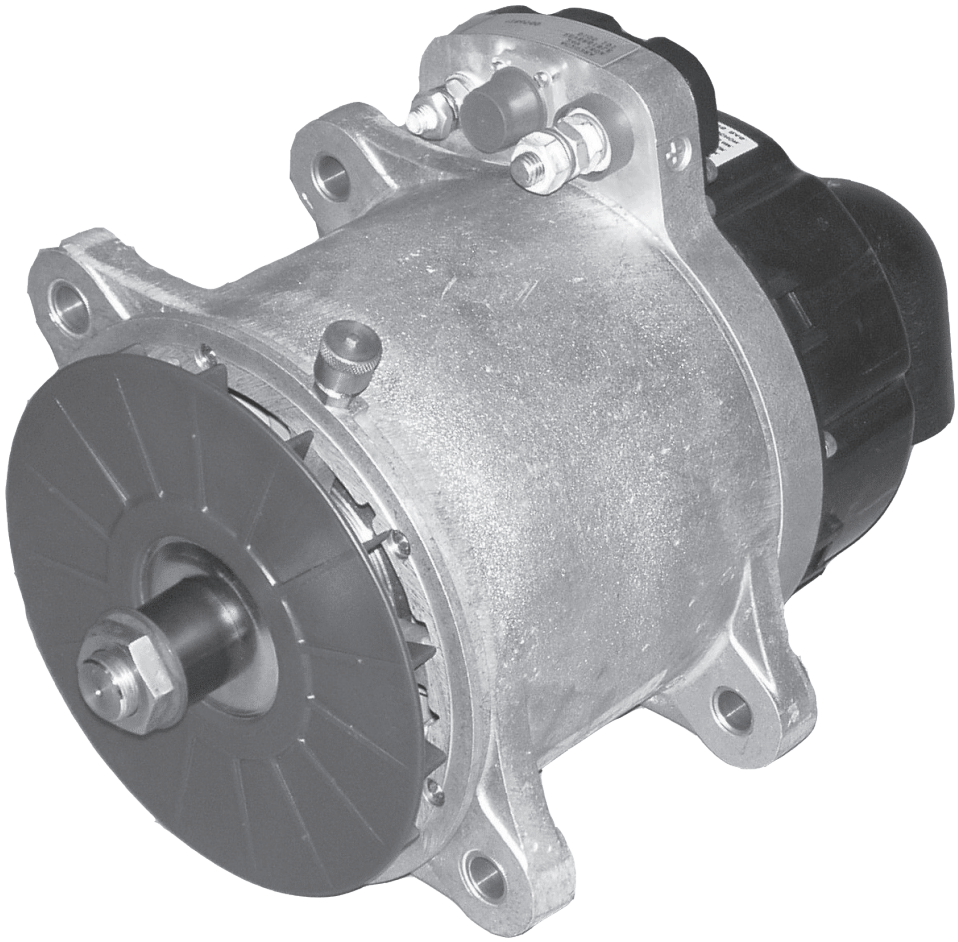
Service Manual for the AC203RA Family of Alternators



Troubleshooting, Diagnostics and Repair

Prestolite electric

Leece·Neville HEAVY DUTY SYSTEMS

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AC203RA
ALTERNATOR

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1.1 THE ALTERNATOR

The Alternator has been designed mainly for public service vehicle (PSV) world markets and is based on the AC203R design. The AC203RA will replace the AC203R in both the 115 A and 180 A output versions.

The external difference between the AC203R and the AC203RA is in the main cable terminations.

The AC203RA has external stud type main terminals and a quick release socket for the warning light and auxiliary circuits.

The AC203RA is finished to a Marine Standard, with normal radio suppression provided. If radio suppression to a Marine Standard BS1597 is required an additional suppression box will be needed.

The AC203RA has the following characteristics:–

1 Voltage 24 V (Nominal)
2 Output 115 A or 180 A versions
3 Swing or cradle mounted
4 Maximum speed 8,000 RPM
5 Temperature range ambient from –30 °C to +80 °C
6 Weight 25 kg (approx.)
7 Rotation reversible
8 Cooling ventilated or piped air
9 Lubrication – stauffer lubricator on drive end shield
10 Terminals – positive, negative, warning light and AC output
11 Regulator – integral, with overvoltage and surge protection
12 Suppression via capacitor on earth return machines
13 Power absorbed @ 3,500 RPM – 115 A – 6.3 kW
180 A – 8.2 kW

1.2 WORKING PRINCIPLES

The AC203RA Alternators are all ventilated three phase machines, of the revolving field (rotor) and stationary armature (stator) design. The rotor and stator are housed between the two end shields. The rotor being supported by a roller bearing at the drive end which can be lubricated, and a sealed ball race bearing at the slip ring end (which requires no lubrication).

The field coil current flows through two carbon brushes which contact onto the two slip rings, mounted on the rotor shaft. The slip rings and brushes operate in an enclosed compartment, thus preventing contamination.

Built in rectification of the generated alternating current is achieved by means of stud type diodes, mounted on three heat sinks. These are contained within the slip ring end shield. The diodes are connected in a three phase bridge circuit between the stator coils and the output terminals.

A second rectifier bridge is formed by additional field diodes (auxiliary diodes) mounted on the same heat sinks. These additional diodes, together with the main negative diodes, provide the rotor field coil current.

The electrical DC output of the machine is delivered through the main output terminals.

NOTE For the wiring systems available, see Section 7.

The AC203RA Alternator range are fitted with the integral 594A type regulator, providing system protection against battery over voltage and voltage surge conditions.

When the control switch is turned on and the engine started, the field winding is connected to the battery via the warning light. The small current flowing through the field winding produces a magnetic field which is sufficient to begin the build up of the alternator output voltage through the auxiliary diodes. As the voltage builds up, the same potential is applied to either side of the warning light which is then extinguished. The voltage level is controlled via the integral 594A type regulator.

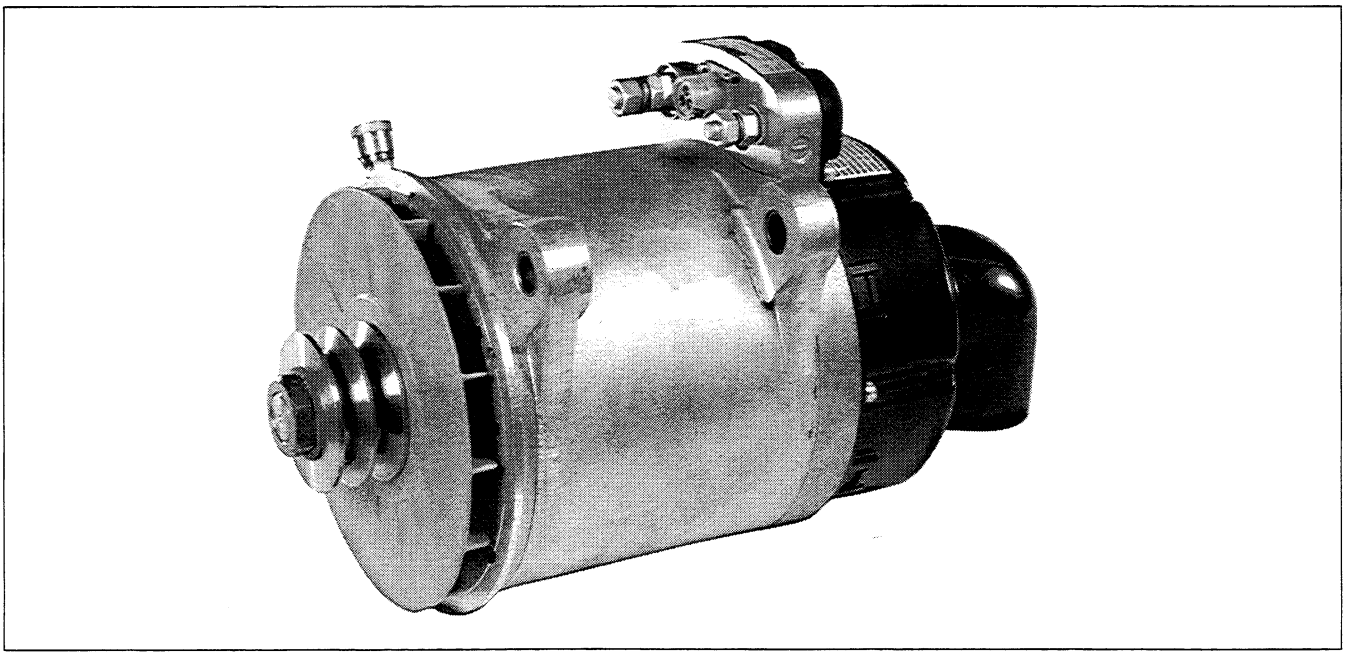
1.3 GUIDANCE ON REPAIR

The instructions given in the manual cover the complete dismantling of the alternator. However, except in the case of compete overhaul, it is not always necessary to strip the machine to the levels shown. When an alternator requires attention, it is recommended it is first tested to locate specific faults.

The voltage regulator and brush box assembly can be replaced without dismantling the alternator.

NOTE When removing the slip ring bearing, due to it's position, it is necessary to use a special extractor tool. Refer to Section 7 Tools and Technical Information.

The rotor can not be removed without the use of this tool.



2.1 CLEANING

Thoroughly clean the alternator before dismantling using a proprietary cleaning agent. Before dismantling refer to Section 6 Testing and Section 7 Tools and Technical Information.

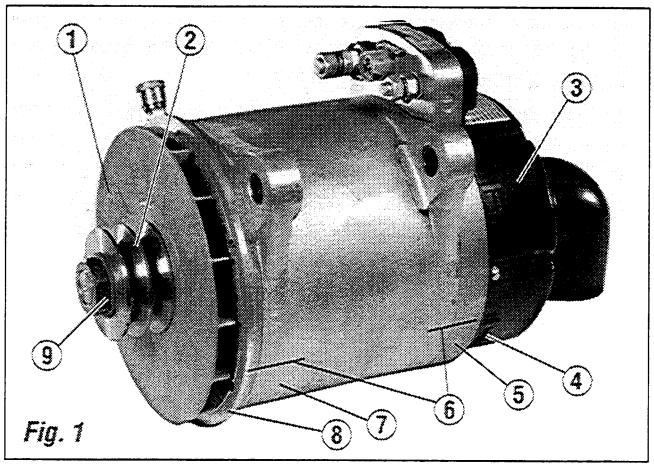


Fig. 1

2.2 REMOVING THE FAN AND PULLEY

Scribe a line (6) across the stator (7) and both end shields (5) and (8).

Remove the drive shaft nut (9) and belville washer. Remove the pulley (2) and the plastic fan (1). Drive out the Woodruff key from the shaft.

2.3 REMOVING THE COWL AND ELBOW

Using an Allen key, remove the six socket headed screws and spring washers, then remove the plastic cowl.

NOTE Certain alternators are fitted with a plastic elbow air duct.

The position of the elbow on the cowl must be noted (1 – 24 positions). The elbow can be repositioned by releasing the centre screw. The plastic cowl (3) has removable drain plates (4). When fitted to the engine the drain plate in the lowest position should be removed to allow drainage.

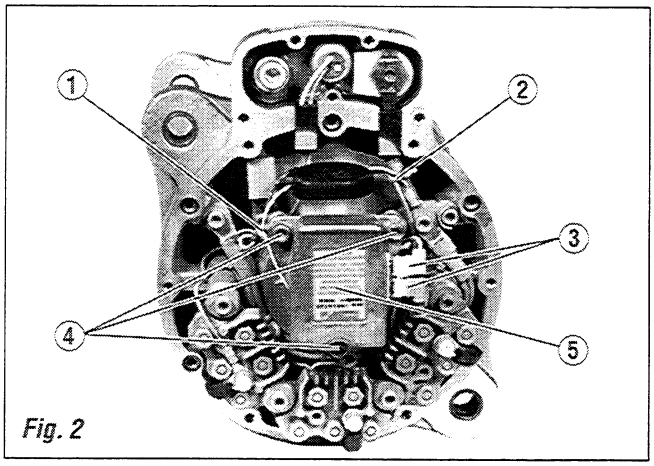


Fig. 2

2.4 REMOVING THE TERMINAL COVER AND REGULATOR

Remove the five socket headed screws and spring washers from the terminal cover. Remove the plastic cover. Cut the cable ties (1) and (2).

Disconnect the (yellow) Lucar 'A' line connectors (3) from the regulator.

Remove the rubber brush box cover from the brush box container, and disconnect the (yellow) 'A' line and (green) 'F' connectors from the brush box.

Remove the three socket headed screws (4) from the regulator mounting lugs on the brush box housing.

Remove the regulator (5).

2.5 REMOVING THE BRUSH BOX AND CONTAINER

Remove the two screws and spring washers (1) and (2) from the brush box (4) then remove the brush box container (3) and rubber gasket (5).

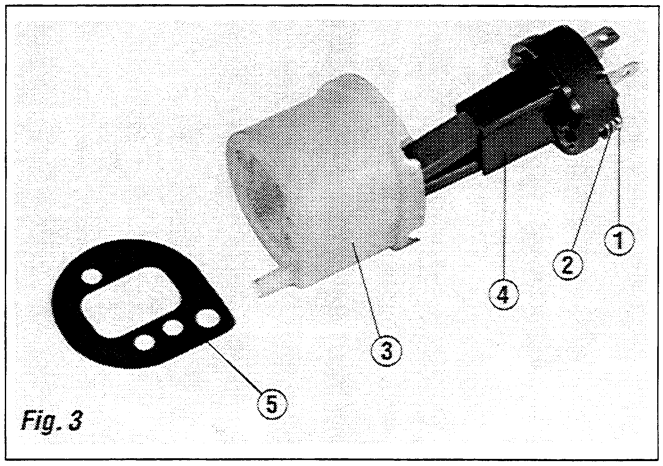


Fig. 3

2.6 REMOVING THE BRUSH BOX HOUSING AND THE HEAT SINK ASSEMBLY

Remove the three socket headed screws from the brush box housing (1).

Remove the housing and 'O'ring from the locating spigot.

Unscrew the three stator lead fixing socket headed screws on the heat sinks (2) and bend the leads straight.

NOTE One phase has the red AC connection lead (3).

Removing the heat sink assembly (see Section 3 Component Inspection and Renewal if diodes are to be tested). Remove the four heat sink fixing screws (4). Remove the negative diodes earth connection lead fixing socket headed screw (5). Remove the positive diodes connection socket headed screw and suppression capacitor connecting lead, from the insulated terminal strip (6). Remove the complete heat sink assembly.

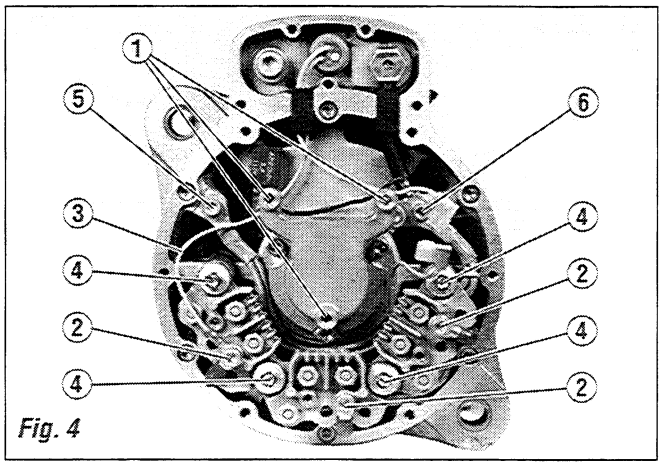


Fig. 4

2.7 REMOVING THE TERMINALS AND PLUG

Remove the terminal nut (1), half nuts (2) and red insulator bush (3). Remove the positive terminal post with the rubber guide and insulator plate then the red insulator bush and washers. The negative terminal post can be removed using an Allan key and spanner, by removing the two full nuts and spring washers (4) and (5). Remove the four screws and washers from the plug flange. Remove the red AC cable and the yellow regulator 'A' connection cable complete with the rubber cable guide. Remove the single socket headed screw and take off the suppression capacitor. Remove the socket headed screws holding the positive terminal nylon strip and remove the strip.

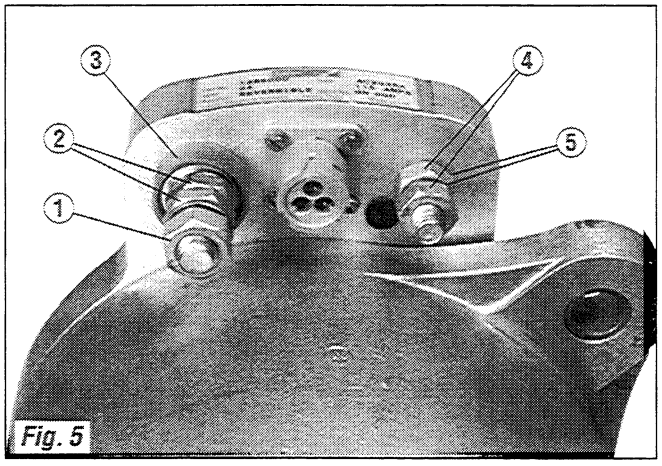


Fig. 5

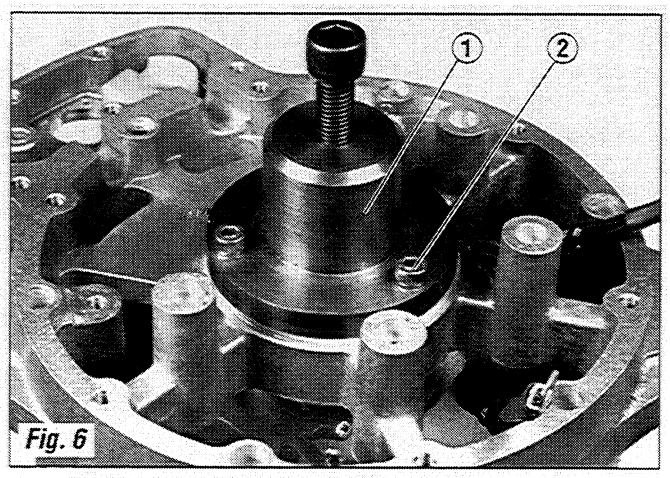


Fig. 6

2.8 REMOVING THE SLIP RING END SHIELD AND BEARING

Remove the circlip from the rotor shaft. Fit the slip ring end shield extractor tool (1) (see Section 7 Tools and Technical Information) using the three screws from the brush box housing (2).

Remove the six socket headed screws and, using the tool, pull the end shield and bearing away from the rotor and stator.

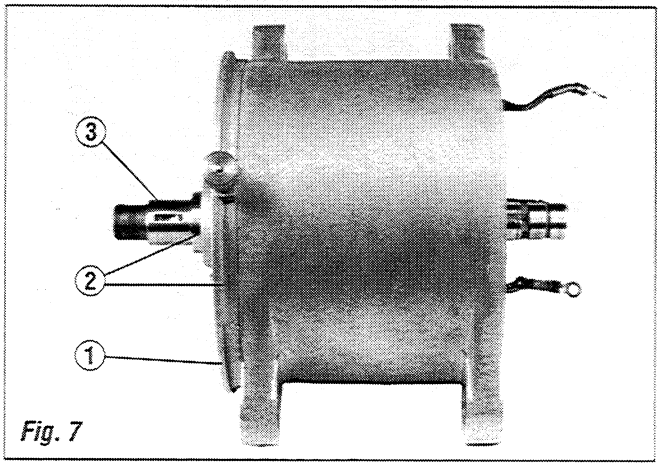


Fig. 7

2.9 REMOVING THE DRIVE END SHIELD AND ROTOR

Remove the drive end bearing and spacer from the rotor shaft (3). Remove the six socket headed screws from the drive end shield (1) and remove the drive end shield and rotor (2). Withdraw the drive end shield from the rotor.

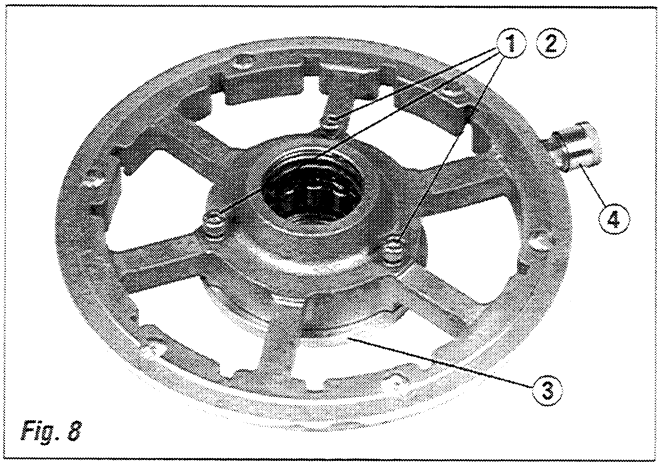


Fig. 8

2.10 REMOVING THE DRIVE END BEARING, CLAMP PLATE AND SEAL

Remove the three drive end bearing clamp plate screws and washers (1) and (2). Remove the clamp plate (3) and lubricator (4). The roller bearing is a sliding fit in the steel bearing liner. To remove the bearing, lay the end shield across two spaced blocks and bring the end shield down sharply. The seal may then be levered out with a screw driver.

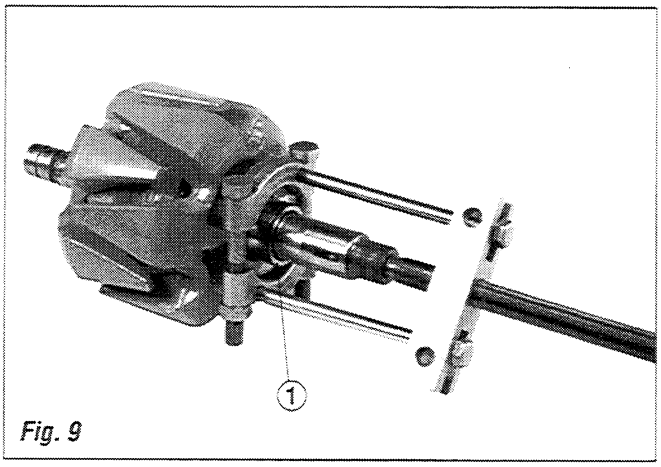


Fig. 9

The inner bearing track (1) may be removed by using a 'Sykes' puller. See Section 7 Tools and Technical Information (7.6 Special Tools [Bought]).

3.1 PREPARATION

All components must be thoroughly cleaned before inspection or testing. To avoid damaging any electrical components during the cleaning process, a fluid suitable for electrical equipment (i.e. not water based) must be used. Non electrical parts maybe cleaned with a proprietary fluid similar to white spirit. Remove any remaining thread-locking compound. It is important that all components are thoroughly dried, especially those which are insulated. The use of a drying oven is the best method.

It is recommended that new bearings, seals, gaskets and 'O'rings are fitted when an alternator is being completely overhauled. Visually check all components for signs of cracking, corrosion, local discolouration and any other signs of damage or excessive wear. Check all internal and external threads.

3.2 CHECKING THE BRUSHES AND BRUSH BOX

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 more than the minimum length as stated in Section 7 Tools and Technical Data.

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

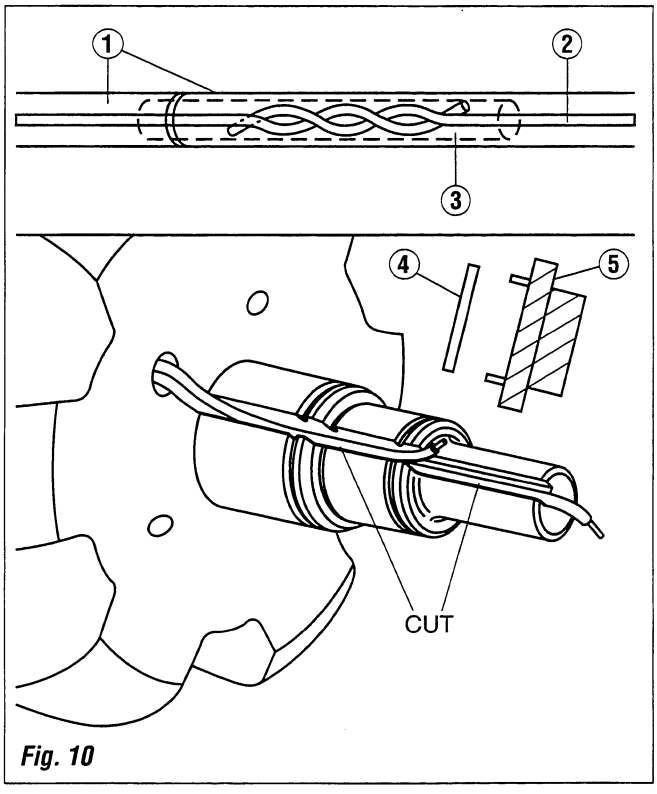


Fig. 10

3.3 REPLACING THE SLIP RINGS

Should it prove impossible to remove all pitting or scoring without reducing the diameter below that which is stated in Section 7 Tools and Technical Data, new slip rings must be fitted as follows:–

Carefully un-solder 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.

* See Section 7 Tools and Technical Information

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 slip rings. It may be necessary to remove the circlip and nylon cover. 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.10.

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 suitable copper wire (2) to the existing wire and solder the joint together. Snip off any excess wire.

Apply a coating of VA276 varnish to the joint and slide a short length of 2 mm glass fibre sleeving (3) over the joint so that it slides inside the existing sleeve (1). Apply a further coating of varnish to the sleeve and slide on a new length of 3 mm glass fibre sleeving (1) to abut the original sleeve. Apply a final coating of VA276 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 the manufacturers 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 one 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, bear the ends for the minimum length necessary, then solder one lead to each slip ring.

Mount the drive end 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.

3.4 REPLACING MAIN DIODES

Unsolder the main lead from the diode to be replaced.

Unscrew and remove the securing nut and spring washer from the diode using a suitable spanner or socket. Push the diode clear of the heat sink.

Ensure that the new diode is clean and free from grease. Thoroughly clean the contact face and hole in the heat sink then smear both surfaces with 'Biccon Jointing Compound' (See Section 7 Tools and Technical Information – 'List of Suppliers'). Insert the new diode into the heat sink, and secure it with the spring washer and nut.

Tighten the diode securing nut to the torque specified in Section 7.3 Torque Value Chart.

Ensure that the connecting surfaces of the main lead and diode are clean and free from grease. Reposition the lead and solder it to the diode.

3.5 REPLACING AUXILIARY DIODES

Unsolder the lead from the diode which is to be replaced.

Renew the diode using the procedure for main diodes. Solder the lead to the stem of the new diode.

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 VA276 varnish to the joint. When partly dry (tacky), slide the glass fibre sleeve over the joint and varnish with more VA276.

When complete, paint the entire assembly – heat sink, diodes and leads – with Blue Epoxy E192 (See Section 7 Tools and Technical Information – 'List of Suppliers'). 'Crimping' together the auxiliary diode leads is permitted provided the current crimping tool and a connector of the correct size and electrical value are used: typical field current is 3.5 A.

3.6 REPLACING HEAT SINKS

When renewing heat sinks, ensure that the insulating bushes and washers are fitted in the correct sequence to insulate the heat sinks from the rectifier end shield and from one another.

NOTE All threaded components must be tightened to the correct value. These are listed in the torque details under Section 7 Tools & Technical Information.

For soldering see details under Tools & Technical Information Section 7.7.

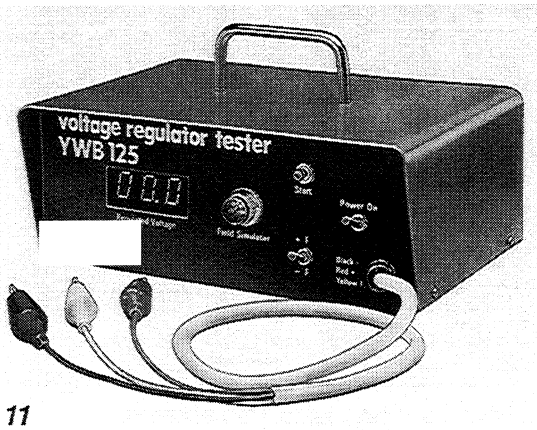


Fig. 11

4.1 TEST EQUIPMENT

A Test machine capable of driving the alternator under full electrical load up to 8,000 RPM.

A wire wound or carbon pile variable resistor, capable of controlling the current through one phase winding of the stator to a maximum of 40 A.

A 24 V, 100 AH battery supply.

A 100 V DC megaohm tester.

A multimeter with a DC range of 0 – 50 V and a resistance range of 0 – 10 Ω and an AC range of 0 – 50 V and diode testing facility.

A 24 V, 48 Watt lamp and single pole ON/OFF switch (for diode testing).

A YWB125 Regulator Tester.

A 594A Regulator Test Box.

Carbon pile or similar variable electrical load capable of carrying a current of 150 A at 30 V.

A DC Ammeter with a range of 0 – 200 A.

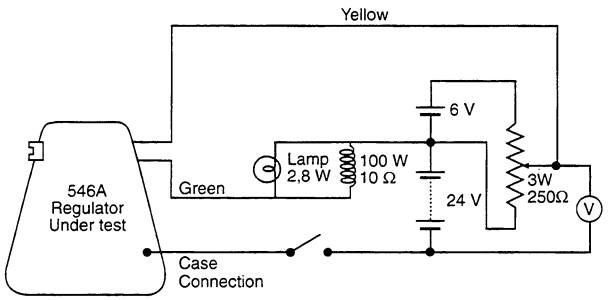


Fig. 12 – STATIC TEST – REGULATOR

4.2 REGULATOR TESTING

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 whether the alternator or the regulator is faulty. The 594A range of regulators maybe tested using the YWB125 Regulator Tester in Fig.11 or the circuit as shown in Fig.12.

Testing the 594A Type Regulator

If a YWB125 Regulator Tester is not available, then the 594A Regulator maybe tested using the regulator test circuit as shown in Fig.12.

Parts Required for Testing the Regulator:–

A 6 V – 6 AH battery.

A field coil from an AC203RA alternator.

Or a 10 Ω wire wound 100 Watt resistor.

A 2.8 Watt lamp.

A 250 Ω 3 Watt variable resistor.

The battery (24 V + 6 V) must be fully charged, no significant voltage drop should occur.

Adjust the variable resistance until 24 V is indicated on the meter, the lamp should be ON.

Adjust 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.

Fig. 13

Testing the Battery Over Voltage and Surge Protection Unit (BOVSPU) 594A Regulator

Test the 594A Regulator in accordance with the procedures above to determine the regulating voltage. If the regulator has a voltage adjust lead then, connect the black lead (V) to negative and check that the voltage is set between 29 V – 30 V.

Parts Required for Testing BOVSPU

Three 9 V batteries (low capacity dry cell).

Two 2.2 mf 35 V capacitors.

Two diodes (10 A).

Resistor 2 kΩ.

Two single pole switches, normally/open PB1 and PB2.

One single pole switch, normally/closed PB3.

One toggle switch S1.

Testing the 594A Regulator Using the Test Components as Shown on Circuit Diagram Fig.14.

1 Connect regulator and tester as shown. Switch on S1. When all connections are complete, the LED D2 should be ON. If the lamp is ON the BOVSPU functions have failed. If the LED does not light, the regulator function has failed open circuit.

2 Press PB1; the LED should be switched OFF. If it is not, the regulator function has failed short circuit.

NOTE The state of the LED is not important in the remaining tests.

3 Press PB1 and hold it in for five seconds. The lamp should light. If it does not, check that, with PB1 held in, there is a voltage of at least 33V between the black and yellow wires. If the voltage is correct and the lamp does not light, the BOVSPU battery over-voltage trip is faulty and the regulator must be replaced.

4 Release PB1; the lamp should remain lit.

5 Press PB3; the lamp should be OFF.

6 Release PB3; the lamp should come ON again. If it is not, the BOVSPU latch function is faulty and the regulator must be replaced.

7 Switch the 24 V supply OFF then ON again, to re-set the latch function.

8 Press and release PB2; the lamp should light and go OFF after one to two seconds. If it does not light, check that, with PB2 held in, there is a voltage of at least 55 V between the black and yellow regulator wires. If the voltage is correct and the lamp does not light the BOVSPU surge voltage trip function is faulty, If the lamp lights and stays lit, the BOVSPU re-set function is faulty. In both cases the regulator must be replaced.

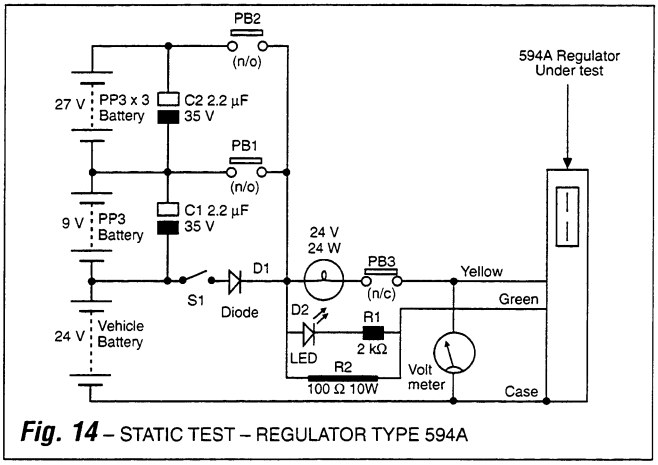


Fig. 14 – STATIC TEST – REGULATOR TYPE 594A

4.3 CHECKING THE STATOR

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

4.3.1 Insulation Test of the Stator

Check the insulation between the frame and one of the three stator leads using the 100 V Megaohm Tester. A minimum resistance of 10 megaohms should be indicated (ensure stator leads are not touching the frame). If the resistance is below this figure, clean and thoroughly dry the stator and then check again. Renew the complete stator if the specified resistance can not be obtained.

4.3.2 Volt Drop Test of the Stator

Check for continuity and resistance by wiring the 24 V battery in series with the adjustable load and the ammeter. Complete the circuit across one pair of stator leads. Adjust the resistor until a current of 40 Amps flows. Then measure the voltage across the same two stator leads with the multimeter. Repeat this complete test on the remaining two pair of leads. The indicated voltage should be the same each time, and within the limits given under Section 7 Tools and Technical Data. If results are not similar in each test, renew the stator.

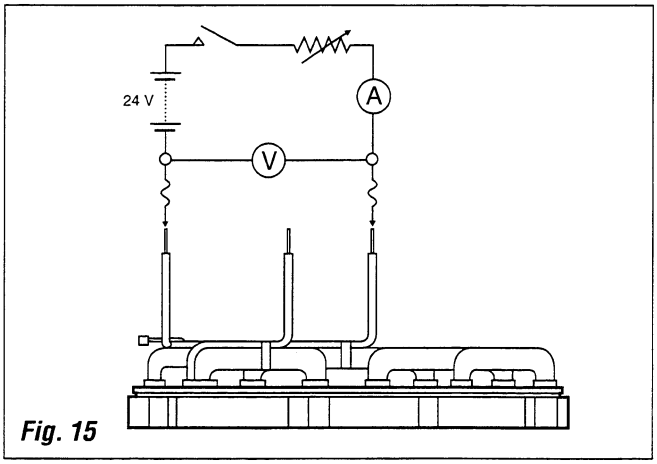


Fig. 15

4.4 CHECKING THE 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 multimeter taking care not to damage the brush tracks with the meter probes. The resistance should be as specified in Section 7.8 Tools & Technical Information, Additional Specific Technical Data. Renew the complete rotor if this resistance can not be obtained.

Check the insulation between each slip ring and the drive shaft with the 100 V Megaohm Tester. The resistance should be 10 megaohm minimum.

If the resistance is below this figure, clean and thoroughly dry the rotor then check the insulation resistance again. Renew the complete rotor if the specified resistance can not 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. See Section 7 Tools and Technical Data for the minimum slip ring diameter.

Should it prove impossible to remove all pitting or scoring without reducing the diameter below that which is stated in Section 7 Tools and Technical Data, new slip rings must be fitted.

See Section 3 Component Inspection and Renewal, 3.3 Replacing the Slip rings.

4.5 DIODE TESTS

All the diodes can be tested while the three heat sinks are still assembled in the rectifier end shield. Using the 24 V 44/48 Watt lamp and a second probe connected to the negative side of the battery, carry out the tests detailed in the diode testing chart opposite.

Should a lamp indication be obtained that does not agree with the table, the diode being tested is faulty and should be replaced. See Section 3 Component Inspection and Renewal, 3.4 Replacing Main Diodes and 3.5 Replacing Auxiliary Diodes.

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 diode.

TEST	POSITIVE PROBE	NEGATIVE PROBE	DIODE BEING TESTED	CORRECT TEST LAMP INDICATION
1	Each Heat Sink in Turn	Main Output Terminal B1+	Pos.	ON
2	Main Output Terminal B1+	Each Heat Sink in Turn	Pos.	OFF
3	Main Output Terminal B– or Earth	Each Heat Sink in Turn	Neg.	ON
4	Each Heat Sink in Turn or Earth	Main Output Terminal B–	Neg.	OFF
5	Each Heat Sink in Turn	Terminal WL	Aux.	ON
6	Terminal WL	Each Heat Sink in Turn	Aux.	OFF

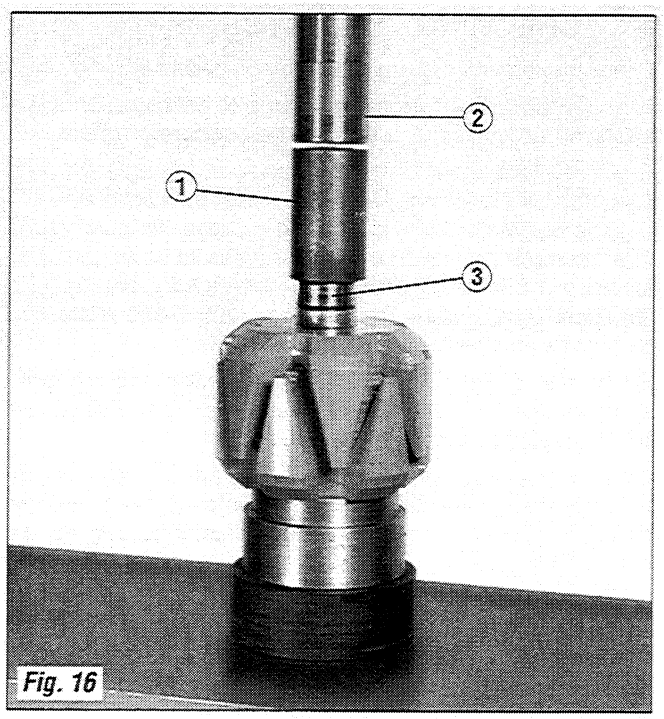


Fig. 16

5.1 FITTING THE DRIVE END BEARING TO THE ROTOR

Using tool (1) and a suitable press (2) fit the new inner track (3) to the rotor shaft.

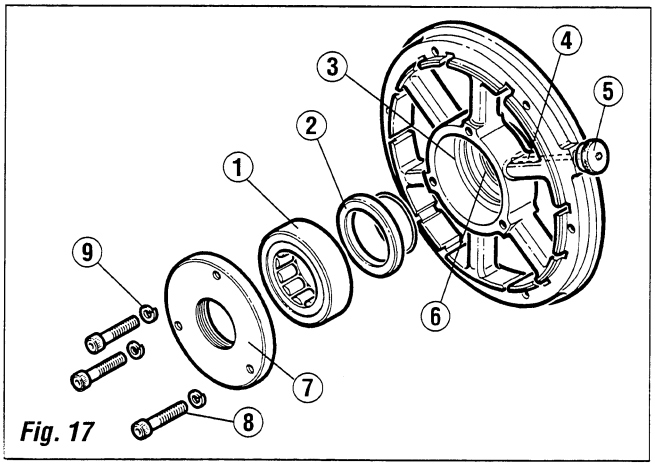


Fig. 17

5.2 FITTING THE DRIVE END ROLLER BEARING AND SEAL

Pack the drive end bearing (1) and new seal (2) and fill cavities both sides of bearing 'Retinex' grease (3).

Press the new seal and bearing into the bearing housing (seal to be fitted the lip against the labyrinth). Fill the lubricator hole (4) in the end shield using the stauffer lubricator (5) filled with grease and screwed down.

Fill the bearing labyrinth grooves (6) with grease. Fit the clamp plate (7) using the three screws and washers (8) and (9). See Section 7 Tools and Technical Information for Torque Value Chart.

Press rotor into drive end shield assembly.

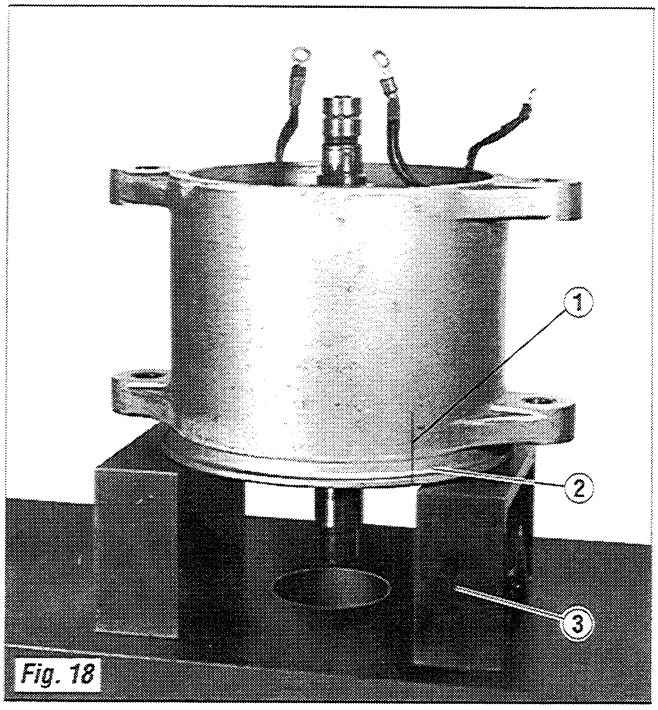


Fig. 18

5.3 FITTING THE DRIVE END SHIELD TO THE STATOR

Mount stator vertically on support blocks.

Check for scribed line position (1) on stator and end shield. Fit the six socket headed screws to the drive end shield (2) and torque to value. See Section 7 Tools and Technical Information for Torque Value Chart. Mount the stator and drive end shield vertically on suitable support blocks (3). Lower the rotor through the bearing and seal into the stator.

5.4 FITTING THE SLIP RING END SHIELD AND BEARING

Check for scribe line position on stator and slip ring end shield (1). Check that the large circlip in the slip ring end bearing housing is fitted.

Fit the six socket headed screws (2) and torque to value. See Section 7 Tools and Technical Information for Torque Value Chart.

Using a steel tube (3), machined to dimensions shown in Section 7 Tools and Technical Information, locate the tube over the slip rings and against the bearing inner track. Support the rotor shaft (4) and press the bearing down until it locates on the rotor shaft shoulder.

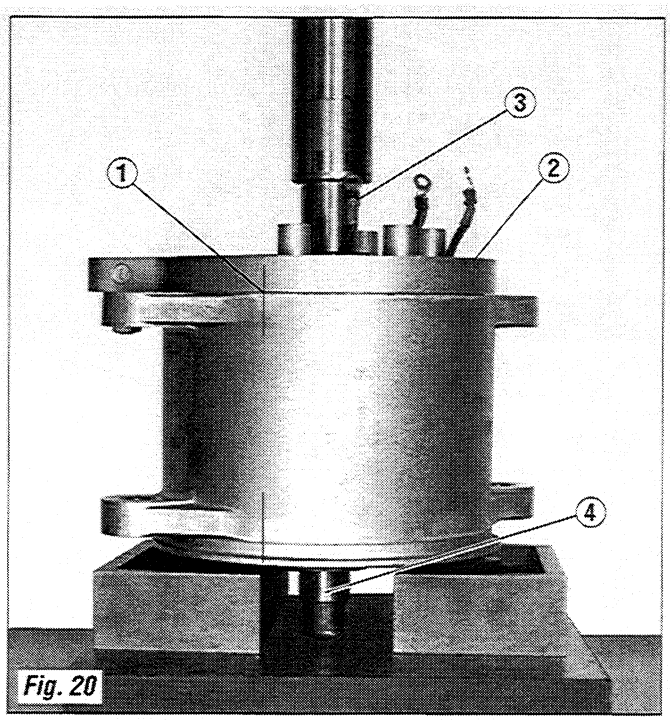


Fig. 20

Fit the new bearing circlip (6).

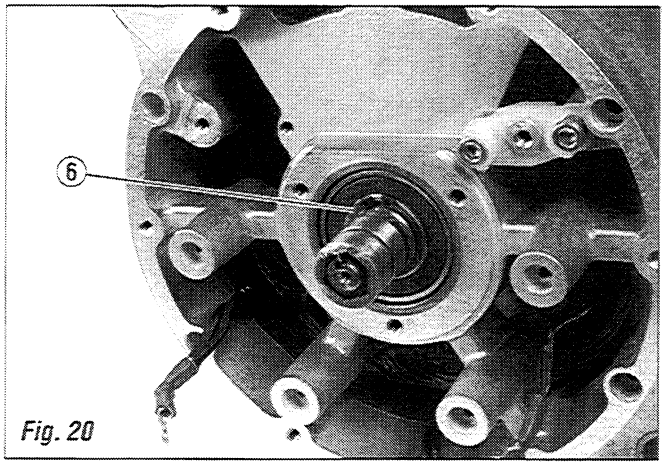


Fig. 20

5.5 ASSEMBLING THE TERMINATIONS

Replace the positive nylon terminal strip (1) using the two socket headed screws (2). Torque to value. See Section 7 Tools and Technical Information for Torque Value Chart.

Refit the suppression capacitor (3) using single screw.

Refit the receptacle plug (4) complete with rubber cable guide, using the four screws and washers.

Refit the negative terminal post (5) using two plain washers under the socket headed screw, two full nuts and spring washers. Refit the positive terminal post (6) complete with rubber guide and cable. Refit the positive terminal post rear insulator plate (7), read insulator bush, two half-nuts, spring washers and full nut. Tighten half nuts to torque value. See Section 7 Tools and Technical Information for Torque Value Chart.

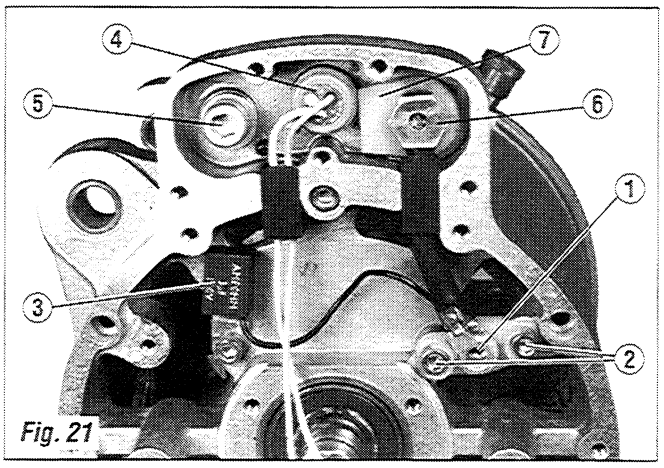


Fig. 21

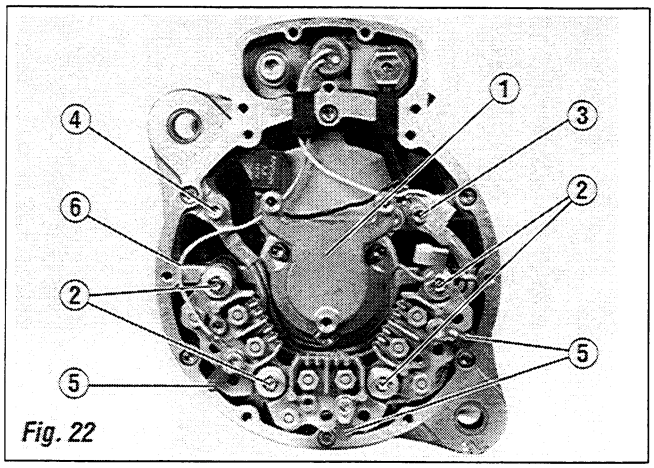


Fig. 22

5.6 REFITTING THE BRUSH BOX HOUSING, HEAT SINKS AND CONNECTING THE PHASE LEADS

Fit the brush box housing and 'O' ring to locating spigot using three screws and washers (1).

Refit the heat sink assembly, locating the four socket headed screws and nylon insulation bushes (2) into the locating holes on the four extended posts.

Connect the positive terminal cable link, the positive diode cable and the suppression cable connector to the nylon insulation terminal strip (3). Tighten screw to torque value. See Section 7 Tools and Technical Information for Torque Value Chart.

Connect the negative diodes earth cable (4) and torque to value. See Section 7 Tools and Technical Information for Torque Value Chart.

Bend inwards the three phase connections (5) and connect the phase screws.

NOTE One phase has the (red) 'AC' cable connected (6).

Torque to value. See Section 7 Tools and Technical Information for Torque Value Chart.

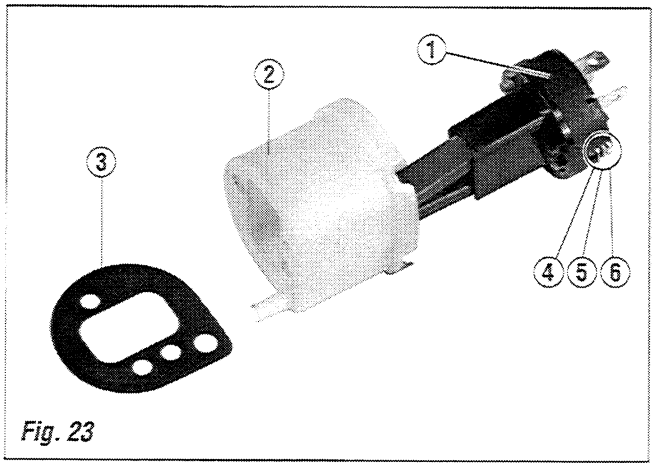


Fig. 23

5.7 FITTING THE BRUSH BOX CONTAINER AND GASKET

Align the brush box (1) and locate inside the container (2), with the gasket (3) located under the container, and onto the brush box housing. Fix with the two screws, plain and spring washers (4)(5) and (6).

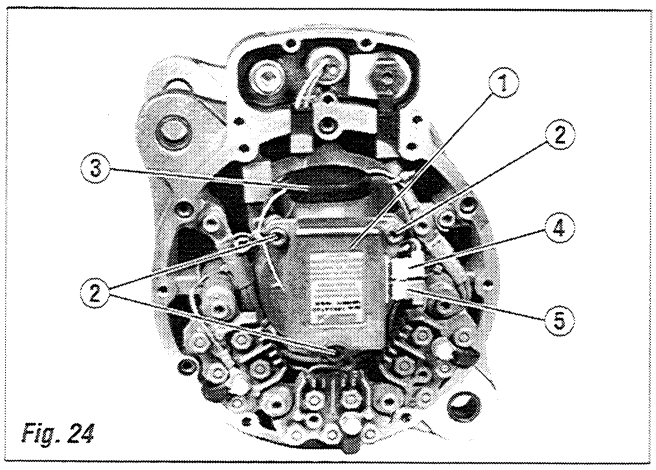


Fig. 24

5.8 FITTING THE REGULATOR

Fit the regulator (1) using the three screws and washers (2) to the brush box housing. Torque to value. See Section 7 Tools and Technical Information for Torque Value Chart.

Fit the green 'F' Connector and yellow 'A' connector to the brush box lucar blades and fit rubber brush box cover (3). Connect the yellow WL lead from the plug (4) and yellow 'A' line diode lead to the regulator (5) lucar blades.

Fit plastic cable ties as shown in Section 2.4 Removing the Terminal Cover and Regulator.

5.9 FITTING THE MAIN TERMINAL COVER, PLASTIC COWL AND ELBOW

Fit the cover using the five socket headed screws (1).

Fit the cowl using the six socket headed screws (2).

NOTE Refer to Section 2 Dismantling – 2.3 Removing the Cowl and Elbow (3) for the positioning of the elbow and drain plate removal.

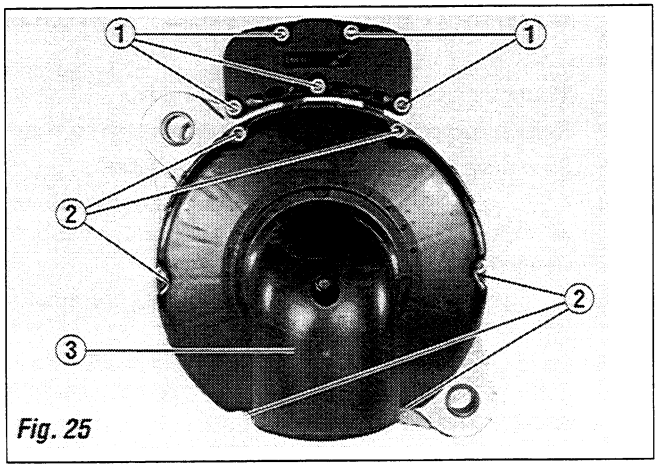


Fig. 25

5.10 FITTING THE FAN AND PULLEY

Fit the drive end bearing steel spacer (chamfered face to bearing).

Fit the Woodruff key and plastic fan (1).

Fit the pulley (2) and lock with bellville washer (3) (dished face towards the pulley) and fit shaft nut (4). Torque to value. See Section 7 Tools and Technical Information for Torque Value Chart.

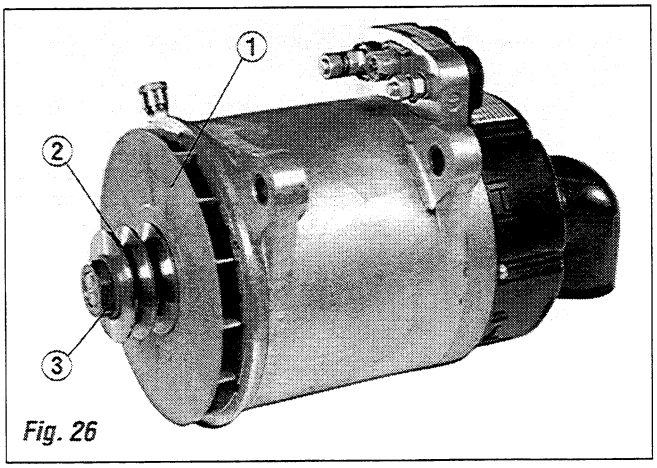


Fig. 26

6.1 DYNAMIC PERFORMANCE TESTING

Alternator

1 Mount the alternator and connect the drive.

2 Refer to test circuit connections and despatch number*.

3 Start drive and run alternator up to excitation*.

4 Adjust speed until the alternator output shows 2 – 3 Amps with the voltage not below 27 V. This should correspond with the cold cutting in speed*.

5 Run the alternator at 3,000 RPM and adjust the resistive load to 10 Amps*.

6 Check AC voltage, see Fig. 27 for plug connections and confirm AC output is less than 10 Amps at 3,000 RPM and greater than 12 V.

7 Increase the load to 75% of maximum alternator output. The voltage should not fall below 27 V at 3,000 RPM.

8 Increase the load further until the voltage falls to 26 V (100% load check).

The load current should not be less than the maximum nominal output figure*.

9 Maintain the alternator speed at 3,000 RPM on 75% full load for one minute. The ammeter and voltmeter readings should remain steady. No excessive noise or vibration should be apparent.

* See Section 9 Performance Test Data.

6.2 SURGE PROTECTION TESTING

1 Set the speed at 4,000 RPM. Set the load to 75% of maximum alternator output. Switch OFF the load. The surge protection unit should NOT trip. Switch the load ON.

2 At the same speed and load switch the battery OFF, than the load OFF. The surge protection unit should trip and the warning light come ON. After two seconds, the machine should re-excite and the warning light go off.

Switch both the load and the battery ON. Output should be restored.

7.1 HEALTH AND SAFETY

Warning: Chlorinated solvents can be dangerous.
For your benefit the following information relating to workshop procedures has been extracted from the 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.

Do not store solvent in buckets or other open storage vessels.

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 solvents, 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.

7.2 LIST OF SUPPLIERS

Race Extractor
Slip Ring Puller
– J F Sykes (St Annes) Ltd
Lytham St Annes
Lancashire
England

Varnish VA276
– The Sterling Varnish Company Ltd
Frazer Road
Trafford Park
Manchester
M17 1DU
England
Tel: 0161 848 8411

Cleaning Agents (Evolve)
– Imperial Chemical Industries Ltd
Solvents Marketing Development
P O Box 13
The Heath
Western Point
Runcorn
Cheshire
WA7 4QF
England
Tel: 01928 514444

Paint
Blue Epoxy
Diodes and
Heat Sinks
– Trimite Ltd
Arundel Road
Uxbridge
Middlesex
UB8 2SD
England

Diode Seating Compound
– BICC
P O Box 4
Hall Lane
Prescot
Merseyside
L34 5UR
England
Tel: 0151 430 7555

Retinex Grease
– Shell Oil
Delta House
Wavel House
Wythenshawe
Manchester
M22 5SB
England
Tel: 0800 414414

Belt Tension Gauge
– Snap On Tools Ltd
Palmer House
154 Cross Street
Sale
Cheshire
M33 1AQ
England
Tel: 0161 969 0126

Resistors and Switches
– RS Components Ltd
P O Box 99
Corby
Northamptonshire
NN17 9RS
England
Tel: (01536) 201234

Araldite
– Ciba Polymers
Duxford
Cambridge
CB2 4QA
England
Tel: (01223) 832121

7.3 TORQUE VALUE CHART

Fixings Description	Nm	Tool Size and Type
Drive End Bearing Clamp Plate	8.00	Allen Key 5 mm A/F
Drive End Shield Fixing Screws	8.00	Allen Key 5 mm A/F
Drive End Lubricator	8.00	13.5 mm A/F Non Standard Spanner
Slip Ring End Shield Fixing Screws	8.00	Allen Key 5 mm A/F
Diode Securing Nut	3.00	11 mm A/F Spanner
Nylon Terminal Strip	3.00	Allen Key 5 mm A/F
Suppression Capacitor Fixing Screws	8.00	Allen Key 5 mm A/F
Terminal Nuts (Negative)	15.00	17 mm A/F Spanner
Terminal Nuts (Positive)	25.00	19 mm A/F Spanner
Brush Box Fixing Screws	1.50	Screwdriver
Heat Sink Fixing Screws	3.00	Allen Key 5 mm A/F
Phase Lead Connection Screws	8.00	Allen Key 5 mm A/F
Brush Box Housing Fixing Screws	8.00	Allen Key 5 mm A/F
Regulator Fixing Screws	8.00	Allen Key 5 mm A/F
Terminal Cover Fixing Screws	3.00	Allen Key 5 mm A/F
Drive Shaft Pulley Nut	90.00	36 mm A/F Socket
Cowl Fixing Screws	3.00	Allen Key 5 mm A/F
Elbow Air Duct Screw	3.00	Allen Key 7 mm A/F

7.4 CIRCUIT DIAGRAM

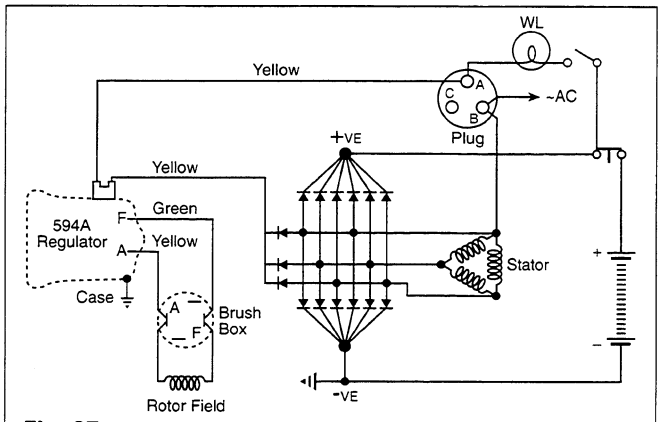


Fig. 27 – AC203RA – EARTH RETURN SYSTEM

7.5 SPECIAL TOOLS (Locally made)

The following tools are essential for servicing the alternator and maybe manufactured locally.

The material should be mild steel.

Unless otherwise indicated, the tolerance on all dimensions is ± 0.2 mm.

7.5.1 Slip Ring Bearing Removal Tool

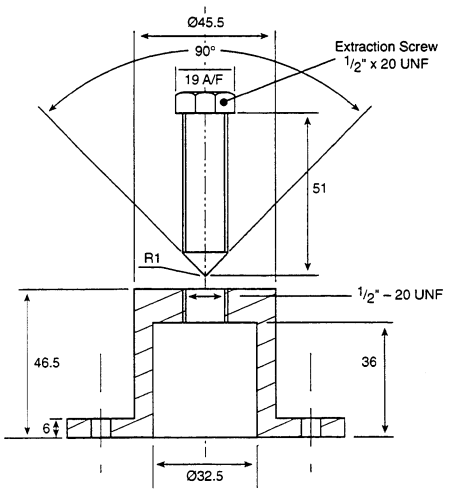


Fig. 28

7.5.2 Slip Ring End Bearing Fitting Tool

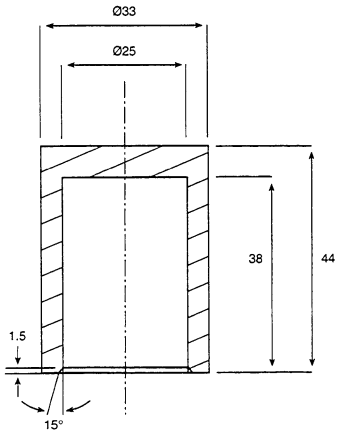


Fig. 29

7.5.3 Drive End Bearing Inner Race Fitting Tool

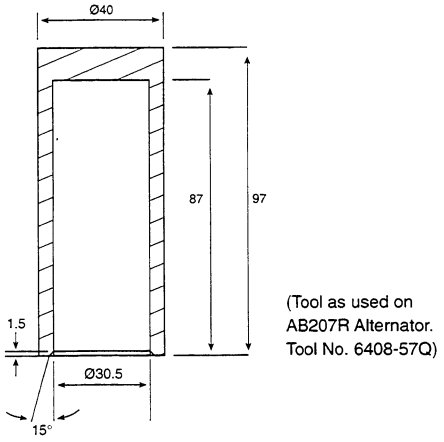


Fig. 30

7.6 SPECIAL TOOLS (Bought)

The bearing and slip ring extractor tool can be obtained from J F Sykes (St Annes) Ltd. Model type Thin Jaw 093005.

7.6.1 Bearing Inner Race Extractor

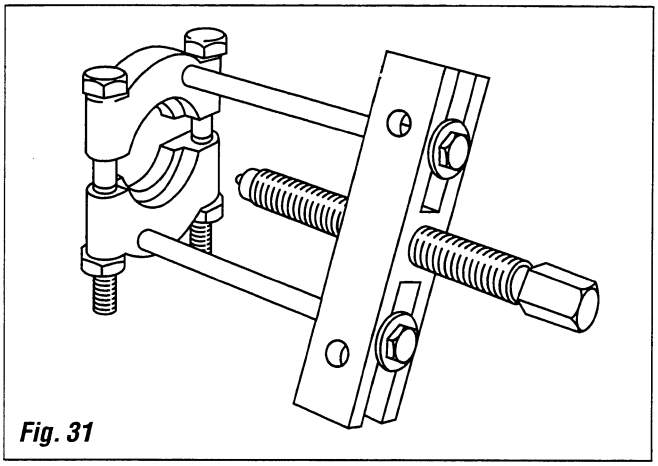


Fig. 31

7.7 SOLDER

To BS219 Grade K

Low-Animonal with melting point of 183 – 188 °C
361 – 370 °F

7.8 ADDITIONAL SPECIFIC TECHNICAL DATA (Subject to change/Additions)

Minimum Slip Ring Diameter	=	22 mm
Rotor Resistance	=	9.5 ± 0.2 Ω
Stator Phase Voltmeter Reading		
115 A Machines	=	2.7 ± 0.15 V
180 A Machines	=	1.2 ± 0.1 V
Minumum Brush Length	=	To Protrude from Brush Box 8 mm minimum
Wiring Systems Available	=	Earth Return

8.1 GENERAL MAINTENANCE

In order to maintain the performance, reliability and safety of the alternator, it is essential that only specified Lucas repair components are used.

All terminals, mounting bolts and pulley nuts should be regularly checked for tightness.

The air passages in the alternator and the external air supply source, where a ducted inlet air supply is used, should be regularly checked to ensure they are clean.

On earth return installations, particular care should be given to negative return paths via mounting lugs and earthing straps. The maximum voltdrop between alternator and battery on flow and return should not exceed one Volt.

8.2 SAFETY

All regulations relating to the protection of personnel within the proximity of rotating machines must be observed. Any exposed moving shafts or pulleys must be provided with effective guards when the alternator is in operation. Precautions must be taken to avoid inhalation of any dust dislodged or solvents used during cleaning. Any test machine used to measure the performance of the alternator must be properly designed and capable of both driving the alternator at its maximum speed and output and absorbing the electrical power generated.

8.3 STORAGE

If all the foregoing instructions have been followed correctly using the specified materials the alternator will be fully protected against adverse ambient conditions, but it is advisable to store it in a clean dry environment until required.

NOTE If long term storage is contemplated, the shaft must be rotated every six months to ensure that the bearings remain covered in lubricant and that the component materials of the grease remain mixed. If the alternator is placed in long term storage, the rotor shaft must be rotated at least three turns by hand. If the alternator is fitted to a vehicle or auxiliary power unit, the engine must be started and run for the minimum period recommended by the equipment manufacturer.

8.4 DRIVE BELT CONDITIONS

Drive belt condition and tension must be checked each time the engine is serviced. Belt tension will be specified in the engine manufacturers operating manual. Several suitable belt tension gauges are available. Details are noted under Section 7 Tools and Technical Information.

9.1 PERFORMANCE TEST CHART

Despatch Number	Test Figure	Exitation Speed Condition Spec. rpm	Cut-In-Speed Condition Spec. rpm	Regulating Voltage Condition Spec. A	rpm	+0.2 -0.3	75% Load Condition Spec. A	rpm	V	100% Load Condition Spec. V	rpm	A
1286000	See Sect. 9.2	WL OUT AT < 1000	WL ON < 650	10	3000	28.50	86	3000	27	26	3000	115
1286010	See Sect. 9.2	WL OUT AT < 1000	WL ON < 650	10	3000	28.50	86	3000	27	26	3000	115
1286500	See Sect. 9.2	WL OUT AT < 1300	WL ON < 1050	10	3000	28.50	135	3000	27	26	3000	180
1286510	See Sect. 9.2	WL OUT AT < 1300	WL ON < 1050	10	3000	28.50	135	3000	27	26	3000	180

9.2 PERFORMANCE TEST CIRCUIT

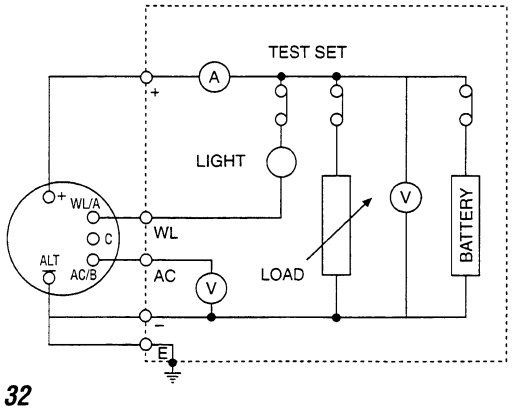


Fig. 32