

Electrical - Charging & Starting

HOW THE CHARGING SYSTEM OPERATES - 1.4, 2.0 AND DIESEL MODELS

The charging system is an alternator that contains a rectifier pack and regulator to maintain a constant direct current (dc) voltage in the system. The alternator has a fixed coil wound stator in which a field coil rotor rotates. Slip rings conduct current to and from the field coils via two carbon brushes. The unit is machine sensed, the regulator senses output voltage and regulates this to a maximum of 14 volts. The alternator is belt driven from the crankshaft and cooled by a fan mounted behind the pulley.

When the ignition is switched on, a small current flows through the ignition warning light then to the field windings, partially magnetising the rotor and then passes to earth via the brushes and regulator. The warning light circuit is complete and the bulb glows. When the engine is started, the magnetised rotor turns within the stator windings generating 3-phase alternating current (ac) and voltage that rises rapidly with rotor speed. The rotor produces ac by virtue of the magnetic field of the rotor relative to the stator. The field diodes in the rectifier pack convert the full wave a.c. current into d.c. Output current from the field diodes supplements the initial current flowing through the field windings, causing an increase in the magnetic influence of the rotor resulting in self-excitation of the alternator. The field current increases with rotor speed and thus increases generated current and voltage until the alternator is fully-excited.

When the voltage applied to the alternator side of the warning light exceeds battery voltage the warning light is extinguished indicating that the alternator is developing battery-charging current. The regulator functions as an electronic control switch on the earth side of the field coils, rapidly switching the earth circuit OFF and ON to maintain the maximum voltage and thus the current to safe limits.

When the battery is in a low stage of charge or the current draw from electrical units causes voltage drop, the alternator automatically charges at its maximum rate (dependent on speed) until 14 volts is reached. When the demand on the alternator falls, the current output is reduced.

HOW THE STARTER MOTOR OPERATES

1.4, 2.0 and Diesel models

When the starter switch is turned from position 'II' to 'III', the supply from the ignition switch on the B/W wire to the fuse 2 and on the W/R wire energises the starter relay. Earth path is through the fuse box fixing.

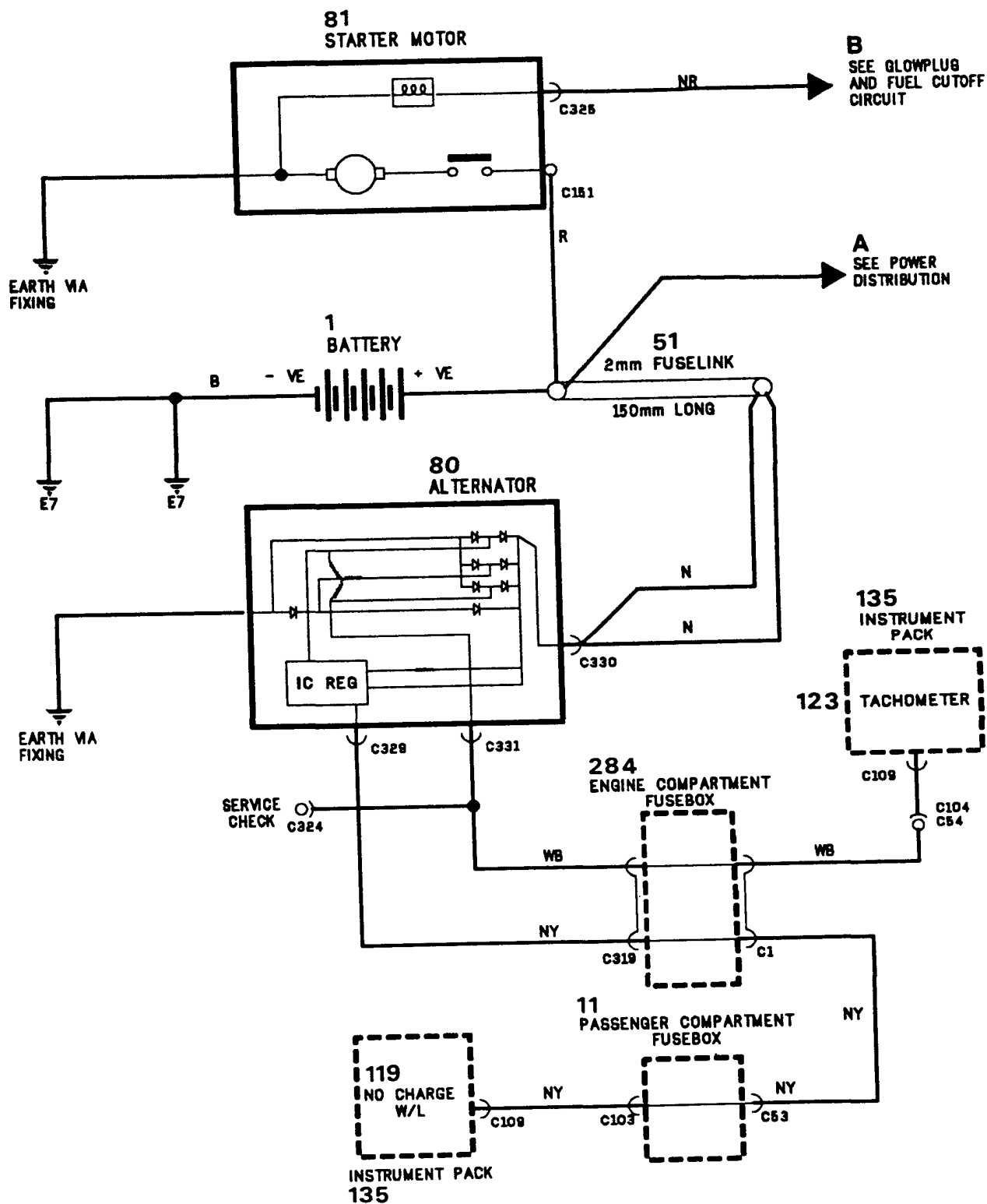
Anti-theft system: When the ignition is switched to position 'III' an earth path is provided by the Anti-theft E.C.U. on the B/W wire to enable the starter relay to be energised, providing it also receives a crank feed via fuse 19 on the W/R wire, the relay completes the W/R wire circuit to energise the starter solenoid.

Once closed, the starter relay provides a feed from fusible link 3 via the N/R wire to the starter solenoid. The earth path is through the starter motor fixings. The solenoid switch closes to connect the battery on the N wire to the starter motor. The earth path is through the starter motor fixings.

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Circuit Diagram - Diesel models



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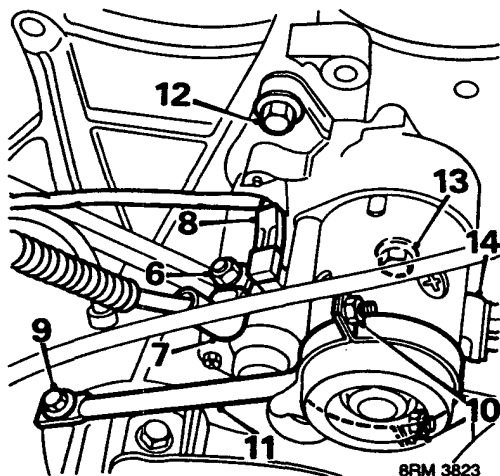
STARTER MOTOR

Remove

1. Disconnect both battery leads.
2. Remove bolt and battery clamp; lift out battery.
3. Remove air cleaner, see **FUEL SYSTEM - Repairs.**
4. Raise L.H. front side of vehicle.

WARNING: Support on safety stands.

5. Remove L.H. front road wheel.



6. Remove starter solenoid terminal nut.
7. Release lead from terminal.
8. Disconnect starter solenoid Lucar.
9. Remove bolt securing support bracket to gearbox.
10. Remove 2 clamp nuts from support bracket.
11. Remove clamp and support bracket.
12. Remove starter motor upper securing bolt.
13. Unscrew starter motor lower securing bolt as far as possible.
14. Using assistance, carefully depress fuel pipes beneath starter motor and remove lower securing bolt.
15. Remove starter motor.

Refit

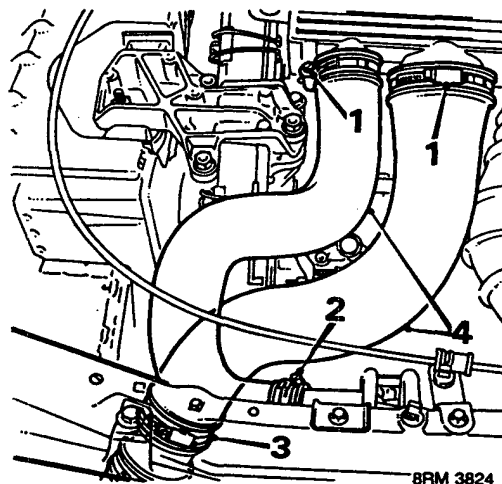
1. Thoroughly clean mating faces of starter motor and clutch housing.
2. Position starter motor to clutch housing.
3. Using assistance, carefully depress fuel pipes beneath starter motor and fit but do not tighten lower securing bolt.
4. Fit upper securing bolt; tighten both bolts to 83 Nm.
5. Fit support bracket and clamp; fit but do not tighten clamp nuts.
6. Align support bracket to gearbox.
7. Fit support bracket securing bolt and tighten to 25 Nm.
8. Tighten clamp nuts.

9. Connect lead to terminal, fit and tighten starter solenoid terminal nut.
10. Connect starter solenoid Lucar.
11. Fit road wheel and tighten nuts to 100 Nm.
12. Remove stand(s) and lower vehicle.
13. Fit air cleaner, see **FUEL SYSTEM - Repairs.**
14. Position battery in tray, fit clamp and tighten bolt; connect both battery leads.

ALTERNATOR

Remove

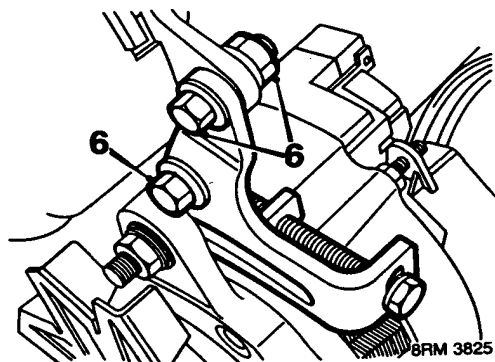
Turbo models



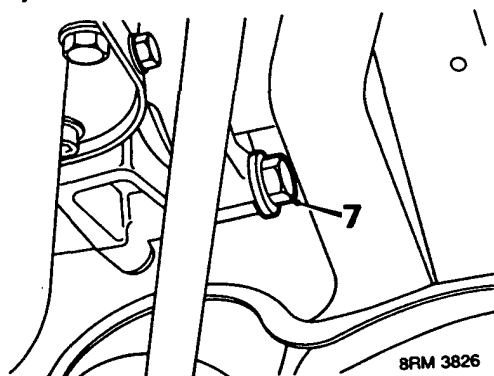
1. Slacken clips securing 2 intercooler hoses to air box.
2. Slacken clip, disconnect hose from intercooler.
3. Slacken clip, disconnect intercooler hose from adaptor.
4. Disconnect 2 intercooler hoses from air box.

All models

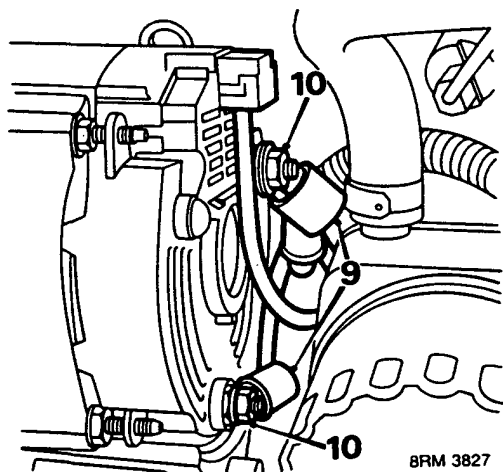
5. Remove alternator drive belt, see **MAINTENANCE**



6. Remove 2 nuts and bolts securing alternator drive belt adjustment bracket to fuel injection pump mounting bracket; remove adjustment bracket.



7. Unscrew alternator pivot bolt as far as possible.
8. Position alternator for access to terminals.



9. Release 2 covers from terminal nuts.
10. Remove 2 nuts securing terminals; disconnect terminals.
11. Manoeuvre alternator from beneath fuel injection pump; recover lower pivot bolt.

Refit

1. Position lower pivot bolt to alternator.
2. Manoeuvre alternator into position beneath fuel injection pump.
3. Connect 2 terminals to alternator, fit and tighten terminal nuts; secure terminal covers.
4. Screw in but do not tighten alternator lower pivot bolt.

Note: Bolt is tightened during drive belt tensioning procedure.

5. Position alternator drive belt adjustment bracket to fuel injection pump mounting bracket.
6. Fit nuts and bolts securing drive belt adjustment bracket and tighten to 35 Nm.
7. Fit and tension alternator drive belt, see **MAINTENANCE**

Turbo models

8. Connect intercooler hoses to adaptor, intercooler and air box, tighten clips.

TORQUE SETTINGS

| | |
|---|--------|
| Road wheel nuts | 100 Nm |
| Starter motor support bracket bolt | 25 Nm |
| Starter motor bolts | 83 Nm |
| Alternator drive belt adjustment bracket nuts and bolts | 35 Nm |