Practical Dynamo Maintenance by W.Topping

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This item has been edited to make it relevant ONLY to Miller dynamos that have had their internal cut-out removed and converted to 2 wire output.

DESPITE the increasing use of crankcase mounted A.C. equipment with a rectifier for D.C. conversion, it will, in my opinion, be a very long while before the conventional magneto and/or dynamo are superseded. For a considerable time to come, therefore, the need to overhaul these parts will continue seasonally to produce a headache for the uninitiated or, on the other hand, a. degree of pleasure and sense of achievement in those who know how to set about the task.

" Know-how," actually, is what the customer pays for if he farms out the work. Dynamo spare parts are not necessarily expensive, but the time involved, even when an expert mechanic is doing the work, can make the bill formidable. To be one's own mechanic, however, calls for a little knowledge of how to diagnose trouble without needlessly dismantling the complete equipment.

To test a dynamo, one needs an ordinary inspection lamp, fitted with a 12-v. bulb. You may ask why 12-v? Well, a dynamo has to be tested as a separate component, and as such must be disconnected from the remainder of the charging circuit. That entails the removal—on two-brush dynamos —of the two wires marked " D " and " F." With the circuit thus disconnected and the engine running, a rise in voltage occurs through a building up of current due to the absence of any stabilizing factor, i.e., the battery or regulator. At fairly high speeds 25 v. on open circuit (wires disconnected) may be forthcoming, so that it will be seen that a 12-v. bulb is needed to absorb this high voltage; even then the engine should be accelerated up very gently, otherwise the bulb may blow.

An initial test of a two-brush dynamo is to bridge the " D and F " terminals with a short length of wire. Now connect the test-lamp from the bridge-wire. as shown in Fig 1, to the frame, or earth, of the machine. Start the engine and run up slowly. An increasing glow should he apparent in the bulb as engine speeds are increased. If there is no light at all from the bulb, then the dynamo is not functioning. A weak glow indicates either a slipping drive to the dynamo or a partial breaking down of the armature windings. But before condemning the dynamo absolutely in these circumstances, try polarising the field by connecting a lead direct from the live side (positive terminal) of the battery to the “F” terminal of the dynamo for a second or two. This expedient often works in cases where the machine has been standing for some time without being used.

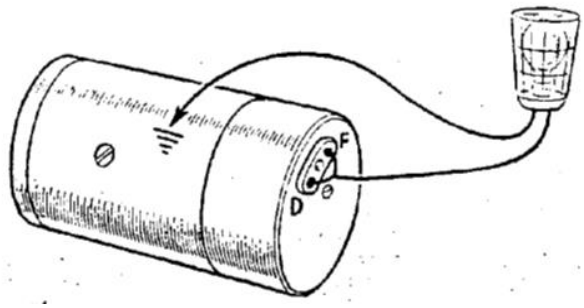
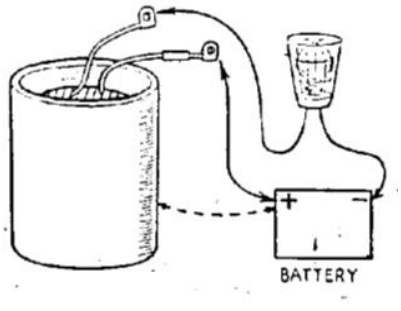


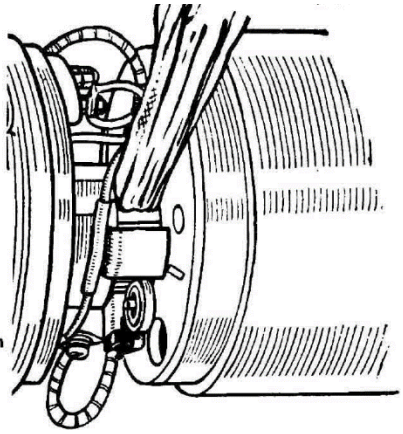
Fig. 1 (Left) Test rig for a modern two-brush Lucas dynamo. Fig. 2 (Right) Checking the field coil for continuity and (dotted) for short circuit to earth.



Remember, first test with a lamp then try polarizing. Fingering the brushes, checking visible connections, also cleaning the commutator bars may also bring success.

These methods failing, the dynamo must be removed for a thorough examination. It usually pays to spend time taking the instrument off the model and working on the bench.

Inspect everything, for one fault may cause another. A typical example is that of the dynamo which is forever burning out armatures. After the second or third armature, looking like a burnt offering, has been removed from the dynamo, the owner, per-chance by accident, checks the bearings. He finds, say, a commutator end-bush is worn and he replaces it. Behold, no more armatures burn out; the problem is solved because the bush is no longer allowing the armature to rub the field pole at high speed.



A dirty commutator can be cleaned by pressing a petrol moistened rag against the work with a piece of wood.

With this point clear in mind. you can start the really interesting part of the work. Lift up the brush springs and slide the brushes partly out of the holders. Allow the springs to rest against the sides of the brushes. This achieves the effect of "cocking " the brushes so that they remain in the holders yet are free of the commutator. It is important not to get the brushes in the wrong holders when reassembling. and "cocking" them ensures that confusion does not arise on this point.

The through bolts are now he removed and the armature withdrawn. Before cleaning the component parts of the dynamo make a careful examination. Initial observation can reveal a lot. Note if burning has occurred around the brush gear due to the carbon dust shorting. Another thing which is sometimes overlooked is a ring of solder finely sprayed around the inside of the dynamo carcase. or yoke at the commutator end. This is a sign of severe overheating, which melts solder at the commutator bars and invariably causes an open-circuit, or ' break,' in the armature-windings. In fact, it may be said that three out of four armature failures are caused by open circuiting of the windings, for it is comparatively rare to find a short-circuited motorcycle dynamo armature. But the field coil should he examined for signs of shorting on the through bolts and pole-piece.

After this preliminary inspection the main task comes. Clean all the components, except the commutator, in petrol: check the bearings and renew if there is any doubt about them. Make sure the main drive-end bearing is clean and packed with a high melting point grease and that the armature windings are wiped clean and dry.

Test the field coil by connecting the test-lamp through the coil to a battery as shown in Fig. 2. Check the coils for an earthed, or short circuit, and also for continuity. When used for the continuity test. the lamp should glow less brightly, due to the resistance of the field-coil winding which is then in circuit. If the glow is of normal brightness, then the field coil may be shorting internally.

Renew the brushes if they are worn and check the field coil leads where they pass through the insulated brush-holder plate. The armature may look sound, but if you want to be quite sure. have it tested at a garage or auto electrician. They will be only too pleased to test it on what is known as a "growler." Or you can make a rough check yourself by connecting battery positive and negative leads and test bulb to adjacent commutator bars; in this position the bulb should light up. Connected from any one bar to " earth" i.e.. the armature spindle, the test-lamp should reveal no electrical flow at all.

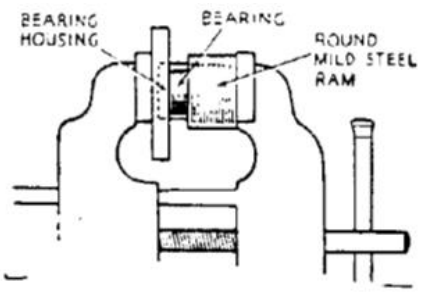


Fig. 3. Using a vice and steel ram to press a new bearing into the dynamo end housing.

If the field and armature are sound then the dynamo can be assembled. Take care that no rubbing of the- field poles is apparent when the through-bolts are tightened. To ensure this, keep the brushes cocked and rotate the armature slowly by hand. Any resistance to motion should be investigated. Perhaps the pole shoe is loose—it must be very tightly fitted in the yoke and the fixing screw caulked—or is the armature slightly out of alignment. The end-brackets of the dynamo should be tapped gently with a wooden mallet until satisfactory armature rotation is obtained. Serious rubbing is caused by a bent armature spindle and will entail replacement of the faulty part.

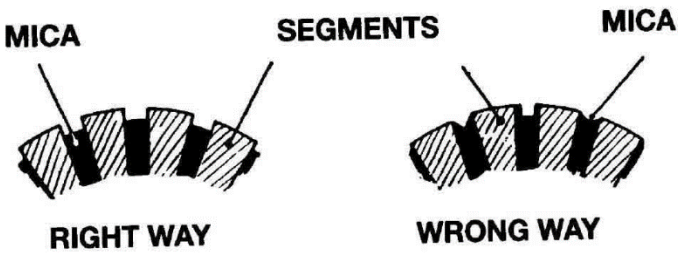
When fitting bearings or bushes it is imperative that they are pressed in evenly; this can be effectively done by using a vice and a small block of metal, as shown in Fig. 3.

The correct connecting-up of the field leads is important. The sleeved lead goes to earth. If these leads are reassembled in the reverse manner the dynamo will charge only when rotated in the opposite direction to that indicated by the arrow on the yoke.

The field connections being tightened, and terminals checked, all that remains is to slip the brushes back on to the commutator and to replace the dynamo on the machine.

When looking for a fault, make sure first that the field coil is sound; test it by disconnecting the field leads from the terminal ends and checking through, as previously described. On Miller dynamos the resistance of the field coil is just over 5 ohms which will reduce the glow of the test-lamp appreciably.

One thing common to all motorcycle dynamos is the importance of having a clean commutator and also clear segments. To undercut the segments, grind off a piece of hacksaw blade to make it thin enough to fit into the mica slots, and cut them down to leave the copper segments standing slightly proud. A few strokes of the blade in each slot should be sufficient. to clear it of foreign matter which may short out the segment bars.



When undercutting the insulation of the commutator, great care should be taken to ensure a flat cut over the full width of each mica segment.

Miller dynamos usually have two ball bearings instead of the one ball and one phosphor-bronze bush of the early Lucas type. Both bearings should be removed and packed with high melting point grease. The drive-end bearing is exposed when the protective plate is removed by releasing the retaining screws. Packing the commutator end-bearing is easier, for this is situated on the armature and comes away with it.

General tests of insulation should be carried out whenever work is done on a dynamo. The positive brush-box and any parallel connections from that brush must, of course, be insulated from the carcase of the unit. And that applies also to the field brush connections. Conversely, the earth brush must be in contact with the carcase. It is surprising, how many people forget this obvious fact.

It is often these glaring defects that are overlooked. Their rectification is simple and inexpensive provided one has a modicum of elementary knowledge.

DYNAMO FAULT-FINDING

	Symptoms	Causes
Battery in low state of charge	Dynamo giving low or intermittent output	Commutator dirty Commutator worn Brushes sticking Brushes worn Brush springs weak Regulator out of adjustment
	Dynamo not charging	Commutator dirty Brushes worn Regulator out of adjustment Cut-out damaged Cut-out contacts dirty or damaged Battery needs attention
	Battery overcharged Burnt out bulbs; Battery frequent 'topping-up'	Regulator out of adjustment Faulty battery