

CONTENTS

Operation	Operation No.	Page No.
Aerial – Remove and refit	86.50.21	86–16
Aerial operating switch – Remove and refit	86.50.24	86–17
Aerial relay – Remove and refit	86.50.27	86–16
Alternator (A133) – Description	86.00.00	86–29
Alternator (A133) – Overhaul	86.10.08	86–29
Alternator – Description	86.10.00	86–4
Alternator – Overhaul	86.10.08	86–8
Alternator – Remove and refit	86.10.02	86–7
Alternator – Test	86.10.01	86–4
Alternator drive belt – Adjustment	86.10.05	86–7
Alternator drive belt – Remove and refit	86.10.03	86–7
Ballast resistor – Remove and refit	86.35.33	86–24
Ballast resistor/start relay – Remove and refit	86.35.34	86–24
Ballast resistor/starter relay – Test	86.35.35	86–24
Battery – Description	86.15.00	86–3
Battery – Remove and refit	86.15.01	86–3
Battery – Test	86.15.02	86–3
Battery leads – Remove and refit	86.15.17	86–3
Boot lid solenoid – Remove and refit	86.26.02	86–12
Boot lock motor – Renew	86.25.49	86–30
Boot lock motor – Adjust	86.25.53	86–31
Cigar lighter – Remove and refit	86.65.60	86–16
Cigar lighter bulb – Remove and refit	86.45.55	86–16
Circuit breakers – Remove and refit	86.25.31	86–12
Coil 6 cylinder – Remove and refit	86.35.32	86–27
Coil 12 cylinder – Remove and refit	86.35.32	86–24
Combined direction indicator/headlamp/horn/switch – Remove and refit	86.65.55	86–20
Combined windscreen wiper switch – Remove and refit	86.65.41	86–20
Courtesy light delay unit – Remove and refit	86.55.49	86–17
Distributor – Overhaul	86.35.26	86–22
Distributor – Remove and refit	86.35.20	86–22
Distributor breather filter – Renew	86.35.23	86–32
Distributor breather inlet tube – Renew	86.35.24	86–32
Distributor breather outlet tube – Renew	86.35.25	86–31
Distributor cap – Renew	86.35.11	86–31
Door lock control module – Renew	86.25.03	86–30
Door lock control module – Adjust	86.25.04	86–30
Door lock solenoid – Remove and refit	86.25.32	86–12
Door lock solenoid relay – Remove and refit	86.25.33	86–12
Door pillar switch – Remove and refit	86.65.15	86–19
Door post lamp and bulb – Remove and refit	86.45.03	86–15
Driver's seat electric motor – Remove and refit	86.75.01	86–20
Electronic speedometer – Description	86.00.00	86–28
Electronic speedometer – Fault diagnosis	86.00.00	86–28
Fibre optics illumination – Description		86–15
Fog/spot lamp assembly – Remove and refit	86.40.96	86–15
Fog/spot lamp lens and bulb – Remove and refit	86.40.94	86–15
Front flasher lamp – Remove and refit	86.40.42	86–13
Front flasher bulb – Remove and refit	86.40.40	86–13
Front flasher lens – Remove and refit	86.40.41	86–13
Front flasher repeater lamp – Remove and refit	86.40.53	86–13
Front flasher repeater bulb – Remove and refit	86.40.51	86–13
Front flasher repeater lens – Remove and refit	86.40.52	86–13
Front passenger door lock motor – Renew	86.25.46	86–30
Front passenger door lock motor – Adjust	86.25.51	86–30
Fuel change over switch – Remove and refit	86.65.39	86–19
Fuel pump inertia switch – Remove and refit	86.65.58	86–19
Fuel pump inertia switch – Reset	86.65.59	86–19
Handbrake warning switch – Remove and refit	86.65.45	86–19
Hazard/flasher unit – Remove and refit	86.55.12	86–17
Hazard warning switch – Remove and refit	86.65.50	86–20
Headlamp – Alignment	86.40.18	86–13
Headlamp – Alignment – Headlamp Levelling	86.40.18	86–20
Headlamp inner – Remove and refit	86.40.03	86–13
Headlamp levelling motor – Remove and refit	86.42.04	86–20
Headlamp levelling switch – Remove and refit	86.68.87	86–19
Headlamp outer – Remove and refit	86.40.02	86–13
Headlamp pilot bulb – Remove and refit	86.40.11	86–13
Headlamp relay – Remove and refit	86.55.17	86–17
Headlamp rim finisher – Remove and refit	86.40.01	86–13

CONTENTS

Operation	Operation No.	Page No.
Heated rear window relay — Remove and refit	86.55.19	86—17
Heated rear window switch — Remove and refit	86.65.36	86—19
High mounted stop lamp — Renew	86.41.01	86—31
High mounted stop lamp bulb — Renew	86.41.02	86—31
Horns — Description	86.30.00	86—12
Horns — Remove and refit	86.30.09	86—12
Horn circuit — Test	86.30.17	86—13
Horn push — Remove and refit	86.30.01	86—12
Horn relay — Remove and refit	86.30.18	86—12
Ignition amplifier 6 cylinder — Remove and refit	86.35.30	86—27
Ignition amplifier 12 cylinder — Remove and refit	86.35.30	86—24
Ignition coil — Renew	86.35.32	86—31
Ignition constant energy — Description	86.35.00	86—25
Ignition opus — Description	86.35.00	86—21
Ignition system constant energy — Test	86.35.29	86—26
Ignition system opus — Test	86.35.29	86—23
Ignition system 6 cylinder — Timing	86.35.15	86—27
Ignition system 12 cylinder — Timing	86.35.29/7	86—24
Ignition/starter/steering lock switch — Remove and refit	86.65.03	86—18
Ignition load relay — Remove and refit	86.60.28	86—17
Interior light switch — Remove and refit	86.85.13	86—19
Kiekert central locking system — Description	86.25.00	86—30
Low coolant control unit — Remove and refit	86.55.33	86—17
Luggage compartment lamp — Remove and refit	86.45.15	86—15
Luggage compartment light switch — Remove and refit	86.65.22	86—19
Map lamp assembly — Remove and refit	86.45.09	86—15
Map light switch — Remove and refit	86.65.43	86—19
Master lighting switch — Remove and refit	86.65.09	86—18
Number plate lamp — Remove and refit	86.40.86	86—14
Number plate lamp bulb — Remove and refit	86.40.85	86—14
Number plate lamp housing — Remove and refit	86.40.98	86—14
Number plate lamp lens — Remove and refit	86.40.84	86—14
Opticell — Remove and refit	86.45.27	86—15
Opticell bulb — Remove and refit	86.45.28	86—15
Panel switch bulb — Remove and refit	86.45.31	86—16
Parking lamp failure sensor — Remove and refit	86.55.22	86—17
Rear door lock motor — Renew	86.25.47	86—30
Rear door lock motor — Adjust	86.25.52	86—30
Rear fog lamp assembly — Remove and refit	86.40.99	86—14
Rear fog lamp bulb — Remove and refit	86.40.21	86—14
Rear fog lamp lens — Remove and refit	86.40.20	86—14
Rear switch panel window lift switches — Remove and refit	86.25.12	86—11
Rear lamp sensor unit — Remove and refit	86.55.34	86—17
Seat belt switch driver's buckle — Remove and refit	86.57.25	86—17
Seat belt switch passenger's buckle — Remove and refit	86.57.27	86—17
Side marker lamp assembly front — Remove and refit	86.40.59	86—14
Side marker lamp bulb — Remove and refit	86.40.58	86—14
Side marker lamp lens — Remove and refit	86.40.57	86—14
Side marker lamp assembly rear — Remove and refit	86.40.64	86—14
Side marker lamp bulb — Remove and refit	86.40.63	86—14
Sliding roof motor — Remove and refit	86.76.01	86—20
Speaker — Front door — Remove and refit	86.50.13	86—16
Speaker — Rear door — Remove and refit	86.50.14	86—16
Speed control — Description	19.75.00	86—33
Side marker lamp lens — Remove and refit	86.40.62	86—14
Starter motor 6 cylinder — Remove and refit	86.60.01	86—17
Starter motor 12 cylinder — Remove and refit	86.60.01	86—18
Starter motor relay — Remove and refit	86.55.05	86—18
Starter solenoid — Remove and refit	86.60.08	86—18
Stop lamp sensor unit — Remove and refit	86.55.50	86—17
Stop lamp switch — Remove and refit	86.65.51	86—19
Tail/stop/flasher/and reverse lamp assembly — Remove and refit	86.40.72	86—14
Tail/stop/flasher/and reverse lamp assembly bulb — Remove and refit	86.40.73	86—14
Tail/stop/flasher/and reverse lamp assembly lens — Remove and refit	86.40.74	86—14
Transmission indicator bulb — Remove and refit	86.45.40	86—16
Window lift motor — Front — Remove and refit	86.25.04	86—11
Window lift motor — Rear — Remove and refit	86.25.09	86—11
Window lift relay — Remove and refit	86.25.28	86—11

BATTERY

Description **86.15.00**

The battery is a special high-performance type and is located in the engine compartment.

WARNING: The battery fitted to this vehicle has special topping-up facilities. When battery charging is carried out the vent cover should be left in position allowing gas to escape or flooding of electrolyte will result.

Data

Battery type: Lucas 12 volt 68 Ah Pacemaker CP 13/11.

BATTERY

Remove and refit **86.15.01**

Ease back the battery terminal covers, slacken the pinch-bolts and disconnect the battery leads (1, Fig. 1).

Disconnect the snap connectors to the battery cooling fan (2, Fig. 1).

Slacken the retaining bolts (these are hinged and fixed to battery tray) (3, Fig. 1).

Withdraw the cooling inlet pipe from the grommet fixing (4, Fig. 1).

Release the positive battery lead from the clip on the cooling jacket (5, Fig. 1).

Ease the battery and cooling jacket forward until clear of the scuttle.

Lift the battery from the car.

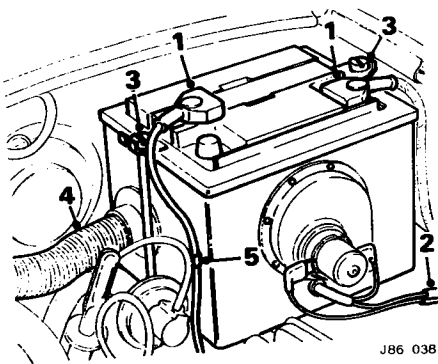


Fig. 1

To refit, reverse the above procedure.

BATTERY

Test **86.15.02**

State of charge—S.G. readings

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

STATE OF CHARGE	SPECIFIC GRAVITY READINGS CORRECTED TO 60°F (15°C)	
	Climates normally below 77°F (25°C)	Climates normally above 77°F (25°C)
Fully charged	1.270 to 1.290	1.210 to 1.230
70% charged	1.230 to 1.250	1.170 to 1.190
Discharged	1.100 to 1.120	1.050 to 1.070

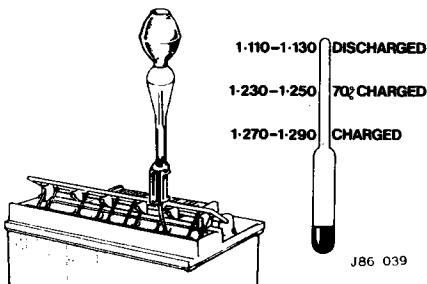


Fig. 2

Electrolyte temperature correction:

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

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

Heavy discharge test

This test should be carried out as a check to the battery condition. A heavy discharge tester applied to the battery terminals will determine whether the battery is capable of supplying the heavy currents required by the starter motor. With the discharge current set to 200 amps, observe the voltmeter reading during the battery discharge. If the voltmeter remains above 9.6 volts the battery is satisfactory.

BATTERY LEADS

Remove and refit
Positive **86.15.17**
Negative **86.15.19**
Battery Terminals **86.15.20**

Ease back the plastic cover from the terminal on the battery post and slacken the clamp bolt. Remove the appropriate terminal from the battery post (1, Fig. 3).

Disconnect the positive lead from the terminal post located on the right-hand engine sub-frame member (2, Fig. 3).

Remove the negative lead from the bulkhead secured by two clips, setscrew and washer (3, Fig. 3).

When refitting, ensure that all connections are clean metal to metal.

Protect the battery terminal with a smear of petroleum jelly.

Tighten all fixings.

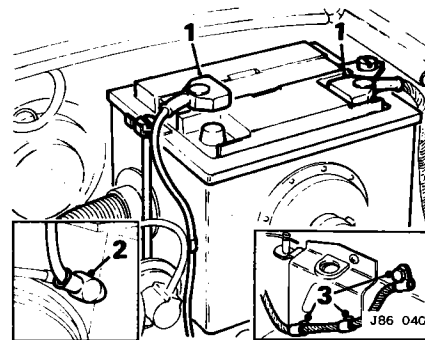


Fig. 3

The Freedom Battery

The freedom battery or the maintenance-free battery is what the name implies. When properly installed, no periodic maintenance is required.

A hydrometer is built into the cover, and has a glass rod which extends down into the electrolyte.

A 'cage' is attached to the lower end of the rod and a green ball is contained inside the cage. As the state of charge changes the green ball is free to move up and down inside the cage. When the state of charge is 65% or greater, the green ball will rise and touch the bottom of the rod. A green dot will then appear when the hydrometer is observed.

When the state of charge is below 65%, the green ball will move downwards and rest at the bottom of the cage. The hydrometer will then have a dark appearance and the green dot will have disappeared. A clear or light yellow appearance indicates the electrolyte level is low.

A cracked case, tipping the battery more than 45 degrees, or overcharging from the vehicle charging system or from an external source, can cause premature loss of electrolyte.

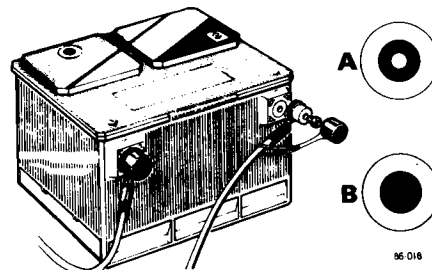


Fig. 4

ELECTRICAL SYSTEM

ALTERNATOR

Description

86.10.00

The Lucas alternators—types 18ACR, 20ACR or 25ACR fitted according to specification of car, are high-output, three-phase machines which produce current at idling speed.

The heatsink, rectifier and terminal block assembly can be removed complete. There are six silicon diodes connected to form a full-wave rectifier bridge circuit, and three silicon diodes which supply current to the rotor winding. Individual diodes cannot be removed from the heatsink assemblies. Regulation is by a Lucas control unit mounted in the slip-ring end bracket. There is no provision for adjustment in service.

Individual connectors are used to connect external wiring to the alternator. The alternators main negative terminals are connected internally to the body of the machine.

Surge protection device

The surge protection device is a special avalanche diode, fitted to the outer face of the slip-ring end bracket (not to be confused with a suppression capacitor, similarly fitted in the end bracket). The avalanche diode is connected between terminal 'IND' and frame and its purpose is to protect the diode pack from damage by absorbing high transient voltages which could occur in the charging system due to faulty cable connections, or when certain switch devices are operated. (The surge protection device is intended to provide limited protection for the diode pack under normal working conditions and therefore the service precaution not to disconnect any of the charging system cables, particularly those at the battery, while the engine is running, should still be observed.)

Alternative high output alternators, the Motorola 9AR 2512P and 9AR 2533P are fitted to some later cars; instructions for their overhaul, which differ in some details from those for Lucas alternators, are given in the appropriate sections of the manual.

CAUTION: No part of the charging circuit should be connected or disconnected while the engine is running.

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 the battery earthed lead.
Disconnect the alternator output cables.
Disconnect ignition and amplifier unit.

ALTERNATOR

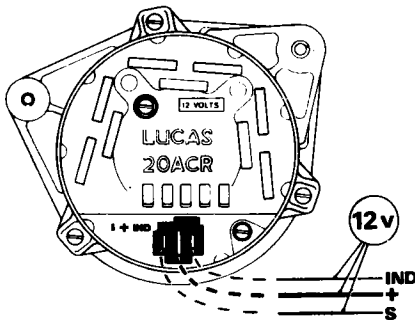
Test in situ (Lucas alternators only)

Test equipment required: d.c. moving coil voltmeter, 0 to 20 volts; d.c. moving coil ammeter 5—0—100 amps; ohmmeter continuity tester.

Test 1

Remove the connectors from the alternator. Switch the ignition on. Connect the voltmeter between a good earth and each of the disconnected leads in turn (Fig. 5). The voltmeter should indicate battery voltage.

If the voltmeter indicates a zero reading when connected to the main output lead, check the wiring to the starter solenoid and battery.



Test 1

Fig. 5

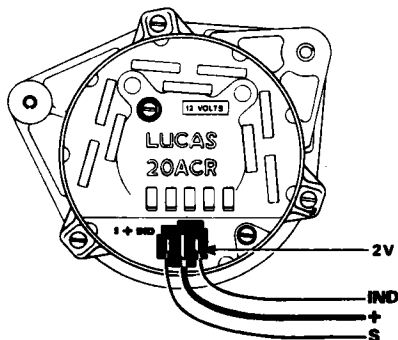
J86 041

If the voltmeter indicates a zero reading when connected to the 'IND' lead, check for earth or open-circuit between the warning light and the alternator connector. Check the warning light bulb and all connections to the warning light. If the voltmeter indicates a zero reading when connected to the 'S' lead, check the wiring to the starter solenoid and battery.

A break in the sensing lead will result in the alternator not charging and the warning light not working.

Test 2

Refit the alternator connector. Switch the ignition on. Connect the voltmeter between a good earth and the 'IND' terminal (Fig. 6). The voltmeter should indicate approximately 2 volts.



Test 2

Fig. 6

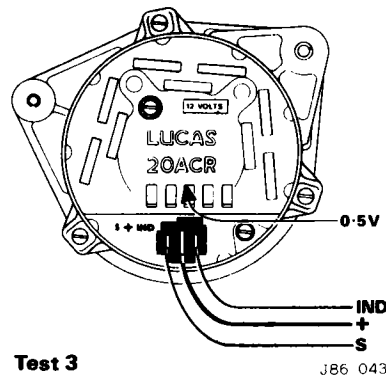
J86 042

If the voltmeter indicates a zero reading, the surge protection diode is suspect and should be checked.

If the voltmeter indicates battery voltage the brushes, rotor, or regulator are suspect. Proceed to the next test.

Test 3

Connect the voltmeter between a good earth and the metal link on the regulator (Fig. 7). Switch the ignition on. The voltmeter should indicate approximately 0.5 volt. If 12 volts is indicated, the regulator is faulty.



Test 3

Fig. 7

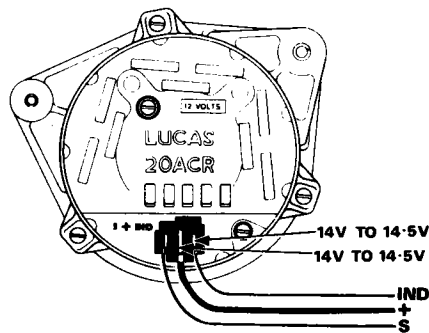
J86 043

If the reading is 0.5 volt but if a 12 volts was indicated on the previous test, check brushes, rotor and slip-rings.

NOTE: If the warning light operates with the ignition off but goes out when the ignition is switched on, check the voltage at the 'IND' terminal with the ignition switched 'off'. If battery voltage is indicated, the diode pack is faulty.

Test 4

Start and run the engine at a constant 2500 rev/min.



Test 4

Fig. 8

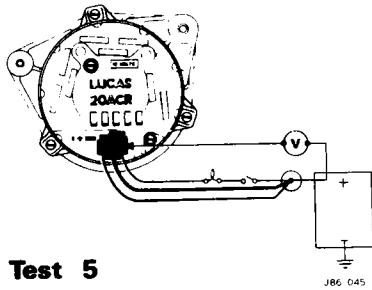
J86 044

Connect the voltmeter to a good earth and the 'IND' terminal; note the voltage. Connect the voltmeter to the main output terminal; the voltmeter readings should be the same (Fig. 8). If there is a difference of more than 0.5 volt, the diode pack is suspect.

Test 5

Connect the voltmeter between the battery insulated terminal and the alternator main output terminal (Fig. 9). Start and run engine at approximately 2500 rev/min. The voltmeter should not exceed 0.5 volt.

If the voltmeter reading is higher than 0.5 volt, check the wiring from the alternator to the battery for loose or dirty connections.



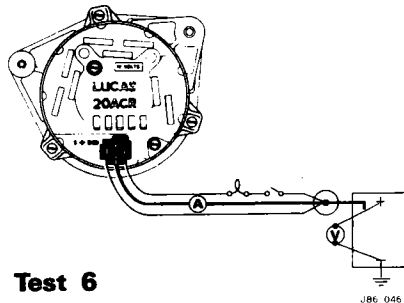
Test 5

Fig. 9

NOTE: The warning light glowing while the engine is running at normal charging speeds usually indicates a faulty diode pack or dirty or loose connections in the wiring from alternator to battery.

Test 6

Disconnect the battery earth lead.
Disconnect the alternator.
Connect an ammeter between the main output terminal or alternator and the disconnected output lead.
Connect a jumper lead between the 'IND' lead and 'IND' terminal (Fig. 10).
Re-connect the battery.
Switch on all load (except wipers) for one minute.



Test 6

Fig. 10

Start and run the engine at normal charging speed. The ammeter should indicate the maximum output for the alternator.
If the output is low, short the metal link on the regulator to earth with a jumper lead and repeat the test.
If maximum output is now indicated on the ammeter, the regulator is suspect.
Should the output still be low, the stator windings are suspect.
Disconnect the battery earth lead.
Connect the ammeter in series with the alternator main output cable and the starter solenoid.
Re-connect the battery.
Connect the voltmeter across the battery terminals.
Start and run engine at normal charging speed until the ammeter reads less than 10A.
The voltmeter should read 13.6 to 14.4 volts.
An incorrect reading indicates that the regulator is faulty.

ALTERNATOR

Test in situ (Motorola alternators) 86.10.01

Equipment required: Voltmeter and ammeter, field rheostat.

NOTE: Before commencing tests, ensure that the battery is fully charged. If not, disconnect the battery before recharging it.
Never disconnect the battery, alternator or regulator with the engine running.
Do not earth the field winding (terminal marked 'EX', connected to the regulator by a green lead).
On cars fitted with air-conditioning it is advisable to remove the alternator from the vehicle before carrying out tests 1 and 3 and to substitute bench tests 4, 5 and 6.
Always disconnect the battery when removing or refitting the alternator.

Test 1

Ignition switched off. Check of stator windings. Check voltage on one of the three phases of stator windings, accessible to a probe from voltmeter passing through ventilation hole as shown (Fig. 11).

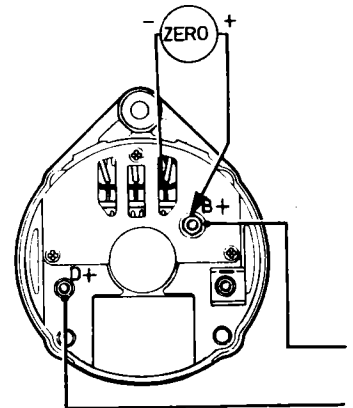
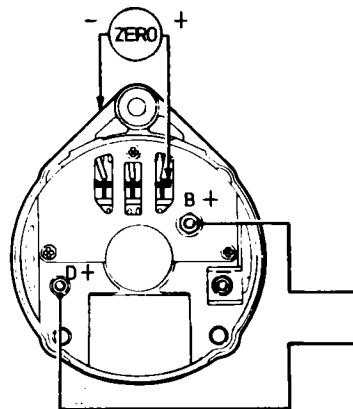


Fig. 11

Connect voltmeter first between the phase and earth, then between winding and positive terminal, observing correct polarity.
Indication of any reading other than zero on the voltmeter shows defective positive rectifier diode, necessitating changing of diode bridge.

Test 2

Ignition switched OFF. Check of battery connections. Check voltage at B+ terminal on alternator and at battery positive terminal (Fig. 12).

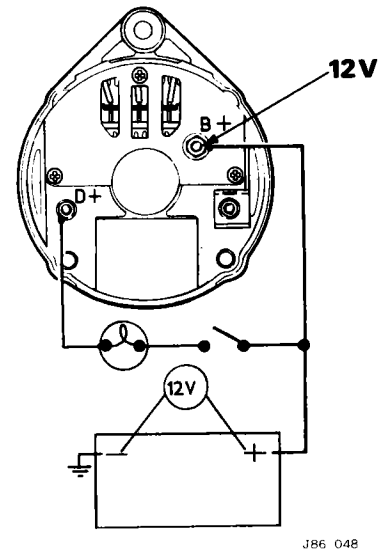


Fig. 12

Voltage should be the same at both points. If voltage at B+ terminal is lower than battery voltage, or fluctuates, check for broken wires, faulty connections or corroded terminals.

Test 3

Ignition on, engine not running. Check of field circuit.
Check voltage at slip-ring by touching probe of voltmeter on field terminal 'EX' (Fig. 13) with regulator attachment screws removed. If voltmeter reading is higher than 2 volts, field circuit is defective; remove brush holder by detaching green regulator lead from field terminal 'EX' and remove two setscrews, with washers securing brush holder to alternator. Check that brushes are free to slide, undamaged and not excessively worn; new brushes protrude by approximately 9 mm (0.35 in) from the brush holder, and complete brush holder must be renewed if either brush protrudes by less than 4 mm (0.15 in). Ensure that brush leads are not frayed and are securely attached to brushes, and that slip-rings are clean.

ELECTRICAL SYSTEM

If voltmeter reads zero, check connections to regulator, ignition switch and ignition indicator lamp.

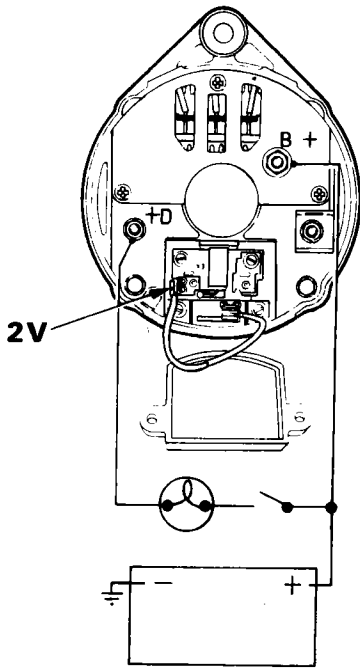


Fig. 13

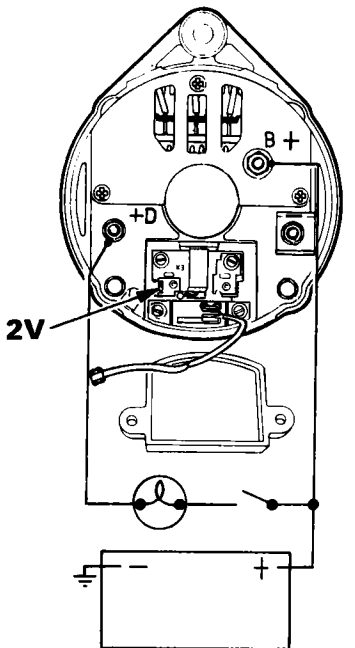


Fig. 14

Also check regulator circuit by detaching its green lead from field EX terminal (Fig. 14) and measuring voltage across field windings, which should not exceed 2 volts. If this voltage is between 8 and 12 volts, alternator is defective. If correct, proceed to test 5.

Test 4

Ignition ON, engine running faster than idle. Further check field circuit.

If incorrect readings were obtained in Test 3, retest field circuit by disconnecting regulator from field terminal EX and connecting ammeter between this terminal and output terminal B+ (Fig. 15). If meter indicates current less than 1 amp, recheck brushes, leads and slip rings.

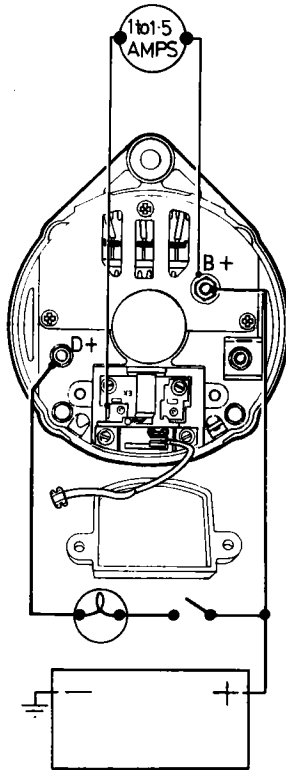


Fig. 15

CAUTION: Use a field rheostat in series with ammeter, so that excessive current which could flow if the field is shorted will not damage ammeter.

Test 5

Ignition ON, engine running faster than idle.

Check of output voltage.

Check voltage both at output terminal (B+) and at positive terminal of battery (Fig. 16). Correct voltage at both points is 14.2 volts \pm 0.5 volts at 77°F (25°C).

If difference between battery voltage and voltage at B+ terminal is more than 0.3 volts, check wiring and terminals for corrosion or breaks.

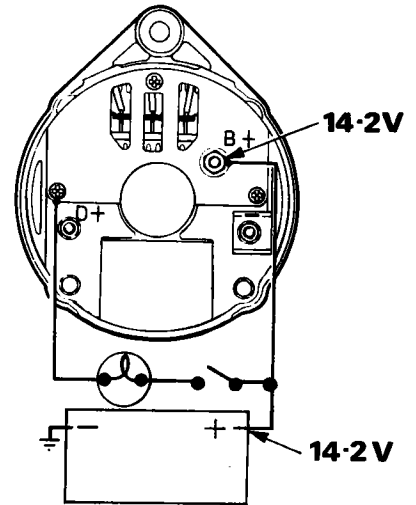


Fig. 16

Test 6

Ignition on, engine running faster than idle. Check the voltage both at B+ and D+ terminals on the alternator (Fig. 17).

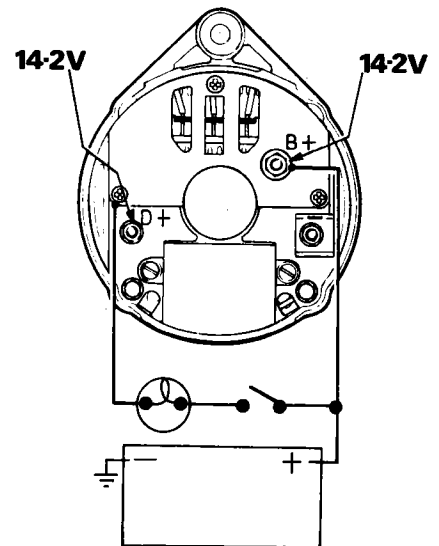


Fig. 17

Voltage should be the same at both points. A difference of more than 0.5 volts between the B+ and D+ indicates a diode fault.

Test 7

Regulator field lead disconnected output terminal shorted to field terminal (Fig. 18), ignition on, engine running at fast idle.
 Regulator and diodes check
 With alternator connected as specified above and shown in diagram (Fig. 18), check voltage between output terminal B+ and earth.

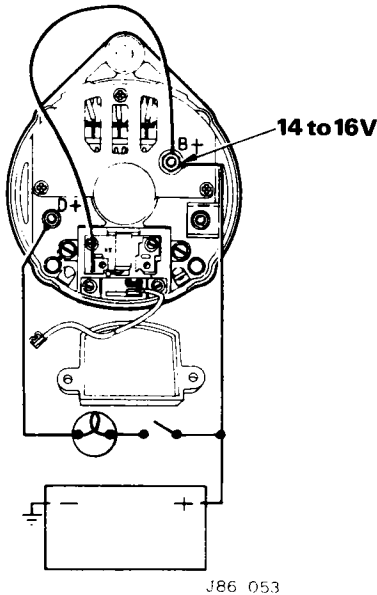


Fig. 18

If voltage rises to 14 to 16 volts in this test, but did not reach 14 volts in test 5, regulator is defective. Replace the regulator.
 If output voltage does not rise and field circuit has been found satisfactory in tests 3 or 4, then either alternator stator or rectifier diodes are defective.

ALTERNATOR

Remove and refit (Lucas or Motorola) 86.10.02
6 cylinder

Disconnect the battery.

Slacken the alternator adjuster link arm locknut (on cars fitted with air conditioning this will be done from below the car).
 Pivot the alternator towards the engine, and displace the drive belt from the pulley.
 Remove the bolt securing the adjuster link to the alternator and swing the link clear of the alternator.
 Disconnect the alternator cables.
 Pivot the alternator away from the engine.
 Withdraw the alternator mounting bolts.
 Ease the alternator clear of the mounting bracket and remove from the engine compartment.

After refitting, adjust the link arm adjuster nut to correct belt tension. Deflection: 3,8 mm (0.15 in).

ALTERNATOR DRIVE BELT 6 cylinder

Remove and refit 86.10.03

Before removing the alternator drive belt it is necessary to remove the power steering pump drive belt (1, Fig. 19) and (if fitted) the air conditioning compressor drive belt (2, Fig. 19).
 To remove the power steering pump belt slacken the two bolts securing the threaded adjuster link and trunion, then slacken nut of pivot bolt and release locknut adjuster. Run the lower nut down and press the steering pump towards the engine.

With careful manoeuvring the belt can now be removed.

Slacken the two compressor mounting bolts. Slacken the compressor adjusting pivot arm locknut and adjust compressor as near to engine block as practicable without knocking the air conditioning hoses. The compressor drive belt can now be removed from beneath the car.

Slacken the alternator pivot bolts (3, Fig. 19), then slacken the locknut on adjuster link arm (4, Fig. 19).

Pivot the alternator (5, Fig. 19) towards the engine and remove the drive belt (6, Fig. 19).

Subsequent to refitting all belts must be tensioned correctly to avoid undue belt and component wear.

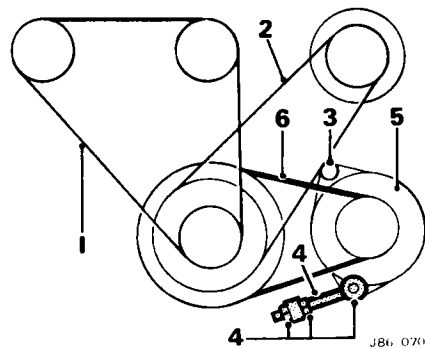


Fig. 19

ALTERNATOR DRIVE BELT

Remove and refit 86.10.03
12 cylinder

Remove the R.H. air cleaner. Remove the air conditioning compressor belt (1, Fig. 20), the power steering pump belt (2, Fig. 20) and the fan belt (3, Fig. 20). Slacken the alternator pivot bolts (4, Fig. 20) and the adjuster link pivot bolt (5, Fig. 20). Slacken the link arm

adjusting nut (6, Fig. 20) and pivot the alternator (7, Fig. 20) towards the engine until the belt can be removed.

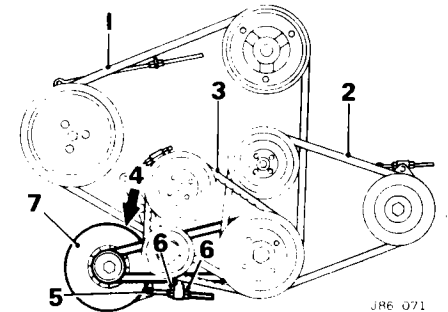


Fig. 20

ALTERNATOR DRIVE BELT

Adjustment (Lucas or Motorola) 86.10.05

Procedure for adjusting the alternator belt differs for air conditioned and non air conditioned cars.

The adjuster for air conditioned cars is only accessible from beneath the car.

In either case proceed as follows:
 Slacken the nut or nuts of the alternator mounting pivot (two pivot bolts are fitted on air conditioned cars, one long bolt on the others).
 Slacken the locknut and pivot bolts of adjuster and trunion block.

Adjust belt tension by means of the adjusting link nut. Correct tension is as follows: A load of 1,5 kg (3.2 lb) must give a total belt deflection of 3,8 mm (0.15 in).

Tighten the locknut and all bolts.

ALTERNATOR

Remove and refit 86.10.02
12 cylinder

Disconnect the battery.
 Remove the right-hand air cleaner.
 Remove the air pump if fitted.
 Slacken the nut securing the alternator.
 Slacken the nut securing the alternator adjusting link.
 Slacken the trunion block to mounting bracket securing bolt.
 Withdraw the electrical connector from the alternator.
 Slacken the adjusting link lock nuts.
 Ease the alternator drive belt off the alternator pulley.
 Withdraw the alternator mounting bolt and the adjusting link bolt.
 Remove the alternator complete from the engine compartment.
 Refitting is the reversal of the above procedure.

ELECTRICAL SYSTEM

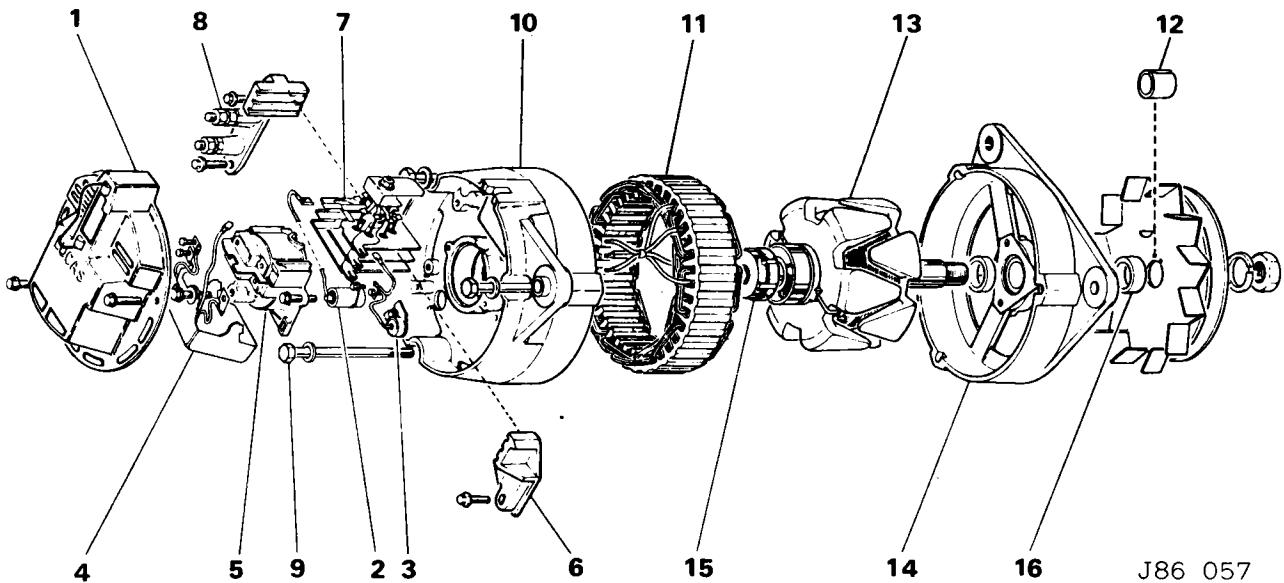


Fig. 21

Key to alternator

- | | |
|--|---------------------------|
| 1. Moulded cover | 9. Through-bolts |
| 2. Suppression capacitor | 10. Slip-ring and bracket |
| 3. Surge diode | 11. Stator assembly |
| 4. Regulator | 12. Shaft adaptor sleeve |
| 5. Brush box assembly | 13. Rotor assembly |
| 6. Nylon damper block (rectifier plates) | 14. Drive-end bracket |
| 7. Rectifier | 15. Slip-ring |
| 8. Terminal assembly | 16. Fan spacer |

ALTERNATOR (Lucas)

Overhaul

86.10.08

NOTE: The alternator must not be dismantled under warranty.

Dismantling

The cover is removed by withdrawing the two retaining screws.

Withdraw the capacitor fixing screw, disconnect the lead from rectifier.

Remove the capacitor.

To remove the surge protection diode disconnect the diode lead from the brush box and the rectifier.

Withdraw the diode retaining screw and remove the diode.

Note the arrangement of the regulator brush box and other connections before disconnecting.

Remove the retaining screw and lift the regulator clear.

Remove the two screws securing the brush box assembly and remove the brush box.

The brushes, slip-ring and rotor can now be checked.

Rotor resistance

Connect an ohmmeter to the slip rings (Fig. 22).

Ohmmeter should register 3 to 3.5 ohms.

The slip-ring should be clean and smooth. Use extra fine sandpaper to rectify slight imperfections.

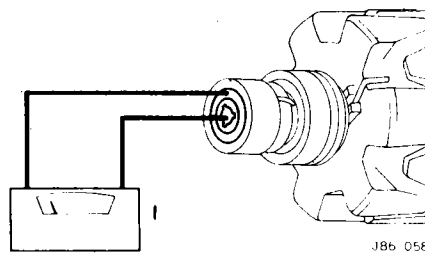


Fig. 22

Insulation test

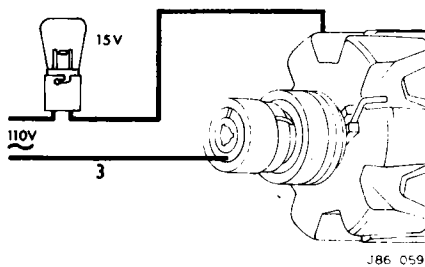


Fig. 23

Connect a test lamp to a slip ring and the rotor frame (Fig. 23).

The lamp should not light.

Diode testing

To remove the rectifier it is necessary to unsolder the stator cable ends from the rectifier.

Diode removal

Remove the terminal nut and damper blocks (when fitted), loosen the securing nuts and remove the rectifier.

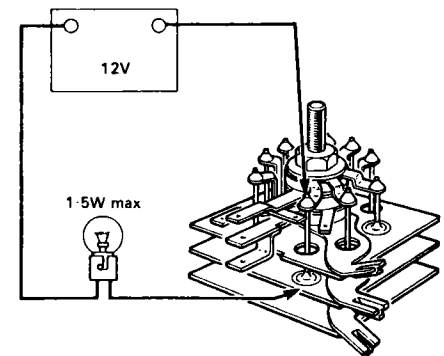


Fig. 24

Connect a battery lead in series with a test lamp to a diode plate.

Connect the other battery lead to each diode pin in turn (Fig. 24). Reverse the connections to plate and diode pins. The lamp should light in one direction only.

Should the lamp light in both directions, or not light at all, the diode is defective and a new rectifier pack should be fitted.

Stator insulator test

Remove the three through-bolts.

Mark the position of stator ring in the end brackets to ensure its correct assembly.

Separate the alternator into its three components: the slip-ring end bracket; the stator windings; the drive-end bracket rotor, fan and pulley.

Inspect the stator connections. Wires comprising each connection must be either soldered or twisted together before commencing the test.

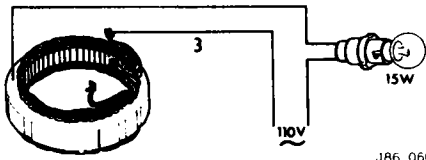


Fig. 25

Connect one side of the test lamp to the stator ring and the other side to one of the three connections (Fig. 25). The test lamp should not light.

To replace bearing.
Remove the fan and pulley.
Remove the Woodruff key and fan spacer.
Using a press, press the rotor shaft from the bearing.
Remove the bearing from the bracket.

Reassembling

Fit the rotor spacing collar on the rotor shaft.
Press the rotor shaft into the bearing.
Fit the fan spacer and Woodruff key.
Refit the fan and pulley.
Refit the stator winding and the slip-ring end bracket, using the marks to ensure correct position.

Fit and tighten the three through-bolts.
Loosely assemble the rectifier, the damper block and terminal assembly. Tighten the securing nut, tighten the terminal assembly screws and damper block screws.
Re-solder the stator connections.
Refit the brush box assembly and secure with the two retaining screws.
Refit the regulator and secure with the fixing screw. Re-connect the regulator leads, ensuring the correct arrangement.
Fit and secure the surge protection diode and re-connect lead to brush box assembly and rectifier.
Fit and secure the suppressor capacitor.
Refit and secure the moulded cover with two screws.

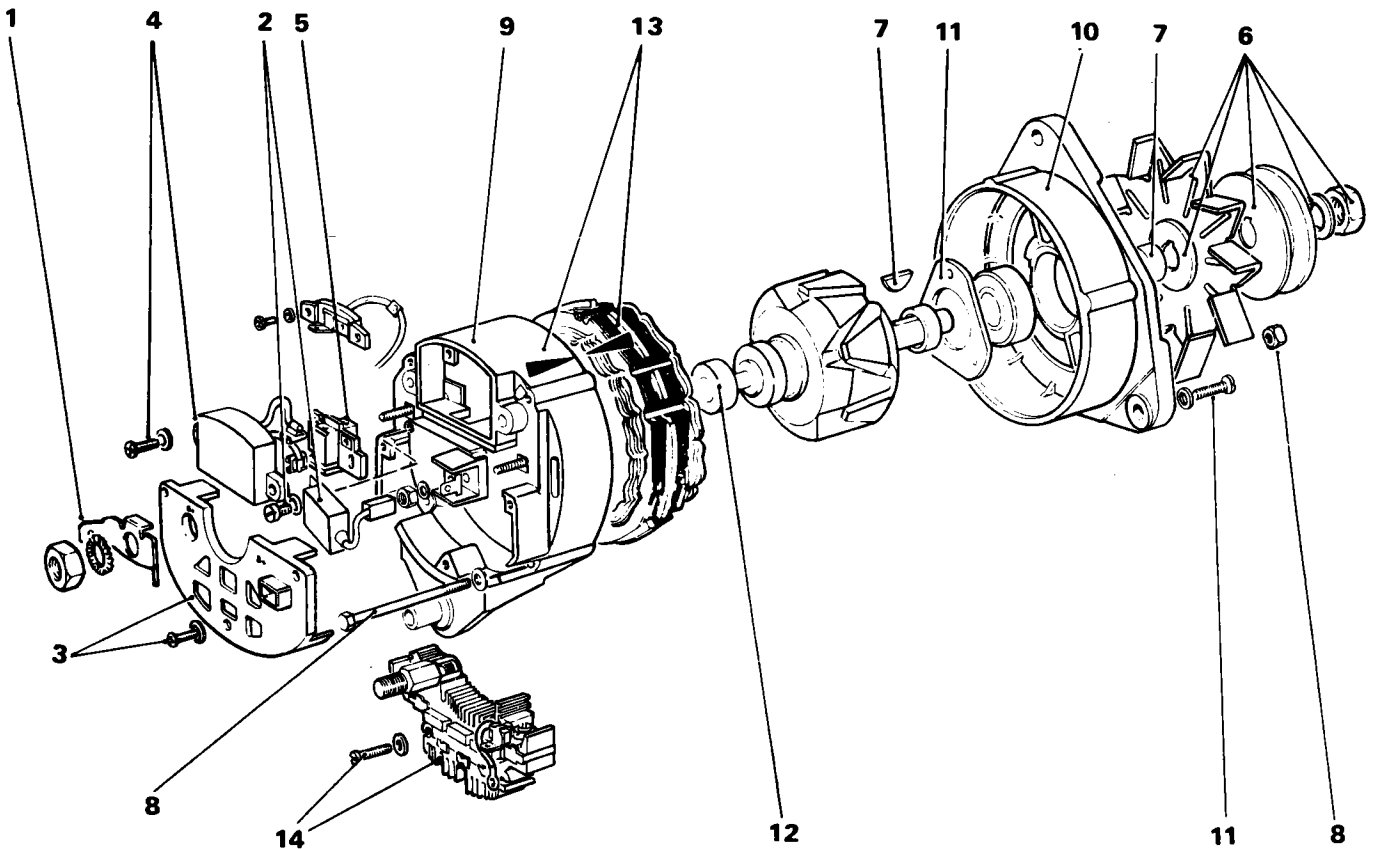


Fig. 26

J86 061

Key to alternator

- 1. Lucar connector blade
- 2. Capacitor and screw
- 3. Mould cover and screws
- 4. Regulator
- 5. Brush holders
- 6. Fan, pulley and pulley nut
- 7. Woodruff key and spacer
- 8. Through-bolts and nuts
- 9. Rear housing
- 10. Front housing
- 11. Bearing retaining plate
- 12. Rear bearing
- 13. Stator ring
- 14. Diode bridge and retaining screws

ALTERNATOR Motorola 9AR 2512P and 9AR 2533P

Overhaul 86.10.08

Dismantling

Detach nut, shakeproof washer and connector blade from B+ terminal at end cover (1, Fig. 26).
Remove setscrew and washer securing capacitor to alternator case, separate Lucar and detach the capacitor (2, Fig. 26).
Withdraw the three screws and remove the moulded rear cover (3, Fig. 26).
Remove the two setscrews and washers, identify the coding of wires, then separate the two Lucars and detach the regulator (4, Fig. 26).

Remove the two setscrews and washers and lift out the brush holder (5, Fig. 26).
Clamp the pulley, unscrew the pulley nut and remove the small washer, pulley fan and large washer from the alternator spindle (6, Fig. 26).
Extract the Woodruff key from the spindle and remove the spacer (7, Fig. 26).
Remove the four through-bolts; collect the washers and square trapped nuts (8, Fig. 26).
If the casing halves do not readily separate, clamp the alternator spindle in protected jaws of the vice and draw off the rear housing, with stator and diode bridge. The rear bearing will remain on the spindle.

CAUTION: Take care to avoid damage to the stator and windings by the rotor.

ELECTRICAL SYSTEM

Remove the alternator spindle from the vice and draw off the front housing (9, Fig. 26). Collect the short spacer adjacent to the rotor. If necessary remove the front bearing from the housing by withdrawing the three screws securing the retaining plate (11, Fig. 26) and pressing out the bearing.

If necessary, draw the rear bearing (12, Fig. 26) off the alternator spindle end.

Mark the position of the stator ring in the rear housing to ensure that it is correctly replaced (13, Fig. 26).

Unsolder the leads of the three-phase windings and D+ (red) lead from diode bridge.

CAUTION: Avoid transmitting excessive heat to the diodes by using long-nosed pliers to grip each terminal as the wire is unsoldered.

Withdraw the two setscrews and lift out the diode bridge (14, Fig. 26). Collect the washers.

Lift the housing off the stator, detach the two terminals from the housing and remove the D+ lead complete.

NOTE: To remove the diode bridge with a minimum of dismantling, remove the capacitor and moulded cover.

Unsolder the stator wire, withdraw the two setscrews and lift out the diode bridge.

Checking the brush holder

Touch each brush with test lead. The test lamp should not light (1, Fig. 27).

Connect the test leads on the field terminal and its corresponding brush (2, Fig. 27).

The lamp must light even when the brush is moved in its holder.

Transfer test leads to the negative terminal and the other brush (3, Fig. 27).

The lamp must light even when the brush is moved in its holder.

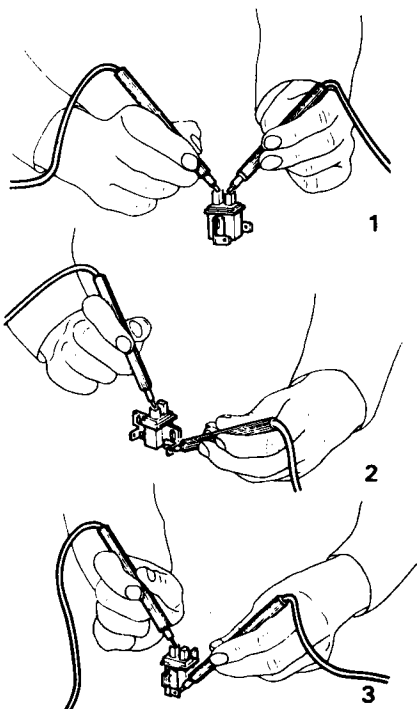


Fig. 27

J86 063

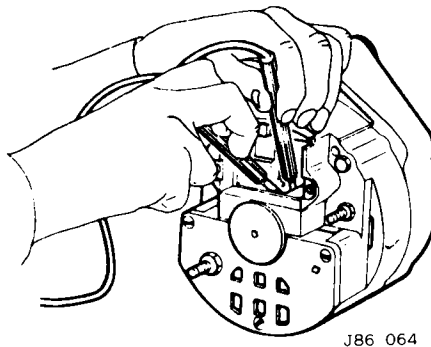
Checking the rotor

Connect ohmmeter leads to each slip-ring (Fig. 28).

The resistance should be between 3.8 and 5.2 ohms.

Connect the ohmmeter between a slip-ring and the alternator housing.

The reading should be infinity.



J86 064

Fig. 28

Checking the stator

Inspect the windings for damage or overheating.

Check the stator insulation by connecting an ohmmeter between the alternator housing and each stator connection. The ohmmeter reading should be infinity.

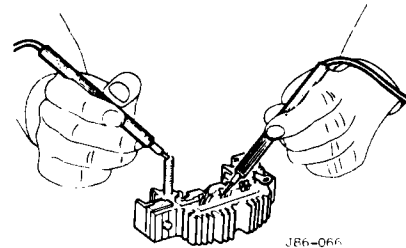
Checking diodes

Positive diodes

Connect a battery lead to each phase terminal in turn, and the other battery lead in series with a test lamp to the B+ terminal.

Reverse the connections to the B+ terminal and the phase terminals (Fig. 29).

The lamp should light in one direction only.



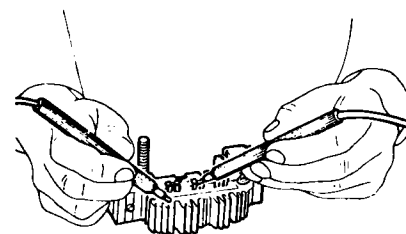
J86-066

Fig. 29

Negative diodes

Connect one battery lead to the heatsink and the lead in series with the test lamp to each phase terminal in turn (Fig. 30).

Reverse the connections and the lamp should light in one direction only.



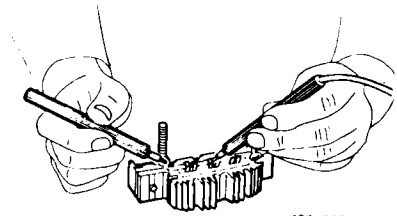
J86-067

Fig. 30

Checking the trio

Connect one battery lead to a phase terminal, the other lead in series with the test lamp to the other side of diode (Fig. 31). Reverse the connections and the lamp should light on one direction only.

Check the other two diodes in the same way. Should the lamp light in both directions, or not light at all, the diode under test is defective.



J86-068

Fig. 31

Reassembling

Fit a new 'O' ring into the recess in the rear bearing housing.

Replace the D+ (red) lead assembly in the rear housing, securing it with two setscrews and washers at the Lucar carrier and bolt and nut at the D+ terminal. Thread the loose end of the lead through the hole below the D+ terminal. Place the stator and coils in marked position with the three leads passing back through the housing. Rest the stator with the housing on top of it, on non-abrasive surface.

Lower the diode bridge, with terminals and capacitor fitted into position in housing with three leads passing through the gaps between the fins. Secure with two setscrews and washers, trapping capacitor connector under R.H. setscrew.

Using long-nosed pliers (as a thermal shunt) to grip each terminal in turn and prevent excess heat reaching the diode, solder the three-phase winding leads and D+ lead to the diode bridge. Do not overheat the diode bridge.

If required, press a new bearing onto the rear end of the rotor spindle.

Press the spindle and bearing into position in the rear housing.

Place the short spacer over the front end of spindle, ensuring that its larger inside diameter is next to the rotor.

If necessary, press a new front bearing into the front housing and secure with the retaining plate; apply Loctite to the screw threads and to the capped holes in the plate.

Press the front housing into position and insert the four through-bolts with plain washers under the heads.

Coat the threads of the through-bolts and trapped nuts with Loctite and tighten to 0.5 kgf m (3.6 lbf ft).

Place plain spacer over the spindle, insert the Woodruff key and replace large washer, fan, pulley, small washer and nut on spindle.

Tighten the nut to 4.0 kgf (29 lbf ft).

Refit the brush holder.

Reconnect the regulator wires to their correct positions and refit the regulator.

Refit the moulded cover, capacitor and the connector blade.

ELECTRICALLY OPERATED WINDOWS AND DOOR LOCKS

Description 86.25.00

The electrically operated door lock circuit comprises a solenoid which includes a capacitor and a resistor for each door, two relays and a thermal circuit breaker.

Operation

With the window lift master switch on, operation of any of the window switches will cause the associated window lift motor to run in the selected direction.

Fault conditions, i.e. sticking windows or overload, will result in excessive current consumption causing the thermal circuit breaker to operate.

The circuit breaker will reset after a short interval, allowing normal operations of the window lift motors to be resumed. If the condition persists, examination of the system is required.

The electric door lock circuit is activated from either of the front doors if the key is turned in either door lock.

All four door solenoids and the boot solenoid will lock, or all four doors will unlock, leaving the boot compartment solenoid in the lock position.

The two front interior tab locks will also operate all five solenoids into the locked position and all four door solenoids into the unlocked position.

Manual operation of the conventional door handles from inside the car will over-ride the door lock solenoid.

NOTE: Rapidly repeated operation of the door locks will result in an overload condition causing the thermal cut-out to operate, isolating the door lock solenoid circuit. A short wait is necessary before the thermal cut-out automatically resets.

WINDOW LIFT MOTOR—FRONT

Remove and refit 86.25.04

Removing

Disconnect the battery.

Remove the arm rest and door trim.

Remove the door speaker (1, Fig. 32).

Remove the screws securing the window lift motor mounting plate (2, Fig. 32) and remove the stop peg from the mounting plate (3, Fig. 32).

Remove the window lower channel securing bolts.

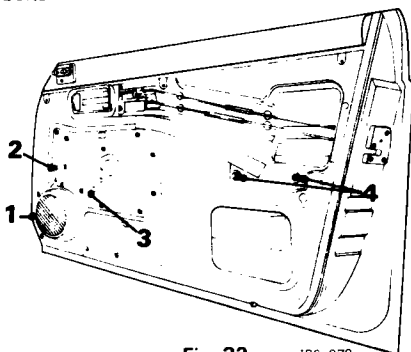


Fig. 32 J86 078

Remove the distance piece from the rear of the mounting plate.

Remove the regulator outer slide channel securing bolts and remove the channel (4, Fig. 32).

Remove the motor from the mounting plate.

Disconnect the electrical feed cables.

Lower the motor to the bottom of the door.

Displace the felt from the lower window channel, and remove the lower channel.

Displace the glass from the regulator, raise the glass to the top of the door and secure the glass with tape.

Remove the regulator and motor assembly from the door.

Mark the position of the motor in relation to the regulator to facilitate the correct fitting of a new motor.

Remove the motor from the regulator.

Refitting is a reversal of the above procedure.

WINDOW LIFT MOTOR—REAR

Remove and refit 86.25.09

Remove the door casing and arm-rest.

Disconnect the battery.

Disconnect the cables from the motor at the plug and socket connection (1, Fig. 33).

Remove the four pan-headed setscrews and detach the regulator mechanism from the door panel (2, Fig. 33).

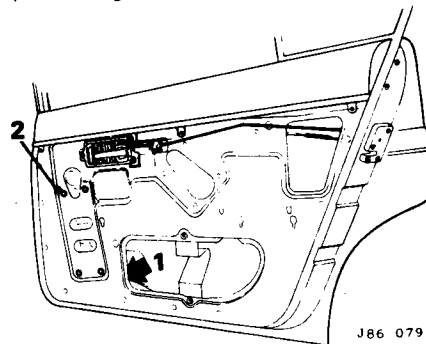


Fig. 33 J86 079

Adjust the position of the door until the regulator arm can be removed from the channel.

Withdraw the regulator through the aperture in the door.

If it is necessary, remove the glass in order to withdraw the regulator.

Withdraw the three setscrews and washers and detach the motor from the regulator.

The motor is sealed during manufacture. Faulty units must be replaced, no service repair being possible.

Refitting is a reversal of the above procedure.

WINDOW LIFT SWITCHES

Remove and refit 86.25.07

To remove L.H. front (1), R.H. front (2), R.H. rear (3), L.H. rear (4) or the master window lift switch (5, Fig. 34).

Disconnect the battery.

Remove the screw securing the console.

Raise the cover and disconnect the cigar light cables (6, Fig. 34).

Tilt the control panel and disconnect the harness block connector from switch.

Depress the plastic lugs on the switch and remove the switch.

When refitting reverse the above procedure.

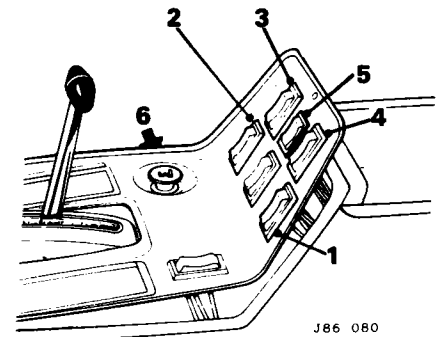


Fig. 34 J86 080

REAR SWITCH PANEL WINDOW LIFT SWITCHES

Remove and refit 86.25.12

Disconnect the battery.

Lever the switch panel from the rear of the centre console (1, Fig. 35).

Disconnect the block connector.

Depress the plastic lugs on the switch and remove the switch.

When refitting reverse the above procedure.

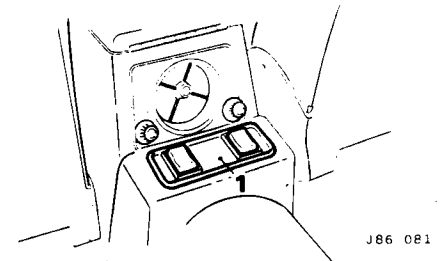


Fig. 35 J86 081

WINDOW LIFT RELAY

Remove and refit 86.25.28

Disconnect the battery.

Remove the L.H. side dash casing.

Pull the relay/socket assembly from its mounting on the component panel and remove the relay (1, Fig. 36).

When refitting reverse the above procedure.

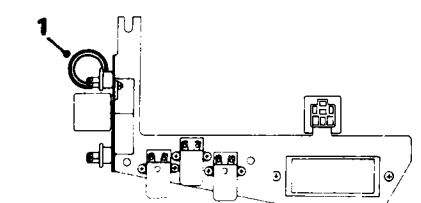


Fig. 36 J86 082

ELECTRICAL SYSTEM

CIRCUIT BREAKERS

Remove and refit 86.25.31

Disconnect the battery.
Remove the L.H. side dash casing.
Disconnect the cables from the circuit breaker.

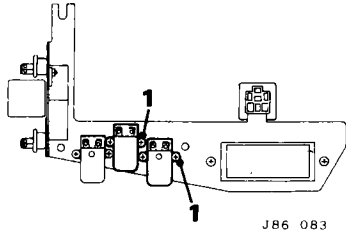


Fig. 37

Remove the screw securing the unit to the component panel and remove the unit (1, Fig. 37).

When refitting reverse the above procedure.

DOOR LOCK SOLENOIDS

Remove and refit 86.25.32

With the window closed, disconnect the battery.
Remove the door arm-rests and door trim.
Remove the rod from the lock and the anchor point on solenoid (1, Fig. 38).

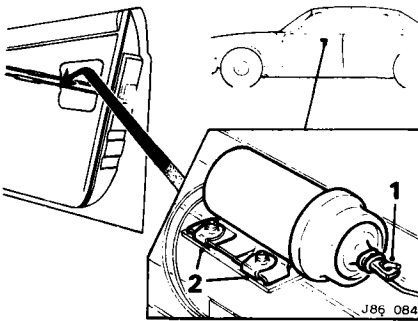


Fig. 38

Remove the bolts securing the solenoid (2, Fig. 38).
Disconnect the block connector from the cable harness and remove the solenoid.

When refitting reverse the above procedure.

DOOR LOCK SOLENOID RELAY—LEFT-HAND AND RIGHT-HAND SIDE

Remove and refit 86.25.33 86.25.34

Disconnect the battery.

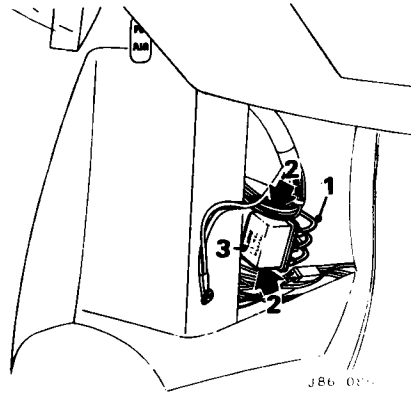


Fig. 39

Remove the R.H. or L.H. side footwell trim pad. Identify and disconnect cables from the relay (1, Fig. 39).

Withdraw the screws securing the relay (2, Fig. 39), retrieve the distance pieces and remove the relay (3, Fig. 39).

When refitting reverse the above procedure.

BOOT LID LOCK SOLENOID

Remove and refit 86.26.02

Disconnect the battery.
Open the luggage compartment.
Disconnect the solenoid multi-plug connector (1, Fig. 40).
Remove the solenoid securing bolts and disconnect the earth wire eyelet (2, Fig. 40).

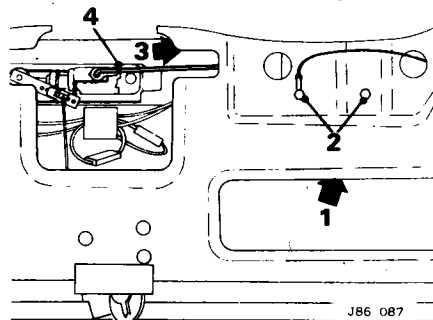


Fig. 40

Slacken the number-plate lamp securing nuts (3, Fig. 40) and withdraw the lamp as far as is necessary to allow the solenoid to be removed.
Remove the lock operating rod (4, Fig. 40).
Remove the solenoid.

Reverse the above procedure to refit.

HORNS

Description 86.30.00

Twin horns are fitted. Both horns operate simultaneously and are energised by a relay. The relay is connected to the battery through the ignition switch so that the horns will only operate with ignition switched on.

HORN-PUSH

Remove and refit 86.30.01

Disconnect the battery.
Slacken the steering-wheel adjusting nut, and pull the steering-wheel out to its maximum travel.
Remove the horn-push securing screws and remove the push from the steering wheel.

Reverse the above procedure to refit.

HORNS

Remove and refit 86.30.09

Disconnect the battery.
Disconnect the wiring at the Lucar connectors (1, Fig. 41).

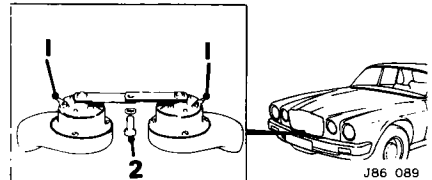


Fig. 41

Withdraw the retaining bolt and spacers (2, Fig. 41).
Remove the horns.

Reverse the above procedure to refit.

HORN RELAY

Remove and refit 86.30.18

Disconnect the battery.
Remove the relay cover.
Displace the fan motor relay for access.

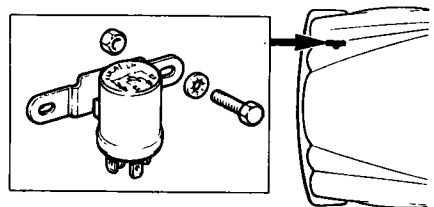


Fig. 42

Identify and disconnect the relay cables.
Remove the relay (Fig. 42).

After refitting, ensure that the cables are reconnected correctly. Refer to the wiring diagram if in doubt.

HORN RELAY CIRCUIT

Check in situ 86.30.17

Switch on the ignition.

NOTE: Avoid leaving the ignition on for extended periods.

With the ignition on a 12-volt test lamp connected between 'W1' and earth should light up.

If the lamp does not light, check fuse no. 1. Test lamp on 'W2'. If test lamp fails to light, an unserviceable relay is indicated.

If the relay operates when horn-push is pressed a test lamp connected between 'C1' and earth should light up. Failure to do so indicates that relay contacts are inoperative or fuse No. 4 is unserviceable.

If checks 1 and 2 are satisfactory and horns do not operate, substitute a test lamp for each horn in turn. If the lamp lights, horn units are unserviceable. If the lamp does not light, further investigation of the horn harness will be required.

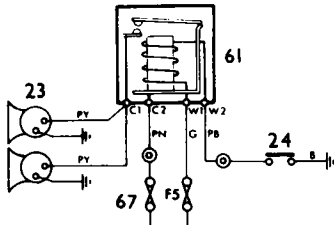


Fig. 43

HORN CIRCUIT CODE

- 23. Horns
- 24. Horn-push switch
- 61. Horn relay
- 67. Line fuse

HEADLAMP ASSEMBLY

Remove and refit

- Headlamp rim finisher 86.40.01**
- Headlamp assembly (outer) 86.40.02**
- Headlamp assembly (inner) 86.40.03**

Remove the top retaining screw and withdraw the headlight rim finisher, noting the retaining lug at the lower edge (1, Fig. 44).

Remove the three cross-headed screws and the headlight retaining rim (2, Fig. 44).

NOTE: On the inners the cross-headed screws require slackening only, the rim may be turned to remove. Do not turn the slot-headed screws as they are for headlamp alignment.

Withdraw the headlight and unplug the adaptor from the rear of the unit (3, Fig. 44).

When refitting, reverse the above procedure.

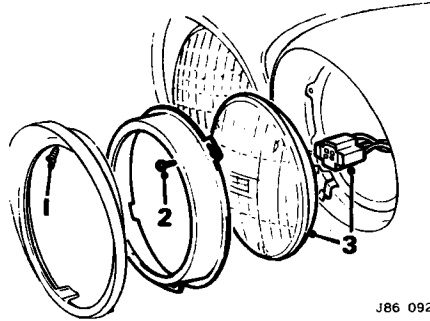


Fig. 44

HEADLAMP PILOT BULB

Remove and refit 86.40.11

Remove the outer headlight as previously described. Withdraw the pilot bulb holder with bulb from the fitting on the rear of the reflector (Fig. 45).

Remove the bulb.

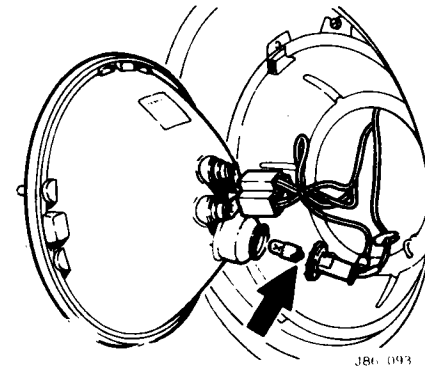


Fig. 45

Reverse the above procedure to refit.

HEADLIGHT ALIGNMENT

86.40.18

Headlight beam setting should only be carried out by qualified personnel, and with approved beam setting apparatus.

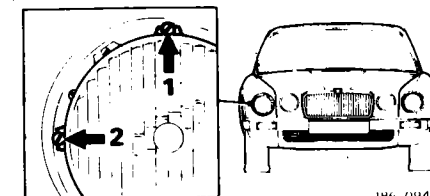


Fig. 46

Adjustment

Remove the headlight rim finisher.

Outer headlights.

Turn the top screw anti-clockwise to lower the beam, clockwise to raise the beam (1, Fig. 46).

Turn the side screw anti-clockwise to move the beam to the left, clockwise to move the beam to the right (2, Fig. 46).

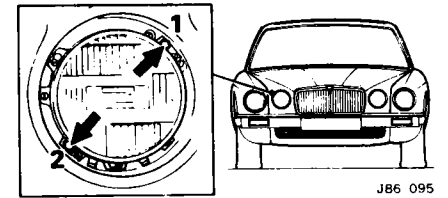


Fig. 47

Inner headlights

The adjustment screws are set diagonally opposite each other. The upper screw is for vertical alignment (1, Fig. 47), the lower screw is for horizontal alignment (2, Fig. 47).

CAUTION: Correct headlamp alignment is mandatory in certain countries.

FRONT FLASHER REPEATER ASSEMBLY

Remove and refit 86.40.53
Lens 86.40.51
Bulb 86.40.52

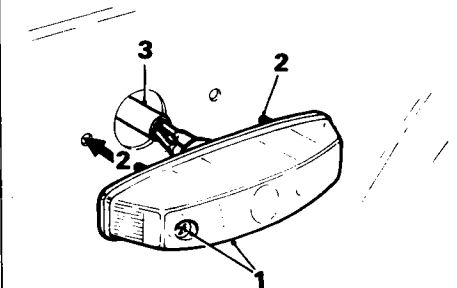


Fig. 48

Remove the retaining screw and detach the lens (1, Fig. 48).

Remove the bulb.

Remove the two nuts and lock washers from the captive retaining bolts (2, Fig. 48).

Disconnect the cables from the snap connectors (3, Fig. 48), check condition of seals while the assembly is removed from the car.

Reverse the above procedure to refit.

FRONT FLASHER ASSEMBLY

Remove and refit 86.40.42
Lens 86.40.40
Bulb 86.40.41

Disconnect the battery.

Remove the screws securing the lens assembly to the front bumper (1, Fig. 49).

ELECTRICAL SYSTEM

Withdraw the assembly clear of the bumper for access. Rotate the assembly at the bulb holder and remove the lens assembly. Check condition of the seal.

Rotate the bulb holder anti-clockwise and withdraw it behind the bumper (2, Fig. 49).

Withdraw the bulb from the holder.

Remove the screw securing the fusebox to the front wing valance and ease the fusebox clear of the valance for access.

Disconnect the cables at the snap connectors. Attach a draw string to the end of the flasher lamp cables.

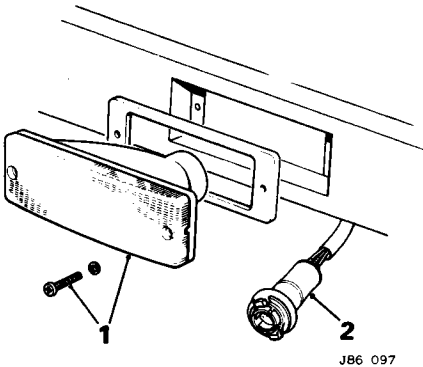


Fig. 49

Remove the plastic straps securing the harness to headlamp harness under the wing. Remove the screws securing the flasher lamp assembly to the bumper, and withdraw the lamp with harness from its location.

Reverse the above procedure to refit.

SIDE MARKER ASSEMBLY

Remove and refit	86.40.64
	86.40.57
	86.40.58
	86.40.59
Bulb	86.40.62
Lens	86.40.63

Withdraw the crosshead retaining screw and remove the lens; note the retaining clip. Withdraw the bulb (1, Fig. 50).

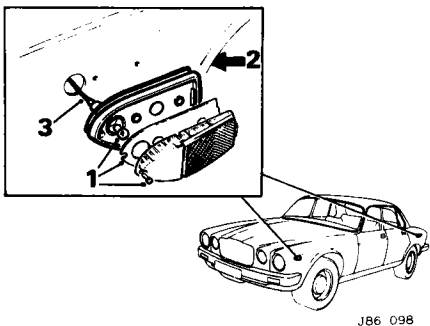


Fig. 50

Remove the retaining nuts and lock washers (2, Fig. 50).

Disconnect the cables from the snap connectors (3, Fig. 50).

Check the condition of seals while the assembly is removed from the car.

TAIL/STOP/FLASHER AND REVERSE LAMPS

Remove and refit	86.40.72
	86.40.73
	86.40.74

Remove the screws securing the lens, and detach the lens (1, Fig. 51).

Remove and check the sealing rubbers.

Remove the bulb (2, Fig. 51).

Remove the screw securing the assembly to the rear wing.

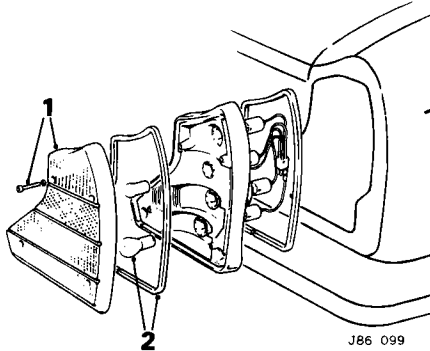


Fig. 51

Withdraw the assembly clear of the wing for access to the cable connections.

Disconnect the block and snap connectors and remove the assembly from the car.

NUMBER-PLATE LAMP ASSEMBLY

Remove and refit	86.40.86
Lens	86.40.84
Bulb	86.40.85

Remove the lens securing screws (1, Fig. 52). Ease the lens/lamp assembly from its location (2, Fig. 52).

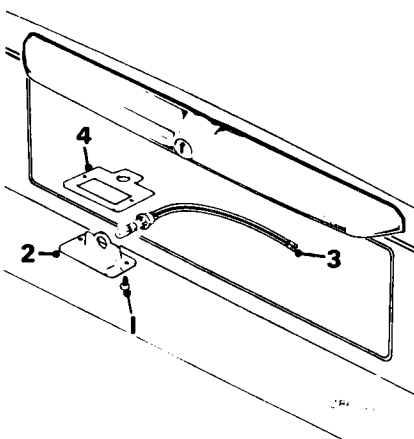


Fig. 52

Disconnect the cable snap connectors (3, Fig. 52).

Check the gasket while the assembly is removed from the car (4, Fig. 52).

NUMBER-PLATE LAMP ASSEMBLY HOUSING

Remove and refit	86.40.98
-------------------------	-----------------

Open the boot lid, and release the solenoid operating rod from the clip. Withdraw the rod from the lock lever.

Remove the nuts, washers and shakeproof washers securing the number-plate lamp housing.

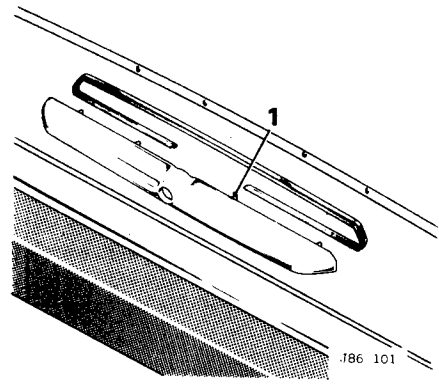


Fig. 53

Disconnect the number-plate lamp snap connectors and remove the assembly from the boot lid (Fig. 53).

Reverse the above operations.

REAR FOGLAMP ASSEMBLY

Remove and refit	86.40.99
-------------------------	-----------------

Remove the rear lamp cluster for access.

Disconnect the fog lamp cables from the snap connectors and attach a draw-string to the cables.

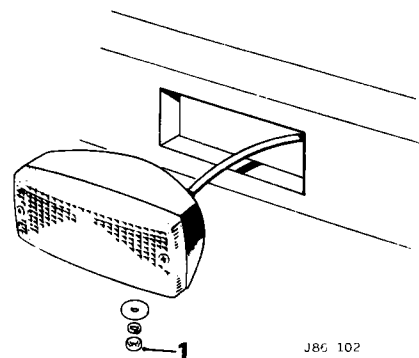


Fig. 54

Displace the rubber grommet from the body under the apron and withdraw the cables through the aperture.

Detach the draw-string from the cables.

Remove the nuts and washers securing the lamp assembly to the rear bumper (1, Fig. 54) and withdraw the lamp.

REAR FOG LAMP LENS AND BULB

**Remove and refit 86.41.20
86.41.21**

Remove the screws securing the lens (1, Fig. 55) and remove the lens and bulb (2, Fig. 55).

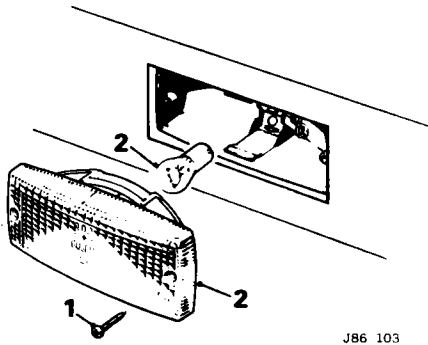


Fig. 55

FOG/SPOTLIGHT LENS UNIT AND BULB

Remove and refit 86.40.94

Caution: Under no circumstances should bulbs in these units be touched with bare hands.

Disconnect the battery.

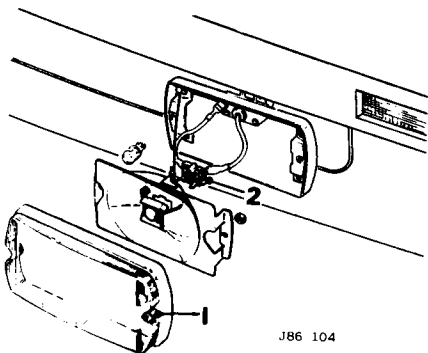


Fig. 56

Remove the two screws securing the light unit (1, Fig. 56).

Move the bulb retaining clip to one side and remove the bulb holder from the light unit (2, Fig. 56).

Using a cloth or glove, pull the bulb from the holder.

Remove the rubber retaining washers from the light unit retaining screws and separate the units.

FOG/SPOTLIGHT ASSEMBLY

Remove and refit 86.40.96

Disconnect the battery.
Disconnect the cable at the snap connector.
Remove the shakeproof washers.
Remove the assembly.

DOOR POST LAMP ASSEMBLY AND BULB

Remove and refit 86.45.03

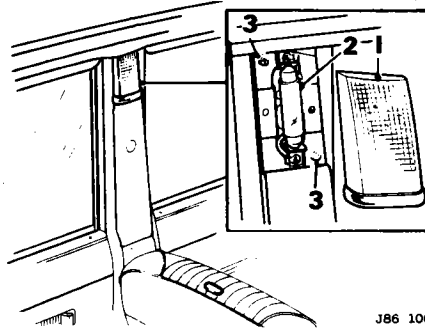


Fig. 57

Disconnect the battery.
Carefully lever the cover from the lamp (1, Fig. 57) and withdraw the festoon-type bulb from the holder (2, Fig. 57).

Withdraw the two retaining screws and lift the lamp from the post (3, Fig. 57).

Disconnect the cables from the snap connectors.

MAP LIGHT ASSEMBLY AND BULB

Remove and refit 86.45.09

Withdraw the bulb holder by exerting pressure on the side clip and pulling the bulb holder downwards (1, Fig. 58).

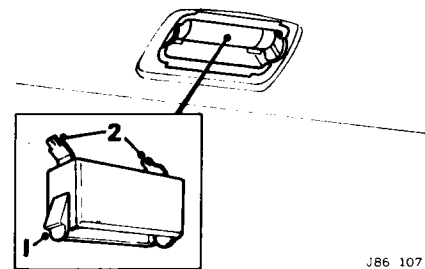


Fig. 58

Withdraw the festoon-type bulb.
Disconnect the cables from Lucar connectors and retain the lamp assembly (2, Fig. 58).

LUGGAGE COMPARTMENT LAMP ASSEMBLY AND BULB

Remove and refit 86.45.15

Disconnect the battery.
The bulb is accessible through an aperture in the luggage compartment lid.

Carefully lever the lamp clear of the mounting plate on the boot lid.
Disconnect the cables and recover the lamp.

FIBRE OPTIC ILLUMINATION SYSTEM

Description

Consists of a centralized light source (Opticell) feeding localized illumination via fibre elements and diffuser lens units to specific areas. Control switches illuminated in this way are as follows:

1. Ignition switch (one element).
2. Lighting switch (one element).
3. Heater/air conditioning control switches (two elements to each control).

Failure of the light source will result in loss of illumination at all the above control units.

OPTICELL

Remove and refit 86.45.27

Disconnect the battery.
Remove the centre console escutcheon and window lift switch panel.
Withdraw the two screws securing the Opticell to the transmission selector quadrant (1, Fig. 59).

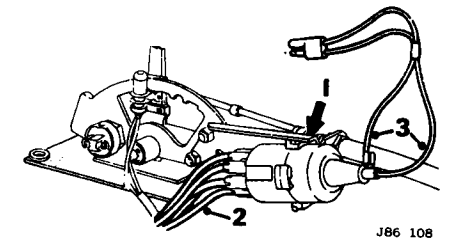


Fig. 59

Disconnect the fibre elements by pulling each one from the Opticell lens hood (2, Fig. 59).
Disconnect the cables (3, Fig. 59).

OPTICELL BULB

Remove and refit 86.45.28

Disconnect the battery.
Remove the centre console escutcheon and window lift switch panel.
Pull the bulb holder from the Opticell reflector.
Withdraw the miniature bayonet capped bulb from the holder.

NOTE: Replace with a bulb of the correct size as necessary.

ELECTRICAL SYSTEM

PANEL SWITCH ILLUMINATION BULB

Remove and refit 86.45.31

Disconnect the battery.
Carefully lever the sub panel assembly clear of the clock mounting panel.

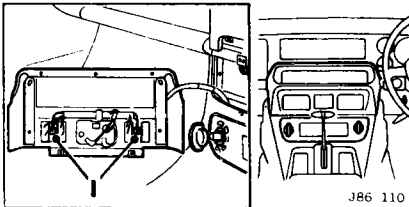


Fig. 60

Release the bulb holder from the lamp housing between the switches (1, Fig. 60), and remove the bulb from the holder.

TRANSMISSION INDICATOR BULB

Remove and refit 86.45.40

Remove the control knob from the selector lever (1, Fig. 61).
Prise the window lift switch panel and the escutcheon from the centre console.

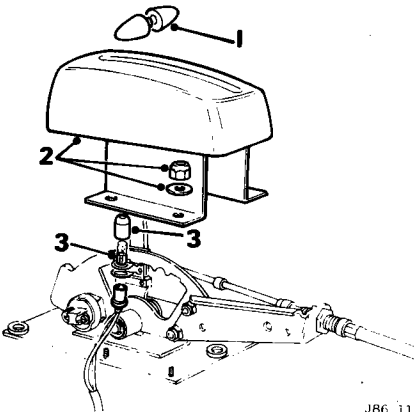


Fig. 61

Remove the four retaining nuts to release the transmission selector cover (2, Fig. 61).
Remove the bulb shroud and withdraw the bulb (3, Fig. 61).

Note: The bulbs used in this unit are of the capless design and only require a straight pull to remove them from the holder. Replace the bulb as necessary.

CIGAR LIGHTER ASSEMBLY

Remove and refit 86.65.60

Includes:
Cigar lighter illumination bulb—remove and refit 86.45.55

Disconnect the battery.
Remove the centre console cover retaining screws and raise the cover for access (1, Fig. 62).
Press together the sides of the cigar lighter bulb holder (2, Fig. 62) and remove from the cigar lighter.

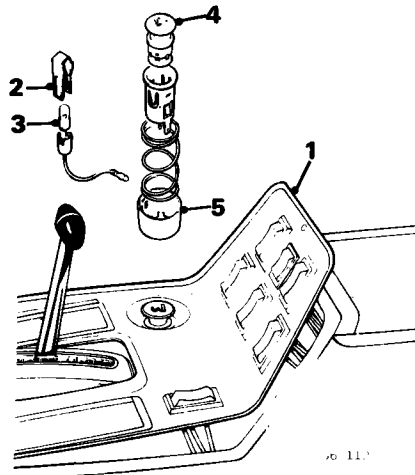


Fig. 62

Remove the bulb (3, Fig. 62).
Disconnect the cables from the cigar lighter.
Press the outer body of the cigar lighter towards the console panel and twist to release from the upper body and spring (4, Fig. 62).
Remove the outer body spring and upper body from the panel (5, Fig. 62).

REAR DOOR SPEAKER

Remove and refit 86.50.14

Includes:
Rear door speaker grille—remove and refit 86.50.08

Remove the rear arm-rest.
Remove the nuts securing the speaker/grille assembly.
Remove the grille and speaker from the housing.

FRONT DOOR SPEAKER

Remove and refit 86.50.13

Includes:
Front door speaker grille—remove and refit 86.50.09

Remove the front door arm-rest and the front door lower trim panel.
Remove the screws securing the speaker assembly and lever carefully clear of adhesive on the door.
Disconnect the speaker wires and remove the nuts securing speaker grille assembly.
Remove the speaker and the grille.

AERIAL

Remove and refit 86.50.21

Removing

Disconnect the battery.
Remove the boot carpet, boot floor, spare wheel, petrol pump cover, and the boot side trim.
Remove the rear lamp assembly.
Disconnect the aerial lead from the aerial extension lead (1, Fig. 63).
Loosen the knurled nut at the top of the aerial shaft under the wing (2, Fig. 63).

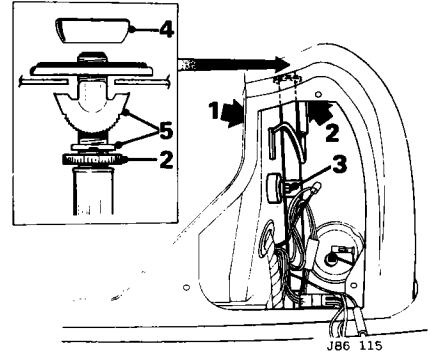


Fig. 63

Remove the bracket from the aerial shaft (3, Fig. 63).
Remove the domed chromed nut from the top of the aerial (4, Fig. 63).
Withdraw the aerial down in to the wing retaining the distance pieces (5, Fig. 63).
Remove the aerial drive shroud from the rear of the boot (1, Fig. 64).
Disconnect the aerial motor feed wires (2, Fig. 64).

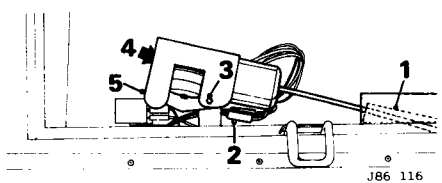


Fig. 64

Remove the bolt from the top of the aerial motor mounting bracket and tilt the assembly away from the rear of the boot (3, Fig. 64).
Remove the plastic drain tube from the bottom of the aerial motor (4, Fig. 64).
Remove the bracket from the aerial motor.
As the motor is withdrawn from the boot, guide the aerial drive and the aerial shaft through the rear of the body.

Refitting is the reversal of the above procedure.

AERIAL MOTOR RELAY

Remove and refit 86.50.27

Disconnect the battery.
Remove the boot carpet and floor.
Identify and disconnect the cables from the aerial relay.
Withdraw the relay from the mounting bracket.

REAR AERIAL OPERATING SWITCH

Remove and refit 86.50.24

Disconnect the battery.
Remove the centre console retaining screws and raise the console cover.
Disconnect the cables from the switch, depress the plastic lugs on the switch and withdraw the switch from the cover.

HEADLAMP RELAY

Remove and refit 86.55.17

Disconnect the battery.
Identify and disconnect the cables from the relay (1, Fig. 65).
Withdraw the bolts securing the relay to the wing valance (2, Fig. 65) and remove the relay.

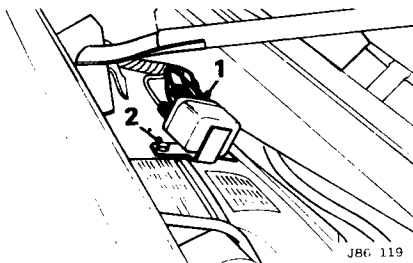


Fig. 65

HAZARD FLASHER UNIT

Remove and refit 86.55.12

Includes:

- Heated rear window/back-light relay**
—remove and refit **86.55.19**
- Ignition load relay**
—remove and refit **86.55.28**
- Bulb failure indicator**
—remove and refit **86.55.45**

Disconnect the battery.
Remove the screws securing the right-hand dash casing and remove the dash casing.
The hazard flasher (1, Fig. 66), heated rear back-light relay (2, Fig. 66), ignition load relay (3, Fig. 66), and the bulb failure indicator (4, Fig. 66) are now accessible.
Displace the flasher socket from the retaining bracket on the component panel, and withdraw flasher unit (1, Fig. 66) from the socket.
Withdraw the heated back-light relay and cable socket assembly from the bracket on the component panel; remove the relay (2, Fig. 66) from the cable socket.

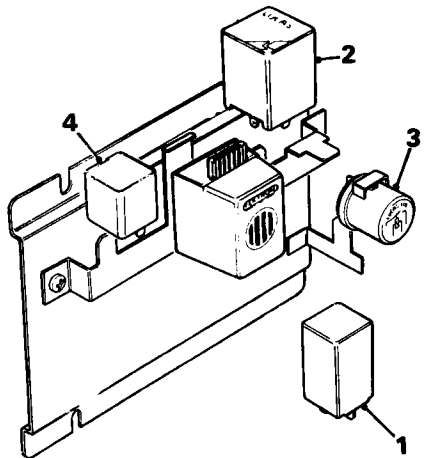


Fig. 66

Displace the ignition load relay and cable socket assembly from the component panel; remove the relay (3, Fig. 66) from the socket.
Remove the bulb failure unit and socket assembly from the bracket on the component panel; remove the unit (4, Fig. 66) from the socket.

STOP LIGHT AND REAR LAMP SENSOR UNITS

Remove and refit 86.55.34 86.55.50

Remove the cover from the electronic control unit situated in the boot, for access to the sensors.
Identify and disconnect the cables from the appropriate sensor.
Withdraw the securing screws and remove the sensor from the mounting panel.

PARKING LAMP FAILURE SENSOR

Remove and refit 86.55.22

Also:

- Low coolant warning control unit**
—remove and refit **86.55.33**
- Door, boot lock circuit breaker**
—remove and refit **86.55.36**
- Courtesy light delay unit**
—remove and refit **86.55.49**

Removing

Disconnect the battery.
Remove the screws securing the left-hand-side dash casing and remove the casing.
The parking lamp failure sensor, low coolant warning control unit, door, boot lock circuit breaker, and the courtesy light delay unit are now accessible.

Identify and disconnect the cables from the parking lamp sensor unit.
Remove the nuts and screws securing the sensor unit to the component panel; remove the unit.
Remove the screw securing the coolant warning unit to the component panel.
Withdraw the screws securing the sensor unit to the component panel; remove the unit.
Remove the screws securing the coolant warning unit to the component panel.
Withdraw the screws securing the glovebox liner to the fascia, and ease the liner downwards for access to the warning unit multi-plug connector.
Disconnect the multi-plug connector from cable harness and remove the warning unit.
Disconnect the cables from the door lock circuit breaker.
Withdraw the drive screw securing the circuit breaker to the component panel and remove the unit.
Remove the courtesy delay unit and the cable socket assembly from the component panel, then withdraw the delay unit from the cable socket.

Refitting

Reverse the appropriate operations.

SEAT BELT SWITCH

Remove and refit
Driver's buckle 86.57.25
Passenger's buckle 86.57.27

Disconnect the battery.
Adjust the seat to its full forward position.
Withdraw the screws securing the rear window switch panel and raise the panel clear of its location.
Remove the screw securing the console side panel and ease the panel clear for access to the switch block connector.
Disconnect the switch block connector front cable harness.
Withdraw the bolt securing the seat belt buckle and remove the buckle.

STARTER MOTOR—6 cylinder

Remove and refit 86.60.01

Removing

Drive the car onto a ramp and disconnect the battery.
Remove the bolt securing the starter lead and the gearbox breather pipe to the bracket on the starter motor. Retrieve the distance piece from the bolt.
Displace the starter lead from the terminal post on the bulkhead.

ELECTRICAL SYSTEM

Remove the top bolt securing the starter motor to the bell housing.

Raise the ramp.

Remove the lower securing bolt and ease the starter motor clear of the bell housing.

Retrieve the spigot plate from the bell housing.

Remove the starter lead from the starter solenoid and remove the bolt securing the bracket to the side of motor; remove the bracket.

Refitting

Refit the starter lead to the solenoid, and cover the terminal with the rubber boot.

Place the bracket in position. Fit and tighten the bolt to secure.

Place the spigot plate in position on the bell housing and position the starter motor.

Fit but do not tighten the lower securing bolt.

Fit and tighten the upper securing bolt and the lower bolt.

Fit the clip securing the breather pipe and the starter cable to the bracket on the motor.

Secure the cable to the terminal post on the bulkhead and refit the rubber boot over the post.

Reconnect the battery.

STARTER MOTOR 12 cylinder

Remove and refit 86.60.01

Removing

Disconnect the battery.

Loosen the two bolts from the steering column universal joints.

Disconnect the feed/return pipes from the power steering pump at the pinion housing and release the clip securing the pipes to the steering rack assembly.

Remove the lower steering column universal pinch bolt, and push the lower column upwards from the pinion housing.

Disconnect the steering tie rods.

Slacken the lower mounting bolts and remove the upper mounting bolt of the steering rack housing.

Remove the right hand exhaust front pipe and swing the steering rack assembly down to its furthest extent.

Disconnect the starter cables at the terminal post and the starter solenoid.

NOTE: Secure the cables loosely with wire or string to the top of the engine; this will facilitate feeding the cables back during the refitting operation.

Withdraw the starter mounting bolts.

Move the starter forward and rotate until the solenoid is in the underneath position, then ease the starter motor assembly down from the engine compartment.

After refitting, refill and bleed the power steering system.

STARTER SOLENOID

Remove and refit 86.60.08

Disconnect the battery.

Remove the starter motor, see operation 86.60.01.

Disconnect the starter lead from the solenoid.

Remove the nut securing the solenoid to the starter motor.

Remove the two fixing nuts and withdraw the solenoid from the bracket.

Retrieve the gasket and release plunger from the top of the drive engagement lever.

IGNITION/STARTER/STEERING LOCK SWITCH

Remove and refit 86.65.03

Disconnect the battery.

Slacken the ignition lock cover shroud screws and remove the shroud from the fibre optic (1, Fig. 67).

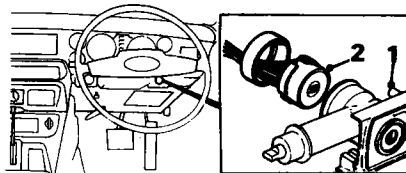


Fig. 67

Disconnect the switch multi-plug connector (2, Fig. 67).

Remove the switch to lock retaining screw, displace the plastic cover and remove the switch assembly.

STARTER MOTOR RELAY

Remove and refit 86.55.05

Disconnect the battery.

Identify and disconnect the relay cables (1, Fig. 68).

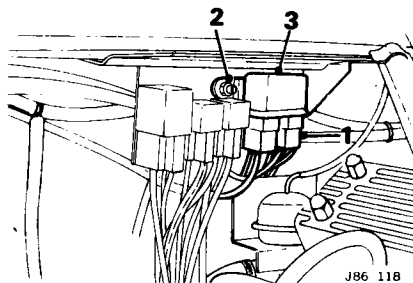


Fig. 68

Remove the nuts securing the relay to the mounting stud and remove the earth lead eyelet (2, Fig. 68).

Remove the relays (3, Fig. 68).

RHEOSTAT SWITCH

Remove and refit 86.65.07

Disconnect the battery.

Remove the right-hand dash casing.

Depress the spring stud and release the rheostat contact knob (1, Fig. 69).

Unscrew and remove the retaining ring (2, Fig. 69).

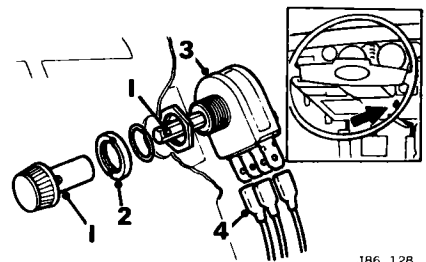


Fig. 69

Remove the rheostat and the adjusting nut (3, Fig. 69) from the switch strut.

Disconnect the cables at Lucar connections and withdraw switch (4, Fig. 69).

MASTER LIGHTING SWITCH

Remove and refit 86.65.09

Disconnect the battery.

Remove the driver's side dash liner.

Remove the screws securing the switch to the mounting bracket.

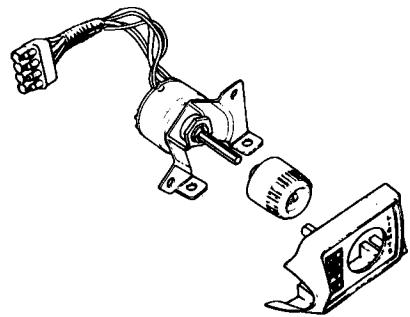


Fig. 70

Lower the switch and displace the fibre optic lead from the switch.

Disconnect the cable block connector from the harness and remove the switch assembly (Fig. 70).

DOOR PILLAR SWITCH**Remove and refit 86.65.15**

Disconnect the battery.
Remove the screw securing the switch to the pillar.

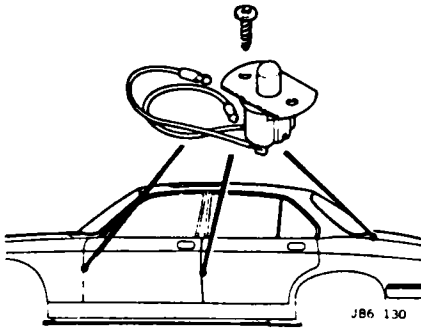


Fig 71

Draw the switch clear of the pillar until the snap connector is accessible.
Disconnect the snap connector from the main harness and remove the switch (Fig 71).

INTERIOR LIGHT SWITCH**Remove and refit 86.85.13**

- Heated rear window switch – remove and refit 86.65.36
- Fuel change over switch – remove and refit 86.65.39
- Map light switch – remove and refit 86.65.43
- Headlamp levelling switch – remove and refit 86.65.87

Disconnect the battery.
Displace and remove the radio surround panel.
Remove the air conditioning control knobs. Remove air conditioning control panel securing collars. Carefully displace panel for access.
Remove veneer panel securing screws, select '1' on gearbox selector gate and displace the veneer panel downwards and outwards for access.
Disconnect switch block connector.
Using suitable pliers close switch retaining clips and remove switch from panel.
Fit and seat new switch to panel, reposition retaining clips and connect switch block connector.
Reassemble.

LUGGAGE COMPARTMENT LIGHT SWITCH**Remove and refit 86.65.22**

Disconnect the battery.
Remove the screws securing the switch and displace the wire retainer pad.
Disconnect cables at snap connectors and remove the switch.

FUEL PUMP INERTIA CUT-OUT SWITCH**Reset 86.65.59**

An inertia switch is fitted in the electrical supply to the fuel pump. Should the car be subjected to a heavy impact, the switch opens, isolating the fuel pump, preventing fuel from being pumped in a potentially dangerous situation.

The pump is located on the passenger side 'A' post and is reset by pressing down the button located on top of the switch.

FUEL PUMP INERTIA CUT-OUT SWITCH**Remove and refit 86.65.58**

Disconnect the battery.
Remove the cover from the inertia switch (1, Fig 72).

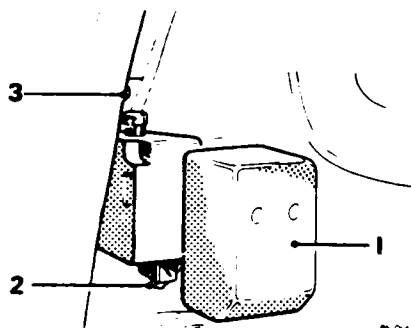


Fig 72

Disconnect the cables from the switch (2, Fig 72) and remove the screws securing the switch to the 'A' post (3, Fig 72).
Remove the switch.

HANDBRAKE WARNING SWITCH**Remove and refit 86.65.45**

Disconnect the battery.
Remove the driver's side console side panel.
Remove the shroud and lay to one side (1, Fig 73).
Pull back the gearbox cover carpet and remove the handbrake mounting bracket securing bolts.

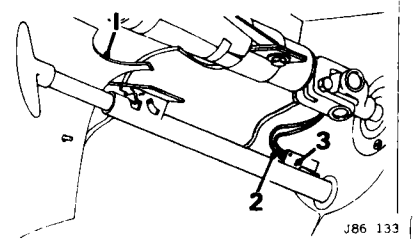


Fig 73

Disconnect the cables from the switch (2, Fig 73).

Ease the handbrake lever assembly clear of transmission tunnel for access.

Loosen the bolts securing the switch assembly to the mounting bracket (3, Fig 73).
Retrieve the tapped plate and the switch assembly.

STOP LIGHT SWITCH**Remove and refit 86.65.51**

Disconnect the battery.
Remove the driver's side dash liner.

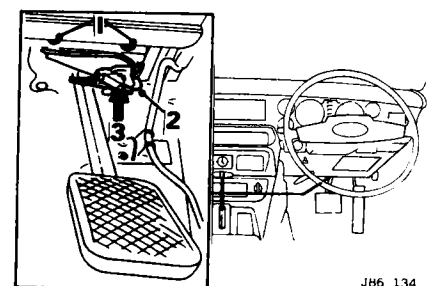


Fig 74

Remove the bolts securing the switch mounting to the brake pedal housing (1, Fig 74).

Lower the switch and bracket assembly.
Disconnect the switch cables from the block connector (2, Fig 74).

Remove the switch to mounting bracket securing bolt, and remove the switch (3, Fig 74).

ELECTRICAL SYSTEM

COMBINED DIRECTION INDICATOR/HEADLIGHT/HORN SWITCH

Remove and refit 86.65.55

Hazard warning switch – remove and refit 86.65.50

Combined windscreen washer and wiper switch – remove and refit 86.65.41

Removing

Disconnect the battery.
Remove the driver's side dash liner.
Disconnect the switch cable multi-pin connector from the harness (1, Fig 75).
Remove the lower shroud (2, Fig 75).
Slacken the steering-wheel adjustment nut and pull the steering-wheel out to its limit.
Turn the wheel for access to the wheel slide grub screw; undo the locknut and remove the grub screw.
Turn the steering-wheel to the straight-ahead position, remove the ignition key to lock the steering wheel.
Remove the pinch-bolt securing the upper steering stub to the column.
Remove the steering-wheel and adjusting stub assembly.

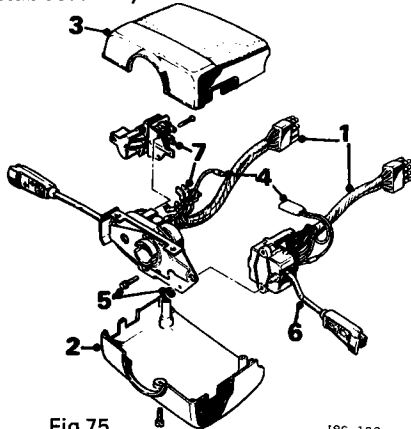


Fig 75

J86 132

Loosen the clamp screw securing the switch assembly to the column; slide the switch and upper shroud assembly clear of the column (3, Fig 75).

Remove the upper shroud from the switch assembly and place the shroud to one side.

Disconnect the wiper switch earth cable from the snap connector (4, Fig 75) and the cable harness multi-pin connector.

Remove the Spire nut and screws securing the wiper switch to the mounting plate (5, Fig 75).

Remove the wiper switch and place to one side (6, Fig 75).

Disconnect the cables from the hazard switch.

Withdraw the screws securing the switch to the assembly and remove the hazard switch (7, Fig 75).

Caution: No attempt must be made to separate the direction indicator/headlight/flasher switch from the bracket. Faulty items are changed as complete assemblies.

Refitting

Reverse the above operations.

DRIVER'S SEAT ELECTRIC MOTOR

Remove and refit 86.75.01

Removing

Disconnect the battery.
Remove the front seat cushion and disconnect the electrical connection underneath the cushion.

Remove the front seat.
Remove the bolts securing the rise/fall mechanism to the mountings onto the floor, and remove the mechanism.
Mark the position of the motor on the mechanism.

Remove the bolts securing the motor to the frame and remove the motor.

To refit, reverse the above operations.

SLIDING ROOF MOTOR

Remove and refit 86.76.01

Removing

Disconnect the battery.
Remove the rear seat and the rear squab.
Remove the trim from the rear of the boot.
Remove the nuts securing the clamping plate.
Remove the four nuts securing the motor mounting bracket.
Disconnect the electrical feed cables at the snap connectors.
Remove the motor and bracket assembly.
Remove the motor from the bracket.

To refit, reverse the above procedure.

HEADLAMP LEVELLING MOTOR

Remove and refit 86.42.04

Removing

Disconnect the battery.
Pull the headlamp wiper arm forward.
Remove the top retaining screw and withdraw the headlamp rim finisher, noting the retaining lug at the lower edge.
Remove the four recessed retaining screws securing the complete headlamp and housing assembly to the body.
Carefully displace the assembly from its mounted position. Tilt the top of the assembly forward and withdraw assembly upward allowing the headlamp levelling motor (2, Fig 76) to clear the wing.
Separate motor to link harness electrical connector (1, Fig 76).
Peel back the actuator rod cover (1, Fig 76A) to gain access to the horseshoe retaining clip (2, Fig 76A) and withdraw the clip.
Remove the two allen screws securing the motor to the headlamp housing.
Displace and remove the motor from the actuator ball socket.

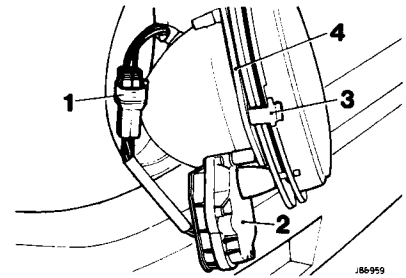


Fig 76

Refitting

Fit and fully seat the new motor to the actuator rod ball socket. Ensure the rod ball locates into slot.

Secure the motor to the headlamp and housing assembly with two allen screws. Install the horseshoe retaining clip at the actuator rod.

Reconnect electrical connection. Ensure the four rim finisher retaining clips (3, Fig 76) and headlamp housing sealing rubber (4, Fig 76) are in position.

Install the assembly, motor first and secure with four screws.

Check for correct initial headlamp beam alignment setting.

Refit the headlamp rim finisher.

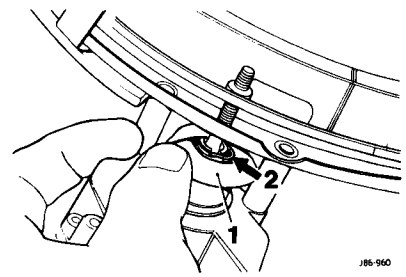


Fig 76A

HEADLAMP ALIGNMENT

Headlamp levelling – German Market 86.40.18

Headlamp beam setting should only be carried out by qualified personnel using approved beam setting apparatus.

Adjustment

Outer headlamps:

Set the headlamps to the vehicle unladen and highest setting – Position 0 (Levelling switch released).

Remove the headlamp rim finisher.

Use the two screws (1, Fig 76B) at the horizontal centre line position to move the headlamp beam to the left or right.

Use the headlamp levelling trim screw (2, Fig 76B) at the base of the headlamp to raise or lower the beam.

Refit the headlamp rim finisher.

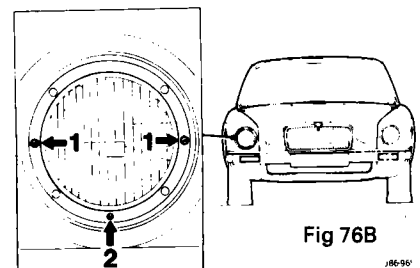


Fig 76B

J86 99

IGNITION SYSTEM—12 Cylinder

Description

86.36.00

The OPUS ignition system comprises:

- A. Distributor
- B. Amplifier unit
- C. Ballast resistor
- D. Ignition Coil

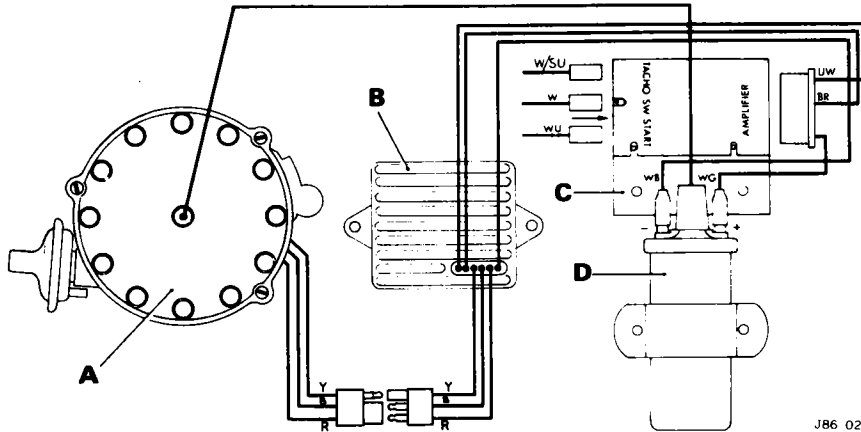


Fig. 77

The Distributor

The OPUS Distributor comprises:

1. Distributor cap rotor, timing rotor (and trigger) Japan and Australia only
2. Vacuum unit rod
3. Grommet
4. Pick-up module
5. Roll pin
6. Vacuum unit (retard/advance) Japan Australia—others
7. Retaining screws
8. Felt pad
9. Control spring
10. Centrifugal bob-weights
11. Distributor lead

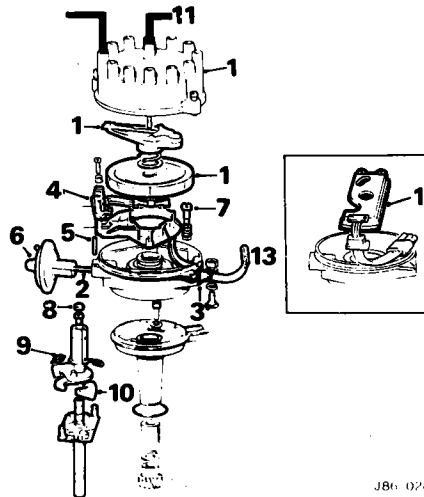


Fig. 78

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 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 the 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.

Amplifier unit—(B—Fig. 77)

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 resistor unit and external cables.

Ballast resistor unit—(C—Fig. 77)

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 the drive for the power transistor in the amplifier unit.

Ignition coil—(D—Fig. 77)

The coil is mounted on the front of the throttle pedestal.

A specially designed, fluid-cooled, high-performance, ballast 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.

ELECTRICAL SYSTEM

Operation

Normally when the engine is stationary, the distributor timing rotor will be in a position where none of its ferrite rods will be in proximity to 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 a.c. voltage is applied by the amplifier unit to the distributor pick-up module 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 in 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.

The 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 (d.c.) voltage 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.

DISTRIBUTOR

Remove and refit—Engine dismantling and reassembling 86.35.20

Removing

Remove the three captive screws and detach the distributor cover.

Disconnect the cable at the connecting plug (1, Fig. 79).

Disconnect the pipe from the vacuum retard unit (2, Fig. 79).

Release three Allen screws (3, Fig. 79), accessible through slots in the micro housing and withdraw the distributor.

Refitting

Rotate the engine until the mark 'A' etched on the crankshaft damper is in line with the 10° Federal B.T.D.C. mark on the timing plate.

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

Rotate the distributor until No. 1 cylinder mark on the timing rotor is in alignment with the mark on the pick-up module.

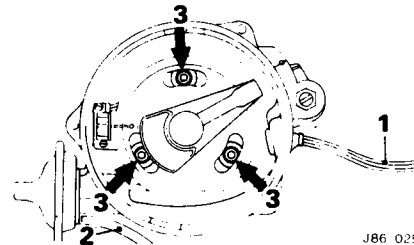


Fig. 79

When refitting, ensure that the marks on the timing rotor and pick-up module do not move out of alignment.

Check the ignition timing.

DISTRIBUTOR

Overhaul

Dismantling

Remove the distributor cover, electronic timing rotor, and trigger unit (1, Fig. 80)—Japan and Australia.

Lift the vacuum operating rod from peg on pick-up arm (2, Fig. 80).

Prise the cable grommet from the body of the distributor (3, Fig. 80).

Remove the pick-up arm bearing spring. Slide the pick-up arm sideways to disengage it from bearing. Lift from micro housing, drawing the cable in through the hole. Detach the pick-up module.

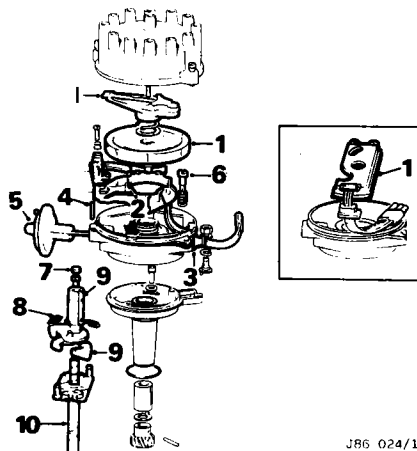


Fig. 80

Use a pin punch 1.85 mm (0.073 in) to tap out the roll-pin securing the vacuum unit in the micro housing (4, Fig. 80).

Withdraw the vacuum unit from the micro housing (5, Fig. 80).

Remove the three spring loaded screws and lift the micro housing from the distributor body (6, Fig. 80).

Extract the felt pad from the top of the rotor carrier shaft and release the screw (7, Fig. 80). Release the control springs from the fixing posts (8, Fig. 80).

Lift the rotor carrier shaft from the distributor shaft. Collect the centrifugal weights (9, Fig. 80).

Reassembling

Smear the centrifugal weights and rotor carrier pivot posts with either Rocol grease No. 30863 or Mobilgrease No. 2. Assemble the weights to the pivot posts.

Lubricate the bore of the rotor carrier shaft with clean engine oil and fit to distributor shaft. Retain with round-headed screw. Fit the oil pad.

Fit control springs.

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

Liberally smear the auto advance mechanism with grease previously specified.

Fit the micro housing to the distributor body, ensuring that the micro adjustment eccentric peg engages in the slot.

Secure the micro housing to the body using screws, plain washers and springs. Tighten the screws to just short of coil binding.

Loosely secure pick-up module to the pick-up arm using two cheese-head screws, plain and spring washers.

Pass the pick-up module connector and cable out through the hole in the micro housing and locate the pick-up arm on the rotor carrier shaft.

Fit the bearing spring.

Engage the wide part of the cable grommet in the hole and prise into position.

Place the vacuum unit into position and secure with a new roll-pin.

Fit the vacuum operating rod to the peg on the pick-up arm.

Fit the electronic timing rotor and secure it using a wave washer and circlip.

Use feeler gauges to set the distance between the pick-up module 'E' core faces and timing rotor outer edge to 0.50 mm to 0.55 mm (0.020 in to 0.022 in).

Tighten both pick-up module securing screws.

Fit the trigger unit (Japan and Australia only).

Fit the rotor arm.

Fit the distributor.

'OPUS' IGNITION SYSTEM

Checking

Equipment required: D.C. moving-coil voltmeter, 0 to 20V scale; hydrometer; ohmmeter; h.t. jumper lead

Preliminary procedure

Battery Test 86.35.29/1

Heavy discharge test

This test should be carried out as a check to the battery condition. A heavy discharge tester applied to the battery terminals will determine whether the battery is capable of supplying the heavy currents required by the starter motor.

Specific gravity readings

Check the specific gravity of the electrolyte in each cell using a hydrometer. Lift the vent cover and tilt it to one side. Insert the hydrometer into each cell in turn through the filling tube and note the readings. A variation of more than 40 points (0.040) in any cell reading means the battery suspect. If necessary prove the battery by substitution.

Circuit test

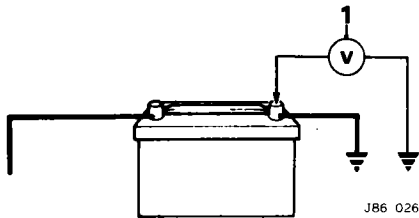
Check the battery.

Disconnect the cable from the coil l.t. terminal marked '-'.

Connect the voltmeter (1, Fig. 81) between the battery earth and frame.

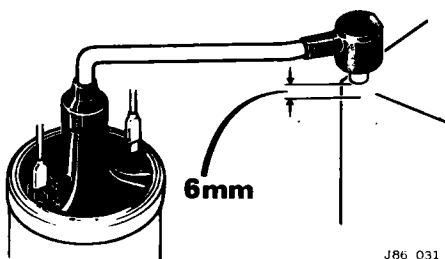
Operate the starter, check voltmeter reading which should not exceed 0.5 volt. Refit the coil cable.

If more than 0.5 volt is registered, rectify faulty connection between frame and battery.



Check for sparking

Disconnect the h.t. lead from the distributor cover and hold the free end approx. 6 mm (¼ in) from an unpainted part of the engine block. With ignition on crank the engine. Regular sparking should occur (Fig. 82).



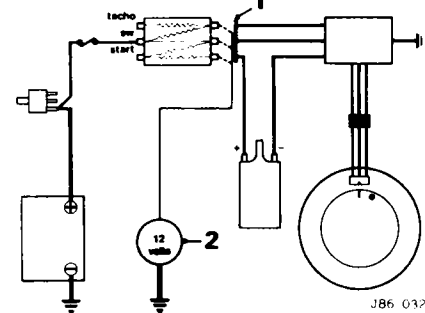
NOTE: If no sparking occurs proceed to 86.35.29/3. If sparking occurs, check the following:

- a. Distributor cover for cleanliness and cracks
- b. H.T. cables
- c. Rotor arm
- d. Spark plugs
- e. Fuel supply

Ballast resistor check 86.35.29/3

Withdraw the socket from the amplifier side of the ballast resistor (1, Fig. 83).

Connect the voltmeter between battery earth and each terminal of the ballast resistor amplifier output in turn (2, Fig. 83).



CAUTION: Voltmeter test lead must not come into contact with the ballast resistor housing.

With ignition on, meter should read battery voltage.

NOTE: If satisfactory, proceed to 86.35.29/4.

If no reading is obtained check supply to 'SW' terminal. Trace the circuit back through the ignition switch.

Coil voltage check 86.35.29/4

Reconnect the socket to the amplifier side of the ballast resistor.

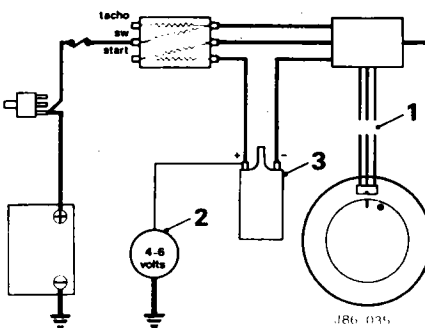
Disconnect the amplifier/distributor socket (1, Fig. 84).

Connect the voltmeter between battery earth and '+' terminal on the coil (2, Fig. 84).

With ignition on, the reading should be 4 to 6 volts. The coil resistance is 0.8 to 1.0 ohm (3, Fig. 84).

NOTE: High reading indicates a faulty coil or amplifier.

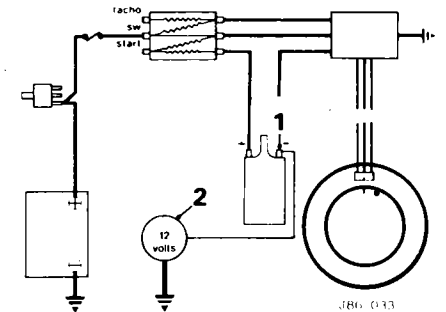
No reading, check supply to '+' terminal on coil.



Coil Primary Winding Check 86.35.29/5

Disconnect the lead at '-' terminal on the h.t. coil (1, Fig. 85), then connect a voltmeter between the '-' terminal and earth (2, Fig. 85). With ignition on the meter should read battery voltage.

NOTE: No reading, replace the h.t. coil.



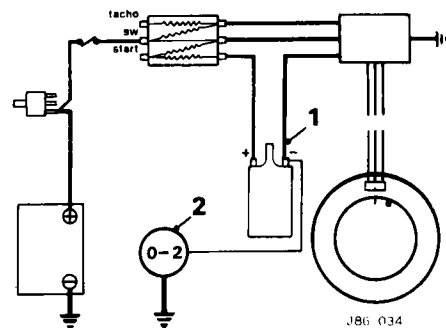
Amplifier volts drop

Reconnect the lead to the '-' terminal on the coil (1, Fig. 86).

Connect the voltmeter between the coil '-' terminal and the battery earth (2, Fig. 86).

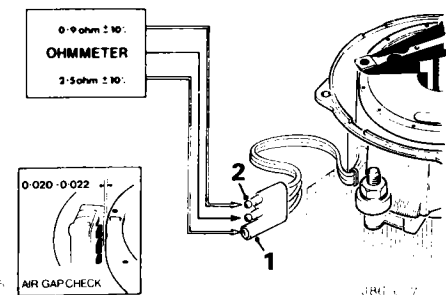
With ignition on, meter should read 0 to 2 volts.

NOTE: High reading battery voltage, replace amplifier. High reading between 2 volts and battery voltage, check for earth fault.



Distributor pick-up module

- a. Primary (input) winding resistance (measured between the centre terminal and the outer terminal with red cable): 2.5 ohms nominal at 20°C (1, Fig. 87).
- b. Secondary (output) winding resistance (measured between centre terminal and outer terminal with yellow cable): 0.9 ohm nominal at 20°C (2, Fig. 87).



ELECTRICAL SYSTEM

IGNITION TIMING

Check **86.35.29/7**

'P' System. Digital fuel injection (Retrospective from 1980 MY)

Series III RHD VIN No. 310613.

LHD 310676. XJS RHD VIN No. 104146

LHD 104236

Ensure the engine is at its normal operating temperature.

Disconnect the vacuum pipe. Run the engine at 3000 rev/min. Check the timing with a stroboscope, adjust the timing to 24° B.T.D.C.

Non Digital system. 'D' system (Japan and Australia). Set the engine idle speed at 750 rev/min.

Disconnect the vacuum pipe. Check the timing with a stroboscope and adjust the timing to 10° B.T.D.C.

Tighten the locknut.

AMPLIFIER UNIT

Remove and refit **86.35.30**

Disconnect the battery.

Withdraw the unit cable plug from the ballast resistor assembly (1, Fig. 88).

Disconnect the plug adaptor between the distributor and amplifier unit line (2, Fig. 88).

Remove the two screws and washers (3, Fig. 88).

Remove the amplifier unit (4, Fig. 88) from the cross-member (5, Fig. 88).

Reverse the procedure above to refit.

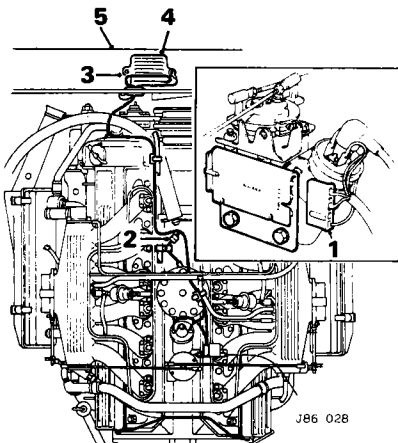


Fig. 88

COIL

Remove and refit **86.35.32**

Disconnect the battery earth lead.

Disconnect the h.t. lead (1, Fig. 89).

Disconnect the l.t. leads at Lucars on the coil (2, Fig. 89).

Remove the bolts and shakeproof washers securing the coil to the throttle pedestal (3, Fig. 89).

Remove the coil from its location (4, Fig. 89).

Reverse the above operations to refit.

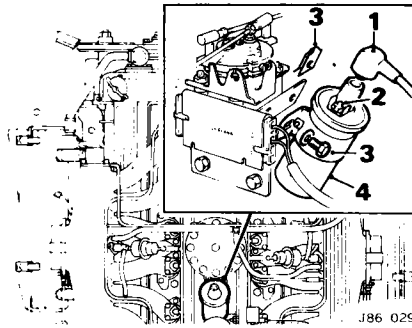


Fig. 89

BALLAST RESISTOR

Removing **86.35.33**

Disconnect the battery earth lead.

Disconnect the block connectors at the ballast resistor (1, Fig. 90).

Disconnect the No. 5 injector electrical connector (for access only).

Disconnect the throttle operating rod at the bell-crank on the induction manifold and swing it aside (2, Fig. 90).

Remove the bolts and shakeproof washers securing ballast resistor to the throttle pedestal (3, Fig. 90).

Manoeuvre the resistor clear of its location.

Reverse the above operations to refit.

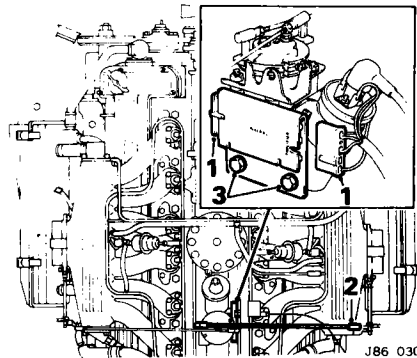


Fig. 90

BALLAST RESISTOR/STARTER RELAY

Remove and refit **86.35.34**

Disconnect the battery.

Note the connections and pull the connectors from the relay.

Release the two setscrews securing the relay and recover the plain washers and spring washers.

Reverse the above operations to refit ensuring that the earth tag is fitted beneath the lower screw.

BALLAST RESISTOR/STARTER RELAY

Test in situ **86.35.35**

If the starter motor does not operate when the ignition key is turned initially, check as follows:

Pull the cable from the connectors 'C1', 'C2', and 'C4' on the relay and short them together (Fig. 91). The starter motor should operate, which shows the relay is at fault. If the starter does not operate, either there is no supply in (brown cable +ve) or the starter motor is at fault.

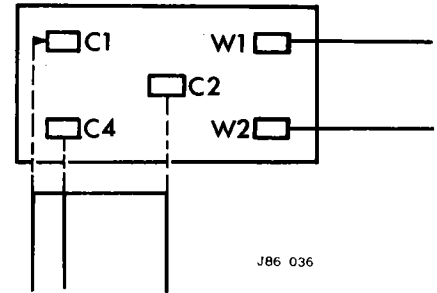


Fig. 91

IGNITION PROTECTION RELAY

Remove and refit **86.35.36**

Disconnect the battery.

Remove the driver's side dash liner.

Remove the direction/hazard warning flasher unit by lifting out of the connector block (1, Fig. 92).

Remove the four nuts securing the fusebox mounting panel and ease the panel down to its full extent (2, Fig. 92).

Remove two screws, nuts and shakeproof washers securing the relay to the mounting bracket.

Note carefully the position of cables.

Disconnect the cables at the Lucar connectors.

Reverse the above operations to refit.

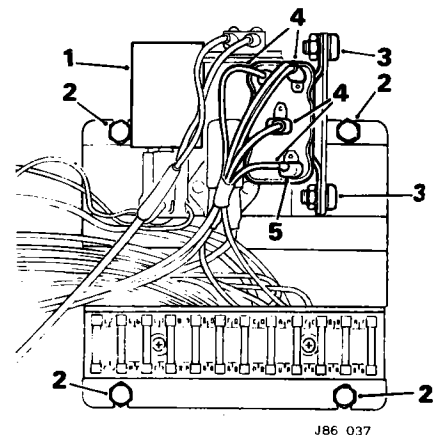


Fig. 92

Lucas constant energy ignition

A Lucas Constant Energy Ignition System fitted to XJ 4.2 E.F.I. Models on Series III. The new ignition system operates by maintaining the energy stored in the coil at a constant level, allowing the output voltage to remain constant over a wide range of engine speeds. The power dissipated in both the coil and module compared with equivalent constant dwell systems is greatly reduced.

Constant energy system component description

Amplifier AB 14

The amplifier (1, Fig. 93) consists of a solid state electronic module housed in an aluminium case with two pre-wired leads (2, Fig. 93) which connect to the low tension terminals on the ignition coil.

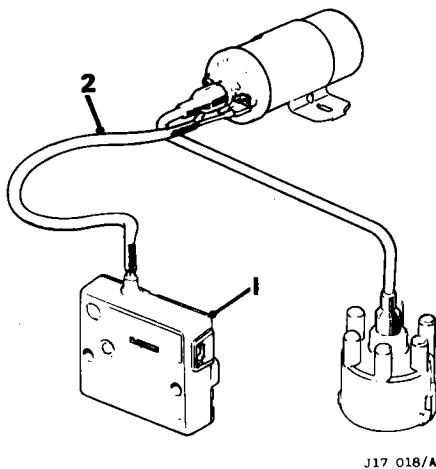


Fig. 93

Connection from the distributor pick-up module is made by an assembly of two leads (1, Fig. 94) inside a screening braid which plugs into a socket on the amplifier side. The amplifier mounting as shown in (2, Fig. 94).

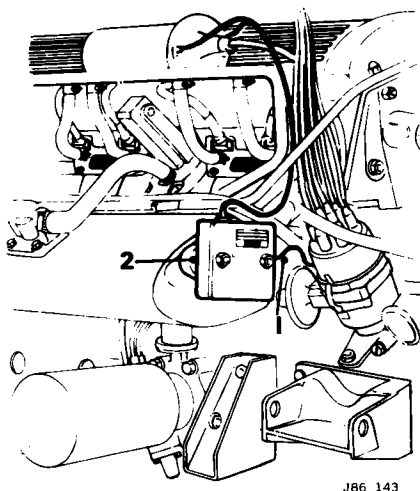


Fig. 94

Distributor (45 DM)

The distributor incorporates a standard automatic advance system, anti-flash shield (1, Fig. 95), rotor arm, and cover (2, Fig. 95). The previous pick-up and module assembly is replaced by a reluctor and pick-up module (3, Fig. 95). The reluctor is a gear-like component (with as many teeth as there are cylinders) which is mounted on the distributor drive shaft.

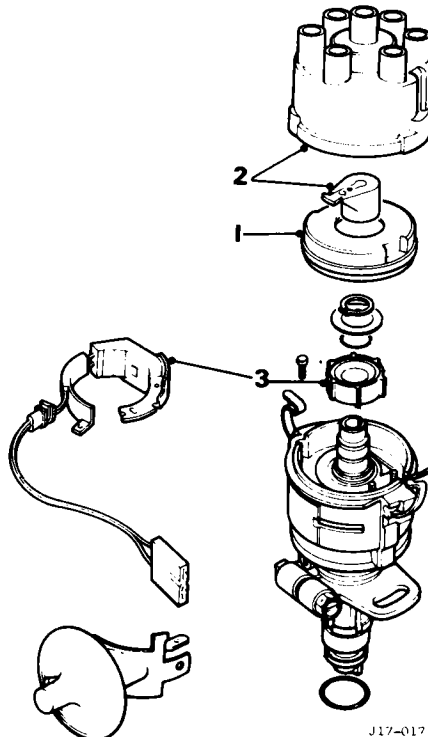


Fig. 95

The pick-up module consists of a winding around a pole-piece attached to a permanent magnet.

The distributor is pre-wired with two leads terminating in a moulded two-pin inhibited connector, which plugs into the amplifier previously described.

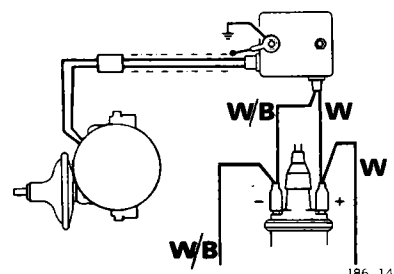


Fig. 96

During normal service the air gap between the reluctor and the pick-up module does not alter and will only require re-setting if it has been tampered with. If it is necessary to adjust the gap, then it should be set such that the minimum clearance between the pick-up and the

reluctor teeth is not less than 0,20 mm (0.008 in). The gap should not be set wider than 0,35 mm (0.014 in).

The air gap is measured between a reluctor tooth and the pick-up module (1, Fig. 97) and should be checked with a plastic feeler gauge. The use of a metal feeler gauge may result in a misleading gauge reading due to the pick-up module contacts being magnetic. However, their use will not affect the electrical operation of the pick-up module.

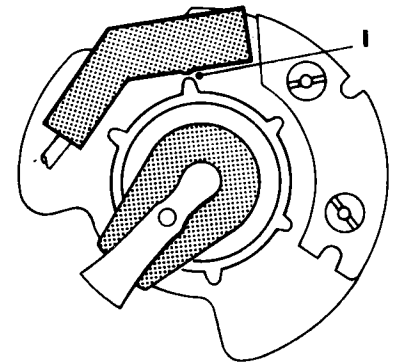


Fig. 97

When the reluctor tooth passes across the pick-up limb, the magnetic field strength around the pick-up winding is intensified, creating a voltage in the winding. The rise and fall of this voltage is sensed by the amplifier and is used to trigger the output stage of the amplifier, which in turn switches on and off the current flowing in the primary winding of the HT coil. The amplifier controls the maximum current flowing in the primary circuit.

Two HT coils are incorporated on the V12 engine. The main coil primary winding is connected in parallel with the primary winding of the auxiliary coil.

The HT section of the auxiliary coil is not used and the HT outlet is sealed.

The auxiliary coil enables the ignition system to achieve the required performance at high engine speeds under load. The constant energy electronic ignition system employs output current limiting and variable dwell for optimum performance. A long dwell is provided at high speeds for adequate energy storage in the coil and a dwell is provided at low speeds for minimum power dissipation. The output current limiting function of the amplifier maintains the storage energy for spark, and the system open circuit voltage remains constant over a wide engine speed range.

It eliminates the need for a ballast resistor whilst ensuring correct current flow at all times even when the engine is cranking. No current flows through the HT coil when the ignition is switched on and the engine is stationary.

WARNING: The amplifier is a sealed unit containing Berylia. This substance is extremely dangerous if handled. Do not attempt to open the amplifier module.

ELECTRICAL SYSTEM

CONSTANT ENERGY IGNITION TEST

Test 1

Check the battery. A heavy discharge test will determine whether the battery is capable of supplying the heavy currents required by the starter motor.

Check the specific gravity of the electrolyte in each cell. A variation of (0.040) in any cell means the battery is suspect.

Test 2

Check for HT spark. Remove the HT lead from the centre of the distributor cap and hold the lead approximately 6 mm (0.25 in) from the engine (Fig. 98). Crank the engine. If a good spark is obtained, check the HT leads, spark plugs, distributor cap, and rotor.

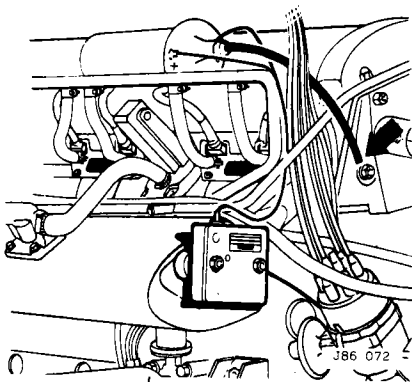


Fig. 98

Test 3

With ignition switched on, the voltage at the HT coil positive terminal (Fig. 99) should be 12 volts. If the voltage is less than 11 volts check wiring to/from the ignition switch.

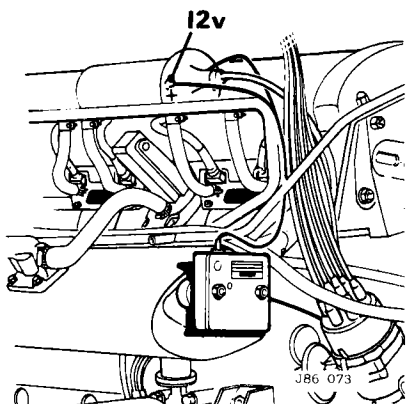


Fig. 99

Test 4

With ignition switched on the voltage at the negative terminal of HT coil should be 12 volts (Fig. 100).

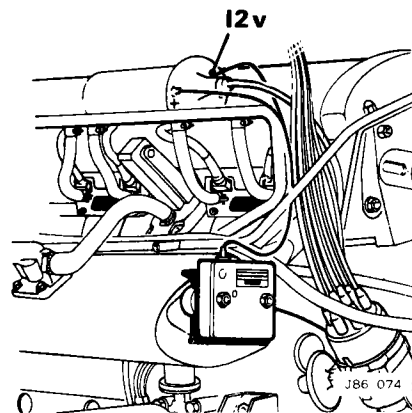


Fig. 100

If a zero reading is obtained, disconnect the lead to the amplifier from the negative terminal of the HT coil (Fig. 101).

If the voltage is zero, a faulty HT coil is indicated.

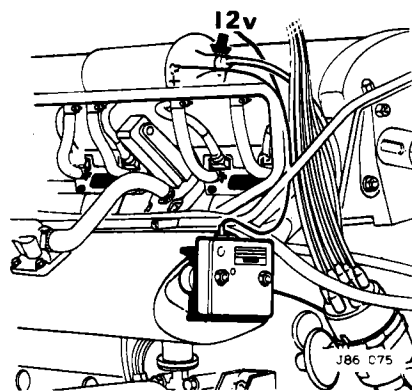


Fig. 101

A 12 volt reading indicates a faulty amplifier.

Test 5

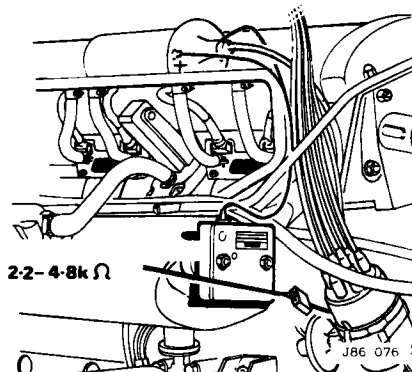


Fig. 102

Disconnect the distributor pick-up leads from the amplifier, and measure the resistance of the pick-up coil. The resistance should be 2.2 to 4.8 ohms (Fig. 102).

Test 6

Connect a test lamp to the negative terminal of the HT coil and earth. Crank the engine. The lamp should dim and flicker slightly (Fig. 103).

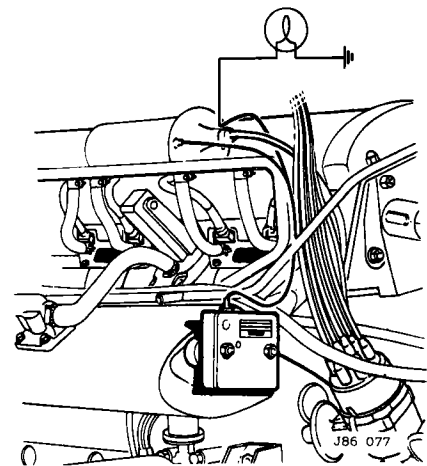


Fig. 103

IGNITION COIL**Remove and refit 86.35.32**

Disconnect the battery.
 Remove the bolts securing the HT coil.
 Note the position of the cables and disconnect the cables.
 Withdraw the HT lead.
 Remove the coil.
 Reverse the above procedure to refit.

IGNITION TIMING**Static Check 86.35.15**

Remove the distributor cap and anti-flash shield.
 Rotate the engine until the rotor arm approaches No. 6 cylinder segment in the distributor cap.
 Slowly rotate the engine until the ignition timing scale on the crankshaft damper is at the appropriate number of degrees at the pointer on the lower L.H. side of the timing chain cover.
 4.2 Litre 'H' or 'S' compression ratio, 6 B.T.D.C.
 3.4 Litre 'H' compression ratio, 8 B.T.D.C.
 Slacken the distributor pinch-bolt and rotate the distributor body so that the pick-up is lined up with the nearest reluctor tooth.
 Switch on the ignition.
 Position the end of the distributor centre HT cable approximately 6 mm (1/4 in) from a good earth point on the engine.
 Turn the distributor body slowly until a spark between the HT lead and earth occurs.
 Repeat the operation as a check.
 Switch off the ignition.
 Tighten the distributor pinch-bolt, refit the anti-flash shield and the distributor cap.
 Refit the centre HT lead to the distributor cap.

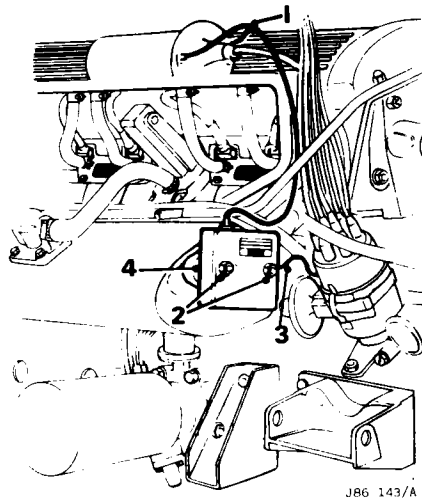
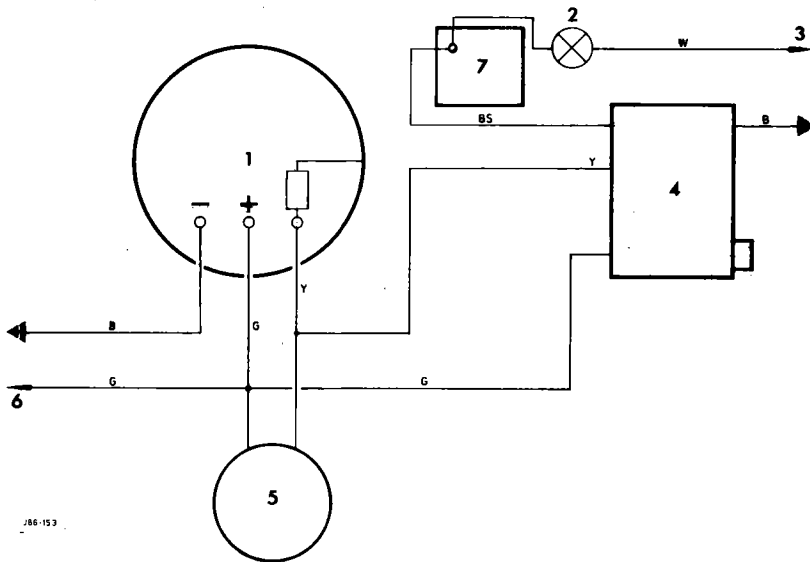


Fig. 104

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

Disconnect the battery.
 Remove the air cleaner.
 Remove the plastic cover from the HT coil and disconnect the two amplifier leads from the coil (1, Fig. 104).
 Remove the two amplifier securing bolts (2, Fig. 104).
 Disconnect the distributor pick-up leads (3, Fig. 104) and withdraw the amplifier (4, Fig. 104).
 To refit, reverse the above procedure.



KEY TO DIAGRAM

- 1. Speedometer
- 2. Oxygen sensor warning light (USA only)
- 3. Feed to ignition switch
- 4. Service interval counter (SIC) (USA only)
- 5. Speed transducer
- 6. Feed to fuse
- 7. Warning light bulb failure unit

COLOUR CODE

- G Green
- Y Yellow
- B Black
- BS Black/Slate

Fig. 105

ELECTRONIC SPEEDOMETER

Description

The two major parts of the system are, an electronic speedometer head and an 8 pole transducer which is situated in the automatic/manual transmission unit in place of the conventional angle drive.

The electronic speedometer operates in a similar way to integrated circuit tachometers. It should be noted that:

Due to the nature of the instrument a slight flickering of the speedometer pointer may be noticeable at below 15 km/h (10 mph).

The control for resetting the odometer is situated in the speedometer facia and is operated by depressing the control button.

The cause(s) of faults which result in incorrect operation are best diagnosed by substitution, having first checked for continuity of wiring/connectors and that battery voltage is supplied to both instrument and transducer. Ensure that earth connections are clean and tight. A fault diagnosis chart is given opposite to assist:

FAULT DIAGNOSIS

Apparent Fault	Probable Cause	Remedy
No reading on Speedometer	Defective Transducer	Substitute Transducer
	Defective Speedometer	Substitute Speedometer
	Defective Wiring	Check continuity of wiring with multimeter, check the positive supply connected to both speedometer and transducer.
Incorrect Speedo Reading	Defective Speedometer	Substitute Speedometer
	Defective Transducer	Substitute Transducer
	Ratio between idle and transducer driven gear incorrect	Check for discrepancy in gear ratios by undoing the knurled collar holding the transducer to the output/drive gear from the gearbox and marking the square drive end. Observe that for every six revolutions of the road wheels the square drive turns 7½ revolutions.
Pointer does not always return to Zero when the vehicle is stationary	Transducer Fault	Substitute Transducer
Excessive needle flicker up to 30 km/h (20 mph) and an odometer count when stationary	Transducer Fault	Substitute Transducer
Needle flicker when brake and trafficator used	Transducer Fault	Substitute Transducer
Various speed indications or needle deflection to max speed when stationary	Transducer Fault	Substitute Transducer

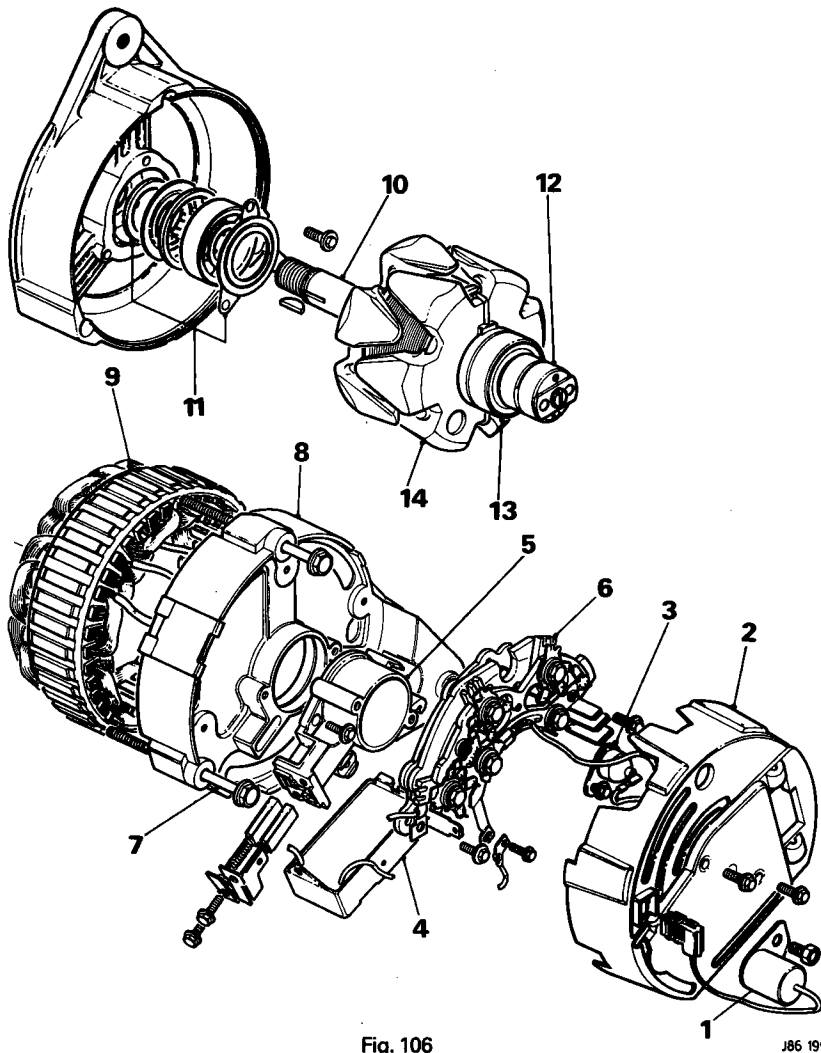


Fig. 106

J86 199

ALTERNATOR

Description

86.10.00

The A133 alternator is a three phase machine with a delta wound stator, twelve pole rotor, full wave rectification and a 15TR voltage regulator. The alternator is machine sensed with an externally fitted radio suppression capacitor.

Operation

The rotor and stator windings generate a three phase alternating current which is rectified to a direct current suitable for charging the battery. The electronic voltage regulator unit controls the alternator output voltage by high frequency switching of the rotor field circuit.

Specification

Voltage	12 volts
Maximum rev/min	15,000 rev/min
Maximum Output	75 amps
Regulated Voltage	13.6 to 14.4 volts
Rotor Resistance	2.46 ohms
Stator Winding Resistance per phase	0.144 ohms
Maximum Brush Length	20 mm (0.79 ins)
Minimum Brush Length	10 mm (0.39 ins)
Warning Lamp Bulb	2.2 watts

The 'on the vehicle' testing procedures are the same as the ACR range of alternators.

KEY TO ALTERNATOR

1. Capacitor
2. Cover
3. Surge Protective Diode
4. Regulator
5. Brush Box Assembly
6. Rectifier Pack
7. Through Bolts
8. Slip-ring End Bracket
9. Stator
10. Rotor Shaft
11. Bearing Kit
12. Slip-ring
13. Slip-ring End Bearing
14. Rotor

Alternator

86.10.08

Dismantle.

Disconnect the capacitor Lucas connector.

Remove the capacitor securing screw and remove the capacitor (1, Fig. 106).

Remove the two screws securing the cover and remove the cover (2, Fig. 106).

Remove the surge protection diode (3, Fig. 106). Note the arrangement of the regulator leads, disconnect the leads and remove the regulator (4, Fig. 106).

Remove the two screws securing the brush box assembly and remove the brush box (5, Fig. 106). Apply a hot iron to the stator lead terminal tags on the rectifier pack and prise out the stator leads when the solder melts.

Remove the remaining two screws securing the rectifier pack assembly (6, Fig. 106) and lift the pack from the slip-ring end bracket (8, Fig. 106). Remove the three through bolts (7, Fig. 106) and lift the slip-ring end bracket (8, Fig. 106) from the stator (9, Fig. 106) using a mallet if necessary.

Note the position of the stator leads relative to the alternator fixing lugs, and then lift the stator (9, Fig. 106) from the drive end bracket.

Remove the shaft nut, washer, pulley, cooling fan, woodruff key and spacers from the rotor shaft (10, Fig. 106).

Press the rotor shaft from the drive end bearing (11, Fig. 106).

To replace the slip-ring end bearing (13, Fig. 106) unsolder the outer and inner slip-rings (12, Fig. 106) then prise the slip-rings gently off the rotor shaft.

Using a suitable extractor withdraw the bearing from the rotor shaft.

NOTE: Care should be taken not to damage the insulation on the rotor leads when removing or refitting the slip-rings. Use a resin covered solder ensuring a build-up of solder does not occur on the upper face of the inner slip-ring.

Check all the components using normal procedures. Referring to the resistance values and brush lengths as detailed.

Re-assembly is the reversal of the dismantling procedure ensuring the brushes move freely in the brush box, also ensure the slip-rings are clean and smooth.

ELECTRICAL SYSTEM

KIEKERT CENTRAL LOCKING SYSTEM

Description 86.25.00

The central door locking system fitted FROM 1986 MY vehicles incorporates a control module fitted in the driver's door and lock operating motors in the passenger doors. The control module is connected to the driver's door lock mechanism by mechanical linkage and is activated by the locking flap or the door key. The passenger doors and the boot lid are fitted with the motors which are connected to the locking mechanism by mechanical linkage. The motors are activated by voltage signals from the control module to lock or unlock. The motor fitted to the boot lid will lock electrically, but is inhibited from unlocking by the mechanical linkage. The boot lid is unlocked by using the boot lock key.

All the doors can be locked or unlocked from the drivers door either by using the door key or by operating the door locking flap from the inside of the vehicle. The front passenger door can be unlocked and locked with the door key without any of the other locks operating.

The driver's door control module and the lock motors are mounted on brackets welded to door intrusion rails as is the lock solenoid. The boot lock motor is mounted on the lid inner panel adjacent to the lock mechanism.

DOOR LOCK CONTROL MODULE

Renew 86.25.03

Remove the door trim casing (Operation No. 76.74.01).

With the door glass in the fully closed position, remove the adhesive tape securing the control module harness to the door interior, and disconnect the control module block connector from the door harness.

Remove the two setscrews securing the control module assembly to the bracket on the intrusion member, release the locking link from the module and remove from the door.

Separate the control module from the mounting bracket by removing the two self tapping screws. To fit a new control module reverse operations 2 to 4. **Do not fully tighten the setscrews at this stage.**

DOOR LOCK CONTROL MODULE

Adjust 86.25.04

Remove the 'A' post lower trim panel, driver's side. (76.13.22).

Locate the door harness multiplug connector within the 'A' post with orange/red and orange/green leads. Disconnect the connector.

Connect a test lamp across the connector terminals on the door harness side.

Set the outer door lock to **full closed** position.

Set the door lock inner flap to **full locked** position.

Move the control module by hand fully towards the lock assembly, then carefully move the module slowly in the opposite direction until the test light flashes momentarily. The module should now be positioned correctly, tighten the setscrews.

To check the setting move the door lock inner flap slowly to the unlock position. If the setting is correct the lamp will flash momentarily just before the flap reaches full travel. When the flap is moved back towards the lock position, the lamp will flash again just before the flap reaches full travel.

Disconnect the test lamp and reconnect the harness block connector.

Operate the outer door handle to release the latch.

Close the door and recheck the operation of **all** doors using the key in the driver's door lock.

Refit trim panels to 'A' post and door.

CAUTION: Should it be necessary to connect an independent battery feed to the control module whilst in situ, the following connections must be **observed**:

Positive feed to purple wire.

Negative feed to black wire.

A wrong connection can destroy the control module and it is recommended that this operation is carried out with the unit removed from the vehicle.

FRONT PASSENGER DOOR LOCK MOTOR

86.25.46

REAR DOOR LOCK MOTOR

Renew 86.25.47

Remove door trim casing (76.74.01 Front Door) (76.34.04 Rear Door).

With the door glass in the fully closed position disconnect the door lock motor block connector from the door harness.

NOTE: It may be necessary to remove the plastic strap from around the harness for access.

Remove two setscrews securing the lock motor assembly to the mounting plate on the intrusion member, release the locking link from the motor and remove the motor assembly from the door. Separate the motor from its mounting bracket by removing two self tapping screws.

To fit a new motor unit, reverse operations 2 to 4. **Do not fully tighten the setscrews at this stage.**

FRONT PASSENGER DOOR LOCK MOTOR

Adjust 86.25.51

Set the door lock to the **full closed** position. Slide the lock motor assembly **towards** the door lockface to take up **all** free movement, tighten the setscrews.

Operate the exterior door handle, close door.

Check the setting by operating with the key from the driver's door.

REAR DOOR LOCK MOTOR

Adjust 86.25.52

Set the door outer lock to the **full closed** position.

Slide the lock motor assembly **away** from the door lockface to take up **all** free movement, tighten the setscrews.

Operate the exterior door handle, close door.

Check the setting by operating with the key from the driver's door.

BOOT LID LOCK MOTOR

Renew 86.25.49

Disconnect the lock motor block connector from the boot lid harness.

Remove the two setscrews securing the lock motor assembly to the boot lid inner panel.

Release the locking link from the motor and remove the motor assembly from the boot lid.

Separate the motor from its mounting bracket.

To fit a new boot lock, reverse operations 1 to 3.

Do not fully tighten the setscrews at this stage.

BOOT LID LOCK MOTOR

Adjust

86.25.53

Ensure that latch is in the unlocked position. Slide the motor assembly towards the latch to take up all free movement, tighten the setscrews. Close the boot lid and check the setting by locking with the key from the driver's door.

Fault Finding — All Locks Inoperative

Check the fuse, mounted above the passenger's side fuse box.
 Fuse intact — check battery supply to 'A' post block connector at purple wire.
 Feed established — check battery supply to control unit at the block connector inside the door (see caution).
 Feed established — reconnect the connector inside the door, connect a test lamp across the door harness connector located in the 'A' post as previously described, and operate the door lock. If the lamp does not light momentarily when operating the door lock, change the control unit.

Passenger Door Motor or Boot Motor Inoperative

Check the system with the test lamp connected across the cable harness block connectors. If the test lamp lights momentarily when operating the driver's door lock at a motor block connector, change the motor.

HIGH MOUNTED STOP LAMP BULB

Renew

86.41.02

Depress the two catches situated on the lower face of the cover (1, Fig. 107) and remove the cover (2, Fig. 107). Turn and twist the relevant bulb holder (3, Fig. 107) and pull the bulb to remove. Fit the replacement bulb and reverse the removal procedure to refit.

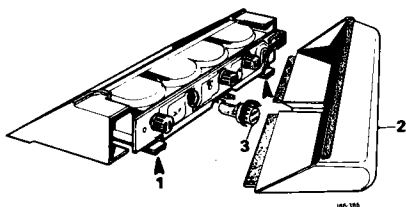


Fig. 107

HIGH MOUNTED STOP LAMP

Renew

86.41.01

Depress the two catches situated on the lower face of the cover (1, Fig. 108) and remove the cover (2, Fig. 108). Disconnect the harness (3, Fig. 108) from the lamp assembly and slide the holder assembly (4, Fig. 108) off the brackets attached to the rear screen. Reverse the removal procedure to refit the replacement lamp assembly.

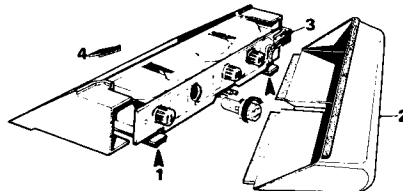


Fig. 108

DISTRIBUTOR BREATHER OUTLET TUBE

Renew

86.35.25

Remove the auxiliary air valve elbow, slide the clip (1, Fig. 109) up the tube (2, Fig. 109) situated on top of the distributor cap, pull the tube from the connector. Remove the plastic right angled adaptor from the tube. Fit the connector to the replacement tube, transfer the clip and feed back under the manifold, push the tube onto the connector on the distributor cap and secure with the clip. Push the plastic right angled adaptor back into the elbow and refit the auxiliary air valve elbow.

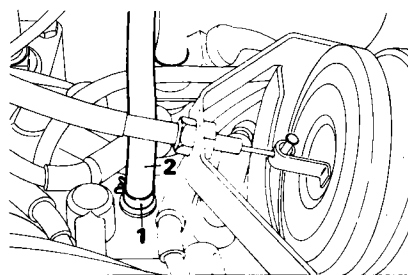


Fig. 109

DISTRIBUTOR CAP

Renew

86.35.11

Disconnect the king lead from the cap. Slacken the cruise control cable solderless nipple (1, Fig. 110), disconnect the inner cable (2, Fig. 110) from the actuator (3, Fig. 110) and collect the nipple. Remove the cruise control cable bracket securing bolts, compress the actuator bellows (4, Fig. 110), displace the bracket (5, Fig. 110) and place the assembly to one side.

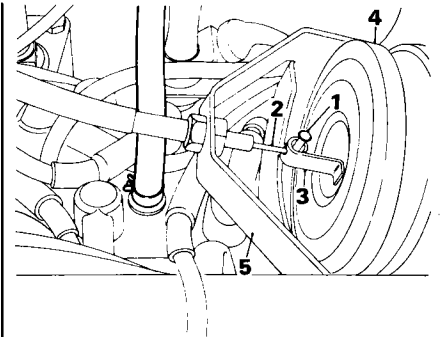


Fig. 110

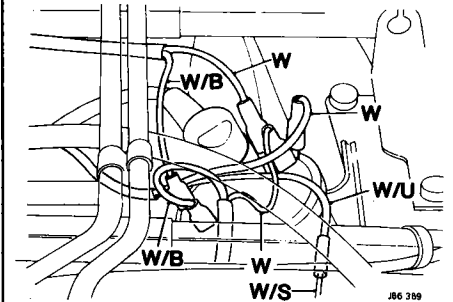


Fig. 111

Note the position of the high tension leads (Fig. 111) relative to the cap and disconnect. Slide the upper (outlet) breather tube securing clip back along the tube and remove the tube. Slacken the distributor cap securing screws and lift the cap for access to the clip securing the lower breather tube. Slide the clip back along the tube, remove the tube, lift off the cap and discard the gasket. Reverse the removal procedure ensuring that the replacement gasket is seated correctly.

IGNITION COIL

Renew

86.35.32

Disconnect the king lead from the cap. Note the position of the low tension leads relative to the ignition coil (Fig. 111). Remove the bolts securing the ignition coil to the pedestal and lift out the ignition coil assembly. Remove the nuts securing the male lucar terminals to the low tension connector posts (treble to positive post). Discard the ignition coil and king lead assembly. Place the insulation sleeve (1, Fig. 112) over the king lead mounting post (2, Fig. 112), fit the

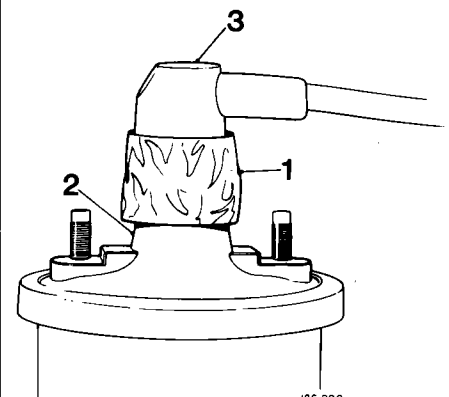


Fig. 112

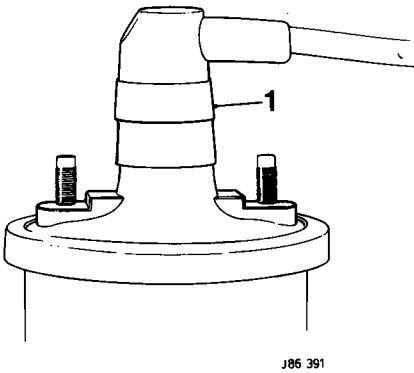


Fig. 113

replacement king lead (3, Fig. 112) to the ignition coil ensuring that the lead will face the front of the engine when the coil is fitted.

Place the sleeve over the king lead connecting plug and using an electrical heat gun apply heat to the sleeve until traces of the adhesive are visible at the top and bottom of the sleeve, when shrunk (1, Fig. 113) the lead should be securely attached to the ignition coil.

Reverse the remaining removal procedure to refit the ignition coil.

DISTRIBUTOR BREATHER FILTER

Renew **86.35.23**

Displace the ratchet strap (1, Fig. 114) away from the filter. Slide the pipe securing clip (1, Fig. 114) up the vacuum hose and pull the filter (3, Fig. 114) from the hose (4, Fig. 114).

Reverse the removal procedure to refit the replacement filter ensuring that the arrow on the filter faces towards the engine.

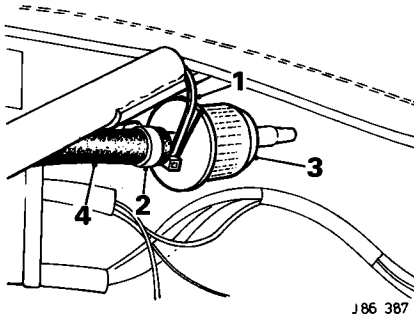


Fig. 114

DISTRIBUTOR BREATHER INLET TUBE

Renew **86.35.24**

Remove the distributor cap, displace the clip (1, Fig. 115) up the tube (2, Fig. 115) and remove the tube from the cap.

Cut the ratchet straps (3, Fig. 115), push the clip securing the filter up the tube and remove the filter (4, Fig. 115).

Transfer the clips to the replacement tube, fit the filter to the tube ensuring that the arrow is pointing towards the engine and secure with the clip.

Feed the tube back to the distributor cap, fit the tube to the cap and secure with the clip.

Refit the distributor cap and secure the tube to the wing tie bar ensuring that the tube is not compressed with the ratchet straps.

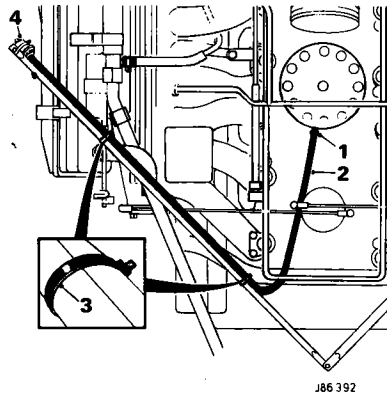


Fig. 115

ELECTRICAL SYSTEM

SPEED CONTYROL SYSTEM

Description 19.75.00

Throttle Actuator

A vacuum operated Throttle Actuator is located under the bonnet, directly in front of the distributor.

The unit contains a control solenoid valve, which controls the vacuum allowed in the unit, a dump solenoid valve, which seals the unit when the system is engaged, and a set of bellows held extended by an internal spring.

One end of the bellows is fixed to the unit body, containing the valves, whilst the other is connected to the accelerator pedal mechanism, via the actuator cable.

An electrical signal transmitted by the speed control unit, triggers the solenoids, and as manifold vacuum evacuates the unit it overcomes the spring pressure, and the bellows compress so opening the throttle.

Speed Control Unit

The Electronic Speed Control Unit is situated on the passenger side under scuttle area, adjacent to the blower motor.

The unit receives signals from the speed transducer and sends out signals to the actuator solenoids, altering the vacuum in the actuator unit to open or close the throttle as required.

The control unit is engaged and the memory recorded when the set button is pressed. After an override the memorised speed may be recalled by operation of the 'RESUME' switch. The memory is cancelled when the control switch is moved to 'OFF'.

When the brake pedal is touched the unit signals the throttle actuator to dump its vacuum, causing the throttle to close.

Adjustment of the 'Set Speed' is possible via an access hole in the speed control unit.

Speed Sensing

On early model vehicles a magnetic speed transducer is mounted to the rear suspension cradle, adjacent to the propshaft flange. The transducer transmits a signal to the control unit indicating the speed of the vehicle.

Two magnets mounted diametrically opposite each other on the differential/propshaft flange, generate a signal which is picked up by the

transducer and sent to the speed control unit. The air gap between the magnets and transducer should be $7 \text{ mm} \pm 1 \text{ mm}$ ($0.275 \pm 0.040 \text{ in}$).

On later models the speed signal is obtained from a speed transducer mounted in the transmission units which also provides the speed signal for the speedometer.

Master ON/OFF Resume Switch

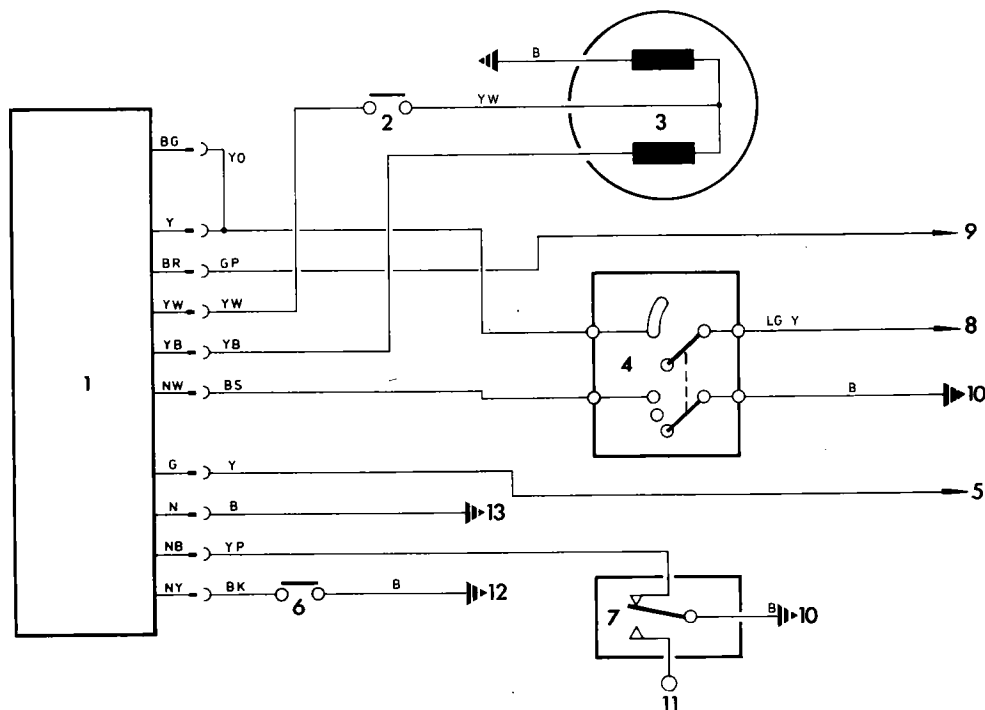
The Master switch is positioned at the rear of the gear selector cover. This switch has three positions, 'OFF', 'ON' and 'RESUME'.

The 'RESUME' mode is spring biased to the 'ON' position. The 'OFF' position ensures that the control unit is isolated from its supply voltage, and consequently cancels the control system memory.

Set Switch

The set switch is located in the end of the indicator stalk. The switch is used to trigger the speed control unit to bring the system into operation. A single push on the button will cause the vehicle to cruise within $\pm 1 \text{ mph}$ of the

SPEED CONTROL SYSTEM



KEY TO DIAGRAM

1. Speed control unit
2. Brake operated switch
3. Actuator
4. Control switch
5. Magnetic pickup
6. Set switch
7. Inhibit switch
8. Kick down solenoid
9. Kick down switch
10. Fuse
11. To stop/lamp switch
12. Hazard switch
13. To fuse

J86 137/1

Fig. 116

speed at which the set switch was pressed, if the button is constantly depressed the vehicle will accelerate until the button is released.

Inhibit Switch

The inhibit switch, comprising a cam and micro-switch, is mounted on the gear selector mechanism, and inhibits the cruise control from operating in any selector positioned other than 'D'

Brake Operated Switches

The existing brake light switch is utilised for cancelling the cruise mode when the brakes are applied. As an additional safety feature, a second brake pedal operated switch, which makes and breaks the direct feed signal from the control unit to actuator, is also fitted.

This second switch is mounted in tandem with the brake light switch, but operates fractionally later. When the switch is operated, the current to the actuator is cut.

This switch functions completely independently to the brake light cancellation or control unit commands.

STATIC TEST

These tests are carried out using the ECONOCRUISE Installation Tester (Fig. 117).

1. Disconnect the main harness multi-plug connector from the electronic speed control unit.
2. Connect the Test Unit leads to the control unit and main harness plug.
3. Switch on the ignition, move the gear selector to the 'D' position; position the master switch to 'ON' and the Test Unit to the 'STATIC' position.
Lamps 1, 2, 5, 7 and 9, should illuminate indicating correct continuity of the wiring.
4. To check the Neutral Gear position override, move the gear lever to 'N', lamp No. 8 should illuminate.
5. The set switch can be checked, by pressing it, lamp No. 3 should illuminate.
6. To check the 'RESUME' position of the main function switch, select 'RESUME' and lamp No. 4 should illuminate.
7. To check the Brakes Cancellation and Safety switches, press the brake pedal, lamps 1, 2 and 5, should extinguish and No. 6 illuminate. If both lamps 5 and 6 illuminate together, check for an open circuit in the Brake Light Switch/Brake Light Circuit. If this circuit is not continuous, then the speed control system will not function.

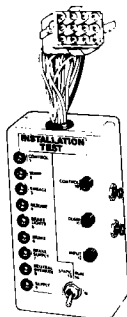


Fig. 117

Running Test

1. Switch the Test Unit to the 'RUN' position.
2. Start the engine, press and hold the dump and control buttons on the Test Unit, the engine revolutions should increase, release buttons. This test indicates that the actuator functions.
Engage gear and drive off. The lower indicator lamp, on the run side of the Test Unit, should flicker, indicating the presence of an impulse from the Transducer Unit, mounted at the propshaft.
3. At approximately 80 km/h, 50 m/h press 'Set' button and release, the middle lamp marked 'Dump', should illuminate and the top light marked 'Control', should flicker. Press brake and both lamps should go out.

Checking the Set Speed

This check is the main dynamic test which ensures that there is no surge or drop off of the set speed when the engage command is given. Before carrying out this test, ensure that:

- (i) The actuator cable is adjusted so that the free play at the actuator does not exceed 1 mm (0.040 in).
- (ii) The air gap at the speed transducer is 7 ± 1 mm (0.275 \pm 0.040 in).
- (iii) The inhibit switch only operates in the 'D' position.

To check the set speed, proceed as follows:

1. Switch system on.
2. Drive at approximately 80 km/h 50 mh on a quiet, flat road.
3. Engage the cruise control and remove foot from the accelerator pedal.
4. Record the speed at which the system is cruising.
5. Press and release the set button; allow the system to settle to the cruise speed again.
6. Note the new cruise speed. If the system is correctly set, then there should not be any increase or decrease in the noted cruising speed. If there is a change, then the Speed Control Unit will require adjustment.
7. Remove the rubber grommet from the side of the Control Unit and adjust the set speed potentiometer, with a suitable screwdriver, clockwise to increase or anti-clockwise to decrease the cruise speed.

Repeat the above procedure until the system is set correctly.

Fault Diagnosis

A. SYSTEM DOES NOT ENGAGE – at any speed above Low Speed Lock Out.

Causes:

1. Control unit malfunction.
2. Engage switch failure.
3. Inhibit switch failure.
4. Inhibit switch incorrectly adjusted.
5. Back-up switch failure.

6. Brake light switch, incorrectly adjusted, or failed. This switch must operate before the back-up switch.
7. Master switch malfunction.
8. Main fuse (No. 12) blown.
9. Stop lamp fuse (No. 12) blown.
10. Transducer air gap too large.
11. Transducer unit knocked out of alignment.
12. Loss of magnetic tab at transducer pick-up.
13. No vacuum supply to throttle actuator.

B. SYSTEM DOES NOT FUNCTION AT LOW SPEED

Causes:

1. Vehicle speed below low speed lock out. System not designed to function below 22 to 25 mph.
2. Loss of magnetic tab at transducer pick-up.

C. SYSTEM WILL NOT RESUME

Causes:

1. Speed control unit malfunction.
2. Low speed lock out speed too high – loss of magnetic tab at transducer pick-up (Vehicle also will not engage at low speeds).

D. SYSTEM HUNTS AT LOW SPEED

Causes:

1. Air gap transducer too large. Reset to 7 ± 1 mm (0.275 \pm 0.040 in).
2. Actuator cable too slack.
3. Control unit malfunction.

CONTENTS

Description	Operation	Operation No.	Page No.
Air conditioning 1981 6 cylinder	Circuit diagram	82 00 00	86A-08
Air conditioning 1981 12 cylinder	Circuit diagram	82 00 00	86A-16
Air conditioning 1983	Circuit diagram	82 00 00	86A-26
Air conditioning 1986	Circuit diagram	82 00 00	86A-35
Air conditioning 1988 (Mark 3)	Circuit diagram	82 00 00	86A-43
Auxiliary fuse box 1981 LH Stg 6 Cylinder		86 00 00	86A-07
Auxiliary fuse box 1981 LH Stg 12 Cylinder		86 00 00	86A-15
Auxiliary fuse box 1983 LH Stg		86 00 00	86A-14
Auxiliary fuse box 1986 LH Stg		86 00 00	86A-31
Auxiliary fuse box 1986 LH Stg		86 00 00	86A-39
Auxiliary fuse box 1981 RH Stg 6 Cylinder		86 00 00	86A-07
Auxiliary fuse box 1981 RH Stg 12 Cylinder		86 00 00	86A-15
Auxiliary fuse box 1983 RH Stg		86 00 00	86A-24
Auxiliary fuse box 1986 RH Stg		86 00 00	86A-31
Auxiliary fuse box 1986 RH Stg		86 00 00	86A-39
Bulb chart 1981 6 cylinder		86 00 00	86A-05
Bulb chart 1981 12 cylinder		86 00 00	86A-13
Bulb chart 1983		86 00 00	86A-21
Bulb chart 1986		86 00 00	86A-34
Bulb chart 1988		86 00 00	86A-42
Cable colour code		86 00 00	86A-05
Cable colour code		86 00 00	86A-13
Cable colour code		86 00 00	86A-21
Cable colour code		86 00 00	86A-31
Cable colour code		86 00 00	86A-39
Fuel injection 1981 6 cylinder	Circuit diagram	86 00 00	86A-09
Fuel injection 1981 12 cylinder	Circuit diagram	86 00 00	86A-17
Fuel injection 1983 6 cylinder	Circuit diagram	86 00 00	86A-27
Fuel injection 1983 12 cylinder	Circuit diagram	86 00 00	86A-27
Fuel injection 1986 12 cylinder	Circuit diagram	86 00 00	86A-35
Fuel injection 1988 12 cylinder	Circuit diagram	86 00 00	86A-43
Headlamp fuse box 1981 6 cylinder		86 00 00	86A-07
Headlamp fuse box 1981 12 cylinder		86 00 00	86A-15
Headlamp fuse box 1983		86 00 00	86A-22
Headlamp fuse box 1986		86 00 00	86A-33
Headlamp fuse box 1988		86 00 00	86A-41
Ignition & fuel system 1981 3.4	Circuit diagram	86 00 00	86A-08
Ignition & fuel system 1983 3.4	Circuit diagram	86 00 00	86A-26
Ignition system 1981 4.2	Circuit diagram	86 00 00	86A-08
Ignition system 1983 4.2	Circuit diagram	86 00 00	86A-25
Ignition system 1983 5.3	Circuit diagram	86 00 00	86A-25
In-line fuses 1983		86 00 00	86A-22
In-line fuses 1986		86 00 00	86A-33
In-line fuses 1988		86 00 00	86A-41
In-line fuses 1990		86 00 00	86A-42
Key to diagrams 6 cylinder 1981		86 00 00	86A-04
Key to diagrams 12 cylinder 1981		86 00 00	86A-12
Key to diagrams 1983		86 00 00	86A-20
Key to diagrams 1986		86 00 00	86A-30
Key to diagrams 1988		86 00 00	86A-38
Kick down inhibit/speed control	Circuit diagram	86 00 00	86A-16
Main fuse box LH steering 1981 6 cylinder		86 00 00	86A-06
Main fuse box LH steering 1981 12 cylinder		86 00 00	86A-14
Main fuse box LH steering 1983		86 00 00	86A-23
Main fuse box LH steering 1986		86 00 00	86A-32
Main fuse box LH steering 1988		86 00 00	86A-40
Main fuse box RH steering 1981 6 cylinder		86 00 00	86A-08
Main fuse box RH steering 1981 12 cylinder		86 00 00	86A-14
Main fuse box RH steering 1983		86 00 00	86A-23
Main fuse box RH steering 1986		86 00 00	86A-32
Main fuse box RH steering 1988		86 00 00	86A-40
Symbols used 1981 6 cylinder		86 00 00	86A-05
Symbols used 1981 12 cylinder		86 00 00	86A-13
Symbols used 1983		86 00 00	86A-21
Symbols used 1986		86 00 00	86A-20
Symbols used 1988		86 00 00	86A-39
Vacuum delay timers 1983	Circuit diagram	86 00 00	86A-25
Vacuum delay timers 1986	Circuit diagram	86 00 00	86A-33
Vacuum delay timers 1988	Circuit diagram	86 00 00	86A-41

KEY TO WIRING DIAGRAMS 1981-83 6 Cylinder

Grid ref.	Circuit Number	Grid ref.	Circuit Number	Grid ref.	Circuit Number
1	Alternator	H1	24	Ignitionator	31
2	Battery	B2	0	Map light switch	31
3	Starter solenoid	D2	102	Map light	31
4	Starter motor	A1	103	Headlamp beam L	32
5	Motor lighting switch	A1	104	Headlamp beam R	32
6	Headlamp high switch	A2	5	Rear window defog switch	32
7	Headlamp beam R/L	A2	105	Rear window demister unit	32
8	Headlamp beam L/R	A2	106	Rear window demister switch	32
9	Main beam warning light	A2	46	Exhaust emission monitor	31
10	R-H Side lamp	A2	47	Oil pressure transmitter	31
11	L Side lamp	A2	10	Rear window demister warning light	32
12	Fan relay	B1	52	Bladed warning light	A3
13	Fan relay resistor	B1	103	Bladed warning switch	A3
14	Fan relay	B1	104	Bladed warning flasher unit	A3
15	Number plate illumination lampset	A2	56	Brake fluid level warning light	31
16	Stop lamp	A3	100	Brake differential pressure switch	31
17	R-L lamp H	A2	101	Relay motor	31
18	Stop lamp switch	A3	65	Handbrake switch	A3
19	Fuse block	C1	108	Handbrake warning light	31
20	Interior light	C1	109	Anti-lovers H-L front	A3
21	Door switch	C1	110	Sideline as L-H front	A3
22	Tail lamp L	A2	72	Sideline as R-H rear	A3
23	Trunk	B2	75	Anti-lovers L-L rear	A3
24	Door push	B2	74	Radio antenna coil	C3
25	Flasher unit (part of 56)	A3	77	Radio cooling fan relay	C3
26	Direction indicator switch	A3	78	Radio cooling fan motor	C3
27	Direction indicator warning light	A3	102	Brake fluid level switch	31
28	L-L front flasher	A3	78	Ignition inhibitor	A1
29	R-H rear flasher	A3	65	Relay motor	31
30	L-L rear flasher	A3			
31	Blower motor	C2			
32	Fuel gauge	B1			
33	Fuel gauge tank unit	B1			
34	Windscreen wiper switch	B2			
35	Windscreen wiper motor	D2			
36	Ignition coil switch	A1			
37	Ignition coil	A1			
38	Key switch (part of 30)	A1			
39	Ignition coil	A1			
40	Fuel pump	A1			
41	Fuel pump	A1			
42	Oil pressure switch	B2			
43	DIP (oil) warning light	B2			
44	Ignition warning light	A1			
45	Coolant temperature gauge	B1			
46	Water temperature transmitter	B1			
47	DIP (water) gauge	B1			
48	Reverse lamp switch	A3			
49	Reverse lamp	A3			
50	Reverse lamp	A3			
51	Fog lamp R/L	A2			
52	Fog lamp L/L	A2			
53	Lock	C1			
54	Open lighter socket	C1			
55	Interior light switch	C1			
56	Door	C1			
57	Door relay	B2			
58	Boot light switch	C1			
59	Boot light	C1			
60	Lock	C1			
61	Automatic release safety switch	A1			
62	Automatic gearbox selector lamp	B1			
63	Windscreen washer pump	B2			
64	Windscreen washer switch	B2			
65	Charging and inspection lamp socket	C2			
66	Charging and inspection lamp	C2			
67	Door lock switch	B2			
68	Amplifier	B2			
69	Service	B2			
70	Vacuum valve	B2			
71	In-car sensor	C1			
72	Antenna sensor	C1			
73	Passenger air sensor	A2			
74	Service indicator counter	A2			
75	Oxygen sensor warning light	A2			
76	Fog guard warning lamp	A2			
77	Fog guard lamp	A2			
78	Exhaust indicator parking brake	A3			
79	Seat belt lock control unit (SBCU)	C1			
80	Fuel injector	B1			
81	Fuel injector	B1			
82	Air temperature sensor	B1			
83	Throttle position switch	B1			
84	Cold start relay	B1			
85	Cold start injector	B1			
86	Seat belt failure sensor	B1			
87	Low current control unit	B1			
88	Park lamp failure sensor	B2			
89	Exhaust temperature sensor	B1			
90	Low current sensor	B1			
91	Throttle switch	B1			
92	Air flow motor	B1			
93	Main relay	B1			
94	Power reserve	B1			
95	Fuel pump relay	B1			
96	Rocking frame — interior contact plate	B1			
97	Oxygen sensor	B1			
98	Exhaust valve	B1			
99	Low current warning light	B1			
100	Ignition lock warning light	B1			
101	Ignition lock	B1			
102	Full throttle switch	B1			
103	Temperature sensor	B1			
104	Time Relay wiper	B1			
105	Seat adjuster motor	B1			
106	Seat adjuster switch	B1			
107	Sliding roof switch	B1			
108	Sliding roof motor	B1			
109	Blind door motor	B1			
110	Blind door relay	B1			
111	Aerial adjusting switch	B1			
112	Headlamp wiper relay	B1			
113	Headlamp wiper motor	B1			
114	Boot lock solenoid	B1			
115	Speed control unit	B1			
116	Magneto coil	B1			
117	Ignition coil	B1			
118	Relay motor	B1			
119	Switch control unit	B1			
120	Ignition	B1			
121	Throttle motor switch	B1			
122	Temperature switch	B1			
123	Throttle motor	B1			
124	Speed control motor	B1			


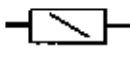


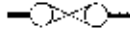


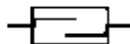


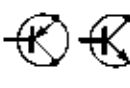




Grid ref.	Circuit Number	Grid ref.	Circuit Number	Grid ref.	Circuit Number
186	Anti-lamp relay	C1	283	Door lock switch	B2
187	Relay	C1	284	Amplifier	B2
188	Blower speed relay	C2	285	Service	B2
189	Compressor clutch	C2	286	Vacuum valve	B2
190	Thermistor	C2	287	In-car sensor	C1
191	Control switch	C2	288	Antenna sensor	C1
192	Control switch	C2	289	Passenger air sensor	A2
193	Starter solenoid (battery coil) relay	A	290	Service indicator counter	A2
194	Anti-lamp solenoid valve	B4	291	Oxygen sensor warning light	A2
195	Anti-lamp solenoid valve switch only	B4	292	Fog guard warning lamp	A2
196	Seat belt switch — driver	C1	293	Fog guard lamp	A2
197	Seat belt switch — passenger	C1	294	Exhaust indicator parking brake	A3
198	Seat switch — passenger	C1	295	Seat belt lock control unit (SBCU)	C1
199	Seat belt warning light	C1	296	Fuel injector	B1
200	Ignition protection relay	A1	297	Fuel injector	B1
201	Fuel solenoid valve	H	298	Air temperature sensor	B1
202	Battery cooling fan	B2	299	Throttle position switch	B1
203	Battery cooling fan resistor	B2	300	Cold start relay	B1
204	Ignition lamp illuminator	B1	301	Cold start injector	B1
205	Headlamp dip beam R-H and L-H	A2	302	Seat belt failure sensor	B1
206	Window lift master switch	B2	303	Low current control unit	B1
207	Window lift switch — H front	B2	304	Park lamp failure sensor	B2
208	Window lift switch — H rear	B2	305	Exhaust temperature sensor	B1
209	Window lift switch — R-H rear	B2	306	Low current sensor	B1
210	Window lift switch — L-H rear	B2	307	Throttle switch	B1
211	Window lift motor	B2	308	Air flow motor	B1
212	Window lift relay	B2	309	Main relay	B1
213	Headlamp relay	A2	310	Power reserve	B1
214	Thema switch	B1	311	Fuel pump relay	B1
215	Fuse operation illumination bulb	B1	312	Rocking frame — interior contact plate	B1
216	Door lock solenoid	B2			
217	Door lock solenoid relay	B2			
218	Throttle motor	B1			
219	Speed control motor	B1			

CABLE COLOUR CODE

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

N. Brown	—	Positive Cable
B. Black	—	Negative Cable
W. White		
K. Pink		Ignition switch controlled
G. Green		
R. Red	Y. Yellow	O. Orange
	S. Slate	L. Light
		P. Purple

SYMBOLS USED

	Motor		Solenoid		Diode
	Alternative Circuit		Fuse		Zener Diode
	Wire Splice		Thrust Switch		Lamp
	Earth Connection		Transistor		Aerial
	Resistor		Cable Connector		
	Potentiometer				

BULB CHART

	WATTS	LUCAS PART NO.	UNIPART NO.	NOTES
Headlamps —				
L.H. Traffic Markers				
Tungsten — Outer	60/45	64629/39	GL J 136	XJ3.4 Ste only. Sealed beam light unit
Inner	50	64629/40	GL J 134	XJ3.4 Ste only. Sealed beam light unit
— Halogen				
Outer	90/55	472	GLB 472	H4 base
Inner	55	448	GL B 448	H4 base
R.H. Traffic Markers				
Normal Halogen — Outer	60/55	472	GLB 472	H4 base
Inner	55	448	GL B 448	H4 base
France — Halogen				
Outer	60/55	475	GL B 475	Yellow bulb. The 40 watt filament is not used
Inner	45/40	411	GLB 411	Sealed beam light unit
USA Tungsten — Outer	37.5/30			Sealed beam light unit
Inner	50			Not USA Headlamp part
Front Parking Lamp	4	252	GLB 233	Not USA
Front Hub Lamp	21	382	GLB 382	USA only
Front Parking and Flasher Lamp	5/2	380	GL B 380	H2 base
Front Fog Lamp — Blue	55		GLB 212	Not USA
Flasher Revolver	4	233	GL B 233	USA only
Front Marker Lamp	4	213	GL B 232	USA only
Rear Marker Lamp	4	213	GLB 989	
Rear Door Guard Lamp	5	980	GL B 987	
Stop Lamp	21	382	GL B 207	
Tail Lamp	6	207	GLB 382	
Rear Fog Lamp	21	382	GL B 382	
Reversal Lamp	21	382	GL B 382	
Gate Illumination Lamp	4	233	GL B 233	
Rear Fog Lamp	21	382	GLB 382	Not USA
Instrument Illumination	2.2	987	GL B 987	
Warning Light — Cluster	1.2	216	GL B 288	
— L.H. Turn Signal	3	504	GLB 504	
Heater Backlight	2.8	660	GL B 660	24 volt bulb
— Bulb Failure	2.2	987	GL B 987	
— R.H. Turn Signal	3	504	GLB 504	
Rectangular Lamp	2	261	GLB 261	Special markets only
Map Lamp	6	254	GL B 254	
Clock Illumination	2.2	987	GLB 987	
Switch Panel Illumination	1.2		GLB 284	
Automatic Selector Illumination	2.2	987	GL B 987	
Cigarette Lighter Illumination	2		GL B 288	
Fibre Optic Lamp	6	254	GLB 254	
Interior Lamp	5	989	GL B 989	
Reversing Lamp	4	233	GL B 232	
Luggage Boot Lamp	5	239	GLB 239	

ELECTRICAL CIRCUITS/HARNESSES**MAIN FUSE BOX L.H. Stg.**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	FOG LAMPS	20A	GFS 420
2	HAZARD WARNING, SEAT BELT LOGIC UNIT	15A	GFS 415
3	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 415
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	WINDSCREEN WIPERS	35A	GFS 435
7			—
8	PANEL ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	BATTERY COOLING FAN, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN, RELAY WINDINGS, WINDSCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICA ONLY)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

MAIN FUSE BOX R.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	ANTI-RUN-ON VALVE (3.4 CARS ONLY)	10A	GFS 410
2	HAZARD WARNING	15A	GFS 415
3	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	AIR CONDITIONING RELAY AND CLUTCH	15A	GFS 415
7	WINDSCREEN WIPERS	35A	GFS 435
8	PANEL ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	BATTERY COOLING FAN, HORN RELAY WINDING, RADIATOR AUXILIARY FAN RELAY, SCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICA ONLY)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

AUXILIARY FUSE BOX R.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 415
14	DOOR LOCK RELAY ELECTRIC DOOR MIRROR DOOR LAMPS	5A	GFS 45
15	FOG LAMPS	20A	GFS 420
16	—	—	—
17	FRONT PARKING LAMPS	3A	GFS 43

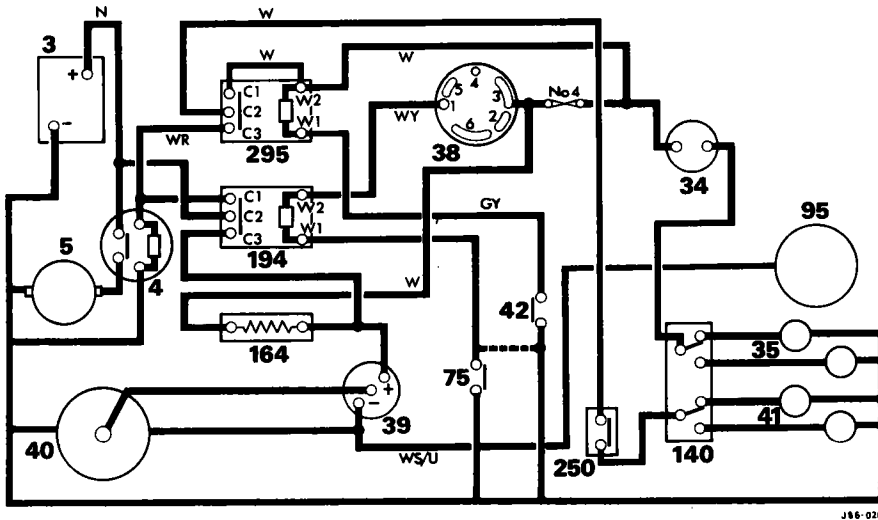
AUXILIARY FUSE BOX L.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	AIR CONDITIONING, RELAY AND CLUTCH	15A	GFS 415
14	FRONT PARKING LAMPS	3A	
15	FRONT PARKING LAMPS	10A	GFS 410
16	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
17	DOOR LOCK RELAY, ELECTRIC DOOR MIRRORS, DOOR LIGHTS	3A	

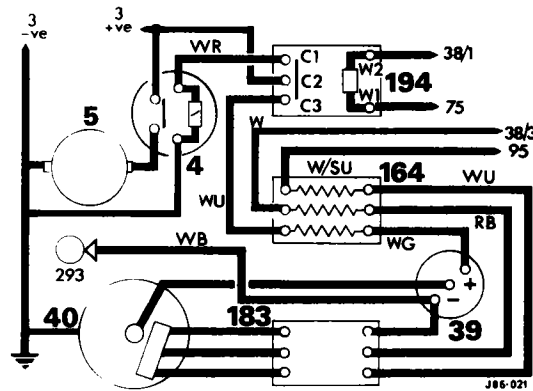
HEADLAMP FUSE BOX

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	RADIATOR, COOLING FAN — WHERE FITTED	8/15A	GFS 415
2	RH DIP	10/20A	GFS 420
3	RH MAIN	17/35A	GFS 435
4	LH MAIN	10/20A	GFS 420
5	LH MAIN	17/35A	GFS 435

ELECTRICAL CIRCUITS/HARNESSES

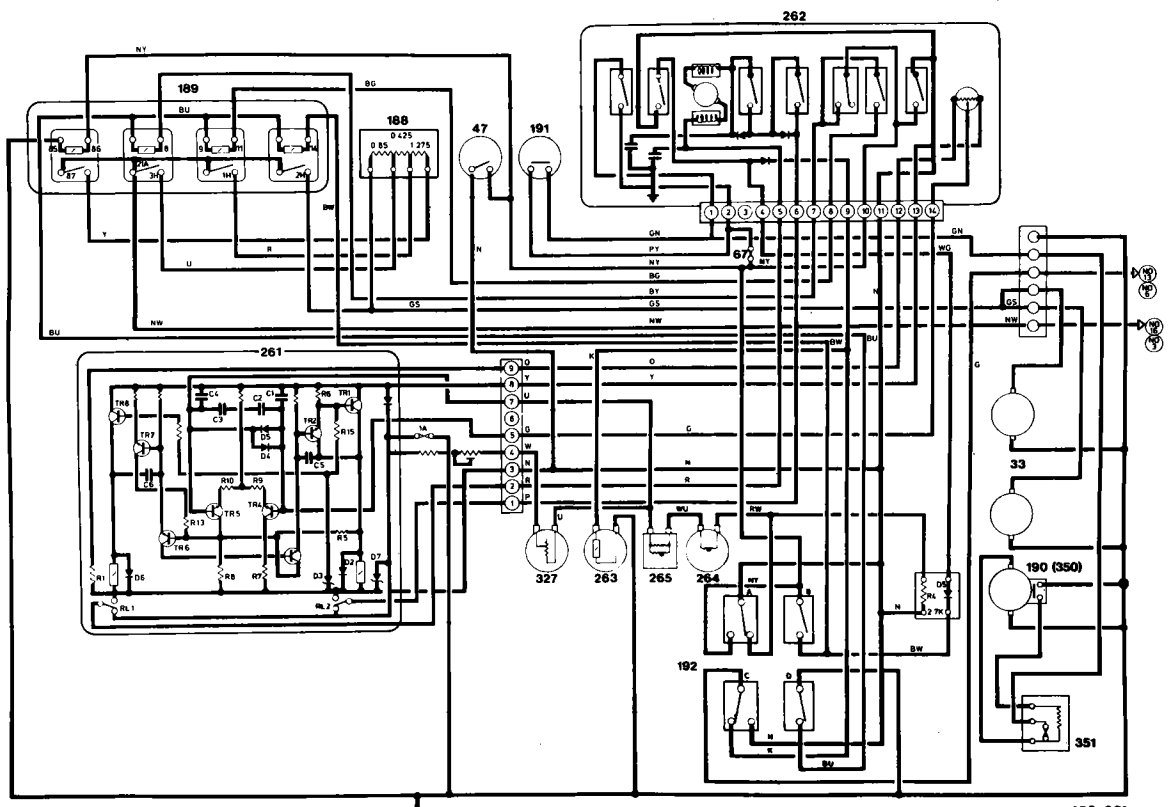


**IGN SYSTEM
(Early Models)**



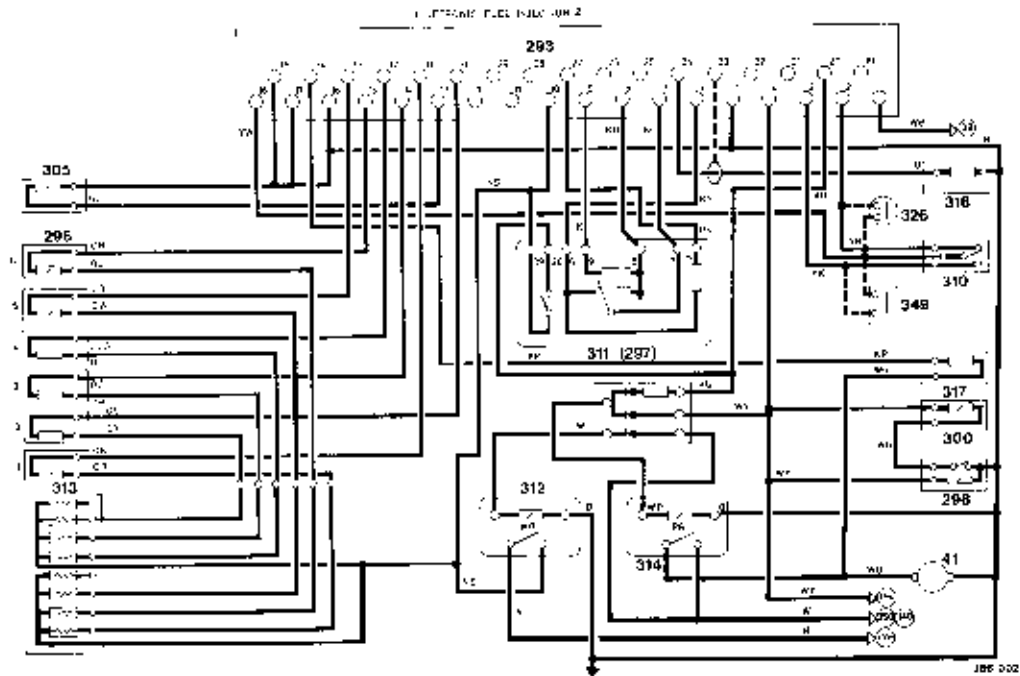
3.4 IGN & FUEL SYSTEM

AIR CONDITIONING

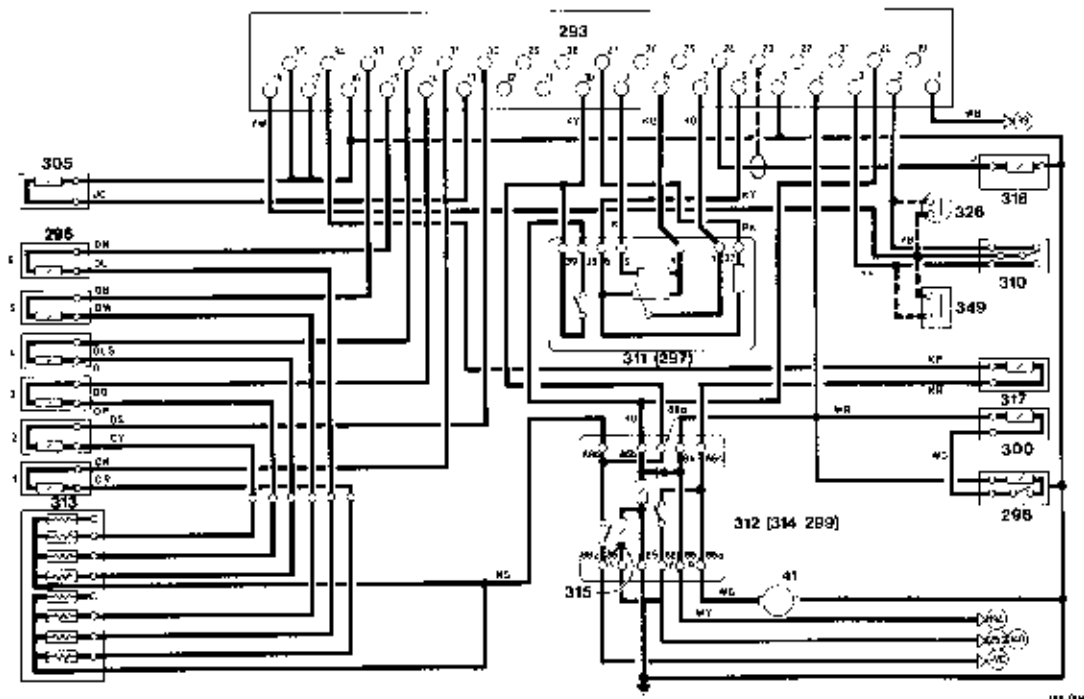


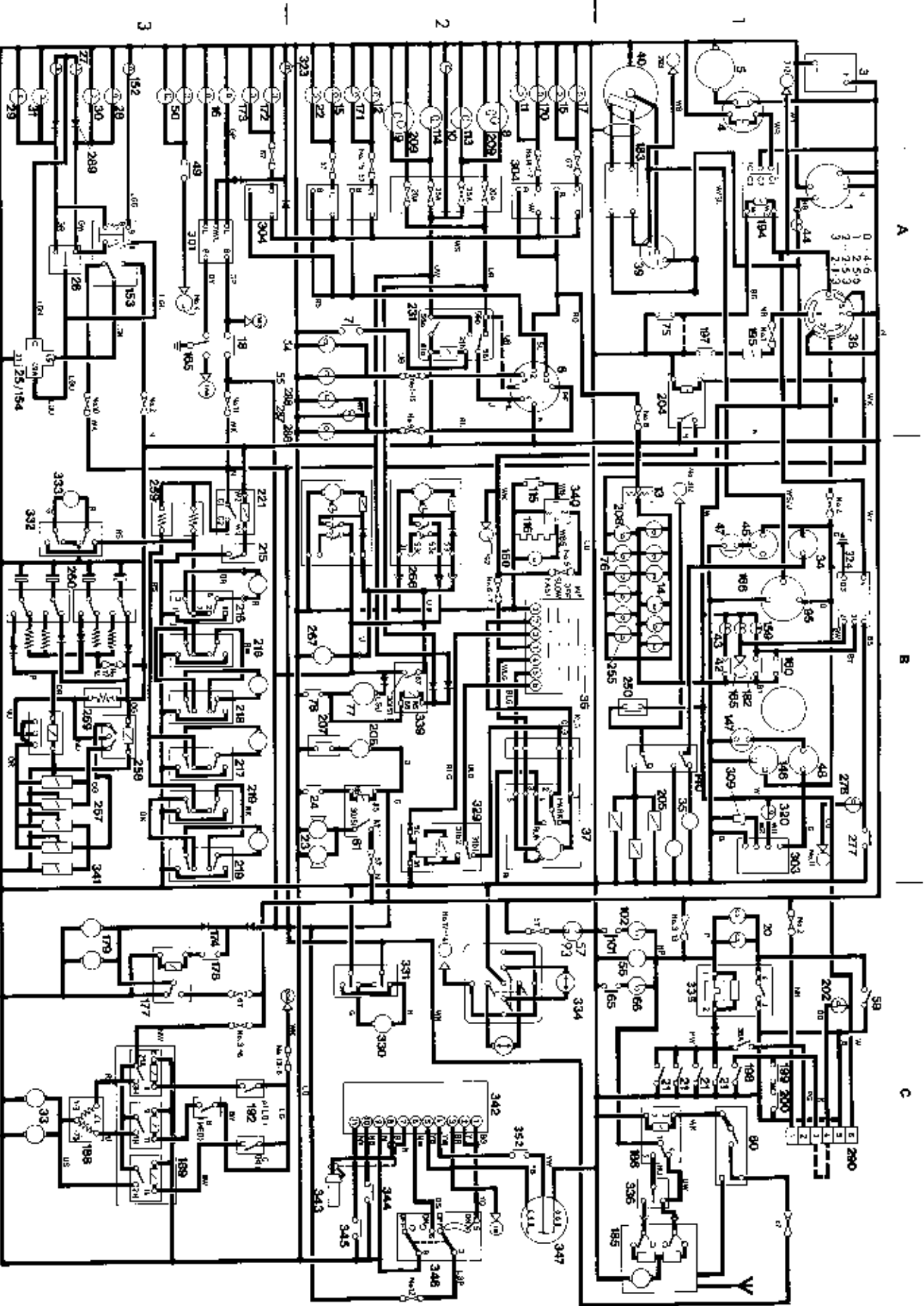
186 001

FUEL INJECTION



FUEL INJECTION (EARLY MODELS)





186 022

1961 - 63 6 CYLINDER MODELS

KEY TO WIRING DIAGRAMS 1981 - 83 12 Cylinder

	Grid ref.	Circuit Number		Grid ref.	Circuit Number		Grid ref.	Circuit Number
1 Alternator	A1		35 Fuel gauge tank unit	B1		95 Tachometer	B1	
2 Battery	A1		36 Windscreen wiper switch	B2		101 Miso light switch	C1	
3 Starter solenoid	A1		37 Windscreen wiper motor	B2		102 Map light	C1	
4 Starter motor	A1		38 Ignition/starter switch	A1		113 Headlamp inner L.H.	A2	
5 Master flashing switch	A1		38A Key switch (part of 38)	A1		114 Headlamp inner R.H.	A2	
6 Headlamp flash switch	A2		39 Ignition coil	A1		115 Rear window demist switch	B2	
7 Headlamp beam R.L.	A2		40 Distributor	A1	2 & 4	116 Rear window demist unit	B1	
8 Headlamp beam L.H.	A2		41 Fuel pump	—		140 Fuel chargeover switch	B1	
9 Headlamp beam L.H.	A2		42 Oil pressure switch	B2		146 Battery condition indicator	B1	
10 Main beam warning light	A2		43 Oil pressure warning light	B2		147 Oil pressure transmitter	B1	
11 R.H. side lamp	A2		44 Ignition warning light	A1		150 Rear window demister/warning light	B2	
12 L.H. side lamp	B1		45 Coolant temperature gauge	B1		152 Hazard warning light	A2	
13 Panel lamp rheostat	B1		47 Water temperature transmitter	B1		153 Hazard warning switch	A2	
14 Panel lamps	B1		48 Oil pressure gauge	B1		154 Hazard warning flasher unit	A2	
15 Number plate illumination lamp(s)	A2		49 Reverse lamp switch	A2		158 Brake fluid level warning light	B1	
16 Side lamp (L)	A2		50 Reverse lamp(s)	A2		160 Brake differential pressure switch	B1	
17 Tail lamp R.L.	A2		51 Reverse lamp(s)	A2		164 Ballast resistor	A1	
18 Tail lamp switch	A2		52 Fog lamp R.H.	A2		165 Handbrake switch	A2	
19 Fuse box(es) (not shown)	A2		53 Fog lamp L.H.	A2		166 Handbrake warning light	A2	
20 Interior light(s)	C1		56 Clock	C1		170 Side marker R.H. front	A2	
21 Door switch	C1		57 Cigar lighter socket	C1		171 Side marker L.H. front	A2	
22 Tail lamp L.H.	A2		58 Interior light switch	C1		172 Side marker R.H. rear	A2	
23 Horn	B2		60 Radio	C1		173 Side marker L.H. rear	A2	
24 Horn push	B2		61 Horn relay	B2		174 Resistor cooling fan (diode/diode)	C2	
25 Flasher unit (part of 164)	A2		62 Horn light switch	C1		177 Resistor cooling fan relay	C2	
26 Direction indicator switch	A2		65 Boot light	C1		178 Resistor cooling fan motor (in pump)	C2	
27 Direction indicator warning light	A2		67 Line fuse	—		179 Resistor cooling fan motor	C2	
28 R.L. front flasher	A2		71 Automatic gearbox safety switch	A1		180 Kickdown switch	B2	
29 L.H. front flasher	A2		76 Automatic gearbox selector lamp	B1		161 Kickdown solenoid	B2	
30 R.H. rear flasher	A2		77 Windscreen washer pump	B2		162 Brake fluid level switch	B1	
31 L.H. rear flasher	A2		79 Windscreen washer switch	B2				
32 Blower motor	C3		33 Charging and regulation lamp socket	C2				
34 Fuel gauge	B1							

	Grid ref.	Circuit Number		Grid ref.	Circuit Number		Grid ref.	Circuit Number
165 Ignition amplifier	A1		260 Door lock switch	B3		316 Oxygen sensor		4
166 Aerial motor	C1		261 Amplifier		3	318 Manifold pressure sensor		2
166 Aerial motor relay	C1		262 Servo		3	323 Low coolant warning light	B1	
169 Resistor	C2		263 Vacuum valve		3	323 Lamp relay/warning light	A2	
169 Resistor	C2		264 In car sensor		3	324 Inverter	B1	
169 Blower speed relay	C3		265 Ambient sensor		2	325 Full throttle switch		4
190 Compressor clutch		3	266 Headlamp wiper motor	B2		327 Temperature selector		3
191 Thermostat		3	267 Headlamp wash motor	B2		328 Timer Relay—wipers		
192 Control switch		3	267 Headlamp wash motor	B2		330 Seat adjuster motor	B2	
194 Starter solenoid/belted car relay	A1		267 Fog guard warning light	A2		331 Seat adjuster switch	B2	
198 Seat belt switch—driver	C1		268 Fog guard lamp	A2		332 Sliding roof motor	B2	
199 Seat belt switch—passenger	C1	Non Fed	269 Direction indicator blocking diode	A2		333 Sliding roof motor	B2	
200 Seat switch—passenger	C1		290 Seat belt logic unit (Federal)	C1		334 Electric door mirror	B2	
202 Seat belt warning light	C1		291 ABS control unit		2	335 Interior lamp delay	C1	
204 Ignition protection relay	A1		292 Fuel injection amplifier		2	336 Aerial adjusting switch	C1	
205 Fuel solenoid valve	B1		293 Fuel injection control unit (ECU)		2 & 4	337 Headlamp wiper relay	B2	
206 Battery cooling fan	B2		296 Fuel injectors		2 & 4	340 Heated back light delay	B2	
207 Battery cooling fan thermostat	B2		297 Air temperature sensor		2 & 4	341 Boot lock solenoid	B2	
208 Cigar lighter illumination	B1		298 Thermostatic switch		2 & 4	342 Speed control unit	B2	
209 Headlamp dip beam R.H. & L.H.	A2		299 Cold start relay		2 & 4	343 Magnet pick up	B2	
215 Window lift master switch	B3		300 Cold start injector		2 & 4	344 Inhibit switch 1989-2000	B2	
216 Window lift switch R.H. front	B3		301 Stop lamp failure sensor	A2		345 Sier switch	B2	
217 Window lift switch L.H. front	B3		303 Low coolant control unit	B1		346 Switch control unit	B2	
218 Window lift switch R.H. rear	B2		304 Park lamp failure sensor	A2		347 Actuator	B2	
219 Window lift switch L.H. rear	B2		305 Coolant temperature sensor		2 & 4	348 Throttle mirror switch	B2	
220 Window lift motor(s)	B2		306 Trigger unit		2	350 Over-temperature switch	B2	
221 Window lift relay	B3		307 EGR valve		2	351 Thermal fuse	B2	
221 Headlamp relay	A2		308 EGR thermo switch		2	352 Speed control brake switch	B2	
240 Inertia switch	B1		309 Low coolant sensor	B1		353 Feedback monitor socket	C2	
255 In-beam optics illumination bulb	B1		310 Throttle switch		2 & 4	354 Feedback disable socket	C2	
257 Door lock solenoid	B3		312 Main relay		2 & 4	355 Feedback relay	C2	
259 Door lock solenoid relay	B3		313 Power resistor		4	356 Kickdown/Speed control inhibit switch	C2	
268 Thermal circuit breaker	B3		314 Fuel pump relay		2 & 4			
			315 Rectifying diode (part of 312)		2 & 4			

CABLE COLOUR CODE

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

N. Brown — Positive Cable
B. Black — Negative Cable

W. White

K. Pink Ignition switch controlled

G. Green

R. Red

Y. Yellow

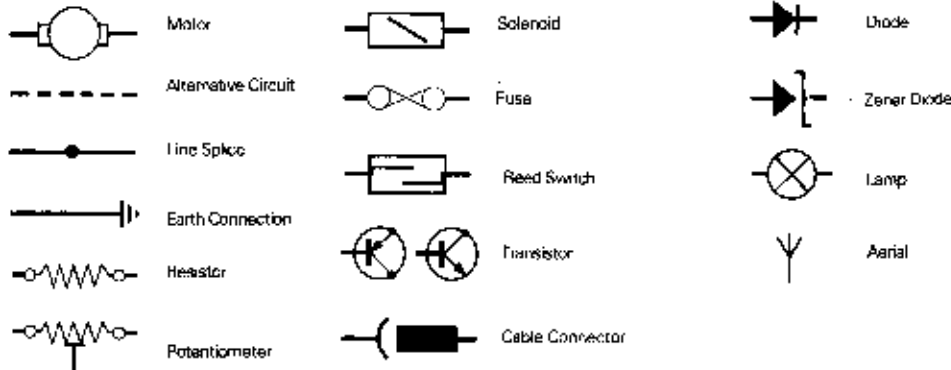
O. Orange

S. Slate

L. Light

P. Purple

SYMBOLS USED



BULB CHART

	WATTS	LUCAS PART NO.	UNIPART NO.	NOTES
Headlamps —				
L.H. Traffic Markers —				
— Tungsten — Outer	80/45	54529/39	GLU 136	XJ 3.4 Std only. Sealed beam light unit
— Inner	50	54629/40	GLU 134	XJ 3.4 Std only. Sealed beam light unit
— Halogen — Outer	60/55	472	GI B 472	H4 base
— Inner	55	448	GLB 448	H1 base
R.H. Traffic Markers —				
Normal — Halogen — Outer	60/55	472	GI B 472	H4 base
— Inner	55	448	GLB 448	H1 base
France — Halogen — Outer	60/55	476	GLB 476	Yellow bulb H4 base
— Inner	45/40	411	GI B 411	Yellow bulb. The 40 watt filament is not used
USA — Tungsten — Outer	37.5/60			Sealed beam light unit
— Inner	50			Sealed beam light unit
Front Parking Lamp	4	233	GLB 233	Not USA Headlamp pilot
Front Flasher Lamp	21	382	GLB 382	Not USA
Front Parking and Flasher Lamp	5/21	380	GLB 380	USA only
Front Fog Lamp — Cable	55		GLB 212	H2 base
Flasher Repeater	4	233	GI B 233	Not USA
Front Marker Lamp	4	233	GLB 233	USA only
Rear Marker Lamp	4	233	GLB 233	USA only
Rear Door Guard Lamp	5	989	GLB 989	
Stop Lamp	21	382	GLB 382	
Tail Lamp	5	207	GLB 207	
Rear Flasher Lamp	21	382	GLB 382	
Reverse Lamp	21	382	GLB 382	
Plate Illumination Lamp	4	233	GLB 233	
Rear Fog Lamp	21	382	GLB 382	Not USA
Instrument Illumination	2.2	887	GLB 887	
Warning Light — Cluster	1.2	286	GLB 286	
— LH Turn Signal	3	504	GLB 504	
— Heated Becklight	2.8	850	GLB 850	24 volt bulb
— Bulb Failure	2.2	987	GLB 987	
— RH Turn Signal	3	504	GLB 504	
— Rectangular Unit	2	281	GLB 281	Special markets only
Map Lamp	6	254	GLB 254	
Clock Illumination	2.2	987	GI B 987	
Switch Panel Illumination	1.2	—	GLB 284	
Automatic Selector Illumination	2.2	987	GLB 987	
Cigarette Lighter Illumination	2	—	GI B 288	
Fibre Optic Lamp	6	254	GLB 254	
Interior Lamp	5	989	GLB 989	
Reading Lamp	4	233	GLB 233	
Luggage Boot Lamp	5	239	GLB 239	

ELECTRICAL CIRCUITS/HARNESSES**MAIN FUSE BOX L.H. Stg.**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	JNIPART NUMBER
1	ANTI RUN ON VALVE 3.4 CARS ONLY	10A	GFS 410
2	HAZARD WARNING	15A	GFS 415
3	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	AIR CONDITIONING RELAY AND CLUTCH	15A	GFS 415
7	WINDSCREEN WIPERS	35A	GFS 435
8	PANEL ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	BATTERY COOLING FAN, HORN RELAY WINDING, RADIATOR AUXILIARY, FAN RELAY, SCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICA ONLY)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

MAIN FUSE BOX R.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	JNIPART NUMBER
1	FOG LAMPS	20A	GFS 420
2	HAZARD WARNING, SEAT BELT LOGIC UNIT	15A	GFS 415
3	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 415
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	WINDSCREEN WIPERS	35A	GFS 435
7	—	—	—
8	PANEL ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	BATTERY COOLING FAN, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN, RELAY WINDINGS, WINDSCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICA ONLY)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

AUXILIARY FUSE BOX R.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 415
14	DOOR LOCK RELAY ELECTRIC DOOR MIRROR DOOR LAMPS	5A	GFS 45
15	FOG LAMPS	20A	GFS 420
16	—	—	—
17	FRONT PARKING LAMPS	3A	GFS 43

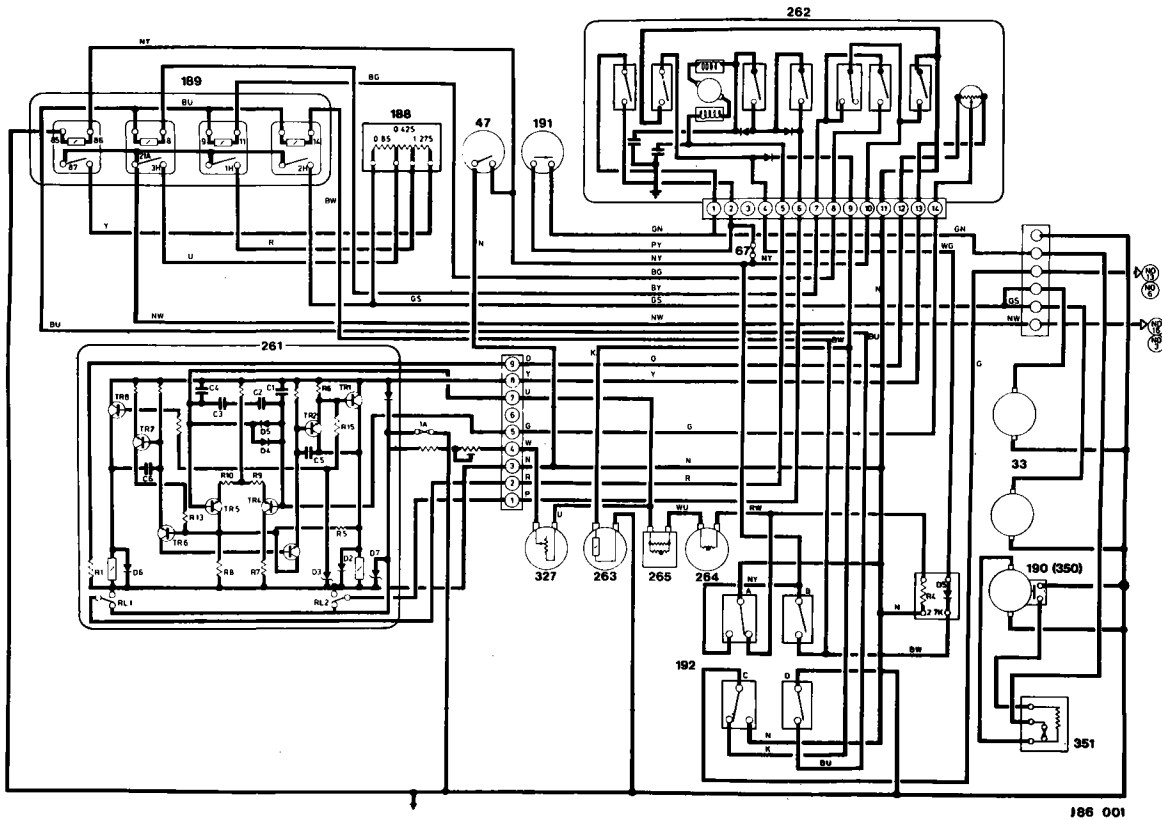
AUXILIARY FUSE BOX L.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	AIR CONDITIONING, RELAY AND CLUTCH	15A	GFS 415
14	FRONT PARKING LAMPS	3A	GFS 43
15	FRONT PARKING LAMPS	10A	GFS 410
16	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
17	DOOR LOCK RELAY, ELECTRIC DOOR MIRRORS, DOOR LIGHTS	3A	GFS 43

HEADLAMP FUSE BOX

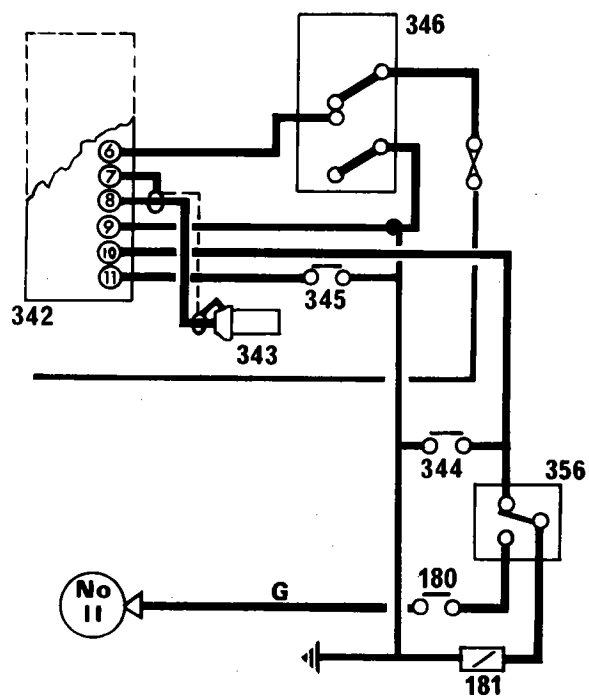
FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	RADIATOR, COOLING FAN — WHERE FITTED	8/15A	GFS 415
2	RH DIP	10/20A	GFS 420
3	RH MAIN	17/35A	GFS 435
4	LH DIP	10/20A	GFS 420
5	LH MAIN	17/35A	GFS 435

AIR CONDITIONING

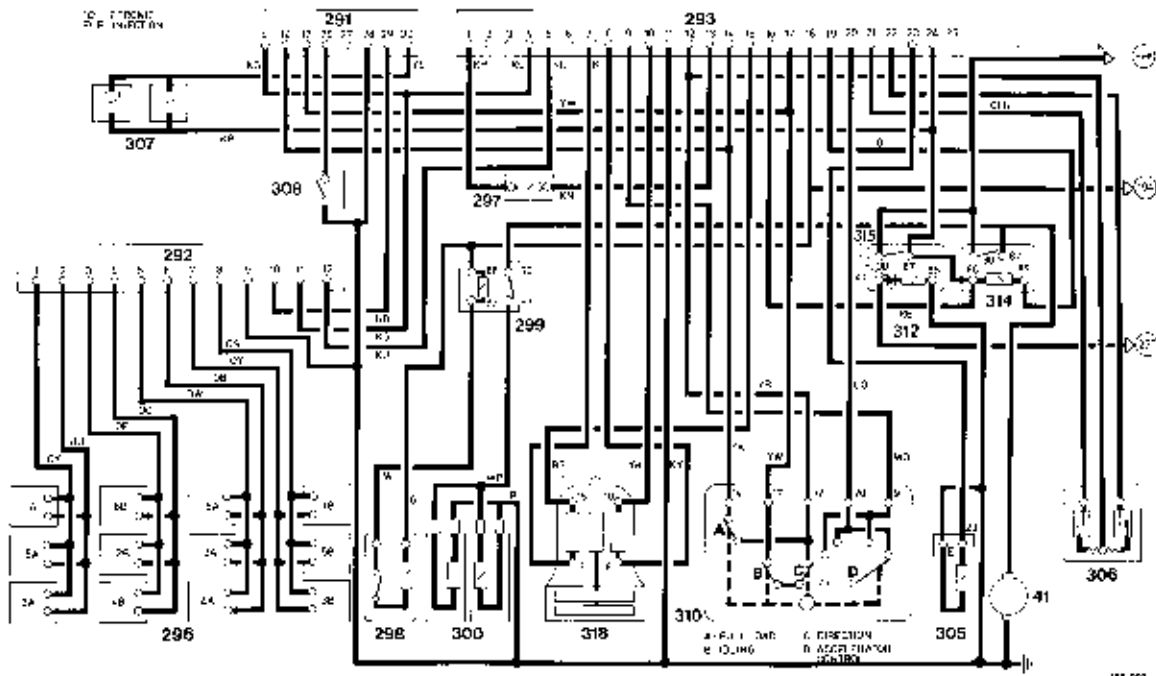


KICK DOWN INHIBIT/SPEED CONTROL
(Alternative Circuit)

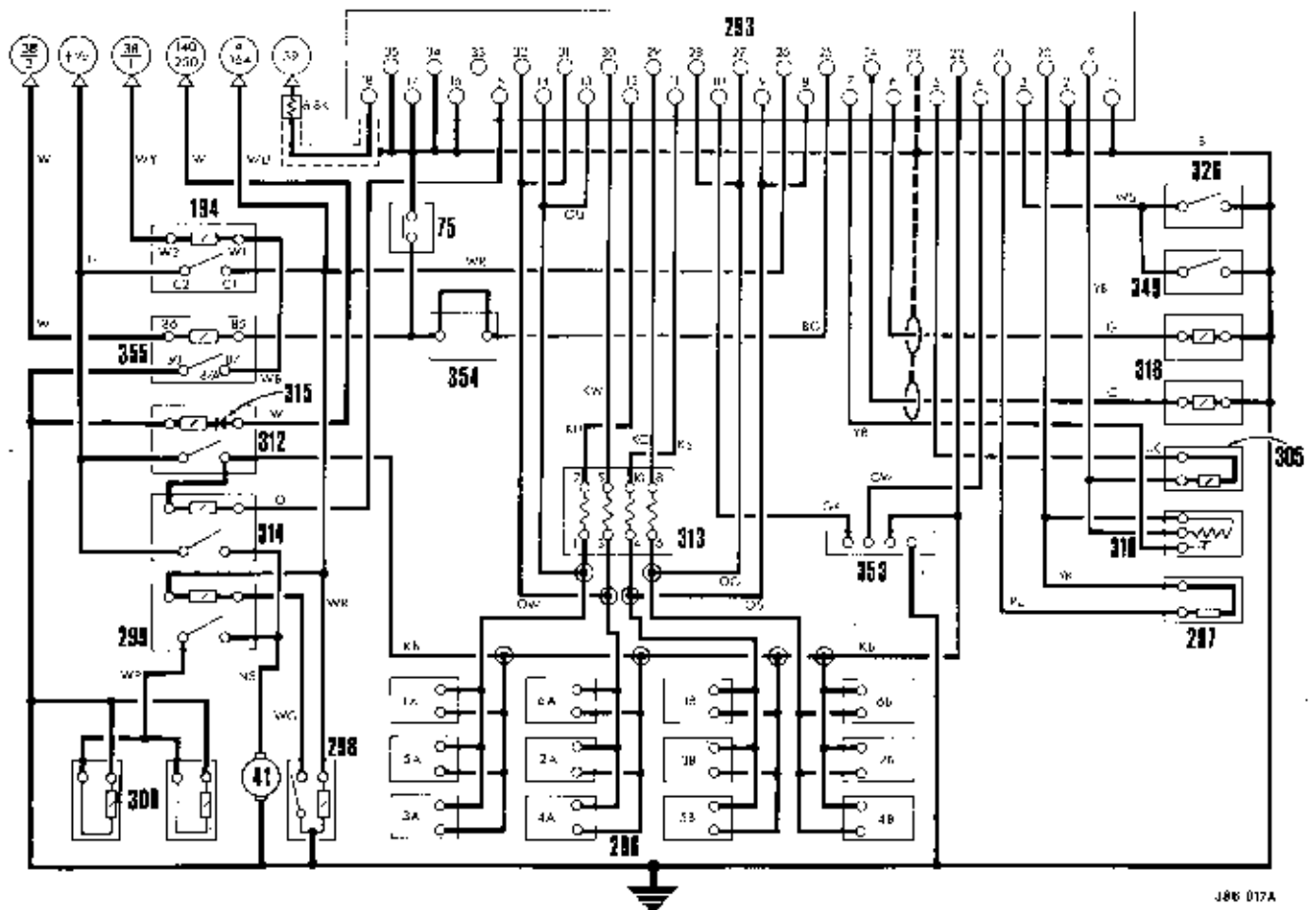
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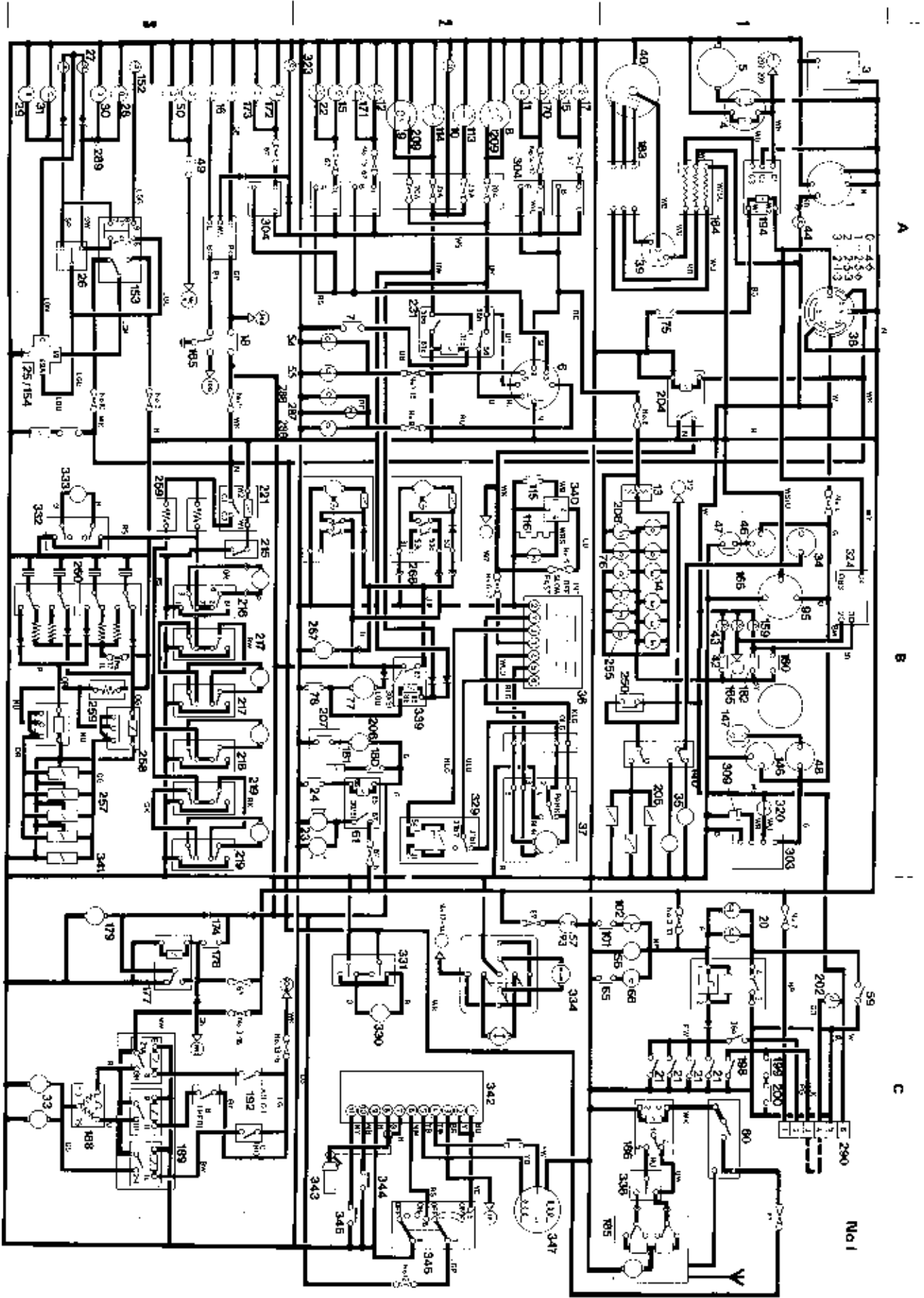


FUEL INJECTION 'D' JETRONIC



FUEL INJECTION 'P' PRESSURE SENSING





A
B
C

No. 1

186 006

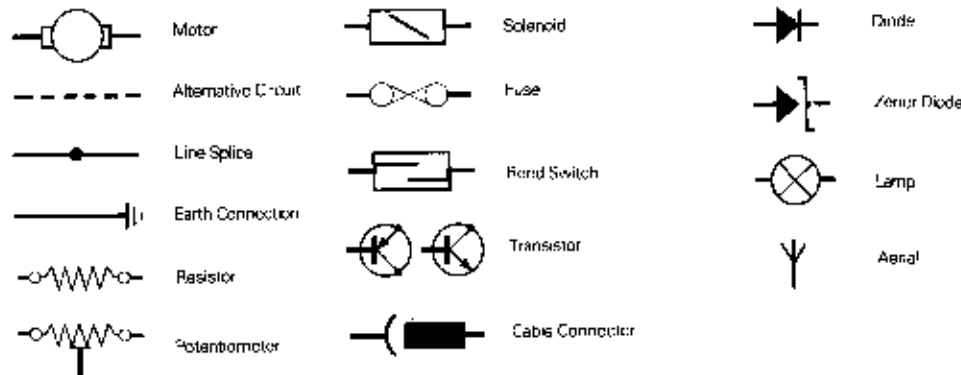
1961 - 63 12 CYLINDER MODELS

CABLE COLOUR CODE

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

- N. Brown — Positive Cable
- B. Black — Negative Cable
- W. White
- K. Pink Ignition switch controlled
- G. Green
- R. Red
- Y. Yellow
- O. Orange
- S. Slate
- L. Light
- U. Blue
- P. Purple

SYMBOLS USED



BULB CHART 1983

	WATTS	LUCAS PART NO.	JNIPART NO.	NOTES
Headlamps				
LH Traffic Markers —				
— Tungsten Outer	60/45	54629739	GLU 136	XJ 3.4 Std only. Sealed beam light unit
— Inner	50	54529740	GLU 134	XJ 3.4 Std only. Sealed beam light unit
— Halogen Outer	60/55	472	GLB 472	H4 base
— Inner	55	448	GLB 448	H1 base
RH Traffic Markers —				
Normal — Halogen Outer	60/65	472	GLB 472	H4 base
— Inner	55	448	GLB 448	H1 base
France — Halogen Outer	60/55	475	GLB 475	Yellow bulb H4 base
— Inner	45/40	411	GLB 411	Yellow bulb. The 40 watt filament is not used
USA — Tungsten — Outer	37.5/60			Sealed beam light unit
— Inner	50			Sealed beam light unit
Front Parking Lamp	4	233	GLB 233	Not USA Headlamp pilot
Front Pasher Lamp	21	382	GLB 382	Not USA
Front Parking and Flasher Lamp	5/21	390	GLB 390	USA only
Front Fog Lamp — Cubic	55	—	GLD 212	H2 base
Flasher Repeater	2	233	GLB 233	Not USA
Front Marker Lamp	4	233	GLB 233	USA only
Rear Marker Lamp	4	233	GLB 233	USA only
Rear Door Guard Lamp	6	989	GLB 989	
Stop Lamp	21	382	GLB 382	
Tail Lamp	5	207	GLR 207	
Rear Flasher Lamp	21	382	GLB 382	
Reverse Lamp	21	382	GLB 382	
Plate Illumination Lamp	4	233	GLB 233	
Rear Fog Lamp	21	382	GLB 382	Not USA
Instrument Illumination	2.2	987	GLB 987	
Warning Light: — Cluster	1.7	786	GLB 286	
— LH Turn Signal	3	504	GLB 504	
— Heated Backlight	2.8	650	GLB 650	24 volt bulb
— Bulb Failure	2.2	987	GLB 987	
— RH Turn Signal	3	504	GLB 504	
— Rectangular Unit	2	281	GLB 281	Social markets only
Map Lamp	6	254	GLR 254	
Click Illumination	2.2	987	GLB 987	
Switch Panel Illumination	1.2	—	GLB 284	
Automatic Selector Illumination	2.2	987	GLB 987	
Ogiate Lighter Illumination	2	—	GLB 286	
Fibre Optic Lamp	6	254	GLB 254	
Interior Lamp	5	389	GLB 389	
Reading Lamp	4	233	GLB 233	
Luggage Boot Lamp	6	239	GLB 239	

ELECTRICAL CIRCUITS/HARNESSES**HEADLAMP FUSE BOX 1983**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	RADIATOR COOLING FAN (WHERE FITTED) 12 CYL INDFR 6 CYLINDER	8/15A 10/20A	GFS 415 GFS 420
2	RH DIP	10/20A	GFS 420
3	RH MAIN	17/35A	GFS 435
4	LH DIP	10/20A	GFS 420
5	LH MAIN	17/35A	GFS 435

IN LINE FUSES 1983

PROTECTED CIRCUIT	FUSE	UNIPART No.	LOCATION
Horn	15A	GFS 415	Adjacent to servo RH cars To the battery LH cars
Cigar Lighter	20A	GFS 420	Behind RH front console side casing
Electric Seal Adjustment	30A	GFS 430	Under carpet below LH side of console in front of seat
Air conditioning Amplifier	3A	GFS 43	Behind LH front console side casing
RH Tail lamp and No. plate lamp (Red lead with black ring) LH Tail lamp and No. plate lamp (Red lead with yellow ring) Side marker lamps (where fitted) Red lead	3A	GFS 43	In the luggage compartment behind the trim below the parcel shelf
Radio cassette	2A	GFS 42	Behind the radio

MAIN FUSE BOX L.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	FOG LAMPS	20A	GFS 420
2	HAZARD WARNING, SEAT BELT LOGIC UNIT	15A	GFS 415
3	MAP AND INTERIOR LAMPS, CLOCKS, AERIAL, CIGAR LIGHTER	15A	GFS 415
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	WINDSCREEN WIPERS	35A	GFS 435
7	—	—	—
8	PANEL ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	BATTERY COOLING FAN, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN, RELAY WINDINGS, WINDSCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICA ONLY)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

MAIN FUSE BOX R.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	FOG LAMPS	20A	GFS 420
2	HAZARD WARNING, SEAT BELT LOGIC UNIT	15A	GFS 415
3	MAP AND INTERIOR LAMPS, CLOCKS, AERIAL, CIGAR LIGHTER	15A	GFS 415
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	WINDSCREEN WIPERS	35A	GFS 435
7	TRIP COMPUTER	2A	GFS 42
8	PANEL, CIGAR LIGHTER AND GLOVE BOX ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	AUTOMATIC TRANSMISSION KICK DOWN SOLENOID, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN, RELAY WINDINGS, WINDSCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICA ONLY), HEADLAMP WASH/WIPE (WHERE FITTED)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

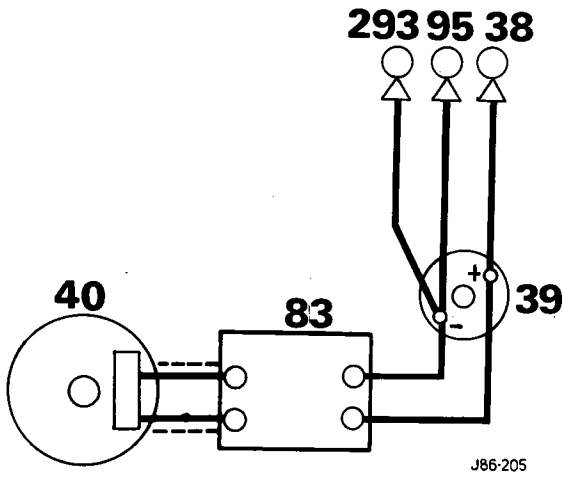
ELECTRICAL CIRCUITS/HARNESSES**AUXILIARY FUSE BOX R.H. Stg. 1983**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 415
14	DOOR LOCK RELAY, ELECTRIC DOOR MIRROR, DOOR LAMPS	5A	GFS 45
15	FOG LAMPS	20A	GFS 420
16	—	—	—
17	FRONT PARKING LAMPS	3A	GFS 43

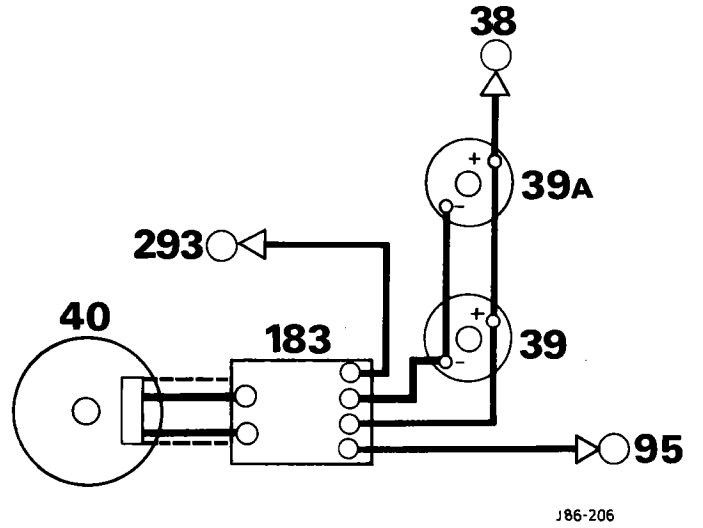
AUXILIARY FUSE BOX L.H. Stg. 1983

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	AIR CONDITIONING, RELAY AND CLUTCH	15A	GFS 415
14	FRONT PARKING LAMPS	3A	GFS 43
15	ANTI RUN-ON VALVE 3.4 CARS ONLY	10A	GFS 410
16	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
17	DOOR LOCK RELAY, ELECTRIC DOOR MIRRORS, DOOR LIGHTS	3A	GFS 43

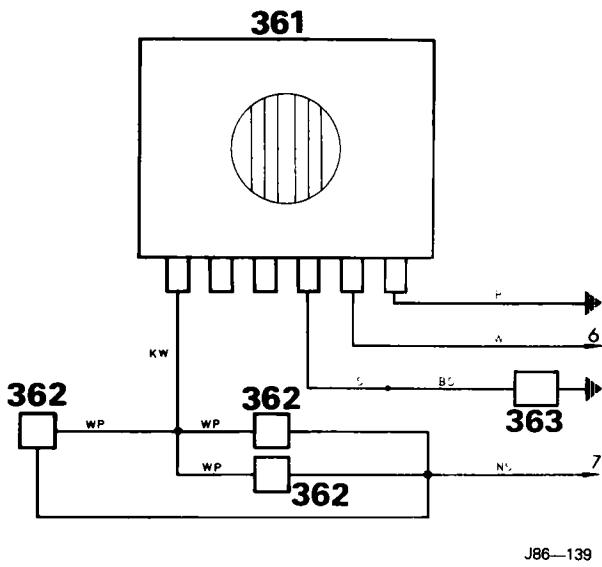
4.2 IGNITION SYSTEM



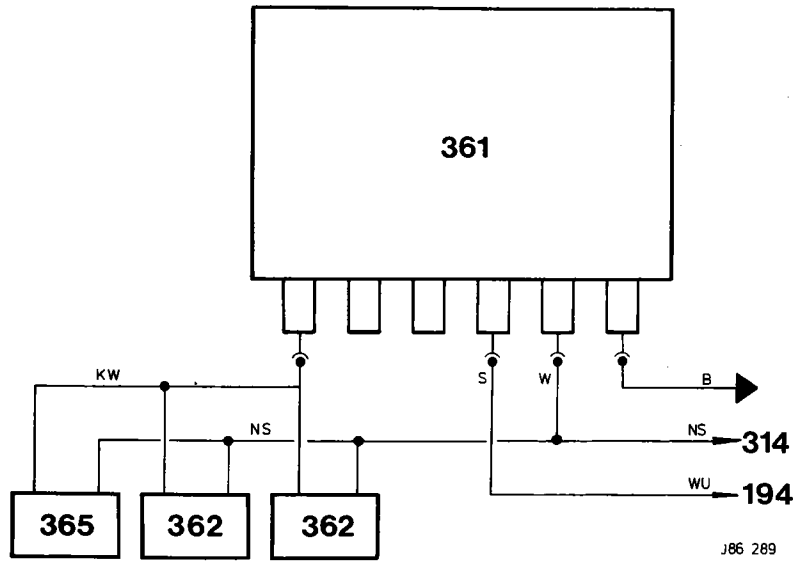
5.3 IGNITION SYSTEM

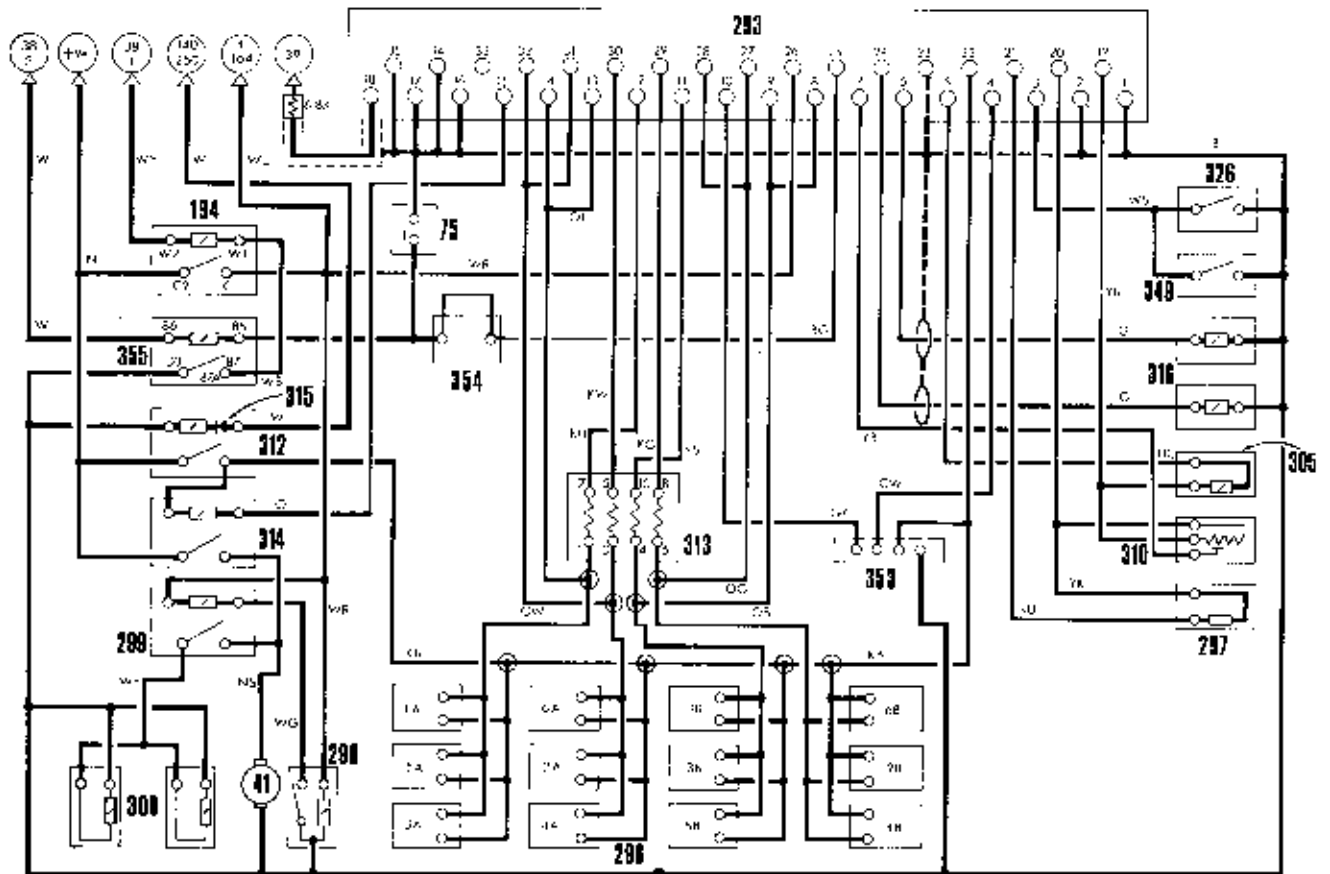


VACUUM DELAY TIMER



VACUUM DELAY TIMER USA



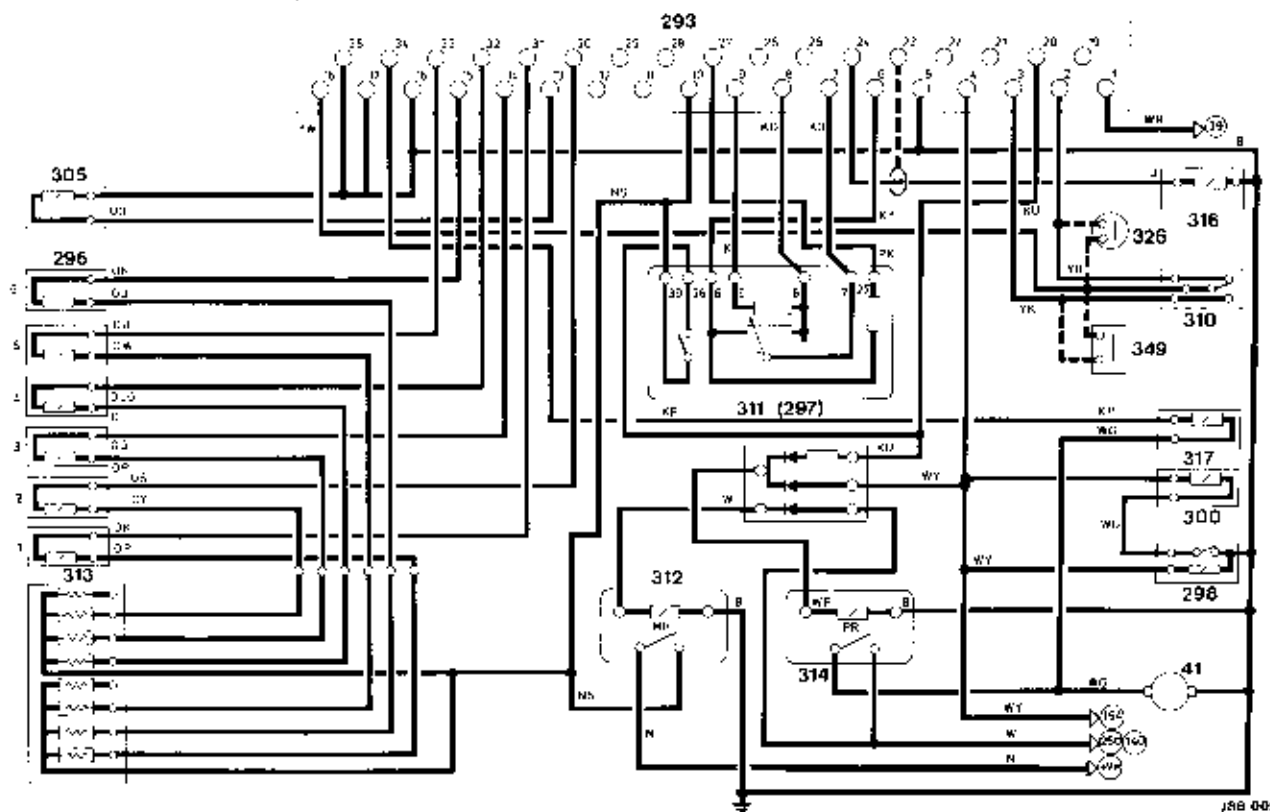


J86 074

12 cyl

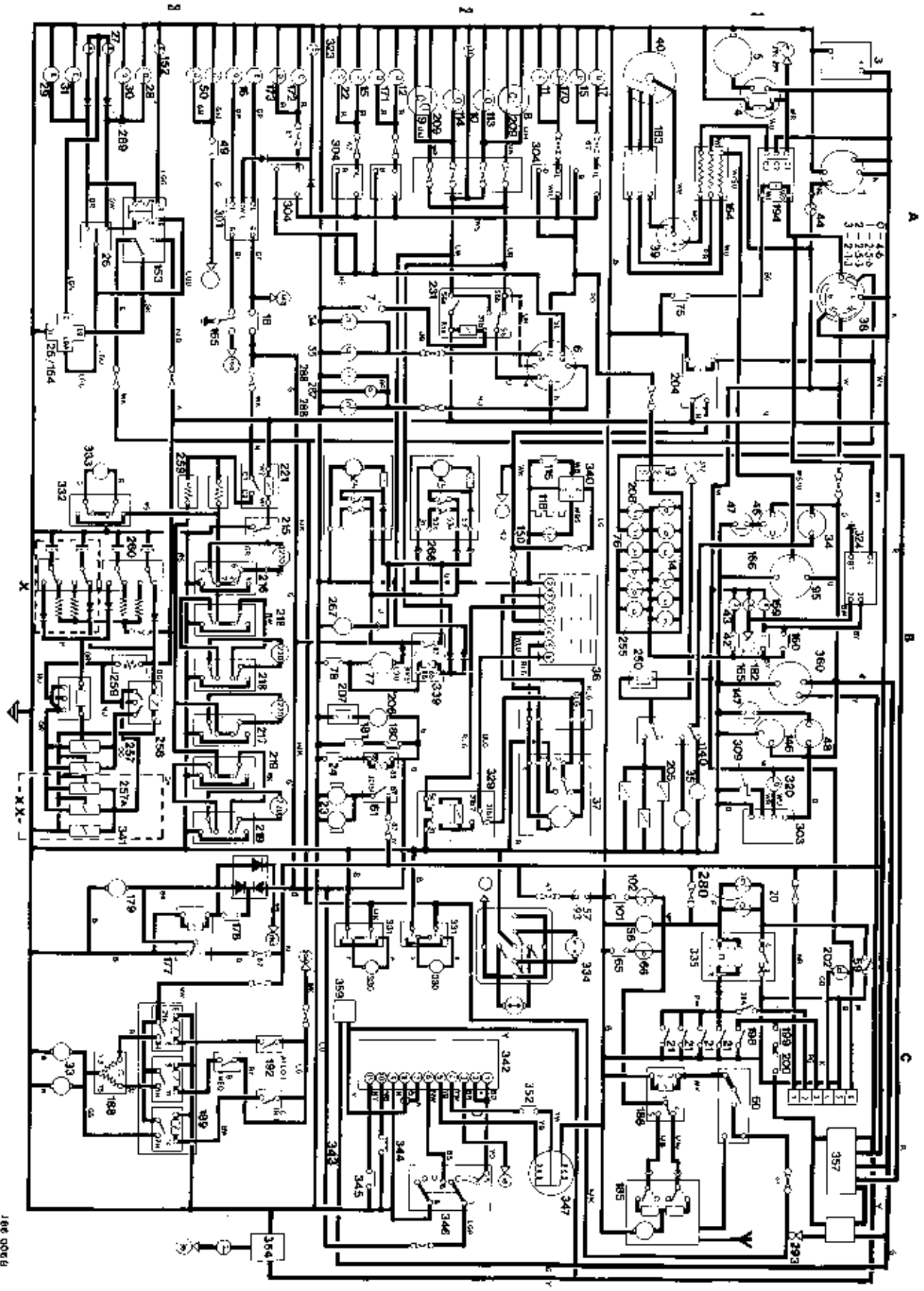
DIGITAL FUEL INJECTION

1. 107 000 L 110 L INJECT 04 2



J88 002

6 cyl FUEL INJECTION



186 0008

CABLE COLOUR CODE

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

N. Brown — **Positive Cable**

B. Black — **Negative Cable**

W. White

K. Pink Ignition switch controlled

G. Green

R. Red

Y. Yellow

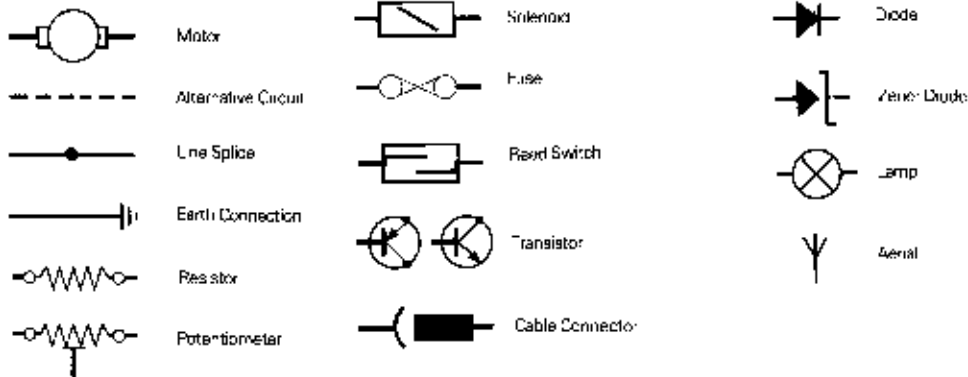
O. Orange

S. Slate

L. Light

U. Blue

P. Purple

SYMBOLS USED**AUXILIARY FUSE BOX R.H. Stg.**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 416
14	DOOR LOCK RELAY, ELECTRIC DOOR MIRROR, DOOR LAMPS	5A	GFS 45
15	FOG LAMPS	20A	GFS 420
16	TRIP COMPUTER (WHERE FITTED)	2A	GFS 42
17	FRONT PARKING LAMPS	3A	GFS 43

AUXILIARY FUSE BOX L.H. Stg.

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	AIR CONDITIONING, RELAY AND CLUTCH	15A	GFS 416
14	FRONT PARKING LAMP RH	3A	GFS 43
15	FRONT PARKING LAMP LH	3A	GFS 43
16	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
17	DOOR LOCK RELAY, ELECTRIC DOOR MIRRORS, DOOR LIGHTS	3A	GFS 43

ELECTRICAL CIRCUITS/HARNESSES**MAIN FUSE BOX L.H. Stg.**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	NOT USED		
2	HAZARD WARNING	15A	GFS 415
3	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	AIR CONDITIONING RELAY AND CLUTCH	15A	GFS 415
7	WINDSCREEN WIPERS	35A	GFS 435
8	PANEL, CIGAR LIGHTER AND GLOVE BOX ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	AUTOMATIC TRANSMISSION KICK DOWN SOLENOID, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN RELAY, WINDSCREEN WASHERS, STOP LAMPS, HEADLAMP WASHWIPE (WHERE FITTED)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

MAIN FUSE BOX R.H. Stg.

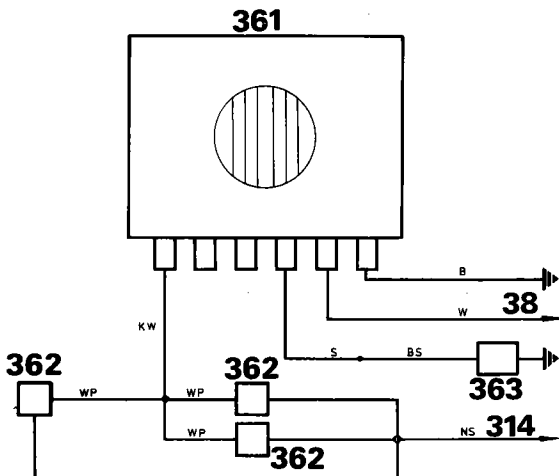
FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	FOG LAMPS	20A	GFS 420
2	HAZARD WARNING, SEAT BELT LOGIC UNIT	15A	GFS 415
3	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 415
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	WINDSCREEN WIPERS	35A	GFS 435
7	TRIP COMPUTER	2A	GFS 42
8	PANEL, CIGAR LIGHTER AND GLOVE BOX ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	AUTOMATIC TRANSMISSION KICK DOWN SOLENOID, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN, RELAY WINDINGS, WINDSCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICA ONLY), HEADLAMP WASHWIPE (WHERE FITTED)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

IN LINE FUSES 1986 – 88

PROTECTED CIRCUIT	FUSE	UNIPART No.	LOCATION
HORN	15A	GFS 415	ADJACENT TO SERVO RH CARS TO THE BATTERY LH CARS
CIGAR LIGHTER	20A	GFS 420	BEHIND RH FRONT CONSOLE SIDE CASING
ELECTRIC SEAT ADJUSTMENT	30A	GFS 430	UNDER CARPET BELOW LH SIDE OF CONSOLE IN FRONT OF SEAT
AIR CONDITIONING AMPLIFIER	3A	GFS 43	BEHIND LH FRONT CONSOLE SIDE CASING
RH TAIL LAMP AND NO. PLATE LAMP (RED LEAD WITH BLACK RING) LH TAIL LAMP AND NO. PLATE LAMP (RED LEAD WITH YELLOW RING) SIDE MARKER LAMPS (WHERE FITTED) RED LEAD	3A	GFS 43	IN THE LUGGAGE COMPARTMENT BEHIND THE TRIM BELOW THE PARCEL SHELF
RADIO CASSETTE	2A	GFS 42	BEHIND THE RADIO

HEADLAMP FUSE BOX 1986 – 88

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	RADIATOR COOLING FAN (WHERE FITTED) 12 CYLINDER 6 CYLINDER	8/15A 10/20A	GFS 415 GFS 420
2	RH DIP	10/20A	GFS 420
3	RH MAIN	17/35A	GFS 435
4	LH DIP	10/20A	GFS 420
5	LH MAIN	17/35A	GFS 435



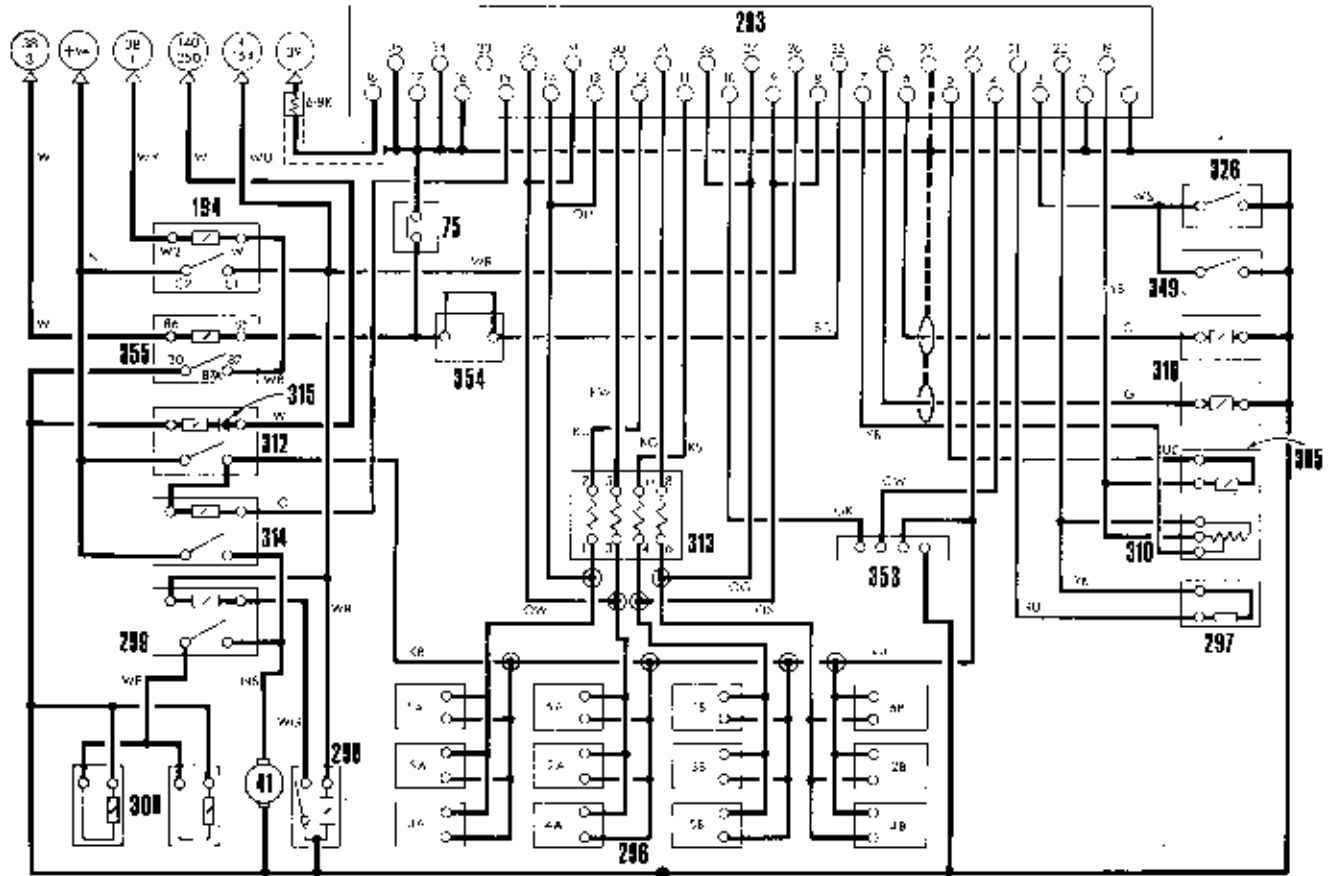
VACUUM DELAY TIMER

J86 552

ELECTRICAL CIRCUITS/HARNESSES

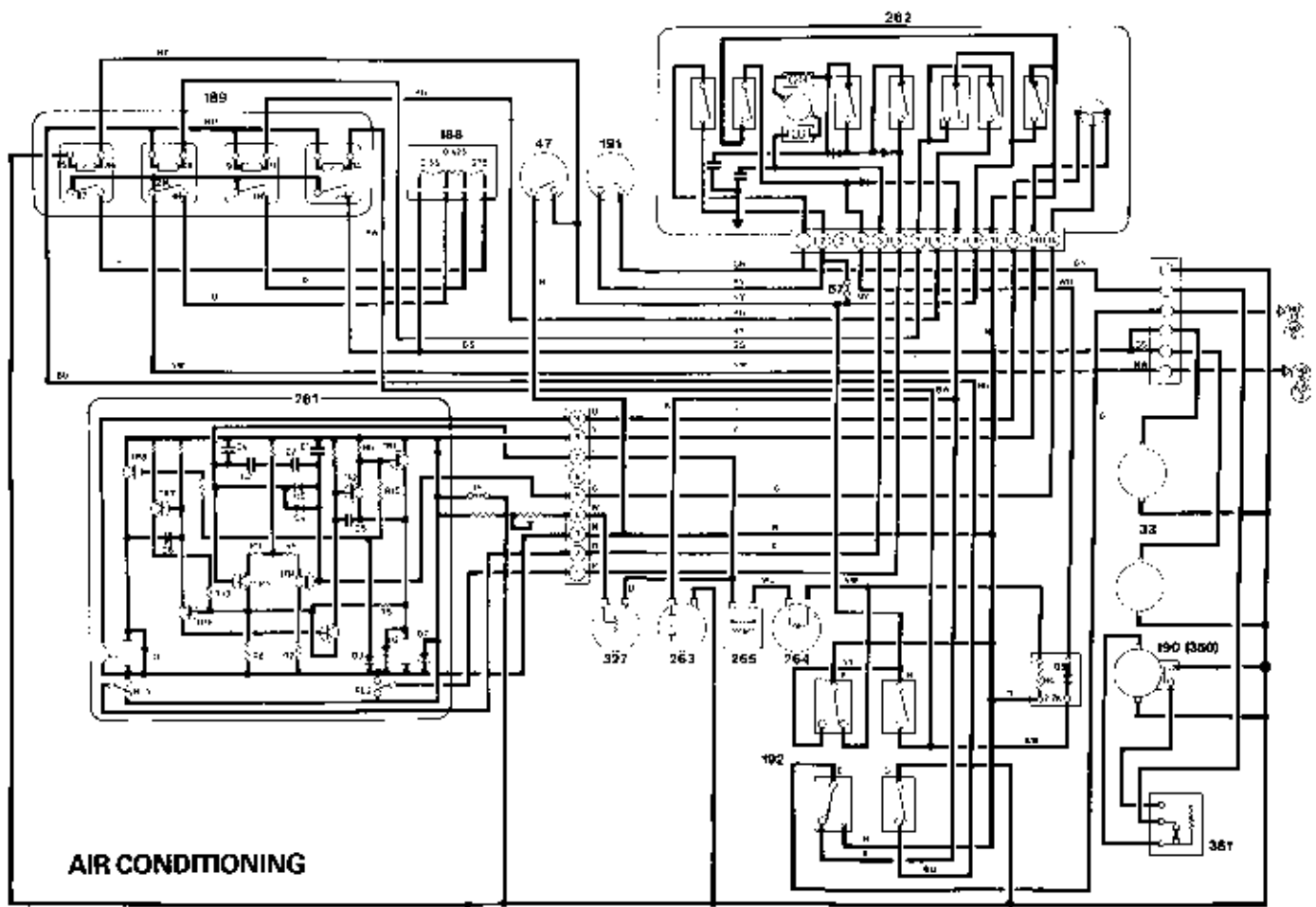
BULB CHART

	WATTS	LUCAS PART NO.	UNIPART NO.	NOTES
Headlamps —				
LH Traffic Markers —				
— Halogen — Outer	60/55	472	GLB 472	H4 base
— Inner	55	448	GLB 448	H1 base
RH Traffic Markers —				
Normal — Halogen — Outer	60/65	472	GLB 472	H4 base
— Inner	55	448	GLB 448	H1 base
France — Halogen — Outer	60/55	475	GLB 476	Yellow bulb H4 base
— Inner	45/40	411	GLB 411	Yellow bulb. The 40 watt filament is not used
Front Parking Lamp	4	233	GLB 233	Headlamp pilot
Front Flasher Lamp	21	382	GLB 382	
Front Parking and Flasher Lamp	5/21	380	GLB 380	
Front Fog Lamp — Cibie	55	—	GLB 212	H2 base
Flasher Repeater	4	233	GLB 233	
Rear Door Guard Lamp	5	989	GLB 989	
Stop Lamp	21	382	GLB 382	
Tail Lamp	5	207	GLB 207	
Rear Flasher Lamp	21	382	GLB 382	
Reverse Lamp	21	382	GLB 382	
Plate Illumination Lamp	4	233	GLB 233	
Rear Fog Lamp	21	382	GLB 382	
Instrument Illumination	2.2	987	GLB 987	
Warning Light — Cluster	1.2	286	GLB 286	
— LH Turn Signal	3	504	GLB 504	
— Heated Backlight	2.8	650	GLB 650	24 volt bulb
— Bulb Failure	2.2	987	GLB 987	
— RH Turn Signal	3	504	GLB 504	
— Rectangular Unit	2	281	GLB 281	Special markets only
Map Lamp	6	254	GLB 254	
Clock Illumination	2.2	987	GLB 987	
Switch Panel Illumination	1.2	—	GLB 284	
Automatic Selector Illumination	2.2	987	GLB 987	
Cigarette Lighter Illumination	2	—	GLB 288	
Fibre Optic Lamp	6	254	GLB 254	
Interior Lamp	5	989	GLB 989	
Reading Lamp	4	233	GLB 233	
Luggage Boot Lamp	5	239	GLB 239	



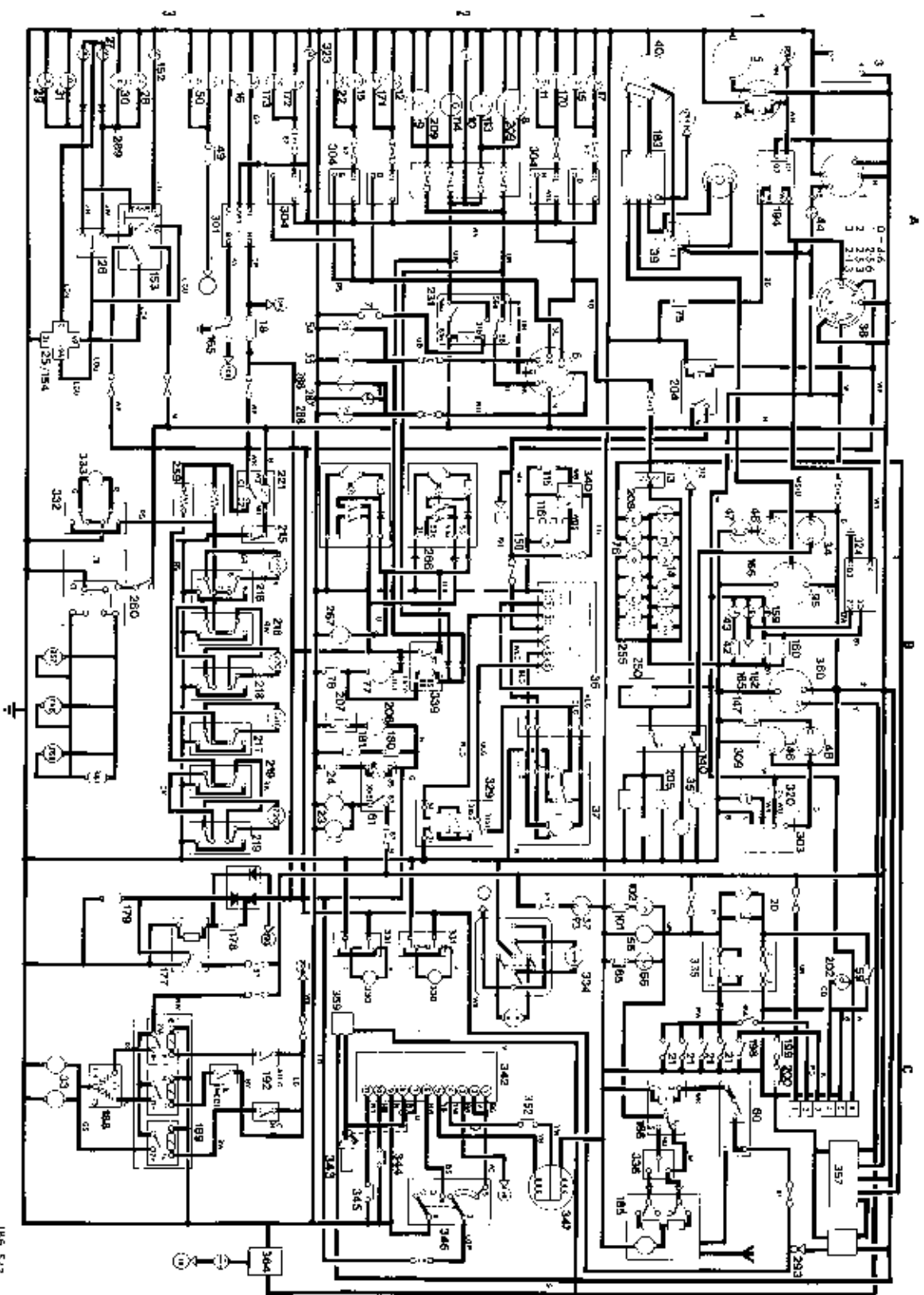
12 CYL. DIGITAL FUEL INJECTION

J85 017A



AIR CONDITIONING

J86 001



J86 547

CABLE COLOUR CODE

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

N. Brown — **Positive Cable**

B. Black — **Negative Cable**

W. White

K. Pink **Ignition switch controlled**

G. Green

R. Red

Y. Yellow

O. Orange

S. Slate

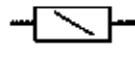
L. Light

U. Blue

P. Purple

SYMBOLS USED

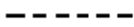
Motor



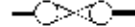
Solenoid



Lock



Alarm or Circuit



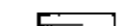
Fuse



Alarm or Circuit



Line Splice



Reed Switch



Lamp



Earth Connection



Transistor



Antenna



Resistor



Cable Connector



Potentiometer

**AUXILIARY FUSE BOX R.H. Stg. 1988**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	MAP AND INTERIOR LAMPS, CLOCK, AFRIAL, CIGAR LIGHTER	15A	GFS 415
14	DOOR LOCK RELAY, ELECTRIC DOOR MIRROR, DOOR LAMPS	5A	GFS 45
15	FOG LAMPS	20A	GFS 470
16	TRIP COMPUTER (WHERE FITTED)	2A	GFS 42
17	FRONT PARKING LAMPS	3A	GFS 43

AUXILIARY FUSE BOX L.H. Stg. 1988

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
13	AIR CONDITIONING, REFRIG AND CLUTCH	15A	GFS 415
14	FRONT PARKING LAMP RH	3A	GFS 43
15	FRONT PARKING LAMP LH	3A	GFS 43
16	AIR CONDITIONING OR HEATER MOTORS RH	50A	GFS 450
17	DOOR LOCK, ELECTRIC DOOR MIRRORS, DOOR LIGHTS	3A	GFS 43

ELECTRICAL CIRCUITS/HARNESSES**MAIN FUSE BOX L.H. Stg. 1988**

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	ANTH-RUN ON VALVE		
2	HAZARD WARNING	15A	GFS 415
3	AIR CONDITIONING OR HEATER MOTORS	50A	GFS 450
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	AIR CONDITIONING RELAY AND CLUTCH	15A	GFS 415
7	WINDSCREEN WIPERS	35A	GFS 435
8	PANEL, CIGAR LIGHTER AND GLOVE BOX ILLUMINATION	15A	GFS 415
9	FOG REAR GUARD LAMPS	10A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	AUTOMATIC TRANSMISSION KICK DOWN SOLENOID, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN RELAY, WINDSCREEN WASHERS, STOP LAMPS, HEADLAMP WASH/WIPE (WHERE FITTED)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

MAIN FUSE BOX R.H. Stg. 1988

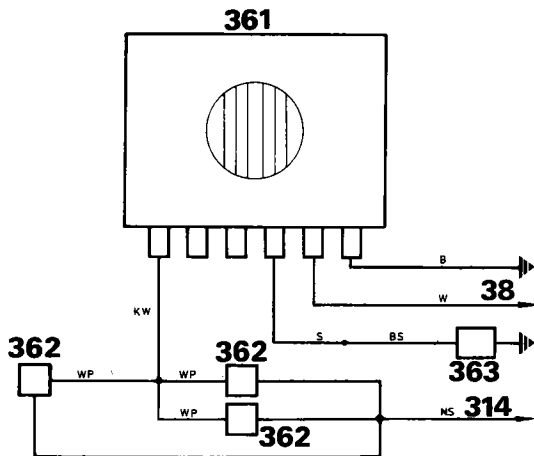
FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	FOG LAMPS	20A	GFS 420
2	HAZARD WARNING, SEAT BELT LOGIC UNIT	15A	GFS 415
3	MAP AND INTERIOR LAMPS, CLOCK, AERIAL, CIGAR LIGHTER	15A	GFS 415
4	PANEL INSTRUMENTS, REVERSE LAMPS, LOW COOLANT SENSOR and WARNING LIGHT	15A	GFS 415
5	HEATED REAR SCREEN	35A	GFS 435
6	WINDSCREEN WIPERS	35A	GFS 435
7	REAR FOG GUARD	10A	GFS 42
8	PANEL, CIGAR LIGHTER AND GLOVE BOX ILLUMINATION	15A	GFS 415
9	AIR CONDITIONING OR HEATER MOTOR LH	50A	GFS 410
10	DIRECTION INDICATORS	15A	GFS 415
11	AUTOMATIC TRANSMISSION KICK DOWN SOLENOID, HORN RELAY WINDINGS, RADIATOR AUXILIARY FAN, RELAY WINDINGS, WINDSCREEN WASHERS, STOP LAMPS, SERVICE INTERVAL COUNTER (AMERICAN ONLY), HEADLAMP WASH/WIPE (WHERE FITTED)	35A	GFS 435
12	CRUISE CONTROL	2A	GFS 42

IN LINE FUSES 1988 ON

PROTECTED CIRCUIT	FUSE	UNIPART NO.	LOCATION
HORN	15A	GFS 415	ADJACENT TO SERVO RH CARS TO THE BATTERY LH CARS
CIGAR LIGHTER	20A	GFS 420	BEHIND RH FRONT CONSOLE SIDE CASING
ELECTRIC SEAT ADJUSTMENT	30A	GFS 430	UNDER CARPET BELOW LH SIDE OF CONSOLE IN FRONT OF SEAT
AIR CONDITIONING AMPLIFIER	3A	GFS 43	BEHIND LH FRONT CONSOLE SIDE CASING
RH TAIL LAMP AND NO. PLATE LAMP (RED LEAD WITH BLACK RING) LH TAIL LAMP AND NO. PLATE LAMP (RED LEAD WITH YELLOW RING) SIDE MARKER LAMPS (WHERE FITTED) RED LEAD	3A	GFS 43	IN THE LUGGAGE COMPARTMENT BEHIND THE TRIM BELOW THE PARCEL SHELF
RADIO CASSETTE	2A	GFS 42	BEHIND THE RADIO

HEADLAMP FUSE BOX 1988 ON

FUSE NUMBER	PROTECTED CIRCUIT	FUSE CAPACITY	UNIPART NUMBER
1	RADIATOR COOLING FAN 12 CYLINDER 6 CYLINDER	8/15A 10/20A	GFS 415 GFS 420
2	RH DIP	10/20A	GFS 420
3	RH MAIN	17/35A	GFS 435
4	LH DIP	10/20A	GFS 420
5	LH MAIN	17/35A	GFS 435



.86 552

VACUUM DELAY TIMER

ELECTRICAL CIRCUITS/HARNESSES

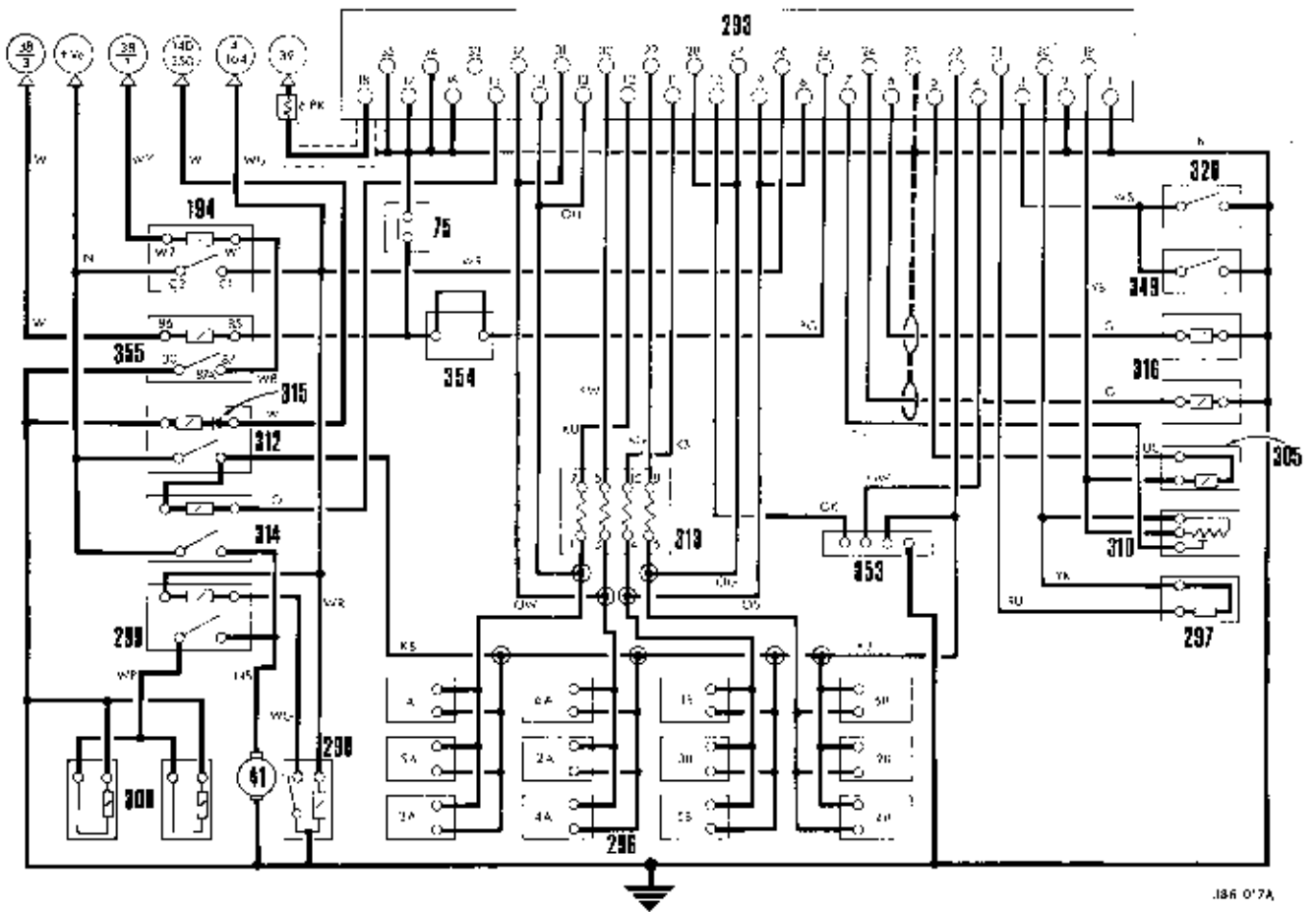
BULB CHART 1988 ON

Description	Capacity	Type	Part No.
Cigar lighter illumination	12V 2W	Capless	JLM 468
Door guard lamp	12V 5W	Capless 501	JLM 9600
Flasher side repeaters	12V 4W	Bayonet 233	JLM 9589
Fibre optic light source	12V 6W	Bayonet 989	JLM 9601
Fog lamps			
- Front	12V 55W	Halogen 479	JLM 9588
- Rear	12V 21W	Bayonet 382	C 9126
Front flasher lamp	12V 21W	Bayonet 382	C 9126
Glove compartment lamp	12V 5W	Festoon 239	JLM 9590
Headlamps			
- France only - Inner	12V 45/40W	Halogen yellow	JLM 9596
- France only - Outer	12V 60/55W	Halogen yellow 476	JLM 9599
- Japan only - Inner	12V 4W	Bayonet 233	JLM 9589
- Japan only - Outer	12V 60/55W	Halogen H4	JLM 9598
- Rest of World - Inner	12V 55W	Halogen H1	JLM 9597
- Rest of World - Outer	12V 60/55W	Halogen H4	JLM 9598
Headlamp pilot bulb Front side light	12V 4W	Bayonet 233	JLM 9589
Instrument illumination	12V 2.2W	Bayonet 987	C 15788
Interior Light	12V 10W	Festoon 272	C 31106
Luggage compartment lamp	12V 5W	Festoon 239	JLM 9590
Map light	12V 10W	Festoon 272	C 31106
Number plate lamp	12V 4W	Bayonet 233	JLM 9589
Panel switch illumination	12V 1.2W	Bayonet 284	JLM 9593
Rear flasher lamp	12V 21W	Bayonet 382	C 9126
(Direction indicator)			
Reversing lamp	12V 21W	Bayonet 382	C 9126
Stop lamp	12V 21W	Bayonet 382	C 9126
Tail lamp	12V 5W	Bayonet 207	JLM 9587
Warning lights	12V 1.2W	Capless 286	C38966

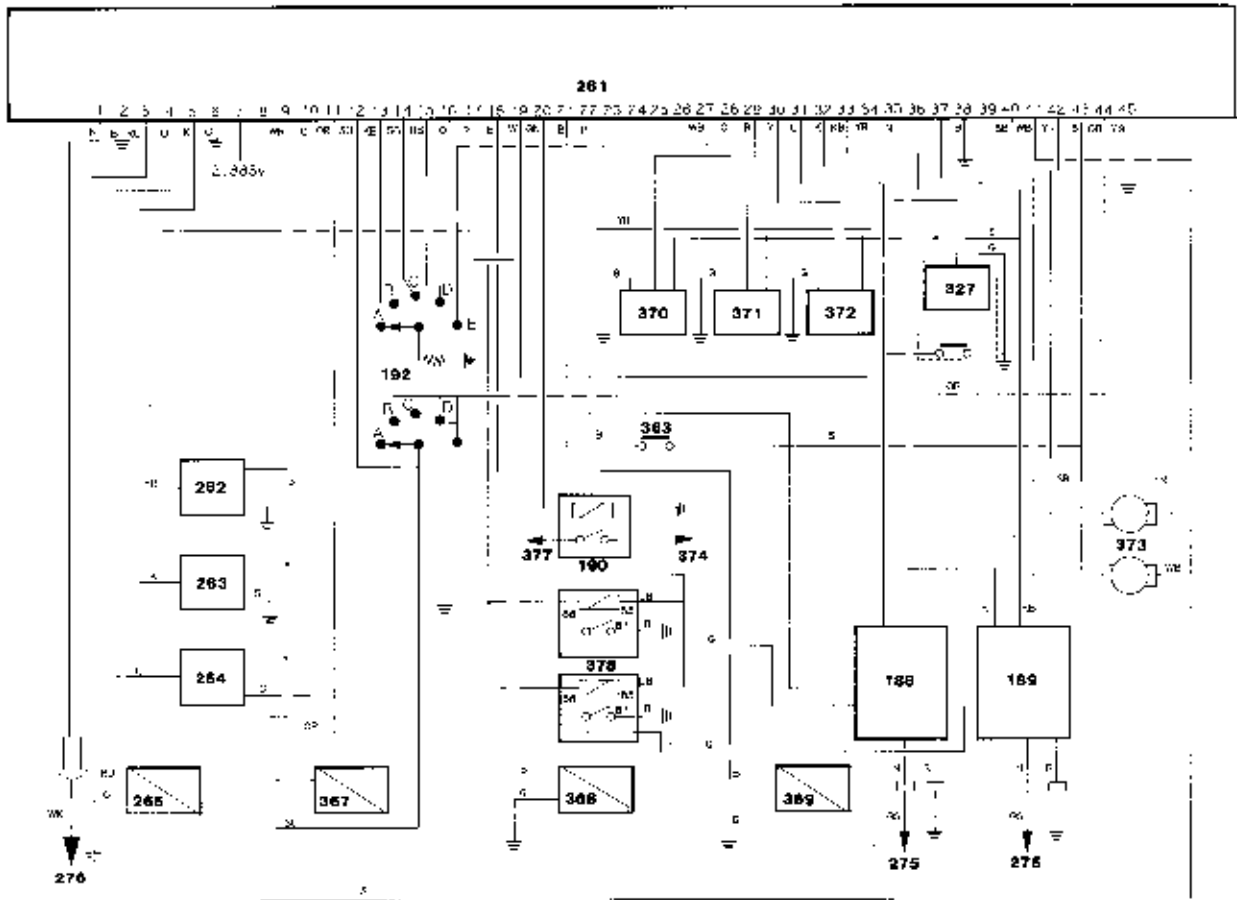
IN LINE FUSES 1990 MY

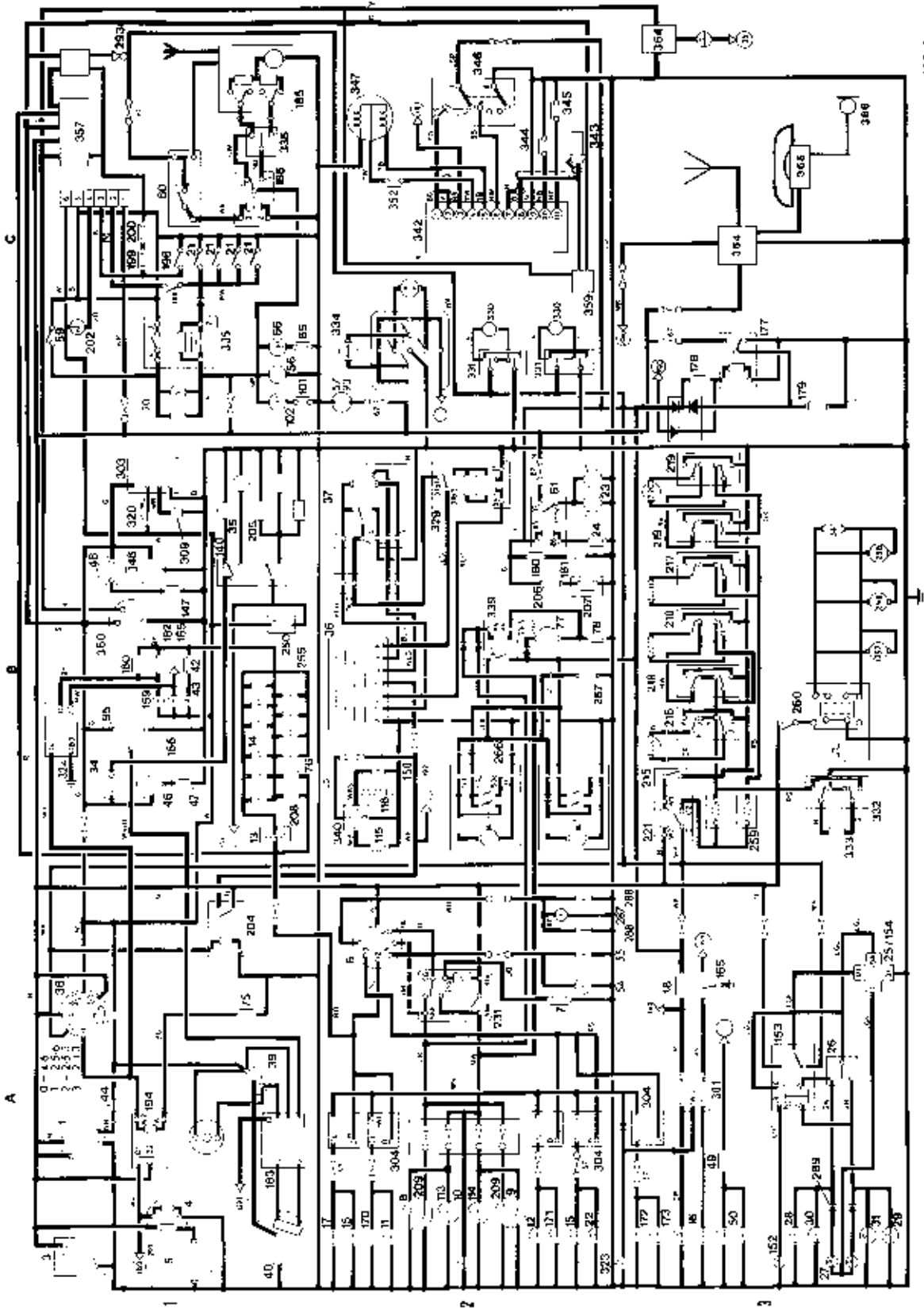
PROTECTED CIRCUIT	FUSE	UNIPART NO.	LOCATION
Headlamp levelling - controlling upward movement	2A	GFS42	Engine compartment. LH wing valance (German market)
Headlamp levelling - controlling downward movement	2A	GFS42	Engine compartment LH wing valance (German market)
Daytime running lamps	35A	GFS435	Adjacent to brake servo (Canadian market)

12 CYL. DIGITAL FUEL INJECTION



AIR CONDITIONING





165 547-1

1968 MY ON

CONTENTS

Operation	Operation No.	Page No.
Battery condition bulb – Remove and refit	88.45.56	88—4
Battery condition indicator – Remove and refit	88.10.07	88—4
Clock – Remove and refit	88.15.07	88—3
Coolant temperature transmitter – Remove and refit	88.25.20	88—3
Flasher indicator bulb – Remove and refit	86.45.63	88—3
Fuel gauge – Remove and refit	88.25.26	88—3
Fuel gauge illumination bulb – Remove and refit	86.45.52	88—3
Fuel tank unit – Remove and refit	88.25.32	88—2
Heated back light warning lamp bulb – Remove and refit	86.45.82	88—4
Ignition low charge indicator bulb – Remove and refit	86.45.64	88—3
Oil gauge – Remove and refit	88.25.01	88—4
Oil gauge illumination bulb – Remove and refit	86.45.50	88—4
Oil pressure transmitter – Remove and refit	88.25.07	88—2
Oil pressure warning switch – Remove and refit	88.25.08	88—2
Speedometer – Remove and refit	88.30.01	88—3
Speedometer cable assembly – Remove and refit	88.30.06	88—3
Speedometer cable inner – Remove and refit	88.30.07	88—3
Speedometer right angle drive – gearbox – Remove and refit	88.30.16	88—4
Speedometer trip reset – Remove and refit	88.30.02	88—3
Speedometer, Electronic — Description	86.30.00	86—5
Tachometer — Remove and refit	88.30.21	88—4
Tachometer illumination bulb – Remove and refit	86.45.53	88—4
Temperature gauge — Remove and refit	88.25.14	88—3
Temperature gauge illumination bulb — Remove and refit	86.45.51	88—3
Trip computer — Description	88.00.00	88—6
Warning lamp cluster — Remove and refit	86.45.62	88—4

INSTRUMENTS

CLOCK

Remove and refit

88.15.07

Disconnect the battery.
Lever the clock from the aperture.
Pull the clock illumination bulb holder from the back of the clock.
Note the position of the Lucar connectors and disconnect the cables.

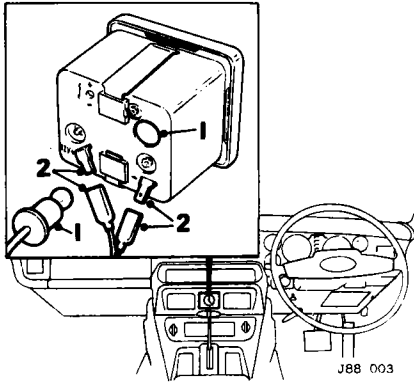


Fig. 1

OIL PRESSURE TRANSMITTER

Remove and refit

88.25.07

Disconnect the battery.
Disconnect the cable from the connector on top of the transmitter (1).
Remove the transmitter, located on the oil filter head on 6 cylinder models (2, Fig. 2), and on the manifold on 12-cylinder models (2, Fig. 3).

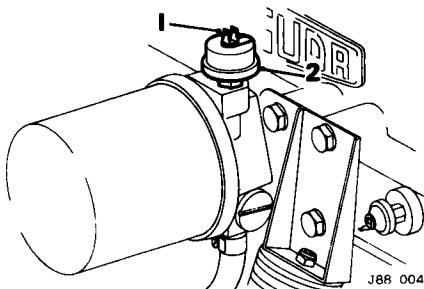


Fig. 2

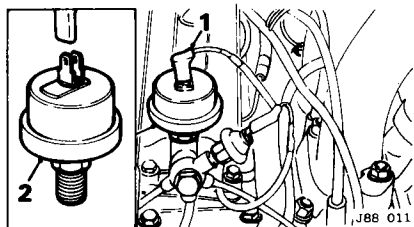


Fig. 3

OIL PRESSURE WARNING SWITCH

Remove and refit

88.25.08

Disconnect the battery.
Disconnect the cable from the connector on top of the switch (1).
Withdraw the switch from the cylinder block on 6 cylinder models (2, Fig. 4), and the manifold on 12 cylinder models (2, Fig. 5).

CAUTION: When refitting, care must be taken not to overtighten the switch, torque figure 4 to 5,5 Nm (3 to 4 lb ft), or the oil pressure transmitter.

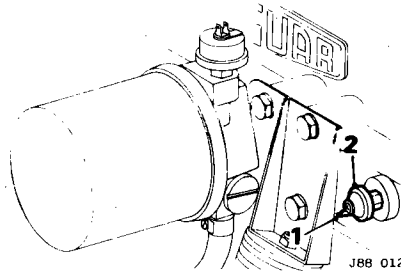


Fig. 4

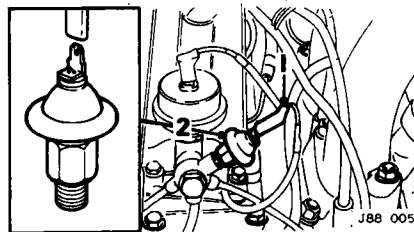


Fig. 5

COOLANT TEMPERATURE TRANSMITTER

Remove and refit

88.25.20

Disconnect the battery.
Remove the remote header tank cap to depressurize the cooling system.

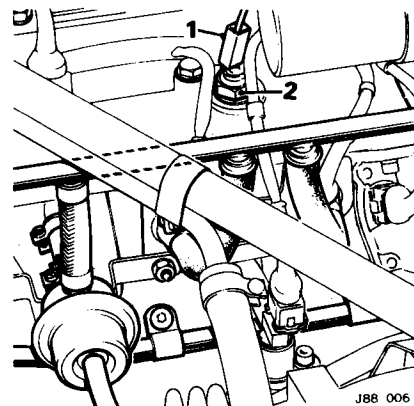


Fig. 6

WARNING: Only remove the cap when the engine is cold.

Disconnect the connector on top of the transmitter (1), and withdraw the transmitter (2, Fig. 6). 6 cylinder cars or (1, Fig. 7) 12 cylinder cars.

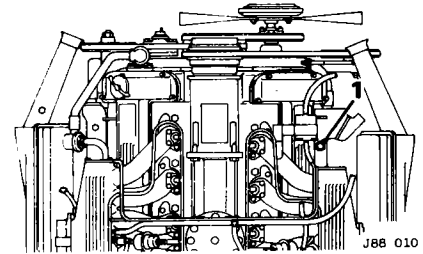


Fig. 7

Refitting

Reverse the above procedure.

FUEL TANK UNIT

Remove and refit

88.25.32

Disconnect the battery.
Raise the rear of the car and drain the fuel tank.
Remove the wheel.
On later cars remove the rear lamp assembly for access.
Remove the cover-plate and disconnect the Lucar connections (1, Figs. 8 or 9).
Using tool No. 18G 1001, rotate the locking ring anti-clockwise to clear the lugs in the tank.
Remove the locking ring and withdraw the tank unit (2, Figs. 8 or 9).
WARNING: Tank unit seal should be replaced with a new seal every time this operation is carried out.

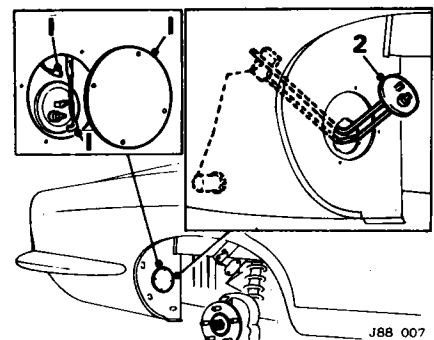


Fig. 8

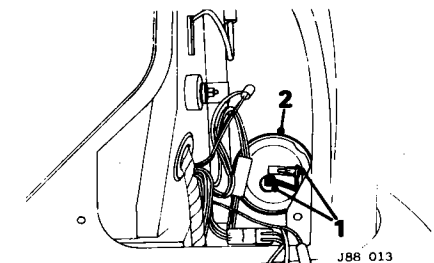


Fig. 9

SPEEDOMETER

Remove and refit 88.30.01

Includes:

Speedometer illumination bulb—remove and refit 86.45.49
Flasher indicator bulb—remove and refit 86.45.63
Ignition low charge indicator bulb—remove and refit 86.45.64
Fuel gauge—remove and refit 88.25.26
Fuel gauge illumination bulb—remove and refit 86.45.52
Temperature gauge—remove and refit 88.25.14
Temperature gauge illumination bulb—remove and refit 86.45.51

Removing

Disconnect the battery.
 Press the speedometer (1, Fig. 10) in towards the fascia and rotate in a clockwise direction for right-hand drive cars and anti-clockwise for left-hand drive cars, until the instrument releases from the locking tabs. Withdraw speedometer from the fascia (1, Fig. 11).
 Note the positions of the cables and disconnect from the Lucar connectors at the back of the instrument (2, Fig. 11).
 Unscrew the speedometer drive cable and turn the trip reset connector anti-clockwise until it releases, then pull it off.

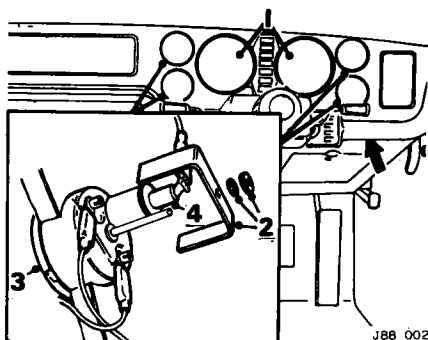


Fig. 10

Withdraw the speedometer illumination bulb, the flasher indicator bulb, and the ignition low charge indicator bulb (3, Fig. 11).

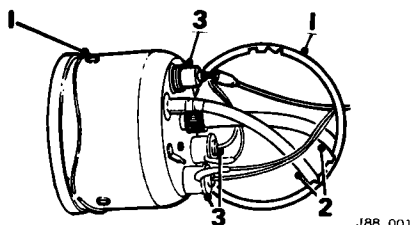


Fig. 11

With the speedometer removed, the fuel gauge retaining bracket nut (2, Fig. 10) can be removed and the indicator (3, Fig. 10) withdrawn from the fascia.

Remove the fuel gauge illumination bulb holder and remove the bulb (4, Fig. 10).

The temperature gauge can also be removed by removing the retaining bracket nut and withdrawing the indicator from the fascia.

Remove the temperature gauge illumination bulb holder and remove the bulb.

Refitting

Reverse the above operations.

SPEEDOMETER TRIP RESET

Remove and refit 88.30.02

Disconnect the battery.

Remove the retaining ring from the speedometer trip reset knob, located in the driver's side dash casing.

Press the speedometer in towards the fascia, rotate anti-clockwise and release it from the fascia.

NOTE: When refitting the speedometer trip reset, it is advisable to remove the fuse block access panel, to assist in the location of the lower end of the reset cable through the mounting bracket.

SPEEDOMETER CABLE ASSEMBLY

Remove and refit 88.30.06

Disconnect the battery.

Press the speedometer in towards the fascia; rotate and release it from the fascia.

Disconnect the cable at the angle drive (1, Fig. 12).

Attach a draw-string to the end of the cable. Raise the car.

Undo the knurled nut securing the speedometer cable to the angle drive on the gearbox. Displace the grommet from the transmission tunnel and feed the cable into the car.

Withdraw the cable (2, Fig. 12) from the instrument into the footwell, remove the draw-string.

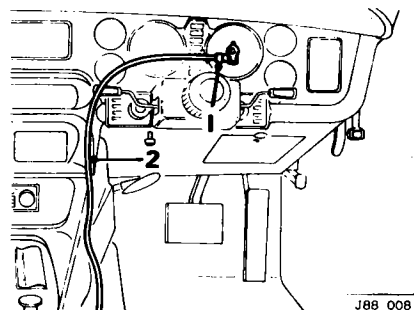


Fig. 12

Refitting

Feed the cable through the hole in the transmission tunnel and replace the grommet.

Reconnect the cable to the angle drive and tighten the knurled nut to secure.

Attach the draw-string to the instrument end of the cable and draw the cable up to the rear of the speedometer.

Reconnect the cable to the angle drive on the speedometer.

Detach the draw-string.

Refit the speedometer.

Reconnect the battery.

SPEEDOMETER CABLE—INNER

Remove and refit 88.30.07

Removing

Disconnect the battery.

Remove the speedometer.

Remove the inner cable.

If the cable is broken, the gearbox end will have to be disconnected to allow the other half to be relieved.

Refitting

Reverse the above operations. Lubricate the cable before refitting.

NOTE: (a) Lubrication should not be excessive; oil should never be used. Use only T.S.D. 119 or equivalent.

(b) The inner cable should only project by 9.52 mm (3/8in) from the outer casing at the instrument end to ensure correct engagement at the point of drive.

SPEEDOMETER RIGHT ANGLE DRIVE—INSTRUMENT

Remove and refit 88.30.15

Removing

Disconnect the battery.

Remove the speedometer.

Unscrew the knurled retaining ring and withdraw the drive.

Refitting

Reverse the above procedure.

INSTRUMENTS

SPEEDOMETER RIGHT ANGLE DRIVE—GEARBOX

Remove and refit 88.30.16

Removing

Disconnect the speedometer drive cable.
Remove the right angle drive by unscrewing the knurled retaining ring nut.

Refitting

Reverse the above procedure.

TACHOMETER

Remove and refit 88.30.21

Includes:

Tachometer illumination bulb—remove and refit 86.45.53
Oil gauge—remove and refit 88.25.01
Oil gauge illumination bulb—remove and refit 86.45.50
Heated back-light warning lamp bulb—remove and refit 86.45.82
Warning lamp cluster—remove and refit 86.45.62
Battery condition indicator—remove and refit 88.10.07
Battery condition indicator bulb—remove and refit 86.45.56

Removing

Disconnect the battery.
Press the tachometer (1, Fig. 13) in towards the fascia and rotate in a clockwise direction for right-hand drive cars and anti-clockwise for left-hand drive cars, until the instrument releases from the locking tabs. Withdraw the tachometer from the fascia (1, Fig. 14).

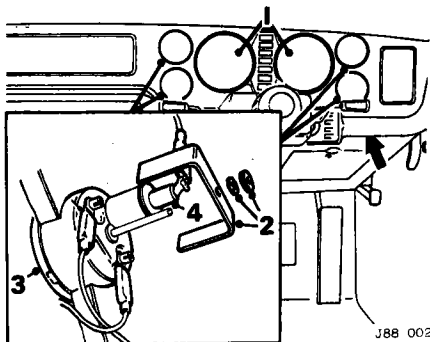


Fig. 13

Lever the warning lamp cluster lens from the assembly and working through the tachometer aperture, disconnect the warning lamp cluster harness block connector.

Bend back the clip securing the cluster harness at rear of the fascia.

Remove the cluster securing screws and withdraw the unit from the fascia.

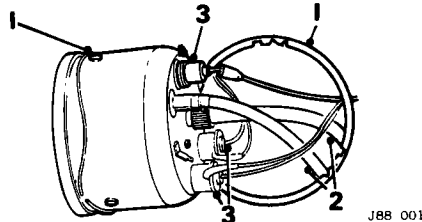


Fig. 14

Note the position of the cables and disconnect the Lucar connectors at the back of the instrument (2, Fig. 14).

Withdraw the bulb holder from the instrument and remove the bulb (3, Fig. 14).

Remove the heated back-light bulb holder and withdraw the bulb.

With the tachometer removed, the oil gauge retaining bracket nut (2, Fig. 13) can be removed and the gauge withdrawn from the fascia (3, Fig. 13).

Remove the oil gauge illumination bulb holder (4, Fig. 13) from the gauge and withdraw the bulb.

The battery condition indicator can also be removed by removing the retaining bracket nut and withdrawing the indicator from the fascia. Disconnect the cables at the Lucar connectors. Remove the battery condition indicator illumination bulb holder and remove the bulb.

ELECTRONIC SPEEDOMETER

Description 86.30.00

The pulse signal required to operate both the speedometer and service interval counter is controlled by a speed transducer situated in the automatic transmission unit in place of the angle drive.

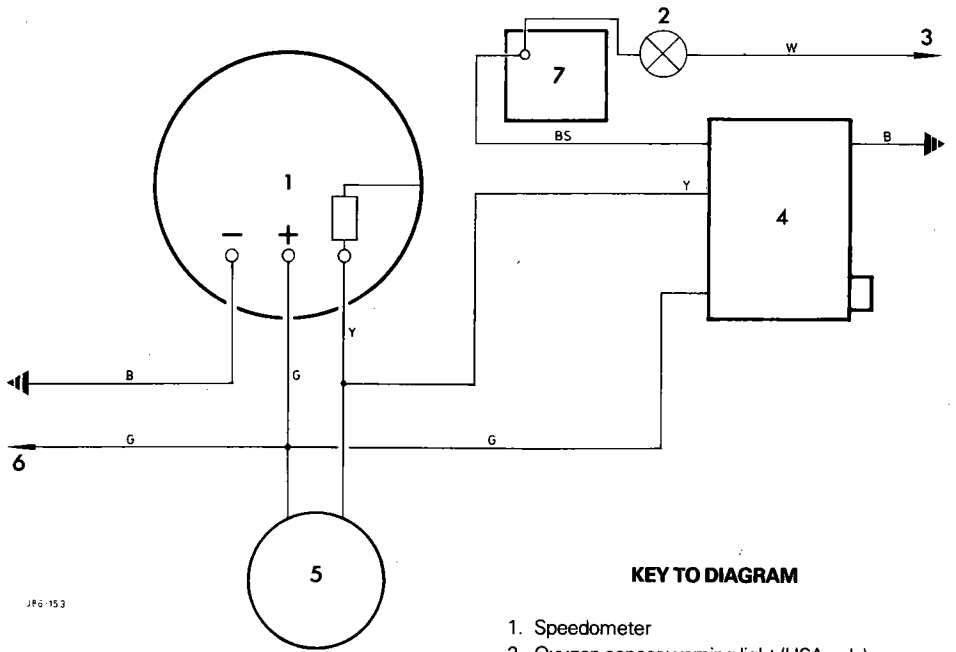
The service interval counter, if fitted, is situated in the boot compartment and is located by removing the rear detachable boot trim panel.

It is important to note that should the harness controlling the pulse input to the speedometer become disconnected at the speedometer, the service interval counter will also CEASE TO OPERATE. The control for resetting the speedometer is now situated in the speedometer fascia and is operated by depressing the control button.

Fault Finding

The cause of faults which result in the incorrect operation of the speedometer are best diagnosed by substitution, having first checked all connections and the fuse. Ensure the earth connections are clean and tight, and battery voltage is applied to the speedometer and the transducer.

JRG-153



KEY TO DIAGRAM

- 1. Speedometer
- 2. Oxygen sensor warning light (USA only)
- 3. To ignition switch
- 4. Service interval counter (USA only)
- 5. Speed transducer
- 6. To fuse
- 7. Bulb failure unit

Fig. 15

TRIP COMPUTER

88.00.00

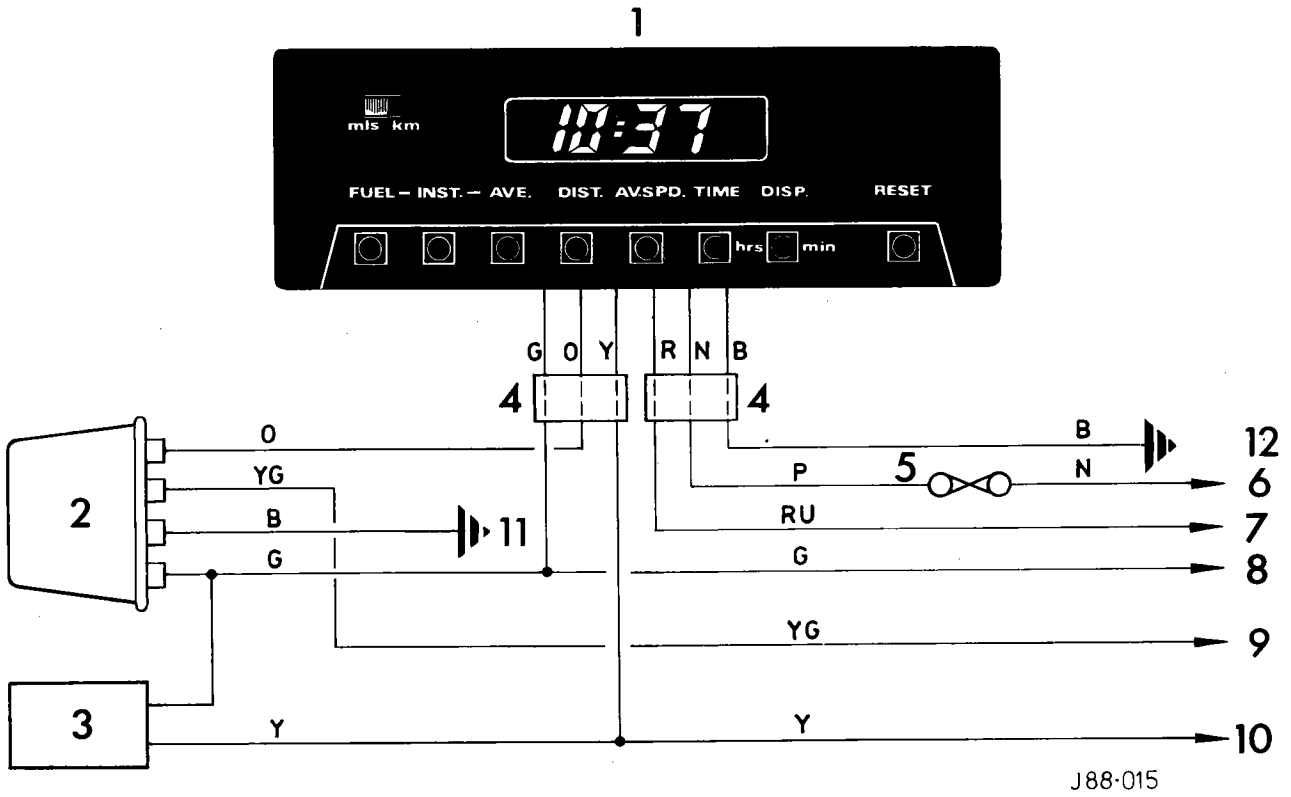
DESCRIPTION

The trip computer records fuel usage, time and distance. By storing the three sets of information and relating one to another it computes fuel consumption, both average consumption for the journey or a current consumption figure updated every three seconds.

The information may be displayed either in miles and gallons or litres and kilometers.

The signals required to operate the trip computer are picked up from the ECU via the interface unit (2 Fig. 16) and the pulse generator (3 Fig. 16). A 12 volt supply is via the fuse (5 Fig. 16). This supply voltage enables the clock to function and for the computer to retain information it has received when the ignition is switched off.

A second 12 volt supply is via fuse (8 Fig. 16) this supply enables the computer to display information when the ignition is switched on. The third 12 volt supply is via the red and blue lead (4 Fig. 16). This supply voltage enables the display and the buttons to dim when the sidelamps are switched on. The legend strip is also illuminated.



Key:

- | | |
|-------------------------|---|
| 1. Trip Computer | 7. To Sidelamps |
| 2. Interface Unit | 8. To Fuse No. 4 (10 amps) |
| 3. Speed Transducer | 9. To ECU |
| 4. Connector Blocks | 10. To Speedometer |
| 5. Inline Fuse (2 amps) | 11. Earth point between battery and wheel arch in luggage compartment |
| 6. Terminal Post | 12. Earth point on steering column bracket behind the instrument panel. |

Fig. 16

TRIP COMPUTER CONTROLS

There are nine controls on the computer face:

- mls/km – Use this switch to display metric or imperial/US units.
- RESET – Press for 5 seconds to switch off all functions displays to zero.
- DISP – Press to switch display off (function updating continues).
- TIME – Press to display time of day – press again to display elapsed time since reset – after 6 seconds, display will revert to time of day.
- AV SPD – Press to display average speed since reset.
- DIST – Press to display distance travelled since reset.
- AVE – Press to display average fuel consumption since reset.
- INST – Press to display the fuel consumption at that time.
- FUEL – Press to display fuel consumed since reset.

To show which function is on display the relevant button will be illuminated. When the vehicle lights are switched on the computer illumination is dimmed but the legend plate is illuminated.

FAULT DIAGNOSIS

Check all fuses and connections. Ensure that earth connections are clean and tight. With the ignition switched off, 12 volts should be obtained on the purple lead to the trip computer.

The voltmeter should give the following readings with the ignition switched on: 12 Volts at the green lead to the trip computer, the green lead to the pulse generator, the green lead and the yellow/green lead to the interface unit.

With the engine running a voltage should be obtained at the orange lead to the computer. A zero reading indicates a faulty interface unit or lack of continuity in the wiring between the computer and the interface unit. Re-check at the interface unit located in the luggage compartment.

With the rear of the vehicle jacked up and on stands, start the engine and put the vehicle into drive. A voltage should be obtained at the yellow lead to the computer. A zero reading indicates a faulty pulse generator or lack of continuity in the wiring between the pulse generator and the computer.

FAULT	ACTION
Computer inoperative Screen blank (All voltages correct)	Replace computer
Computer does not dim with sidelamps on (Battery voltage at red/blue cable connection)	Replace computer
More than one LED illuminated simultaneously (All battery voltages correct)	Replace computer
Time of day displayed Average speed/distance displayed Fuel characteristics zero Speedometer operating (All battery voltages correct – Zero voltage on orange lead with engine running)	Replace interface unit
Time of day displayed All other functions zero Speedometer not operating (All battery voltages correct – Zero voltage on orange lead with car on axle stands, engine running, transmission in 'DRIVE')	Replace pulse generator (speed transducer)

CONTENTS

Operation	Operation No.	Page No.
Headlamp washer reservoir—Remove and refit	84.20.01	84—4
Headlamp wiper motor—Remove and refit	84.25.12	84—4
Washer bracket—Remove and refit	84.10.02	84—2
Washer jets—Remove and refit	84.10.09	84—2
Washer reservoir—Remove and refit	84.10.01	84—2
Wheel boxes—Remove and refit	84.15.28	84—3
Windscreen washer pump—Remove and refit	84.10.21	84—2
Windscreen washer/wiper switch—Remove and refit	84.15.34	84—4
Windscreen wiper rack drive—Remove and refit	84.15.24	84—3
Wiper arms—Remove and refit—LH	84.15.02	84—3
Wiper arms—Remove and refit—RH	84.15.03	84—3
Wiper blades—Remove and refit	84.15.05	84—3
Wiper motor—Remove and refit	84.15.12	84—3
Wiper motor delay unit—Remove and refit	84.15.36	84—4
Wiper motor gear assembly—Remove and refit	84.15.14	84—3

WINDSCREEN WIPERS AND WASHERS

WASHER RESERVOIR

Remove and refit 84.10.01
Bracket 84.10.02

Pull the plastic cap from the neck of the reservoir; (1, Fig. 1) withdraw the cap, feed the tube and filter complete from the reservoir. Withdraw the reservoir from the bracket. The bracket is secured by two setscrews (2, Fig. 1).

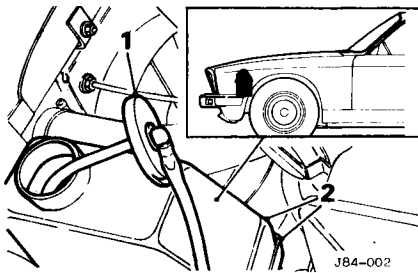


Fig. 1

Refitting is a reversal of the removal procedure.

NOTE: It is recommended that only soft water mixed with a proprietary cleaning fluid to the correct proportions is used when filling the washer system. This will minimize the formation of deposits that affect the performance of the system.

WASHER JETS

Remove and refit 84.10.09

Prise and raise the grille clear of the scuttle. Disconnect the washer tube from the jet assembly, then remove the grille from the car. Remove the washer jet butterfly nut and remove the jet from the grille (Fig. 2).

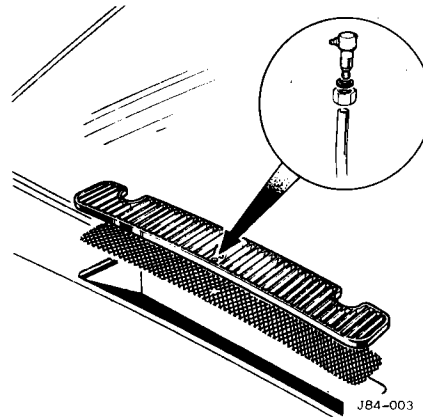


Fig. 2

After refitting operate the washers and adjust the jets.

WINDSCREEN WASHER PUMP

Remove and refit 84.10.21

Note the position of the leads, then disconnect the leads from the washer pump (1, Fig. 3). Carefully prise the washer tube from the pump nozzles (2, Fig. 3).

Remove the screws securing the pump and tubing retaining clip to valance (3, Fig. 4) then withdraw the pump.

NOTE: Warming the tubing will facilitate refitting.

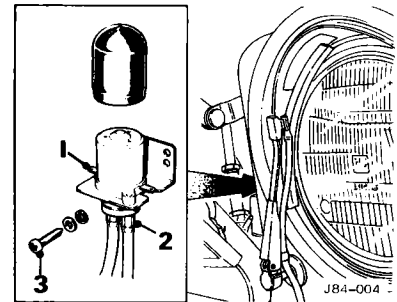


Fig. 3

WINDSCREEN WIPER ARM/BLADES POSITION

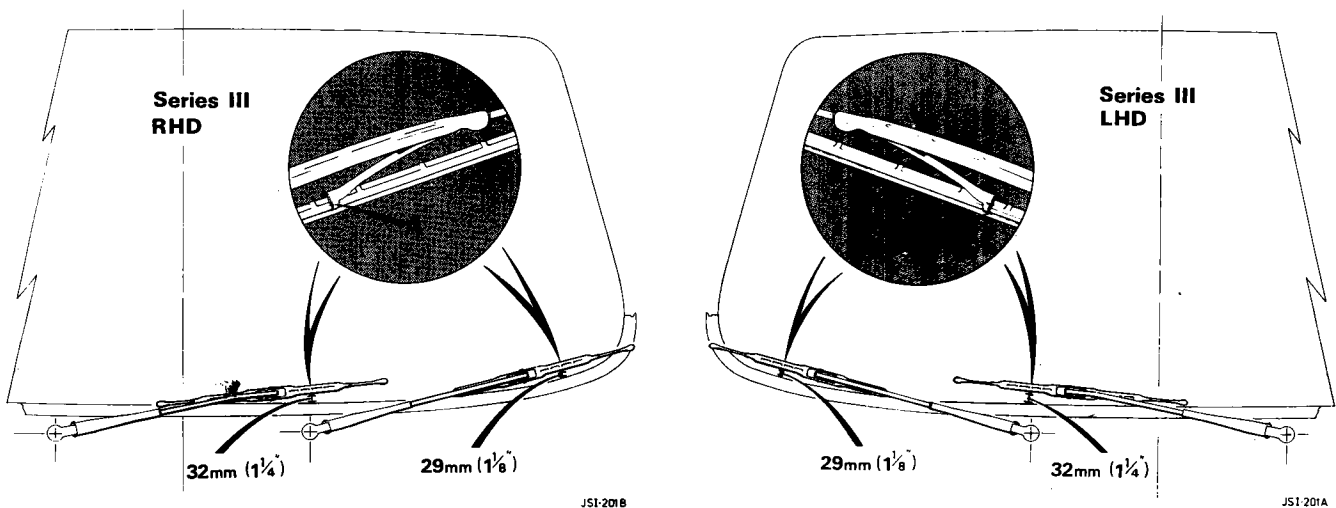


Fig. 4

WIPER ARMS

Remove and refit L.H. 84.15.02
R.H. 84.15.03

Raise the plastic cover to expose the spindle nut (1, Fig. 5).

Note the position of the arm, then remove the nut.

Remove the arm and blade assembly.

When refitting, locate the arm and blade assembly to its noted position on the spindle.

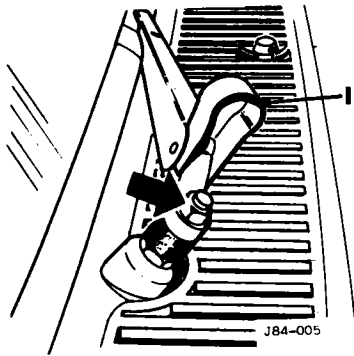


Fig. 5

WIPER BLADES

Remove and refit 84.15.05

Raise the blade with one hand and with the thumb-nail of the other hand depress the spring clip (1, Fig. 6).

Press the wiper arm towards the windscreen to disengage the dimple from the blades (2, Fig. 6); slide the blade from the arm.

Press the blade straight onto the wiper arm until the dimple engages the spring clip to refit.

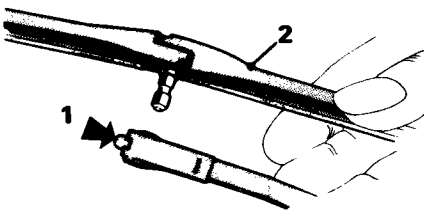


Fig. 6

WIPER MOTOR

Remove and refit 84.15.12

Disconnect and remove the battery. Withdraw the wiper arms and blades from the spindles.

Remove the bonnet pull bracket nuts and bolts. Remove the wiper motor cover. Disconnect the cable rack conduit from the motor (1, Fig. 7).

Remove the two retaining nuts and washers from the motor clamp (2, Fig. 7).

Tilt the motor towards the engine and withdraw the cable connectors.

Remove the motor and drive as a complete assembly, drawing the rack drive from the conduit.

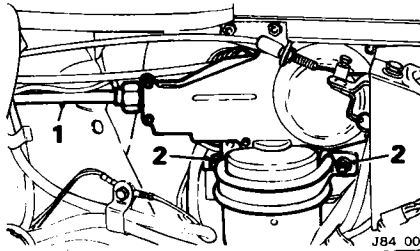


Fig. 7

When refitting, insert the rack into the conduit. It may be necessary to turn the wheelbase spindles to enable the rack to be pushed right home.

WIPER MOTOR GEAR ASSEMBLY

Remove and refit 84.15.14

Remove the wiper motor and rack drive cable. Remove the circlip and washer on the gear assembly shaft (1, Fig. 8).

Mark and note the position of the gear assembly in relation to a chosen point on the housing and remove the gear (2, Fig. 8).

When refitting, ensure that the gear is to the position marked.

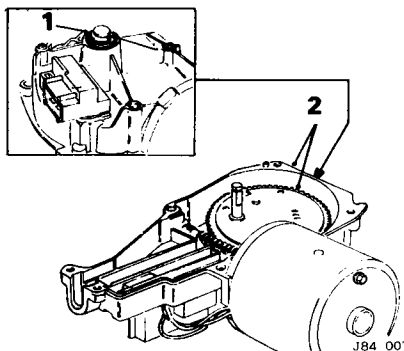


Fig. 8

WINDSCREEN WIPER RACK DRIVE

Remove and refit 84.15.24

Disconnect the battery. Remove the wiper arm and blades.

Remove the bonnet-pull bracket nuts and bolts, and the wiper motor cover.

Remove the gear cover-plate by withdrawing the hexagon-head screws (1, Fig. 9).

Remove the link arm by removing the retaining clip and washer (2, Fig. 9).

Manoeuvre and withdraw the rack drive cable (3, Fig. 9).

To refit, grease and insert the rack into the tube, turning the wheelbox spindles to enable the rack to be just right home.

Align the rack with the link arm and fit the link arm. Continue to refit by reversing the above instructions.

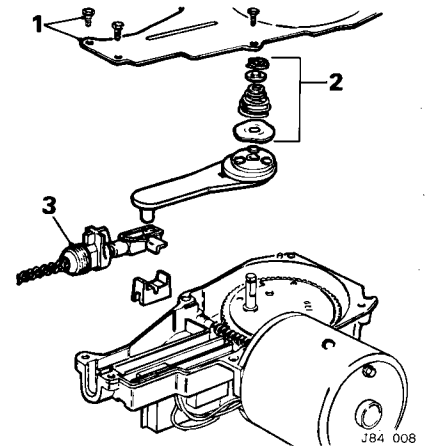


Fig. 9

WHEEL BOXES

Remove and refit

Disconnect and remove the battery. Remove the wiper arm and blades. Remove the screen rail fascia. Remove the wiper motor. Remove the demister flap/actuator assembly. Remove the two nuts (1, Fig. 10) retaining the wheelbox backplate and release the drive conduit (2, Fig. 10). Remove the nuts securing the wheelbox(es) to the scuttle and remove the chrome distance pieces and sealing rings (3, Fig. 10). Remove the wheelboxes.

Reverse the above procedure to refit.

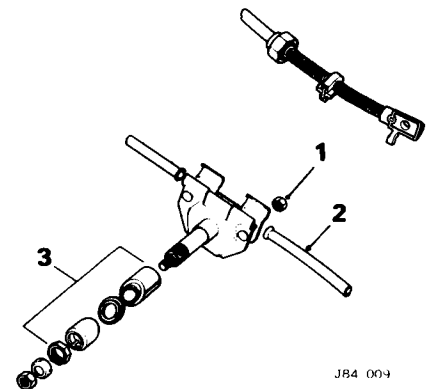


Fig. 10

WINDSCREEN WIPERS AND WASHERS

WIPER MOTOR DELAY UNIT

Remove and refit 84.15.36

Remove the passenger's side dash casing. The delay unit is retained in a socket behind the left-hand fusebox (1, Fig. 11).

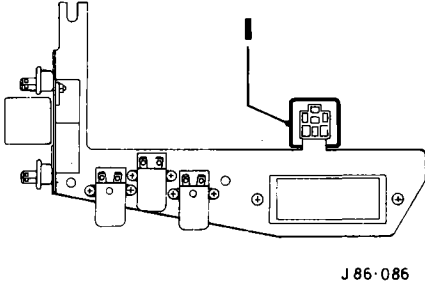


Fig. 11

J 86-086

WINDSCREEN WASHER/WIPER SWITCH

Remove and refit 84.15.34

Disconnect the battery. Remove the driver's dash liner. For access, remove the indicator switch. Remove the upper shroud (1, Fig. 12). Disconnect the wiper switch cable harness at the multi-pin connectors. Remove the Spire nut from the switch spigot (2, Fig. 12). Remove the two screws securing the wiper switch to assembly (3, Fig. 12) and remove switch.

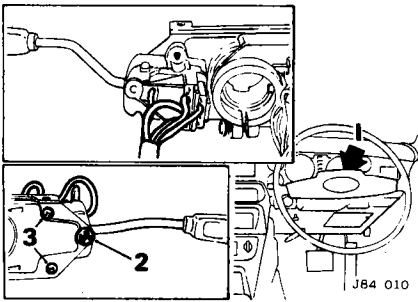


Fig. 12

J 84 010

Reverse the above procedure to refit.

HEADLAMP WASHER RESERVOIR

Remove and refit 84.20.01

NOTE: This reservoir supplies both windscreen and headlamp washing systems.

Raise the front of the car and place on stands. Remove the L.H. front wheel.

Remove the three screws and detach the stoneguard; collect the sealing strips. Slacken the hose clip securing the rubber elbow to filler neck (1, Fig. 13). Remove the three screws securing the mounting strap assembly (2, Fig. 13), detach the mounting strap and lower the reservoir until the screws attaching the manifold assembly to the reservoir are accessible. Remove the four screws securing the manifold assembly (3, Fig. 13), withdraw the reservoir from the pipes.

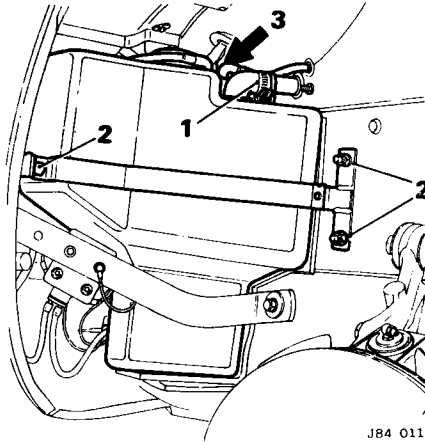


Fig. 13

J 84 011

Reverse the above procedure to refit.

HEADLAMP WIPER MOTOR

Left and Right Hand

Remove and refit 84.25.12

Disconnect the battery. Remove the L.H. or R.H. cable harness cover. Disconnect the tube from the washer reservoir filler cap (L.H. side). Disconnect the cable block connector and reposition the tube and the cable block connector through the body grommets. Turn the steering to full L.H. or R.H. lock. Remove the wiper motor cable harness clip. Displace the washer pump for access (L.H. side).

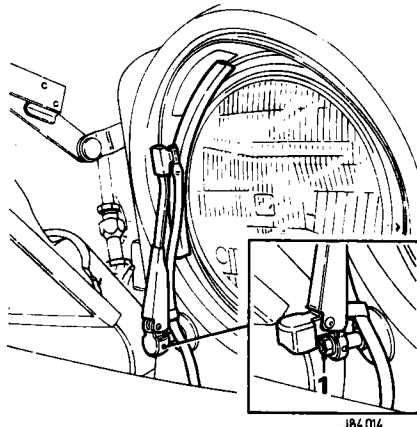


Fig. 14

J 84 014

Lift the wiper arm securing nut cover. Remove the nut securing the wiper arm and remove the wiper arm (1, Fig. 14). Slacken the wiper motor securing nut (1, Fig. 15) and remove the wiper motor.

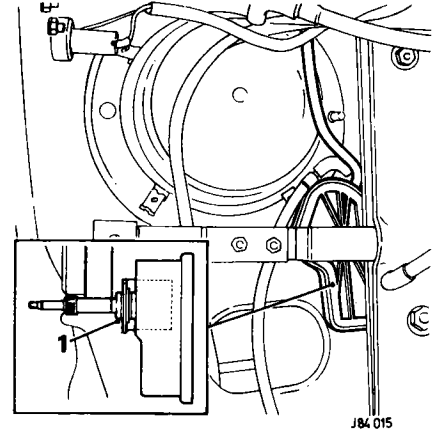


Fig. 15

J 84 015

Refitting is the reversal of the above procedure.