Lucas A.C. Lighting-Ignition System

1. General

The Lucas A.C. Lighting-Ignition System comprises of seven main components:

(1) Alternator with magnet rotor.
(2) Bridge-connected rectifier.
(3) Ignition coil.
(4) Contact breaker unit with automatic timing control.
(5) Lighting switch.
(6) Ignition switch.
(7) 6volt battery.

Under normal running conditions electrical energy in the form of rectified A.C. passes through the battery from the alternator, the rate of charge depending on the position of the lighting switch. When no lights, or only the pilot lights, are in use the alternator output is sufficient only to supply the ignition coil and to trickle charge the battery. When the lighting switch is turned to the "HEAD" position the current increases proportionately.

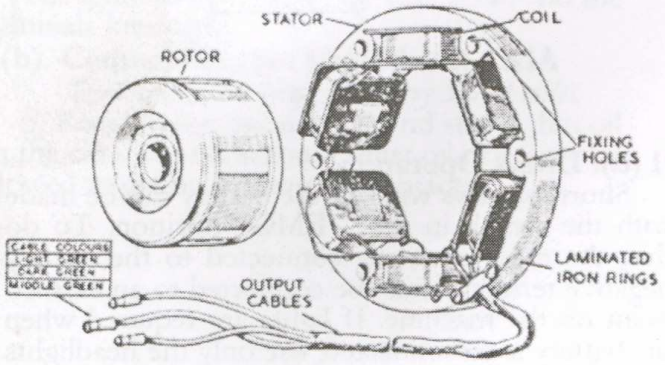
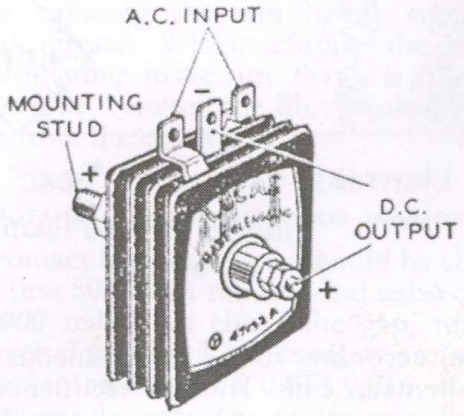


Fig. 1

1 (a). **Alternator Model RM13 and RM18**

The alternator (see Fig. 1) has an outside diameter of 5 in. and is suitable for motor cycles up to 250 c.c. having headlamp bulbs not exceeding 30 watts. The alternator comprises of two main components, a stator and a rotor. The stator is built up from iron laminations and carries three pairs of series-connected coils insulated from the laminations. The rotor has a hexagonal steel core, each face of which carries a permanent magnet keyed to a laminated pole tip. The pole tips are riveted circumferentially to brass side plates, the assembly being cast in aluminium and machined to give a smooth external finish. The stator and rotor can be separated without the need to fit magnetic keepers to the rotor poles. As the rotor turns rapid and repeated reversals of flux take place in the coil cores. These lines cut through the turns of the coil and induce alternating voltages in that coil. External connections are taken to these coils from a bridge-connected rectifier (see Fig. 2).



RECTIFIER

Fig. 2

1 (b). Circuit Details

The alternator stator 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 position of the lighting and ignition switch controls, as shown schematically in Fig. 3.

In the " OFF " and " PILOT " positions two pairs of coils are disconnected and only the third pair is in use. Current flows from these through the rectifier and battery, taking one of two alternative paths (indicated by the arrows on the rectifier

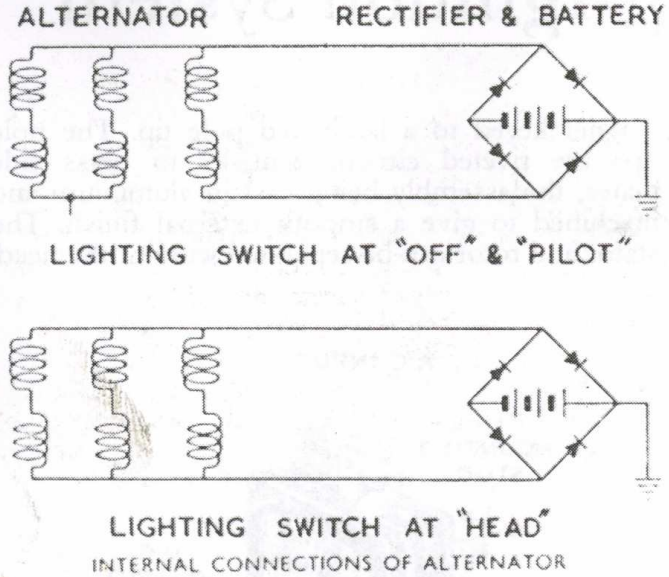


Fig. 3

diagram) according to the instantaneous polarity at the alternator coils. Thus the rectifier acts as an electrical non return valve converting the A.C. current from the alternator into uni-directional current, which trickle charges the battery as well as energising the ignition coil. In the " HEAD " position the alternator output is increased by connecting all three pairs of coils in parallel, thus providing current for the headlight, tail and speedometer lights in addition to the ignition and a trickle charge to the battery.

1 (c). Emergency Starting

An emergency starting position is provided on the ignition switch. This switch is for use if the battery has become discharged and a normal start cannot be made. In the switch position " EMG " the alternator is connected directly to the ignition coil and this allows the engine to be started independently of the battery (see Fig. 4). During the closed period of the contact points, pulses of unidirectional current pass from the upper end of the two left alternator coils (Fig. 4) through the top right hand plate of the rectifier and the contact points back into the left hand alternator coils. If the opening of the contact points is timed to coincide with one of these pulses there will be sufficient energy present in the system to overcome the impedance of the primary winding of the ignition coil and the voltage of the battery, thus causing a pulse of current to pass through the primary of the ignition coil and so create sufficient voltage in the secondary winding to provide a good spark at the plug. The advantage of this system is that the primary of the coil is short-circuited during the closed period of the contact breaker so that no unwanted sparks can occur on the compression stroke of the engine. Note that, if the battery is removed, the emergency start will not function unless the lead normally connected to the battery negative terminal is earthed. The emergency start system functions better with a discharged battery than with a fully charged one.

Proper functioning of the emergency starting feature is dependent on accurate ignition timing being observed and correct contact breaker gap being maintained. After starting has been effected the ignition switch should be turned to the normal running " IGN " position.

With the later type ignition switch, it is necessary to push in the key and then turn in an anticlockwise direction for the emergency start position.

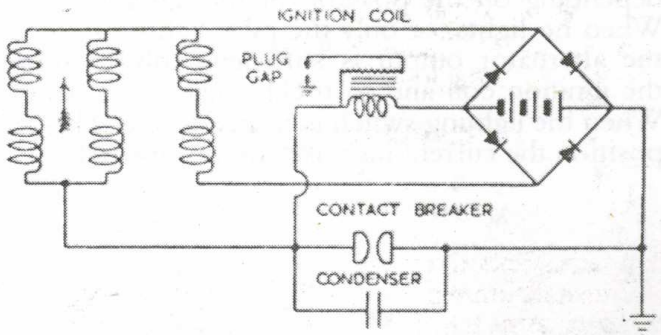


Fig. 4

1 (d). Direct Operation

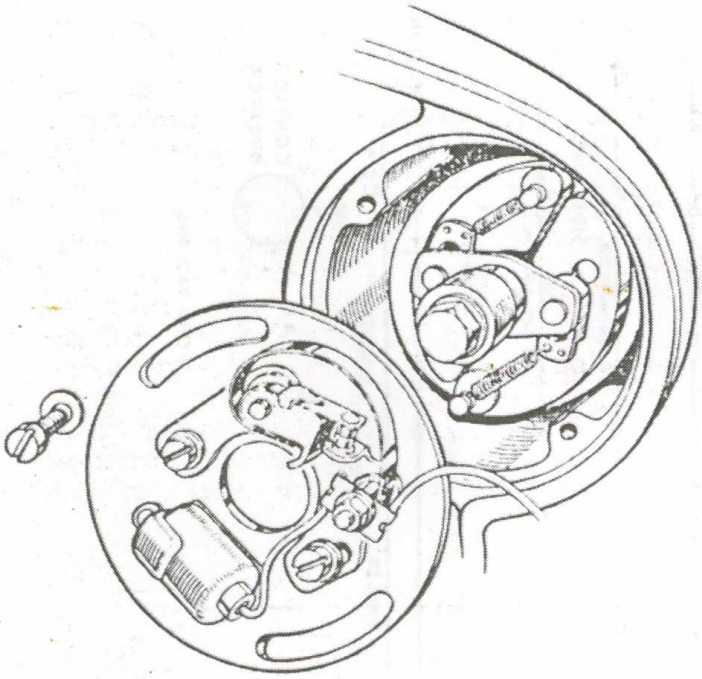
Short journeys without the battery can be made with the switch in the " EMG "position. To do this, the cable normally connected to the battery negative terminal must be connected to an earthed point on the machine. If lights are required when the battery is disconnected, use only the headlights and keep the engine speed low to prevent excessive voltage rise.

2. Routine Maintenance

The alternator and rectifier require no maintenance apart from ensuring that all connections are clean and tight.

If the rotor, stator, engine crankshaft, or stator locating ring have been disturbed, the air gap between the rotor and stator should be checked. If a feeler gauge at least .008 in. thick cannot be passed between the rotor and each of the stator poles the alignment should be checked.

The nuts which clamp together the rectifier plate assembly must not under any circumstances be slackened. They have been carefully set during manufacture to give correct rectifier performance. A separate nut is used to secure the rectifier to the e of the motor cycle.



CONTACT BREAKER

Fig. 5

2 (a). Ignition Coil

The ignition coil should be kept clean and the terminals kept tight.

2 (b). Contact Breaker Unit Model CA1A

(See Fig. 5). *Lubrication every 3,000 miles.*

(i) Remove the metal cover and smear thin oil on the cam. On no account must oil or grease be allowed to get on or near the contacts.

(ii) Lubricate the automatic timing control mechanism using thin machine oil.

Cleaning every 6,000 miles.

Examine the contact breaker. The contacts must be free from grease and oil. If they are burnt or blackened, clean with a fine carborundum stone or a very fine emery cloth. Wipe away any dirt or metal dust with a clean petrol moistened cloth.

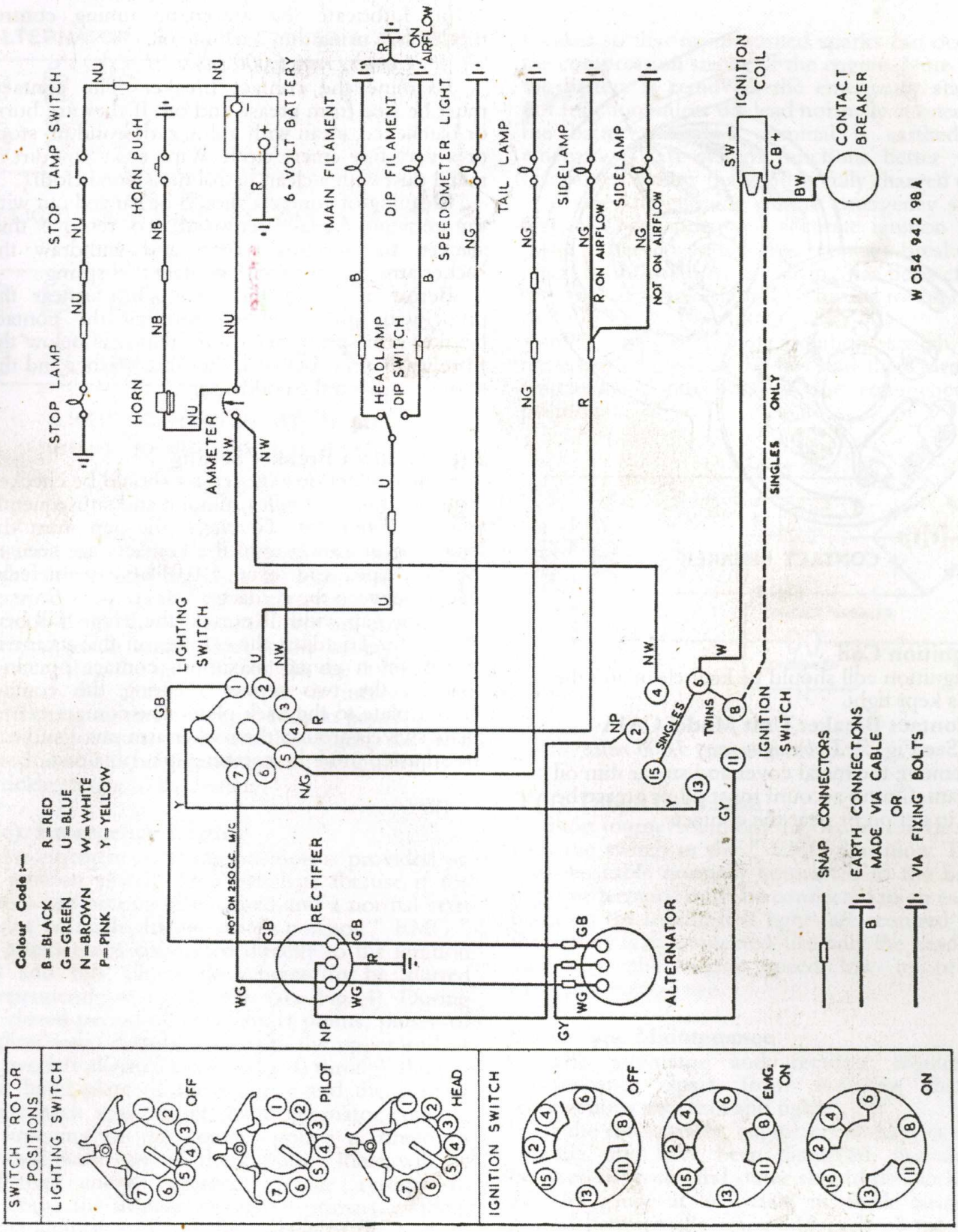
Cleaning of contacts should be carried out with the moving contact removed. To remove this, slacken the terminal screw and withdraw the rocker arm complete with contact and spring.

Before replacing the arm lightly smear the pivot with grease. When refitting the contact breaker arm spring make sure that it is below the fibre washer, i.e. between the fibre washer and the wiring tag from the condenser.

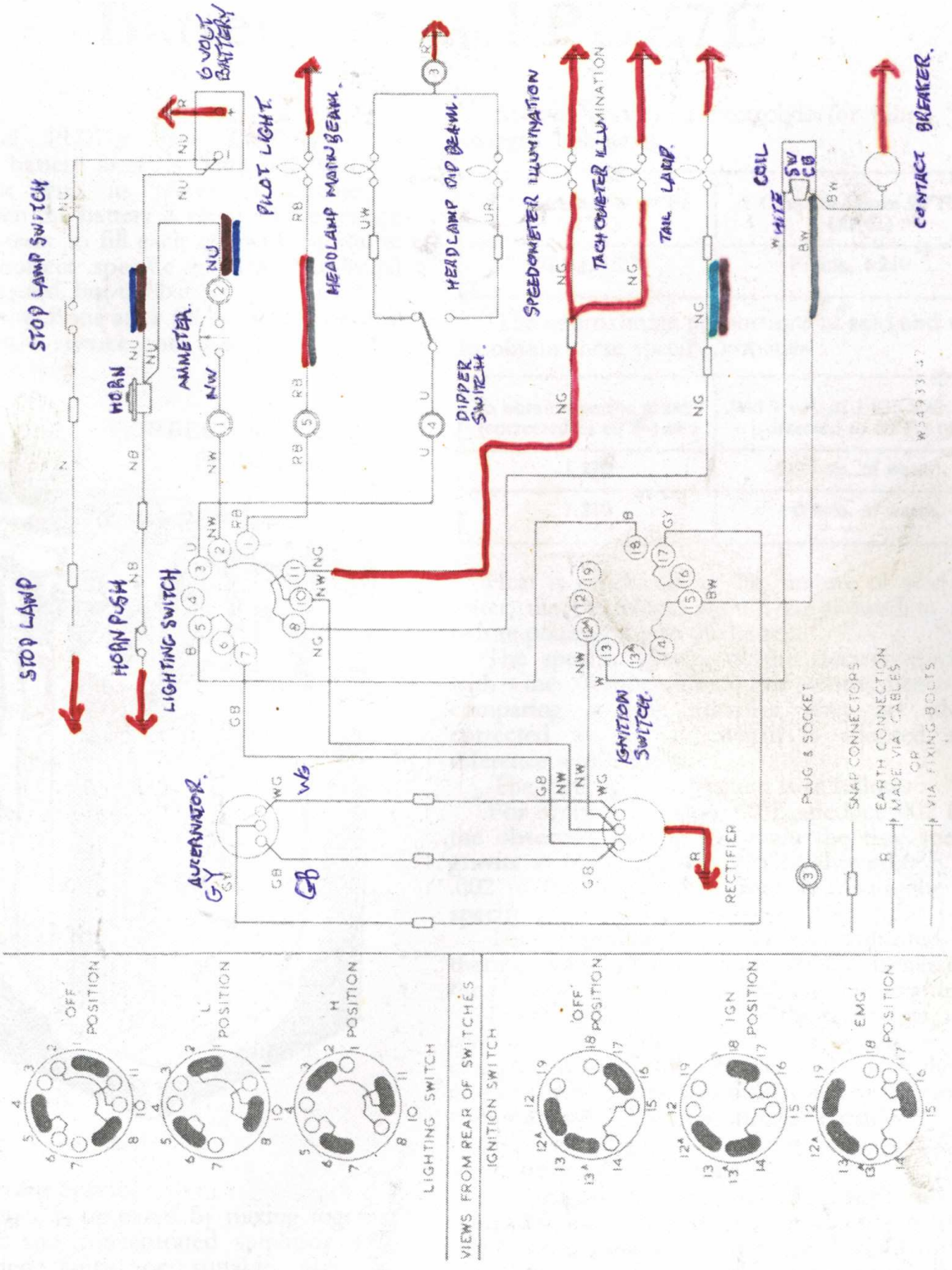
2 (c). Contact Breaker Setting

The contact breaker setting should be checked after the first 500 miles running and subsequently every *6,000* miles. To check the gap, turn the engine over slowly until the contacts are seen to be fully open and insert a 0.014-0.016 in. feeler gauge between the contacts.

If the gap width is correct the gauge will be a sliding fit. To adjust the setting, set the engine in the position giving maximum contact opening. Slacken the two screws securing the contact carrier plate to the back plate. The contact carrier plate swivels around the rocker arm pivot and can be adjusted until the correct gap is obtained.



WIRING DIAGRAM
1957—1961 MODELS
WITH SCREW ON TERMINALS FOR SWITCHES



B = BLACK P = PURPLE Y = YELLOW U = BLUE G = GREEN
D = DARK N = BROWN S = SLATE L = LIGHT R = RED
W = WHITE M = MEDIUM

WIRING DIAGRAM
1962 ON MODELS
WITH PLUG ON SWITCH SOCKETS