

Chapter M

Electrical system

Section

- M1 Charging system
- M2 Starting system
- M3 Ignition system
- M4 Warning lamps and instruments
- M5 Speed control
- M6 Windscreen wipers and washer
- M7 Interior lighting
- M8 Exterior lighting
- M9 In-car entertainment
- M10 Electrically operated front seats
- M11 Electrically operated window lifts
- M12 Centralised door locking
- M13 Electric gear change
- M14 Horns
- M15 Hood mechanism

A wiring diagram for the fuel injection system fitted to 1980 model year cars destined for California, is included in Chapter U and Chapter V of this manual.

Chapter M

Issue record sheet 1

December 1981

The dates quoted below refer to the issue date of individual pages within this chapter.

Section	M1	M2	M3	M3 Supp. 1	M3 Supp.2	M4	M5	M6	M7	M8	M8 Supp. 1	M9
Page No.												
1	May 80	Feb 77	Jul 79	Jul 79	Dec 81	Feb 77	Feb 80	Apr 77	May 77	Jul 79	Jul 79	Jul 79
2	Feb 77	Feb 77	Jul 79	Jul 79		Feb 77	Feb 80	Apr 77	May 77	Jul 79	Jul 79	Jul 79
3	May 80	Feb 77	Feb 77	Jul 79		Feb 77	Feb 80	Apr 77	May 77	May 77	Jul 79	Jul 77
4	May 80	Feb 77	Feb 77	Jul 79		Feb 77	Feb 80	Apr 77	May 77	May 77	Jul 79	Jul 77
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6	Feb 77	Feb 77	Feb 77	Jul 79		Feb 77	Feb 80	Apr 77	May 77	May 77	Jul 79	Jul 79
7	Feb 77	Feb 77	Jul 79	Jul 79		Feb 77	Feb 80	Apr 77	May 77	May 77	Jul 79	Jul 79
8	Feb 77	Feb 77	Jul 79	Jul 79		Feb 77	Feb 80	Apr 77	May 77	May 77		Jul 79
9	May 80	Feb 77	Feb 77	Jul 79		Feb 77	Nov 80	Apr 77	May 77	May 77		Jul 77
10	May 80	Feb 77	Feb 77	Jul 79		Feb 77	Nov 80	Apr 77	May 77	May 77		Jul 77
11	Feb 77	Feb 77	Apr 77	Jul 79		Feb 77	Feb 80	Apr 77	May 77	May 77		Jul 77
12	Feb 77	Feb 77		Jul 79		Feb 77	Feb 80	Apr 77	May 77	May 77		Jul 77
13	Feb 77	Feb 77		Jul 79		Feb 80	Nov 80	Apr 77	May 77	May 77		Jul 77
14	Feb 77					Feb 80		Apr 77		May 77		Jul 77
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Chapter M

Issue record sheet 2

December 1979

The dates quoted below refer to the issue date of individual pages within this chapter.

Section	M9 Supp.1	M10	M11	M12	M13	M14	M15	M16	M17					
Page No.														
1	Jul 79	Dec 79	Jul 77	Aug 77	Aug 77	Aug 77	Sept 77	Sept 77	Sept 77					
2	Jul 79	Dec 79	Jul 77	Aug 77	Aug 77	Aug 77	Sept 77	Sept 77	Sept 77					
3	Jul 79	Jul 77	Jul 77	Aug 77	Aug 77	Aug 77	Sept 77	Sept 77	Sept 77					
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Chapter M

Electrical system

Introduction

The electrical system is negative earth. Components not described within this chapter are detailed as follows:

- Automatic air conditioning - Chapter C
- Emission control - Chapter U

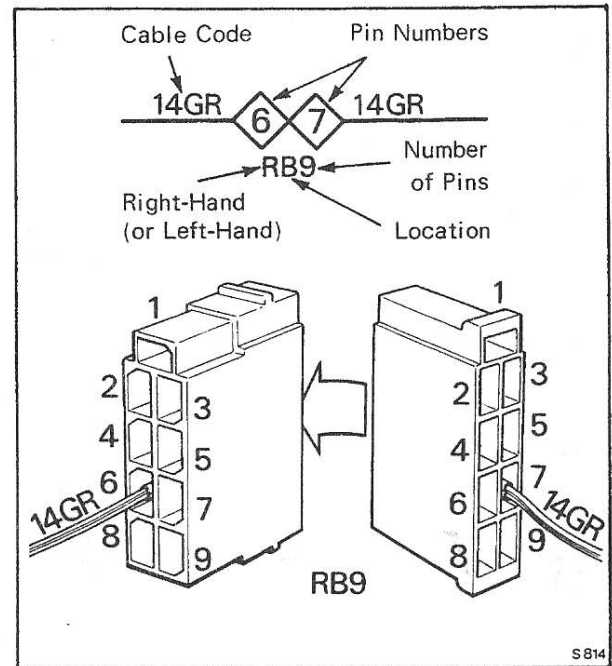
Some changes have been made in this edition of the Electrical system, the main one being the addition of separate system wiring diagrams and fault diagnosis. In addition, each section covers all the components that are in the system with one or two exceptions. For example, the battery, battery temperature sensors, alternator, regulator etc. are all within Section 1, the Charging System.

Connector code

The wiring diagrams are basically theoretical circuits showing all plug and socket connectors, which can be identified using the following code. The pin numbers referred to are viewed with the plug inserted and do not necessarily correspond with the numbers moulded on the plug and socket.

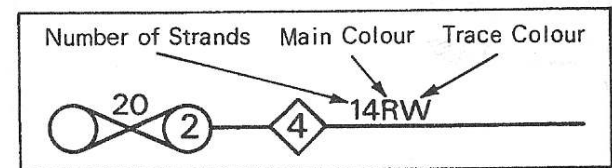
Code	Location
B	Body socket
C	Console
D	Door socket
FA	Fuseboard 'A'
FB	Fuseboard 'B'
V	Valance
R	Relay P.C.B.
M	Main distribution
TA	Toeboard socket 'A'
TM	Toeboard socket M
G	Gearbox actuator
S	Switchbox
DI	Direction indicator
WD	Window demist socket
OC	Oil check switch socket
PD	Panel dim socket
HW	Hazard warning socket
SL	Seat loom
TL	Tape loom
CR	Radio changeover relay
SA	Seat actuator

When the code is in brackets e.g. (LTK), this shows alternative socket used on left-hand drive cars.



Cable colour code

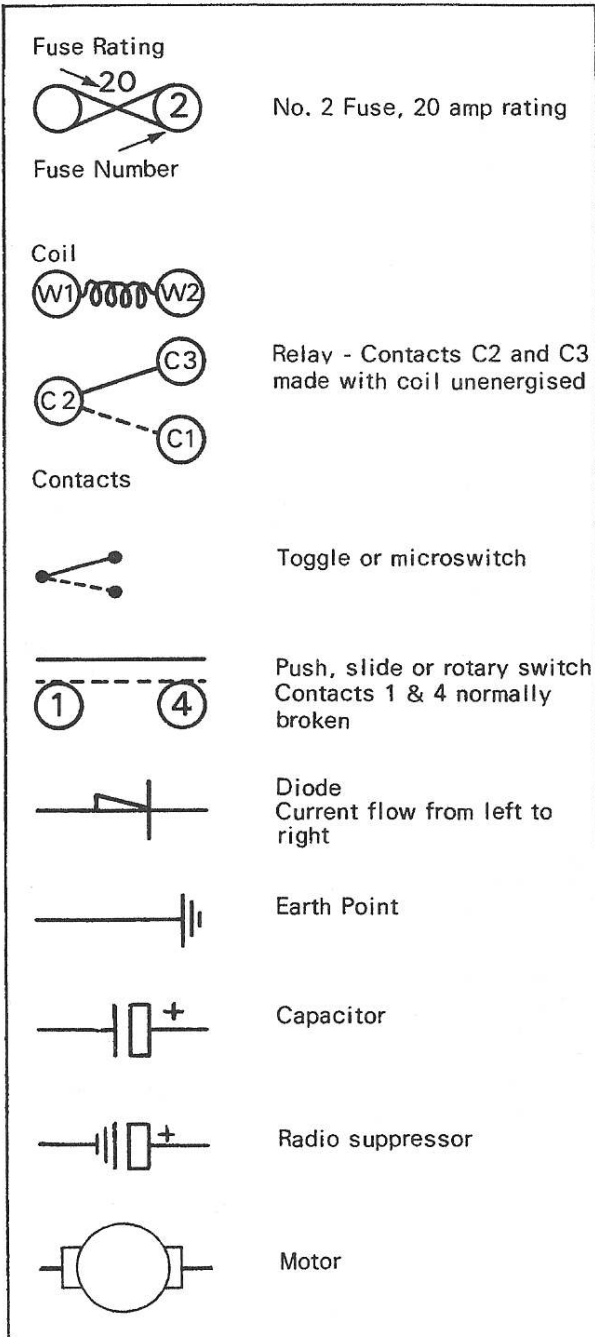
The colour code has not changed although all cables are now plastic-covered.



- | | | | |
|---|--------|----|-------------|
| B | Black | LG | Light green |
| N | Brown | U | Blue |
| R | Red | S | Slate |
| O | Orange | P | Purple |
| Y | Yellow | W | White |
| G | Green | | |

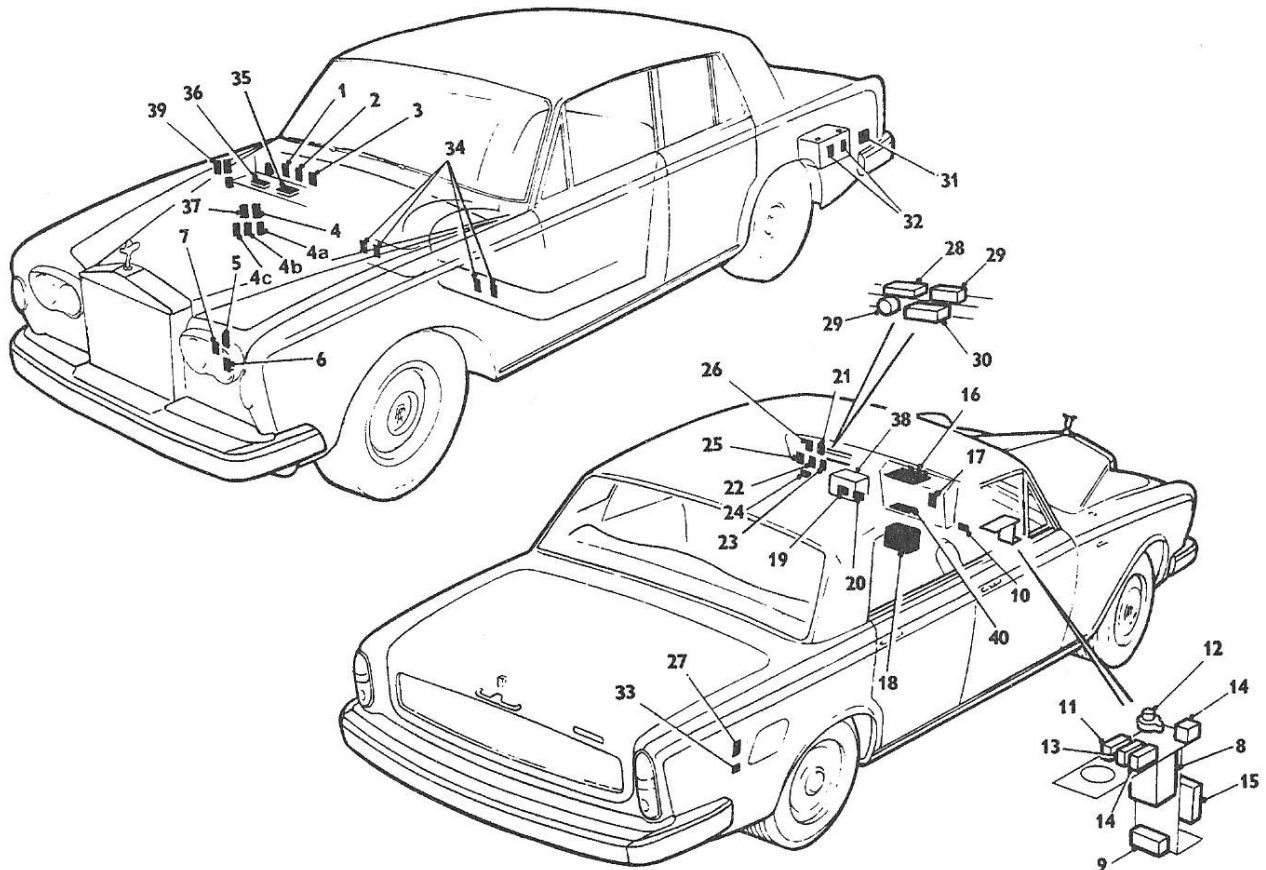
Component identification

The following list will help to identify some of the components used in the wiring diagrams:



Chapter M

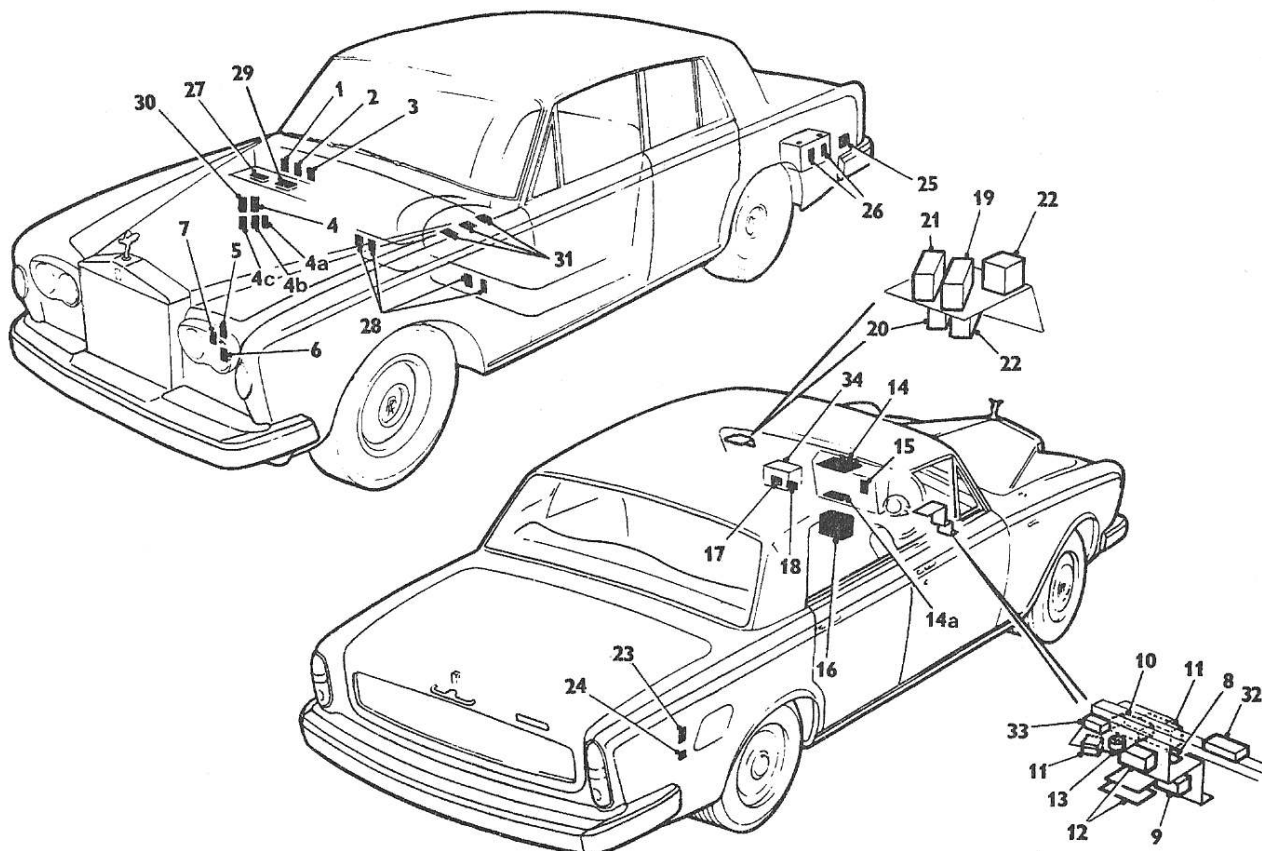
Component location
Left-hand drive cars



- | | | | |
|----|--|----|---|
| 1 | Fan and compressor relay | 20 | Lower quantity relay |
| 2 | Fan delay relay | 21 | Fuel pump cut-off relay (not USA) |
| 3 | Servo isolation relay | 22 | Speed control relay |
| 4 | Choke on start relay - SU carbs only | 23 | Rear fog lamps relay (when fitted) |
| 4a | Choke heater relay - Solex carb only | 24 | Diode board for washer level and auto speed control |
| 4b | Choke heater resistor relay - Solex carb only | 25 | Recirculation flap relay |
| 4c | Choke heater resistor - Solex carb only | 26 | Washer level amplifier |
| 5 | Horn relay | 27 | Rear window demist relay (except Convertible) |
| 6 | Head flash relay | 28 | Auto-speed control electronic control box |
| 7 | Head safety relay | 29 | Key warning buzzer and relay (USA only) |
| 8 | Combined wiper function module | 30 | EWL ignition control (when fitted) |
| 9 | Hood interlock relay (convertible only) | 31 | Voltage control unit |
| 10 | Seat belt warning (USA only) | 32 | Battery temperature sensors |
| 11 | Low washer fluid lamp relay | 33 | Stop lamp failure relay |
| 12 | Engine overheat buzzer | 34 | Seat relays |
| 13 | Panel lamps relay | 35 | Ammeter shunt |
| 14 | Interior light delay unit and relay | 36 | Fusebox - fan and compressor |
| 15 | Panel lamps unit | 37 | Starter relay |
| 16 | Test circuit board for warning lamps | 38 | Fan speeds module |
| 17 | Hood down temperature relay (convertible only) | 39 | Wiper operation relays (3) |
| 18 | A.C.U. Servo unit | 40 | Radio/tape changeover relay |
| 19 | Fan shut off relay | | |

Chapter M

Component location
Right-hand drive cars



- | | |
|--|--|
| 1 Fan and compressor relay | 16 A.C.U. Servo |
| 2 Fan delay relay | 17 Lower quantity relay |
| 3 Servo isolation relay | 18 Fan shut off relay |
| 4 Choke on start relay - SU Carburetter engines only | 19 Recirculation flap relay |
| 4a Choke heater relay - Solex carburetter engines only | 20 Rear fog lamps relay |
| 4b Choke heater resistor relay (Solex only) | 21 Hood interlock relay (Convertible) |
| 4c Choke heater resistor (Solex only) | 22 Washer fluid level amplifier and relay |
| 5 Horn relay | 23 Rear window demist relay (except Convertible) |
| 6 Head flash relay | 24 Stop lamp failure relay |
| 7 Head safety relay | 25 Voltage regulator |
| 8 Diodes for washer fluid level speed control and headlamps wash (when fitted) | 26 Battery temperature switches |
| 9 Fuel pump relay | 27 Fusebox - fan and compressor |
| 10 Intermittent and wash/wipe control unit | 28 Seat motor relays |
| 11 Interior lamps delay unit and relay | 29 Ammeter shunt |
| 12 Instrument lights dimming unit and relay | 30 Starter relay |
| 13 Engine overheat buzzer | 31 Wiper function relays |
| 14 Warning light test board | 32 Automatic speed control box |
| 14a Radio/tape changeover relay | 33 Automatic speed control relay |
| 15 Hood down temperature relay - Upper system (Convertible) | 34 Fan speed module and voltage stabiliser unit |

Note - items 20 and 22 can be transposed

Section M1

**Charging system
Contents**

	Page
Introduction	M1 - 3
General precautions	M1 - 3
System operation	M1 - 3
Battery	M1 - 3
Battery temperature sensors	M1 - 4
Alternator Model CAV 512	M1 - 4
Regulator Model 440	M1 - 7
Ammeter and ammeter shunt	M1 - 7
Charging system - Fault diagnosis	M1 - 9
Component location	M1 - 13
Wiring diagram	
Sheet 1 of 2	
Applicable to all cars prior to car serial numbers SRX 34573, LRG 34601, SBH 34775, CRH 34830 and DRX 33029	M1 - 15
Sheet 2 of 2	
Applicable to all cars from car serial numbers SRX 34573, LRG 34601, SBH 34775, CRH 34830 and DRX 33029	M1 - 17

Section M1

Charging system

Introduction

The wiring diagram at the end of this section shows all components used in the charging system and are detailed in this section with the following exceptions: Ammeter and ammeter shunt - Section M4, Ignition warning lamp - Section M3.

General precautions

It is essential that the following precautions are taken to avoid irreparable damage to the system when carrying out vehicle maintenance.

The battery must not be connected or disconnected whilst the engine is running.

The engine must be switched off before attempting to disconnect a lead from the charging system

1. Whenever a lead is disconnected, it should be identified in relation to its terminal to facilitate reconnection. Short circuiting or reverse polarity, no matter how brief, will cause immediate and permanent damage to transistors and diodes.
2. The battery must not be connected into the system without first checking for correct polarity.
3. Radio interference suppressors are fitted to the 'A' terminal of the regulator and to the 'A' and + terminal of the alternator. **Do not connect suppressors to the 'F' terminal** (brown/green lead).

System operation

The initial field excitation is supplied from the battery via the warning lamp when the ignition switch is closed. The voltage generated from the initial field excitation is rectified by three auxiliary diodes in conjunction with three main diodes and supplements the field current from the battery to rapidly build-up the voltage to the full battery value. At that moment, the potential of terminal A is equal to that of the alternator positive terminal, consequently the warning lamp is extinguished and all the field current is now supplied from alternator terminal A. When the voltage at terminal A rises in excess of battery voltage, the value at the alternator positive terminal will also rise and charging current will

be supplied to the battery.

The regulator controls the alternator output voltage by rapidly switching the alternator field voltage on and off by means of transistors, the reference voltage being provided by a zener diode.

Battery

Important

It is imperative that the negative (earth) lead is disconnected from the battery before commencing work on the electrical system or components, or if any electric arc welding is to be used on the car. **The battery must not be disconnected or connected whilst the alternator is running** nor connected into the system without first checking correct polarity.

Corrosion

To remove corrosion from the battery leads and terminal posts, disconnect the leads and wash with hot water or a dilute solution of ammonium carbonate.

The ammonium carbonate must be removed with clean water; thoroughly dry the leads and terminal posts with a cloth.

After connecting the battery leads to the battery terminals, smear the terminals with petroleum jelly (not grease).

Battery - To charge

Warning

The gases given off during charging are highly inflammable.

1. Remove the battery from the car.
2. Ensure that the battery charger is switched off.
3. Connect the charger leads to the battery, **ensuring that the positive lead is connected to the positive terminal.**
4. For normal charging, leave the screw caps in position but remove them when boost charging.
5. Switch on the charger and adjust the current to 7 amps (max).
6. Periodically measure the specific gravity and compare with the values shown in Table 1. When the fully charged value is attained, the charging is complete.

Initial charge - For new batteries

1. The specific gravity figures given in Table 1 are correct at 15.6 °C. To the specific gravity measured, add 0.00072 for every 1 °C above this

M1 - 4

temperature.

e.g. Measured S.G.
1.265 at 32.3 °C

Correct S.G.=
1.265 + (32.3-15.6)
x 0.00072 =
1.265 + (16.7)
x 0.00072 =
1.265 + 0.01202
=1.277.

2. Fill the battery with cool accumulator acid preferably between 4 °C and 27 °C of the correct specific gravity given in Table 1.
3. The electrolyte level will fall soon after filling and must be restored by adding more electrolyte, after which the battery must stand for 3 hours. After this time, it will again be necessary to top-up to obtain the correct level.
4. The recommended charge rate is 7 amps for 12 hours. The charge may be interrupted provided that the charging periods are at least 8 hours and the rest periods do not exceed 16 hours.
5. The charge will not be complete until the total specified charging time has elapsed, the voltage and specific gravity of each cell has remained constant throughout 5 successive hourly readings and gas is being freely emitted from each cell.
6. When the charge is completed, the specific gravity of the acid in each cell should not exceed the figures quoted in Table 1; if it does, acid must be withdrawn from the cell(s) and an equal amount of distilled water added. The battery should then be charged for a further one hour and the specific gravity measured again.

The final adjustment of the acid level should be made after the battery has been standing for two hours to allow excess gas to escape and the electrolyte level to fall.

Table 1

Air temperature below 32 °C (90 °F)	
Specific Gravity	Condition of battery
1.270 to 1.290	Fully charged
1.180 to 1.200	Half discharged
1.090 to 1.110	Fully discharged
Air temperature above 32 °C (90 °F)	
Specific Gravity	Condition of battery
1.220 to 1.240	Fully charged
1.150 to 1.170	Half discharged
1.070 to 1.090	Fully discharged

Battery temperature sensors

The temperature sensors determine the optimum output voltage necessary to charge the battery. Two sensors are fitted inside the battery box, one which opens when the temperature falls below 0 °C and one which closes when the temperature exceeds 35 °C.

The last two figures on the sensor indicate the operating temperature i.e. 00 opens at temperatures

below 0 °C and 35 closes at temperatures above 35 °C.

Sensors - To test

Cable colours for cars from serial numbers SRX 34573, LRG 34601, SBH 34775, CRH 34830 and DRX 33029 are given in brackets.

Disconnect the brown, brown/blue (white) and brown/red (red) cables from the High, Medium and Low connections of the regulator.

If the ambient temperature is between 0 °C and 35 °C there should be continuity between the brown and brown/blue (white) cables and an open circuit between the brown/blue (white) and brown/red (red) cables. With the ambient temperature above 35 °C, there will be continuity between the brown/blue (white) and the brown/red (red) cables. With the ambient temperature below 0 °C there will be an open circuit between the brown and brown/blue (white) cables.

Remake the connections to the regulator ensuring that the brown cable between the regulator and the battery is also connected.

Alternator Model CAV 512

The alternator is a three-phase machine of the revolving field and stationary armature type and is self-limiting in current output. Rectification of the output into direct current is provided by six diodes contained within the slipping end-shield and connected in a three-phase bridge circuit between the stator and output terminals. A second rectifier bridge is formed by using three of the six main diodes and three auxiliary diodes, and these supply the energy for the alternator field coil which is fed through sliprings and brushes. This arrangement of auxiliary diodes prevent the battery from discharging through the field coil when the alternator is stationary.

The alternator fitted to the Corniche is an AC5B/12/38 with an output of approx. 53 amps. The alternator fitted to Silver Shadow II and late 1976 Camargue is an AC5B/12/53 with an output of approx. 75 amps.

Alternator - To test in position

1. Connect a 0-50 volt first grade moving coil voltmeter between the regulator negative terminal and the positive terminal marked H1.
2. Connect a 0-100 amp first grade ammeter in series in the alternator positive line.
3. With the battery in a fully charged condition, the system is in correct working order when the following sequence is observed:
4. Switch the ignition on and observe that the warning lamp marked GEN illuminates.
5. Switch on all the electrical loads with the exception of the windscreen wipers.
6. Start the engine, allow it to run at approximately 1000 r.p.m. and observe that the warning lamp is extinguished.
7. Momentarily increase the engine speed to approximately 3000 r.p.m. and observe that the alternator current is approximately 53/75 amps

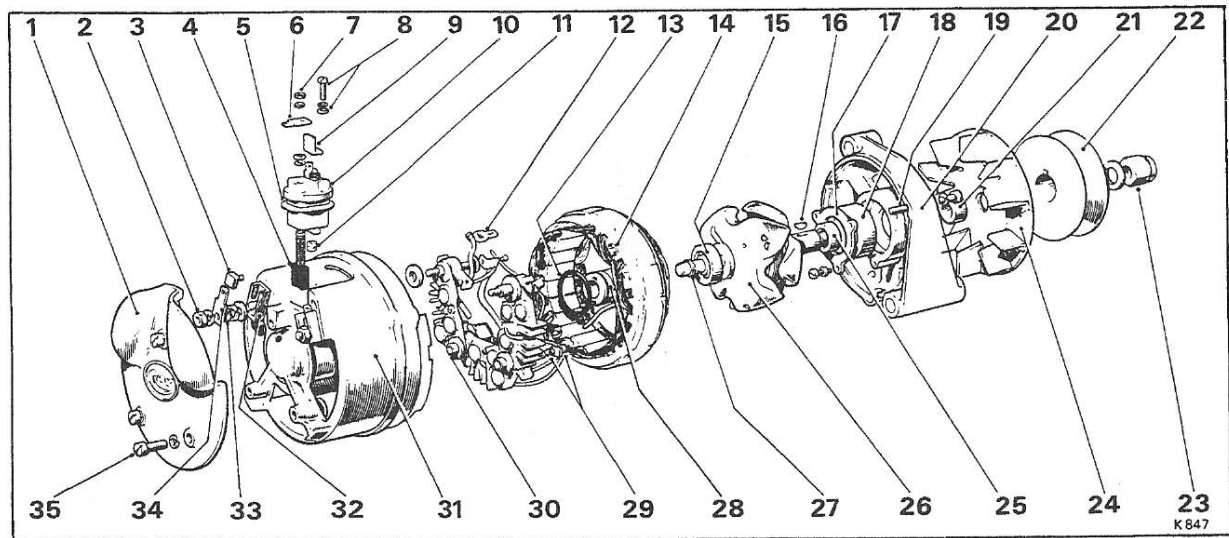


Fig. M1 Exploded view C.A.V. type 512 alternator

1	Baffle	13	'O' ring	25	Bearing spacer
2	Main terminal nut	14	Stator	26	Rotor
3	Insert	15	Bearing	27	Circlip
4	Brush	16	Woodruff key	28	Slip rings
5	Gasket	17	Clamp plate	29	Heat sink securing screw
6	'Lucar' blade	18	Bearing	30	Diode and heat sink assembly
7	Field terminal nuts and washers	19	'Through' bolt	31	Slip ring end shield assembly
8	Retaining screw and washers	20	Drive-end shield	32	Shroud
9	Insulator	21	Fan spacer	33	Round slotted nut
10	Brush holder	22	Pulley	34	'Lucar' terminal
11	Grommet	23	Pulley nut	35	Baffle screw
12	'A' lead	24	Fan		

8. With the engine running at approximately 1500 r.p.m. switch off all the loads. The voltage should rise to between 14.0 and 14.5 volts and then remain constant, the current reading should drop appreciably.

9. Should there be a fault in the system this will be apparent by one or more of the following symptoms:

10. If the warning lamp does not illuminate check the bulb and renew if defective.

11. If the bulb is serviceable but does not illuminate, check the regulator by first switching off the engine and disconnecting the lead from terminal F on the regulator. Clip this lead to earth and switch on the ignition. If the lamp now illuminates the regulator is faulty and must be replaced by a new regulator. If the lamp still remains unlit then the alternator is faulty. The tests described in 9-11 may be used to locate the alternator fault. Having located the fault, switch off the engine and reconnect the F lead to F terminal.

12. Tests on the alternator can be carried out on the engine by partial dismantling in the following manner:

13. Field winding

Disconnect the leads from F and A terminals on the alternator and remove brush gear moulding. Measure the field resistance across the slip rings which should be $3.2 \text{ ohms} \pm 0.16 \text{ ohms}$. An appreciably lower field resistance could mean a short circuit between the coils: a higher reading indicates that the contact surfaces of the slip rings need cleaning. A reading of infinity indicates an open circuit in the field.

14. Brushes (see Fig. M2)

If the field resistance is correct check that the brush length is greater than the minimum length of 7.94 mm. (0.312 in.) and ensure that proper contact with the slip rings is made.

15. Slip rings

The surface of the slip rings should be smooth and uncontaminated by oil or other foreign matter. The surface may be cleaned with very fine glass paper without fully dismantling the machine. On no account must emery cloth or similar abrasive be used.

16. Stator winding

Low output or no output at all from the alternator may be due to either a faulty stator or a faulty

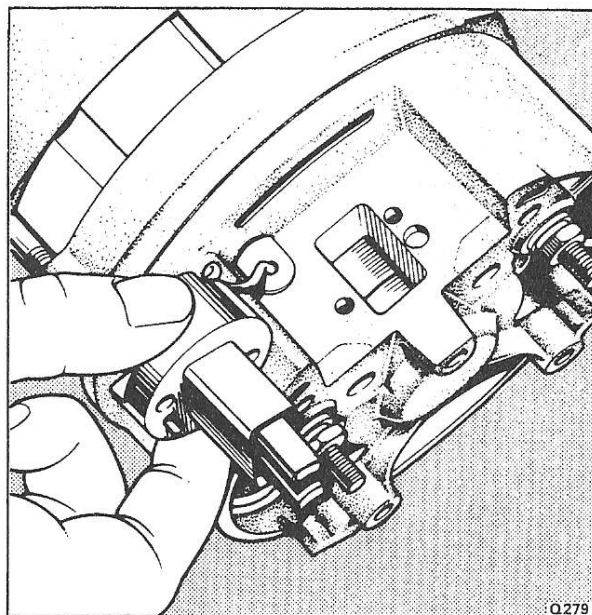


Fig. M2 Alternator brushes

diode in which case it is difficult to distinguish between the two faults without first dismantling the alternator. In these circumstances it is necessary to remove the stator from the alternator and measure the volts drop across each pair of three stator connections as described in Alternator - Bench testing.

Alternator - Bench testing (AC5B/12/38)

1. Before making any connections, test the alternator for earths by non-destructive flash test (or megohm meter) with voltage rating of 110 volts. Connect instrument between D+ and earth, D- and earth and A terminal and earth. Ensure always to keep one probe on the frame to prevent full test voltage being applied between any two terminals of the alternator. A megohm meter must have a minimum insulation resistance of 10 megohms.
2. Mount the alternator to the test machine drive and make all connections as in wiring diagram M3.
3. Close switch 4 and observe that the lamp is lit.
4. Start the drive and increase speed until the lamp is extinguished which indicates that the alternator is charging. This should occur below 2000 r.p.m..
5. Reduce alternator speed to 1125 r.p.m. and measure the voltage between HIGH and -ve on the regulator. This should be between 12 and 14 volts.
6. Connect the voltmeter across the battery terminals, apply load of 40-50 amps and increase alternator speed to 3200 r.p.m.
7. Observe ammeter (2) reading which should be 50-55 amps at 13-13.6 volts.
8. Increase speed to 10 000 r.p.m. and again observe ammeter reading which should be between 60 and 65 amps at 13-14 volts. Adjust battery load as necessary.

9. Run at 10 000 r.p.m. for one minute.
10. Decrease speed to 3000 r.p.m. and switch off loads connected across battery, the voltage should rise to between 13 and 14 volts and then remain constant. At the same time, the current reading should drop appreciably.
11. Open switches 8 and 9, the voltage should be between 14.5 volts and 15.0 volts.
12. Close switch 8, the voltage should now fall to between 14.0 and 14.5 volts.
13. Close switch 9, the voltage should now fall to between 13.5 and 14.0 volts.

Alternator - Bench testing (AC5B/12/53)

1. Carry out operations 1 to 3 as for AC5B/12/38 alternator.
2. Start the drive and increase speed to 1500 r.p.m. the warning lamp should be extinguished.
3. Reduce alternator speed to 1200 r.p.m. and measure the voltage between HIGH and -ve on the regulator. This should be between 12 and 14.5 v.
4. Connect the voltmeter across the battery terminals, increase the speed to 2100 r.p.m. and verify that ammeter (2) reading is approx. 50 amps at 14 volts. Adjust load as necessary.
5. Increase speed to 6000 r.p.m. and verify that the ammeter reading is 75 amps at 14 volts.
6. Carry out operations 9 to 13 of AC5B/12/38 bench test.

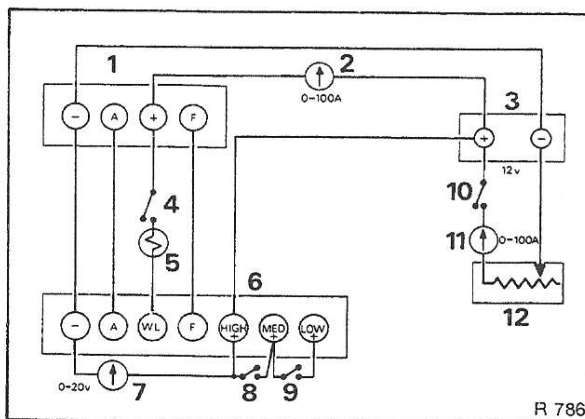


Fig. M3 Bench testing rig

1	Alternator	7	Voltmeter
2	Ammeter	8	Switch
3	Battery	9	Switch
4	Switch	10	Switch
5	16v 2.2w lamp	11	Ammeter
6	Regulator	12	Carbon pile resistor (60 amps minimum)

Alternator - To fit

When fitting an alternator, ensure that all connections are correctly fitted and that the earth strap is routed as shown in Fig. M4.

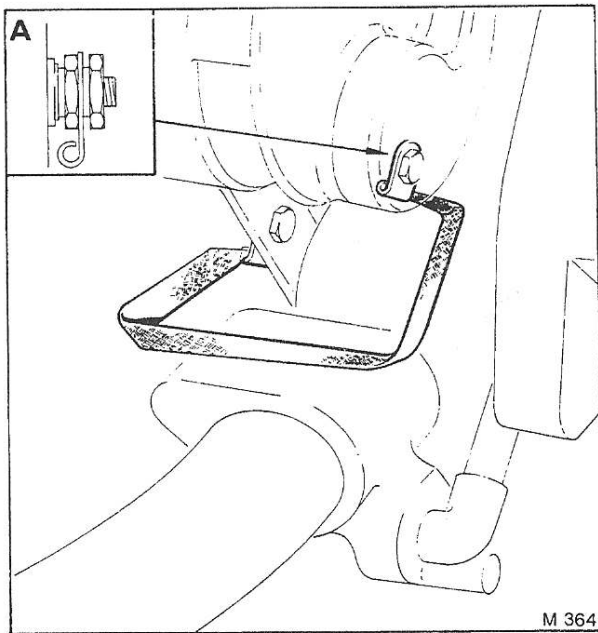


Fig. M4 Correct route of earth strap

Regulator Model 440

The regulator is fully transistorised with no moving parts, does not require service attention and is non-repairable. A cut-out relay is not necessary as the diodes in the alternator prevent reverse currents from passing through the stator when the machine is stationary or when generating less than battery voltage.

It requires little maintenance other than to ensure that the cooling fins are clean and unobstructed. If a fault occurs, the regulator must be replaced.

Ammeter and ammeter shunt

Refer to Section M4 for details of the ammeter and ammeter shunt.

Section M1

Charging system Fault diagnosis

Malfunction	Possible cause	Action
Flat battery	Slipping belts	Check belt tension
	Poor battery connections	Ensure that battery terminals and earth wingnut terminal are clean and secure
	Faulty battery	Recharge from external source. After recharging check specific gravity of each cell. Readings with more than 40 points variation indicate that the battery is suspect
	Continuous drain on battery	Switch off all electrical loads (except electric clock), close all doors, close bonnet and disconnect luggage compartment lamp switch. Check for current leakage in the earth (negative) lead by connecting a 12 volt 2.2 watts lamp in the line, the lamp should not illuminate. The maximum continuous current drain, which is through the regulator circuit should not exceed 8 milliamps. Locate source of leakage by removing fuses one at a time. A fully charged battery should be used for these checks.
	Faulty alternator	<p>Disconnect the battery earth connection and the 120 Brown/White cable from shunt. Connect 0/75 amp ammeter between the 120 Brown/White cable and the corresponding terminal on the shunt. Reconnect the battery. Switch Auto ACU to DEF and headlamps to MAIN BEAM. Start the engine and increase engine speed to approximately 3000 r.p.m., the ammeter should initially indicate 55 (or 75) amps min., a low reading indicates a system fault. No output could be due to any of the following:</p> <p>Faulty alternator, defective alternator to regulator wiring, regulator, open circuit in the regulator positive (brown) or negative (black) leads</p> <p>To isolate fault proceed as follows:</p> <p>Remove F (brown-green) and negative (black) leads from regulator and connect together, switch on electrical loads as previously mentioned, start engine and gradually increase engine speed. If alternator output is restored, replace the regulator unit. The engine speed must not exceed 2500 r.p.m. during this test as, without the regulator in circuit, there is no control over the system voltage.</p> <p>If the alternator is still low on output, check the 14 brown and black leads (H1 and -ve) to ensure that there is a supply and earth to the regulator</p> <p>To determine if the alternator is satisfactory disconnect the leads to the A and F terminals disconnecting also the suppressor condenser on the A terminal. Connect a 12 volt 2.2 watt test lamp</p>

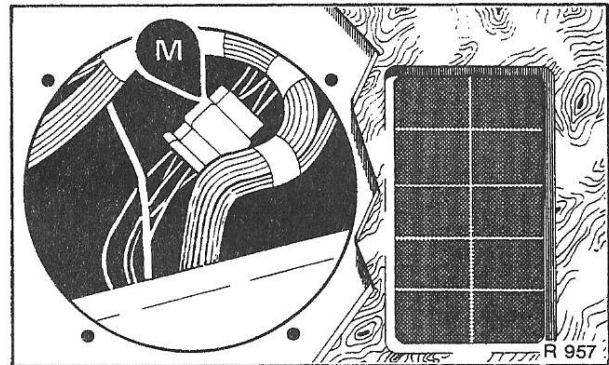
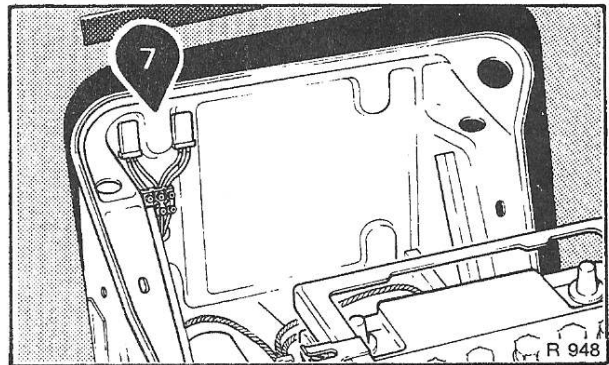
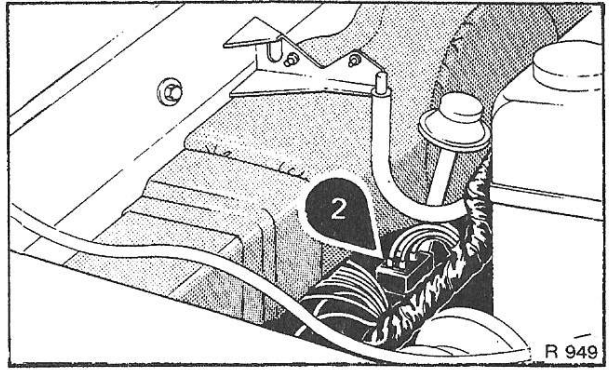
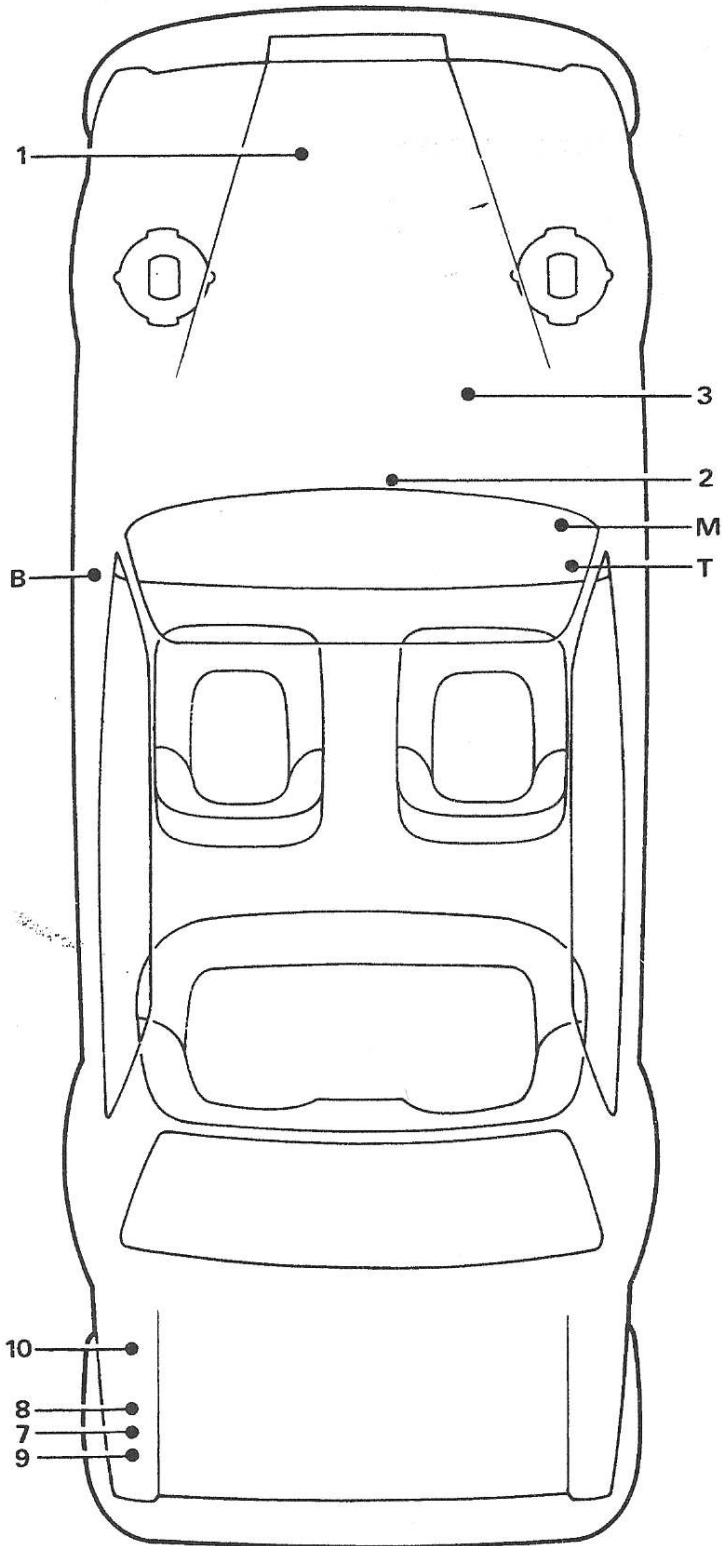
Malfunction	Possible cause	Action
Flat battery cont.	Faulty alternator cont.	between the main alternator positive terminal and A, short the F terminal to earth. Switch on electrical loads and gradually increase engine speed. No output indicates a faulty alternator which should be removed for bench testing. If the alternator is satisfactory, check the continuity and insulation of both the alternator to regulator A and F leads and also the suppressor condenser NOTE: When carrying out insulation checks on the leads they must be disconnected at both the regulator and alternator To check regulator 14NY warning lamp lead see 'Warning lamp fails to illuminate'. 'A short to earth on this lead will prevent the alternator from working).
	Faulty regulator	Connect a 0-20 volt voltmeter across the battery terminals, run the engine up to 2000 r.p.m. with minimum electrical loads switched on. Observe car ammeter and record voltmeter reading when charge rate is below 10 amps. Voltmeter reading should be 14.0 to 14.5 volts at 20° C, 13.5 to 14.0 volts below 0° C and 14.5 to 15.0 volts above 35° C. If setting is high, disconnect 14 brown-red and 14 brown-blue leads from regulator. At temperatures between 0° C and 35° C there should be continuity between the 14 brown and 14 brown-blue leads. If this check is satisfactory, change regulator, connect all leads and check regulator setting.
	Charging circuit-voltage drop	Connect voltmeter between alternator '+' ve output terminal and the battery '+' ve terminal. Switch headlamps to main beam and run engine at approximately 3000 r.p.m.; note voltmeter reading. Transfer voltmeter connections to battery '-' ve terminal and alternator '-' ve terminal and repeat. The voltmeter readings should not exceed 0.5 volts for the live lead and 0.25 volts for the earth side. Higher readings indicate a high resistance connection in the circuit
Overcharging	Faulty regulator	Check regulator setting as in Faulty regulator; replace regulator if outside specified limits
	Faulty battery	Check as in Faulty battery
Warning lamp fails to illuminate when ignition is switched on. (On cars from serial numbers SRX 34573, LRG 34601, SBH 34775, CRH 34830 and DRX 33029, the ignition warning lamp connection has been taken from the left-hand 'A' post plug and socket connection of the alternator to regulator brown/slate cable, see Figure M1-17 sheet 2).	Faulty connections or warning lamp bulb	Remove switchbox and check bulb. If fault persists check supply to warning lamp. To check continuity of 14NY, disconnect 14NY cable at regulator WL and short lead to earth, warning lamp should illuminate. If the lamp is satisfactory, check the continuity of the alternator to regulator A and F leads and the alternator field by removing the 14NG (F) lead from the regulator (all other leads being connected) and short directly to earth, the warning lamp should illuminate. If satisfactory, check 14N and 14B leads on regulator for supply volts and earth; change regulator.

Malfunction	Possible cause	Action
Warning lamp fails to extinguish, alternator not charging	Broken belt	Examine belts
	Faulty regulator	Check regulator
	Faulty connection	Check connection
	Faulty alternator	Check alternator
Alternator output low	Slipping belts	Check tension
	Faulty alternator	As for Faulty alternator
	Faulty regulator	As for Faulty regulator
Intermittent alternator charge	Loose connections in car wiring	Check charging circuit connections at shunt, starter motor, battery, alternator output plug, toeboard sockets and body sockets.
	Faulty regulator or alternator	Check for loose connections on regulator, brush gear and slip rings. Change regulator.

Charging system

Component location

Fig. M5



Components

- 1 Alternator
- 2 Ammeter shunt
- 3 Starter solenoid
- 4a Ammeter
- 5 Ignition switch
- 6 Ignition warning lamp
- 7 Battery temperature sensors
- 8 Battery
- 9 Regulator
- 10 Left-hand boot earth
- 15 Right-hand valance earth
- 21 Choke thermal delay unit
- 120 Radio interference suppressor
- B Body sockets
- M Main distribution loom socket
- T Toeboard sockets

Charging system

Schematic wiring diagram

Sheet 1 of 2

Applicable to all cars prior to car serial numbers
SRX 34573, LRG 34601, SBH 34775, CRH 34830
and DRX 33029.

Charging system

Schematic wiring diagram

Sheet 2 of 2

Applicable to all cars from car serial numbers
SRX 34573, LRG 34601, SBH 34775, CRH 34830
and DRX 33029.

Section M2

**Starting system
Contents**

	Page
Introduction	M2 - 3
System operation	M2 - 3
Maintenance	M2 - 3
Starter motor	M2 - 3
Starter relay	M2 - 6
Column neutral start switch	M2 - 7
Gearbox neutral start switch	M2 - 7
Starter switch	M2 - 7
Starting system - Fault diagnosis	M2 - 9
Component location	M2 - 11
Wiring diagram	M2 - 13

Section M2

Starting system**Introduction**

The ammeter and ammeter shunt are detailed in Section M4 - Warning lamp and Instruments, battery details are in Section M1 - Charging System.

System operation

The starter motor will not rotate unless the column neutral start switch and gearbox neutral start switch are in the 'Park' or 'Neutral' positions i.e. with switch contacts 'made'. However, the gear range selector should always be in the 'Park' position whenever the car is started. When the starter switch is operated, the coil of the starter relay is energised which closes contact C2 to C1. The starter solenoid becomes energised, engaging pinion with flywheel, closing the solenoid contacts thereby connecting the battery directly to the starter motor causing it to rotate.

Maintenance

The starter motor will operate for long periods before requiring attention and should not need servicing except during major overhauls but a check should be made from time to time to ensure that the electrical connections are secure and clean.

Starter motor (see Fig. M6)**Starter motor - To remove**

1. Place the car on a ramp or over a pit.
2. Disconnect the battery.
3. Remove the electrical connections from the motor.
4. Remove the setscrews which secure the starter motor, then from beneath the car, lower the starter motor between the engine and front side-frame member.
5. Remove and keep the packing piece(s) fitted between the starter motor flange and the crankcase end-face.

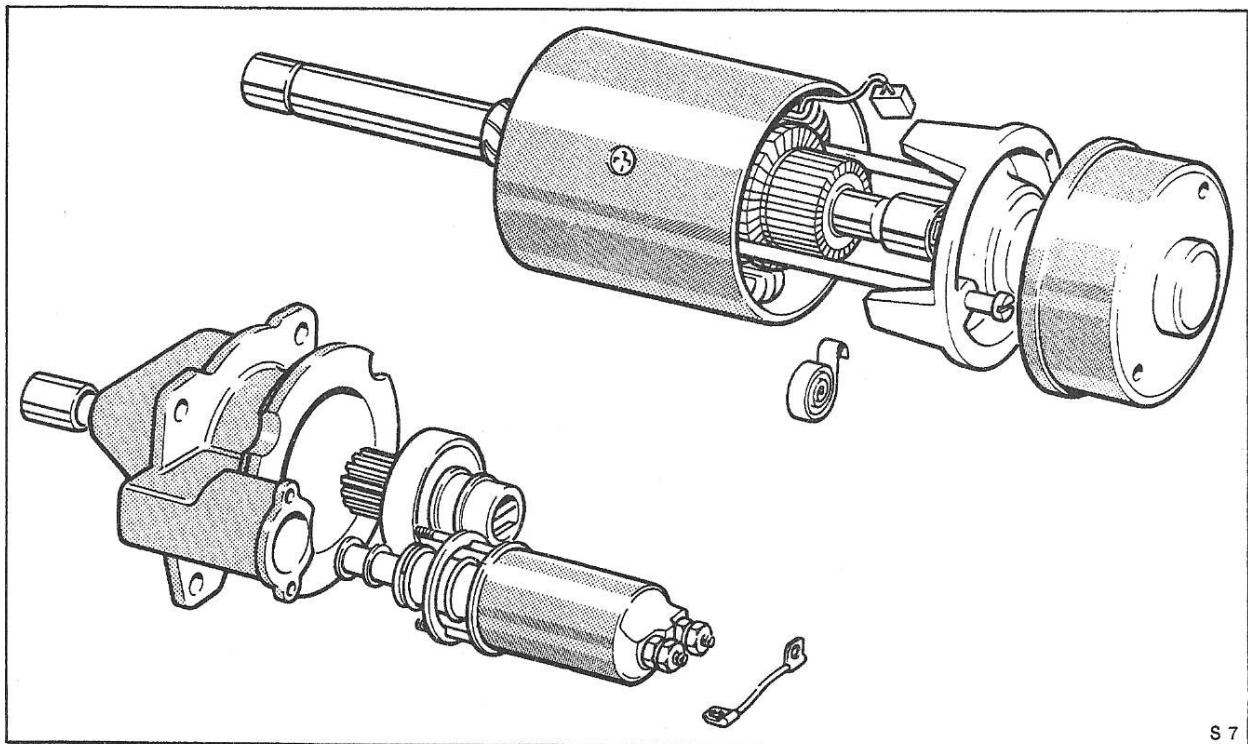


Fig. M6 Starter motor

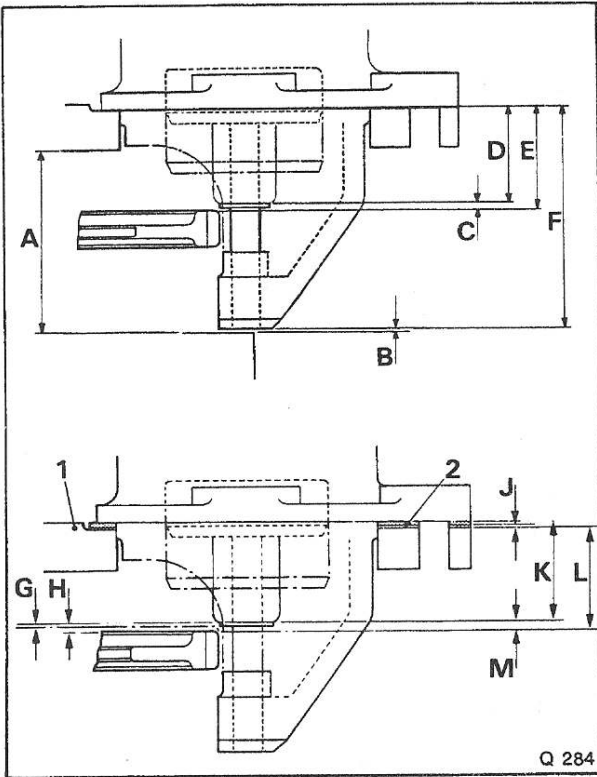


Fig. M7 Clearances between starter motor pinion and flywheel without packing pieces

- A 6,640 cm. (2.614 in.)
- B 5,84 mm. (0.23 in.) clearance between gearbox and starter motor
- C 3,50 mm. (0.138 in.) minimum static clearance
6,375 mm. (0.251 in.) maximum static clearance
- D 3,24 cm. to 3,46 cm. (1.277 in. to 1.362 in.)
- E 3,614 cm. to 3,88 cm. (1.423 in. to 1.528 in.)
- F 8,016 cm. max (3.156 in.)

With packing pieces

- G 0,48 mm. (0.019 in.) minimum working clearance
- H 2,74 mm. (0.108 in.) maximum flywheel float
- J 0,84 mm. to 0,99 mm. (0.033 in. to 0.039 in.)
- K 3,24 cm. to 3,46 cm. (1.277 in. to 1.362 in.)
- L 3,61 cm. to 3,88 cm. (1.423 in. to 1.528 in.)
- M Pinion to flywheel clearance (see table)
- 1 Rear face of crankcase
- 2 Packing pieces

Dimension M	Packing pieces
0,48 mm. (0.019 in.) minimum	2
0,58 mm. (0.023 in.) minimum	1
0,76 mm. (0.030 in.) minimum	None

Starter motor - To fit (see Fig. M7)

Important

Ensure that the existing packing pieces are fitted as they provide the correct clearance between the starter motor and flywheel. If a new starter motor is to be fitted or the original packing pieces have been mislaid proceed as follows:

1. Measure the distance from the mounting face on the crankcase to the edge of the flywheel. If this measurement is 3,706 cm. (1.459 in.) or less, two packing pieces should be fitted. If the measurement reads between 3,709 cm. and 3,807 cm. (1.460 in. and 1.499 in.), one packing piece should be fitted.
2. Packing pieces are not required when the measurement exceeds 3,810 cm. (1.500 in.).

Starter motor - To bench test

Light-running current - To measure (see Fig. M8)

1. Clamp the starter motor securely in a vice.
2. Using a fully charged 12 volt battery and ammeter, measure the light-running current which should be 100 amps (max) at 5000 to 6000 r.p.m.
3. If there is excessive sparking at the commutator, ensure that the brushes are clean and free to move in their boxes and that the spring pressure is correct (see Brush springs - To service).

Lock torque and current - To measure (see Fig. M9)

1. With the starter terminal voltage set to 7.2v, operate the flywheel braking device and note the meter readings which should compare with the following values:

Minimum torque	Maximum current
4 kgf.m. (29 lbf.ft.)	940 amps

Pinion movement - To set (see Fig. M10)

1. Remove the flexible copper link connecting the yoke terminal and 'STA' terminal on the solenoid, connect 'STA' terminal to earth.
2. Connect a 6 volt supply to the small unmarked setscrew terminal and earth on the solenoid.

Note

This will energise the series and shunt windings in the solenoid. The period of energising should be as brief as possible to prevent overheating of the series winding.

3. Energise the solenoid to bring the drive assembly into the engaged position. Measure the distance between the pinion and thrust collar on the armature shaft extension. The measurement must be taken with the pinion pressed lightly towards the armature to take up any slack in the linkage. The correct setting for this distance should be between 3,404 mm. and 3,662 mm. (0.134 in. and 0.144 in.)
4. To adjust the setting, slacken the eccentric pivot pin lock-nut and turn the screw until the required setting is obtained. The arc of adjustment is 180° therefore ensure that the head of the arrow marked on the pivot pin is set only between the arrowed ends of the arc scribed on the drive-end bracket casting. After setting, ensure that the eccentric pivot pin lock-nut is tightened.
5. Recheck the setting.

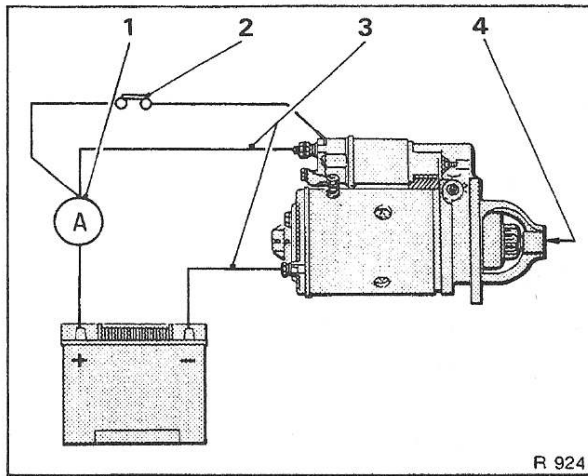


Fig. M8 Measuring light-running current

- 1 Ammeter 0-100 amps
- 2 Switch
- 3 Heavy-duty cables
- 4 Apply tachometer here

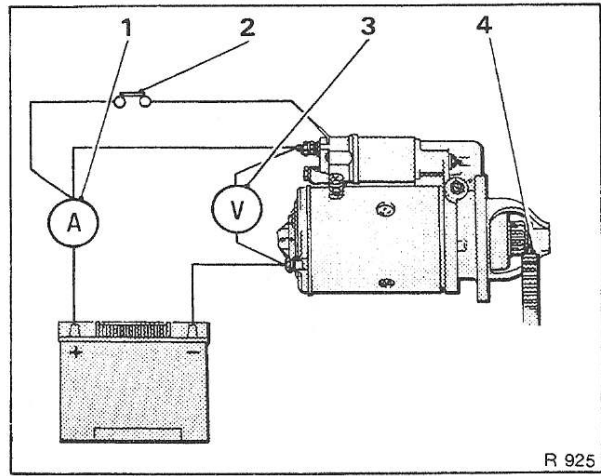


Fig. M9 Measuring lock torque and current

- 1 Ammeter 0-1000 amps
- 2 Switch
- 3 Voltmeter 0-20 volts
- 4 Flywheel brake

Solenoid contacts - To check

When carrying out the following checks, the pinion movement should have been correctly set.

1. Remove the copper link connecting solenoid terminal 'STA' with the starter motor terminal and connect 'STA' to earth.
2. Connect a 12vdc supply between the small unmarked terminal and earth.
3. Connect a 12 volt 15 watt test lamp across the solenoid main terminal and small terminal.
4. Insert a stop in the end-drive bracket to restrict the pinion travel to that of the normal out-of-mesh clearance. An open-ended spanner can be used with the jaws embracing the armature shaft extension.
5. Close the switch to energise the solenoid.
6. The solenoid contacts should close and remain fully closed, as indicated by the test lamp being lit.
7. Switch off and remove the stop.
8. Switch on and hold the pinion assembly in the fully engaged position.
9. Switch off and observe the test lamp, the solenoid contacts should remain open as indicated by the test lamp being extinguished.

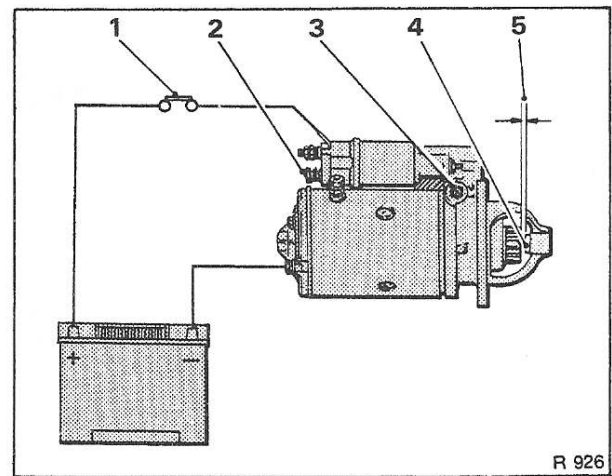
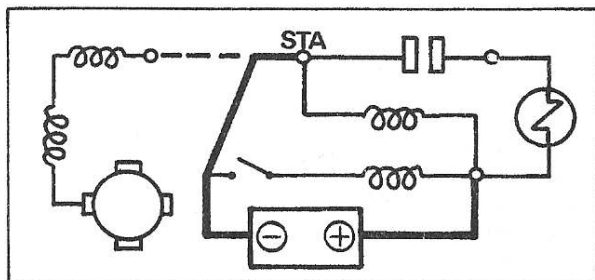


Fig. M10 Setting pinion movement

- 1 Switch
- 2 Copper link removed from STA
- 3 Eccentric pivot pin
- 4 Thrust washer
- 5 Pinion clearance 3,404 to 3,658 mm. (0.134 to 0.144 in.)



Brushgear and commutator - To service

1. Remove the starter motor and clean it prior to removing the die-cast alloy cover and sealing ring.
2. Remove the two nuts which secure the die-cast cover and sealing ring to the starter motor; remove the cover.
3. Ensure that the brushes are of adequate length, they must be renewed if they are worn to 8 mm. ($\frac{5}{16}$ in.).

4. Check the commutator for signs of 'pitting' and 'burning'. If necessary, clean with a cloth moistened with petrol. If this is unsatisfactory, the armature must be removed from the starter motor. Verify that the bearing diameters are true to centre then set up the armature between the centres of a lathe and polish the commutator with fine glass paper; on no account must emery cloth or similar abrasive be used.

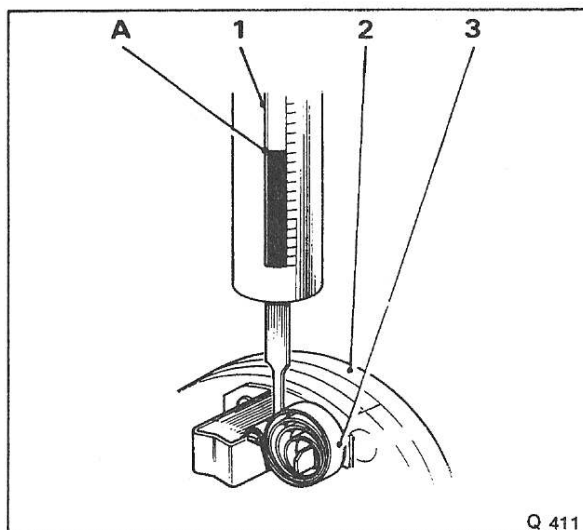


Fig. M11 Checking brush spring pressure

- 1 Commutator end bracket
- 2 Spring gauge
- 3 Anchor post
- A Pressure reading

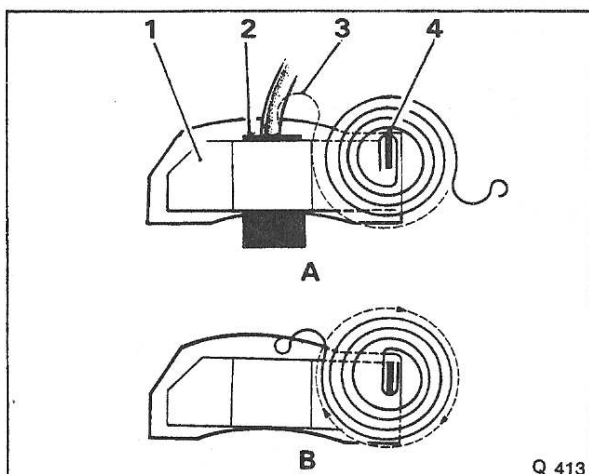


Fig. M12 Correct fitting of brush spring

- 1 Brush box
- 2 Brush
- 3 Normal working position of spring
- 4 Anchor post
- A Correct (spring-tension half-turn)
- B Incorrect (spring-tension full-turn)

5. If the commutator needs to be skimmed, the minimum diameter to which it may be reduced is 39 mm. (1.545 in.). After skimming, the commutator surface should be polished with fine glass paper.

6. The insulation segments must not be undercut.

Brushes - To remove

1. There are four brushes in the brush box, two are connected to the brush box and two are connected to the free ends of the field coils. Carefully prise open the field connections with a screwdriver and use a soldering iron to remove the solder from the connections.
2. Remove the brushes.

Brushes - To fit

1. When fitting a new brush, ensure that it is free in its brush-box.
2. New brushes are pre-formed and do not require bedding-in.

Brush springs - To service (see Fig. M11 and M12)

1. Measure the brush-spring pressure using a pull-type spring gauge and without the brush in the brush box. The spring pressure recorded by spring gauge at the moment the spring pressure is relieved from the brush box should be 1,1 kgf. (42 zf.) minimum.
2. If new brush springs are required ensure that they are fitted correctly. If the springs are fitted incorrectly there will be excessive pressure on the brushes resulting in premature brush wear and damage to the commutator.

Brushgear insulation - To check (see Fig. M13)

1. Test the brushgear using a 110 volt a.c. 15 watt test lamp connected between each of the two insulated brushboxes and a clean unpainted part of the bracket in turn. The lamp must not light.

Field coils - To test (see Fig. M14)

1. Inspect the inside of the yoke for obvious signs of a fault.
2. Check the tightness of the pole-shoes and inspect the field coils.
3. Check field coil continuity by inspecting the interconnections between the field coils and check that the terminal and brush flexible-joints are satisfactory.
4. Ensure that the brushes are not contacting the yoke, then connect a 110 volt a.c. 15 watt test lamp between the field coil terminal and the edge of the yoke. The lamp should not light.

Starter relay

The starter relay is a Lucas Model 22RA which can be tested as follows:

1. Disconnect all cables from the relay, noting the cable colours to ensure correct fitting.
2. Connect the relay winding W1 and connection C2 to the negative side of a 12v battery.

3. Connect a test lamp between C1 and the positive side of a battery, the lamp should remain extinguished.
4. Connect W2 to the positive side of battery and ensure that the test lamp is lit.

Column neutral start switch

The column neutral start switch prevents the engine from being started unless the gear selector is in 'Neutral' or 'Park'. It is fitted in the cowl of the steering column.

Gearbox neutral start switch

The gearbox neutral start switch prevents the engine from being started unless the gearbox is in the 'Neutral' or 'Park' positions. It is part of the gearchange actuator and the continuity of the switch can be tested by connecting a test lamp between earth and pin K of the actuator plug and connect pin S of the plug to a 12v supply. The lamp should be lit with 'Neutral' or 'Park' selected and extinguished when any other gear range is selected.

Starter switch (Switchbox) - To remove (see Fig. M15)

1. Disconnect the battery.
2. Remove the driver's side facia trim panel (see Chapter S).
3. Unscrew and remove the screws securing the switchbox to the panel.
4. Disconnect the plugs and sockets and remove the switchbox.

Note

The illustration shows a switchbox as fitted to Rolls-Royce Camargue.

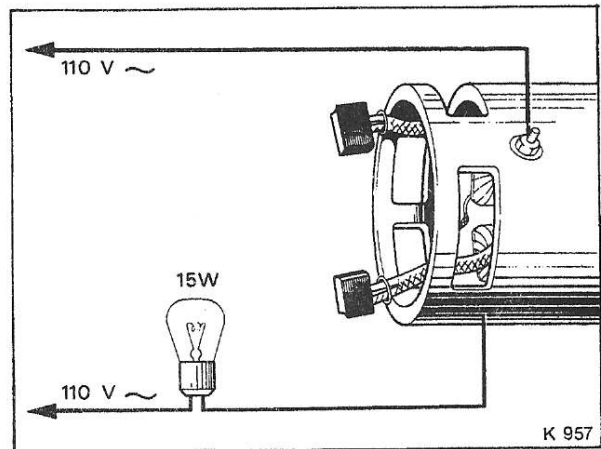


Fig. M14 Checking field coil insulation

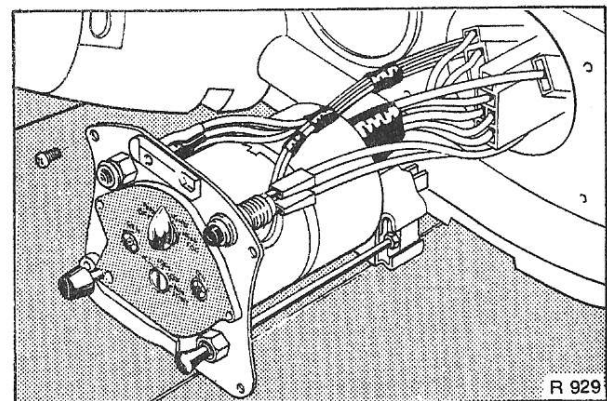


Fig. M15 Switchbox

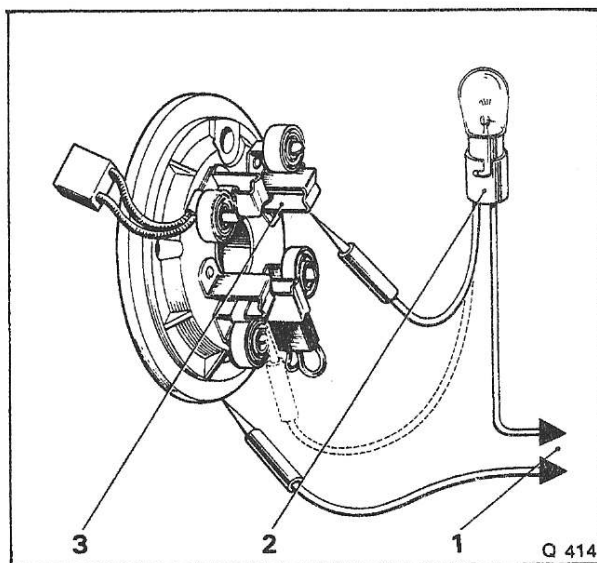


Fig. M13 Checking brushgear insulation

- 1 110 volt AC mains
- 2 15 watt lamp
- 3 Insulated brush box

Section M2

**Starting system
Fault diagnosis**

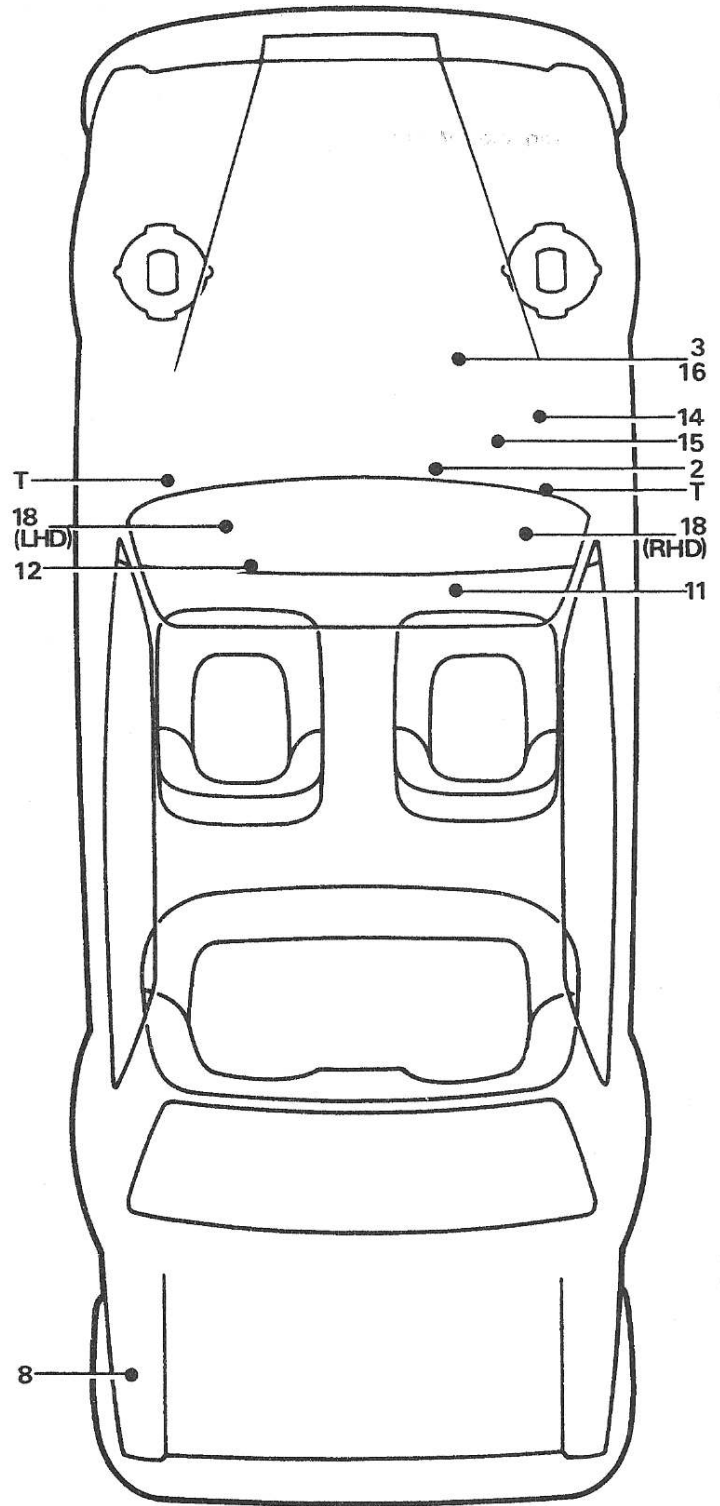
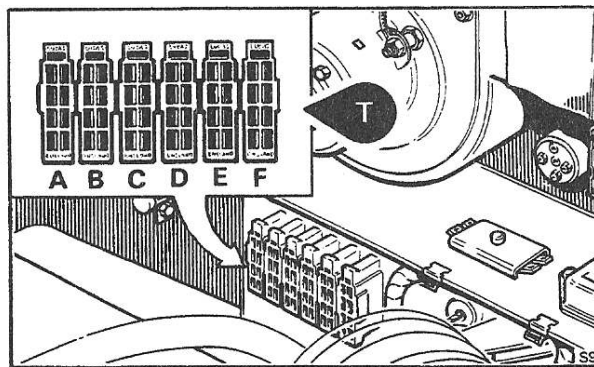
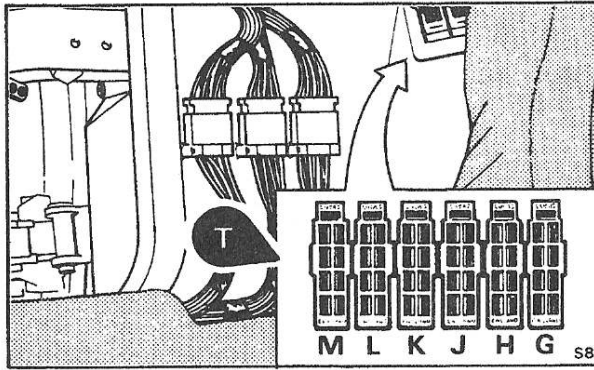
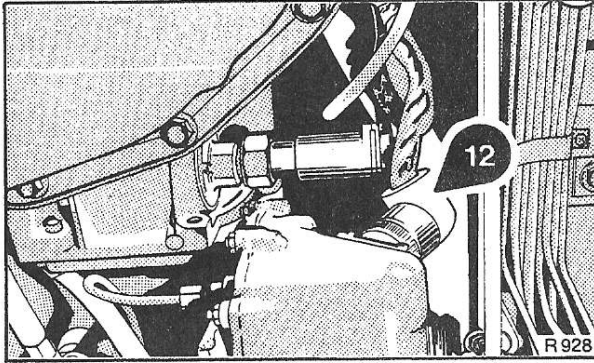
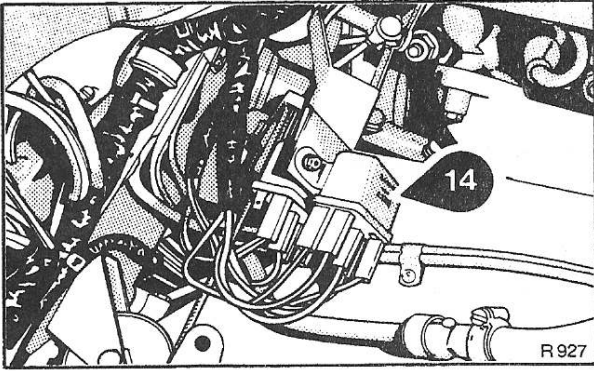
Malfunction	Possible cause	Action
Cranking speed too low	Battery in low state of charge	Measure specific gravity of all battery cells
	Poor electrical connections in main starter circuit	Inspect the battery terminals, starter terminals, battery earth, chassis earth and engine earthing strap
	Faulty starter motor	Remove the motor for examination
	Incorrect grade of engine oil	This would normally only be apparent under cold start conditions i.e. below freezing point
	Tight engine	The steady cranking current with a fully charged battery and known good starter motor at an ambient temperature of 20° C should not exceed 250 amperes. A figure greatly in excess indicates a tight engine
Starter motor fails to operate when ignition is turned to START position	Flat battery or poor electrical connections	Switch on vehicle exterior lamps and observe whether lamps dim when ignition key is turned to START position
	Gear range selector lever not in 'P' or 'N' position	Rectify
	Number 2 fuse blown	Substitute fuse. If new fuse 'blows', isolate the various circuits to isolate the short e.g. disconnect right-hand toeboard socket to isolate ignition weakener cut-off valve and choke solenoid
	Faulty starter relay, column neutral start switch, switchbox, gearchange actuator neutral start switch	Check connections and items listed. Disconnect the L.T. lead from ignition coil negative. With the ignition key held in START position and using a test lamp, check the supply through each component: If the fault is located in the column neutral start switch or gearchange actuator neutral start switch, check the adjustment before changing the unit.
	Open circuit in switchbox, starter relay winding and earth	Check earth connections at right-hand valance earth. Check connections at items listed
Starter relay operates but starter motor inoperative	Battery in low state of charge.	Measure specific gravity of battery
	Poor connections at starter and starter solenoid supply circuit	Inspect the battery terminals, starter terminals, battery earth, chassis earth and engine earthing strap. Check 28N cable at shunt, 28N and 28NB cables at starter relay and 28NB cable at starter solenoid

Malfunction	Possible cause	Action
Starter solenoid 'chatters' when operating the ignition key in the START position	Faulty starter relay	Connect a test lamp across terminals C1 and C2 on the relay. The test lamp should normally be illuminated and be extinguished when the relay is operated
	Faulty starter motor	Remove for examination
	Flat battery	Switch on vehicle exterior lamps and observe whether lamps dim when ignition key is turned to START position.
Starter continues to crank engine with ignition key in OFF position	Poor electrical connection in main starter and solenoid supply circuit	Inspect the battery terminals, battery earth, starter terminals, chassis earth, and engine earth strap. Check also 28N cable between shunt and starter relay and the 28NB cable between starter relay and starter solenoid
	Faulty solenoid	Remove starter motor and fit new solenoid
	Incorrect starter solenoid adjustment	Remove starter motor and adjust solenoid, bench test before fitting
	Faulty solenoid	Remove starter motor and fit new solenoid

Starting system

Component location

Fig. M16



Components

- 2 Ammeter shunt
- 3 Starter solenoid
- 8 Battery
- 11 Column neutral start switch
- 12 Gearbox neutral start switch
- 13 Starter switch
- 14 Starter relay
- 15 Right-hand valance earth
- 16 Starter motor
- 17 Fuseboard A
- 18 Petrol pumps relay
- T Toeboard sockets

Starting system

Schematic wiring diagram

Fig. M17

Section M3

Ignition system

Contents

Cars prior to car serial numbers

Silver Shadow II	- SRX 34573
Silver Wraith II	- LRG 34601
Bentley T2	- SBH 34775
Corniche Saloon	- CRH 34830
Corniche Convertible	- DRX 33029

	Page
Introduction	M3 - 3
Ignition distributor	M3 - 3
Ballast resistance unit	M3 - 4
Sparking plugs	M3 - 4
Choke thermal delay unit	M3 - 4
Choke-on-start relay	M3 - 5
Choke solenoid	M3 - 5
Petrol pumps relay	M3 - 5
Fault diagnosis	M3 - 7
Component location	M3 - 9
Wiring diagram	M3 - 11

Supplement No. 1

For cars from car serial numbers

Silver Shadow II	- SRX 34573
Silver Wraith II	- LRG 34601
Bentley T2	- SBH 34775
Corniche Saloon	- CRH 34830
Corniche Convertible	- DRX 33029

Supplement No.2

Ignition timing data

Section M3

Ignition system

Introduction

The wiring diagram shows exhaust gas recirculation (EGR) and fuel weakening components, when these are not fitted, the cables are taped back. The wiring diagram also shows the wiring for left-hand and right-hand drive cars.

Details of EGR solenoid, EGR thermostat, full throttle switch, throttle weakener solenoid, throttle weakener switch and anti-diesel solenoid can be found in Chapter U. Details of the kick-down switch and kick-down solenoid (detent) can be found in Chapter T. Details of the oil pressure switch and ammeter shunt can be found in Section 4 of this chapter. The starter motor, starter relay, switchbox and neutral start switches are dealt with in Section 2.

Ignition distributor (see Fig. M18)

The ignition distributor fitted is a Lucas Opus Mk.2 'High energy' with 5EM module in which an oscillator pick-up and control unit replace the conventional contact breaker. A drum with eight ferrite rods (one per cylinder) moulded into the outer edge is mounted on the distributor drive-shaft. As the drum rotates, each time one of the ferrite rods passes the oscillator pick-up, a voltage is created which is then amplified and used to switch off the normally conducting power transistor which is connected to the primary coil winding of the ignition coil, thereby inducing a high voltage in the secondary winding. This is then distributed to the sparking plugs in the conventional manner.

Ignition distributor - To remove

1. Disconnect the battery.
2. Remove the gear-range thermal cut-out from the fuseboard.
3. Remove the distributor cap.
4. Rotate the crankshaft in the normal direction of rotation until the rotor arm is adjacent to 'A1' plug position (i.e. 'A1' piston at approximately T.D.C. on the firing stroke).
5. Disconnect the plug connecting the distributor to the ballast resistor and also remove the leads from the ignition coil. Note the colours of the sleeve markers to facilitate fitting.
6. Disconnect the hose from the distributor advance capsule.
7. Unscrew the two nuts securing the distributor clamp to the pedestal. **Do not slacken the distributor clamp screw.**
8. Withdraw the distributor.

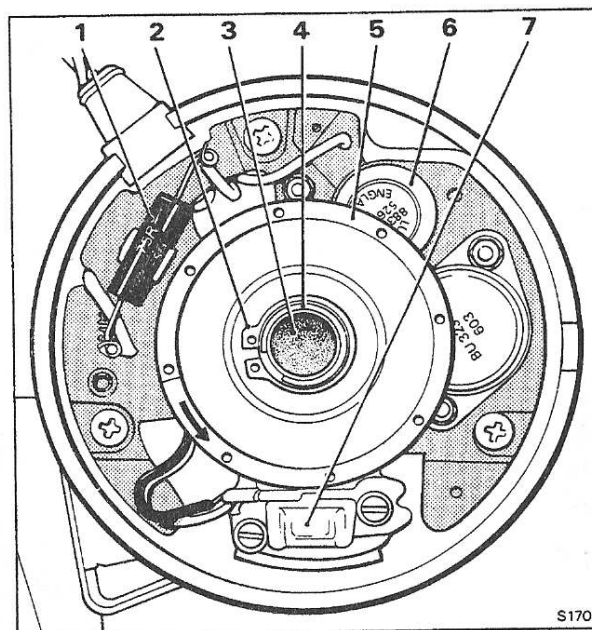


Fig. M18 Ignition distributor (5EM module)

- | | |
|---|------------------------|
| 1 | Resistor |
| 2 | Circlip |
| 3 | Lubrication pad |
| 4 | Rotor carrier assembly |
| 5 | Timing rotor |
| 6 | Control unit |
| 7 | Pick-up module |

Ignition distributor - To fit

Reverse the procedure for removal, if the crankshaft was rotated while the distributor was removed, the correct position for ignition timing can be obtained as follows:

1. Remove 'A' bank rocker cover from the engine.
2. Rotate the crankshaft by hand at least one full turn in the normal direction of rotation until the 'A1' inlet valve has opened and just closed.
3. Further rotate the crankshaft in the correct direction of rotation until the flywheel is at T.D.C.
4. Fit the 'A' bank rocker cover.
5. Renew the seal at the base of the distributor housing.
6. Fit the distributor with the rotor arm adjacent to the 'A1' plug position and reconnect the hose to the advance capsule.
7. Check the dwell angle and ignition timing.

Ignition timing - To set

For cars fitted with emission control components, refer to Chapter U, for all other cars proceed as follows:

1. Run the engine until normal operating temperature is reached and choke fast-idle is off.
2. Stop the engine.
3. Connect a stroboscope and impulse tachometer in accordance with manufacturers instructions.
4. Disconnect the hose from distributor advance capsule and blank off the hose.
5. Start the engine and set the speed to 1300 r.p.m. using the idle stop screw. The speed should be set by decreasing to 1300 r.p.m. from a higher speed.
6. Direct the stroboscope light onto the crankshaft damper and timing pointer (refer to fig. M19). Slacken the distributor clamp bolt and adjust the distributor to set the timing at 25° B.T.D.C.

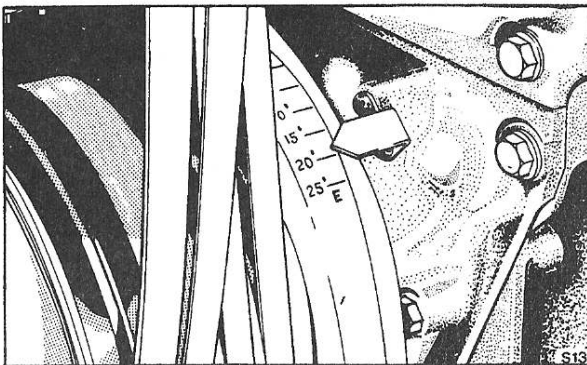


Fig. M19 Ignition timing pointer

7. Tighten the clamp bolt and verify that the timing is still at 25° B.T.D.C.
8. Reset the engine speed to 650 r.p.m. using the idle stop screw. Check that the ignition timing is approximately 11° B.T.D.C. Stop the engine.
9. Reconnect the hose to the distributor advance capsule.

Ignition coil

The ignition coil fitted to cars destined for North America, Japan and Australia is a Lucas 23C12, all other cars have a Lucas 22C12 coil.

Ignition coil - To remove and fit

1. Disconnect the battery.
2. Disconnect the leads from the coil.
3. Remove the two setscrews and spacers securing the coil.
4. Remove the coil.
5. When fitting the coil, ensure that the low tension and capacitor leads are fitted correctly. The capacitor is connected to the + terminal.

Ballast resistance unit

The ballast resistance unit is an encapsulated assembly fixed in an aluminium heatsink and is attached to the front face of the engine near the distributor. If the unit develops a fault, it cannot be repaired therefore it must be replaced.

The resistance unit ensures that a satisfactory voltage is applied to the primary winding of the coil at all times, particularly during the period of starter motor operation when the battery terminal voltage is temporarily below normal. The tachometer test connection is connected to one of the 'Lucar' connections.

Sparking plugs - To clean and check

1. Remove the sparking plugs.
 2. Thoroughly clean in a sparking plug cleaning machine.
 3. Clean off all surplus abrasive material from the electrodes and threads with compressed air.
 4. Set the plug gap to between 0,74 mm. and 0,77 mm. (0.029 in. and 0.031 in.)
- For cars destined for North America, Japan and Australia, refer to Chapter U.

Sparking plugs - To fit

1. Ensure that the threads are clean then lubricate with a small amount of 'Graphogel' grease.
2. Ensure that a steel washer is fitted to each plug.
3. Fit and tighten the plugs to between 1,79 kgf.m. and 2,35 kgf.m. (13 lbf.ft. and 17 lbf.ft.).

Choke thermal delay unit

Used in conjunction with the choke solenoid to hold the choke flap closed when the engine ambient temperature is below 0° C. The length of time that the contacts are made depends on the ambient temperature and is controlled by the two resistance/heaters in the unit, the colder the temperature, the longer the contacts are 'made'.

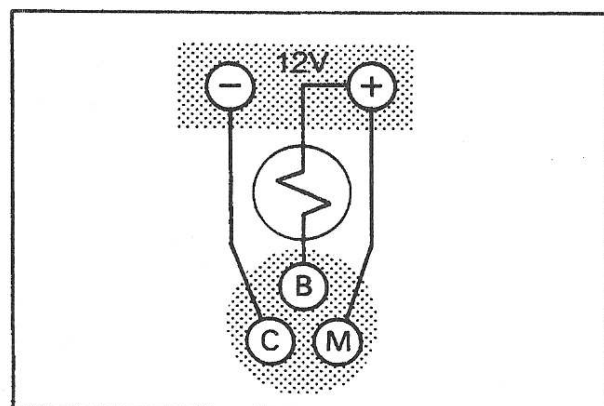


Fig. M20 Choke thermal delay test circuit

Choke thermal delay unit - To test (see Fig. M20)

1. Disconnect the battery.
2. Remove the unit from the car and place it in a refrigerator for 5 minutes with the temperature below freezing point.
3. While the unit is still cold (below freezing point) connect terminal C to the negative side of a 12v battery and connect terminal B to a 12v test lamp, connect the other test lamp lead to the positive terminal of the battery. The lamp should glow.
4. Connect terminal M of the unit to the positive terminal of the battery and verify that the lamp is extinguished within one minute.

Choke-on-start relay

The choke-on-start relay coil is energised whenever the starter switch is operated and both neutral start switches are in the neutral or park position (i.e. when the engine is cranking). Its function is to provide an earth path for the choke solenoid during engine cranking thereby holding the choke flap closed.

Relay - To test (see Fig. M21)

1. Disconnect the battery.
2. Remove the 14WR cable from terminal W2 and the 9WLG cables from terminal C1. Insulate the cables.
3. Connect a test lamp to the relay as shown in the following diagram the lamp should be extinguished.
4. Connect W2 to the positive terminal of the battery, the lamp should glow.

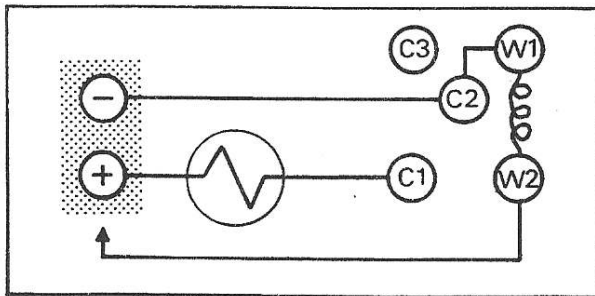


Fig. M21 Choke-on-start relay test circuit

Choke solenoid

The choke solenoid operates the choke flap and it is energised whenever the engine is cranking or the choke thermal delay switch is closed i.e. when the engine ambient temperature is below 0°C. The choke flap is closed when the solenoid is energised.

Solenoid - To test

1. Switch on the ignition.
2. Disconnect the 9WLG cable 'Lucar' connector at the solenoid.

3. Connect a wire from the solenoid 'Lucar' connector to earth and ensure that the choke flap closes.
4. Switch off the ignition and reconnect the 9WLG cable.

Petrol pumps relay

The coil of the relay is earthed via the oil pressure switch which effectively prevents the petrol pumps from operating if the ignition is switched on and the oil pressure is low (i.e. switch is made).

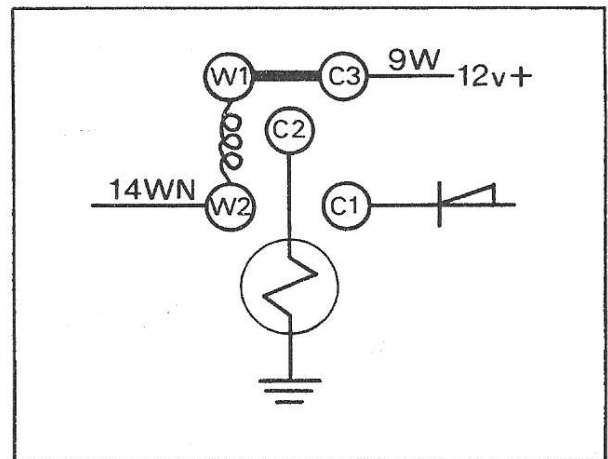


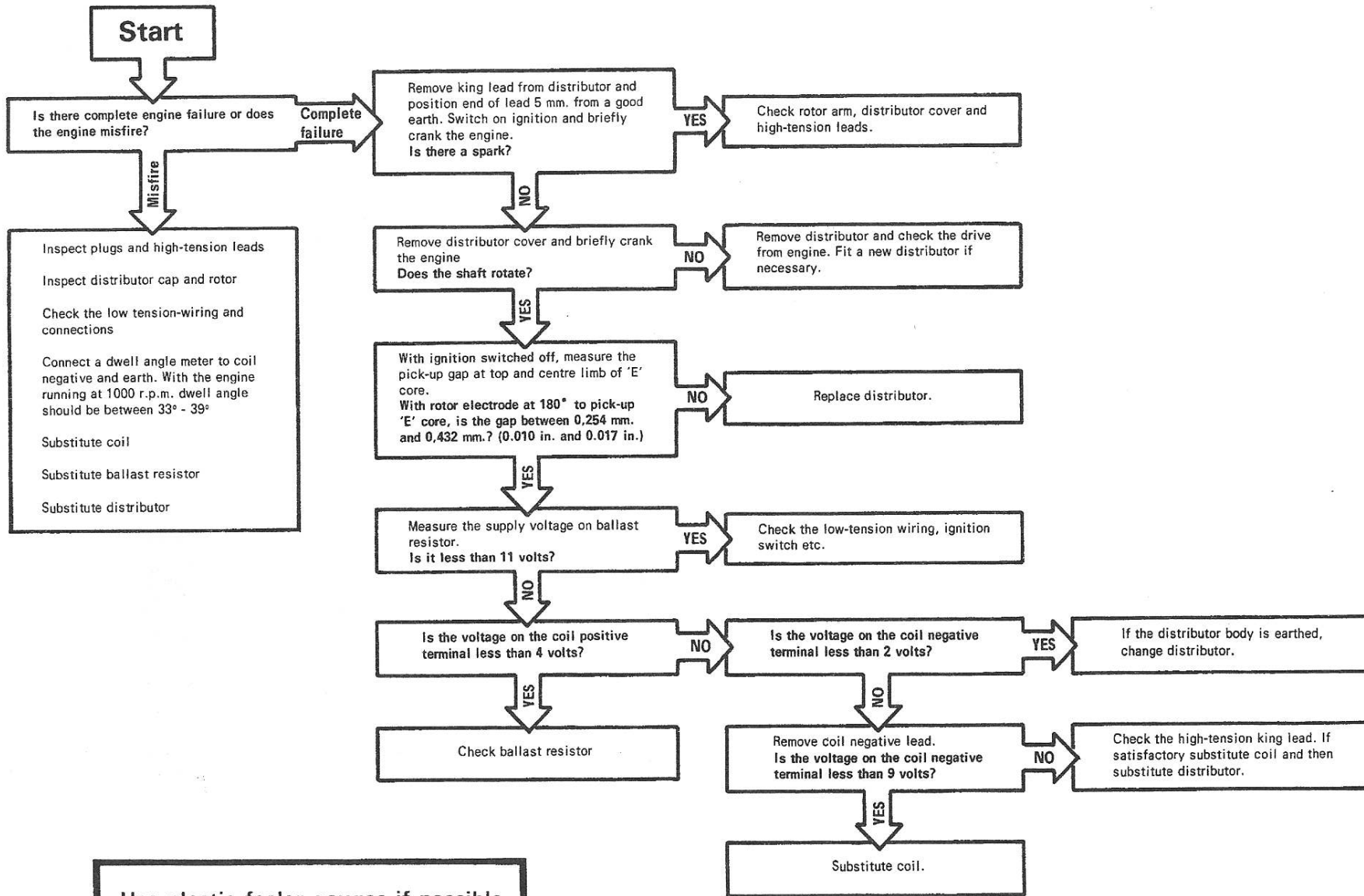
Fig. M22 Petrol pumps relay test circuit

Relay - To test (see Fig. M22)

1. Disconnect the 9WK cable from C2 and connect a 12v test lamp between C2 and earth.
2. Switch on the ignition and use another test lamp or meter to verify that there is a live feed at C3. The test lamp connected to C2 should remain extinguished.
3. Disconnect the 14WN cable from W2, the test lamp should glow.
4. Switch off the ignition.

Section M3

**Ignition system
Fault diagnosis**

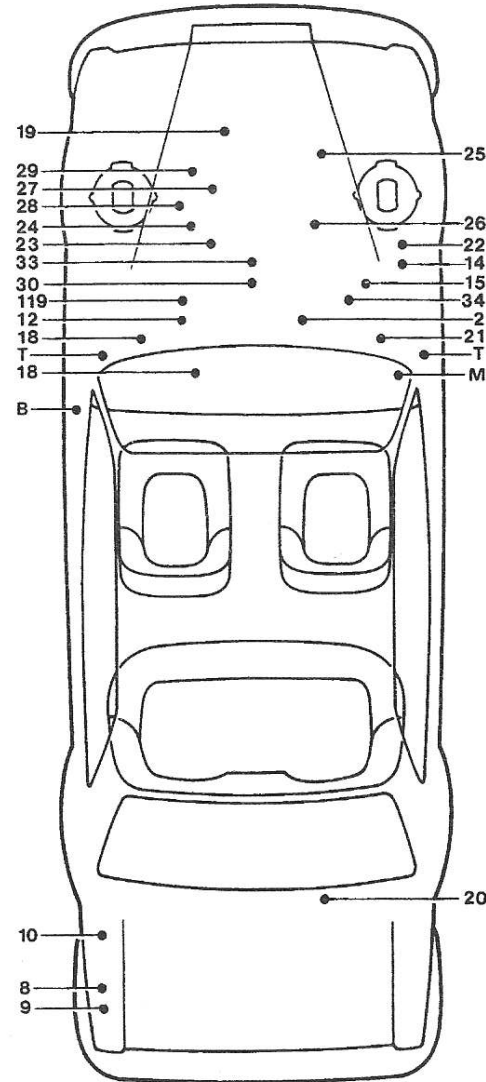
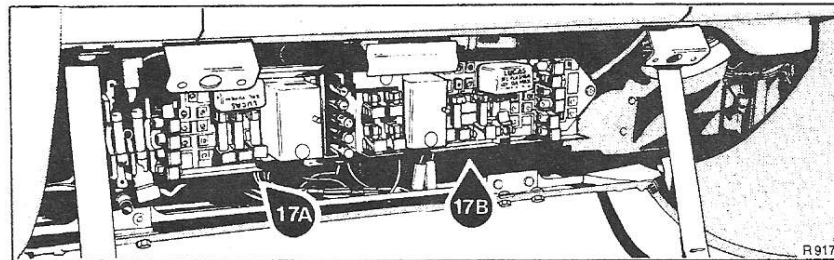
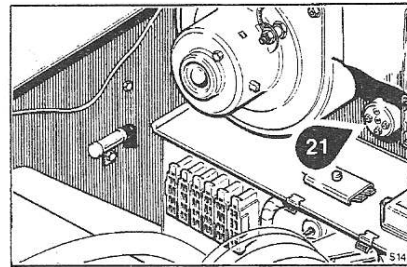
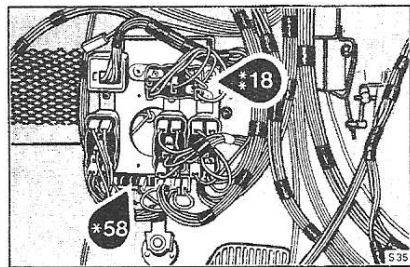
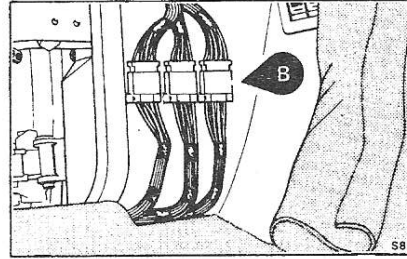
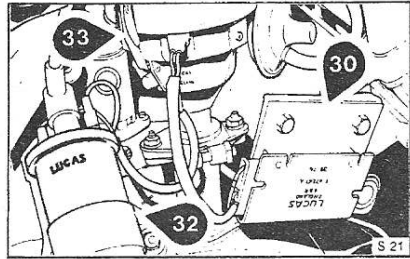
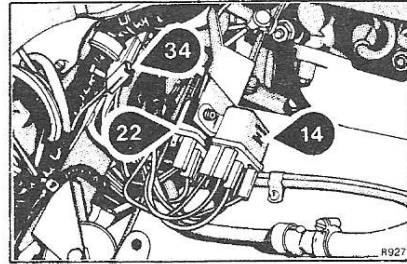
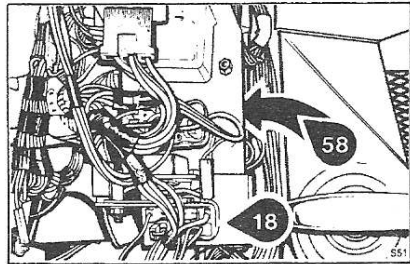


Use plastic feeler gauges if possible and do not force them into the gap

Ignition system

Component location

Fig. M23

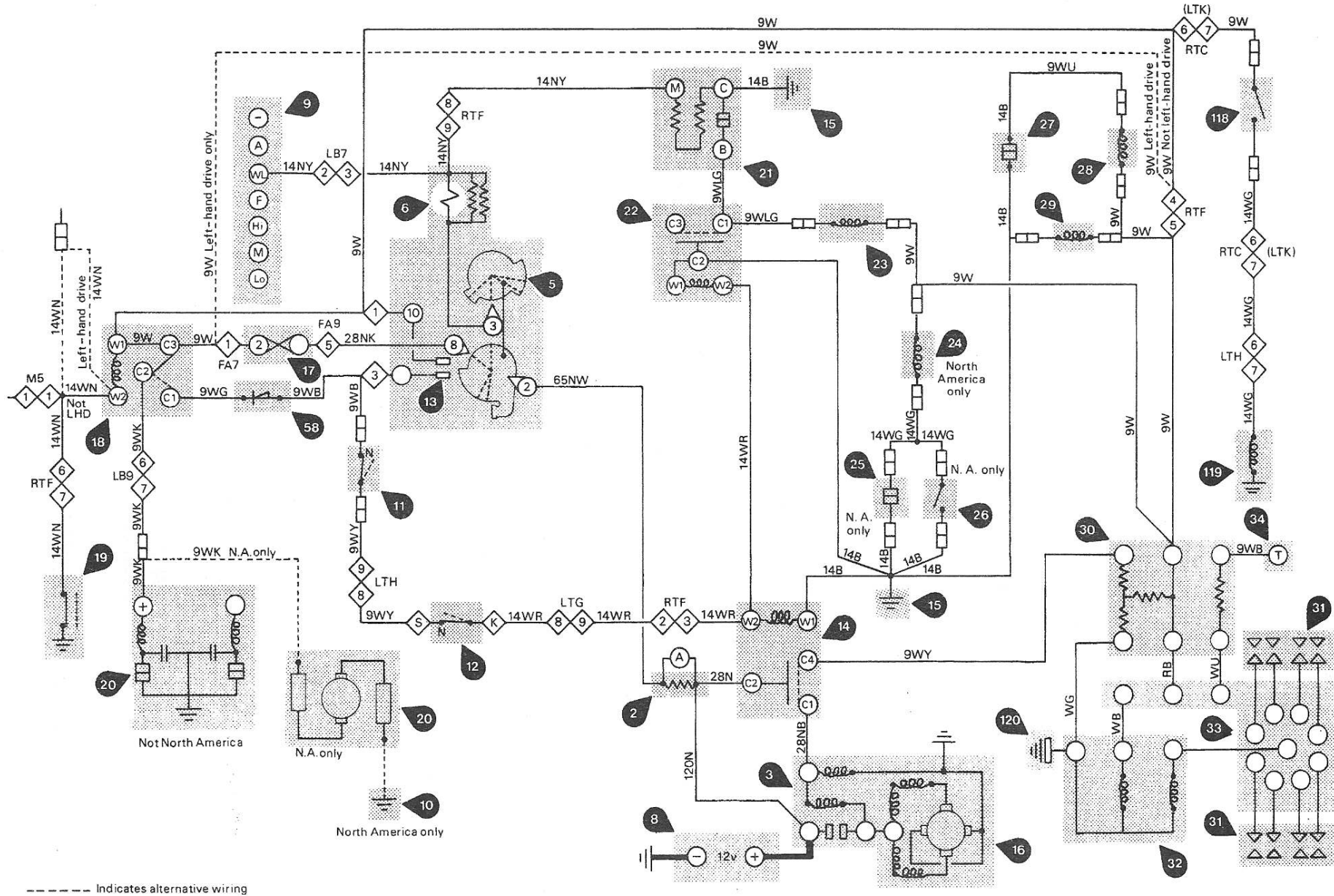


- Components**
- 2 Ammeter shunt
 - 3 Starter solenoid
 - 5 Ignition switch
 - 6 Ignition warning lamp
 - 8 Battery
 - 9 Regulator
 - 10 Left-hand boot earth
 - 11 Column neutral start switch
 - 12 Gearbox neutral start switch
 - 13 Starter switch
 - 14 Starter relay
 - 15 Right-hand valve earth
 - 16 Starter motor
 - 17 Fuseboard 'A'
 - 18 Petrol pumps relay
 - 19 Oil pressure switch
 - 20 Petrol pumps
 - 21 Choke thermal delay unit
 - 22 Choke-on-start relay
 - 23 Choke solenoid
 - 24 Exhaust gas recirculation solenoid
 - 25 Exhaust gas recirculation thermostat
 - 26 Full throttle switch
 - 27 Throttle weakener thermostat
 - 28 Throttle weakener solenoid
 - 29 Anti-diesel solenoid
 - 30 Ballast resistor
 - 31 Spark plugs
 - 32 Ignition coil
 - 33 Ignition distributor
 - 34 Tacho test connector
 - 58 Diode block
 - 118 Kick-down switch
 - 119 Kick-down solenoid (detent)
 - 120 Radio interference suppressor
- T Toeboard socket
 B Body socket
 M Main distribution loom socket
- * All left-hand drive
 ‡ Left-hand drive - not North America

Ignition system

Schematic wiring diagram

Fig. M24



Section M3

Supplement number 1
Ignition system
Contents

	Page
Introduction	M3 - 3
Ignition distributor	M3 - 3
Ballast resistance unit	M3 - 4
Sparking plugs	M3 - 4
Choke thermal delay unit	M3 - 4
Choke-on-start relay	M3 - 5
Choke solenoid	M3 - 5
Petrol pumps relay	M3 - 5
Component location	M3 - 7
Schematic wiring diagrams	
Right-hand drive cars	M3 - 9
Left-hand drive cars for countries other than Canada Japan and U.S.A.	M3 - 11
Left-hand drive cars for Canada, Japan and U.S.A	M3 - 13

From car serial numbers

Silver Shadow II	-	SRX 34573
Silver Wraith II	-	LRG 34601
Bentley T2	-	SBH 34775
Comiche Saloon	-	CRH 34830
Comiche Convertible	-	DRX 33029

Section M3

Supplement number 1
Ignition system**Introduction**

Details of EGR solenoid, EGR thermostat, full throttle switch, throttle weakener solenoid, throttle weakener switch and anti-diesel solenoid can be found in Chapter U. Details of the kick-down switch and kick-down solenoid (detent) can be found in Chapter T.

Ignition distributor (see Fig. M18 Supp. 1)

The ignition distributor fitted is a Lucas Opus Mk. 2 'High energy' with 5EM module in which an oscillator pick-up and control unit replace the conventional contact breaker. A drum with eight ferrite rods (one per cylinder) moulded into the outer edge is mounted on the distributor drive-shaft. As the drum rotates, each time one of the ferrite rods passes the oscillator pick-up, a voltage is created which is then amplified and used to switch off the normally conducting power transistor which is connected to the primary coil winding of the ignition coil, thereby inducing a high voltage in the secondary winding. This is then distributed to the sparking plugs in the conventional manner.

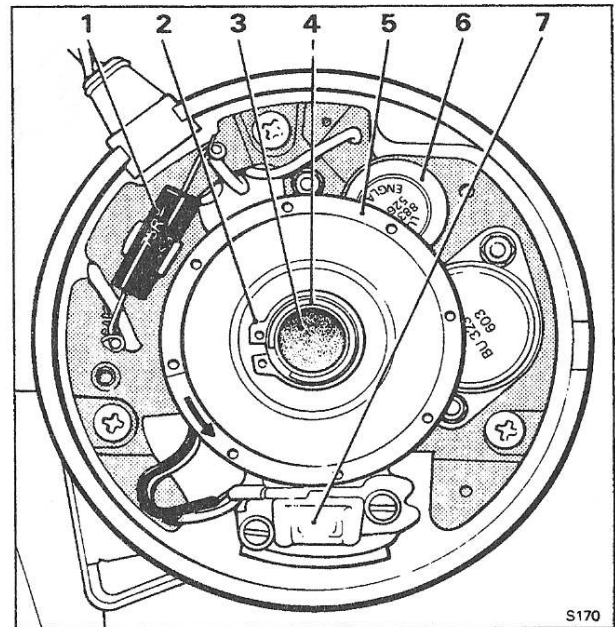
Ignition distributor - To remove

1. Disconnect the battery.
2. Remove the gear-range thermal cut-out from the fuseboard.
3. Remove the distributor cap.
4. Rotate the crankshaft in the normal direction of rotation until the rotor arm is adjacent to 'A1' plug position (i.e. 'A1' piston at approximately T.D.C. on the firing stroke).
5. Disconnect the plug connecting the distributor to the ballast resistor and also remove the leads from the ignition coil. Note the colours of the sleeve markers to facilitate fitting.
6. Disconnect the hose from the distributor advance capsule.
7. Unscrew the two nuts securing the distributor clamp to the pedestal. **Do not slacken the distributor clamp screw.**
8. Withdraw the distributor.

Ignition distributor - To fit

Reverse the procedure for removal, if the crankshaft was rotated while the distributor was removed, the correct position for ignition timing can be obtained as follows:

1. Remove 'A' bank rocker cover from the engine.
2. Rotate the crankshaft by hand at least one full turn in the normal direction of rotation until the 'A1' inlet valve has opened and just closed.

**Fig. M1 Supp. 1. Ignition distributor (5EM module)**

- 1 Resistor
- 2 Circlip
- 3 Lubrication pad
- 4 Rotor carrier assembly
- 5 Timing rotor
- 6 Control unit
- 7 Pick-up module

3. Further rotate the crankshaft in the correct direction of rotation until the flywheel is at T.D.C.
4. Fit the 'A' bank rocker cover.
5. Renew the seal at the base of the distributor housing.
6. Fit the distributor with the rotor arm adjacent to the 'A1' plug position and reconnect the hose to the advance capsule
7. Set the ignition timing.

Ignition timing - To set

For cars fitted with emission control components, refer to Chapter U, for all other cars proceed as follows:

1. Run the engine until normal operating temperature is reached and the choke 'fast-idle' is off. Stop the engine.
2. Connect a stroboscope and impulse tachometer in accordance with the manufacturers' instructions.

M3 - 4
Supp. 1

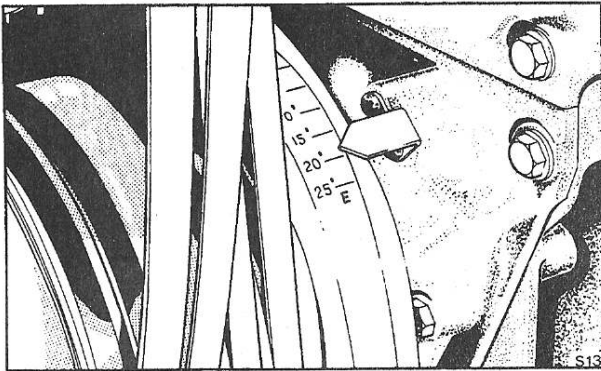


Fig. M2 Supp. 1. Ignition timing pointer

3. Disconnect the hose from the distributor advance capsule and blank-off the hose.
4. Set the engine speed and timing as shown in table 1. The engine speed should be set by decreasing from a higher speed.
5. Tighten the distributor clamp bolt and verify that the timing is still correct.
6. Reset the engine speed to 650 rpm and check the timing as shown in table 2.
7. Stop the engine and reconnect the hose to the advance capsule.

Table 1 Ignition timing

	Engine speed	Crankshaft timing
Silver Shadow II, Silver Wraith II and Bentley T2 (SU carburettors)	1300 rpm	25° BTDC
Corniche and Camargue (Solex carburettors)	1200 rpm	15° BTDC

Table 2 Ignition timing check

	Engine speed	Crankshaft timing
Silver Shadow II, Silver Wraith II and Bentley T2 (SU carburettors)	650 rpm	11° BTDC (approximately)
Corniche and Camargue (Solex carburettors)	650 rpm	2° BTDC (approximately)

Ignition coil

The ignition coil fitted to cars destined for North America, Japan and Australia is a Lucas 23C12, all other cars have a Lucas 22C12 coil.

Ignition coil - To remove and fit

1. Disconnect the battery.
2. Disconnect the leads from the coil.
3. Remove the two setscrews and spacers securing the coil.
4. Remove the coil.

5. When fitting the coil, ensure that the low tension and capacitor leads are fitted correctly. The capacitor is connected to the + terminal.

Ballast resistance unit

The ballast resistance unit is an encapsulated assembly fixed in an aluminium heatsink and is attached to the front face of the engine near the distributor. If the unit develops a fault, it cannot be repaired therefore it must be replaced.

The resistance unit ensures that a satisfactory voltage is applied to the primary winding of the coil at all times, particularly during the period of starter motor operation when the battery terminal voltage is temporarily below normal. The tachometer test connection is connected to one of the 'Lucar' connections

Sparking plugs - To clean and check

1. Remove the sparking plugs.
 2. Thoroughly clean in a sparking plug cleaning machine.
 3. Clean off all surplus abrasive material from the electrodes and threads with compressed air.
 4. Set the plug gap to between 0,74 mm. and 0,77 mm. (0.029 in. and 0.031 in.).
- For cars destined for North America, Japan and Australia, refer to Chapter U.

Sparking plugs - To fit

1. Ensure that the threads are clean then lubricate with a small amount of 'Graphogen' grease.
2. Ensure that a steel washer is fitted to each plug.
3. Fit and tighten the plugs to between 1,79 kgf m and 2,35 kgf.m. (13 lbf.ft. and 17 lbf.ft.)

Choke thermal delay unit

Used in conjunction with the choke solenoid to hold the choke flap closed when the engine ambient temperature is below 0 °C. The length of time that the contacts are made depends on the ambient temperature and is controlled by the two resistance/heaters in the unit, the colder the temperature, the longer the contacts are 'made

Choke thermal delay unit - To test (see Fig. M3 Supp. 1)

1. Disconnect the battery.
2. Remove the unit from the car and place it in a refrigerator for 5 minutes with the temperature below freezing point.
3. While the unit is still cold (below freezing point) connect terminal C to the negative side of a 12v battery and connect terminal B to a 12v test lamp, connect the other test lamp lead to the positive terminal of the battery. The lamp should light.

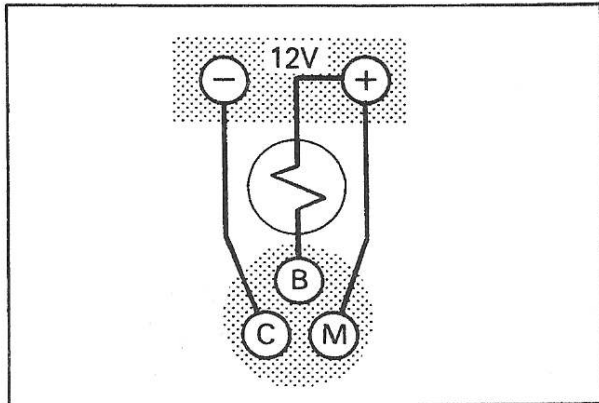


Fig. M3 Supp. 1. Choke thermal delay test circuit

4. Connect terminal M of the unit to the positive terminal of the battery and verify that the lamp is extinguished within one minute.

Choke-on-start relay

The choke-on-start relay coil is energised whenever the starter switch is operated and both neutral start switches are in the neutral or park position (i.e. when the engine is cranking). Its function is to provide an earth path for the choke solenoid during engine cranking thereby holding the choke flap closed.

Relay - To test (see Fig. M4 Supp. 1)

1. Disconnect the battery.
2. Remove the white/red cable from terminal W2 and the white/light green cables from terminal C1. Insulate the cables.
3. Connect a test lamp to the relay as shown in the following diagram, the lamp should be extinguished.
4. Connect W2 to the positive terminal of the battery, the lamp should light.

Choke solenoid

The choke solenoid operates the choke flap and it is energised whenever the engine is cranking or the choke thermal delay switch is closed i.e. when the engine ambient temperature is below 0 °C. The choke flap is closed when the solenoid is energised.

Solenoid - To test

1. Switch on the ignition.
2. Disconnect the white/light green cable 'Lucar' connector at the solenoid.
3. Connect a wire from the solenoid 'Lucar' connector to earth and ensure that the choke flap closes.
4. Switch off the ignition and reconnect the white/light green cable.

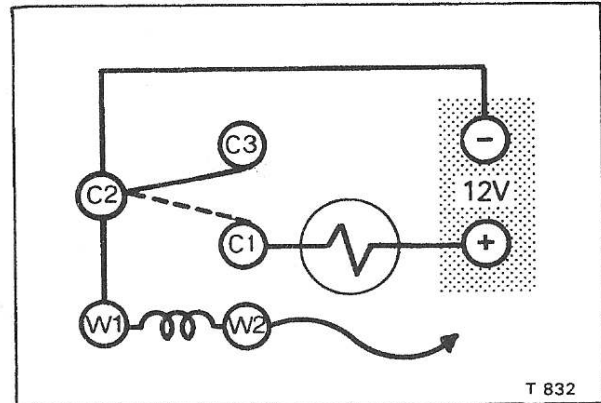


Fig. M4 Supp. 1. Choke-on-start relay test circuit

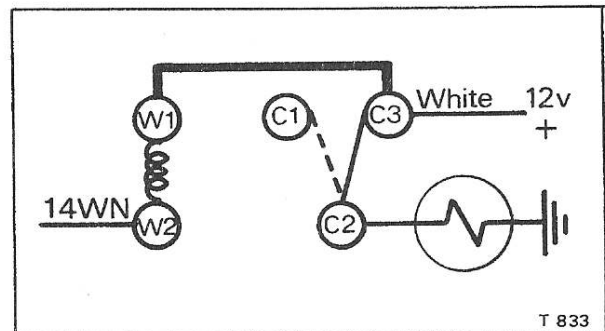


Fig. M5 Supp. 1. Petrol pumps relay test circuit

Petrol pumps relay

The coil of the relay is earthed via the oil pressure switch which effectively prevents the petrol pumps from operating if the ignition is switched on and the oil pressure is low (i.e. switch is made).

Relay - To test (see Fig. M5 Supp. 1)

1. Disconnect the white/pink cable from C2 and connect a 12v test lamp between C2 and earth.
2. Switch on the ignition and use another test lamp or meter to verify that there is a live feed at C3. The test lamp connected to C2 should remain extinguished.
3. Disconnect the white/brown cable from W2, the test lamp should light.
4. Switch off the ignition.

Section M3

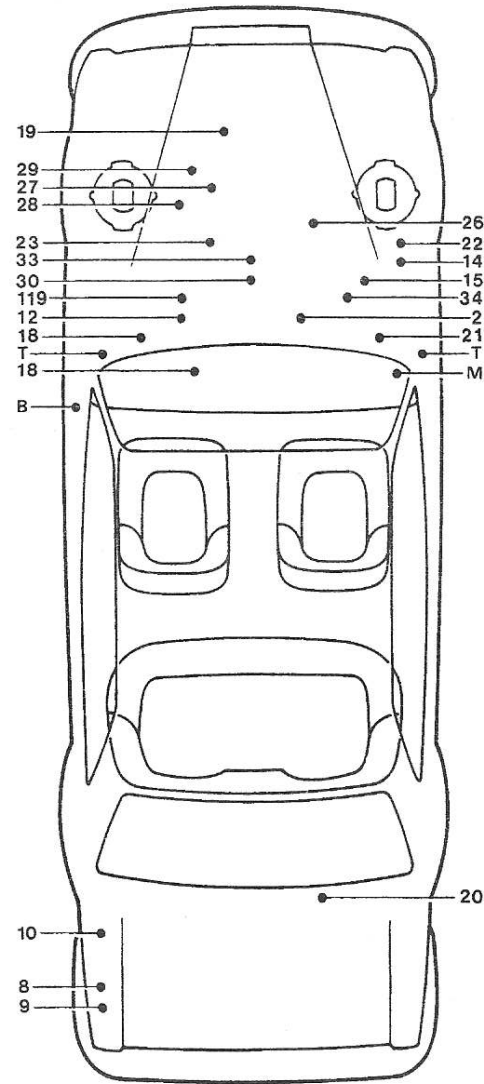
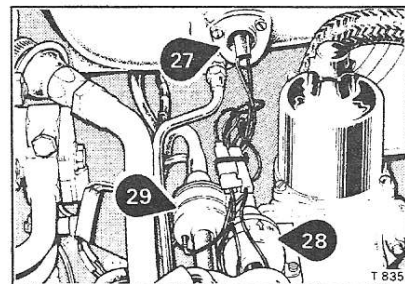
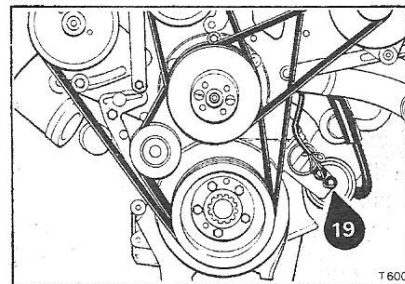
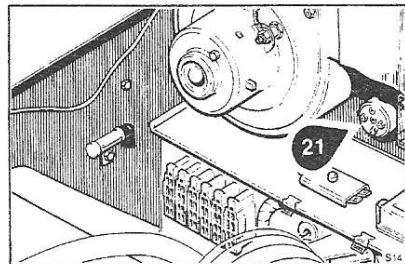
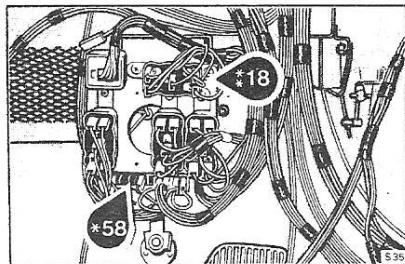
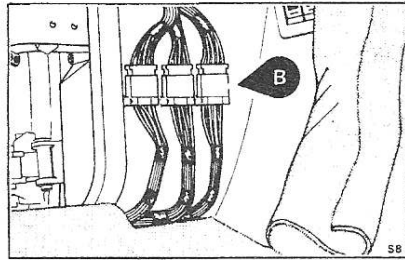
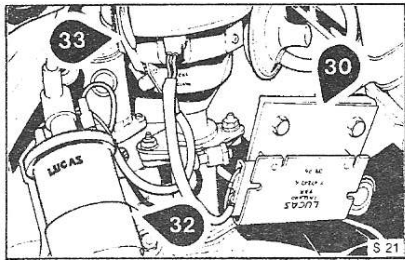
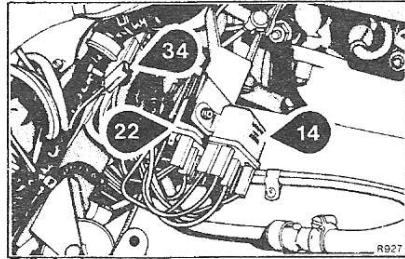
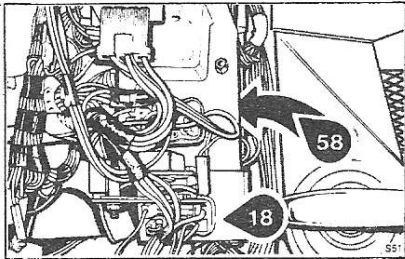
**Supplement number 1
Ignition system**

Component location

Applicable to all cars from
car serial numbers

Silver Shadow II	-	SRX 34573
Silver Wraith II	-	LRG 34601
Bentley T2	-	SBH 34775
Corniche Saloon	-	CRH 34830
Corniche Convertible	-	DRX 33029

Fig. M6 Supp. 1



Components

- 2 Ammeter shunt
- 3 Starter solenoid
- 5 Ignition switch
- 6 Ignition warning lamp
- 8 Battery
- 9 Regulator
- 10 Left-hand boot earth
- 11 Column neutral start switch
- 12 Gearbox neutral start switch
- 13 Starter switch
- 14 Starter relay
- 15 Right-hand valance earth
- 16 Starter motor
- 17 Fuseboard 'A'
- 18 Petrol pumps relay
- 19 Oil pressure switch
- 20 Petrol pumps
- 21 Choke thermal delay unit
- 22 Choke-on-start relay
- 23 Choke solenoid
- 26 Full throttle switch
- 27 Throttle weakener thermostat
- 28 Throttle weakener solenoid
- 29 Anti-diesel solenoid
- 30 Ballast resistor
- 31 Spark plugs
- 32 Ignition coil
- 33 Ignition distributor
- 34 Tacho test connector
- 58 Diode block
- 118 Kick-down switch
- 119 Kick-down solenoid (detent)
- 120 Radio interference suppressor

- T Toeboard socket
- B Body socket
- M Main distribution loom socket

- * All left-hand drive
- * Left-hand drive - not North America

Section M3

Supplement number 1
Ignition system

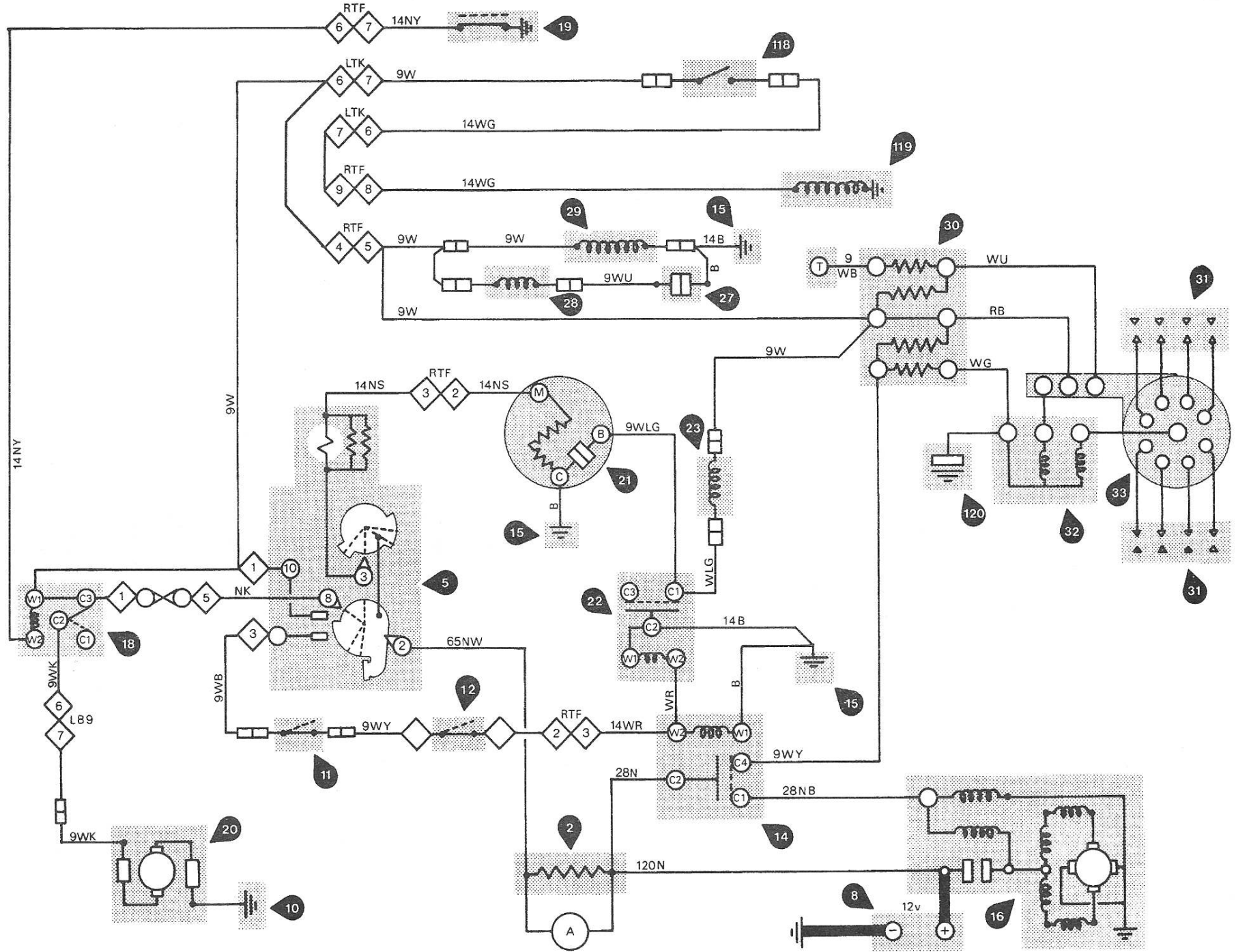
Schematic wiring diagram

Applicable to right-hand drive cars for
countries other than Australia and Japan

From car serial numbers

Silver Shadow II	-	SRX 34573
Silver Wraith II	-	LRG 34601
Bentley T2	-	SBH 34775
Comiche Saloon	-	CRH 34830
Comiche Convertible	-	DRX 33029

Fig. M7 Supp. 1



Section M3

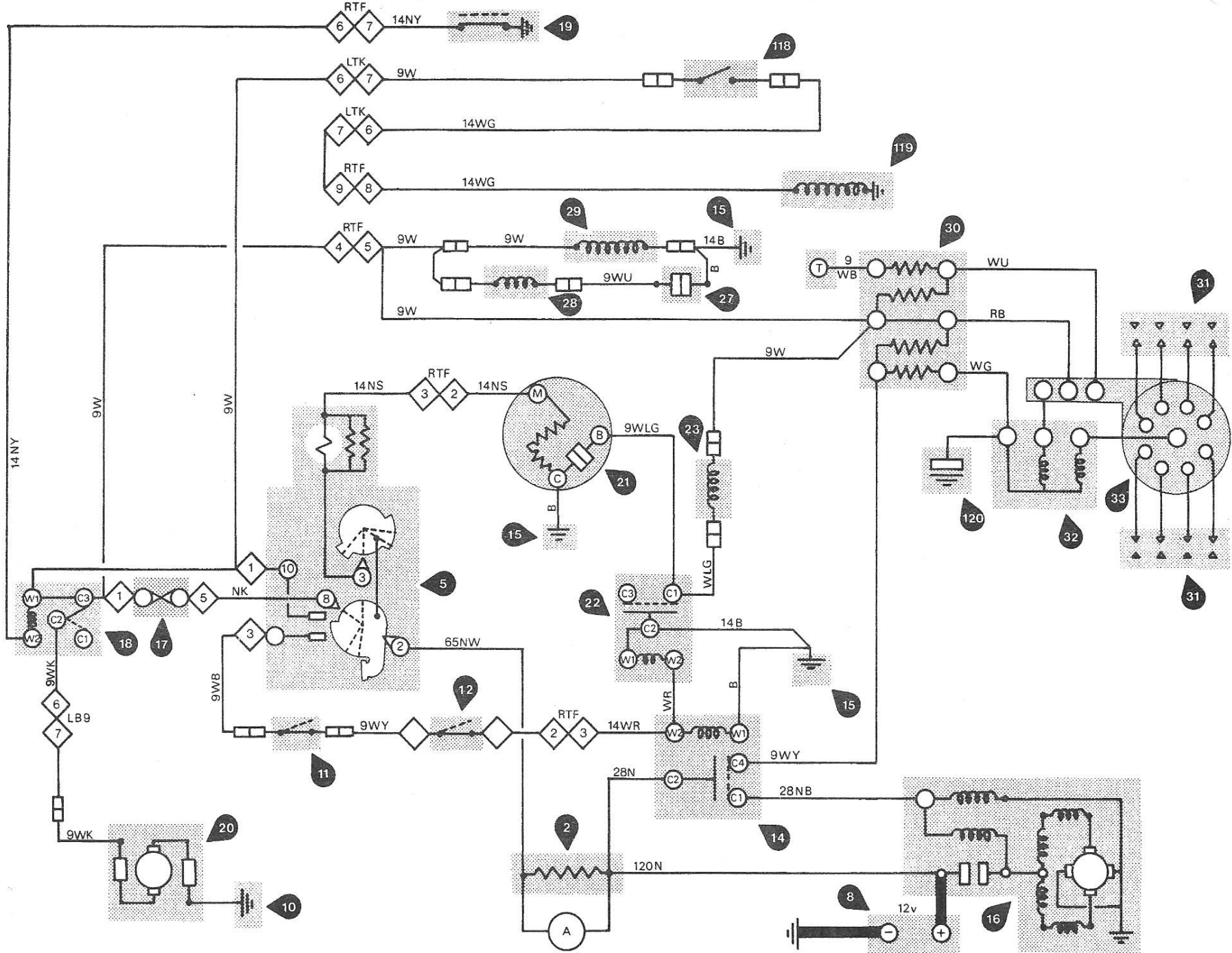
**Supplement number 1
Ignition system**

Schematic wiring diagram

Applicable to left-hand drive cars for
countries other than Canada, Japan and
U.S.A. From car serial numbers

Silver Shadow II	-	SRX 34573
Silver Wraith II	-	LRG 34601
Bentley T2	-	SBH 34775
Corniche Saloon	-	CRH 34830
Corniche Convertible	-	DRX 33029

Fig. M8 Supp. 1



Section M3

Supplement number 1
Ignition system

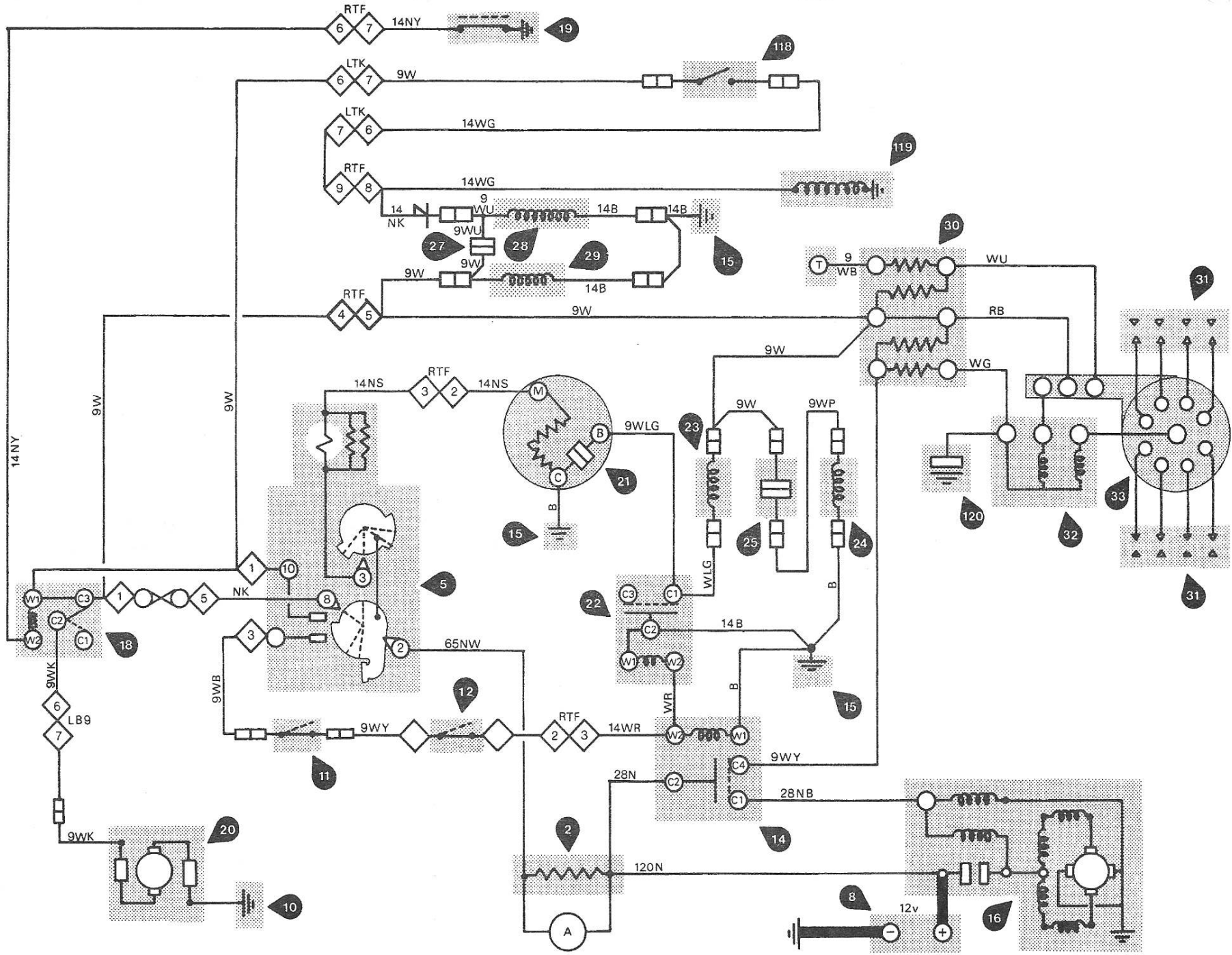
Schematic wiring diagram

Applicable to left-hand drive cars for
Canada, Japan and U.S.A.

From car serial numbers

Silver Shadow II	-	SRX 34573
Silver Wraith II	-	LRG 34601
Bentley T2	-	SBH 34775
Comiche Saloon	-	CRH 34830
Comiche Convertible	-	DRX 33029

Fig. M9 Supp. 1



Section M3

Supplement number 2
Ignition timing data

S.U. HIF7 carburetters			Solex 4A1 carburetter		
Engines without the suffix letter B after the serial number			Fuel	Ignition timing	R.P.M.
Fuel	Ignition timing	R.P.M.	Car identification (†)		
97 R.O.N. (Min.)	25° B.T.D.C.	1 300	97 R.O.N. (Min.)	15° B.T.D.C.	1 200
94 R.O.N. (Min.)	25° B.T.D.C.	2 050	94 R.O.N. (Min.)	15° B.T.D.C.	1 700
90 R.O.N. (Min.)	25° B.T.D.C.	2 800	90 R.O.N. (Min.)*	15° B.T.D.C.	2 200
Engines with the suffix letter B after the serial number (e.g. SYL 26907B)			Car identification (††)		
Fuel	Ignition timing	R.P.M.	97 R.O.N. (Min.)	25° B.T.D.C.	1 850
97 R.O.N. (Min.)	20° B.T.D.C.	2 200	94 R.O.N. (Min.)	20° B.T.D.C.	1 650
94 R.O.N. (Min.)	20° B.T.D.C.	2 200	90 R.O.N. (Min.)*	20° B.T.D.C.	2 350
90 R.O.N. (Min.)	17° B.T.D.C.	2 200	Car identification (†††)		
Note			97 R.O.N. (Min.)	20° B.T.D.C.	2 100
(a) When setting the ignition timing ensure that the distributor vacuum advance signal hose is disconnected at the capsule and the hose blanked off.			94 R.O.N. (Min.)	20° B.T.D.C.	2 100
(b) Details of the ignition timing applicable to cars destined for Australia, Canada, Japan and the U.S.A. are given in the appropriate section of Chapter U.			90 R.O.N. (Min.)*	16° B.T.D.C.	2 100
			Note		
			(a) For the identification of cars refer to Chapter K, divider card.		
			(b) When setting the ignition timing ensure that the distributor vacuum advance signal hose is disconnected from the capsule and the hose blanked off.		
			(c) Carburetter settings marked with an asterisk(*) require a modification to the distributor vacuum advance signal and throttle damper/jack hoses, details are given on Chapter K, divider card.		