

# **MAINTENANCE MANUAL AND INSTRUCTION BOOK**

*for*

**1 9 4 6**

*350 c.c. and 500 c.c.*

*CLUBMAN MODELS*

*O.H.V., MATCHLESS*



**MATCHLESS  
MOTOR CYCLES**

PROPRIETORS : ASSOCIATED MOTOR CYCLES LIMITED

PLUMSTEAD • LONDON • S.E.18



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# **MAINTENANCE    MANUAL**

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# **AND INSTRUCTION BOOK**

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*for 1946*  
*Matchless Motor Cycles*  
*Models 46/G3L and 46/G80L*



Compiled and Issued by the Manufacturers :

**MATCHLESS MOTOR CYCLES**

(Proprietors: ASSOCIATED MOTOR CYCLES LIMITED)

Registered Offices:

**PLUMSTEAD ROAD, PLUMSTEAD**  
**LONDON, S.E.18    ..    ENGLAND**

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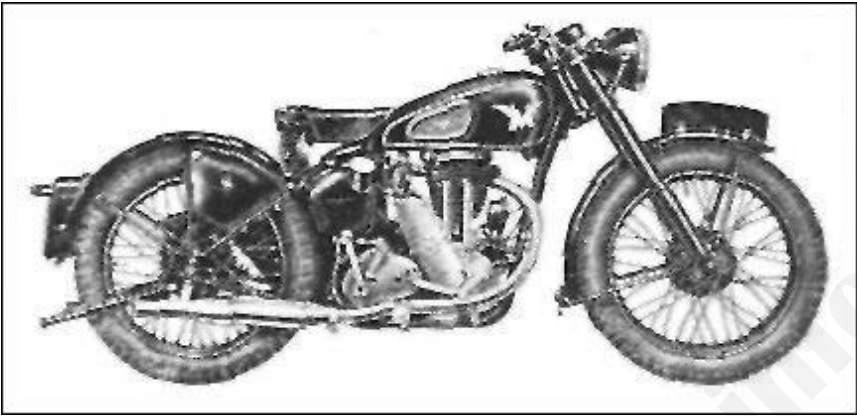
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**Supplied free, upon application, with each new motor cycle. Replacement Copies, 1/6 each**

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## **1946 MATCHLESS "Clubman" MODELS**

**350 "CLUBMAN" Model G3L    500 "CLUBMAN" Model G80L**

**46/G3L    —    Bore 69 mm.    Stroke 93 mm.    Capacity 347 c.c.**

**46/G80L    —    Bore 82.5 mm.    Stroke 93 mm.    Capacity 498 c.c.**

## ***INTRODUCTION***

Motorcycling is one of the most economical and pleasurable modes of transport. It is our sincere wish that every "MATCHLESS" owner should obtain, from his mount, the service, comfort and innumerable miles of low-cost travel that we have earnestly endeavoured to build into it.

However, it must be remembered that although a motor cycle is of simple design and construction, it is, nevertheless, a highly specialised piece of engineering. In consequence, it must be intelligently and efficiently maintained in order to provide unfailing reliability.

In this book are non-technical instructions for carrying out all the maintenance operations likely to be called for in strenuous service and illustrations are provided to assist. Neglect to make essential adjustments, only casual attention to lubrication and the lack of periodical maintenance attention will soon neutralise the best efforts of the designers and may bring needless trouble to the owner.

We are always pleased to give "MATCHLESS" owners the full benefit of our wide experience in matters relating to motor cycles of our manufacture and in paragraph 113 will be found details of the particulars that should be given us when making such an enquiry.

**MATCHLESS MOTOR CYCLES**

# DATA

## 1 DATA

### (a) Description.

Models	"350"	
	"500"	
Engine number	350 & 500	Stamped on left-hand side of crankcase.
Frame number	350 & 500	Stamped on right-hand side of seat lug. (Below saddle).
Cubic Capacity (Actual)	350	347 Cubic Centimetres.
	500	498 Cubic Centimetres.
Cylinder bore	350	69 Millimetres.
	500	82.5 Millimetres.
Stroke	350 & 500	93 Millimetres.
Compression Ratio	350	6.3 to 1.
	500	5.97 to 1. (With plate fitted).
	500	7.24 to 1. (No plate fitted).

### (b) Capacities.

Front fork	6½ fluid ounces.
Gear box	1 lb. 14 ozs.
Oil tank	3 pints.
Petrol tank	3 gallons.

### (c) Carburetter.

Main Jet size	... 350	... 150.
	500	... 180.
Throttle size	... 350	... 6/4.
	500	... 29/4.
Choke size	... 350	... 1 inch diameter.
	500	... 1-3/32 inches diameter.
Taper needle	... 350	... T-6-Std.
	500	... T-29-Std.

Taper needle located in 3rd notch from top, 350, and 2nd from top, 500.

### (d) Chains.

Front chain	350	½" pitch, .305 wide, 65 links.
	500	½" pitch, .305 wide, 67 links.
Rear chain	350 & 500	5/8" pitch, .380 wide, 91 links.
Dynamo chain	350 & 500	3/8" pitch, .225 wide, 47 links.
Magneto chain	350 & 500	3/8" pitch, .225 wide, 58 links.

(Dynamo and Magneto chains are "endless.")

**(e) Gear ratios (Touring).**

			350 Solo. Engine Sprocket, 18 teeth	500 Solo. Engine Sprocket, 21 teeth	500 Sidecar. Engine Sprocket, 19 teeth
Top	...	...	5.8 to 1	5.0 to 1	5.5 to 1
Third	...	...	7.5 to 1	6.4 to 1	7.0 to 1
Second	...	...	10.2 to 1	8.8 to 1	9.6 to 1
First	...	...	15.5 to 1	13.4 to 1	14.6 to 1

**(f) Gear Ratios (Competition).**

					350 Solo. Engine Sprocket, 17 teeth	500 Solo. Engine Sprocket, 19 teeth
Top	...	...	...	...	6.13	5.49
Third	...	...	...	...	7.93	7.1
Second	...	...	...	...	12.91	11.55
First	...	...	...	...	19.58	17.52

**(g) Ignition letting.**

The ignition setting, with the ignition control in the fully advanced position, is  $\frac{7}{16}$ " before top dead centre.

**(h) Sparking plug.**

Type CHAMPION L-10 on 350 c.c. LODGE H-145 on 500 c.c.  
Thread 14 Millimetres.  
Reach  $\frac{1}{2}$ ".  
Point gap .020" to .025".

**(i) Piston dimensions.**

							350	500
Top land	...	...	...	...	...	...	2.6877"	3.2145"
Second land	...	...	...	...	...	...	2.6962"	3.2260"
Third land	...	...	...	...	...	...	2.6962-	3.2190"
Top of skirt	...	...	...	...	...	...	2.7132"	3.2435"
Bottom of skirt	...	...	...	...	...	...	2.7143"	3.2446"

All above measurements are subject to a toleration limit of + or — .0005".

**(j) Piston rings**

Model	Diameter	Width of Com- pression ring	Width of Scraper ring	Ring gap (Normal)	Maximum permiss- ible wear	Clearance in groove
350	2-23/32"	$\frac{1}{16}$ "	$\frac{1}{8}$ "	.006" to .008"	.030"	.003"
500	3 $\frac{1}{4}$ "	$\frac{1}{16}$ "	$\frac{1}{8}$ "	.006" to .008"	.030 "	.003"

Two compression and one scraper ring are fitted to each piston.

All piston rings supplied by us are "gapped " before despatch and therefore are ready for immediate fitting and use.

**(k) Spokes. (300 and 500).**

Front, left side, 5  $\frac{13}{16}$ " by 8g. by 10g. Butted.

Front, right side, 8  $\frac{3}{16}$ " by 9g. by 11g. Butted.

Rear, both sides, 8  $\frac{3}{16}$ " by 6g. by 9g. Butted.

Spoke lengths are measured under the head. (Not overall length).

**(l) Valve timing. (350 and 500).**

Inlet valve opens 32° before top dead centre.

Inlet valve closes 63° after bottom dead centre.

Exhaust valve opens 65° before bottom dead centre.

Exhaust valve closes 30° after top dead centre.

(For checking, see Para. 49.)

**(m) Valves.**

Model	Clearance (with cold engine).	Inlet head diameter	Exhaust head diameter	Stem diameter	Seat angle
350	Nil.	1-19/32"	1½	$\frac{3}{8}$ "	45°
500	Nil.	1.687"	1.687"	$\frac{3}{8}$ "	45°

Valve head measurements are subject to a toleration limit of + or — .0005"

Valve stem actual measurement is minus .0035" to minus .0045".

**(n) Valve springs. (350 and 500).**

Free length of Outer valve spring. 2  $\frac{1}{16}$ ".

Free length of Inner valve spring. 1  $\frac{13}{16}$ ".

Renew valve springs when free length is more than  $\frac{3}{16}$ " to  $\frac{1}{4}$ " below the above measurements.

**(o) Wheel sizes. (350 and 500).**

**Tyres.** 26" by 3.25" (Front and back).

**Rims.** 19" by 2½". (Front and back).

Front and rear rims are not interchangeable because the spoke nipple diameters differ. Those used in the front are .225" in diameter and those used in the rear are .250" in diameter.

Wheel bearing end play is .002".



# CONTROLS

## 2 CONTROLS

- (1) **Throttle twist grip.** Twist inwards to open. When fully closed engine should just idle when hot.
- (2) **Air control lever.** Pull inwards to increase air supply. Once set, when engine has warmed up, requires no alteration for different road speeds. Should be fully closed to start engine from cold.
- (3) **Ignition control.** Advances and retards ignition point. Pull inwards to advance. Retard two-fifths of total movement for starting.
- (4) **Valve lifter lever.** Small lever close to clutch lever. Lifts exhaust valve from seat, releasing compression in combustion chamber, enabling engine to be easily rotated for starting. Also used for stopping engine if throttle stop is set as advised in Para. (1) above. Also see Para. 6.
- (5) **Clutch lever.** Large lever in front of left hand. Grip to release clutch so that drive to rear wheel is disconnected. Used when moving away from standstill and when changing gear.
- (6) **Front brake lever.** Large lever in front of right hand. Grip to operate front wheel brake and, for normal braking, use in conjunction with rear brake application. See Para. 9.
- (7) **Rear brake pedal.** Depress with left foot to apply rear brake. Apply gently and use increasing pressure as road speed decreases.
- (8) **Gear change pedal.** Controls selection of the four speeds, or ratios, between engine and rear wheel revolutions. with a " free," or neutral, position. See Para. 7 and Illustration 3.
- (9) **Kick-starter pedal.** The almost vertical pedal on right hand side of gear box. For details of use see Para. 5 and Illustration 2.
- (10) **Lighting switch.** In top of head lamp. Controls lamps by rotating lever which has three positions :—
  - (1) "OFF." Lamps not on.
  - (2) " L." Pilot bulb in head lamp and rear lamp on.
  - (3) " H." Head and rear lamps on. Head lamp has a double filament. See Item (17) below.
- (11) **Ammeter.** In top of head lamp. Indicates flow of electric current in, or out, of battery. (" Charge " or " Discharge.")
- (12) **Horn push switch.** Depress button to sound horn.
- (13) **Gear box filler cap.** See Paras. 23 and 66.
- (14) **Footrest.** For rider.
- (15) **Petrol tank filler cap.** To release, slightly unscrew and then lift away.
- (16) **Oil tank filler cap.** Operated as Petrol tank filler cap (15),
- (17) **Dipping switch.** (*Not Illustrated*). Trigger switch on left handlebar. Used to select normal or " dipped " beam of head lamp when main lighting switch lever is in the " H " position.



Before using the machine, sit on the saddle and become familiar with the position and operation of the various controls. Pay particular attention to the gear positions. See Para. 7 and Illustration 3.

Although all the controls are adjustable for position, the only ones that may require alteration to suit the individual taste of the rider are the foot brake pedal (see Para. 89), and the gear change foot pedal (see Para. 7). If any adjustment is made to the rear brake pedal make certain the brake does not bind and also see there is not excessive free pedal movement before the brake comes "on." (See Para. 90).

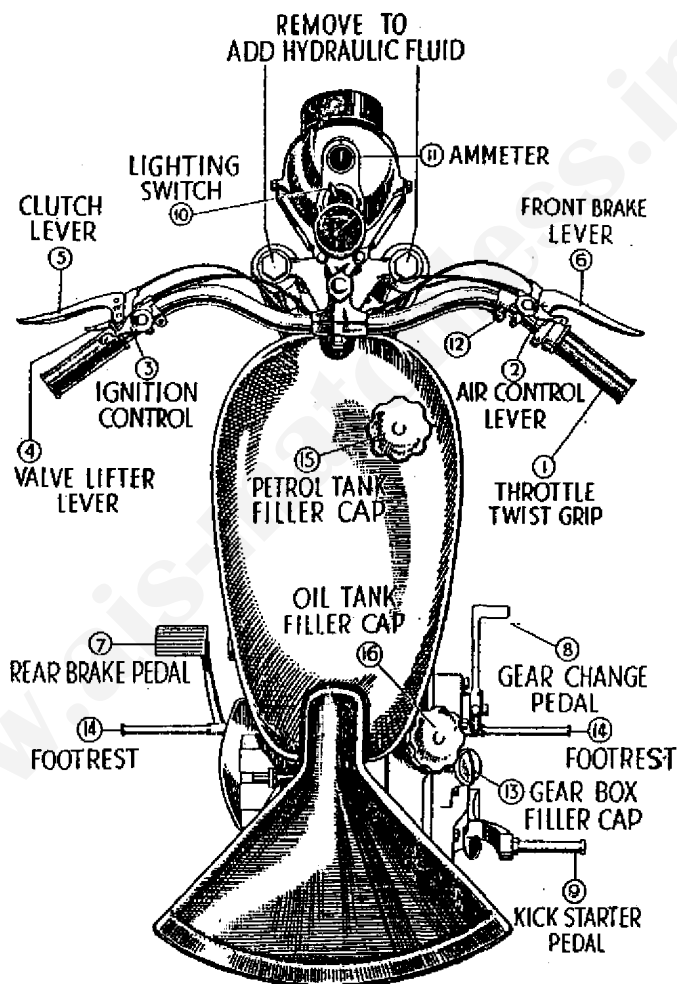


Illustration 1

Showing controls. The dip switch (reference 17) is not shown but is situated close to the ignition control.

# DRIVING

## 3 FUEL

At the time of writing this instruction book only one grade of motor fuel is on sale but it is certain that, very soon, the various grades of pre-war petrol will again be available.

We recommend the use only of best quality fuel because the small amount of economy that might be considered to accrue by using the cheaper fuels is more than offset by the various advances obtained by only using Number One grades.

Fuel to which "Lead" has been added will materially prevent "pinking" but it is a very debatable point whether the use of such a fuel, which discourages the use of the gear box, is not generally detrimental. It must be remembered that the gear box is there to be used and therefore we suggest the use of "straight" petrol plus the free use of the gear box to prevent the engine labouring under heavy stresses at low engine speeds.

## 4 FUEL SUPPLY

Two petrol taps are situated underneath the rear end of the petrol tank. (One each side). Both must be shut off when the machine is left standing for more than a few minutes.

The tap plungers work horizontally. To open, the hexagon knob (marked "Push-On") is pushed towards the body of the tap. To close, press the round milled knob (marked "Push-Off").

Normally, only use the tap on the left hand side of the machine and the other side will then act as a reserve supply. Always re-fuel as soon as possible after being forced to call upon the reserve, and then at once close the "reserve" tap. It will be noted that, by fitting two petrol taps, it is possible to remove the petrol tank from the machine without the necessity of first draining it of fuel.

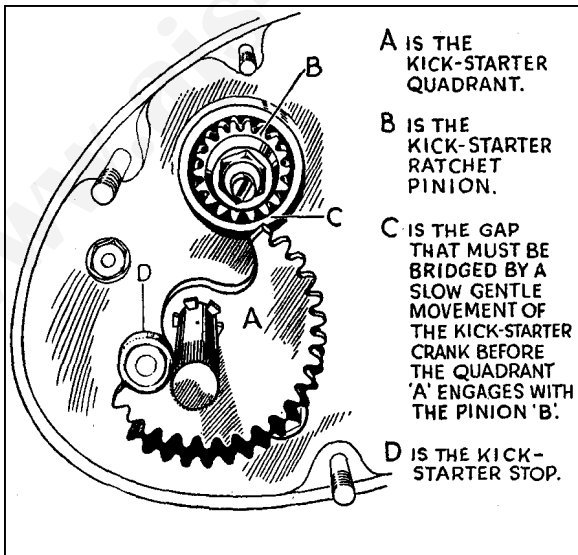


Illustration 2

Kick-starter quadrant  
and ratchet pinion.

## 5 STARTING THE ENGINE

- (a) See that there is sufficient fuel in the petrol tank.
- (b) See that there is sufficient oil in the oil tank.
- (c) See that the gear pedal is in the neutral position. (See Para. 7).
- (d) Push inward the hexagonal end of one petrol tap slide.
- (e) See that the air control lever is in the fully closed position.
- (f) Fully advance the ignition and then slack back the control lever two-fifths of its total movement.
- (g) Open the throttle not more than one-sixth of the total movement of the twist grip.
- (h) Depress the plunger on the top of the carburettor float chamber until it can be felt the chamber is full of petrol.
- (i) Raise the valve lifter lever and, while keeping it raised, turn over the engine several times by depressing the kick-starter pedal, three times, the object being to free the engine. (This only applies if the engine is cold.)
- (j) Depress the kick-starter until compression is felt, then raise the valve lifter lever and ease the engine just over compression. Then, after allowing the kick-starter pedal to nearly return to its normal position, give it a long swinging kick with the valve closed and the engine should immediately fire.

The kick-starter mechanism must be allowed to properly engage before putting heavy pressure on the kick-starter crank pedal pin. That means there are two definite and separate movements when operating the mechanism by depressing the crank.

The first is a Mow and gentle movement which ends when it is felt the quadrant has engaged with the teeth on the ratchet pinion. (See Illustration 2).

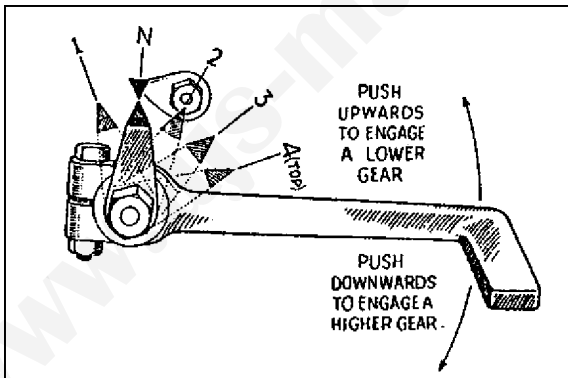


Illustration 3

Showing the relative positions taken up by the moving gear indicator when the various gears are engaged.

The moving gear indicator is attached to the control spindle and the fixed gear indicator is located on the kick-starter case cover.

The two indicators are only in line with each other when the foot gear change pedal is in the neutral position.

The first slow and gentle movement is essential to avoid damage to the teeth of the kick-starter quadrant.

After the engine has started, slowly open the air lever until it runs evenly. Then set the throttle so, that the engine is running at a moderate speed (neither racing nor ticking over) and allow to warm up. While doing this, check the oil circulation as detailed in Para. 12. The machine can then be taken on the road.

**Note :—**Do not race up the engine from cold.

## 6 STOPPING THE ENGINE

To stop the engine, close the throttle, raise the valve lifter lever and keep it raised until the engine has ceased to revolve.

## 7 ON THE ROAD

Having started and warmed up the engine, take the machine off the stand, sit astride it, free the clutch by pulling up the large lever on the left bar and engage the lowest gear.

Next, slowly release the clutch lever and the machine will commence to move forward. As it does this, the engine speed will tend to drop as it picks up the load so it will be necessary to slightly increase the throttle opening, bit by bit, to keep the engine speed gently rising as the speed of the machine is increased.

When well under way, disengage the clutch, slightly close the throttle, engage second gear and release the clutch lever, then open up the throttle to increase the speed of the machine. Repeat those operations in order to engage third and top gears.

To engage a higher gear the pedal is pressed downward with the toe and a lower gear is obtained by raising the pedal with the instep. To engage first gear from the neutral position, the pedal is therefore raised. After each pedal movement, internal springs return the pedal to its normal horizontal position.

The pedal must be moved to the full extent of its travel when selecting a gear, either up or down. It must not be "stamped down" or jabbed, but firmly and decisively moved till it stops. A half-hearted movement may not give full engagement. Keep the foot off the pedal when driving and between each gear change because, unless the lever can freely return to its normal central position, the next gear cannot be engaged.

Finally, fully advance the ignition and leave it in that position unless it is necessary to retard in order to ease the engine and so prevent "pinking" when pulling hard on a gradient.

## 8 NOTES ON DRIVING

If, at first, the lowest gear will not engage, release the clutch lever and after a second or two, make another attempt. This condition may exist in a new machine, but it tends to disappear after a little use.

Always endeavour to make the movements of hand (on the clutch) and foot (on the gear pedal) as simultaneous as possible, and remember, in all gear changes a steady pressure of the foot is desirable. This pressure should be maintained until the clutch lever is fully released. It is not sufficient to just jab the foot pedal and then release the clutch lever. When actually in motion, it will be found sufficient to merely free the clutch a trifle to ease the drive when changing gear and with reasonable care changes of gear can then be made without a sound.

Do not race the engine unnecessarily or let in the clutch sufficiently suddenly to cause the rear wheel to spin. Take a pride in making a smooth get-away.

When changing up to a higher gear, as the clutch is freed, the throttle should be slightly closed so that the engine speed may be reduced to keep in step with the higher gear ratio. Conversely, when changing down to a lower gear, the throttle is to be regulated so that the engine speed is increased to keep in step with the lower gear ratio.

Do not slip the clutch to control the road speed.

The clutch must only be used when starting from a standstill and when changing gear. It must not be operated to ease the engine instead of changing gear, or be held out in order to "freewheel."

The exhaust valve may be lifted, when the machine is being slowly ridden, with first gear engaged, down exceptionally steep, or difficult, gradients to prevent the rear wheel locking on a loose surface.

The exhaust valve lifter is **NOT** used in normal driving on main and secondary roads. When travelling slowly, such as may occur in traffic on a hill, and the engine commences to labour, it is then necessary to change to a lower gear. Engine "knocking" or "pinking" and a harshness in the transmission are symptoms of such labour and although relief can sometimes be found by retarding the ignition, it is generally much better to change down. A good driver is able to sense such conditions and will make the change before the engine has reached the stage of distress. The gear box is provided to be used and consequently full use should be made of the intermediate gears to obtain effortless running and smooth hill climbing.

Keep the feet clear of the brake and gear pedals when not actually using them and keep the hand off the clutch lever when not in use.

Drive as much as possible on the throttle, making the minimum use of the brakes.

## 9 STOPPING THE MACHINE

To stop the machine, close the throttle, declutch by lifting the large lever on the left bar, and gently apply both brakes. Increasing the pressure on them as the road speed of the machine decreases. Place the gear change foot pedal in the neutral position and stop the engine. (See Para. 6).

Before leaving the machine, turn off the fuel supply, because should the carburettor flood while the engine is stationary, there is a possibility of neat fuel entering the cylinder via the inlet port. When this occurs, there is a risk of fire when re-starting and real danger of oil dilution with the consequent risk of engine seizure.

When using the machine on wet or greasy roads, it is generally better to apply **BOTH** brakes together, because sudden or harsh application of either brake only, under such conditions, may result in a skid.

In all conditions, it is advisable to make a habit of always using both brakes together rather than to habitually using the rear brake and reserving the front brake for emergency.

## 10 RUNNING IN

For at least the first 500 miles, care to avoid over-driving must be taken and, under no circumstances must the engine be driven on full throttle during this "running in" period. Above all, the engine must not be allowed to attain a high rate of revolutions either when on the road or running idle. To be on the safe side, the following speeds should not be exceeded in the various gears : 1st. 10 m.p.h. ; 2nd. 15 m.p.h. ; 3rd. 25 m.p.h. ; and top, 30 m.p.h.

Special attention must be given during the running in period to such details as tappet adjustment, chains, brakes, contact breaker points, wheel bearings and steering head bearings, all of which tend to bed down in the first hundred miles or so. Particular note must be made of the adjustment of steering head bearings, which, if run in a slack condition, will be quickly ruined. After this bedding down process has taken place, adjustments to such details will probably only be necessary at lengthy intervals.

## 11 AFTER RUNNING IN

After the first 500 miles of running, speed on the various gears may safely be gradually increased, but under no circumstances should the engine be driven at maximum power output until at least 2,000 miles have been covered. Although the engine is capable of "revving" very fast, over-revving must, at all times, be avoided, particularly on the lower gears.

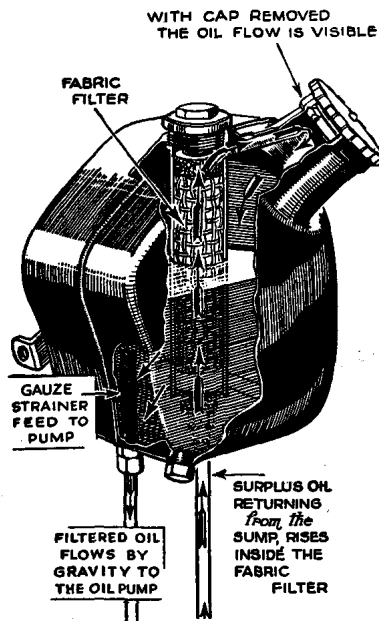


Illustration 4

Showing the oil tank with the felt filter in its cylindrical housing and the metal strainer mounted on the entry end of the feed pipe union. Also shows the direction of flow of oil from tank to engine and return flow from engine to tank via the small spout, located so that it can be inspected by removing the tank filler cap (mentioned in Para. 12).

## 12 CHECKING OIL CIRCULATION

Provision is made to observe the oil in circulation and it is necessary to do this before each run.

If the filler cap on the oil tank is removed, the returning oil can be seen running from the small spout just inside the filler cap orifice. This check should be made immediately after starting the engine from cold. This is because while the engine is stationary, oil from all parts of the interior of the engine drains back into the crankcase sump, so that, until this surplus is cleared, the return flow is very positive and continuous. Therefore, if the oil circulation is deranged, the fact is apparent at once by the lack of a steady return flow.

It should be remembered that normally the return flow is somewhat spasmodic and mixed with air bubbles. This is partly due to the fact that the return portion of the oil pump plunger has greater pumping capacity than that delivering fresh oil, and partly due to the variations in the amount of oil in suspense in the crankcase according to the engine speed. For example, upon a sudden acceleration, the return flow may completely cease for a time, only, of course, upon deceleration, to resume at a greater rate than normal.

## 13 PILLION PASSENGERS AND PANNIER BAGS

The addition of weight to the rear of a motor cycle may affect its steering. Therefore the rider must make some allowance for the difference in the "feel" of the machine when a passenger is carried.

The rear tyre pressure must be increased to satisfactorily carry any increased load. (See Para. 97).

# LUBRICATION

## 14 LUBRICANTS TO USE

Efficient lubrication is of vital importance and it is false economy to use cheap oils and greases.

We recommend the following lubricants for use in machines of our make :—

FOR ENGINE LUBRICATION IN SUMMER :

<b>Castrol " Grand Prix "</b>	}	<b>As S.A.E. 50</b>
<b>Triple Shell</b>		
<b>Mobiloil " D "</b>		
<b>Essolube " Racer "</b>		
<b>Motorine " B de Luxe "</b>		

FOR ENGINE LUBRICATION IN WINTER :

<b>Castrol " XXL "</b>	}	<b>As S.A.E. 30</b>
<b>Double Shell</b>		
<b>Mobiloil " B B "</b>		
<b>Essolube " Racer "</b>		
<b>Motorine " C "</b>		

FOR GEAR BOX LUBRICATION AND ALL FRAME PARTS USING GREASE :

**Castrolase " Medium "**  
**Shell " Retinax " Grease**  
**Mobilgrease No. 2**  
**Esso Grease**  
**Belmoline " C "**

FOR TELEDRYULIC FRONT FORKS :

<b>Castrolite</b>	}	<b>As S.A.E. 20</b>
<b>Single Shell</b>		
<b>Mobiloil " Arctic "</b>		
<b>Essolube 20</b>		
<b>Motorine " E "</b>		

FOR REAR CHAINS :

**Tallow**

When buying oils and greases it is advisable to specify the **Brand** as well as the grade and, as an additional precaution, to only buy in sealed containers or from branded cabinets.

## 15 FILLING THE GREASE GUN

The standard grease gun consists of a barrel having a spring loaded end cap, to which is fixed a centre steel piston in the shape of a long rod. This piston fits into a small cylinder made in one with the screwed top cap, on the end of which is the supped nozzle that fits over the grease nipples. In the barrel of the gun, and sliding on the central piston rod, is a cork piston.

The grease must be filled on the **TOP** of the cork piston. The gun may be filled by inserting the grease in the barrel of the gun by means of a lath or similar "spoon." However, it is better to obtain the grease packed in the special containers that are supplied, having loose collars in which are holes so that, by placing the barrel of the gun over the hole in the central floating plate and pressing downwards, the gun is instantly charged with grease. Twisting the gun, and, at the same time, taking it away from the floating plate, leaves the top of the gun barrel flush with grease, and then all that remains to be done is to replace the screwed top cap.

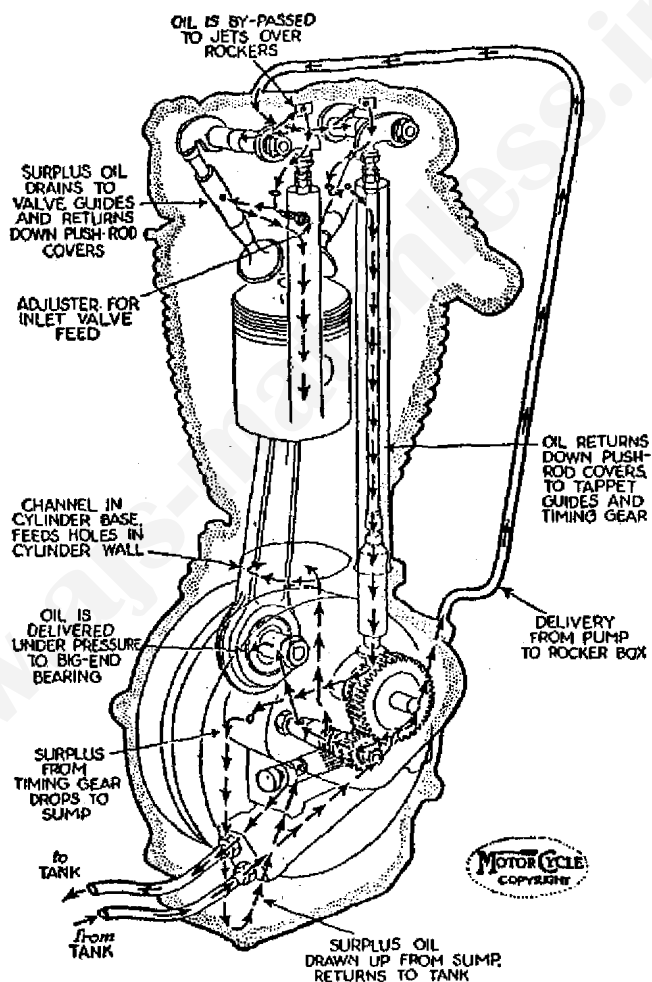


Illustration 5

Engine Oil Circulation



## 16 ENGINE LUBRICATION SYSTEM

This is by dry sump system. Oil feeds, by gravity, from oil tank under saddle to pump in crankcase. Pump forces oil to various parts. Oil then drains to bottom of crankcase sump. Pump then returns oil to tank. Process is continuous while engine is revolving. Pump is designed to return more oil to tank than it can force into engine. Therefore crankcase sump is kept clear of excess oil.

A felt cartridge filter, in the oil tank, removes foreign matter collected by the oil in its passage through the engine. A metal gauze strainer is fitted to the oil feed pipe in the oil tank to prevent pieces of fluff, etc., which may find their way into the tank when replenishing, from entering the oil pump. (See Illustration 4).

Felt filter and metal strainer should be cleaned in petrol each time the oil tank is drained.

## 17 ENGINE OIL PUMP

Pump has only one moving part. This is the plunger which revolves and reciprocates. Rotation is caused by the worm gear on the timing side flywheel axle. Reciprocation is caused by the guide screw which engages in the profiled groove cut on the plunger. Oil is fed to pump through the lower of the two oil pipes between tank and crankcase and is returned through the upper pipe.

If, for any reason, the crankcase halves are separated, the oil pump plunger must be removed from its housing before attempting to separate the crankcase halves.

## 18 ENGINE OIL CIRCULATION

Engine oil pump forces oil through :—

- (a) Passage oil through timing side flywheel axle, timing side flywheel and crank pin to lubricate big-end bearing. The splash passes to interior of cylinder, to lubricate cylinder and piston, and then falls into crankcase sump.
- (b) Passage in crankcase, controlled by ball valve, direct to cylinder, to assist in cylinder and piston lubrication and then falls into crankcase sump.
- (c) Passage in timing gear case where it " builds up " to a predetermined level to lubricate the timing gears and then falls into crankcase sump.
- (d) Through pipe from from of oil pump housing to rocker box by which all rocker gear and valve stems are lubricated and then falls through push rod cover tubes and tappet guides to the timing gear case and, from there, drains into crankcase sump, as detailed in Para. (c).

Engine oil pump extracts oil in crankcase sump and returns it to oil tank. On its way it passes through the felt cartridge filter located in the oil tank.

## 19 THE OIL TANK AND FILTERS

The level of oil in tank should never be less than about half-full (otherwise the small amount of oil becomes excessively hot and dirty, thereby impairing lubrication and cooling), or more than within one inch of filler cap opening (otherwise, upon starting the engine, the bulk of oil then in the crankcase sump may be greater than the space left in the oil tank).

The oil filter is made in cylindrical form of thick felt and is supported by a tubular wire cage. The felt is not detachable from the cage.

A metal gauze strainer (secured to the feed pipe union) stands in the oil tank.

Oil should be changed every two thousand miles. When oil is changed, felt filter and metal strainer should be removed and cleaned in petrol.

**For access to filter :—**

Remove the two bolts fixing the saddle springs to frame.

Raise rear of saddle.

Unscrew hexagon cap on top of oil tank.

Withdraw spring and dished cap washer.

Insert finger in filter and withdraw to the rear of machine. (Great care needed towards end of this operation otherwise filter will be kinked.)

**To re-fit filter :—**

Reverse above instructions.

**Note :—**

If, after the filter has been removed from the tank, it is damaged, so that the felt is perforated, or the ends distorted, it is essential to discard it and to fit a new filter.

Be careful to avoid damaging the filter or the cork washer under the hexagonal cap and, when replacing the saddle spring bracket bolts, be sure to firmly tighten them.

**For access to metal strainer (after oil has been drained from tank) :—**

Remove oil feed pipe from union screwed into bottom of oil tank. This is pipe nearer to rear wheel and is removed by unscrewing its union nut.

Spring away pipe from union.

Unscrew union from bottom of oil tank. Metal strainer is integral part of this union.

**To re-fit metal strainer :—**

Reverse above instructions.

## 20 ADJUSTMENT OF OIL FEED

The internal flow of oil is regulated by fixed restrictions. No adjustment is provided except for the oil feed to the inlet valve stem. This adjustment is made by a needle pointed screw located in the right side of cylinder head. (See Illustration 6). It is locked in position by a nut. The approximate correct setting is half a complete turn from the fully closed position. Once set it requires little, or no, adjustment.

Inlet valve squeak indicates the oil feed adjustment is not open enough. Excessive oil consumption, a smoky exhaust or an oiled sparking plug, generally indicates the oil feed adjustment is open too much.

## 21 EXHAUST VALVE STEM LUBRICATION

The exhaust valve stem is lubricated by oil fed through a passage drilled in the cylinder head. No adjustment is provided. All excess, oil is by-passed back to the timing gear case.

## 22 LUBRICATION POINTS TO REMEMBER

A dirty, or choked, felt oil filter causes heavy oil consumption. This is because the return flow of oil to the oil tank is slowed, or even almost completely stopped, thereby allowing an excess of oil to "build up" in the crankcase sump, much of which passes to the piston.

A clogged metal strainer, in the gravity feed pipe, will also cause improper, or no, oil circulation. This can only occur as the result of adding dirty oil when replenishing the tank.

Both end caps on pump plunger housing must be air-tight.

Check oil circulation before starting each run.

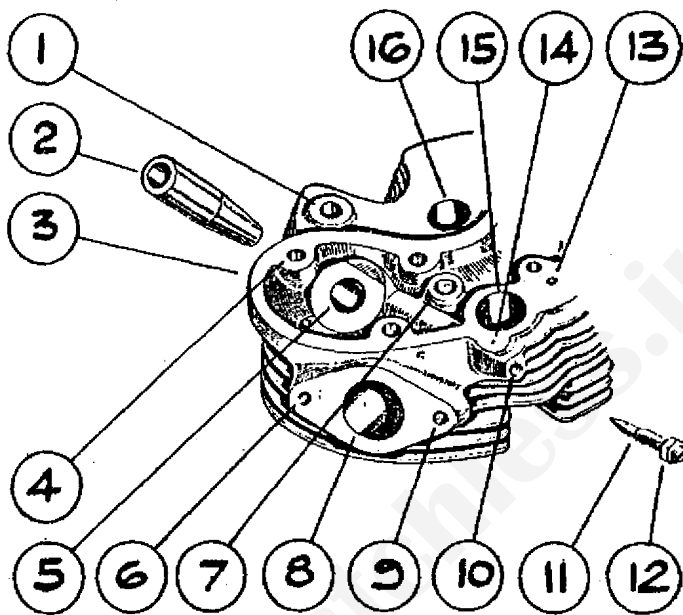


Illustration 6

The inlet valve guide is shown withdrawn and the inlet valve stem oil adjusting screw (with lock nut) is also withdrawn. (See para. 20.)

(By courtesy of "Motor Cycling")

- 1 PLAIN HOLE, TO ACCOMMODATE CYLINDER HEAD RETAINING BOLT.
- 2 GUIDE FOR VALVE.
- 3 CYLINDER HEAD.
- 4 TAPPED HOLE, TO ACCOMMODATE ROCKER BOX RETAINING BOLT
- 5 PLAIN HOLE, TO ACCOMMODATE VALVE GUIDE.
- 6 TAPPED HOLE, TO ACCOMMODATE CARBURETTER RETAINING STUD.
- 7 PLAIN HOLE, TO ACCOMMODATE CYLINDER HEAD RETAINING BOLT.
- 8 INLET PORT.
- 9 TAPPED HOLE, TO ACCOMMODATE CARBURETTER RETAINING STUD.

- 10 TAPPED HOLE, TO ACCOMMODATE NEEDLE SCREW.
- 11 NEEDLE SCREW, ADJUSTING OIL FEED TO INLET VALVE GUIDE.
- 12 LOCK NUT. FOR NEEDLE ADJUSTING SCREW.
- 13 PLAIN HOLE, FOR OIL FEED TO EXHAUST VALVE GUIDE.
- 14 PLAIN HOLE, FOR OIL FEED TO INLET VALVE GUIDE.
- 15 PLAIN HOLE, TO ACCOMMODATE PUSH ROD COVER TUBE TOP GASKET.
- 16 TAPPED HOLE, TO ACCOMMODATE SPARKING PLUG.

## **23 GEAR BOX LUBRICATION**

The gear box must not be entirely filled with grease, and, under normal conditions, the addition of about two ounces of grease every 1,000 miles will be sufficient.

In no circumstances must heavy grease be used for gear box lubrication. See para. 14.

Lubricant may be inserted through grease nipple on the kick-starter case or through the filler cap orifice.

A screwed drain plug in gear box shell (low down at rear) facilitates gear box flushing and change of lubricant.

## **24 CHAIN LUBRICATION**

Front driving chain and dynamo chain run in oil bath. (Front chaincase.) Use engine oil. Maintain level to height of the inspection cap opening.

Oil in front chaincase also lubricates the engine shock absorber. Transmission harshness generally indicates level of oil in chaincase is too low.

Remove chaincase inspection cap each week, inspect level of oil, top-up as necessary.

### **To remove inspection cap :—**

Unscrew knurled screw about four turns.

Slide cap sideways, till the back plate can be slipped through the opening, and take away the complete cap assembly.

When replacing inspection cap, centralise cork washer and then fully tighten knurled screw. Essential this is kept tight otherwise cap assembly will be lost.

Rear driving chain should be removed for lubrication. Clean chain in paraffin, drain and wipe. Immerse in bath of molten tallow, leave for several minutes, remove and allow excess lubricant to drain off and then replace on machine. Engine oil is a poor substitute for tallow and, if used, chain should be allowed to soak for several hours.

Lubricate rear chain every two thousand miles in Summer and every thousand miles in Winter.

Magneto chain runs in case packed with grease. A grease nipple is fitted to the case cover. Inject small quantity of grease every thousand miles.

## **25 HUB LUBRICATION**

Keep hubs packed with grease. This prevents entry of water and dirt. Nipples in centre of hubs. Inject small quantity of grease. Excessive grease may reach brakes and impair their efficiency.

## **26 BRAKE EXPANDER LUBRICATION**

Nipple on each brake expander bush. (One on front brake cover plate, one on rear brake cover plate.) Use grease very sparingly. Excessive grease may impair efficiency of brake.

## **27 BRAKE ROD JOINT LUBRICATION**

A few drops of engine oil on each brake rod yoke end pin and on the threaded rear portion of brake rod. (One yoke end pin at each end of brake rod and one at bottom end of front brake cable).

## 28 BRAKE PEDAL LUBRICATION

Grease nipple in heel of brake foot pedal. Use grease sparingly.

## 29 SPEEDOMETER LUBRICATION

One nipple on top of speedometer gear box attached to rear wheel spindle. Use grease sparingly. No other part of the speedometer (including the driving cable) requires lubrication.

## 30 STAND FIXING BOLT LUBRICATION, ETC.

Several of the parts of a motor cycle that have a very small movement, such as the hinge bolts of the stands, should be lubricated. Occasionally remove those bolts and smear with engine oil.

## 31 STEERING HEAD BEARING LUBRICATION

One nipple on main frame head lug and one on handlebar lug. Use grease sparingly.

## 32 FRONT FORK LUBRICATION

No parts of the **TELEDAULIC** Front Fork requires lubrication, but it is advisable to test the level of the hydraulic fluid, and top-up if required, every three thousand miles.

### Test level and top-up by:—

- (a) Support motor cycle, vertically, with the weight on both wheels. (A steady under each footrest is best method).
- (b) Unscrew the two hexagonal plugs at top of fork inner tubes. (These are on level with handlebars).
- (c) Pull upwards each plug as far as possible. (Attached to undersides of plugs are the fork damper rods. Rods will therefore be exposed).
- (d) Work plugs and rods up and down, several times (pumping action), making upward strokes as violent as possible but only use fingers to do so. (This action is to eject any hydraulic fluid that may be trapped in the tubes above the damper valves).
- (e) Wait two minutes. (To allow any ejected oil to drain down to main supply).
- (f) Remove oil level screws. These are located on each slider, just under the mud-guard bridge fixing bolts. (Each screw has a fibre washer).
- (g) Oil should just ooze from oil level holes if the oil level is correct.
- (h) If no trickle, top-up by pouring down each fork inner tube about two table-spoonfuls (one fluid ounce) of Hydraulic Fluid.
- (i) Repeat pumping action. (Para. (d)).
- (j) Wait two minutes (To allow oil time to trickle out of holes).
- (k) Let all excess oil leak away.
- (l) If no trickle, repeat as Paras. (h) and (i).
- (m) If still no trickle it is evident leakage has occurred. Investigate and correct same.
- (n) Replace oil level screws. (Ensure a fibre washer on each screw).
- (o) Replace plug in top of each fork inner tube.

### 33 CONTROL LEVER LUBRICATION

A drop of engine oil on all moving parts of the handlebar control levers.

Also, if the twist grip operation is too tight, indicating dryness, lubricate as follows :—

Remove the two screws that retain the two halves of the twist grip body. This will release the grip so that it can be slid off the handlebar.

Smear the end of the handlebar with high melting point grease and also smear some round the friction spring and on the drum in which the inner control wire is wound.

Then replace the grip and screws and fully tighten same.

### 34 LUBRICATION CHART

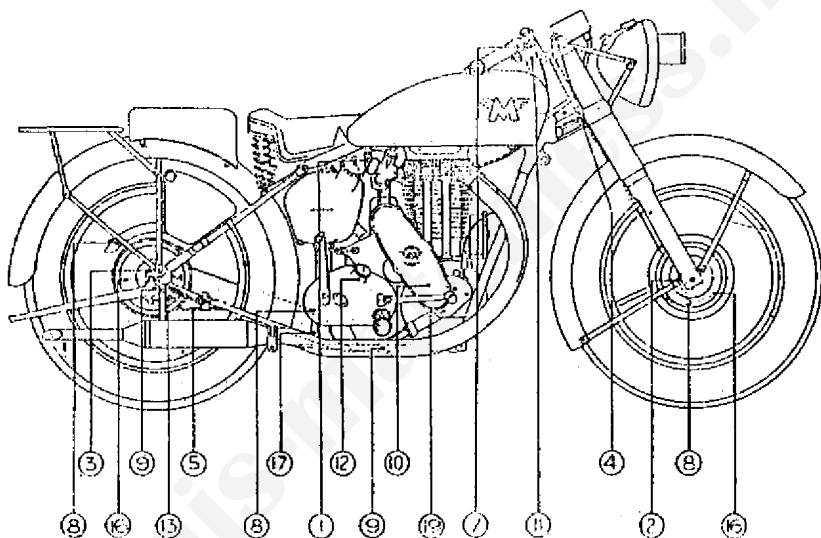


Illustration 7

Lubrication Chart.

#### Engine oil. Locations

- 1 Main oil tank
- 7 Control lever moving parts
- 8 Brake rod joints
- 9 Front, prop and rear stand hinge pins
- 19 Front chain case

#### Hydraulic Fluid Location :—

- 4 Front forks

#### Tallow Location :—

- 5 Rear chain

#### Grease. Locations :—

- 2 Front hub
- 3 Rear hub
- 10 Magneto chain case
- 11 Steering head bearings
- 12 Gear box
- 13 Speedometer gear box
- 16 Front and rear brake expanders
- 17 Brake pedal spindle

# MAINTENANCE

## 35 PERIODICAL MAINTENANCE

Regular maintenance attention to lubrication and certain adjustments must be made to ensure unflinching reliability and satisfactory service and performance. This attention is detailed below and we strongly recommend every rider to carefully follow these suggestions.

The reference numbers, in brackets, refer to the locations specified on the Lubrication Chart. (See Para. 34 and Illustration 7).

### DAILY

#### **Oil tank :—**

Inspect oil level (1) and top-up if necessary. Check oil circulation. (See Para. 12).

#### **Petrol tank :—**

Check level and re-fill if necessary.

#### **Tyres :—**

Check pressures and inflate if necessary. (See Para. 97).

### WEEKLY

#### **Battery :—**

Inspect each cell for level of electrolyte and top-up if necessary. (See Para. 100).

#### **Brakes :—**

Inspect front and rear brake adjustments and alter if necessary. (See Paras. 90 and 91)

### MONTHLY

#### **Tappets :—**

Check adjustment and alter if necessary. (See Para. 50).

#### **Steering head :—**

Test for up and down play and adjust if necessary. (See Para. 72).

#### **Chains :—**

Inspect all chains (front, rear, dynamo and magneto) and test whip. Adjust if necessary. (See Paras. 67, 68, 69 and 70).

#### **Petrol system :—**

Ensure all joints in petrol feed are petrol tight.

#### **Nuts and bolts :—**

Test all for tightness and tighten if necessary. (Beware of over tightening.)

#### **Speedometer gear box :—**

Inject small quantity of grease. (13).

**Control levers :—**

Smear moving parts with engine oil. (7).

**Brake joints :—**

Smear yoke end pins at front and rear ends of brake rod and at bottom end of front brake cable with engine oil. (8).

**QUARTERLY****Sparking plug :—**

Clean and, if necessary, re-set point gap. (See Para. 99).

**Hubs :—**

Check end play and adjust if necessary. (See Para. 83).

**Stands :—**

Smear hinge bolts with engine oil.

**Contact points :—**

Clean and, if necessary, re-set gap. (See Para. 99).

**Contact tappet :—**

Clean and smear with thin oil. (See Para. 99).

**Carburettor :—**

Remove float chamber and clean interior.

**YEARLY (OR DURING ENGINE OVERHAUL)****Magneto and Dynamo :—**

Get a Lucas Service Station to dismantle, clean, service and lubricate.

**EVERY 500 MILES****Front chaincase :—**

Remove inspection cap and check oil level, (19). Top-up if necessary. Level not to be below  $\frac{3}{16}$ " from bottom edge of inspection orifice when machine is on rear stand.

**Rear chain :—**

Examine. If dry, apply engine oil, spreading with a brush or rag. (5).



## **EVERY 1.000 MILES**

### **Hubs :—**

The hubs are packed with grease during assembly to lubricate the bearings and prevent the entry of mud and water. A grease nipple is on each hub shell. Inject grease, which must not be excessive in quantity or the surplus may reach the brake and so impair its efficiency. (2 and 3).

### **Brake expanders :—**

A grease nipple is in the brake expander bush on each brake cover plate. Inject grease. (16). Use sparingly otherwise surplus may impair brake efficiency.

### **Gear Box :—**

Inject about 2 ozs. (12.)

### **Magneto chain :—**

Magneto chain runs in case packed with grease. Nipple on cover. (10). Use small quantity.

## **EVERY 2.000 MILES**

### **Oil tank :—**

Drain and re-fill with new oil. Oil should be changed after first 500 and 1.000 miles running.

Tank drain plug is on front lower edge of tank and crankcase sump drain plug is in bottom of crankcase on right hand side. Have machine on front and rear stands, or with both wheels on the ground, when draining.

Clean felt oil filter and metal strainer each time the engine oil is changed. (See Paras. 12 and 16).

### **Rear chain :—**

Remove and lubricate with molten tallow. (See Para. 24).

## **EVERY 3.000 MILES**

### **Front fork :—**

Check level of hydraulic fluid in each inner tube and, if necessary, top-up. (See Para. 32).

### **Steering head :—**

One grease nipple on head lug of main frame, another on handlebar lug (11). Use grease sparingly.

### **Brake pedal :—**

Grease nipple in heel of pedal. (17). Use grease sparingly.

# ENGINE SERVICE

## 36 ACCESS

For almost all service work to the upper parts of the engine, it is necessary, in order to obtain accessibility, first, to remove the petrol tank. The two petrol taps facilitates this operation by removing the need to first drain the tank of petrol.

## 37 TO REMOVE THE PETROL TANK

Disconnect the petrol feed pipe from both petrol taps. (Have taps in " OFF " position).

Cut the wires locking the four tank fixing bolts.

Unscrew the tank fixing bolts and tank may be removed from the frame.

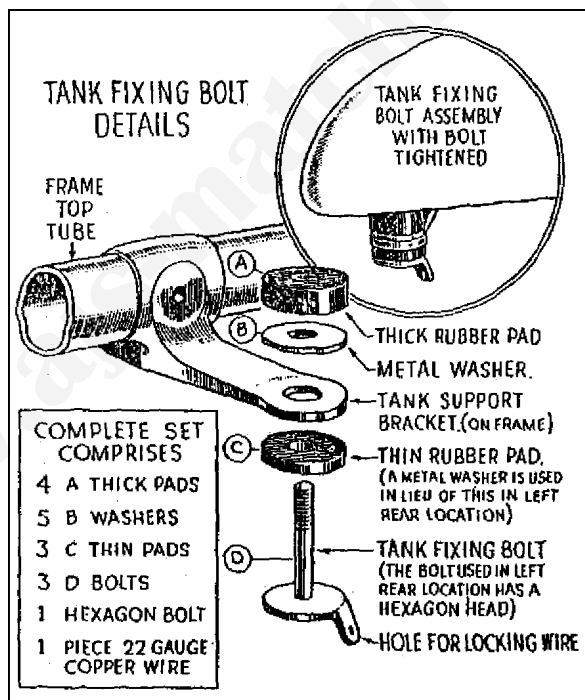


Illustration 8

Showing details, and order of assembly, of the fuel tank fixing bolts and components.

## **38 TO REPLACE THE PETROL TANK**

Place a metal washer on each tank support bracket.

Place a thick rubber pad on each metal washer.

Place the tank in position.

Place a meal washer on the hexagon-headed tank fixing bolt and screw it into the rear left-hand location.

Place thin rubber pads on each of the remaining three tank fixing bolts and replace them.

Screw home all four fixing bolts sufficiently to just slightly compress the rubber pads and, in that position, interlace them, in pairs, with 22 gauge copper wire. (It is not intended the tank fixing bolts should be screwed home as far as they will go).

Replace the petrol feed pipe. (Hold taps with the adjustable wrench when tightening the top end union nuts on the petrol feed pipe.)

## **39 TO REMOVE THE ROCKER BOX**

Remove the petrol tank. (See Para. 37).

Remove the three nuts and washers under them, retaining the rocker box side cover, and take away the cover.

Disconnect oil pipe feeding oil to rocker box.

Turn over engine till both valves are closed.

On 500 c.c. remove engine steady stay by removing bolt from frame clip and nut and washer from rocker box bolt extension.

Remove the seven bolts retaining rocker box to cylinder head.

Tilt upwards the right-hand side of rocker box and extract the two long push rods. Lay these aside so they may be identified because, although identical in design, they should not be interchanged.

Raise forward end of rocker box (to clear the exhaust valve assembly), swing it round in an anti-clockwise direction (to clear the frame tube), and then lift it clear of the inlet valve assembly.

Do not lose the hardened steel caps on the ends of the valve stems.

## **40 TO REPLACE THE ROCKER BOX**

Carefully clean top of cylinder head and lower face of rocker box.

Ensure steel caps are in position on valve stem ends.

Revolve engine till both tappets are down, *i.e.*, the top dead centre of firing stroke.

Lay composition washer on cylinder head. This must be faultless. If necessary, fit new. Ensure small lip of gasket surrounds the small hole in cylinder head through which oil to inlet valve stem passes.

Place rear end of rocker box over inlet valve assembly, swing it in a clockwise direction over exhaust valve assembly till it is in position.

Slightly raise right-hand side of rocker box which will allow the two long push rods to be dropped in position. (Ensure inlet rod is placed in inlet position. See Para. 39).

Ensure each rocker box fixing bolt has a plain steel washer on it and then insert the bolts and screw down each a few turns. (Note that the bolt having the short head is in the centre, right-hand, position and, on 500 c.c., that the bolt with the threaded extension is in its correct position.

Finally, tighten each bolt, in turn, bit by bit, till all are fully home.

On 500 c.c. replace the engine steady stay by securing to the rocker box fixing bolt having the threaded extension by washer and nut and to the clip on frame tube by bolt.

Turn over engine several times to ensure all parts have bedded home.

Test rocker box fixing bolts for tightness.

Check tappet clearances and re-set, if necessary. (See Para. 50).

Replace rocker box oil feed pipe. Do not allow union, screwed into rocker box, to turn when tightening union nut. (Use two spanners).

Inspect rubber fillet on rocker box side cover and, if not perfect, fit a new fillet.

Replace rocker box side cover, the three fibre washers and three retaining nuts. Beware of over tightening the three nuts.

Replace petrol tank. (See Para. 38).

## **41 TO REMOVE THE CYLINDER HEAD**

### **Remove :—**

The petrol tank. (See Para. 37).

The sparking plug.

The Rocker box. (See Para. 39).

### **Remove the right-hand side footrest by :—**

Remove nut, and washer, on right-hand side of footrest rod.

Partially withdraw footrest rod from left-hand side.

Pry away the right-hand side footrest arm. (Only necessary on 350 c.c. model.)

### **Remove the exhaust system by :—**

Remove nut, and washers, retaining exhaust pipe to its stay.

Remove nut, and washers, retaining silencer to its stay.

Remove complete exhaust system by pulling away from stays and then downwards from the exhaust port in cylinder head.

### **Remove carburettor by :—**

Unscrew venturi air intake.

Unscrew two carburettor retaining nuts.

Take away carburettor and rest on saddle.

### **Remove :—**

The four bolts retaining cylinder head to barrel and head is free to be taken away. While doing this the push rod cover tubes will come away with the head.

If the cylinder head bolts resist removal, brush paraffin round their heads and leave for a time to soak before making further effort.

## 42 TO REMOVE AND REPLACE THE VALVES

Remove the cylinder head. (See Para. 41).

Rest, in turn, head of each valve on small wood block and compress springs to allow removal of valve split collets. The collets are a taper fit in the valve spring collars and it may be necessary to give the collar a sharp tap to release them.

### Replace valves by :—

Clean valve guide bores with rag.

Smear each valve stem with engine oil.

Reverse procedure described above.

### NOTE :—

A distance sleeve is fitted under the cup for the exhaust valve springs, but not under the cup for the inlet valve springs.

It is essential that the collets are correctly located on the valve stems. It will be observed that the collet has two grooves machined in the bore and those two grooves must register with the two rings on the valve stem. If fitted so that only one of the grooves engages the ringed valve stem, damage will almost certainly result.

On 350 c.c. the inlet valve head is larger in diameter than the exhaust. Therefore inlet and exhaust valves are not interchangeable and no mistake can be made when replacing same in the cylinder head.

On 500 c.c. both valve heads are identical in dimensions but are made of different materials. Therefore, upon removal, valves should be laid aside so that they may be identified for re-fitting. In case of doubt, see marking "In" or "Ex" on top of stem above collet grooves.

## 43 DECARBONISATION

Need for decarbonisation depends on fuel, oil and driving conditions. It will be indicated by a tendency to knock on hills or accelerating after rounding a corner.

Every two thousand miles is a fair average.

Generally only necessary to take off cylinder head, clean head and piston top of deposit and grind in valves.

Every other time also remove cylinder barrel and inspect piston rings and clean out piston ring grooves. If rings show any black portions on their bearing faces (indicating leakage) replace same with new.

Do not use any abrasive, such as emery cloth, to remove deposit from the top of a piston. It is preferable to use a scraper made of soft metal.

It is usually not necessary to clean the inside of a piston and no attempt should be made to polish the skirt.

## 44 VALVE GRINDING

It is advisable to grind in the valves at every decarbonisation.

Clean valve stems with very fine emery cloth, using up and down motion with cloth held between thumb and forefinger.

Scrape off all carbon deposit that is on the valve heads.

Smear the face of each valve, in turn, with valve grinding compound and revolve the valve on its seat in a slight forward and backward direction, at the same time, maintaining slight pressure on the valve head to keep it on its seat. During this operation, occasionally raise the valve off its seat and turn it slightly, afterwards lowering the valve to the seat and repeating the forward and backward movement.

Finally, remove all traces of grinding compound from the valves and seatings by washing off with petrol and pass a piece of clean rag through each valve guide to remove any abrasive that may have collected.

If a valve seat is re-cut the cutting tool should have an angle of  $45^\circ$ .

When grinding in valves a suitable valve holding tool is necessary. The Spares List gives particulars of this and other tools.



*Illustration 9*

## 45 TO REPLACE THE CYLINDER HEAD

A gasket is fitted between cylinder head and barrel.

The top ends of the push rod cover tubes have rubber gaskets between tubes and head, they are a push fit and metal washers are located between the top edges of the gaskets and the cylinder head recesses. If the cover tubes are pulled away from the head, the gaskets will probably remain in position in the head.

It should be noted that a compression plate is a standard fitment on all 500 c.c. machines.

A rubber gland is fitted at the bottom of each cover tube.

### **Replace the cylinder head by :—**

Carefully clean the top edge of the cylinder barrel and the under face of the cylinder head.

Fit the cover tubes, with their rubber gaskets and metal washers, into the cylinder head.

Place the cylinder head gasket in position on the top edge of the cylinder barrel.

Place a rubber gland round each tappet guide.

Place the cylinder head in position.

Ensure each cylinder head securing bolt has a plain steel washer on it and then replace the bolts and engage each a few turns.

Finally, screw down the cylinder head securing bolts. In turn, bit by bit, till all are fully home.

### **Replace :—**

The rocker box. (See Para. 40).

The carburetter.

The exhaust system.

The footrests.

The petrol tank (See Para. 38).

### **Note :—**

If old gaskets are re-fitted they must be in an undamaged state otherwise new must be used.

## 46 TO REMOVE THE CYLINDER BARREL AND PISTON

### **Remove :—**

The cylinder head. (See Para. 41).

The four nuts retaining cylinder barrel to crankcase.

### **Take away :—**

Cylinder barrel. (Ensure piston is not damaged in doing this. Steady piston with hand as barrel is withdrawn).

Fill throat of crankcase with clean rag to prevent entry of foreign matter.

### **Remove :—**

One gudgeon pin circlip. It is immaterial which circlip is removed. Use special pliers included in tool kit.

Gudgeon pin by pushing it out of piston.

Take away piston.

**Note :—**

The gudgeon is an easy sliding fit in both piston and connecting rod small-end bush.

Rings may be removed from a piston by "peeling off" with a knife, or by introducing behind the rings three pieces of thin steel spaced at  $120^\circ$  from each other and then sliding off the rings. (Do not scratch the piston).

## **47 TO REPLACE THE PISTON AND CYLINDER BARREL**

All parts must be clean.

Place rings on piston. (Scraper first then the two compression).

Smear gudgeon pin with engine oil.

**Refit piston by :—**

Introduce piston over connecting rod. If of split skirt type, so that slit in piston faces to the front of the machine.

Introduce gudgeon pin in piston and pass it through connecting rod small-end bush and centralise it.

Re-fit circlips. (Use special pliers). Use rotary action when bedding circlips in their grooves and make sure each circlip lies snugly in its groove. This is essential otherwise considerable damage will result.

**Refit cylinder barrel by :—**

Take new cylinder base washer. Coat one side with liquid jointing compound and apply it to cylinder base. Ensure jointing does not choke any of the cylinder base oil holds.

Smear cylinder bore and piston with engine oil.

Space piston rings so that the gaps are evenly spaced at  $120^\circ$  to each other.

Remove rag from crankcase throat.

Fit barrel over piston. Ensure each piston ring is fully compressed into its groove, in turn, as the barrel passes over it.

Replace cylinder barrel holding down nuts, screwing each down, in turn, bit by bit, till all are fully home.

## **48 CAM CONTOUR**

On the flanks of the cams are quietening curves which are very slight inclines from the base circles to the feet of the humps.

Therefore, it is necessary to ensure the tappet ends are on the base circles when checking valve clearances and valve timing.

It is for this reason valve clearances must be checked when the piston is at the top of its compression stroke, at which position both tappets are well clear of the quietening curves.

## **49 VALVE TIMING**

**Inlet valve timing :—**

Inlet valve opens  $32^\circ$  before top dead centre.

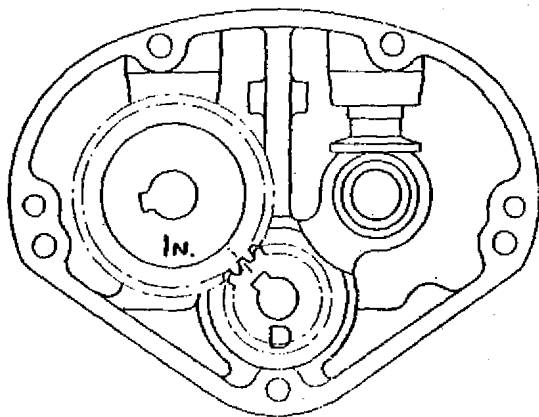
Inlet valve closes  $63^\circ$  after bottom dead centre.

**Exhaust valve timing :—**

Exhaust valve opens  $65^\circ$  before bottom dead centre.

Exhaust valve closes  $30^\circ$  after top dead centre.





*Illustration 10*  
**Inlet Camshaft timing marks.**

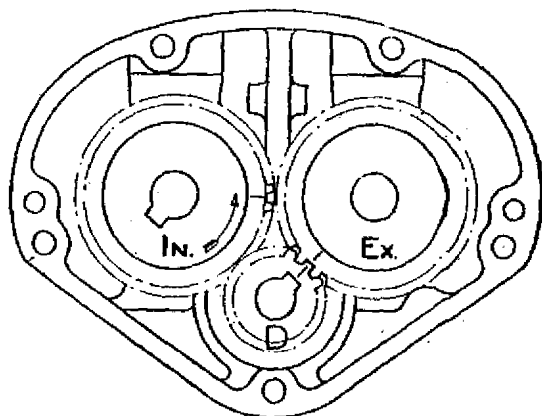
When checking the valve timing the tappet clearances must be set to .016" so that the tappets may be well clear of the quietening curves of the camshafts.

The timing gears are marked to facilitate their replacement.

**To re-set the valve timing, by using the marks on the gears, proceed as follows :—**

Turn over the engine till the mark on the small timing pinion (D in Illustration 10) is in line with the centre of the inlet (rear) camshaft bush. Insert the inlet camshaft so that the mark on it is in mesh with the mark on the small timing pinion (D).

Rotate the engine in a forward direction till the mark on the small timing pinion (D in Illustration 11) is in line with the centre of the exhaust (front) camshaft bush. Insert the exhaust camshaft so that the mark on it is in mesh with the mark on the small timing pinion (D).



*Illustration 11*  
**Exhaust Camshaft timing marks.**

## 50 TAPPET ADJUSTMENT

The top ends of the two long push rods have screwed extensions. These are locked in position by nuts, thereby providing tappet adjustment.

The correct tappet clearances, with valves closed and engine cold, is **NIL**. This means the push rods should be free enough to revolve and, at the same time there should be no appreciable up and down play. (See Para. 48.)

### Prepare to adjust tappets by :—

Remove the three nuts, and fibre washers under them, retaining tappet cover to rocker box.

Take away cover.

### Adjust tappets on all 350 and on 500 if no compression plate is fitted by:—

With spanners, hold the body C, either valve (Illustration 12) and slacken lock nut B. Then screw, in or out, the head A until the clearance is nil.

Tighten lock nut B and re-check the clearance.

Treat other valve in like manner.

### Adjust tappets on 500 with compression plate fitted by:—

Turn over engine till exhaust valve is lifted.

Slacken nut on exhaust push rod. (B illustration 12.)

Turn over engine till inlet valve is fitted.

Slacken nut on inlet push rod. (B illustration 12.)

Screw out, or in, the exhaust tappet adjusting screw till tappet clearance is nill. (A illustration 12.)

Turn over engine till exhaust valve is lifted.

Tighten lock nut on exhaust push rod. (B illustration 12.)

Screw out, or in, the inlet tappet adjusting screw till tappet clearance is nill. (A illustration 12.)

Turn over engine till inlet valve is lifted.

Tighten lock nut on inlet push rod. (B illustration 12.)

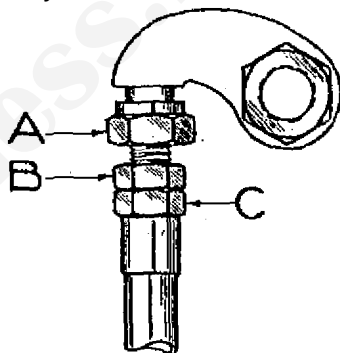


Illustration 12

Tappet adjustment.

### Finally : —

Check adjustments so that, with no up and down movement, the long push rods are free to revolve when the valves are closed.

### Complete adjustment by :—

Replace rocker tappet cover taking care to replace the fibre washer that is under each retaining nut.

Do not overtighten the nuts because the joint is made with a rubber fillet and undue pressure is not necessary.

### Note:—

The part marked C in Illustration 12 is the top end of the long push rod. It is threaded and the adjusting screw A screws into it.

In normal conditions tappet adjustment should not be necessary more frequently than about every five thousand miles or after decarbonising and grinding valves. If adjustment is found necessary more frequently the cause should be investigated at once.

In no circumstances should the valve end hardened caps be omitted. These caps are provided to prevent wear on the valve stems end and although it is possible to lengthen the push rods sufficiently to take up the clearance resulting from the omission of the caps, the effect of this would be to bring the edge of the adjusting cup A at the top of its travel, dangerously close to the oil lug on the rocker box.

## 51 TO RE-TIME THE IGNITION

The maximum advance is  $\frac{7}{16}$ ".

Have available a stout screwdriver, or an old type tyre lever with turned up end, and a bar of metal about  $\frac{1}{4}$ " diameter and  $5\frac{1}{2}$ " long.

Before setting the ignition firing point it is essential the magneto contact breaker points are correctly adjusted. Therefore always check these first.

Serious damage may result from the ignition being set too far advanced. (Causing detonation).

### Check contact breaker points by :—

Remove contact breaker cover.

Check setting of contact breaker points, and, if necessary, re-set same by the method described in Paragraph 99.

### Set ignition firing point by :—

Remove :—

The sparking plug high tension cable from plug.

The sparking plug.

The magneto chain case cover.

The rocker box tappet cover.

Unscrew, several turns nut retaining magneto sprocket to camshaft. (No need to remove nut).

Lever off sprocket until it is loose on the taper of the shaft. (Use stout screwdriver or old type tyre lever).

Turn over engine till both valves are closed.

Insert rod through sparking plug hole, feel piston till by partially rotating engine forwards or backwards, it is felt the piston is at the top of its stroke.

Mark rod flush with top face of sparking plug hole. Remove rod and measure  $\frac{7}{16}$ " above the flush mark and record position on rod.

Plate handlebar ignition control lever in fully advanced position.

Replace rod in sparking plug hole.

Slightly rotate engine **BACKWARDS** until upper mark on rod is flush with top face of sparking plug hole. (To rotate backwards, engage top gear and rotate back wheel in backwards direction).

Rotate sprocket on magneto armature shaft, in anti-clockwise direction (as seen from sprocket end of magneto), till the contact breaker points are just about to separate. (To find the exact moment for the commencement of the point separation, place a piece of tissue paper between the points and turn the armature shaft (by the sprocket on it) until the paper is just released, and no more, upon a gentle pull).

Tighten nut on camshaft and ensure engine, and/or magneto shaft, does not move in doing so.

Re-check the setting which must be  $\frac{7}{16}$ " before top dead centre. (With the ignition handlebar control lever in the fully advanced position).

Replace :—

Rocker box tappet cover.

Contact breaker cover.

Magneto chain case cover.

Sparking plug

Sparking plug wire.

## 52 TO REMOVE AND REPLACE THE OIL PUMP PLUNGER

### Remove :—

Lower end of rocker box oil feed pipe by unscrewing union nut.

Both oil pump end caps.

Oil pump plunger guide screw. (See Illustration 13).

Oil pump plunger, by pushing at from and extracting from rear end of its housing.

### Replace by :—

Reversing above procedure.

### Note :—

Remember there is a paper washer under each oil pump end cap and, when fitting a new paper washer to the front cap, ensure the oil passage in the cap is not obstructed by the paper washer.

Make certain that the guide screw is correctly located in its groove (cut in the plunger) before tightening down otherwise serious damage will result when revolving engine.

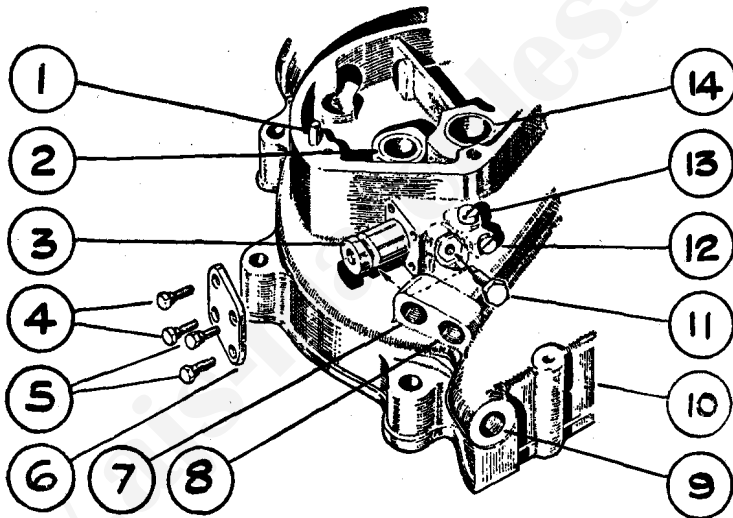


Illustration 13

The rotating oil pump plunger, is here shown partially withdrawn, together with the guide screw which registers in the plunger profiled groove, thereby providing the reciprocating movement.

(By courtesy of "Motor Cycling")

- |  |   |
|--|---|
| 1 DOWEL PEG, LOCATING TIMING GEAR COVER.           | 8 TAPPED HOLE, FOR PIPE FEEDING OIL TO OIL PUMP.    |
| 2 BUSH, FOR INLET CAMSHAFT.                        | 9 TAPPED HOLE, TO ACCOMMODATE CRANKCASE DRAIN PLUG. |
| 3 PLUNGER, FOR OIL PUMP.                           | 10 CRANKCASE. TIMING SIDE.                          |
| 4 BOLT, FIXING REAR END CAP.                       | 11 GUIDE SCREW, FOR OIL PUMP PLUNGER.               |
| 5 BOLT, FIXING REAR END CAP.                       | 12 PLUG SCREW, FOR OIL PASSAGE.                     |
| 6 REAR END CAP, FOR OIL PUMP.                      | 13 PLUG SCREW, FOR OIL PASSAGE.                     |
| 7 TAPPED HOLE, FOR PIPE RETURNING OIL TO OIL TANK. | 14 BUSH, FOR TIMING SIDE FLYWHEEL AXLE.             |

## 53 OVERSIZE PARTS AND RE-BORING CYLINDER BARREL

Pistons and rings, .020" larger than standard, are available. This degree of oversize is such that it is essential for the cylinder barrel to be re-bored to accommodate it. We can provide chat service at prices quoted in the Spares List.

On the 350 c.c the cylinder standard bore is  $2.7187 \pm .0005$ ". The 500 c.c. cylinder standard bore is  $3.250 \pm .0005$ ".

When the wear at the top of the barrel reaches .008" the barrel should be bored out .020" oversize and a new oversize piston and rings fitted.

Crankpin rollers .001" larger than standard can be supplied. We recommend only skilled mechanics should fit these because it is almost general that the big-end journals and sleeves require "lapping" to ensure a correct fit.

## 54 WORKSHOP SERVICE

Motor cycle repairers may require service information other than that detailed in Paras. 36 to 53 and, in those cases, our Service Department will always be pleased to assist on receipt of details of the required matter.

# CARBURETTER SERVICE

**The information given in this section includes all that will normally be required by the average rider. For further details, particularly those connected with racing and the use of special fuels, we refer the enquirer to the manufacturers of the carburetter, Messrs. Amal Ltd., Holford Works, Perry Barr, Birmingham.**

Our Spare Parts Department does not stock every part of the Carburettor but confines its stock to those parts that, from time to time, may need replacement as the result of wear. Those parts include float chamber floats and needles, jet taper needles, needle jets and washers. For all other parts application should be made, through the local dealer, to the manufacturers.

## 55 CARBURETTER FUNCTION

The petrol level is maintained by a float and needle valve and, in no circumstances, should any alteration be made to this. In the event of a leaky float, or a worn needle valve, the part should be replaced with new. (Do not attempt to grind a needle to its seat).

The petrol supply to the engine is controlled, firstly, by the main jet and, secondly, by means of a taper needle (see 6, Illustration 14) which is attached to the throttle valve and operates in a tubular extension of the main jet.

The main jet controls the mixture from three-quarters to full throttle, the adjustable taper needle from three-quarters down to one-quarter throttle, the cut-away portion of the intake side of the throttle valve from one-quarter down to about one-eighth throttle, and a pilot jet, having an independently adjusted air supply, takes care of the idling from one-eighth throttle down to the almost closed position. These various stages of control must be kept in mind when any adjustment is contemplated. (See 18, Illustration 14, for location of the pilot jet air adjustment screw.) The pilot jet consists of a small hole drilled in the choke, or jet block.

The size of the main jet should not be altered save for some very good reason. See Data, Para. 1 (Sub Para. c), for details of standard jet sizes, throttle valves, chokes and jet taper needles.

With the standard setting it is possible to use nearly full air in all conditions, except, perhaps, when the engine is pulling hard up hill or is on full throttle, when some benefit may be obtained by slightly closing the air control.

Weak mixture is always indicated by popping, or spitting, at the air intake.

A rich mixture usually causes bumpy, or jerky, running and, in cases of extreme richness, is accompanied by the emission of black smoke from the exhaust.

## 56 CARBURETTER ADJUSTMENT

A rough test, to ascertain if the setting is correct, is to warm up the engine and, with the ignition fully retarded and the air about three-quarters open, gradually open the throttle to full open, during which the engine should respond without a misfire, but, upon a sudden opening of the throttle, it should splutter and stop. (The engine should not be run more than a few seconds with the ignition fully retarded).

To check the setting of the pilot jet and its air control, warm up the engine, then, with the ignition about two-thirds advanced and the air about three-quarters open, the engine should idle positively and evenly when the throttle is almost closed. If it fails to do so, adjust the pilot jet air screw (18, Illustration 14) inwards, or outwards, until even firing is obtained. (The pilot jet air screw is at the base of the mixing chamber and its position is locked by a nut. See 17 and 18. Illustration 14). This adjustment is not unduly sensitive, and it should be possible to obtain the correct adjustment in a few seconds.

In the event of adjustment of the air screw failing to provide the required result it is possible the pilot jet is obstructed with dirt. The pilot jet is actually a passage drilled in the sprayer base or choke and is very small, so there is always latent danger of this becoming choked. (See Para. 55).

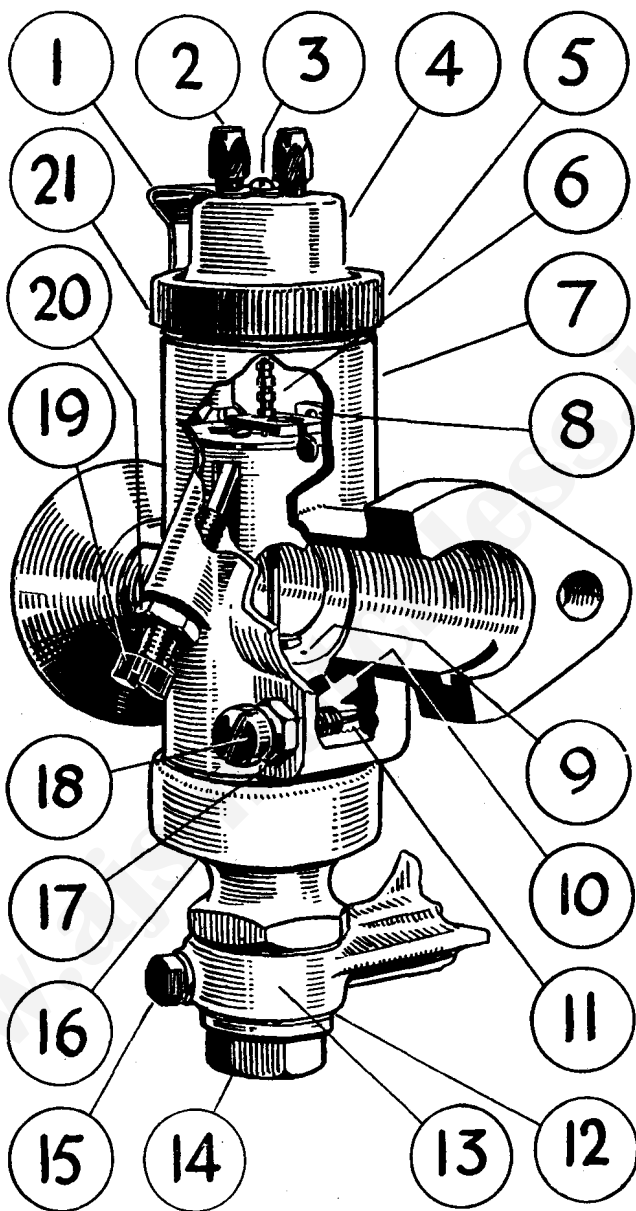
Upon removing the float chamber and the large nut at the bottom of the mixing chamber, the sprayer base can be pushed out of the mixing chamber and the jet can be cleared by using a strand of fine wire.

Before concluding that incorrect carburation is responsible for heavy petrol consumption, and before carrying out any of the tests and adjustments described above, it is most important to make sure the ignition is set correctly. (See Para. 51). Late ignition usually causes a great increase in petrol consumption.

---

(See illustration 14)

- |  |  |
|--|--|
| 1 SPRING CLIP, LOCKING THE FIXING RING.  | 11 THREADED HOLE, TO ACCOMMODATE PILOT JET AIR ADJUSTING SCREW (18). |
| 2 CABLE ADJUSTER, FOR BODY TOP.  | 12 FIBRE WASHER, FOR HOLDING BOLT.                                   |
| 3 SCREW, SECURING LOCKING CLIP, TO BODY TOP.   | 13 PART OF FLOAT CHAMBER.  |
| 4 TOP, FOR MIXING BODY.  | 14 BOLT, HOLDING FLOAT CHAMBER TO MIXING BODY.                       |
| 5 RING FIXING TOP TO MIXING BODY.  | 15 PLUG SCREW, FOR PETROL PASSAGE IN FLOAT CHAMBER.                  |
| 6 TAPER NEEDLE, FOR NEEDLE JET. (TOP NOTCHED END SHOWN).   | 16 UNION NUT, FOR MIXING BODY BASE.                                  |
| 7 MIXING BODY.   | 17 LOCK NUT, FOR PILOT JET AIR SCREW.                                |
| 8 CUP, FOR LOCATING JET TAPER NEEDLE.  | 18 SCREW, FOR PILOT JET AIR ADJUSTMENT.                              |
| 9 AIR BALANCE PASSAGE.   | 19 STOP SCREW, FOR THROTTLE.   |
| 10 PASSAGE, TO ALLOW MIXTURE FROM THE PILOT JET MIXING CHAMBER TO PASS TO THE CARBURETTER MAIN BORE, AND THENCE TO THE INLET PORT OF THE ENGINE. | 20 LOCK NUT, FOR THROTTLE STOP SCREW.                                |
|  | 21 RING, FIXING TOP TO MIXING BODY.                                  |



*Illustration 14*

Showing details of the pilot jet with its air adjusting screw and the throttle stop screw.

## 57 CARBURETTER TUNING INFORMATION

### Poor idling may be due to :—

Air leaks. Either at junction of carburetter and engine, or by reason of badly worn inlet valve stem or guide.

Faulty engine valve seatings.

Spark plug faulty, or its points set too closely.

Ignition advanced too much.

Contact breaker points dirty, pitted, loose, or set too closely.

High-tension wire defective.

Pilot jet not operating correctly.

Tappets adjusted too closely.

### Heavy petrol consumption may be due to :—

Late ignition setting.

Bad air leaks. Probably at carburetter and engine joint.

Weakened valve springs.

Leaky float. (Causing flooding).

Taper needle extension insufficient.

Poor compression, due to worn piston rings or defective valve seatings. (Test compression with throttle wide open).

## 58 TWIST GRIP ADJUSTMENT

A screw is provided in one-half of the twist grip body to regulate the spring tension on the twist grip rotating sleeve. This screw is locked by a nut and it must be screwed into the body to increase the tension.

The most desirable state of adjustment is that when the grip is quite free and easy to turn but, at the same time, will stay in the position in which it is placed.

The complete twist grip can be moved on the handlebar by slackening the two screws that clamp it in position. The most desirable position is that in which the throttle cable makes the cleanest and most straight path to the under-side of the petrol tank.

During assembly, all control cable inner wires are coated with a graphite wax lubricant. This lasts practically indefinitely, but should a new inner wire be fitted this must be similarly treated during assembly.





# TRANSMISSION SERVICE

## 59 THE GEAR BOX

The gear box provides four speeds and has a positive foot change, operated by the right foot, and a kick-starter.

It is retained to the main frame by being clamped between the two engine rear plates by two bolts. The bottom fixing bolt acts as a pivot. The top fixing bolt passes through the gear box top lug and the rear plates, which are slotted, thereby allowing a swinging fore and aft movement of the gear box to enable the front driving chain to be adjusted. That movement is controlled by a bolt that has an eye encircling the gear box top fixing bolt and which passes through an eye block secured to the right-hand side engine rear plate.

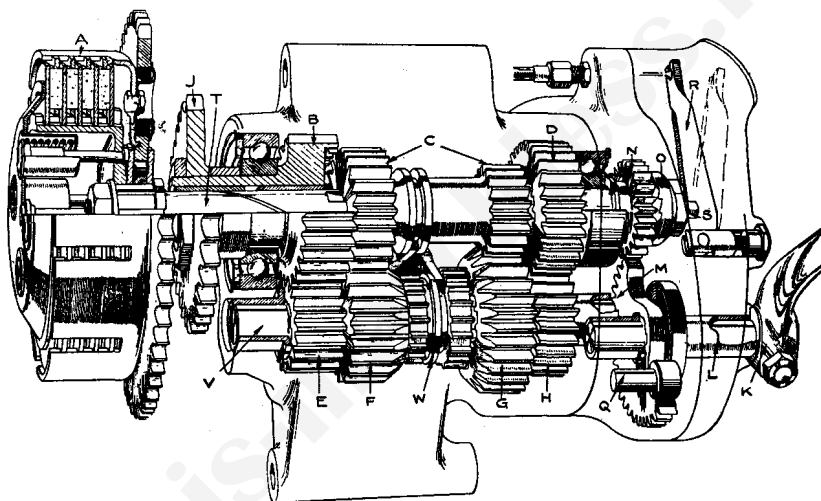


Illustration 15

The Transmission of power, or drive, through the gears may easily be traced on above illustration.

## 60 TRANSMISSION OF POWER THROUGH GEARS

(See Illustration 15)

### First, or lowest, gear.

Sliding gear (C) on mainshaft is in mid-way position, *i.e.*, disengaged from gears B and D.

Layshaft sliding clutch (W) moves to right and engages with gear G.

Power passes through clutch A, to mainshaft T, to mainshaft sliding gear C, to layshaft gear G, to layshaft clutch W, to layshaft V, to layshaft gear E, to main gear B, to chain sprocket J.

Sliding gear (C) on mainshaft is in mid-way position, *i.e.*, disengaged from gears B and D.

Layshaft sliding clutch (W) moves to left and engages with gear F.

Power passes through clutch A, to mainshaft T, to mainshaft sliding gear C, to layshaft gear F, to layshaft clutch W, to layshaft V, to layshaft gear E, to main gear B, to chain sprocket J.

### **Third gear.**

Sliding clutch (W) on layshaft is in mid-way position, *i.e.*, disengaged from gears F and G.

Mainshaft sliding gear (C) moves to right and engages with gear D.

Power passes through clutch A, to mainshaft T, to mainshaft sliding gear C, to mainshaft gear D, to layshaft gear H, to layshaft V, to layshaft gear E, to main gear B, to chain sprocket J.

### **Fourth gear, or "top."**

Sliding clutch (W) on layshaft is in mid-way position. *i.e.*, disengaged from gears F and G.

Mainshaft sliding gear (C) moves to left and engages with main gear B.

Power passes through clutch A, to mainshaft T, to mainshaft sliding gear C, to main gear B, to chain sprocket J.

### **Note :—**

Clutch A is connected to the engine sprocket by the front driving chain and chain sprocket J is connected to the rear wheel sprocket by the rear driving chain.

## **61 TO REMOVE FRONT CHAINCASE AND CLUTCH**

### **To remove outer half of front chaincase :—**

Place tray under engine to catch oil.

Disconnect brake rod at pedal end.

Remove battery from its carrier.

Remove screw binding chaincase metal band at its rear.

Remove metal band. (Slightly prise up battery carrier if necessary).

Remove rubber band.

Remove nut, and washer, in centre of chaincase front.

Take away outer half of chaincase.

### **To remove front driving chain and clutch assembly :—**

Engage top gear, apply rear brake, and unscrew engine sprocket nut.

Unscrew the four nuts retaining the four clutch springs.

Take away the clutch spring pressure plate with the clutch springs and clutch spring cups.

Remove front chain connecting link and take away chain.

Engage top gear, apply rear brake, and unscrew nut retaining the clutch centre to the gear box mainshaft.

Remove the spring and plain washers from gear box mainshaft.

Remove complete clutch assembly by pulling it away, as one unit, from gear box mainshaft. Take care not to lose any of the twenty-four clutch sprocket bearing rollers which may be displaced when the clutch centre and sprocket assembly is withdrawn from the mainshaft. The clutch centre is a sliding fit on the mainshaft and an extractor should not be required.

### **To remove dynamo chain and back half of chaincase :—**

Remove the spring lock ring on dynamo sprocket retaining nut.

Take away lock washer surrounding dynamo sprocket nut.

Apply spanner (RTK-1, included in tool kit) to the two flats on the back of the dynamo sprocket and, holding same, unscrew the nut retaining the dynamo sprocket.

Release dynamo sprocket with suitable extractor.

Take away, as one assembly, the dynamo sprocket, dynamo chain and engine shock absorber assembly. (The dynamo chain is "endless.")

Straighten tabs on lock washers under the three bolts retaining the back half of chaincase to the boss on the crankcase and remove the three bolts.

Remove the long headed bolt (under battery carrier) fixing rear chain guard to front chaincase.

Remove nut on centre fixing bolt, and spacer behind it, and back half of chaincase can be taken away.

## **62 TO RE-FIT THE FRONT CHAINCASE AND CLUTCH**

### **Fit back half of front chaincase by :—**

Place on face of crankcase boss some liquid jointing compound.

Ensure the spacer is in position on the centre fixing bolt. This is located between the engine plate and the chaincase. (On 350 models is 1-61/64" long and on 500 models is 1-13/32" long.)

Place in position rear half of front chaincase.

Fit long headed bolt, holding rear chain guard to front chaincase, but do not fully tighten.

Fit to crankcase boss the three lock washers and bolts retaining case to boss.

Fully tighten the three bolts and turn up the tabs of the three lock washers.

Fit spacer (inside chaincase, d " long) to the centre fixing bolt.

Fit nut to centre fixing bolt and fully tighten.

Fully tighten long headed bolt holding rear chain guard to front chaincase.

### **Fit dynamo sprocket and chain and engine shock absorber by :—**

Ensure dynamo sprocket key is in position (in dynamo armature shaft).

Ensure the spacing collar, which fits between crankcase ball bearing and the back of the engine sprocket, is in position on the driving side flywheel axle.

Take dynamo driving chain and place it round the small sprocket of the engine sprocket assembly and the sprocket that fits on the dynamo shaft and fit these three parts, in one movement, to the driving side flywheel axle and the dynamo shaft.

Fit the dynamo shaft plain washer and sprocket retaining nut, screwing nut with fingers only.

Hold the dynamo sprocket by applying spanner RTK-1 to the flats on the back of the sprocket and fully tighten the sprocket retaining nut. (This holding relieves the dynamo shaft of all bending and twisting strains while the sprocket retaining nut is being tightened).

Fit the dynamo sprocket retaining nut lock washer and lock ring. Ensure the lock ring lies snugly in the groove cut in the nut.

Fit engine shock absorber cam, spring, cap washer and retaining nut but do not fully tighten nut.

### **Fit the clutch centre and sprocket by :—**

Place on the gear box main shaft the thicker of the two clutch sprocket roller bearing retaining washers.

Place in the gear box main shaft the clutch sprocket roller bearing ring.

With grease, stick in place on the bearing ring the twenty-four clutch sprocket bearing rollers.

Introduce clutch sprocket over the rollers.

Place on the gear box main shaft the thin clutch bearing retaining washer.

Push on the splined end of the gear box main shaft the clutch centre.

Fit the plain washer, spring washer and nut that retains the clutch centre but do not fully tighten the nut.

### **Fit the front chain and lock the clutch centre nut by :—**

Replace the front driving chain. Ensure the spring connecting link is fitted so that the closed end of the spring clip faces the direction of rotation.

Engage top gear, apply the rear brake and then fully tighten the nut that retains the clutch centre to the gear box main shaft.

### **Fit the clutch plates and springs by :—**

Slide into position, in the clutch case attached to the clutch sprocket, the thickest of the five steel plain clutch plates. Ensure the recessed part of the steel plate faces to the clutch centre and thereby overhangs the flange of the clutch centre.

Slide into place a clutch friction plate (plate with fabric inserts) and follow with a steel plain plate, then another friction plate and so on, alternatively, till all plates are fitted. (Five plain plates and four friction plates on 350 c.c.; six plain, and five friction on 500 c.c.)

Drop into the spring pressure plate the four clutch spring cups.

Show up the spring pressure plate and insert over the studs the four clutch springs, retaining each one a few turns, as fitted, with a clutch spring adjusting nut.

Fully tighten the four clutch spring adjusting nuts.

Slacken back, four complete turns, each clutch spring adjusting nut. (An old and broad screwdriver, specially slotted on the engaging edge, is the most suitable tool for clutch spring adjustment).

Engage top gear, apply rear brake and then fully tighten the engine shock absorber retaining nut.

Check front driving chain for adjustment. (See Para. 67).

Check dynamo driving chain for adjustment. (See Para. 69).

### **Fit outer half of front chaincase by :—**

Ensure faces of both halves of chaincase are clean.

Place a line of liquid jointing compound on the face of the front half of chaincase.

Take off, from the rear brake rod, the adjusting knurled nut and fully depress the brake pedal and then place in position the front half of the front chaincase.

Fit to the centre fixing bolt the plain washer and nut and, when tightening the nut, move the front half of the chaincase, as may be necessary, for it to exactly register with the back half.

Ensure the rubber and metal bands are clean and undamaged.

Place round the edge of the chaincase some liquid jointing compound.

Press in position the rubber band so that its two free ends meet at the rear of the larger end of the chaincase.

Fit the metal band, starting at the front end of the chaincase and drawing together the two free ends of the band with one hand while, with the other hand, replacing its binding screw.

Fully tighten the metal band binding screw.

Replace, on the brake rod, the knurled adjusting nut, and adjust the rear brake. (See Para. 90).

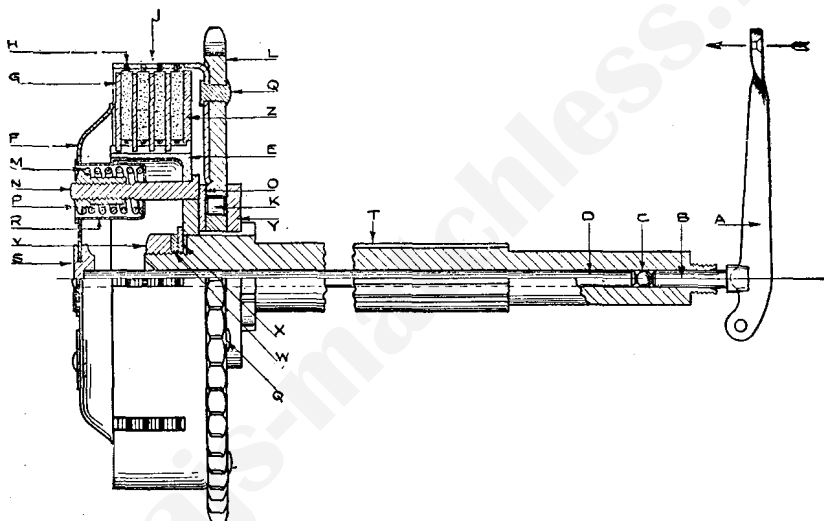
Allow time for the liquid jointing compound to set and then :—

Remove inspection cap from the chaincase and pour in engine oil to the level mentioned in Para. 24.

Replace inspection cap.

**Note :—**

If, after replacing a front chaincase, it is found not to be oil tight the general reason is distortion of the two joint faces. These faces must be undamaged and, on test, should closely fit to a surface plate. They must also be absolutely clean before replacement and the edges must be in exact register, one with the other. Any distortion caused by accidental impact must be remedied before refitting. If any doubt exists, check for distortion before assembly.



*Illustration 16*

**Showing Clutch, Gear Box, Mainshaft and Clutch Operating Mechanism, 350 c.c.  
(500 c.c. has five friction plates.)**

## **63 THE CLUTCH**

(See *Illustration 16*).

Clutch operating lever A is moved in direction of arrow to disengage the clutch.

Operation of clutch handlebar lever moves lever A in direction of arrow and causes it to press against operating plunger B, which, in turn, presses against steel ball C, against the clutch thrust rod D which pushes against the clutch spring pressure plate F.

This action compresses the clutch springs M so that their pressure is released from compressing the clutch plain plates G and the clutch friction plates H, thereby allowing the engine to drive the clutch sprocket L without imparting power, and motion, to the gear box main shaft T. Consequently no power is transmitted to the rear wheel and the clutch is said to be "out" or free.

On allowing the clutch handlebar lever to return to its normal position the clutch operating lever becomes " free " and the clutch spring pressure causes the clutch thrust rod D, the steel ball C and the operating plunger B to move to the right.

The whole of the clutch spring pressure is thereby transferred to the clutch spring pressure plate F and this forces the steel plates G tightly against the clutch friction plates H to that power, transmitted by the engine to clutch sprocket L, is transferred through clutch case J to friction plates H, to steel plates G, to clutch centre E which causes the gear box main shaft T to revolve.

## 64 CLUTCH SPRING ADJUSTMENT

If clutch slip is experienced the most probable cause is incorrect cable adjustment.

If the clutch cable adjustment is found to be correct, i.e., there is the clearance mentioned in Para. 65, the clutch spring adjusting nuts should be adjusted.

### To adjust clutch spring adjustment nuts :—

Obtain access to clutch spring adjustment nuts by removing outer half of front chaincase. See Para. 61.

Screw home, one-half of a complete turn, each clutch spring adjustment nut. Test machine for clutch slip.

If necessary, repeat, by screwing home a further half-turn but be careful to adjust each of the nuts a similar amount.

If, to remedy clutch slip, it is necessary to screw nearly home the four nuts, this is a clear indication that, either the clutch springs have lost their strength, and/or, the fabric inserts in the clutch friction plates have worn so that they are past further useful service. Replace with new.

The standard setting of the clutch spring adjusting nuts is obtained by fully tightening all four nuts and then unscrewing each exactly four complete turns.

## 65 CLUTCH ADJUSTMENT

Minor adjustment of the clutch operating mechanism is obtained by screwing, in or out, the clutch cable adjuster located in the back of the kick-starter case.

Major adjustment of the clutch operating mechanism is obtained by altering the position of the fulcrum pin of the clutch operating lever in the kick-starter case. (Lever A in Illustration 16 and 175-X-4 in Illustration 17).

This Major adjustment is explained below. (See Illustration 17)

175-X-4 is the gear box clutch operating lever, and 66-X-7 is the pin on which it hinges.

329-X is the operating lever fork and this, slides in the kick-starter case cover. Its position being determined by the sleeve nut 331-X.

Cap 328-X is secured to the outside of the kick-starter case cover, being fixed by the two screws 333-X and acts as a locking device for the sleeve nut 331-X and acts as a locking device for the sleeve nut 331-X.

It is essential that there is about 1/32" clearance between the operating plunger 330-X and the nose on operating lever 175-X-4 when the clutch is in the engaged, or driving position.

It will be appreciated that, as the result of wear on the fabric inserts in the clutch friction plates, the plates will tend to close up towards each other. This increases the effective length of the clutch thrust rod. On the other hand, the clutch control inner wire tends to stretch in use. These two actions will neutralise each other but the fact remains that, from time to time, it is necessary to adjust the rod clearance and also take up cable stretch.

Clutch slip caused by the clutch thrust rod permanently bearing on the spring pressure plate will rapidly ruin the fabric inserts and thrust rod. In addition, the heat generated by this may be so intense that the hardening of the clutch springs and the two ends of the thrust rod may be adversely affected.

Therefore, the importance of correct adjustment, and inspection of same to see the adjustment is maintained, must be stressed.

### Obtain adjustment of clutch mechanism by (See Illustration 17) :—

Remove the two screws 333-X.

Take away the cap 328-X.

Adjust the sleeve nut 331-X as may be necessary as follows.

To increase clearance between clutch operating lever 175-X-4 and operating plunger 330-X, turn sleeve nut in a right-hand, or clockwise, direction.

To decrease clearance between clutch operating lever 175-X-4 and operating plunger 330-X, turn sleeve nut in a left-hand, or anti-clockwise, direction.

One or two turns should be ample.

Replace cap and screws.

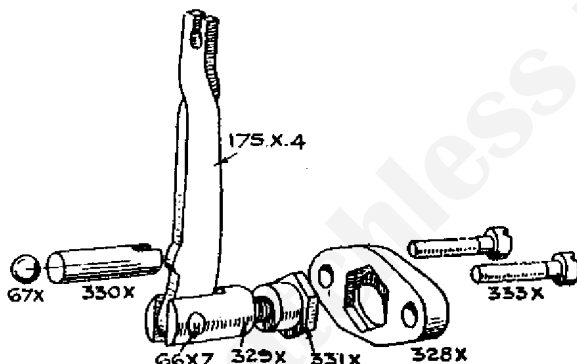


Illustration 17

Clutch operating lever details.

175-X-4	LEVER, OPERATING CLUTCH.	331-X	SLEEVE, OR NUT, FOR OPERATING LEVER FORK.
67-X	BALL (STEEL), FOR OPERATING PLUNGER.	328-X	CAP, COVERING SLEEVE, (SCREWED TO KICK-STARTER CASE COVER.)
330-X	OPERATING PLUNGER.	333-X	SCREW, FIXING CAP TO KICK-STARTER CASE COVER.
66-X-7	PIN, OR AXLE, FOR OPERATING LEVER.		
329-X	FORK, FOR OPERATING LEVER.		

## 66 CLUTCH CABLE ADJUSTMENT

Minor adjustment of the clutch operating mechanism is obtained by :—

Slacken nut on the cable adjuster screwed into the back of the kick-starter case.

To decrease the effective length of the clutch control cable, i.e., to take up play between the control and the clutch thrust rod, unscrew the cable adjuster from the kick-starter case. A few turns should be ample.

To provide a greater amount of play, screw into the kick-starter case the cable adjuster.

Finally, tighten lock nut on cable adjuster.

**Note :—**

The amount of play, or free movement, can easily be discovered by virtue of the greatly increased resistance of the handlebar clutch control lever as the de-clutching action commences.

**To remove a clutch control cable :—**

Remove the oil filler cap from the kick-starter case cover.

Screw right home the clutch cable adjuster that is located in the back of the kick-starter case.

Disengage, from the operating lever, the clutch cable inner wire by operating through the oil filler cap opening.

Completely unscrew the clutch cable adjuster.

Disengage, from the handlebar operating control lever, the clutch inner wire.

Pull cable, from its lower end, till removed from the machine, easing it through the frame cable clips while doing so.

**To replace a clutch control cable :—**

Reverse the above instructions and, finally, adjust as detailed in Paras. 65 and 66.

## **67 FRONT CHAIN ADJUSTMENT**

**Tighten the front chain by :—**

Remove inspection cap from front chaincase. (See Para. 24).

Slacken :—

Nut on right-hand of gear box top fixing bolt.

Nut on right-hand of gear box bottom fixing bolt.

Forward nut on the adjusting eye-bolt. (Two or three turns)

Screw up the rear nut on adjusting eye-bolt until with the finger through the inspection cap orifice it can be felt that the chain is dead tight. Then slack off the rear nut and carefully tighten the forward nut until the correct chain tension is obtained, after which securely tighten the rear nut to lock. (Correct chain whip,  $\frac{3}{8}$  inch.) Check adjustment in more than one position and adjust as above at tightest place. It is important that these instructions to over-tighten and then slack back are carefully followed.

Tighten nuts on gear box top and bottom fixing bolts.

Replace chaincase inspection cap. (See Para. 24).

## **68 REAR CHAIN ADJUSTMENT**

To provide rear chain adjustment the rear wheel is bodily moved in the frame fork ends, which are open ended and slotted.

**Tighten rear chain by :—**

Place machine on rear stand.

Slacken nuts on rear wheel solid spindle.

Slacken nut on each chain adjusting bolt, two or three turns. (These bolts screw into forward end of each frame fork end).

Screw, in turn, each chain adjusting bolt, further into the fork ends until the chain tension is correct. Each bolt must be turned the same amount. The chain whip should be  $\frac{3}{8}$ " to  $\frac{1}{2}$ ". (See final paragraph below).

Check adjustment, in more than one position, by partly revolving the rear wheel.

Tighten wheel spindle nuts.

Re-check chain tension.

Tighten nuts on chain adjusting bolts.



**Note :—**

Before tightening the rear chain, check the front chain adjustment, and, if attention is necessary adjust front chain first.

Altering the adjustment of the front chain upsets the adjustment of the rear chain. Therefore, after making a front chain adjustment, always check the rear chain adjustment and re-set if necessary.

Altering the adjustment of the rear chain may upset the adjustment of the rear brake. Therefore, after making a rear chain adjustment, always check the brake adjustment and re-set if necessary. (See Para. 90).

When adjusting the rear chain care should be taken to leave the rear wheel in correct alignment. (See Para. 82).

The whip of chains should always be tested mid-way between the two sprockets, and the sprockets should be turned and tests made in several positions. This is because chains never wear evenly, and there is usually one position where the chain is tighter than in any other. The adjustment should be set for the tightest position found.

## **69 DYNAMO CHAIN ADJUSTMENT**

The dynamo armature shaft is eccentric to the body of the dynamo. Therefore, by partially revolving the dynamo in its housing the distance between the two dynamo driving sprockets can be varied, thereby allowing latitude for chain adjustment.

**Tighten dynamo chain by :—**

Remove inspection cap from front chaincase. (See Para. 34).

Slacken dynamo clamping strap bolt.

Apply spanner RTK-1 to the flats cast on the dynamo end plate (left-hand side of dynamo) and rotate dynamo, in an anti-clockwise direction till, by passing a finger through the inspection cap opening, it can be felt the chain tension is correct.

The chain whip should be about  $\frac{1}{4}$ ", (See final part of Para. 68). Ensure, when feeling tension, the front driving chain is not confused with the dynamo chain which lies behind the front driving chain.

Tighten dynamo clamping strap bolt.

Re-check chain tension.

Replace chaincase inspection cap. (See Pan 24).

## **70 MAGNETO CHAIN ADJUSTMENT**

The magneto platform hinges on one of its fixing bolts. This provides sufficient movement for adjustment to the magneto driving chain.

**Tighten magneto chain by :—**

Remove magneto chain case cover.

Slacken nuts on bolts supporting magneto platform.

Insert a screwdriver under that end of the magneto platform which is slotted and lever upwards until the chain tension is correct.

The chain whip should be about  $\frac{1}{4}$ ". (See final paragraph of Para. 68).

Tighten nuts on platform supporting bolts.

Re-check chain tension.

Place supply of grease on magneto driving chain.

Replace magneto chain cover.

## 71 ENGINE SHOCK ABSORBER

The engine shock absorber is a spring device for smoothing out the impulses transmitted by a single cylinder engine.

The engine sprocket is a free fit on the driving side flywheel axle. It has, integral with it, a face cam that engages with a similar face cam (shock absorber cam) which is keyed to the driving side flywheel axle by splines. A spring keeps the shock absorber cam in close engagement with the sprocket cam, and, the shock absorber cam being driven by the engine, over-rides the sprocket cam under the influence of the engine impulses.

The shock absorber spring is compressed by the overriding of the cams thereby absorbing the shocks.

It is essential the faces of the cams are adequately lubricated otherwise the shock absorbing action will be nullified and this is automatically taken care of, providing the level of the engine oil in the front chaincase is maintained according to the instructions given in Para. 24.

The shock absorber spring is retained by a cap washer and a sleeve lock nut. The sleeve nut must be fully tightened against the shoulder of the driving side flywheel axle.

The dynamo sprocket is integral with the engine sprocket.

Behind the engine sprocket is a spacing collar which is a sliding fit on the driving side flywheel axle and in no circumstances must this be omitted.

### **Note :—**

At the first sign of transmission harshness examine front chaincase for correct oil level, and dismantle and lubricate the shock absorber parts if the harshness continues. For access to the shock absorber parts it is necessary to remove the outer half of the front chaincase. (See Para. 61).

### **The order of assembly of the engine shock absorber is :—**

- 1 The spacing collar which lies between the driving side flywheel axle ball bearing and the engine sprocket.
- 2 The engine sprocket.
- 3 The shock absorber cam.
- 4 The shock absorber spring.
- 5 The cap washer.
- 6 The lock nut.



# FRAME & FORK SERVICE

## 72 STEERING HEAD ADJUSTMENT

The steering head races are of the floating self-aligning type and have spherical seats. Therefore they do not fit tightly in the head lug and handlebar clip lug.

The two races in the head lug and the race in the handlebar clip lug are all identical. The lowest of the four races (fork crown ball race) is dissimilar to the others.

Occasionally test the steering head for correct adjustment by exerting pressure upwards from the extreme ends of the handlebars.

It is particularly important that the adjustment is tested after the first one hundred miles because of the initial settling down that always occurs in that period.

Should any shake be apparent, adjust the steering head bearings.

### Prepare to adjust steering head bearings by :—

Jack up the front of the machine so that all weight is taken off the front wheel. (A box under the engine serves that purpose).

### Adjust steering head bearings by :—

Slacken the two bolts in the fork crown. (These support the lower ends of the head lamp bottom stays).

Slacken the domed nut at top of the steering column.

Screw down the lower nut (underneath domed nut) a little at a time (using spanner RTK-3) and whilst doing to test the head assembly for slackness by placing the fingers over the gap between handlebar lug and top frame lug, at the same time exerting upward pressure by lifting from the front edge of front mudguard. Continue to tighten the lower adjusting nut until no perceptible movement can be felt and yet the steering head is perfectly free to turn, then tighten down the domed nut to lock the adjustment.

Tighten the two fork crown bolts.

Remove packing from under engine.

## 73 FRONT FORKS. (TELEDRAULIC)

In order to clearly understand the following descriptions, and subsequent assembly and adjustment instructions, reference to Illustrations 18, 19 and 20 will be necessary.

Owing to the unusual construction of the **TELEDRAULIC** fork it is desirable to understand what happens in use.

Here is a brief description of the fork and the way it functions.

As will be seen from the general arrangement, Illustration 19, the main members are two long, stout, externally ground, tubes which, it will be observed, are firmly fixed to the handlebar clip lug by the top bolts 40-G12M-FF189 and are clamped to the fork crown by the pinch bolts STD-369. Upon the external of these tubes are mounted the springs and sliding members, to which latter the front wheel and mudguard are fixed.

The telescopic action of these sliders, combined with the hydraulic dampers, described later, explain the word "**Teledraulic**," coined for the description of the fork.

The hydraulic dampers operate in tubular members located inside the main tubes.

As will be seen, the sliding members operate on steel bushes attached to the bottom ends of the main tubes and also upon bakelite bushes secured to the top ends of the sliders themselves. Above each bakelite bush will be observed an oil seal, provided to overcome any possibility of oil leakage into the spring chamber.

The normal level of oil reaches a line diagonally across the bottom edge of the oil level screw holes. It will be seen that all parts located below this level are continuously submerged in oil. Bearing this in mind, it is at once clear that the upward movement of the sliders, upon impact with a road bump, in addition to meeting resistance from the springs, also causes oil to be swept down by the close-fitted steel bushes.

This oil is forced upward through the holes **A** in the bottom ends of the damper tubes and also through holes **B** in the bottom ends of the main inner tubes. (See illustration 18). At the same time, oil pressure lifts the damper valve and fills the tube between this valve and the plunger sleeve. This displacement of oil, upon impact, imposes a certain amount of damper effect, the extent of which increases with the violence of the shock caused by the road inequality, or, in other words the bigger the bump, the more damping effect takes place.

Upon the recoil movement the damper valve returns to its seat and the oil trapped between the valve and the plunger sleeve has no other source of escape but past this sleeve. This very restricted passage causes a considerable damper effect to the recoil action.

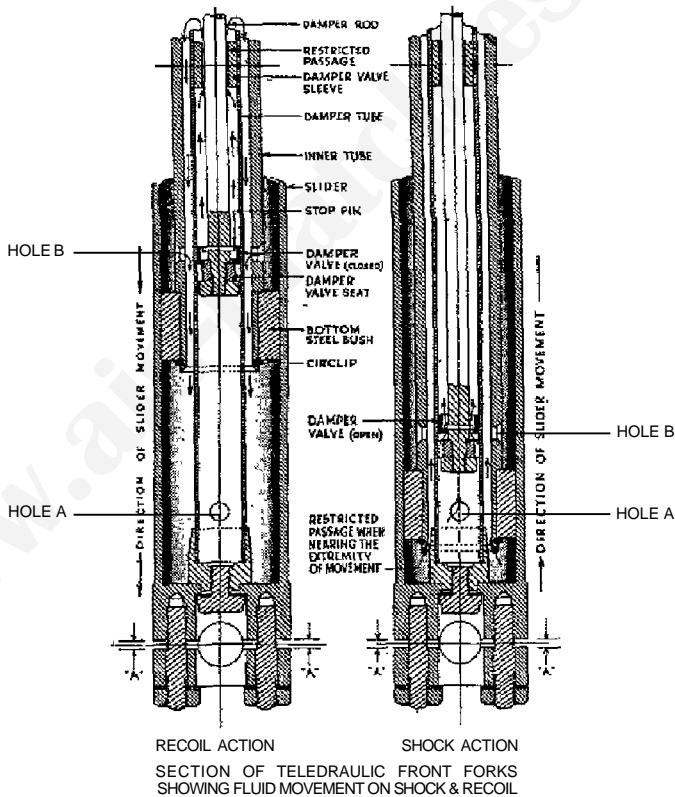


Illustration 18

Damper Tube Detail Sectional Drawing.

It will thus be gathered that, on the shock movement of the sliders, slight damper action occurs, with a greatly increased damper action on the reverse movement, both actions automatically increasing in effect the more violent the movement.

Before concluding this description, it should be mentioned that upon a very violent impact, as a result of which the springs are almost fully compressed, the damping of the upward movement of the sliders is automatically increased by the greatly restricted passage for the displaced oil. due to the lower ends of the inner tubes encircling the tapered, enlarged, ends of the damper tubes. Thus "bottoming" is prevented, no matter how violent the impact.

The hydraulic dampers each contain 6½ fluid ounces of oil.

It is necessary to maintain the correct level of oil. For testing and topping-up instructions see Para. 32, and it is important those instructions are carefully followed.

To make the various stages of assembly quite clear it must be assumed that the fork is completely dismantled and then, for assembly instructions, follow the stages detailed in Paras. 74 and 75.

To dismantle the forks, reverse the Information given in Paras. 74 and 75.

## **74 TO ASSEMBLE THE FRONT FORK**

**Prepare, by making five sub-assemblies :—**

- (a) Fork crown and cover tube assembly.
- (b) Inner tube right assembly.
- (c) Inner tube left assembly.
- (d) Right-hand damper tube and slider assembly.
- (e) Left-hand damper tube and slider assembly.

**(a) Make the fork crown and cover tube assembly by :—**

Fit steering column into fork crown and secure lower end with circlip.

Force column upwards as far as it will go in fork crown so that circlip lies in fork crown recess and abuts tightly against fork crown,

Plate column in a vice and fit the two top and bottom cover tubes, right and left, in turn by :—

Place a plain locating plate inside a bottom (long) cover tube.

Place a screwed locating plate inside a top (short) cover tube.

Place the bottom and top cover tube, with locating plates, in position against the fork crown and bind together with three screws. See Illustration 19. The screws are inserted from the bottom and the holes in the locating plates and the fork crown are not evenly spaced. Therefore, before inserting the first screw, the plates must be positioned so that all holes in the two plates and the fork crown register with each other.

Fit the fork crown ball race (the odd one of the four races, *i.e.*, the race that does not have a spherical seat) to the fork crown, load the race track with grease and fill with twenty-eight steel balls ( $\frac{3}{16}$ " diameter).

Lay a frame ball race over the steel balls.

This assembly is now complete.

Fit on the handlebar clip lug the two top cover tube caps.

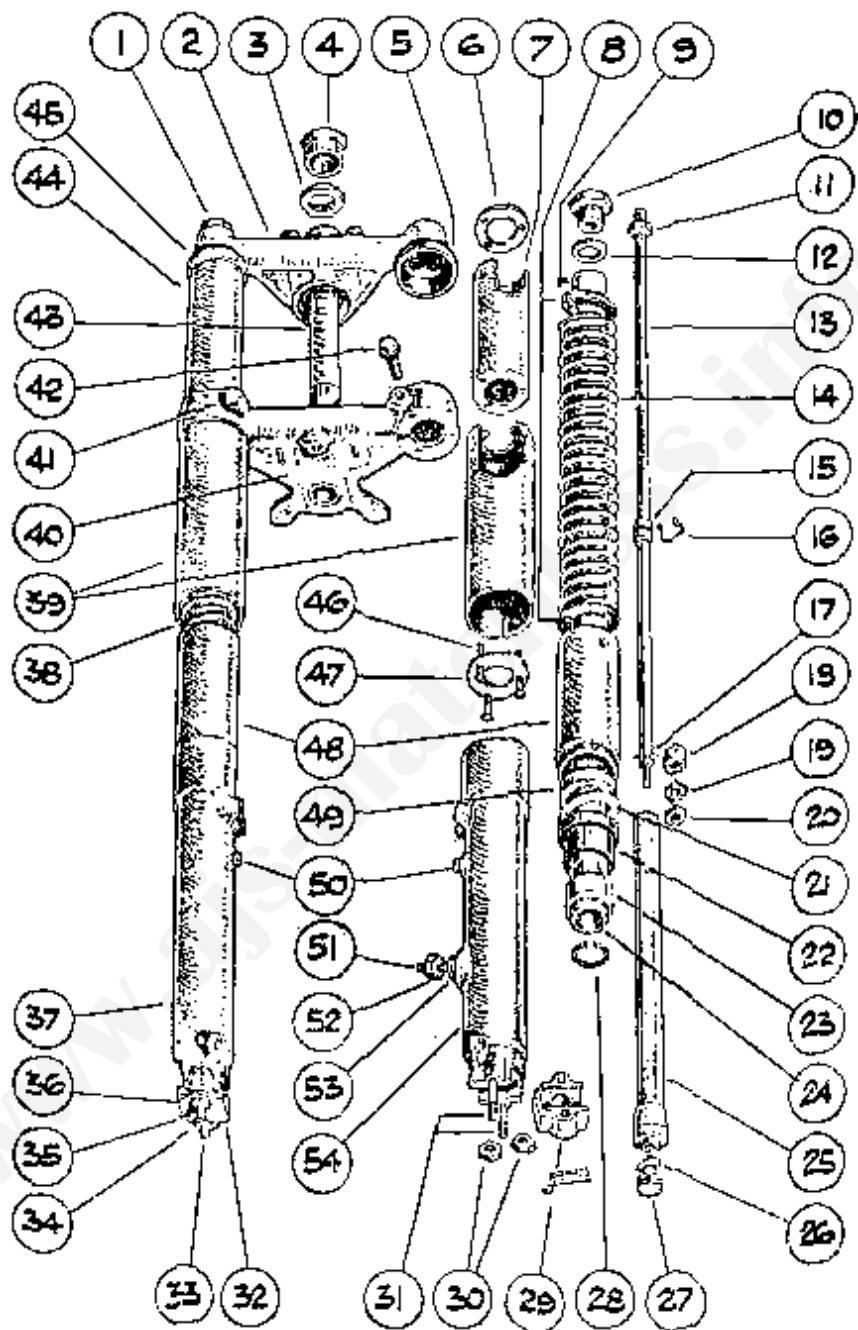


Illustration 19

- |   |   |
|---|---|
| 1 BOLT, FOR TOP OF INNER TUBE.                      | 28 CIRCLIP, FOR INNER TUBE BOTTOM STEEL BUSH.           |
| 2 HANDLEBAR LUG.                                    | 29 CAP, FOR FORK SLIDER.                                |
| 3 ADJUSTING NUT, FOR HEAD STEM.                     | 30 NUT, FOR FRONT WHEEL AXLE STUD.                      |
| 4 LOCK NUT, FOR STEM ADJUSTING NUT.                 | 31 STUD, SECURING FRONT WHEEL AXLE CAP.                 |
| 5 CAP, FOR TOP COVER TUBE.                          | 32 CAP, FOR FORK SLIDER.                                |
| 6 PLATE, LOCATING (THREADED), FOR TOP COVER TUBE.   | 33 STUD, SECURING FRONT WHEEL AXLE CAP.                 |
| 7 COVER TUBE, TOP.                                  | 34 NUT, FOR FRONT WHEEL AXLE STUD.                      |
| 8 WASHER (LEATHER), SEATING, FOR FORK SPRING.       | 35 STUD, SECURING FRONT WHEEL AXLE CAP.                 |
| 9 TUBE, INNER, FIXED.                               | 36 NUT, FOR FRONT WHEEL AXLE STUD.                      |
| 10 BOLT, FOR TOP OF FIXED INNER TUBE.               | 37 FORK SLIDER. (RIGHT-HAND SIDE.)                      |
| 11 NUT, LOCK, FOR TOP OF DAMPER ROD.                | 38 SPRING, FOR FORK.                                    |
| 12 WASHER (STEEL), FOR INNER TUBE TOP BOLT.         | 39 COVER TUBE, BOTTOM.                                  |
| 13 ROD, FOR DAMPER.                                 | 40 FORK CROWN.  |
| 14 SPRING, FOR FORK.                                | 41 BOLT, PINCH, FOR FORK CROWN.                         |
| 15 SLEEVE, FOR DAMPER TUBE.                         | 42 BOLT, PINCH, FOR FORK CROWN.                         |
| 16 CLIP, RETAINING DAMPER SLEEVE.                   | 43 HEAD STEM.   |
| 17 PIN, STOP, FOR DAMPER TUBE VALVE.                | 44 COVER, TUBE, TOP.                                    |
| 18 VALVE, FOR DAMPER TUBE.                          | 45 CAP, FOR TOP COVER TUBE.                             |
| 19 SEAT, FOR DAMPER TUBE VALVE.                     | 46 SCREW, RETAINING LOCATING PLATES.                    |
| 20 NUT, LOCK, FOR DAMPER TUBE VALVE.                | 47 PLATE LOCATING (PLAIN HOLES), FOR BOTTOM COVER TUBE. |
| 21 WASHER (PAPER). FOR OIL SEAL                     | 48 EXTENSION, FOR SLIDER.                               |
| 22 BUSH (BAKELITE), FOR FORK FIXED INNER TUBE.      | 49 OIL SEAL, FOR FORK INNER FIXED TUBE.                 |
| 23 BUSH (STEEL), BOTTOM, FOR FORK FIXED INNER TUBE. | 50 PLUG, OIL LEVEL, FOR SLIDER.                         |
| 24 BOTTOM END OF FORK FIXED INNER TUBE.             | 51 BOLT, ANCHOR, FOR FRONT BRAKE COVER PLATE.           |
| 25 DAMPER TUBE                                      | 52 NUT, FOR ANCHOR BOLT,                                |
| 26 WASHER (FIBRE), FOR DAMPER TUBE FIXING BOLT.     | 53 WASHER (STEEL), FOR ANCHOR BOLT                      |
| 27 BOLT, FIXING DAMPER TUBE AT BOTTOM.              | 54 FORK SLIDER, (LEFT-HAND SIDE.)                       |

**(b) Make the inner tube right assembly by :—**

Take an inner tube and lay it down so that the internally threaded end is to the left.

Pass over the right-hand end of the tube, in the order mentioned :—

- A leather washer.
- A fork spring.
- A leather washer.
- A slider extension. (Unscrewed end first).
- An oil seal. (Leather side first).
- A paper washer.
- A bakelite bush. (Flanged end first).
- A steel bush.

Then fit a circlip to the right-hand end of the inner tube.

This completes the assembly.

**Note :—**

Exercise great care when removing and re-fitting the oil seals.

**(c) Make the inner tube left assembly by :—**

Exactly the same as for the right-hand assembly (b).

**(d) Make the right-hand damper tube and slider assembly by :—**

Take a damper tube rod and fit, in the drilled end, a damper stop pin.

Place a damper valve on the same end of the rod, reduced end outwards, so that the valve body can slide over the stop pin. (The damper valve is made of steel). Place next to the damper valve a valve seat. (The damper valve seat is made of brass).

Thread on the rod a  $\frac{1}{4}$ " nut and fully tighten.

Take a damper tube and push the above assembly into it.

Slide on to the damper rod a plunger sleeve. (The plunger sleeve has a groove cut round its centre).

Manipulate the plunger sleeve till the groove round it registers with the slot cut in the body of the damper tube and locate it in that position by fitting a " U " shaped plunger sleeve clip.

Select a slider that does not have in its side the stud for anchoring the front brake cover plate.

Insert the damper rod and tube assembly into the slider and retain by fitting a bolt passing through the bottom of the slider and engaging with the enlarged and screwed end of the damper tube. There is a fibre washer under the bolt and, unless well tightened, oil leakage will result. A thin walled tubular box spanner will be required for the bolt. Such spanner is not included in the standard tool kit.

Fit a  $\frac{5}{16}$ " nut to the free end of the damper rod and screw it down as far as it will go.

This completes the assembly.

**(e) Make the left-hand damper tube and slider assembly by :—**

Exactly the same method as described above (d) for the right-hand assembly but use the slider that has the stud in its side for anchoring the front brake cover plate. (Ensure the stud with nut are fitted.)

## **75 FITTING THE FIVE FORK SUB-ASSEMBLIES TO THE MACHINE**

**Fit the fork crown, steering column and handlebar clip lug by :—**

Place a frame ball race in the top of the main frame head lug, load the ball track with grease and fill with twenty-eight steel balls. ( $\frac{3}{16}$ " diameter).

Lay a frame ball race over the steel balls.

Pass up the main frame head lug the steering column and slide on to it the handlebar clip lug, ensuring the top cover tubes enter the caps fitted to the handlebar clip lug so that they fit snugly.

Fit a head stem adjusting nut. (Do not fully tighten).

Fit a head stem domed lock nut. (Do not fully tighten).

Ensure the grease nipples are screwed into the main frame head lug and the handlebar clip lug. (One in each).

Take a fork crown binding bolt, place on it a plain steel washer, pass it through the lower hole in a headlamp left-hand side bottom stay and fit the bolt in the left-hand position in the fork crown. (Do not fully tighten).

Fit the right-hand bolt, washer and stay in a like manner. (Do not fully tighten).



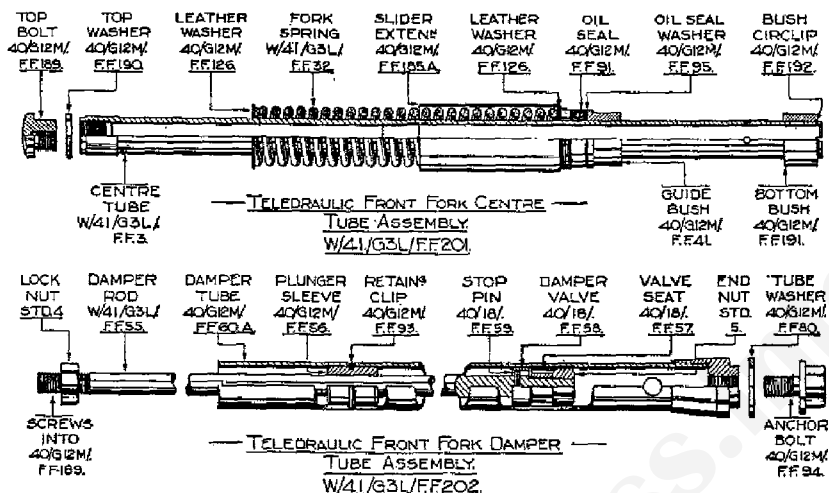


Illustration 20

**Fit the inner tube assemblies (b and c) to the front fork crown assembly by :—**

Take one inner tube assembly, introduce the top end (the internally threaded end) to the fork crown (immaterial if left or right side) and push it upwards till it engages with the handlebar clip lug and then gently force it home.

Fit the second inner tube assembly in a like manner.

**Fit the left-hand damper tube and slider Assembly (e) by :—**

Pass downwards through the left-hand inner tube assembly a piece of flexible wire and attach it to below the  $\frac{5}{16}$ " nut on the damper rod of the damper tube and slider assembly that has, in the side of the slider, the stud for the front brake cover plate anchorage.

Draw upwards the damper tube and slider assembly until the damper rod protrudes above the handlebar clip lug sufficiently for the flexible wire to be detached.

Take a domed top bolt and place on it a large plain steel washer.

Screw the domed bolt on to the damper rod and then lock it in position by unscrewing the  $\frac{5}{16}$ " nut on the damper rod till it tightly abuts against the under-side of the domed bolt. (Make sure the  $\frac{5}{16}$ " nut is tightly locked against the bolt and do not screw the domed bolt into the end of the inner tube).

**Fit the right-hand damper tube and slider assembly (d) by :—**

Exactly the same method as described above except that the fork slider has no stud for brake anchorage.

**Complete the assembly of the fork by :—**

Fit the two oil level screws. (One to each slider and each has a fibre washer under its head).

From the top, pour down each inner tube  $6\frac{1}{2}$  fluid ounces of oil. (Mobiloil "Arctic," Single Shell or Castrolite.)

Apply pressure, in turn, to the inner tube top domed bolts until they can be screwed into the tubes and fully tightened.

Screw slider extensions to sliders, as far as possible **by hand**.

### **Fit the front mudguard, front stand, front wheel and make final adjustments by :—**

Fit front mudguard and stays.

Fit front stand.

Hold the near side clamp, or cap, on the front wheel spindle and offer up wheel so as to engage that clamp with its retaining studs. At the same time, engage the slot in the brake cover plate with the stud in the left-hand side fork slider.

Fit the clamp retaining nuts and lightly tighten same.

Fit the right-hand side clamp and lightly tighten nuts.

### **Note :—**

The clamps, or caps, must not be interchanged and it is most important that the gaps, fore and aft, between the clamp and the end of the fork slider are equal. The gaps are indicated by Arrows **A** in illustration 18.

### **Proceed as follows :—**

Lightly tighten nut on left-hand end of front wheel spindle.

Fully tighten the four spindle clamping nuts.

Fully tighten nut on left-hand end of front wheel spindle.

Fit, and tighten, nut on brake anchorage stud and fit split pin.

Fully tighten the two screwed slider extensions. These each have two holes at their top ends to accommodate a hook spanner. Use hook spanner 11914-5. The holes are only exposed when all weight is relieved from the front wheel.

Test fork for freedom of action and, if any stiffness is felt, loosen the nuts on the right-hand side spindle clamp, and work fork up and down. Then tighten spindle clamp nuts.

Adjust steering head. (See Para. 72).

Fully tighten the two fork crown binding bolts. (These pass through the lower ends of the head lamp bottom stays).

### **Note :—**

During assembly, absolute cleanliness is essential because any dirt, or other abrasive matter, left on the various sliding parts will cause damage and rapid wear.

## **76 PROP STAND**

The prop stand hinges on a bolt that has a screwdriver slot in its head. The bolt passes through a lug brazed to the frame and screws into the stand jaw and is then locked by a  $\frac{7}{16}$ " nut. It is essential all parts are quite clean when replaced and that the nut is fully tightened, otherwise it may become displaced and lost.

## **77 FRONT STAND**

The two bolts fixing the front stand to the fork sliders are not interchangeable. That on the left-hand side is longer than that on the opposite side. The nuts on these bolts are safeguarded by split pins passing through the bolts.

**Do not attempt to use the FRONT STAND unless the machine is already supported by the REAR STAND.**

## **78 REAR STAND**

A plain steel washer is fitted under the **HEAD** of each of the two bolts that retain the rear stand to the fork ends. The washers should **NOT** be fitted **UNDER** the nuts of those bolts.

## 79 TO REMOVE OIL TANK AND BATTERY CARRIER

Two studs on the seat tube, one facing to the front, the other facing to the rear, engage with two right-angle stays on the oil tank and two similar stays on the battery carrier and two washers and nuts, fitted to the studs, retain the oil tank and battery carrier in position.

### Remove oil tank and battery carrier by :—

Drain oil tank.

Disconnect, from the battery, the positive and negative wires.

Remove battery from the carrier.

Remove countersunk headed screw that secures bottom of battery carrier to chain guard stay.

Disconnect oil feed pipe from bottom of oil tank.

Disconnect oil return pipe from bottom of oil tank.

Remove venturi air intake from carburetter.

Remove right-hand side tank fixing bolt.

Remove bolt retaining oil tank stay to rear mudguard. (This bolt has on it two spacers and one washer).

Remove the two nuts retaining oil tank and battery carrier to the two frame studs, and washer under each nut.

Oil tank and battery carrier are now free to be taken away and, when doing so, it is necessary to give each a slight rotary movement in order to disengage from the frame studs

### Note :—

The frame studs are brazed to the frame.

### To re-fit :—

Locate tank and battery carrier on their two fixing studs and, before doing anything else, fit both oil pipes. Then reverse the instructions given above.

If, for any reason, the oil pipes have been removed from oil tank **and** engine, always re-fit the engine ends first.

## 80 TO REMOVE THE REAR CHAIN GUARD

### Remove :—

The rear wheel and chain sprocket assembly. (See Para. 82).

The bolt retaining the front, top, end of the chain guard to the front chaincase.

The bolt retaining the front, bottom, end of the chain guard to the rear frame.

The bolt retaining the rear, top, end of the chain guard to the rear frame

The chain guard is then free to be taken away.

# WHEEL, BRAKE & TYRE SERVICE

## 81 TO REMOVE FRONT WHEEL

### Prepare by :—

Place machine on rear and front stands.

### Remove :—

The split pin, and pin, retaining yoke end of front brake cable to the brake expander lever.

Release, but do not remove, the nut retaining the brake cover plate to the fork slider. (It is not necessary to remove the split pin which is provided to prevent the loss of the nut should it work loose).

### Slacken :—

The nut on the left-hand side of the wheel spindle.

### Remove :—

The four nuts that clamp the fork slider caps to the fork sliders.

The two caps. (These must be re-fitted in same order and position as originally.

Therefore, lay them aside so that the order and position of assembly will be correctly made).

The wheel is then free to drop out after disengaging the brake cover plate from the anchor bolt in the left-hand fork slider.

When replacing the wheel, observe the instructions given in Para. 75.

**Do not attempt to use the FRONT STAND unless the machine is already supported by the REAR STAND.**

## 82 TO REMOVE REAR WHEEL

### Prepare :—

Place machine on rear stand.

### Disconnect :—

Rear lamp wire at connection near rear wheel spindle.

Speedometer driving cable. (Unscrew gland nut on cable).

Rear chain connecting link. (Allow chain to hang clear of the rear wheel sprocket without becoming disengaged from the gear box small sprocket).

### Remove :—

The two nuts securing rear portion of rear mudguard to its front portion.

Nut and washer from bolt securing mudguard side bridge and tool box stay to tubular stay.

Adjusting nut from rear brake rod.

### Slacken :—

The two nuts (unscrew about four turns) retaining the rear mudguard side stays to their studs.

The two nuts on the rear wheel spindle.

### Remove :—

The rear portion of the rear mudguard, with its stays.

(Spring outwards the tool box to disengage the top fixing bolt).

The rear wheel from the fork ends by twisting it sideways to release and clear the rear brake cover plate anchor bolt and then withdrawing it to the rear.

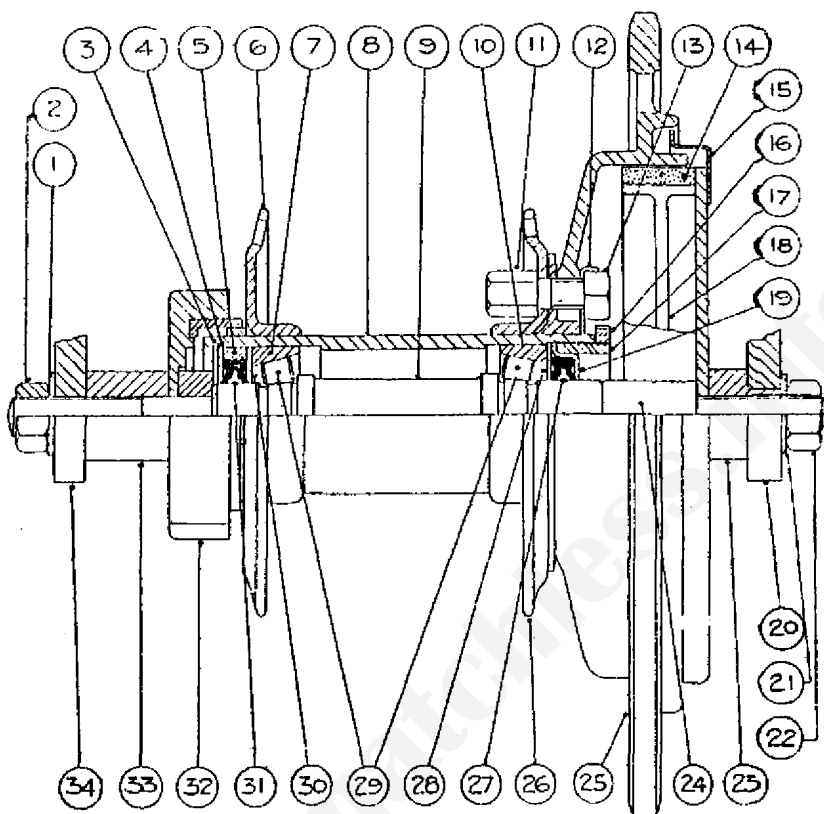


Illustration 21

### REAR HUB

(In all relative details the construction of the front and rear hubs, is similar)

- |                                      |   |
|--------------------------------------|---|
| 1 WASHER, SOLID SPINDLE.             | 19 DISHED CUP, FOR OIL SEAL.  |
| 2 NUT, SOLID SPINDLE.                | 20 FORK END OF FRAME.   |
| 3 SPRING CIRCLIP.                    | 21 WASHER, SOLID SPINDLE.   |
| 4 RETAINING RING, FOR OIL SEAL.      | 22 NUT, SOLID SPINDLE.  |
| 5 COLLAR, ROUND OIL SEAL.            | 23 SPACER, BETWEEN BRAKE COVER PLATE AND FORK END. (FLAT PART FITS IN FORK END SLOT.) |
| 6 HUB FLANGE, RIGHT SIDE.            | 24 SPACER, INSIDE BRAKE COVER PLATE.  |
| 7 BEARING OUTER CUP.                 | 25 SPROCKET AND BRAKE DRUM.   |
| 8 HUB SHELL.                         | 26 HUB FLANGE, LEFT SIDE.   |
| 9 HOLLOW SPINDLE.                    | 27 OIL SEAL.  |
| 10 BEARING OUTER CUP.                | 28 RETAINING RING, FOR OIL SEAL.  |
| 11 BOLT, FIXING SPROCKET.            | 29 TAPER ROLLER.  |
| 12 LOCK WASHER, SPROCKET NUT.        | 30 RETAINING RING, FOR OIL SEAL.  |
| 13 NUT, SPROCKET BOLT.               | 31 OIL SEAL.  |
| 14 BRAKE LINING.                     | 32 GEAR BOX, FOR SPEEDOMETER DRIVE.   |
| 15 BRAKE COVER PLATE.                | 33 SPACER, BETWEEN GEAR BOX AND FORK END.   |
| 16 LOCK NUT, BEARING ADJUSTING RING. | 34 FORK END OF FRAME.   |
| 17 RING, ADJUSTING BEARING.          |   |
| 18 BRAKE SHOE.                       |   |

Re-fit in the reverse order but, before finally tightening the rear wheel spindle nuts, ensure the speedometer gear box is so positioned that the speedometer driving cable can be correctly replaced.

When the wheel alignment is correct a piece of thin string stretched taut across both wheels, about four inches from, and parallel to, the ground, should just touch each tyre at both sides of the wheel centres.

Alternatively, a straight wooden batten, about five feet long, is handy to use for checking wheel alignment. This should be applied, as in the case of string, parallel to and about four inches from the ground.

**Note :—**

Always check the rear chain tension and the rear brake adjustment after making an alteration to the rear wheel position. (See Paras, 68 and 90).

## **83 WHEEL BEARINGS AND ADJUSTMENT**

The wheel bearings are of taper roller type. The inner bearings for the rollers are integral with the wheel spindle. The outer cups for the rollers are pressed into the hub shell. They have a fixed location on one side and an adjustable location on the other.

On the outer side of each taper roller bearing is an oil sealing ring.

Adjustment is obtained by a ring screwed into the hub shell and which abuts against the moveable bearing cup. This adjusting ring is locked in position by a large circular lock ring, or nut.

On the rear wheel the adjustment is made on the left-hand, or brake, side, but, on the front wheel, it is on the right-hand side.

It is rarely necessary to make adjustment to wheel bearings. It is most important they are not adjusted too tightly as this would quickly ruin them. There must always be a slight amount of end play, This should be about .002".

To adjust the rear wheel bearings the wheel must be removed from the machine, but those of the front wheel can be dealt with in situ.

A service method of ensuring correct adjustment is to :—

First slacken the lock nut (16 in Illustration 21).

Then tighten the adjusting ring (17 in illustration 21) until all slackness has been taken up and then to slacken it back exactly one-half turn.

Finally, tighten the lock ring (16), making sure that, when doing so, the adjusting ring (17) does not creep round.

## **84 TO DISMANTLE A WHEEL BEARING**

**Prepare :—**

Remove the wheel from the machine. (See Paras. 81 or 82).

**Remove :—**

Brake cover plate with brake shoes, etc., (If rear wheel also withdraw centre solid spindle and remove the speedometer drive gear box).

**Slacken :—**

Lock ring. (16 in illustration 21). (Use spanner 11914-S).

**Unscrew :—**

Adjusting ring. (17 illustration 21).

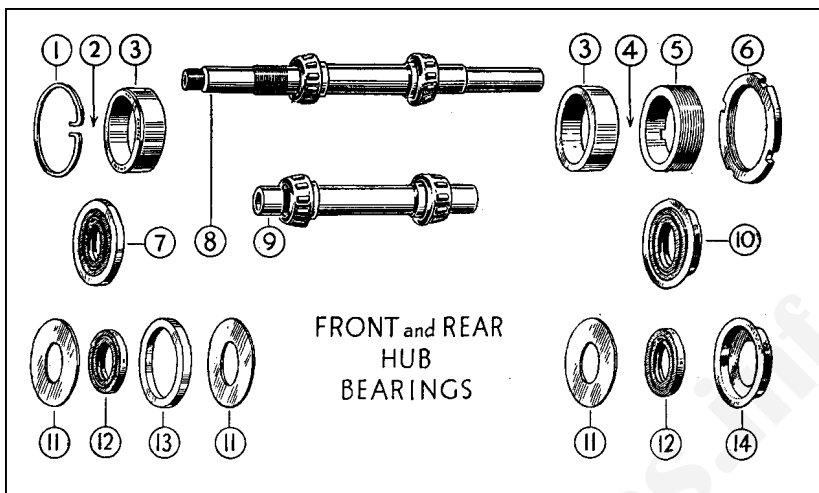


Illustration 22

Showing exploded view of hub bearing components.

- 1 SPRING CIRCLIP, (FITS IN GROOVE CUT IN UNTHREADED END OF HUB.
  - 2 OIL SEAL ASSEMBLY, CONSISTING OF :
    - 1 SPACING RING (11)
    - 1 OIL SEAL (12)
    - 1 COLLAR (13)
    - 1 SPACING RING (11)
 FITS HERE, BETWEEN THE BEARING CUP (3) AND THE SPRING CIRCLIP (1).
  - 3 OUTER CUP OF TAPER ROLLER BEARING. (\*)
  - 4 OIL SEAL ASSEMBLY, CONSISTING OF :
    - 1 SPACING RING (11)
    - 1 OIL SEAL (12)
    - 1 DISHED CUP (14)
 FITS HERE, BETWEEN THE BEARING CUP (3) AND THE BEARING ADJUSTING RING (5).
  - 5 ADJUSTING RING, FOR BEARINGS.
  - 6 LOCK NUT, FOR BEARING ADJUSTING RING.
  - 7 AN OIL SEAL (12) ENCIRCLED WITH ITS SPACING COLLAR (13).
  - 8 FRONT WHEEL SPINDLE, WITH SET OF TAPER ROLLERS MOUNTED IN TWO CAGES.
  - 9 REAR WHEEL HOLLOW SPINDLE WITH SET OF TAPER ROLLERS MOUNTED IN TWO CAGES.
  - 10 AN OIL SEAL (12) SHOWN PRESSED INTO A DISHED CUP (14).
  - 11 RETAINING SPACING RING, OR WASHER, FOR OIL SEAL.
  - 12 OIL SEAL.
  - 13 SPACING COLLAR, (THIS ENCIRCLES THE OIL SEAL FITTED TO THE UNTHREADED END OF A HUB.)
  - 14 DISHED CUP, (THIS CONTAINS THE OIL SEAL FITTED TO THE THREADED END OF A HUB.
- \* These are not supplied separately. A front, or rear wheel spindle complete with taper roller bearings includes two of these bearing cups.

Also rollers are not supplied separately.

**Remove :—**

Adjusting ring. (The lock nut 16 will come away with it).  
Dished steel washer.  
Oil seal.  
Plain steel washer.

**Turn to opposite end of hub.**

**Remove :—**

Spring ring fitted lust inside the hub end.  
Plain steel washer.  
Oil seal, with the spacing collar encircling it.  
Plain steel washer.

The spindle, complete with rollers and cages, and one outer cup, by pressing them out of the hub shell, from either end, leaving one outer bearing cup in position.

Do not attempt to remove by hammer blows, or the bearing surfaces will almost certainly be damaged.

If desired, the remaining cup can also be pressed out of the shell.

## **85 TO ASSEMBLE A WHEEL BEARING. (FRONT OR REAR)**

**Prepare :—**

The interior of hub shell and all parts must be clean.

**Fit taper roller bearings and spindle by :—**

Press, into the unthreaded end of the hub shell one of the roller bearing cups. Its thinner edge should face inwards. Ensure cup is quite "square" to the hub shell before entry and press in until it leaves a gap of not less than  $9/32$ " from its edges to the inside edge of the circlip groove cut in the hub.

Take a plain washer and insert it in the unthreaded end of the hub shell.

Take an oil seal and press it into the collar (13 illustration 22) and then place this assembly so that it lies against the washer mentioned in the preceding paragraph.

Place a plain washer against the oil seal assembly.

Insert the spring ring in the groove cut in the unthreaded end of the hub shell, making sure it lies snugly in the groove.

Then, from the threaded end of the hub, force back the outer bearing ring until the felt washer assembly is tight against the spring ring.

In the threaded end of the hub shell, introduce the wheel spindle and rollers, entering the correct end of spindle first. (Threaded end in the case of the front wheel and shorter end in the case of the rear wheel).

Press into the threaded end of the hub shell the second roller bearing cup, thinner edge first, so that there is about  $1/16$  inch play in the bearings.

Place a plain washer against the bearing cup in the threaded end of the hub shell.

Take an oil seal and press it into the dished washer (14 Illustration 22) and then insert that assembly in the threaded end of the hub shell so that it abuts, oil seal face inwards, against the washer mentioned in the preceding paragraph.



Screw into the hub shell the adjusting ring (5 Illustration 22).

Screw the lock nut (6 Illustration 22) on the adjusting ring.

Adjust hub bearings by the method described in Para. 83.

Inject two fluid ounces of grease into the hub shell. (Through grease nipple in hub barrel). (More than this quantity may result in brake inefficiency).

Re-fit brake cover plate with shoes, etc. and, if a rear wheel, also re-fit the speedometer drive gear box and the central spindle.

The wheel is then ready for fitting to machine.

**Note :—**

In the case of the front brake cover plate it is most important this is correctly positioned.

It is retained to the front wheel spindle by an inside nut (part number 40-G12M-H47), and an outside nut (part number 40-G12M-H46). Between the inside nut and the brake cover plate is a locating washer (part number 40-G12M-B100).

The inside nut should be positioned so that, when the locating washer is placed next to it, the outside face of the washer is  $\frac{1}{8}$ " proud of the outer edge of the brake drum. (Tested by placing a straight edge across the edge of the brake drum).

## **86 BRAKE SHOES**

The front and rear brake shoes, springs and expanders are interchangeable. The two shoes in each brake are **NOT** identical, they are "handed."

One end of each shoe bears on a fulcrum fixed in the brake cover plate. The other end accommodates a detachable thrust collar. (See Para. 87).

## **87 BRAKE SHOE ADJUSTMENT**

Brake adjustment, to compensate for lining wear, is normally made by means of a finger adjuster on the rear brake rod and a cable adjuster for the front brake cable.

After a very considerable mileage this continual adjustment causes the brake expander to occupy a position whereby the available leverage is considerably reduced and consequently the brake loses efficiency. (See Paras. 90 and 91 and Illustrations 25 and 26). To overcome this, the brake shoes have adjustable thrust collars. These have machined slots of three varying depths (See Illustration 23).

Adjustment is obtained by removing the collars and turning them, so that the next shallower slots are engaged with the shoes upon replacement on the shoes.

The thrust collars on each pair of shoes must be engaged by the same depth slots, so as to match the shoes.

When wear on the brake linings is taken up in this manner it is then necessary to considerably unscrew the adjusting nuts on the rear brake rod, or screw in the cable adjuster of the front brake cable, and then to adjust the brake as described in Paras. 90 and 91.

When a brake cover plate and brake shoe assembly has been disturbed, it is advisable, upon re-assembly, to centralise the brake shoes in the brake drum to ensure equal shoe pressure. This is best done before re-fitting the wheel to the machine (front wheel only) and before fully tightening the spindle nut retaining the brake cover plate to the wheel spindle. (If rear wheel, do in situ).

### Centralise brake shoes by :—

Ensure the nut binding the cover plate to the wheel spindle is slightly slack.

Place on the brake expander lever a tubular spanner (to increase the leverage). and, while maintaining pressure on the tubular spanner (to expand fully the brake shoes), fully tighten the spindle nut binding the cover plate to spindle.

If brake shoes tend to squeak when the brake is applied on the road it is generally an indication the brake shoes are not centralised in the drum.

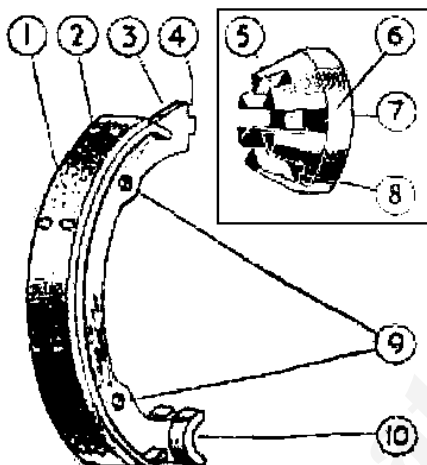


Illustration 23

Brake Shoe and Thrust Piece details.

- 1 BRAKE LINING.
- 2 BRAKE RIVET. (EIGHT USED ON ONE SHOE.)
- 3 BRAKE SHOE.
- 4 TONGUE, OF BRAKE SHOE, WHICH FITS INTO THE CENTRE OF THE BRAKE EXPANDER THRUST COLLAR (7).
- 5 ONE OF THE TWO SHALLOW SLOTS OF THE THRUST COLLAR. (USED WHEN BRAKE LININGS HAVE HAD EXTREME WEAR.)
- 6 ONE OF THE TWO DEEP SLOTS OF THE THRUST COLLAR. (USED WHEN BRAKE LININGS ARE NEW.)
- 7 THE BRAKE EXPANDER THRUST COLLAR.
- 8 ONE OF THE TWO MEDIUM DEPTH SLOTS OF THE THRUST COLLAR. (USED WHEN BRAKE LININGS HAVE HAD REASONABLE WEAR.)
- 9 HOLE TO ACCOMMODATE THE BRAKE SHOE SPRING.
- 10 BRAKE SHOE HEEL WHICH PIVOTS ON THE PIN FORMING AN INTEGRAL PART OF THE BRAKE COVER PLATE.

## 88 FRONT BRAKE COVER PLATE

It is essential the front brake cover plate is correctly positioned on the front wheel spindle. Full information regarding this is given in Para. 85.

## 89 BRAKE PEDAL ADJUSTMENT

The position of the rear brake pedal can be adjusted within narrow limits. This is done by means of a bolt A (Illustration 24) screwed into the heel of the pedal. The adjusting bolt is locked by a thin nut B.

The best position, for normal use, is to position the pedal so that, when the brake is "off," it is just clear of the underside of the footrest arm.

After altering the adjustment of the brake pedal, rear brake adjustment should be checked. (See Para. 90).

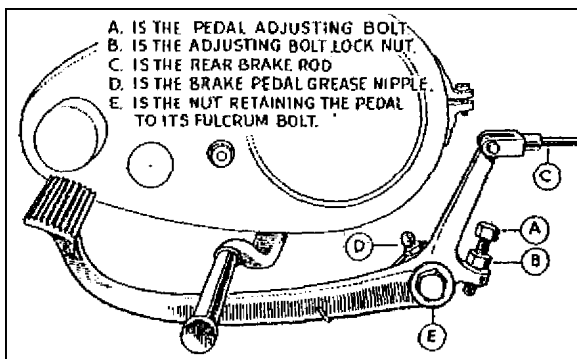


Illustration 24

Showing the rear brake pedal with his adjusting bolt and lock nut.  
To permanently raise the toe end of the pedal, slacken lock nut (B) and unscrew the adjusting bolt (A).  
(Check back brake adjustment after).

## 90 REAR BRAKE ADJUSTMENT

Major adjustment of the rear brake shoes is made on the brake thrust collars, as described in Para. 87.

Minor adjustment of the rear brake shoes is made by altering the position on the rear brake rod of the knurled adjusting nut. (Screw further on the rod to "take up" the brake).

### Adjust rear brake by :—

Place machine on rear stand.

Screw further on the rear brake rod the knurled adjusting nut till, by rotating the rear wheel, it can be felt the brake shoes are just touching the brake drum.

Then unscrew the adjusting nut two complete turns.

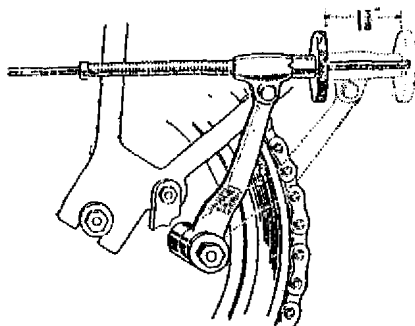


Illustration 25

Showing brake rod adjustment exhausted, indicating brake shoe thrust collar adjustment is essential.

## 91 FRONT BRAKE ADJUSTMENT

Major adjustment of the front brake shoes is made on the brake thrust collars, as described in Para. 87.

Minor adjustment of the front brake shoes is made by altering the position of the knurled cable adjuster on the fork assembly. (Unscrew the brake cable adjuster to "take up" the front brake).

The adjuster is locked in position by a nut.

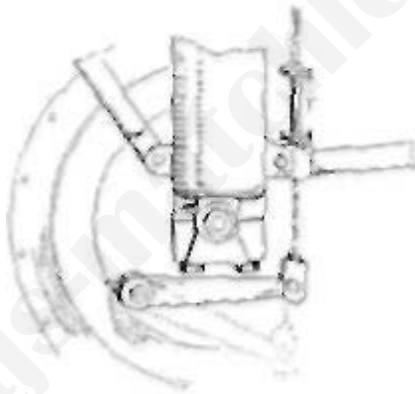
### Adjust front brake by :—

Place machine on rear and front stands.

Unscrew the cable adjuster lock nut about half a turn.

Unscrew the cable adjuster till, by rotating the front wheel, it can be felt the brake shoes are just touching the brake drum.

Then screw down the adjuster two complete turns and tighten the lock nut.



*Illustration 26*

Showing front brake cable adjuster thread exhausted, indicating brake shoe thrust collar adjustment is essential.

## 92 BRAKE DRUMS

The front wheel brake drum is retained to the wheel by eight countersunk screws.

The rear wheel brake drum is integral with the rear wheel sprocket and is retained to the wheel by six bolts and nuts. Under each nut is a special lock washer and it is essential these are always in position.

Harshness in transmission can be caused by the drum retaining bolts and nuts being loose. Rear wheel spokes will break for the same reason.

## 93 RIMS, SPOKES AND SECURITY BOLTS

The front and rear rims are 19" by 2½" and accommodate the same size of tyre (26" by 3.25"), but they are not interchangeable because the nipple holes in the front rim are smaller than those in the rear rim.

The dimensions of spokes will be found in Para. 1. Sub-para. (k).

## 94 TYRES AND SERVICE

Obtaining satisfactory life and service from the tyres is largely a matter within the user's control because the first essential is correct inflation.

Check tyre pressures with a low pressure gauge at least once per week. Inflate as necessary. (See Para. 97).

Avoid unnecessary or "stunt" acceleration and fierce braking, which wear out tyres by causing wheel spin.

Do not drive in tram lines. It is dangerous and the uprisings of worn rails will damage the tyres.

Remove flints, etc., that become imbedded in the tread and, if any oil gets on the tyres or spokes, clean it off with petrol.

## 95 TYRE REMOVAL

It is not essential to remove a wheel from the machine to repair a puncture but it will usually be found desirable and more convenient to do so.

### **Take off outer cover and remove inner tube by :—**

Remove :—

Cap from tyre valve.

Nut from tyre valve.

Inside from tyre valve. (This allows inner tube to deflate). Most valve caps have a slotted top to engage with the valve inside in order to unscrew it.

Push edge of cover that is diametrically opposite to valve right into well of rim and, using tyre lever W40-G3-TK29, pick up edge of cover near valve so that it comes off over the edge of the rim.

Work off the remaining edge of the cover till it is clear of the rim. This is quite easy and there is no reason to use force.

Push upwards valve stem, through its hole in the rim, and the inner tube is then free to be taken away.

Remove cover from rim by pushing it right into well of rim and, diametrically opposite, picking it up with the tyre lever and then working off all the way round.

## 96 TYRE FITTING

### Re-fit inner tube and outer cover by :—

Place one edge of cover right into well of rim, and, commencing diametrically opposite, and using the hands only, work the cover over the edge of the rim.

Replace the valve " inside " and slightly inflate the inner tube. (Do not distend the tube).

Fit the valve into its hole in the rim and replace its nut, only screwing it on the valve stem about half an inch.

Tuck in the inner tube so that it lies snugly in the cover. Ensure it is not " twisted."

Introduce the free edge of the cover into the rim at the spot diametrically opposite to the valve. Get this edge right into the well of the rim and then, by working round the cover, equally on either side, the cover will slip into place without excessive exertion, fitting the part nearest to the valve last of all.

Slightly inflate the inner tube and inspect for the inner tube being trapped between the outside edge of the cover and the rim at the spots where the valve bolt is located.

Half inflate the tyre, spin wheel and test for trueness because it is essential the pattern of the tread runs evenly and the cover must be manipulated till that occurs. Inflate to required pressure. (See Para. 97).

Screw fully home the nut on valve.

Replace valve cap.

### Note :—

Never run without the valve cap in position, otherwise dirt will enter the valve and, upon application of a tyre pump, some will get on the valve seat, thereby preventing the valve making an air-tight seal and deflation will result.

## 97 TYRE PRESSURES

The following are correct minimum inflation pressures for specified loads per tyre :—

Load per tyre.	200 lbs.	Pressure.	16 lbs. per square inch
do.	240 lbs.	do.	18 lbs. do.
do.	230 lbs.	do.	20 lbs. do.
do.	350 lbs.	do.	24 lbs. do.
do.	400 lbs.	do.	28 lbs. do.
do.	440 lbs.	do.	32 lbs. do.

The best method of ascertaining the correct pressure is to actually weigh the loads on the front and rear tyres on a weighbridge and this is a service that can usually be provided by a corporation or railway company and then use the above table.

**As a rough guide** it may be stated that, with a rider of average weight and with normal equipment, solo, the pressures should be 17 lbs. for the front tyre and 20 lbs. for the rear.

# ELECTRICAL SERVICE

## 98 ELECTRICAL EQUIPMENT

LUCAS electrical equipment is fitted and this comprises three independent electrical circuits, as follows :—

- (a) **IGNITION—Magneto, High-tension Wire and Sparking Plug.**
- (b) **CHARGING—Dynamo, Cut-out and Regulator, Ammeter and Battery.**
- (c) **LIGHTING AND ACCESSORIES—Lamps, Wires, Switches and Horn.**

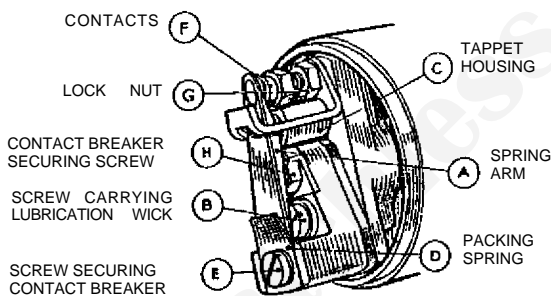


Illustration 27

Showing Contact Breaker

## 99 IGNITION CIRCUIT

A LUCAS type N1/3/AO magneto is fitted and the only service attention this requires is occasional lubrication of the contact breaker cam and tappet, infrequent adjustment of the contact breaker points and complete servicing at intervals of about ten thousand miles. To lubricate the contact breaker cam and tappet it is necessary to remove the complete contact breaker from the magneto.

### Remove contact breaker by :—

Swing away the flat spring blade retaining the contact breaker cover.

Pull away the contact breaker cover.

Remove the screw E, Illustration 27, retaining the contact breaker spring arm A, Illustration 27, to the contact breaker body and take away the backing spring F, Illustration 28, and the spring arm E, Illustration 28. There is a spring washer under the screw.

Unscrew the screw B, Illustration 27, carrying the lubrication wick and take away the fibre insulating bush encircling the screw.

Straighten the tab on the lock washer D, Illustration 28, under the central screw H, Illustration 27, retaining the contact breaker body A, Illustration 28, to the armature shaft and, with spanner LTX-5. remove the central screw.

Finally, lever off the contact breaker body.

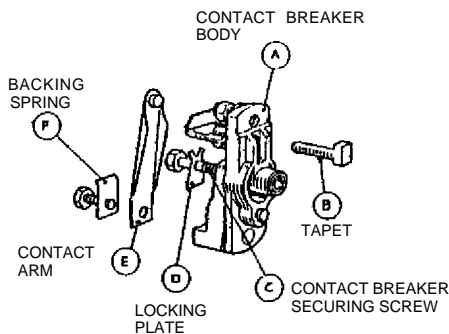


Illustration 28

Showing component details of Contact Breaker.

#### Lubricate contact breaker cam and tappet by :—

Remove contact breaker as described above.

Saturate, with a few drops of thin machine oil, the wick mounted in the core of its carrying screw B, Illustration 27.

Push out of the contact breaker body the tappet B, Illustration 28, wipe it with a soft cloth, smear it with thin machine oil and then replace it.

#### NOTE :—

When replacing the contact breaker parts, ensure the backing spring F, Illustration 28, is fitted so that its bent over end faces outwards.

#### Contact breaker points.

The contact breaker point separation should be from .010 to .012".

#### Clean contact breaker points by :—

Remove the contact breaker cover.

Examine contacts. (F Illustration 27).

If they are dirty, oily, or burnt, they must be cleaned with a fine carborundum stone, or **very fine** emery cloth, and afterwards wiped with a cloth that has been moistened with petrol.

Cleaning is made easier if the contact breaker spring arm A, Illustration 27, is removed.

Examine the contact breaker spring arm and wipe away any rust.

#### Check and adjust contact breaker point setting by :—

Remove contact breaker cover.

Turn over engine till the contact breaker points F, Illustration 27, are fully open.

Insert the gauge (part of spanner LTK—5) between the two contact points. If the setting is correct the gauge should be a sliding fit.

If there is an appreciable variation from the gauge slacken the lock nut G, Illustration 27, on the adjusting point and turn the contact point (apply spanner LTK-5 to its hexagon head) until the gap is set to the gauge. (Screw the point into the contact breaker body to increase the gap, or outwards, to decrease it).

Finally, tighten the lock nut and re-check the setting.

#### SPECIAL NOTE :—

Check the contact breaker point gap after the first one hundred miles and five hundred miles. Owing to the initial settling down, there is a tendency for the gap to alter in the first few hundred miles of use. This may seriously affect the ignition setting. Subsequent adjustment will only be required at long intervals but it is as well to check the gap every two thousand miles. (When the engine is decarbonised is always an opportune time).



Complete service (dismantling, cleaning, lubrication of the armature shaft bearings, etc.) should be entrusted to a Lucas Service Station and should be done about every ten thousand miles.

#### Sparking plug :—

The sparking plug has a thread of 14 mm. and the reach is  $\frac{1}{2}$ ". The point gap should be from .020 to .025". Check the point gap every time the engine is decarbonised and, if necessary, re-set the points by bending the "L" shaped exterior electrode to, or from, the central electrode. (See Para. 1. Sub-para. h).

## 100 CHARGING CIRCUIT

A LUCAS type E3AR/A05/1 Dynamo is fitted. The positive brush is insulated and the negative is earthed.

There are two terminals on the dynamo commutator end cover. That nearer to the front of the machine is connected to the terminal marked D on the cut-out and regulator Unit. The other is connected to the terminal marked F on the cut-out and regulator Unit

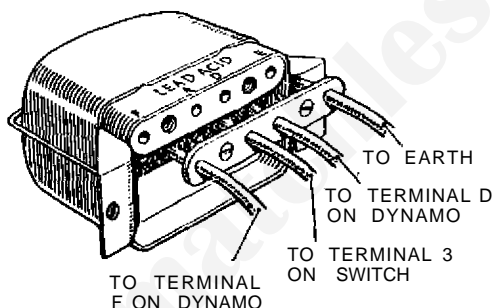


Illustration 29

Showing connections to Lucas Cut-out and Regulator Unit.

#### The cut-out and regulator unit :—

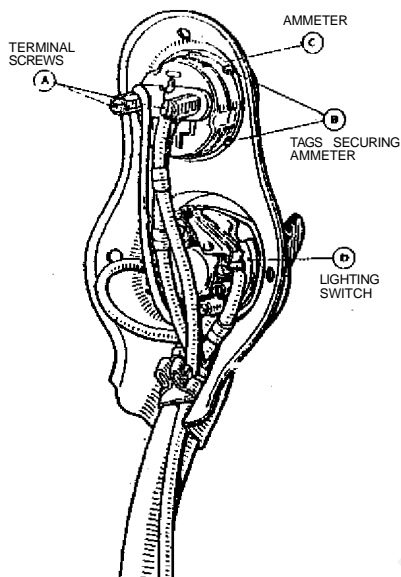
The cut-out and regulator Unit, type MCR1, located under the saddle, houses the cut-out and the voltage regulator. Both are accurately set and re-adjustment is rarely needed but, if under normal conditions, it is found that the battery is continually in a low state of charge, or is being overcharged, then the regulator setting should be checked by a **Lucas Service Depot** and re-set, if necessary. The cut-out is mounted alongside the regulator and a cap, common to both, covers them.

The regulator provides complete automatic control, causing the dynamo to give an output which varies according to the load on the battery or its state of charge.

Normally, during daytime running, when the battery is in good condition, the dynamo gives only a trickle-charge, so that the ammeter readings will seldom exceed 1 or 2 amperes.

#### Ammeter—Lucas—removal and replacement :—

The LUCAS ammeter is type CZ-27 and is mounted in the panel in the top of the headlamp.



*Illustration 30*

Showing the panel containing the Lucas Lighting Switch and Ammeter removed from the Head Lamp.

#### **To remove ammeter :—**

Remove the panel from top of headlamp by taking away the three retaining screws.

Unscrew the ammeter terminal screws A, Illustration 30, and remove the wires.

Bend back the four metal tags B, Illustration 30, that secure the ammeter to the panel and the ammeter is then free to be taken away from the panel.

#### **To replace ammeter :—**

Reverse the above procedure.

#### **Battery—Lucas :—**

The battery fitted is LUCAS type PUW-7E-5. This is a lead-acid battery in which the electrolyte is in free liquid form.

When examining a battery, do not hold naked lights near the vent as there is a danger of igniting the gas coming from the plates.

When the vent plugs are removed ensure the ventilating holes in each are quite clear. A clogged vent plug will cause pressure in the cell to increase, due to gases given off while charging, and this may cause damage.

Ensure a rubber washer is fitted under each vent plug otherwise the electrolyte may leak.

Top-up battery once every fortnight.

#### **Top-up battery by :—**

Unscrew battery clamping screw and remove.

Remove battery lid.

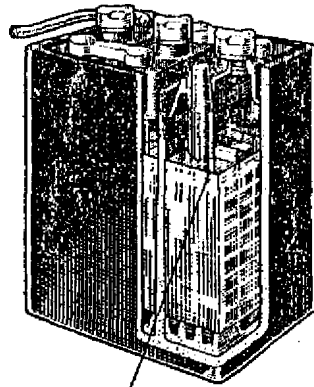
Remove the three vent plugs.

Have available a supply of clean distilled water.

Wipe the top of the battery to remove all dirt and moisture.

*Illustration 31*

**Lucas Battery.**



**ELECTROLYTE LEVEL**

Pour distilled water in each cell to bring the electrolyte level with the tops of the plate separators. Acid must not be added to the electrolyte unless some is accidentally spilled. Should this happen, make loss good with acid diluted to same specific gravity as acid in the cell.

Specific gravity is measured with a hydrometer.

Take a reading from each cell.

Readings should be :—

1.280 to 1.300 if battery fully charged.

About 1.210 if battery half discharged.

Below 1.150 if battery fully discharged.

Above figures are given assuming temperature of acid is about 60° F.

If one cell gives a reading very different from the rest it may be that acid has been spilled, or has leaked, from that cell, or there may be a short circuit between the plates. This will necessitate the battery being sent to a Lucas Service Depot for rectification.

Wipe from top of battery any spilled liquid.

Replace vent plugs.

Replace battery lid.

Replace, and tighten, battery clamping screw.

**NOTE :—**

Rag used for wiping battery top should afterwards be thoroughly washed in several changes of water or be destroyed.

**WARNING :—**

Do not leave a battery in a discharged condition for any length of time. If it is to be stored out of use it must first be fully charged and afterwards be given a refreshing charge about every two weeks.

## 101 LIGHTING AND ACCESSORIES

### Headlamp :—

A LUCAS type DU-42 headlamp is fitted. It has a panel mounted in its top and that panel carries the main lighting switch and the ammeter.

The pilot bulb is a 6 volt bulb, 3 watts. S.B.C.

The main bulb is a 6 volt bulb, with double filaments, 24 watts. S.B.C. The word " Top " is etched on main bulbs to indicate the correct position in the lamp holder for normal use.

### To remove head lamp front and interior :—

To remove the headlamp front release the spring clip located at the bottom of the lamp front and pull outwards the bottom of the front. As it comes away release the top tag of the front from the lamp shell by slightly lifting upwards.

The front is then free and it will be noticed the reflector has come away with it.

The reflector and glass are retained to the front by four spring clips and, upon removing the clips, the reflector and front can be lifted away. There is a cork packing strip between the reflector and the glass.

### To replace head lamp front and interior :—

Lay glass in lamp front.

Fix cork strip to reflector edge by pressing into the pins forming an integral part of the front.

Lay reflector assembly on top of glass, ensuring top of reflector registers with top of lamp front, and replace the four spring clips so that they are approximately equi-distant from each other.

Take front assembly and locate top tag in slot of lamp shell and then press front towards shell till it is in position.

Finally, replace spring catch at bottom of lamp front.

### Bulb holders and focussing :—

The two bulbs are held in holders fixed to a plate that fits in the rear of the reflector and the plate is retained by two spring wires. Upon springing outwards the two wires, so that they are clear of the bulb holder plate, the plate with holders and bulbs may be taken away.

The main bulb is adjustable in its holder. It is secured by a clamp bound with one screw and, upon slackening the screw, the bulb may be pushed, inwards and outwards, thereby providing movement to enable the light beam to be focussed.

To obtain the best driving light the bulb should be correctly focussed in the reflector. This is achieved by slackening the clamp binding screw and pushing the bulb holder, in or out of the clamp. Until the smallest circle of light is obtained.

Tighten the binding screw after making the adjustment. It is best to make the focussing adjustment after dark with the machine so positioned that the light beam falls on a wall some distance away).

### Head lamp adjustment :—

The lamp must be set so that the light beam is projected slightly below the horizontal. The lamp is retained to its brackets by two side fixing bolts. By slightly slackening these two bolts the lamp may be tipped up, or down, to obtain the correct setting of the light beam.

### WARNING :—

Care must be taken, when handling the reflector, to prevent it from becoming finger-marked or scratched. It can be cleaned by polishing with a clean, dry soft cloth. **Metal polishes must not be used.**

### Rear lamp :—

A LUCAS rear lamp is fitted. The body, with bulb holder, is secured to the rear number plate by two screws and one bolt, with washers and nuts.

The cover, carrying the red glass, is secured to the body by two spring clips. To remove the cover, slightly twist it and then pull outwards. To replace, introduce the cover to the body so that the two slots in it register with the two spring clips on the body and then push into complete engagement.

The bulb is 6 volts. 3 watts. S.B.C (Same as pilot bulb in headlamp).

### Wire connections :—

Most of the terminal connections consist of a metal sleeve that is a holding fit in a metal socket. To make such a connection it is necessary to withdraw the metal sleeve from the terminal socket, bare the end of the wire for  $\frac{3}{8}$ " , pass the wire into the metal sleeve and turn back the wire strands so that they lie outside the sleeve and then push the sleeve into the socket.

Terminal connections to the switch and regulator unit are in the form of a metal post to which the wire is secured by a binding screw. To make such a connection it is necessary to slacken the binding screw, bare the end of the wire for  $\frac{3}{16}$ " , pass the wire through the slot cut in the side of the binding post and secure by fully tightening the binding screw.

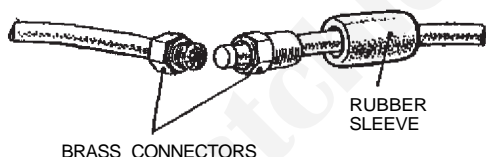


Illustration 32

Showing details of the Lucas detachable wire connector.

The rear lamp wire has, inserted in it, a screwed connection. (See Illustration 32). This is located just above the rear wheel spindle and is quickly detachable in order to facilitate rear wheel removal. It consists of four parts :—

- (a) A threaded sleeve.
- (b) A collet.
- (c) A gland nut.
- (d) A rubber sleeve.

To make such a connection, bare the ends of the wires for  $\frac{1}{8}$ " , pass the rubber sleeve over one wire, pass the threaded sleeve over the same wire and follow by passing the bared end of that wire through the collet and bend back the strands of wire. Pass the bared end of the second wire through the gland nut and bend back the wire strands. Then screw the gland nut into the threaded sleeve and complete the operation by sliding the rubber sleeve over the metal assembly. The rubber sleeve serves the dual purpose of insulating the exposed metal parts and preventing same from separation which might be caused by vibration.

The earth wires and high-tension wire have terminals of the solid sleeve type having an eye at the extreme end. To make such a connection it is necessary to bare the end of the wire for  $\frac{3}{8}$ " , pass the terminal over the wire so that the bared end fully enters the reduced core of the terminal and then flatten that part by pinching in a vice or by hammering.

### Earth wires :—

There are two earth wires, one from the regulator and the second from the negative terminal of the battery. The ends of those wires have sleeve terminals, as described in the above paragraph, and are secured to the seat lug bolt (just below the saddle on the left-hand side by means of a screw and washer and it is essential the connections are kept clean and the screw must be kept fully tight.

### Electric horn :—

Electric horns are adjusted to give their best performance before leaving the works and will give long periods of service without any attention. Subsequent adjustment is rarely necessary.

When needed, the adjustment of a horn takes up wear of the vibrating parts, which, if not corrected, results in loss of power or roughness of tone.

The adjustment is made by turning the adjustment screw, usually in a clockwise direction. (See Illustration 33). The underside of the screw is serrated and the screw should not be turned more than two or three notches before re-testing. If the adjustment screw is turned too far in a clockwise direction a point will occur at which the armature pulls in but does not separate the contacts.

When testing, do not continue to operate the push switch if the horn does not sound. If, when the push is operated, the horn does not take any current (indicated by an ammeter connected in series with the horn), it is possible that the horn has been adjusted so that its contact breaker is permanently open.

After adjusting, note the current consumption. A horn may give a good note, yet be out of adjustment and taking excessive current. The current, when the horn is adjusted to give its best performance, must not exceed 4 to 5 amperes.

### Warning :—

When adjusting, do not attempt to unscrew the nut securing the tone disc, or any other screw in the horn.

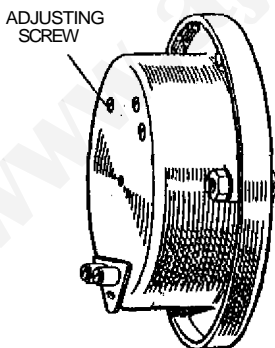


Illustration 33

Showing position of the tone adjusting screw on the Lucas Electric Horn.

If the horn becomes uncertain in action, or does not vibrate, it has not necessarily broken down. The trouble may be due to a discharged battery, or a loose connection, or short circuit in the wiring of the horn.

The performance of the horn may be upset by the fixing bolt working loose, or by vibration of some part adjacent to it.

The horn push switch must make good electrical contact with the metal part of the handlebar and, if there is reason to suspect the bar is corroded at that point, the switch should be unclipped and the bar and switch cleaned and then replaced.

### Fuses :—

There are no detachable fuses in LUCAS motor cycle electrical equipment.

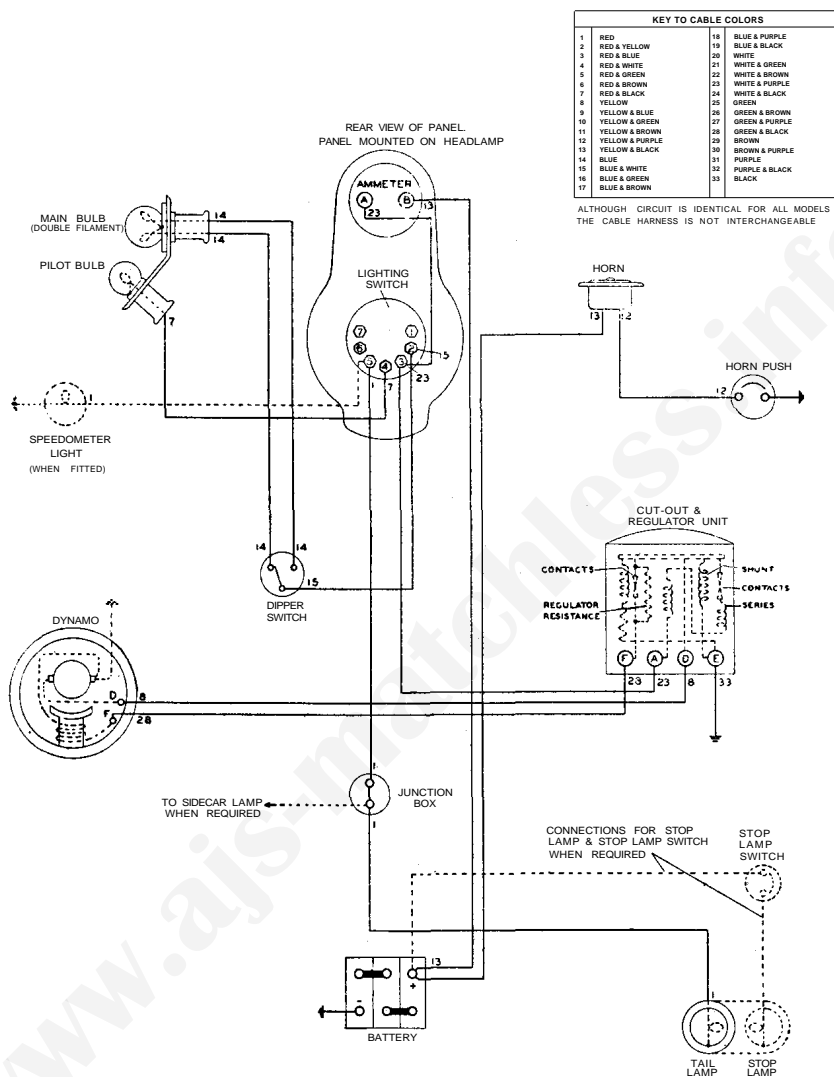


Illustration 34

Wiring Diagram.

# TOOLS AND SPECIAL EQUIPMENT

## 102 TOOLS

The standard tool kit, issued with each new machine, contains :—

1	17520	Tool bag. (Not shown in Illustration 35).
1	36-G3-EQ2	Tyre inflator.
1	W40-G3-TK29	Tyre lever.
1	LTK-15	Pliers.
1	11024	Gudgeon pin circlip pliers.
1	LTK-13	Screwdriver.
1	LTK-20	Grease gun.
1	LTK-12	Adjustable wrench.
1	17 634	Sparking plug box spanner and tommy bar.
1	RTK-1	Dynamo spanner.
1	RTK-3	Triple spanner.
2	W41-G3L-TK 1	Double end spanner. Small.
1	W41-G3L-TK2	Double end spanner. Large.
1	RTK-5	Contact point spanner and gauge.
1	11914 -S	Hub lock nut hook spanner.

## 103 OPTIONAL EQUIPMENT

The following items of optional equipment are available. They are described and priced in the Spares List. (See Para. 104).

- (a) Trip speedometer, with illuminated dial. 80 M.P.H. driven by special gear box mounted alongside the rear wheel with dog drive from rear hub.
- (b) Mudguard type pillion seat.
- (c) Pillion footrests, bolted through rear fork ends, to fold up when not in use and specially designed for these machines.
- (d) Detachable luggage carrier.

## 104 SPARES LIST

An illustrated and priced spares list is available at a cost of 1/6 post free.

## 105 GASKET SETS

For convenience in ordering, two standard sets of engine washers and gaskets as well as the washers used in the petrol and oil feed systems are stocked. One set is for the 350 c.c. machines and the other for the 500 c.c. and full details of contents and prices are included in the Spares List. (See Para. 104).



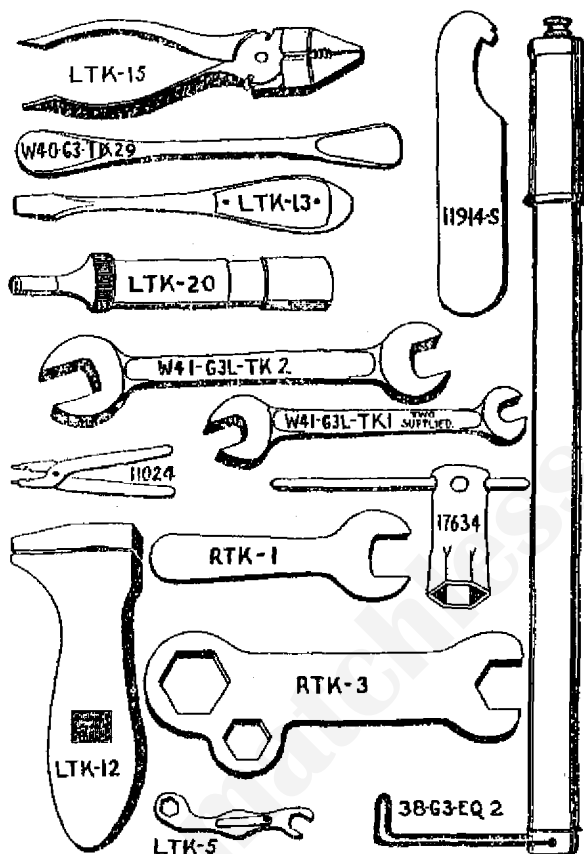


Illustration 35

Description	Part Number
Crease Gun - - LTK20	
Pliers - - - - LTK15	
Circlip Pliers - - 11024	
Spanner, 6' Adjustable - - - - LTK12	
Spanner, Hub Lock Nut - - - - 11914/S	
Spanner, Magneto - LTK5	
Spanner, Sparking Plug, Box - - 17634	

Description	Part Number
Spanner, Dynamo - RTK1	
Spanner, 3 - Way. .820 x 1.011 x 1.200	RTK3
Spanner. Light Forged, $\frac{3}{16}$ " x $\frac{1}{4}$ " Whit. (2 Off) -	W41/G3L/TK1
Spanner. Light Forged, $\frac{5}{16}$ " x $\frac{3}{8}$ " Whit. - - -	W41/G3L/TK2
Screwdriver - - LTK13	
Tyre Lever, 7" -	W40/G3/TK29

# USEFUL INFORMATION

## 106 TRACING TROUBLES

In the following five paragraphs are particulars of failures and troubles that can occur together with the probable reasons. These troubles are arranged in the order of their probability.

### **Engine fails to start, or is difficult to start, may be due to :—**

- Throttle opening too large.
- Petrol tap closed.
- Air lever in open position.
- Ignition not set just off fully advanced position.
- Not enough petrol in the tank.
- Lack of fuel because of insufficient flooding.
- Lack of fuel because of pipe, or tap, obstruction.
- Excessive flooding of carbureter.
- Pilot jet choked.
- Oiled up, or fouled, sparking plug.
- Stuck up engine valve.
- Valve stem sticky with burnt oil.
- Weak valve spring.
- Valve not seating properly.
- Contact points dirty.
- Incorrect contact point gap.
- Water on high-tension pick-up.
- Water on sparking plug.
- Vent hole in petrol tank filter cap choked.

### **Engine misses fire may be due to :—**

- Defective, or oiled, sparking plug.
- Incorrect contact point gap.
- Contact breaker spring blade sticking.
- Contact breaker spring blade tappet sticking.
- Contact breaker points loose.
- Tappet adjustment incorrect.
- Oil on contact breaker points.
- Weak valve springs.
- Defective sparking plug wire.
- Partially obstructed petrol supply.

### **Loss of power may be due to :—**

- Faulty sparking plug.
- Lack of oil in tank.
- No tappet clearance, or too much clearance.
- Weak valve spring.
- Sticky valve stem.
- Valve not seating properly.
- Brakes adjusted too closely.
- Ignition lever creeps to full retarded position.
- Badly fitting, or broken, piston rings.
- Punctured carburetter float.
- Engine carbonised.
- Choked silencer.

### **Engine overheats may be due to :—**

Lack of proper lubrication. (Quality or quantity of oil).  
Faulty sparking plug.  
Air control to carburettor out of order.  
Punctured carburettor float.  
Engine carbonised.  
Weak valve springs.  
Pitted valve seats.  
Worn piston rings.  
Ignition lever creeps to full retard position.  
Ignition setting incorrect.  
Choked silencer.

### **Engine stops suddenly may be due to :—**

No petrol in tank, or choked petrol supply.  
High-tension wire detached from sparking plug.  
Choked main jet.  
Oiled up, or fouled, sparking plug.  
Water on high-tension pick-up.  
Water in float chamber.  
Vent hole in petrol tank filler cap choked.

## **107 EXCESSIVE OIL CONSUMPTION**

Excessive oil consumption may be due to :—

- (a) Clogged, or partly clogged, felt filter in oil tank.
- (b) High crankcase pressure, caused by in-operative release valve action. (The disc in the valve may be damaged or jammed with dirt).
- (c) Stoppage, or partial stoppage, in the pipe returning oil from the engine to the oil tank.
- (d) Badly worn, or stuck-up, piston rings. (Causing high pressure in the crankcase).
- (e) Air leak in dry sump oiling system.

## **108 EXCESSIVE PETROL CONSUMPTION**

Excessive petrol consumption may be due to .—

- (a) Leaks in the petrol feed system. (Damaged fibre wishers, loose union nut on piping, defective float needle action).
- (b) Incorrect ignition setting. (Ignition not advanced sufficiently).
- (c) Defective engine valve action.
- (d) Too high a gear.
- (e) Incorrect use of air control lever.
- (f) Moving parts of carburettor badly worn. (Only possible after very considerable mileage).

## **109 ABNORMAL TYRE WEAR**

Abnormal tyre wear may be due to :—

- (a) Incorrect tyre pressure.
- (b) Wheels not in alignment.
- (c) Harsh driving methods. (Mis-use of acceleration and braking).

## 110 CLEANING THE MACHINE

Do not attempt to rub, or brush, mud off the enamelled surfaces because this will soon destroy the sheen of the enamel. Mud, and other road dirt, should be soaked off with water.

The best method is to use a small hose, taking care not to direct water on to the engine, carburetter, magneto and other such parts. As a poorer substitute, a pail of water and a sponge can be used.

After washing down with water, the surplus moisture should be removed with a chamois leather, and, when the enamelled surfaces are thoroughly dry, they may be polished with a good wax polish and soft dusters.

Such parts as the engine crankcase and the gear box can be cleaned by applying paraffin with a stiff brush, and, with a final application of petrol, will come up like new.

## 111 CHROMIUM PLATING

Under some climatic conditions, a rusty looking deposit may be observed on ferrous parts that are chromium plated. This is not ordinary rust (ferric oxide) but is a salt deposit that in most cases and in its early stages, can be quickly and easily removed with a damp chamois leather. In stubborn cases it may be necessary to use a special chromium cleaning compound.

The safest precaution during Winter is to wipe over all such parts with a soft rag soaked in "**Tekall**," which is a lanoline base rust preventative marketed in small tins and available at most garages. This material, so applied, leaves an almost invisible film that is impervious to moisture and its use cannot be too highly recommended for owners who value the appearance of their mounts.

In Summer, when these difficult conditions do not prevail, chromium parts should be frequently cleaned with a damp chamois leather and afterwards polished with a soft duster, or, better still, with a polisher of the "**Selyt**" type.

If a polish is used it must be one of the special compounds for chromium plating only. Ordinary metal polishing liquids, in particular, must not, on any account, be used because these almost without exception contain oleic acid which attacks chromium.

### NOTE:—

"**Tekall**" is a product of **20th Century Finishes Ltd., 175-177, Kirkgate, Wakefield**, and is retailed in ½-pint and 1-pint tins at 2- and 2/6 respectively.

## 112 REPAIRS

The instructions regarding repairs should be clear and definite, otherwise the cost may be greater than that expected. We shall be pleased to give estimates for repairs if parts are sent to us for that purpose. If the estimate is accepted, no charge is made for the preliminary examination, but, should it be decided not to have the work carried out. It may be necessary to make a charge to cover the cost of whatever dismantling and re-assembly may have been done to prepare the estimate.

Parts sent to us as patterns, or for repair, should have attached to them a label bearing the sender's full name and address. The instructions regarding such parts should be sent under separate cover.

If it is necessary to bring a machine, or parts, to the works for an urgent repair, it is **essential** you **make an appointment** beforehand **to avoid disappointment**. This can be done by letter or telephone.

## 113 CORRESPONDENCE

Our routine is organised into different departments, therefore delay cannot be avoided if matters relating to more than one department are contained in one letter.

Consequently it is desirable, when communicating with more than one department, to do so on **separate sheets**, each of which should bear your name and address. **In particular**, requests for **Technical Advice** should not be on the same sheets as **orders for spare parts**.

When writing on a technical matter, or when ordering spares, it is essential to quote the **Complete Engine Number**. Every number has one, or more, letters incorporated in it and these letters **must be quoted** otherwise we are not able to identify the machine.

## 114 PROPRIETARY FITTINGS

No expense is spared to secure and fit the most suitable and highest quality instruments and accessories for the standard equipment of our machines.

Nevertheless, our Guarantee does not cover such parts and, in the event of trouble being experienced, the parts in question should be returned to, and claims made, direct on the actual manufacturers who will deal with them on the terms of their respective guarantees, as follows :—

<b>Carburettors</b>	Messrs. Amalgamated Carburettors, Ltd., Holford Works, Perry Barr, Birmingham.*
<b>Chains</b>	The Renold and Coventry Chain Co., Ltd., Didsbury, Manchester.*
<b>Electrical Equipment (except Horn)</b>	Messrs. Joseph Lucas. Ltd.. Great King Street, Birmingham, 19.*
<b>Electric Horn (according to make)</b>	Messrs. Joseph Lucas Ltd., Great King Street, Birmingham 19.* or Messrs. Clearhooters. Ltd., 33, Hampton Street. Birmingham 19.
<b>Gear Boxes</b>	Messrs. Burman and Sons, Ltd., Ryland Street. Birmingham.*
<b>Saddles</b>	Messrs. Lycetts and Motor Accessories, Co.. Ltd., Western Works, Arthur Street, Small Heath, Birmingham, 10.
<b>Sparking Plugs</b>	Champion Sparking Plug Co., Ltd., Messrs. Lodge Plugs, Ltd., Rugby Feltham, Middlesex.*
<b>Speedometers</b>	Messrs. S. Smith and Sons (M.A.), Ltd., Cricklewood, London.*
<b>Tyres</b>	Messrs. Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham.*

\*These manufacturers issue instructive literature regarding their products obtainable by writing to them.

## 115 GUARANTEE

We give the following guarantee with our motorcycles, motorcycle combinations and sidecars, which is given in place of any implied conditions, warranties or liabilities whatsoever, statutory or otherwise. All such implied conditions, warranties and liabilities being in all cases excluded. Any statement, description, condition or representation contained in any catalogue, advertisement, leaflet or other publication shall not be construed as enlarging, varying or overriding this guarantee. In the case of machines (a) which have been used for " hiring-out " purposes or (b) any motorcycle and/or sidecar used for any dirt track, cinder track or grass track racing or competitions (or any competition of any kind within an enclosure for which a charge is made for admission to take part in or view the competition) or (c) machines from which the trade mark, name or manufacturing number has been removed, no guarantee, condition or warranty of any kind is given or is to be implied.

We guarantee, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and be in force for six months only from date of purchase, and damages for which we make ourselves responsible under this guarantee are limited to the free supply of a new part in exchange for the part or the motorcycle, motorcycle combination or sidecar which may have proved defective. We do not undertake to replace or refix, or bear the cost of replacing or refixing, such new part in the motorcycle, motorcycle combination or sidecar. We undertake, subject to the conditions mentioned below, to make good at any time within six months any defects in these respects. As motorcycles, motorcycle combinations and sidecars are easily liable to derangement by neglect, or misuse, this guarantee does not apply to defects caused by wear and tear, misuse or neglect.

The term " misuse " shall, include amongst others the following acts :—

1. The attaching of a sidecar to a motorcycle in such a manner as to cause damage or calculated to render the latter unsafe when ridden.
2. The use of a motorcycle or of a motorcycle and sidecar combined, when carrying more persons or a greater weight than that for which the machine was designed by the manufacturers.
3. The attaching of a sidecar to a motorcycle by any form of attachment not provided, supplied or approved by us or to a motorcycle which is not designed for such use.

Any motorcycle, motorcycle combination or sidecar sent to us to be plated, enamelled or repaired will be repaired upon the following conditions. i.e., we guarantee that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, such guarantee to extend and be in force for three months only from the time such work shall have been executed or until the expiration of the six months above referred to, and this guarantee is in lieu and in exclusion of any common law or statute warranty or condition, and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.

## 116 CONDITIONS OF GUARANTEE

If a defective part should be found in our motorcycles, motorcycle combinations or sidecars, or in any part supplied by way of exchange before referred to, it must be sent to us CARRIAGE PAID, and accompanied by an intimation from the owner that he desires to have it repaired or exchanged free of charge under our guarantee, and he must also furnish us at the same time with the number of the machine, the date of the purchase or the date when the alleged defective part was exchanged as the case may be.

failing compliance with the above, such articles will lie here AT THE RISK OF THE OWNER, and this guarantee and any implied guarantee, warranty or condition shall not be enforceable.

We do not guarantee specialities such as tyres, saddles, chains, electrical equipment, lamps, etc. or any component parts supplied to the order of the Purchaser differing from standard specifications supplied with our motorcycles, motorcycle combinations, sidecars or otherwise.

## 117 SERVICE

The **Service and repair department** is situated in **Burrage Grove, Plumstead, London. S.E.18**, and is open on Mondays to Fridays from 8.30 a.m. to 5.30 p.m. and on Saturdays from 8.30 a.m. to 12.30 p.m. It is closed on Sundays and National Holidays.

It exists for the purposes of :—

- (a) Giving technical assistance verbally or through the post.
- (b) Supplying spare parts over the counter or through the post.
- (c) Repairing and re-conditioning machines, or parts of machines, of our make.

**Burrage Grove** is the first turning on the left from Burrage Road when entering Burrage Road from the Plumstead Road. (See final paragraph overleaf.)

The nearest Railway Station is WOOLWICH ARSENAL, SOUTHERN RAILWAY, This Station is five minutes' walk from our Service Depot in Burrage Grove. There is an excellent service of electric trains from Charing Cross, Waterloo, Cannon Street and London Bridge Stations, Southern Railway.

Bus services 53, 53a, 54, 75, 99, 122, and 161. Trolleybus services, 696 and 698, and Tram services 36, 38 40, 44, 46 and 75 pass the end of Burrage Road (one minute from the Service Depot).

Visitors from the North can pass into Woolwich via the Free Ferry between North Woolwich and Woolwich. North Woolwich is a L.N.E.R. terminus and is also served by bus and Trolleybus services. There is also a tunnel under the River Thames at this point for foot passengers. The Free Ferry accommodates all types of motor vehicles and there is a very frequent service. The Southern landing stage is less than a mile from the Service Depot,

Visitors arriving by road, if they are strangers to the locality, should enquire for Beresford Square, Woolwich. Upon arrival there, the road skirting the Royal Arsenal should be followed in an Easterly direction for about four hundred yards, and Burrage Road is the second turning on the right after leaving the Square, Burrage Grove is then the first turning on the left.

## 118 THE DRIVER AND THE LAW

The driver of a motor cycle **MUST** be **INSURED** against Third Party Claims and **MUST** be able to produce an **INSURANCE CERTIFICATE** showing that such an insurance is in force.

If your Insurance Certificate specifies you can only drive one particular machine you **MUST NOT DRIVE** any other machine unless its owner has a current Certificate covering " **ANY DRIVER** " and it is advisable to remember that, in the absence of such a provision the penalties for doing so are very heavy.

The driver of a motor cycle **MUST** hold a current **DRIVING LICENCE**. If you are a learner and hold a Provisional Driving Licence, your machine must show, front and back, the standard " L " plates in red and white and you must not take a **PILLION PASSENGER** unless that passenger is the holder of a current **UNRESTRICTED** driving license,

As soon as you receive your driving licence, sign it in the appropriate place and do so each time it is renewed. It is an offence not to.

Make sure you are well acquainted with the recommendations set down in the " Highway Code," a copy of which can be obtained from any main Post Office.

## 119 THE MACHINE AND THE LAW

Every Motor Cycle used on the public roads must be registered and carry the registration numbers and licence disc allotted to it.

**To register a new machine** (normally done by the dealer) :—

Send to the local Registration Authority the following :—

- (a) Form " RF 1/2 " duly completed.
- (b) The certificate of insurance,
- (c) The invoice you received from your Dealer when you purchased the machine.
- (d) The appropriate registration fee.

In due course you will receive :—

- (1) A Registration Book. (Commonly called the " log " book).
- (2) A Licence Disc.
- (3) Your insurance certificate.
- (4) Your invoice.

The Registration Book and the Licence Disc will bear the registration numbers that have been allotted to your machine and will also show the date the Road Licence expires.

Your number plates must then be painted with the registration numbers in characters of even thickness as follows :—

The numbers on the front plate must be  $1\frac{3}{4}$ " high,  $1\frac{1}{4}$ " wide and  $\frac{5}{16}$ " thick with spaces  $\frac{1}{2}$ " wide between each two characters.

The numbers on the rear plate must be  $2\frac{1}{2}$ " high,  $1\frac{3}{4}$ " wide and  $\frac{3}{8}$ " thick with spaces  $\frac{1}{2}$ " wide between each two characters.

The Licence Disc must be enclosed in a watertight container and this must be fixed to the machine in a conspicuous position, near the front and on the left-hand side.

It is not legally necessary to carry your Driving Licence. Insurance Certificate and Registration Book while driving your machine.

The Dealer from whom a new machine is purchased will always attend to the Registration and will paint the number plates if requested to do so.

### Speedometer.

A speedometer **MUST** be fitted and it must be so illuminated that it is possible to read the dial after dark.

### Lamps.

During the official " **LIGHTING UP** " hours the machine must exhibit a white light facing forwards and a red light facing rearwards. The rear number plate must be adequately illuminated by a white light.

Each electric light bulb **MUST** be marked with the " Wattage." (Beware of cheap, imported, bulbs that do not have this marking).

(All motor cycles made by us have electric equipment that complies with the law regarding position, size of bulbs, marking on bulbs and the correct illumination of the rear number plate).





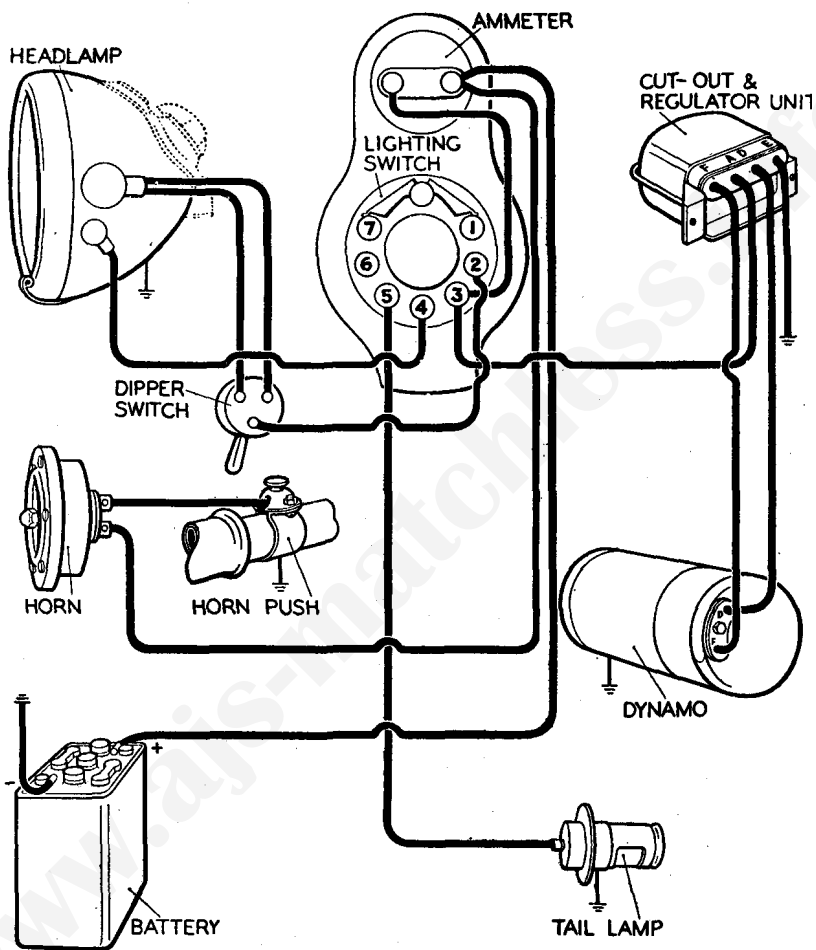


Illustration 36

Wiring Diagram. (Pictorial.)

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