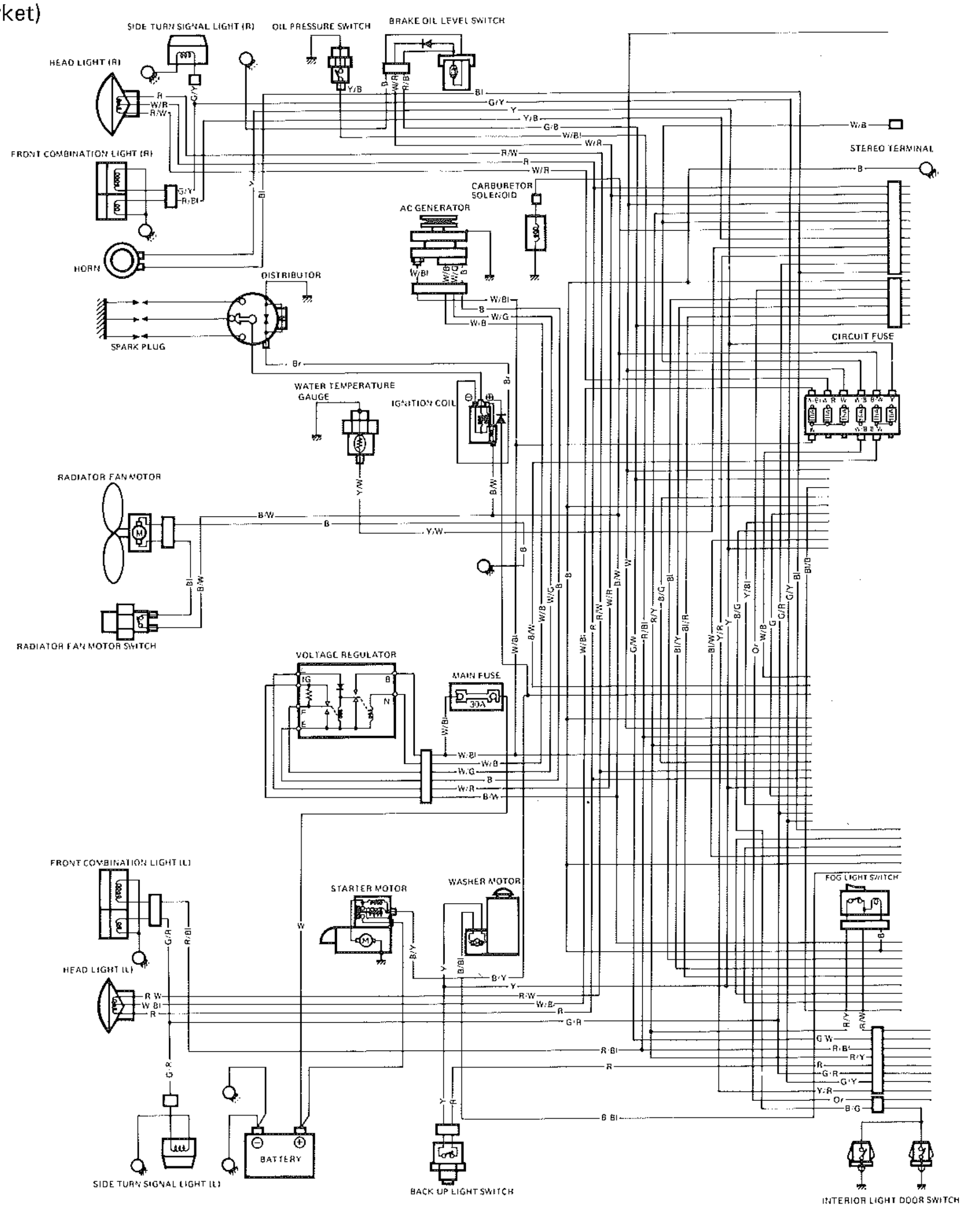
20. BODY ELECTRICAL EQUIPMENT

20

20–1. Wiring Diagram

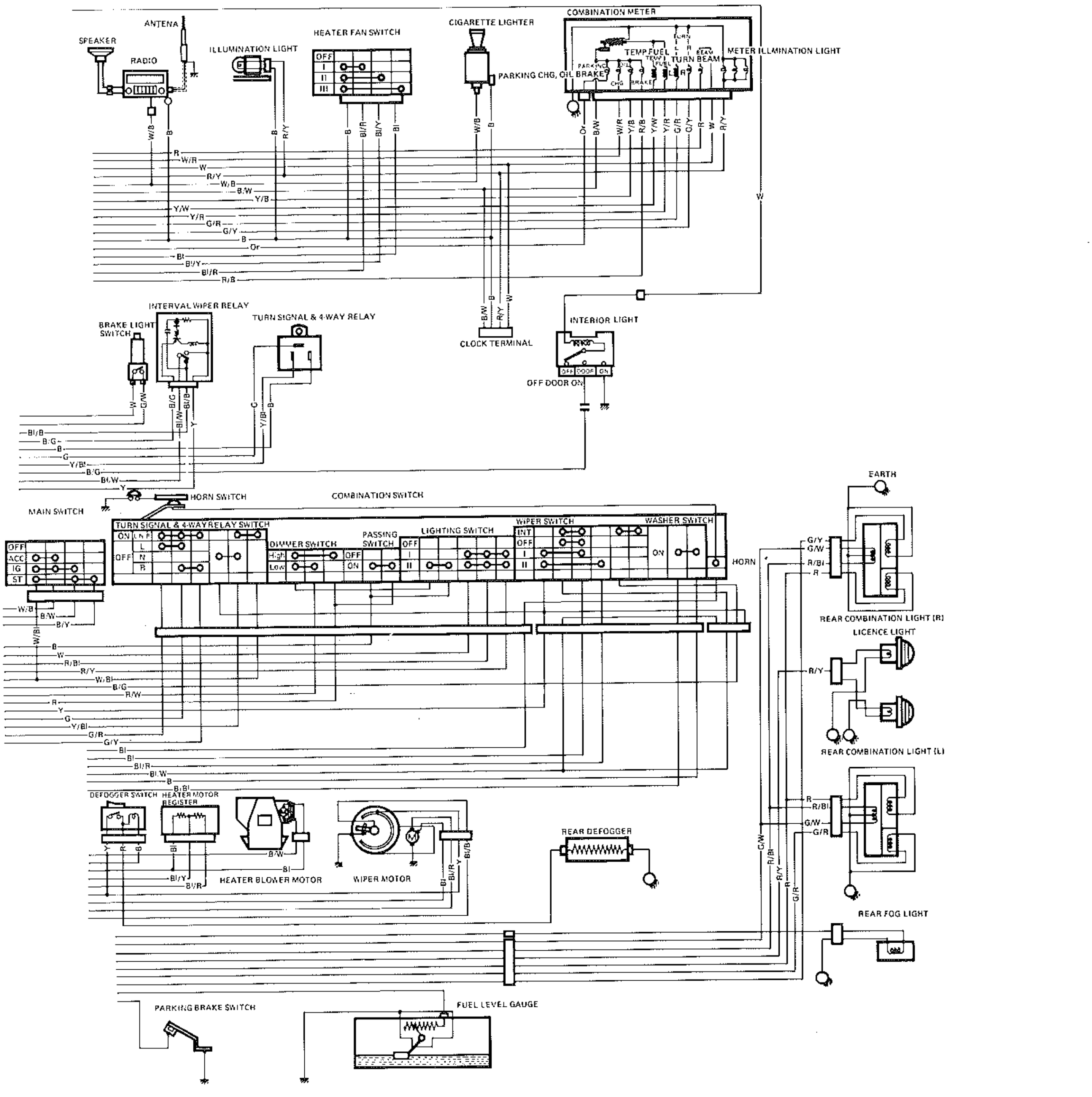
(For European Market)



WIRE COLOR

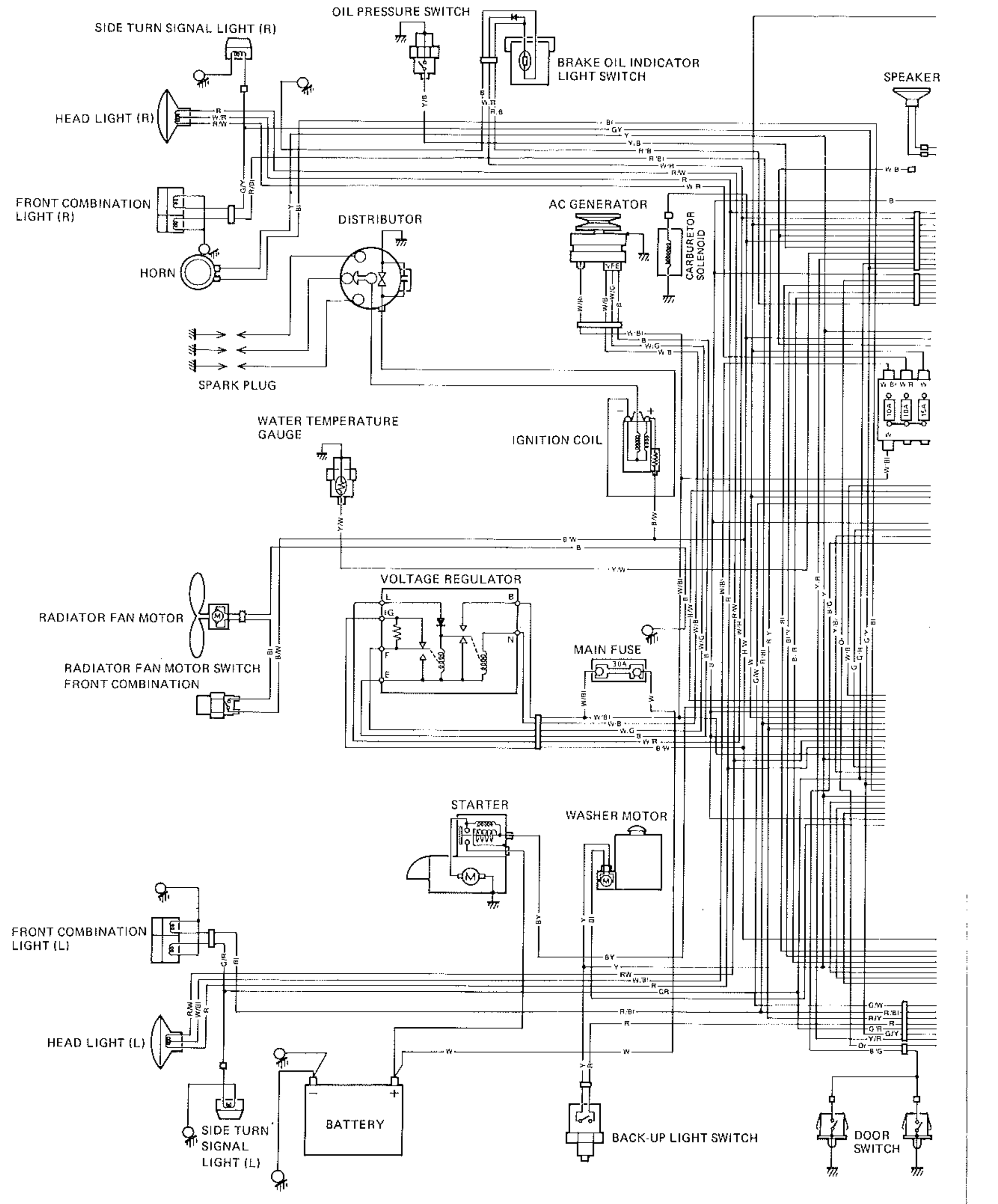
W	White	W/R	White with Red tracer
B	Black	W/G	White with Green tracer
R	Red	W/Bl	White with Blue tracer
Y	Yellow	B/W	Black with White tracer
G	Green	B/Bl	Black with Blue tracer
Bl	Blue	R/W	Red with White tracer
W/B	White with Black tracer	R/B	Red with Black tracer

Fig. 20-1



R/Bl	....	Red with Blue tracer
R/Y	....	Red with Yellow tracer
Y/W	....	Yellow with White tracer
Y/B	....	Yellow with Black tracer
Y/R	....	Yellow with Red tracer
Y/Bl	....	Yellow with Blue tracer
G/W	....	Green with White tracer
G/R	....	Green with Red tracer
G/Y	....	Green with Yellow tracer
Bl/W	....	Blue with White tracer
Bl/R	....	Blue with Red tracer
B/Y	....	Black with Yellow tracer

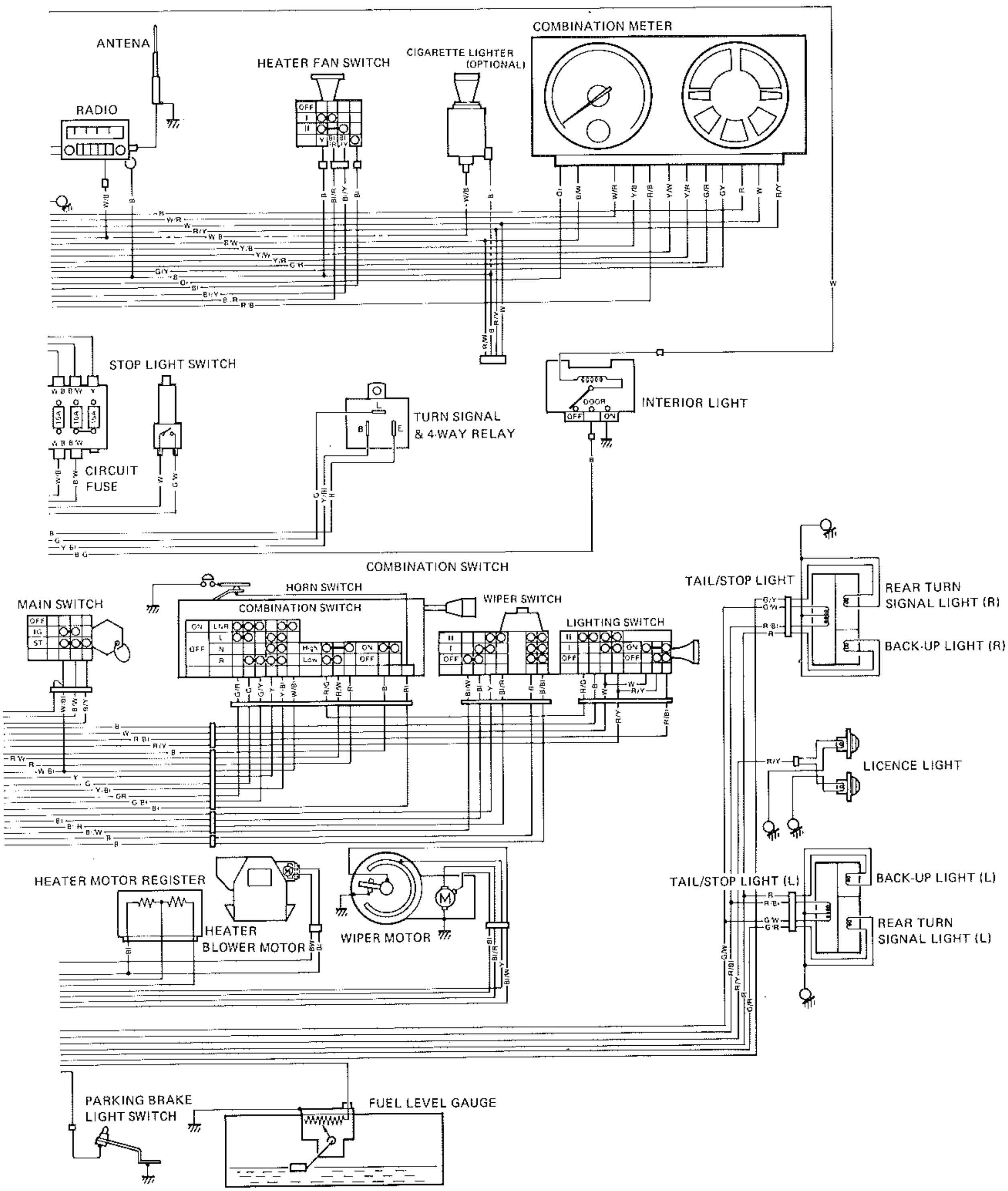
(For Australian Market)



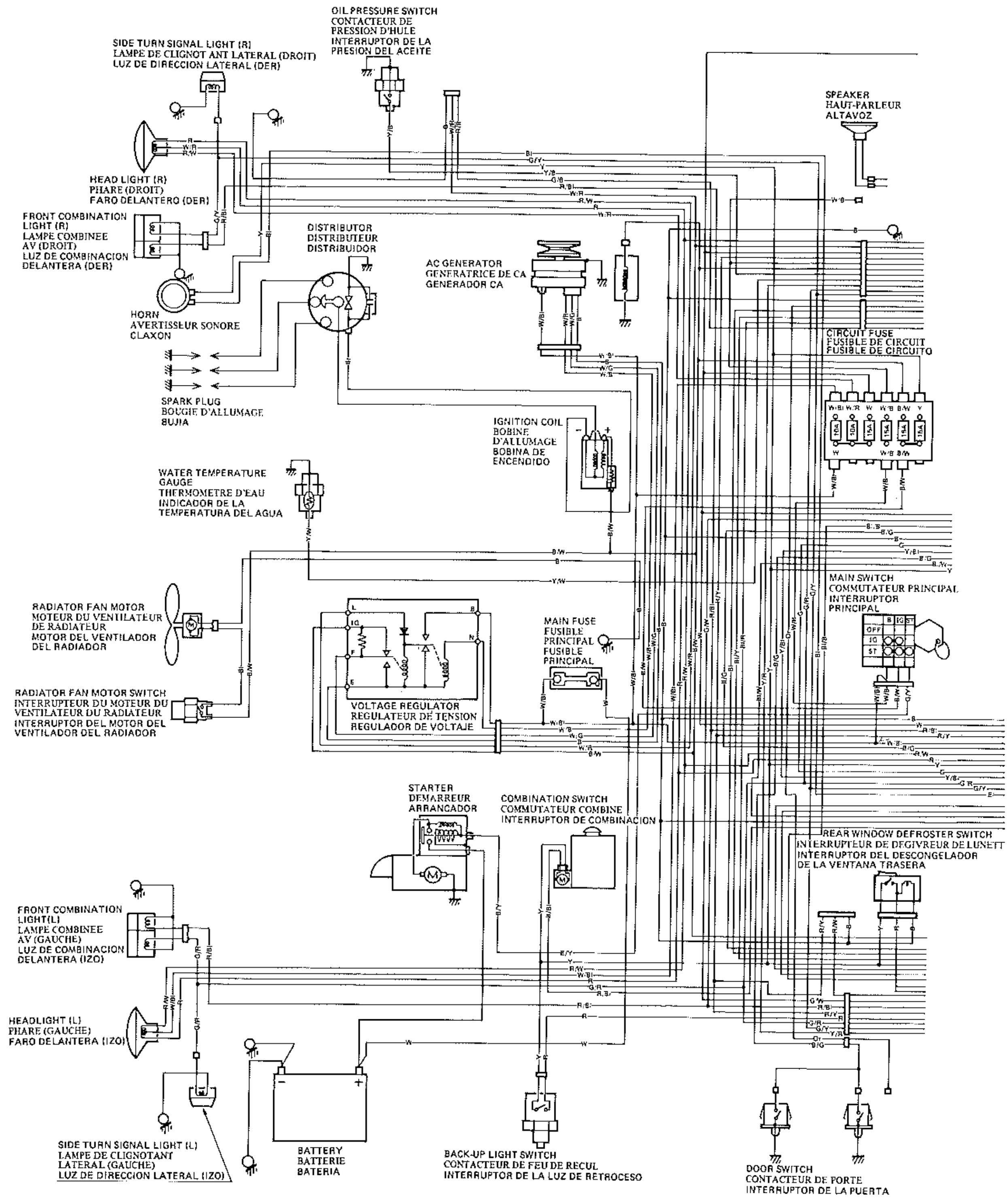
WIRE COLOR

W	White	W/R	White with Red tracer
B	Black	W/G	White with Green tracer
R	Red	W/Bl	White with Blue tracer
Y	Yellow	B/W	Black with White tracer
G	Green	B/Bl	Black with Blue tracer
Bl	Blue	R/W	Red with White tracer
W/B	White with Black tracer	R/B	Red with Black tracer

Fig. 20-2



R/Bl .... Red with Blue tracer		G/R .... Green with Red tracer	
R/Y .... Red with Yellow tracer		G/Y .... Green with Yellow tracer	
Y/W .... Yellow with White tracer		Bl/W .... Blue with White tracer	
Y/B .... Yellow with Black tracer		Bl/R .... Blue with Red tracer	
Y/R .... Yellow with Red tracer		B/Y .... Black with Yellow tracer	
Y/Bl .... Yellow with Blue tracer			
G/W .... Green with White tracer			

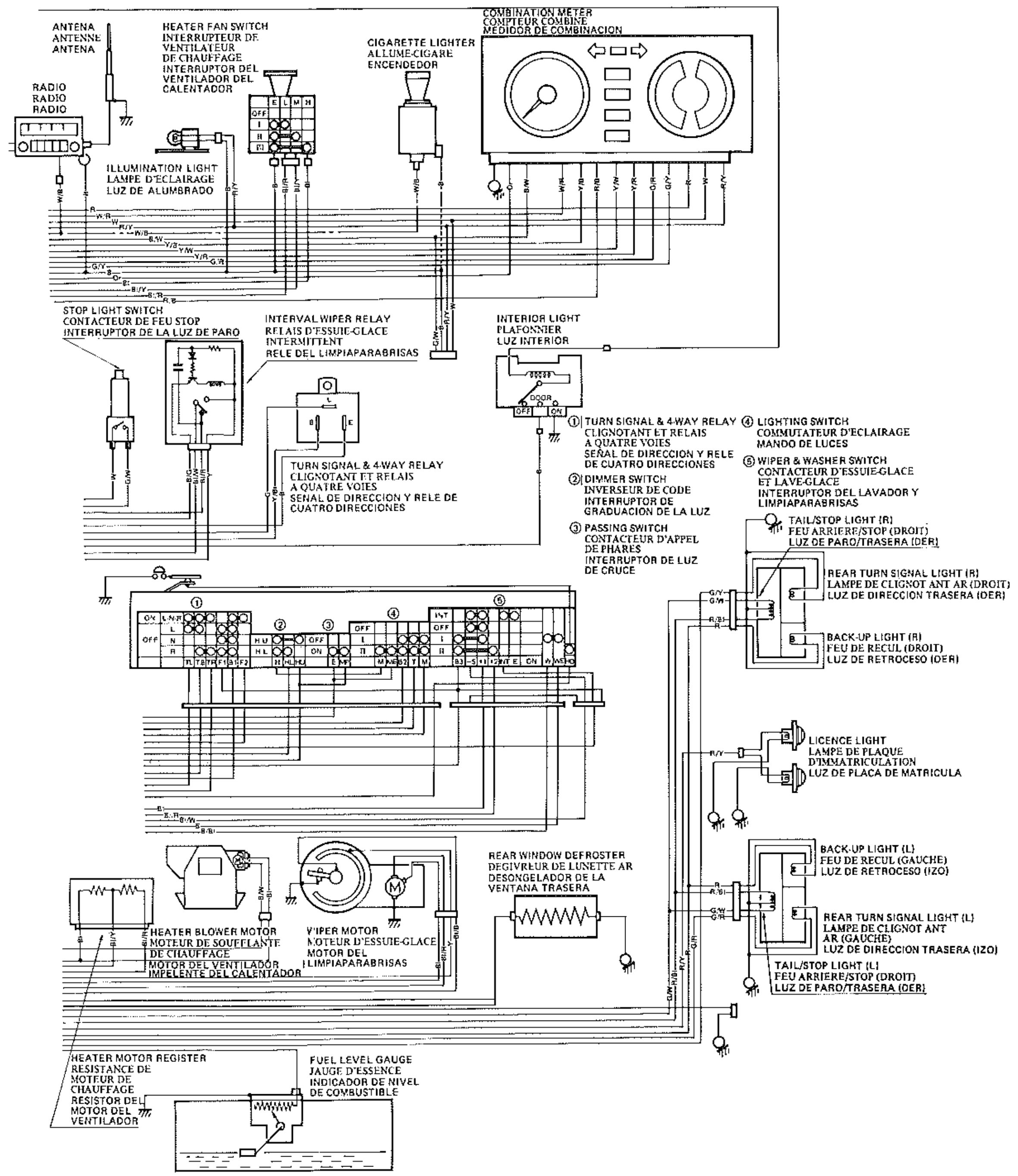


WIRE COLOR

W	White	W/R	White with Red tracer
B	Black	W/G	White with Green tracer
R	Red	W/Bl	White with Blue tracer
Y	Yellow	B/W	Black with White tracer
G	Green	B/Bl	Black with Blue tracer
Bl	Blue	R/W	Red with White tracer
W/B	White with Black tracer	R/B	Red with Black tracer

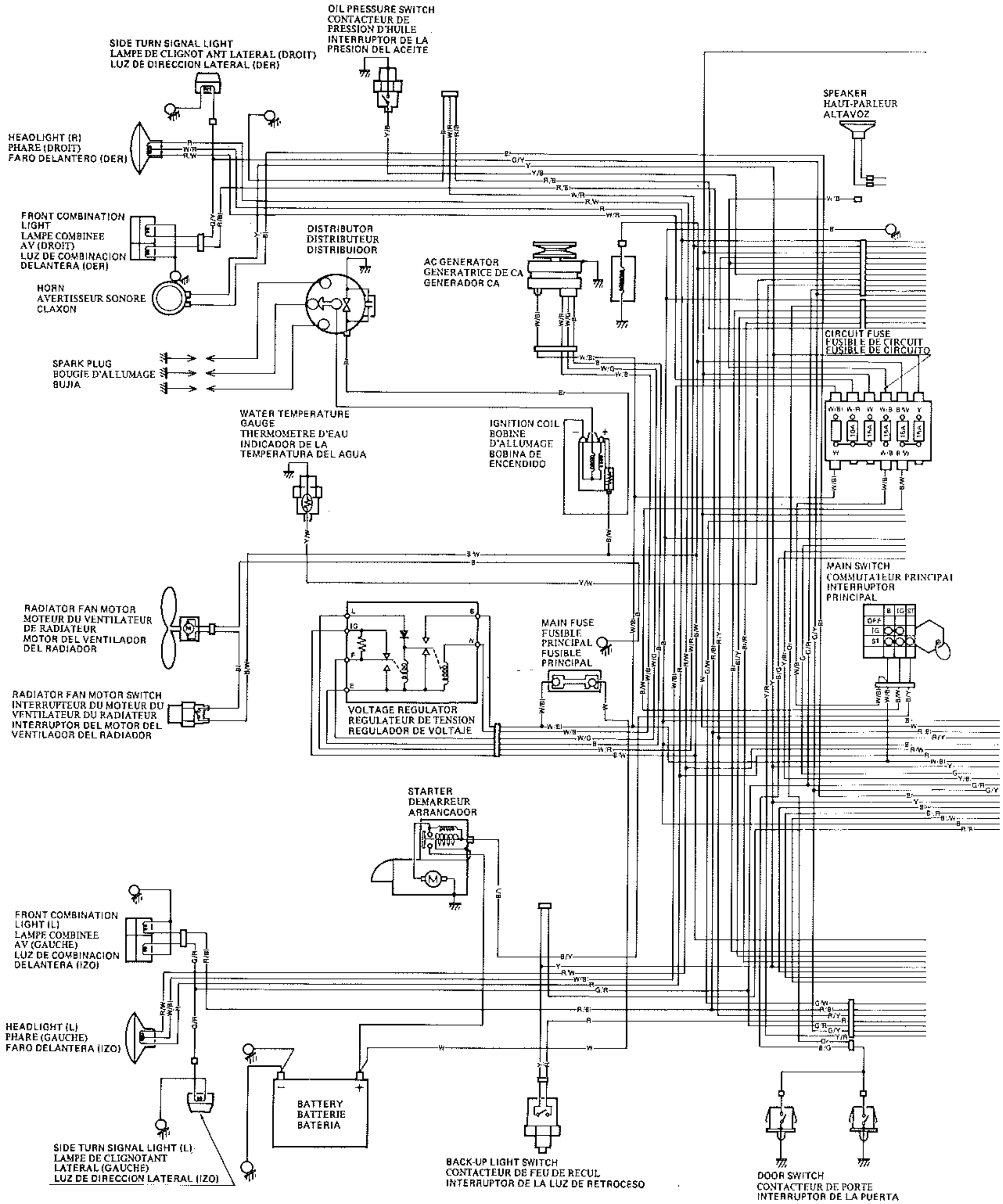
Fig. 20-3

NOTE:
This diagram is applicable to vehicle provided with multicontrol lever (combined lighting switch and turn signal switch etc.)



R/Bl	....	Red with Blue tracer	G/R	....	Green with Red tracer
R/Y	....	Red with Yellow tracer	G/Y	....	Green with Yellow tracer
Y/W	....	Yellow with White tracer	Bl/W	....	Blue with White tracer
Y/B	....	Yellow with Black tracer	Bl/R	....	Blue with Red tracer
Y/R	....	Yellow with Red tracer	B/Y	....	Black with Yellow tracer
Y/Bl	....	Yellow with Blue tracer			
G/W	....	Green with White tracer			

(For Other Market)

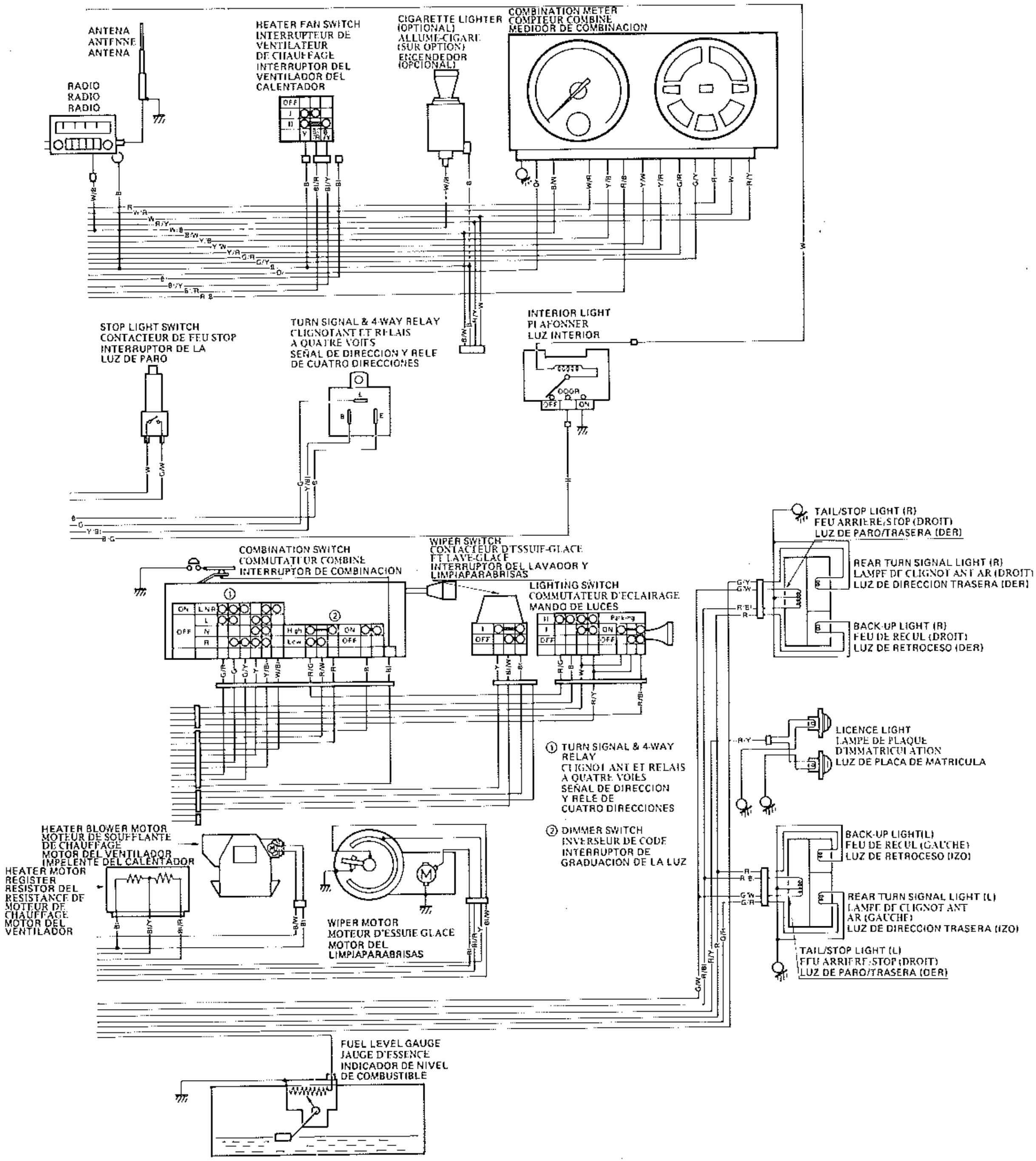


WIRE COLOR

W	White	W/R	White with Red tracer
B	Black	W/G	White with Green tracer
R	Red	W/Bl	White with Blue tracer
Y	Yellow	B/W	Black with White tracer
G	Green	B/Bl	Black with Blue tracer
Bl	Blue	R/W	Red with White tracer
W/B	White with Blck tracer	R/B	Red with Black tracer

Fig. 20-4

NOTE:
This diagram is applicable to vehicle provided with lighting switch and turn signal switch etc. separately.

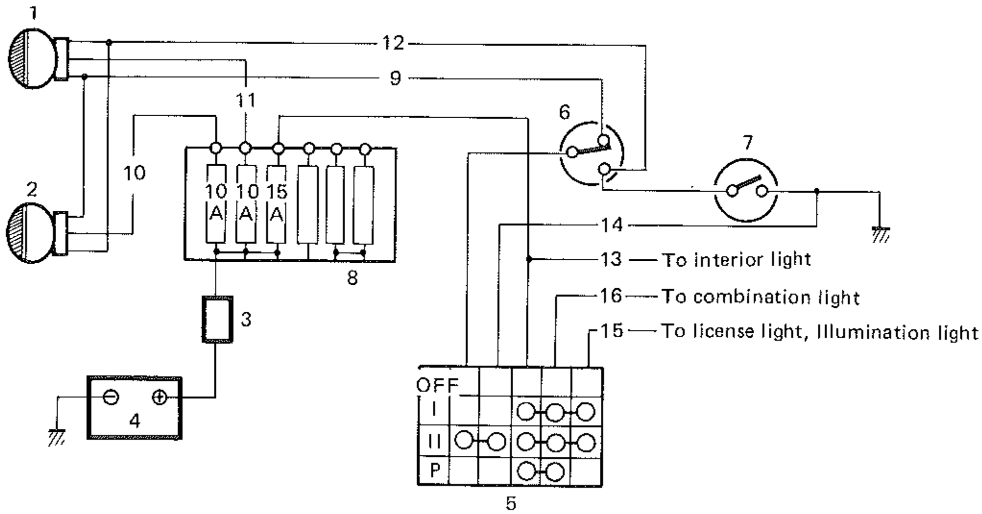


R/Bl	....	Red with Blue tracer
R/Y	....	Red with Yellow tracer
Y/W	....	Yellow with White tracer
Y/B	....	Yellow with Black tracer
Y/R	....	Yellow with Red tracer
Y/Bl	....	Yellow with Blue tracer
G/W	....	Green with White tracer
G/R	....	Green with Red tracer
G/Y	....	Green with Yellow tracer
Bl/W	....	Blue with White tracer
Bl/R	....	Blue with Red tracer
B/Y	....	Black with Yellow tracer

20–2. Headlight

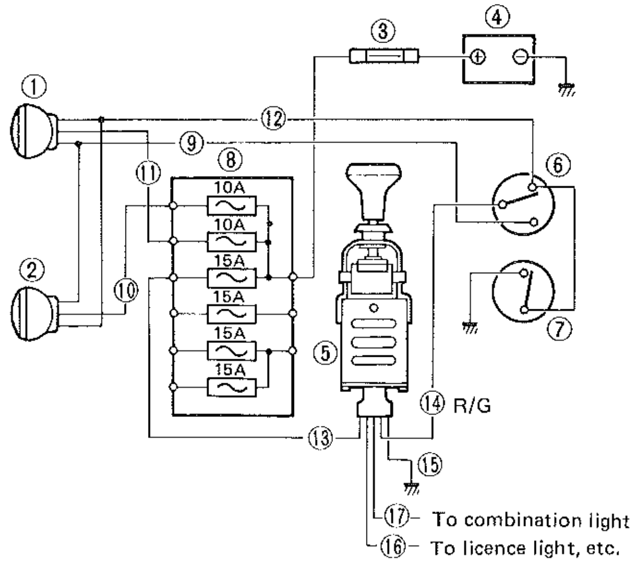
Wiring circuit

Multicontrol type switch



1. Right head light	*2. Left head light*	*3. Main fuse*
4. Battery	*5. Lighting switch*	*6. Dimmer switch*
7. Passing switch	*8. Fuse box*	*9. Red/white*
10. White/blue	*11. White/red*	*12. Red*
13. White	*14. Black*	*15. Red/yellow*
16. Red/blue		

Separate type switch



1. Right head light	*2. Left head light*	*3. Main fuse*
4. Battery	*5. Lighting switch*	*6. Dimmer switch*
7. Passing switch	*8. Fuse box*	*9. Red/white*
10. White/blue	*11. White/red*	*12. Red*
13. White	*14. Red/green*	*15. Black*
16. Red/yellow	*17. Red/blue*	

Fig. 20-5

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, check the headlight beam setting according to the following procedure.

Set a blank wall 10 m (32.8 ft) in front of the vehicle and check if the hot spot (or high intensity zone) of the main beam axis (high beam) falls within the range between the headlight height ("H") and 1/5 of the headlight height below it as shown in Fig. 20-6.

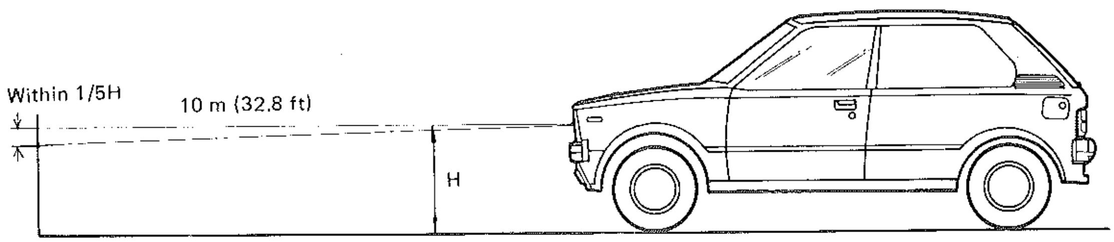


Fig. 20-6

(2) Horizontal beam alignment
Check if the hot spots of the main beam (high beam) strike within the ranges given in Fig. 20-7.

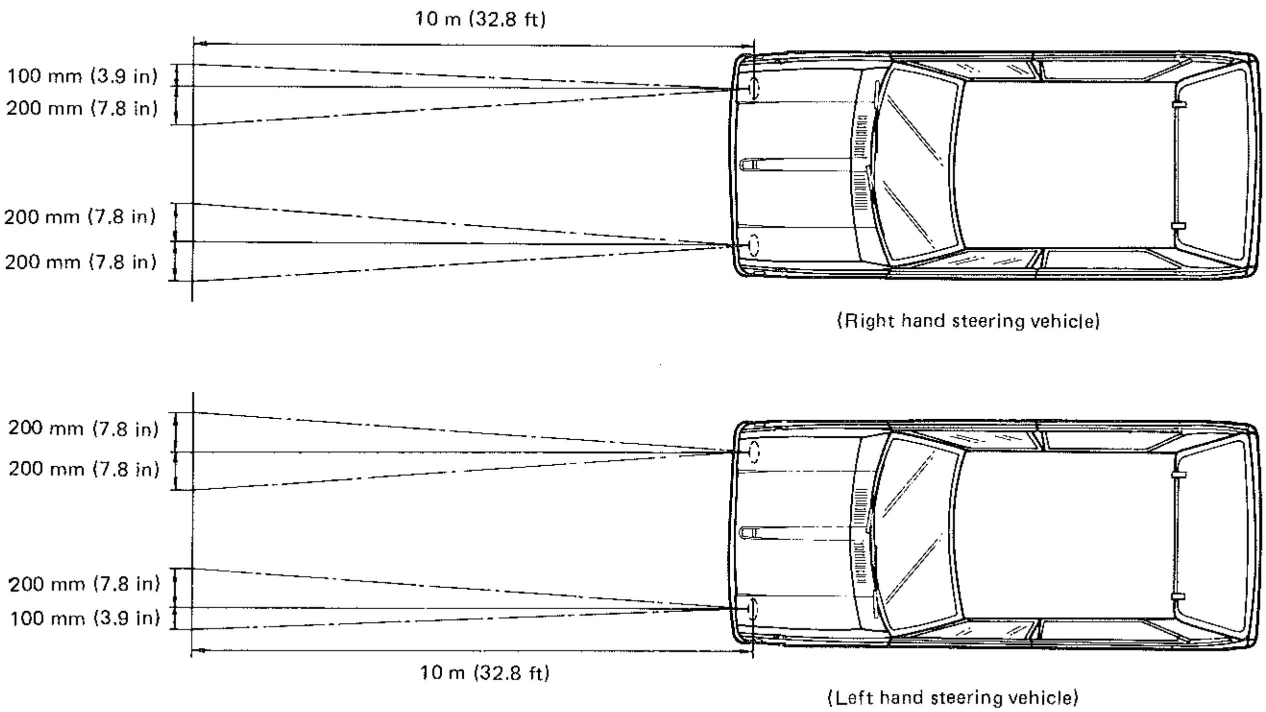


Fig. 20-7

Maintenance

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

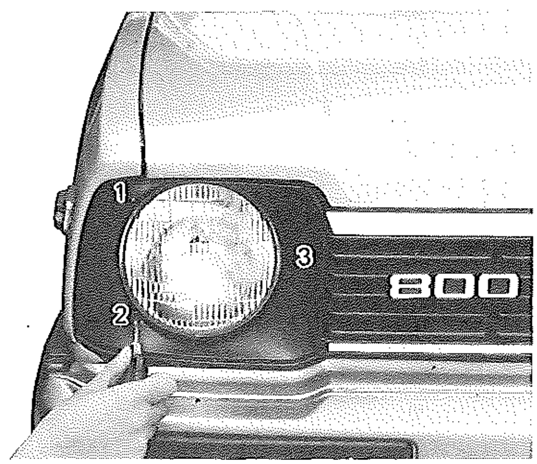


Fig. 20-8

(2) Headlight dimmer switch

Check continuity between terminals with a circuit tester after turning on the head light switch: At LOW BEAM, continuity must be obtained between Black (Red/green) and Red/white terminals.

At HIGH BEAM, continuity must be obtained between Black (White) and Red terminals.

High beam	○		○
Low beam	○	○	
	Black (Red/green)	Red/white	Red

Headlight dimmer switch

ON	○	○
OFF		
	Black (White)	Red

Fig. 20-9 Passing light switch

Multicontrol type switch

		Black	White	Red/Blue	Red/Yellow
P			○	○	
II	○	○	○	○	○
I			○	○	○
OFF					

Separate type switch

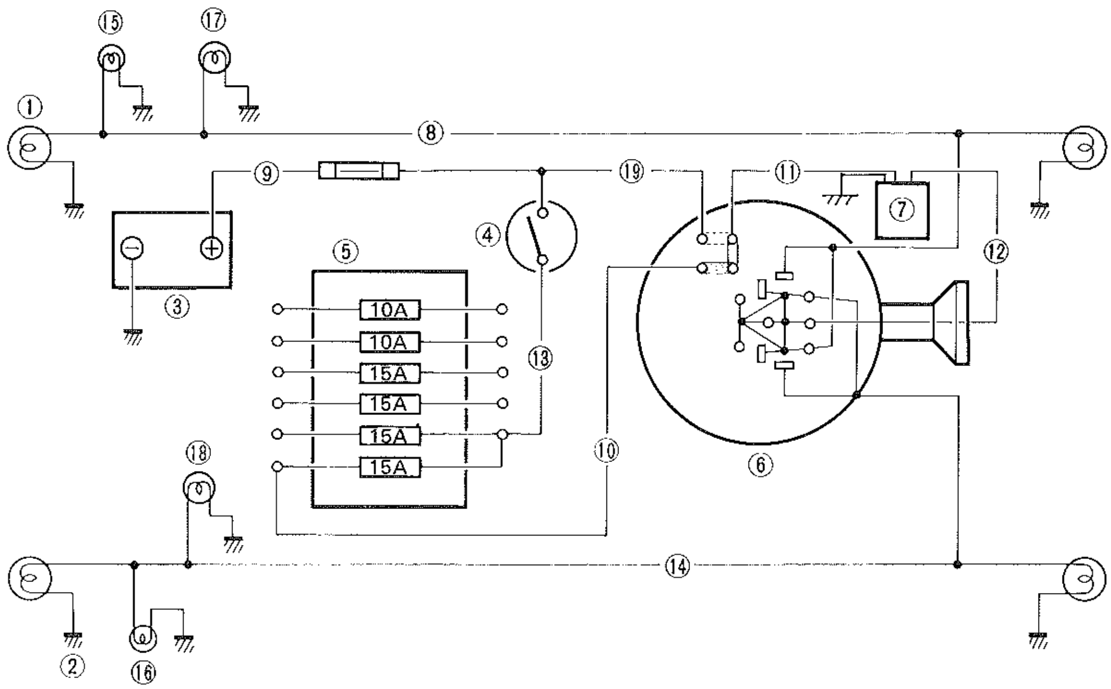
	Black	Red/green	White	Red/yellow
II	○	○	○	○
I			○	○
OFF				

	Red/blue	White	Red/yellow
P	○	○	
OFF	○		○

Fig. 20-10 Lighting switch

20–3. Turn Signal Light and Hazard Warning Light

Circuit description



1. *Right turn signal*
2. *Left turn signal*
3. *Battery*
4. *Main switch*
5. *Fuse box*
6. *Turn signal & dimmer switch*
7. *Turn signal & Hazard warning relay*
8. *Green/yellow*
9. *White*
10. *Yellow*
11. *Yellow/blue*
12. *Green*
13. *Black/white*
14. *Green/red*
15. *Meter pilot light (Right)*
16. *Meter pilot light (Left)*
17. *Side turn signal (Right)*
18. *Side turn signal (Left)*
19. *White/Blue (White)*

Fig. 20-11

When the Hazard warning Switch is "OFF".
Yellow lead ⑩ is connected to Yellow/blue lead ⑪ .

When the Hazard warning Switch is "ON".
White/blue (White) 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 the Turn-signal Switch is "ON" for a right turn, green lead ⑫ is connected to Green/yellow lead ⑧ .

When the Turn-signal Switch is "ON" for a left turn, green lead ⑫ is connected to Green/red lead ⑭ .

Switch inspection

Check continuity between the following terminals using a circuit tester.

Hazard warning	Turn signal	Green/Red	Green	Green/Yellow	Yellow	Yellow/Blue	White/blue (White)
ON		○—	—○—	—○		○—	—○
OFF	Left	○—	—○		○—	—○	
	Neutral				○—	—○	
	Right		○—	—○	○—	—○	

Fig. 20-12 Turn signal & Hazard warning switch

20–4. Windshield Wiper Motor

Circuit description

3-speed type

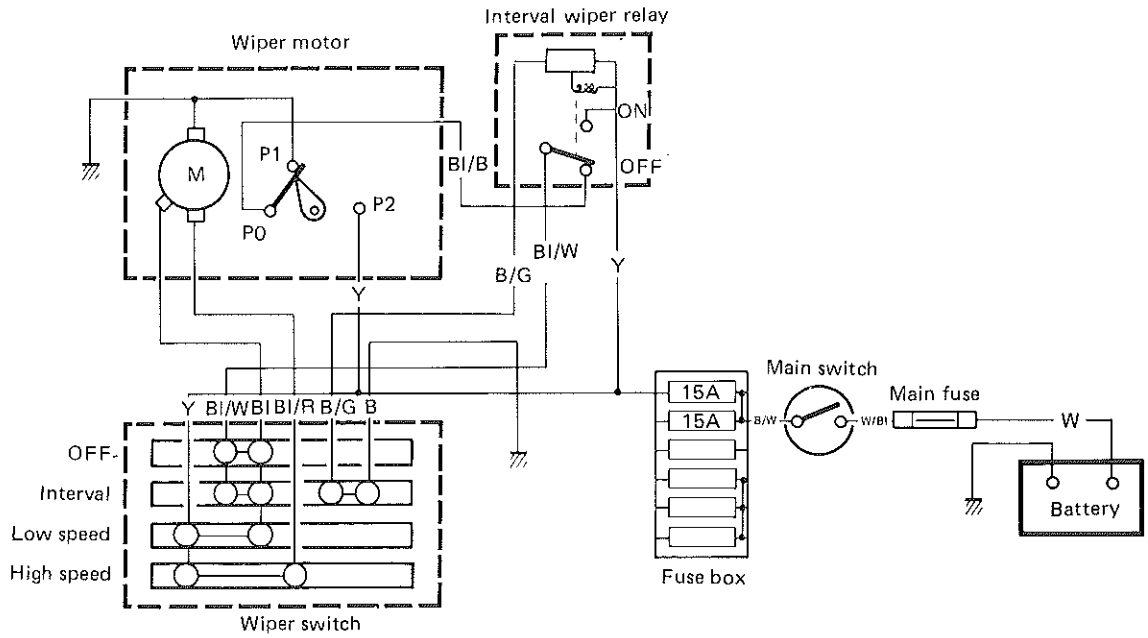
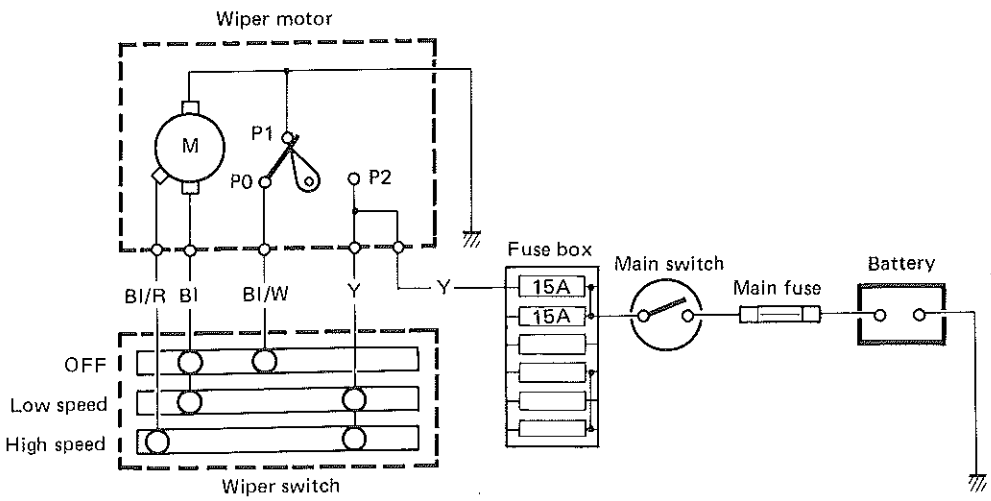


Fig. 20-13

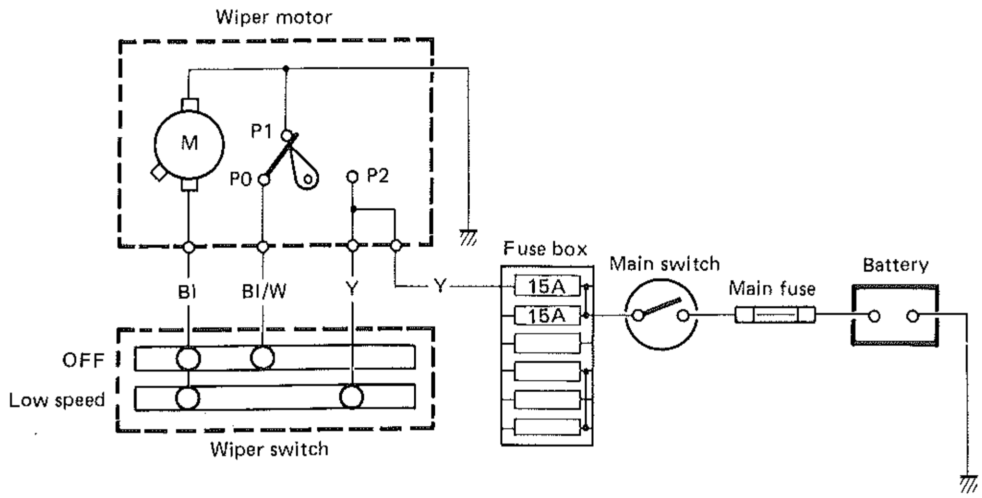
2-speed type



Y	: Yellow	B/W	: Black with white tracer
Bl	: Blue	W/Bl	: White with Blue tracer
Bl/W	: Blue with white tracer		
Bl/R	: Blue with red tracer		
B/G	: Black with green tracer		
Bl/B	: Blue with black tracer		

Fig. 20-14

1-speed type



Y : Yellow
Bl : Blue
Bl/W : Blue with white tracer
Bl/R : Blue with red tracer
B/G : Black with green tracer
Bl/B : Blue with black tracer
B/W : Black with white tracer
W/Bl : White with Blue tracer

Fig. 20-15

The circuit is designed so that, when the Wiper Switch is turned "OFF", the blade will automatically return to the horizontal position. In Fig. 20-13 ~ 20-15, 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. Bl/W (Bl/B) ——► Bl ——► 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 back e.m.f., 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

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 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/white, 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.

Maintenance

(1) Wiper trouble diagnosis

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

a) Fuse blown or mounted incorrectly

b) Wiper switch:

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

For European Market

	Yellow	Blue/white	Blue	Blue/red	Black/green	Black
Interval		○—	—○		○—	—○
OFF		○—	—○			
I	○—	—	—○			
II	○—	—	—	—○		

For Other Market

3-speed type

	Yellow	White	Blue	Red	Green	Black
Interval		○—	—○		○—	—○
OFF		○—	—○			
I	○—	—	—○			
II	○—	—	—	—○		

2-speed type

	Blue/white	Blue/red	Blue	Yellow
OFF	○—	—	—○	
I			○—	—○
II		○—	—	—○

1-speed type

	Blue	Yellow	Blue/white
OFF	○—	—	—○
I	○—	—○	

Fig. 20-16 Wiper switch

	Black/blue(Blue)	Black
ON	○—	—○

Fig. 20-17 Washer switch

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

To check these, check continuity between the Blue lead and ground, and the Blue/red wire and ground.

(2) No-load run test

As shown in Fig. 20-18, using a 12V battery, connect the "+" terminal to the Blue terminal and the "–" terminal to the motor. If the motor rotates at 47 - 57 r/min, this is acceptable (for Low-speed check). For High-speed check, connect the "+" terminal of the battery to the Blue/red terminal and the "–" to the motor. If the motor rotates at 73 - 83 r/min, this is acceptable.

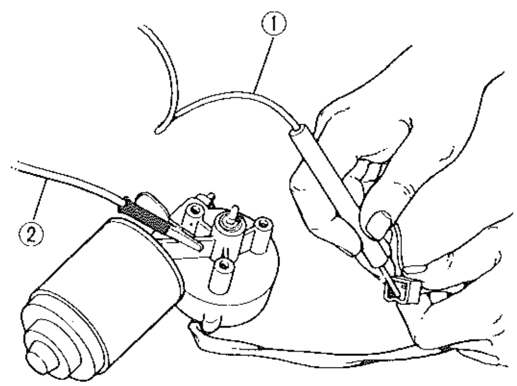


Fig. 20-18 Testing motor 1. "+" terminal 2. "–" terminal

(3) Automatic stop action test
Connect the yellow terminal of the motor to the positive "+" battery terminal, and put a jumper between the Blue/white (Blue/black) and the Blue to see if the motor output shaft comes to a halt at a certain, not just any, angular position. That position corresponds to the starting position of the blade. Using the jumper, stop the motor a number of times to make sure that the motor stops at the same position each time.

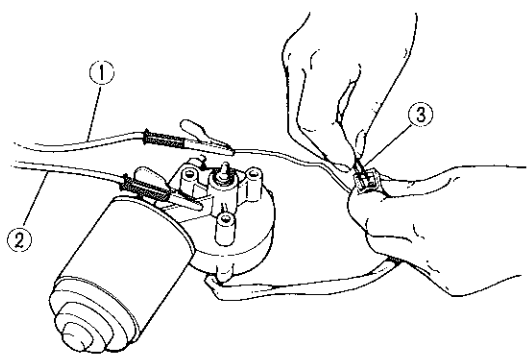


Fig. 20-19 Testing motor
1. "+" terminal   2. "–" terminal
3. Put a jumper between Blue/white (Blue/black) and Blue

(4) Interval wiper relay test
Connect ⊕ cord and ⊖ cord of 12V battery to the relay terminals as shown in the illustration. If an operating sound at the contact point of the relay is heard, the relay is at work properly.

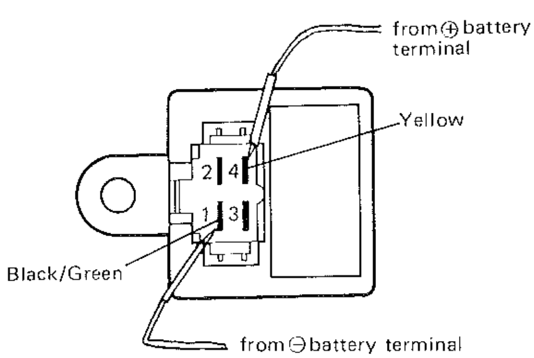
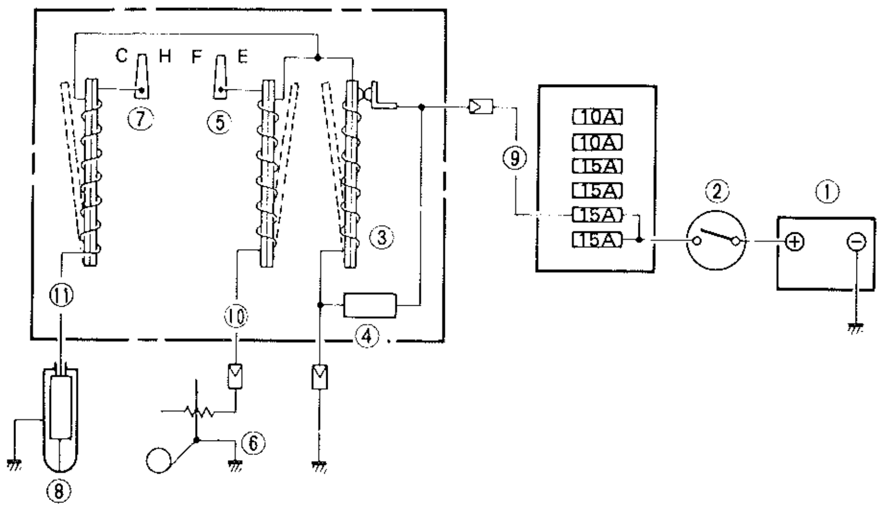


Fig. 20-20

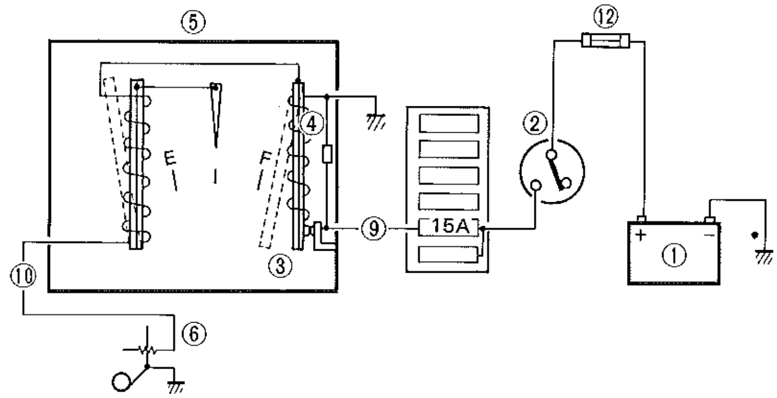
20–5. Fuel and Water Temperature Gauge

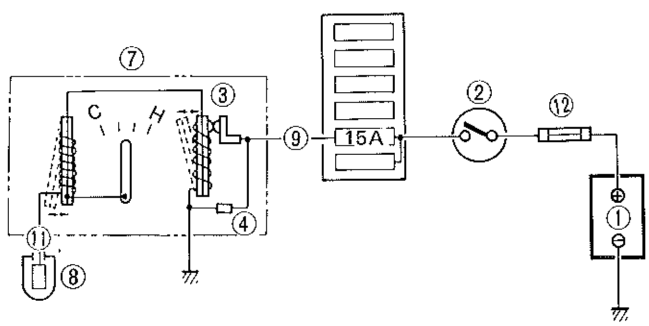
Circuit description

Meter Combined type



Meter Separated type





1. Battery	*2. Ignition switch*	*3. Regulator*	*4. Condenser*
5. Fuel meter	*6. Fuel level gauge*	*7. Water temperature gauge*	
8. Thermo-gauge (Thermistor)		*9. Black/white*	
10. Yellow/red	*11. Yellow/white*	*12. Main fuse*	

Fig. 20-21

The Fuel Gauge and Water Temperature Gauge circuit is shown in Fig. 20-21. A regulator is provided so that the Fuel Gauge and Water Temperature Gauge indications are not changed by battery voltage variation. To prevent the point surface being damaged by fire, and prevent noise, a condenser is provided on the regulator.

Fuel Gauge operation

The Fuel Gauge is resistor type using a bimetal strip. The resistance of the fuel level gauge (which includes a sliding resistor) varies according to the amount of fuel in the fuel tank. Current flowing through the heating coil changes in proportion to change in the resistance and flexion of the bimetal strip also changes, i.e., as the amount of fuel decreases, the fuel level gauge resistance increases, current decreases, and flexion of the bimetal strip decreases, and the change is registered on the meter. When the fuel is large, the flexion of the bimetal strip is large, with a correspondingly large indication on the meter.

Water temperature gauge operation

The Water Temperature Gauge which detects the water temperature in the engine is a resistor type using a bimetal strip. The thermo-gauge, with a built-in thermistor, is mounted on the inlet manifold. Thermistor resistance decreases as the temperature increases. A heating wire is wound around the bimetal strip, so that the bimetal flexes according to the current through the heating wire. As the water temperature increases, resistance of the thermo-gauge is lowered, current increases, flexion of the bimetal strip increases, and the meter indication rises.

Inspection

FUEL GAUGE TANK UNIT

This tank unit is to be tested to see how its variable resistor changes its effective resistance value for a change in fuel level. With a resistance meter connected to the tank unit as shown, move the lever from "empty" position to "full" position. If the resistance indicated by the meter changes in a manner approximating the curve shown in the following graph, the tank unit is in sound condition:

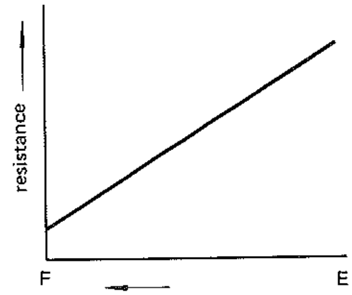


Fig. 20-22 Resistance-fuel level relationship

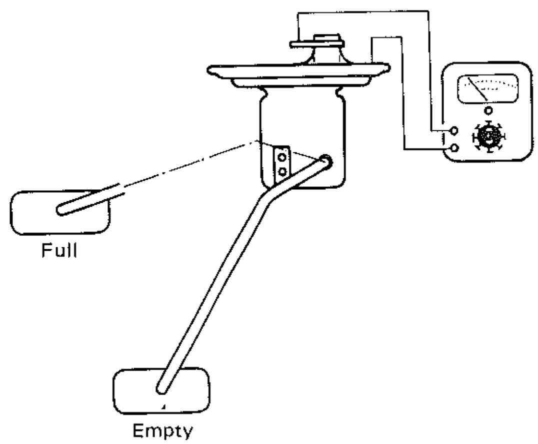


Fig. 20-23 Checking tank unit

TROUBLE SHOOTING GUIDE

A dash unit giving a false indication means that there is something wrong in the electric circuit or, less frequently, in mechanical parts. The following information will be useful in locating the cause:

FUEL GAUGE INDICATION TOO LOW

If the indicating hand tells a level much lower than the actual fuel level existing in the tank,the most likely cause is a defective ground connection of the dash unit or of the fuel tank. Undo the grounding connection, polish the mating faces with sandpaper, and tighten the connection fully to ensure the metal-to-metal contact. This will remedy the trouble; if it will not, then check the terminal connections of the circuit.

TEMPERATURE GAUGE INDICATION TOO LOW

This trouble is often due to a loose terminal connection on the inlet manifold. Check the connection, which is of slip-in type, and repair the fittings to obtain positive metal-to-metal contact.

> **NOTE:**
> Bear in mind that, at the time of starting up a cold engine, the water temperature gauge could be giving a true indication while the engine itself is extremely cold.

INDICATION BY DASH UNIT TOO HIGH

Whether the dash unit is of the temperature gauge or the fuel gauge, an indication that is too high (with the indicating hand deflected beyond the end of the scale) usually means that the regulator is poorly grounded, its condenser is reptured or its contact points are burnt. The grounding circuit has a slip-in connection, which should be serviced as mentioned before. If the contact points are burnt, replace the dash unit and also the condenser.

Where the dash unit is of the fuel gauge, it is possible that the actuating arm on its tank unit is stuck in the position for high level.

> **NOTE:**
> If the parts mentioned above are found to be in sound condition, then the false indication means that the cause is within the dash unit, tank unit or engine unit, and, in such a case, the unit blamed must be replaced.

20–6. Defogger Circuit Diagram(Option)

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

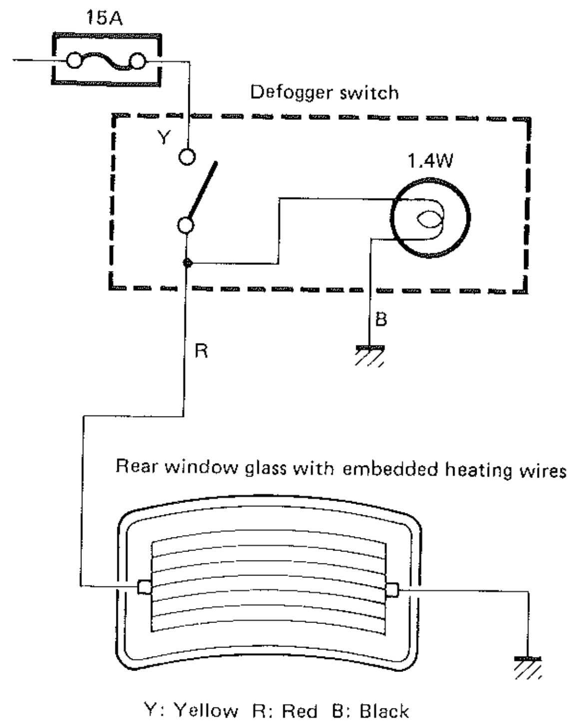


Fig. 20-24

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

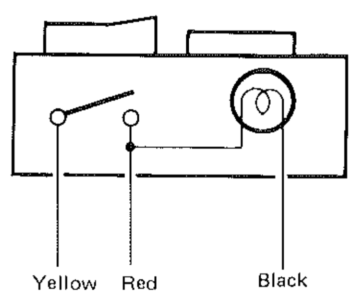


Fig. 20-25

20–7. Fuse Box

The fuse Box is wired as follows.

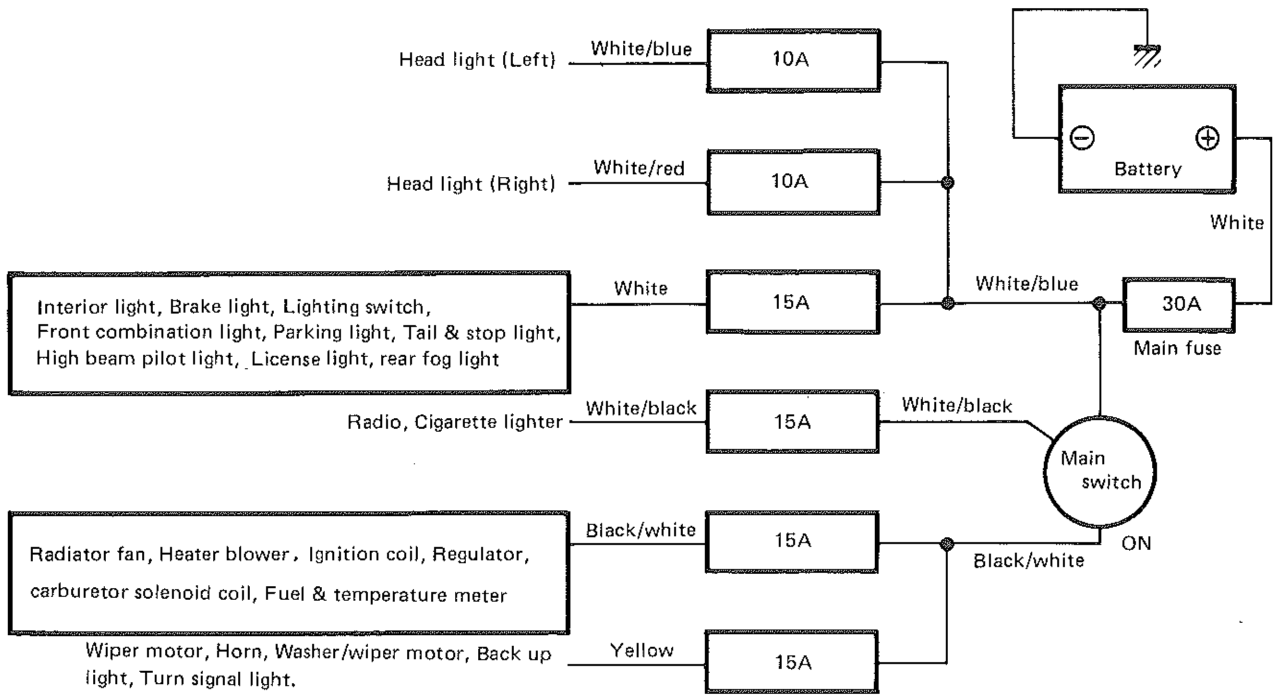


Fig. 20-26