



CHARGING SYSTEM 31

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TECHNICAL DATA

Alternator (BOSCH)

Type	N1-70A	N1-90A
Nominal rated output at 13,5 volts and engine speed of 6,000 rev/min	70 amp	90 amp
Max. continuous speed (rev/min)	15,000	15,000
Stator winding resistance, ohms/phase	0,05 + 0,005 - 0	0,09 + 0,009 - 0
Rotor winding resistance, ohms at 20°C	2,8 + 0,28 - 0,0	2,8 + 0,28 - 0,0
Min. length of slip ring end brushes	5mm (0,197in)	5mm (0,197in)
Regulating voltage at engine speed of 4,000 rev/min and 3 to 7 amp load	ALL MODELS: 13,7 to 14,6 volts	

DRIVE BELT TENSION

Belt tension is as follows:

New belt - 400 to 500N

Used belt - 300 to 400N

Variants fitted with self-adjusting tensioning systems 270N (Constant)

All figures refer to cold belts, a used belt is one which has run for at least ten minutes.

BATTERY

Type Lead acid (Maintenance Free)

Voltage 12

Battery model Depending upon territory, the battery fitted will be one of the following:-

500A/70RC

590A/90RC

Battery size is given in terms of cold start performance (Amps) and reserve capability (Minutes).

The first set of figures (eg. 270) is the current that the battery will supply, at a temperature of -18°C, for a minimum period of 30 seconds with the terminal voltage not falling below 7,2 volts.

The second set of figures (eg. 50RC) is the time in minutes for the battery terminal voltage to drop to 10,5 volts when supplying a load of 25 amps, with the battery at a temperature of 22°C.

SERVICE AND REPAIR OPERATIONS

31 211 0 BATTERY - TEST (Sealed for life type)

SPECIAL EQUIPMENT REQUIRED: DC Voltmeter 0-20V
or multimeter (+1%)

The battery condition is tested by checking the voltage across the terminals. This technique of battery testing only using a voltmeter gives a cleaner quicker indication of battery condition.

NOTE: The battery should be in a 'stabilised' condition, that is when no charging of any type has occurred for 6 hours or more. Any battery that has been charged can be stabilised to remove any over-voltage caused by charging by discharging the battery through the headlights for 30 seconds. After waiting for 4 to 5 minutes, the battery can then be tested.

A - Batteries off charge for 6 hours or more
ON or OFF vehicle

1. Clean battery and read the voltage across battery terminals.

B - Batteries ON the vehicle that have been
recently charged
i.e. on engines running prior to testing.

1. Switch on headlamps for 30 seconds.
2. Switch off headlamps and all electrical accessories and wait 4 to 5 minutes.
3. Clean battery and read the voltage across battery terminals.

Typical Battery Conditions (Voltage)

12,4 volts	POOR
12,6 volts	NORMAL
12,7 volts or more	GOOD

31 214 0 BATTERY - REMOVE AND INSTALL

SPECIAL EQUIPMENT REQUIRED: NONE

To Remove

1. Open hood, fit fender covers and disconnect battery leads, earth first.
2. Remove battery clamp bolts, Fig.2, clamps and battery.

To Install

3. Position battery in vehicle and secure.
4. Reconnect battery leads, positive lead first.
5. Cover terminals with industrial petroleum jelly, remove fender covers and close hood.

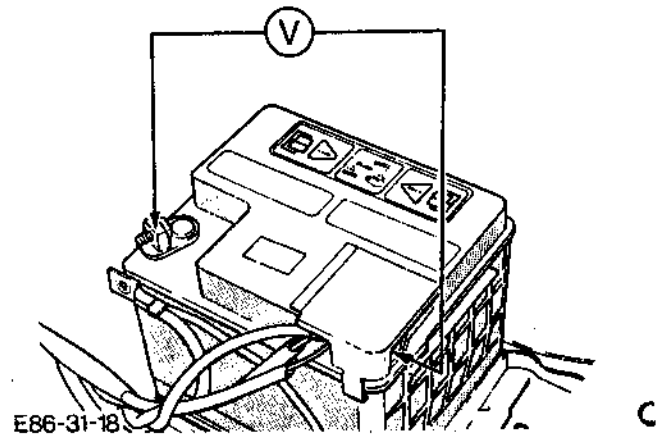


Fig.1. Reading the battery voltage across the terminals.

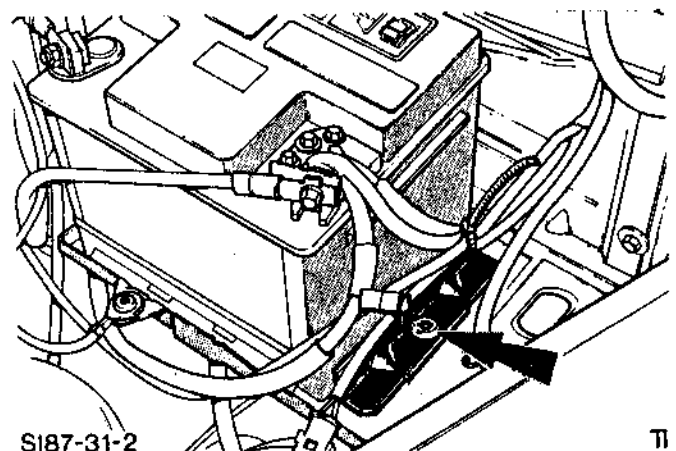


Fig.2. Battery clamp bolt.

31 414 0 ALTERNATOR ASSEMBLY - REMOVE AND INSTALL ((Manual belt tension adjust))

SPECIAL EQUIPMENT REQUIRED: NONE

To Remove

1. Disconnect battery.

Remove heatshield from rear of alternator and disconnect wiring. Slacken alternator mounting bolts and tilt alternator towards engine.

Remove drive belts.

Remove alternator mounting bolts and remove alternator from vehicle, Fig.3.

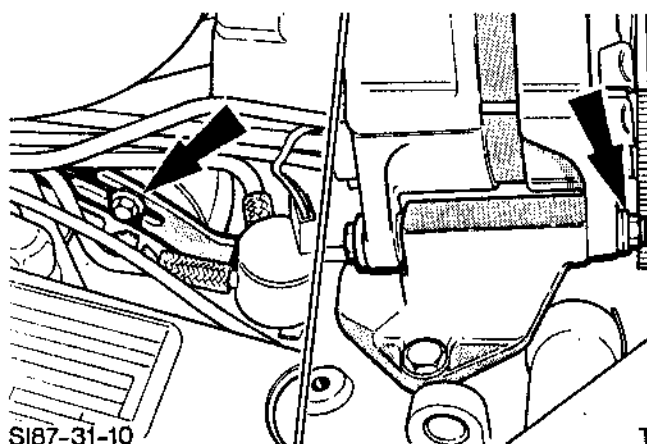


Fig.3. Alternator mounting bolts.

To Install

2. Position alternator and retain with mounting bolts.

3. Check drive belt tension using a belt tension gauge if available, for tensions see Technical Data. Alternatively, total free movement measured on the longest span should be 4mm (0,16 in) applying normal fingertip pressure.

4. Tighten alternator adjusting and mounting bolts in the following order:

- a. Adjusting strap bolt
- b. Through bolt and nut

5. Reconnect wiring and refit heatshield.

6. Reconnect battery.

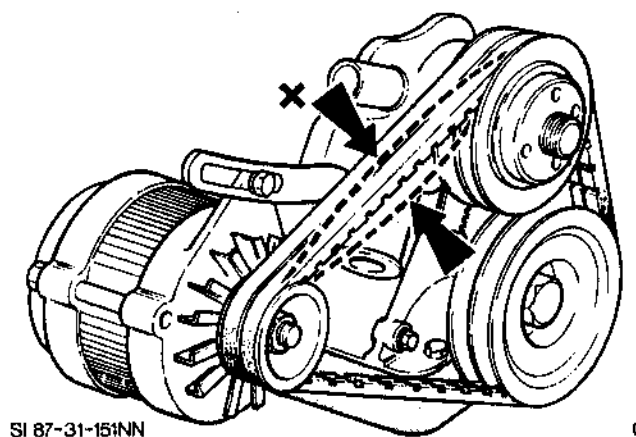


Fig.4. Adjusting the drive belt tension.
X = 4 mm

31 414 0 ALTERNATOR ASSEMBLY - REMOVE AND INSTALL (Automatic belt tension adjust)

SPECIAL SERVICE TOOLS REQUIRED: NONE

To Remove

1. Disconnect battery earth lead, raise vehicle and remove sump guard; Operation No. 24 254 0 refers.
2. Remove turbo heatshield (2 nuts, 1 bolt), Fig.1.
3. Remove heatshield from rear of alternator and disconnect wiring.
4. Use a suitable ring spanner to rotate the belt tensioner in a clockwise direction to release tension on the belt, Fig.2. Remove belt after noting its position around the pulleys.
5. Remove upper and lower retaining bolts, Fig.3, then remove alternator from underneath vehicle.

To Install

6. Locate the alternator in its bracket and secure with the upper and lower retaining bolts.
7. Release the tensioner and refit the drive belt ensuring that it is correctly arranged around the pulleys, Fig.2.
8. Reconnect alternator wiring and refit heatshield.
9. Refit turbo heatshield and secure with 2 nuts and 1 bolt, Fig.1.
10. Refit sump guard, lower vehicle and reconnect battery earth lead.

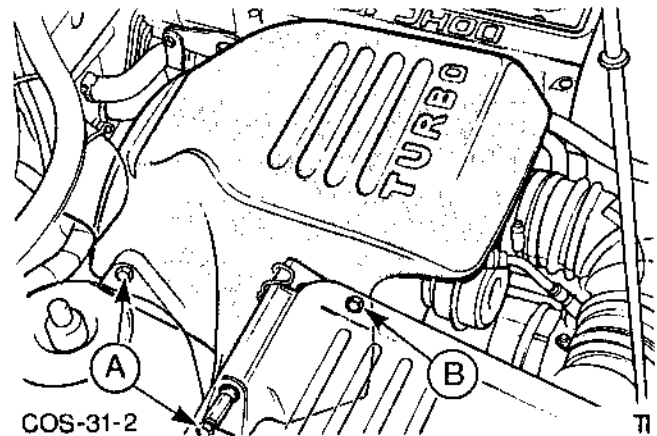


Fig.1. Turbo heatshield fixings.

A - Nuts
B - Bolt

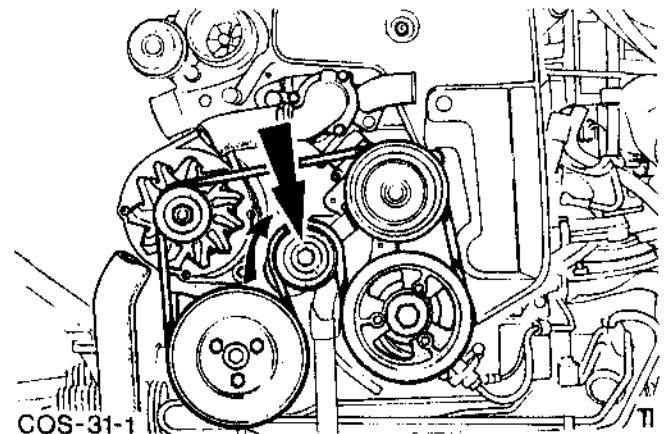


Fig.2. Rotate tensioner to release drive belt.

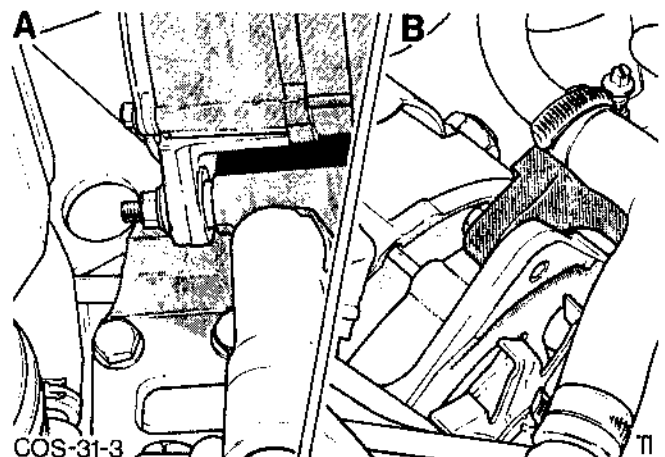
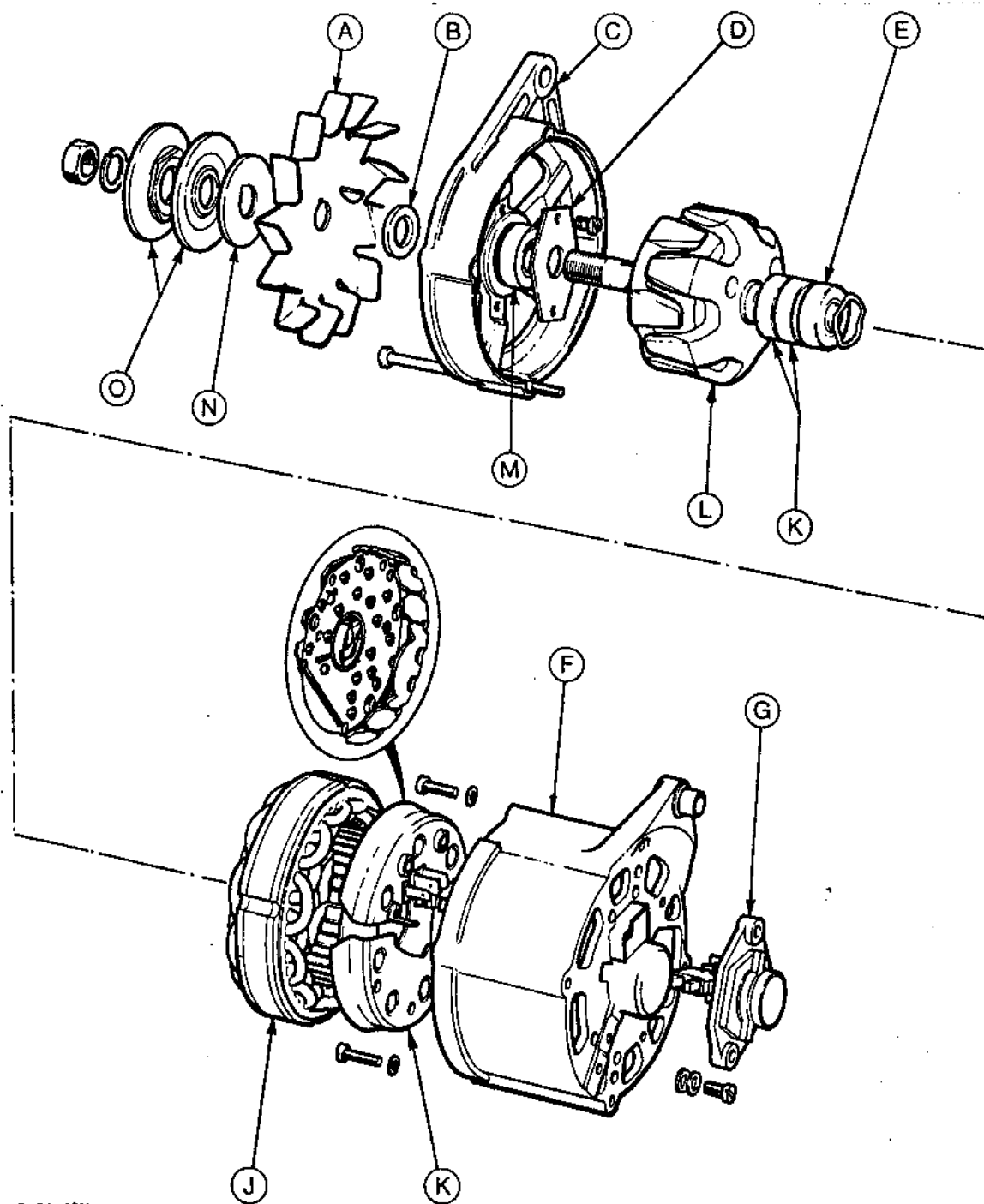


Fig.3. Alternator upper and lower retaining bolts.



S-31-19N

Fig.5. Exploded view of Bosch N1-90 alternator.

- | | | |
|---------------------------------------|-----------------------------|-----------------------|
| A - Fan | E - Slip ring end bearing | K - Slip rings |
| B - Spacer | F - Slip ring end housing | L - Rotor |
| C - Drive end housing | G - Brush box and regulator | M - Drive end bearing |
| D - Drive end bearing retaining plate | H - Rectifier (diode) pack | N - Spacer |
| | J - Stator | O - Pulley |

31 414 8 ALTERNATOR ASSEMBLY - OVERHAUL (ALTERNATOR REMOVED)

Manufacturer - BOSCH

SPECIAL EQUIPMENT REQUIRED: Press, Test Lamp,
Ohmmeter/Multimeter

To Dismantle

1. Remove pulley retaining nut, washer, pulley, fan, spacer and woodruff key (where fitted).
2. Remove brush box and regulator.
3. Remove through bolts and separate drive end housing and rotor from slip ring end housing.
4. Press out rotor from drive end housing.
5. Remove drive end bearing and retainer.
6. Support slip ring end bearing with a large washer, incorporating a cut out to accommodate the rotor shaft, and press bearing from shaft. Fig.6.
7. Remove rectifier (diode) pack retaining screws and lift out stator and rectifier pack.
8. Unsolder stator to diode pack connections using a pair of pliers as a heat sink to reduce heat spread to diodes. Overheating may cause diode failure.
9. Clean and examine all components.

Checking Diodes

10. To check positive diodes, connect a 12 volt supply via test lamp of approximately 5 watts, wired to form a circuit when connected through one of the diodes.
 - (a) Connect test equipment to positive section of diode pack, Fig.8. with negative terminal attached to topside of one of diodes. Connect positive terminal to underside of diode, Fig.8. If diode is functioning correctly, bulb will light.
 - (b) Carry out same procedure for remaining two positive diodes.

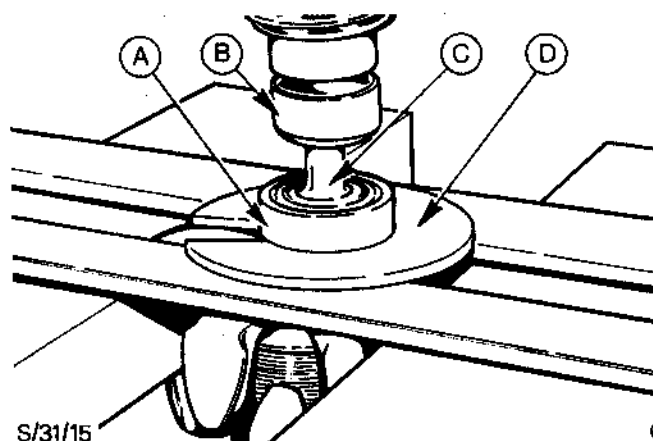
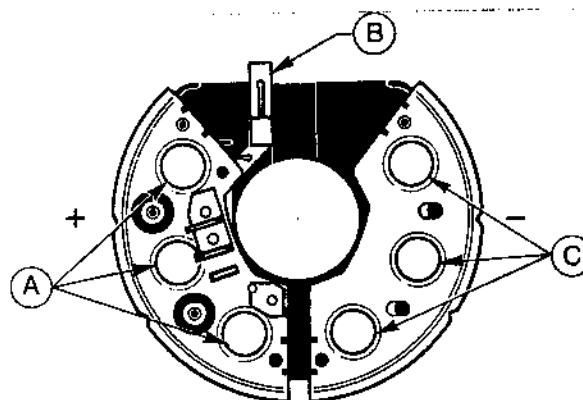


Fig.6. Removing the slip ring end bearing.

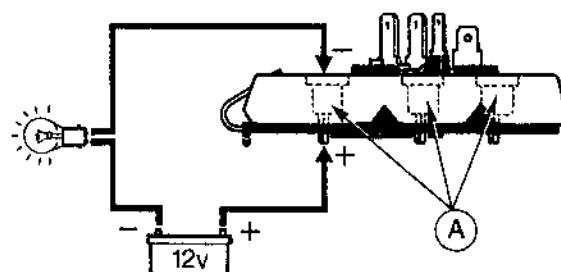
A - Bearing C - Mandrel
B - Press D - Washer



B/31/1

Fig.7. Diode pack.

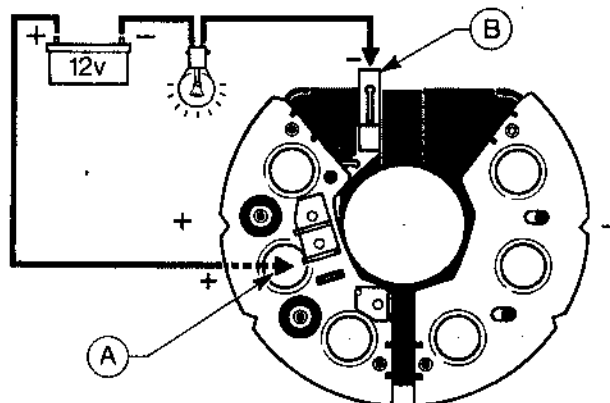
A - Positive diodes C - Negative diodes
B - Brushbox terminal



B/31/2

Fig.8. A - Positive diodes.

- (c) Reverse the terminals, i.e. positive terminal to topside and negative terminal to underside. If bulb illuminates diode is defective.
- (d) Carry out same procedure for remaining two positive diodes.

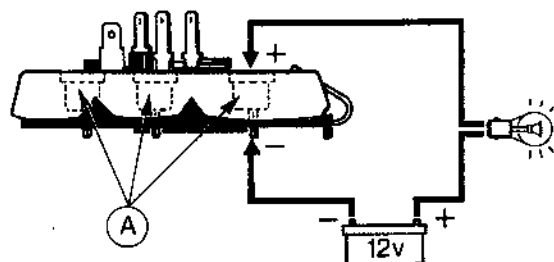


B/31/3

Fig.9. Diode pack.
A - Positive diodes
B - Brushbox terminal

11. To check field diodes, connect test equipment as shown in Fig.9. With negative connection coupled to brush-box terminal and positive connection to diode pin, bulb will light if diode is operating correctly.

- (a) Connect positive terminal to two remaining diodes in turn to test.
- (b) Reverse terminals. If bulb illuminates, diode is defective.



To check negative diodes.

- (a) Connect test equipment to negative section of diode pack, Fig.10, with positive terminal attached to topside of one of diodes. Connect negative terminal to underside of diode, Fig.10. If diode is functioning correctly, bulb will light.

B/31/4

Fig.10. A - Negative diodes

- (b) Carry out procedure for remaining two diodes.
- (c) Reverse terminals. If bulb illuminates diode is defective.

Repeat process on remaining two diodes.

12. Carry out electrical check of rotor condition

- (a) Rotor winding continuity, Fig.11.

Connect an ohmmeter/multimeter between the two slip ring contacts. For correct resistance values, refer to Technical Data.

S/31/13

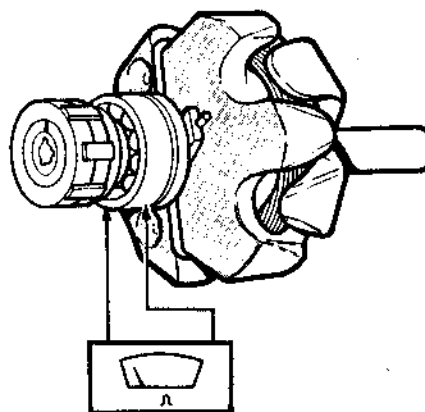
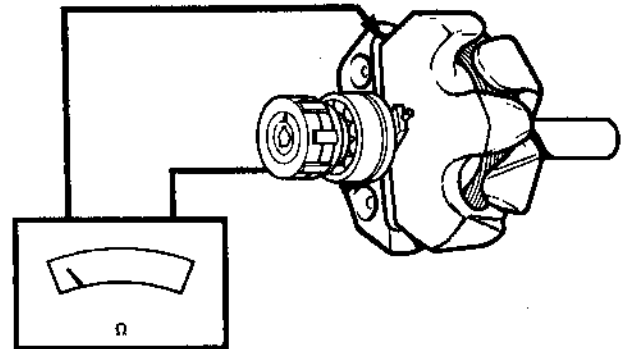


Fig.11. Rotor winding continuity check.

(b) Rotor winding insulation, Fig.12.

Connect an ohmmeter between one slip ring contact and one of the rotor poles. There should be no reading.



S/31/14

Fig.12. Rotor winding insulation check.

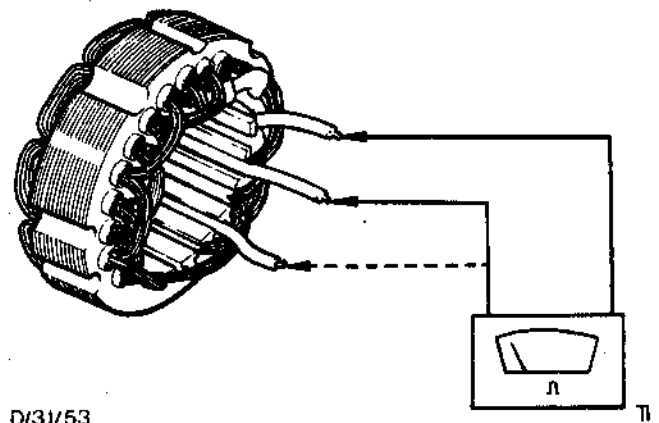
13. Carry out electrical check of stator condition.

(a) Stator winding continuity, Fig.13.

Connect an ohmmeter between two of the three stator winding connections. The resistance should be within limits shown below. Repeat test using third stator winding connection and one of the two connections used in first test. The resistance should again be within the limits shown below:

N1-70 Amp 0,10 to 0,11 ohms

N1-90 Amp 0,09 to 0,10 ohms

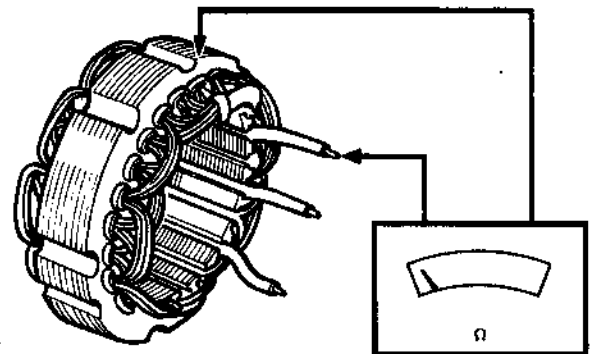


D/31/53

Fig.13. Stator winding continuity check.

(b) Stator winding installation, Fig.14.

Connect an ohmmeter between one stator wire contact and the lamination pack. There should be no reading.



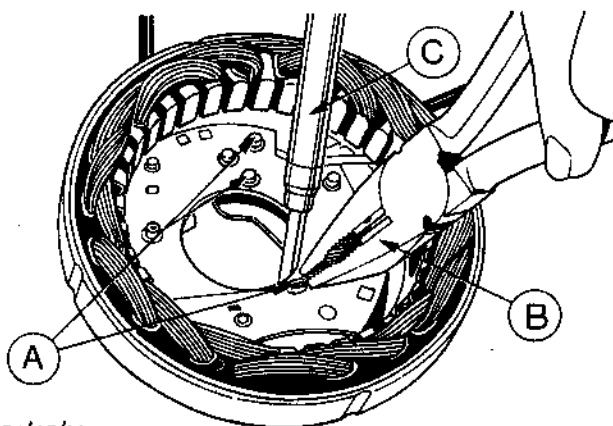
D/31/8/N

Fig.14. Stator winding insulation check.

To Assemble

14. Re-solder stator to diode pack connections, Fig.15. using only a 60/40 electricians solder.

Use a pair of pliers as a heat sink to reduce heat spread to diodes.

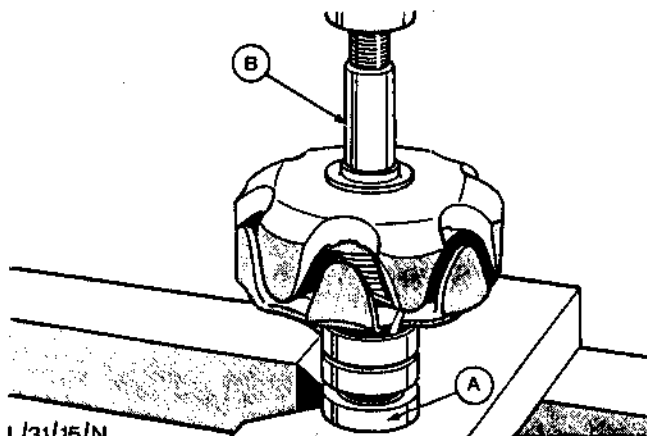


L/31/16/N

Fig.15. Resoldering stator to diode pack.
A - Stator connections C - Soldering iron
B - Pliers

15. Position stator and diode pack in slip ring end housing and secure.

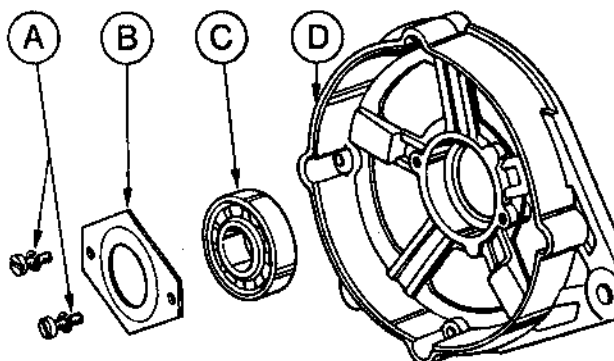
16. Press slip ring end bearing onto rotor shaft Fig.16.



L/31/15/N

Fig.16. Fitting the slip ring end bearing.
A - Bearing
B - Rotor shaft

17. Refit drive end bearing into housing and secure with retainer plate. Assemble the bearing and retainer as shown in Fig.17.

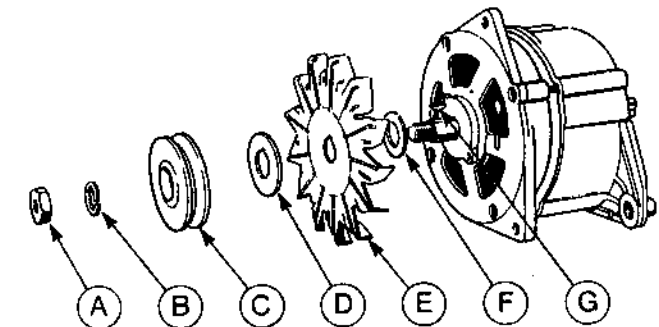


L/31/14

Fig.17. Fitting the drive end bearing.
A - Screws C - Drive end bearing
B - Retainer plate D - Drive end housing

18. Refit rotor to drive end housing.
19. Assemble rotor and drive end housing to slip ring end housing.
20. Refit regulator box.
21. Refit thrust washer, fan, spacer, pulley, lock washer and retaining nut, assembling the components as shown in Fig.18.

A - Retaining nut	E - Fan
B - Lock washer	F - Washer
C - Pulley	G - Key (where fitted)
D - Spacer	



L/31/13/N

Fig.18. Fan, pulley and associated components.

NOTE: Spacer 'D' in Fig.18. must be fitted correctly, with the outer circumference pressing against the fan. In this way, it acts as a vibration damper and prevents fatigue failures.

