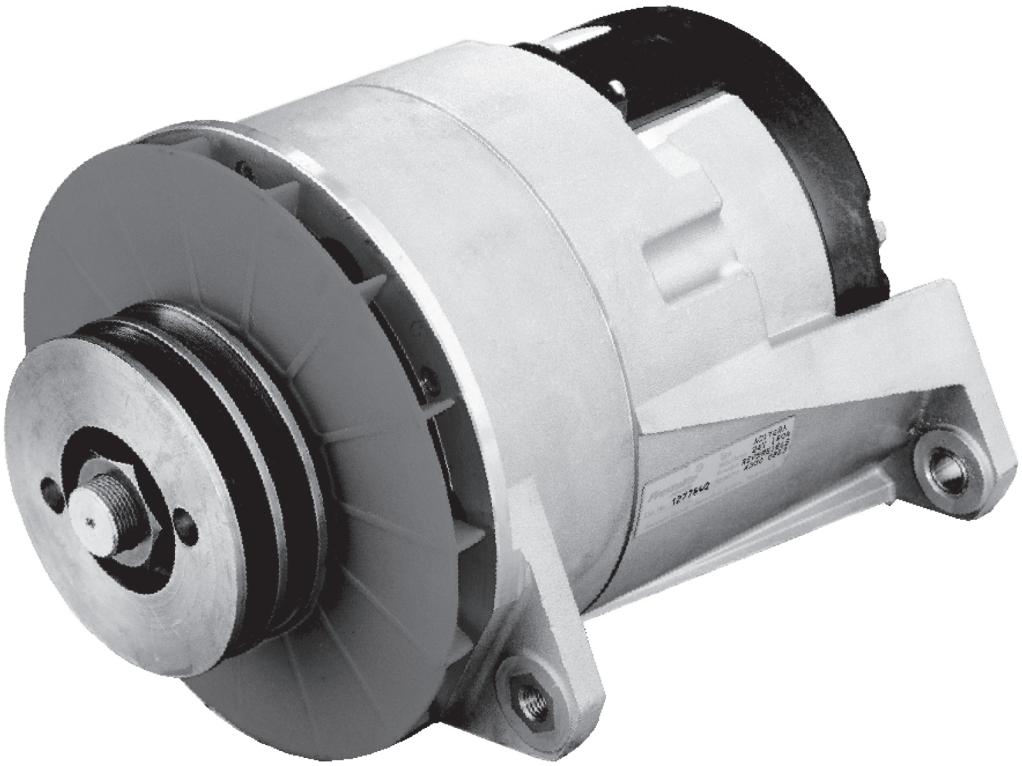
Service Manual for the AC172R/RA Family of Alternators



Troubleshooting, Diagnostics and Repair

TSM4011

Prestolite electric

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AC172R ALTERNATOR

1.1 THE ALTERNATOR

The AC172R alternator represents a range of alternators for use in the public service vehicle market. Normally supplied for 24 volt systems only, it is available with outputs of 65, 100 and 120 amp (A).

The AC172R is a ventilated machine, similar in basic construction to the familiar AC5R. A narrow stator containing the winding laminations is housed between two end shields. There is a fan mounted externally at the drive end and a cover protecting the regulator, brush box and diodes at the rear (slip-ring) end. A rotor revolves inside, supported at either end by a ball bearing.

Variations include different mounting lug configurations, rear cover design and lubrication methods. Either a type 546 or, more commonly, a type 547 regulator can be fitted. Both can be used in conjunction with the 543 Battery Over-Voltage Protection Unit.

1.2 WORKING PRINCIPLE

All alternators have a revolving field coil assembly (the rotor) and a stationary armature (the stator). Field coil current flows through two carbon brushes which bear on two slip-rings mounted on the rotor shaft. The slip-rings and brushes operate in an enclosed compartment, thus preventing dust or water contaminating the slip-rings.

As the rotor revolves, alternating current (AC) is generated. This is converted (rectified) to direct current (DC) by six diodes mounted in heat sinks fitted to the slip-ring end shield; these diodes can be press-fit (65 A machines) or stud type (100 A and 120 A machines).

A second rectifier bridge is formed by three additional press-fit diodes mounted in the same heat sinks as the main diodes. These, together with the main negative diodes, provide the current for the field coil.

The electrical DC output is delivered through two main terminals, with the voltage being controlled by the regulator. The alternator is self limiting in respect of maximum output current.

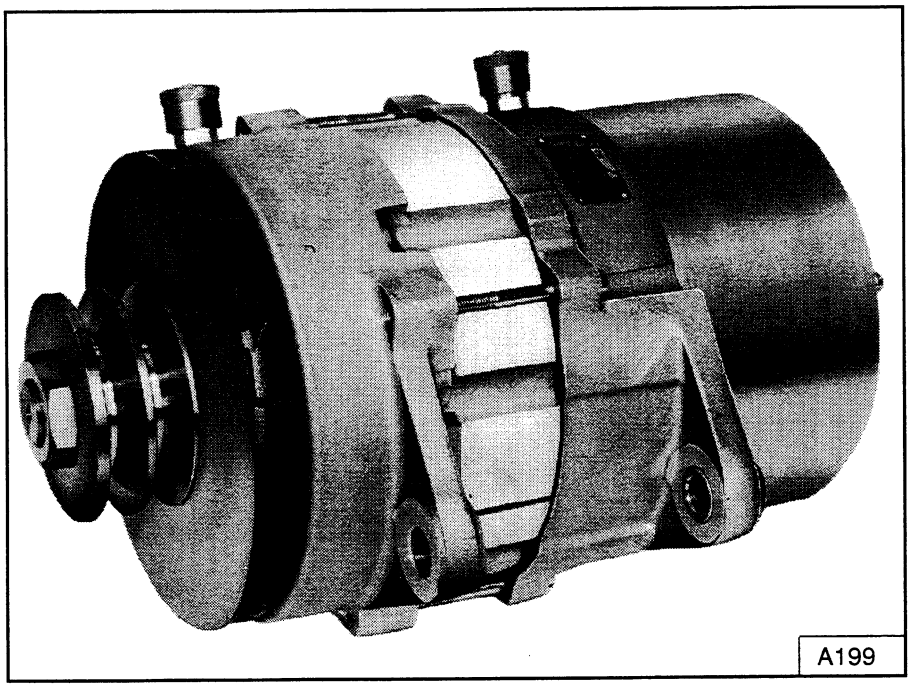
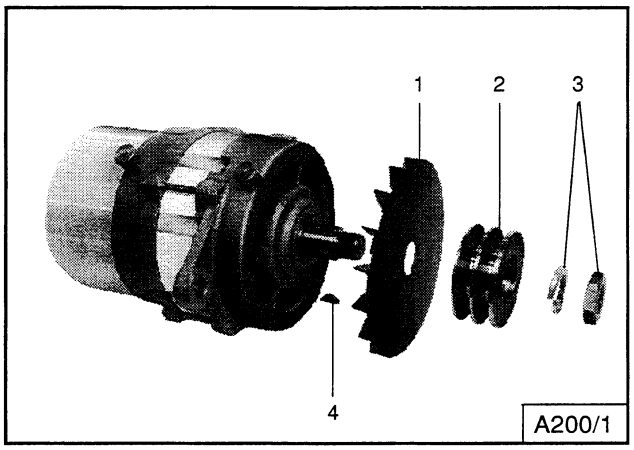


Fig. 1 AC172R - 100 - 24 Alternator

Note: When a machine is being checked to isolate a fault, it is advisable to test the regulator as described in Section 5 'TESTING' before dismantling the complete machine.

Thoroughly clean the alternator before dismantling. Refer to the Section 6 **'ADDITIONAL INFORMATION'** for details on cleaning fluids and their use.

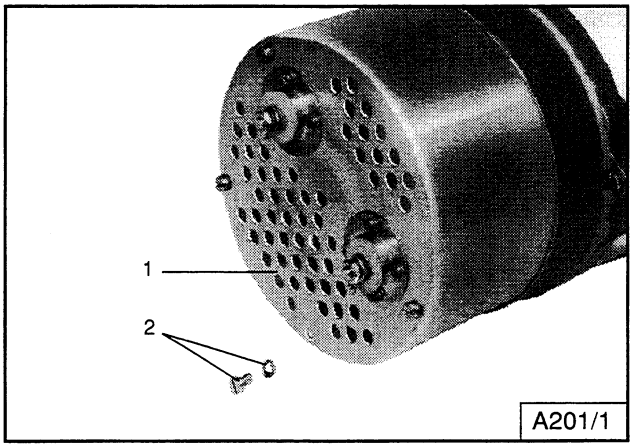
Special tools required for dismantling are also detailed in Section 6.



2.1 REMOVING THE PULLEY AND FAN

Grip the alternator pulley in a vice, ensuring that the pulley is protected from damage (use a pair of rubber drive belts), and that the body of the alternator is supported. Unscrew and remove the drive shaft nut and spring washer (3) and remove the pulley (2). Line up the notch in the fan (1) with the Woodruff Key and slide the fan off the drive shaft.

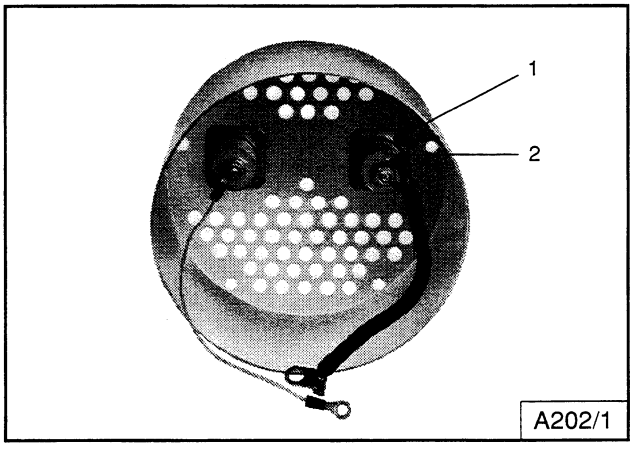
Lever out the Woodruff Key (4).



2.2 REMOVING THE REAR COVER

Unscrew and remove the four screws, spring washers and plain washers (2) then remove the rear cover (1).

Note: In the case of a radio-suppressed machine it will be necessary to disconnect the two capacitor leads to release the cover.

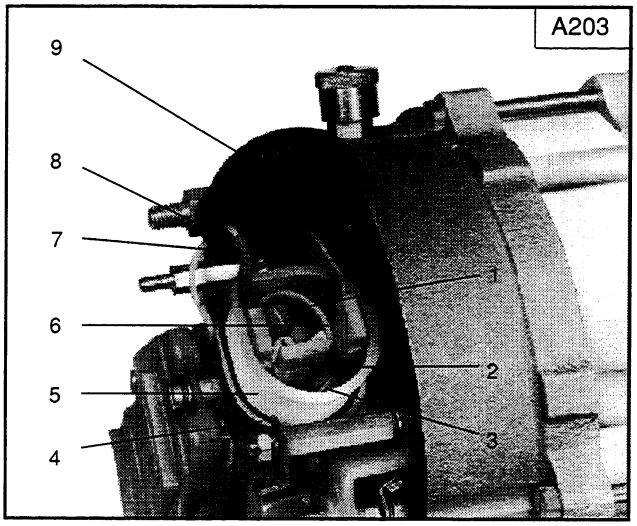


2.3 REMOVING THE CAPACITORS

If it is deemed necessary to remove a capacitor, proceed as follows: Unscrew the four screws securing the capacitor (2) to the clamp plate (1) and, holding the clamp plate, withdraw the capacitor.

2.4 REMOVING THE TERMINAL BOX

Prise off the rubber terminal cover (9) and disconnect the three leads (6), (7) and (8). Unscrew and remove the two screws, washers and spring washers (1) and (3) and remove the brush holder and gasket (2). Remove the plastic insulator then disconnect the Lucar connector from lead (6). Remove the terminal box (5) and discard the gasket (4).

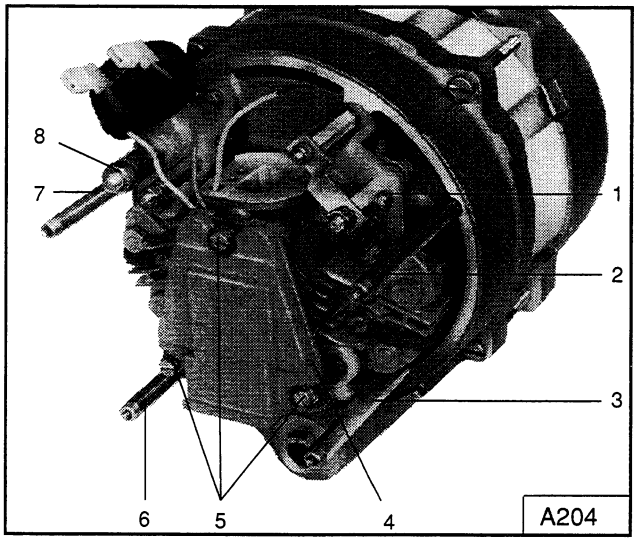


2.5 REMOVING THE REGULATOR

Remove the screw and spring washer (1) securing the black regulator lead to the main negative terminal pillar. Similarly, remove the red lead (if fitted) from the main positive terminal pillar (8).

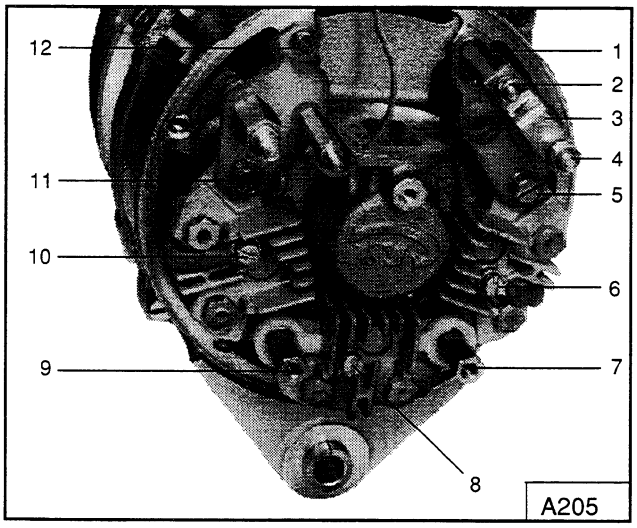
Unscrew and remove the three regulator securing screws, washers and spring washers (5), and remove the regulator (4).

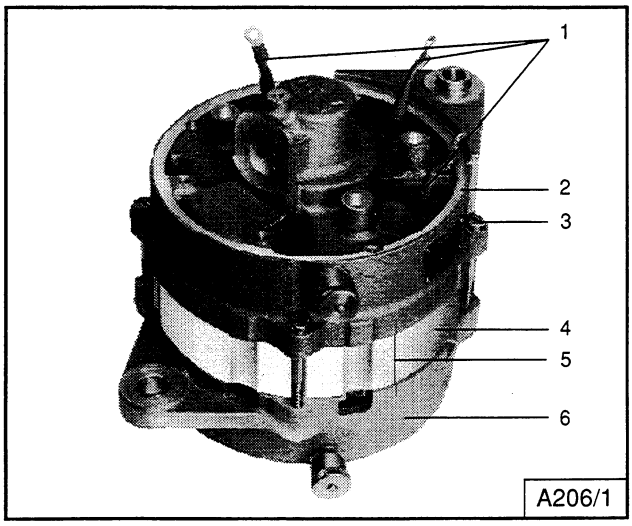
Unscrew and remove the four rear cover mounting pillars (2), (3), (6) and (7), if fitted.



2.6 REMOVING THE HEAT SINK ASSEMBLY

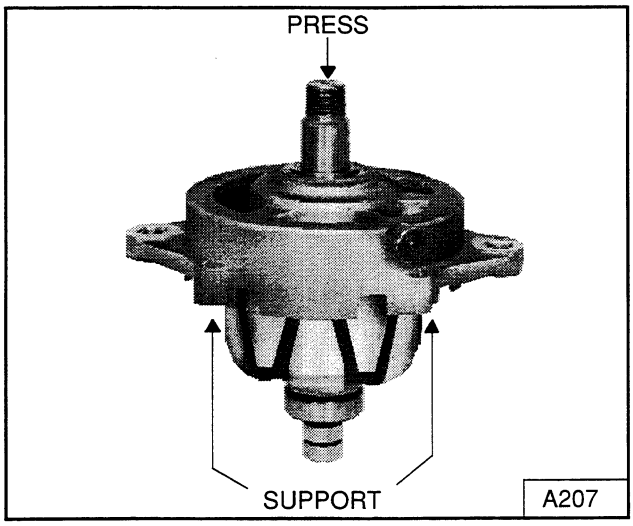
Unscrew and remove the three screws and spring washers (6), (8) and (10), securing the stator leads. Remove the two nuts and spring washers (2) and (4) and lift off the terminal link (3), if fitted. Remove the regulator pillars and washers (7) and (9). Unscrew and remove the three screws and washers (5), (11) and (12), and the terminal pillar (1). Pull the stator leads clear. The heat sink assembly can now be removed.





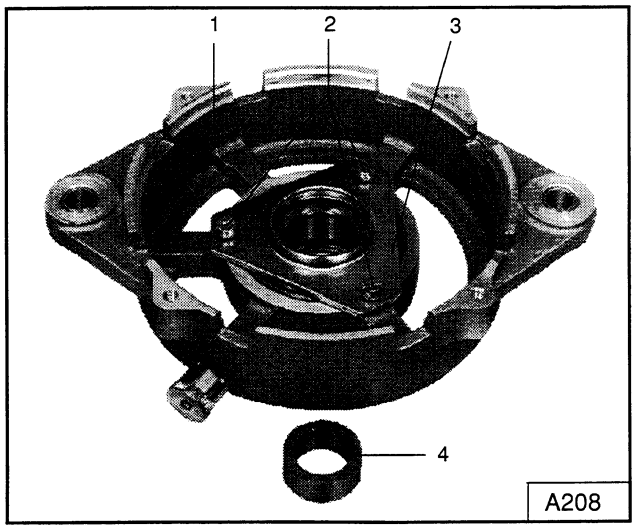
2.7 SEPARATING THE STATOR FROM THE END SHIELDS

Straighten the three stator leads (1) as shown. Scribe a line (5) across the two end shields and stator. Unscrew and remove the four through bolts and spring washers (3). Using two screwdrivers, carefully prise the slip-ring end shield (2) from the stator (4). Similarly, separate the stator from the drive end shield (6).



2.8 SEPARATING THE ROTOR FROM THE DRIVE END SHIELD

Using a standard workshop press, separate the rotor from the drive end shield as shown.

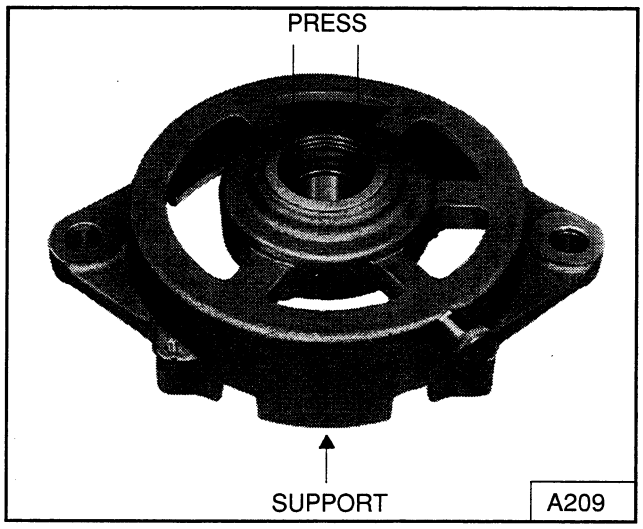


2.9 REMOVING THE CLAMP PLATE

Position the drive end shield (1) as shown, holding a hand underneath to catch the spacer (4) as it falls out. Unscrew and remove the three clamp plate securing screws and spring washers (2), and remove the clamp plate (3).

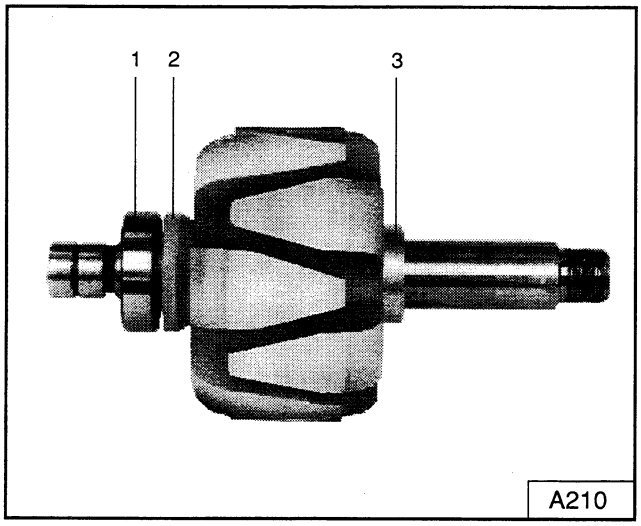
2.10 REMOVING THE DRIVE END BEARING

Using a standard workshop press, remove the bearing from the drive end shield.



2.11 REMOVING THE SLIP-RING END BEARING

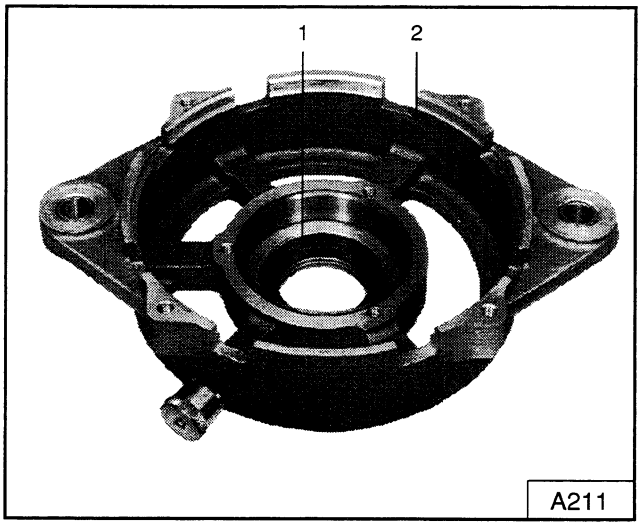
Remove the spacer (3) from the rotor shaft. Fit a 'Sykes' race extractor to the slip-ring end of the rotor (taking care not to damage the slip-ring moulding) and remove the slip-ring end bearing (1). Slide the plastic spacer (2) off the rotor shaft.



2.12 REMOVING THE DRIVE END BEARING SEAL

Note: The following instruction does not apply to machines with sealed bearings.

Using a large screwdriver, lever out the rubber seal (1) from the drive end shield (2): use a piece of wood or similar material to avoid damage by the screwdriver to the edge of the end shield. Discard the rubber seal.



3.1 GENERAL

Wipe all components clean with a dry cloth then use compressed air to remove loose dust from inaccessible areas. DO NOT 'spin' the bearings with compressed air as this can cause damage to the bearing.

All components must be thoroughly cleaned with an approved cleaning fluid before examination (refer to Section 6 **'ADDITIONAL INFORMATION'**). The stator frame and rotor shaft should be wiped clean using a non-fluffy rag moistened with white spirit. Take care to avoid the spirit having prolonged contact with the winding insulation and stator leads.

All seals and gaskets must be renewed.

Examine all components visually for signs of cracking, corrosion, local discolouration and any other signs of damage or excessive wear. Check all internal and external threads.

It is essential to remove all remaining traces of carbon dust with compressed air before carrying out any insulation tests.

In addition to the usual workshop facilities, the following electrical equipment will be required:-

1. First-grade moving coil DC ammeter with a range of 0 to 50 A.
2. 'Avo' or similar 'multimeter'.
3. 100 V 'Megohm' test meter or similar 100 V 'Flash' tester.
4. 24 V battery of 50 ampere-hour minimum capacity.
5. Adjustable load capable of carrying a current of 40 A at 24 V.
6. 24 V 44/48 W lamp and single pole ON/OFF switch.

3.2 BRUSHGEAR

Examine the moulded brush box for cracks and any other signs of damage or 'tracking'.

Check that the brushes are in good condition and that they protrude from the brush box for a minimum of 11,0 mm (0,429 in).

Should the brushes or brush box be faulty, the complete brush box must be renewed. It is recommended that the brush box is renewed when a complete overhaul is being carried out.

3.3 STATOR

3.3.1 Visual Check

Check the stator visually for signs of damage or deterioration of the insulation of windings and leads. Ensure that the windings are held securely in place and that all bindings are tight and in good condition.

3.3.2 Insulation Test

Check the insulation between the frame and one of the three stator leads using the 100 V 'Megohm' test meter or 100 V 'Flash' tester. A minimum resistance of 10 megohms should be indicated if the 'Megohm' test meter is being used. If the resistance is below this figure, clean and thoroughly dry the stator then check the insulation again. Renew the complete stator if the specified resistance cannot be obtained.

3.3.3 Stator Volt Drop Test

Check for continuity and correct resistance by wiring the 24 V battery in series with the adjustable load and the 0-50 A ammeter; complete the circuit across one pair of stator leads. Adjust the resistor until a current of 40 A flows, then measure the voltage across these two same stator leads with the 'Avo'. Repeat this complete test on the remaining two pairs of leads. The indicated voltage should be the same each time and within the limits given in Section 7 **'TECHNICAL DATA'**. If the results are not similar in each test, renew the stator.

3.4 ROTOR

Check the rotor for any signs of damage or rubbing.

Examine the field windings for damage or deterioration of the insulation and ensure that they are held securely in place.

Ensure that the slip-rings are clean and free from grease, then check for continuity by measuring the resistance between them with the 'Avometer'. Take care not to damage the brush tracks with the meter prods. The resistance should be as specified in Section 7 **'TECHNICAL DATA'**. Renew the complete rotor if this resistance cannot be obtained.

Check the insulation between each slip-ring and the drive shaft with the 100 V 'Megohm' test meter or 100 V 'Flash' tester. The resistance should be 10 megohms minimum if the 'Megohm' test meter is being used.

If the resistance is below this figure, clean and thoroughly dry the rotor then check the insulation again. Renew the complete rotor if the specified resistance cannot be obtained.

Check the slip-ring surfaces for any pitting or scoring. If skimming is necessary, mount the rotor in a lathe using the bearing journals for location. Remove the minimum amount of metal necessary using a diamond or tungsten carbide

tipped tool to obtain a fine even finish. The minimum permissible slip-ring diameter is 22,2 mm (0,875 in).

Should it prove impossible to remove all pitting or scoring without reducing the diameter below the minimum stated figure, new slip-rings must be fitted.

The slip-rings must be concentric with the rotor shaft to within 0,05 mm (0,002 in).

Great care must be taken when handling the rotor to avoid damaging the slip-ring surfaces.

3.5 BEARINGS

It is recommended that new bearings are fitted as normal routine when the alternator is being completely overhauled.

3.6 RENEWING THE SLIP-RINGS (See Fig. 2)

Should it prove impossible to remove pitting or scoring without reducing the diameter below the minimum stated figure, new slip-rings must be fitted. Proceed as follows:-

Carefully unsolder and remove the two leads from the slip-rings.

Using a 'Sykes' puller ', remove the defective slip-rings. Clean and polish the rotor shaft until the new slip-rings are a sliding fit on the shaft.

Carefully examine the field coil leads for any signs of mechanical stress or damage to the insulation. Pay particular attention to the ends where they were attached to the slip-rings. Ensure that the coil leads are long enough to connect to the new slip-rings.

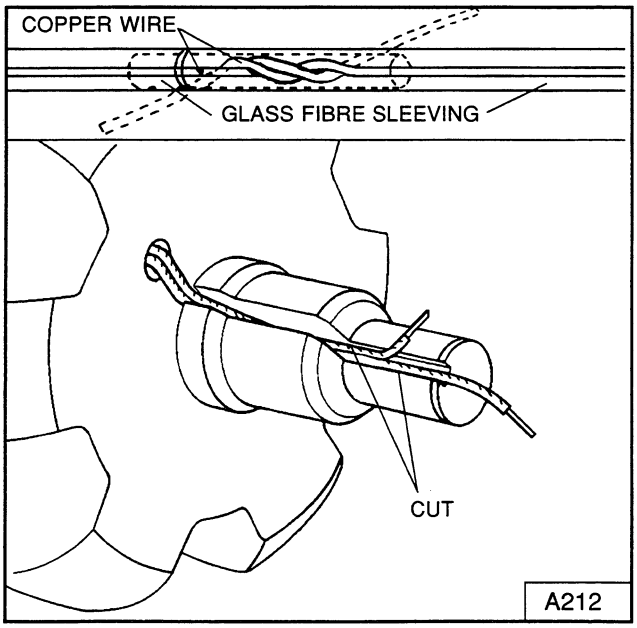


Fig. 2 Renewing the field coil leads

Should the lead ends be defective in any way, they should be renewed in the following manner:-

Cut the two leads as indicated in Fig. 2.

Taking each lead in turn, trim back a short length of the glass fibre sleeving and clean off the covering of the wire to expose the copper surface. Lightly twist a new length of 21 swg enamelled copper wire (Fig. 2) to the existing wire and solder the joint together. Snip off any excess wire.

Apply a coating of Z6/VA445 varnish to the joint. Slide a short length of 2 mm glass fibre sleeving (Fig. 2) over the joint so that it slides inside the existing sleeve. Apply a further coating of varnish to the sleeve and slide on a new length of 3 mm glass fibre sleeving to abut the original sleeve. Apply a final coating of Z6/VA445 varnish to the outside.

Degrease the shaft with white spirit and allow to dry. Coat the relevant part of the shaft with 'Araldite' using the two-tube method in accordance with the manufacturer's instructions. Do NOT allow 'Araldite' to come into contact with any other part of the shaft.

Slide the slip-rings on to the shaft and over the field coil lead, ensuring that the lead passes through the groove in the slip-ring. Allow to set for one hour at 70° C or 20 hours at 20° C (ambient).

Cut the extended field coil leads to length, bare the ends for the minimum length necessary, then solder one lead to each slip-ring.

Mount the drive shaft of the rotor in a lathe and support the outer race of the slip-ring bearing in a 'steady'. Use a diamond or tungsten carbide tipped tool to obtain the fine finish required. Remove just enough metal from the slip-rings to ensure that they are concentric with the rotor shaft to within 0,05 mm (0,002 in).

3.7 TESTING THE DIODES

All the diodes can be tested while the three heat sinks are still assembled in the slip-ring end shield. Using the 24 V 44/48 W lamp connected in series between a probe and the positive terminal of the 24 V battery plus a second probe connected to the negative side of the battery, carry out the tests detailed in the diode testing chart below.

Should a lamp indication be obtained that does not agree with the table, the diode being tested is faulty and the heat sink containing it must be renewed or repaired.

Note: A broken lead between diode and terminal or a high resistance solder joint could also indicate a faulty diode. Check for either of these faults before removing a heat sink.

Test	Test Probe Position		Diode Being Tested	Correct Test Lamp Indication
	Positive Probe	Negative Probe		
1	Each Heat Sink in Turn	Main Output Terminal D+	Pos.	ON
2	Main Output Terminal D+	Each Heat Sink In Turn	Pos.	OFF
3	Main Output Terminal D-	Each Heat Sink in Turn	Neg.	ON
4	Each Heat Sink in Turn	Main Output Terminal D-	Neg.	OFF
5	Each Heat Sink in Turn	Terminal 'A' (on Main D+)	Aux.	ON
6	Terminal 'A' (On Main D+)	Each Heat Sink in Turn	Aux.	OFF

3.8 DIODE AND HEAT SINK RENEWAL

(See Fig. 3, page 9)

Individual stud diodes can be renewed but a faulty press-fit diode will necessitate renewal of the complete assembly comprising heat sink and diode(s). The following procedure should be adopted in either case:

Note: 65 A machines have press-fit type main diodes; the main diodes in 100 A and 120 A machines are stud type. All machines have press-fit auxiliary diodes.

3.8.1 Removing the heat sinks

Unsolder the connecting lead (5) from each of the main diodes in the faulty heat sink.

Cut the leads (1) from the auxiliary diode (2) at a point approximately 25 mm (1,0 in) from the diode.

Remove the insulating washers and brush (7) and detach the heat sink (6).

3.8.2. Renewing the stud type diodes

Unscrew and remove the securing nut and spring washer (3) from the diode using an 11 mm thin-walled tubular spanner. Push the diode (4) clear of the heat sink.

Thoroughly clean the contact face and hole in the heat sink then smear both surfaces with 'Biccon X' jointing compound (see Section 6 '**ADDITIONAL INFORMATION**').

Ensure that the new diode is clean and free from grease; insert it into the heat sink. Secure with the spring washer and nut.

Tighten the diode securing nut to a torque of 2,7 to 3,1 Nm using an 11 mm thin-walled tubular spanner.

3.8.3 Replacing the heat sinks

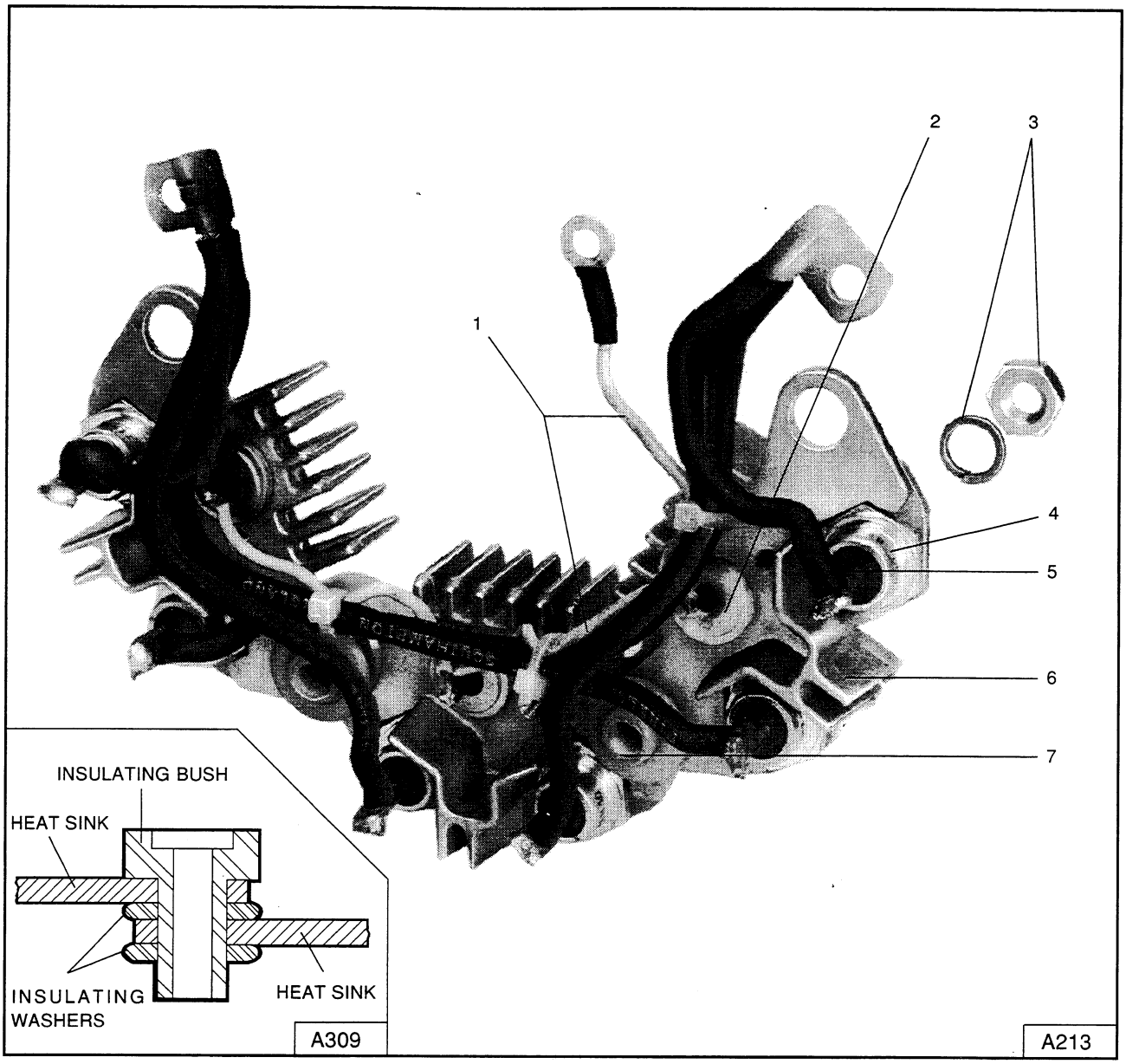
Renew the heat sink(s) ensuring that the insulating bushes and washers are fitted in the correct sequence to insulate the heat sinks from the end shield and from each other (see Fig. 3 inset).

Ensure that the connecting surfaces of the main leads and diodes are clean and free from grease. Reposition the leads and solder them to the diodes.

To connect the auxiliary diode lead, slide a small glass fibre sleeve of suitable diameter over the lead to be joined. If necessary, splice in a small length of suitable cable to lengthen the lead. Twist the bared ends together and solder the joints. Apply Z6/VA445 varnish to the joint. When partly dry (tacky), slide the glass fibre sleeve over the joint and varnish with more Z6/VA445.

When complete, paint the entire assembly - heat sink, diodes and leads - with Pacific Blue Q14 synthetic enamel (see Section 6 '**ADDITIONAL INFORMATION**').

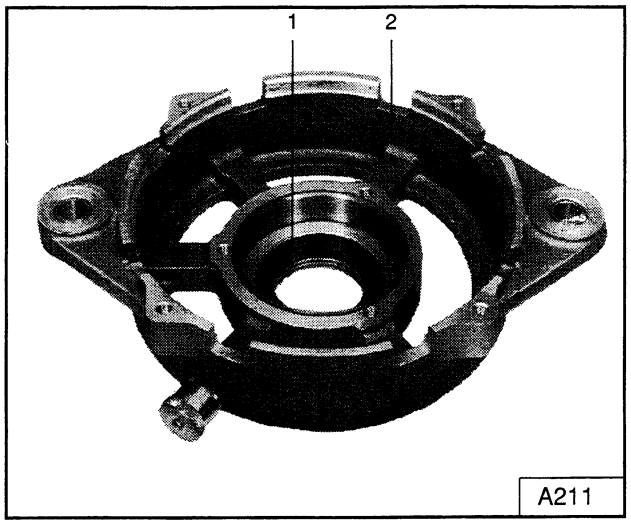
'Crimping' together the auxiliary diode leads is permitted provided the correct crimping tool and a connector of the correct size and electrical value are used; typical field current is 3,5 A.



Key to Numbers:-

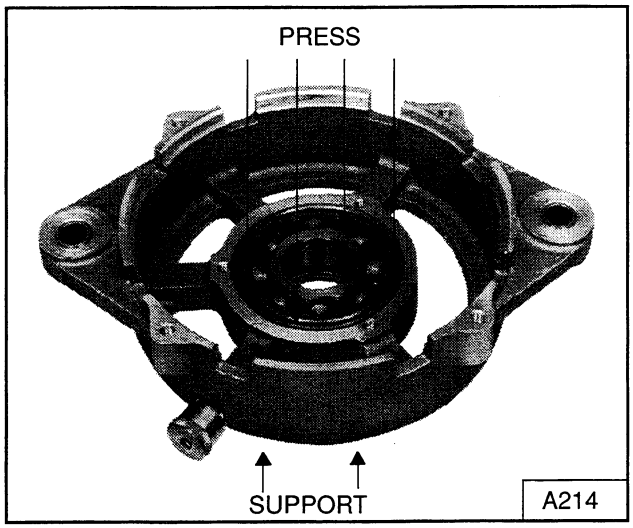
1. Auxiliary diode lead.
2. Auxiliary diode.
3. Nut and spring washer.
4. Main diode (stud type).
5. Main diode lead.
6. Heat sink.
7. Insulating bush and washers.

Fig. 3 View of heat sink and diode assembly.



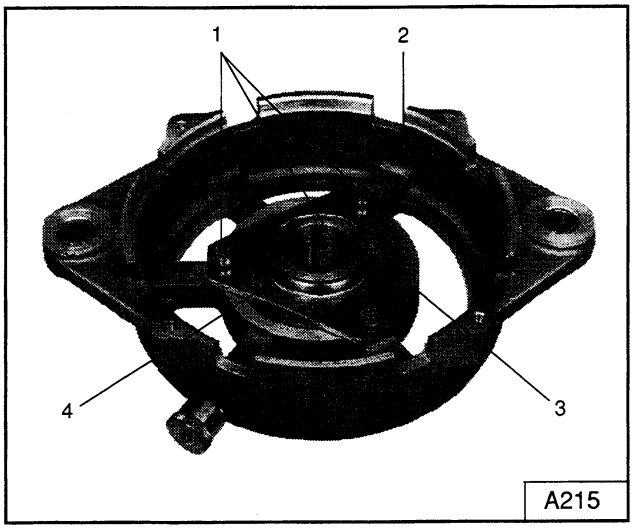
4.1 FITTING THE DRIVE END BEARING SEAL

Fit a new rubber seal (1) to the drive end shield (2). The solid side of the seal must face away from the drive end shield.



4.2 FITTING THE DRIVE END BEARING

Press the drive end bearing into the drive end shield as shown, using a standard workshop press and pressing against the outer race only.

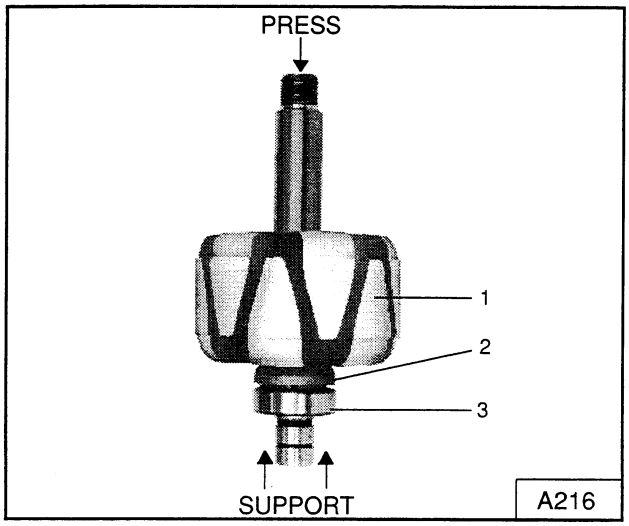


4.3 FITTING THE CLAMP PLATE

Fit the triangular clamp plate (3) to the drive end shield (2) and secure it using the three screws and spring washers (1), tightened to a torque value of 2,3 to 2,8 Nm. Fit the metal spacer (4) so that it sits snugly inside the clamp plate.

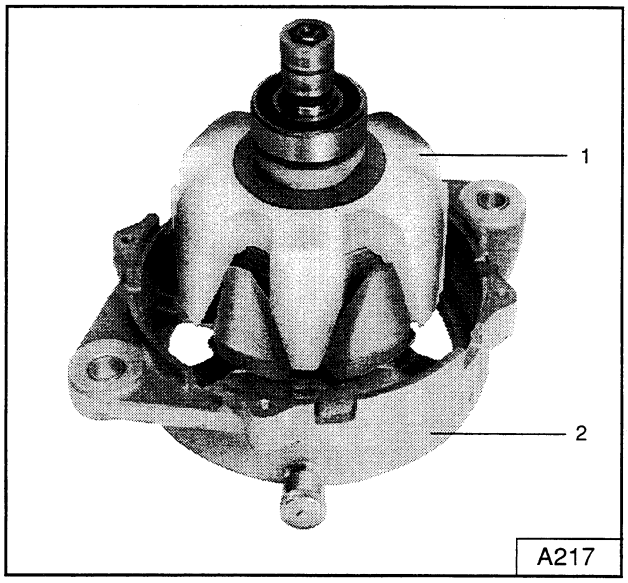
4.4 FITTING THE SLIP-RING END BEARING

Fit the plastic spacer (2) onto the rotor shaft as shown. Mount the rotor (1) in a press, drive end uppermost, with the slip-ring end of the rotor shaft sitting loosely in the slip ring end bearing (3); the rubber seal of the bearing should face downwards. Support the inner race of the bearing with a suitable cylindrical spacer then press the rotor shaft into the bearing.



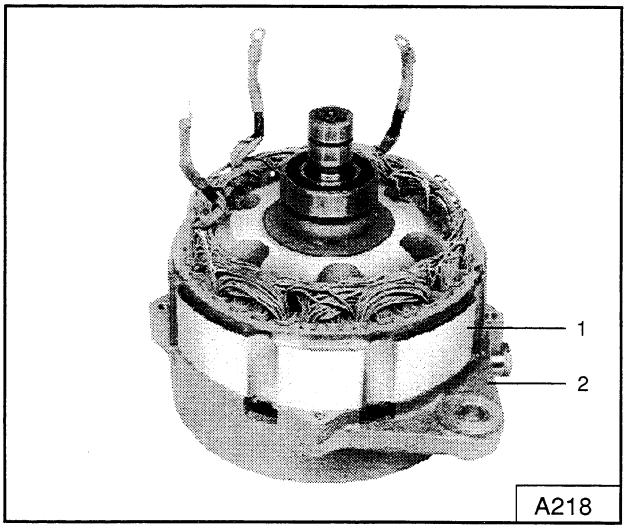
4.5 FITTING THE ROTOR INTO THE DRIVE END SHIELD

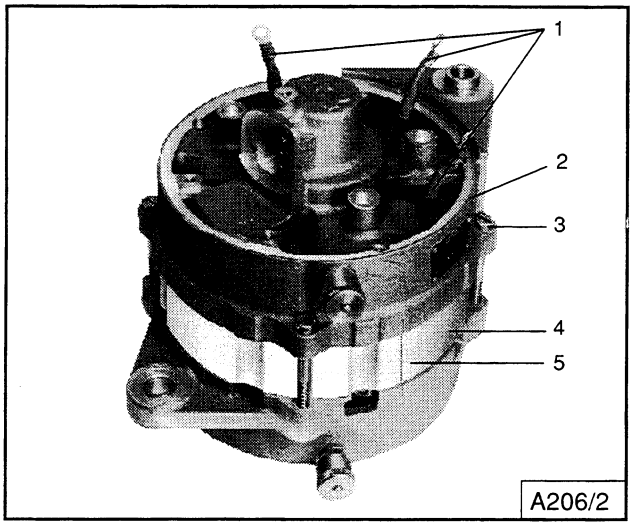
Fit the rotor into the drive end shield (2), pressing firmly on the shoulders of the rotor claws (1) to make sure that the rotor is pushed fully home.



4.6 FITTING THE STATOR TO THE DRIVE END SHIELD

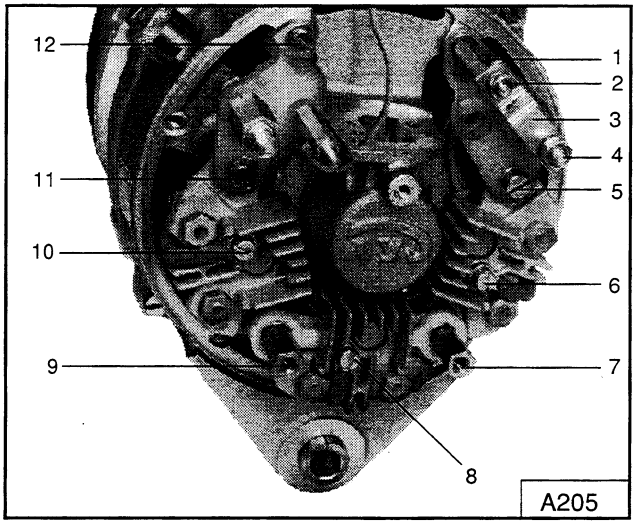
Fit the stator (1) to the drive end shield (2) ensuring that the marks scribed during dismantling are in line with each other.





4.7 FITTING THE SLIP-RING END SHIELD

Fit the slip-ring end shield (2) to the stator (4), making sure that the three stator leads (1) are correctly positioned and do not foul the slip-ring end shield; if necessary use a press. Make sure that the scribe marks (5) made during dismantling are all in line, then secure the whole assembly using the four through bolts and spring washers (3), tightened to a torque value of 6,2 to 7,4 Nm.



4.8 FITTING THE HEAT SINK & DIODE ASSEMBLY

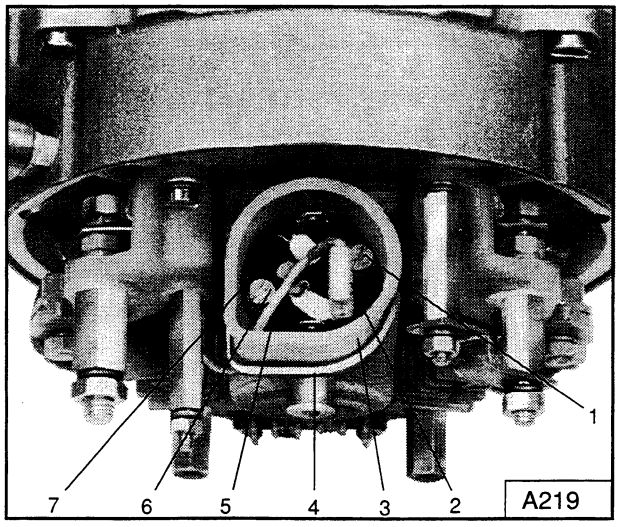
Fit the heat sink and diode assembly to the slip-ring end shield. Secure it using the following procedure:

The two regulator pillars (7) and (9), together with their washers and spring washers; torque value 2,8 to 3,4 Nm.

The three (or four) securing screws, washers and spring washers (5), (11) and (12); torque values - 2,8 to 3,4 Nm (large) and 1,7 to 2,3 Nm (small).

The terminal pillar (1) together with its washer and spring washer. If fitted, this item replaces one of the smaller securing screws. The torque value is 1,7 to 2,3 Nm.

Fit the terminal link (3) (if fitted) as shown. Secure it with the two nuts (2) (torque value 1,7 to 2,3 Nm) and (4) (torque value 2,8 to 3,4 Nm). Secure the stator leads to the heat sinks using the three screws and spring washers (6), (8) and (10) tightened to a torque value of 2,0 to 2,3 Nm.



4.9 FITTING THE TERMINAL BOX

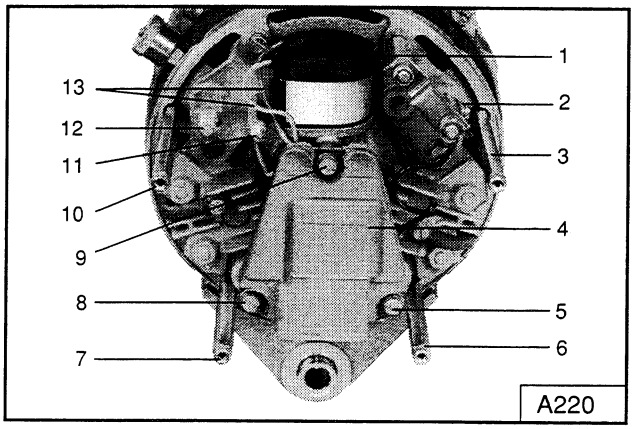
Place the plastic terminal box (3), with a new gasket (4), in position over the brush box. Pass the yellow lead (5) through the hole and fit a new Lucar connector and insulator (2). Insert the brush holder (7) into the terminal box and secure using the two screws, washers and spring washers (1) and (6); tighten to a torque value of 1,4 to 1,7 Nm. Connect the Lucar connector (2) as shown.

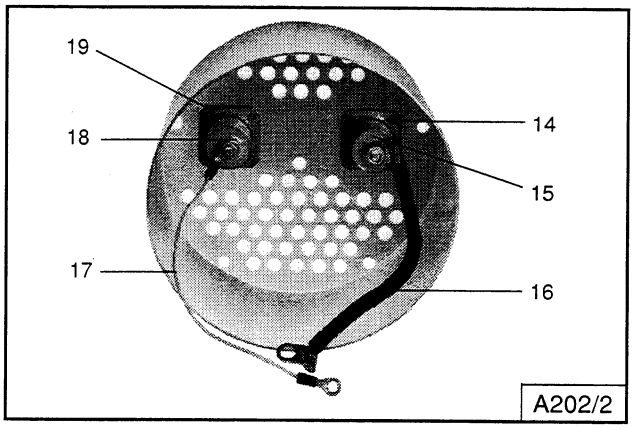
4.10 FITTING THE REGULATOR

Fit the regulator (4) and secure it using the three screws, washers and spring washers (5), (8) and (9), tightened to a torque value of 1,4 to 1,7 Nm. Connect the black regulator lead to the main negative terminal and secure it using the small screw and spring washer (2), tightened to a torque value of 1,4 to 1,7 Nm. Similarly, connect the red regulator lead (if fitted) to the main positive terminal (12).

Connect the two remaining regulator leads (13) to the two remaining brush box terminals (green lead to the 'F' terminal) then re-fit the rubber terminal box cover (1).

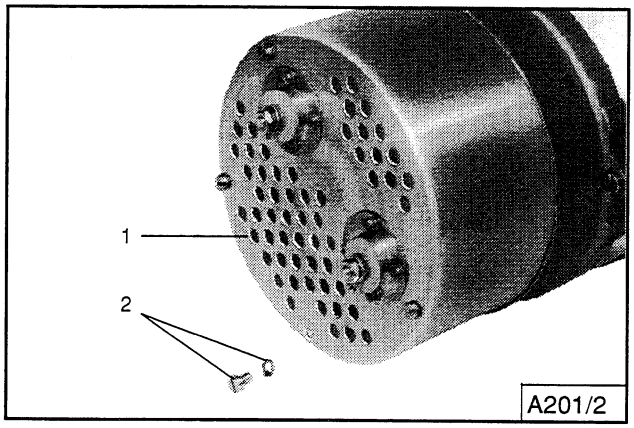
In the case of radio-suppressed machines, fit the four rear cover mounting pillars (3), (6), (7) and (10), and tighten to a torque value of 1,7 to 2,3 Nm. Fit new capacitors (15) and (18) (if previously removed) to the rear cover and secure each using the four screws and spring washers (not shown) screwed into the clamp plates (14) and (19). Connect the two capacitor leads (16) and (17) in the rear cover to the main positive terminal (12) and the auxiliary (warning light) terminal (11); tighten the terminal nuts to torque values of 2,8 to 3,4 Nm and 1,7 to 2,3 Nm respectively.





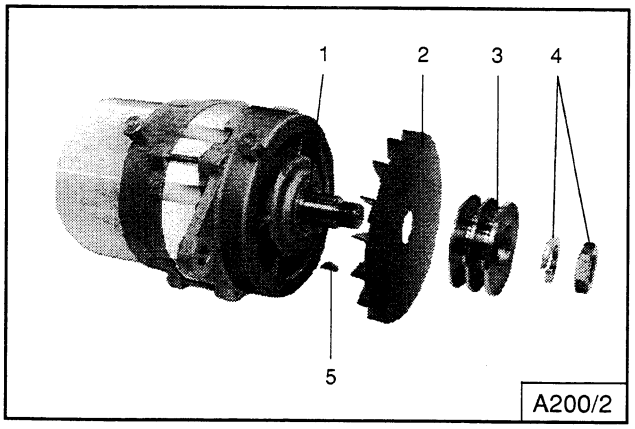
4.11 FITTING THE REAR COVER

Fit the rear cover (1) and secure using the four screws and spring washers (2), tightened to a torque value of 1,7 to 2,3 Nm.



4.12 FITTING THE PULLEY AND FAN

Slide the remaining spacer (1) onto the rotor shaft and engage it with the recess in the drive end shield as shown. Fit a new Woodruff Key (5) into the slot in the rotor shaft. Slide the fan (2) onto the rotor shaft (there is a notch to enable it to slide over the key) and seat it firmly against the spacer. Re-fit the pulley (3) and secure it using the nut and spring washer (4) tightened to a torque value of 90 to 100 Nm (secure the pulley in a vice as described at the beginning of Section 2 '**DISMANTLING**').



5.1 TEST EQUIPMENT

5.1.1 Equipment required to test the alternator

(i) Test machine with variable speed drive capable of driving the alternator at speeds of up to 8000 rpm on full load.

(ii) 24 V 100 ampere-hour lead acid battery.

(iii) Carbon pile or similar variable electrical load capable of carrying a current of 120 A at 30 V.

(iv) 100 V 'Megohm' test meter or a 100 V 'Flash' tester.

(v) First grade DC moving coil ammeter with a range of 0 to 150 A.

(vi) First grade moving coil DC voltmeter with a range of 0 to 50 V.

(vii) 'Avo' or similar multimeter with a resistance range.

(viii) 24 V, 2,8 W warning lamp.

5.1.2. Additional equipment required to test the regulator

(i) 6 V battery (low capacity acceptable).

(ii) Field coil from AC172R alternator.

Note: If a suitable field coil is not available a 10 ohm 100 W wire wound resistor can be used as a substitute load. If a 10 ohm 100 W resistor is not available, a similar resistance can be made up using two 22 ohm 50 W resistors in parallel. Resistors of this value can be obtained from RS Components Ltd. under stock No. 158-345. They should be used with heat sinks stock No. 401-403. These heat sinks must be placed so that the fins are vertical in free air. See Section 6 'ADDITIONAL INFORMATION'.

(iii) 250 ohm 3 W variable resistor.

5.2 STATIC TESTS - REGULATOR

The alternator and regulator form an integral unit, therefore before undertaking repair work on the alternator it is essential to carry out a test to determine which is at fault.

Remove the regulator leads from the terminals on the alternator and connect the leads to the test circuit as shown in Fig. 4.

The batteries (24V and 6 V) must be fully charged; no significant volt drop should occur when the variable resistor is set at its lowest value.

Set the variable resistance until 24 V is indicated on the meter; the lamp should be ON.

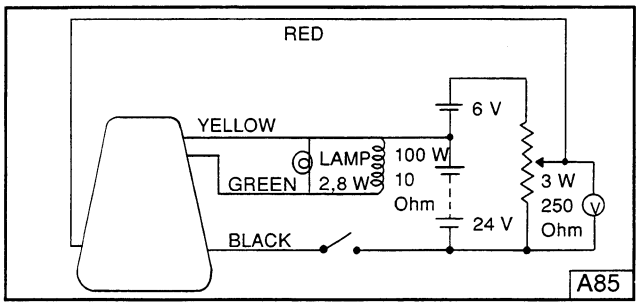


Fig. 4 Test Circuit for 546 and 547 regulators

Decrease the resistance until the lamp goes out; this must occur at between 28 V and 29 V. The lamp must switch off cleanly - no flickering is permissible.

If the regulator fails this test it is faulty and must be renewed.

5.3 STATIC TESTS - ALTERNATOR

Before mounting the alternator on the test machine or making any connections, check the insulation resistance of the alternator windings.

The regulator must be disconnected from the alternator when carrying out the following insulation tests; UNDER NO CIRCUMSTANCES MUST THE INSULATION TESTER BE CONNECTED TO ANY OF THE REGULATOR LEADS.

Connect one side of a 100 V 'Megger'-type tester to the alternator frame and keep it there until the test has been completed. Connect the other side of the tester to one of the heat sinks, then the main positive, main negative and 'A' terminals in turn. The resistance between any of these terminals and earth should be not less than 10 megohms.

5.4 PERFORMANCE TESTING

(i) Mount the alternator on the test machine and connect the drive.

(ii) Make the connections as shown in Fig. 5 DO NOT REMOVE ANY CONNECTIONS WHILE THE ALTERNATOR IS RUNNING.

(iii) Start the drive and increase speed to 1500 rpm (approx.). Check that the alternator is charging.

(iv) Reduce speed until the ammeter reads zero and the lamp is extinguished. This speed should correspond to the cutting-in-speed. See Section 7 '**TECHNICAL DATA**'.

(v) Adjust alternator speed and load to correspond to the figures in the performance table, in Section 7 '**TECHNICAL DATA**'. Check for each condition specified.

Some variation from the stated outputs is permissible but failure to reach within 10% of the required figures indicates a faulty machine. If the static tests were satisfactory then the regulator must be considered suspect and should therefore be replaced.

The adjustable load must be set so that the machine provides the maximum rated output at 28 V. If the battery is fully discharged it may not be possible to obtain the rated voltage.

If the load will not absorb the full rated output it may be necessary to discharge the battery before commencing the performance tests.

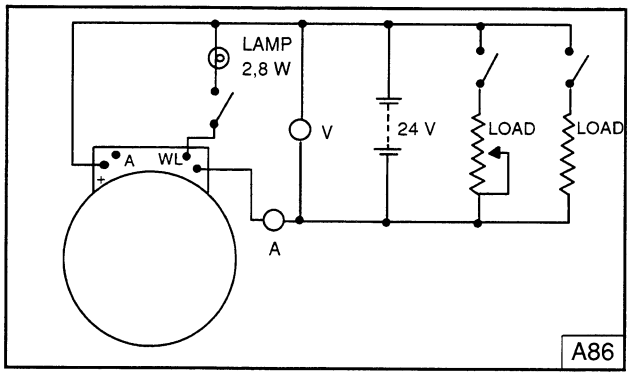


Fig. 5 Test Circuit for AC172R alternator

5.5 LUBRICATION

Although some machines are fitted with sealed bearings, many are 'Stauffer' lubricated. The following instructions apply to 'Stauffer' lubricated machines only:

Before re-assembly, pack the following with Shell 'Dolium R' grease:-

(i) The grease passageways in both end shields

(ii) Both bearings

(iii) The cavity between the slip-ring end bearing and the plastic spacer, two thirds full.

Note: It is important that the slip-ring end bearing is fitted the correct way round with the sealed end towards the slip-ring.

Smear a thin film of 'Dolium R' grease on the lips of the drive end seal and also on the rotor drive shaft.

Every 100,000 km, or every year (whichever is the shorter), remove the lubricator caps and add TWO caps full of 'Dolium R' grease to the drive end lubricator and one cap full to the slip-ring end lubricator. No other lubrication is required.

DO NOT OVER-LUBRICATE THE MACHINE.

6.1 SPECIAL TOOLS

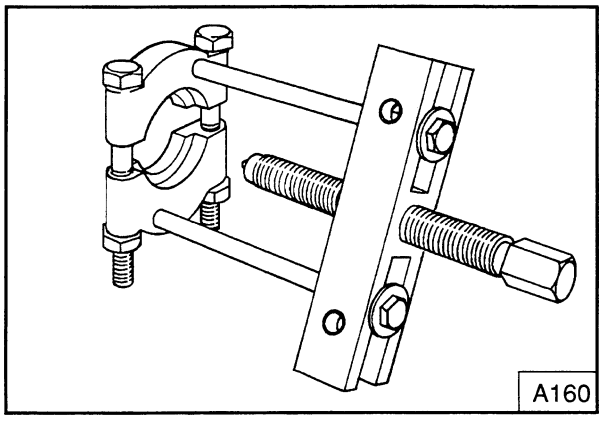


Fig. 6 'Sykes' type race extractor

A 'Sykes' race extractor of the type shown in Fig. 6 will be necessary to remove the slip-rings and the slip-ring end bearing. No other special tools are required.

6.2 CLEANING FLUIDS

Kerosene may be used on parts which do not contain electrically insulated components.

Components containing electrical insulation should be cleaned with a chlorinated solvent. Usually wiping with a moistened cloth is quite sufficient.

WARNING: Chlorinated solvents can be dangerous.

For your benefit the following information relative to workshop procedures has been extracted from ICI poster No. CD/2139/8250/5Ed/63/480:-

'Avoid breathing the vapour'

These solvents are safe when properly used but in common with other halocarbons inhalation of high concentration of vapour will cause drowsiness, headaches and giddiness. Severe exposure may lead to unconsciousness or prove suddenly fatal.

Note: These vapours are considerably heavier than air and may collect at low levels, particularly in undisturbed areas.

Do Not SMOKE when using these solvents.

Do Not Use the solvent in a place which is not well ventilated, but avoid draughts.

Do Not Lean into any vessel containing the solvent - liquid or vapour.

Avoid Contact with the skin and eyes.

These solvents will remove the natural grease from the skin. Contact with the hands should be avoided as far as possible, and if contact is likely PVC gloves should be worn.

Solvent in the eyes will be irritating and if there is any danger of splashing, eye protection should be worn.

Do not take internally.

Avoid contact of the liquid or vapour with naked flames or red hot surfaces (e.g. welding arcs) as acidic and toxic decomposition products will be formed.

The ICI poster also lists additional precautions for users of metal cleaning equipment, and the first-aid treatment of persons affected by over-exposure to solvent vapour. Users should obtain this poster (or its equivalent, from other suppliers) and mount it in a prominent place.

6.3 LIST OF SUPPLIERS OF MATERIALS

Resistors

R.S. Components Limited
Birchington Road
Weldon Industrial Estate
Corby
NN17 9RS
England
Tel: 0536 201234

Biccon X jointing compound

BICC PLC
P.O. Box 4
Hall Lane
Prestcott
Merseyside
L34 5UR
England
Tel: 051 430 7555

Cleaning fluids

I.C.I. Ltd
P.O. Box 13
The Heath
Runcorn
Cheshire
WA7 4QF
England
Tel: 0928 514 444

Varnish Z6/VA445

Sterling Technology Limited
Frazer Road
Trafford Park
Manchester
M17 1DU
England
Tel: 061 848 8411

Dolium R Grease

Shell UK Oil
No. 7 Oxford Road
Manchester
M60 7HH
England
Tel: 061 277 2000

Type	AC172R-65	AC172R-100	AC172R-120
Nominal Voltage	24 V	24 V	24 V
Maximum Output	1820 W	2800 W	3360 W
Maximum Permissible Alternator Speed	8000 rpm	8000 rpm	8000 rpm
Maximum Ambient Operating Temperature	80°C	80°C	80°C
Rotation	Reversible	Reversible	Reversible
Mounting	Swing	Swing	Swing
Drive	V-belt	V-belt	V-belt
Weight (approx excluding pulley)	13,5 kg	13,5 kg	13,5 kg
Surge Voltage Protection	200 V peak for 10 micro secs	200 V peak for 10 micro secs	200 V peak for 10 micro secs
Maximum Torque	14,2 Nm at 1400 rpm	14,6 Nm at 1700 rpm	19,0 Nm at 2000 rpm
Power Absorbed	3,9 kW at 5000 rpm	4,8 kW at 5000 rpm	6,3 kW at 5000 rpm
Stator Winding Connections	Delta	Delta	Delta
Minimum Slip-Ring Diameter	22,2 mm	22,2 mm	22,2 mm
Minimum Brush Length	11,0 mm	11,0 mm	11,0 mm
Workshop Tests			
Performance:			
Cutting-in Speed	700 rpm	1000 rpm	1000 rpm
Output at maximum Load (28 V)	50 A (1500 rpm) 65 A (6000 rpm)	75 A (2000 rpm) 100 A (6000 rpm)	90 A (2000 rpm) 120 A (6000 rpm)
Regulated Voltage	28 V	28 V	28 V
Stator Volt Drop Test (with windings at 20°C and carrying 40 A DC)	4,2 to 4,3 V	2,2 to 2,3 V	1,75 to 1,85 V
Rotor Resistance (with rotor at 20°C)	1,2 ± 0,2 ohm	10,2 ± 0,2 ohm	8,1 ± 0,2 ohm

Description	Nm	kgf m	lbf in
Drive end shield clamp plate screws	2,3 - 2,8	0,23 - 0,3	20 - 25
Through bolts	6,2 - 7,4	0,63 - 0,75	55 - 65
Regulator mounting pillars	2,8 - 3,4	0,3 - 0, 35	25 - 30
Heat sink assembly securing screws:			
large	2,8 - 3,4	0,3 - 0,35	25 - 30
small	1,7 - 2,3	0,17 - 0,23	15 - 20
Auxiliary terminal pillar	1,7 - 2,3	0,17 - 0,23	15 - 20
Auxiliary terminal nuts	1,7 - 2,3	0,17 - 0,23	15 - 20
Main negative terminal nuts	2,0 - 2,3	0,2 - 0,23	18 - 20
Main positive terminal nuts	2,8 - 3,4	0,3 - 0,35	25 - 30
Regulator lead securing screws	1,4 - 1,7	0,14 - 0,17	13 - 15
Stator lead securing screws	2,0 - 2,3	0,2 - 0,23	18 - 20
Brush holder screws	1,4 - 1,7	0,14 - 0,17	13 - 15
Regulator screws	1,4 - 1,7	0,14 - 0,17	13 - 15
Rear cover mounting pillars	1,7 - 2,3	0,17 - 0,23	15 - 20
Capacitor clamp plate screws	0,9 - 1,0	0,09 - 0,1	8 - 9
Capacitor Lead Securing Nuts	2,8 - 3,2	0,3 - 0,33	25 - 28
Rear cover screws	1,7 - 2,3	0,17 - 0,23	15 - 20
Drive shaft nut	90 - 100	9,2 - 10,2	800 - 885