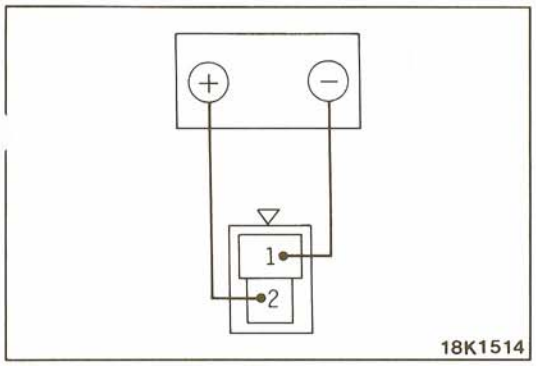
◀▶ ▶◀ 1. Rear wheelhouse trim and quarter trim
2. Rear washer tank
3. Washer motor and pump
4. Washer tube
5. Washer nozzle and tube

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

SERVICE POINTS OF REMOVAL

1. REMOVAL OF REAR WHEELHOUSE TRIM AND QUARTER TRIM

Refer to GROUP 23 BODY – Trims.



INSPECTION

WASHER MOTOR AND PUMP

Make the check while the motor is installed to the washer tank.

(1) Check to be sure that there is washer fluid in the washer tank.
(2) Check to be sure that the washer motor operates and the fluid is forced out under pressure when the battery's positive (+) terminal is connected to terminal 2 and the negative (−) terminal is connected to terminal 1.

SERVICE POINTS OF INSTALLATION

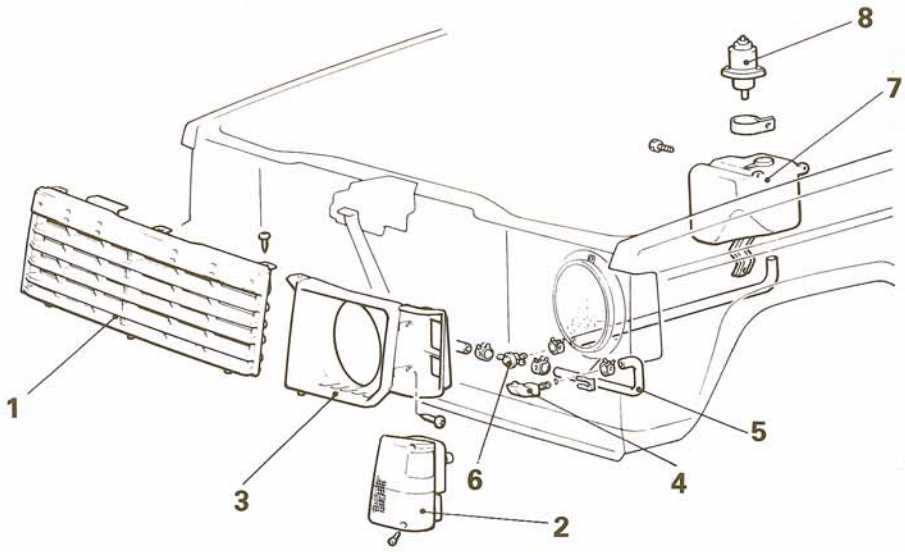
1. INSTALLATION OF REAR WHEELHOUSE TRIM AND QUARTER TRIM

Refer to GROUP 23 BODY – Trims.

HEADLIGHT WASHER

REMOVAL AND INSTALLATION

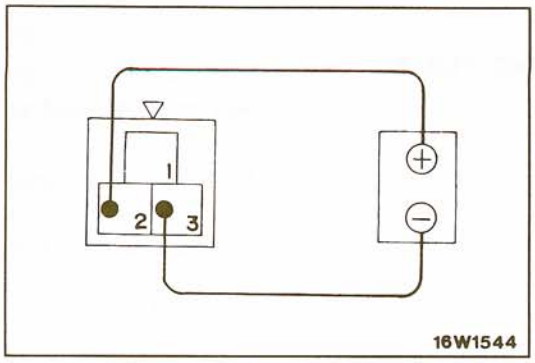
N08KPAA



Removal steps

1. Radiator grille
2. Front combination light
3. Headlight bezel
4. Headlight washer nozzle
5. Washer tube
6. Check valve
7. Headlight washer tank
8. Washer motor and pump

NOTE
Reverse the removal procedures to reinstall.

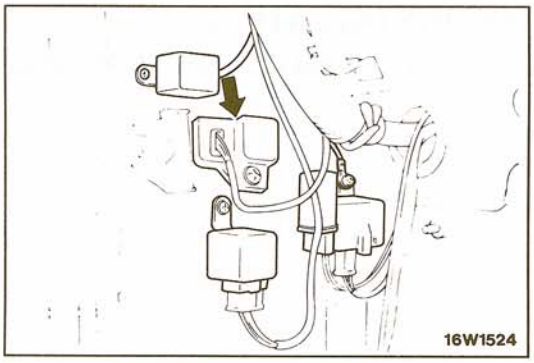


INSPECTION

WASHER MOTOR AND PUMP

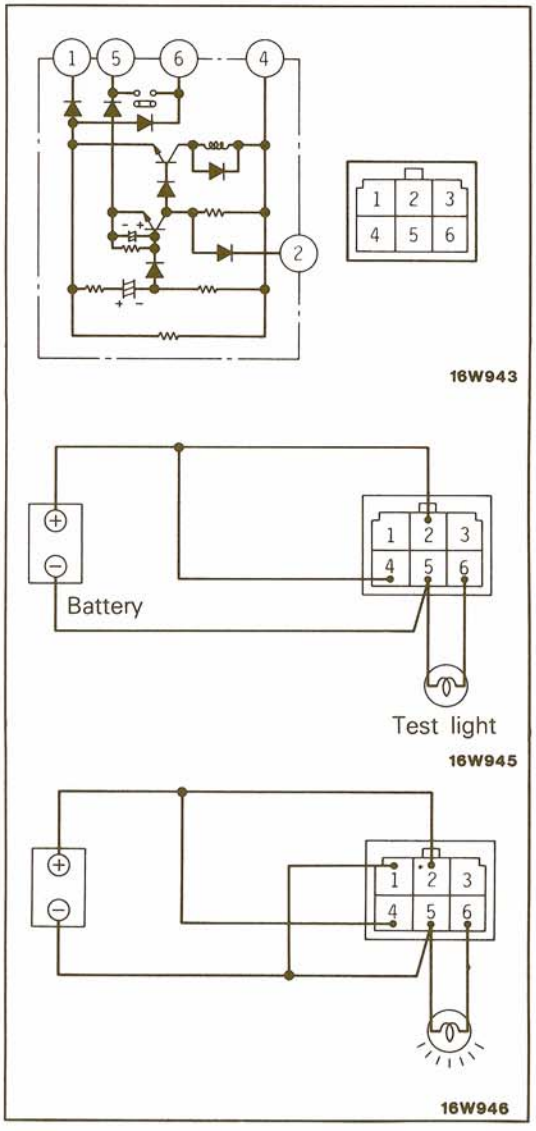
Make the check while the motor is installed to the washer tank.

(1) Check to be sure that there is washer fluid in the washer tank.
(2) Check to be sure that the washer motor operates and the fluid is forced out under pressure when the battery's positive (+) terminal is connected to terminal 2 and the negative (−) terminal is connected to terminal 3.



HEADLIGHT WASHER RELAY

Remove the headlight washer relay (located at the upper part of the left side cowl side trim).



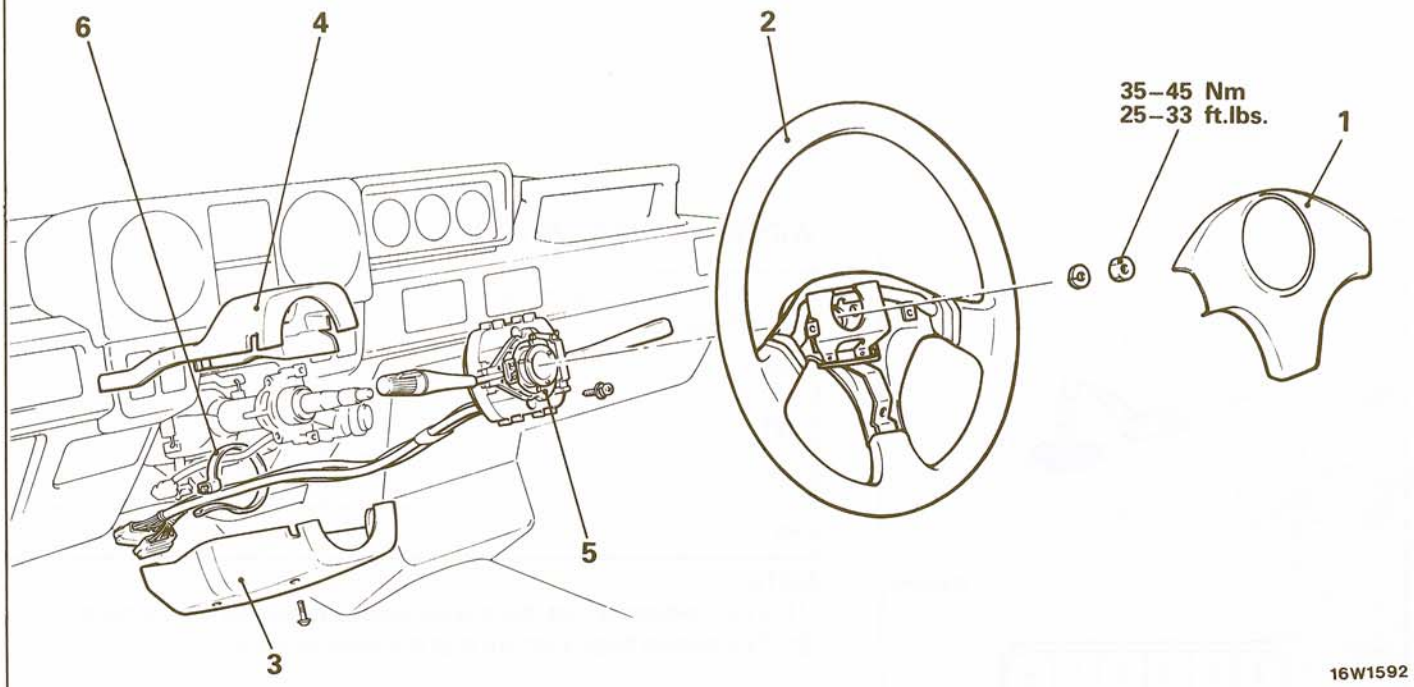
WASHER OPERATION CHECK

(1) Connect the battery and the test light to the relay as shown in the figure.
(2) If, when terminal 1 is connected to the negative (−) terminal of the battery, the light illuminates (for about 0.5 second), the unit is operating normally.

COLUMN SWITCH

REMOVAL AND INSTALLATION

N08KMAD

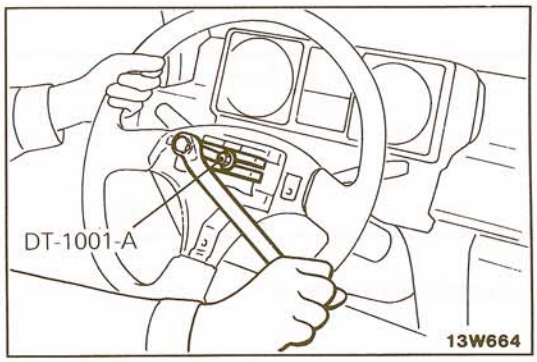


16W1592

Removal steps

1. Steering wheel center pad
◆◆ 2. Steering wheel
3. Lower column cover
4. Upper column cover
5. Column switch
6. Cable band

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



SERVICE POINTS OF REMOVAL

2. REMOVAL OF STEERING WHEEL

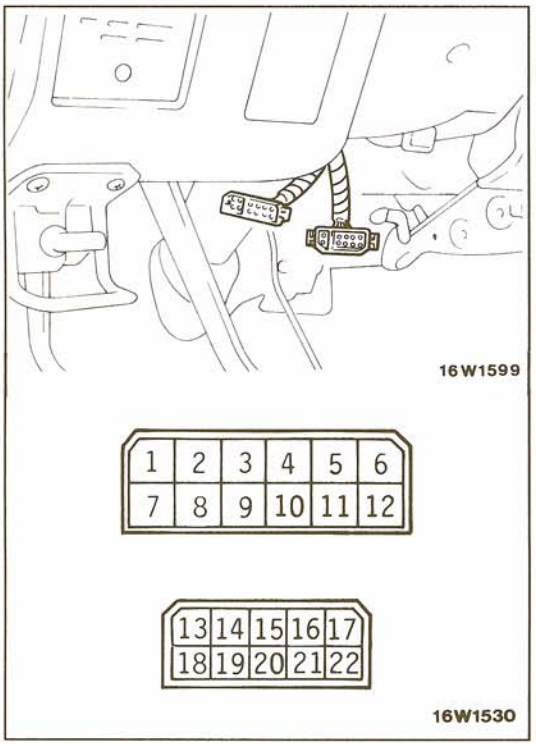
Remove the steering wheel by usiing the special tool.

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

INSPECTION

Remove the steering lower cover, and then detach the connector of the column switch from the wiring harness.

Operate the switch and check the continuity between the terminals.



WIPER·WASHER SWITCH

Terminal / Switch position	20	18	15	14	19	13
OFF	○		○	○		○
INT	○		○	○	○	
				○		○
LO	○			○		
				○		○
HI		○		○		
				○		○

NOTE
(1) ○—○ indicates that there is continuity between the terminals.
(2) The dotted lines indicate that the washer switch ON.

HEADLIGHT WASHER

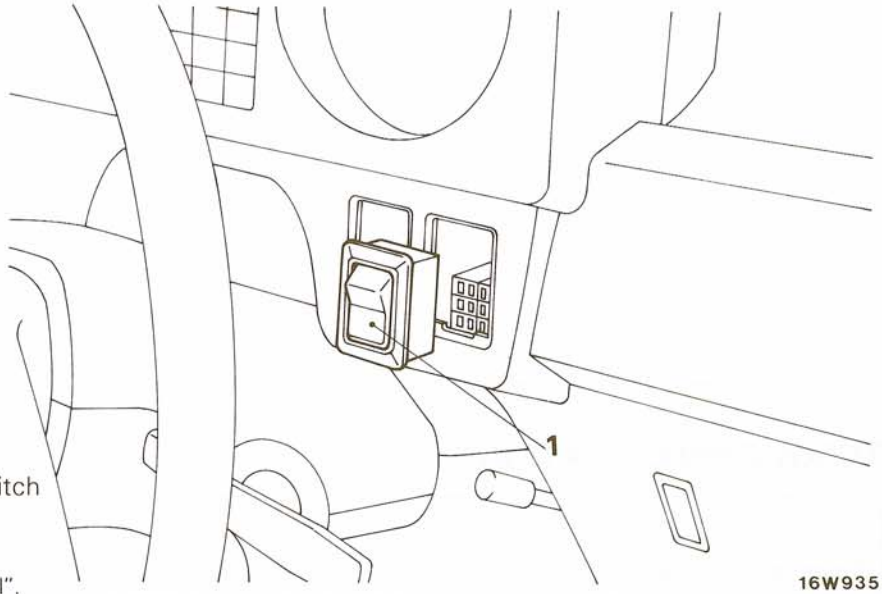
Terminal / Switch Poisition	12	5
OFF		
ON	○	○

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

REAR WIPER AND WASHER SWITCH

REMOVAL AND INSTALLATION

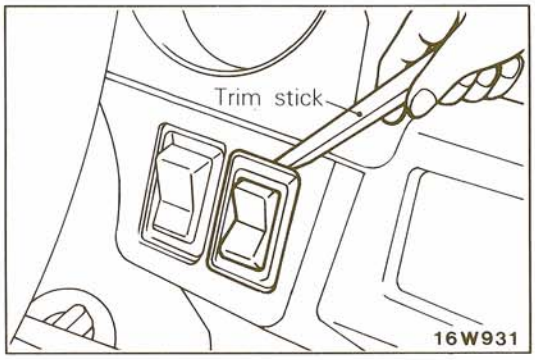
N08KOABa



16W935

◆◆ 1. Rear wiper and washer switch

NOTE
◆◆ : Refer to "Service Points of Removal".

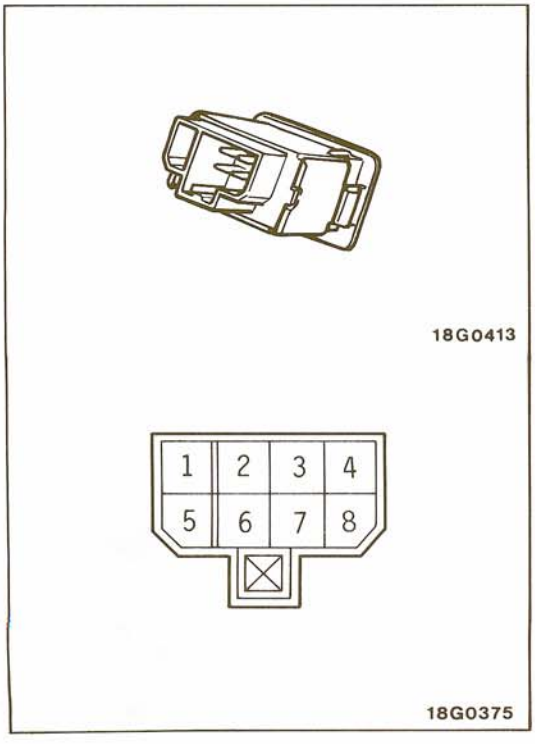


16W931

SERVICE POINTS OF REMOVAL

1. REMOVAL OF REAR WIPER AND WASHER SWITCH

Insert the trim stick into the switch and pry the switch to remove it from the instrument panel.



18G0413

18G0375

INSPECTION

Operate the switch, and check the continuity between the terminals.

Switch position \ Terminal		7	5	3	8	2	6
Wiper switch	ON	○				○	
	OFF		○			○	
	INT		○			○	
				○	○		
Washer switch	ON	○					○
	OFF						

NOTE

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

HORN

SPECIFICATIONS

GENERAL SPECIFICATIONS

N08LB--

Items	Specifications
Effective sounding voltage V	11-14.5
Power consumption (at 12V) A	Max. 3.5
Sound level dB	100-110
Fundamental frequency Hz	
"High" sound	400–440
"Low" sound	340–380

TORQUE SPECIFICATIONS

N08LD--

Items	Nm	ft.lbs.
Steering wheel lock nut	35–45	25–33

SPECIAL TOOLS

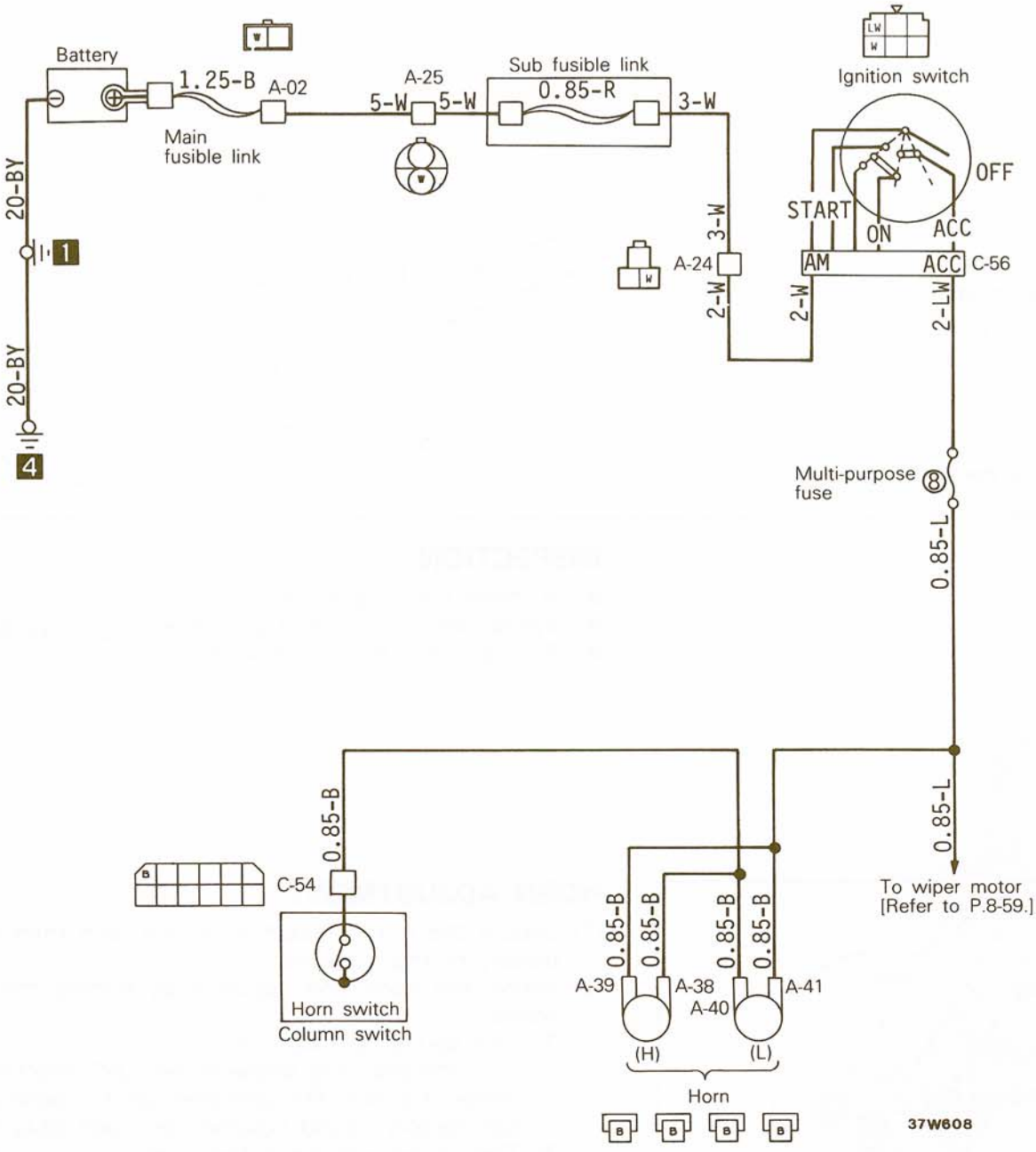
N08LG--

Tool (Number and name)	Use
DT-1001-A Steering wheel puller 	Removal of steering wheel

TROUBLESHOOTING

N08LHAB

CIRCUIT DIAGRAM



Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

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

OPERATION

- When the horn switch is turned on, with the ignition switch at "ACC" or "ON", current flows through fuse No. 8, horn switch, and ground, causing the horns to sound.

TROBLESHOOTING HINTS

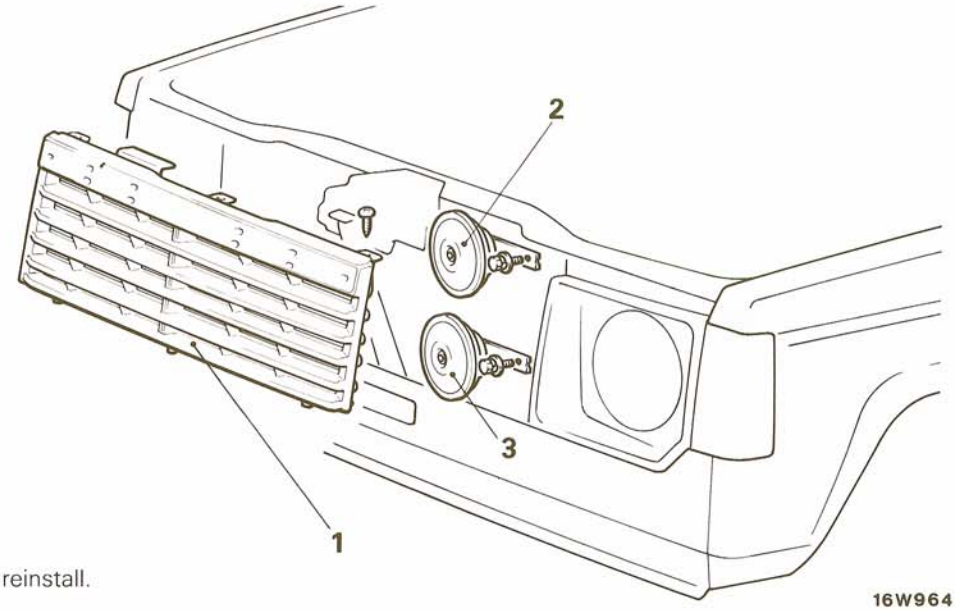
One or other horn does not sound

- Check horn

HORN

REMOVAL AND INSTALLATION

N08LJAE



16W964

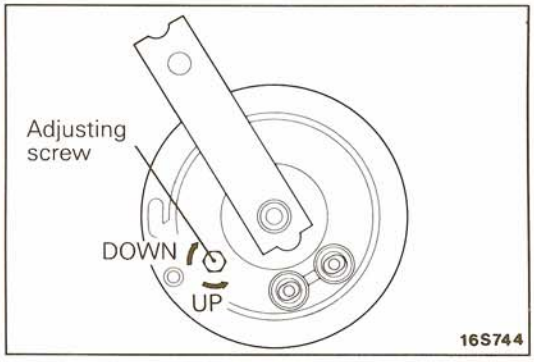
Removal steps

1. Radiator grille
2. Horn (High)
3. Horn (Low)

NOTE
Reverse the removal procedures to reinstall.

INSPECTION

- A loose horn adjustment screw.
- Water, dirt, or other foreign matter lodged inside the horn.
- A loose horn bracket mounting bolt.



16S744

HORN ADJUSTMENT

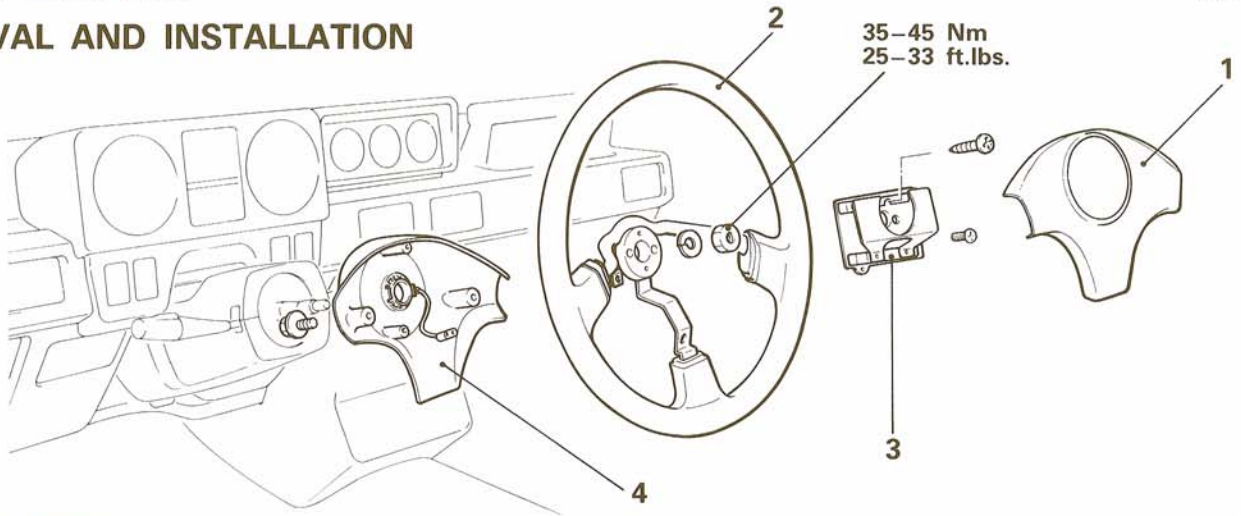
(1) Secure the horn bracket in a vice, and then connect a battery of the 12 volts.
(2) Sound the horn, and adjust it by turning the adjusting screw.
   ① The sound volume is too low.
   Turn the adjusting screw in the "UP" direction within a range of about 180°, and then set it in position when a satisfactory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

HORN SWITCH

N08LKAK

REMOVAL AND INSTALLATION

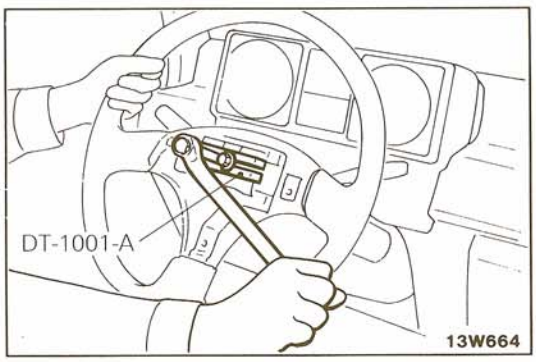


16W1591

Removal steps

1. Steering wheel pad and horn switch
◆◆ 2. Steering wheel
3. Steering bossplate
4. Steering wheel cover

NOTE
(1) Reverse the removal procedure to reinstall.
(2) ◆◆ : Refer to "Service Points of Removal".



SERVICE POINTS OF REMOVAL

2. REMOVAL OF STEERING WHEEL

Remove the steering wheel by using the special tool.

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

INSPECTION

- A burned out or short-circuited horn switch contact.
- A broken or damaged horn switch spring.
- A damaged horn switch harness.

ACCESSORY

SPECIFICATIONS

GENERAL SPECIFICATIONS

CIGARETTE LIGHTER

N08MB--

Items	Specifications
Maximum current A	10
Return time sec.	18 or less

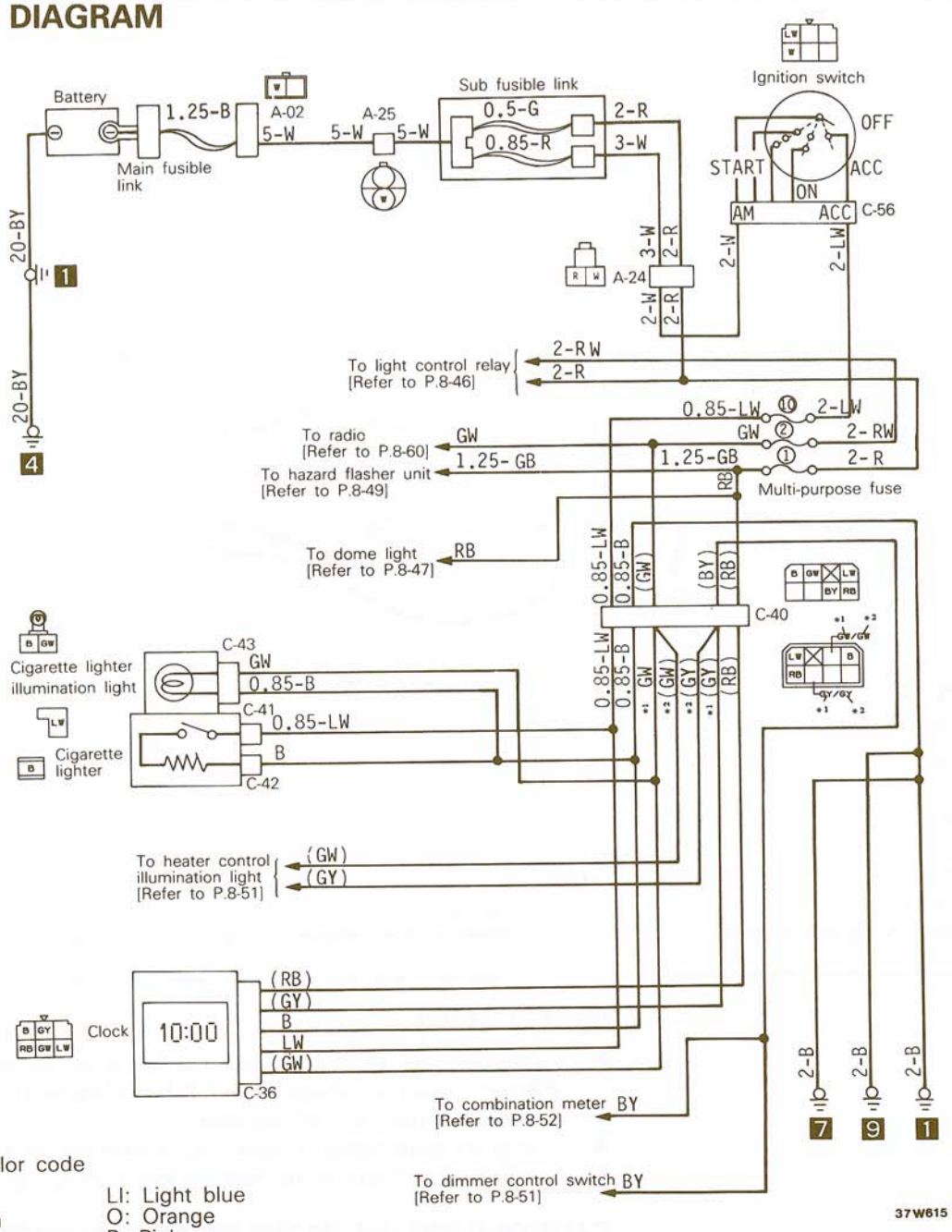
CLOCK

Items	Specifications
Type	Crystal oscillating type
Display type	Fluorescent digital display

TROUBLESHOOTING

N08MHAB

CIRCUIT DIAGRAM



Wiring color code

B: Black	Ll: Light blue
Br: Brown	O: Orange
G: Green	P: Pink
Gr: Gray	R: Red
L: Blue	Y: Yellow
Lg: Light green	W: White

Remark
For information concerning the ground points (example: 1), refer to P.8-7.

OPERATION

Clook

- Current always folws through the circuit connecting fuse No. 1, colck, and ground, to operate the clock.
- When the ignition switch is at "ACC" or "ON", current flows through fuse No. 10 clock and ground, causing the time to displey on the colck.

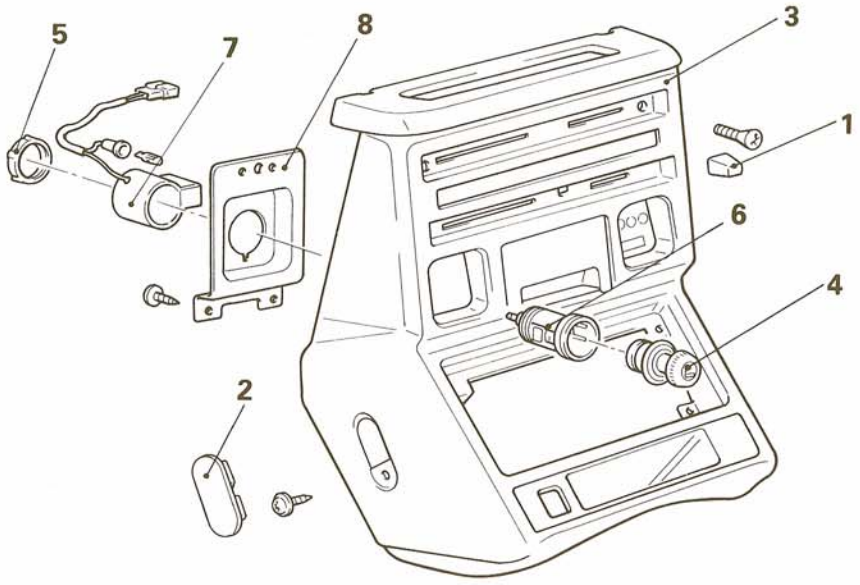
Cigarette Lighter

- When the cigarette lighter is pushed in with the ignition switch at "ACC" or "ON", the lighter contacts colse, causing current to flow through fuse No. 10 cigarette ligher, and ground, and the cigarette lighter element golews.

CIGARETTE LIGHTER

REMOVAL AND INSTALLATION

N08MJAE



Removal steps

1. Knob
2. Plug
3. Center panel
4. Plug
5. Nut
6. Socket
7. Outer case
8. Cigarette lighter bracket

NOTE
Reverse the removal procedure to reinstall.

16W1555

INSPECTION

- Take out the plug, and check for a worn edge on the element spot connection, and for shreds of tobacco or other material on the element.
- Using an ohmmeter, check the continuity of the element.
- Confirm that there is no dirt on the surface of the socket.

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

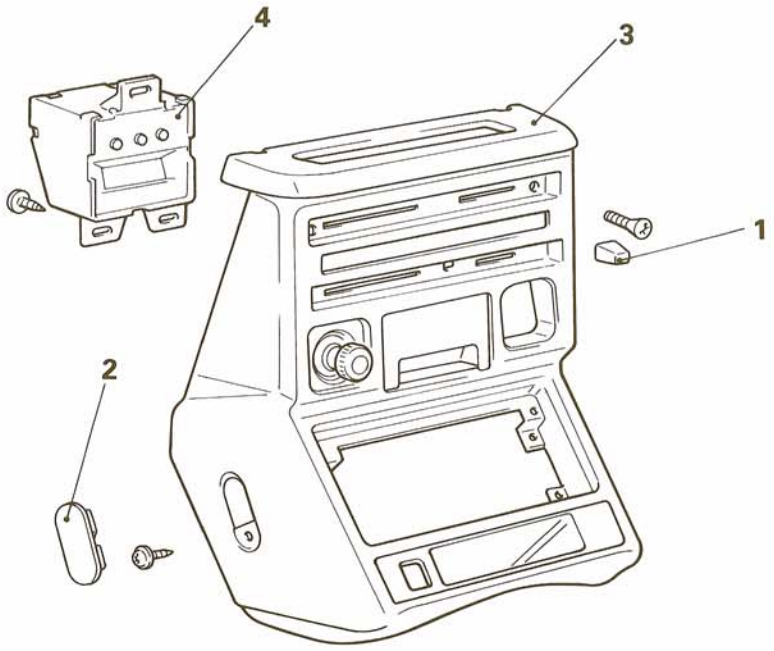
1. **When using a "plug-in" type of accessory, do not use anything with a load of more than 120W.**
2. **It is recommended that only the lighter be inserted in the receptacle.**
   Use of "plug-in" type accessories may damage the receptacle and result in poor retention of the lighter.

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

CLOCK

REMOVAL AND INSTALLATION

N08MKAD



Removal steps

1. Knob
2. Plug
3. Center panel
4. Clock

16W1558

NOTE
Reverse the removal procedures to reinstall.

AUDIO SYSTEM

SPECIFICATIONS

GENERAL SPECIFICATIONS

N08NB--

Items	Specifications		
Radio			
Model	AR-6377PY	AR-6377PY	RX-321Y
Receiving band	AM/FM	AM/FM	AM/FM
Tape player			
Model	—	CX-25P	
Speaker			
Instrument panel			
Model	—	SR-10WZ4-UKB	SR-10WZ4-UKB
Rated input power		15W (Max. 20W)	15W (Max. 20W)
Center pillar trim			
Model	SR-16SA4-3-DK	SR-16SA4-3-DK	SR-16SA4-3-DK
Rated input power	15W (Max. 30W)	15W (Max. 30W)	15W (Max. 30W)
Antenna			
Type	Pole antenna	Pole antenna	Pole antenna

NOISE SOURCES

Source of Electrical System Noise

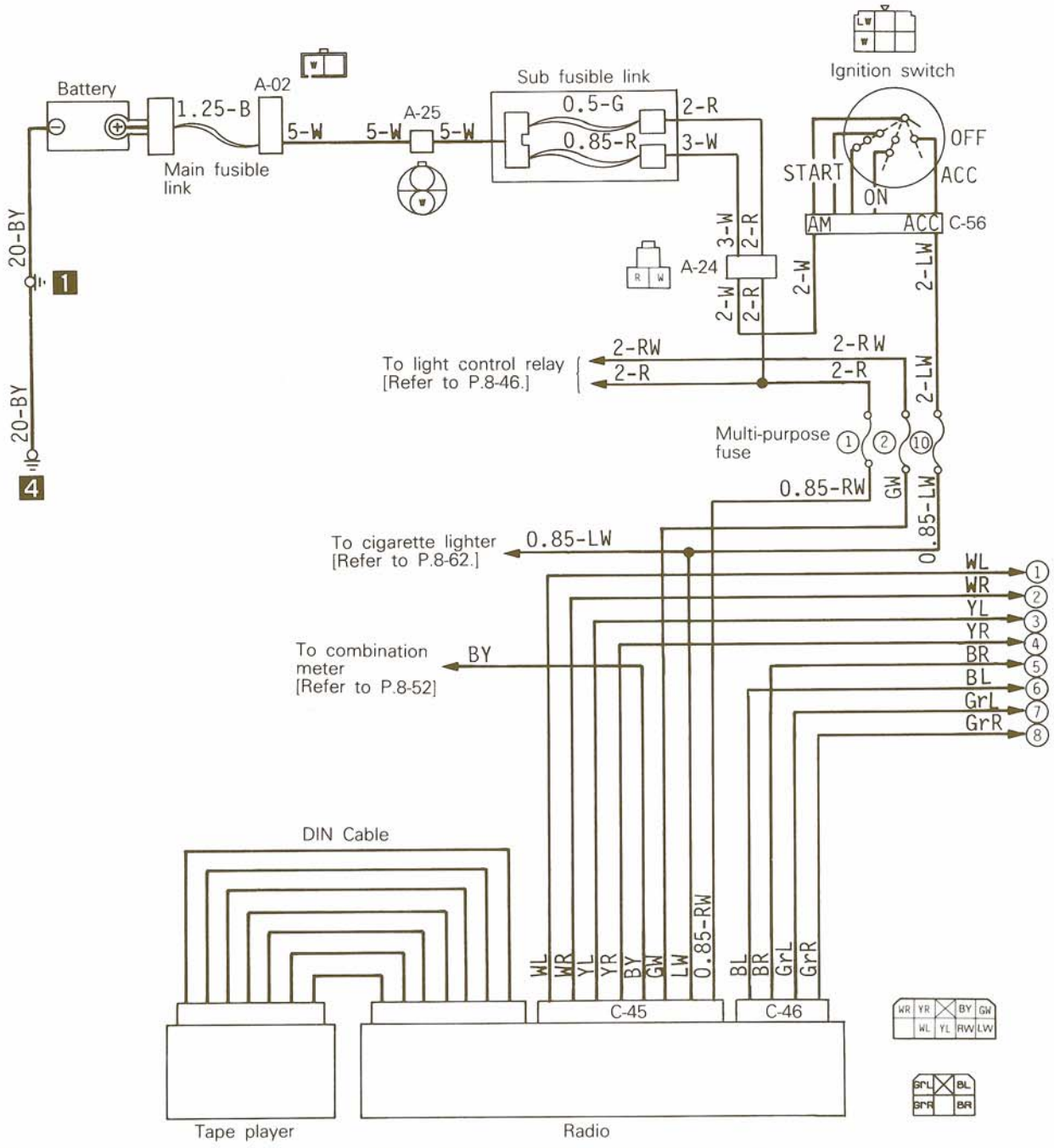
Ignition system	Power generation system	Other electrical device
(1) Spark plug (2) High tension cable (3) Distributor	(1) Ripple at contact between alternator armature and carbon brush (2) Spark from voltage regulator contact	(1) Armature of wiper, blower and other motors. (2) Starter and switch when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

Noise Sourse 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	Engine 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, 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.

TROUBLESHOOTING

CIRCUIT DIAGRAM



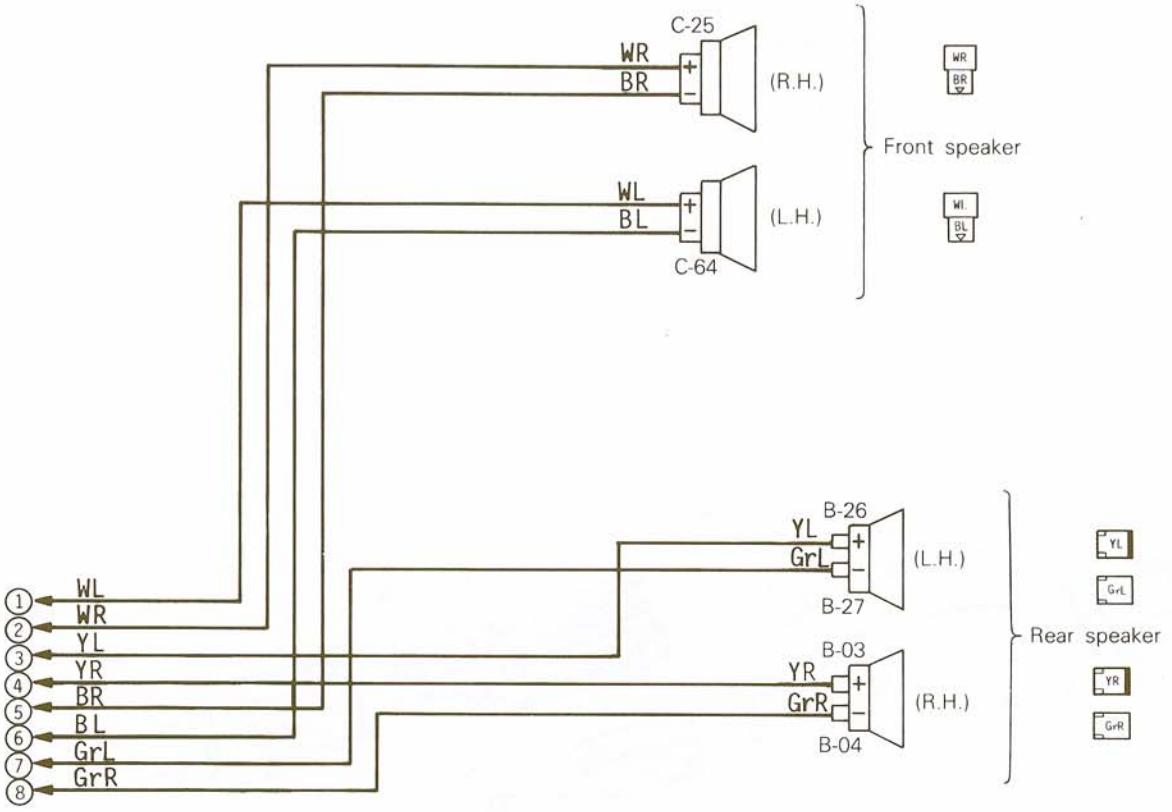
OPERATION

- When the radio power switch is turned on with the ignition switch at "ACC" or "ON", current flows through fuse No. 10, radio, and ground, causing the radio to operate.
- For an electronically turned radio, battery voltage is always supplied for use of the memory and other functions in the radio.

TROUBLESHOOTING HINTS

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.

N08NHAB



37W618

Remarks
(1) For information concerning the ground points (example: 1), refer to P.8-7.
(2) The symbols ①, ②, etc. indicate that the wiring is connected (using the same numerical symbol) to the facing page.
(In other words, ① on the right page is connected to ① on the left page.)

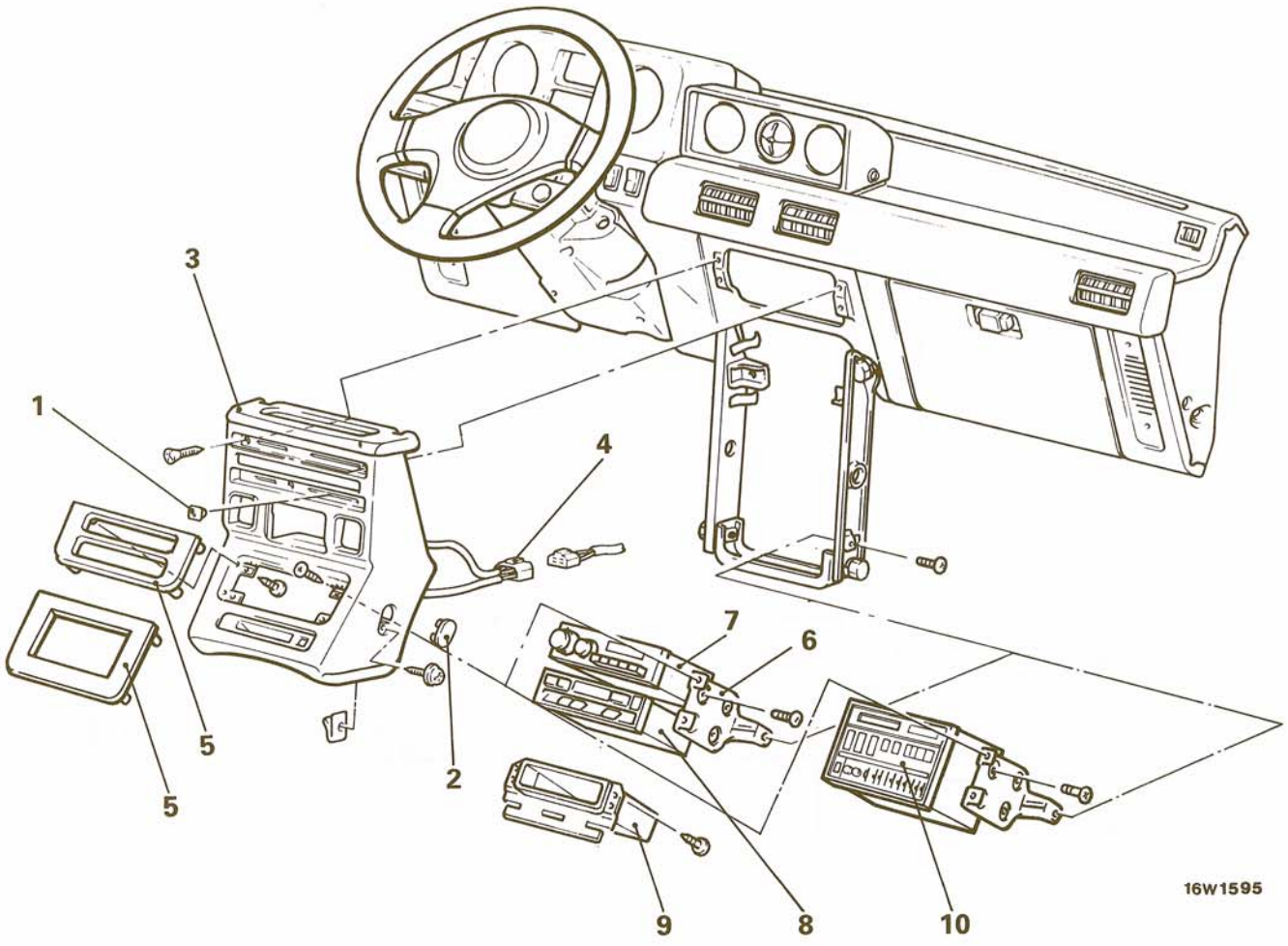
Wiring color code

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

RADIO AND TAPE PLAYER

REMOVAL AND INSTALLATION

N08NJAK



Removal steps

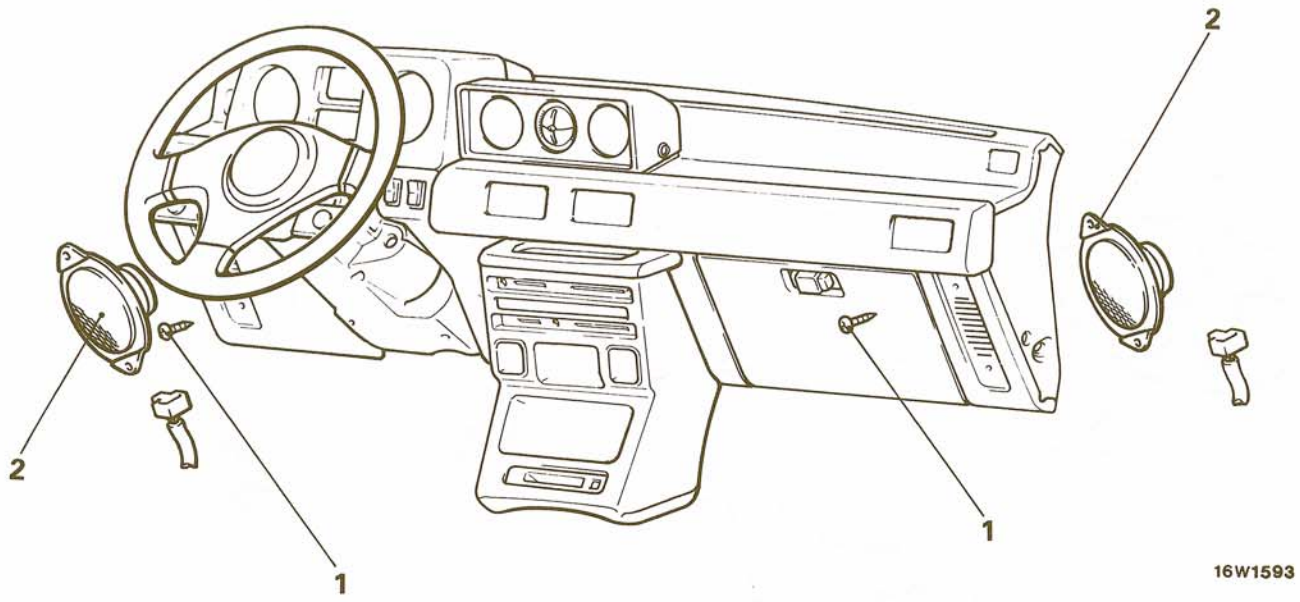
1. Knob
2. Plug
3. Center console
4. Connection of center panel wiring harness to front wiring harness connector
5. Radio panel
6. Radio bracket
7. Radio
8. Tape player
9. Box (Vehicles without tape player)
10. Radio with tape player

NOTE
Reverse the removal procedures to reinstall.

FRONT SPEAKER

REMOVAL AND INSTALLATION

N08NMAE



16W1593

Removal steps

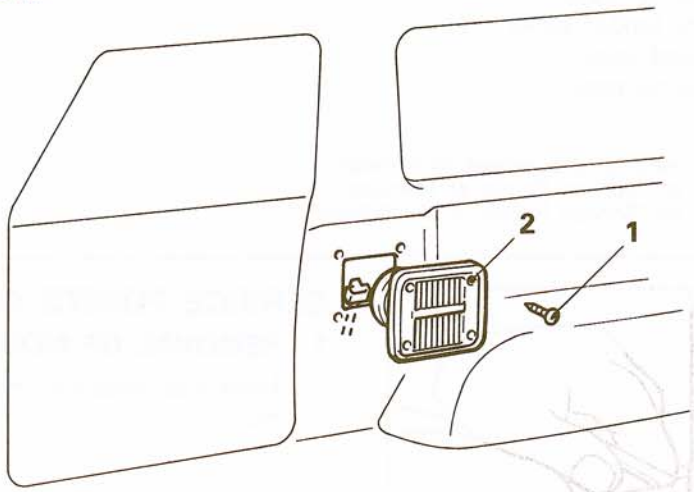
1. Mounting screws
2. Front speaker

NOTE
Reverse the removal procedures to reinstall.

REAR SPEAKER

REMOVAL AND INSTALLATION

N08NOAD



16W1578

Removal steps

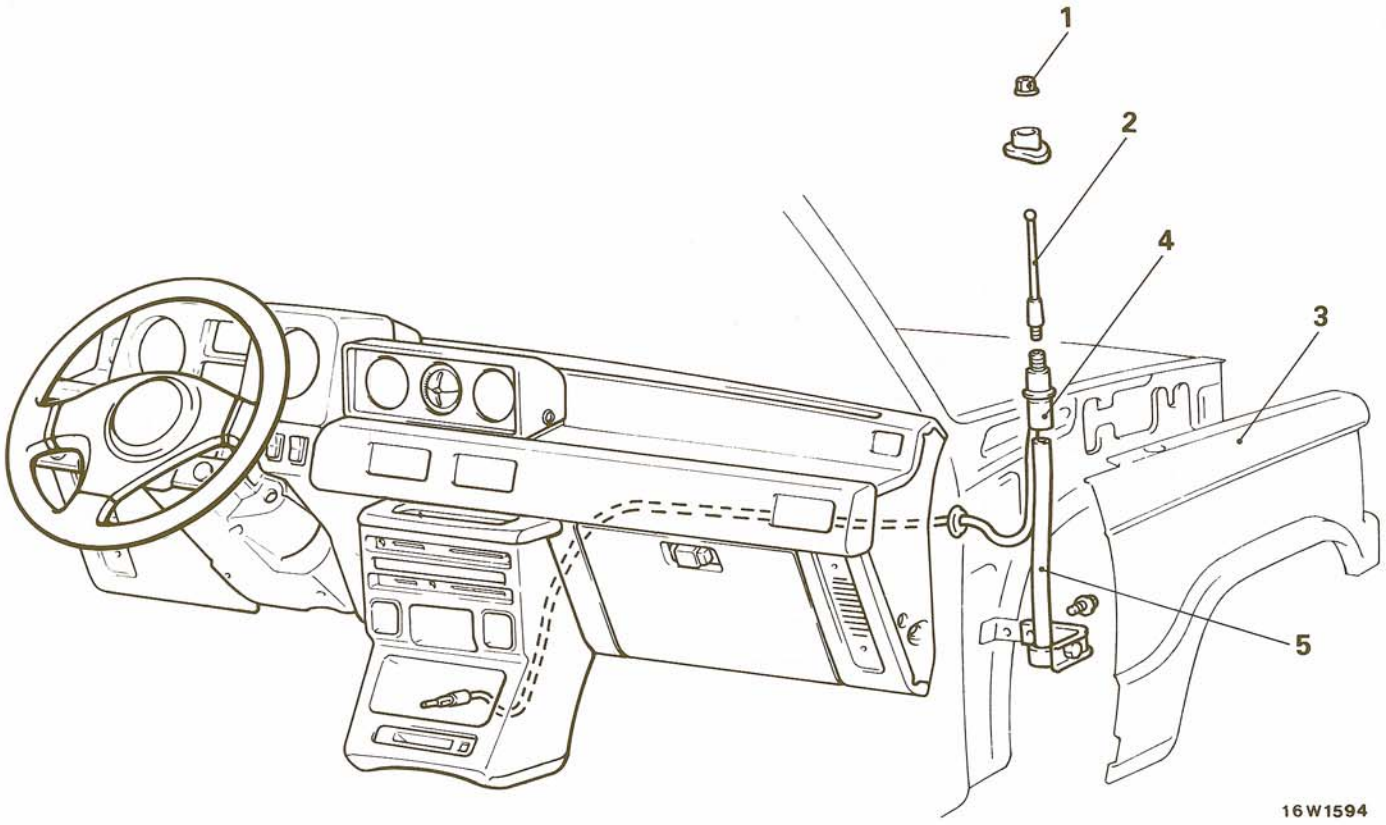
1. Mounting screws
2. Rear speaker

NOTE
Reverse the removal procedures to reinstal

ANTENNA

REMOVAL AND INSTALLATION

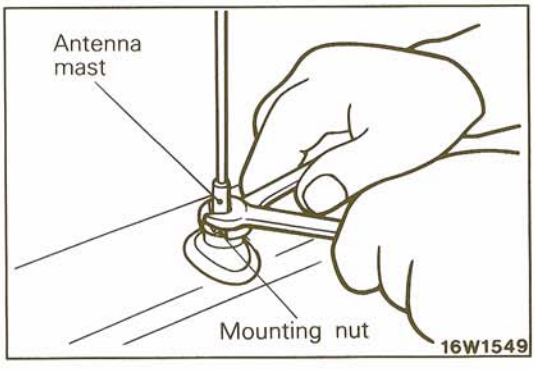
N08NPAC



Removal steps

◀▶ 1. Mounting nut
2. Antenna mast
◀▶ ▶◀ 3. Front fender panel
4. Ground base
5. Antenna base

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



SERVICE POINTS OF REMOVAL

1. REMOVAL OF MOUNTING NUT

Hold the antenna mast, and then remove the mounting nut.

3. REMOVAL OF FRONT FENDER PANEL

Refer to GROUP 23 Body-Front Fender

SERVICE POINTS OF INSTALLATION

3. INSTALLATION OF FRONT FENDER PANEL

Refer to GROUP 23 Body-Front Fender.

NOISE SUPPRESSION

N08NQAA

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.
3. Before performing any checking or adjustments, first confirm the following points.
   Adjust the antenna trimmer completely.
   Set the push buttons (tuning) properly.
   Extend the antenna all the way.

PREVENTION OF IGNITION CIRCUIT NOISE

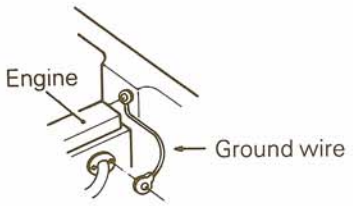
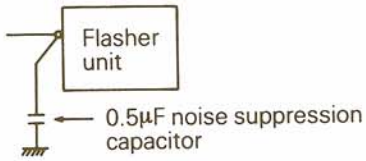
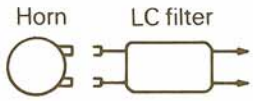
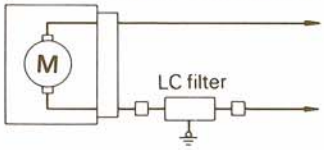
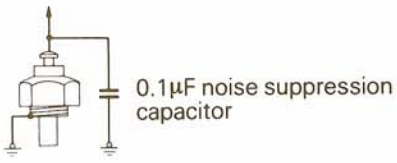
A resistance-equipped cable is used for the high-tension cable in order to prevent noise; however, if any noise from the ignition circuit does occur, check the tightness and ground connection of the positive (+) terminal of the noise filter, and, if necessary, check the noise filter.

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

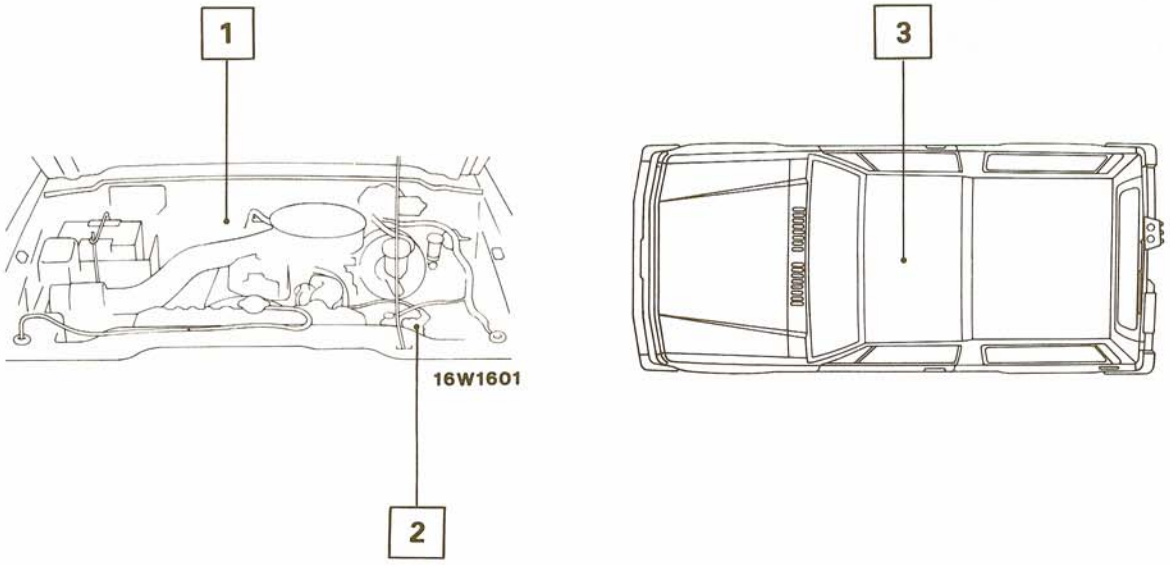
PREVENTION OF OTHER CIRCUIT NOISE

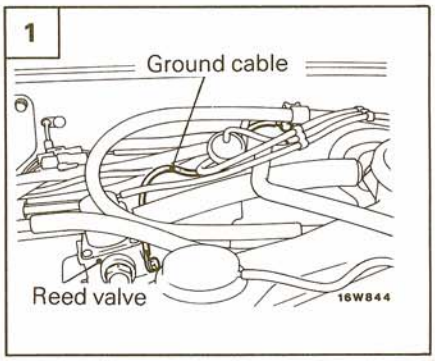
1. For other noises, take necessary corrective actions in accordance with the following items and the NOISE SUPPRESSION CHART.
2. Polish the grounding cable terminal, and connect it properly.
3. Polish the pillar antenna ground terminal, and connect it properly.
4. Ground electric parts completely.
5.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

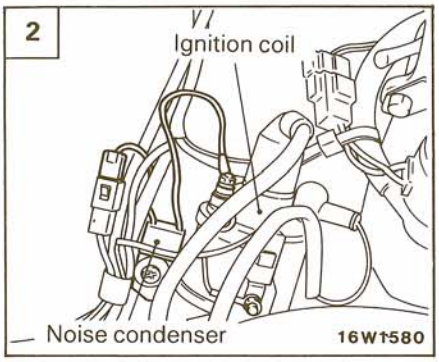
NOISE SUPPRESSION CHART

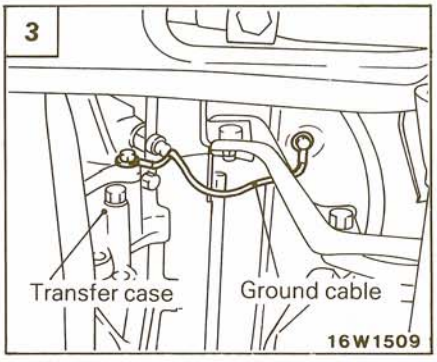
Symptom	Noise source	Remedy
Unusual noise related to engine speed.	Engine	Securely ground the engine, frame and/or body and engine hood.  16E710
"Clatter" noise related to the flashing of turn signal lights	Turn signals	Connect a 0.5 μF noise-suppression capacitor to the B terminal of the flasher unit.  16E712
Abnormal noise when the horn is operated.	Horn	1. Connect a 0.5 μF noise-suppression capacitor to the + B terminal of the horn. 2. For an FM radio, connect an LC filter to the horn terminals.  16E713
Noise when the windshield washer oprates.	Washer motor	1. Connect a 0.5 μF noise-suppression capacitor between the terminal of the washer motor and the power source wire. 2. For an FM radio, connect an LC filter between the terminal of the washer motor and the power source wire.  16F671
Unusual noise when the engine is started.	Water temperature gauge unit	Connect a 0.1 μF noise-suppression capacitor to the terminal of the water temperature gauge unit.  16F672

NOISE SUPPRESOR LOCATION









BACK DOOR WINDOW DEFOGGER

SPECIFICATIONS

GENERAL SPECIFICATIONS

N08PB-A

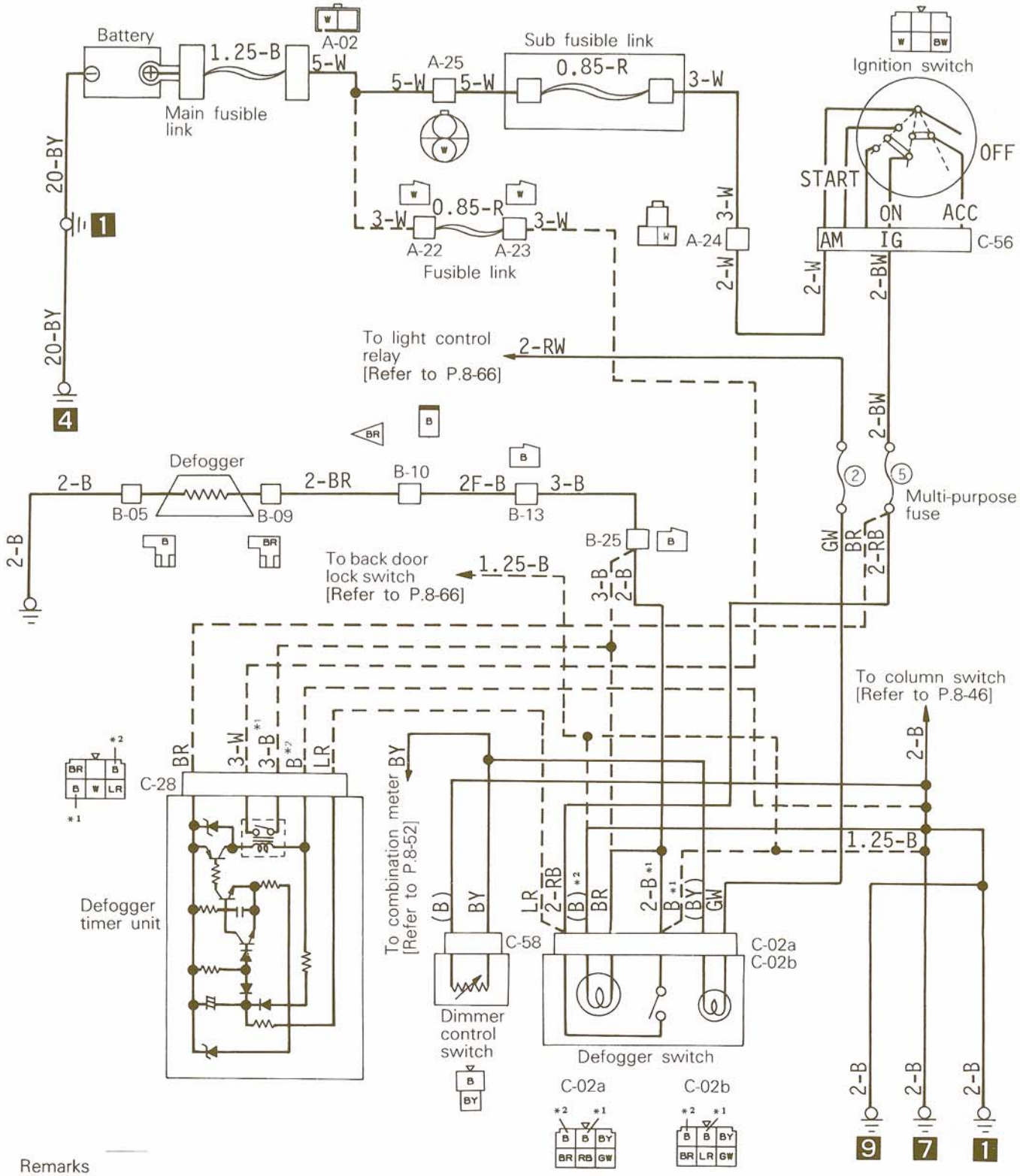
Items	L042GT (Vehicles with rear window defogger)	L042GV
Back door window defogger switch		
Type	Seesaw type	Seesaw type (automatic reset)
Rated current	20A	20A
Back door window defogger timer		
Timer	–	7–13 min.
Back door window glass with defogger		
No. of printed heater lines	11	11
Power consumption [20°C (68°F)]	.112–148 W	145–196 W

N08PG-A

TROUBLESHOOTING

N08PHBB

CIRCUIT DIAGRAM



Remarks
(1) The broken lines are applicable to the L042GV.
(2) For information concerning the ground points (example: 1), refer to P.8-7.

37W606

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

OPERATION

Without timer

- When the defogger switch is turned on with the ignition switch at "ON", current flows through fuse No. 5, defogger switch, defogger and ground, causing the defogger to operate.
- At the same time the defogger indicator goes on.

With timer

- With the ignition key at the "ON" position, voltage is applied, through fuse no. 5 and the defogger timer unit, to the defogger switch.
- When the defogger switch is switched ON (automatic return), current flows to fuse no. 5, the defogger timer unit, the defogger switch, and ground, and the timer switch (within the defogger timer unit) operates for ten minutes.
- When the timer switch is activated, current flows to the dedicated fuse, the defogger timer unit, the defogger, and ground, and the defogger is activated.

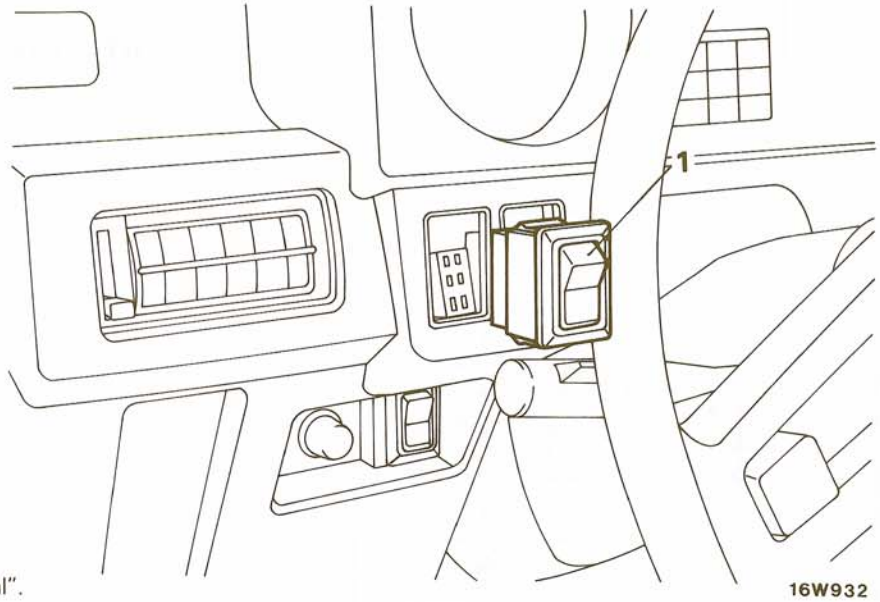
TROUBLESHOOTING HINTS

1. Both defogger and indicator light do not operate
   (1) Blower motor also does not operate
      - Check fuse.
   (2) Blower motor operates
      - Check defogger switch.
2. Defogger does not operate
   (1) Indicator light goes on
      - Check defogger.

DEFOGGER SWITCH

REMOVAL AND INSTALLATION

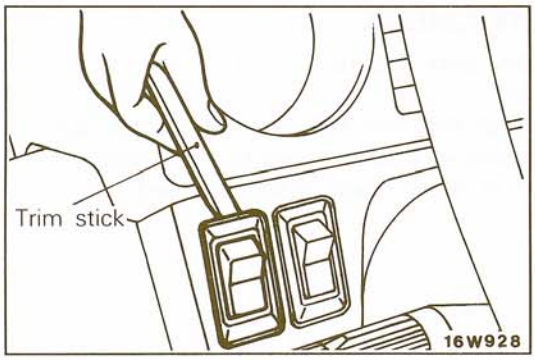
N08PJBG



16W932

◆◆ 1. Defogger switch

NOTE
◆◆ : Refer to "Service Points of Removal".



16W928

SERVICE POINTS OF REMOVAL

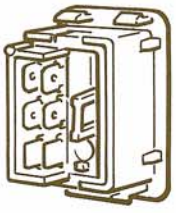
1. REMOVAL OF DEFOGGER SWITCH

Insert the trim stick into the switch and pry the switch to remove it from the instrument panel.

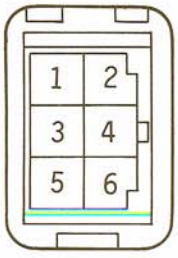
INSPECTION

DEFOGGER SWITCH

(1) Remove the 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.



16G0193

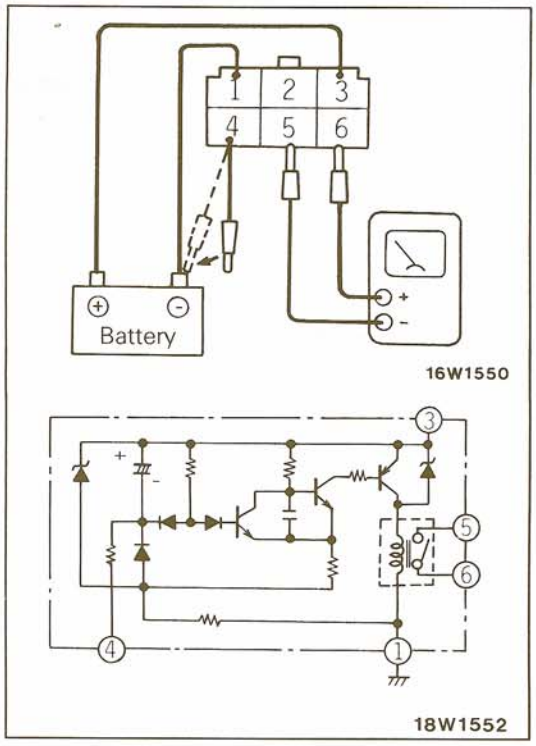


16G0195

* : Indicator light
** : Illumination light

Switch position \ Terminal	3	4	5	*	6	1	**	2
OFF			○	⌀	○	○	⌀	○
ON	○	○	○	⌀	○	○	⌀	○

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

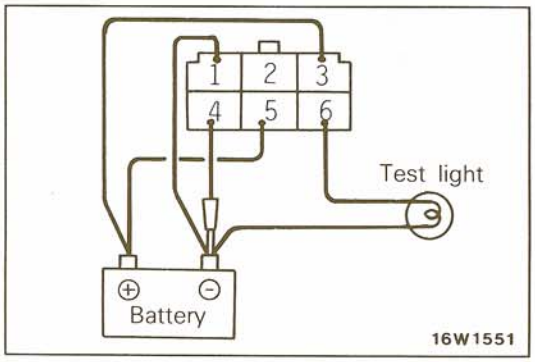


DEFOGGER TIMER

Remove the defogger timer from the cowl side at the passenger seat side.

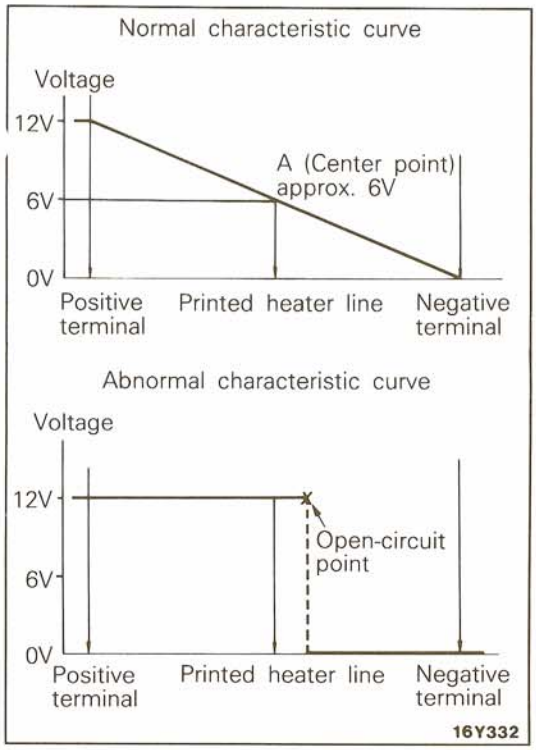
CONTINUITY CHECK

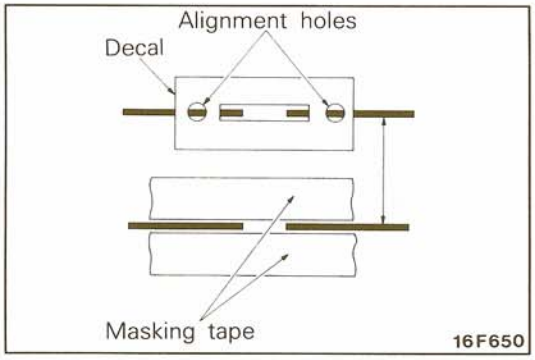
(1) Connect the battery to the timer, as shown in the figure.
(2) Check to be sure that there is continuity at terminals 5 and 6 when terminal 4 is connected to the negative (–) terminal of the battery.



TIMER OPERATION CHECK

(1) Connect the battery and the test light to the timer, as shown in the figure.
(2) Check to be sure that the test light flashes for about ten minutes when terminal 4 is connected to the negative (–) of the battery and is then soon disconnected.





PRINTED HEATER LINES

INSPECTION

N08PKAA

1. The printed heater lines should be tested while the engine is running at 2,000 rpm and the battery is being charged.
2. Turn the defogger switch to the "ON" position, and use voltmeter to measure the voltage of each printed heater line at the back door window glass center point "A".
3. If all of the heater lines indicate approximately 6V, the back door 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 0 V).
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

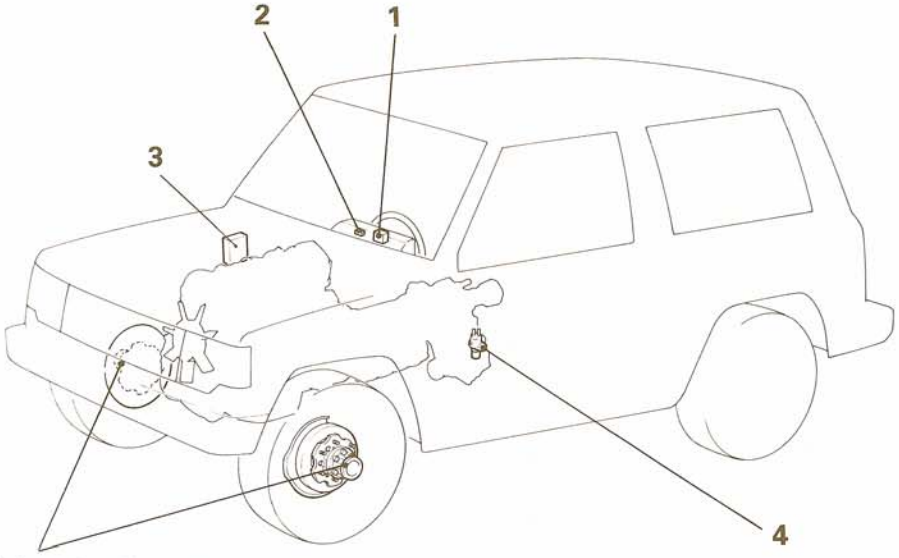
   Wipe the glass adjacent to the broken heater line, clean with unleaded gasoline, and bond a decal or masking tape as shown.
2. Shake the electroconductive paint container well, and remove the amount of paint needed. Dilute it with a small quantity of paint thinner, and apply three coats with the brush 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.

GENERAL INFORMATION

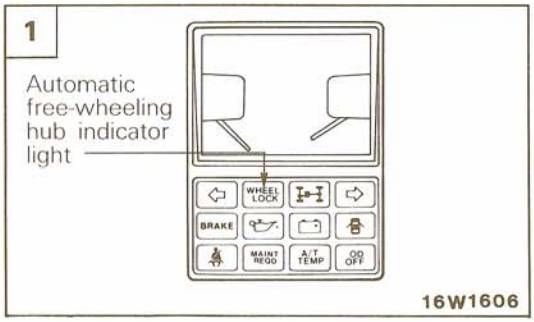
N08RAAA

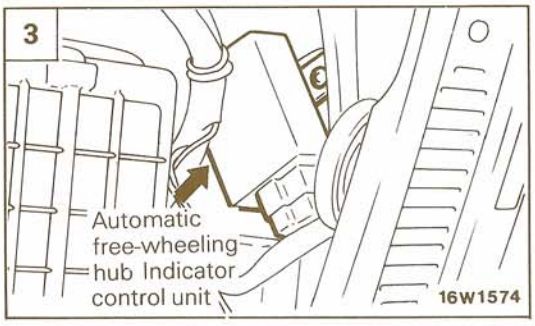
This system is composed of the automatic free-wheeling hub indicator light, the vehicle-speed sensor (reed type switch), the automaic free-wheeling hub indicator control unit, and the pulse generator.
The pulse generator is located at the rear part of the front output shaft of the transfer; the vehicle-speed sensor is incorporated within the combination meter.
Based upon the output signals from the pulse generator and from the vehicle-speed sensor (reed type switch), the automatic free-wheeling hub indicator control unit judges whether the automatic free-wheeling hub is in the locked condition or the free condition.
When it is in the locked condition, the indicator light illuminates; when it is in the free condition, the indicator light does not illuminate.
This is, therefore, a system which makes it easy to see, from the driver's seat, whether the automatic free-wheeling hub is in the locked condition or the free condition.

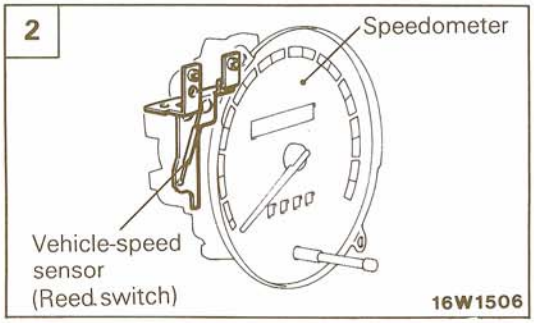


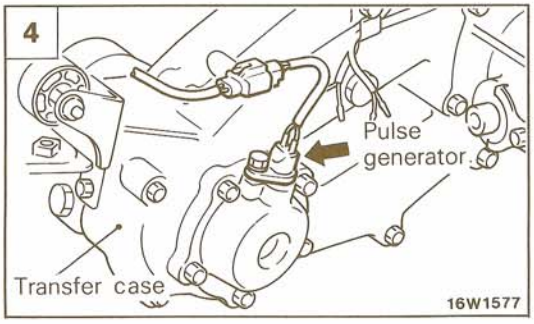
Automatic free-wheeling hub

16W1567

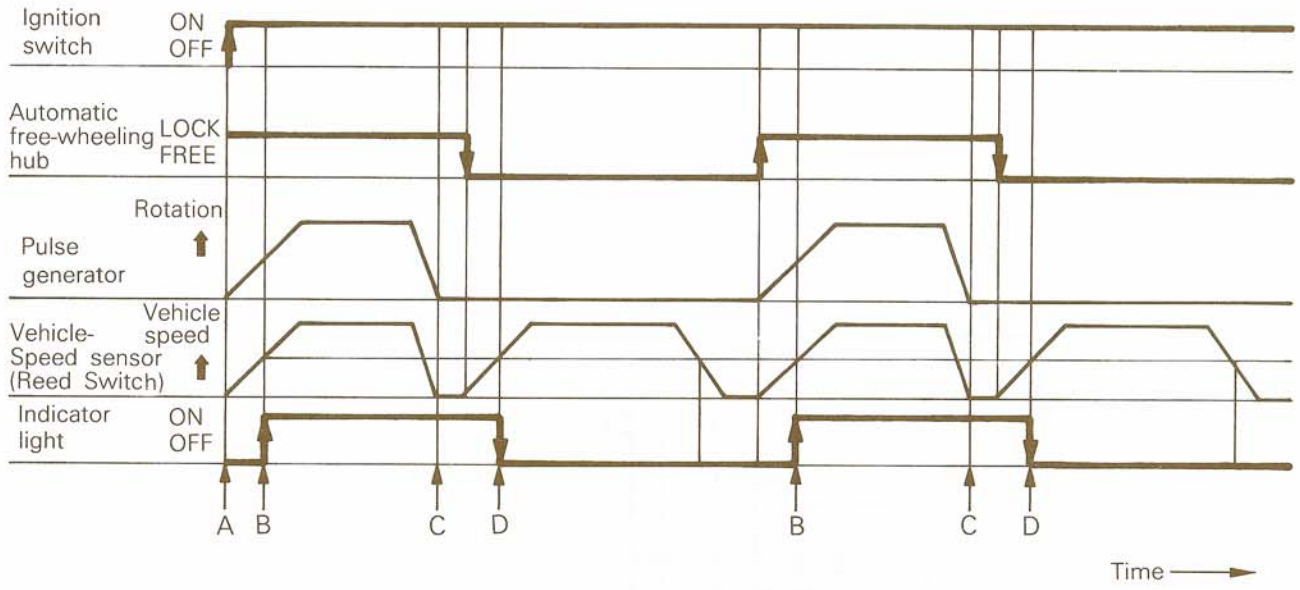








OPERATIONAL CHARACTERISTICS OF THE SYSTEM



Symbols used in above diagram	Indication by automatic free-wheeling hub indicator light
A	No illumination of the indicator light when the ignition key is turned from OFF to ON, regardless of the condition of the automatic free-wheeling hub.
B	The indicator light illuminates when the automatic free-wheeling hub is locked and pulse signals are output from the pulse generator, and when, in addition, the vehicle-speed sensor detects a vehicle speed of approximately 2.5 mph (4 km/h) or higher.
C	The locked condition is entered in the memory even if the vehicle is stopped (with ignition key still at ON) while the automatic free-wheeling hub is in the locked condition, and the indicator light illumination continues.
D	After the automatic free-wheeling hub is changed from the locked condition to the free condition (the pulse signals from the pulse generator cease), the indicator light remains illuminated until the vehicle-speed sensor detects a vehicle speed of approximately 2.5 mph (4 km/h) or higher.

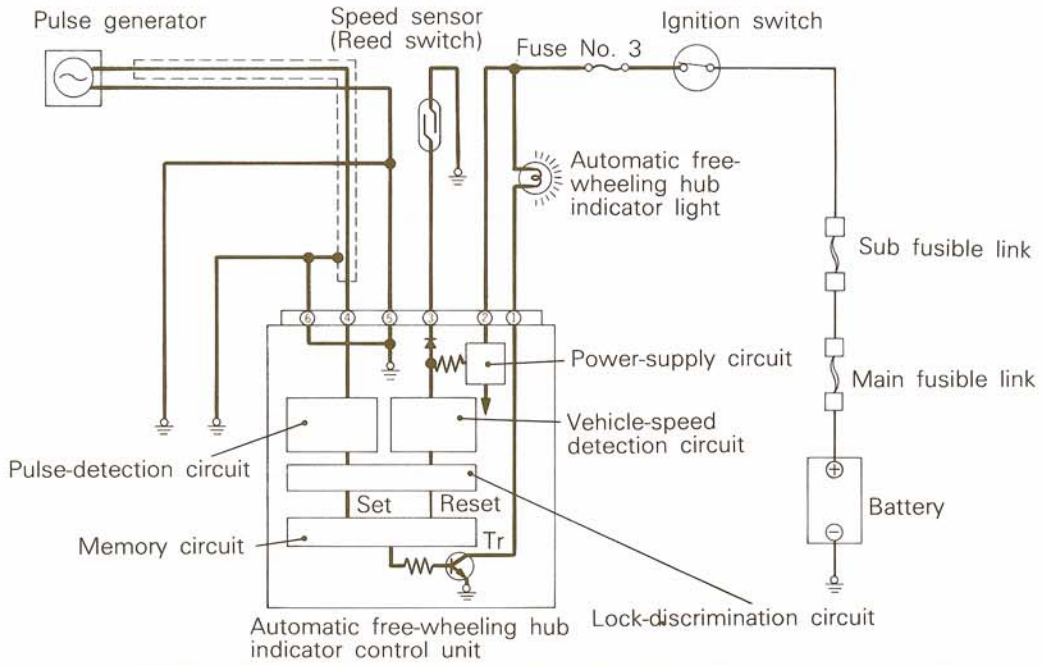
EXPLANATION OF INDICATOR OPERATION

1. Automatic free-wheeling hub in locked condition

The output of the pulse generator is input to terminal 4 of the control unit, and the output signals from the vehicle-speed sensor are input to terminal 3 of the control unit.

Only when there are pulse signals from the pulse generator, and when, moreover, the vehicle-speed signals indicate a vehicle speed of approximately 2.5 mph (4 km/h) or highter does the control unit judge that the automatic free-wheeling hub is the locked condition at the lock-discrimination circuit of the control unit, and therefore the set signal (locked condition) is output.

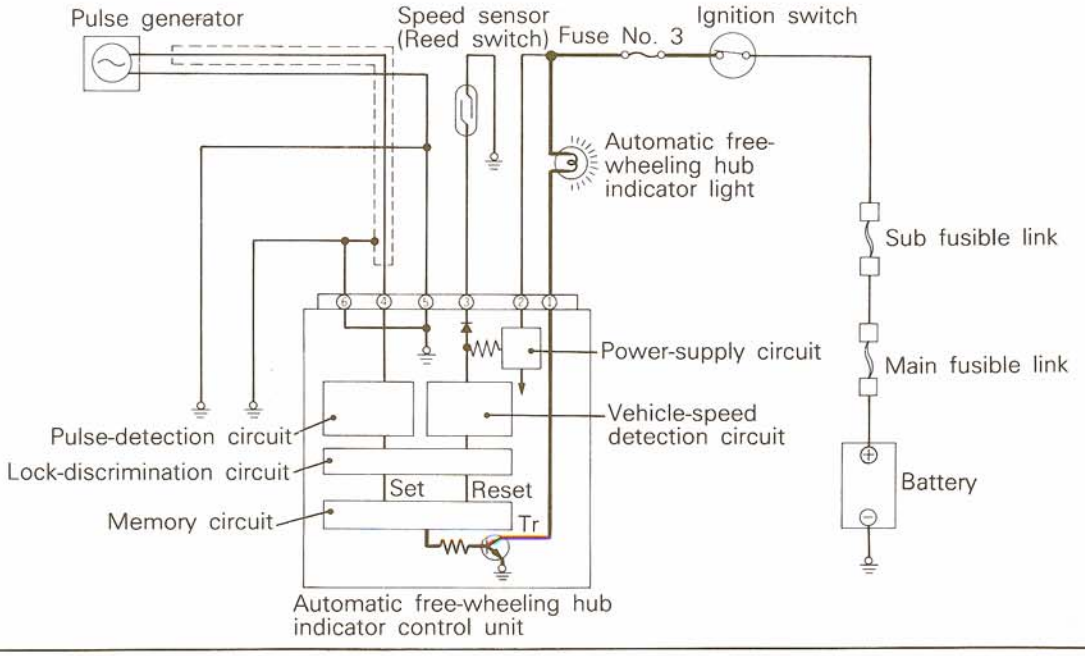
This signal is entered into the memory circuit, thus causing the indicator light to illuminate.



2. When vehicle is stopped (with ignition key still at ON) with automatic free-wheeling hub locked

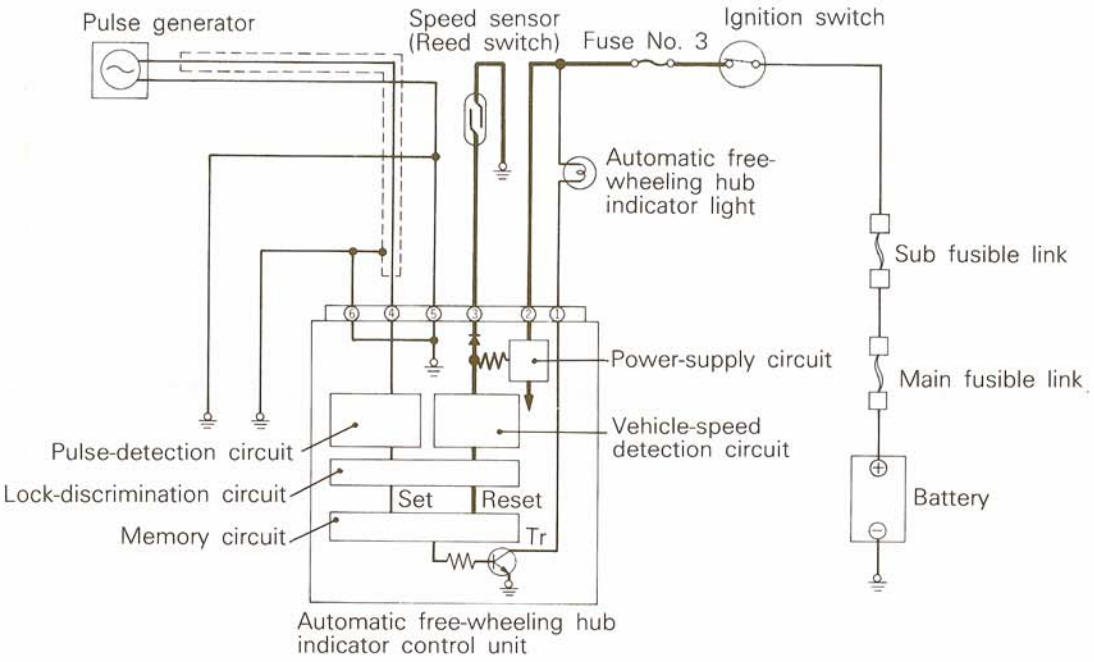
Signals are not output from the pulse generator and the vehicle-speed sensor when the vehicle is stopped.

However, because the set signal (locked condition) is entered into the memory circuit, the indicator light shows the condition in effect when the vehicle was traveling.



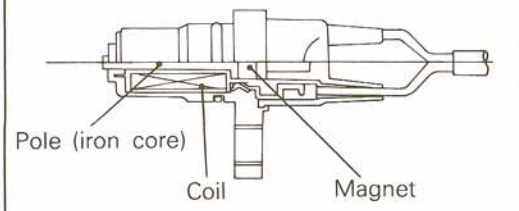
3. Automatic free-wheeling hub in free condition

For the free condition, although there are (when the vehicle is traveling) output signals from the vehicle-speed sensor, there are no signals from the pulse generator, with the result that the memory circuit is erased (because reset signals are output from the lock-discrimination circuit), and so the indicaotr light does not illuminate.

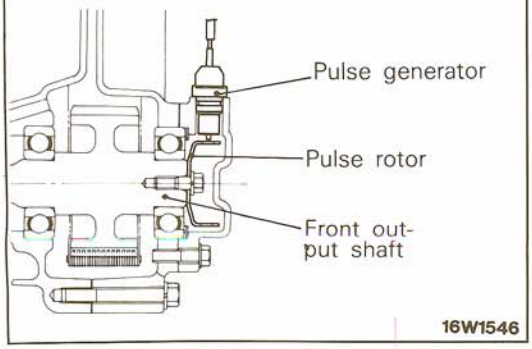


16W1534

Pulse generator cross-sectional view



16W1547



16W1546

PULSE GENERATOR

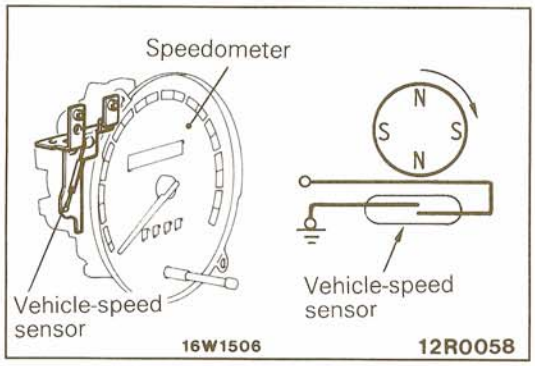
The pulse generator is located at the rear part of the front output shaft of the transfer, and is composed of the magnet, the coil and the pole (iron core).

When a magnetic material (iron, nickel, etc.) is brought close to and moved away from the pole (iron core), the magnetic flux within the pole changes, thus generating AC voltage in the coil.

Because the front output shaft does not rotate when the automatic free-wheeling hub is in the free condition, there is no generation of AC voltage in the pulse generator.

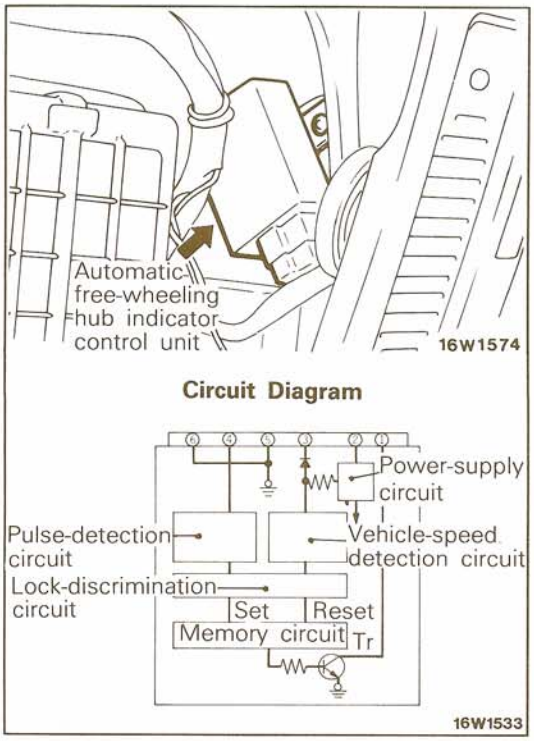
In the locked condition, however, the front output shaft and the pulse rotor rotate, with the result that the magnetic flux (within the pole (iron core) of the pulse generator) changes in accordance with the rotations of the pulse rotor, thereby generating AC voltage in the coil.

This AC voltage is transmitted to the automatic free-wheeling hub indicator control unit.



VEHICLE-SPEED SENSOR (REED-TYPE SWITCH)

The vehicle-speed sensor functions to substitute pulse signals for the rotations (vehicle speed) of the transmission's output gear; it is located within the speedometer.
Pulse signals are generated when the speedometer cable rotates.



AUTOMATIC FREE-WHEELING HUB INDICATOR CONTROL UNIT

The control unit is located at the upper part of the right cowl side.
The control unit is composed of the pulse-detection circuit (which receives the input signals from the pulse generator), the vehicle-speed-detection circuit (which receives the input signals from the vehicle-speed sensor), the lock-discrimination circuit (which, based on both of these input signals, judges the condition of the automatic free-wheeling hub and then transmits indicator output signals to the memory circuit), and the memory circuit (which "memorizes" the indicator output signals from the lock-discrimination circuti).

SPECIFICATIONS

GENERAL SPECIFICATIONS

N08RB--

Items	Specifications
Automatic free-wheeling hub indicator light W (SAE trade number)	1.4 (74)
Pulse generator	
Type	Magnet coil type
Vehicle-speed sensor	
Type	Reed switch type
Pulse generation	4 pulses/ rotation

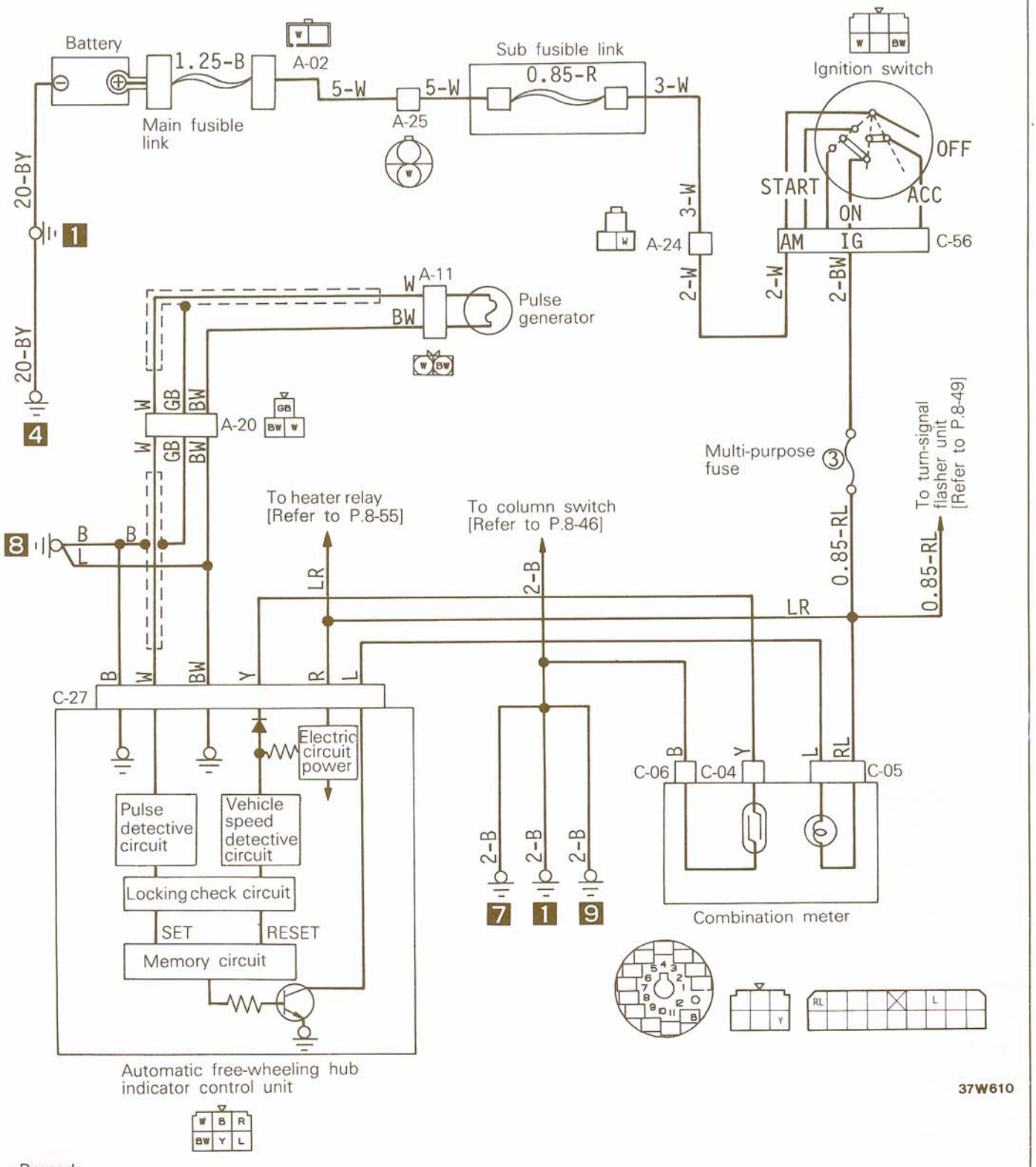
SERVICE SPECIFICATIONS

N08RC--

Items	Specifications
Standard values	
Pulse generator resistance Ω	215–275
Vehicle-speed sensor output voltage V	
	When OFF 4 or more
	When ON 0

TROUBLESHOOTING

CIRCUIT DIAGRAM



Remark
For information concerning the ground points (example: 1), refer to P.8-7.

Wiring color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

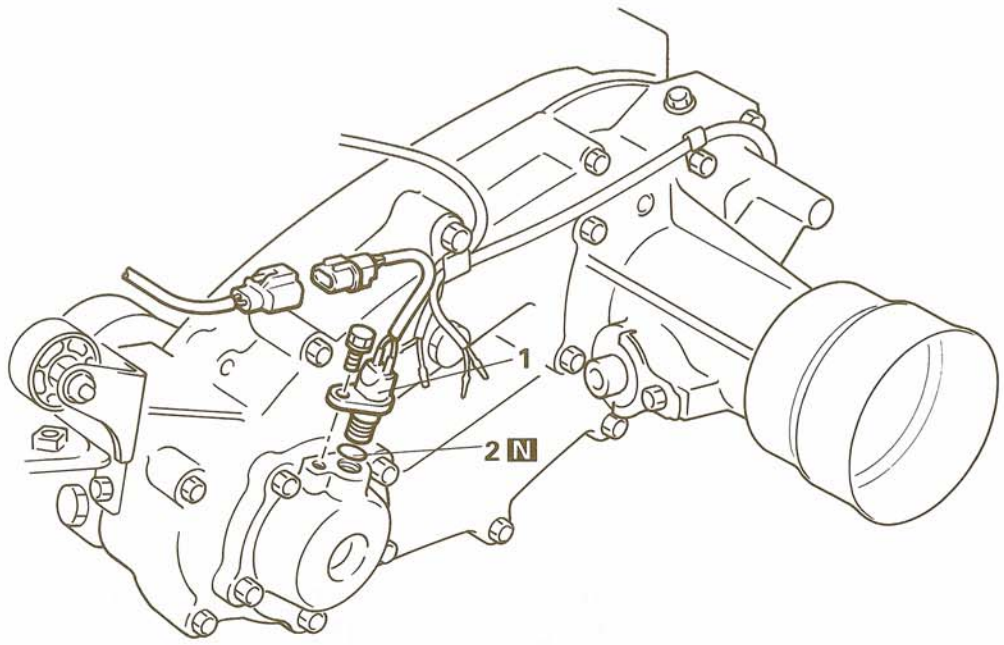
OPERATION

- When the ignition switch is placed in the "ON" position, battery voltage will go to the automatic free-wheeling hub indicator control unit through fuse No. 3.
- When driving with the free-wheeling hub in the "LOCK" position, the pulse signal from the pulse generator and the vehicle speed signal from the vehicle speed sensor will be input into the control unit.
- When vehicle speed increases over about 5 km/h (3 mph), the control unit goes on, electrical current flows to fuse No. 3, the automatic free-wheeling hub indicator control unit and the ground, lighting the automatic free-wheeling indicator light.
- When the vehicle is stopped in this situation, the pulse signsl and vehicle speed signal are not input, and the control unit memory circuit leaves the indicator light on.
- When driving with the free-wheeling hub in the "FREE" position, the pulse signal is not input to the control unit causing the control unit to go OFF and the indicator light to go out.

PULSE GENERATOR

REMOVAL AND INSTALLATION

N08RJAA



16W087

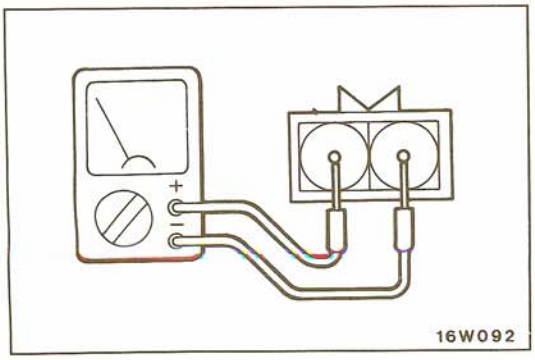
Removal steps

1. Pulse generator
2. O-ring

NOTE
(1) Reverse the removal procedures to reinstall.
(2) N : Non-reusable parts

INSPECTION

- Check whether or not metal particles are adhered to the pole (iron core) of the pulse generator.
- Check whether or not the installation bolts of the pulse rotor or the pulse generator are loose.
  (For detailed information concerning the pulse rotor, refer to GROUP 21 TRANSMISSION – Transfer.)



16W092

CHECKING PULSE GENERATOR RESISTANCE

Check whether or not the resistance between the terminals shown in the figure is within the standard value range.

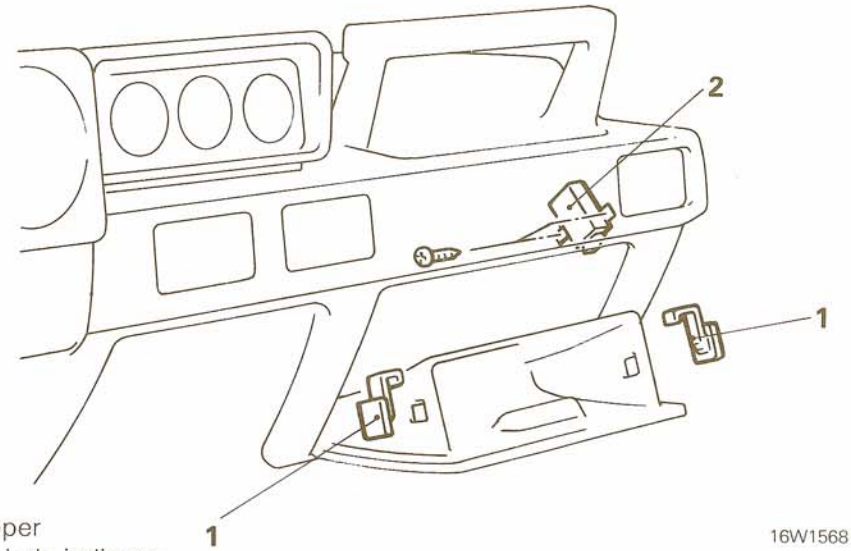
Standard value : 215 – 275 Ω

If the resistance is not within the standard value range, replace the pulse generator.

AUTOMATIC FREE-WHEELING HUB INDICATOR CONTROL UNIT

REMOVAL AND INSTALLATION

N08RKAA

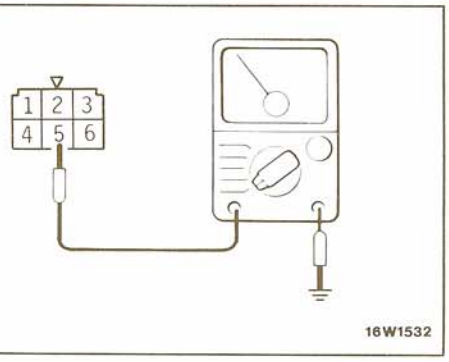


16W1568

Removal steps

1. Glove compartment stopper
2. Automatic free-wheeling hub indicator control unit

NOTE
Reverse the removal procedures to reinstall.



16W1532

CHECKING OUTPUT VOLTAGE OF THE VEHICLE-SPEED SENSOR (REED TYPE SWITCH)

1. Turn the ignition key to ON.
2. Insert a test probe from the rear side of the conncetor of the automatic free-wheeling hub indicator control unit.
3. Measure the output voltage of the vehicle-speed sensor when the vehicle is moved a distance of about 0.5 m (1.6 ft.).

Standard values :
Vehicle-speed sensor OFF : 4V or higher
Vehicle-speed sensor ON : 0V

If there is a malfunction of the vehicle-speed sensor, replace it by replacing the speedometer assembly.

UNITED STATES

CHRYSLER MOTORS

The special service tools referred to herein are required for certain service operations. These special service tools or their equivalent, if not obtainable through a local source are available through the following outlet.

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