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WORKSHOP INSTRUCTIONS

GENERATOR

MODEL RA5

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GENERATOR

MODEL RA5

1. GENERAL

The generator is a shunt-wound, two pole two brush machine, arranged to work in conjunction with a compensated voltage control regulator unit. The generator is air-cooled, air being drawn through it by means of a fan and suitable outlet and inlet holes in the end brackets.

The output of the generator is controlled by the regulator, being dependent on the state of charge of the battery and the loading of the electrical equipment of the car. When the battery is in a low state of charge, the generator gives a high output : conversely, when the battery is fully charged the output is reduced to a value sufficient to maintain the battery in good condition without any possibility of over-charging. An increase in output is given, to balance the increased load, when lamps or other accessories are in use. Further, a high boosting charge is given immediately after starting up, thus quickly restoring to the battery the energy taken from it by the starting motor.

The armature is fitted with a ball bearing at the drive end and a roller bearing at the commutator end. A condenser is fitted in the commutator end bracket, and connected between the live brush and earth. This condenser serves to reduce any radio interference that may result from sparking at the commutator, and does not in any way affect the performance of the generator.

2. ROUTINE MAINTENANCE

The generator needs no lubrication in normal service, as the bearings are packed with grease before assembly. If new bearings have to be fitted, or whenever the generator is dismantled for any other purpose, see that the bearings are clean and packed with high-melting-point grease. After about every 12,000 miles, remove the two screws securing each brushgear cover plate and examine the brushgear. Check that the brushes move freely in their holders ; if they are stiff remove them and clean their sides with a little petrol. Be careful to replace brushes in their original positions, in order to retain the "bedding". Brushes that are too worn to "bed" correctly on the commutator must be renewed.

The commutator surface should be clean and free from oil or dirt, and should have a polished appearance. If it is badly discoloured, the commutator end bracket must be removed (see para. 4b) and the commutator cleaned with a petrol-moistened cloth.

Occasionally inspect the generator driving belt, and if necessary take up any undue slackness. Care should be taken to avoid overtightening the belt, which should have no more tension than is required to transmit the drive without slipping. See that the machine is properly aligned with respect to the drive, as otherwise the armature bearings may be unduly strained.

3. PERFORMANCE DATA

(*a*) Cutting-in speed : 800-850 r.p.m. at 13.0 generator volts.

(*b*) Output : 24 amps. at 1400-1550 r.p.m. at 13.5 generator volts, taken on a 0.55 ohm resistance load without regulator.

(*c*) Brush spring tension: 15-25 ozs.

(*d*) Field resistance (total): 6.0 ohms.

4. SERVICING

(a) TESTING IN POSITION TO LOCATE A FAULT IN CHARGING CIRCUIT

(*i*) Inspect, and if necessary adjust, the driving belt, as described in para. 2.

(*ii*) Check that the generator and control box are correctly connected, *i.e.*, generator terminals "D" and "F" to control box terminals "D" and "F" respectively (if the terminals are not marked, the field terminal "F" can be identified as the small terminal at the side of the commutator end bracket).

(*iii*) With all lights and accessories switched off, disconnect the cables from both generator terminals and connect these terminals together with a short length of wire. Start the engine and allow it to run at a normal idling speed.

(*iv*) Clip the negative lead of a moving-coil voltmeter, 20 volts full scale, to one terminal of the generator, and the other lead to a good earthing point on the generator yoke or end brackets.
Gradually increase the engine speed, when the voltmeter reading should rise rapidly and without fluctuation. Do not allow the reading to reach 20 volts, and do not race the engine in an attempt to force up the

voltage. It is sufficient to run the generator up to a speed of about 800 r.p.m.

(*v*) A low reading, of approximately 1 volt, may indicate a fault in the field winding : one of approximately 5 volts, a fault in either the armature winding or the brushgear.

(*vi*) Remove the two screws securing each brushgear cover plate, and examine the brushgear. Hold back each brush spring and move the brush by pulling gently on its flexible connector. If the movement is sluggish, remove the brush, clean it and if necessary ease it by polishing the sides on a smooth file. Always replace brushes in their original positions. If the brushes are so worn that they will no longer bed correctly on the commutator, or if the core of the flexible connector is exposed on the brush face, new brushes must be fitted.

If a fault in the suppression condenser is suspected, disconnect its connecting eyelet and lead, by removing the screw and lock washer found under the brushgear cover, on the side nearer the output terminal "D". Replace the screw to secure the flexible connector to the brush, start the engine and test the generator as described above. If the output is now correct, the condenser is at fault, and the commutator end bracket must be removed, as described below, in order that a replacement may be fitted.

(*vii*) If, on testing the generator, there is still no reading (or a very low one) on the voltmeter, an internal fault is causing the trouble and the generator should be dismantled for inspection.

(b) DISMANTLING

Before beginning to dismantle the generator, it is advisable to mark the yoke and end brackets in some way, to ensure their correct alignment on reassembly.

(*i*) Remove the generator from the engine, and take off the drive pulley. Remove the key from the armature shaft.

(*ii*) Remove the brushgear cover plates, hold back the brush springs and slide the brushes from their holders. Remove the two nuts, steel washer and insulating washer from the field terminal at the side of the commutator end bracket, and unscrew and withdraw, from the commutator end, the two through bolts securing the end brackets to the yoke.

(*iii*) Pull the commutator end bracket off the yoke. The bracket locates on two loose dowels passing through the laminated yoke of the machine, and is fitted with a roller bearing for the armature shaft. The driving end bracket and armature can now be lifted out of the yoke as one unit. The end bracket carries the armature shaft in a ball bearing, which should not be needlessly disturbed. If, however, the bearing requires examination or the armature is to be replaced, the armature shaft can be pressed out of the end bracket by means of a hand press.

Test the brush spring tension with a spring scale. The correct tension is 15 - 25 oz. Fit a new spring if the tension is low.

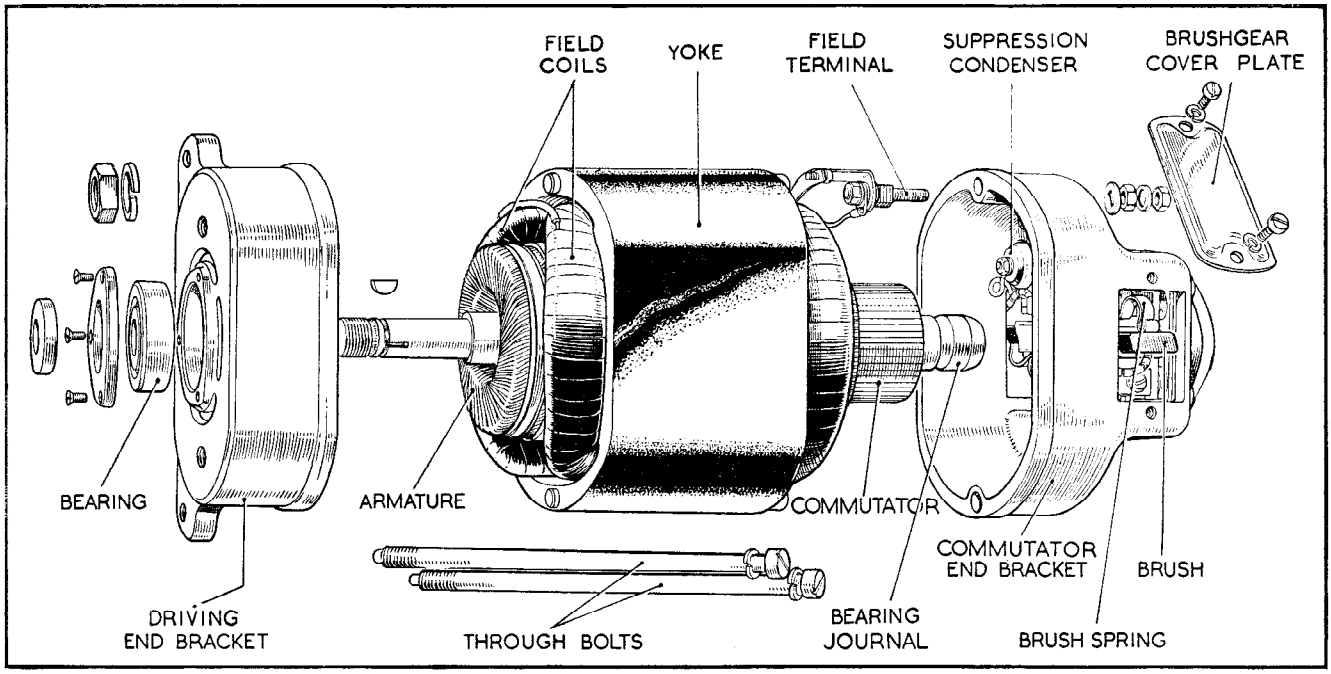

Fig. 1
Generator, dismantled

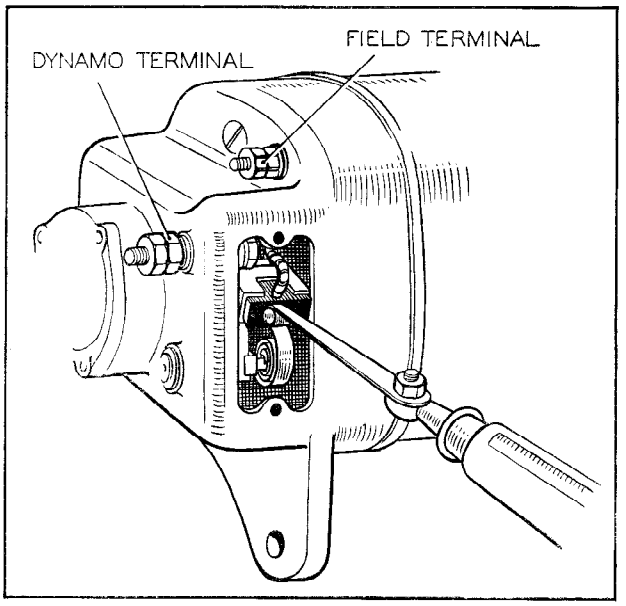

Fig. 2
Checking brush spring tension

(c) COMMUTATOR

The commutator must be smooth and free from pits and burnt spots. It may be cleaned with a petrol-moistened cloth or, if this is ineffective, polish with fine glasspaper.

After long service, it may be necessary to skim a badly pitted or scored commutator. Mount the armature (with or without the drive end bracket) in a lathe, rotate it at a high speed and carefully take a light cut off the commutator, using a very sharp tool. Do not remove more metal than is necessary. Polish the commutator with very fine glass paper, and undercut the insulation between the segments for a depth of about $\frac{1}{32}$", using a hacksaw blade ground down to the thickness of the insulation.

(d) ARMATURE

The testing of the armature winding necessitates the use of a voltage drop test, or a growler. If these are not available, the armature must be checked by substitution.

No attempt should be made to machine the armature core or to true a distorted shaft.

In the event of an armature replacement proving necessary, remove the collar and bearing journal from the commutator end of the old armature shaft and fit them to the new armature.

N.B. Parts of the bearings are not interchangeable : in the event of damage to the journal of the commutator end bearing, a complete new end bracket assembly must be fitted.

(e) BEARINGS

It is extremely unlikely that wear of the bearings sufficient to necessitate replacement will be found to occur during the normal life of the dynamo. If, however, such wear is found to have taken place, the faulty bearing must be replaced. Before fitting the new bearings, or whenever the generator is dismantled, see that the bearings are clean and packed with high-melting-point grease.

The bearing at the commutator end is an integral part of the end bracket. If a new bearing is necessary, a complete new end bracket must therefore be fitted together with a new inner journal on the armature shaft. The drive end bearing can be pressed out of its housing after the bearing retaining plate has been removed. The new bearing can then be fitted by means of a hand press, using a tool that locates on the outer journal of the bearing.

(f) FIELD COILS

The field coils can be tested, without removing them from the yoke, by measuring their resistance with a suitable ohm meter (approx. 6 ohms between the

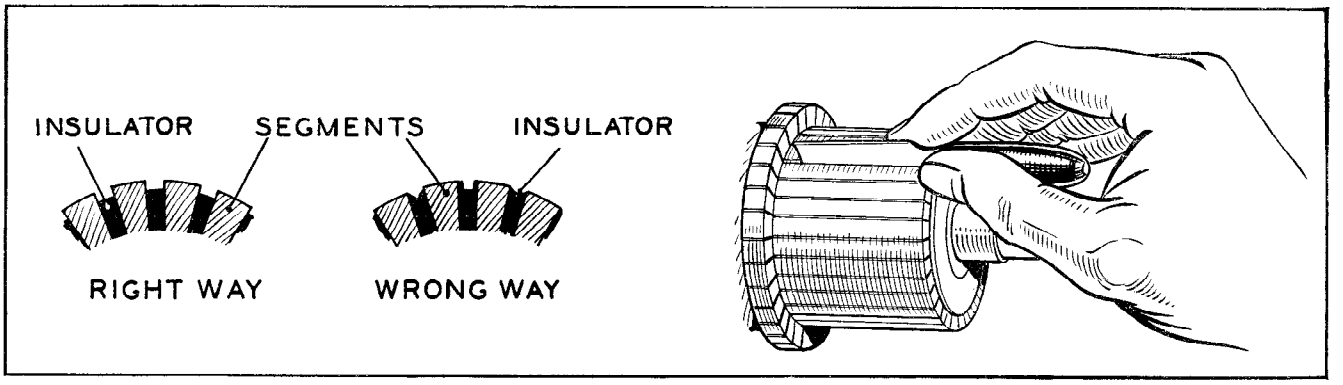

Fig. 3
Under-cutting commutator insulation

field terminal and earth). If no ohm meter is available connect the coils in series with a 12 volt D.C. supply and an ammeter, when the ammeter should read approximately 2 amps. No reading on the meter indicates an open circuit.

Remove the earthing connection of the coils to the yoke, and test for insulation between the field terminal and the yoke with a mains test lamp. If the lamp lights, the coils are earthing to the yoke.

If one of the coils is found to be faulty, disconnect the coil connections. At the commutator end, one coil is connected to the field terminal and the other to an earthing screw on the yoke ; at the drive end, the coils are joined by a sweated connection. Each coil is held in position by a retaining strip passing through a slot in the pole shoe. This strip may be gently tapped out, and the field coil removed.

Fit the new coil over the pole shoe, insert the retaining strip in its slot and remake the coil connections.

(g) REASSEMBLY

The procedure for reassembling the generator is, in the main, the reverse of that described in para. 4(b) for dismantling.

The following points must be kept in mind :

(*i*) The end brackets locate over their dowel pins in the yoke, and must be replaced in their original positions relative to the yoke and each other.

(*ii*) Ensure that the square insulating washers on the field terminal fit correctly in the hole in the end bracket.

(*iii*) The distance piece, or collar, at the driving end must be replaced with the chamfered edge towards the machine.

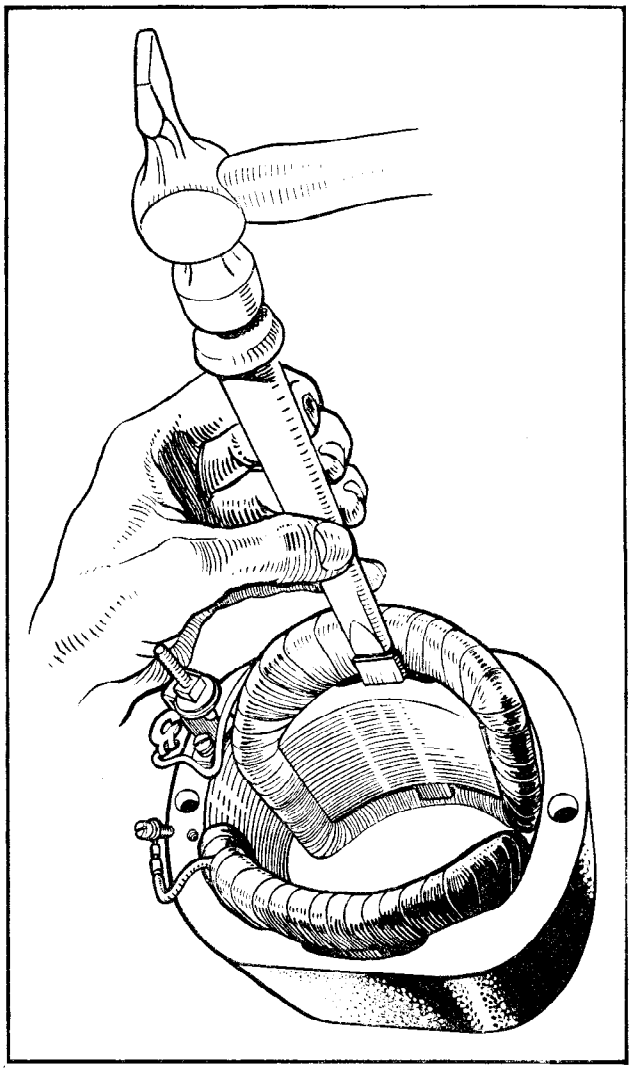

Fig. 4
Removing field coils