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Wiring Diagram at end of section

ALTERNATOR**86.10.00**

The Butec type A7/1A alternator is a high powered three phase machine which produces current even at idling speed.

Two replaceable heat sinks contained within the alternator, each carry three silicon type rectifying diodes. Individual diodes in a heat sink cannot be replaced. Three sensing diodes, mounted in a replaceable block attached to the A.C. terminals, permit a warning light to be used.

A built-in 0.15 micro-farad capacitor connected between the heat sinks is provided for smoothing transients.

Regulation is provided by a Butec type 2R/1 control box, which is mounted separately. Isolation of the field windings is provided by a relay in the ignition switch circuit

Replacement parts are only obtainable from Butec Service Depots.

CAUTION: When using electric-arc welding equipment in the vicinity of the engine, take the following precautions to avoid damage to the semi-conductor devices used in the alternator and control box and also the ignition system:

- Disconnect battery earthed lead.
- Disconnect alternator output cables.
- Withdraw regulator connector plug.
- Disconnect ignition amplifier unit.

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect the bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximately 30.5 cm (12 in.) long, 25.4 cm (10 in.) wide and 15 cm (6 in.) high. Ensure bonnet is adequately supported after disconnecting stay.

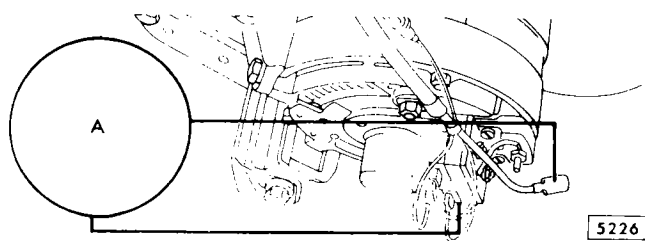
ALTERNATOR**Test – (in situ)****86.10.01**

Equipment required:

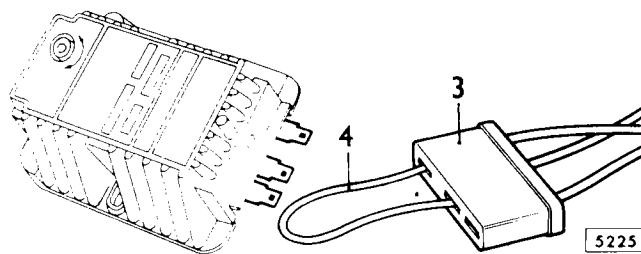
Moving coil ammeter or multi-range test meter 0–75 amperes.

Complete the following procedure to determine if a fault is due to the alternator, or to the regulator unit.

1. Disconnect cable from alternator main output terminal.
2. Connect ammeter between main output terminal and its cable.
3. Disconnect regulator unit.
4. Bridge field and negative leads of regulator cables with a jumper lead.
5. Start and gradually increase speed of engine. Zero reading on ammeter will indicate faulty alternator, but ammeter reading that increases with rising engine speed indicates faulty regulator unit.



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5225

ALTERNATOR

Remove and refit

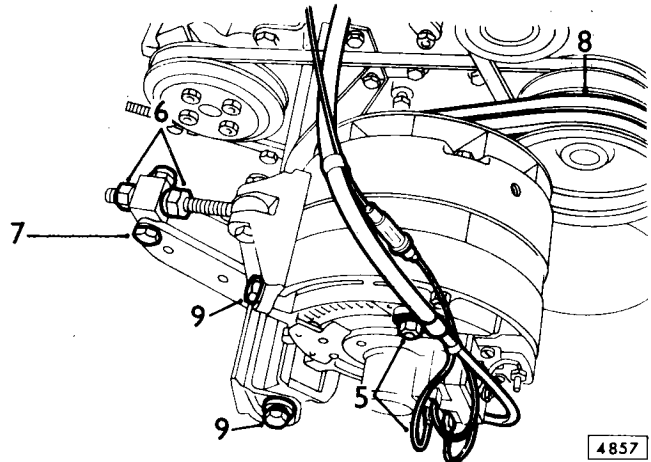
86.10.02

Removing

1. Disconnect battery – 86.15.19.
2. Remove **radiator cowl – 26.40.07.**
3. Remove header tank – 26.15.01.
4. Remove ignition coil fixings and move coil to one side to facilitate access to alternator mounting bracket.
5. Disconnect alternator leads and release cable clip on alternator minus terminal.
6. Release locknuts to slacken adjuster.
7. Slacken locknut and setscrew at adjustment sleeve.
8. Remove belts from alternator pulley.
9. Remove fixings securing alternator to its mounting bracket and detach adjuster.
10. Withdraw alternator up between engine and radiator.

Refitting

11. If replacement alternator is being fitted transfer the pulley, spacer and mounting brackets from the old unit to its replacement – 86.10.04.
12. Reverse operations 1 to 10.
13. Adjust drive belts – **86.10.05.**
14. Start engine and check that charging system operates satisfactorily.



4857

ALTERNATOR DRIVE BELTS

Remove and refit

86.10.03

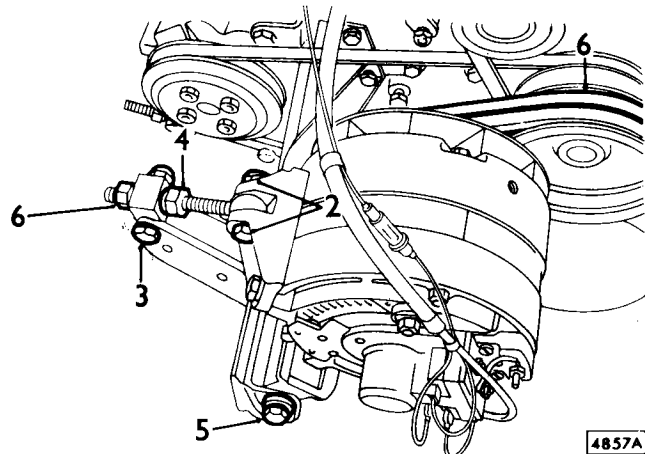
Removing

If one alternator drive belt is found to be faulty, both must be changed.

1. Disconnect battery – 86.15.19.
2. Slacken setscrew and locknut at adjustment bolt boss.
3. Slacken setscrew and locknut at adjustment sleeve.
4. Slacken locknuts on adjustment bolt.
5. Slacken two pivot setscrews.
6. Slacken outboard locknut until drive belts can be manoeuvred clear.

Refitting

7. Manoeuvre replacement belts into position.
8. Set drive belt tension; operations 6 and 7 of **86.10.05.**



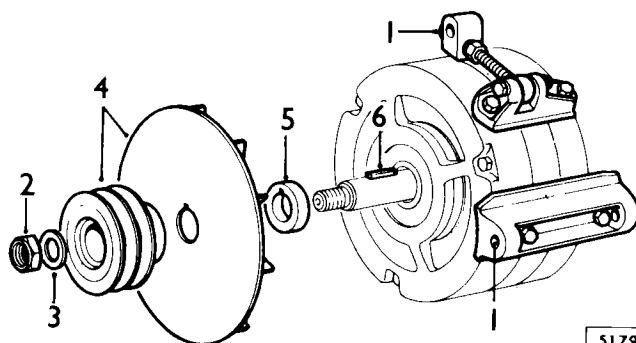
4857A

ALTERNATOR PULLEY**Remove and refit****86.10.04****Removing**

NOTE: The pulley is normally removed only when replacing an alternator and the alternator is separated from the car.

If it is found necessary to replace the pulley in situ, refer to operation 86.10.04/1.

1. Remove alternator – 86.10.02.
2. Restrain fan and pulley and remove shaft nut.
3. Recover plain washer.
4. Draw pulley and fan from shaft.
5. Recover spacer.
6. Remove drive key.

**Refitting**

Reverse operations 1 to 6.

ALTERNATOR PULLEY**Remove and refit – in situ****86.10.04/1****Removing**

1. Disconnect battery – 86.15.19.
2. Jam pulley and belt with screwdriver handle and start shaft nut.
3. Slacken setscrew and locknut at adjustment bolt boss.
4. Slacken setscrew and locknut at adjustment sleeve.
5. Slacken locknuts on adjustment bolt.
6. Slacken two pivot setscrews.
7. Slacken outboard locknut until drive belts can be manoeuvred clear.
8. Restrain fan and release shaft nut.
9. Prise fan and pulley from shaft.
10. Recover drive key and spacer.

Refitting

11. Fit drive key and spacer to drive shaft.
12. Fit fan and pulley to shaft.
13. Secure with plain washer and shaft nut.
14. Restrain fan and fully tighten shaft nut.
15. Adjust drive belts – **86.10.05.**

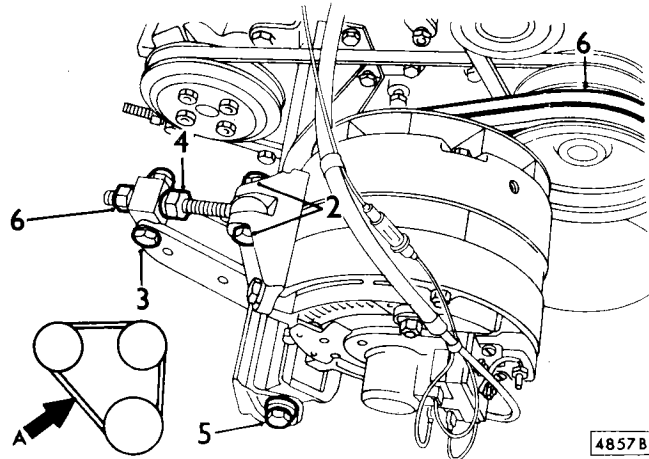
ALTERNATOR DRIVE BELTS

Adjust

86.10.05

CAUTION: It is very important that both drive belts are subject to the same tension. Any slight variation in the figures obtained for each belt may be rectified by vigorously exercising the tighter belt by hand, running the engine for a few seconds, then rechecking. If results are still not satisfactory, both belts must be changed.

1. Disconnect battery — 86.15.19.
2. Slacken setscrew and locknut at adjustment bolt boss.
3. Slacken setscrew and locknut at adjustment sleeve.
4. Slacken locknuts on adjustment bolt.
5. Slacken two pivot setscrews.
6. Use outboard locknut to set belt tension as follows:—
A load of 1,95 kg (4.29 lb.) applied at point A in the direction shown shall deflect the belt 1,5 mm (0.59 in.).
7. Retighten setscrews and locknuts loosened at operations 2, 3, 4 and 5.
8. Reconnect battery.

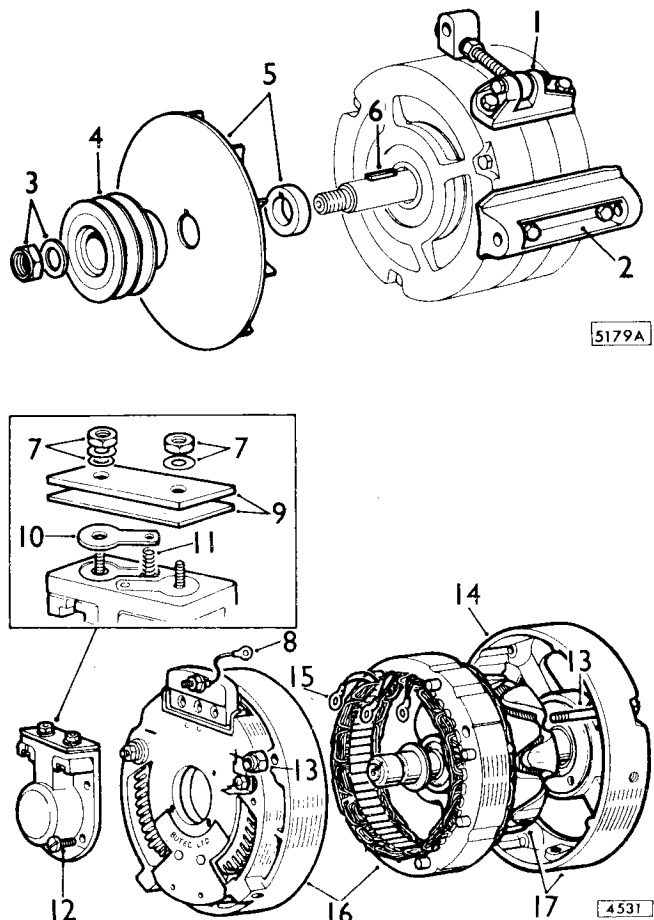


ALTERNATOR

Overhaul

86.10.08

1. Remove adjustment bolt mounting bracket.
2. Remove pivot bracket.
3. Remove nut and washer retaining pulley.
4. Withdraw pulley from shaft.
5. Withdraw fan and spacer.
6. Extract drive key from shaft.
7. Remove field terminal nuts and washers.
8. Detach jumper lead terminal.
9. Withdraw insulator cover and cork gasket from terminal posts.
10. Remove jumper plates from terminal posts.
11. Withdraw brush assemblies, it may be necessary to remove the centre screw from the field diode block terminals to enable inner brush assembly to be withdrawn.
12. Remove brush holder housing.
13. Remove through bolts and nuts.
14. Separate rotor and drive end housing from slip ring housing by tapping the slip ring end of the rotor shaft with a hide faced mallet.
15. Remove the three nuts from the field terminal posts and detach the stator winding terminals.
16. Separate the stator assembly from slip ring end housing, by inserting a medium sized screwdriver between the stator and end housing and carefully prising housing from the eight locating dowels in stator assembly.
17. Remove rotor from end housing by carefully tapping out with a hide faced mallet.



Rectifier testing, using ohmmeter

86.10.08/1

18. Positive terminal diodes

Connect negative lead of ohmmeter to terminal post of a diode and positive lead to the corresponding heat sink. Meter should indicate a low resistance.

19. Reverse polarity of meter connections. Reading should indicate a very high resistance or infinity.

20. Apply tests 18 and 19 to each of the two remaining positive terminal diodes.

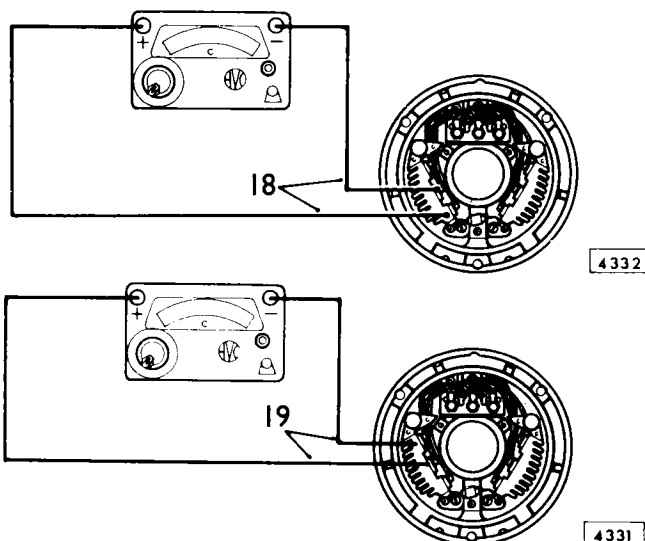
21. Negative terminal diodes

Connect positive lead of ohmmeter to terminal post of a diode, and negative lead to corresponding heat sink. Meter should indicate a low resistance.

22. Reverse polarity of meter connections. Reading should indicate a very high resistance or infinity.

23. Apply tests 21 and 22 to each of the two negative terminal diodes.

24. Any diode or diodes not operating properly will necessitate heat sink assembly replacement.



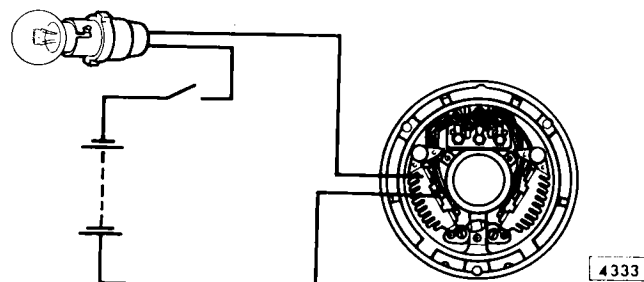
Rectifier testing, using 12 volt battery and test lamp – alternative method

86.10.08/2

25. If an ohmmeter is unavailable, a 12 volt battery and test lamp may be used to test the diodes. This test is basically the same as those detailed in 86.10.08/1 but with the battery and bulb replacing the ohmmeter. The results of the test procedure can be as follows:- If bulb lights in one direction only, the rectifier diode is good.

If bulb lights in both directions the diode is shorted.

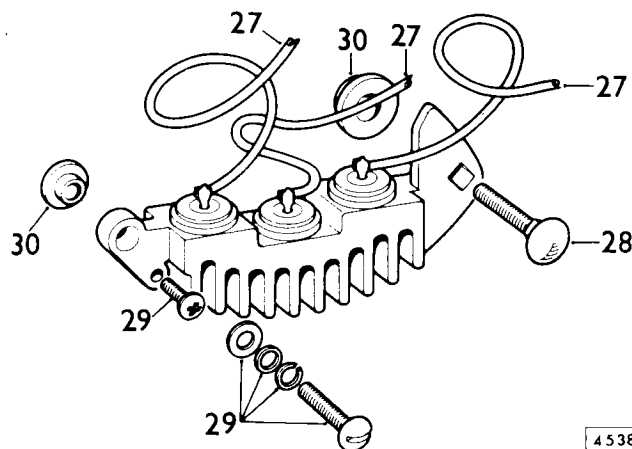
If bulb does not light in either direction, diode is open circuit.



Rectifier assembly replacement

86.10.08/3

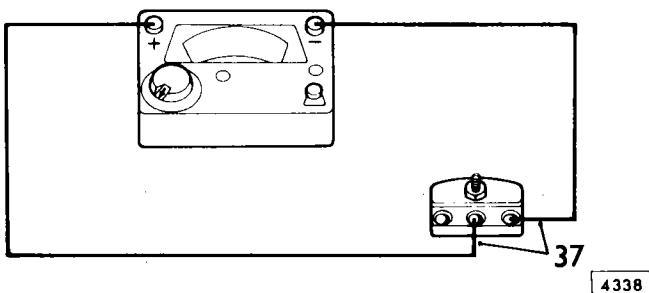
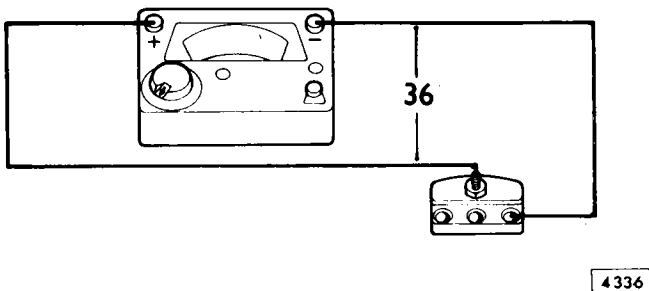
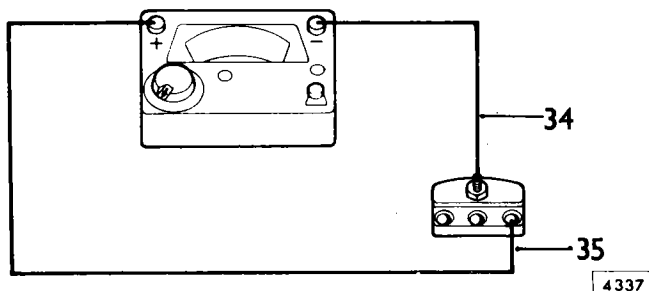
26. Detach capacitor lead from heatsink(s), secured by a screw.
27. Cut the three flexible leads of the diode/heatsink assembly(ies) to be replaced, at the crimped terminals.
28. Remove dome headed terminal bolt and nut from end housing.
29. Remove setscrews and washers retaining opposite end of heatsink to end housing.
30. Fit replacement rectifier assembly (of correct polarity) and ensure that large and small ceramic insulators and fibre washers are in their correct relative positions.
31. Remove the three A.C. terminal nuts.
32. Connect diode leads and refit terminal nuts.
33. Reconnect capacitor lead(s).



Testing field diode block

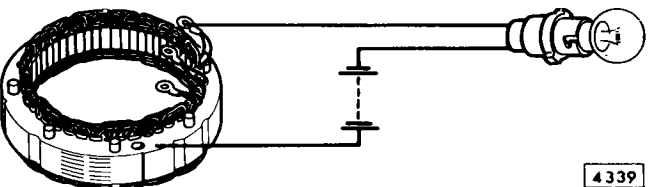
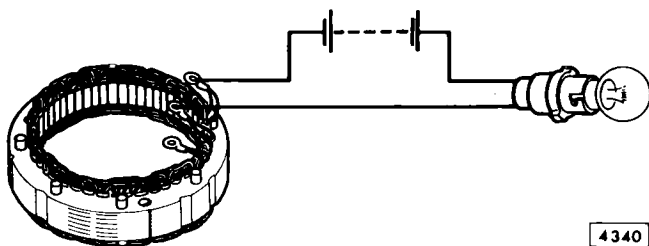
86.10.08/4

34. Connect negative lead of ohmmeter to terminal post of diode block.
35. Connect positive lead of ohmmeter in turn to each of the three other terminals. In each instance meter should indicate low resistance.
36. Reverse polarity of ohmmeter leads and again take reading at each of other three terminals. In each instance meter should indicate high resistance.
37. Use meter to check for leakage between each diode. Apply meter leads between any two of the three diodes in turn. No meter reading should be obtained.

**Stator and housing – checking**

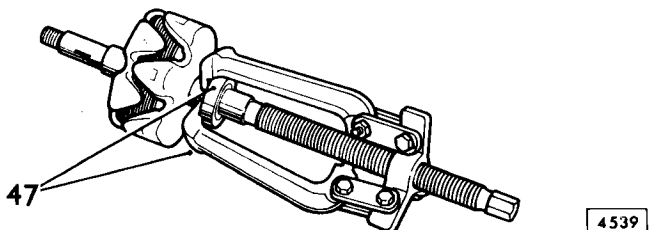
86.10.08/5

38. Blow away dust etc., from assembly using compressed air line. Avoid damaging the insulation of windings with nozzle of air line.
39. Visually inspect windings for broken wires, burn marks, or evidence of insulation damage.
40. Carefully clean stator housing with a cloth moistened in petrol, but avoid applying petrol to winding insulation.
41. Allow assembly to dry; then continuity test windings by connecting them in series with a test lamp and battery circuit. Connect each terminal to each of the other two in turn. At each test lamp should light.
42. Connect test lamp circuit between stator housing and each of the terminals in turn. If insulation is satisfactory, lamp should NOT light.

**Rotor bearing – replacement**

86.10.08/6

43. Unsolder wire from rotor coil to outer slip ring.
44. Bend wire so that it is parallel to shaft.
45. Unsolder wire from inner slip ring.
46. Use an extractor tool to remove slip ring assembly and insulating washer.
47. Withdraw bearing from rotor shaft using extractor tool.
48. Press on new bearing.

86.10.08/4
86.10.08/6

Slip ring – replacement

86.10.08/7

49. Store slip ring assembly in a warm place for some time prior to fitting; this will help to prevent cracking of the slip ring assembly when fitting.
50. Align slots in slip ring with slot in rotor shaft.
51. Press slip ring on to shaft until it is against the shoulder.
52. Solder coil leads to slip rings.
53. Mount rotor assembly between centres of a lathe and check concentricity of slip rings with a dial test indicator.
54. If necessary make a light smooth cut preferably using a diamond tipped tool. Limit, checked with dial test indicator, to be within 0,050 mm (0.002 in.) total indicator reading.
55. Temporarily fit through bolts into slip ring end housing (wrong way around) to facilitate alignment of stator assembly.
56. Locate stator assembly on through bolts and press down firmly to mate with slip ring end housing.
57. Connect stator windings and replace terminal nuts.
58. Fit rotor into end housing.
59. Align rotor and end housing with through bolts in stator assembly, ensuring that the threaded holes for the mounting brackets align with the corresponding ones in the slip ring end housing.
60. Press the assembly together carefully.
61. Withdraw through bolts and refit them so that their heads are at the driving end of the alternator.
62. Fit and tighten the locknuts.
63. Locate shaft key.
64. Fit fan with blades facing end housing.
65. Fit pulley with boss facing fan.
66. Fit washer and locknut to retain pulley.
67. Fit mounting brackets.

CONTROL BOX

Test – (in situ)

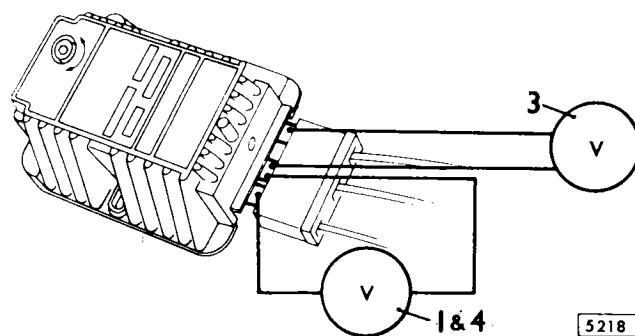
86.10.25

Special equipment – Moving coil voltmeter 0–30 Volts or multi-range testmeter.

The Butec R2/1 unit has no moving contacts, the switching operations being performed by transistors. All components are mounted upon a printed circuit base and housed in a sealed aluminium case which also serves as a heat sink. A socket headed plug in the case provides access to the output voltage adjustment screw.

CAUTION: DO NOT disconnect the battery whilst the alternator is running, or reverse the battery connections, otherwise damage will be caused to both regulator box and alternator.

1. With engine speed steady at 1000 r.p.m., and dipped head and side lights switched on, check that a voltage at least equal to battery voltage exists between positive (+) and negative (–) at the regulator terminals.
2. The control potentiometer may be incorrectly set; remove cover plug and adjust to 14 volts.
3. Note setting of control potentiometer; then rotate control fully clockwise and measure voltage between field and negative (–) terminals; this must be less than 1.5 volts. If so, the regulator is operating correctly; reset to original position. If regulator control box is faulty remove it for further testing or unit replacement.
4. Replace voltmeter between positive and negative regulator terminals.
5. Simultaneously switch on heater blower and main headlamp beam. Regulator output voltage must not change by more than 0.2 volts (steady reading).



CONTROL BOX

Remove and refit

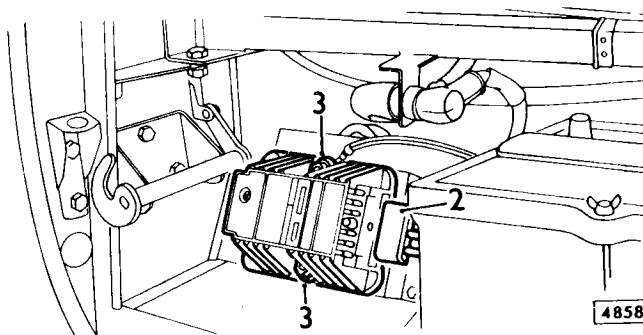
86.10.26

Removing

1. Disconnect battery – 86.15.19.
2. Detach connector plugs from regulator control box.
3. Remove regulator control box, secured by two screws.

Refitting

Reverse operations 1 to 3.



BATTERY

WARNING: THE BATTERIES FITTED TO THIS VEHICLE HAVE A SPECIAL ARRANGEMENT TO FACILITATE TOPPING UP. IT IS IMPERATIVE THAT THE MANIFOLD COVER IS LEFT IN POSITION WHILE THE BATTERY IS BEING RE-CHARGED.

Description

86.15.00

The battery, which is a special high performance type, is located in the engine compartment.

Data

Battery type: Lucas 12 volt XCA55/8
or Lucas 12 volt PACEMAKER CP13/11

BATTERY

Remove and refit

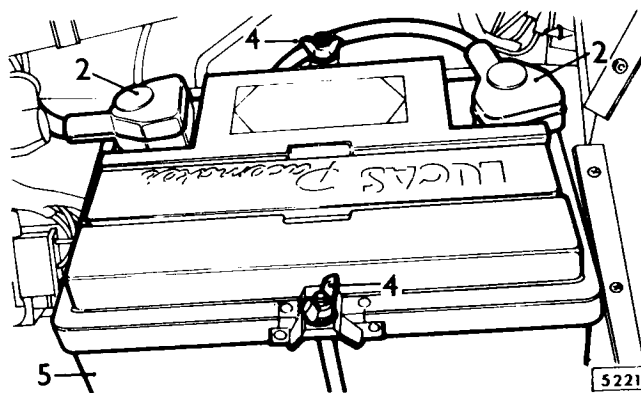
86.15.01

Removing

1. Raise bonnet.
2. Withdraw plastic covers from battery terminals.
3. Slacken terminal bolts and withdraw terminals.
4. Remove battery clamp, secured by two wing nuts.
5. Remove battery.

Refitting

6. Reverse operations 1 to 5. Smear battery terminal posts with petroleum jelly before fitting cables.
7. Restart electric clock on dashboard.



BATTERY**Test****86.15.02**

It is NOT possible to test this battery with a high rate discharge meter, due to the location of the intercell connectors. The battery top must not be drilled in an attempt to locate the connectors. Check the specific gravity of the electrolyte in each cell using an hydrometer. A variation of more than 40 points (0.040) in any cell reading means that the battery is suspect and should be removed for testing by a battery agent. If possible prove the battery by substitution.

State of charge S.G. readings

1. Lift and tilt the battery vent cover to one side.
2. Insert the hydrometer into each cell through the filling tube and note the readings.

STATE OF CHARGE	SPECIFIC GRAVITY READINGS CORRECTED TO 15°C (60°F)	
	CLIMATES NORMALLY Below 25°C (77°F)	CLIMATES NORMALLY Above 25°C (77°F)
FULLY CHARGED	1.270 – 1.290	1.210 – 1.230
70% CHARGED	1.230 – 1.250	1.170 – 1.190
DISCHARGED	1.100 – 1.120	1.050 – 1.070

Electrolyte Temperature Correction

For every 10°C (18°F) below 15°C (60°F), subtract 0.007.

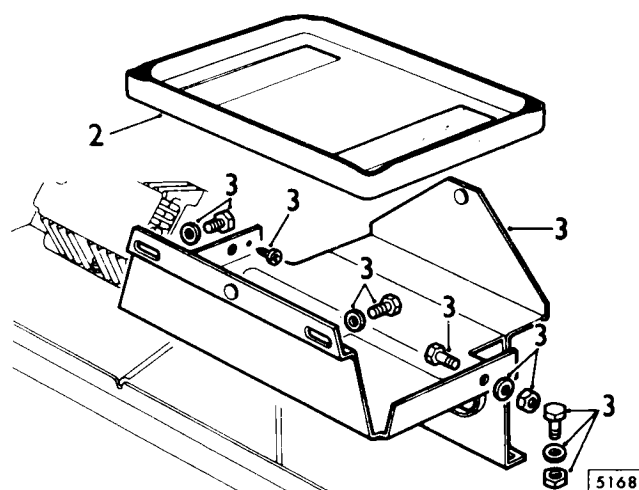
For every 10°C (18°F) above 15°C (60°F), add 0.007.

BATTERY CARRIER**Remove and refit****86.15.11****Removing**

1. Remove battery – 86.15.01.
2. Withdraw battery tray.
3. Remove battery carrier secured to the sill panel and valance.

Refitting

Reverse operations 1 to 3.



5168



BATTERY LEAD – POSITIVE

Remove and refit

86.15.17

Removing

1. Raise bonnet.
2. Lift plastic cover from terminal on battery post.
3. Release clamp bolt and remove terminal from battery post.
4. If necessary, remove lead from terminal post located on upper right hand engine sub-frame member.

Refitting

Reverse operations 1 to 4.

NOTE: Ensure that all connections are clean and metal to metal. Protect the battery terminal with a smear of petroleum jelly. Tighten all fixings.

BATTERY LEAD – NEGATIVE

Remove and refit

86.15.19

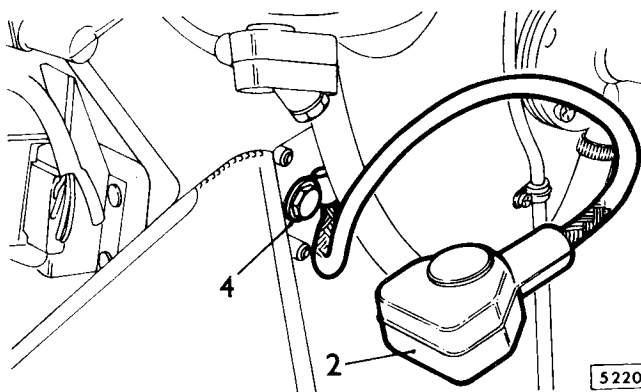
Removing

1. Raise bonnet.
2. Lift plastic cover from terminal on battery post.
3. Release clamp bolt and remove terminal from battery post.
4. If necessary, remove lead from bulkhead, secured by a setscrew and washer.

Refitting

Reverse operations 1 to 4.

NOTE: Ensure that all connections are clean and metal to metal. Protect the battery terminal with a smear of petroleum jelly. Tighten all fixings.



HORNS

Description

86.30.00

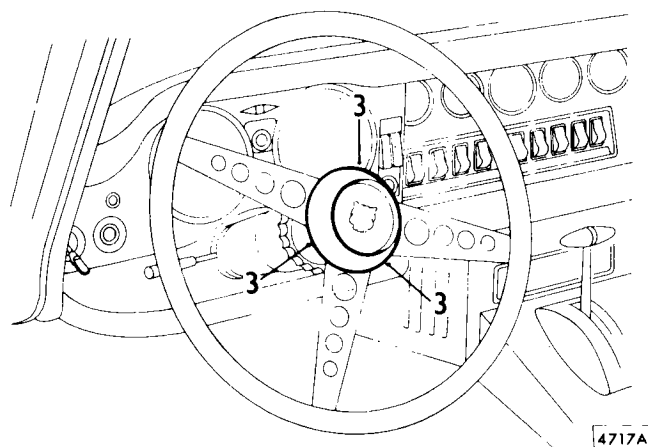
Twin horns are fitted, and are mounted on the crossmember below the radiator. Both horns operate simultaneously and are energised by a relay located on the right hand engine valance. The relay terminal W.1 is connected to the battery through the ignition switch, so that the horns will only operate whilst the ignition is switched 'ON'.

HORN SWITCH**Remove and refit****86.30.01****Removing**

1. Disconnect battery – 86.15.19.
2. Set steering wheel in fully raised position.
3. Remove horn push assembly secured by three screws in steering wheel boss.
4. Withdraw switch contact assembly from steering column.

Refitting

Reverse operations 1 to 4.

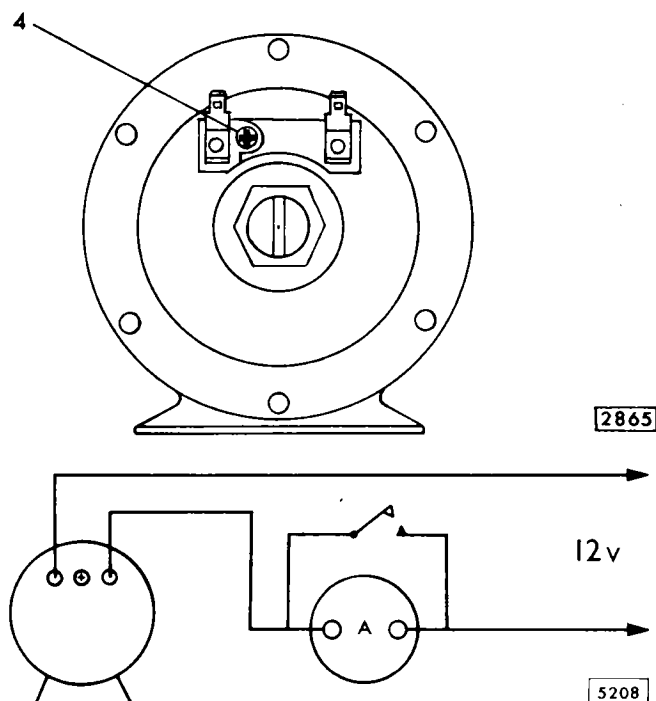
**HORNS****Adjust****86.30.08**

The horn adjustment screw provides for the take up of wear of moving parts, but does not affect the pitch of the note.

1. Raise bonnet.
2. Detach supply lead to horn.
3. Connect an ammeter (0-25A range) or a suitable multi range testmeter, in series with the horn and its supply lead.

NOTE: To prevent overloading of ammeter whilst making adjustments, connect an ON/OFF switch in parallel with ammeter terminals. Keep switch ON except when taking readings, i.e. when horn is sounding.

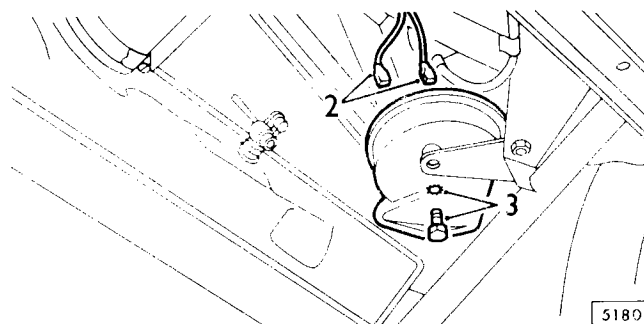
4. Turn adjustment screw anti-clockwise until horn just fails to sound.
5. Turn adjustment screw clockwise until horn operates within the limit of 6.5 to 7.0 amperes.
6. Horns not responding to adjustment should be replaced.

**HORNS****Remove and refit****86.30.09****Removing**

1. Disconnect battery – 86.15.19.
2. Detach wiring at 'Lucar' connectors on horn body.
3. Remove horn(s).

Refitting

Reverse operations 1 to 3.

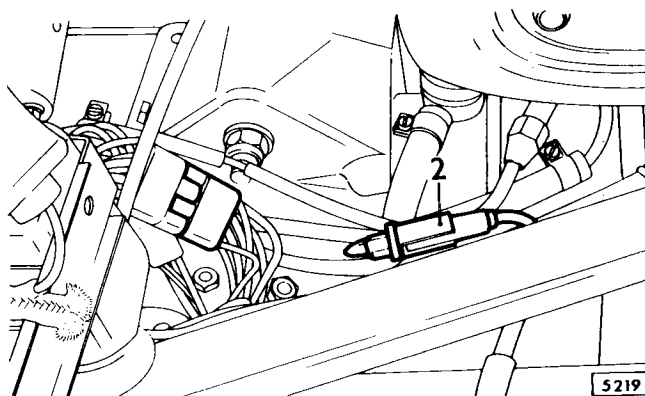


HORN CIRCUIT

Check (Horns inoperative)

86.30.16

1. Check fuse No. 7 located on right hand side behind front dash panel.
2. Check in line fuse located on right hand top engine sub-frame member.
3. Check that 'Lucar' connectors at relay have not become detached.
4. Check that 'Lucar' connectors at horns have not become detached.
5. Check wiring at each horn using a 12 volt test lamp connected in place of the horn.
6. Check relay – 86.30.17.
7. Check horn control on steering column.



HORN RELAY

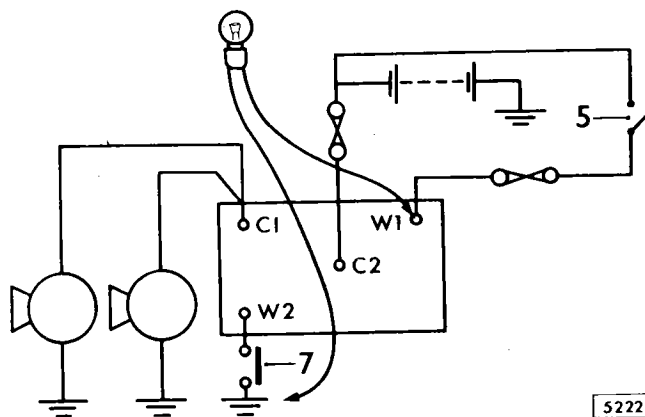
Check – (in situ)

86.30.17

1. Cars equipped with exhaust emission control equipment – remove absorption canister – 17.15.13.
2. Switch ignition 'ON'.

NOTE: Avoid leaving ignition switched on for long periods when making tests.

3. Connect 12 volt test lamp leads between terminal W.1. (green) of relay and a good earth point. If lamp does not light, check fuse No. 7.
4. Transfer test lamp lead to relay terminal W.2. (purple/black); lamp should light indicating continuity through relay winding.
5. Transfer test lamp lead to relay terminal C.2. (brown), if test lamp does not light check line fuse located on right hand top engine sub-frame member.
6. Transfer test lamp lead to relay terminal C.1. (purple/yellow), short relay terminal W.2. to earth; lamp should light indicating relay contacts are closed and relay is working. Failure of lamp to light means relay replacement.
7. Failure of horns to operate, must now be due to horn control, associated wiring, or defective horns.



HORN RELAY

Remove and refit

86.30.18

Removing

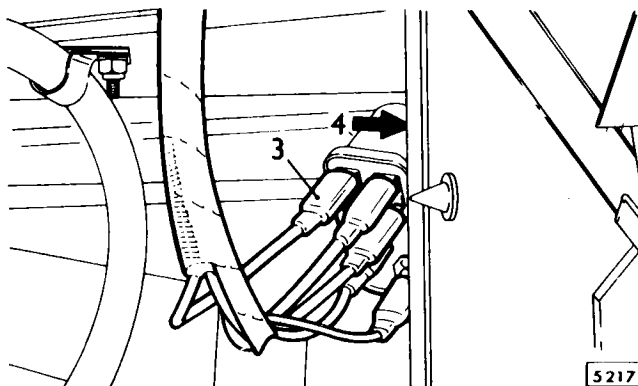
1. Cars equipped with exhaust emission control equipment – remove absorption canister – 17.15.13.
2. Disconnect battery – 86.15.19.
3. Detach leads from relay.
4. Remove relay, secured by two screws.

Refitting

Reverse operations 1 to 4.

NOTE: Wiring identification:

Relay terminal W.1. green lead.
 Relay terminal W.2. purple/black lead.
 Relay terminal C.1. purple/yellow lead.
 Relay terminal C.2. brown lead.



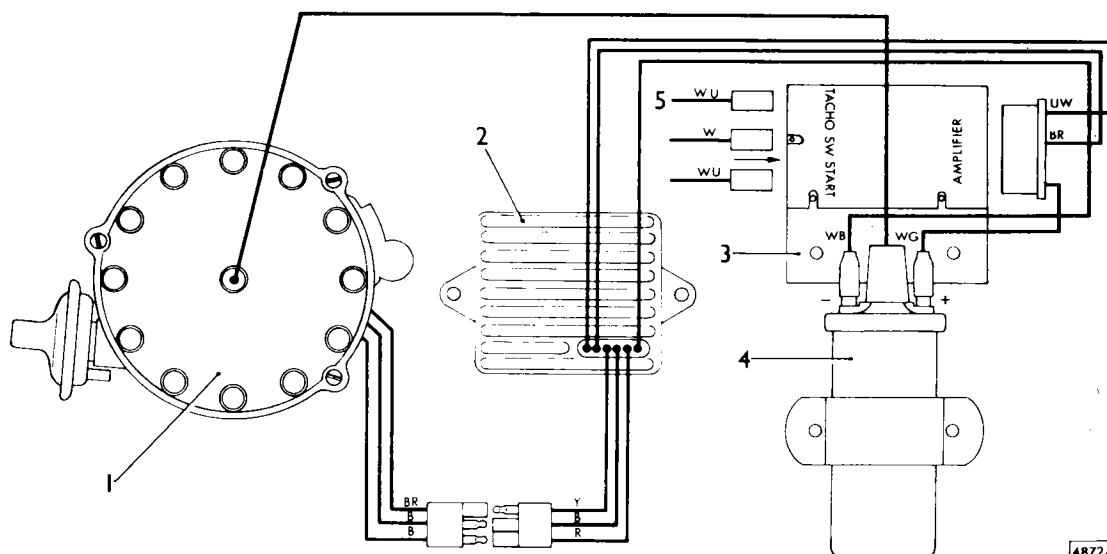
THE IGNITION SYSTEM

Description

86.35.00

'OPUS' Electronic ignition system, which is fitted, comprises the following:—

CABLE COLOUR CODE	
B	Black
R	Red
W	White
U	Blue
Y	Yellow
G	Green



4872A

The Distributor

The 'OPUS' distributor comprises:—

1. A centrifugal auto-advance mechanism.
2. Retard type vacuum unit.
3. High tension rotor.
4. Electronic timing rotor.
5. Pick-up module assembly.

The timing rotor and pick-up module, working in conjunction with a separate amplifier unit, replace the contact breaker and cam of a conventional distributor.

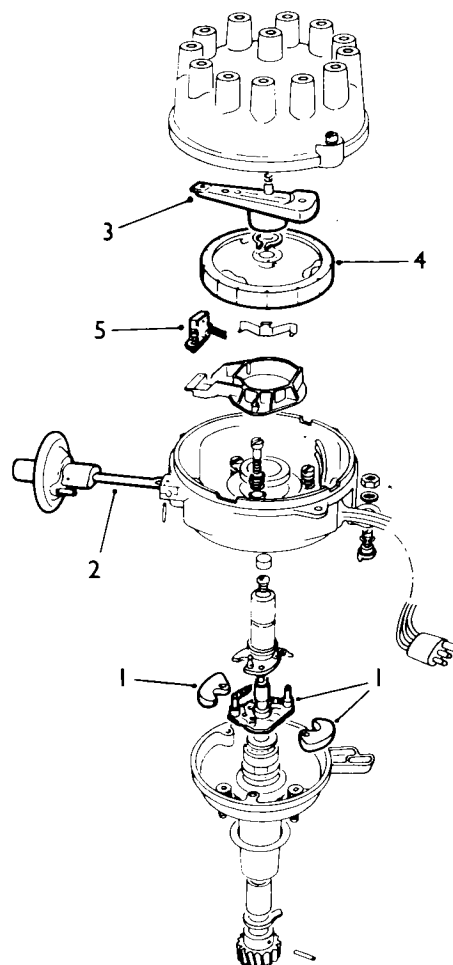
The timing rotor is a glass-filled nylon disc with small ferrite rods embedded into its outer edge, the number and spacing of the rods corresponding with the number of cylinders and firing angles of the engine. An air gap (adjustable to specified limits) exists between the rotor and the ferrite core of the stationary pick-up module. The pick-up module assembly comprises a magnetically-balanced small transformer, with primary (input) and secondary (output) windings.

CAUTION: Magnetic balancing of the pick-up module. This unit is balanced during manufacture and the setting cannot alter in service. The sealed ferrite adjusting screw must not be disturbed.

Automatic control of retard-ignition timing is provided by the vacuum unit which varies the static timing position of the pick-up module in relation to the ferrite rods in timing rotor.

The distributor timing rotor and pick-up module generate an electronic timing signal, which is fed to the amplifier unit via external cables.

CAUTION: The length of this triple-core extruded type cable must not be altered and the cables must not be separated or replaced by loose individual cables.



4873

Amplifier Unit – Item 1

This interprets the timing signals from the distributor. The power transistor incorporated in the printed circuit then functions as an electronic switch in the primary circuit of the ignition coil. The unit is connected to the ignition coil via a ballast resistance unit and external cables.

Ballast Resistance Unit – Item 2

An encapsulated assembly comprising three resistors in an aluminium heat sink fixing bracket. External wiring connects two of the resistors in series with the ignition coil primary winding. The third resistor unit is associated with the function of one of the transistors in the amplifier unit.

Ignition Coil – Item 3

A specially designed fluid-cooled, high-performance, ballast-ignition ignition coil. The coil terminals are marked '+' and '-' and have different types of Lucar connector to prevent incorrect cable connection.

CAUTION: The 'OPUS' coil is NOT interchangeable with any other type.

Operation

Normally when the engine is stationary, the distributor timing rotor will be in a position where none of the ferrite rods will be in close proximity with the ferrite core of the pick-up module.

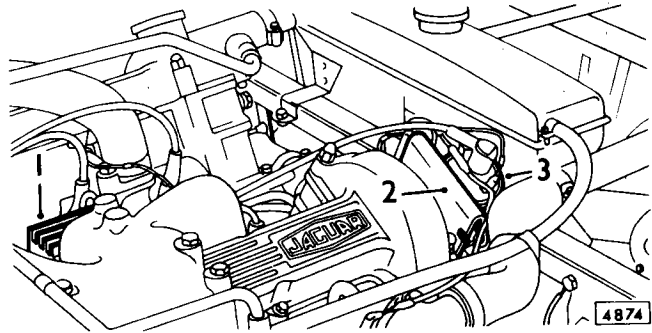
When the ignition is switched on, a power transistor in the amplifier unit is in a conductive state and the ignition coil primary winding circuit is complete via the emitter/collector electrodes of the power transistor.

Simultaneously, a sinusoidal (pulsating a.c.) voltage is applied by the amplifier unit to the distributor pick-up module primary windings and a small residual a.c. voltage is produced at the pick-up secondary windings which at this stage is magnetically balanced. The voltage at the pick-up module secondary terminals is applied to the amplifier unit, but the residual voltage at this stage is insufficient to have any effect on transistor circuits which control the switching off of the power transistor in the output stage of the amplifier unit.

When the engine is cranked, one of the ferrite rods in the rotor, now brought into close proximity with the ferrite core of the module causes "magnetic unbalancing" of the module core, resulting in an increase in the voltage at the module output terminals.

This "unbalancing" and voltage increases to maximum as the rotor rod traverses the centre and upper limbs of the module 'E' shaped core.

Maximum voltage is then applied to the amplifier unit, where it is rectified, the resulting direct (d.c.) current is then used to operate the transistor circuits which control the switching off of the power transistor in the output stage. With the power transistor switched off, its emitter/collector electrodes cease to conduct and the coil primary winding is disconnected which causes a rapid collapse of the primary winding magnetic field through the secondary windings of the ignition coil, resulting in a high-tension (H.T.) voltage being produced at the H.T. output terminal of the ignition coil.



Data

1. Nominal voltage 12V (Negative Earth)
2. Stall current (measured at 'SW' terminal of ballast resistance unit) 5.0 – 6.5A
3. Ignition coil primary winding resistance (measured between L.T. terminals '+' and '-') 0.8 – 1.0 ohm at 20°C
4. Distributor Pick-up Module
 - (a) Primary (input) winding resistance (measured between centre terminal and outer terminal with red cable) 2.5 ohms nominal at 20°C
 - (b) Secondary (output) winding resistance (measured between centre terminal and outer terminal with black cable) 0.9 ohm nominal at 20°C
 - (c) Gap between pick-up-module 'E' core faces and timing rotor-outer edge 0.50 mm – 0.55 mm (0.020 in – 0.022 in)
5. Centrifugal Auto-advance Details
Run up to 100 distributor rev/min. and set gauge to read zero degrees.
Check at following speeds.

Distributor R.P.M.	Distributor advance degrees
350	No advance
550	1.0 – 3.5
750	5.5 – 7.5
950	6.0 – 8.0
1750	8.0 – 10.0
2900	11.0 – 13.0
3500	11.5 – 13.5
6. Distributor retard
 - (a) With rising vacuum at 17.7 cm (7 in) hg. and up to 25.3 cm (13 in) hg. 7 – 9 degrees
 - (b) With falling vacuum at 25.4 mm (1 in) hg. No retard



DISTRIBUTOR CAP

Remove and refit

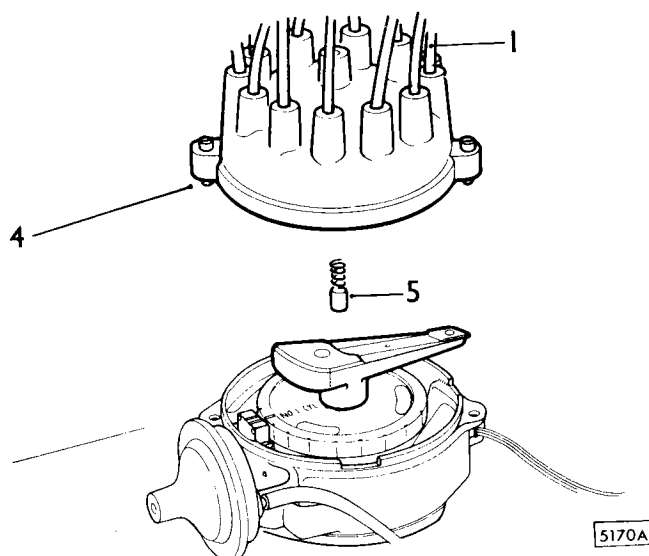
86.35.10

Removing

1. Check all H.T. sparking plug leads and ensure each is adequately identified.
2. Detach leads from sparking plugs.
3. Detach H.T. lead from ignition coil.
4. Unscrew three captive screws and detach distributor cap.
5. Check carbon contact is in good condition and moving freely on spring.

Refitting

Reverse operations 2 to 4.



DISTRIBUTOR LEADS

Remove and refit

86.35.11

Removing

1. Pull faulty lead from distributor cap and from sparking plug.
2. Cut length of replacement H.T. lead same length as that removed.
3. Transfer identification sleeve or renew.
4. Fit terminations.

Refitting

5. Fit new lead to sparking plug and to distributor cap.

ROTOR ARM

Remove and refit

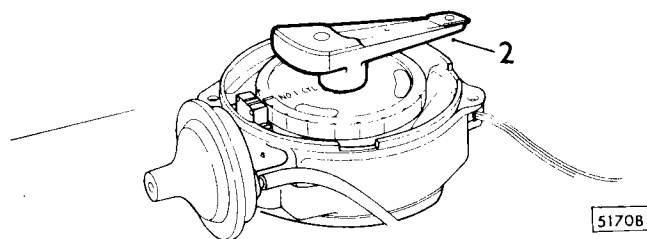
86.35.16

Removing

1. Remove three captive screws and detach distributor cover.
2. Withdraw H.T. rotor.

Refitting

3. Place two or three drops of clean engine oil on rotor carrier shaft oil pad.
4. Replace H.T. rotor. Ensure keyway engaged, and rotor pushed fully home.
5. Refit distributor cover and tighten three screws.



ELECTRONIC TIMING ROTOR**Remove and refit****86.35.17****Removing**

1. Remove rotor arm — 86.35.16.
2. Remove circlip and wave washer.
3. Detach electronic timing rotor.

Refitting

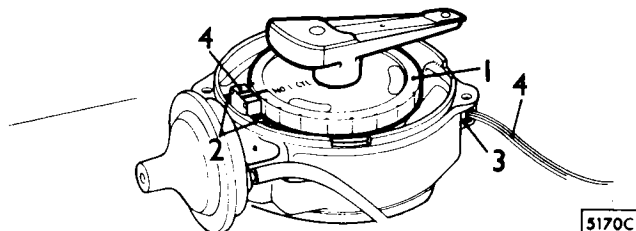
Reverse operations 1 to 3.

PICK UP MODULE**Remove and refit****86.35.18****Removing**

1. Remove electronic timing rotor — 86.36.17.
2. Remove two cheese head screws securing pick up module to pick up arm and recover two spring and two plain washers.
3. Prise cable grommet inwards from body of distributor.
4. Feed cable and cable connector in through hole and lift pick up module clear.

Refitting

5. Feed cable connector out through hole in distributor body. Fit grommet into hole in body, wide end first.
6. Locate pick up module on pick up arm, pick up core towards distributor shaft. Loosely secure using two cheese head screws, plain and spring washers.
7. Fit electronic timing rotor and secure using a wave washer and circlip.
8. Use feeler gauges to set distance between pick up module E core faces and timing rotor outer edge to 0,50 to 0,55 mm (0.021 to 0.022 in.).
9. Tighten both pick up securing screws.
10. Fit rotor arm.



DISTRIBUTOR

Remove and refit – Engine dismantling and reassembling only 86.35.20

Removing

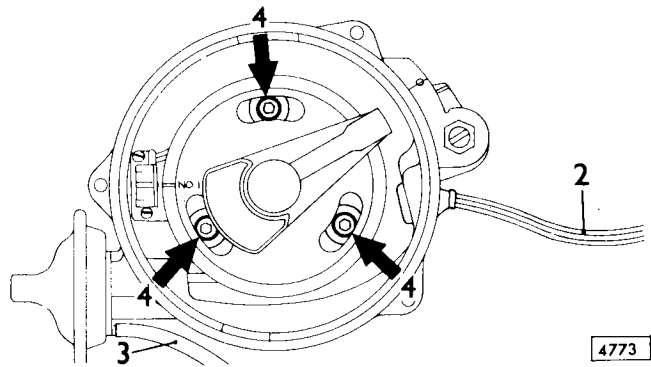
1. Remove three captive screws and detach distributor cover.
2. Disconnect cable at connecting plug.
3. Disconnect pipe from vacuum retard unit.
4. Release three Allen screws, accessible through slots in micro housing, withdraw distributor.

Refitting

5. Rotate engine until mark 'A' etched on crankshaft damper is in line with 12° B.T.D.C. mark on timing plate.

CAUTION: No. 1 piston 'A' bank must be on firing stroke. Both inlet and exhaust valves in cylinder will be closed and removal of sparking plug will enable an observation to be made to ascertain that this is so. **DO NOT** rotate engine backwards.

6. Rotate distributor until No. 1 cylinder mark on timing rotor is in alignment with mark on pick up module.
7. Reverse operations 1 to 4 ensuring that marks on timing rotor and pick up module do not move out of alignment.
8. Check ignition timing – 86.35.29/7.



DISTRIBUTOR

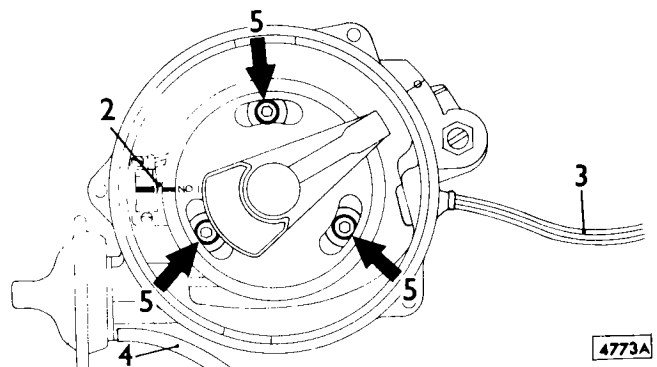
Remove and refit – Service replacement only 86.35.20/1

Removing

1. Remove three captive screws and detach distributor cover.
2. Rotate engine until No. 1 cylinder mark on timing rotor is in alignment with mark on pick-up module.
3. Disconnect cable assembly at connector plug.
4. Disconnect pipe from vacuum retard unit.
5. Release three Allen screws, accessible through slots in micro-housing, and withdraw distributor. **DO NOT** rotate engine.

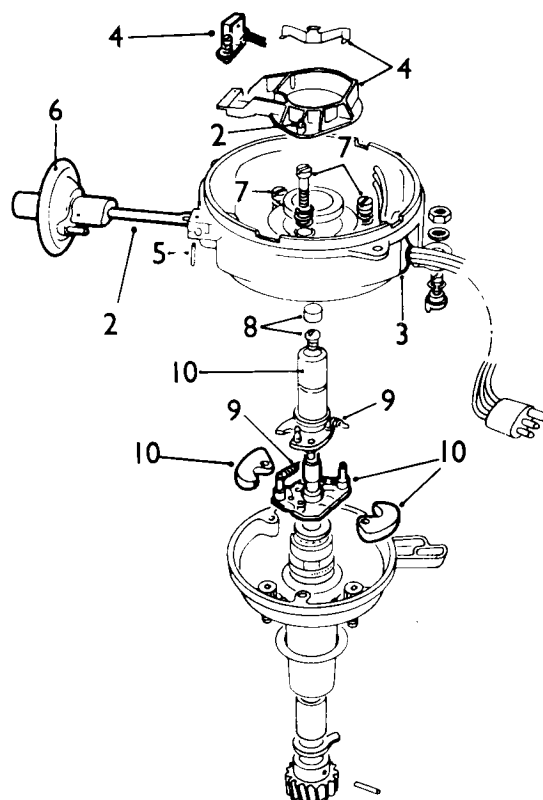
Refitting

6. Reverse operations 3 to 5.
7. Check that No. 1 cylinder mark on timing rotor is in alignment with mark on pick-up module.
8. Refit distributor cap.
9. Check ignition timing – 86.35.29/7.



DISTRIBUTOR**Overhaul****86.35.26****Dismantling**

1. Remove distributor — 86.35.20 and electronic timing rotor — 86.35.17.
2. Lift vacuum operating rod from peg on pick up arm.
3. Prise cable grommet from body of distributor.
4. Remove pick up arm bearing spring.
Slide pick up arm sideways to disengage it from bearing. Lift from micro housing, drawing cable in through hole. Detach pick-up module.
5. Use a pin punch 1,85 mm (0.073 in.) to tap out roll pin securing vacuum unit in micro housing.
6. Withdraw vacuum unit from micro housing.
7. Remove three spring loaded screws and lift micro housing from distributor body.
8. Extract felt pad from top of rotor carrier shaft and release screw.
9. Release control springs from fixing posts.
10. Lift rotor carrier shaft from distributor shaft. Collect centrifugal weights.



4873A

Inspection

11. Check control springs for correct length.
12. Check pivot holes in centrifugal weights for wear or deformation.
13. Check distributor shaft for undue play.

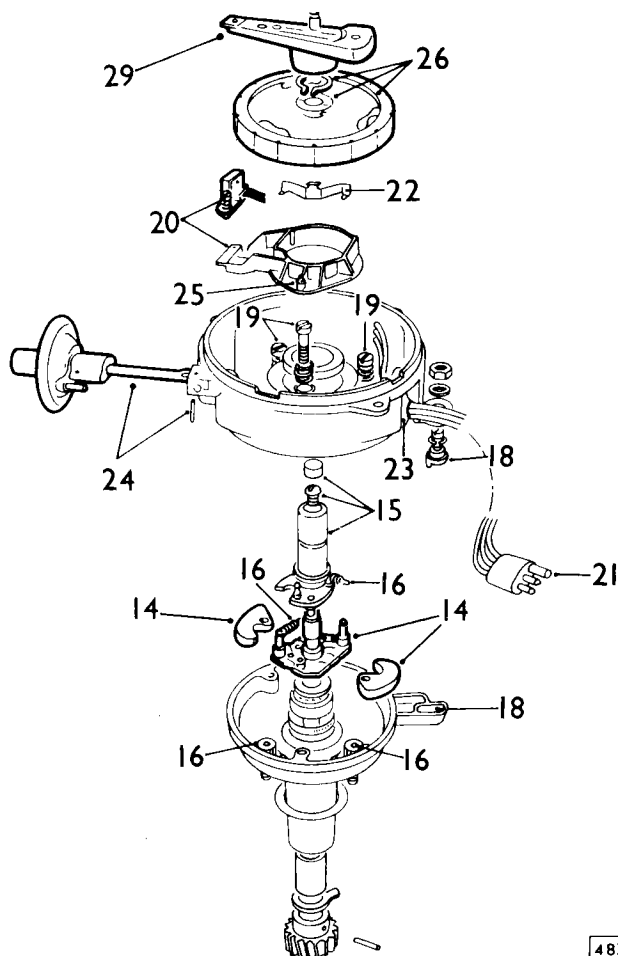
NOTE: If any part of the distributor body assembly is found to be defective, the complete assembly must be renewed.

Assembly

14. Smear centrifugal weights and rotor carrier pivot posts with either Rocol grease No.30863 or Mobilgrease No.2. Assemble weights to pivot posts.
15. Lubricate bore of rotor carrier shaft with clean engine oil and fit to distributor shaft. Retain with round headed screw. Fit oil pad.
16. Fit control springs.

NOTE: Ensure three socket headed screws and plain washers in place through slots in distributor body base.

17. Liberally smear auto advance mechanism with grease previously specified.
18. Fit micro housing to distributor body, ensuring micro adjustment eccentric peg engages in slot.
19. Secure micro housing to body using screws, plain washers and springs. Tighten screws to just short of coil binding.
20. Loosely secure pick up module to pick up arm using two cheese head screws, plain and spring washers.
21. Pass pick up module connector and cable out through hole in micro housing and locate pick up arm on rotor carrier shaft.
22. Fit bearing spring.
23. Engage wide part of cable grommet in hole and prise into position.
24. Place vacuum unit in position and secure with a new roll pin.
25. Fit vacuum operating rod to peg on pick up arm.
26. Fit electronic timing rotor and secure using a wave washer and circlip.
27. Use feeler gauges to set distance between pick up module E core faces and timing rotor outer edge to 0,50 to 0,55 mm (0.020 to 0.022 in.).
28. Tighten both pick up module securing screws.
29. Fit rotor arm.
30. Fit distributor.



48738

'OPUS' IGNITION SYSTEM

Checking

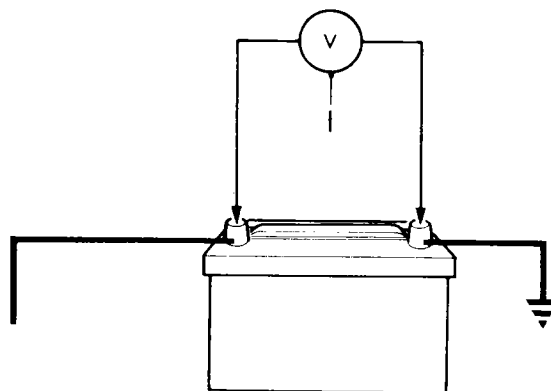
86.35.29

Special Equipment. A Multi-testmeter, or a Voltmeter 0 — 20V range. Ammeter 0 — 20A range and an Ohmmeter 0 — 20 ohms range.

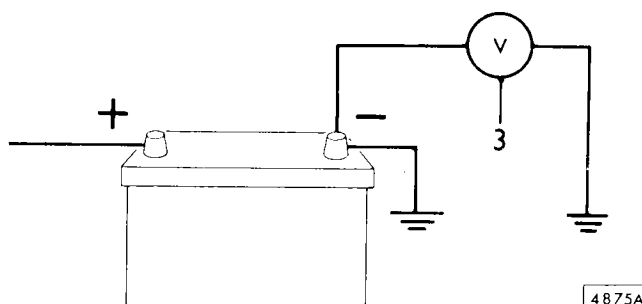
CAUTION: When carrying out the following tests it is essential that they are performed in the order enumerated under each heading.

BATTERY**Circuit Test****86.35.29/1**

1. Check battery voltage. Full 12V should be registered.
2. Disconnect cable from coil L.T. terminal marked '-'.
3. Connect voltmeter between battery earth and frame.
4. Operate starter, check voltmeter reading which should not exceed 0.5 Volts. Refit coil cable.
5. If more than 0.5 volts is registered rectify faulty connection between frame and battery.



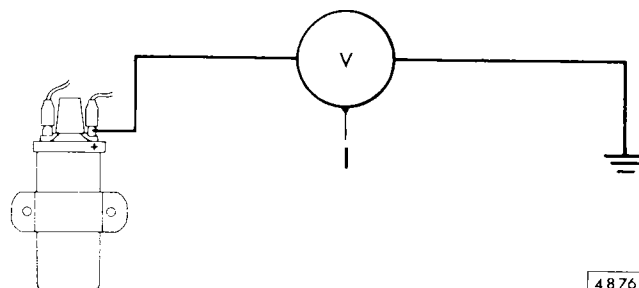
4837



4875A

IGNITION COIL**Applied Voltage Test****86.35.29/2**

1. Connect voltmeter between coil '+' terminal and earth.
Switch on ignition, check voltmeter reading.
If 4 – 6 volts registered proceed to operation 86.35.29/3.
2. If below 4 volts is registered, check value of each resistor in ballast unit with ohmmeter.



4876

Readings obtained should be:-

Resistor 1 – 7.6 – 9.2 ohms.

Resistor 2 – 0.72 – 0.80 ohms.

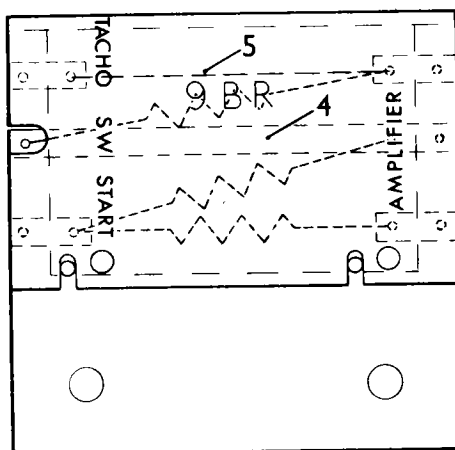
Resistor 3 – 0.9 – 1.0 ohms.

Renew resistor unit if outside these limits. Check battery supply voltage to unit.

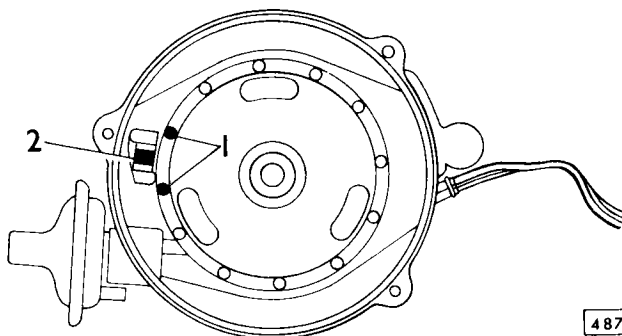
Connection 4 – Straight through internal connection.

Connection 5 – Tachometer terminal and straight through internal connection (incorporated in later units marked 47227).

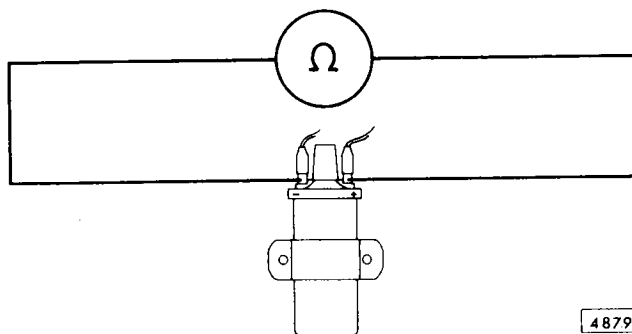
3. If above 6 volts is registered, remove distributor cover, crank engine until two of the timing rotor rods (1) are equi-distant either side of the pick-up module core (2) and re-check.
4. Check ignition coil for continuity and resistance of primary winding between '+' and '-' terminals. Renew coil if outside limits of 0.8 – 1.0 ohms, or open circuited.



4877A



4878



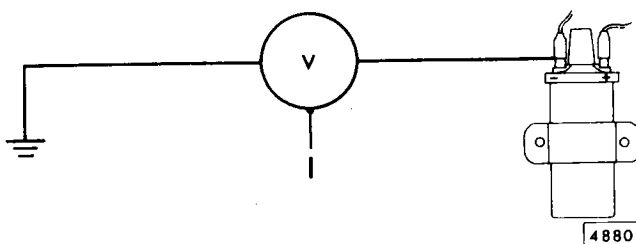
4879

IGNITION COIL

Voltage Drop Test

86.35.29/3

1. Connect voltmeter between '-' (negative) terminal of coil and earth. DO NOT disconnect coil cables.
2. Switch on ignition and note meter reading. Replace amplifier unit if above 2 volts.



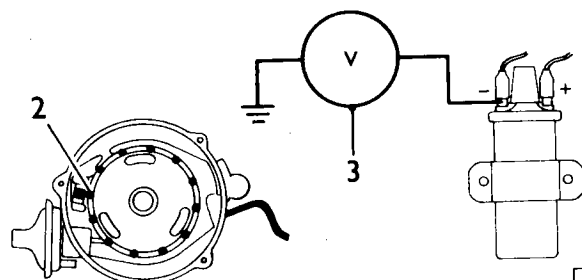
4880

AMPLIFIER UNIT

Switching Action Test

86.35.29/4

1. Remove distributor cover.
2. Rotate engine until one of the ferrite rods is in line with timing mark on module.
3. Connect voltmeter between '-' (negative) terminals of coil and earth. DO NOT disconnect coil cables.
4. Switch on ignition and note meter reading.
5. If below battery voltage (12 volts) carry out operations 86.35.29/5 and 86.35.29/6, in that order.

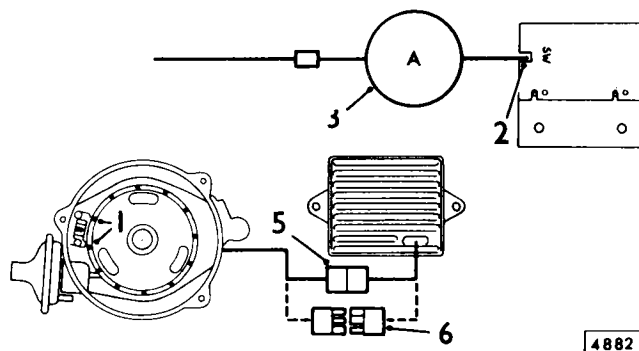


4881

86.35.29/3
86.35.29/4

AMPLIFIER UNIT**Test****86.35.29/5**

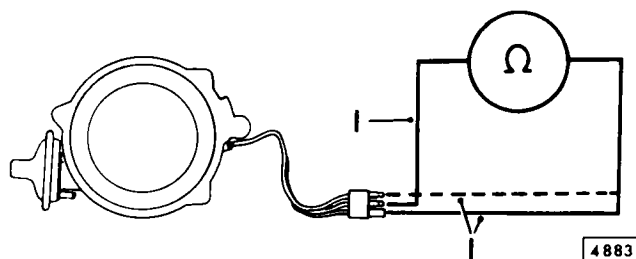
1. Rotate engine until two of the ferrite rods in the timing rotor are equi-distant either side of module core.
2. Disconnect cable from "SW" terminal of ballast unit.
3. Connect a moving coil ammeter (0 – 20A range) in series with cable and terminal.
4. Switch on ignition and check ammeter reading (5 – 6.5 amperes).
5. Separate connector between distributor and amplifier unit.
6. Connect outside terminals of amplifier plug alternately to centre terminal. Ammeter reading should remain unchanged. If reading increases by more than 0.5A, renew amplifier unit.



4882

PICK-UP MODULE**Test****86.35.29/6**

1. Connect one lead of ohmmeter to centre terminal of the pick-up module connector and the other lead alternately to each of the outside terminals.
2. Readings obtained should be as stated under heading 'Distributor Pick-up Module' in DATA section.
3. Renew module if outside these limits.
4. If readings obtained conform to those stated under 'DATA', remove pick-up module and check sealed adjusting screw near bottom limb of 'E' shaped core.
5. Renew module assembly if seal is broken.



4883

IGNITION TIMING**Check****86.35.29/7**

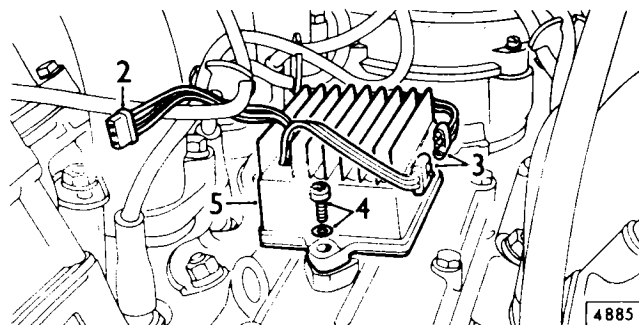
1. Disconnect vacuum pipe from vacuum retard unit.
2. Slacken locknut of micro adjustment control and set vernier at zero.
3. Set engine idling speed at 500 to 600 rev/min.
4. Check timing with a stroboscope and adjust until timing is 12° B.T.D.C.
5. Tighten locknut, refit vacuum pipe.
6. Reset engine idling speed at 650 to 750 rev/min.

AMPLIFIER UNIT**Remove and refit****86.35.30****Removing**

1. Disconnect battery – 86.15.19.
2. Withdraw unit cable plug from ballast resistor assembly.
3. Disconnect plug adaptor between distributor and amplifier unit line.
4. Remove two screws and washers.
5. Remove amplifier unit. Collect spacers.

Refitting

Reverse operations 1 to 5.



4885



COIL

Remove and refit

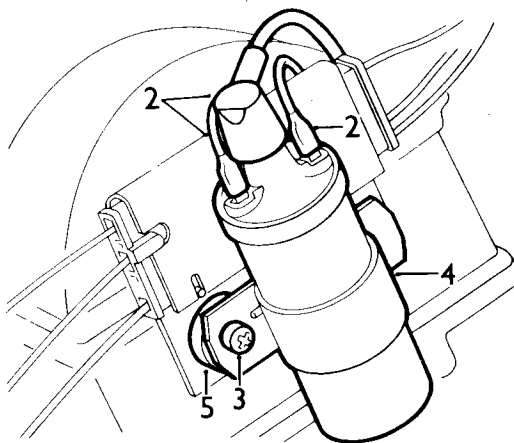
86.35.32

Removing

1. Disconnect battery — 86.15.19.
2. Disconnect cables.
3. Remove two setscrews and washers.
4. Detach coil.
5. Collect ballast resistor unit distance pieces.

Refitting

Reverse operations 1 to 5.



4888

BALLAST RESISTOR UNIT

Remove and refit

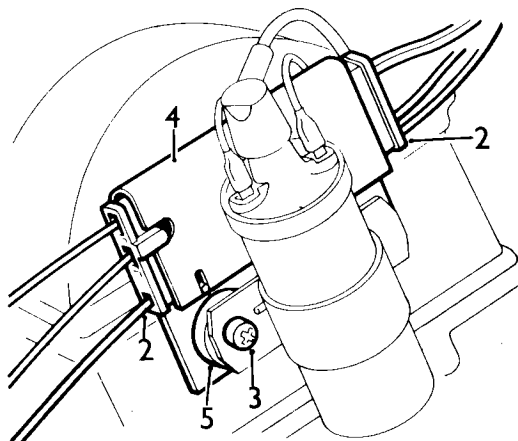
86.35.33

Removing

1. Disconnect battery — 86.15.19.
2. Withdraw connector plugs.
3. Remove setscrews and washers.
4. Remove unit.
5. Collect distance pieces.

Refitting

Reverse operations 1 to 5.



4889

BALLAST RESISTOR/STARTER RELAY

Remove and refit

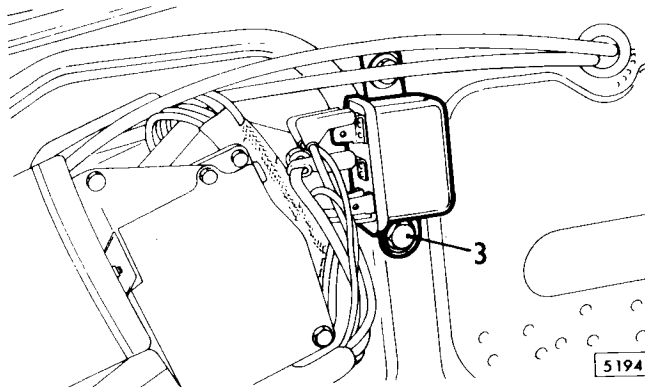
86.35.34

Removing

1. Disconnect battery — 86.15.19.
2. Note connections and pull connectors from relay.
3. Release two setscrews securing relay and recover plain washers and spring washers.

Refitting

Reverse operations 1 to 3, fitting earth tag beneath lower screw.



5194

BALLAST RESISTOR/STARTER RELAY

Test — (in situ)

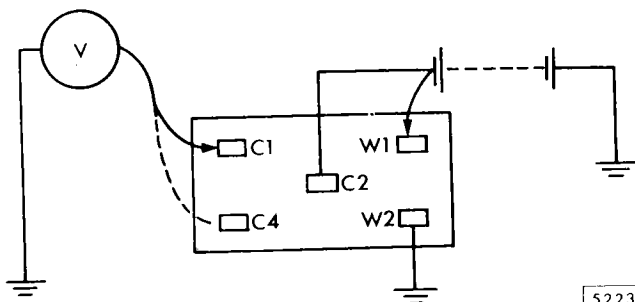
86.35.35

If starter motor does not operate when ignition key turned initially, check as follows.

1. Pull cable from C2 and C4 connectors on relay and short together. Starter motor should operate showing relay at fault. If starter does not operate, either no supply in brown cable or starter motor at fault.

Relay removed

1. Apply 12V as shown, 12V should appear on both C1 and C4.



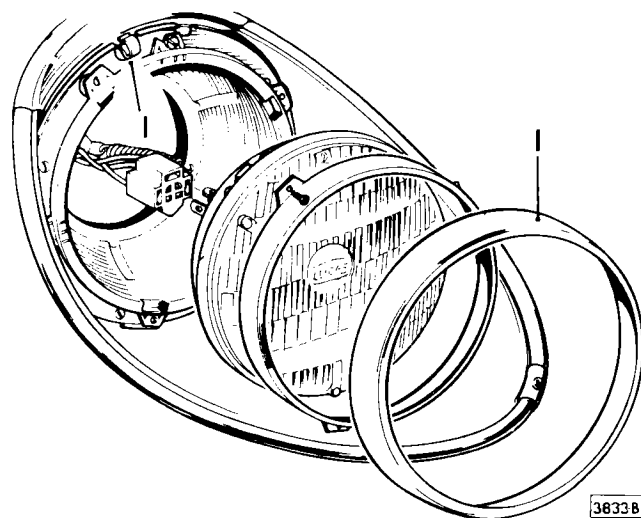
5223

HEADLAMP RIM**Remove and refit****86.40.01****Removing**

1. The rim is secured by spring clips and should be carefully prised off with a suitable screwdriver inserted behind the rim.

Refitting

2. Locate rim on spring clip and snap into position.



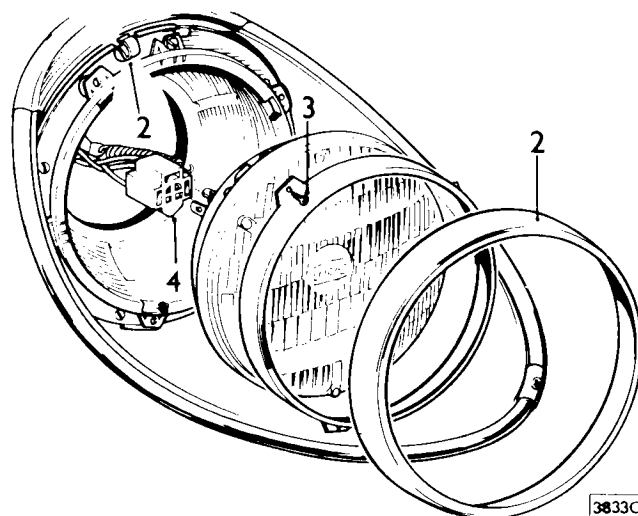
3833B

HEADLAMP ASSEMBLY**Remove and refit****86.40.02**

1. Left hand headlamp only -- remove flasher lamp assembly 86.40.26 to facilitate access to wiring.
2. Remove rim -- 86.40.01.
3. Withdraw lamp assembly, retained by four screws.
4. Disconnect cables at snap connectors.

Refitting

5. Reverse operations 1 to 4.
6. Adjust beam alignment -- 86.40.17.



3833C

HEADLAMP SEALED BEAM UNIT**Remove and refit****86.40.09****Removing**

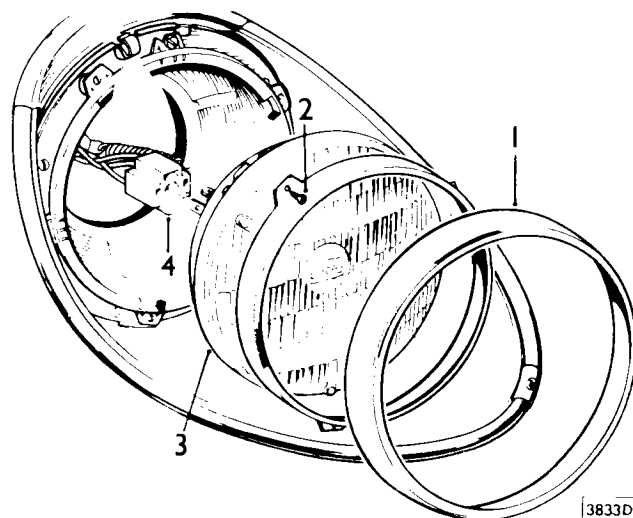
1. Remove rim -- 86.40.01.
2. Remove retaining ring, secured by three screws. DO NOT disturb adjusting screws.
3. Withdraw light unit.
4. Detach wiring connector.

Cars fitted with separate headlamp bulbs.

5. Withdraw bulb.

Refitting

Reverse operations 1 to 5.



3833D



HEADLAMP PILOT BULB

Remove and refit

86.40.11

Removing

1. Remove light unit – 86.40.09.
2. Withdraw pilot bulb from holder, the bulb is of the capless type and is a push fit into its holder.

Refitting

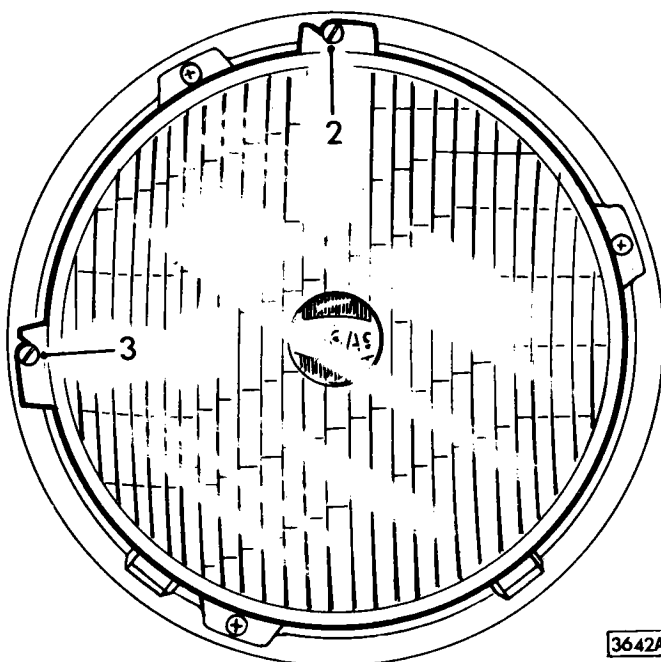
3. Insert bulb into its holder, taking care not to misplace or distort the contact wires.
4. Refit light unit.

HEADLAMPS ALIGN BEAM

86.40.17

NOTE: It is recommended that a suitable beam setting instrument should be used.

1. Remove rim – 86.40.01.
2. Adjust vertical alignment.
3. Adjust horizontal alignment.
4. Refit rim.



3642A

SIDE/FLASHER LAMP LENS

Remove and refit

86.40.24

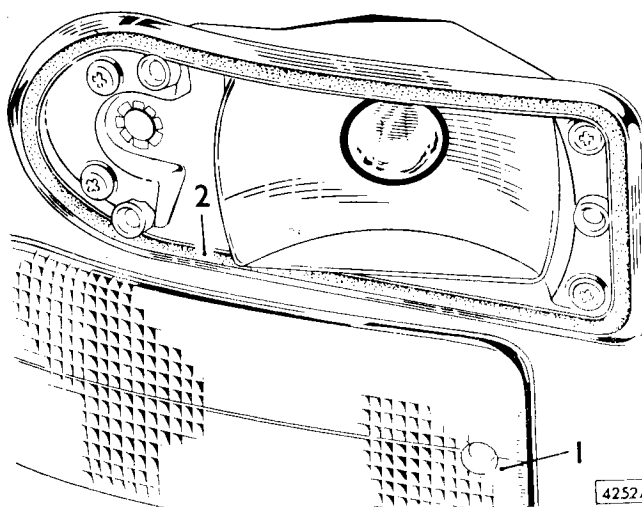
NOTE: Lamps for U.S.A./CANADA and ITALY incorporate double filament bulbs with off-set pins (side/flasher). Lamps for all other countries have single filament bulbs (flasher only). Pins are not off-set.

Removing

1. Remove three retaining screws and detach lens.

Refitting

2. Examine lens and gasket, if necessary renew.
3. Refit lens and secure using three screws.



4252A

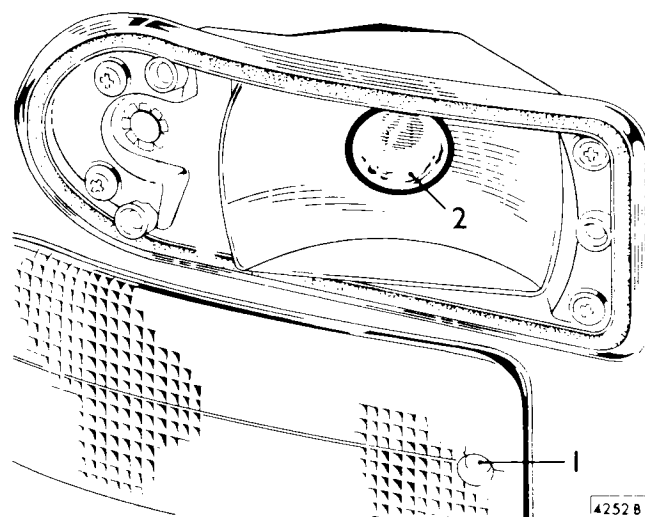
86.40.11
86.40.24

SIDE/FLASHER LAMP BULB**Remove and refit****86.40.25****Removing**

1. Remove three retaining screws and detach lens.
2. Remove bulb.

Refitting

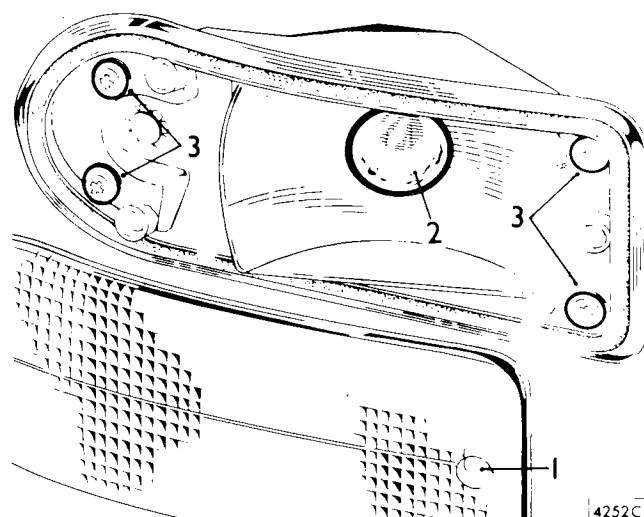
3. Fit bulb.
4. Examine lens and gasket, if necessary renew.
5. Refit lens and secure using three screws.

**SIDE/FLASHER LAMP ASSEMBLY****Remove and refit****86.40.26****Removing**

1. Remove three retaining screws and detach lens.
2. Remove bulb.
3. Remove four screws, disconnect cables and detach assembly.

Refitting

4. Examine gasket and renew if necessary.
5. Connect cables, fit assembly and retain with four screws.
6. Fit bulb.
7. Examine lens and gasket, renew if necessary.
8. Refit lens and secure using three screws.


FRONT FLASHER LAMP LENS
FRONT FLASHER LAMP BULB
FRONT FLASHER LAMP ASSEMBLY
Remove and refit
86.40.40
86.40.41
86.40.42
Removing

See procedure given under 86.40.24, 86.40.25 or 86.40.26.

Refitting

See procedure given under 86.40.24, 86.40.25 or 86.40.26.



FRONT FLASHER REPEATER LENS

(Flasher repeater lamps are only fitted to cars for certain territories).

Remove and refit

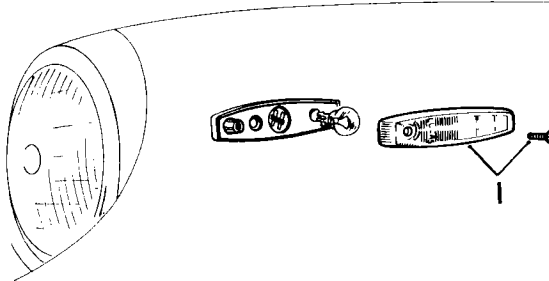
86.40.51

Removing

1. Remove screw retaining lens and detach lens from clip.

Refitting

2. Refit lens and retaining screw.



3686B

FRONT FLASHER REPEATER BULB

(Flasher repeater lamps are only fitted to cars for certain territories).

Remove and refit

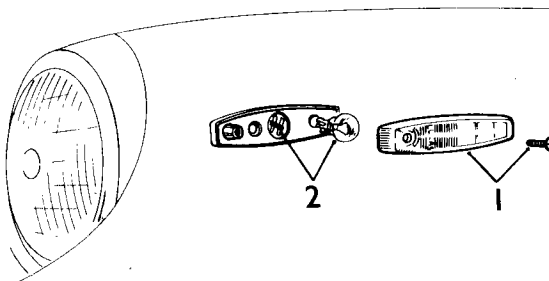
86.40.52

Removing

1. Remove screw retaining lens and detach lens from clip.
2. Withdraw bulb, which is of the capless type, and is a push fit into its holder.

Refitting

3. Insert bulb into its holder taking care not to displace or distort the connecting wires.
4. Replace lens and retaining screw.



3686C

FRONT FLASHER REPEATER ASSEMBLY

(Flasher repeater lamps are only fitted to cars for certain territories).

Remove and refit

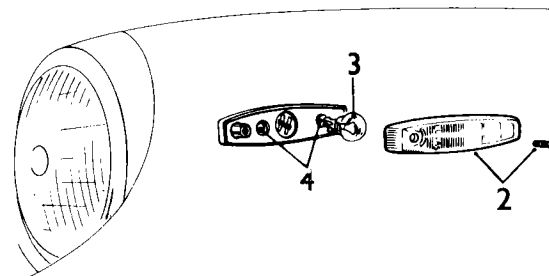
86.40.53

Removing

1. Disconnect battery — 86.15.19.
2. Remove screw retaining lens, and detach lens from clip.
3. Withdraw bulb, which is of the capless type and is a push fit into its holder.
4. Withdraw lamp assembly, secured by two screws.
5. Disconnect leads at connector.

Refitting

6. Reverse operations 1 to 5. Renew gasket.
7. When fitting bulbs, take care not to distort or displace the connecting wires.



3686D

SIDE MARKER LAMP BULB

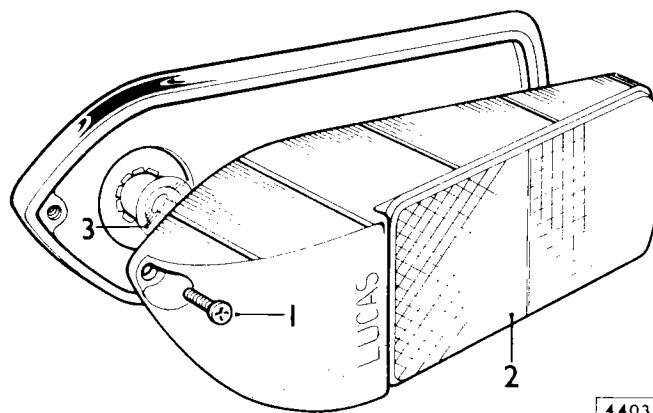
(Side marker lamps are only fitted to cars for certain territories)

Remove and refit**86.40.62****Removing**

1. Remove lens retaining screw.
2. Withdraw lens.
3. Remove bulb.

Refitting

Reverse operations 1 to 3.



4403

SIDE MARKER LAMP LENS

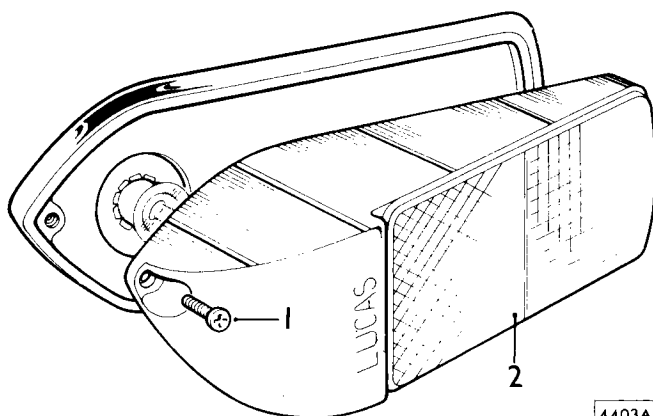
(Side marker lamps are only fitted to cars for certain territories).

Remove and refit**86.40.63****Removing**

1. Remove lens retaining screw.
2. Withdraw lens.

Refitting

Reverse operations 1 and 2.



4403A

SIDE MARKER LAMP ASSEMBLY

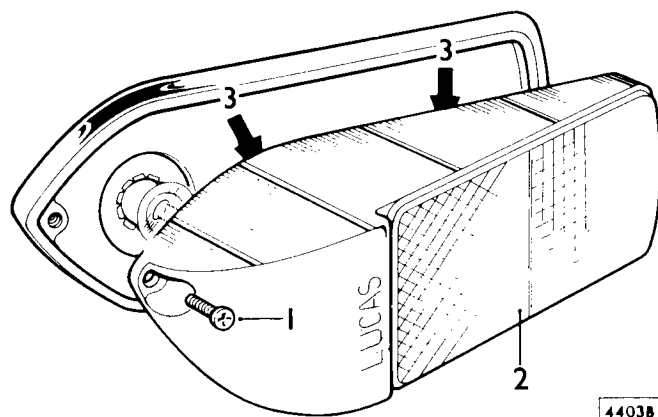
(Side marker lamps are only fitted to cars for certain territories).

Remove and refit**86.40.64****Removing**

1. Remove lens retaining screw.
2. Withdraw lens.
3. Remove screws and withdraw lamp.
4. Disconnect leads.

Refitting

Reverse operations 1 to 4. Renew gasket.



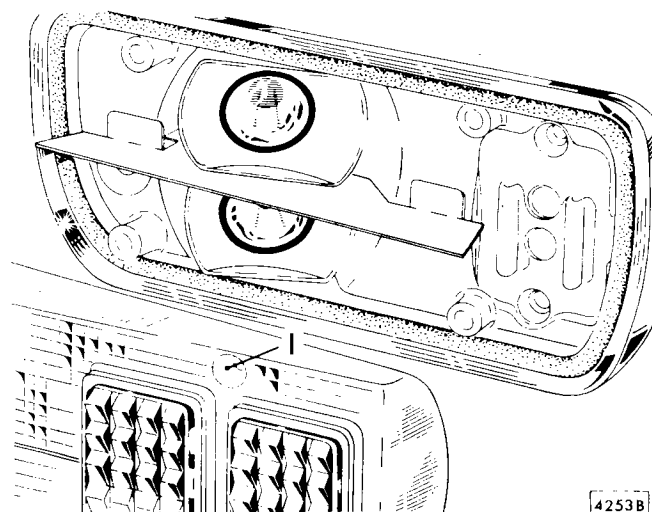
4403B

TAIL, STOP AND FLASHER LAMP LENS**Remove and refit****86.40.68****Removing**

1. Remove lens, secured by four screws.

Refitting

2. Examine lens and gasket, if necessary renew.
3. Refit lens and securing screws.



4253B



TAIL, STOP AND FLASHER LAMP BULB

Remove and refit

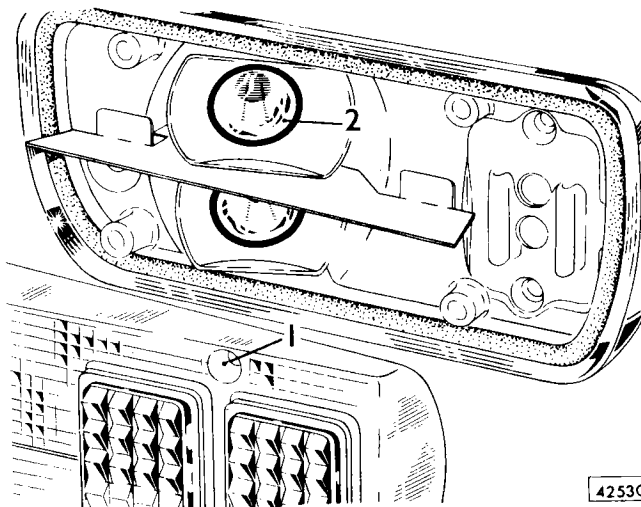
86.40.69

Removing

1. Remove lens secured by four screws.
2. Withdraw bulb. Upper bulb flasher, lower bulb stop and tail.

Refitting

3. Fit new bulb.
4. Examine lens and gasket, if necessary renew.
5. Refit lens and securing screws.
6. Check operation of lamps.



TAIL, STOP AND FLASHER LAMP ASSEMBLY

Remove and refit

****Right-hand 86.40.70**

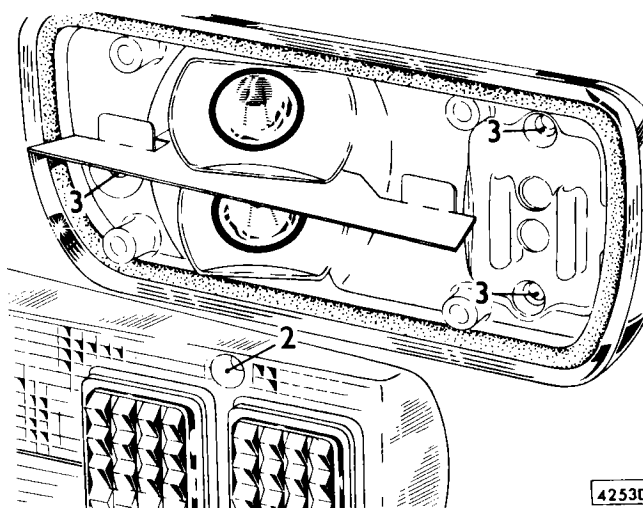
Left-hand 86.40.71**

Removing

1. Disconnect battery – 86.15.19
2. Remove lens, secured by four screws.
3. Withdraw lamp assembly secured by three screws.
4. Disconnect cables and remove lamp assembly.

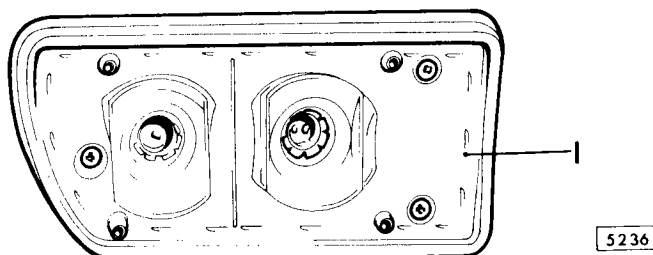
Refitting

5. Reverse operations 1 to 4.
6. Examine lens and gasket, if necessary renew.
7. Check operation of lamp.



TAIL STOP AND FLASHER LAMP

1. Alternative form



NUMBER PLATE LAMP LENS

Remove and refit

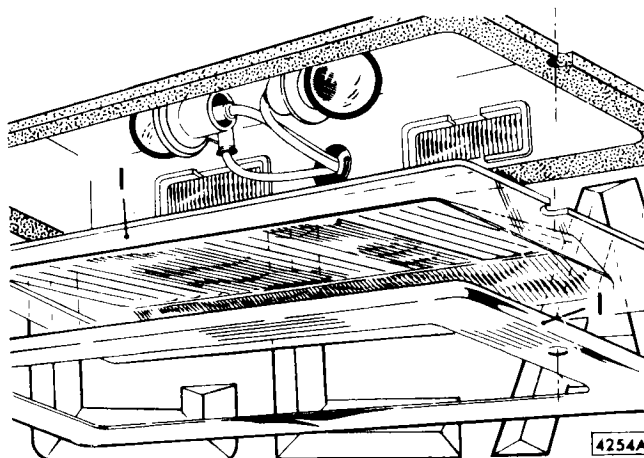
86.40.84

Removing

1. Withdraw lens and bezel secured by two screws.

Refitting

2. Examine lens and gasket, if necessary renew.
3. Refit lens, bezel and gasket.

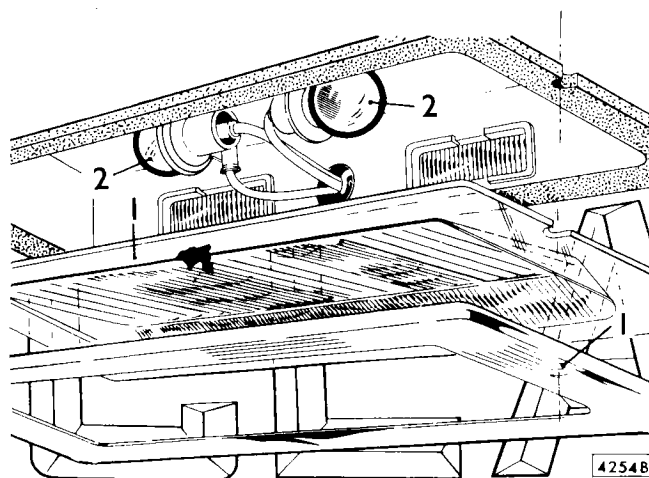


NUMBER PLATE LAMP BULB**Remove and refit****86.40.85****Removing**

1. Remove lens and bezel, secured by two screws.
2. The lamp contains 2 bulbs which are of the bayonet cap type. Withdraw bulb(s).

Refitting

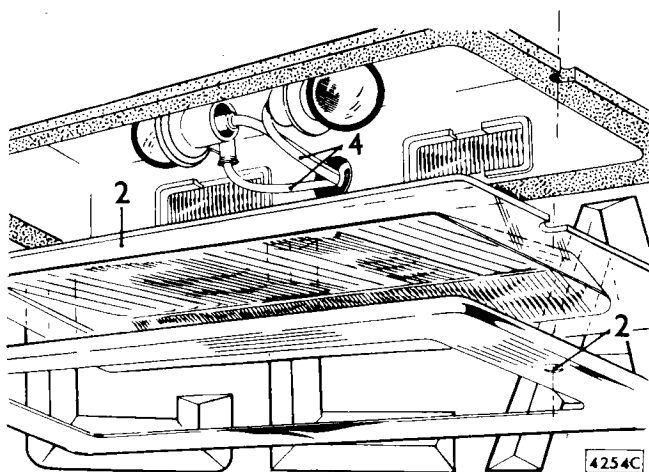
3. Reverse operations 1 and 2.
4. Check operation of lamp.

**NUMBER PLATE LAMP ASSEMBLY****Remove and refit****86.40.86****Removing**

1. Disconnect battery – 86.15.19.
2. Remove lens and bezel, secured by two screws.
3. Withdraw lamp assembly.
4. Disconnect cables.

Refitting

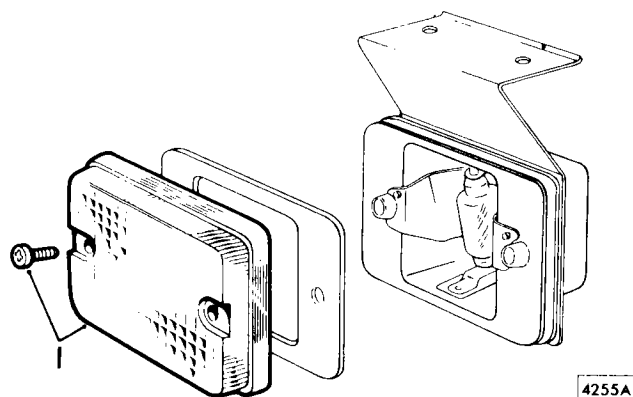
5. Reverse operations 1 to 4.
6. Check operation of lamp.

**REVERSE LAMP LENS****Remove and refit****86.40.89****Removing**

1. Remove lens, secured by two screws.

Refitting

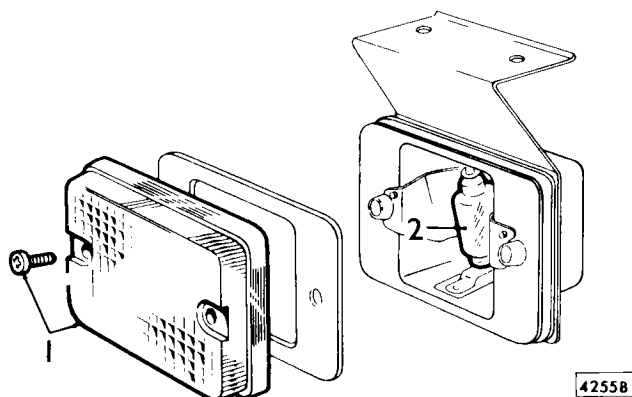
2. Examine lens and gaskets, if necessary renew.
3. Refit lens and secure using two screws.

**REVERSE LAMP BULB****Remove and refit****86.40.90****Removing**

1. Remove lens, secured by two screws.
2. Withdraw bulb.

Refitting

3. Fit new bulb.
4. Examine lens and gasket, if necessary renew.
5. Refit lens and secure using two screws.
6. Check operation of lamp.



REVERSE LAMP ASSEMBLY

Remove and refit

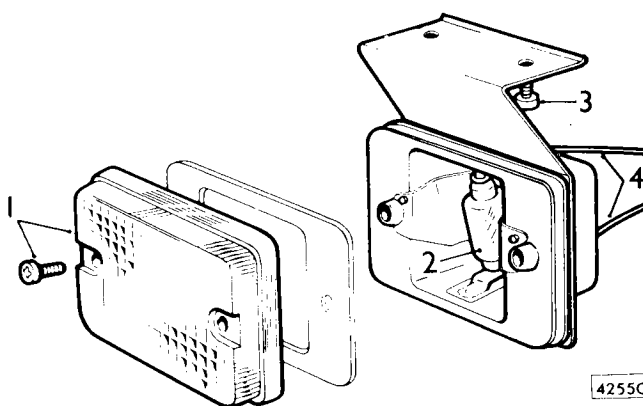
86.40.91

Removing

1. Remove lens, secured by two screws.
2. Withdraw bulb.
3. Remove two screws securing lamp bracket to body.
4. Disconnect cables.

Refitting

5. Secure lamp bracket to body using two self tapping screws.
6. Make electrical connections.
7. Fit bulb.
8. Examine gasket and renew if necessary.
9. Refit lens and secure, using two screws.
10. Check operation of lamp.



INTERIOR LAMP BULB/S

Remove and refit

86.45.01

Removing

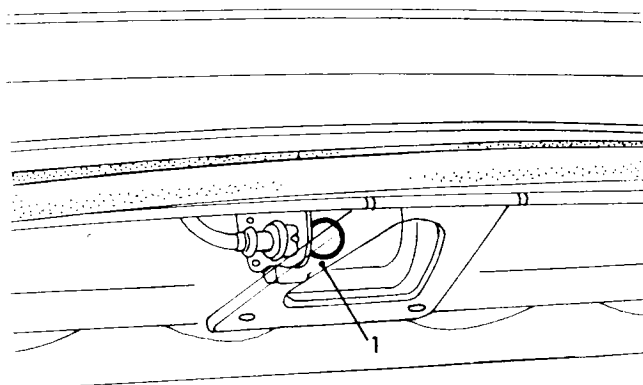
1. Detach lens cover and remove bulb(s).

Refitting

2. Fit bulb(s) and refit lens cover.

Refitting

Reverse operations 1 and 2.



INTERIOR LAMP ASSEMBLY (2 + 2 only)

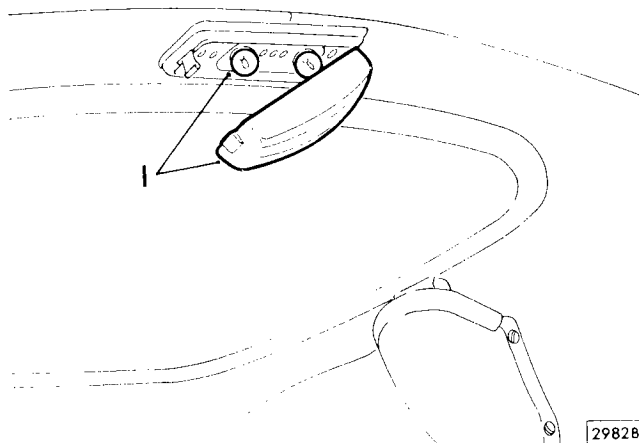
Remove and refit

86.45.02

Removing

1. Detach lens cover and remove bulb(s).
2. Remove two screws, withdraw assembly and disconnect cables.

NOTE: On open two seater cars the bulb is accessible when the luggage compartment lid is raised.

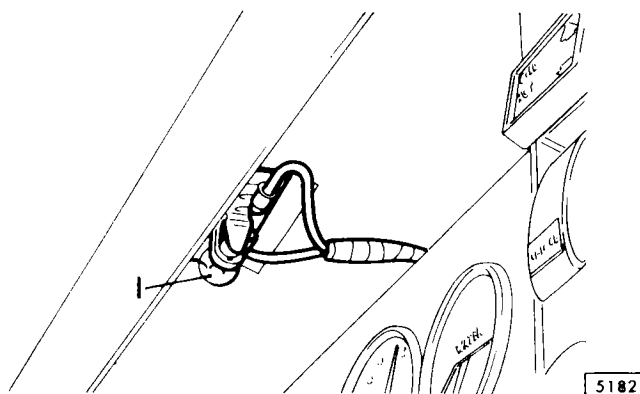


MAP LAMP BULB**Remove and refit****86.45.09****Removing**

1. Remove bulb from holder located under screen rail fascia.

Refitting

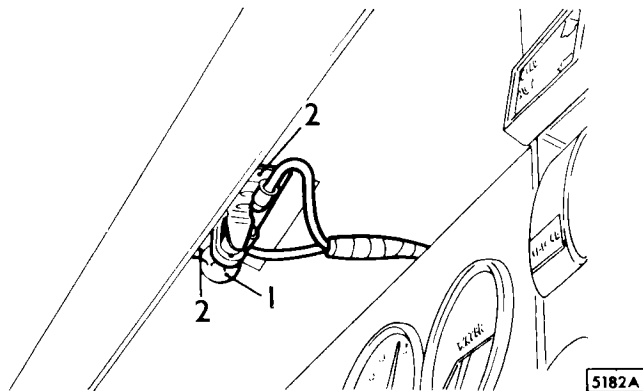
Reverse operation 1.

**MAP LAMP ASSEMBLY****Remove and refit****86.45.10****Removing**

1. Remove bulb from holder.
2. Carefully drill out pop rivets. DO NOT pierce fascia trim.

Refitting

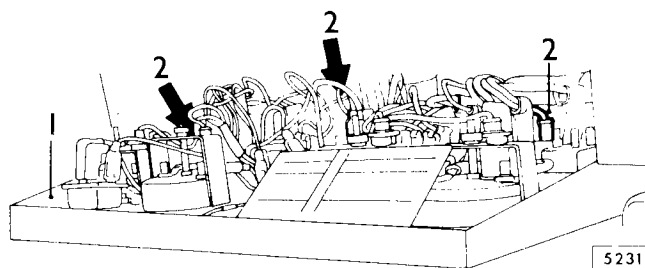
3. Secure replacement holder with new rivets.

NOTE: Refit insulation pad beneath holder.**PANEL ILLUMINATION BULB****Remove and refit****86.45.31****Removing**

1. Remove two finger nuts and lower centre instrument panel.
2. Remove bulb from holder.

Refitting

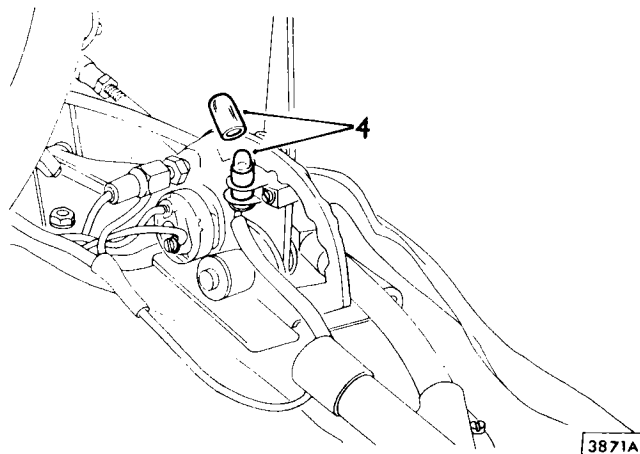
Reverse operations 1 and 2.

**AUTOMATIC TRANSMISSION INDICATOR BULB****Remove and refit****86.45.40****Removing**

1. Disconnect battery – 86.15.19.
2. Remove console assembly – 76.25.01.
3. Withdraw two screws and detach gear indicator cover.
4. Detach bulb cover and withdraw bulb.

Refitting

Reverse operations 1 to 4.



ELECTRICAL

INSTRUMENT ILLUMINATION BULBS

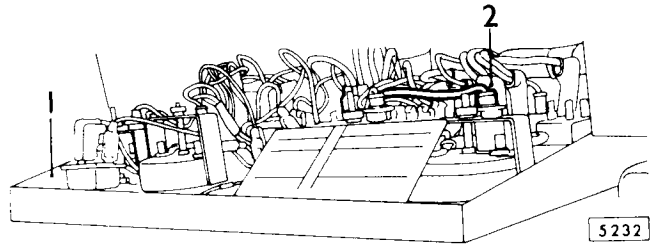
Remove and refit 86.45.48

Removing

1. Release knurled finger nuts and lower instrument panel.
2. Withdraw bulb holder.
3. Remove bulb.

Refitting

Reverse operations 1 to 3.



SPEEDOMETER ILLUMINATION BULBS TACHOMETER ILLUMINATION BULBS FLASHER INDICATOR BULBS IGNITION WARNING BULB HEADLAMP FULL BEAM BULB OIL PRESSURE WARNING BULB FUEL WARNING BULB

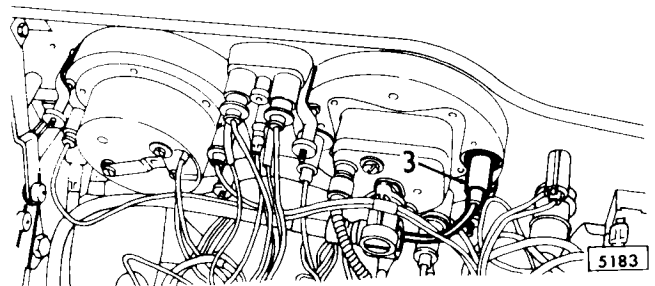
Remove and refit 86.45.49
86.45.53
86.45.63
86.45.64
86.45.65
86.45.66
86.45.70

Removing

1. Disconnect battery – 86.15.19.
2. Remove screen rail crash roll assembly – 76.46.04.
3. Pull out bulb holder.
4. Remove bulb.

Refitting

Reverse operation 1 to 4.



HANDBRAKE/BRAKE FLUID WARNING BULB HAZARD WARNING BULB

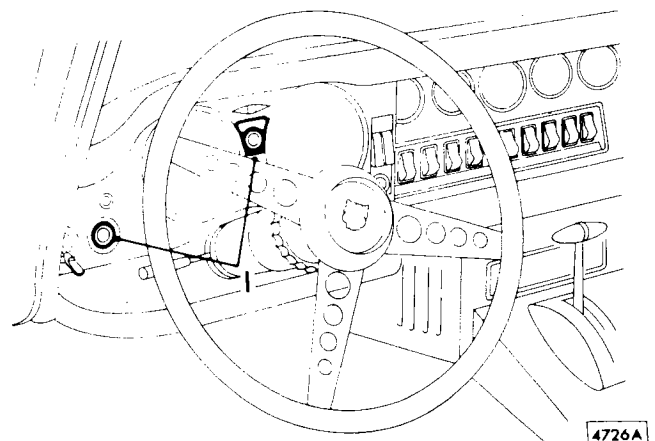
Remove and refit 86.45.67
86.45.68

Removing

1. Unscrew bezel.
2. Remove bulb.

Refitting

Reverse operations 1 and 2.



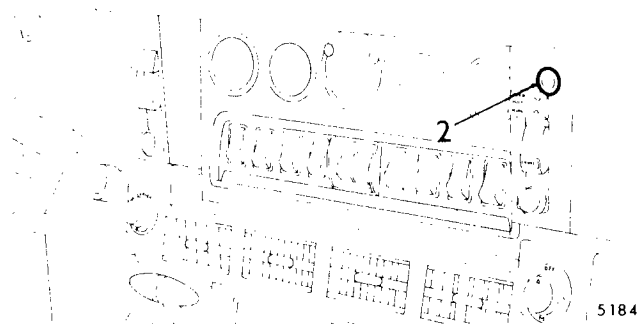
86.45.48
86.45.68

CHOKE WARNING LIGHT BULB**Remove and refit****86.45.71****Removing**

1. Remove screen rail crash roll assembly — 76.46.04.
2. Press bulb holder from facia panel.
3. Remove bulb.

Refitting

Reverse operations 1 to 3.



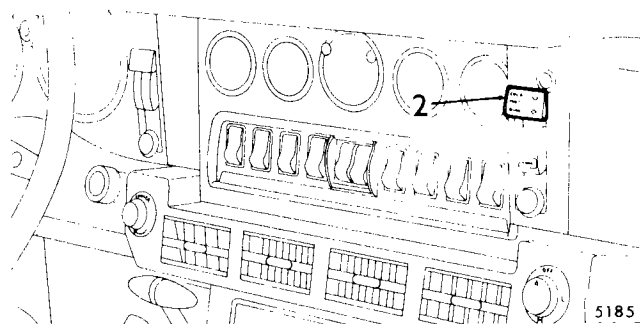
5184

CHOKE INDICATOR LIGHT BULB**Remove and refit****86.45.72****Removing**

1. Remove screen rail crash roll assembly — 76.46.04
2. Press indicator display from facia panel.
3. Remove bulb.

Refitting

Reverse operations 1 to 3



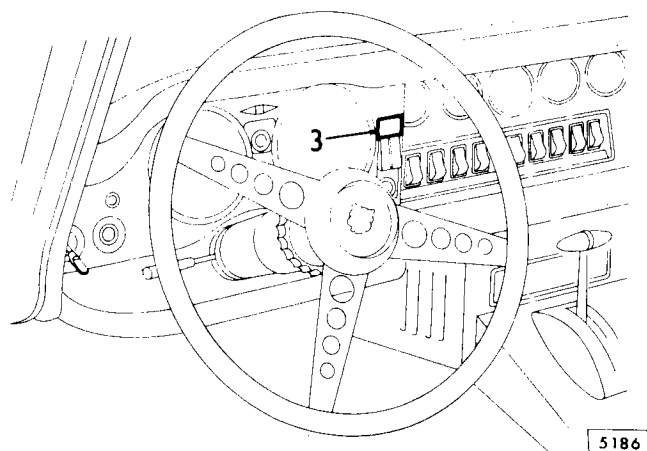
5185

HEATER INDICATOR LIGHT BULB**Remove and refit****86.45.73****Removing**

1. Remove screen rail crash roll assembly — 76.46.04.
2. Disengage cable from clip.
3. Press indicator display from facia panel.
4. Remove bulb.

Refitting

Reverse operations 1 to 4.



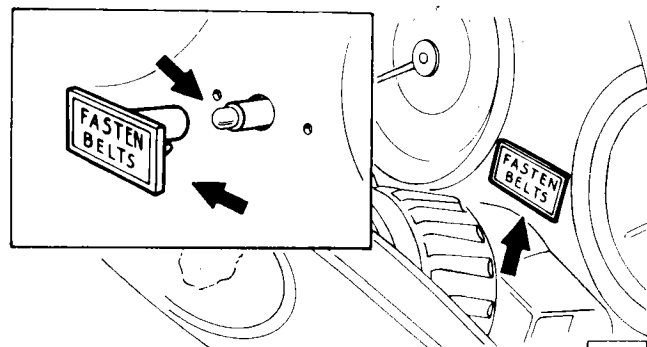
5186

****SEAT BELT WARNING LAMP BULB****Remove and refit****86.45.75****Removing**

1. Disconnect battery.
2. Withdraw lens cover unit from facia, (retained by two nylon friction bushes).
3. Withdraw bulb holder from lamp unit.
4. Remove bulb.

Refitting

Reverse operations 1 to 4.**



5493



RADIO CONTROL UNIT

Remove and refit 86.50.01

Removing

1. Disconnect battery – 86.15.19.
2. Detach radio control knobs.
3. Remove two dome nuts.
4. Remove two screws.
5. Remove two nuts securing control unit.
6. Withdraw radio panel.
7. Remove two setscrews and washers and withdraw control unit.
8. Disconnect fuse holder, collect fuse cartridge.
9. Disconnect speaker leads.
10. Disconnect aerial pick-up lead.
11. Disconnect power lead for rear aerial (if fitted).
12. Disconnect tape recorder lead (if fitted).
13. Withdraw control unit.

Refitting

Reverse operations 1 to 13.

RADIO SPEAKER/S

Remove and refit 86.50.12

Removing

1. Extract bolt, remove seat belt inertia reel (if fitted).
2. Lift door draught welt.
3. Remove two screws and detach boot lid lock control escutcheon (right hand side only).
4. Lift trim secured by solution to door shut face. Insert screwdriver under lower edge, prise away from clip fixings, and remove trim panel.
5. Remove four drive screws, withdraw speaker/baffle board assembly. Unsolder cables.

Refitting

Reverse operations 1 to 5.

NOTE: Speakers must be mounted with wide portion of baffle at top.

RADIO CONTROL UNIT MOUNTINGS

Remove and refit 86.50.02.

Air conditioned cars only

Removing

1. Remove radio control unit 86.50.01.
2. Remove four setscrews, plain and spring washers securing mounting brackets to evaporator unit.

Refitting

Reverse operations 1 and 2.

MANUAL AERIAL

Remove and refit 86.50.20

Removing

1. Remove spare wheel.
2. Remove two drive screws and detach panel at right hand side.
3. Remove nut, bush and seal washer securing aerial mast to wing.
4. Draw aerial from wing and disconnect coaxial cable.

Refitting

Reverse operations 1 to 4.

MOTORISED AERIAL

Remove and refit 86.50.21

Removing

1. Remove spare wheel.
2. Disconnect battery – 86.15.19.
3. Remove two drive screws and detach panel at right hand side.
4. Remove nut, bush and seal washer securing aerial mast to wing.
5. Note connections to relay and disconnect cables.
6. Remove four nuts and washers and detach motor from mounting bracket.
7. Draw assembly from car and disconnect coaxial cable.

Refitting

Reverse operations 1 to 7.

RADIO PANEL

Remove and refit 86.50.04

Removing

1. Disconnect battery – 86.15.19.
2. Remove parcel tray – 76.67.04 – driver's side.
3. Remove parcel tray – 76.67.05 – passenger side.
4. Remove fixings at both sides of radio panel.
5. **Non air conditioned cars only**
Withdraw panel sufficiently to detach 'Lucar' connectors from cigar lighter – 86.65.60.
6. Disconnect radio control unit (if fitted) – 86.50.01.

Refitting

Reverse operations 1 to 6.

86.50.01
86.50.21

MOTORISED AERIAL RELAY**Remove and refit** 86.50.27**Removing**

1. Disconnect battery – 86.15.19.
2. Remove two setscrews and detach cover plate from luggage compartment side panel.
3. Remove securing screws and detach relay.
4. Disconnect cables. Note location for reference when refitting.

Refitting

Reverse operations 1 to 4.

MOTORISED AERIAL RELAY**Test** 86.50.28

Check by substitution or by the following method.

1. Connect 12V battery supply to contact terminal C.2.
2. Apply 12 volt to terminal W.1 to energise relay coil.
3. Check with battery earthed test lamps that current is available at terminal C.1.
4. Switch off current to W.1 and W.2, check with test lamp that current is available at terminal C.3.
5. Replace unit if faulty.

AIR CONDITIONING MASTER RELAY**Remove and refit** 86.55.10**Removing**

See 82.20.08.

Refitting

See 82.20.08.

FLASHER AND ALARM UNITS**Flasher unit**

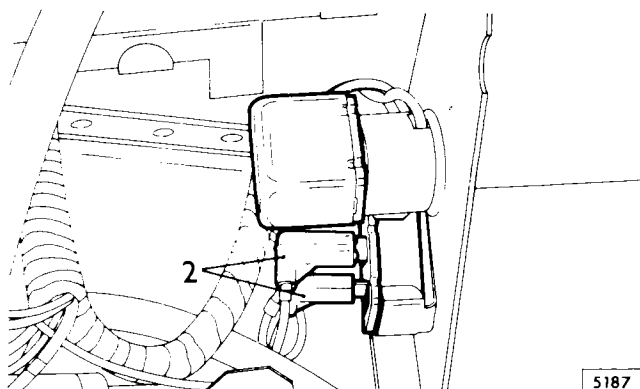
The Lucas 8FL flasher unit is a sealed component, no service or repair being possible. Check bulbs and wiring before renewing unit. Care must be taken to fit correct replacement unit. Check current rating marked on unit covers. These **MUST** correspond.

Remove and refit 86.55.11**Removing**

1. Remove drive screws and detach right hand under scuttle casing.
2. Disconnect cables. Note location for reference when refitting. Withdraw unit from spring clip bracket.

Refitting

Reverse operations 1 and 2.



5187



Hazard Flasher Unit

The hazard unit is a sealed component, no service or repair being possible. Correct replacement units **MUST** be fitted.

Remove and refit

86.55.12

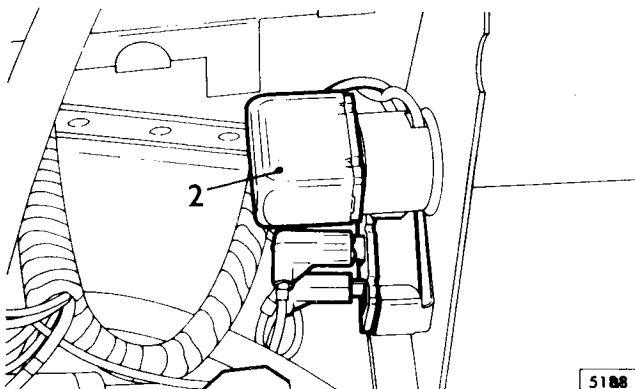
Removing

1. Remove drive screw and detach right hand under scuttle casing.
2. Withdraw unit from base block.

Refitting

Reverse operations 1 and 2.

NOTE: Unit blades are off-set to prevent incorrect assembly.



KEY ALARM BUZZER UNIT **SEAT BELT WARNING**

NOTE: Cars for U.S.A./CANADA only

Remove and refit

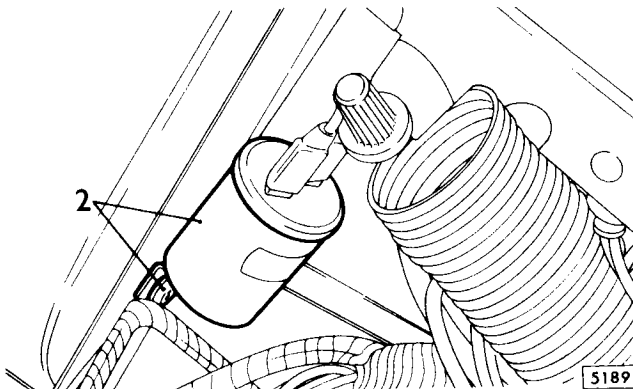
86.55.13

Removing

1. Remove drive screw and detach driver's side under scuttle casing.
2. Withdraw drive screw, disconnect cables and remove unit.

Refitting

Reverse operations 1 and 2.



STARTER MOTOR

Description

86.60.00

Two types of starter motor are fitted, the later incorporating oil seals. The sealed motor is identified by a domed sealing cover fitted at the brush gear end.

Performance Data — Starter Motor and Solenoid

The performance is dependent on the capacity and state of charge of the battery.

Early Starter Motors

Lock Torque

2,5 kgf.m. (18.5 lbf.ft.) with 460 A at 7.2 V

Torque at 1,000 rev./min.

****1,08**** kgf.m. (7.8 lbf.ft.) with 245 A at 9.4 V

Light Running Current

70 A at 5800 — 6500 r.p.m. with 9.4 V

86.55.12
86.60.00/1

Later Starter Motors

Lock Torque

****4,0**** kgf.m. (29 lbf.ft.) with 940 A at 6.5 V.

Torque at 1,000 rev./min.

1,8 kgf.m. (13 lbf.ft.) with 535 A at 8.0 V.

Light Running Current

100 A at 5000 to 7500 rev.&min. with 8.0 V

Early Motor Solenoid

Closing (or series) winding resistance measured between small unmarked Lucar terminal and the main terminal marked 'STA' – 0.27 to 0.33 ohms.

Holding (or shunt) winding resistance measured between the small unmarked Lucar terminal and a good earth point on solenoid body – 1.00 to 1.20 ohms.

Later Motor Solenoid

Specification as for early motors, readings as follows:-

Series winding

0.13 to 0.15 ohms.

Shunt winding

0.63 to 0.75 ohms.

Operation

Turning the ignition key to the start position energises the solenoid, the plunger of which moves the drive assembly along the armature shaft to engage the starter pinion with the flywheel. Full engagement of the pinion with the flywheel normally takes place, in which case the solenoid contacts close to connect the starter motor to the battery and the engine is cranked.

If tooth-to-tooth abutment between pinion and flywheel occurs, the solenoid plunger continues its normal movement by compressing a drive-engagement spring inside the plunger. This plunger movement causes the solenoid contacts to close, connecting the starter motor to the battery. The starter armature now commences to rotate and the pressure of the drive-engagement spring, combined with push-screw assistance from the drive helix, causes the pinion to be fully engaged with the flywheel and the engine is cranked. The solenoid plunger linkage incorporates a lost motion spring, which ensures that the solenoid contacts will open to disconnect the starter motor from the battery prior to disengagement of the pinion from the flywheel.

STARTER MOTOR

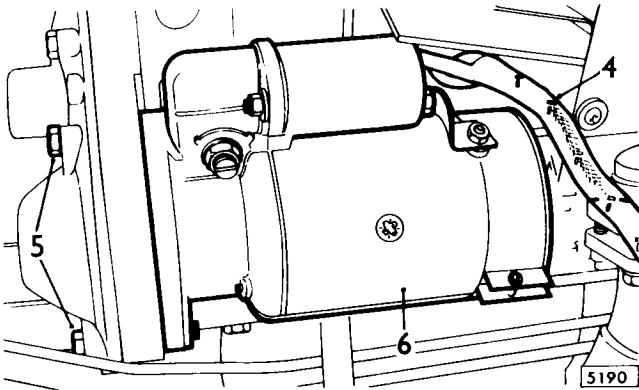
Remove and refit 86.60.01

Removing

- 1. Remove battery – 86.15.01.
- 2. Remove left hand under shield – 76.79.07.
- 3. Disconnect hydraulic pipe from clutch slave cylinder. Blank off unions.
- 4. Disconnect cables from starter motor.
- 5. Remove two bolts securing motor to bell housing.
- 6. Withdraw motor forward to clear pinion and rear wards through battery location.

Refitting

- 7. Reverse operations 1 to 6.
- 8. Bleed clutch – 35.15.01



STARTER MOTOR

Test (in situ) 86.60.02

Failure to crank engine

- 1. Switch ignition 'ON', and observe Battery Condition Meter reading, (allow a few seconds for the instrument to stabilise). Needle should settle in the 'Normal' band of the dial.
- 2. If needle settles in the 'Off Charge' (Red) band, there is probably insufficient current in the battery to operate the starter. For satisfactory starter motor performance, the battery must be in good condition and at least 70% charged. Check specific gravity of electrolyte in each cell with a hydrometer. A variation of more than 40 points (0.040) in any cell reading, the battery is suspect and should be removed for testing by a battery agent. If possible, prove the battery by substitution. Ensure that the battery posts are clean and that the terminals also are clean and firmly clamped to the battery terminal posts.

Electrolyte Temperature Correction

For every 10°C (18°F) below 15°C (60°F), subtract 0.007.

For every 10°C (18°F) above 15°C (60°F), add 0.007.

- 3. If battery is in satisfactory condition switch on headlamps and attempt to start engine, if lamps dim but starter does not crank engine, indication is given that current is flowing to starter solenoid, but an internal fault exists. Remove starter and solenoid assembly for detailed examination.

STATE OF CHARGE	BATTERY SPECIFIC GRAVITY READINGS CORRECTED TO 15°C (60°F)	
	CLIMATES NORMALLY Below 25°C (77°F)	CLIMATES NORMALLY Above 25°C (77°F)
FULLY CHARGED	1.270 – 1.290	1.210 – 1.230
70% CHARGED	1.230 – 1.250	1.170 – 1.190
DISCHARGED	1.100 – 1.120	1.050 – 1.070



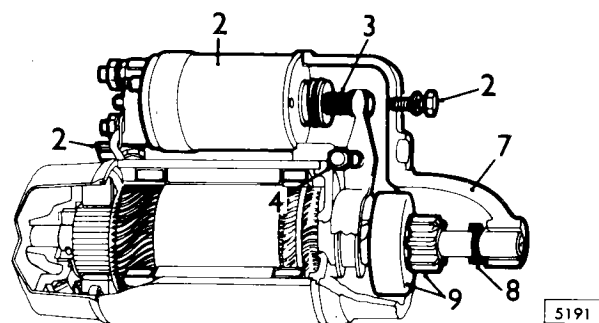
STARTER MOTOR ROLLER CLUTCH DRIVE UNIT

Remove and refit

86.60.05

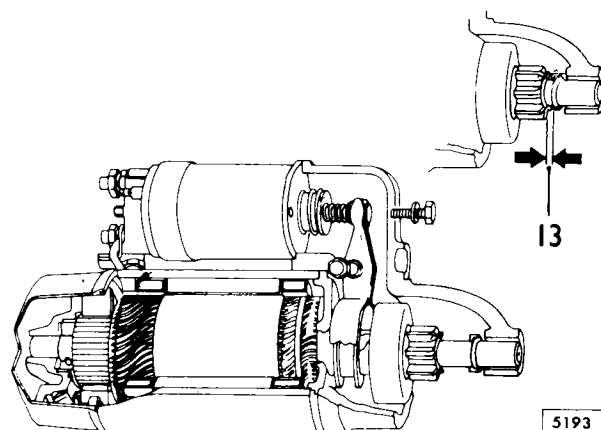
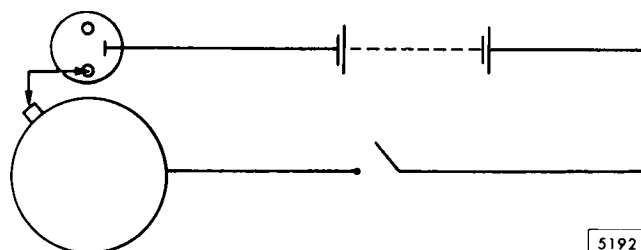
Removing

1. Remove starter motor — 86.60.01.
2. Remove solenoid complete with bridge strap (copper link).
3. Remove solenoid unit from drive end fixing bracket.
4. Remove engagement lever pivot pin.
5. Withdraw through bolts, but do not remove end bracket or commutator end cover.
6. Mount starter motor vertically in a vice, (drive end uppermost).
7. Withdraw drive end fixing bracket.
8. Remove jump ring from groove on drive shaft.
9. Remove collar and drive unit from shaft.



Refitting

10. Reverse operations 3 to 9.
- Tightening torques:
 Through bolts 1,1 kg.m. (8.0 lb.ft.).
 Solenoid unit fixing bolts 0,62 kg.m. (4.5 lb.ft.)
- (a) Smear all moving parts of drive unit liberally with grease.
 Shell SB.2628 (Home and cold climate countries).
 Retinax 'A' (Hot climate countries).
11. Connect solenoid terminal 'STA' to starter motor casing.
 12. Connect a 6 volt supply between solenoid operating 'Lucar' terminal and starter motor casing.
 13. With solenoid energised and drive assembly now in engaged position, press pinion lightly back towards armature to take up any slack in drive operating mechanism and then set position of eccentric pivot pin to obtain 0,127 – 0,381 mm (0.005 – 0.015 in.) clearance between pinion and thrust collar.
 14. Apply sealing compound and tighten locknut.
 15. Refit bridge strap (copper link).
 16. Refit starter motor — 86.60.01.



STARTER MOTOR SOLENOID UNIT

Remove and refit

86.60.08

Removing

1. Remove starter motor – 86.60.01.
2. Remove link connecting solenoid to yoke terminal.
3. Remove two fixings, withdraw solenoid from bracket. Collect gasket.
4. Release plunger from top of drive engagement lever.

Refitting

Reverse operations 1 to 4 inclusive.

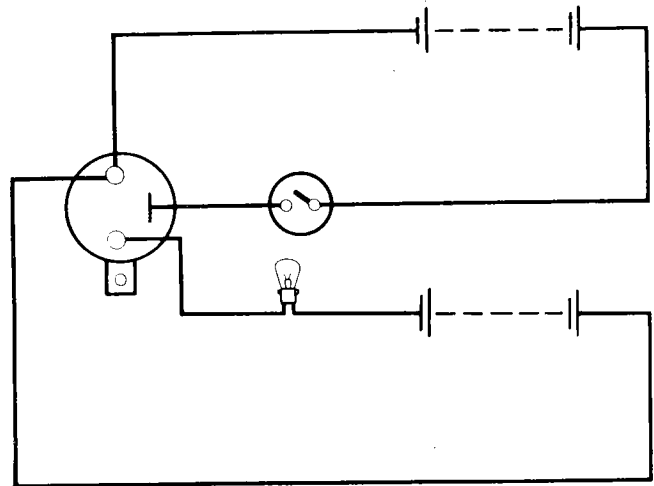
STARTER MOTOR SOLENOID UNIT

Test

86.60.09

The following checks assume that the pinion travel has been correctly set.

1. Remove bridge strap connecting solenoid to motor.
2. Connect a 12 volt D.C. supply, with switch between solenoid 'Lucar' and large terminal 'STA'.
DO NOT CLOSE SWITCH
3. Connect a separately energised 60 watt test lamp across solenoid main terminals.
4. Close switch. Solenoid should be heard to operate, and lamp should light with full brilliance.
5. Open switch. Lamp should go out.



STARTER RELAY

Remove and refit

86.60.10

See 86.35.34.

STARTER RELAY

Test

86.60.11

See 86.35.34.

STARTER MOTOR

Overhaul

86.60.13

Dismantling

1. Remove link connecting solenoid to yoke terminal.
2. Remove two fixings, withdraw solenoid from bracket. Collect gasket.
3. Release plunger from top of drive engagement lever.
4. Remove commutator-end sealing cover.
5. Withdraw through bolts.
6. Lift brushes from boxes and detach commutator-end bracket from yoke.
7. Withdraw yoke and field coil assembly from armature and intermediate bracket. Collect sealing ring fitted to intermediate bracket.
8. Slacken locknut and remove drive engagement pivot pin from fixing bracket.
9. Remove drive end fixing bracket.
10. Remove drive engagement lever.
11. Using suitable piece of tubing drift the thrust collar away from the jump ring on armature shaft.
12. Remove jump ring.
13. Withdraw roller clutch drive assembly.
14. Remove intermediate bracket.
15. Check individual components as detailed under relevant sub-headings.

Re-assembling

16. Reverse operations 1 to 15. Tighten the through bolts to a torque of 1,1 kg.m. (8.0 lb.ft.).

Brush replacement

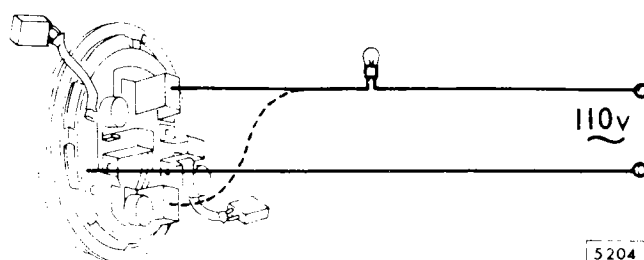
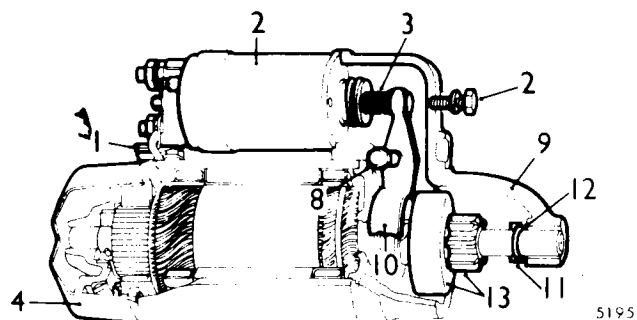
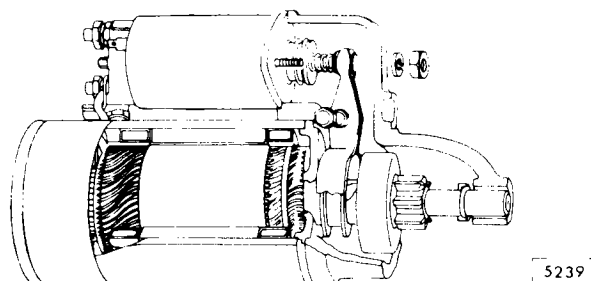
17. Renew brushes when worn to 8 mm (0.313 in.) in length.

NOTE: The insulated brush connectors are hot pressed to the free ends of the field coils. To replace, cut off the worn brush connectors approximately 3 mm (0.125 in.) from the joint.

Open out and tin the loop of the replacement brush. Place the tinned loop over the stub of the brush connector, squeeze up and solder.

Brush box insulation test

- **18.** Connect a 110V a.c. 15W test lamp between a clean** part of the end bracket and each of the two insulated brush boxes. If the lamp lights, renew the commutator end bracket assembly.



Commutator cleaning

19. Clean the commutator if not scored with a petrol moistened cloth.
Worn commutators should be cleaned with fine glass paper or mounted in a lathe and a fine cut taken with a sharp tool. Finally polish with very fine glass paper.
DO NOT UNDER CUT INSULATORS BETWEEN SEGMENTS.

NOTE: Armatures must not be skimmed below a minimum diameter of 38 mm (1.5 in.). Replace if below this limit.

Armature – checking

20. Armature conductors lifted from risers indicate overspeeding. Carefully resolder conductors or replace armature. Check clutch operation.

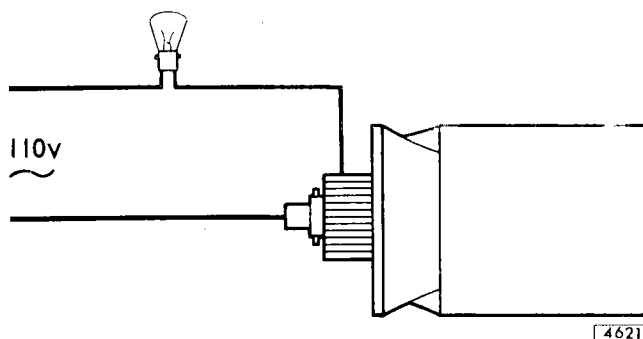
Armatures showing signs of fouling indicate worn bearings or un-true shaft.

Renew armature or bearings as required.

No attempt should be made to machine an untrue shaft.

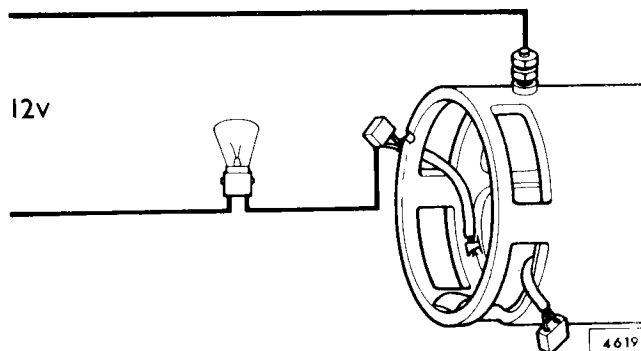
Armature insulation test

21. Connect a 110V a.c. 15W test lamp between any one of the commutator segments and the shaft.
If lamp lights renew armature.

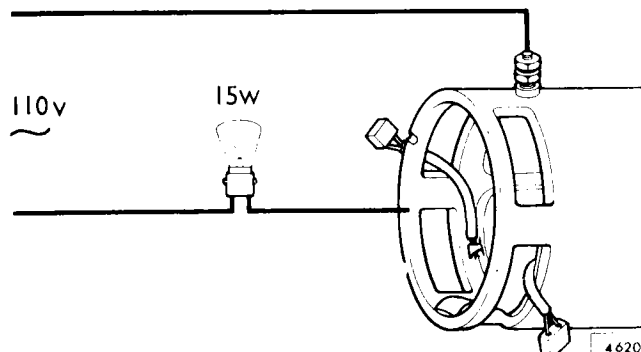


Field coil – Test

22. Check continuity of winding by connecting a 12 volt test lamp and battery between the terminal post and each brush (with the armature removed). An open circuit is indicated if lamp does not light.
Replace faulty coils.



23. Check coil insulation with a 110 volt a.c. 15 watt test lamp connected between the terminal post and a clean part of the yoke.
Renew field coils if bulb is illuminated.



24. To replace field coils, unscrew the four pole shoe retaining screws using a wheel-operated screwdriver. Remove coils, pole shoes and insulation pieces. Fit new coils over shoes, and replace in yoke, taking care that the taping around the coils is not trapped between the shoes and yoke. Locate shoes by lightly tightening the screws, fit insulation pieces, and finally tighten screws with wheel-screwdriver.

Bearing - replacement

25. Replace bearings if excessive side play of shaft is evident. Bushes in intermediate and drive end brackets should be pressed out, commutator end bracket bush must be withdrawn with a withdrawal tool. Soak bushes in clean engine oil for 24 hours before refitting. Refit by using a shouldered polished mandrel, 0,013 mm (0.0005 in.) greater in diameter than shaft.

NOTE: Porous bronze bushes must not be reamed out after fitting.

Roller clutch drive - Checking

26. Check that pinion is free to move on shaft splines, and clutch assembly operates correctly. Replace faulty or sticking units.

Pinion Movement - Setting

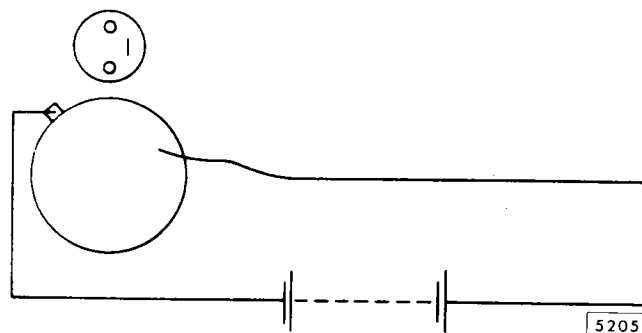
27. After re-assembly of the starter (cranking) motor pinion movement must be reset as follows:
Connect the 'Lucar' solenoid terminal in series with a switch to a 10 volt battery.
Connect other battery terminal to starter yoke.
Close switch. (This throws the drive assembly forward into the engage position). Measure the distance between pinion and thrust washer on armature shaft extension.

NOTE: Pinion should be pressed lightly towards armature to take up any slack in engagement linkage. Correct setting should be 0,127 to 0,381 mm (0.005 to 0.015 in.)

To adjust, slacken the eccentric pin securing nut and turn pin until correct setting is obtained.

NOTE: Arc of adjustment is 180° and the head of the arrow on the pivot pin should be set only between the arrow heads on the drive end casting.

Tighten securing nut to retain pin position after setting.



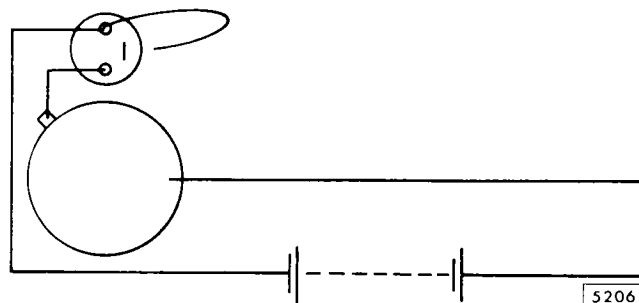
STARTER MOTOR

Bench Testing

86.60.14

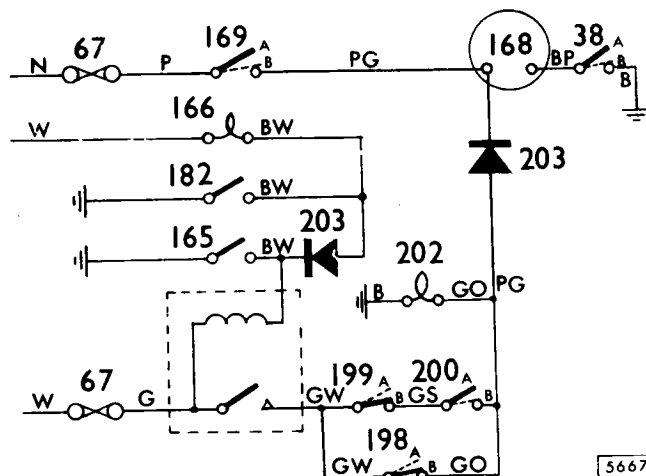
The following bench tests will determine if the fault is with the motor or solenoid unit.

1. Clamp motor in vice.
2. Connect a 12 volt battery, using heavy duty cables, to the motor frame and motor terminal.
3. Check that motor operates under light running conditions. If necessary equipment is available check light running current and speed against figures stated under "Performance Data".
4. If starter motor fails test, dismantle for overhaul. If starter operates check or replace solenoid unit as follows:-
5. Transfer cable from motor terminal to main solenoid terminal.
6. Fit jumper lead and touch to Lucar solenoid connector.
7. If motor does not operate, solenoid or solenoid contacts are faulty. Check and replace as necessary.

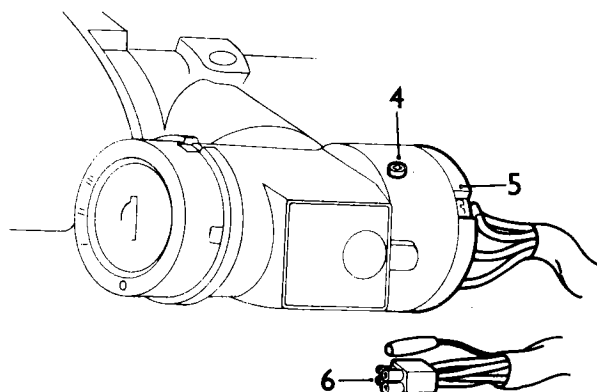


****SEAT BELT WARNING SYSTEM****86.65.00**

The system is associated with the ignition key alarm buzzer and gives audio and visual indication that seat belts are not fastened. Warning signals comprise an illuminated sign to 'Fasten belts' and a buzzer alarm. The warning lamp is situated at bottom centre of the facia between the speedometer and revolution counter (tachometer). The alarms are actuated if, with the engine running, the handbrake is released. Occupied front seats must have safety belts fastened to cancel the warnings. The passenger seat section of the system is inhibited if the seat is not occupied.**



5667



5234

IGNITION/STARTER SWITCH**Remove and refit****86.65.03****Removing**

1. Disconnect battery – 86.15.19.
2. Remove parcel tray – 76.67.04 – driver's side.
3. Remove four bolts securing upper steering column, and lower column to foot well.
4. Remove the phillips headed screw located in the steering column lock body which retains the switch.
5. Withdraw the switch.
6. Disconnect the switch harness at the plug/socket unit located under the side instrument panel.

Refitting

Reverse operations 1 to 6.

PANEL SWITCHES**Remove and refit****86.65.06**

Side lamp switch	86.65.25
Head lamp switch	86.65.26
Panel light switch	86.65.12
Interior light switch	86.65.13
Courtesy light switch	86.65.14
Heated rear window switch	86.65.36
Windscreen wiper switch	86.65.38
Windscreen washer switch	86.65.40
Hazard warning switch	86.65.50

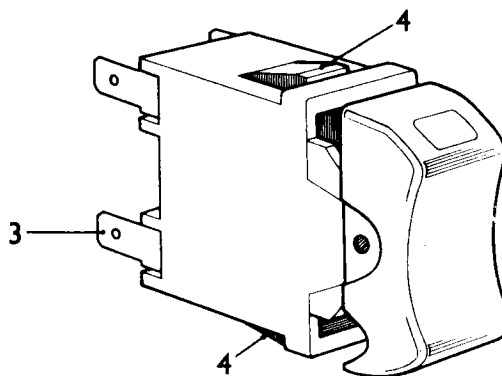
Removing

1. Disconnect battery – 86.15.19.
2. Release two finger nuts and lower instrument panel.
3. Disconnect cables from switch to be removed. Note location of cables for reference when refitting.
4. Press in nylon locking tabs and withdraw switch.

NOTE: Headlight switch must be removed before side light switch can be withdrawn.

Refitting

Reverse operations 1 to 4.



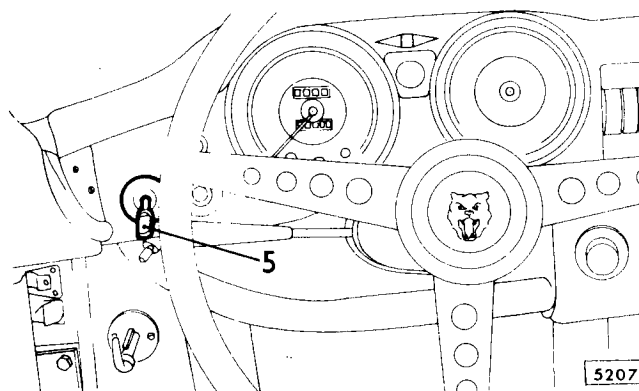
4488

HEADLIGHT DIP SWITCH**Remove and refit****86.65.11****Removing**

1. Disconnect battery – 86.15.19.
2. Remove driver's side parcel tray.
3. Remove drive screw and detach under scuttle casing.
4. Remove ring nut.
5. Withdraw switch and disconnect cables. Note location for reference when refitting.

Refitting

Reverse operations 1 to 4.



5207

DOOR PILLAR SWITCH**Remove and refit** 86.65.15**Removing**

1. Unscrew switch and disconnect cable.

Refitting

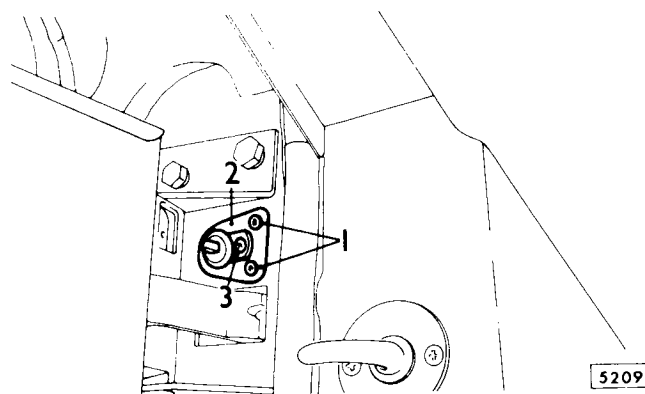
Reverse operation. Check earth contact between switch and panel.

DOOR PILLAR/KEY ALARM SWITCH**Remove and refit** 86.65.27**Removing**

1. Withdraw two screws.
2. Remove switch/plate assembly and disconnect cables.
3. Remove self tapping screw and detach switch from carrier plate.

Refitting

Reverse operations 1 to 3.

****SEAT SWITCH****Remove and refit** Passenger side only 86.65.29**Removing**

1. Disconnect battery.
2. Remove passenger seat cushion.
3. Disconnect cable connector located beneath seat.
4. Release hooks retaining seat diaphragm to frame.
5. Withdraw two switch retaining screws and washers.
6. Remove seat switch.

Refitting

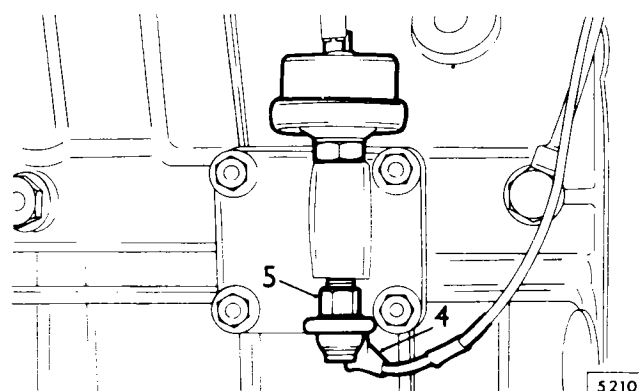
Reverse operations 1 to 6.**

OIL PRESSURE SWITCH**Remove and refit** 86.65.30**Removing**

1. Disconnect battery – 86.15.19.
2. Remove windscreen washer reservoir – 84.10.01.
3. Detach servo fluid reservoir and bracket complete from bulkhead.
4. Detach Lucar connector from switch.
5. Unscrew switch from cylinder block.

Refitting

Reverse operations 1 to 5



****BELT SWITCHES**

Remove and refit

Drivers 86.65.31
Passengers 86.65.32

Removing

1. Disconnect battery.
2. Remove seat cushion.
3. Withdraw seat belt anchorage bolt.
4. Slacken two screws retaining transmission tunnel side trim.
5. Lift side trim slightly and pull seat belt harness and connector clear.
6. Disconnect cable connector and remove belt complete with its harness.

Refitting

Reverse operations 1 to 6.**

HANDBRAKE WARNING SWITCH

Remove and refit

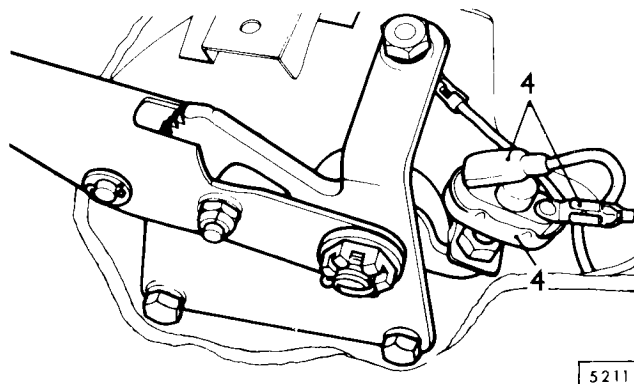
86.65.45

Removing

1. Disconnect battery – 86.15.19.
2. Remove left hand front seat – 76.70.01.
3. Remove console assembly – 76.25.01.
4. Disconnect cables, release lock nuts and remove switch.

Refitting

5. Set handbrake fully off.
6. Remove locknut from switch and fit switch to bracket.
7. Loosely refit locknut.
8. Fit connectors to switch.
9. Reconnect battery.
10. Adjust handbrake switch by following operations 4 to 10 – 86.65.46.
11. Refit console assembly.
12. Refit left hand front seat.

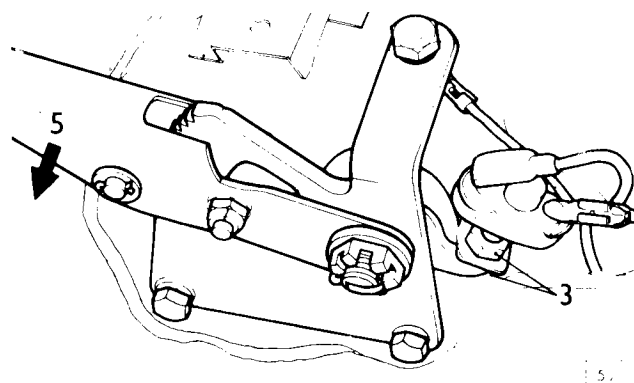


HANDBRAKE WARNING SWITCH

Adjust

86.65.46

1. Remove left hand front seat.
2. Remove console assembly – 76.70.01.
3. Slacken warning switch locknuts.
4. Check fluid level in both brake reservoirs. Top up as necessary.
5. Set handbrake fully off.
6. Switch on ignition. **DO NOT ROTATE ENGINE.**
7. Observe brake warning light. Wind locknut towards switch body, keeping switch pressed tight to bracket, until light goes off.
8. Secure locknut.
9. Check operation of switch by carefully lifting handbrake lever; warning light should come on before third click of ratchet. Adjust locknuts and tighten.
10. Switch off ignition.
11. Refit console assembly.
12. Refit left hand front seat.

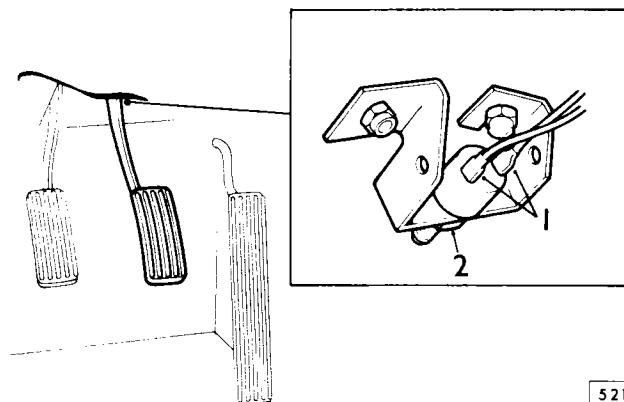


STOP LIGHT SWITCH**Remove and refit****86.65.51****Removing**

1. Disconnect cables.
2. Remove locknuts, withdraw switch.

Refitting

Reverse operations 1 and 2 to refit. Check that switch is inoperative when brake pedal is released. Adjust if necessary. **See operation — 86.65.56.**



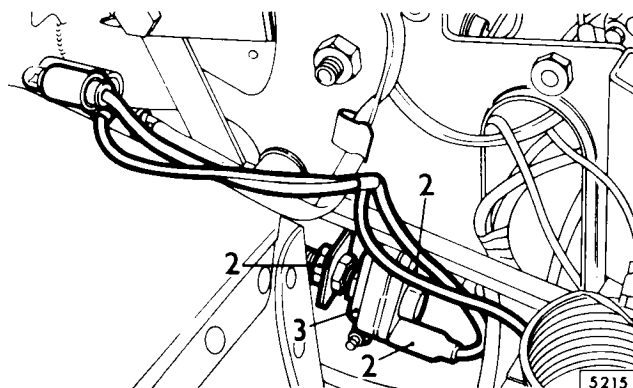
5213

CHOKE WARNING LIGHT SWITCH**Remove and refit****86.65.53****Removing**

1. Remove screen rail facia assembly — 76.46.04.
2. Disconnect cables, remove locknut.
3. Withdraw switch.

Refitting

Reverse operations 1 to 3. Check that switch is inoperative when choke is off. Adjust if necessary.



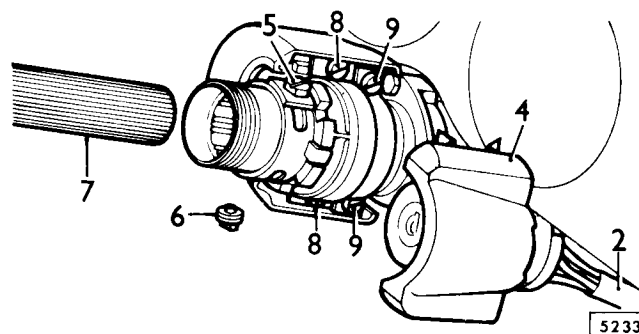
5215

DIRECTION INDICATOR/HEADLIGHT FLASHER SWITCH**Remove and refit****86.65.55****Removing**

1. Disconnect battery — 86.15.19.
2. Disconnect cables at plug and socket connection.
3. Release locknut and pull steering wheel upwards to full extent.
4. Remove switch inner cover. Retained by spring clips.
5. Remove two hexagonal headed screws, special square washers and release striker.
6. Withdraw stop button.
7. Withdraw steering wheel/inner shaft assembly.
8. Remove two screws and detach switch outer cover.
9. Remove two screws and detach switch clamp.
10. Withdraw switch assembly over column.

Refitting

11. Ensure peg on switch clamp fits in outer steering column locating hole.
12. Reverse operations 1 to 10. Adjust striker position to centralise switch cancellation.



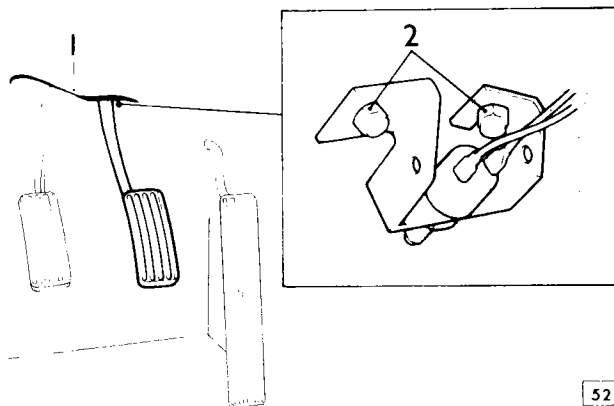
5233

STOP LIGHT SWITCH

Adjust

86.65.56

1. Loosen trim as necessary.
2. Slacken two locknuts securing stop light switch bracket.
3. Adjust brake pedal stop so that pedal pad has approximately 3,17 mm (.125 in) free movement before resistance of master cylinder is felt.
4. Switch on ignition and set stop light switch so that stop lights are on when resistance of master cylinder is felt.
5. Secure locknuts.
6. Re-check adjustment.
7. Switch off ignition.
8. Replace trim.



5214

CIGAR LIGHTER

Remove and refit

86.65.60

Removing

Cars with air conditioning only

1. Disconnect battery – 86.15.19.
2. Remove false bottom from armrest storage compartment.
3. Release connectors from cigar lighter.
4. Unscrew centre contact and sheath of cigar lighter and remove from armrest.

Refitting

Reverse operations 1 to 4.

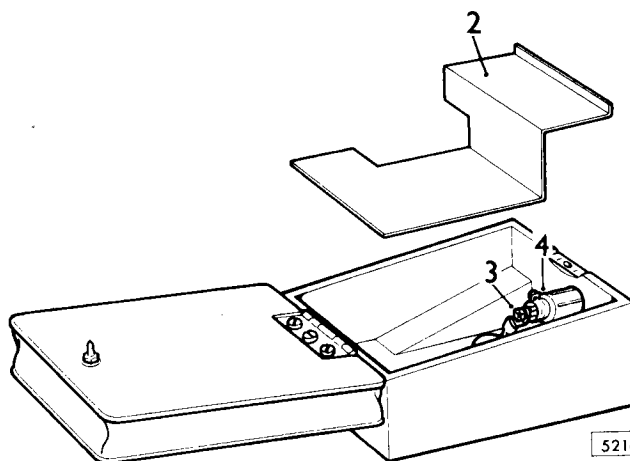
Removing

Cars without air conditioning

5. Remove radio panel – 86.50.04.
6. Detach Lucas connectors from cigar lighter.
7. Unscrew centre contact and sheath of cigar lighter and remove from radio panel.

Refitting

Reverse operations 5 to 7.



5216

FUSE BLOCK

Remove and refit

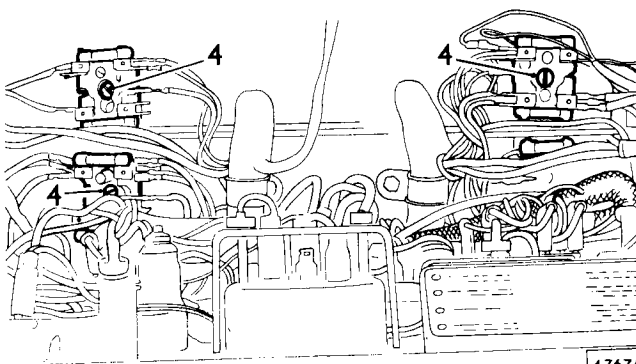
86.70.01

Removing

1. Disconnect battery – 86.15.19.
2. Lower instrument panel.
3. Disconnect cables from fuse unit. Note location for reference when refitting.
4. Remove screw(s) and detach fuse block(s).

Refitting

Reverse operations 1 to 4.



4767A

****AIR CONDITIONING FUSE******Remove and refit****86.70.02**

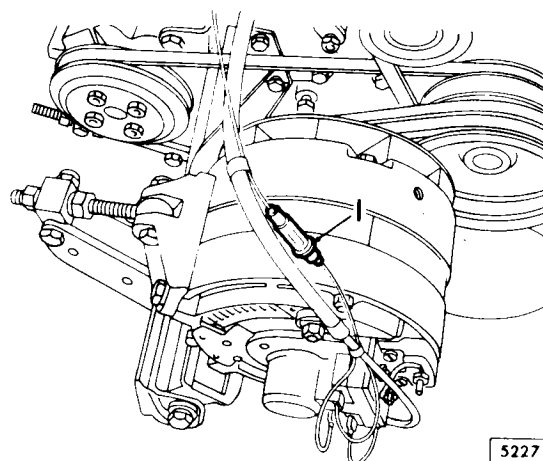
Fuse is in-line type and is installed on wiring harness between alternator and radiator matrix on cars fitted with air conditioning only.

Removing

1. Press fuse holder together, twist it, and remove fuse.

Refitting

2. Fit new fuse, press halves of holder together and twist to lock.

**WIRING HARNESSES**

NOTE: Removal and refitting of a cable harness is a major operation and should be undertaken only by an authorised dealer.

The wiring harness consists of seven main items, namely right and left hand body, forward, bulkhead, panel, headlamp and engine harness. Connection between various harnesses is by indexed plug and socket to prevent incorrect connection, and colour coding must be followed on all snap connections.

When replacing harnesses all items must be secured in clips provided and all grommets must be replaced if worn or damaged.

Small individual harnesses connect components into the main circuits.

Always refer to wiring diagram when making connections and carefully examine runs before disconnecting any cables.

WARNING: IN ALL CASES DISCONNECT THE BATTERY BEFORE REMOVING HARNESS.

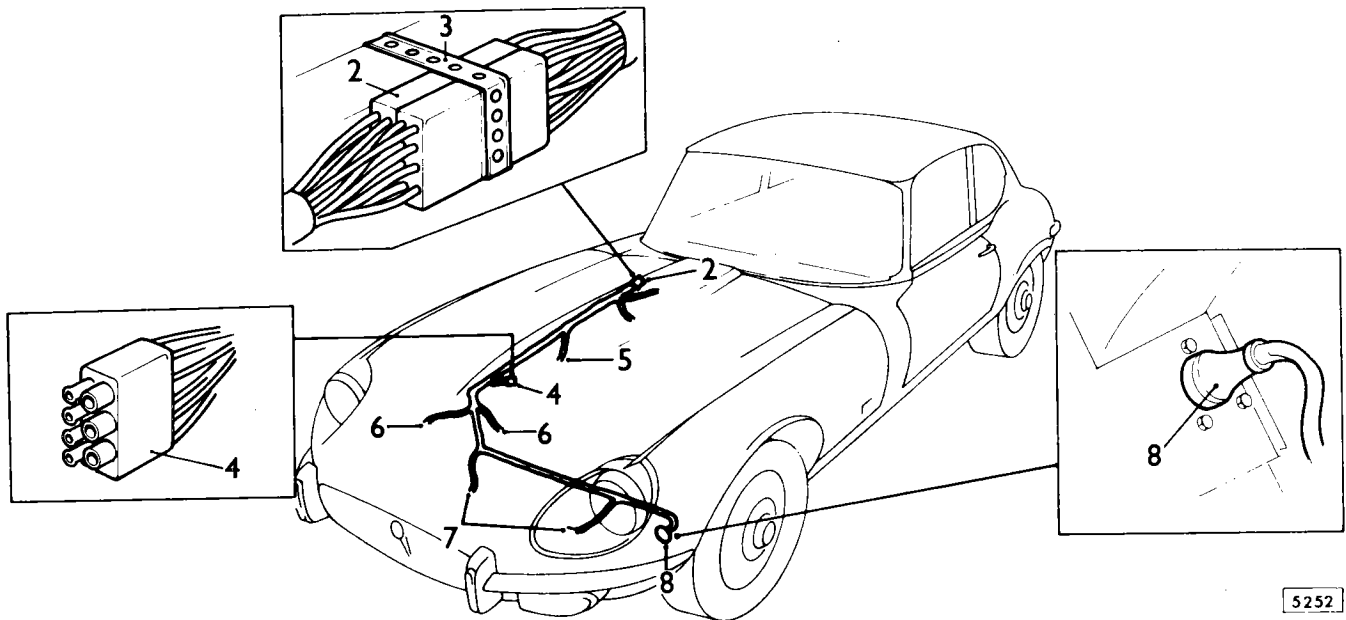
WIRING HARNESS – FORWARD

Remove and refit

86.70.08

Removing

1. Disconnect battery – 86.15.19.
2. Disconnect at bulkhead harness junction.
3. Remove straps securing harness to frame side member.
4. Disconnect plug to engine harness.
5. Disconnect horn relay connection.
6. Disconnect alternator and cooling fan leads.
7. Raise front of vehicle and disconnect horn connectors and all clips on frame cross member.
8. Disconnect harness plug connector to front lamps.
9. Disconnect all earth connections.



5252

Refitting

10. Lay new harness in position.
11. Make all connections and secure all clips and strapping.
12. Ensure frame earth connections are clean and tight.
13. Reconnect battery.

WIRING HARNESS – BULKHEAD

Remove and refit

86.70.09

Removing

1. Disconnect battery – 86.15.19.
2. Remove screen rail facia assembly – 76.46.01.
3. Disconnect forward harness plug in engine compartment.
4. Detach earth connections.
5. Remove right and left hand parcel trays and under scuttles **76.67.04/05 and 76.46.11.**
6. Remove right and left hand scuttle side panels **76.13.01.**
7. Remove knurled nut and lower instrument panel.
8. Release all connectors from fuses.
9. Disconnect all connections to instruments, radio (if fitted) and lights at both sides of car facia.

NOTE: If vehicle air conditioned, remove radio panel and detach cigar lighter cables.

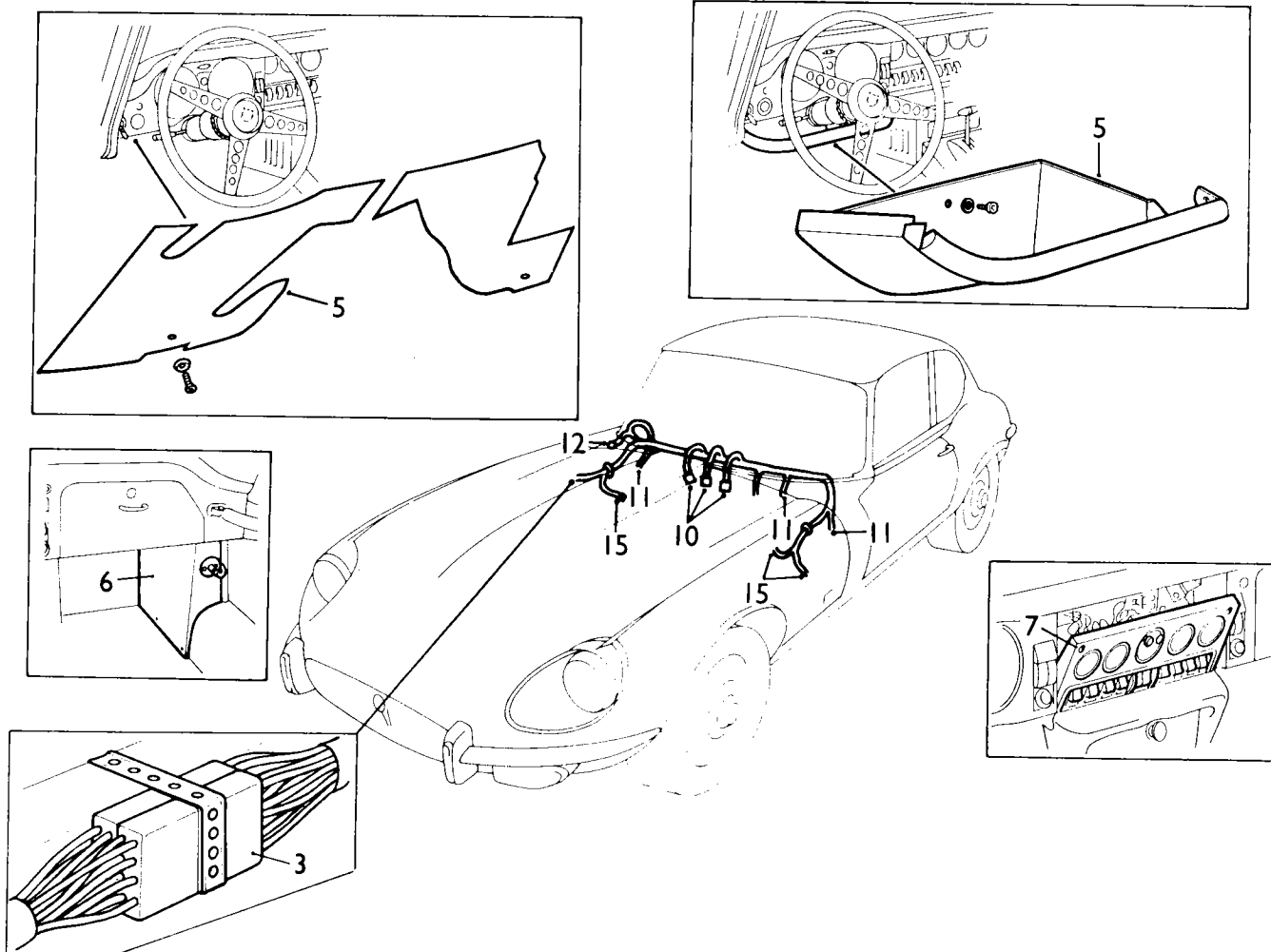
10. Disconnect plug connections to panel harness.
11. Disconnect connectors to right and left hand harnesses and steering column.
12. Pull connectors from door light switches.

NOTE: Hazard flasher holder is part of harness and must be detached from side panel.

13. Release clips securing harness across car. Remove taping where necessary.

NOTE: It may be found easier to remove clips and taping if windscreen is removed.

14. Remove grommet retainer.
15. Detach plug from windscreen wiper motor and connectors from starter ballast resistor relay, windscreen washer motor and heater.
16. Withdraw harness rearwards through bulkhead into car.



Refitting

17. Lay new harness in position according to whether car is right or left hand drive.
18. Make all plugs and connectors.
19. Refit strapping and secure clips.

20. Retape upper and lower sections of cable harness.
21. Ensure frame earth connections are clean and tight.
22. Ensure windscreen wiper linkage clear.
23. Replace windscreen and all interior trim removed.
24. Reconnect battery.

5258

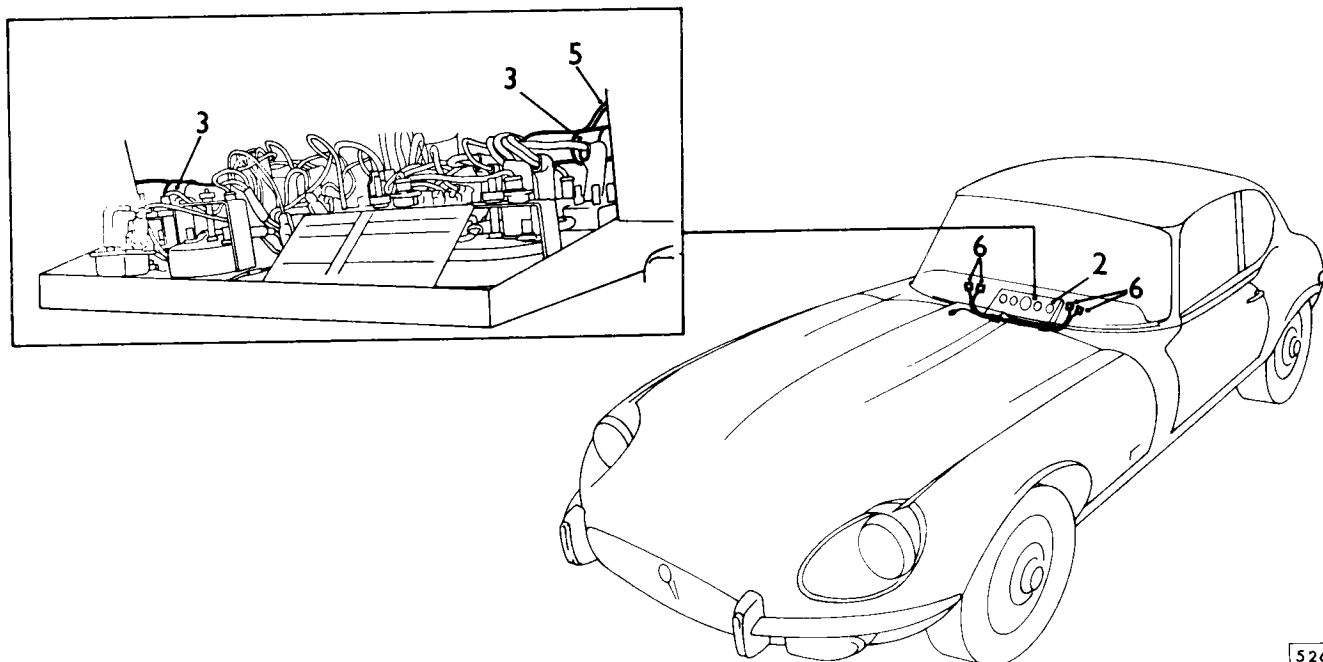
WIRING HARNESS – PANEL

Remove and refit

86.70.10

Removing

1. Disconnect battery – 86.15.19.
2. Remove two knurled finger nuts and lower centre facia panel.
3. Remove two cable clips on rear of panel.
4. Disconnect all instrument connections.
5. At right hand side, reach through aperture to detach wire from choke warning switch.
6. Unplug from bulkhead harness.



5264

Refitting

Reverse operations 1 to 6.

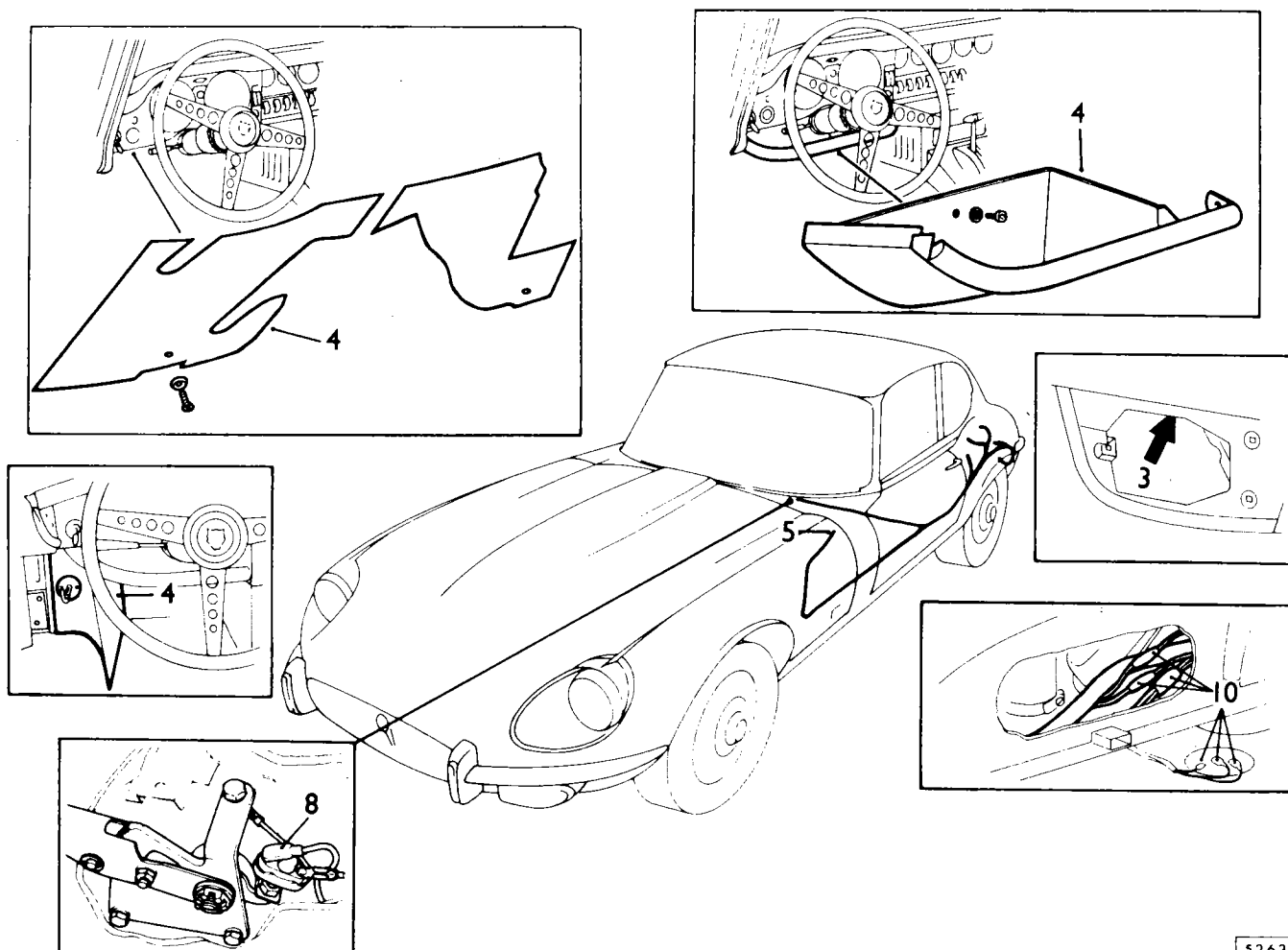
WIRING HARNESS – LEFT HAND

Remove and refit

86.70.11

Removing

1. Disconnect battery – 86.15.19.
2. Remove left hand tail lamp assembly **86.40.70.**
3. Remove bolt, nut and washer, disconnect earth cable accessible through tail lamp aperture.
4. Remove left hand parcel tray, under scuttle and scuttle side panel **76.67.04, 76.67.11 and 76.13.01.**
5. Disconnect at bulkhead harness junction.
6. Carefully lift trim and insulation from lower edge of door sills until harness is exposed.
7. In luggage compartment, remove floor and access panel at left hand side (2 + 2 only).
8. Remove centre console **76.25.01** and disconnect lead to handbrake switch.
9. Remove left hand loud-speaker **86.50.12**, if radio fitted, and detach connectors.
10. Reach through access panel at left hand side of luggage compartment and draw cables down. Separate connectors from interior light and heated rear window if fitted. Disconnect tank unit.
11. Lift tab clips securing harness in door sill.
12. Withdraw harness from front and rear towards centre of car. Renew grommets at rear wheel arch if necessary.



5263

Refitting

Reverse operations 1 to 12 inclusive.



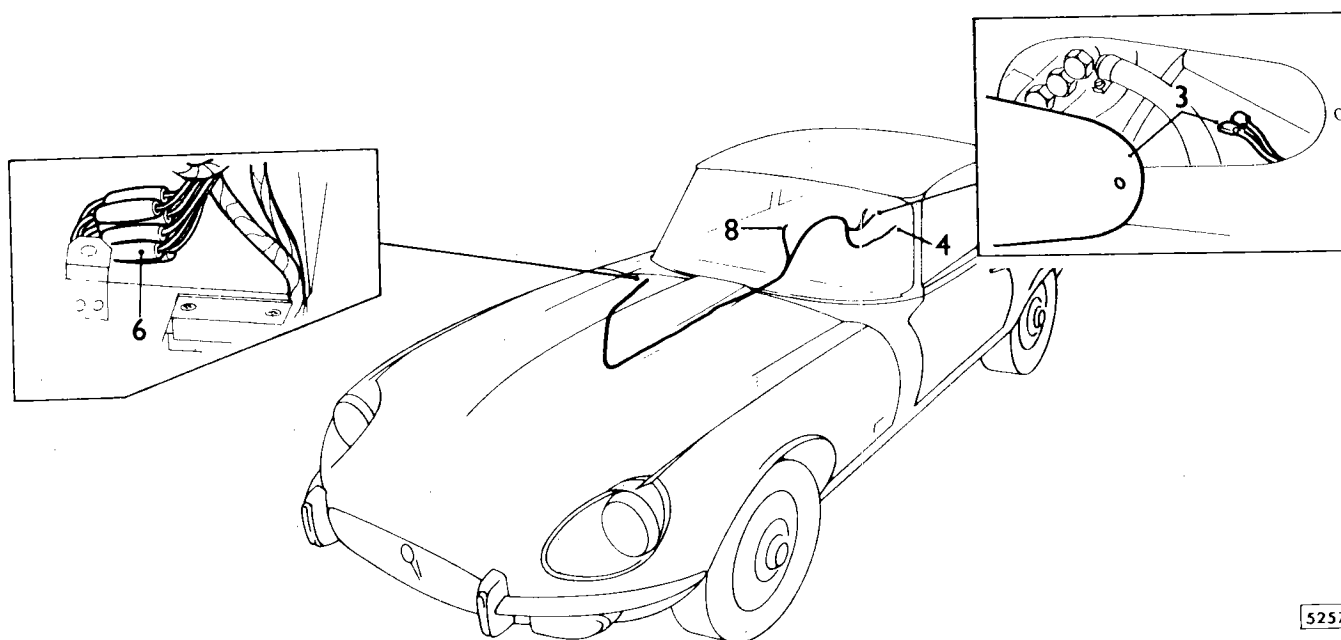
WIRING HARNESS – RIGHT HAND

Remove and refit

86.70.12

Removing

1. Remove battery – 86.15.19.
2. Remove spare wheel.
3. Remove access panel at right hand side of luggage compartment. Disconnect petrol pump and electric aerial (if fitted).
4. Separate connectors to right hand tail lamp assembly.
5. Remove right hand parcel tray, under scuttle and scuttle side panel **76.67.05, 76.46.11 and 76.13.01.**
6. Disconnect at bulkhead harness junction.
7. Carefully lift trim and insulation from lower edge of door sills until harness is exposed.
8. Remove right hand loud-speaker **86.50.12**, if radio fitted, and detach connectors.
9. Lift tab clips securing harness in door sill.
10. Withdraw harness from front and rear towards centre of car. Renew grommets at rear wheel arch if necessary.



5257A

Refitting

Reverse operations 1 to 10 inclusive.

WIRING HARNESS – ENGINE**Remove and refit****86.70.17****Removing**

1. Disconnect battery – 86.15.19.
2. Disconnect plug to forward harness at front of right hand sub frame side member.
3. Disconnect connectors to ballast resistor, ignition coil, ignition amplifier.

If car fitted with automatic transmission

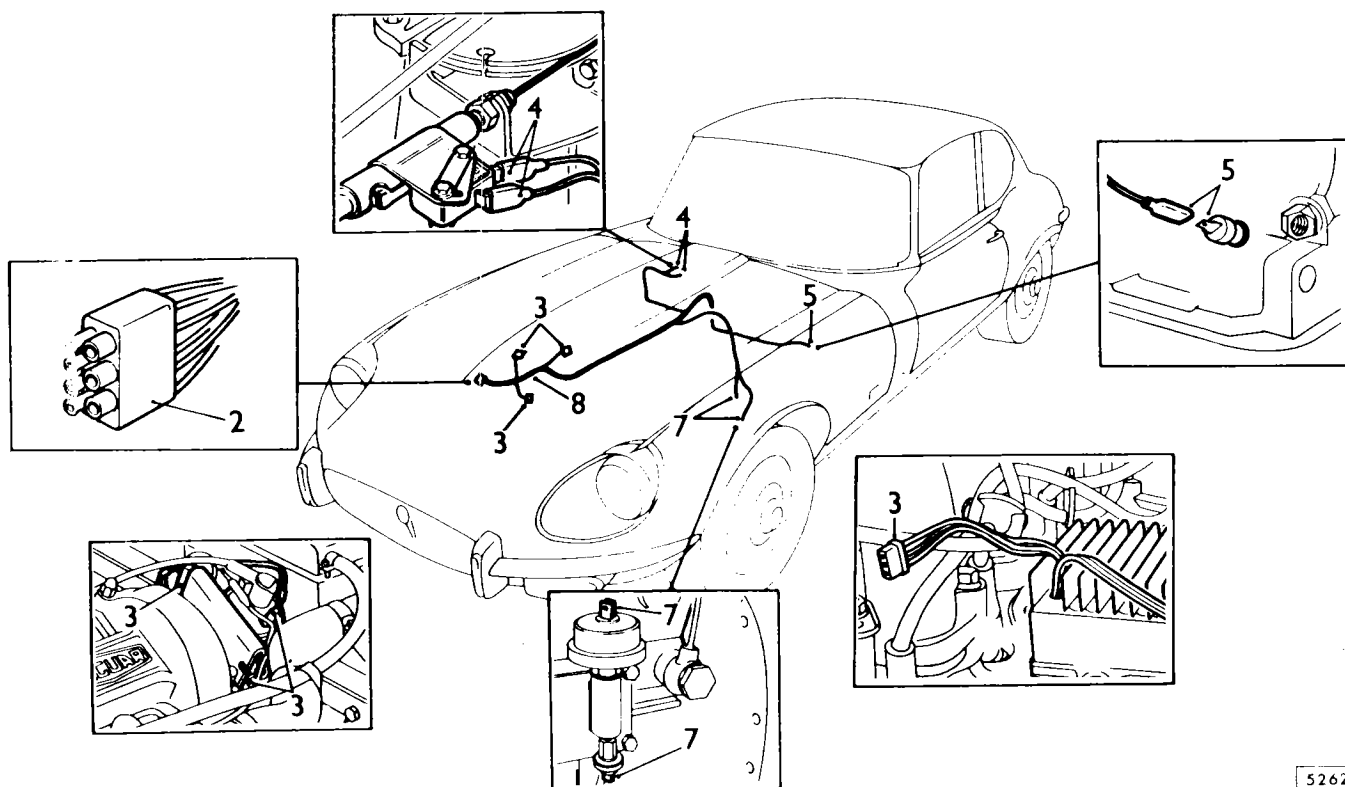
4. Detach connectors from kickdown switch on accelerator cable.
5. Beneath vehicle, detach cable from kickdown operating solenoid at gearbox.

All vehicles

6. Remove windscreen washer reservoir **84.10.01.**
7. Reach in through to engine and detach connectors from oil pressure switch and oil pressure transmitter.
8. Release all cable clips along top of engine block.

NOTE: Recover insulation from forward clip.

9. Draw cable harness from car.



5262

Refitting

Reverse operations 1 to 9 inclusive.

WIRING HARNESS – FRONT LAMPS

Remove and refit

86.70.18

Removing

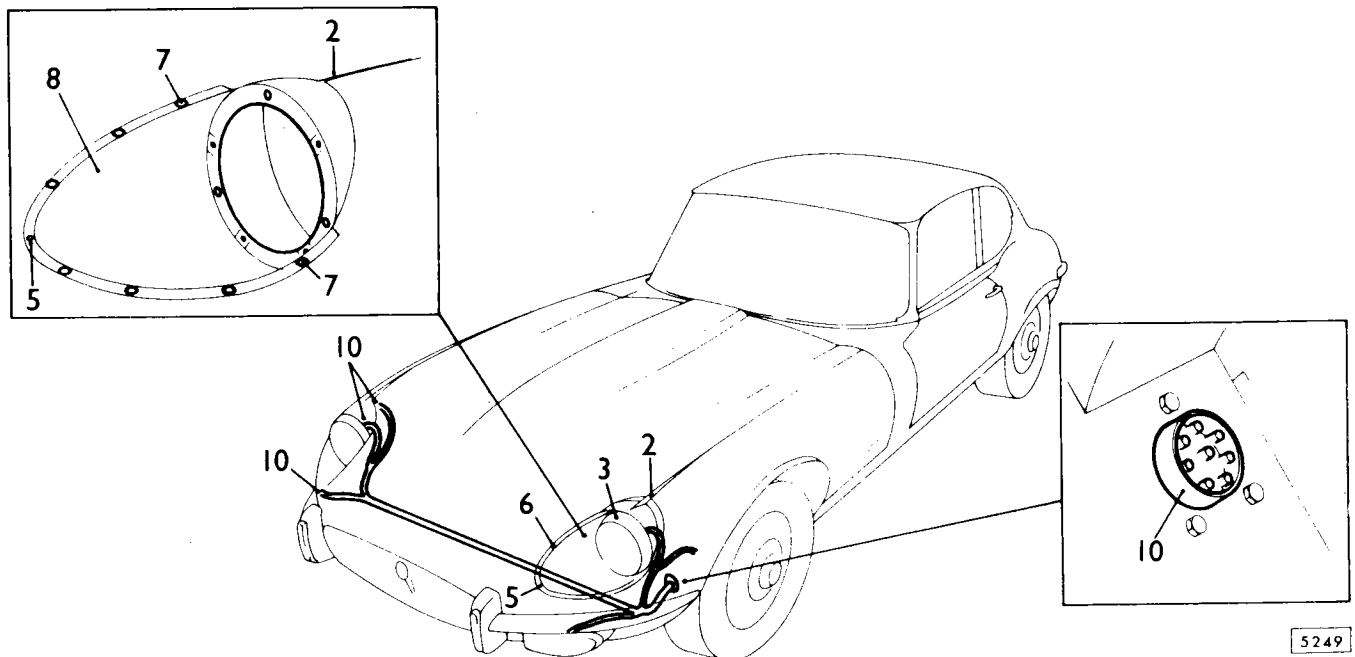
1. Disconnect battery – 86.15.19.
2. Under wheel arch, straighten two foremost limbs of finisher strip clips at both sides of car.
3. Prise off headlamp bezels.
4. Remove two screws securing finisher and lift it clear.
5. Remove one screw at forward end of finisher.
6. Prise off two strips and recover seals.
7. Carefully drill out seven rivets securing each headlamp scoop. Hold rivet head with pliers while drilling.

CAUTION: Be especially careful, while drilling outer rivets to avoid piercing skin of scoop. Ideally fit a stop to drill.

8. Protect paintwork and lift each scoop, complete with headlamp assembly from bonnet apertures.
9. Remove clips as necessary.
10. Note connections and separate connectors.

NOTE: It is unnecessary to detach wires from seven pin plug short harness.

11. Attach draw cord to harness at right hand side.
12. Carefully pull harness out through left hand aperture. Detach draw cord and leave in position.



Refitting

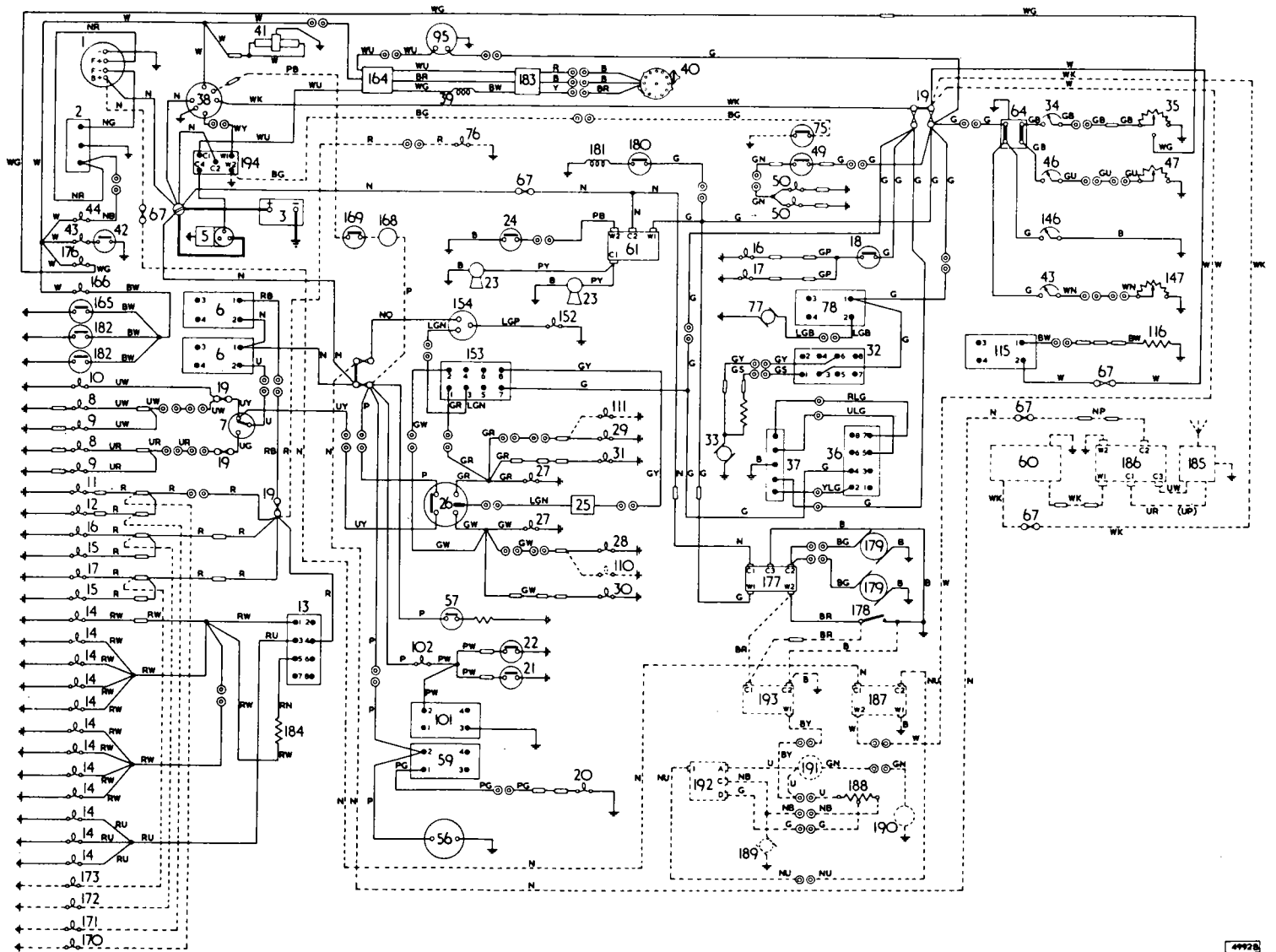
13. Reverse operations 8 to 12 to reposition scoops.
14. Re-rivet each scoop, ensuring spacer washers fitted beneath each rivet head.
15. Refit chrome headlamp finishers by reversing operations 1 to 6.

WIRING DIAGRAM

Refer to following pages for cable runs and all circuitry



ELECTRICAL



1. Alternator
2. Control Box
3. Battery (12 volt)
5. Starter Motor
6. Lighting Switch
7. Headlamp Dip Switch
8. R.H. Headlamp
9. L.H. Headlamp
10. Main Beam Warning Lamp
11. R.H. Sidelamp
12. L.H. Sidelamp
13. Panel Lamps Switch
14. Panel Lamps
15. Number Plate Illumination Lamp
16. R.H. Stop & Tail Lamp
17. L.H. Stop & Tail Lamp
18. Stop Lamp Switch
19. Fuse Unit 2 Way
20. Interior Lights
21. R.H. Door Switch
22. L.H. Door Switch
23. Horns
24. Horn Push
25. Flasher Unit
26. Direction Indicator Switch
27. Direction Indicator Warning Lamps
28. R.H. Front Flasher Lamp
29. L.H. Front Flasher Lamp
30. R.H. Rear Flasher Lamp
31. L.H. Rear Flasher Lamp
32. Heater Switch
33. Heater Motor(s)
34. Fuel Gauge
35. Fuel Gauge Tank Unit
36. Windscreen Wiper Switch
37. Windscreen Wiper Motor
38. Ignition/Starter/Steering Column Lock Switch
39. Ignition Coil
40. Distributor
41. Fuel Pump
42. Oil Pressure Switch
43. Oil Pressure Gauge
44. Ignition Warning Lamp
46. Water Temperature Gauge
47. Water Temperature Transmitter
49. Reverse Lamp Switch
50. Reverse Lamps
56. Clock
57. Cigar Lighter
59. Interior Light Switch
60. Radio (If Fitted)
61. Horn Relay
64. Bi-metal Instrument Voltage Stabiliser
67. Line Fuse
75. Automatic Gearbox Safety Switch
76. Automatic Gearbox Gear Selector Indicator Lamp
77. Electric Windscreen Washer
78. Electric Windscreen Washer Switch
95. Revolution Counter
101. Map Light Switch
102. Map Light
110. R.H. Repeater Flasher
111. L.H. Repeater Flasher
115. Rear Window Demist Switch
116. Rear Window Demist Unit
146. Battery Condition Indicator
147. Oil Pressure Transmitter
152. Hazard Warning Lamp
153. Hazard Warning Switch
154. Hazard Warning Flasher Unit
164. Ballast Resistor
165. Handbrake Switch
166. Handbrake Warning Lamp
168. Ignition Key Warning Buzzer
169. Buzzer Door Switch
170. R.H. Front Marker
171. L.H. Front Marker
172. R.H. Rear Marker
173. L.H. Rear Marker
176. Low Fuel Warning Light
177. Radiator Cooling Fan Relay
178. Radiator Cooling Fan Thermostat
179. Radiator Cooling Fan Motor
180. Auto. Trans. Kickdown Switch
181. Auto. Trans. Kickdown Solenoid
182. Brake Fluid Level Switch
183. Opus Ignition Amplifier
184. Panel Light Resistor

185. Aerial Motor (if fitted)
186. Aerial Motor Relay (if fitted)
187. Main relay - air conditioning
188. Air Conditioning Resistor
189. Air Conditioning Motor
190. Air Conditioning Compressor
191. Air Conditioning Thermostat Switch
192. Air Conditioning Control Switch
193. Radiator Cooling Fan Thermostat Relay
194. Starter Solenoid/Ballast Coil Relay


CABLE COLOUR CODE


N. Brown	P. Purple	W. White
U. Blue	G. Green	Y. Yellow
R. Red	L. Light Green	B. Black
K. Pink	S. Slate	

When a cable has two colour code letters, the first denotes the Main Colour and the second the Tracer Colour.


 SNAP CONNECTOR

 PLUG AND SOCKET

 LINE SPLICE

 EARTH CONNECTION
VIA CABLE

OR

 VIA FIXING BOLT



CONTENTS

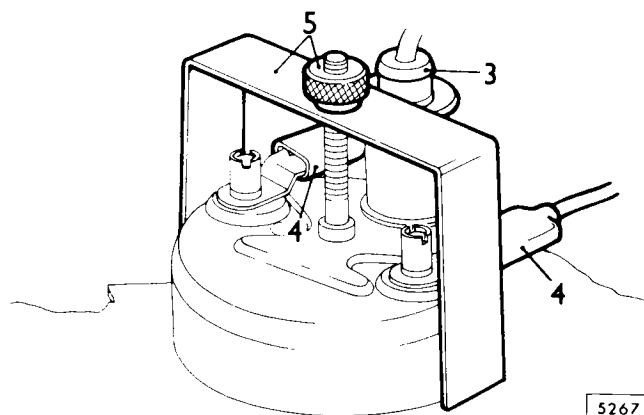
OPERATION	OPERATION NO.
Battery condition indicator	
Remove and refit	88.10.07
Clock	
Remove and refit	88.15.07
Fuel gauge	
Remove and refit	88.25.26
Tank unit — Remove and refit	88.25.32
Instrument panel	
Remove and refit	88.20.01
Oil gauge	
Remove and refit	88.25.01
Oil pressure sender unit	
Remove and refit	88.25.07
Revolution counter	
Description	88.30.00
Remove and refit	88.30.21
Speedometer	
Cable assembly — Remove and refit	88.30.06
Check	88.30.10
Description	88.30.00
Remove and refit	88.30.01
Trip recorder control — Remove and refit	88.30.02
Voltage stabiliser	
Remove and refit	88.20.26
Water temperature gauge	
Remove and refit	88.25.14
Water temperature transmitter	
Remove and refit	88.25.20

BATTERY CONDITION INDICATOR**Remove and refit****88.10.07****Removing**

1. Disconnect battery lead — 86.15.19.
2. Remove knurled finger nuts in the centre instrument panel and lower the hinged panel to the horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach the two Lucar connectors from the instrument.
5. Support the instrument from beneath the panel and remove the clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

Refitting

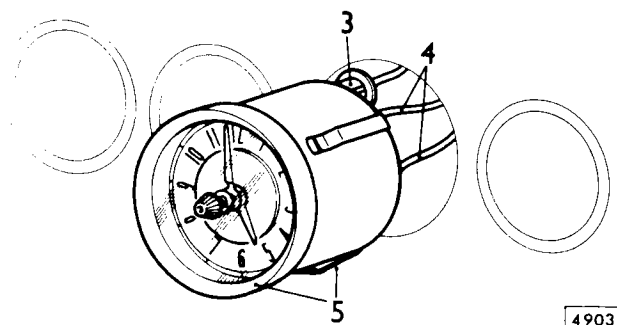
Reverse operations 1 to 6.

**CLOCK****Remove and refit****88.15.07****Removing**

1. Disconnect battery lead — 86.15.19.
2. Remove the knurled finger nuts in the centre instrument panel and lower hinged panel to the horizontal position.
3. Detach lead to illumination lampholder.
4. Withdraw the two Lucar connectors from the instrument.
5. Support the clock from beneath the panel and remove clamp retaining clock in panel.
6. Remove clock through panel.

Refitting

7. Reverse operations 1 to 6.
8. Re-start the clock by setting the hands.



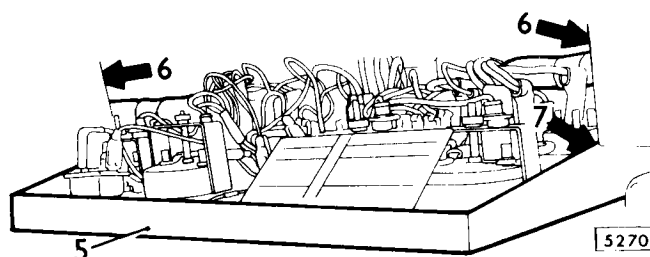
CENTRE INSTRUMENT PANEL

Remove and refit

88.20.01

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove parcel tray, driver's side – 76.67.04.
3. Remove parcel tray, passenger side – 76.67.05.
4. Remove dash liners – 76.46.11.
5. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
6. Separate wiring harness connectors at plug/socket connectors.
7. Remove pivot screws securing centre instrument panel.
8. Withdraw panel.



Refitting

Reverse operations 1 to 8.

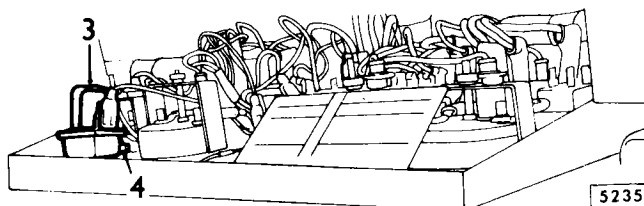
VOLTAGE STABILIZER

Remove and refit

88.20.26

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
3. Withdraw Lucar connectors from stabilizer.
4. Remove stabilizer from panel, secured by a nut and washer.



Refitting

Reverse operations 1 to 4.

OIL GAUGE

Remove and refit

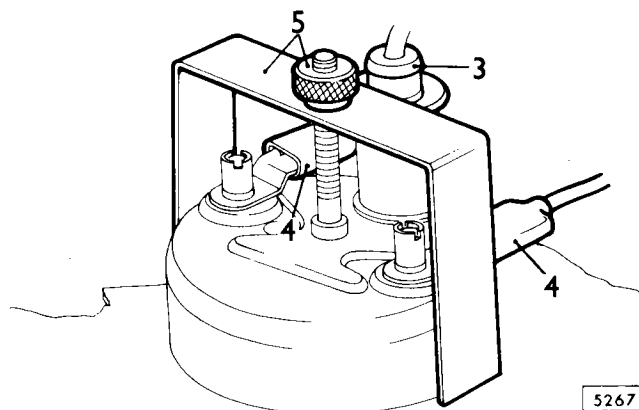
88.25.01

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach Lucar connectors from instrument.
5. Support instrument from beneath panel and remove clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

Refitting

Reverse operations 1 to 6.



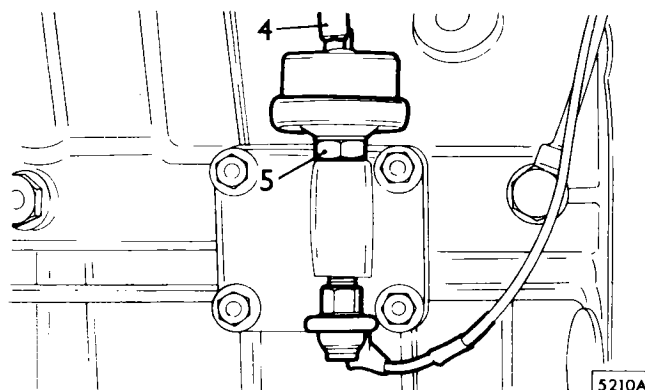
OIL PRESSURE SENDER UNIT**Remove and refit****88.25.07****Removing**

1. Disconnect battery lead — 86.15.19.
2. Remove windscreen washer reservoir — 84.10.01.
3. Detach servo fluid reservoir and bracket complete from bulkhead.
4. Detach Lucar connector from transmitter.
5. Unscrew transmitter from cylinder block.

Refitting

Reverse operations 1 to 5.

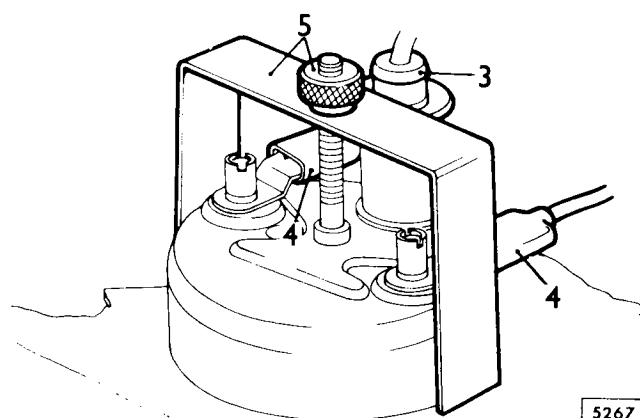
NOTE: Use a new sealing washer between the transmitter and its housing.

**WATER TEMPERATURE GAUGE****Remove and refit****88.25.14****Removing**

1. Disconnect battery lead — 86.15.19.
2. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach Lucar connectors from instrument.
5. Support instrument from beneath panel and remove clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

Refitting

Reverse operations 1 to 6.

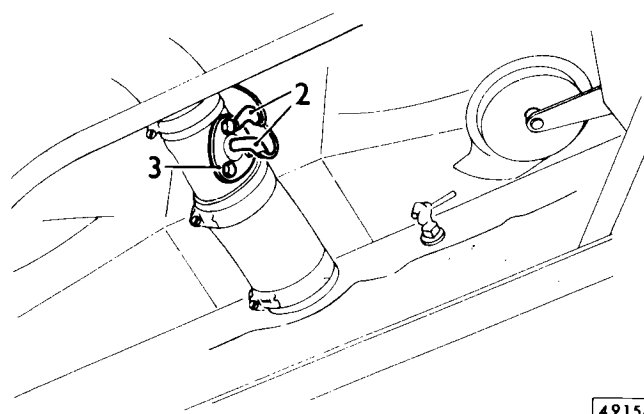
**WATER TEMPERATURE TRANSMITTER****Remove and refit****88.25.20****Removing**

1. Disconnect battery lead — 86.15.19.
2. Detach Lucar connector from transmitter.
3. Remove transmitter.

Refitting

Reverse operations 1 to 3.

NOTE: Use a new sealing washer on the transmitter.



INSTRUMENTS

FUEL GAUGE

Remove and refit

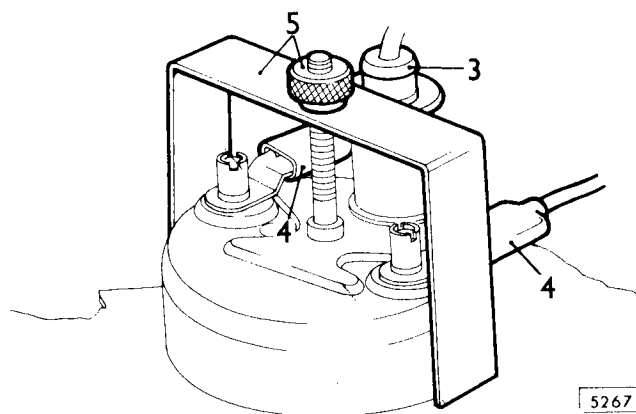
88.25.26

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts and lower hinged centre panel to horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach Lucar connectors from instrument.
5. Support instrument from beneath panel and remove clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

Refitting

Reverse operations 1 to 6.



FUEL GAUGE TANK UNIT

Remove and refit

88.25.32.

Removing

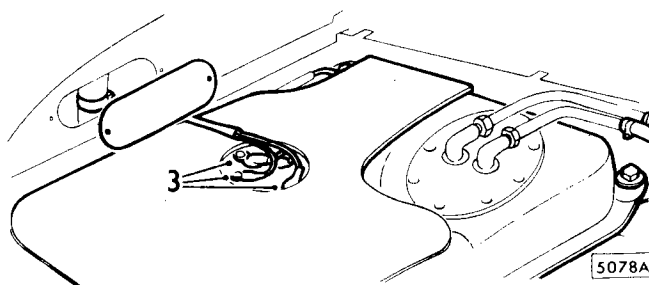
WARNING: ENSURE ALL DUE PRECAUTIONS ARE TAKEN AGAINST FIRE AND EXPLOSION.

1. Disconnect battery lead – 86.15.19.
2. Remove the L.H. section of the boot floor.
3. Detach leads from tank unit at Lucar connectors.
4. Remove tank unit.

Refitting

Reverse operations 1 to 3.

NOTE: A new gasket must be used between the tank unit flange and tank.



SPEEDOMETER AND TACHOMETER

88.30.00

Speedometer

Performance is dependent on the condition of the flexible drive; apparent faults in the instrument may be due to some failure of the drive. Before returning to speedometer for service check the inner cable.

Inaccuracy of an instrument may be due to incorrect tyre pressure or badly worn tyres. If non-standard tyres are fitted, apply to Smiths for a specially calibrated instrument.

Check that the code number on the face of the instrument is correct for the final drive unit ratio.

Pointer Waver

This complaint may be caused by a defective drive cable.

Over lubrication of the cable may have caused the instrument to become oiled up. If no fault in the cable is found, replace the speedometer.

Noisy installation

Check inner cable for defects if the cable is found to be satisfactory the drive gearing on the transmission may be suspect.

Test the drive with the inner cable withdrawn, but the outer casing connected at the transmission.

Ticking noise

Regular ticking in time with the distance counter usually indicates an internal defect of the instrument. Return speedometer for replacement.

Loud screeching

Usually more prevalent during cold weather. Return instrument for replacement.

Revolution counter (tachometer)

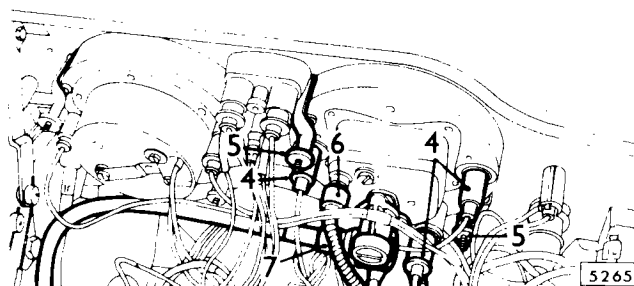
This is an electronic impulse type instrument having a printed circuit. The pulse lead is connected to a terminal on the ballast resistor unit. Connections to the back of the instrument are by means of a blocked plug and socket, the contacts of which are offset to prevent reversed polarity of the connections.

SPEEDOMETER**Remove and refit****88.30.01****Removing**

1. Disconnect battery lead 86.15.19.
2. Remove parcel tray 76.67.04.
3. Remove dash liner 76.46.11.
4. Withdraw speedometer illumination and warning light lampholders (note their positions).
5. Remove speedometer clamps.
6. Disconnect trip recorder control at knurled ferrule on instrument.
7. Disconnect speedometer cable from right-angle drive on instrument.
8. Withdraw instrument through panel.

Refitting

9. Reverse operations 1 to 8.
10. Check that the code number on the face of the instrument is correct for the final drive unit ratio of the vehicle.



SPEEDOMETER TRIP RECORDER CONTROL

Remove and refit

88.30.02

Removing

1. Remove screen rail crash roll assembly 76.46.04.
2. Disconnect battery lead 86.15.19.
3. Remove parcel tray 76.67.04.
4. Remove dash liner 76.46.11.
5. Withdraw speedometer illumination and warning light lampholders (note their positions).
6. Remove speedometer clamps.
7. Disconnect trip recorder control cable at knurled ferrule on instrument.
8. Remove plastic cap from control knob.
9. Unscrew chrome bezel behind control knob.
10. Withdraw control cable.

Refitting

Reverse operations 1 to 10.

SPEEDOMETER CABLE ASSEMBLY

Remove and refit

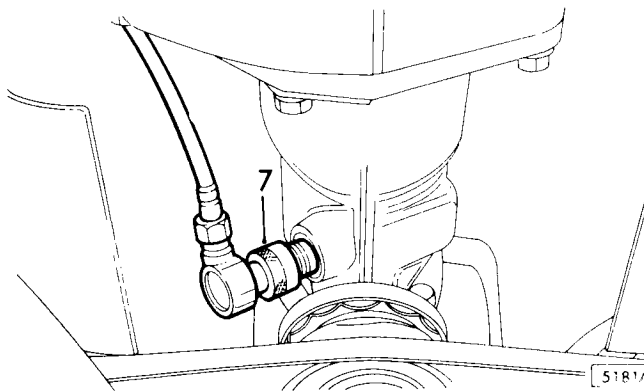
88.30.06

Removing

1. Remove parcel tray driver's side 76.67.04.
2. Remove parcel tray, passenger side 76.67.05.
3. Remove dash liner, driver's side 76.46.11.
4. Remove radio panel 86.50.04.
5. Detach speedometer cable at ferrule on right angle drive, behind instrument.
6. Carefully pull away carpet which is adhered to gearbox tunnel.
7. Disconnect drive cable at gearbox or (automatic transmission unit) from beneath car.
8. Release cable from body clipping.
9. Withdraw cable through grommet in side of gearbox tunnel.

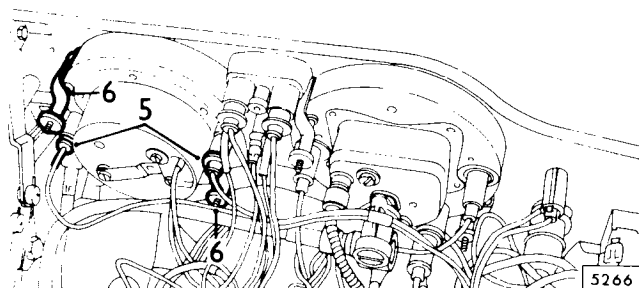
Refitting

Reverse operations 1 to 9.



TACHOMETER (Revolution counter)**Remove and refit****88.30.21****Removing**

1. Remove screen rail crash roll assembly 88.30.21.
2. Disconnect battery lead 86.15.19.
3. Remove parcel tray 76.67.04
4. Remove dash liner 76.46.11.
5. Withdraw tachometer illumination lampholder.
6. Remove tachometer clamps.
7. Detach tachometer leads at plug/socket unit.
8. Withdraw instrument through panel.

**Refitting**

Reverse operations 1 to 8.