LUCAS

SR MAGNETOS

GENERAL INFORMATION, FITTING AND MAINTENANCE INSTRUCTIONS

The SR range of magnetos is fitted to agricultural, industrial, marine, motor cycle and other engines. Since this range includes single, twin and four-cylinder magnetos, for engine-speed and half-engine-speed drives, either base or flange-mounted, with or without metallic screening of cables and covers, the information given in this booklet is necessarily of a general nature. Nevertheless, the three main types are represented in Figs. 1, 2 and 3 and all important points of maintenance concerning features not illustrated are duly covered in the text. Any further information or advice, no matter how trivial, will be furnished gladly on request.

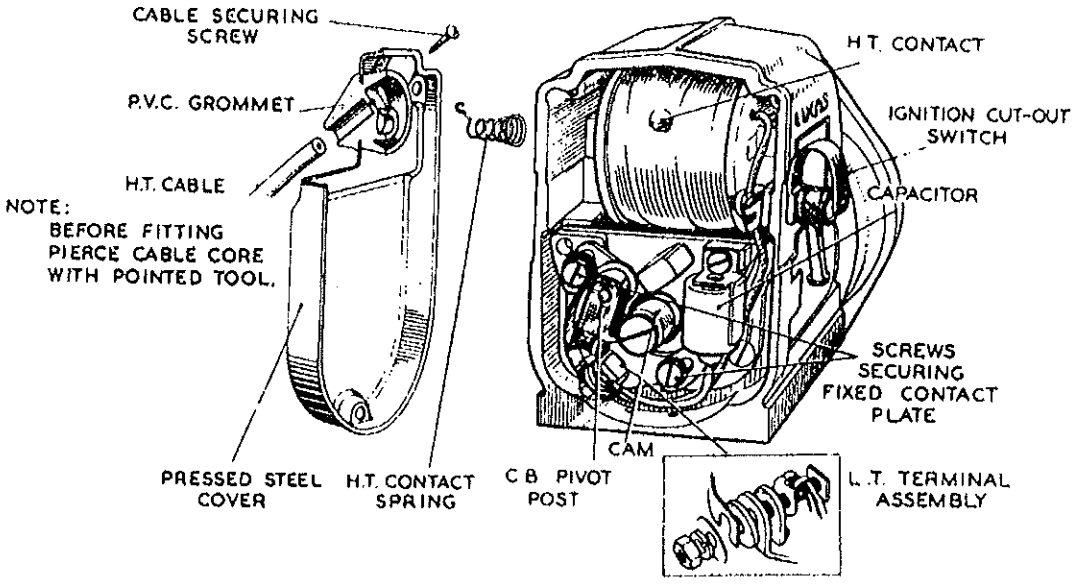

Fig. 1

How the Magneto Works

The magneto shaft, permanent magnet and laminated pole shoes form a single diecast assembly known as the rotor. This, supported on ball bearings, revolves between a pair of laminated pole pieces in the stator. These stator pole pieces are bridged by the laminated core of a coil having a primary winding of relatively few turns of thick wire and a secondary winding of many turns of fine wire. A contact breaker is arranged to interrupt the primary circuit at the instant a spark is required.

The rotor, driven by the engine, produces an alternating magnetic field in the iron core of the coil. This field induces alternating voltages in the primary and secondary windings of the coil. Magnetic flux due to current flowing in the

primary winding opposes any change in direction of the magnetic field in the coil core. In this way, field reversals due to the rotating magnets are delayed until the contact breaker opens. At this instant, the restraining influence of the primary winding is removed and the consequent rapid reversal of the magnetic field linked with the coil causes a high voltage to be induced in the secondary winding.

With single-cylinder magnetos, this high voltage is conducted direct to the plug through the high tension cable, but in multi-cylinder magnetos it is taken to a rotating electrode in the cable cover and distributed to each plug in turn.

Impulse Starter (when fitted)

An impulse starter consists of two members flexibly coupled by a clock type spring. One member is secured to the magneto spindle whilst the other carries the driving dogs or sprocket. When cranking the engine, that member secured to the magneto spindle is at first prevented from turning by a pawl or trip lever. The coupling spring is therefore wound up until a projection on the driving member trips the pawl. The magneto rotor is then rapidly accelerated through the sparking position. This sequence is repeated until the engine starts and the pawl is held out of engagement by centrifugal force.

An impulse starter has two outstanding merits:—

1. At the instant of firing, the rotor is rotated at high speed and therefore a spark of great intensity is produced.
2. During starting, the time of firing is delayed until the piston is at approximately top dead centre, i.e., the ignition is automatically retarded.

For these reasons, an engine does not require to be swung sharply with a "snatch" over T.D.C. but can usually be started by pulling the flywheel quite gently over compression.

Automatic Timing Control (when fitted)

An automatic timing control is a centrifugally operated mechanism enabling an angular movement of the magneto rotor to occur relative to the drive. The mechanism consists of two members flexibly coupled by pivoted spring-loaded governor weights and toggles. At low engine speeds and during starting, the weights are closed and a delayed spark is produced. As the engine speed increases, the governor weights swing out and advance the rotor (and thus the cam and the spark) relative to the drive.

The mechanism is usually contained in the engine timing case and needs no attention in service.

Warning: Polythene sheeting should not be used to cover the magneto when not in use, as this can cause excessive condensation to occur and possible failure — particularly in river and marine craft.

FITTING

Fitting Impulse Starters

Fitting instructions are included with replacement impulse starters. Additional copies will be supplied on request. Instructions for fixed dog impulse starters are given in Publication No. 1073 and for adjustable dog impulse starters in Publication No. 1074.

Fitting Magneto to Engine

(a) Refer to the engine maker's timing instructions and turn the engine until the piston in No. 1 cylinder is at the specified position with respect to T.D.C. If no instructions are available, refer to page 7 in this booklet.

(b) Remove the cable cover and turn the magneto shaft against the normal direction of rotation until the contact breaker gap just closes. With multi-cylinder engines, the rotating electrode in the cable cover must be adjacent to the fixed electrode connected to the plug in No. 1 cylinder.

(c) Turn the magneto shaft in the normal direction of rotation until the contact breaker just opens. Be careful to retain this position.

(d) *Magnetos not fitted with impulse starters:*
Loosely secure the driving member to the magneto shaft.

Mount the magneto in position on the engine and tighten the fixing screws.

Press the driving member fully home and tighten the locking nut.

Magnetos fitted with impulse starters:

Mount the magneto in position on the engine.

If an impulse starter of the correct type and setting is fitted, the driving dogs will automatically line up and mate with the engine coupling.

(e) Turn the engine slowly and check that the contact breaker opens at the correct instant. Refit the cable cover.

Re-positioning of Cut-out Switch

The cut-out switch usually fitted to the lefthand side of unscreened magnetos can be removed to the opposite side, when this position is the more convenient. Details of a conversion kit and fitting instructions are given in Publication No. 1075, available on request.

MAINTENANCE

SR magnetos are designed and manufactured to give long periods of trouble-free service with the minimum of attention. As with other parts of the engine, occasional minor adjustments, lubrication and cleaning should be carried out as recommended.

After First 20 Running Hours

During the first 20 hours' running of a new magneto or replacement contact set, most of the bedding-down of the contact breaker heel occurs. The contact breaker gap should, therefore, be checked and, if necessary, reset as described on page 4.

Cleaning Outside of Magneto

Using a clean fluffless cloth, keep the outside of the magneto and high tension cables clean and dry. Keep clear any ventilating holes or notches in the base and cable cover.

Every 150 Running Hours

Apply a spot of clean engine oil to the visible end of the contact breaker pivot post.

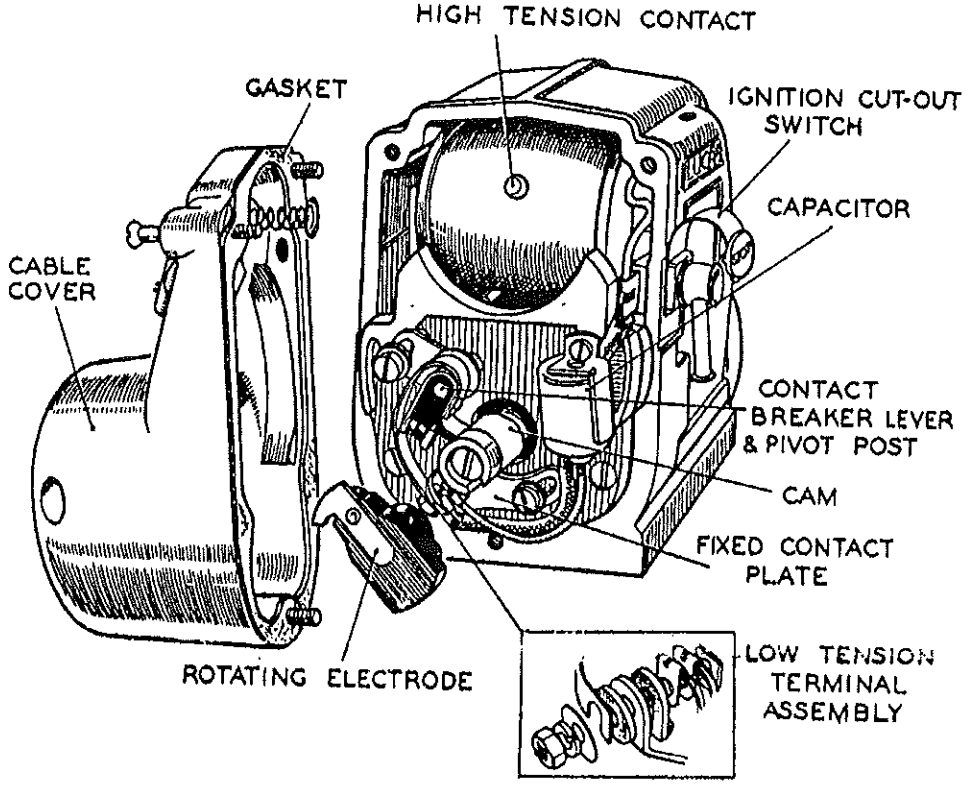

Fig. 2

With magnetos of the type shown in Fig. 3, remove the cable cover and inject a few drops of thin machine oil into the distributor gear oil hole.

NO OIL MUST BE ALLOWED ON OR NEAR THE CONTACTS.

Every 300 Running Hours, or Monthly

Checking sparking plug "points":

Inspect the plug "points" and check the setting. If necessary, clean the plug with petrol and reset the "points" to the gap recommended by the engine manufacturer.

Checking the contact breaker

(a) Remove the cable cover and examine the contact breaker. If the contacts are rough or pitted, polish them with fine carborundum stone, silicon carbide paper or emery cloth. After polishing, clean the contacts with petrol or methylated spirits (denatured alcohol). The contact breaker lever should be removed for cleaning, as described below.

Note: Under certain conditions, a film of hydrated tungsten oxide can appear on the contacts. Before putting into service, therefore, it is important to examine and, if necessary, to clean the contacts of any magneto which has been in storage or only occasionally in use.

The above Note does not apply to platinum contacts. However, these too should be cleaned from time to time.

(b) Check the contact breaker gap setting. To do this, turn the engine over slowly until the contacts are fully open and insert a 0.010" to 0.012" (0.25 mm. to 0.3 mm.) feeler gauge in the gap. If the gap width is correct, the gauge will be a sliding fit between the contacts. To adjust the gap, slacken the two screws securing the fixed contact plate and move the plate until the gap is set to the thickness of the gauge. Tighten the two screws.

Before refitting the cable cover, wipe the inside with a clean dry fluffless cloth and, with multi-cylinder magnetos, check that the carbon brush and (in earlier 4-cylinder magnetos) the brass contact stud move freely in their holders.

Also, check that a sealing gasket (of aluminium in screened magnetos) in good condition is positioned between the cable cover and magneto body. During manufacture, the gasket is fixed to the body of unscreened magnetos by an adhesive and need not be removed unless damaged.

How to remove the contact breaker lever:
To remove the contact breaker lever, slacken the nut securing the slotted end of the contact breaker spring and withdraw the spring and lever. Because the end of the spring is slotted, complete removal of the nut is not necessary. If, however, this nut is removed, it is most important that the components are reassembled in the order shown.

With unscreened magnetos of the type shown in Fig. 2, it is necessary to withdraw the moulding which carries the rotating electrode before the contact breaker lever can be lifted off its pivot post. When refitting the rotating electrode, see that the projection in the moulding engages with the slot in the magneto spindle and push the moulding fully home.*

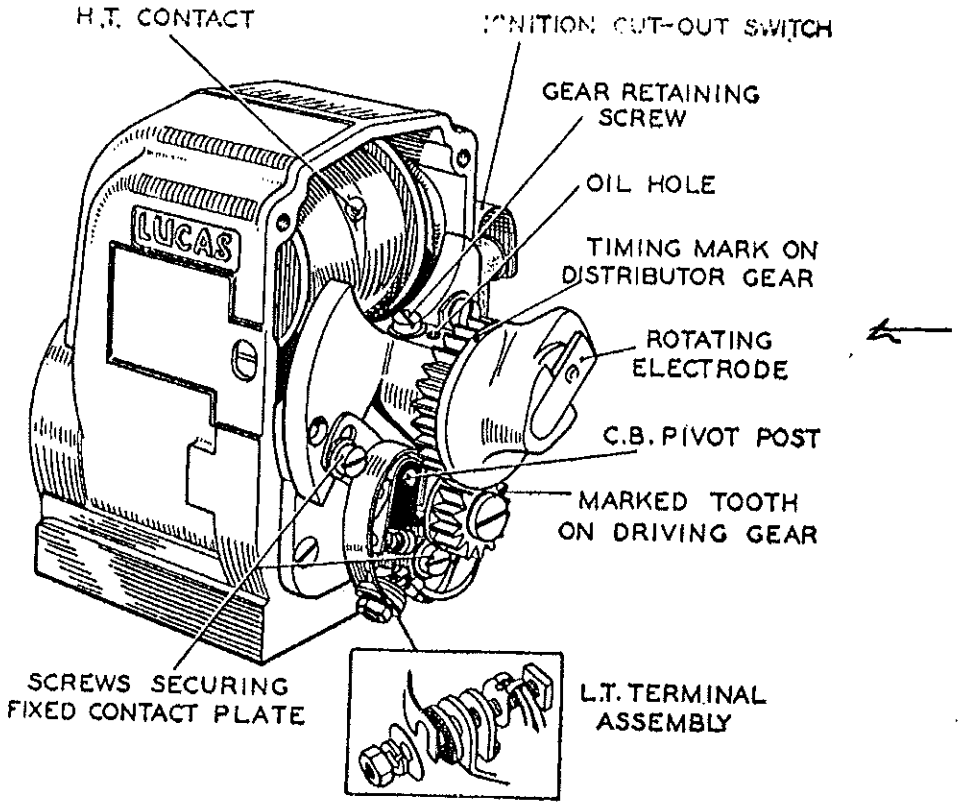

Fig. 3

With screened and unscreened magnetos of the type shown in Fig. 3, slacken the distributor gear retaining screw and withdraw the moulded distributor gear. Slacken the two screws which secure the fixed contact plate and pivot the plate and terminal assembly to the fullest extent of the adjusting slot. The contact breaker lever can now be lifted off its pivot post *without disturbing the small diecast driving gear.* When refitting the moulded distributor gear, see that the marked teeth of the moulded and diecast gears engage.

*In some earlier magnetos, the rotating electrode was a common part with coil ignition distributors and the moulded portion carried the words REMOVE TO OIL. This instruction must be ignored on SR magnetos.

At one time, these timing marks consisted of paint spots but later (in 1954), these were superseded in favour of letter markings. The moulded distributor gear now carries, near its periphery, the letter "O", while two teeth of the die-cast gear carry a letter — one a "C" and the other an "A". When reassembling, the gears must be meshed so that the "O" is adjacent to the "C" in clockwise rotation magnetos and adjacent to the "A" in anti-clockwise rotation magnetos.

Note: The moulded distributor gear also carries a single number denoting the moulding machine in which it was made. This figure is not therefore a timing mark and must be ignored.

Every 1,000 Running Hours

Remove the contact breaker lever from its pivot post amd smear with Mobilgrease No. 2.

Every 2 Years

Bearings:

About every two years or when the engine is overhauled, the magneto should be dismantled at a Lucas Service Depot and the bearing repacked with high melting point grease.

Cam:

The porous sintered iron cam fitted to later magnetos should be re-impregnated with medium viscosity engine oil. The felt pad cam-lubricator fitted to earlier magnetos should be renewed.

Impulse Starter:

An impulse starter should be removed and the springs lubricated with thin machine oil — never with grease or high viscosity oil.

Automatic Timing Control:

The weights, springs and toggles of an automatic timing control mechanism should be examined and lubricated with medium viscosity engine oil.

HIGH TENSION CABLES

Unscreened Cables

Occasionally inspect the cables from the moulded cable cover to the sparking plugs. If the high tension cables pass through conduit, examine particularly where the cables are bent between the magneto and the conduit and between the conduit and the sparking plugs.

Lightly pull on the cables and inspect that portion which is normally just inside the conduit. Replace any cables which have the insulation cracked or damaged, as otherwise the spark may occur between the cable and some part of the engine, instead of at the sparking plug.

Replacement cable must be 7 mm. P.V.C.-covered or neoprene-covered rubber. The method of connecting the cable to the pressed steel cover of single-cylinder magnetos will be apparent from the exploded view shown in Fig. 1. With other types, remove the moulded cable cover by unscrewing the securing screws. Unscrew the cable fixing screw on the inside of the cover, and withdraw the defective cable. Push the new cable well home into its terminal and then tighten the screw, which will pierce the insulation to make contact with the cable core. The end of the cable must not be bared but cut off flush to the required length.

After fitting a new cable, a continuity check should be made between the electrode in the cover and the plug end of the cable. A flashlamp battery and bulb can be used to make this test.

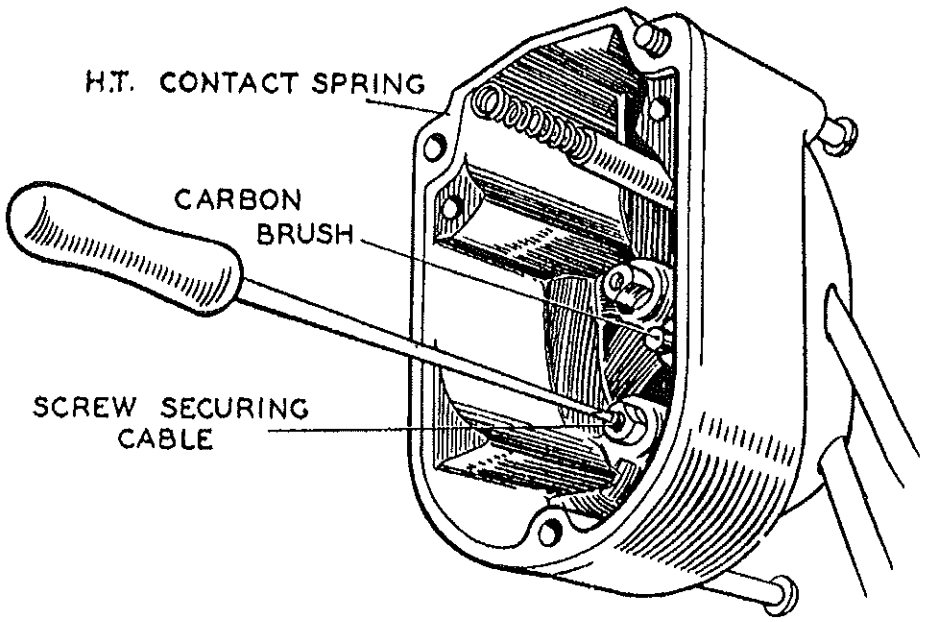

Fig. 4

Screened Cables

A defective cable must be renewed complete with braiding. Screened cables are secured to the magneto by a squared plug nut on the outside of the metal cable cover and by a single terminal piercing screw on the inside.

When refitting, see that a metal gasket is positioned between the cable cover and magneto body, and that a rubber waterproofing sleeve is correctly positioned at each end of the cable.

TIMING

Cam-to-Rotor Timing

To ensure high-energy sparking the following points should be noted:—

1. Never turn the contact breaker cam on the rotor spindle from its original angular position relative to the rotor.
2. Always maintain the contact breaker gap between 0.010" — 0.012" (0.25 — 0.3 mm.).

Magneto-to-Engine Timing

Always follow the engine manufacturer's instructions when re-timing a magneto to the engine. If, however, these instructions are not immediately available, the magneto-to-engine timing can (as a temporary measure only) be set as follows:—

Magnetos fitted with automatic timing control:

Contact breaker to open when piston in cylinder under compression is at T.D.C.

Magnetos with or without impulse starters:

Contact breaker to open when piston in cylinder under compression is $\frac{5}{16}$"—$\frac{3}{8}$" (7.9 — 9.5 mm.) before T.D.C.

Publication No. 874G

LF/865/L P/466/L Printed in England

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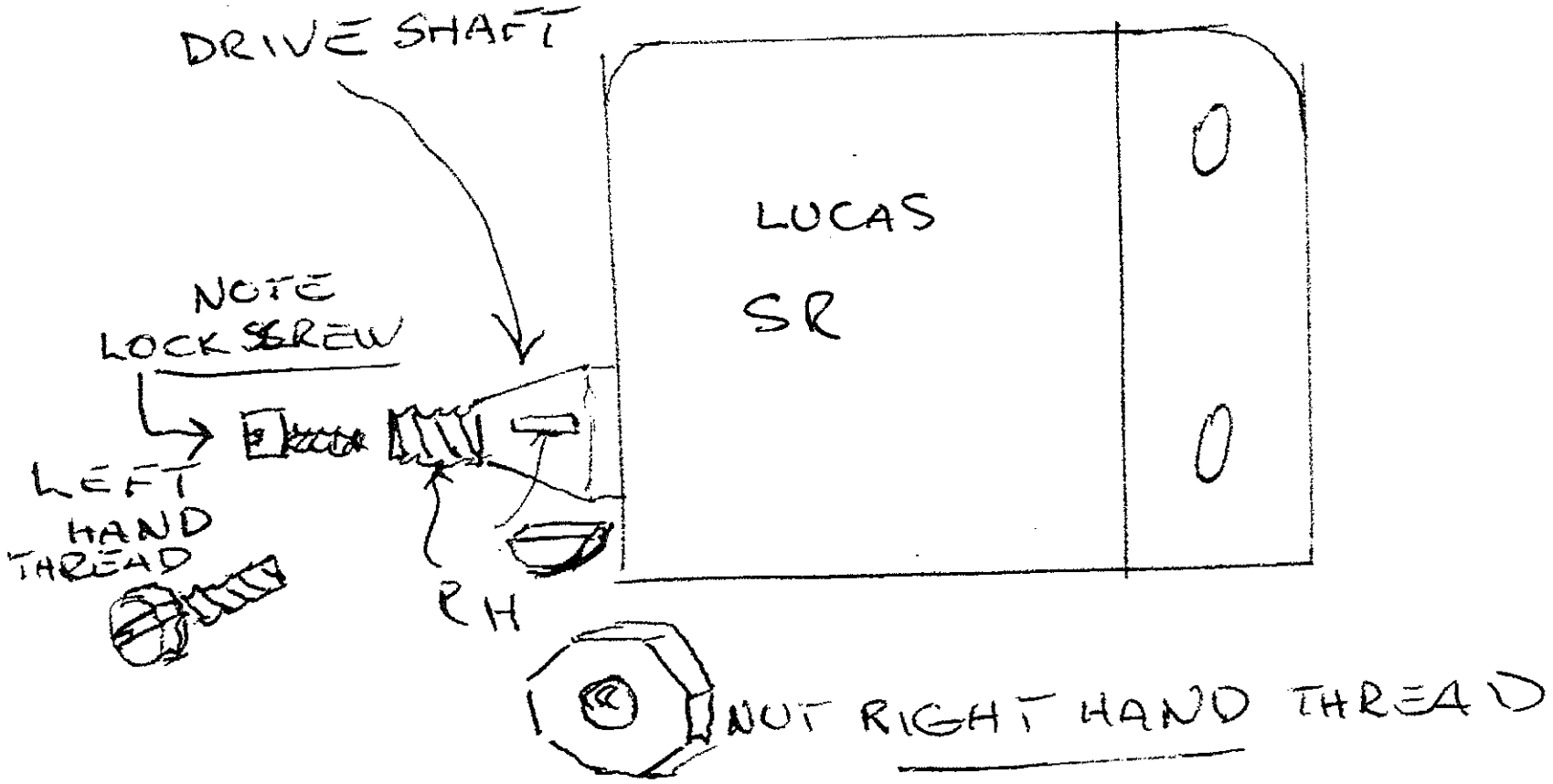
HOW TO LOCATE AND REMEDY TROUBLE

Condition	*Possible Causes*	*Methods of Detection and Remedy*
ENGINE WILL NOT START	Controls not set correctly for starting.	See that the ignition is switched on, petrol turned on and everything is in order for starting.
	Contact breaker inoperative.	Crank the engine and check that the contact breaker opens and closes correctly. If it does not, clean and adjust as described on pages 4–5.
	Contacts need cleaning and adjusting.	Clean and adjust the contact breaker as described on pages 4–5.
	Plug not sparking.	Detach the high tension cable(s) from the plug(s). Hold the cable(s) ⅛" (3·17 mm.) from the engine and see if a spark jumps the gap when the engine is cranked. (i) If a spark is produced, check the plug by substitution. (ii) If no spark is produced, check the cable(s) by substitution (see pages 6–7). Clean and check inside of cable cover, as described on page 5.
	Defect in cut-out circuit.	Disconnect the remote cut-out switch (if fitted) and crank the engine. If the engine now starts, renew the connecting cable or switch.
	Incorrect timing.	Check the magneto-to-engine timing as described on page 7.
ENGINE MISFIRES	Defective fuel supply.	Inspect the carburettor, petrol supply, etc.
	Sparking plug needs cleaning and adjusting.	Remove plug(s) from engine. Clean off soot or carbon and check plug "points" for correct gap width.
	Contacts need cleaning and adjusting.	Clean and adjust the contact breaker as described on pages 4–5.
	Defective high tension supply.	Check high tension cable(s) by substitution (see pages 6–7). Clean and check inside of cable cover as described on page 5.

If, after making the above checks, a fault in the magneto is suspected but cannot be located, the nearest Lucas Service Depot or Agent should be consulted.

When communicating with a Service Depot, it is necessary, in addition to describing the trouble, and the type and year of engine, to state the Model, Type and Service Number of the magneto.


DRIVE SHAFT
LUCAS
SR
NOTE
LOCKSCREW
LEFT
HAND
THREAD
RH
NUT RIGHT HAND THREAD