MOTOR CYCLE ALTERNATORS

MODELS RM18, 19, 20 AND 9AF

Supplementary Information to SECTION L-2 Part E

(a) NEW RANGE

Models RM18, 19, 20 and 9AF comprise a new range of alternators superseding models RM13, 13/15, 15 and 5AF. The new alternators differ from each other in thickness (the rotors of RM18, RM19 and 9AF, and RM20 containing approximately 25, 32 and 45 iron laminations, respectively, with the associated stators having approximately 14, 16 and 26), and from the previous range in respect of rotor diameter—the latter now being 0.165" (4.2 mm.) greater in diameter and able to accept driving shafts of up to one inch (25.4 mm.) in diameter.

Model RM18 supersedes RM13 and is normally fitted to small capacity machines having low top gear ratios, whilst RM19, superseding RM13/15 and 15, is for larger machines. Model RM20 is to accommodate additional current consuming equipment, such as two-way radio, fitted to special purpose machines—particularly as used by military forces and road patrols of the Police, Automobile Association and Royal Automobile Club. Scooter alternator model 9AF, like model 5AF that it supersedes, carries a finned flywheel cast integral with its rotor. Other versions of the new range include units wound to provide energy transfer ignition, with or without the direct lighting of head, tail and stop lamps.

(b) IDENTIFICATION

Rotors of the new range are straight-sided like those of former models RM12 and 14 but can be distinguished from them by being 0.414" (10.5 mm.) smaller in diameter. The steel centre of models RM13 and 15, on the other hand, were recessed on the side that carried the Company's name.

The new stators, whilst carrying the usual coil cheek retaining tags, also exhibit a small tongue at the side of each pole core.

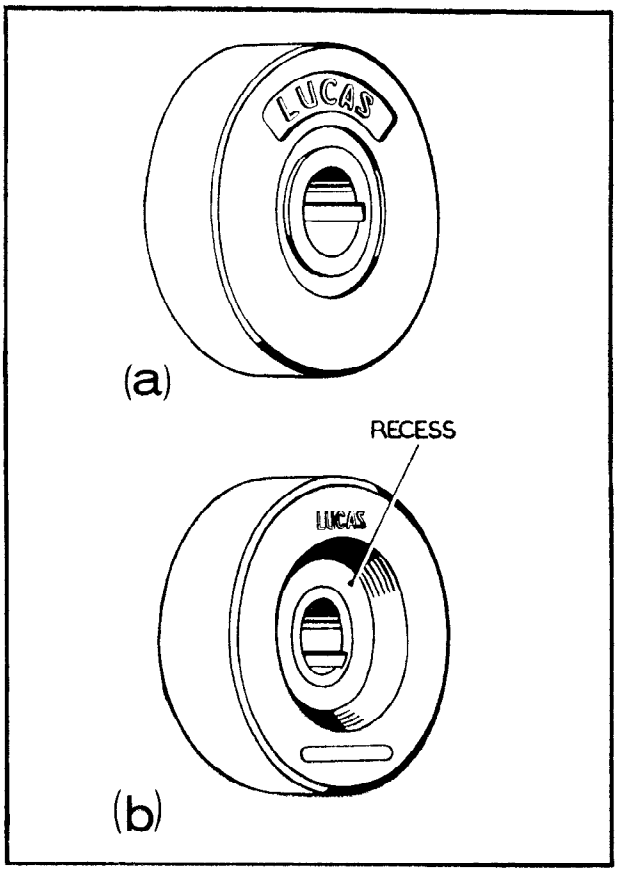

Fig. 1
Alternator rotors, (a) new type, (b) old type

(c) PERFORMANCE DATA

The following table contains all the test data at present available for alternators of the new range. A perusal of this table will show that, even with only four basic coil windings, there is potentially, a large number of coil and voltage combinations from which to meet diverse requirements. It will also be noted that it can be possible for a particular stator (RM19 47162, or RM20 47185 for example) to be found on both 12-volt and 6-volt machines—when charging a 12-volt battery, its output would be suitable for a coil ignition machine but its reduced output into a 6-volt battery would make it equally suitable for a magneto equipped machine with the lower voltage system.

Model	*No. of turns per coil and gauge of wire (S.W.G.)*[1]	*Voltage of associated battery*	*Maximum rectified output in amperes into battery (6 coils in parallel) at* 5,000 *r.p.m.*	2,000 *r.p.m.*	*Minimum rectified output in amperes into battery (2 coils in circuit, 4 short-circuited) at* 2,000 *r.p.m.*
RM18 (Approx. weight: 2 lb. 5 oz., 1.05 kg.)	140 of 22	6	8.25— 8.75	6.5 — 7.0	1.5 —2.0
		12	7.75— 8.25	4.5 — 5.0	0.75—1.25
	122 of 21*	6	9.75—10.25	6.5 — 7.0	2.0 —2.5
RM19 and 9AF (Approx. weights: RM19, 4 lb. 1 oz., 1.84 kg. 9AF, 9 lb., 4.08 kg.)	250 of 25 (two coils) plus 122 of 21 (four coils)	6	7.0 — 7.5	5.75— 6.25	1.0 —1.5[2]
	140 of 22	6	8.75— 9.25	7.5 — 8.0	2.0 —2.5
		12	8.25— 8.75	6.25— 6.75	1.5 —2.0
	122 of 21*	6	9.75—10.25	8.25— 8.75	2.0 —2.5
	74 of 19	6	14.25—14.75	9.75—10.25	2.25—2.75
RM20 (Approx. weight: 5 lb. 4 oz., 2.38 kg.)	122 of 21	6	10.75—11.25	9.5 —10.0	2.75—3.25
		12	10.5 —11.0	8.5 — 9.0	2.0 —2.5
	74 of 19*	6	16.25—16.75	12.75—13.25	3.0 —3.5

[1]Diameters of Standard Wire Gauge sizes : 19 is 0.040" (1.016 mm.) ; 21 is 0.032" (0.813 mm.) ; 22 is 0.028" (0.711 mm.) ; 25 is 0.020" (0.508 mm.).

The foregoing measurements refer to bare wires ; about 0.002" (0.051 mm.) should be added to allow for the covering of insulation.

[2]Coils of 25 S.W.G. wire in circuit ; 21 S.W.G. coils short-circuited.

*Standard windings.

(d) CHANGE OF CABLE COLOUR

Since SECTION L-2 Part E was published, the cable colour code Green-with-White has since been changed to White-with-Green—white now being the main colour and green the tracer.

(e) TESTING ALTERNATORS ON MOTOR CYCLE

The performance data given in the above Table refers to bench testing of units when, by inspection of the windings, the appropriate figures can be sought. When checking alternators in situ, test figures as supplied by the Sales and Service Company for particular motor cycle models, or against alternator Part Numbers, should be followed.

(i) Test Equipment Required

First-grade moving coil 0–20 A.C. voltmeter.
First-grade moving coil 0–20 D.C. ammeter.

One-ohm load resistor capable of carrying up to 20 amperes without overheating.

(ii) Test No. 1

Check that the battery is in good condition and more than half charged—or fit a 'known-to-be-good' slave battery.

Connect the D.C. ammeter between the battery negative terminal and the battery main cable.

Start the engine and set it to run at approximately 3,000 r.p.m.

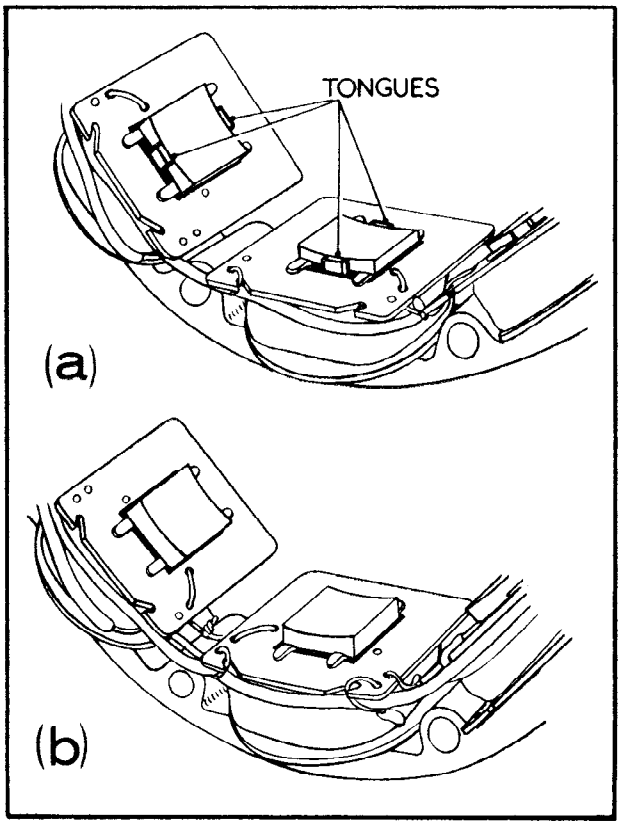

Fig. 2
Alternator stators, (a) new type, (b) old type

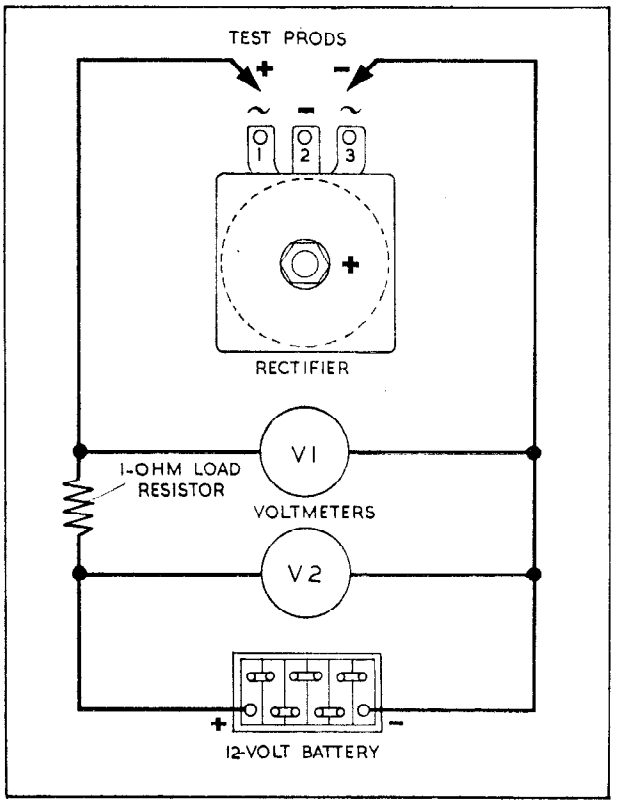

Fig. 3
Test circuit for rectifiers

Observe the ammeter readings in each position of the lighting switch and compare with the values published for the machine—these values being the minimum acceptable battery charging currents. If the readings obtained are lower than the published values, stop engine and proceed to Test No. 2.

Note: Unsatisfactory readings can be due to defective wiring or connections. Therefore ensure that all snap-connector joints and earth connections are in good condition before proceeding to Test No. 2. If considered necessary, check the rectifier by substitution or by testing, see para. (g) below.

(iii) **Test No. 2**

Disconnect the three alternator output cables. Start the engine and set it to run at approximately 3,000 r.p.m.

Connect the one-ohm load resistor in parallel with the A.C. voltmeter and check the voltage readings between the alternator output cables against the published (minimum acceptable) values, as follows :—

Voltmeter and resistor connected between :

First, White-with-green and Green-with-black cables.

Secondly, White-with-green and Green-with-yellow cables.

Thirdly, White-with-green and Green-with-black again, but with Green-with-yellow connected to Green-with-black cable.

Fourthly, each cable in turn and earth—when every reading should be zero.

(iv) **Conclusions to be Drawn from Results of Above Tests**

All readings low—demagnetised rotor magnets.

One reading low—short-circuited coil.

Zero reading(s)—open-circuited coil or coils.

Positive voltage reading between any output cable and earth—earthed coil or coils.

(f) MAGNET KEEPERS

Magnet keepers are fitted (two per rotor) only during bulk transportation and storage of rotors, to prevent mutual demagnetisation of closely adjacent rotors. The use of magnet keepers is not necessary when removing a rotor in service, providing care is taken to keep it away from other magnetic sources.

(g) CHECKING THE RECTIFIER

If a spare rectifier known to be in good condition is available, the simplest check is that of substitution. However, when no satisfactory substitute is available, a rectifier can be checked by removing it from the machine and bench testing it as described below.

(i) **Test Equipment Required**

Two first-grade moving coil 0–20 D.C. voltmeters. A one-ohm load resistor capable of carrying up to 20 amperes without overheating.

A fully charged 12-volt battery of approximately 50 ampere-hours' capacity at the 10-hour rate.

Note: When testing, it is essential to see that the battery voltage, as indicated by voltmeter V_2 in Fig. 3, is at least 12.

It is also important to carry out the individual tests as quickly as possible to avoid overheating of the rectifier plates.

(ii) **Forward Resistance Test**

With the test equipment connected as shown in Fig. 3, proceed as follows to check in turn each of the four cells which form the rectifier :—

In sequence, connect the

Positive test prod to terminal '2' and the negative prod to '1'.

Positive test prod to terminal '2' and the negative prod to '3'.

Negative test prod to the centre bolt and the positive prod to '1'.

Negative test prod to the centre bolt and the positive prod to '3'.

In each test, not more than 2.5 volts should be shown by voltmeter V_1.

(iii) **Back Leakage Test**

With the test equipment connected as for (ii) above, proceed as follows :—

In sequence, connect the

Negative test prod to terminal '2' and the positive prod to '1'.

Negative test prod to terminal '2' and the positive prod to '3'.

Positive test prod to the centre bolt and the negative prod to '1'.

Positive test prod to the centre bolt and the negative prod to '3'.

In each test, the voltage shown by voltmeter V_1 should be within 2 volts of that shown by voltmeter V_2.