SECTION 5A — CHRYSLER ELECTRONIC IGNITION SYSTEM

GENERAL INFORMATION

The Chrysler Electronics Ignition System introduces a number of changes which result in cleaner exhaust emission because of the elimination of breaker point deterioration, with resultant misfiring and reduced ignition system maintenance.

Externally the electronic system looks essentially the same as the breaker point system except for the inclusion of a control unit in the circuit between the distributor and ignition coil, a dual ballast resistor and a double primary wire from the distributor.

Internally the cam, breaker points and condenser have been replaced by the toothed reluctor and a magnetic pick up unit.

COMPONENTS

Control Unit — is mounted in the engine compartment and is made up of the electronic circuitry which is activated by the voltage induced in the pick up coil and controls the power switching transistor which opens and closes the primary ignition circuit (Fig. 1).

The control unit is self contained and therefore cannot be repaired. **The effective earthing of the control unit to body sheet metal is essential for the correct functioning of this component. Special mounting screws are used to attach the control unit. In addition an earth wire is also connected from the unit to the body of the vehicle to ensure that voltage drop at this point is minimised.**

All connector pins or blades in the electronic ignition circuit must be clean and all connectors fully engaged to ensure a minimum voltage drop throughout the entire circuit.

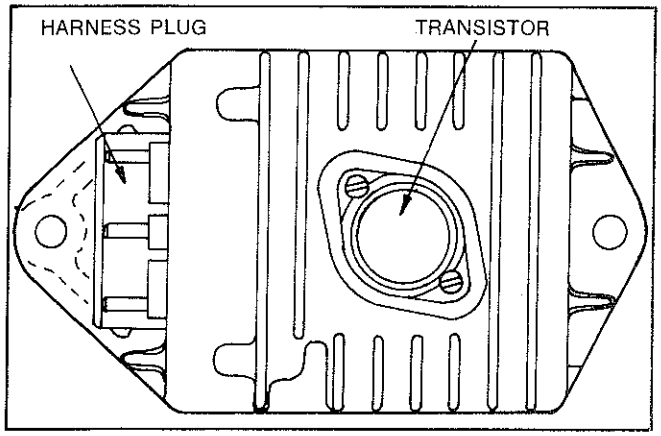


Fig. 1—Electronic ignition control unit

Magnetic Pick-up Unit — is mounted on the distributor upper plate and comprises the following (Fig. 2).

Pick-up unit, consists of a permanent magnet and a coil wound around a pole piece. The pole piece is an extension of the mounting bracket and is attached to the permanent magnet.

Permanent magnet — supplies the magnetic flux which induces a voltage in the pick-up coil as a result of the interaction of the reluctor and permanent magnet.

Reluctor — is a steel cylinder having symmetrical projections or teeth on its periphery, one for each cylinder. The reluctor is keyed to the distributor shaft and replaces the lobed cam of the breaker point ignition system. As the reluctor rotates it increases and decreases the gap between the pole piece and reluctor.

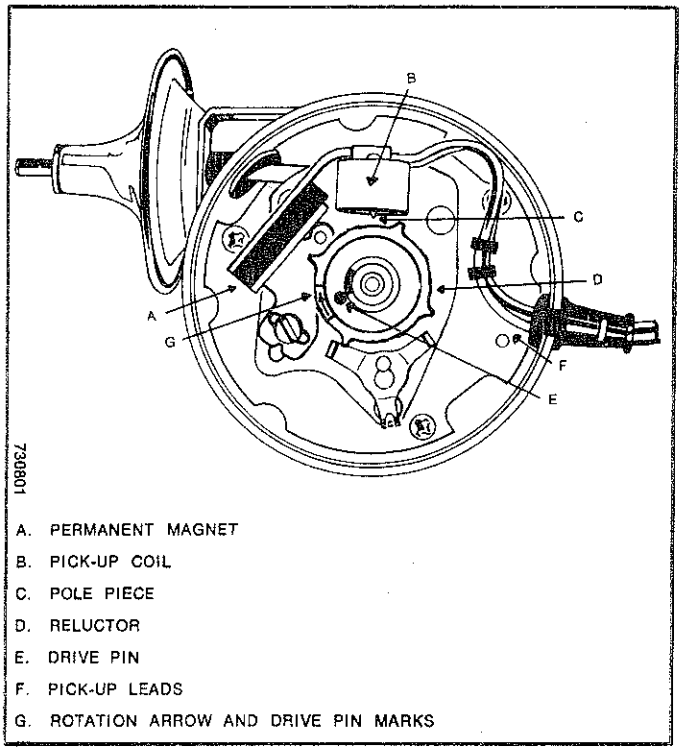


Fig. 2—Electronic ignition distributor (typical)

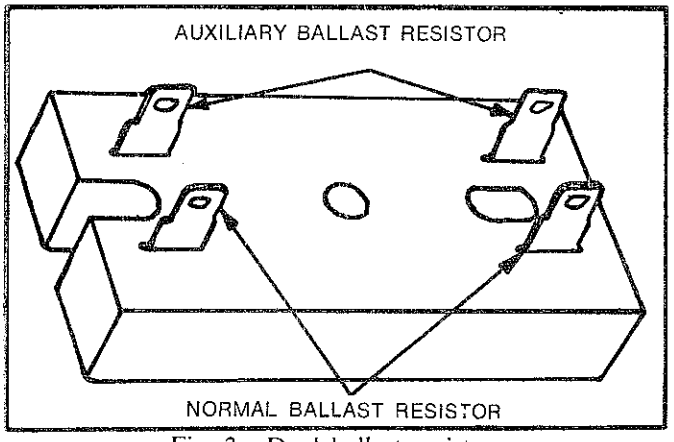


Fig. 3—Dual ballast resistor

Dual Ballast Resistor — contains two resistors (Fig. 3).

In early vehicles (Fig. 4) a 5 ohm/0,5 ohm ballast was used — the 0,5 ohm used to maintain primary current between starting and running battery voltage fluctuations, with the 5 ohm used to protect the control unit from excess voltage exposure.

In later models (Fig. 4A) the coil always operates with one 0,85 ohm resistor in circuit to provide optimum coil output and the other 0,85 ohm resistor is present to achieve the same effect as the earlier 0,5 ohm resistor.

The basic circuits (Fig. 4) of the ignition system and their relationship are similar to conventional ignition with some component changes in the primary circuit. The primary circuit consists of the battery, ignition switch, compensating side of the dual ballast resistor, primary winding of the ignition coil, the power switching transistor of the control unit and the vehicle frame (later units have the additional coil ballast resistor).

The secondary circuit consists of the coil secondary winding, the distributor cap and rotor, spark plugs and vehicle frame.

In addition to the two basic circuits other circuits have been added. These are the pick-up circuit, control unit feed circuit, (and auxiliary ballast circuit on earlier units).

The control unit is fed by a control feed circuit with earlier models using an additional auxiliary ballast circuit which used the 5 ohm section of the dual ballast resistor.

The pick-up circuit is used to sense the proper timing for the control unit switching transistor. (Fig. 2).

FUNCTION

Each time a tooth of the reluctor passes the pole piece of the permanent magnet, it varies the amount of magnetic flux cutting through the pick-up coil. This variation of flux induces a voltage across the pick-up coil terminals which serves to trigger the control unit. When the control unit is triggered its electric circuitry causes the power switching transistor to interrupt the primary circuit of the ignition coil. At this time, a collapsing magnetic field in the ignition coil induces in its secondary winding a high voltage which fires a spark plug. Thus, a spark plug is fired each time a reluctor tooth passes by the pole piece. Since the pole piece and tooth are seperated by an air gap, there is no wear.

Automatic spark advance is performed with the same centrifugal and vacuum advance mechanisms as used in the breaker point type distributor.

The control unit determines electrically how long the ignition coil primary current is allowed to flow before it is interrupted. In other words it determines the DWELL within the electronic system. Since the control unit circuitry is sealed and has no moving parts the dwell **cannot** be changed. **The reluctor and pick-up unit determines the ignition timing. The control unit determines the dwell.**

The advantages of the electronic ignition system are, lower tune-up costs and lower emissions throughout the life of the vehicle, due to the elimination of the breaker points. In the electronic ignition system, electronic circuitry performs the functions which in a conventional system are performed by the mechanical breaker points. The benefits are two-fold. First, the magnetic pick-up and electronic circuitry do not wear out. This reduces maintenance costs because there is no longer a need to change breaker points or condenser and to re-adjust ignition timing. Second, electronic circuitry can control ignition timing and dwell angle more accurately over the range of performance demanded from today's vehicles than can mechanical breaker points, resulting in better exhaust emission control.

IGNITION SYSTEM TESTING

Equipment Required:

Ohmmeter with capacity to read 0-1000 ohms.
Open scale voltmeter 0-20 v.
Non magnetic feeler 0.20 mm (0.008") (shim brass).

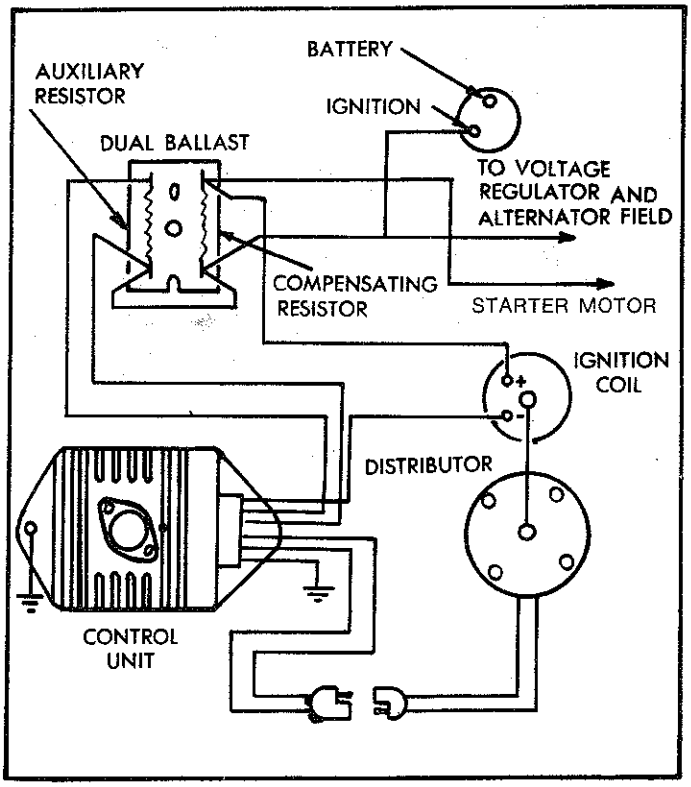


Fig. 4—Schematic — Electronic ignition system (used up to V.I.C. JH6)

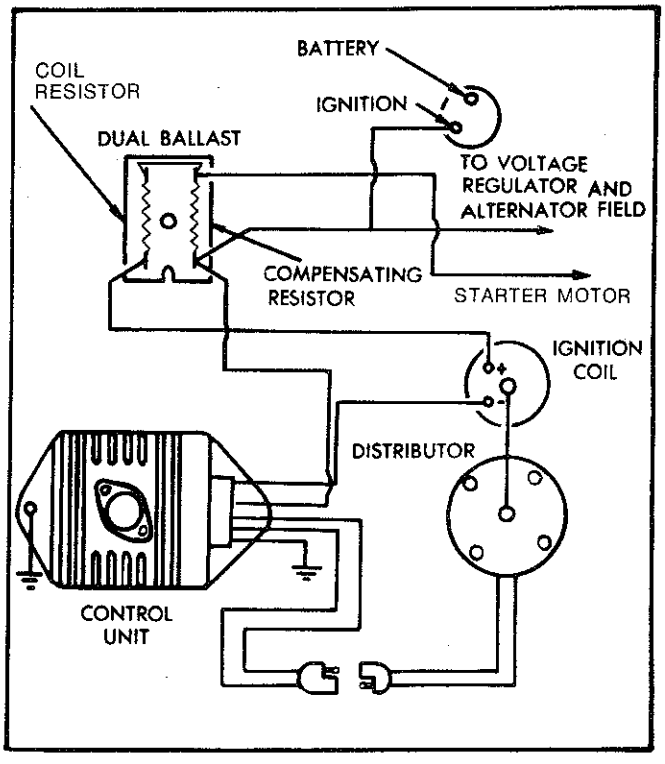


Fig. 4A—Schematic — Electronic ignition system (used from V.I.C. JH6)

When ignition system problems are suspected, the following procedure should be followed:

Test No. 1

Prior to performing any other tests, check that the Electronic Control Unit **is properly earthed.** Connect one ohmmeter lead to a known good earth and the other lead to the control unit cover. The ohmmeter should show a continuity between the cover and earth.

Remove the wiring connector from the control unit and connect the ohmmeter lead to the No. 6 terminal of the plug and a known good earth. The ohmmeter should show a continuity between the terminal and earth.

If a continuity does not exist in the above tests the attaching screws, washers and wire earthing screw must be removed and examined to make sure they are free from dirt and rust. Refit the screws and washers and recheck the unit for continuity.

Test No. 2

If the ignition system still fails to operate proceed as follows:

(1) Ensure that the ignition switch is in the "off" position.

(2) Remove the multi-wiring connector from the control unit.

(3) Connect one ohmmeter lead to a known good earth.

(4) Connect the other ohmmeter lead to the Control Unit No. 5 connecting pin. (Refer Fig. 5).

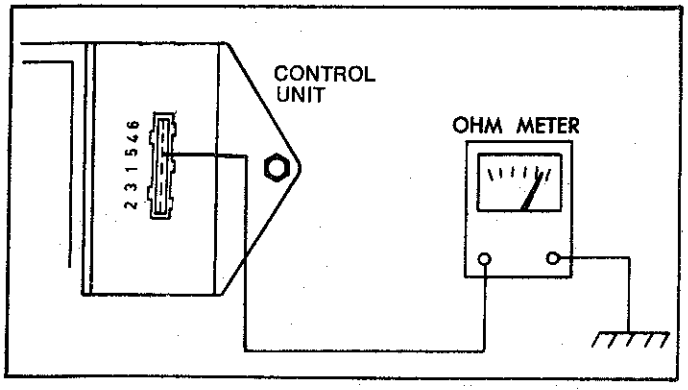


Fig. 5—Checking control unit earth

The ohmmeter should show a continuity between the No. 5 connecting pin and earth.

If continuity does not exist the electronic control unit must be replaced.

Test No. 3

If test No. 2 proves satisfactory, the high tension secondary cables and wiring harness must be checked as outlined by the following procedure.

(1) Visually inspect all secondary cables at the coil, distributor and spark plugs for cracks and tightness.

(2) Check primary wire at the ignition coil and ballast resistor for tightness. If the above checks do not determine the problem, the following steps will determine if a component is faulty.

(3) Check and note battery voltage.

(4) Ensure that ignition switch is in the "off" position.

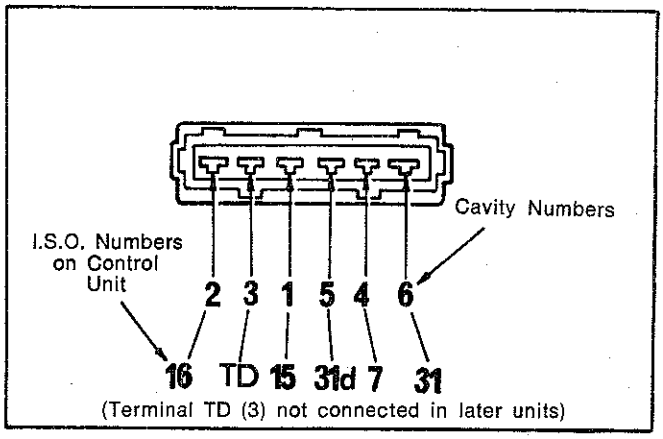


Fig. 6—Wiring loom connector cavities

(5) Remove the multi-wiring connector from the control unit.

(6) Turn the ignition switch "on".

(7) Connect the negative lead of a voltmeter to a good ground. Make the following checks:

(a) Connect the positive lead of the voltmeter to the **wiring harness connector cavity** No. 1 Voltmeter reading should be approximately the same as battery voltage with all accessories off. Voltage should not drop more than 1 volt. If voltage drop is greater than 1, refer to Fig. 7 to determine the circuit that must be checked.

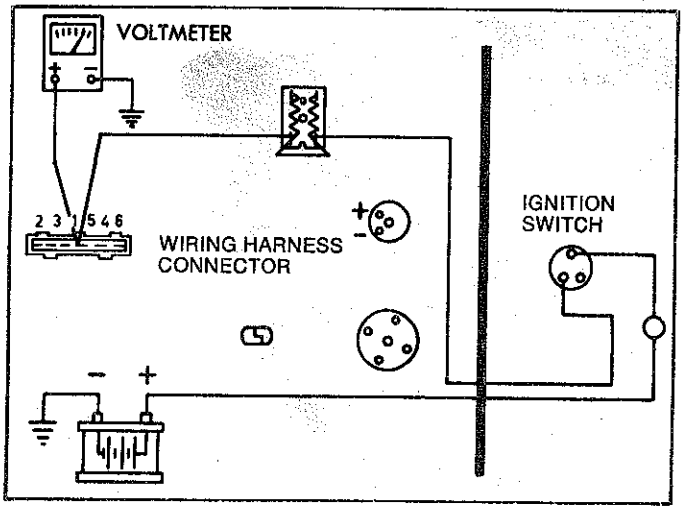


Fig. 7—Checking voltage drop cavity No. 1

(b) Connect the positive lead of the voltmeter to the **wiring harness connector cavity** No. 2. Voltmeter reading should be approximately the same as battery voltage. Voltage should not drop more than 1 volt. If voltage drop is greater than 1, refer to Fig. 8 to determine the circuit that must be checked.

(c) Connect the positive lead of the voltmeter to the **wiring harness connector cavity** No. 3. Voltmeter reading should be approximately the same as battery voltage. Voltage should not drop more than 1 volt. If the voltage drop is greater than 1, refer to Fig. 9 to determine the circuit that must be checked.

NOTE: This test is only applicable to vehicles built up to V.I.C. JH6 (early type).

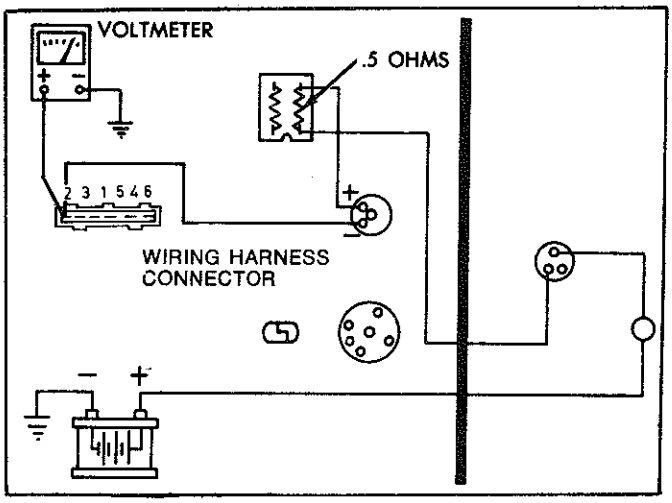


Fig. 8—Checking voltage drop cavity No. 2

(8) Turn ignition switch 'off".

(9) Connect an ohmmeter to **wiring harness connector cavity** No. 4 and No. 5 (Fig. 10). The ohmmeter resistance reading should be as specified.

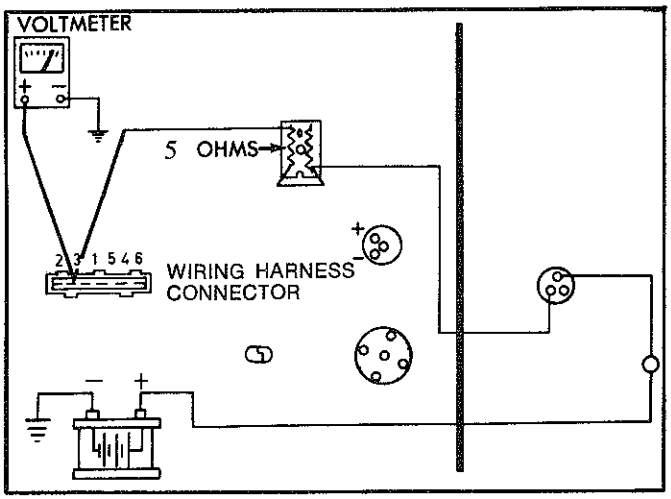


Fig. 9—Checking voltage drop cavity No. 3 — applicable only up to V.I.C. JH6

If reading is higher or lower than specified, disconnect the dual lead connector coming from the distributor. Using the ohmmeter, check the resistance at the dual lead connector (Fig. 11). If the reading is not between the specified limits, replace the pick-up coil assembly in the distributor. If reading is within above specifications, check the wiring harness between the control unit and dual lead connector.

(10) Connect one ohmmeter lead to a good ground and the other lead to either connector of the distributor (Fig. 12). Ohmmeter should show an open circuit. If the ohmmeter does show a reading, the pick-up coil in the distributor must be replaced.

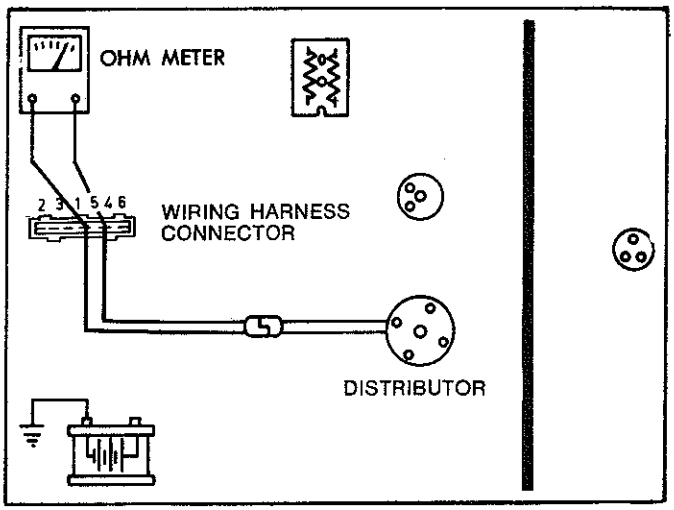


Fig. 10—Checking resistance between cavities 4 and 5

(11) Ensure that the ignition switch is in the "off" position.

(12) Reconnect wiring harness at the control unit and distributor.

(13) Remove the high voltage cable from the centre tower of the distributor. Hold the cable approximately 5,0 mm (3/16") from engine. Crank engine.

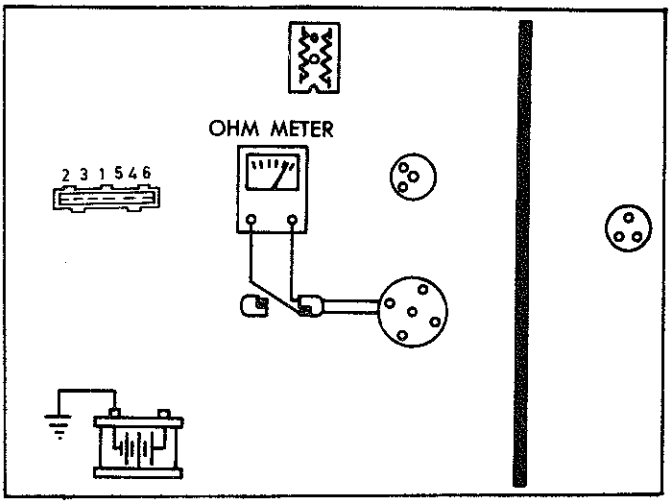


Fig. 11—Checking resistance at dual lead connector

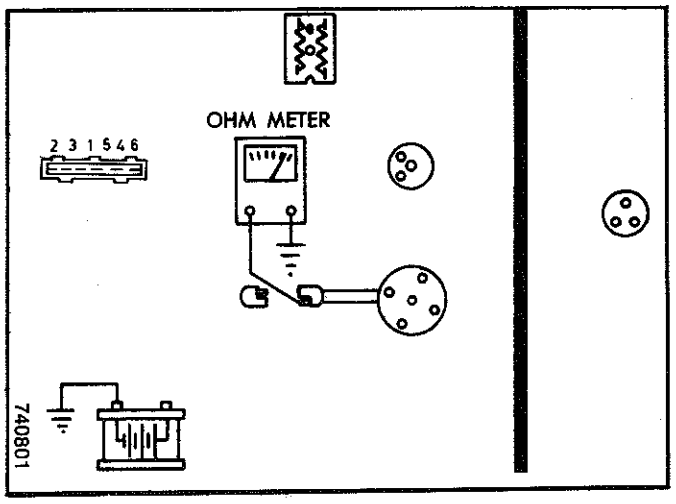


Fig. 12—Checking pick-up coil

(14) If arcing does not occur, replace the control unit.

(15) Crank the engine again. If arcing still does not occur, refit the control unit and replace the ignition coil.

(16) Check the air gap between a reluctor tooth and the pick-up coil (Fig. 13). To set the gap, loosen the pick-up coil hold down screw. Insert a 0,20 mm (0.008") non magnetic feeler gauge between the reluctor tooth and the pick-up coil. Adjust the gap so that the feeler is snug. Tighten hold down screw. Recheck the gap after tightening the screw.

NOTE: A 0,25 mm (0.010") feeler gauge should not slip between the pick-up coil pole piece and an aligned reluctor tooth.

CAUTION: A 0,25 mm (0.010") feeler gauge can be forced between a properly adjusted reluctor and pole piece. Do not use force to insert gauge. No evidence of reluctor teeth striking the pick-up pole piece should be visible.

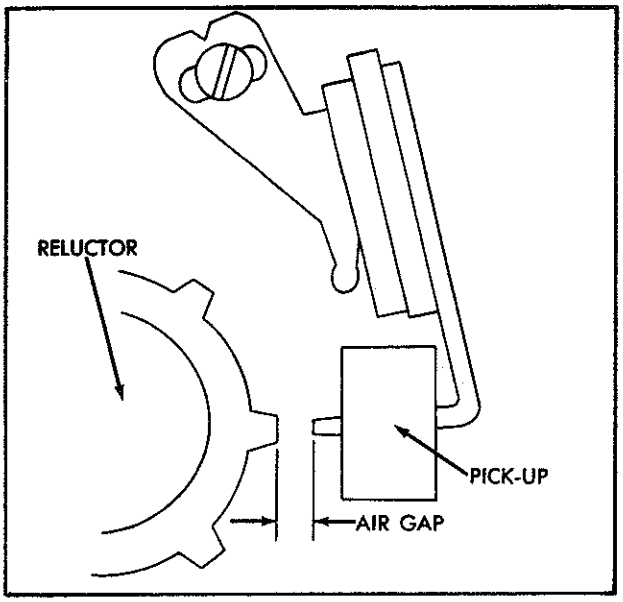


Fig. 13—Adjustment of reluctor to pick-up coil air gap

NOTE: If a problem DOES NOT show up when making the voltage checks, coil resistance checks, or ground continuity checks it is likely the control unit or coil is faulty. It is unlikely that both units would fail simultaneously. However, before replacing the control unit make sure no foreign matter is lodged in or blocking the female terminal cavities in the harness connector. If clear, try replacing control unit or coil (in turn) to see which one restores secondary ignition voltage.

SECTION 5B — BOSCH ELECTRONIC IGNITION DISTRIBUTOR

SPECIFICATIONS

DISTRIBUTOR			
Engine Application	Astron	<———	<———
Engine Capacity	1,85 Litre	2,00 Litre	2,60 Litre
Manufacturer	Bosch	<———	<———
Manufacturer's Part Number	9 230 062 418 (early) 9 230 064 503 (late)	9 230 062 414 (early) 9 230 064 504 (late)	9 230 064 501
Chrysler Part Number	4062574 (early) 4156330 (late)	4065351 (early) 4156331 (late)	4151124
Timing B.T.C. (Vac. Disconnected)	*5° ± 1° @ 850 r.p.m.	<———	7° ± 1° @ 850 r.p.m.
Advance—Centrifugal (Distributor degrees @ **Distributor** R.P.M.)	0° Below 300 0° to 1,5° @ 700 5,25° to 6,75° @ 1400 8,5° to 11° @ 3000	0° Below 400 0° to 2.2° @ 600 4,5° to 6,5° @ 1000 8,5° to 10,5° @ 1750 7,5° to 10,5° @ 3200	0° Below 500 0° to 0,75° @ 700 1,75° to 3,25° @ 1000 5,3° to 6,75° @ 1400 9° to 11° @ 3000
Advance—Vacuum (Distributor degrees @ Millimetres (ins.) of Mercury (Hg))	0° Below 67 mm (2.6") 0° to 2° @ 90 mm (3.5") 3° to 5,25° @ 150 mm (5.9") 7,25° to 9,5° @ 300 mm (11.8") 9° to 11° above 360 mm (14.2")	0° Below 160 mm (6.3") 0° to 1,5° @ 200 mm (7.9") 2,5° to 4,75° @ 300 mm (11.8") 5,5° to 7,5° above 420 mm (16.5")	0° Below 120 mm (4.7") 0° to 0,5° @ 130 mm (5.1") 4,5° to 6,75° @ 250 mm (9.8") 6,5° to 8,5° @ 300 mm (11.8")
Firing Order	1, 3, 4, 2	<———	<———
Dwell Angle	Not adjustable	<———	<———
Shaft Side Play (new or rebuilt)	0 to 0,07 mm (0 to 0.003")	<———	<———
Service Wear Limit	0,15 mm (0.006")	<———	<———
Shaft End Play (after assembly)	0,10 to 0,35 mm (0.004 to 0.014")	<———	<———
Rotation	Clockwise	<———	<———
Reluctor Run Out (180° apart)	0,038 mm (0.0015")	<———	<———
PICK-UP COIL			
Resistance @ 21°-27°C (70°-80°F)	150 to 900 Ohms	<———	<———
Gap Reluctor to Pole Piece	0,15 to 0,20 mm (0.006 to 0.008")	<———	<———

***NOTE: Ignition timing specifications printed are correct at the time of publication. If these specifications differ from those on the Vehicle Emission Control Information Label, use the specifications on the label.**

DISTRIBUTOR

Removal

(1) Disconnect vacuum hose at distributor.

(2) Disconnect double primary wires at distributor.

(3) Remove high tension leads from the spark plugs and coil.

CAUTION: The correct method of detaching this type of ignition lead from the spark plug is to grasp the rubber insulator at the spark plug end of the lead and remove by a combined twisting and pulling movement.

(4) Unfasten distributor cap retaining clips and lift off the distributor cap.

(5) Rotate the engine crankshaft until the distributor is pointing toward the No. 1 cylinder firing position, ensuring that the mark on the crankshaft pulley is in line with the top dead centre mark on the pointer on the timing case cover.

NOTE: On vehicles fitted with belt drive camshaft DO NOT rotate the engine anti-clockwise.

(6) Remove distributor hold down nut.

(7) Carefully lift the distributor from the engine; the shaft will rotate a small amount as the distributor gear is disengaged from the camshaft gear.

NOTE: To retain the engine in the correct timing position do not rotate crankshaft while distributor is removed.

Installation

(1) Ensure the crankshaft is positioned at T.D.C. with No. 1 piston on compression stroke.

(2) Align the mating mark (line) of the distributor housing with the protruding side of the roll pin of the drive gear.

(3) Insert the distributor into the cylinder head with the mating marks uppermost (Fig. 1) and install retaining nuts.

(4) Install distributor rotor and cap.

(5) Connect high tension leads and distributor primary lead.

(6) Connect vacuum hose ensuring it is firmly positioned.

Shaft and Bushing Wear Test

(1) Remove the distributor rotor.

(2) Clamp the distributor in a vice equipped with soft jaws and apply only enough pressure to restrict any movement of the distributor, during the test.

(3) Attach a dial indicator to the distributor housing so indicator plunger arm rests against reluctor sleeve (not against the reluctor).

(4) Place one end of a wire loop around the reluctor sleeve just above the reluctor.

(5) Hook a spring scale in the other end of the wire loop.

NOTE: The wire loop must be down against the top of the reluctor to ensure a straight pull; also be sure that the wire loop does not interfere with the indicator or indicator holding bracket.

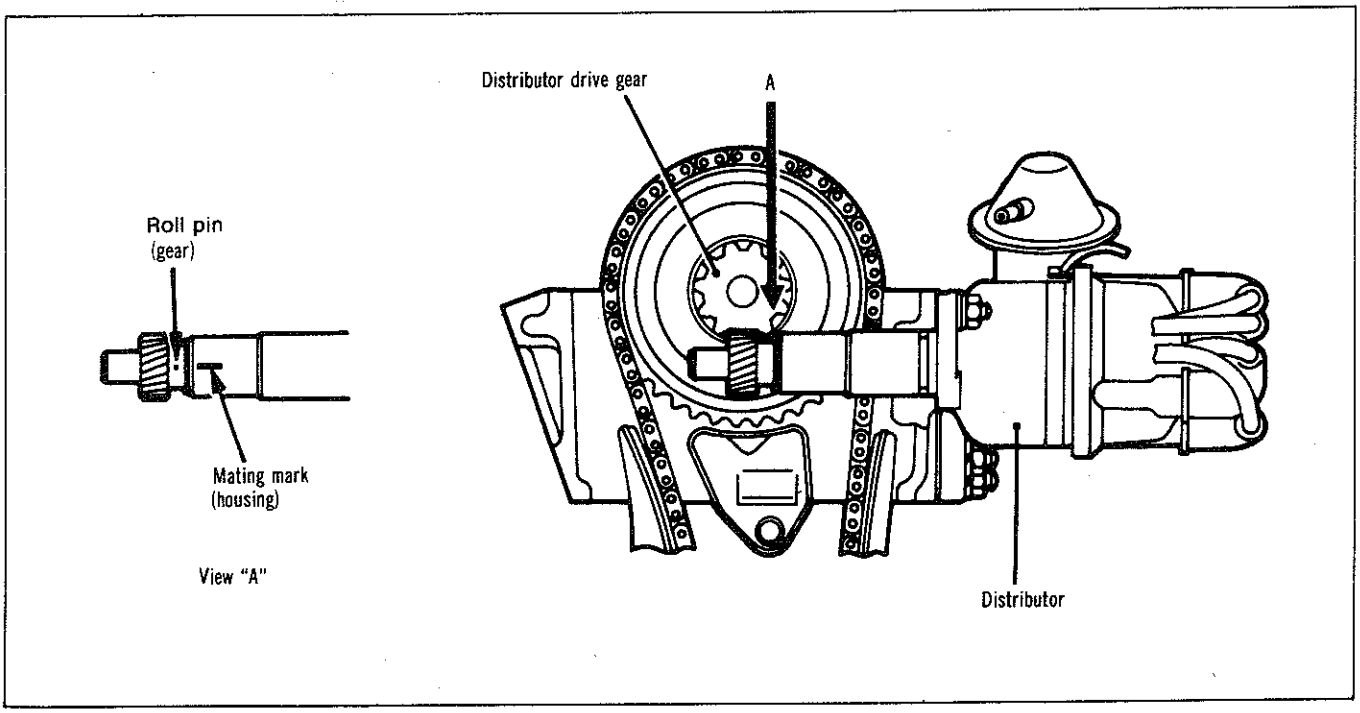
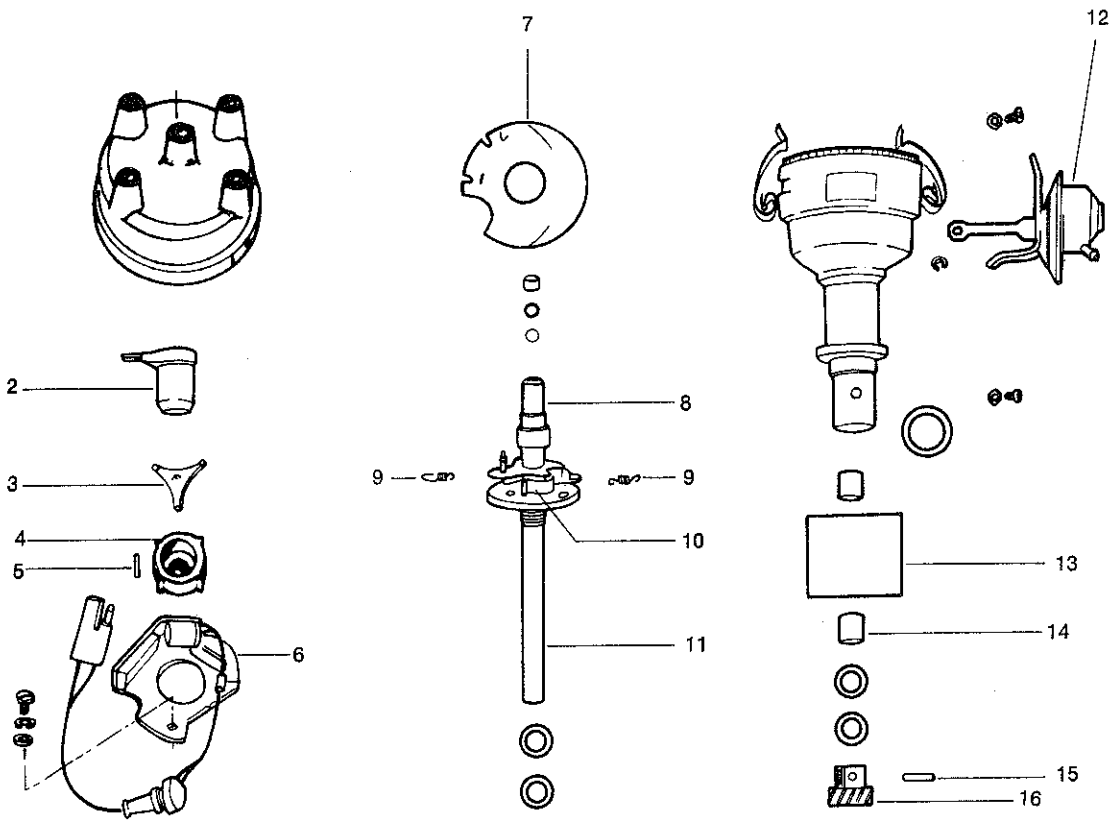


Fig. 1—Installing distributor assembly



1 DISTRIBUTOR CAP
2 ROTOR
3 RETAINER SPRING
4 RELUCTOR
5 ROLL PIN
6 PICK UP PLATE (UPPER)
7 PICK UP PLATE (LOWER)
8 RELUCTOR SLEEVE
9 WEIGHT SPRING
10 WEIGHT
11 DISTRIBUTOR SHAFT
12 VACUUM ADVANCE DIAPHRAGM
13 FELT
14 BRUSH
15 ROLL PIN
16 DRIVE GEAR

Fig. 2—Exploded view—Bosch distributor

(6) Apply a 4,45 N (1 lb.) pull toward the dial indicator and a 4,45 N (1 lb.) pull away from the indicator and read the total movement of the plunger on the indicator dial. If the total indicator plunger movement exceeds 0,15 mm (0.006") replace the distributor housing or shaft assembly (see "Distributor Disassembly").

Disassembly

(1) Unfasten spring clips holding distributor cap and remove cap from housing.
(2) Pull rotor from reluctor-sleeve.

CAUTION: Care must be taken not to burr or mark the reluctor teeth and they must not be filed or otherwise metal finished. Any variation to the reluctor teeth shape will result in an erratic voltage signal to the control unit.

(3) Remove the reluctor from the reluctor sleeve. The reluctor is a light push fit on the sleeve and can be removed with two right angled screw drivers or by two flat screw drivers with a short right angled bend at the tip.
(4) Remove the driving pin from the reluctor sleeve.
(5) Remove cable from holding slot in distributor housing.
(6) Remove the two screws securing the vacuum control unit.
(7) Remove vacuum control unit link retaining clip.
(8) Unscrew self-tapping screws holding base plate assembly to housing and withdraw from housing.
(9) Press out driving pin and remove helical drive gear or collar.
(10) Slide shaft from housing.
(11) To remove the reluctor sleeve from the shaft assembly, remove the automatic advance springs and insert two screw drivers between the reluctor sleeve and driving plate. Lever the sleeve and a circlip within the sleeve bore will be disengaged and the sleeve released.

NOTE: The reluctor teeth may appear to be a little rough at the edges. Do not try to clean them by filing the edges. A sharp edge is required to quickly decrease the negative voltage in the pick-up coil. If the teeth are rounded the voltage signal to the control unit will be erratic.

Inspection

Check bearing surfaces for wear and replace worn parts. New sintered bushings should be soaked in light oil for an hour before installation. Use a correct mandrel for pressing out and replacing bushes. Distorted or stretched advance springs must be replaced with the correct springs as the springs determine the advance curve, which is important to optimum engine performance. The vacuum control unit must be tested for leaks, if a leak is found, the complete unit must be replaced. Check pick-up coil resistance with an Ohmmeter. The reading must be as specified. Inspect the pick-up coil wiring and examine distributor cap and rotor for cracks and distorted electrodes.

Assembly

Assemble the distributor by reversing disassembly procedure noting the following:
(1) If replacement bushes are fitted these are to be immersed in light oil (SAE 10) for 1 hour prior to assembly.
(2) Prior to fitment of the shaft assembly, lubricate the shaft and shaft recess with SAE 30 engine oil.
(3) Lubricate the bore of the reluctor sleeve, weight pivots and contact surfaces, reluctor sleeve and action plate contact surfaces with molybdenum type grease.

NOTE: When installing the drive gear roll pin ensure it is installed so that the protruding side aligns with the rotor locating cut out at the top of the shaft.

(4) Lubricate the lower plate with a molybdenum type grease on the three areas on which the brass pads of the upper plate operate during vacuum advance operation. Also lubricate the vacuum link pivot with molybdenum type grease.
(5) If the shaft retaining collar has been removed a new roll pin must be fitted.
(6) To adjust reluctor to pole piece air gap align one reluctor blade with the pick-up pole.
Install a 0,20 mm (0.008") non-magnetic feeler gauge between reluctor blade and pick-up pole.
Move pick-up until contact is made between pick-up, feeler gauge and reluctor blade. Tighten pick-up hold down screw. Remove feeler gauge. No force should be required to remove feeler gauge. Loosen screw and move the pick-up pole in or out as required. Retighten hold down screw securely after adjustment. Check gap with 0,25 mm (0.010") feeler gauge.

NOTE: A 0,25 mm (0.010") gauge can be forced between the pick-up pole and reluctor blade. Do not use force.

Apply vacuum to vacuum unit and rotate drive shaft. Reluctor teeth should not hit pick-up pole piece. Gap is not correctly adjusted if hitting occurs. If hitting occurs on only one side of reluctor distributor shaft is bent and requires replacement.

Fitting Replacement Helical Drive Gear

Replacement drive gears will be supplied with the drive pin hole drilled through one side only. Line up this hole with the hole in the shaft before drilling through. Ensure that the drill is sharp and cooled during the drilling process.

Fitting Replacement Shaft and Drive Gear

(1) Place gear on shaft and insert a 0,18 mm (0.007") feeler between gear and lower face of housing.
(2) Use the one guide hole in the replacement gear to mark shaft with the drill point.
(3) Remove gear and drill through shaft.

(4) Deburr shaft, place gear on shaft and line up hole in gear with hole in shaft.

(5) Complete drilling of opposite side of nylon gear.

(6) Finished size of hole in gear and shaft is 4,75 mm to 4,85 mm (0.187" to 0.191").

(7) Use only a roll pin 4,76 mm (3/16") nominal diameter.

(8) Check that the shaft end play is adjusted to 0,10 to 0,35 mm (0.004" to 0.014") by shims between gear and lower face of distributor housing.

Centrifugal Advance Curve

Carefully mount distributor assembly (less cap and rotor) in a reliable stroboscope-type distributor tester so that the gear is not damaged. It is important that the appropriate adapter for checking electronic type distributors is connected to the distributor stand and that the instructions for its usage are followed. After this is done proceed with test as follows:

(1) Adjust the tester speed control to operate distributor at a slow speed (below point at which centrifugal advance starts to operate), and align the "O" of the tester degree ring with any of the arrow flashes.

(2) Adjust the tester speed control to operate distributor at speeds called for in Specifications, and observe arrow flashes opposite tester degree ring to determine degrees of advance.

(3) If the centrifugal advance curve does not meet specifications adjust spring tension by bending the spring mounting tabs in the required direction.

Bending the spring tab towards the distributor cam decreases the tension, whilst bending away increases the spring tension. The lighter spring controls the initial advance and the combination of both springs controls the advance at the higher speeds.

Testing Vacuum Diaphragm For Leaks

With the distributor mounted in a distributor tester and with the vacuum unit attached to the distributor, proceed as follows:

(1) Place thumb over end of vacuum pump hose and adjust the regulator control knob to give a reading of 68 kPa (20") of vacuum with hose closed off to ensure tester hose does not leak.

(2) Attach vacuum pump hose to the tube on the vacuum unit. Vacuum gauges should hold on maximum vacuum obtainable if no leaks exist.

(3) Observe the breaker plate whilst performing leak test to check response of breaker plate to vacuum advance. There should be instant response to the pull of the diaphragm, moving the plate without drag, bind or jerk in either direction.

(4) If leakage is indicated, replace the vacuum unit assembly

Checking Vacuum Advance Curve

If only the vacuum advance curve is to be checked, connect tester vacuum pump hose to distributor vacuum advance unit and perform operation (1) of Centrifugal Advance Curve test, then proceed as follows:

(1) Turn tester vacuum pump ON. Adjust vacuum pump regulator to vacuum test specifications. Refer to Specifications and observe arrow flashes on tester degree ring to determine degrees of advance.

(2) If the vacuum advance is below or above specifications, the vacuum unit must be replaced as no adjustment is provided.

Checking Ignition Timing

(1) Disconnect the vacuum hose from the distributor.

(2) With engine idling, adjust the timing to specification, by loosening the distributor mounting nut and rotating the distributor.

(3) With the timing set, tighten the distributor mounting nut securely and recheck the timing.

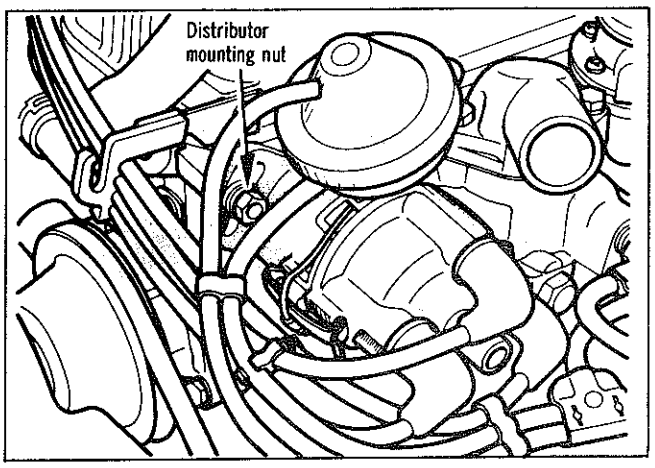


Fig. 3—Distributor mounting nut

(4) Check whether the timing advances with an increase in engine speed, if no advance is observed the distributor advance mechanism must be checked for wear or damage.

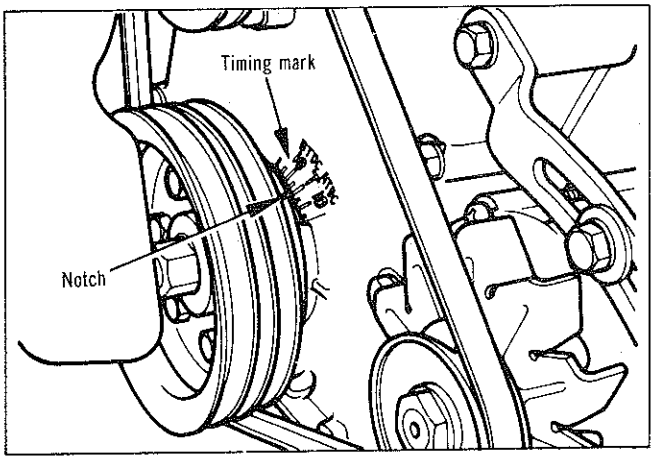


Fig. 4—Timing mark

SECTION 5G — MITSUBISHI ELECTRONIC IGNITION SYSTEM

SPECIFICATIONS

Distributor

Manufacturer	Mitsubishi
Model Number	T4T60176
Direction of Rotation	Clockwise
Firing Order	1-3-4-2
Ignition Timing @ 850 r.p.m. (Vacuum Disconnected)	*5° B.T.D.C. ±1°
Pick-up Coil Resistance @ 21-27°C (70-80°F)	1000 to 1100 Ohms
Reluctor to Pick-up Air Gap	Not adjustable
Advance — Centrifugal (**Distributor** degrees @ **Distributor** r.p.m.)	0° @ 500 5,5° @ 1000 9,5° @ 1750
Advance — Vacuum (**Distributor** degrees @ Millimetres (ins.) of Mercury (Hg)	0° @ 180 mm (7.1") 2,5° @ 260 mm (10.2") 6,5° @ 420 mm (16.5")

Coil

Make and Number	Diamond LB-119
Secondary Resistance @ 20°C (68°F)	0,70 to 0,86 Ohms
Primary Resistance @ 20°C (68°F)	8700 to 11 700 Ohms

*** NOTE: Ignition timing specifications printed are correct at the time of publication. If these specifications differ from those on the Vehicle Emission Control Information Label, use the specifications on the label.**

GENERAL INFORMATION

The system consists of a battery, ignition switch, ignition coil, pointless distributor with an electronic control unit, spark plugs and wiring.

Primary current is switched by the electronic ignition control unit is response to timing signals produced by the distributor magnetic pick-up. The control unit is attached to the distributor and consists of a power transistor chip and ceramic board on which an electronic circuit is fabricated with an integrated circuit, several passive components and a thick film circuit.

Rotation of the reluctor in the distributor housing changes the magnetic flux generating an AC voltage in the pick-up coil. Voltage waveforms become spark signals where the reluctor projections and the permanent magnets face each other.

The spark signal of the signal generator is delivered to the control unit. The signal is controlled and operates the power transistor which provides ON-OFF control of the current of the ignition coil. When primary current of the control unit is cut off, the ignition coil generates a secondary output which produces a spark in the spark plug.

The centrifugal advance mechanism is located below the rotor assembly and has governor weights that move inward or outward with changes in engine speed. With engine speed increases, the weight moves outward causing the reluctor to rotate ahead of the distributor shaft, thus advancing ignition timing.

The vacuum advance has a spring loaded diaphragm connected to the breaker plate assembly. The diaphragm is actuated against spring pressure by vacuum pressure. When the vacuum increases, the diaphragm causes the breaker plate assembly to pivot opposite to distributor rotation and advance the ignition timing.

Due to the elimination of breaker point deterioration and the resultant misfiring this system produces cleaner exhaust emissions and reduces ignition system maintenance.

ON VEHICLE ADJUSTMENTS AND TESTS

Ignition Timing

To obtain maximum engine performance, the distributor must be correctly positioned on the engine to give proper ignition timing.

The ignition timing test will indicate timing of the spark at number one cylinder.

Test procedures are as follows:

(1) Connect a suitable Power Timing Light to number one cylinder (refer to the equipment manufacturer's instructions for correct connecting procedures). **Do not puncture cables, boots or nipples with test probes. Always use proper adapters. Puncturing the spark plug cables with a probe will damage the cables. The probe can separate the conductor and cause high resistance. In addition breaking the rubber insulation may permit secondary current to arc to ground.**

(2) Switch off lights and air conditioner, start engine and run until operating temperature is obtained.

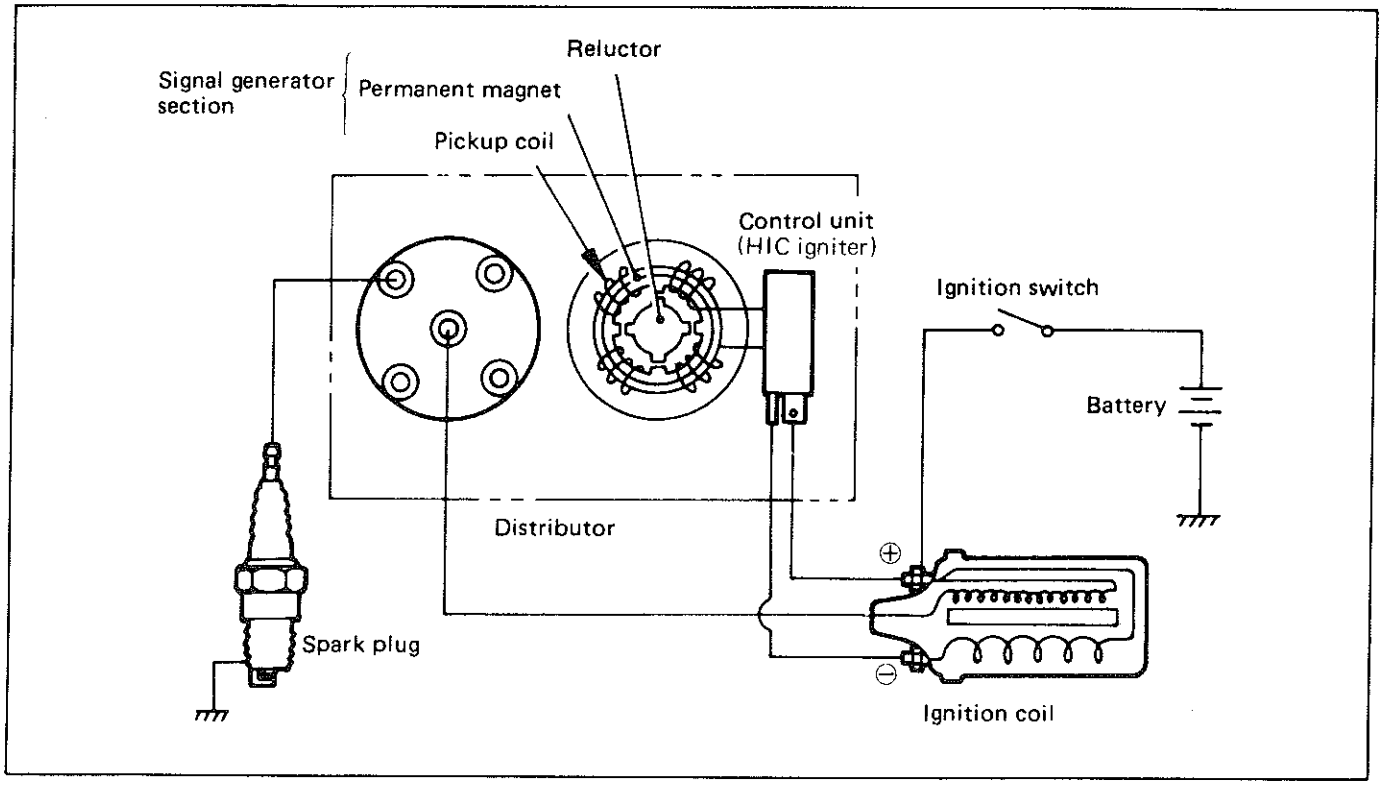


Fig. 1—Electronic ignition system circuit

(3) Set hot idle engine speed. (refer to Specifications under Fuel Systems).

(4) Disconnect vacuum hose **at distributor** and plug vacuum hose.

(5) Loosen distributor hold down arm screw just enough so the distributor housing can be rotated in its mounting.

(6) Aim Power Timing Light at timing plate on chain case cover. If light flash occurs when timing mark on vibration damper is located ahead of specified degree mark on timing plate in the direction of engine rotation, timing is advanced. To adjust, turn distributor housing in direction of rotor rotation.

If flash occurs when the vibration damper timing mark is located past the specified degree mark in the direction of engine rotation, timing is retarded. To adjust turn distributor housing against direction of rotor rotation. Refer to "Specification." (Moving the distributor housing against shaft rotation advances timing and with shaft rotation retards timing).

CAUTION: Do not use distributor vacuum advance chamber as a turning handle when turning distributor.

(7) Tighten distributor hold-down arm screw after timing has been set and recheck timing adjustment with a Power Timing Light.

(8) When ignition timing is correct, reconnect vacuum hose to distributor.

(9) If engine idle speed has changed, readjust carburettor. **DO NOT RESET TIMING.**

Centrifugal Advance

(1) Run the engine at idle, until operating temperature is normal. Remove the vacuum hose (non-striped hose) from the vacuum advance mechanism and plug.

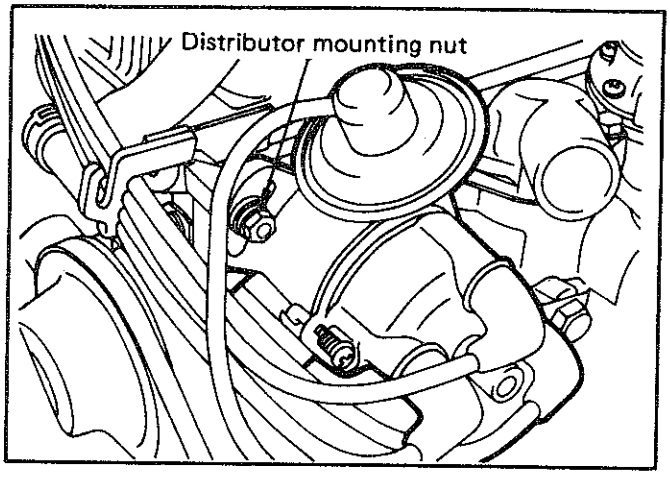


Fig. 2—Adjusting ignition timing

(2) Slowly accelerate the engine to check for advance.

Excessive advance . . . . . .
Deteriorated governor spring
(A broken governor spring will cause abrupt advance.).

Insufficient advance . . . . . .
Faulty operation of governor weight or cam.

Vacuum Advance

(1) Set the engine speed at 2,500 r.p.m. and check for advance by disconnecting the vacuum hose from or reconnecting it to the distributor.

(2) For a more precise check to determine whether the vacuum advance mechanism is working properly, remove the vacuum hose from the distributor, connect a vacuum pump or equivalent, and run the engine at idle. Slowly apply vacuum to check for advance.

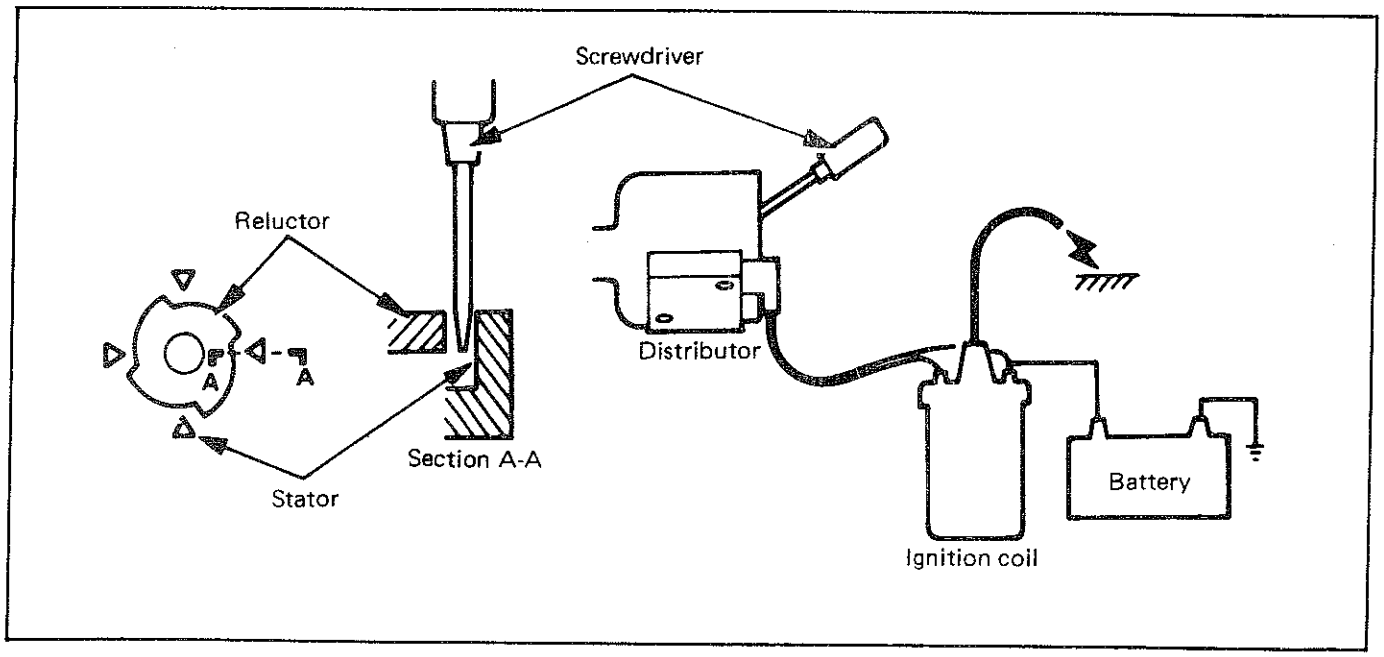


Fig. 3 — Secondary ignition test

Excessive advance . . . . . .
Deteriorated (or sagging) vacuum controller spring (A broken spring will cause abrupt advance.).
Insufficient advance or no advance . .
Breaker plate binding or diaphragm broken.

Secondary Ignition Test

When normal ignition does not take place, this test is performed to determine whether the pick-up coil and electronic ignition control unit are working properly.

(1) Check the ignition switch, wiring harness, spark plug cables and connector, and correct or replace as necessary.

(2) Remove the distributor cap and remove the rotor assembly.

(3) Turn the ignition switch ON.

(4) Disconnect the high tension cable from the centre terminal of the distributor cap and hold it 5 or 6 mm (0.2 to 0.24 in.) away from the ground surface (cylinder block, etc.). Insert a conventional screwdriver between the reluctor and stator of the distributor to see if spark is produced. If no spark is produced, a defective control unit, pick-up coil, ignition coil or secondary cable is indicated. Check all these parts.

Removal

(1) Disconnect the battery negative (earth) cable.

(2) Disconnect the wiring harness from the control unit. Disconnect the high tension cables from the distributor cap.

NOTE: The correct method of detaching this type of ignition lead is to grasp the rubber insulator and remove by a combined twisting and pulling action.

(3) Disconnect the hose from the vacuum advance diaphragm.

(4) Manually rotate the engine to the top dead centre position with the No. 1 piston on the compression stroke.

(5) Remove the distributor mounting nut and remove the distributor assembly.

Installation

(1) Ensure that the crankshaft is positioned at T.D.C. with No. 1 piston on compression stroke.

(2) Align the mating mark (line) on the distributor housing with the mating mark (dot) on the distributor driven gear (see Fig. 5.)

(3) Install the distributor in the cylinder head aligning the mating mark on distributor attaching flange with the centre of the distributor mounting stud (Fig. 6) and install the retaining nut.

(4) Connect the vacuum hose, high tension leads, control unit wiring harness and battery cable.

(5) Check and set ignition timing as detailed previously.

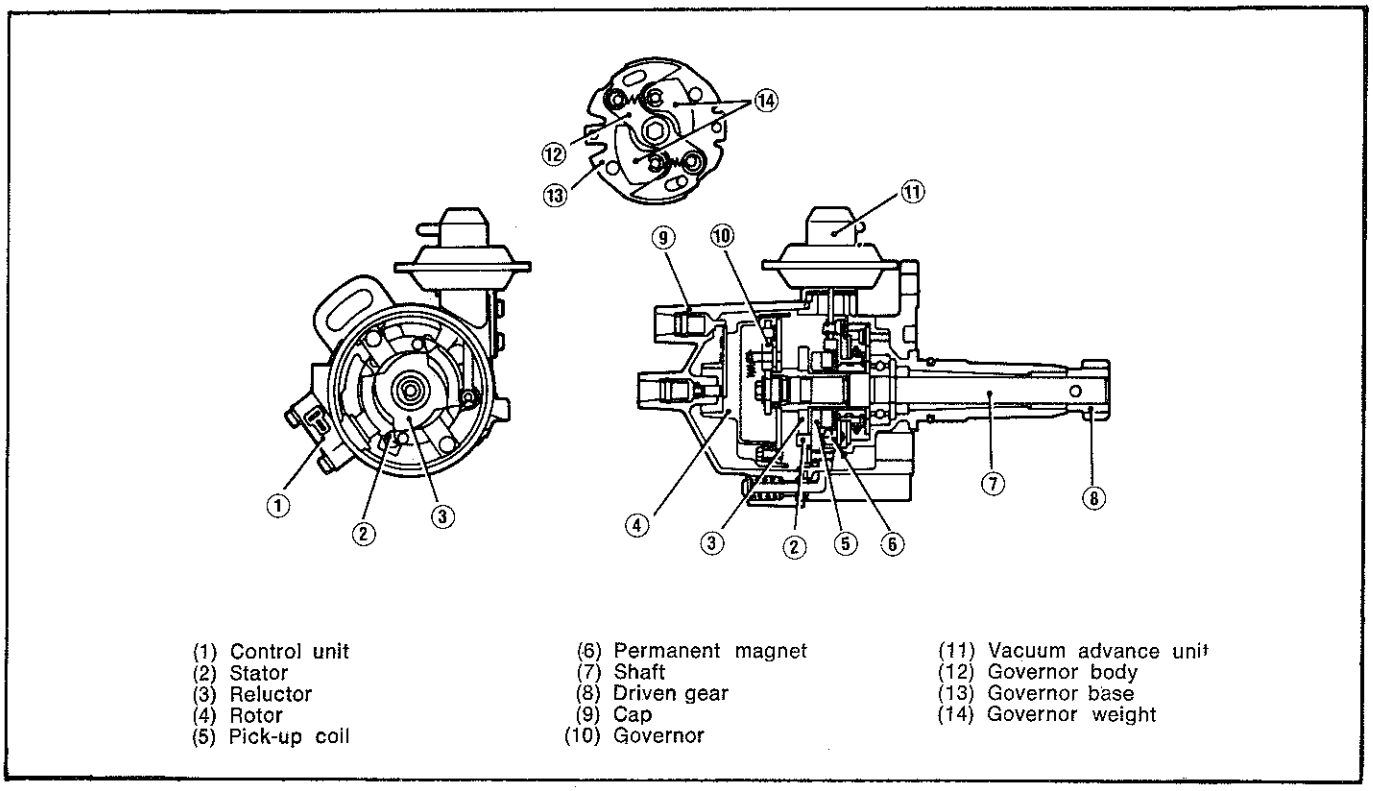


Fig. 4—Sectioned view distributor assembly

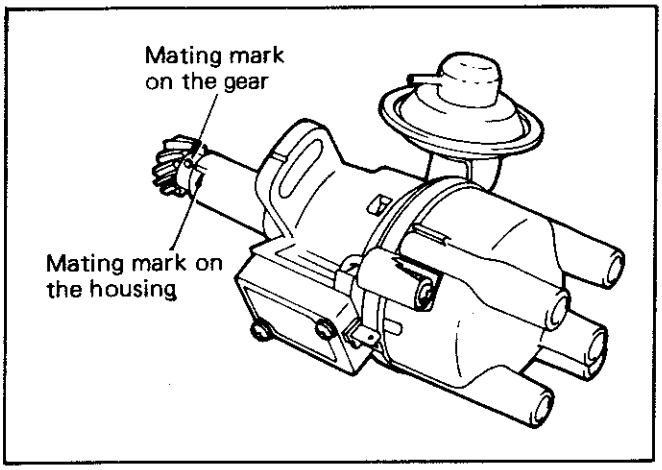


Fig. 5—Installing distributor

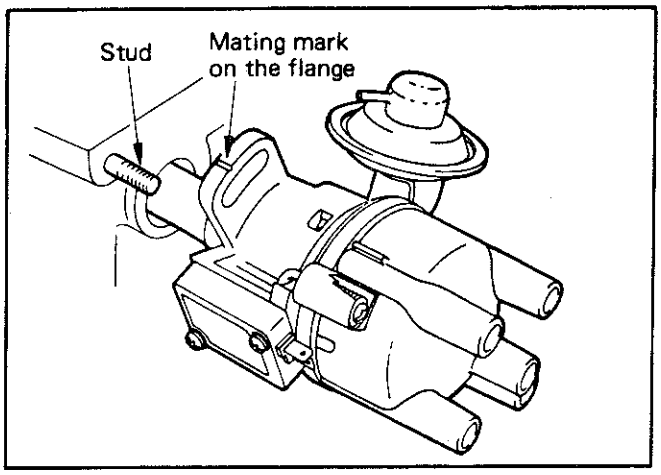


Fig. 6—Installing distributor

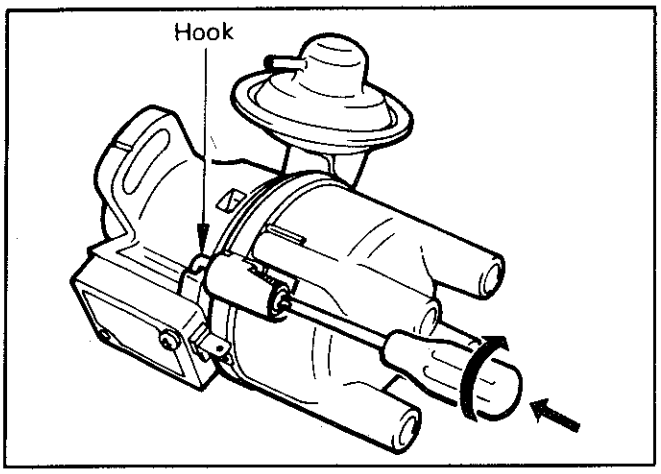


Fig. 7—Removing cap

Disassembly

(1) Remove the distributor cap as shown in Fig. 7, i.e. push down on the screw and turn to disengage the retaining hook.

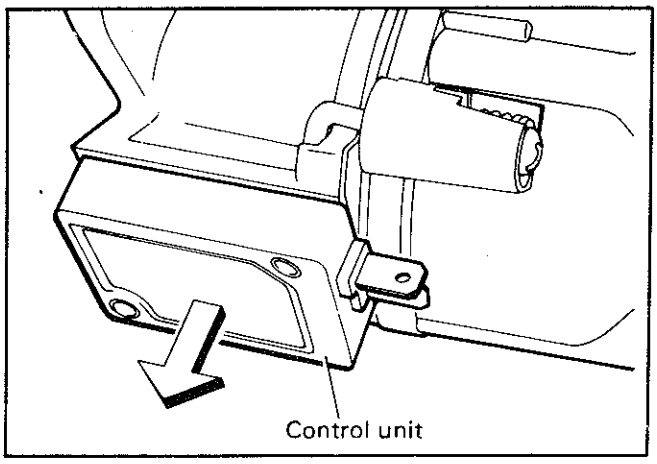


Fig. 8—Removing control unit

(2) Remove the two screws retaining the control unit. Pull it away from the distributor housing — Fig. 8.

NOTE: The mating surfaces of the control unit and the distributor housing are coated with a silicon No. 2 grease. Do not wipe it away.

(3) Remove the mounting screws and remove the rotor assembly.

(4) Remove the mounting screw and remove the governor assembly with reluctor.

(5) Remove the pick-up coil.

(6) Remove the vacuum control unit screws.

(7) Remove the E-ring from the vacuum link and remove the vacuum control unit.

(8) Remove the breaker assembly.

(9) Remove the lock pin from the gear.

(10) Remove the plate and shaft.

Inspection

(1) Pick-up Coil Test — Using ohmmeter, measure the resistance of the pick-up coil. The resistance should be as specified. The resistance value can be measured with the pick-up coil in or out of the distributor.

(2) Control Unit Test — Check for continuity between the "C" terminal of the control unit and the reverse surface (metallic surface) of the control unit. If the control unit is installed in the distributor, check for continuity between "C" terminal and distributor housing. The continuity test should be performed in the same way as the diode test by alternately connecting the test bars, using an ohmmeter. If there is continuity or no continuity in both directions, the control unit is defective. Replace the control unit.

NOTE: It is only the transistors of the switching section in the control unit that can be tested by this test. Even if the transistors check good, the control unit itself may be defective.

(3) Check the cap and rotor for cracks and deposits. A cracked cap or rotor should be replaced. Deposits should be wiped away.

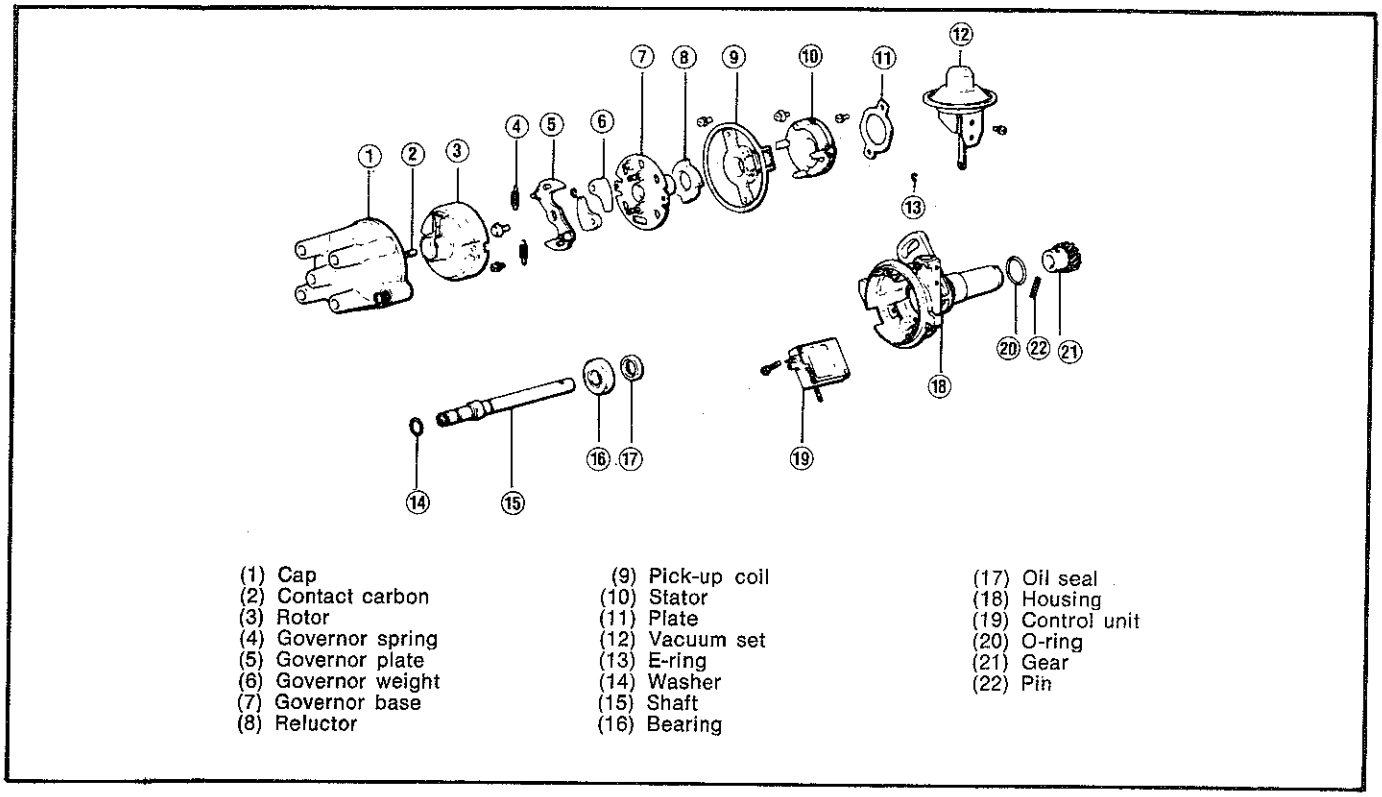


Fig. 9—Distributor

(4) Check the gear for wear. Replace if necessary.

(5) Check the shaft for play in the thrust direction. Replace the shaft and ball bearing assembly if necessary.

Assembly

Assemble by reversing the disassembly procedures.

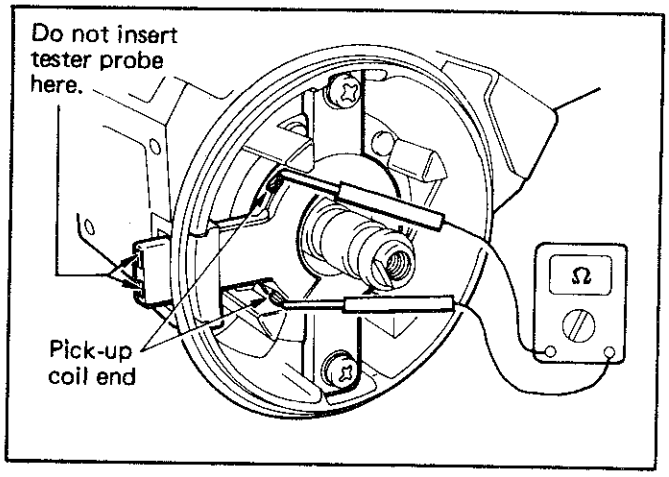


Fig. 10—Checking pick-up coil

SECTION 6 — RADIO, TAPE PLAYER, ANTENNA, SPEAKERS

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
RADIO INOPERATIVE	(a) Blown fuse.	(a) Replace fuse, check for short or open in wiring harness.
	(b) Antenna open or shorted.	(b) Test with an auxiliary antenna, if reception restored replace original antenna.
	(c) Receiver speaker connections loose or faulty.	(c) Test voltage at fuse and tighten all connections. With speaker control turned to either stop rotate control to other stop. If radio plays, replace faulty speaker. If radio does not play, remove radio receiver for servicing.
RADIO RECEPTION WEAK	(a) Unbalanced antenna trimmer.	(a) Adjust antenna trimmer for maximum volume on a weak station at approximately 1000 KHZ frequency with antenna at 2/3 height.
	(b) Shorted antenna lead-in.	(b) Turn on radio and wiggle antenna. If speaker static is heard, check antenna for mounting tightness. If speaker static is still heard after tightening, disassemble antenna and test for faulty insulators, or presence of moisture. If no static is heard, test for faulty or loose receiver or antenna connections at receiver. Also check antenna lead-in at antenna. If antenna checks O.K., remove radio receiver for servicing.
RADIO NOISY	(a) Outside electrical interference.	(a) Move the car or eliminate interference.
	(b) Insufficient or faulty inteference suppression.	(b) Install effective capacitor in ignition system.
	(c) Faulty antenna.	(c) Turn on radio, wiggle antenna lead and listen for speaker static. If static is heard, disassemble antenna and check for faulty insulators or presence of moisture. If no static is heard, start engine and slowly accelerate engine speed. If a whining noise is heard, check the suppressors, check the alternator for burnt-out diodes, check voltage regulator setting. If O.K., remove radio receiver for servicing.
RADIO RECEPTION DISTORTED	(a) Speaker voice coil leads rubbing on speaker cone.	(a) Install auxiliary speaker and compare. Replace if improved.
	(b) Torn speaker cone.	(b) Replace the speaker.
INTERMITTENT RECEPTION	(a) Broken or shorted antenna lead-in wire.	(a) Test with substitute antenna and replace if necessary.
	(b) Faulty radio.	(b) Send radio to authorized radio dealer for repair.

GENERAL INFORMATION

Radio

The radio is an integrated circuit unit with push button and spindle controls. The illumination of the radio dial is controlled by the radio "on-off" switch. The radio is fitted with a 152 mm x 92 mm (6" x 4") oval speaker mounted in the instrument panel, and is equipped with a manual type antenna mounted on the right hand windscreen pillar.

Cassette Tape Player

This unit is a 5.0 watt automatic reverse stereo cassette tape player, mounted in the front of the floor console. It is fitted with two speakers located in the rear parcel shelf.

RADIO

To operate the radio the ignition switch must be in the "ON" or "ACCESSORY" positions. Operation is by the five push buttons and two combination spindle knobs. The right hand outer knob is pressed in for "ON-OFF" operation and turned clockwise for increased volume. The inner knob is the tone control. The left hand side knob is for manual station tuning. Station selection can also be accomplished by pushing buttons fully in. Resetting of the push buttons is achieved by pulling the desired button out, manually selecting the required station and then firmly pushing the button in.

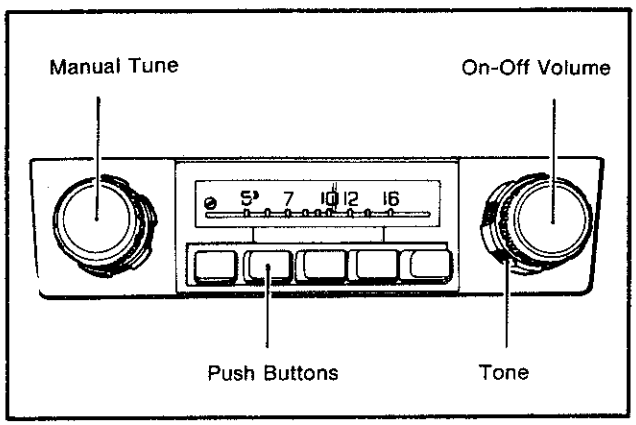


Fig. 1—Radio controls

Removal

(1) Disconnect battery negative (ground) lead.

(2) Remove the radio control knobs by withdrawing rearward.

(3) Remove the nuts on the central spindles.

(4) Remove the screw retaining the cover on the left side of the radio and remove the cover.

(5) Remove the screw retaining the rear of the radio to the mounting bracket.

(6) Disconnect the power lead and antenna lead, then remove the radio from the instrument panel.

(7) Install by reversing removal procedures.

Speaker Removal

(1) Remove the glove box retaining screws and remove the glove box.

(2) Remove the speaker retaining nuts, disconnect the wiring and remove the speaker.

TAPE PLAYER

Operation

NOTE: The use of thin tapes (C90 or C120) is not recommended in this type of player, due to the tendency of the tape to tighten on the spool and cause tape entanglement in the player.

(1) The ignition switch must be in the ON or ACCESSORY position.

(2) When the cassette is inserted in the tape slot the power supply switches on automatically and the unit starts to operate.

(3) Stopping the tape is achieved by depressing the EJECT button.

(4) Changing the programme is achieved by pushing the PROGRAMME SELECT button. When the tape comes to the end of the reel, the unit will automatically change to the next programme. Tape direction is shown by the two PROGRAMME INDICATOR lamps in the form of directional arrows.

(5) Volume control is achieved by rotating the VOLUME knob clockwise to increase, anti-clockwise to decrease.

(6) Tone is controlled by rotating the TONE knob clockwise or anticlockwise.

(7) Speaker BALANCE is controlled by pushing and rotating the balance control knob clockwise to increase right speaker volume, anti-clockwise to increase left speaker volume.

Removal

(1) Apply the hand brake lever fully.

(2) Remove the rear accessory box floor cover, remove the retaining screws. The accessory box can now be removed.

(3) Remove the hand brake lever retaining bolts and position the lever to one side.

(4) Remove the console retaining screws located at the front (side) and rear of the console.

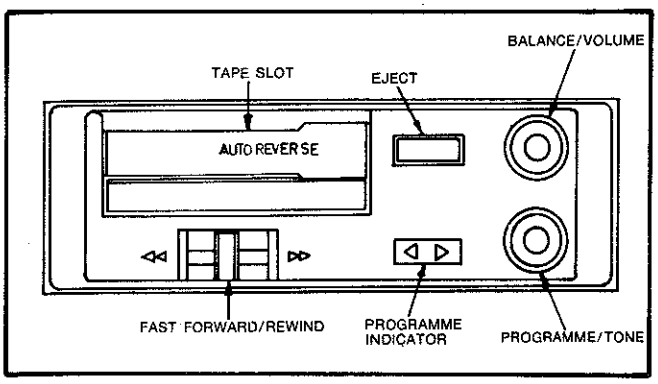


Fig. 2—Tape player

(5) Move the console slightly rearward and disconnect all tape player wiring.

(6) Position the gear lever to allow removal of the console over the gear lever knob and remove console assembly from vehicle.

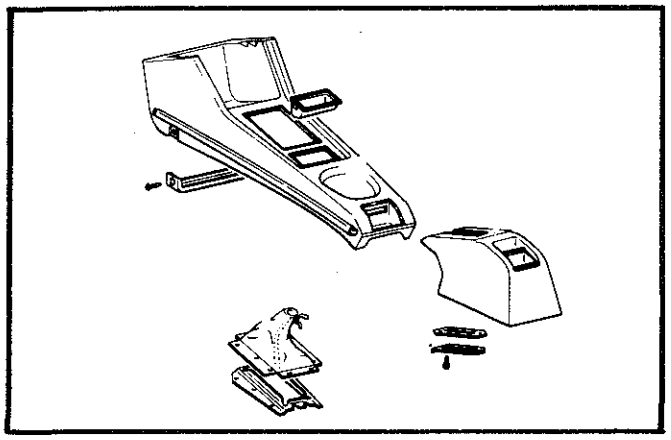


Fig. 3—Console assembly

(7) Remove the tape player to console mounting screws and remove the tape player.

NOTE: Anti theft screws are used to secure the tape player. Removal of the screws can only be achieved by drilling.

(8) Install by reversing removal procedure using new mounting screws.

Speaker Removal

(1) Remove the speaker bezel attaching screws and raise the speaker from the shelf panel, disconnect the wiring and remove the speaker from the vehicle.

(2) Remove the speaker to bezel attaching screws and remove the speaker from the bezel.

(3) Install by reversing removal procedure.

ANTENNA

Removal

(1) Remove the screws attaching the upper clip and base of the anntenna and remove the antenna.

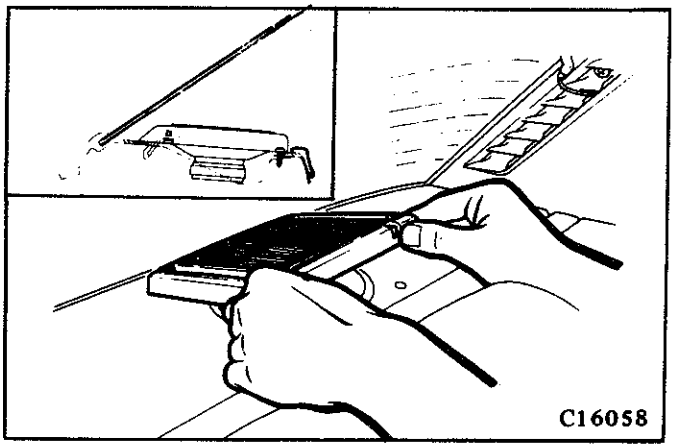


Fig. 4—Removing rear speaker

SECTION 7 — HEADLAMPS AND LIGHTING

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HEADLIGHTS DIM (ENGINE RUNNING ABOVE IDLE)	(a) High resistance in lighting circuit.	(a) Check for loose or corroded connections.
	(b) Faulty sealed beam units.	(b) Replace faulty units.
	(c) Faulty voltage regulator.	(c) Adjust voltage regulator or replace.
LIGHTS FLICKER	(a) Loose connections or damaged wires in lighting circuit.	(a) Tighten connections or repair damaged wires.
	(b) Wiring insulation damaged.	(b) Repair faulty insulation.
LIGHTS BURN OUT FREQUENTLY	(a) High voltage regulator setting.	(a) Adjust voltage regulator.
	(b) Loose connections in light circuit.	(b) Tighten loose connections.
LIGHTS WILL NOT OPERATE	(a) Discharged battery.	(a) Recharge or replace battery.
	(b) Loose connections in lighting circuit.	(b) Tighten loose connections.
	(c) Burned out lamps.	(c) Replace faulty lamps.
	(d) Open or corroded contacts in headlight switch.	(d) Replace headlight switch.
	(e) Faulty contact in dimmer switch.	(e) Repair or replace dimmer switch.
	(f) Faulty head lamp relay.	(f) Replace relay.
HEADLIGHTS DIM (ENGINE IDLING OR TURNED OFF)	(a) Partly discharged battery.	(a) Recharge battery.
	(b) Faulty battery.	(b) Replace battery.
	(c) High resistance in lighting circuit.	(c) Repair faulty connection.
	(d) Faulty sealed beam unit.	(d) Replace sealed beam unit.
	(e) Corroded battery terminals.	(e) Clean terminals and spray with suitable corrosion inhibitor.

SPECIFICATIONS

HEADLAMP APPLICATION	TYPE	WATTAGE	
Sealed Beam Outer — Except Two Door	2 Dual Beam	50/37½ W	
— Two Door (except '79 Spec.)	2 Dual Beam	60/37½W	
— Two Door ('79 Spec.)	2 Dual Beam	60/55 W	
Sealed Beam Inner — Std. Type	2 Single Beam	50 W	
— Quartz Halogen	2 Single Beam	55 W	
BULB APPLICATION	**RATING**	**TRADE P/N**	**QUANTITY**
Front Park Lamps — Except Two Door	12 V 4 CP	67	2
— Two Door	12 V 8/3.4 W	—	2
Front and Rear Turn Signal	12 V 32 CP	1073	4
Front Turn Signal Repeater	12 V 4 CP	67	2
Stop/Tail Lamps — Two Door/Sedan	12 V 21/5 W	380	4
— Wagon	12 V 21/5 W	380	2
Back Up Lamps	12 V 32 CP	1156	2
Licence Plate Lamps — Two Door	12 V 4 CP	67	2
— Sedan	12 V 5 W Festoon	—	2
— Wagon	12 V 10 W	12814	2
Dome Lamp and Wagon Cargo Lamp	12 V 10 W Festoon	—	1
Instrument Panel Lamps	12 V 2 CP Wedge Base	194	13 Std. Models 14 Premium & Sport Models
Heater Controls	12 V 0.7 CP Wedge Base	74	1
Glove Box	12 V 2 CP	1895	1
Ash Receiver — Except Two Door	12 V 0.7 CP Wedge Base	74	1
— Two Door	12 V 2 CP Wedge Base	194	1
Gear Shift Console Lamp — Except Two Door	12 V 2 CP	1895	1
— Two Door	24 V 3 W	611	1
Stereo Illumination (Cassette Player)	12 V 0.7 CP Wedge Base	74	1
Cigar Lighter Illumination	12 V 2 CP	1895	1
"C" Pillar Reading Lamps	12 V 4 CP	67	2
Roof Console Reading Lamps	13 V 3 CP	1816	1
Fender Peak Lamps	12 V 0.5 CP	330	2

GENERAL INFORMATION

The dual headlamp system consists of four sealed beam units. The two outer units are of the two filament type for low and high beam operation. The two inner bulbs are of the single filament type for high beam operation only.

These units are not interchangeable with the dual filament units due to different mounting location lug positioning.

Some models are fitted with Quartz Halogen inner bulbs these are also single filament type for high beam operation only and are of a higher wattage than the standard inner bulbs.

NOTE: When aiming the headlamps, due regard must be given to State laws regarding headlamp aiming.

AIMING THE HEADLAMPS (with Aimers)

Pre-Aiming Procedures

(1) Before adjustment, the tyre pressure should be checked and adjusted if necessary.

(2) Check beam selector for faulty operation.

(3) Check high beam indicator for correct operation.

(4) Check for badly rusted or faulty headlamp assemblies. These must be corrected before a satisfactory adjustments can be made.

(5) Place vehicle on a level floor.

(6) Rock vehicle to allow vehicle to assume its normal position.

(7) If petrol tank is not full, place a weight in the boot of the vehicle to simulate the weight of a full tank. Fuel weighs 0,72 kg per litre (7¼ lbs. per gallon). There should be no other load in the vehicle.

(8) Thoroughly clean headlamp lenses.

(9) For use of aimer equipment, refer to aimer makers' specifications.

AIMING THE HEADLAMPS (with Aiming Screen)

All Models, except '79 Spec. Two Door

The following is an alternative method of aiming the headlamps if aimers are not available.

To aim the headlamps, use an aiming screen or a light-coloured wall as shown in Fig. 1.

(1) Place the car on a level floor 7,62 m (25 feet) from the aiming screen, and directly in line with the centre of the screen.

(2) Jounce the vehicle, first in the front end and then in the rear, to ensure the vehicle is in normal position.

NOTE: The vehicle should contain no passengers, driver or trunk load, and the vehicle should have a full tank of petrol.

Low Beam (Outer Pair)

(1) Follow steps (1) and (2) above.

(2) With the headlamps on low beam, the top of the high intensity portion of the beam pattern should be at the horizontal centreline and the right edge at the vertical centreline (as shown in Fig. 1).

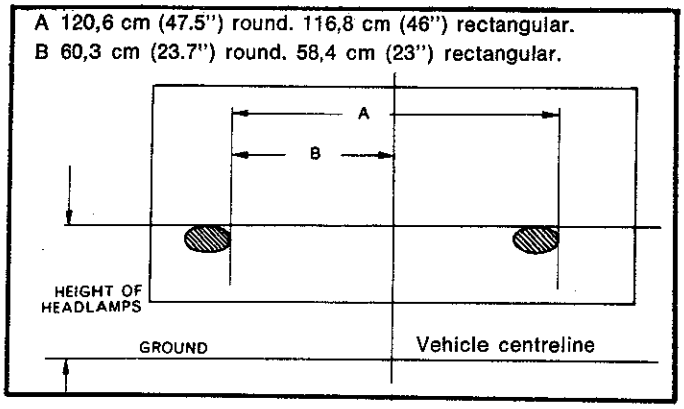


Fig. 1—Low beam adjustment pattern.

(3) The adjustment screws can be reached through holes provided in the headlamp bezel. The screw at the top of both outer lamps adjusts the lamps along the vertical plane, and the screw at the left of lamps adjusts the lamps in the horizontal plane.

High Beam (Inner Pair)

(1) Follow steps (1) and (2) of "aiming the headlamps".

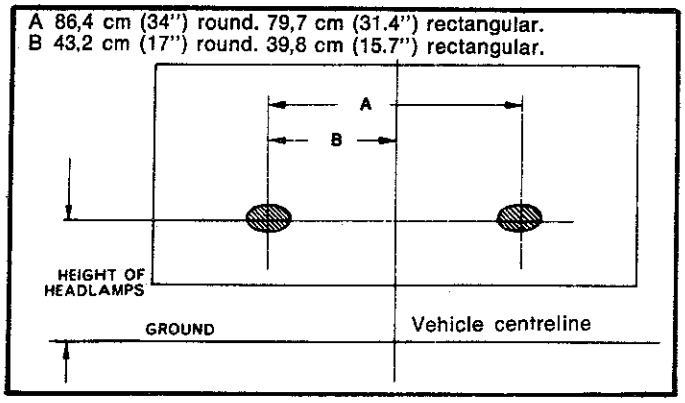


Fig. 2—High beam adjustment pattern

(2) Switch to high beam, mask off the outer pair and adjust the inner pair (as shown in Fig. 2).

'79 Spec. Two Door Models

(1) Place the car on a level floor 5 metres (16 feet 6 ins.) from a wall or aiming screen and directly in line with the centre of the aiming screen.

(2) Ensure that the fuel tank is full and any load is removed from the vehicle, i.e. kerb mass condition.

(3) Jounce the front and then the rear of the vehicle.

(4) Mask out the outer lamps, switch the lights on and select high beam.

(5) Make vertical and horizontal adjustments of the lamp to achieve the patterns shown in Fig. 3.

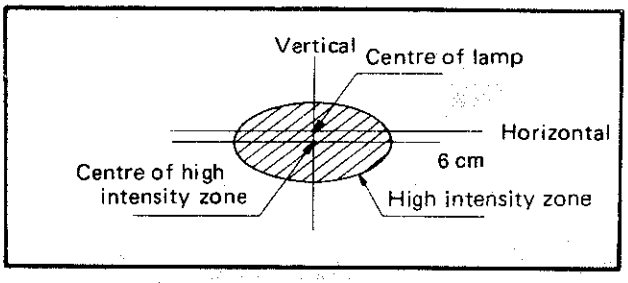


Fig. 3—Aiming pattern inner lamps high beam

(6) Unmask the outer lamps, select **low** beam and adjust the outer lamps to achieve the pattern shown in Fig. 4.

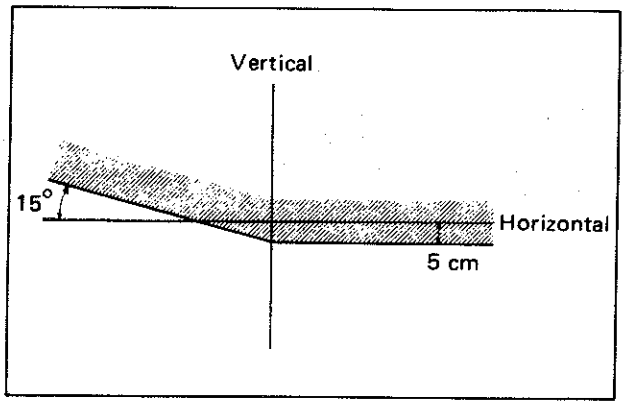


Fig. 4—Aiming pattern outer lamps low beam

HEADLAMP SEALED BEAM REPLACEMENT

Lens filament and reflector are sealed into one unit which can be removed as follows:

(1) Remove the screws attaching the radiator grille and remove the grille.

(2) Remove the headlamp retaining rim screws and remove the rim.

(3) Remove the sealed beam and unplug the connector.

(4) Install new beam unit by reversing removal procedure.

NOTE: Do not disturb the headlamp aiming screws.

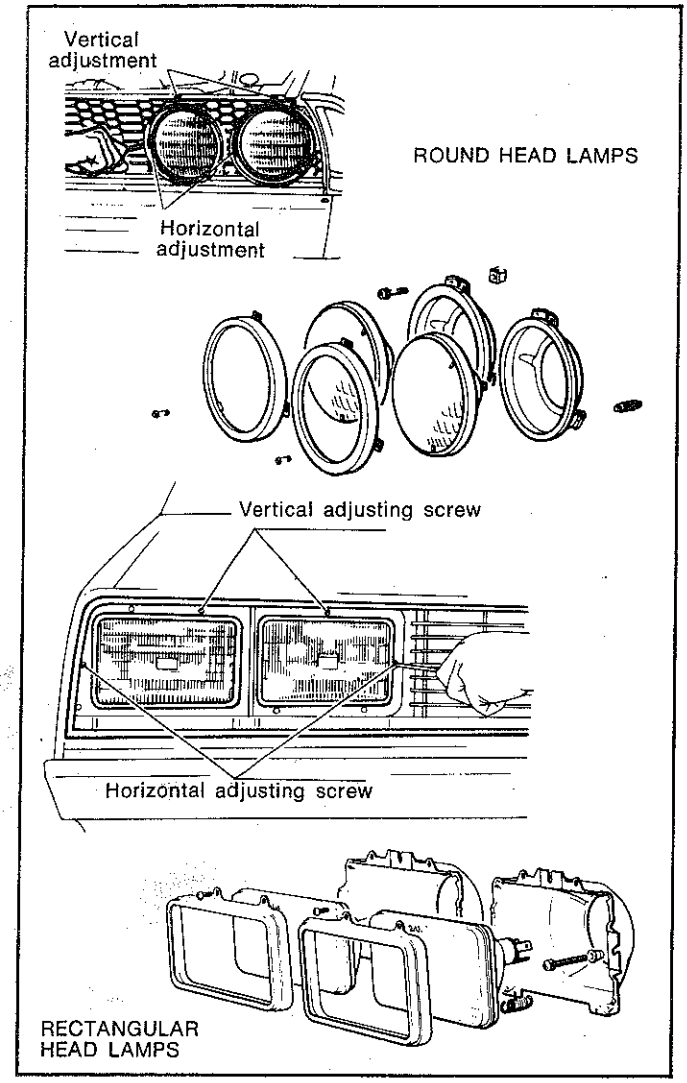


Fig. 5—Headlamp adjustment and components

HEADLAMP BULB REPLACEMENT —

'79 Spec. Two Door

Removal

(1) For access to the left hand lamps, remove the battery. Disconnect the wiring loom connector.

(2) Pull the rubber cover away from the rear of the lamps.

(3) On the high/low beam lamp, press in and turn the bulb retainer in an anti-clockwise direction. On the beam lamp, unclip the retaining clip on each side of the bulb. Remove the failed bulbs.

Installation

(1) Install by reversing the removal procedure, noting that the bulb retainers are indexed to ensure correct assembly.

NOTE: Always handle Quartz Halogen bulbs with a soft cloth and never with the bare fingers or premature bulb failure will occur.

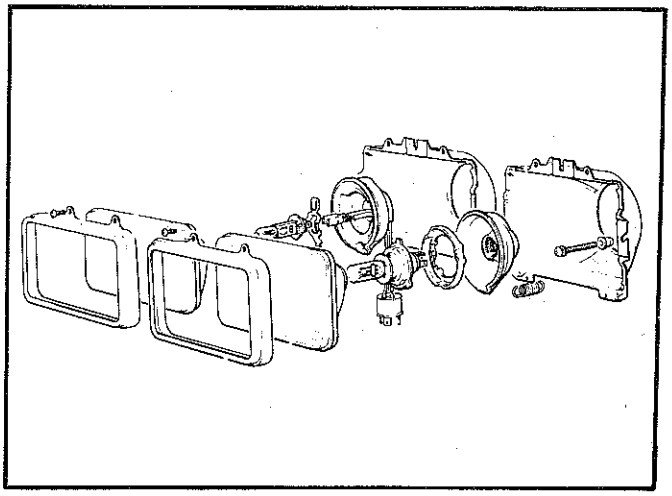


Fig. 6—'79 spec. two door headlamp components

(2) Ensure that the rubber covers seat firmly against the back of the lamp reflector with the TOP marking to the top.

On the high/low beam it is important that the rubber cover is pressed firmly against the bulb base until it snaps into place. Entry of water past the seals will damage both the reflector and the bulb.

(3) Connect the wiring loom and battery. Switch the lights on and adjust headlamp aim as necessary.

DIMMER SWITCH

GENERAL INFORMATION

The dimmer switch is located on the combination switch on the right hand side of the steering column. It alternates the headlamps between "high" and "low" beam when moved towards the steering wheel. Headlamp flashing can also be achieved with the headlamps switched off, by moving the dimmer control towards the steering wheel.

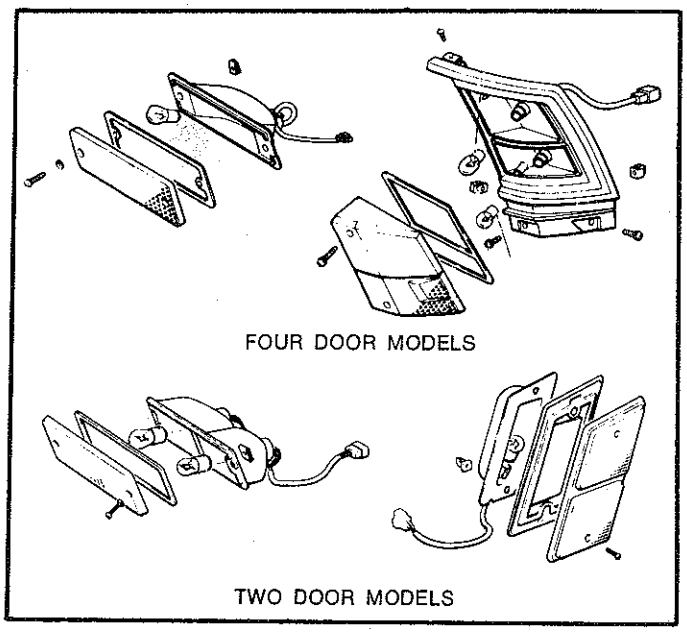


Fig. 7—Front turn signal/parking lamp

Servicing

Refer Section 13 Combination Switch for servicing and replacement of the switch.

FRONT TURN SIGNAL/PARKING LAMPS

Bulb/Lens Replacement

(1) Remove the lens retaining screws and remove the lens.
(2) Remove the bulb.
(3) Install by reversing removal procedure.

TURN SIGNAL FENDER PEAK LAMPS (where Fitted)

Bulb Replacement

(1) From under the fender release the nut securing the lamp to the fender.
(2) Lift lamp assembly from fender.
(3) Unscrew bulb holder and remove bulb.

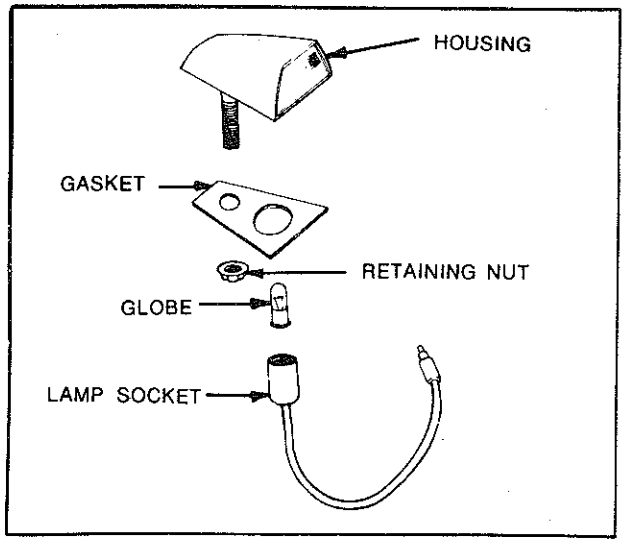


Fig. 8—Turn signal fender peak lamp

TAIL LAMP ASSEMBLY

The tail lamp lens and housing is a one piece moulded unit which necessitates complete replacement if a lens is damaged.

Bulb Replacement

(1) Remove the bulb holder retaining screws and withdraw the holder from the lamp housing.
(2) Replace the faulty bulb and reinstall the bulb holder.

Lens Replacement

Two Door and Sedan

(1) Remove the bulb holder as previously described.
(2) Remove the nuts retaining the lens housing to the body and remove the housing.
(3) Install by reversing removal procedure, tightening the nuts in a criss-cross pattern.

Station Wagon

(1) Open the tailgate and pry the circular covers from the rear end of the trim panel.
(2) Using a suitable tube spanner (8 mm), remove the retaining nuts and then the lamp assembly.
(3) Install by reversing removal procedure ensuring that the housing to body seal is in good condition and correctly located.

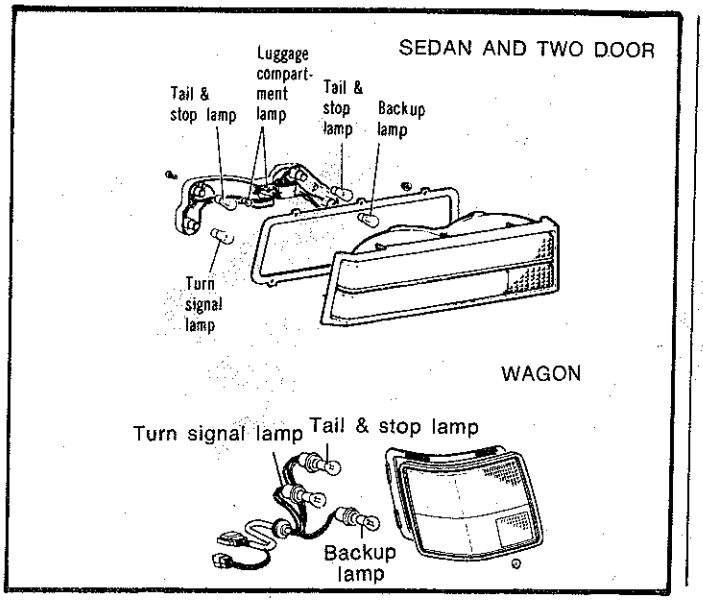


Fig. 9—Tail lamp assembly

LICENCE PLATE LAMP

Lens/Bulb Replacement

(1) Remove the lens attaching screws and remove the lens and gasket.
(2) Replace the bulb and reinstall the gasket and lens.

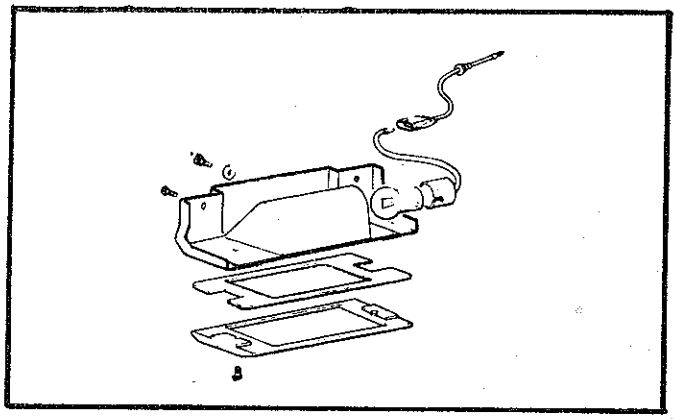


Fig. 10—Licence plate lamp (sedan)

FUSES

General Information

The fuses are located in a fuse box attached under the instrument panel on the right hand kick panel.

The fuse box is a 10 pole type and has a built-in "fuse checker".

To check the fuse operation, turn the ignition switch and the headlamps on.

Move the slide knob to each fuse contact, if the lamp lights the fuse is good, if not the fuse should be replaced and if necessary, the fault rectified.

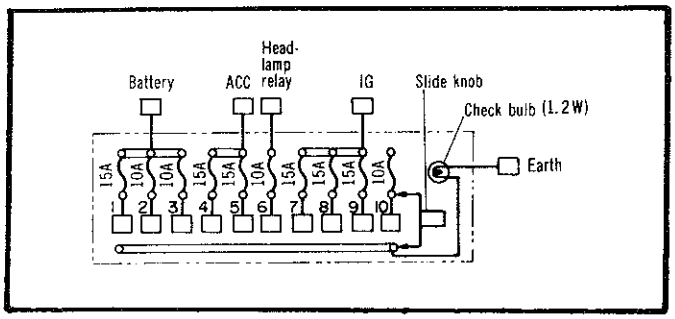


Fig. 11—Fuse box and fuse checker

The fuses in the main block are:

(1)	Stop Lamps, Horn.	15 A
(2)	Hazard Lamps.	10 A
(3)	Interior Lighting.	10 A
(4)	Radio, Cigar Lighter.	15 A
(5)	Wiper, Washer.	15 A
(6)	Parking Lamps, Instrument Illumination.	10 A
(7)	Rear Window Defogger.	15 A
(8)	Turn Signal, Back Up, Voltage Regulator.	15 A
(9)	Heater, Instrument Circuit.	15 A
(10)	Fuel Cut Off.	10 A

Two spare fuses are also fitted to the block, one 10 amp and one 15 amp. The fuse capacities and the name of the main circuits are also printed on the fuse block cover.

CONSOLE LIGHTING

Floor Console (Small)

Bulb Replacement

Remove the console retaining screws and raise the console to the top of the gear lever. Replace the bulb and reinstall the console.

Floor Console (Large)

Bulb Replacement

The automatic transmission selector quadrant bulb can be replaced by reaching under the console in the gap provided between the console and the transmission tunnel. The bulb is located in the right hand rear corner of the quadrant.

If difficulty is experienced in removing the bulb using the above method, the complete console will have to be removed, refer Group 23.

Roof Console

Bulb Replacement Dome Lamp

(1) Remove lens by inserting a screwdriver in the slot at the rear of the cover and twisting the screwdriver.

(2) The bulb can now be removed from the holder.

Bulb Replacement Reading Lamp (Four Door Models)

(1) Remove the rear view mirror mounting cover and remove the mirror.

(2) Pull down the front end of the console and release the two centrally located retaining clips.

(3) Slide the console forward to release the rear retaining clip.

(4) Pull the console down and disconnect the wiring loom.

(5) Remove the reading lamp housing retaining screws, remove and separate the housing, the bulb can now be replaced.

(6) Install by reversing removal procedure noting that the retaining clips mounted to the reading lamp housing must be fitted with the black clip on the left hand side, white clip right hand side. The console housing is also marked B and W.

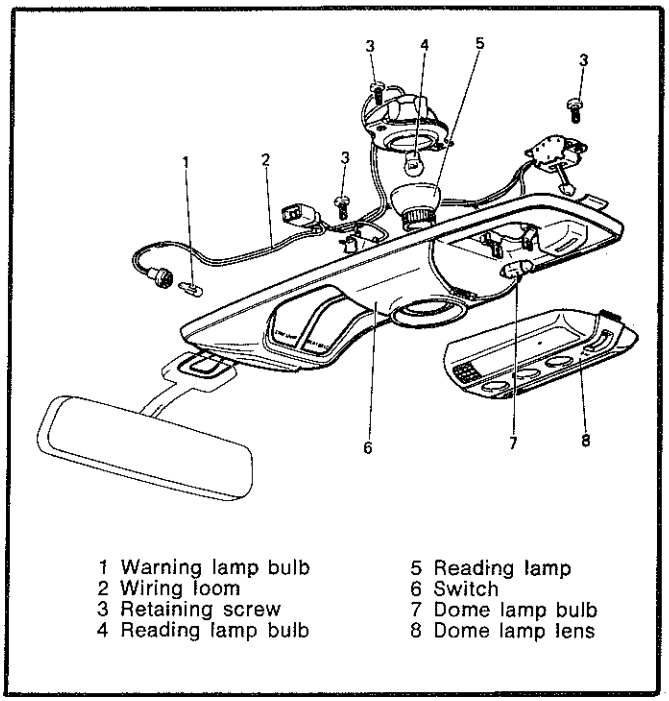


Fig. 12—Roof console (four door models)

Bulb Replacement Reading Lamp (Two Door Models)

(1) Remove the digital clock cover by pressing the centre of the cover up slightly and simultaneously pulling one side down.

(2) Remove the screws securing the clock assembly to the rear vision mirror bracket.

(3) Remove the console retaining screw located forward of the warning light cluster.

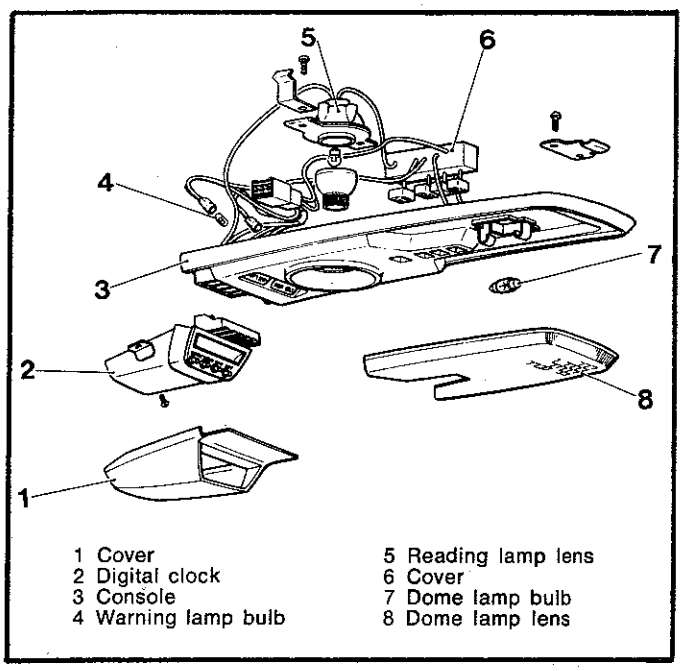


Fig. 13—Roof console (two door models)

(4) Pull the front of the console down to release the centre retaining clips, careful use of a screwdriver will assist in releasing the clips.

(5) Pull the console forward to release the rear retaining clip.

(6) Disconnect the wiring loom connector and remove the console.

(7) Remove the screws securing the reading lamp housing, remove the housing and replace the bulb.

(8) Install by reversing removal procedure.

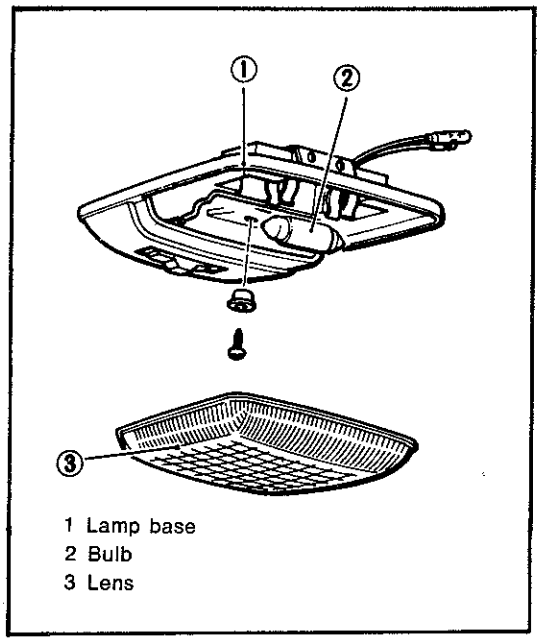


Fig. 14—Standard dome lamp

DOME LAMP (Standard Type)

Bulb Replacement

(1) Remove lens by inserting a screwdriver in the slot at the rear of the cover and twisting the screwdriver.

(2) The bulb can now be removed from the holder.

"C" PILLAR READING LAMP

Bulb Replacement

(1) Withdraw the lamp assembly from the "C" pillar, it is held in position by spring clips.

(2) Disconnect the wiring loom.

(3) Remove the bulb cover retaining screw and remove the cover.

(4) Remove the bulb.

(5) Install by reversing removal procedure.

CARGO LAMP (Station Wagon)

Bulb Replacement

(1) Remove the lens by inserting a screwdriver in the slot at the front of the cover and twisting the screwdriver.

(2) The bulb can now be removed from the holder.

Housing Replacement

(1) Remove the lens and lever the housing out of the headlining. The housing is held in place with spring clips — refer Fig. 15.

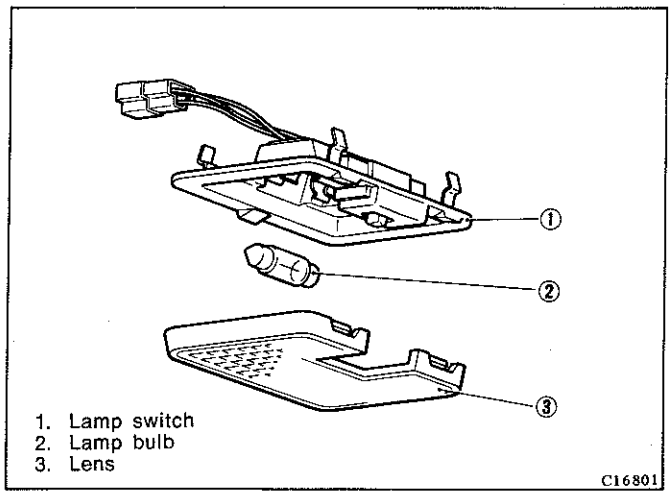


Fig. 15—Cargo area lamp — Station wagon

Tailgate Switches

The cargo lamp door operated switches (Fig. 16) are activated by movement of the tailgate latches. Adjust the switches to turn the lamp off when the tailgate is closed (providing the switch in the lamp body is in the GATE position). To gain access to the switches remove the tailgate inner trim assembly.

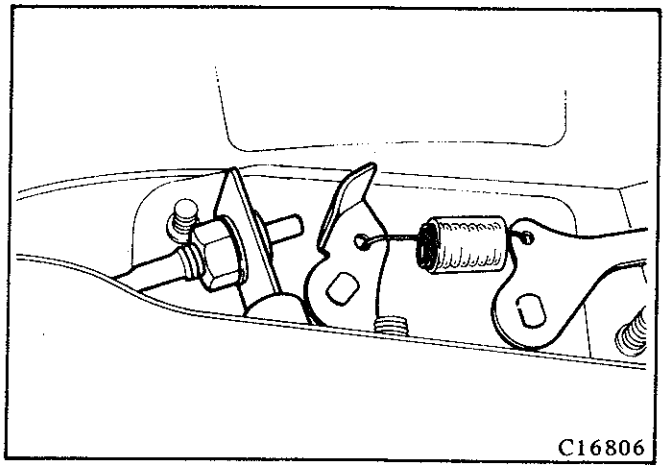


Fig. 16—Cargo area lamp switch

SECTION 9 — WINDSHIELD WIPERS

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
WIPER DOES NOT OPERATE	(a) Wiring connections loose, disconnected or broken.	(a) Repair faulty connection.
	(b) Wiper switch defective.	(b) Replace switch.
	(c) Wiper connecting link or rod defective.	(c) Repair or replace link and/or rod.
	(d) Fuse blown or poor contact.	(d) Repair or replace fuse or holder.
	(e) Motor mounting poorly earthed.	(e) Clean contact area.
	(f) Motor reduction gears defective.	(f) Repair or replace gears.
	(g) Worn or poor contacting brushes.	(g) Repair or replace brushes.
	(h) Armature coil shorted.	(h) Rewind or replace motor.
WIPERS DO NOT PARK CORRECTLY	(a) Wiper motor cam burnt or smeared with grease.	(a) Repair or replace.
	(b) Wiper arm incorrectly set.	(b) Reset arm.
WIPER MOTOR NOISY	(a) Reduction gears broken or worn out.	(a) Replace gears.
	(b) Brushes excessively worn.	(b) Replace brushes.
	(c) Armature shaft bushes worn.	(c) Replace bushes.
POOR WIPING	(a) Blade deteriorated.	(a) Replace blade.
	(b) Incorrect arm pressure.	(b) Replace arm.
BLADE CHATTER	(a) Twisted wiper arm.	(a) Replace arm DO NOT ATTEMPT TO STRAIGHTEN.
	(b) Wrong blades used.	(b) Replace with correct blade.
	(c) Wax or oil film on glass.	(c) Clean glass.
	(d) Incorrect arm spring tension.	(d) Repair or replace arm.
WIPER DOES NOT OPERATE ON INTER-MITTENT POSITION	(a) Faulty intermittent wipe relay.	(a) Replace relay.
	(b) Faulty intermittent wipe wiring loom.	(b) Repair loom.
	(c) Incorrectly or poorly connected wiring loom.	(c) Correct or repair wiring loom.
CONTINUOUS WIPER OPERATION ON INTER-MITTENT POSITION	(a) Faulty intermittent wipe relay.	(a) Replace relay.
	(b) Faulty intermittent wipe wiring loom or connections.	(b) Repair loom or connections.
	(c) Faulty washer switch.	(c) Repair or replace.
INTERMITTENT WIPE OPERATES WHEN SWITCH IS OFF.	(a) Faulty intermittent wipe relay.	(a) Replace relay.
	(b) Poorly earthed wiper motor.	(b) Clean contact area.
	(c) Faulty intermittent wipe wiring loom or connections.	(c) Repair loom or connections.
INTERMITTENT WIPE OPERATING TIME EXTREMELY LONG OR SHORT	(a) Faulty intermittent wipe relay.	(a) Replace relay.
	(b) Faulty intermittent wipe wiring loom or connections.	(b) Repair loom or connectors.
	(c) Poorly earthed wiper motor.	(c) Clean contact area.
	(d) Faulty parking switch.	(d) Repair or replace switch.
IRREGULAR INTER-MITTENT WIPE OPERATION	(a) Faulty intermittent wipe relay.	(a) Replace relay.
	(b) Faulty intermittent wipe wiring loom or connections.	(b) Repair loom or connectors.
WIPERS DO NOT OPERATE DURING WASHER OPERATION	(a) Faulty intermittent wiper relay.	(a) Replace relay.
	(b) Faulty intermittent wipe wiring loom or connections.	(b) Repair loom or connectors.
	(c) Faulty washer switch.	(c) Repair or replace switch.

GENERAL INFORMATION

The windshield wiper motor incorporates dual speed operation. A parking switch is integral with the motor and is activated when the wipers are switched off.

The combination switch on the steering column controls High and Low speed, Intermittent wipe, Park position and Washer operation.

WIPER BLADE LIFE

The harsh effect of car wash brushes, lack of care when cleaning the screen, road grime, polluted atmosphere, temperature extremes and natural ageing of the rubber inserts all lead to the deterioration in the standard of wipe pattern.

Therefore replacement of the blade inserts is recommended approximately every twelve months.

WIPER BLADE

Replacement

(1) Release the spring loaded blade to arm clip simultaneously tilting the blade down away from the arm and carefully pull the blade assembly off the arm.

(2) Remove the wiper rubber retaining clip by squeezing the tangs and pulling it from the blade.

(3) The rubber blade and metal backing can now be removed from the wiper blade levers.

(4) Install by reversing removal procedure.

WIPER ARM

Replacement

(1) Raise the cover and remove the nut retaining the arm to the wiper pivot and remove the arm.

(2) Install by reversing removal procedure noting that if a new arm is fitted it must be correctly positioned prior to tightening the nut as the tightening of the nut cuts new splines into the arm.

NOTE: The arm and blade must be positioned correctly to conform to Australian Design Rule No. 16 (Refer Fig. 1).

WIPER MOTOR

Removal

(1) Disconnect the wiper motor wiring connector.

(2) Remove the bolts securing the motor bracket to the body and pull the motor out slightly.

(3) Remove the wiper linkage from the motor crank arm by pulling the bush from the ball on the crank arm.

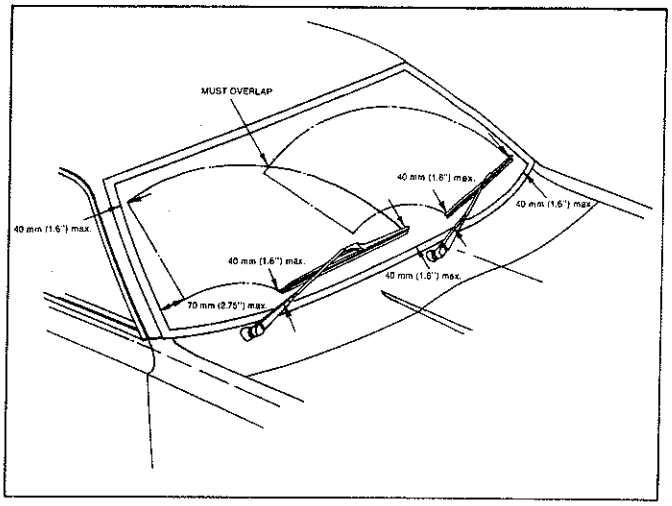


Fig. 1—Correct wiper arm installation

Disassembly

NOTE: Prior to removing the crank arm from the wiper motor, mark the arm and motor to allow correct positioning of the arm on reassembly. Failure to reinstall the arm in the correct position will cause incorrect parking of the wiper blades.

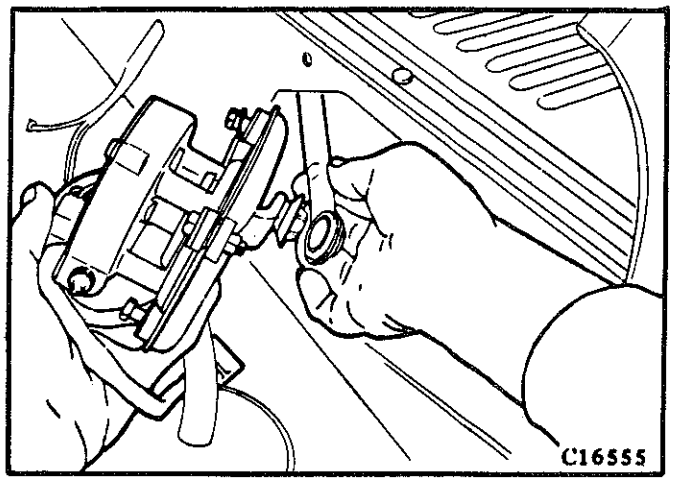


Fig. 2—Removing wiper link

(1) Remove the crank arm retaining nut and remove the arm.

(2) Remove the motor mounting plate and gear cover.

(3) Remove the driven gear from the housing.

(4) Remove the through bolts and separate the motor housing from the gear housing.

(5) Remove the armature from the housing.

NOTE: Use care not to lose the steel balls fitted to both ends of the armature shaft.

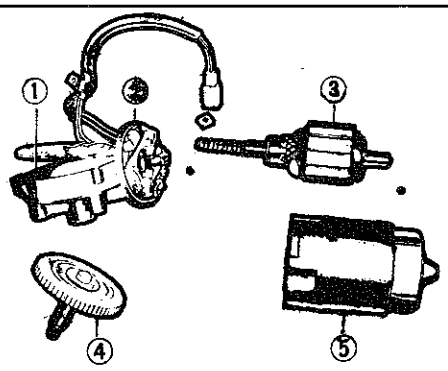


Fig. 3—Wiper motor components

Inspection

(1) Thoroughly inspect the motor parts for wear, corrosion or damage.

(2) Clean the armature commutator with 00 to 000 sandpaper or if necessary, turn down the commutator.

(3) Replace worn or oil soaked brushes.

(4) Check the armature and crankshaft in their respective bushings and replace worn parts if any looseness is detected.

(5) Inspect gear for worn or broken teeth and replace if showing damage or excessive wear.

Refacing the Commutator

If the armature commutator is rough or out of round, burned, or the moulding material is even with, or extends above the surface of the commutator bars, the commutator should be turned down.

Remove only enough metal to provide a clean, smooth surface. Operation can be performed on a suitable lathe or undercutting tool.

After refacing the commutator, undercut the moulded segments using a suitable undercutting tool. Be sure to undercut squarely. After undercutting, polish the commutator with 00 to 000 sandpaper to remove burred edges.

NOTE: Be sure the commutator is clean and free from oil or grease. A dirty, greasy commutator will cause a high resistance and greatly impair the efficiency of the wiper.

Assembly

(1) Assemble the armature, gear housing and motor housing. Attaching the steel balls to the armature shaft with grease will assist in installation. Ensure that the brushes are correctly contacting the commutator.

(2) Install the through bolts and tighten securely.

(3) Apply a quantity of long fibre grease to the toothed surface and contact point of the reduction gear.

(4) Install the gear cover and tighten the retaining screws securely.

(5) Install the crank arm in the previously marked position and tighten the retaining nut securely.

NOTE: Prior to installing the arm, cycle the motor to ensure that it stops in the park position.

(6) Install the motor mounting plate.

Bench Testing Wiper Motor

Before bench testing the motor, the lead connectors should be inspected for open or short-circuits and for poor connections.

(1) Connect a positive lead from a test battery to the positive terminal of the motor (Refer wiring diagrams).

(2) Connect a negative lead from test battery to the "Low" speed terminal of motor (refer wiring diagrams). The motor should then run at low speed (48 r.p.m.).

(3) Connect a negative lead from test battery to the "High" speed terminal of motor (refer wiring diagram). The motor should then run at high speed (75 r.p.m.).

Installation

(1) Offer the wiper motor to the body mounting and connect the wiper linkage.

(2) Position the motor to the mounting and install the retaining bolts securely.

(3) Connect the wiper motor wiring connector.

WIPER LINKAGE

(1) Remove the wiper motor and arms as previously described and remove the access plate on the plenum chamber.

(2) Remove the wiper pivot retaining nuts and push the pivots into the plenum chamber.

(3) Withdraw the linkage from the plenum chamber.

(4) Install by reversing removal procedure.

WIPER SWITCH

Servicing

For removal and servicing of the wiper/washer switch refer to Section 13 Combination Switch.

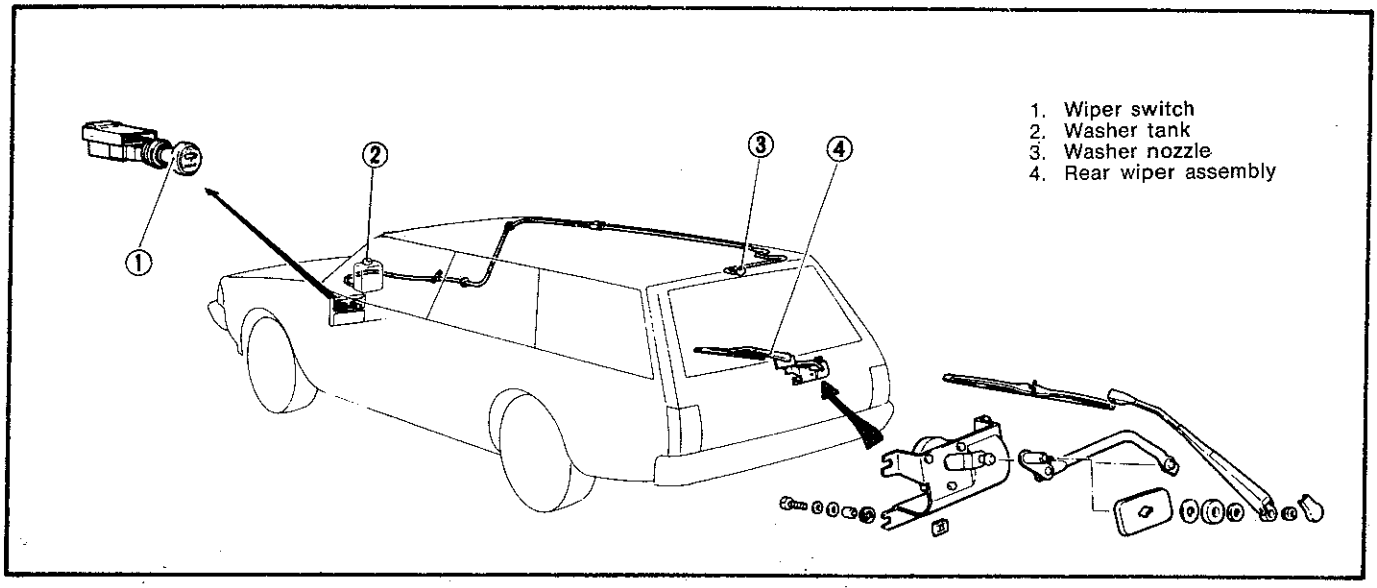


Fig. 4—Rear wiper/washer components

REAR WIPER/WASHER SYSTEM

Fitted to some station wagon models, the system receives its water supply from a washer bottle common to the front washers. It has a separate electric pump controlled by a switch mounted on the instrument panel to the driver's right. A non return valve is fitted in the line to the rear washer jet. The wiper motor is mounted in the tail gate and is a permanent magnet type.

Wiper Motor and Linkage Removal

(1) Remove the tailgate inner trim.

(2) Lift the cap on the inner end of the wiper arm and remove the retaining nut.

(3) Remove the arm shaft attaching nut and push the shaft inwards.

(4) Loosen the wiper motor mounting bolts and pull the motor out a little.

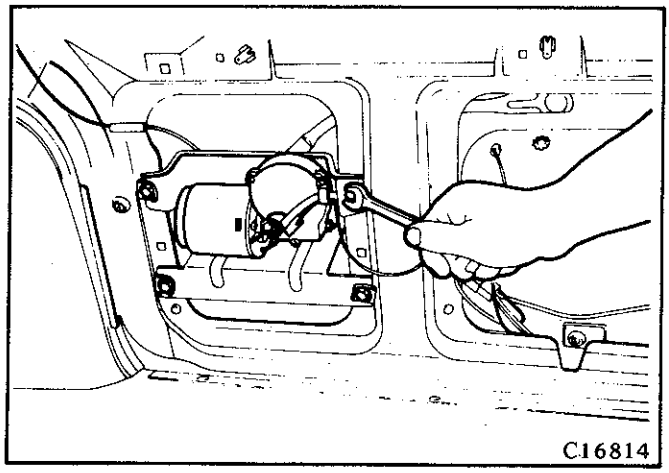


Fig. 5—Removing wiper motor from tailgate

(5) Disconnect the link from the motor and remove the motor and link respectively.

CAUTION: If removal of the crankarm is necessary, mark the relative positions of the crankarm and the motor to ensure correct "park" position of the wiper blade.

Installation

Install by reversing removal procedure and noting the following:

(1) Fit the locating boss of the shaft bracket in the hole in the tailgate. Tighten the arm shaft retaining nut to 7 to 9 Nm (60 to 84 lbs. in.).

(2) After installing the link, adjust the wiper blade so that it just clears the weatherstrip. Tighten the retaining nut to 9 to 12 Nm (84 to 138 lbs. in.).

Servicing

Servicing procedures are as described previously for the windshield wiper motor with the operating speed being 48 ± 5 r.p.m. No load current draw is 2 amps or less.

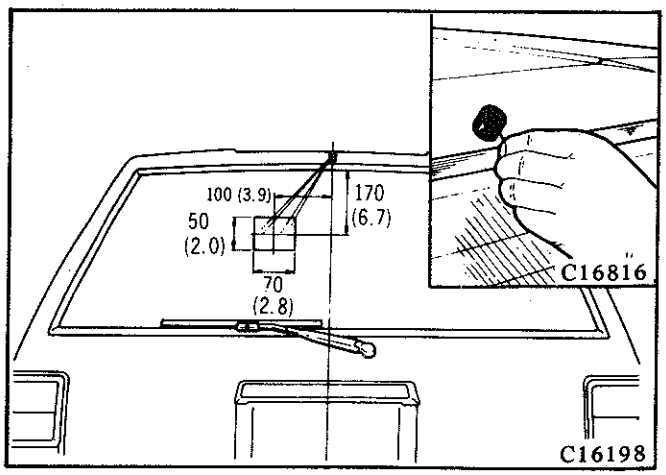


Fig. 6—Adjusting rear window washer jet

Rear Window Washer

Inspection and Adjustment

(1) Adjust the washer nozzle injection position as shown in Fig. 6 by inserting a metal wire in the outlet jet and rotating the ball.

(2) If the rear window washer jet does not supply sufficient fluid and the wiring, fuses and pump motor are operating satisfactorily, check for bent or broken piping and or failure of the non return valve (located in the lower portion of the front pillar). Refer Fig. 7.

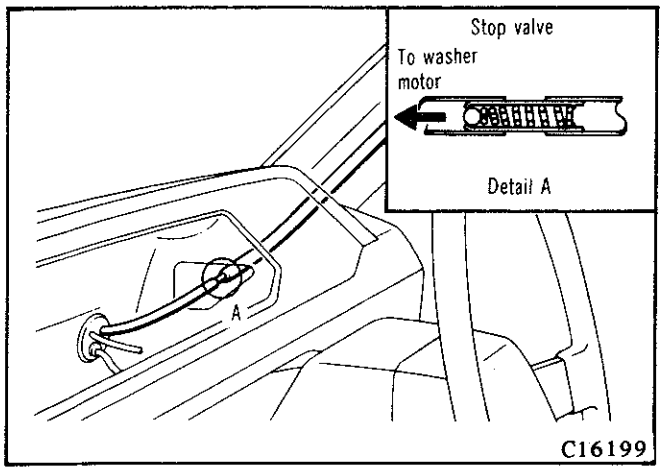


Fig. 7—Location of non return valve

Wiper/Washer Switch

The switch is pulled out to operate the wiper and twisted to the right to operate the washer, return of the washer switch to the OFF position is automatic. To remove the switch, loosen the screw in the underside of the knob and remove the knob, unscrew the switch retaining nut and remove the switch from the rear side of the instrument panel.

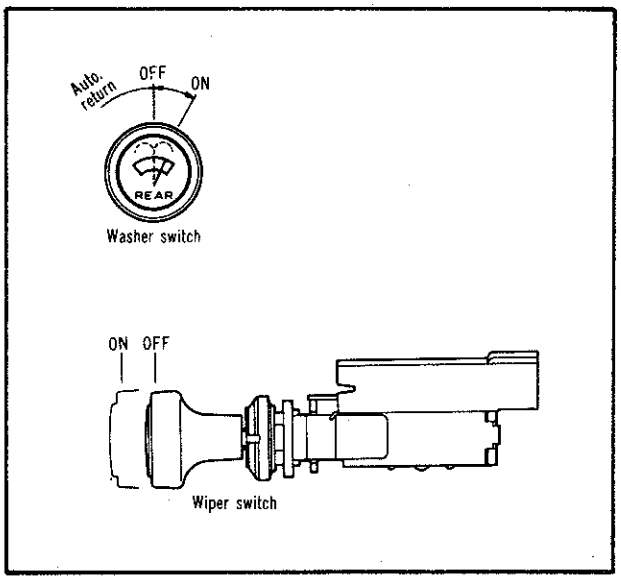


Fig. 8—Operation of wiper/washer switch

SECTION 10 — GAUGES AND INSTRUMENTS

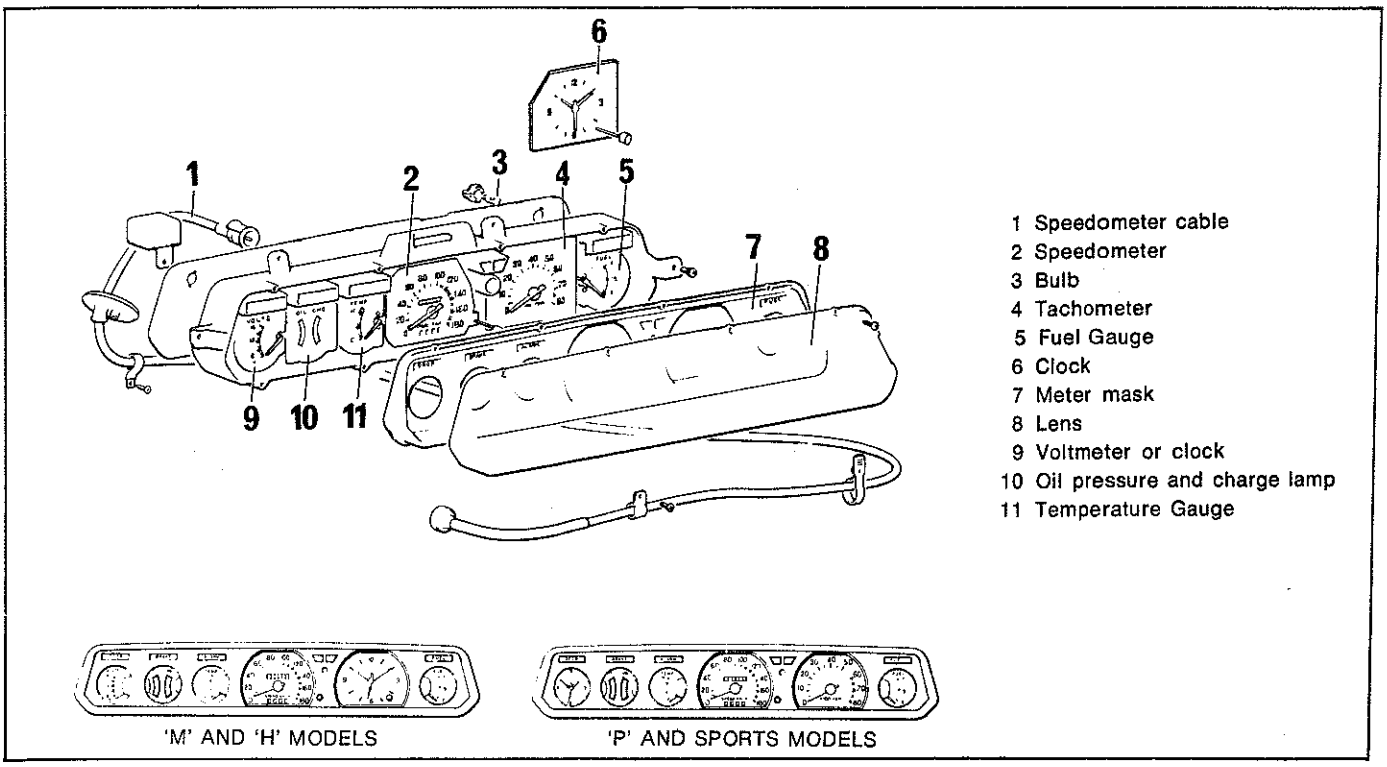


Fig. 1—Instrument cluster assembly (four door models)

GENERAL INFORMATION

The instrument cluster assembly consists of a number of gauges which monitor engine and vehicle performance. A different combination of gauges is used on various models. All gauges can be removed from the cluster housing for servicing and testing.

As a running change (from V.I.C. JA18) the imported instruments for four door models were revised by reversing the positions of the odometer and tripmeter (the odometer moved to a position below the speedometer needle pivot and contained a six digit reading in kilometres and 1/10 kms.). The zeros were also deleted from the numerals on the tachometer (where fitted).

Australian manufactured instruments were introduced at V.I.C. JL13 and can be identified by a six digit (kilometres only) odometer, located above the speedometer needle pivot.

NOTE: The sender units for the imported and local instruments are not compatible and should not be intermixed.

INSTRUMENT CLUSTER (Four Door Models)

Removal

(1) Disconnect battery negative (ground) lead.

(2) Holding both sides of the instrument cluster hood, lift it away from the instrument cluster.

NOTE: When removing the hood, use care not to catch the bottom of the hood on the trip meter and clock knobs.

(3) Disconnect the speedometer cable by pressing in the retaining clip and withdrawing the cable from the speedometer.

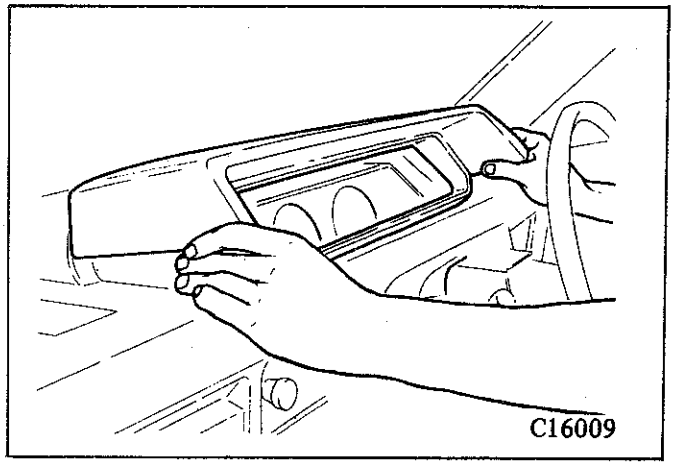


Fig. 2—Removing instrument panel

(4) Remove the instrument cluster mounting screws, withdraw the cluster slightly and disconnect all wiring connectors.

(5) The instrument cluster can now be removed from the instrument panel.

Installation

Install by reversing removal procedure.

Assembly

(1) Remove the instrument cluster as previously described.

(2) Remove the clock knob.

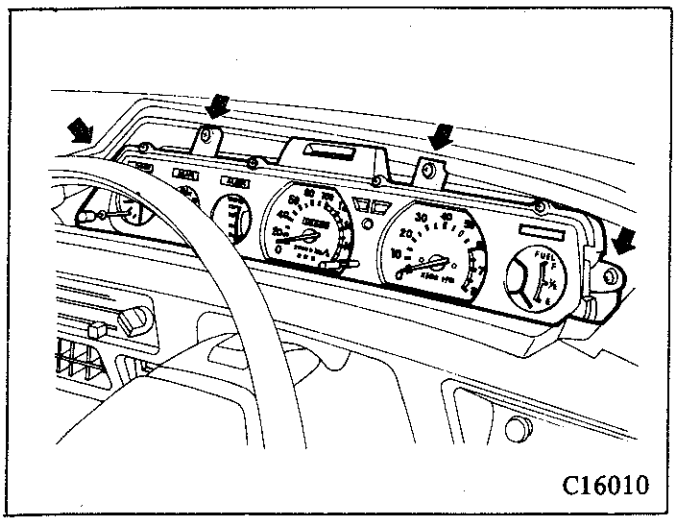


Fig. 3—Instrument cluster mounting screws

(3) Remove the lens attaching screws and remove the lens and mask from the housing.
(4) The gauges can now be removed by removing the attaching screws from the rear of the housing.

Assembly

Assemble by reversing disassembly procedure taking care not to over tighten the lens retaining screws as damage to the lens may result.

INSTRUMENT CLUSTER (Two Door Models)

Removal

(1) Disconnect battery negative (ground) lead.
(2) From under the instrument panel, disconnect the speedometer cable by pressing in the retaining clip and withdrawing the cable from the speedometer.
(3) Remove both warning lamp lenses, these are clipped into position.
(4) Remove the ash tray and ash tray holder upper retaining screws, remove the holder.
(5) Remove the rubber plug on the left hand side of the ash tray and remove the screw.
(6) Remove the screws uncovered by the warning lamp lens, Refer Fig. 5 insert.
(7) Remove the cluster upper retaining screws.
(8) Withdraw the cluster and disconnect all wiring connectors.

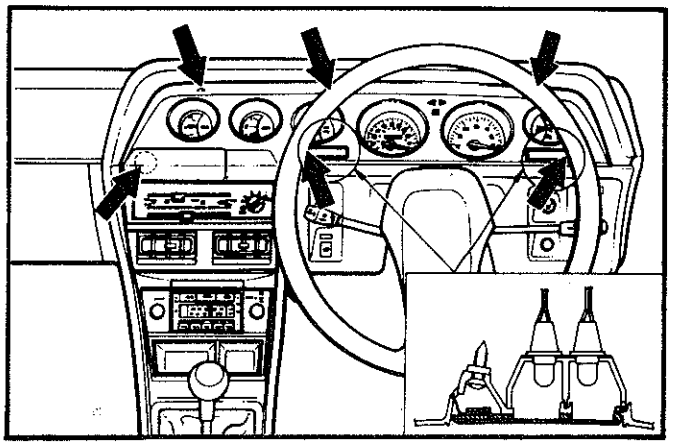


Fig. 5—Cluster retaining screws

Installation

Install by reversing removal procedure.

Disassembly

(1) Remove the instrument cluster as previously described.
(2) Remove cluster housing to cluster panel retaining screws and separate the housing, mask, lens and panel.
(3) Individual gauges can now be removed by removing the attaching screws from the rear of the housing.

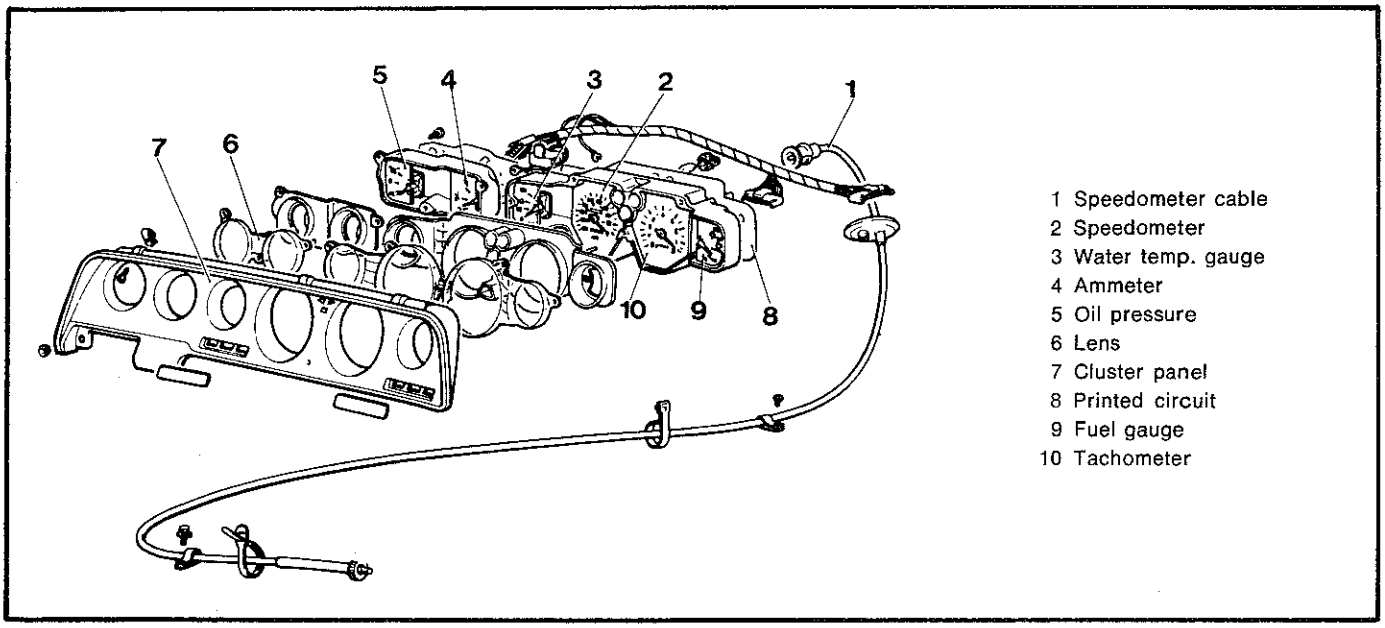


Fig. 4—Instrument cluster assembly (two door model)

Assembly

Assemble by reversing disassembly procedure taking care not to over-tighten retaining screws as damage may result.

SPEEDOMETER

The speedometer is a mechanical type with a rotary needle. The needle indicates 60 km/h at 637 r.p.m. (imported) or 625 r.p.m. (local). The odometer registers 1 km per 637 r.p.m. (imported) or 625 r.p.m. (local). The trip meter operates through the driving shaft of the odometer and indicates distance travelled per trip. To reset the trip meter push in the reset button.

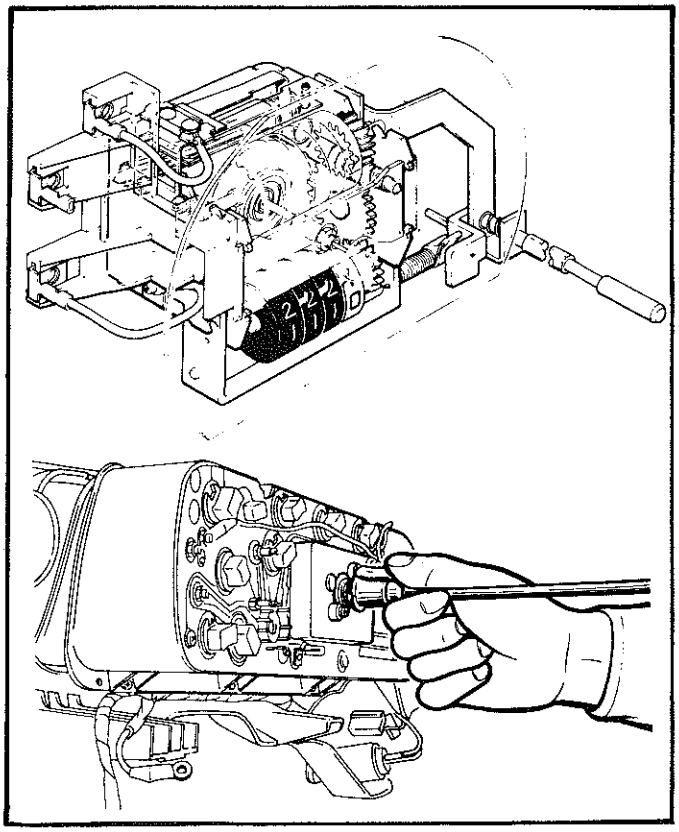


Fig. 6—Speedometer

Testing Speedometer Head

Disconnect the flexible cable from the speedometer head. Take a short length of flexible cable with a tip matching the female drive of speedometer head. Insert the cable into the head and manually spin it several times. If the cable tends to bind, the speedometer head is faulty and should be removed and serviced by an Instrument Specialist.

Testing Inner Flexible Cable

Remove the inner cable and lay on flat surface. Check for kinks by twisting one end of the cable. If the cable turns over smoothly it is not kinked, but if any part of the cable flops over as it is twisted, it is kinked and should be replaced.

Before inserting a new inner cable, check the outer casing for any distortion or breaks and replace if necessary.

Speedometer Cable Installation

When connecting the cable to the speedometer, insert the cable until the cable stop fits positively in the meter groove. Pull the cable to ensure the stop is held in the groove.

NOTE: Loose installation could cause needle fluctuation, noise and damage to the speedometer head.

Wide and gradual curves should be used when routing the cable to the transmission and sufficient cable to engine component clearance should be maintained when securing the cable.

When the cable has been installed, withdraw it through the dash panel until the cable identification tape is visible in the engine compartment.

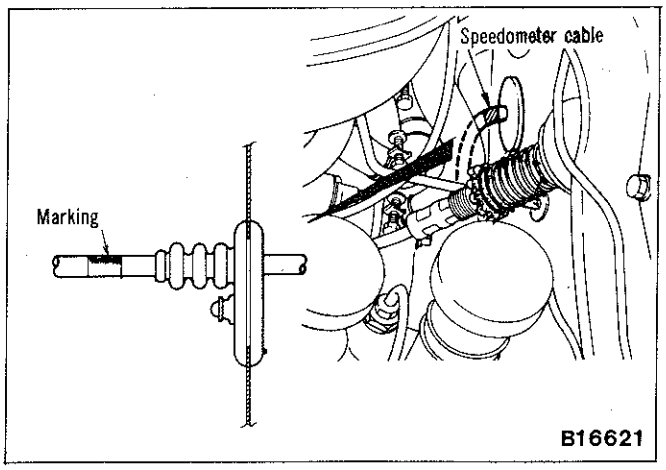


Fig. 7—Speedometer cable position in engine compartment

TACHOMETER

The tachometer is a pulse type which monitors the increase and decrease of DC current of the coil. The resulting pulse is converted by the transistor circuit of the tachometer to register engine speed.

NOTE: The tachometer is a negative earth type. If incorrectly connected, transistors and diodes will be damaged.

Testing

Connect an accurate test tachometer to the engine and compare readings. If speed variations are greater than specified remove the unit and have it repaired by an Instrument Specialist.

If the tachometer is inoperative check all wiring for correct connection.

If above check fails to indicate a fault remove the unit and have it tested by an Instrument Specialist.

NOTE: Do not test on a distributor test rig as damage will occur to the transistorised movement.

TACHOMETER TOLERANCE CHART at 20°C (68°F) to 26°C (79°F)		
Indicator Speed (r.p.m)	Tolerance (r.p.m.)	
	Imported	Local
1000	± 100	± 75
2000	± 100	± 75
3000	± 150	± 75
4000	± 200	± 150
5000	± 250	± 150
6000	± 300	± 150
7000	± 350	± 150

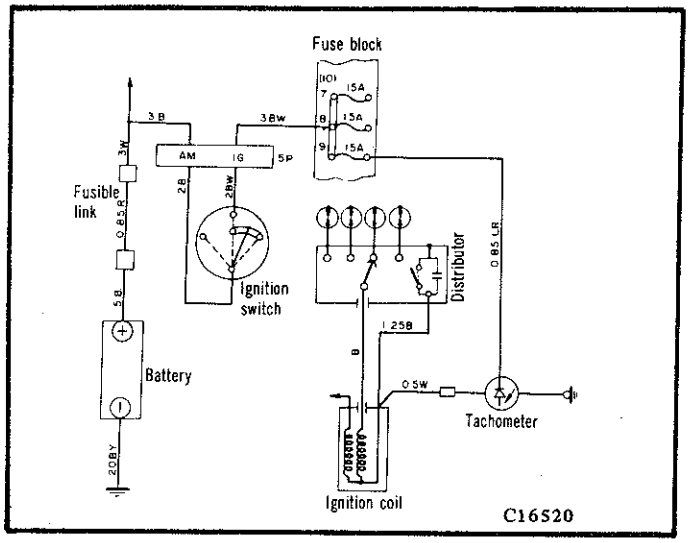


Fig 8—Tachometer circuit

CLOCK

Round Type

The clock is a quartz crystal controlled electronic movement unit. Adjustment (loss or gain) of the clock used in the imported instruments can be achieved by turning the screw at the back of the unit. One turn clockwise advances the clock three minutes a day, one turn anti-clockwise retards the clock three minutes a day.

Accuracy of the clock in local instrument cluster should be within 5 secs. per 24 hours for a 72 hour period. This clock is not adjustable and should be forwarded to an instrument specialist for repair.

The digital clock is a quartz crystal controlled electronic movement unit with a fluorescent tube digital display. The accuracy of this unit is within ±5 seconds (max.) a day, depending on battery voltage and temperature conditions.

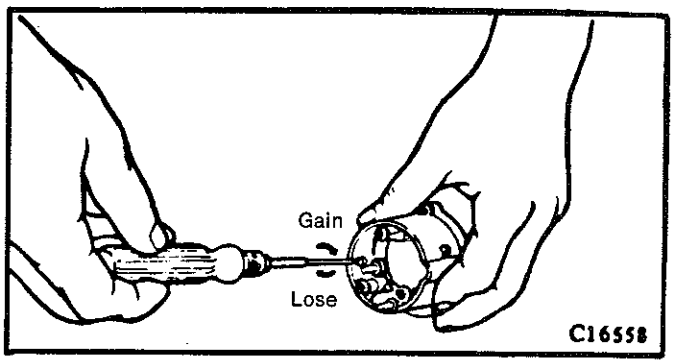


Fig. 9—Adjusting clock (imported round type)

The clock is fitted with four switches which control the following functions:

- DISPLAY — Illuminates the clock when the ignition is switched off.
- HOUR — Advances the hour figure.
- MIN. — Advances the minute figure.
- SET — Sets the display to the nearest hour for ease of readjustment.

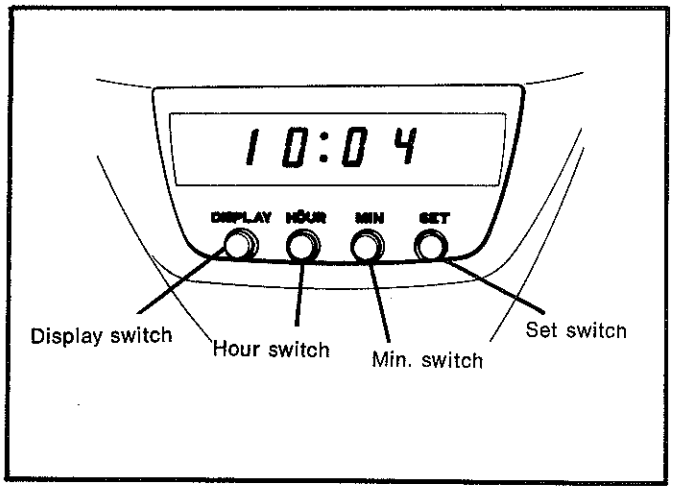


Fig. 10—Digital clock controls

Removal

(1) Remove the clock cover by pulling down on one side.

(2) Remove the clock retaining screws and withdraw the clock from its mounting. Disconnect the wiring and remove the clock.

NOTE:

- When removing the clock use care not to bend the electrical terminals.
- Ensure the clock is not subjected to knocks or dropped as damage will occur.
- If infra-red ray lamps are used for body paint repairs, the clock must be removed to prevent transistor damage.

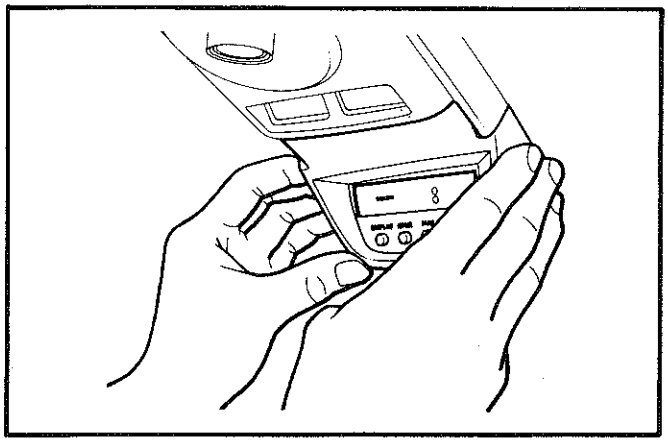


Fig. 11—Removing digital clock cover

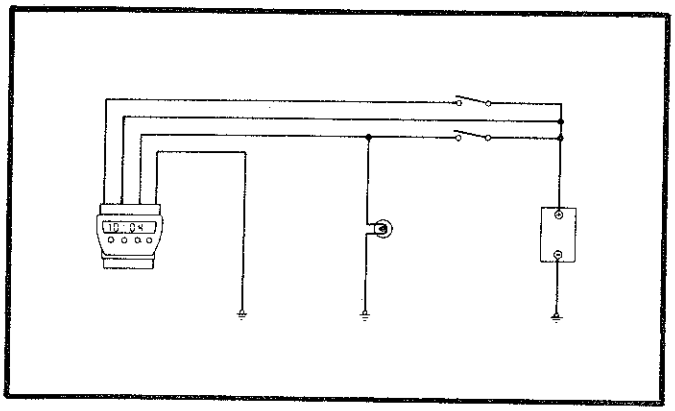


Fig. 12—Digital clock circuit

FUEL GAUGE CIRCUIT

The fuel gauge is a bi-metallic type with a variable resistance sending unit.

On imported instruments a constant voltage regulator is built into the fuel gauge and regulates the operational voltage of the system to 6,8 to 7,2 V thus preventing indication error due to voltage fluctuations.

Local instruments have a constant voltage regulator built into the instrument cluster regulating the operational voltage to 9,9 to 10,1 V.

The sending unit resistance varies in proportion to the fuel in the tank, therefore varying the current flow through the gauge. The fuel tank sending unit has a hinged float arm which moves a contact point across the resistance winding.

Note: The imported and local sender units are not compatible and should not be intermixed. The appropriate part number is stamped on each sender unit.

Testing

A simple method of checking the fuel gauge is to disconnect the lead from the tank unit and earth it. If the gauge indicates "FULL" the gauge is good, if not check the gauge as follows:

NOTE: Do not keep the tank unit lead earthed for an excessive amount of time as damage to the fuel gauge may result.

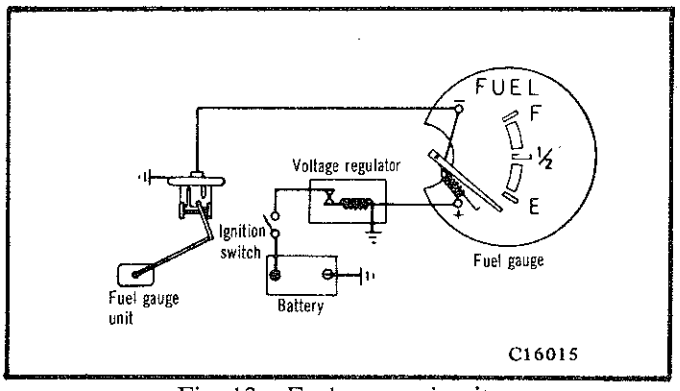


Fig. 13—Fuel gauge circuit

On imported instruments, use a suitable ohmmeter to measure the resistance between the fuel gauge terminals. If the resistance is not within 100 to 104 ohms, the unit is faulty and must be replaced.

On local instruments, use a suitable resistance box to connect a 40 ohm resistance between the fuel gauge terminals, the gauge should read "FULL". Using 292 ohms the gauge should read "EMPTY".

Using an ohmmeter, measure the resistance between the tank unit terminal and body. The "Empty" reading for two door and sedan models should be 88 to 102 ohms and 103 to 117 ohms (when fitted with imported instruments). The "Full" reading should be — two door and sedan 5 to 9 ohms and wagons 1 to 5 ohms. The reading for local instruments on sedan and wagon models are — "Empty" 292 ohms and "Full" 40 ohms.

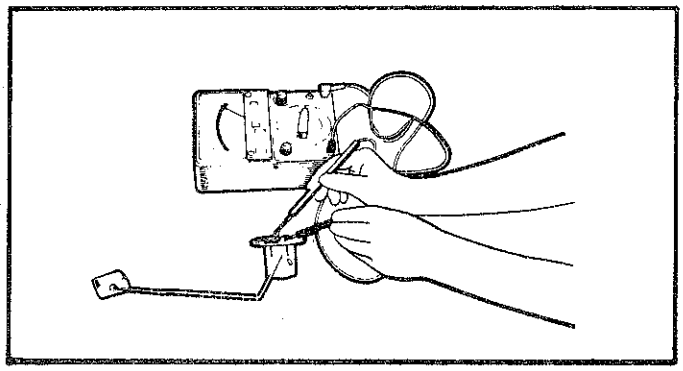


Fig. 14—Checking gauge sending unit

TEMPERATURE GAUGE CIRCUIT

The temperature gauge is a bi-metallic type with a thermister type sending unit.

On imported instruments a constant voltage regulator is built into the fuel gauge to regulate the operational voltage of the system to 6,8 to 7,2 V thus preventing indication error due to voltage fluctuation. Local instruments have a constant voltage regulator built into the instrument cluster regulating the operational voltage to 9,9 to 10,1 V.

The sending unit resistance varies with water temperature, therefore varying the current flow through the gauge.

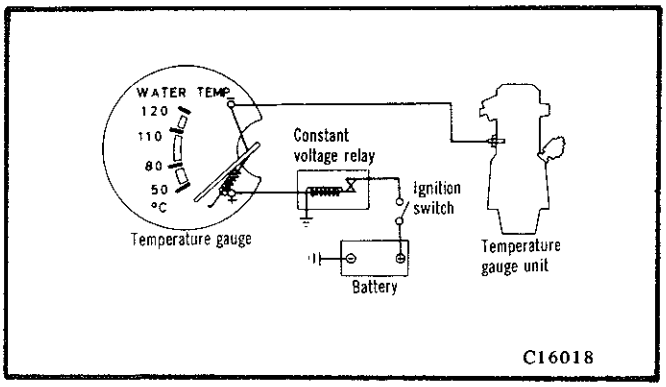


Fig. 15—Temperature gauge circuit

Testing

Check the temperature gauge by disconnecting the lead from the sending unit, connecting a 25 ohm resistor (imported instruments) or 40 ohm resistance (local) in series with the gauge and earthing it. If the gauge indicates "HOT", the gauge is good.

NOTE: Do not directly earth the sending unit lead as damage to the gauge will result.

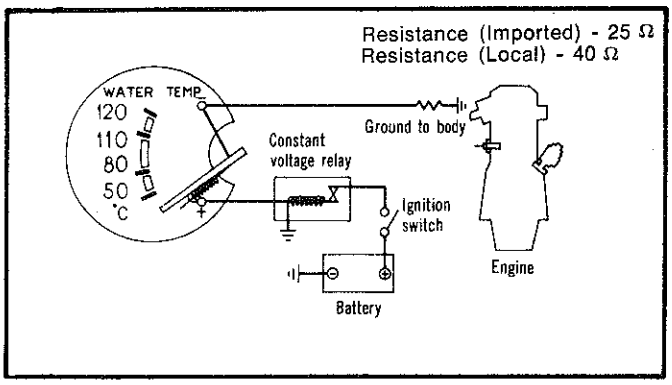


Fig. 16—Checking temperature gauge

Temperature Gauge Continuity (Imported Instruments)

Using a suitable ohmmeter measure the resistance between the gauge terminals. If the resistance is not 55 ohms, the gauge is faulty and must be replaced.

Sending Unit

NOTE: The imported and local sender units must be used with the appropriate instrument cluster. Imported sender units have a "blade" shaped terminal while local units have a "button" shaped terminal.

Place the imported sending unit in water heated to 80°C (176°F) and measure the resistance of the unit with a suitable ohmmeter. The reading should be 68,4 to 82,4 ohms.

The local sending unit should be tested at 100°C (212°F) and give a reading of 55,8 to 77,4 ohms.

NOTE: The heat sensing section of the sending unit and thermometer should be kept clear of the water heating source and the water should be continuously stirred.

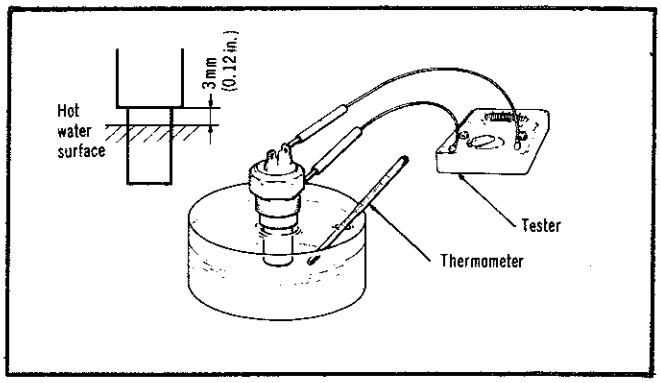


Fig. 17—Checking sending unit

VOLTMETER

The voltmeter is a moving coil (imported instruments) or bi-metallic type (local), indicating the condition of the battery or electrical system. The indicating range is from 8,0 to 16,0 V.

Testing

Connect a test voltmeter in parallel with the battery terminals and compare the voltmeter and test voltmeter readings at different engine speeds. If the voltmeter reading varies more than 0,5 V from the test voltmeter replace the unit.

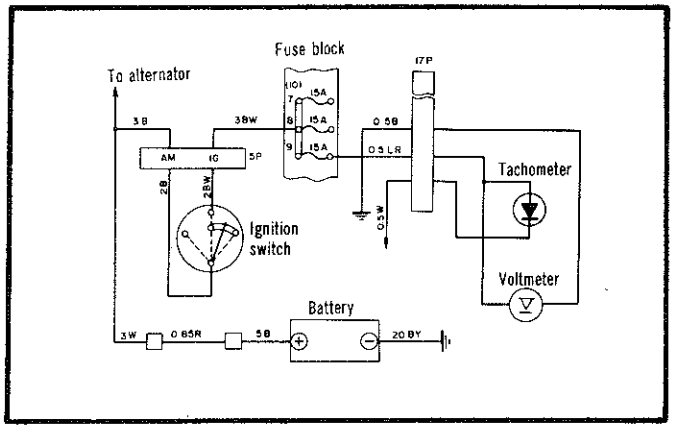


Fig. 18—Voltmeter circuit

AMMETER

The ammeter circuit is a shunt resistance type with only one thirtieth of indicated current flowing through the ammeter.

The ammeter consists of a permanent magnet and a moving iron piece with a pointer mounted in the meter case. When current flows through the circuit, the pointer moves in the + or — direction, depending on the magnetic flux variation in the direction of current flow and the amount of current.

Testing

(1) Connect a 3,4 W bulb in series with the ammeter as shown in Fig. 19.

(2) The unit is satisfactory if approximately 6,0 amps is indicated in the meter.

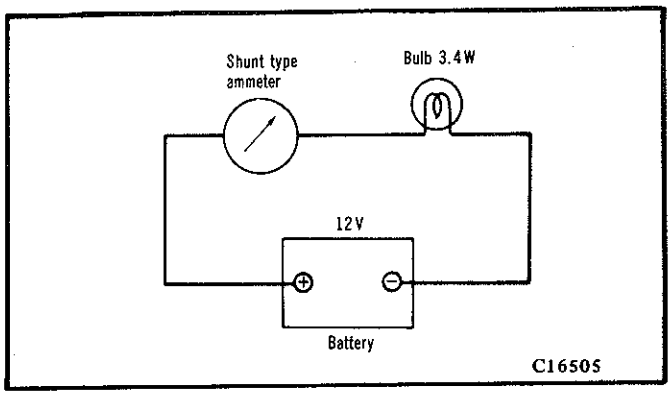


Fig. 19—Ammeter testing circuit

OIL PRESSURE GAUGE

The oil pressure gauge and sending unit are the bi-metal type. Oil pressure displaces the sending unit diaphragm causing the point arm to make contact with the bi-metal strip. Current flow around the bi-metal causes it to deflect and break contact thus allowing the strip to cool and remake the contact. The gauge pointer is thus effected by the amount of current which varies with point contacting pressure.

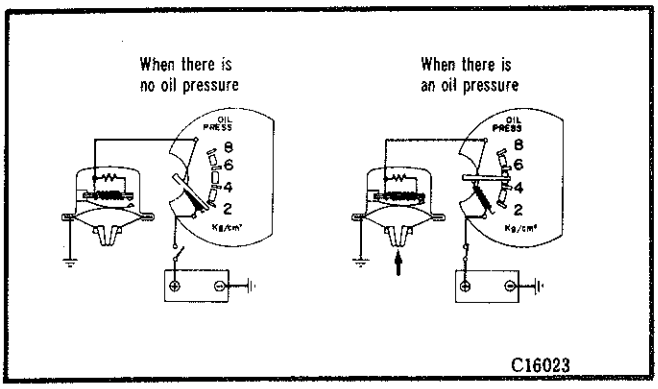


Fig. 20—Oil pressure gauge operation

Testing

(1) Disconnect the gauge sending unit lead and connect a 144 ohms resistor in series with a 12V battery to the gauge.

(2) The gauge reading should be 4,0 kg/cm² (57 p.s.i.) at 83.5 mA.

(3) If the gauge is satisfactory, reconnect the lead and check that the gauge unit operates correctly.

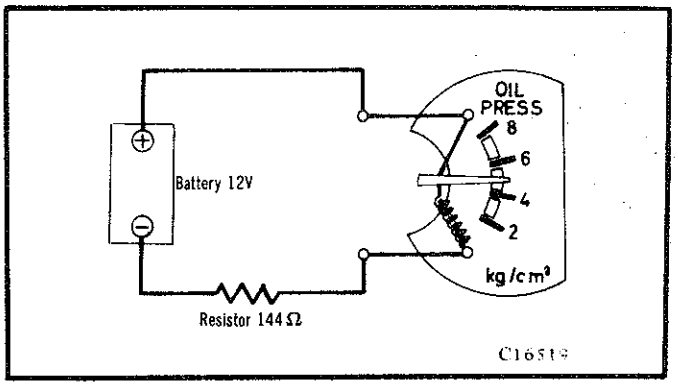


Fig. 21—Oil pressure gauge test connection

OIL PRESSURE INDICATING LAMP

The oil pressure indicating lamp is connected between the oil pressure sending unit screwed into the oil gallery on the cylinder block and the ignition side of the fuse box.

When the oil pressure exceeds 30 kPa (4.27 p.s.i.) the contacts in the sending unit open and the indicator lamp goes out. If the lamp is inoperative:

(1) Check the circuit for loose connections, burnt out globe or broken wire.

(2) If the above checks fail to locate the fault, replace the oil pressure sending unit.

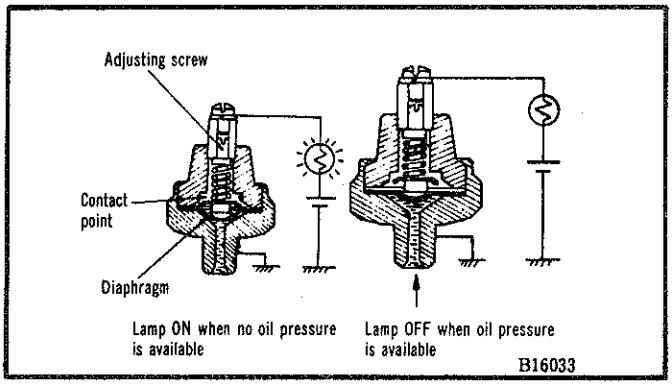


Fig. 22—Oil pressure switch

CHARGE INDICATOR LAMP

The charging indicator lamp goes out when alternator voltage rises to a predetermined value. Refer to Section 3 for the charge indicator lamp circuit.

BRAKE SYSTEM WARNING LAMPS

The brake system has two warning lamps, one to indicate when the hand brake is applied and the other for hydraulic system failure.

The hand brake warning lamp circuit consists of a switch, mounted on the hand brake bracket contacting the hand brake lever and a warning lamp fitted to the instrument cluster. When the hand brake is applied the switch is earthed thus completing the circuit and lighting the warning lamp.

The hydraulic system warning lamp consists of a pressure differential switch on the brake proportioning valve (early model), brake master cylinder (later model), contacting a hydraulically balanced spool valve. This valve, when moved, permits central position by an unbalance of pressure due to a circuit failure will contact the terminal, thus completing the lamp circuit. A checking relay mounted on the splash shield tests the warning lamp bulb every time the vehicle is started, the bulb should light with the ignition key only in the START position.

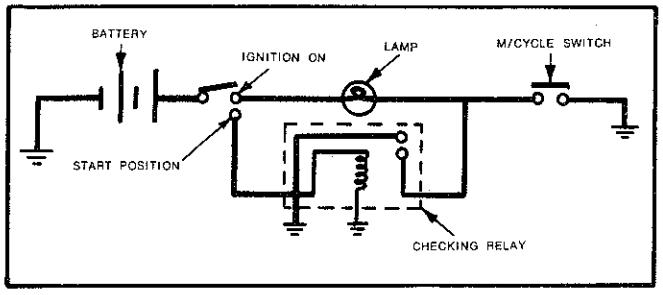


Fig. 23—Hydraulic system warning lamp circuit

Hydraulic System Lamp Test

(1) Turn the ignition switch to the START position, the lamp should light.

(2) If lamp fails to light, replace globe.

(3) If lamp still fails to light, earth pressure differential switch lead.

(4) If lamp still fails to light, check all associated wiring.

(5) If lamp now lights when the pressure differential switch lead is earthed, but fails to light when the ignition key is turned to the start position, the relay should be suspected as faulty and be replaced.

Pressure Differential Switch Test

(1) Turn ignition switch ON.

(2) Earth pressure differential switch lead, the lamp should light.

(3) Connect a brake bleeder tube to a wheel cylinder bleeder valve.

(4) While the brake pedal is operated, release the pressure from the system as in brake system bleeding — the lamp should light if switch is functioning.

(5) Replace switch if necessary and retest if required. If brake bleeding is required refer to Group 5, Brakes.

LOW FUEL WARNING LAMP

Some models are equipped with a low fuel warning lamp which lights when approximately 6.0 litres (1.25 gallons) is left in the tank.

The unit is a thermister type whose resistance varies with temperature, thus the lamp operation will vary slightly with the thermister set position.

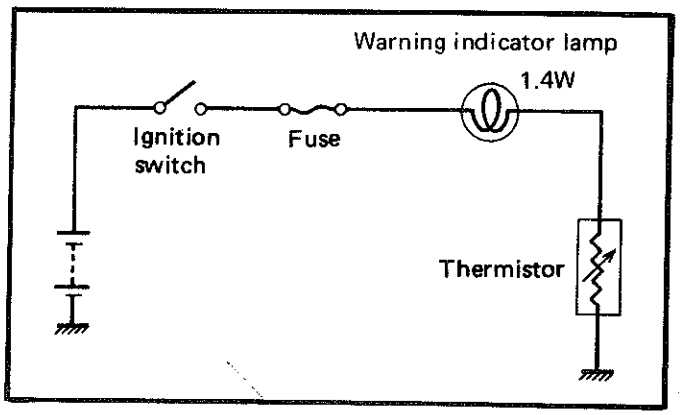


Fig. 24—Low fuel warning circuit

Testing

(1) With the sending unit removed from the fuel tank, connect it to a battery through a 12V, 3.4W test lamp.

(2) Immerse the sending unit in water.

(3) The lamp must be OFF while the unit is immersed in the water and must come ON when the unit is taken out.

NOTE: After completing the test, wipe the unit dry prior to reinstallation into the fuel tank.

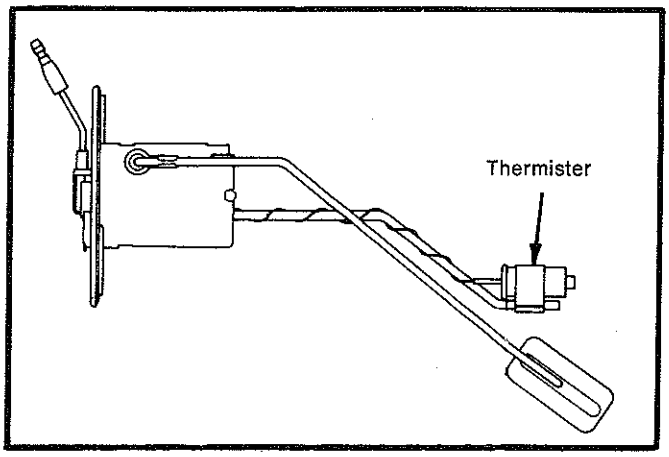


Fig. 25—Sending unit and thermister (early imported)

INSTRUMENT PANEL LAMPS

All instrument panel lamps and warning lamps are contained in twist-in sockets. Some bulbs can be replaced from under the instrument panel but those that are not easily accessable will necessitate instrument cluster removal.

PRINTED CIRCUIT BOARD

An instrument cluster printed circuit board is used to avoid complicated wiring.

The printed circuit consists of thin copper strips which are covered by a lacquer film. If a short circuit occurs the strips will burn out instantaneously.

Repair (Imported Cluster Type)

When the printed circuit board burns out, replacement is generally recommended. If a replacement is not readily available the board can be repaired as follows:

NOTE: When the printed circuit is burnt, the cause must be located and corrected prior to replacement or repair of the board otherwise a repeated failure will occur.

(1) Trace both ends of the burnt circuit.

(2) Clean the places to be soldered by rubbing lightly with a fine sand paper.

(3) Cut off any turned over copper strip, if any, and bond the cut ends to the board.

(4) Solder a 0,5 mm² insulated cable between the burnt circuit as shown in Fig. 26.

(5) Insulate the soldered connections with lacquer or a similar material.

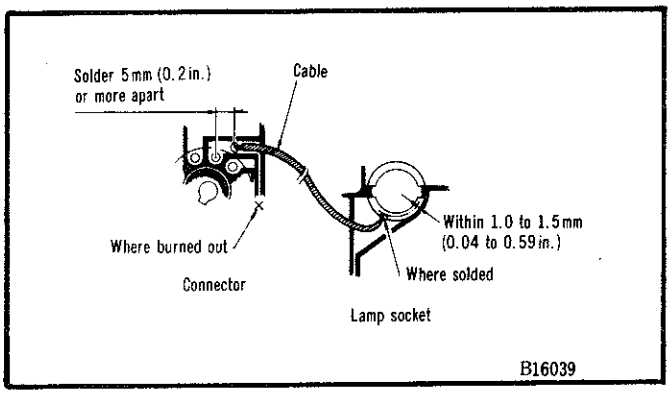


Fig. 26—Soldering printed circuit

Local cluster printed circuit boards should be replaced if a failure occurs.

COMBINATION IGNITION SWITCH/STEERING COLUMN LOCK

General Information

The switch contains the four following positions:

(1) LOCK—Steering locked and ignition off.

(2) ACC.—The accessory position allows operation of the turn signal indicators, radio, etc.

(3) ON—The ignition and accessories are switched on.

(4) ST.—The ignition on and engine cranking.

NOTE: Under no circumstances should the key be turned to the "LOCKED" position or any attempt to be made to withdraw the key while the vehicle is in motion. The lock can be operated with the road wheels facing any direction, but the key must be withdrawn from the lock before the steering will lock.

Ignition Switch Testing

(1) Remove the steering column cover and disconnect the ignition switch from the wiring loom.

(2) Using a 12V series test lamp or ohmmeter connect one lead to the black wire of the ignition switch.

(3) With the switch in the LOCK position there should not be continuity at any of the switch wires.

(4) With the switch in the ACC. position there should be continuity at the blue switch wire.

(5) With the switch in the ON position, there should be continuity at the blue and the black/white switch wire.

(6) With the switch in the ST. position there should be continuity at the black/yellow and black/red switch wire.

(7) If any of the above tests fail the ignition switch is faulty and must be replaced.

Removal

(1) Disconnect the battery negative (ground) terminal.

(2) Remove the steering column cover.

(3) Loosen the ignition switch retaining screw and remove the switch.

(4) Install by reversing removal procedure and check the switch for positive operation.

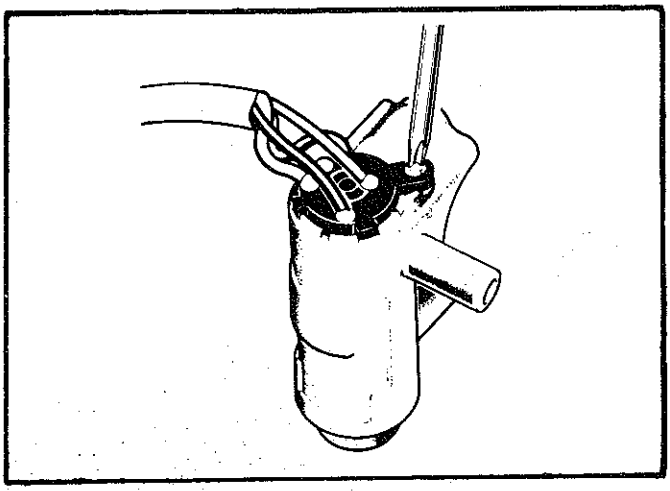


Fig. 27—Removing ignition switch

HEATED REAR WINDOW

The electrically heated rear window consists of a series of electrically connected grid lines baked on the inside surface of the rear window and an instrument cluster mounted switch. The element is activated by the instrument cluster switch.

NOTE: It is important that the heated rear window is not left on for any length of time because of high power consumption and should only be used with the engine running.

Inspection of Rear Window — Defogger On

Switch on the defogger and use a voltmeter to measure voltage of each bar at the glass centre point. If a voltage of approximately 6V is indicated by the voltmeter, the circuit is satisfactory.

If indicated voltage at the glass centre point is 12V, the wire is broken at a point between the centre and the outer (starting edge) of the terminal. Therefore, move the tester bar slowly towards the starting point of the terminal as shown in Fig. 28 until a point is detected where voltage drops sharply (to 0V). This rapid voltage change indicates a break in the printed circuit.

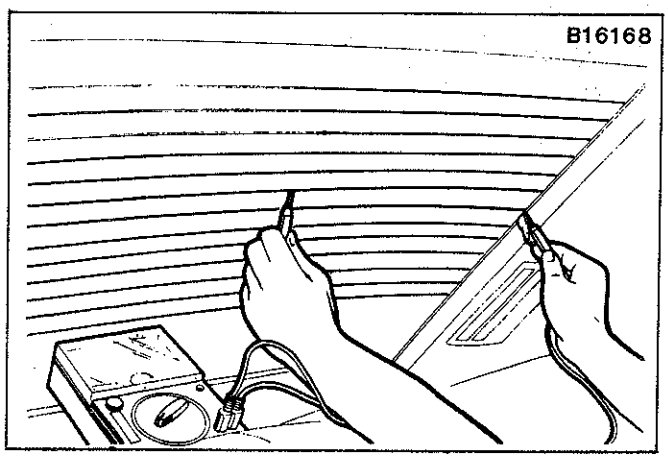


Fig. 28—Inspecting heated rear window circuit

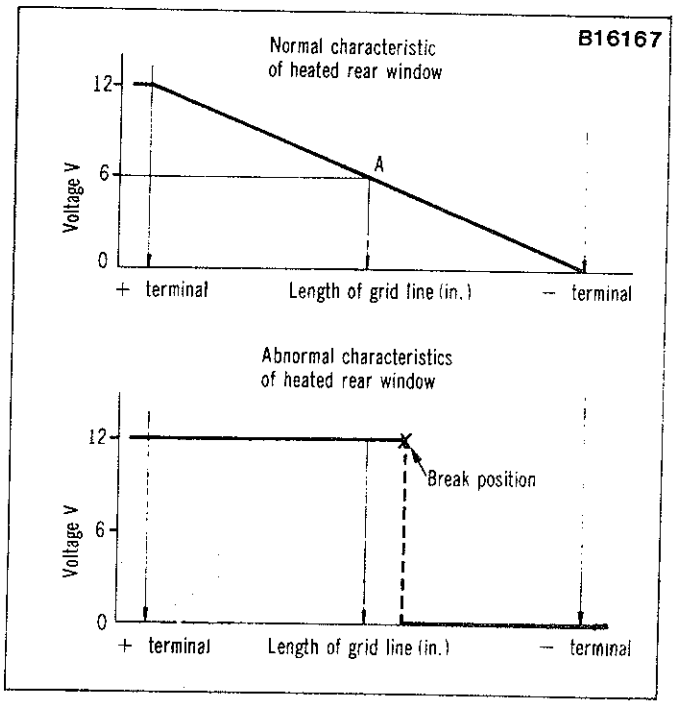


Fig. 29—Voltage characteristics of heated rear window

Inspection of Rear Window — Defogger Off

Using an ohmmeter, measure the resistance of each printed heater between the centre and end, left and right separately. The section involving a broken wire indicates resistance twice that in other sections. In the affected section, move tester probe to a position where resistance changes sharply.

Repair Method

The use of a Chrysler Parts heated rear window repair kit is recommended. Repair instructions are provided with each kit.

SECTION 11 — HORNS

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
HORNS WILL NOT OPERATE	(a) Incorrect adjustment.	(a) Adjust horn.
	(b) Broken or defective wiring.	(b) Repair wiring.
	(c) Faulty horn.	(c) Replace horn.
	(d) Defective horn switch.	(d) Repair or replace horn switch.
	(e) Low battery.	(e) Recharge or replace battery.
	(f) Faulty fuse.	(f) Replace fuse.
HORNS OPERATE CONTINUOUSLY	(a) Shorted wiring.	(a) Repair wiring.
	(b) Horn switch faulty.	(b) Repair or replace switch.
UNSATISFACTORY HORN NOTE OR TONE	(a) Horns loose on mounting.	(a) Tighten mounting.
	(b) Horns out of adjustment.	(b) Adjust horn.
	(c) Internal fault.	(c) Replace horn.
	(d) Loose or broken connection in wiring.	(d) Repair faulty wiring.

SPECIFICATIONS

Type	Flat diaphragm
Voltage (Effective Sounding)	10 to 14,5V
Current Draw @ 12V	2,0 * 0,5A
Frequency — Low Note	350 ± 15Hz
— High Note	415 ± 15Hz

GENERAL INFORMATION

All models are equipped with dual horns fitted in the engine compartment in the right hand front corner.

TESTING

If horns fail to operate, connect the horns to the battery. If they operate when connected to the battery the horn switch on the steering wheel or the horn wiring is faulty. If they still fail to operate the horns are faulty.

ADJUSTMENT

(1) With the horn removed from the vehicle connect in series with an ammeter and horn button and apply the appropriate nominal voltage.

(2) Release the adjusting screw lock nut and turn the adjusting screw slowly to give the best performance on 10 to 14.5 volts.

(3) After adjustment, the current draw should not exceed the specified amperage at 12 volts.

(4) Tighten the adjusting screw lock nut.

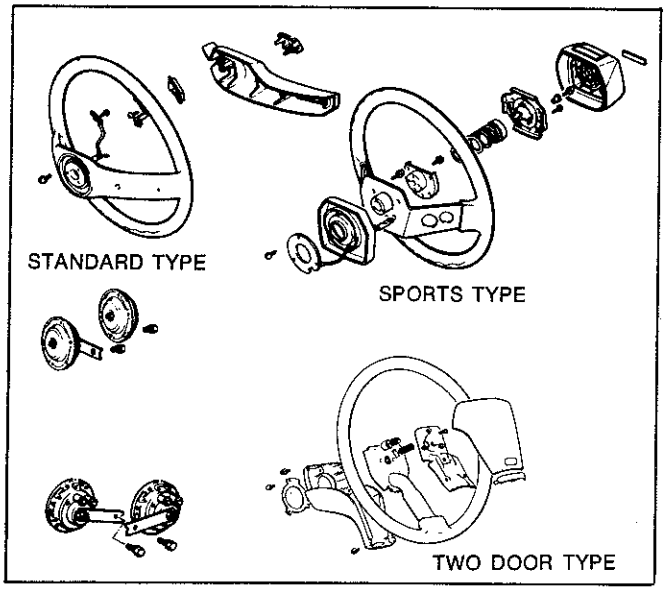


Fig. 1—Horn and horn switch components

SECTION 12 — WIRING DIAGRAMS

DIAGRAM INDEX

System	Figure No.
SEDAN MODELS	
Start, ignition (standard) and charging system	1, 2
Start, ignition (electronic) and charging system	3, 4, 5
Instruments, sender unit and cigar lighter	6, 7
Wiper washer	8, 9
Head lamp, stop lamp and park lamp	10, 11
Turn signal, hazard, back up lamps and horns	12, 13
Interior lights	14, 15, 16
Radio, cassette and heater	17, 18
Radio, heater	19
Heated rear window	20, 21
Air conditioner	22
TWO DOOR MODELS	
Complete electrical system	23

LEGEND

	Thermal Element (Bi-metal strip)		Resistor
	Circuit breaker		Variable resistor
	Coil		Diode
	Lamp		Ground
	Fuse		Transistorised
Ω	Ohms		Switch
	Splice		

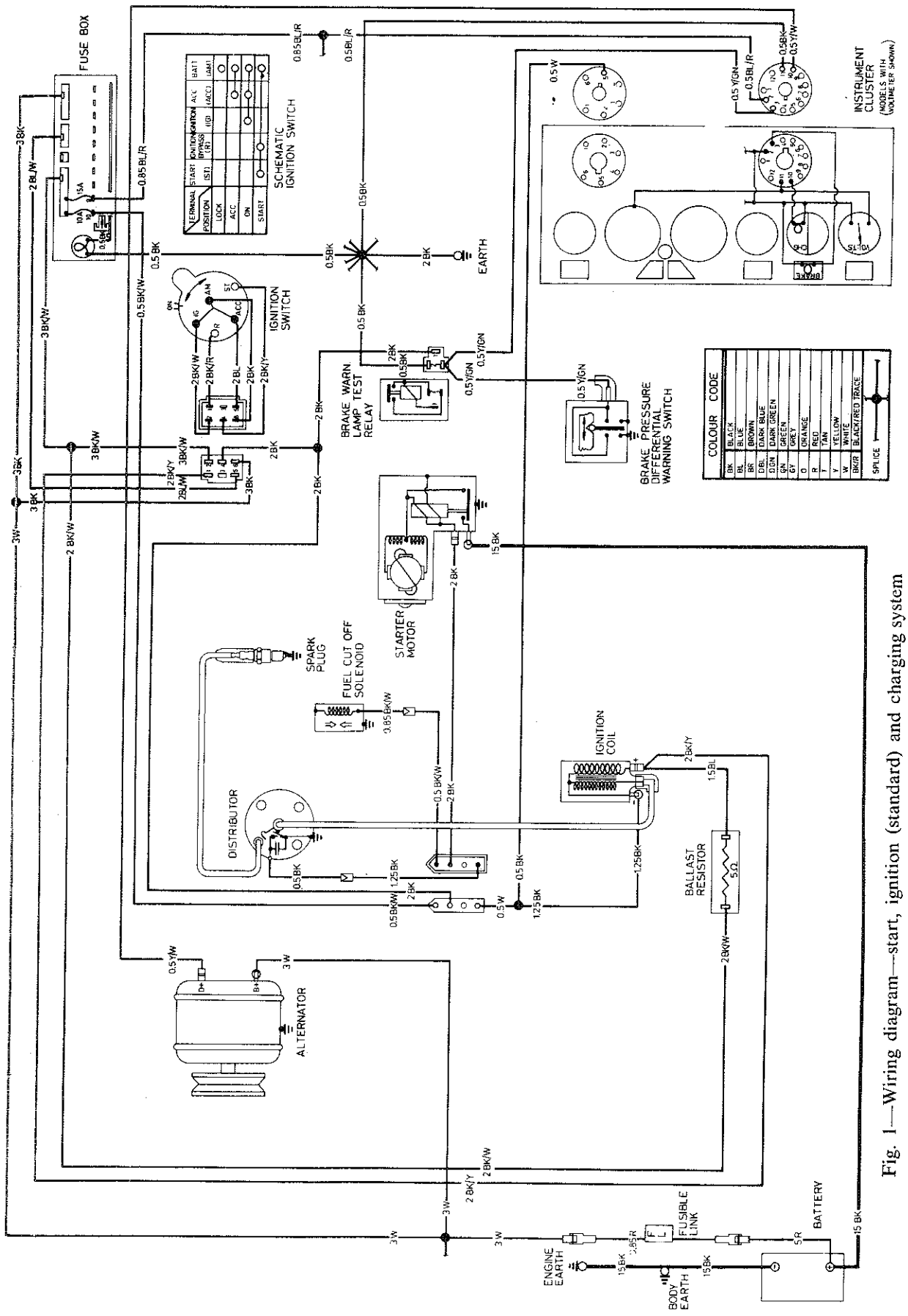


Fig. 1—Wiring diagram—start, ignition (standard) and charging system

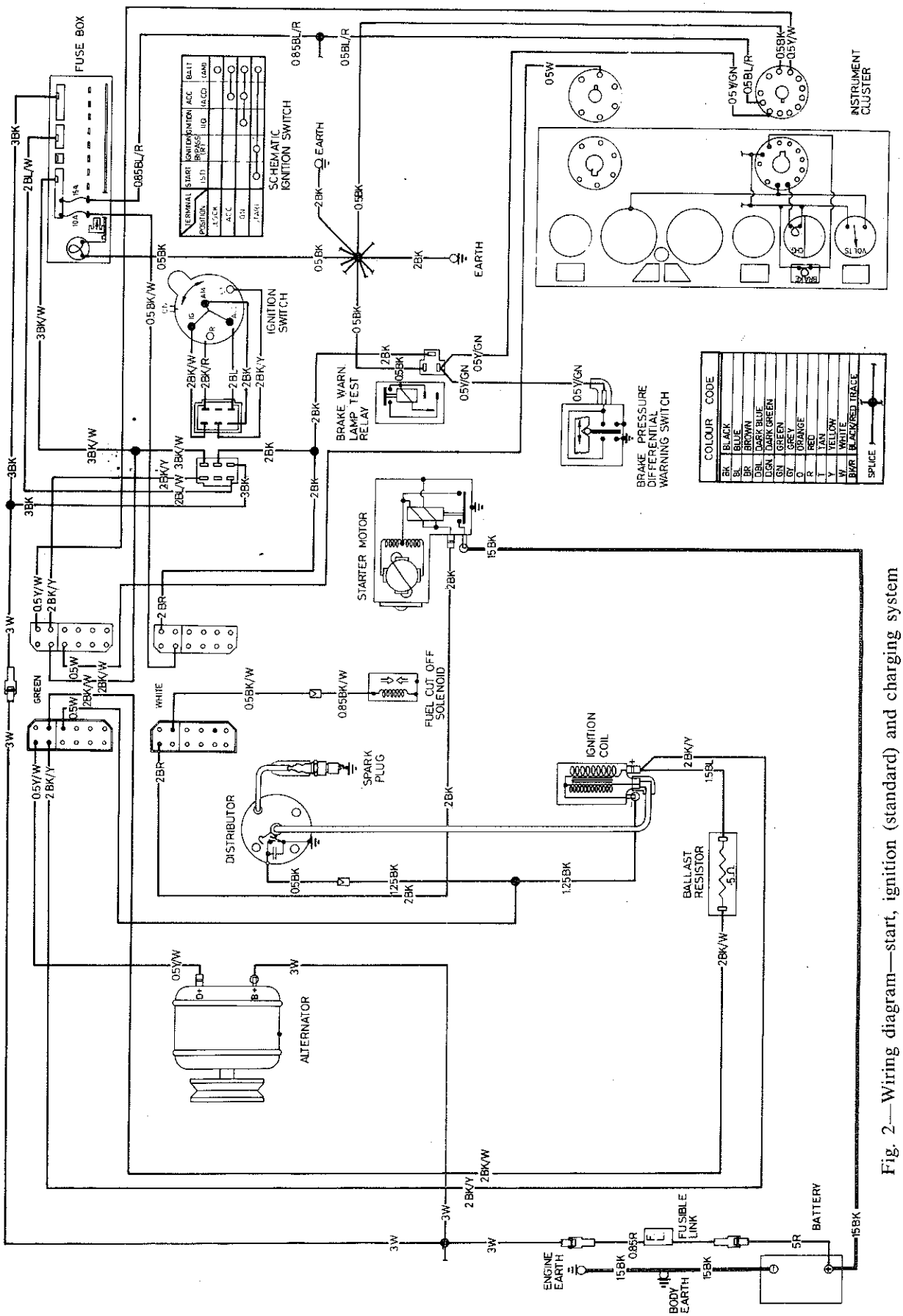


Fig. 2—Wiring diagram—start, ignition (standard) and charging system

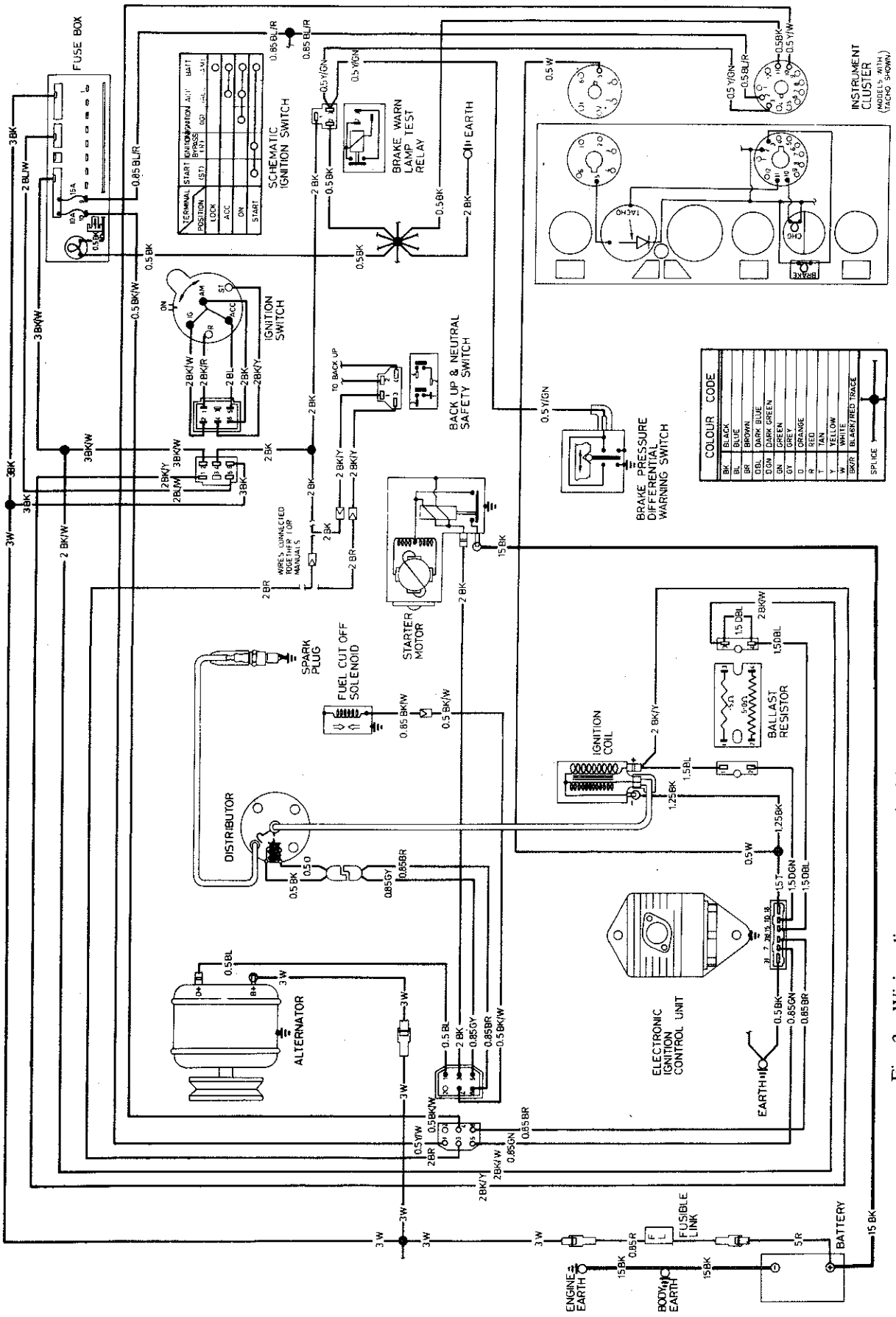


Fig. 3—Wiring diagram—start, ignition (electronic) and charging system

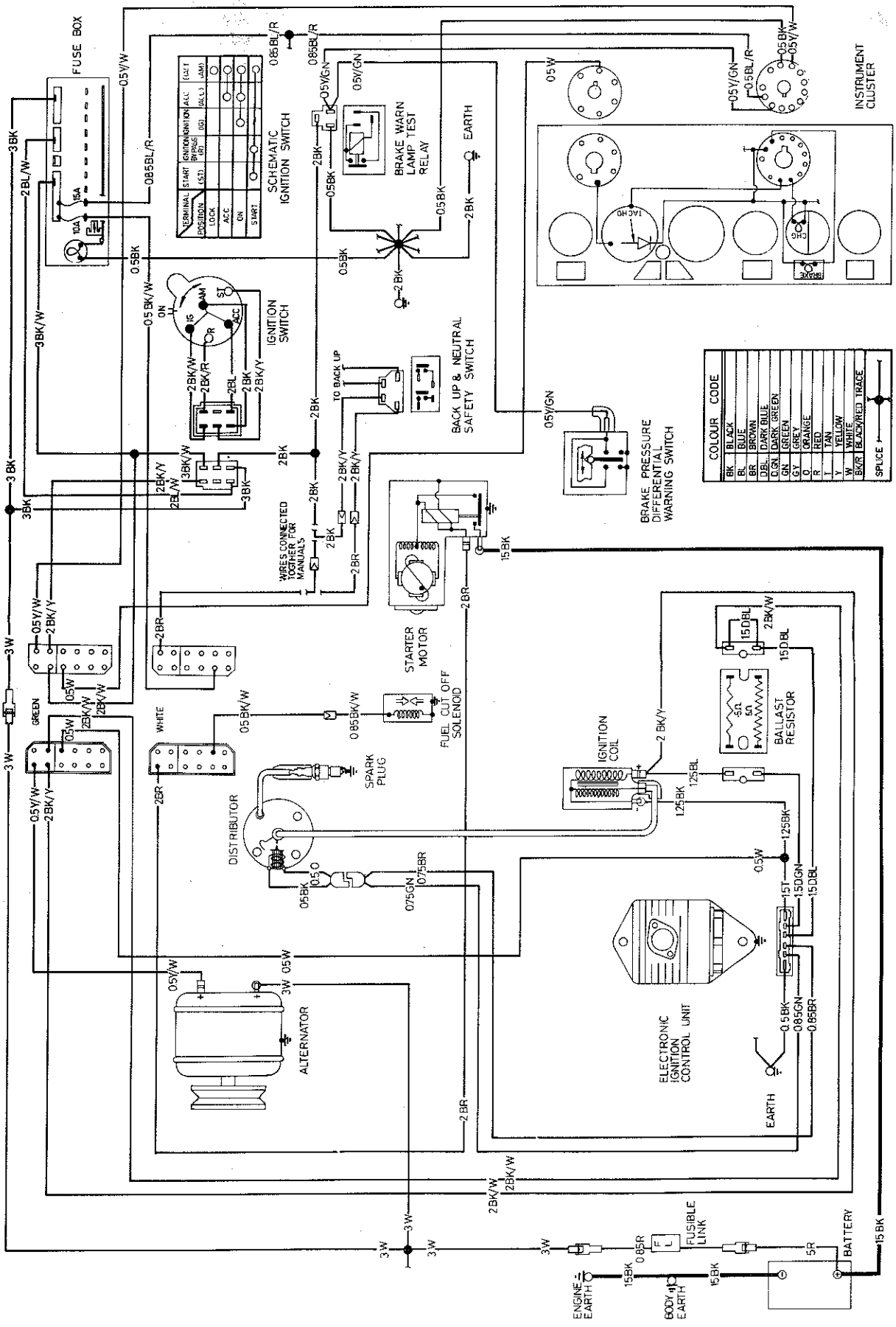


Fig. 4—Wiring diagram—start, ignition (electronic) and charging system

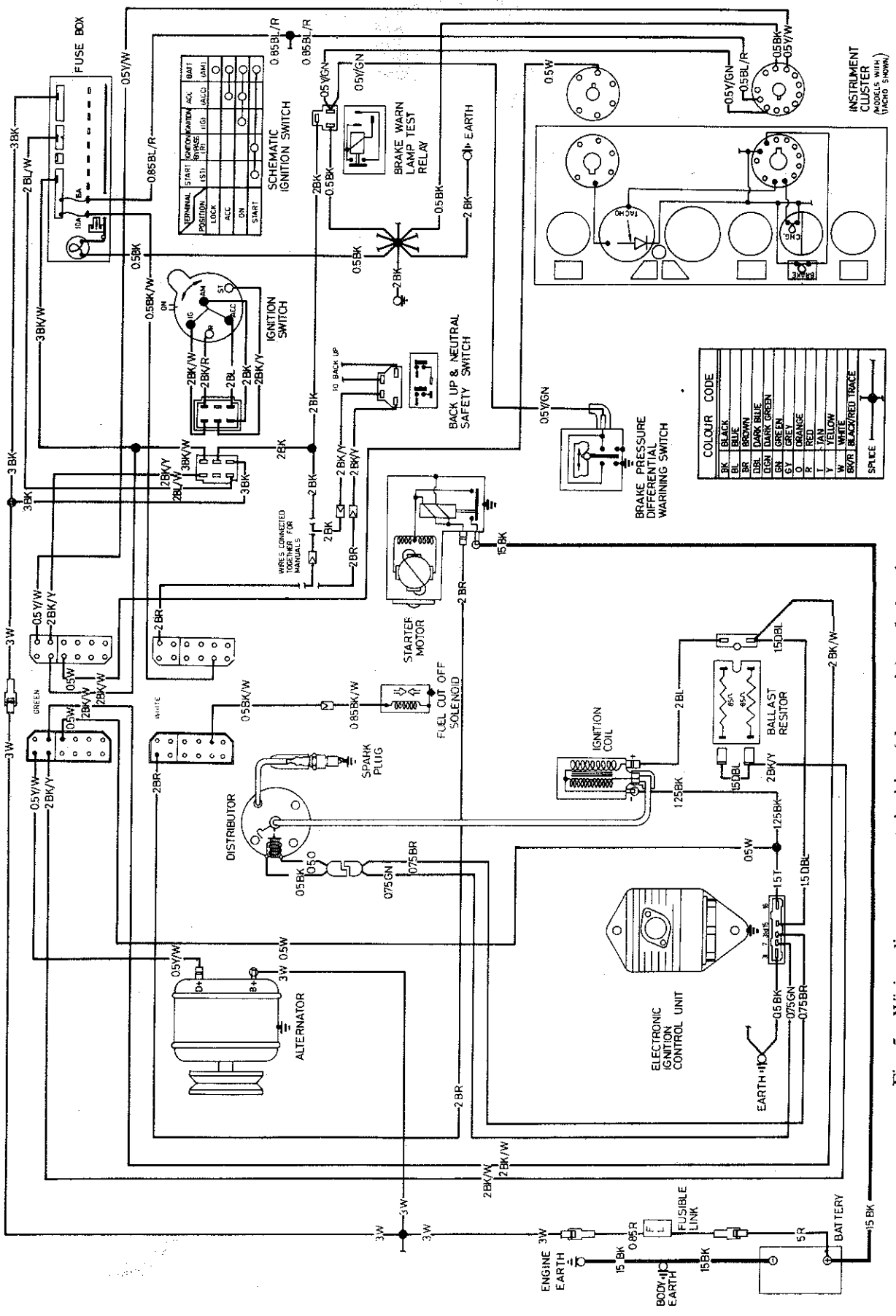


Fig. 5—Wiring diagram—start, ignition (electronic) and charging system

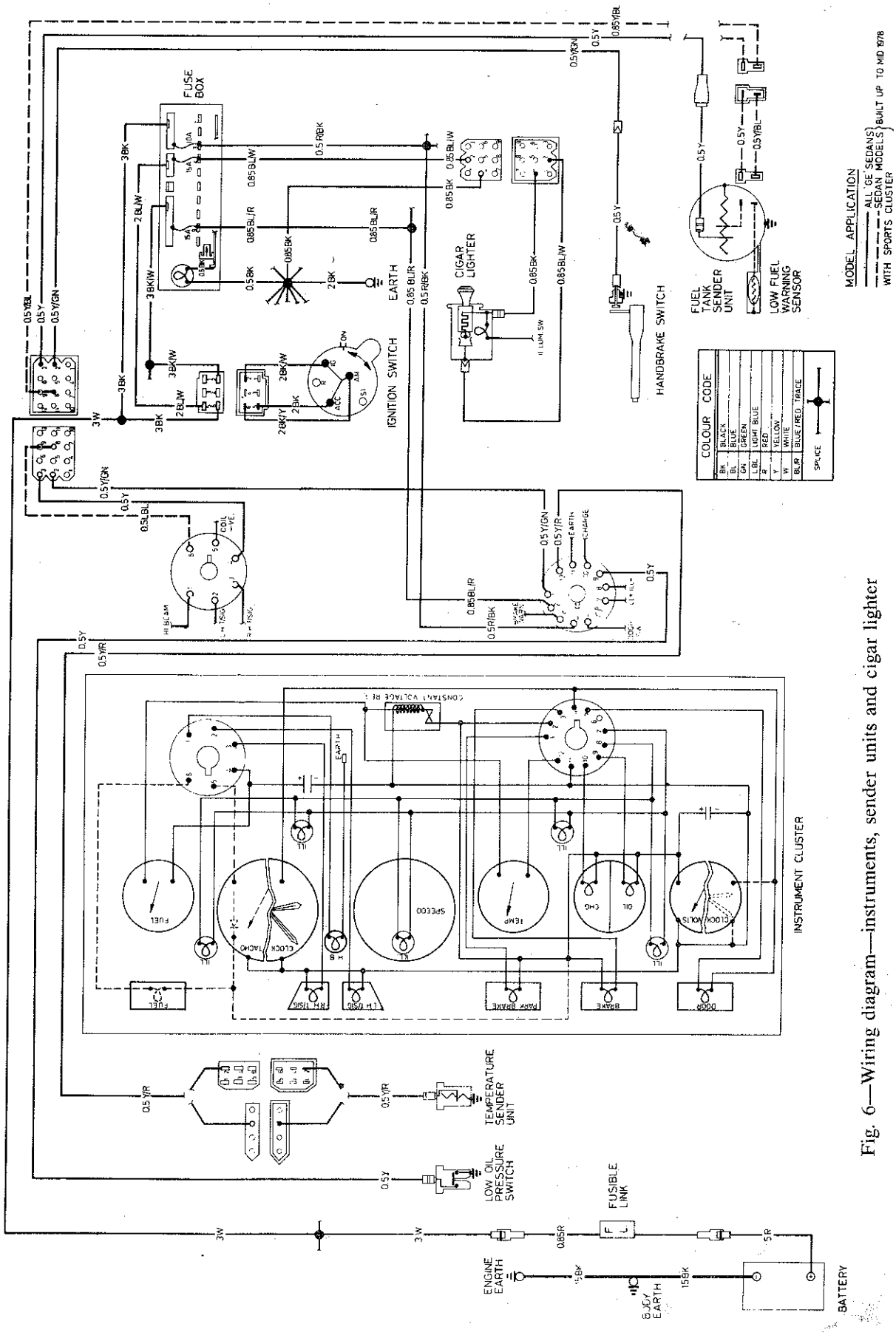


Fig. 6—Wiring diagram—instruments, sender units and cigar lighter

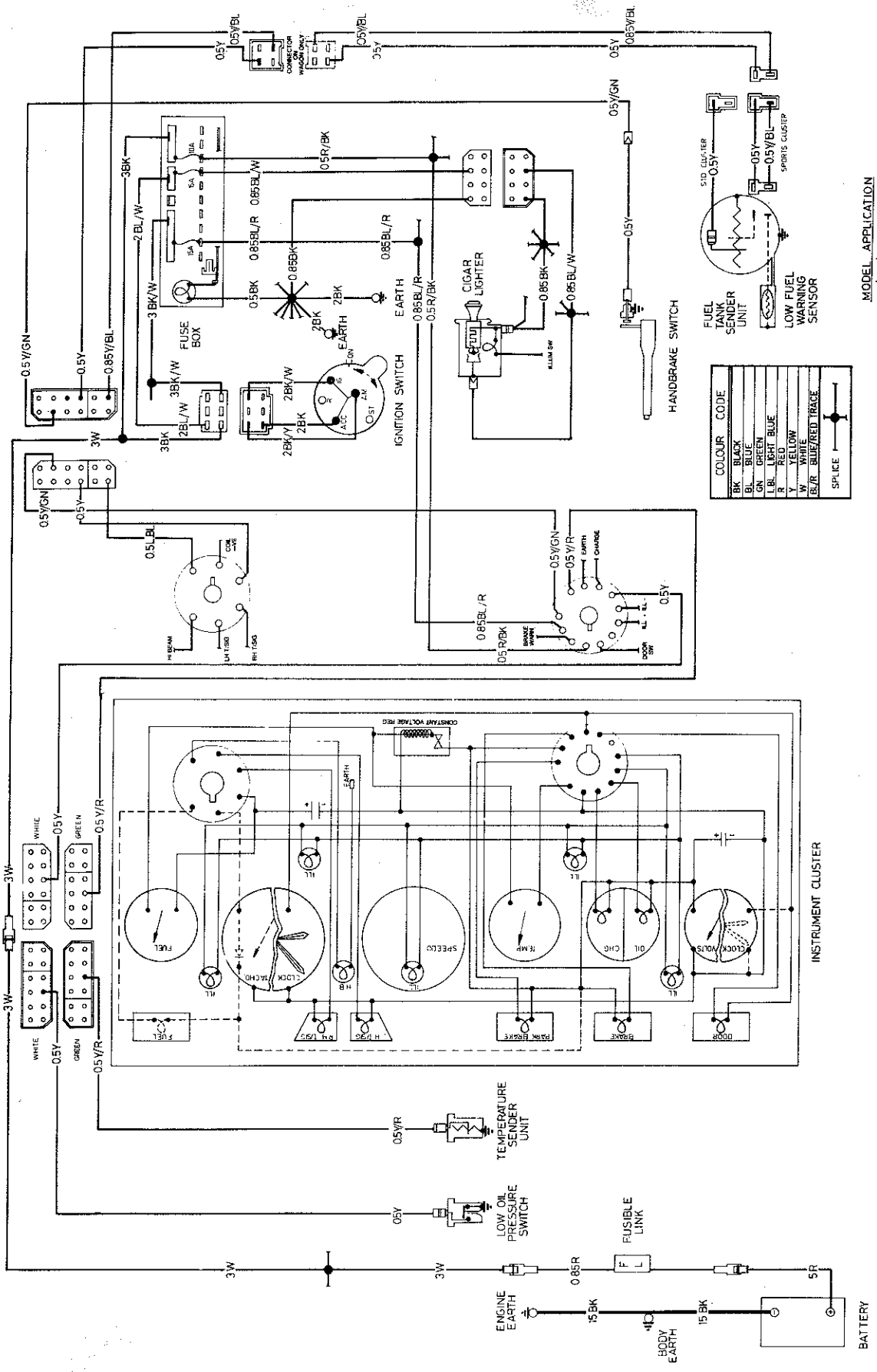


Fig. 7—Wiring diagram—instruments, sender units and cigar lighter

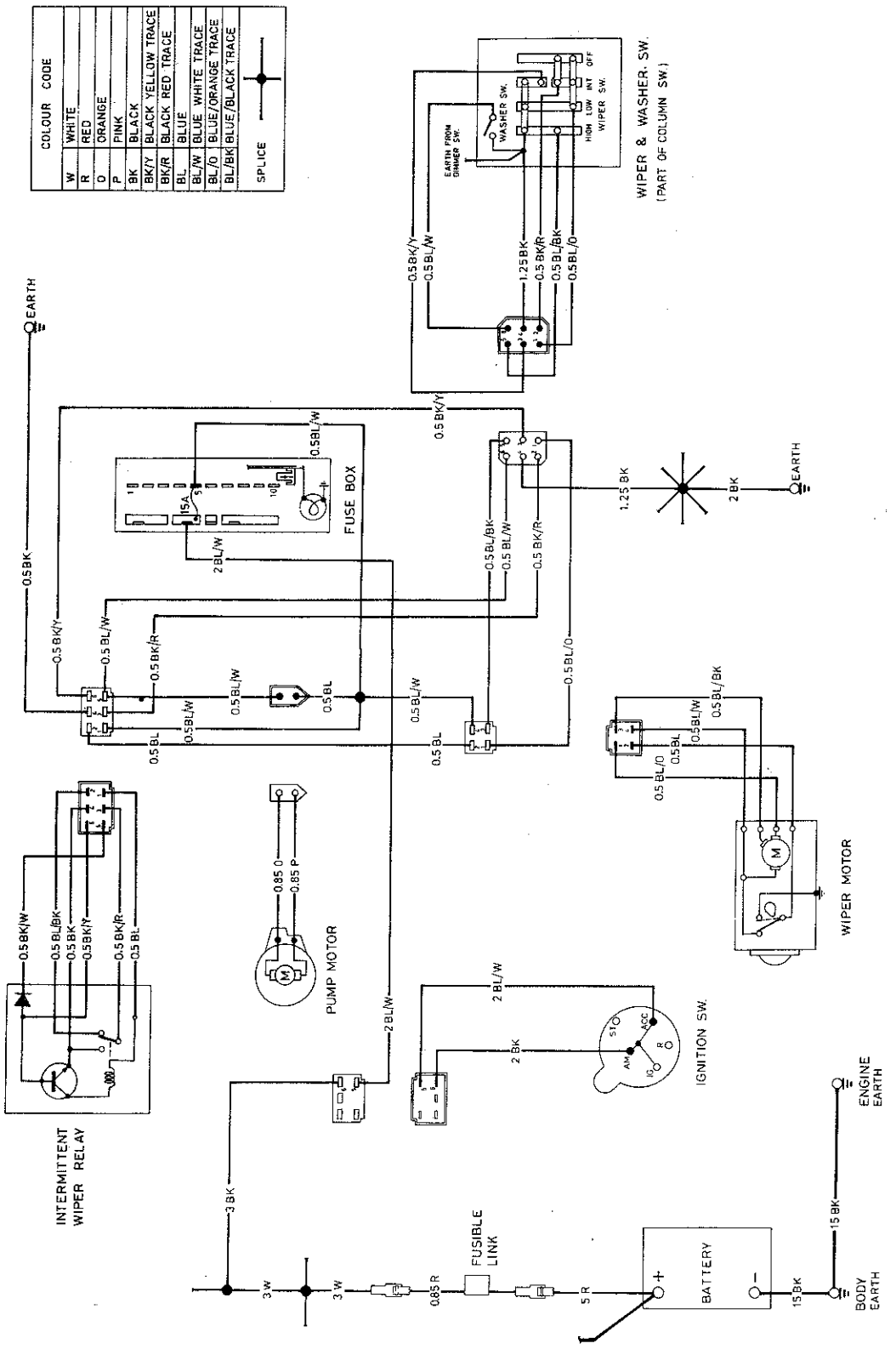


Fig. 8—Wiring diagram—wiper washer

MODEL APPLICATION
ALL O.E. SEDANS BUILT UP TO MID 1978

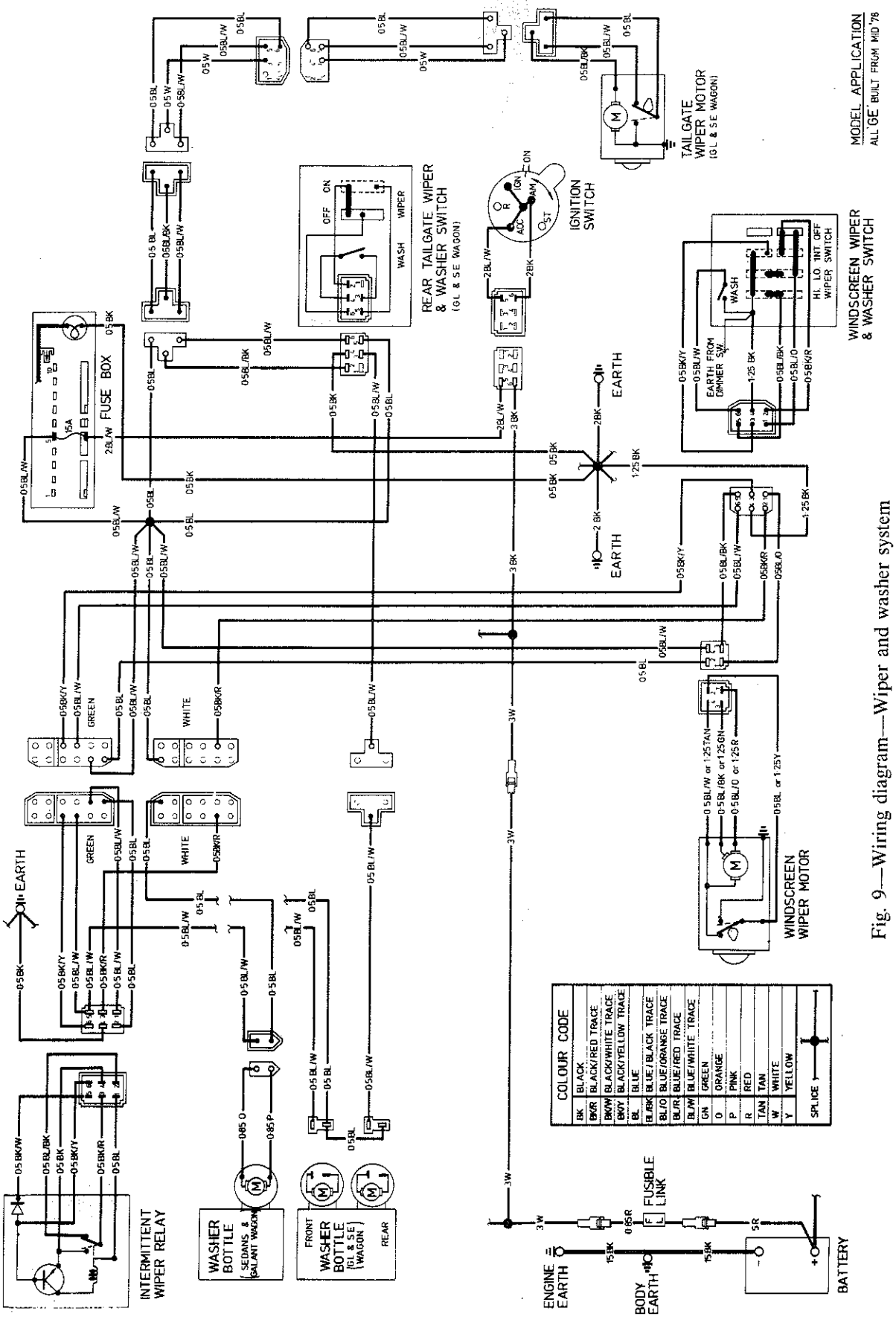


Fig. 9—Wiring diagram—Wiper and washer system

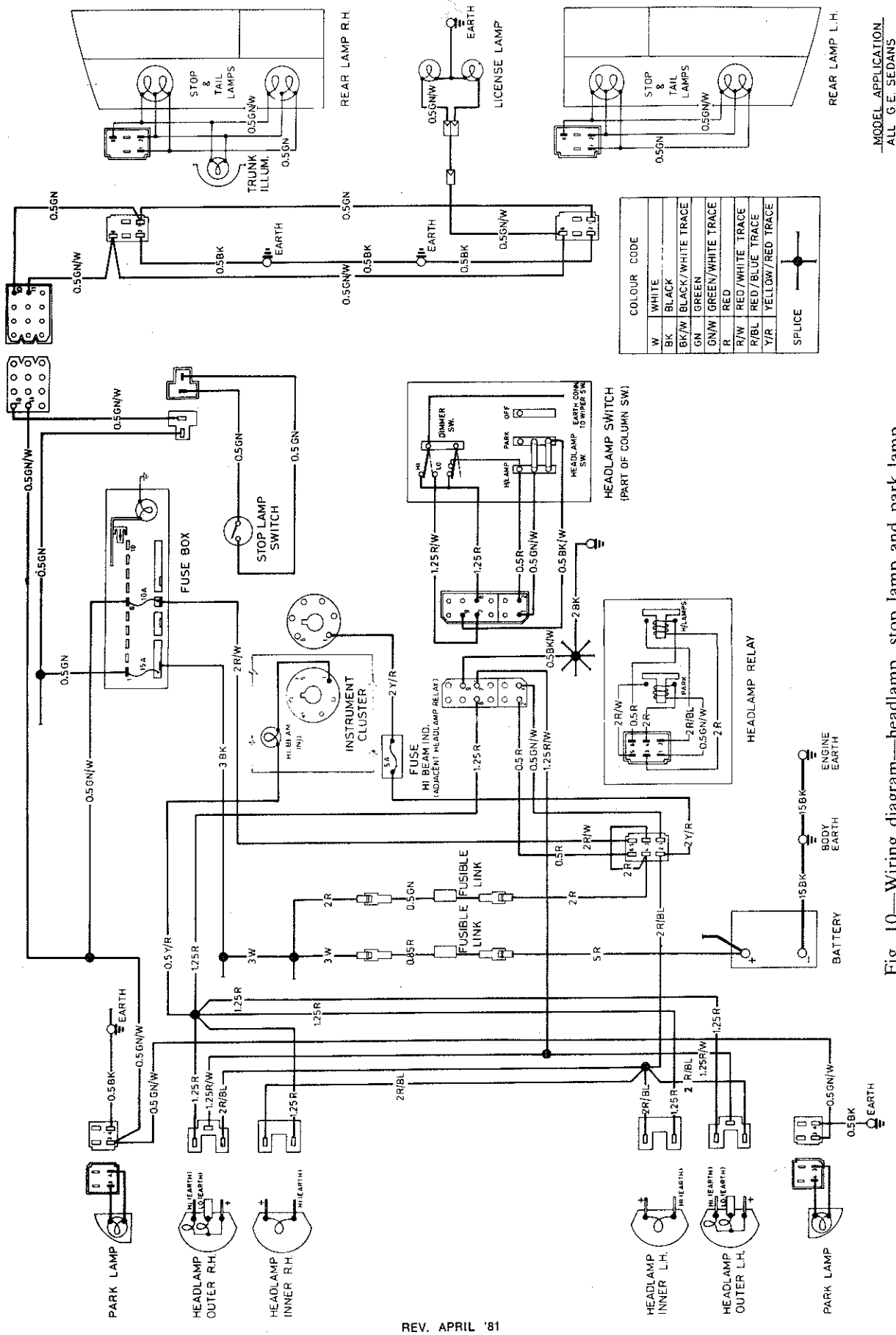


Fig. 10—Wiring diagram—headlamp, stop lamp and park lamp

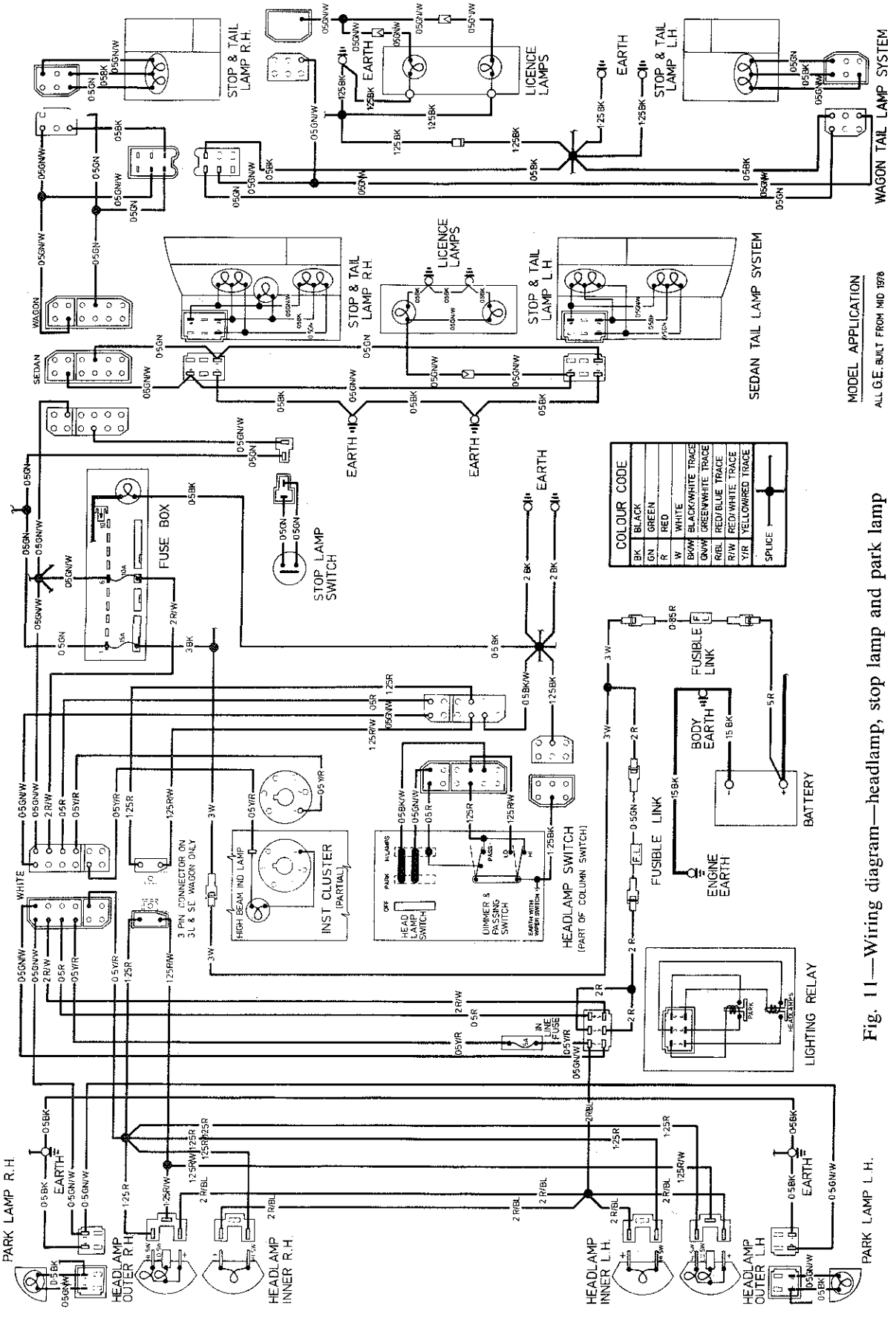
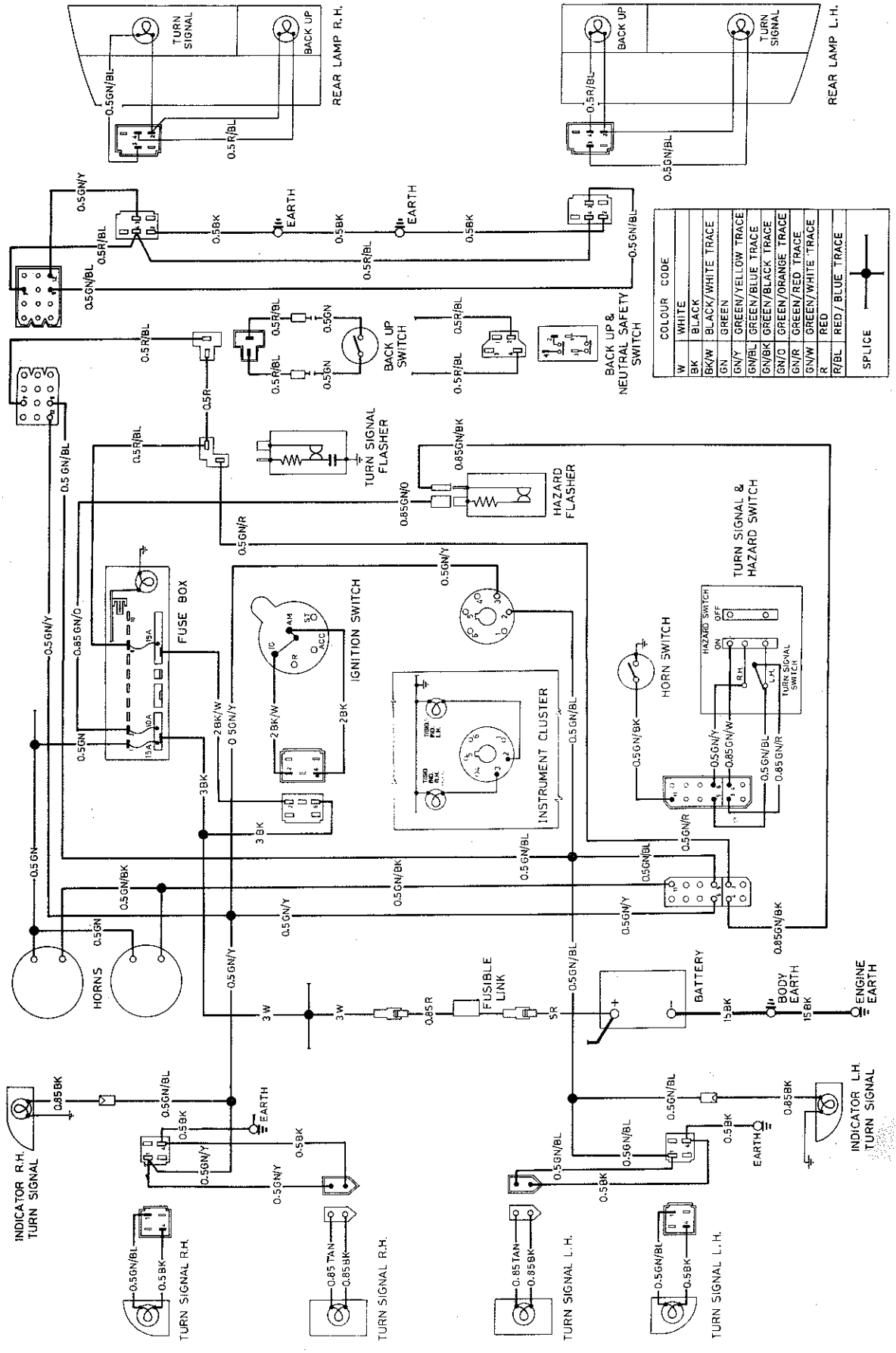


Fig. 11—Wiring diagram—headlamp, stop lamp and park lamp



MODEL APPLICATION
ALL G.E. SEDANS
(UP TO MAY 1978)

Fig. 12—Wiring diagram—turn signal, hazard, back up lamps and horns

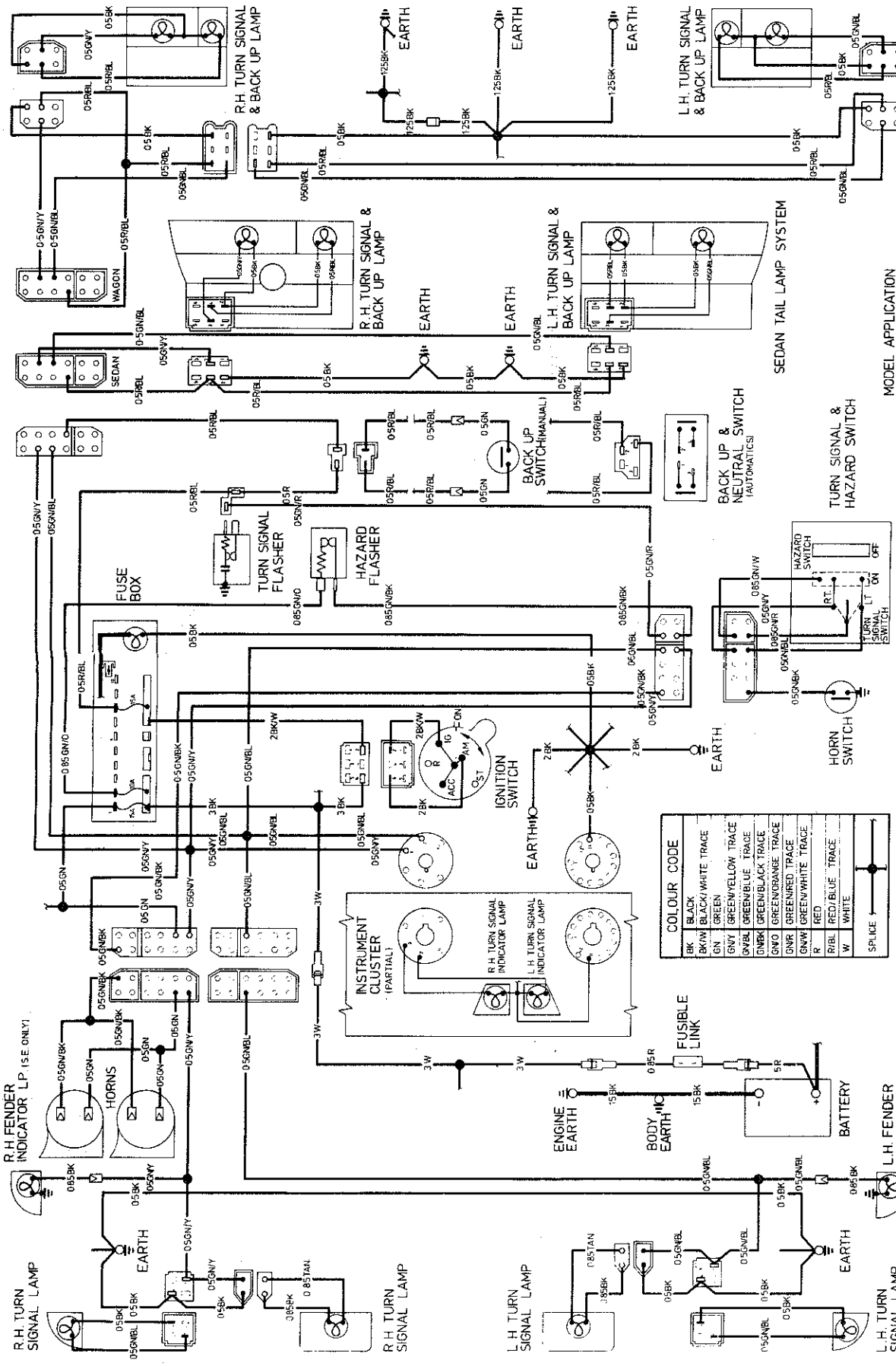


Fig. 13—Wiring diagram—turn signal, hazard, back up lamps and horns

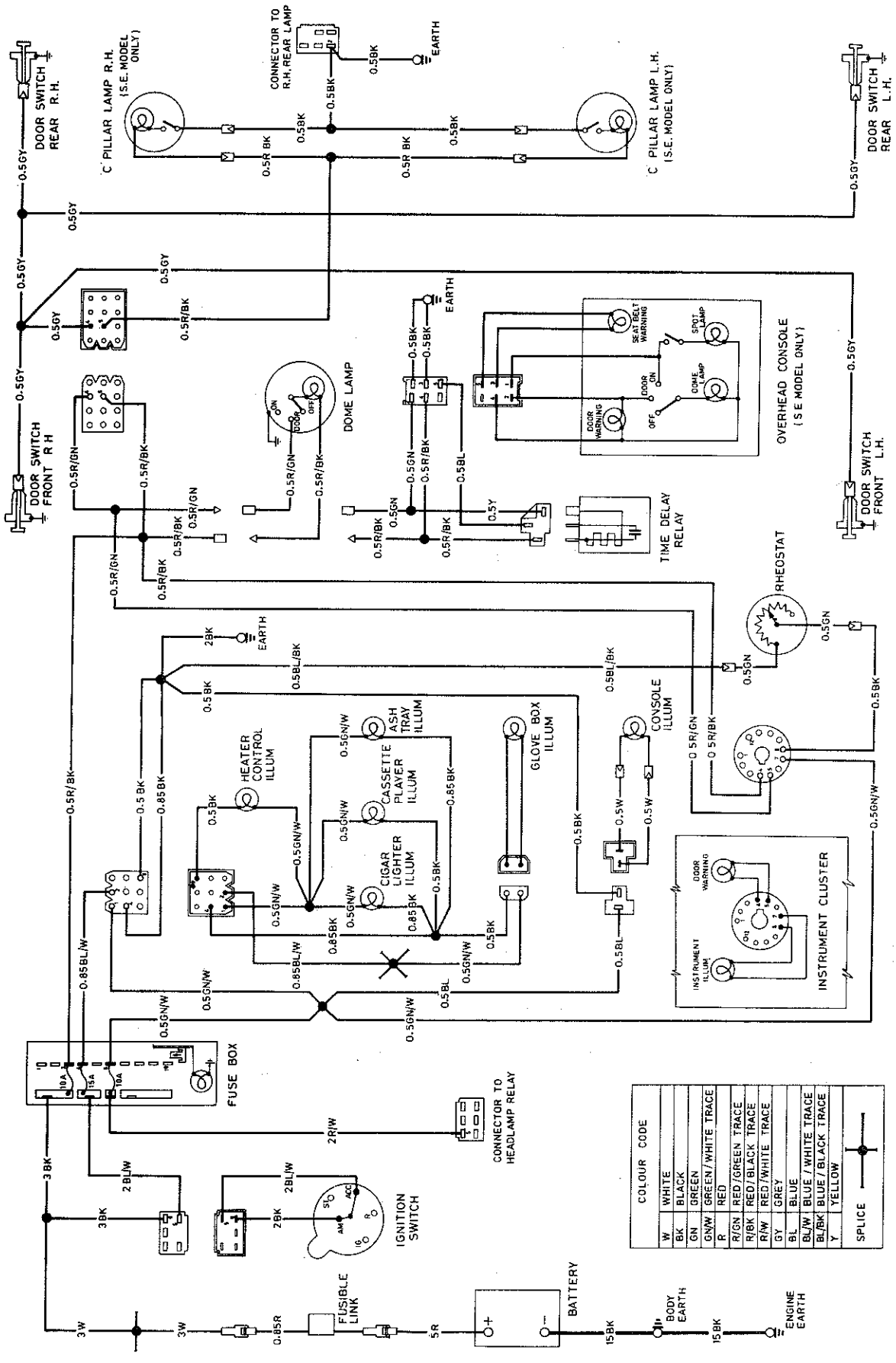


Fig. 14—Wiring diagram—interior lights

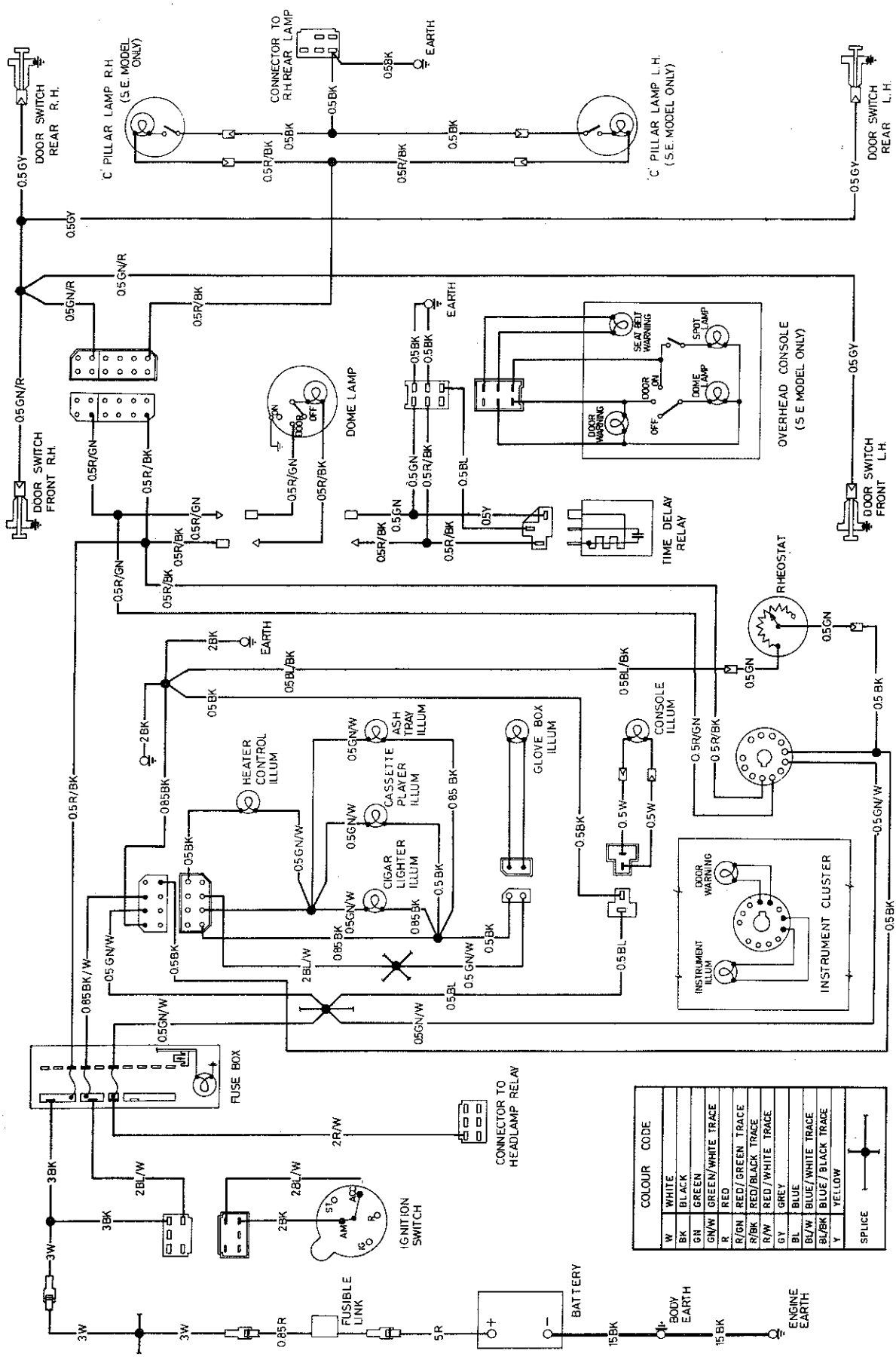


Fig. 15—Wiring diagram—interior lights

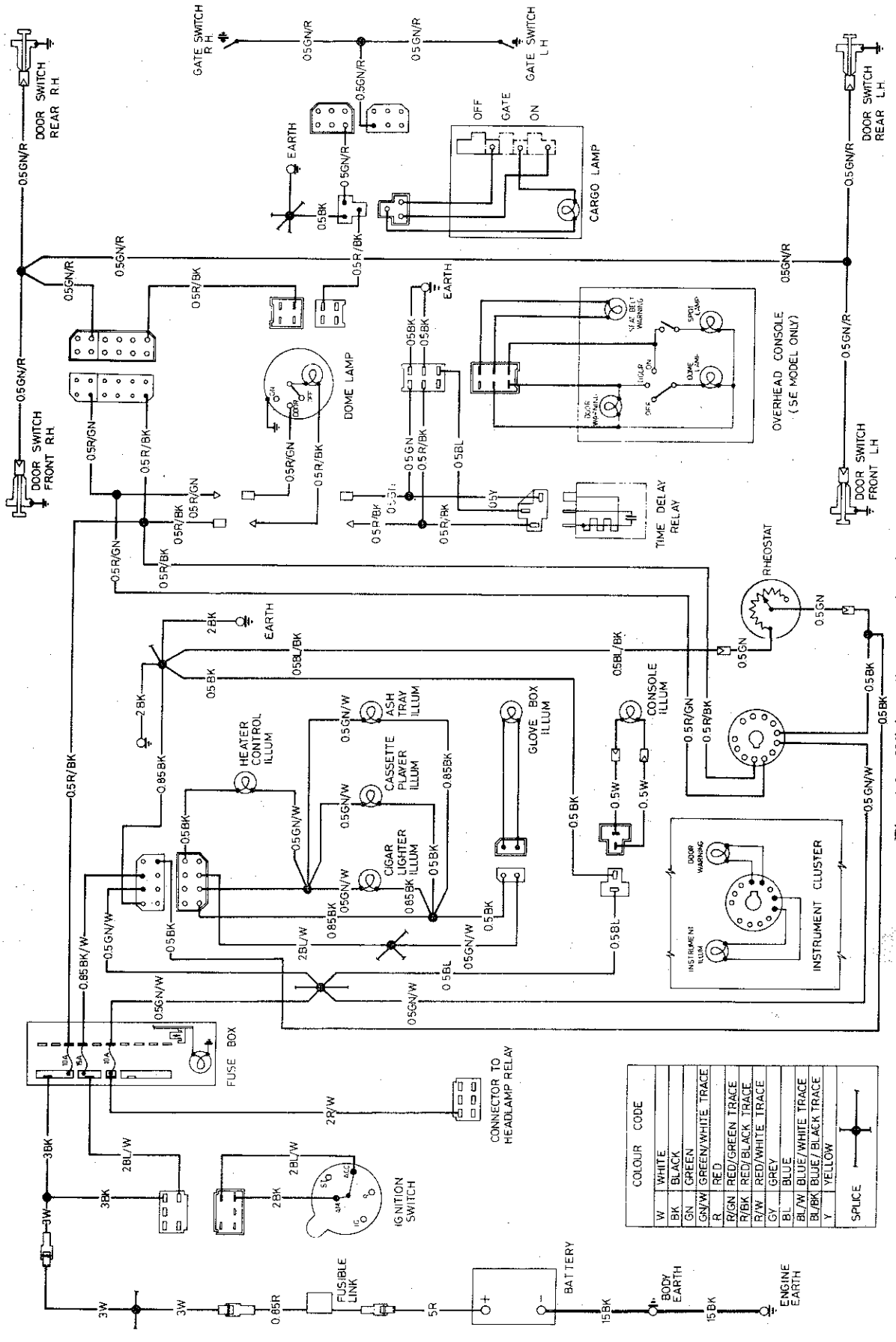


Fig. 16—Wiring diagram—interior lights

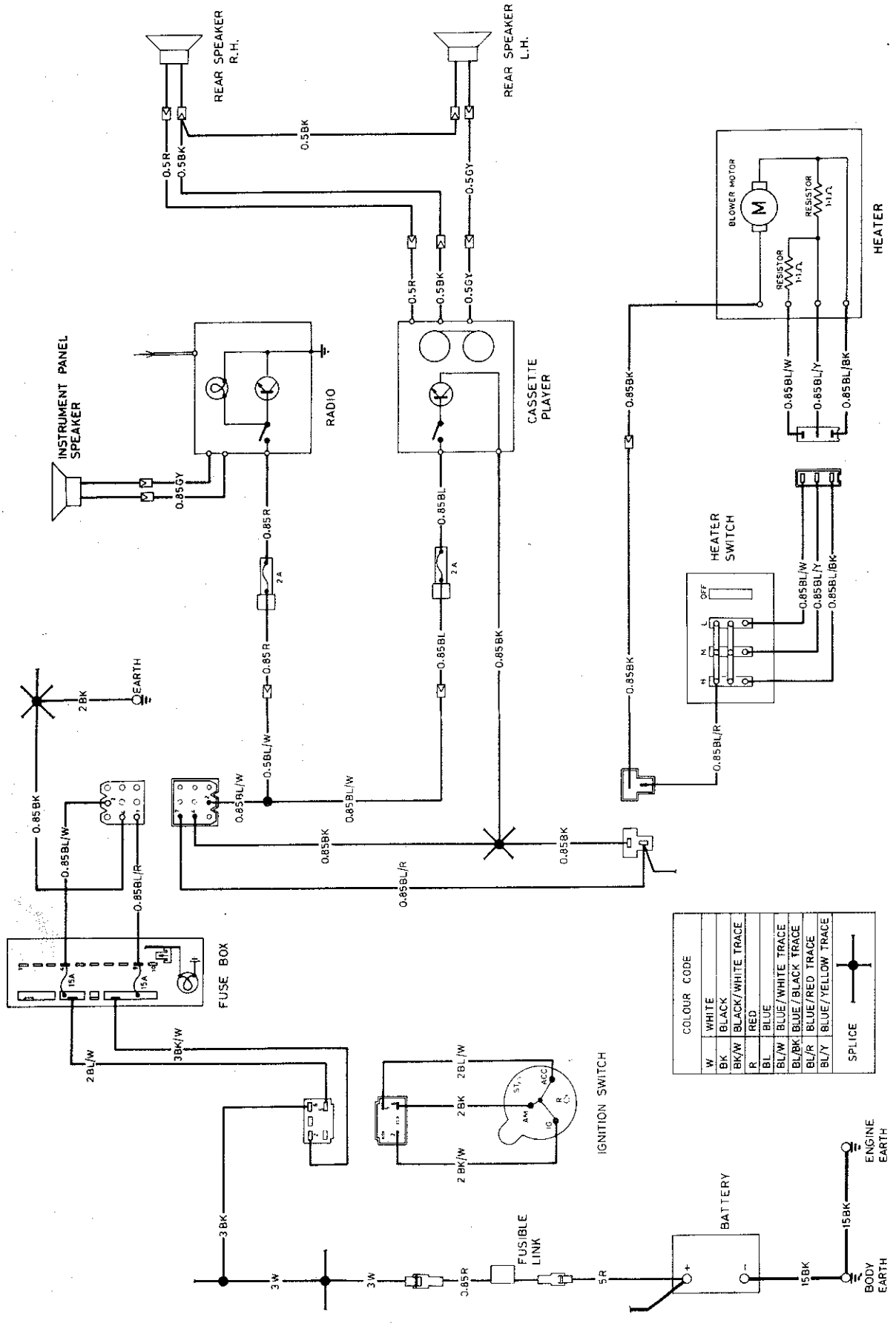


Fig. 17—Wiring diagram—radio, cassette and heater

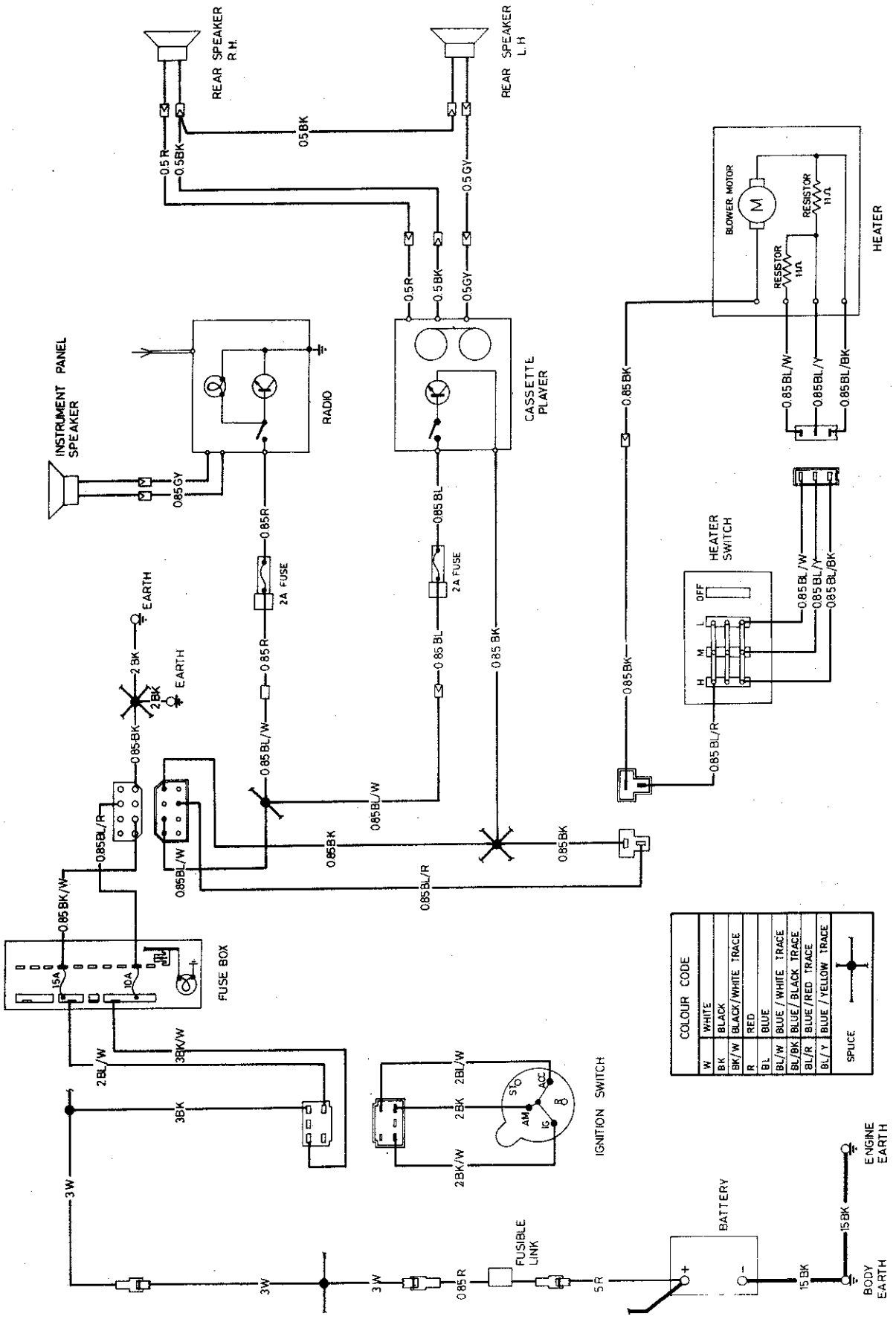


Fig. 18—Wiring diagram—radio, cassette and heater

MODEL APPLICATION
ALL 'GE' WAGON

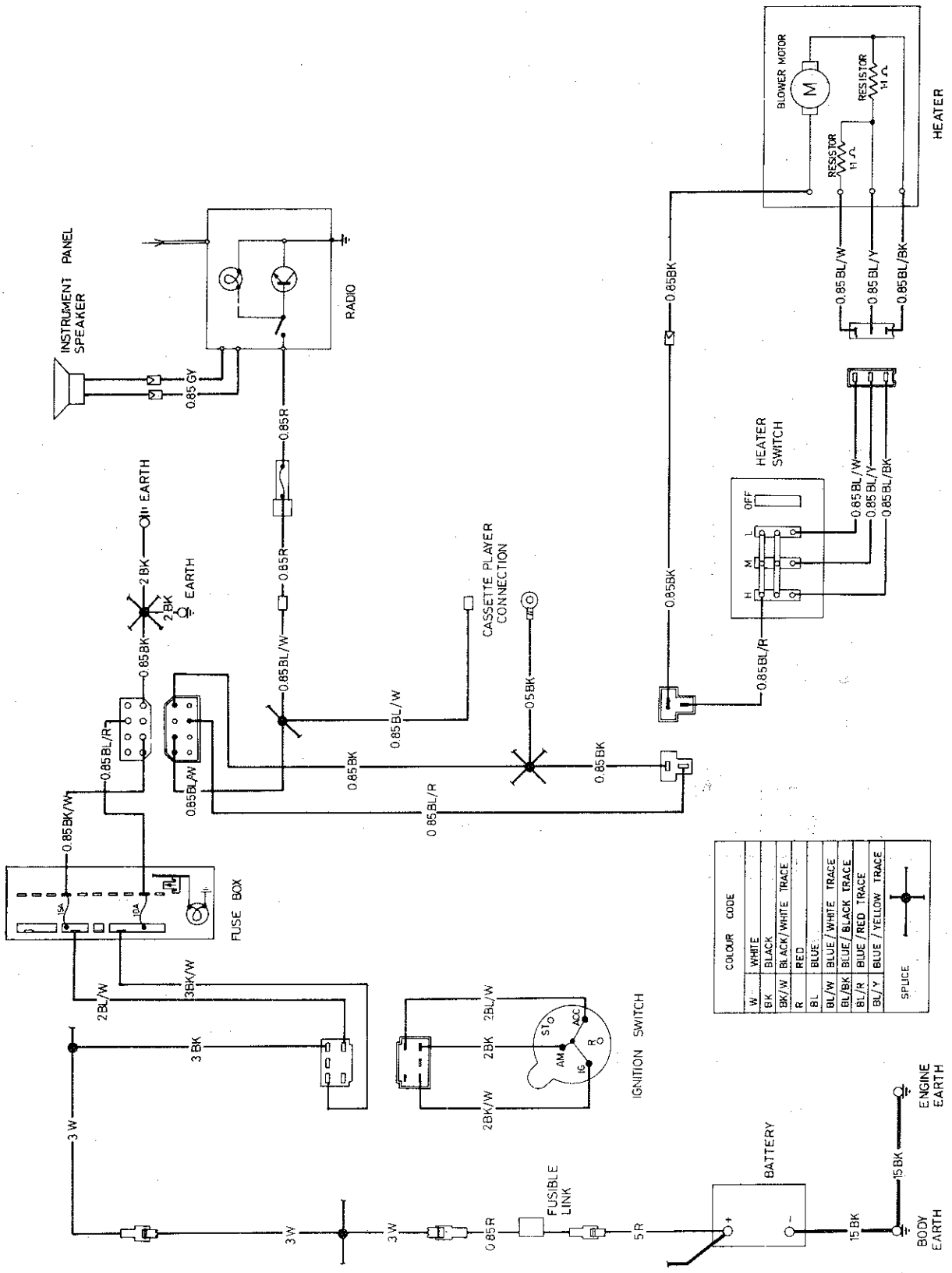


Fig. 19—Wiring diagram—radio, heater

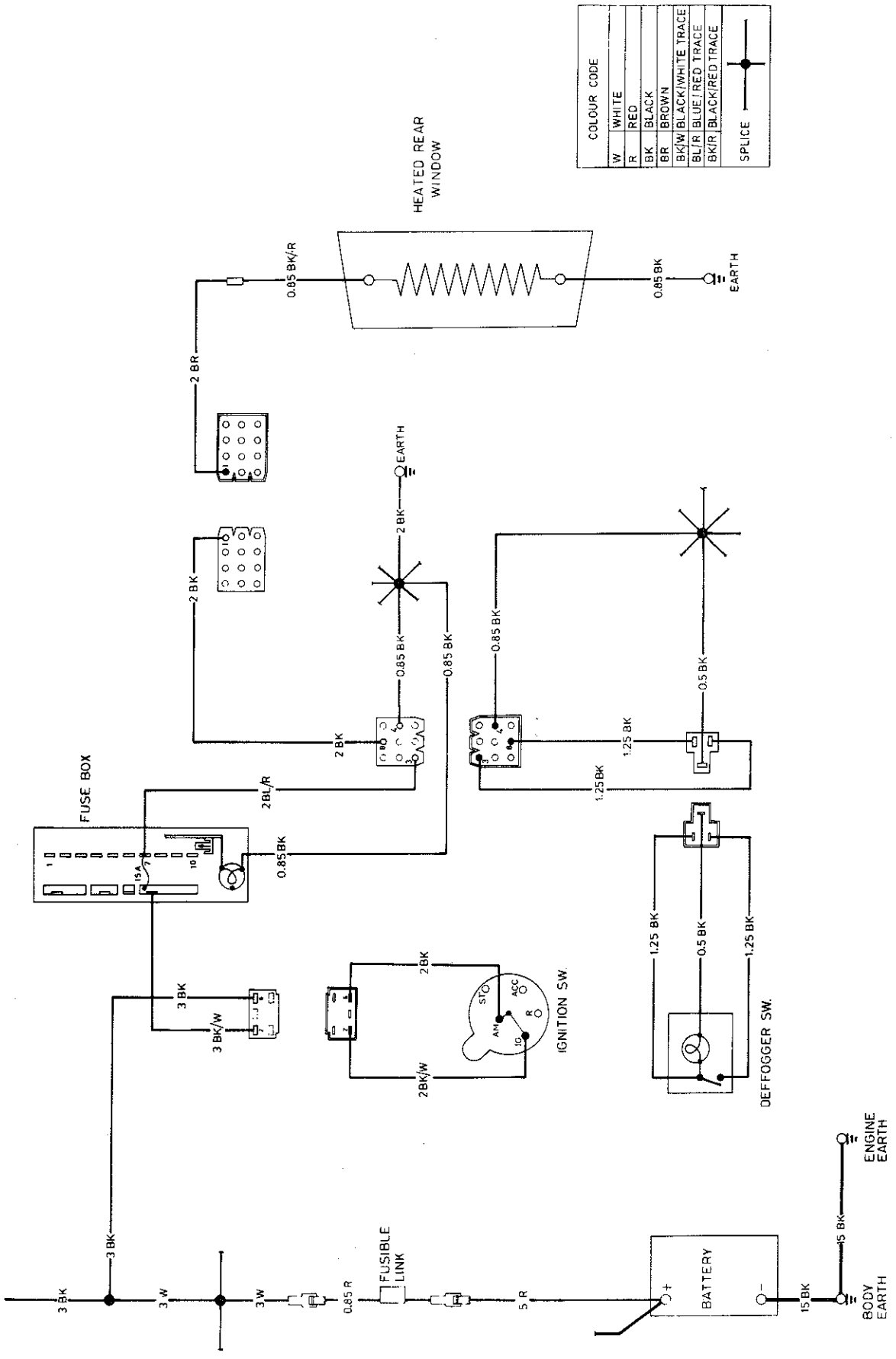


Fig. 20—Wiring diagram—heated rear window

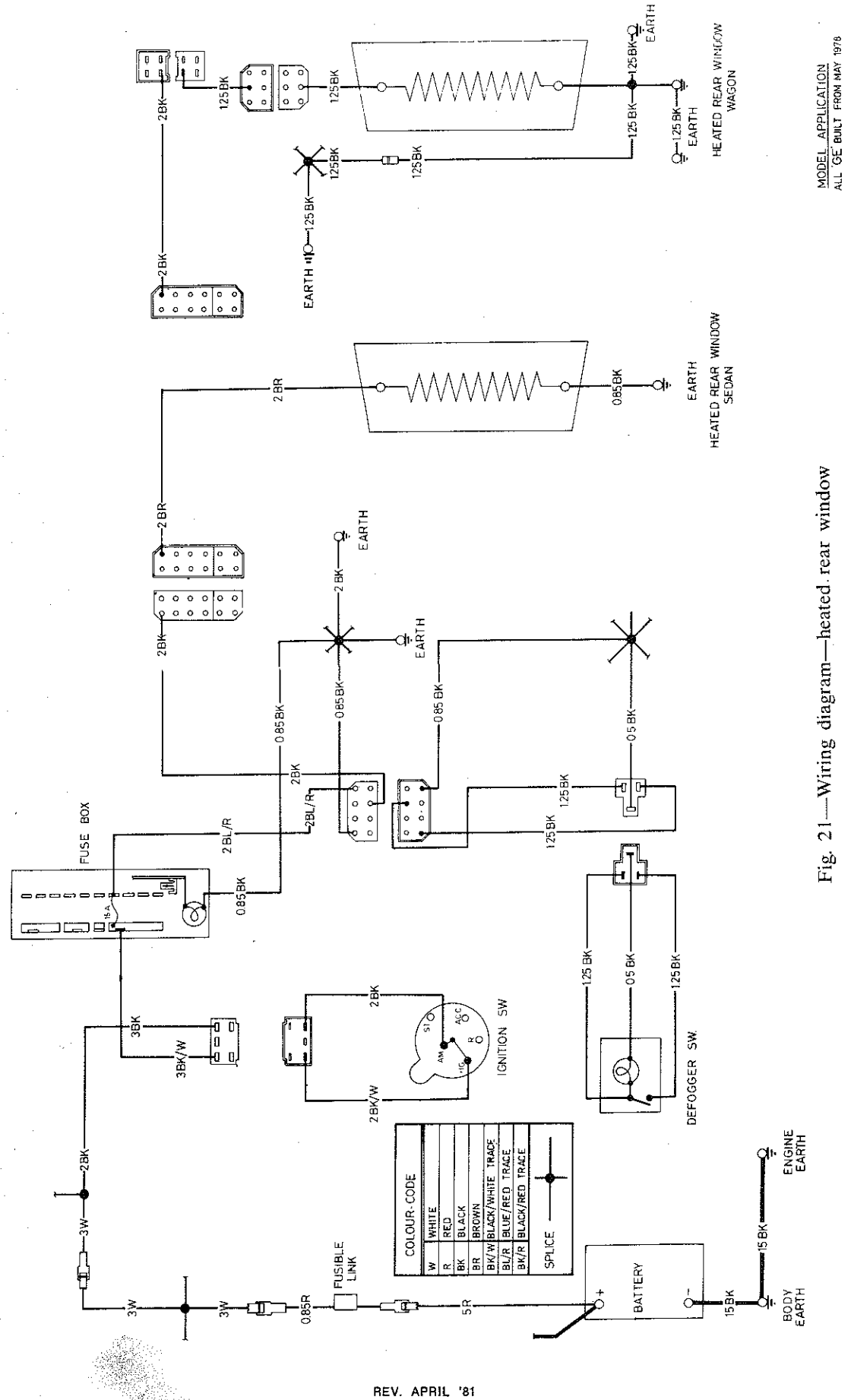


Fig. 21—Wiring diagram—heated rear window

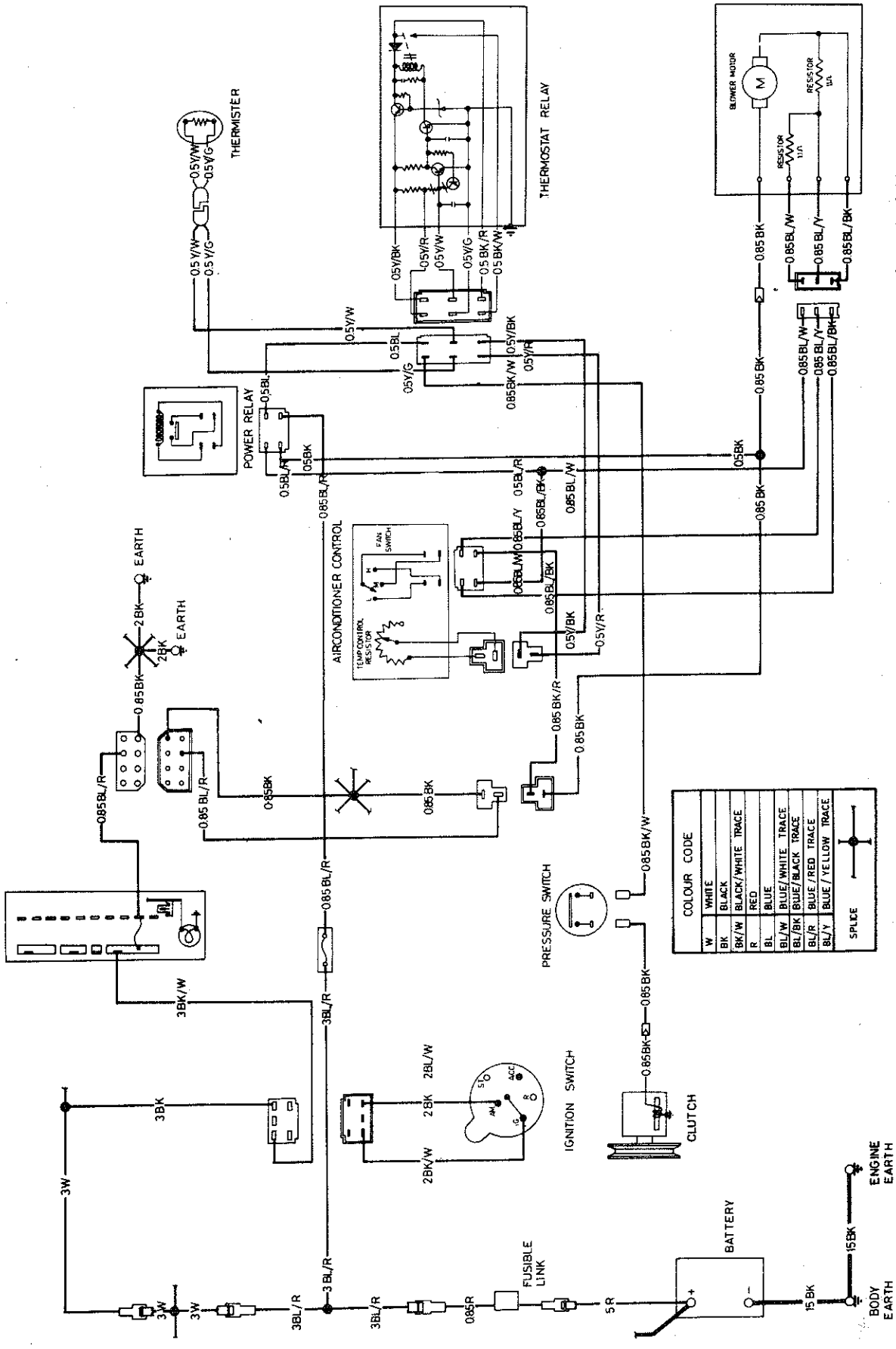


Fig. 22—Wiring diagram—air conditioning

SECTION 13 — COMBINATION SWITCH

GENERAL INFORMATION

The combination switch is situated at the top of the steering column and controls turn signal indicators, hazard warning lights, windscreen wipers/washers, parking lamps, head lamps and high beam selector. Should any failure occur with the switch, the complete switch assembly will have to be replaced as it is only serviced as an assembly.

SWITCH ASSEMBLY

Removal

(1) Position the steering wheel tilt mechanism to the lowest position.

(2) Remove the steering column cover.

(3) Disconnect the switch leads from the instrument panel wiring loom.

(4) Remove the horn pad by removing the retaining screws (std. type) or by unclipping the pad (sports and two door type), then remove the steering wheel retaining nut. Remove the steering wheel using Puller Tool No. E19M10A.

(5) Remove the screws securing the switch to the column and remove the switch.

Installation

(1) Install the switch to the column and secure the retaining screws.

(2) Position the switch wiring loom along the steering column centre line. Clip the loom securely to prevent it fouling any other parts. Connect the switch loom to the instrument panel loom.

(3) Install the steering wheel ensuring the road wheels are in the straight ahead position and that the cancelling pins of the column switch are inserted in the holes on the bottom surface of the wheel. Tighten the steering wheel retaining nut to 35 to 45 Nm (25 to 33 lbs./ft.).

(4) Install the horn pad and steering column cover.

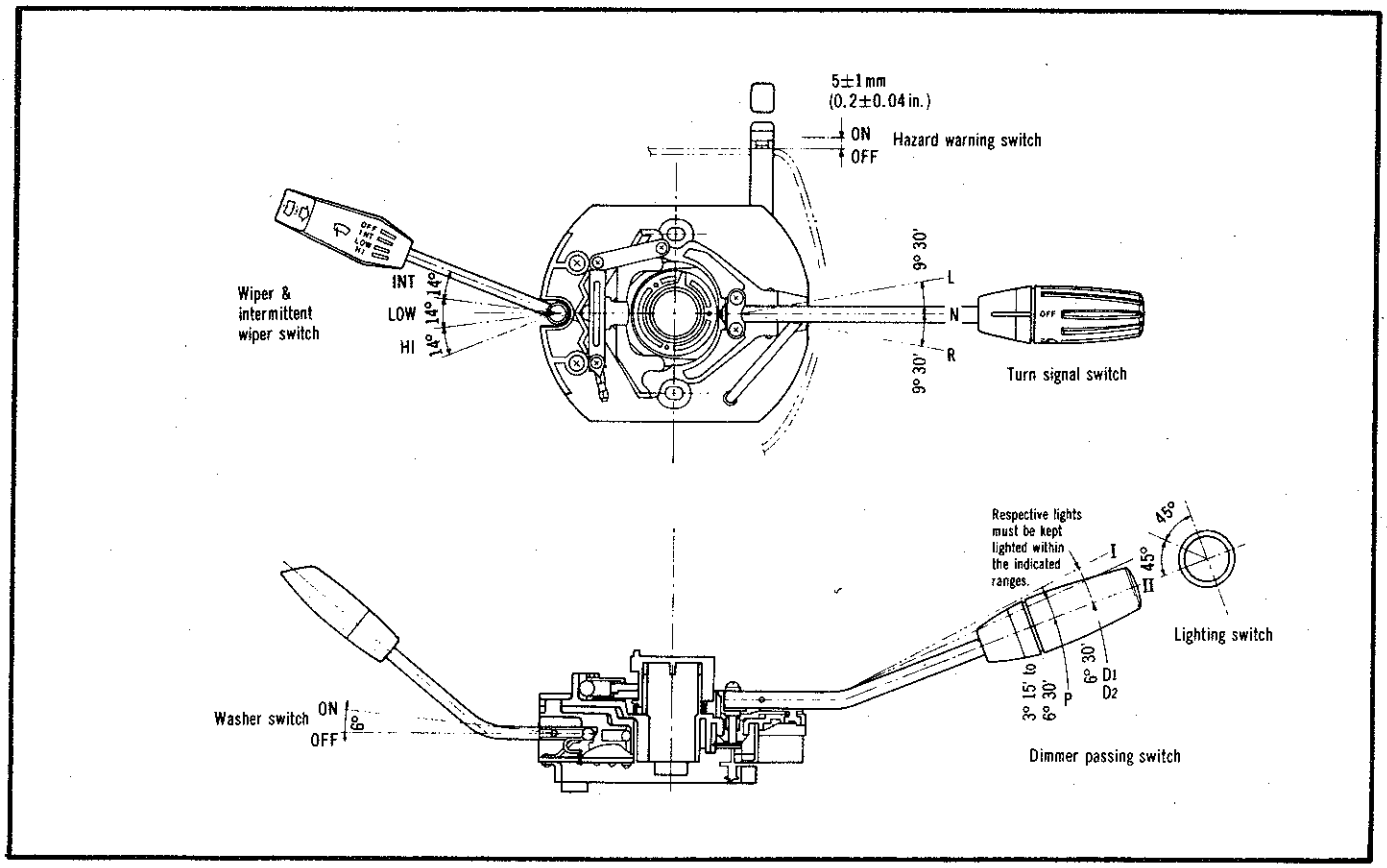


Fig. 1—Combination switch assembly