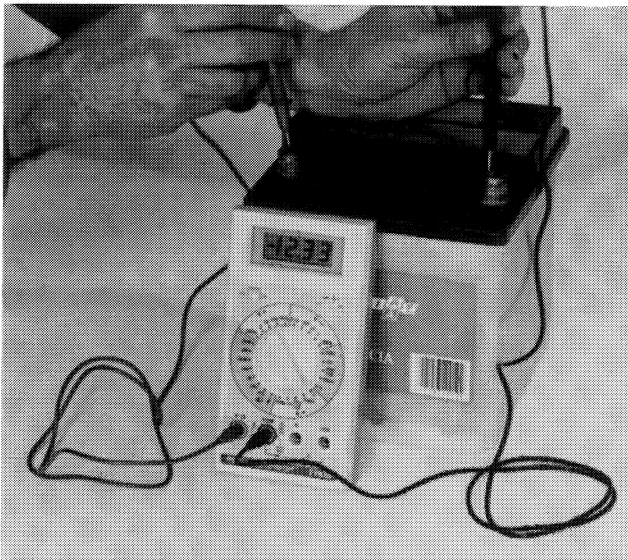


# PUNTO eMANUAL

Electrical Equipment

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Overhauling - Marelli .....	5 ➡
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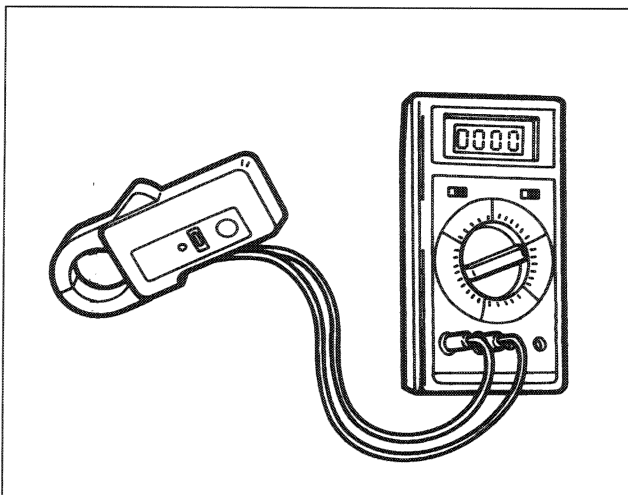
F3M036L01

If a discharged battery is suspected, **after leaving the battery on an open circuit for at least two hours**, measure the voltage without load, connecting a digital voltmeter to its terminals. If the reading is below 12.30 V it is 50% charged; if it is 12.48 V it is 75% charged, and if it is 12.66 V it is 100% charged.



*If the electrolyte level in one or more cells of the battery is below the minimum level marked on the plastic container, open the cell cover and add distilled and deionized water (as for ordinary batteries).*

**NOTE** Do not subject the battery to fast charging at voltages of over 15.5 V, or to high recharging currents or amperages.



P3M036L02

## ALTERNATOR

Checking the voltage and maximum current intensity delivered by the alternator on the car, using a digital multimeter and HALL effect clip-on ammeter.

### Description and use of the clip-on ammeter

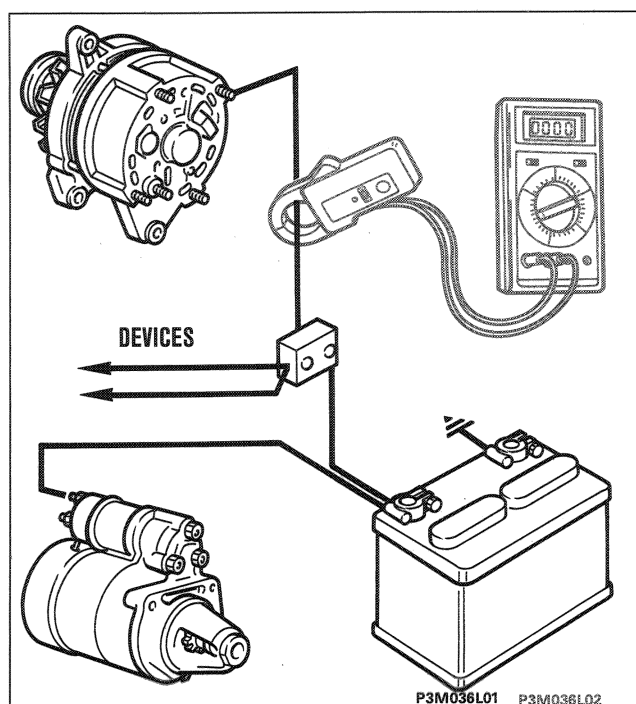
This is clipped to a multimeter and permits the following to be measured: battery charging and discharging current, SCR (silicon-controlled diode) controlled current and currents absorbed by starter motors, between 10 and 600 A without the circuit having to be interrupted. Before starting the measurements:

- set the 'LO-HI' switch on the clip to "LO" for measurements up to 200 A or to "HI" for measurements between 200 and 600 A.

The reading is obtained in both positions for any value, but it is necessary to change the position to ensure greater precision of the reading on the display.

- After connecting the clip to the multimeter, set the multimeter to the 200 mV or 2 V range, alternating or direct depending on the current to be measured. If the selected range is 200 mV, the reading will be given directly in amperes; if the range is 2 V, the reading must be multiplied by one thousand.
- The reading must then be reset by operating the "ZERO ADJUST" button on the clip-on ammeter. If there is reason to suspect the existence of dispersed magnetic fields, the ammeter should be reset while being held at a distance of 5-10 cm from the operator. When measuring DC, a possible hysteresis phenomenon could render it impossible to reset the clip. In this case, open and close the clip a few times and then reset it.

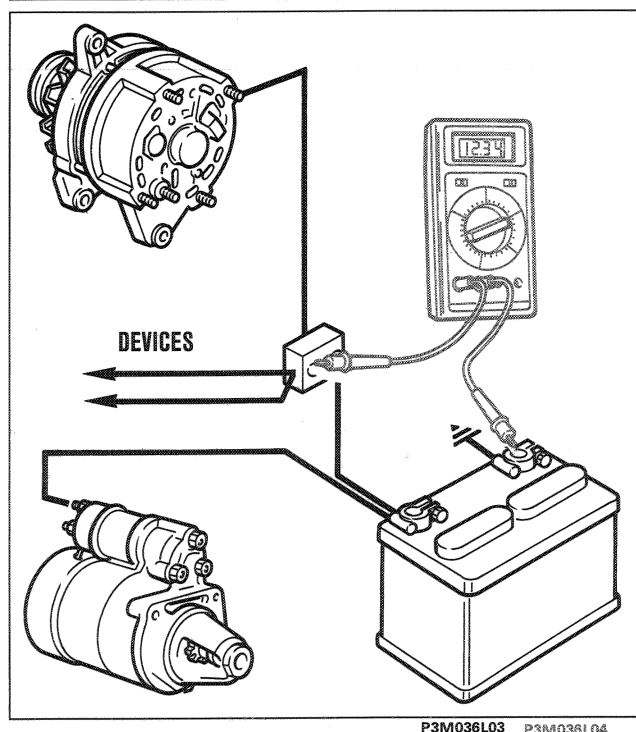
55.



### Checking the current intensity

- Clip the clip-on ammeter onto the alternator-junction block cable (see figure)
- start up the engine and increase its speed to 3000 - 4000 rpm;
- gradually switch on all the available electrical devices
- read the value of the maximum current output on the multimeter display.

If the current intensity reading on the multimeter is over 5 A lower than the specified value, overhaul the alternator.

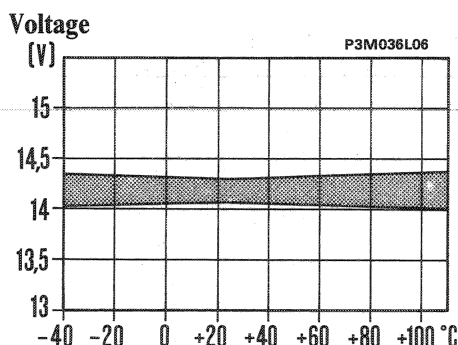
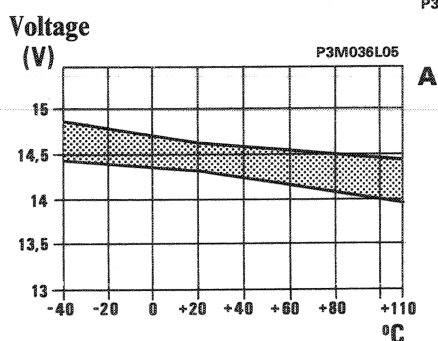


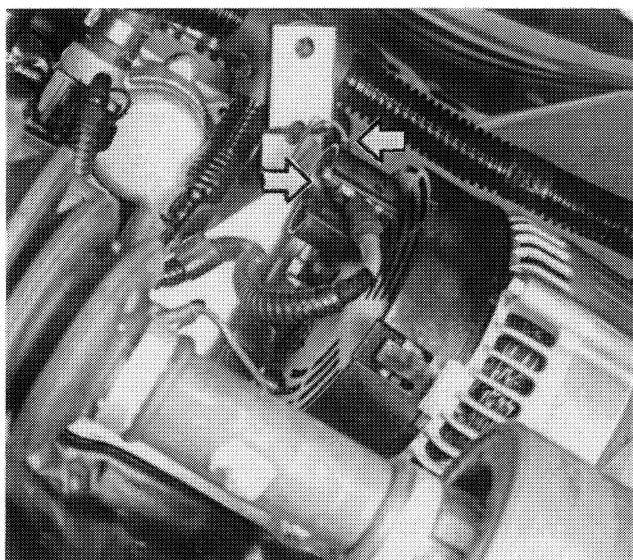
### Checking the voltage

- Place the multimeter leads in contact with the battery terminals;
- start the engine and increase its speed to 3000 - 4000 rpm;
- gradually switch on a few electrical devices until an absorption of about half of the maximum load is obtained.

Under these conditions, the voltage measured should be the maximum and minimum values shown in the graphs below, in accordance with the ambient temperature of the electronic regulator (alternator).

Graph A refers to the RTM 121A electronic regulator which is incorporated in the M. Marelli alternators, whereas graph B refers to the EL 14V 4C electronic regulator which is incorporated in the Bosch alternators.



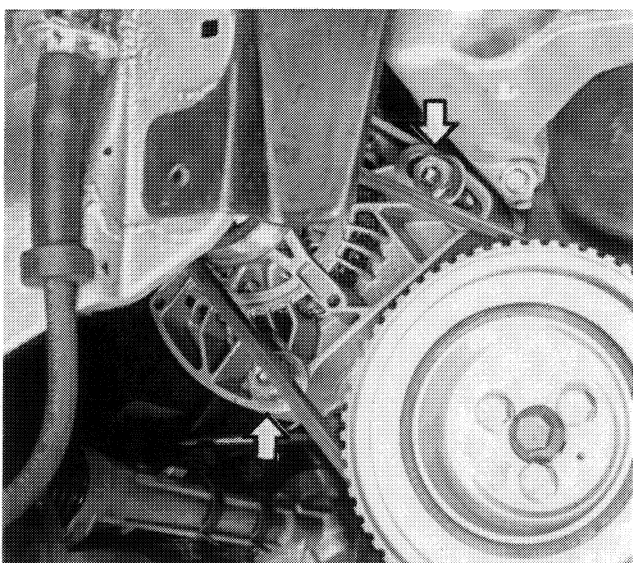


P3M037L01



## REMOVING-REFITTING ALTERNATOR

- Disconnect the alternator's negative and positive cables;



P3M037L02



- undo the bolts arrowed in the figure and disengage the alternator drivebelt;



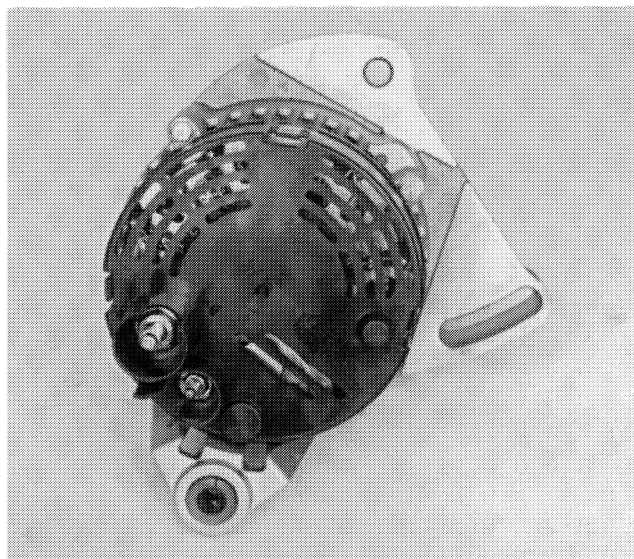
P3M037L03



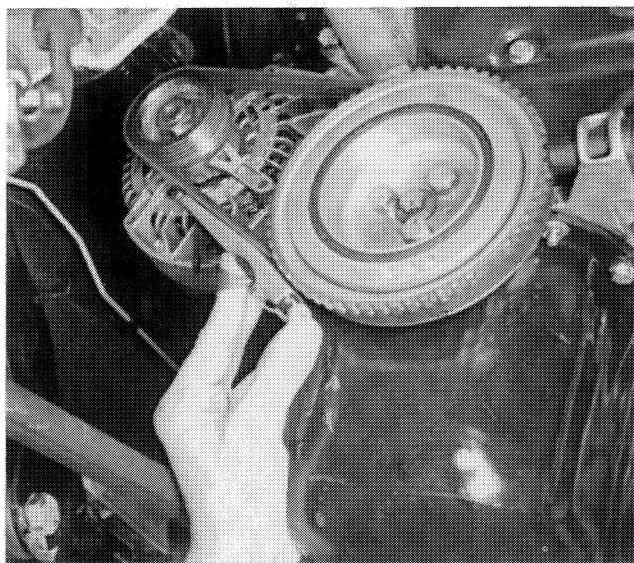
- undo the slot-mounted bolt securing the alternator;
- withdraw the alternator from the top of the car;



### 55.



P3M038L01



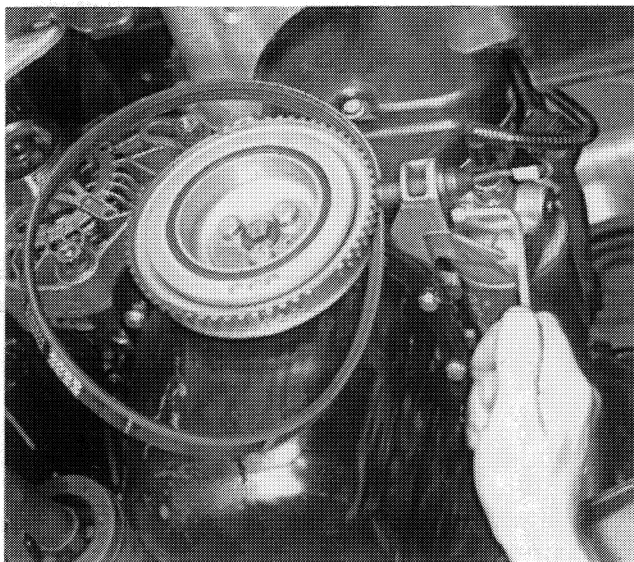
P3M038L02



To refit, reverse the procedure for removal.

### Tensioning the alternator drivebelt

- Slacken the alternator attachment bolts;
- insert a lever between the alternator and the motor to tension the belt;
- tighten the alternator attachment bolts;
- periodically check the tension, every 20,000 km. If the load is below 25 daN, reset the tension to 35 - 45 daN.



P3M038L03



### Replacing and checking tension of alternator belt

- Undo the alternator attachment bolts (see procedure on previous page);
- remove the engine rpm sensor;
- withdraw and replace the belt;
- check that the belt tension is 50 - 60 daN, measured using tool 1895762000;
- run the engine for 15 minutes, allow it to cool down for a further 15 minutes and check that the tension is 40 - 50 daN; if the tension is less, reset it to 50 - 60 daN.

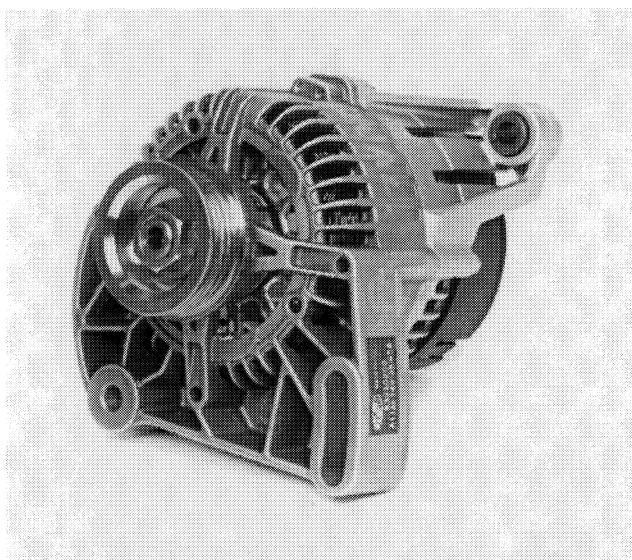
**OVERHAUL OF MARELLI ALTERNATOR**  
**Marelli A115I-14 V-35/65 A alternator)**

If there is no or incorrect indication of alternator recharging, before totally dismantling the alternator, carry out the following checks:

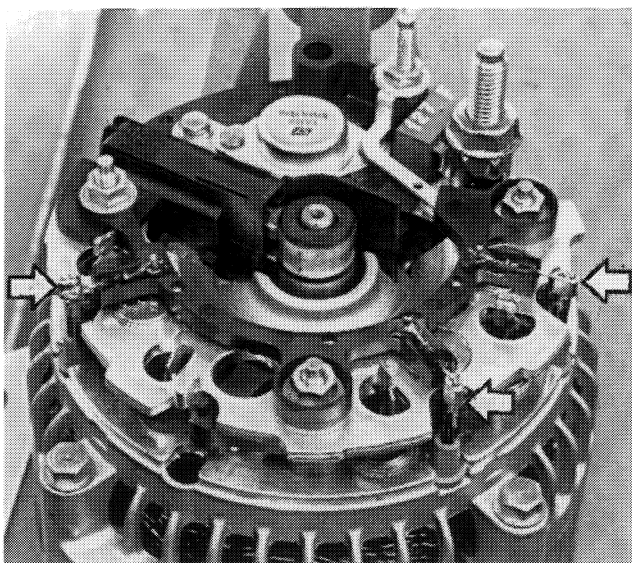
- Check the belt tension;
- check that the nut on the alternator's positive terminal (B+) is tight, and make sure that the washer is present;
- check that the nut on the excitation terminal (D+) is tight, and make sure that the washer is present;
- check that the nuts on the positive connector block in the engine compartment are tight;
- check that the bolts securing the battery negative cable to the body shell are tight;
- check that the battery terminals are clean and tight;

- remove the plastic cover protecting the diode pack, then unsolder the terminals of the stator windings from the excitation diodes;

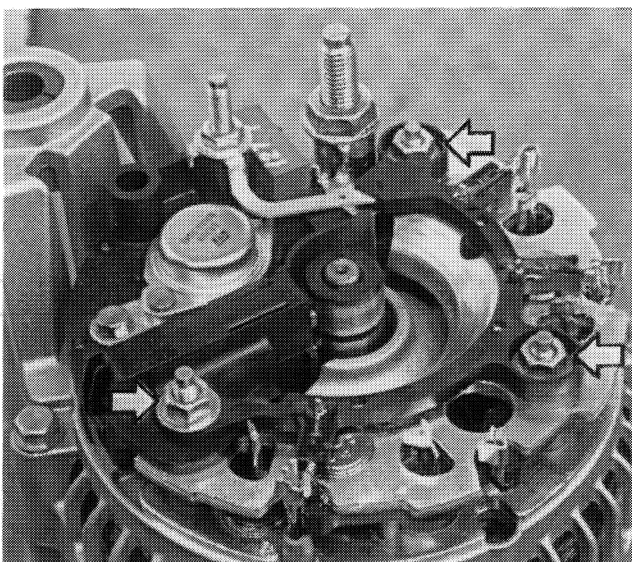
- undo the bolts indicated in the figure;



P3M039L01

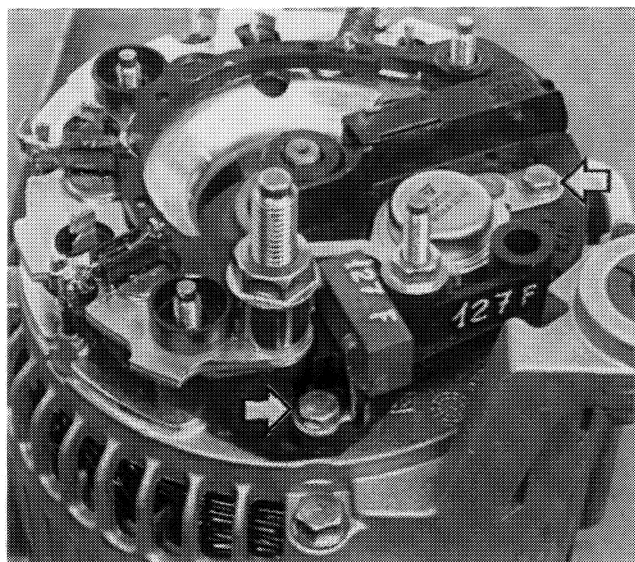


P3M039L02

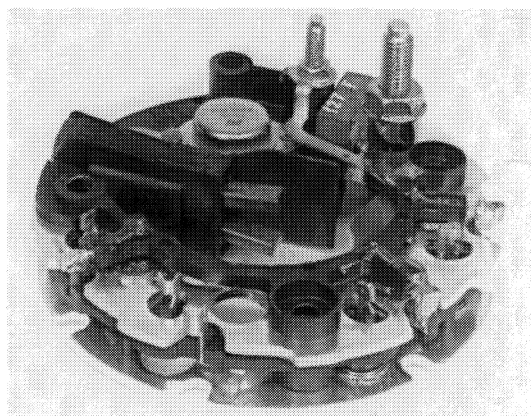


P3M039L03

55.



P3M040L01



P3M040L02

- undo the bolts arrowed in the figure and remove the diode pack from the alternator;



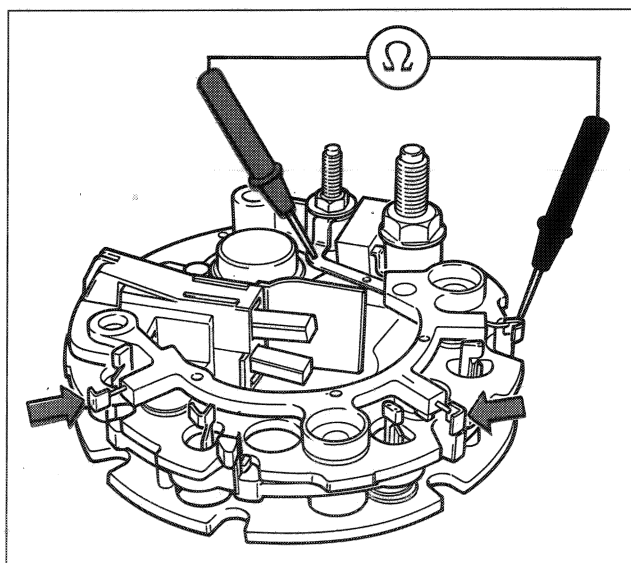
*Work carefully since the diode pack is glued to the alternator cover.*

### CHECKING THE DIODES

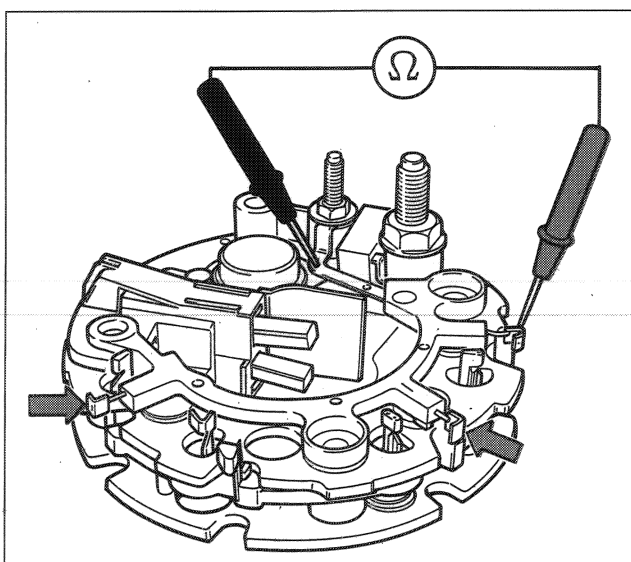
#### Checking excitation diodes

- Connect the leads of an ohmmeter as indicated in the figure;

**NOTE** *The readings on the three terminals of the excitation diodes should show infinite resistance (no current passing).*



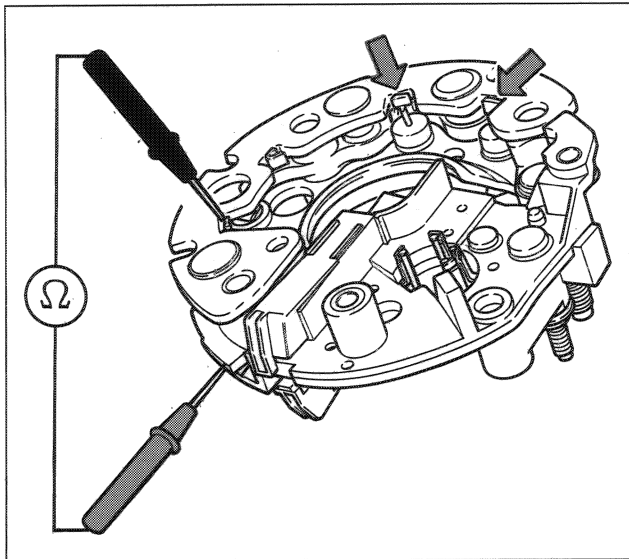
P3M040L04 P3M040L03



P3M040L06 P3M040L05

- reverse the positions of the ohmmeter leads as shown in the figure.

**NOTE** *The readings on the three terminals of the excitation diodes should show the diode's resistance (current passing).*

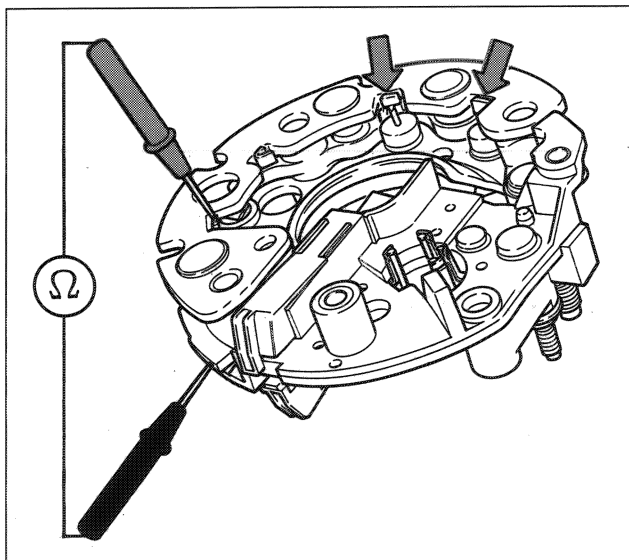


P3M041L02 P3M041L01

### Checking positive diodes

- Turn the diode pack the other way up;
- connect the ohmmeter leads as shown in the figure;

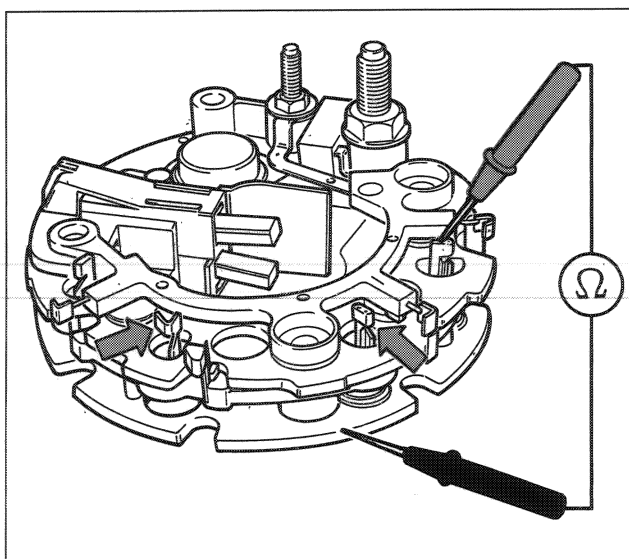
**NOTE** The readings on the three terminals of the positive diodes should show infinite resistance (no current passing).



P3M041L04 P3M041L03

- reverse the positions of the ohmmeter leads as shown in the figure.

**NOTE** The readings on the three terminals of the positive diodes should show the diode's resistance (current passing).



P3M041L06 P3M041L05

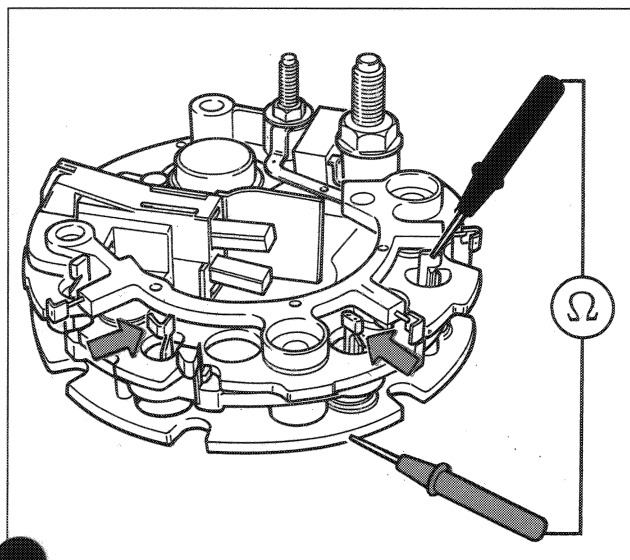
### Checking negative diodes

- Connect the leads of an ohmmeter as shown in the figure.

**NOTE** The readings on the three terminals of the positive diodes should show infinite resistance (no current passing).



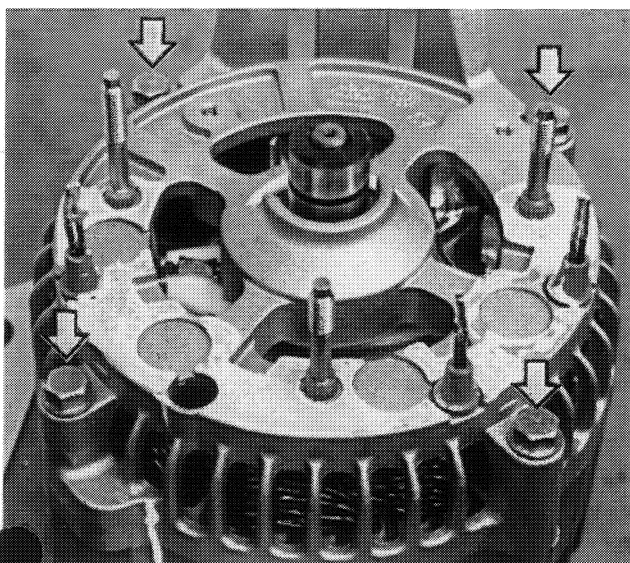
5.



P3M042L02 P3M042L01

- reverse the positions of the ohmmeter leads as shown in the figure.

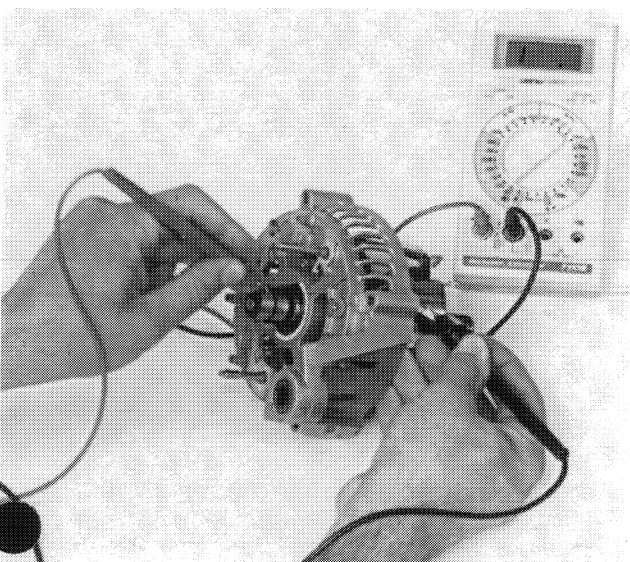
**NOTE** The readings on the three terminals of the negative diodes should show the diode's resistance (current passing).



P3M042L03

### Disassembly

- Undo the nuts securing the cover;
- carefully withdraw the rotor shaft with the bearing from the front cover (pulley side).

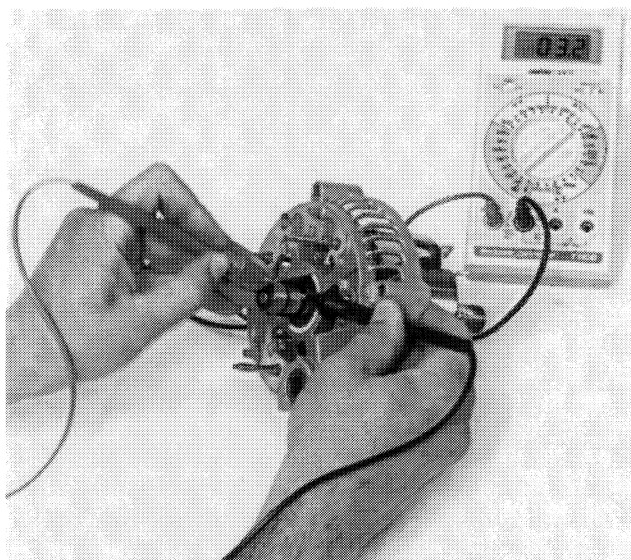


P3M042L04

### Checking rotor winding insulation

- Place the two leads of an ohmmeter in contact with a slip ring and the rotor casing (see figure);
- the instrument should give an infinite resistance reading; if it does not, renew the rotor and the rear cover.



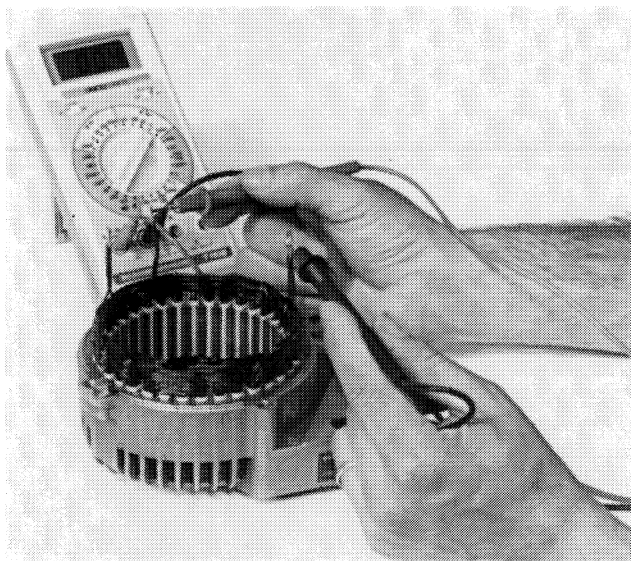


P3M043L01

### Checking rotor winding resistance on the slip rings

- Place the two leads of an ohmmeter in contact with the rotor's slip rings (see figure). The instrument should give a resistance reading.

**NOTE** *If the resistance is different from the specified value or infinite (broken circuit), the rotor and rear cover will need to be renewed.*



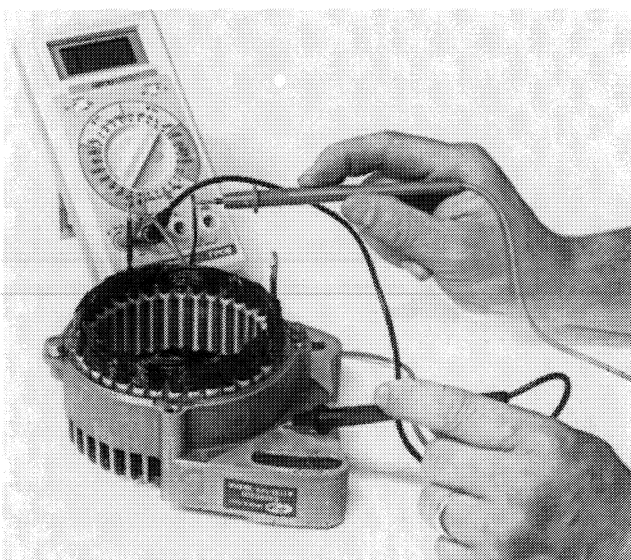
P3M043L02

### Checking continuity of the three stator windings

- Place the leads of an ohmmeter ( $\Omega \times 1$ ) in contact with the ends of the rotor phases in the three possible ways;
- the instrument must give the same resistance reading for each of the three measurements.



*If the reading does not move from the beginning of the scale (infinite resistance) or reaches full scale (no resistance), this means that the phase being measured is broken or short-circuited, and so the stator must be renewed.*



P3M043L03

### Checking insulation between the stator three windings

- Check that there are no current leaks between the stator and its casing;
- check that the bearing turns freely without tight spots or noise;
- check that there are no recesses on the slip rings caused by the brushes, otherwise the complete rotor will have to be replaced.

### Reassembly

To reassemble, reverse the procedure for disassembly.



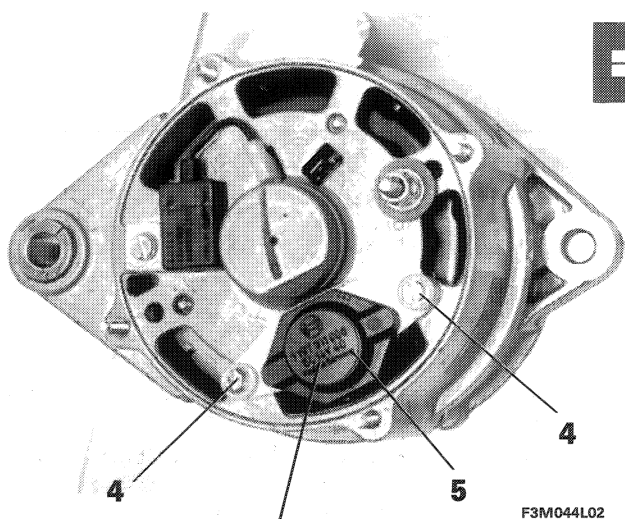
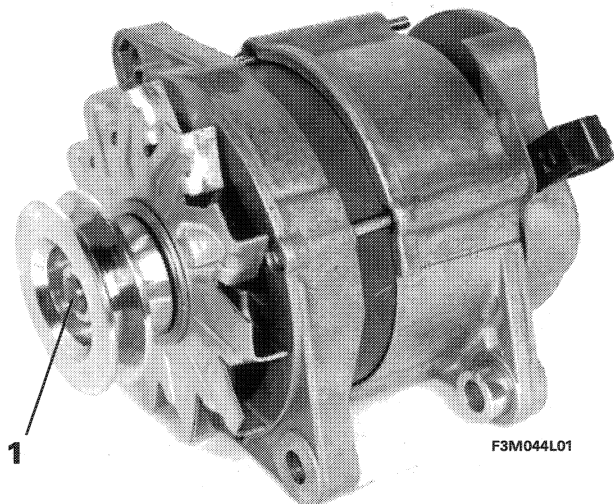
### OVERHAUL OF BOSCH ALTERNATORS

**NOTE** *All the BOSCH alternators are more or less the same in terms of construction, so the descriptions and illustrations on the following pages apply to all of them.*

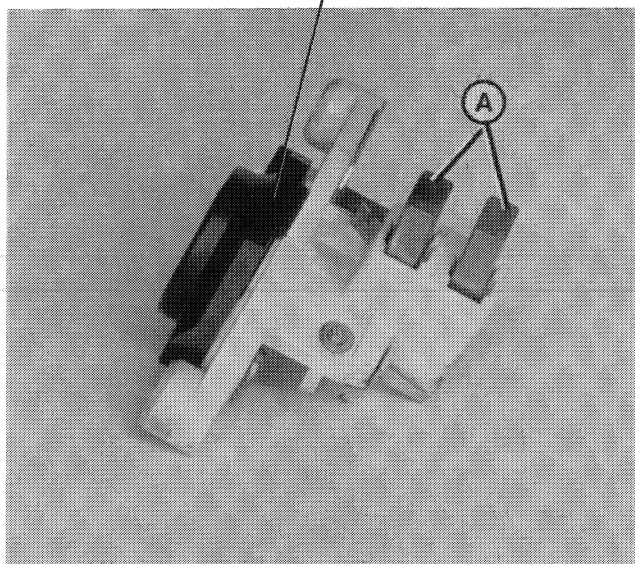
#### Disassembly

Using an appropriate wrench, undo the nut (1) securing the fan and pulley to the alternator shaft.

Withdraw the fan and pulley from the alternator shaft.



Undo the bolts (4) securing the voltage regulator (5) to the alternator's rear end bracket.

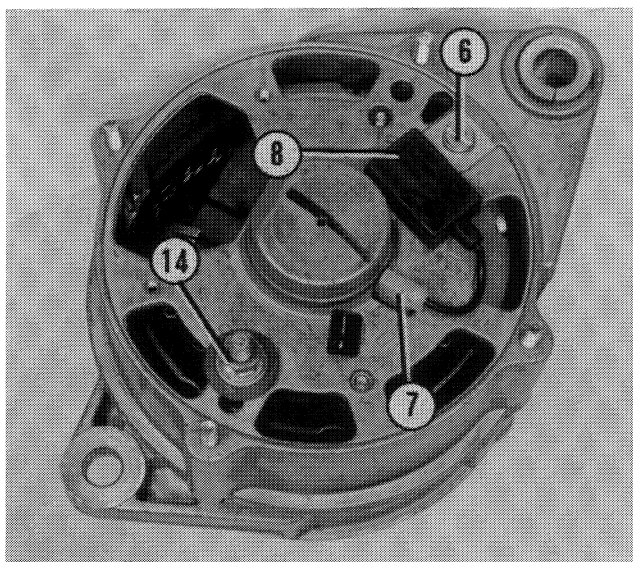


#### Electronic voltage regulator

A. brushes

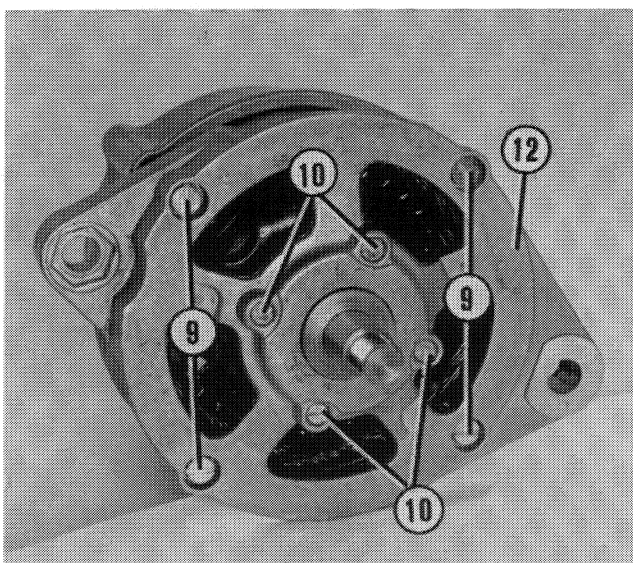


*If the regulator has to be renewed, always check the state of wear of the rotor's slip rings. If the brushes have made recesses on the rings, renew the complete rotor assembly.*



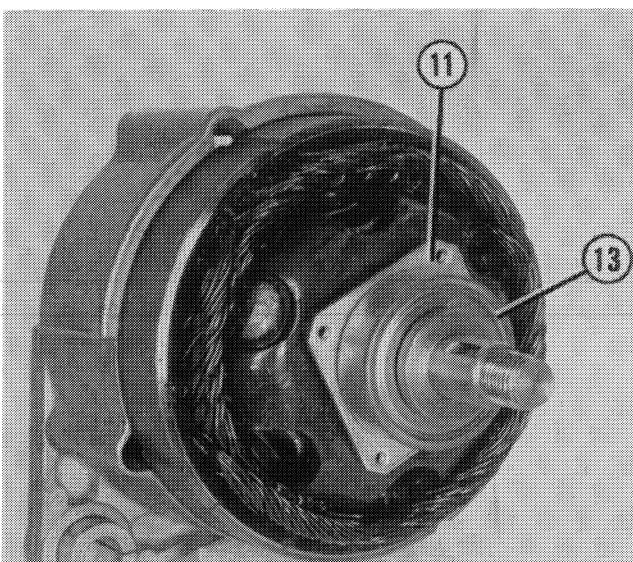
F3M045L01

Undo the bolt (6), disconnect the connection (7) from the blade connector underneath and remove the capacitor (8).



F3M045L02

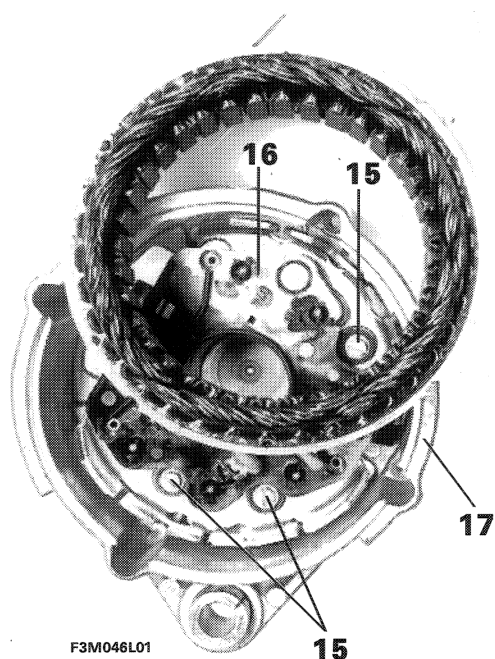
Undo the bolts (9) which assemble the three main parts of the alternator.  
Undo the bolts (10) which secure the plate (11) mounted under the bearing (13) on the alternator's front bracket (12).



F3M045L03

Using a press or brass drift, release the bearing (13) from the alternator's front bracket (12), which can then be separated from the stator.

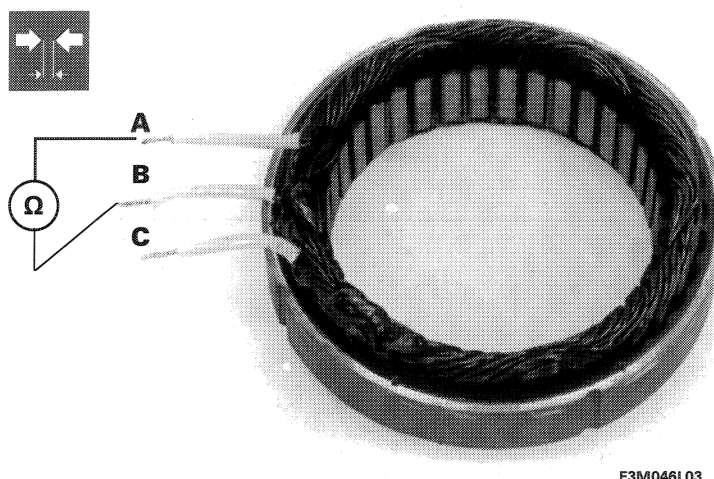
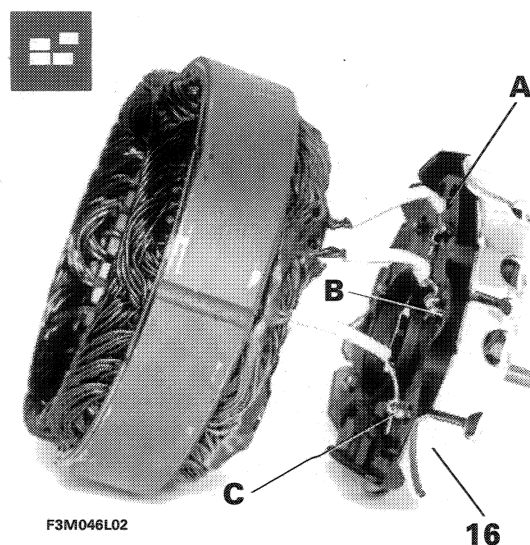
55.



Withdraw the rotor from the stator as appropriate, after releasing it from the rear end bracket.

Undo the nut (14 top figure on preceding page) and the bolts (15) securing the diode pack (16) to the alternator's rear end bracket (17).

Unsolder the stator terminals (A-B-C) from the diode pack (16).



### STATOR

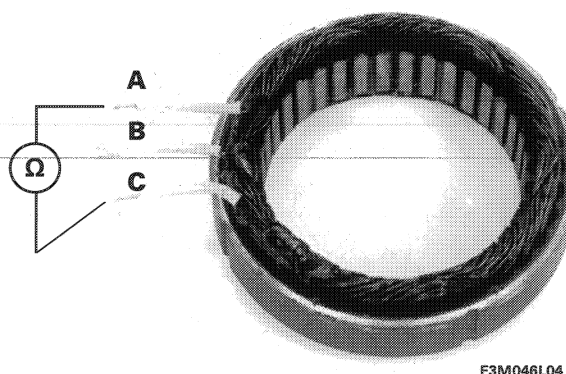
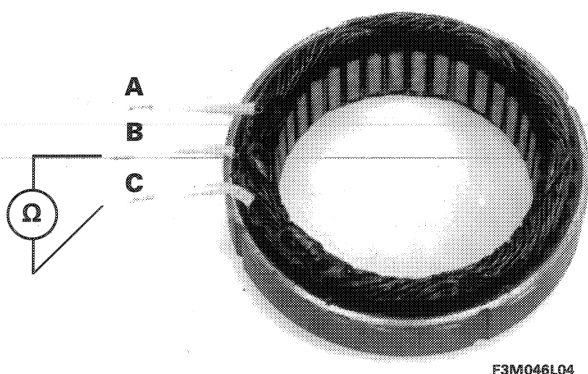
#### Checking the continuity of the 3 stator windings

Place the leads of an ohmmeter (set to the scale  $\Omega \times 1$ ) in contact with the ends of the stator's phases (A-B-C) in the three possible ways as illustrated.

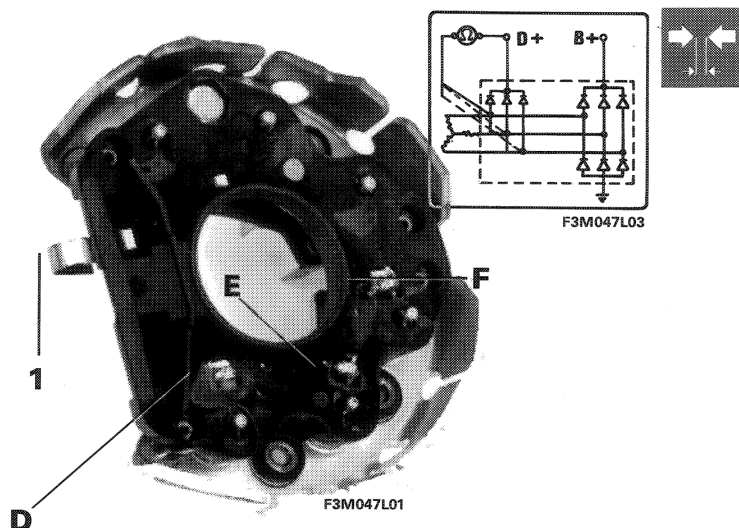
The instrument must give the same resistance reading for each of the three measurements.



*If the instrument's pointer does not move (infinite resistance) or reaches full scale (no resistance), this means that the phase being measured is broken or short-circuited, and so the stator must be renewed.*



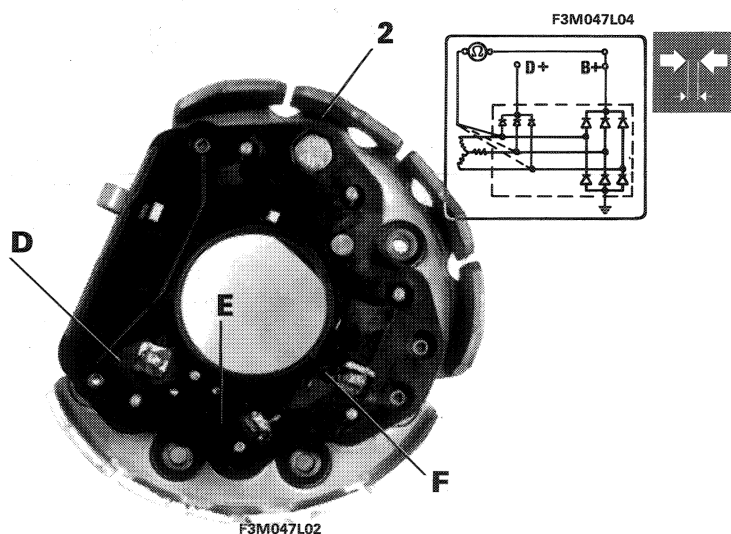


**CHECKING THE DIODES****Checking the excitation diodes**

Place an ohmmeter lead in contact with the blade (1) which touches the positive brush.

The instrument's second lead should be placed in contact with each of the three terminals (D-E-F) in turn.

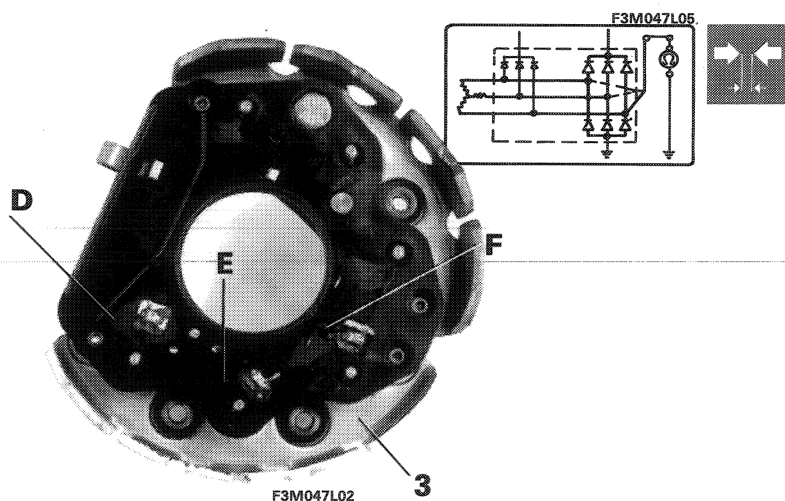
Repeat the three measurements after reversing the connections of the instrument's leads.

**Checking positive power diodes**

Place an ohmmeter lead in contact with the positive diode pack (2).

The instrument's second lead should be placed in contact with each of the three terminals (D-E-F) in turn.

Repeat the three measurements after reversing the connections on the instrument's leads.

**Checking negative power diodes**

Place an ohmmeter lead in contact with the negative diode pack (3).

The instrument's second lead should be placed in contact with each of the three terminals (D-E-F) in turn.

Repeat the three measurements after reversing the connections of the instrument's leads.



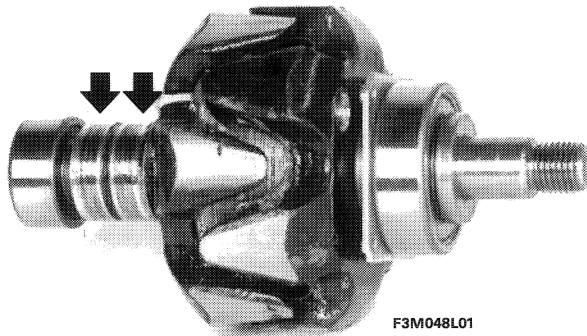
## 55.

In the last three measurements described on the preceding page, the instrument must give a resistance reading for each terminal (D-E-F).

When the connections of the two leads are reversed, the instrument's pointer should not move. If the pointer moves for both connections (diodes short-circuited), or does not move at all (diode broken), the complete diode pack must be renewed.



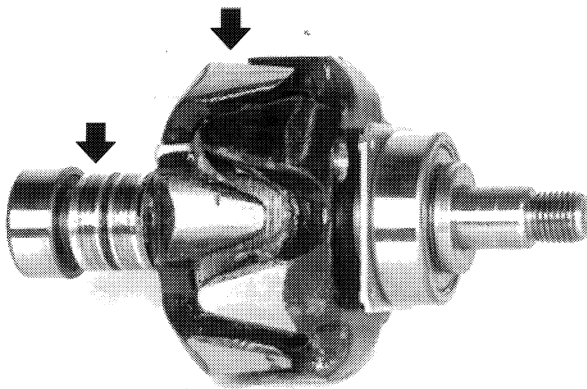
*The diode is working if the voltage drop is between 0.5 - 0.9 V and the reverse current is zero.*



### Checking rotor winding resistance on the slip rings

Place the two leads of an ohmmeter (set to the scale  $\Omega \times 1$ ) in contact with the rotor's slip rings (see arrows); the instrument should give a resistance reading.

If the instrument's resistance reading is different from the specified value or is infinite (broken circuit), the rotor will have to be replaced.



### Checking rotor winding insulation

Place the two leads of an ohmmeter (set to the scale  $\Omega \times 1$ ) in contact with a slip ring and the rotor casing (see arrows).

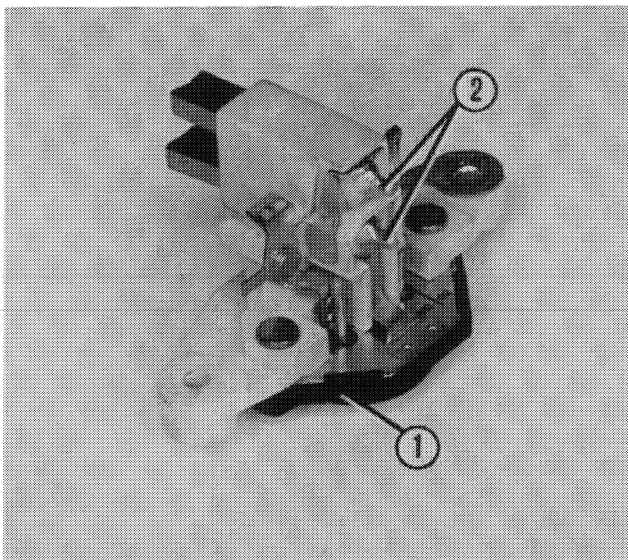
The instrument should give an infinite resistance value; if it does not, renew the rotor.

### Replacing the brushes

Unsolder the 2 terminals of the brushes from the regulator unit, then fit the new brushes and resolder the two terminals.

**NOTE** *Rest the regulator on a metal plate during soldering, to prevent it being damaged by an excessive increase in temperature.*

*If the voltage regulator is faulty, the entire assembly of brushes, brush holder and regulator must be replaced.*



### Electronic regulator unit

1. Electronic regulator.
2. Brush terminals.

### Reassembly

To reassemble, reverse the procedure for disassembly.