



Land Rover  
Range Rover

## Workshop Bulletin

MARCH 1988

BULLETIN No. LSM180WB4

RANGE ROVER VOGUE SE



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INTRODUCTION **01**

## RANGE ROVER VOGUE SE

### INTRODUCTION

Land Rover Ltd introduce the addition of a Vogue SE version of Range Rover to complement the existing model range. The Vogue SE will be fitted with, as standard equipment;

- Automatic Transmission
- Air Conditioning
- Electric Sunroof
- Leather Seats - Electrically Operated
- Polished Burr Walnut door Cappings and Door Pulls
- Body Colour Paint to Alloy Wheels
- Coach Line
- Premium In-car Entertainment
- A133/80 Alternator

This bulletin contains servicing details for the Lucas A133/80 Alternator and Electrically operated seats, and includes up to date wiring diagrams for the complete Range Rover model range.

## 04 GENERAL SPECIFICATION DATA

### ELECTRICAL

System ..... 12 volt, negative ground

#### Alternator

Manufacturer ..... Lucas  
 Type ..... 133/80  
 Polarity ..... Negative ground  
 Brush length  
   New ..... 20 mm (0.78 in)  
   Worn, minimum free protrusion  
   from brush box ..... 10 mm (0.39 in)  
 Brush spring pressure flush with brush box face ..... 136 to 279 g (5 to 10 oz)  
 Rectifier pack output rectification ..... 6 diodes (3 positive side and 3 ground side)  
 Field winding supply rectification ..... 3 diodes  
 Stator windings ..... 3 phase-delta connected  
 Field winding rotor poles ..... 12  
   Maximum speed ..... 16,000 rev/min  
   Winding resistance at 20°C ..... 2.6 ohms  
 Control ..... Field voltage sensed regulation  
 Regulator-type ..... 15 TR  
   voltage ..... 13.6 to 14.4 volts  
 Nominal output  
   Condition ..... Hot  
   Alternator speed ..... 6000 rev/min  
   Control voltage ..... 14 volt  
   Amp ..... 80 amp

## 06 TORQUE WRENCH SETTINGS

### ELECTRICAL

	Nm	lbf/ft
Alternator mounting bracket to cylinder head .....	34	25
Alternator to mounting bracket .....	24	17
Alternator to adjusting link .....	24	17
Alternator shaft nut .....	27.2 to 47.5	20 to 35
Alternator through bolts .....	4.5 to 6.2	3.3 to 4.6
Alternator rectifier bolts .....	3.4 to 3.96	2.5 to 2.9

Charts below give torque values for all screws and bolts used-except for those that are specified.

SIZE	METRIC		SIZE	UNC		UNF	
	Nm	ft lb		Nm	ft lb	Nm	ft lb
M5	5-7	3.7-5.2	1/4	6.8-9.5	5-7	8.1-12.2	6-9
M6	7-10	5.2-7.4	5/16	20.3-27.1	15-20	20.3-27.1	15-20
M8	22-28	16.2-20.7	3/8	35.3-43.4	26-32	35.3-43.4	26-32
M10	40-50	29.5-36.9	7/16	67.8-88.1	50-65	67.8-88.1	50-65
M12	80-100	59.0-73.8	1/2	81.3-101.7	60-75	81.3-101.7	60-75
M14	90-120	66.4-88.5	5/8	122.0-149.1	90-110	122.0-149.1	90-110
M16	160-200	118.0-147.5					

**FRONT SEAT**

**Remove and refit**

**Removing**

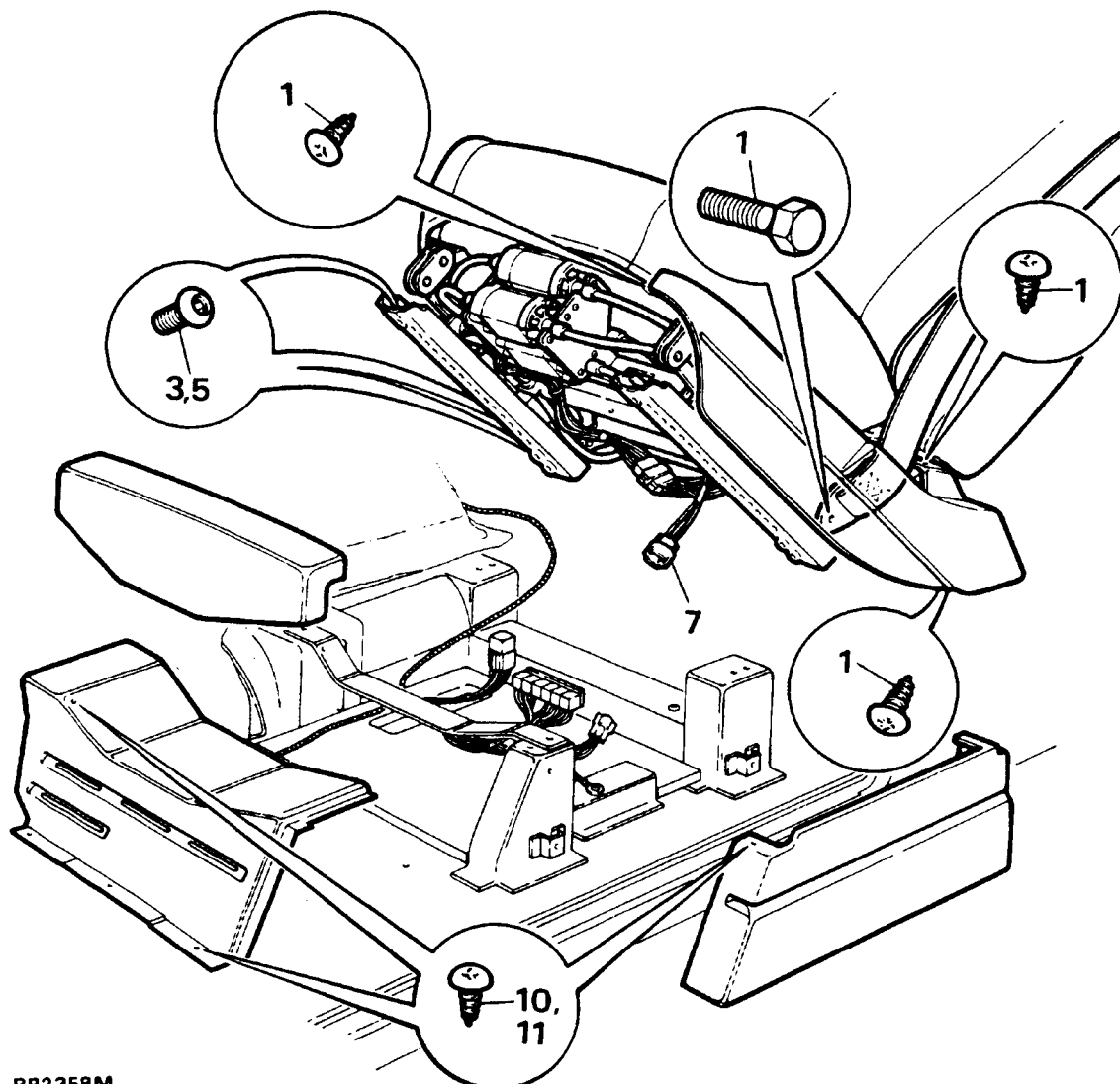
1. Remove the three fixings securing the seat cushion side trim panel and withdraw the panel. Remove the bolt securing the seat belt to the side of the seat.
2. Move the seat until it is in its most rearward position.
3. Remove the two fixings securing the front of the seat located in each seat slide channel.
4. Move the seat until it is in its most forward position.
5. Remove the four fixings securing the rear of the seat located inside each seat slide channel.
6. Disconnect the battery negative terminal.
7. Disconnect the electrical multi-plugs to the seat motors and seat control switch.

**Note:** Certain models may be fitted with a seat belt warning system depending upon territory requirements. If the system is fitted disconnect the electrical connector at the seat belt buckle.

8. Withdraw the seat from the vehicle.
9. If necessary the seat motors and operating switch can be removed. (Refer to Section 86 Electrical).
10. Remove the single screw securing the seat base side trim panel and withdraw the panel.
11. Remove the three screws securing the seat base front trim panel to the front footwell, remove the single screw securing the top of the front trim panel to the seat base located under the seat base cushion, and withdraw the panel.

**Refitting**

12. Reverse the removal instructions.
13. Arrange the electrical leads beneath the seat to ensure that they do not become trapped by the seat slide mechanism.





## ELECTRICAL EQUIPMENT

### DESCRIPTION

The electrical system is Negative ground, and it is most important to ensure correct polarity of the electrical connections at all times. Any incorrect connections made when reconnecting cables may cause irreparable damage to the semi-conductor devices used in the alternator and regulator. Incorrect polarity would also seriously damage any transistorized equipment such as radio and tachometer etc.

**WARNING: During battery removal or before carrying out any repairs or maintenance to electrical components always disconnect the battery negative lead first. If the positive lead is disconnected with the negative lead in place, accidental contact of the wrench to any grounded metal part could cause a severe spark, possibly resulting in personal injury. Upon installation of the battery the positive lead should be connected first.**

### ALTERNATOR - LUCAS A133/80

The alternator is a three phase, field sensed unit. The rotor and stator windings produce three phase alternating current, AC, which is rectified to direct current, DC. The electronic voltage regulator unit controls the alternator output voltage by high frequency switching of the rotor field circuit. Use only the correct Range Rover replacement fan belt. Occasionally check that the engine and alternator pulleys are accurately aligned.

It is essential that good electrical connections are maintained at all times. Of particular importance are those in the charging circuit (including those at the battery) which should be occasionally inspected to see that they are clean and tight. In this way any significant increase in circuit resistance can be prevented.

Do not disconnect battery cables while the engine is running or damage to the semi-conductor devices may occur. It is also inadvisable to break or make any connections in the alternator charging and control circuits while the engine is running.

The Model 15TR electronic voltage regulator employs micro-circuit techniques resulting in improved performance under difficult service conditions. The whole assembly is encapsulated in silicone rubber and housed in an aluminium heat sink, ensuring complete protection against the adverse effects of temperature, dust, and moisture etc.

The regulating voltage is set during manufacture to give the required regulating voltage range of  $14.2 \pm 0.2$  volts, and no adjustment is necessary. The only maintenance needed is the occasional check on terminal connections and wiping with a clean dry cloth.

The alternator system provides for direct connection of a charge (ignition) indicator warning light, and eliminates the need for a field switching relay or warning light control unit. As the warning lamp is connected in the charging circuit, lamp failure will cause loss of charge. Lamp should be checked regularly and a spare carried.

When using rapid charge equipment to re-charge the battery, the battery must be disconnected from the vehicle.

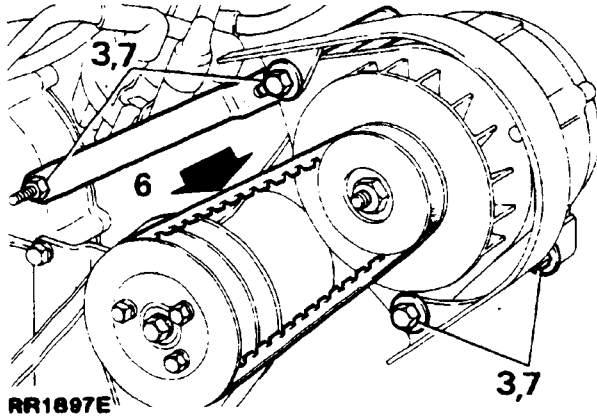
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**ALTERNATOR**

**Remove and refit**

**Removing**

1. Disconnect battery ground lead.
2. Disconnect leads from alternator.



3. Loosen alternator fixings, pivot alternator inwards and remove drive belt.
4. Remove three mounting bolts and lift the alternator clear of the engine.

**Refitting**

5. Fit the alternator and mounting bolts.

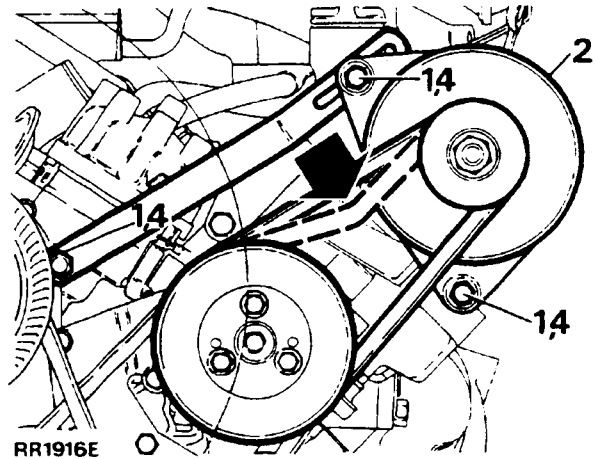
**NOTE: The fan guard is attached to the front fixing and the adjustment bracket bolt.**

6. Fit the drive belt and adjust the belt tension.
7. Tighten the mounting bolts and the adjustment bracket securing nut.
8. Connect the wiring leads to the alternator.
9. Connect the battery.

**ALTERNATOR DRIVE BELT**

**Adjust**

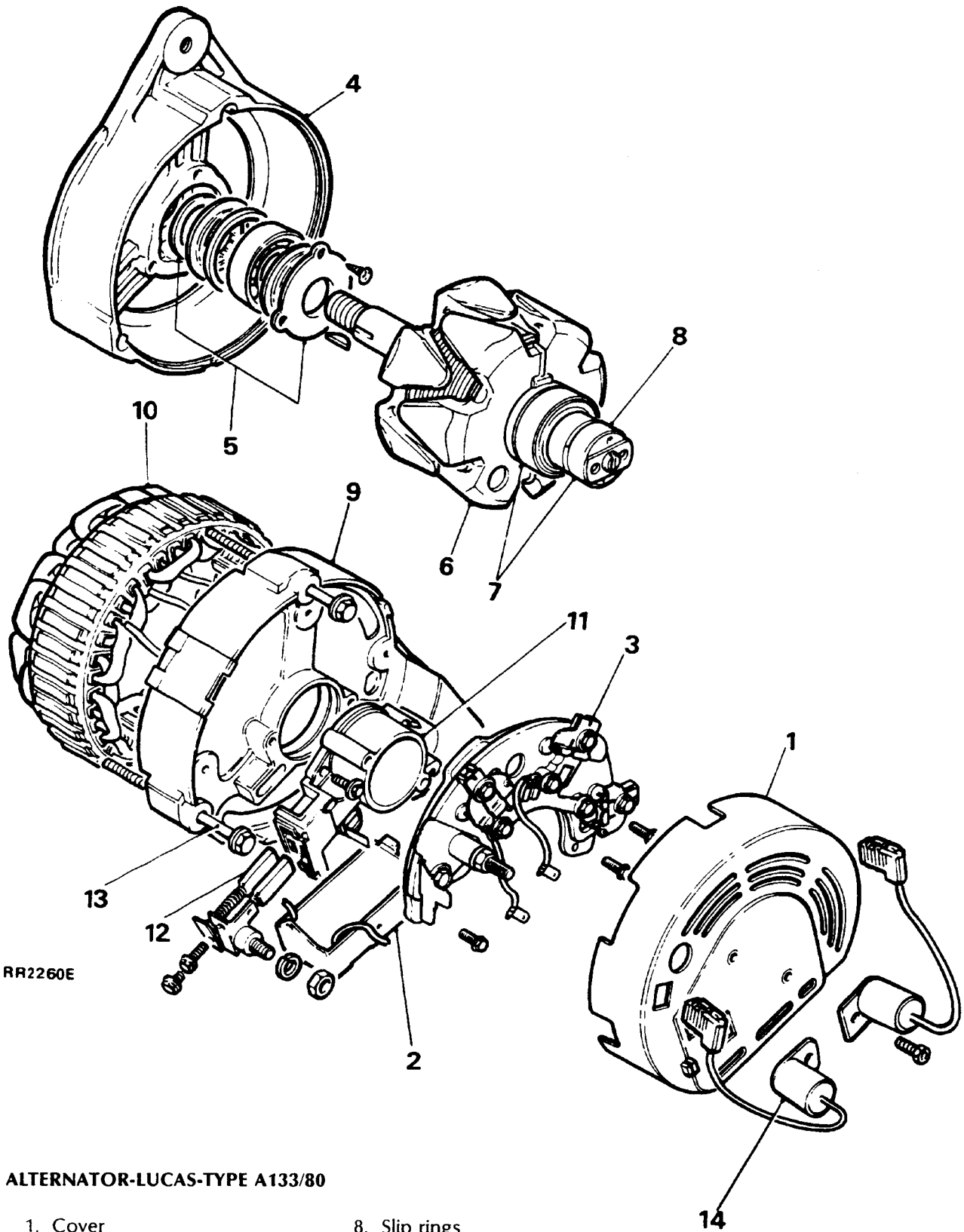
1. Loosen the alternator fixings and the adjustment link.
2. Pivot the alternator to give the required belt tension.
3. Belt tension should be 4 to 6mm (0.19 to 0.25 in) at the point indicated by the bold arrow.



4. Tighten the alternator fixing bolts and the adjustment link.

**NOTE: Check adjustment after running engine at fast idle speed for 3 to 5 minutes if a new belt has been fitted.**





**ALTERNATOR-LUCAS-TYPE A133/80**

- |                          |                          |
|--------------------------|--------------------------|
| 1. Cover                 | 8. Slip rings            |
| 2. Regulator             | 9. Slip ring end bracket |
| 3. Rectifier             | 10. Stator               |
| 4. Drive and bracket     | 11. Brush box            |
| 5. Bearing assembly      | 12. Brushes              |
| 6. Rotor                 | 13. Through bolt         |
| 7. Slip ring end bearing | 14. Suppressors          |

## ALTERNATOR-LUCAS-TYPE A133/80

## Overhaul

## Including Test (Bench)

**NOTE: Alternator charging circuit-**The ignition warning light is connected in series with the alternator field circuit. Bulb failure would prevent the alternator charging, except at very high engine speeds, therefore, the bulb should be checked before suspecting an alternator failure.

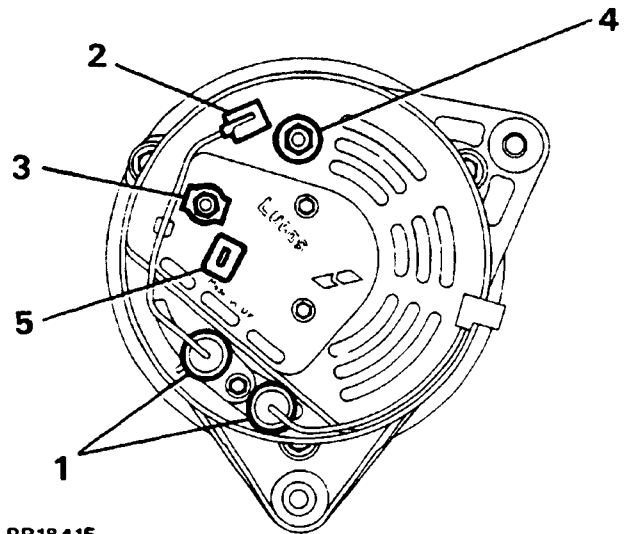
## Precautions

Battery polarity is **NEGATIVE GROUND**, which must be maintained at all times.

No separate control unit is fitted; instead a voltage regulator of micro-circuit construction is incorporated on the slip ring end bracket, inside the alternator cover.

Battery voltage is applied to the alternator output cable even when the ignition is switched off, the battery must be disconnected before commencing any work on the alternator. The battery must also be disconnected when repairs to the body structure are being carried out using electric welding equipment.

## Sequence of connections



RR1841E

1. Suppression capacitors (two)
2. Positive suppression terminal
3. IND terminal
4. + output terminal
5. Sensing terminal

## ALTERNATOR TESTING

### Charging system check

1. Check the battery is in good condition, with an open circuit voltage of at least 12.6 V. Recharge or fit a charged substitute battery to carry out test.
2. Check drive belt adjustment and condition. Rectify as necessary.
3. Check battery connections are clean and tight.
4. Check alternator connections are clean and tight.
5. Ensure that there is no continuous drain on battery due, for example, to interior, underbonnet or door edge lamps being left on.

### Alternator test

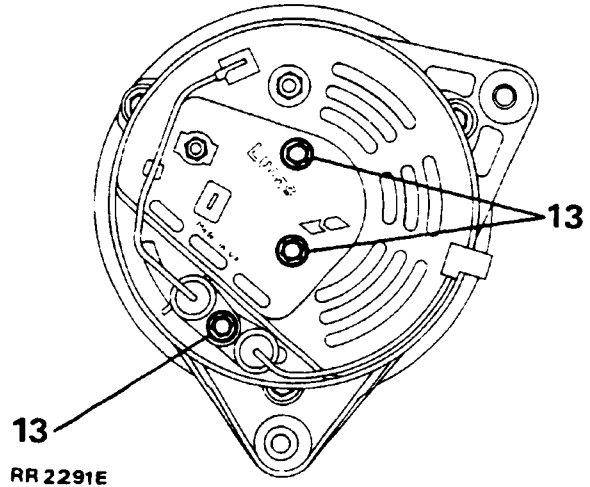
The following instructions refer to the use of suitable test equipment using a carbon pile rheostat.

6. Connect test equipment referring to the manufacturer's instructions.
7. Start engine and run at 3000 rev/min without accessory load.
8. Rotate the carbon pile load control to achieve the greatest output (amps) without allowing voltage to fall below 12.0 V. A reading of 80 amps, minus 10% to allow for EFI and Ignition loss, should be obtained.
9. Run engine at 3000 rev/min, switch selector to regulator test, read voltmeter. A reading of 13.6 to 14.4 V should be obtained.
10. Switch selector to diode/stator test, switch on headlamps to load alternator. Raise engine speed to 3000 rev/min, read voltmeter. The needle must be within the 'OK' range.

**NOTE:** See also charging circuit resistance test, page 7.

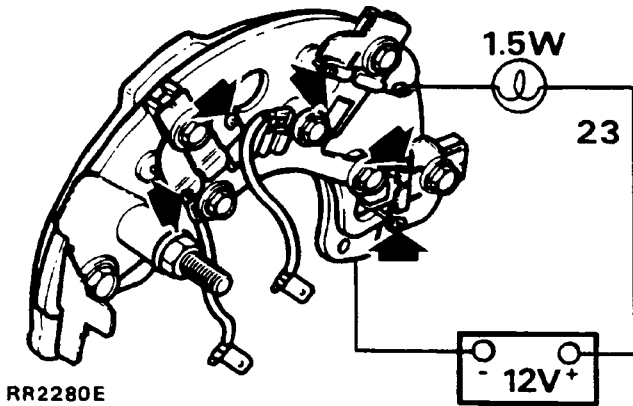
### Testing-alternator removed

11. Withdraw the connectors from the alternator.
12. Remove the alternator.
13. Disconnect the suppressor and remove the alternator cover.



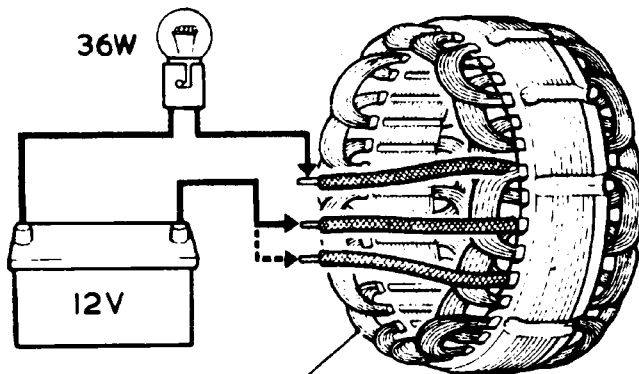
14. Disconnect the lead and remove the rectifier assembly.
15. Note the arrangement of the brush box connections and remove the screws securing the regulator to the brush box and withdraw. This screw also retains the inner brush mounting plate in position.
16. Remove the screw retaining the outer brush box in position and withdraw both brushes.
17. Check brushes for wear by measuring length of brush protruding beyond brush box moulding. If length is 10mm (0.4 in) or less, fit new brushes.
18. Check that brushes move freely in holders. If brush is sticking, clean with a mineral spirit moistened cloth or polish sides of brush with fine file.
19. Check brush spring pressure using push-type spring gauge. Gauge should register 136 to 279g (5 to 10 oz) when brush is pulled back until face is flush with housing. If reading is outside these limits, fit a new brush assembly.
20. Remove the two screws securing the brush box to the slip ring end bracket and lift off the brush box assembly.
21. Securely clamp alternator in a vice and release the stator winding cable ends from the rectifier by applying a hot soldering iron to the terminal tags of the rectifier. Pry out the cable ends when the solder melts.

22. Remove the two remaining screws securing the rectifier assembly to the slip ring end bracket and lift off the rectifier assembly. Further dismantling of the rectifier is not required.
23. Check the diodes. Connect the test equipment as shown and test each diode in turn, note whether lamp lights, then reverse test lead connections. The lamp should light in one direction only. Renew the rectifier assembly if a faulty diode is diagnosed.



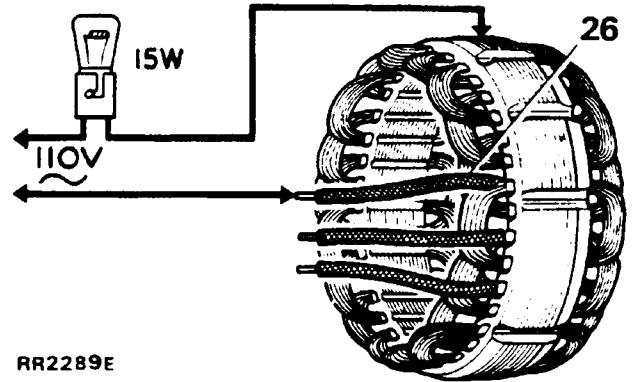
RR2280E

24. Remove the slip ring end bracket bolts and lift off the bracket.
25. Connect a 12 volt battery and a 36 watt test lamp to two of the stator connections. Repeat the test replacing one of the two stator connections with the third. If test lamp fails to light in either test, fit a new stator.



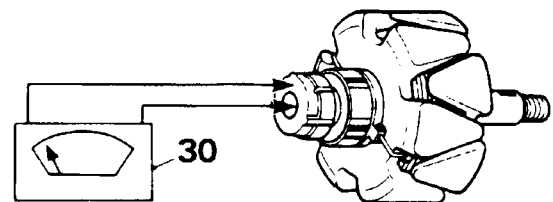
RR2288E

26. Using a 110 volt a.c. supply and a 15 watt test lamp, test for insulation between any one of the three stator connections and stator laminations. If test lamp lights, fit a new stator.



RR2289E

27. Clean surfaces of slip rings using a solvent moistened cloth.
28. Inspect slip ring surfaces for signs of burning; remove burn marks using very fine sandpaper. On no account should emery cloth or similar abrasives be used, or any attempt made to machine the slip rings.
29. Note the position of the stator output leads in relation to the alternator fixing lugs, and lift the stator from the drive end bracket.
30. Connect an ohmmeter to the slip rings. A reading of 2.6 ohms should be recorded.



RR2290E

31. Using a 110 volt a.c. supply and a 15 watt test lamp, test for insulation between one of the slip rings and one of the rotor poles. If the test lamp lights, fit a new rotor.

32. To separate the drive end bracket and rotor, remove the shaft nut, washers, woodruff key and spacers from the shaft.
33. Remove bearing retaining plate by removing the three screws. Using a press, drive the rotor shaft from the drive end bearing.
34. If necessary, to remove the slip rings or the slip ring end bearing on the rotor shaft, unsolder the outer slip ring connection and gently pry the slip ring off the shaft, repeat the procedure for the inner slip ring connection. Using a suitable extraction tool, withdraw the slip ring bearing from the shaft.

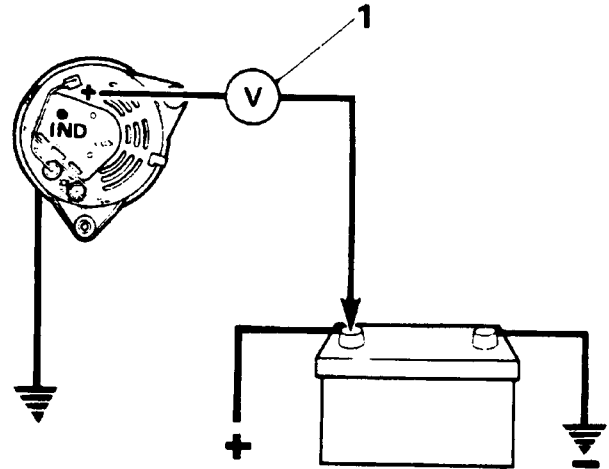
### Reassembling

35. Reverse the dismantling procedure, noting the following points.
  - (a) Use Shell Alvania 'RA' to lubricate bearings.
  - (b) When refitting slip ring end bearing, ensure it is fitted with open side facing rotor.
  - (c) Use Fry's H.T.3 solder on slip ring field connections.
  - (d) When refitting rotor to drive end bracket, support inner track of bearing. Do not use drive end bracket to support bearing when fitting rotor.
  - (e) Tighten through-bolts evenly.
  - (f) Fit brushes into housings before fitting brush moulding.
  - (g) Tighten shaft nut to the correct torque, see Torque Values.
  - (h) Refit regulator pack to brush moulding.
36. Reconnect the leads between the regulator, brush box and rectifier.
37. Refit the alternator.

### Testing in position

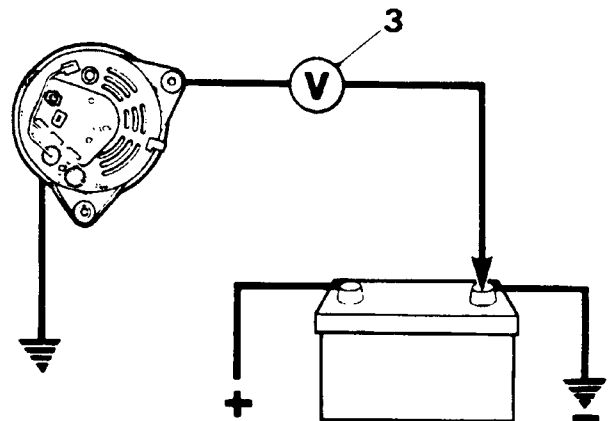
#### Charging circuit resistance test.

1. Connect a low range voltmeter between the alternator terminal marked + and the positive terminal of the battery.



RR2317E

2. Switch on the headlamps and start the engine. Set the throttle to run at approximately 3000 rev/min. Note the voltmeter reading.
3. Transfer the voltmeter connections to the frame of the alternator and the negative terminal of the battery, and again note the voltmeter reading.



RR2318E

4. If the reading exceeds 0.5 volt on the positive side or 0.25 volt on the negative side, there is a high resistance in the charging circuit which must be traced and remedied.

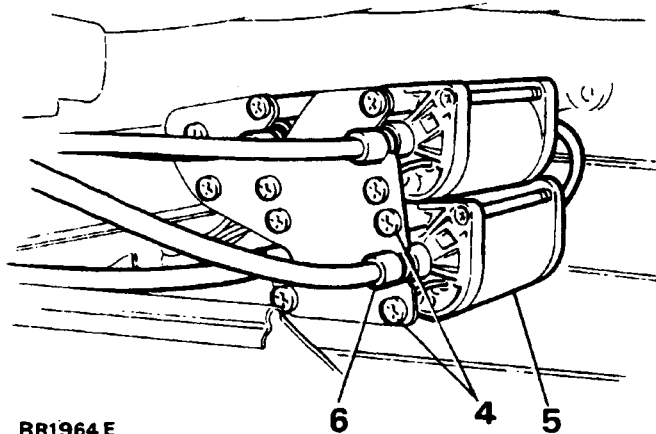
**FRONT SEAT ADJUSTMENT MOTORS**

**Remove and refit**

Four electric motors mounted beneath each front seat control the fore and aft movement, the cushion height front and rear, and the angle of recline of the seat. Adjustment is possible with either front door open, or with ignition switched ON.

**Removing**

1. Position the seat to give access to the motors.
2. Disconnect the battery negative lead.
3. Remove the seat base trim.
4. Remove two securing screws from each side of the required motor.



RR1964 E

5. Withdraw the motor from its mounting.
6. Disconnect the drive cables by unscrewing the ferrule.
7. Disconnect the wires from the multi-plug and remove the motor.

**Refitting**

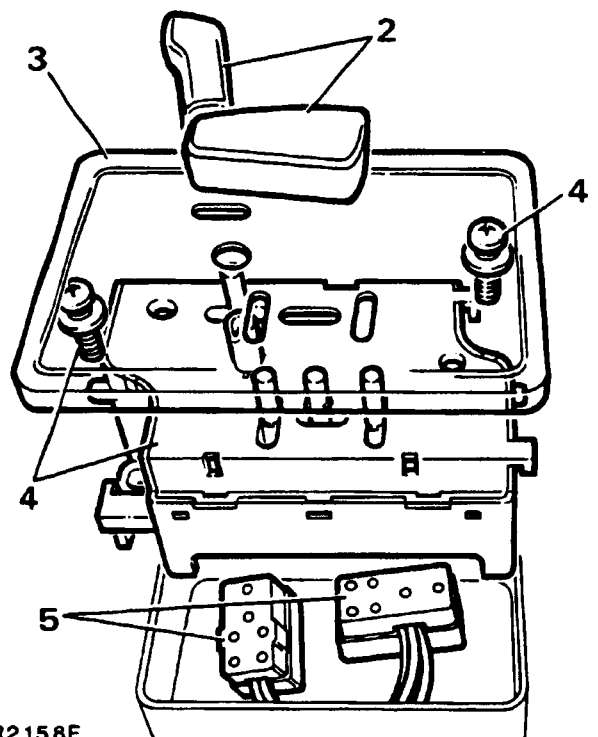
8. Reverse the removal procedure.
9. Check the seat adjustment for correct operation.

**SEAT ADJUSTMENT CONTROL SWITCH**

**Remove and refit**

**Removing**

1. Disconnect the battery negative lead.
2. Pry the two finger tip controls from the top of the switch housing.
3. Removing the switch housing cover by lightly depressing the sides of the cover to disengage the clips.
4. Remove two crosshead screws and washers and lift the switch assembly to gain access to the two multiplugs.
5. Disconnect the multiplugs and withdraw the switch assembly.

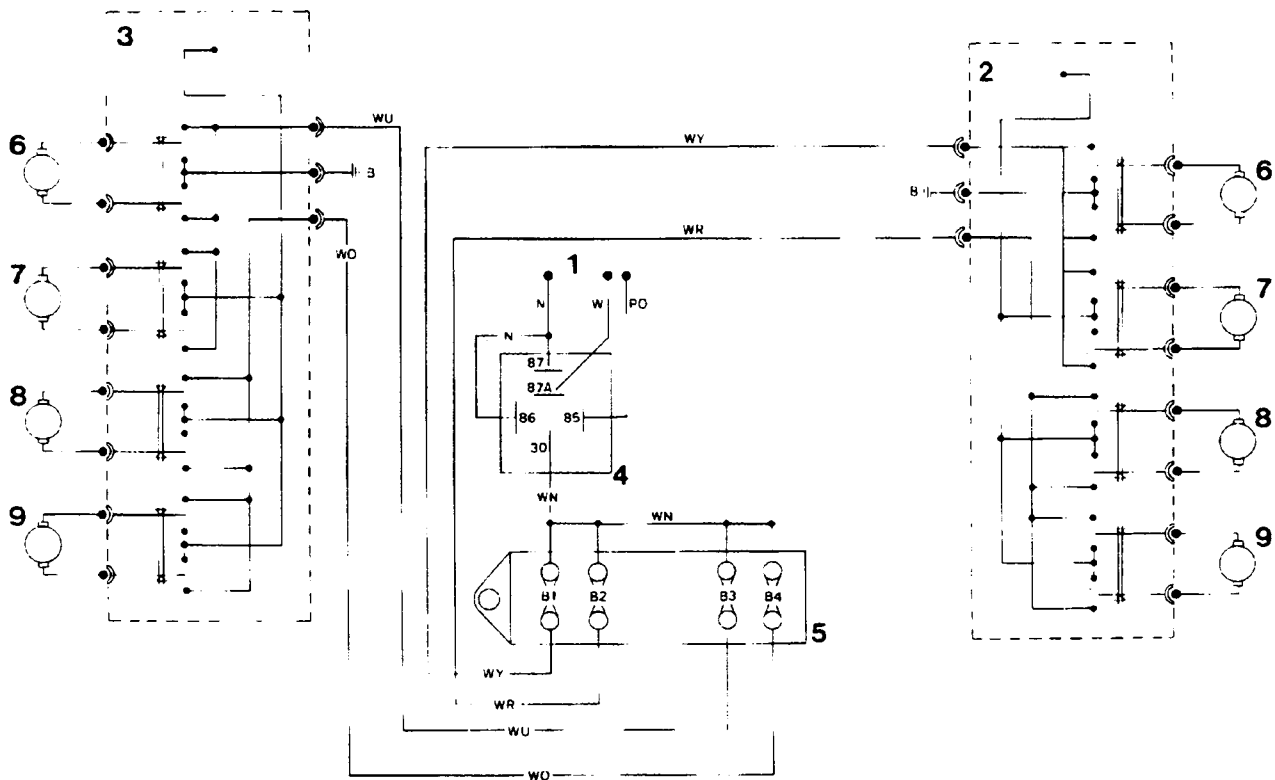


RR2158 E

**Refitting**

6. Reverse instructions 1 to 5.

**NOTE:** If switch housing removal is required it is necessary to remove the seat to gain access to the two securing screws- see Body Section 76.



RR1929E

### SEAT ADJUSTMENT - Circuit diagram

1. Main connections - Item 126 on main circuit diagram left hand steer catalyst vehicles.  
 - item 170 on main circuit diagram - left hand steer non - catalyst vehicles.  
 - item 165 on main circuit diagram - right hand steer vehicles.

**Brown** - Live positive feed

**White** - Ignition positive feed

**Purple/Orange** - Door switch

2. Left hand seat control.
3. Right hand seat control.
4. Load control relay.
5. Auxiliary fuse box (B).
6. Seat recline motor.
7. Seat height (rear) motor.
8. Seat base adjust motor.
9. Seat height (front) motor.

### CABLE COLOUR CODE

<b>B</b>	Black
<b>U</b>	Blue
<b>N</b>	Brown
<b>G</b>	Green
<b>O</b>	Orange
<b>P</b>	Purple
<b>R</b>	Red
<b>W</b>	White
<b>Y</b>	Yellow

The last letter of a colour code denotes the tracer.

Relay	Main Circuit Diagram Item Number		
	Right hand steer	Left hand steer Non-catalyst	Left hand steer Catalyst
1. Headlamp wash timer unit	19. M	17. M	17. M
2. Heated rear window	66. M	64. M	64. M
3. Starter solenoid relay	6. M	6. M	6. M
4. Brake check relay	151. A	Not fitted	Not fitted
5. Headlamp relay	157. A	Not fitted	Not fitted
6. Compressor clutch	11. A	11. A	11. A
7. Condenser fan	9. A	9. A	9. A
8. Air conditioning/heater	5. A	5. A	5. A
9. Stowage position	Not used	Not used	Not used
10. Rear wiper delay	132. M	139. M	132. M
11. Ignition load relay	1. M	1. M	1. M
12. Window lift relay (if fitted)	65a. M	63a. M	63a. M
13. Seat adjustment relay (if fitted)	165a. M	170a. M	126a. M
14. Auxiliary lamp relay (if fitted)	88. M	86. M	86. M
15. Flasher/hazard unit	74. M	72. M	72. M
16. Interior lamp delay	101. M	99. M	99. M
17. Voltage sensitive switch (air conditioning)	72. M	70. M	70. M
18. Front wiper delay	15. M	14. M	14. M
19. Seat adjustment relay (load control - if fitted)	4. S	4. S	4. S
20. Main EFI relay	10. E	10. E	22. E
21. Fuel pump relay	11. E	11. E	21. E
22. Sunshine roof auxiliary relay (if fitted)	3. SR	3. SR	3. SR

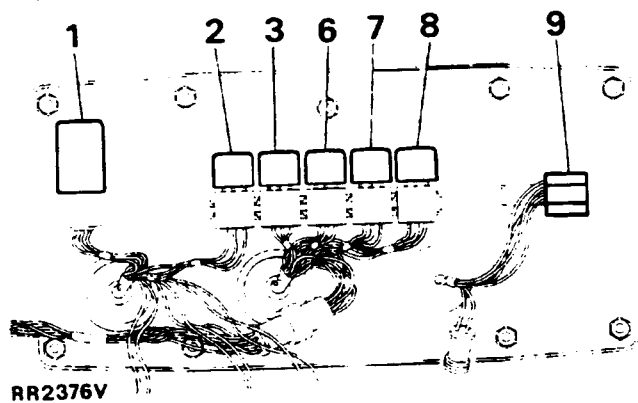
M = Main circuit diagram  
 A = Air conditioning circuit diagram  
 S = Seat adjustment circuit diagram

E = EFI circuit diagram  
 SR = Sunroof circuit diagram

**NOTE:** This relay chart applies to ALL petrol model Range Rovers. Vogue SE models have electric seat adjustment, window lift, air conditioning, auxiliary lamps and sunshine roof fitted as standard equipment. Saudi vehicles are fitted with two extra relays, an overspeed monitor and buzzer, located immediately below the instrument binnacle. Access to the two units is gained by removing the lower dash panel and steering column shroud.

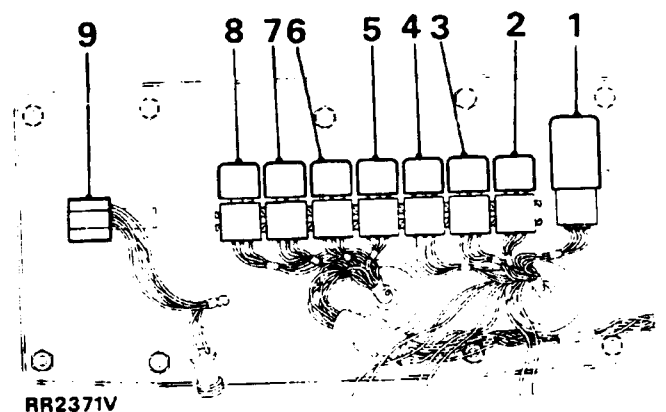
**RELAYS-Identification**

RR2376V shows left hand drive configuration of relays.



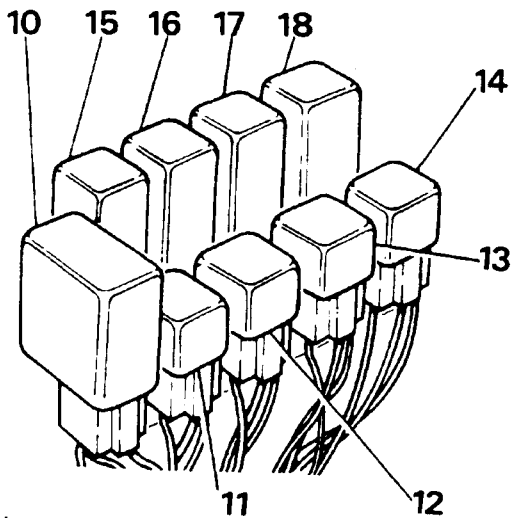
RR2376V Closure panel viewed from the engine compartment, with protective cover removed.

RR2371V shows right hand drive configuration of relays.



RR2371V Closure panel viewed from the engine compartment, with protective cover removed.



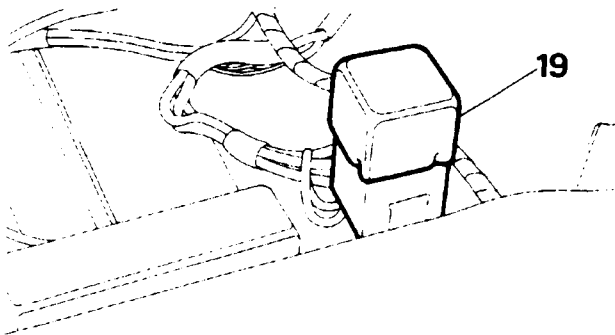


RR2372V

Steering column mounted relays viewed with the lower dash panel removed.

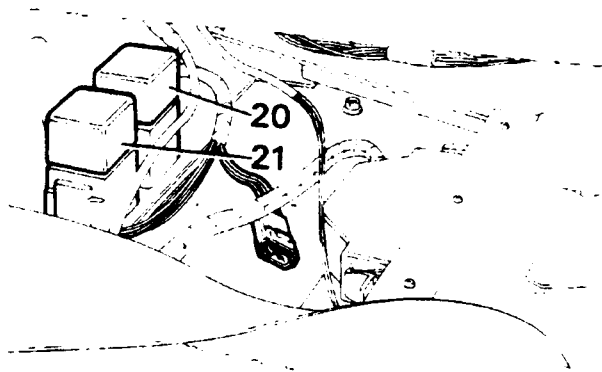
**NOTE:** Left hand drive configuration of relays illustrated above.

Unit 10, on right hand drive vehicles is located at the right hand side of the bank of relays.



RR2373V

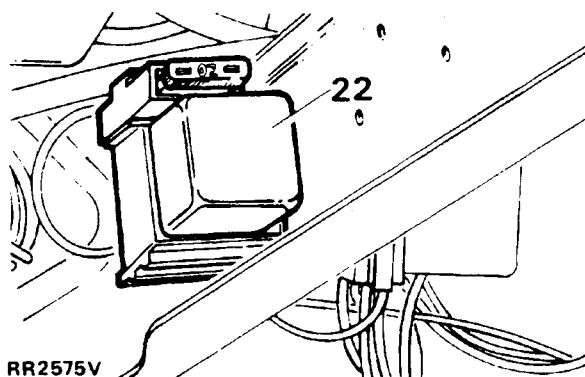
Seat adjustment relay (load control) located beneath the left hand front seat adjacent to fuse box (B).



RR2374V

Main EFI (black terminal block) and fuel pump relays (blue terminal block) mounted beneath right hand front seat.

**NOTE:** Refer to fuel injection section of manual for full information on E.F.I. relays.



RR2575V

Sunshine roof auxiliary relay located on side of the steering column support bracket located behind the lower dash panel. (Left hand drive shown).

**RELAYS - (Mounted on the engine compartment closure panel).**

**Remove and refit**

**Removing**

1. Lift the hood.
2. Disconnect the battery negative lead.
3. Remove the bolt securing the relay protective cover, located on the front of the engine compartment closure panel.
4. Remove the cover.
5. Pull the appropriate relay off its multi-plug.

**Refitting**

6. Reverse the removal procedure.

**Continued**

**RELAYS - (Mounted on the steering column support bracket)**

**Remove and refit**

**Removal.**

1. Disconnect the battery negative lead.
2. Remove the six screws securing the lower fascia panel.
3. Lower the dash panel, disconnect the electric leads from the dimming control switch and remove the fascia panel.
4. Locate the appropriate relay on the relay mounting bracket, carefully pull the relay off the multi-plug.

**Refitting**

5. Reverse the removal procedure.

**RELAYS - (Floor mounted beneath front seats)**

**Remove and refit**

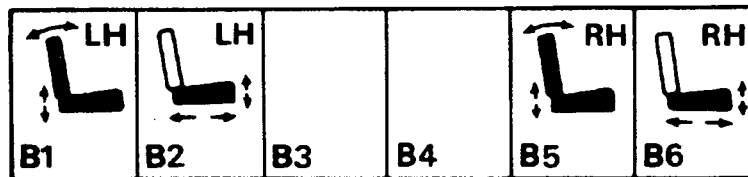
**Removing**

1. Position seat to gain access to the required relay.
2. Disconnect the battery negative lead.
3. Carefully pull the relay off the multi-plug.

**Refitting**

4. Reverse the removal procedure.

**AUXILIARY FUSE BOX**



RR1760E

**AUXILIARY FUSE BOX (B)-Located under the front left-hand seat**

FUSE NO	COLOUR CODE	FUSE VALUE	CIRCUIT SERVED
B1	Green	30 amp	Seat recline
B2	Green	30 amp	Seat base
B3	----	----	Spare
B4	----	----	Spare
B5	Green	30 amp	Seat recline
B6	Green	30 amp	Seat base

**AUXILIARY FUSE BOX**

**Remove and refit**

**Removing**

1. Disconnect the battery negative lead.
2. Remove the clip-on fuse box cover.
3. Remove the fuses from auxiliary fuse box.
4. Remove the single screw securing the top auxiliary.
5. Remove the leads from the fuse box, by inserting a small screwdriver into each fuse socket to depress the small retaining tab on the back of the lucar connections, withdraw the leads from the rear of the fuse box.

**Refitting**

6. Reverse the removal instructions ensuring that all leads are refitted to the correct fuse socket (refer to circuit diagram).

**NOTE: When refitting the leads to the fuse box, the retaining tabs on the back of the lucar connectors must be in their raised position to prevent the leads being pushed out of the rear of the fuse box when the fuse is refitted.**

## MAIN CIRCUIT DIAGRAMS

NOTE:- Right and left hand drive non-catalyst wiring diagrams cover the full Range Rover model range, therefore it will be noted that references are made to Diesel Components on both circuit diagrams, these references should be ignored when using the diagrams for Vogue SE models.

**MAIN CIRCUIT DIAGRAM**
**Right Hand Steering - RR2378M & RR2379M**

1.	Ignition load relay	59.	LH horn	116.	Fuse 18
2.	Battery	60.	Under bonnet illumination switch	117.	Fuel cut off relay (carburetter models)
3.	Terminal post	61.	Under bonnet light	118.	Fuel pump(petrol models)
4.	Starter solenoid	62.	Clock	119.	Ignition coil
5.	Starter motor	63.	Fuse 19	120.	Capacitor
6.	Starter relay	64.	Fuse 20	121.	Distributor
7.	Starter inhibit switch (Automatic)	65.	Pick-up point central locking/window lift (option)	122.	EFI Harness plug
8.	Ignition switch	65 (a)	Window lift relay (option)	123.	Fuel shut off solenoid (Diesel)
9.	Tachometer	66.	Heated rear window relay	124.	Radio choke
10.	Voltage transformer(dim dip)	67.	Fuse 9	125.	Radio fuse
11.	Ignition warning lamp	68.	Radio aerial amplifier	126.	Radio and four speakers
12.	Alternator	69.	Heated rear screen	127.	Sun roof (option) pick up points
13.	Fuse 7	70.	Heated rear screen switch	128.	Automatic transmission oil temperature warning lamp
14.	Front wipe/wash switch	71.	Heated rear screen warning lamp	129.	Automatic transmission oil temperature switch
15.	Front wipe delay unit	72.	Voltage sensitive switch	130.	Fuse 16
16.	Front wiper motor	73.	Fuse 13	131.	Rear wash wipe switch
17.	Front wash switch	74.	Hazard switch	132.	Rear wipe delay unit
18.	Front wash pump	75.	Flasher unit	133.	Rear wiper motor
19.	Headlamp wash timer unit (option)	76.	Direction indicator switch	134.	Rear screen wash pump
20.	Headlamp wash pump (option)	77.	Hazard/indicator warning lamp	135.	Low screen wash fluid level warning lamp
21.	Main lighting switch	78.	LH rear indicator lamp	136.	Low screen wash switch
22.	Fuse 6	79.	LH front indicator lamp	137.	Low coolant switch
23.	Fuse 5	80.	LH side repeater lamp	138.	Multi-function unit in binnacle
24.	LH side lamp	81.	RH side repeater lamp	139.	Low coolant level warning lamp
25.	LH tail lamp	82.	RH front indicator lamp	140.	Low fuel level warning lamp
26.	Number plate lamp(2 off)	83.	RH rear indicator lamp	141.	Cold start/diesel glow plug warning lamp
27.	Main beam dip/flash switch	84.	Trailer warning lamp	142.	Cold start switch - carburetter
28.	Radio illumination	85.	Fuse 15	143.	Glow plug timer (diesel)
29.	RH side lamp	86.	Stop lamp switch	144.	Glow plugs (diesel)
30.	RH tail lamp	87.	Reverse lamp switch	145.	Handbrake warning lamp
31.	Rheostat	88.	Auxiliary lamp relay (option)	146.	Brake fail warning lamp
32.	Fuse 3	89.	LH stop lamp	147.	Handbrake warning switch
33.	Fuse 4	90.	RH stop lamp	148.	Brake fail warning switch
34.	Fuse 1	91.	LH reverse lamp	149.	Brake pad wear warning lamp
35.	Fuse 2	92.	RH reverse lamp	150.	Brake pad wear sensors
36.	Rear fog switch	93.	LH auxiliary lamp (option)	151.	Brake check relay
37.	Fuse 12	94.	RH auxiliary lamp (option)	152.	Split charge relay (option)
38.	Switch illumination (2 off)	95.	Auxiliary lamp switch (option)	153.	Split charge terminal post (option)
39.	Cigar lighter illumination (2 off)	96.	Fuse 17	154.	Heater/air conditioning connections
40.	Heater illumination (4 off)	97.	Dash cigar lighter	155.	Fuse 8
41.	Clock illumination	98.	Cubby box cigar lighter	156.	Coil negative (engine RPM input to ECU.)
42.	Automatic gear selector illumination (2 off)	99.	LH interior lamp	157.	Headlamp relay
43.	Instrument illumination (6 off)	100.	RH interior lamp	158.	Ignition load relay (+)
44.	Rear fog warning lamp	101.	Interior lamp delay unit	159.	Battery feed (+)
45.	LH rear fog	102.	LH door edge lamp	160.	Ignition auxiliary (+)
46.	RH rear fog	103.	RH door edge lamp	161.	Ignition on (+)
47.	LH dip beam	104.	LH puddle lamp	162.	Earth (-)
48.	RH dip beam	105.	RH puddle lamp	163.	Fuse 14
49.	LH main beam	106.	Interior lamp switch	164.	Trailer pick up point
50.	RH main beam	107.	LH rear door switch	165.	Electric seats pick up point (option)
51.	Main beam warning lamp	108.	RH rear door switch	165 (a).	Electric seats relay (option)
52.	Fuel gauge	109.	Tailgate switch	166.	Fuse 10
53.	Fuel gauge sender unit	110.	LH front door switch	167.	Electric mirrors pick up point (option)
54.	Water temperature gauge	111.	RH front door switch		
55.	Water temperature sender unit	112.	Differential lock warning lamp		
56.	Fuse 11	113.	Differential lock switch		
57.	Horn switch	114.	Oil pressure warning lamp		
58.	RH horn	115.	Oil pressure switch		

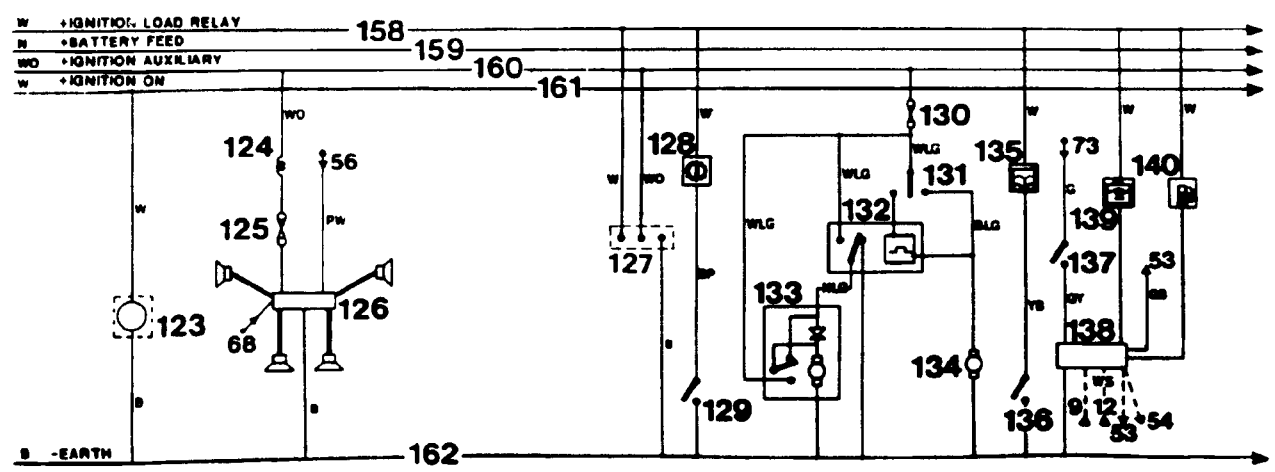
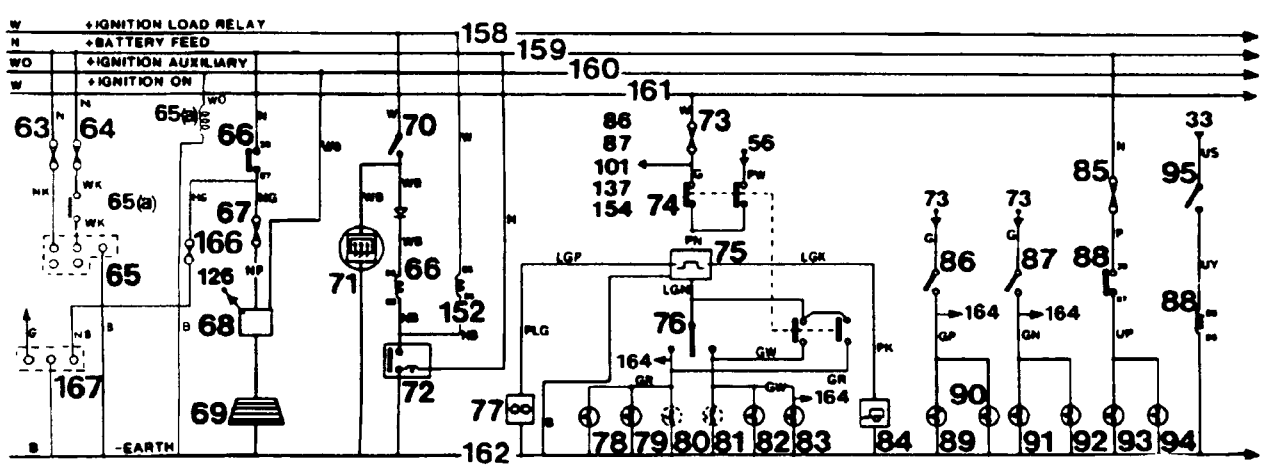
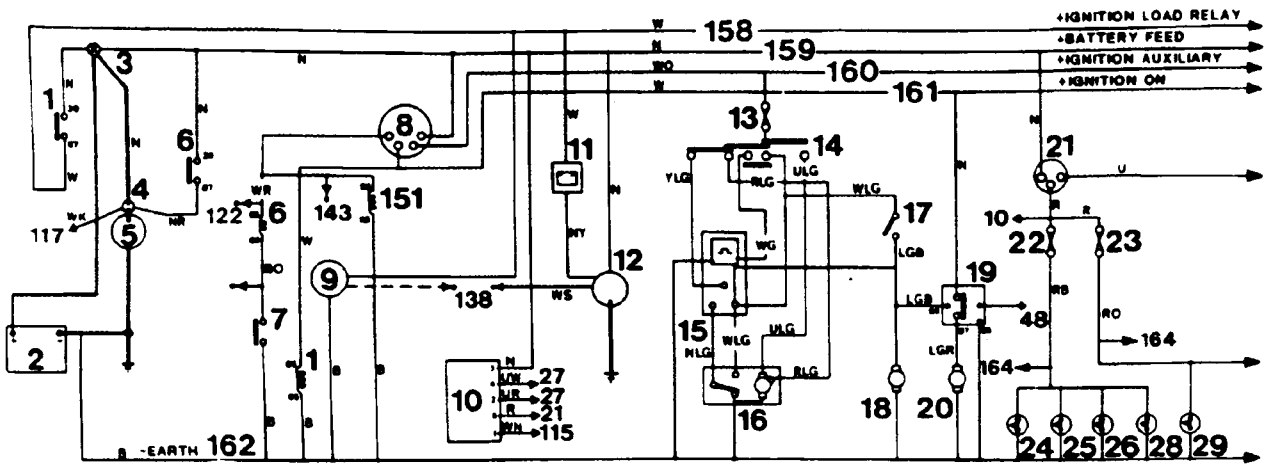
**CABLE COLOUR CODE**

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<b>K</b>	Pink	<b>P</b>	Purple	<b>U</b>	Blue		

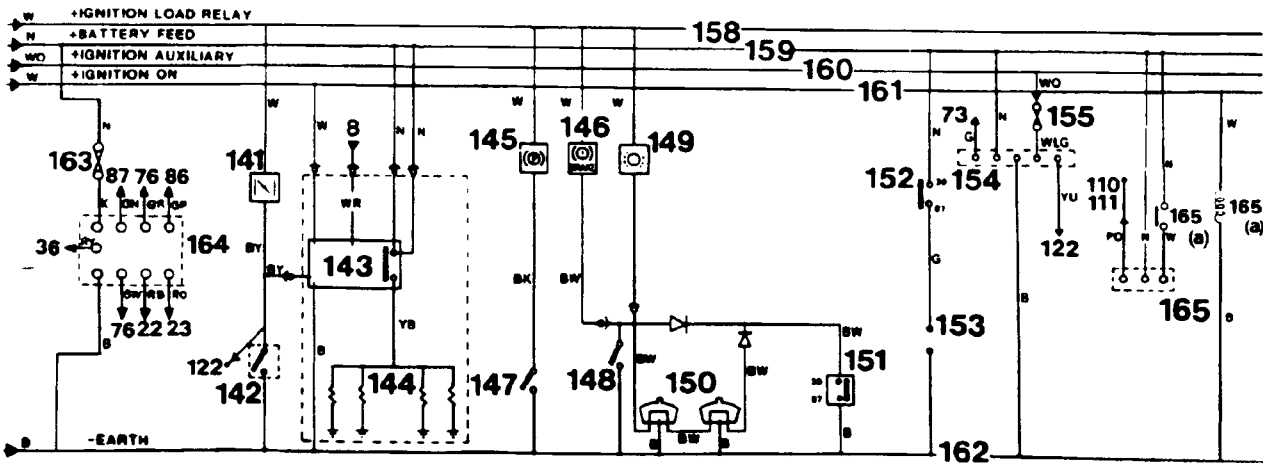
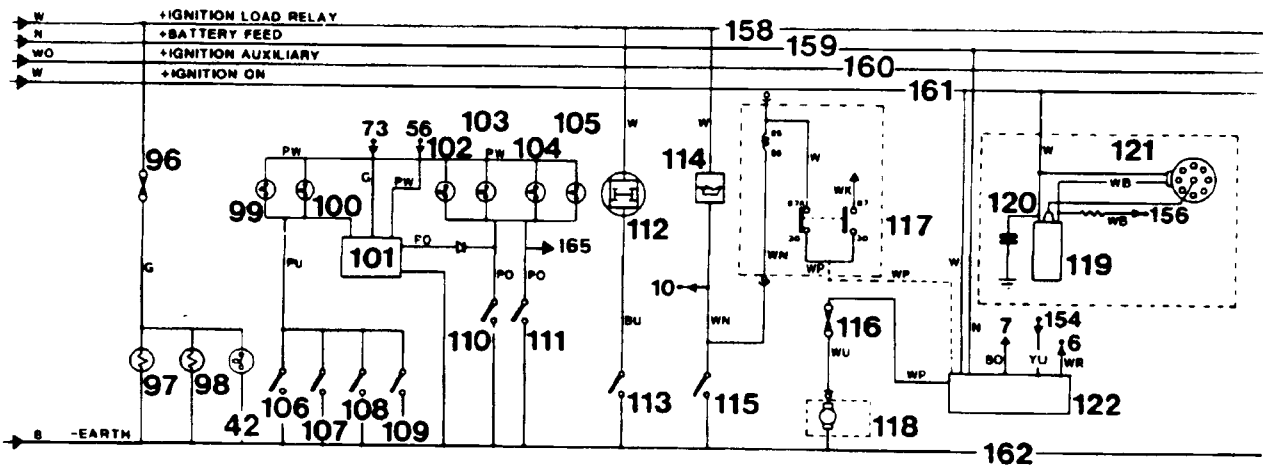
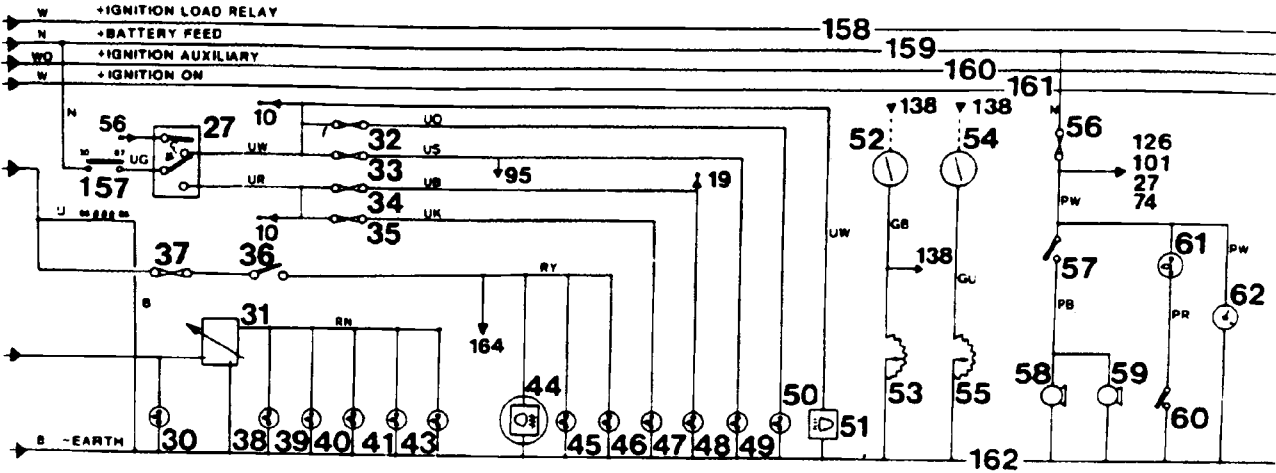
The last letter of a colour code denotes the tracer.



**MAIN CIRCUIT DIAGRAM**  
 Right hand steering - RR2378M & RR2379M



RR2378M



RR2379M

**MAIN CIRCUIT DIAGRAM - NON CATALYST VEHICLES**
**Left-hand Steering - RR2380M & RR2381M**

1. Ignition load relay	62. Fuse 20	122. Radio choke
2. Battery	63. Pick-up point central locking/window lift	123. Radio fuse
3. Terminal post	63 (a). Window lift relay (option)	124. Radio
4. Starter solenoid	64. Heated rear window relay	125. Four speakers
5. Starter motor	65. Fuse 9	126. Seat belt warning lamp
6. Starter relay	66. Radio aerial amplifier	127. Speed transducer, Saudi only
7. Starter inhibit switch (automatic)	67. Heated rear screen	128. Resistor
8. Ignition switch	68. Heated rear screen switch	129. Audible warning unit
9. Tachometer	69. Heated rear screen warning lamp	130. Transfer box neutral switch
10. Ignition warning lamp	70. Voltage sensitive switch	131. Seat buckle switch
11. Alternator	71. Fuse 13	132. Overspeed monitor (Saudi only)
12. Fuse 7	72. Hazard switch	133. Overspeed buzzer (Saudi only)
13. Front wiper/wash switch	73. Flasher unit	134. Sun roof pick up point (option)
14. Front wiper delay unit	74. Direction indicator switch	135. Automatic transmission oil temperature warning lamp
15. Front wiper motor	75. Hazard/indicator warning lamp	136. Automatic transmission oil temperature switch
16. Front wash pump	76. LH rear indicator lamp	137. Fuse 16
17. Headlamp wash timer unit (option)	77. LH front indicator lamp	138. Rear wash wiper switch
18. Headlamp wash pump (option)	78. LH side repeater lamp	139. Rear wiper delay unit
19. Main lighting switch	79. RH side repeater lamp	140. Rear wiper motor
20. Fuse 6	80. RH front indicator lamp	141. Rear screen wash pump
21. Fuse 5	81. RH rear indicator lamp	142. Low screen wash fluid level warning lamp
22. LH side lamp	82. Trailer warning lamp	143. Low screen wash switch
23. LH tail lamp	83. Fuse 15	144. Low coolant switch
24. Number plate lamp (2 off)	84. Stop lamp switch	145. Multi-function unit in binnacle
25. Main beam dip/flash switch	85. Reverse lamp switch	146. Low coolant level warning lamp
26. Radio illumination	86. Auxiliary lamp relay	147. Low fuel level warning lamp
27. RH side lamp	87. LH stop lamp	148. Cold start/Diesel glow plug warning lamp
28. RH tail lamp	88. RH stop lamp	149. Choke switch - carburetter
29. Rheostat	89. LH reverse lamp	150. Glowplug timer/Diesel
30. Fuse 3	90. RH reverse lamp	151. Glowplugs/Diesel
31. Fuse 4	91. LH auxiliary lamp (option)	152. Handbrake/warning lamp
32. Fuse 1	92. RH auxiliary lamp (option)	153. Handbrake warning switch
33. Fuse 2	93. Auxiliary lamp switch (option)	154. Brake fail warning lamp
34. Rear fog switch	94. Fuse 17	154 (a) Brake fail warning switch
35. Fuse 12	95. Dash cigar lighter	155. Brake pad wear warning lamp
36. Switch illumination (2 off)	96. Cubby box cigar lighter	156. Brake pad wear sensors
37. Cigar lighter illumination (2 off)	97. LH interior lamp	157. Brake check unit
38. Heater illumination (4 off)	98. RH interior lamp	158. Split charge relay (option)
39. Clock illumination	99. Interior lamp delay unit	159. Split charge terminal post
40. Automatic gear selector illumination (2 off)	100. LH door edge lamp	160. Heater/air conditioning connections
41. Instrument illumination (6 off)	101. RH door edge lamp	161. Fuse 8
42. Rear fog warning lamp	102. LH puddle lamp	162. Coil negative (engine RPM input to ECU)
43. LH rear fog	103. RH puddle lamp	163. Ignition load relay (+)
44. RH rear fog	104. Interior lamp switch	164. Battery feed (+)
45. LH dip beam	105. LH rear door switch	165. Ignition auxiliary (+)
46. RH dip beam	106. RH rear door switch	166. Ignition on (+)
47. LH main beam	107. Tailgate switch	167. Earth (-)
48. RH main beam	108. LH front door switch	168. Warning lights common earth (-)
49. Main beam warning lamp	109. RH front door switch	169. Warning lights supply (+)
50. Fuel gauge	110. Differential lock warning lamp	170. Electric seats pick up point (option)
51. Fuel gauge sender unit	111. Differential lock switch	170 (a) Electric seats relay (option)
52. Water temperature gauge	112. Oil pressure warning lamp	171. Fuse 14
53. Water temperature sender unit	113. Oil pressure switch	172. Trailer pick up point
54. Fuse 11	114. Fuse 18	173. Fuse 10
55. Horn switch	115. Fuel shut-off relay - carburetter	174. Electric mirrors pick up point (option)
56. RH horn	116. Fuel pump - petrol models	
57. LH horn	117. Ignition coil	
58. Under bonnet illumination switch	118. Capacitor	
59. Under bonnet light	119. Distributor	
60. Clock	120. EFI Harness plug	
61. Fuse 19	121. Fuel shut-off solenoid-Diesel	

**CABLE COLOUR CODE**

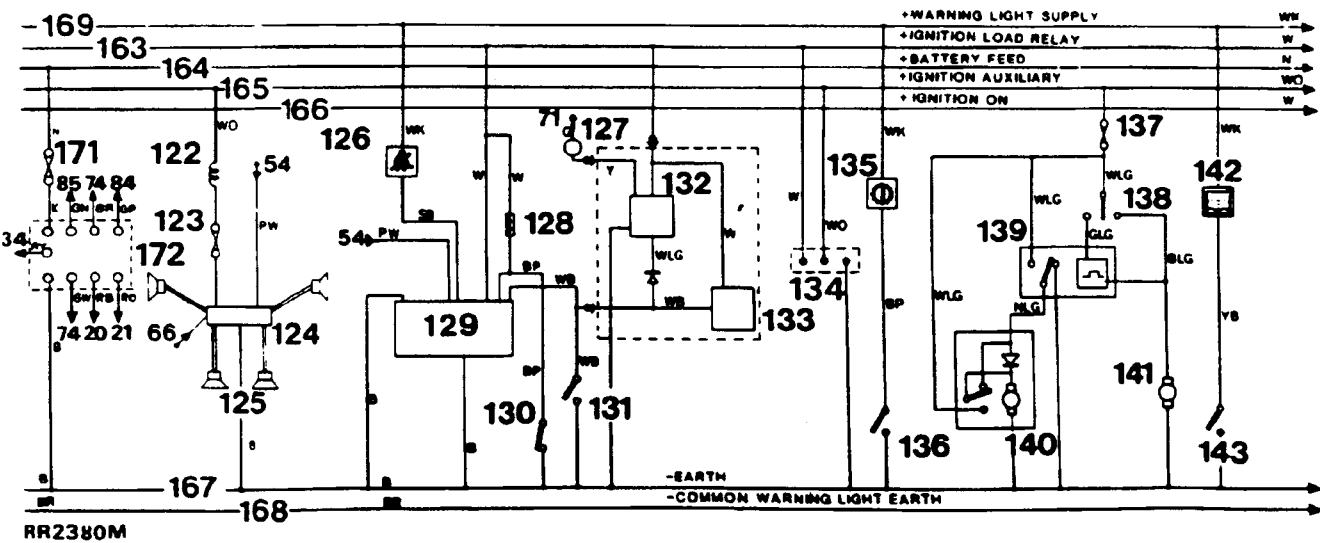
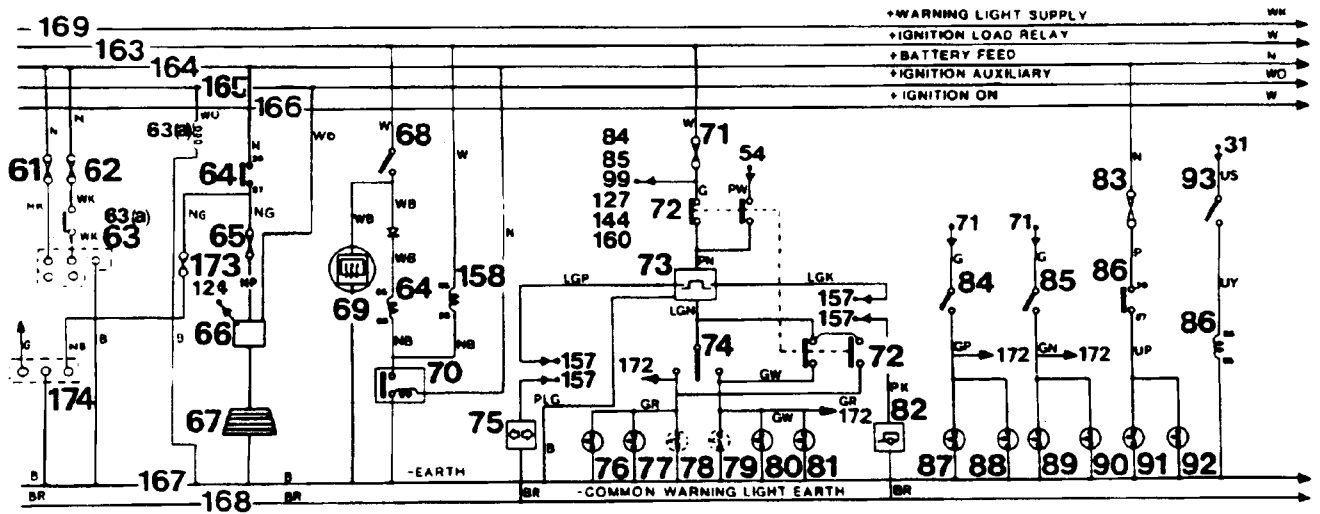
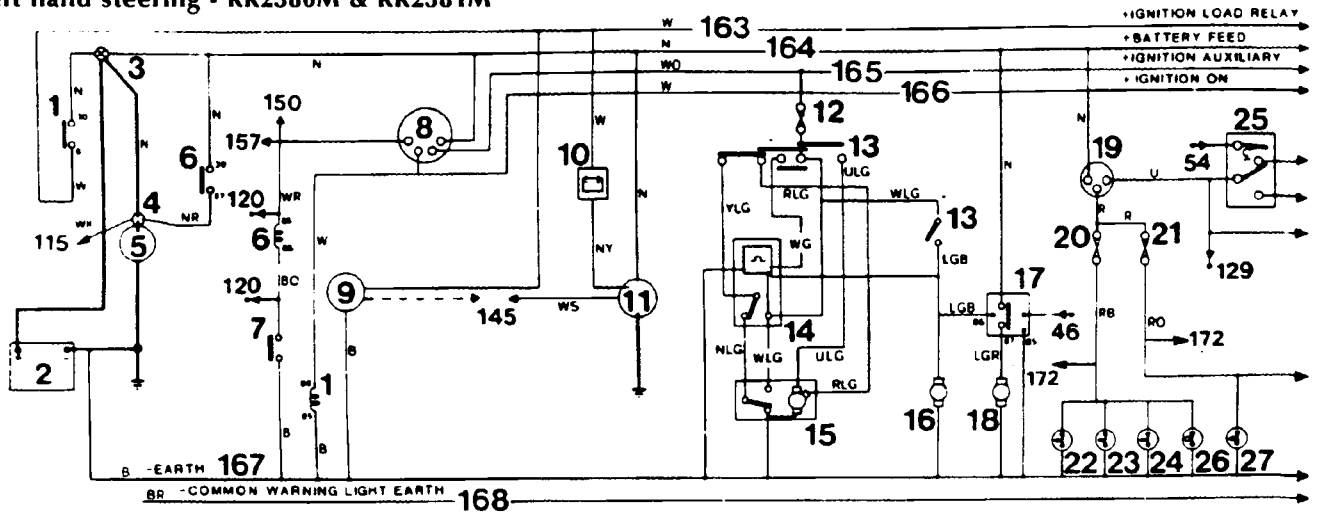
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<b>G</b> Green	<b>O</b> Orange	<b>S</b> Grey	<b>Y</b> Yellow
<b>K</b> Pink	<b>P</b> Purple	<b>U</b> Blue	

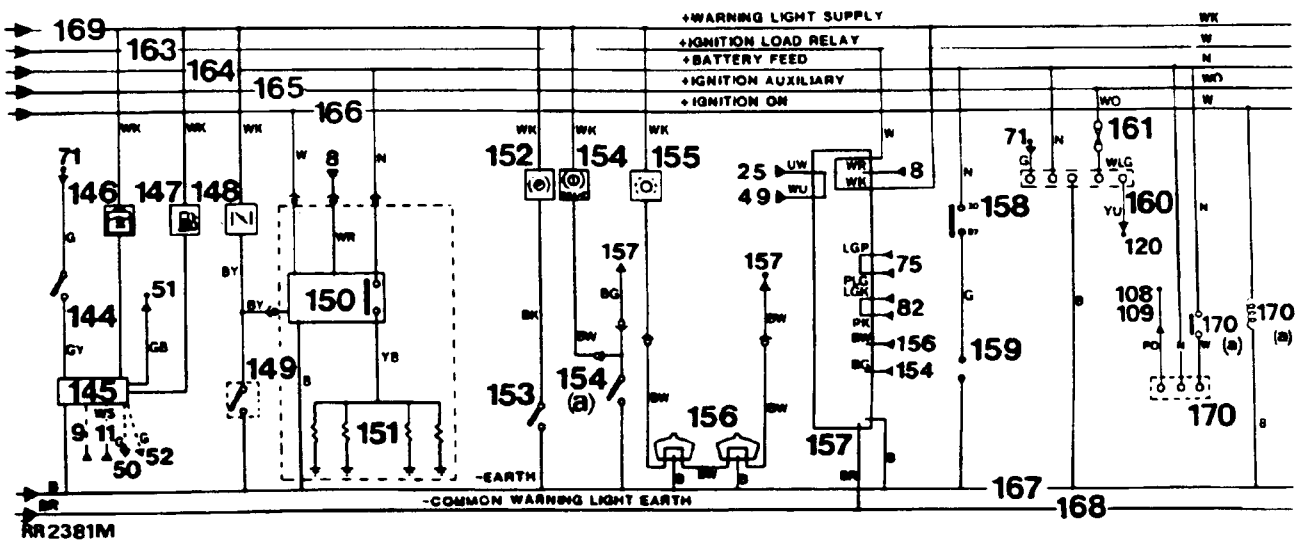
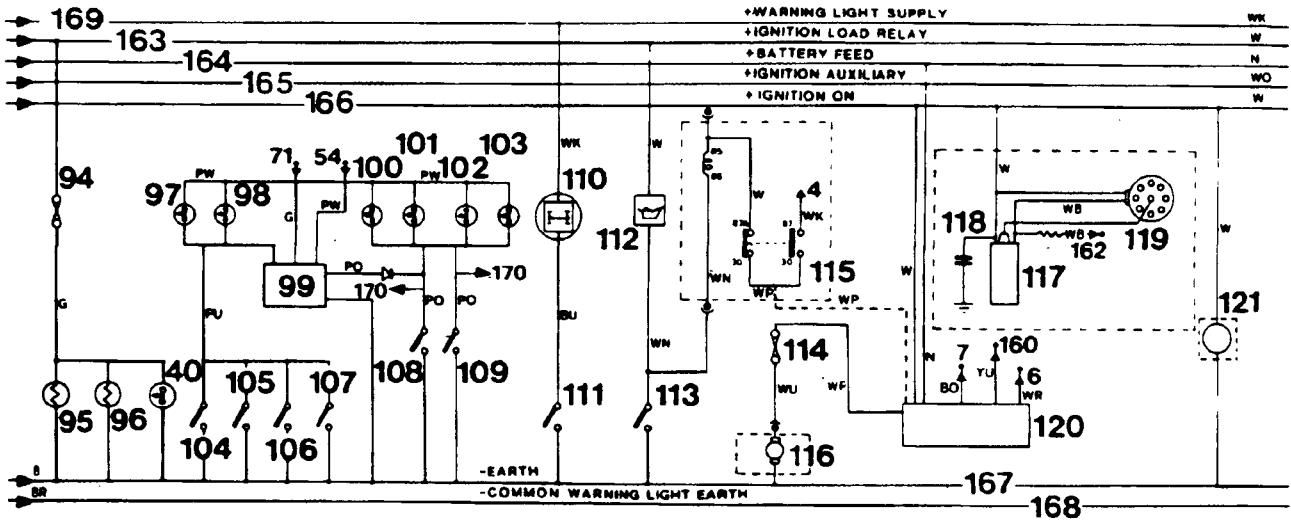
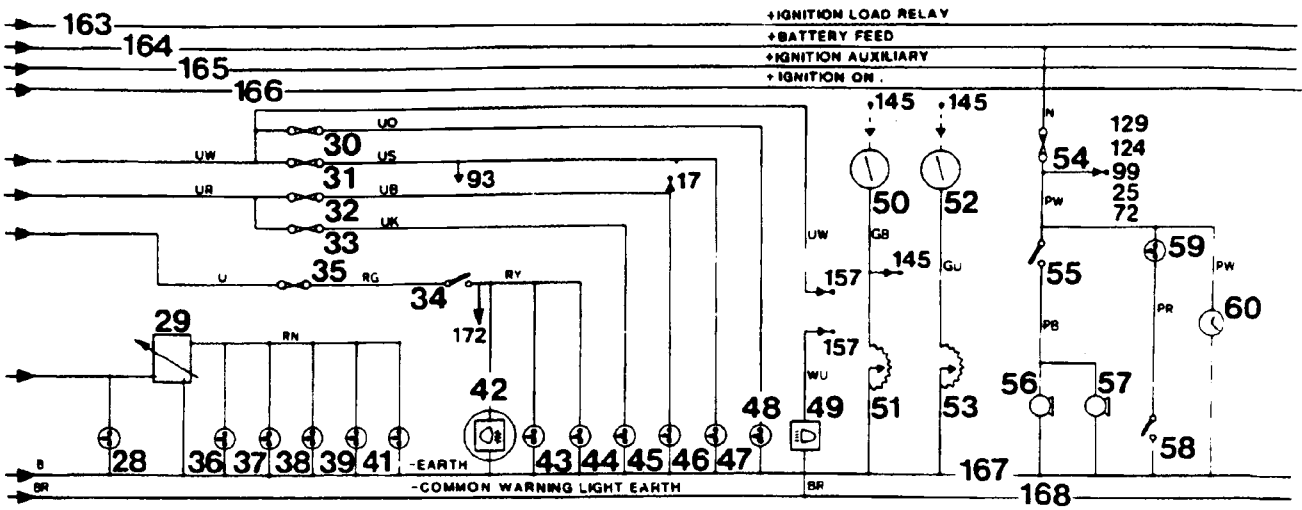
The last letter of a colour code denotes the tracer.





**MAIN CIRCUIT DIAGRAM - NON CATALYST**  
 Left hand steering - RR2380M & RR2381M





RR2381M

**MAIN CIRCUIT DIAGRAM - CATALYST VEHICLES**
**Left hand steering - RR2382S and RR2383S**

1.	Ignition load relay	57.	LH horn	112.	Oil pressure warning lamp
2.	Battery	58.	Under bonnet illumination switch	113.	Oil pressure switch
3.	Terminal post	59.	Under bonnet light	114.	Fuse 18
4.	Starter solenoid	60.	Clock	115.	Speed transducer
5.	Starter motor	61.	Fuse 19	116.	Fuel pump
6.	Starter relay	62.	Fuse 20	117.	Ignition coil
7.	Starter inhibit switch (automatic)	63.	Pick-up point central locking/window lift	118.	Capacitor
8.	Ignition switch	63 (a).	Window lift relay	119.	Distributor
9.	Tachometer	64.	Heated rear window relay	120.	EFI Harness plug
10.	Ignition warning lamp	65.	Fuse 9	121.	Coil negative (engine RPM input to ECU)
11.	Alternator	66.	Radio aerial amplifier	122.	Radio choke
12.	Fuse 7	67.	Heated rear screen	123.	Radio fuse
13.	Front wipe/wash switch	68.	Heated rear screen switch	124.	Radio
14.	Front wipe delay unit	69.	Heated rear screen warning lamp	125.	Four speakers
15.	Front wiper motor	70.	Voltage sensitive switch	126.	Electric seats pick up point (option)
16.	Front wash pump	71.	Fuse 13	126 (a)	Electric seat relay (option)
17.	Headlamp wash timer unit (option)	72.	Hazard switch	127.	Sunroof connection point (option)
18.	Headlamp wash pump (option)	73.	Flasher unit	128.	Automatic transmission oil temperature warning lamp
19.	Main lighting switch	74.	Direction indicator switch	129.	Automatic transmission oil temperature switch
20.	Fuse 6	75.	Hazard/indicator warning lamp	130.	Fuse 16
21.	Fuse 5	76.	LH rear indicator lamp	131.	Rear wash wipe switch
22.	LH side lamp	77.	LH front indicator lamp	132.	Rear wipe delay unit
23.	LH tail lamp	78.	LH side repeater lamp	133.	Rear wiper motor
24.	Number plate lamp (2 off)	79.	RH side repeater lamp	134.	Rear screen wash pump
25.	Main beam dip/flash switch	80.	RH front indicator lamp	135.	Low screen wash fluid level warning lamp
26.	Radio illumination	81.	RH rear indicator lamp	136.	Low screen wash switch
27.	RH side lamp	82.	Trailer warning lamp	137.	Low coolant switch
28.	RH tail lamp	83.	Fuse 15	138.	Multi-function unit in binnacle
29.	Rheostat	84.	Stop lamp switch	139.	Low coolant level warning lamp
30.	Fuse 3	85.	Reverse lamp switch	140.	Low fuel level warning lamp
31.	Fuse 4	86.	Auxiliary lamp relay	141.	E.F.I. warning lamp
32.	Fuse 1	87.	LH stop lamp	142.	Handbrake warning lamp
33.	Fuse 2	88.	RH stop lamp	143.	Handbrake warning switch
34.	Rear fog switch	89.	LH reverse lamp	144.	Brake fluid level warning switch
35.	Fuse 12	90.	RH reverse lamp	145.	Brake fluid level warning lamp
36.	Switch illumination (2 off)	91.	LH auxiliary lamp	146.	Brake pad wear warning lamp
37.	Cigar lighter illumination (2 off)	92.	RH auxiliary lamp	147.	Brake pad wear sensors
38.	Heater illumination (4 off)	93.	Auxiliary lamp switch	148.	Brake check unit
39.	Clock illumination	94.	Fuse 17	149.	Split charge relay (option)
40.	Automatic gear selector illumination (2 off)	95.	Dash cigar lighter	150.	Split charge terminal post (option)
41.	Instrument illumination (6 off)	96.	Cubby box cigar lighter	151.	Heater/air conditioning connections
42.	Rear fog warning lamp	97.	LH interior lamp	152.	Fuse 8
43.	LH rear fog	98.	RH interior lamp	153.	Ignition load relay (+)
44.	RH rear fog	99.	Interior lamp delay unit	154.	Battery feed (+)
45.	LH dip beam	100.	LH door edge lamp	155.	Ignition auxiliary (+)
46.	RH dip beam	101.	RH door edge lamp	156.	Ignition on (+)
47.	LH main beam	102.	LH puddle lamp	157.	Earth (-)
48.	RH main beam	103.	RH puddle lamp	158.	Warning lights common earth (-)
49.	Main beam warning lamp	104.	Interior lamp switch	159.	Warning lights supply (+)
50.	Fuel gauge	105.	LH rear door switch	160.	Fuse 14
51.	Fuel gauge sender unit	106.	RH rear door switch	161.	Trailer pick up point
52.	Water temperature gauge	107.	Tailgate switch	162.	Fuse 10
53.	Water temperature sender unit	108.	LH front door switch	163.	Electric mirrors pick up point (option)
54.	Fuse 11	109.	RH front door switch		
55.	Horn switch	110.	Differential lock warning lamp		
56.	RH horn	111.	Differential lock switch		

**CABLE COLOUR CODE**

<b>B</b>	Black	<b>N</b>	Brown	<b>R</b>	Red	<b>W</b>	White
<b>G</b>	Green	<b>O</b>	Orange	<b>S</b>	Grey	<b>Y</b>	Yellow
<b>K</b>	Pink	<b>P</b>	Purple	<b>U</b>	Blue		

The last letter of a colour code denotes the tracer.



**MAIN CIRCUIT DIAGRAM - CATALYST VEHICLES**  
 Left hand steering - RR2382S & RR2383S

