LUCAS

Alternating - Current

GENERATORS

for

MOTOR-CYCLES

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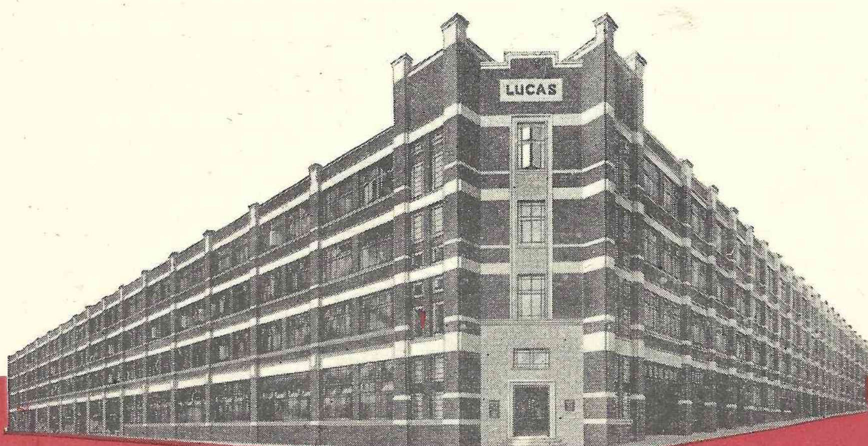

JOSEPH LUCAS (SALES & SERVICE) LTD · BIRMINGHAM 18

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INTRODUCTION

Lucas alternating current motor cycle equipment is now used on a wide range of present day machines. Since it was first introduced, the experience of its use in the motor cycle " field " coupled with further research by our engineers has resulted in several improvements in design, so that present day machines now incorporate what will become more or less a standard layout. With its introduction, the reaction throughout the motor cycle trade has been one of complexity, probably associated with the term A.C., which gives the impression that only a specialist would be able to understand and service the equipment.

This is not so, as there is no mystery whatsoever in Alternating Current equipment as applied to motor cycles. It is simply an adaption of a system used extensively in other spheres of industry. Many advantages are obtained with the use of this equipment over the existing D.C. system, such as reduction in weight and the number of moving parts, and its ability to give a starting performance with a flat battery equal to that of magneto ignition.

The A.C. equipment can be serviced to a great extent by even the fitter or mechanic who is not normally concerned with the "electrics," providing he has some basic understanding of the operation and make-up of the A.C. generator and its associated equipment. For instance, in this publication, which has been compiled equally for the non-specialist as well as the specialist, the rectifier tests which we have recommended can be carried out by any " operator " by merely following the instructions given, providing, of course, suitable test equipment is available.

A section briefly outlining the theoretical aspects is also included. It will impart sufficient working knowledge of the equipment to ensure quick location and interpretation of obstruse faults, should they arise.

Until fully conversant with A.C. equipment we recommend you to follow strictly the test procedure sequence we have given. We are confident that by studying the following pages, you can become quite proficient in the servicing of LUCAS A.C. equipment.

The data contained in this publication supersedes all technical information, on A.C. test procedure, which has been issued prior to the introduction of this new addition.

JOSEPH LUCAS (SALES AND SERVICE) LTD., BIRMINGHAM, 18, ENGLAND.

CONTENTS

HOW AN E.M.F. IS PRODUCED

When a conductor is moved through a magnetic field an electro-motive-force or E.M.F. is induced into it. If the conductor forms a loop or closed circuit, an electric current will register on a sensitive meter connected across the conductor. When the conductor is moved downwards, as shown in the illustration (Fig. 1*a*), the needle swings in a direction corresponding to the direction of current flow.

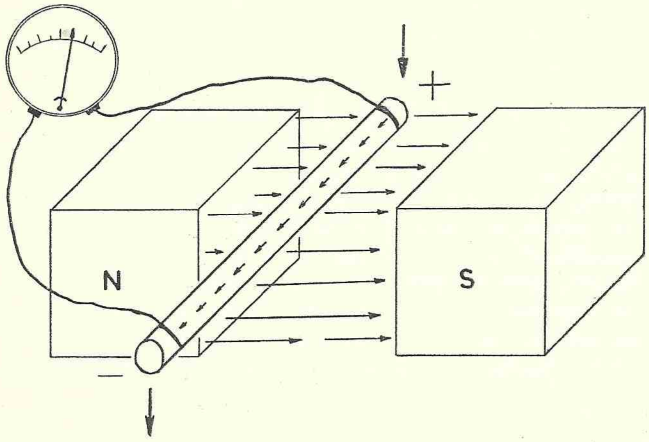


Fig. 1a

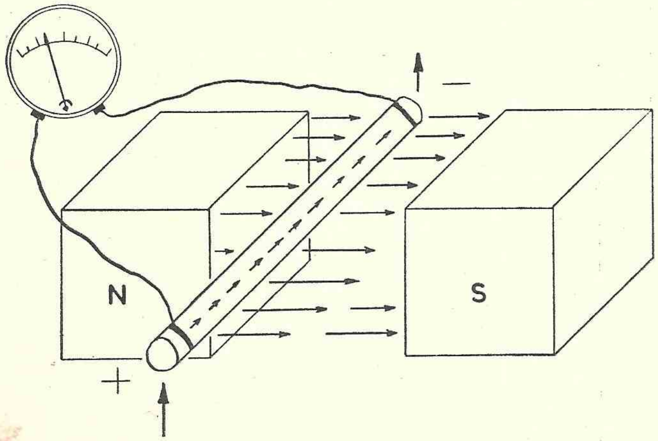


Fig. 1b

If the conductor is moved upwards (Fig. 1*b*), the needle will swing in the opposite direction, indicating that the current flow is also in the opposite direction.

The amount of movement of the needle will depend upon the speed at which the conductor is moved up and down, the density of the magnetic field and the size or cross sectional area of the conductor. We can obtain the same effect by moving a magnet in and out of a coil of wire (Fig. 2).

Induction will again take place and current flows in the wire coil. This time, because we have a coil consisting of several turns of wire, instead of one single conductor, the induction will be increased, thereby giving a greater output. The sensitive meter, if connected across the ends of the coil, will register in exactly the same manner as it did with the single conductor.

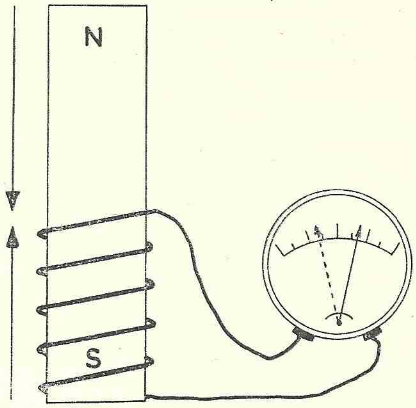


Fig. 2

A SIMPLE A.C. GENERATOR

In Fig. 3 we show an A.C. generator in its simplest form. The coil has now been wound round a piece of iron which forms a yoke. The yoke helps to concentrate the magnetic field around the coil. In the centre of the yoke a bar magnet is made to rotate.

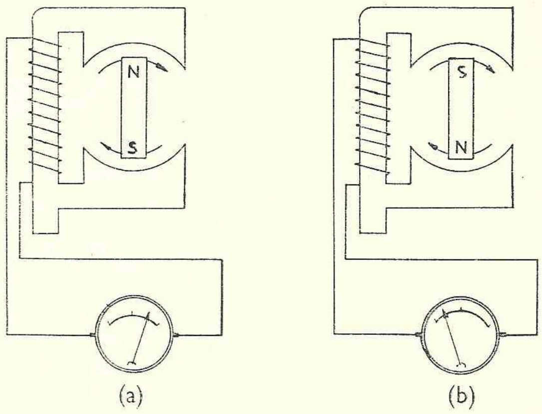


Fig. 3

The polarity of the magnetic field will change every 180° of rotation of the magnet. In the left hand illustration the north pole is at the top, but after the magnet has rotated 180°, the south pole is at the top. The magnetic field has been reversed. The direction of current flow in the coil has also been reversed. Induction has taken place due to movement of the magnet in close proximity to the coil, and alternating current has been produced.

Exactly the same thing happens, on a larger scale, with the LUCAS range of A.C. generators, current being taken from the coils and used in the circuit for lighting, ignition, etc.

The principle of operation of the inductor generator is the same as that of the rotating magnet type, the difference being in the method used to achieve this.

In the inductor generator (IA45) the coils and magnets are stationary and a six-pole, laminated steel rotor, fixed to the engine crankshaft, is used to cause the flux reversals (Fig. 4*a*).

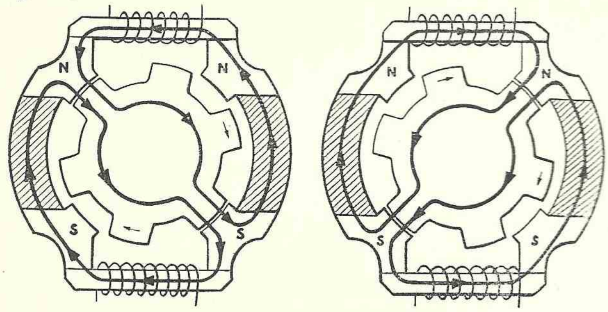


Fig. 4a

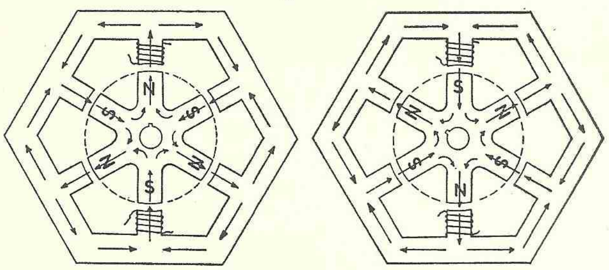


Fig. 4b

The (RM12, 13 and 14) generators use a magnetic six-pole rotor to cause the flux reversals (Fig. 4*b*), the coils are stationary, being fixed to the stator assembly.

THE SINE WAVE

The sine wave shown in Fig. 5 is simply a representation of the sort of current output from our elementary alternator. It shows the current output during one complete revolution of the bar magnet.

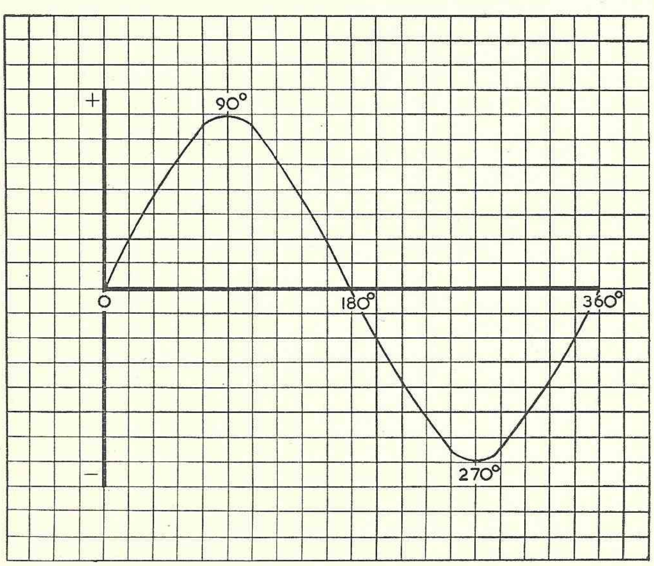


Fig. 5

In the vertical direction is represented the current. When positive, above the neutral point or horizontal line ; when negative below the neutral line. Starting from the left side, we divide this line into 360°, that is, one complete revolution of the bar magnet. From 0° the current gradually builds up to its maximum value at 90° ; then gradually reduces, being zero again at 180°. It now carries on in the negative direction, reaching a maximum at 270°, then gradually reduces again, becoming zero at 360°. This cycle is repeated as long as the magnet is rotated.

RECTIFIER FOR BATTERY CHARGING

Because of the alternating characteristic of the current produced by the alternator it cannot be connected directly to a battery for charging purposes. A battery can only be charged by a D.C. or unidirectional current. If a battery is to be charged by the alternator, then a rectifier must be incorporated in the circuit.

A rectifier is a device for converting an alternating current (Fig. 6*a*) into a unidirectional current either by the suppression or inversion of alternate half-waves (Fig. 6*b*).

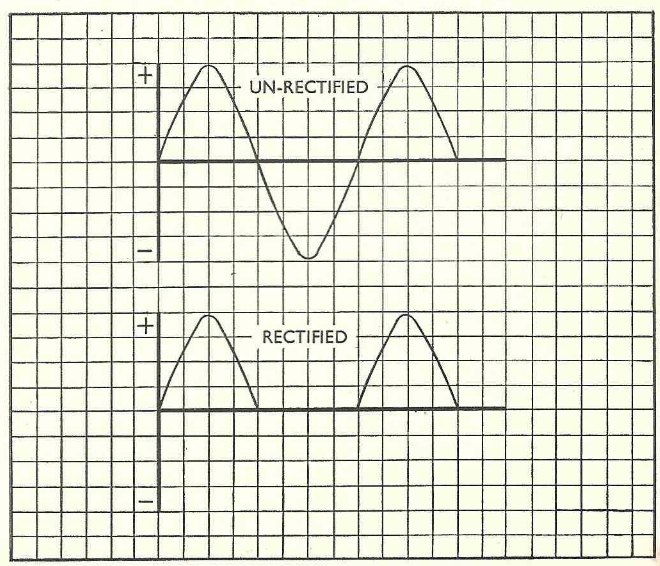


Fig. 6a & 6b

A selenium type rectifier is used with LUCAS A.C. sets. The formation of the element is shown in Fig. 7. It consists of a steel base plate with selenium. A metal alloy is then sprayed on to the selenium, forming what is called a counter electrode. This combination of base plate, selenium and counter electrode has the property of allowing current to pass in one direction only, that is, from the base plate to the counter electrode. In practice, there is a small reverse current leakage, but from our point of view it can be disregarded.

With a rectifier of this type in the circuit, the generator can be connected up to charge a battery. The alternating output, which in effect would try to flow round the

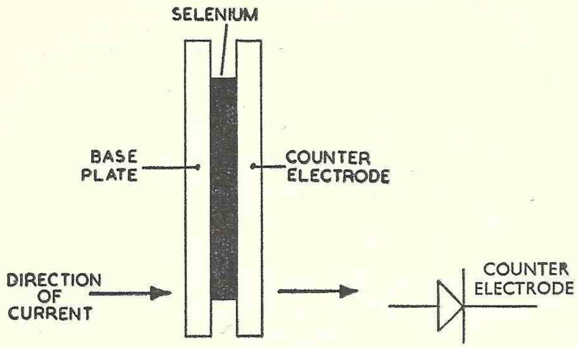


Fig. 7

circuit, first in a clockwise direction and then in an anti-clockwise direction, becomes D.C. or unidirectional, and current therefore will always flow through the battery in one and the same direction (Fig. 8). The negative half waves, which are shown below the horizontal line (Fig. 6*a*) have been suppressed, and only the positive half waves above the line are allowed to pass through the rectifier and round the circuit. This arrangement is known as half-wave rectification.

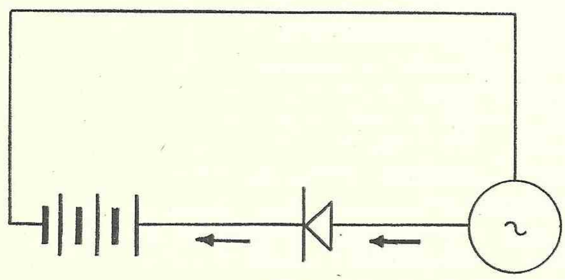


Fig. 8

FULL WAVE RECTIFICATION

But by using this method of battery charging, one half-cycle of our generator output is lost. In fact, it is dissipated in heat in the rectifier, the full output from the generator is not being utilised. In practice we overcome this problem by the use of a full wave rectifier. It consists of four elements, of the type shown in Fig. 7, connected so as to allow the full output from the alternator to pass through to the battery.

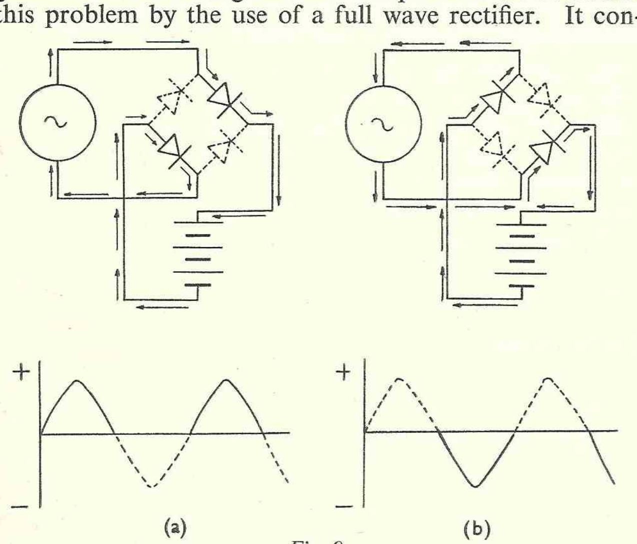


Fig. 9

The illustrations in Fig. 9 show the bridge rectifier as it is called, connected in circuit with an alternator and battery. The left hand illustration (*a*) shows the circuit when current is flowing in a clockwise direction ; the right hand illustration (*b*) an anti-clockwise direction. With this arrangement we utilise the full output from the generator. That is, both the positive half waves and the negative half waves are used to charge the battery. The efficiency of the bridge rectifier is affected by the amount of tension on the plates, which are held together by a bolt and self-locking nut. The tension on this bolt must not be altered as it is set correctly before leaving the works, and cannot be adjusted correctly in service.

Another type of rectifier, used with the IA45 and RM12 alternators which have a centre tapped winding, is the two element type illustrated in Fig. 10.

Although structurally different from the bridge connected type, it performs a similar function, rectifying the alternator output for battery-charging purposes.

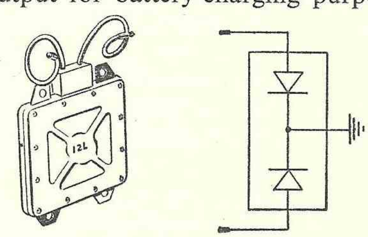


Fig. 10

CONTROLLING THE ALTERNATOR OUTPUT

The simple generator which has been described on page 5 is of course not satisfactory for our requirements, and in practice contains not one, but several coils, each consisting of many turns of wire assembled to the stator, and the bar magnet becomes a multi-pole unit. The ampere output from such a machine is considerably more than would be obtained from the machine with the single coil and bar magnet. Some form of output control is necessary, otherwise the generator output would remain at a maximum irrespective of load requirements and the battery would eventually become overcharged.

Inductor Generator IA45

With the inductor generator, the method of output control is quite simple. A wire resistor, wound on a porcelain former is connected across the generator coil, as shown in Fig. 11.

The resistor is switched in or out of circuit automatically by operation of the lighting switch. When the resistor is in circuit part of the generator output is dissipated in heat, reducing the amount of current which flows into the battery and thereby avoiding overcharging.

Because the resistor is controlled by the action of the lighting switch it will only be in circuit when it is required. With the lighting switch in the OFF position the resistor is in circuit and so reduces the generator output. When it is in the PILOT or HEAD position, an increase in load, the resistor is out of circuit allowing an increase in output to compensate for the increase in load.

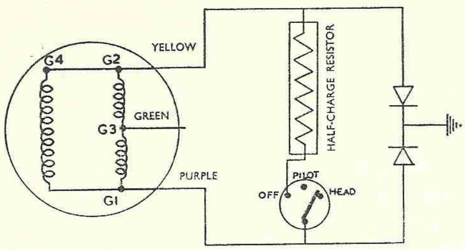


Fig. 11

ROTATING MAGNET GENERATORS

The rotating magnet generators, RM13 and RM14, are also controlled by the action of the lighting switch, but instead of a resistor being used to reduce or control the output, the generator windings themselves are used.

The alternator stator, on the rotating magnet type, carries three pairs of series connected coils, one pair being permanently connected across the rectifier bridge network. The purpose of this latter pair is to provide some degree of charging current for the battery whenever the engine is running. Connections to the remaining coils vary according to the positions of the lighting and ignition switch.

Provided the ignition key is in the IGN position, the basic charging circuits for the RM13 and RM14 alternators are as shown in Fig. 12*a*, *b*, and *c*.

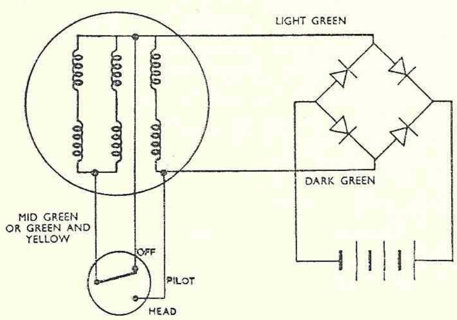


Fig. 12a

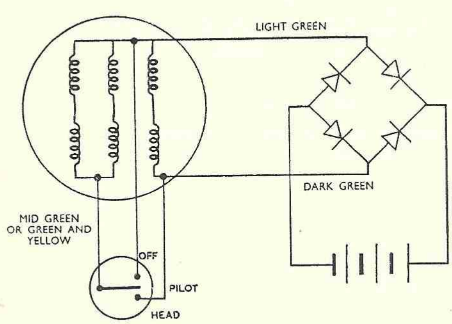


Fig. 12b

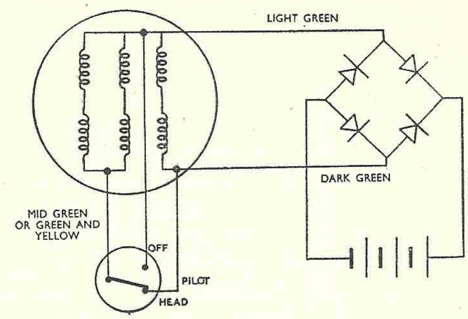


Fig. 12c

When the lights are not being used, lighting switch in OFF position, the control coils are short circuited, as shown in Fig. 12*a*, and the alternator output is regulated to its minimum value by interaction of the coil flux, set up by current flowing in the short-circuited coils, with the flux of the rotor.

NOTE.—*On later machines taking the RM13 this arrangement has been modified, so that in the OFF position the control coils are not short-circuited but open-circuited, as in the PILOT position, giving an increased charge rate for normal running conditions.*

In practice, this is achieved by taking out the link between terminals 5 and 6 on the lighting switch. This should be done in every case when servicing the earlier machines. The link is, of course, now omitted on production machines taking the RM13 A.C. set.

In the PILOT position (Fig. 12*b*) these coils are disconnected and the regulating fluxes are consequently reduced. The generator output therefore increases and compensates for the additional parking light load.

In the HEAD position (Fig. 12*c*), the generator output is further increased by connecting the control coils in parallel with the charging coils.

The output of the RM12 series "C" is also controlled by varying the connections of the windings, through the action of the lighting switch, but the connections differ from those of the RM13 and RM14.

Six leads are brought out from the RM12 series "C" alternator, making the arrangement of the connections a little more complicated. However, the same principles apply, the coils being short-circuited or open-circuited as required, and the resultant interaction of the coil and rotor fluxes regulating the output accordingly.

The connections, with the lighting switch in the OFF, PILOT and HEAD positions are shown in illustrations Fig. 13*a* and *b*.

EMERGENCY STARTING

A major feature of the LUCAS A.C. Lighting-Ignition Sets is that whilst utilizing the advantages of coil ignition, they overcome the disadvantage of a " flat " or defective battery. This is because the primary winding of the ignition coil is energised by timed electric impulses, direct from the alternator, which gives a starting performance equivalent to that obtained from a magneto.

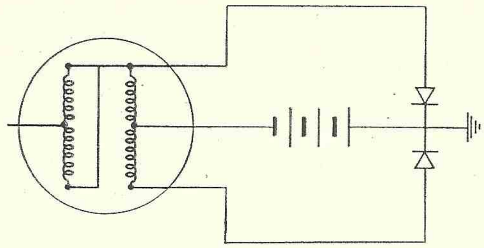


Fig. 13a. RM12—Series "C". Arrangement of Coils with Lighting Switch in "Off" or "Pilot" position.

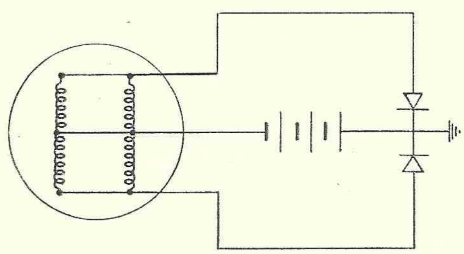


Fig. 13b. RM12—Series "C". Arrangement of Coils with Lighting Switch in "Head" position.

The circuits used with the RM13 and RM14 are shown in Fig. 14*a* and *b*. With these circuits the contact breaker is arranged to open when the alternating current in the windings reaches a maximum in the direction shown by the arrow.

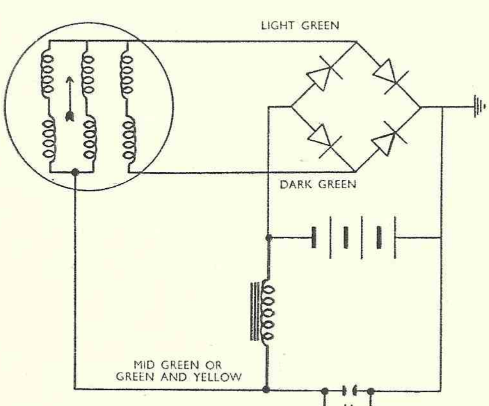


Fig. 14a. Emergency Start Circuit Single Cylinder Machines.

Single-Cylinder Machines

When current flows through the windings in the direction indicated by the arrow in Fig. 14*a* and the contacts are closed, the main return circuit to the alternator is through one arm of the rectifier bridge. At the instant of contact separation, the built up energy of the alternator windings quickly discharges through an alternative circuit provided by the battery and the ignition coil primary winding. This rapid transfer of energy from the alternator to coil causes H.T. to be induced in the ignition coil secondary windings and a spark to occur at the plug.

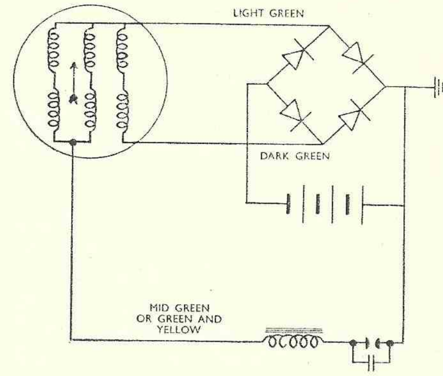


Fig. 14b. RM14—Emergency Start Circuit Twin-Cylinder Machines.

Twin-Cylinder Machines

From Fig. 14*b* it will be seen that for twin cylinder machines the ignition coil primary winding and the contact breaker are connected in series, and not in parallel as for single cylinder machines. The adoption of this conventional practice permits a slightly more simple harness and switching system to be utilised. It is, however, unsuitable for use with single cylinder machines due to "idle" sparking occurring *before* the contacts separate. Twin engines being fitted with distributor electrodes, are unaffected by this premature sparking.

With single cylinder machines connected as shown in Fig. 14*a* "idle" sparking occurs *after* the contacts have separated and so does not affect these engines.

Since with the emergency start circuit the battery receives a small charging current, causing the battery voltage to rise quickly, the machine should not be run, under normal conditions, continuously in the emergency start position, because the rising voltage of the battery opposes that of the alternator and gradually effects a reduction in the energy available for transfer to the ignition coil.

This reduction in spark energy will cause mis-firing to occur, which will, in fact, remind the rider that he has omitted to return the ignition key to the IGN position.

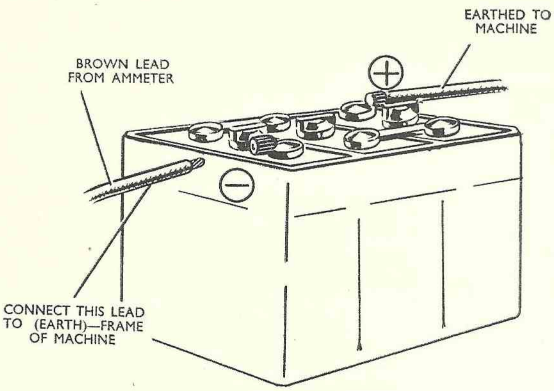


Fig. 15. Connections for running in "EMG" position without Battery.

When using a machine for trials or competition purposes, fitted with either the RM13 or RM14 alternator, and no lighting is required, the battery can be removed and the machine run continuously in the EMG position, providing the cable normally connected to the battery negative terminal is re-connected to an earthed point on the machine, see illustration in Fig. 15.

RM12 Series "C" (Six Lead).—The circuit for emergency starting on this generator differs from that used with the RM13 and RM14 generators. The arrangement of the stator coil winding differs ; six leads are brought out instead of three. It is used in conjunction with a centre tapped rectifier (Fig. 10) and a resistor is connected across the alternator to allow for continuous running in the EMG position.

A disadvantage with the RM12 layout is that the battery does not receive a charge whilst the machine is being run in the emergency start position and, without a battery, it is not possible to use the lighting or horn. The illustration in Fig. 16 shows the emergency start circuit layout for the RM12 Series "C" alternator.

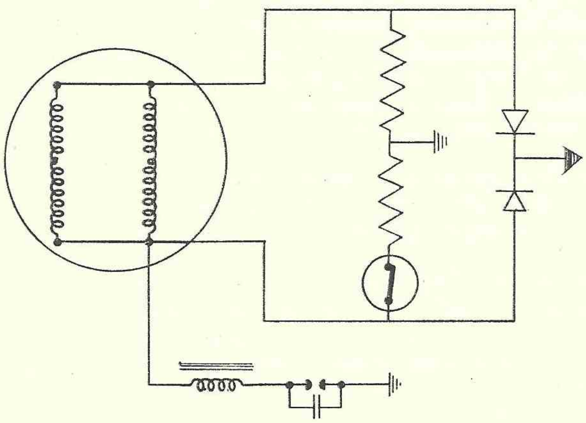


Fig. 16. RM12—Series "C". Connected for Emergency Starting.

As with the RM13 and RM14 sets, the brown lead connected to the battery negative terminal should be reconnected to an earthed point on the machine, for trials or competition purposes, as shown in Fig. 15.

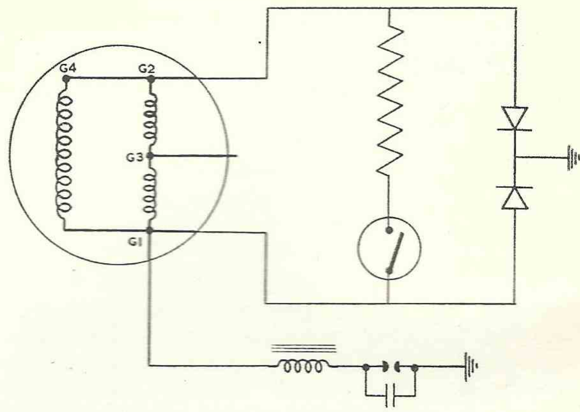


Fig. 17. IA45—Connected for Emergency Starting.

The inductor generator IA45, when connected for emergency start, has a conventional circuit, illustrated in Fig. 17. It will be seen from the illustration that the ignition coil primary winding, and the contact breaker are connected in series.

Also, the resistor is not connected in circuit allowing the full output to be utilised for ignition purposes.

As with the RM12 circuit, the battery does not receive a charge whilst running in the emergency position, so it is necessary to switch back to the IGN position if lighting or horn are to be used.

If it is required to use the machine for trials or competition purposes and no battery or lighting is required, then the circuit should be re-connected as shown in the illustration, Fig. 18.

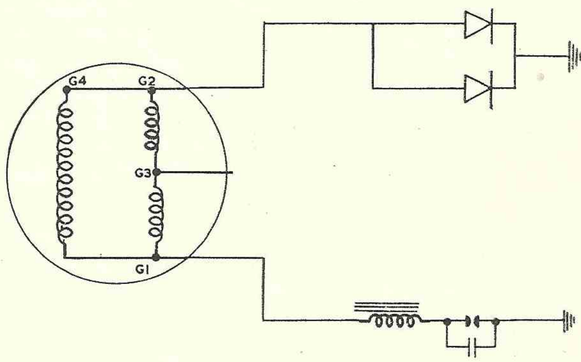


Fig. 18. IA45—Connected for use without Battery.

IGNITION TIMING IN RELATION TO SPARK ENERGY AND EMERGENCY STARTING

Correct ignition timing, both electrically and mechanically, is a very critical factor with the A.C. sets, particularly in relation to emergency starting. As already stated, in the emergency start position the alternator supplies current direct to the ignition circuit, timing being so arranged that the contacts are opened when the peak of the voltage wave coincides with each ignition point of the engine, illustrated graphically in Fig. 19.

It will be realised that if for any reason the contacts do not open at the precise instant required, emergency starting performance will be affected. Electrically, the timing position is fixed by the manufacturer, i.e., the alternator rotor is keyed on to the crankshaft in a position consistent with peak voltage, and cannot be altered. It is on the mechanical side that variations in timing can arise. The engine ignition timing must be accurately set to the figures specified for the particular machine. The contact breaker gap must also be set to the specified figure and maintained at this as variation in the gap setting will affect the timing position in relation to spark energy. If the timing at the distributor or contact breaker is too much advanced or retarded, either through a timing error, incorrect contact gaps, or weak automatic advance springs, the contacts will not open at the peak of the voltage curve, see Fig. 20 ; consequently the spark will be weak.

REMEMBER IGNITION TIMING IS CRITICAL.

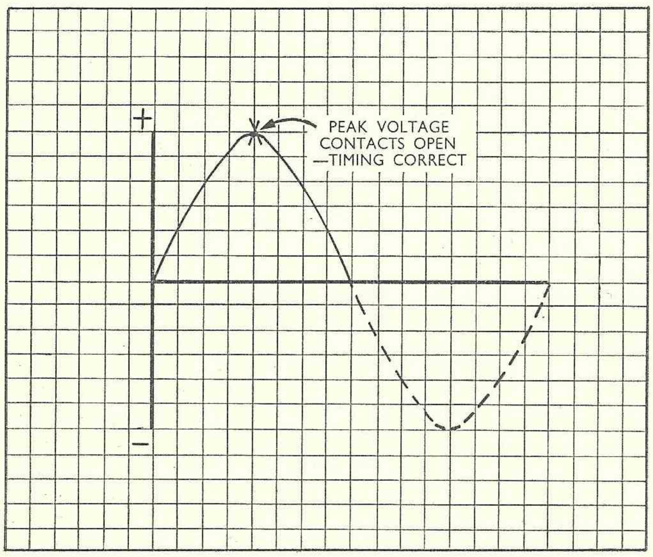


Fig. 19

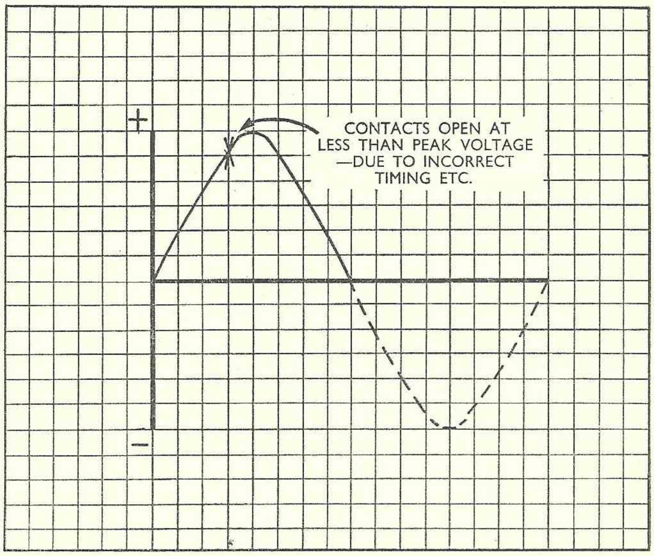


Fig. 20

TESTING PROCEDURE

Until completely conversant with alternator sets it is advisable to carry out all testing progressively in the following sequence :—

Test (1)
Test the set overall by checking the current input to the battery. Check that battery is in a good state of charge.

Test (2)
If battery is in a poor condition, carry out test using 1 ohm load resistor in place of battery.

Test (3)
Check the output from the individual sets of the generator coils.

Test (4)
Test the rectifier.

Test (5)
Test wiring and continuity through switch positions.

IMPORTANT.—All Lucas A.C. sets use a POSITIVE EARTH battery system, i.e., the battery POSITIVE lead is connected to the frame of the machine. Damage will be caused if the battery is incorrectly fitted.

RM13—MODIFICATION TO SWITCH CONNECTIONS, GIVING INCREASED OUTPUT

On earlier machines fitted with the RM13 alternator, the lighting switch incorporated a link between terminals 5 and 6.

On later machines this link is omitted in order to give an increased output in the OFF position. The opportunity should be taken, when servicing an earlier machine, to remove this link if this has not already been done, and thus bring the machine up-to-date.

The increased charge rate is obtained because the arrangement of the generator coils in the OFF position is the same as for the PILOT position, the control coils being open-circuited instead of short-circuited.

ALTERNATIVE BATTERY-CHARGING RATES FOR RM13 SETS

The Lucas RM13 A.C. system enables a choice of charging rates to be made to suit particular conditions of running.

On some machines, particularly export machines, having higher gear ratios, the equipment is connected to ensure adequate charging of the battery under conditions of low-speed town work, " running-in " period, short winter journeys involving long periods of parking with lights on, etc.

The connections used for these conditions are as follows :—

ALTERNATOR CABLES		HARNESS CABLES
Medium Green	by snap connector to	Dark Green.
Dark Green	„ „ „ „	Medium Green.
Light Green	„ „ „ „	Light Green.

If the machine is to be used mainly for long-distance daylight running, it is possible to reduce the charging rate to a trickle-charge in the OFF position of the lighting switch by re-connecting the Medium and Dark Green cables colour to colour.

The latter method of connection prevents overcharging of the battery, indicated by excessive gassing of the electrolyte and a frequent need for topping up.

RECTIFIERS—BRIDGE CONNECTED TYPES

The earlier type rectifier No. 47103 has now been superseded in service by a new smaller type No. 47111, the new rectifier being more efficient and less prone to the effect of climatic conditions.

The advantages accruing from this latest technical development should be extended wherever possible to users of LUCAS RM13 A.C. sets, and accordingly the new type rectifier should be fitted in all cases where a replacement is required.

USING THE MACHINE FOR TRIALS OR COMPETITION PURPOSES

When using the machine without a battery, and in the EMG position, earth the lead normally connected to the battery negative terminal. If an IA45 is fitted, re-connect leads as shown in Fig. 18.

RM14—UNIVERSAL STATOR REPLACEMENT PROCEDURE

The replacement stator has a thin lamination stack. Distance tubes are supplied to enable the stator to be fitted in place of an earlier one having a thick lamination stack.

Supplied with the stator are :

One cable clip.
Four short distance tubes.
Four long distance tubes.

Before attempting to replace a stator, check the part number which is stamped on a fibre washer clamped under one of the stator coils. Once the stator is identified proceed to fit the replacement as follows :—

Stator Part Nos. 465948 and 465951

Remove the clip securing the output cable and pass the cable through to the other side of the stator. Secure the cable to the stator using the cable clip as shown in Fig. 21.

Fit the stator in the crankcase cover with the short distance tubes behind the laminations and the long distance tubes in front.

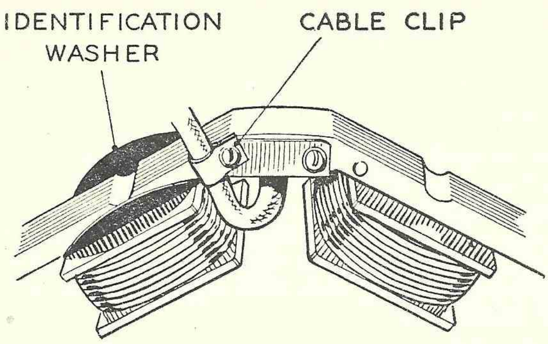


Fig. 21

Stator Part No. 465989

No re-positioning of the output cable is necessary.

Fit the stator to the crankcase with the long distance tubes behind the laminations and the short distance tubes in front.

Stator Part Nos. 465974 and 465998

None of the additional parts are required. Fit the stator as a direct replacement.

TIMING—ROTOR KEYWAY POSITIONS

Do not fit the rotor without the key and expect it to work properly.

Remember correct ignition timing is essential to ensure operation in the EMG position ; ignition timing can be carried out in the normal manner.

PRS8—SWITCH CONNECTIONS

The PRS8 lighting-ignition switch can be used with both single and twin cylinder machines, providing the following adjustment is made :—

Single-Cylinder Machines

A wire link is connected between terminals 14 and 19.

Twin-Cylinder Machines

The wire link should be re-connected between terminals 14 and 15.

STATOR MOUNTING POSITIONS

To maintain efficient operation of emergency start it is important that the stator is correctly refitted to the motor cycle. Listed below are the necessary details for all machines using alternators up to the present time.

Triumph 5T and 6T—RM14

The Wide Stack Stator in both applications (chaincase and crankcase mounting) is mounted with the side on which the coils stand proud of the laminations, facing away from the engine.

The Narrow Stack Stator whether fitted as a replacement for the wide stack or on later engines as original equipment, must be fitted with the inter-coil connections facing away from the engine.

NOTE.—*The rotor keyway is in a different position according to whether the alternator is mounted on the chaincase cover or crankcase, and the appropriate rotor must be used with each application.*

B.S.A. C11G—RM13

The stator must be fitted with the intercoil connections facing *towards* the engine.

Triumph Terrier and Cub—RM13

The stator must be fitted with the intercoil connections facing *towards* the engine.

Royal Enfield Clipper—RM13

The stator must be fitted with the intercoil connections facing *towards* the engine.

Brockhouse Indian Brave—RM13

The stator must be fitted with the intercoil connections facing *away* from the engine.

ROTORS—KEYWAY POSITIONS AND APPLICATION

It is essential that the correct rotor is fitted with each stator assembly, as the keyway positions vary for each application. If in doubt as to the correct rotor, refer to Fig. 22, which shows the different keyway positions for the complete range of alternators.

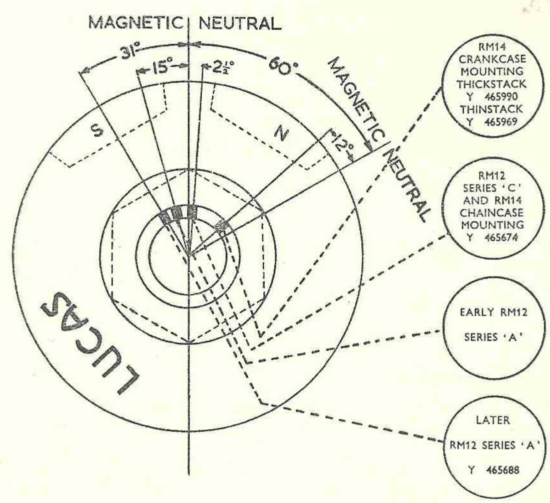


Fig. 22. Rotor Keyway Positions.

WARNING—USE OF D.C. SUPPLY FOR CONTINUITY TESTS

Under no circumstances should a D.C. supply be used for checking the continuity of the stator windings, unless a bulb of low wattage or resistor, is used in series with the test leads.

TEST EQUIPMENT REQUIRED

In order to carry out the tests we have given, the following instruments are required :—

1. A.C. voltmeter, scaled 0—15 volts.
2. D.C. voltmeter, scaled 0—15 volts.
3. D.C. ammeter, scaled 0—15 amps.
4. A 1 ohm resistor.
5. A 12 volt battery, 50 ampere-hour (approx.).

High grade moving coil meters should be used with a clear scale, so that the meter can be read accurately to a quarter of a volt.

The 1 ohm resistor should be capable of carrying approximately 10 amps without overheating.

HOW TO MAKE UP A ONE OHM RESISTOR

The 1 ohm resistor must be accurate otherwise correct voltage (or current) values will not be obtained.

A suitable resistor can be made from 4 yards 18 S.W.G. (.048″ dia.) NICHROME wire together with two flexible leads and suitable crocodile clips.

To Calibrate

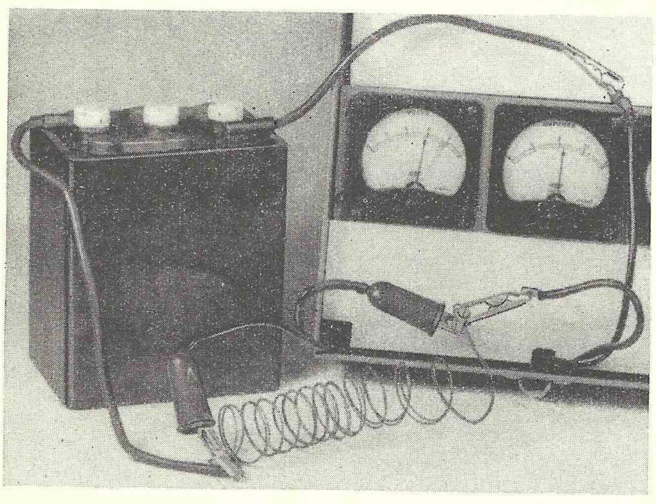
Bend the wire into two equal parts.

(*a*) Fix a heavy gauge flexible lead to centre bend of the wire, and connect this lead to the positive terminal of a 6 volt battery.

(*b*) Connect a voltmeter across the battery terminals.

(*c*) Connect an ammeter to the battery negative post.

(*d*) Take a lead from the other terminal of the ammeter, connect a crocodile clip to it, and connect to the free ends of the wire (which should be twisted together).



(*e*) Move the clip along the wire, making contact with both wires until the discharge reading on the ammeter exactly equals the number of volts shown on the voltmeter. The resistance is then 1 ohm (see illustration).

(*f*) Cut the wire at this point, twist the two ends together and fix a second heavy gauge flexible lead.

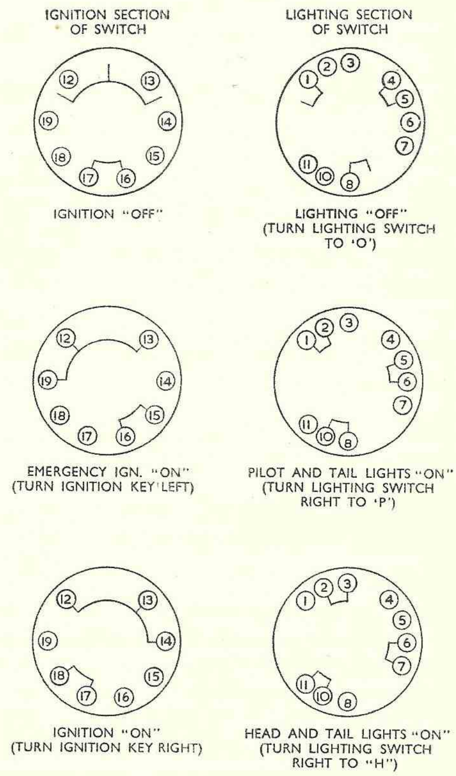
(*g*) Wind the wire on to an asbestos former 2″ dia. (approx.).

The foregoing gives a general description of the test equipment required and it would perhaps be helpful to mention here that there are a number of compact portable test sets on the market suitable for this class of work. The manufacturers of this equipment will undoubtedly be pleased to supply you with all relevant information upon request.

If any difficulty should arise however, or should you be undecided as to the capabilities of a particular set we shall on receipt of a post card be very pleased to help and advise in your choice of the correct equipment.

PRS8—CONTINUITY TESTS

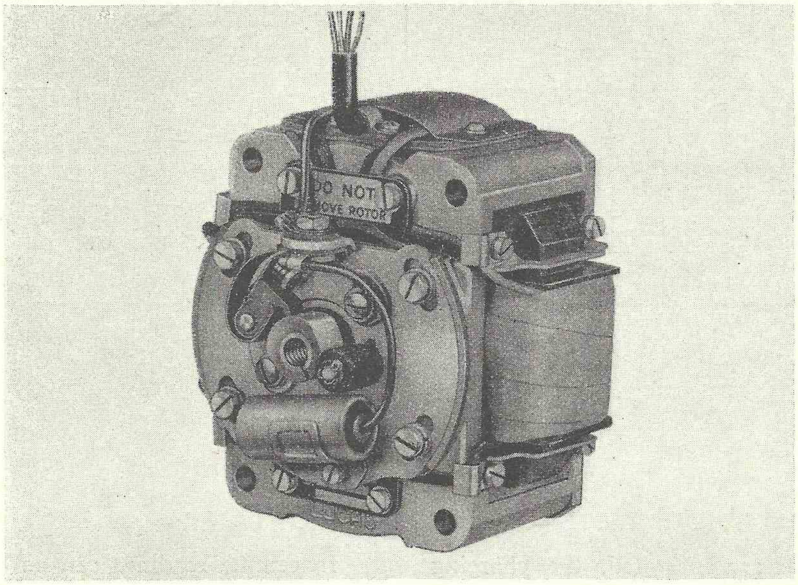
Remove all external links from the switch, and using a 6 volt battery in series with a 36 watt bulb, check for continuity of switch connections as shown in the illustrations below :—



DIAGRAMS SHOW SWITCH POSITIONS LOOKING ON TOP OF SWITCH

Replace external links and check continuity of link connections. If continuity of switch is in order, any faults which still exist will probably be in the external wiring circuit.

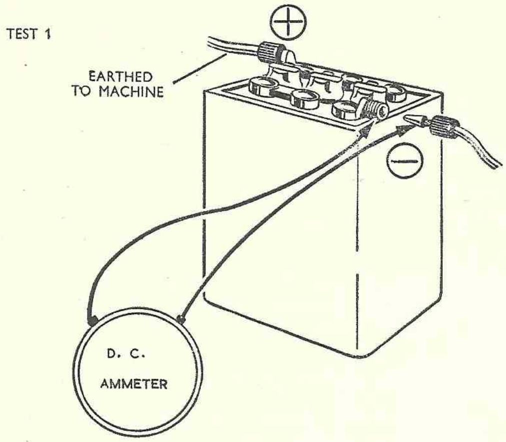
TEST PROCEDURE



1A45 ALTERNATOR SET

Checking D.C. Input to Battery

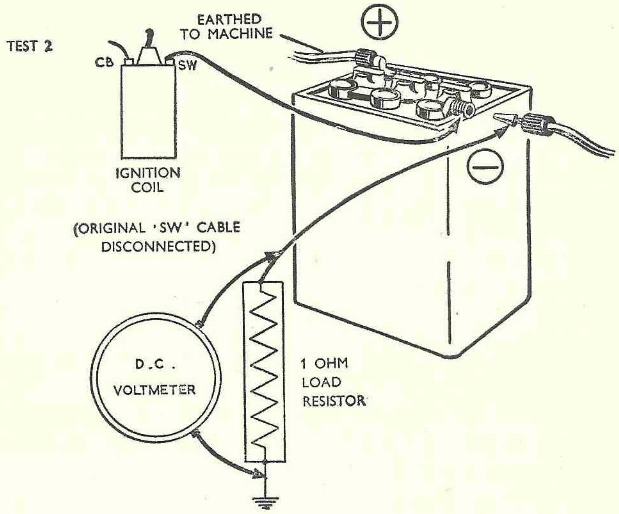
TEST 1. Ammeter connected in series with main lead and battery.



If battery is in poor condition or low state of charge use TEST 2.

Test	Switch Position	Reading Amps. at 3,000 r.p.m.
1	OFF	3·0 (min.)
	PILOT	5·0 (min.)
	HEAD	2·5 (min.)

TEST 2. Disconnect main lead from battery. Connect 1 ohm resistor in place of battery. Feed ignition coil separately from battery. Turn ignition switch to IGN position.



Test	Switch Position	Reading Volts at 3,000 r.p.m.
2	OFF	4·5 (min.)
	PILOT	8·0 (min.)
	HEAD	5·5 (min.)

CONCLUSIONS FROM THESE TESTS

Test 1. If meter readings are as stated, the charging circuit and alternator are satisfactory.

No reading ; check the generator.

A low reading can be caused by a faulty battery. Proceed with Test 2. If readings still low check battery with hydrometer and discharge tester.

A high reading, 2-3 amps above values given, in the OFF position may be due to an open-circuit half-charge resistor, which should be checked.

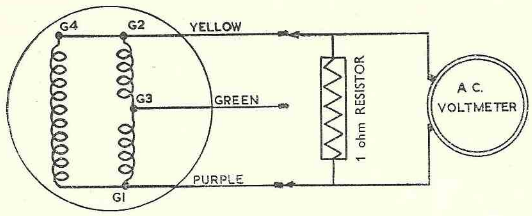
Test 2. If meter readings are lower or higher than values stated, check the generator.
No reading on meter, check the rectifier.

IMPORTANT

Inaccurate readings can be due to faulty wiring, bad connections at the snap connectors or poor earths. Make a quick visual check of all connections before proceeding with the tests.

Remember it is no use carrying out Test 1 if the battery is faulty or in a low state of charge, if in doubt proceed with Test 2.

Testing the IA45 Alternator on the Machine, using an A.C. Voltmeter and 1 Ohm Load Resistor



Test	Voltmeter and Resistor Connected Across	Voltmeter Reading at 4,000—5,000 r.p.m.
1	G1 AND G2	4·5 (min.)
2	G1 AND G3	8·5 (min.)
	G2 AND G3	8·5 (min.)

Test	Individual Coil Check (disconnect G2 and G4)	
3	G1 AND G4	2·3 (min.)
	G1 AND G2	2·3 (min.)

Test	
4	NO READING SHOULD BE OBTAINED WITH VOLTMETER CONNECTED ACROSS ANY ONE LEAD AND THE GENERATOR STATOR (EARTH)

Disconnect at the snap connectors the PURPLE, GREEN and YELLOW cables, but leave the BLUE cable connected for ignition purposes. The above readings should be obtained from a satisfactory alternator.

CONCLUSIONS FROM THESE TESTS

(*a*) If a reading is obtained in Test 4, a coil or cable is earthed. Check coil lead and terminal plate.

(*b*) If no reading is obtained in Test 4 but very low readings in Tests 1 and 2, a short circuit across an internal connection of a coil can be suspected. Test 3 should then indicate the faulty coil. If very low readings are obtained from both coils in this test the alternator is most probably severely demagnetised.

(*c*) A reading of approximately 2.5 to 3.5 volts in Test 1 will normally be obtained if the rotor has been withdrawn and replaced. Remagnetisation is required.

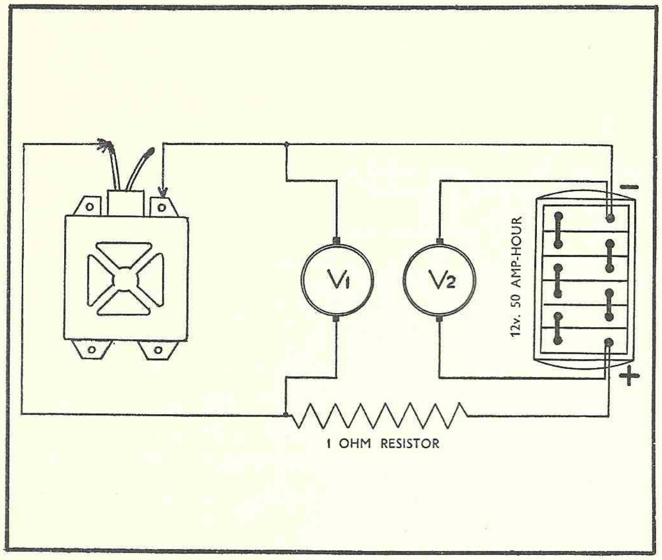
IMPORTANT

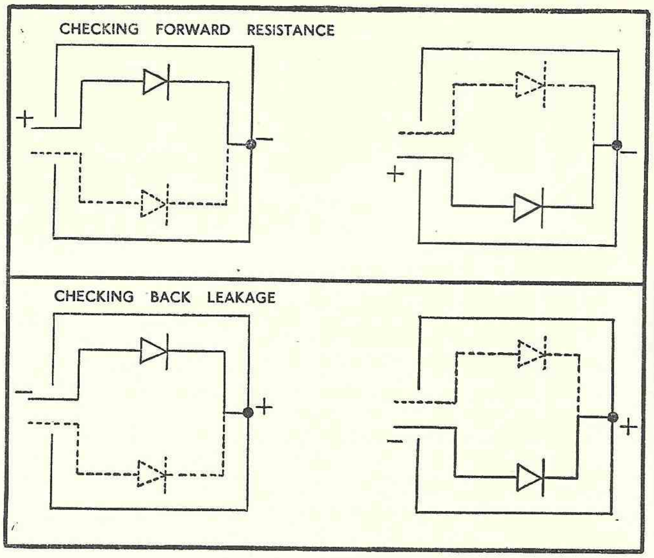
If the alternator voltage is excessive, do not immediately assume it is over-magnetised. First check for poor earths and for badly soldered and loose connections. A badly earthed rectifier will give the same apparent effect as an over-magnetised generator.

As snap connectors are used on the set it is quite possible that they have not been pressed firmly together and it is advisable that these are checked if voltage readings are considerably higher than the values given.

NOTE

When carrying out Test 1, and G4 is brought out as a separate cable, a temporary link should be connected between G4 and G2 on the alternator terminal plate.





V1 — will measure the volt drop across the rectifier cell, which should not be greater than 2·5 volts.

V2 — must be checked when testing the rectifier cell, to make certain the supply voltage is 12 volts on load.

FORWARD RESISTANCE TEST

Test 1. Connect negative lead to rectifier case. Connect positive lead to each cable connector in turn ; reading on V1 should not be greater than 2.5 volts. Keep the testing time as short as possible to avoid overheating the rectifier cell.

BACK LEAKAGE TEST

Test 2. Connect positive test lead to case ; negative test lead to each cable connector in turn. Reading on V1 should not be below 10 volts.

CONCLUSIONS FROM THESE TESTS

If the voltage reading, in Test 1, is exceeded on either rectifier cell, the unit is aged and should be replaced.

If the reading in Test 2 is below 10 volts, on either cell, the rectifier is shorted internally and should be replaced.

DOUBLE BANK RECTIFIER (47094) USED WITH THE RM12 SERIES "A"

The test procedure and figures for this rectifier are as quoted in the above tests. But it will be necessary to disconnect the two leads which are connected to the rectifier fixing bolts, before testing the two units separately.

IMPORTANT

There are two types of Westinghouse rectifiers in service on LUCAS sets. The original having low voltage plates being identified by the figures *2L* stamped on the case, the other which has high voltage plates being identified by the figures *12L*.

The values quoted in the above tests are for the high voltage rectifiers *12L*. When testing a low voltage rectifier *2L* the Forward Resistance reading should be the same but the Back Leakage figure can be down to 9 volts.

Circuit Continuity through Switch Positions

TO TEST IGNITION SWITCH

1. (Connecting charging circuit to battery).

   Connect red voltmeter test lead to earth.

   Connect black voltmeter lead to single snap connector containing green cable from alternator.

   Switch ignition on when battery volts should register on D.C. voltmeter.

TO TEST HALF-CHARGE SWITCH AND RESISTANCE

2. Disconnect the two cables (purple and yellow) coming from the headlamp into the snap connectors. Temporarily connect the purple cable to the single snap connectors containing green cable.

   Connect black voltmeter lead to the yellow cable.

   With light switch off, battery volts should register on D.C. meter and zero volts with the light switch in Pilot or Head position.

3. The two remaining cables are from the rectifier which can be tested from this position by carrying out the procedure given in the Rectifier Test.

CONCLUSIONS FROM THESE TESTS

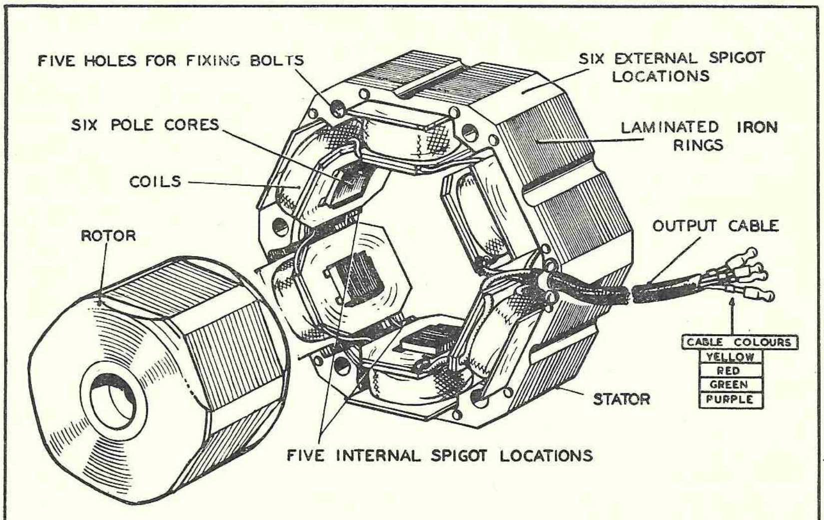
1. No voltage or low voltage in Test 1 indicates open circuit or high resistance connection in switch or wiring from switch to alternator.

2. No reading in OFF position indicates open circuit in resistance or switch which would give high charge in off position.

3. Faulty rectifier or rectifier cable connections would result in no charge.

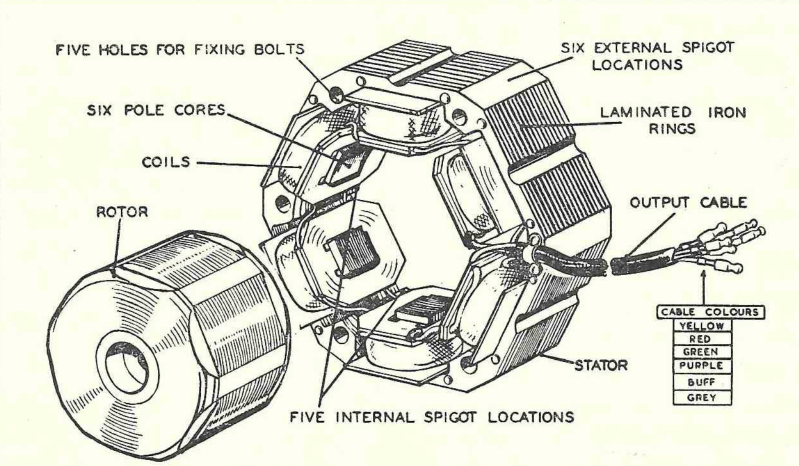
TEST PROCEDURE

SERIES 'A'



LUCAS RM12 MOTOR CYCLE ALTERNATOR - SERIES 'A'

SERIES 'C'

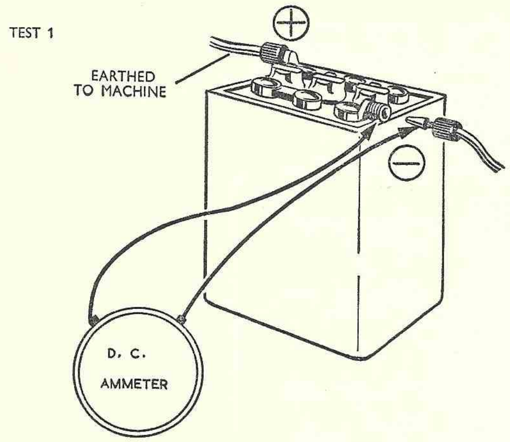


LUCAS RM12 MOTOR CYCLE ALTERNATOR - SERIES 'C'

RM12 ALTERNATOR SET

Checking D.C. Input to Battery

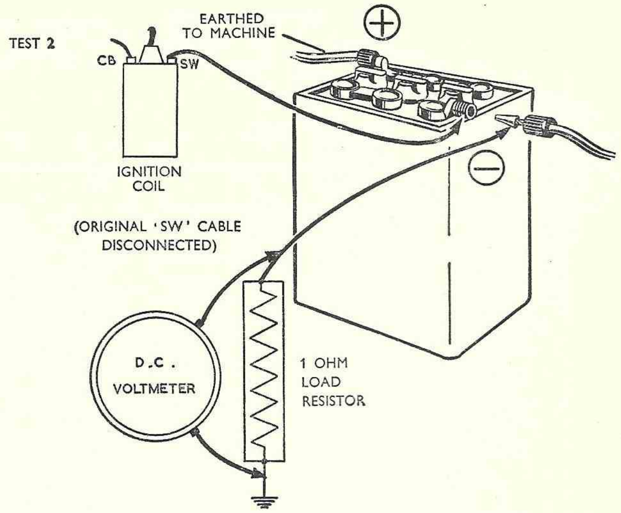
TEST 1. Ammeter connected in series with main lead and battery.



If battery is in poor condition or low state of charge use TEST 2.

Test	Switch Position	Reading Amps. at 3,000 r.p.m.
1	OFF	2·5 (min.)
	LOW	2·5 (min.)
	HIGH	3·5 (min.)

TEST 2. Disconnect main lead from battery. Connect 1 ohm resistor in place of battery. Feed ignition coil separately from battery. Turn ignition switch to IGN position.



Test	Switch Position	Reading Volts at 3,000 r.p.m.
2	OFF	2·0 (min.)
	LOW	3·0 (min.)
	HIGH	4·0 (min.)

CONCLUSIONS FROM THESE TESTS

Test 1. If meter readings are as stated, the charging circuit and alternator are satisfactory.

No reading ; check the generator.

A low reading can be caused by a faulty battery. Proceed with Test 2. If readings still low check battery with hydrometer and discharge tester.

Test 2. If meter readings are lower or higher than values stated, check the generator.

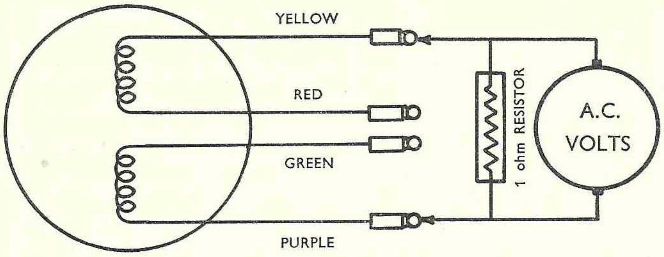
No reading on meter, check the rectifier.

IMPORTANT

Inaccurate readings can be due to faulty wiring, bad connections at the snap connectors or poor earths. Make a quick visual check of all connections before proceeding with the tests.

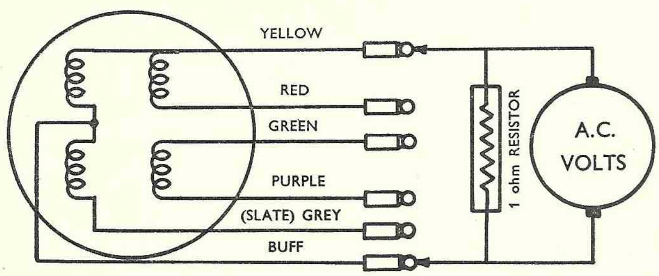
Remember it is no use carrying out Test 1 if the battery is faulty or in a low state of charge, if in doubt proceed with Test 2.

Testing the RM12, Series 'A' or Series 'C' Alternator on the Machine, using an A.C. voltmeter and 1 Ohm Load Resistor



SERIES 'A' (Four Lead)

Test	Voltmeter and Resistor Connected Across	Reading Volts at 3,000 r.p.m.
1	YELLOW AND RED	8·0 (min.)
2	GREEN AND PURPLE	8·0 (min.)
3	YELLOW AND PURPLE WITH GREEN AND RED JOINED TOGETHER	6·0 (min.)
4	PURPLE AND GREEN WITH RED AND YELLOW JOINED TOGETHER	5·5 (min.)
5	ANY ONE LEAD AND GENERATOR STATOR (EARTH)	NO READING



SERIES 'C' (Six Lead)

Test	Voltmeter and Resistor Connected Across	Reading Volts at 3,000 r.p.m.
1	YELLOW AND RED	7·25 (min.)
2	YELLOW AND BUFF	7·25 (min.)
3	GREY AND BUFF	7·25 (min.)
4	GREEN AND PURPLE	7·25 (min.)
5	ANY ONE LEAD AND GENERATOR STATOR (EARTH)	NO READING

CONCLUSIONS FROM THESE TESTS

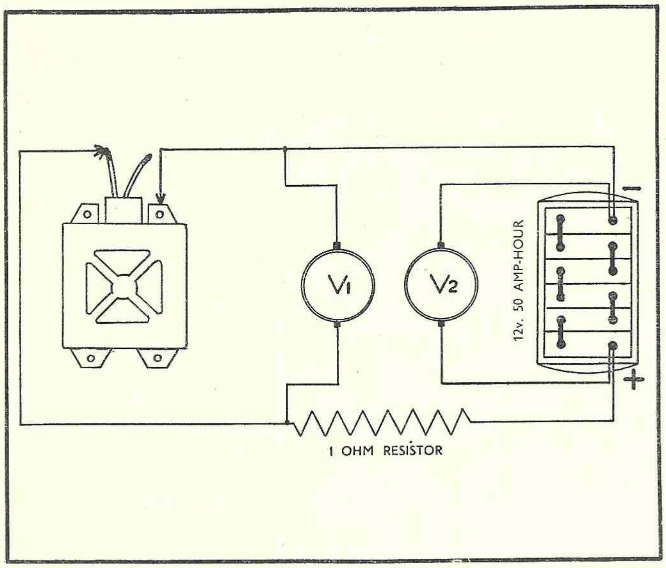
Low reading on any coil indicates earthed or shorted turns. Zero reading will indicate open-circuit or earthed coil.

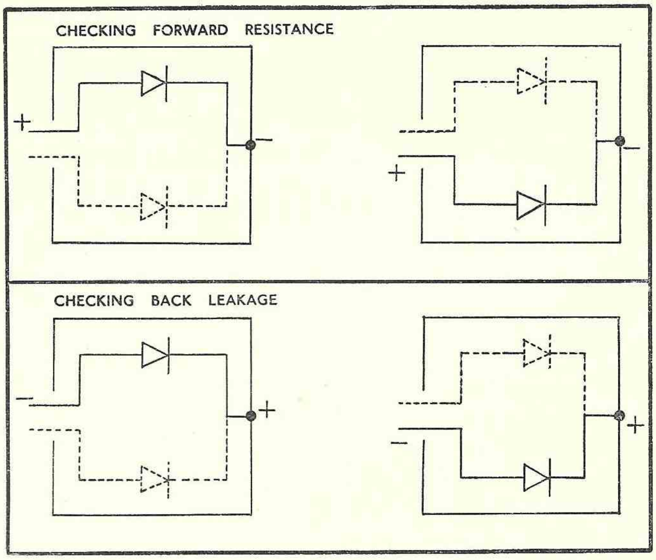
If all coils read low, partial de-magnetisation of rotor may have occurred as a result of faulty rectifier. Check rectifier, and battery earth polarity before replacing rotor.

A reading between any one lead and the generator stator indicates an earthed coil. Replace stator or locate the earth fault by isolating and testing the individual coils.

IMPORTANT

With the engine running at 3,000 r.p.m. approx., the output voltages are steady, and even if the engine is running a few r.p.m. faster or slower the values stated in the tests will be obtained from a good generator.





V1 — will measure the volt drop across the rectifier cell, which should not be greater than 2·5 volts.

V2 — must be checked when testing the rectifier cell, to make certain the supply voltage is 12 volts on load.

FORWARD RESISTANCE TEST

Test 1. Connect negative lead to rectifier case. Connect positive lead to each cable connector in turn ; reading on V1 should not be greater than 2.5 volts. Keep the testing time as short as possible to avoid overheating the rectifier cell.

BACK LEAKAGE TEST

Test 2. Connect positive test lead to case ; negative test lead to each cable connector in turn. Reading on V1 should not be below 10 volts.

CONCLUSIONS FROM THESE TESTS

If the voltage reading, in Test 1, is exceeded on either rectifier cell, the unit is aged and should be replaced.

If the reading in Test 2 is below 10 volts, on either cell, the rectifier is shorted internally and should be replaced.

DOUBLE BANK RECTIFIER (47094) USED WITH THE RM12 SERIES "A"

The test procedure and figures for this rectifier are as quoted in the above tests. But it will be necessary to disconnect the two leads which are connected to the rectifier fixing bolts, before testing the two units separately.

IMPORTANT

There are two types of Westinghouse rectifiers in service on LUCAS sets. The original having low voltage plates being identified by the figures *2L* stamped on the case, the other which has high voltage plates being identified by the figures *12L*.

The values quoted in the above tests are for the high voltage rectifiers *12L*. When testing a low voltage rectifier *2L* the Forward Resistance reading should be the same but the Back Leakage figure can be down to 9 volts.

NOTE : It should be remembered that the two rectifier cells in each section of the Double Bank Rectifier, are in series (see diagram Page 46).

Testing the External Wiring Circuit on RM12 Series 'C' Sets

USING D.C. VOLTMETER ONLY

1. Connect red test lead to EARTH.

2. Disconnect six alternator cables from main harness (located under saddle).

Test Alternator Wiring through Ignition Switch

3. With ignition switch OFF connect black test lead to each of the six main harness cables.

   Voltmeter should read zero on all six cables.

4. With ignition switch ON, repeat operation as above. Voltmeter should read battery volts on GREEN cable. Remainder zero.

Test Alternator Wiring through Headlamp Switch

5. With ignition switch still ON, operate lighting switch to " Head " position. Battery volts should also register at BUFF cable.

Test Alternator Wiring through Switch in "Emergency Start" position

6. Turn ignition switch to emergency position when there should be no voltage reading at any of the six connections.

NOTE

These tests are to be carried out in the case of " No Charge " or " No Emergency Start " if previous tests have been carried out and all is in order.

Testing the 'High' and 'Low' Charge Switch Circuits

USING D.C. VOLTMETER ONLY

1. With the alternator leads still disconnected, disconnect the battery.

2. Connect the red lead to positive terminal of battery.

3. Connect a wander lead to negative battery terminal.

4. Use the negative lead from voltmeter and wander lead to make the following continuity test.

TEST A

Continuity through light switch cables and light switch in the "OFF" and "LOW" positions.

Connect test leads to yellow and grey cables which should be common and register battery volts.

TEST B

Continuity through cables and light switch in the "HEAD" position.

Connect test leads to grey and purple cables. If correct, meter should register battery volts.

TEST C

Continuity through cables and ignition switch in the "EMERGENCY START" position.

Connect test leads to purple, grey and red leads from resistance which should all be common and register battery volts.

TEST D

Repeat the operation for yellow and blue leads from resistance which should read battery volts if correct.

NOTE

Incorrect switching of these cables will cause incorrect charging rates, i.e. failure of yellow and grey to link together will cause high charge rate with headlight switch off.

In the case of incorrect switch it is necessary to remove the switches from panel and check connections and if necessary the switch itself.

RM12 Alternator—Converting Series 'B' Machines to Series 'C' —Includes latest improvements for "Emergency" running

As a direct result of service experience with the new " six lead " RM12 alternator it seemed desirable that provision should be made for continuous operation in the "EMG" switch position. A revision to the equipment was therefore made.

It permits the continuous use of the machine in the "EMG" switch position with full engine performance. Previously it was not possible to do this because the high speed output from the alternator series "B" was too great. This latest improvement protects the electrical circuits from accidental misuse of the "EMG" switch and also helps where riders wish to use the machine temporarily without a battery for " trials " or other sporting events. It should be pointed out that the battery cannot be charged in the "EMG" switch position and, without a battery, it is not possible to use the lighting or horn.

N.B.—Where the equipment is run temporarily without a battery ALWAYS connect the brown battery lead in the harness to earth.

We supply complete kits (Part No. 047504) to our Service Depots so that they can arrange to convert all the machines now in service.

FITTING INSTRUCTIONS

There are four stages in the procedure :—

1. Fit new rotor.
2. Fit new resistor and bracket and resistor leads.
3. Modify the alternator feed cables.
4. Fit new switches and switch harness.

Fitting New Rotor

(*a*) Remove exhaust pipe from L.H. side of motor cycle (alternator side).

(*b*) Remove foot rest.

(*c*) Remove foot brake pedal — by removing brake pedal retaining nut and sliding the brake pedal off the pivot.

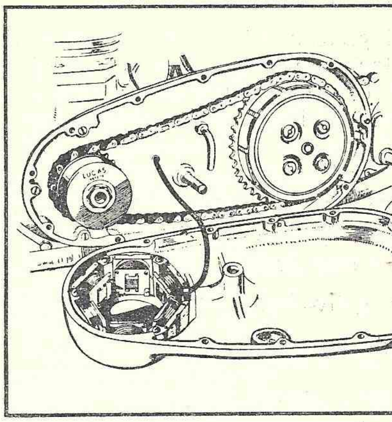
(*d*) Take off the chain case — remove screws around case and gently ease off the cover, *taking care not to damage paper gasket.* (If gasket is damaged a new one must be fitted.)

(*e*) Remove rotor fixing bolt — engage top gear and hold back wheel while unscrewing bolt — this prevents the engine shaft turning.

(*f*) Remove rotor — this is a tight fit on the shaft, and must be gently eased off with a large sprocket drawer or two suitable levers.

(*g*) Fit new rotor.

Reverse above procedure for re-assembly — remember to bend up the locking washer tag against rotor fixing bolt.



LUCAS R.M.12 ALTERNATOR UNIT. showing the Rotor keyed to the shaft and the Stator positioned in the chaincase cover.

(*h*) Replace chain case cover — tighten screws evenly and refill with half-pint of SAE 20 engine oil.

(*i*) Finally replace the foot rest and brake pedal. Smear the brake pivot pin with medium grease and tighten the lock nut securely.

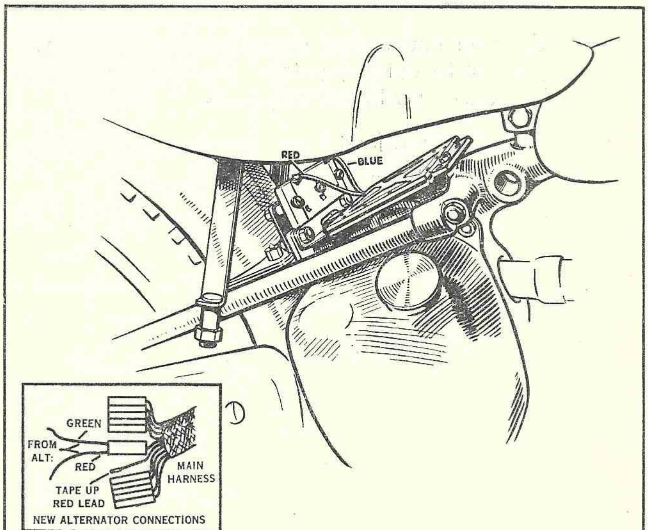
Fitting New Resistor

(*a*) Run the sleeved resistor cables from the nacelle over the top of the main harness to the resistor mounting bracket under the saddle.

(*b*) Unbolt the rectifier mounting bracket and turn it over (see illustration), take care not to lose the distance piece under the front fixing bolt.

(*c*) Connect red and blue leads to resistor and fit in position shown.

(*d*) Make sure resistor has a good earth by removing any enamel under the fixing bolts.



RE-POSITIONED RECTIFIER AND RESISTOR

Reconnecting Alternator Leads

(*a*) Remove both green and both red leads from the connector block under the saddle. Using the double snap connector provided, connect the green and the red lead from the alternator to the green lead in the main harness. Tape up the red lead in the main harness which is no longer required. (See inset illustration, Page 27).

Fitting New Switches and Switch Harness

(*a*) Disconnect negative battery lead.

(*b*) Remove light unit.

(*c*) Disconnect speedometer drive cable and bulb holder then remove speedometer from the nacelle.

(*d*) Remove the clip holding the cable harness to left side fork leg.

(*e*) Remove the existing switches from nacelle, unscrew lock nuts and pull switches forward, clear of the nacelle.

(*f*) Disconnect the main harness leads from the two five-way connectors.

(*g*) Disconnect blue lead from lighting switch (terminal 3).

(*h*) Disconnect orange lead from ammeter.

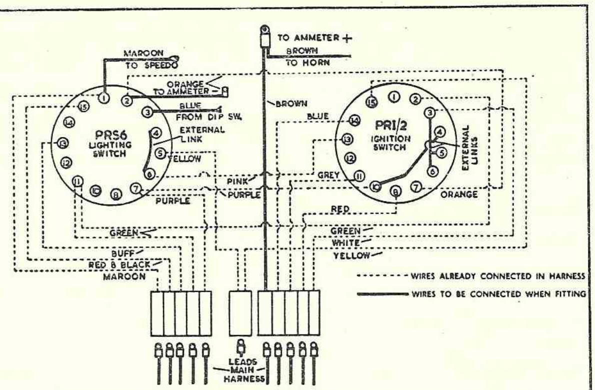
(*i*) Disconnect brown leads from horn and ammeter.

(*j*) Cut off black lead going to lighting switch close to the earthing-eyelet which fastens under the speedometer securing bolt.

(*k*) The two switches can now be completely removed.

(*l*) Connect new switch harness to main harness — (colour to colour) ; tape up red lead in main harness — no longer required.

(*m*) Connect blue lead from dip switch to terminal (3) on lighting switch.



SCHEMATIC DRAWING OF NEW HEADLAMP HARNESS AND SWITCHES

(*n*) Connect maroon lead from terminal (1) on lighting switch to speedometer illumination bulb holder (remove holder from the old switch harness).

(*o*) Connect brown leads *eyelet* to ammeter, left hand terminal looking into the nacelle.

(*p*) Connect loose end of brown lead to horn.

(*q*) Connect orange lead to other ammeter terminal.

(*r*) Connect resistor red and blue leads to the appropriate terminals on the snap connector block.

(*s*) Fit new switches in nacelle.

(*t*) Clip harness to left hand fork.

(*u*) Refit speedometer in nacelle, and connect up speedometer drive ; make sure that the black earth lead eyelet is clamped in position under the fixing bolt.

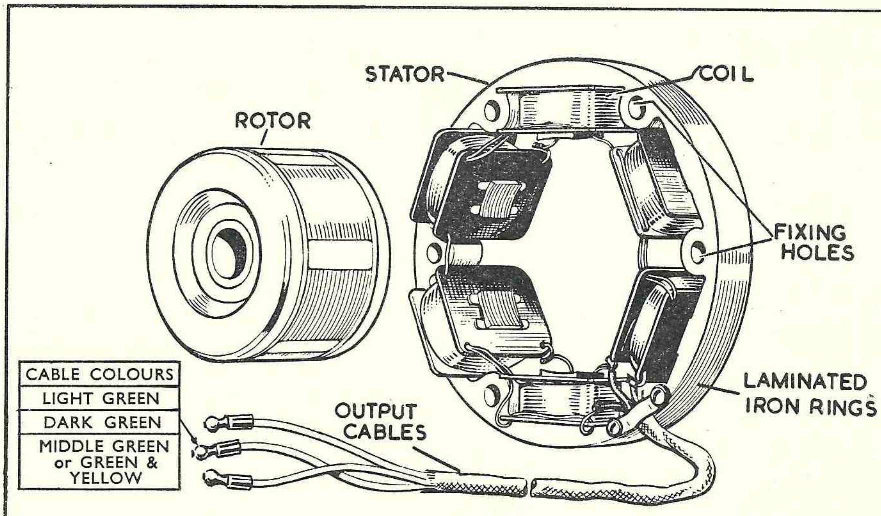
(*v*) Replace speedometer bulb holder in its housing.

(*w*) Make sure that no switch wires or terminals are touching the speedometer or fixing bracket.

(*x*) Replace light unit.

(*y*) Reconnect the battery lead and test the circuit in each switch position.

TEST PROCEDURE

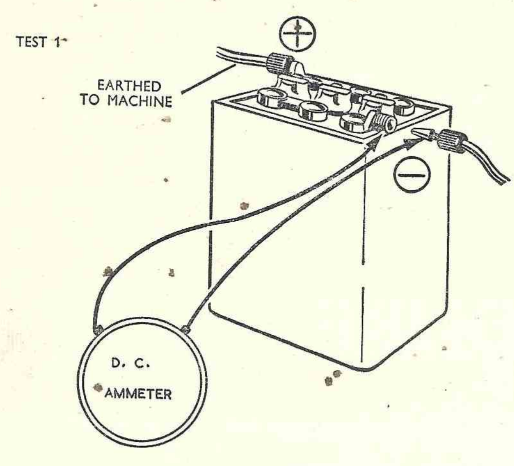


LUCAS RM13 MOTOR CYCLE ALTERNATOR

RM13 ALTERNATOR SET

Checking D.C. Input to Battery

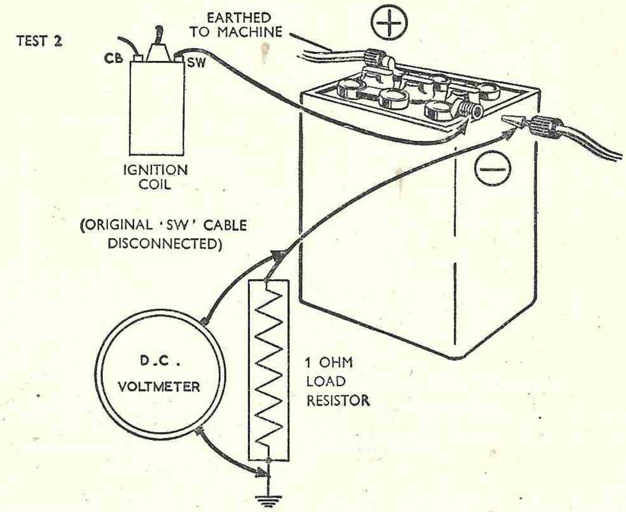
TEST 1. Ammeter connected in series with main lead and battery.



If battery is in poor condition or low state of charge use TEST 2.

Test	Switch Position	Reading Amps. at 3,000 r.p.m.
1	OFF	1·5 (min.)
	PILOT	0·5 (min.)
	HEAD	0·25 (min.)

TEST 2. Disconnect main lead from battery. Connect 1 ohm resistor in place of battery. Feed ignition coil separately from battery. Turn ignition switch to IGN position.



Test	Switch Position	Reading Volts at 3,000 r.p.m.
2	OFF	1·5 (min.)
	PILOT	1·5 (min.)
	HEAD	3·0 (min.)

CONCLUSIONS FROM THESE TESTS

Test 1. If meter readings are as stated, the charging circuit and alternator are satisfactory.

No reading ; check the generator.

A low reading can be caused by a faulty battery. Proceed with Test 2. If readings still low check battery with hydrometer and discharge tester.

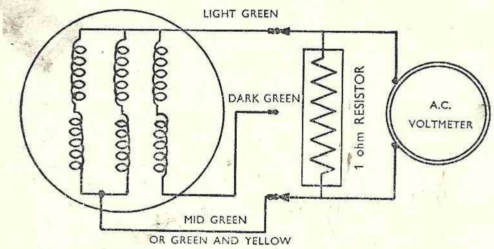
Test 2. If meter readings are lower or higher than values stated, check the generator.
No reading on meter ; check the rectifier.

IMPORTANT

Inaccurate readings can be due to faulty wiring, bad connections at the snap connectors or poor earths. Make a quick visual check of all connections before proceeding with the tests.

Remember it is no use carrying out Test 1 if the battery is faulty or in a low state of charge ; if in doubt proceed with Test 2.

Testing the RM13 Alternator on the Machine, using an A.C. Voltmeter and 1 Ohm Load Resistor



Test	Voltmeter and Resistor Connected Across	Reading Volts at 3,000 r.p.m.
1	DARK GREEN AND LIGHT GREEN	3·0 (min.)
2	LIGHT GREEN AND MID GREEN OR GREEN AND YELLOW	6·0 (min.)
3	DARK GREEN AND LIGHT GREEN (with mid green or green and yellow connected to dark green.)	8·5 (min.)
4	ANY ONE LEAD AND GENERATOR STATOR (EARTH)	NO READING

CONCLUSIONS FROM THESE TESTS

Low reading on any group of coils indicates earthed or shorted turns.

Zero reading will indicate open-circuit or earthed coil.

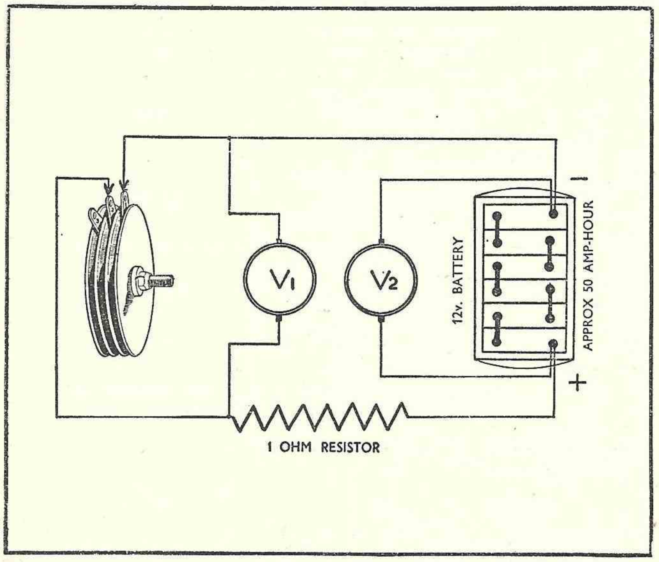
If all coils read low, partial de-magnetisation of rotor may have occurred as a result of faulty rectifier. Check rectifier, and battery earth polarity before replacing rotor.

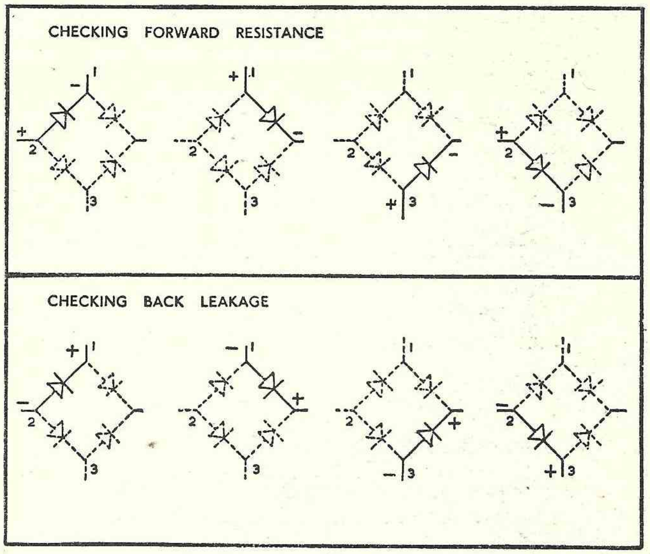
A reading between any one lead and the generator stator indicates an earthed coil. Replace stator or locate earth by isolating and testing individual coils.

NOTE

With the engine running at 3,000 r.p.m. (approx.) the output voltages are steady, and even if the engine is running a few r.p.m. faster or slower the values stated will be obtained from a good generator.

Rectifier—Bench Testing





V1 — will measure the volt drop across the rectifier plate.

V2 — must be checked when testing the rectifier plate, to make certain the supply voltage is the recommended 12 volts on load.

It is essential that the supply is kept at 12 *volts for these tests.*

FORWARD RESISTANCE TEST

Test 1. Connect test leads in turn to terminals 2 and 3, 2 and 1, Bolt and 1, Bolt and 3. Reading in all positions should not be greater than 2.5 volts. Keep the testing time as short as possible to avoid overheating the rectifier cell.

NOTE.—If the later type of rectifier, which has no terminal markings, is fitted, the same test procedure is followed. The same voltage values also apply.

BACK LEAKAGE TEST

Test 2. Proceed as for Test 1, and test each cell in turn, but reverse the test leads. Reading on V1 should not be less than 2 volts below the open-circuit reading on voltmeter No. 2, i.e. 10 volts.

CONCLUSIONS FROM THESE TESTS

Test 1. If the voltage reading on V1 is more than 2.5 volts, on any cell, it is aged and the rectifier should be replaced.

Test 2. If the voltage reading on V1 is less than 10 volts, on any cell, the rectifier is shorted and should be replaced.

IMPORTANT

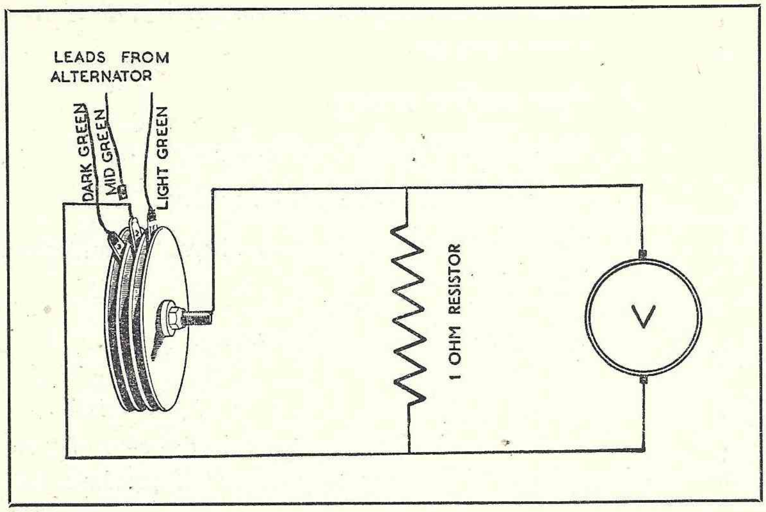
Before fitting a replacement rectifier check the following points :—

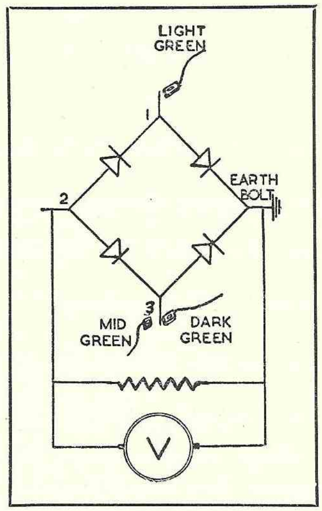
1. Check that battery is correctly connected, POSITIVE to EARTH.

2. Check rectifier visually for signs of damage.

NEVER disturb the tension of the nut which holds the elements together on the through bolt. The efficiency of the rectifier depends upon the correct tension of the plates. The tension of the nut is set before leaving the works, and cannot be adjusted correctly in service.

Checking Rectifier in Position on Machine





Voltmeter and Resistor Connected Across	Reading with Leads Connected as Shown
TERMINAL No. 2 (OR CENTRE TERMINAL ON LATEST TYPE) AND FRAME OF MACHINE	6·5 (min.)

PROCEDURE

Connect the alternator leads as detailed direct to the rectifier terminals No. 1 and No. 3.

(NOTE.—On the latest type rectifiers the terminals are not numbered, so connect the alternator leads to the outer cranked terminals).

Connect the test leads which must have a D.C. voltmeter with 1 ohm load shunted across, between earth (frame of machine) and terminal No. 2 (centre terminal on latest type rectifier) when the value stated should be obtained with engine running at 3,000 r.p.m.

CONCLUSIONS FROM THESE TESTS

If the alternator passes its individual test, but it fails on this test it indicates that either the rectifier is faulty or it is not properly earthed.

Connecting the test leads to the centre bolt will eliminate the possibility of faulty earth connection.

Testing the External Wiring Circuit

USING D.C. VOLTMETER ONLY

1. All cables, including battery, to be connected as normal.
2. Connect voltmeter red test lead to earth.

Testing Charging Circuit through Ignition Switch

3. Connect black test lead to No. 2 terminal on rectifier.
4. Switch ignition to IGN position.
5. Battery volts, i.e. six, should register on voltmeter.
6. If there is zero reading on voltmeter in the above condition, check circuit back through ignition switch, ammeter, etc., to the battery.

Testing Emergency Start Circuit (Single Cylinder Machine)

7. Connect red test lead to earth.
8. Connect black test lead to C.B. terminal on ignition contact breaker.
9. Open ignition contacts.
10. Switch ignition switch to EMG position.
11. Battery volts should register on voltmeter.
12. Transfer black test lead to alternator mid-green lead.
13. Battery volts should register on voltmeter.

NOTE

These tests are to be carried out in the case of " No Charge " or " No Emergency Start " if previous tests have been carried out and all is in order.

It is important that both the ignition timing and the rotor timing is correct for efficient operation of Emergency Start.

Testing the 'Low,' 'Medium' and 'High' Charge Positions

USING D.C. VOLTMETER ONLY

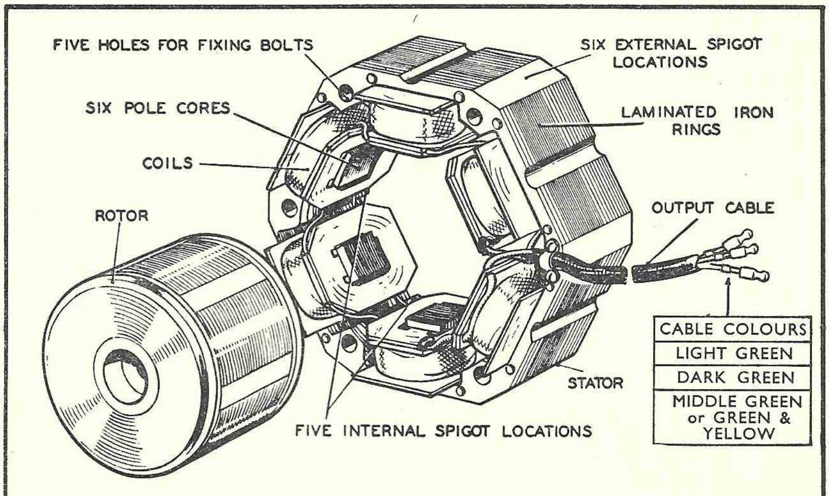
1. Connect red test lead to earth.
2. The set, including battery connected as normal, with the exception of the alternator middle green cable which should be disconnected at the snap connector under the saddle.
3. Connect black test lead to mid-green cable coming from headlamp (i.e. not coming from alternator).
4. With ignition switch in IGN position and lighting switch OFF.
5. A low voltage (i.e. 1—2) should register on voltmeter.
6. With lighting switch in PILOT, zero voltage should register on voltmeter.
7. With lighting switch in HEAD position a low voltage should register on voltmeter.

NOTE

Incorrect switching of these cables will cause incorrect charging rates, i.e. failure of mid-green and dark green linking together in HEAD position will result in a low charge rate with headlight switched on.

In the case of incorrect switching it is necessary to check the wiring and the switch for correct connections, etc.

TEST PROCEDURE

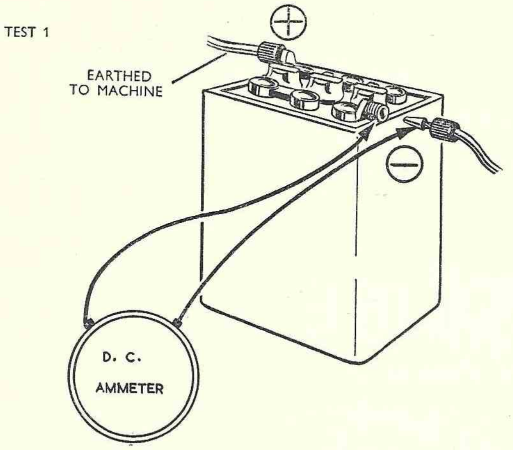


LUCAS RM14 MOTOR CYCLE ALTERNATOR

RM14 ALTERNATOR SET

Checking D.C. Input to Battery

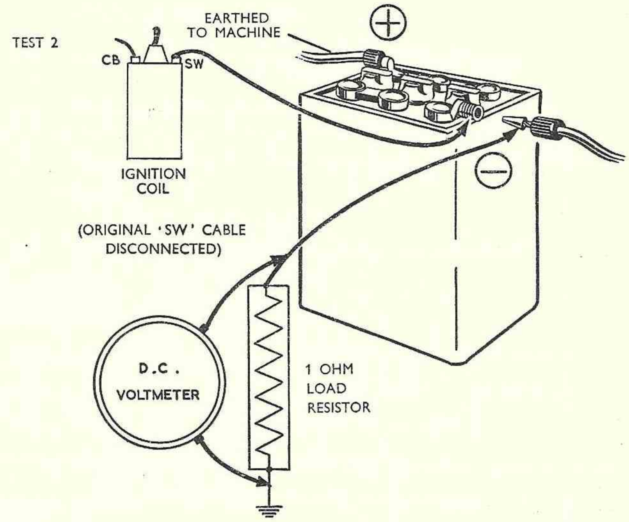
TEST 1. Ammeter connected in series with main lead and battery.



If battery is in poor condition or low state of charge use TEST 2.

Test	Switch Position	Reading Amps. at 3,000 r.p.m.
1	OFF	2·5 (min.)
	PILOT	1·5 (min.)
	HEAD	2·5 (min.)

TEST 2. Disconnect main lead from battery. Connect 1 ohm resistor in place of battery. Feed ignition coil separately from battery. Turn ignition switch to IGN position.



Test	Switch Position	Reading Volts at 3,000 r.p.m.
2	OFF	2·5 (min.)
	PILOT	2·0 (min.)
	HEAD	3·0 (min.)

CONCLUSIONS FROM THESE TESTS

Test 1. If meter readings are as stated, the charging circuit and alternator are satisfactory.

No reading ; check the generator.

A low reading can be caused by a faulty battery. Proceed with Test 2. If readings still low check battery with hydrometer and discharge tester.

Test 2. If meter readings are lower or higher than values stated, check the generator.

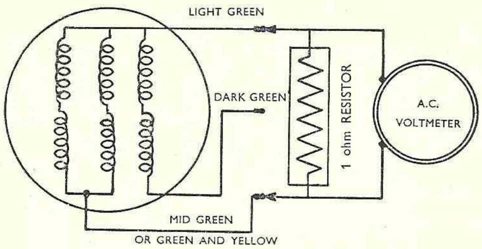
No reading on meter, check the rectifier.

IMPORTANT

Inaccurate readings can be due to faulty wiring, bad connections at the snap connectors or poor earths. Make a quick visual check of all connections before proceeding with the tests.

Remember it is no use carrying out Test 1 if the battery is faulty or in a low state of charge, if in doubt proceed with Test 2.

Testing the RM14 Alternator on the Machine, using an A.C. Voltmeter and 1 Ohm Load Resistor



Test	Voltmeter and Resistor Connected Across	Reading Volts at 3,000 r.p.m.
1	DARK GREEN AND LIGHT GREEN	4·0 (min.)
2	LIGHT GREEN AND MID GREEN OR GREEN AND YELLOW	6·5 (min.)
3	DARK GREEN AND LIGHT GREEN (with mid green or green and yellow connected to dark green.)	9·0 (min.)
4	ANY ONE LEAD AND GENERATOR STATOR (EARTH)	NO READING

CONCLUSIONS FROM THESE TESTS

Low reading on any group of coils indicates earthed or shorted turns.

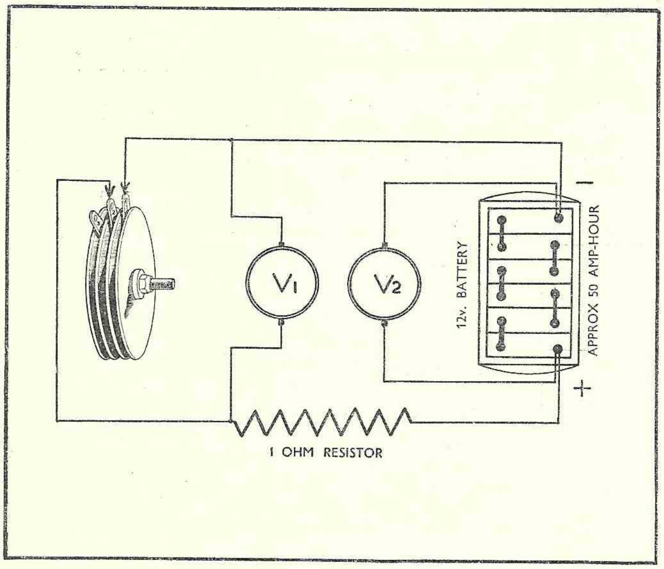
Zero reading will indicate open-circuit or earthed coil.

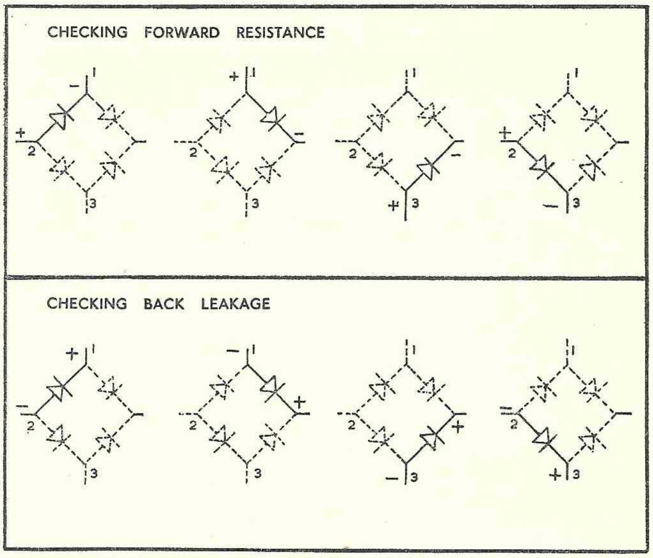
If all coils read low, partial de-magnetisation of rotor may have occurred as a result of faulty rectifier. Check rectifier, and battery earth polarity before replacing rotor.

A reading between any one lead and the generator stator indicates an earthed coil. Replace stator or locate earth by isolating and testing individual coils.

NOTE

With the engine running at 3,000 r.p.m. (approx.) the output voltages are steady, and even if the engine is running a few r.p.m. faster or slower the values stated will be obtained from a good generator.





V1 — will measure the volt drop across the rectifier plate.

V2 — must be checked when testing the rectifier plate, to make certain the supply voltage is the recommended 12 volts on load.

It is essential that the supply is kept at 12 *volts for these tests.*

FORWARD RESISTANCE TEST

Test 1. Connect negative lead to rectifier earth bolt. Connect positive lead in turn to terminals 2 and 3, 2 and 1, Bolt and 1, Bolt and 3. Reading in all positions should not be greater than 2.5 volts. Keep the testing time as short as possible to avoid overheating the rectifier cell.

NOTE.—If the later type of rectifier, which has no terminal markings, is fitted the same procedure is followed. The same voltage values also apply.

BACK LEAKAGE TEST

Test 2. Proceed as for Test 1, and test each cell in turn, but reverse the test leads. Reading on V1 should not be less than 2 volts below the open-circuit reading on voltmeter No. 2, i.e. 10 volts.

CONCLUSIONS FROM THESE TESTS

Test 1. If the voltage reading on V1 is more than 2.5 volts, on any cell, it is aged and the rectifier should be replaced.

Test 2. If the voltage reading on V1 is less than 10 volts, on any cell, the rectifier is shorted and should be replaced.

IMPORTANT

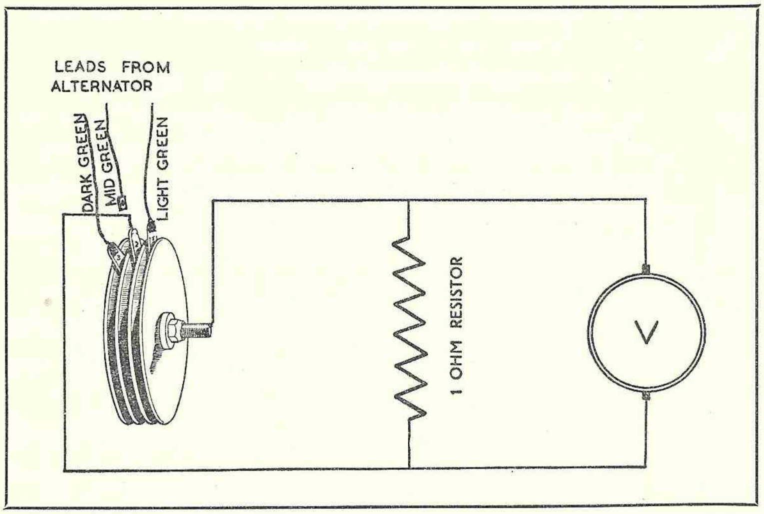
Before fitting a replacement rectifier, check the following points :—

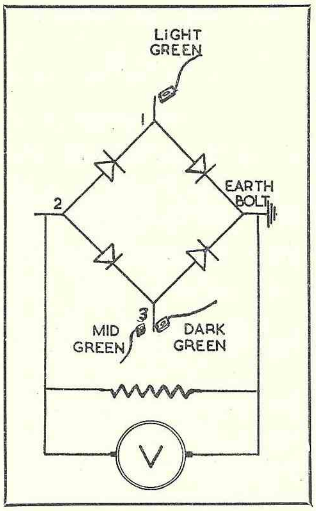
1. Check that battery is correctly connected, POSITIVE to EARTH.

2. Check rectifier visually for signs of damage.

DO NOT make any adjustment to the nut which holds the elements together on the through bolt. The efficiency of the rectifier depends upon the correct tension of this bolt. The tension on the bolt is set correctly before leaving the works, and cannot be adjusted correctly in service.

Checking Rectifier in Position on Machine





Voltmeter and Resistor Connected Across	Reading with Leads Connected as Shown
TERMINAL No. 2 (OR CENTRE TERMINAL ON LATEST TYPE) AND FRAME OF MACHINE	7·5 (min.)

PROCEDURE

Connect the alternator leads as detailed direct to the rectifier terminals No. 1 and No. 3 with all the other cables disconnected from the rectifier.

(NOTE.—On the latest type rectifiers the terminals are not numbered, so connect the alternator leads to the outer cranked terminals).

Connect the test leads which must have a D.C. voltmeter with 1 ohm load shunted across, between earth (frame of machine) and terminal No. 2 (centre terminal on latest type rectifier) when the values stated should be obtained with engine running at 3,000 r.p.m.

CONCLUSIONS FROM TESTS

If the alternator passes its individual test, but it fails on this test it indicates that either the rectifier is faulty or it is not properly earthed.

Connecting the test leads to the centre bolt will eliminate the possibility of faulty earth connection.

Testing the External Wiring Circuit

USING D.C. VOLTMETER ONLY

1. All cables, including battery, to be connected as normal.

2. Connect red test lead to earth.

Testing Charging Circuit through Ignition Switch

3. Connect black test lead to No. 2 terminal on rectifier.

4. Switch ignition to IGN position.

5. Battery volts (i.e. six) should register on voltmeter.

6. If there is a zero reading on voltmeter in the above condition, check circuit back through ignition switch and ammeter, etc.

Testing Emergency Start Circuit (Twin Cylinder Machine)

7. Connect red test lead to earth.

8. Connect black test lead to distributor C.B. terminal.

9. Open ignition contacts.

10. Switch ignition to EMG position.

11. A low voltage (i.e. 1—2) should register on the voltmeter if the emergency start circuit is in order.

NOTE

These tests are to be carried out in the case of " No Charge " or " No Emergency Start " if previous tests have been carried out and all is in order.

It is important that both the ignition timing and the rotor timing is correct for efficient operation of Emergency Start.

Testing the 'Low,' 'Medium' and 'High' Charge Positions

USING D.C. VOLTMETER ONLY

1. Connect red test lead to earth.

2. The set, including battery, connected as normal with the exception of the alternator middle green cable which should be disconnected at the snap connector under the saddle.

3. Connect black test lead to mid-green cable coming from headlamp (i.e. not coming from alternator).

4. With ignition switch in IGN position and lighting switch OFF.

5. A low voltage (i.e. 1—2) should register on voltmeter.

6. With lighting switch in PILOT, zero voltage should register on voltmeter.

7. With lighting switch in HEAD position a low voltage should register on voltage.

NOTE

Incorrect switching of these cables will cause incorrect charging rates, i.e. failure of mid-green and dark green linking together in HEAD position will result in a low charge rate with headlight switched on.

In the case of incorrect switching it is necessary to check the wiring and the switch for correct connections, etc.

Location and Remedy of Faults

Although every precaution is taken to eliminate all possible causes of trouble, failure may occasionally develop through lack of attention to the equipment, or damage to the wiring. The following pages set out the recommended procedure for a systematic examination to locate and remedy the causes of some of the more probable faults. The sources of many troubles are by no means obvious, and in some cases a considerable amount of deduction from the symptoms is needed before the cause of the trouble is disclosed.

IGNITION CIRCUIT

Engine will not start in IGN position

(*a*) Turn switch to EMG position. If the engine will now fire, the alternator and rectifier are operating correctly and the indication is a discharged battery ; this can be confirmed by poor light from the lamps and hydrometer readings below 1.200. Recharge the battery if necessary.

(*b*) Remove the H.T. cable from the sparking plug terminal and hold it about $\frac{1}{8}$-in. away from some metal part of the engine while the latter is slowly turned over. If sparks jump the gap regularly, the ignition equipment is functioning correctly. Check for engine defects or examine sparking plug.

(*c*) If sparks do not occur in test (*b*), check for a fault in the low tension wiring, i.e. from battery to switch, coil and contact breaker. If the wiring proves to be in order, examine the contact breaker ; if necessary clean the contacts and adjust the gap setting.

Engine will not start in EMG position

(*a*) Remove the H.T. cable and test as described under (*b*) above ; if sparks appear, then the trouble is due to engine defects, etc.

(*b*) If the ignition equipment is not operative in the above test, check the snap connectors, rectifier connections and other wiring. All connections must be clean and tight.

(*c*) Examine the contact breaker ; if necessary clean the contacts and adjust the gap setting.

(*d*) Make sure ignition timing is correct to engine maker's specification.

(*e*) See that the alternator rotor is fitted the correct way round on the engine shaft.

Engine misfires

(*a*) Examine the contact breaker ; if necessary, clean the contacts and adjust the gap.

(*b*) Remove the sparking plug (or each plug in turn), rest it on the cylinder head and observe if a spark occurs at the plug points when the engine is turned. Irregular sparking may be due to dirty plugs, which may be cleaned and adjusted, or to defective high tension cables. Any cable on which the insulation shows signs of deterioration or cracking should be renewed.

(*c*) If sparking is regular at each plug when tested as described in (*b*), the trouble is probably due to engine defects, and the carburetter, petrol supply, etc., must be examined.

(*d*) If misfiring occurs after the engine has been running for some time, check that the ignition switch is in the normal IGN position. If run continuously in the EMG position, the rising voltage of the battery may eventually cause misfiring to occur.

CHARGING CIRCUIT

Battery in low state of charge

(*a*) This state will be shown by poor or no light from the lamps when the engine is stationary, with a varying light intensity when the motor cycle is running.

(*b*) If the engine starts and runs in the EMG position, this indicates that the rectifier is functioning correctly.

(*c*) Check the condition of the battery with a hydrometer. Top up, if necessary, and have battery recharged.

(*d*) Check wiring from battery to switch, rectifier and alternator, tightening any loose connections or replacing broken cables.

Excess Circuit Voltage

(*a*) This will be indicated by burnt-out or blackened bulbs, and possibly poor engine performance due to burned ignition contacts.

(*b*) Examine all wiring for loose or broken connections.

(*c*) Check the earthing of battery and rectifier.

(*d*) Examine the battery, removing any traces of corrosion.

(*e*) If the ignition is affected, clean the contact breaker contacts or if necessary renew them.

THE BATTERY POSITIVE (+ve) TERMINAL IS EARTHED TO THE MACHINE. UNDER NO CIRCUMSTANCES MUST THE NEGATIVE (—ve) TERMINAL BE EARTHED.

LIGHTING CIRCUITS

Failure of lights (machine stationary)

(*a*) If only one bulb fails to light, replace with new bulb.

(*b*) If all lamps fail to light, test the state of charge of battery, recharging it if necessary either by a long period of daytime running or from an independent electrical supply.

(*c*) Examine the wiring for a broken or loose connection, and remedy.

Lamps light when switch on, but gradually fade

Test the state of charge of the battery, recharging if necessary.

Brilliance varies with speed of motor cycle

Test the state of charge of the battery, recharging if necessary.

Lights flicker

Examine the wiring for loose connections, or short circuits caused by faulty cable insulation.

Headlamps illumination insufficient

(*a*) If the bulb is discoloured or filaments have sagged as a result of long service, a new bulb of the same type should be fitted.

(*b*) Check the setting of the lamp.

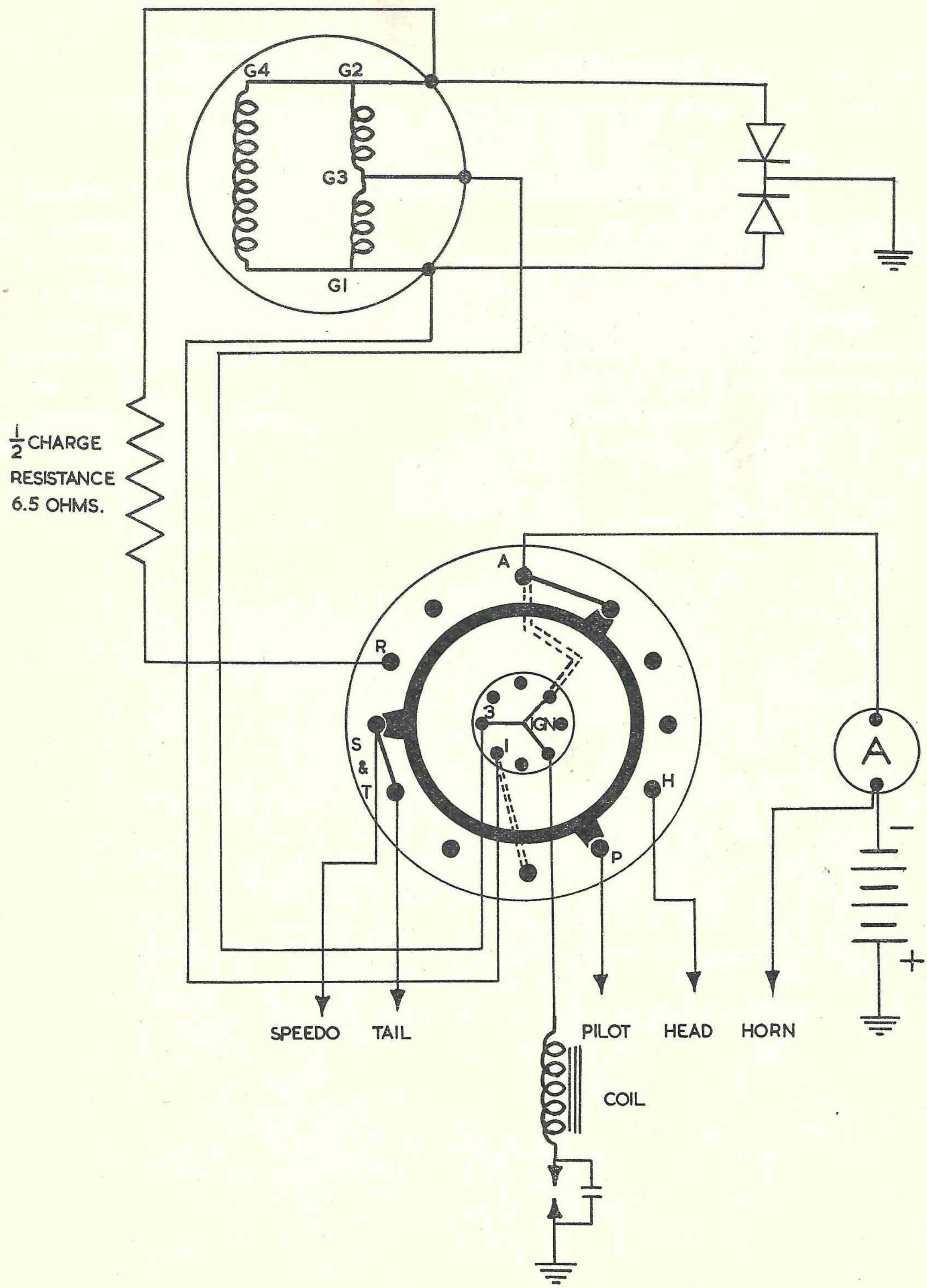
LUCAS

WIRING DIAGRAMS

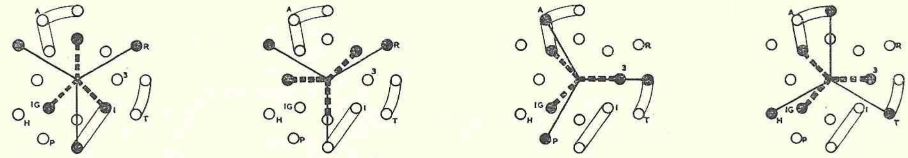
FOR

MOTOR-CYCLES

A.C. EQUIPMENT



THEORETICAL DIAGRAM



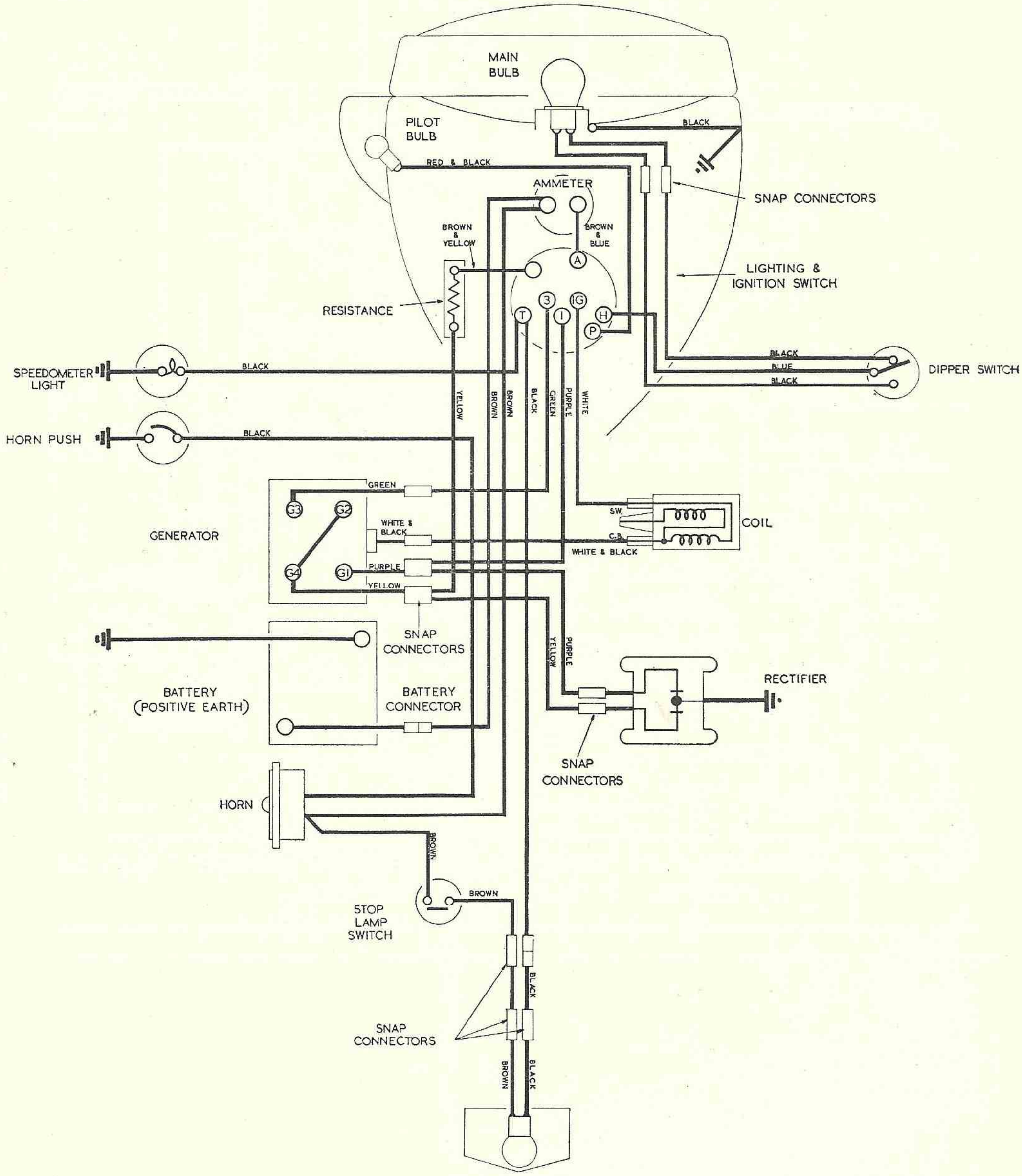
LIGHTING OFF (TURN LT. SW TO 'O') EMERGENCY IGNITION ON (TURN IGNITION KEY LEFT)

LIGHTING OFF (TURN LT. SW. LEFT TO 'O') IGNITION OFF (TURN IGNITION KEY CENTRAL)

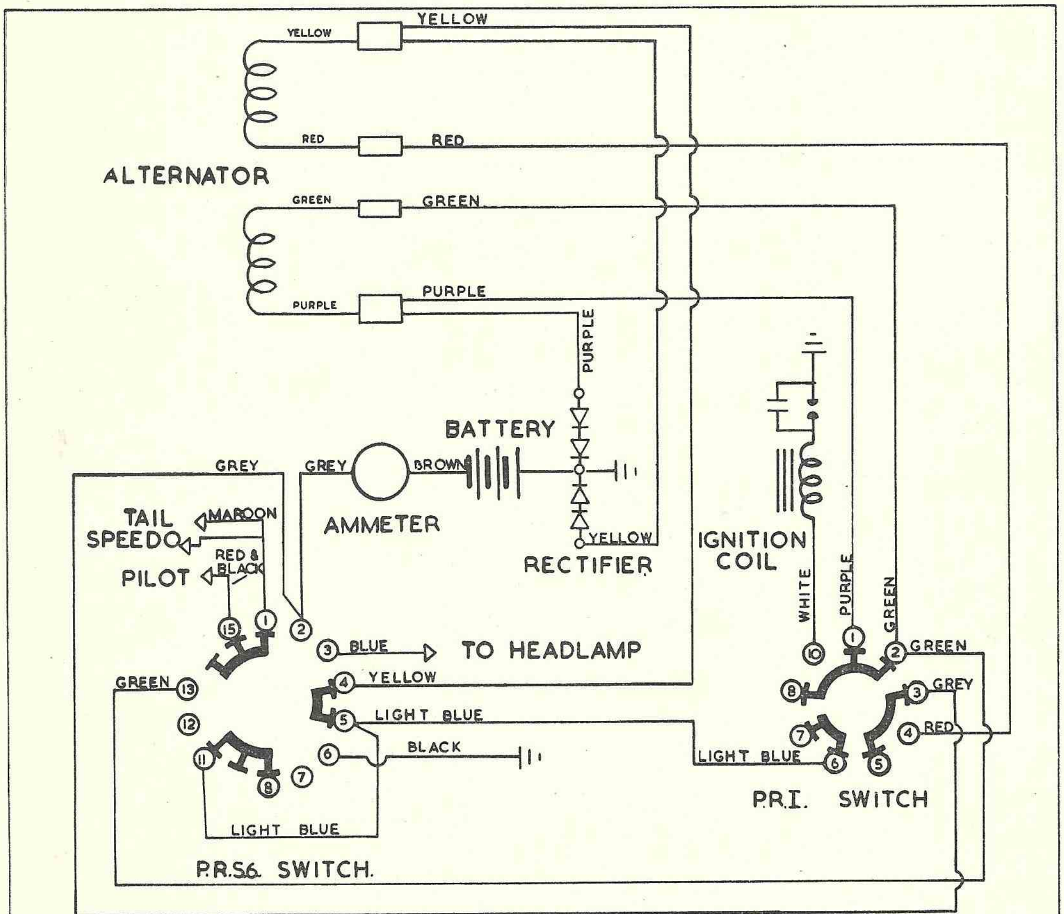
TAIL & PILOT LT'S ON (TURN LT. SW. RIGHT TO 'P') IGNITION ON (TURN IGNITION KEY RIGHT)

TAIL & HEAD LT'S ON (TURN LT. SW. RIGHT TO 'H')

DIAGRAMS SHOWING SWITCH POSITIONS LOOKING ON TOP OF SWITCH



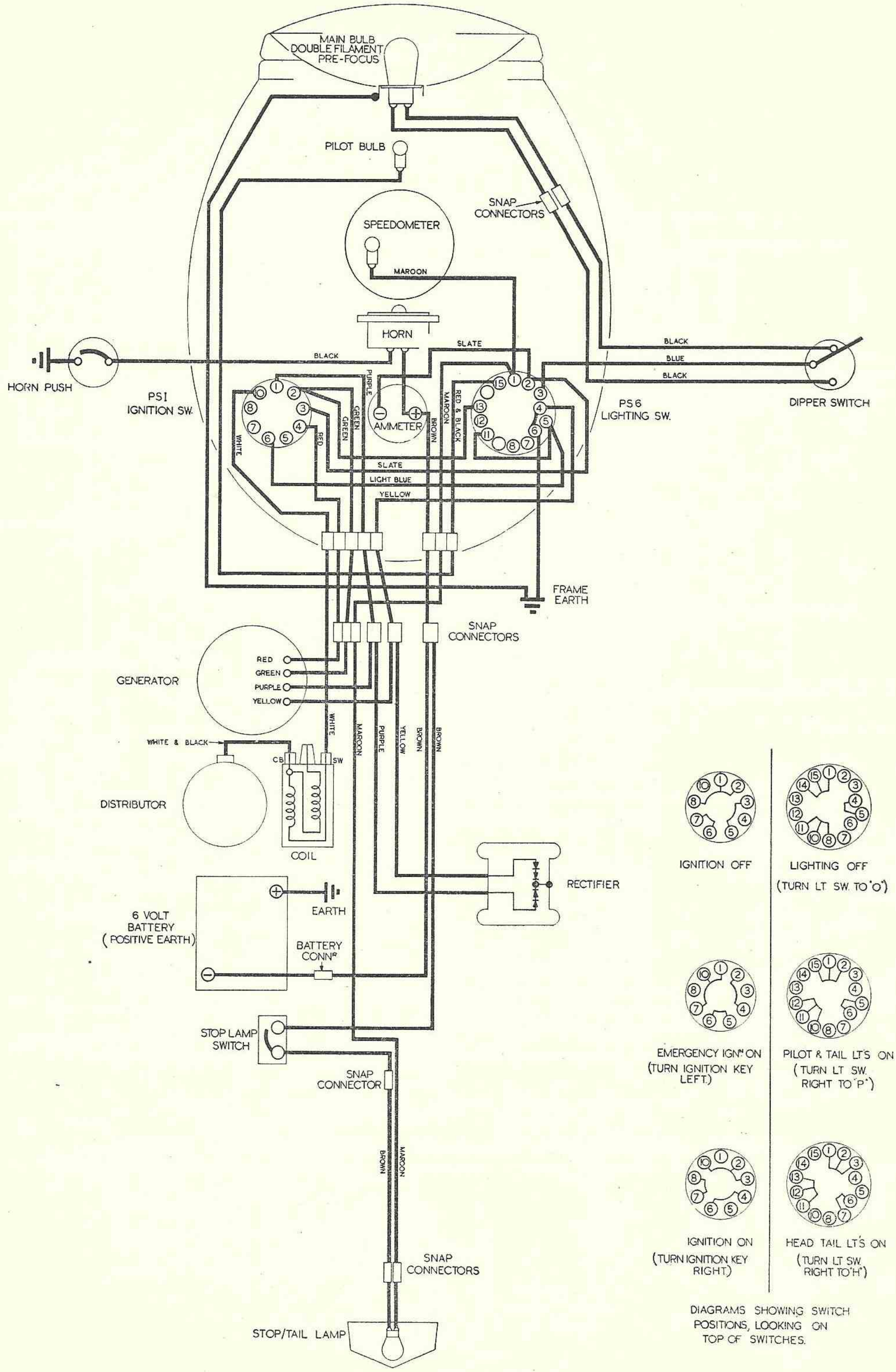
WIRING LAYOUT DIAGRAM



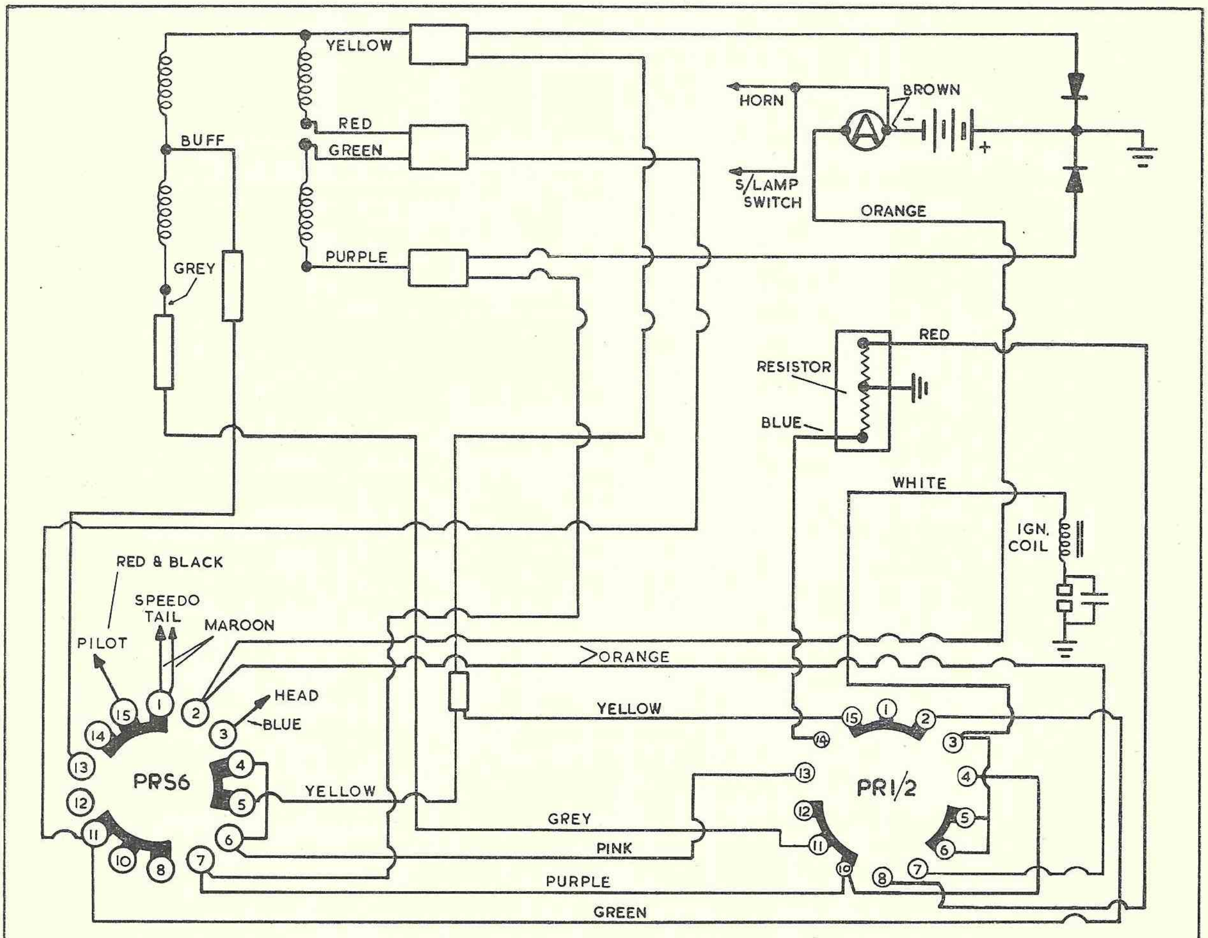
TECHNICAL DIAGRAM OF "THE RM 12 ALTERNATOR CIRCUIT" USED ON TRIUMPH "5 T.A.C." MOTOR CYCLES

(The Alternator is single wound and a double plate full wave rectifier is incorporated in the circuit)

THEORETICAL DIAGRAM

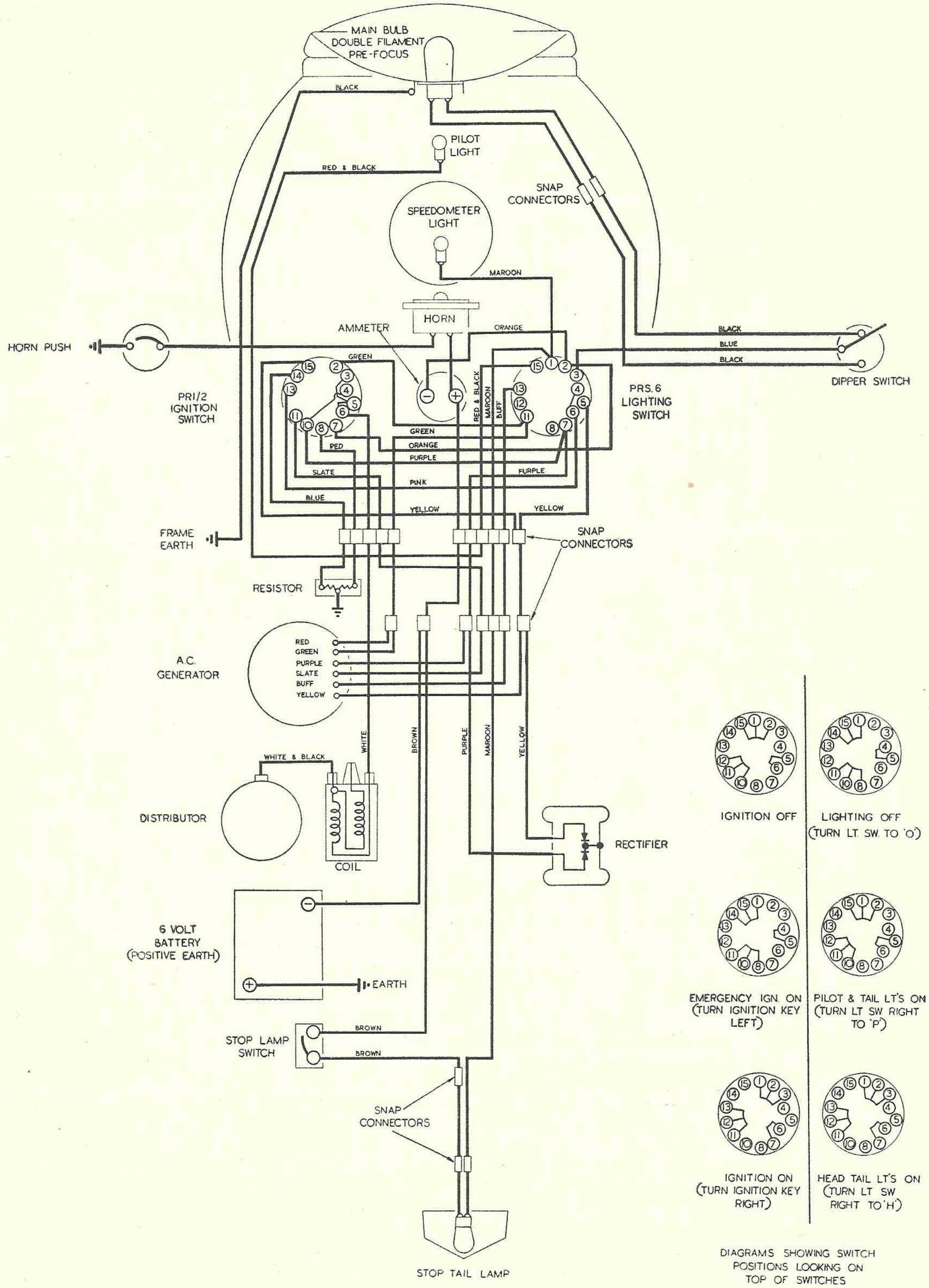


WIRING LAYOUT DIAGRAM

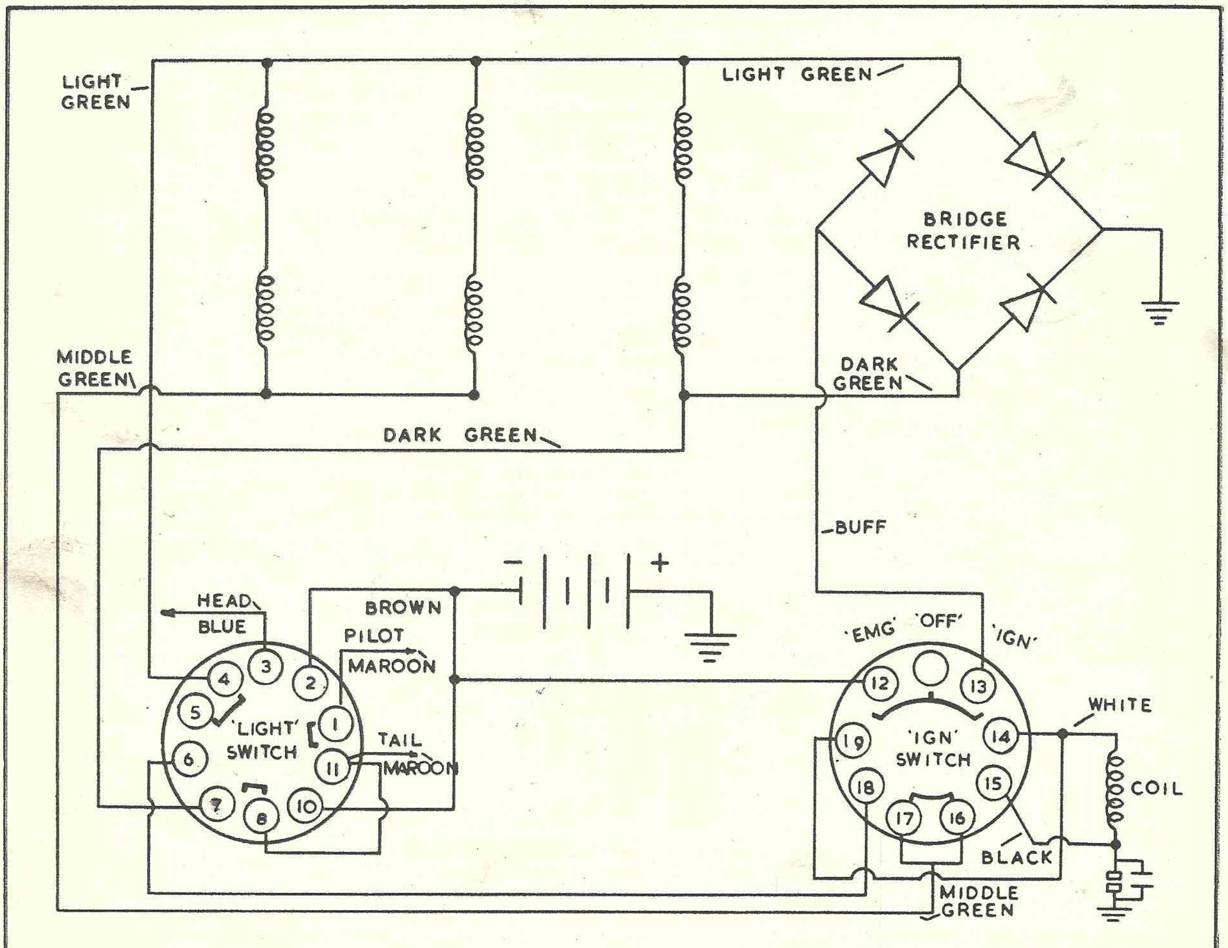


TECHNICAL DIAGRAM OF THE RM12 ALTERNATOR CIRCUIT USED ON TRIUMPH "5 T.A.C." MOTOR CYCLES. (MODIFIED FOR CONTINUOUS RUNNING IN THE "EMG" SWITCH POSITION)

THEORETICAL DIAGRAM

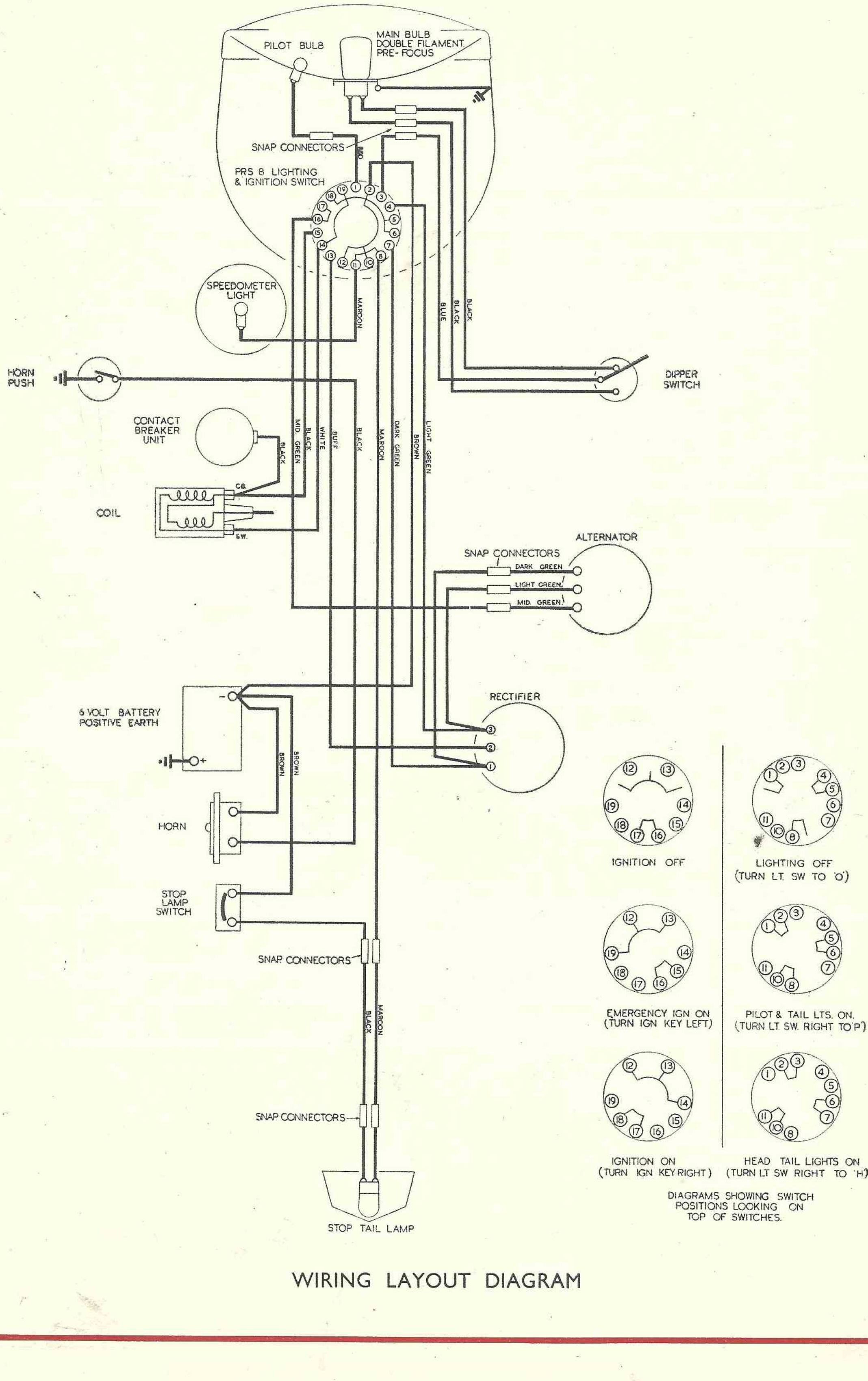


WIRING LAYOUT DIAGRAM

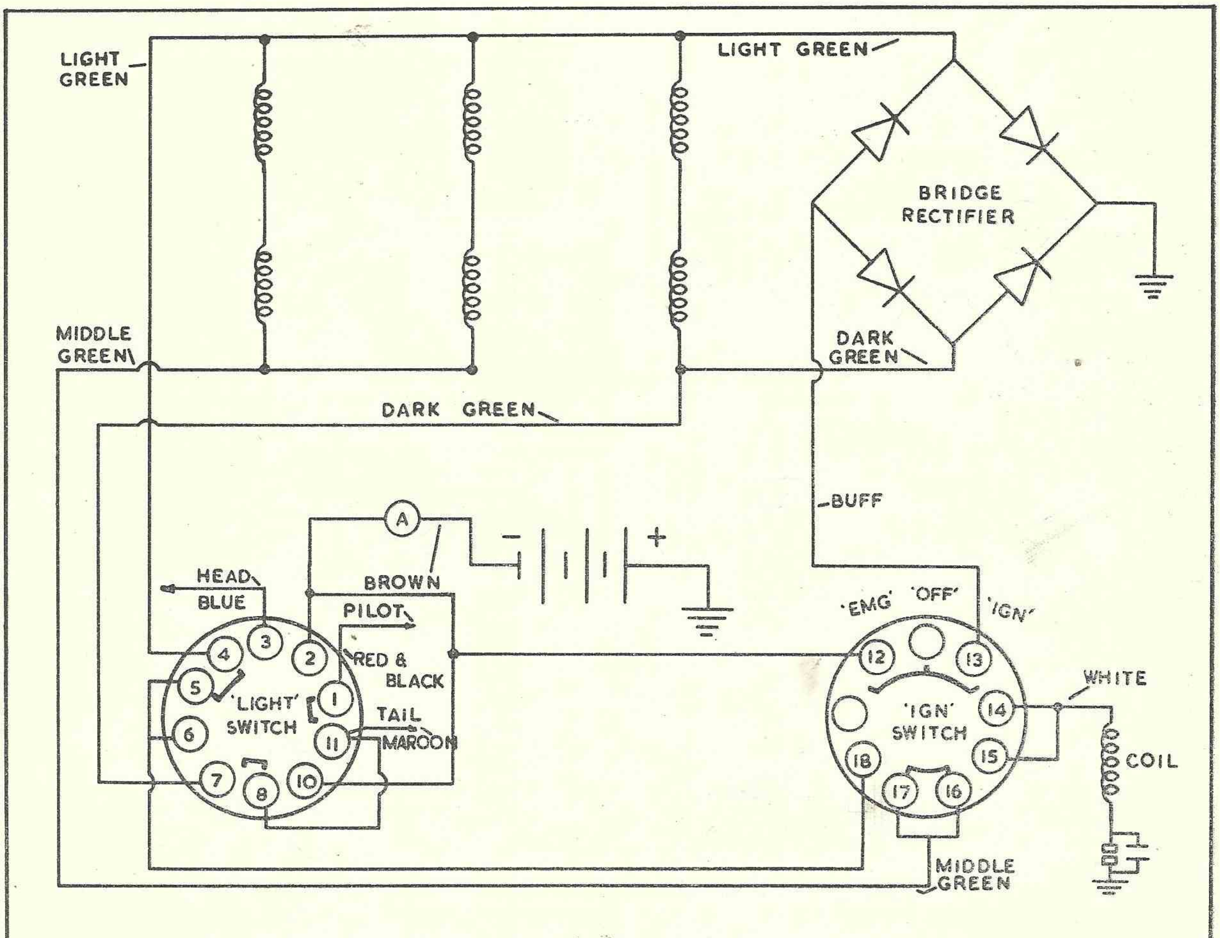


TECHNICAL DIAGRAM OF LUCAS RM13 ALTERNATOR CIRCUIT USED ON SINGLE CYLINDER MOTOR CYCLES

THEORETICAL DIAGRAM

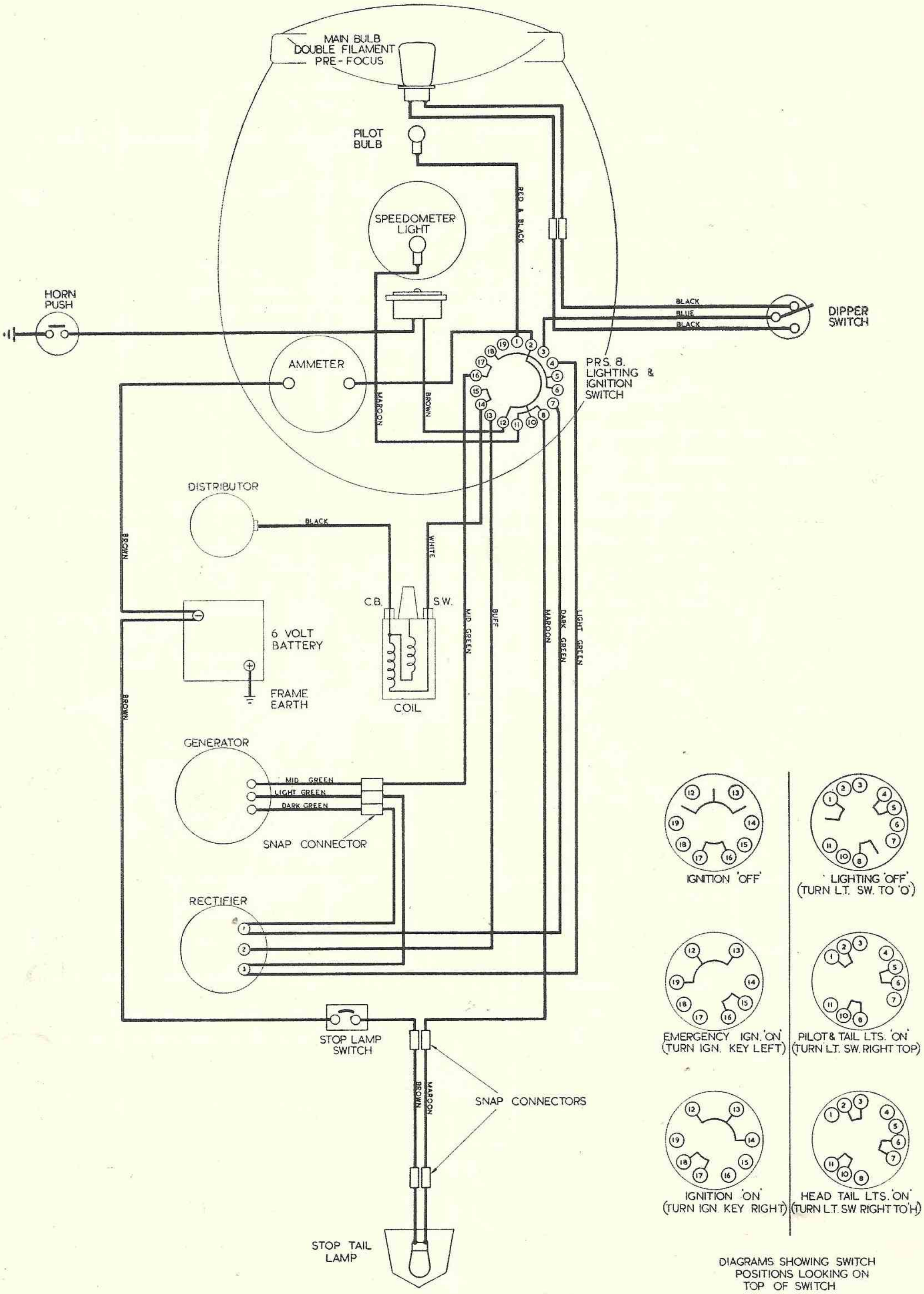


WIRING LAYOUT DIAGRAM

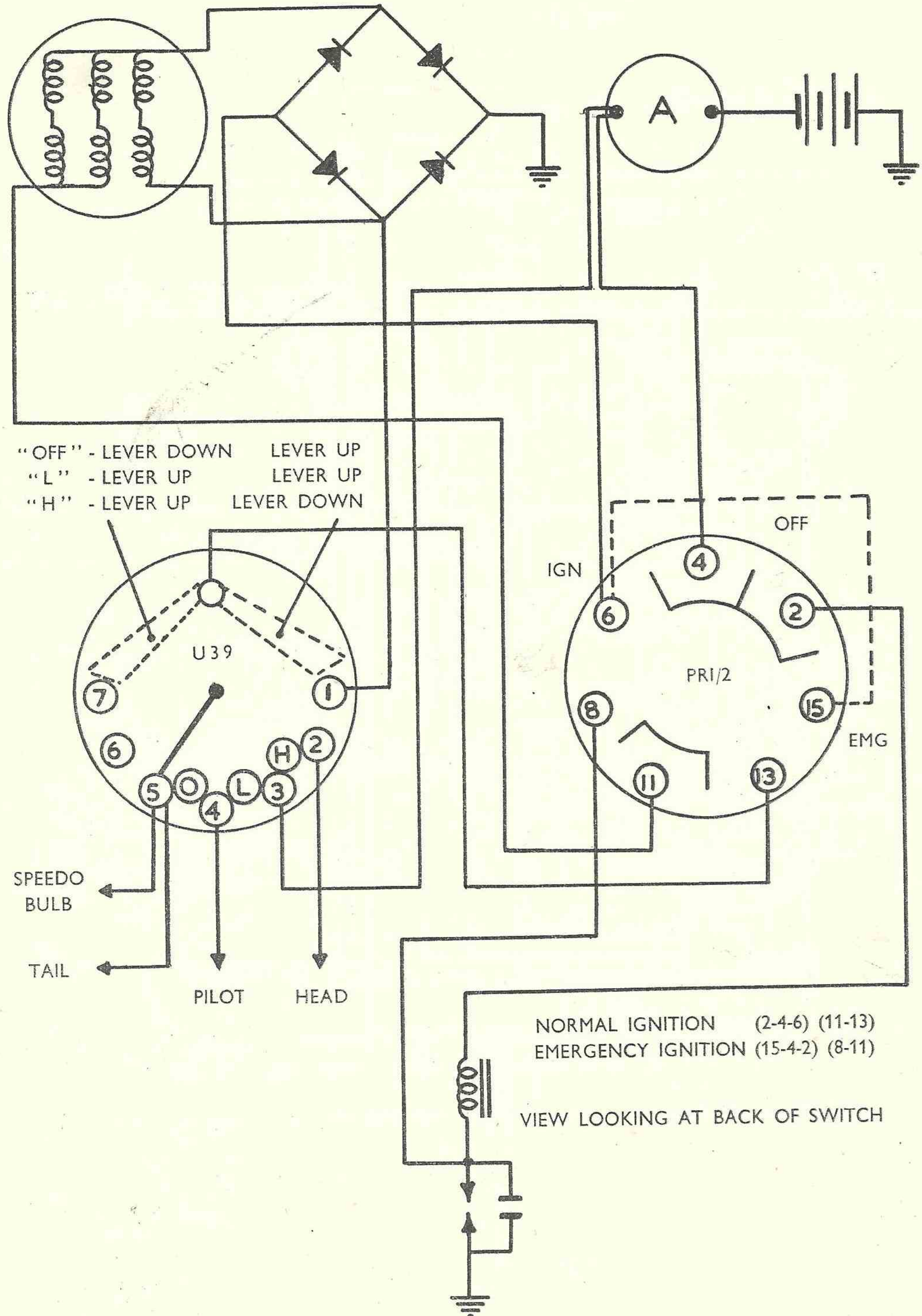


TECHNICAL DIAGRAM OF LUCAS RM14 ALTERNATOR CIRCUIT USED ON TWIN CYLINDER MOTOR CYCLES

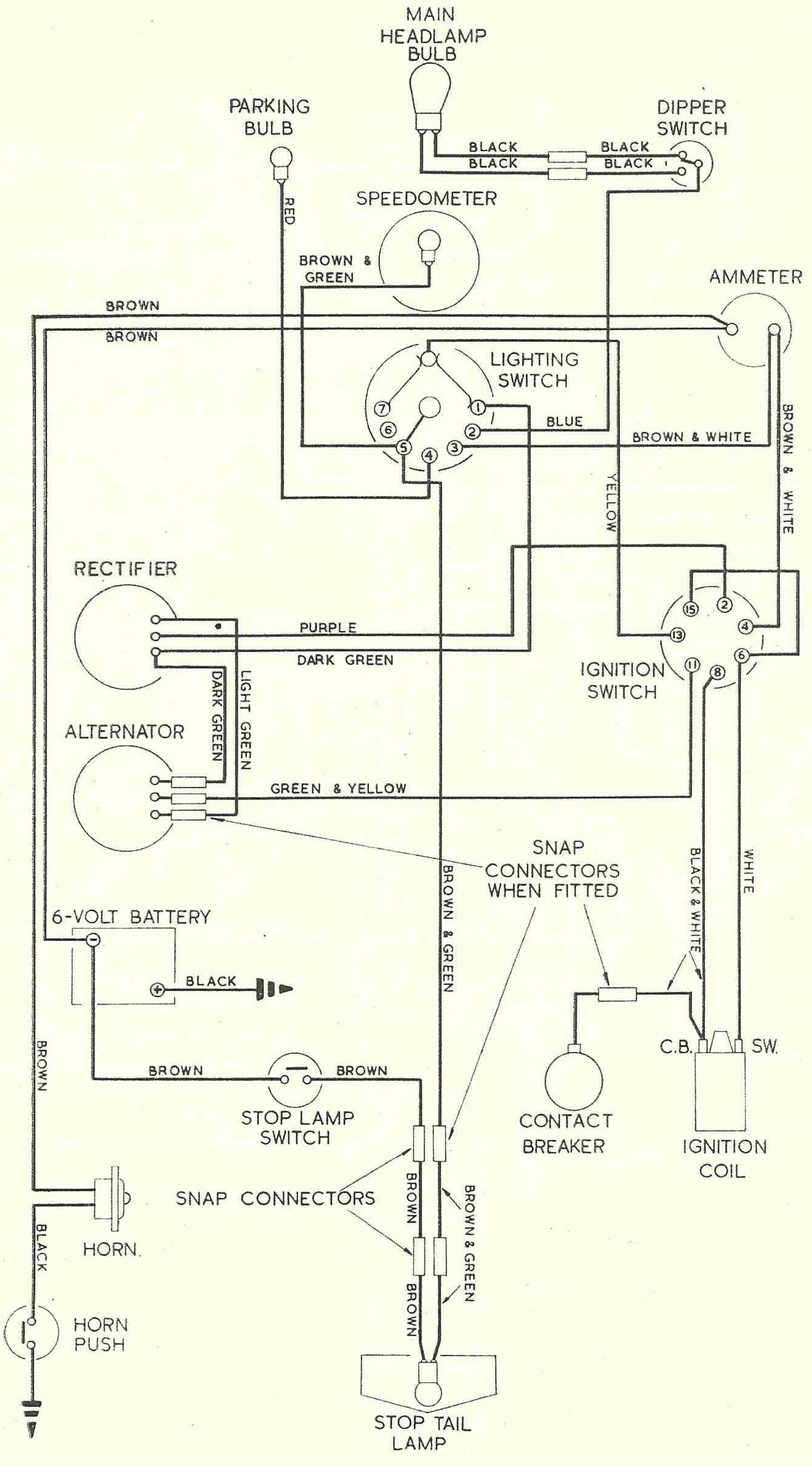
THEORETICAL DIAGRAM



WIRING LAYOUT DIAGRAM

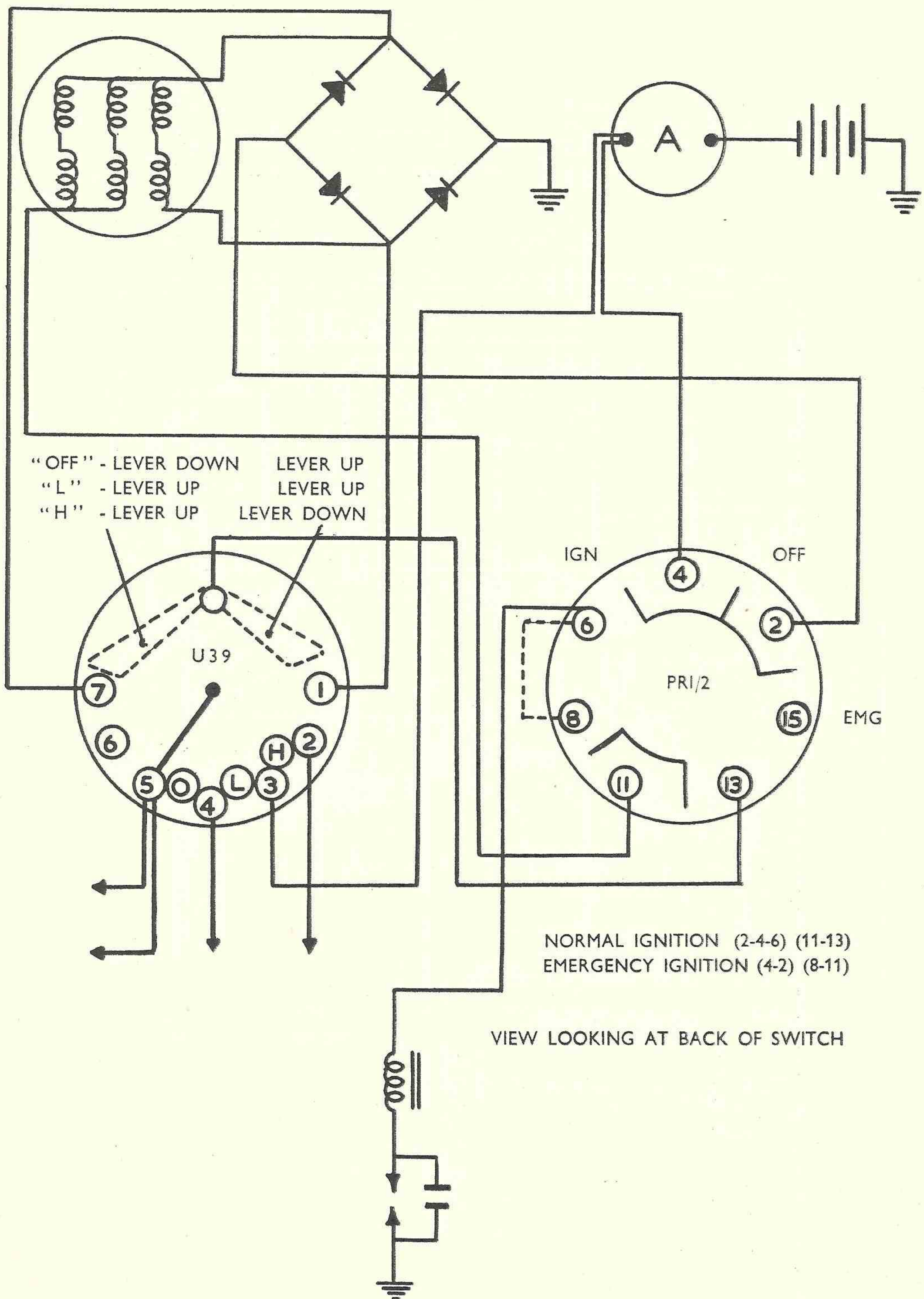


THEORETICAL DIAGRAM



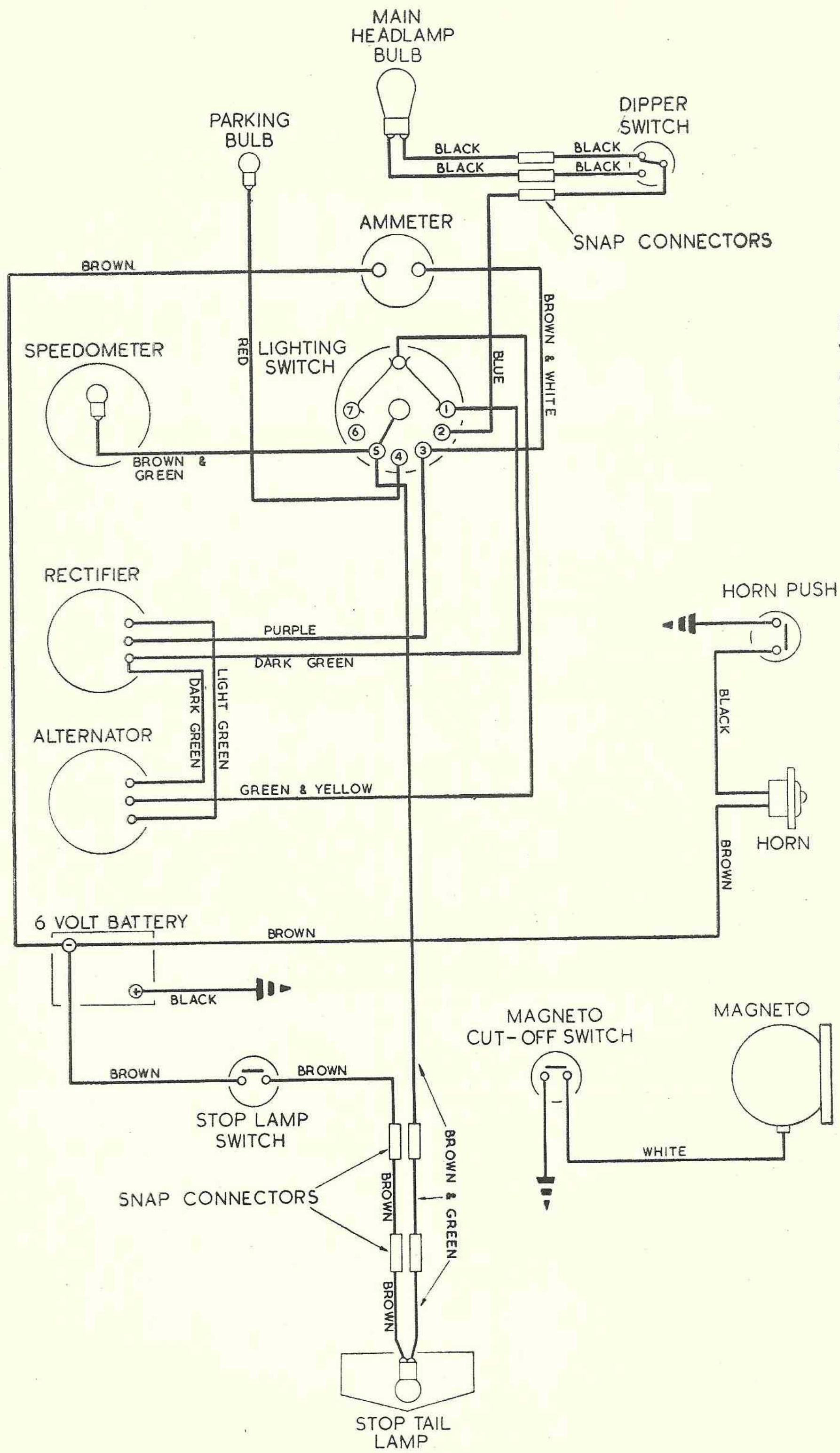
WIRING LAYOUT DIAGRAM

RM14—Separate Lighting-Ignition Switch Circuit for use on Twin Cylinder Machines



THEORETICAL DIAGRAM

RM13 or RM14—Circuit used on Single or Twin Cylinder Machines using Magneto Ignition



NOTE:
When this circuit is used on Twin Cylinder machines a lead is included between terminal 7 on the lighting switch, and the Light Green terminal at the rectifier.

WIRING LAYOUT DIAGRAM

LUCAS

ELECTRICAL EQUIPMENT

SPARES LIST

FOR

A.C. GENERATORS

Make	Year	Alternator		Rectifier	Resistance	Lighting and Ignition Switch	
		Model	Part No.			Model	Part No.
B.S.A.							
" Bantam "	1950/3	IA45	47077/EF	47097A	—	PRS4	31268A
" C11G "	1954	RM13	047506	47111A	—	PRS8	31443A/E
" C11G "	1955	RM13	047506	47111A	—	PRS8	31443A/E
Brockhouse							
" Indian Brave "	1951/5	IA45A	47069A	47097A	—	PRS4	31268A
" Indian Brave " (later)	1955	RM13	047506	47111A	—	U39 PR1/2	†31491A *34093B
Dot							
248 c.c.	1951/5	IA45A	47069A	47097A	—	PRS4	31268A
Enfield							
Clipper (except U.S.A.)	1955	RM13	047514	47111A	—	PR1/2 U39	*34093B †31491A
O.E.C.							
" 250 " 248 c.c.	1952/5	IA45A	47069A	47097A	—	PRS4	31268A
Triumph							
5 TAC	1953	RM12 (Series A)	47090A	47094A	47106	PRS6	†34087A
5 TAC (later)	1953	RM12 (Series C)	047500	47097A	—	RS39 PR1/2	†31371A/B *34091A
5 TAC and 6 TAC	1954	RM14	047507	47111A	—	PRS8	31443A/E
" Terrier " T15	1953/5	RM13	047502	47111A	—	PRS8	31443A/E
" Tiger Cub " T20	1954/5	RM13	047502	47111A	—	PRS8	31443A/E
" Speed Twin " and " Thunder Bird " ..	1955	RM14	047511	47111A	—	PRS8	31443A/E
" Speed Twin " and " Thunder Bird " (later)	1955	RM14	047510				
Turner Manufacturing							
(Light Delivery Vehicles) Bi-Van and Tri-Van	1951	IA45	47068H	47097A	—	S56	*31246A

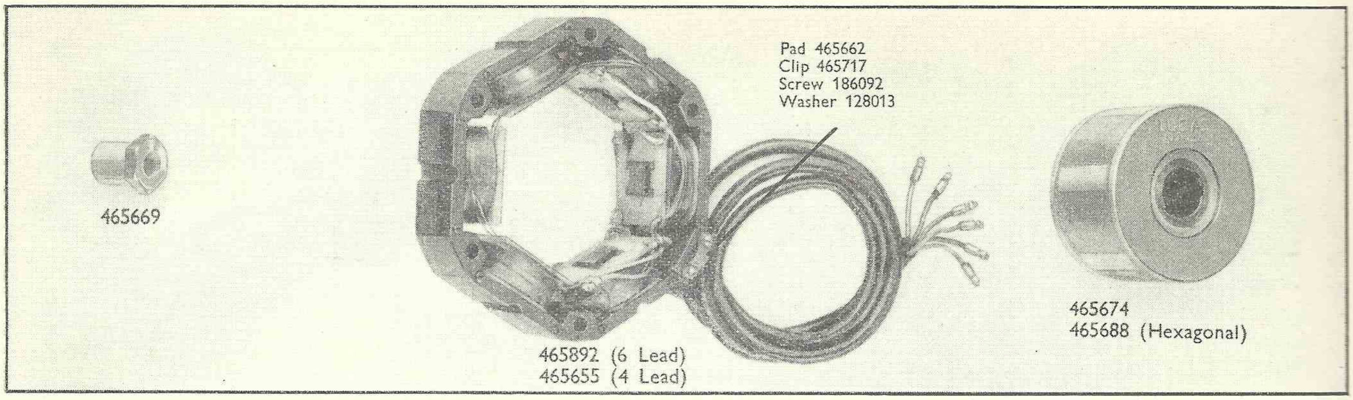
AMENDMENT.

Specifications for Triumph 5TAC should read :—

Make	Year	Alternator		Rectifier	Resistance	Lighting and Ignition Switch	
		Model	Part No.			Model	Part No.
5 TAC	1953	RM12 (Series A)	47090A	47094A	—	PR1 PRS6	*34095A †34087A
5 TAC (later)	1953	RM12 (Series C)	047500	47097A	47106	PR1/2 PRS6	*34091A †34087A

Detailed parts for Switch 34095A are as for 34093A.

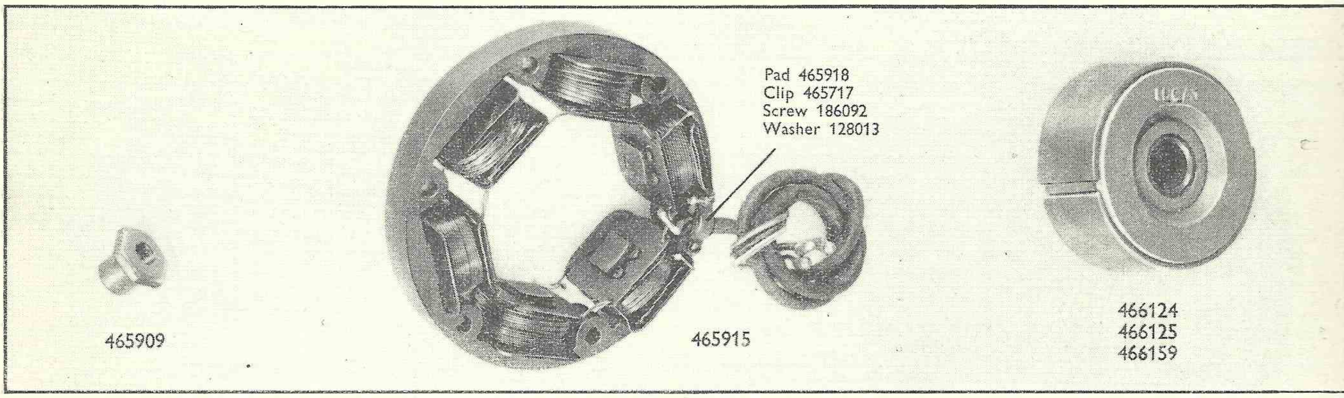
RM12 ALTERNATORS



No. Off	Part No. / Model / Type / Rotation	47090A RM12 RO Clock	047500 RM12 RO Clock
1	Rotor assembly	465688	465674
1	§Stator assembly	465655	465892
1	Pad, insulating	465662	465662
1	Clip, cable	465717	465717
2	Screw, cable clip fixing	186092	186092
2	Washer, fixing screw	128013	128013
1	Nut, locking	465669	465669
	Serviced by :—Stator	**465655**	**465892**
	Rotor	**465688**	**465674**

§Recommended spares for stock.

RM13 ALTERNATORS

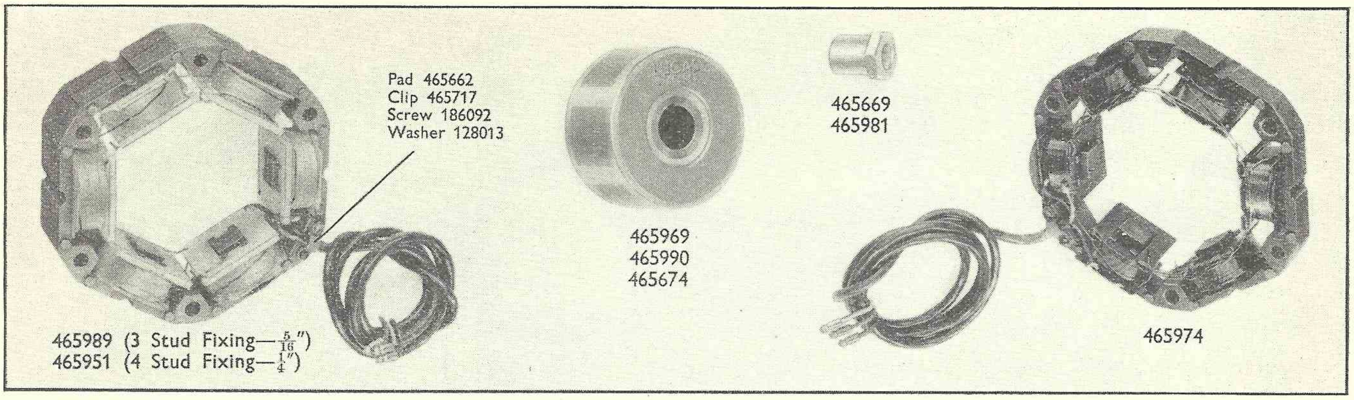


No. Off	Part No. / Model / Type / Rotation	047502 RM13 RO19 Clock	047506 RM13 AC Clock	047514 RM13 Enfield Clock
1	Rotor assembly	466124	466125	466159
1	§Stator assembly	465915	465915	465915
1	Pad, insulating	465918	465918	465918
1	Clip, cable	465717	465717	465717
2	Screw, cable clip fixing	186092	186092	186092
2	Washer, fixing screw	128013	128013	128013
1	Nut, locking	465909	—	—
	Serviced by :—Stator	**465915**	**465915**	**465915**
	Rotor	**466124**	**466125**	**466159**

§Recommended spares for stock.

Detailed Spare Parts

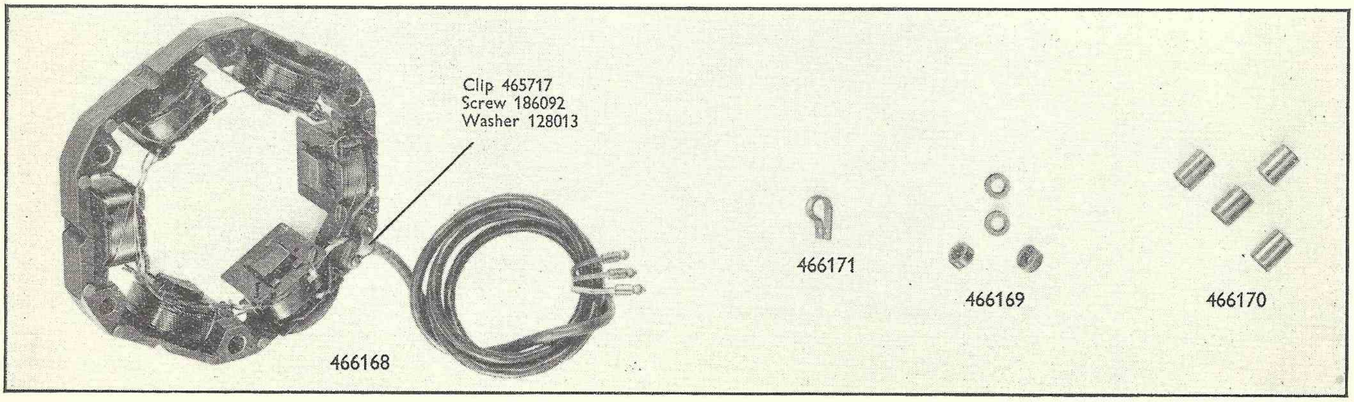
RM14 ALTERNATORS



No. Off	Part No. .. .. Model .. .. Type .. .. Rotation	047507A (Thick Stack) RM14 RO Clock	047510 (Thin Stack) RM14 RO Clock	047511 (Intermediate Stack) RM14 RO Clock
1	Rotor assembly	465674	465969	465990
1	§Stator assembly	465951	465974	465989
1	Pad, insulating	465662	—	465662
1	Clip, cable	465717	465717	465717
2	Screw, cable clip fixing	186092	186092	186092
2	Washer, fixing screw	128013	128012	128013
1	Nut, locking	465669	465981	465669
	Serviced by :—Stator	**465951**	**465974**	**465989**
	Rotor	**465674**	**465969**	**465990**

§Recommended spares for stock.

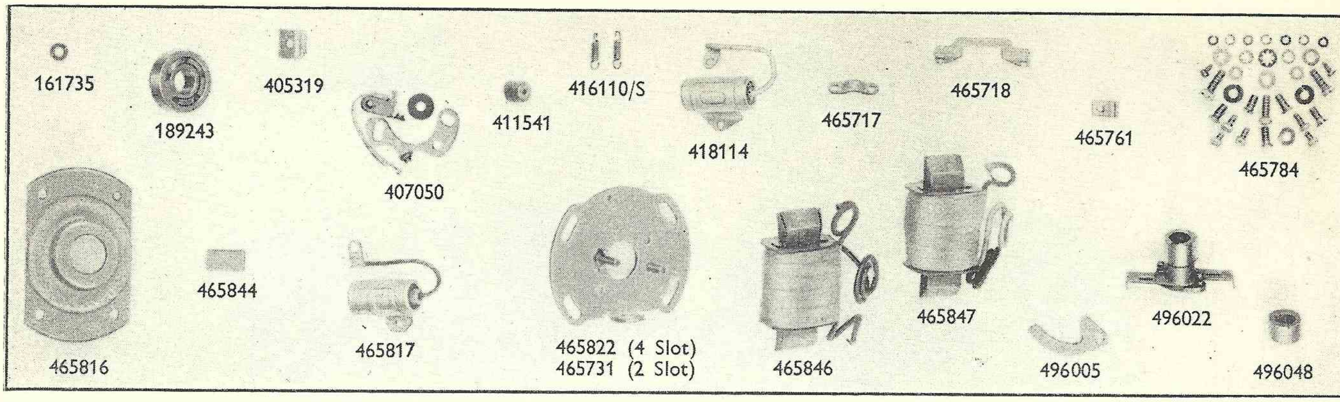
RM14 UNIVERSAL SERVICE REPLACEMENT STATORS



No. Off	Part No. .. .. Model .. Type ..	466168 RM14 RX
1	§Stator assembly	466168
1	Clip, cable	465717
2	Screw, cable clip fixing	186092
2	Washer, fixing screw	128013
1	Clip, cable	466171
4	Collar, packing, short	466169
4	Collar, packing, long	466170

§Recommended spares for stock.

IA45 ALTERNATORS

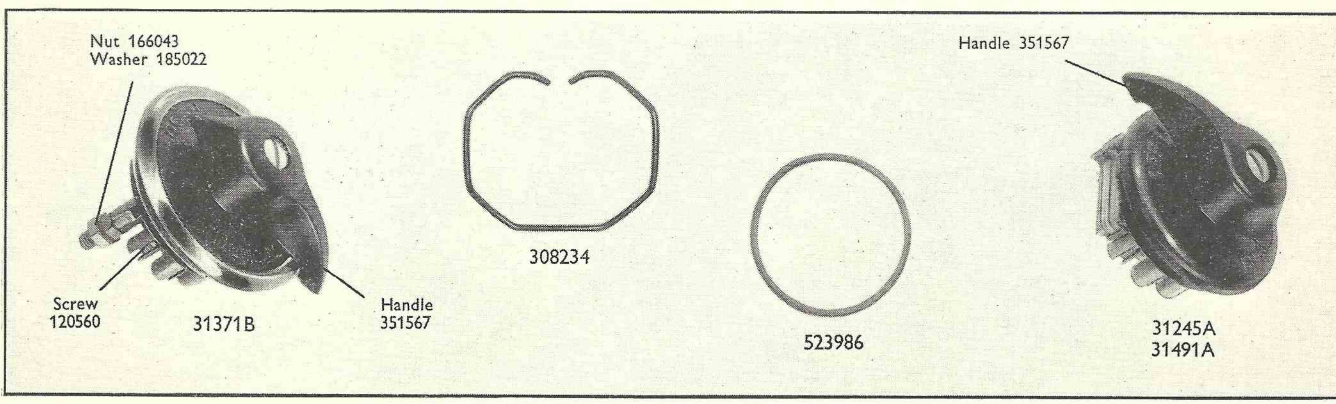


No. Off	Part No. .. .. / Model .. .. .. / Type .. .. .. / Rotation .. .. / E.C.M. Curve No. .. / Range	47068H IA45 QB Clock — —	47069A IA45A VN Clock 457 28°—32°	47077E/F IA45 AC Clock — —
1	§Condenser	418114	418114	465817
1	§Contact set	407050	407050	407050
1	Felt, cam lubricating	411541	411541	411541
1	Base, with pivot pins ..	465731	465731	465822
1	Bush, terminal insulating	161735	161735	161735
1	Plate, terminal insulating	405319	405319	405319
1	§Plate, bearing support	—	—	465816
1	§Bearing	—	—	189243
1	§Cam	496048	—	496048
2	§Weight, auto advance..	—	496005	—

No. Off	Part No. .. .. / Model .. .. .. / Type .. .. .. / Rotation .. .. / E.C.M. Curve No. .. / Range	47068H IA45 QB Clock — —	47069A IA45A VN Clock 457 28°—32°	47077E/F IA45 AC Clock — —
2	§Spring set, auto advance	—	416110/S	—
1	§Cam assembly ..	—	496022	—
4	Clamp, coil fixing ..	465718	465718	465718
4	Clip, cable	465761	465761	465761
1	Pad, insulating.. ..	465844	465844	465844
1	Clamp, cable	465717	465717	465717
1	§Coil, left hand ..	465847	465847	465847
1	§Coil, right hand ..	465846	465846	465846
1	§Sundry parts set ..	465784	465784	465784

§Recommended spares for stock.

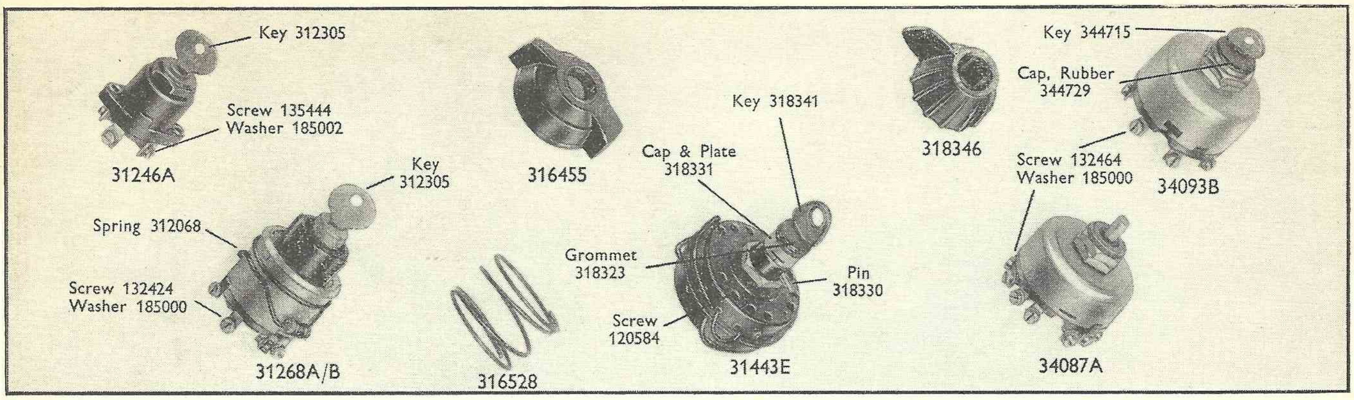
LIGHTING SWITCHES — MODEL RS39 AND U39



No. Off	Part No. .. .. / Model .. .. / Type	31371A/B RS39 L2	31245A U39 L21	31491A U39 L26
1	§Handle, with fixing screw	351567	351567	351567
‡	§Screw, terminal	120560	120560	120560
1	Spring, switch fixing	—	308234	308234
1	§Ring, rubber, switch seating	523986	523986	523986
1	§Washer, locking, handle fixing	188408	188408	188408
1	Nut, strap fixing	166043	—	—
1	Washer, strap fixing nut	185022	—	—

§Recommended spares for stock.
‡As required.

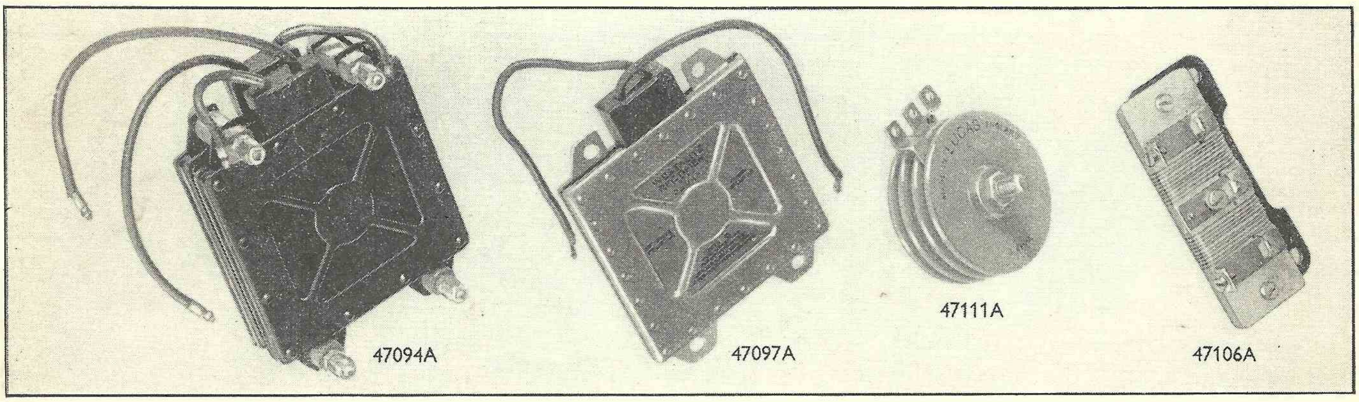
LIGHTING AND IGNITION SWITCHES — Models S56, PRS4, PRS6, PRS8 and PR1/2



Part No. .. .. Model .. .. .. Type	*31246A S56 L		31268A PRS4 L		31268B PRS4 L		31443A/E PRS8 L		34087A PRS6 —		*34093B PR1/2 —	
		No. off		No. off		No. off		No. off		No. off		No. off
§Key	312305	2	312305	2	312305	2	318341	2	—	—	344715	2
§Cap, rubber	—	—	—	—	—	—	—	—	—	—	344729	1
§Screw, terminal ..	135444	4	132424	8	132424	8	120584	18	132464	12	132464	7
Pin, knob fixing ..	—	—	—	—	—	—	318330	1	—	—	—	—
Grommet	—	—	—	—	—	—	318323	1	—	—	—	—
§Washer, spring ..	185002	4	185000	8	185000	8	—	—	185000	12	185000	7
Spring assembly, fixing	—	—	312068	1	316528	1	—	—	—	—	—	—
Cap and Plate ..	—	—	—	—	—	—	318331	—	—	—	—	—
‖Knob	—	—	316455	1	316455	1	318346	1	—	—	—	—

§Recommended spares for stock. *Ignition switch only. ‖Order separately

RECTIFIERS



Part No.	
47094A	Double Pack — Centre Tapped — 3¾″ square — 4 bolt fixing. Fixing centres 2¼″ x 4¼″.
47097A	Single Pack — Centre Tapped — 3¾″ square. Double voltage. 4 fixing holes. Fixing centres 2¼″ x 4¼″.
47111A	Bridge type — 4 Plate — 2¾″ diameter — Centre bolt mounting $\frac{5}{16}$″ diameter.

RESISTANCE used in conjunction with Alternator, Series "C" (047500)

Part No.	
47106A	Oblong former — wound with Nichrome wire — 2 hole fixing bracket. Fixing centres 4$\frac{9}{16}$″.