

SECTION 21

BODY ELECTRICAL EQUIPMENT

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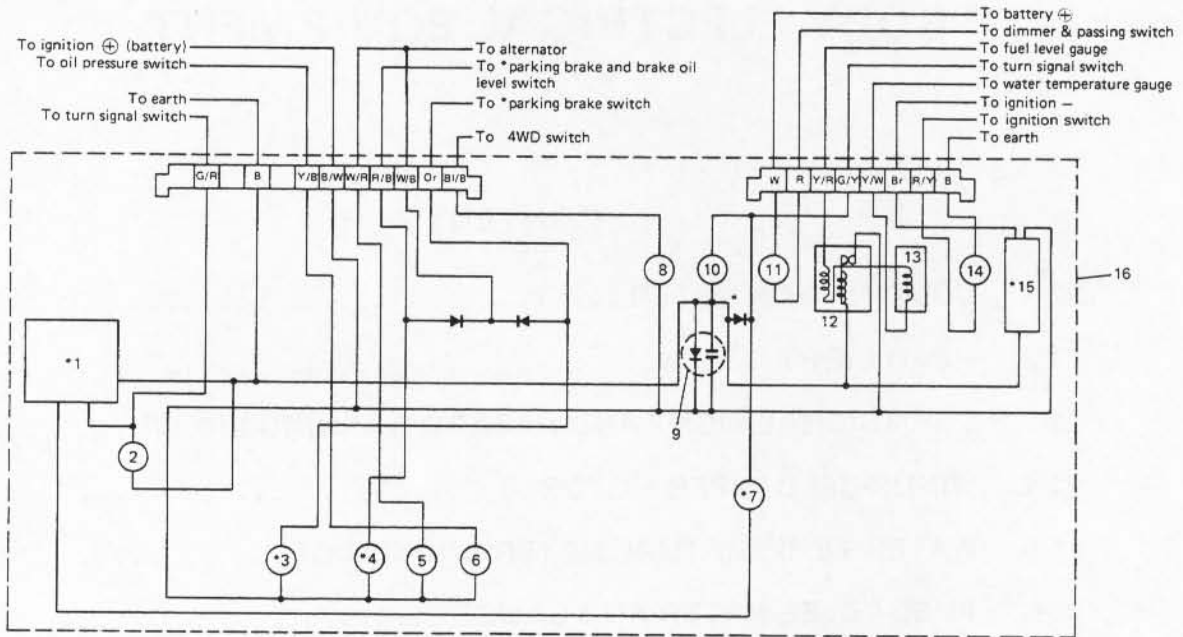
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21-1. COMBINATION METER

COMBINATION METER CIRCUIT AND COMPONENTS

NOTE:

Whether equipped with * marked parts or not depends on vehicle specifications.



Wire color

G/R . . . Green/Red	Bl/B . . . Blue/Black
B Black	W White
R Red	Y/R . . . Yellow/Red
Y/B . . . Yellow/Black	G/Y . . . Green/Yellow
B/W . . . Black/White	Y/W . . . Yellow/White
W/R . . . White/Red	R/Y . . . Red/Yellow
R/B . . . Red/Black	W/B . . . White/Black
Or Orange	

- | | |
|----------------------------------|---------------------------------|
| 1. Hazard relay | 9. Noise suppressor |
| 2. Turnsignal pilot light (L) | 10. Turn signal pilot light (R) |
| 3. Parking brake light | 11. Beam pilot light |
| 4. Brake oil level warning light | 12. Fuel level meter |
| 5. Charge light | 13. Temp. meter |
| 6. Engine oil pressure light | 14. Illumination light |
| 7. Hazard pilot light | 15. Tachometer |
| 8. 4WD light | 16. Combination meter |

[Combination meter without tachometer]

[Combination meter with tachometer]

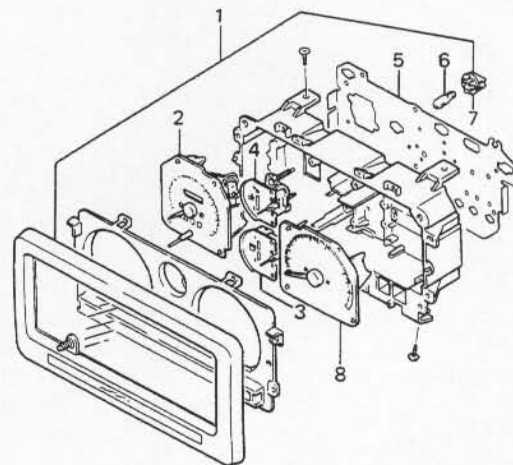
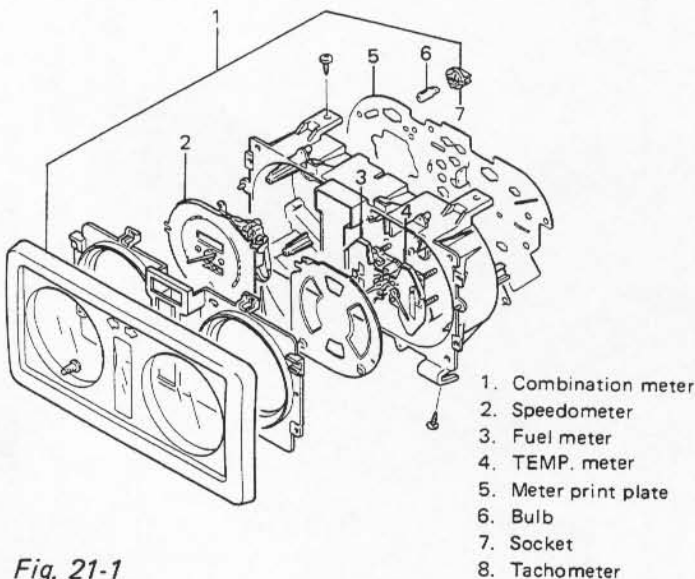


Fig. 21-1

REMOVAL AND INSTALLATION

1. Disconnect battery negative cable.
2. Remove instrument lower panel.
3. Lower steering column.
4. Remove combination meter cover.
5. Loosen combination meter screws.
6. Disconnect speedometer cable and wire harness coupler.
7. Remove combination meter.

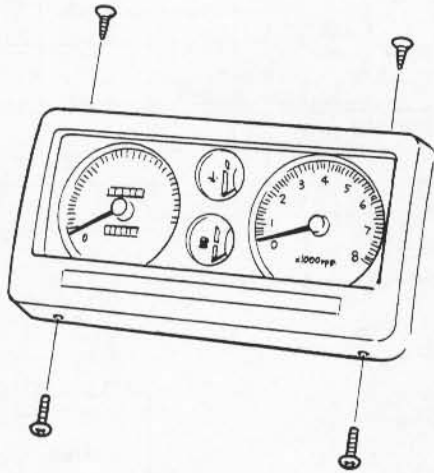


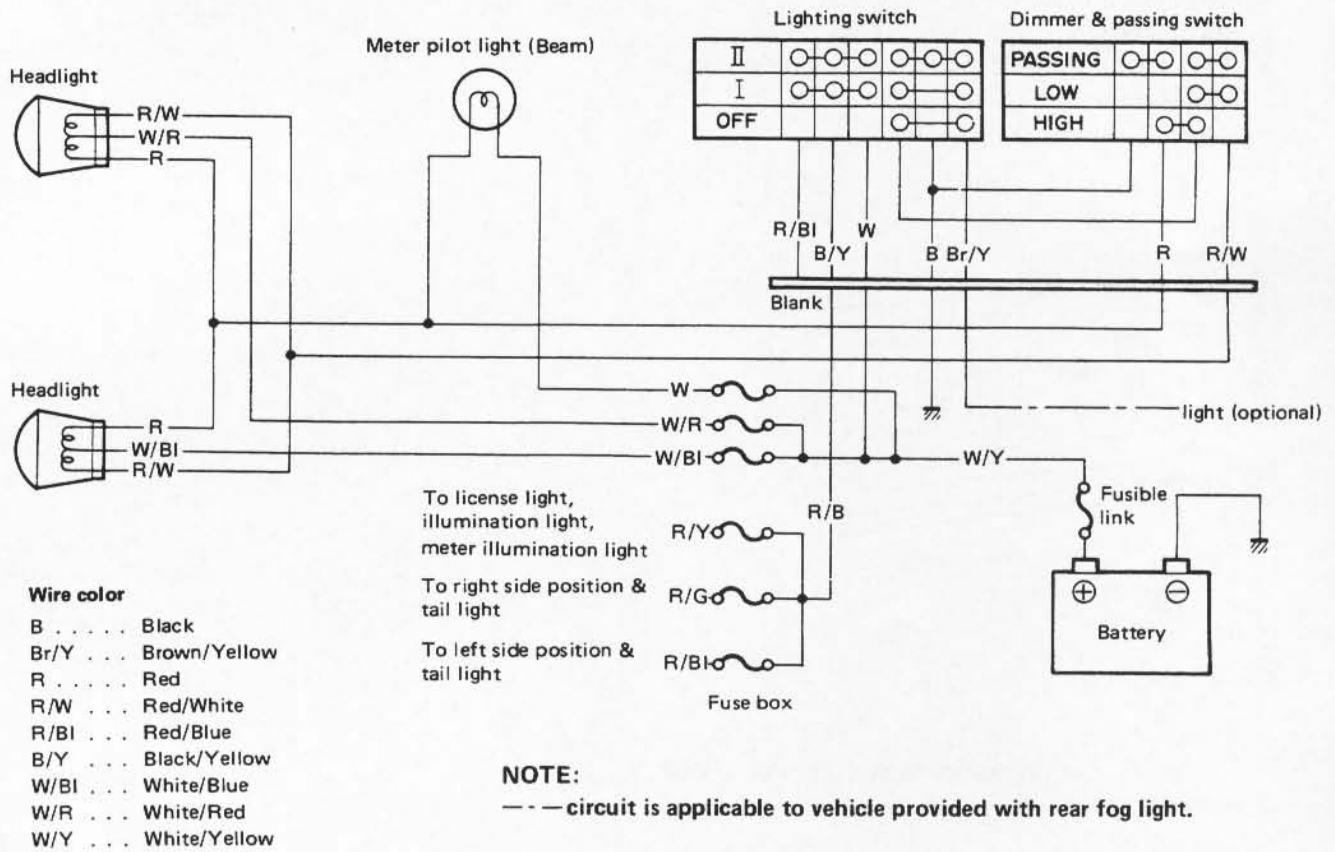
Fig. 21-2

8. To install combination meter, reverse above removal procedure.

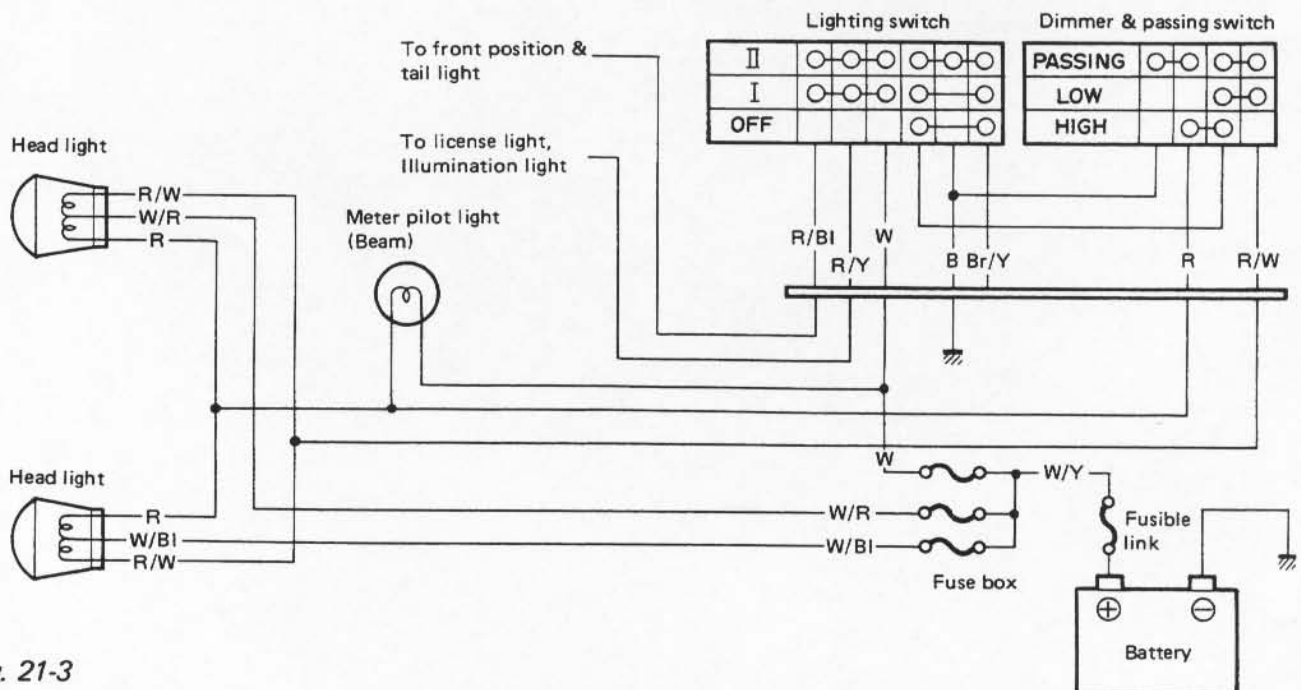
21-2. HEAD LIGHT

WIRING CIRCUIT

[This circuit is applicable to vehicle equipped with 14 fuses]



[This circuit is applicable to vehicle equipped with 10 fuses]



HEADLIGHT INSPECTION

1. Lighting (Low beam, High beam, Passing)
2. Mounting
3. Dirt and cracks on lenses
4. Main beam axis direction and brightness

HEADLIGHT BEAM SETTING (STANDARD)

Before measuring or adjusting the headlight beam, adjust air pressure of the 4 tires to the specified value and settle the attitude of the vehicle by manually moving it up and down, then move the vehicle onto a flat surface. There are various measuring methods (e.g. screen method, using focusing type tester, etc.). The method described in this manual does not use a tester.

(1) Vertical beam alignment

Unless otherwise prescribed by the local statutory regulations, set the head lights in such a way that the main beam axis will fall on a spot not above the height of the head light and not below a height equal to a fifth ($1/5$) of the head light height. In other words, the main beam should be sloped down. The beam spot, mentioned above, refers to a blank wall standing vertical 10 meters (32.8 feet) ahead of the head lights, with the vehicle standing perfectly level.

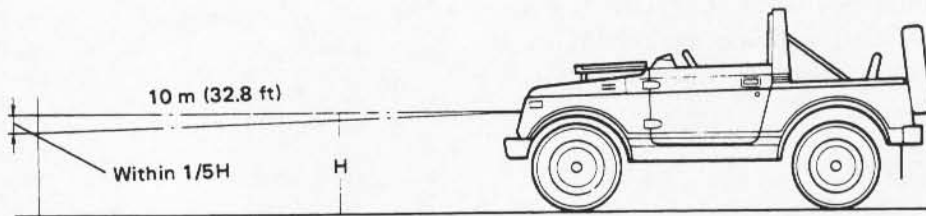


Fig. 21-4

(2) Horizontal beam alignment

Check if hot spots of main beam (high beam) strike within ranges given in Fig. 21-5.

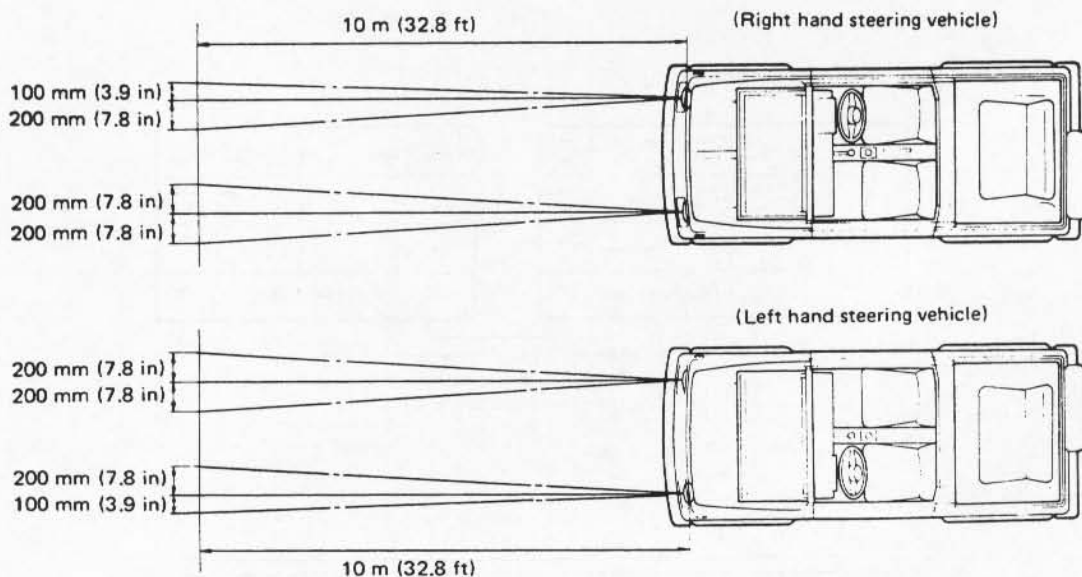


Fig. 21-5

MAINTENANCE

(1) Headlight adjustment

There are three screws; 1, 2, and 3. By means of these screws, adjust light position for beam alignment.

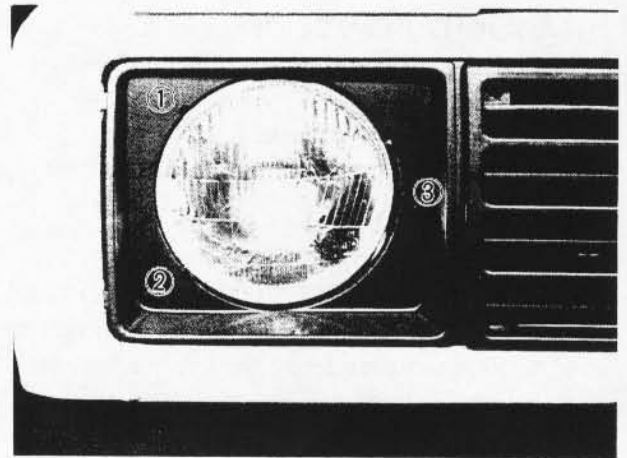
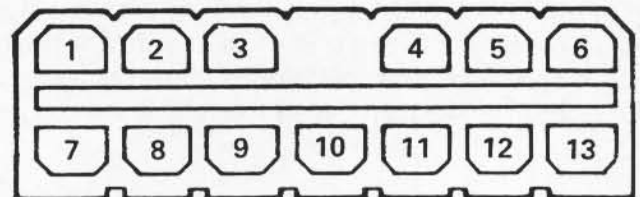


Fig. 21-6

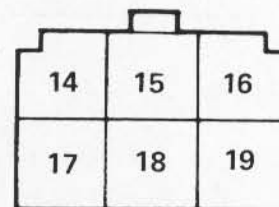
(2) Head light dimmer switch

Using circuit tester, check each circuit for continuity by putting tester probe pins to the terminals shown in Fig. 21-7. With switch kept in LOW BEAM position, tester should indicate continuity between terminals ⑦ and ⑱. Similarly, there should be continuity between terminals ⑧ and ⑱ when in HIGH BEAM position.

Switch connector



- | | |
|----------------------------|------------------|
| 1. Green/Red (Green/Black) | 8. Red |
| 2. Green/Yellow | 9. Blue/Green |
| 3. Green | 10. Brown/Yellow |
| 4. Yellow | 11. Red/Blue |
| 5. White/Blue | 12. Red/Yellow |
| 6. Yellow/Blue | 13. White |
| 7. Red/White | |



- | | |
|------------------|----------------|
| 14. Yellow/White | 17. Blue/Black |
| 15. Blue | 18. Black |
| 16. Blue/Red | 19. Blue/White |

Fig. 21-7

Combination switch (Lighting switch circuit)

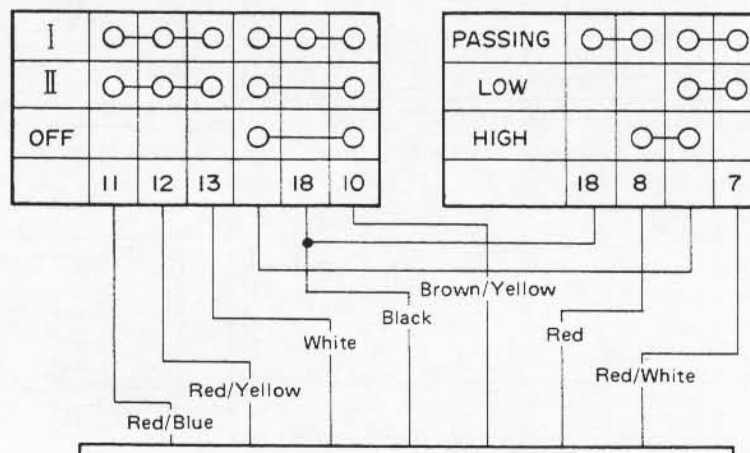
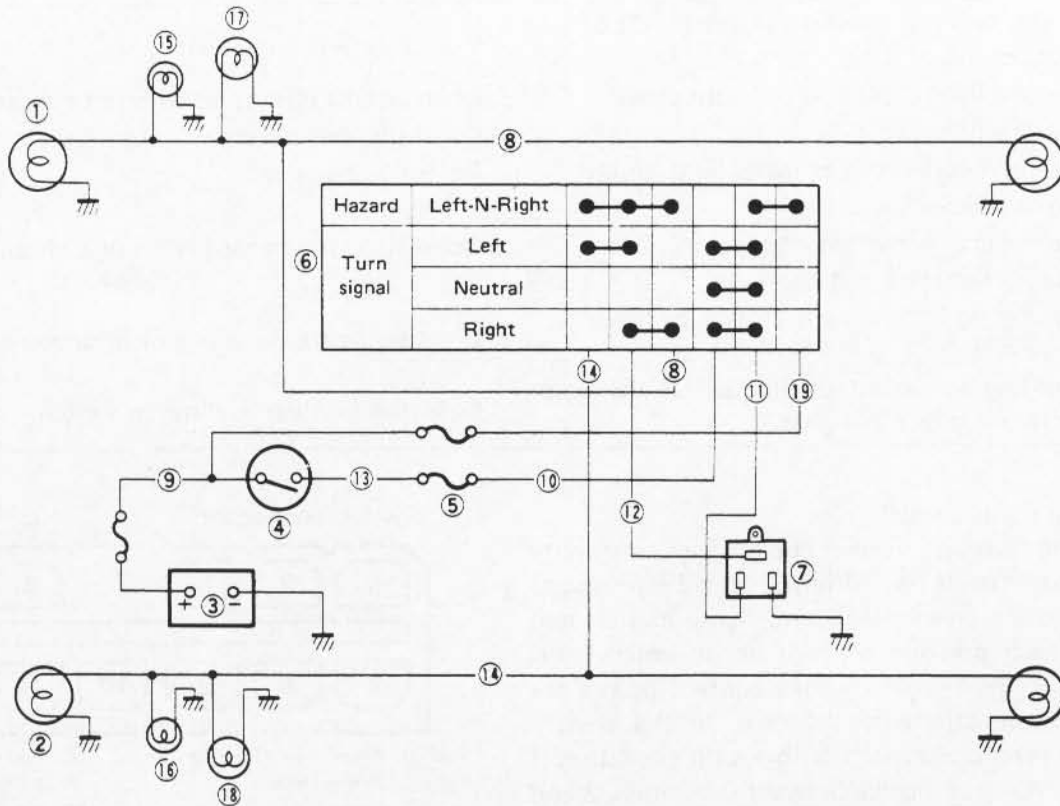


Fig. 21-8

21-3. TURN SIGNAL LIGHT AND HAZARD WARNING LIGHT

CIRCUIT DESCRIPTION



- | | | |
|--|-----------------|-------------------------------|
| 1. Right turn signal | 8. Green/Yellow | 15. Meter pilot light (Right) |
| 2. Left turn signal | 9. White/Yellow | 16. Meter pilot light (Left) |
| 3. Battery | 10. Yellow | 17. Side turn signal (Right) |
| 4. Main switch | 11. Yellow/Blue | 18. Side turn signal (Left) |
| 5. Fuse | 12. Green | 19. White/Green |
| 6. Turn signal and hazard warning switch | 13. Black/Blue | |
| 7. Turn signal and hazard warning relay | 14. Green/Red | |

Fig. 21-9

When hazard warning switch is "OFF", Yellow lead ⑩ is connected to Yellow/Blue lead ⑪.

When the hazard warning switch is "ON", White/Green lead ⑲ is connected to Yellow/Blue lead ⑪, and Green lead ⑫ to both Green/Yellow lead ⑧ and Green/Red lead ⑭.

When Turn-signal switch is "ON" for right turn, Green lead ⑫ is connected to Green/Yellow lead ⑧.

When Turn-signal switch is "ON" for left turn, Green lead ⑫ is connected to Green/Red lead ⑭.

INSPECTION

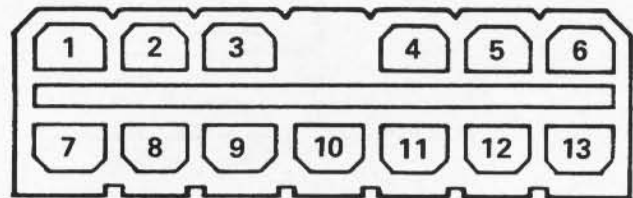
1) Trouble diagnosis

Symptom	Possible cause
1. Lights will not come on in either left or right group of light.	Fusible link is blown off.
2. Hazard light comes on but turn signal lights will not.	Open circuit (due to poor point contact) in turn signal dimmer switch.
3. No light comes on; or lights light up but do not flicker.	Defective relay unit.
4. Turn signal lights are satisfactory, but hazard light will not come on.	Open circuit in hazard warning switch.
5. Flickering frequency is erratic, or lights remain lit.	Light bulbs are defective or improperly grounded.
6. Turning on hazard warning switch lights up only one group of lights.	Defective contact in dimmer switch.

2) Turn signal switch

Using circuit tester, check for continuity between each pair of terminals by referring to the chart given below and figure at the right for each position of turn signal switch lever. Discontinuity means that contact points are burnt or otherwise defective in the switch. For example, switch is in sound condition if continuity is noted between terminals 2 and 3, with lever in right-turn position, and between terminals 1 and 3, with lever in left-turn position.

Switch connector



- | | |
|----------------------------|------------------|
| 1. Green/Red (Green/Black) | 8. Red |
| 2. Green/Yellow | 9. Blue/Green |
| 3. Green | 10. Brown/Yellow |
| 4. Yellow | 11. Red/Blue |
| 5. White/Blue | 12. Red/Yellow |
| 6. Yellow/Blue | 13. White |
| 7. Red/White | |

Fig. 21-10

3) Hazard warning switch

Disconnect lead wire of the hazard warning switch at its coupler. Set switch to ON position and check for continuity with circuit tester between each of the following pairs of terminals; 2 and 3, 1 and 3, 5 and 6 among those shown in Fig. 21-10. The switch is in sound condition if continuity is noted between each pair.

Turn signal & hazard warning switch

		1 (Green/Red or Green/Black)	3 (Green)	2 (Green/Yellow)	4 (Yellow)	6 (Yellow/Blue)	5 (White/Blue)
Hazard warning	Left-N-Right	●	●	●		●	●
Turn signal	Left	●	●		●	●	
	Neutral				●	●	
	Right		●	●	●	●	

21-4. WINDSHIELD WIPER MOTOR

CIRCUIT DESCRIPTION

The circuit is designed so that, when the Wiper Switch is turned "OFF", the blade will automatically return to the horizontal position. In Fig. 21-11, when the Wiper Switch is turned "ON" while the Main Switch is "ON", current is supplied to the Wiper Motor from the Battery, the motor rotates and the blade moves. The gear mechanism which converts rotational movement of the motor into swinging movement of the blade has a cam on the final gear shaft. The cam switches the contacts of P0 and P2 every revolution. (At the blade stop position, the contact is switched from P2 to P1.)

Repeated contact making and breaking is independent of the wiper motor rotation. When the Wiper Switch is turned "OFF" while the blade is in a position other than the rest position, motor current path is changed (i.e. BI/W → BI → MOTOR). Therefore, the motor keeps rotating even though the wiper switch is turned "OFF", and the blade will return to the rest position.

When the blade returns to the rest position, the cam contact is changed from P2 to P1 and motor current is shunted. When supply to the motor is cut off, a counter electromotive force is generated in the armature. As a result of this counter electromotive force, current flows through the motor and shunt circuit and the motor stops and the wiper blade stays in the specified position.

[INTERVAL WIPER RELAY CIRCUIT (OPTIONAL)]

When the wiper switch is set to the interval position with the ignition switch ON (the condenser is charged at this time), current from the battery flows through the yellow/blue wire, generates magnetic force in the coil in the relay and causes the switch in the relay to turn ON. Then current is transmitted in the sequence of yellow/blue, relay, wiper switch and blue and causes the wiper motor to rotate (meanwhile, the condenser discharges). By the time the wiper motor makes one rotation and the cam in the motor comes to the automatic stop position P1, the condenser in the relay has finished discharging (no magnetic force in the coil in the relay). Then the switch in the relay turns OFF and the wiper stops. They remain that way until the condenser is fully charged. As soon as the condenser begins discharging after being fully charged, magnetic force generated in the coil in the relay causes the switch to turn ON. As described above, interval operation of the wiper motor is controlled by charging and discharging of the condenser.

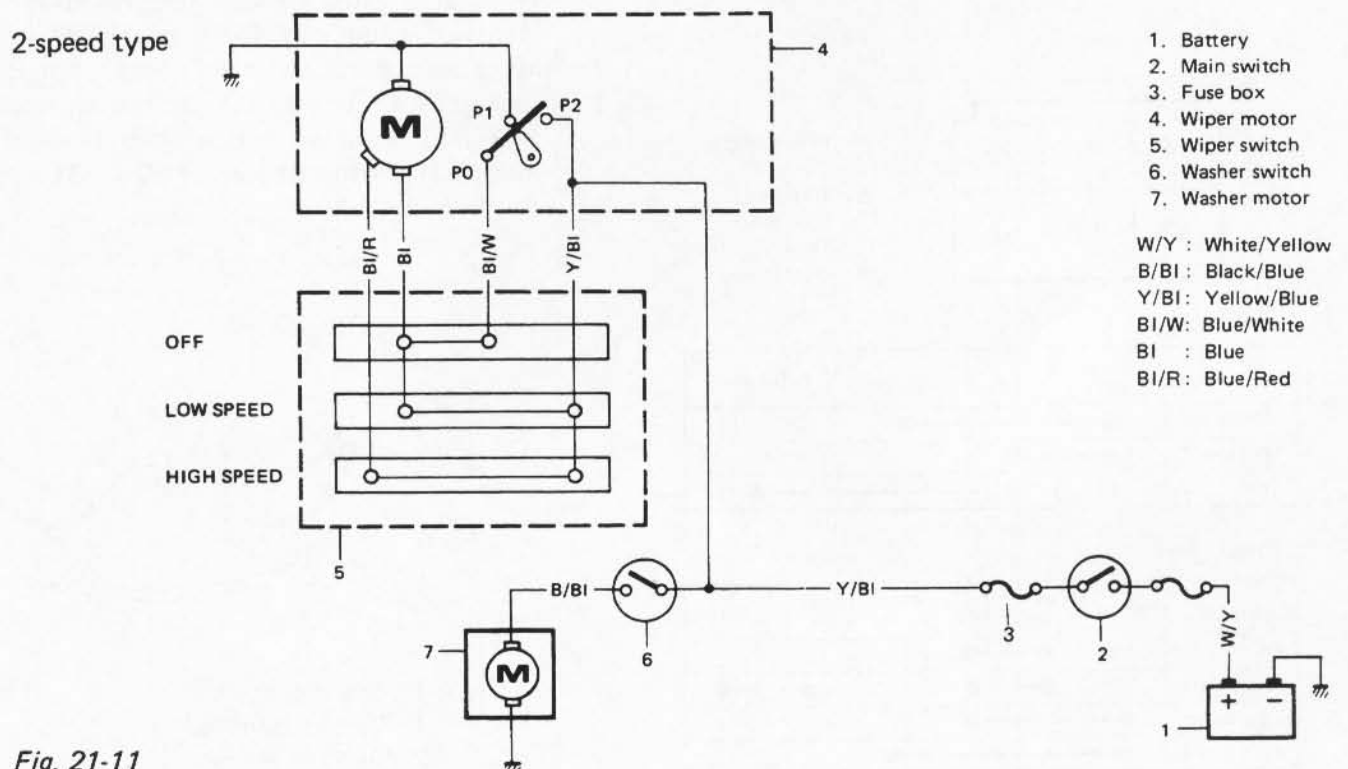


Fig. 21-11

3-speed type

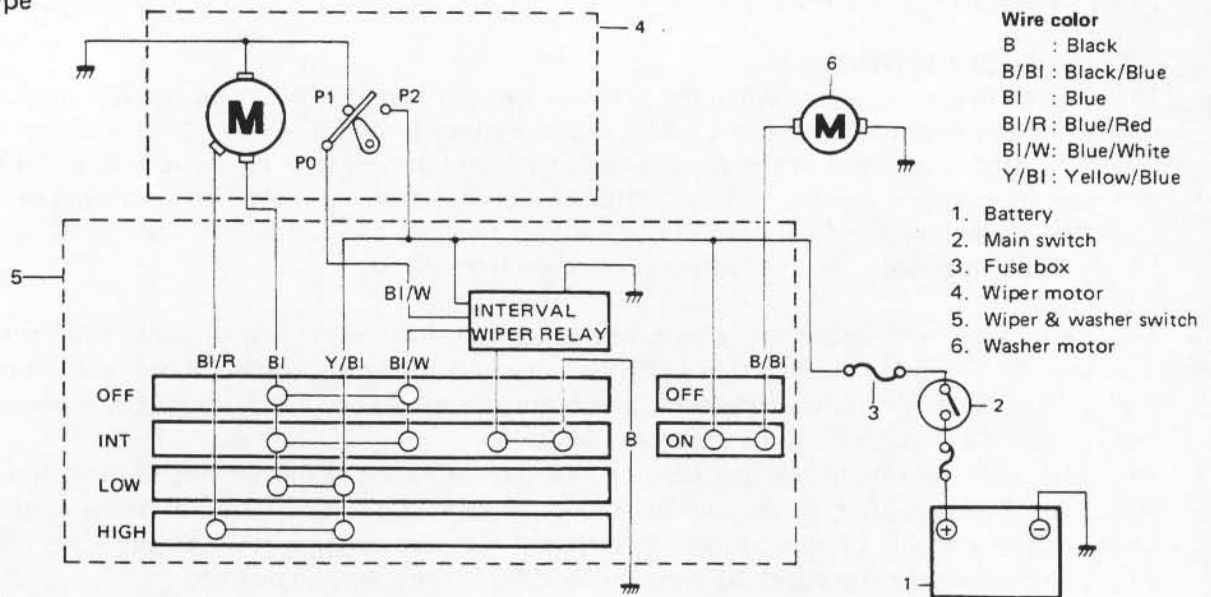


Fig. 21-12

MAINTENANCE

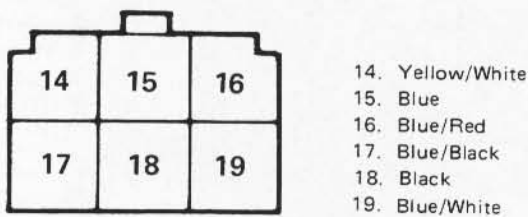
1) Wiper trouble diagnosis

When wiper motor does not start even if Wiper Switch is turned "ON", check lead connections and coupler connections. Then, check the following.

- a) Fuse blown or mounted incorrectly.
- b) Wiper switch:

To check wiper switch, remove couplers and check continuity between following terminals by using circuit tester.

Switch connector



2-speed type

	Yellow/white	Blue	Blue/red	Blue/white
High speed	●	●	●	
Low speed	●	●		
OFF		●		●

Wiper switch

3-speed type

	Yellow	Blue/white	Blue	Blue/red	To replay	Black
OFF		●	●			
Interval		●	●		●	●
Low speed	●		●			
High speed	●		●	●		

Wiper switch

- c) Break in wiper motor armature or poor commutator brush contact:

To check these, check continuity between Blue lead and ground, and Blue/Red wire and ground respectively.

2) No-load run test

As shown in Fig. 21-13, using a 12V battery, connect positive battery terminal to Blue terminal and the negative terminal to motor. If motor rotates at 45 – 57 r/min, this is acceptable (for Low-speed check). For High-speed check, connect the positive terminal to Blue/Red terminal and negative terminal to motor. If motor rotates at 67 – 81 r/min, this is acceptable.

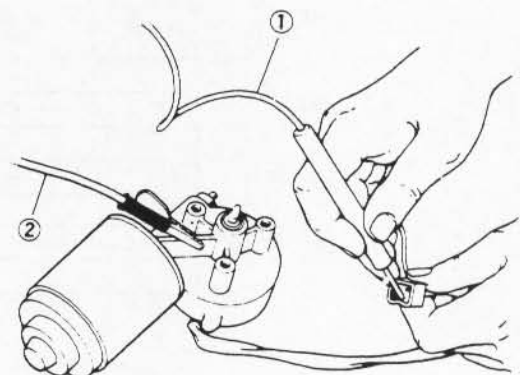


Fig. 21-13 Testing motor

- 1. Positive terminal
- 2. Negative terminal

3) Automatic stop action test

Connect yellow terminal of motor to positive \oplus battery terminal, and put a jumper between Blue/White (Blue/Black) and Blue terminals to see if motor output shaft comes to a halt at a certain, not just any, angular position. That position corresponds to starting position of the blade. Using jumper, stop motor a number of times to make sure that motor stops at the same position each time.

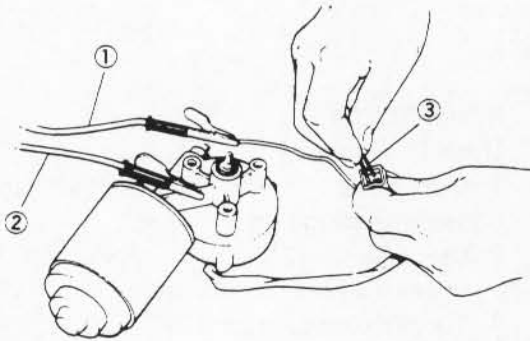


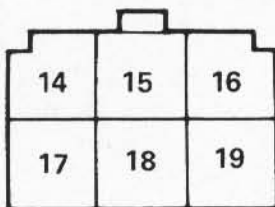
Fig. 21-14 Testing motor

1. Positive terminal
2. Negative terminal
3. Put a jumper between Blue/White (Blue/Black) and Blue

4) Internal wiper relay test

1. Disconnect wiper & washer switch coupler.
 2. Turn wiper switch to "INT" position.
 3. Connect positive battery terminal to Yellow/White coupler terminal and negative battery terminal to Black terminal.
- If an operating sound is heard, the relay is at work properly.

Switch connector



14. Yellow/White
15. Blue
16. Blue/Red
17. Blue/Black
18. Black
19. Blue/White

Fig. 21-15

21-5. WATER TEMPERATURE METER AND GAUGE

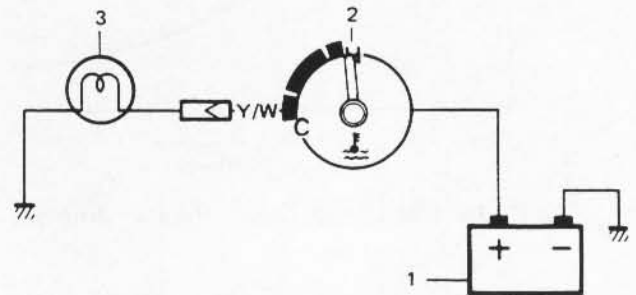
The water temperature meter is located in the combination meter and its gauge unit on the inlet manifold.

The gauge unit shows different resistance values depending on the coolant temperature. This causes a current flowing through the temperature meter coil to change, controlling the meter pointer. That is, when the coolant temperature is raised, the gauge unit resistance is decreased with more current flowing through the meter coil, raising the meter pointer upward from the "C" position.

INSPECTION

[Water temperature meter]

1. Disconnect Y/W (Yellow/White) lead wire going to gauge unit installed to intake manifold.
 2. Use a bulb (12V 3.4W) in position to ground above wires as illustrated.
 3. Turn main switch ON, Confirm that the bulb is lighted and meter pointer fluctuates several seconds thereafter.
- If meter is faulty, replace it.



1. Battery
 2. Water temperature meter
 3. Test lamp (12V, 3.4W)
- Y/W: Yellow/White

Fig. 21-16

[Gauge unit]

Warm up gauge unit. Thus make sure its resistance is decreased with increase of temperature. Temperature and resistance relationship can be plotted in a graph as shown below.

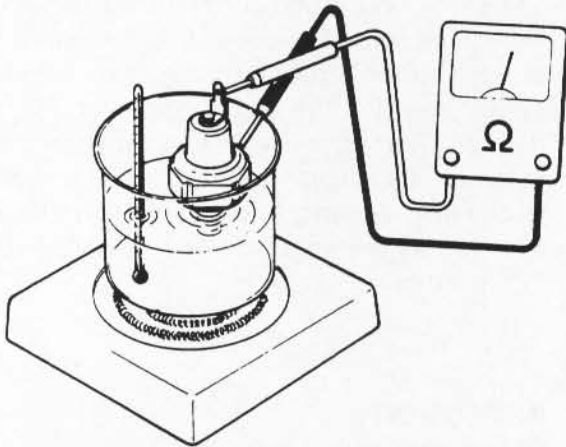


Fig. 21-17

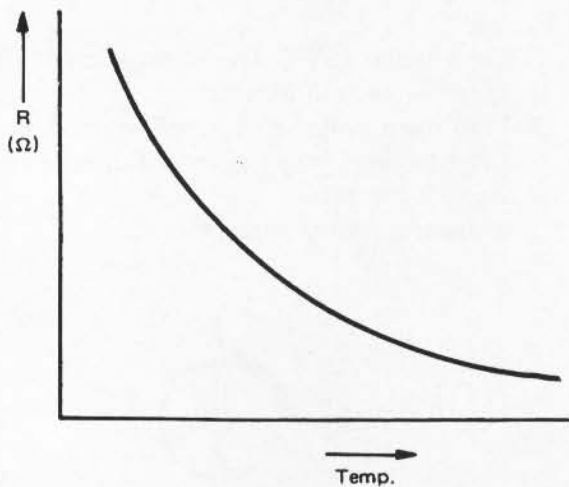


Fig. 21-18 Resistance-Temp. Relationship

Temperature	Resistance
50°C (122°F)	133.9 – 178.9 Ω
80°C (176°F)	47.5 – 56.8 Ω
100°C (212°F)	26.2 – 29.3 Ω

NOTE:

Wind sealing tape on screw threads of gauge before installing gauge to intake manifold.

21-6. FUEL LEVEL METER AND GAUGE

The fuel level meter circuit consists of the fuel level meter installed inside the combination meter and the fuel level gauge installed to the fuel tank.

Current flowing through the meter coil is changed to control the meter pointer. That is, when fuel is full, the fuel level gauge unit resistance is decreased with more current flowing into the meter coil, causing the meter pointer to point at the "F" position.

INSPECTION

[Fuel level meter]

1. Disconnect Y/R (Yellow/Red) lead wire going to gauge unit.
2. Use a bulb (12V 3.4W) in position to ground above lead wire as illustrated.
3. Turn ignition switch ON.

Make sure the bulb is lighted and meter pointer fluctuates several seconds thereafter. If meter is faulty, replace it.

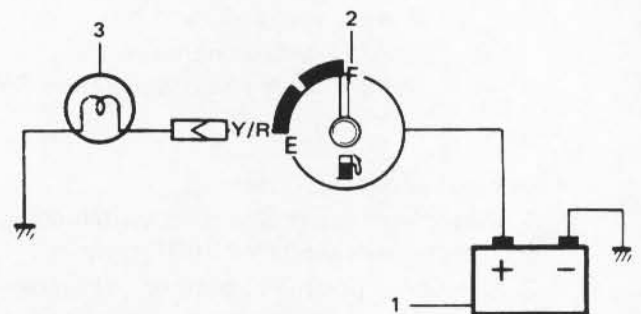


Fig. 21-19

1. Battery
 2. Fuel level meter
 3. Test lamp (12V, 3.4W)
- YR : Yellow/Red

[Gauge unit]

Use ohmmeter to confirm that level gauge unit changes in resistance with change of the float position. Float position-to-resistance relationship can be plotted in a graph as shown below.

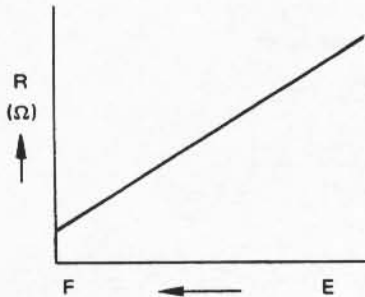
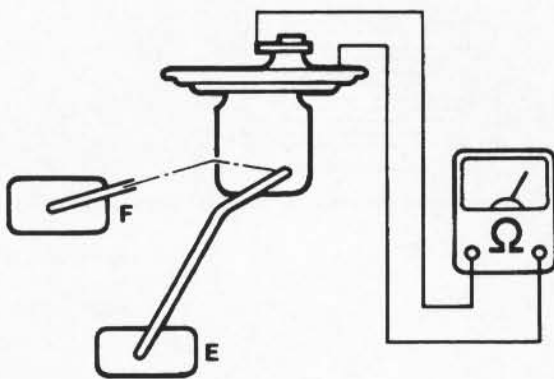


Fig. 21-20 Resistance-Fuel Level Relationship



F : Full
E : Empty

Fig. 21-21

Position	Resistance
E	$110 \pm 7 \Omega$
F	$3 \pm 2 \Omega$
1/2	$32.5 \pm 4 \Omega$

21-7. BRAKE FLUID LEVEL WARNING LAMP

NOTE:

Whether equipped with this system or not depends on the vehicle specifications.

The brake fluid level warning lamp system consists of the brake fluid level switch installed to the master cylinder reservoir and the lamp (brake fluid level warning lamp) inside the combination meter.

Depending on specifications, this circuit may include a parking brake switch which gives a warning for unreleased parking brake.

OPERATION

When the engine is stopped, the warning lamp is lighted regardless of the brake fluid level position and parking brake operation, if the main switch is turned ON. This is because the point of the regulator incorporated in the alternator is closed so that the W/R lead wire is grounded. After the engine is started (meaning the charging is started), release the parking brake (if parking brake warning system is included). If the lamp goes OFF, the brake fluid level is proper.

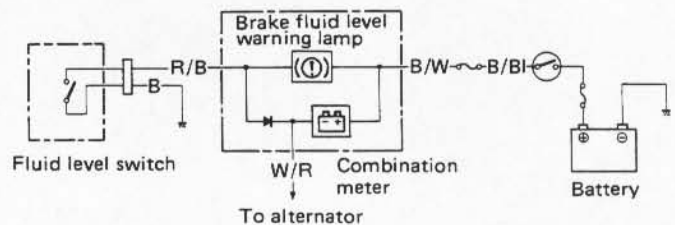


Fig. 21-22

INSPECTION

[Brake fluid level switch]

Use ohmmeter to check switch for resistance and continuity.

If found defective, replace switch.

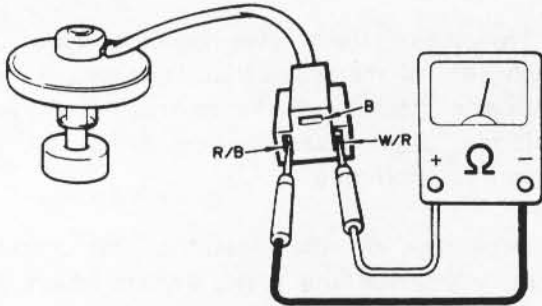


Fig. 21-23

W/R : White/Red
 B : Black
 R/B : Red/Black

R/B – B Resistance	
OFF position (float up)	∞
ON position (float down)	Several Ω

R/B – W/R Continuity	
R/B to W/R	Continuity obtained
W/R to R/B	No continuity obtained

21-8. DEFOGGER CIRCUIT DIAGRAM (OPTIONAL FOR METAL TOP MODEL)

The Defogger circuit for the rear window glass heating wires is as follows:

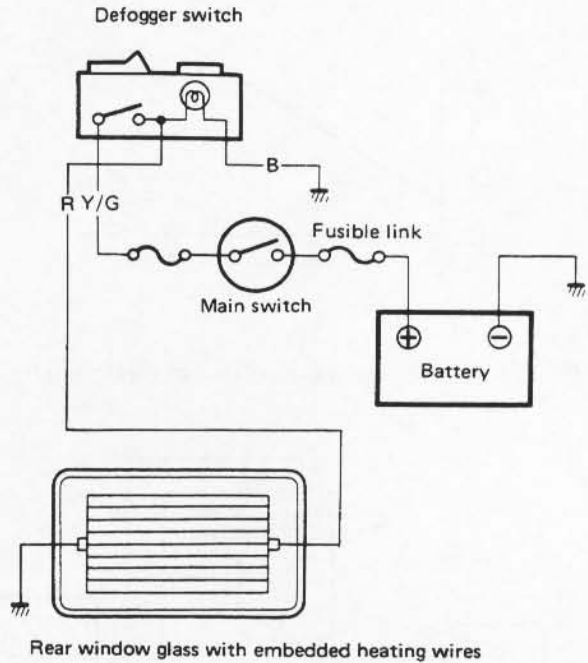


Fig. 21-24

Y/G : Yellow/Green
 B : Black
 R : Red

To check function of Defogger Switch, check continuity between Yellow/Green wire and Red wire when Defogger Switch is "ON"

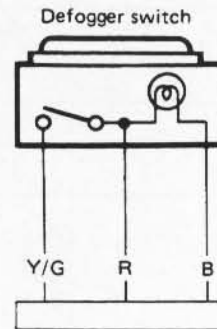


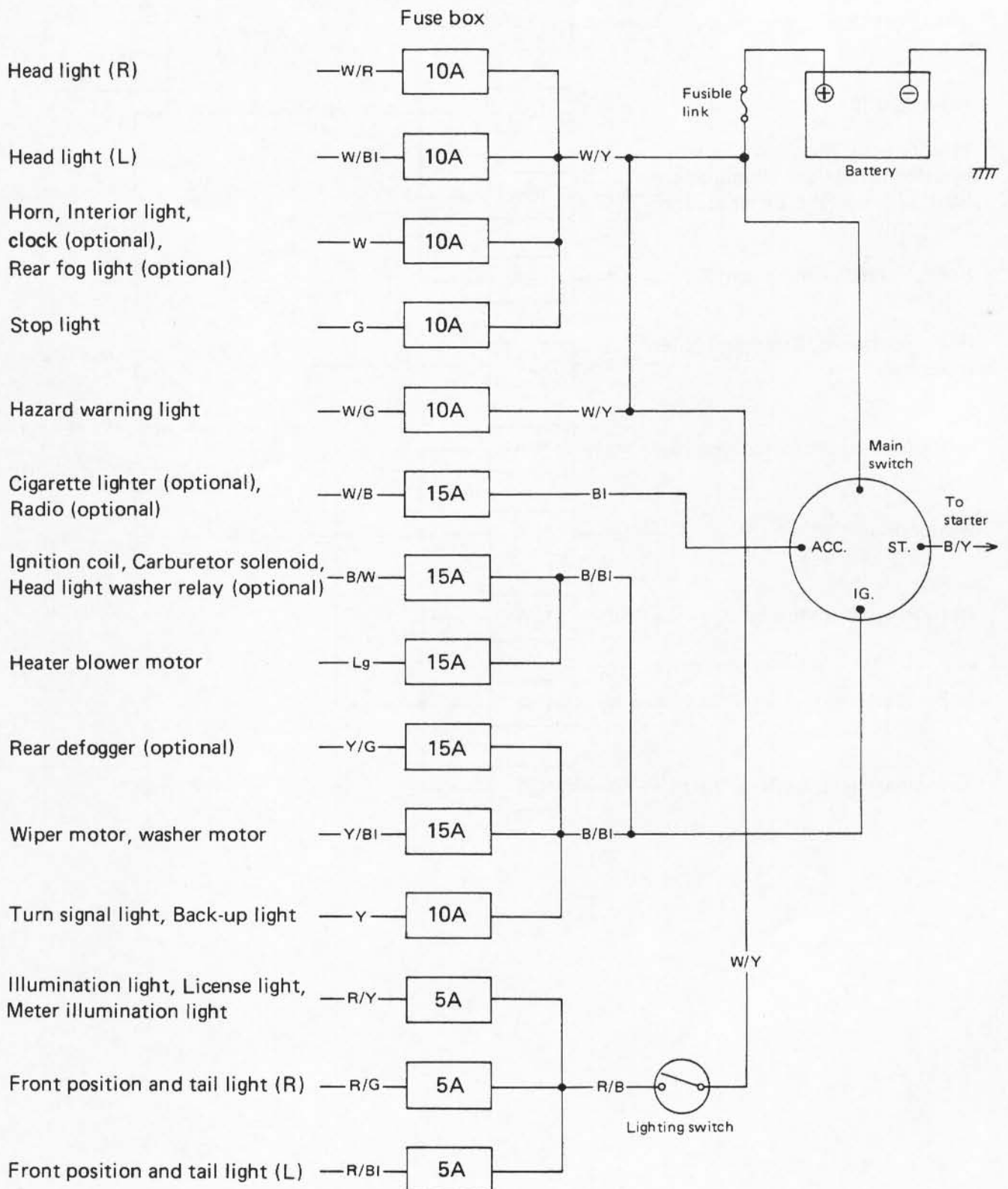
Fig. 21-25

Y/G : Yellow/Green
 R : Red
 B : Black

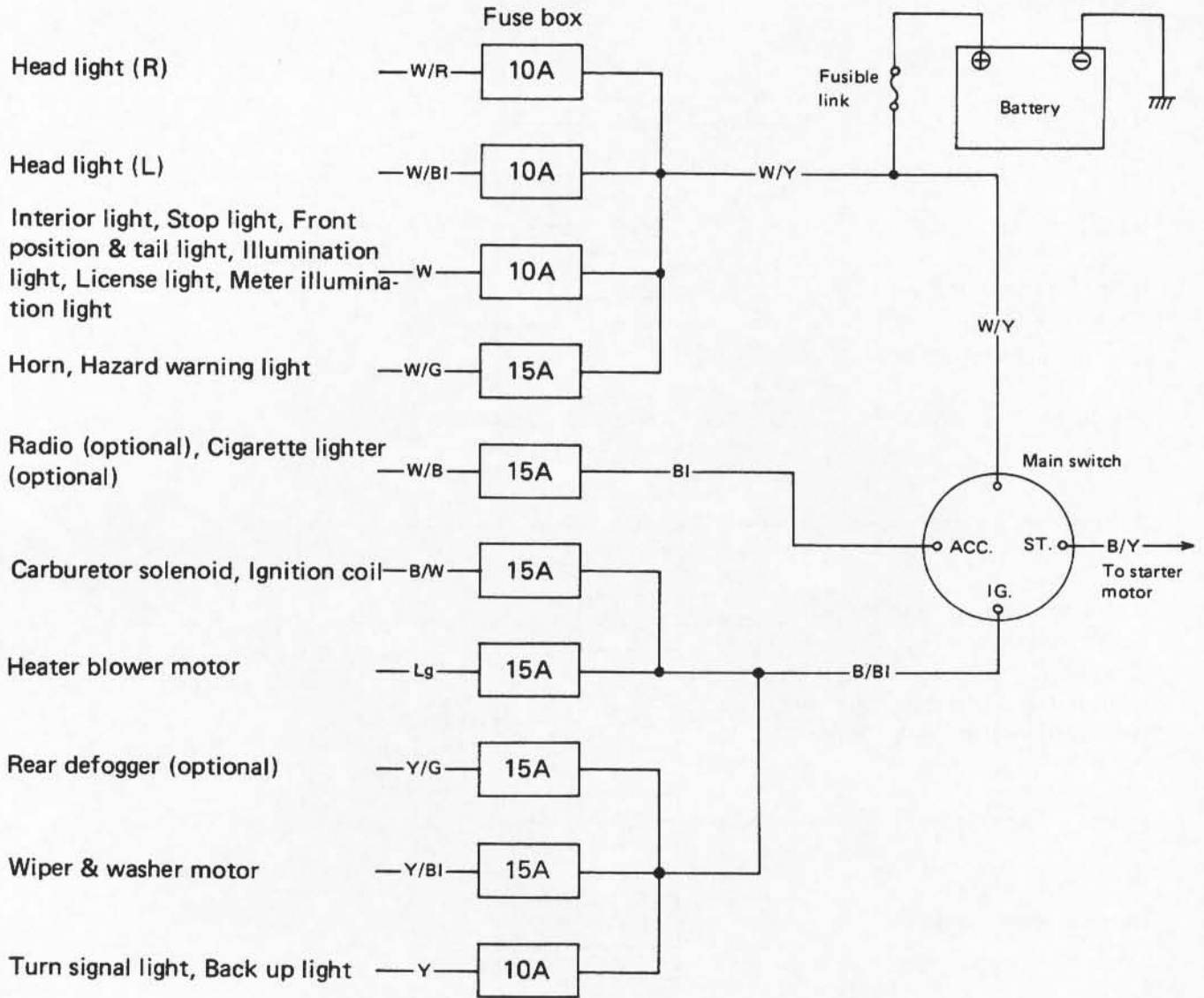
21-9. FUSE BOX

The fuses in the fuse box is wired as follows.

[For 14 fuses circuit]



[For 10 fuses circuit]



21-10. WIRING HARNESS ROUTING

When reinstalling wire harness, be careful for the following.

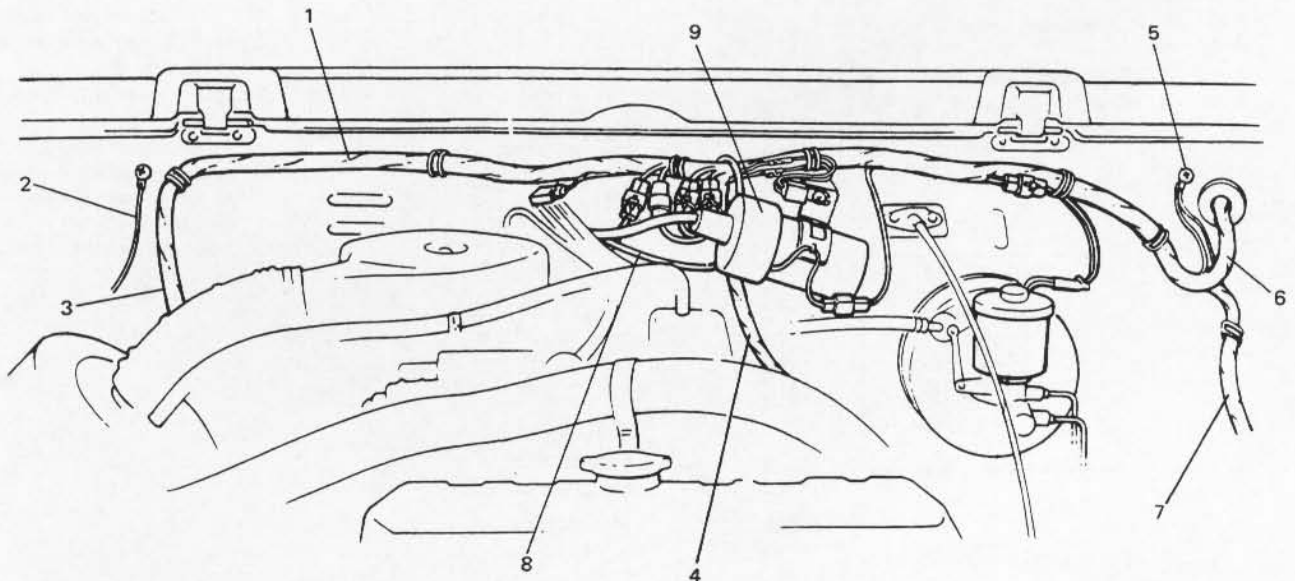
- When doing wiring harness related work, make always sure to disconnect battery negative cable from battery.
- Clamp wire harness securely at prescribed positions.
- Try to route wire harness so as to avoid contact with other parts as much as possible. Use special care not to let it contact sharp edges of body or other parts.
- Connect connectors securely.

NOTE:

Wire harness connectors vary with car specifications such as round or square shaped ones and ones with cover, etc. So there are cases that the one in the car being serviced is not the same as the one illustrated in this manual.

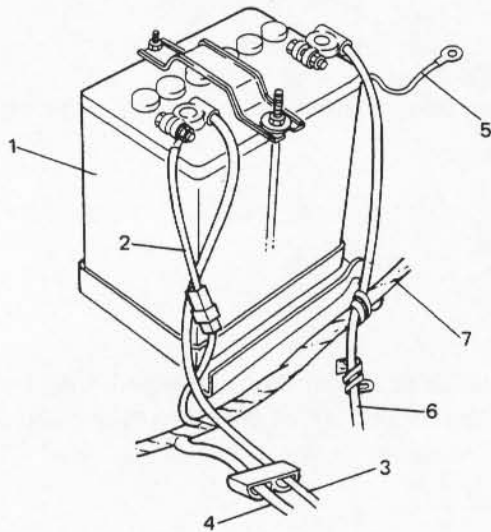
Engine Room Wiring

The following figure shows wire harness routing of left hand steering car. That of right hand steering car is opposite from the figure.

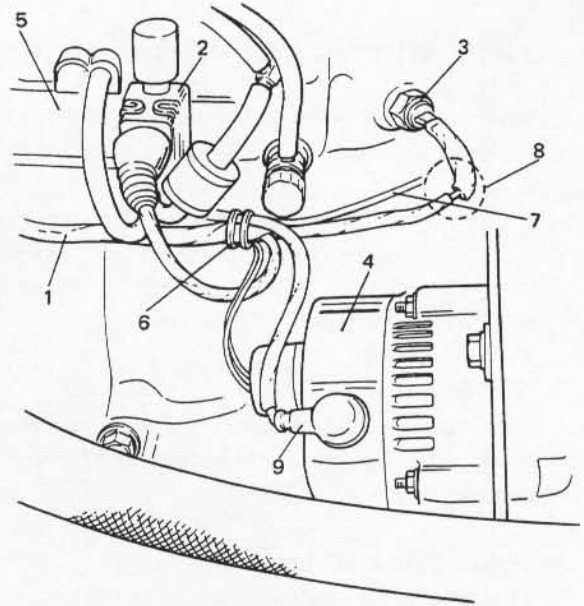


1. Wire harness No. 2
2. To battery negative terminal
3. To starter, alternator, head light, small light, horn and etc.
4. To license light, stop/tail light, 4WD switch
5. Earth
6. To wiring harness No. 1
7. To head light, small light, etc.
8. To distributor (For Canadian Market only)
9. Ignition coil cap (Some vehicle is not provided depending on specification.)

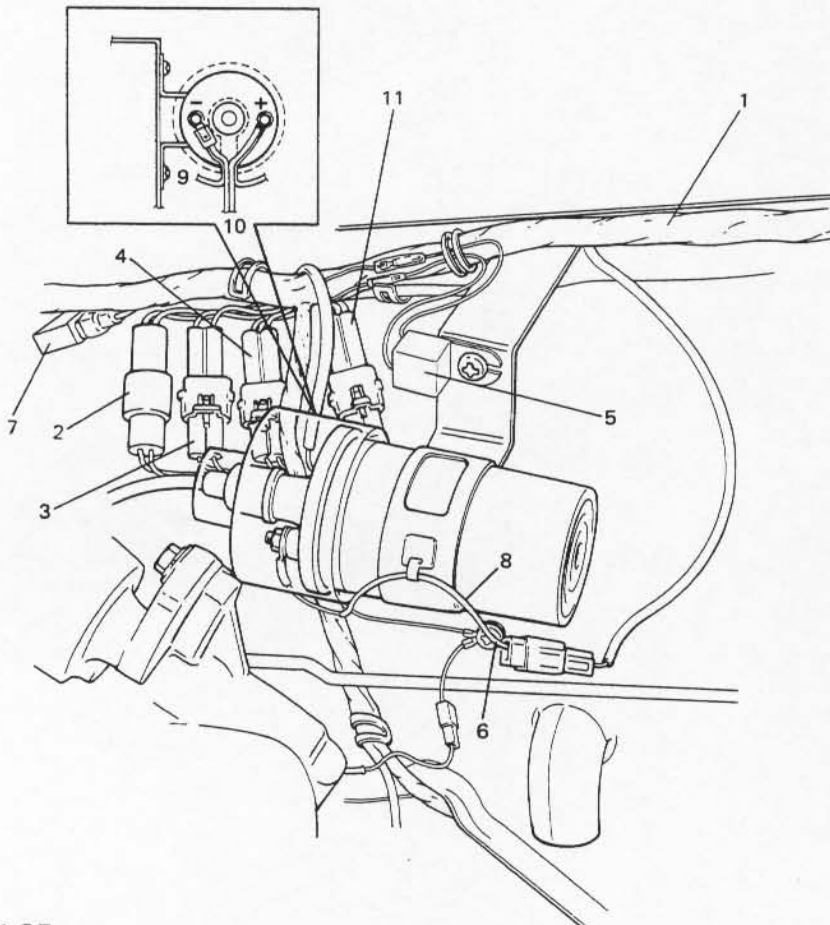
Fig. 21-26



1. Battery
2. Fusible link
3. To starter
4. To starter, alternator, etc
5. Earth
6. Earth (To starter mounting bolt)
7. Wiring harness No. 2

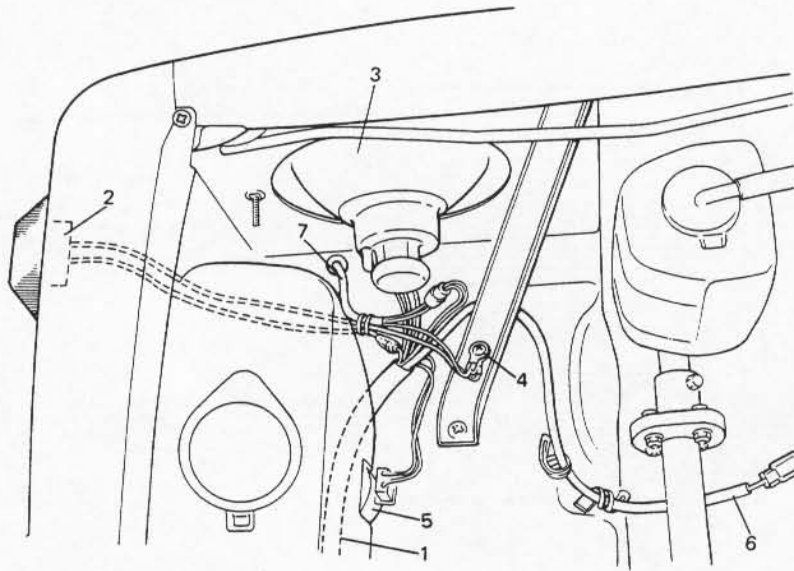


1. Wire harness No. 2
2. TWSV (Three way solenoid valve)
3. Water temperature gauge
4. Alternator
5. Intake manifold
6. Clamp
7. To fuel cut solenoid
8. Give some play to wiring so as to prevent this portion from being stressed.
9. Mount this terminal horizontally as shown



1. Wire harness No. 2
2. To neutral switch
3. To 4th switch
4. To 5th switch
5. Condenser
6. Earth
7. Noise suppressor filter
8. Ignition coil positive lead wire
9. To wire harness No. 2
10. To distributor
11. To back up light switch

Fig. 21-27

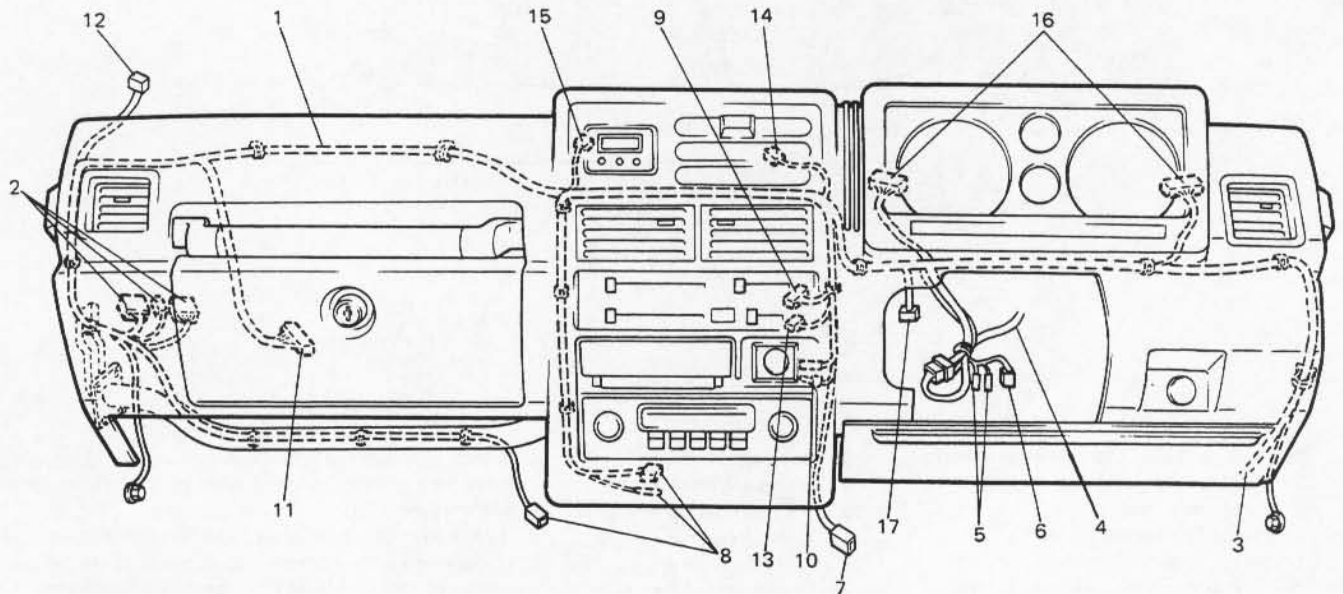


1. Wire harness No. 2
2. Side turn signal light
(Side marker light for
Canadian market)
3. Head light
4. Earth
5. Washer motor
6. To oil pressure gauge
7. To combination light

Fig. 21-28

Instrument Panel Wiring

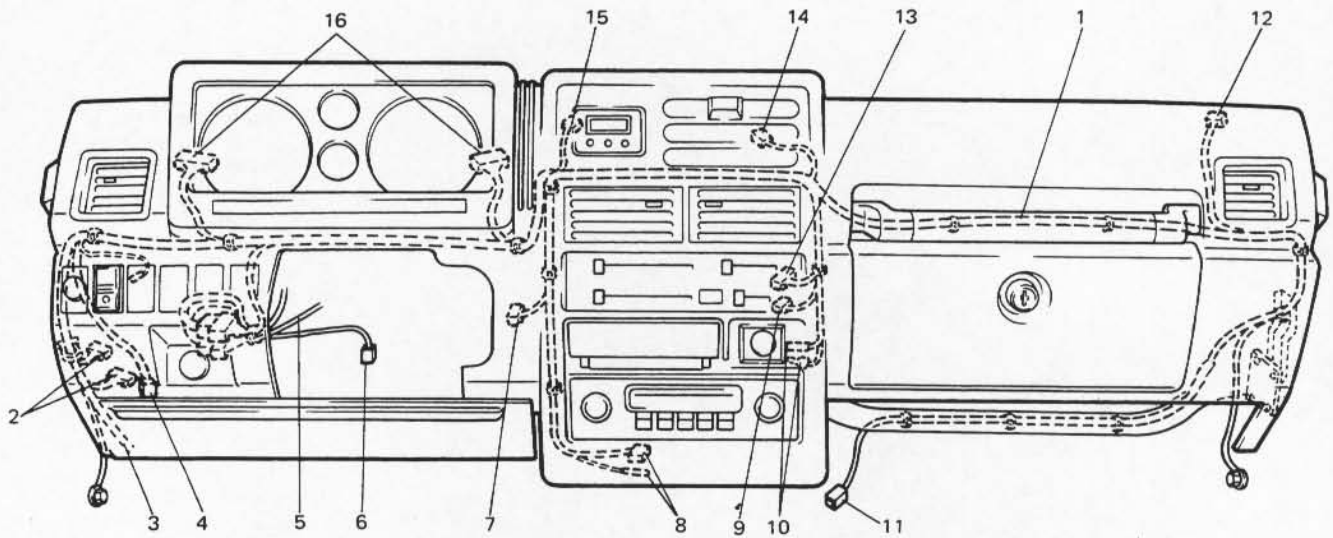
[For right hand steering vehicle]



- | | | |
|--------------------------|---------------------------|-----------------------------|
| 1. Wire harness No. 1 | 7. To heater blower motor | 13. To illumination lamp |
| 2. To wire harness No. 2 | 8. To radio | 14. To optional meter |
| 3. To fuse box | 9. To heater fan switch | 15. To clock |
| 4. To combination switch | 10. To cigar light | 16. To meter |
| 5. To clutch switch | 11. To ECM | 17. To rear defogger switch |
| 6. To stop lamp switch | 12. To wiper motor | |

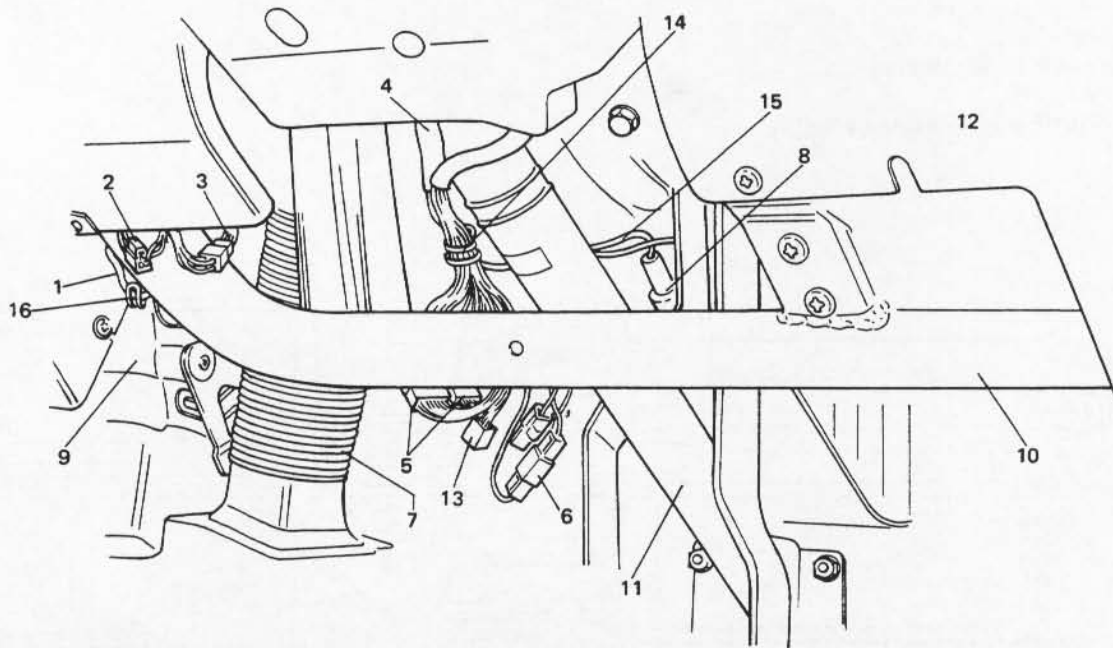
Fig. 21-29-1

[For left hand steering vehicle]



- | | | | |
|--------------------------|---------------------------|-------------------------|--------------------------|
| 1. Wire harness No. 1 | 5. To combination switch | 9. To heater fan switch | 13. To illumination lamp |
| 2. To wire harness No. 2 | 6. To stop lamp switch | 10. To cigar light | 14. To optional meter |
| 3. To fuse box | 7. To heater blower motor | 11. To radio | 15. To clock |
| 4. Speed warning buzzer | 8. To radio | 12. To wiper motor | 16. To meter |

Fig. 21-29-2



- | | | |
|---|----------------------------|---|
| 1. Radio and cigarette lighter wire harness | 8. Stop light switch | 14. Clamp lead wires of ignition switch and combination switch, using care not to allow lead wires to contact the edge of steering shaft bracket. |
| 2. To illumination light | 9. Car heater (optional) | 15. Route stop light switch lead wire over steering shaft. |
| 3. To heater blower motor | 10. Steering column holder | 16. Secure lead wires of radio and cigarette lighter by means of clamp so that they won't contact link mechanism. |
| 4. Wiring harness No. 1 | 11. Steering column | |
| 5. To combination switch | 12. Instrument panel | |
| 6. To rear fog light switch (optional) | 13. To ignition switch | |
| 7. Defroster hose | | |

Fig. 21-30

21-11. WIRING DIAGRAM

Wiring diagrams are attached at the end of this manual.