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# INSTRUCTION BOOK

# MATCHLESS

**MODEL G2—250 c.c. O.H.V.**



*Factories:*

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

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THE MODERN MOTOR CYCLE unquestionably provides one of the most healthy, economical and pleasant means of transport. In addition, by reason of its superb braking, high power to weight ratio and ease of control it is, if used with due care, one of the safest vehicles on the road.

It is our sincere desire that every 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.

It must be borne in mind, however, that although of simple design and construction, it is nevertheless a highly specialised piece of engineering and must in consequence be intelligently and efficiently maintained in order to provide unfailing reliability.

In this book we provide non-technical instructions for carrying out all the maintenance operations likely to be called for in normal service, together with assisting illustrations.

To owners of long experience we tender apologies for the elementary nature of some of the contents of this handbook, but owners, whether novice or expert, are advised to read the contents from beginning to end.

We are at all times pleased to give 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 required when making enquiries of our Service Department.

## *Safety on the Road*

IN the interest of Safety on the Road, a few words of warning will not be out of place.

The outstanding manoeuvrability of a motor cycle over most other vehicles on the road makes it necessary to exercise caution at all times.

There are, unfortunately, a few motor-cyclists whose reckless driving constitutes a menace not only to themselves but also to other road users resulting in the totally false impression in some quarters that motor-cycling is a dangerous pastime.

**REMEMBER IT IS NOT THE MOTOR CYCLE THAT CAUSES ACCIDENTS, IT IS THE MAN WHO IS RIDING IT**

Take a pride in your riding technique and never rely upon the other fellow doing the right thing.

Your example of careful and courteous riding will materially contribute to road safety and to the reputation of a fine sporting pastime.

## NO ACCIDENTS PLEASE

Your motor cycle, as issued from the factory, is fitted with an efficient silencing system, and with careful and unobtrusive driving, particularly in built-up areas, will not cause annoyance to the general public.

Owners who interfere with the silencing system by removing the baffles are purely exhibitionists and such conduct can only bring motor-cyclists in general into disrepute.



# DATA

## Identity

Engine Number	.. .. .	On the crankcase near engine plate cowling
Frame Number	.. .. .	On right side of frame head lug
Cylinder bore	.. .. .	69.85 mm.
Stroke	.. .. .	64.84 mm.
Cubic capacity	.. .. .	248.5 c.c. (15.2 cu. ins.)

## Carburettor

Type 376/99	.. .. .	Annal Monobloc (12 inclination)
Main jet (without air filter)	.. .. .	180
Main jet (with air filter)	.. .. .	180
Choke size	.. .. .	1 1/2"
Throttle slide	.. .. .	31
Needle position	.. .. .	central

## Capacities

Petrol tank	.. .. .	24 gallons (12.5 litres)
Oil capacity	.. .. .	2 1/2 pints (1.4 litres)
Gear box	.. .. .	3 pints (1.8 litres)
Front chain case	.. .. .	200 c.c.

## Compression ratio

7.8 to 1

## General

Seat height	.. .. .	30 in. (76 cms.)
Wheelbase	.. .. .	53 in. (134.5 cms.)
Weight	.. .. .	325 lbs. (148 kilos)
Ground clearance	.. .. .	5 1/2 in. (14 cms.)

## Cylinder bore

Nominal size	.. .. .	2.7505 — .0005 in.
	.. .. .	— .0005 in.

## Piston size

Skirt diameter (taken at right angle to gudgeon pin top of the skirt)	.. .. .	
High limit	.. .. .	2.7488 in.
Low limit	.. .. .	2.7480 in.

## Piston rings

Compression rings	.. .. .	diameter 2 1/2 in. (69.85 mm.)
Compression rings	.. .. .	width .0625 in. — .0615 in.
Compression rings	.. .. .	radial thickness .112 — .106 in.
Scraper ring	.. .. .	diameter 2 1/2 in. (69.85 mm.)
Scraper ring	.. .. .	width .156 in. — .155 in.
Scraper ring	.. .. .	radial thickness .112 — .106 in.
Piston ring gap	.. .. .	.008 in. — .013 in.

## Ignition timing

1/2 in. B.T.D.C.

## Valve timing

Inlet valve opens	.. .. .	32 B.T.D.C.
Exhaust valve closes	.. .. .	32 A.T.D.C. with .01 in. rocker clearance

## Sparking plug

K.L.G. FE, 80

## Chain sizes

Front (73 links)	.. .. .	1/2 in. 225
Rear (125 links)	.. .. .	1/2 in. 305

## Gear ratios

Internal ratios	.. .. .	1.30 to 1, 1.85 to 1, 2.92 to 1
Actual ratios—Top	.. .. .	6.89 to 1
Third	.. .. .	8.96 to 1
Second	.. .. .	12.75 to 1
First	.. .. .	20.12 to 1

## Sprockets

Engine	.. .. .	21 teeth
Clutch	.. .. .	50 teeth
Final drive	.. .. .	19 teeth
Rear wheel	.. .. .	55 teeth

# CONTROLS

**Throttle twist grip.** On right handlebar. Twist inwards to open. When fully closed engine should just idle when hot.

**Air lever.** Small lever on right handlebar. Pull inwards to increase air supply to carburettor. Once set, when engine has warmed up, requires no alteration for different road speeds. Should be fully closed when starting engine from cold.

**Clutch lever.** Large lever on left handlebar. Grip to release clutch so that drive to rear wheel is disconnected.

**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.

**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.

**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.

**Kick-starter lever.** Vertical pedal on right hand side of gear box.

**Gear indicator.** Moves under the control of the gear change lever and the number registering with a line on gear box indicates gear in engagement (or neutral).

**Gear box filler cap.** Located on side of gear case cover. Allows insertion of lubricant and access to clutch inner wire and internal clutch operating lever.

**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.

**Oil reservoir filler cap.** Located on right side crankcase. To remove, unscrew.

**Lighting switch.** Left hand one on top of head lamp, with three positions:

OFF	.. .. .	Off.
L.	.. .. .	Pilot, rear and speedometer ON.
H.	.. .. .	Main, rear and speedometer ON.

**Ignition switch.** Right hand one on head lamp. Three positions—EMG., OFF., IGN.

**Ammeter.** In top of head lamp. Indicates charge or discharge.

**Dipping switch.** On left handlebar. Operates when lamp switch is at "H."

**Horn switch.** On left handlebar, incorporated with Dip Switch.

**Speedometer.** In top of head lamp.

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.

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."



# DRIVING

## FUEL

Although various quality fuels are again available owners are advised to use only the best. The small economy that might be considered to accrue by using the cheaper grades is more than offset by the advantages obtained by using only Premium 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. Push hexagon end in for ON.

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.

## STARTING THE ENGINE FROM COLD

### SPECIAL NOTE

It is **NOT** necessary to flood the carburettor, by depression the plunger on the float chamber, before attempting to start the engine. Flooding the carburettor unnecessarily will result in difficult starting.

Check that there is sufficient fuel in the petrol tank.

Check that there is sufficient oil in the oil reservoir.

Check that the gear pedal is in the neutral position.

Pull outward the plunger of off-side petrol tap.

Check that the air control lever is in the fully closed position.

Depress the kickstarter two or three times to rotate and free the engine.

Open the throttle to the slightest amount possible.

Turn the ignition switch to IGN.

Give the kickstarter a long, deliberate swinging kick when the engine should commence running.

Do not allow the kickstarter to return violently against its stop.

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

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

After the engine has started, slowly open the air lever. Then set the throttle so that the engine is running at a moderate speed (neither racing nor ticking over) and allow to warm up. While doing this, check the oil circulation as detailed in page 9. The machine can then be taken on the road.

## STOPPING THE ENGINE

To stop the engine, close the throttle, TURN OFF IGNITION. Before leaving the machine, turn off the fuel supply.

## ON THE ROAD

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

Next, slowly release the clutch lever and the machine will commence to move forward.

As it does this, the engine speed will tend to drop as it picks up the load so it will be necessary to increase the throttle opening, gradually, to keep the engine speed gently rising.

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

To engage a higher gear the pedal is 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.

## RUNNING IN THE ENGINE

It is a natural desire to learn the capabilities of one's machine, similarly it can be irritating to be overtaken by a rider of a machine fitted with a smaller capacity engine. Nevertheless, the owner of a new machine must, in his own interest, strictly adhere to the principles of running in, which will result in a quieter engine, with a better performance than a similar machine owned by a rider who is unwilling to drive with restraint during the initial stage of running in.

The load imposed on the engine is governed by the amount of throttle that is used, and the makers of your machine, know from experience, that if the throttle or twist grip is not opened in excess of one-third of its total movement for the first 1,000 miles independent of road speed, the engine cannot be overloaded.

After this distance the amount of throttle can be progressively increased.

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

Do not overlook instructions for changing oil (see page 10).



# LUBRICATION

## LUBRICANTS TO USE

Efficient lubrication is of vital importance and it is false economy to use cheap oils and greases. The use of multigrade oils is not recommended.

We recommend the following lubricants to use in machines of our make.

### FOR ENGINE LUBRICATION

HOT above 50° F	COLD 32° F to 50° F	EXTREME COLD below freezing point (32° F)
SAE 50	SAE 30	SAE 20
Mobiloil D Castrol Grand Prix Energol SAE 50 Essolube 50 Shell X-100 Motor Oil 50	Mobiloil A Castrol XL Energol SAE 30 Essolube 30 Shell X-100 Motor Oil 30	Mobiloil Arctic Castrolite Energol SAE 20 Essolube 20 Shell X-100 Motor Oil 20 20W

**NOTE**—For the British Isles and much of Europe the **Cold** and **Hot** recommendations approximate to **Winter** and **Summer** conditions respectively. The **Extreme Cold** recommendations refer to wintry conditions in parts of Northern Europe, Canada, the Baltic and Scandinavian countries, and high mountainous districts where extreme cold is the average condition.

### FOR GEAR BOX LUBRICATION

HOT above 50° F	COLD 32° F to 50° F	EXTREME COLD below freezing point (32° F)
SAE 50	SAE 50	SAE 30
Mobiloil D Castrol Grand Prix Energol SAE 50 Essolube 50 Shell X-100 Motor Oil 50	Mobiloil D Castrol Grand Prix Energol SAE 50 Essolube 50 Shell X-100 Motor Oil 50	Mobiloil A Castrol XL Energol SAE 30 Essolube 30 Shell X-100 Motor Oil 30

**NOTE**—For the British Isles and much of Europe the **Cold** and **Hot** recommendations approximate to **Winter** and **Summer** conditions respectively. The **Extreme Cold** recommendations refer to wintry conditions in parts of Northern Europe, Canada, the Baltic and Scandinavian countries, and high mountainous districts where extreme cold is the average condition.

### FOR HUB LUBRICATION AND ALL FRAME PARTS USING GREASE

Mobilgrease No. 4      Castrol Heavy      Energrease C3  
Esso Pressure Gun Grease      Shell Retinax A. or C.D.

### FOR TELEDAULIC FRONT FORKS

Mobiloil A (SAE-30)      Castrol XL (SAE-30)      Energol SAE 30  
Essolube 30 (SAE-30)      Shell X-100 Motor Oil 30 (SAE-30)

### FOR REAR CHAINS

Mobilgrease No. 2      Esso Fluid Grease      Energrease A.O.  
Castrol Grease Graphited  
Heated Until Just Fluid

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

## CHECKING OIL CIRCULATION

Provision is made to observe the oil circulating, which is visible after removing the oil filler cap on the right side of the crankcase.

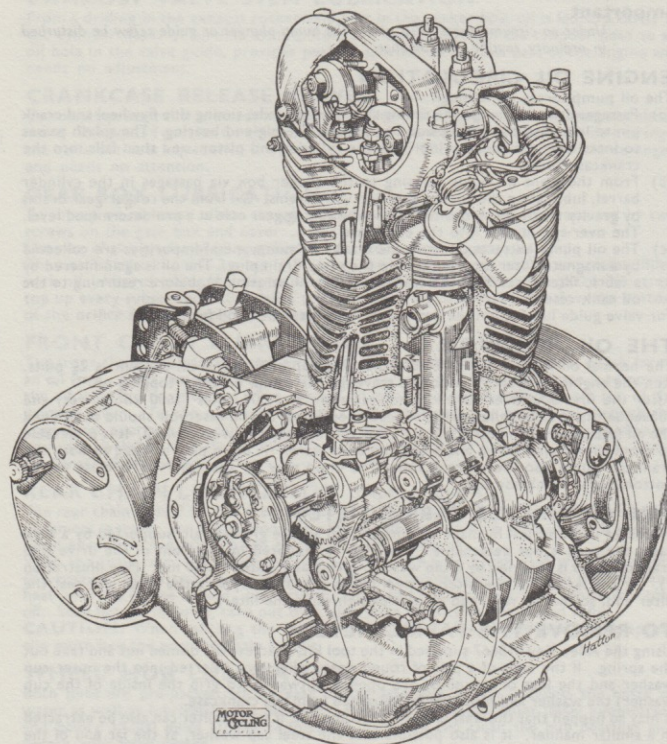


Illustration I

Cut-away section of engine

## ENGINE LUBRICATION SYSTEM

This is by true dry sump system. The oil tank, or reservoir, is integral with the crankcase. The oil pump has only one moving part, i.e., the oil pump plunger, which rotates and reciprocates. Rotation is created by the worm gear on the timing side flywheel axle. Reciprocation is caused by engagement of the oil pump guide pin with the profiled groove in the oil pump plunger. The oil pump is designed so that the sump scavenging capacity is greater than the delivery, thus keeping the crankcase sump free of oil during normal running conditions.

Whilst the oil reservoir is integral with the crankcase, oil is fed to the pump by gravity, on the same principle as a machine fitted with a separate oil tank, but without the use of external oil pipes.



## ENGINE OIL PUMP (see Illustration 1)

If, for any reason, the crankcase is dismantled the oil pump plunger must be removed from its housing before attempting to separate the crankcase halves. It is also necessary to remove the small timing pinion.

### Important

*Under no circumstances must either the pump plunger or guide screw be disturbed in ordinary routine maintenance.*

## ENGINE OIL CIRCULATION

The oil pump forces oil through:—

- Passages drilled through the timing side flywheel axle, timing side flywheel and crank pin to lubricate the timing side bearing and the big-end bearing. The splash passes to interior of cylinder, to lubricate the cylinder and piston, and then falls into the crankcase sump.
- From the front oil pump housing to the rocker box via passages in the cylinder barrel, lubricating the rocker gear and valve stems. Oil from the rocker gear drains by gravity via the push rod tunnels to the timing gear case at a pre-determined level. The over-spill drains into the crankcase sump.
- The oil pump extracts oil from the crankcase sump, metal impurities are collected by a magnetic filter incorporated in the sump drain plug. The oil is again filtered by a fabric filter located in the crankcase. (See illustration 1), before returning to the oil tank reservoir.

For valve guide lubrication see paragraph "Adjustment of oil feed".

## THE OIL RESERVOIR

The normal oil level is 1 inch below the filler cap orifice, the oil content is  $2\frac{1}{2}$  pints. Run the engine for a short period to scavenge the sump, before "topping up". After the first 500 miles (800 kilometres) again at 1,000 miles (1600 kilometres) and subsequently at 5,000 mile intervals (8000 kilometres) the oil reservoir should be drained the oil filter cleaned in petrol and the reservoir replenished with new oil. It is preferable to drain the oil after a run and when the oil is warm. A drain plug is fitted to both the crankcase sump also the oil reservoir. The drain plug for the reservoir is close to the bottom front crankcase bolt.

## THE CRANKCASE FABRIC FILTER

The filter is cylindrical in shape and made from a close grained felt, supported by a wire cage, the cage is not detachable. The filter is mounted in the front of the drive side crankcase and is retained by a cap washer, spring and plated dome nut. (See illustration 1). At the far end of the filter, a steel cup is fitted to support the filter and seal the filter end, so that all returned oil will pass through the filter.

## TO REMOVE THE FABRIC FILTER

Using the Allen Key 018667 supplied in the tool kit, unscrew the domed nut and take out the spring. If the ends of a pair of round nosed pliers are inserted into the outer cup washer and the legs of the pliers are opened outwards (to grip the inside of the cup washer) the washer and filter can be extracted from the crankcase. It may so happen that the washer only will come out, if so, the filter can also be extracted in a similar manner. It is also possible that the steel cap washer, at the far end of the filter, will remain in the crankcase, if so this is of no consequence. The filter should be handled with care and if damaged it should be discarded and replaced by a new one. To clean the filter it should be immersed in petrol and when thoroughly clean it should then be allowed to dry before re-insertion.

## TO REMOVE MAGNETIC FILTER

Incorporated with the crankcase sump plug is a powerful magnet, which does not require frequent attention. For cleaning place a tray under the crankcase, unscrew the sump plug, with the use of a good fitting ring spanner. Metal particles adhering to the magnet can be removed by wiping with a grease coated rag, the grease will collect metal particles on the rag. Keep the magnet away from large pieces of steel or iron, as contact can impair the efficiency of the magnet.

## ADJUSTMENT OF OIL FEED

The internal flow of oil is controlled by fixed restrictions, with the exception of the oil feed to the inlet valve guide, which is regulated by a needle pointed screw located in the cylinder head (see illustration 3) and secured by a locknut.

To adjust the oil feed loosen the lock nut and screw home lightly the regulating screw, then unscrew it the smallest amount possible and retighten the lock nut. An excess of oil to the inlet valve guide will cause a smoky exhaust and heavy oil consumption. Insufficient oil can cause the valve to run dry with a squeaking noise.

## EXHAUST VALVE STEM LUBRICATION

From a drilling in the exhaust rocker axle boss in the rocker box, oil is fed to a cavity in the cylinder head. A further drilling from this cavity, through the cylinder head to an oil hole in the valve guide, provides positive lubrication for this part of the engine and needs no adjustment.

## CRANKCASE RELEASE VALVE

Crankcase pressure is released into the atmosphere through a timed and ported release valve. The ported portion for this valve is situated between the two driving side bearings, the valve outlet is adjacent to the gear box housing. The valve cannot become deranged and needs no attention.

## GEAR BOX LUBRICATION

To top up or replenish oil for the gear box remove the inspection plate secured by two screws on the gear box end cover.

Use one of the grades of oil specified, on no account must grease be used.

The normal oil content is 3 pints (1.8 litres), the gear box must not be completely filled with oil. After draining and replenishing the oil at the first 500 miles (800 kilometres) top up every subsequent 1,000 miles (1600 kilometres) to a level just below the bottom of the orifice for the inspection plate.

## FRONT CHAIN LUBRICATION

The front chain is lubricated with engine oil filled to the front chain case, which forms an oil bath. If the lower of the two slotted screwed caps on the chain case is removed, the oil level can be observed. The correct oil level is just above the bottom run of the primary chain. To top up, remove both slotted screwed caps and fill oil through the uppermost aperture, checking the level through the lower. A drain plug is situated immediately below the clutch assembly. If the chaincase is drained, refill with 1 pint (6 litres) of engine oil.

## REAR CHAIN LUBRICATION (Exposed chain)

The rear chain should be removed occasionally, particularly during wintry or prolonged inclement weather, for lubrication. The life of this chain will be prolonged if it is lubricated effectively and not allowed to run in a dry condition.

With the chain removed, scrub the side plates with a wire brush then wash in paraffin (Kerosene). Use a small quantity of one of the recommended greases in a flat tin and heat until the grease is fluid. Immerse the chain and re-heat the grease, which will cool off. Soak for ten minutes, take out the chain, wipe off surplus grease and refit.

**CAUTION:** When refitting the chain connecting link, the closed end of the spring clip must face the way the chain travels.

## WHEEL HUB LUBRICATION

Both hubs are pre-packed with grease during assembly, which prevents the entry of water as well as lubricating the bearings. After the first 5,000 miles (8000 kilometres) and before 10,000 miles (16000 kilometres) dismantle and clean the hub bearings and repack with fresh grease.

## SPEEDOMETER LUBRICATION

A grease nipple is fitted to the speedometer gear box which is attached to the right side of the rear wheel. Use grease sparingly, no other part of this equipment requires lubrication.

## REAR FORK HINGE (SWINGING ARM)

Apply grease gun on nipple mounted on the right side of the fork hinge, during routine maintenance (use S.A.E. 140 oil).

## REAR BRAKE PEDAL

A grease nipple is fitted underneath the pivot part of the pedal.

## GENERAL

Occasionally apply a little engine oil to parts such as control levers, and cables, brake rods, stands, etc. Use a little grease to lubricate the twist grip rotor.



# 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.

### DAILY

- Oil Reservoir** Inspect oil level and top-up if necessary. Check oil circulation.
- Petrol tank** Check level and re-fill if necessary.

### WEEKLY

- Oil reservoir** Check level and top-up if necessary.
- Tyres** Check pressures and inflate if necessary. Inflator under twin seat.

### EVERY 500 MILES (800 KILOMETRES)

- Oil reservoir** Drain at first 500 miles and re-fill with new oil, and clean filters.
- Ignition** Check contact breaker points. Regrease felt pad.
- Gear box** Drain at first 500 miles and re-fill 3 pints (1.8 litres).
- Chaincase** Check level of oil when machine is standing vertically on level ground. (See chain lubrication).
- Battery** Inspect each cell for level of electrolyte and top up with distilled water if necessary. Level of electrolyte should just be over top of plates. Beware of overfilling.

### EVERY 1,000 MILES (1,600 KILOMETRES)

- Oil reservoir** Drain at first 1,000 miles and re-fill with new oil.
- Rear chain** In wet weather remove and soak in molten grease. See page 11.
- Gear box** Check oil level.
- Small parts** Smear all moving parts with engine oil and wipe off surplus.
- Chaincase** Drain, and re-fill, or monthly

### EVERY 2,000 to 5,000 MILES (3200 to 8000 KILOMETRES)

(according to road conditions)

- Air filter** (If fitted) clean and re-oil filter element.

### EVERY 3,000 MILES (4800 KILOMETRES)

- Rear chain** In dry weather remove and soak in molten grease.
- Brake pedal** Inject small amount of grease.
- Speedometer.** Inject small amount of grease into speedometer gear box.
- Ignition** Clean contact breaker points and re-set if necessary. Regrease felt pad.
- Plug** Clean sparking plug and re-set points as necessary.
- Steering head** Test steering head for up and down movement and adjust if necessary.
- Bolts and Nuts** Check all nuts and bolts for tightness and tighten if necessary but beware of over-tightening.
- Rockers** Check O.H.V. rocker adjustment and correct if necessary.

### EVERY 5,000 MILES (8000 KILOMETRES)

- Oil reservoir** Drain and re-fill with new oil. If machine is only used for short runs renew oil every three months instead of mileage interval.
- Filter.** Clean felt fabric filter in crankcase.
- Ignition.** Clean and adjust contact points. Check gap.
- Front fork** Drain and re-fill with fresh oil. (See page 28). Insufficient oil content is indicated by abnormally lively action.
- Carburettor** Remove carburettor float chamber side cover and clean interior. Also detach petrol pipe banjo and clean gauze strainer.

# ENGINE SERVICE

## TAPPET ADJUSTMENT

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

The correct tappet clearances, with valves closed and engine warm (not hot) is **NIL**. This means the push rods should be free enough to revolve and, at the same time, there should be no appreciable up and down play.

### Prepare to adjust tappets by:

Set piston to T.D.C. (both valves closed).

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

Take away cover.

### Adjust tappets by:

With spanners, hold the sleeve 5, either valve (illustration 2) and slacken lock nut 2. Then screw, in or out, the head 3 until the clearance is nil.

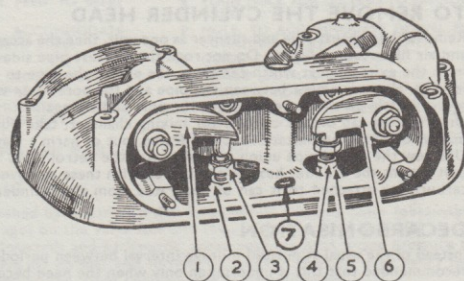
Tighten lock nut 2 and re-check the clearance.

### Finally

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

Illustration 2

Tappet adjustment



- 1 INLET ROCKER ARM (TAPPET END).
- 2 NUT, LOCKING ADJUSTING CUPPED SCREW.
- 3 CUPPED ADJUSTING SCREW.
- 4 CUPPED ADJUSTING SCREW AND LOCK NUT.

- 5 SLEEVE, TO ACCOMMODATE ADJUSTING SCREW, ON TOP END OF PUSH ROD.
- 6 EXHAUST ROCKER ARM (TAPPET END).
- 7 ROCKER BOX BOLT.

### Complete adjustment by:

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

As mentioned elsewhere do not over-tighten the nuts because the joint is made with a rubber fillet and undue pressure is not necessary.

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

**For service work on the upper part of the engine, with the exception of tappet adjustment, the twin seat and petrol tank should be removed for accessibility.**



## TO REMOVE TWIN SEAT

Remove two bolts under the rear end of the seat, release the nuts securing the front portion of the seat, which now can be lifted off.

## TO REMOVE THE PETROL TANK

Close both petrol taps, unscrew the two cap nuts securing the petrol pipe (watch for 4 fibre washers each side of the banjo unions). Take out two bolts securing the front of the petrol tank and a further bolt securing the rear, noting the location of the tank bolt rubbers and spacers, the front ones are thick the rear are thin, the steel washers are also dissimilar.

## TO REMOVE THE ROCKER BOX

Remove the three nuts and fibre washers securing the rocker box cover, also the sparking plug.

Turn the engine until both valves are closed, i.e., after the inlet valve has opened and just closed.

Remove two nuts and the bolt securing the engine steady bracket to the rocker box and frame.

Take out the nine bolts securing the rocker box to the cylinder head (one of these bolts is inside the rocker box (see illustration 2), the location of these bolts must be noted as they are dissimilar.

Tilt upwards the right side of the rocker box, extract both push rods and identify their location for replacement in their original positions, remove the rocker box from the cylinder head.

## TO REMOVE THE CYLINDER HEAD

Remove the exhaust pipe and silencer as one unit, then the accessory compartment cover and air filter tube if fitted. Do not rock the exhaust pipe sideways unduly to extract it from the exhaust port which can cause the end of the pipe to close in and result in gas leakage, also movement between the pipe and the port when the engine is hot. Instead squirt a little paraffin or petrol into the port and try again.

Unscrew the cap on the carburettor mixing chamber, take out both slides, wrap them in a piece of rag and attach it to the frame, out of harm's way.

Unscrew the petrol pipe union and take away the petrol pipe. Four sleeve nuts and one bolt retains the cylinder head to the barrel, with these removed, the cylinder head with carburettor attached to it can be separated from the cylinder.

## DECARBONISATION

Instead of the usual stipulated mileage interval between periods of decarbonisation, it is recommended that this is undertaken only when the need becomes apparent because of loss in power, heavy petrol consumption or generally reduced performance.

When undertaken, unless it is thought necessary to inspect the piston and rings, the cylinder barrel is best left undisturbed.

Before starting this work have available a gasket set, and if the machine has covered considerable mileage, a new set of piston rings also.

Carbon formed on the piston crown and in the sphere of the cylinder head, can be scraped off with a cheap steel rule, with the sharp corners removed, or similar tool. Deal with the cylinder head before removing the valves, and do not use emery cloth or other abrasives for this work.

## TO REMOVE AND REPLACE THE VALVES AND GUIDES

The valve springs are removed by inserting the index finger through the coil of the spring and pulling upwards sharply.

A light tap on the valve spring collar will expose the valve split collets (which should be put in a place of safety), then take out the valve.

Both valve guides are located by an external circlip, the cylinder head must be gently and uniformly heated before attempting to remove or replace the guides.

With the head pre-heated tap the guide upwards out of the port sufficiently to enable the circlip to be prised out of its groove. Reheat the head and drive out the guides through the cylinder head. When refitting the guides, pre-heat the head and verify that the oil holes are in alignment with holes in the cylinder head.

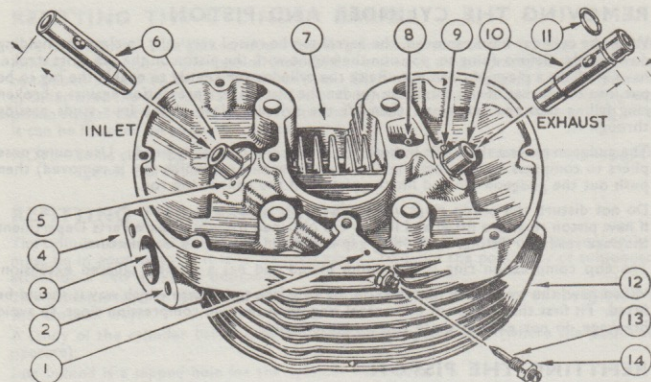


Illustration 3

The valve guides and the needle adjusting screw are also shown withdrawn

- |   |  |
|---|--|
| 1 PLAIN HOLE, FOR OIL FEED TO INLET VALVE.                | 8 PLAIN HOLE, FOR OIL FEED TO EXHAUST VALVE.                 |
| 2 TAPPED HOLE, TO ACCOMMODATE CARBURETTOR RETAINING STUD. | 9 HOLE, TO ACCOMMODATE DOWEL PIN LOCATING VALVE SPRING SEAT. |
| 3 INLET PORT.   | 10 GUIDE, FOR EXHAUST VALVE.                                 |
| 4 TAPPED HOLE, TO ACCOMMODATE CARBURETTOR RETAINING STUD. | 11 CIRCLIP (BOTH GUIDES).                                    |
| 5 HOLE, TO ACCOMMODATE DOWEL LOCATING VALVE SPRING SEAT.  | 12 EXHAUST PORT.   |
| 6 GUIDE, FOR INLET VALVE.                                 | 13 NEEDLE SCREW, ADJUSTING OIL FEED TO INLET VALVE.          |
| 7 TAPPED HOLE, FOR SPARKING PLUG.                         | 14 LOCK NUT, FOR NEEDLE ADJUSTING SCREW.                     |

## VALVE GRINDING

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.)

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

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

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

A holder for the valve, when grinding in the valve, can be supplied. The part number is 017482.

## REPLACING THE VALVES

A valve spring compressor is required to compress the springs, a special tool which is inexpensive, can be obtained from dealers, or from our Spare Parts Department. The application of this tool is shown in illustration 4. Before the valve springs position correctly the valve spring seat—the raised portion on the underside is located with the depression (5) in cylinder head. (See illustration 3).

The inlet valve is the larger of the two valves and it is vitally important to locate correctly the two split collets into the grooves on each valve stem.

Clean the valve guide bores with a piece of clean rag, apply a little oil on the valve stems and also inside each guide before assembly.



## REMOVING THE CYLINDER AND PISTON

With the cylinder head removed, the barrel can be raised vertically to clear the holding down studs. Before doing so, position the engine with the piston on the top of its stroke, have available a piece of clean rag. Raise the cylinder sufficiently to enable the rag to be put into the throat of the crankcase (under the piston) as a precaution against a broken ring falling into the crankcase, then lift the cylinder clear of the four studs passing through it.

The gudgeon pin is a sliding fit in both the piston and connecting rod. Use round nose pliers to compress and extract the circlip (it is immaterial which one is removed) then push out the gudgeon pin and lift the piston off the connecting rod.

Do not disturb the piston rings unless absolutely necessary.

If new piston rings are fitted and if they are obtained from our Spare Parts Department they are ready for fitting, as the ring gap is allowed for during manufacture.

The top compression ring is chromium plated and has a slightly tapered extension.

When new, the word TOP is etched on the ring face to indicate which way it should be fitted. Fit first the scraper or oil control ring, then the two compression rings, to avoid breakage do not expand these rings unnecessarily.

## REFITTING THE PISTON

It is vitally important to correctly fit the gudgeon pin circlip and a little extra care and time should be devoted to the simple but most important operation. Apply a little oil to the gudgeon pin and bosses in the piston. Place the piston over the connecting rod with the split in the skirt facing the front of the machine. (The piston crown is marked F). With round nosed pliers introduce the circlip into its groove with a rotary motion, then verify that the circlip is properly located.

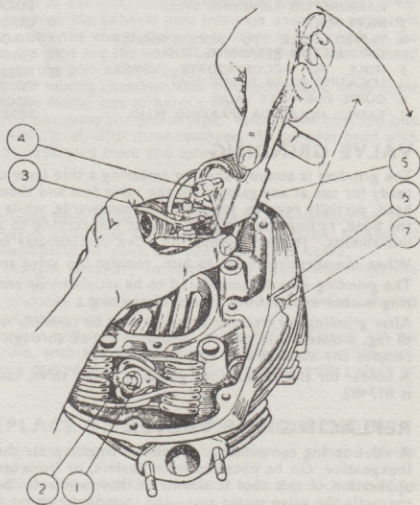


Illustration 4

Application of  
valve spring compressor

- 1 COLLET, FOR VALVE.
- 2 COLLAR, FOR VALVE SPRING.
- 3 COLLAR, FOR VALVE SPRING.
- 4 BOLT THROUGH TOOLS AND COILS OF VALVE SPRING.

- 5 VALVE SPRING COMPRESSOR TOOL.
- 6 OIL PASSAGE FROM ROCKER BOX TO INLET VALVE GUIDE.
- 7 SCREW WITH LOCK NUT ADJUSTING OIL FEED TO INLET VALVE.

## REFITTING THE CYLINDER BARREL

Fit a new cylinder base gasket, after removing broken pieces of the old one. Use a little jointing compound on the base of the cylinder and stick a new gasket to it, no jointing compound should be on the crankcase face. Set the piston ring gaps at 120°, pass the cylinder over the four long studs and lower it gently at the same time compressing each piston ring in turn with the fingers, until the cylinder has passed the scraper ring when it can be lowered on to the crankcase.

NOTE—Some clean rag under the piston to fill the throat of the crankcase will safeguard against a broken piston ring falling into the crankcase.

## REFITTING THE CYLINDER HEAD

The cylinder head gasket also acts as an oil seal for the push rod tunnels, consequently it must be in good order if it is to be used again. To avoid the possibility of subsequent attention a new gasket is desirable.

This gasket is neither symmetrical nor reversible and it must be placed on the cylinder in the correct way.

A study of the cylinder barrel face will show an elongated hole (where the push rods operate).

Just behind is a tapped hole for the cylinder head bolt.

Close to the cylinder bore and to the right of the cylinder head bolt hole is a smaller hole, which is the oil feed passage from the pump to the rocker gear.

Place the gasket on the cylinder so that the oil feed hole in the cylinder registers with the small hole in the gasket.

Put the cylinder head in position, refit the four cylinder head sleeve nuts and the long cylinder head bolt, do not omit the five washers.

First tighten the four sleeve nuts diagonally—not one side at a time—then tighten the long bolt, until all are firmly tightened.

If a torque spanner is available it should be set to 35 foot lbs. for the four sleeve nuts only.

## REFITTING THE ROCKER BOX

Before attempting to refit, make sure the piston is on T.D.C. of the firing stroke, with both cam followers down.

Use a new rocker box gasket for this assembly. In the centre portion of this gasket is a projection with a small hole in it. There is also a similar size hole in the cylinder head which is the oil feed passage from the oil pump through the cylinder to the rocker gear.

It will be readily seen that if the rocker box gasket is reversed the oil feed passage will be sealed, therefore ensure that the gasket is properly located before fitting the rocker box.

With the rocker box gasket correctly located, take up the rocker box, pass all the holding down bolts through it, put the rocker box into position.

Take up the two engine push rods, tilt the right side of the rocker box upwards, then introduce the push rods through the head and cylinder. The exhaust push rod operates with the cam follower nearest to the contact breaker. (See illustration 1).

Locate the rocker arms in the push rod adjusters and first tighten the two central rocker box bolts which have screwed extensions.

Tighten the remainder diagonally including the one inside the rocker box.

Washers are fitted under the heads of all these bolts.

It should be remembered that a soft gasket is used between the cylinder head and the rocker box, therefore the degree of tightness for these bolts is a matter of good judgment and commonsense.

Re-adjust the tappets as previously described.

## IGNITION TIMING

Before setting or checking the ignition timing, make sure the contact gap, at full separation, is .012".

(See details on Contact Breaker).

Reference to illustration 5 will indicate the principle used.



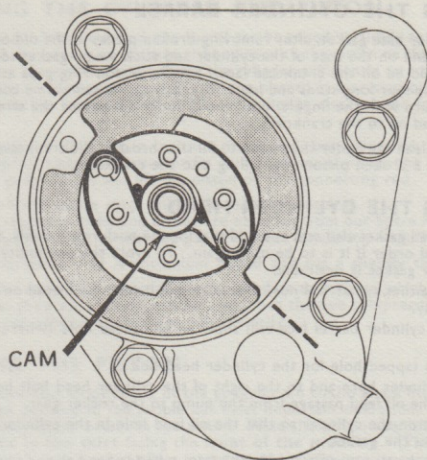


Illustration 5

Automatic Ignition Advance Mechanism  
(Approximate Ignition Setting)

## TO CHECK THE TIMING

Position the engine as detailed for tappet adjustment. Remove the sparking plug, the cover for the contact breaker and engage top gear.

Obtain a short length of stiff wire or wheel spoke about 5" long. Insert the wire through the sparking plug hole, until it touches the piston crown. By slowly moving the rear wheel backwards and forwards the top dead centre of the piston travel can be ascertained. Keep the wire vertical as far as the plug hole will permit—make a mark on the wire to register with the seating for the sparking plug on the cylinder head. Take out the wire and make a further mark on it  $\frac{1}{4}$ " ABOVE the previous mark.

Put the wire through the sparking plug hole, then turn the engine **BACKWARDS** until the top mark on the wire registers with the seating for the sparking plug, the piston is now  $\frac{1}{4}$ " before top dead centre.

A  $\frac{3}{16}$ " hole is drilled in the contact breaker base plate to enable a small screwdriver to be inserted, and engaged between the two bob weights for the automatic ignition control. (See illustration 5).

Turning the screwdriver clockwise will separate the bob weights to the fully advanced position. If the timing is correct the contact points should be just about to separate.

The exact point of separation can best be found by inserting a thin piece of cigarette paper between the points, which when pulled lightly will be free when the contact points separate.

## TO ADJUST IGNITION TIMING

By slackening the two screws in the slotted holes on the contact breaker base plate, the plate can be moved either clockwise or anti-clockwise to adjust the timing as required.

Move the plate clockwise to advance and use the method described for checking to obtain the correct timing.

## TO RESET IGNITION TIMING

As the ignition advance is limited to  $\frac{1}{2}$ " B.T.D.C., this setting is critical and must be carefully carried out. The automatic ignition control unit is a taper fit on the camshaft, retained by a central bolt. To remove this unit take out the retaining bolt, use in its place a withdrawal bolt, Part No. 047244. Screw home this bolt—do not use undue force—then tap the head of the bolt lightly which will separate the unit from the shaft.

**NOTE**—The contact breaker cam is detachable and if it is inadvertently removed, the timing should be rechecked after refitting the cam, before attempting to start the engine.

## VALVE TIMING

The cam wheel, also the small timing pinion which drives it, are both marked to facilitate assembly.

If, for any reason, the cam wheel is removed, to re-assemble rotate the engine until the piston is on T.D.C. of the stroke, the mark on the small timing pinion tooth will then be at 11 o'clock. Take up the cam wheel, raise both cam followers, then introduce the cam into the crankcase with the mark on the tooth gap to register with the mark on the small pinion.

These markings have been selected to give the most effective valve timing and best engine performance.

To check the valve timing, as a single piece camshaft is used, it is only necessary to record the inlet valve opening also the exhaust valve closing positions to verify that the valve timing is correct. The average valve timing, taken with .010" rocker clearance is:—

Inlet valve opens  $32^{\circ}$  B.T.D.C.

Exhaust valve closes  $32^{\circ}$  A.T.D.C.

See TAPPET ADJUSTMENT for running pushrod clearance.



# 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, Amal Ltd., Holford Road, Witton, Birmingham, 6.

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 be required. Those parts include floats and float needles, jet taper needles, pilot jets, main jets, needle jets and washers.

## CARBURETTER FUNCTION

The petrol level is maintained by a float and needle valve and, in no circumstances, should any alteration be made to these parts. 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 illustration 6) 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 illustration 6, for location of the pilot jet air adjustment screw). The pilot jet unlike earlier models, is now detachable for cleaning.

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, and jet taper needle.

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

With the taper needle projection, main jet size, and type of throttle slide specified correct carburation except at idling speed is assured.

In the event of difficulty being experienced look for cause under heading Useful Information (pages 40 and 41).

To check for correct idling mixture, first run the engine until it is just warm but not hot when with the throttle nearly closed and air fully open it should fire evenly and slowly. If it fails to do so, first of all make certain that the sparking plug is clean and the point setting correct. Having done this and idling is still uneven try re-setting the pilot jet air screw.

Adjustment of this air screw is not unduly sensitive and it should be possible to obtain the correct setting for even firing in a few seconds.

In the event of even firing at idling speed being unobtainable by adjustment of the air screw look for obstruction in the pilot jet.

Having obtained even firing all that remains is to adjust if necessary the position of the throttle stop screw until the desired idling speed is obtained.

## 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 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.

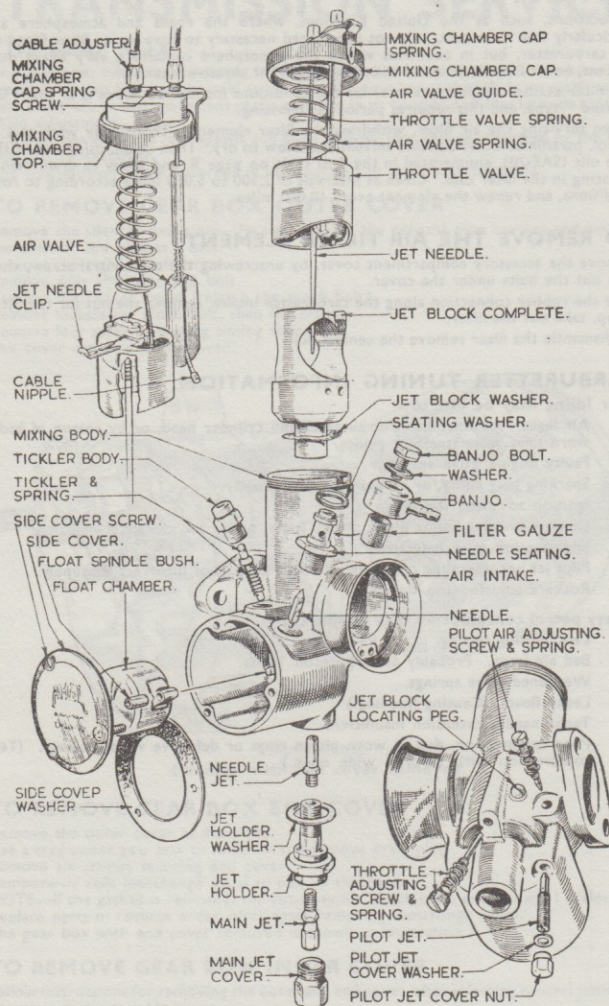


Illustration 6

Carburetter details in assembly order



## AIR FILTER

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

The filter available (optional extra) for the conditions mentioned above is of the "Oil Wetted" type, and this requires periodical servicing.

When servicing the air filter, withdraw the filter element. Thoroughly wash this in petrol, paraffin or other suitable solvent and allow to dry. Then re-oil, using one of the light oils (SAE-20), enumerated in the final table on page 8, and allow to drain before replacing in the filter case. Clean at intervals of 2,500 to 5,000 miles according to road conditions, and renew the element every 10,000 miles.

## TO REMOVE THE AIR FILTER ELEMENT

Remove the accessory compartment cover, by unscrewing the top central screw, then take out the bolts under the cover.

Slide the rubber connection along the carburettor intake, remove the nut for the filter clamp, take out the filter.

To dismantle the filter remove the central bolt.

## CARBURETTER TUNING INFORMATION

### Poor idling may be due to:

Air leaks. At junction of carburettor and cylinder head, 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. Partially choked or incorrect air supply.

Rockers adjusted too closely.

### Heavy petrol consumption may be due to:

Late ignition setting.

Bad air leaks. Probably at carburettor 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.)

# TRANSMISSION SERVICE

## THE GEAR BOX

The gear box, cylindrical in shape, is housed in an arc machined on the crankcase, and retained by two high tensile steel straps. As the gear box mainshaft is eccentric to the gear box shell, partial movement of the gear box in its housing provides latitude for front chain adjustment.

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

The transmission shock absorber is incorporated in the clutch assembly.

## TO REMOVE GEAR BOX OUTER COVER

Remove the silencer fixing nut, the two nuts on the exhaust pipe bracket and take off the silencer and pipe as a unit.

Remove the right side footrest.

Remove gear indicator and bolt.

Remove footchange pedal (release the pinch bolt).

Remove kickstarter pinch bolt, then the crank.

Remove four screws securing timing cover.

The cover can now be removed.

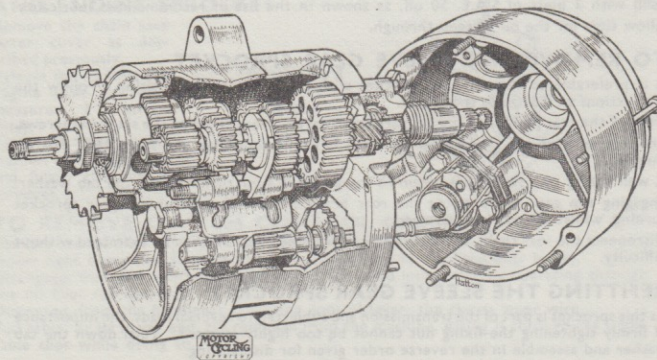


Illustration 7

Gearbox with end cover removed

## TO REMOVE GEAR BOX END COVER

Remove the outer cover as described.

Use a tray under gear box to catch oil and remove drain plug.

Remove six screws securing end cover.

Temporarily refit footchange pedal to pull off the cover.

NOTE—If the gasket is renewed, the cut-away for clutch cable entry is at 11 o'clock.

Replace parts in reverse order, after again removing footchange pedal.

The gear box with end cover removed is shown in illustration 7.

## TO REMOVE GEAR BOX INNER COVER

Follow instructions for removing the outer and end cover, after selecting neutral position. Disconnect clutch cable.

Unscrew clutch body lock ring, take out the body (watch for the  $\frac{3}{8}$ " ball bearing, also the locating peg, which can fall out of position).

The gear box mainshaft nut is now exposed, remove the nut, also the nut on the footchange quadrant spindle—the end cover can then be removed.



## DISMANTLING THE KICKSTARTER

When the gear box cover is removed, the kick-starter mechanism will come out with the cover.

The face ratchet pinion is under tension of the ratchet spring, to remove this pinion temporarily fit the kick-starter crank and relieve the spring tension, the pinion will then be released.

To remove the kick-starter shaft prise out the end of the return spring from its anchorage, the shaft can then be extracted.

## REFITTING THE GEAR BOX END COVER

With the kick-starter mechanism assembled the end plate can be refitted in the reverse order described for dismantling.

The gasket must be undamaged to avoid oil leakage. The only necessary precaution is to ensure that the foot change operating parts are in correct order by first fitting the thin washer with the largest diameter hole over the shaft for the foot change spindle before the gear box end cover is fitted. After fitting the end cover the thick washer goes over the spindle followed by the foot change ratchet, the washer for the pawl spring and finally the foot change ratchet and shaft nut. The assembly is clearly shown in the illustration, particular note should be made of the pawl spring location.

The outer pawl spring washer is shaped to hold it in position, whilst the cover is refitted. When the assembly is completed, ensure the gear box drain plug is firmly tightened and refill with 3 pints of S.A.E. 50 oil, as shown in the list of recommended lubricants. Allow time for the oil to seep through.

## TO REMOVE THE SLEEVE GEAR SPROCKET

It is preferable to remove this sprocket with the end plate in position. Follow the instructions to dismantle the clutch.

Take off the rear portion of the primary drive cover, after removing the six fixing screws. The nut securing the sleeve gear sprocket is firmly tightened and has a LEFT HAND thread.

A well fitting ring spanner is required to release it after turning back the tab washer. Engaging top gear and pressing the rear brake pedal will prevent the gear sprocket turning, whilst the nut is unscrewed.

Disconnect the rear chain, the sprocket is on a splined gear and can be extracted without difficulty.

## REFITTING THE SLEEVE GEAR SPROCKET

As this sprocket is part of the transmission and subjected to reversal loads, the importance of firmly tightening the fixing nut cannot be too highly stressed. Turn down the tab washer and assemble in the reverse order given for dismantling.

## TO REMOVE GEAR BOX INTERNALS

If the gear box is to be completely dismantled, remove parts in the following order:— the clutch, sleeve gear sprocket and the gear box end cover.

With the gears exposed unscrew the selector fork shaft, using a spanner on the two flats machined on it, the gears, shafts and operating mechanism can then be withdrawn.

The spring loaded plunger and cam plunger bolt are situated immediately below the sleeve gear sprocket.

## TO ASSEMBLE GEAR BOX INTERNALS

Fit the mainshaft with gears in the sequence shown in the illustration. Ensure the plunger and spring for the cam segment are in position, then insert the cam segment assembly.

Take up the selector fork with the projection at three o'clock and put the fork in the slot for the slider gear with the projection in the profiled slot in the cam segment.

Fit the layshaft with gears, i.e., fixed and free pinion. Take up the sliding gear, fit the remaining selector fork into the sliding gear, slip the gear on the layshaft and engage the projection in the cam segment slot. Line up the selector forks and refit the shaft and tighten. Fit the low gear pinion to complete the assembly.

## TO REMOVE CHAINCASE OUTER COVER

Use a tray under chain case to catch oil.

Remove drain plug.

Remove near side footrest.

Remove engine plate cowling (two screws).

Remove three snap connectors on wire in BLACK sheath, push the sheath towards the chain case a small amount.

Remove six cover screws and inspection cap.

Carefully pull off the cover, without strain on the alternator cables.

If the cover is completely removed, turn back one of the snap connectors, to permit the black sheath to pass through the metal duct on the chain case rear portion.

When refitting the case, the gasket must be undamaged, ensure the cable colours match with those in the connector block.

Replace parts in reverse order, gently take up the cable slack by pulling the sheath at the rear of the case.

**Screw locations length (under head)**

Top right and bottom left  $1\frac{1}{8}$ ".

Top left  $2\frac{1}{4}$ ".

Top centre  $\frac{1}{2}$ ".

Bottom centre  $1\frac{3}{8}$ ".

Bottom right  $1\frac{1}{16}$ ".

## TO REMOVE ALTERNATOR ROTOR AND ENGINE SPROCKET

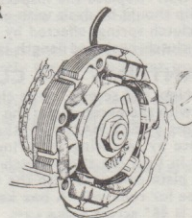
Remove the chain case outer cover as described previously

Release and remove the engine shaft nut (nut measures 1" across flats).

Take off the shaft washer, rotor, shaft key and finally the engine sprocket.

Illustration 8

Rotor



## TO REMOVE CLUTCH CONTROL CABLE

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

Screw right home the clutch cable adjuster (adjacent to the handlebar lever).

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

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.

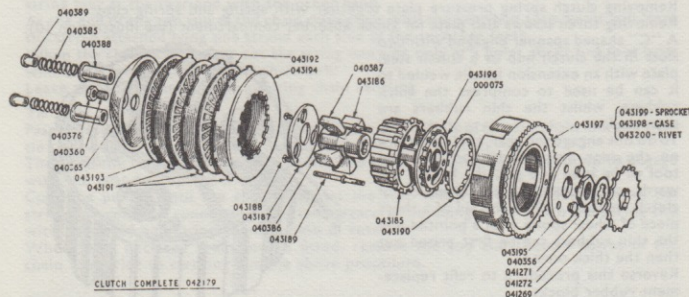


Illustration 9

Exploded view of Clutch Mechanism



## TO REPLACE CLUTCH CONTROL CABLE

Reverse the above instructions and, finally, adjust as detailed earlier. Locate the cable in front of the gear box clamp bolt.

## CLUTCH ADJUSTMENT

Attention to the clutch is usually confined to adjustment of the operating mechanism. To avoid clutch slip or clutch drag, it is essential to have  $\frac{1}{16}$  of an inch free movement between the clutch outer casing and the clutch cable adjuster. Without such movement the operating mechanism will be pre-loaded causing wear on the operating parts, also clutch slip. Conversely, excessive movement in the clutch cable will prevent separation of the friction plates and cause the clutch to drag, thus making the gear selection difficult. As the clutch inserts tend to settle down, this has the effect of lengthening the clutch push rod, as the width of the friction inserts are slightly reduced. To deal with clutch drag, or clutch slip, first unscrew the clutch cable adjuster lock nut which is located at the handlebar end, run down the adjuster as far as it will go. Remove the clutch inspection cap, unscrew one or two turns the adjuster lock nut, shown in illustration of clutch assembly on page 25.

With a screwdriver, screw in the adjuster until contact with the push rod can be felt, unscrew the adjuster exactly half a turn and retighten the lock nut, taking care the adjuster does not move. Complete the adjustment by unscrewing the clutch cable adjuster until there is  $\frac{1}{16}$  movement between the outer casing and the adjuster, tighten the lock nut. Replace the inspection cap.

Clutch slip should be dealt with promptly otherwise the friction plates will be damaged and the clutch springs affected by heat. The normal free length of the clutch springs is  $1\frac{1}{2}$ ", the clutch push rod length is 10".

## DISMANTLING THE CLUTCH

**NOTE**—Nuts and screws in the clutch and gear box assembly have a right hand thread, with the exception of the nut retaining the gear box rear chain sprocket, which has a LEFT HAND THREAD.

Commence by removing the primary drive cover.

Unscrew in turn the three clutch spring adjusting screws, take away the clutch spring pressure plate complete with the spring cups and springs, leaving the steel and friction plates free for removal. A box key is required to unscrew the nut and sprocket. The shaft nut is  $\frac{3}{8}$ " across flats.

Engage top gear, apply pressure on the rear brake pedal.

With a box key unscrew the gear box shaft nut.

Remove the chain connecting link, the clutch hub which is on a splined shaft can be pulled off after nut has been removed.

For access to the clutch bearing unscrew the three nuts securing the clutch studs and back plate. The clutch bearing arrangement is shown in illustration 9, page 25.

## TO DISMANTLE CLUTCH SHOCK ABSORBER

The six rubber blocks used in the shock absorber can be replaced by:

Removing front chaincase.

Removing clutch spring pressure plate together with spring and spring cups.

Removing three screws also plate for shock absorber compartment (see illustration 10).

A "C" shaped spanner engaged with two slots in the clutch hub or a clutch steel plate with an extension handle welded to it can be used to compress the thick rubbers, whilst the thin rubbers are extracted.

To do this engage top gear, apply pressure on the rear brake pedal, position the tool to be used and pull the handle upwards, or opposite to the direction of clutch rotation. With the aid of a short piece of wheel spoke with a pointed end the thin rubbers can be first prised out then the thick ones.

Reverse this procedure to refit replacement rubber blocks.

**NOTE**—If clutch hub is removed, a tool similar to a gear box mainshaft held in a vice will be required to hold the hub, whilst rubber blocks are extracted.

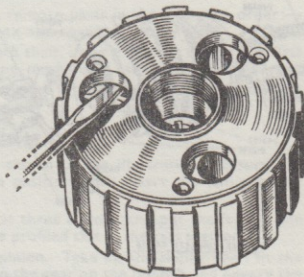


Illustration 10

## CLUTCH SPRING ADJUSTMENT

In the event of clutch slip, first ascertain that the operating mechanism is correctly adjusted (see clutch adjustment).

After dismantling the clutch, when refitting the clutch spring adjusting nuts, they should be screwed on until the spring stud just protrudes through the bottom of the recess in the adjuster nut.

## FRONT CHAIN ADJUSTMENT

Remove inspection cap from front chaincase, remove the two securing screws on the rear engine cowling, lift the cowling to expose the gear box adjuster bolt.

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

Two clamping strap bolts.

Adjust chain by means of adjuster eye-bolt and two nuts.

(The correct chain whip is  $\frac{3}{8}$ ").

Check the adjustment in several positions and adjust at tightest part of chain.

Tighten two clamping strap bolts, top gear box fixing bolt.

Refit rear engine cowling and securing screws.

Replace chaincase inspection cap.

**NOTE**—After adjusting front chain, check rear chain adjustment.

## REAR CHAIN ADJUSTMENT

Prior to adjusting rear chain, check front chain and adjust if required.

Loosen both nuts on the rear wheel spindle.

Loosen lock nuts on the adjusters and turn the adjusters until correct chain adjustment is obtained, taking care to move both adjusters exactly the same amount to maintain wheel alignment.

While on the stand the chain whip should be  $\frac{3}{4}$ " to ensure  $\frac{1}{2}$ " whip when rider is seated. Check the adjustment in several positions and adjust at tightest part of chain.

Remove the rubber cap on the totally enclosed chain guard to check chain tension.

Retighten wheel spindle nuts, and adjuster lock nuts.

**NOTE**—After chain adjustment rear brake should be checked and readjusted as necessary. See brake adjustment.

## REMOVING AND REFITTING REAR CHAIN

To protect the rear chain from mud and water it is very closely shrouded by the chain guard and removing the chain without first detaching the chain guard, can present considerable difficulty. A simple procedure however, is as follows:—

First obtain a piece of thin string about ten feet long.

With cycle on the stand turn the rear wheel until the chain connecting link is at a position near the rear sprocket, and remove the connecting link.

Now pass the string through the centre hole of the end link of the top run, draw the two ends of the string level and tie together.

Then pull the bottom run of the chain backwards with one hand while keeping the string taut at the rear end with the other hand.

As the end of the top run of the chain disengages with the gear box sprocket it will leave the string attached lying one strand each side of the sprocket teeth.

When the chain is well clear cut the rear side only at a point about one foot from where it is looped through the chain link.

Leave the string then in situ awaiting chain refitting.

### To refit the chain

Pass the longer cut end of the string through the centre hole of the end chain link and then tie the two loose ends of the string together.

Then pull the string from the rear end, at the same time guiding the chain up to engage with the gear box sprocket.

Continue pulling until the chain encircles the rear wheel sprocket, then remove the string and refit the connecting link, taking care while doing so to attach the spring clip with its closed end facing the direction of rotation.

Where fully enclosed chain case is fitted, remove the top and bottom halves of the chain case prior to carrying out the above procedure.



# FORK & FRAME SERVICE

## STEERING HEAD ADJUSTMENT

With the machine on the stand, need for adjustment of the steering head bearings may be detected by trying to rock the forks with hands holding the fork legs. The bearings should be tested for slackness after the first 200 miles and subsequently every 1000 miles. Two spanners should be used, one turning the adjusting nut (34) the other to slacken and retighten the lock nut when the adjustment has been carried out.

Adjustment should be such that no play be felt, yet the bearings are free to rotate and are not over tight.

Adjusting the bearings too tightly will ruin them, and induce heavy steering.

NOTE.—It is important that adjusting and locking nuts are tightly locked together.

## FRONT FORKS

The construction of the forks is clearly illustrated in the exploded drawing, and it will be noted that the structure comprises of two main tubes with fixed external bearings, and welded up crown and top pressings. Long coil springs are attached to the top pressing and to damper posts fitted at the lower ends of the slider tubes.

As the fork slider and damper tube move upwards against the resistance of the main spring, oil is forced up through the annular clearance between the damper tube and the slider leg. Because the damper tube is tapered, the clearance diminishes progressively, resulting in increased hydraulic resistance to upward movement of the fork slider. When the maximum diameter of the damper post enters the end of the tube, the oil flow is restricted, thus providing a hydraulic lock which prevents "fork bottoming".

## FRONT FORK MAINTENANCE

The forks are self lubricating and normally require no attention beyond changing the oil every 5000 miles.

The oil should be drained by removing plugs (7).

After the fork legs have drained, the drain plugs and washers should be replaced. With the machine on the stand, remove the filler Plugs (2) and refill each leg with 70 ccs. of SAE 30 oil.

Since 30 ccs. of oil will remain trapped in the damper plugs after draining, the addition of the above mentioned 70 ccs. of oil will give the correct 100 ccs. of oil in each leg.

After refilling, the machine should be rolled off the stand to locate the top spring adaptors and to replace the top filler plugs and washers.

## TO REMOVE THE COMPLETE FRONT FORK ASSEMBLY

Owners are advised not to interfere with the forks unless absolutely necessary. If the fork has been damaged, it is best to remove it complete and obtain a service exchange unit.

To remove the fork assembly follow this sequence:—

Place the machine on the centre stand and remove the front wheel and mudguard. Remove the battery headlamp shell speedometer cable, reflector unit, ignition warning light, ammeter leads, lighting and ignition sockets. Disconnect the control cables and the two wires from the dip switch harness to the main harness. Remove the handlebar.

Remove steering column top nut (24) and withdraw column itself (26) from the bottom whilst holding the fork in position. The fork unit can be taken away after removal of distance piece and washer (watch for 34 ball bearings).

If it is desired to dismantle the slider units, the fork sliders complete with oil seals and springs may be withdrawn after removing top filler plug screws.

Care should be taken not to damage the oil seals when pulling them over the bearings.

## TO REFIT THE FORKS AS A UNIT

Reassemble in reverse sequence.

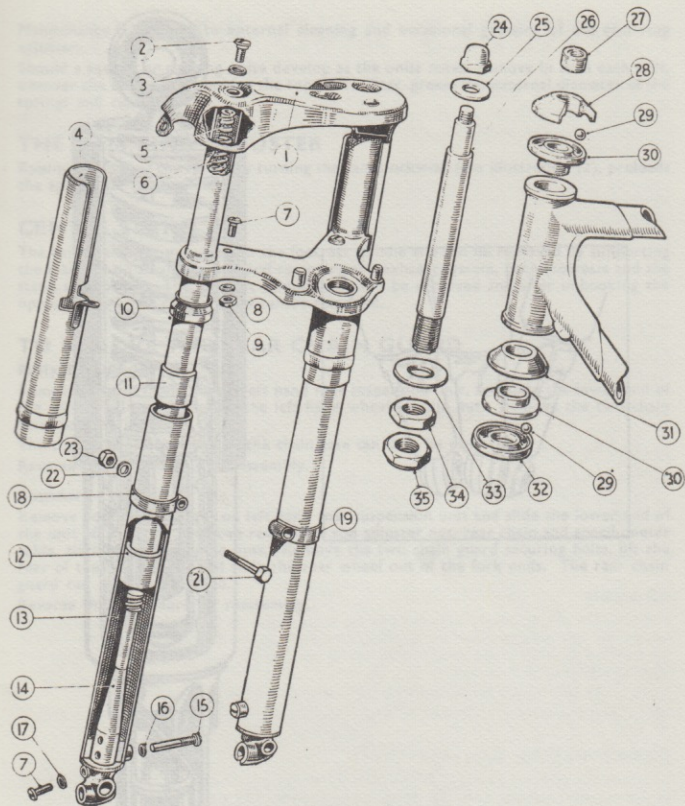


Illustration 11

Exploded view of Teledraulic Forks

- |  |                                     |
|--|-------------------------------------|
| 1 FORK, H.                                   | 18 MUDGUARD CLIP LEFT.              |
| 2 INNER TUBE TOP SCREW.                      | 19 MUDGUARD CLIP RIGHT.             |
| 3 INNER TUBE TOP SCREW FIBRE WASHER.         | 21 MUDGUARD CLIP BOLT.              |
| 4 TOP COVER TUBE.                            | 22 MUDGUARD CLIP BOLT WASHER.       |
| 5 INNER TUBE TOP ADAPTOR                     | 23 MUDGUARD CLIP BOLT NUT.          |
| 6 MAIN SPRING.                               | 24 NUT, DOMED TOP                   |
| 7 DRAIN SCREW.                               | 25 WASHER TOP DOMED NUT             |
| 8 TOP COVER TUBE SHAKEPROOF WASHER.          | 26 HEAD STEM.                       |
| 9 TOP COVER TUBE FIXING SCREW NUT.           | 27 SPACER FOR HEAD STEM.            |
| 10 OIL SEAL.                                 | 28 ADJUSTING RACE.                  |
| 11 ASSEMBLED PART.                           | 29 BALLS STEERING.                  |
| 12 ASSEMBLED PART.                           | 30 FRAME RACE TOP AND BOTTOM.       |
| 13 SLIDER EXTENSION.                         | 31 DUST COVER FOR BALL RACE.        |
| 14 DAMPER TUBE.                              | 32 CROWN RACE.                      |
| 15 DAMPER TUBE RETAINING SCREW.              | 33 WASHER HEAD STEM BOTTOM NUTS.    |
| 16 DAMPER TUBE RETAINING SCREW FIBRE WASHER. | 34 HEAD STEM ADJUSTING NUT, BOTTOM. |
| 17 DRAIN SCREW FIBRE WASHER.                 | 35 HEAD STEM LOCK NUT, BOTTOM.      |



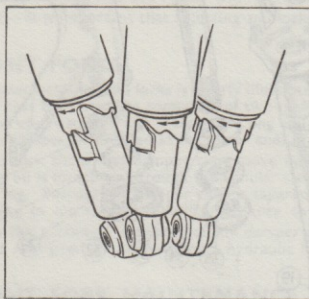


Illustration 12

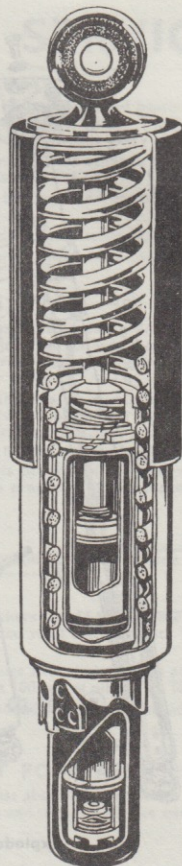
"Ghost" view of Rear Suspension Unit

## REAR SUSPENSION

The rear wheel is mounted in a fork which is hinged just behind the gear box.

The fork works in bronze bearings and is lubricated by an oil reservoir around the bushes and this can be replenished with heavy gear oil (SAE 140) by means of a grease nipple situated above the pivot on the right hand side. Movement of the fork is controlled by Girling suspension units. These units are of the sealed unit type, and topping up is not necessary. The springs are lubricated before assembly and the fluid in the damper unit is the exact quantity and sufficient for life of the unit.

The unit is shown in illustration 12.



Maintenance is confined to external cleaning and occasional greasing of the cam ring adjuster.

Should a squeak or rubbing noise develop as the units move, remove in turn each unit, uncover the spring by removing the top split collars, grease the external diameter of the springs and reassemble.

## THE CAM RING ADJUSTER

Raising the base of the spring by turning the cam clockwise (see illustration 12), preloads the spring for varying loads.

## CENTRE STAND

The centre stand is mounted on the footrest spindle and can be removed by supporting the machine on a suitable box and removing the exhaust system, both footrests and the stand stop plates. The footrest spindle can then be removed and after unhooking the operating rod, the centre stand can be removed.

## TO REMOVE THE REAR CHAIN GUARD

### Fully Enclosed Type

Remove bottom fixing nut on left hand rear suspension unit, and slide the lower end of the unit off the stud, slacken the left hand wheel spindle nut. Remove the two chain case securing bolts.

The top and bottom halves of the chain case can then be removed.

Reverse this procedure for reassembly.

### Standard type

Remove bottom fixing nut on left hand rear suspension unit and slide the lower end of the unit off the stud. Remove rear brake rod adjuster nut, rear chain and speedometer cable, slacken wheel spindle nuts. Remove the two chain guard securing bolts, lift the rear of the chain guard and slide the rear wheel out of the fork ends. The rear chain guard can now be removed.

Reverse this procedure for reassembly.



# WHEELS AND BRAKES

## TO REMOVE FRONT WHEEL

Place the machine on the centre stand and disconnect the front brake cable. Slacken the two clamping cotter bolts and remove the two wheel spindle nuts, the front wheel can then be removed.

When replacing the front wheel it is important to make sure that the brake anchorage registers with the stop on the left hand side, tighten both spindle nuts, the left hand clamping cotter bolt should then be tightened. Roll the machine off the stand, and depress the forks vigorously a few times to enable the right leg to assume its own lateral position on the wheel spindle nut. It can then be kept in this position by tightening the right hand clamping cotter bolt.

NOTE—The importance of following this sequence, particularly when reassembling, must be emphasised, otherwise the fork action or alignment may be affected.

## TO REMOVE REAR WHEEL

Remove chain guard as described, and with the rider standing on the left side of the machine lean the machine towards the left, the rear wheel can then be removed between the mudguard and silencer.

Reverse this procedure for reassembly.

## HUBS AND BEARINGS

Both hubs are greased when new and no further lubrication will be required for 5000 miles, it is then advisable to renew the grease, the old grease should be removed by washing in petrol or paraffin.

When dismantling and reassembling the hubs refer to illustration for assembly order. If bearings show any signs of wear, fit replacements.

## BRAKES

If the brakes are correctly adjusted and oil is not used to lubricate the bearings, the brakes will not require attention for many thousands of miles. Petrol or paraffin should not be used to wash brake shoes, these liquids have an adverse effect on the linings and braking efficiency will be lost.

Front brake adjustment is effected by a cable adjuster on the left hand fork slider.

Rear brake adjustment is effected by a knurled nut at the rear end of the brake rod.

## BRAKE PEDAL ADJUSTMENT

To adjust the position of the pedal, slacken the brake pedal spindle nut, move the pedal to the desired position, hold the pedal in this position and tighten the spindle nut.

After altering the pedal position check the brake rod adjustment.

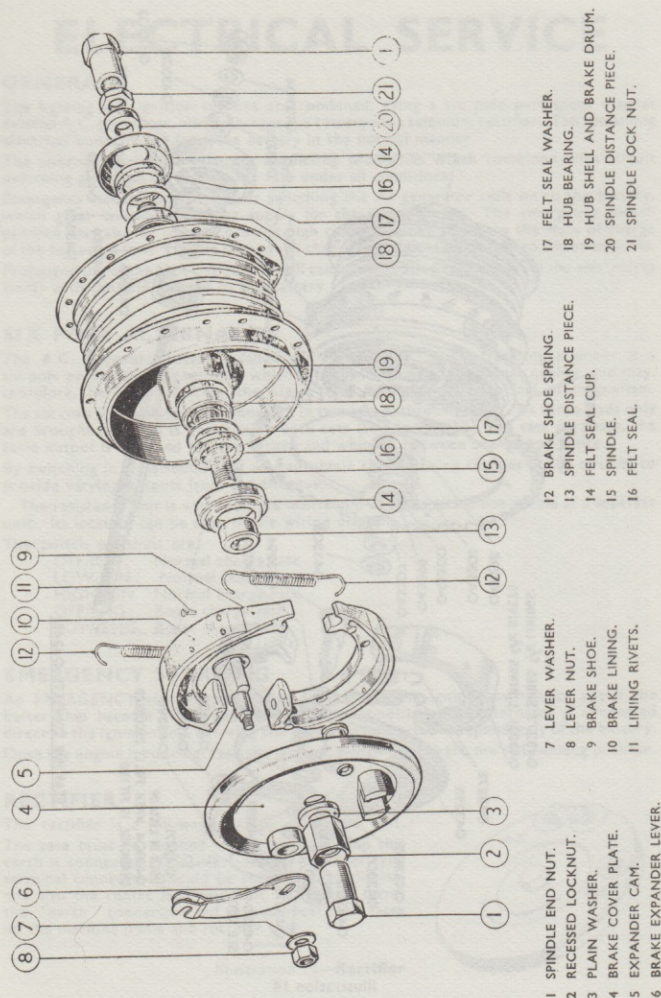
## REAR BRAKE ADJUSTMENT

When adjusting the rear brake, screw the knurled adjuster down the brake rod until the brake shoes are just touching the brake drum. Then UNSCREW the adjuster eight complete turns.

## TYRES

To obtain maximum mileage from the tyres, maintenance should be regular and painstaking. Once a week check tyre pressures with a gauge and at the same time remove any road grit which is wedged in the treads.

A comprehensive booklet produced by Messrs. Dunlops, on "How to keep your motor cycle tyres fit", which includes instructions on tyre removal and refitting is issued with each new machine. A table of minimum inflation pressures for specified loads per tyre is also included. As a rough guide, and with a rider of average weight and normal equipment, without a pillion passenger, the pressures should be 18 lbs. for the front tyre and 22 lbs. for the rear tyre.



17 FELT SEAL WASHER.  
18 HUB BEARING.  
19 HUB SHELL AND BRAKE DRUM.  
20 SPINDLE DISTANCE PIECE.  
21 SPINDLE LOCK NUT.

12 BRAKE SHOE SPRING.  
13 SPINDLE DISTANCE PIECE.  
14 FELT SEAL CUP.  
15 SPINDLE.  
16 FELT SEAL.

7 LEVER WASHER.  
8 LEVER NUT.  
9 BRAKE SHOE.  
10 BRAKE LINING.  
11 LINING RIVETS.

1 SPINDLE END NUT.  
2 RECESSED LOCKNUT.  
3 PLAIN WASHER.  
4 BRAKE COVER PLATE.  
5 EXPANDER CAM.  
6 BRAKE EXPANDER LEVER.

Illustration 13

Front Hub Assembly



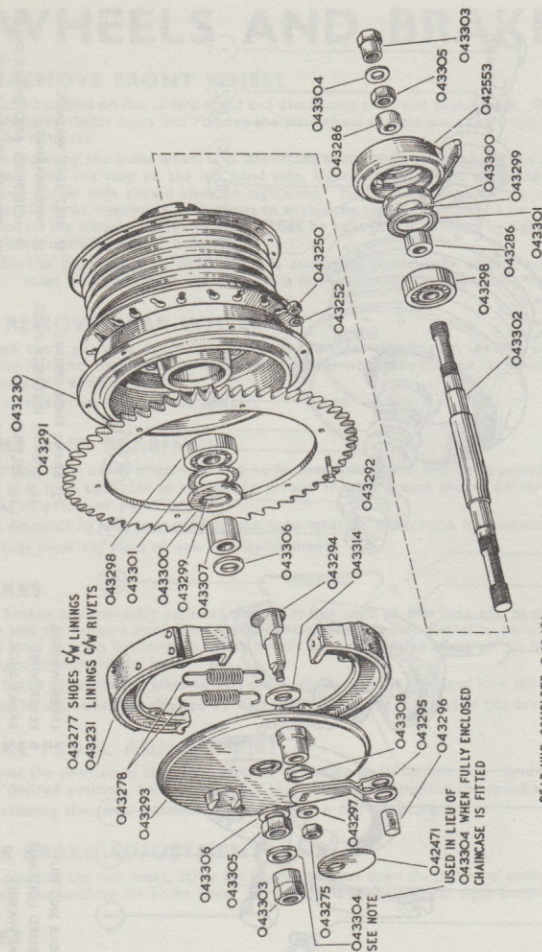


Illustration 14

#### Rear Hub Assembly

## ELECTRICAL SERVICE

### GENERAL

The lighting and ignition systems are combined, using a six pole permanent magnet excited A.C. generator, which charges the battery via a selenium rectifier. The remaining electrical units are fed from the battery in the normal manner.

The alternator unit has inherent regulating properties which combined with circuit switching gives the correct charge rate under all conditions.

Emergency starting is provided by switching the six generator coils on to the battery, which gives immediate voltage supply for the ignition coil. The emergency switch position may also be used to provide high rate boost charge where the state of charge of the battery is low. The use of the high charge rate should be limited to fifteen minutes.

Prolonged use of the high charge rate will cause evaporation of water from the electrolyte (acid) with possible damage to the battery.

### SIX POLE ALTERNATOR

The A.C. Generator used is called an "Alternator". The rotating member is a six pole permanent magnet unit, which is of special design and magnet quality, and may, therefore, be removed from the Stator Coil assembly without loss of magnetism.

The six coils of the Stator are connected in two sets of three in series. As three leads only are brought out, one is common to both sets (this is WHITE). For test purposes, the same output is obtained between green and white as between orange and white.

By switching in a resistance unit we can obtain the following changes in the circuits to provide varying outputs from the alternator.

The resistance unit is wound in the main loom of wires and is not visible as a separate unit. Its location can be seen in the wiring diagram.

The switch positions are:

OFF IGN	Normal charge rate
LOW IGN	Normal charge rate
HIGH IGN	Normal charge rate
OFF/EMG	Boost charge rate
LOW/EMG	Boost charge rate

### EMERGENCY STARTING

An EMERGENCY starting position is provided in the ignition switch for use if the battery has become discharged. Under these conditions, the alternator is connected direct to the ignition coil, allowing the engine to be started independently of the battery.

Once the engine is running, turn the ignition switch back to the normal running position.

### RECTIFIER

The rectifier is a full-wave bridge connected unit. The case must be earthed to the machine and this earth is connected POSITIVE. The three bullet type terminal connectors should be checked for tightness, and also the centre fastening bolt. This bolt forms the "earth" connection and so must meet clean faces on the machine frame and rectifier case.

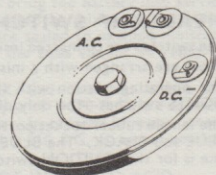


Illustration 15—Rectifier

### COIL IGNITION

The coil, also the air filter body (when fitted) is housed in the accessory compartment on the left side of the machine. To remove the compartment cover unscrew the top cover screw, then take away the two bolts located below the cover.

The coil needs no attention beyond keeping the exterior clean, particularly between the terminals, which must be securely tightened.



## CONTACT BREAKER UNIT

This unit comprises the contact set, condenser and cam lubricating pad.

The contacts are adjusted by releasing the locking screw and then setting the distance by a slight movement of the eccentric screw whilst the rocker arm heel is on the peak of the cam lobe, and finally tightening the locking screw firmly.

When dry the lubrication pad should be removed, and have H.M.P. grease kneaded into it, and then replaced. Oil is not advised, but if used sparingly and frequently is better than complete neglect. Excess oil may reach the contact surfaces and would be harmful.

When service attention is given to the breaker unit always check tightness of the live condenser connection and earth fixing screw.



Illustration 16  
Contact Breaker

## AUTO-ADVANCE MECHANISM

Behind the contact breaker base plate is the advance mechanism which by means of weights and springs moves the cam in order to provide a retarded position for starting and gradually to advance the ignition setting as the engine speed increases.

## HEADLAMP

The reflector is of the latest pattern aluminised thin coating deposited in high vacuum, and gives a much greater light reflection than the older plated types.

As this high efficiency coating is extremely thin, the reflecting surface should never be touched. This also means that reflectors cannot be supplied as spares without the glass front, which acts as protection during transit and stocking.



Illustration 17—Headlamp

## HEADLAMP BLUE—30 x 24 Watts

The bulb is a double filament pre-focus type, and is removed after the contact unit has been taken off. By holding the reflector and rim unit upside down and taking care to CATCH the bulb, it will DROP out, as no other fastening is employed.

## HEADLAMP SWITCHES

The switches are connected inside the lamp to the wiring system by multi pin plug sockets.

These are arranged with a missing pin and hole, so that incorrect mating is impossible. The operating portion with the brass contact legs is the same in both the IGN. and LIGHTS switches—the only difference being the names on the escutcheon plates.

The female rubber socket portions which are connected to the wiring loom are coloured BLUE and BLACK. The BLUE one is the LIGHTING switch connector and the BLACK one is for the IGNITION switch.

## IGNITION WARNING SYSTEM

The two red pins on the top of the headlamp are the ignition warning device. When the ignition switch is in the EMG. or IGN. positions, the right hand pin lights up fully and the left hand one partially—the light coming from the speedometer bulb. This warning light is on with the engine running or stationary, and provides visual indication of the ignition switch being "ON".

## SPARKING PLUG

The K.L.G. Type FE80 "Corundite" Plug is fitted to all models.

It has a thread of 14 mm. and the reach is  $\frac{3}{8}$ ". The point gap is .020 to .022". Check the point gaps every time the engine is decarbonised and, if necessary, re-set the points.

See that the plug is fitted with its external seating washer

Coat the thread with "Oil Dag" or Graphite paste.

Firmly tighten the plug by using the standard box spanner and tommy bar (Part No. 017252.) All that is required is a GAS-TIGHT joint. Therefore do not over tighten, which will not make a gas-tight joint more gas-tight, but can, and possibly will, distort and damage the body of the plug.

Set the gaps to .020 to .022". Never try to move the central electrode. To widen or narrow the gap between the electrodes only move the earth (side electrodes). Check the gaps first with a gap gauge. If they are too wide tap the earth (side electrodes) towards the central electrode using preferably a small copper drift and light hammer. Check the gaps between each tap and stop when the gauge is a nice sliding fit between the central electrode and the three earth side electrodes.

If the gaps are too small to start with gently lever the earth electrodes away from the centre electrode using a small screw-driver and then tap them back as described above. Avoid damaging the centre electrode and do not attempt to move the electrodes apart by forcing anything between them.

For maximum efficiency, plugs should be cleaned at every 3,000 miles. To take the plug to pieces for cleaning, unscrew the gland nut by holding the smaller hexagon on the gland nut upside down in a vice and then using the box spanner to unscrew the larger hexagon on the body.

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

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

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

Finally adjust the gap to .020 to .022".



Illustration 18

## BATTERY TYPE 3-ER7L POSITIVE EARTH

"Dry charged" batteries are supplied without electrolyte, but with their plates in a charged condition. No initial charging is required and to bring the battery into service it is only necessary to fill the cells with electrolyte, prepared by mixing concentrated sulphuric acid and distilled water. The cell filler holes are sealed to exclude moisture and air before the battery is brought into service and the seals should be removed immediately before electrolyte is poured in.

**PREPARATION OF ELECTROLYTE.** In the U.K. and countries where the temperatures are normally below 90°F. (32°C.) electrolyte of 1.270 S.G. is required, viz: 1 part acid (1.835 S.G.) to 2.8 parts distilled water. In tropical climates where temperatures frequently rise above 90°F., electrolyte of 1.210 S.G. is recommended, viz: 1 part acid (1.835 S.G.) to 4 parts distilled water.

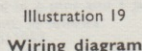
**WARNING.** ALWAYS ADD ACID TO WATER—NOT WATER TO ACID.

ON DRY CHARGED BATTERIES THE FILLING OF EACH CELL MUST BE COMPLETED IN ONE OPERATION AND LEVELS RESTORED AFTER STANDING FOR AN HOUR OR MORE BY SYPHONING OFF EXCESS ELECTROLYTE.

Electrolyte should be mixed in a glass or earthenware vessel or lead lined tank. Temperature of filling room, battery and electrolyte should be maintained between 60°F. and 80°F.



Never let a battery completely run down; if this does occur get it charged as soon as possible, or its length of life may be seriously shortened.





# USEFUL INFORMATION

## TRACING TROUBLES

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

Carburettor flooded unnecessarily.  
Water on high-tension cable.  
Moisture on sparking plug.  
Oiled up, or fouled, sparking plug.  
Throttle opening too large.  
Pilot jet choked.  
Air lever in open position or bad air leak at carburettor joint.  
Lack of fuel because of pipe, or tap, obstruction.  
Valve not seating properly.  
Contact points dirty.  
Incorrect contact point gap.  
Ignition not switched on.  
Discharged battery.

**Engine misses fire may be due to:**

Defective, or oiled, sparking plug.  
Incorrect contact point gap.  
Contact breaker rocker arm sticking.  
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 plug.  
Lack of oil in tank.  
No rocker clearance, or too much clearance.  
Weak, or broken, valve spring.  
Sticky valve stem.  
Valve not seating properly.  
Brake Adjusted too closely.  
Badly fitting, or broken, piston rings.  
Punctured carburettor float.  
Engine carbonised.  
Choked silencer.  
Bad air leak between carburettor and head.

**Engine overheats may be due to:**

Lack of proper lubrication. (Quality or quantity of oil).  
Faulty sparking plug.  
Air control to carburettor out of order.  
Punctured carburettor float.  
Engine carbonised.  
Weak valve springs.  
Pitted valve seats.  
Worn piston rings.  
Ignition setting incorrect.  
Choked silencer.  
Automatic timing control faulty.

**Engine stops suddenly may be due to:**

Stuck up valve.  
No petrol in tank, or choked petrol supply.  
Choked main jet.  
Oiled up, or fouled, sparking plug.  
Water on sparking plug.  
Water in float chamber.  
Vent hole in petrol tank filler cap choked.  
Loose coil connections.

## EXCESSIVE OIL CONSUMPTION

Excessive oil consumption may be due to:  
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 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.

## STEERING UNSATISFACTORY

Incorrect steering head adjustment (too tight or excessively slack).  
Pitted steering head ball races resulting from loose adjustment.  
Wheels out of alignment.  
Front and/or rear tyre tread not correctly manipulated to run true with wheel (causes handlebar oscillation at low road speed.)  
Damaged front fork main tubes resulting from impact.

## 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 soaked in "TEKALL," which is a lanoline base rust preventative marketed in small tins and available at most garages. This material, so applied, leaves an almost invisible film that is impervious to moisture and its use cannot be too highly recommended 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.

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.  
1 pint tin "Tekall," Part number 011958.



# REPAIRS AND SERVICE

## REPAIRS

The instructions regarding repairs should be clear and definite, otherwise the cost may be greater than that expected. We shall be pleased to give estimates for repairs if parts are sent to us for 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 AND ORDERS

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.

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

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

Owners are strongly advised to purchase a Spare Parts List so that correct part numbers can be quoted. Most parts are clearly illustrated in this list which makes it very easy to recognise the part or parts required.

## PROPRIETARY FITTINGS

No expense is spared to secure and fit the most suitable, and highest quality, instruments and accessories for the standard equipment or 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 Road, Witton, Birmingham, 6
Chains	The Renold and Coventry Chain Co. Ltd., Didsbury, Manchester
Electrical Equipment	Wico-Pacy Sales Corporation, Bletchley, Bucks.
Spark Plug	K.L.G. Sparking Plugs Ltd., Putney Vale, London, S.W.15
Speedometers	Messrs. S. Smith & Sons (M.A.) Ltd., Cricklewood, London
Tires	Messrs. Dunlop Rubber Co. Ltd., Fort Dunlop, Birmingham
Rear Suspension	Girling Ltd., King's Road, Tyseley, Birmingham 11

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

### To register a new machine:

Send to the Local Registration Authority the following:

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

In due course you will receive:

- (1) A Registration Book. (Commonly called the "log" book.)
- (2) A 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  $1\frac{3}{8}$ " high,  $1\frac{1}{2}$ " wide and  $\frac{7}{16}$ " thick with spaces of  $\frac{1}{8}$ " between each two characters.

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

## Ignition Suppressors

As required by law all machines for the Home Market are issued with an approved type of radio interference suppressor already installed.

## 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 a red light facing rearwards. The rear number plate must be adequately illuminated by a white light.

Each front 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.

## 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 12.55 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:

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

**Burrage Grove** is the first turning on the left from Burrage Road when entering Burrage Road from the Plumstead Road. (See final paragraph 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 pass the end of Burrage Road (one minute from the Service Depot).

Bus routes 21a, 75 and 161 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 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".

## 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.

# 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.      | (7) Wheel bearings.          |
| (2) Contact breaker points. | (7) Brakes.                  |
| (3) Sparking plug.          | (8) Forks and steering head. |
| (4) Clutch.                 | (9) Alignment of wheels.     |
| (5) Chains.                 | (10) Tyre pressures.         |
- (b) Tighten all external nuts and bolts, including cylinder head nuts and fork crown pin screws.
- (c) Top-up battery and check all lighting equipment.
- (d) Clean out carburettor and check for correct idling.
- (e) Adjust 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—Oil, greases and materials used are chargeable to the customer.

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



# SPARE PARTS

**G**ENUINE SPARE PARTS purchased from an Authorised Dealer, or from the Factory, are identical with the parts originally built into your motor cycle. By using them you are assured that they will fit accurately and give satisfactory service.

## SPARES STOCKISTS

For the convenience of owners Spares Stockists are appointed for most districts. To prevent delay and save the delivery surcharge, customers are recommended always to apply to their nearest Spares Stockist.

## CORRESPONDENCE AND SPARES ORDERS

Always quote the complete engine number, including all the letters in it. This will enable us to identify the machine.

Each series of frames is numbered from zero upwards, therefore, the quotation of a frame number only does not facilitate identification.

## SPARES LIST

An illustrated spares list covering the models described in this Instruction Book is available on application. Price 3s. 6d. each.

## PART NUMBERS

If there is any doubt about the names of parts required, or their part numbers, please send the old parts as patterns.

## REMINDER

Do not forget to include your name and full postal address. We do receive orders without this very necessary information.

## PAYMENT

- (1) Cash with order.\*
- (2) Cash against pro-forma invoice.
- (3) Approved ledger account.

We do not send C.O.D. (Cash on delivery).

\*Add 5% of total value for carriage and packing. Minimum 1/-.

## GUARANTEE

Full details of the guarantee relating to the models described in this book are given on page 48.

## INSTRUCTION BOOKS

A copy of this book is issued free of charge to all purchasers of a new machine.

# TOOLS AND SPECIAL EQUIPMENT

## TOOLS

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

1	017253	Tool Roll.
2	017007	Tyre Lever.
1	017114	Pump.
1	017249	Adjustable Spanner.
1	017257	$\frac{1}{8}$ " $\times$ $\frac{3}{16}$ " Spanner.
2	017052	$\frac{3}{16}$ " $\times$ $\frac{1}{4}$ " spanner.
1	017053	$\frac{1}{16}$ " $\times$ $\frac{3}{8}$ " spanner.
1	017252	Plug spanner and tommy bar.
1	023284	Suspension unit spanner.
1	021625	6" screwdriver.
1	042540	Feeler gauge.
1	018667	Allen key.
1	042570	Steering head adjusting spanner.

## SPECIAL TOOLS (Not supplied in tool kit)

1	042571	Timing pinion extractor.
1	042247	Automatic advance unit extractor bolt.
1	022011	Timing disc. A circular timing disc, graduated in degrees and made of ivory. A very useful device.
1	017482	Holder for valve grinding.
1	018276	Valve spring compressor.

## OPTIONAL EQUIPMENT

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

Stop rear light.  
Air cleaner.  
Detachable luggage carrier.  
Pillion footrests, specially designed fold up type.

## 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.

## BADGES

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



## GUARANTEE

We give the following guarantee with our motorcycles, motorcycle combination 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 understand subject to the conditions mentioned below, to make good at any time within six months any defect 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 damage 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.

## NOTICE

We do not appoint agents for the sale on our behalf of our motorcycles or other goods, but we assign to motorcycle dealers areas in which we supply to such dealers exclusively for re-sale in such areas. No such Dealer is authorised to transact any business, give any warranty, make any representation or incur any liability on our behalf.