

ELECTRICAL EQUIPMENT

DATA

ALTERNATOR

Manufacturer	Magneti Marelli
Type	A127/65
Polarity	Negative earth
Maximum operating speed	15000 rev min
Maximum DC output at 6000 rev min	65 amp
Stator windings	3 phase
Stator winding resistance	0.15 ohm/phase
Regulator type	21TR
Regulator controlled voltage	13.6 - 14.4 volts
Field winding rotor poles	12
Rotor winding resistance	3.2 ohms
Brush length - new	17 mm (0.67 in) From moulding
Renew regulator/brushbox assembly at	5 mm (0.20 in) From moulding
Brush spring pressure - flush with brushbox moulding	1.3 - 2.7N (4.7 - 9.8 oz)

STARTER MOTOR

200 Tdi diesel engine	
Type	Paris Rhone D9R91 12 volt

STARTER MOTOR

V8 petrol engine	
Type	Lucas M78 R 12 volt

TORQUE WRENCH SETTINGS

ALTERNATOR

	Nm	lbf ft
Alternator shaft nut	50 - 70	37 - 52
Alternator through bolts	5.5	4.0
Rectifier screws	3.5	2.5
Regulator/brushbox screws	2.5	2.0
Terminal nut - main output	4.0	3.0
Terminal nut - phase	4.0	3.0

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FAULT DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CURE
A. Battery in low state of charge.	<ol style="list-style-type: none"> 1. Broken or loose connection in alternator circuit 2. Current voltage regulator not functioning correctly. 3. Slip rings greasy or dirty. 4. Brushes worn, not fitted correctly or wrong type. 5. Fan belt broken. 	<ol style="list-style-type: none"> 1. Examine the charging and field circuit wiring. Tighten any loose connections, repair/replace broken leads. Examine the battery connection. 2. Check/fit new unit. 3. Clean. 4. Fit new brushes. 5. Fit new belt.
B. Battery overcharging leading to burnt out bulbs and frequent need for topping-up.	<ol style="list-style-type: none"> 1. Current voltage regulator not functioning correctly. 	<ol style="list-style-type: none"> 1. Fit new unit
C. Lamps giving insufficient illumination	<ol style="list-style-type: none"> 1. Battery discharged 2. Bulbs discoloured through prolonged use. 3. Fan belt broken. 	<ol style="list-style-type: none"> 1. Charge the battery from an independant supply or by a long period of daylight running. 2. Fit new bulb. 3. Fit new fan belt.
D. Lamps light when switched on but fade out.	<ol style="list-style-type: none"> 1. Battery discharged. 	<ol style="list-style-type: none"> 1. Charge the battery from an independant supply or by a long period of daylight running.
E. Lights flicker.	<ol style="list-style-type: none"> 1. Loose connection. 	<ol style="list-style-type: none"> 1. Tighten/clean.
F. Failure of lights.	<ol style="list-style-type: none"> 1. Battery discharged. 2. Loose/broken connection. 3. Fan belt broken. 	<ol style="list-style-type: none"> 1. Charge the battery from an independant supply or by a long period of daylight running. 2. Locate and rectify. 3. Fit new belt.
G. Starter motor lacks power or fails to turn engine.	<ol style="list-style-type: none"> 1. Stiff engine. 2. Battery discharged. 3. Broken or loose connection in starter circuit. 4. Greasy or dirty slips rings. 5. Brushes worn, not fitted correctly or wrong type. 6. Brushes sticking in holders or incorrectly tensioned. 7. Starter pinion jammed in mesh with flywheel. 	<ol style="list-style-type: none"> 1. Locate cause and remedy. 2. Charge the battery from an independant supply or by a long period of daylight running. 3. Check and tighten all battery, starter and starter switch connections and check the cables connecting these units for damage. 4. Clean slip rings. 5. Fit new brushes. 6. Rectify. 7. Remove starter motor and investigate.

FAULT DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CURE
H. Starter noisy.	<ol style="list-style-type: none"> 1. Starter pinion or flywheel teeth chipped or damaged. 2. Starter motor loose on engine. 3. Armature shaft bearing. 	<ol style="list-style-type: none"> 1. Fit new components. 2. Rectify, checking pinion and flywheel for damage. 3. Fit new bearing.
I. Starter operates but does not crank the engine.	<ol style="list-style-type: none"> 1. Starter pinion is not engaging with the flywheel. 	<ol style="list-style-type: none"> 1. Check operation of starter solenoid. If correct remove starter motor and investigate.
J. Starter pinion will not disengage from the flywheel when the engine is running.	<ol style="list-style-type: none"> 1. Starter pinion jammed in mesh with the flywheel. 	<ol style="list-style-type: none"> 1. Remove starter motor and investigate.
K. Engine will not start.	<ol style="list-style-type: none"> 1. The starter will not turn the engine due to a discharged battery. 2. Sparking plugs faulty, dirty or incorrect plug gaps (petrol engines only). 3. Defective coil or distributor (petrol engines only). 4. Fault in the low tension wiring circuit (petrol engines only). 5. Faulty amplifier (petrol engines only). 6. Air gap out of adjustment (petrol engines only). 7. Fuel system fault. 	<ol style="list-style-type: none"> 1. Charge the battery from an independent supply or by a long period of daylight running. 2. Clean and reset plug gaps. 3. Carry out ignition checks. Fit new coil or distributor as necessary. 4. Examine all the ignition cables and check that the terminals are secure and not corroded. 5. Check/fit new component if necessary. 6. Adjust as necessary. 7. Refer to Fuel System Section.
L. Engine misfires/stalls.	<ol style="list-style-type: none"> 1. Faulty sparking plugs (petrol engines only). 2. Air gap incorrectly set (petrol engines only). 3. Distributor cap cracked (petrol engines only). 4. Faulty pick-up or reluctor (petrol engines only). 5. Excessive wear in distributor shaft (petrol engines only). 6. Rotor arm and flash shield cracked or showing signs of tracking (petrol engines only). 	<ol style="list-style-type: none"> 1. Rectify. 2. Adjust. 3. Fit new cap. 4. Fit new components. 5. Fit new components. 6. Fit new components.

FAULT DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CURE
M. Frequent charging of the battery necessary.	<ol style="list-style-type: none"> 1. Alternator inoperative. 2. Loose or corroded connections. 3. Slipping fan belt. 4. Voltage regulator faulty. 5. Excessive use of the starter motor. 6. Vehicle operation confined largely to night driving. 7. Abnormal accessory load. 8. Internal discharge of battery. 	<ol style="list-style-type: none"> 1. Check the brushes, cables and connections or fit a new alternator. 2. Examine all connections, especially the battery terminals and ground cables. 3. Adjust. 4. Fit new regulator. 5. In the hands of the user. 6. In the hands of the user. 7. Superfluous electrical fittings such as extra lamps etc. 8. Fit a new battery.
N. Alternator not charging correctly.	<ol style="list-style-type: none"> 1. Slipping fan belt. 2. Voltage control not operating correctly. 3. Greasy, charred or glazed slip rings. 4. Brushes worn, sticking or oily. 5. Shorted, open or burnt out field coils. 	<ol style="list-style-type: none"> 1. Adjust. 2. Rectify/fit new component. 3. Clean. 4. Rectify/fit new brushes. 5. Fit new field coils.
O. Alternator noisy.	<ol style="list-style-type: none"> 1. Worn, damaged or defective bearings. 2. Cracked or damaged pulley. 3. Alternator out of alignment. 4. Alternator loose in mounting. 5. Excessive brush noise. 	<ol style="list-style-type: none"> 1. Fit new bearings. 2. Fit new pulley. 3. Rectify. 4. Rectify. 5. Check for rough or dirty slip rings, badly seating brushes, incorrect brush tension, loose brushes and loose field magnets. Rectify/fit new components.
P. Poor performance of horns.	<ol style="list-style-type: none"> 1. Low voltage due to discharged battery. 2. Bad connections in wiring. 3. Loose mounting nut. 4. A faulty horn. 	<ol style="list-style-type: none"> 1. Recharge battery. 2. Carefully inspect all connections and horn push. 3. Rectify. 4. Fit new horn.
Q. Central door locking does not operate (on all doors).	<ol style="list-style-type: none"> 1. Battery discharged. 2. Control unit in driver's door lock actuator faulty. 3. Loose or broken connection in driver's door. 4. Blown fuse. 	<ol style="list-style-type: none"> 1. Recharge. 2. Fit new unit. 3. Locate and rectify. 4. Rectify.

FAULT DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CURE
R. Central door locking does not operate (on one door only).	1. Loose or broken connection. 2. Lock actuator failure. 3. Faulty lock. 4. Mechanical linkages disconnected.	1. Locate and rectify. 2. Fit new actuator. 3. Rectify. 4. Locate and rectify.
S. Window lift will not operate.	1. Motor failure. 2. Loose or broken connection. 3. Faulty switch. 4. Mechanical linkage faulty.	1. Fit new motor. 2. Locate and rectify. 3. Fit new switch. 4. Rectify.
T. Exterior mirrors fail to operate.	1. Loose or broken connection. 2. Faulty switch. 3. Mirror motor failure.	1. Locate and rectify. 2. Fit new switch. 3. Fit new motor.

DESCRIPTION

A negative earth electrical system is employed on the vehicle, it is therefore most important to ensure correct polarity of the electrical connections at all times. 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 cause damage to transistorised equipment such as radio and tachometer etc.

WARNING: During battery removal or before carrying out repairs or maintenance to electrical components always disconnect the negative lead first. If the positive lead is disconnected with the negative lead in place, accidental contact of the spanner to any earthed metal part could cause a severe spark, possibly resulting in personal injury. When installing the battery the positive lead must be fitted first.

ALTERNATOR

The Model A127-65 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.

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 ensure that they are clean and tight. In this way any significant increase in circuit resistance can be prevented.

The battery leads must not be disconnected whilst 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 with the engine running.

The electronic voltage regulator employs micro-circuit techniques resulting in improved performance under difficult service conditions. The 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.

The brush box assembly is incorporated in the regulator.

Surge protection is incorporated in the regulator unit.

The regulating voltage, 13.6 to 14.4 volts, is set during manufacture, and no adjustment is necessary. The only maintenance required is checking for tightness of the 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, bulb failure will cause loss of charge. The bulb should be checked regularly and a spare carried.

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

Should the need arise to change the alternator drive belt, use only the correct Land Rover replacement.

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

No separate control unit is fitted; instead a voltage regulator of micro-circuit construction is mounted on the slip ring end bracket.

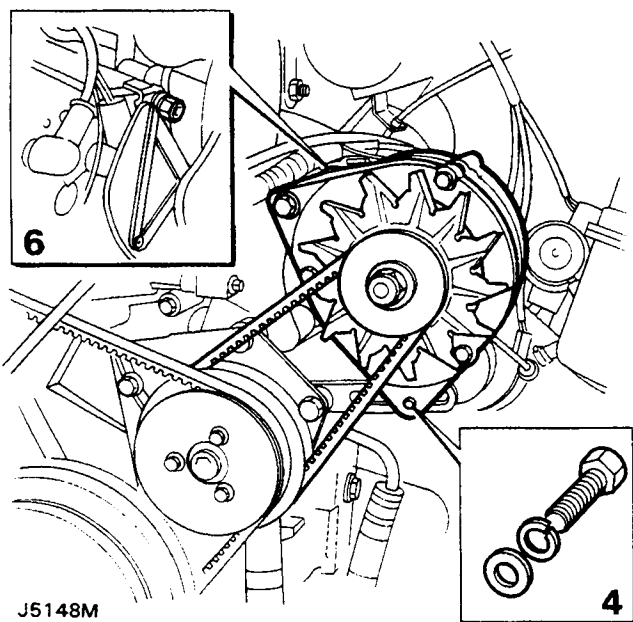
Battery voltage is still applied to the alternator output cable when the ignition is switched off, therefore the battery must be disconnected before commencing any work on the alternator. The battery must also be disconnected when repairs to the body are being carried out by arc welding.

ALTERNATOR (200Tdi engines)

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Disconnect the electrical leads from the alternator.
3. Slacken the alternator securing bolts, pivot the alternator inwards and remove the drive belt.
4. Remove the adjustment bolt from under the alternator.
5. Remove the nut from the pivot bolt and detach the heat shield.
6. Support the alternator, withdraw the pivot bolt and detach the alternator from the engine.



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Refitting

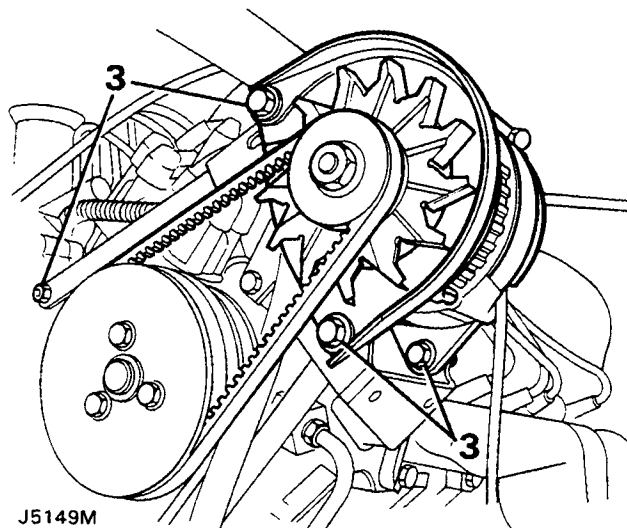
7. Position the alternator on the engine and insert the pivot bolt.
8. Fit the heat shield and secure with the nut. Do not fully tighten the nut at this stage.
9. Fit the adjustment bolt and the drive belt.
10. Adjust the belt tension and tighten the adjustment and pivot bolts.
11. Connect the electrical leads to the alternator.
12. Reconnect the battery negative lead.

ALTERNATOR (V8 petrol engines)

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Disconnect the electrical leads from the alternator.
3. Slacken the alternator securing bolts, pivot the alternator inwards and remove the drive belt.
4. Remove the three securing bolts and withdraw the alternator and fan guard from the engine.



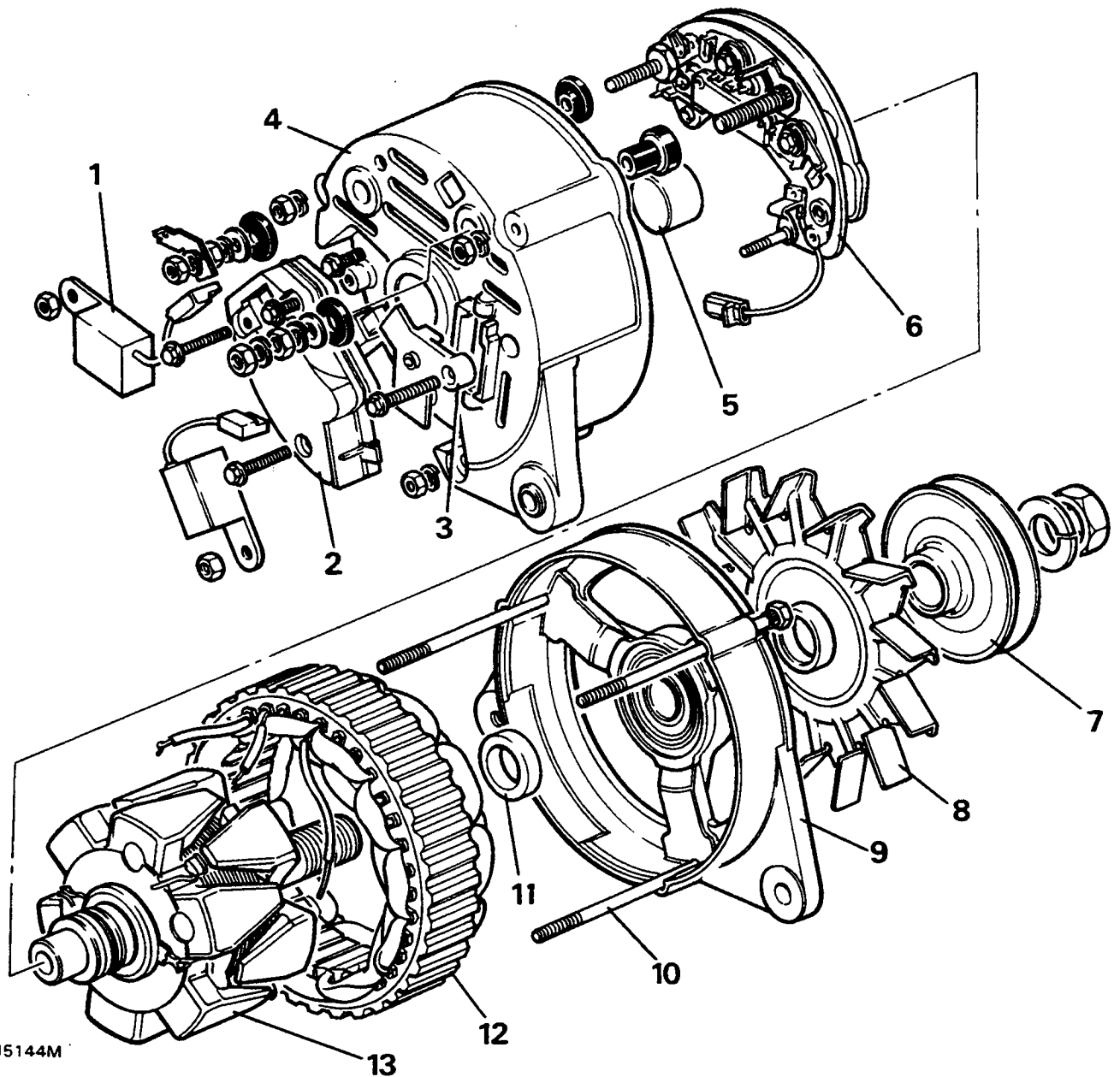
J5149M

Refitting

5. Fit the alternator and fan guard.

NOTE: The fan guard is attached to the the adjustment bracket bolt and the front alternator securing bolt.

6. Fit the drive belt and adjust the belt tension.
7. Tighten the securing bolts and the adjustment bracket nut.
8. Connect the electrical leads to the alternator.
9. Reconnect the battery negative lead.



ALTERNATOR - A127-65

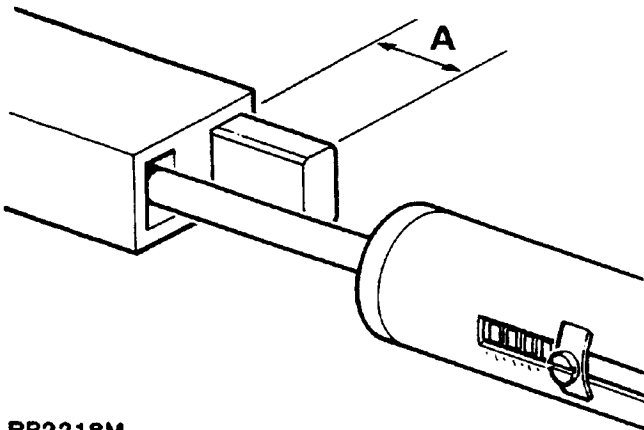
1. Suppresion capacitors
2. Regulator/Brushbox assembly
3. Insulation cover
4. Slip ring end bracket
5. Slip ring end bearing
6. Rectifier
7. Pulley
8. Fan
9. Drive end bracket
10. Through bolts
11. Spacer
12. Stator
13. Rotor

ALTERNATOR

Dismantle, Overhaul, Test components

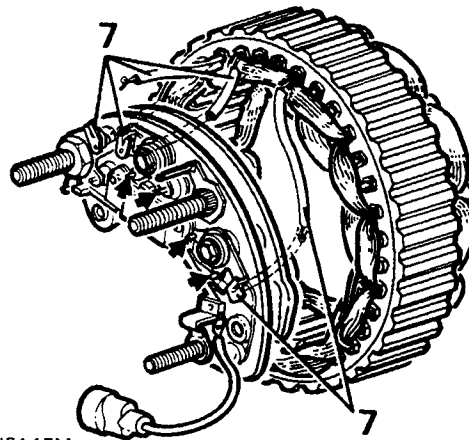
NOTE: It is assumed in the following procedure that the alternator has been removed from the vehicle and transferred to a suitable work bench.

1. Remove the nuts from the through bolts, disconnect the connectors and remove the two suppression capacitors.
2. Remove the three securing screws, disconnect the lead from the rectifier and withdraw regulator and brushbox assembly.
3. Check the brush lengths by measuring the length of protrusion from the moulding. If the length of protrusion (A) is 5mm (0.20 in) or less, fit a new regulator/brushbox assembly.
4. Check the brush spring pressure using a push type spring gauge. The gauge should register 136 to 279 g when the brush is pressed until the face is flush with the housing. If the reading is outside these limits, renew the regulator/brushbox.



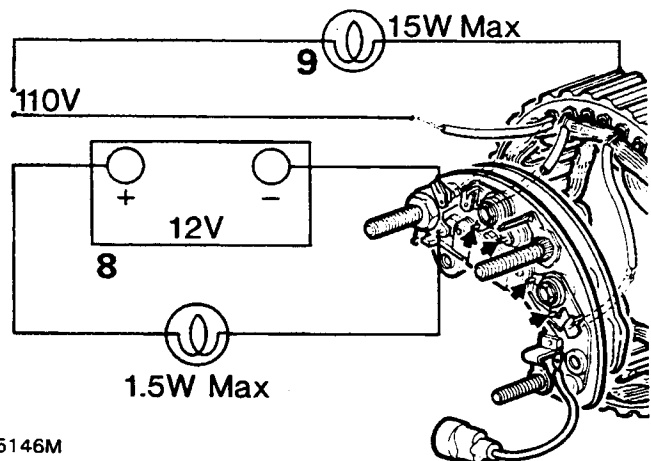
RR2218M

5. Mark the relative positions of the end brackets and stator. Remove the through bolts and withdraw the slip ring end bracket and stator. Carefully tap the mounting lugs with a mallet if necessary.
6. Remove the nuts, washers and insulators from the stud terminals, noting their location for reassembly. Remove the two screws and if fitted the insulation cover, and withdraw the rectifier and stator from the slip ring end bracket.
7. Release the stator winding cable ends from the rectifier by applying a hot soldering iron to the terminal tags on the rectifier. Prise out the cable ends when the solder melts, and separate the rectifier and stator. Note the location of the cable ends to aid reassembly, further dismantling of the rectifier is not necessary.



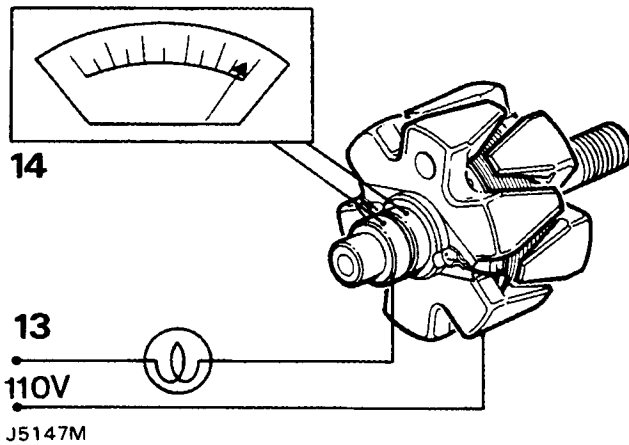
J5145M

8. Check the diodes using a suitable 12 volt test lamp. Connect the test equipment as shown and test each diode in turn, note whether the lamp illuminates, then reverse the test lead connections. The lamp should illuminate in one direction only. Renew the rectifier assembly if a faulty diode is diagnosed.
9. Visually inspect the stator windings for signs of damage or burning. Check the stator insulation using a suitable 110 volt test lamp. Connect the test leads to each of the three leads in turn. If the test lamp illuminates, fit a new stator.



J5146M

10. Remove the fan and pulley assembly. Push out the rotor shaft from the bearing in the drive end bracket, using a suitable press. Remove the spacer from the rotor shaft.
11. Clean the surfaces of the slip rings using a solvent moistened cloth.
12. Inspect the slip ring surfaces for signs of burning, remove burn marks using extra fine glasspaper. Under no circumstances should emery cloth or similar abrasives be used, or any attempt be made to machine the slip rings.



13. Check the insulation of the rotor field windings, using a suitable 110 volt test lamp connected between one of the slip rings and one of the rotor poles. If the test lamp illuminates the rotor must be renewed.
14. Check the resistance/continuity of the rotor field windings by connecting an ohmmeter to the slip rings as shown. A reading of 3.2 ohms should be obtained.
15. Check the condition of the bearings. If signs of rubbing between the rotor poles and stator is evident, both bearings are excessively worn and must be renewed.
16. Use a suitable press, applying pressure from the rear of the slip ring end bracket to withdraw or refit the bearing. The drive end bearing cannot be replaced as a separate item, therefore the drive end bracket must be replaced in the event of the bearing requiring replacement.

Reassembling

17. Fit the spacer and press the rotor into the drive end bracket. Insert the through bolts. Fit the spacer, fan, pulley and spring washer to the shaft. Fit and tighten the pulley nut to a torque of 50 to 70 Nm (37 to 52 lbf ft).
18. Solder the stator cable ends to the locations noted during dismantling.
19. Fit the stator and rectifier assembly to the drive end bracket in the position marked.
20. Fit the insulators to the studs on the rectifier. Fit the slip ring end bracket in the position previously marked, locating the regulator lead through its aperture.
21. Fit the insulation cover, if applicable, and secure the rectifier with the two screws.
22. Fit and tighten the through bolt nuts evenly to a torque of 5.5 Nm (4.0 lbf ft).

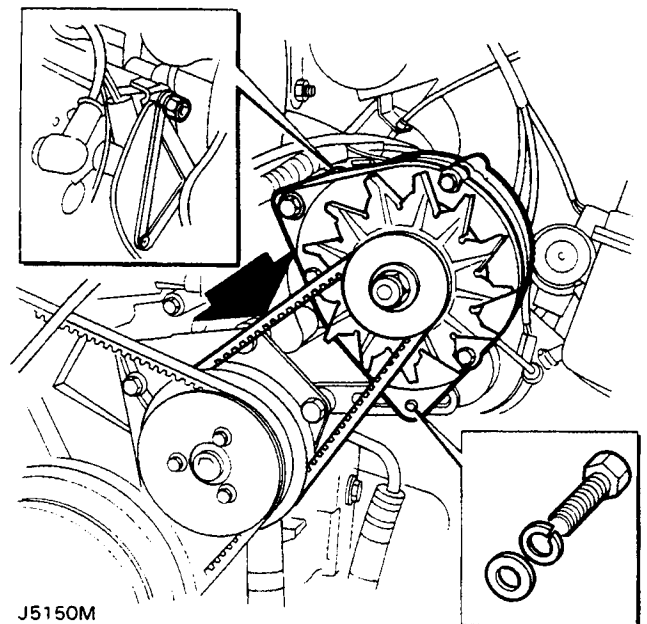
23. Connect the lead to the regulator, locate the brushes on the slip rings and secure the regulator/brushbox assembly, taking care not to damage the brushes.
24. Fit both suppression capacitors.
25. Refit the alternator to the vehicle.

ALTERNATOR DRIVE BELT TENSIONING

200Tdi engine

Adjust tension

1. Slacken the alternator pivot and adjustment bolts.
2. Adjust the alternator to give the correct belt tension.



3. Tight the adjustment and pivot bolts.

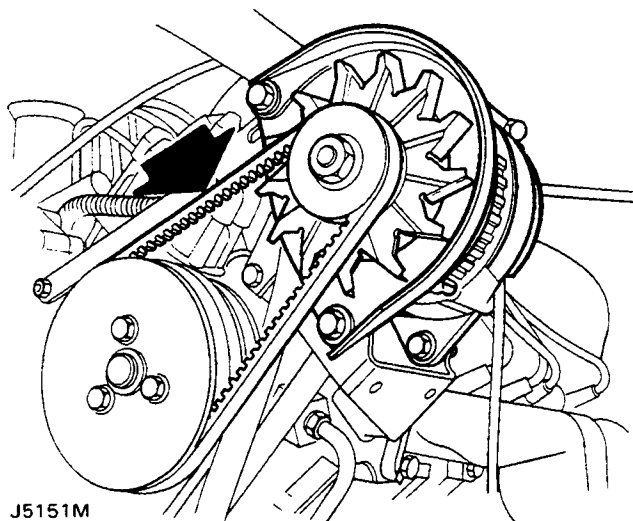
NOTE: If a new drive belt has been fitted, run the engine at fast idle speed for 3 to 5 minutes; then check the tension.

V8 engine

Adjust tension

1. Slacken the alternator fixings and the adjustment link.
2. Adjust the alternator to give the required belt tension of 4 to 6 mm (0.19 to 0.25 in).
3. Tighten the alternator fixing bolts and the adjustment link.

NOTE: If a new drive belt has been fitted, run the engine at fast idle speed for 3 to 5 minutes; then check the tension.



ELECTRONIC IGNITION

A Lucas 35DLM8 distributor is employed, having a conventional vacuum advance and centrifugal automatic advance mechanism.

A pick-up module, in conjunction with a rotating timing retractor inside the distributor body, generates timing signals. These are applied to an electronic ignition amplifier mounted on the side of the distributor body.

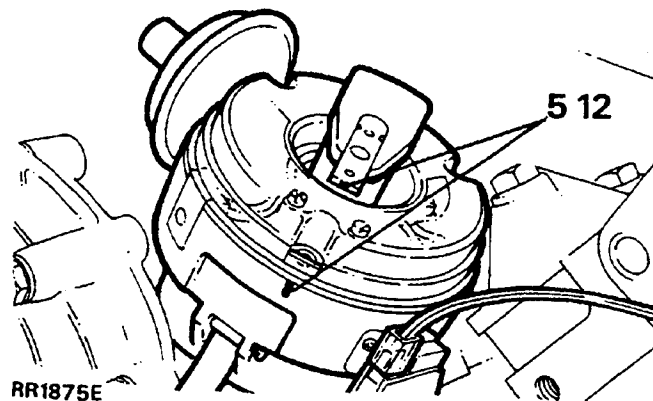
NOTE: The pick-up air gap is factory set. Do not adjust the gap unless the pick-up is being changed or the base plate has been moved. Use a non ferrous feeler gauge to set the air gap.

DISTRIBUTOR

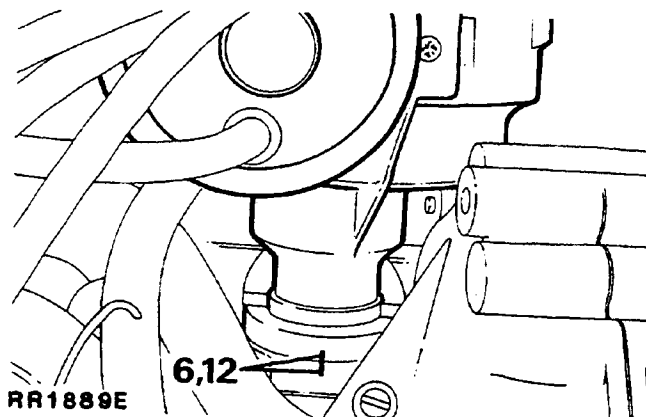
Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Disconnect the vacuum hose.
3. Remove the distributor cap.
4. Disconnect the low tension lead from the coil.
5. Mark the distributor body in relation to the centre line of the rotor arm.



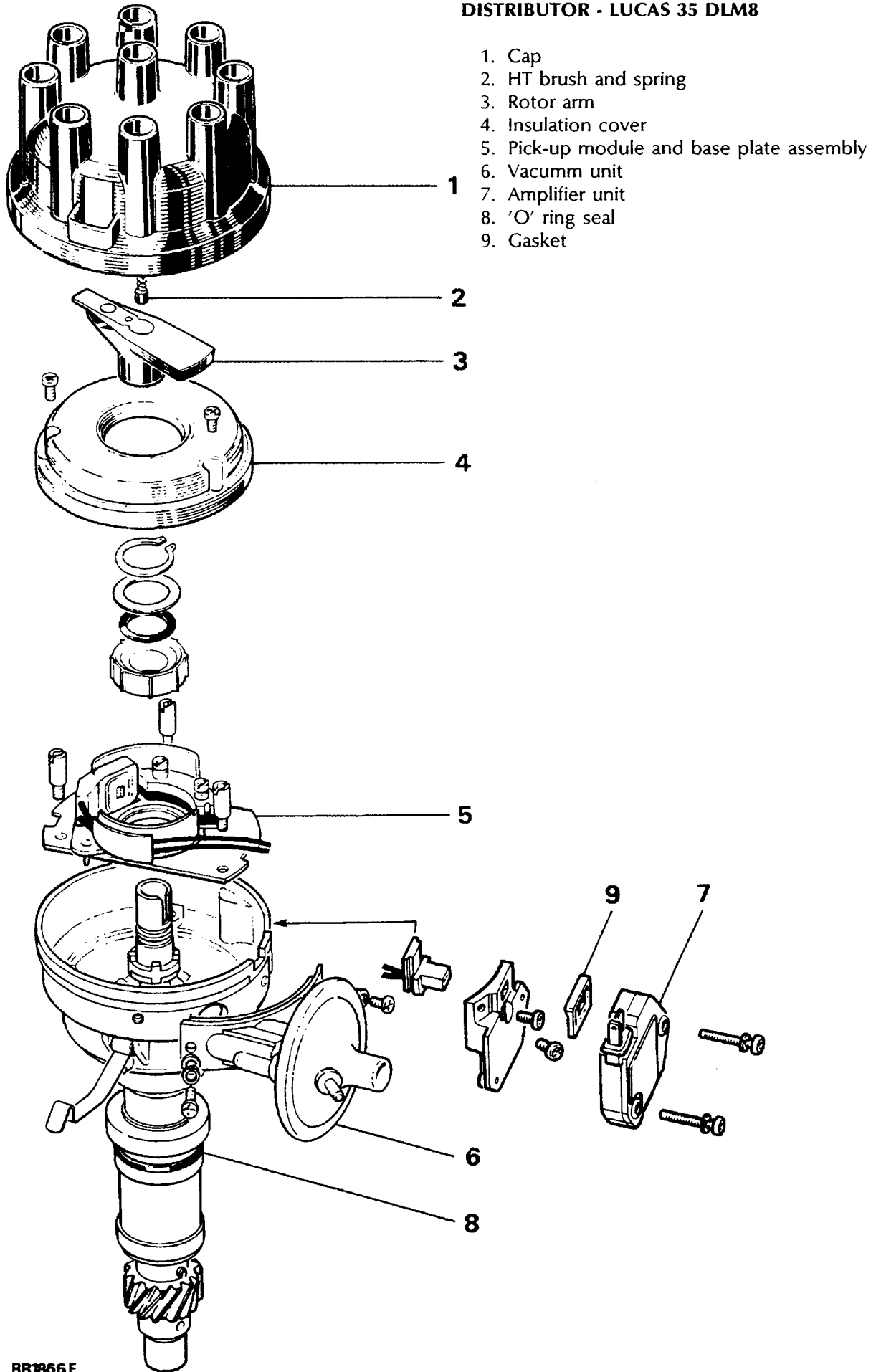
6. Add alignment marks to the distributor and front cover.



NOTE: Marking the distributor enables refitting in the exact original position, if the engine is turned with the distributor removed, complete ignition timing must be carried out.

7. Release the distributor clamp and remove the distributor.

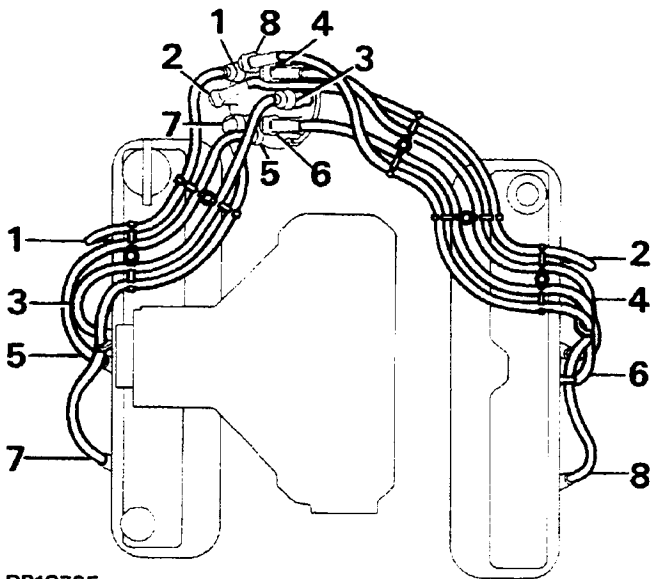
DISTRIBUTOR - LUCAS 35 DLM8



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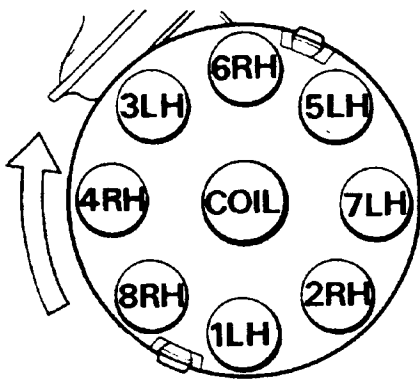
Refitting

NOTE: If a new distributor is being fitted, mark the body in the same relative position as on the distributor removed.



RR1876E

8. Plug leads should be connected as illustrated. Numbers 1 to 8 inclusive indicate plug lead numbers. The illustration shows the lead locations when viewed from the rear of the engine.



RR616M

9. If the engine has not been turned while the distributor has been removed, proceed as follows (instructions 10 to 17). Alternatively proceed to instruction 18.
10. Fit a new 'O' ring seal to the distributor housing.
11. Turn the distributor drive until the centre line of the rotor arm is 30° counter-clockwise from the mark made on the top edge of the distributor body.
12. Fit the distributor in accordance with the alignment markings.

NOTE: It may be necessary to align the oil pump drive shaft to enable the distributor drive shaft to engage in the slot.

13. Fit the clamp and secure the distributor in the exact original position.
14. Connect the vacuum hose to the distributor and the low tension lead to the coil.
15. Fit the distributor cap.
16. Reconnect the battery.
17. Using suitable electronic equipment, set the ignition timing, (see IGNITION TIMING - Adjust).
18. If, with the distributor removed, the engine has been turned it will be necessary to carry out the following procedure.
19. Set the engine number one piston to the static ignition timing figure (see Engine Tuning Data - Section 05) on the compression stroke.
20. Turn the distributor drive until the rotor arm is approximately 30° counter-clockwise from number one sparking plug lead position on the distributor cap.
22. Check that the centre line of the rotor arm is now in line with number one sparking plug lead on the distributor cap. Reposition the distributor as necessary.
23. If the distributor does not seat correctly in the front cover, the oil pump drive is not engaged. Engage by lightly pressing down the distributor whilst turning the engine.
24. Fit the clamp, do not tighten the bolt at this stage.
25. Set the ignition timing statically to 6° BTDC.
26. Connect the vacuum hose to the distributor.
27. Fit the low tension lead to the coil.
28. Fit the distributor cap.
29. Reconnect the battery negative lead.
30. Using suitable electronic equipment set the ignition timing, (see IGNITION TIMING - Adjust).

DISTRIBUTOR-LUCAS 35DLM8

Overhaul

Dismantling

Distributor cap

1. Unclip and remove the distributor cap.
2. Clean the cap and HT brush with a lint free cloth.
3. If the cap is found to be faulty a new one must be fitted.

Rotor arm

4. Pull the rotor arm from the shaft.
5. If the rotor arm is found to be faulty a new one must be fitted.

Insulation cover (Flash shield)

6. Remove the cover, secured by three screws.
7. Fit a new cover if found to be faulty.

Vacuum unit

8. Remove the two screws from the vacuum unit securing bracket, disengage the connecting rod from the pick-up base plate connecting peg and withdraw the vacuum unit from the distributor body.

Amplifier module

9. Remove the securing screws and withdraw the module.
10. Remove the gasket.
11. Remove the two screws securing the cast heatsink and remove the heatsink.

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

Pick-up and base plate assembly

12. Using circlip pliers, remove the circlip retaining the reluctor on the rotor shaft.
13. Remove the flat washer and the 'O' ring seal from the recess in the top of the reluctor.
14. Gently withdraw the reluctor from the shaft, taking care not to damage the teeth.
15. Remove the three support pillars and the cable grommet. Lift out the base plate and pick-up assembly.

NOTE: Do not disturb the two barrel nuts securing the pick-up module, otherwise the air gap will need re-adjustment.

16. Fit a new pick-up and base plate assembly if the module is known to be faulty, otherwise check the pick-up winding resistance (2k-5k ohm).

Reassembly

17. Reassemble the distributor in reverse order to dismantling, noting the following points.

Lubrication**Apply clean engine oil:**

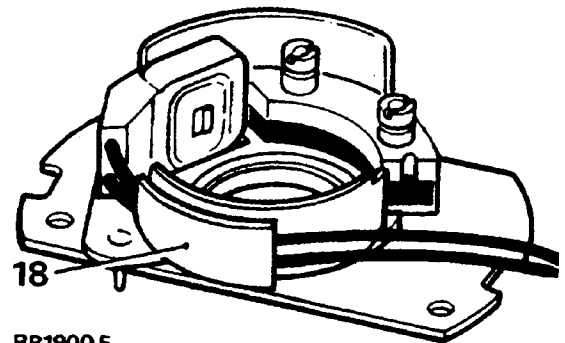
- a. A spot in the rotor spindle before fitting the rotor arm.

Apply Omnilube 2 (or equivalent) grease:

- b. Auto advance mechanism.
- c. Pick-up plate centre bearing.
- d. Pre-tilt spring and its rubbing area (pick-up and base plate assembly).
- e. Vacuum unit connecting peg (pick-up and base plate assembly).
- f. The connecting peg hole in the vacuum unit connecting rod.

Fitting pick-up and base plate assembly

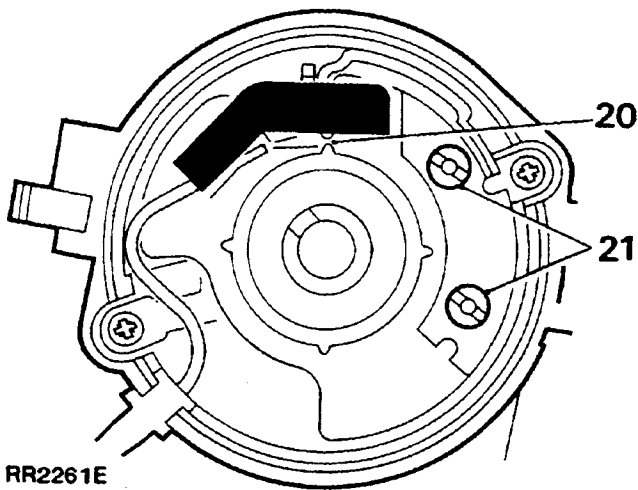
18. Pick-up leads must be prevented from fouling the rotating reluctor. Both leads should be located in the plastic guide as illustrated. Check during reassembly.

**Fitting reluctor**

19. Slide the reluctor as far as it will go on the rotor shaft, rotate the reluctor until it engages with the coupling ring beneath the pick-up base plate. The distributor shaft, coupling ring and reluctor are 'keyed' and rotate together. Fit the 'O' ring seal and flat washer to the reluctor and secure with the circlip.

Pick-up air gap adjustment

20. The air gap between the pick-up limb and reluctor teeth must be set within the specified limits, using a non-ferrous feeler gauge.



RR2261E

21. If adjustment is necessary, slacken the two barrel nuts to set the air gap (see Engine Tuning Data).

NOTE: When the original pick-up and base plate assembly has been refitted the air gap should be checked and if necessary adjusted. When fitting a new assembly the air gap will require adjusting to within the specified limits.

Amplifier module

22. Before fitting the module, apply MS4 Silicone grease or equivalent heat conducting compound to the amplifier module back plate, the seating face on the body and both faces of the heatsink casing.

Ignition coil

Remove and refit

Removal

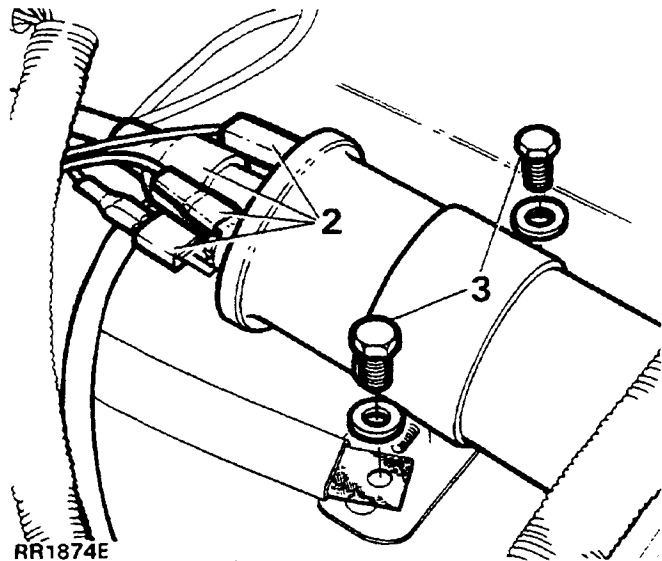
1. Disconnect the battery negative lead.
2. Disconnect the high and low tension electrical leads from the ignition coil.
3. Remove the two securing bolts and withdraw the coil from the vehicle.

NOTE: An earth strap is located under one of the coil securing bolts.

Refitting

4. To refit the coil reverse the removal instructions.

NOTE: Ensure that the bolting location for the earth strap is free from paint and grease. Coat the area around the bolt with Petroleum Jelly.



RR1874E

IGNITION TIMING

Adjust

1. It is essential that the following procedures are adhered to. Inaccurate timing can lead to serious engine damage and additionally create failure to comply with emission regulations. If the engine is being checked in the vehicle, where air conditioning is fitted the compressor must be disengaged.
2. On initial engine build, or if the distributor has been disturbed for any reason, the ignition timing must be set statically to 6° BTDC. (This sequence is to give only an approximation in order that the engine may be started) **ON NO ACCOUNT MUST THE ENGINE BE STARTED BEFORE THIS SETTING HAS BEEN CARRIED OUT.**

Equipment required

Calibrated tachometer
Stroboscopic timing lamp

3. Couple the stroboscopic timing lamp and the tachometer to the engine following the manufacturer's instructions.
4. Disconnect the vacuum hose from the distributor.
5. Start the engine, with no load and not exceeding 3000 rev min run until normal operating temperature is reached. (Thermostat open). Check that the normal idling speed falls within the tolerance specified in the data section.
6. Idle speed for timing purposes must not exceed 800 rev min.

7. With the distributor clamping bolt slackened, turn the distributor until the timing flash coincides with the timing pointer and the correct timing mark on the rim of the torsional vibration damper, as shown in the engine tuning section.
8. Retighten the distributor clamp bolt securely. Recheck the timing to ensure that clamp bolt tightening has not affected the setting.
9. Refit the vacuum hose.
10. Disconnect the stroboscopic timing lamp and the tachometer from the engine.

LUCAS CONSTANT ENERGY IGNITION SYSTEM 35DLM8-PRELIMINARY CHECKS

Inspect the battery cables and connections to ensure that they are clean and tight. Check the battery state of charge if in doubt as its condition.

Inspect all LT connections to ensure that they are clean and tight. Check the HT leads are correctly positioned and not shorting to earth against any engine components. The wiring harness and individual cables should be firmly fastened to prevent chafing.

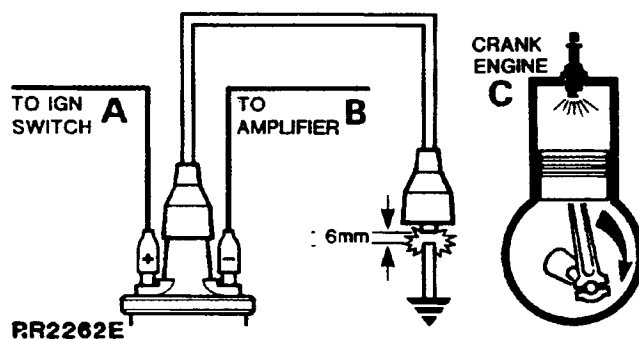
Pick-up air gap

Check the air gap between the pick-up limb and the reluctor teeth, using a non-ferrous gauge, (see Engine Tuning Data).

NOTE: The gap is set initially at the factory and will only require adjusting if tampered with or when the pick-up module is replaced.

TEST 1:

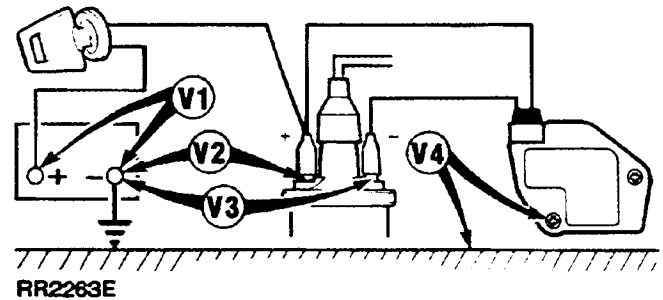
HT Sparking



Remove the coil/distributor HT lead from the distributor cover and hold it approximately 6 mm (0.25 in) from the engine block, using suitable insulated pliers. Switch the ignition 'ON' and operate the starter. Regular sparking indicates a fault in HT distribution, plugs, timing or fuelling, proceed to Test 6. If no spark or weak spark occurs proceed to Test 2.

TEST 2:

LT Voltage



Switch the ignition 'ON' - engine stationary

1. Connect a voltmeter to the points in the circuit indicated by V1 to V4 and make a note of the voltage readings.
2. Compare the voltages obtained with the specified values listed below.

V1 - More than 12 volts.
 V2 - 1 volt maximum below volts at V1.
 V3 - 1 volt maximum below volts at V1.
 V4 - 0 volt - 0.1 volt.

3. If all readings are correct proceed to Test 3.
4. Check incorrect reading(s) with the following chart to identify the area of possible faults, i.e. faults listed under the heading SUSPECT and rectify.
5. If the coil and amplifier are suspected, disconnect the LT lead at the coil, repeat check V3. If the voltage is still incorrect, fit a new coil. If voltage is now correct, check LT lead, if satisfactory fit a new amplifier.
6. If the engine will not start proceed to Test 3.

1	2	3	4	SUSPECT
L	*	*	*	DISCHARGED BATTERY
*	L	L	*	IGN. SWITCH AND/OR WIRING
*	*	L	*	COIL OR AMPLIFIER
*	*	*	H	AMPLIFIER GROUND

KEY

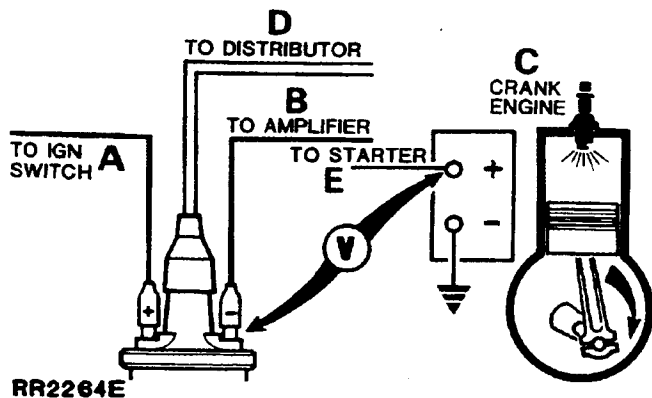
* Expected voltage

H Voltage higher than expected

L Voltage lower than expected

TEST 3:

Amplifier Switching



Connect the voltmeter between the battery positive (+ve) terminal and the HT coil negative (-ve) terminal, the voltmeter should register 0 volts.

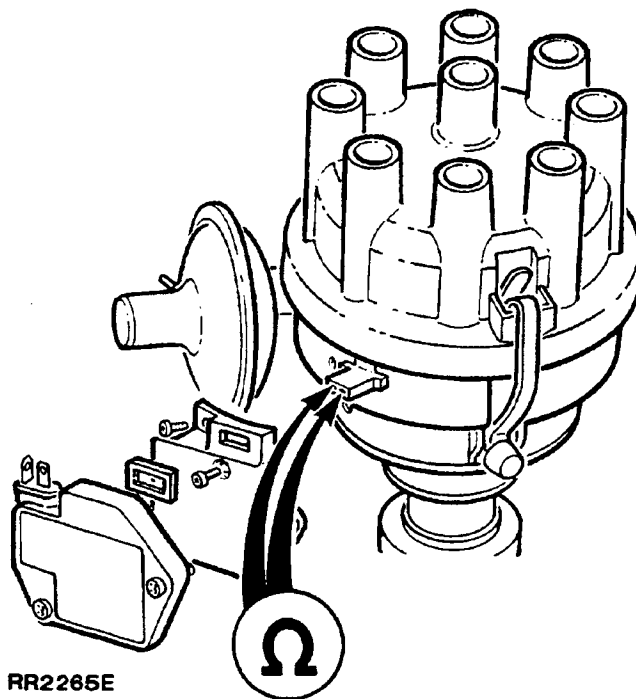
Switch the ignition 'ON', the voltmeter should still register - volts.

Crank the engine, the voltmeter reading should increase when cranking, in which case proceed to Test 5.

If there is no increase in voltage during cranking proceed to Test 4.

TEST 4:

Pick-up Coil Resistance



Remove the amplifier.

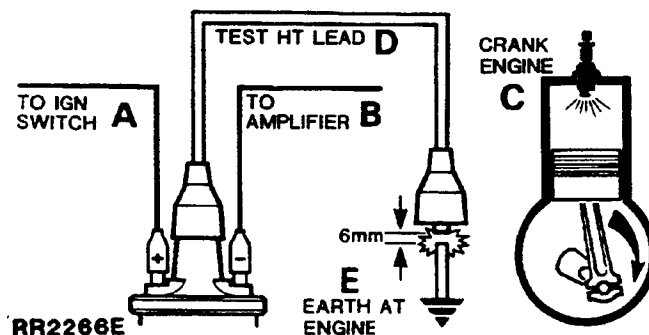
Connect the ohmmeter leads to the two pick-up terminals in the body of the distributor.

The ohmmeter should register between 2k and 5k ohm if pick-up is satisfactory. If the ohmmeter reading is correct, check all connections between the pick-up and amplifier, if satisfactory, fit a new amplifier. If the engine still does not start carry out Test 5.

Change the pick-up if the ohmmeter reading is incorrect. If the engine still does not start proceed to Test 5.

TEST 5:

Coil HT Sparking



Remove the existing coil/distributor HT lead and fit the test HT lead to the coil tower. Using suitable insulated pliers, hold the free end about 6mm (0.25 in) from the engine block and crank the engine. There should be good HT sparking.

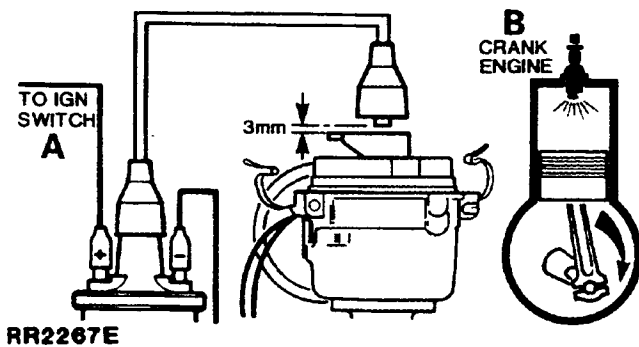
If weak or no sparking, fit a new coil and repeat this test.

HT sparking good, repeat test with original HT lead. If sparking is good carry out Test 6.

If weak or no sparking, fit a new HT lead, if the engine will not start carry out Test 6.

TEST 6:

Rotor Arm



Remove the distributor cover. Disconnect the coil HT lead from the cover, using suitable insulated pliers hold the lead approximately 3mm (0.13 in) above the rotor arm electrode and crank the engine.

There should be no sparking between the rotor and HT lead. If satisfactory carry out Test 7.

If HT sparking occurs, an earth fault on the rotor arm is indicated. Fit a new rotor arm. If the engine will not start carry out Test 7.

TEST 7:

Visual and H.T. Cable Checks

Examine:	Should be:
1. Distributor Cover	Clean, dry, no tracking marks
2. Coil Top	Clean, dry, no tracking marks.
3. H.T. Cable Insulation	Must not be cracked, chafed or perished
4. H.T. Cable Continuity	Must not be open circuit
5. Sparking Plugs	Clean, dry, and set to correct gap

NOTE:

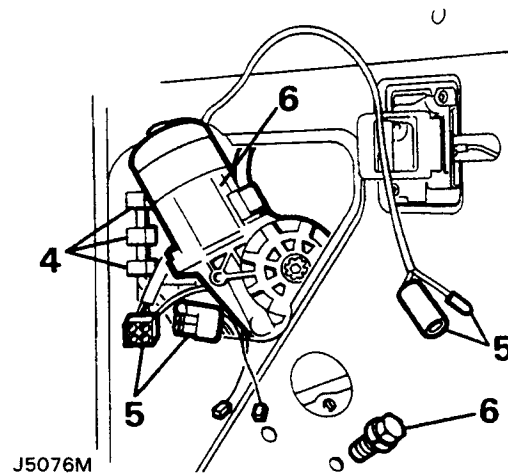
- | | |
|-------------------------------|---|
| 1. Reluctor | Must not foul pick-up or leads |
| 2. Rotor and Insulation Cover | Must not be cracked or show signs of tracking marks |

WINDOW LIFT MOTOR-Front doors

Remove and refit

Removal

1. Ensure that the window glass is in its fully closed position and secure it with adhesive tape.
2. Disconnect the battery negative lead.
3. Remove the door pull, trim panel, and plastic vapour barrier.
4. Release the window lift motor wiring harness from the three retaining clips to allow the harness to be pulled out of the opening at the front of the inner door panel.
5. Disconnect the window lift motor harness multi-plug from the main door harness.
6. Support the motor, remove the three securing bolts and withdraw the motor through the top front opening of the door panel.



Refitting

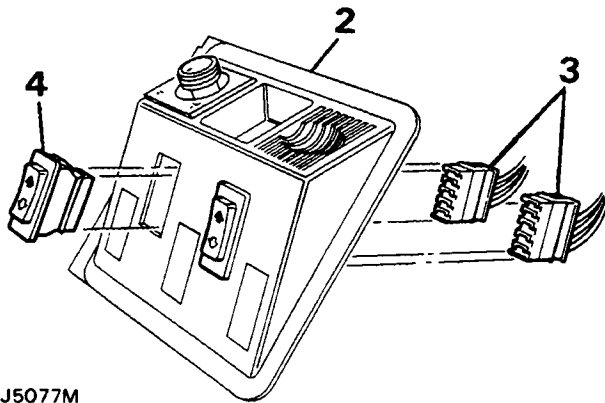
7. To refit the window lift motor reverse the removal procedure, ensuring that the drive gear is engaged and correctly aligned with the window lift linkage before fitting the securing bolts.

WINDOW LIFT SWITCHES

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the gaiter from the hand brake lever and detach the console mounted switch panel.
3. Disconnect the multi-plug at the rear of the switch(es).
4. Apply pressure to the rear of the switch to push it through the panel.



J5077M

Refitting

5. Refit the window lift switches in reverse order to removal.

ELECTRICALLY OPERATED CENTRAL DOOR LOCKING SYSTEM

Where electrically operated central door locking is fitted, locking or unlocking the drivers door from outside by key operation, or from the inside with the sill knob automatically locks or unlocks the passenger and rear doors.

Front and rear passenger doors can be independantly locked or unlocked from inside the vehicle by sill knob operation but can be overridden by further operation of the drivers door locking control.

On rear doors, where side facing fold down seats are fitted, a child safety lock is provided which can be mechanically pre-set to render the interior door handles inoperative.

Failure of a door actuator will not affect the operation of the remaining doors and the door with the inoperative actuator can still be locked or unlocked manually.

The actuator unit fitted to the drivers door is the master actuator and is identified from the actuators fitted to the passenger and rear doors by having a white connecting link, whereas the passenger and rear door actuators have grey coloured connecting links.

NOTE: Actuator units are non-servicable, if a fault should occur replace the unit with a new one.

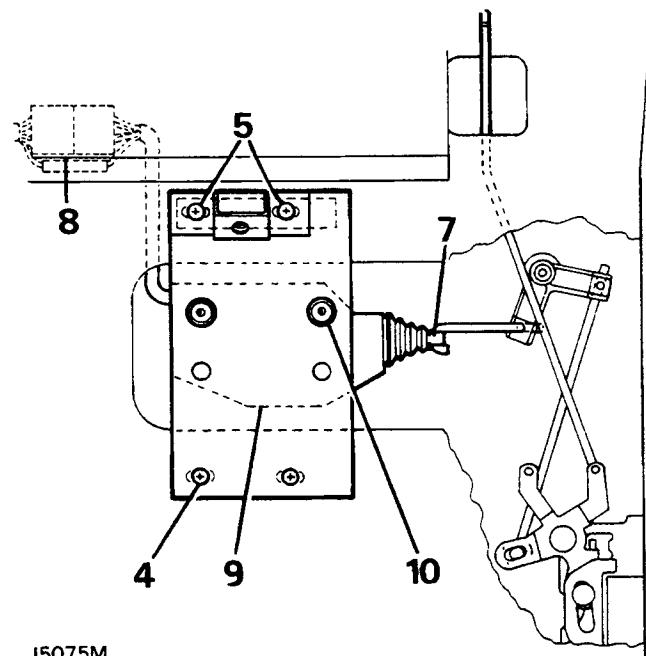
FRONT DOOR ACTUATOR UNITS

Remove and refit

Removal

1. Ensure that the window glass is in its fully closed position.
2. Disconnect the battery negative lead.
3. Remove the door pull, trim panel and plastic vapour barrier.
4. Remove the lower two screws and plain washers securing the actuator mounting plate to the inner door panel.

NOTE: The upper two actuator mounting plate securing screws also secure one of the door pull mounting brackets and locate with a nut retainer strip fitted on the inside face of the inner door panel.



J5075M

5. Remove the upper two screws, the door pull mounting bracket and retrieve the nut retaining strip from inside the door.
6. Release the window lift motor leads from the three clips at the front of the door to allow sufficient slack in the harness for actuator assembly removal.
7. Detach actuator assembly operating rod from the actuator link on the door lock.
8. Withdraw the actuator assembly from the door until the electrical cable is pulled out of its channel sufficiently to expose the connector.
9. Detach the connector and remove the actuator from the door.
10. The actuator unit may be changed by removing the two rubber mounted screws that secure it to the mounting plate.

Refitting

11. Attach the actuator assembly connector to its mating half on the door harness.
12. Engage the actuator assembly operating rod with the hooked end of the actuator link.
13. Pull the door harness back into its channel from the front end and secure the window lift motor leads with the three clips.
14. Fit the actuator assembly to the inner door panel and loosely secure with the two lower screws and plain washers.
15. Position the nut retainer on the inside face of the inner door panel, locate the door pull mounting bracket and loosely secure with the two upper screws.
16. Set the actuator mounting plate with the screws in the centre of the slotted holes, then tighten the screws sufficiently to retain the assembly.
17. Ensure that manual operation of the sill locking control is not restricted by the operation of the actuator operating rod and vice versa, resetting the mounting plate as necessary.
18. Reconnect the battery negative lead.
19. Check that electrical operation of the door lock occurs when the sill locking control is moved through half of its total movement. Reset the mounting plate as necessary and fully tighten the four screws.

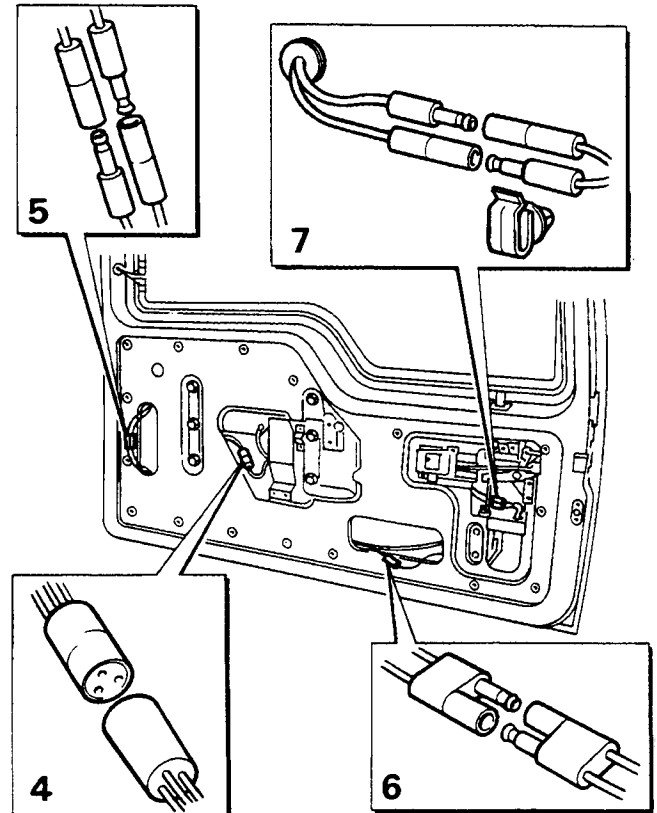
NOTE: The above adjustment ensures that the full tolerance on the switching operation is utilised.

REAR DOOR HARNESS

Remove and refit

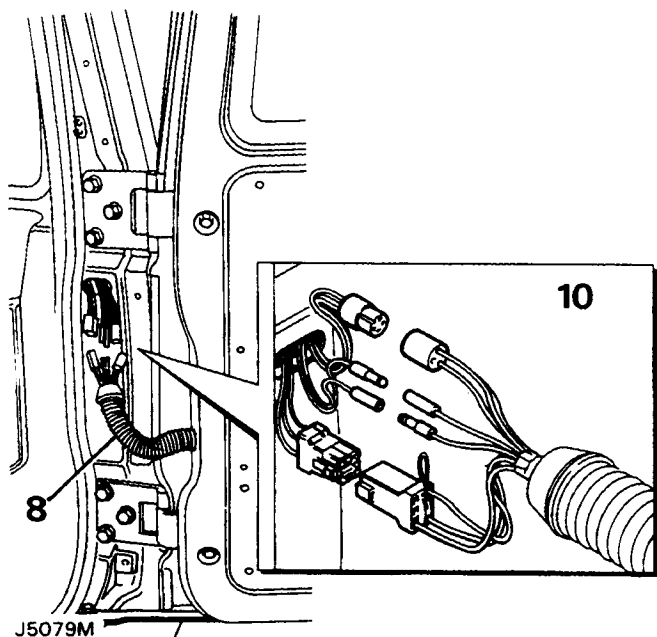
Removal

1. Disconnect the battery negative lead.
2. Remove rear door pull and trim panel.
3. Remove protective plastic sheet from inner door panel.



J5078M

4. Disconnect the wiper motor lead at the multi-plug.
5. Disconnect the heated rear screen leads at the bullet connectors.
6. Disconnect the central locking actuator lead.
7. Unclip and disconnect the number plate light leads and displace the grommet beneath the door lock.
8. Release the convolute grommet from the door post.
9. Withdraw the two multi-plugs and bullet connectors from inside the door post.



10. Separate the connectors and multi-plugs, release the convolute grommet from the door and carefully withdraw the harness through the aperture in the side of the door.

Refitting

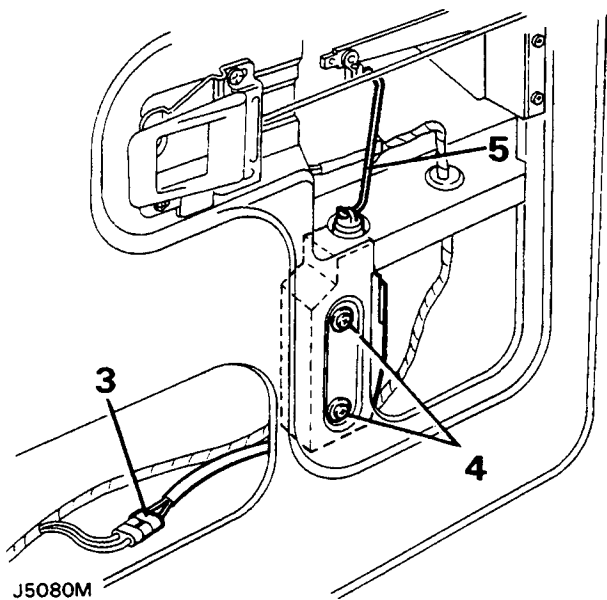
11. Refit the harness in reverse order of removal.

REAR DOOR ACTUATOR

Remove and refit

Removal

1. Disconnect the battery negative lead.









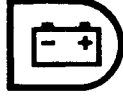




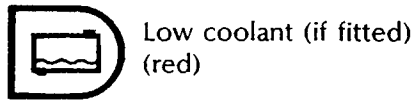
2. Remove the door pull, trim panel and vapour protective sheet from the inner door panel.
3. Disconnect the actuator leads from the door electrical harness.
4. Remove the two screws securing the actuator door panel.
5. Manoeuvre the actuator, disconnect the rod from the link and withdraw the actuator from the door.

Refitting

6. Refit the actuator in reverse order of removal.

INSTRUMENT BINNACLE WARNING LIGHT SYMBOLS

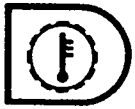
-  Trailer connected, flashes with direction indicators (green)
-  Direction indicator, left turn/right turn (green)
-  Headlamp high beam on (blue)
-  Park brake brake on (red)
-  Seat belt (red)
-  Brake fluid pressure failure, will illuminate on initial bulb check (red)
-  Engine oil pressure low, will illuminate on initial bulb check (red)
-  Cold start/choke, symbol only shows on illumination (amber)
-  Ignition on/no charge indicator (red)
-  Differential lock lock on (amber)
-  Brake pad wear, symbol only shows on illumination (amber)



Low coolant (if fitted)
(red)



Park brake/Brake fluid
pressure failure (red)

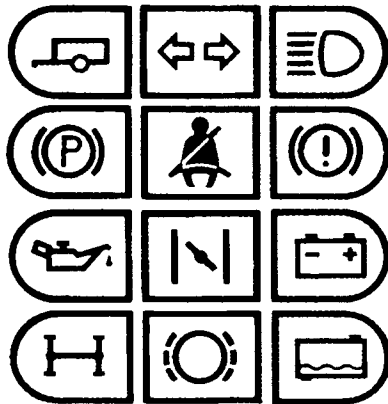


Transfer gearbox high
oil temperature (red)



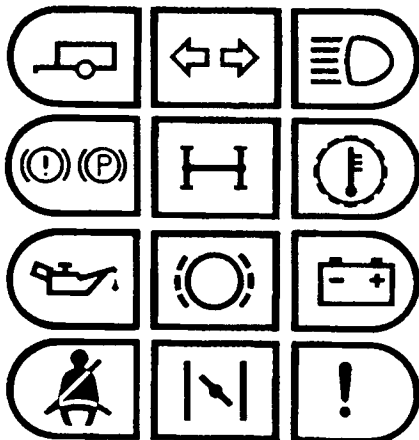
Micro-processor check
EFI only (amber)

WARNING LIGHTS EARLY MODELS



J5169M

WARNING LIGHTS LATER MODELS



J5258M

PANEL AND WARNING LIGHTS

Bulb replacement

1. Disconnect the battery negative lead.
2. Remove the four screws securing the instrument fascia switch panel.
3. Release the switch panel and disconnect the eight multi-plugs from the rear of the switches. Note the colour coding locations to assist with refitting.
4. Remove the four nuts and washers and the two screws securing the instrument pack to the rear casing.
5. Pull the instrument pack forward and remove the appropriate bulb holder by rotating it counter-clockwise and withdrawing it.

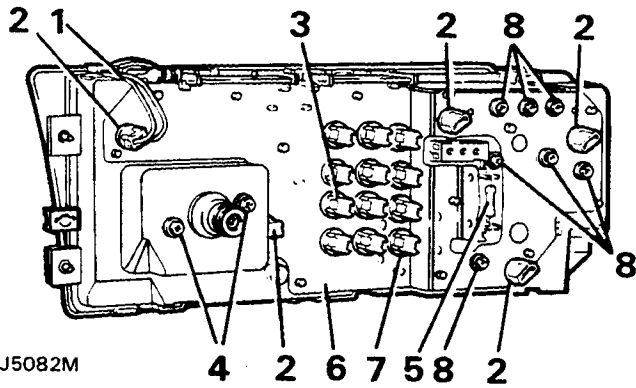
NOTE: The 'No Charge/Ignition On' warning light bulb unit, identified by its blue coloured base, is of a higher wattage (2 watt) than the other bulb units (1.12 watt). On high-line instrument packs two additional panel illumination bulbs are fitted, these are also of a different wattage (1.4 watt).

INSTRUMENT BINNACLE

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the four screws securing the instrument fascia switch panel.
3. Release the switch panel and disconnect the eight multi-plugs from the rear of the switches. Note the colour coding locations to assist with refitting.



J5082M

1. Panel lighting harness (Hi-line only).
2. Panel illumination bulbs.
3. No charge warning light (blue holder).
4. Speedometer securing screws.
5. Printed circuit resistor.
6. Printed circuit.
7. Warning light bulbs.
8. Tachometer, fuel and temperature gauge securing screws.

4. If it is necessary to remove the switches from the panel, depress the side tags and push the switches out from the rear of the panel.
5. Remove the four nuts and washers and the two screws securing the instrument pack to the rear casing.
6. Pull the instrument pack forward, from the rear of the pack disconnect the speedometer cable and the two multi-plugs, then lift the instrument pack from the rear casing.

NOTE: When the instrument binnacle is removed from the vehicle it must be stored in the upright position, otherwise fluid loss may occur.

7. Remove the two screws securing the instrument binnacle to the mounting bracket and withdraw the bracket.

Refitting

8. Refit the instrument pack to the mounting bracket.
9. Connect the two multi-plugs and the speedometer cable to the rear of the instrument pack, locate the pack over the studs and secure with the nuts washers and screws.
10. If the switches have been removed from the instrument fascia switch panel, refit in reverse order of removal.

11. Connect the eight multi-plugs to the rear of the switches, following the colour coding noted during removal.
12. Position the switch panel over the instrument pack to locate with the rear casing and secure with the four screws.

Speedometer

Remove and refit

Removal

13. Remove the instrument binnacle from the vehicle.
14. Release the speedometer bulb and the two instrument panel illumination bulbs from their respective locations and withdraw the harness and bulb holders from the panel.
15. Remove the two screws from either side of the instrument pack and remove the trip button.
16. Release the six securing clips and remove the front window casing assembly.
17. Remove the two securing screws from the rear of the panel and lift out the speedometer.

Refitting

18. Refit the speedometer in reverse order to removal.

Tachometer, fuel and temperature gauges

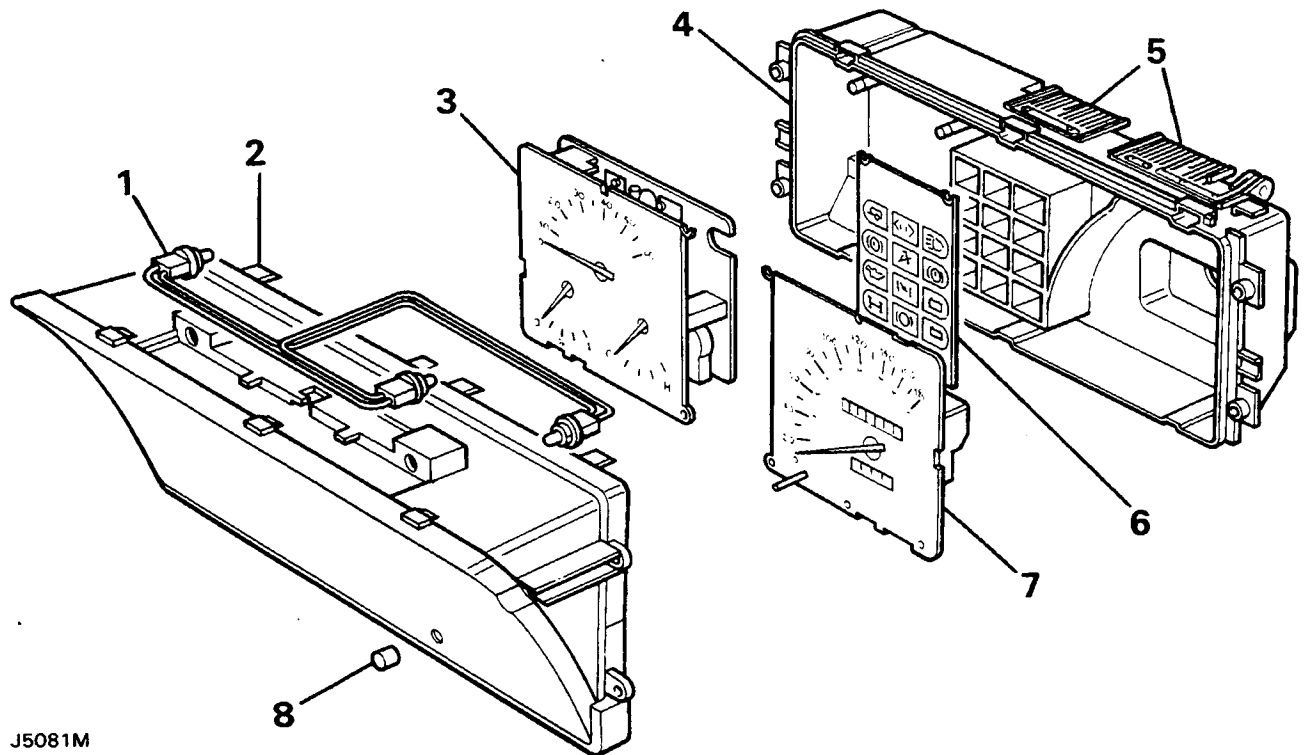
Remove and refit

Removal

19. Carry out operations 13 to 16 of the speedometer removal.
20. Remove the seven screws from the rear of the panel and withdraw the tachometer and fuel and temperature gauges assembly. Note the locations of the three different screw sizes.

Refitting

21. Refit the tachometer and fuel and temperature gauges assembly in reverse order of removal.



J5081M

Instrument Pack

1. Panel lighting harness (Hi-line only).
2. Panel lens and front housing.
3. Tachometer, fuel and temperature gauges.
4. Instrument case.
5. Printed circuit input tags.
6. Warning light panel.
7. Speedometer.
8. Speedometer knob.

Illuminated warning panel**Remove and refit****Removal**

22. Remove the speedometer, the tachometer and fuel and temperature gauges assembly and withdraw the illuminated warning panel.

Refitting

23. Refit the illuminated warning panel in reverse order of removal.

Printed circuit**Remove and refit****Removal**

24. Remove the instrument binnacle from the vehicle.
25. Remove all bulb holders from the rear of the pack.
26. Remove the five tachometer securing screws that pass through the printed circuit, noting the location of the two longer screws.
27. Release the resistor from the securing tags.
28. Detach the printed circuit from the securing pegs and withdraw it from the rear of the instrument pack.

Refitting

29. Refit the printed circuit in reverse order to removal.

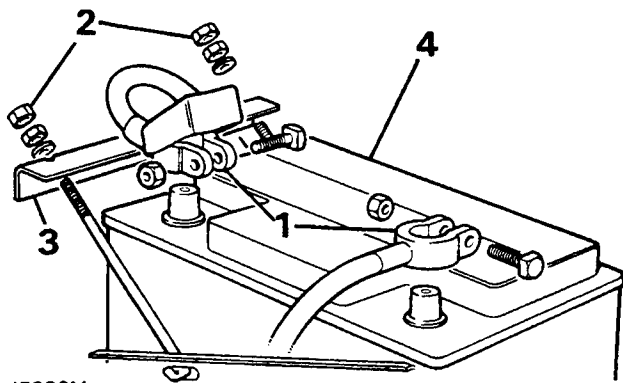
BATTERY

Remove and refit

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 spanner to any earthed metal part could cause a severe spark, possibly resulting in personal injury. When installing the battery the positive lead should be connected first.

Removal

1. Disconnect the battery negative lead followed by the disconnection of the positive lead.
2. Release the four nuts securing the battery bracket in position.
3. Remove the bracket from the studs.
4. Remove the battery.



J5083M

Refitting

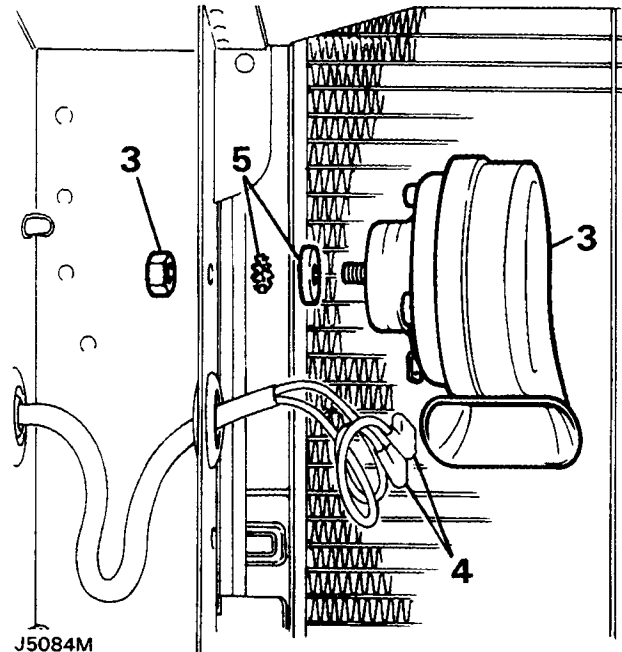
5. Clean the battery terminals and lead clamps.
6. Refit the battery in reverse order to removal, coating the clamps and terminals with petroleum jelly before reconnecting.

HORNS

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the radiator grille.
3. Disconnect the electrical leads.
4. Remove the securing nut, withdraw the horn and remove the plain and serrated washer from the stud.



J5084M

NOTE: Twin horns are fitted to the vehicle. An identification letter is stamped on the front outer rim of the horn denoting the tone; 'H'-high note, 'L'-low note.

Refitting

5. Refit the horns in reverse order to removal.

RELAYS

Relays are fitted in three locations on the vehicle, at the sides of both footwells and on the steering column support bracket, behind the fuse panel. The number of relays fitted will vary dependant upon the vehicle model. The relays fitted to the upper locations in the footwell will change with the driving hand of the vehicle, i.e. the relays fitted in the drivers footwell on a right hand drive vehicle will be found in the drivers footwell on a left hand drive vehicle, those fitted in the passenger footwells will also reverse accordingly.

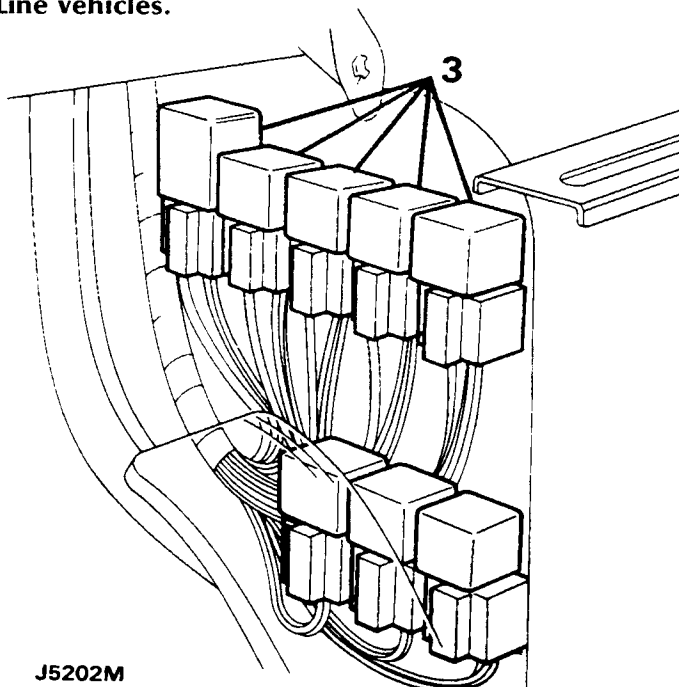
The air conditioning and heater relays, fitted below the main bank of relays in the right hand footwell, remain in this location irrespective of the driving hand of the vehicle.

Drivers footwell**Remove and refit**

The following relays are fitted behind the trim panel at the side of the drivers footwell. The connector blocks to which the relays are fitted are colour coded, the colour of the connector block is shown after the relay.

Window lift front (Natural)
 Window lift rear (Yellow)
 Front wiper delay (Red)
 Heated rear window (Black, inner)
 Headlamp load (Black, outer)

NOTE: Window lift relays are only fitted to High Line vehicles.



J5202M

Removal

1. Disconnect the battery negative lead.
2. Remove the trim panel from the side of the drivers footwell.
3. Identify the relay to be removed and detach it from its connector block.

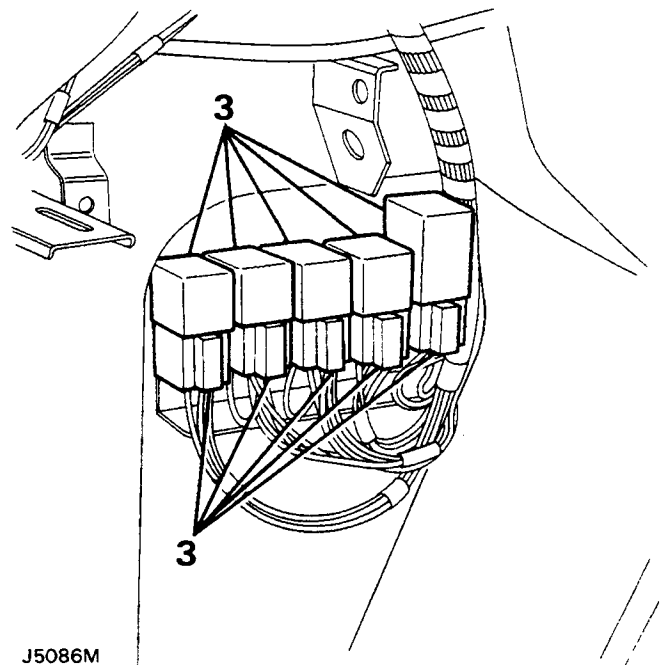
Refitting

4. Refit the relays in reverse order to removal.

Front passenger footwell**Remove and refit**

The following relays are fitted behind the trim panel at the side of the front passenger footwell. The connector blocks to which the relays are fitted are colour coded, the colour of the connector block is shown after the relay.

Headlamp wash (Blue)
 Fuel pump (Yellow) (Early models only)
 Rear wiper delay unit (Red)
 Air con. fresh air solenoid (Red, inner)
 Air con. heater (Red, outer)
 Start relay (Black)



J5086M

NOTE: Air conditioning relays are only fitted to High Line vehicles.

Removal

1. Disconnect the battery negative lead.
2. Remove the trim panel from the side of the front passengers footwell.
3. Identify the relay to be removed and detach it from its connector block.

Refitting

4. Refit the relays in reverse order to removal.

Right hand footwell

Below the main bank of relays, in the right hand footwell, additional relays are fitted as follows:

Non-air conditioning vehicles have the heater ignition relay fitted in this location.

Air conditioning vehicles have three relays fitted in this location, the air conditioning/heater relay and the air conditioning medium and low speed relays. Irrespective of the driving hand of the vehicle these relays remain in this location.

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the trim panel from the side of the footwell.
3. Identify the relay to be removed and detach it from its connector block.

Refitting

4. Refit the relays in reverse order to removal.

Steering column support bracket mounted relays.

Remove and refit

The following relays are fitted behind the fuse panel mounted on the steering column support bracket. The connector blocks to which the relays are fitted are colour coded, the colour of the connector block is shown after the relay.

Voltage switch (Yellow)

Fan relay (Red)

Air con. compressor clutch (Red)

Flasher unit (Blue)

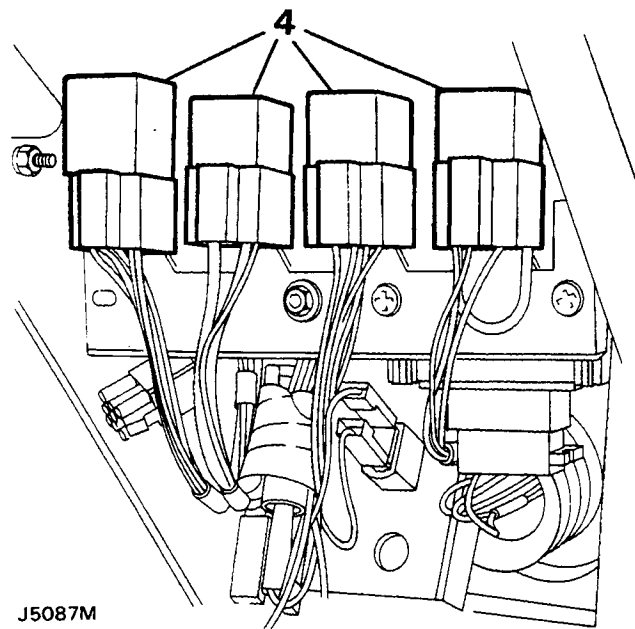
NOTE: The voltage switch, fan relay and air conditioning compressor clutch relay and their connector blocks are only fitted to High Line vehicles.

Removal

1. Disconnect the battery negative lead.
2. Remove the fuse unit access panel from the lower fascia.
3. Remove the two screws securing the fuse unit and move the unit to one side.
4. Identify the relay to be removed and detach it from its connector block.

Refitting

5. Refit the relays in reverse order to removal.



J5087M

Heater plug timer unit (Diesel only)

Remove and refit

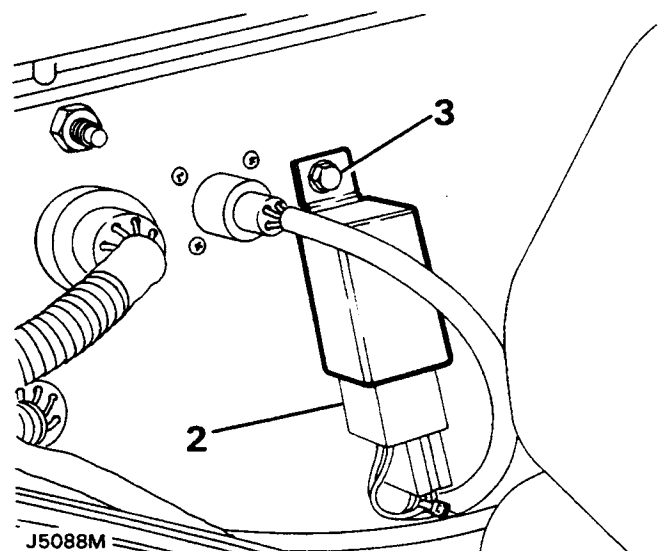
The heater plug timer unit is located in the engine compartment and is secured to the bulkhead.

Removal

1. Disconnect the battery negative lead.
2. Disconnect the multi-plug from the unit.
3. Remove the securing screw and detach the unit from the bulkhead.

Refitting

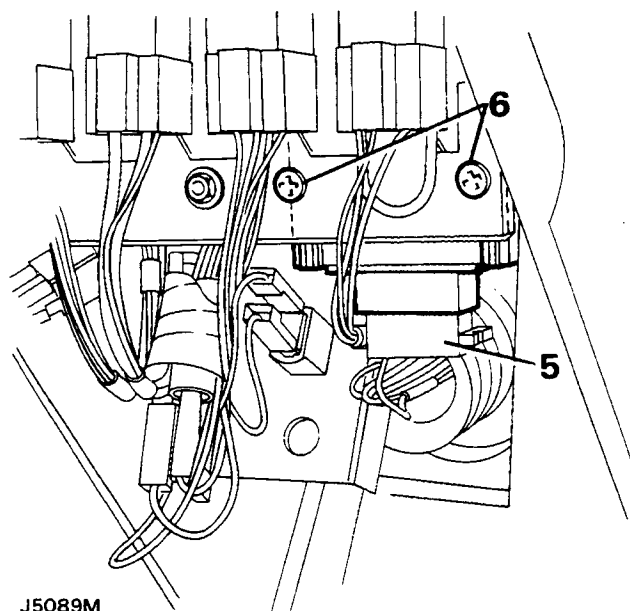
4. Refit the heater plug timer unit in reverse order to removal.



J5088M

DIM/DIP CONTROL UNIT**Remove and refit****Removal**

1. Disconnect the battery negative lead.
2. Remove the fuse unit access panel from the lower fascia.
3. Remove the two screws securing the fuse unit and move the unit to one side.
4. Remove the fascia footwell closing panel.
5. Disconnect the multi-plug from the dim/dip unit.
6. Remove the two screws securing the dim/dip unit and slide the unit out of the retaining bracket.



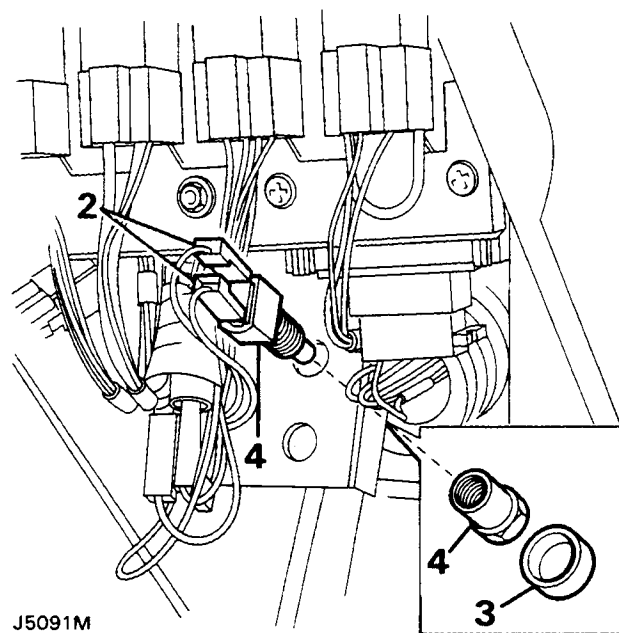
J5089M

Refitting

7. Refit the dim/dip control unit in reverse order to removal.

BRAKE LIGHT SWITCH**Remove and refit****Removal**

1. Remove the fascia footwell closing panel.
2. Disconnect the leads from the switch.
3. With the brake pedal depressed, remove the rubber bush from the switch securing nut.
4. Remove the nut and withdraw the switch.



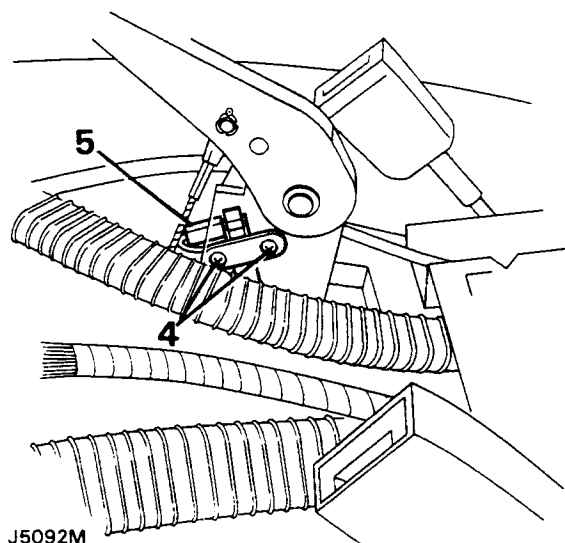
J5091M

Refitting

5. Refit the brake pedal switch in reverse order to removal.

HANDBRAKE WARNING LIGHT SWITCH**Remove and refit****Removal**

1. Disconnect the battery negative lead.
2. Remove the handbrake lever gaiter.
3. Remove the centre console switch panel.
4. Remove the screws securing the handbrake switch.
5. Withdraw the switch and detach the leads at the connectors.



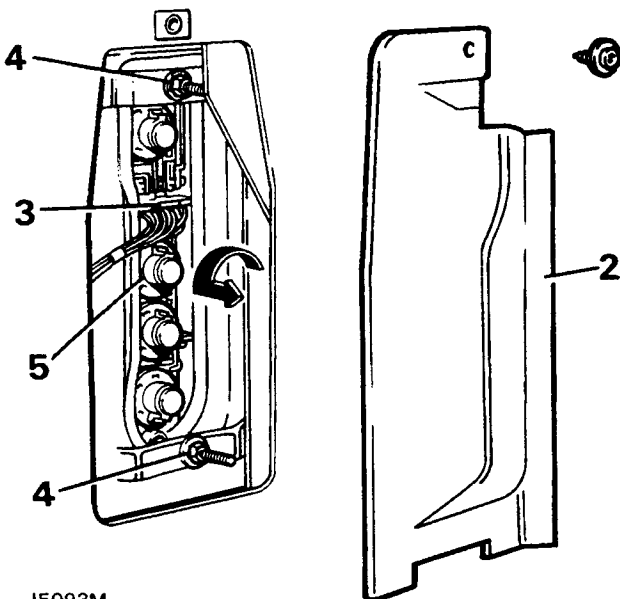
J5092M

Refitting

6. Refit the handbrake warning light switch in reverse order to removal.

REAR LAMPS**Remove and refit****Removal**

1. Disconnect the battery negative lead.
2. Remove the rear lamp assembly access panel from the lower trim panel adjacent to the door post.
3. Disconnect the lamp assembly from the wiring harness at the multi-plug.
4. Remove the nuts and plain washers securing the lamp assembly and withdraw the assembly from the exterior of the vehicle.
5. Remove the bulbs as necessary.



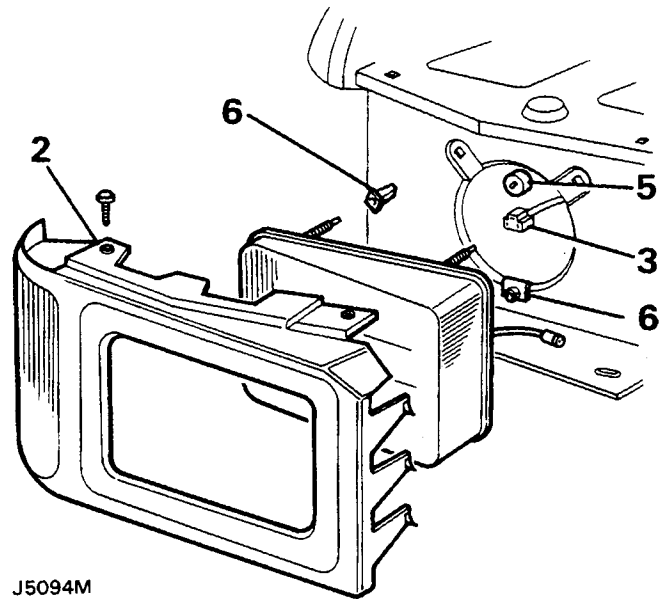
J5093M

Refitting

6. Refit the rear lamp assembly in reverse order of removal, ensuring that the rubber seal is seated correctly.

HEADLAMPS**Remove and refit****Removal**

1. Disconnect the battery negative lead.
2. Remove the headlamp surround complete with indicator lamp.



J5094M

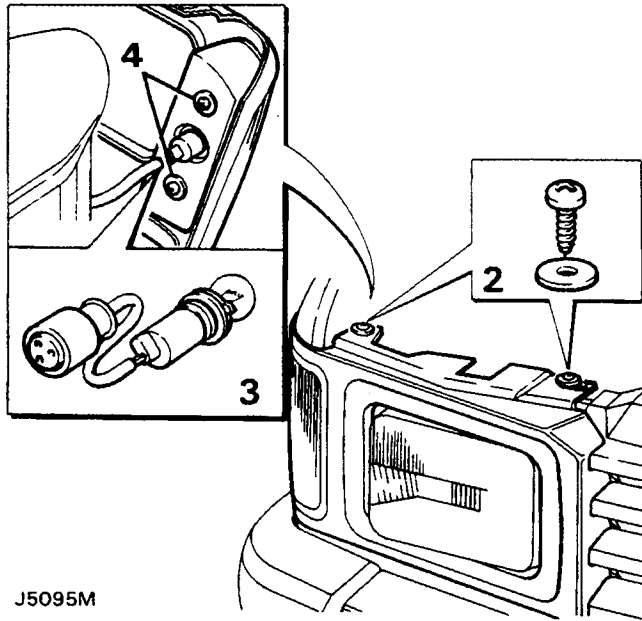
3. Disconnect the multi-plug from the rear of the headlamp and detach the rubber boot.
4. Detach the sidelamp bulb holder.
5. Remove the knobs from the headlamp adjustment screws.
6. Release the plastic retainers from the mounting and withdraw the headlamp.

Refitting

7. Refit the headlamp in reverse order of removal.
8. Set the headlamp using suitable beam setting equipment.

FRONT INDICATOR LAMPS**Remove and refit****Removal**

1. Disconnect the battery negative lead.
2. Remove the headlamp surround securing screws, withdraw the surround and disconnect the indicator lamp multi-plug.
3. Remove the bulbholder complete with bulb.
4. Remove the two securing screws and withdraw the indicator lamp unit from the headlamp surround.



J5095M

Refitting

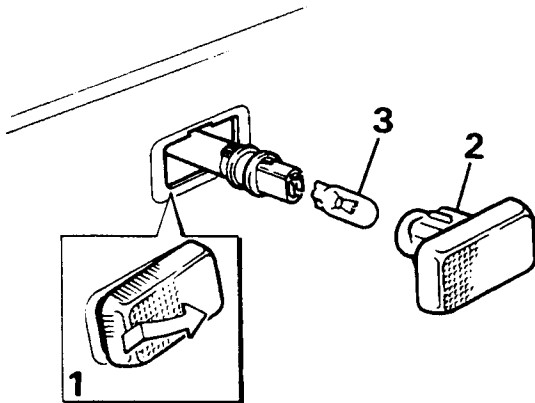
5. Refit the indicator lamp in reverse order to removal.

SIDE REPEATER LAMP BULB

Remove and refit

Removal

1. Push the lens forward and then pull outward to detach the lens and bulb holder from the wing.
2. Turn the lens counter clockwise and pull it from the bulbholder.
3. Pull the bulb from the holder without turning.



J5103M

Refitting

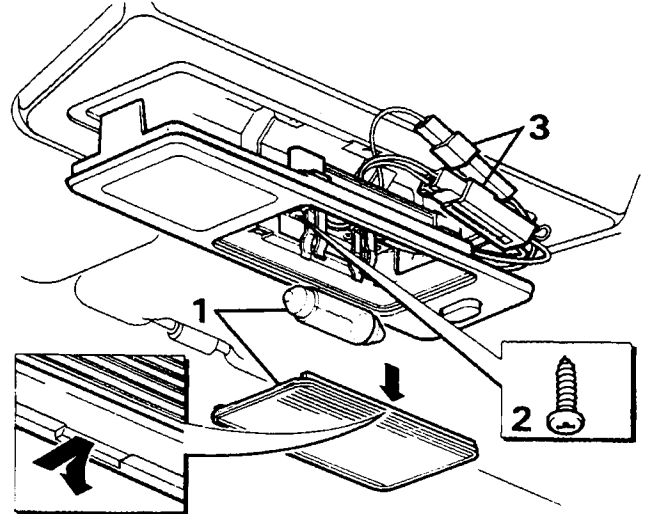
4. Refit the repeater lamp in reverse order of removal.

INTERIOR LIGHTS

Remove and refit

Removal

1. Remove the lens and bulb.
2. Remove the securing screws and lower the light unit.



J5096M

3. Withdraw the two connectors from inside the headlining; then disconnect and detach the light unit.

Refitting

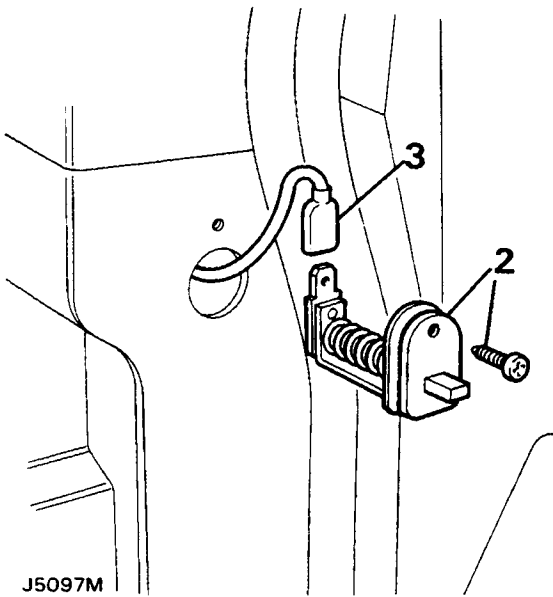
4. Refit the interior light in reverse order to removal.

DOOR PILLAR SWITCHES

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the securing screw and withdraw the switch from the pillar.
3. Disconnect the electrical lead.



Refitting

4. Refit the door pillar switches in reverse order to removal.

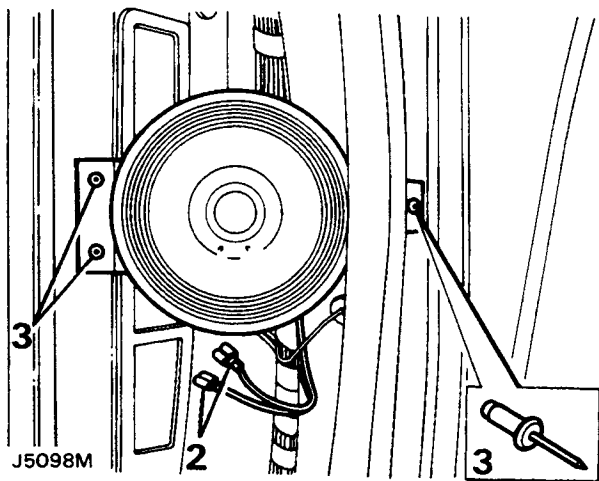
SPEAKERS

Remove and refit

Rear speakers

Removal

1. Remove the rear quarter speaker trim panel.
2. Disconnect the speaker leads.
3. Drill out the three pop-rivets and withdraw the speaker and bracket assembly.



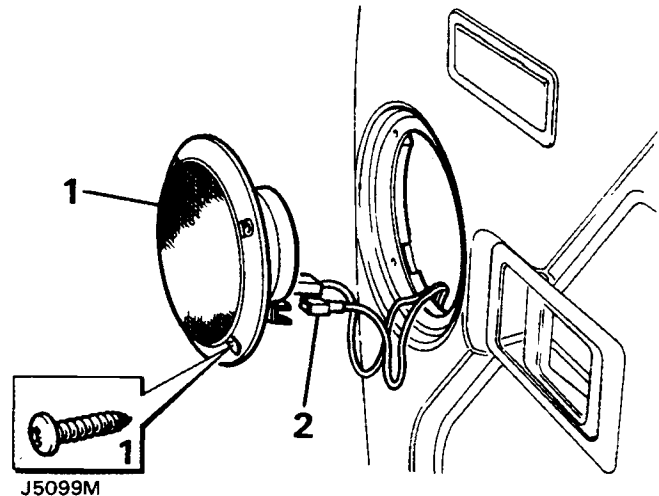
Refitting

4. Refit the rear speakers in reverse order to removal.

Door speakers

Removal

1. Remove the securing screws and withdraw the speaker from the trim panel.
2. Disconnect the speakers leads.



Refitting

3. Refit the door speakers in reverse order to removal.

HEATER CONTROL PANEL BULBS, PRINTED CIRCUIT CLOCK, AND CIGAR LIGHTER

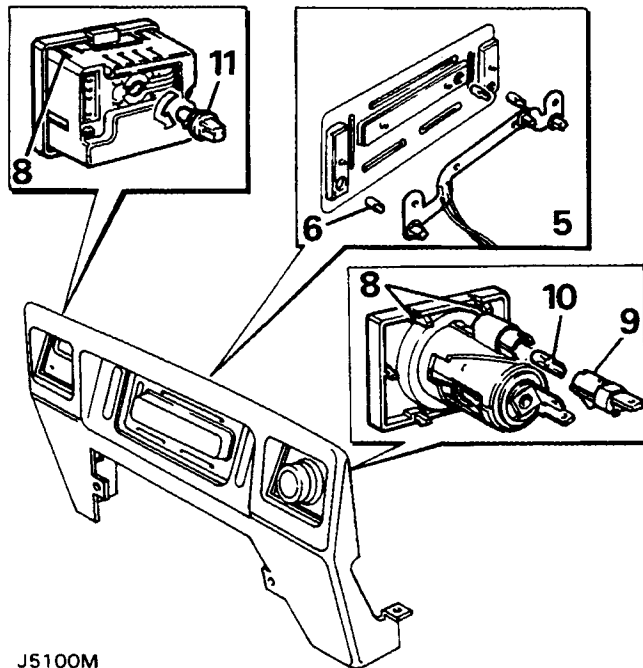
Remove and refit

Panel removal

1. Remove the centre console.
2. Remove the knobs from the heater control levers.
3. Remove the four screws from the front of the panel and the two screws, one each side of the panel, securing the panel to the lower fascia.
4. Withdraw the panel and disconnect the clock, cigar lighter and illumination multi-plugs.

Bulb replacement

5. Remove the bulb holders by pulling them from the rear of the panel without turning.
6. Replace the bulbs as necessary.
7. If the bulb holder is damaged the bulb holder and printed circuit assembly must be replaced.



J5100M

Cigar lighter and clock

NOTE: On right hand drive vehicles the cigar lighter is fitted to the aperture on the right of the heater control panel and the clock to the aperture on the left. On left hand drive vehicles the locations are reversed.

Removal

8. To remove the cigar lighter or clock press in the retaining tags and push the unit out from the rear of the panel.

Cigar lighter illumination - bulb replacement

9. Remove the bulb holder from the rear of the cigar lighter.
10. Pull the bulb from the holder and replace with a new one of the correct type (12V 1.2-watt wedge base capless).

Clock illumination - bulb replacement

11. Turn the bulbholder counter clock-wise and pull from the rear of the clock.
12. The bulb cannot be removed from the holder they should be replaced as a single unit (12V 1.2 watt).

Panel refitting

13. Refit the panel assembly by reversing instructions 1 to 4.

STEERING COLUMN CONTROLS

Remove and refit

The steering column switch layout is as follows:

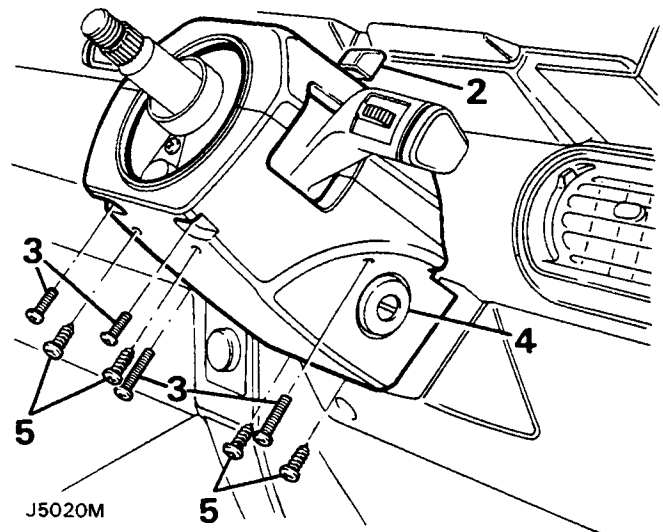
Left hand switch - Main lighting switch, high and low beam, direction indicators and horn.

Right hand switch - Windscreen wash/wipe.

Steering column shroud

Removal

1. Remove the steering wheel.
2. Pull off the hazard warning light button.
3. Remove the four screws securing the upper half of the shroud to the lower half and carefully lift the upper half away.
4. Remove the ignition/start key if located in the barrel.
5. Remove the four screws securing the bottom half of the shroud to the steering column brackets and carefully withdraw.



J5020M

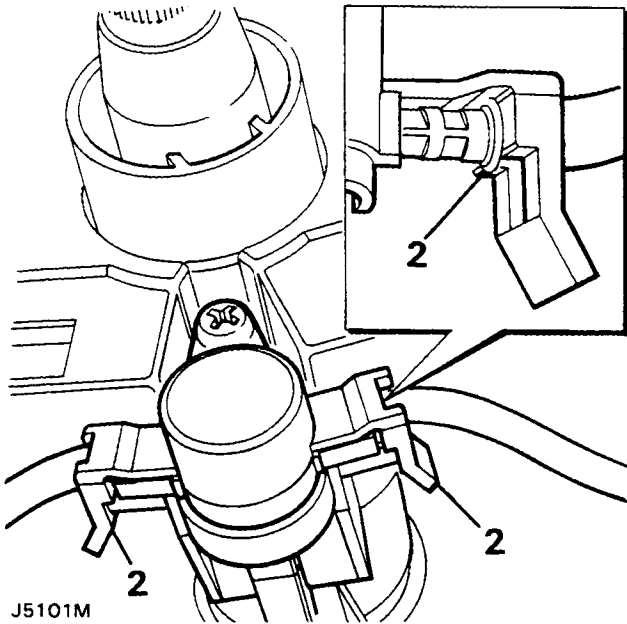
Refitting

6. Refit the shroud in reverse order of removal.

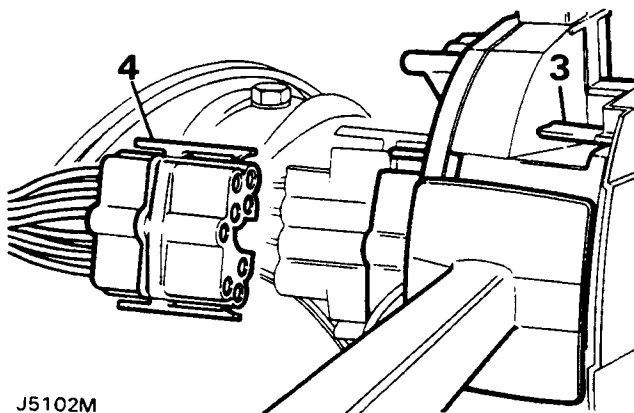
Steering column switches

Removal

1. Remove the steering column shroud.
2. Release the retaining clips and pull the fibre optic guides from their respective housings.



3. Depress the retainers at the top and bottom of the switches and pull the assemblies away from the steering column switch housing.
4. Release the harness multi-plugs from the back of the switches and remove the switch assemblies.



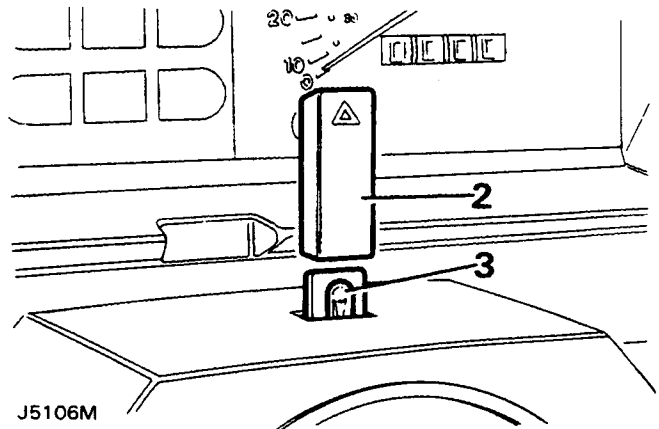
Refitting

5. Refit the switches in reverse order to removal.

Hazard warning switch bulb replacement

Removal

1. Disconnect the battery negative lead.
2. Pull the hazard switch cover upwards and remove it to gain access to the bulb.
3. Remove the bulb by pulling it upwards, to aid removal attach a piece of adhesive tape or rubber tubing to the bulb.



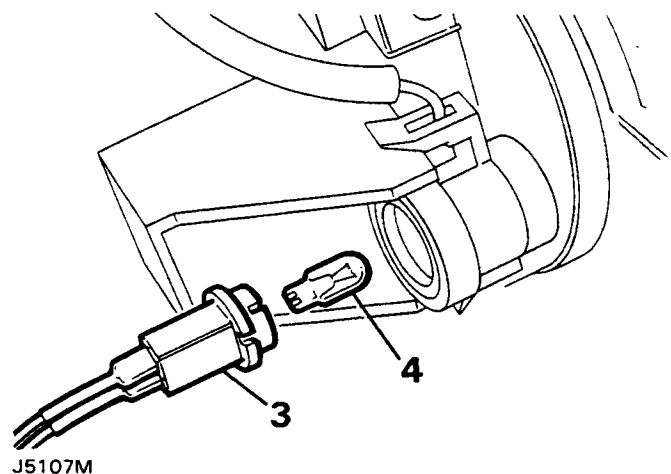
Refitting

4. Refit the bulb in reverse order to removal.

Column switch illumination bulb (Early models only)

Removal

1. Disconnect the battery negative lead.
2. Remove the steering column shroud.
3. Working behind the column switch housing turn the bulb holder through 90° and withdraw from the housing.
4. Remove the bulb by pulling it from the housing without turning.

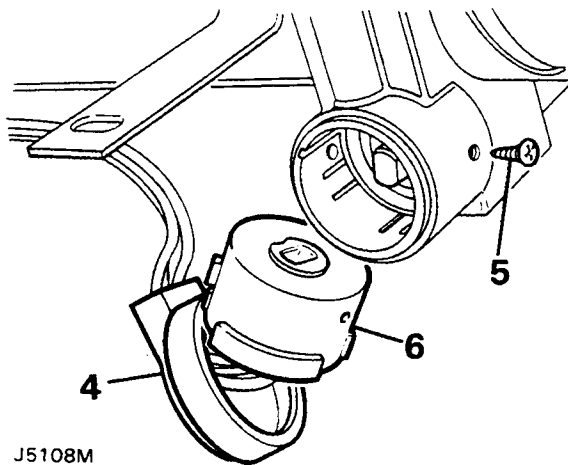


Refitting

5. Refit the column switch illumination bulb in reverse order to removal.

Ignition/start switch**Removal**

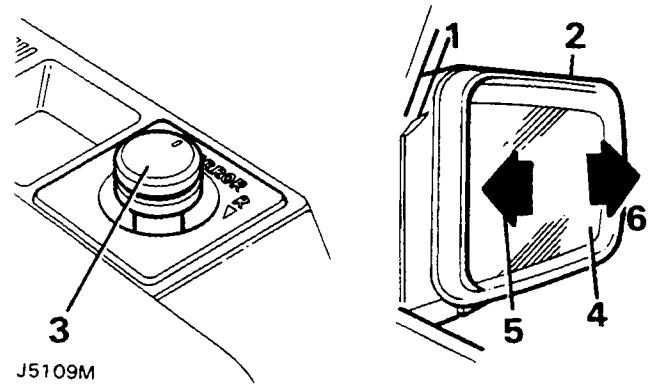
1. Disconnect the battery negative lead.
2. Remove the steering column shroud.
3. Disconnect the ignition/start switch cable at the multi-plug.
4. Remove the rubber cover protecting the switch.
5. Remove the screw securing the ignition/starter switch to the housing.
6. Withdraw the switch.

**Refitting**

7. Refit the column ignition/start switch in a reverse order to removal.

EXTERIOR DRIVING MIRRORS**General**

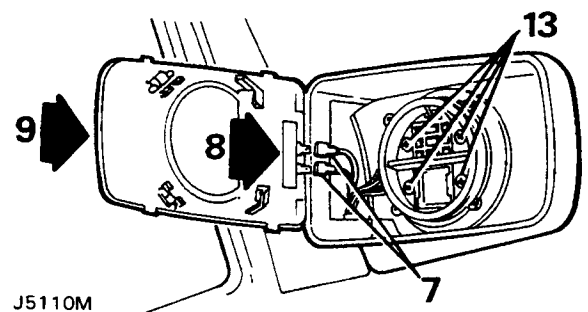
1. The mirror housing is hinged vertically and should be set in one of the two fixed angle positions provided to suit the respective left or right side mirror location.
2. Additionally, for safety and convenience, the mirror housing is designed to fold completely forward or rearward against the vehicle body.

**Adjusting**

3. Fine adjustment is controlled by an electric motor inside the mirror housing. This is operated by a control knob fitted to the auxiliary switch panel on the console adjacent to the hand brake lever. To adjust, select the left or right hand mirror by turning the knob to the appropriate location. Move the head of the control knob to the left, right, up or down as required without turning.
4. The mirror also incorporates a demist facility, activated by operation of the rear window demist switch.

Replacing the mirror glass

5. Press the inner end of the glass inwards to its full extent.
6. Insert the fingers under the outer end of the glass and pull outwards until the glass is released from its four retaining clips.
7. Disconnect the two demister leads attached to the back of the glass unit.
8. To replace the glass, locate the inner end of the glass in the housing first.
9. Carefully press the outer end of the glass inwards until it is safely held by the four retaining clips.
10. Reset the fine adjustment as required.



Electric motors

Remove and refit

Removal

11. Disconnect the battery negative lead.
12. Remove the mirror glass, as described in items 5 to 7.
13. Remove the four self-tapping screws securing the motor assembly to the mirror body.
14. Disconnect the electrical connections at the rear of the motor.
15. Withdraw the motor from the mirror housing.

Refitting

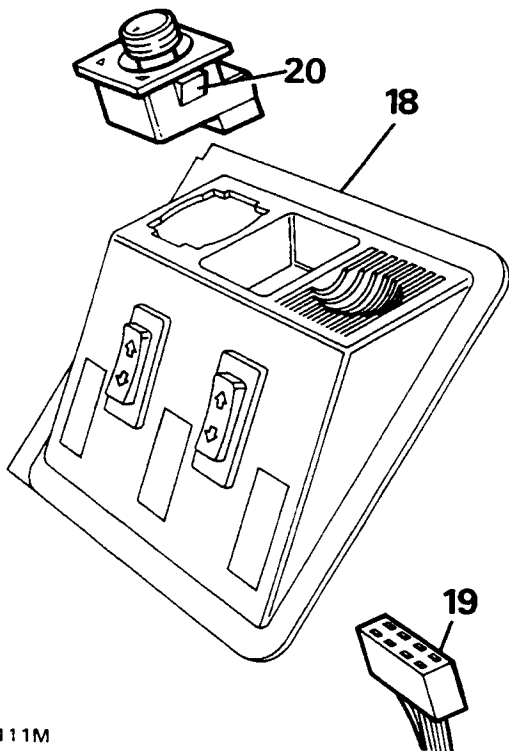
16. Refit the electric motor in reverse order to removal, ensuring that the electrical leads are correctly refitted (see the electric mirror circuit diagram).

Control knob

Remove and refit

Removal

17. Disconnect the battery negative lead.
18. Detach the auxiliary switch panel from its location at the rear of the console.
19. Disconnect the multi-plug from the rear of the mirror control knob.
20. Depress the two spring clips securing the control knob and push it through the panel.



J5111M

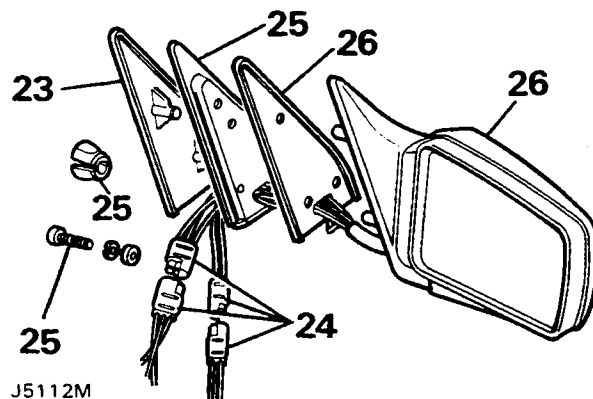
Refitting

21. To refit the control knob reverse the removal procedure.

Complete assembly

Remove and refit

22. Disconnect the battery negative lead.
23. Carefully prise off the interior finisher plate to reveal the three securing screws and electric wiring.
24. Disconnect the two electrical plugs (one two pin one three pin).
25. Supporting the mirror assembly remove the three securing screws and complete with plain and spring washers. Pull the inner mounting plate away from the inner door frame with its two retaining clips.
26. Detach the mirror assembly from the outer door frame and remove the sealing rubber.



J5112M

Refitting

27. To refit the mirror assembly reverse the removal procedure.

NOTE: To prevent damage to the electrical leads ensure that they are not pushed down inside the door casing.

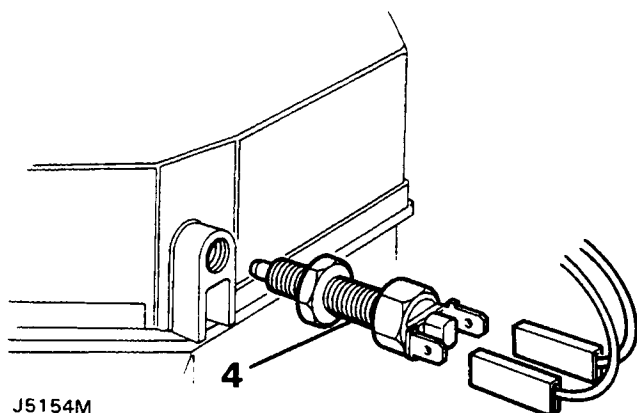
REVERSE LIGHT SWITCH

Remove and refit

The reverse light switch is located at the rear of the gear change housing and is accessible from underneath the vehicle.

Removal

1. Disconnect the battery negative lead.
2. Disconnect the electrical leads from the reverse switch.
3. Release the locknut securing the switch.
4. Unscrew the switch from the gear selector housing.



J5154M

Refitting

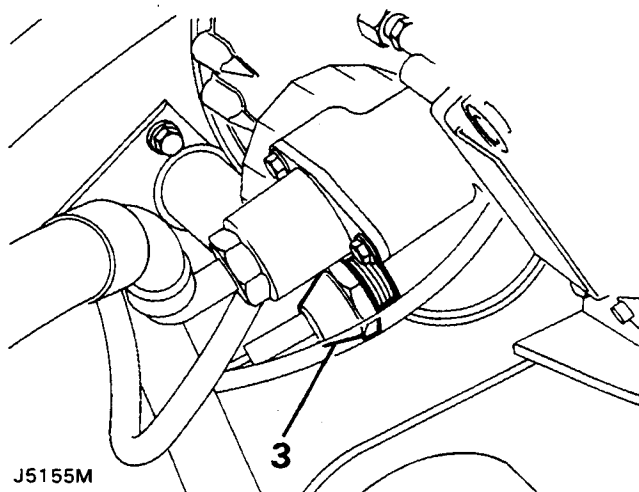
NOTE: the reverse light switch will require re-setting on reassembly.

5. Select reverse gear.
6. Loosely assemble the reverse light switch to the gearbox selector housing.
7. Connect a 12-volt supply to either of the switch terminals.
8. Connect a test lamp to the remaining terminal.
9. Screw the switch into the housing until the test lamp illuminates; then turn the switch a further half-turn.
10. Secure with the locknut ensuring that the switch is not rotated.
11. Remove the test lamp and reconnect the switch electrical leads.
12. Connect the battery negative lead.

OIL PRESSURE WARNING SWITCH

Remove and refit

The oil pressure warning switch is located in the oil filter adaptor housing.



J5155M

Removal

1. Disconnect the battery negative lead.
2. Disconnect the electrical lead from the oil pressure warning switch.
3. Unscrew and remove the switch and sealing washer.

Refitting

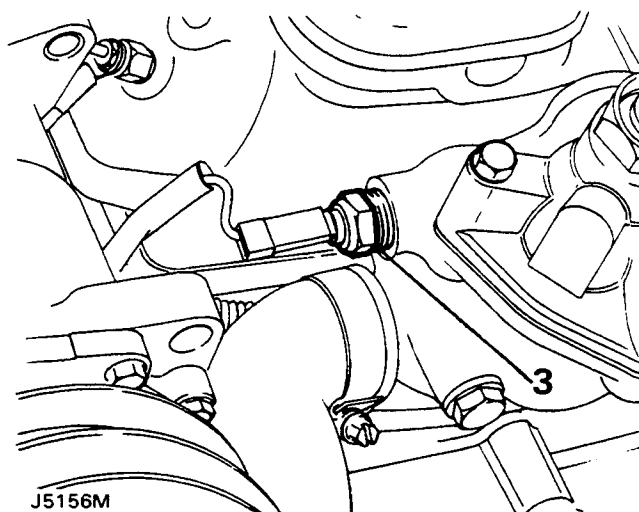
4. Refit the oil pressure warning switch in reverse order to removal using a new sealing washer.

COOLANT TEMPERATURE SENSOR

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Disconnect the electrical lead from the temperature sensor.
3. Remove the temperature sensor and joint washer.



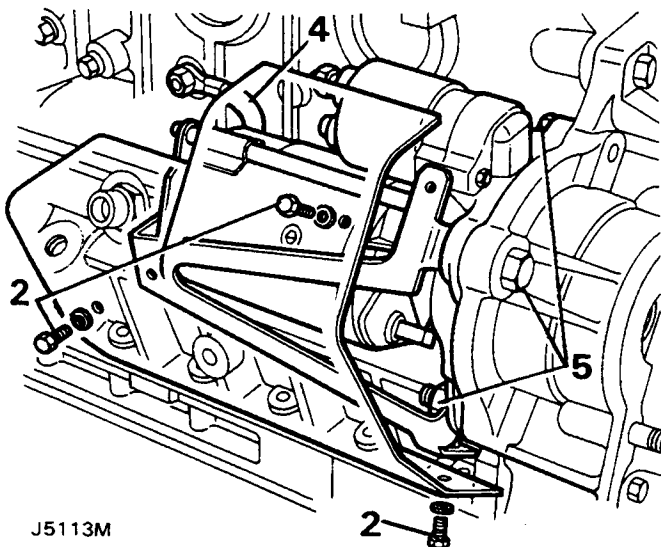
J5156M

Refitting

4. Refit the temperature sensor in reverse order to removal using a new joint washer.

STARTER MOTORS**Paris Rhone, 200Tdi diesel engine****Remove and refit****Removal**

1. Disconnect the battery negative lead.
2. Remove the securing bolts and detach the starter motor heat shield.
3. Disconnect electrical leads from the solenoid and detach the plastic tie.
4. Disconnect the earth leads from the starter motor.
5. Remove the securing nuts and bolts and detach the starter motor complete with heat shield mounting bracket.

**Refitting**

6. Refit the starter motor to the engine in reverse order to removal.

OVERHAUL**Dismantling**

1. Remove the starter motor from the engine.
2. Disconnect the field winding lead from the solenoid.
3. Remove the two securing nuts and washers and withdraw the solenoid and spring, leaving the plunger in place.
4. Remove the two outer nuts from the through studs and withdraw the terminal strap.

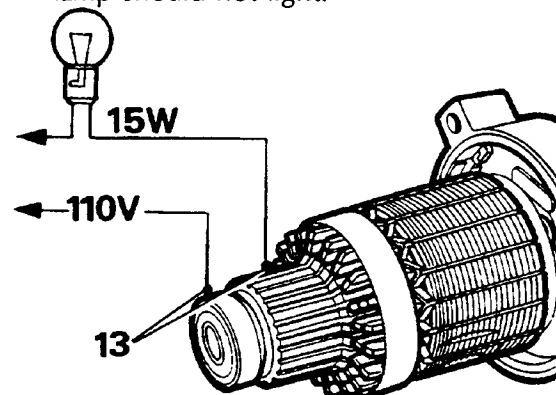
5. Remove the inner nuts from the two through studs.
6. Remove the two nuts securing the brush plate assembly to the cover and detach the cover.
7. Withdraw the yoke complete with the brush plate assembly, noting the position of the yoke location plate in the reduction gear housing.
8. Remove the socket head screw and withdraw the armature and the reduction gear housing from the drive end bracket.
9. Remove the clutch drive and pinion assembly and detach the solenoid plunger from the lever.
10. Withdraw the brushes from their boxes.

Inspection and test

11. Clean and examine all parts for condition. Check bearings, bushes and the pinion drive assembly for wear. Examine the reduction drive pinion and drive gear internal teeth. Check that the field coil and armature brushes are satisfactory for continued use.

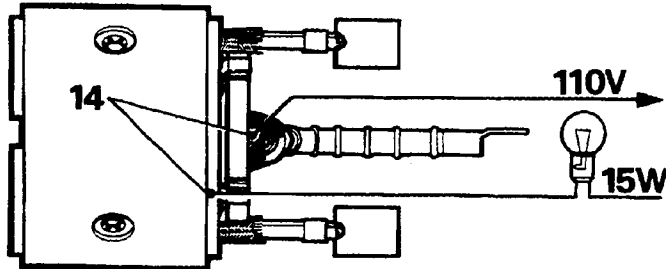
ARMATURE

12. Using very fine glass paper, clean the commutator and wipe the surface with a petrol moistened cloth. Do not undercut the insulation slots.
13. Check the armature insulation by connecting a 110V AC 15 watt test lamp between each segment in turn and the armature shaft. The lamp should not light.



FIELD COIL INSULATION

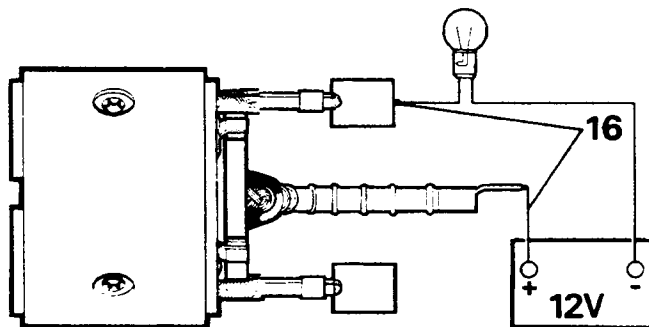
14. Connect a 110V AC 15 watt test lamp between the disconnected end of the winding and a clean unpainted part of the yoke, ensuring that the brushes or leads do not touch the yoke during the test.
15. The lamp should not light: if it does light fit a new field coil assembly.



ST1847M

FIELD COIL CONTINUITY

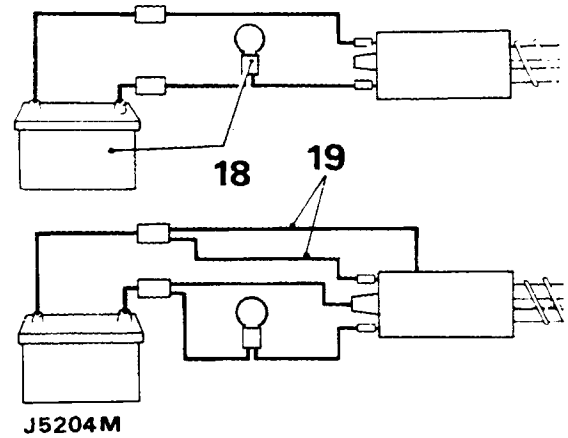
16. Connect a 12V battery operated 60 watt test lamp between each brush in turn and a link lead.
17. The lamp should light: if it does not light, fit a new field coil assembly.



J5203M

SOLENOID

18. Connect a 12V battery operated 60 watt test lamp across the solenoid main terminals. The lamp should not light: if it does light, fit a new solenoid assembly.
19. Leave the test lamp connected and, using the same 12V battery supply, energise the solenoid by connecting the 12V supply between the small solenoid operating lucar terminal blade and a good earth point on the solenoid body.

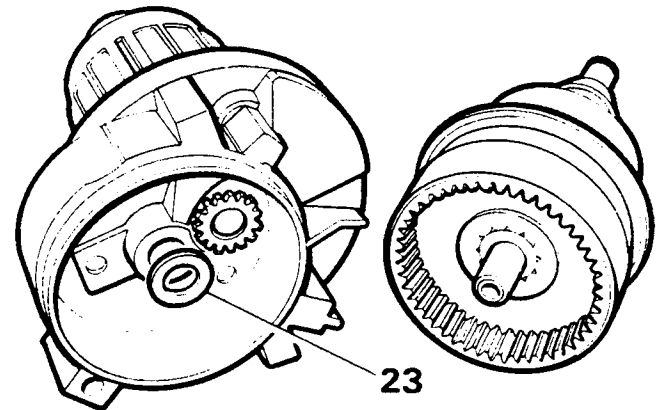


J5204M

20. The solenoid should be heard to operate and the test lamp should light with full brilliance, otherwise fit a new solenoid assembly.

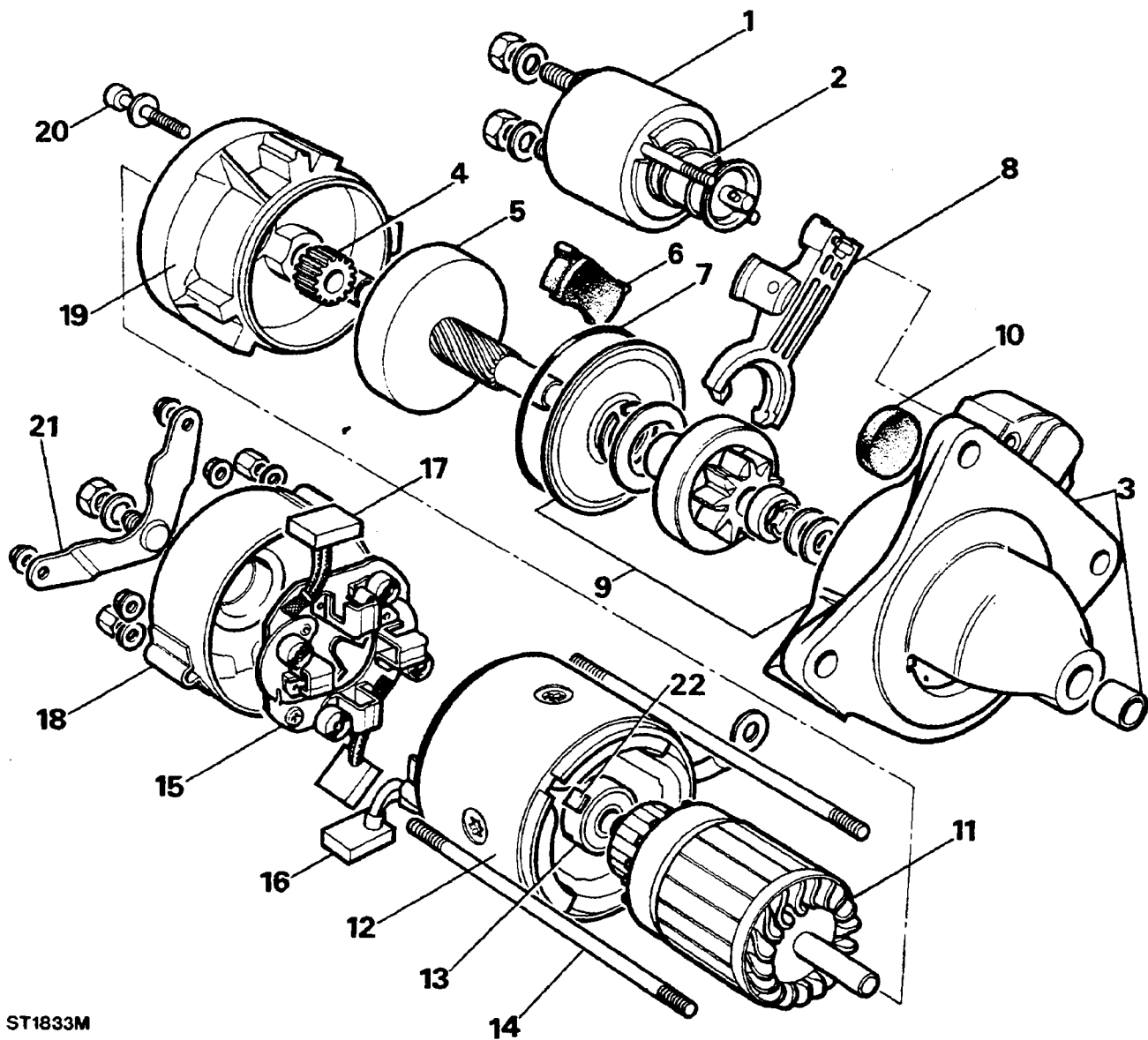
REASSEMBLY

21. If removed fit the round rubber pad to the drive end bracket.
22. Fit the lever to the clutch drive and pinion assembly, locate the solenoid plunger in the end of the lever and fit the assembly to the drive-end bracket, ensuring that the two washers are in position on the shaft.
23. Position the fibre washer on the shaft inside the reduction gear.



J5205M

24. Position the rubber pad, plain side towards the drive-end bracket, fit the 'O' ring seal and assemble the reduction gear housing to the drive-end bracket and secure with the socket head bolt.
25. Place the yoke location plate in position in the reduction gear housing, ensuring that it is fitted in the slot noted during dismantling, and fit the yoke and brush plate to the armature.



ST1833M

PARIS RHONE STARTER MOTOR

- | | |
|-------------------------------------|----------------------------|
| 1. Solenoid | 12. Yoke |
| 2. Solenoid plunger and spring | 13. Roller bearing |
| 3. Drive end bracket and bush | 14. Through-studs |
| 4. Reduction gear pinion | 15. Brush plate |
| 5. Reduction gear | 16. Field coil brushes |
| 6. Rubber pad | 17. Armature brushes |
| 7. 'O' ring seal | 18. Brush plate cover |
| 8. Lever | 19. Reduction gear housing |
| 9. Clutch drive and pinion assembly | 20. Socket headed screw |
| 10. Rubber pad | 21. Terminal strap |
| 11. Armature | 22. Yoke location key |

26. Insert the brushes into their boxes and release the retaining springs, ensuring that the brushes rest correctly on the commutator.
27. If removed refit the through studs to the drive end bracket.
28. Fit the brush plate cover and secure to the brush plate with the two nuts.
29. Secure the assembly with the through stud nuts.
30. Fit the terminal strap to the through studs and secure with the two nuts.
31. Fit the coil spring to the solenoid plunger, assemble the solenoid to the drive-end bracket and secure with the two nuts.
32. Check that the starter motor turns freely without tight spots.

TIGHTENING TORQUES

Battery connection	11 Nm
Earth connection	11 Nm
Socket head screw	$7,0 \pm 1,4$ Nm
Field winding to solenoid nut	$9,5 \pm 1,5$ Nm
Through stud nuts	$8,5 \pm 1,5$ Nm
Brush cover nuts	$4,2 \pm 0,6$ Nm
Solenoid retaining nuts	$3,1 \pm 0,4$ Nm

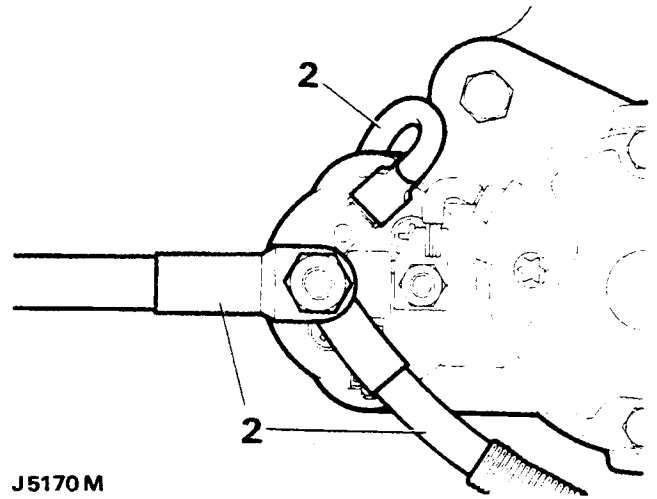
STARTER MOTOR

Lucas M78R-V8 petrol engine

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Disconnect the electrical leads from the solenoid and starter motor.
3. Remove the exhaust heat shield.
4. Remove the two securing bolts and withdraw the starter motor from the flywheel housing.



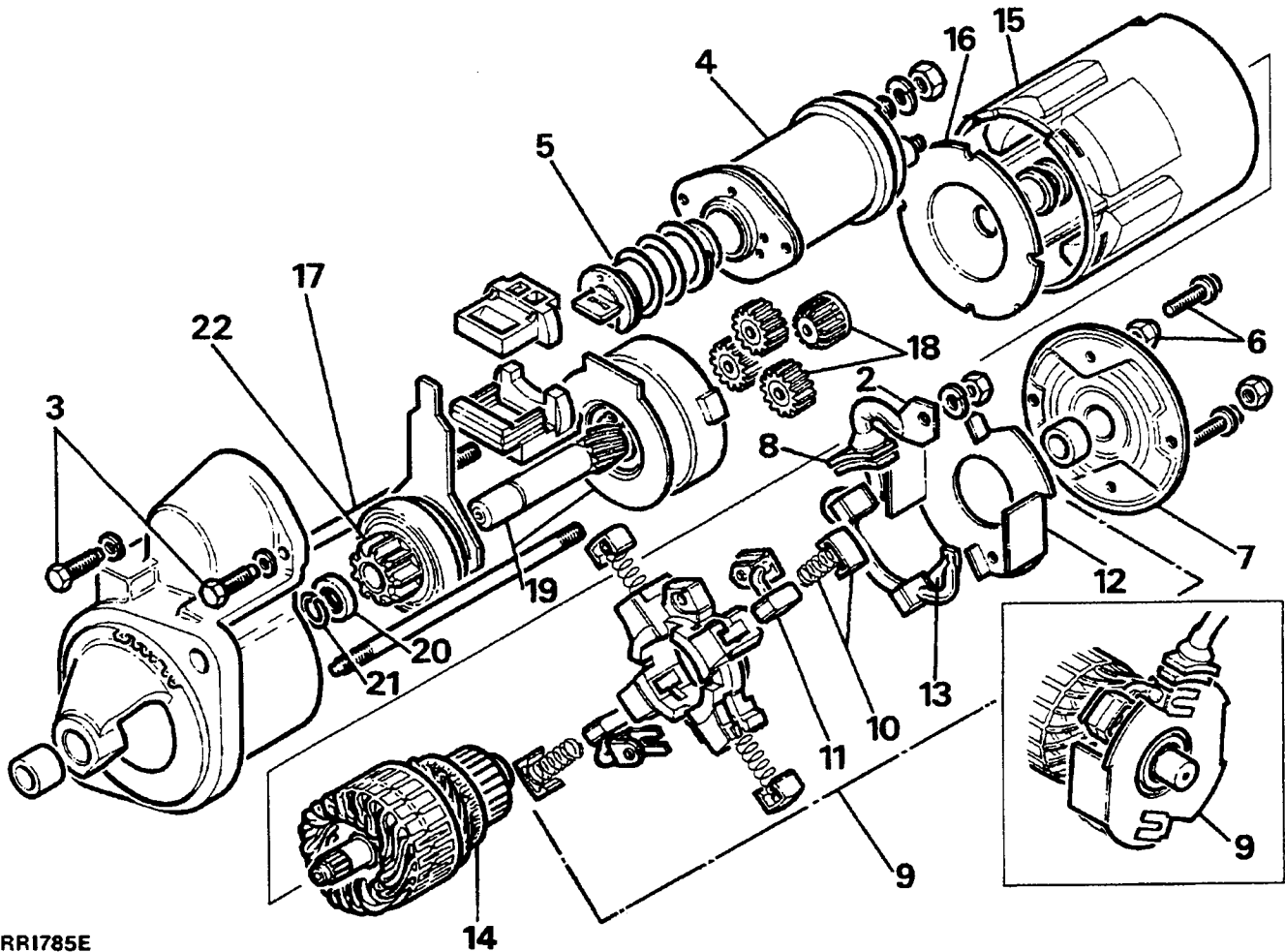
J5170 M

Refitting

5. Refit the starter motor in reverse order to removal.

Overhaul

1. Remove the starter motor from the engine.
2. Remove the braid between the starter and the solenoid terminal.
3. Remove the solenoid fixing screws.
4. Withdraw the solenoid body.
5. Lift and remove the solenoid plunger.
6. Remove the two nuts and two screws from the commutator end bracket.
7. Remove the commutator end bracket.
8. Remove the grommet from the yoke.
9. Lift the brush box assembly clear of the armature.
10. Remove the brush springs.
11. Unclip and remove the earth brushes.
12. Remove the insulating plate.
13. Withdraw the brushes and bus bar.
14. Remove the armature from the yoke.
15. Remove the yoke.
16. Remove the intermediate bracket.
17. Remove the through studs from the drive-end bracket.
18. Remove the sun and planet gears.
19. Push out the drive shaft socket assembly from the drive-end bracket.
20. Carefully tap the thrust collar from over the jump ring back towards the drive.
21. Prise the jump ring from its locating groove in the drive shaft.
22. Remove the drive assembly from the drive shaft.

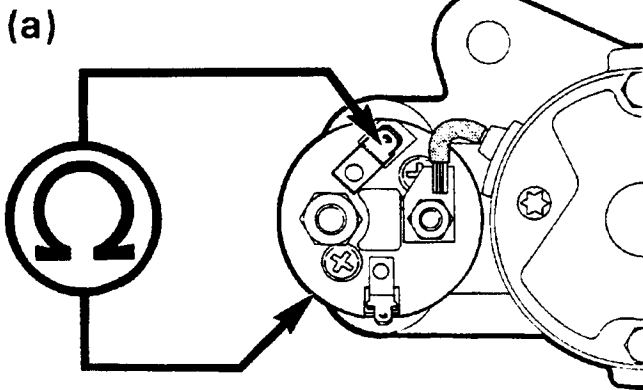


RR1785E

Inspection

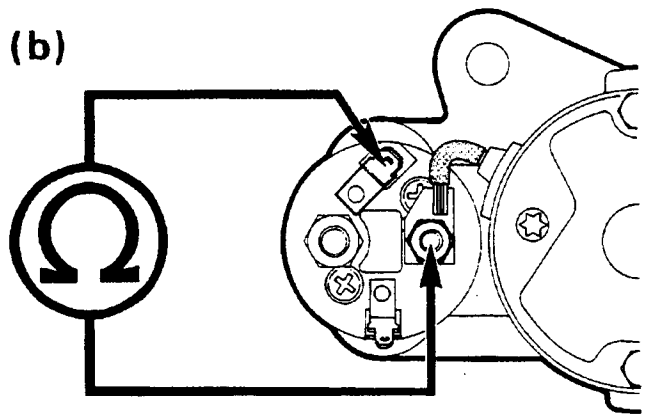
Solenoid

23. Check the continuity and resistance value of the windings by connecting an ohmmeter as shown.



RR1812E

(a) The resistance value should be 1.074 ± 0.035 ohms.



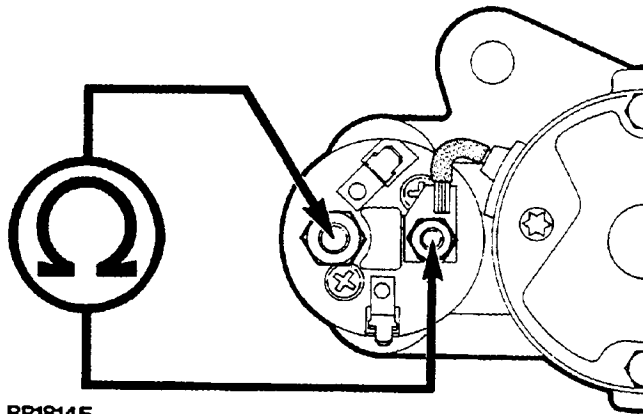
RR1813E

(b) The resistance value should be $0,298 \pm 0.015$ ohms.

If the test results are unsatisfactory replace the solenoid. If the results are correct proceed to 24.

24. Check the contacts by connecting an ohmmeter as shown.

Solenoid plunger removed, ohmmeter should read infinity.



RR1814E

Solenoid plunger operated by hand, ohmmeter should read zero.

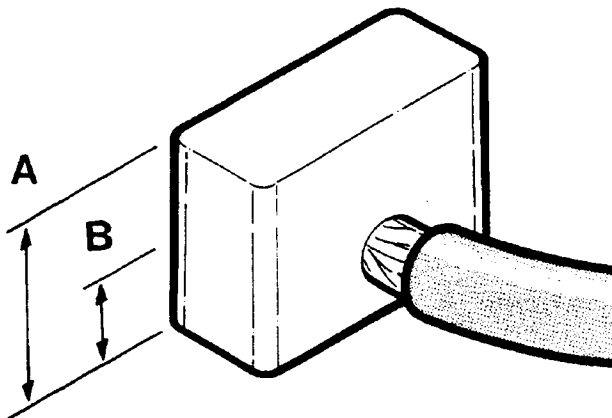
If the test results are unsatisfactory, replace the solenoid.

If the results are correct proceed to 25.

25. Check the operation of the spring for freedom of movement.

Brush gear

26. Check the brush springs and ensure that the brushes move freely in their holders.



RR1815E

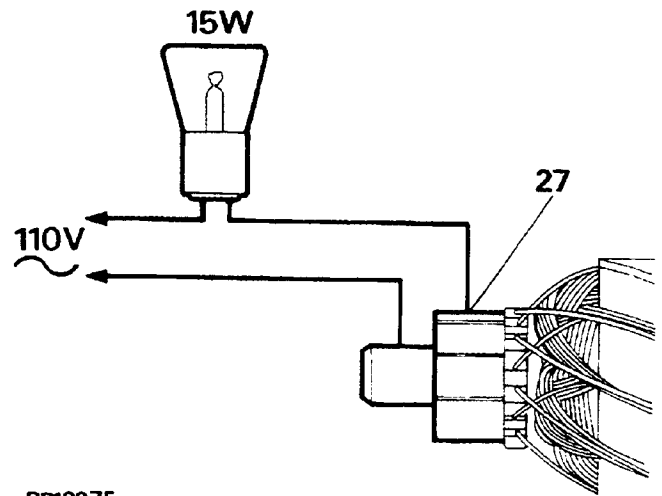
Clean the brushes with a petrol moistened cloth.

Brush length new, Dimension A 9mm (0.354 in).

Minimum brush length, Dimension B 3,5mm (0.138 in).

Armature

27. Check the armature insulation using suitable test equipment. Connect the tester between any one commutator segment and the shaft. The method illustrated uses a 110V 15 watt test lamp. If the lamp illuminates the armature is faulty, and a replacement component must be fitted.



RR1927E

28. If necessary, the commutator may be machined, providing a finished surface can be obtained without reducing the diameter below 28,8mm (1.13 in), otherwise a new commutator must be fitted. Finish the surface with fine glass paper. Do not undercut the insulation slots.

Drive assembly

29. Test the roller clutch. the pinion should rotate in one direction only, independent of the clutch body. Replace the unit if unsatisfactory or if teeth are damaged or worn.

Bearings

30. Renew the bearing bushes if there is evidence of the armature fouling the magnets or if there is perceptible side play between the shaft and bush.
31. Drive end/intermediate end bracket: press out the bush using a suitable press and mandrel.
32. Press the new bush in, ensuring that on the drive end bracket, the bush is flush with the casting.

NOTE: Soak new bushes in engine oil for thirty minutes before fitting.

33. Commutator end bracket: thread a suitable tap firmly into the bush. Extract the bush with the tap using a power press in reverse.

Reassembly

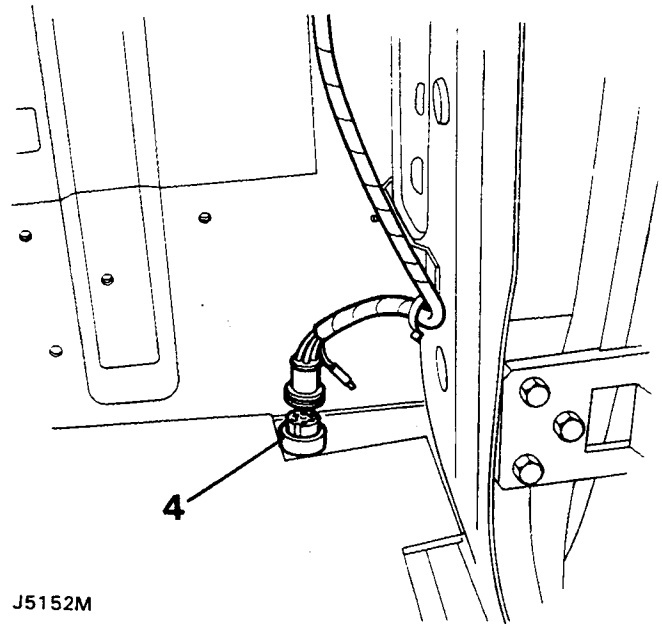
34. To reassemble the starter motor reverse instructions 1 to 22. Smear the teeth and operating collar of the roller clutch with Shell Retinax 'A' grease. Smear the pivot lever of the drive assembly with Mobil 22 grease. Smear the drive shaft, sun and planet gears with Rocol BRB1200 grease.
35. Tighten all fixings to the correct torque, see Torque Wrench settings.

TRAILER SOCKET

Remove and refit

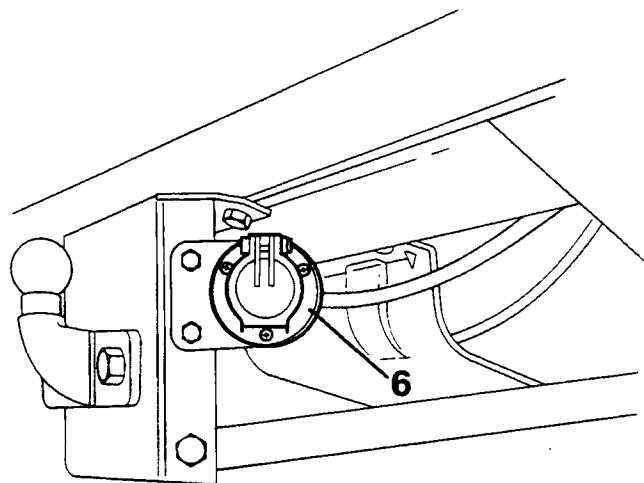
Removal

1. If fitted remove the RH side facing seat.
2. Remove the rear lower side trim panel.
3. Raise the carpet adjacent to the RH rear quarter panel.
4. Disconnect the trailer socket lead multi-plug from the RH body harness.



J5152M

5. Displace the rubber grommet in the floor and pass the socket lead through to the underside of the vehicle.
6. Remove the securing screws and withdraw the trailer socket from the towing hook mounting bracket.



J5153M

Refitting

7. Refit the trailer socket in reverse order to removal.

TANK SENDER UNIT (Diesel engines)**Remove and Refit**

WARNING: Ensure that the **WARNINGS** and **FUEL HANDLING PRECAUTIONS** given in Section 01 are adhered to before carrying out the following operations.

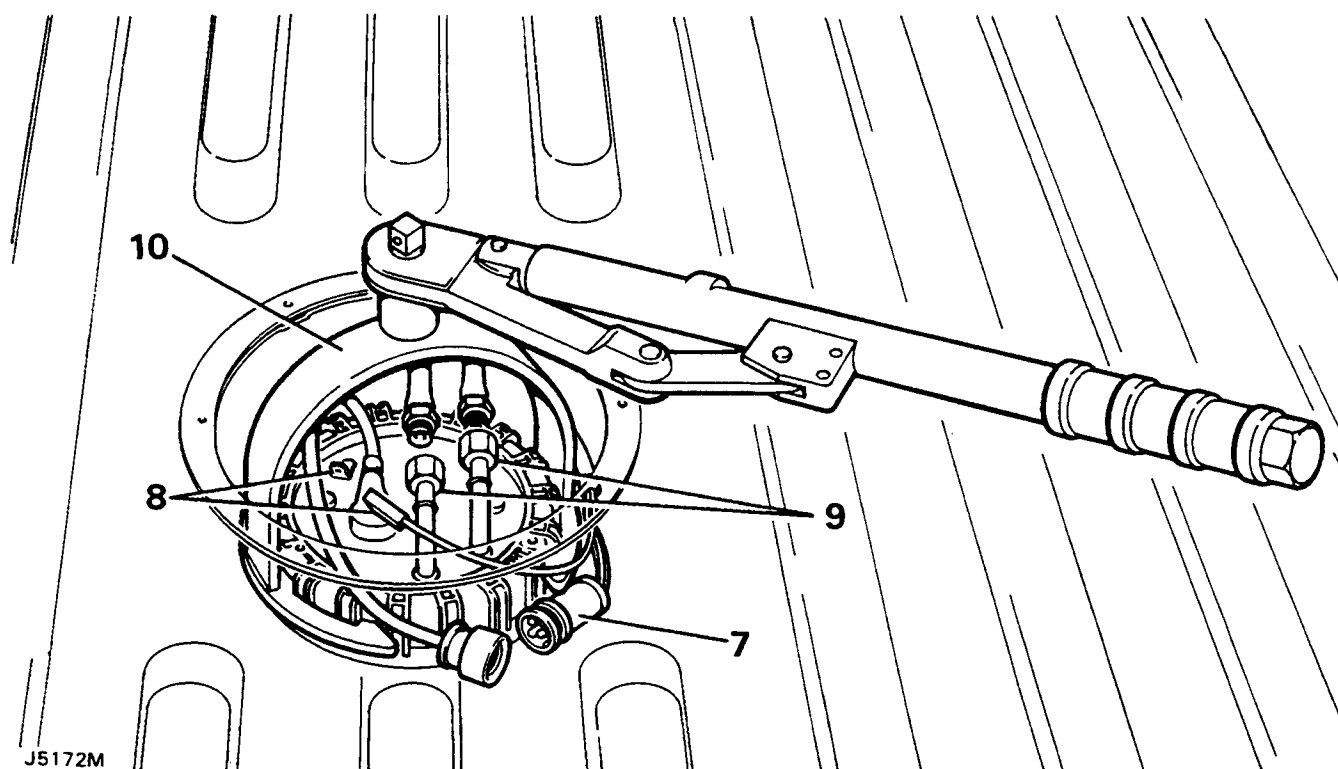
Special tool**LST131****Removal**

1. Disconnect the battery negative lead.
2. Remove the rear carpet retainer.
3. Ease the carpet from under the lower trim panels at the rear of the fold down seats.
4. Raise the carpet to expose the sound insulation.
5. Fold back the sound insulation to reveal the access panel.
6. Remove the securing screws and detach the access panel from the floor.
7. Disconnect the electrical connections at the multi-plug.

8. Remove the insulation sealant from the earth lead and disconnect the lead from the sender unit.
9. Disconnect the fuel pipes from the sender unit.
10. Using special tool LST131 remove the locking ring and withdraw the sender unit from the fuel tank.

Refitting

11. Fit the sender unit to the fuel tank and secure with the locking ring, tightened to a torque of 45 to 50 Nm (33.2 to 36.9 lbf ft).
12. Connect the fuel pipes to the sender unit.
13. Connect the electrical leads at the multi-plug.
14. Connect the earth lead to the sender unit and insulate with suitable sealant.
15. Inspect the access panel seal to ensure that it is satisfactory for further use, renew as necessary.
16. Fit the access panel to the aperture in the floor and secure with the screws.
17. Reverse operations 1 to 5 to refit the sound insulation and carpet.



J5172M

MAIN HARNESS**Remove and refit****Removal**

NOTE: Main harness removal should be commenced from the passenger side of the vehicle irrespective of the driving hand of the vehicle.

1. Disconnect the battery negative lead.
2. Remove the heater.
3. Remove the radio harness extension at the multi-plug.
4. Remove the side trim panels from the passenger and drivers footwells.
5. Remove the fascia ventilation connectors and tubes from the drivers side only.
6. Remove the courtesy light switch from the 'A' post at the passenger side, disconnect the lead and feed it through the 'A' post into the interior of the vehicle, at the same time displacing the rubber grommet.
7. Disconnect the LH or RH body harness, whichever is applicable, from the passenger side, at the main harness multi-plug.
8. Disconnect the multi-plugs to the passenger door harness.
9. Remove the passenger side repeater lens, remove the bulb, displace the grommet and feed the leads, complete with bulb holder, through the panels into the interior of the vehicle.
10. Remove the relays from the passenger footwell, noting their locations to assist when refitting.

NOTE: The number of relays will vary dependant upon the vehicle model.

11. Remove the relay block connectors from the bracket, noting the colour locations.
12. Fold back the carpet in the passenger footwell, bend down the retaining tags and open the flaps in the sound insulation, to gain access to the six bulkhead mounted sockets.
13. Working from the engine compartment, disconnect the multi-plugs from the bulkhead sockets, noting the locations, remove the securing screws and push the sockets through the bulkhead into the interior of the vehicle.
14. Disconnect the centre console harness from the main harness at the multi-plugs.

15. Release the harness from the bulkhead clips and from the two 'P' clips, then manoeuvre the harness from its location in the passenger side and allow to rest in the footwell.
16. Disconnect the courtesy light lead at the drivers side following the instructions for the passenger side.
17. Disconnect the LH or RH body harness, whichever is applicable, from the drivers side, at the main harness multi-plug.
18. Disconnect the multi-plugs to the drivers door harness.
19. Disconnect the drivers side repeater light following the procedure for the passenger side.
20. Remove the relays from the drivers footwell noting their locations.

NOTE: The number of relays will vary dependant upon the vehicle model.

21. Remove the relay block connectors from the mounting bracket, noting their locations to assist when refitting.
22. Pull the relay leads from the sound insulation at the rear of the footwell.
23. Disconnect the multi-plug from the dim/dip unit.
24. Disconnect the brake pedal switch.
25. Remove the relays from the block connectors on the steering column support bracket; then remove the block connectors, noting their locations for refitment.
26. Detach the fuse panel from the steering column support bracket.

NOTE: The fuse panel is an integral part of the main harness assembly and cannot be replaced as a separate unit.

27. Disconnect the ignition/start switch leads at the multi-plug.
28. Disconnect the wiper motor leads at the multi-plug.
29. Detach the leads from the terminal post at the rear of the RH fascia support bracket.
30. Detach the negative leads from the steering column support bracket.
31. Cut and remove the tie straps securing the ignition/start and column switch leads to the steering column.
32. Disconnect the multi-plugs from the column switches and the leads from the switch illumination bulb.

33. Disconnect the handbrake and drivers seatbelt leads at the rear of the centre console tunnel.
34. Release the harness from the clip on the bulkhead and carefully withdraw the harness over the steering column and relay mounting bracket.

Refitting

35. Feed the harness into position from the drivers side, above the steering column and relay mounting bracket and position the connectors in their approximate locations.
36. Connect the handbrake and drivers seat belt leads to their respective connections at the rear of the centre console tunnel.
37. Connect the multi-plugs to the steering column switches, two to the LH switch and one to the RH switch and connect the illumination leads to the bulbholder.
38. Locate the ignition/start and the switch illumination leads together and secure to the steering column with tie straps.
39. Secure the negative leads to the steering column support bracket with the nut and bolt.
40. Locate the brown eyeleted leads with the terminal post at the rear of the RH fascia support bracket and secure with the nut and spring washer.
41. Connect the wiper motor and ignition/start switch leads at the multi-plugs.
42. Position the fuse panel and secure with the two screws.
43. Fit the four relay block connectors and the relays to the bracket on the steering column support bracket, to the locations noted during removal.
44. Connect the footbrake pedal switch leads.
45. Connect the leads to the dim/dip unit.
46. Connect the block connectors and relays to the mounting bracket in the drivers footwell, in the locations noted during removal, and feed the leads behind the sound insulation at the rear of the footwell.
47. Feed the drivers side repeater lamp lead and bulbholder through the panels, fit the bulb and lens and locate the grommet to the inner panel.
48. Connect the multi-plugs to the drivers door harness.
49. Connect the body harness at the drivers side. If RH drive, two multi-plugs, if LH drive one multi-plug.
50. Feed the drivers courtesy light switch lead through the 'A' post, connect to the switch and fit the grommet to the 'A' post.
51. Fully position the harness to the passenger side and fit the two 'P' clips at the rear of the heater location.
52. Connect the centre console harness to the main harness at the multi-plugs.
53. Fit the six bulkhead sockets, to the locations noted during removal, from the engine compartment secure with the flange screws and connect the plugs to their respective sockets.
54. Close the flaps in the sound insulation and reposition the carpet in the footwell.
55. Fit the block connectors and relays to the mounting bracket in the side of the passenger footwell, in the locations noted during removal.
56. Fit the passenger side repeater lamp.
57. Connect the passenger door harness multi-plugs to the main harness.
58. Connect the body harness to the main harness. If LH drive, two multi-plugs, if RH drive one multi-plug.
59. Connect the courtesy light lead to the switch in the 'A' post at the passenger side.
60. Locate the harness into the bulkhead clips ensuring that the harness is secure.
61. Refit the fascia vents at the drivers side.
62. Refit the trim panels in both footwells.
63. Connect the radio/cassette player extension harness at the multi-plug.
64. Refit the heater.

RH BODY HARNESS

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the fascia assembly (Section 76).
3. Remove the side trim panel from the footwell.
4. Remove the headlining (Section 76).
5. Remove the 'A' post upper trim panel.
6. Disconnect the multi-plugs from the main harness at the fascia.
7. Remove the securing screws and detach the RH fascia vent from the fascia support panel.
8. Displace the harness grommet from the fascia support panel.
9. Remove the tape securing the harness to the 'A' post.

10. Withdraw the harness from the fascia support panel.
11. Remove the rear speaker and disconnect the leads.
12. Detach the earth leads from the screw on the 'E' post.
13. Remove the rear door pillar switch and detach the lead.
14. Displace the grommet and withdraw the pillar switch lead from the 'E' post.
15. Displace the harness grommet from the 'E' post, pull the harness multi-plugs from the within the 'E' post and detach the body harness from the rear door harness.
16. Disconnect the rear lamp multi-plug and if fitted the trailer harness multi-plug.
17. Release the harness from the roof panel and 'E' post clips and withdraw it from the vehicle.

Refitting

18. Place the harness in position and locate with the clips on the roof panel and 'E' post.
19. Connect the rear lamp multi-plug and if fitted the trailer harness multi-plug.
20. Connect the rear door harness multi-plugs, feed the multi-plugs into the 'E' post and fit the grommet.
21. Feed the door pillar switch lead through the 'E' post and connect to the switch. Fit the switch and the grommet to the 'E' post.
22. Connect the earth leads to the screw on the 'E' post.
23. Refit the speaker to the 'E' post.
24. Feed the front end of the harness through the fascia support bracket, connect the harness multi-plugs and locate the harness grommet in the support bracket.
25. Secure the harness to the 'A' post with adhesive tape.
26. Refit the fascia vent and secure with the screws.
27. Refit the headlining.
28. Refit the side trim panel in the footwell.
29. Refit the fascia assembly.
30. Reconnect the battery negative lead.

LH BODY HARNESS

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the fascia assembly (Section 76).

3. Remove the side trim panel from the footwell.
4. Remove the headlining (Section 76).
5. Remove the 'A' post upper trim panel.
6. Disconnect the multi-plug from the main harness at the fascia.
7. Remove the securing screws and detach the LH fascia vent from the fascia support panel.
8. Disconnect the rear washer tube at the non-return valve in the engine compartment, pull the tube through the bulkhead and withdraw it from the harness grommet in the fascia support panel.
9. Displace the harness grommet from the fascia support panel.
10. Remove the tape securing the harness to the 'A' post.
11. Withdraw the harness from the fascia support panel.
12. Remove the rear speaker and disconnect the leads.
13. Detach the earth leads from the screw on the 'E' post.
14. Disconnect the rear lamp multi-plug.
15. Raise the carpet and sound insulation adjacent to the 'E' post.
16. From the underside of the vehicle release the harness from the clips, disconnect the sender unit multi-plug and where applicable the in tank fuel pump multi-plug.
17. Displace the floor grommet and feed the and multi-plugs into the interior of the vehicle.
18. Remove the tape securing the interior light leads to the roof panel, release the harness from the roof panel and 'E' post clips and withdraw it from the vehicle.

Refitting

19. Place the harness in position and locate with the clips on the roof panel and 'E' post.
20. Tape the interior light leads to their locations on the roof panel.
21. Feed the fuel tank sender unit multi-plug and if fitted the in tank fuel pump multi-plug and leads through the floor aperture. Connect the multi-plugs, secure the leads with the clips and refit the grommet to the aperture.
22. Connect the rear lamp multi-plug.
23. Connect the earth leads to the screw on the 'E' post.
24. Refit the speaker to the 'E' post.
25. Reposition the sound insulation and carpet.

26. Feed the front end of the harness through the fascia support bracket, connect the harness multi-plug and locate the harness grommet in the support bracket.
27. Feed the rear washer tube through the grommet and bulkhead and reconnect to the non-return valve.
28. Secure the harness to the 'A' post with adhesive tape.
29. Refit the fascia vent and secure with the screws.
30. Refit the headlining.
31. Refit the side trim panels in the footwells.
32. Refit the fascia assembly.
33. Reconnect the battery negative lead.

RH HARNESS (Engine compartment)

Remove and refit

Removal

1. Disconnect and remove the battery.
2. Remove both headlamp surrounds and the radiator grille.
3. Disconnect the harness leads from the RH horn and feed the leads into the rear of the headlamp housing.
4. Disconnect the headlamp and sidelight multi-plugs.
5. Displace the grommet and feed the indicator lamp lead and multi-plug into the rear of the headlamp housing.
6. Displace the grommet at the rear of the headlamp and feed the harness into the engine compartment.
7. Disconnect the coolant level indicator leads from the expansion tank.
8. Remove the nut and bolt from the inner wing valance and remove the right hand harness earth lead.
9. Open the seven retaining clips and release the harness.
10. Disconnect the multi-plug at the bulkhead and withdraw the harness.

Refitting

11. Refit the RH engine compartment harness in reverse order to removal.

LH HARNESS (Engine compartment)

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove both headlamp surrounds and the radiator grille.
3. Disconnect the harness leads from the LH horn and feed the leads into the rear of the headlamp housing.
4. Disconnect the headlamp and sidelight multi-plugs.
5. Displace the grommet and feed the indicator lamp lead and multi-plug into the rear of the headlamp housing.
6. Displace the grommet at the rear of the headlamp and feed the harness into the engine compartment.
7. Remove the nut and bolt from the inner wing valance and remove the left hand harness earth lead.
8. Open the three clips and release the harness.
9. Disconnect the multi-plug at the bulkhead and withdraw the harness.

Refitting

10. Refit the LH engine compartment harness in reverse order to removal.

ENGINE HARNESS (DIESEL)

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the heat shield from the starter motor.
3. Remove the plastic tie from the starter solenoid and disconnect the leads at the lucar connectors.
4. Disconnect the engine harness at the bulkhead connection.
5. Remove the plastic ties securing the engine harness to the lighting harness.
6. Release the harness from the bulkhead clips.
7. Disconnect the brake fluid level multi-plug at the reservoir filler cap.

8. Displace the rubber boot at the bulkhead terminal post and disconnect the leads from the post.
9. Release the harness from the securing clips on the engine.
10. Disconnect the lead from the solenoid on the fuel injection pump.
11. Disconnect the leads from the oil pressure warning switch and the coolant temperature sensor.
12. Remove the heat shield from the alternator.
13. Disconnect the leads from the alternator noting their locations for refitment.
14. Remove the harness from the vehicle.

Refitting

15. Place the harness assembly in its approximate position in the engine compartment.
16. Connect the alternator leads to the locations noted during removal and refit the alternator heat shield.
17. Connect the leads to the cooling sensor and to the oil pressure warning switch.
18. Connect the lead to the fuel injection pump solenoid.
19. Secure the eyelets to the terminal post and fit the rubber boot.
20. Connect the brake fluid level multi-plug.
21. Secure the harness run to the engine and bulkhead mounted clips.
22. Connect the harness multi-plug to the socket on the bulkhead.
23. Connect the leads to the starter and secure to the starter solenoid with a plastic tie.
24. Refit the starter motor heat shield.
25. Check the harness run for security and secure as necessary with plastic ties.
26. Reconnect the battery negative lead.

ENGINE HARNESS (V8 Engine)

Remove and refit

Removal

1. Disconnect the battery negative lead.
2. Remove the air cleaner.
3. Disconnect the harness at the bulkhead.
4. Release the harness from the bulkhead securing clips.
5. Disconnect the brake fluid level multi-plug.

6. Release the harness from the engine mounted securing clips.
7. Disconnect the leads from the oil pressure warning switch.
8. Disconnect the leads from the coolant temperature sensor.
9. Remove the plastic ties securing the harness to the alternator mounting bracket.
10. Disconnect the harness leads from the alternator.
11. Raise the vehicle on a hydraulic ramp.
12. Remove the plastic tie from the starter solenoid and disconnect the harness leads.
13. Remove the harness from the vehicle.

Refitting

14. Place the harness assembly in its approximate position in the engine compartment.
15. Raise the vehicle on a hydraulic ramp.
16. Connect the harness leads to the starter motor and secure to the solenoid with a plastic tie.
17. Lower the ramp.
18. Connect the leads to the alternator and secure to the alternator mounting bracket with plastic ties.
19. Connect the oil coolant temperature sensor and the oil pressure warning switch leads.
20. Connect the brake low fluid warning multi-plug.
21. Secure the harness run to the engine and bulkhead mounted clips.
22. Connect the harness multi-plug to the bulkhead socket.
23. Fit the air cleaner.
24. Reconnect the battery negative lead.

AIR CONDITIONING HARNESS

Remove and refit

Removal

1. Disconnect and remove the battery from the vehicle.
2. Remove the radiator grille.
3. Disconnect the harness multi-plug from the bulkhead socket.
4. Remove the plastic ties securing the harness to the lighting harness.
5. Disconnect the receiver dryer and compressor multi-plugs.

6. Remove the plastic ties from the compressor leads.
7. Disconnect the leads from the switch on the thermostat housing.
8. Disconnect the air conditioning earth lead from the inner wing.
9. Release the harness from the clips adjacent to the battery tray.
10. Remove the plastic ties and disconnect the multi-plugs in front of the radiator.
11. Withdraw the harness from the vehicle.

Refitting

12. Place the harness assembly in its approximate position in the engine compartment.
13. Connect the two multi-plugs and secure the harness with plastic ties to its location in front of the radiator.
14. Connect the earth lead to the bolt on the inner wing.
15. Connect the leads to the switch on the thermostat.
16. Connect the compressor and receiver dryer multi-plugs and secure the compressor leads with a plastic tie.
17. Connect the harness multi-plug to the socket on the bulkhead.
18. Secure the harness to the lighting harness with plastic ties.
19. Refit the radiator grille.
20. Refit and connect the vehicle battery.

GEARBOX HARNESS













































Remove and refit

Removal

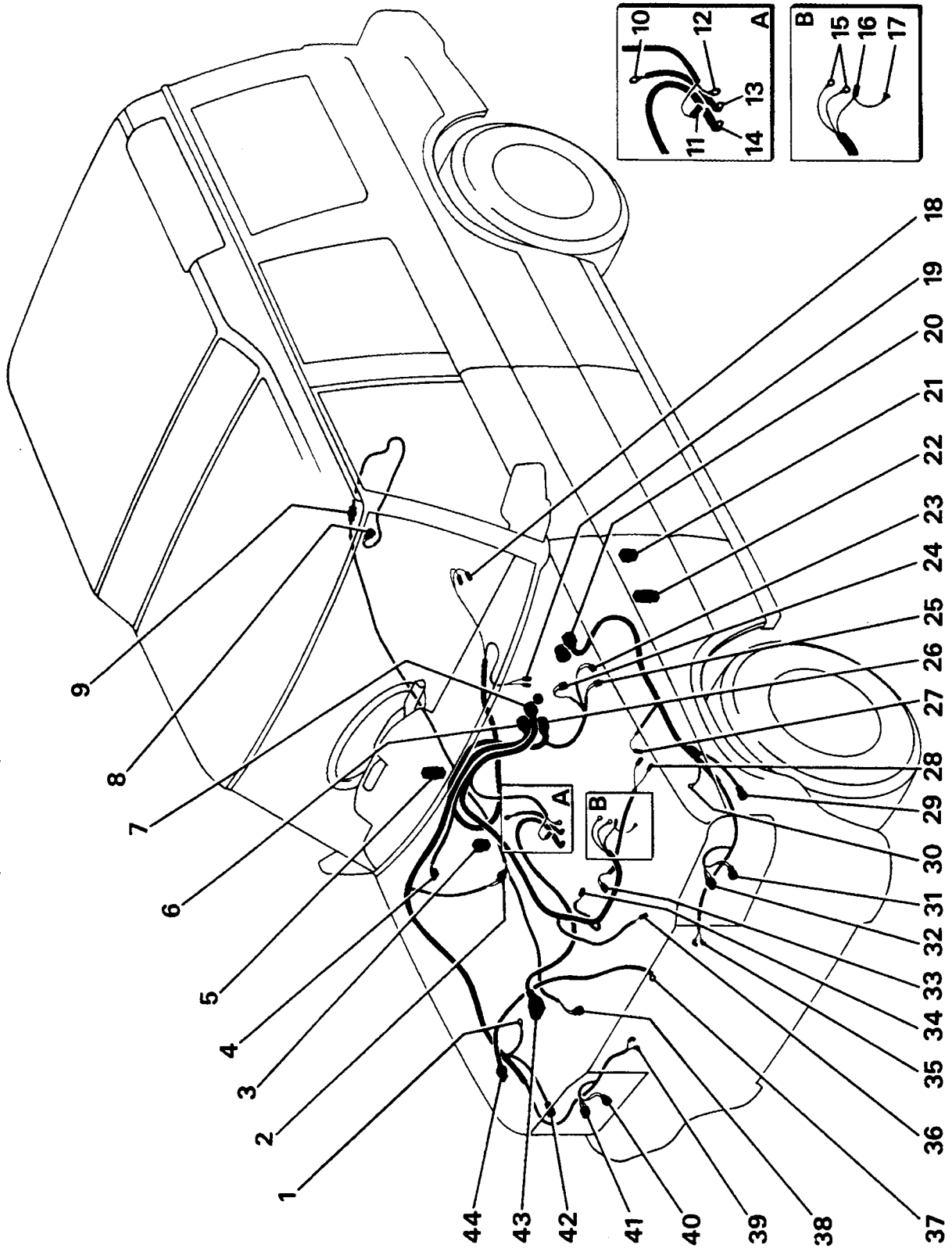
1. Disconnect the battery negative lead.
2. Disconnect the multi-plugs from the washer pumps at the rear of the washer bottle.
3. Disconnect the harness at the bulkhead socket.
4. Raise the vehicle on a hydraulic hoist.
5. Disconnect the differential lock switch and the reverse switch leads from the gearbox and release the leads from the clips securing it to the breather pipes.
6. Remove the harness from the vehicle.

Refitting






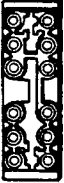
7. Refit the harness in reverse order of removal.


















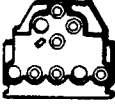


1. Earth lead RH inner wing valance. 
2. Brake pad wear harness/RH wing harness connector. 
3. Headlamp load relay RH drive vehicles. 
4. Low brake fluid lead connection. 
5. Flasher unit. 
6. RH wing harness bulkhead connection (Green). 
7. Engine harness bulkhead connector (Grey). 
8. Rear brake pad wear harness to caliper connector. 
9. Rear brake pad wear harness connector. 
10. Starter solenoid lead terminal post connection. 
11. Engine harness/starter solenoid connection.  J5174M
12. Engine harness/starter solenoid connection. 
13. Starter solenoid/terminal post lead, solenoid connection. 
14. Battery/starter solenoid lead, solenoid connection. 
15. Engine harness alternator connections. 
16. Engine harness alternator connections. 
17. Alternator connection. 
18. Reverse switch lead connections. 
19. Differential lock switch lead connections. 
20. LH wing harness bulkhead connection (Red). 
21. Starter relay RH drive vehicles. 
22. Headlamp power wash relay RH drive vehicles. 
23. Windscreen wash pump connection. 
24. Headlamp power wash pump connection. 
25. Rear door glass wash pump connection. 
26. Gearbox harness bulkhead connection (Brown). 
27. LH wing harness coil connection. 
28. Coil distributor lead connections. 
29. LH indicator lamp connection. 
30. Earth lead LH inner wing valance. 
31. LH sidelamp connection. 
32. LH headlamp connection. 
33. Distributor coil lead connections. 
34. Coolant temperature sensor connections. 
35. LH horn connections. 
36. Oil pressure warning switch connections. 
37. Battery negative lead earth connection. 
38. Front brake pad wear caliper connection. 
39. RH horn connections. 
40. RH sidelamp connection. 
41. RH headlamp connection. 
42. RH indicator lamp connection. 
43. Battery positive lead connection. 
44. Battery negative lead connection. 






HARNESS ILLUSTRATION No.1 V8 ENGINE, GEARBOX, LEFT AND RIGHT HAND LIGHTING HARNESS



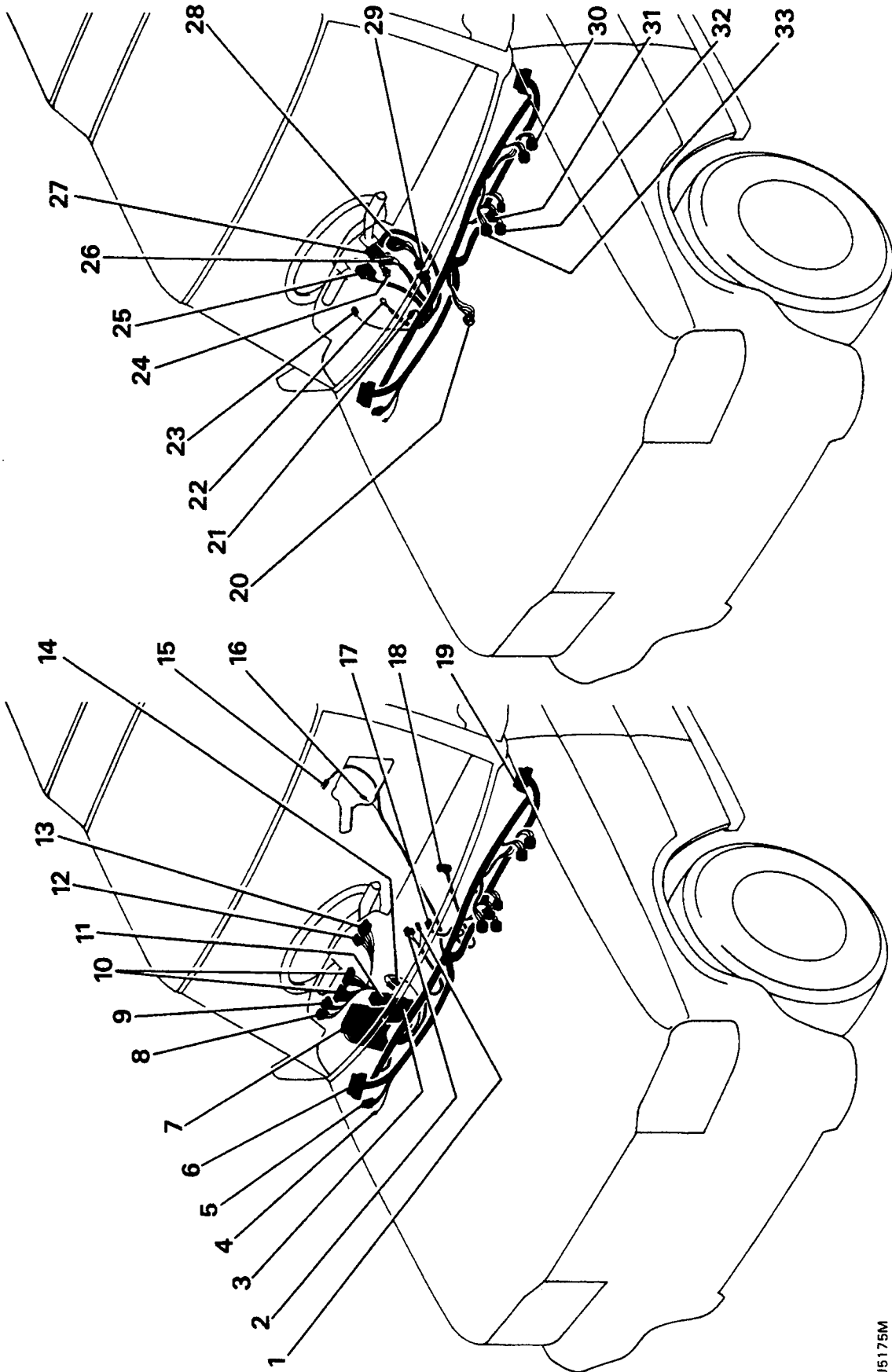
J5173M

1. Cigar lighter illumination. 
2. Cigar lighter connection. 
3. Dim/dip switch connection. 
4. RH body harness connector. 
5. RH body harness connector (Blue). 
6. RH body harness connector (Blue). 
7. Fuse box.








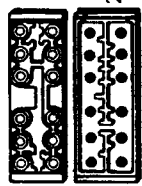









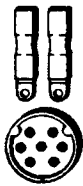





















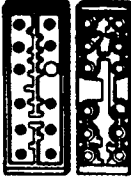







Not illustrated
8. Rear wipe switch connector (instrument binnacle (Blue)). 
9. Rear wash switch connector (instrument binnacle (White)). 
10. Instrument pack connectors. 
11. Voltage switch connection.  J5176M
12. Rear fog guard switch connector (instrument binnacle (Red)). 
13. Heated rear window switch connection (instrument binnacle (Grey)). 
14. Stop switch connectors. 
15. Drivers seat belt buckle connection (where fitted). 
16. Hand brake warning light connection. 
17. Ignition pick up connection (spare). 
18. Clock connection. 
19. Bulkhead connections (main harness). 
20. Terminal post (interior). 
21. Brake check diode connections. 
22. Steering column earth connection. 
23. Choke switch connection. 
24. Bulb holder column switch illumination. 
25. Windscreen wash/wipe switch connection. 
26. Main lighting switch connection. 
27. Direction indicators switch connections. 
28. Start/ignition switch.

Not illustrated
29. Start/ignition switch connection. 
30. LH body harness connection. 
31. Engine harness bulkhead connector. 
32. Gearbox harness bulkhead connector. 
33. RH wing harness bulkhead connector. 

HARNES ILLUSTRATION No.2 MAIN HARNES BINNACLE SWITCHES, COLUMN SWITCHES AND TERMINAL CONNECTIONS

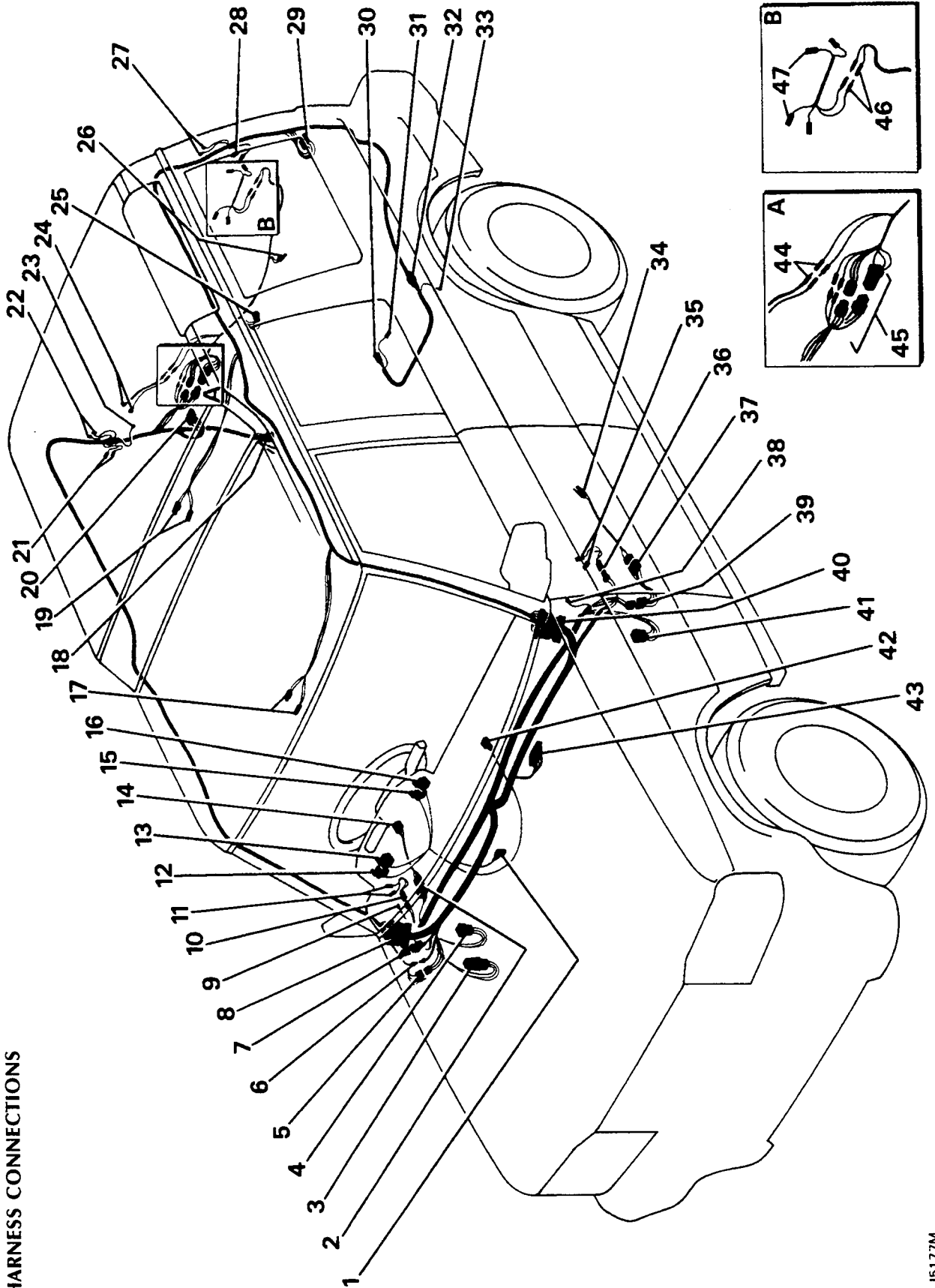


J5175M









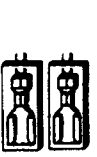









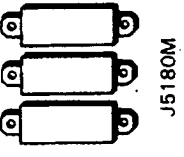
1. Wiper motor connection. 
2. Drivers door actuator harness to main harness. 
3. Windscreen wiper delay unit RH drive vehicles. 
4. Heated rear window relay RH drive vehicles. 
5. Door harness to main harness connector. 
6. RH body harness connector. 
7. RH body harness connector. 
8. RH body harness connector. 
9. Front door courtesy light switch connection. 
10. Speaker connections to main harness. 
11. Front door speaker connections. 
12. Radio volume UP control connection (high line only) 
13. Radio volume DOWN control connection (high line only). 
14. Drivers door actuator connection. 
15. Radio tuning control connection (high line only). 
16. Radio waveband selector connection. 
17. Front courtesy light connections. 
18. Trailer socket cable connection. 
19. Rear courtesy light connections. 
20. RH rear lamp assembly connection. 
21. RH rear speaker connections. 
22. Earth lead connections. 
23. Rear door courtesy light switch connection. 
24. Heated rear window connections. 
25. Rear wiper motor connection. 
26. Rear door actuator connection. 
27. Earth lead connections 
28. LH rear speaker connections. 
29. LH rear lamp assembly connections. 
30. Fuel pump/sender unit connector. 
31. Fuel pump/sender unit earth lead connector. 
32. Fuel pump/sender unit cable to LH body harness connector. 
33. Fuel pump/sender unit earth to chassis connector. 
34. Front passenger door actuator connector. 
35. Front door speaker connections. 
36. Speaker connections to main harness. 
37. Passenger door actuator to door harness. 
38. Front door courtesy light switch connection. 
39. Door harness to main harness connector. 
40. LH body harness connections. 
41. Fuel pump relay connector (petrol engines only). 
42. Radio binnacle controls harness to radio connector (high line only). 
43. Radio to main harness connector. 
44. Heated rear window cables to door harness. 
45. Rear door harness to RH body harness connectors. See illustration J5079 
46. Rear number plate cables to door harness connectors. 
47. Rear number plate lead connectors. 

J5178M

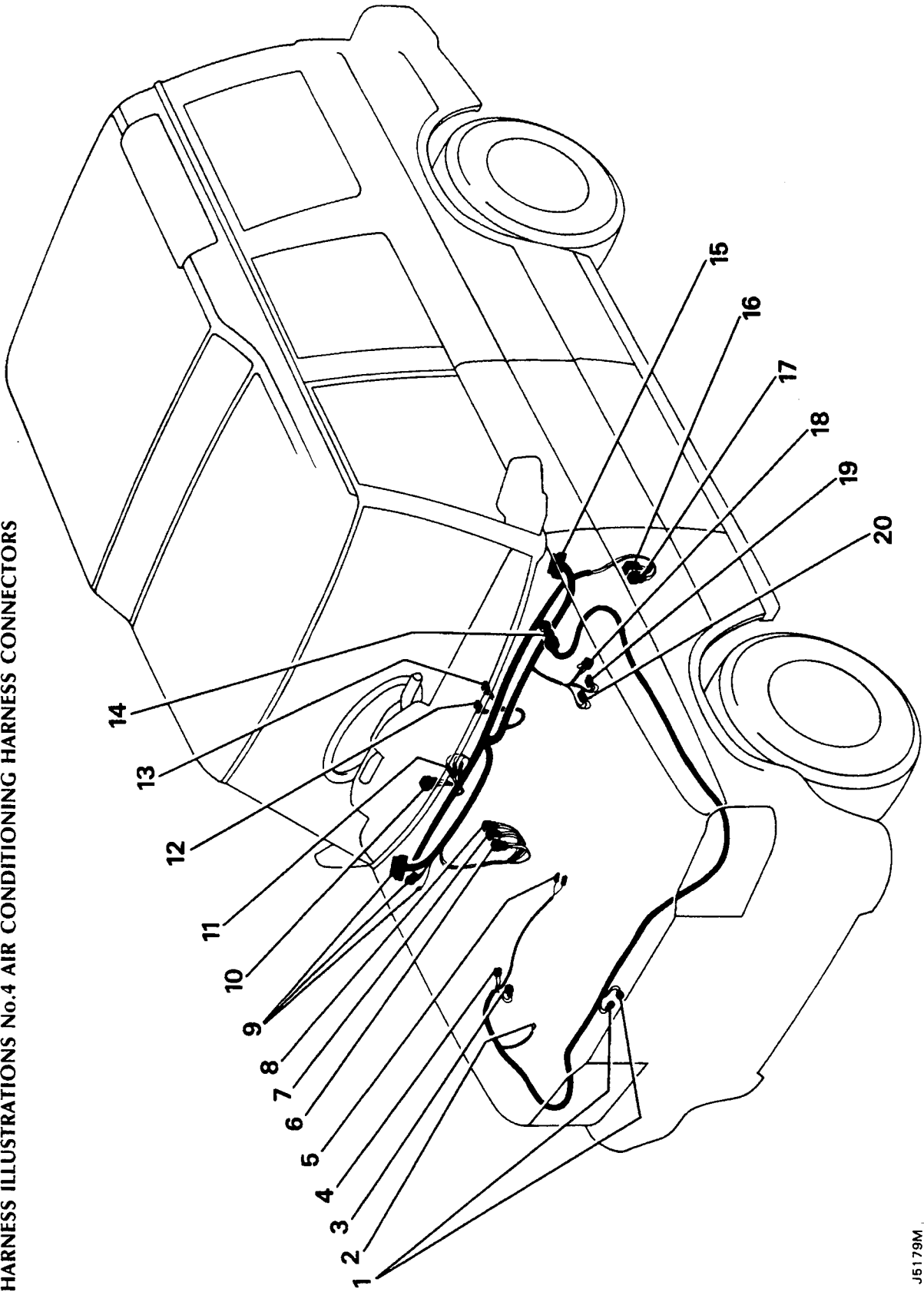
HARNESS ILLUSTRATION No.3 RADIO BINNACLE SWITCHES, CENTRAL DOOR LOCKING, BODY HARNESS, REAR DOOR AND FUEL PUMP HARNESS CONNECTIONS











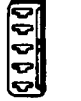
















J5177M

- | | |
|--|---|
| <p>1. Evaporator fans harness connectors.</p>  | <p>12. Fan speed switch connection.</p>  |
| <p>2. Earth lead inner wing valance.</p>  | <p>13. Function switch connection.</p>  |
| <p>3. High pressure switch connection.</p>  | <p>14. Air conditioning bulkhead connector (Black).</p>  |
| <p>4. Compressor clutch connection.</p>  | <p>15. LH body harness connector.</p>  |
| <p>5. Engine water temperature sensor connections.</p>  | <p>16. Fresh air solenoid relay connector (Red).</p>  |
| <p>6. Air conditioning ignition relay connection (Red).</p>  | <p>17. Air conditioning/heater relay connector (Red).</p>  |
| <p>7. Medium speed relay connection (Red).</p>  | <p>18. Air conditioning motor connection.</p>  |
| <p>8. Low speed relay connection (Red).</p>  | <p>19. Thermostat connection (Black).</p>  |
| <p>9. RH body harness connections.</p> <p>Not illustrated</p> | <p>20. Air conditioning resistors connection (Natural).</p>  |
| <p>10. Compressor clutch relay connection.</p>  | |
| <p>11. Air conditioning diode connections.</p>  <p>J5180M</p> | |

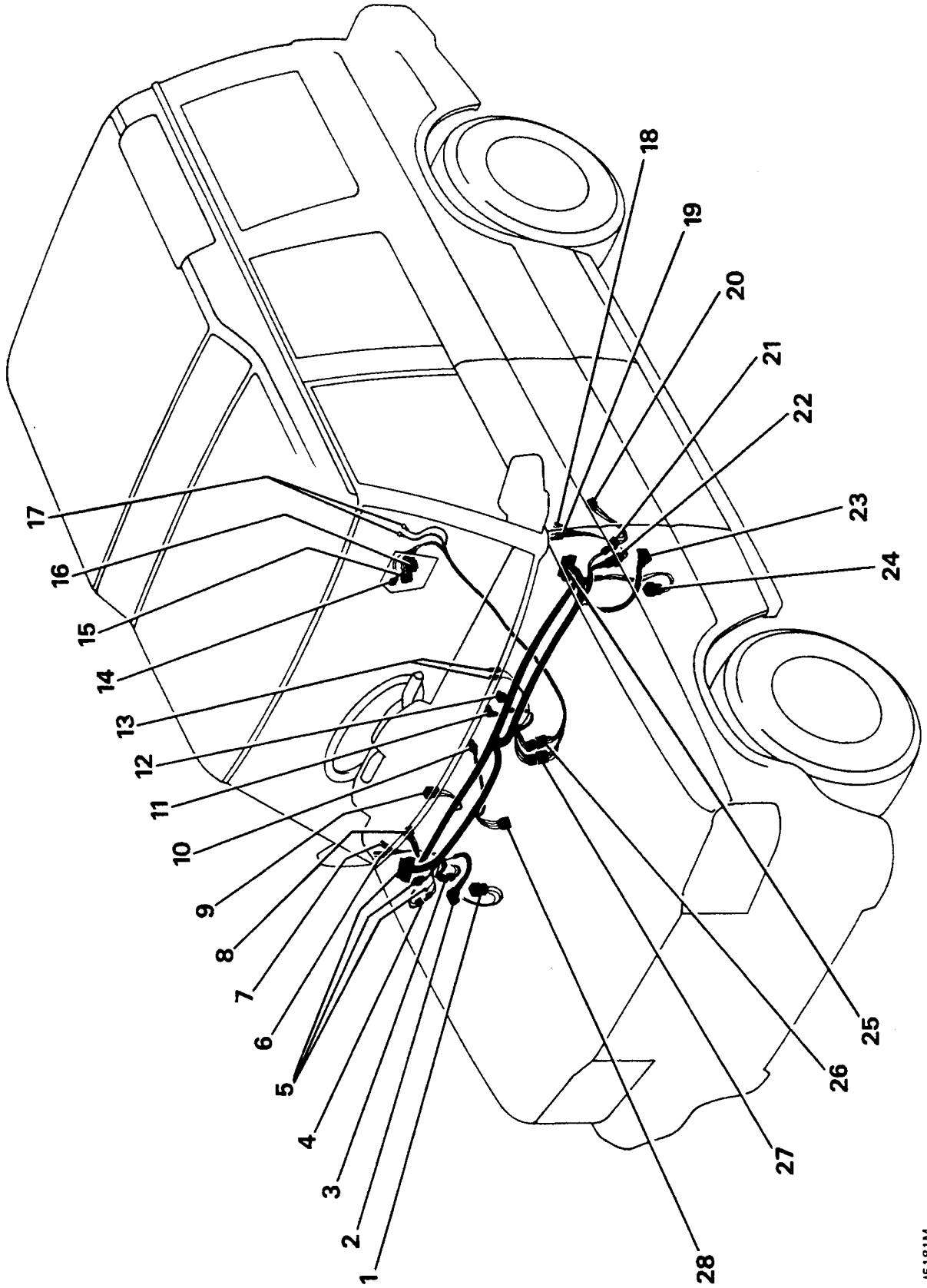
HARNES ILLUSTRATIONS No.4 AIR CONDITIONING HARNES CONNECTORS



J5179M





















- | | | |
|--|---|--|
| <p>1. Air conditioning, heater relay.</p>  | <p>12. Heater function switch connector.</p>  | <p>23. LH indicator repeater lamp.</p> <p>Not illustrated</p> |
| <p>2. RH indicator repeater lamp.</p> <p>Not illustrated</p> | <p>13. Heater recirculating solenoid connections.</p>  | <p>24. Window lift relay.</p>  |
| <p>3. RH door mirror leads to main harness connector.</p>  | <p>14. Door mirrors adjustment control connector.</p>  | <p>25. LH body harness connector.</p>  |
| <p>4. Drivers door actuator leads to main harness connector.</p>  | <p>15. RH window lift switch connection.</p>  | <p>26. Window lift switch leads to main harness connector.</p>  |
| <p>5. RH body harness connections.</p> <p>Not illustrated</p> | <p>16. LH window lift switch connection.</p>  | <p>27. Door mirror adjustment control leads to main harness.</p>  |
| <p>6. RH door mirror adjustment connector.</p>  | <p>17. Earth leads.</p>  | <p>28. Heater motor connection.</p>  |
| <p>7. RH door mirror demist connector.</p>  | <p>18. LH door mirror demist connector.</p>  | |
| <p>8. Drivers door actuator to door harness connector.</p>  | <p>19. LH door mirror adjustment connector.</p>  | |
| <p>9. Fan relay connector (Red).</p>  | <p>20. Passenger door actuator to door harness connector.</p>  | |
| <p>10. Heater control panel illumination connector.</p>  | <p>21. Passenger door actuator leads to main harness connector.</p>  | |
| <p>11. Fan speed connector.</p>  <p>J5182M</p> | <p>22. LH door mirror leads to main harness connector.</p>  | |

HARNESS ILLUSTRATION No.5 ELECTRIC WINDOWS, HEATER, AND SIDE REPEATER LAMP HARNESS CONNECTIONS



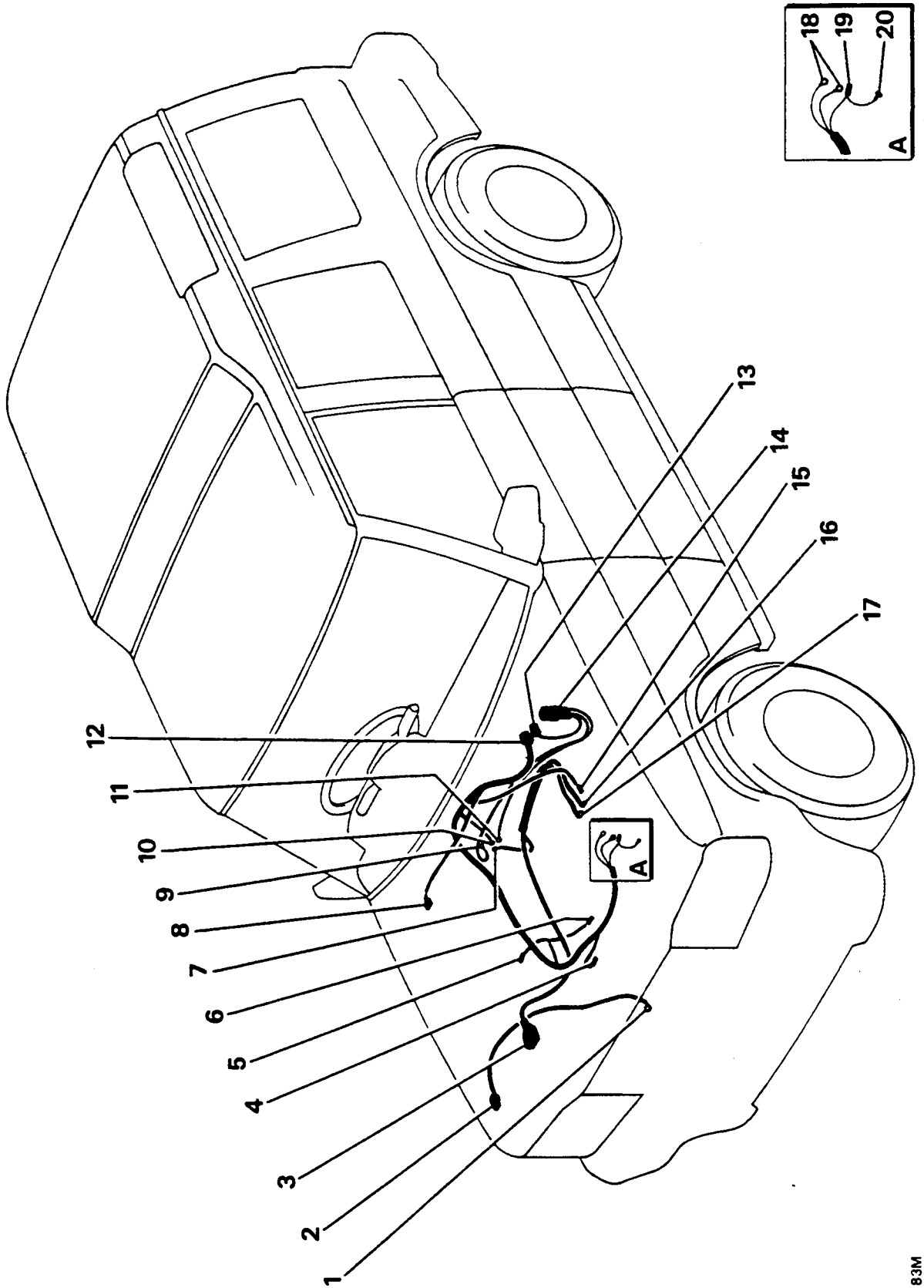
ADDITION: JANUARY 1990

J5181M

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| <p>1. Battery negative lead earth connection.</p>  | <p>12. Engine harness bulkhead connector (Grey).</p>  |
| <p>2. Battery negative lead connection.</p>  | <p>13. Glow plug timer bulkhead connector (Black).</p>  |
| <p>3. Battery positive lead connection.</p>  | <p>14. Glow plug timer.</p>  |
| <p>4. Coolant temperature sensor connections.</p>  | <p>15. Engine harness starter solenoid connection.</p>  |
| <p>5. Fuel shut-off connection (injection pump).</p>  | <p>16. Battery/starter solenoid lead, solenoid collection.</p>  |
| <p>6. Oil pressure warning switch connections.</p>  | <p>17. Starter solenoid/terminal post lead, solenoid connection.</p>  |
| <p>7. Starter solenoid lead terminal post connection.</p>  | <p>18. Engine harness alternator connections.</p>  |
| <p>8. Low brake fluid lead connection.</p>  | <p>19. Engine harness alternator connections.</p>  |
| <p>9. Number one glow plug connection.</p>  | <p>20. Alternator connection.</p>  |
| <p>10. Engine harness terminal post connection.</p>  | |
| <p>11. Glow plug timer cable terminal post connection.</p>  | |

J5184M

HARNESS ILLUSTRATION No.6 DIESEL ENGINE HARNESS, GLOW PLUG TIMER AND BATTERY CONNECTIONS



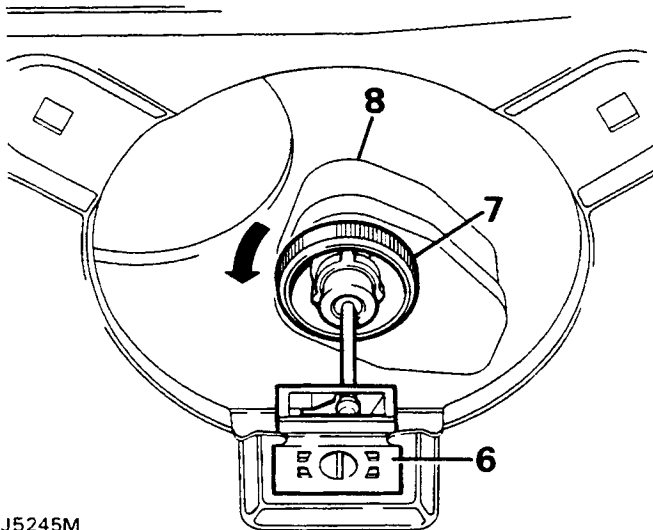
J5183M

HEADLAMP LEVELLING MOTOR

Removal

NOTE: The removal procedure for both head lamp levelling motors is identical. The removal of ancilliary items will vary dependant upon the motor being removed and the vehicle model.

1. Disconnect battery, LH headlamp, remove battery, RH headlamp.
2. Remove wheel chock and jack, LH side only.
3. Remove air filter trumpet, LH side V8 engined vehicles only.
4. Remove headlamp surround.
5. Remove headlamp unit.
6. Remove guide from headlamp mounting panel.
7. Remove retaining ring securing levelling motor to inner panel.
8. Withdraw levelling motor through perture, disconnect multi-plug and remove motor.



J5245M

Refitting

9. Connect multi-plug to levelling motor.
10. Insert motor through aperture and fit to mounting panel, ensuring correct location of lugs in panel.
11. Secure motor with retaining ring.
12. Temporarily reconnect battery and switch headlamps ON in the dipped position.
13. Set levelling switch to 0' and adjust motor actuator shaft to give a clearance of 18 mm (0.708 in) between face of shaft and front face of headlamp mounting panel.

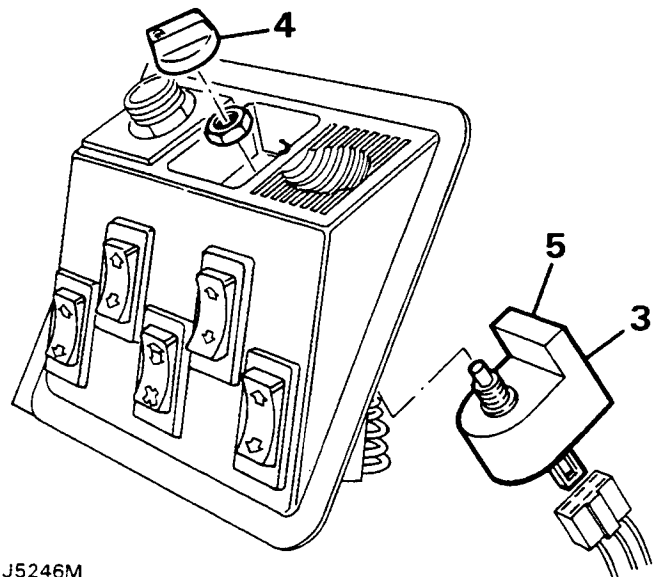
14. Switch OFF headlamps and disconnect battery.
15. Refit guide to headlamp mounting panel.
16. Fit headlamp ensuring correct coupling with guide.
17. Reconnect or refit battery, as applicable.
18. Operate headlamp levelling system and check for correct functioning.
19. Refit headlamp surround.
20. Refit air filter trumpet, jack and chock where applicable.
21. Using suitable beam setting equipment, check beam setting and rectify as necessary.

HEADLAMP LEVELLING SWITCH

Removal

NOTE: Before removing the headlamp levelling switch note the orientation of the knob and the switch in the mounting panel.

1. Disconnect battery negative lead.
2. Detach auxiliary switch panel from rear of console.
3. Disconnect multi-plug from rear of levelling switch.
4. Remove control knob.
5. Remove securing nut and withdraw switch from rear of panel.



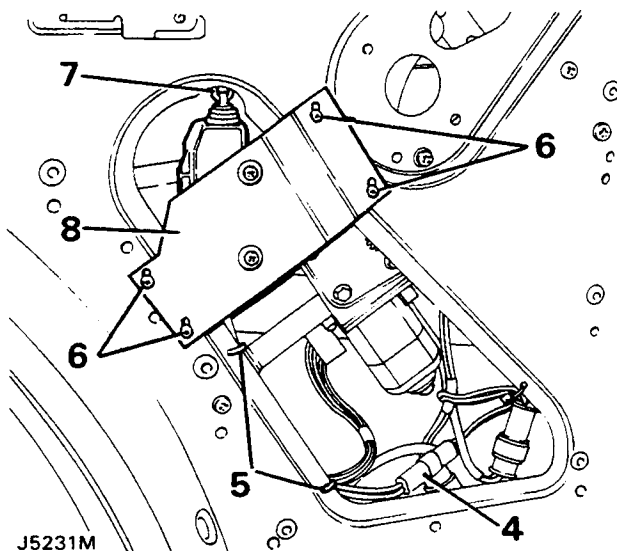
J5246M

Refitting

6. Refit headlamp levelling switch in reverse order to removal, ensuring correct orientation as noted prior to removal.

REAR SIDE DOOR ACTUATOR UNITS**Removal**

1. Ensure that the window glass is in the fully closed position.
2. Disconnect the battery negative lead.
3. Remove the door pull, trim panel and plastic vapour proof barrier.
4. Disconnect the actuator lead from the door harness at the connector.
5. Note the locations and release the straps securing the actuator lead to the door casing.
6. Remove the four screws securing the actuator mounting plate to the door casing.
7. Unhook the operating rod from the actuator link and withdraw the actuator and mounting plate from the door.
8. If a new actuator is being fitted remove the mounting plate from the existing actuator.

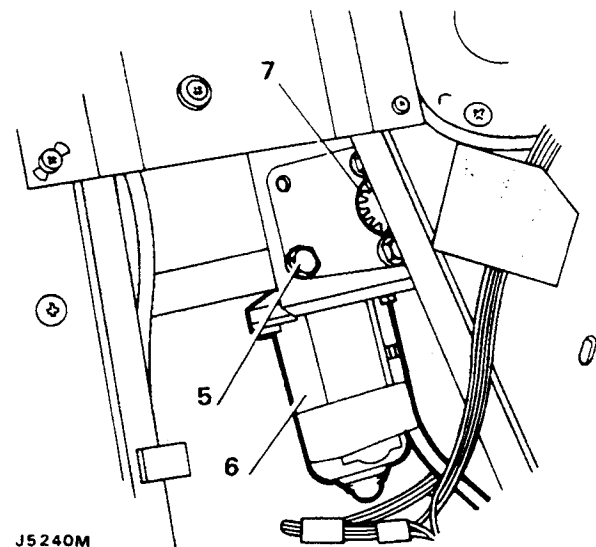
**Refitting**

9. If removed fit the mounting plate to the actuator.
10. Engage the actuator operating rod with hooked end of the actuator link.
11. Fit the actuator and mounting plate to the door and loosely secure with the four screws.
12. Set the mounting plate with the screws in the centre of the slotted holes, then tighten the screws.
13. Connect the actuator lead to the door harness.

14. Reconnect the battery negative lead.
15. With the sill locking button held in position, set the bellcrank to approximately the position it would be in if the sill button was depressed to half of its total movement.
16. At this setting check the electrical operation of the door lock. Adjust the mounting plate as necessary to achieve the correct setting. Fully tighten the securing screws on completion.
17. Refit the vapour barrier.
18. Connect the sill button operating rod to the bellcrank, hold in position, fit the door trim panel and the door pull.

WINDOW LIFT MOTOR - Rear side doors**Removal**

1. Ensure that the side door glass is in the fully closed position and secure with adhesive tape.
2. Disconnect the battery negative lead.
3. Remove the door pull, trim panel and plastic vapour barrier.
4. Disconnect the lift motor harness multi-plug from the door harness.
5. Support the motor and remove the three securing screws.
6. Withdraw the motor through the lower opening in the inner door panel.

**Refitting**

7. Refit the lift motor in reverse order to removal, ensuring that the drive gear is engaged and correctly aligned with the window lift linkage, before fitting the securing bolts.

CIRCUIT DESCRIPTION AND TESTING

General

When carrying out diagnosis or tests on any circuit, the following general points should be observed at all times.

1. Check the circuit fuses.
2. Check the state of charge of the battery ST1, 12 volts minimum. Ensure that the connections are clean and secure.
3. Check that battery voltage is present at the terminal post ST2 and ensure connections are clean and secure.
4. Check that the earth connections associated with the circuit are secure, bearing in mind that the failure of a connection can depend on the electrical load being passed.
5. Check that all the alternator connections are secure and that the belt tension is correct.
6. Study the circuit diagram, function and operation to verify that the complaint is valid.
7. Components should not be removed or replaced until the fault has been positively identified.
8. Where circuits interact or share the same fuse, check each circuit operation to verify and pinpoint the problem, using the appropriate test equipment.

Test equipment

Test lamp

A test lamp must only be used where instructed. Do not use a test lamp on solid state components, otherwise damage may be caused to integrated circuits, transistors, diodes and capacitors. A multimeter of 10 megaohms or higher impedance must be used to test solid state circuits.

Voltmeter

A voltmeter should be used to confirm that voltage is present at a particular terminal or connection in a circuit. The reading, when compared with battery voltage, will indicate the voltage drop in the circuit being checked.

Ohm-meter

Use an ohm-meter to check continuity and measure the resistance in part or all of the circuit being tested. As false ohm-meter readings can sometimes occur, when checking the resistance of a solid state circuit, take a second reading with the meter connections reversed and compare the results.

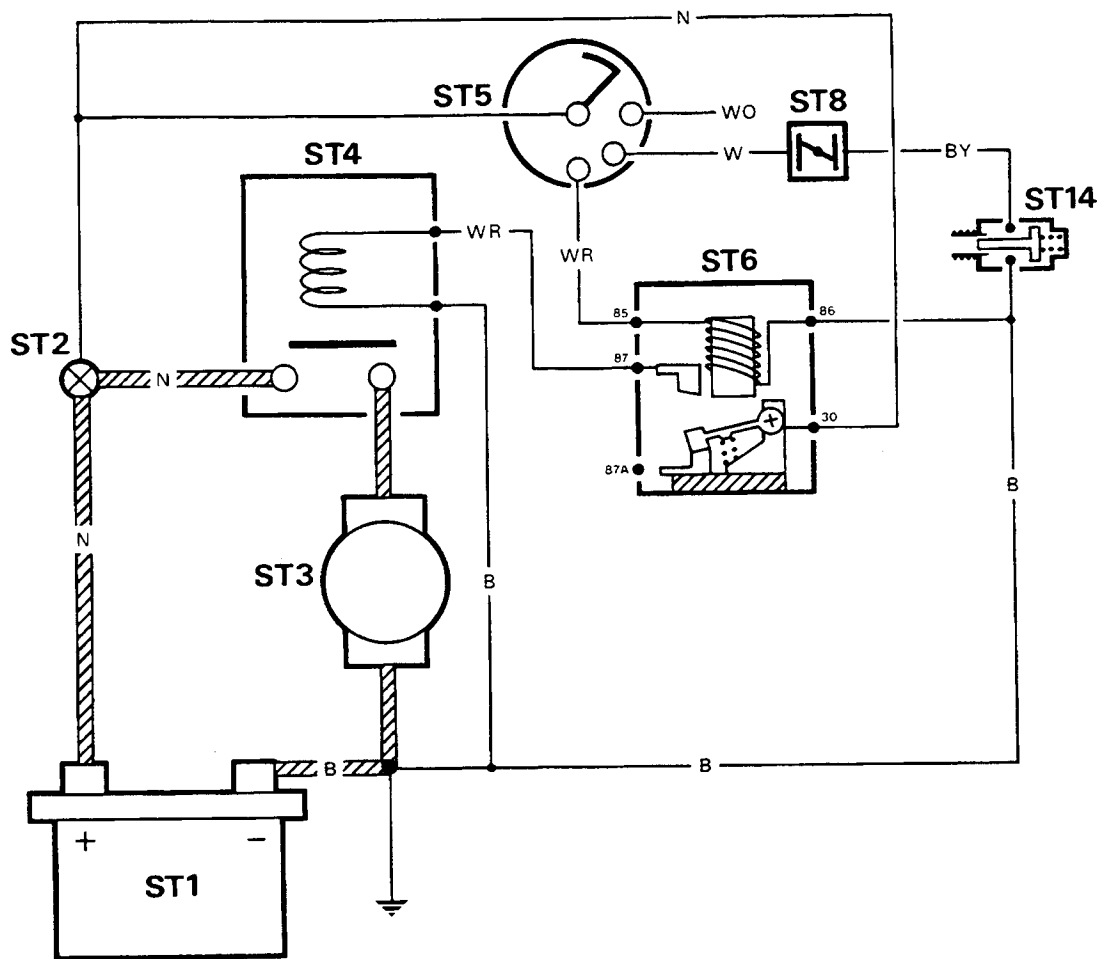
Testing

Always observe the following points when carrying out diagnostic checks:

1. Follow precisely the instructions provided in this manual and those supplied with any test equipment.
2. Unless otherwise instructed, it is not necessary to disconnect any wiring when checking with a voltmeter, insert the test probe and check both ends of the connector to ensure good continuity.
3. Poor power supply and bad earth connections are the most common causes of intermittent continuity, high resistance or an open circuit.
4. Study the circuit operation, then carry out the recommended tests systematically and thoroughly.

CABLE COLOUR CODES

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



J5247M

STARTING SYSTEM CIRCUIT (V8 PETROL ENGINES) - PRE 93 MODEL YEAR

STARTING SYSTEM (V8 petrol engines)

The components of the system are as follows:

ST1	Battery
ST2	Terminal post
ST3	Starter motor
ST4	Starter solenoid
ST5	Starter/ignition switch
ST6	Starter relay
ST8	Cold start warning light
ST14	Choke switch

NOTE: ST8 and ST14 are only fitted to early vehicles fitted with V8 carburettored engines.

System operation

The circuit diagram shows the circuit at rest where it can be seen that the N wire from the terminal post ST2 is supplying battery voltage to the starter solenoid ST4, the starter/ignition switch ST5 and terminal 30 on the starter relay ST6.

When the starter/ignition switch is turned to the cranking position, current is supplied to the ignition system through the W wire. With the switch in this position, current is also supplied via the WR wire to terminal 85 on the starter relay ST6, where it passes through the relay windings to exit at terminal 86 and via the B wire to earth.

This circuit energises the starter relay, which switches the relay contacts, allowing current to be supplied to the starter solenoid windings via terminals 30 and 87 on the relay, the wire NR and the wire B to earth, thus energising the solenoid ST4 to feed the starter motor.

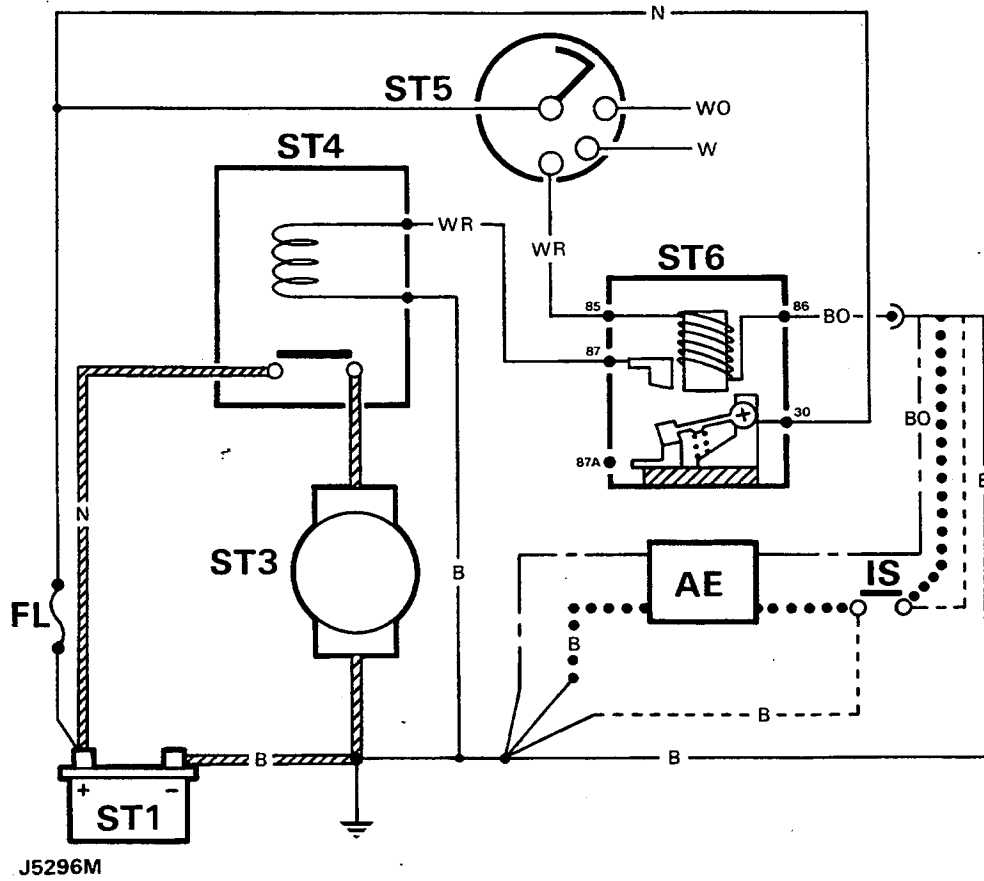
When the engine starts and the key is released, current continues to flow to the ignition circuit.

Circuit test

With the ignition switched OFF and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at terminal post ST2, at the N wire on starter solenoid ST4, at terminal 30 N wire on relay ST6 and at the N wire on switch ST5.
3. Disconnect the WR wire from solenoid ST4.
4. Ensure that the gear lever is in the neutral position. Switch the ignition ON.
5. Connect the voltmeter to the WR wire on switch ST5, turn the key to the cranking position and check the voltage reading. Renew switch ST5 if faulty.
6. Connect the voltmeter to terminal 85 WR wire on relay ST6, turn the key to the cranking position and check the voltage reading.
7. Connect the voltmeter to terminal 87 WR wire on relay ST6, turn the key to the cranking position and check the voltage reading. If no reading is obtained continue with test 8.
8. Bridge terminal 86 on relay ST6 to earth and repeat test 7, if relay ST6 now operates satisfactorily check out the existing earth lead. If relay ST6 still fails to operate substitute and repeat test.
9. Connect the voltmeter to the WR wire disconnected from solenoid ST4, turn the key to the cranking position and check the voltage. If no reading is obtained, check the wire back to relay ST6, if satisfactory reconnect the WR wire to solenoid ST4.
10. Disconnect the lead from the solenoid ST4 to the starter motor ST3. Connect the voltmeter to the ST4 terminal, turn the key to the cranking position and check the voltage reading. The reading should be no more than 1 volt below battery voltage.
11. If no reading, substitute solenoid ST4 and repeat test.
12. Set the meter to ohms.
13. Connect the test leads between a good earth connection on the chassis or to ST1 negative (-ve) terminal and the engine. A zero '0' reading indicates a satisfactory condition. If necessary, rectify any loose or corroded earth connections.
14. If the starter motor fails to operate after carrying out the foregoing tests, remove it for rectification or replacement.



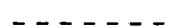



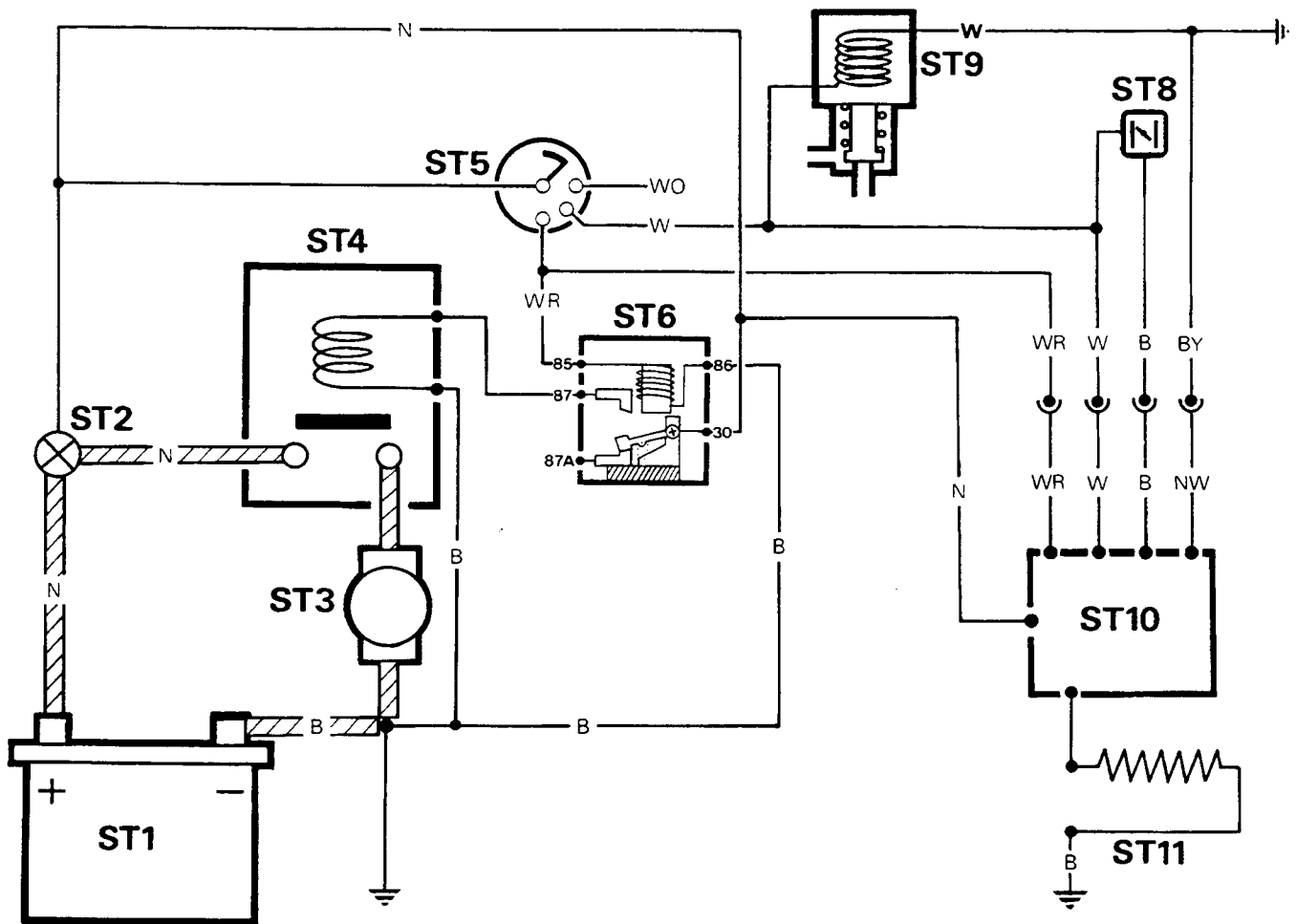
**STARTING SYSTEM CIRCUIT V8 PETROL ENGINES
- 93 MODEL YEAR**

The components of the system are as follows:

- ST1 Battery
- ST3 Starter motor
- ST4 Starter solenoid
- ST5 Starter/ignition switch
- ST6 Starter relay
- FL Fused link
- AE Alarm ECU
- IS Inhibitor switch

Circuit wiring variations

-  Manual gears
-  Manual gears with alarm
-  Automatic gears
-  Automatic gears with alarm



J5257M

STARTING SYSTEM CIRCUIT 200Tdi ENGINES - PRE 93 MODEL YEAR

The components of the system are as follows:

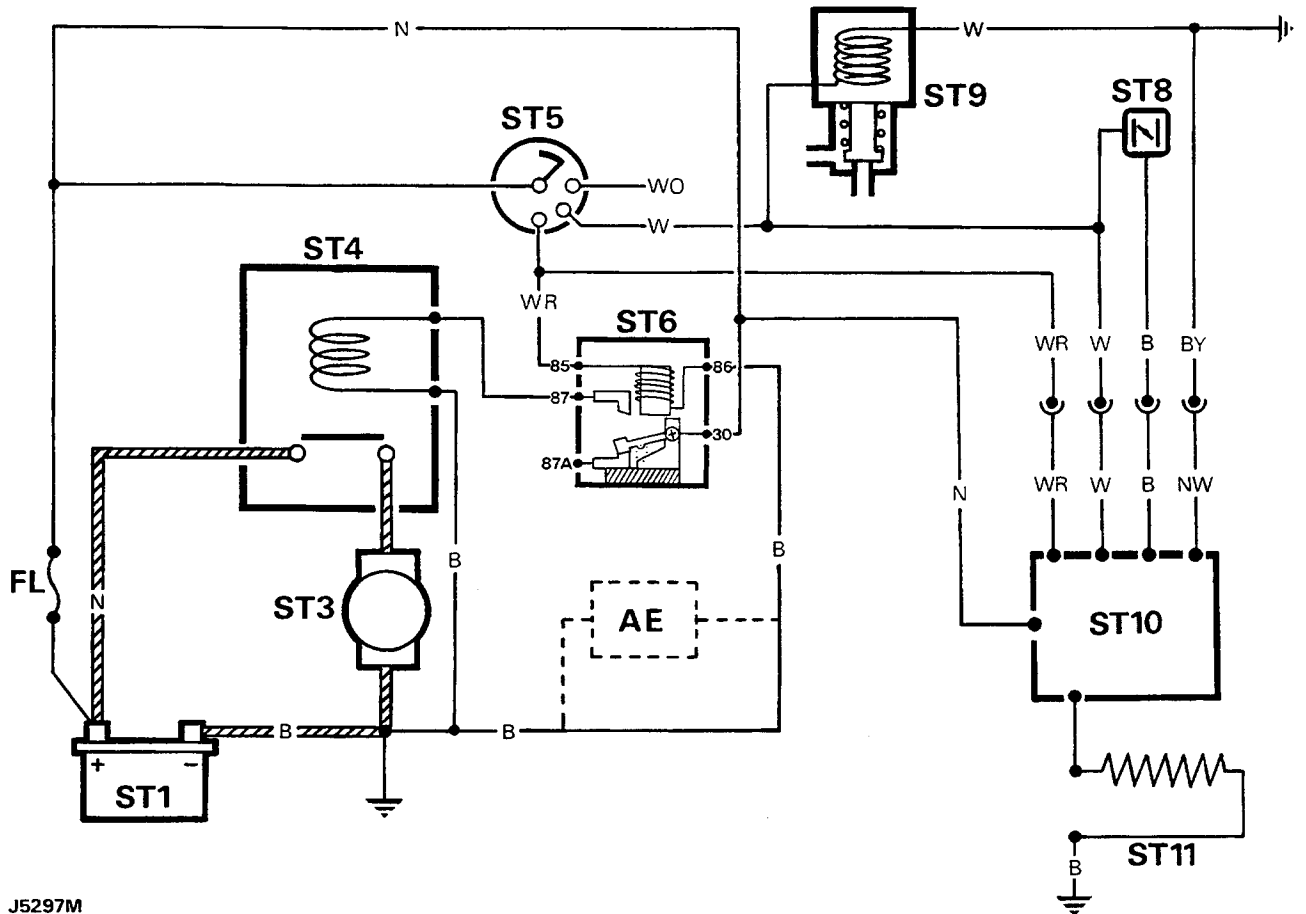
- ST1 Battery
- ST2 Terminal post
- ST3 Starter motor
- ST4 Starter solenoid
- ST5 Starter/ignition switch
- ST6 Starter relay
- ST8 Cold start warning light
- ST9 Fuel shut-off solenoid
- ST10 No.1 Glow plug

System operation

To warm up the combustion chamber the starter key is turned to position 2 on the starter switch ST5. Current is supplied from ST5 via the W wire to the glow plug timer ST10 and the fuel shut-off valve ST9.

The supply of current energises ST9 to allow fuel to flow to the injection system and energises the internal relay within ST10. Energising the relay allows battery voltage, supplied to ST10 through the N wire, to reach the glow plugs via the YB wire. At the same time current is fed through the NW and the BY wires to the instrument panel to illuminate the cold start warning light ST8.

The time taken to heat the combustion chamber depends upon the engine temperature. The maximum period the timer will operate for is fifteen seconds, but as it is able to sense the glow plug resistance/temperature it will adjust the time accordingly. The warning light ST8 will then extinguish.



J5297M

**STARTING SYSTEM 200Tdi ENGINES
- 93 MODEL YEAR**

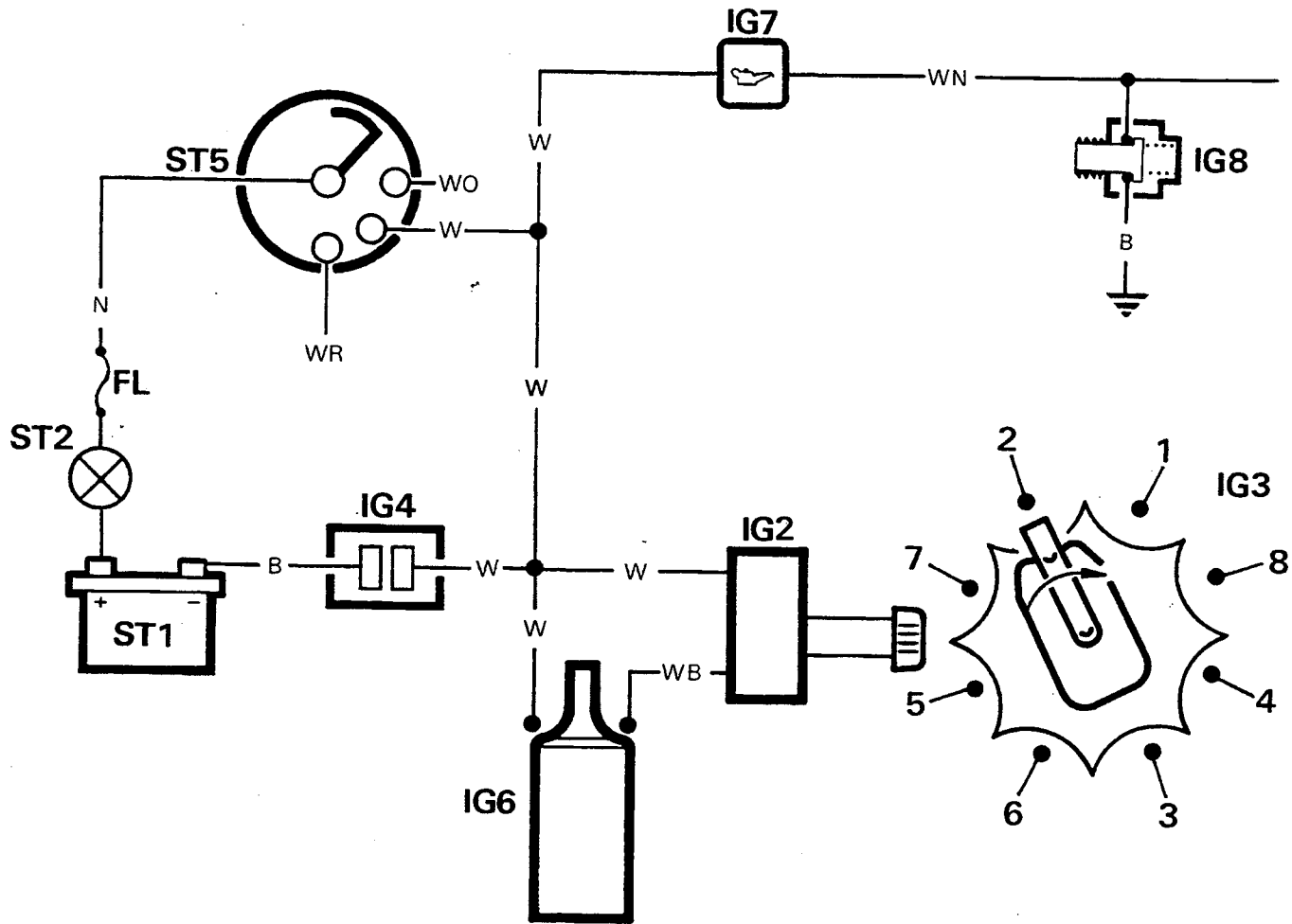
The components of the system are as follows:

- ST1 Battery
- ST3 Starter motor
- ST4 Starter solenoid
- ST5 Starter/ignition switch
- ST6 Starter relay
- ST8 Cold start warning light
- ST9 Fuel shut-off solenoid
- ST10 Glow plug timer
- ST11 No.1 Glow plug
- AE Alarm ECU
- FL Fused link

Circuit test

Carry out the complete test given for the V8 petrol engine. If these tests are satisfactory, the correct starting procedure is being carried out and the cranking speed is correct (not less than 120 rev/min) the engine should start easily. If the engine still fails to start it is most probably either the fuel shut-off solenoid ST9 or the glow plug timer that has failed. In these circumstances carry out the following glow plug circuit test:

1. Set the meter to volts and ensure that the start switch is in the OFF position.
2. Connect the voltmeter to the N wire terminal on the glow plug timer ST10 and check the reading. If no or low voltage is recorded check the wiring back to the terminal post ST2.
3. Disconnect the W wire from the fuel shut-off solenoid ST9, turn the start switch ON and check for a voltage reading at the W wire terminal on ST9 and the W wire terminal on ST10. If no reading is obtained, check the operation of ST9 and the W wiring and connections.
4. Disconnect the wire from ST10 at No.1 glow plug ST11 and with the start switch turned to cranking check for voltage at the wire terminal. If no voltage is recorded renew the glow plug timer ST10.
5. If the instrument panel warning light ST8 fails to operate check the bulb and wiring as necessary.



J5298M

IGNITION SYSTEM (V8 Petrol engines)

The components of the system are as follows:

- IG2 Amplifier/reluctor pick-up
- IG3 Reluctor/rotor arm
- IG4 Capacitor, radio suppressor
- IG6 Ignition coil
- IG7 Oil pressure warning light
- IG8 Oil pressure warning light switch
- ST1 Battery
- ST2 Terminal post - Pre 93 model year
- ST5 Starter/ignition switch
- FL Fused link - 93 model year

System operation

With the ignition switched on and the engine cranking or running, current is fed via the W wire to the radio suppressor IG4, ignition coil IG6 and the amplifier/reluctor pick-up IG2.

The current flow through the amplifier/reluctor pick-up IG2 and the primary windings in the coil IG6 create a strong magnetic field in the coil and another in the pick-up. When the magnetic field at the pick-up is interrupted by the passing of each of the reluctor peaks IG3, a pulse is generated in the amplifier which causes the magnetic field in the coil to collapse and a high voltage discharge to occur along the coil HT cable to the central electrode on the distributor cap and rotor arm. As the rotor arm rotates the HT voltage is distributed to each of the spark plugs.

Also shown in this circuit is the oil pressure warning light IG7 and switch IG8. The warning light, although not part of the ignition circuit, illuminates when the ignition is switched on and the engine is at rest. The circuit is completed through IG8. When the engine is running, the oil pressure is sufficient to operate the switch which in turn extinguishes the light.

Circuit test

With the ignition switched OFF and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 or fused link and at the ignition switch ST5 N wire.
3. With the ignition switch ON check the voltage at ST5 W wire. If the reading is low substitute or renew the ignition switch ST5 and repeat the test.
4. Check the voltage at the ignition coil IG6 (+ve) terminal W wire. If the reading is low disconnect the radio suppressor IG4 and repeat the test. Check the condition of the W wire from ST5.
5. Disconnect the WB wire from IG6 (-ve) terminal and check the voltage at the IG6 (-ve) terminal. If the reading is low substitute or renew the ignition coil and repeat tests 4 and 5. Reconnect the WB wire to IG6.
6. Disconnect the harness connector from the ignition amplifier IG2 and check the voltage at the harness connector W wire. If the reading is low, check the wiring from IG6, reconnect the harness.

Checking amplifier switching

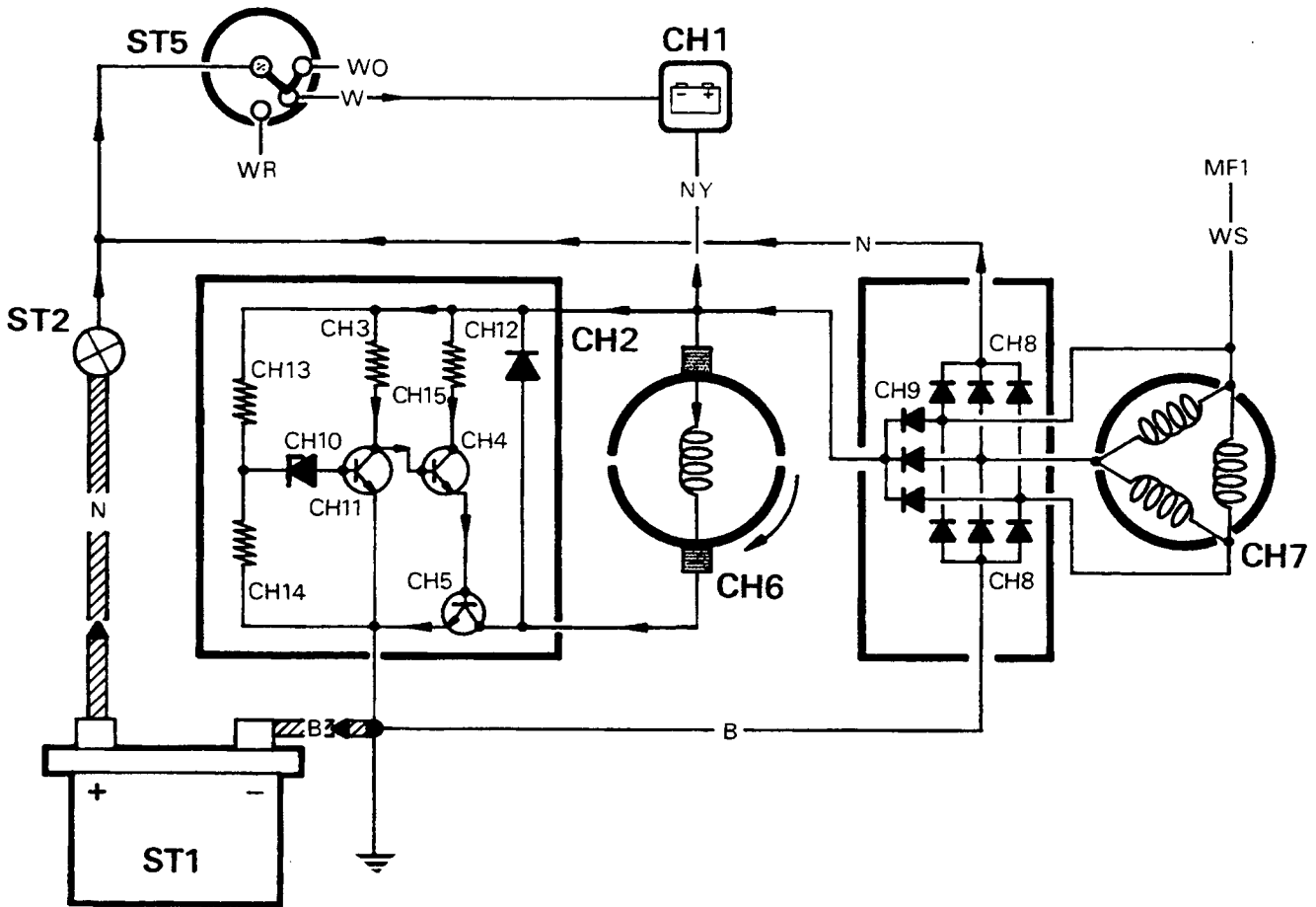
7. Remove the coil to distributor HT lead from the distributor cap and connect to a good earth; then connect the voltmeter to the battery positive (+ve) terminal and coil IG6 negative (-ve) terminal. The voltmeter should register zero '0' volts. Turn the ignition key to crank the engine, the reading should increase to just above zero '0' volts. If the reading does not increase, renew the amplifier and repeat the test.

Checking HT sparking and rotor arm insulation

8. Hold the coil to distributor HT lead approximately 6 mm (0.25 in) from the cylinder head or block and crank the engine. If no spark is evident substitute the HT lead and repeat the test. Regular sparking indicates that the coil and LT circuit are satisfactory.
9. Remove the distributor cap and hold the HT lead not more than 3 mm (0.13 in) above the rotor arm and crank the engine. With the rotor arm insulation in good condition no sparking will occur. Renew the rotor arm if sparking does take place.
10. Refit the distributor cap and the HT leads.

Checking pick-up coil resistance

11. Set the meter to ohms and ensure that the ignition is switched OFF.
12. Remove the amplifier IG2 from the distributor.
13. Connect the test leads to the pick-up connections, a reading of 2000 to 5000 ohms should be recorded. If the reading is outside these limits renew the amplifier.



J5159M

CHARGING SYSTEM CIRCUIT - PRE 93 MODEL YEAR

The components of the system are as follows:

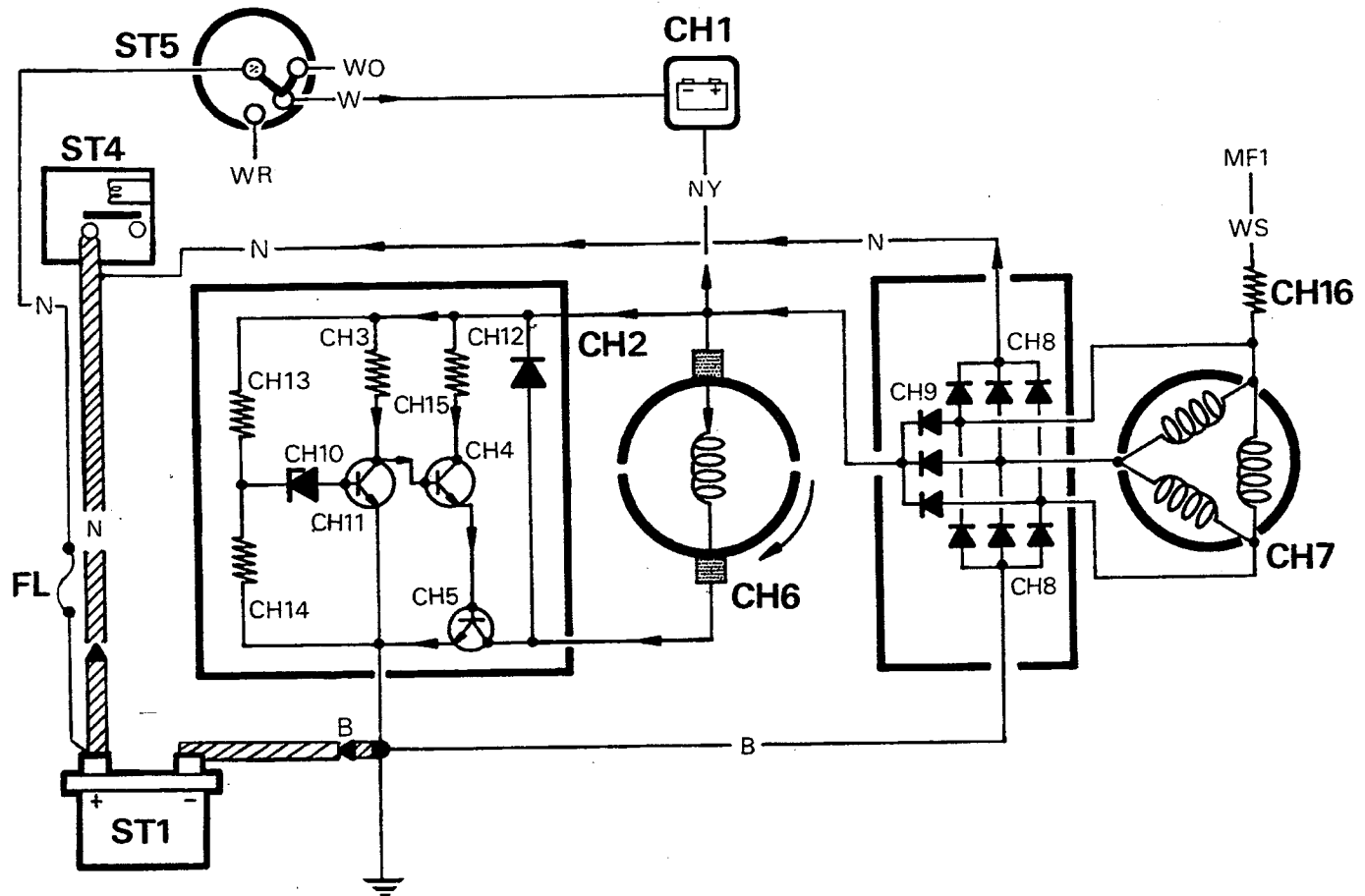
- CH1 Charge/ignition warning light
- CH2 Regulator
- CH3 Resistor
- CH4 Transistor
- CH5 Transistor
- CH6 Alternator field winding
- CH7 Alternator stator winding
- CH8 Rectifier diodes
- CH9 Auxiliary diodes
- CH10 Zener diode
- CH11 Transistor
- CH12 Field protection diode
- CH13 Resistor
- CH14 Resistor
- CH15 Resistor
- ST1 Battery
- ST2 Terminal post
- ST3 Start/ignition switch

System operation

When the ignition is switched on without the engine running the charge/ignition warning light CH1 will illuminate, indicating that the alternator is not charging.

The warning light is earthed through wire NY, resistor CH3 and transistors CH4 and CH5, this flow of current CH4 and CH5 induces current to flow through transistor CH15 and to earth, again via CH5.

As a result of CH4 and CH5 switching on, a rise in the current flow through the field winding CH6 to earth via CH5 occurs, creating a magnetic field force in the rotor field windings CH6. When CH6 is rotated within the stator windings CH7 the AC voltage output of CH7 increases.



J5299M

CHARGING SYSTEM CIRCUIT - 93 MODEL YEAR

The components of the system are as follows:

- CH1 Charge/ignition warning light
- CH2 Regulator
- CH3 Resistor
- CH4 Transistor
- CH5 Transistor
- CH6 Alternator field winding
- CH7 Alternator stator winding
- CH8 Rectifier diodes
- CH9 Auxiliary diodes
- CH10 Zener diode
- CH11 Transistor
- CH12 Field protection diode
- CH13 Resistor
- CH14 Resistor
- CH15 Resistor
- CH16 Resistor - V8 only
- ST1 Battery
- ST3 Start/ignition switch
- ST4 Starter solenoid
- FL Fused link

The AC current is rectified to DC by the rectifier diodes CH8, which charges the battery by the brown wire N and the black earth wire B. The auxiliary diodes CH9 supply a positive DC current to the warning light, field windings and regulator. This additional supply means that the warning lamp has an equal positive supply at both connections, which causes the flow through the bulb to cease, indicating that charging is taking place.

The zenor diode CH10, monitors the voltage passing through CH13 and CH14, when the level reaches 14.2 volts, CH10 allows current to pass via CH11 to earth, this in turn causes CH4 and CH5 to break current flowing through CH3 and switch off CH15. With CH15 switched off no current can flow through the field windings CH2, therefore the magnetic field collapses and the alternator output falls. The falling output is detected by CH10 which reverts to its original state and the process repeats.

Diode CH12 eliminates surges in voltage across the field winding, which could damage the regulator, by allowing any such surge on the negative side to pass through the diode to the positive connection.

Circuit testing

With the ignition switched OFF and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 or fused link and at the ignition switch ST5 N wire.

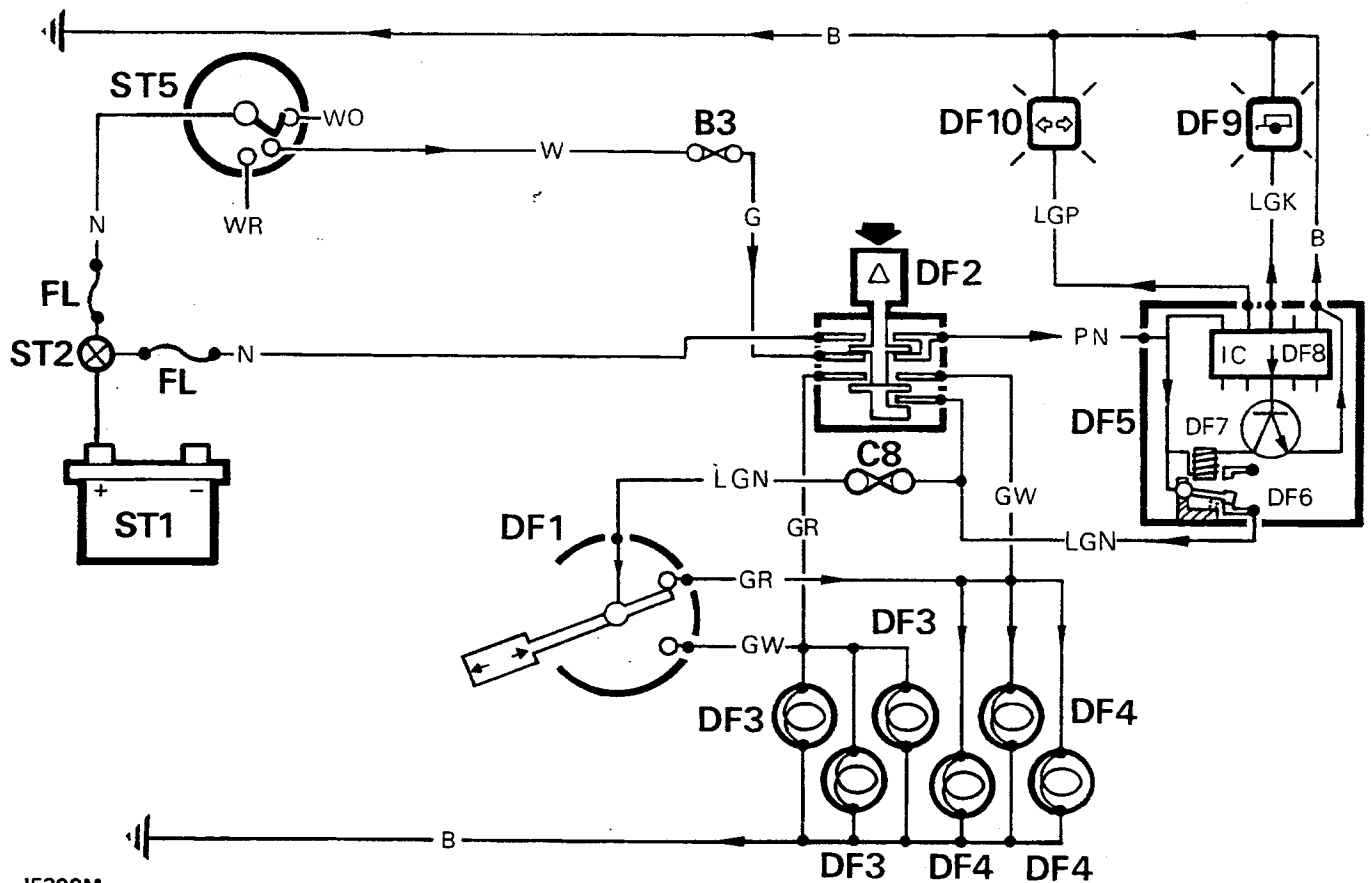
Checking voltage drop in charging system

3. Connect the voltmeter to the alternator main output (+ve) terminal and the battery (+ve) terminal. Switch on the headlamps, start the engine and run at approximately 3000 rev/min. The voltmeter reading should not exceed 0.5 volts.

4. With the engine still running, transfer the voltmeter connections to the alternator body and the battery (-ve) terminal. The reading should not exceed 0,25 volts, if necessary locate the cause of the high resistance and rectify.

Checking alternator output

5. Check the tension of the alternator drive belt and adjust as necessary.
6. Visually inspect all cables to ensure that they are clean and tight.
7. Disconnect the NY wire at the alternator and connect to a temporary earth. Switch ON the ignition, warning light CH1 should illuminate, if satisfactory switch OFF the ignition and reconnect NY wire. Should the bulb fail to illuminate, check bulb and wiring as necessary.
8. Disconnect battery negative lead (-ve), disconnect and insulate the alternator main output (+ve) lead. Reconnect battery and check for battery voltage at the output lead, if low or no voltage is indicated, check the lead back to ST2, or starter motor.
9. Disconnect battery negative lead (-ve), connect an ammeter between the alternator main output (+ve) lead and its terminal on the alternator, reconnect the battery.
10. Switch on the headlamps and leave for approximately 15 minutes, to reduce the battery voltage; then switch them off.
11. Run the engine at approximately 3000 rev/min until the ammeter reading is less than 10 amps, the voltmeter reading should be within the limits of 13.6 to 14.4 volts.
12. If the alternator fails to charge, substitute the voltage regulator and repeat check 11, renew regulator or alternator as necessary.



J5300M

DIRECTIONAL INDICATORS AND HAZARD WARNING CIRCUIT

The components of the system are as follows:

DF1	Direction indicator switch
DF2	Hazard flasher switch and warning light
DF3	Right hand indicator lamps including trailer
DF4	Left hand indicator lamps including trailer
DF5	Flasher unit
DF6	Flasher unit internal relay
DF7	Flasher unit internal IC timer
DF8	Integrated circuit
DF9	Direction indicator, instrument warning light, trailer
DF10	Direction indicator, instrument warning light, vehicle
ST1	Battery
ST2	Terminal post - Pre 93 model year
ST5	Start/ignition switch
FL	Fused link - 93 MY
B3	Fuse
C8	Fuse

System operation

With the ignition switched on and the hazard warning switch DF2 latched in the down position a supply of current is provided to the direction indicator circuit via fuse B3.

When the indicator switch DF1 is operated, to indicate a left turn, current flows through DF2 and the flasher unit DF5 via the contacts of the internal relay DF6 and DF1 to the instrument warning light DF10 and the indicator lamps DF4. Current also flows through the integrated circuit DF8 to the trailer warning light DF9.

DF8 monitors the period of time that the lights are switched on and switches them off by passing current through the transistor DF7. This causes DF6 to be energised thus opening the contacts and switching off the indicators.

When indicating a right turn the flasher unit DF5 functions as described for left turn but DF1 switches the current flow to the right indicator lamps.

The hazard warning switch, when depressed, connects all the indicator lamps via fuse C8 to the flasher output, causing all the lamps to flash simultaneously.

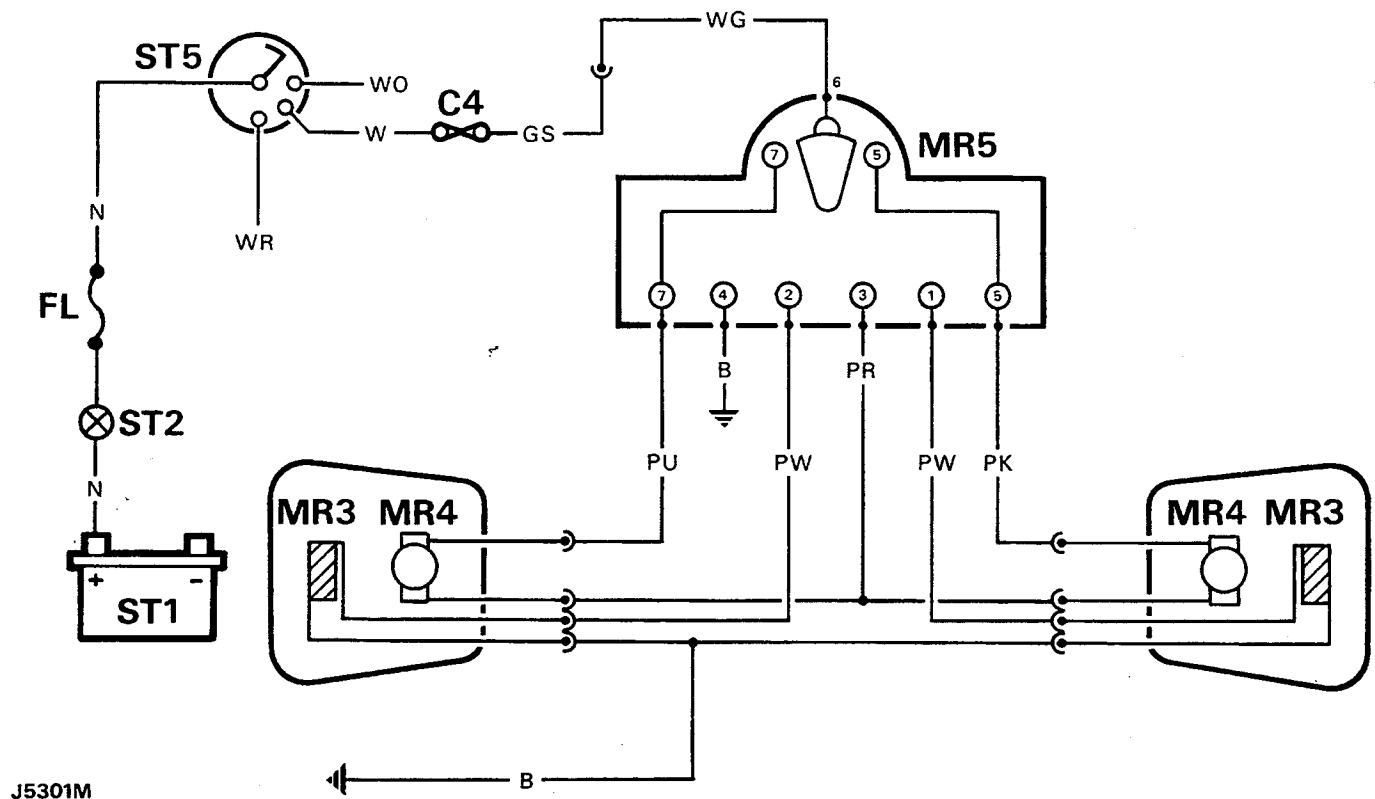
A Bulb Check Unit is fitted on vehicles for certain markets, this is a safety device that warns of any failed bulbs.

Circuit test

With the ignition switched OFF and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 or fused link, the N wire connection on the ignition switch ST5, the N wire connection on the hazard flasher unit DF2 and the PN wire connections on DF2 and the flasher unit DF5.
3. Check that fuse B3 is sound and with the ignition switched ON that power is reaching the G wire connection on DF2.
4. With the ignition switched OFF, check the operation of the hazard flashers and with the ignition switched ON, check the operation of the direction indicators.
5. If both systems fail to operate, check the LGN wire for a voltage reading at the respective connections on DF1, DF2 and DF5, at the same time alternately operating the hazard and indicator switches.
6. Should there be no output from DF6 when operating both systems renew DF5, if only the hazard system fails to operate renew DF2.
7. If the indicators fail to operate in one or both directions and all bulbs and wiring connections are satisfactory, renew DF1. Renew DF5 if both systems operate but the trailer warning light DF9 fails to illuminate.



ELECTRIC MIRROR CONTROL CIRCUIT

The components of the system are as follows:

MR3	Mirror clutch
MR4	Mirror motor
MR5	Control switch
ST1	Battery
ST2	Terminal post - Pre 93 model year
ST5	Starter/ignition switch
C4	Fuse
FL	Fused link - 93 MY

System operation

Each electric mirror contains a motor and two epicyclic gearboxes having nylon rack drives, which are positioned each side of an electro magnetic clutch.

The gearboxes and rack drives provide the necessary reduction ratio to move the mirror, whilst the clutch enables the motor to be connected to either gearbox. One gearbox and rack adjusts the vertical inclination of the mirror and the other gearbox and rack provides lateral adjustment.

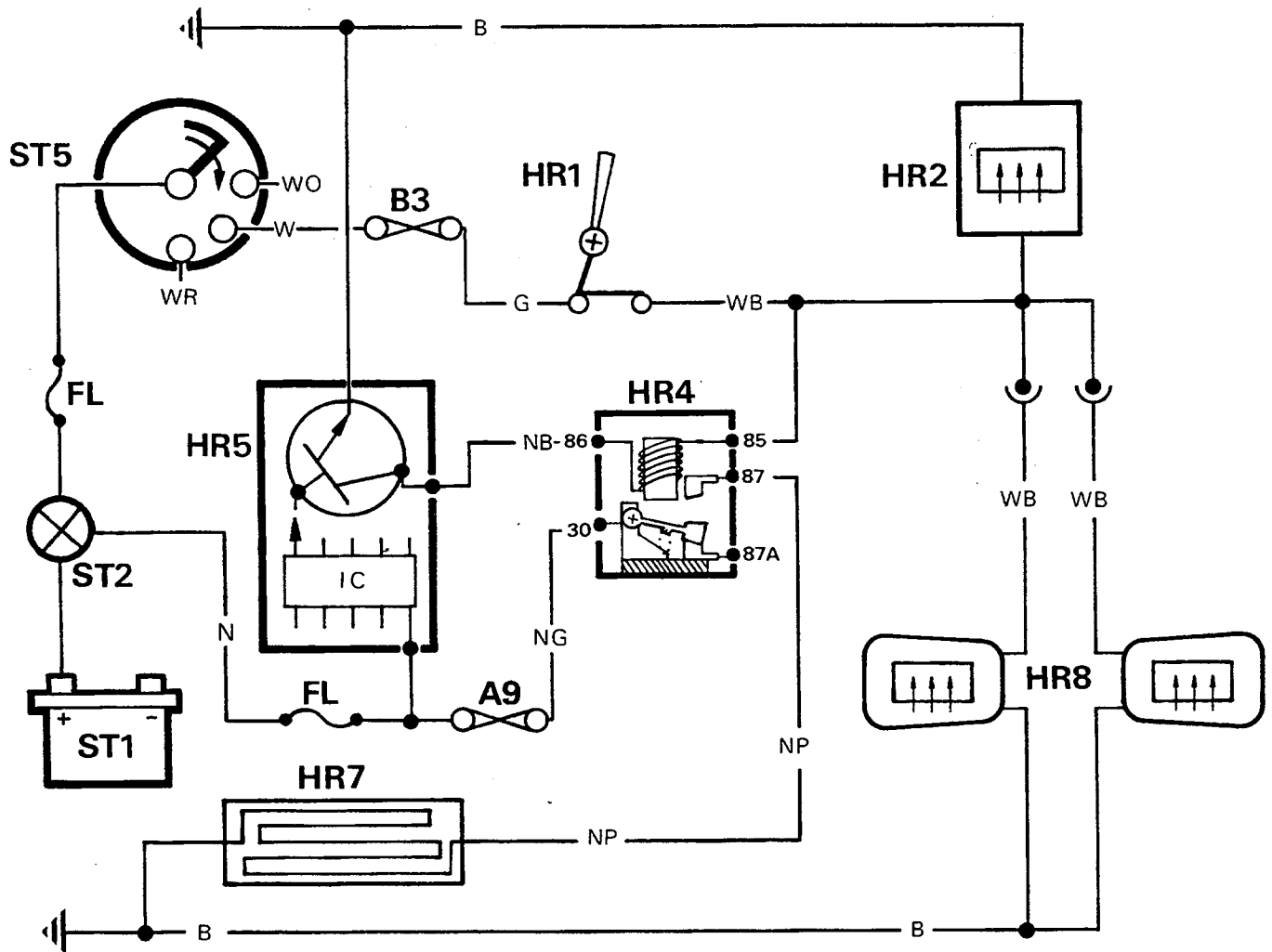
A combined changeover and adjustment control allows each mirror to be adjusted independantly. Turning the control knob either to the left or right will give mirror selection. Movement of the knob towards the left or right, without turning it, rotates the motor in the appropriate direction to give lateral adjustment. Movement of the control forward or backward, again without turning, gives vertical adjustment. The clutch will be heard to operate before the motor is powered.

Circuit test

With the ignition switched OFF and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 or fused link and at the ignition switch ST5 N wire.
3. With the ignition switched ON, check that all the circuits served by Fuse C4 will operate. If none of the circuits operate check the fuse and W wire from ST5 to the fuse panel.
4. Ensure that Fuse C4 is of the correct value and check the voltage at the WG wire terminal on the mirror control switch MR5.
5. If the mirrors still fail to operate, remove the trim panel from the side of the front footwell to gain access to the wiring harness.
6. Disconnect the mirror and main harness connector and connect a voltmeter between the PR wire in the main harness plug and a good earth. Select the right hand mirror on MR5, move the control lever UP and then to the LEFT, check for correct voltage in both positions.
7. Move the voltmeter probe from the PR wire to the PK wire and check for correct voltage when the control lever is moved to the RIGHT and then DOWN.
8. If no voltage readings are obtained, at the above locations, renew the mirror control switch MR5.
9. To check the mirror motor operation M4, connect a 12 volt + supply to the PK wire mirror/door harness. The motor should adjust the mirror when the PR wire is earthed. Reverse the connections to test the motor in the opposite direction.
10. Check the operation of the mirror clutch MR3 by connecting the 12 volt + supply to the PW wire, the clutch will be heard to operate when the B wire is connected to earth.
11. Repeat the foregoing checks to test the left hand mirror, noting that the PK wire for the right hand mirror becomes a PU wire on the left hand mirror.
12. With the ignition OFF and the meter set to ohms, check that the earths at the harness connectors are sound.



J5302M

HEATED REAR WINDOW AND MIRROR DEMIST CIRCUIT

The components of the system are as follows:

HR1	ON/OFF switch
HR2	ON/OFF switch light
HR4	Relay
HR5	Voltage sensitive switch (Air conditioned vehicles only)
HR7	Rear window element
HR8	Mirror elements
ST1	Battery
ST2	Terminal post - Pre 93 model year
ST5	Starter/ignition switch
A9	Fuse
B3	Fuse
FL	Fused link - 93 MY

System operation

The heated rear window, when in operation, imposes a fairly heavy load on the electrical system. Where vehicles are fitted with other systems that also impose a heavy load, such as the air conditioning system, a voltage sensitive switch is incorporated into the circuit. This unit automatically switches the heated rear window circuit off and on as necessary to ensure that other circuits are not affected by a drop in voltage.

With the ignition switch ST5 and the heated rear window switch HR1 in the ON position, current is fed via fuse B3 to the warning light HR2 and to the relay HR4. After passing through the relay windings the current flow passes to the voltage sensitive switch HR5, which is also connected directly to the battery via fused link (or terminal post ST2) to allow it to monitor battery voltage.

Providing that the battery voltage is not below 12.3 volts, HR5 will connect the current flow from terminal 85 on HR4 to earth, thus energising the relay contacts and allow a supply of current from fuse A9 to flow through the relay to the heated rear window.

If the battery voltage falls below 12.3 volts, HR5 automatically breaks the earth path for the relay windings and switches the system off. As the voltage rises again to 12.3 volts the earth path for the relay is reconnected by HR5 and the heated rear window is switched on.

The exterior rear view mirrors HR8 are fitted with heating elements and have an electrical supply direct from the switch HR1. As this part of the circuit is not controlled by the voltage sensitive switch, the mirror elements remain on for as long as HR1 is switched on.

Circuit testing

With the ignition switched off and the meter set to volts carry out the following:

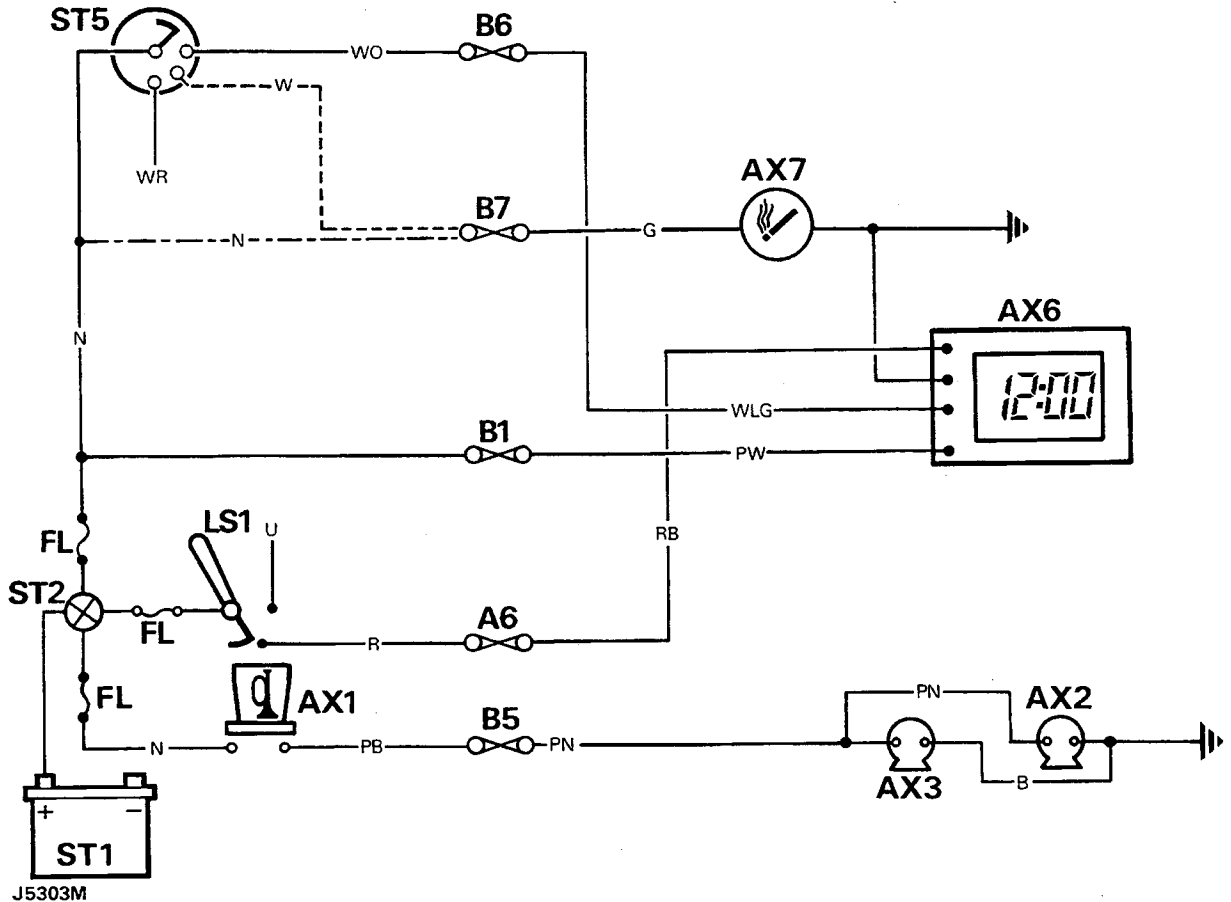
NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 or fused link and at the ignition switch ST5 N wire.
3. Carry out a voltage check at terminal 30 NG wire on the relay HR4. If the voltage is low check Fuse A9 and associated wiring.
4. With the ignition switched ON check the voltage at the W wire terminal on ST5 and at the G wire terminal on HR1. If the voltage is low check the wiring, Fuse B3 and the operation of ST5 before continuing.
5. Switch ON ST5 and the heated rear window switch HR1 and check the voltage at the WB connection. If necessary renew HR1 and repeat the test.

6. Check the voltage of the WB wire at relay HR4 and at the mirror connectors in both doors, also check that the earth lead to each mirror is satisfactory.
7. If a voltage sensitive switch is fitted connect a jump lead from the NB terminal on HR4 to a good earth. This will cause the contacts to close in HR4 and switch on the heated screen HR7.
8. Check the voltage at terminal 87 on HR4, if no reading renew the relay.
9. Check the voltage at the NP wire connection on HR7, if the reading is low check the condition of the NP wire from HR4.

Mirror defrost circuit testing

1. With ST5 and HR1 switched ON, check the voltage at the WB wire connector on the main harness.
2. Disconnect the mirror NB wires from the main harness, connect an ohm meter across the mirror element, the reading should be approximately 9 ohms for each mirror. Significantly more than 9 ohms indicates high resistance, an infinity reading denotes an open circuit and a zero reading a short circuit.
3. Check the remaining wiring and rectify as necessary.



AUXILIARIES SYSTEM CIRCUIT

The components of the system are as follows:

- AX1 Horn push
- AX2 Horn
- AX3 Horn
- AX6 Clock
- AX7 Cigar lighter
- LS1 Main lighting switch
- ST1 Battery
- ST2 Terminal post - Pre 93 model year
- ST5 Start/ignition switch
- A6 Fuse
- B1 Fuse
- B5 Fuse
- B6 Fuse
- B7 Fuse
- FL Fused link - 93 MY

- Australian vehicles
- Non Australian vehicles

System operation

The clock, and cigar lighter have permanent supplies via fuses B1 and B7. The permanent supply to the clock, through the PW wire, powers the memory.

Power is also supplied from the ignition switch ST5 via fuse B6 and the WLG wire to illuminate the clock when the ignition is switched on. A further supply from the main lighting switch through fuse A6 and the RB wire activates a dimmer unit within the clock when the vehicle lights are in use.

The horn push AX1 is supplied with power from ST2 via the main lighting switch LS1 from where it passes through fuse B5 and on to the horns.

System operation Australia

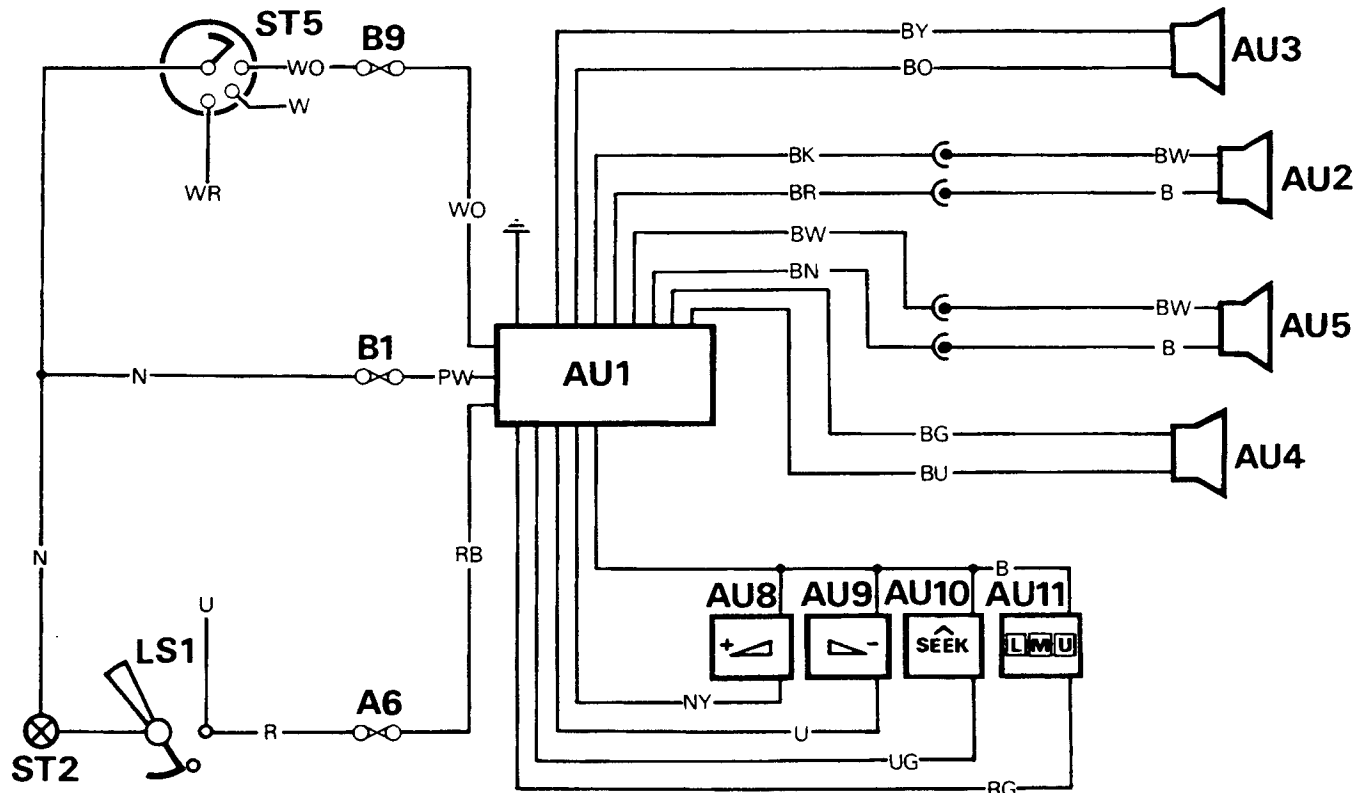
System operation for Australian vehicles, differs only in respect of the cigar lighter circuit. This takes its feed from the ignition switch via the W wire to Fuse B7 and on through the G wire to the cigar lighter.

Circuit testing

The auxiliary circuits are very simple and therefore only a guide to diagnosis is given.

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. With the ignition switched OFF check that all circuits served by Fuses B1 and B7 are operating.
2. If all the circuits fail to operate, check the supply from ST2 to the fuses, should only some of the circuits fail, check the fuses and any affected circuit using a voltmeter.
3. Switch the ignition ON, check the voltage at the WO wire terminal on ST5 and at Fuse B6. If satisfactory check the WLG wire at Fuse B6 and at the clock AX6, if no voltage is recorded check the fuse and wiring.
4. Switch on the main lighting switch LS1 and check the voltage at the R wire terminal and at Fuse A6. If satisfactory check the RB wire at Fuse A6 and at the clock AX6, if no voltage is recorded check the fuse and wiring.
5. If there is a fault on the horn circuit, commence checking by ensuring that the earth and Fuse B5 are satisfactory; then with the horn button depressed check the PN wires from the horns AX2 and AX3 back to fuse for voltage. If no voltage is recorded, check for voltage at the PB wire on the directional indicator switch multi-plug, again having the horn button in the depressed position. If voltage is still not evident, substitute the directional indicator switch and repeat the test.



J5190M

AUDIO SYSTEM CIRCUIT - PRE 93 MODEL YEAR

AUDIO SYSTEM

The components of the system are as follows:

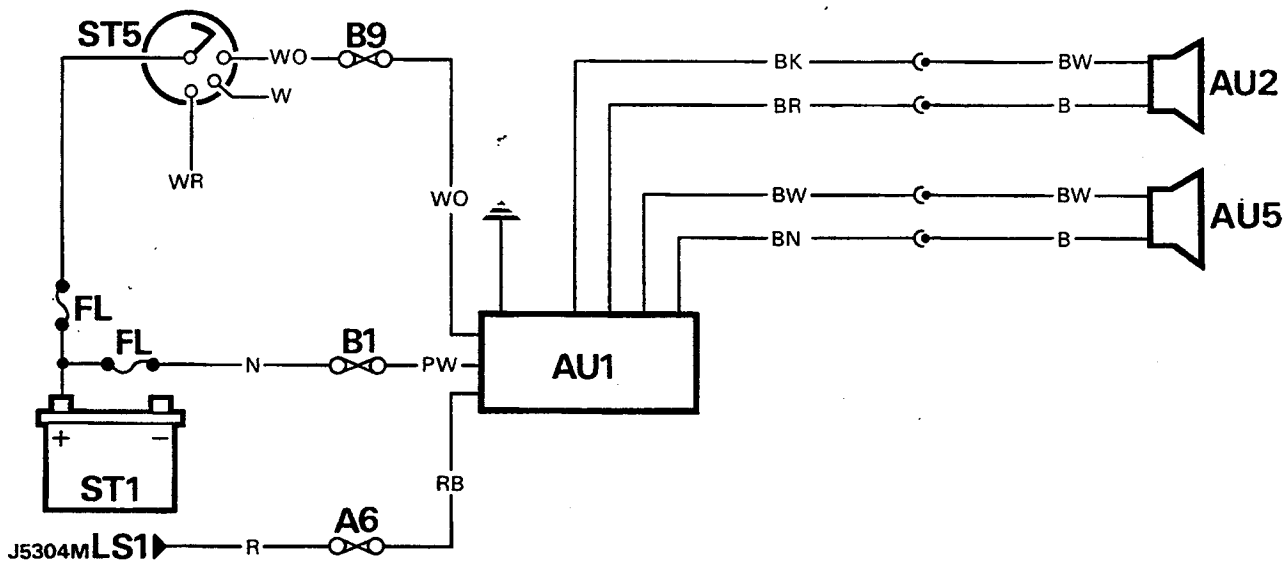
AU1	Radio/cassette player
AU2	Front LH speaker
AU3	Rear LH speaker
AU4	Rear RH speaker
AU5	Front RH speaker
AU8	Volume UP control
AU9	Volume DOWN control
AU10	Tuning control
AU11	Waveband control
LS1	Main lighting switch
ST2	Terminal post
ST5	Start/ignition switch
A6	Fuse
B1	Fuse
B9	Fuse

System operation

The audio unit will only operate when the ignition switch ST5 is switched on. This supplies power to the unit via the WO wire and fuse B9. A second supply from the terminal post ST2, through fuse B1 and the PW wire, maintains the memory.

On high specification vehicles remote audio controls, AU8, AU9, AU10 and AU11 are fitted to the instrument binnacle and connected by a separate harness to the audio unit.

It should be noted that the fuse rating for the audio unit fitted to high specification vehicles is of a higher value.



AUDIO SYSTEM 1 of 3 - 93 MODEL YEAR

The components of the system are as follows:

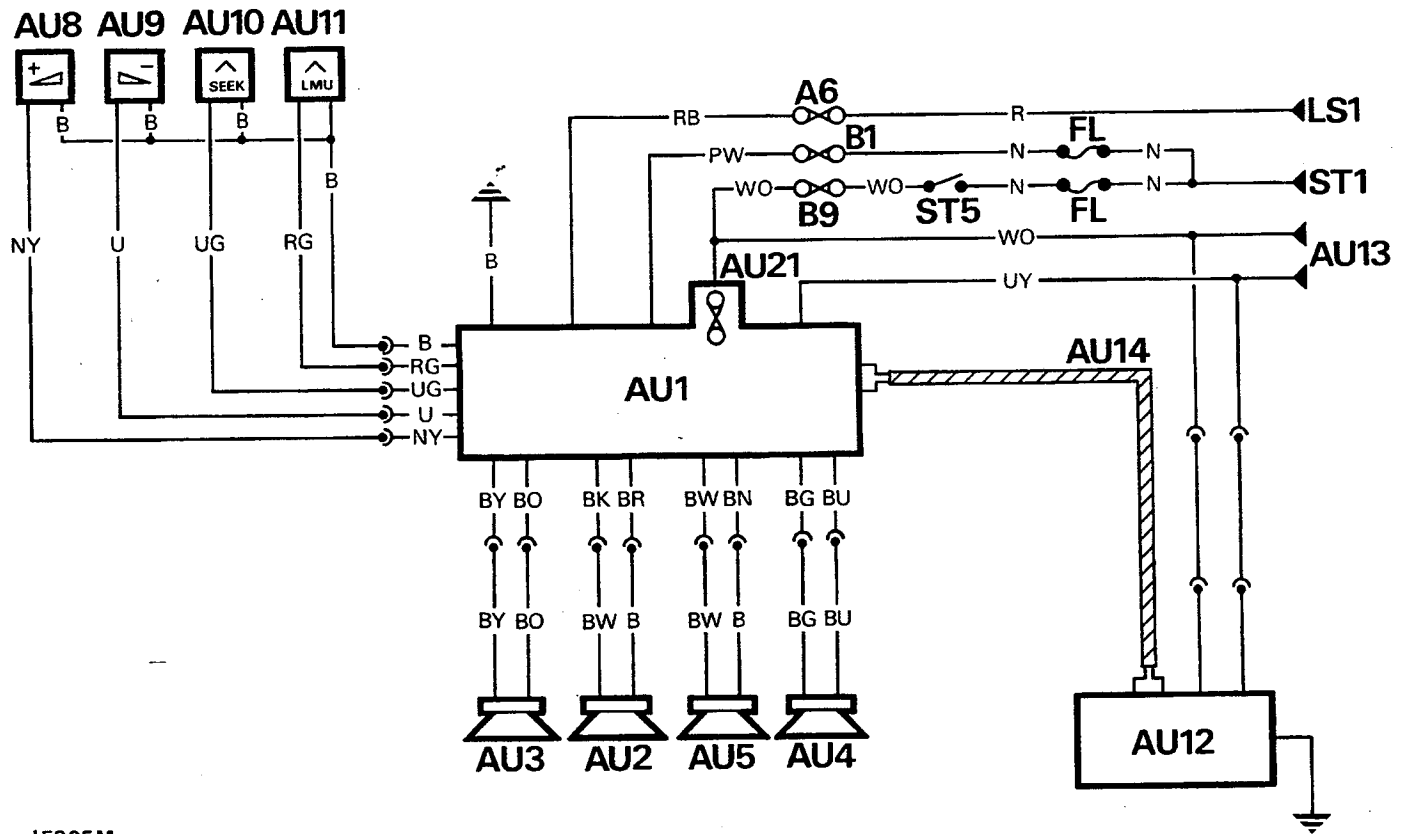
AU1	Radio/cassette player
AU2	Front LH speaker
AU5	Front RH speaker
LS1	From lighting switch
ST1	Battery
ST5	Start/ignition switch
A6	Fuse
B1	Fuse
B9	Fuse
FL	Fused link

Circuit testing

As this modular circuit is simple to understand, only a guide to fault diagnosis is provided.

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. With the ignition switched OFF, check the operation of all circuits served by Fuse B1. If B1 has failed, disconnect each of the circuits it serves and isolate the fault. Failure of B1 will also erase the memory of the audio unit AU1 and it will need to be re-programmed.
2. Switch the ignition ON and check the operation of AU1, if necessary check the supply from ST5, the wiring, Fuse B9 and all earth connections.
3. If radio interference is a problem check for correct earthing of the aerial, should the problem still persist it will be necessary to check the, charging, ignition, front and rear wash/wipe and the central door locking circuits until the source of the problem is found.

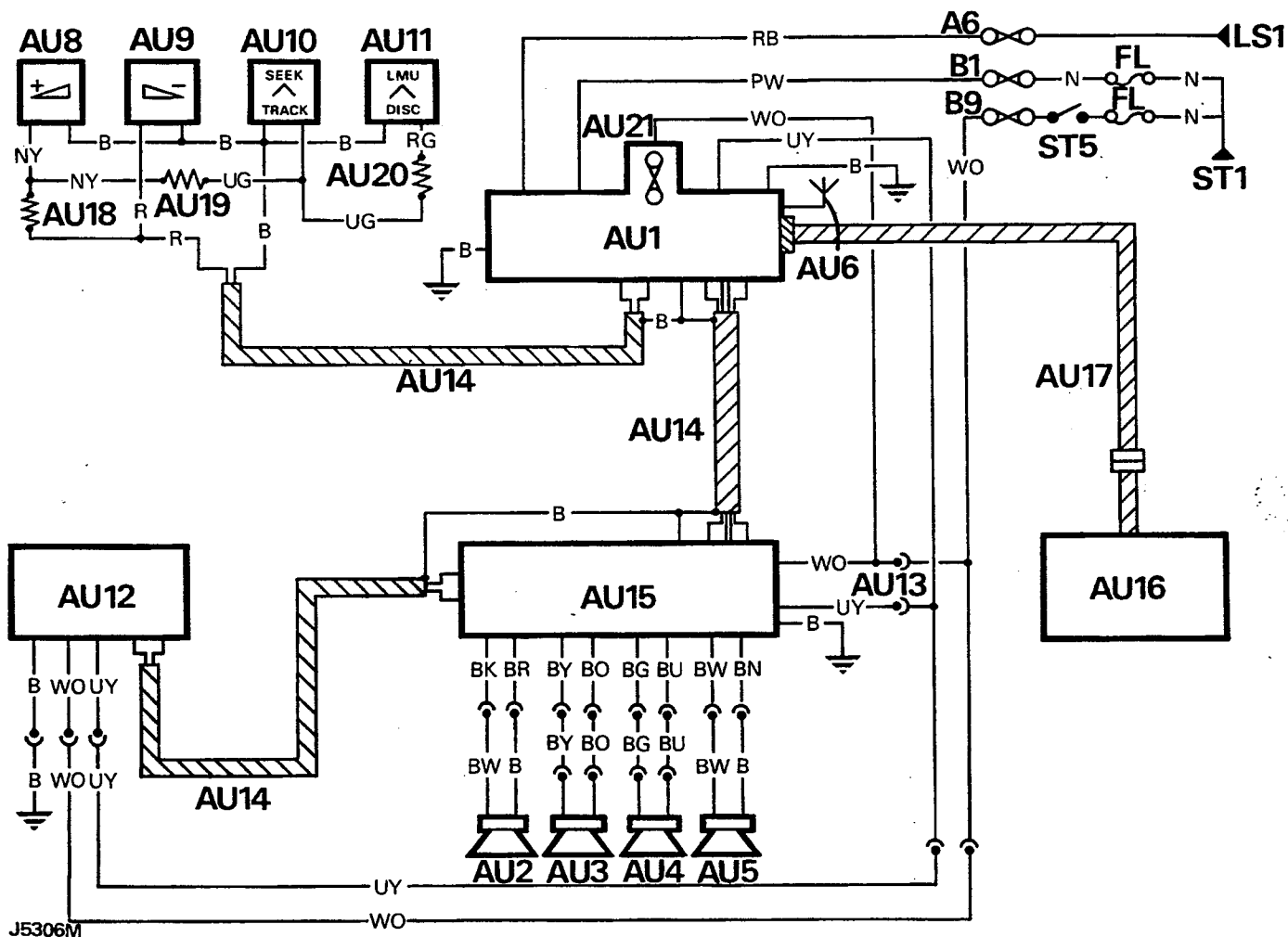


J5305M

AUDIO SYSTEM 2 of 3 - 93 MODEL YEAR

The components of the system are as follows:

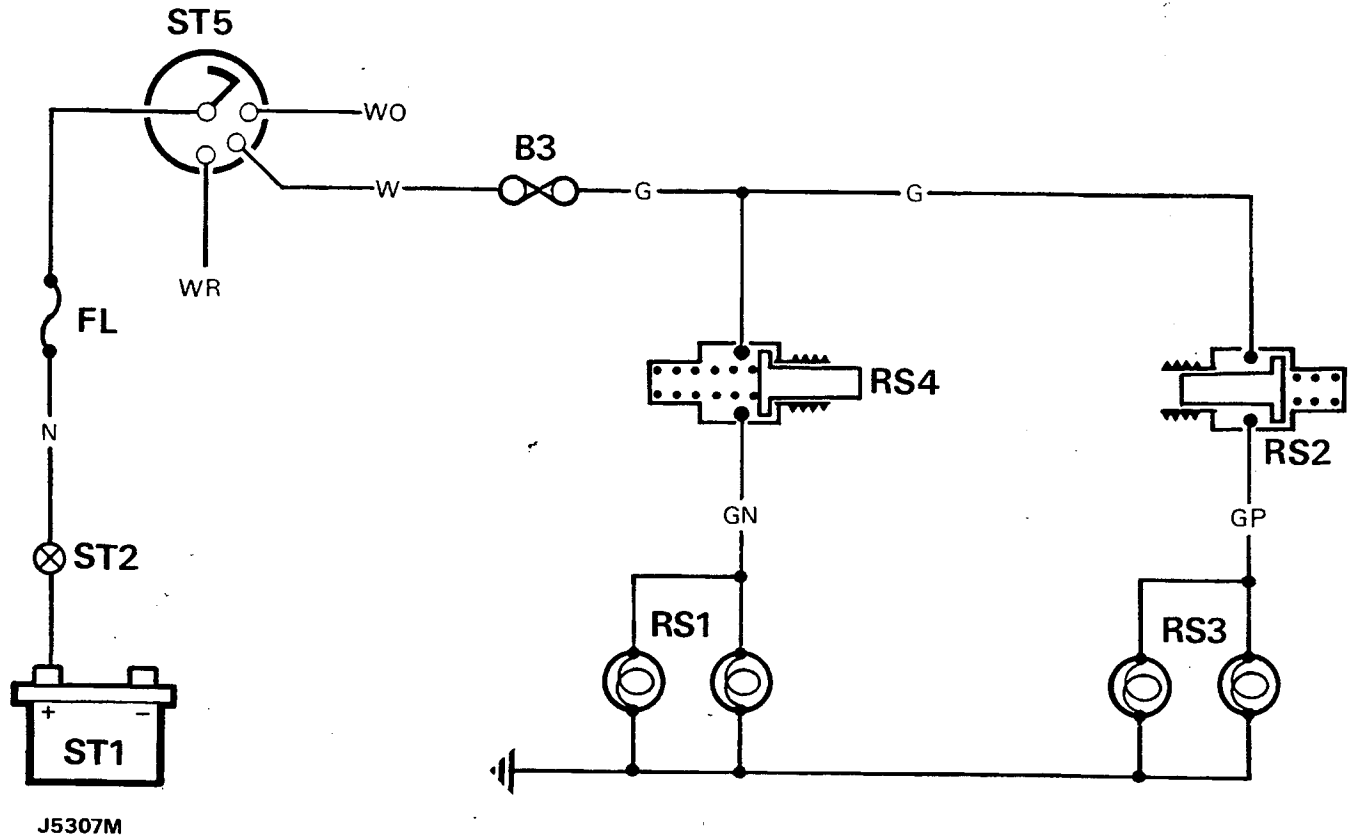
- AU1 Radio/cassette player
- AU2 Front LH speaker
- AU3 Rear LH speaker
- AU4 Rear RH speaker
- AU5 Front RH speaker
- AU8 Volume UP control
- AU9 Volume DOWN control
- AU10 Tuning control
- AU11 Waveband control
- AU12 Subwoofer
- AU13 Poweramplifier connection (unused)
- AU14 Screened and earthed cable
- AU21 7.5a Radio fuse
- LS1 Main lighting switch
- ST5 Start/ignition switch
- A6 Fuse
- B1 Fuse
- B9 Fuse
- FL Fused link



AUDIO SYSTEM 3 of 3 - 93 MODEL YEAR

The components of the system are as follows:

- | | | | |
|------|----------------------------|------|-----------------------|
| AU1 | Radio/cassette player | AU17 | Multicore cable |
| AU2 | Front LH speaker | AU18 | 390 ohms resistor |
| AU3 | Rear LH speaker | AU19 | 470 ohms resistor |
| AU4 | Rear RH speaker | AU20 | 820 ohms resistor |
| AU5 | Front RH speaker | AU21 | Radio fuse |
| AU6 | Aerial input | LS1 | Main lighting switch |
| AU8 | Volume UP control | ST1 | Battery |
| AU9 | Volume DOWN control | ST5 | Start/ignition switch |
| AU10 | Tuning control | A6 | Fuse |
| AU11 | Waveband control | B1 | Fuse |
| AU12 | Subwoofer | B9 | Fuse |
| AU13 | Poweramplifier connection | FL | Fused link |
| AU14 | Screened and earthed cable | | |
| AU15 | Remote amplifier | | |
| AU16 | Compact disc player | | |



REVERSE AND STOP LAMPS SYSTEM

The components of the system are as follows:

RS1	Reverse lamps
RS2	Stop lamp switch
RS3	Stop lamps
RS4	Reverse lamp switch
ST1	Battery
ST2	Terminal post - Pre 93 model year
ST5	Start/ignition switch
B3	Fuse
FL	Fused link - 93 MY

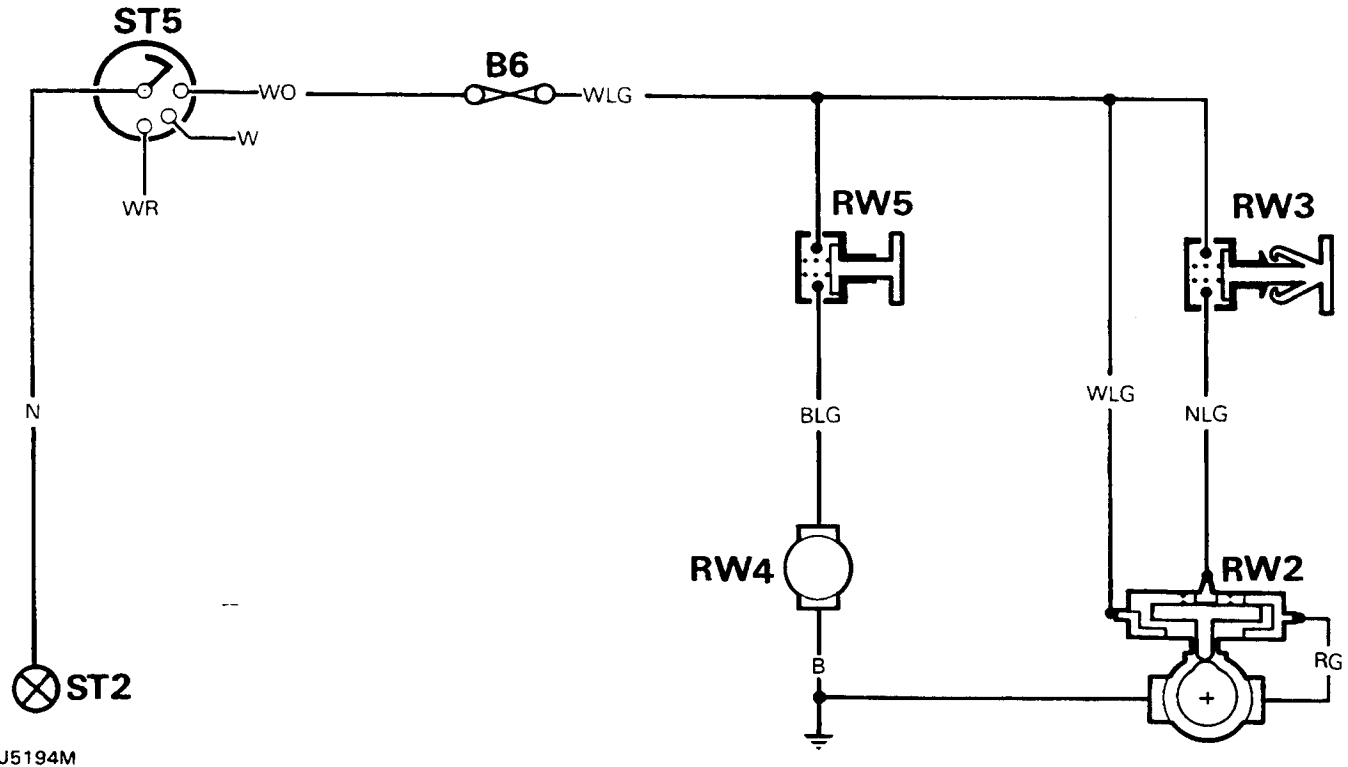
System operation

The reverse and stop lamps are operated by mechanical switches working in conjunction with the gear change mechanism and the foot brake. When the contacts in the switches are made, by either application of the footbrake or selection of reverse gear, the appropriate lamps will illuminate.

Circuit testing

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. If both reverse and stop lamps are not functioning, check Fuse B3, if the fuse is satisfactory, switch ON the ignition and check for voltage at the W wire into the fuse and as necessary back to ST5.
2. Should only one of the circuits be inoperative, check for voltage at the G wire terminal on the respective switch, engage reverse gear or depress the footbrake, dependant upon the circuit being checked and observe whether voltage is present at the GP wire terminal on the switch. Renew switch as necessary.



J5194M

REAR WASH/WIPE CIRCUIT (EARLY MODELS)

REAR WASH/WIPE SYSTEM (EARLY MODELS)

The components of the system are as follows:

- RW2 Wiper motor and park switch
- RW3 Wiper motor control switch
- RW4 Wash motor
- RW5 Wash motor control switch
- ST2 Terminal post
- ST5 Start/ignition switch
- B6 Fuse

System operation

The wash/wipe circuit is a simple circuit which receives current from Fuse B6 via the WLG wire, by depressing the motor control switch RW5 the current flows through the BLG wire to power the wash pump.

Depressing the wiper control switch RW3, which will hold until pressed a second time, allows current to pass through the NLG wire and power the motor. A separate supply via a WLG wire to the park switch ensures that the wiper arm completes its sweep and comes to rest in the correct place.

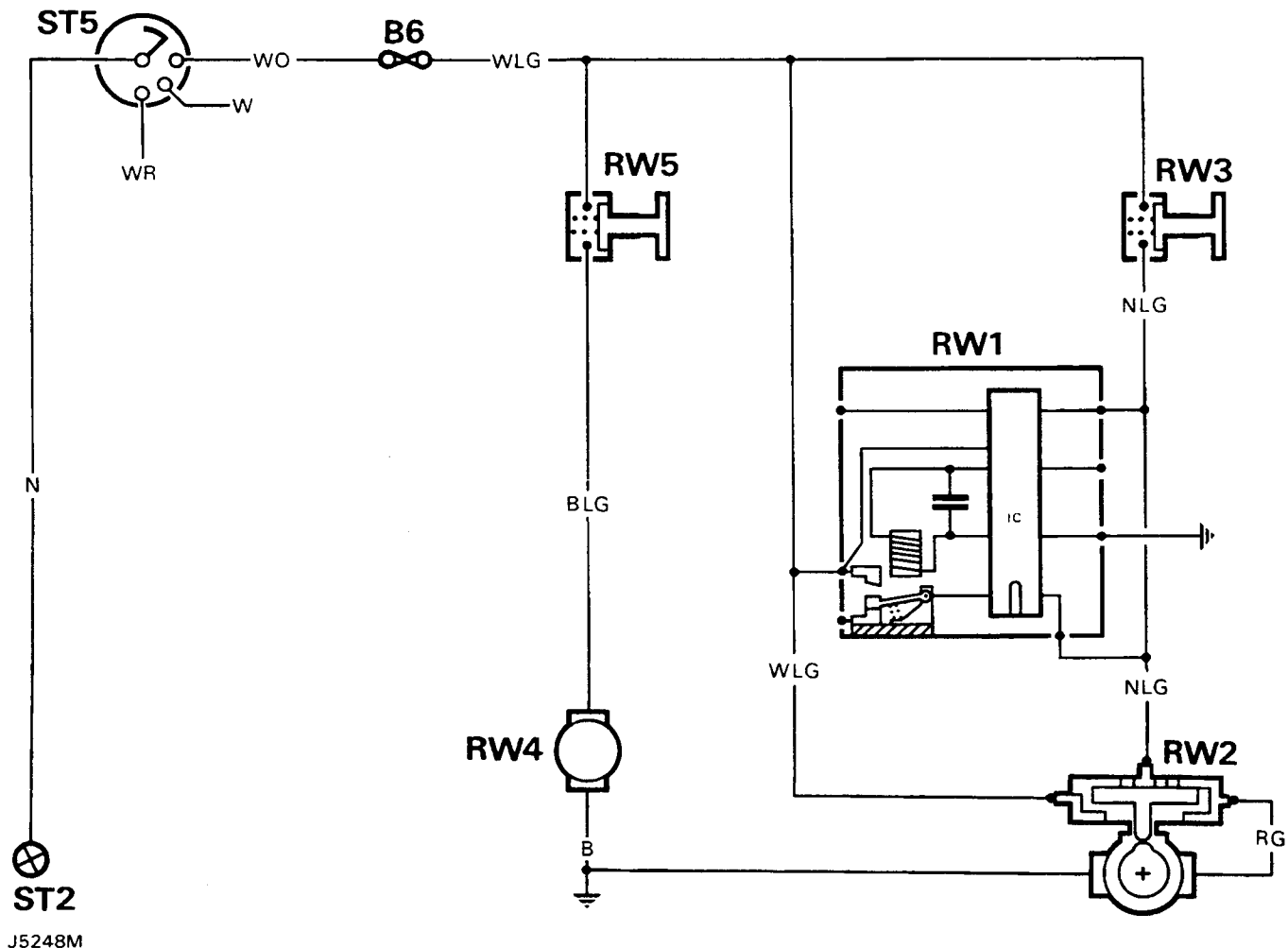
REAR WASH/WIPE SYSTEM (91MY ONWARD)

The components of the system are as follows:

- RW1 Delay timer unit
- RW2 Wiper motor and park switch
- RW3 Wiper motor control switch
- RW4 Wash motor
- RW5 Wash motor control switch
- ST2 Terminal post
- ST5 Start/ignition switch
- B6 Fuse

System operation

When the rear wiper switch is pressed the wiper will sweep the window twice, pause for approximately 7 seconds, then sweep the window a further two times. This sequence of two sweeps and a pause will continue until the switch is pressed again. Pressing the switch a second time will operate the wiper once and then stop.



REAR WASH/WIPE CIRCUIT (91 MODEL YEAR)

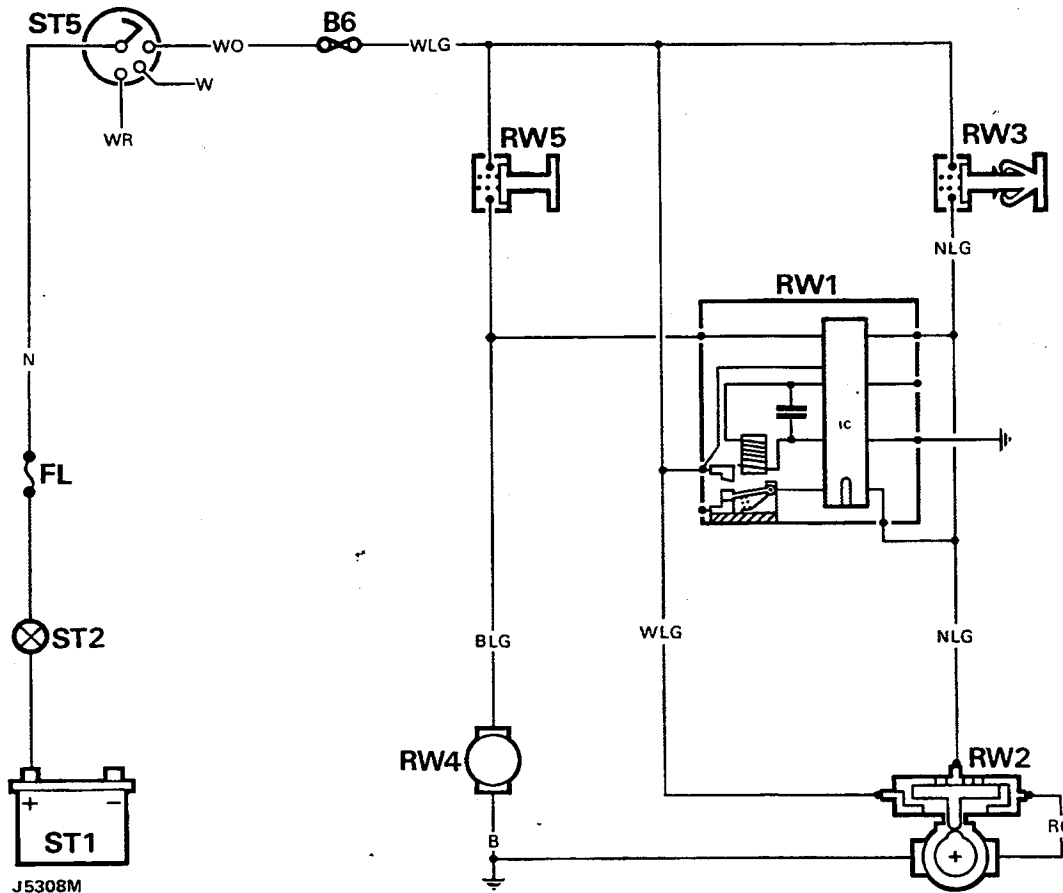
With the switch RW3 pressed once, current flows from Fuse B6 through the WLG wire, the switch and the NLG wire to the electronic circuits within the delay timer unit RW1. This causes the relay in RW1 to switch on an initial supply from the WLG wire to pass through the relay contacts and the integrated circuit to the NLG wire. The supply then travels via the park switch contacts and the RG wire to the wiper motor.

When RW3 has been released the electronic circuit and capacitor within RW1 will hold the internal relay energised and the motor running for a period of two return sweeps of the wiper. When the capacitor has discharged the relay contacts separate and the motor comes to rest in the park position for approximately seven seconds whilst the capacitor recharges and the cycle repeats.

Circuit testing

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Switch ON the ignition and check for voltage at the WO wire on Fuse B6. If necessary check the wiring back through ST5 to ST2 and rectify as required.
2. Examine Fuse B6, if satisfactory check for correct voltage at the WLG wire terminals at RW1, RW2, RW3 and RW5.
3. Connect the meter to the NLG wire at RW3, depress and hold RW3 and check for correct voltage, if no reading renew RW3.



4. With the meter connected to the NGL wire at RW2, depress and hold RW3 and listen for the relay operation in RW1. If the relay fails to operate or the meter does not register, check the earth connection before renewing the unit.
5. Depress and hold RW5 and check for voltage at the BLG wire at RW4. If RW4 fails to operate, check the earthing of unit and renew as necessary.
6. Connect the meter to the RG wire on RW2, depress RW3 and check for correct wiper operation and voltage reading. Check for sound earth connections before renewing RW2.

REAR WASH/WIPE CIRCUIT - JUNE 92 ONWARDS

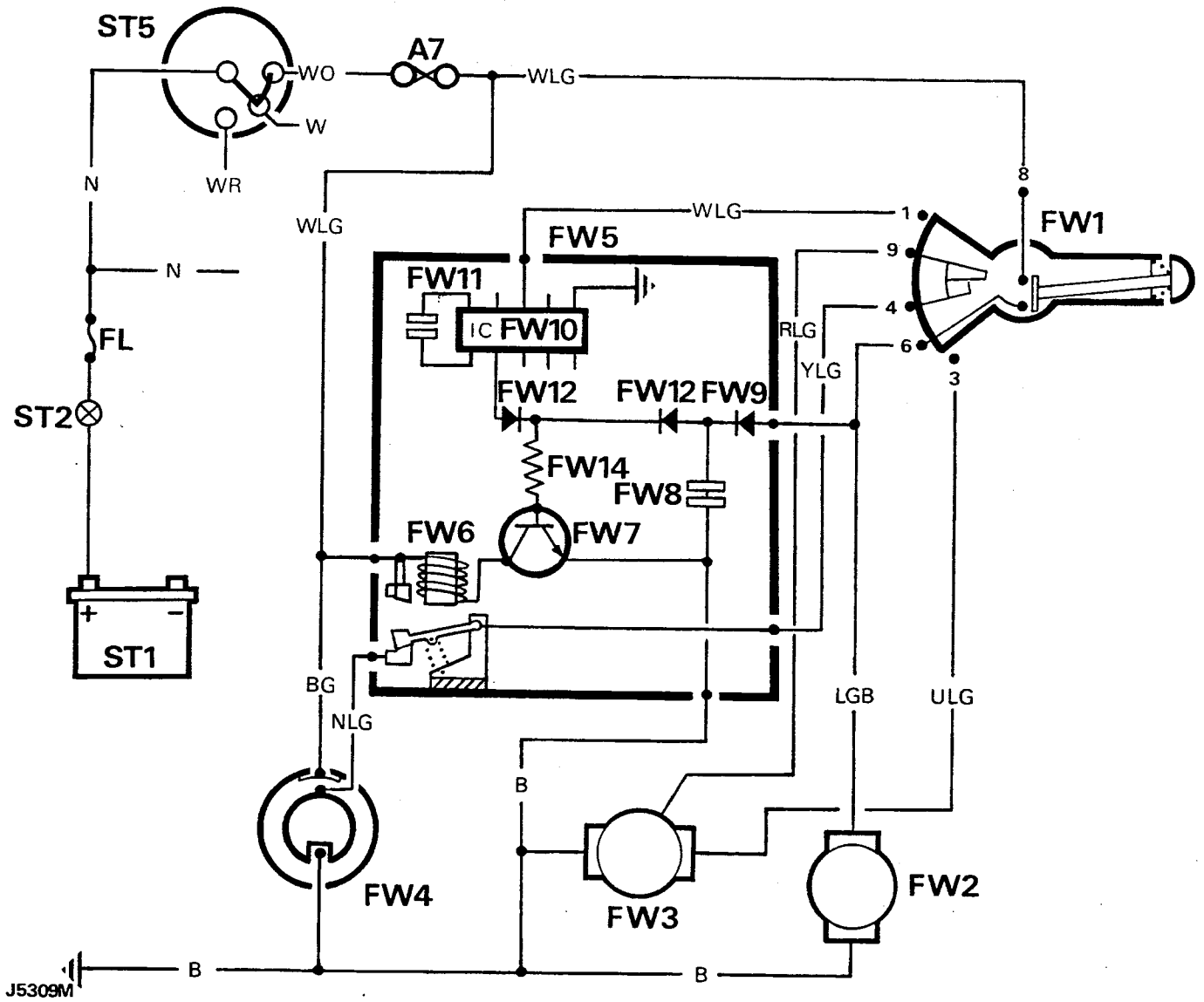
The components of the system are as follows:

RW1	Delay timer unit
RW2	Wiper motor park switch
RW3	Wiper motor control switch
RW4	Wash motor
RW5	Wash motor control switch
ST1	Battery
ST2	Terminal post - June 92
ST5	Start/ignition switch
FL	Fused link - 93 MY

System operation

With the switch RW3 latched the wiper sweeps 3 or 4 times then pauses for a few seconds. The wiper then sweeps once and pauses until switched off.

Pressing switch RW5 actions water jet and wiper to sweep 3 or 4 times then stop until pressed again.



FRONT WASH/WIPE CIRCUIT

FRONT WASH/WIPE

The components of the system are as follows:

- FW1 Wiper control
- FW2 Washer motor
- FW3 Wiper motor
- FW4 Wiper motor park switch
- FW5 Delay timer unit
- FW6 Relay
- FW7 Transistor

- FW8 Capacitor
- FW9 Diode
- FW10 Integrated circuit
- FW11 Capacitor
- FW12 Diode
- FW13 Diode
- FW14 Resistor
- ST1 Battery
- ST2 Terminal post - Pre 93 model year
- ST5 Start/ignition switch
- A7 Fuse
- FL Fused link - 93 MY

System operation

The system is operated by a multi-position control switch located on the right hand side of the steering column. Each function of the control switch is explained in the following paragraphs.

At rest off/park position

With the control lever FW1 in the off/park position and the ignition switched on, current is fed from Fuse A7 via the WLG wire to terminal 8 in the control lever. Current is also carried to one contact of the relay in FW5, via the WLG wire.

It is important to note that with the FW1 in the off/park position, the wiper motor FW3 has two earths. One earth is direct from the motor through the black wire. The second earth path is from the slow speed motor connection, through the RLG wire to terminal 9 on FW1, out from FW1 via terminal 4, through the YLG wire to the relay contact FW6 and through the NLG wire to the park switch track connection and earth.

Wash/wipe

Depressing the push button at the end of FW1 connects terminals 8 and 6 and allows the supply of current to pass through the LGB wire to power the washer motor FW2. Simultaneously flowing through diodes FW9 and FW12, resistor FW14 and the base emitter circuit of transistor FW7 to earth, causing FW7 to switch. With FW7 switched, current flows through the relay windings FW6 and the collector emitter circuit of FW7 and energises the relay contacts.

With the relay contacts closed, current is fed via the YLG wire to terminal 4 on FW1 and exits through terminal 9 through the RLG wire to the slow speed brush on FW3. While the push button is operated the capacitor FW8 is being charged. Releasing the button cuts off the power supply to FW7 and the capacitor FW8 discharges via FW12, FW14 and the base emitter circuit of FW7 to earth keeping it switched on and the relay contacts closed.

When the capacitor is discharged the relay will break the direct supply via the WLG wire and introduce a supply to the wiper motor through the park switch FW4. When the park switch contact disc, which is driven by the motor, reaches the park position, one contact runs onto the insulation and the motor stops. With the contact disc in the rest position both connections to the motor are earthed ensuring that it stops instantly.

Wiper on slow speed

With the control set to slow speed current is supplied to terminal 9 on FW1 and via the RLG wire to the slow speed brush in the motor. The wiper motor will also drive the park switch contact disk which alternately connects and disconnects terminal 4 of FW1 through the relay contacts and the YLG wire. This ensures that the wiper motor will park when switched off.

Wiper on fast speed

When FW1 is switched to fast speed, power is supplied to terminal 3 of FW1 then via the ULG wire to the fast speed brush on the wiper motor.

Flick wipe

With FW1 in the OFF position a single sweep of the wiper may be obtained by lifting the lever towards the driver. Lifting the lever momentarily disconnects terminals 9 and 4 and connects terminals 8 and 9 on FW1, providing a feed to FW3 through the RLG wire. If FW1 is lifted and held, the wiper will continue to sweep the screen until the lever is released, when terminal 8 is disconnected and 9 and 4 reconnected to park the motor.

Intermittent variable wipe

When FW1 is moved to the intermittent variable delay position, the time delay between the motor operation is governed by the adjustment of the variable resistance in the control lever to terminal 1 and the delay unit integrated circuit FW10. The resistance value, set by the driver, determines the time taken to charge the capacitor FW11 and therefore the delay between each return sweep of the screen by the wiper arm. FW10 automatically controls the switching of the capacitor FW11 so that it discharges through diode FW13, resistor FW14 to the base emitter circuit of FW7 which in turn switches on the earth path to energise the relay FW6 to run the motor. When the capacitor has discharged FW7 switches off, the relay contacts move to the other position, switching on the park circuit to stop the motor.

Circuit testing

With the ignition switched off and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 and at the ignition switch ST5 N wire.
3. With the ignition switched ON check the voltage at Fuse A7. If necessary check the WO wiring and connections from ST5.
4. Check for correct voltage at the WLG wire terminals on the wiper control FW1, the delay unit FW5 and at the BG wire terminal on the wiper motor park switch FW4.
5. Move FW1 to the normal run position and check for correct voltage at the RLG wire at the motor FW3 multi-plug. If necessary check the RLG wire from FW1.
6. Move FW1 to the fast run position and check for correct voltage at the ULG wire on FW3 multi-plug. If necessary check the ULG wire from FW1.
7. Move FW1 to the delay position and check the voltage at FW5. If the reading is incorrect check the condition of the WG wire back to FW1. Should the wipers fail to operate in the delay mode, renew FW5 and recheck the function. If the wipers operate in the fast and slow mode, but fail to park correctly, renew FW5 and recheck the operation.
8. To check the wash/wipe mode, depress and hold the button on the end of FW1 and check the voltage at the LGB wire on FW1 and the screenwash motor FW2. If there is no voltage at FW1 renew FW1 and recheck. If there is no voltage at FW2, check the LGB wire from FW1. Also check for correct voltage at the RLG wire on FW1. If there is no reading at either or both points renew FW1.

HEADLAMP POWER WASH

System operation

The power wash pump PW2 and the wash timer PW1, which is supplied with power direct from the terminal post and the headlamp dipped beam switch via Fuse A1, are activated by operating the windscreen wash switch FW1. The power supply from the headlamp dip circuit charges a capacitor in the wash timer unit PW1, which when triggered by the current from FW1, through terminal 6, causes the relay contacts to close and the pump to operate by receiving power from the relay through the LGR wire.

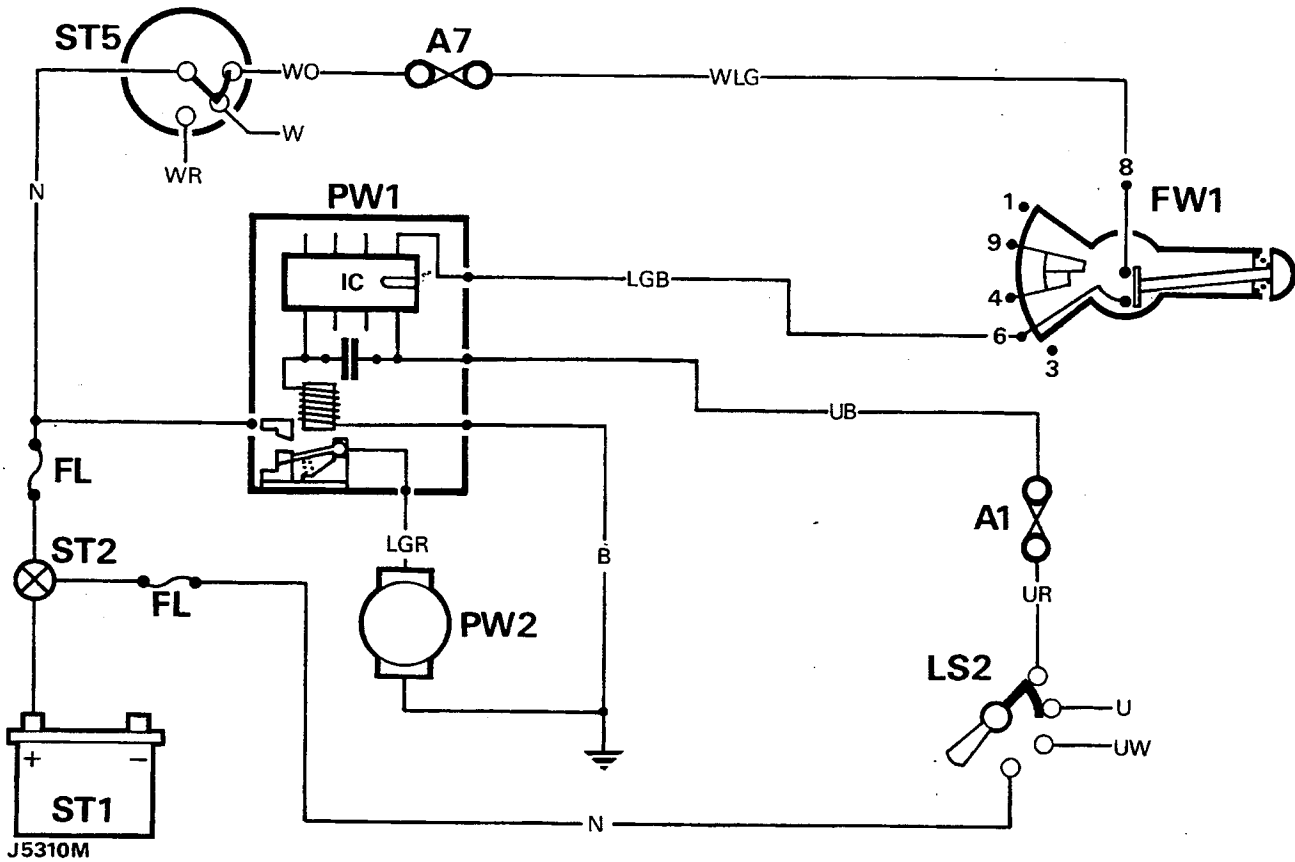
The wash timer will operate the pump for approximately one second, this is usually sufficient to clean the headlamp lenses. Holding the wash button depressed will not extend the wash period as the timer capacitor needs to be recharged before the cycle can be repeated. The system will only operate when the headlamps are in the dipped beam position.

Circuit testing

With the ignition switched off and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 and at the ignition switch ST5 N wire.
3. Check the voltage at the N wire connection on the timer unit PW1, if no or low reading is obtained check the wiring back to ST2.
4. With ST5 switched ON check the operation of all other circuits served by Fuse A7, if necessary rectify any faults back to ST2 or renew A7.

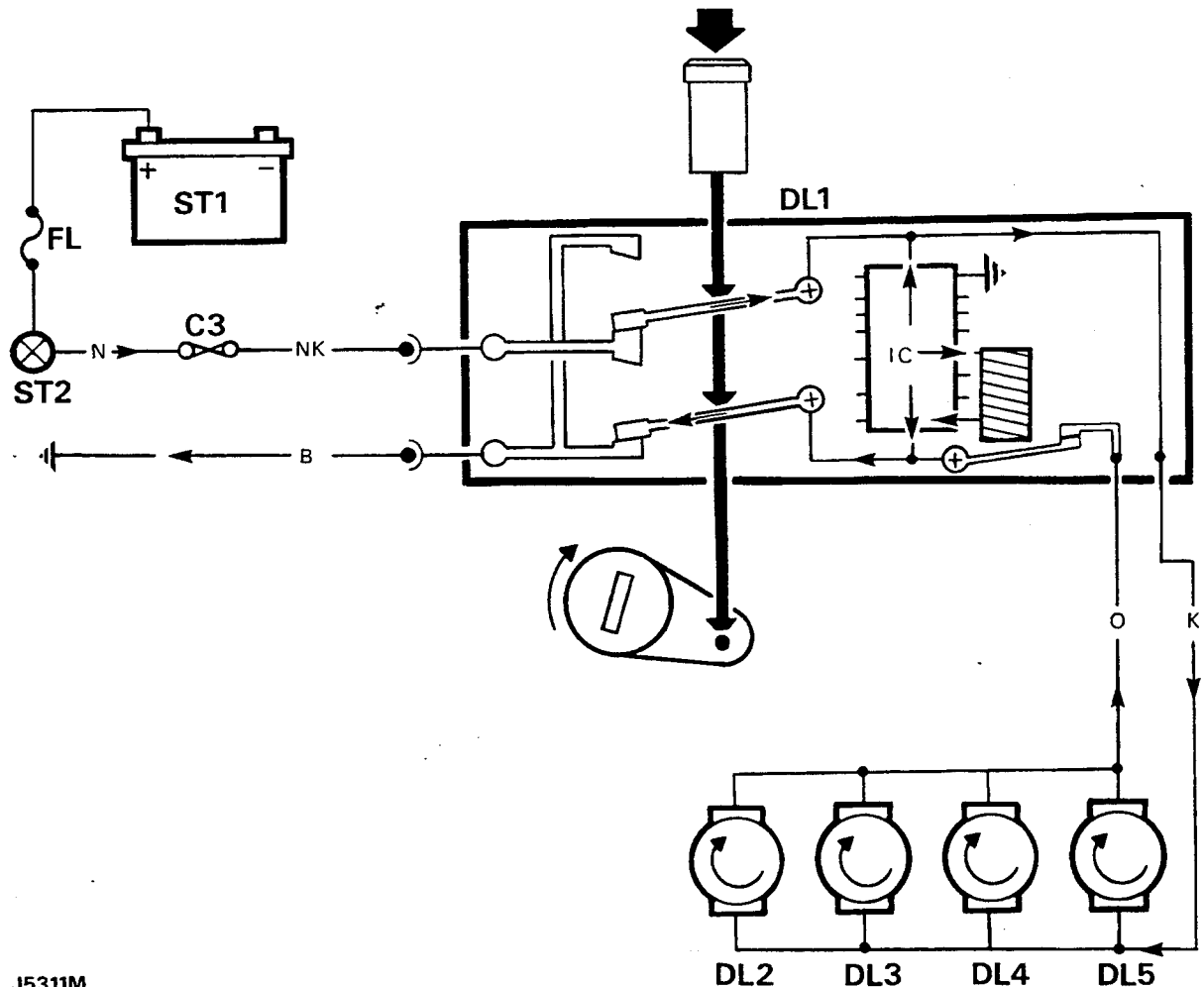


HEADLAMP POWER WASH CIRCUIT

The components of the system are as follows:

- FW1 Wiper control
- PW1 Wash timer
- PW2 Wash motor
- LS2 Head lamp main and dipped beam switch
- ST1 Battery
- ST2 Terminal post - Pre 93 model year
- ST5 Start/ignition switch
- A1 Fuse
- A7 Fuse
- FL Fused link - 93 MY

5. Check for satisfactory operation of FW1 by operating the front screen washer.
6. Ensure that the lighting circuit is in order and that Fuse A1 is sound.
7. With ST5 switched ON and FW1 held depressed check the voltage at the LGB and UB connections on PW1. If no voltage reading is obtained check back through each circuit and rectify as necessary.
8. Ensure that PW1 is correctly earthed then check the voltage at the LGR connection. Renew PW1 if there is no voltage or if the timer function has failed.
9. If the foregoing checks are satisfactory and the system still fails to operate renew the wash motor/pump.



J5311M

CENTRAL DOOR LOCKING NON ALARMED

The components of the system are as follows:

DL1	Drivers door lock actuator
DL2	Passenger door lock actuator
DL3	Rear door lock actuator
DL4	Rear side door lock actuator
DL5	Rear side door lock actuator
ST1	Battery
ST2	Terminal post - Pre 93 model year
C3	Fuse
FL	Fused link - 93 MY

System operation

The central door locking system allows the three passenger doors and the rear door to be locked or unlocked using the drivers exterior key or interior sill knob. The rear side doors can be independantly locked or unlocked from the inside using the appropriate sill knob, which will be overridden when the lock controls in the drivers door are used. The front passenger door and the rear door may be locked or unlocked in isolation, from the outside using the key or from the inside using the sill knob.

The drivers door actuator DL1 contains a double acting micro switch, an IC solid state load sensor/timer and a relay. Battery voltage is supplied from the terminal post ST2 or fused link on 93 model year via Fuse C3 to one of the micro switch contacts. The two micro switches, which are manually operated by the key or sill knob, change the polarity of the feed to the motors to change their direction of rotation. The relay and load sensor/timer ensure that the motors operate only for the time required to lock or unlock the doors.

Circuit testing

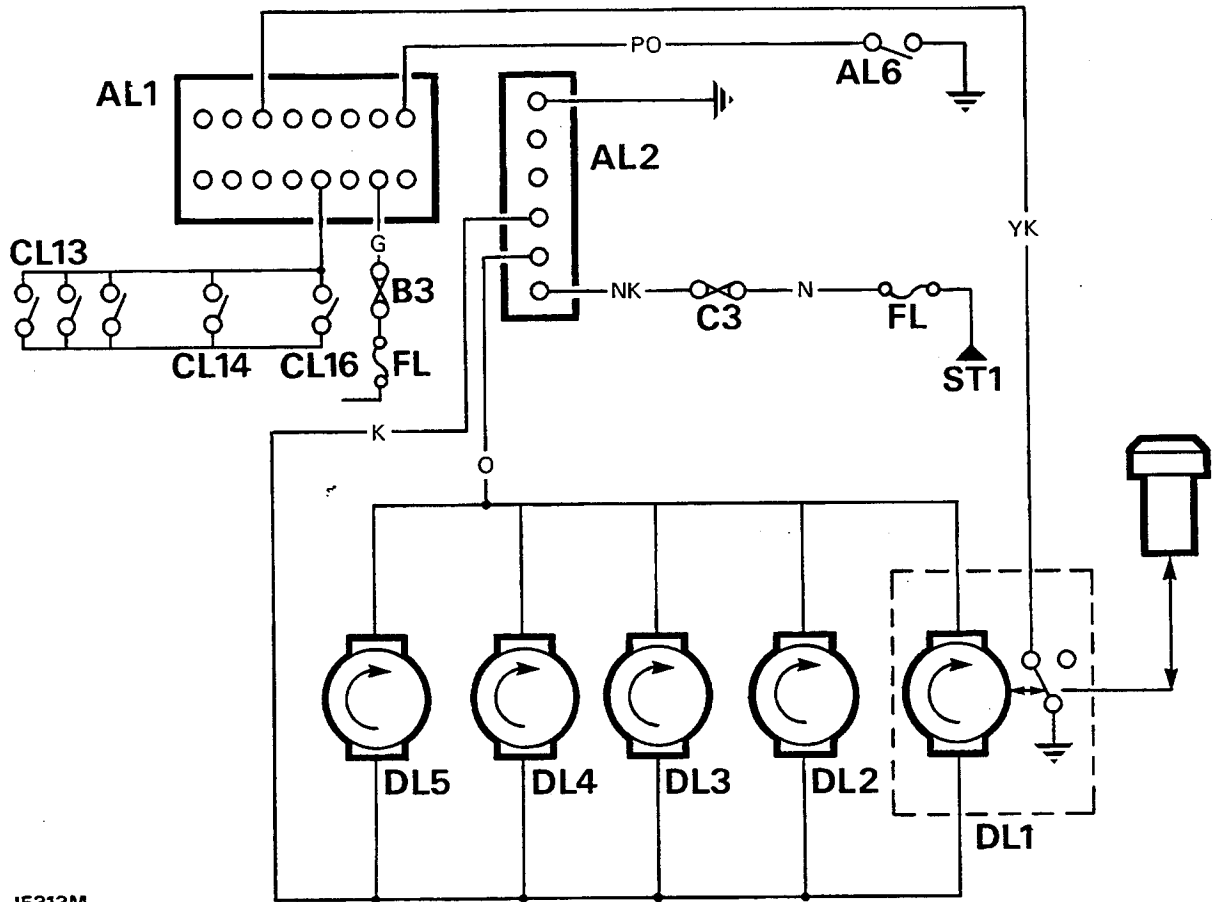
With the ignition switched off and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 (or fused link) and Fuse C3.
3. Check the voltage of the NK wire at the connector block inside the drivers door. If the voltage is below 11 volts check the condition of the wiring back to Fuse C3.

NOTE: To test the system beyond the drivers door lock actuator it is easier to use a test lamp in preference to a voltmeter, owing to the very brief current flow in the circuit while the system is in operation.

4. Connect the test lamp to the O wire in the drivers door actuator lead and earth. Operate the door lock and observe the test lamp, which should flash on briefly when the door mechanism is locked.
5. Repeat the above with the test lamp connected to the K wire and earth. The lamp should flash briefly when the door mechanism is unlocked.
6. Carry out the foregoing checks on all of the door lock actuators to ascertain that the wiring harness is satisfactory.
7. If with the test lamp connected to the K wire, the lamp illuminates when the drivers door mechanism is locked and unlocked, there could be a fault in the O wire. If the test lamp illuminates when the drivers door is locked and unlocked when connected to the O wire, the fault could be in the K wire.



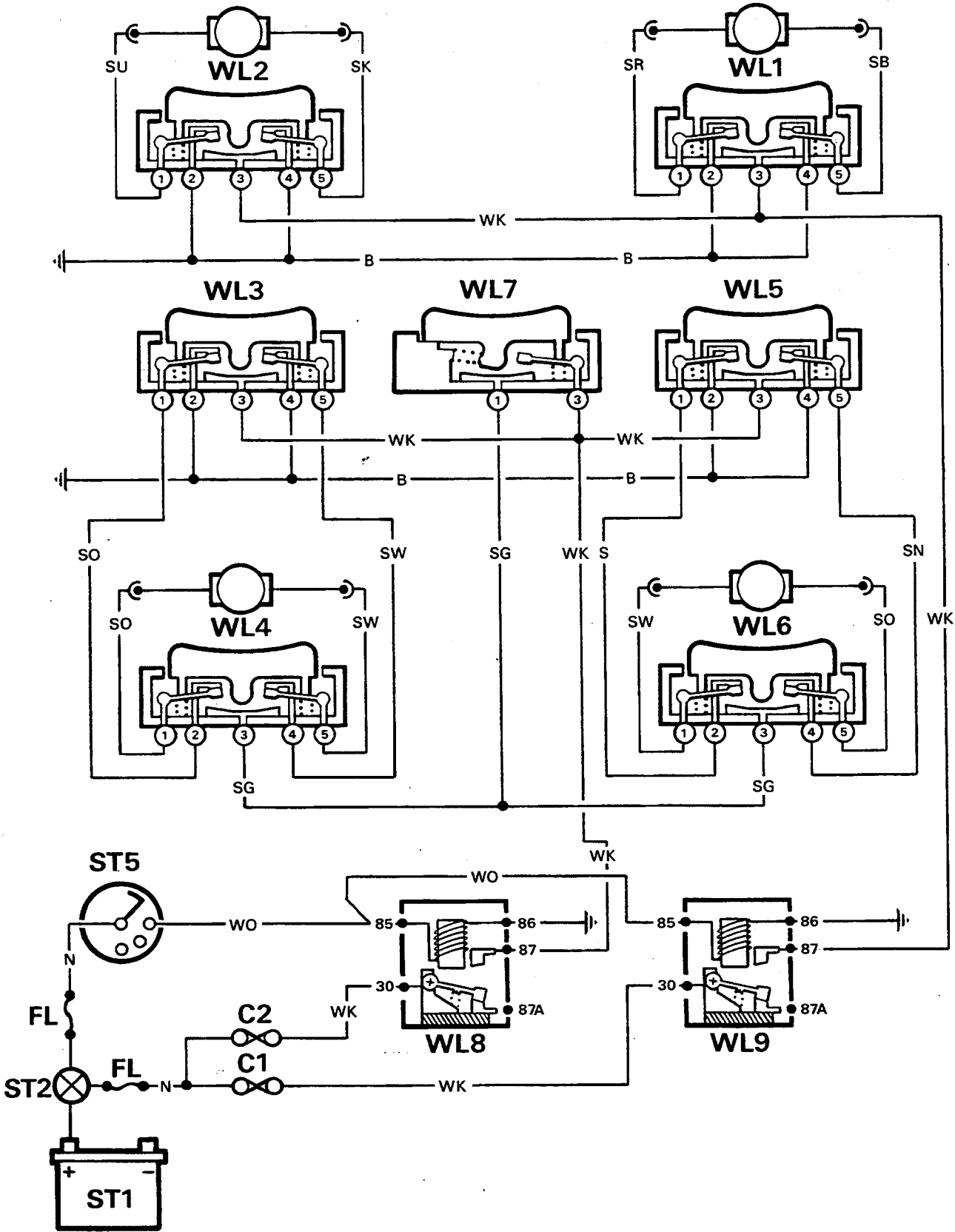
J5313M

**CENTRAL DOOR LOCKING ALARMED
- 93 MODEL YEAR**

The components of the system are as follows:

- DL1 Drivers door lock actuator
- DL2 Passenger door lock actuator
- DL3 Rear door lock actuator
- DL4 Rear side door lock actuator
- DL5 Rear side door lock actuator

- ST1 Battery
- B3 Fuse
- C3 Fuse
- FL Fused link
- AL1 16 way connector to alarm ECU
- AL2 6 way connector to alarm ECU
- AL6 Bonnet switch
- CL13 Rear side and rear door switches
- CL14 Front passenger door switch
- CL16 Drivers door switch



J5312M

ELECTRIC WINDOWS CIRCUIT

ELECTRIC WINDOWS

The components of the system are as follows:

WL1	Front RH window control switch and motor
WL2	Front LH window control switch and motor
WL3	Rear LH window, drivers control switch
WL4	Rear LH window control switch and motor
WL5	Rear RH window, drivers control switch
WL6	Rear RH window control switch and motor
WL7	Rear passenger windows, drivers master switch
WL8	Relay, rear windows
WL9	Relay front windows
ST1	Battery
ST2	Terminal post - Pre 93 model year
ST5	Start/ignition switch
C1	Fuse
C2	Fuse
FL	Fused link - 93 MY

System operation

With the ignition switch ST5 ON or in the auxiliary position the windings of the relays WL8 and WL9 are energised.

Energising the relays introduces a supply of current through the WK wire via fuses C1 and C2 and the relay contacts to the window control switches WL1, WL2, WL3, WL5 and the drivers rear side door window master switch WL7.

When operating the switches for the front passenger and drivers windows, WL1 and WL2, a supply is connected to the appropriate motor through a set of contacts in the switch being used. A second set of contacts within the switch provides the earth path to complete the circuit.

When operating the switches controlling the rear passenger door windows, from the drivers position, a supply is connected to the motor through the contacts in the switch being operated and the contacts in the door mounted control switch. The earth circuit is also through the door switch contacts back to the drivers control switch.

The switches mounted in the rear side doors, WL4 and WL6, will only operate when the drivers master switch WL7 is in the ON position. These switches operate in the same manner as the front door switches when they not isolated by the master switch.

Each of the motors is fitted with a thermal cut-out switch, should the control switch be held in the depressed position after the window has fully closed or opened, the thermal cut-out will operate to prevent damage to the motor. The thermal cut-out will also operate if a window is stalled in any intermediate position. Full control is restored when the motor and switch have cooled.

Circuit testing

With the ignition switched off and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 or fused link, fuses C1 and C2 and at terminals 30 on WL8 and WL9, if necessary check the wiring and renew fuses.
3. With the ignition switched ON check the voltage at terminals 85 on WL8 and WL9, if satisfactory check voltage at terminals 87. If no reading is obtained check the operation of the relays and renew as necessary.

To check failure of the drivers or front passenger window operation proceed as follows:

4. Check the voltage at WL1 terminal 3 or WL2 terminal 3, whichever is applicable. If no voltage check the WK wire back to WL9 and rectify as necessary.

Checking switches

5. Switch OFF the ignition, set the meter to ohms and disconnect the multi-plug from the appropriate switch.
6. Connect one of the test meter leads to terminal 1 of the switch and the other lead to terminal 2, the meter should read '0' (zero), indicating that the contacts are operating. Repeat the test with the leads attached to terminals 4 and 5, the meter should again read '0' (zero).
7. Connect the test leads to terminals 1 and 3, depress the switch in the direction of terminal 1, a '0' (zero) reading should be obtained.
8. Remove the test lead from terminal 1 and connect to terminal 5, depress switch in the direction of terminal 5, a '0' reading should again be obtained.
9. If the meter does not read '0' on any of the foregoing checks, renew the switch.

Checking door connections

10. Disconnect the multi-plug inside the door panel. Note the variance in colour coding of the leads from the switch to the motor between left and right hand doors, as shown in the circuit diagram.
11. With the meter set to volts and the ignition switched ON, connect the positive +ve test lead to the SK or SB lead, dependant upon which door is being checked.
12. Connect the negative -ve test lead to a good earth, depress the appropriate window switch to open the window, battery voltage should be obtained.
13. Repeat the above with the positive +ve test lead connected to the SU or SR lead and the negative -ve test lead connected to earth. Depress the switch to close the window, battery voltage should be obtained.
14. Should the window still fail to operate and all connections are satisfactory, renew the window lift motor and recheck. Whilst the motor is removed ensure that the window regulator is functioning correctly.

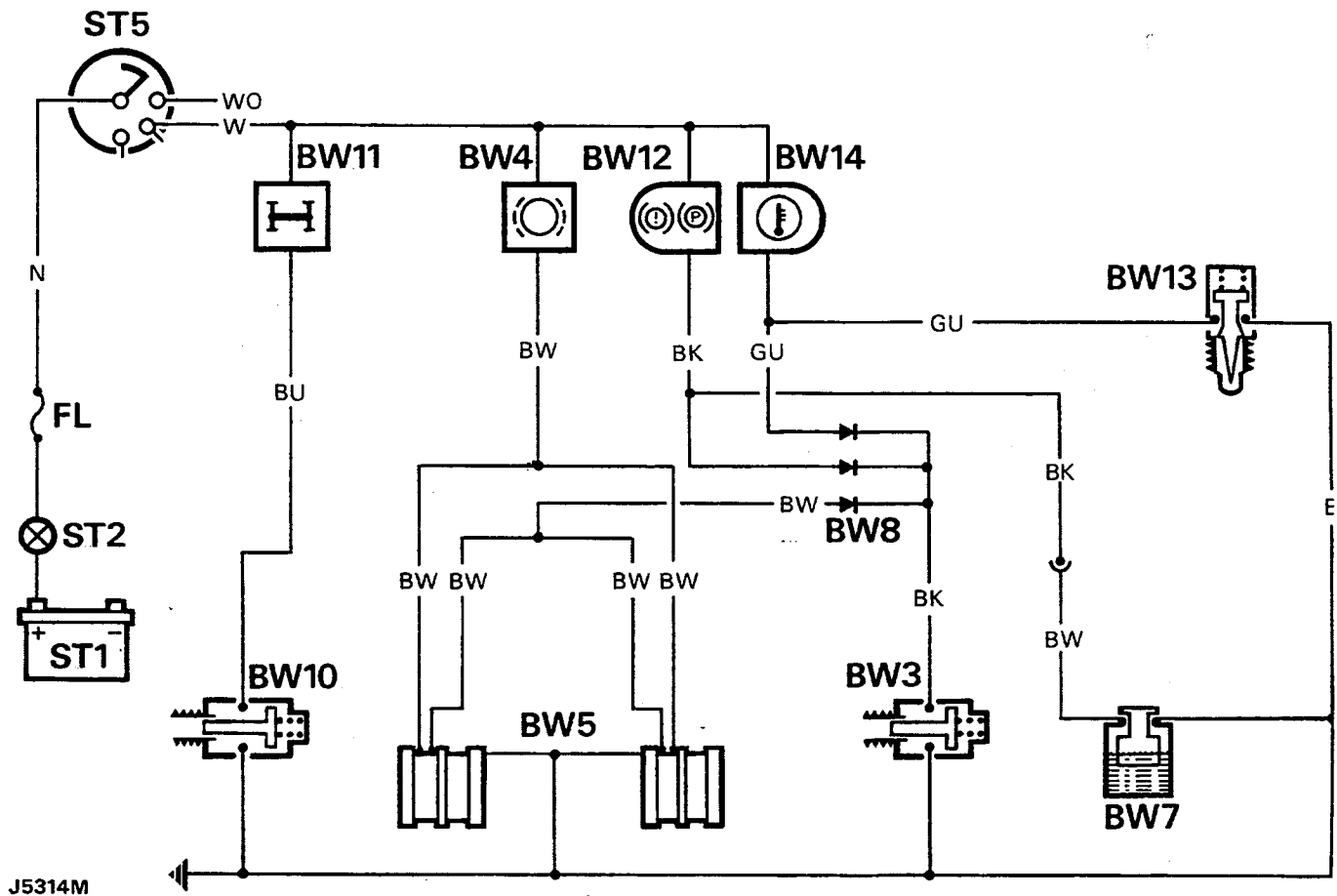
Rear passenger side door windows

15. Check the switches WL3, WL4, WL5 and WL6 are functioning by carrying out the tests detailed in paragraphs 5 to 9.
16. With the ignition ON and the meter set to volts, connect the positive +ve test lead to terminal 3, WK wire, on the drivers master switch WL7 and the negative -ve test lead to a good earth, battery voltage should be obtained. Low or no voltage indicates a possible fault in the wiring from relay WL8.
17. Switch WL7 ON, transfer the positive test lead to the SG wire, the meter should register battery voltage. No voltage will indicate that the switch may be faulty, renew switch and repeat check.
18. Connect the positive +ve test lead to terminal 3 on WL4 or WL6 as necessary and connect the negative -ve test lead to earth, battery voltage should be obtained. If low or no voltage, check the SG and WK wires back to WL7 and rectify as necessary.
19. Should the above tests prove positive but the window or windows still fail to operate properly, check the door connections following the procedure for the front doors (paragraphs 10 to 14) and consulting the circuit diagram for the colour coding of the relevant wires.

BRAKE WARNING, DIFFERENTIAL LOCK AND TRANSFER BOX OIL TEMPERATURE CIRCUITS ALL MARKETS EXCEPT AUSTRALIA

The components of the system are as follows:

BW3	Parking brake warning light switch
BW4	Brake wear warning light
BW5	Brake pad wear electrical connection
BW7	Low fluid sensor switch
BW8	Diodes
BW10	Differential lock switch
BW11	Differential lock warning light
BW12	Parking brake/low fluid warning light
BW13	Transfer box oil temperature switch V8 petrol only
BW14	Transfer box oil temperature warning light V8 petrol only
ST1	Battery
ST2	Terminal post - Pre 93 model year
ST5	Start/ignition switch
FL	Fused link - 93 MY



BRAKE WARNING, DIFFERENTIAL LOCK AND TRANSFER BOX TEMPERATURE CIRCUITS ALL MARKETS EXCEPT AUSTRALIA

System operation

With the ignition switched ON current is supplied, via the white W wire, to the brake pad wear warning light BW4, low fluid/parking brake warning light BW12 and the transfer box oil temperature warning light BW14. Application of the parking brake activates the parking brake warning light switch BW3 allowing the circuit to earth through the diodes BW8 therefore illuminating the warning lights.

In the event loss of brake fluid, the switch in the fluid reservoir provides an earth for the warning light via the BK and BW wires. The transfer box high oil temperature warning light operates in a similar manner through the GU wire when the switch is activated.

The inner brake pads on the right hand side of the vehicle contain an electrode, when the pad wears to its limits the electrode comes into contact with the brake disc, this completes the circuit and the warning lamp illuminates.

Also shown in this circuit is the differential lock switch warning light. This is a simple circuit which is completed when the switch is made and thereby illuminating the warning light.

Circuit testing

With the ignition switched OFF and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 and at the brown N wire at ST5.
3. Disconnect the harness connector from BW7, with the ignition switched ON, check for battery voltage at the BW wire. If low or no voltage check the bulb and wiring back to ST5.

4. Reconnect the harness and unscrew the reservoir top, lift the top clear of the reservoir and the warning light should illuminate. If the light fails to illuminate check the earth connection.
5. Disconnect the BK wire from BW3 and check for battery voltage. If low or no voltage check the bulb and the wiring back to ST5.
6. Reconnect the harness and apply the hand brake, the warning light should illuminate. If the light fails to illuminate check the earth connection.
7. Disconnect the multi-plug from the front RH brake pad and check for battery voltage. If low or no voltage check the bulb and the wiring back to ST5. Repeat the procedure on the rear RH brake pad.
8. With the ignition ON select differential lock, the warning light should illuminate. If the light does not illuminate, disengage the differential lock and check that the switch BW10 is correctly set (Section 37 Transfer Gearbox).
9. If the setting is found to be correct disconnect the BU wire from the switch and check for battery voltage. If low or no voltage check the bulb and the wiring back to ST5. If satisfactory disconnect the earth lead from the switch and connect to the BU wire, if the warning light still does not illuminate check out the earth wire.
10. With the ignition ON disconnect the GU wire from the oil temperature switch BW13 on the transfer box and check for battery voltage. If low or no voltage check the bulb and the wiring back to ST5. If satisfactory disconnect the earth lead from the switch and connect to the GU wire, if the warning light still does not illuminate check out the earth wire. If the earth is satisfactory renew switch BW13.

BRAKE WARNING, DIFFERENTIAL LOCK AND TRANSFER BOX OIL TEMPERATURE CIRCUITS AUSTRALIAN VEHICLES ONLY

The components of the system are as follows:

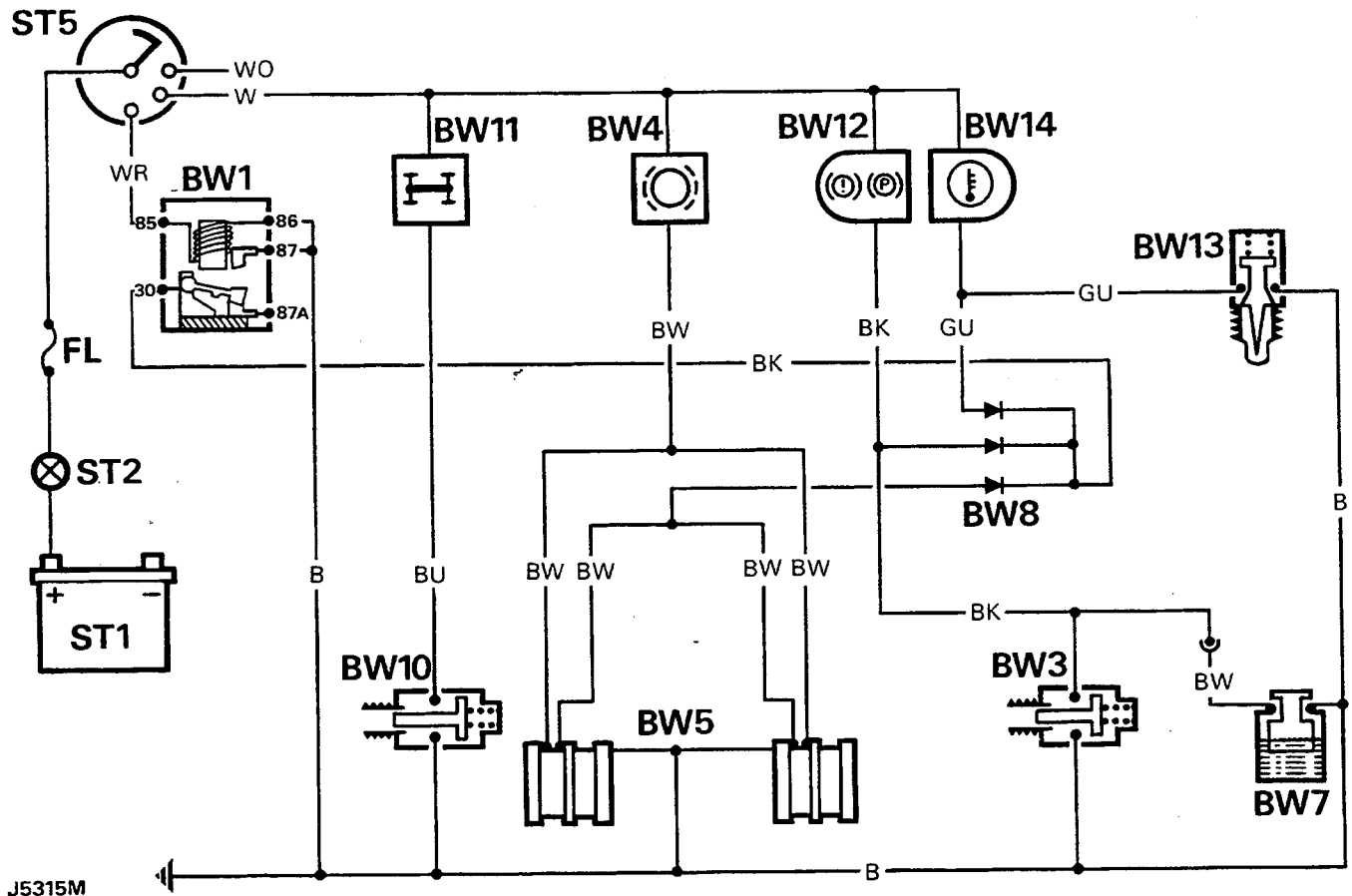
BW1	Brake check relay
BW3	Parking brake warning light switch
BW4	Brake wear warning light
BW5	Brake pad wear electrical connection
BW7	Low fluid sensor switch
BW8	Diodes
BW10	Differential lock switch
BW11	Differential lock warning light
BW12	Parking brake/low fluid warning light
BW13	Transfer box oil temperature switch V8 petrol only
BW14	Transfer box oil temperature warning light V8 petrol only
ST1	Battery
ST2	Terminal post - Pre 93 model year
ST5	Start/ignition switch
FL	Fused link - 93 MY

System operation

To comply with Australian legislation vehicles are fitted with a brake check relay. When the ignition key is turned to the number three position, for engine starting, the brake pad wear warning light BW4, the parking brake/low fluid warning light BW12 and the transfer box high oil temperature warning light BW14 will illuminate as a bulb check. Application of the parking brake will only illuminate the parking brake/low fluid warning light BW12.

If warning lights other than the parking brake/low fluid warning light illuminate when the park brake is applied, check that the diodes BW8 are functioning.

If more than one warning light remains ON when the parking brake is released check that the diodes BW8 are functioning.



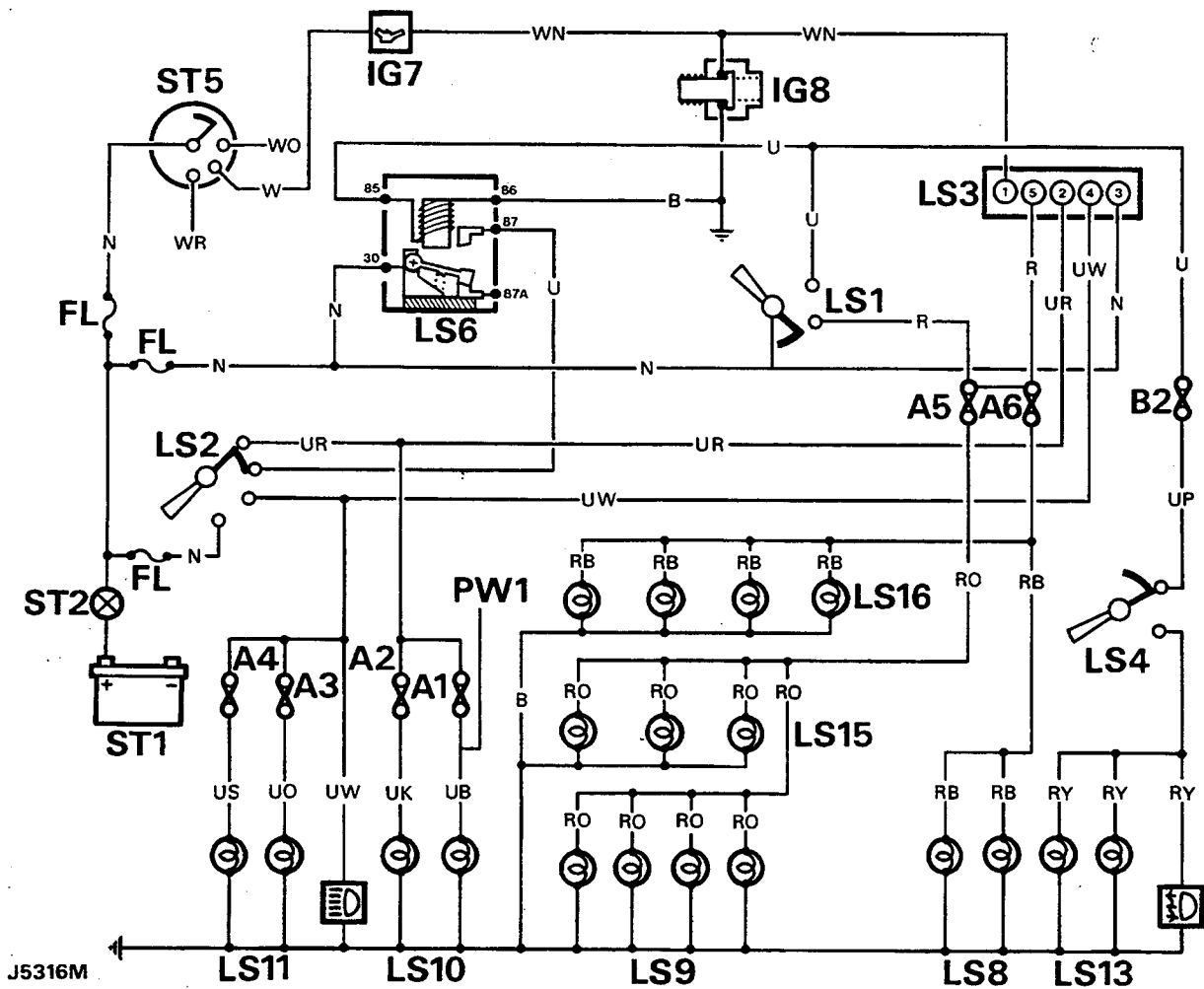
BRAKE WARNING, DIFFERENTIAL LOCK AND TRANSFER BOX OIL TEMPERATURE CIRCUITS AUSTRALIAN VEHICLES ONLY

Other than the bulb check function the system operates in the same manner as that described for non Australian vehicles.

Circuit testing

Circuit testing should be carried out as for other markets with the addition of the following:

1. If the bulb check function does not operate, disconnect the BK wire from terminal 30 on the brake check relay. With the ignition ON check for voltage.
2. If voltage is recorded, check the relay by substitution. If the relay is satisfactory, check the earth wire from terminals 86 and 87.
3. If no voltage is recorded check the wiring back to the ignition switch ST5.



LIGHTING CIRCUIT

The components of the system are as follows:

- | | | | |
|------|---|------|--|
| LS1 | Main lighting switch | LS15 | Instrument pack and binnacle switches illumination |
| LS2 | Headlamp main and dipped beam switch | LS16 | Radio, clock, cigar lighter and heater controls illumination |
| LS3 | Dim/dip unit | ST1 | Battery |
| LS4 | Rear guard fog lamps switch | ST2 | Terminal post - Pre 93 model year |
| LS6 | Headlamp relay | ST5 | Start/ignition switch |
| LS8 | LH front and rear side lights | IG7 | Oil pressure warning light |
| LS9 | RH front and rear side lights | IG8 | Oil pressure warning light switch |
| LS10 | Headlamps dipped beam | A1 | Fuse |
| LS11 | Headlamps main beam and instrument warning light | A2 | Fuse |
| LS13 | Rear guard fog lamps and instrument warning light | A3 | Fuse |
| | | A4 | Fuse |
| | | A5 | Fuse |
| | | A6 | Fuse |
| | | B2 | Fuse |
| | | FL | Fused link - 93 MY |

System operation

The headlamp dim/dip facility, shown in the circuit diagram, is only applicable to UK specification vehicles.

The facility ensures that when the engine is running and the lights are switched ON, the headlamps are illuminated dimly, thus preventing the vehicle from being driven with only side lamp illumination.

With the engine at rest and with the side lamps LS8 and LS9 switched on, the oil warning light IG7 will be illuminated and terminal 1 on the dim/dip unit LS3 will be earthed through the oil pressure warning light switch IG8.

When the engine is started, the oil pressure will cause IG8 to disconnect the earth for both IG7 and LS3. This in turn causes IG7 to extinguish and the electronic circuits within LS3 to switch a 9 volt supply to the dip filaments of the headlamps LS10 via the UR wire and Fuses A1 and A2. Headlamp power wash is also connected to Fuse A1, as there is only a 9 volt supply the facility will not operate.

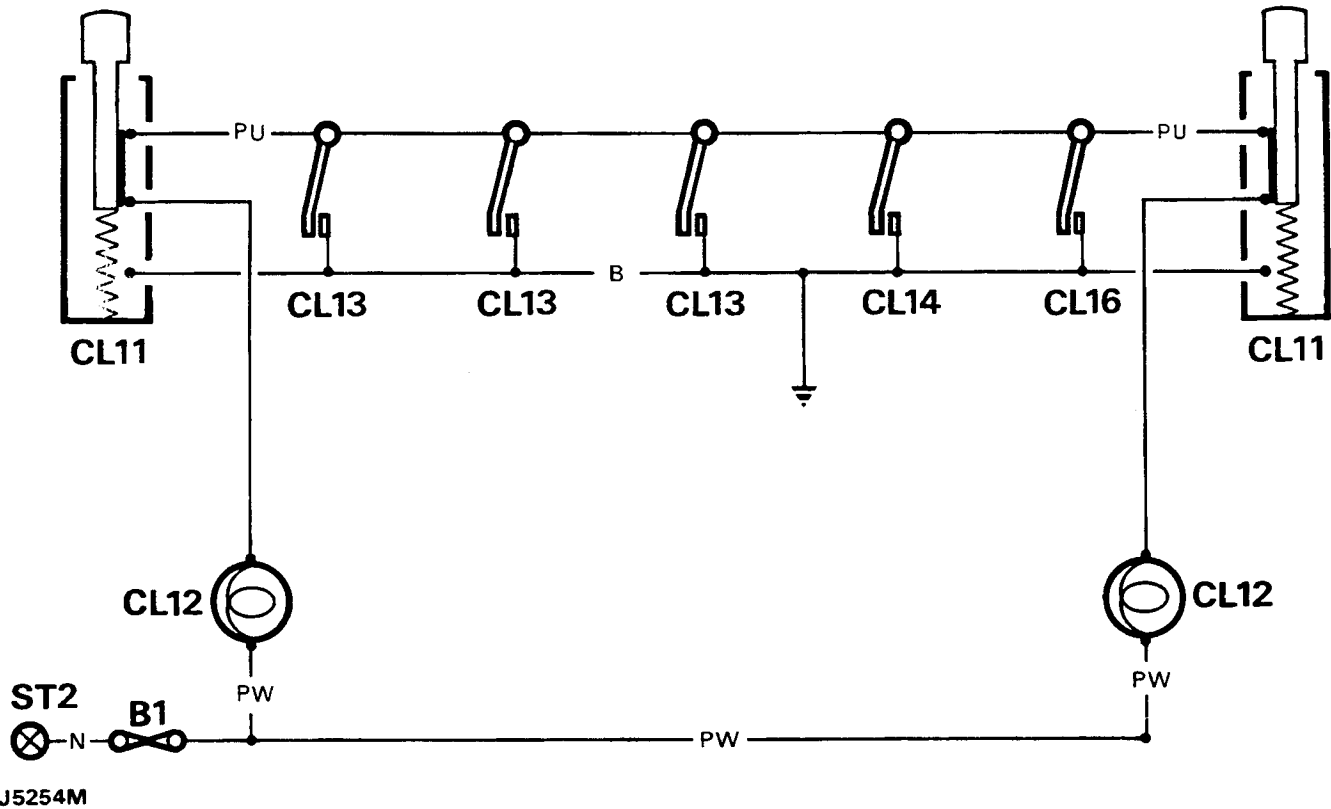
When LS1 is moved to switch on the headlamps, current is fed to the U wire to energise the headlamp relay LS6. Energising the relay introduces a 12 volt supply direct from ST2 or battery to the relay contacts, through the UG wire to the headlamp switch LS2 and on to the dipped filaments LS10. With the dipped headlamps ON the power wash facility is supplied with 12 volts and becomes operable.

Moving the switch LS2 to 'Main Beam' disconnects the supply to the dip filaments and switches on the main beams LS11 via Fuses A3 and A4. The current feed via the UW wire to terminal 4 on LS3 causes the unit to switch off the supply to the dip filaments.

Current for the rear fog guard lamps LS13 is supplied from the main lighting switch LS1 through the U wire via Fuse B2 and the UP wire to the switch LS4, then on to the filaments via the RY wires.

Circuit testing

As the lighting circuits are relatively simple no detailed circuit testing is given.



INTERIOR COURTESY LIGHT CIRCUIT PRE 93 MODEL YEAR

The components of the system are as follows:

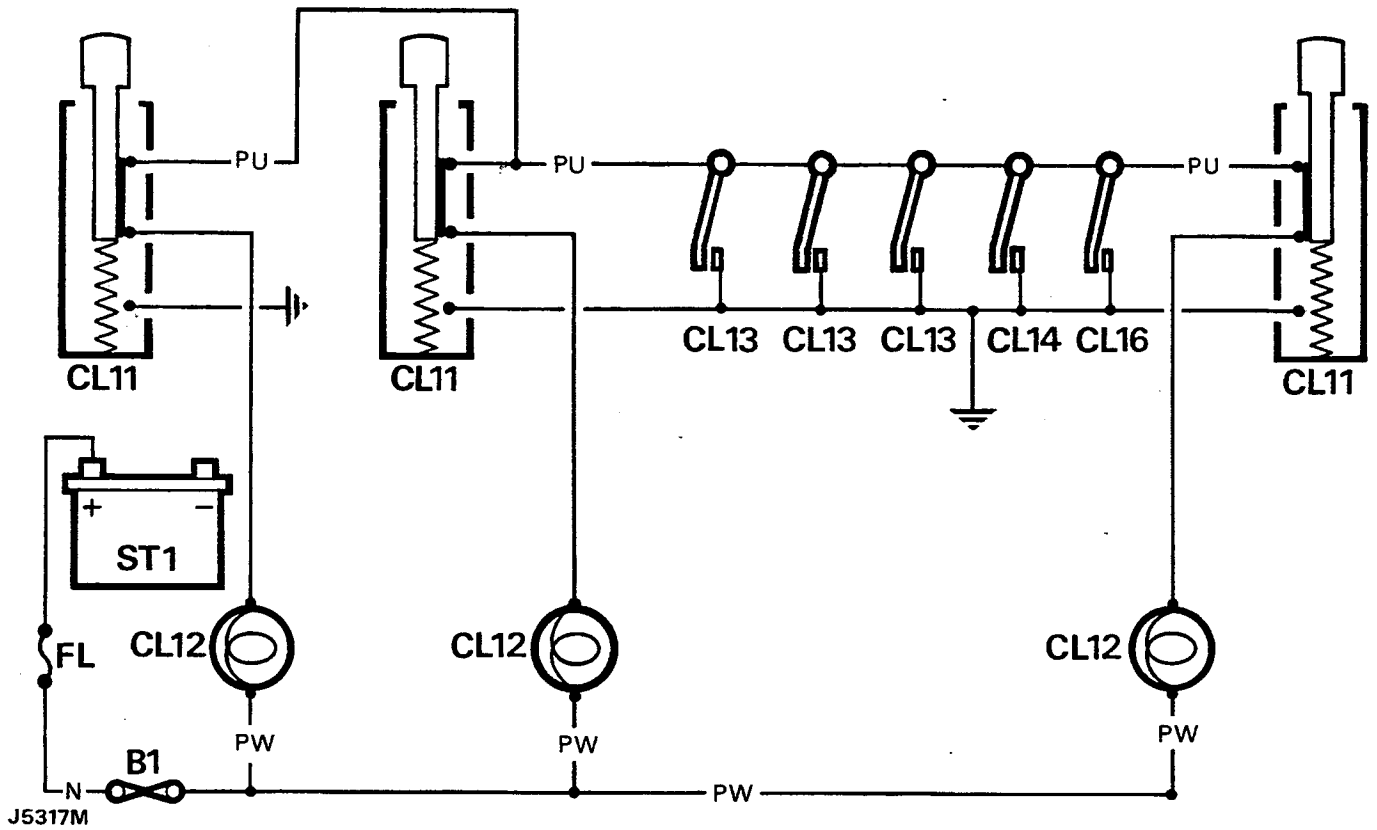
C11	Interior light switch
C12	Interior light
C13	Rear side and rear door switches
C14	Front passenger door switch
C16	Drivers door switch
ST2	Terminal post
B1	Fuse

System operation

The two interior courtesy lights, fitted in the roof of the vehicle, are controlled by individual push type (on/off) switches on the lights and by door switches. Opening any of the doors will operate both lights or they may be operated separately by use of the switch on the respective light.

Circuit testing

1. With the ignition switched OFF open and close each door in turn and check that the interior lights illuminate. If by opening any one of the doors the lights do not come ON the respective door switch could be suspect.
2. If the switch is found to be satisfactory check the wiring back to the switch.
3. If both lights fail to illuminate when all switches are operated check the fuse.
4. If only one light illuminates substitute the relevant bulb and repeat the check. If the light still fails to come ON suspect the switch in the light unit.



INTERIOR COURTESY LIGHTS 93 MODEL YEAR

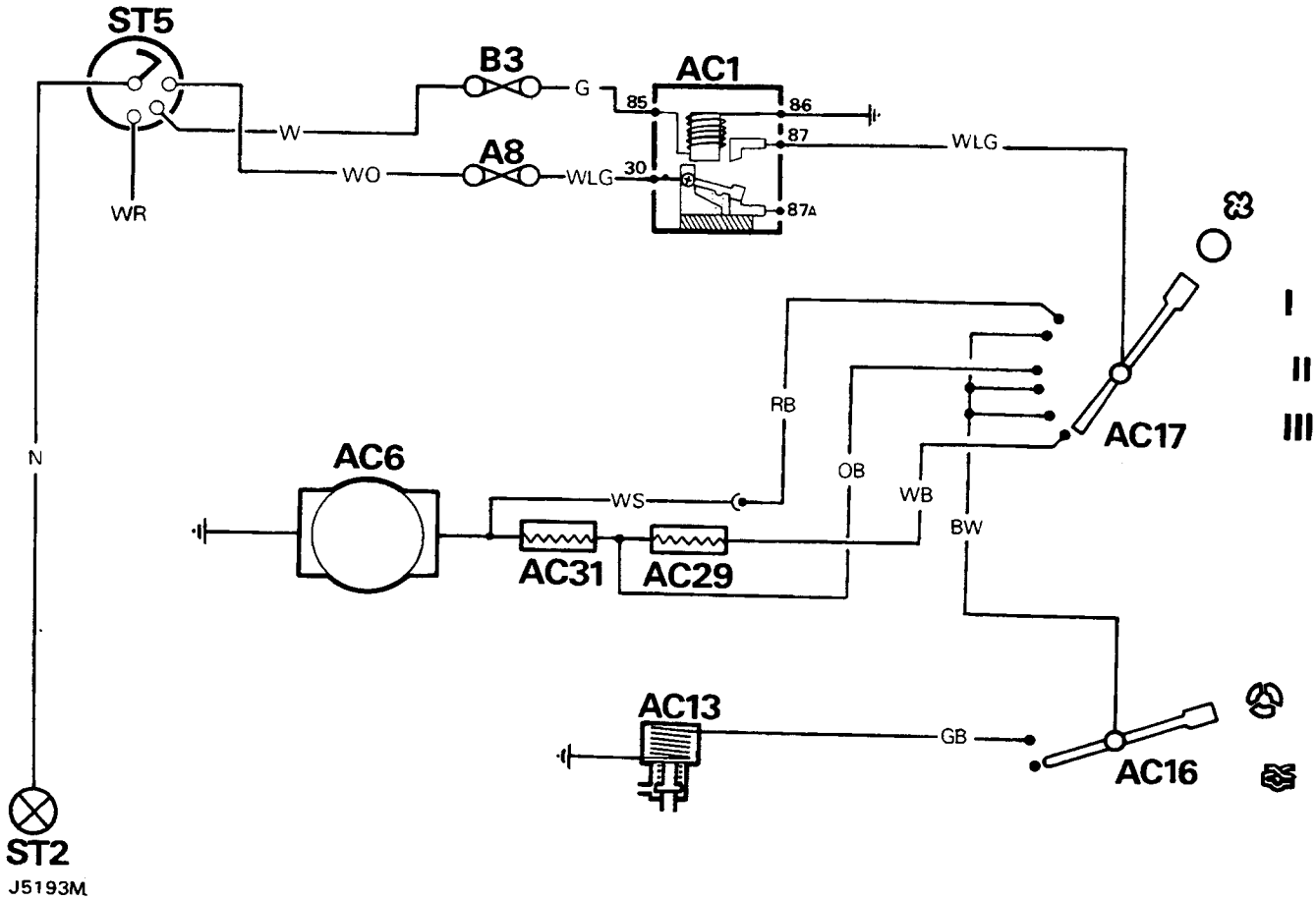
The components of the system are as follows:

- C11 Interior light switch
- C12 Interior light
- C13 Rear side and rear door switches
- C14 Front passenger door switch
- C16 Drivers door switch
- ST1 Battery

- B1 Fuse
- FL Fused link

System operation

The three interior courtesy lights, are controlled by individual on/off switches, and by door switches when any door is opened.



HEATER SYSTEM CIRCUIT

HEATER SYSTEM PRE 93 MODEL YEAR

The components of the system are as follows:

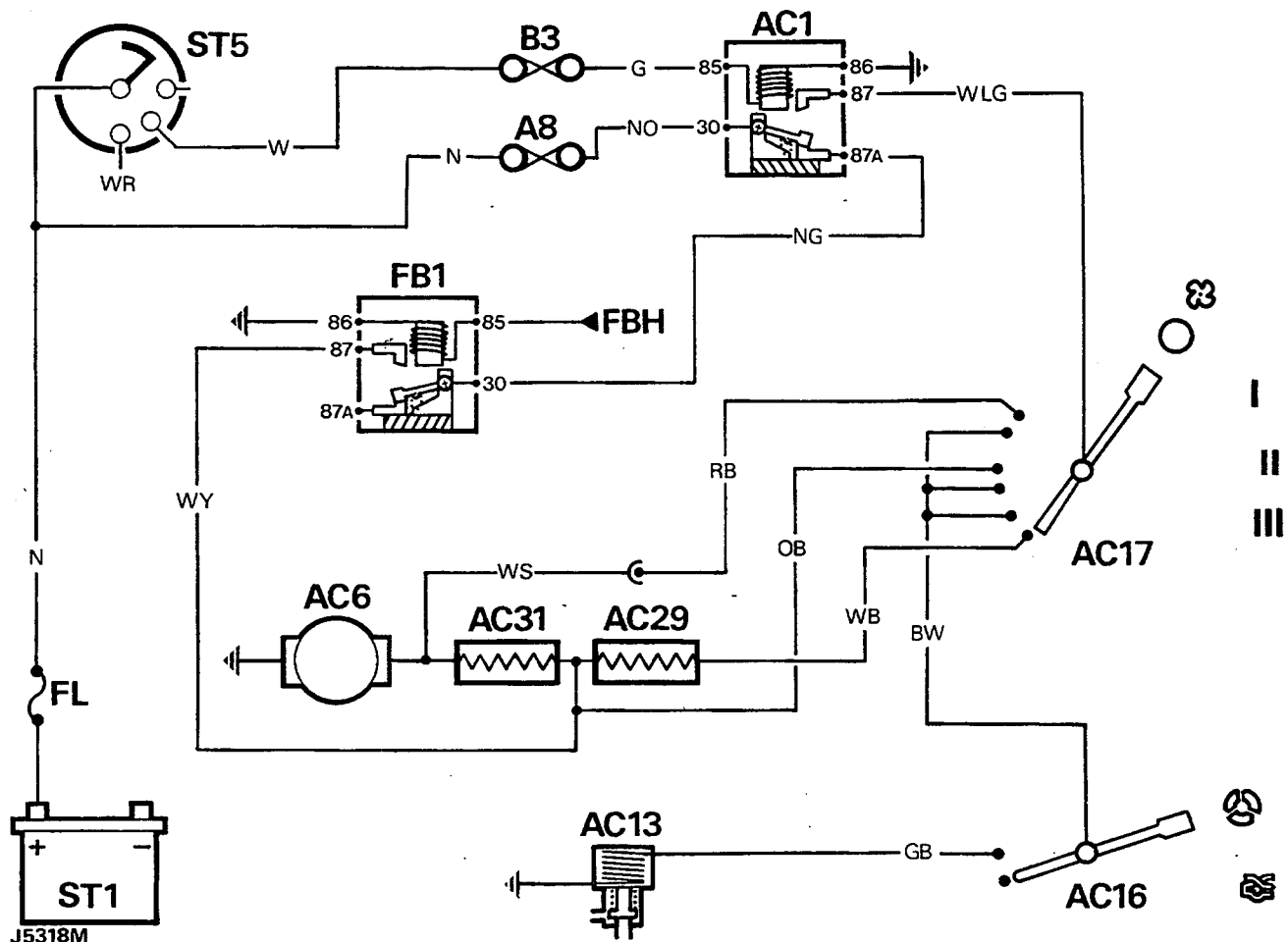
- AC1 Air conditioning/heater relay
- AC6 Heater blower motor
- AC13 Vacuum valve
- AC16 Control switch, vacuum valve and ventilation selection
- AC17 Blower motor speed selection
- AC29 Resistor
- AC31 Resistor
- ST2 Terminal post
- ST5 Start/ignition switch
- A8 Fuse
- B3 Fuse

System operation

When the ignition is switched ON current passes from ST5 through the W and WO wires to Fuses A8 and B3. The flow from B3 through the G wire energises the relay AC1 allowing the current from A8 to pass through the relay contacts to the blower motor speed selector AC17 via the WLG wire.

Selection of the fan speed will direct current through the resistors or direct to the blower motor, dependant on the speed selected.

When any of the fan speeds are selected current is also fed to AC16 via the BW wire. Selection of recirculating air activates the vacuum valve AC13, which in turn closes the heater flap, preventing the flow of fresh air.



HEATER SYSTEM CIRCUIT 93 MODEL YEAR

HEATER SYSTEM

The components of the system are as follows:

- AC1 Air conditioning/heater relay
- AC6 Heater blower motor
- AC13 Vacuum valve
- AC16 Control switch, vacuum valve and ventilation selection
- AC17 Blower motor speed selection
- AC29 Resistor
- AC31 Resistor
- ST1 Battery
- ST5 Start/ignition switch
- A8 Fuse
- B3 Fuse
- FL Fused link
- FB1 Fuel burning relay*
- FB2 Fuel burning heater*

* if fitted

System operation

When the ignition is switched ON current passes from ST5 through the W wires to Fuses B3. The flow from B3 through the G wire energises the relay AC1 allowing the current from A8 to pass through the relay contacts to the blower motor speed selector AC17.

Selection of the fan speed will direct current through the resistors or direct to the blower motor, dependant on the speed selected.

When any of the fan speeds are selected current is also fed to AC16 via the BW wire. Selection of recirculating air activates the vacuum valve AC13, which in turn closes the heater flap, preventing the flow of fresh air.

Circuit testing

With the ignition switched OFF and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Check the voltage at the terminal post ST2 and at the brown N wire at ST5.
3. With the ignition switched ON, check for voltage at the W wire on Fuse B3 and the WO wire on Fuse A8.
4. Check for voltage at terminals 30 and 85 on AC1 if no voltage check the fuses and the wiring back to the fuses.
5. Check for voltage at terminal 87 on AC1, if no voltage substitute relay AC1 and recheck. If satisfactory check for voltage at the WLG wire on AC17. If no voltage is evident check the wiring back to AC1.
6. Select the low speed position on AC17 and check for voltage at the BW wire on AC16. Repeat the check with AC17 in the medium and fast speed positions.
7. With AC17 set to any one of the blower speed positions and AC16 set to the fresh air position, check for voltage at the GB wire on AC13 vacuum valve. If voltage is present but fresh air is not being drawn into the vehicle, substitute AC13 and recheck.
8. With AC17 set to the low speed position check for voltage at the output side of resistor AC29. Any voltage present should be lower than battery voltage. If no voltage is recorded, check for voltage at the input side of AC29, if voltage is present renew AC29.
9. Repeat the foregoing checks on AC31 with AC17 set to medium speed.
10. Set AC17 to the fast speed setting check for battery voltage at the input to the blower motor.
11. If the blower motor AC6 is not functioning and all the preceding checks are satisfactory the blower motor is suspect.

HEADLAMP LEVELLING CIRCUIT

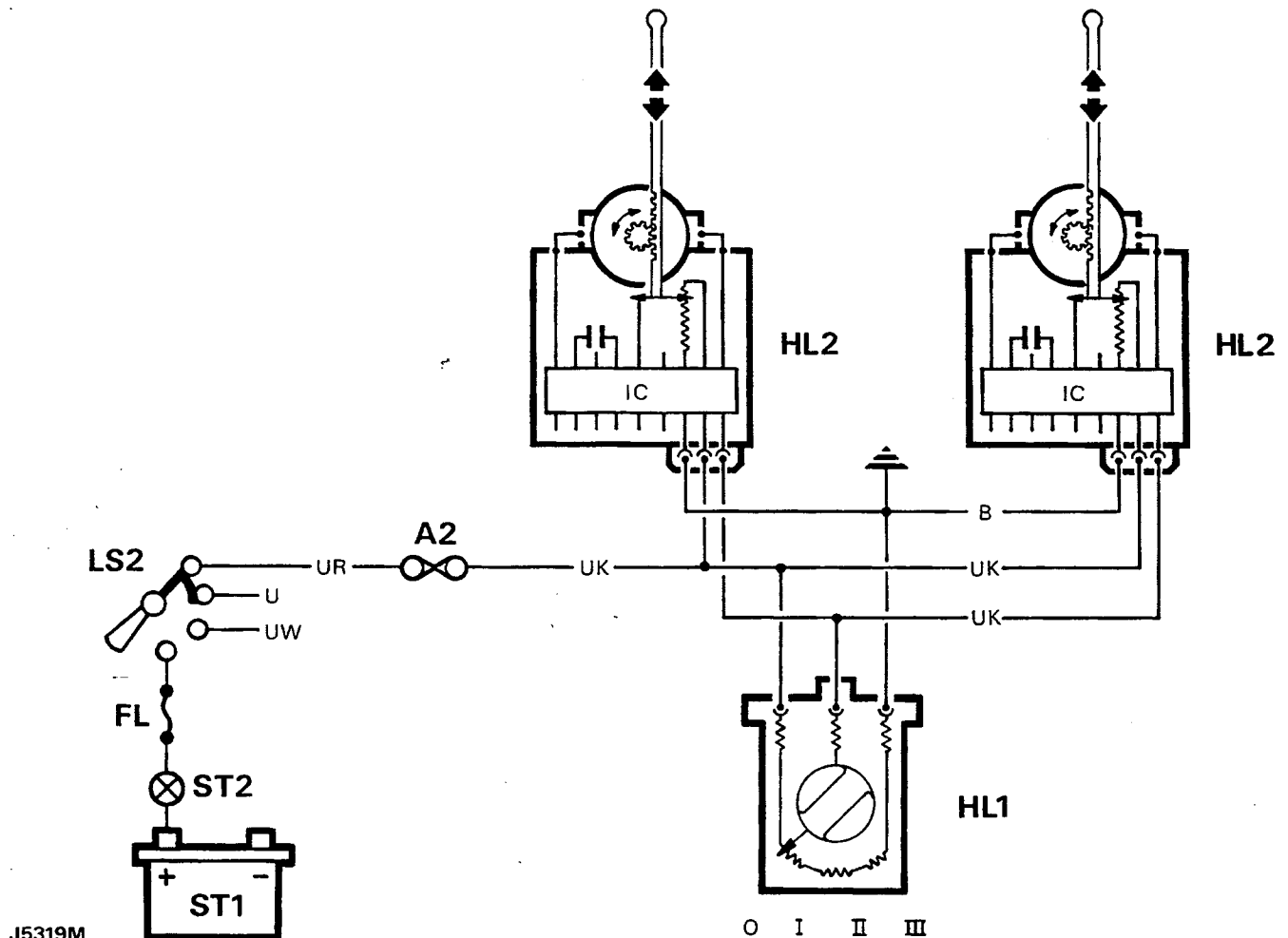
System operation

Headlamp levelling can only be carried out when the headlamps are switched on and set in the dipped beam position.

The headlamps can be adjusted in three increments to cater for varying loads on the rear of the vehicle. The response of the motors HL2 to the position of the switch HL1 is determined by integrated circuits IC within the motors which compares the resistance set by HL1 to variable resistors driven by the motors.

When HL1 is set to a new position, the resistance on all three connections between the switch and the control circuit is altered. The ICs sense the change and power the motors to drive the variable resistors to a new position. This movement is monitored by the ICs which detect when the circuits are in balance and switch off the motors.

The headlamps are pivoted at the top with the motor unit located at the bottom to provide adjustment.



HEADLAMP LEVELLING CIRCUIT

The components of the system are as follows:

HL1	Head lamp levelling switch
HL2	Headlamp levelling actuator/motor
LS2	Headlamp main and dipped beam switch
ST1	Battery
ST2	Terminal post - Pre 93 model year
A2	Fuse
FL	Fused link - 93 MY

Circuit testing

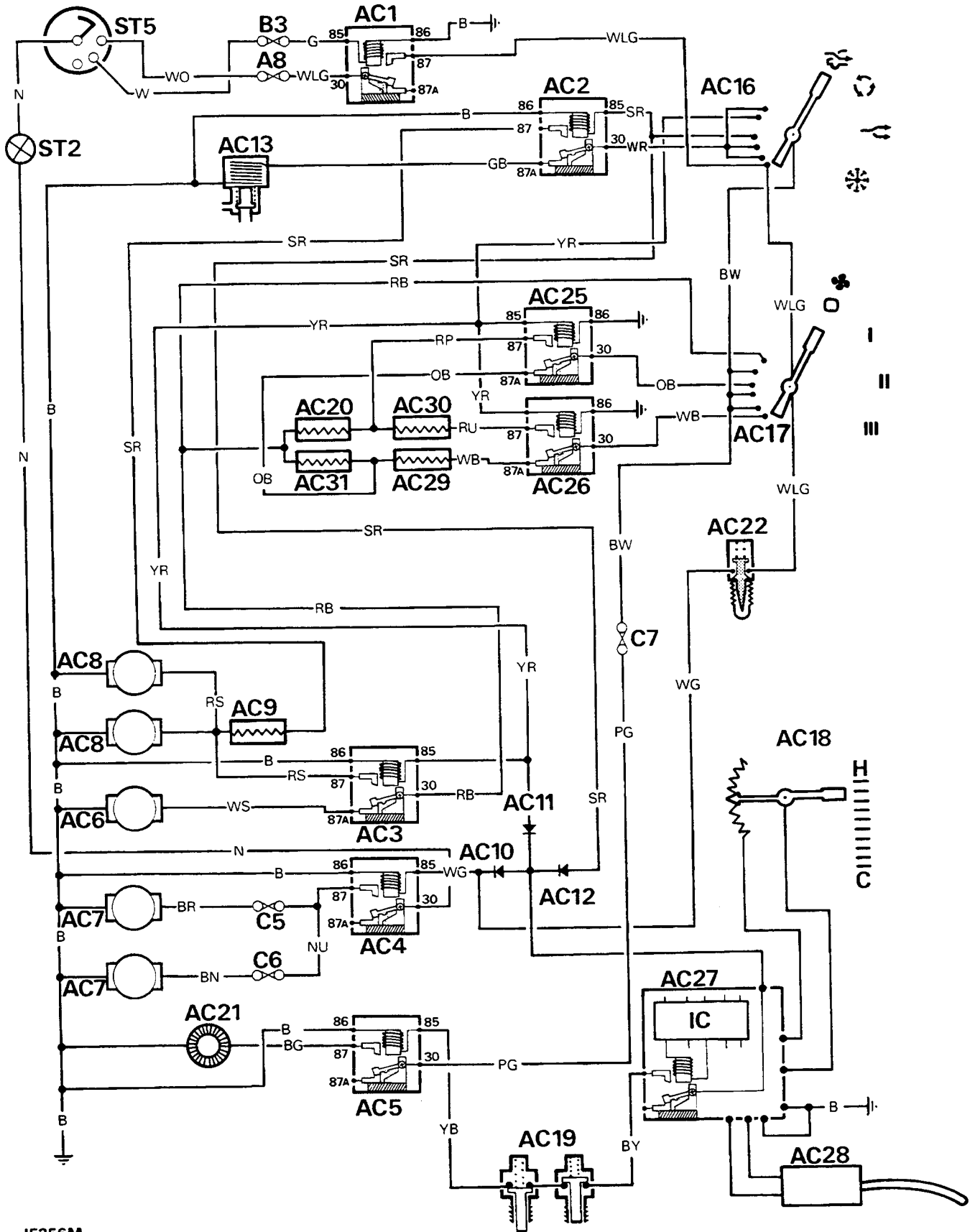
With the ignition switched off and the meter set to volts carry out the following:

NOTE: All voltage readings should not be more than 1 volt below battery voltage, unless otherwise stated. If any voltage reading is low, check the security of connections and the condition of wiring before progressing to the next test.

1. Check the battery voltage, minimum 12 volts. If necessary charge or substitute the battery.
2. Switch on headlamps and check for satisfactory functioning.
3. If only one motor is operating substitute suspect motor and check for satisfactory operation.
4. If both motors are not operating and wiring is satisfactory, substitute levelling switch HL1 and recheck operation.

AIR CONDITIONING CIRCUIT (DIESEL AND NON EFI PETROL ENGINES) - PRE 9 PROCESSOR
-16-SEP-1992 08:37:00.97 ACCOUNTING ERROR CODE - OO MANY EDIT FILES SYSTEM STATUS IS -1 s
follows:

AC1 Air conditioning/heater relay
AC2 Fresh air solenoid relay
AC3 Evaporator fan relay
AC4 Condenser fan relay
AC5 Compressor clutch relay
AC6 Heater blower motor
AC7 Condenser fans
AC8 Evaporator fans
AC9 Evaporator fan half speed resistor
AC10 Diode
AC11 Diode
AC12 Diode
AC13 Vacuum valve
AC16 Control switch, vacuum valve and ventilation selection
AC17 Blower motor speed selection
AC18 Thermostat control
AC19 Refrigerant over and under pressure switches
AC20 Resistor
AC21 Compressor clutch
AC22 Engine water temperature switch
AC25 Medium speed relay
AC26 Low speed relay
AC27 Thermostat control box
AC28 Temperature probe
AC29 Resistor
AC31 Resistor
ST2 Terminal post
ST5 Start/ignition switch
A8 Fuse
B3 Fuse
C5 Fuse
C6 Fuse
C7 Fuse



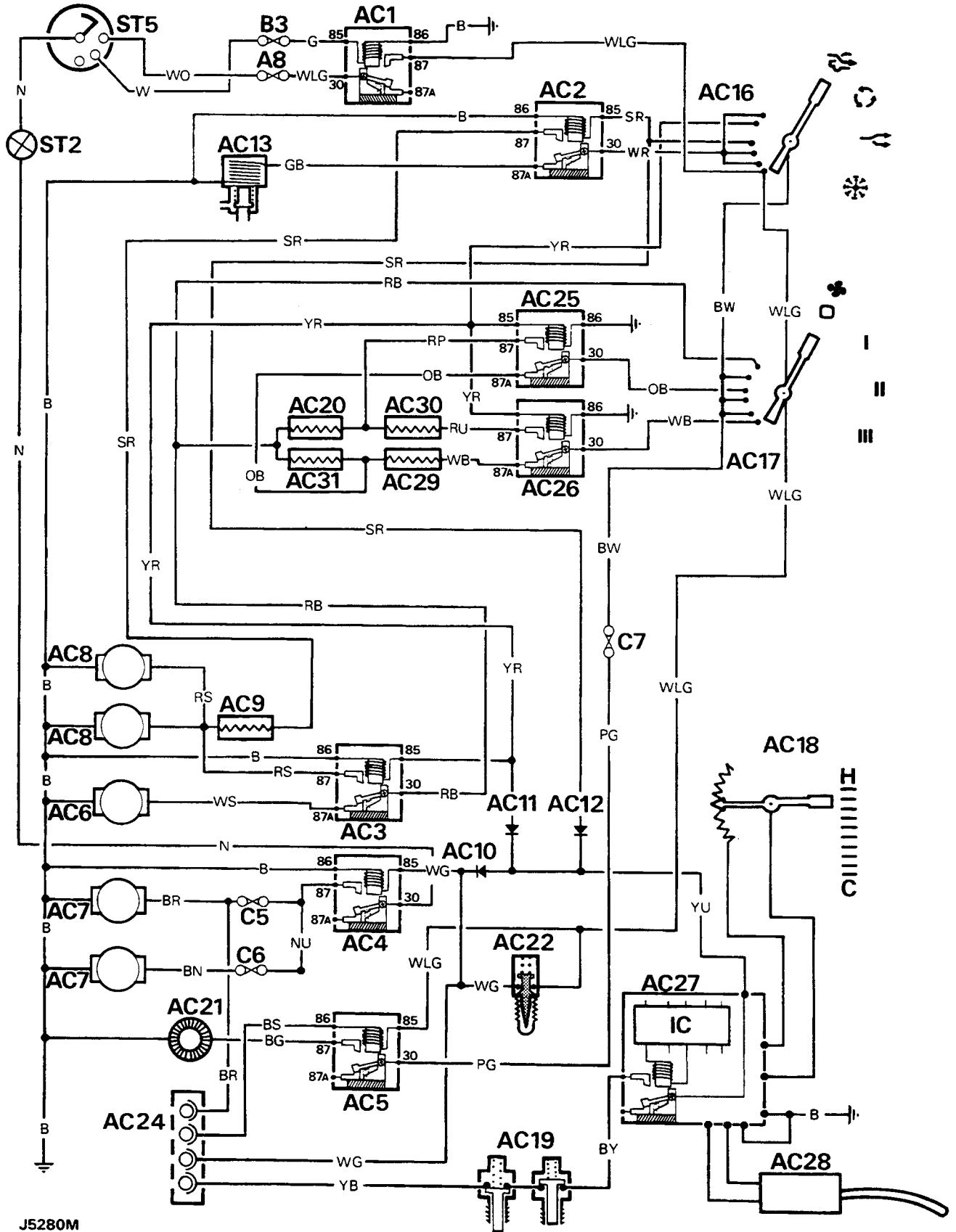
J5256M

AIR CONDITIONING CIRCUIT (DIESEL AND NON EFI PETROL ENGINES) - PRE 93 MODEL YEAR

AIR CONDITIONING CIRCUIT (EFI PETROL ENGINES) - PRE 93 MODEL YEAR

The components of the system are as follows:

AC1	Air conditioning/heater relay
AC2	Fresh air solenoid relay
AC3	Evaporator fan relay
AC4	Condenser fan relay
AC5	Compressor clutch relay
AC6	Heater blower motor
AC7	Condenser fans
AC8	Evaporator fans
AC9	Evaporator fan half speed resistor
AC10	Diode
AC11	Diode
AC12	Diode
AC13	Vacuum valve
AC16	Control switch, vacuum valve and ventilation selection
AC17	Blower motor speed selection
AC18	Thermostat control
AC19	Refrigerant over and under pressure switches
AC20	Resistor
AC21	Compressor clutch
AC22	Engine water temperature switch
AC25	Medium speed relay
AC26	Low speed relay
AC27	Thermostat control box
AC28	Temperature probe
AC29	Resistor
AC31	Resistor
ST2	Terminal post
ST5	Start/ignition switch
A8	Fuse
B3	Fuse
C5	Fuse
C6	Fuse
C7	Fuse



AIR CONDITIONING CIRCUIT (EFI PETROL ENGINES) - PRE 93 MODEL YEAR

Description

The heating and air conditioning system is controlled by five levers, four of which have electro mechanical connections and one AC15 is mechanical only.

AC14 is linked to an air flap and controls the volume of fresh air from the face level vents only. It also controls a micro switch that switches on the evaporator fans to improve the volume of cool air, to the face vents, when AC17 is switched on.

AC15 is connected to an air flap controlling the distribution of heated or recirculated air to the windscreen and footwells. It has no electrical connections.

AC16 is an electrical switch that controls the distribution of recirculated, fresh or cooled air and the blending of hot and cooled air.

AC17 is an electrical control which allows selection of slow, medium or fast speed from the heater blower.

AC18 is a rheostat that determines the air temperature, it is also linked mechanically to two air flaps in the system which direct the air through the heater or air conditioning system.

System operation

With AC16 set to the fresh air position, AC17 in the off position and AC18 to the cold setting, fresh air will enter the vehicle through the open intake, which is controlled by AC13. The volume of air entering will depend upon the forward speed of the vehicle, this may be boosted by switching AC17 to one of the fan speed positions. By switching AC18 from the cold position the air is diverted through the heater unit to raise the temperature.

The fresh air flap remains in the open position until AC16 is moved to the recirculate position, this activates the vacuum valve AC13 and thereby closes the flap.

With AC16 moved to the next position (refrigerated and warm air blend), AC13 is de-energised allowing fresh air to enter the heater and or the air conditioning unit. At the same time both evaporator fans AC8 are switched to half speed by the power supplied through the SR wire AC9 and the RS wire. Current also flows via a separate SR wire from AC16 through AC12 and the YU wire to AC27 and AC28.

To obtain maximum cooling AC18 should be set to cold, AC16 moved to the 'snowflake' position and AC17 set at the maximum speed position. AC3 will be energised which switches off the heater blower AC6, while keeping AC8 powered at full speed via the RB and RS wires and the contacts in AC3.

When the ignition is switched on current passes from ST5 through the W and WO wires to fuses A8 and B3. The flow from B3, through the G wire, energises the relay AC1 allowing current from A8 to pass through the relay contacts to the ventilation control switch AC16, blower motor speed selector AC17 and the engine water temperature switch AC22 via the WLG wire.

Engine over heating will activate AC22 allowing current to flow through the WG wire to energise fan control relay AC4. With AC4 energised, current flows through the contacts to the compressor fans AC7 via the NU wire, fuses C5 and C6 and the BR and BN wires.

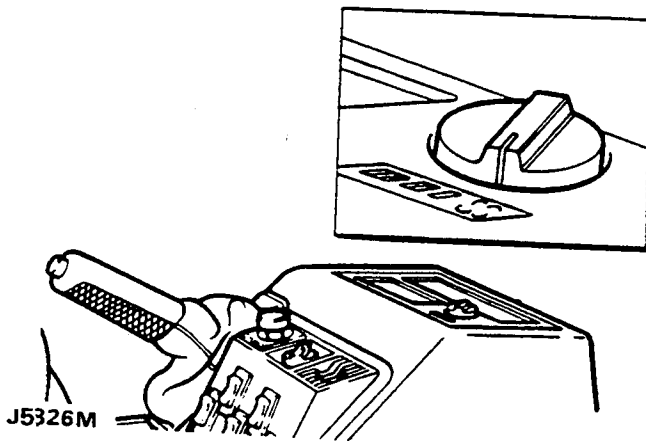
Selection of AC16 to the air conditioning (snowflake) position allows current to flow through the YR wire to energise the medium and low speed relays AC25 and AC26, the air conditioning/heater relay AC3, fan control relay AC4 and thermostat control box AC27.

Vehicles fitted with V8 EFI engines have a link between the fuel and air conditioning systems. If the overall electrical load detected by the EFI ECU is above the value programmed into its memory, the ECU will not earth the BS connection for the compressor clutch relay AC5.

The interior air temperature, sensed by AC28, controls the operation of a relay within the electronic thermostat AC27. When the temperature inside the vehicle reaches the setting selected with AC18, the thermostat relay will be de-energised and the signal to the EFI ECU via switches AC19 will be disconnected. When this signal ceases, the ECU will automatically disconnect the earth for the NU wire and AC4, causing the compressor clutch AC21 to disengage and the air conditioning to switch off.

If the engine compartment temperature is sensed to be too high, by the ECU temperature sensors, the ECU will supply current to the windings of AC4 via AC24 and the WG wire. This supply will keep the cooling fans AC7 operating for a predetermined period after the engine has been switched off. Diode AC10 prevents feed back to the remainder of the circuit during this phase of operation.

Rear Air Conditioning WYNN unit - 93 MY



The air conditioning unit in the rear of the vehicle will only supply cooled, dried, recirculated air when the air conditioning system in the front of the vehicle is operating. The 3 speed blower will operate at any time with the starter switch in position 'II'. It will supply recirculated air when the air conditioning function on the front system is not selected.

NOTE: Electrical connection to the rear air conditioning unit is made at a multiplug located behind the heater assembly on the drivers side of the main harness.

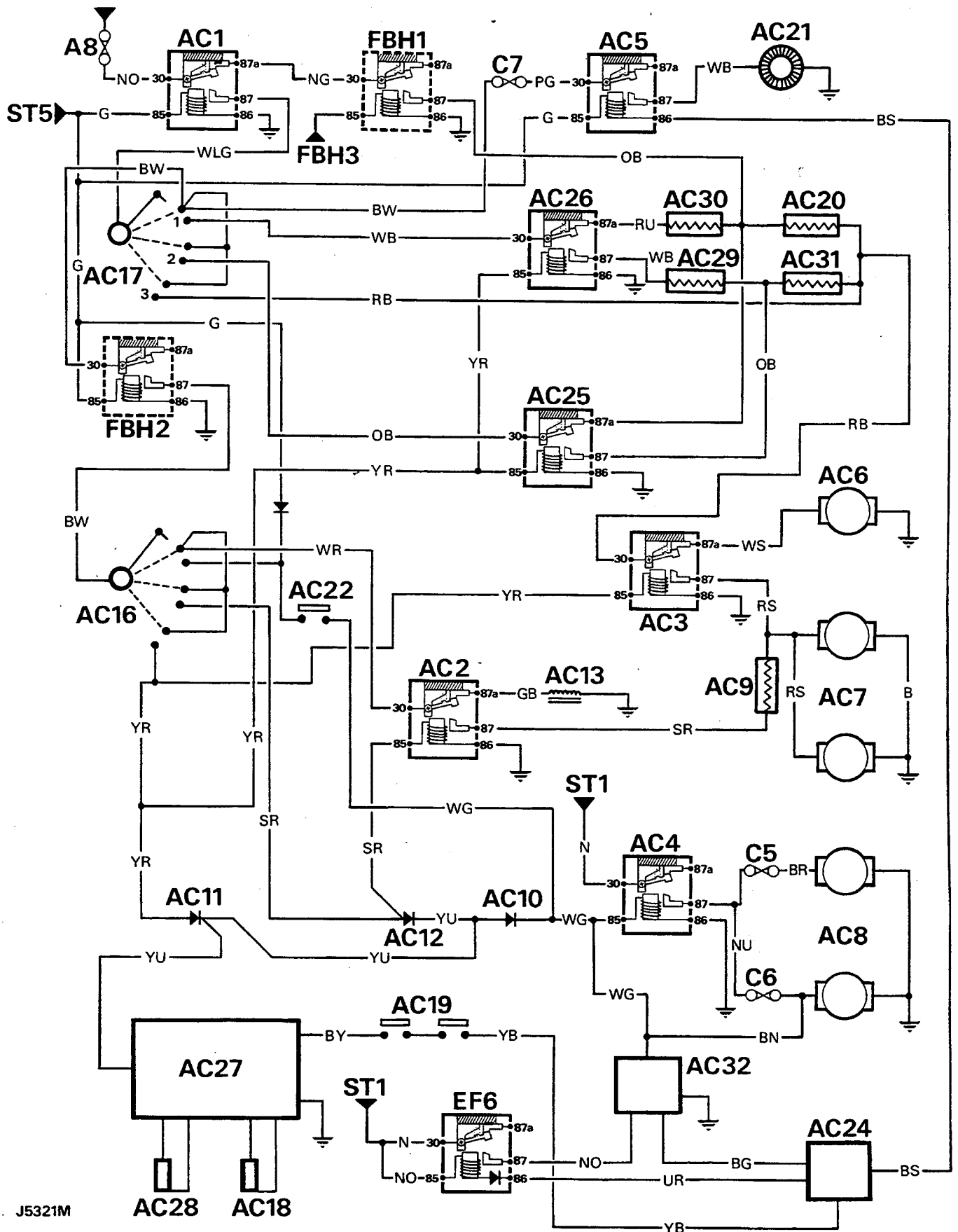
AIR CONDITIONING CIRCUIT EFI PETROL ENGINES - 93 MODEL YEAR

The components of the system are as follows:

AC1	Air conditioning/heater relay
AC2	Fresh air solenoid relay
AC3	Heater/air con fan relay
AC4	Condenser fan relay
AC5	Compressor clutch relay
AC6	Heater blower motor
AC7	Condenser fans motors
AC8	Evaporator fans motors
AC9	Evaporator fan half speed resistor
AC10	Diode
AC11	Diode
AC12	Diode
AC13	Vacuum valve
AC16	Control switch, vacuum and ventilation selection
AC17	Blower motor speed selection
AC18	Thermostat control
AC19	Refrigerant over and under pressure switches
AC20	Resistor
AC21	Compressor clutch
AC22	Engine water temperature switch
AC24	Connect to EFI ECU
AC25	Medium speed relay
AC26	Low speed relay
AC27	Thermostat ECU
AC28	Temperature probe
AC29	Resistor
AC30	Resistor
AC31	Resistor
AC32	Condenser fan timer unit
ST1	Battery
ST5	Start/ignition switch
A8	Fuse
B3	Fuse
C5	Fuse
C6	Fuse
C7	Fuse
EF6	Fuel injection load relay
FBH1	Fuel burning heater fan relay*
FBH2	Fuel burning heater fan switch relay*
FBH3	Fuel burning heater unit*

* if fitted

AIR CONDITIONING CIRCUIT EFI PETROL ENGINES - 93 MODEL YEAR



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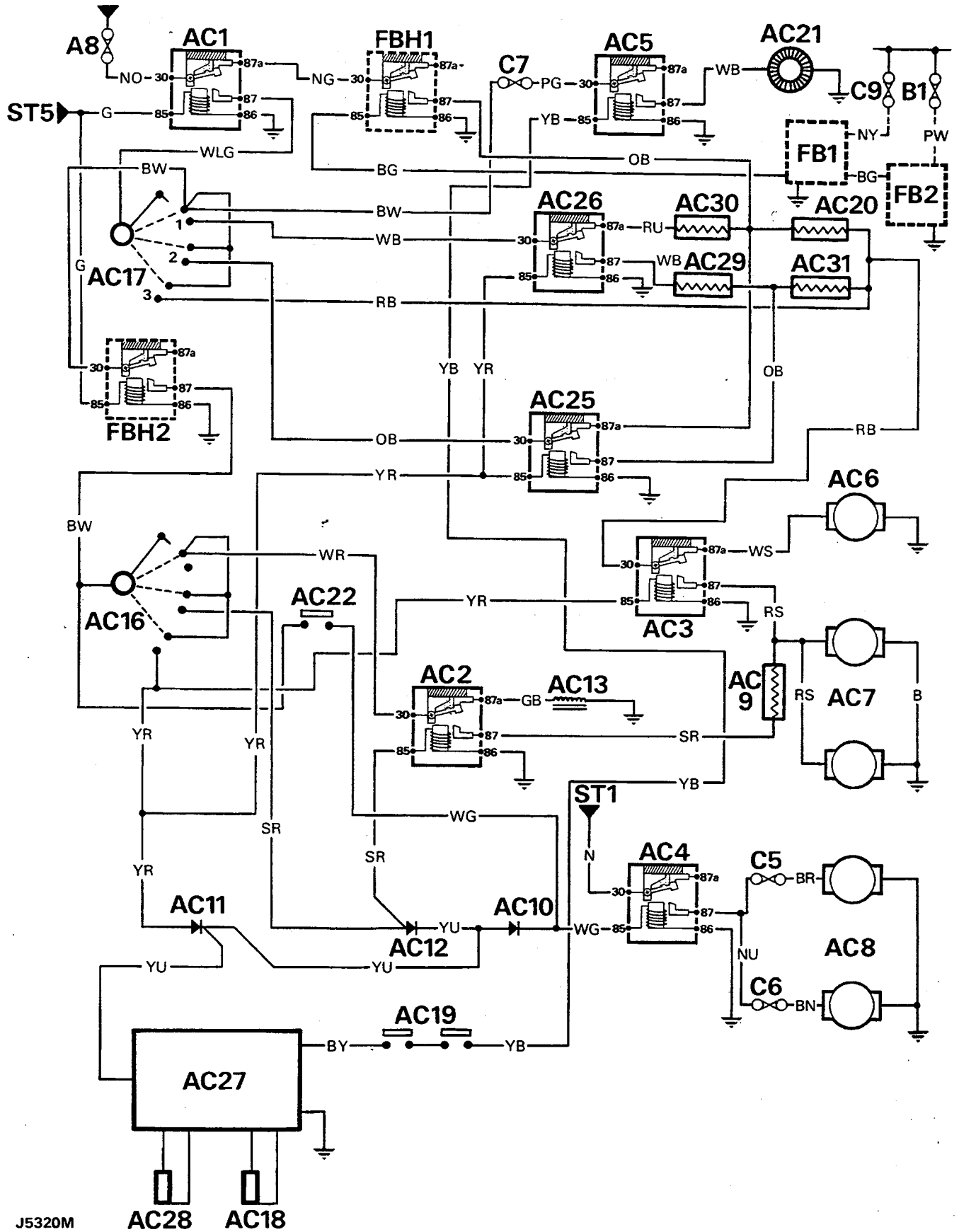
AIR CONDITIONING CIRCUIT 200Tdi DIESEL ENGINES - 93 MODEL YEAR

The components of the system are as follows:

AC1	Air conditioning/heater relay
AC2	Fresh air solenoid relay
AC3	Heater/air con fan relay
AC4	Condenser fan relay
AC5	Compressor clutch relay
AC6	Heater blower motor
AC7	Condenser fan motors
AC8	Evaporator fan motors
AC9	Evaporator fan half speed resistor
AC10	Diode
AC11	Diode
AC12	Diode
AC13	Vacuum valve
AC16	Control switch, vacuum valve and ventilation selection
AC17	Blower motor speed selection
AC18	Thermostat control
AC19	Refrigerant over and under pressure switches
AC20	Resistor
AC21	Compressor clutch
AC22	Engine water temperature switch
AC25	Medium speed relay
AC26	Low speed relay
AC27	Thermostat ECU
AC28	Temperature probe
AC29	Resistor
AC30	Resistor
AC31	Resistor
AC32	Condenser fan timer unit
ST1	Battery
ST5	Start/ignition switch
A8	Fuse
B3	Fuse
C5	Fuse
C6	Fuse
C7	Fuse
FBH1	Fuel burning heater fan relay*
FBH2	Fuel burning heater fan switch relay*
FBH3	Fuel burning heater unit*
FB1	Fuel burning ECU*
FB1	Fuel burning timer*

* if fitted

AIR CONDITIONING CIRCUIT 200tdi DIESEL ENGINES - 93 MODEL YEAR

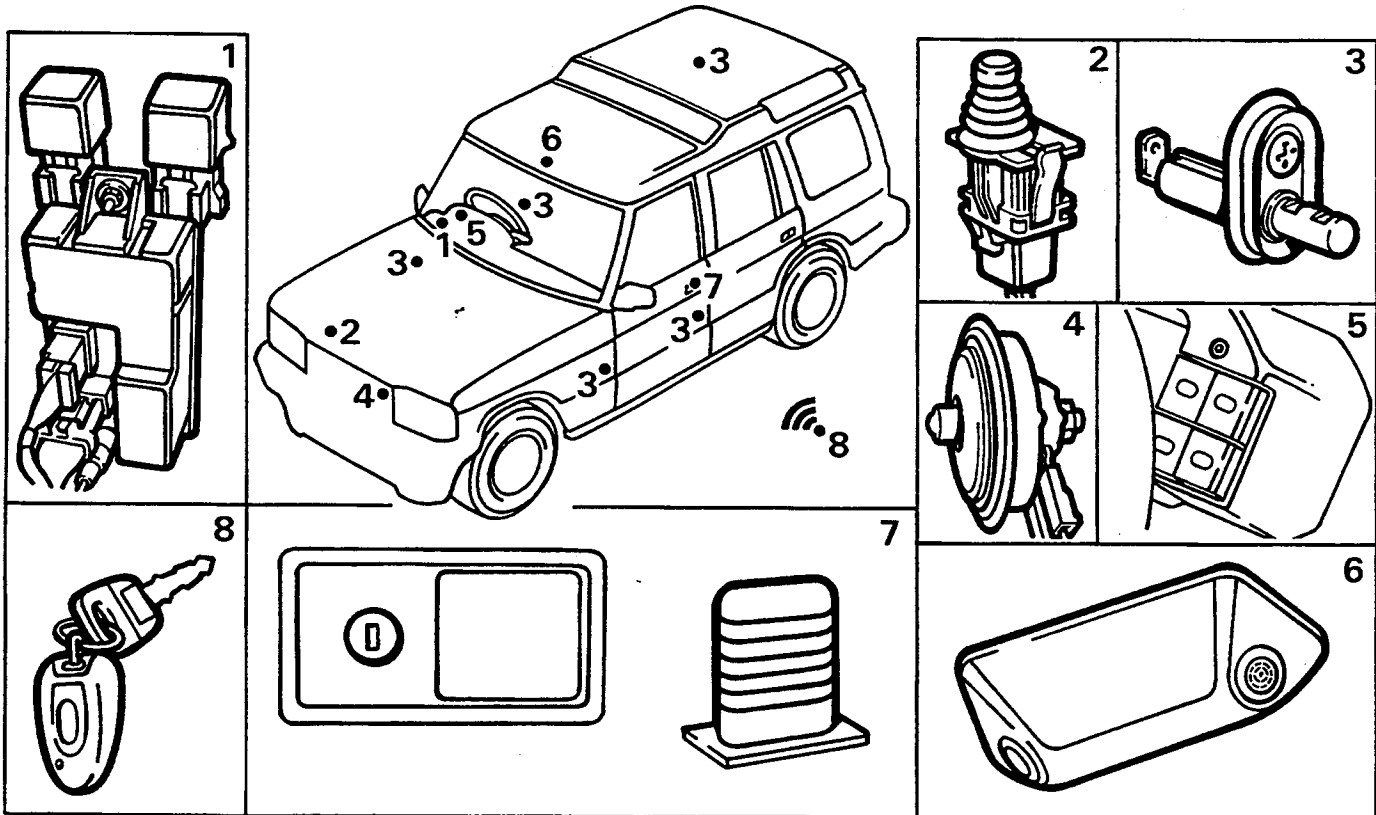


J5320M

ANTI THEFT ALARM SYSTEM

For 1993 models a vehicle alarm system is available as original equipment. The main function of the system is to offer easy to use remote locking and unlocking of the vehicle without having to actively select the alarm function.

ALARM COMPONENTS



J5325M

COMPONENT

LOCATION

- 1. Electronic control unit (ECU) and relays
- 2. Bonnet switch
- 3. Door switches
- 4. Alarm sounder
- 5. Light emitting diode (LED)
- 6. Ultrasonic unit
- 7. Lock barrel, sill buttons
- 8. Handset transmitter

- Steering column
- Front panel crossmember
- Behind L.H. headlamp
- Instrument panel
- Roof map pocket

ANTI-THEFT SYSTEM FUNCTION

Perimetric protection

Using the key in the correct sequence will turn on and off perimetric protection only. When fully perimetrically armed, all doors, tailgate, and bonnet are protected against unauthorised access. If the door key is used in the normal manner the driver will be unaware of the door key sequence. The time taken to lock or unlock with the key must be less than 5 seconds. To prevent unauthorised tampering, the alarm will sound if the key is held in the unlocked position for longer than 5 seconds when armed. Cranking is disabled when perimetric protection is armed.

NOTE: When key is turned left or right the keyswitch input will be activated, in conjunction with the sill button switch when links are operated.

Volumetric protection

Using the handset transmitter will turn on and off volumetric protection. In volumetric mode the vehicle interior is protected using the ultrasonic sensor. Using the handset also arms and disarms the vehicle perimetrically. Cranking is disabled when volumetric and perimetric protection is armed.

NOTE: If armed volumetrically the vehicle CANNOT be disarmed using the key.

Alarm horn

When an intrusion is detected the alarm horn will sound intermittently (Switzerland and Denmark continuous horn sound) and the hazard lights flash (where territorial regulations allow) for 30 seconds. The alarm must be retriggered before alarm horn will sound again.

Vehicle status indication

Vehicle status is indicated by up to three devices: (a) alarm horn, (b) hazard lights, (c) dash board LED. When the vehicle arms in either mode the hazard lights will flash three times and the LED will flash rapidly for 10 seconds. LED will then flash at a slower rate while vehicle is armed. When the vehicle disarms, hazard lights will flash once and LED will extinguish. If LED remains lit, it indicates that the alarm has been triggered. Turning on ignition or arming the alarm will extinguish LED. The LED will give a long pulse flash to indicate the ultrasonic unit being activated.

Central locking

Central locking is controlled by the alarm ECU and may be operated by the key, sill button(s) or handset. The system works on both front doors on four door vehicles or driver's door on two door vehicles.

NOTE: The central door locking system will shut down for a short period after more than 15 consecutive operations.

Inertia switch

An inertia switch is incorporated in the alarm system ECU. If ignition is on and the vehicle receives an impact sufficient to activate the inertia switch, the ECU will signal to unlock central locking actuators and flash hazard lights. Central locking will remain disabled for 30 seconds. To reset turn ignition off and then on after the 30 second period has elapsed.

Ultrasonic unit

The unit operates by emitting an air pressure carrier wave and receiving the wave back. Any disturbance within the vehicle which disturbs the wave will be detected, triggering the alarm.

When the volumetric sensor is activated it monitors movement within the vehicle for 15 seconds before detecting and responding to intrusions. If the sensor detects movement within the vehicle it delays arming until a 15 seconds quiet period has elapsed. If continuous movement is detected the alarm will not arm volumetrically.

Radio frequency system

The RF system uses four frequencies according to market. If the coaxial aerial is not fitted system performance will be impaired. Both ECU and handset have a colour coded label.

Frequency	Colour ECU/Handset	Territory
418.0 MHz	Pink/pink	UK, Ireland
224.5 MHz,	Yellow/yellow	France
433.92 MHz	Blue/blue	Europe, not France, Switzerland, Italy, Denmark
433.92 MHz	White/Blue	Switzerland, Denmark
315.0 MHz	Green/green	Rest of world, Italy, Australia
315.0 MHz	Orange/Green	Gulf, Japan

Partially armed mode

If a door, tailgate or bonnet is left open when the system is armed, the LED will not light for 10 seconds indicating a mislock condition. Hazard lights will not flash. If an open door or tailgate is causing the mislock, the starter motor is disabled. The alarm will sound if ignition is turned to start position. If an open bonnet is causing the mislock the starter motor is disabled. The alarm will arm the volumetric part of the system. If the door tailgate or bonnet is subsequently closed, after a 5 second delay, the doors will unlock and immediately lock and the system will fully arm.

Handset transmitter

The handset LED will give one short flash when button is pressed momentarily.

If button is held down the LED will light again after 2 seconds for 2 seconds, and extinguish until button is released and repressed. The handset contains unique information distinguishing it from other transmitters. It also contains a set of 'random' rolling codes programmed into the ECU before leaving the factory. Each time the handset is pressed a different code is transmitted to the ECU.

If handset is operated more than four times outside the vehicle range (6 metres) or power supply is removed, it will be necessary to re-synchronise handset and the ECU by pressing the handset three times within range and within 5 seconds.

NOTE: If both handsets are lost or damaged when system is armed it will be necessary to fit a new ECU with two matching handsets.

Handset batteries

If handset LED flashes continuously when button is pressed, the batteries need replacing. The hazard lights will flash one 3 second pulse, instead of three times upon arming vehicle.

Power up mode

The alarm system always remembers the state it was left in when power was removed. If the alarm powers up in an armed state and is subsequently triggered it will give a warning that it will fully trigger unless disarmed. This warning consists of short horn pulses every two seconds for 15 seconds.

New born mode

When the ECU is first produced, it will be in its 'new born' mode. In this mode it will respond to any remote of the right frequency. This mode will be cancelled when the ECU has received ten valid handset signals without power interruption.

Engine cranking

It is only possible to crank the engine when ignition is ON and alarm disabled.

BUILT IN TEST PROCEDURE

The built in test procedure is accessed as follows:

1. Starting conditions: ignition off, doors unlocked, bonnet switch depressed.
2. Carry out instructions 3 to 7 within 8 seconds.
3. Release bonnet switch
4. Switch ignition ON.
5. Lock doors.
6. Switch ignition OFF.
7. Switch ignition ON.

If alarm is correctly accessed, horn will sound and LED will flash. The following checks can be made:

8. Open and close any door or tailgate - LED will light.
9. Depress bonnet switch - hazards will flash.
10. Check engine cranking is disabled. Do not turn off ignition.
11. Check ultrasonic by operating handset, LED will emit one 5 second flash, and will flash if interior is disturbed.

NOTE: If ECU is in new born mode any handset of the right frequency will work. If not an initialised handset is required see Handset Initialisation.

12. Turn OFF ignition or press handset to end test procedure. Horn will sound as before to indicate end of test mode.

HANDSET INITIALISATION

NOTE: New handsets are supplied in pairs. If a new handset is required, it will require initialisation to the ECU using the following procedure:

1. Starting conditions: ignition off, doors unlocked, bonnet switch depressed.
2. Carry out instructions 3. to 9. within 8 seconds.
3. Switch ignition ON.
4. Switch ignition OFF.
5. Lock doors.
6. Unlock doors.
7. Release bonnet switch
8. Switch ignition ON.
9. Switch ignition OFF.

If alarm is correctly accessed, horn will sound and LED will light. It is now possible to programme two handsets of correct frequency to vehicle alarm ECU. This must be carried out within two minutes.

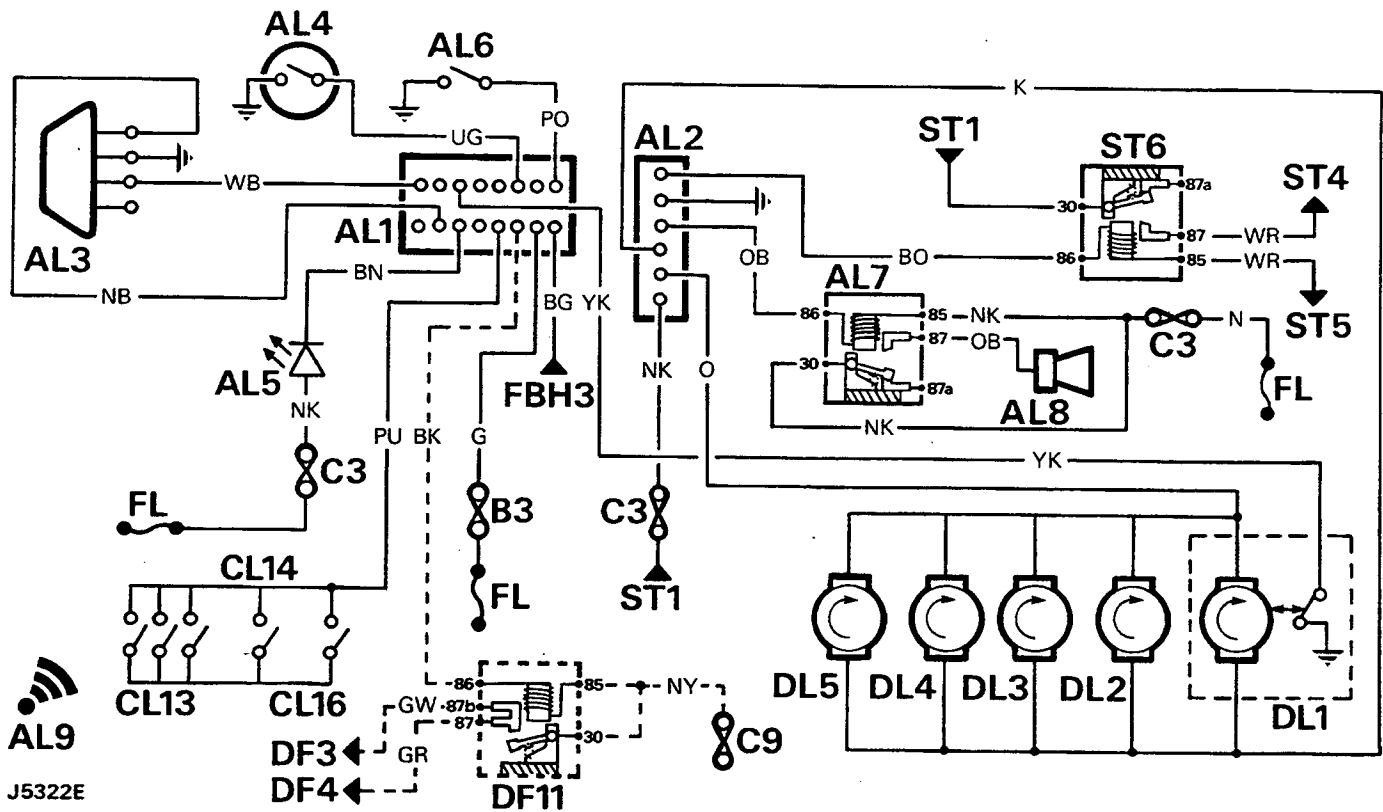
10. Press and hold down button on first handset until dash LED flashes.
11. Repeat instruction 10. for second handset.
12. The LED will extinguish if both handsets have been initialised correctly.

HANDSET BATTERIES**Replace**

1. Gently prise handset apart using a coin or small flat bladed screwdriver.
2. Hold the board in one hand, cup other hand, clap hands together to jar batteries from clip.
3. Leave batteries out, operate handset by pressing button for 10 seconds to allow integrated circuit to reset itself.

CAUTION: Handle new batteries as little as possible. Hands should be clean, dry and free from grease.

4. Fit new batteries in clip, positive side uppermost.
5. Clip handset case together.



ALARM CIRCUIT DIAGRAM

- | | | | |
|------|-------------------------------|------|----------------------------------|
| DL1 | Drivers door lock actuator | AL4 | Drivers door key switch |
| DL2 | Passenger door lock actuator | AL5 | Light emitting diode (LED) |
| DL3 | Rear door lock actuator | AL6 | Bonnet switch |
| DL4 | Read side door lock actuator | AL7 | Alarm relay |
| DL5 | Rear side door lock actuator | AL8 | Alarm sounder |
| DF3 | RH indicators lamps | AL9 | Remote handset |
| DF4 | LH indicators lamps | CL13 | Rear side and rear door switches |
| DF11 | Hazard light relay* | CL14 | Front passenger door switch |
| B3 | Fuse | CL15 | Drivers door switch |
| C4 | Fuse | ST1 | Battery |
| FL | Fused link | ST4 | Starter solenoid |
| AL1 | 16 way connector to alarm ECU | ST5 | Start/ignition switch |
| AL2 | 6 way connector to alarm ECU | ST6 | Starter relay |
| AL3 | Ultrasonic sensor module | FBH3 | Fuel burning heater unit* |

* if fitted

TAIL DOOR GUARD LAMP

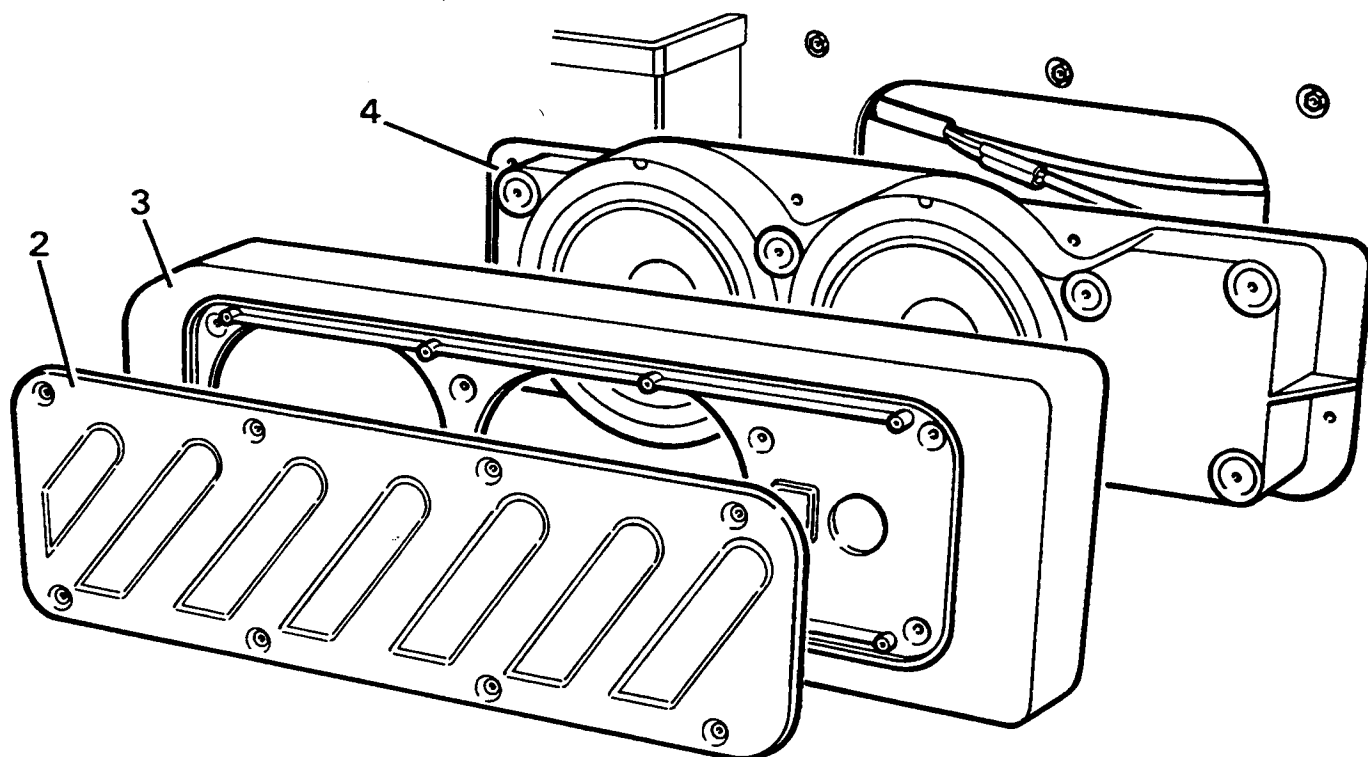
Remove

1. Disconnect the battery negative lead.
2. Remove rear door pull and trim panel.
3. Remove protective plastic sheet from inner door panel.
4. Release number plate lamp feed wire from clip.
5. Disconnect rear guard lamp wire from door harness and pass wire through harness grommet.
6. Disconnect rear guard lamp wire from diode.
7. Detach lamp assembly from door edge.

Refit

8. Reverse the removal instructions.

SPEAKERS AND AMPLIFIER PACK, REAR DOOR



J5283M

Remove

1. Disconnect the battery negative lead.
2. Remove securing screws and withdraw speaker grille.
3. Remove securing screws and withdraw speaker trim.
4. Remove securing screws ease speaker and amplifier pack away from door panel, disconnect multiplug and withdraw assembly.
5. Disconnect speaker plug from amplifier remove securing screws and detach amplifier.

Refit

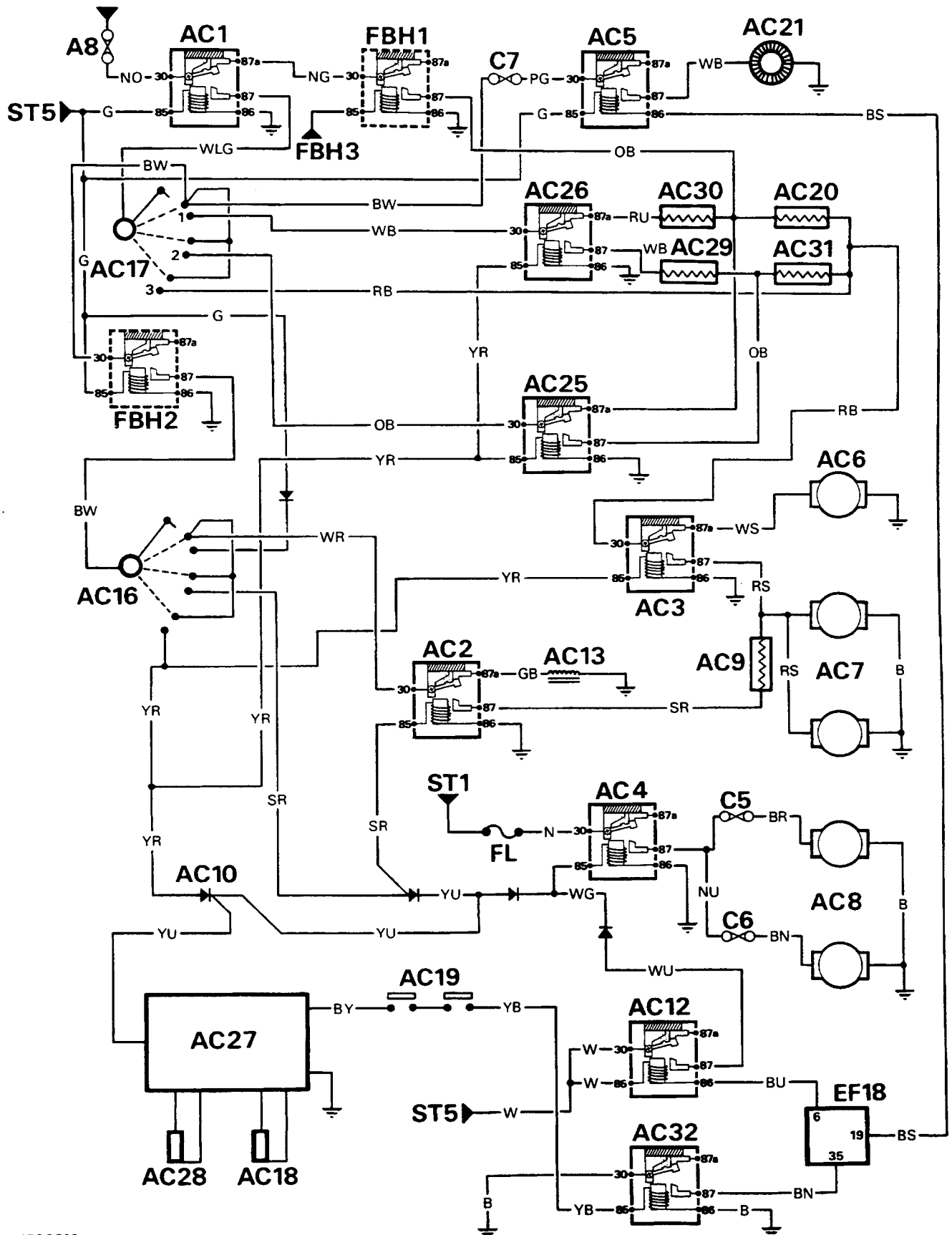
1. Reverse the removal instructions.

AIR CONDITIONING CIRCUIT Mpi ENGINE 93MY

AC1	Air conditioning/heater relay
AC2	Fresh air solenoid relay
AC3	Heater/air con fan relay
AC4	Condenser fan relay
AC5	Compressor clutch relay
AC6	Heater blower motor
AC7	Evaporator fan motor
AC8	Condenser fan motor
AC9	Evaporator fan half speed resistor
AC10	Diodes
AC12	Fan logic relay
AC13	Vacuum valve
AC16	Control switch, vacuum valve and ventilation selection
AC17	Blower motor speed selection
AC18	Thermostat control
AC19	Refrigerant over and under pressure switches
AC20	Resistor
AC21	Compressor clutch
AC25	Medium speed relay
AC26	Low speed relay
AC27	Thermoswitch ECU
AC28	Temperature probe
AC29	Resistor
AC30	Resistor
AC31	Resistor
AC32	Air conditioning logic relay
ST1	Battery
ST5	Start/ignition switch
EF18	Connections to MEMS ECU
A8	Fuse
C5	Fuse
C6	Fuse
C7	Fuse
FBH1	Fuel burning heater fan relay *
FBH2	Fuel burning heater fan switch relay *
FBH3	Fuel burning heater unit *
FL	Fused link

* If fitted

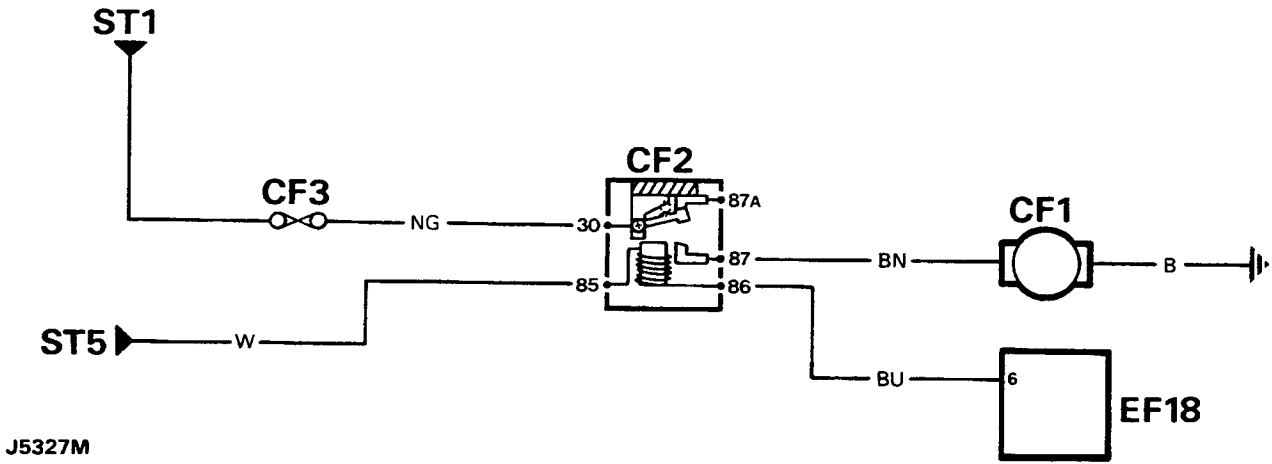
AIR CONDITIONING CIRCUIT Mpi ENGINE 93MY



J5328M

wj86trg

COOLANT FAN CIRCUIT - Mpi



Component

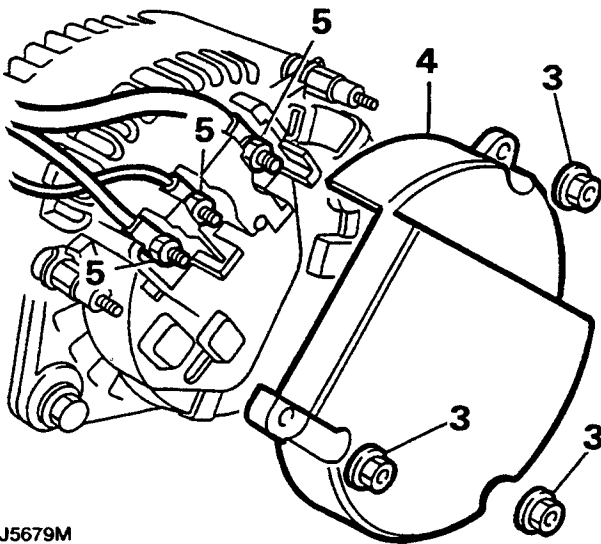
Location

ST1	Battery	
ST5	Start ignition switch	
CF1	Coolant fan	
CF2	Relay	steering column bracket
CF3	20 amp in-line fuse	Right inner wing
EF18	MEMS ECU Pin 6	Right inner wing

ALTERNATOR - Mpi

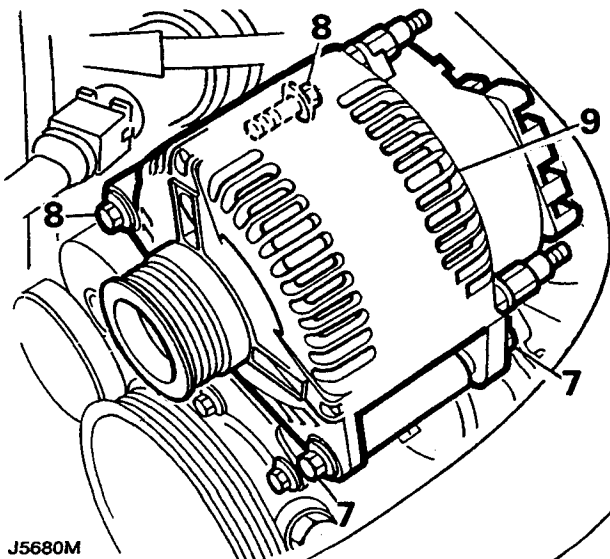
Remove

1. Disconnect the battery negative lead.
2. Remove drive belt.
3. Remove 3 nuts securing alternator cover (if fitted).
4. Remove alternator cover.
5. Remove 3 nuts securing harness to alternator.
6. Remove harness.



J5679M

7. Remove 2 front bolts securing alternator to mounting bracket.
8. Remove 2 rear bolts securing alternator to mounting bracket.
9. Manoeuvre alternator from vehicle.



J5680M

Do not carry out further dismantling if component is removed for access only

10. Restraining the alternator shaft with an 8 mm Allen key, remove nut securing pulley to alternator shaft.
11. Remove pulley.

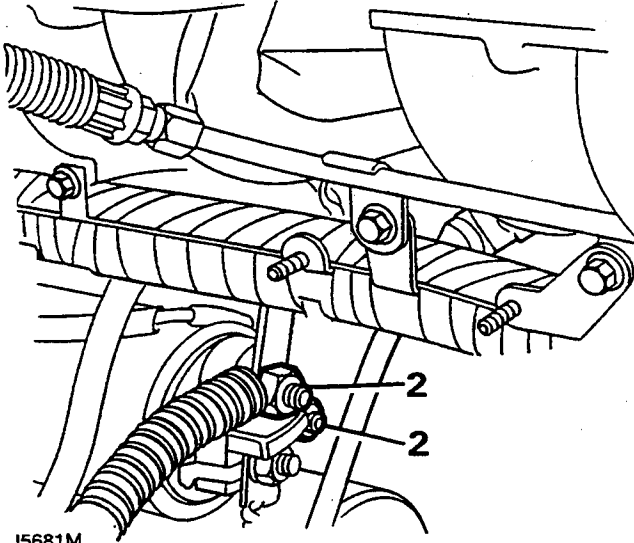
Refit

1. Clean pulley and alternator shaft.
2. Position pulley to alternator shaft.
3. Fit alternator pulley nut, hold shaft with an 8 mm Allen key, tighten nut to the correct torque.
4. Manoeuvre alternator onto mounting bracket.
5. Fit 4 bolts securing alternator to mounting bracket, tighten to correct torque.
6. Connect cables to alternator and secure with nuts.
7. Fit alternator terminal cover.
8. Fit and check drive belt.
9. Connect battery earth lead.

STARTER MOTOR - Mpi

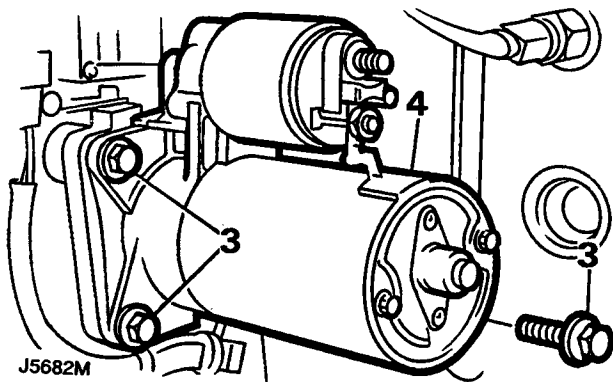
Remove

1. Disconnect the battery negative lead.
2. Remove 2 nuts securing cables to starter solenoid; release cables.



J5681M

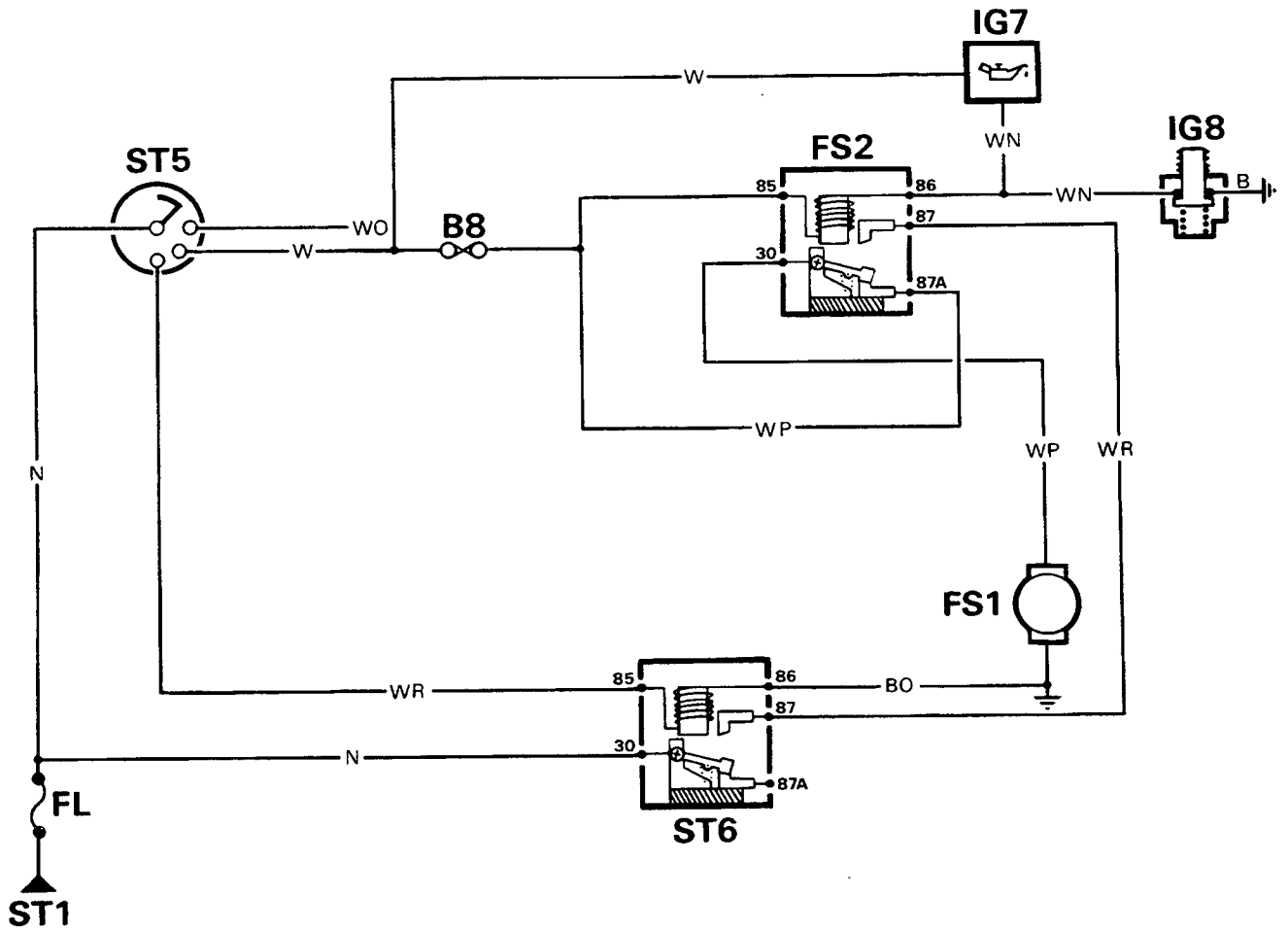
3. Remove 3 bolts securing starter motor.
4. Manoeuvre starter motor clear of bell housing.
5. Remove starter motor.



J5682M

Refit

1. Clean mating faces of starter motor and differential housing.
2. Manoeuvre starter motor into position.
3. Fit mounting bolts and tighten to the correct torque.
4. Connect battery cables to starter solenoid; fit nuts and tighten to the correct torque.
5. Connect battery earth lead.



J5330M

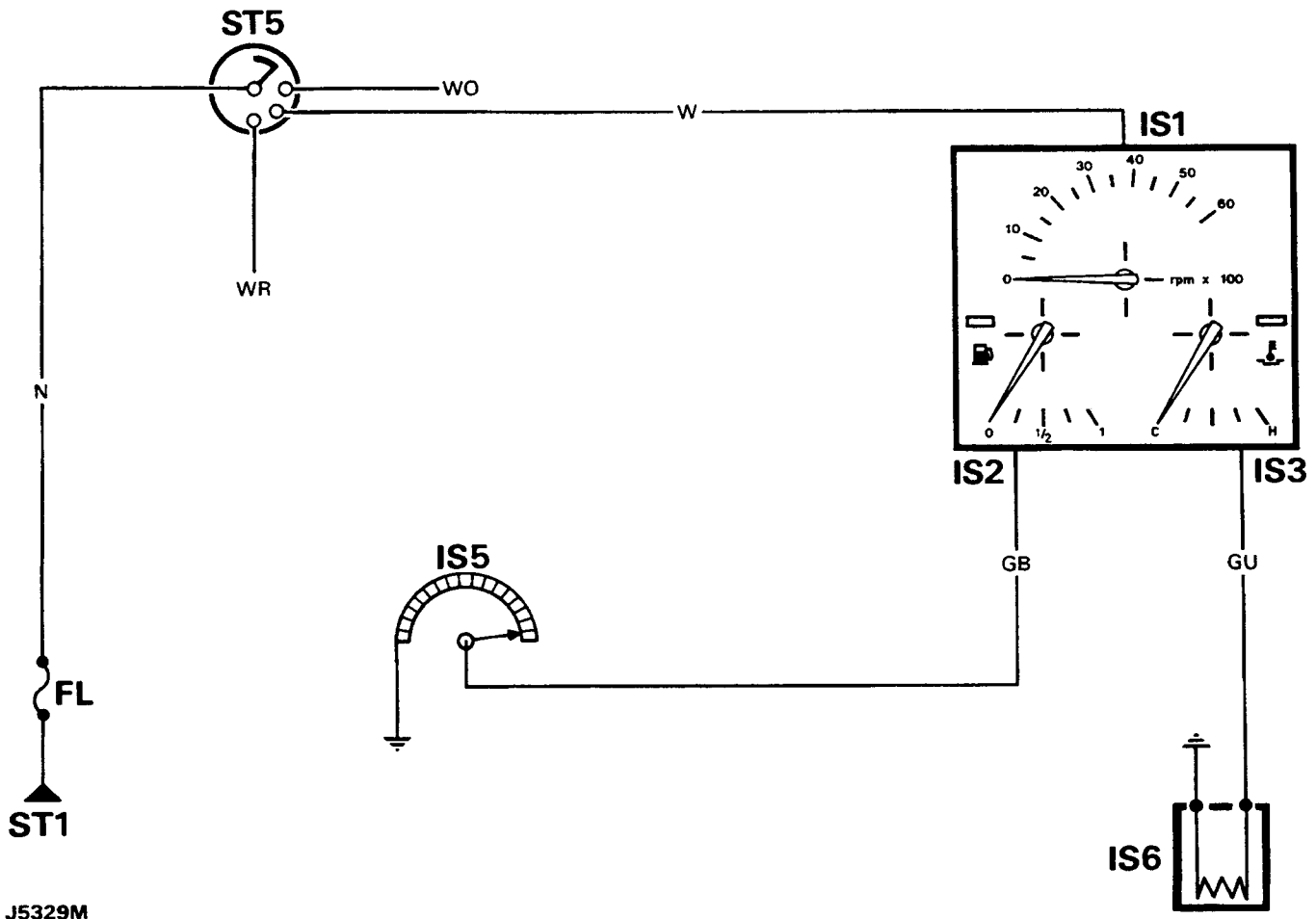
FUEL PUMP CIRCUIT (PETROL ENGINES) 93MY

Component	Location
FS1	Fuel pump In fuel tank
FS2	Fuel pump relay Under dash
IG7	Oil pressure warning light
IG8	Oil pressure switch
ST1	Battery
ST5	Starter/ignition switch
ST6	Starter relay Passenger side footwell
B8	Fuse
FL	Fused Link

	1	2	3	4	5	6	7	8	9
A	UR		UW	UW	R	R			
	UR	UR	UW	UW	R	R	WO	WO	N
	UB	UK	UO	US	RO	RB	WLG	WLG	NG
				RO		WLG			
B	N	U	W	N	PB	WO	N	W	WO
	PW	UP	G	P	PN	WLG	P	WP	WO
						WLG			
C	N	N	N	W	NU	NU	BW		
	WK	WK	NK	GS	BR	BN	PG		

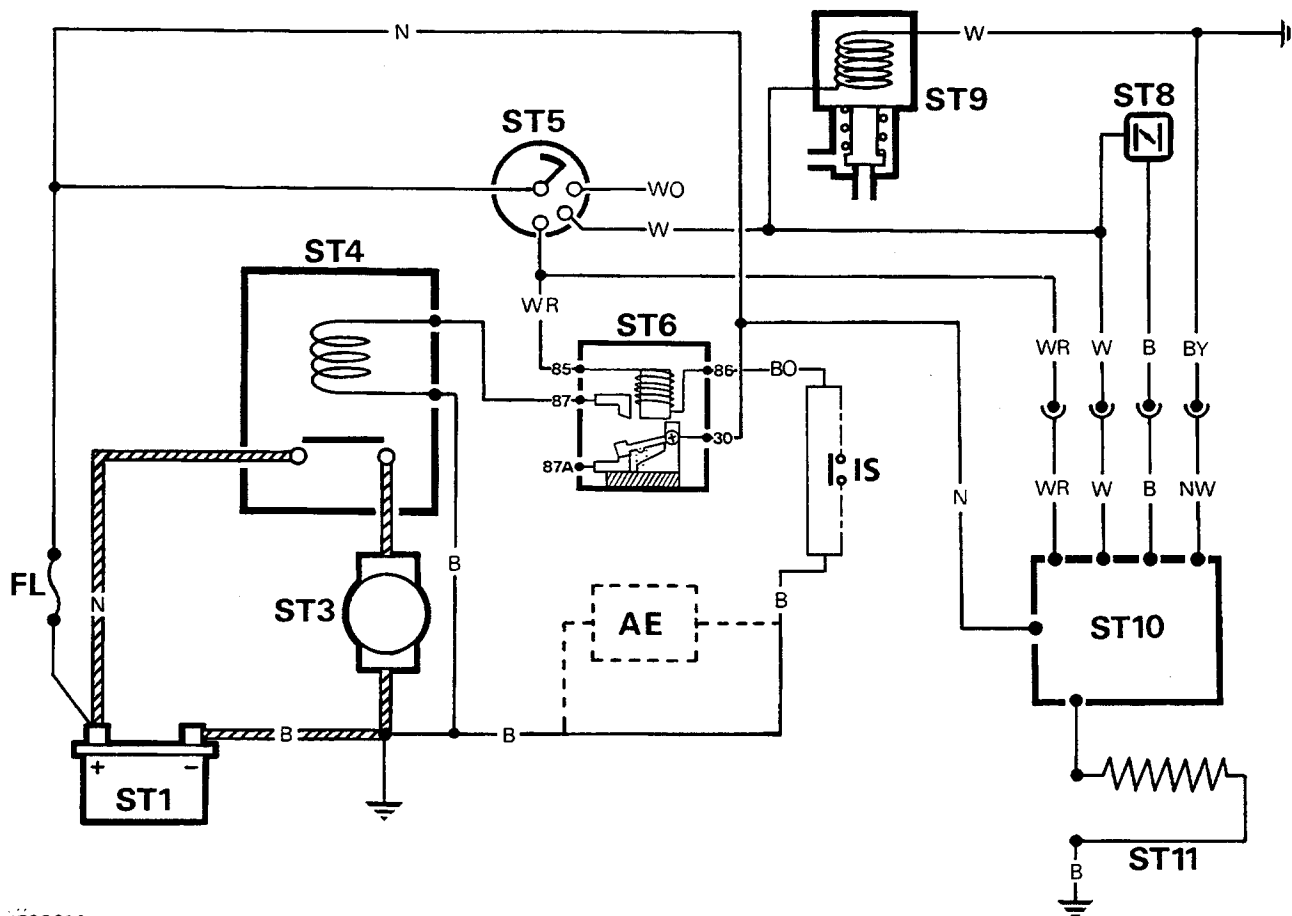
J5171M

FUSE No	VALUE	CABLE COLOUR AT FUSE BOX	CIRCUIT SERVED
A1	10.0	In - Blue/Red Out - Blue/Black	Headlamps, dipped beam and power wash.
A2	10.0	In - Blue/Red Out - Blue/Pink	Headlamps, dipped beam.
A3	10.0	In - Blue/White Out - Blue/Orange	RH headlamp, main beam.
A4	10.0	In - Blue/White Out - Blue/Slate	LH headlamp, main beam.
A5	5.0	In - Red Out - Red/Orange	Right hand front and rear side lamps, column switches, binnacle switches, and instrument pack illumination.
A6	5.0	In - Red Out - Red/Black	Left hand front and rear side lamps, number plate lamps, radio, cigar lighter, clock and heater control panel illumination.
A7	20.0	In - White/Orange Out - White/Light green	Front wash wipe and delay.
A8	20.0	In - White/Orange Out - White/Light green	Air conditioning/heater ignition relay, fan speed switch.
A9	30.0	In - Brown Out - Brown/Green	Heated rear window.
B1	5.0	In - Brown Out - Purple/White	Radio memory, interior lights, clock function.
B2	10.0	In - Blue Out - Blue/Purple	Rear fog guard lamps.
B3	15.0	In - White Out - Green	Direction indicators, stop lamps, reverse lamps, headlamp levelling, air conditioning/heater relay.
B4	15.0	In - Brown Out - Purple	Trailer socket.
B5	15.0	In - Purple/Black Out - Purple/Brown	Horns.
B6	10.0	In - White/Orange Out - White/Light green	Rear door window wash and wipe, clock display.
B7	10.0	In - Brown Out - Purple	Cigar lighter element.
B8	10.0	In - White Out - White/Purple	Fuel pump relay.
B9	10.0	In - White/Orange Out - White/Orange	Radio.
C1	30.0	In - Brown	Window lift relay.
C2		Out - White/Pink	
C3	15.0	In - Brown Out - Brown/Pink	Central door locking.
C4	3.0	In - White Out - Green/Slate	Electric mirrors.
C5	20.0	In - Brown/Blue Out - Black/Red	Air conditioning fans.
C6	20.0	In - Brown/Blue Out - Black/Brown	Air conditioning fans.
C7	5.0	In - Black/White Out - Purple/Green	Air conditioning compressor clutch.
C8	15.0		Hazard warning lights
C9			Spare



FUEL LEVEL AND ENGINE TEMPERATURE CIRCUITS

- IS1 Tachometer
- IS2 Fuel level indicator
- IS3 Engine temperature indicator
- IS5 In tank fuel level unit
- IS6 Engine temperature sensor
- ST1 Battery
- ST5 Starter/ignition switch
- FL Fused link



J5338M

STARTING SYSTEM 200Tdi ENGINE - 94 MY

Circuit wiring variations

The components of the system are as follows:

- ST1 Battery
- ST3 Starter motor
- ST4 Starter solenoid
- ST5 Starter/ignition switch
- ST6 Starter relay
- ST8 Col start warning light
- ST9 Fuel shut-off solenoid
- ST10 Glow plug timer
- ST11 No. 1 Glow plug
- AE Alarm ECU
- FL Fused link
- IS Inhibitor switch

- Manual gears
- - - - - Automatic gears
- - - - - Alarm

AIR CONDITIONING CIRCUIT DIESEL ENGINES - 94 MY WITH AUTOMATIC GEARBOX

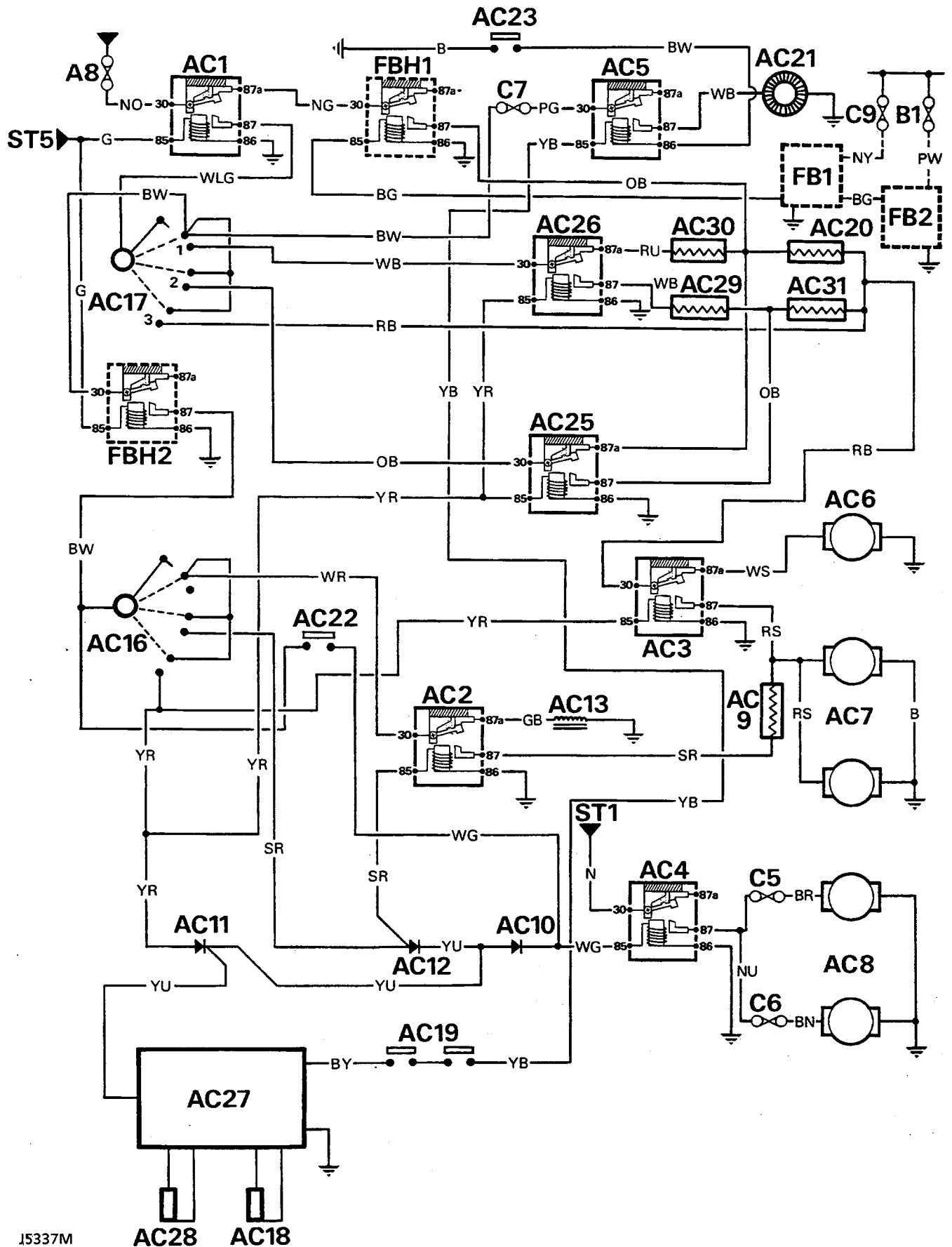
The components of the system are as follows:

AC1	Air conditioning/heater relay
AC2	Fresh air solenoid relay
AC3	Heater/air con fan relay
AC4	Condenser fan relay
AC5	Compressor clutch relay
AC6	Heater blower motor
AC7	Condenser fan motors
AC8	Evaporator fan motors
AC9	Evaporator fan half speed resistor
AC10	Diode
AC11	Diode
AC12	Diode
AC13	Vacuum valve
AC16	Control switch, vacuum valve and ventilation selection
AC17	Blower motor speed selection
AC18	Thermostat control
AC19	Refrigerant over and under pressure switches
AC20	Resistor
AC21	Compressor clutch
AC22	Engine water temperature switch (Normally open)
AC23	Engine water temperature switch (Normally closed) **
AC25	Medium speed relay
AC26	Low speed relay
AC27	Thermostat ECU
AC28	Temperature probe
AC29	Resistor
AC30	Resistor
AC31	Resistor
AC32	Condenser fan timer unit
ST1	Battery
ST5	Start/ignition switch
A8	Fuse
B3	Fuse
C5	Fuse
C6	Fuse
C7	Fuse
FBH1	Fuel burning heater fan relay*
FBH2	Fuel burning heater fan switch relay*
FB1	Fuel burning ECU*
FB2	Fuel burning timer*

* if fitted

** This will switch off the air conditioning if a high coolant temperature occurs to reduce load and regulate temperature.

AIR CONDITIONING CIRCUIT DIESEL ENGINES - 94 MY WITH AUTOMATIC GEARBOX



J5337M

AC28 AC18

ADDITION: OCTOBER 1993

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