SCOOTER SERVICE SHEET

1050

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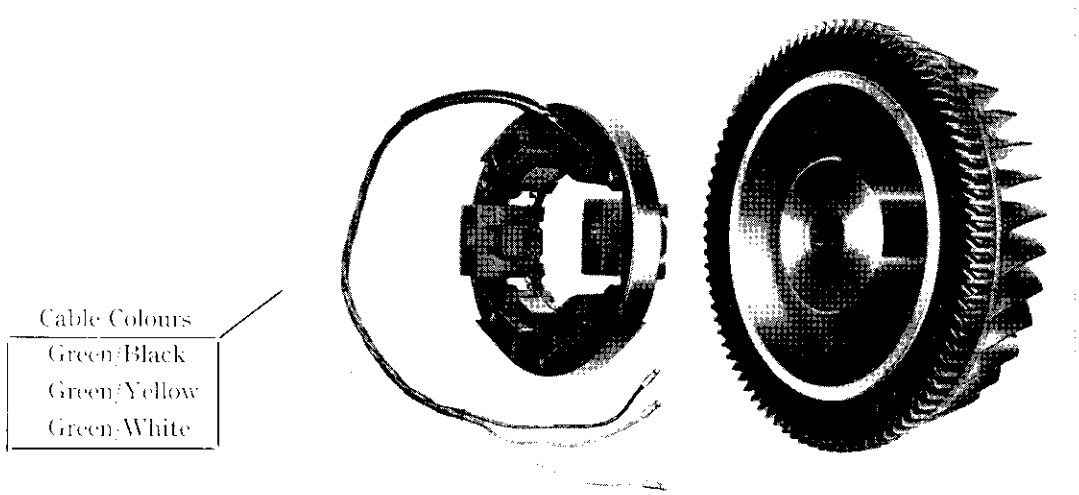
250 c.c. O.H.V. Twin Cylinder Scooter fitted with Lucas 5AF Alternator

Introduction and Testing Procedure



General Description

Designed specially for enclosed engines where fan cooling is necessary, the 5AF alternator consists of a conventional, RM13 type, wound stator for bolting to the engine crankcase but its RM15 type rotor is cast integral with the engine flywheel. This has cooling fins cast in its external surface while an inertia ring is screwed to its periphery. When the engine is fitted with an electric starting motor, a starter ring gear is substituted for the inertia ring. There is a 6 volt and 12 volt version of this unit. Two particular applications of the 5AF alternator concerns the 250 c.c. o.h.v. twin cylinder scooters, which include a de-luxe machine having a starting motor fitted with a starter ring gear. On the standard machine is fitted a 6 volt 5AF which incorporates an inertia ring, instead of the starter ring gear.

The 6 volt 5AF is rated at 60 watts, whilst the 12 volt unit is rated at 110 watts.

Output Control

The standard circuit has the output wires from the generator connected by their snap connectors to similarly coloured wires on the wiring harness and provides the following output control.

Lighting Switch in "OFF" Position

The output is taken from one pair of coils by means of the Green/White and Green/Black wires, and the remaining coils (Green/White and Green/Yellow wires) are open-circuited.

Lighting in Switch "PILOT" Position

Output taken from one pair of coils by Green/White and Green/Black wires as before and the remaining coils are on open-circuit.

Lighting Switch in "HEAD" Position

All three pairs of coils are connected in parallel and the maximum output is obtained. **Note.**—To provide an increased charging rate with the lighting switch in the "OFF" position, some models will be found to have the wire joining terminals 5 and 6 of the headlamp switch removed. This means that no coils are shorted out in this switch position and the charging rate is slightly increased.

In circumstances where a considerable amount of low speed running is necessary or there are long periods of parking with the lights on, it is possible to increase the charging rate with the lighting switch in the "OFF" and "PILOT" positions by connecting the Green/Yellow alternator cable by its snap connector to the Green/Black harness cable and the Green/Black alternator cable to the Green/Yellow harness cable.

The Green/White cables should not be disturbed. These alternative connections considerably increase the charging rate in these switch positions, and the connections should be returned to standard for normal conditions of use or long runs.

Owing to the effects of the above modifications it is essential that the wiring circuit is returned to standard before checking the charging rates during fault finding.

Emergency Starting

With the ignition switch in the "EMG" position, the battery is not isolated from the alternator and will, in fact, receive a charge whilst the machine is being run.

This arrangement is also a safeguard against continuous running in the "EMG" position. The back pressure of the battery will increase as it is charged, until it is sufficiently strong to affect the working of the ignition system. When this happens misfiring will occur, resulting in poor engine performance. In view of this, always check that the machine is not being run with the ignition switch continually in the "EMG" position, before testing the system for other faults.

Motor Cycle Trials Events, etc.

When using the machine for trials riding, the alternator can be used continuously in the "EMG" position without a battery, providing the lead from the main harness to the battery negative terminal is earthed to the machine, but contact points are liable to become badly burned.

Test Procedure

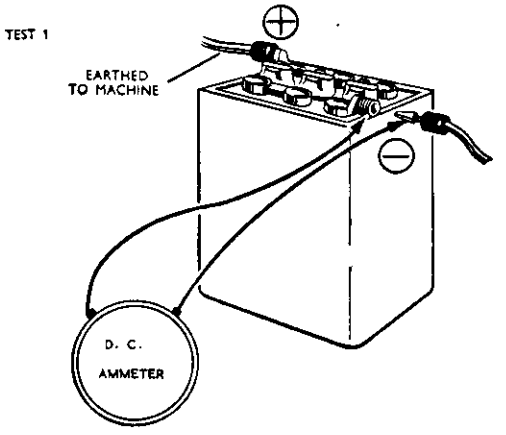
As the lights and other equipment are operated on a normal D.C. circuit they can be checked by normal continuity tests with a battery and bulb.

The following equipment is required to satisfactorily test the charging circuit. The meters used should be accurate moving coil instruments.

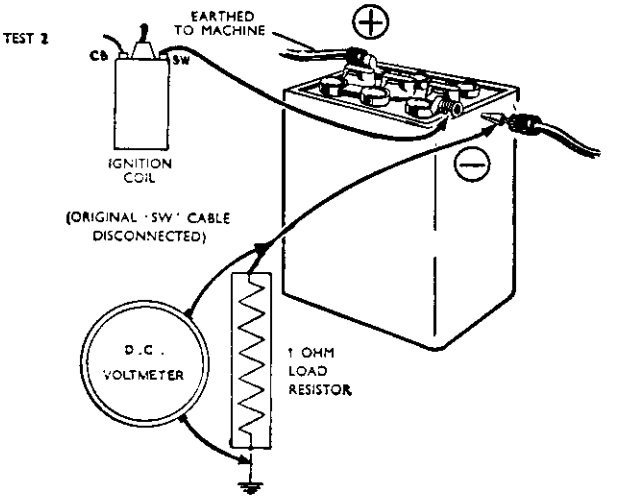
A.C. voltmeter scale 0–15 volts
D.C. ammeter scale 0–15 amps.
D.C. voltmeter scale 0–15 volts
1 ohm. load resistance
12 volt battery and 36 watt bulbs

Checking D.C. Input to Battery

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



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.



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.	
		6 Volt	12 Volt
1	OFF	1.75 (min.)	2.5 (min.)
	PILOT	0.75 (min.)	1.5 (min.)
	HEAD	0.5 (min.)	3.25 (min.)

Test	Switch Position	Reading Volts at 3,000 r.p.m.	
		6 Volt	12 Volt
2	OFF	1.75 (min.)	3.75 (min.)
	PILOT	1.75 (min.)	3.25 (min.)
	HEAD	3.25 (min.)	6.0 (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.

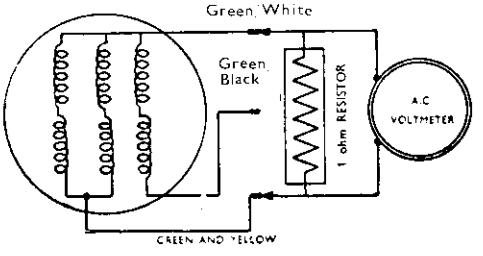
Test 2. If meter readings are lower or higher than values stated, check the generator. No reading on meter, check the rectifier.

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 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. 6 Volt	12 Volt
1	Green/White and Green/Black	3.25 (min.)	3.5 (min.)
2	Green/White and Green/Yellow	6.25 (min.)	5.5 (min.)
3	Green/White and Green/Yellow (with Green/Black connected to Green/Yellow)	8.75 (min.)	7.0 (min.)
4	Any one lead and Generator Stator (Earth)	No Reading	No Reading

Conclusions from these Tests

Low reading on any group of coils indicates shorted turns.

Zero reading will indicate open-circuit coil.

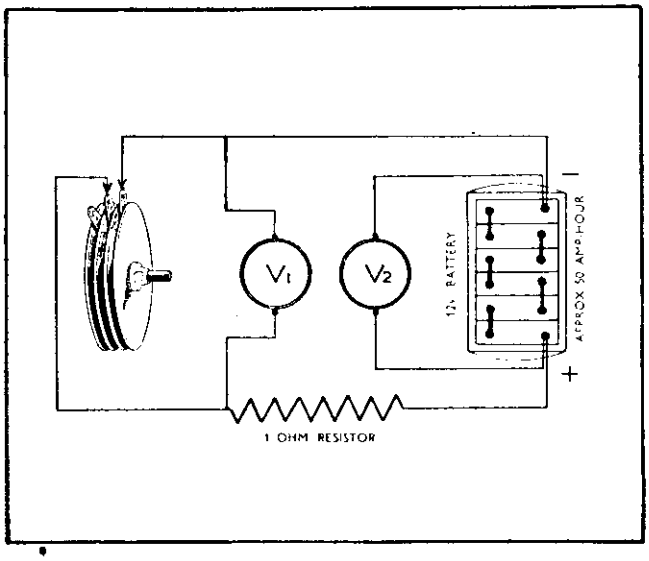
If all coils read low, partial de-magnetisation of rotor may have occurred as a result of faulty rectifier. Check rectifier, and battery earth polarity before replacing rotor.

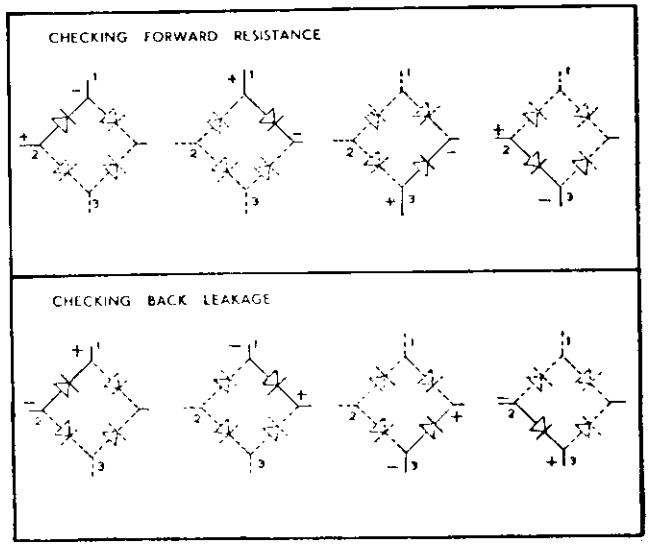
A reading between any one lead and the generator stator indicates an earthed coil. Replace stator or locate earth by isolating and testing individual coils.

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 across terminals 2 and 1, bolt and 1, bolt and 3, 2 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 latter 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.

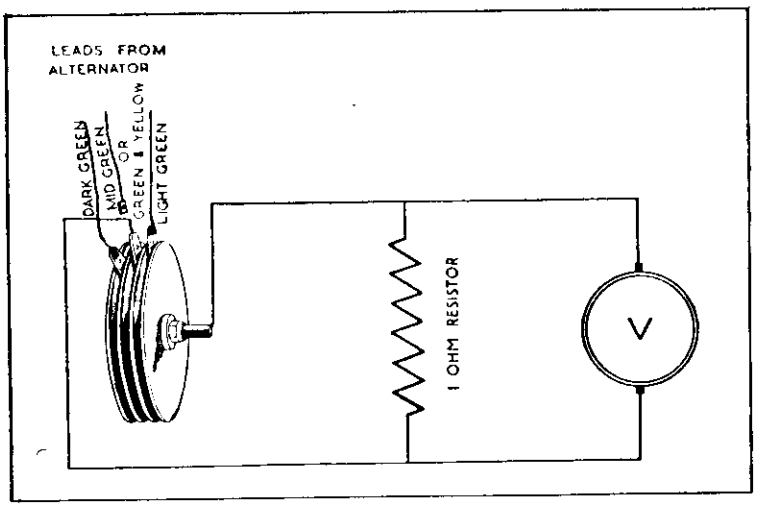
Important

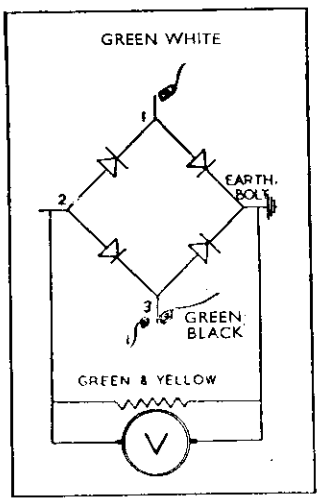
Before fitting a replacement rectifier, check the following points:—

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	7.0 (min.) 6 volt 6.5 (min.) 12 volt

Procedure

Connect the alternator leads as detailed direct to the recifier terminals No. 1 and No. 3 with all the other cables dsconnected 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 possiblity of faulty earth connection.

Testing the External Wiring Circuit

Using D.C. Volmeter 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 or twelve 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., to the battery.

Testing Emergency Start Circuit

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. Battery volts should register on the voltmeter.
12. Transfer Black test lead to alternator Green/Yellow 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

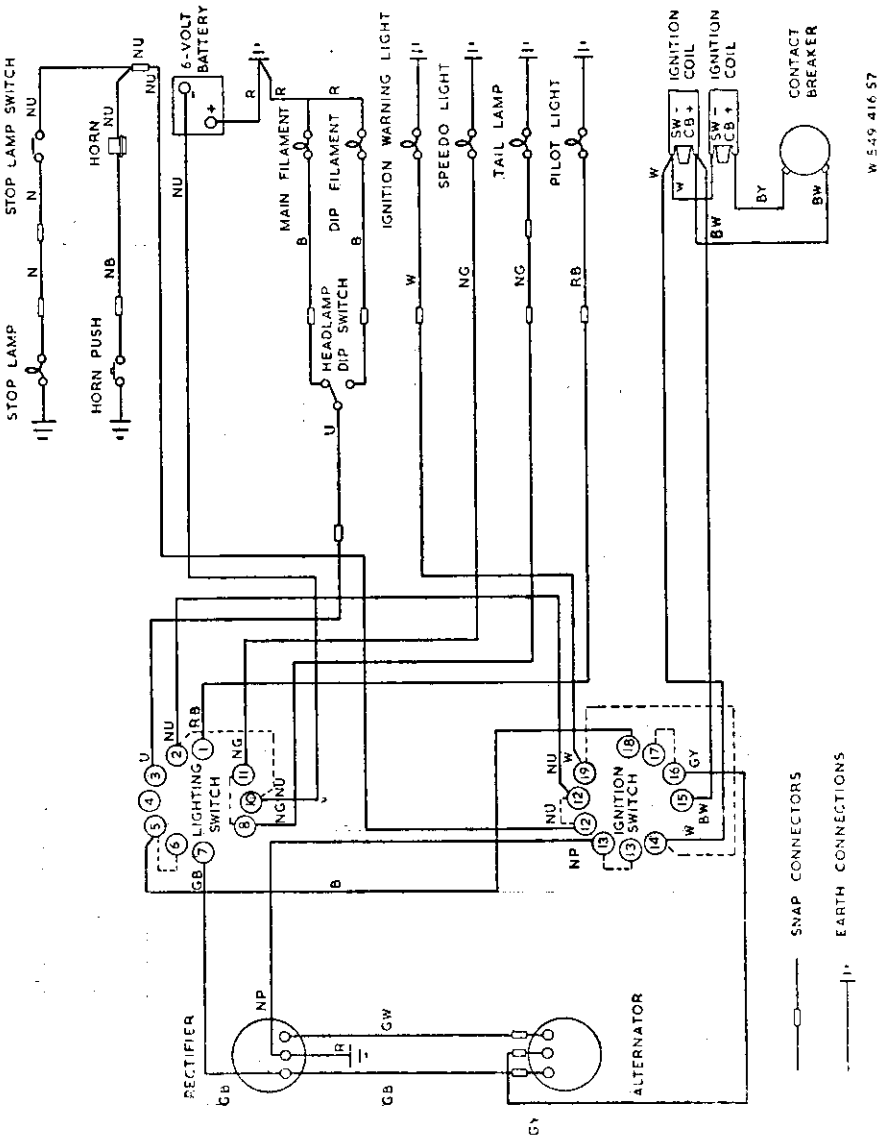
1. Connect Red test lead to earth.
2. The set, including battery, connected as normal with the exception of the alternator Green/Yellow cable which should be disconnected at the snap connector under the saddle.
3. Connect Black test lead to Green/Yellow cable coming from headlamp (i.e., not coming from 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 Green/Yellow and Green/Black 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.

Wiring Diagram 6 Volt Model



Colour Code

R—Red.	N—Brown.	U—Blue.	P—Purple.	L—Light.
B—Black	G—Green.	Y—Yellow.	W—White.	D—Dark.

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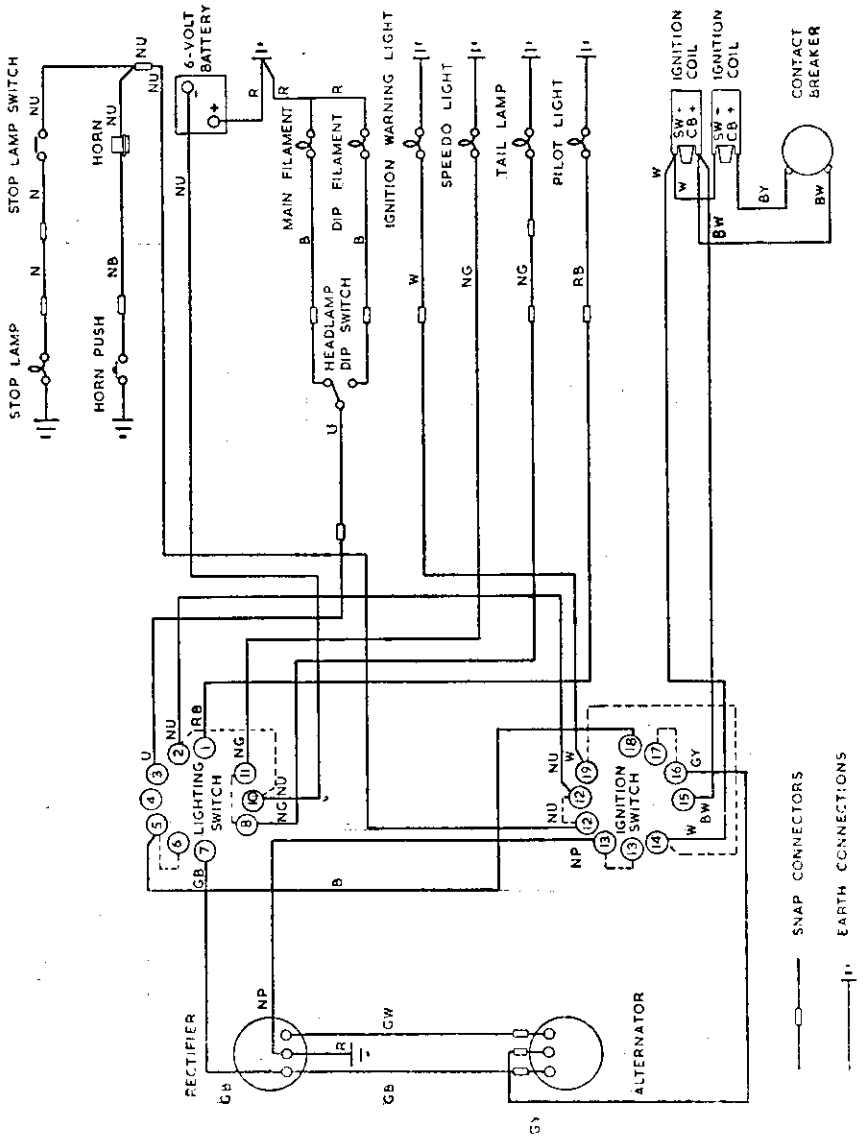

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