

CHAS F. THORN & SON, LTD.
PRINTERS
58-64, Wellington Street
WOOLWICH, S.E.18

MAINTENANCE MANUAL AND INSTRUCTION BOOK

for

500 c.c. O.H.V.

"SPRINGTWIN"

VERTICAL TWIN
(MODEL 20)

1950



A·J·S
MOTOR CYCLES
PROPRIETORS: ASSOCIATED MOTOR CYCLES LIMITED
PLUMSTEAD · LONDON · S.E.18



Price :
TWO SHILLINGS and SIXPENCE

EDITION CM-II

WHEN CORRESPONDING REGARDING
SERVICE OR 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.

MAINTENANCE MANUAL AND INSTRUCTION BOOK

for
A·J·S
“SPRINGTWIN”
500 c.c. VERTICAL TWIN
(MODEL 20)



Compiled and Issued by the Manufacturers :

A·J·S 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 : ICANHOPIT-WOL-LONDON"

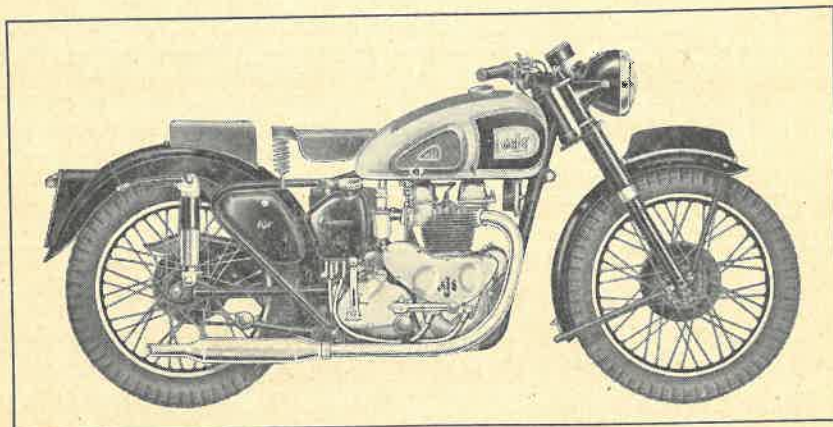
Telephone : WOOLWICH 1223 (5 Lines)

Codes : A.B.C. 5th and 6th Edition ; Bentley's ; and Private Codes

All correspondence to :—
A·J·S MOTOR CYCLES, PLUMSTEAD ROAD, LONDON, S.E.18

Price : TWO SHILLINGS and SIXPENCE

EDITION CM-II



A·J·S "SPRINGTWIN"

VERTICAL TWIN

Bore 66 m.m. Stroke 72·8 m.m. Capacity 498 c.c.

INTRODUCTION

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

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

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

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

A·J·S MOTOR CYCLES

DATA

Identity

Make	...	...	...	...	...	...	...	...	...	A·J·S
Model	...	...	...	...	...	...	...	...	...	"SPRINGTWIN"
Engine number	...	...	...	...	...	...	...	...	...	On crankcase in front of left cylinder
Frame number	...	...	...	...	...	...	...	...	...	On seat lug of main frame, right side (below saddle)
Number of cylinders	...	...	...	...	...	...	...	...	...	Two
Bore (nominal)	...	...	...	...	...	...	...	...	...	66 mm. (2·6 ins.)
Stroke	...	...	...	...	...	...	...	...	...	72·8 mm. (2·868 ins.)
Engine capacity	...	...	...	...	...	...	...	...	...	498 c.c. (30·459 cu. ins.)

THE MEASUREMENTS IN THE FOLLOWING DATA GIVE, IN MANY INSTANCES, OUR HIGH AND LOW MACHINING LIMITS. IN THOSE CASES THE HIGH LIMIT IS INDICATED BY (H) AND THE LOW BY (L)

Axles

Journal diameters of

Camshaft	Crankshaft roller bearing	Crankshaft centre bearing	Rocker spindle
1 3/16 in. - .00175 in. (H) 1 1/16 in. - .00225 in. (L)	1 3/8 in. + .0002 in. (H) 1 3/8 in. - .0003 in. (L)	5/8 in. + .00125 in. (H) 5/8 in. - .00075 in. (L)	1/2 in. - .001 in. (H) 1/2 in. - .002 in. (L)

The gear box main shaft is 10 1/2 inches in overall length

Bearings (ball and roller)

Location	Internal diameter	External diameter	Thickness	Part number
Crankshaft roller bearing	1 3/8 in.	3 in.	1 1/8 in.	011543
Gear box main gear ball bearing	1 5/8 in.	62 mm.	16 mm.	177-X-1
Gear box main shaft ball bearing	17 mm.	40 mm.	12 mm.	68-X-1

Bearings (split)

Location	Internal diameter	Part number
Crankshaft centre bearing	1·62625 in. (H) 1·62575 in. (L)	011547
Crankpin journal bearing (big-end)	1·62625 in. (H) 1·62575 in. (L)	015071

Bearings (bushes)

Location	Internal diameter	Part number
Camshaft bushes	1 1/8 in. + .001 in.	011654 & 010474
Rocker bushes	.5005 in.	014245
Layshaft bushes	.6125 in. + .001 in.	181-X-1

Brake liners

Length	Width	Thickness	Radius	Quantity off	Part number
6 5/8 in.	7/8 in.	3/16 in.	3 1/2 in.	4 (2 per brake)	3836-2

Brake liner rivets

Diameter	Length	Material	Type	Head	Quantity per liner	Part number
1/8 in.	3/8 in.	Copper	Tubular	Tinmans No. 11	6	STD-113

Capacities

Location	British	Metric
Engine	30.459 cub. in.	498 c.c.
Gear box	1 pint	568.2 c.c.
Front fork (each side)	10 fl. ozs.	284 c.c.
Rear leg (each leg)	1 3/8 fl. ozs.	50 c.c.
Rear wheel fork hinge bearing	1 1/2 fl. ozs.	42.6 c.c.
Fuel tank	4 gallons	18 litres
Oil tank	4 pints	2.275 litres

Carburettor

Type	76AG/IAU
Main jet size	180
Throttle valve size	6/3
Jet taper needle position	Centre notch

Connecting rod

Internal diameter small end	Internal diameter big end	Centres	Part number
3/4 +.0005 in. (H)	1.7715 in. (H)	8.75 in.	014134
3/4 -.0000 in. (L)	1.7710 in. (L)		

Chains

Location	Pitch	Width	Links	Part number
Front driving	1/2 in.	305 in.	67	110046-67
Rear driving	3/8 in.	380 in.	98	110056-98

Chain whip

Front driving chain	3/8 inches
Rear driving chain... ..	1 1/8 inches with no load on saddle

Clutch

Clutch thrust rod overall length	10 1/16 inches
Clutch thrust rod diameter	1/4 inch
Clearance between operation fork to nose of clutch lever in kick-starter case	1/32 inch

Crankcase

Internal diameter of crankshaft centre bearing housing	1.7715 in. (H)
	1.7710 in. (L)

Cylinders

Nominal bore	Actual bore	Part number	Compression ratio
66 mm.	2.598 +.0005 (H) -.0005 (L)	011713	7 to 1

Gear box ratios

First gear	Second gear	Third gear	Fourth gear (top)
1 to 2.67	1 to 1.76	1 to 1.28	1 to 1

Gear ratios

Engine sprocket	First gear	Second gear	Third gear	Fourth gear (top)
19	14.7 to 1	9.7 to 1	7.0 to 1	5.5 to 1
20	14.0 to 1	9.2 to 1	6.7 to 1	5.25 to 1
21	13.4 to 1	8.8 to 1	6.4 to 1	5.0 to 1

The standard size of engine sprocket is the 20 tooth sprocket

Gudgeon pin

External diameter	Length
.7499 in. (H)	2.232 in. (H)
.7497 in. (L)	2.228 in. (L)

Ignition (magneto)

Make	Model	Type	Rotation	Point gap	Ignition point before top dead centre (with control in fully advanced position)
Lucas	K2F	SHB	Anti-clock	.012 in.	3/8 in. (39°)

Ignition (sparking plug)

Make	Type	Thread	Reach	Point gap
K.L.G.	FE80	14 mm.	3/4 in.	.015 in.

Lighting (dynamo)

Make	Type	Voltage	Rotation
Lucas	E3L-L1-0	6	Anti-clock

Lighting (bulbs)

Location	Type	Voltage	Wattage	Cap	Part number
Head lamp	Double filament	6	24 x 24	S.B.C.	168
Pilot	Single contact	6	3	M.B.C.	988]
Rear lamp	Single contact	6	3	M.B.C.	988
Speedometer	Single contact	6	1.8	M.B.C.	53205

Oversize parts

The following are the only "oversize" variations provided for the 500 c.c. Vertical Twin machine.

Big-end and crankshaft centre main bearings :

First undersize ... ..	.010 below normal
Second undersize ... ..	.020 below normal
Third undersize ... ..	.030 below normal

Journals to be reground to suit

Cylinder re-bore :
.020 inch oversize

Pistons and rings :
.020 inch oversize

Pistons

Top land diameter	Top of skirt diameter	Bottom of skirt diameter
2.582 inches (H)	2.5976 inches (H)	2.5984 inches (H)
2.580 inches (L)	2.5969 inches (L)	2.5969 inches (L)

Piston rings

Description	Diameter	Width	Depth	Quantity per piston
Compression	66 mm.	.0625 in. (H) .0615 in. (L)	.100 in. (H) .092 in. (L)	2
Oil control	66 mm.	.125 in. (H) .124 in. (L)	.100 in. (H) .092 in. (L)	1
Piston ring gap—Normal				.006 inch
Permissible maximum				.030 inch
Piston ring clearance in groove				.002 inch

Spokes

Location	Type	Gauge	Length underhead	Quantity	Part number
Front, left side	Butted	8×10	5 $\frac{3}{16}$ in.	20	011018 (37-X-H51)
Front, right side	Butted	9×11	8 $\frac{1}{8}$ in.	20	011014 (12399)
Rear, left side...	Butted	7×9	8 $\frac{1}{8}$ in.	20	011012 (39-8-H54)
Rear, right side	Butted	7×9	8 $\frac{1}{8}$ in.	20	011012 (39-8-H54)

Speedometer

Make	Graduated in	Maximum speed	Type number
Smith	Miles per hour	120	S-480-3-L
Smith	Kilometres per hour	180	S-480-7-L

Sprockets

Location	Number of teeth	Chain pitch	Chain width	Part number
Engine	19	$\frac{1}{2}$ inch	.305 inch	015203
Engine	20	$\frac{1}{2}$ inch	.305 inch	015204
Engine	21	$\frac{1}{2}$ inch	.305 inch	014294
Clutch	40	$\frac{1}{2}$ inch	.305 inch	7-X-28
Gear box	16	$\frac{5}{8}$ inch	.380 inch	179-X-7
Rear wheel	42	$\frac{5}{8}$ inch	.380 inch	010293

Valves

Location	Diameter of head	Diameter of stem	Seat angle	Part number	Clearance with cold engine
Inlet	1.391 inch	.27975 in. (H) .27875 in. (L)	45°	014163	.006 in.
Exhaust	1.297 inch	.3100 in. (H) .3090 in. (L)	45°	014165	.006 in.

Valve guides

Location	External diameter	Internal diameter	Part number
Inlet valve	$\frac{5}{8}$ in. + .00175 in. (H) + .00225 in. (L)	$\frac{9}{32}$ in. + .0005 in. (H) - .0005 in. (L)	014170
Exhaust valve	$\frac{5}{8}$ in. + .00175 in. (H) + .00225 in. (L)	$\frac{5}{16}$ in. + .0005 in. (H) - .0005 in. (L)	014171

Valve guides are automatically correctly positioned by circlips

Valve springs

Free length	Outer valve spring	Part number	Free length	Inner valve spring	Part number
1 $\frac{3}{4}$ inches		011769	1 $\frac{13}{32}$ inches		011770

Renew valve springs when $\frac{1}{16}$ to $\frac{1}{8}$ inch less than normal free length

Valve timing (with .012 inch rocker clearance)

INLET VALVE	EXHAUST VALVE
Opens before top dead centre ... 35°	Opens before bottom dead centre ... 65°
Closes after bottom dead centre ... 65°	Closes after top dead centre ... 35°

Valve timing pinion

Retained by bolt threaded $\frac{1}{8}$ inch by 20 threads per inch. Right hand thread. Part number 011776.

Weight

Weight of machine with empty tanks ... 391 lbs.

Wheels (tyres)

FRONT TYRE				REAR TYRE		
Size	Pressure for solo	Pressure for pillion		Size	Pressure for solo	Pressure for pillion
26×3.25 in.	18 lb.	18 lb.		26×3.50 in.	25 lb.	27 lb.

Wheels (rims)

Location	Diameter	Width	Gauge	Number of spoke holes	Size of nipples
Front rim	19 in.	2 $\frac{1}{2}$ in.	15	40	.225 inch
Rear rim	19 in.	2 $\frac{1}{2}$ in.	15	40	.250 inch

Wheels (bearing end play)

Bearing end play002 inch

CONTROLS

- (1) **Throttle twist grip.** On right handlebar. Twist inwards to open. When fully closed engine should just idle when hot.
- (2) **Air lever.** Small lever on right handlebar. Pull inwards to increase air supply to carburetter. 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 retard. Retard two-fifths of total movement for starting.
- (4) **Magneto cut-out switch.** Push switch on left handlebar. A press action switch which, when operated, short circuits the magneto, thereby stopping the engine from firing. Place gear foot lever in neutral position before using cut-out switch to stop engine.
- (5) **Clutch lever.** Large lever on left handlebar. Grip to release clutch so that drive to rear wheel is disconnected. Used when moving away from a standstill and when changing gear.
- (6) **Front brake lever.** Large lever on right handlebar. Grip to operate front wheel brake and, for normal braking, use in conjunction with rear brake application.
- (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.** Pedal in horizontal position close to right foot rest. Controls selection of the four speeds, or ratios, between engine and rear wheel revolutions, with a "free," or neutral, position. See illustration 3.
- (9) **Kick-starter lever.** Vertical pedal on right hand side of gear box. Operated to start the engine.
- (10) **Lighting switch.** In top of head lamp. Controls lamps by a rotating lever which has three positions :
 - (1) "OFF" Lamps not on.
 - (2) "L" Pilot bulb in head lamp and rear lamp on.
 - (3) "H" Head and rear lamps on.
- (11) **Ammeter.** In top of head lamp. Indicates flow of electric current, in, or out, of battery. ("Charge" or "Discharge.")
- (12) **Horn switch.** Press switch on right handlebar. Depress button to sound horn.
- (13) **Gear box filler cap.** Located on top edge of kick-starter case cover. Allows insertion of lubricant and access to clutch inner wire.
- (14) **Footrest for rider.** One located each side of machine.
- (15) **Petrol tank filler cap.** Located in top of fuel tank. To release, slightly depress, turn fully to the left, and then lift away. There are two locking positions. The middle position, between the fully tightened down and "lift away" positions, is in the nature of a "safety" device to prevent loss that might be occasioned by unauthorised meddling.
- (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).

- (18) **Dummy grip.** The fixed grip on the left handlebar.
- (19) **Speedometer hand.** The rotating hand in speedometer head. Indicates speed in miles per hour to a maximum of 120 miles per hour. (Certain machines for export have the head calibrated in kilometres per hour to a maximum of 180 k.p.h.)
- (20) **Total mileage recorder.** The top set of figures located in the speedometer dial. Indicates the number of miles (or kilometres) travelled to a total of 100,000 and then automatically re-sets to zero.
- (21) **Trip mileage recorder.** The bottom set of figures located in the speedometer dial. Indicates the number of miles (or kilometres) travelled since the recorder was set to zero. Can be re-set at any time. Used to measure the length of individual trips. The red figures indicate tenths of a mile. Unless re-set, indicates a total of 1,000 miles and then automatically re-sets to zero.
- (22) **Re-set knob.** Protrudes from lower part of speedometer head. Pull and turn to right till "000.0" appears to re-set the trip mileage recorder.
- (23) **Gear indicator.** Mounted on gear change foot lever. Moves under the control of the gear change lever and, when in line with a similar indicator that is rigidly fixed to the kick-starter case cover, indicates when the gears are in the "free," or neutral, position.

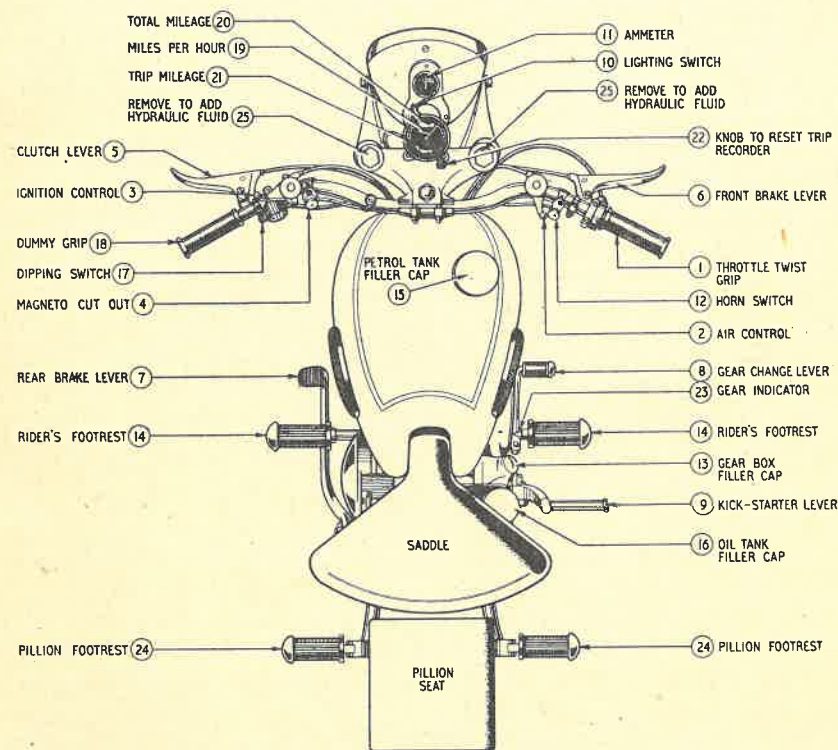


Illustration 1

Showing controls

(24) **Pillion foot rest.** One located each side of machine. Fold upwards to a vertical position when not in use.

(25) **Fork top bolt.** One at top of each fork main inner tube. Must be removed to allow insertion of hydraulic fluid.

All the controls are adjustable for position. 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."

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 (Pool Spirit) is on sale, but it may be that soon the various grades of pre-war petrol will again be available when the use only of best quality fuel is recommended because the small amount of economy that might be considered to accrue by using the cheaper grades is more than offset by the advantages obtained by using only Number One grades.

FUEL SUPPLY

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

The tap plungers work horizontally. To open, the hexagon knob (marked "push on") is pushed towards the body of the tap. To close, press the round milled knob (marked "push off.")

Normally, only use the tap on the right hand side of the machine and then the other side will act as a reserve supply. Always re-fuel as soon as possible after being forced to call upon the reserve, and then, at once, close the "reserve" tap.

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

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 inward the hexagonal end of the off side petrol tap slide.
- See that the air control lever is in the fully closed position.
- Fully advance the ignition by seeing the lever is in the closed position and then retarding, by drawing the lever inwards, for two-fifths of its total movement.
- Depress the plunger (tickler) on the top of the carburetter float chamber until it can be felt the chamber is full of petrol.
- Open the throttle not more than one-sixth of the total movement of the twist grip.
- Operate the kick-starter by giving it a long swinging kick and the engine should immediately fire.

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

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

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

After the engine has started, slowly open the air lever until it runs evenly. Then set the throttle so that the engine is running at a moderate speed (neither racing nor ticking over) and allow to warm up. While doing this, check the oil circulation, by looking into the oil tank, as detailed elsewhere.

The machine can then be taken on the road.

NOTE—Do not race up the engine from cold and do not flood the carburetter 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 kick-starter pedal when suction will extinguish the fire.

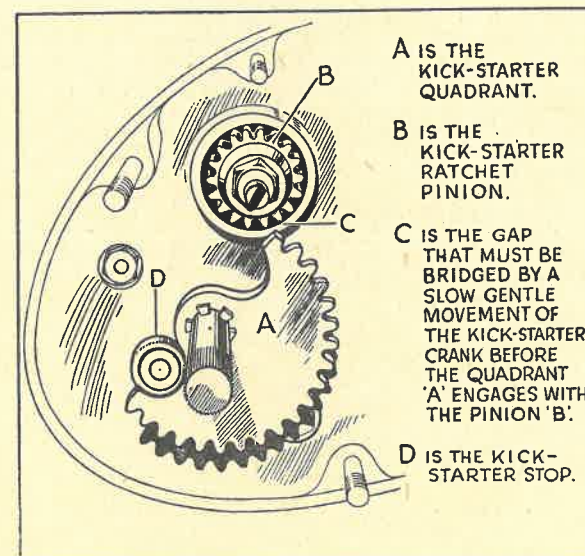


Illustration 2

Kick-starter quadrant and ratchet pinion

STOPPING THE ENGINE

To stop the engine, close the throttle, depress the magneto cut-out press switch on the left handlebar and keep it depressed 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 handlebar and engage first, or lowest, gear.

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

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.

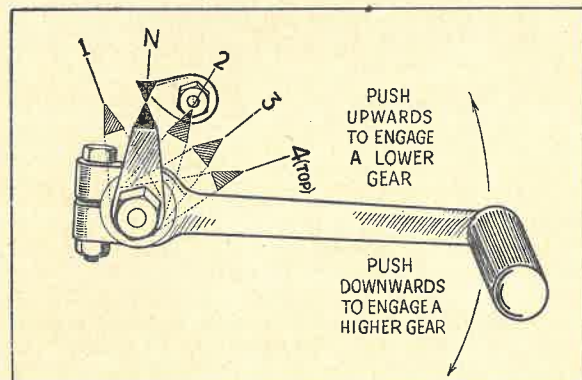


Illustration 3

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

The two indicators are only in line with each other when the gears are in the "free," or neutral, position.

The shaded outlines indicate the positions taken up by the moving gear indicator when the various gears are in engagement.

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

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

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

STOPPING THE MACHINE

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

Before leaving the machine, turn off the fuel supply.

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, the 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, wheel bearings and steering head bearings, all of which tend to bed down in the first hundred miles or so. Particular note must be made of the adjustment of steering head bearings, which, if run in a slack condition, will be quickly ruined. After this bedding down process has taken place, adjustments to such details will probably only be necessary at lengthy intervals.

After about 1,000 miles has 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 mount's maximum capabilities. Restraint in this direction will be amply repaid later.

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 bent 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, until this surplus is cleared, the return flow is very positive and continuous. Therefore, if the oil circulation is deranged, the fact is apparent at once by the lack of a steady return flow.

The oil tank vent pipe stands up in the tank so that its upper open end is also visible on removal of the filler cap and mention of this is made so that it may not be confused with the spout mentioned above.

PILLION PASSENGERS

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

The rear tyre pressure must also be increased to satisfactorily carry any increased load. See "DATA."

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 just jab the foot pedal and then release the clutch lever. When actually in motion, it will be found sufficient to merely free the clutch a trifle, to ease the drive when changing gear and, with reasonable care, changes of gear then can be made without a sound.

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

When changing up to a higher gear, as the clutch is freed, the throttle should be slightly closed so that the engine speed may be reduced to keep in step with the higher gear ratio. Conversely, when changing down to a lower gear, the throttle 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 clutch must only be used when starting from a standstill and when changing gear. It must **NOT** be operated to ease the engine, instead of changing gear, or be held out, in order to "free-wheel."

When travelling slowly, such as may occur in traffic or on a hill, and the engine commences to labour, it is then necessary to change to a lower gear. Engine "knocking" or "pinking" and a harshness in the transmission are symptoms of such labour and although relief can sometimes be found by retarding the ignition, it is generally much better to change down. A good driver is able to sense such conditions and will make the change before the engine has reached the stage of distress. The gear box is provided to be used and consequently full use should be made of the intermediate gears to obtain effortless running and smooth hill climbing.

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

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

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.

Do not operate the magneto cut-out switch when the engine is driving the machine.

IMPORTANT NOTICE

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



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	
Mobiloil B.B.	(SAE-50)	Mobiloil A	(SAE-30)
Triple Shell	(SAE-50)	Double Shell	(SAE-30)
Essolube 40	(SAE-40)	Essolube 30	(SAE-30)
Prices Energol 40	(SAE-40)	Price's Energol 30	(SAE-30)
Castrol XXL	(SAE-50)	Castrol XL	(SAE-30)

FOR GEAR BOX LUBRICATION

Mobiloil D	(SAE-60)
Triple Shell	(SAE-50)
Essolube 50	(SAE-50)
Price's Energol 60	(SAE-60)
Castrol Grand Prix	(SAE-60)

FOR HUB LUBRICATION AND ALL FRAME PARTS USING GREASE

Mobilgrease No. 2
Shell Retinax Grease C.D.
Esso Grease
Price's Belmoline C
Castrolase Medium

FOR TELEDAULIC FRONT FORKS AND TELEDAULIC REAR LEGS

Mobiloil Arctic	(SAE-20)
Single Shell	(SAE-20)
Essolube 20	(SAE-20)
Price's Energol 20	(SAE-20)
Castrolite	(SAE-20)

FOR REAR CHAINS

Tallow

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

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 cupped nozzle that fits over the grease nipples. In the barrel of the gun, and sliding on the central piston rod, is a cork piston.

The grease must be filled on the **TOP** of the cork piston. The gun may be filled by inserting the grease in the barrel of the gun by means of a lath or similar "spoon."

However, it is better to obtain the grease packed in the special containers that are supplied, having loose collars in which are holes so that, by placing the barrel of the gun over the hole of the central floating plate and pressing downwards, the gun is instantly charged with grease. Twisting the gun, and, at the same time, taking it away from the floating plate, leaves the top of the gun barrel flush with grease, and then all that remains to be done is to replace the screwed top cap.

ENGINE LUBRICATION SYSTEM

This is of the **dry sump** type. Two separate gear type oil pumps are used, one for delivery and the other for returning oil to the tank. Oil feeds by gravity to the delivery pump, by which it is forced, under pressure, to various parts of the engine, from whence it drains back to the crankcase sump to be collected by the return pump and returned to the tank. The return pump has a much larger capacity than the delivery pump to ensure that the crankcase is kept clear of excess oil.

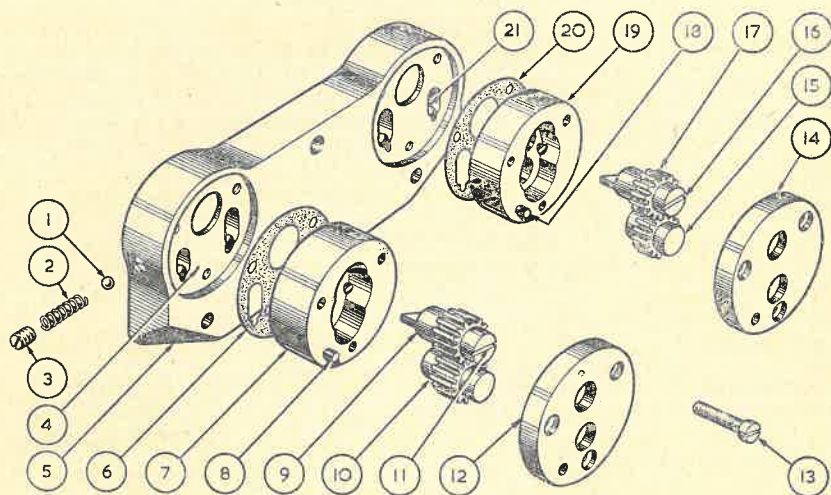


Illustration 4

Showing Delivery Oil Pump (on the right) and the Return Oil Pump (on the left)

- | | |
|--|---|
| 1 BALL, FOR NON-RETURN VALVE. | 12 COVER, FOR OIL RETURN PUMP BODY. |
| 2 SPRING, FOR NON-RETURN VALVE. | 13 SCREW (1 OF 6) USED TO RETAIN COVERS AND BODIES OF OIL PUMPS TO THE CARRYING PLATE. |
| 3 PLUG, RETAINING NON-RETURN VALVE SPRING AND BALL. | 14 COVER, FOR OIL FEED PUMP. |
| 4 BLEED HOLE. | 15 DRIVEN GEAR, FOR OIL FEED PUMP. |
| 5 PLATE, CARRYING OIL PUMPS. | 16 SCREWDRIVER SLOT, TO ENABLE DRIVING GEAR TO BE CORRECTLY POSITIONED DURING ASSEMBLY. |
| 6 WASHER, PAPER, FOR BODY OF RETURN PUMP. | 17 DRIVING GEAR, FOR OIL FEED PUMP. |
| 7 BODY OF OIL RETURN PUMP. | 18 DOWEL PIN, LOCATING PUMP COVER. |
| 8 DOWEL PIN, LOCATING PUMP COVER. | 19 BODY OF OIL FEED PUMP. |
| 9 DRIVING GEAR, FOR OIL RETURN PUMP. | 20 WASHER, PAPER, FOR BODY OF FEED PUMP. |
| 10 DRIVEN GEAR, FOR OIL RETURN PUMP. | 21 BLEED HOLE. |
| 11 SCREWDRIVER SLOT TO ENABLE DRIVING GEAR TO BE CORRECTLY POSITIONED DURING ASSEMBLY. | |

ENGINE OIL PUMPS

Each pump is independently driven, at half engine speed, from the ends of the two camshafts. They each consist of a pair of close fitting gear wheels in a cast iron body. The gears of the delivery pump are considerably narrower than those of the return pump, giving the latter the necessary extra capacity to ensure efficient scavenging.

ENGINE OIL CIRCULATION

Oil, from the oil tank, is fed by gravity, through a coarse mesh metal filter, via an external pipe, to the suction side of the delivery pump, from whence it is discharged, under pressure, to a large and easily detachable felt filter that is housed in the crankcase.

After passing through the felt filter the main supply is directed to the crankshaft centre bearing and thence, through passages in the crankshaft, to each big-end, the splash from which provides adequate cylinder lubrication.

A by-pass carries an ingeniously divided supply, direct to the camshaft bearings and also to each of the four overhead rocker bearings, the rockers being drilled to allow a small discharge into the cupped ends in which the ball ended valve push rods operate.

A predetermined level of oil is allowed to build up in the timing case to ensure adequate lubrication of the gears, and also in the camshaft tunnels, to ensure adequate lubrication of the cams and cam levers. Upon reaching these determined levels, the surplus overflows into the crankcase, and so to the sump.

The return pump collects all surplus oil from the crankcase sump and passes it, via, another external pipe, through the large felt filter located in the oil tank. (See illustration 5.)

The stream of oil flowing into the tank is instantly visible upon removal of the tank filler cap.

THE OIL TANK

The level of oil in the supply tank should never be allowed to fall below the low level mark and, upon replenishment, should not be higher than one inch from the filler cap orifice, otherwise, when starting the engine, the bulk of oil in the crankcase sump may be greater than the space available in the tank.

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 filters cleaned in petrol and the tank replenished with new oil.

THE OIL FILTERS

There are three filters for the oil.

(A) The metal filter located in the feed pipe in the bottom of the oil tank.

This is a thimble shaped filter of coarse metal mesh inserted, from the exterior, in the short metal feed pipe located in the bottom of the oil tank. It has an open end finished with a turned over metal ring, which, upon the fitting of the tubular rubber sleeve connecting the oil feed pipe to the end of the rigid feed pipe to the engine, is gripped by the rubber sleeve, thereby preventing it from moving from its correct location.

(B) The felt fabric filter located in a chamber in the front part of the crankcase and parallel to the exhaust camshaft.

This is a cylindrical filter made of close grain felt that is supported by a tubular wire cage.

In the inner end is inserted an aluminium seat which effectively closes that end of the cylindrical filter. This seat is a push in fit.

In the outer end is inserted an aluminium plug, or valve, which acts as a relief valve, allowing the oil to escape if, for any reason, it cannot percolate through the felt fabric. In normal conditions this valve does not operate but, if for example, the cleaning of the filter had been neglected to such an extent that it was so clogged the oil could not pass through it in the volume supplied by the pump, then the valve would lift to give immediate temporary, or permanent, relief, as may be necessary.

(C) The large close grain felt cartridge, located in the oil tank through which all oil returning from the crankcase sump is compelled to pass.

CLEANING OIL FILTERS

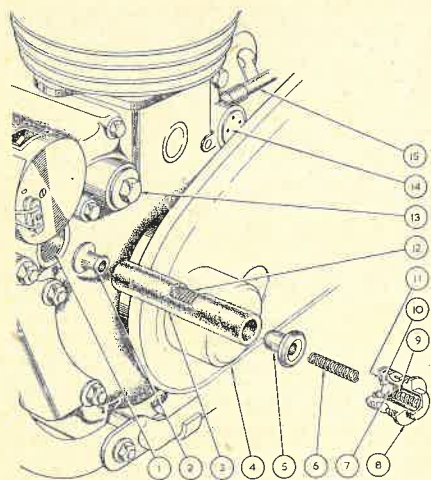
To remove and clean the feed pipe metal filter :

Release the engine end of the oil feed pipe. (This leads from the rear outlet in the base of the oil tank to the forward banjo connection on the timing side of the crankcase.) Then remove the oil feed pipe by withdrawing the rubber connecting sleeve from 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 ringed open end and pulling away.

After removal the filter should be cleaned in petrol and allowed to dry before re-fitting.

Reverse the above procedure to re-fit the filter and pipes.



- 1 HOUSING (PART OF CRANKCASE) FOR OIL FELT FILTER.
- 2 SEAT, FOR OIL FELT FILTER.
- 3 FELT FABRIC FILTER.
- 4 FRONT CHAIN CASE.
- 5 RELIEF VALVE, FOR FELT FABRIC FILTER.
- 6 SPRING, FOR FELT FILTER RELIEF VALVE.
- 7 BALL, FOR NON-RETURN VALVE.
- 8 CAP, FOR FELT FILTER HOUSING.
- 9 SPRING, FOR NON-RETURN VALVE.
- 10 CIRCLIP, RETAINING NON-RETURN VALVE SEAT.
- 11 SEAT, FOR NON-RETURN VALVE.
- 12 WIRE FORMER, OR SUPPORT, FOR FELT FABRIC FILTER.
- 13 CAP, FOR OIL DISTRIBUTOR HOUSING.
- 14 CAP, FOR RELEASE VALVE HOUSING.
- 15 PIPE, FROM RELEASE VALVE TO OIL TANK.

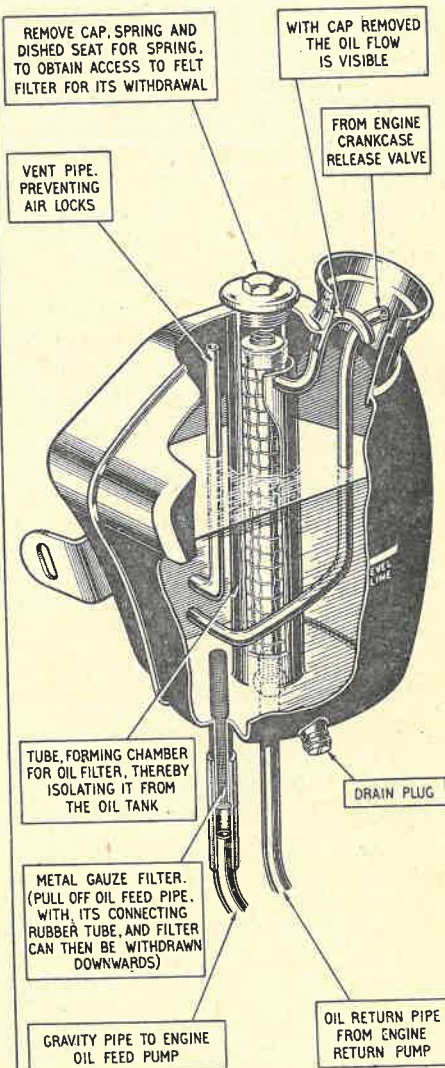


Illustration 5

Showing locations of felt filters

To remove and clean the felt crankcase fabric filter :

Unscrew the hexagonal headed plug just beneath the dynamo on the drive side of the crankcase, and gently withdraw the spring and aluminium relief valve in which the spring operates.

This will expose the felt fabric filter which can be withdrawn by inserting a finger in the open end. In the other end of the filter is an aluminium seating plug which should be pulled away from the filter. (See illustration 5.)

The filter should be cleaned in petrol and allowed to dry before re-insertion.

The housing tunnel for the filter should also be thoroughly cleaned out with a fluff free rag moistened in petrol.

Reverse the above procedure to re-fit the felt filter and, when doing so, do not forget to replace the aluminium seating plug in the open end of the filter before inserting it in its housing tunnel.

To remove the felt filter located in the oil tank :

Unscrew the hexagonal headed cap on top of the oil tank and lift away the spring and the dished spring seat. The felt filter can then be removed by inserting a finger in the open end and drawing upward.

GEAR BOX LUBRICATION

Use one of the grades of Oils already specified. In no circumstances must 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 fluid ounces 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.

CHAIN LUBRICATION

The front driving chain runs in an oil bath. (Front chaincase). Use engine oil and maintain level to height of the inspection cap opening.

Remove chaincase inspection cap each week, inspect level of oil, add additional oil as may be necessary.

To remove inspection cap, unscrew central screw about four turns, slide cap sideways till back plate can be slipped through the opening and pull away.

Reverse procedure to replace. Centralise cork washer first. It is essential cap is kept tight otherwise it will be lost.

The rear driving chain should be removed for cleaning and lubrication.

Remove, clean in paraffin, drain and wipe, immerse in bath of molten tallow, leave for several minutes, drain and replace on machine. Engine oil is a poor substitute for tallow. If oil is used soak chain in it for several hours.

Lubricate rear chain every 3,000 miles in Summer and every 1,000 in Winter.

HUB LUBRICATION

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

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 end pin and on the threaded portion of brake rod. (One pin on yoke each end of brake rod and on bottom of front 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 parts 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

One grease nipple on Front Frame Head Lug and another on right hand side of Handlebar Lug.

CONTROL LEVER LUBRICATION

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

If twist grip is too stiff : remove two screws binding the two halves of the clip. This releases the grip which may be pulled off the handlebar. Smear handlebar, the drum on which the inner wire is wound and the friction spring on the half clip with grease and replace.

LUBRICATION CHART

The figures in diamond frames refer to parts located on the left hand side of the machine and those in circles refer to parts located on the right hand side.

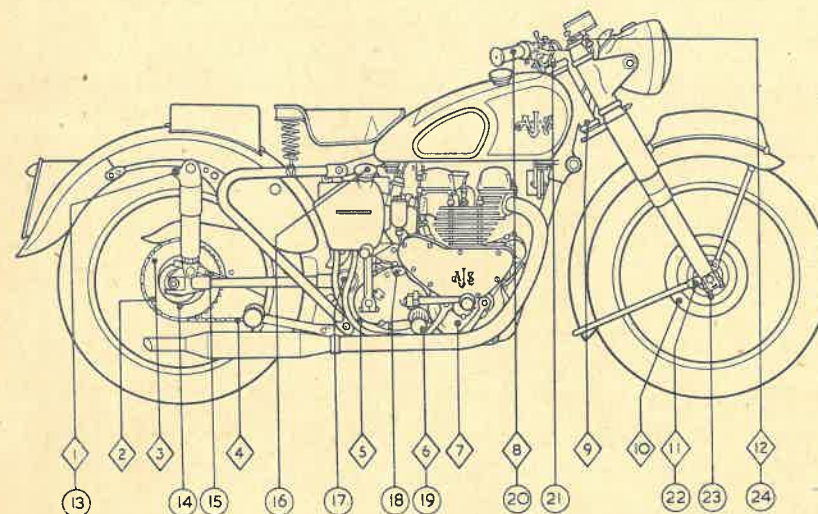


Illustration 6

Lubrication Chart

Engine Oil Locations

- 16 MAIN OIL TANK.
- 7 FRONT CHAINCASE.
- 8 } CONTROL LEVER MOVING PARTS.
- 20 }
- 2 BRAKE ROD JOINTS.
- 6 }
- 11 } FRONT, CENTRE AND PROP STAND
- 19 }
- 22 }
- 17 REAR FORK HINGE.

Hydraulic Fluid Locations

- 12 } FRONT TELEHYDRAULIC FORKS.
- 24 }
- 13 }

Grease Locations

- 23 FRONT HUB.
- 14 REAR HUB.
- 21 STEERING HEAD TOP BEARING.
- 9 STEERING HEAD BOTTOM BEARING.
- 15 SPEEDOMETER GEAR BOX.
- 10 FRONT BRAKE EXPANDER.
- 3 REAR BRAKE EXPANDER.
- 5 BRAKE PEDAL SPINDLE.

Heavy Oil Location

- 18 GEAR BOX.

Tallow Location

- 4 REAR CHAIN.

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

MAINTENANCE

PERIODICAL MAINTENANCE

Regular maintenance attention to lubrication and certain adjustments must be made to ensure unfailing reliability and satisfactory service. This necessary attention is detailed below and owners are strongly recommended to carefully follow these suggestions and to make a regular practice of doing so from the first.

The reference numbers, in brackets, refer to the locations specified on the Lubrication Chart, illustration 6.

DAILY

Petrol tank Check level and re-fill if necessary.

Oil tank Check circulation of oil. (16).

WEEKLY

Oil tank Check level (16) and re-fill if necessary. (16).

Tyres Check pressures and inflate if necessary.

EVERY 500 MILES

Oil tank Drain at first 500 miles and re-fill with new oil and clean felt filter. (16).

Chaincase Check level of oil when machine is standing vertically on level ground when level of oil should not be less than $\frac{3}{16}$ " below bottom edge of inspection orifice. (7).

Rear chain If dry, apply engine oil with a brush. (4).

Battery Inspect each cell for level of electrolyte and top up with distilled water if necessary.

EVERY 1,000 MILES

Oil tank Drain at first 1,000 miles and re-fill with new oil. (16).

Rear chain Remove and soak in molten tallow in bad weather. (4).

Gear box Add 2 fluid ounces of specified oil. (18).

Hubs Inject small amount of grease. (14-23).

Expanders Inject small amount of grease. (3-10).

Steering head Inject small amount of grease. (9-21).

Small parts Smear all moving parts with engine oil and wipe off any surplus. (2-6-8-11-19-20-22).

EVERY 3,000 MILES

Rear chain Remove and soak in molten tallow in Summer. (4).

Brake pedal Inject small amount of grease. (5).

Speedometer Inject small amount of grease into speedometer gear box. (15).

Magneto Oil wick on contact breaker cam.
Clean contact breaker points and re-set gap if necessary.

Plugs Clean sparking plugs and re-set points 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 rocker adjustment and correct if necessary.

EVERY 5,000 MILES

Oil tank Drain and re-fill with new oil. (16).

Filters Clean metal mesh filter in oil feed pipe.
Clean felt fabric filters in crankcase and oil tank.

Magneto Clean as detailed in Electrical section.

Dynamo Clean as detailed in Electrical section.

Front fork Check each side of front fork for hydraulic fluid content and, if necessary, top up. (12-24).

Rear legs Check each leg for hydraulic fluid content and, if necessary, top up. (1-13).

Carburetter Remove carburetter float chamber and clean its interior.

EVERY 10,000 MILES

Magneto and Dynamo Get a **Lucas Service Station** to dismantle, clean, lubricate and generally service.

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 1 p.m.—2 p.m. to 5.30 p.m. It is closed on Saturdays, Sundays and National Holidays.

It exists for the purpose of:—

- Giving technical assistance verbally or through the Post.
- Supplying spare parts over the counter or through the Post.
- Repairing and re-conditioning machines, or parts of machines, of our make.

If it is considered necessary to bring a machine, or parts, to the factory for an urgent repair IT IS ESSENTIAL you make an appointment beforehand to avoid disappointment. This can be done by letter or telephone.

ENGINE SERVICE

TO ADJUST OVERHEAD ROCKERS (Tappet clearance)

Using box spanner 014540, remove all four bolts securing a rocker cover. (It is desirable to deal only with one cover at a time).

Lift off the cover, exposing the rocker.

Using single ended spanner 015264, slightly slack off the nut of the bolt clamping the disc headed end of the rocker spindle. (See note below).

Then slowly revolve the engine, by means of the kick-starter pedal, till well past the position at which the valve closes and then proceed to revolve the rocker spindle until the correct clearance is obtained, whereupon, re-tighten the locking nut and replace the cover. (Inspect gasket under rocker cover and, if damaged, replace with new).

The correct rocker clearance, with cold engine, is .006" for both inlet and exhaust.

It is best to ensure that each piston, in turn, is at the top of its firing stroke when adjusting rocker clearances. The method of obtaining that position is explained in the paragraph dealing with **Timing the Ignition**. This piston position is essential to ensure the cam levers are well clear of the cam quietening curves when adjusting rocker clearance.

It should, perhaps, be explained here that these quietening curves, as they are called, are actually slight inclines from the base circles of the cams to the front of each hump and their object is to slowly take up the clearance between the cam levers and valve push rods before the valves commence to open, thus reducing noise resulting from impact of the cam levers against the faces of the cams.

NOTE—If the rocker spindle clamping bolt nut is unscrewed to an unnecessary extent the rocker spindle will then move sideways, under the influence of the spring washer, and then the thrust washer at the opposite end of the rocker spindle may drop out of exact location and, unless noticed and re-positioned, damage to the flanged end of the rocker spindle may result upon re-tightening the clamping bolt nut. Care to avoid this is necessary. (See illustration 7.)

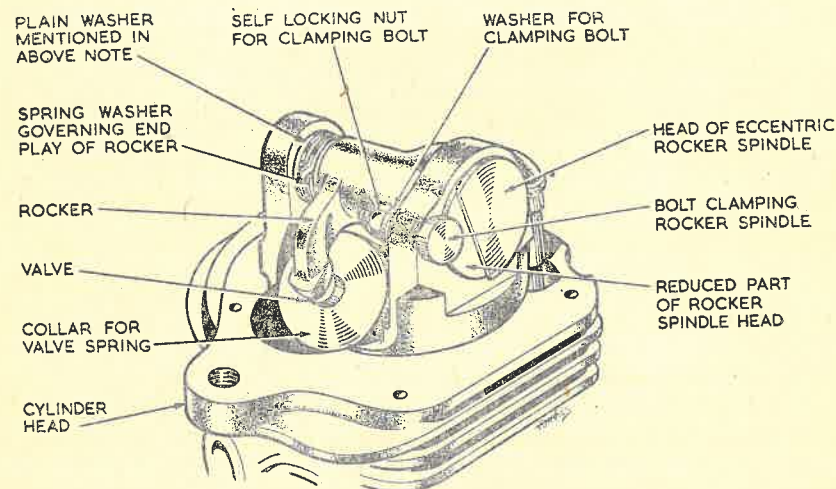


Illustration 7

Rocker Adjustment

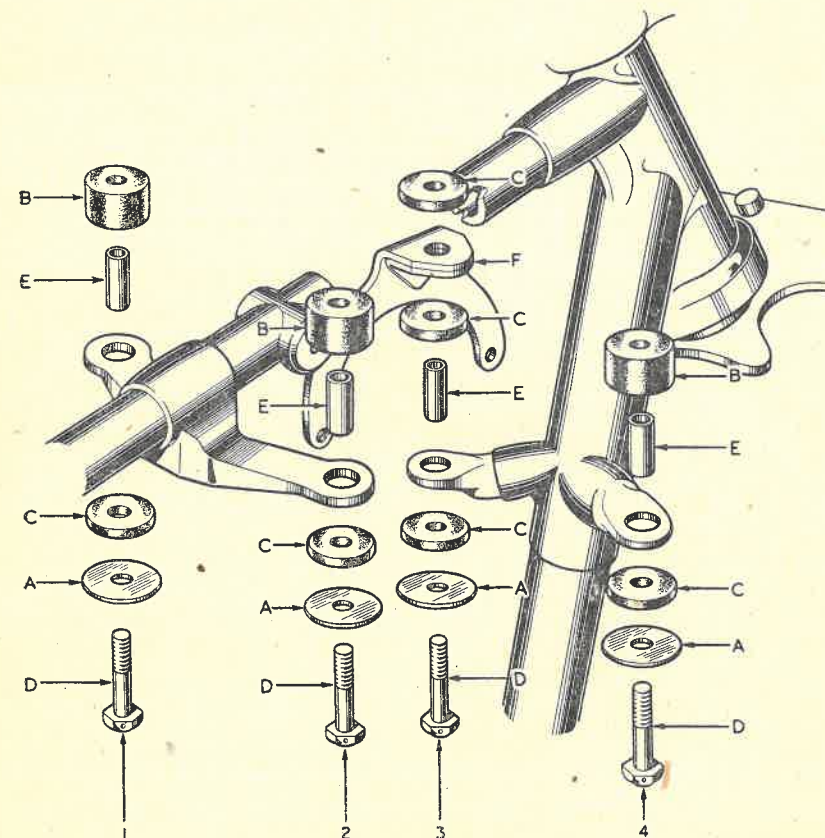


Illustration 8

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

- 1 ... Assembly securing the rear, left-hand side of tank.
- 2 ... Assembly securing the rear, right-hand side of tank.
- 3 ... Assembly securing the front, left-hand side of tank and the electric horn.
- 4 ... Assembly securing the front, right-hand side of tank.

NOTE—Assemblies 1, 2 and 4 are identical.

A ...	Plain metal washer ...	...	...	...	Part number 014999
B ...	Thick rubber pad ($\frac{3}{8}$ in.) ...	...	...	...	do. 014995
C ...	Thin rubber pad ($\frac{3}{16}$ in.) ...	...	...	...	do. 014996
D ...	Tank fixing bolt ($1\frac{1}{4}$ in.) ...	...	...	...	do. 014997
F ...	Sleeve ($\frac{1}{8}$ in.) ...	...	...	...	do. 014998
H ...	Horn bracket ...	...	...	...	do. 015245

For all service work to the upper part of the engine, other than adjustment of the rockers, it is necessary, in order to obtain accessibility, to first remove the petrol tank. The two petrol taps facilitate this operation by removing the need to drain the tank of petrol.

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 should be specially observed so that they may be correctly replaced.

The tank fixing bolts, with rubber and metal washers, in the two rear positions and in the front off-side position are identical.

TO REPLACE THE PETROL TANK

Proceed in reverse order to removal. Firmly screw home the four fixing bolts and interlace them, in pairs, with 22 gauge copper wire.

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 pistons and rings, the cylinder barrels are best left undisturbed. The various stages in decarbonisation are described below.

TO REMOVE CYLINDER HEADS FOR DECARBONISATION

To ensure the various parts of each head are not intermixed it is recommended that only one head is removed at a time.

Remove the petrol tank, as already described.

Remove the rocker box covers, as already described.

Remove the sparking plugs.

Remove the exhaust pipes and silencers (no need to separate pipes and silencers) by taking away nuts and washers holding pipes to stays and silencers to rear frame, pulling silencer end of each assembly outwards far enough to allow fixing studs to disengage and then pulling each assembly forwards till disengaged from the cylinder head.

Remove carburettor by taking away the two fixing nuts and withdrawing to the rear. Lay carburettor on saddle.

Remove inlet manifold by taking away the four fixing nuts and washers and withdrawing to the rear. Take care not to damage the gaskets between manifold and heads.

Remove bridge plate between the fronts of the cylinders by slackening the nut on the bolt retaining the steady stays to the clip on the main frame, removing the lock nuts on the two bolts retaining stays and bridge to heads, unscrewing the two bolts, swinging away the stays and lifting away the bridge.

Remove heads by using box spanner 015213 to remove the four domed nuts that retain each head.

After removal invert each head to dislodge the spacers under the domed nuts and lay aside to await re-assembly.

The cylinder head gaskets will generally adhere to the tops of the barrels but care must be taken not to damage them.

TO REMOVE THE VALVES

Assuming that a valve spring compressor is not available:

Prepare a block of wood about 2" cube, lay same on a bench, place cylinder head over it so that the heads of both valves are supported on the block.

Apply pressure to each valve spring cap, in turn, to sufficiently compress the springs to permit the extraction of the split collet. The collets are a taper fit in the valve spring collar and it may be necessary to give the collar a sharp tap to release them. (A stout screwdriver is a handy tool with which to apply the pressure).

Lift away valve spring collar, springs and spring seat from each valve.

Lift head off the wood block and valves will drop out.

REMOVING CARBON DEPOSIT

Do not use a sharp implement for removing carbon deposit from the interior of the aluminium 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 inserted valve seatings and in no circumstances should any abrasive material, such as emery cloth, be used for cleaning and polishing.

VALVE GRINDING

Before commencing valve grinding, carefully examine the face of each valve and, 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 inevitably cause undue and undesirable widening of the seats.

As a rule, inlet valves require very little attention and one light application of fine 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 continuously in one direction).

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 collected.

NOTE—A piece of oil resisting rubber tube having a bore of $\frac{1}{4}$ " slipped over the valve end will be found a suitable device for revolving the valves during grinding in. This is not included in the standard tool kit but can be supplied at a cost of 10d., postage 6d. extra, Part number 36-G8-E384.

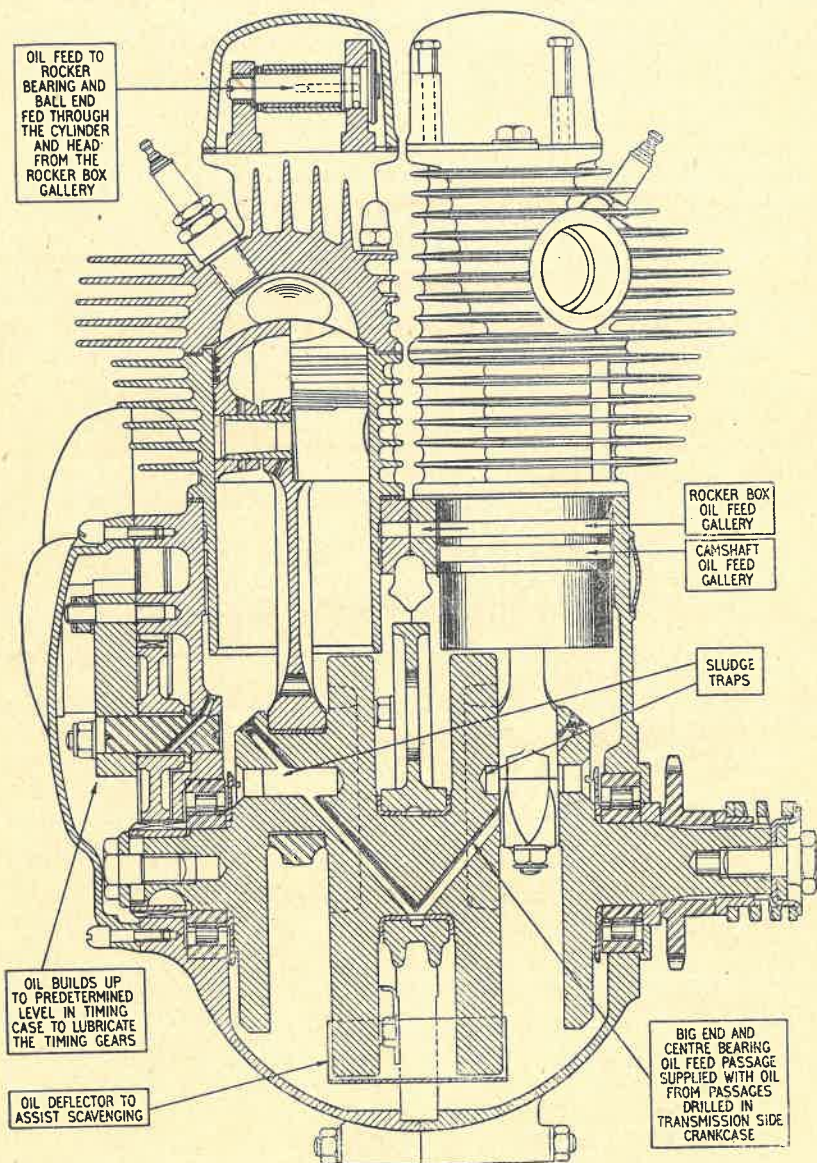


Illustration 9

Cross section of engine showing oil galleries, oil passages, oil deflector and sludge traps.

REMOVING CYLINDER BARRELS AND PISTONS

Unless it is desired to inspect the pistons and rings, during decarbonisation, they are, as already advised, best left undisturbed.

Having removed the cylinder heads **withdraw the cylinder barrels by :**

Lift away the four push rods, identify them for re-fitting and lay aside.

Dealing with one barrel at a time, exert upward pressure on a barrel, slightly rocking to and fro while doing so, and steady the piston with one hand as it emerges from the barrel.

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

To remove a piston

Using 11024 circlip pliers, contract one of the gudgeon pin circlips and, with a rotary motion, gently withdraw the circlip from its housing. The gudgeon pin may then be pushed out of the piston which action frees the piston from the connecting rod. (Being a parallel, floating fit in the piston and connecting rod small end it is immaterial from which side the gudgeon pin is withdrawn). (On early machines the gudgeon pins will be a tighter fit than that described and, in those cases, it might be necessary to apply a little heat to facilitate gudgeon pin removal).

Rings may be removed from a piston by peeling off or by introducing behind them three thin and narrow metal strips, equally spaced round the piston, and then sliding them off, taking care not to scratch the piston.

Carefully examine the contact edge of each piston ring and replace any which do not show a bright surface over the whole circumference.

FITTING PISTONS AND CYLINDER BARRELS

Pistons to be free of carbon on their crowns and all piston ring grooves to be clean. Piston rings to be clean and on pistons.

Fit a piston to its connecting rod by : Smear gudgeon pin with clean engine oil.

Place piston over connecting rod so that the slotted side faces to the front of the machine, introduce gudgeon pin to piston and pass through connecting rod, press right home against the circlip still in situ. Then again, using pliers 11024, contract the other circlip, introduce same into its groove in the piston, using a rotary movement. Make quite certain that the circlip lies snugly in its groove because failure to do so will inevitably lead to serious damage.

Before fitting the cylinders, make sure they are clean and examine the base washers and renew same if not perfect.

To fit a new cylinder base washer : first clean off the old washer and all traces of jointing compound. Then smear one side of the new washer with jointing compound and, when that is nearly dry (" tacky ") apply to the cylinder.

Space the piston rings so that the gaps are 120° to each other, smear piston and rings and bore of barrel with clean engine oil and, supporting the piston with one hand, gently pass over the barrel, compressing each piston ring with the fingers, as it enters the barrel.

Press the cylinder barrel right down into the throat of the crankcase.

Fit the second piston, gudgeon pin, rings and barrel in a like manner.

Revolve the engine till the pistons are at the top of their strokes and then, with a clean rag, wipe off all surplus oil. All is now ready to re-fit the cylinder heads.

TO RE-FIT THE CYLINDER HEADS

Clean the valve stems and the bores of the valve guides with rag moistened with petrol, make sure all other parts are clean, then smear each valve stem with clean engine oil and proceed to re-fit the valve stems by reversing the procedure taken to dismantle them.

Insert the four valve push rods into their original positions and, after making sure that the cylinder head gaskets are undamaged and in position, proceed to fit the two heads and leave the two sets of four cylinder head retaining nuts finger tight.

Now re-fit the inlet manifold, making sure the two paper gaskets are undamaged, and leave the four retaining nuts finger tight.

Next, fully tighten down the four retaining nuts on each head, treating each, diagonally, bit by bit, till all are fully down.

Then, fully tighten the inlet manifold retaining nuts and re-fit the carburetter.

Next, carefully check each rocker clearance, as previously described, and re-set if necessary. (The correct rocker clearance with cold engine is .006" for inlet and exhaust).

The gaskets under each rocker cover should be inspected and, if not sound, should be replaced after which the rocker covers can be refitted.

The bridge between the two cylinder heads should then be laid in position and, after ensuring the bolts have a washer under each head, they should be inserted through the ends of the steady stays and bridge piece and fully tightened, followed by the two locking nuts.

Finally, tighten the bolt binding the ends of the steady stays to the frame clip.

VALVE TIMING

Inlet valve opens 35° before top dead centre

Inlet valve closes 65° after bottom dead centre

Exhaust valve opens 65° before bottom dead centre

Exhaust valve closes 35° after top dead centre

(Check valve timing with .012" rocker clearance)

Upon removing the timing gear cover (secured by 10 screws) it will be observed the valve timing gears are marked to facilitate correct assembly.

One tooth of the mainshaft small pinion is marked with one centre punch dot and a tooth gap of the idle pinion, into which it meshes, is similarly marked. With these two marks coinciding it will be seen that a tooth gap on each side of the intermediate pinion is marked with two centre punch dots which also coincide with a similarly marked tooth on each of the camshaft driving gear wheels.

During assembly it is only necessary to mesh the gears with these various marks coinciding to ensure correct valve timing.

The dynamo and magneto drive pinions are not marked. The dynamo does not need "timing" and if, for any reason, the magneto timing has been disturbed, it is re-set as described below.

Removal of gears

When completely dismantling the engine there is no necessity to remove the small timing pinion from the crankshaft before splitting the crankcase because the complete crankshaft can be taken away with the pinion still in position.

If, however, it is desired to remove the pinion without completely dismantling the engine a special extractor is required (part number ME-564). This consists of a nut, threaded externally and internally. The external threads enable it to be screwed into the threaded centre of the pinion and the internal threads accommodate a specially designed and hardened bolt which, upon screwing down, pulls off the pinion.

The intermediate gear needs no extractor.

The gears on the two camshafts and the gear on the magneto shaft have to be mechanically withdrawn and each has two holes drilled and threaded to accommodate the two bolts of a bridge type extractor (part number 015374) which has a central bolt threaded in the bridge. The two outside bolts are screwed into the holes in the gears whereupon application of the centre bolt being screwed into the bridge bears on the end of the shaft thereby causing the gear to be withdrawn.

The gear on the dynamo needs no extractor because the dynamo, complete with gear assembled, is easily and quickly removed from the engine and the subsequent removal of the gear from the dynamo shaft is a simple workshop operation.

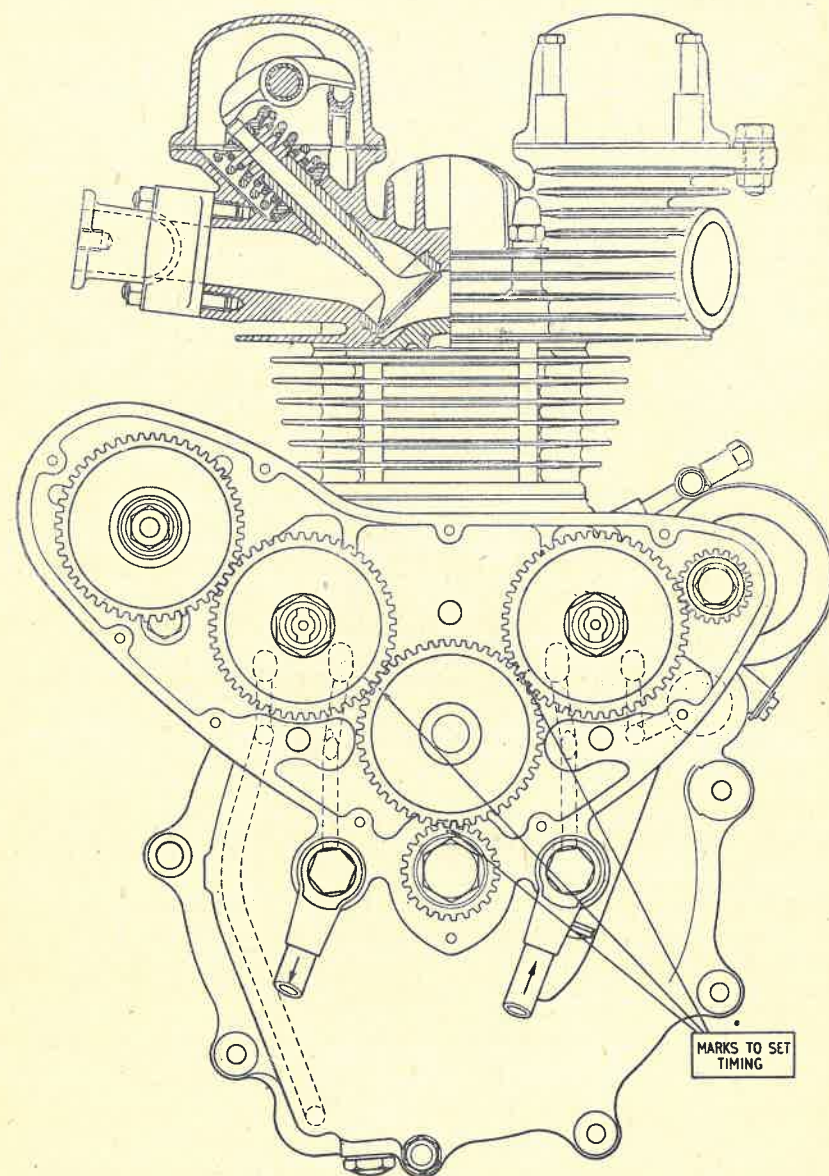


Illustration 10
Showing valve and components and timing gear

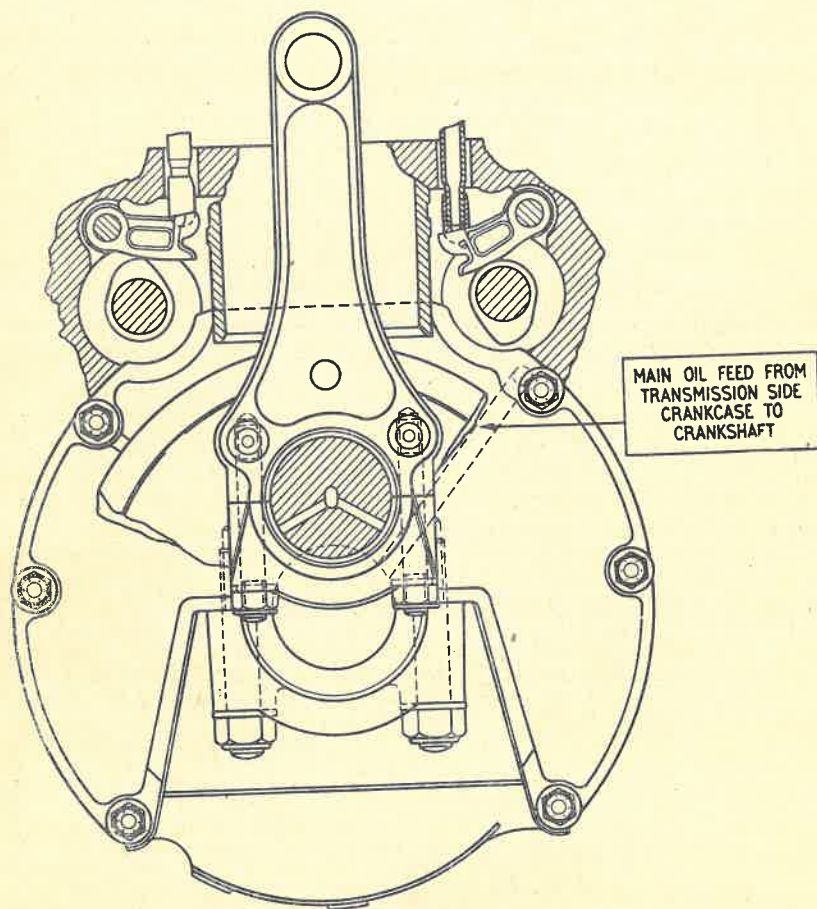


Illustration 11

Showing mounting for centre bearing for crankshaft, a connecting rod with big-end bearing and oil deflector

TO RE-TIME THE IGNITION

Before proceeding to time the ignition it is advisable first to check the contact breaker point gap, which should be from .010" to .012", and correct it if necessary.

Having loosened the nut securing the magneto driving pinion, release same from the tapered end of the magneto shaft by means of a special extractor, as described above. Remove the inlet rocker cover from the off-side cylinder head.

Remove the sparking plug from the off-side cylinder.

Insert a small rod into the sparking plug hole and, feeling the piston with the end of this rod, carefully turn the engine in its normal direction of rotation until the piston is exactly at the top of the stroke after the inlet valve has closed.

Hold the rod as vertical as the angular sparking plug hole will permit, make a mark on same exactly coinciding with the top edge of the sparking plug hole boss. Then withdraw the rod and make another mark exactly $\frac{3}{8}$ " higher up. Re-insert the rod and turn the engine backward until the higher mark coincides with the top edge of the sparking plug hole boss.

Place the ignition control lever in the fully advanced position.

Next, taking care not to disturb the piston position, turn the magneto in a clockwise direction (looking at the contact breaker end of the magneto) until the contact breaker points are just about to separate by reason of the fibre block on the bell crank lever commencing to mount the lower cam hump.

The exact point of separation is best found by inserting between the contact points a strip of thin tissue paper when the separation point can be determined by the paper just being released with a light pull.

Having obtained this position, press the magneto driving gear on to its taper with the fingers and lightly tighten the securing nut.

It is next advisable to re-check the setting by again turning the engine to the position at which the piston is $\frac{3}{8}$ " before the top of the firing stroke, re-inserting tissue paper between the contact points and confirming that same can be released with a light pull.

Upon being satisfied that the setting is correct securely tighten down the nut fixing the magneto driving gear.

Thoroughly clean off all traces of jointing compound from face edges of the timing cover and crankcase and then smear both faces with new jointing compound, which leave till tacky and then re-fit the cover to the crankcase.

The whole operation of timing the ignition will be found quite simple if the foregoing instructions are carefully followed.

NOTE—The sparking plug High Tension cable for the off-side cylinder is that connected to the rear pick-up on the magneto.

CARBURETTER SERVICE

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

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

CARBURETTER FUNCTION

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

The petrol supply to the engine is controlled, firstly, by the main jet and, secondly, by means of a taper needle (see 6, illustration 12) which is attached to the throttle valve and operates in a tubular extension of the main jet.

The main jet controls the mixture from three-quarters to full throttle, the adjustable taper needle from three-quarters down to one-quarter throttle, the cut-away portion of the intake side of the throttle valve from one-quarter down to about one-eighth throttle, and a pilot jet, having an independently adjusted air supply, takes care of the idling from one-eighth throttle down to the almost closed position. These various stages of control must be kept in mind when any adjustment is contemplated. (See 18, illustration 12, for location of the pilot jet air adjustment screw). The pilot jet consists of a small hole drilled in the choke, or jet block.

The size of the main jet should not be altered save for some very good reason. See "DATA" for details of standard sizes of jet, throttle valve, choke 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.

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

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

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 splutter 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 idle positively and evenly when the throttle is almost closed. If it fails to do so, adjust the pilot jet air screw (18, illustration 12) inwards, or outwards, until even firing is obtained. (The pilot jet air screw is at the base of the mixing chamber and its position is locked by a nut. See 17 and 18, illustration 12). This adjustment is not unduly sensitive, and it should be possible to obtain the correct adjustment in a few seconds.

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

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

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

See Illustration 12

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

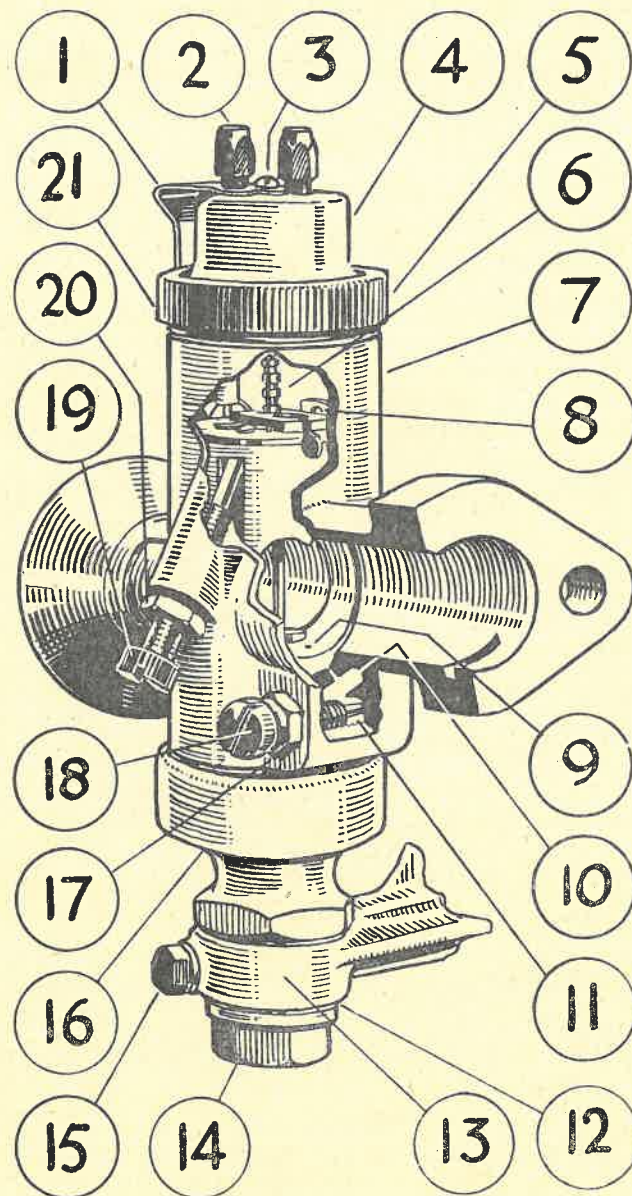


Illustration 12

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

CARBURETTER TUNING INFORMATION

Poor idling may be due to :

- Air leaks. Either at junctions of carburetter and inlet manifold, or by reason of badly worn inlet valve stems or guides.
- Faulty engine valve seatings.
- Spark plug faulty, or its points set too closely.
- Ignition advanced too much.
- Contact breaker points dirty, pitted, loose, or set too closely.
- High-tension wire defective.
- Pilot jet not operating correctly.
- Rockers adjusted too closely.

Heavy petrol consumption may be due to :

- Late ignition setting.
- Bad air leaks. Probably at carburetter or manifold joints.
- Weakened valve springs.
- Leaky float. (Causing flooding).
- Taper needle extension insufficient.
- Poor compression, due to worn piston rings or defective valve seatings. (Test compression with throttle wide open).

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 rotating sleeve. This screw, which is locked by a nut, must be screwed into the body to increase the tension.

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

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

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

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 top lug and the rear plates, which are slotted, thereby allowing a swinging fore and aft movement of the gear box to enable the front driving chain to be adjusted. That movement is controlled by a bolt that has an eye encircling the gear box top fixing bolt and which passes through an eye block secured to the right-hand side engine rear plate. Two nuts threaded on the eye bolt, one on each side of the eye block, provide means of accurately tensioning the front chain and, after that adjustment, locking the eye bolt in its required position.

TRANSMISSION OF POWER THROUGH THE GEARS

(See illustration 13).

First, or lowest, gear

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

Layshaft sliding clutch (W) moves to right and engages with gear (G). Power passes through clutch A, to mainshaft T, to mainshaft sliding gear C, to layshaft gear G, to layshaft clutch V, to layshaft gear E, to main gear B, to chain sprocket J.

Second gear

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

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

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

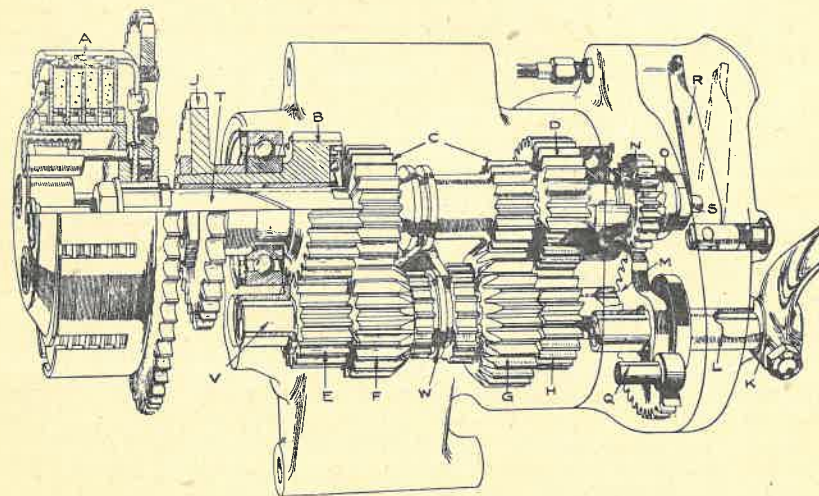


Illustration 13

Third gear

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

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

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

Fourth, or top, gear

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

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

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

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

TO REMOVE FRONT CHAINCASE AND CLUTCH ASSEMBLY

To remove outer half of front chaincase

Place tray under chaincase to catch oil.

Remove screw binding chaincase metal band at its rear.

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 chain, shock absorber and clutch

Engage top gear, apply the rear brake and unscrew engine shock absorber retaining bolt.

Unscrew the five nuts retaining the five clutch springs.

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

Remove front chain connecting link and take away chain.

Withdraw shock absorber assembly consisting of cap, spring, cam and sprocket.

Flatten the turned up edge of the lock washer under the clutch centre retaining nut.

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

Lift away the plain and lock washers under the retaining nut.

Remove the remainder of the clutch assembly by pulling it away, as one unit, from the gear box main shaft. Take care not to lose any of the twenty-four clutch sprocket bearing rollers which will be displaced during withdrawal. (The clutch centre is a sliding fit on the splined main shaft and an extractor should not be required).

To remove back half of chaincase

Flatten turned up ends of tab lock washers under the three bolts retaining the back half of the chaincase to the boss of the crankcase and remove the three bolts and the lock washers.

Remove the nut on the centre fixing bolt and take away nut and the spacer under it.

Remove bolt, having long head, that retains the battery carrier stay to the lug on inner side of chaincase half.

Back half of front chaincase is now free to be lifted away.

TO RE-FIT THE FRONT CHAINCASE AND CLUTCH

Check truth of faces of both chaincase halves. (See note at end of these instructions.)

Fit back half of front chaincase by :

Place on face of crankcase boss some liquid jointing compound.

Ensure the spacer is in position on the centre bolt. This is located between the engine plate and the chaincase.

Place in position rear half of front chaincase.

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

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

Fit spacer (inside chaincase, $\frac{7}{8}$ " long) to the centre fixing bolt.

Fit nut to centre fixing bolt and fully tighten.

Re-fit long headed bolt binding battery carrier stay to back of the chaincase rear half.

Fit engine shock absorber by :

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

Then place in position, on the flywheel axle, in the order specified, the engine sprocket, the shock absorber cam, the spring and cap washer and, finally, the shock absorber retaining bolt. Do not attempt to fully tighten the bolt.

Fit the clutch centre and sprocket by :

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

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

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

Introduce clutch sprocket over the rollers.

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

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

Fit the lock washer, plain washer and nut that retain the clutch centre but do not attempt to fully tighten the nut.

Fit the front chain and lock 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.

Finally, turn up one edge of the lock washer so that it is firmly against one of the faces of the nut.

Fit the clutch plates and springs by :

Slide into position, in the clutch case attached to the clutch sprocket, one of the steel plain clutch plates.

Slide into position a clutch friction plate (plate with fabric inserts) and follow with a steel plain plate, then another friction plate and so on, alternatively, till all plates are fitted. (Six plain and five friction plates).

Drop into the spring pressure plate the five cups for the clutch springs.

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

Fully tighten the five clutch spring adjusting nuts.

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

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

Check front driving chain for adjustment.

Fit outer half of front chaincase by :

Ensure facing edges of both halves of chaincase are clean.

Place a line of liquid jointing compound on both facing edges and allow to dry till "tacky," then place front half of chaincase in position. Hold in position and replace the washer and nut on the chaincase centre fixing bolt and, when tightening the nut, move the front half of the chaincase, as may be necessary, for it to exactly register with the back half.

Ensure the rubber and metal bands are clean and undamaged.

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

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

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

Fully tighten the metal band binding screw.

Allow time for the liquid jointing to set (at least one hour) and then 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 oil tight, the general reason is distortion of the two joint faces. These faces must be undamaged and, on test, should closely fit to a surface plate. They must also be absolutely clean before replacement and the edges must be in exact register, one with the other. Any distortion caused by accidental impact must be remedied before refitting.

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

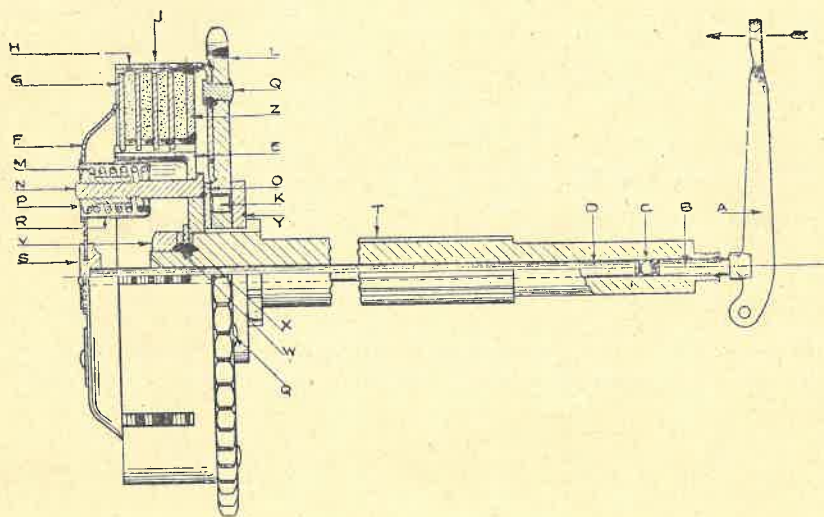


Illustration 14

Showing clutch, gear box main shaft and clutch operating mechanism

THE CLUTCH (See illustration 14)

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

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

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

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

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

CLUTCH SPRING ADJUSTMENT

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

If the clutch cable adjustment is found to be correct, i.e., there is the clearance of $\frac{1}{8}$ inch mentioned in the following paragraph, the clutch spring adjustment nuts should be adjusted.

To adjust clutch spring adjustment nuts:

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

Screw home, one-half of a complete turn, each clutch spring adjustment nut and then test for clutch slip.

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

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

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

CLUTCH ADJUSTMENT

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

Major adjustment of the clutch operating mechanism is obtained by altering the position of the fulcrum pin of the clutch operating lever in the kick-starter case. (Lever A in illustration 14 and 175-X-4 in illustration 15).

The Major adjustment is explained below.

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

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

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

It is essential that there is about $\frac{1}{32}$ " clearance between the operating plunger 330-X and the nose on operating lever 175-X-4 when the clutch is in the engaged, or driving, position. This clearance is easily checked by removing the filler cap when it should be possible, with finger pressure only, to move the clutch withdrawal lever 175-X-4, the top end of which lies just beneath the filler cap orifice, about $\frac{3}{32}$ " to and fro. This amount of free movement at the extreme tip represents approximately the clearance of $\frac{1}{32}$ " specified above.

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

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

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

Obtain adjustment of clutch mechanism by :

Remove the two screws 333-X.

Take away the cap 328-X.

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

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

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

One or two turns should be ample.

Replace cap and screws.

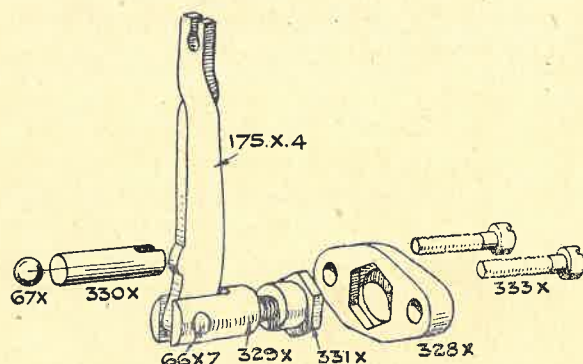


Illustration 15

Details of clutch operating lever

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

CLUTCH CABLE ADJUSTMENT

Minor adjustment of the clutch operating mechanism is obtained by :

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

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

To provide a greater amount of play, screw into the kick-starter case the cable adjuster. Finally, tighten lock nut on cable adjuster.

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

To remove a clutch control cable

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

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

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

Completely unscrew the clutch cable adjuster.

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

Pull cable, 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 in the previous paragraph.

FRONT CHAIN ADJUSTMENT

Tighten the front chain by :

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

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

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

Remove inspection cap from front chaincase.

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

Tighten nuts on gear box top and bottom fixing bolts.

Replace chaincase inspection cap.

REAR CHAIN ADJUSTMENT

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

The rear wheel centre spindle has two cams attached to it. These cams abut against projections in each of the rear fork two slotted ends. The projection on the right-hand fork end is adjusted at the factory and its position is locked by a nut. That 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 to ever alter it again.

The chainside cam has 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 tensioned. (Both cams turn together).

The correct chain tension is such that, when the machine is on the centre stand, finger pressure applied to the chain, midway between gear box sprocket and rear wheel sprocket, in an upward and downward direction, allows a total movement, up and down, of $1\frac{1}{2}$ ". The rear wheel should be rotated to several positions and tests made at each, because chains never wear evenly and there is usually one position where the chain is tighter than in any other. The adjustment of $1\frac{1}{2}$ " total whip should be set for the tightest position found.

(When off the stand, and with the rider on the saddle, this measurement is reduced to about $\frac{1}{2}$ " total whip, which is the correct adjustment when on the road).

To adjust the rear chain

Place the machine on the centre stand.

Slacken exterior nut on left-hand end of rear wheel spindle.

Slacken nut to right of speedometer gear box.

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

Apply adjustable wrench L-TK-12 to hexagonal body of chainside cam and turn, forwards or backwards, as may be necessary, to obtain the $1\frac{3}{8}$ " of whip detailed above and, holding the wheel and cam in that position, fully tighten the spindle exterior nut. (After every forward movement of the wheel in the fork ends it must be pressed forward so that the two cams may abut against the two projections mentioned above).

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

NOTE—Before tightening the rear chain, check the front chain adjustment, and, if attention is 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 re-set if necessary.

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

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

Always re-check the chain tension after making it and tightening all bolts and nuts.

ENGINE SHOCK ABSORBER

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

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

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

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

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

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

The order of assembly of the engine shock absorber is

- 1 The spacing collar between the crankshaft roller bearing and the engine sprocket.
- 2 The engine sprocket.
- 3 The shock absorber cam.
- 4 The shock absorber spring.
- 5 The cap washer.
- 6 The retaining bolt.

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 box under each footrest serves that purpose).

Slacken the nuts on the two fork crown studs.

Slacken the domed nut at top of the steering column.

Screw down the nut underneath the domed nut a little at a time (using spanner R-TK-3) and, while 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 domed nut in order to lock the adjustment.

Tighten the two fork crown pinch stud nuts.

Remove packing from under engine.

FRONT FORKS (TELEDRAULIC)

Owing to the unusual construction of the "TELEDRAULIC" fork it is desirable to understand what happens in use and, in order to clearly follow the descriptions and subsequent assembly and adjustment instructions, reference to illustrations 16 and 17 will be necessary.

As will be seen from the general arrangement drawing, illustration 17, the main members 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 clip lug by the top bolts 014354 and are clamped to the fork crown by the clamping studs 011755 and nuts 011635. Upon the external of these tubes are mounted the springs and sliding members, to which latter 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 "Teledraulic," coined for the description of the fork.

The hydraulic dampers are of the shuttle type operating above the steel bushes at the lower ends of the main inner tubes.

The sliding members (sliders) operate on the steel bushes at the lower ends of the main inner tubes and on plastic bushes secured to the top ends of the sliders themselves. Above each plastic bush is an oil seal which is provided to overcome any possibility of the hydraulic fluid leaking into the spring chamber.

The hydraulic fluid used is a thin oil of the grade specified in the Lubrication Section and, henceforth in these instructions, is referred to as "oil."

The normal level of oil is well above the bottom extremity of the main inner tubes. Bearing this in mind, it is at once clear that the upward movement of the sliders, upon impact with road bumps, in addition to meeting resistance from the springs also causes oil to be swept down by the close fitting steel bushes. This oil is forced upward through the open ends of the main inner tubes, through the holes A (illustration 16) and then past the shuttle which the escaping oil raises off its seat, then past the exterior of the shuttle into the upper part of the slider. As the oil level inside the main inner tube rises, air trapped above the holes A is compressed, thereby forming an air buffer acting as auxiliary to the main springs. This displacement of oil, upon impact, imposes a certain amount of damper effect, the extent of which increases with the violence of the shock, or, on other words, the bigger the bump the more damping takes place. Upon the recoil movement the shuttle returns to its seat and oil, trapped above, has, as its important source of escape, the small passage between the bore of the shuttle and the main inner tube, upon which it operates. Once past this restriction the oil can freely enter the lower chamber via the holes A. This very restricted passage for the oil causes a considerable damper effect to the recoil movement.

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

Before concluding this description, it should be mentioned that, upon a very violent impact, as a result of which the springs are almost fully compressed, the damping of the upward movement of the sliders is automatically increased by the greatly restricted passage for the displaced oil, due to the lower ends of the main inner tubes encircling the tapered damper cones 012954. Thus "bottoming" is prevented, no matter how violent the impact.

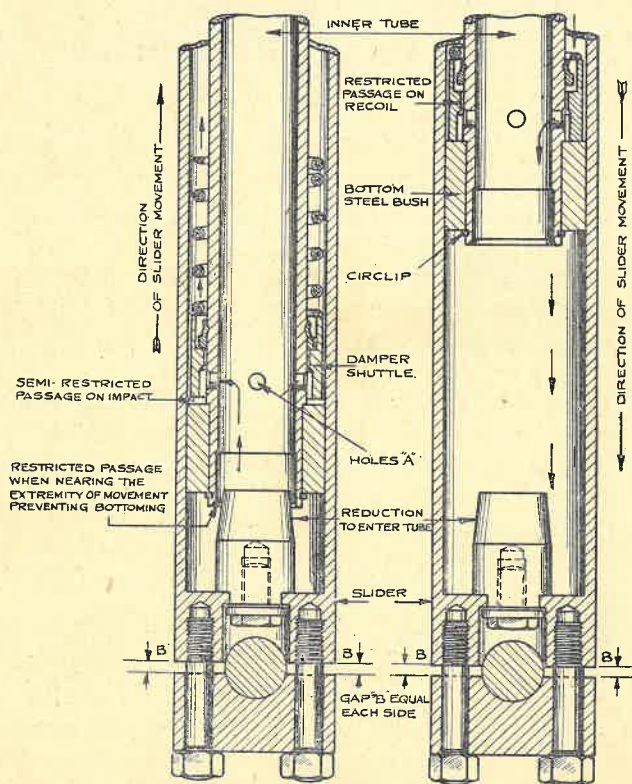


Illustration 16

FRONT FORK "TOPPING UP"

No part of the **TELEDAULIC** Front Fork requires individual lubrication, but it is advisable to check the oil content, used primarily for hydraulic damping, every five thousand miles.

Each fork main inner tube contains 10 fluid ounces (equal to 284 c.c.) of oil.

To check the oil content of front fork

Have motor cycle vertical and raised (a box under each footrest will do) so that the front wheel is well clear of the ground. Remove the bolts from the upper ends of the fork inner tubes.

Have a graduated measure of not less than 10 fluid ounces capacity available in which to catch and measure the oil.

Treat each side of fork separately.

Remove drain plug from bottom of a slider and catch oil that runs out. The amount should be about 8 to 8½ fluid ounces.

Replace drain plug and work the forks up and down a few times and again remove drain plug and catch oil. It may be necessary to repeat this operation several times to ensure the extraction of the maximum amount of oil.

The total amount of oil withdrawn should be 9½ fluid ounces. If less than this amount, add to bring to 9½ ounces and, after replacing firmly the drain plug, pour the 9½ ounces of oil into the main inner tube via the top open end and then replace the hexagonal headed top bolt taking care to tighten firmly down. The top bolt has a rubber ring encircling it to ensure an air tight joint. See that the rubber ring is undamaged.

Treat the other slider in a like manner.

The top screwed plugs **must** be re-fitted while the weight is off the front wheel, therefore make sure they are tightened firmly **BEFORE** removing the packing placed under the footrests.

NOTE—Although the oil content of each side is specified as 10 fluid ounces, it is not possible to completely drain all the oil via the drain plug. This explains the lesser quantity of 9½ ounces, mentioned above. However, if the fork has been completely dismantled and then re-assembled in a "dry" state it should be noted that, in that event, the correct quantity of oil to add to each main inner tube is 10 fluid ounces.

TO REMOVE THE COMPLETE FRONT FORK ASSEMBLY

Support the machine with the front wheel clear of the ground. (A box, of suitable height, under each footrest is the best method).

Remove front wheel by method described in Wheel Section.

Remove front stand and front mudguard.

Detach the switch panel that is held to the top of the head 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, upon a pad 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).

Remove the bolt from top of each main inner tube.

Remove domed lock nut at top of steering column.

Remove lock nuts on steering column.

Use a soft mallet to tap upward the handlebar lug until it disengages with the fork stem (steering column) and the fork assembly can then be withdrawn. (Take care to avoid loss of the 56 steering head steel balls).

To re-fit a complete front fork assembly

Stick, with grease, 28 balls in fork crown ball race.

Stick, with grease, 28 balls in main frame top ball race.

Proceed to fit fork assembly by reversing the instructions given above to dismantle.

TO REMOVE A FORK SLIDER (either side)

Support the machine with the front wheel clear of the ground.

Remove extension from the slider by unscrewing. Two holes are in its side for the application of hook spanner 010438.

Remove front wheel, front stand and front mudguard.

Withdraw slider by giving it a sharp downward jerk. If difficulty is experienced, apply a little heat to the enlarged top end of the slider. This will cause sufficient expansion to release the oil seal which is normally a snug push-in fit in the top of the slider.

To re-fit a fork slider

The re-assembly is carried out in exactly reverse order, again, if necessary, applying a little heat to enable the oil seal to be pushed down into the slider top before screwing in the extension.

After completion the oil which has escaped **MUST BE** returned via the top end of the main inner tube as already described in "Topping up."

TO REMOVE A FORK MAIN INNER TUBE (either side)

Remove the fork slider as already described in the preceding paragraph.

Remove the bolt at the extreme top of the main inner tube.

Loosen nut on fork crown clamping stud.

The entire main inner tube assembly can now be drawn down through the fork crown lug.

To re-fit a fork main inner tube

Upon re-assembly the main inner tube assembly is first pushed home, by hand, as far as possible and then drawn right home by screwing in the top hexagon headed bolt. When this bolt is tightened fully down then proceed to securely tighten the fork crown clamping stud nut. The slider is then re-fitted. The remainder of the assembly is quite straight-forward if carried out in the reverse order to the dismantling.

NOTE—If any oil has been lost in the process of dismantling and re-assembly, it should be topped up, upon completion, as already described.

TO ASSEMBLE THE TELEHYDRAULIC FRONT FORKS

Assuming that the fork has been completely dismantled, proceed as follows :

Prepare by making five sub-assemblies

- (a) One fork crown and cover tube assembly.
- (b) Two main inner tube assemblies.
- (c) Two slider assemblies.

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

Take a fork crown (with stem and stem circlip which three parts are only sold as one assembly) and secure it in a vice and fit the two top and bottom cover tubes, right and left, in turn, by :

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

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

Place a bottom cap on the lower end of the top tube.

Place the bottom tube in position against the fork crown.

Place the top tube in position against the fork crown.

Bind together the two cover tubes by three screws.

NOTE—The screws are inserted from the bottom and the holes in the locating plates, the cover tubes and the fork crown are not evenly spaced. Therefore, before inserting the first screw, the plates and tubes must be positioned so that all holes in the two plates, the two tubes and the fork crown will register with each other.

Fit the remaining top and bottom cover tubes in a like manner.

Fit the fork crown ball race to the fork crown, load the race track with grease and fill it with twenty-eight steel balls ($\frac{3}{8}$ " diameter).

Lay over the steel balls a frame ball race (a race with a spherical seat).

The assembly is now complete.

Prepare handlebar lug by :

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

Press into position the ball race (plain race with vertical sides).

Remove the handlebar half clip.

(b) Make an inner tube assembly by :

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

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

A buffer spring.

A plastic bush. (Flanged end last).

A paper washer.

An oil seal. (Visible spring side first) see note below.

A slider extension. (Screwed end first).

A leather washer.

A fork spring.

A leather washer.

Then, over the right-hand end pass, in the order mentioned :

A damper shuttle,

A steel bush.

Then, fit a circlip.

This completes the assembly and the second assembly should be made in a like manner

NOTE—Great care must be exercised when fitting the oil seal and this is best done by : Cut a piece of thin foil sheeting 4" x 3" and wrap round the screwed end of the main inner tube. Then gently slide the oil over the seal wrapped foil, using a rotary motion in the opposite direction to the overlap of the foil, and taking particular care to apply first that side of the oil seal in which the spring is visible. This is of the utmost importance.

Make the second inner tube assembly in exactly a like manner.

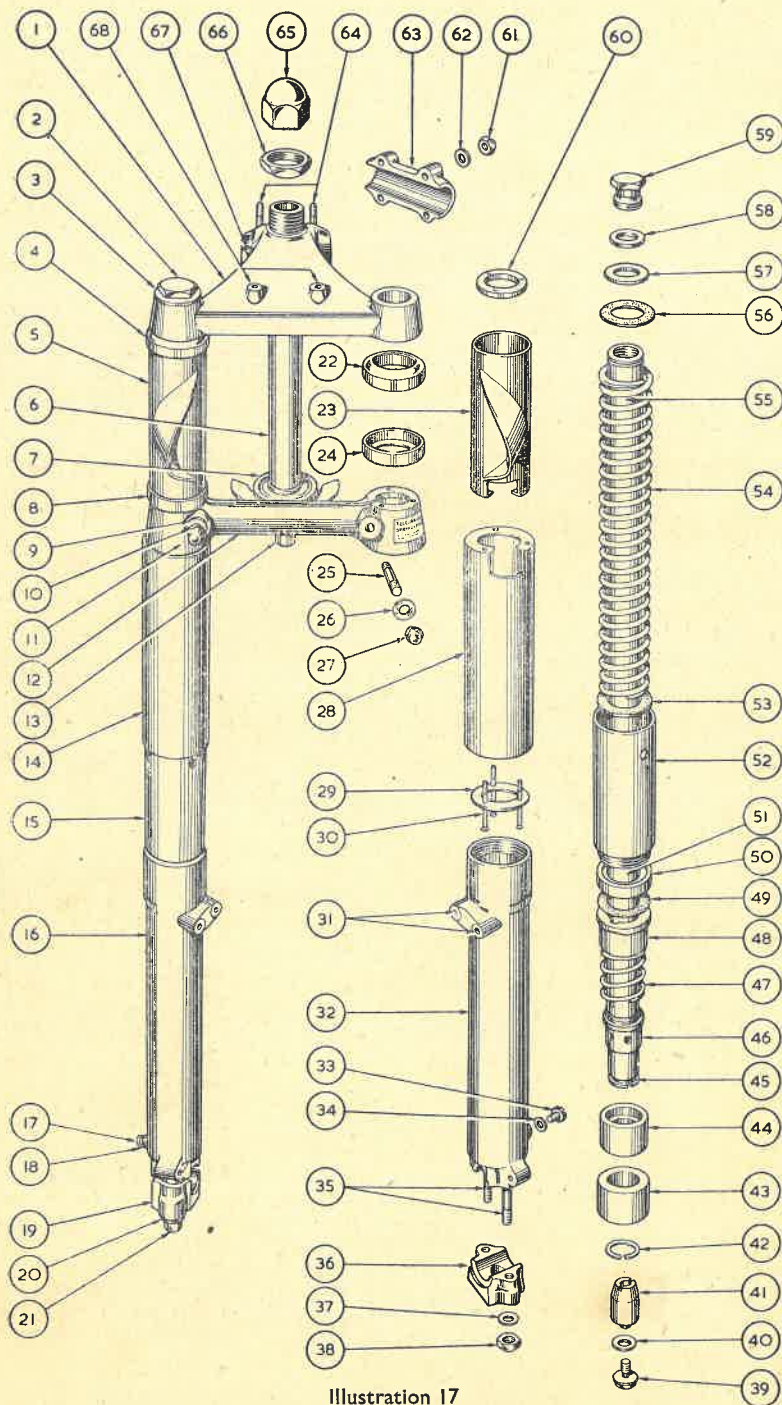


Illustration 17

REF. NO.	PART NUMBER	DESCRIPTION
1	013631	LUG, FOR HANDLEBAR AND STEERING HEAD.
2	014354	BOLT, TOP, FOR FORK INNER TUBE.
3	40-G12M-FF190	WASHER, PLAIN, FOR FORK INNER TUBE TOP BOLT.
4	40-G12M-FF186	CAP, FOR FORK TOP COVER TUBE, TOP LOCATION.
5	013694	TUBE, FORK COVER, TOP, RIGHT WITH LAMP LUG.
6	—	STEM, FOR FORK CROWN (NOT SOLD SEPARATELY).
7	STD-805	BALL RACE, FOR FORK CROWN.
8	012569	CAP, FOR FORK TOP COVER TUBE, BOTTOM LOCATION.
9	STD-11	WASHER, PLAIN, FOR FORK CROWN PINCH STUD.
10	011635	NUT, FOR FORK CROWN PINCH STUD.
11	—	FORK CROWN (NOT SOLD SEPARATELY).
12	013861	FORK CROWN ASSEMBLY (CROWN, STEM AND CIRCLIP).
13	—	BOSS, ON FORK CROWN, THREADED TO ACCOMMODATE STEERING DAMPER PLATE FIXING BOLT.
14	41-G3L-FF184B	TUBE, FORK COVER, BOTTOM.
15	014341	EXTENSION, FOR FORK SLIDER.
16	013632	SLIDER, FOR FORK, WITH CAP, STUDS AND NUTS.
17	STD-485	SCREW, PLUG, FOR FORK SLIDER OIL DRAIN HOLE.
18	STD-203	WASHER, FIBRE, FOR FORK SLIDER DRAIN HOLE SCREW.
19	013509	CAP, FOR FORK SLIDER.
20	STD-11	WASHER, PLAIN, FOR FORK SLIDER CAP SECURING STUD.
21	STD-4	NUT, FOR FORK SLIDER CAP SECURING STUD.
22	40-G12M-FF186	CAP, FOR FORK TOP COVER TUBE, TOP LOCATION.
23	013695	TUBE, FORK COVER, TOP, LEFT WITH LAMP LUG.
24	012569	CAP, FOR FORK TOP COVER TUBE, BOTTOM LOCATION.
25	011755	STUD, PINCH, FOR FORK CROWN.
26	STD-11	WASHER, PLAIN, FOR FORK CROWN PINCH STUD.
27	011635	NUT, FOR FORK CROWN PINCH STUD.
28	41-G3L-FF184B	TUBE, FORK COVER, BOTTOM.
29	40-G12M-FF127	PLATE, PLAIN, LOCATING BOTTOM COVER TUBE.
30	40-G12M-FF129	SCREW, RETAINING BOTH LOCATING PLATES.
31	—	HOLES, THREADED, TO ACCOMMODATE BRAKE ANCHOR STAY.
32	013632	SLIDER, FOR FORK, WITH CAP, STUDS AND NUTS.
33	STD-485	SCREW, PLUG, FOR FORK SLIDER OIL DRAIN HOLE.
34	STD-203	WASHER, FIBRE, FOR FORK SLIDER DRAIN HOLE SCREW.
35	40-G12M-FF195	STUD, SECURING CAP TO FORK SLIDER
36	013509	CAP, FOR FORK SLIDER.
37	STD-11	WASHER, PLAIN, FOR FORK SLIDER CAP SECURING STUD.
38	STD-4	NUT, FOR FORK SLIDER CAP SECURING STUD.
39	40-G12M-FF94	BOLT, FIXING DAMPER CONE TO SLIDER.
40	40-G12M-FF80	WASHER, FIBRE, FOR DAMPER CONE FIXING BOLT.
41	012954	CONE, FOR FORK DAMPER.
42	40-G12M-FF192	CIRCLIP, LOCATING INNER TUBE BOTTOM BUSH.
43	40-G12M-FF191	BUSH, BOTTOM, FOR FORK INNER TUBE.
44	013347	SHUTTLE, FOR DAMPER.
45	40-G12M-FF192	CIRCLIP, LOCATING INNER TUBE BOTTOM BUSH.
46	—	STOP SHOULDER, A PART INTEGRAL WITH THE FORK INNER TUBE, WHICH, WITH SHUTTLE 013347, FORMS THE DAMPER VALVE.
47	011126	SPRING, BUFFER, FOR FRONT FORK.
48	40-G12M-FF41	BUSH, PLASTIC, GUIDE, FOR FORK INNER TUBE.
49	014297	WASHER, COMPOSITION, FOR INNER TUBE OIL SEAL.
50	40-G12M-FF91	OIL SEAL, FOR FORK INNER TUBE.
51	013348	TUBE, FORK, MAIN, INNER.
52	014341	EXTENSION, FOR FORK SLIDER.
53	40-G12M-FF126	WASHER, LEATHER, FOR FORK SPRING SEATING.
54	012972	SPRING, MAIN, FOR FRONT FORK (SOLO).
55	013348	TUBE, FORK, MAIN, INNER.
56	40-G12M-FF126	WASHER, LEATHER, FOR FORK SPRING SEATING.
57	40-G12M-FF190	WASHER, PLAIN, FOR FORK INNER TUBE TOP BOLT.
58	014355	RING (RUBBER) SEALING, FOR INNER TUBE TOP BOLT.
59	014354	BOLT, TOP, FOR FORK INNER TUBE.
60	40-G12M-FF128	PLATE, THREADED, LOCATING TOP COVER TUBE.
61	014278	NUT, FOR HANDLEBAR CLIP STUD.
62	STD-12	WASHER, PLAIN, FOR HANDLEBAR CLIP STUD.
63	013629	CLIP, HALF ONLY, FOR HANDLEBAR LUG.
64	012870	STUD, FOR HANDLEBAR CLIP.

(Continued)

65 L4-FF46	NUT, LOCK (DOMED) FOR FORK CROWN STEM.
66 STD-236	NUT, ADJUSTING, FOR FORK CROWN STEM.
67 STD-51	NIPPLE, GREASE, FOR HANDLEBAR LUG.
68 ———	HOLES TO ACCOMMODATE BOLTS FIXING SPEEDOMETER HEAD.

Make a slider assembly by :

Fit the oil drain screw plug. (This screw has a fibre washer under it.)

Carefully fit the damper cone (Part number 012954) so that its spigot end engages in the recessed hole at the bottom of the slider inside and secure it with the fixing bolt 40-G12M-FF94, which has fibre washer 40-G12M-FF80 under it. Firmly, but carefully, tighten this bolt. (A thin walled tubular spanner will be required for this operation and it must be noted that, unless the bolt is well tightened, oil leakage will result. It is to prevent that leakage that a fibre washer is fitted under the head of the bolt).

Make the second slider in a like manner.

The five sub-assemblies must now be fitted to the machine in the following manner :

Fit the fork crown, steering column and handlebar lug (a) by

Support the machine, by boxes under the footrests, so that it is just above its assembled height.

Place a spherical base ball race in the top of the frame head lug, fill the ball track with grease and load with 28 steel balls $\frac{3}{16}$ " diameter.

Pass up, through the frame head lug, the fork crown and stem assembly, which has already been prepared, and gently slide on to it the handlebar lug (with ball race already fitted) ensuring, while doing so, that the top cover tubes enter the caps fitted to the underneath side of the handlebar lug into which the caps snugly fit.

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

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

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

Fit the inner tube assemblies (b) to the fork crown assembly by

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

Fit the top washer and hexagonal bolt and screw right home. (This will draw the inner tube assembly fully into correct position).

Fit a fork crown pinch stud to the crown, apply a washer and nut but do not fully tighten.

Fit the second inner tube assembly in a like manner.

Fit a slider (c) by

(The sliders are interchangeable but that in the left position requires two studs for the mudguard bridge fixing).

Pass a slider up over the steel bottom bush and the upper plastic bush of one of the main inner tubes. Gently press down the oil seal into the upper threaded end of the slider, using only the fingers and, if there is a difficulty in doing so, apply a little heat to expand the enlarged end of the slider. Very little heat should be required to cause sufficient expansion to permit easy entry of the oil seal which should be pressed down far enough to leave exposed several turns of the thread cut internally in the slider.

Screw in, by hand, as far as possible, the slider extension but do not fully tighten down.

Fit the second slider in a like manner.

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

Fit front mudguard by placing in position so that the holes in the left side of the bridge engage with the two studs mounted in the top end of the left slider. Then secure the right side by the two washers and bolts. Fully tighten bolts.

Fit the brake cover plate stay to the two studs mentioned above and replace the two washers and nuts. Fully tighten nuts. If the front brake cable and its adjuster are not already fitted to the cover plate stay, do so now, leaving the final positioning of the adjuster till after the cable has been connected to the brake expander lever.

Fit mudguard stays.

Fit front stand.

Fit front wheel by : Hold the left side cap on the front wheel spindle and offer up wheel so as to engage that clamp with its retaining studs. Fit the washers and nuts and lightly tighten the nuts. Fit the right side cap with washers and nuts and lightly tighten the nuts.

NOTE—The caps must not be interchanged and it is most important that the gaps, fore and aft, between the cap and the end of the fork slider are equal. The gaps are indicated by Arrows B in illustration 16.

Fit bolt retaining cover plate stay to cover plate and fully tighten same.

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

Fully tighten the four nuts clamping the front wheel spindle in the slider caps. (Do not overtighten).

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

Fully tighten the two screwed slider extensions. These each have two holes at their top ends to accommodate hook spanner 010438. (The holes are only exposed when all weight is relieved from the front wheel).

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

Attach brake control cable yoke end to the brake expander lever and adjust brake. (See Wheel Section).

Adjust steering head by method already described.

Fix head lamp to lamp lugs and replace instrument panel in top of headlamp.

Securely tighten the nuts on the two fork crown pinch studs. This is very important.

Fix speedometer head and replace driving cable and lighting bulb and holder in head.

Finally, to complete the assembly :

Remove top bolts from both fork main inner tubes.

Pour into each inner tube 10 fluid ounces of hydraulic fluid (one of the oils recommended in the Lubrication Section).

Examine the rubber ring on each top plug and, if damaged, replace.

Re-fit the two top plugs while the forks are still extended, i.e., with the front wheel clear of the ground. Fully tighten plugs.

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



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 $1\frac{1}{2}$ fluid ounces (42.6 c.c.) of engine oil which is sufficient to last almost indefinitely. Provision is, however, made for replenishment should same ever be required. A small screw will be observed in the right-hand end cap of the hinge bearing, upon removal of this screw, oil can be injected into the reservoir, the screw orifice operating as a level control.

The rear wheel fork is suspended on springs located in the two **"TELEDRAULIC"** legs joining the rear of the fork to the main frame rear loops, and the spring action is damped by hydraulic dampers identical in design to those used in the **"TELEDRAULIC"** Front Fork Assembly.

The hydraulic fluid used is one of the grades of oil specified in the Lubrication Section for use in the **"TELEDRAULIC"** Front Forks. It is introduced to each leg through the filling orifice of each top pivot body.

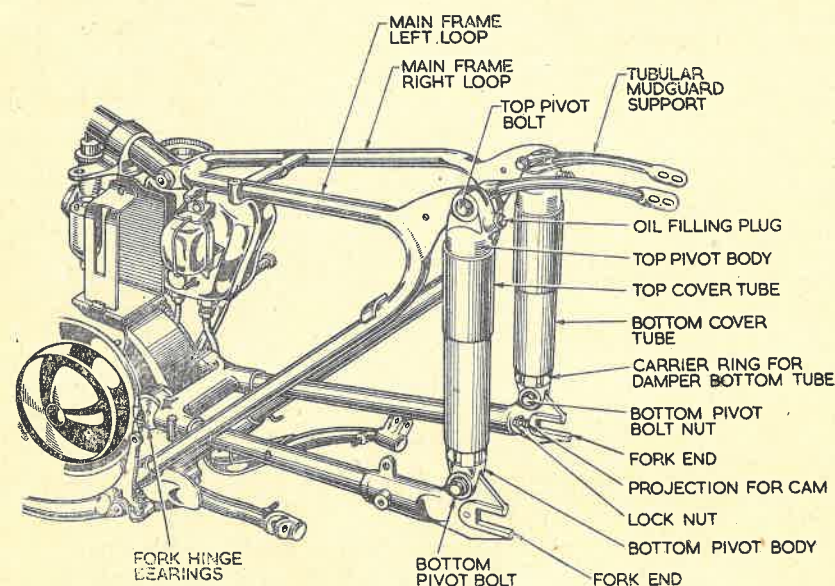


Illustration 18

Showing rear sprung frame and **"TELEDRAULIC"** legs

TELEDRAULIC LEGS

Each leg must contain exactly $1\frac{1}{2}$ fluid ounces (50 c.c.) of oil to provide correct hydraulic damping. The result of oil shortage is too lively an action but, as oil shortage can only occur as the result of leakage, it is very unlikely to be encountered and, unless serious doubts exist as to correct functioning, owners are advised to leave well alone.

Should the need arise, however, the oil content of each leg should be separately checked.

To check oil content of **"TELEDRAULIC"** leg and top up:

Deal with one leg at a time.

Remove top securing bolt, taking care to observe the location of the spacing washer on it.

Remove bottom securing bolt and take away the leg.

Hold leg, vertically, in a vice gripping the lower pivot body.

Using hook spanner 010438 slacken the serrated carrier ring.

Reverse the position of the leg in the vice grip.

By hand, unscrew the bottom pivot body (which will now be uppermost).

After removing the pivot body, gently withdraw the serrated carrier ring, taking care not to lose the dowel pin by which the ring is locked to the bottom damper tube, the open end of which, with oil content, will now be visible.

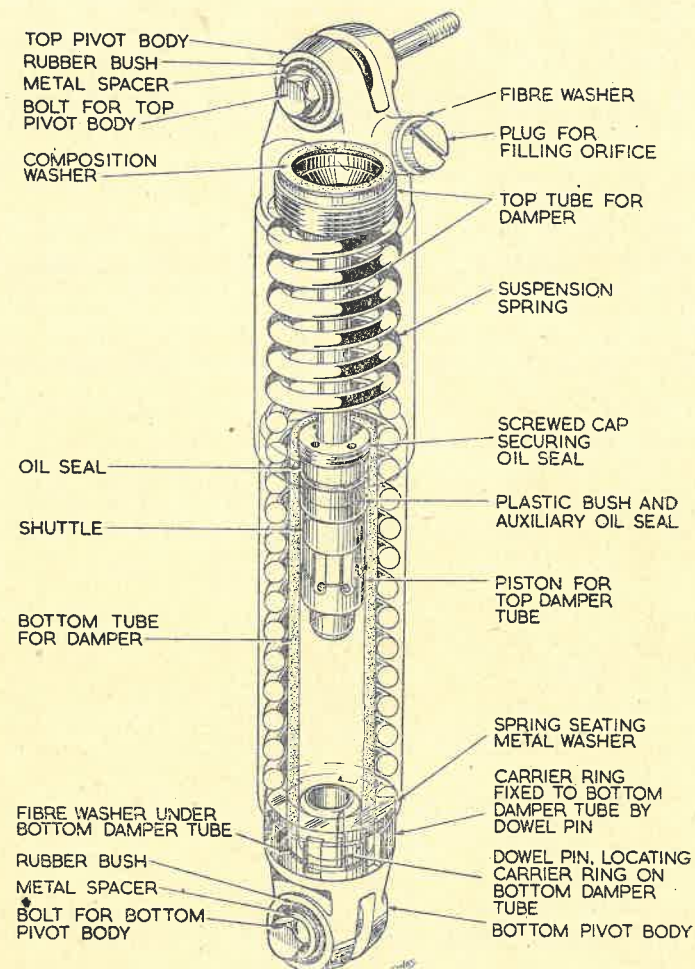


Illustration 19

Showing "Ghost" view of **"TELEDRAULIC"** Leg.

Withdraw the outer cover tubes with spring.

Carefully pour the oil out of the open end of the bottom damper tube into a suitable container. (Preferably a graduated measure that can hold not less than two fluid ounces).

When oil ceases to drain out, remove the filler plug and, gripping the bottom damper tube with one hand, telescope the assembly several times and the remainder of the oil will be pumped out.

Unless, for some reason, further dismantling is desired, the leg can now be re-assembled in reverse order, taking care to securely tighten the serrated carrier ring.

Next, holding the leg in a vice, filler plug uppermost, carefully pour in the specified quantity of oil, pausing now and again to move the top end up and down to expel air.

Upon being satisfied that the exact quantity of oil has been applied (no more, no less) re-fit the filler plug and re-attach the "TELEDRAULIC" leg, taking care to re-fit the spacing washer correctly on the top fixing bolt and to securely tighten the nuts on the two bolts.

Deal similarly with the other leg.

Although necessarily lengthy in description, this operation, providing the foregoing instructions are carefully followed, will be found quite simple.

PROP STAND

The prop stand hinges on a bolt that has a screwdriver slot in its head. The bolt passes through a lug brazed to the frame and screws into the jaw of the stand leg and is then locked by a nut and split pin. It is essential all parts are quite clean when replaced and that the nut is fully tightened. Smear the hinge bolt with engine oil before replacing it.

CENTRE STAND

The centre stand is mounted on a bolt set across the bottom rear of the main frame and is removed by taking off a nut of the centre bolt and pushing bolt through 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 operate **only as a support** and care is necessary, when using, to avoid passing the vertical position. No stops are provided and dragging the machine backward, with the stands down, is likely to fracture the lugs on the aluminium sliders of the forks to which the stand is attached.

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

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:

Drain oil tank.

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

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

Remove battery from carrier.

Disconnect oil feed pipe from bottom of oil tank. (Pull away pipe so that rubber connection is withdrawn from the stump pipe protruding from bottom of tank).

Disconnect oil return pipe in a like manner.

Disconnect voltage control unit from carrier side. Only two bolts to remove. No need to disconnect any of the electric cables.

Remove bolt retaining rear stay from oil tank to rear mudguard.

Remove screw, in base of carrier, retaining carrier to stay that is supported by the front chaincase.

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

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

TO REMOVE THE REAR CHAIN GUARD

Remove the rear wheel. (See Wheel 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 spacers on this bolt, one is between the two sides of the guard and the other is between the head of the fixing bolt and the guard).



WHEEL, BRAKE AND TYRE SERVICE

TO REMOVE FRONT WHEEL

Take a piece of wood $\frac{7}{8}$ " in thickness and, with the centre stand resting on the wood, place the machine on the centre stand. Disconnect the front stand from the front mudguard and raise the front wheel on the front stand so that the tyre is 1" from the ground. (In that position the front stand will **not** be vertical). Remove the split pin, and pin, retaining front brake cable yoke end to 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 caps to the fork sliders, which will permit the removal of the two caps 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 caps **MUST** be re-fitted in same order and position as originally. Therefore, lay them aside so that the order and position of assembly will be correctly made.

When replacing the front wheel, observe the instructions already given in the Fork and Frame Section and remember to depress the wheel when placing in position to get the wheel spindle between the two sets of studs that retain the slider caps.

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

TO REMOVE REAR WHEEL

Take a piece of wood $\frac{7}{8}$ " in thickness and, with the centre stand resting on the wood, place the machine on the centre stand. Remove the bolt, washer and nut, in rearmost position on each tubular member fixing the hinged portion of the rear mudguard.

Disconnect the snap connector in the wire of the rear lamp.

Disconnect rear brake rod from brake expander lever, by removal of split pin and yoke end pin.

Revolve rear wheel till the chain connecting link is in its most possible rear-most position.

Remove connecting link and allow chain to come right away from the rear wheel sprocket but ensure it hangs so it cannot come away from the gear box sprocket.

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

Slacken the nut, on the rear wheel spindle that positions the speedometer gear box.

Slacken both exterior nuts on the rear wheel spindle three complete turns.

Using adjustable wrench L-TK-12, apply it to the hexagonal body of the adjusting cam on the left-hand end of the wheel axle and turn the cam till, by pushing the wheel forwards, the wheel is in its most forward possible position.

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

TO RE-FIT REAR WHEEL

Reverse the above procedure but leave the tightening of the nut that locates the speedometer gear box for the final operation, i.e., after the speedometer cable has been re-connected and the exterior axle nuts have been tightened.

It will be found easier to re-fit the wheel to the fork ends with the brake cover plate hanging free and then, holding the wheel on its left-hand side, as far forward in the fork end as is possible, to swing the right-hand side backwards, lifting up the free cover plate so that the slot in it is positioned to engage with the square headed anchor bolt and then swinging the right-hand end of the axle forwards till engagement has been completed.

After re-fitting the rear wheel, check the rear chain adjustment, and, if necessary, re-set it. Then check the rear brake adjustment and, if necessary, re-set it.

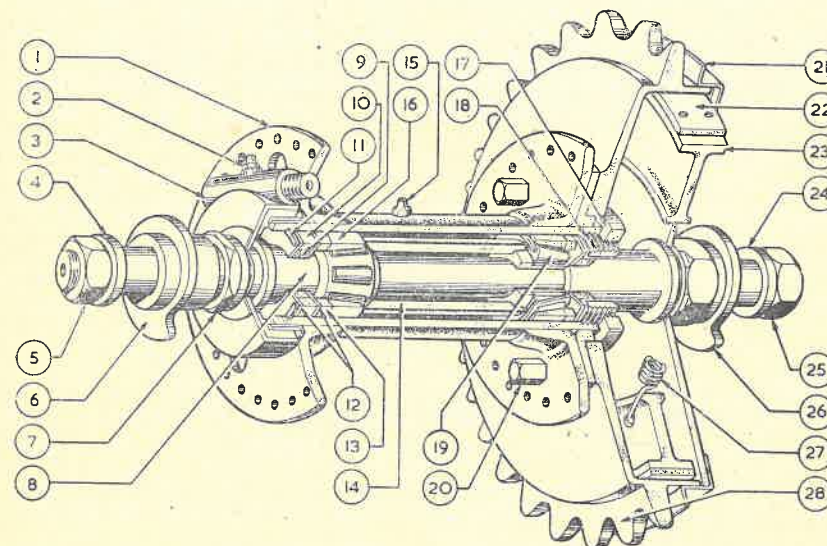


Illustration 20

Showing rear hub, rear chain sprocket, brake and speedometer gear box

- | | |
|--|---|
| 1 RIGHT-HAND SIDE HUB FLANGE. | 14 SPACER, BETWEEN THE TWO TAPER ROLLER BEARINGS. |
| 2 GREASE NIPPLE ON SPEEDOMETER GEAR BOX. | 15 GREASE NIPPLE, IN HUB SHELL. |
| 3 SPEEDOMETER GEAR BOX. | 16 OUTER RACE OF RIGHT SIDE TAPER ROLLER BEARING. |
| 4 SPIGOT BUSH, FITS IN RIGHTHAND FORK END. | 17 NUT, LOCKING BEARING ADJUSTING RING. |
| 5 NUT, ON CENTRE SOLID SPINDLE. | 18 RING, FOR ADJUSTING BEARING. |
| 6 RIGHT-HAND SIDE CAM. | 19 ROLLER (PART OF LEFT SIDE TAPER ROLLER BEARING). |
| 7 NUT, LOCKING SPEEDOMETER GEAR BOX IN POSITION. | 20 BOLT, SECURING BRAKE DRUM AND SPROCKET TO HUB. |
| 8 SPACER, BETWEEN SPEEDOMETER GEAR BOX AND RIGHT-HAND SIDE TAPER ROLLER BEARING. | 21 REAR BRAKE COVER PLATE. |
| 9 OIL SEAL. | 22 BRAKE LINING. |
| 10 COLLAR, ENCIRCLING RIGHT-HAND OIL SEAL. | 23 BRAKE SHOE. |
| 11 CIRCLIP, LOCATING RIGHT-HAND SIDE TAPER ROLLER BEARING. | 24 SPIGOT BUSH, FITS IN LEFT-HAND FORK END. |
| 12 WASHER, RETAINING OIL SEAL (ONE EACH SIDE OF SEAL). | 25 NUT, ON CENTRE SOLID SPINDLE. |
| 13 SPACER, BETWEEN OIL SEAL INNER WASHER AND TAPER BEARING. | 26 LEFT-HAND SIDE CAM. |
| | 27 SPRING, FOR BRAKE SHOE. |
| | 28 BRAKE DRUM AND SPROCKET. |

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 threaded on the centre spindle in the case of the rear wheel. (Reference to illustration 21 will make that 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 circlip 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. 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 creep round.

TO DISMANTLE A FRONT WHEEL BEARING

These instructions need reference to the upper part of illustration 21.

Remove wheel from machine.

Remove nuts, and brake cover plate with shoes, 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 lock nut (11) still on it.

Carefully apply steady pressure on the threaded end of the wheel spindle which will, in turn, eject from the opposite end of the hub the cup housing for the oil seal (9), the oil seal (8), the metal washer (7) that is behind the oil seal and the outer cup (6). These may be lifted away as they emerge.

The front wheel spindle (6), 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 visible washer (avoiding fouling the circlip that can be seen in the hub end), so that the complete left-hand assembly of oil seal and outer cup is pushed a trifle further into the hub shell. This will take off pressure on the circlip, thereby making its extraction an easy matter.

Extract circlip (1), and then, reversing the hub, apply pressure on the inside edge of the outer cup (6), so that it is forced out of the hub. As it emerges it will push in front of it, the oil seal external plain washer (2), the oil seal (3), with its encircling spacer collar (4) and the oil seal inner plain washer (5), all of which can be lifted away as they appear, to be finally followed 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 to carefully apply steady pressure on the inner edge of the cup (6) to force the above entire assembly tightly back against the circlip (1).

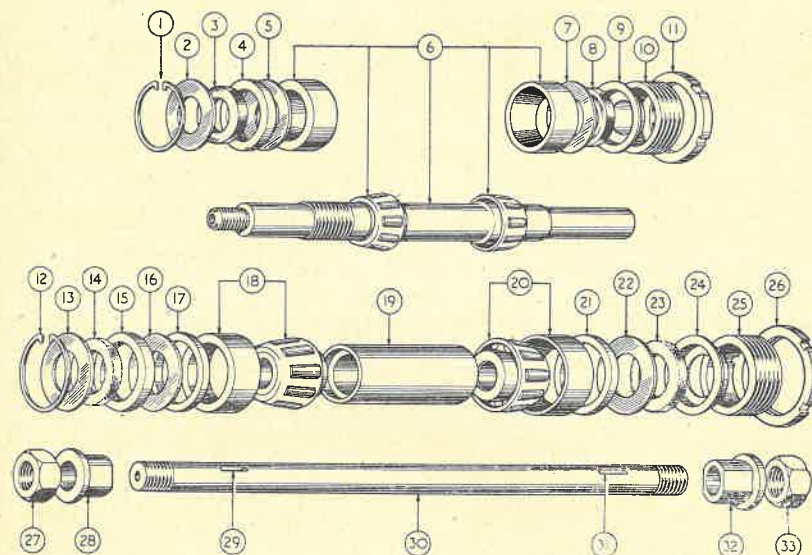


Illustration 21

Showing exploded view of hub bearing components in the order of assembly. Upper part is that of front bearings. Lower part is that of rear bearings.

- | | |
|--|---|
| 1 CIRCLIP. | 19 SPACER, BETWEEN BEARINGS. |
| 2 WASHER, METAL, OUTSIDE OIL SEAL. | 20 TAPER BEARING (OUTER CUP, CAGE FOR ROLLERS AND ROLLERS). THESE ARE NOT SUPPLIED SEPARATELY. ALSO ROLLERS ARE NOT SUPPLIED SEPARATELY. |
| 3 OIL SEAL. | 21 SPACER, BETWEEN OIL SEAL WASHER AND TAPER BEARING. |
| 4 SPACING COLLAR, ENCIRCLING OIL SEAL. | 22 WASHER, METAL, BETWEEN OIL SEAL AND SPACER. |
| 5 WASHER, METAL, BETWEEN OIL SEAL AND TAPER BEARING. | 23 OIL SEAL. |
| 6 OUTER RACES (2 OFF). CENTRE SPINDLE. ROLLERS IN CAGES (2 SETS). THESE ARE NOT SUPPLIED SEPARATELY. ALSO, ROLLERS ARE NOT SUPPLIED SEPARATELY. | 24 CUP, HOUSING, FOR OIL SEAL. |
| 7 WASHER, METAL, BETWEEN OIL SEAL AND TAPER BEARING. | 25 ADJUSTING RING. |
| 8 OIL SEAL. | 26 LOCK NUT, FOR ADJUSTING RING. |
| 9 CUP, HOUSING, FOR OIL SEAL. | 27 NUT, EXTERNAL, FOR REAR WHEEL SPINDLE. |
| 10 ADJUSTING RING. | 28 BUSH, FOR REAR WHEEL SPINDLE (FITS IN FORK END). |
| 11 LOCK NUT, FOR ADJUSTING RING. | 29 KEYWAY, TO ACCOMMODATE KEY LOCKING CAM TO REAR WHEEL SPINDLE. |
| 12 CIRCLIP. | 30 REAR WHEEL SOLID CENTRE SPINDLE. |
| 13 WASHER, METAL, OUTSIDE OIL SEAL. | 31 KEYWAY, TO ACCOMMODATE KEY LOCKING CAM TO REAR WHEEL SPINDLE. |
| 14 OIL SEAL. | 32 BUSH, FOR REAR WHEEL SPINDLE (FITS IN FORK END). |
| 15 SPACING COLLAR, ENCIRCLING OIL SEAL. | 33 NUT, EXTERNAL, FOR REAR WHEEL SPINDLE. |
| 16 WASHER, METAL, BETWEEN OIL SEAL AND SPACER. | |
| 17 SPACER, 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. | |

TO DISMANTLE A REAR WHEEL BEARING

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

Remove wheel from machine.

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

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

Completely 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 fouling the circlip that can be seen in the hub end), so that, in turn, the cup housing (24) for the oil seal, the oil seal (23), the metal washer (22) that is behind the oil seal, the spacing ring (21) that is between the metal washer and the taper bearing, and outer cup (20) are ejected. These may be lifted 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 fouling the circlip that can be seen in the hub end), so that the complete right-hand assembly of oil seal and outer cup is pushed a trifle further into the hub shell. This will take off pressure on the circlip, thereby making its extraction an easy matter.

Extract circlip (12).

Through the open 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 front of it, the oil seal plain washer (13), the oil seal (14) with its encircling spacer collar (15), the oil seal internal plain washer (16) and the spacing ring (17) between the metal washer and the taper bearing, to be finally followed by the cup (18).

The dismantling is then completed.

To re-fit, reverse the above procedure, remembering that, after cup (18), spacer (17), washer (16), oil seal (14), spacer (15) and washer (13) have been inserted in the plain end of the hub, to re-fit the circlip (12) and then to carefully apply steady pressure on the inner edge of the cup (18) to force the above entire 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 retained to the front wheel spindle by an inside nut (part number 40-G12M-H47) and an outside nut (part number 013483). Between the inside nut and the brake cover plate is a locating washer (part number 11913).

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

The outside 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 six 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 drum 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 "handed."

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 continual adjustment causes the brake cam to occupy a position whereby the available leverage is considerably reduced and, as a result, the brake loses efficiency.

To overcome this a hardened headed thrust pin is fitted to each shoe to enable a packing washer to be fitted under the head as, and when, required. Eight of these washers (STD-174) are provided in the tool kit. When wear of the brake linings is taken up in this manner it is then necessary to considerably unscrew 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 afterwards.

When a brake cover plate has been disturbed, it is advisable, upon re-assembly, to centralise the shoes in the brake drum to ensure equal pressure to each. In the case of the front wheel this is best done before re-fitting the wheel to the machine, but in the case of the rear wheel it is best done after re-fitting.

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

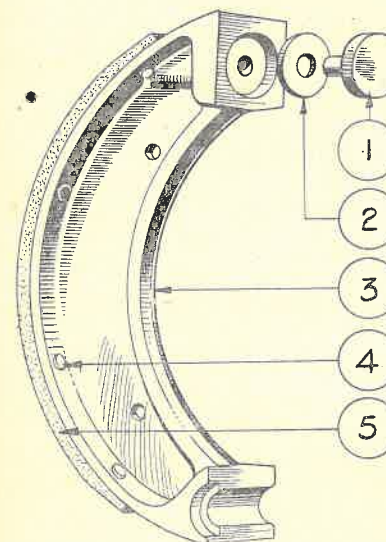


Illustration 22

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

Centralise brake shoes by:

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

Place on the brake expander lever a tubular spanner (to increase the leverage), and, while maintaining pressure on the tubular spanner (to expand fully the brake shoes), fully tighten the spindle nut binding the cover plate to 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. Unscrew the adjuster to "take up" the front brake. The adjuster is locked in position by a nut.

Adjust front brake by :

Place machine on centre and front stands.

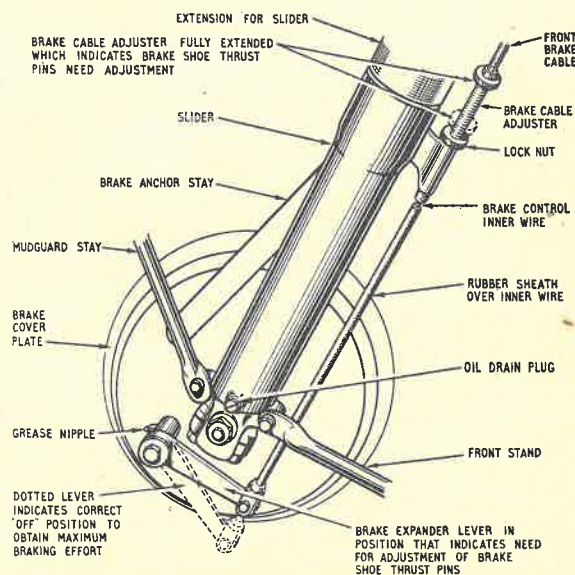
Slacken lock nut on cable adjuster.

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 23

Showing front brake cable adjuster thread exhausted, indicating brake shoe thrust pin adjustment is necessary.



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 knurled adjusting nut. Screw the nut further on the rod to "take up" the rear brake.

Adjust rear brake by :

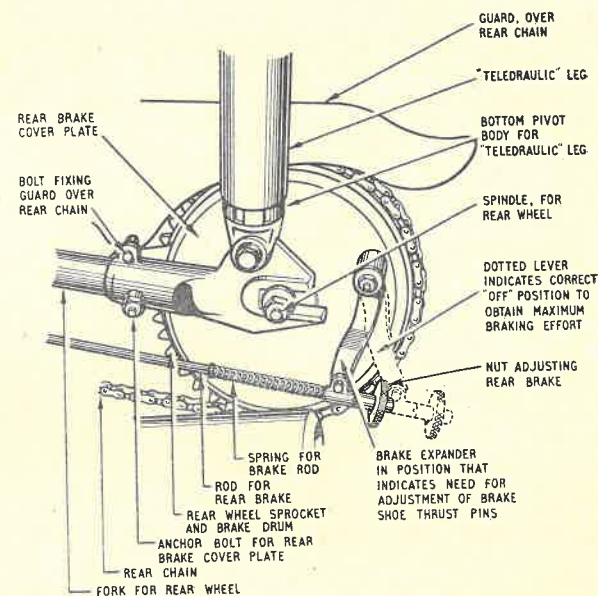
Place machine on centre stand.

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 accommodating slots cut in the clip which connects the brake rod and brake expander lever and being retained in that position by the spring which encircles the rear end of the brake rod).

Illustration 24

Showing brake rod adjustment exhausted, indicating the need for brake thrust pin adjustment.



BRAKE PEDAL ADJUSTMENT

The position of the rear pedal brake can be adjusted within narrow limits. This is done by means of a bolt screwed into the heel of the pedal. The adjusting bolt is locked by a nut.

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

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

RIMS AND SPOKES

The front and rear rims are 19" x 21", each are 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."

TYRES AND SERVICE

Obtaining satisfactory life and service from the tyres is largely a matter within the user's control because the first essential is correct inflation. Check tyre pressures with a low pressure gauge at least once a week. Inflate as may be necessary.

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

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

Remove flints, etc., that become embedded in the tread and, if any oil gets on the tyres 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 string stretched taut across both wheels, about four inches from, and parallel to, the ground, should just touch each tyre at both sides of the wheel centres.

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

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

TYRE REMOVAL

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

Take off outer cover and remove inner tube by :

Remove cap from tyre valve.

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 levers 40-G3-TK29, pick up edge of cover **NEAR VALVE** so that it comes off over the edge of the rim.

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

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

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

TYRE FITTING

Re-fit inner tube and outer cover by :

Place one edge of cover right into well of rim, with the three white dots 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 slightly inflate the inner tube. (Do not distend the tube).

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

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

Smear some soapy water round the free edge of the cover. This is a great help in fitting and in ensuring the cover centralises itself on the rim and should always be employed if at all possible.

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

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

Half inflate tyre, spin wheel and test for trueness because it is essential the pattern of the tread runs evenly and the cover must be manipulated till that occurs. This **centralisation of the cover is most important**.

Inflate to required pressure.

Screw fully home the nut on the valve.

Replace the valve cap.

TYRE PRESSURES

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

Load per tyre, 200 lb.	Pressure 16 lb. per square inch
do. 240 lb.	do. 18 lb. do.
do. 280 lb.	do. 20 lb. do.
do. 350 lb.	do. 24 lb. do.
do. 400 lb.	do. 28 lb. do.
do. 440 lb.	do. 32 lb. do.

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 weighbridge 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 pressures should be 18 lb. for the front tyre and 22 lb. for the rear.

ELECTRICAL SERVICE

ELECTRICAL EQUIPMENT

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

- (1) **IGNITION**—Magneto, High-tension wires, Sparking plugs and Cut-out switch.
- (2) **CHARGING**—Dynamo Automatic Voltage Control Unit and Battery.
- (3) **LIGHTING AND ACCESSORIES**—Lamps, Horn, Switches and wiring.

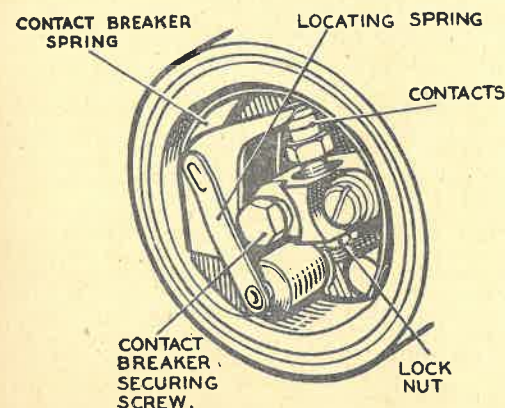


Illustration 25
Showing Contact Breaker

IGNITION

A LUCAS type K2F magneto is fitted. The replacement part number is 42180-A and the part number of the complete contact breaker is 470534.

Lubrication and adjustment is required every 3,000 miles, cleaning is required every 5,000 miles and every 10,000 miles the complete unit should be handed to a **Lucas Service Station** for dismantling, replacement of worn parts, cleaning and lubrication.

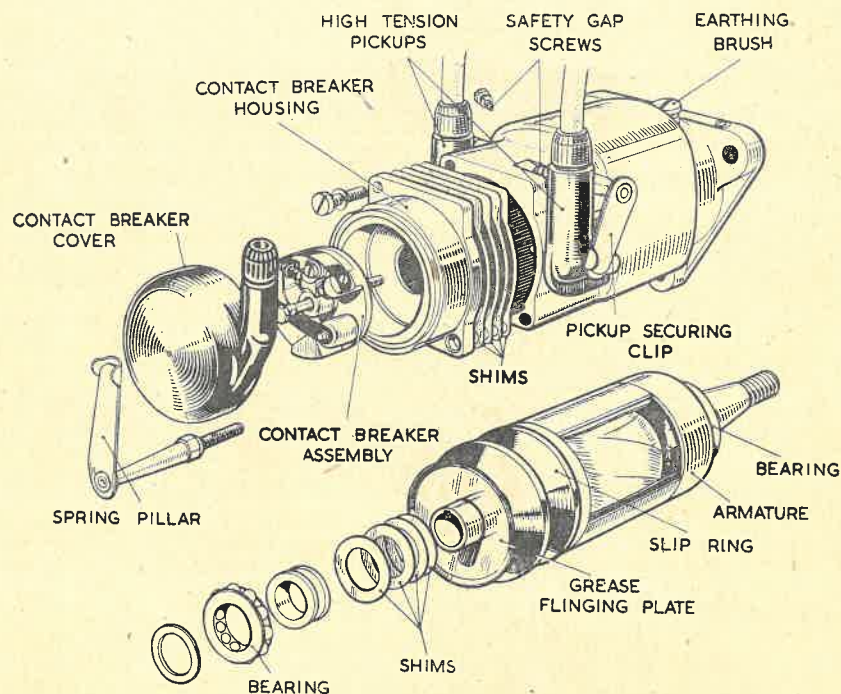


Illustration 26

Showing dismantled components of magneto

Lubrication every 3,000 miles

(a) The cam is supplied with lubricant from a felt pad contained in a pocket in the contact breaker housing. A small hole in the cam fitted with a wick, enables the oil to find its way on to the surface of the cam. Remove the contact breaker cover and turn over the engine until the hole in the cam can be clearly seen and then carefully add a few drops of thin machine oil. (The hole is located in the lowermost part of the cam ring). Do not allow any oil to get on the contact points.

(b) The contact breaker rocker arm also requires lubrication and the complete contact breaker must be removed for this purpose. Take out the hexagon headed screw from the centre of the contact breaker and pull the contact breaker off the tapered shaft on which it fits. Then push aside the rocker arm retaining spring, prise the rocker arm off its bearing and lightly smear the bearing with clean engine oil. When replacing the contact breaker, take care to ensure that the projecting key, on the tapered portion of the contact breaker base, engages with the keyway cut in the magneto spindle, otherwise the timing of the magneto will be upset. Tighten the hexagon-headed screw with care; it must not be too slack, nor must undue force be used.

Adjustment every 3,000 miles

Remove the contact breaker cover and turn the engine until the contact points are fully opened. Check the gap with a gauge having a thickness of .012" (Spanner 015023 has a gauge of this thickness as an integral part of it). If the setting is correct the gauge should be a sliding fit, but if the gap varies appreciably from the gauge it should be adjusted.

Keep the engine in the position to give maximum opening of the contact points, slacken the lock nut on the fixed contact point and turn the contact screw, by its hexagon head (use spanner 015023) until the gap is set to the gauge. Finally, tighten the lock nut and re-check the setting.

Cleaning every 5,000 to 6,000 miles

Take off the contact breaker cover and remove the contact breaker. If the contact points are burned or blackened, clean them with a fine carborundum stone or with very fine emery cloth, and afterwards wipe away any dust or dirt with a petrol moistened cloth. After replacing the contact breaker check the point gap and, if necessary, re-set it.

Remove the high tension pick-ups (held by swinging spring clips), wipe clean and polish with a fine dry cloth. The high tension pick-up brush must move freely in its holder.

If it is dirty, clean with a cloth moistened with petrol. If the brush is worn to within $\frac{1}{8}$ " of the shoulder it must be renewed. Treat both pick-ups and their brushes.

While the pick-ups are removed, clean the slip ring track and flanges by holding a soft cloth on the ring by means of a suitably shaped piece of wood, while the engine is slowly turned.

If, on inspection, the high tension cable shows signs of perishing or cracking, it must be replaced by a suitable length of 7 mm. rubber covered ignition wire.

Sparking plug

The sparking plug has a thread of 14 mm. and a reach of $\frac{3}{4}$ ". The point gap should be .018". Check the point gap every time the engine is decarbonised.

NOTE—Check the contact breaker point gap after the first 100 miles and first 500 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 3,000 miles. (When the engine is decarbonised is always an opportune time).

Magneto removal and fitting

The magneto is "spigot fitting" and is retained to the crankcase by three bolts.

To remove the magneto it is necessary to :

Take away the timing gear cover.

Withdraw the driving gear from the magneto shaft. (Already described in the Engine Section).

Disconnect the high tension wires from the sparking plugs.

Disconnect the ignition control cable.

Disconnect the cut-out wire (or remove the contact breaker cover).

Remove the nuts from the two studs and one bolt that secure the magneto body to the crankcase and the unit is free to be taken away.

The re-fitting is done by the above procedure reversed and the method of timing has already been described in the Engine Maintenance Section.

CHARGING

A LUCAS type **E3L-LI-O** dynamo is fitted. It is anti-clockwise in rotation and is a **lengthened version** of the E3 Dynamo fitted to our single cylinder machines. The cutting in speed is 1050,—1,200 r.p.m. at 6.5 volts and at 1,850 to 2,000 revolutions per minute it gives an output of 8.5 amps at 7 volts. The replacement part number is 20009-E. The positive brush is insulated and the negative brush is earthed. The two exterior 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

Remove the dynamo (see below for instructions).

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.

If, after long service, the brushes have become worn to such an extent that the brush flexible 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 pressing a fine dry cloth against it while the engine is slowly turned over by means of the kick-starter. (It is an advantage to remove the sparking plugs before doing this). If the commutator is very dirty, moisten the cloth with petrol.

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

To remove and re-fit dynamo

The dynamo rests on a cradle forming part of the crankcase and is retained by a band having an adjustable clamping action. It is rotated by a gear meshing with the timing gear wheel on the exhaust cam shaft.

Upon merely slackening the clamping strap the dynamo, complete with its driving gear, can be withdrawn from the crankcase. The two wires from dynamo to regulator unit are retained by an insulated bridge secured by one screw and, upon removing that screw, the bridge, with the two cables, can be taken away from the dynamo.

The cut-out and regulator unit (A.V.C.), is type **MCR-2**, and the replacement part number is 37097-A.

Although the voltage regulator and the cut-out are combined structurally, they are electrically separate.

The regulator is set to maintain a pre-determined 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 day-time running, when the battery is in good condition, the dynamo gives only a trickle charge, so that the ammeter reading will seldom exceed 1 to 2 amperes.

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 cut-out 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 proceeding that would soon cause the battery to become completely discharged.

The regulator and cut-out are accurately set during manufacture and the cover protecting them is therefore sealed. If, under normal running conditions, it is found that the battery is continually in a low state of charge, or is being constantly overcharged, then the regulator setting should be checked by a qualified electrician and, if necessary, re-set. Whenever possible, this should be carried out by a Lucas Service Depot or Agent.

The A.V.C. Unit is retained to the battery carrier by two bolts with nuts. The four terminals of the A.V.C. Unit are plainly marked by the letters F.A.D.E. Wires from F and D go to similarly 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.

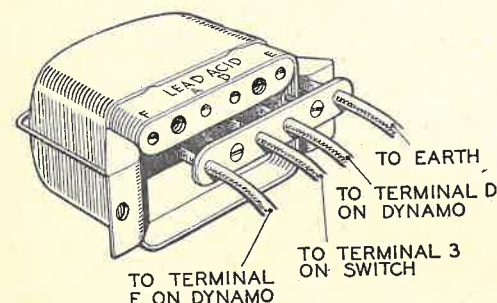


Illustration 27

Showing connections to regulator and cut-out unit

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. The negative terminal is earthed to the frame.

The maintenance period of a battery is expressed in terms of **time** and not miles, as is general with all other parts of the machine.

The routine maintenance **MUST** be carried out, irrespective of if the machine is used, or not.

Maintenance once every 14 days

Remove battery cover, brush dirt from top of battery and remove vent plugs. (There are three vent plugs).

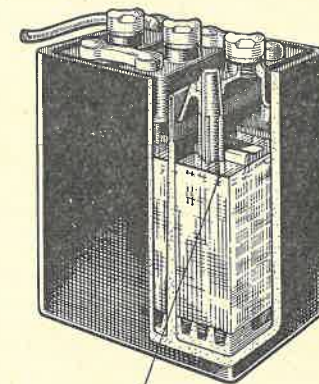
NOTE—NEVER bring a naked light near a battery when the vent plugs have been removed, or when the battery is being charged, as the gas given off by the electrolyte is highly explosive.

The specific gravity of the electrolyte indicates the state of charge of the battery. Table "A" shows what the specific gravity of the electrolyte should be, at various temperatures, when the battery is fully charged. Check the gravity by means of a hydrometer, and if it is below the figures shown for the appropriate temperature in table "B," the battery should be charged as soon as possible by the normal running of the motor cycle. 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 30 minutes.

NEVER transfer the electrolyte from one cell to another.

NEVER leave a battery in a discharged condition. It must be put on charge as soon as possible.



ELECTROLYTE LEVEL

Illustration 28
Lucas PUW-7E-4

Table "A"	Temperature	Table "B"
1.270	120° F.	1.220
1.280	100° F.	1.230
1.285	80° F.	1.235
1.295	60° F.	1.245
1.305	40° F.	1.255
1.310	20° F.	1.260
1.320	0° F.	1.270
1.325	-21° F.	1.275

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 carrier.

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, dust or road slush.

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 1.280 to 1.300 indicates fully charged.

Reading about 1.210 indicates half discharged.

Reading below 1.150 indicates fully discharged.

LIGHTING AND ACCESSORIES

Headlamp

A LUCAS type **SSU-700-P** headlamp is fitted. The replacement part number is 50788-B.

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 29. 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, illumination being arranged through a small circular window in the reflector.

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

Focussing the main driving beam

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

It is best to make the focussing adjustment in the dark with the machine so positioned that the light falls on a wall some distance away.

To focus the light beam, place the machine as suggested above, slacken the clamp binding screw, pull inwards, or outwards, the bulb till, with the light switched on, the smallest circle of light is obtained. Then set the lamp, by slightly slackening its two fixing bolts, so that it is tilted in such a manner that the light beam is projected slightly below the horizontal, after which tighten the two fixing bolts.

To remove the headlamp front and interior

Slacken 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, raise slightly to disengage the bottom tag from the lamp shell. The cap which carries the bulbs is secured to the reflector by means of two spring plungers. To remove the cap, depress one plunger and tilt the cap bodily. The reflector and front glass unit is secured to the rim by means of five spring clips. These can be disengaged from the turned up inner edge of the rim by pressing with a screwdriver blade and, at the same time, working away from the edge.

To replace the headlamp front and interior

Lay reflector and glass unit in the rim so that the block on the reflector back engages with the forked bracket on the rim.

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

Offer up assembly to the lamp shell, engaging the bulb carrier cap in the position in which the pilot bulb is against the small window of the reflector. Engage bottom tag on lamp rim with the small slit in the shell and gently force the top of the rim back into the shell, after which re-tighten the locking screw on the top of the lamp body.

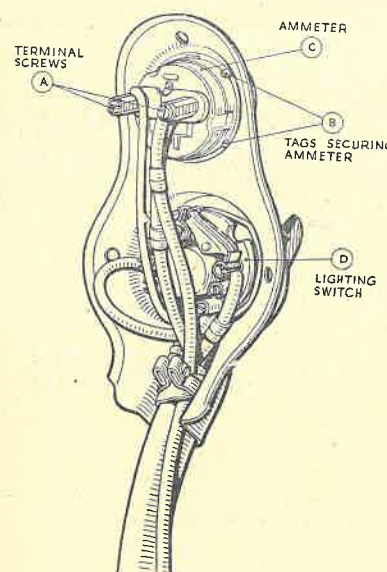


Illustration 29

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

The ammeter fitted is type CZ-27 and the replacement part number is 364455

Rear lamp

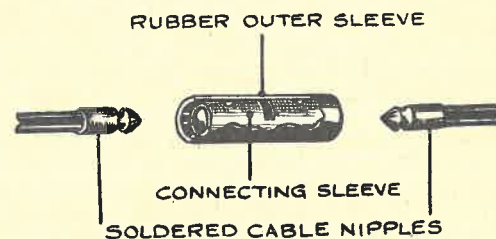
A LUCAS type 467/2 rear lamp is fitted. The body, with bulb holder, is secured to the rear number plate by two nuts and spring washers.

The cover, carrying the red glass, is secured to the body by a sleeve nut. Upon removing this nut, the cover and glass may be taken away to permit bulb replacement. Details of lamp bulbs are given in "DATA."

Snap wire connector

The LUCAS snap connector, as shown in illustration 30, 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 split ferrule, into which the two sleeves snap and the fourth component is a rubber sleeve which covers the whole connector. That rubber sleeve serves the dual purpose of insulating the various metal parts and also preventing same from separation as the result of vibration.

Illustration 30
Lucas snap connector
Part number 900269



One snap connector is used in the rear lamp wire (the wires have red coloured sleeves) and another is used in the wire connecting the regulator unit to the output side of the ammeter in the head lamp. (The wires have purple and white coloured sleeves.)

Screwed wire connector

A LUCAS screwed connector of the type shown in Illustration 31 is used in the wire connecting the positive terminal of the battery to the input side of the ammeter (the wire has yellow and black coloured sleeves) in the head lamp. It is made up of four parts. One part, a metal sleeve, is threaded internally and accommodates a collet 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 collet. 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 played 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 as, and when, it is wished to remove the battery from the machine. A rubber sleeve encircles the whole assembly, serving the dual purpose of insulation and prevention of loss through vibration.

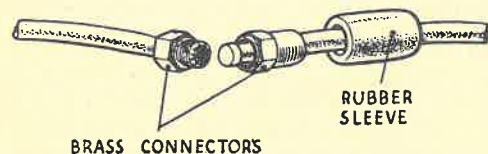


Illustration 31
Lucas screwed wire connector
Part number 571395

Terminals

The earth wires (two—one from regulator, the other from negative terminal of battery) and the high-tension wires (two—one on sparking plug end of each wire from magneto to sparking plug) have terminals of the solid sleeve type having an eye at the extreme end. To make such a connection, it is necessary to bare the end of the wire for $\frac{3}{8}$ " , pass the terminal over the wire so that the bared end fully enters the reduced core of the terminal and then flatten that part by either pinching 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 lug 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.

Horn

The horn push switch, situated on the right handlebar, must make good electrical contact with the metal part of the handlebar and, if there is reason to suspect the bar is corroded at that point, the switch should be unclipped, the bar and switch cleaned and then replaced.

Fuses

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

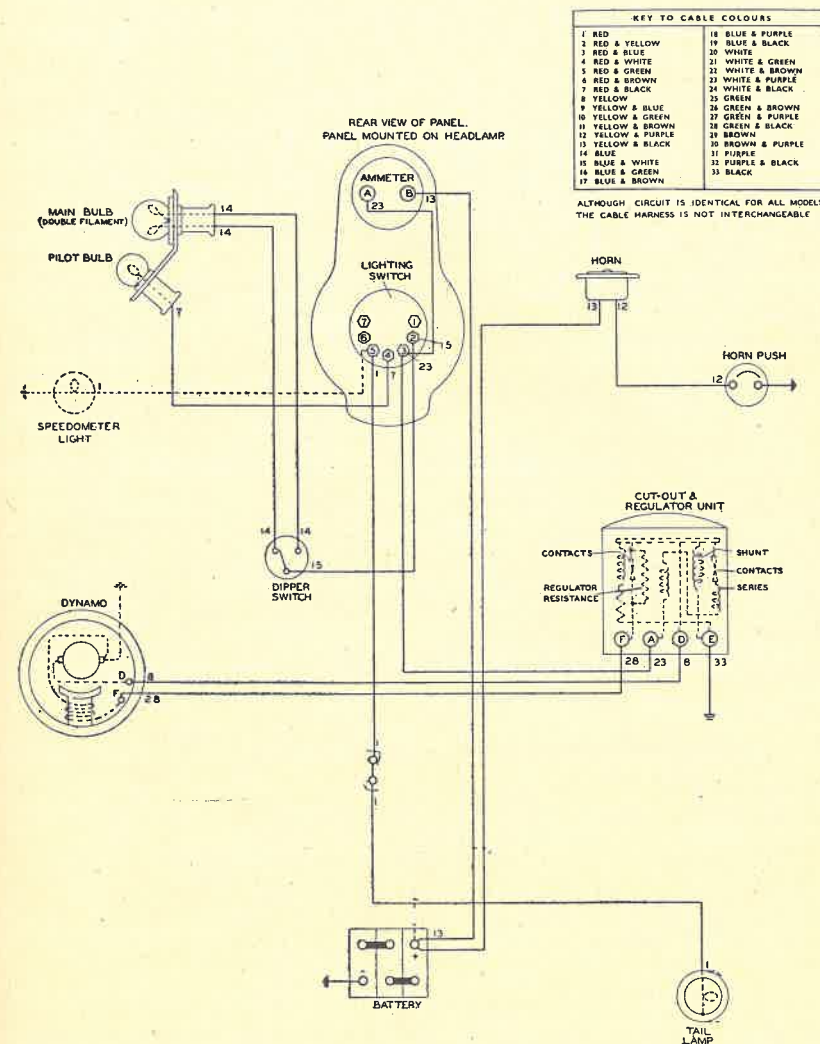


Illustration 32
Theoretical wiring diagram

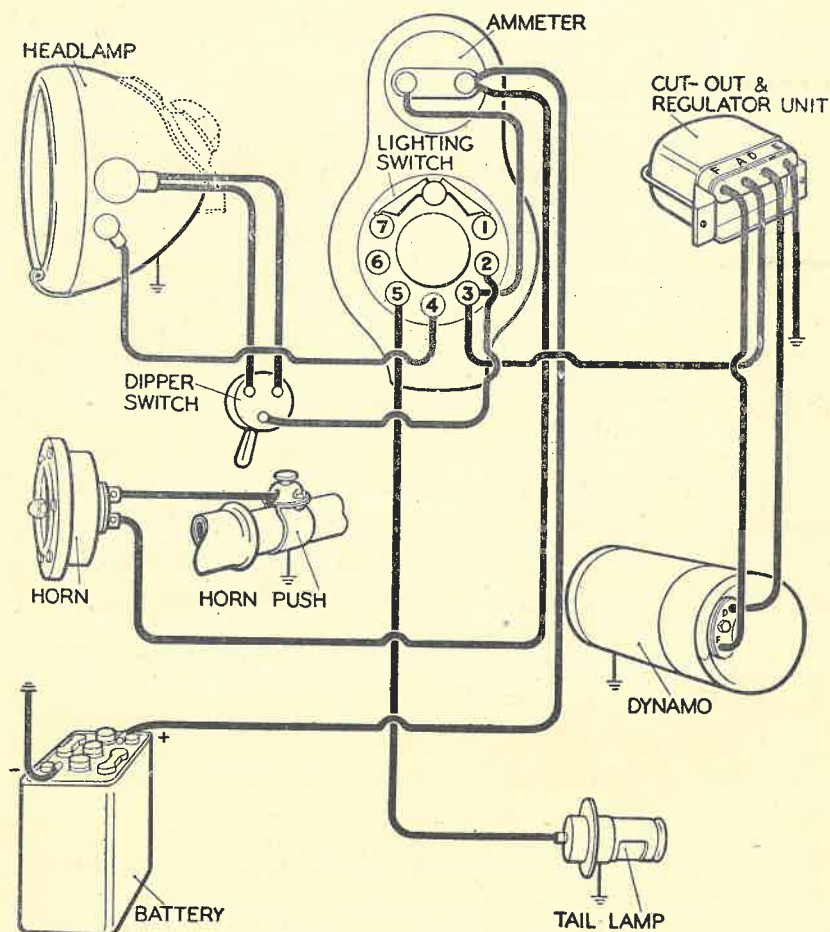


Illustration 33

Pictorial wiring diagram

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.
- Ignition not set just off fully advanced position.
- Lack of fuel because of insufficient flooding.
- Lack of fuel because of pipe, or tap, obstruction.
- Excessive flooding of carburetter.
- Pilot jet choked.
- Oiled up, or fouled, sparking plugs.
- Stuck up engine valve.
- Weak, or broken, valve spring.
- Valve not seating properly.
- Contact points dirty.
- Incorrect contact point gap.
- Water on high-tension pick-ups.
- Moisture on sparking plugs.

Engine misses fire may be due to :

- Defective, or oiled, sparking plugs.
- Incorrect contact point gap.
- Contact breaker rocker arm sticking.
- Contact breaker points loose.
- Rocker adjustment incorrect.
- Oil on contact breaker points.
- Weak valve springs.
- Defective sparking plug wire.
- Partially obstructed petrol supply.

Loss of power may be due to :

- Faulty sparking plugs.
- Lack of oil in tank.
- No rocker clearance, or too much clearance.
- Weak, or broken, valve spring.
- Sticky valve stem.
- Valve not seating properly.
- Brakes adjusted too closely.
- Badly fitting, or broken, piston rings.
- Punctured carburetter float.
- Engine carbonised.
- Choked silencer.

Engine overheats may be due to :

Lack of proper lubrication. (Quality or quantity of oil).
Faulty sparking plugs.
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.
Oiled up, or fouled, sparking plug.
Water on high-tension pick-up, or sparking plug.
Water in float chamber.
Vent hole in petrol tank filler cap choked.

EXCESSIVE OIL CONSUMPTION

Excessive oil consumption may be due to :

- Clogged, or partly clogged, oil filter.
- Stoppage, or partial stoppage, in the pipe returning oil from the engine to the oil tank.
- Badly worn, or stuck up, piston rings. (Causing high pressure in the crankcase).
- Air leak in dry sump oiling system.
- Worn inlet valve stems.

EXCESSIVE PETROL CONSUMPTION

Excessive petrol consumption may be due to :

- Leaks in the petrol feed system. (Damaged fibre washers, loose union nuts on piping, defective float needle action).
- Incorrect ignition setting. (Ignition not advanced sufficiently).
- Defective engine valve action.
- Incorrect use of air control lever.
- Moving parts of carburettor badly worn. (Only possible after very considerable mileage).
- Bad air leak at carburettor junction, or inlet manifold joint.

ABNORMAL TYRE WEAR

Abnormal tyre wear may be due to :

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

CLEANING THE MACHINE

Do not attempt to rub, or brush, mud off the enamelled surfaces because this will soon destroy the sheen of the enamel. Mud, and other road dirt, should be soaked off with water.

The best method is to use a small hose, taking care not to direct water on to the engine, carburettor, magneto and other such parts. As a poorer substitute, a pail of water and a sponge may be used.

After washing down with water, the surplus moisture should be removed with a chamois leather, and, when the enamelled surfaces are thoroughly dry, they may be polished with a good wax polish and soft dusters.

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

CHROMIUM PLATING

Under some climatic conditions, a rusty looking deposit may be observed on ferrous parts that are chromium plated. This is not ordinary rust (ferric oxide) but is a salt deposit that, in most cases and in its early stages, can be quickly and easily removed with a damp chamois leather. In stubborn cases it may be necessary to use a special chromium cleaning compound.

The safest precaution during Winter is to wipe over all chromium plated parts with a soft rag in "TEKALL," which is a lanoline base rust preventative marketed in small tins and available at most garages. This material, so applied, leaves an almost invisible film that is impervious to moisture and its use cannot be too highly recommended to owners who value the appearance of their mounts.

In Summer, when those conditions do not prevail, chromium parts should be frequently cleaned with a damp chamois leather and afterwards polished with a soft duster, or, better still, with a polisher of the "Selvyt" type.

If a polish is used it must be one of the special compounds for chromium plating only. Ordinary metal polishing liquids, in particular, must not, on any account, be used because these, almost without exception, contain acids, which attack chromium.

NOTE—"Tekall" is a product of 20th Century Finishes Ltd., 175-177, Kirkgate, Wakefield, and is retailed in $\frac{1}{2}$ pint and 1 pint tins. It can be obtained from our Spare Parts Department, as follows :

$\frac{1}{2}$ pint tin "Tekall," Part number 011957, price 2/-, plus 6d. postage.

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

REPAIRS

The instructions regarding repairs should be clear and definite, otherwise the cost may be greater than that expected. We shall be pleased to give estimates for repairs if parts are sent to us for that purpose. If the estimate is accepted, no charge is made for the preliminary examination, but, should it be decided not to have the work carried out, it **MAY** be necessary to make a charge to cover the cost of whatever dismantling and re-assembly may have been done to prepare the estimate.

Customers desiring that old parts which are replaced with new during the course of overhaul or repair be retained must make the 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 an urgent repair, **IT IS ESSENTIAL** you **MAKE AN APPOINTMENT** beforehand to **AVOID DISAPPOINTMENT**. This can be done by letter or telephone.

CORRESPONDENCE

Our routine is organised into different departments, therefore delay cannot be avoided if matters relating to more than one department are contained in one letter.

Consequently, it is desirable, when communicating with more than one department, to do so on **SEPARATE SHEETS**, each of which should bear your name and address. **IN PARTICULAR**, requests for **TECHNICAL ADVICE** should not be on the same sheets as **ORDERS FOR SPARE PARTS**.

When writing on a technical matter, or when ordering spares, it is essential to quote the **COMPLETE ENGINE NUMBER**. Some numbers have one, or more, letters incorporated in them and these letters **MUST BE QUOTED**, otherwise we are not able to identify the machine.

PROPRIETARY FITTINGS

No expense is spared to secure and fit the most suitable, and highest quality, instruments and accessories for the standard equipment of our machines.

Nevertheless, our Guarantee does not cover such parts and, in the event of trouble being experienced, the parts in question should be returned to, and claims made, direct on the actual manufacturers who will deal with them on the terms of their respective guarantees.

Those manufacturers are :

Carburettors	Messrs. Amalgamated Carburettors Ltd., Holford Works, Perry Barr, Birmingham.
Chains	The Renold and Coventry Chain Co. Ltd., Didsbury, Manchester.
Electrical equipment	Messrs. Joseph Lucas Ltd., Great King Street, Birmingham, 19.
Gear boxes	Messrs. Burman and Sons Ltd., Ryland Road, Birmingham, 15.
Sparking Plugs	K.L.G. Sparking Plugs Ltd., Putney Vale, London, S.W.15
Speedometers	Messrs. S. Smith and Sons (M.A.) Ltd., Cricklewood, London.
Tyres	Messrs. Dunlop Rubber Co. Ltd., Fort Dunlop, Birmingham.

All the above manufacturers issue instructive 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 1.0 p.m.—2.0 p.m. to 5.30 p.m. It is closed on Saturdays, Sundays and National Holidays. It exists for the purposes of :

- Giving technical assistance verbally or through the post.
- Supplying spare parts over the counter or through the post.
- Repairing and re-conditioning machines or, parts of machines, of our make.

Burrage Grove is the first turning on the left from Burrage Road when entering Burrage Road from the Plumstead Road. (See final paragraph below).

The nearest Railway Station is **WOOLWICH 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, 53a, 54, 99 and 122. Trolleybus routes, 696 and 698, and Tram routes 36, 38 and 40, pass the end of Burrage Road (one minute from the Service Depot).

Bus routes 21a, 75 and 161 and Tram routes 44, 46 and 72 serve **Beresford Square** which is three minutes walk from the **Service and Repair Department**.

Visitors from the North can pass into Woolwich 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, 569, 669 and 685. There is also a tunnel under the River Thames at this point for foot passengers. The Free Ferry accommodates all types of motor vehicles and there is a very frequent service. The Southern landing stage is less than a mile from the Service Depot.

Visitors arriving by road, if they are strangers to the locality, should enquire for **Beresford Square, Woolwich**. Upon arrival there, the road skirting the Royal Arsenal should be followed in an Easterly direction for about four hundred yards, and Burrage Road is the second turning on the right after leaving the Square. Burrage Grove is then the first turning on the left.

The above information revised by LONDON TRANSPORT EXECUTIVE December, 1948

THE DRIVER AND THE LAW

The driver of a motor cycle **MUST** be **INSURED** against Third Party Claims and **MUST** be able to produce an **INSURANCE CERTIFICATE** showing that such an insurance is in force.

If your Insurance Certificate specifies you can only drive one particular machine you **MUST NOT DRIVE** any other machine unless its owner has a current Certificate covering "**ANY DRIVER**" and it is advisable to remember that, in the absence of such a provision the penalties for doing so are very heavy.

The driver of a motor cycle **MUST** hold a current **DRIVING LICENCE**. If you are a learner and hold a Provisional Driving Licence, your machine must show, front and back, the standard "**L**" plates in red and white and you must not take a **PILLION PASSENGER** unless that passenger is the holder of a current **UNRESTRICTED** driving 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.

Make sure you are well acquainted with the recommendations set down in the "Highway Code," a copy of which can be obtained from any main Post Office.

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 :

- (a) Form "RFI/2," duly completed.
- (b) The certificate of insurance.
- (c) The invoice you received from your dealer when you purchased the machine.
- (d) The appropriate registration fee.

In due course you will receive :

- (1) A Registration Book. (Commonly called the "log" book).
- (2) A Licence Disc.
- (3) Your Insurance Certificate.
- (4) Your Invoice.

The Registration Book and the Licence Disc will bear the registration numbers that have been allotted to your machine and will also show the date the Road Licence expires.

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

The numbers on the front plate must be $1\frac{3}{4}$ " high, $1\frac{1}{4}$ " wide and $\frac{5}{16}$ " thick with spaces of $\frac{1}{2}$ " between each two characters.

The numbers on the rear plate must be $2\frac{1}{2}$ " high, $1\frac{3}{4}$ " wide and $\frac{3}{8}$ " thick with spaces $\frac{1}{2}$ " between each two characters.

The Licence Disc must be enclosed in a water-tight container, having a transparent front, and this must be fixed to the machine in a conspicuous position, near the front and on the left-hand side.

It is not legally necessary to carry your Driving Licence, Insurance Certificate and Registration Book while driving your machine.

Speedometer

A speedometer **MUST** be fitted and it **MUST BE** so **ILLUMINATED** that it is possible to read the dial after lighting up time.

Lamps

During the official "**LIGHTING UP**" hours the machine must exhibit a white light facing forwards and a red light facing rearwards. The rear number plate must be adequately illuminated by a white light.

Each electric light bulb **MUST** be marked with its "Wattage." (Beware of cheap, imported, bulbs that do not have this marking).

All motor cycles made by us have electric equipment that complies with the law regarding position, size of bulbs, marking on bulbs and the correct illumination of the rear number plate.

GUARANTEE

We give the following guarantee with our motorcycles, motorcycle combinations and sidecars, which is given in place of any implied conditions, warranties or liabilities whatsoever, statutory or otherwise, all such implied conditions, warranties and liabilities being in all cases excluded. Any statement, description, condition or representation contained in any catalogue, advertisement, leaflet or other publication shall not be construed as enlarging, varying or overriding this guarantee. In the case of machines (a) which have been used for "hiring-out" purposes or (b) any motorcycle and/or sidecar used for any dirt track, cinder track or grass track racing or competitions (or any competition of any kind within an enclosure for which a charge is made for admission to take part in or view the competition) or (c) machines from which the trade mark, name or manufacturing number has been removed, no guarantee, condition or warranty of any kind is given or is to be implied.

We guarantee, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and be in force for six months only from date of purchase, and damages for which we make ourselves responsible under this guarantee are limited to the free supply of a new part in exchange for the part of the motorcycle, motorcycle combination or sidecar which may have proved defective. We do not undertake to replace or refix, or bear the cost of replacing or refixing, such new part in the motorcycle, motorcycle combination or sidecar. We undertake, subject to the conditions mentioned below, to make good at any time within six months any defects in these respects. As motorcycles, motorcycle combinations and sidecars are easily liable to derangement by neglect, or misuse, this guarantee does not apply to defects caused by wear and tear, misuse or neglect.

The term "misuse" shall include amongst others the following acts :—

1. The attaching of a sidecar to a motorcycle in such a manner as to cause damage or calculated to render the latter unsafe when ridden.
2. The use of a motorcycle or of a motorcycle and sidecar combined, when carrying more persons or a greater weight than that for which the machine was designed by the manufacturers.
3. The attaching of a sidecar to a motorcycle by any form of attachment not provided, supplied or approved by us or to a motorcycle which is not designed for such use.

Any motorcycle, motorcycle combination or sidecar sent to us to be plated, enamelled or repaired will be repaired upon the following conditions, i.e., we guarantee that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, such guarantee to extend and be in force for three months only from the time such work shall have been executed or until the expiration of the six months above referred to, and this guarantee is in lieu and in exclusion of any common law or statute warranty or condition, and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.

CONDITIONS OF GUARANTEE

If a defective part should be found in our motorcycles, motorcycle combinations or sidecars, or in any part supplied by way of exchange before referred to, it must be sent to us **CARRIAGE PAID** and accompanied by an intimation from the owner that he desires to have it repaired or exchanged free of charge under our guarantee, and he must also furnish us at the same time with the number of the machine, the date of the purchase or the date when the alleged defective part was exchanged as the case may be.

Failing compliance with the above, such articles will lie here **AT THE RISK OF THE OWNER**, and this guarantee and any implied guarantee, warranty or condition shall not be enforceable.

We do not guarantee specialities such as tyres, saddles, chains, electrical equipment, lamps, etc., or any component parts supplied to the order of the Purchaser differing from standard specifications supplied with our motorcycles, motorcycle combinations, sidecars or otherwise.

TOOLS AND SPECIAL EQUIPMENT

TOOLS

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

1	...	38-G3-EQ2	...	Inflator
1	...	17520	...	Tool bag
1	...	015264	...	S.E. spanner. (Rocker clamping bolt nut)
1	...	41-G3L-TK1	...	D.E. spanner. ($\frac{3}{16}$ " \times $\frac{1}{4}$ ")
1	...	41-G3L-TK2	...	D.E. spanner. ($\frac{5}{16}$ " \times $\frac{3}{8}$ ")
1	...	3263	...	D.E. spanner. ($\frac{3}{16}$ " \times .375")
1	...	015023	...	D.E. spanner. (Magneto)
1	...	R-TK-3...	...	Three way spanner. (.80" \times 1.001" \times 1.2")
1	...	17634	...	Box spanner. (Sparking plug)
1	...	015213	...	Box spanner. (Cylinder head nut)
1	...	17634-T	...	Tommy bar for spanners 17634 and 015213
1	...	014540	...	Box spanner, with self contained tommy for rocker cap fixing bolts
1	...	11914-S	...	Hook spanner. (Front hub bearings)
1	...	010438	...	Hook spanner. (Rear hub bearings)
1	...	L-TK-12	...	Adjustable wrench
2	...	40-G3-TK29	...	Tyre lever
1	...	L-TK-13	...	Screwdriver
1	...	L-TK-15	...	Pliers. (Sidecutting)
1	...	11024	...	Pliers. (Circlip)
1	...	L-TK-20	...	Grease gun

OPTIONAL SPECIAL TOOLS

The following tools are **NOT** included in the standard tool kit.

Pinion extractor M.E-564 A two piece extractor for removing the timing gear small pinion and the gear on the magneto shaft.

Gear extractor 015374 A bridge type extractor, consisting of bridge, central screw and two side bolts, for removing the gears on the camshafts.

Timing disc 014598 A circular timing disc, graduated in degrees and made of ivory. A very useful device. Price 3/6, plus 6d. postage.

The above described tools can be supplied to special order to dealers and private owners. Apply to Spares Department.

GASKET SETS

For convenience in ordering, standard sets of engine washers and gaskets are stocked. Full details of contents and prices are included in the Spares List.

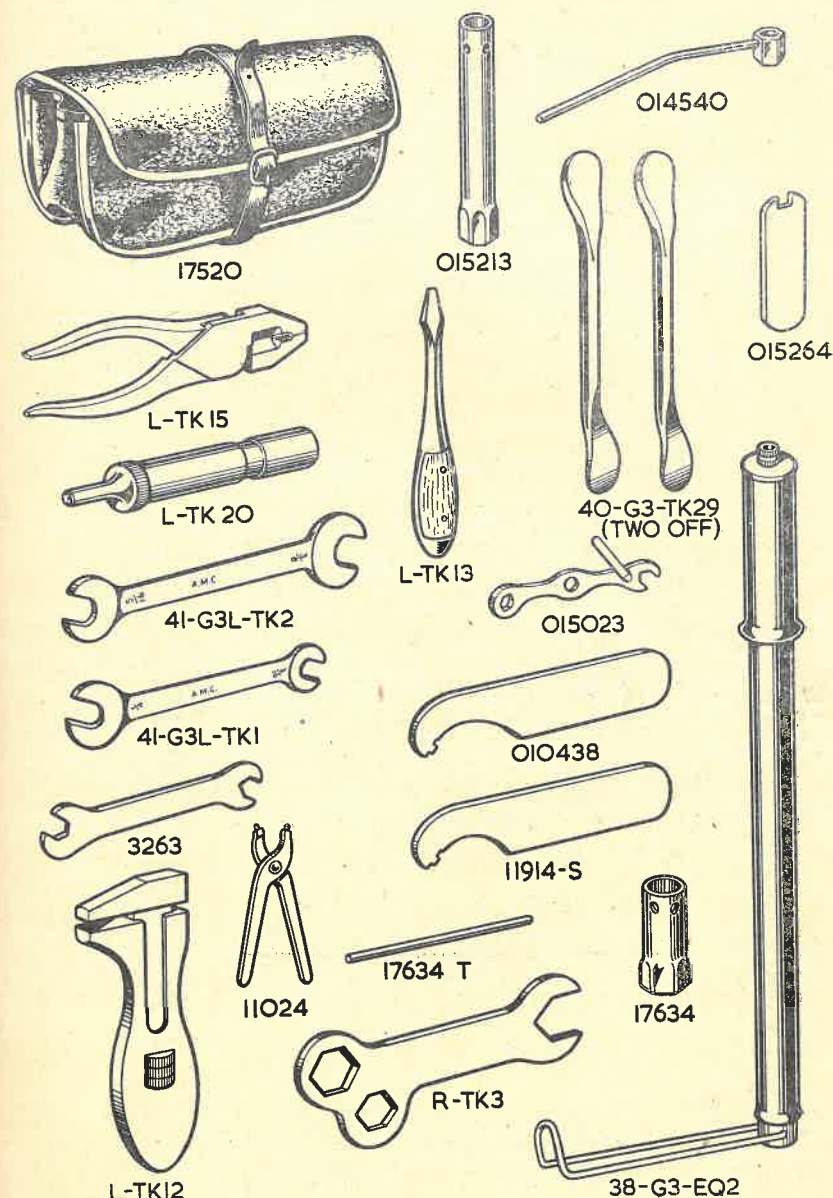


Illustration 34

Showing tools issued with standard tool kit

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 signed 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. | (6) Wheel bearings. |
| (2) Contact breaker points. | (7) Brakes. |
| (3) Sparking plugs. | (8) Forks, legs, and steering head. |
| (4) Clutch. | (9) Alignment of wheels. |
| (5) Chains. | (10) Tyre pressures. |

(b) Tighten all external nuts and bolts, including cylinder bolts.

(c) Top-up battery and check all lighting equipment.

(d) Clean out carburetter and adjust mixture.

(e) Adjust and lubricate all cables.

(f) Grease all nipples.

(g) Drain oil system. Clean filter and replenish.

(h) Check oil level in front chaincase.

(i) Top-up gear box.

(j) Test machine on the road.

NOTE—Oils, greases and materials used are chargeable to the customer.

SPARES LIST

An illustrated and priced **Spares List** is available at a cost of 2/6, post free.

BADGES

Neat 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.

ILLUSTRATIONS

	Illustrations	Page
Battery ...	28	71
Brake adjustment, front ...	23	64
Brake adjustment, rear ...	24	65
Brake shoe adjustment ...	22	63
Carburetter ...	12	35
Clutch ...	14	40
Clutch lever ...	15	42
Contact breaker ...	25	67
Controls ...	1	9
Crankshaft ...	11	32
Cut-out unit ...	27	71
Engine lubrication ...	9	28
Fork component details ...	17	50
Fork damper details ...	16	46
Gear box ...	13	37
Gear lever positions ...	3	12
Hub bearing details ...	21	61
Hub, rear ...	20	59
Kick-starter engagement ...	2	11
Lamp panel ...	29	73
Leg, teledraulic, rear ...	19	55
Lubrication chart ...	6	21
Magneto, exploded view ...	26	68
Oil felt filter ...	5	18
Oil pumps ...	4	16
Rear spring frame ...	18	54
Rocker adjustment ...	7	24
Tank fixing details ...	8	25
Timing, valve ...	10	31
Tools ...	34	85
Wire connector, snap type ...	30	74
Wire connector, screwed type ...	31	74
Wiring diagram theoretical ...	32	75
Wiring diagram, practical ...	35	76

INDEX

	Page
Carburettor Service ...	33
Controls ...	8
Data ...	3
Driving ...	10
Electrical Service ...	67
Engine Service ...	24
Free Service ...	86
Frame and Fork Service ...	45
Guarantee ...	83
Introduction ...	2
Lubrication ...	15
Lubrication Chart ...	21
Maintenance ...	22
Service ...	81
Rear teledraulic legs ...	54
Repairs ...	79
The Law ...	81
Tools and Special Equipment ...	84
Transmission Service ...	36
Useful Information ...	77
Wheel, Brake and Tyre Service ...	58



GENUINE A·J·S SPARES

PURCHASED FROM
AN AUTHORISED "A·J·S" DEALER OR
FROM THE FACTORY, ARE IDENTICAL
WITH THE PARTS ORIGINALLY BUILT
INTO YOUR MOTOR CYCLE.

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