

MAINTENANCE MANUAL

AND

INSTRUCTION BOOK

for

1952

350 c.c. and 500 c.c.

MATCHLESS

SPRING FRAME AND RIGID
SINGLE CYLINDER MODELS

PRICE 2/6 NETT



MATCHLESS MOTOR CYCLES

REGISTRATION ASSOCIATED MOTOR CYCLES LIMITED

PLIMSTED - LONDON - S.E.18

Printed in England

by

CHAS. F. THORNTON & SONS, LTD
85-86, Wellington Street
WOLVERTON, N.E.15

36,200-7-52

EDITION CM-11

WHEN CORRESPONDING REGARDING
SERVICE OR SPARES

ALWAYS QUOTE
THE COMPLETE ENGINE NUMBER

(including all letters in it)

THIS ENABLES US TO IDENTIFY THE MACHINE

EACH SERIES OF FRAMES IS NUMBERED FROM ZERO
UPWARDS. THEREFORE THE QUOTATION OF A
FRAME NUMBER ONLY DOES NOT PERMIT A MACHINE
TO BE IDENTIFIED.

MAINTENANCE MANUAL AND INSTRUCTION BOOK

for
MATCHLESS
1952

SINGLE CYLINDER MOTOR CYCLES



Compiled and Issued by the Manufacturers:

MATCHLESS MOTOR CYCLES

(Proprietors): ASSOCIATED MOTOR CYCLES LIMITED

Registered Offices:

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

Nearest Station:
WOOLWICH ARSENAL
(Southern Region Railway)

Factories:
BURRAGE GROVE and MAXEY ROAD
PLUMSTEAD, S.E.18

Telegrams and Cables: "MATCHLESS, WOL-LONDON"

Telephone: WOOLWICH 1223 (5 Lines)

Codes: A.E.C. 1th and 2th Edition; Bentley's; and Private Codes

All correspondence to:-

MATCHLESS MOTOR CYCLES, PLUMSTEAD ROAD, LONDON, S.E.18

Price: TWO SHILLINGS and SIXPENCE

EDITION CM-18

1952 MATCHLESS MODEL 9

350 MODEL G3L RIGID FRAME (TOURING) -
350 MODEL G3LS SPRING FRAME (TOURING)
350 MODEL G3LC RIGID FRAME (COMPETITION)
350 MODEL G3LCS SPRING FRAME (COMPETITION)

500 MODEL G800 RIGID FRAME (TOURING)
500 MODEL G800S SPRING FRAME (TOURING)
500 MODEL G800C RIGID FRAME (COMPETITION)
500 MODEL G800CS SPRING FRAME (COMPETITION)

350	mm	Height of pipe	Distance of 2nd zone	Capacity 340 c.c.
350		Inner 33.5 mm.	Distance of 1st zone	Capacity 400 c.c.

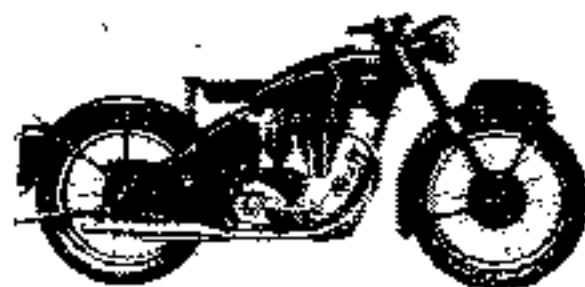
ASTRONOMY

[illegible]

In this book are notations and instructions for carrying out all the maintenance operations likely to be called for in a typical service and illustrations are provided to assist. Despite the terse nature of the comments, the casual attention to maintenance and the lack of attention to maintenance attention will soon neutralize the best effects of the design and may bring needless trouble to the owner.

We are always pleased to give "50% OFFERINGS" wherein the full benefit of our wide experience in water saving is made available to many copies of our manufacture and elsewhere will be found details of the particulars that should be given us when making such an enquiry.

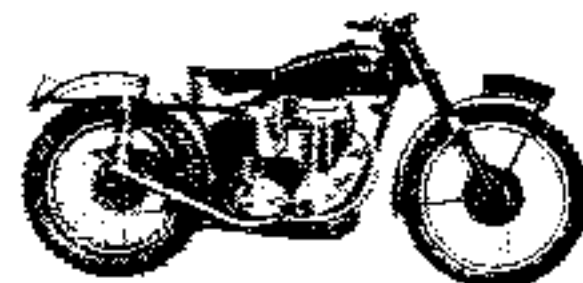
MATCHLESS MOTOR CYCLES

1952
RIGID
G3L and G3M

1932
SPRING
CULTS and GHOSTS



1952
RIGID
COMPETITION
GALC and GENC



1952
SPRING
COMPETITION
GJCS and GBOCS

Ignition (magneto)

Model	Make	Type	Location	Points gap	Ignition point, before top dead centre, with adjuster in fully advanced position
Touring	Lynn	NH 4	Accessories	0.12 in.	1 in. (25°)
Competition	Lynn	NH 1	Accessories	0.12 in.	1 in. (28°)

Lighting (bulbs)

Location	Type	Voltage	Wattage	Code	Part number
Head lamp (main beam)	Double filament	6	35/45 W	W45/45	011
Side	Single filament	6	5	W5/5	012
Rear lamp	Single filament	6	5	W5/5	013
Speedometer	Single filament	6	5	W5/5	014

Quarter parts

The following are the only 1/4 parts available for the 250 and 300 cc engine systems. Dimensions

Head gasket	0.01 in. gap
Cylinder to head	0.00 in. and 0.00 in. (0.00 in.)
Head to crank	0.00 in. and 0.00 in. (0.00 in.)

Pinions (bearing 250 and 300)

Model	Top pinion to crankshaft	Bottom pinion to crankshaft	Pinion to gear
250	0.00 in.	0.00 in.	0.00 in.
300	0.00 in.	0.00 in.	0.00 in.

Pinions are available in 1/4 parts for 250 and 300 cc engines.

Piston rings

Pinion ring gap at bottom	Pinion ring gap at top	Pinion ring gap at side
0.00 in.	0.00 in.	0.00 in.
Pinion ring gap at top	0.00 in.	0.00 in.

Spark plug

Model	Make	Type	Length	Location	Points gap
250	K.L.G.	REC	14 mm	5 in.	0.12 in. (0.00 in.)

Spokes (250 and 300 rigid and spring frame Touring models)

Location	Type	Gauge	Length (inches)	Quantity	Part number
Front, left side	Rigid	8x10	3 1/2 in.	20	011010
Front, right side	Rigid	8x10	3 1/2 in.	20	011011
Rear, left side	Rigid	7x9	3 1/2 in.	20	011012
Rear, right side	Rigid	7x9	3 1/2 in.	20	011013

Spokes (250 and 300 rigid and spring frame Competition models)

Location	Type	Gauge	Length (inches)	Quantity	Part number
Front, left side	Rigid	8x10	3 1/2 in.	20	011010
Front, right side	Rigid	8x10	3 1/2 in.	20	011011
Rear, left side	Rigid	7x9	3 1/2 in.	20	011012
Rear, right side	Rigid	7x9	3 1/2 in.	20	011013

Valve timing (250 and 300 rigid and spring frame)

Valve	Timing	Quantity	Part number
Intake	0.00 in.	20	011010
Exhaust	0.00 in.	20	011011

Valve timing (250 and 300 rigid and spring frame)

Valve timing is 0.00 in. for 250 and 300 cc engines. Part number 011010.

Weight

Weight of engine and frame only

Model	Spokes (rigid frame)	Spokes (spring frame)	Competition (rigid frame)
250	345 lbs.	375 lbs.	385 lbs.
300	355 lbs.	385 lbs.	395 lbs.

Wheels (bearing and play)

Bearing end play ... 0.01 in. (0.01 in. permissible run rack).

0-11

CONTROLS

- (1) **Throttle twist grip.** On right handlebar. Twist inwards to open. When fully closed engine should just die when hot.
- (2) **Air lever.** Small lever on right handlebar. Pull inwards to increase air supply to carburettor. Once set, when engine has warmed up, requires no alteration for different road speeds. Should be fully closed when starting engine from cold.
- (3) **Ignition lever.** Small lever on left handlebar. Advances and retards ignition point. Pull inwards to advance on touring mode (forward on competition models). 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 detailed above.
- (5) **Clutch lever.** Large lever on left handlebar. Grip is released close to this lever to rear wheel is disconnected.
- (6) **Front brake lever.** Large lever on right handlebar. Grip is released to rear wheel brake and, for normal braking, in conjunction with rear brake applies on.
- (7) **Rear brake lever.** Pedal close to left side foot rest. Depress with left foot to apply rear brake. Apply gently and use increasing pressure as the road speed decreases.
- (8) **Gear change lever.** Pivotal in horizontal position close to right foot rest. Controls selection of the four speeds, or neutral, between engine and rear wheel revolutions, with a "free" or neutral position. See illustration 2.
- (9) **Kickstarter lever.** Vertical pedal on right hand side of gear box.
- (10) **Lighting switch.** In top of head lamp. Controls lamp by a rotating lever which has three positions:
 - (1) "OFF" - Lamps not on.
 - (2) "L" - Main bulb in head lamp and rear lamp and side-swept lamp on.
 - (3) "H" - Head and rear lamp and speedometer lamp on.
- (11) **Ammeter.** In top of head lamp. Indicates flow of electric current in or out of battery. ("Charge" or "Discharge").
- (12) **Turn switch.** First switch on right handlebar.
- (13) **Gear box filler cap.** Located on top edge of kickstarter box cover. A leak indicates oil shortage and needs to be checked immediately.
- (14) **Footrest for rider.**
- (15) **Petrol tank filler cap.** Located in top of fuel tank. To remove, screw cap, turn fully to the left and then the screw. There are two locking positions. The middle position, between the fully tightened down and "let away" positions, is in the nature of a "safety" device to prevent loss that might be occasioned by unauthorized handling.
- (16) **Oil tank filler cap.** Located on top edge of oil tank. The construction and operation is exactly as the petrol tank filler cap.
- (17) **Dipping switch.** 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. (The head lamp bulb has two filaments.)

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."

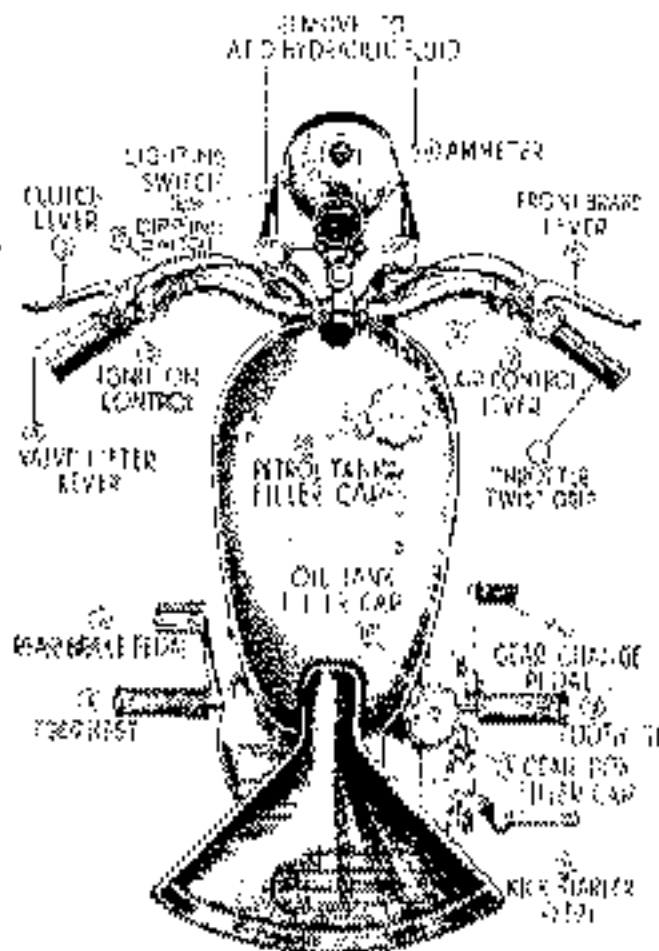


Illustration 1

Showing Controls

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.

DRIVING

FUEL

At the time of publishing this instruction book only one grade of motor fuel (Pratt & Sperry) is on sale, but it may be that soon the various grades of pre-war petrol will again be available when the use of best quality fuel is recommended because the small amount of economy that might be considered to accrue by using the cheapest grades is more than offset by the advantage obtained by using only Number One grades.

FUEL SUPPLY

Two fuel feed taps are situated underneath the rear end of the petrol tank. (One on 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 "A" in diagram) is pushed towards the body of the tap. To close, press the round knurled knob (marked "B" in diagram).

Normally, only use the tap on the right hand side of the machine and when the other side will act as a reserve supply. Always be careful to never allow the reserve being forced to fall upon the reserve tap as it will cause the "reserve" tap to be closed.

It will be noted that, by fitting two petrol feed taps, it is possible to remove the petrol tank from the machine without the necessity of first draining it of fuel.

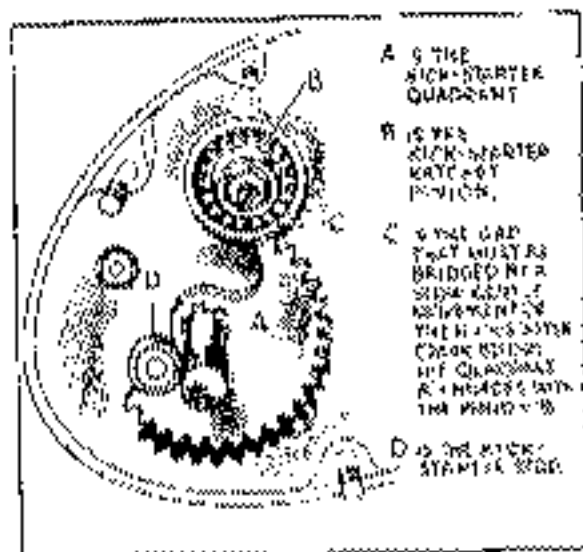


Illustration 2

Kickstarter
quadrant and ratchet pinion

STARTING THE ENGINE

- See that there is sufficient fuel in the petrol tank.
- See that there is sufficient oil in the oil tank.
- See that the gear pedal is in the neutral position.
- Push forward the hexagonal end of off-side petrol tap slide.
- See that the air control lever is in the fully closed position.
- Fully advance the ignition and then slack back the control lever two-fifths of its total movement.
- Open the throttle not more than one-sixth of the total movement of the twist grip.
- Depress the plunger on the top of the carburettor float chamber until it can be felt the chamber is full of petrol.
- Raise the valve lifter lever and, while keeping it raised, turn over the engine several times by depressing the kickstarter pedal three times, the object being to free the engine. (This only applies if the engine is cold.)
- Depress the kick starter until compression is felt, then raise the valve lifter lever and allow the engine to run over compression. Then, after allowing the kick starter pedal to return nearly to its normal position, give it a long swinging kick with the valve closed. Flywheel momentum will carry over compression and the engine should be immediately started. If it fails to do so repeat exactly the same process.

The kick starter lever is never violently against its stop.

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

The first is a slow one gear movement which ends when it is felt the quadrant has engaged with the teeth on the ratchet pinion. (See illustration 2.)

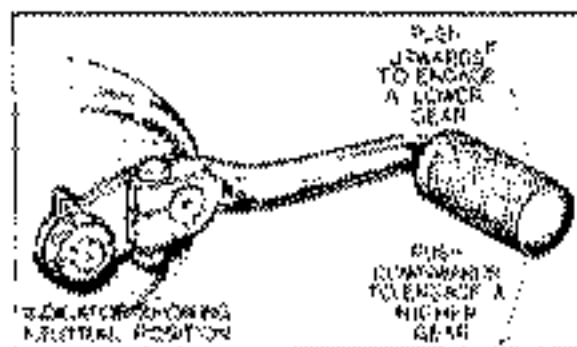


Illustration 3

Showing the gear selection mechanism, which operates by pushing the lever forward to engage a lower gear and pulling the lever back to engage a higher gear. The lever is marked with 'N' for neutral, 'L' for low, 'H' for high, and 'R' for reserve.

When dismounting for any purpose, the kickstarter lever should be disengaged from the ratchet pinion.

The first slow gear movement is essential to avoid damage to the teeth of the kickstarter quadrant.

When 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 (without rising and falling over) and allow to warm up. While doing this, check the oil level as detailed in page 16. The machine can then be taken on the road.

Never build up the engine from cold and do not flood the carburettor to such an extent that petrol is dripping, because then, in the event of a backfire, there is a danger of such loose petrol igniting. This cannot possibly happen if the starting instructions are carefully followed, but, in the event of a fire, there is no cause for panic. Merely turn off the petrol tap to isolate the main supply, open wide the throttle and turn over the engine by operating the kickstarter pedal when action will extinguish the fire.

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.

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 road so it will be necessary to increase slightly the throttle opening, but by far, to keep the engine speed gently rising.

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 these operations in order to engage third and top gears.

To engage a higher gear the pedal is pushed down—ward with the toe and a "kick-gear" is obtained by raising the pedal with the instep. To engage lower gear from the normal position, the pedal is therefore raised. After each pedal movement, following spring return the pedal to its normal horizontal position.

The pedal must be moved to the full extent of its travel when selecting a gear, neither up or down. It must not be "stamped down" or "stamped up" but firmly and deliberately moved till it stops. A halfhearted movement may not give full engagement. When the foot off the pedal when driving and between each gear change between, when the lever has fully returned to its normal central position, the next gear chosen be required. Finally, full advance the ignition and leave it in that position unless it is necessary to retard to prevent the engine and so prevent "flaking" when so long held on a gradient.

STOPPING THE MACHINE

To stop the machine, close the throttle, disengage by lifting the large lever on the left handlebar, and gently apply both brakes, increasing the pressure on them to the road speed of the machine decreases. Push the gear change foot pedal to the central position and stop the engine.

Before leaving the machine, turn off the fuel supply.

IMPORTANT NOTICE

NEVER DRIVE AWAY AT HIGH SPEED WHEN STARTING A COLD MACHINE OR A COLD ENGINE. GIVE THE OIL A CHANCE TO WARM UP AND THEN GO, PARTICULARLY WHEN THE MACHINE IS COLD, UNTIL THE OIL REACHES ITS NORMAL RUNNING TEMPERATURE THE OIL CIRCULATION IS RESTRICTED, SEIZURES CAN BE AVOIDED BY TAKING THIS SIMPLE ESSENTIAL PRECAUTION.

RUNNING IN

Although it is customary to quote permitted maximum speeds on the various gears during the period of running in, these are really no guide to overdriving. It is only essential thing to avoid being the use of large throttle opening.

If the precaution is taken of limiting the use of the throttle to about one-third of its opening during the first 1,000 miles, irrespective of the road speed, and whether on the level or climbing, the necessary conditions for running in will have been observed.

Special attention must be given, during the running in period, to such details as valve rocker adjustment, chains, brakes, contact breaker points, 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 rubbed. After this bedding down process has taken place, adjustments to such details will probably only be necessary at lengthy intervals.

After about 1,000 miles have been covered larger throttle openings may be gradually indulged in for short bursts only.

Until at least 2,000 miles have been covered the owner of a new machine is strongly advised to curb his natural desire to learn the machine's maximum capabilities. Restraint in this direction will be amply repaid later.

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 is fully released. It is not sufficient to push the foot pedal and then release the clutch lever. When already 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 then can be made without a jolt.

Do not unnecessarily raise the engine or let in the clutch sufficiently suddenly to cause the rear wheel to spin. Take a little in making a smooth getaway.

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 should 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 throttle must only be moved when starting from a standstill and when changing gear. It must **NEVER** be operated to raise the engine, instead of changing gear, or be held out to "free-wheel."

The exhaust valve lifter is **NEVER** used in normal driving on main and secondary roads.

When descending slowly, such as may occur in traffic on a hill, and the engine commences to labour, it is not necessary to change to a lower gear. Engine "creeching" or "purring" goes hand-in-hand with the transmission transmission of such labour and although it will 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 intended to be used and consequently full use should be made of the intermediate gears to obtain smoothness and a 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 slowly as possible on the throttle, making the minimum use of the brakes.

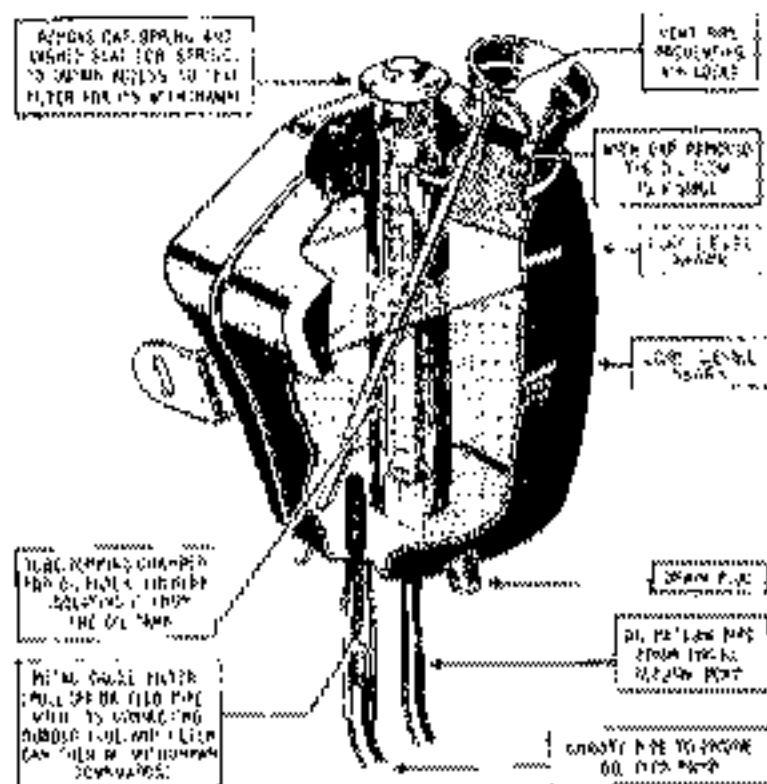
When using the machine on wet or greasy roads, it is generally better to apply **BOTH** brakes together, because sudden or harsh application of either brake only, under such conditions, may result in a skid.

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

CHECKING OIL CIRCULATION

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

If the filler cap on the oil tank is removed the back over end of the oil return pipe will be noticed some two inches below the level of the filler cap orifice and the returning oil can be seen running from it. 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, with the stopple is cleared, the return flow is very positive and continuous. Therefore, if the oil circulation is delayed, the fact is apparent at once by the lack of a steady return flow.



11024815200 7

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. An air vent pipe is provided to ensure freedom from airlocks.

LUBRICATION

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 to use in machines of our make:

FOR ENGINE LUBRICATION

SUMMER		WINTER	
Mobil 1B	(SAB-30)	Mobil 1A	(SAB-25)
Casrol "Grand Prix"	(SAB-60)	Casrol XL	(SAB-30)
Pace's Energol 60	(SAB-60)	Pace's Energol 30	(SAB-30)
EssoLube "Duo"	(SAB-60)	EssoLube 30	(SAB-30)
Shell "Motor Oil X-100"	(SAB-60)	Shell Motor Oil X-100	(SAB-40)

除的比 个是在其 商除数 11月14日在YIC76

Model 100	154R-50
Case of 6000 Pairs	154E-60
Price's Emerald 44	154R-46
Exquisite 50	154R-50
She'll Never Get It	154E-60

• OIL MUST BE 150°C/300°F AND ALL FRAMING PARTS OILING GREASE

Metoprolol HCl
Calcium Chloride
Hydrochloric Acid
Sodium Chloride
Sodium Hydroxide

NAME TELIZHAKOVA; FAZLIT KOSRAGI AND; TELIKOV, VIKTOR; REAR LODS

Plasma Arcing	(SAB-20)
Calentation	(SAB-20)
Free's Knagel 30	(SAB-20)
Free's 20	(SAB-20)
Thin Free's (1) x 100	(SAB-20)

POW: 2 F&A CHAINS

Tallone

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

FILLING THE GREASE GUN

The standard grease gun consists of a barrel having a spring loaded end cap, to which is fixed a central 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 tapered nozzle that fits over the grease nipple. 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 ladle or similar "spoon."

However, it is better to obtain the grease packed in the special containers that are supplied having cone collars in which are holes so that, by placing the barrel of the gun over the hole of the central floating plate and pressing downward, 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.

ENGINE LUBRICATION SYSTEM

This is by dry sump system. Oil feeds, by gravity, from the oil tank to the pump in the crankcase. The pump forces oil to various parts, which then drops to the bottom of crankcase sump. The pump then returns oil to the tank. This process is continuous while the engine is revolving. The pump is so designed that it has a greater capacity on the return side so that on the delivery side it ensures that oil is extracted from the crankcase. A felt cartridge filter in the oil tank, removes foreign matter collected by the oil in its passage through the engine. A round gauge pressure is fitted to the oil feed pipe in the oil tank to prevent pieces of rust, etc., which may find their way into the tank when refilling it, from entering the oil pump. (See Illustration 4.)

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

ENGINE OIL PUMP

The pump is on your moving part. This is the burger which revolves and rotates. Rotation is caused by the main gear on the timing side flywheel shaft. Its position is guided by the guide pin which engages in the provided groove cut on the flywheel. Oil is fed to the 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 covers are removed, the oil pump plunger must be removed from its housing before attempting to reassemble the crankcase halves.

ENGINE OIL CIRCULATION

The oil pump forces oil through two

- (a) A passage cut through the timing side flywheel side, driving side flywheel and crank pin to lubricate the big end bearing. The oil then passes in interior of cylinder to lubricate the cylinder and piston, and then falls into the crankcase sump.
- (b) A passage in crankcase, controlled by ball valve, direct to the cylinder, to assist in cylinder and piston lubrication and then falls into the crankcase sump.
- (c) A passage in timing gear case where it "soaks up" oil and is distributed to the timing gear and then overflows into the crankcase sump.
- (d) Through a pipe from the front of oil pump housing to the rocker box by which oil on the gear and valve stems are lubricated and then falls through the push rod cover tubes and tappet guides to the timing gear case and, from there, drains into the crankcase sump as detailed in Para. (c).

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

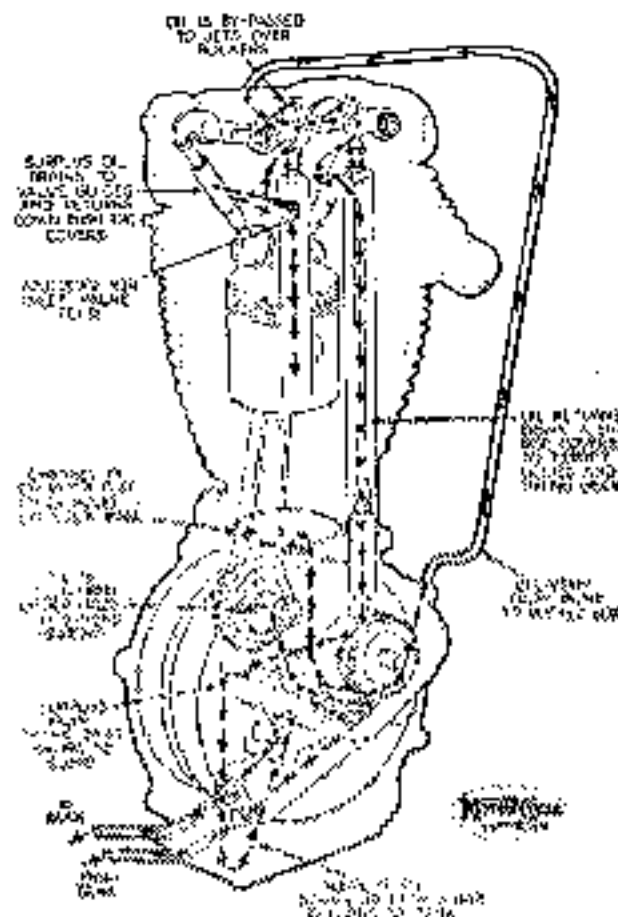


Illustration 4

Engine Oil Circulation

THE OIL TANK AND FILTERS

The level of oil in the supply tank should never be allowed to fall below the low level mark. When replenishment, should not be higher than the top level mark, otherwise, when starting the engine, the supply of oil in the crankcase sump may be greater than the space available in the tank.

The oil filter is made in a 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 is secured in the tank end of the feed pipe union.

After the first 500 miles, again at 1,000 miles, and subsequently at 5,000 mile intervals, it is recommended that the oil tank is drained, the oil filter is cleaned in petrol and the tank replenished with new oil.

For access to felt oil filter:—

Unscrew the hexagonal headed tap on top of oil tank and withdraw the dished washer and spring. Then insert a finger in the felt filter and gently move same until the tap end touches the underneath of saddle. Then by enclosing the filter with the hand it will be found possible to exert sufficient upward pressure on the flexible saddle cap to permit the filter to be completely withdrawn without distortion. Care is needed to avoid sinking the filter.

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 necessary to discard it and to fit a new filter.

Be careful to avoid damaging the filter or the cork washer under the hexagonal cap.

To remove and clean the feed pipe metal filter:—

Release the oil feed pipe from the rubber connecting sleeve on the metal feed pipe protruding from the bottom of the oil tank.

The metal filter may come away with the rubber sleeve, in which case there is no need to disturb it. On the other hand it may remain in the oil tank bottom pipe, in which case it may be withdrawn by grasping the flange cover and pulling away.

After removal the filter should be cleaned in petrol and allowed to dry before re-fitting. Reverse the above procedure to refit the filter and pipes.

ADJUSTMENT OF OIL FEED

The internal flow of oil is regulated by three mechanisms. The adjustment is provided means for the oil feed to the inlet valve stem. This adjustment is made by a needle point screw located in the right side of cylinder head. (See Illustration B.) It is locked in position by a nut. The approximate correct setting is approximate of 3 complete turns from the fully closed position. Once set, it requires little, or no, adjustment.

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

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 returned back to the timing gear tank.

LUBRICATION POINTS TO REMEMBER

A dirty, or choked, felt oil filter causes heavy oil consumption. This is because the normal flow of oil to the oil tank is reduced, or even a flow completely stopped, thereby allowing an excess of oil to "build up" in the crankcase sump, both of which points 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 blunger housing must be airtight.

Check oil circulation before starting each run.

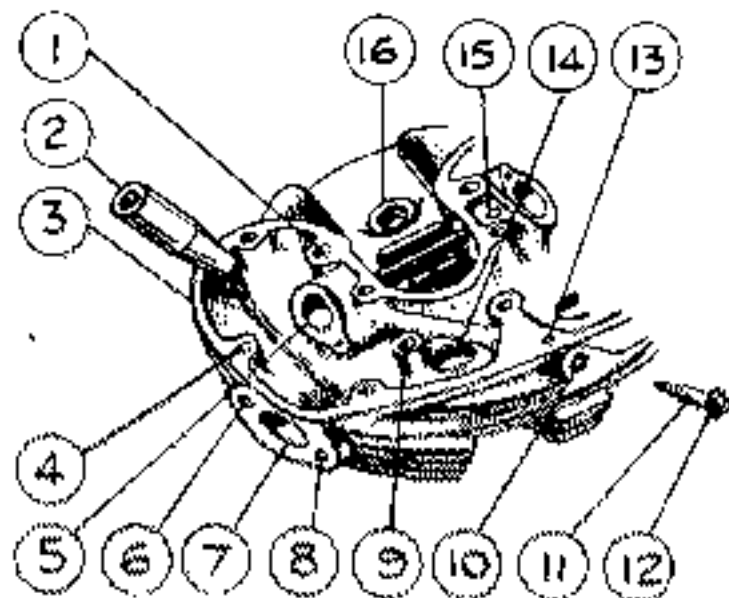


Illustration B

The inlet valve guide is shown withdrawn as also is the inlet valve stem adjusting screw (with lock nut).

- | | |
|---|---|
| 1. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. | 2. TAPPED HOLE TO ACCOMMODATE NEEDLE SCREW. |
| 3. INLET VALVE. | 4. OIL FEED PIPE. |
| 5. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. | 6. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. |
| 7. INLET VALVE. | 8. OIL FEED PIPE. |
| 9. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. | 10. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. |
| 11. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. | 12. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. |
| 13. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. | 14. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. |
| 15. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. | 16. TAPPED HOLE TO ACCOMMODATE OIL FEED RETAINING BOLT. |

GEAR BOX LUBRICATION

Use one of the grades of Oils already specified. In no circumstances must heavy grease be used.

Lubricant is inserted through the filler cap orifice mounted on top edge of kick-starter case cover.

The gear box must not be entirely filled with oil, and, under normal conditions, the addition of two (2) quinces of oil every 1,000 miles will be sufficient.

Excessive oil will cause leakage.

A screwed drain plug in gear box shell, low down at rear, facilitates gear box flushing and change of lubricant. An oil level plug adjacent to R.S. casting, indicates maximum permissible oil level (content 1 pint).

HUB LUBRICATION

Keep hubs packed with grease. This prevents entry of water and dirt. Grease nipples in front and hub. Inject small quantity of grease. Excessive grease may impact the shoe of brakes.

CHAIN LUBRICATION

Rear driving chain and dynamic chain run on oil bath. (From crankcase) Use engine oil. Maintain level to height of the inspection cap opening.

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

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

For engine inspection cap see

When inspecting chain about four cups.

Slide cap sideways, oil the back plate can be dropped through the opening, and take away the inspection cap assembly.

When replacing inspection cap, centrifugal clutch washer and chain fully adjust to bearing screw. Essential this is kept tight otherwise cap assembly will be lost.

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

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

Magneto chain runs in case packed with grease.

BRAKE EXPANDER LUBRICATION

Grease nipple on each brake expander bush. (One on each brake cover plate.) Use grease sparingly. Excessive grease may impair efficiency of brakes.

BRAKE ROD JOINT LUBRICATION

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

BRAKE PEDAL LUBRICATION

Grease nipple in heel of foot brake pedal.

SPEEDOMETER LUBRICATION

One grease nipple on top of speedometer gear box attached to right side of rear wheel spindle. (No other part of the speedometer requires lubrication.)

STAND FIXING BOLT LUBRICATION

Several of the bolts of a motor cycle that have a very small amount of movement, such as the hinge bolts of the stands, should be lubricated.

STEERING HEAD BEARING LUBRICATION

Use grease nipple on front frame head lug and another on right hand side of handlebar lug.

CONTROL LEVER LUBRICATION

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

Control grip is too stiff - remove very slowly holding the two halves of the grip. This releases the grip which may be pulled off the handlebar. Small handlebar, the drum on which the motor wire is wound and the friction spring on the half clip with grease and replace.

REAR FORK HINGE (spring frame models)

Heavy Grease Oil (see page 18)

WHEN ORDERING SPARES
ALWAYS QUOTE
THE COMPLETE ENGINE NUMBER
(including all the letters in it).

THIS ENABLES US TO IDENTIFY THE MACHINE.

EACH SERIES OF FRAMES IS NUMBERED FROM ZERO UPWARDS. THEREFORE THE QUOTATION OF A FRAME NUMBER ONLY DOES NOT PERMIT A MACHINE TO BE IDENTIFIED.

LUBRICATION CHART

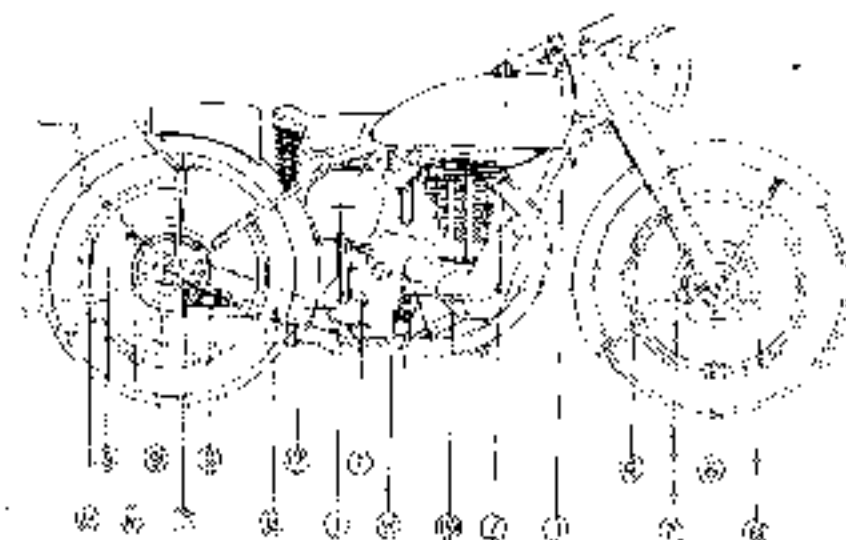


Illustration 4

Lubrication Chart

Original EMI Receptacle

4. NAME OF FIRM.
5. COMPLETE STREET ADDRESS.
6. PHONE NO. (CITY).
7. PRIMARY BRANCH, AND IF SEVERAL, LIST ALL.
8. BUSINESS CREDIT RISK.

© 2004 Blackwell Publishing Ltd

- የኢትዮጵያ የህዝባዊ መብት ማስፈጸሚያ

15.11.2009 16:40:18

- Σ 00466, 14419

1998年12月15日

- 14.
- Let's All Help**

ANNALS

2. $\Delta H_{\text{vap}}^{\circ}$ 100.0 kJ/mol
3. K_{eq} 10.0
4. ΔG° 10.0 kJ/mol
5. ΔG° 10.0 kJ/mol
6. ΔG° 10.0 kJ/mol
7. ΔG° 10.0 kJ/mol
8. ΔG° 10.0 kJ/mol
9. ΔG° 10.0 kJ/mol
10. ΔG° 10.0 kJ/mol
11. ΔG° 10.0 kJ/mol
12. ΔG° 10.0 kJ/mol
13. ΔG° 10.0 kJ/mol
14. ΔG° 10.0 kJ/mol
15. ΔG° 10.0 kJ/mol

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

MAINTENANCE

SADDLE ADJUSTMENT

Saddle— adjustment is provided at both front and rear ends. Importance is attached to the desirability of owner selecting the adjustment most to their liking. At the front end, the adjustment consists of three evenly spaced positions for the hinge bolt, accessible only upon removal of the pistol fork. At the rear end, adjustment is obtained by altering the position of the lower spring riding nuts upon the sawtooth studs to which the axles are attached.

PERIODICAL MAINTENANCE

Regular maintenance, attention to lubrication, and timely adjustments must be made to ensure maximum reliability and satisfactory service. The necessary attention is detailed below. For complete and complete instructions, follow carefully these suggestions. See to make a regular practice of doing so from the first.

The parentheses numbers, in brackets, refer to the locations recorded on the Lubjackson Chart, Figure 2.

1984年

- | | |
|-------------------|---|
| Oil tank | Inspect for leaks, fill and top-up if necessary. Check oil circulation. |
| Refrigerant level | Check level and re-fill if necessary. |

WILEY

- | | |
|-----------|--|
| Will emit | Control level (1) and re-set if necessary. |
| Trans | Control pressures and initiate if necessary. |

前年歲收千 500 兩以上者

- | | |
|-------------------|---|
| Oil tank | Check to see that 500 tested and refill with new oil, and clean to 100% (1.) |
| Chassis | Check level of oil. When machine is standing vertically on level ground, when level of oil should not be less than $\frac{1}{2}$ " below bottom edge inspection window. (19.) |
| Rear chain | If dry, apply engine oil with a brush. (5.) |
| Battery | Inspect each cell for level of electrolyte and top-up with distilled water if necessary. (See pages 81 and 87.) Level of electrolyte should just be over top of plates. |

EVERY 1,000 MILES

Oil tank	Drain at first 1,000 miles and re-fill with new oil. (1.)
Rear chain	Remove and soak in mutton tallow in wet weather. (5.)
Gear box	Add 2 fluid ounces of specified oil. (12.)
Hubs	Inject small amount of grease. (12.3.)
Expanders	Inject small amount of grease. (116.)
Steering head	Inject small amount of grease. (111.)
Small parts	Smear greasing parts with engine oil and wipe off surplus.
Air Filter	(If fitted) clean and renew filter element.

EVERY 3,000 MILES

Rear chain	Remove and soak in mutton tallow in dry weather. (5.)
Spindle pedal	Inject small amount of grease. (117.)
Speedometer	Inject small amount of grease into speedometer gear box. (115.)
Magneto	(2.) Wipe on contact brushes. Remove papers with thin oil. Clean contact breaker points and reset if necessary.
Plug	Clean sparking plug and reset position if necessary.
Steering head	Test steering head for up and down movement and adjust if necessary.
Bolts and nuts	Check all nuts and bolts for tightness and tighten if necessary. But beware of over-tightening.
Rockers	Check O.H.V. rocker adjustments and correct if necessary.

EVERY 5,000 MILES

Oil tank	Drain and re-fill with new oil. (1.) If motor oil is a good low cost type remove oil every three months instead of whenever it is used.
Filters	Clean metal mesh filter in oil tank. (11.) Wash oil filter. Clean felt filter in petrol tank.
Magneto	Car as detailed in Electrical section.
Dynamo	Clean as detailed in Electrical section.
Front fork	Check each side of front fork for hydraulic fluid correct level, if necessary, top up. (8.) Insufficient oil content is indicated by abnormally heavy action.
Rear legs	(If fitted) Check each leg for hydraulic fluid correct level, if necessary, top up. (113.) Insufficient oil content is indicated by abnormally heavy action. (Dealers' Service only.)
Carburettor	Remove carburettor float chamber and clean as laid out.

EVERY 10,000 MILES

Magneto and Dynamo	Get a Lucas Service Station to dismantle, clean, lubricate and generally service.
Air Filter	(If fitted) renew filter element.

FREE SERVICE SCHEME

FREE SERVICE SCHEME

All owners of **NEW MODELS** are entitled to one **FREE SERVICE AND INSPECTION** at 500 miles, or, at latest, three months after taking delivery.

This service is arranged by the supplying dealer to whom the Free Service Voucher must be handed. This voucher, together with the Instruction Manual, are supplied by us upon receipt of the Uganda application card to be found in the tool box upon taking delivery of a new motor cycle.

The **INSPECTION AND SERVICE** consists of:

- (a) Check, and, if necessary, adjust:
 - (1) Rocker clearances.
 - (2) Contact breaker points.
 - (3) Sparking plug.
 - (4) Clutch.
 - (5) Chain.
 - (6) Wheel bearings.
 - (7) Brakes.
 - (8) Forks, legs, and steering head.
 - (9) Alignment of wheels.
 - (10) Tyre pressure.
- (b) Lubricate mechanical parts and seals, including the roller chain.
- (c) Top-up battery and check all lighting equipment.
- (d) Clean oil carburettor and adjust mixture.
- (e) Adjust and secure engine cooling.
- (f) Grease all bushes.
- (g) Drain air system. Clean filter and re-adjust.
- (h) Check oil level in front chaincase.
- (i) Top-up gear box.
- (j) Tighten bolts on the road.

NOTE—Lubricants and materials used are chargeable to the customer.

FOR THE CONVENIENCE OF OWNERS, SPARES STOCKISTS

ARE APPOINTED FOR MOST DISTRICTS. TO
SAVE DELAY, AND THE DELIVERY SURCHARGE,
CUSTOMERS ARE RECOMMENDED TO ALWAYS
APPLY TO THEIR NEAREST SPARES STOCKIST.

ENGINE SERVICE

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 facilitate this operation by removing the need to first drain the tank of petrol.

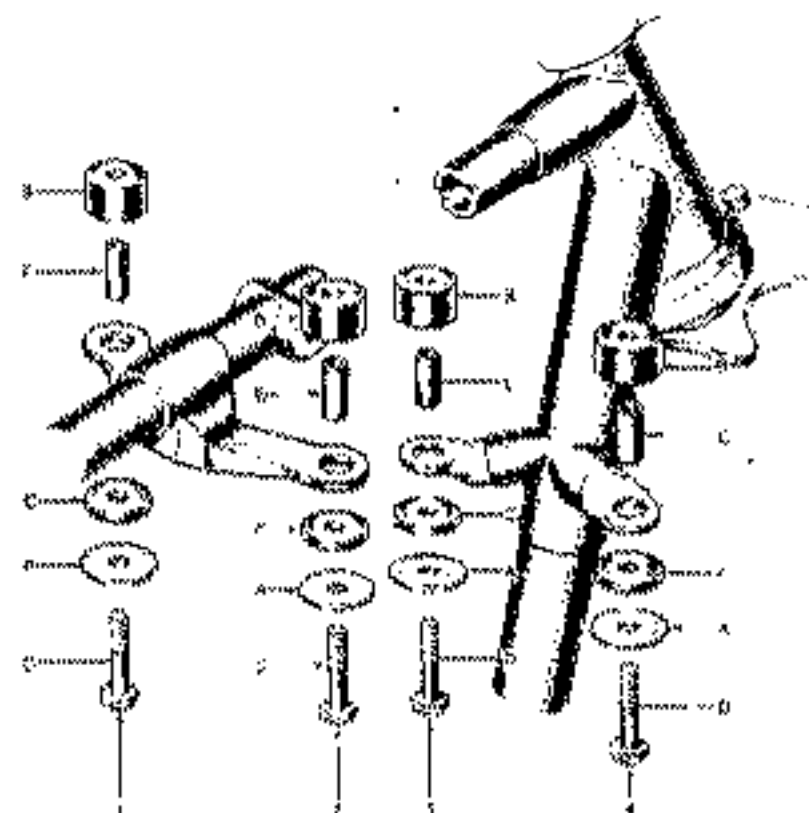


Illustration K

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

		Part Number	
A	METAL WASHER	014399	12" diameter
B	THICK RUBBER PAD	014375	2" high
C	THIN RUBBER PAD	014395	4" high
D	TANK FIXING BOLT	014377	12" x 1/2" x 24
E	SLEEVE FOR FIXING BOLT	014390	8" long

TO REMOVE THE PETROL TANK

Close both petrol taps and disconnect the petrol feed pipe from each tap. (Use two spanners, one to hold the tap and the other to unscrew the union nut on the petrol pipe.)

Cut the wires interlacing the four fixing bolts.

Unscrew the tank fixing bolts and the tank is then free to be taken away.

NOTE—The disposition of the various rubber and metal washers and tubular spacers should be carefully observed so that they may be correctly reloaded.

TO REPLACE THE PETROL TANK

Proceed in reverse order to removal. Screw firmly home the four fixing bolts and interlace them to pipes, with 22 gauge copper wires.

TO REMOVE THE ROCKER BOX

Remove the petrol tank.

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

Disconnect the oil pipe leading to the rocker box.

Two cover geyne washers which are completely closed.

On 500 c.c. models, remove engine steady bracket by removing nut from frame clip and nuts and washers from the rocker box top extensions.

Remove the nine bolts retaining rocker box to cylinder head.

Disconnect valve from scale.

Tilt upward the right hand side of rocker box and extract the two end bushings. Lay these aside so they may be identified and replaced in their original position.

The rocker box may then be lifted off.

TO REPLACE THE ROCKER BOX

Connect it to the top of cylinder head and lower face of rocker box.

Reinstall engine used cover, top cover and down, roll the top dead centre of firing stroke. Lay the compression pinning valves on as near head. This must be followed if necessary reason.

Lay the rocker box in position and align the right hand side to allow the two end bushings to be inserted into the original respective positions.

Insert all nine rocker box fixing bolts and note that the hole with three threads in the centre right hand position and on 500 c.c. models the bolts with threaded extensions are fitted into each side of the central shock head bolt.

Tighten each bolt to turn by by bit until all are fully home.

On 500 c.c. models replace the engine steady stay.

Turn engine over several times to ensure parts have settled home.

Refit valve cover side.

Refit rocker box oil pipe union nut using two spanners to ensure that the union screwed into rocker box does not turn while the nut is being tightened.

Check taper clearances and reset if necessary.

Inspect rubber fillot on rocker box side cover and renew if not perfect.

Replace the side cover ensuring that a fibre washer is fitted under each of the three retaining nuts.

Beware of over tightening these nuts, the joint being made by the rubber & at excessive pressure is not necessary.

Repair the petrol tank.

DECARBONISATION

Instead of the usual stipulated mileage interval between periods of decarbonisation, it is recommended that this is undertaken only when the need for same becomes apparent because of excessive pinking, loss of power or generally reduced performance. When undertaken, unless it is thought necessary to inspect the piston and rings, the cylinders barrel is not left undisturbed. The various stages in decarbonisation are described below.

TO REMOVE THE CYLINDER HEAD

Remove:

The petrol tank.

The sparking plug.

The rocker box.

Remove the exhaust system by:

Remove nut and washer, retaining exhaust pipe to its base.

Remove nut and washer, retaining silencer to its base.

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

Remove carburettor by:

Undo two carburettor cover up nuts.

Take away carburettor and rest on saddle.

Remove:

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

If the sparking plug on cylinder head bolts resist removal, do not use force but brush parallel round their heads and leave for a time to rust before making further effort.

TO REMOVE AND REPLACE THE VALVES

Remove the cylinder head.

Remove the valve cap nut by turning the finger of the spring cone and strongly pull upwards.

The cap spring collar and split cone are then removed leaving the valve free to be withdrawn.

A sharp file tip on the valve holder may be necessary to free the valve guide holes. It will be observed that the valve holding seat has a raised impression on its outer side which registers with a hole and ridge on the valve guide hole to ensure correct positioning.

TO REPLACE A VALVE

After cleaning valve guide holes, smear each valve guide with clean oil, grease and apply top collar and split cone.

Then apply the valve springs which although possible to fit by hand are fitted easily manipulated with a special compressor and Part No. 019216 illustrated. To operate this tool apply the top end of the valve spring to its groove in the top cap, insert a short rod into the rocker box fixing bolt (suitably drilled) through the hole in this tool and the valve spring cone and pull outward and upward until the end of the prong of the spring can be rested on the seat, then press down with the fingers. Withdraw the line or rod when the compressor is against the cylinder head, resting position with the fingers until the bolt has been withdrawn and the tool removed, when the cap can be readily pushed down in its proper location with the prong lying flat upon the seat.



Illustration 2
Showing application of
valve spring compressor

- | | |
|-----------------------------|--|
| 1. COLLAR FOR VALVE | 5. VALVE SPRING COMPRESSOR TOOL |
| 2. COLLAR FOR VALVE SPRING | 6. OIL PASSAGE FROM ROCKER BOX TO VALVE GUIDE |
| 3. COLLAR FOR VALVE SPRING | |
| 4. KEY TO LOCK VALVE SPRING | 7. SPRAY WITH OIL AND SPRAYING OIL FROM TOILET VALVE |

NOTE: The special valve spring compressor tool is not part of the standard tool kit but is available from any of our dealers (Part No. 019216).

It is essential that the valves are correctly seated on the valve stem. It will be observed that the roller has two grooves machined in the back and these two grooves must register with the two lips on the valve stem. If need be the roller seats the grooves engages the ringed valve stem, damage will almost certainly result.

The 350 cc. the inlet or exhaust is larger in diameter than the exhaust. Therefore inlet and exhaust valves are not interchangeable and no mistake can be made when replacing them in the cylinder head.

The 350 cc. both valve heads are identical in dimensions but are made of different materials. Therefore, upon removal, valves should be laid aside on the way may be required for refitting. In case of doubt, see marking "IN" or "EX" on stem adjacent to coil spring groove.

SPARES LIST EDITION CL-21 PRICE 2/6
IS THE APPROPRIATE LIST FOR THIS SERVICE MANUAL

REMOVING CARBON DEPOSIT

Do not use a sharp implement for removing carbon deposit from the interior of the cylinder head and the piston crown. A blunt piece of soft brass will be found quite suitable and the use of such will obviate the risk of making deep scratches. Care is necessary to avoid damaging the valve seatings and in no circumstances should any abrasive material, such as emery, or emery cloth, be used for cleaning and polishing.

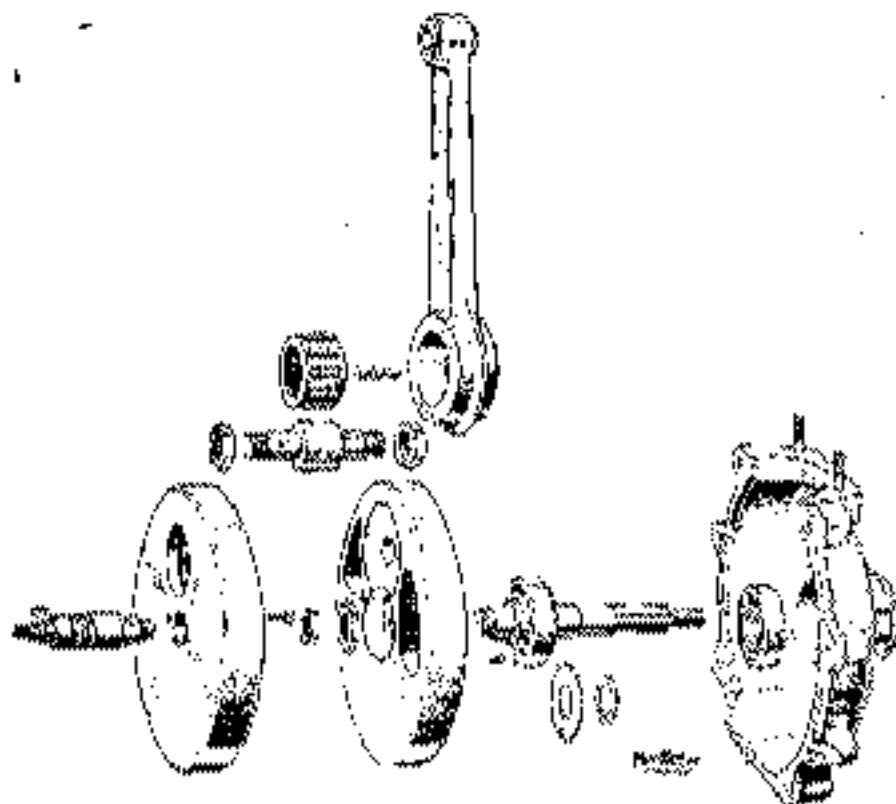


Illustration 16

Showing flywheel in exploded form

VALVE GRINDING

Before commencing valve grinding, carefully examine the tips of each valve rod. If any are found to be deeply pitted, have them refaced. (Most garages have suitable equipment for that purpose.) Any attempt to remove deep pit marks by grinding will soon cause undue and undesirable widening of the seats.

As a rule, inlet valves require very little attention and one light application of oil-free grinding paste should be sufficient to restore an even matt finish to both valve face and seat. The exhaust valves may require two, or even three, applications but, as already mentioned, excessive grinding is both unnecessary and harmful.

The grinding is accomplished by smearing a thin layer of fine grinding paste (obtainable ready for use at any garage) on the valve face and then, after inserting the valve in the head, partially revolve, forwards and backwards, while applying light finger pressure to the head, raising the valve off its seat and turning to another position after every few movements. (Never revolve the valve completely in one direction.)

When the abrasive ceases to bite, remove the valve and examine its face.

The grinding may be considered to be satisfactorily completed when a continuous matt ring is observed on both valve face and seat.

After grinding, all traces of abrasive must be carefully washed off with petrol and a piece of rag, moistened in petrol, should be pulled through the bore of each valve guide to remove any abrasive that may have entered.

A holder for the valve, when grinding in the valve, can be supplied. The part number is 017487.

TO REPLACE THE CYLINDER HEAD

A gasket is fitted between cylinder head and barrel. (Touring models only).

The top ends of the piston rod cover tubes have rubber gaskets between tubes and head, they are a push fit and should without any control 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.

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 taper gudgeon.

Place the cylinder head in position.

Ensure each cylinder head securing bolt has a plain steel washer on it and that neither the bolts nor engage each a few turns.

Finally, screw down the cylinder head securing bolts, in turn, but do not, at any stage, turn.

Replace

The sparking plug. One washer, using as it is desirable to cover each one with "Oil Plug" or equivalent paste to prevent leakage when valve is closed.

The motor oil, earth return, exhaust system, and the petrol tank.

NOTE: When the gaskets are refitted they must be in an undamaged state otherwise new ones must be used.

TO REMOVE THE CYLINDER BARREL AND PISTON

Remove

The cylinder head.

The four bolts 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° from each other and then sliding off the rings. (Do not scratch the piston.)

TO REPLACE THE PISTON AND CYLINDER BARREL

All parts must be clean.

Place rings on piston. (Scraper first then the two cam procedures. (On 300 c.c. models the top compression ring is chromium plated and is marked on one edge "top" for reference.)

Smear gudgeon pin with engine oil.

Refit piston by:

Introduce gasket over connecting rod, so that fit in piston force to the front of the machine.

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

Refit the pin. (Use special pliers). Use heavy action when bedding circlip. A light groove and make sure each circlip fits snugly in its groove. This is essential otherwise considerable damage will result.

Refit cylinder barrel by:

Take out cylinder base washer. Coat with oil and with finger joints compress and apply it to cylinder base. Ensure jointing does not crowd any of the cylinder base oil holes.

Smear cylinder bore and piston with engine oil.

Space piston rings so that the gaps are evenly spaced at 120° to each other.

Gently fit barrel over piston and carefully compress each ring in turn with the fingers, as it is or less the chambered mouth of the barrel.

Slide the top from clockwise thrust.

Re-pass cylinder barrel bedding down nut, so that each down, 16 to 20, 200 lb or 200, 100 lb are fully down.

CAM CONTOUR

On the flanks of the cams are quietening curves which are very slight indents from the base circles on the foot 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 the compression stroke, at which position both tappets are well clear of the quietening curves.

VALVE TIMING

Inlet valve timing

Inlet valve opens 32° before top dead centre

Inlet valve closes 63° after bottom dead centre.

Exhaust valve timing

Exhaust valve opens 65° before bottom dead centre.

Exhaust valve closes 30° after top dead centre.

(See page 37 for particulars of special timing die produced in degrees.)

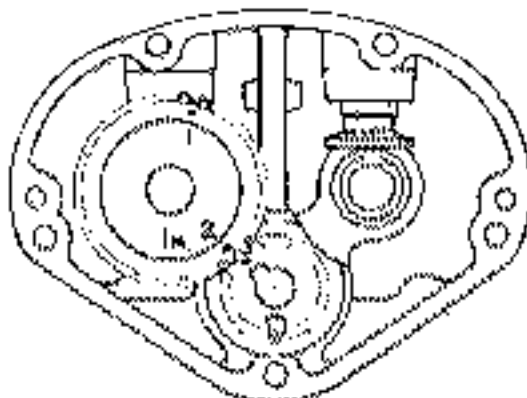


Illustration 11
Inlet Camshaft timing marks
(Use mark "2")

When checking the valve timing the tappet clearances must be set so that the tappets are well clear of the quietening curves of the camshaft.

The timing gears are marked to facilitate gear engagement.

To reset the valve timing, by using the marks on the gears, proceed as follows:

To reset the engine fit the mark on the inlet timing piston (1) in line with the centre of the inlet (front) camshaft bush. Insert the inlet camshaft so that the No. 2 mark on it is in mesh with the mark on the small timing piston (2).

Reverse the engine in a forward direction so the mark on the small timing piston (2) in line with the centre of the exhaust (front) camshaft bush. Insert the exhaust camshaft so that the No. 2 mark on it is in mesh with the mark on the small timing piston (2).

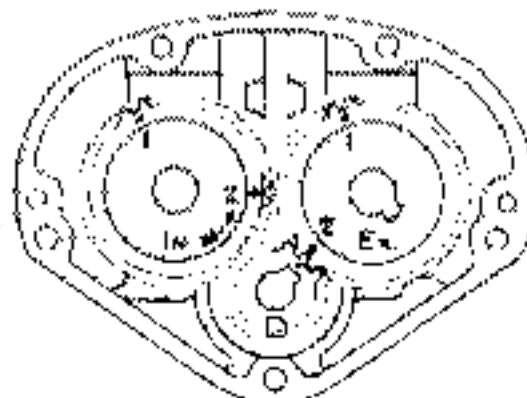


Illustration 12
Exhaust Camshaft timing marks
(Use mark "2")

TAPPET ADJUSTMENT

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

The correct tappet clearance, on touring models, with valves closed and engine cold, is NIL (warm engine or competition models). 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.

Preparation to adjust tappets by:

1. See plate on T.O.C. (Both valves closed).

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

Take away cover.

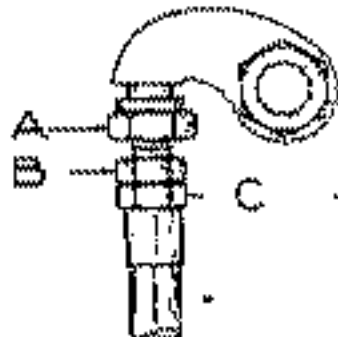
Adjust tappets on all 350 and 500 models by:

With spanners, lock the sleeve C, either valve (Illustration 13) and always lock the B. Then screw, in or out, the head A until the clearance is nil.

Tighten lock nut B and replace the sleeve C.

Repeat other valve in like manner.

Illustration 13
Tappet adjustment



Finally

Check adjustments for the, with no up and down movements, the long push rods are then to revolve when the valves are closed.

Complete adjustment by:

Replace rocker tappet cover taking care to replace the fibre washers that it holds over each of the.

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

NOTE—In normal conditions tappet adjustment should not be necessary more frequently than about every five thousand miles or after adjustment of one adjusting valve. If adjustment is found necessary more frequently the cause should be investigated at once.

The tappet rods are made of Light Alloy, and in manufacture, the sleeve marked C in Illustration 13 is fitted to the bare rod and then the push rod is threaded and the rod is screwed to take the adjusting screw marked A.

It will consequently be seen that, contrary to the practice when steel rods are used, it is not possible to supply and fit sleeve C to an existing Light Alloy rod.

Consequently the "Push Rod, bare" will only be supplied for spares purposes complete with sleeve C already fitted and threaded.

TO RE-TIME THE IGNITION

The maximum advance is $1\frac{1}{2}^\circ$ (30°).

Have available a stout screwdriver, or an old type tyre lever with curved up end, and a piece of stout wire $1\frac{1}{2}''$ long.

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

Check contact breaker points by:

Remove contact breaker cover.

Check setting of contact breaker points, and, if necessary, make same.

Set ignition firing point by:

Remove—

The sparking plug high tension cable from plug.

The sparking plug.

The magneto chain case cover.

The nut on the side cover.

Unscrew several turns, not retaining magneto sprocket to camshaft. (No need to remove nut).

Screw off sprocket until it is loose on the edge 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 by rocking engine forwards or backwards till it is felt the piston is at the top of its stroke with both valves closed.

Place rod depth with top face of sparking plug hole. Remove rod and measure $1\frac{1}{2}''$ above the plug with a lead pencil position on rod.

Place "magneto ignition control" lever (M.I.) in advance position.

Insert rod in sparking plug hole.

Rotate magneto magnet **BACKWARDS** until upper mark on end of face with top face of sparking plug hole. (To rotate magnet, always top gear and turn back wheel by hand.) Rotate sprocket on magneto camshaft shaft in anti-clockwise direction (as seen from sprocket end of magnet) till the contact breaker points are just about to separate. To find the exact moment for the maximum of the point separation, place a piece of stout paper between the points and turn the camshaft shaft (by the sprocket on it) until the paper is just released, and no more, upon a gentle pull.

Tighten nut on side cover and remove engine, and/or magneto shaft, does not move in doing so.

Recheck the setting which must be $1\frac{1}{2}^\circ$ before top dead centre. (With the ignition hand (on control lever) in the fully advanced position.)

See page 95 for pointers of special timing disc graduated in degrees.

Replaces

Rocker box side cover, Contact breaker cover, Magneto chain case cover, Sparking plug (see note on page 17 re gap after on sparking plug thread), and Sparking plug wire.

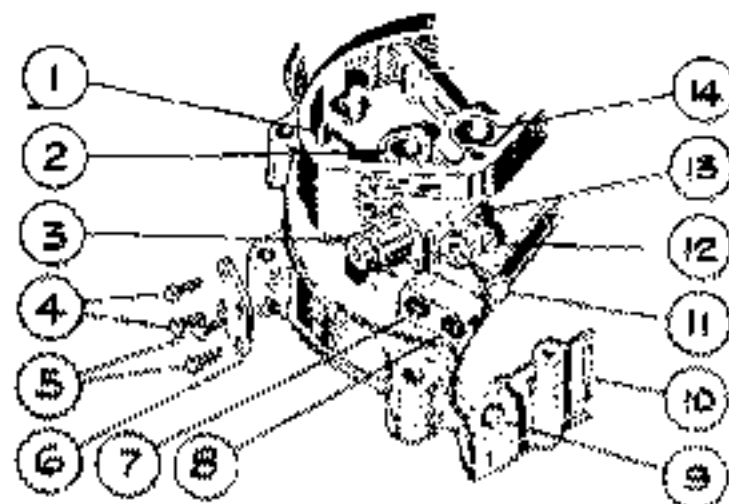


Illustration 14

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

(See also Illustration 13)

- | | |
|---|--|
| 1. UPPER END TIMING COVER | 9. BUSH FOR TIMING GEAR |
| 2. BUSH FOR INLET CAMSHAFT | 10. CRANKCASE TIMING GEAR |
| 3. PLUNGER FOR OIL PUMP | 11. GUIDE SCREW AND PIN FOR OIL PUMP PLUNGER |
| 4. BOLT FIXING REAR END CAP | 12. PLUG FOR OIL PUMP PASSAGE |
| 5. BOLT FIXING REAR END CAP | 13. PLUG FOR OIL PUMP PASSAGE |
| 6. REAR END CAP FOR OIL PUMP | 14. BUSH FOR TIMING GEAR |
| 7. TAPPED HOLE FOR PRE-FEED OIL TO OIL PUMP | |
| 8. TAPPED HOLE FOR PRE-FEED OIL TO OIL PUMP | |

TO REMOVE AND REPLACE THE OIL PUMP PLUNGER

Remove

Lower end of rocker link feed pipe by unscrewing union nut.

Both oil pump and caps.

Oil pump plunger guide screw with pin. (See illustration 14, No. 11.)

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

Replace by:

Reversing above procedure.

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

Make certain that the guide screw pin is correctly located in its groove (cut in the plunger) before tightening down. **NOTE:** The guide screw pin is inserted in the groove at end and front. Do not revolve the engine until oil pump plunger and guide screw pin is properly located, otherwise damage is inevitable.

OVERSIZE PARTS AND RE-BORING CYLINDER BARREL

Over and under .000" and .040" larger than standard are available. Three degrees of over and under is essential for the cylinder barrel to be re-bored to accommodate over and under. We can provide this service at prices quoted in the spare list.

On the 150 cc. the cylinder standard bore is 2.7167 ± .0008". The 500 cc. cylinder standard bore is 3.442 ± .0008".

When the wear at the top of the barrel reaches .000" the barrel should be bored out .010" oversize and a new oversize piston and rings fitted.

Over and under .002" larger than standard can be supplied. We recommend only oversize medium or undersize for these because it is almost general that the biggest journals and sleeves require "tapping" to require a correct fit.

REMOVING SPARKING PLUG

Always exercise the greatest care to avoid thread seizure when removing a sparking plug. If any resistance is felt, apply paraffin. Before replacing plug, it is desired to coat the threads with "Loose Day" or Graphite paste. This will guard against seizure upon subsequent removal.

WHEN IN DOUBT REGARDING THE NAMES AND PART NUMBERS OF THE PARTS YOU REQUIRE, PLEASE SEND THE OLD PARTS TO SERVE AS PATTERNS.

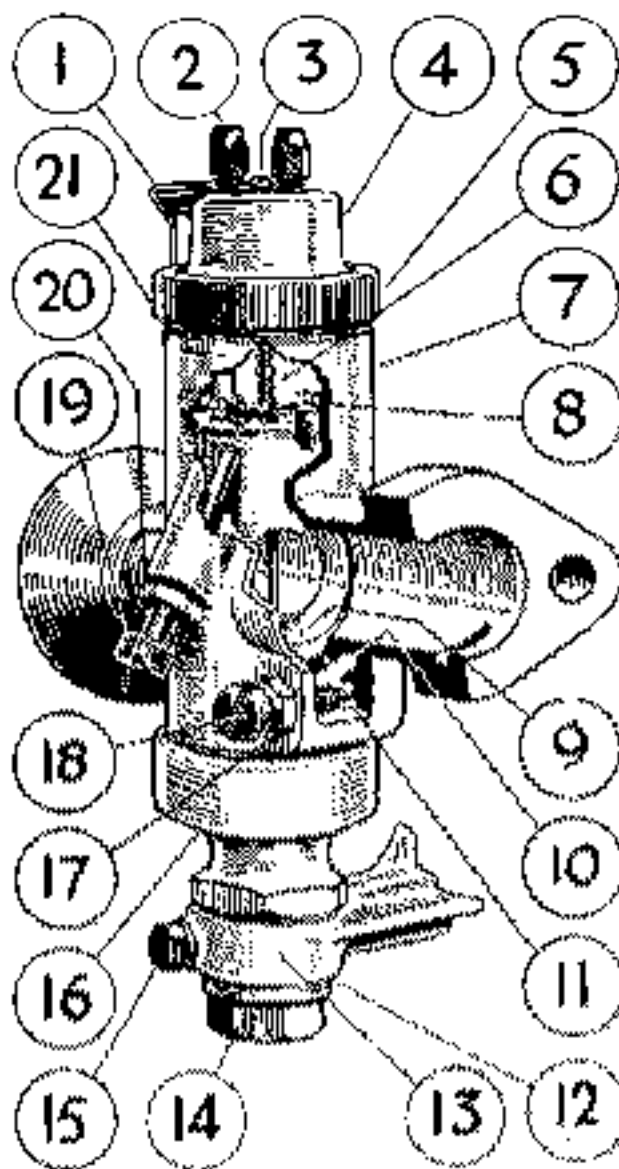


Illustration 15

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

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 carburettor, Messrs. Amal Ltd., Mollard 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. These parts include floats and float needles, jet taper needles, needle jets and washers.

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 test.)

The petrol supply to the engine is controlled, firstly, by the main jet and, secondly, by means of a taper needle (see illustration 15) which is attached to the throttle valve and operates in a similar manner to 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 sub-way portion of the taper needle of the mixture valve from one-quarter down to about one-eighth throttle, and a pilot jet, having an independently adjustable air supply, takes care of the idling from one-eighth throttle down to the choke closed position. These various stages of control must be kept in mind when any adjustment is contemplated. (See illustration 15, for position of the pilot jet air adjustment screw.) The pilot jet complete with a small hole drilled in the choke or jet block.

The jet of the main jet should only be altered once for some very good reason. See "DATA" for details of tapered stop of jet, throttle valve, and jet taper needle. 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.

Wash mixture is always induced by sucking, or sucking at the air intake.

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

See Illustration 16

- | | |
|--------------------------------------|--------------------------------------|
| 1. AIR INLET, LOCATING THE INLET AIR | 11. TAPERED VALVE, TO ADJUST Mixture |
| 2. CARBURETTER, FOR IDLING | 12. AIR ADJUSTING SCREW (18) |
| 3. CARBURETTER, FOR IDLING | 13. THROTTLE VALVE, FOR MIXING BODY |
| 4. CARBURETTER, FOR IDLING | 14. MAIN JET, FOR MIXING BODY |
| 5. CARBURETTER, FOR IDLING | 15. AIR ADJUSTING SCREW (18) |
| 6. CARBURETTER, FOR IDLING | 16. AIR ADJUSTING SCREW (18) |
| 7. CARBURETTER, FOR IDLING | 17. AIR ADJUSTING SCREW (18) |
| 8. CARBURETTER, FOR IDLING | 18. AIR ADJUSTING SCREW (18) |
| 9. CARBURETTER, FOR IDLING | 19. AIR ADJUSTING SCREW (18) |
| 10. CARBURETTER, FOR IDLING | 20. AIR ADJUSTING SCREW (18) |
| 11. CARBURETTER, FOR IDLING | 21. AIR ADJUSTING SCREW (18) |
| 12. CARBURETTER, FOR IDLING | 22. AIR ADJUSTING SCREW (18) |
| 13. CARBURETTER, FOR IDLING | 23. AIR ADJUSTING SCREW (18) |
| 14. CARBURETTER, FOR IDLING | 24. AIR ADJUSTING SCREW (18) |
| 15. CARBURETTER, FOR IDLING | 25. AIR ADJUSTING SCREW (18) |
| 16. CARBURETTER, FOR IDLING | 26. AIR ADJUSTING SCREW (18) |
| 17. CARBURETTER, FOR IDLING | 27. AIR ADJUSTING SCREW (18) |
| 18. CARBURETTER, FOR IDLING | 28. AIR ADJUSTING SCREW (18) |
| 19. CARBURETTER, FOR IDLING | 29. AIR ADJUSTING SCREW (18) |
| 20. CARBURETTER, FOR IDLING | 30. AIR ADJUSTING SCREW (18) |
| 21. CARBURETTER, FOR IDLING | 31. AIR ADJUSTING SCREW (18) |
| 22. CARBURETTER, FOR IDLING | 32. AIR ADJUSTING SCREW (18) |
| 23. CARBURETTER, FOR IDLING | 33. AIR ADJUSTING SCREW (18) |
| 24. CARBURETTER, FOR IDLING | 34. AIR ADJUSTING SCREW (18) |
| 25. CARBURETTER, FOR IDLING | 35. AIR ADJUSTING SCREW (18) |
| 26. CARBURETTER, FOR IDLING | 36. AIR ADJUSTING SCREW (18) |
| 27. CARBURETTER, FOR IDLING | 37. AIR ADJUSTING SCREW (18) |
| 28. CARBURETTER, FOR IDLING | 38. AIR ADJUSTING SCREW (18) |
| 29. CARBURETTER, FOR IDLING | 39. AIR ADJUSTING SCREW (18) |
| 30. CARBURETTER, FOR IDLING | 40. AIR ADJUSTING SCREW (18) |
| 31. CARBURETTER, FOR IDLING | 41. AIR ADJUSTING SCREW (18) |
| 32. CARBURETTER, FOR IDLING | 42. AIR ADJUSTING SCREW (18) |
| 33. CARBURETTER, FOR IDLING | 43. AIR ADJUSTING SCREW (18) |
| 34. CARBURETTER, FOR IDLING | 44. AIR ADJUSTING SCREW (18) |
| 35. CARBURETTER, FOR IDLING | 45. AIR ADJUSTING SCREW (18) |
| 36. CARBURETTER, FOR IDLING | 46. AIR ADJUSTING SCREW (18) |
| 37. CARBURETTER, FOR IDLING | 47. AIR ADJUSTING SCREW (18) |
| 38. CARBURETTER, FOR IDLING | 48. AIR ADJUSTING SCREW (18) |
| 39. CARBURETTER, FOR IDLING | 49. AIR ADJUSTING SCREW (18) |
| 40. CARBURETTER, FOR IDLING | 50. AIR ADJUSTING SCREW (18) |
| 41. CARBURETTER, FOR IDLING | 51. AIR ADJUSTING SCREW (18) |
| 42. CARBURETTER, FOR IDLING | 52. AIR ADJUSTING SCREW (18) |
| 43. CARBURETTER, FOR IDLING | 53. AIR ADJUSTING SCREW (18) |
| 44. CARBURETTER, FOR IDLING | 54. AIR ADJUSTING SCREW (18) |
| 45. CARBURETTER, FOR IDLING | 55. AIR ADJUSTING SCREW (18) |
| 46. CARBURETTER, FOR IDLING | 56. AIR ADJUSTING SCREW (18) |
| 47. CARBURETTER, FOR IDLING | 57. AIR ADJUSTING SCREW (18) |
| 48. CARBURETTER, FOR IDLING | 58. AIR ADJUSTING SCREW (18) |
| 49. CARBURETTER, FOR IDLING | 59. AIR ADJUSTING SCREW (18) |
| 50. CARBURETTER, FOR IDLING | 60. AIR ADJUSTING SCREW (18) |
| 51. CARBURETTER, FOR IDLING | 61. AIR ADJUSTING SCREW (18) |
| 52. CARBURETTER, FOR IDLING | 62. AIR ADJUSTING SCREW (18) |
| 53. CARBURETTER, FOR IDLING | 63. AIR ADJUSTING SCREW (18) |
| 54. CARBURETTER, FOR IDLING | 64. AIR ADJUSTING SCREW (18) |
| 55. CARBURETTER, FOR IDLING | 65. AIR ADJUSTING SCREW (18) |
| 56. CARBURETTER, FOR IDLING | 66. AIR ADJUSTING SCREW (18) |
| 57. CARBURETTER, FOR IDLING | 67. AIR ADJUSTING SCREW (18) |
| 58. CARBURETTER, FOR IDLING | 68. AIR ADJUSTING SCREW (18) |
| 59. CARBURETTER, FOR IDLING | 69. AIR ADJUSTING SCREW (18) |
| 60. CARBURETTER, FOR IDLING | 70. AIR ADJUSTING SCREW (18) |
| 61. CARBURETTER, FOR IDLING | 71. AIR ADJUSTING SCREW (18) |
| 62. CARBURETTER, FOR IDLING | 72. AIR ADJUSTING SCREW (18) |
| 63. CARBURETTER, FOR IDLING | 73. AIR ADJUSTING SCREW (18) |
| 64. CARBURETTER, FOR IDLING | 74. AIR ADJUSTING SCREW (18) |
| 65. CARBURETTER, FOR IDLING | 75. AIR ADJUSTING SCREW (18) |
| 66. CARBURETTER, FOR IDLING | 76. AIR ADJUSTING SCREW (18) |
| 67. CARBURETTER, FOR IDLING | 77. AIR ADJUSTING SCREW (18) |
| 68. CARBURETTER, FOR IDLING | 78. AIR ADJUSTING SCREW (18) |
| 69. CARBURETTER, FOR IDLING | 79. AIR ADJUSTING SCREW (18) |
| 70. CARBURETTER, FOR IDLING | 80. AIR ADJUSTING SCREW (18) |
| 71. CARBURETTER, FOR IDLING | 81. AIR ADJUSTING SCREW (18) |
| 72. CARBURETTER, FOR IDLING | 82. AIR ADJUSTING SCREW (18) |
| 73. CARBURETTER, FOR IDLING | 83. AIR ADJUSTING SCREW (18) |
| 74. CARBURETTER, FOR IDLING | 84. AIR ADJUSTING SCREW (18) |
| 75. CARBURETTER, FOR IDLING | 85. AIR ADJUSTING SCREW (18) |
| 76. CARBURETTER, FOR IDLING | 86. AIR ADJUSTING SCREW (18) |
| 77. CARBURETTER, FOR IDLING | 87. AIR ADJUSTING SCREW (18) |
| 78. CARBURETTER, FOR IDLING | 88. AIR ADJUSTING SCREW (18) |
| 79. CARBURETTER, FOR IDLING | 89. AIR ADJUSTING SCREW (18) |
| 80. CARBURETTER, FOR IDLING | 90. AIR ADJUSTING SCREW (18) |
| 81. CARBURETTER, FOR IDLING | 91. AIR ADJUSTING SCREW (18) |
| 82. CARBURETTER, FOR IDLING | 92. AIR ADJUSTING SCREW (18) |
| 83. CARBURETTER, FOR IDLING | 93. AIR ADJUSTING SCREW (18) |
| 84. CARBURETTER, FOR IDLING | 94. AIR ADJUSTING SCREW (18) |
| 85. CARBURETTER, FOR IDLING | 95. AIR ADJUSTING SCREW (18) |
| 86. CARBURETTER, FOR IDLING | 96. AIR ADJUSTING SCREW (18) |
| 87. CARBURETTER, FOR IDLING | 97. AIR ADJUSTING SCREW (18) |
| 88. CARBURETTER, FOR IDLING | 98. AIR ADJUSTING SCREW (18) |
| 89. CARBURETTER, FOR IDLING | 99. AIR ADJUSTING SCREW (18) |
| 90. CARBURETTER, FOR IDLING | 100. AIR ADJUSTING SCREW (18) |

CARBURETTER ADJUSTMENT

To ascertain if the setting is correct, a rough test 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 sputter and stop. (The engine should not be run for 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 die positively and evenly when the throttle is almost closed. If it is too difficult to adjust the pilot jet air screw (18, Illustration 15) towards, 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 15.) The adjustment is not unduly sensitive, and it should be possible to obtain the correct adjustment in a few attempts. In the event of the adjustment of the air screw failing to provide the required results it is possible the pilot jet is obstructed with dirt. The pilot jet is really a passage drilled in the spray bar, or choke, and is very small, so there is always latent danger of this becoming choked.

Upon removing the float chamber and the jets at the bottom of the mixing chamber, the spray bars can be pushed out of the mixing chamber and the jet can be checked 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 later.) Usually a small increase in petrol consumption.

TWIST GRIP ADJUSTMENT

A screw is provided in one of the halves of the twist grip body to regulate the spring tension on the grip marking slugs. This screw, which is locked to a nut, can be screwed into the body to increase the tension.

The most desirable state of adjustment is that when the grip is twisted back and away to operate the clutch when the foot is in the position in which it is placed.

The twist grip with grip can be moved on the handlebar by slackening the two screws which grip together the two halves of the body. The most desirable position is that in which the throttle cable makes the nearest and most straight path to the underside of the petrol tank.

During assembly, all control levers and cables are packed with a greaseproof lubricant. This lasts practically indefinitely, but should a new make over be fitted this must be liberally treated during assembly.

AIR FILTER

In locations, such as the United Kingdom, where the roads and atmosphere are particularly free from dust, it is not considered necessary to have an air filter fitted to a carburettor, but in countries where the atmosphere contains a very heavy dust content, an air filter is essential in order to prevent excessive wear.

The filter available (and most useful for the conditions mentioned above) is of the "Can Wicket" type, and this requires periodical servicing.

When servicing the air filter, withdraw the filter element. Thoroughly wash this in petrol, paraffin or other suitable solvent and allow to dry. Then re-oil, using one of the light oils (SAE-20), enumerated in the first table on page 15, and allow to drain before replacing in the filter case. Clean regularly at intervals of 1,000 miles and renew the element every 10,000 miles.

CARBURETTER TUNING INFORMATION

Poor idling may be due to:

Pilot jet not operating correctly.

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

Faulty engine valve seating.

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.

Roskops adjusted too closely.

Heavy petrol consumption may be due to:

Lean mixture setting.

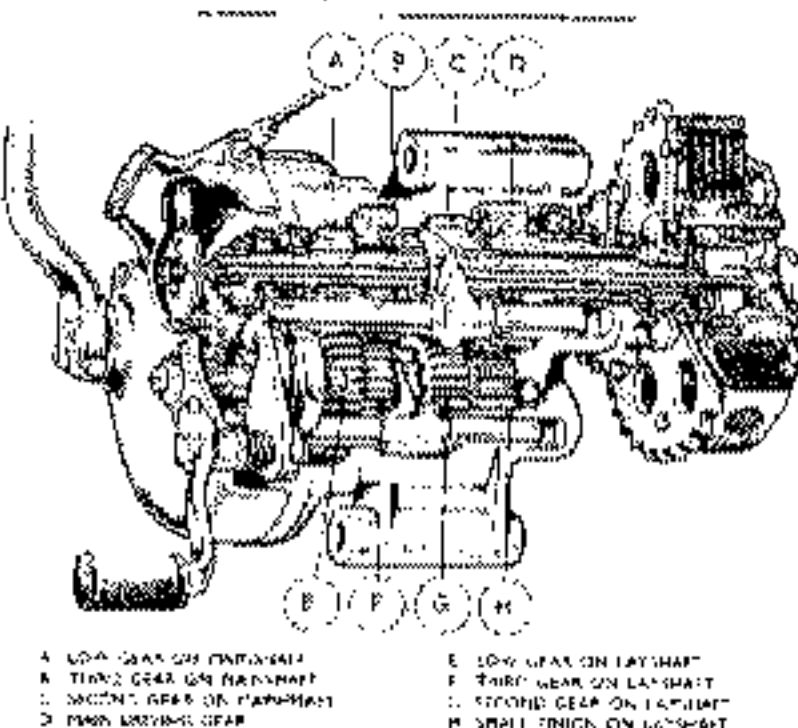
Bad air leaks. Probably at carburettor joint.

Weakened valve springs.

Broken Rod. (Causing flooding.)

Weak needle valve action insufficient.

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



Section through gearbox showing gears and clutch with actuating mechanism

Illustration 15

TRANSMISSION SERVICE

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 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 casting 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. This movement is controlled by a lever which has an eye controlling the gear box top fixing bolt and which passes through an eye block secured to the right-hand side engine case yoke. Two nuts threaded on the eye bolt, one on each side of the eye block, provide means of accurately controlling the front chain and steer that adjustment, setting the eye bolt in its required position.

Illustration 16 clearly shows the general "kick-starter" gearbox type, i.e. the gear selection and kick-starter mechanism. It will be seen that movement of the foot change lever causes movement of the cam barrel through the operation of an ingenious cam-follower which the lever is attached.

This cam movement actuates the sliding gear striker fork causing movement of the sliding gears which engage the stationary gears by teeth. As each gear is selected it is held in engagement by means of a ball spring plunger operating in depression on the end of the cam barrel.

The top mechanism referred to allows the foot change lever to return to its normal position, upon foot pressure being released, in case the foot change of gear. Downward direction of movement causes engagement of higher gears and upward movement will then cause a lower gear to become engaged.

As mentioned elsewhere an external warning is shown as a plate when gear is neutral, is engaged.

It should be noted that, although the basic design of the clutch fitted on 250 models is identical to that used on earlier models, the method of operation differs slightly, the necessity to use foot movement to free the up now achieved through a depression of these balls operating on inclined planes. (See illustration 17.)

Operation of the clutch handlebar lever moves clutch operating levers B causing inward movement of the thrust rod by reason of the three balls making the inclined planes on which they are located. The resulting inward movement of the clutch thrust rod forces out the pressure plate, normally in the end in contact with the friction plates by the spring B, thereby allowing the engine to drive the clutch assembly without imparting drive to the machine B.

Consequently no power is transmitted to the rear wheel, the clutch is said to be "clutch" or "free" upon releasing the clutch handlebar lever. The clutch operating lever, when in its normal position by the pressure of the spring forcing the balls against the inclined planes thereby allowing the spring pressure through the friction of the pressure plate to be transmitted to the friction plates which causes the gear box assembly to revolve and impart driving power to the rear wheel.

TO REMOVE KICK-STARTER CASE COVER FOR EXPOSURE OF K.S. GEAR CHANGE, AND INTERNAL CLUTCH ACTUATING MECHANISM

Remove oil drain plug and drain off all contents of the gear box.

Remove the large oil filler plug and slack off the clutch cable adjuster, sufficient to permit the cable end to be detached from the dotted end of the "main" clutch operating lever which is exposed by the removal of filler cap.

Unscrew the clutch cable adjuster until it is free from the K.S. case cover and withdraw the cable nipple through the aperture hole.

Remove the nut and small spiral spring securing small gear indicator disc from the cam barrel spindle.

Next remove the five cheese head screws by which the K.S. case cover is secured to the gear box end plate.

Withdraw the cover about $\frac{1}{2}$ inch, holding the K.S. pedal firmly while doing so.

Now swing the K.S. crank round until it can be tied to the foot change lever. This prevents the K.S. return spring unwinding and facilitates re-assembly.

The entire cover can now be removed.

Re-assemble in exact reverse order, taking care to avoid damage to the paper joint gaskets.

NOTE The position of the various cheese head screws securing the K.S. case cover are as follows:-

In the top position, screw measuring $2\frac{1}{2}$ inches under head.

In the bottom position, screw measuring $2\frac{1}{2}$ inches under head.

In the rear position, screw measuring $1\frac{1}{2}$ inches under head.

In the front position, two screws measuring $\frac{1}{2}$ inch under head.

TO REMOVE GEAR BOX END PLATE FOR EXAMINATION OF GEARS

Remove K.S. case cover as already described.

Remove the pin securing each gear strike fork shaft pins and withdraw the pins and also the cam barrel in which they operate, together with the spring ball caught clunger which engages depressions on the underside of the cam barrel.

Remove the mainshaft end pin and draw off the K.S. catches for the pinion, using and then reset when the pinion is mounted.

Remove the three cheese head screws by which the end plate is secured to the gear box shell and the end plate is then free to be withdrawn, exposing the gears and gear strike shaft pins.

Take each in turn, using the steel pin stuck in the end of the mainshaft and introduced between the clutch thrust rod lever and the clutch thrust rod.

To Re-assemble

If gears have been disassembled insert them in their sockets under with a steel pin in each socket and apply the cover with paper joint gasket in position.

Re-fit the three cheese head screws and firmly tighten down with a screwdriver.

Take each ball catch clunger and spring and apply the gear selection cam barrel with the pin of the depressions on its outside engaging with the ball end of the spring loaded plunger.

Next insert the indicator shaft pins and locate each in position with its spring pin.

Complete the assembly in reverse order of dismantling, ascertaining, before applying the K.S. case cover, that the ball is seated in the end of the mainshaft.

Fit to correct level with one of the recommended pins and adjust the gear indicator disc and adjust to position to give correct indication of gears.

TO REMOVE FRONT CHAINCASE AND CLUTCH ASSEMBLY

To remove outer half of front chaincase

Place tray under chaincase to catch oil.

Remove exhaust pipe and silencer, as one or two.

Remove nut on the end of footrest rod, push rod towards the right hand side of machine sufficiently to allow footrest to tilt foot to be disengaged.

Slide footrest arm to one side or completely take away.

Remove screw binding chaincase metal band to its ears.

Remove metal band.

Remove rubber band.

Remove nut and washer, in centre of chaincase front.

Take away outer half of chaincase.

To remove front driving shaft and clutch assembly completely.

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

Unscrew the nuts retaining the clutch springs using one of spanner sets from 60/220.

Take away the clutch spring pressure plate with the clutch springs and clutch spring cups, and screw the turned up part of the lock plate that it when the large clutch plate is.

Remove front chain connecting link and take away chain.

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

Remove the lock plate and plate washer 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 gear sprocket bearing rollers which may be placed in the clutch centre and sprocket assembly is which have been removed. The clutch centre is a sliding fit on the mainshaft sleeve and no adjustment should not be required.

To remove dynamo chain and lock half of chaincase

Remove the spring lock ring on dynamo sprocket retaining nut.

Take away lock washer surrounding dynamo sprocket nut.

Apply spanner 51/224, included in toolkit to the two flats on the back of the dynamo sprocket and, holding same, unscrew the nut retaining the dynamo sprocket. Turning sprocket the other way the dynamo shaft of bearing sleeve.

Release dynamo sprocket with suitable extractor.

Take away, as one assembly, the dynamo sprocket, dynamo chain and engine shaft 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.

TO RE-FIT THE FRONT CHAINCASE AND CLUTCH

Fit back half of front chaincase by 4

Place on face of crankcase boss and back face of chaincase some liquid jointing compound. "Val seal" recommended.

Ensure the spacer is in position on the centre fixing bolt. This is located between the engine plate and the chaincase. (It 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 over 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 crankcase, 2" 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 shaft assembly by 1

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

Slide the spring cover, which fits between crankcase bell housing and the back of the engine sprocket, it is in position on the spring cover pin on the bell.

Take care to drive chain and place it round the sprockets of the engine sprocket, dynamo sprocket and the sprocket on the dynamo shaft, and fit these three parts in the mainshaft, to the driving side sprocket and the two dynamo shaft.

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

Hold the dynamo sprocket by applying spanner 51/224 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 when the sprocket retaining nut is being tightened.)

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

Fit engine shaft assembly cover, by fitting cap washer and retaining nut but do not fully tighten nut.

Fit the clutch centre and sprocket by 1

Place on the gear box main shaft splined sleeve the twenty-four clutch sprocket bearing rollers bearing retaining washers.

Place on the gear box main shaft splined sleeve the clutch sprocket roller bearing ring.

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

Remove chain sprocket over the rollers.

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

Push on the splined sleeve the clutch centre link.

Fit the plate washer, lock plate 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.

Turn up the angle of the lock plate so that it tightly abuts against a flat of the nut.

Fit the clutch plates and springs by

Slide into position in the clutch case attached to the clutch sprocket, a steel plate and a clutch plate.

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

Drop into the spring pressure plate the clutch spring cups.

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

Fully tighten the clutch spring adjusting nuts, using end of spanner Part No. 532254.

Slacken back four complete turns each clutch spring adjusting nut.

Engage top gear, apply rear brake and then fully tighten the engine clutch adjustment adjusting nut.

Check front driving chain for adjustment.

Check dynamo driving chain for adjustment.

Check clutch operating lever for correct lever movement as detailed elsewhere.

Fit outer half of front chaincase by

Ensure faces of both halves of chaincase are clean.

Take off, from the rear brake rod, the adjusting knitted nut.

Ensure the rubber and metal bands are clean and undamaged.

A thin type of rubber band, known as a "V" band, is used. It is not symmetrical and the wider top flange or edge should be downwards.

Apply the rubber band by placing the narrow edge on the rear portion of the crankcase, arranging it so that the pin in the band sits just to the rear of the battery cover, and applying the band first at all in the extreme forward edge of the crankcase. It is important that sides of band abut.

Fully depress the brake pedal and then place in position the inner half of the chaincase, making it as far as necessary to ensure its outer edges are under the pressure exerted by the rubber band, and then to the rear, fitting both the pin and the rubber band, tightening the nut fully home.

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

Fully tighten the metal band binding screw.

Remove the inspection cap from the chaincase and pour in engine oil to the level of the bottom edge of the inspection cap orifice and then replace the cap.

NOTE—if, after replacing a front chaincase, it is found not to be of right, the general reason is distortion of the two joint faces or incorrect position of rubber band. These faces must be undamaged and, on that, should abut at the rubber 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 removed before refitting.

If any doubt exists, **CHECK** for **DISTORTION BEFORE ASSEMBLY**.

CLUTCH SPRING ADJUSTMENT

If clutch slip occurs the most probable cause is either incorrect cable adjustment or absence of free movement of the internal clutch lever. If both are found to be correct the clutch spring adjusting nuts may require adjustment.

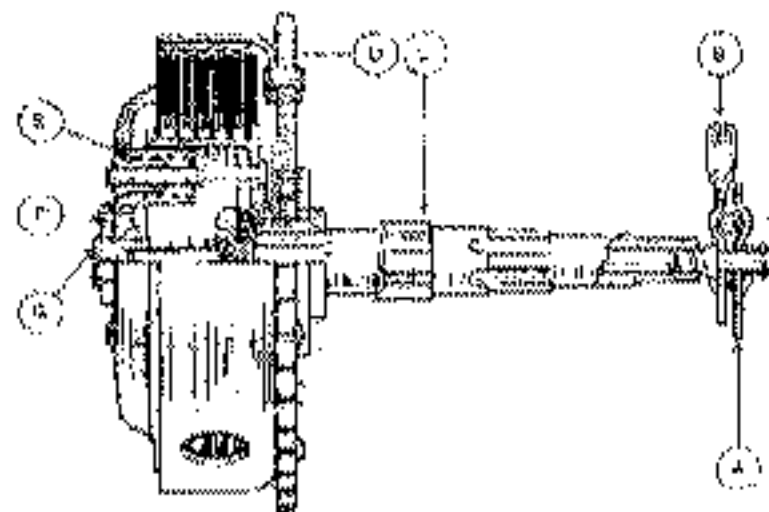
To obtain access to clutch spring adjusting nuts, remove front half of chaincase as already detailed.

With the slotted driver provided on one of the chain spanners in the tool kit, screw each nut, in 4 inch, fully home, then unscrew exactly four complete turns.

Before replacing outer half of chaincase, test for slip by starting up the engine, engaging top gear, and applying the rear brake when it should be possible to pull up the engine a full throttle without slip occurring.

If no more slip is found necessary to further tighten the adjusting nuts this is a clear indication that either the clutch springs have lost their tension, the fingers are so worn that they require removal or that they have become jammed with oil.

In the two former instances renewals are necessary, but if oil is the cause of slip it may be rectified by washing the plates in petrol and allowing to dry off. If fingers are glazed roughen with sand paper.



- | | |
|--------------------------------------|--|
| A REAR CLUTCH INTERNAL ADJUSTING NUT | B CLUTCH SPRING |
| C CLUTCH INTERNAL OPERATING LEVER | D LOCK NUT FOR CLUTCH FREE THRUST CUP |
| E GEAR BOX MAIN SHAFT | E THRUST CUP (a thin plate between plates for clutch bowl) |
| F CLUTCH SPROCKET | |

Showing clutch, gear box main shaft and clutch operating mechanism

Illustration 17

Correct adjustment of the clutch operating mechanism is of the utmost importance and the following instructions must be carefully observed:

Clutch cable stretch, which may develop at long intervals, is taken up by means of the adjuster provided at the gear box end of the cable, but when making this adjustment it is important that the normal movement of the internal lever is not encroached upon. The correct measure is to remove the gear box oil filler plug which exposes the internal lever. The end of this lever to which the cable is attached must then be pressed backward with the finger or end of a screw driver and when this is done, the slack in the cable should be taken up by means of the adjuster.

Having done this, the amount of free movement of the internal lever to the end where the cable is attached must be carefully checked. This is best done by applying light backward pressure to the lever end, as already described, at the same time operating the hand bar lever. The correct free movement is $\frac{1}{2}$ to $\frac{3}{4}$ inch. It should be explained that the free movement is readily felt on the hand bar gear by means of the greatly increased effort required as the clutch commences to disengage.

As the use of wire of the clutch plate fabric inserts, the plates tend to close up somewhat each other. This closing up has the effect of reducing the free movement referred to. When it is resulting from lack of free movement will typically cause the plates and any gear teeth suffer from rubbing when the clutch springs. The solution should be to immediately pressing for free movement of the internal lever.

To adjust this free movement it is necessary to remove the adjuster nut at the end of the cable, turning it with extension secured by three screws when the adjuster is being fitted to the end of the clutch adjustment cable will be exposed. The lock nut secures this screw adjusting plug is of square plug type and can therefore be loosened by adjustment. The three screws are already tightened by means of the squaring plug tool key provided in the tool kit.

Then to check the free movement of the internal lever, apply backward pressure as described and observe the movement of the internal end of the lever behind resistance in feet. The correct amount of movement is stated in $\frac{1}{2}$ to $\frac{3}{4}$ inch.

A careful study of illustrations 16 and 17 will show clearly to making the above instructions readily understandable.

To remove a clutch control cable

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

Remove right hand side clutch cable adjuster that is located in the back of the kick-start case.

Disengage, from the operating lever, the clutch cable cover with by operating through the oil filler cap opening.

Completely remove the clutch cable adjuster.

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

Pull cable, by 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 earlier.

FRONT CHAIN ADJUSTMENT

Tighten the front chain by:

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

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

Remove inspection cap from front chain case.

Screw up the rear nut on adjusting eye-bolt until, with the finger through the inspection cap or filler, 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 the assembly. (The correct chain which is $\frac{1}{2}$ inch.) Check the adjustment in more than one position and adjust, as above, as required. It is important that these instructions are over-tighten and then slack back and carefully followed.

Tighten nuts on gear box top fixing bolt.

Replace chaincase inspection cap.

REAR CHAIN ADJUSTMENT (Spring Frame Models)

To service rear chain adjustment the rear wheel is bodily moved in the rear frame fork ends which are upper ended and locked.

The rear wheel centre spindle has two arms attached to it. These arms abut against projections in each of the rear fork end slots. The projection on the right-hand fork end is so used as the lock key and its rotation is locked by a nut. This adjustment is provided to ensure the rear wheel is positioned in line with the front wheel and, once it has been determined during assembly, there should be no necessity ever to alter it again.

The axle ends can have a hexagonal body to accommodate a spanner and is turned, forwards or backwards, to position the rear wheel so that the rear driving chain is correctly adjusted. (Both ends can be adjusted.)

The correct chain tension is such that, when the machine is on the main stand, finger pressure applied to the chain, midway between gear box sprocket and rear wheel sprocket, can upward and downward direction, allow a total movement up and down of $\frac{1}{2}$ inch. The rear wheel should be rotated to several positions and tests made as with, separate chains being used each, and there is usually one position where the chain is tighter than in any other. The adjustment of $\frac{1}{2}$ inch must be used for the tightest position found.

(When off the stand, and when the rider on the saddle, this measurement is reduced to about $\frac{1}{4}$ inch when, which is the correct adjustment when on the road.)

To adjust the rear chain

Place the machine on the main stand.

Backlash nut to right of speedometer gear box.

Backlash nut to right-hand end of rear wheel spindle.

Fast forward the wheel so that both ends are in contact with the projections on the rear fork ends.

Apply adjustable wrench 617249 to hexagonal body of chaincase cam, and, while rotating in a forward position on the wheel, to ensure contact of the two cams, turn, with the wrench, until the chain whip of $\frac{1}{2}$ inch, detailed above, is obtained. Then holding the wheel in that position, fully re-tighten the spindle exterior nut.

Finally, fully-tighten the nut to the right of the speedometer gear box after being satisfied that the gear box is in such a position that no strain is being placed on the driving cable.

REAR CHAIN ADJUSTMENT (Rigid Frame Models)

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

Slightly slacken nuts on rear wheel solid spindle (left side first).

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 $\frac{1}{2}$ " to $\frac{3}{4}$ ".

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

Tighten wheel spindle nuts.

Recheck chain tension.

Tighten nuts on chain adjusting bolts.

NOTES ON REAR CHAIN ADJUSTMENT

Before tightening the rear chain, check the front chain adjustment, and if necessary, adjust the 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 make it necessary.

Altering the adjustment of the rear chain may upset the adjustment of the front chain. Therefore, after making a rear chain adjustment, always check the front adjustment, and make it necessary.

The whip of chains should always be tested midway 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.

Always recheck the chain tension after making it and tightening all bolts and nuts.

DYNAMO CHAIN ADJUSTMENT

The dynamo adjustment bolt is essential to the work of the dynamo. Therefore, by partially loosening the dynamo in its bearing the contact between the two dynamo driving sprockets can be varied, thereby allowing for their adjustment.

Tighten dynamo chain by :

Remove inspection cap from front sprocket.

Slacken dynamo clamping strap bolt.

With the finger turn dynamo bodily in an anticlockwise direction i.e. by passing a finger through the inspection cap opening, it can be felt the chain contact is correct.

The chain whip should be about $\frac{1}{2}$ ". Ensure, when testing strap, the dynamo driving chain is not confused with the dynamo chain which lies behind the front drive chain.

Tighten dynamo clamping strap bolt.

Re-check chain tension.

Replace chaincase inspection cap.

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 flat end of the magneto platform which is slotted and lever upwards until the chain tension is correct.

The slack whip should be about $\frac{1}{2}$ ".

Tighten nuts on platform supporting bolts.

Re-check chain tension.

Make supply of grease on magneto driving chain.

Replace magneto chain cover

ENGINE SHOCK ABSORBER

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

The engine shock absorber is a lever on the driving side flywheel axle. It has, integral with it, a damper coil engaged with a similar lever (the shock absorber coil) which is keyed to the driving side fly-wheel axle by splines. A spring keeps the shock absorber coil in close engagement with the pin on the sprocket and, the shock absorber coil being driven by the engine, overcomes the reaction from under the influence of the engine movement. The shock absorber spring is compressed by the winding of the damper, thereby absorbing the shocks.

It is essential the pressure of the coils are adequately increased otherwise the shock absorbing action will be nullified and this is automatically taken care of, providing the level of the oil in the shock absorber is maintained according to the instructions given in the "Lubrication Section".

The shock absorber spring is retained by a cap washer and a retaining nut which must be fully tightened.

The dynamo sprocket is integral with the engine sprocket.

Engine and engine sprocket (between the sprocket and the crankshaft roller bearing) is a tapering collar which is sliding fit on the driving side flywheel axle and in no circumstances must this be altered.

NOTE: At the first sign of maximum hardness coming from chaincase for correct oil level and dynamo and lubricate the shock absorber parts if the hardness continues. For loads to the shock absorber coil it is necessary to remove the outer nut of the front chain case.

The order of assembly of the engine shock absorber is

1. The spring collar between the crankshaft roller bearing and the engine sprocket.
2. The engine sprocket.
3. The shock absorber coil.
4. The shock absorber spring.
5. The cap washer.
6. The retaining nut.

FORK & FRAME SERVICE

STEERING HEAD ADJUSTMENT

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

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.

Adjust steering head bearings by:

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

Slacken the nut on the top fork crown pinch bolt.

Slacken the damper nut at top of the steering column.

Screw down the nut underneath the damper with a ball-nut turn (spring spanner 015250) and, without doing so, test the head assembly for slackness by placing the fingers over the gap between handlebar lug and frame top lug at the same time exerting upward pressure by lifting from the front edge of the 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 damper nut in order to lock the adjustment.

Tighten the top fork crown pinch bolt nut.

Remove packing from under bearings.

FRONT FORKS (TELEHYDRAULIC)

Owing to the unusual construction of the TELEHYDRAULIC fork it is essential to understand what happens in use and, in short, to follow closely the development and subsequent assembly and adjustment instructions. Reference to Illustration 18 and 19 will be necessary.

As will be seen from the general arrangement drawing, Illustration 18, the main body parts of the forks are two long tubes. These are of heavy gauge and are externally ground to very fine limits. These fork main, inner, tubes are firmly fixed to the handlebar slip lug by the top bolts 016210 and are clamped to the fork crown or the clamp seat 016220 and nuts 011615. Upon the external of these tubes are mounted the springs and sliding members, on which rest the front wheel, mudguards and front stand are fixed.

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

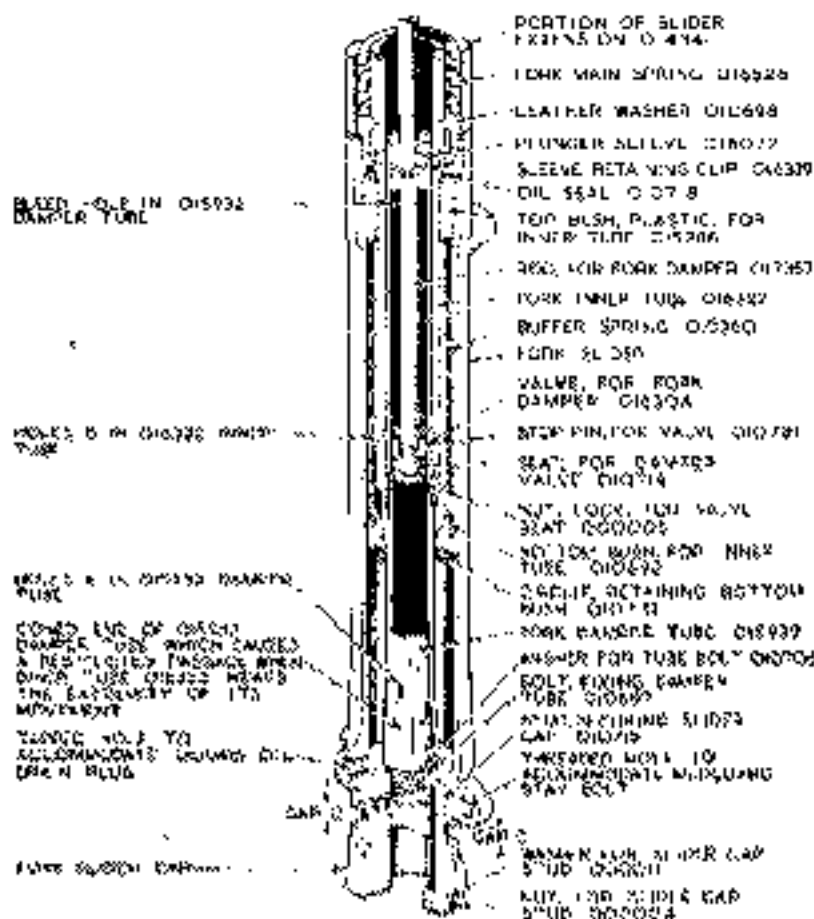


Illustration 18

Interposed internally for the upper slider tube is a conical piston, in section illustrated, except in design to the day and rapid practically universally. The hydraulic damper is a cylinder piston, located inside the main tubes. As will be seen the main tubes and the piston operate with the piston located in the main tube at the top end and also upon the piston bush, secured to the top end of the inner tube. Above these bushes, an oil seal is fitted, the object of which is to prevent leakage of oil from below into the main spring chamber. The normal rise of oil in the main tube is the result of the oil seal and having this in mind, it is not seen that the upward movement of the damper tube, which is fixed with road springs, is the result of the oil seal. The oil seal also causes oil to be forced by the piston into the main tube. This oil is forced upward through the bottom of the main tube and also through the holes A (Illustration 18) in the bottom of the damper tube, then pass the damper disc valve which the piston is raised all its seat. As the oil level rises in the main inner tubes, air trapped is compressed, thereby forcing air to the bottom of the main tube. This displacement of oil upon impact imparts a certain amount of damper effect, the extent of which increases with the violence of the shock, or in other words, the bigger the bump the greater the damping effect. Upon the recoil movement, the damper disc valve returns to its seat and the oil trapped between this valve and the plunger sleeve shown

has no other source of escape but past this sleeve and the adjacent small metered bleed hole. This instantaneously restricted passage causes a considerable damper effect to the recoil action. It will thus be gathered that on the slack movement of the fork, 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 main springs are almost fully compressed, the damping of the upward movement of the sliders is instantaneously increased by the automatically greatly restricted passage for the displaced oil, brought about by the lower ends of the oil tubes entering the tapered enlarged ends of the damper tubes as the sliders near the limit of their upward movement. Thus bottoming is prevented, no matter how sudden the impact. For ordinary purposes the recommended oil content is 5, oz. (141.6 c.c.) each leg of one of the S.A.E. 20 oil is specified. To deal with heavier loads than normal, the oil content may be increased to a permitted maximum of 10 fluid oz. (284 c.c.) per leg. To increase damping all oil heavier grade may be used. It will be found, however, that for normal purposes the recommended grade and quantity of oil will give the most comfortable ride.

FRONT FORK "TOPPING UP"

No part of the **TELEHYDRAULIC** Front Fork requires individual adjustment, but it is advisable to check the oil content once every five thousand miles. The correct content is already stated, it is 5 fluid ounces (141.6 c.c.) each side.

Support motor cycle vertically with weight on both wheels. A steady under each foot rest is the best method.

Unscrew the hexagonal plug at top of fork inner tube. These plugs are held with handle bars and attached to them are the damper rods. Make a preliminary measure of not less than 10 fluid oz. capacity available in which to catch and measure the oil. Remove the drain plug from the bottom of a clean and catch can or other container. Then remove drain plug and work the top plug so which damper rods are attached up and down (pumping action), making several strokes as violent as possible thus using every drop of oil in the pot. The pumping action is to force the oil trapped in the damper tubes above the damper disc valve. Wait two minutes and again remove drain plug. Repeat the action until no further oil can be drained off when, if the fork and the correct oil content, about 5 fluid oz. (141.6 c.c.) will have been drained off. If less, add to make this quantity, or reduce if an excess quantity has been drained off. Repeat with drain plug and carefully pour into the top of one tube being checked usually 5 fluid oz. (141.6 c.c.), after which the top plug may be replaced.

NOTE: Although the normal oil content of each side is specified as 5, fluid oz., it is not possible to drain all the oil up the drain plug. This excess oil flows down quantity of 6 fluid oz. (170.1 c.c.) referred to above. However, the fork at any time completely dismantled and then reassembled in a dry place, it should be noted that in this event the correct quantity of oil to add to each leg is 6, fluid oz. (170.1 c.c.).

TO REMOVE THE COMPLETE FRONT FORK ASSEMBLY

Support the motor cycle with one front wheel clear of the ground. The fork, of course, hangs under the motor cycle in the best method.

Remove front wheel by method described in "Wheel Section".

Remove front stand and front mudguard.

Detach the switch panel that it hold in the top of the mud lamp by three screws.

Disconnect speedometer driving cable from the speedometer head.

Detach the speedometer light bulb with its holder.

Remove the two bolts retaining the head lamp and take same away.

Remove the two bolts retaining the speedometer head and take same away.

Remove the handlebar half clip and lay the handlebars, complete with controls, down a side on top of the petrol tank.

Detach the front brake cable from the forks. (First remove the slotted yoke end and then completely unscrew the cable adjuster.)

Unscrew the hexagonal plug on top of each inner tube and slacken the lock nuts securing the damper rods attached. Then, before removing the hexagonal plugs, attach a piece of wire about 18 inches long underneath each damper rod lock nut, to enable the damper rods to be raised for assembly.

Remove domed lock nut at top of steering column.

Remove fork nut on steering column.

Use a soft mallet to tap upward the handlebar lug until it disengages with the fork stem (inner lug collar) and the fork assembly can then be withdrawn. (Take care to avoid lugs of the 36 steering head axle balls.)

To re-fit a complete front fork assembly

Slide both grease 30 balls in fork crown ball race

back, with grease 30 balls in main frame top ball race.

Push the fork assembly by reversing the instructions given above to dismantle, carefully tightening the damper rod lock nuts before inserting the hexagonal headed plugs in which they are attached.

TO REMOVE A FORK SLIDER (either side) (Dealer service only)

Support the motor cycle with the front wheel clear of the ground, and remove the complete slider extension from the slider which is intended to remove. Special anticlastic clamp rod screw rod (shown in workshop ready).

Now remove the front wheel, front stand and mudguard as detailed above. Then with a thin screw driver, remove the bolt securing the damper tube. The hexagonal head of the bolt is sunk in the upper part of the wheel rim flange. Place a suspended under brush to catch the oil which will drain out when removing the bolt and the core of the front wheel fork will rise the head. A sharp jerk downwards should now enable the stem to be withdrawn, but this is difficult to be experienced, apply a lot of heat to the bearings one end of the slider. This will cause a little expansion to allow the oil seal to be removed a good inch in the top of the slider. The reaction is carried out in exactly the reverse order, again if necessary applying a little heat to enable the oil seal to be pushed home. Now the slider can be removed in the under extension. After completion, the oil which has escaped MUST be returned into the top. (See front fork "Topping up".)

TO REMOVE A FORK INNER TUBE ASSEMBLY (either side) (Dealer service only)

First unscrew the hexagonal plug at the top of the inner tube it is intended to remove, and after slackening the lock nut by which the damper rod is secured to it's plug, unscrew the plug, allowing the nut to fall. Now proceed to remove the slider as already detailed, except the nut which the bolt securing the damper tube. The damper tube will protrude the top of the fork crown as the slider is removed. Now loosen the crown clamping stud nut when it should be possible to draw the entire inner tube assembly down through the crownings. If this is impossible, the inner tube is first pushed back as far as possible by hand and then pulled right home by screwing down the top hexagonal plug. With this plug tightened down, then proceed to tighten the crown clamping stud nut, after which the hexagonal plug may be removed and a piece of wire passed down through the inner tube. Loop the bottom end of this wire underneath the damper rod lock nut. The slider is then carefully pushed upward while at the same time pulling on the wire until the top end of the damper rod protrudes sufficiently to permit the unscrewed plug to be attached and secured with the lock nut, after which the wire may be removed. It may be found necessary to apply a little heat to enable the oil seal to be pushed home with the fingers before screwing on the tubular extension.

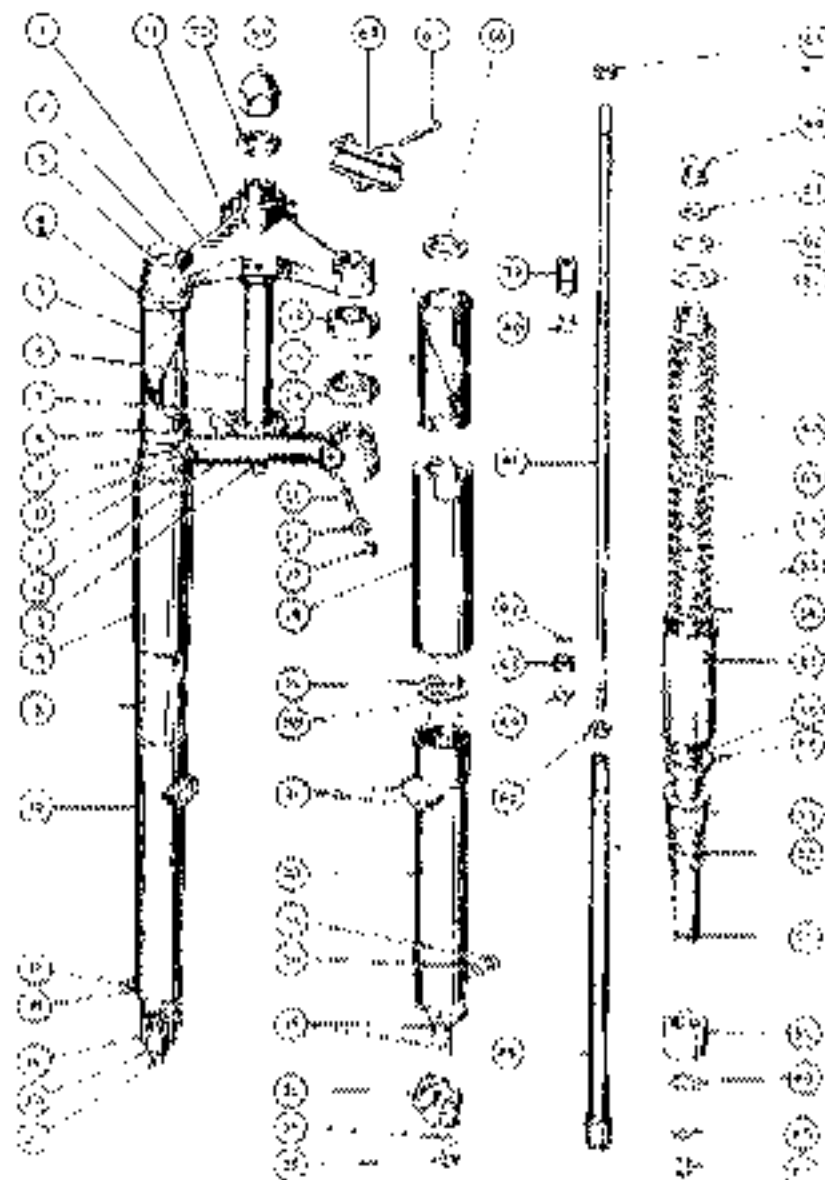


Illustration 19

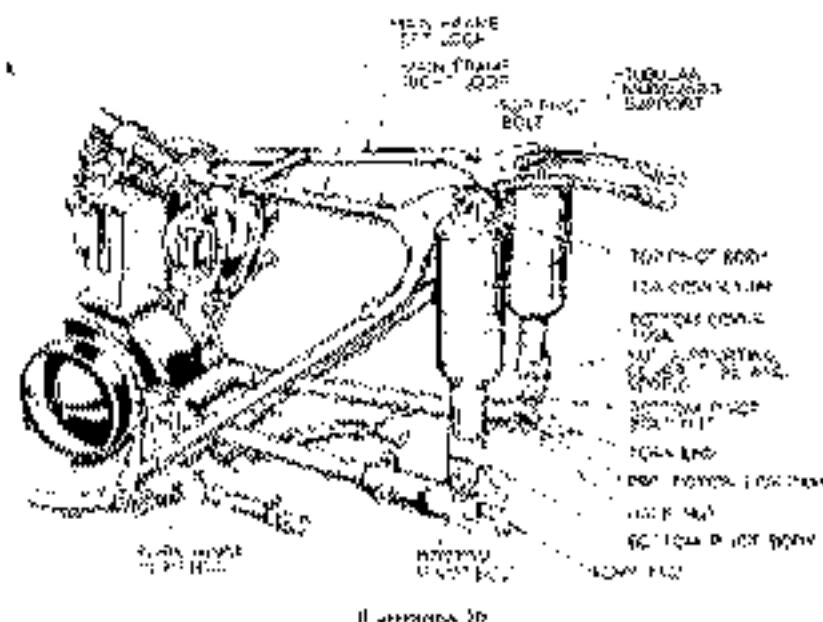
REF. PART
NO. NUMBER

DESCRIPTION

1	01670	LEG FOR HANDLEBAR AND STEERING HEAD
2	01671	BOLT TOP FOR FORK INNER TUBE
3	010729	WASHER PLAIN FOR FORK FINER TUBE TOP BOLT
4	01073	CAP FOR FORK TOP COVER TUBE TOP LOCATION
5	011631	TUBE FORK COVER TOP RIGHT WITH LAMP LUG
6	—	STEM FOR FORK CROWN (NOT SOLD SEPARATELY)
7	000025	BALL RACE FOR FORK CROWN
8	011644	CAP FOR FORK TOP COVER TUBE BOTTOM LOCATION
9	000011	WASHER PLAIN FOR FORK CROWN RING STUD
10	011635	NUT FOR FORK CROWN RING STUD
11	—	FORK CROWN (NOT SOLD SEPARATELY)
12	011634	FORK CROWN ASSEMBLY CROWN, STEM AND CIRCLIP
13	—	BOLT FOR FORK CROWN THREADED TO ACCOMMODATE STEERING DAMPER PLATE TUBING BOLT
14	011754	TUBE FORK COVER BOTTOM
15	011741	EXTENSION FOR FORK COVER
16	011752	SLIDER FOR FORK WITH CAP, STUDS AND NUTS
17	000015	SCREW PLUG FOR FORK SLIDER OIL DRAIN HOLE
18	000017	WASHER WIRE FOR FORK SLIDER DRAIN HOLE SCREW
19	011753	CAP FOR FORK SLIDER
20	000011	WASHER PLAIN FOR FORK SLIDER CAP SECURING STUD
21	000044	NUT FOR FORK SLIDER CAP SECURING STUD
22	000021	CAP FOR FORK TOP COVER TUBE TOP LOCATION
23	011755	TUBE FORK COVER TOP LEFT WITH LAMP LUG
24	011745	CAP FOR FORK TOP COVER TUBE BOTTOM LOCATION
25	011756	SLIDER FINER FOR FORK CROWN
26	011757	WASHER PLAIN FOR FORK CROWN FINER STUD
27	011758	NUT FOR FORK CROWN FINER STUD
28	011759	TUBE FORK CROWN WITH STUD
29	011760	WASHER PLAIN LOCATING FOR FORK COVER TUBE
30	011761	WASHER PLAIN LOCATING FOR FORK COVER TUBE
31	011762	BOLT THREADED TO ACCOMMODATE WHEEL ANCHOR STUD
32	011763	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
33	011764	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
34	011765	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
35	011766	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
36	011767	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
37	011768	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
38	011769	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
39	011770	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
40	011771	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
41	011772	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
42	011773	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
43	011774	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
44	011775	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
45	011776	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
46	011777	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
47	011778	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
48	011779	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
49	011780	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
50	011781	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
51	011782	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
52	011783	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
53	011784	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
54	011785	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
55	011786	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
56	011787	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
57	011788	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
58	011789	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
59	011790	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
60	011791	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
61	011792	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
62	011793	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
63	011794	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
64	011795	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
65	011796	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
66	011797	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
67	011798	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
68	011799	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
69	011800	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
70	011801	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
71	011802	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
72	011803	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
73	011804	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD
74	011805	WASHER PLAIN FOR FORK COVER TUBE STUD AND STUD

REAR SUSPENSION

The rear wheel is mounted in a fork that is hinged just behind the gear box. The hinge has robust plain bearings lubricated from a reservoir of 1 l fluid ounces (42.6 c.c.) of heavy gear oil, which is sufficient to last almost indefinitely. Provision is, however, made for replenishment should same be required. A small screw will be observed in the right hand and top of the hinge bearing, upon removal of this screw, oil can be injected into the reservoir, the screw plugging operating as a level control.

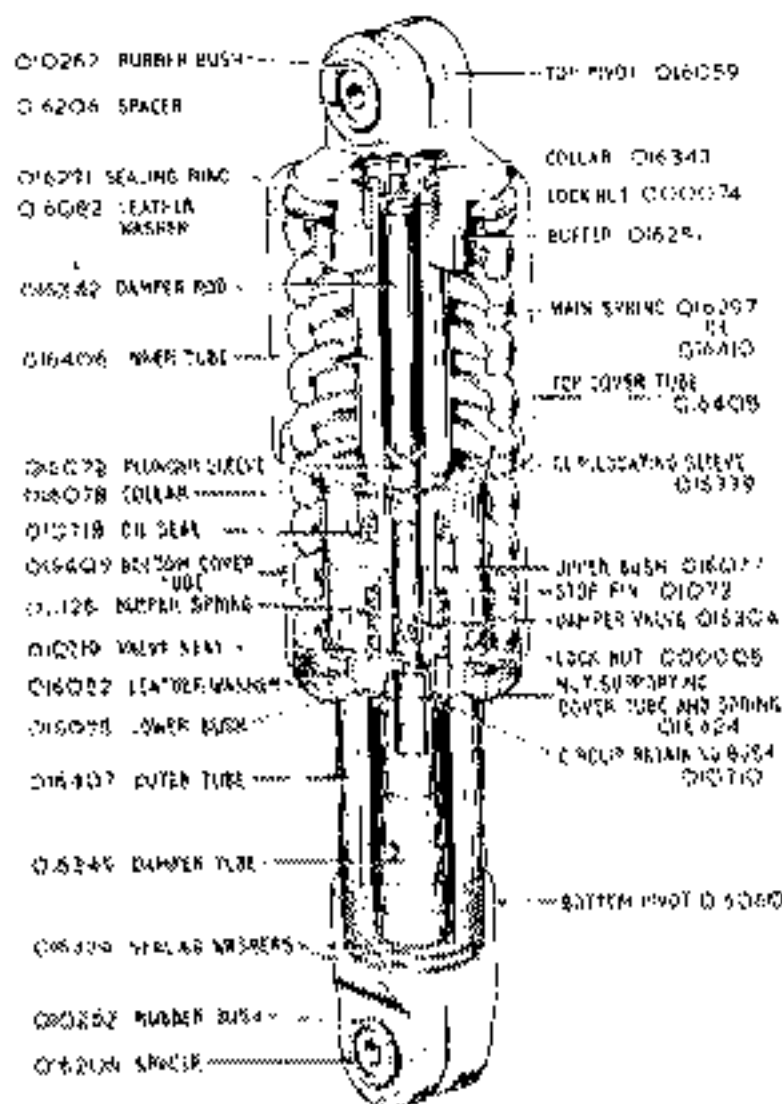


Showing rear moving frame and "TELEMANUAL" sign

The rear wheel lock is equipped on springs located in the rear of the vehicle. The
 extension of the rear of the lock to the rear of the frame rear wheel, and the spring wheel is
 formed by hydraulic, damper identical in design to those used in the "FEDERAL" and
 "FRONT" wheel assembly.

The hydraulic fluid used is one of the grades of oil specified in the Lubrication Schedule for use in the "TELEPHONICS" Feint Books.

The recommended quantity for each leg is 85 c.c. or a tin's order 2 fluid ozs. of S.A.S. 30 grade of one of the brands specified. For abnormal loads, the next heavier S.A.S. grade may be used, but unless the load is, or is likely to be, unusually heavy, the load capacity is increased by this alteration of grade alone, and under such circumstances when the oil content of each leg exceed 90 c.c. or roughly $\frac{3}{4}$ pint. Use the service factor existing in the current functioning of the rear legs, owners are advised to leave the engine should the need arise, however, the oil content of each leg should be separately checked as follows:



በጽሑፍዎ ላይ ምን ዓይነት ማሳሰቢያዎች አሉ?

श्रीमान् " गोपनी " जेहन अ " TELEDRAULIC " ले

To check oil content of "TELEHYDRAULIC" leg and top-up: (DEALERS' SERVICE ONLY)

Dealing with one leg at a time, remove top securing bolt, taking care to observe the location of the spring washers on it. Remove bottom securing bolt and take away the leg.

Using a suitable clamp encircling the outer tube adjacent to the bottom pivot lug, grip in a vice and remove the pivot lug.

Then holding leg vertically, bottom end uppermost, carefully remove the loosened pivot lug, and gripping the exposed end of the damper tube with the fingers, raise and lower several times (pumping action) after which pour the oil contents into a graduated measure.

It may be necessary to repeat the pumping action to eject oil from underneath the damper valve, and finally the open end of tube should be supported above the measure and left to drain for several minutes.

If the leg contained the correct amount of oil, 25 c.c. (2½ ozs.) then it have been drained out into the graduated measure, leaving 10 c.c. (1½ ozs.) which cannot be measured.

All that now remains is to pour carefully back in to the leg exactly 25 c.c. (2½ ozs.) of oil, above which the pivot lug may again be screwed on and securely tightened down to prevent oil leakage when the leg is re-fitted, after which the other leg may be dealt with in a similar manner.

NOTE—Shortage of oil is indicated by very lively action.

PROP STAND

The prop stand finger or screw which passes through a lug fixed to the frame and screws into the jaw of the stand eye. It is then locked by a nut and spring pin. Care is taken during this job if necessary to avoid jamming, and it is essential to observe the following tightening the lock nut that the screw is perfectly free. Secure the large bolt with a piece of all before repeating it.

CENTRE STAND (Spring Frame Models)

The centre stand is mounted on a bolt set across the bottom of the main frame, which is removed by taking off a nut on the centre bolt and pushing bolt down on the frame. During removal and replacement the stand should be in a horizontal position in order to take off as much of the tension of the return spring as is possible.

FRONT STAND

The front stand is intended to support only as a support and is of temporary nature only, as it is not intended to support the machine. The stand is pivoted and designed for use in the backward position. The stand should be in a horizontal position in order to take off as much of the tension of the return spring as is possible.

Do not attempt to use the FRONT STAND unless the machine is already supported by the chain stand.

REAR STAND (Rigid Frame Models)

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 head of these bolts.

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 two nuts, fitted to the studs, retain the oil tank and battery carrier in position.

Remove oil tank and battery carrier by:

1. Drain oil tank

Disconnect wire from the battery where it is attached to the seat lug bolt by a screw.

Disengage wire from the battery at the point close to the battery, where there is a double threaded connection. (Pull back the rubber sleeve to reveal the two main components of the connection. Hold one component in a wrench, or pliers while the second component is unscrewed from it.)

2. Remove battery from carriage.

Disconnect oil feed pipe from bottom of oil tank.

Disconnect oil return pipe from bottom of oil tank.

Disconnect vent pipe from back of oil tank.

Slide seat voltage control unit from carrier slot. Only two bolts to remove. No need to disconnect any of the electric cables.

Remove bolt retaining rear stay from oil tank by run in diagonal.

Remove nut on base of carrier, retaining carrier to stay that is supported by the front stay.

Remove the two nuts and washers retaining the oil tank and battery carrier to the main frame.

The oil tank and battery carrier are now free to be taken away and, when doing so it is necessary to give the oil tank a slight movement in order to disengage from the main frame.

NOTE—The main studs are brazed to the frame.

To re-fit

Re-fit tank and battery carrier on their own fixing studs and, before doing anything else, fit both oil pipes. Then observe the instructions given above.

TO REMOVE THE REAR CHAIN GUARD (Spring Frame Models)

Release the rear stay. (See above Section.)

Remove the bolt retaining the front end of the chain guard to the rear fork.

Remove the bolt retaining the rear end of the chain guard to the rear fork. (There are two washers on this bolt, one a washer and the other stays of the guard and the carrier is between the two stays facing bolt and the guard.)

TO REMOVE THE REAR CHAIN GUARD (Rigid Frame Models)

Release

The rear portion of rear mechanism.

The bolt retaining the front end of the chain guard to the front chainstay.

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

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

The chain guard is then free to be taken away.

**BY USING GENUINE SPARES YOU ARE ASSURED THEY
WILL FIT ACCURATELY AND GIVE SATISFACTORY SERVICE**

WHEELS AND BRAKES

TO REMOVE FRONT WHEEL

Place machine on beer stand.

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

Remove bolt retaining brake anchor stay to brake cover plate.

Slacken the nut on the left-hand end of front wheel spindle.

Remove the four nuts retaining the cam to the fork sliders, which will permit the spreading of the two ends and, putting pressure on the front wheel (in order to decrease the effective height of the wheel spindle) the wheel can be withdrawn towards the front.

NOTE The two ends **MUST** be refitted in same order and position as originally. Therefore, by their side is that the order and position of assembly will be correctly made.

When replacing the front wheel, observe the instructions already given in the Fork and Frame Section. (And remember to press down on the wheel when putting in position in order to get the wheel spindle between the two sets of studs).

Do not attempt to use the FRONT STAND unless the machine is supported by the centre stand (on SPRING FRAME MODELS) or by the REAR STAND (on RIGID FRAME MODELS).

TO REMOVE REAR WHEEL (Spring Frame Models)

Place the machine on the centre stand. Remove the bolt, washer and nut, in rear most position on each tubular member fixing the hinged portion of the rear mudguard.

Disconnect the lamp connection in the wire of the rear lamp.

Remove adjusting nut from rear brake rod.

Remove rear wheel till the chain connecting link is more than halfway rear over bottom.

Remove connecting link and allow chain to swing right away from the rear wheel sprocket but ensure it hangs in its usual curve away from the gear box sprocket.

Disconnect speedometer cable from speedometer gear box by unscrewing the cable gland nut.

Slacken the nuts on the rear wheel spindle that protrude the speedometer gear box.

Slacken both washer or nuts on the rear wheel spindle from opposite ends.

Using adjustable wrench (17/16"), apply it to the hexagonal body of the adjusting cone on the left-hand end of the wheel axle and turn the cone till, by pushing one wheel forwards, the wheel is in its most forward possible position.

Hold left-hand side of wheel tightly inward against the cam rods and pull backwards the right-hand side of the wheel so that the brake cover plate engages with the square headed anchor bolt. Then, raise the hinged portion of the rear mudguard and pull wheel away from the fork ends.

TO REMOVE REAR WHEEL (Rigid frame Models)

Place machine on rear stand.

Disconnect rear lamp wire at connection near rear wheel spindle.

Disconnect speedometer driving cable. (Unscrew gland nut or cable.)

Disconnect 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.

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

Remove adjusting nut from rear brake rod.

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

Slacken the two nuts on the rear wheel spindle.

Remove the rear portion of the rear mudguard, with its stays, leaving tool box and stay in position.

Remove the rear wheel from the fork ends by twisting it a few turns to release and clear the rear Arrow cover plate anchor bolt and then withdrawing it to the rear.

Before the machine is put together, before finally tightening the rear wheel spindle nuts, ensure the speedometer gear box is so back that the speedometer driving cable can be correctly reconnected.

When the wheel alignment is correct, a piece of thin string stretched tight across both wheels, about four inches from and parallel to, the ground, should be exactly level with at both ends of the wheel axles.

A conveniently, a simple, wooden batten, about two 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 fitting any alterations to the rear wheel' pump on.

TO RE-FIT REAR WHEEL (Spring Frame Model)

Reverse the above procedure, but that the speedometer drive cable are engaged, but leave the light on, or the nut that moves the speedometer gear box for the final operation, i.e. after the speedometer cable has been re-connected and the exterior light bulb has been tightened. (This see also in the Right Hand Models).

It will be found when refitting the wheel to the fork ends with the Arrow cover plate hanging down and with the top of the wheel on its left-hand side, as the frame is the fork end as is possible, to swing the right hand side backwards, lifting it to the fork end which the top of it is positioned as engage with the square headed anchor bolt and the Arrow cover plate and the end of the cable for handle (if long enough) can then be engaged.

After engaging the rear wheel, check the rear chain adjustment, and, if necessary, reset it. Then check the rear brake adjustment and, if necessary, reset it.

WHEEL BEARINGS AND ADJUSTMENT

The wheel bearings are of taper roller type. The inner bearings for the rollers are integral with the wheel spindle in the case of the front wheel, and are separate tracks that are a push fit on the centre spindle in the case of the rear wheel. (Reference to Illustration 13 will make this clear). The outer cups for the rollers are pressed into the hub shell. They have a fixed location one side and an adjustable location on the other. The fixed location is provided by a cup in a groove cut in one end of the hub shell, while the adjustable location is regulated by a screwed ring that is threaded into the opposite end of the hub and the position of which can be locked by an encircling nut.

On the rear wheel the adjusting ring is located on the left-hand side of the hub while on the front wheel the adjustment is on the right-hand side.

It is rarely necessary to make adjustment to wheel bearings. If 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", which represents a just perceptible rim rock. (Not more than $\frac{1}{16}$ " rock.)

To adjust the rear wheel bearings the wheel must first 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:

Slacken the lock nut.

Tighten the adjusting ring until all slackness has been taken up.

Slacken back the adjusting ring exactly one-half turn.

Tighten the lock nut, making sure that, when doing so, the adjusting ring does not move round.

TO DISMANTLE A FRONT WHEEL BEARING

These instructions should be read in the upper part of illustration 21.

Remove wheel from machine.

Remove nuts and locknut cover plate with slacks, etc., from left-hand side of wheel.

Turn to right-hand side and slacken lock nut. (11.)

Completely unscrew the adjusting ring (10) and take it away with the rock but not off it.

Carefully apply steady pressure on the flange end of the wheel spindle which will in turn, give from the opposite end of the hub the hub housing for the oil seal (2), the oil seal (3), the metal washer (4) that is lost and the oil seal and the outer cup (6). These may be lifted away as they emerge.

The front wheel spindle (16), with its two sets of rollers in cages, may now be lifted out of the hub.

Turn to the left-hand end of the hub, carefully apply steady pressure on the wheel spindle (16) forcing the disc (1) that can be seen in the hub end, so that the complete oil seal assembly of oil seal and outer cup is pushed a little further into the hub shell. This will take off pressure on the cup (6) thereby making its separation a very matter.

Remove circlip (1), and then, reversing the hub, apply pressure on the inner edge of the outer cup (6) so that it is forced out of the hub. As it emerges it will push a boss of it, the oil seal external plain washer (2), the oil seal (3), with its enclosing spacer (4) and the oil seal inner plain washer (5), all of which can be lifted away as they appear, to be fitted as follows by the cup (6).

The dismantling is then completed.

To re-fit, reverse the above procedure, remembering that, after cup (6), washer (5), spacer (4), oil seal (3) and washer (2) have been inserted in the plain end of the hub, to re-fit the circlip (1) and then carefully to apply steady pressure on the inner edge of the cup (6) to force the above entire assembly tightly back against the circlip (1).

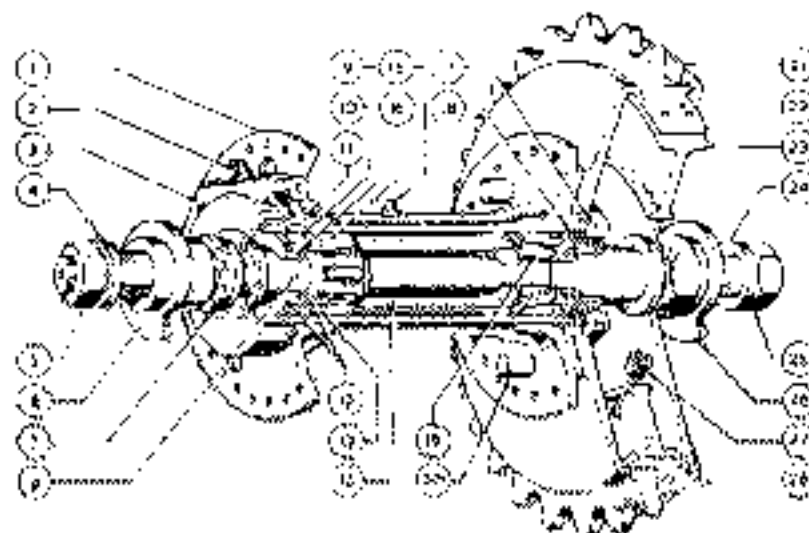
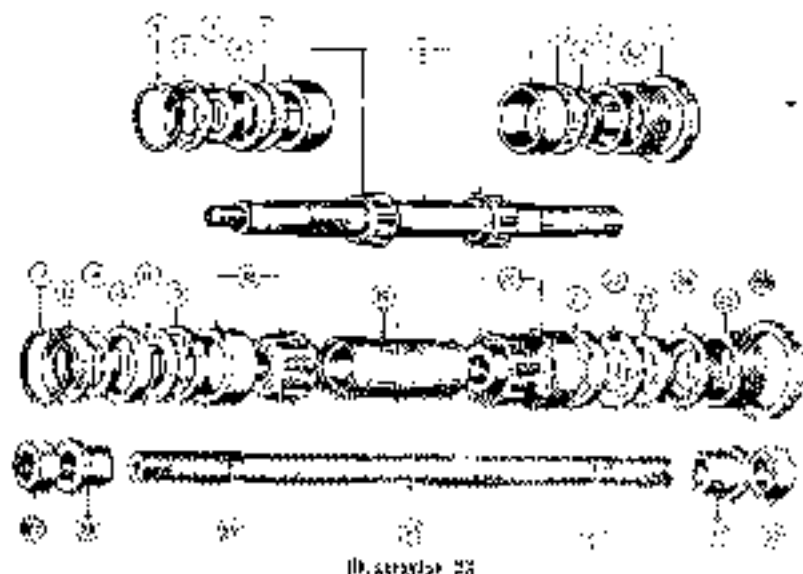


Illustration 21

Showing rear hub, rear chain sprocket, brake and speedometer gear box (Spring Frame Model)

(Spring Frame Model) (Sprocket Sample for Item 14 and 20)

- | | |
|---------------------------------------|---|
| 1. REAR HUB END OF HUB FLANGE. | 14. SPACER, BETWEEN THE TWO TAPE ROLLER BEARINGS. |
| 2. OIL SEAL AND SPEEDOMETER GEAR BOX. | 15. SPACER, BETWEEN THE TWO TAPE ROLLER BEARINGS. |
| 3. SPEEDOMETER GEAR BOX. | 16. OIL SEAL, IN HUB END. |
| 4. OIL SEAL, IN HUB END. | 17. OIL SEAL, IN HUB END. |
| 5. OIL SEAL, IN HUB END. | 18. OIL SEAL, IN HUB END. |
| 6. OIL SEAL, IN HUB END. | 19. OIL SEAL, IN HUB END. |
| 7. OIL SEAL, IN HUB END. | 20. OIL SEAL, IN HUB END. |
| 8. OIL SEAL, IN HUB END. | 21. OIL SEAL, IN HUB END. |
| 9. OIL SEAL, IN HUB END. | 22. OIL SEAL, IN HUB END. |
| 10. OIL SEAL, IN HUB END. | 23. OIL SEAL, IN HUB END. |
| 11. OIL SEAL, IN HUB END. | 24. OIL SEAL, IN HUB END. |
| 12. OIL SEAL, IN HUB END. | 25. OIL SEAL, IN HUB END. |
| 13. OIL SEAL, IN HUB END. | 26. OIL SEAL, IN HUB END. |
| 14. OIL SEAL, IN HUB END. | 27. OIL SEAL, IN HUB END. |
| 15. OIL SEAL, IN HUB END. | 28. OIL SEAL, IN HUB END. |



Showing exploded view of hub bearing components in the order of assembly. Upper part is that of front bearings. (Rigid and Spring Frame Models). Lower part is that of rear bearings (Spring Frame Model only)

Rigid Frame Models identical parts for steps 25 to 27

- 1 CIRCUP
- 2 WASHER, METAL, OUTSIDE OIL SEAL
- 3 OIL SEAL
- 4 SPRING OIL SEAL ENCLOSING OIL SEAL
- 5 WASHER, METAL, BETWEEN OIL SEAL AND TAPER BEARING
- 6 OUTER ROLLERS IN CAGE, 2 SETS, THESE ARE NOT SUPPLIED SEPARATELY, ALSO ROLLERS ARE NOT SUPPLIED SEPARATELY
- 7 WASHER, METAL, BETWEEN OIL SEAL AND TAPER BEARING
- 8 OIL SEAL
- 9 CUR, BEARING, FOR OIL SEAL
- 10 ADJUSTING RING
- 11 LOCK NUT, FOR ADJUSTING RING
- 12 CIRCUP
- 13 WASHER, METAL, OUTSIDE OIL SEAL
- 14 OIL SEAL
- 15 SPRING OIL SEAL ENCLOSING OIL SEAL
- 16 WASHER, METAL, BETWEEN OIL SEAL AND SPACE
- 17 SPACE BETWEEN OIL SEAL, WASHER AND TAPER BEARING
- 18 TAPER BEARING, OUTER CUP CAGE FOR ROLLERS AND ROLLERS, THESE ARE NOT SUPPLIED SEPARATELY, ALSO ROLLERS ARE NOT SUPPLIED SEPARATELY
- 19 SPACE BETWEEN INNER CUP
- 20 TAPER BEARING, OUTER CUP CAGE FOR ROLLERS AND ROLLERS, THESE ARE NOT SUPPLIED SEPARATELY, ALSO ROLLERS ARE NOT SUPPLIED SEPARATELY
- 21 SPACE BETWEEN OIL SEAL WASHER AND TAPER BEARING
- 22 WASHER, METAL, BETWEEN OIL SEAL AND TAPER
- 23 OIL SEAL
- 24 CUR, BEARING, FOR OIL SEAL
- 25 ADJUSTING RING
- 26 LOCK NUT, FOR ADJUSTING RING
- 27 NUT, EXTERNAL, FOR REAR WHEEL SHOCK
- 28 CUR, FOR REAR WHEEL SHOCK, THIS IS FOR REAR
- 29 KEYWAY, TO ACCOMMODATE KEY LOCATING AND LOCKING WHEEL SHOCK
- 30 REAR WHEEL SHOCK CENTER WHEEL
- 31 KEYWAY, TO ACCOMMODATE KEY LOCATING AND LOCKING WHEEL SHOCK
- 32 RING, FOR REAR WHEEL SHOCK, THIS IS FOR REAR
- 33 NUT, EXTERNAL, FOR REAR WHEEL SHOCK

TO DISMANTLE A REAR WHEEL BEARING

These instructions have reference to the lower part of illustration 21.

Remove wheel from machine.

Remove brake cover plate, with brake shoes, centre solid spindle with cone, spacers, bushes, nut and speedometer gear box.

Turn to left-hand side and slacken lock nut (26).

Can slightly unscrew the adjusting ring (25) and take it away with the lock nut (26) still on it.

Turn to the right-hand end of the hub and carefully apply steady pressure on the visible steel washer (avoiding loading the circlip that can be seen in the hub end), so that, in turn, the cup bearing (34) for the oil seal, the oil seal (23), the metal washer (22) that is behind the oil seal, the adjusting ring (21) that is between the metal washer and the taper bearing, and outer cup (30) are ejected. These may be allowed away as they emerge.

The rollers in cage (20), the centre spacer (19) and the rollers in cage (18) may now be lifted out of the hub.

Turn to the right-hand end of the hub, carefully apply steady pressure to the visible washer (avoiding loading the circlip that can be seen in the hub end), so that the tapered roller bearing assembly of oil seal and outer cup is pushed a little further into the hub shell. This will take off pressure on the circlip, thereby making its extraction very easy.

Remove circlip (12).

Through the right-hand end of the hub, carefully apply steady pressure to the inner edge of the outer cup (18) so that it is forced out of the hub.

As it emerges, it will push, in turn, out the oil seal plate washer (14), the oil seal (15) which is pushing the taper roller (13), the oil seal internal plate washer (11) and the adjusting ring (7) between the metal washer and the taper bearing, so as finally followed by the cup (30).

The dismantling is then completed.

As with, reverse the above procedure, remembering that, after cup (18) has been removed, washers (14), oil seal (15), roller (13) and washer (11) have been inserted in the hub end of the hub, to make the circlip (12) and then carefully to apply steady pressure on the lower edge of outer cup (18) to force the above main assembly tightly back against the circlip (12).

FRONT BRAKE COVER PLATE

It is most important the front brake cover plate is correctly positioned.

It is secured to the frame wheel up side by an inside nut (part number 017003) and an inside washer (part number 015431). Between the inside nut and the brake cover plate is a locking washer (part number 017222).

The lock washer should be positioned so that, when the locking washer is placed next to it, the outside face of the washer is $\frac{1}{16}$ " proud of the outer edge of the brake drum. (Tested by placing a straight edge across the edge of the brake drum.)

The inside nut is fitted so that its hexagonal side is against the brake cover plate.

BRAKE DRUMS

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

The rear wheel brake drum is integral with the rear wheel sprocket and is retained to the wheel hub by five bolts and nuts. Under each nut is a lock washer of the "tab" type and it is essential these are always in position.

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

BRAKE SHOES

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

One end of each shoe bears on a fulcrum fixed in the brake cover plate. The other end accommodates a detachable thrust pin. By inserting washers under a thrust pin its effective height can be increased, thereby compensating for wear on the brake linings.

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 system, a adjustment correct the brake cam to arrange a position whereby the shoe-to-drum clearance is sensibly uniform over its whole, the brake loses efficiency.



Illustration 24

To overcome this a hardened bearing pin is fitted to each shoe to enable packing washer to be fitted under the heel as, and when, required. Wear or shoe thickness additions are provided in the heel too. When wear of the brake linings is taken up in this manner it is then necessary to increase considerably the adjusting nut on the rear brake rod, or screw in the cable adjuster of the front brake cable, and afterwards adjust the brake as described elsewhere.

When a new cable pin has been introduced, it is advisable, when most ready, to set the shoe in the brake drum to ensure equal pressure all round. In the case of the front wheel this is best done before adjusting the wheel as the machine, but in the case of the rear wheel it is best done after assembly. If brake shoes are to be used when the brake is applied it is generally an indication the brake shoes are not correctly adjusted.

- (1) Brake shoe thrust pin.
- (2) Thrust pin packing washer.
- (3) Brake shoe.
- (4) Rivet, securing brake shoe lining.
- (5) Brake shoe lining.

Centralize brake shoes, Front or Rear, 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 the spindle.

FRONT BRAKE ADJUSTMENT

Major adjustment of the front brake shoes is made on the brake thrust pins, by fitting packing washers under the pins, as already described.

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

The adjuster is locked in position by a nut.

Adjust front brake by:

Place motorcycle on high stand.

Slacken lock nut on cable adjuster.

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 back the adjuster two complete turns and tighten the lock nut.

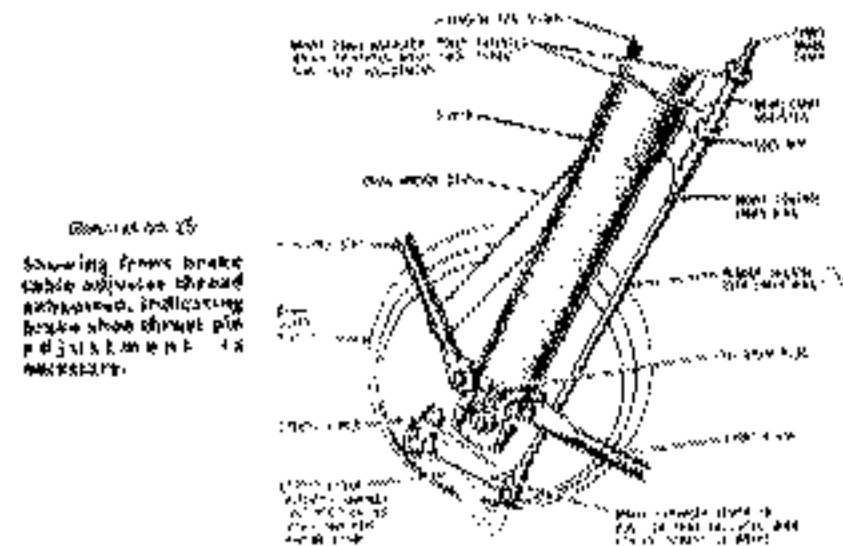


Illustration 25
Showing front brake cable adjuster threaded mechanism, illustrating brake shoe thrust pin adjustment.

REAR BRAKE ADJUSTMENT

Major adjustment of the rear brake shoes is made on the brake thrust pins, by fitting packing washers under the pins, as already described.

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

Adjust rear brake by :

Place machine on centre stand if spring frame, otherwise on rear stand.

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

Then unscrew the adjusting nut two complete turns. (The adjusting nut is automatically locked in position in virtue of the two projecting noses on it engaging in a corresponding slot cut in the clip which connects the brake rod and brake expansion lever and being retained in that position by the spring which secures the rear end of the brake rod.)

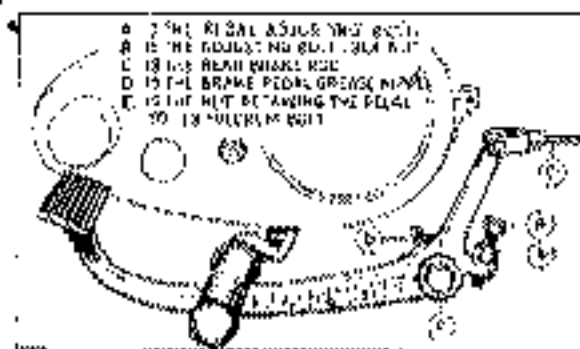


Illustration 26

Shoving the rear brake pedal with the adjusting bolt and lock nut. The adjustment is made by turning the bolt and of the pedal, slacken lock nut. It is a mistake to adjust the bolt. (Check lock nut and adjust bolt.)

(BUSH FRAME MODELS)

BRAKE PEDAL ADJUSTMENT

The position of the rear brake pedal can be adjusted with a screw driver. This is done by means of a hole worked into the heel of the pedal. The adjusting bolt is locked by a nut.

The best position, for normal use, is to position the foot so that, when the brake is "set," it is just clear of the landing plate at the footrest position.

After altering the adjustment of the brake pedal, rear brake adjustment should be checked.

Illustration 27

Shoving brake rod against knurled adjustment. (BUSH FRAME MODELS) (BUSH FRAME MODELS)



RIMS AND SPOKES

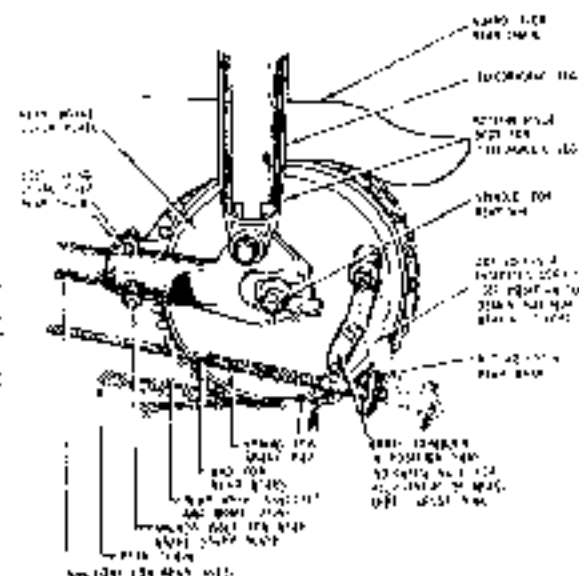
The front and rear rims are each drilled for forty spokes, but they are not interchangeable because the nipple holes in the front rim are smaller than those in the rear rim. See "DATA."

The dimensions of spokes will be found in "DATA."

Illustration 28

Shoving brake rod against knurled adjustment. (BUSH FRAME MODELS)

(BUSH FRAME MODELS)



TYRES AND SERVICE

Obtaining satisfactory life and service from the tyre is largely a matter within the user's control because the foot wears at its correct position. Check tyre pressure with a low pressure gauge at least once a week. Inflate as may be necessary.

Avoid, as necessary, or "stomp" acceleration and fierce braking, which wear out tyres by causing wheel hops and skids.

Do not drive in rain lanes. It is dangerous, especially when wet, and the spring ridges on which rain is caught damage the tyre.

Remove stones, etc., that become embedded in the tread and, if any oil gets on the tyre or spokes clean it off with petrol.

Make sure the front and rear wheels are in track. When the wheel alignment is correct, a piece of thin spring steel held in a track 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 bar, about five feet long, is handy to use for checking wheel alignment. This should be pulled in to the side of spring, parallel to and about four inches from the ground.

Always check the rear chain adjustment, and the rear brake adjustment, after making an adjustment of the rear wheel position.

TYRE REMOVAL

It is no 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.

Remove nut from tyre valve.

Remove the "inside" from tyre valve. This allows inner tube to deflate. Most valve caps have a reduced and slotted top to engage with the valve "inside" in order to unscrew it.

Push edge of cover, that is diametrically opposite to the valve, **RIGHT INTO WELL OF RIM** and, using tyre lever 017007, 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 stems 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 it off all the way round.

TYRE FITTING

Re-fit inner tube and sugar cover by :

Place one edge of cover right into well of rim, with the three valve holes on the cover side adjacent to the valve hole, and, commencing diametrically opposite, and using the hands only, work the cover over the edge of the rim.

Replace the valve " inside " and tightly inflate the inner tube. (Do not distend the tube.) Fix the valve into its hole in the rim and replace the nut, by inserting it on the valve stem about half an inch.

Fill in the inner tube so that it lies snugly in the grooves. Where it is not covered, smear some soapy water round the free edge of the cover. This is a great help in setting and in ensuring the cover eventually joints on the rim and should always be employed if at all possible.

Increase 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, when you are either side of the valve position, the cover will slip into place without excessive exertion. Fitting the joint nearest to the valve last of all.

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

Put into the tyre spin wheel and test for pressure because it is essential the pattern of the tread runs evenly and the cover must be manipulated all that occurs. This presentation of the cover is most important.

It is so required pressure.

Remove the nut from the valve.

Replace the valve cap.

TYRE PRESSURES

The following are correct pressures in pounds per square inch for specified loads per tyre :

Load per tyre, 200 lb.		Pressure 15 lb. per sq. in. and less	
do.	247 lb.	do.	18 lb.
do.	265 lb.	do.	20 lb.
do.	335 lb.	do.	24 lb.
do.	407 lb.	do.	28 lb.
do.	440 lb.	do.	32 lb.

The best method of ascertaining the correct pressure is to actually weigh the loads on the front and rear tyres. This should be done on a weight-bridge and is a service that can usually be provided by British Railways at a Goods Depot or by a Corporation at its Depot.

When the weights are known the table above can then be used.

As a rough guide it may be stated that, with a rider of average weight and with normal equipment, solo, the pressure should be 18 lb. for the front tyre and 22 lb. for the rear.

USEFUL INFORMATION

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.

TRACING TROUBLES

Engine fails to start, or is difficult to start, may be due to :

- Throttle opening too large.
- Air lever in open position, or carburettor in carburettor flange.
- Ignition not set, not off fully advanced position.
- Lack of fuel because of insufficient flooding.
- Lack of fuel because of pipe, or tap, obstruction.
- Excessive flooding of carburettor (with hot engine only).
- Wet or choked.
- Choked up or flooded, sparking plug.
- Loose or engine valve.
- Wet, or broken, valve spring.
- Valve not seating properly.
- Contact breaker loose.
- Insufficient contact points gap.
- Wiper in high-position pickup.
- Pressure on sparking plug.

Engine cranks fast may be due to :

- Overrun, or dead, sparking plug.
- Loose or contact breaker gap.
- Contact breaker points loose.
- Broken or broken, wiper.
- Oil on contact breaker points.
- Weak valve springs.
- Defective packing along wire.
- Excessive resistance, piston supply.

Loss of power may be due to :

- Throttle opening too big.
- Lack of air in tank.
- Weak or broken, valve spring.
- Sticky valve stem.
- Valve not seating properly.
- Brakes adjusted too closely.
- Badly fitting, or broken, piston rings.
- Forced carburettor float.
- Engine mechanism.
- 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 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.
- Stuck up, or fouled, sparking plug.
- Water on high-tension pick-up, or sparking plug.
- Water in float chamber.
- Wand held in petrol tank filter cap closed.

EXCESSIVE OIL CONSUMPTION

Excessive oil consumption may be due to:

- (a) Clogged, or partly clogged, oil filter.
- (b) Slippage, or partial stoppage, in the pipe returning oil from the engine to the oil tank.
- (c) Badly worn, or stuck up, piston rings. (Causing high pressure in the crankcase.)
- (d) Air leak in dry pump sipping system.
- (e) Worn inlet valve stem or guide.

EXCESSIVE PETROL CONSUMPTION

Excessive petrol consumption may be due to:

- (a) Leaks in the petrol feed system. (Damaged hose, washer, loose union, loose tapping, defective float needle action.)
- (b) Incorrect ignition setting. (Ignition too advanced for the engine.)
- (c) Defective engine valve action.
- (d) Incorrect use of air control lever.
- (e) Worn points of carburettor badly worn. (Only possible after very considerable mileage.)
- (f) Bad air leak at carburettor junction.

STEERING UNSATISFACTORY

- Incorrect steering head adjustment. (Too tight or excessively slack.)
- Pitted steering head ball races resulting from poor adjustment.
- Wheels out of alignment.
- Front and/or rear tyre tread not correctly manipulated to run true with wheel (i.e. no noticeable oscillation at low road speed.)
- Damaged frame fork main tubes resulting from impact.

ABNORMAL TYRE WEAR

Abnormal tyre wear may be due to:

- (a) Incorrect tyre pressure.
- (b) Wheels not in alignment.
- (c) Harsh driving methods. (Misuse of acceleration and braking.)

CLEANING THE MACHINE

Do not attempt to rub, or brush, mud off the smaller surfaces because this will soon destroy the finish of the machine. 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 at the engine, carburettor, magneto and other such parts. As a poorer substitute, a bail of water and a sponge may be used.

After washing down with water, the surplus moisture should be removed with a clean cloth, and, when the greasy surfaces are thoroughly dry, they may be polished with a good wax polish and buffed out.

Such parts as the engine crankcase and the gear box may be cleaned by applying paraffin with a stiff brush, and, with a final application of polish, will come up like new.

CHROMIUM PLATING

Under some adverse conditions, a rusty looking deposit may be observed on chrome parts that are chromium plated. This is not ordinary rust (iron's oxide) but is a salt deposit that, in most cases and in its early stages, can be quickly and easily removed with a fine chrome leather. In extreme cases it may be necessary to use a special chromium cleaning compound.

Lack of lubrication will lead to more serious damage.

The latest recommendation for cleaning is to wipe down all chromium plated parts with a soft rag in "TEKALL" which is a latest and best new preventative method in which the wax and paraffin are most carefully. This material, so applied, leaves an almost invisible film over the chromium, or molybdenum and iron can then be used highly recommended to prevent the return of the appearance of their surfaces.

As far as possible, when these conditions do not prevail, chromium parts should be frequently polished with a clean chrome leather and afterwards polished with a soft cloth, or a special oil, with a pressure of the "Water" type.

As a point is made it must be one of the special compounds for chromium plating only. The only tools, polishing liquids, in particular, must not contain any acids, but must contain these, a fine method compound, contain as do, which attack chromium.

NOTE: "Tekall" is a product of 20th Century Finishes Ltd., 175-177, Kingsgate, Wetherfield, and is available in 1/2 pint and 1 pint tins. It can be obtained from our Spare Parts Department, as follows:

- 1/2 pint tin "Tekall," Part number 011957, price 2/6, plus 6d. postage.
- 1 pint tin "Tekall," Part number 011958, price 2/6, plus 6d. postage.

ELECTRICAL SERVICE

ELECTRICAL EQUIPMENT

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

- (1) **IGNITION**—Magneto, High-tension wire and Sparking plug.
- (2) **CHARGING**—Dynamo, Automatic Voltage Control Unit and Battery.
- (3) **LIGHTING AND ACCESSORIES**—Lamps, Horn, Switches and Wiring.

IGNITION CIRCUIT

A LUCAS type N14 magneto is fitted (Type N14 is competitive model) and the only service operation this requires is occasional lubrication of the contact breaker cam and tappet, infrequent adjustment of the contact breaker points and sometimes 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.

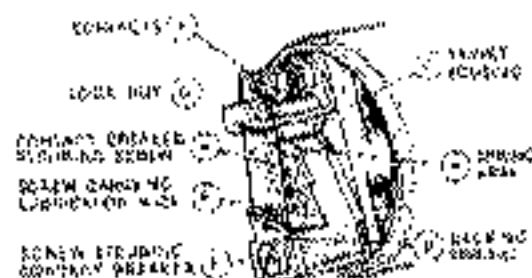


Illustration 28

Showing Contact Breaker

Remove contact breaker by:

Swing away the fly plate revealing the contact breaker cover.

Pull away the contact breaker cover.

Remove the screw B, Illustration 29, releasing the contact breaker from arm A, Illustration 29, in the contact breaker body and ease away the locking spring F, Illustration 29, and the spring arm E, Illustration 29. There is a spring washer under the screw.

Remove the screw B, Illustration 29, carrying the lubrication wick and take away the fibre insulating bush including the screw.

Straighten the tab on the lock washer D, Illustration 29, where the control screw M, Illustration 29, enters the contact breaker body A, Illustration 29, to the adjustment shaft and, with spanner 01751, remove the control screw.

Finally, lever off the contact breaker.

The above instructions do not apply to competition models fitted with Racing Magneto Type N11.

Lubricate contact breaker cam and tappet by:

Remove contact breaker as described on page 76.

Saturate, with a few drops of thin machine oil, the wick mounted in the core of its carrying screw B, Illustration 29.

Push out of the contact breaker body the tappet B, Illustration 29, 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 locking spring F, Illustration 29, is fitted so that its bent over end faces outwards.

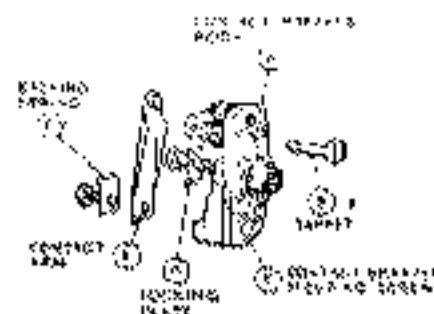


Illustration 29

Showing component details of Contact Breaker

Contact breaker points.

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

Clean contact breaker points by:

Remove the contact breaker cover.

Remove contact. (1, Illustration 29.)

If they are dirty, oily, or pitted, they may be cleaned with a fine carbonadium stone, or very fine emery cloth, and afterwards wiped with a cloth that has been thoroughly oiled.

Cleaning is made easier if the contact breaker spring arm A, Illustration 29, is removed.

Remove the contact breaker spring arm and wipe away any dirt.

Check and adjust contact breaker point setting by:

Remove contact breaker cover.

Turn over engine till the contact breaker points F, Illustration 29, are fully open.

Slide the gauge (part of spanner 01751) between the two contact points. If the setting is correct the gauge should be a snug fit.

If there is an appreciable variation from the gauge slacken the lock nut D, Illustration 29, on the adjusting point and turn the contact point (apply spanner 01751 in 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.

The foregoing instructions do not apply to competition models fitted with Racing Magneto Type N3E.

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. Adjust the engine's decomposition is always an opportune time.

Complete service (disassembly, cleaning, lubrication of the pressure shaft bearings, etc.) should be entrusted to a Lucas Service Station every ten thousand miles.

SPARKING PLUG

The K.L.C. Type FF80 "Granite" Plug is fitted to all models.

It has a thread of 14 wpi. and the reach is 2". The point gap is 0.01". Check the point gap every time the engine is decomposed and, if necessary, reset the points.

See the plug is fitted with its internal sealing washer.

Clean the threads with "Oil Soap" or Graphite paste. (See page 17.)

Firmly tighten the plug by using the standard hex spanner and compare the torque to 51/2-52.1 All this is required is a tight "TIGHT" point. Therefore do not over tighten, which will not make a gas-tight joint (no gas-tight, but can, and possibly will, distort and damage the head of the plug).

Set the gap to 0.015 inch. NEVER TRY TO MOVE THE CENTRAL ELECTRODE. To widen, or narrow, the gap between the electrodes, only move the earth (or base) electrode. Check the gap first in the gap gauge.

If it is too wide, use the earth electrode (the base) and move the central electrode. Use any rough metal tool to do this, provided it is light enough in weight to be controllable.

Check the gap between each top and base when the plugs are in place during the normal run of the engine.

If the gap is too narrow, start with gently lower the base electrode away from the central electrode by using a small screwdriver, and then tap each to the correct position.

Do not move the electrodes apart by forcing anything between them.

For maximum efficiency, plugs should be changed at every 3,000 miles. To ease the plug to allow for cleaning, and for the plug out by using the smaller hexagon on the base not to push down a wire and then using the hex corner to tighten the larger hexagon on the body.

Then tie away the central electrode assembly which should be washed in petrol or paraffin. Then, using buffer cotton glass paper, remove the carbon deposit and wash again.

The central firing point should be cleaned with fine sand cloth. The inside of the body should be scraped clean with a wire and finally rinsed in petrol.

There is an internal washer, between the insulator and its seating in the body. On re-assembly lightly smear this with thin oil and then screw up the plug and nut until it is tight to give a gas-tight joint.

Finally adjust the gap to 0.015" ± 0.001".



K.L.C.



Illustration 22

CHARGING

A LUCAS type B1 N dynamo is fitted. It is anti-clockwise in rotation. The cutting speed is 1250-1500 r.p.m. at 7 volts and at 1,850 to 2,200 revolutions per minute it gives an output of 5 amperes at 7 volts. The replacement part number is 20028A. The positive brush is insulated and the negative brush is earthed. The two external terminals are marked "D" and "F," indicating the respective terminals for the Positive and Field wires that lead to similarly marked terminals on the Regulator Unit.

Inspect commutator and brush gear every 5,000 to 6,000 miles. (Maker's Recommendation.)

Remove the cover band to inspect commutator and brush gear.

The brushes are held in contact with the commutator by means of springs. Move each brush, see they are free to slide in their holders. If dirty, or if sticking, remove and clean with a cloth moistened with petrol. Take care to replace brushes in their original positions, otherwise they will not "bed" properly on the commutator.

After long service, the brushes have become worn to such an extent that the brush holder wire is exposed on the running face, or if the brushes do not make good contact with the commutator, they must be replaced by genuine LUCAS brushes.

The commutator must be free from any trace of oil or dirt and should have a highly polished appearance. Clean a dirty, or blackened, commutator by rubbing a fine dry cloth against it up to the engine is slowly turned over by means of the electric starter. It is an advantage to remove the sparking plug before doing this. If the commutator is very dirty, remove the plug with petrol.

At every 10,000 miles, the complete dynamo should be handed to a Lucas Service Station for disassembly, replacement of worn parts, cleaning and lubrication.

Electrical breakdown of the dynamo is gross, unusual and dangerous before assuming this type of failure, it should be tested as follows.

Check that the dynamo regulator and battery are correctly connected.

To restore the dynamo (see page 82)

Test Dynamo in position by:

- Remove the two wires from the dynamo terminals and connect the two terminals with a short length of wire.
- Start the engine and let it run at normal idling speed.
- Connect the positive lead of a working mill voltmeter (calibrated not less than 0 to 10 volts) to either of the two dynamo terminals and connect the negative lead to a good earth point on the dynamo or engine.
- Gradually increase the engine speed, when the voltmeter reading should rapidly rise and without fluctuations.

Do not allow the voltmeter reading to rise above 10 volts.

Do not allow the engine to be started to increase the voltage. It is sufficient to run up the engine to a speed of 1,000 r.p.m.

If the above testing is obtained the dynamo is in order.

If there is no reading, check the brush gear.

If there is a low reading of approximately 5 volts, the field winding may be at fault.

If there is a low reading of approximately 1 1/2 to 2 volts, the armature winding may be at fault.

If the tests, more or less above, clearly indicate the dynamo is not charging, it is then desirable to remove the dynamo from the machine in order to make further tests and repairs or replacements.

TO REMOVE THE DYNAMO

Remove the fast rest rod and nut on the transmitter side and push rod through until footrest arm on drive side is free to be removed. Remove exhaust pipe and silencer as one unit. (This is desirable but not absolutely necessary)

Place a tray under primary chaincase to catch the oil

Remove chaincase band binding screw and remove metal band.

Remove nut and washer in centre of chaincase when outer half can be taken away.

1. Remove spring clasp, locking plate and nut securing dynamo sprocket and withdraw sprocket with suitable tool. (Use spanner 61775A to hold sprocket while nut is being slackened, it relieves the dynamo shaft of all bending stress).

Detach dynamo cables and loosen dynamo mounting base to full extent.

Twist dynamo by hand until the locating strip on its body is in line with the spring gateway in the rear engine plate holding the dynamo, in which position same can be withdrawn lifting upwards to clear gear box while doing so.

To re-fit the dynamo, reverse the foregoing taking care to accurately locate the dynamo sprocket over the spring gateway. See separate instructions for correct dynamo chain adjustment and refitting outer half of chaincase. Ensure that dynamo sprocket turning nut is well tightened before refitting locking plate and rest side clasp.

The cut-out and regulator unit (A.V.C.), is type MCR-2, and the replacement part number is 12144-A.

Although the voltage regulator and the cut-out are machined separately, they are electrically separate.

The regulator is set to maintain a predetermined generator voltage at all speeds and regulates the output of the dynamo to the battery according to the state of charge of the battery. The charge rate is at its maximum when the battery is discharged, automatically tapering off to a minimum as the battery becomes charged and its voltage rises.

Normally, during daytime running, when the battery is in good condition, the dynamo generates only a small charge so that the ammeter reading will not exceed 1 or 2 amperes and will be discontinuous. The cut-out is an automatic switch which is connected between the dynamo and the battery. When the engine is running fast enough to cause the voltage of the dynamo to exceed that of the battery the switch allows the battery to be charged by the dynamo. On the other hand, when the engine speed is low, or the engine is stationary, the cut-out disconnects the battery from the dynamo, thereby preventing current flowing back from the battery to the dynamo, a phenomenon that would soon cause the battery to become completely discharged.

The regulator and cut-out are accurately set during manufacture. A good general guiding condition, if it found that the battery is running on a low state of charge, or is being constantly over-charged, then the regulator setting should be checked by a qualified electrician and, if necessary, reset. Whenever possible, this should be carried out by a Local Service Depot or Agent.

The A.V.C. Unit is secured to the battery carrier by two bolts with self-locking nuts. Upon assembly these nuts are adjusted to permit flexing of the rubber grommets through which the bolt is pass. The self locking nature of the nuts prevents the grommets slipping off. The four terminals of the A.V.C. Unit are plainly marked by the letters A, B, C, & D. Wires from C and D go to similar marked terminals on the dynamo. The A terminal is connected to one of the ammeter terminals and the E terminal is "earthed."

We specially warn against unskilled meddling with the settings of the regulator and the cut-out contacts.

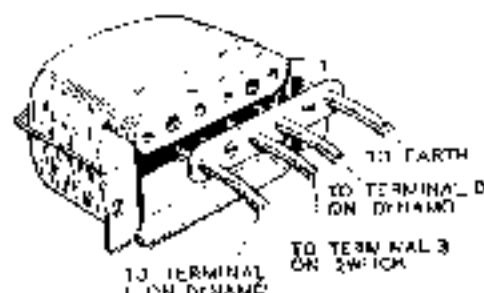


Illustration 32

Showing connections to regulator and cut-out unit Type MCR-2

Later models may be fitted with a new A.V.C. Unit type RE-100, but the foregoing notes will still apply with the exception of terminal grouping which will be R.A.E.2.

Battery

The battery fitted is Lucas type PUW-7E-4. This is a lead acid battery in which the electrolyte is in free liquid form. The voltage is 6 and the capacity is 12 ampere hours.

Maintainance once every 14 days

Remove battery caps, brush off the top of battery and remove vent plugs. (There are three vent plugs.)

NOTE—NEVER bring a naked light near a battery when the vent plugs have been removed, or when the battery is being charged, as the gas given off by the electrolyte is highly explosive.

The specific gravity of the electrolyte indicates the state of charge of the battery. With a fully charged battery the specific gravity of the electrolyte should be 1.280 to 1.300. Check the gravity by means of a hydrometer, and if it is below 1.150 the battery should be charged as soon as possible so the full running of the engine could. If this cannot be arranged, the battery should be charged from an external source.

If the level of the electrolyte is so low that a hydrometer reading cannot be taken, no attempt should be made to take a reading after adding distilled water until the battery has been on charge for at least 24 hours.

NEVER transfer the electrolyte from one cell to another.

NEVER leave a battery in a discharged condition. It must be kept at charge as soon as possible.

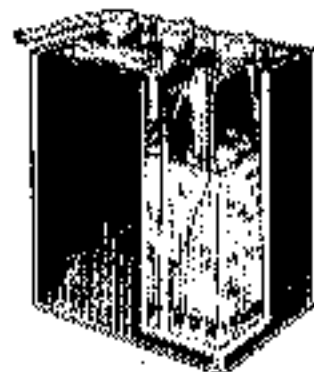


Illustration 33

Lucas PUW-7E-4

Battery

Check if the electrolyte in each cell is level with the top of the separators. Top-up, if necessary, with distilled water. Do not allow the distilled water to come into contact with metals—always only use a glass or earthenware container and funnel.

If a battery is found to need an excessive amount of topping-up, steps should be taken to find out the reason. For example, the battery may be receiving an excessive charge, in which case the regulator setting may need adjustment. If one cell in particular needs topping-up more than another, it is likely the case, or container, is cracked, in which event the battery must be replaced and arrangements made to clean up the battery canister.

Metal parts should be well cleaned and, if possible, washed, with a solution of ammonia, or bicarbonate of soda, in water.

Vent plugs should be kept clean and air passages in them kept free. Re-fix vent plugs tightly.

- Keep the battery, and surrounding parts, particularly the tops of the cells, clean and dry. Brush away any sand or dirt or road sludge.

Battery electrolyte, which contains sulphuric acid in a diluted form, is destructive to practically everything except rubber, lead, glass or earthenware. Therefore, rags used to clean battery tops, etc., should be thrown away afterwards. If put back in the tool box they will cause the tools to rust.

Assuming the temperature of the electrolyte is about 60° F., a test with a hydrometer quickly shows the state of charge, as under:

Reading 1.200 to 1.200 indicates fully charged.

Reading above 1.210 indicates half discharged.

Reading below 1.180 indicates fully discharged.

If the electrolyte exceeds this, 332 must be added to the hydrometer reading for each 5° F. rise to give the specific gravity at 60° F. Similarly, 332 must be subtracted from the hydrometer reading for every 5° F. below 60° F.

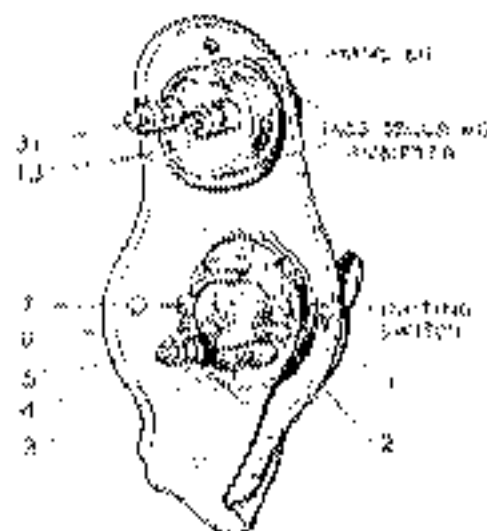


Illustration 14

Showing lamp panel containing ammeter (at top) switch and cable harness.

The ammeter fitted is type CZU 37.

(See page 63 for numbered references.)

LIGHTING AND ACCESSORIES

Headlamp

A LUCAS headlamp is fitted. It has a panel mounted on its top, retained by three screws, in which is the main switch and ammeter and it also supports the cable harness. See Illustration 14. The main bulb has a double filament. One filament provides the main driving beam and the other a dipped beam, brought into operation by the dipping switch on the left handlebar as may be required. The pilot bulb is the same as used in the rear lamp and is mounted outside the reflector. It is carried on a sliding plate which may, after removal of the headlamp rim and light unit, be slid out for bulb replacement.

The reflector and lens glass are made up as one assembly and the two components are not sold as separate spares.

The lamp is fitted with a m.e.l.-lux main bulb. The design of the bulb, and of its holder, is such that the bulb is correctly positioned in relation to the reflector and no adjustment is required when a replacement bulb is fitted.

To remove the headlamp rim and light unit

Loosen the screw on the top of the lamp body at the front, pull the rim outward from the top and, as the front comes away, lower slightly to disengage the bottom tag from the lamp shell. Twist the back panel in a clockwise direction and pull it off, the bulb can then be removed. The light unit is secured to the rim by means of spring clips. These can be disengaged from the turned up inner edge of the rim by prising with a screwdriver blade and, at the same time, working away from the edge.

To replace the headlamp rim and light unit

Line the bulb axle in the rim so that the locating block on the axle back engages with the forked bracket on the rim.

Replace, by springing in, the spring clips so that they are evenly spaced around the rim.

To replace the lens glass engage the protrusion on the inside of the lens shell with the plate in the bezel, push on and secure by twisting it to the right.

Engage bottom tag on lamp body with the small slot in the shell and gently force the top of the front plate against the shell, then work through the locating screw on the top of the lamp body.

Rear lamp

A LUCAS rear lamp is fitted. The body, with bulb holder, is secured to the rear mudguard plate.

Details of lamp bulbs are given in "DATA"

Horn

The horn push switch, situated on the right handlebar,

Fuses

There are no detachable fuses in LUCAS motor cycle electrical equipment.

Snap wire connector

The LUCAS snap connector, as shown in Illustration 35, is made up of four components. Two are tubular sleeves, having pointed extremities, and which are soldered to the ends of the two wires to be connected. The third part is the centre spigot ferrule, into which the two sleeves snap and the fourth component is a rubber sleeve which covers the whole connector. This rubber sleeve serves the dual purpose of insulating the various metal parts and also preventing same from separating as the result of vibration.

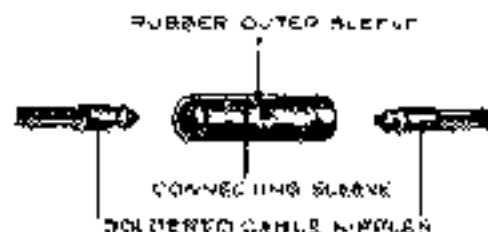


Illustration 35

Lucas snap connector
Part number 996348

This snap connector is used in the gear lamp wire and another is used in the wire connecting the regulator unit to the output side of the generator in the head lamp.

Screwed wire connector

A LUCAS screwed connector of the type shown in Illustration 36 is used in the wire connecting the terminal of the battery to the input side of the generator in the head lamp. It is made up of four parts. One part, a metal sleeve, is threaded internally and accommodates a nut which is placed on the end of one of the wires to be connected in such a manner that the wire ends protrude through the centre of the sleeve. The third metal part screws into the first and has passing through it the second of the wires to be connected. The wire ends are pressed out and the act of screwing the two threaded parts together binds the ends of the two wires, thereby making a good electrical contact that can be immediately broken off, and which is designed to remove the battery from the circuit. A rubber sleeve encloses the whole assembly, serving the same purpose of insulation and prevention of loss through vibration.

Illustration 36

Lucas screwed wire connector
Part number 971395



Terminals

All 1932 models will have the POSITIVE battery terminal connected to "EARTH".

The earth wires (one from the regulator, the other from the coil or battery) and the high-tension wires (one from the sparking plug and one from the magneto coil) have terminals of the solid screw type having an eye at the extreme end. To make such a connection, it is necessary to bore the end of the wire to $\frac{1}{8}$ inch, pass the terminal over the wire so that the hard end fully covers the reduced core of the terminal and then flatten that part by either pinching it in a vice or by hammering.

The two earth wires, mentioned above, are connected to the "EARTH" by securing them to the left side of the seat lag bolt (which is situated just under the saddle) by means of a washer and a screw. It is essential that the connections are kept clean and the screw must be kept fully tight.

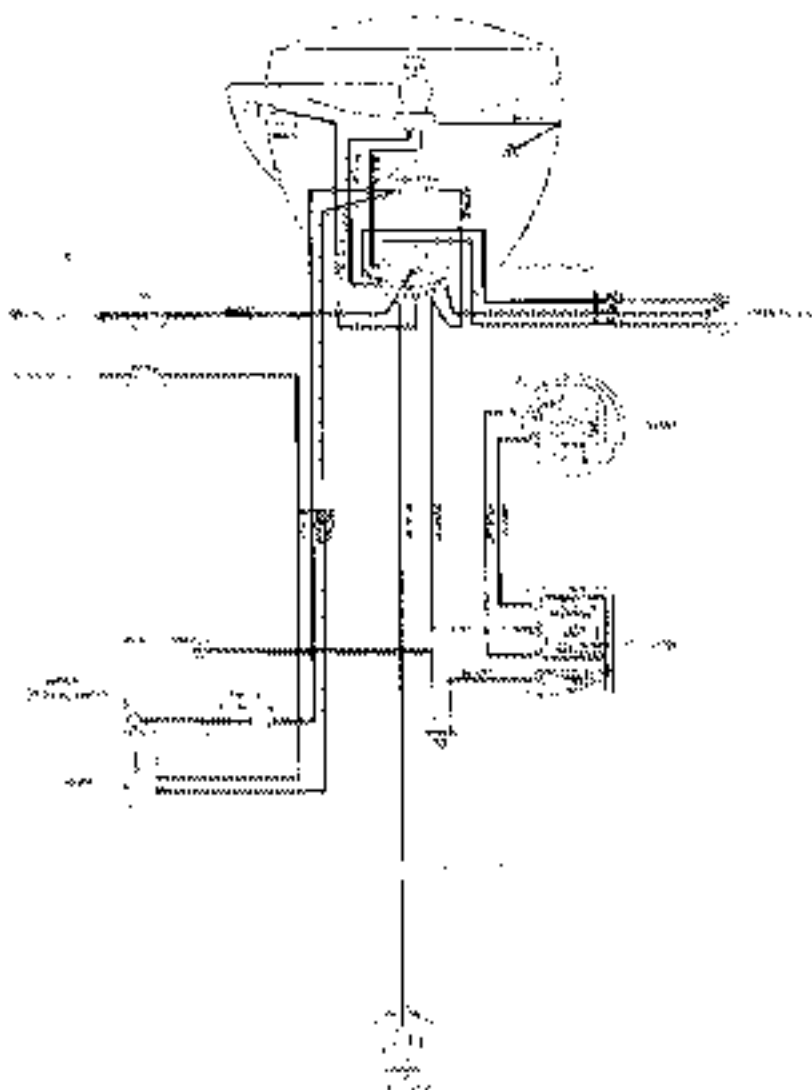


Illustration 47

Wiring diagram

REPAIRS AND SERVICE

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 repair purposes. 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.

Customers desiring that old parts which are replaced with new during the course of overhaul or repair be retained must make this fact known prior to the work being put in hand because, normally, such parts, having no further useful life, are scrapped upon removal.

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 any urgent repair, it is **ESSENTIAL** you **MAKE AN APPOINTMENT** beforehand to **AVOID DISAPPOINTMENT**. This can be done by letter or telephone.

CORRESPONDENCE AND ORDERS

Our machine is equipped with different departments, therefore enquiries or orders on matters relating to more than one department are contained in one letter.

Consequently, it is desirable when writing, dealing with more than one department, to do so in **SEPARATE SHEETS**, each of which should bear your name and address, when writing on a technical matter, or when ordering spares, it is essential to quote the **COMPLETE ENGINE NUMBER**. Some numbers have one or more letters incorporated in them and these letters **MUST BE QUOTED**, otherwise model identification is not possible.

Orders should always be sent in one form and not as part of a letter.

Orders are strongly advised to purchase a spare part just as that specific part becomes due, be quired. Most parts are clearly marked with the model which makes it very easy to recognise the part or parts required.

PROPRIETARY FITTINGS

We do not seem to have any special and for the most reliable, and of good quality, instructions and accessories for the correct equipment of our machines.

Nevertheless, our Guarantee can not cover such parts and, in the event of trouble being experienced, the parts in question should be recovered to the original make, direct from the actual manufacturers who will deal with them on the basis of their respective guarantees.

These manufacturers are:

Carburettors	Messrs. Anderson & Co. Ltd., 10, Market Street, Manchester.
Cams	The Ford & Wadsworth Valve Co. Ltd., Oldham, Manchester.
Electrical Equipment	Messrs. Smith & Sons Ltd., 10, King's Road, London, E.C.4.
Gear Boxes	Messrs. Brown & Forth Ltd., 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.
Spark Plug	K.L.G. Spark Plug Co. Ltd., 10, King's Road, London, E.C.4.
Speedometers	Messrs. S. Smith & Sons (M.A.) Ltd., 10, King's Road, London, E.C.4.
Tires	Messrs. Dunlop Rubber Co. Ltd., 10, King's Road, London, E.C.4.

All the above manufacturers except S. Smith & Sons (M.A.) Ltd., issue instructional literature regarding their products which is obtainable by writing to them.

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 5.55 p.m.—2.0 p.m. to 5.35 p.m. It is closed on Saturdays, 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-constructing 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 below.)

The nearest Railway Station is WOODWICH ARSENAL SOUTHERN REGION 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 Region Railway.

Bus routes 53, 55, 54, 55 and 172. Trolleybus routes 496 and 498, and Tram routes 16, 38 and 48, pass the site of Burrage Road (one minute from the Service Depot).

Bus routes 113, 75 and 161 and Tram routes 44, 46 and 72 serve Boreford Square which is a five minutes' walk from the Service and Repair Department.

Visitors from the North can pass into Woodwich via the Free Ferry between North Woolwich and Woolwich. North Woolwich is a British Railways terminus and is also served by Bus and Trolleybus routes 101, 558, 585 and 586. 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 convenient service. The Southern Railway stage is less than a mile from the Service Depot.

Visitors arriving by road, if they are strangers to the locality, should enquire for Boreford Square, Woodwich. 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 the first turning on the left.

THE DRIVER AND THE LAW

The owner of a motor vehicle **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 correct Certificate covering "ANY DRIVER" and it is advisable to remember that, in the absence of such a provision the penalty for doing so is very heavy.

The driver of a motor vehicle **MUST** hold a correct **DRIVING LICENCE**. If you are a learner and hold a Provisional Driving Licence, your machine must show, front and back, the word "L" plates in red and white and you must not take a **PASSENGER** on board that passenger is the holder of a correct **UNRESTRICTED** driving licence.

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.

Notes and 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.

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. The dealer, from whom the machine is bought, will, generally, attend to all matters legally essential before it is used on the public roads.

To register a new machine

Send to the Local Registration Authority the following:

- Form "RFL/2," duly completed.
- The certificate of insurance.
- The invoice you received from your dealer when you purchased the machine.
- The appropriate registration fee.

In due course you will receive :

- (1) A Registration Book, (Commonly called the "log" book.)
- (2) A Service Card.
- (3) Your Insurance Certificate.
- (4) Your Insurer.

The Australian Bank and the ... force One will bear the ... on ... the ...
been affected to your ... you will also show the ... the ... the ...

Your number plates must then be painted, in white on a dark background, with the registration numbers in characters of even thickness as follows:

The numbers on the front plate are 1 1/2" high, 1 1/2" wide and 3/4" thick with spaces of 1/2" between each two characters.

The numbers on the rear plate must be $\frac{1}{2}$ " high, $\frac{1}{8}$ " wide and $\frac{1}{8}$ " thick with spaces $\frac{1}{4}$ " between each two characters.

The kitchen knife must be sharpened in a water-tight container, using a replacement stone, and this must be fixed to the machine in a sharp corner position, near the top and on the left hand side.

It is not legally necessary to carry your Driving License, Insurance Card/Policy and Registration Book while driving your car. So,

Sequencing

A specimen of PLANT or FLOWER and a PHOTO BE as NEUTRALIZED as it is possible
will need to be obtained before making up film.

Length

During the official "LIGHTING UP" hours the ship is must exhibit a white light facing forwards and a red light facing rearwards. The 100' horizon plate must be adequately illuminated by a white light.

Each electronic light bulb **MUST** be marked with its "Wattage." (Rebate is 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.

GUARANTEE

WE GIVE THE FOLLOWING GUARANTEE WITH OUR MONOCYCLE, MONOCYCLE COMBINATIONS AND ACCESSORIES, WHICH IS GIVEN IN PLACE OF ANY IMPLIED CONDITIONS, WARRANTIES OR LIMITING WHATEVER, LIABILITY OR OTHERWISE, ALL SUCH IMPLIED CONDITIONS, WARRANTIES AND LIABILITY BEING IN ALL CASES EXCLUDED. ANY STATEMENT, DESCRIPTION, CONDITION OR REPRESENTATION CONTAINED IN ANY CATALOGUE, ADVERTISEMENT, LIST OR OTHER MATERIAL SHALL NOT BE CONSIDERED AS ENLARGING, VARYING OR OTHERWISE THIS GUARANTEE. IT IS THE MAXIMUM EXTENT TO WHICH HAVE BEEN USED FOR: (1) "MONOCYCLE" PURPOSES OR (2) AS MONOCYCLE AND/OR ACCESSORY USED FOR ANY OTHER USE. UNDER TRACKER OR GREAT TRACK NUMBER OR COMBINATION FOR THE COMPANY IS ONE OF THE SEVERAL TYPES OF WHICH IS WHICH IS CHANGE IS MADE FOR ADDITION OR TAKE PART IN OR VIEW THE COMBINATION OF MONOCYCLE RIGHT WITH THE TRACK MARK, NAME OR MONOCYCLING NUMBER, THE BEST NUMBER. AN GUARANTEE, CONDITION OR WARRANTY OF THE KIND IS GIVEN BY IT TO BE LIMITED.

[illegible]

The term "divorce" is not included because others can follow any path.

- [illegible]

[illegible]

CONDITIONS OF GUARANTEE

[illegible]

Two of symphonies will be played, each ending with the song "The Rock of the Church", and the dancers will be playing guitars, mandolins or lutes or they will not be playing at all.

We do not guarantee optimal results in terms, add-on, the to electrical equipment, time, etc., or any component parts included in the order of the Purchaser differing from standard specifications approved by the manufacturer, manufacturer combination, a defect or otherwise.

TOOLS AND SPECIAL EQUIPMENT

TOOLS

The standard tool kit, issued with each new machine, contains:

1	017253	Tool bag.
1	017114	Tyre inflator.
1	017007	Tyre lever.
1	017248	Pliers.
1	011188	Gudgeon pin circlip pliers.
1	017256	Screwdriver.
1	017246	Grass shears.
1	017249	Adjustable wrench.
1	017252	Locking plug hex spanner and ratchet bar.
1	017224	Cranks spanner and clutch spring nut key.
1	010178	Double end spanner, 1-1/4 in. by 1-200 in.
2	017052	Double end spanner, small.
1	017053	Double end spanner, large.
1	017251	Contact point spanner and gauge (Type 9).
1	017251	Contact point spanner and gauge (Competition).
1	017220	Double end spanner.
1	018055	Handball or screw cap.
1	018151	Oil glass spanner for petrol tank.

OPTIONAL EQUIPMENT

The following items of optional equipment are available. They are described and priced in the Spares List.

- Air cleaner.
- Mudguard type piston seal.
- Piston foretraps, bolted on, to hold up when one or two are splintered damaged for three machines. (Not on competition model).
- Detachable luggage carrier. (Tool box compressor only).
- Filling disc, 018045. A circular filling disc, produced by degrease and made at normal. A very useful device.
- Valve holder for valve grinding. Part number 017451.
- Valve spring compressor. Part number 018076. (See page 29).
- Engine frames and bags for saving fuel and engine models.

SPARES LIST

An illustrated and priced spares list is available at a cost of 2/- post free. (See page 29).

GASKET SETS

For convenience in ordering, standard sets of engine washers and gaskets as well as the washers used in the petrol and oil feed systems are stocked. Full details of contents and prices are included in the Spares List.

BADGES

Fast monogram badges are now available at a cost of 1/6, plus 6d. postage. They can be supplied as a tie pin, as a brooch or for fitting in a button hole. When ordering state type required.

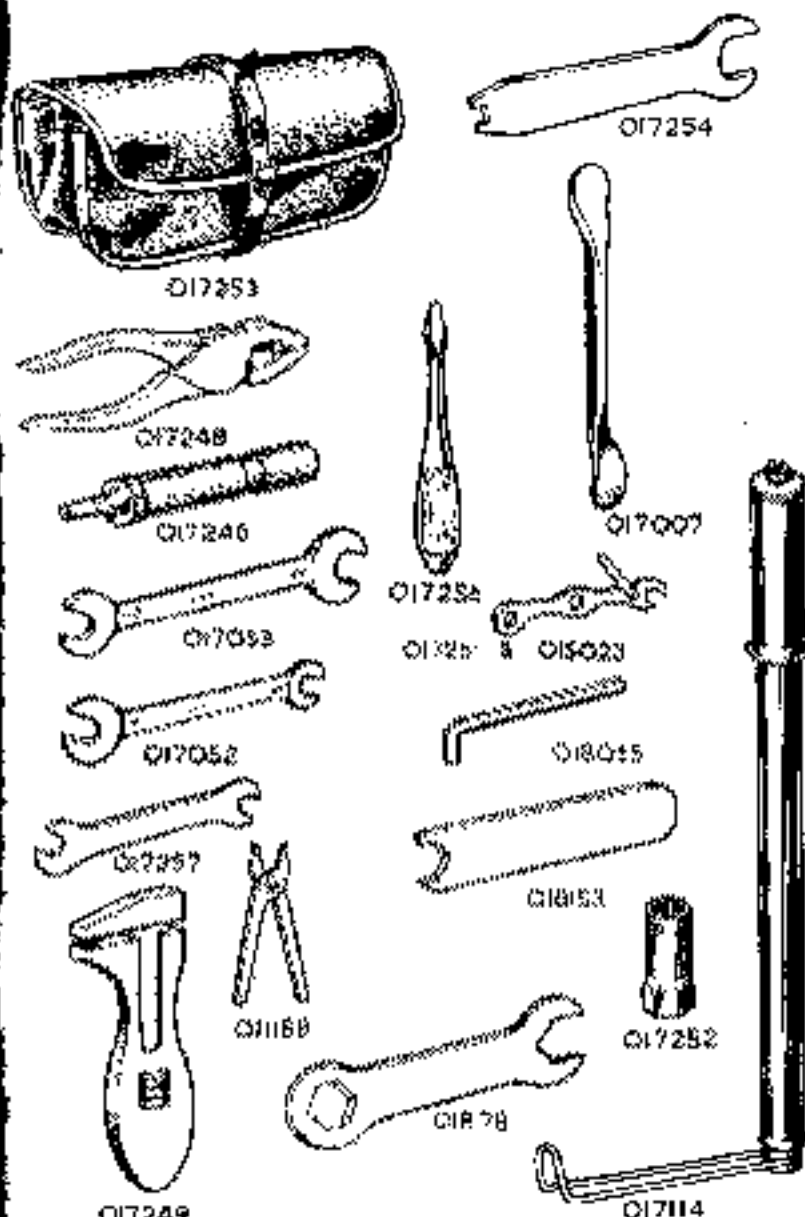


Illustration 36

INDEX

Carburetor Service	39
Controls	8
Data	4
Driving	10
Electrical Service	76
Engine Service	26
Free Service	25
Fork and Frame Service	52
Guarantee	89
Introduction	2
Lubrication	15
Lubrication Chart	22
Maintenance	23
Service	87
Rear telescopic legs	58
Repairs and Service	86
The Law	87
Tools and Special Equipments	90
Transmission Service	42
Useful Information	73
Wheel, Brake and Tyre Service	62



SPARES AND SERVICE DEPARTMENTS

HOURS OF BUSINESS FOR CALLERS

MONDAYS	8.30 a.m. to 12.55 p.m. 2.0 p.m. to 5.30 p.m.
TUESDAYS	Ditto
WEDNESDAYS	Ditto
THURSDAYS	Ditto
FRIDAYS	Ditto

NOT OPEN ON NATIONAL HOLIDAYS

ILLUSTRATIONS

	Illustration	Page
Battery	33	81
Brake adjustment front	25	69
Brake adjustment rear (rigid frame)	27	70
Brake adjustment rear (spring frame)	28	71
Brake shoe adjustment	24	68
Brake pedal adjustment	26	70
Carburettor	15	38
Crank	17	42
Cumulator breaker	29	76
Cumulator breaker details	30	77
Cylinder	1	9
Cylinder and	33	81
Cylinder head	3	17
Cylinder	16	39
Head components details	19	56
Oil chamber details	18	55
Oil tank	16	41
Oil level position	2	11
Oil feeding details	21	66
Oil feed	21	66
Oil starter engagement	1	10
Lower panel	24	63
Leg, telescopic rear	21	58
Lubrication chart	7	31
Oil tank	4	14
Oil pump	14	36
Rear spring frame	20	59
Spark plug	21	79
Valve timing details	8	26
Valve adjustment	13	34
Timing valve, inlet only	17	37
Timing valve, exhaust only	12	33
Valve	28	91
Valve lubrication	6	18
Valve spring compressor	9	29
Wire connector, wedge type	25	84
Wire connector, screwed type	26	84
Timing diagram	27	95