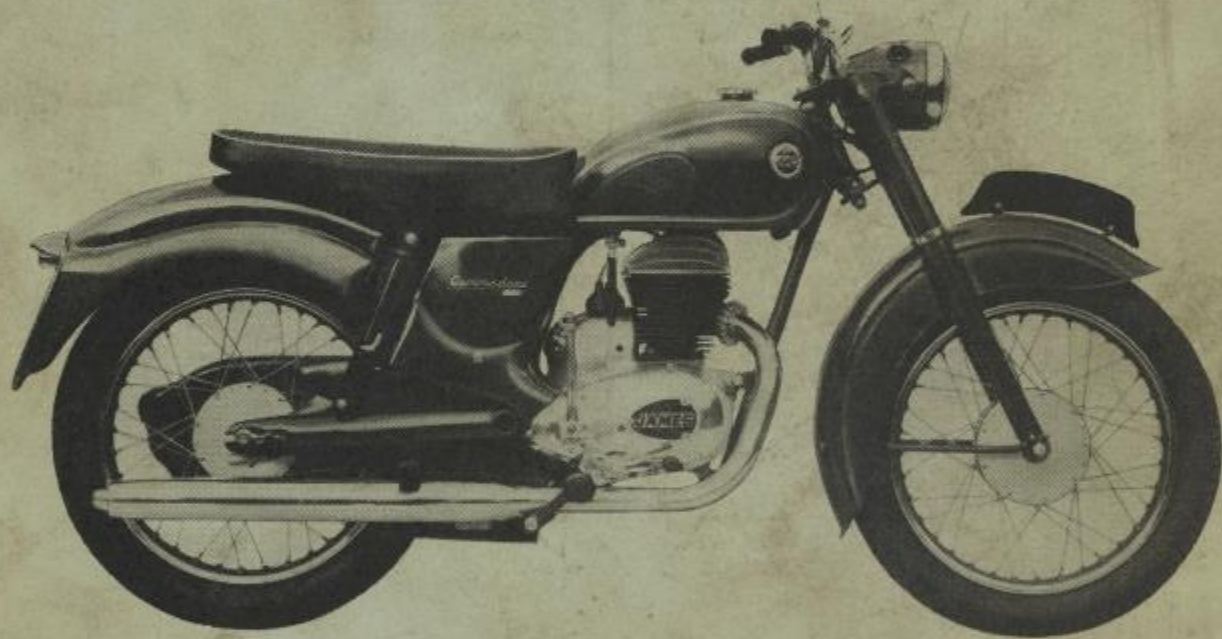


JAMES INSTRUCTION BOOK

COMMODORE 250



1957 MODEL L25

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MANUFACTURERS

JAMES MOTOR CYCLES LTD · GREET · BIRMINGHAM · II

PRICE: THREE SHILLINGS

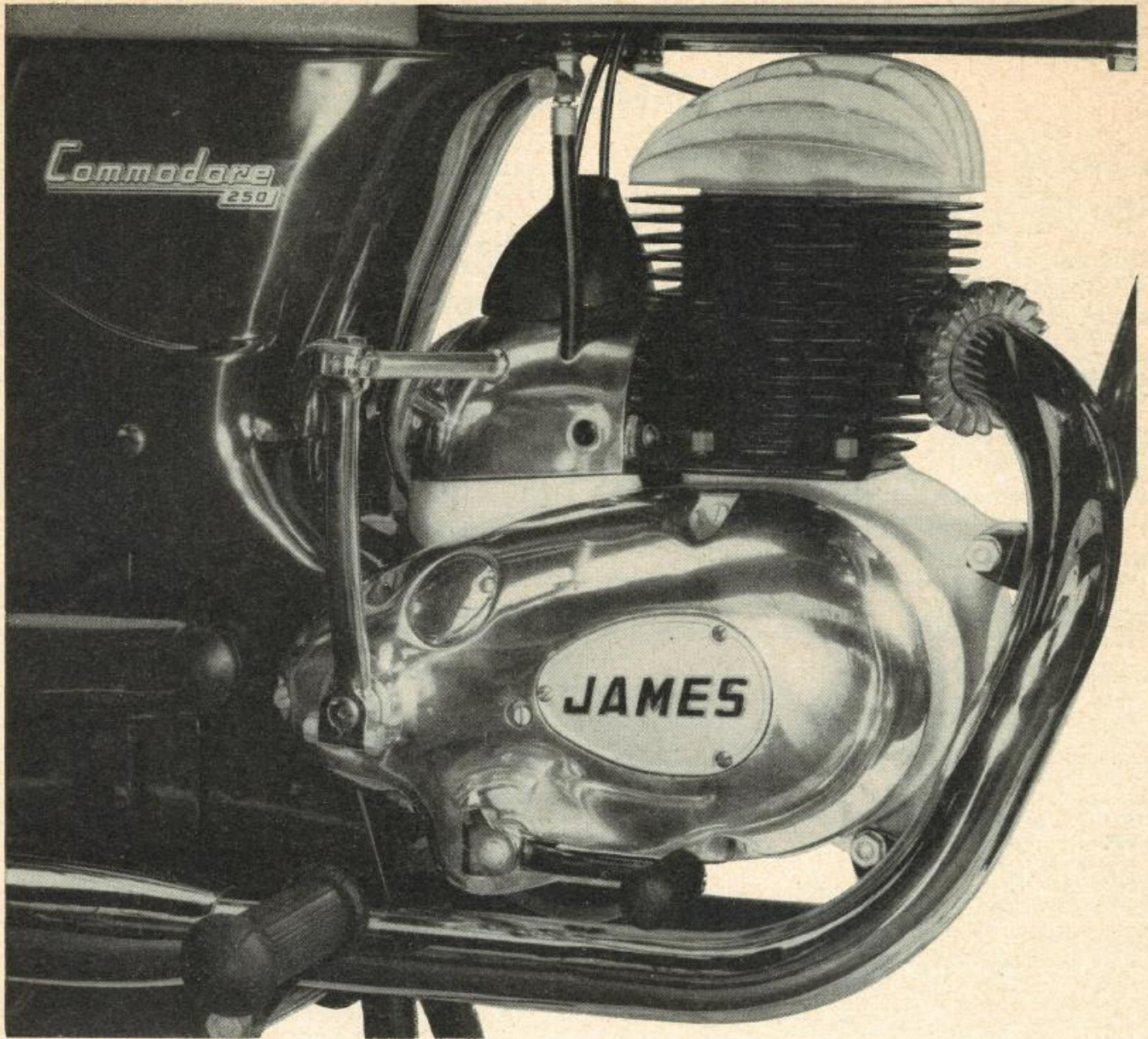
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Skilled design and construction have made your James motor cycle as safe as possible. It has first-class steering and brakes and is very easy to handle in traffic. The very manoeuvrability of your machine makes it necessary to exercise caution at all times. Take a pride in your riding technique: your example of courteous, careful and unobtrusive riding will materially contribute to road safety and to the reputation of a fine sport.

In operation, a James is as simple as it is possible for a high efficiency motor cycle to be and only the minimum of attention is necessary for it to give you many thousands of miles of reliable and economical personal transport.

The purpose of this booklet is to acquaint you with important details concerning your motor cycle and to indicate those parts which require special care or regular lubrication. We strongly advise you to study it carefully in order to become thoroughly acquainted with your machine so that it may be a constant source of pleasure. It is hoped that the information given in the following pages will help both novice and experienced rider, for even the owner with many years of motor cycle riding behind him may commit errors in the care and maintenance of a new machine which may cause serious and expensive damage. The service life, driving safety, and reliability of your James depend on the care you give it.

James Motor Cycles Limited
GREET : BIRMINGHAM, 11 : ENGLAND

Telephone : Victoria 2211 (5 lines)

Telegrams : JAMESGREET BIRMINGHAM (Telex)

Operating Instructions

BEFORE STARTING

- Fill fuel tank petrol mixture in the ratio of 24 parts petrol to 1 of oil. At petrol station : 1½ gallons petrol mixed with ½ pint of oil. Capacity of tank 2¾ gallons.
- Check oil in chaincase and gearbox .. oil should reach level plugs.
- Check tyre pressures
- | | | | | | |
|--------|----|----|---------|----|---------|
| | | | Front | .. | Rear |
| Solo | .. | .. | 16 lbs. | .. | 19 lbs. |
| Two-up | .. | .. | 16 lbs. | .. | 25 lbs. |

STARTING

- Open fuel tap pull tap out.
- Engine gear lever is in neutral .. with indicator at "N" check by rolling machine slightly forwards and backwards.
- Close air lever when engine is cold it may be necessary to prod the tickler a few times to flood the carburetter. With warm engine there is no need to use the tickler and air lever need not be fully closed. It is parallel with the handlebar in the closed position.
- Adjust throttle by slightly opening twistgrip about ⅓th of its travel.
- Ease over compression standing over the machine, idly turn over the engine by means of the kickstarter so that the piston is over compression with the kickstarter at the top of its stroke.
- Turn on ignition switch to position IGN. Use position EMG only for emergencies when battery is flat. (If EMG ignition is used for starting, it should be switched over to IGN as soon as the engine is running.)
- Start engine by firmly depressing kickstarter to the full extent of its travel. It is important that the engine should be turned over compression and that the actual starting "kick" should be purposeful to avoid a "kick-back."
- Allow engine to warm up the air lever should be opened as the engine warms up.

RIDING

- Disengage the clutch Grip clutch lever on left handlebar.
- Select 1st gear move foot gear change pedal upwards.
- Engage clutch and move off Slowly release clutch lever and increase engine speed simultaneously by opening throttle. It is necessary to keep up engine revs to avoid stalling.
- Changing from 1st to 2nd, to 3rd and to 4th gear Depress foot gear change pedal at each gear, closing throttle
- Changing from 4th to 3rd, to 2nd and to 1st gear Lift foot gear change pedal with toe at each speed, leaving the throttle slightly open.
- Riding in traffic Engage lower gears. Overtake only when road is clear and do so quickly but unobtrusively. Avoid slipping the clutch.
- Approaching bends or riding downhill Close throttle and change into lower gear if necessary to lower speed. Never coast along with engine in neutral.
- Riding uphill Do not allow engine to labour in top gear but change gear appropriately. Wide throttle openings are rarely necessary and only waste petrol.

STOPPING

- Close throttle Reduce speed by changing into lower gears. When speed has slowed down sufficiently de-clutch and apply brakes slowly. Move gear pedal to neutral.
- Turn off engine Switch off ignition and close petrol tap. Keep the ignition switch turned off when engine is not running.

Controls

Newcomers to motor cycling and indeed all who are making their first acquaintance with the "Commodore" are strongly advised to acquire a thorough knowledge of the positions and functions of the controls. Only when you are able to operate these automatically without having to grope for them or reflect on how to use them will you be a really safe rider.

FILLER CAP. Incorporates oil measure for refuelling (three and one half measures to one gallon). Plastic cap held in position by synthetic rubber sealing ring. Push in—pull out.

PETROL TAP. On right under tank. Pull knob to turn fuel ON. Push in to turn fuel OFF. Always push knob to OFF position when stopping for any length of time.

AIR LEVER. Close to enrich mixture for starting and then open gradually as the engine warms up until the lever is fully open.

TICKLER. On carburettor cover. Depress two or three times to provide rich mixture for starting.

IGNITION SWITCH. Marked "EMG," "OFF" and "IGN." For normal purposes the lever will be moved to the "IGN" for starting and will only be switched to the "EMG" position when the battery is flat. **NOTE IMPORTANT.** Refer emergency starting on page 20 for further instructions.

THROTTLE TWIST GRIP. Controls speed of engine. Twist towards rider to open. Away from rider to close.

KICK STARTER. Use to start engine.

HAND CLUTCH LEVER. Pull towards handlebar to release engine drive from rear wheel. Use when moving away from rest and also when changing gear. Always let the clutch in gently to prevent transmission snatch.

FOOT GEAR CHANGE PEDAL. Move UP to select a lower gear. Move DOWN to select a higher gear. Neutral will be found between first (bottom) and second gear.

Automatically returns to its starting position. Foot should be removed from lever between each gear change. Always de-clutch when changing gears.

HAND FRONT BRAKE LEVER. Grip to operate front brake. Normally applied in conjunction with rear brake.

REAR BRAKE PEDAL. Press down to operate rear brake.

LIGHTING SWITCH. Switch has three positions:—

- "L" Parking light, tail lamp and speedo bulbs lit.
- "OFF" No lamps in use.
- "HIGH" Headlamp, tail lamp and speedometer bulbs lit.

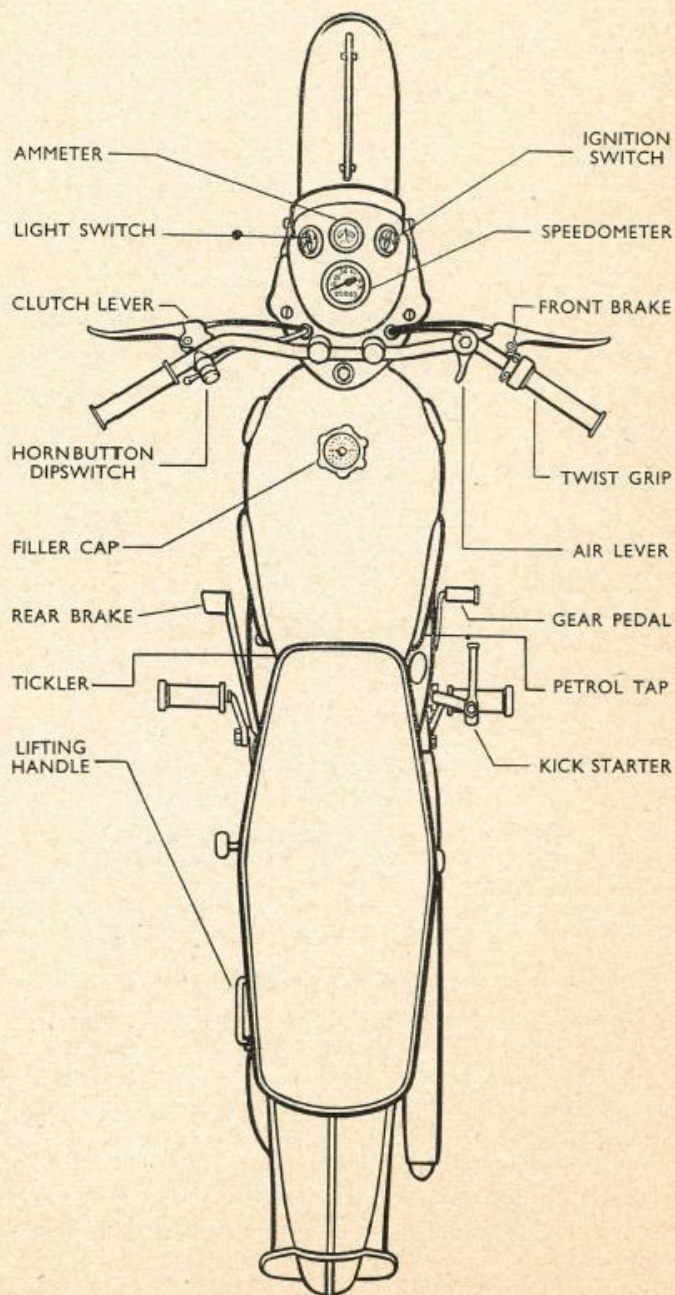
DIPSWITCH AND HORNBUTTON. Deflects main headlamp beam downwards and to the left. Prevents dazzling oncoming drivers.

Hornbutton is in unit with dipswitch on left handlebar.

AMMETER. Indicates flow of current and state of battery charge.

SPEEDOMETER. Indicates speed and mileage.

LIFTING HANDLE. To raise machine on stand. Place foot on stand extension when lifting.



Riding Hints

RUNNING-IN

The manner in which a new motor cycle is driven during the first 1,000 miles (1,600 kms.) can make or mar its eventual performance and useful life, and owners are therefore strongly advised to exercise great care during the vital "running-in" period. In a new machine, despite the most careful manufacture and assembly, each bearing surface has microscopic idiosyncrasies not entirely suited to the opposite surface and the initial period of "light duties" will give those working parts a mirror finish impossible to achieve by machinery.

Two-stroke engines are quickly run in, owing to their simple and efficient design. However, as in everything else, treatment must follow the dictates of common sense, and not too much should be attempted on the first ride. Do not exceed 35 m.p.h. in top gear for the first 100 miles or so and limit your throttle openings to two-thirds in any gear for the first 500 miles.

Full throttle riding should **not** be indulged in for at least 1,000 miles, when it will probably be time to adjust the contact-breaker point gap. How to do this is shown on page 18.

FAILURE TO START

If repeated kicks meet with no success after flooding when the engine is cold, turn off fuel supply, switch off the ignition, open the throttle wide and clear cylinder of excessive mixture by giving a number of kicks to starting lever. Now turn on fuel supply and again easing engine over compression, switch on the ignition and after opening the throttle a little, try again. If not successful the sparking plug will probably be found to be wet; if so remove and dry out and turn over engine quickly without the plug so that accumulated mixture can be blown out.

Should the need arise to drain the crankcase, the plug is fitted to the bottom of the left hand side.

FAULTS IN STARTING

Errors often made whilst starting are as follows:

Opening throttle too wide: this destroys the advantage of a rich mixture.

Failure to lean the machine slightly to the left, so that pressing of the foot on the kickstarter causes rider and machine to overbalance.

Failure to appreciate that word "kickstarter" is a misnomer. What is really required is a sharp but firm swinging movement, the force on the crank being almost constant throughout its travel. A frantic jab does not produce the required spin of the engine.

Tickling the carburettor insufficiently.

These faults are easily corrected with care and will result in greatly improved starting.

It is **NOT** advisable to start the machine on the stand.

ROAD CRAFT

One of the most important rules to remember is: Before moving off, pulling out to overtake, turning right and turning left, glance over your shoulder to make sure it is safe to do so and if necessary give the correct signal.

If at first bottom gear will not engage whilst the machine is stationary, do not resort to force — simply raise the clutch and move the machine backwards and forwards for a second or two, then try again. In time this condition will disappear.

Take pride in making a smooth start; it is not clever or wise to race the engine and then let the clutch in suddenly to make a flying start. Make a smooth getaway after first glancing to the rear and signalling your intention.

Always drive on the engine and not on the brakes, thereby saving expense on brake liners. Remember that an engine in low gear is a safe and sure brake and that skidding is well-nigh impossible when using it so.

Change gear on hills **BEFORE** the engine has commenced to labour; a good driver will learn to anticipate such a condition, and change down early.

When changing gear move the foot pedal to the full extent of its travel firmly and smoothly, at the same time as the clutch is disengaged.

Cornering. When approaching an uncertain bend at speed, change down if necessary and brake **BEFORE** entering the curve. On a left-hand bend, ease over near the crown of the road in order to sweep in close to the verge once round the corner. On a right-hand bend, always keep well in to the verge. Never accelerate into a bend.

When using the brakes, apply gentle pressure at first, increasing in strength as the road speed decreases.

Use your full headlight when riding at night unless in brightly lit streets.

Make full use of the dipswitch whilst riding at night; this is a "courtesy control" and its use will be appreciated by oncoming drivers.

Always reduce speed when your visibility is impaired.

Many accidents are caused by rash over-taking. Be cautious, remembering that a small engine has not the acceleration of a larger machine. Every car driver has a blind spot in his mirror within which he cannot see you. Make sure that he knows you are there if you are overtaking. Similarly glance behind yourself before pulling out.

Remember that pedestrians, young or old, are the most likely to make unexpected changes in direction and speed, step off pavements, come from behind stationary vehicles or, in country districts, suddenly appear round the curve of a blind bend. Constant observation and anticipation is required to avoid them.

TRAINING FOR BEGINNERS

Skill in motor cycling is not a gift. It has to be acquired and practised. Many clubs operate a scheme in co-operation with the R.A.C. and the A.C.U. for teaching young motor cyclists and beginners to become expert. For details apply to the Motor Cycle Department, Royal Automobile Club, 85 Pall Mall, London, S.W.1.

Maintenance

ROUTINE UPKEEP

Observing the servicing rules painstakingly means trouble-free running of your machine and will preserve its value, while at the same time very little will be needed in the way of replacement parts.

Lubrication and adjustment of cycle and engine parts is of great importance and it is in your interest to carry out these simple jobs in accordance with the ROUTINE SERVICE PLAN given below. A list of recommended lubricants is given on page 8.

AFTER THE FIRST 200 MILES (320 kilometres)

Examine the contact breaker points (see page 18).
Check nuts and bolts for tightness. Adjust if necessary.
Check adjustment of rear chain (see pages 12, 22).
Check steering head bearings (see pages 9, 10).

EVERY 500 MILES (800 kilometres)

Inspect oil level in gearbox and primary chaincase. If necessary top up with recommended oil. FILL TO OIL LEVEL PLUG ON CHAINCASE AND TO LEVEL SCREW (BEHIND KICKSTARTER PEDAL.)

WEEKLY

Inspect tyres and check pressures (see pages 2, 5, 14).

EVERY MONTH (every Fortnight in Summer)

Clean battery terminals and top-up with distilled water (see pages 20, 21.)

EVERY 1,000 MILES (1,600 kilometres)

Check, adjust and oil control cables, levers and twistgrip.
Check adjustment of rear chain. If rollers appear dry, oil with brush. In winter lubricate more frequently. If chain has collected much dirt remove and clean (see pages 12, 23).
Check adjustment of steering head bearings.
Oil brake pedal pivots.
Check and adjust sparking plug gap.
Check contact breaker points gap.

EVERY 5,000 MILES (8,000 kilometres)

Drain and refill chaincase and gearbox, whilst engine is warm. DO NOT OVERFILL.
Make thorough examination of lighting cables.

OCCASIONALLY

Oil brake cam bearings to ensure smooth application. Oil too such parts as the rear brake lever, cable or rod pivots, and centre stand pivots.
Do **NOT** oil wheel hub bearings. (See page 8 "Hubs and Bearings").
Decarbonise when the need is apparent (see pages 16 and 17).

FREE SERVICE SCHEME

(OPERATIVE IN U.K. ONLY)

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 Card** must be handed. This card will be found in the toolbox of new motor cycles.

The **INSPECTION AND SERVICE** consists of :

- (a) Check, and, if necessary, adjust :
 - (1) Contact breaker points.
 - (2) Sparking plug.
 - (3) Clutch.
 - (4) Chains.
 - (5) Wheel bearings.
 - (6) Brakes.
 - (7) Steering head bearings.
 - (8) Forks and rear suspension.
 - (9) Alignment of wheels.
 - (10) Tyre pressures.
- (b) Tighten all external nuts and bolts, including cylinder bolts.
- (c) Check all lighting equipment.
- (d) Clean out carburetter and adjust mixture control.
- (e) Adjust and lubricate all cables.
- (f) Grease all nipples.
- (g) Check oil level in primary chaincase.
- (h) Top-up gear box.
- (i) Test machine on the road.

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

SPARES AND REPAIRS.

For the convenience of owners, James Spares Stockists are appointed for most districts, and customers are recommended to always apply to their nearest stockist. Address of local stockists can be obtained on application to Factory Service Department.

When ordering spare parts, owners are advised to produce the original part as pattern, and to quote their full engine and frame numbers to facilitate identification.

Instructions regarding repairs should be clear and definite, otherwise the cost may be greater than 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 will be made for the preliminary examination, but should the owner decide not to have the work carried out, a nominal charge may be made to cover the cost of whatever work may have been done to prepare the estimate. Parts sent to us as patterns or for repairs, should have attached to them a label with the sender's full name and address. Instructions regarding such parts should be sent separately.

Customers wishing to retain old parts which are replaced during overhaul or repair should state so before work commences, as normally such parts are scrapped upon removal.

If it is necessary to bring a machine, or parts, to the works for an urgent repair, it is essential that an appointment be made beforehand. This can be done by letter or telephone, and will avoid disappointment.

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

ALWAYS QUOTE YOUR ENGINE AND FRAME NUMBERS WHEN ORDERING SPARES.

Lubrication

Oil is the life blood of your motorcycle, and it is essential that your machine be continuously and correctly lubricated in order to secure maximum performance and low running costs. Strict attention and regular use of the recommended lubricants will reduce friction and wear to the minimum.

ENGINE. The Petroil system of lubrication employed for the two-stroke engine is practically fool proof. A definite proportion of oil is mixed with the petrol in the tank and passed through the carburetter in an atomized form. The recommended ratio is 1 : 24. When the charge is in the crankcase a proportion of oil separates out as the result of heat and the driving action, and remains in the crankcase where it is splashed on to the moving parts by the rotating crankshaft. The remaining oil in the petroil mixture entering the combustion chamber, serves to lubricate the piston and cylinder wall. As the amount of fuel used increases with the power output, it will be seen that a greater quantity of oil is supplied under arduous conditions.

PETROIL MIXTURE. Fill the tank with a mixture of ONE part of oil to TWENTY-FOUR parts of petrol.

The filler cap fitted to our machines incorporates an oil measure. $3\frac{1}{2}$ oil measures per gallon of petrol provides a ratio of ONE part oil to TWENTY-FOUR parts petrol. Half a pint of oil mixed with one and a half gallons of petrol gives the correct 1 to 24 ratio.

It is best to pour the oil in first and fill the tank with petrol afterwards.

Remember to push the fuel tap to OFF before refuelling. It pays to buy oils of good repute. Brands recommended are listed below.

GEARBOX. The power lost in the transmission is an appreciable percentage of the total power of the engine and only by correct lubrication can the loss be reduced to the minimum. It is impossible to avoid contamination of the lubricating oil with minute particles of metal worn from the gear teeth and operating parts. If these particles are allowed to accumulate in the box, they will accelerate wear of gears and bearings. It is therefore desirable to drain and replenish the gearbox with fresh oil every 5,000 miles. Always drain

after a run when the oil is warm and runs out easily. Check the oil level regularly and top up if necessary. Overfilling will not improve lubrication and is liable to cause leakage.

PRIMARY CHAINCASE. The primary chain and clutch run in oil and careful maintenance of the oil level will ensure smooth transmission. To check the oil level remove level plug and pour oil through filler plug until it runs out of the lower hole. Drain and replenish every 5,000 miles.

FORKS AND REAR SUSPENSION. Both forks and rear suspension units have hydraulic damping and are self lubricating. They are filled with the correct grade and quantity of oil at the works and should require no attention for thousands of miles. If the machine has been used very strenuously it may be desirable to change the oil at 5,000 miles. The rear suspension fork pivots on bonded rubber torsion bushes which should NEVER be lubricated.

HUBS AND STEERING HEAD. Wheel and steering head bearings are packed with grease when new and require no attention for 5,000 to 10,000 miles when they should be dismantled, cleaned out with *paraffin, and packed with fresh grease.

CYCLE PARTS. Although we advise owners to lubricate cycle parts every 1,000 miles, more frequent attention may be desirable during wet weather in order to prevent damage due to rust and to ensure smooth operation of controls. Engine oil is suitable for all cycle parts. Control cables should be lubricated regularly particularly where they emerge from the outer casing as it is here that breakages can occur if the cables are running dry. Other important points are brake cam pivots, rear brake pedal pivots and the handlebar control levers.

REAR CHAIN. If the rollers appear dry, oil with a brush. It is advisable to wash the chain with *paraffin periodically to remove mud, grit, etc. and to coat with a small amount of recommended grease. Excess of lubricant on the outside of the chain will merely collect dirt and cause rapid wear of the chain and also sprocket teeth.

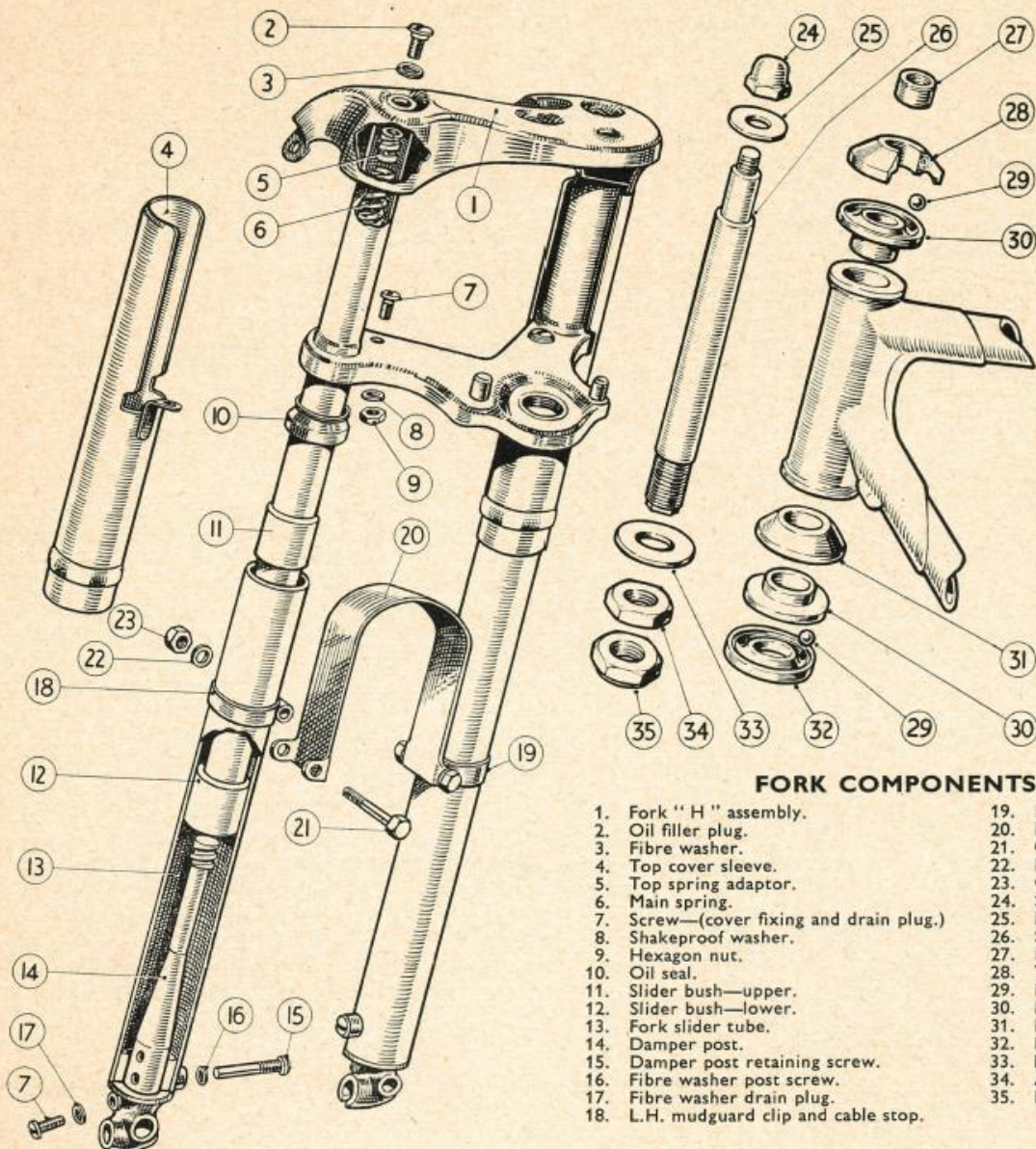
*Kerosene

RECOMMENDED LUBRICANTS

	MOBIL	SHELL	WAKEFIELD	B.P.	ESSO
* ENGINE					
GEARBOX	Mobiloil "D"	Shell X100-50	Castrol Grand Prix	Energol SAE 50	Essolube 50
CHAINCASE					
OIL CAN					
(Where the above grades are not available it is permissible to use SAE 40 in equivalent brands)					
REAR CHAIN...	Mobilgrease M.P.	Shell Retinax A or CD	Castrolase Graphited	Energolase C 3	Esso Fluid Grease
WHEELS, HUBS AND STEERING HEAD BEARINGS	Mobilgrease M.P.	Shell Retinax A or RB	Castrolase Heavy	Energolase C 3	Esso Multi Purpose Grease H
FORKS ...	Mobiloil A	Shell X100-30	Castrol XL	Energol SAE 30	Essolube 30

* WE DO NOT RECOMMEND SELF MIXING OILS FOR USE WITH THE 250 cc. ENGINE

Front Fork



FORK COMPONENTS.

- | | |
|---|---------------------------------------|
| 1. Fork "H" assembly. | 19. R.H. mudguard clip. |
| 2. Oil filler plug. | 20. Bridge piece. |
| 3. Fibre washer. | 21. Clip bolt. |
| 4. Top cover sleeve. | 22. Plain washer. |
| 5. Top spring adaptor. | 23. Clip nut. |
| 6. Main spring. | 24. Steering stem top nut. |
| 7. Screw—(cover fixing and drain plug.) | 25. Plain washer $\frac{1}{2}$ " dia. |
| 8. Shakeproof washer. | 26. Steering stem. |
| 9. Hexagon nut. | 27. Distance piece. |
| 10. Oil seal. | 28. Top fork race. |
| 11. Slider bush—upper. | 29. Ball bearing $\frac{1}{4}$ ". |
| 12. Slider bush—lower. | 30. Frame race (top or bottom). |
| 13. Fork slider tube. | 31. Lower frame race cover. |
| 14. Damper post. | 32. Lower fork race. |
| 15. Damper post retaining screw. | 33. Plain washer $\frac{3}{4}$ " dia. |
| 16. Fibre washer post screw. | 34. Adjusting Nut. |
| 17. Fibre washer drain plug. | 35. Locknut. |
| 18. L.H. mudguard clip and cable stop. | |

DESCRIPTION. The construction of the forks is clearly illustrated in the accompanying exploded drawing. The structure comprises 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 end of the slider tubes.

As the fork slider and damper tube move upward 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, clearance is restricted, thus providing a hydraulic limit stop. Rebound damping is provided by oil drag.

FORK DATA.

Total movement : $4\frac{3}{4}$ ins.
Maximum loading : 640 lbs.

Oil capacity : 55 cc. or 1 petroil filler cap measure per fork leg.

Recommended oil : SAE 30.

MAINTENANCE. The forks are self lubricating and normally require no attention beyond changing the oil every 5,000 miles. The old oil should be drained by removing plugs (7) and the forks depressed a few times to clear all remaining fluid. Do not depress the forks too vigorously as oil may be ejected suddenly. Replace drain plugs and washers. If washers are damaged fit new replacements. With the machine on the stand remove the filler plugs (2) and refill each leg with 1 tank filler cap oil measure of recommended oil. After filling, the machine should be rolled off the stand to locate the top spring adaptors and to replace filler plugs and washers.

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 1,000 miles. Two spanners should be used, one turning the adjusting nut (34, page 9) the other to slacken and retighten the locknut when adjustment has been satisfactorily carried out. Adjustment should be such that no play may be felt, yet the bearings are free to rotate and are not over-tight. Adjusting bearings too tightly will ruin them and induce heavy steering. **It is very important that adjusting and locking nuts are tightly locked together.**

DISMANTLING FORKS. 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, follow this sequence. First place the machine on the centre stand and arrange a box or similar object under the engine so that the front of the machine is well clear of the ground. Now in this order remove the following parts, petrol pipe, twin-seat, petrol tank, front wheel, front mudguard. There is no need to uncouple the handlebar lever controls; if the handlebar is detached it can be laid back with all the controls attached. Disconnect lighting cables at battery end and speedometer cable from the rear end. This will enable the headlamp to be removed bodily with cables and speedometer leads attached.

Next, drain oil from fork slider tubes and allow the bridge piece holding the mudguard attachment clips to drop to the bottom of the sliders. Then, take away the steering stem top nut (24, page 9) after which it will be possible to withdraw the stem itself (26, page 9) from the bottom whilst holding the fork in position. The fork itself can now be taken away, but some provision will need to be made to catch the ball bearings as they fall out. The bottom cone is pressed into the fork crown.

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. When re-assembling, it will be necessary to ease the seals over the bearings with a strip of thin metal, care being taken not to cut the synthetic seal. The springs and damper posts are retained within the tube by bolts (15, page 9).

The bronze bearings are fixed to the inner tubes and if any wear is apparent the unit should be handed to a James

Dealer for replacement bearings, or in exchange for a reconditioned component.

HANDLEBAR ADJUSTMENT. Handlebar angle adjustment is provided by two extensions with hemispherical bases locating in slotted concave recesses in the fork top plate and retained in position by two large hex bolts and dished spacers. To adjust the handlebar position, the two hex bolts under the top plate should be slackened with the box spanner and the handlebar rotated to the desired position before re-tightening.

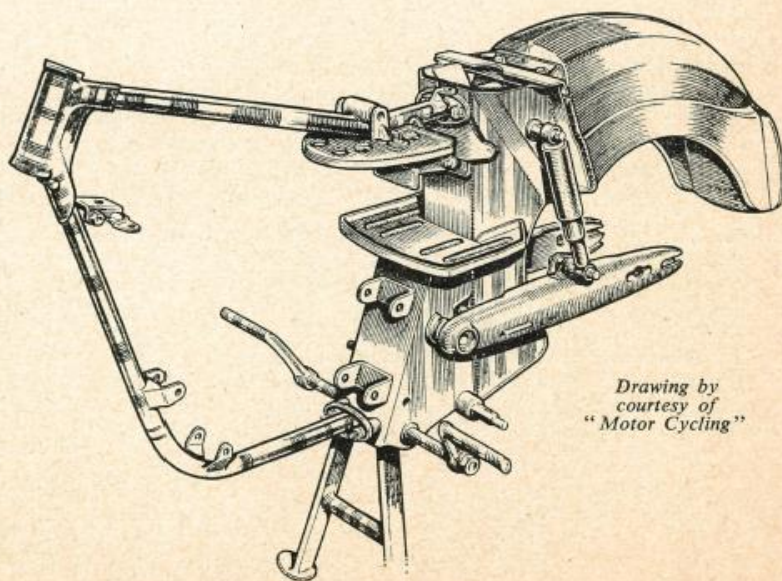
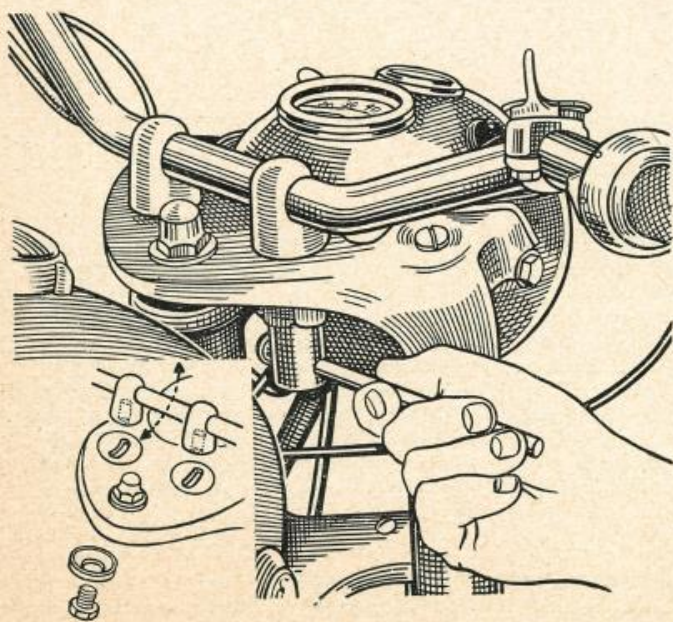
Rear Suspension

The damper unit consists essentially of two tubes, the inner pressure tube in which works the piston with piston rod attached to the top eye, closed at its upper end by the rod guide and at the lower end the base valve. The outer tube contains the reserve supply of fluid, and is integral with the bottom eye. The upper end of the reserve tube is sealed by a gland cover and underneath is the multi-lip gland seal through which operates the piston rod with piston, valve and piston ring.

Briefly the fluid is compressed above the piston when the unit is extending and driven through metering holes in the valve plate on top of the piston while fluid is drawn from the reserve chamber through a non-return base valve. When the body is rising the fluid is compressed below the piston and forced through metering holes in the base valve plate and sufficient fluid is allowed to pass through the piston (by the valve plate lifting off its seat) to fill the increasing space above.

The separate base and piston valves allow the movement of the wheel to be controlled separately in both directions, and the amount of resistance in each valve, fixed during manufacture, has been proved by extensive testing.

The piston has a cast iron piston ring which reduces friction to a constant and prevents the otherwise uncontrollable variation in fluid resistance caused by manufacturing tolerances in the piston and bore.



*Drawing by
courtesy of
"Motor Cycling"*

Two fluid baffles are fitted around the lower part of the pressure tube. They carry out a very important function, that of preventing any undue movement of the fluid in the reserve tube. Without them the fluid would be splashed about with every movement of the wheel causing aeration or frothing which reduces, and in bad conditions, completely prevents any damping action.

When the wheel drops into a depression the body moves downward and some of the compressed fluid above the piston escapes through and lubricates the rod guide bearing seen immediately below the gland seal. This fluid is led through a hole (shown dotted in the rod guide) to an annular space of about .010", between a light aluminium tube and

the reserve tube. The fluid is returned by this means to the reserve supply without splashing or aeration.

It is most unlikely that any failure, in the rear suspension unit will occur, but in the event of any fault developing, the unit will have to be replaced since no maintenance is possible due to the fact that the damping chamber is permanently sealed.

REMOVAL OF REAR SUSPENSION UNIT. This is carried out by simply unscrewing the upper and lower attachment bolts, thus allowing the complete unit to be withdrawn from the mountings.

Wheels and Brakes

MAINTENANCE

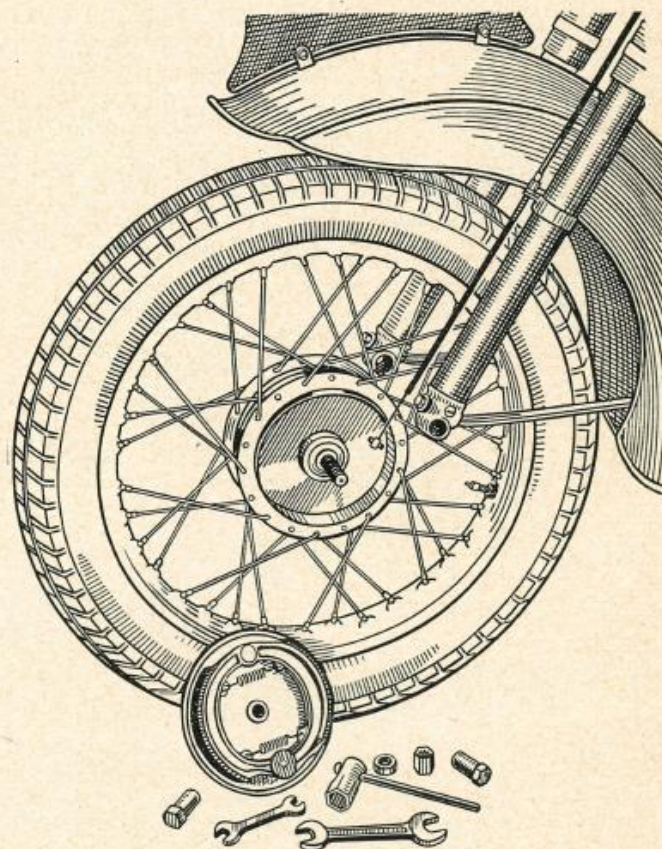
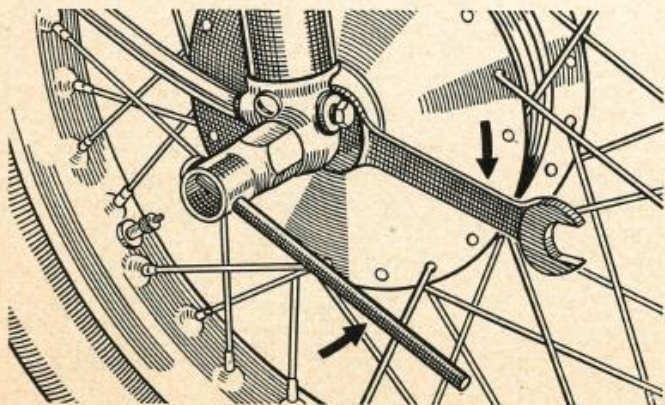
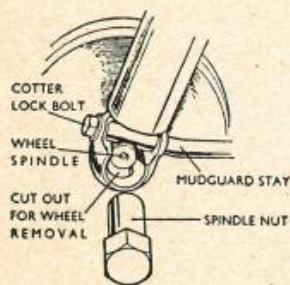
Both hubs are greased when new and no further lubrication will be required for five or ten thousand miles, when it is advisable to dismantle the hubs for attention to the bearings. The old grease should then be cleaned out with petrol or *paraffin and the bearings regreased. When dismantling and assembling the hubs refer to exploded drawings. If bearings show any sign of wear, fit replacements. The need to exclude dirt from the bearings cannot be over emphasised.

*Kerosene

REMOVING FRONT WHEEL

Raise the machine on the stand and disconnect front brake cable by lifting the brake cam lever and unhooking the nipple. It may be necessary to screw down the adjuster to allow sufficient slack in the cable.

Slacken the two domed $\frac{1}{4}$ " bolts securing the mudguard stays, about 3 or 4 turns and give them a sharp tap to release the spindle nuts (the ends of the mudguard stays are formed into cotters which lock the spindle nuts.) Insert $\frac{7}{16}$ " open ended spanner over lock nut on plain side of front hub and holding it in position, remove the spindle nut with box spanner. (Width of gap between fork and hub may restrict insertion of spanner and it is sometimes necessary to spring the fork leg outwards to fit the spanner over the lock nut). The spindle nut on the brake side can then be removed. If the large hexagon nut locking the brake back plate starts turning, it should be held with an open ended spanner. The wheel will drop out through spindle cut-outs in the bottom of the fork ends.

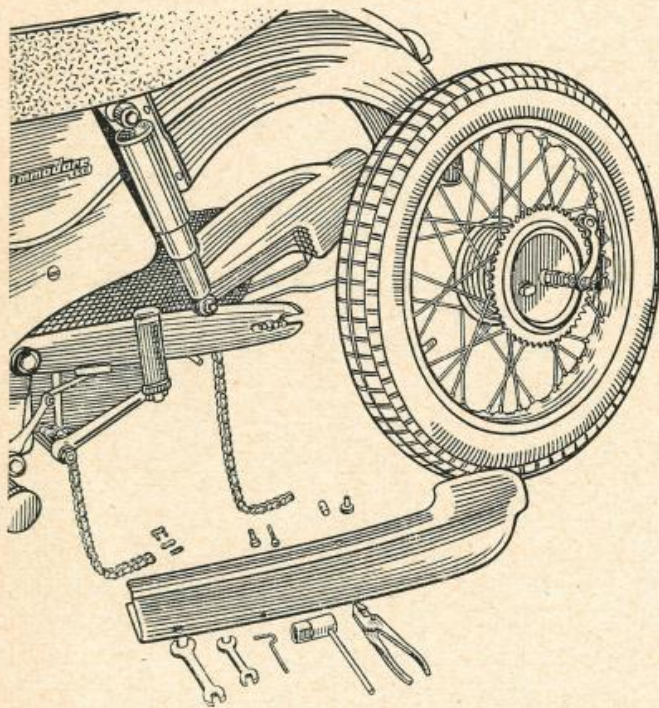


REPLACING THE FRONT WHEEL

Ease the wheel spindle through the fork end cut-outs, ensuring that the slotted back plate stop engages over its stud on the fork leg. Fit both spindle nuts (a smear of grease over the nuts and the mudguard cotters will prevent rust and facilitate subsequent wheel removals). Tighten the spindle nut and the mudguard stay bolt on the brake side. Then tighten the spindle nut on the plain side of the hub, but before locking the mudguard stay bolt, roll the machine off the stand and bounce the forks several times so that the fork end assumes its correct lateral position on the spindle nut. It is essential to follow this procedure to ensure correct alignment of the fork sliders. Failure to do so may impair fork movement with resulting damage to slider bushes, etc. Having tightened the cotter bolt on plain side of hub, refit brake cable and re-adjust front brake.

REMOVING REAR WHEEL.

It is necessary to place a brick or block of wood under the centre stand to provide sufficient clearance for removing the back wheel. Raise the cover of the top of the chaincase and remove lower chaincase pressing, which retained by a $\frac{5}{16}$ " hexagon bolt under the front end and a $\frac{1}{4}$ " socket headed stud on the side. Rotate the rear wheel until chain connecting link appears on lower run and disconnect the chain link with pliers (place a piece of rag or paper under the chain to prevent it picking up dirt) and rotate the wheel until chain comes off the sprocket. Undo the knurled brake rod adjuster and disconnect speedometer cable nut on the exhaust side. Slacken the two rear spindle nuts and slide the wheel out of the slotted fork ends.



REPLACING REAR WHEEL.

With the centre stand still raised off the ground on a brick or similar object, ease the wheel under the mudguard from the chaincase side. If the spindle nuts are left on the spindle it should be noted that the washers go outside the fork ends. When replacing the wheel in the slots remember that the brake backplate stop must locate in its slot and the rear brake rod must be fitted into its roller on the brake cam lever at the same time. The chain can now be refitted by holding the first few links over the sprocket teeth and rotating the wheel clockwise until the chain can be re-connected, (the connecting spring link must be replaced with the closed end facing the direction of drive — in other words the closed end faces the rear wheel on the bottom run of the chain). Since the bottom half of the chaincase has been removed, it is a good plan to adjust chain tension before replacing it. To do so, it is essential to have someone sitting on the machine with the stand retracted so that the rear suspension is compressed to the normal riding position. Chain tension should then be checked in several positions by rolling the motor cycle forwards and backwards and measuring up and down movement in the centre of the bottom run of the chain. The two adjusters should be rotated a similar number of times forwards or backwards until there is $\frac{1}{2}$ " chain whip. Having obtained correct chain

adjustment, tighten the spindle nuts and adjuster lock nuts.

Refit bottom chaincase cover, reconnect speedometer cable and finally adjust the rear brake. Before riding, check rear chain tension with special tool as described on page 22.

WHEEL ALIGNMENT.

It is wise to always check wheel alignment after removal. The simplest way is to use a thin piece of string stretched taut across both wheels with the front wheel pointing straight ahead. The string should just touch each tyre at both sides of the wheel centre. An alternative method is to use a perfectly straight board placed alongside the wheels so that it touches each one. If necessary turn the handlebar so that the front wheel touches the board at two points. If both tyres do not make contact at two points, slacken the rear wheel spindle nuts and turn adjusters until wheel is correctly aligned.

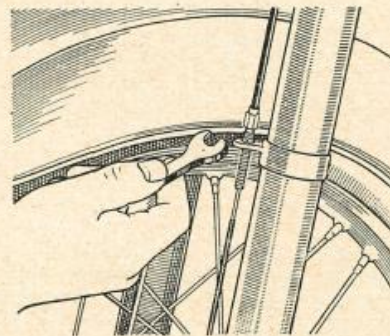
BRAKES.

If the brakes are correctly adjusted and oil is never used to lubricate the bearings, the brakes will require no attention for many thousands of miles.

Never rasp the surfaces of brake liners with a coarse file or stiff wire brush to provide increased friction — this treatment has exactly the opposite effect.

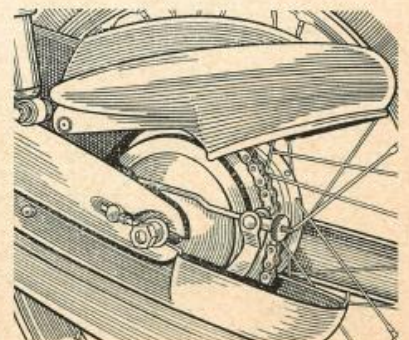
If grease or oil has inadvertently reached the brake linings, it should be removed with a little petrol or preferably trichloethylene.

Brake cable or rod adjustment should be such that only a slight movement of the lever or pedal is sufficient to operate the brake, but at the same time, the wheels must spin freely when the brakes are off. To give the correct adjustment, screw up the adjuster until the liners are just fouling the drum, then slacken off two complete turns.

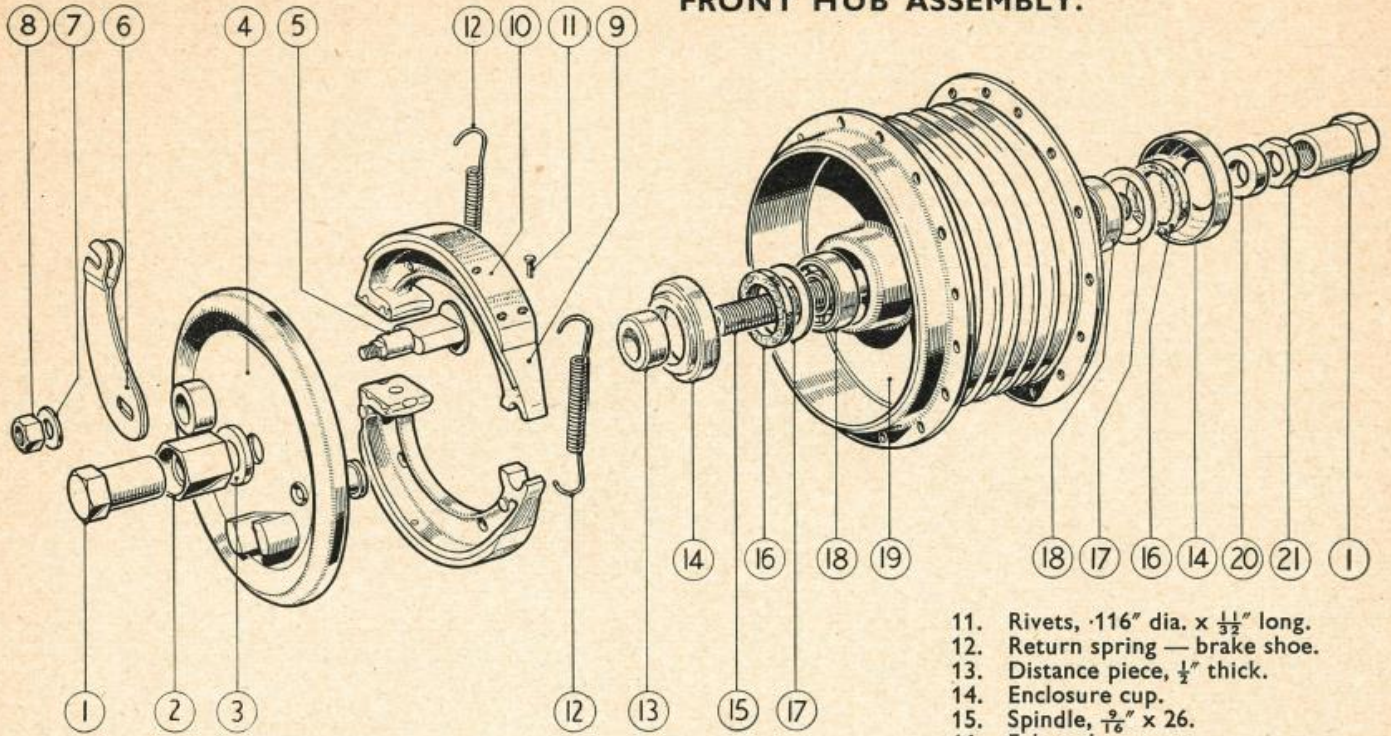


FRONT
BRAKE
CABLE
ADJUSTMENT.

REAR BRAKE
FINGER
ADJUSTMENT.



FRONT HUB ASSEMBLY.

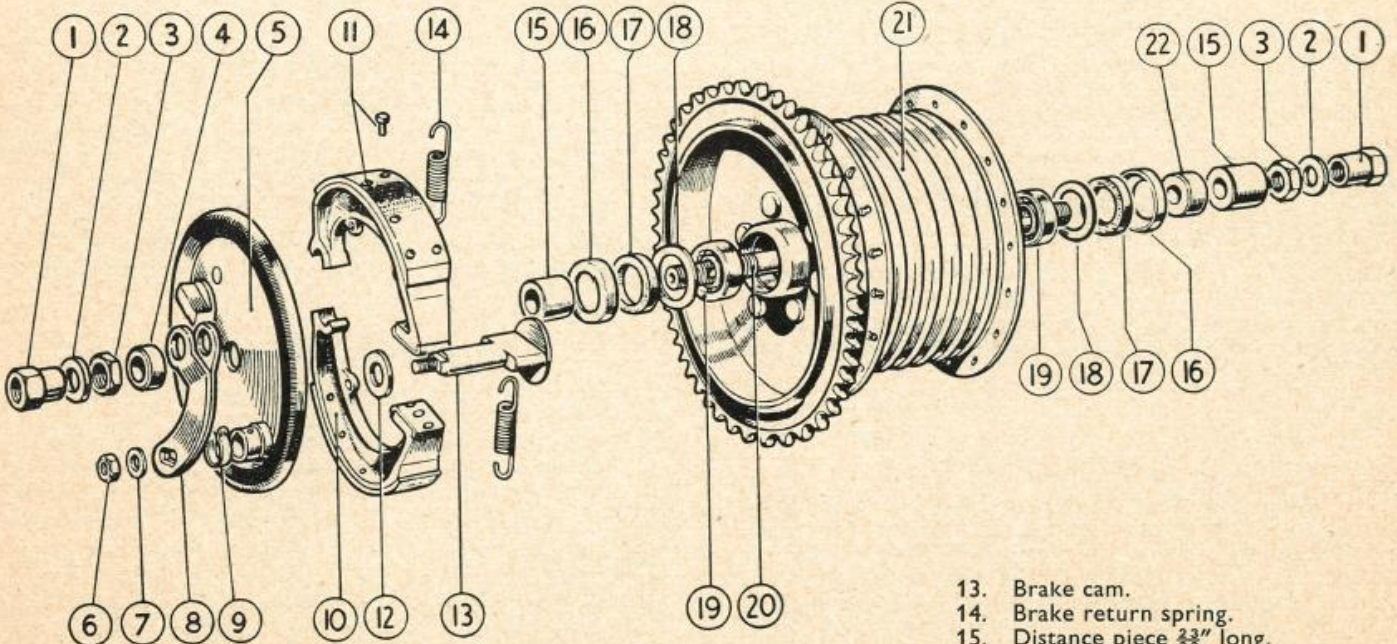


1. Spindle nut.
2. Recessed locknut, $\frac{1}{8}$ " x $\frac{9}{16}$ " dia.
3. Plain washer, $\frac{9}{16}$ " dia.
4. Brake backplate.
5. Brake cam and washer.

6. Brake cam lever.
7. Plain washer, $\frac{5}{16}$ " dia.
8. Hexagon nut, $\frac{5}{16}$ " x 26.
9. Brake shoe.
10. Brake lining.

11. Rivets, .116" dia. x $\frac{1}{2}$ " long.
12. Return spring — brake shoe.
13. Distance piece, $\frac{1}{2}$ " thick.
14. Enclosure cup.
15. Spindle, $\frac{9}{16}$ " x 26.
16. Felt seal.
17. Enclosure washer.
18. Bearing, 15 x 35 x 11 m.m.
19. Hub shell and brake drum.
20. Distance piece, $\frac{5}{16}$ " thick.
21. Locknut, $\frac{3}{16}$ " x $\frac{9}{16}$ " dia.

REAR HUB ASSEMBLY



1. Spindle nut $\frac{9}{16}$ " x 26 t.p.i.
2. Plain washer $\frac{9}{16}$ " x 10 s.w.g.
3. Locknut $\frac{9}{16}$ " x 26 t.p.i. x $\frac{3}{8}$ "
4. Distance piece $\frac{3}{8}$ " long.
5. Backplate.
6. Hex. nut $\frac{5}{16}$ " x 26 t.p.i.

7. Plain washer $\frac{5}{16}$ " dia.
8. Brake cam lever.
9. Oiler spring clip.
10. Brake shoe complete.
11. Brake lining and rivets.
12. Brake cam washer.

13. Brake cam.
14. Brake return spring.
15. Distance piece $\frac{3}{32}$ " long.
16. Enclosure cup, bearing seal.
17. Felt seal.
18. Enclosure washer, bearing seal.
19. Bearing 42 x 15 x 13 m.m.
20. Spindle.
21. Hub shell.
22. Distance piece $\frac{1}{2}$ " long.

Tyres

To obtain the maximum mileage from the tyres, maintenance should be regular and painstaking. Once a week check the tyre pressures with a gauge and at the same time examine the outer covers to ensure no particles of gravel, etc., are wedged in the tread. The pressure required naturally varies according to the weight carried by the tyre and the total weight is unevenly distributed between the two tyres, so that if a passenger is carried the rear tyre pressure should be increased.

RECOMMENDED TYRE PRESSURES

Wheel	Solo	With Passenger
FRONT ...	16 lbs.	16 lbs.
REAR ...	19 lbs.	25 lbs.

The following hints will also assist in prolonging the life of the tyres :

Clean oil and grease from the tyres with petrol as soon as possible.

Ensure correct alignment of the wheels.

Cross tramlines at as near a right-angle as possible. They are dangerous, particularly in wet weather and may damage the tread.

Fierce braking and acceleration quickly wear away the tread. Apply brakes gently to avoid skidding, and when starting from rest, accelerate steadily on a small throttle opening.

TYRE REMOVAL

Deflate tyre by removing cap and nut from valve stem, and unscrewing inner valve. A small key for this purpose is found on the top of the valve cover.

Push outer-cover right into wheel rim well opposite valve, and insert tyre lever under cover as near to the valve as possible. If the opposite side is properly in the well the edge of the cover should come over the rim without using force.

Work around cover until all of it is over the rim, then remove inner-tube by pushing valve up through hole and gently easing out. Remove opposite side of cover in the same way — pushing into well, inserting lever in other side and working off.

TYRE REPLACEMENT

It is seldom necessary to remove the outer-cover completely with normal punctures, but if the tyre has been taken off proceed as follows : Work one side of tyre over rim, insert inner-tube and pump up sufficiently to remove any kinks ; place valve in hole and screw the securing nut about $\frac{1}{2}$ " up the shaft. The white spot on side of outer-cover should be positioned over valve.

Move free edge of cover over rim opposite valve and work round rim, equally on either side of valve until a few inches remain free. The valve should be in the centre of this free length and no difficulty should be experienced in getting it over the edge of rim providing the rest of the cover is right down in the well.

Once tyre is home, inflate to about half pressure and manipulate cover until tread runs evenly ; when rotation of the wheel has shown this to be so, inflate to correct pressure. Do not forget to replace the valve cap. This prevents the ingress of dirt.

When fitting new tyres it is a good plan to smear a little soft soap around the rim to ease the cover on.

Cleaning

Make a practice of giving the machine a really good clean as often as possible, keeping a soft cloth specially for the purpose. By careful cleaning the original sheen of enamelled parts may be retained indefinitely.

Where mud is thickly caked on, do not attempt to brush it off ; abrasive particles will rapidly damage the enamel. Water from a small hose or a wet sponge should be used, taking care not to let water into the carburetter, and brake linings.

Never garage a dripping machine after a wet run. Remove moisture by dabbing gently with a soft cloth, i.e., butter muslin.

Salt laid down in city streets during snowy winter periods has a corrosive effect on enamel and chromium plating. A useful tip is to smear the wheel rims (particularly chromed rims) and other exposed parts of the machine with a film of oil or grease. This can easily be removed with a petrol-soaked rag when the weather improves.

James "Touch up" units incorporating a retractable nylon brush and a quantity of quick drying enamel may be purchased from any James Spares Stockist and will be found useful for retouching small scratches where the paintwork has been damaged.

CHROMIUM PLATING

In damp weather, small spots of rust-like deposit may be observed on chromium plating. If attended to in good time such spots can easily be removed by rubbing with a good brand of chromium polish. NEVER USE HOUSEHOLD METAL POLISH ON CHROMIUM PLATING.

In summer, when wet conditions are less frequent, it is best to clean plating with a damp chamois leather cloth and soft rag.

ALUMINIUM ALLOY CASTINGS

A certain amount of road dirt and oil will inevitably gather on the cast alloy surfaces of the engine crankcase, primary chaincase, gearbox and carburetter, and regular cleaning will not only improve the appearance of the machine but will avoid dirt stains on trouser legs and shoes. A clean engine unit is also easier and more pleasant to maintain.

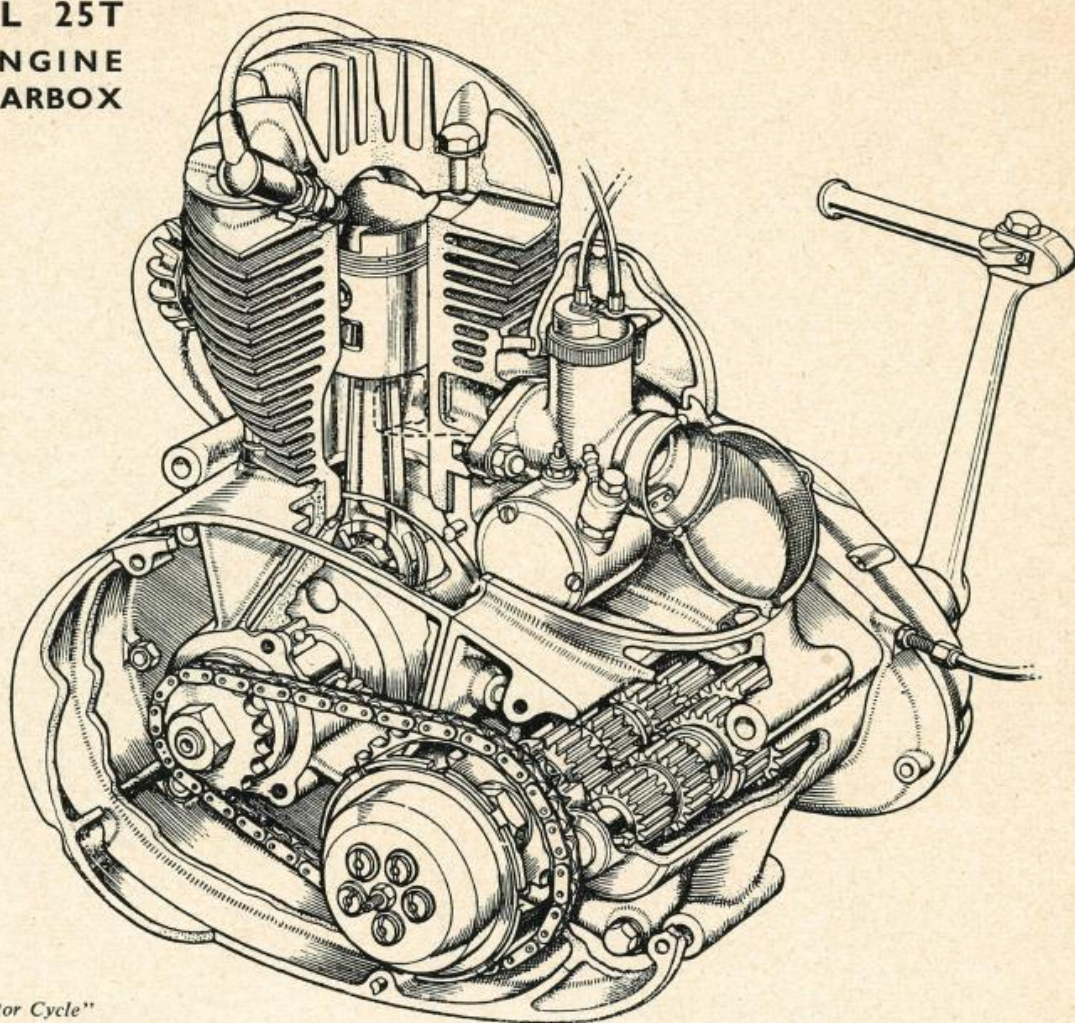
Such parts can be cleaned with a stiff brush dipped in petrol or *paraffin or, alternately, we recommend a special detergent available from most motor cycle accessory retailers, i.e., GUNK. This product is simply brushed on to the alloy parts and hosed off with water. GUNK is sold in tins and full instructions are given by the makers.

If this method of cleaning is employed care should be taken to mask the carburetter cover to prevent the entry of water into the carburetter and consequent starting difficulties. Surplus water should always be wiped off with a clean rag.

* Kerosene

Power Unit

250 cc. MODEL 25T
TWO STROKE ENGINE
AND 4 SPEED GEARBOX



Drawing by courtesy of "The Motor Cycle"

DESCRIPTION

The main features of this engine are illustrated above. The light alloy cylinder head, having deep radial fins has projections on either side and these two mate with the cut-aways of the piston providing a hemispherical combustion chamber with sparking plug positioned on the left-hand side. A composite washer is fitted between the cylinder head and the barrel.

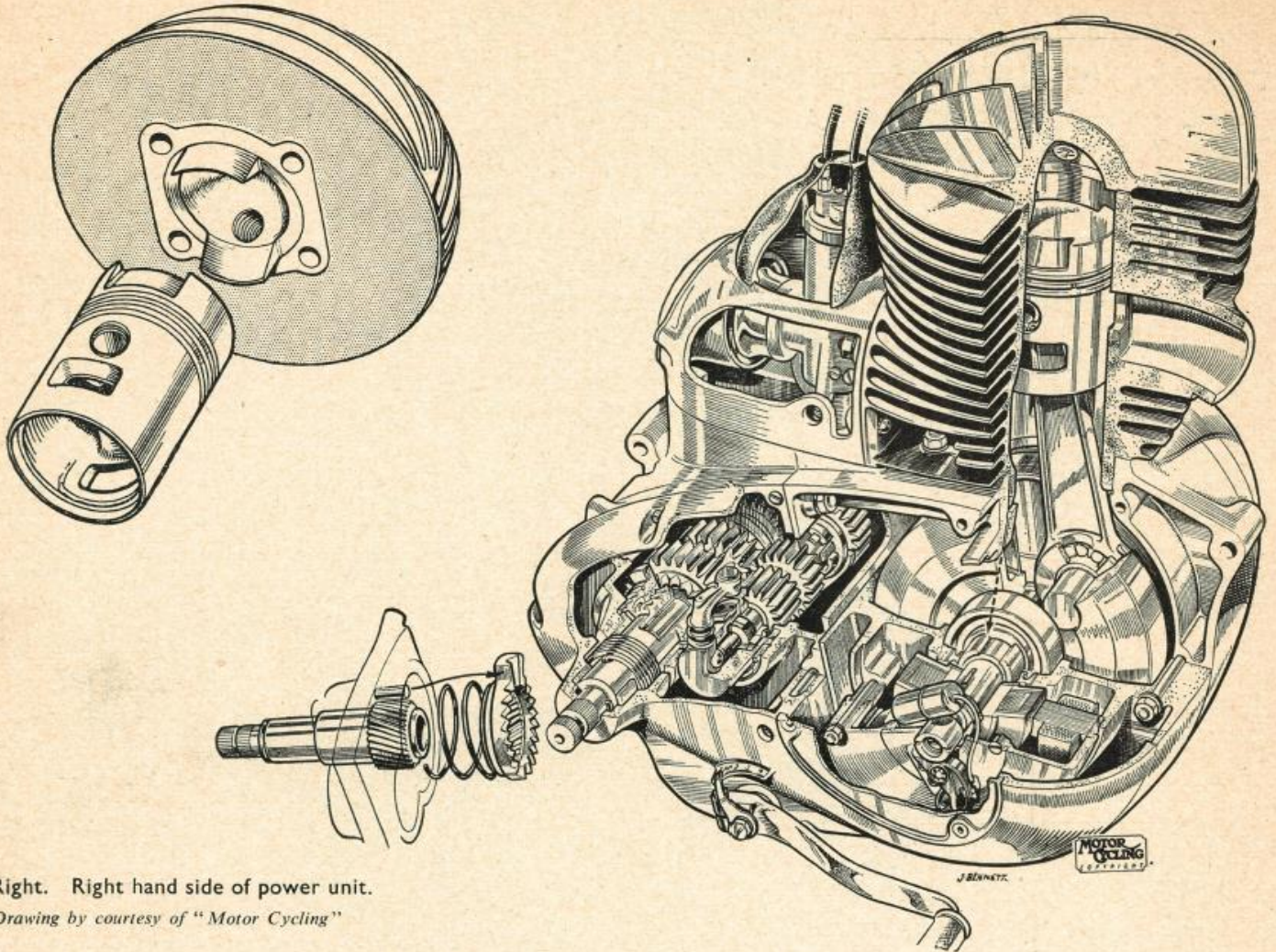
The cast iron cylinder is spigotted into the crankcase. In the cylinder walls are arranged five holes or ports, viz: two inlet ports at the back which permits the air fuel mixture to enter the crankcase, two transfer ports at the sides which are in communication with the crankcase and one exhaust port at the front through which the burned charge is allowed to escape. Some mention must be made of the unique method of arranging the transfer ports which constitutes a departure from previous methods. Movement of the piston in a vertical direction is arranged to cover and uncover the ports at suitable times so that the mixture is first drawn from the carburetter through the inlet ports into the crankcase. There it is compressed and then forced through the windows in the piston via the transfer passages into the cylinder above the piston where it is further compressed. It is then ignited by a spark from the plug and after expansion due to heat escapes through the exhaust port into the exhaust pipe and silencer.

The crankshaft assembly is supported by two ball races on the driving side and one parallel roller bearing on the timing side. The flywheels are balanced on original assembly and are built up with detachable shafts on either side. Annular grooves in the crankcase castings direct oil to the main bearings and oil seals are fitted at the crankcase extremities.

The forged "I" section connecting rod employs the use of a single row of $\frac{1}{4}'' \times \frac{3}{8}''$ rollers which are caged and these are used in connection with a shouldered crankpin attached to the steel flywheels by means of an interference fit. A bronze bush is fitted to the small end.

The piston is of the flat topped pattern and is fitted with three piston rings. The top ring is taper faced and chrome plated, the remaining two rings are square faced, unplated and are fitted with EXPANDER rings to obviate mechanical noise until working temperature is achieved.

Bulbous die cast crankcase extensions on either side of the units enclose the A/C generator on the right-hand side and primary transmission on the left-hand side. The casting on the generator side is recessed to house the alternator. A cover plate encloses the latter and superimposed on this is the contact breaker itself. The crankcase extensions are profiled rearwards to blend the gearbox shell and enclose the clutch. The gearbox is bolted to the back of the crankcase.



Right. Right hand side of power unit.

Drawing by courtesy of "Motor Cycling"

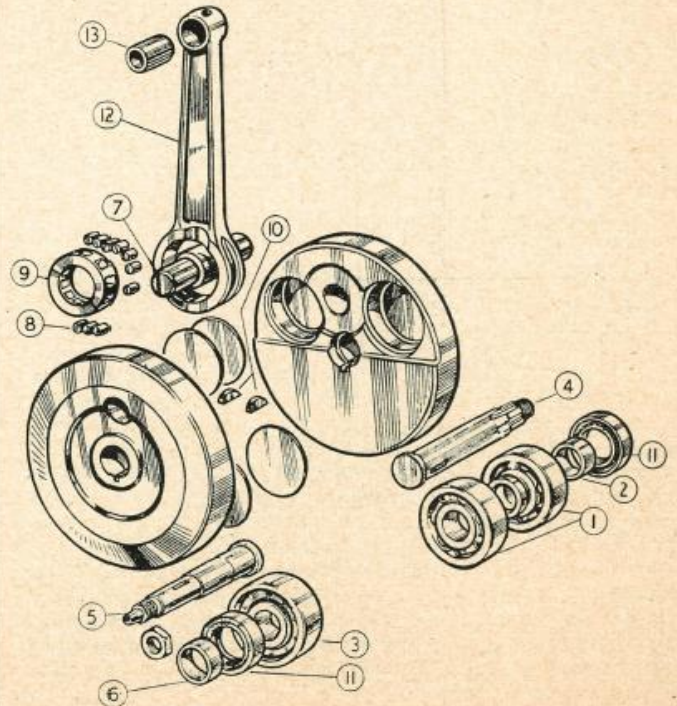
DECARBONISING.

The points at which carbon forms most rapidly are the combustion chamber, piston head, exhaust port and silencer. Excessive carbon in the combustion chamber will reduce compression space and could cause pre-ignition. Heavy carbon deposits in the exhaust pipe and silencer will cause back pressure coupled with heavy fuel consumption, loss of power and overheating.

We do not specify any particular mileage at which to carry out the task of decarbonisation as the rate at which carbon forms is largely dependant upon the way the rider treats his machine and also the type of riding it is used for. Carbon tends to form more quickly if a machine is used for short journeys than on long runs, when the engine becomes really warm and will blow out most of the carbon. Hence, while one machine may require attention at 2,000 miles, another one might have accumulated only a slight deposit at 5,000 miles. Irrespective of mileage, it will be time to decarbonise when excessive pinking is experienced.

When preparing to decarbonise, disconnect the petrol pipe and remove the fuel tank. Some manipulation will be required in order to detach the carburetter cover which is

CRANKSHAFT ASSEMBLY.



CRANKSHAFT COMPONENTS

- | | |
|------------------------------------|------------------------------|
| 1. Crankshaft unit complete. | 7. Crankpin. |
| 2. Crankshaft bearing drive side. | 8. Crankpin rollers. |
| 3. Bearing spacer. | 9. Crankpin roller cage. |
| 4. Crankshaft bearing timing side. | 10. Crankshaft key. |
| 5. Crankshaft D/S. | 11. Oil seals, T.S. and D.S. |
| 6. Crankshaft T/S. | 12. Con rod Assembly. |
| | 13. Gudgeon pin bush. |

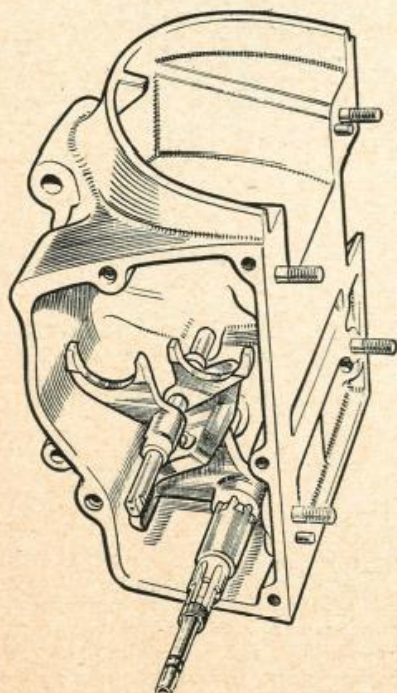
fastened to the cylinder on either side by bolts slotted to permit of their removal by means of a screw driver. Thus to remove the cover the rubber grommet must be slid along the carburetter cables so that the top ring can be unscrewed in order to withdraw the slides, the cover gauze should then be taken away by removal of the two screws on either side which will then permit the cover itself to be detached from the right-hand side of the machine. Continue to remove the carburetter complete and sparking plug. Unscrew the four cylinder head fixing bolts. The head can now be lifted clear of the cylinder and although the gasket fitted between the cylinder head and the barrel may not be damaged, it is advisable to replace this when reassembling.

With a soft copper scraper, remove all deposit from the inside of the head, taking care not to damage the joint faces. With the piston at the top of the stroke, remove all carbon from the piston top. Wipe off any loose carbon from around the edge of the piston, then unscrew the exhaust pipe nut and remove silencer and exhaust pipe. Move the piston to the bottom of its stroke and scrape out any carbon from exhaust stub and from the edges of the port in the cylinder bore. This is best done from the outside of the cylinder, taking care to avoid scratching the cylinder bore. A piece of soft cloth placed in the cylinder bore will help to prevent the scraper causing damage. Make sure there is no loose carbon about before assembly.

Remove any accumulation of mud or grit from the cylinder fins.

If it is necessary at any time to remove the cylinder, the four nuts and spring washers fitted to the studs securing the cylinder to the crankcase must first be removed. Following this, the cylinder may be taken off, but it is important not to twist the cylinder in relation to the piston, otherwise there is a danger of the ends of the piston rings springing into the ports and consequent breakage.

To remove the piston from the connecting rod a pair of thin nosed pliers should be used to take out one of the spring circlips which retain the gudgeon pin in position. The pin itself is an intentionally tight fit in the piston and its removal will be made easier if a cloth dipped in boiling water is swathed round the piston in such a manner as to create some expansion on the piston bosses. Thereafter providing



Drawing by courtesy of "The Motor Cycle"

that any carbon has been removed from the end of the gudgeon pin, the latter can be pushed out by means of a band type extractor. Lift piston away and mark the inside of the skirt to enable it to be re-fitted in the same position relative to the cylinder.

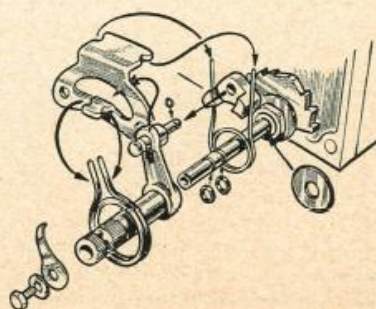
Carbon will also form in the grooves behind the piston rings, and to remove this deposit it will be necessary to spring the rings out of the grooves. It is desirable to ensure that each ring is re-fitted in its original groove. Behind the lower rings will be found the expander rings. These rings are fitted to prevent noise due to "piston slap" whilst the engine is cold. These rings will have to be cleared of carbon and will, in time probably lose their "temper" because of the heat and, therefore, it is advisable to renew the expander rings when decarbonising. The piston rings should be bright all round and for the whole width indicating that the whole of the piston ring area is in contact with the cylinder bore. If the gap between the ends of the rings when in the cylinder exceeds $.030"$, then they should be discarded and replaced. The amount of gap can be checked by placing the ring inside the cylinder bore and pushing in a little way with the skirt of the piston. This ensures that the ring is square to the bore, and the gap can then be checked by feeler gauges. Check ring gap in unworn part of bore.

Where new rings of the standard size are fitted, the gap will have been pre-determined, but it is as well to check up. Place the ring square inside the cylinder bore when the gap between the ends of the ring should have a maximum of $.011"$ and a minimum gap of $.007"$. NOTE: TAPER FACED CHROME RING must be fitted CORRECT SIDE UP—RING IS MARKED "TOP."

Quite often we are asked in the case of the cylinder showing just a little wear, whether $.015"$ oversize piston rings can be filed down to compensate this wear. This is a totally impracticable solution; with the bore at nominal size, nominal size rings must be fitted. Similarly with a bore $.015"$ oversize $.015"$ O/S rings also must be fitted.

When the engine has covered a considerable mileage the cylinder bore will obviously wear and, therefore, before fitting the cylinder the bore should be checked for size. Wear will be greatest at the top of the ring travel and will gradually diminish to the bottom. The measurement must, therefore, be taken from the top. If the bore is $.008"$ or more larger at the top than at the bottom, the cylinder should be returned to the works for reboring and the fitting of an oversize piston with rings. For this purpose a rotary exchange service is available; price upon application.

When refitting the cylinder, fit new base washer to crankcase. Smear cylinder bore and piston surfaces with engine oil and fit cylinder barrel over piston, taking every care not to twist the cylinder. Ensure each piston ring is fully compressed in its groove with the ends correctly fitting on the locating pegs, make sure also that ends of expander rings fit at pegs as with piston rings as the barrel passes over. Replace the four nuts on the cylinder base studs and tighten equally until they are fully tight. Re-fit cylinder head with new gasket in position. Tighten the four bolts in diagonal rotation to prevent any possibility of cylinder head distortion.

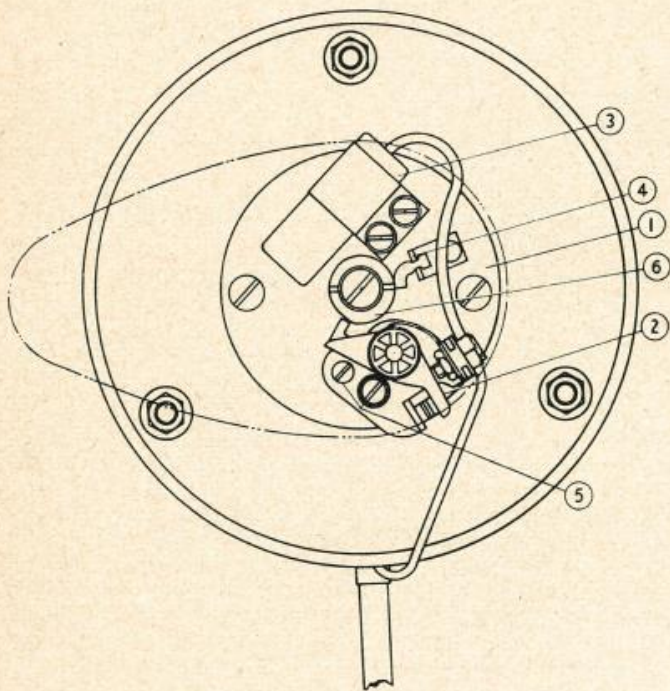


Drawing by courtesy of "Motor Cycling"

Ignition and Lighting

(WIPAC ALTERNATOR EQUIPMENT)

GENERAL DESCRIPTION. The equipment consists of a permanent magnet alternator which charges the battery via a full wave bridge rectifier. The electrical apparatus i.e., lights, horn and ignition coil, is connected to the battery. It is the function of the alternator and rectifier to maintain the battery in a charged state for all load conditions. This is accomplished by a system of coil switching which adjusts the generator output according to the load. The coil design also ensures regulation of the output over the working speed range. In addition an emergency start facility is provided whereby the machine may be started even if the battery is flat. Should the battery be flat the emergency start condition will also give a charge into the battery as soon as the machine is running. The individual circuit components are mentioned briefly below and then their lay out will be considered.

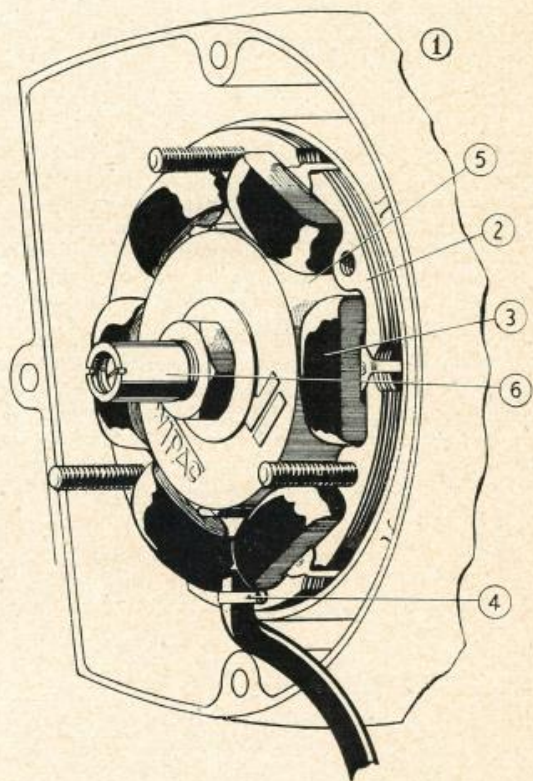


1. Base Plate
2. Contact Breaker Assembly.
3. Condenser Set.
4. Cam Grease Pad.
5. Point Gap Adjusting Screws.
6. Mainshaft Cam.

CONTACT BREAKER. Access to this component for point adjustment is gained by removing the die cast James name plate on the right-hand side of the engine. The points should be maintained with a gap of .012"/.015". Incorporated with the unit is a felt pad for lubrication of the cam, this should be removed and h.m.p. grease or petroleum jelly kneaded into it and finally squeezing out any excess before replacing. Ensure the felt pad is in contact with the cam. Point adjustment is facilitated by first loosening the screws (5). The small screw is mounted eccentrically, so that this can be adjusted to vary the point gap as required. The importance of re-locking the large screw, however, when adjustment has been maintained must be emphasised.

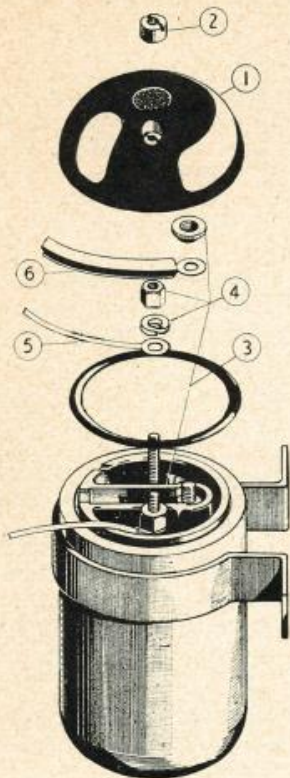
TIMING THE ENGINE. The cam operating the contact breaker is attached to the end of the crankshaft by means of a plain taper. Its removal is effected by a double purpose screw. As the end screw, therefore, is removed it will automatically bring with it the cam at the same time. Ignition timing is effected by measuring the piston $\frac{1}{4}$ " down stroke and then having made sure that the two tapers are perfectly dry, the cam on the end of the crankshaft should be offered up so that the points just commence to break. It must be tightened on to the end of the crankshaft securely.

CONDENSER. The condenser is fitted in the contact breaker housing and is retained by a simple clip and screw. A faulty condenser is usually indicated by continuous and excessive sparking at the contact points, but if failure is suspected make sure that the condenser is well earthed. Occasionally sparking of the points is normal and can be ignored.



1. Alternator Complete.
2. Stator Ring.
3. Coils (Set of Six).
4. Lead Unit (including Clip and Screw).
5. Rotor.
6. Cam Unit.

ALTERNATOR. The cover on which the contact breaker is mounted can be removed after taking away the three fixing nuts to reveal yet a further nut on the crankshaft. With this removed the rotor, which incidentally is keyed to the shaft, can be withdrawn. The rotor itself comprises six magnets with laminated pole pieces. It is self keeping and may be removed from the stator without any loss of magnetism.



The laminated stator has six poles each of which is wound with a coil of enamelled copper wire. These coils are vacuum impregnated with a special varnish to make them resistant to harmful effects of heat, oil and petrol. There is no point in interfering indiscriminately with the stator, the housing into which it fits is accurately machined so that it can be assembled without force. If any attempt is made to refit this stator carelessly and on the skew, the air gap between the stator and rotor will be upset and it is precisely for this reason that these two parts should not be removed unless absolutely necessary and then extra special care must be taken in refitting.

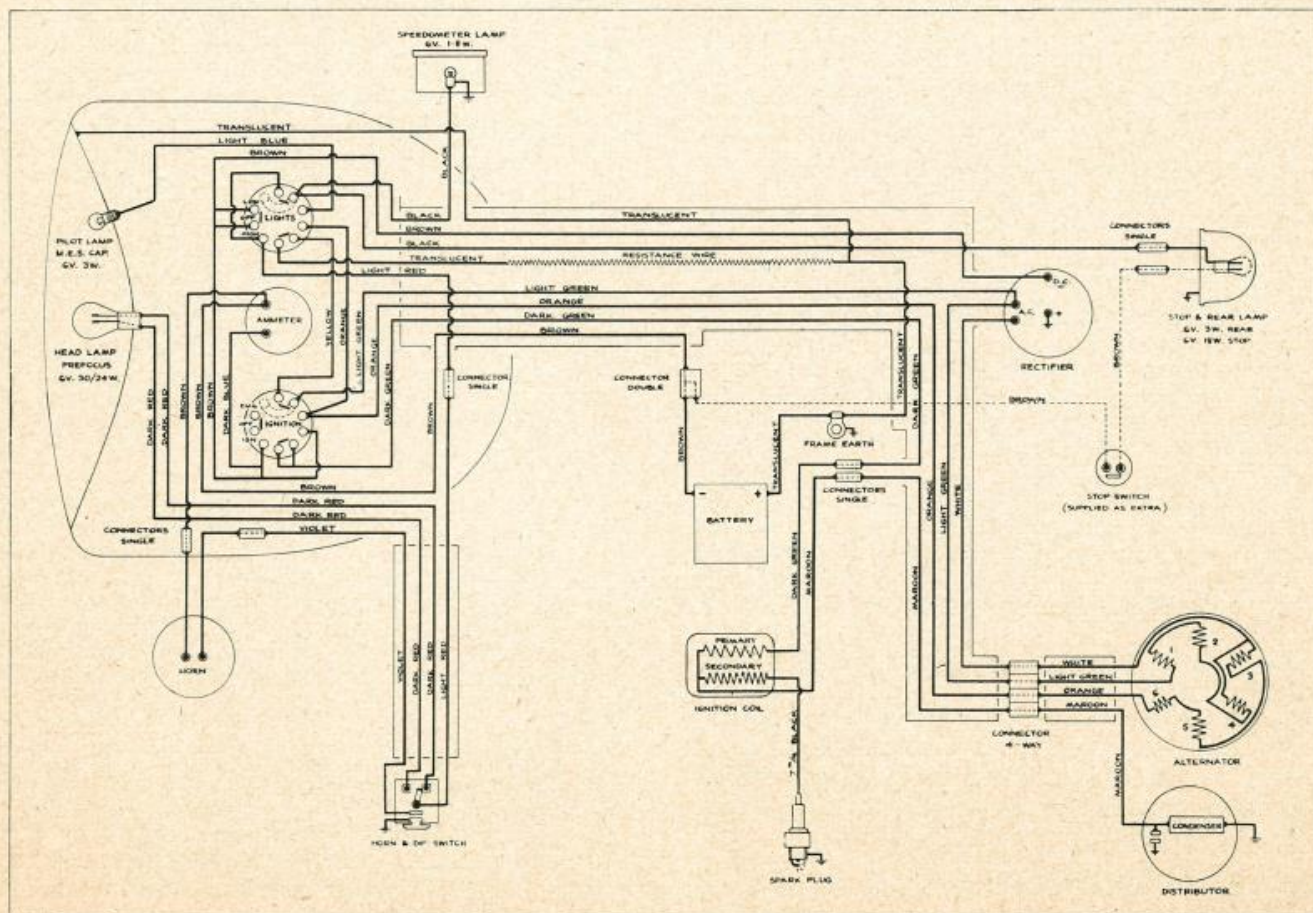
1. Coil cap unit.
2. Cap fixing nut set.
3. Cap gasket.
4. Terminal nut set.
5. L.T. lead.
6. H.T. lead set 16".

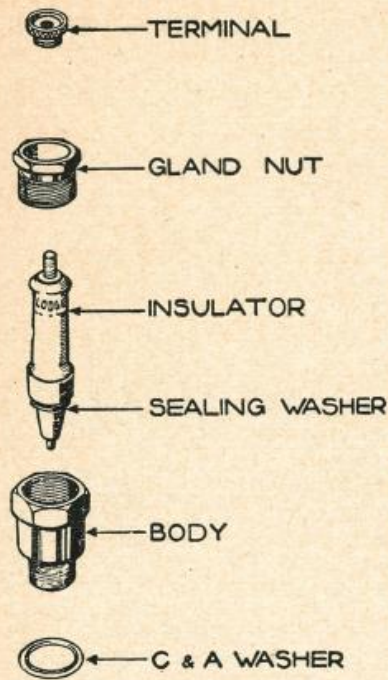
HIGH TENSION IGNITION COIL. The coil is fitted in the compartment under the saddle and is oil filled to facilitate cooling. For inspection of the terminals the top cover only can be removed by unscrewing the two slotted brass nuts at the top. The rest of the unit is factory sealed and should not be tampered with in any way.

IGNITION FAILURE. Serious trouble in the form of condenser breakdown is very rare and any ignition failure will generally be due to the condition of the sparking plug or the contact breaker points, or faulty insulation of the H.T. lead or other connections.

The first step in dealing with ignition trouble should be to remove plug from engine and examine the points to see whether they are oily and the gap correctly set between .018" and .025". If the insulator is fouled with oil and carbon there may be sufficient leakage to prevent correct sparking and cleaning will be necessary. Fitting a new plug will readily show whether the failure is due to plug or not. The plug lead should then be examined for cracks or other faults. The contact breaker can then be examined to see whether the points are opening correctly. When the points are fully open there should be a gap of .015". The surfaces must also be clean and free from oil and severe pitting. A piece of stiff paper will usually remove oil or grease. If the points are burned or pitted they should be cleaned with a fine carborundum stone if available, otherwise fine emery cloth can be used, wiping off any traces of metal or emery dust with petrol-soaked rag. As a result of wear on the heel of the rocker arm bearing on the cam, the point gap will be reduced. This wear should be negligible if the felt oiling pad is kept moist with a suitable lubricant.

IGNITION AND LIGHTING WIRING DIAGRAM





SPARKING PLUG.

A Lodge CCL 14 (14 m.m. long reach) plug is fitted as original equipment. This plug will stand up to the maximum power output of the engine without pre-ignition and if the carburetter mixture is correct, little trouble should be experienced. The sparking plug gap should be checked every 2,000 miles and reset to .018" — .022". It is a good plan to carry a spare plug of the correct type so that when the plug in use requires cleaning, it can be removed and the clean spare inserted in its place. Keep the spare plug well wrapped up to protect the all important points.

TO ENSURE BEST PERFORMANCE AND MINIMUM TROUBLE, ALWAYS FIT THE SPARKING PLUG RECOMMENDED BY US.

CLEANING THE PLUG. Grip body very gently in a vice and remove gland nut to free the insulator. Wash in petrol, scraping insulator with a knife or rubbing with a fine emery to remove carbon and wash again. The body can be cleaned internally by scraping and wiped with a petrol-soaked rag. The electrodes should be very carefully scraped. DO NOT rub a wire brush over the points — this will have a ruinous effect. When re-assembling tighten gland nut carefully. Set point gaps to .018" — .022" by tapping OUTSIDE electrodes — NEVER attempt to bend the central electrode.

Do not over tighten the plug in the cylinder head; this may result in stripped threads and flattening of the rolled steel washer.

BRIDGING OF PLUG GAP. This occurs in the form of a deposit between the central electrode and earth points causing a short circuit and preventing a spark. It is sometimes mistaken for oiling-up but the cause is believed to be the residue of detergent in varying percentages in oils. It might also be "wet carbon" bridge, carburetter rich or carburetter flooding; or a lead Bromide bridge — high plug temperature — weak mixture.

The high working temperature of a two-stroke engine appears to be the reason for this bridging and it follows that a weak mixture, retarded ignition, a choked exhaust system or anything likely to increase the working temperature may result in bridging. Attention to the following will result in an increased mileage before it becomes necessary to clean the points.

- Ensure ignition timing is correct and contact breaker gap is between .012"/.015".
- The carburetter may be set to give a richer mixture.
- The normal spark plug gap should be increased as much as possible consistent with easy starting and good running. Poor condition of the contact breaker points and connections may lead to spark failure.

EMERGENCY STARTING. When the ignition switch is in the EMG. position, the full output of the alternator is

applied to the battery, thus providing an immediate source of power for the ignition and also a boost charge for the battery. As the EMG. start should only be employed when the battery is discharged, the switch in the EMG. position should only be left for about fifteen minutes with the engine running, in order to restore rapidly the state of charge. Do not run on EMG. longer than this, or the battery will be overcharged causing the electrolyte to over-spill.

IGNITION AND LIGHTING SWITCHES. These switches are arranged to be easily removed by having the connections detachable by means of a plug in the connector block. As in the case of a radio valve there is unequal spacing so that the block cannot be reconnected incorrectly. Both ignition and lighting switches are the same other than the markings on the escutcheon plate *i.e.*, EMG./OFF/IGN or L./OFF/HIGH. It is advisable occasionally to check that the rubber connector blocks are pushed fully home on the brass pins. The set itself is an AC/DC system. A/C current, therefore, is generated in the first place and is converted by means of a fullwave rectifier. A glance at the accompanying wiring diagram will show that with the switch in the EMG. position, current is being drawn from the six coils which are wired as two sets of three in series, and are then connected parallel. For normal use, however, and providing the battery is maintained in reasonable condition, the switch should always be positioned in the IGN position and the current is then generated by three coils only wired in series together with a resistance. This will be sufficient for all normal requirements. When the lights are then operated the resistance is cut out of the circuit which increases the output to fill the needs of the light consumption.

RECTIFIER. It is important that the rectifier be fully earthed to the frame by means of the fixing bolt. The rectifier itself is mounted on the frame by a bracket under the twinseat. ALWAYS REFER TO THE WIRING DIAGRAM WHEN CHECKING CONNECTIONS OR REPLACING THE CABLES.

THE MACHINE SHOULD NOT BE USED WITH THE BATTERY DISCONNECTED, EXCEPT AS A LAST RESORT MERELY TO GET YOU HOME, AND EVEN THEN IT SHOULD BE UNDERSTOOD THAT IF LIGHTS ARE USED, UNLESS THE ROAD SPEED IS RESTRICTED TO SOMETHING IN THE REGION OF TEN MILES PER HOUR, THERE IS NO GUARANTEE THAT THE BULBS WILL NOT BE OVERLOADED. The battery when in the circuit, controls the maximum voltage from the alternator. It is unnecessary to disconnect the rectifier when the battery is removed.

BATTERY. "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.

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 100°F.

Batteries filled in this way are 90% charged. After filling, a dry charged battery needs only the attention normally given to lead-acid type batteries.

BATTERY MAINTENANCE. It will be noted that directions are expressed in terms of TIME instead of MILE-AGE as is usually the case with motor cycles.

This is because deterioration soon sets in if the battery is left standing without attention for any length of time. To keep the battery in good condition, maintenance must be carried out whether the machine is in use or not.

Every month (every fortnight in Summer) remove battery, clean terminals and top up the three cells to $\frac{1}{8}$ " above the level of the plates with distilled water — NOT tap water, as this contains impurities detrimental to the battery. Pour the distilled water through a glass funnel or syringe.

Many lighting troubles can be traced to unseen corrosion between the surfaces of the battery terminals; keep the terminals clean. A little grease smeared on them will help prevent corrosion.

Do not keep distilled water in receptacles made of any kind of metal as this will quickly render it impure — make use of a clean glass bottle or jar. Rain water collected in a jar makes a satisfactory substitute for distilled water.

Never bring a naked light near a battery with vent plugs removed or when the battery is being charged; the gas given off by the electrolyte is dangerously explosive.

Battery acid is highly corrosive; therefore, throw away any

cleaning rags used to clean the battery lest their use on other parts of the machine causes rust.

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.

HEADLAMP. The main bulb has twin filaments. One filament providing the main driving beam and the other a dipped beam brought into operation by the dipper switch on the left handlebar when required. The pilot bulb fits into an adaptor which in turn is pressed into the reflector.

The design of the lamp holder, lamp and reflector assembly is such that when the bulb is correctly positioned, no focusing is required. The reflector and front glass are cemented on original assembly and no attempt should be made to separate them. While, therefore, it is possible to supply a replacement headlamp glass, the proprietary manufacturers will not undertake to supply the reflector separately from the glass.

REMOVING LIGHT UNIT AND HEADLAMP RIM.

Slacken the screw on the bottom of the lamp body at the front. Pull the rim outward from the bottom and as the front comes away raise slightly to disengage the top lip of the body from the front rim. The main bulb can then be removed from its housing in the reflector assembly. The lamp rim is secured to the light unit by spring clips which can be removed by pressing with a screw-driver blade at the same time working away from the edge.

REPLACING RIM AND LIGHT UNIT.

Lay the light unit in the rim and arrange the spring clips so that they are evenly spaced around the rim. To refit, engage top lip of shell on the headlamp rim and then gently force the rim back on to the shell after which the locking screw at the bottom should be tightened.

Clutch and Primary Drive

The drive from the engine to the four plate clutch is by pre-stretched chain running in an oil bath chaincase. No attention is necessary beyond that of lubrication and occasional adjustment to push rod clearance to prevent clutch slip.

CLUTCH ADJUSTMENT. Whilst the clutch is engaged *i.e.*, driving, there must be clearance between the end of the push rod located in the hollow gearbox mainshaft and the clutch lever fitted to the gearbox end cover. There is an adjuster on the outer plate. The object of this in the first place is to adjust the length of the push rod so that the operating arm at the other end is roughly at right angles to the cable at full lift. Thereafter any stretch which occurs in the cable can be taken up by means of the adjuster at the end of the cable. The clutch inserts will in time become worn on the driving faces and it will be necessary from time to time to make use of the push rod adjuster to maintain the free movement as previously referred to. Eventually and after considerable mileage has been covered, relining of the plates will become necessary. We advise owners to take advantage of our exchange scheme in connection with the replacement of service clutch plates.

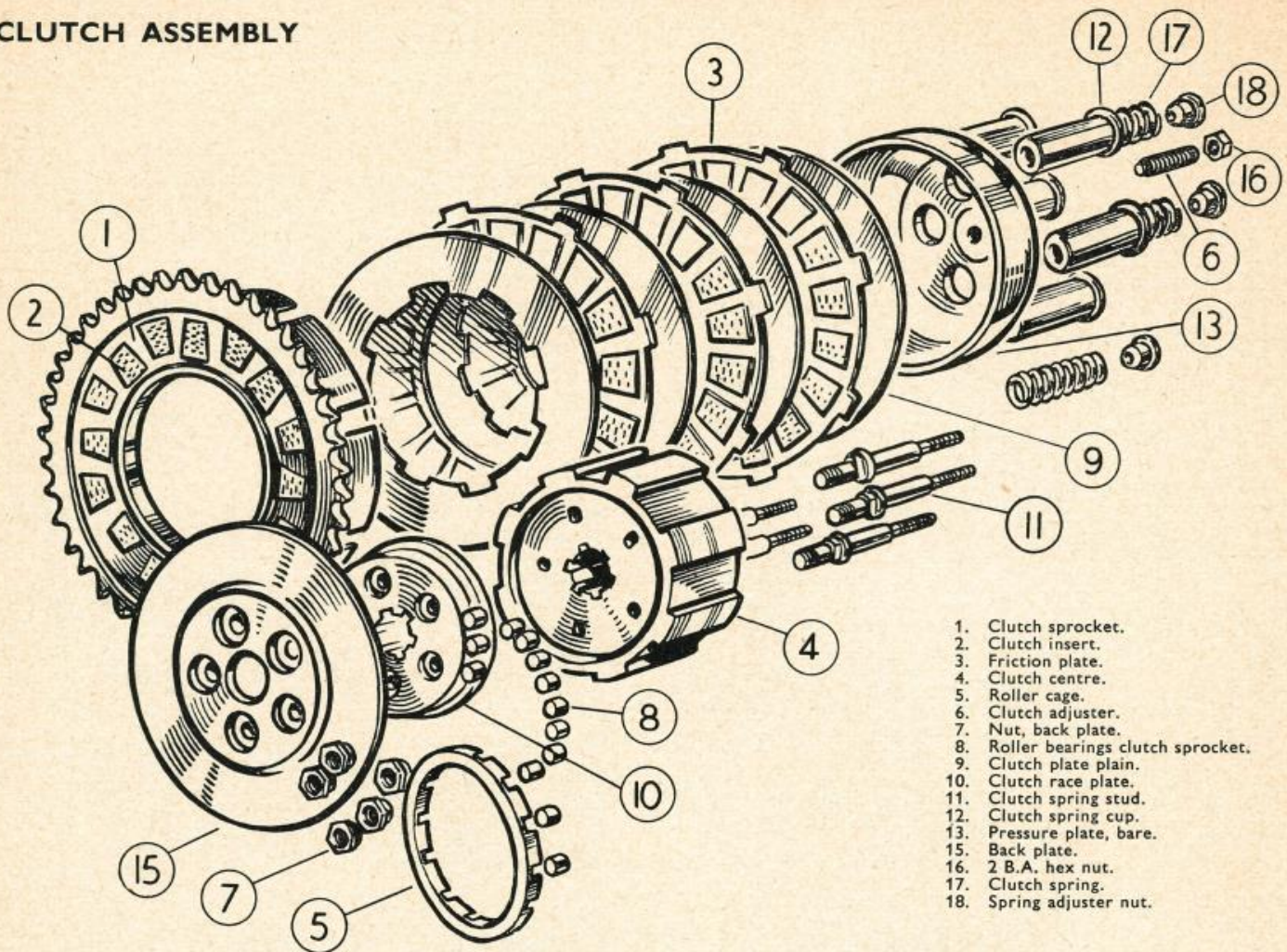
DISMANTLING THE CLUTCH. Access to the clutch is obtained after the removal of the aluminium engine cover on the left-hand side retained by five screws. The screws outside the springs must be taken away by means of their right-hand threads, after which the clutch pressure plate with thimbles will present no difficulty. Thereafter the insert plates and steel plates fitted alternately can be readily withdrawn and there then remains the sprocket assembly which is splined to the main shaft to be dealt with. For this

purpose it is as well to leave the rear chain in position and select top gear, afterwards screwing the brake rod adjuster hard on. This will offer some resistance to the clutch centre nut which will have to be initially tapped in an anti-clockwise direction in order that it can be loosened. It will then be seen that the sprocket assembly is fitted along splines of the gearbox mainshaft. The clutch hub is a sub assembly of the sprocket, both of which, therefore, must be removed together.

If an extractor is available for removing the clutch back plate assembly, no difficulty whatever will be experienced, but alternatively some means will have to be devised to prise off the assembly. This can be done by means of two long screw drivers judiciously used as levers behind the plate itself. The sprocket assembly itself in which the inserts are fixed is mounted on a single row of eight caged rollers. This assembly need not be separated except after very lengthy mileage to reline the clutch itself and even then it is a good plan to employ the service exchange facilities which are available for repairs of this nature.

FINAL DRIVE SPROCKET. Removal of the left-hand engine cover, clutch and chaincase inner cover will reveal the final drive sprocket. The engine need not be removed from the frame merely to replace this when the need arises. For this purpose, therefore, it is as well to leave the rear chain round the two sprockets, position the gear lever in top and then screw the brake rod adjuster hard on. Next flatten down the tab washer on the outside of the locking nut and remove the latter by means of a substantial ring spanner for preference by means of its **left-hand thread**. The chain can now be detached and the final drive sprocket can be withdrawn along the splines of the high gear sleeve.

CLUTCH ASSEMBLY



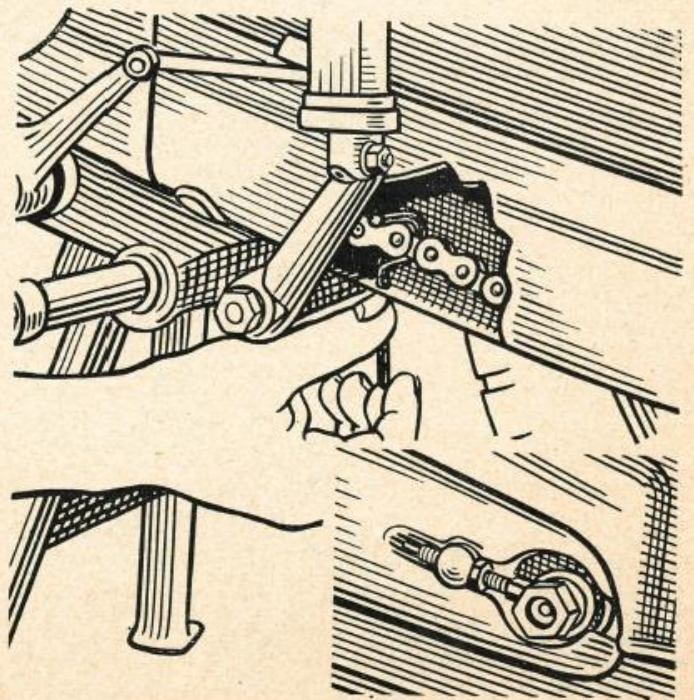
1. Clutch sprocket.
2. Clutch insert.
3. Friction plate.
4. Clutch centre.
5. Roller cage.
6. Clutch adjuster.
7. Nut, back plate.
8. Roller bearings clutch sprocket.
9. Clutch plate plain.
10. Clutch race plate.
11. Clutch spring stud.
12. Clutch spring cup.
13. Pressure plate, bare.
15. Back plate.
16. 2 B.A. hex nut.
17. Clutch spring.
18. Spring adjuster nut.

TRANSMISSION. A chain is an assembly of links with rollers connected together by outer link plates and held together by rivets. If it is kept clean, adequately lubricated and correctly adjusted, a chain will give little trouble and will wear out long before breaking point is reached.

The front chain is fully enclosed in an oil bath and consequently wear will be negligible over a long period. The rear chain, being exposed and more heavily loaded is more likely to give trouble through neglect and should be regularly checked for tension and frequently lubricated.

REAR CHAIN ADJUSTMENT. A special tool is provided in the toolkit to adjust the chain without removing the rear chaincase. It is a "Crook" shaped length of hexagon bar which also serves as an Allen key.

To check chain tension enlist the assistance of someone to sit on the machine so that the rear suspension units are compressed to the normal riding position. Then insert the "crook" shaped end of the tool through the hole provided in the bottom of the chaincase nearest to the pillion footrest hanger. By manipulation the tool is hooked over the chain and up and down movement can be measured with a thumb bearing against the bottom of the chaincase. With rider seated chain whip should be between $\frac{3}{8}$ " and $\frac{1}{2}$ " up and down movement. If movement is greater or less, slacken rear spindle nuts and move the rear wheel forwards or backwards by turning the adjusters bearing on the spindle nuts. Check rear brake adjustment after moving rear spindle.



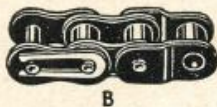
CLEANING AND LUBRICATING THE CHAIN. A chain cannot be cleaned merely by drenching with oil while in position on the machine. The best way to do the job is as follows :

Remove spring clip and connecting link and take chain off the sprockets. Soak in a bath of paraffin using a stiff brush to remove all external dirt and allow paraffin to run through the joints of the chain. All grit and dirt between the joints must be removed. Swill in clean paraffin and hang over a pan to allow it to drain.

Immerse chain in a tin containing graphited grease that has been heated until fluid, over a pan of boiling water. Move the chain about in the grease until grease has cooled off to normal semi-solid state. Remove chain from grease and wipe off surplus.

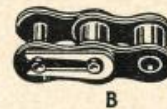
NOTE : When replacing chain, see that the spring clip faces in direction of drive, i.e., closed end of link should face forwards on top run of chain.

ALTERATIONS TO LENGTH OF REAR CHAIN. If chain has an even number of pitches, that is, a cranked link is not used in the chain, remove the rivets holding the second pair of outer link plates (see A) which will shorten the chain by four rollers and two pairs of outer link plates. Replace with a cranked double link and single connecting link (B).



If chain has an odd number of pitches, remove rivets holding the second pair of outer links (see A) (first pair will be cranked) and replace with single connecting link and inner link (B).

PETROL CONSUMPTION. Very often in correspondence we are called upon to reply to queries connecting with petrol consumption. It is not fully appreciated that this depends quite as much upon the manner in which the machine is driven, and the purpose for which it is used, as any adjustments that can be made to the carburetter. The same machine can be driven by two different riders, and produce petrol consumption figures with very considerable variation. On the other hand it must be made quite clear that the correct carburetter setting will at all times produce the most economical petrol consumption by which we mean that there is no object in weakening the setting beyond reason, since wider throttle openings would then be necessary to counteract the mal-adjustment. Mention should also be made that petrol consumption, with the same carburetter setting will also vary according to road speeds. While, therefore, it may be possible to obtain say 90 miles per gallon when the machine is driven at an average speed of 40 m.p.h. these figures would be adversely affected if any attempt were made to maintain abnormally high average touring speeds, when consumption might well fall to the extent of 70 m.p.g.



CHAIN COMPONENTS



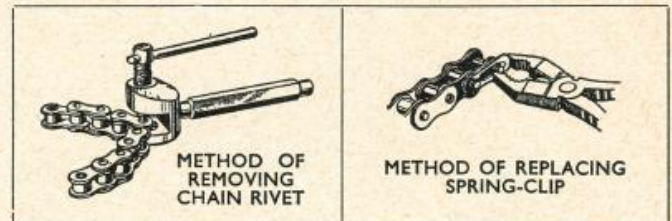
INNER LINK



CONNECTING LINK



CRANKED DOUBLE LINK



METHOD OF REMOVING CHAIN RIVET

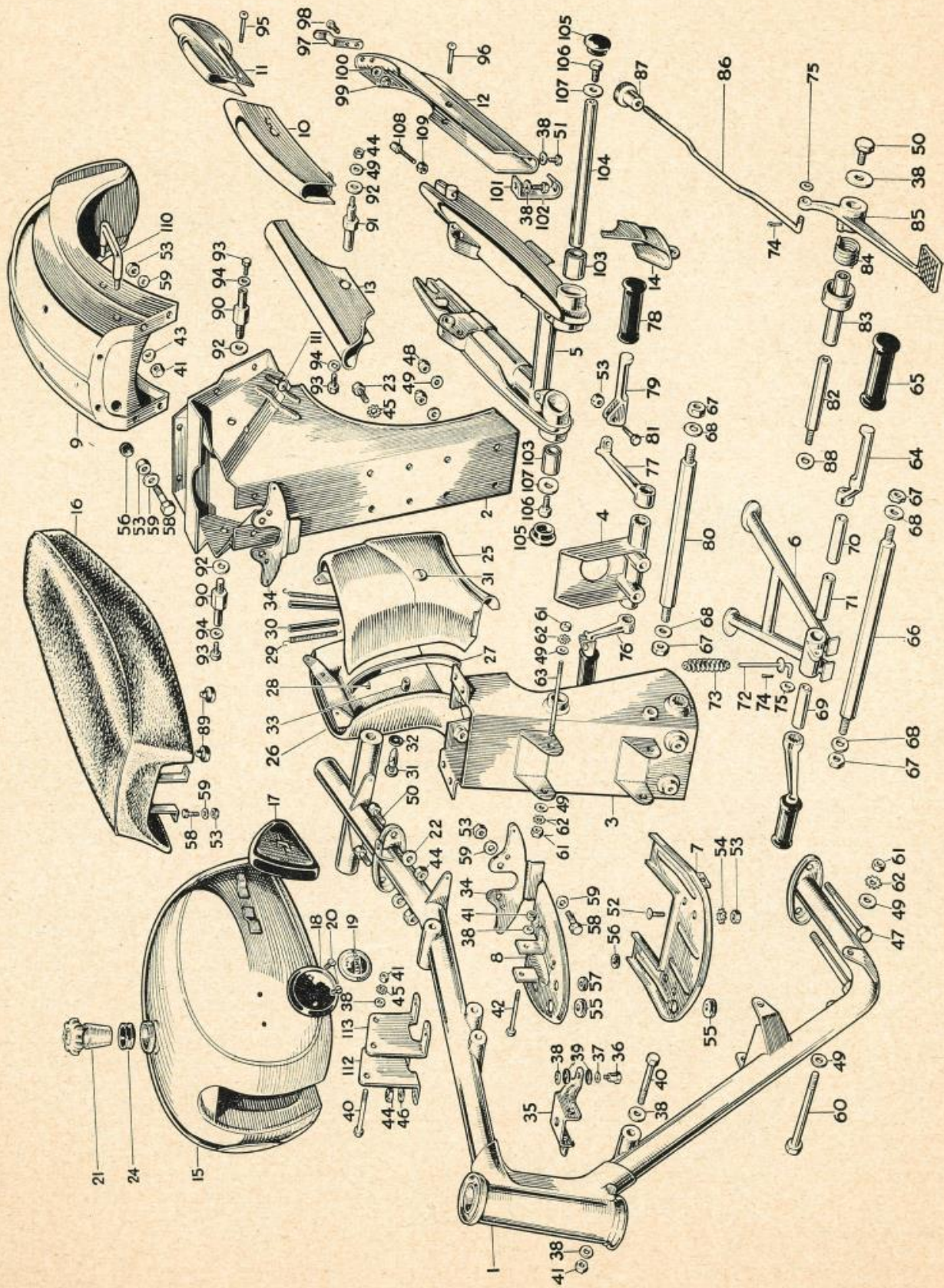
METHOD OF REPLACING SPRING-CLIP

FITTING A NEW REAR CHAIN. To simplify the task of fitting a new rear chain, disconnect the old chain at the rear wheel sprocket by removing the single connecting spring link. Connect old chain to new chain, when by pulling the bottom run of the old chain, the new one can easily be carried round the gearbox sprocket, whereupon the old chain is disconnected and the ends of the new one connected together. Care should be taken when fitting a new chain to keep it from contact with the floor or any place where it is likely to collect grit, etc.

There are, however, a number of practical hints which can be given and without doubt one of the worst offenders as regards excessive petrol consumption is the habit of "flicking" the twist grip. The throttle should be opened and closed as slowly as is consistent with complete control of the machine.

Excessive flooding of the carburetter can also be wasteful. In many instances this is not necessary at all since an initially rich carburetter setting can be obtained merely by closing the air lever. "Backing off" the twist grip will invariably save petrol. When climbing, for instance, and the load begins to make itself apparent to the extent that the engine is not responding to the throttle, it will often be found that performance will be assisted by slightly closing the throttle instead of opening it. Similarly when the engine is running light at normal touring speeds, it will be found that the same speed can be maintained by slightly closing the throttle. This theory can be likened to the lifting of a weight by means of a windlass. Far more energy is required to lift the weight to a given height than is needed to retain it at the same height.

Frame Assembly



FRAME ASSEMBLY COMPONENTS

- | | | | | | |
|----|---|----|--|-----|---|
| 1 | Frame front section. | 39 | Rubber washer $\frac{3}{8}$ " dia. | 77 | Hanger for pillion footrest—nearside |
| 2 | Main channel pressing. | 40 | Hexagon bolt $\frac{5}{16}$ " b.s.c. $\times 2\frac{1}{8}$ " long. | 78 | Pillion footrest rubber. |
| 3 | Frame box. | 41 | Hexagon nut $\frac{5}{16}$ " b.s.c. | 79 | Pillion footrest. |
| 4 | Mounting bracket for pillion footrest. | 42 | Hexagon bolt $\frac{5}{16}$ " b.s.c. $\times 2\frac{1}{2}$ " long. | 80 | Pillion footrest bar. |
| 5 | Swing arm. | 43 | Plain washer $\frac{5}{16}$ " dia. | 81 | Hexagon bolt $\frac{1}{4}$ " b.s.c. $\times \frac{7}{8}$ " long. |
| 6 | Centre stand. | 44 | Hexagon nut $\frac{3}{8}$ " b.s.c. | 82 | Pivot bolt for brake pedal. |
| 7 | Battery platform. | 45 | Shakeproof washer $\frac{5}{16}$ " dia. | 83 | Spacer tube for brake pedal. |
| 8 | Centre section cover plate. | 46 | Plain washer $\frac{3}{8}$ " dia. | 84 | Return spring for brake pedal. |
| 9 | Rear mudguard. | 47 | Hexagon bolt $\frac{3}{8}$ " b.s.f. $\times 7$ " long. | 85 | Brake pedal. |
| 10 | Upper chainguard. | 48 | Self locking hexagon nut $\frac{3}{8}$ " b.s.f. | 86 | Brake rod. |
| 11 | Rear chainguard. | 49 | Plain washer $\frac{3}{8}$ " dia. | 87 | Brake adjuster. |
| 12 | Lower chainguard. | 50 | Hexagon bolt $\frac{3}{8}$ " b.s.c. $\times \frac{5}{8}$ " long. | 88 | Plain washer $\frac{7}{16}$ " dia. |
| 13 | Pump cover. | 51 | Hexagon bolt $\frac{5}{16}$ " b.s.c. $\times \frac{1}{2}$ " long. | 89 | Rubber buffer for twinseat. |
| 14 | Chainguard front cover. | 52 | Mushroom head screw $\frac{1}{4}$ " b.s.c. | 90 | Upper attachment bolt for R.S. unit. |
| 15 | Petrol tank. | 53 | Hexagon nut $\frac{1}{4}$ " b.s.c. | 91 | Lower attachment bolt for R.S. unit. |
| 16 | Twinseat. | 54 | Shakeproof washer $\frac{1}{4}$ " dia. | 92 | Plain washer $\frac{9}{16}$ " dia. |
| 17 | Rubber knee grip. | 55 | Rubber grommet (panel hole 1"). | 93 | Hexagon bolt $\frac{5}{16}$ " b.s.c. $\times \frac{5}{8}$ " long. |
| 18 | Tank badge seating washer. | 56 | Rubber grommet (panel hole $\frac{7}{16}$ "). | 94 | Plain washer $\frac{5}{16}$ " dia. |
| 19 | Tank badge. | 57 | Rubber grommet (panel hole $\frac{1}{16}$ "). | 95 | "Unbrako" screw $\frac{1}{4}$ " b.s.c. $\times 1\frac{3}{4}$ " long |
| 20 | Tank badge fixing screw. | 58 | Hexagon bolt $\frac{1}{4}$ " b.s.c. $\times \frac{5}{8}$ " long. | 96 | "Unbrako" screw $\frac{1}{4}$ " b.s.c. $\times 2$ " long |
| 21 | Filler cap. | 59 | Plain washer $\frac{1}{4}$ " dia. | 97 | Spring clips for chainguard. |
| 22 | Plain washer $\frac{3}{8}$ " dia. | 60 | Hexagon bolt $\frac{3}{8}$ " b.s.f. $\times 2\frac{3}{4}$ " long. | 98 | Screw for spring clip 5 BA. |
| 23 | Hexagon bolt $\frac{5}{16}$ " b.s.c. $\times 1\frac{3}{16}$ " long. | 61 | Hexagon nut $\frac{3}{4}$ " b.s.f. | 99 | Self locking hexagon nut 5 BA. |
| 24 | Rubber Ring for filler cap. | 62 | Shakeproof washer $\frac{3}{8}$ " dia. | 100 | Plain washer $\frac{5}{32}$ " dia. |
| 25 | Centre section pressing L.H. | 63 | Double ended stud $\frac{3}{8}$ " b.s.f. | 101 | Attachment bracket for lower chain guard. |
| 26 | Centre section pressing R.H. | 64 | Footrest hanger. | 102 | Hexagon bolt $\frac{5}{16}$ " b.s.c. $\times \frac{1}{2}$ " long. |
| 27 | Plastic "T" section. | 65 | Rubber for footrest. | 103 | Silentbloc pivot bush. |
| 28 | Screw for "T" section. | 66 | Footrest bar. | 104 | Pivot tube for swing arm. |
| 29 | Cover operating spring. | 67 | Hexagon nut $\frac{7}{16}$ " b.s.c. | 105 | Pivot cover for swing arm. |
| 30 | Plastic sleeve for operating spring. | 68 | Plain washer $\frac{7}{16}$ " dia. | 106 | Hexagon bolt $\frac{1}{2}$ " b.s.c. |
| 31 | Oddie fastener. | 69 | Spacer tube offside. | 107 | Plain washer $\frac{1}{2}$ " dia. |
| 32 | Rubber washer for Oddie fastener. | 70 | Spacer tube nearside. | 108 | Chain adjuster bolt. |
| 33 | Rubber bush for Oddie fastener. | 71 | Pivot tube for centre stand. | 109 | Hexagon nut $\frac{1}{4}$ " b.s.c. |
| 34 | Spring hinge plate. | 72 | Operating rod for centre stand. | 110 | Lifting handle. |
| 35 | Bracket for tank and horn. | 73 | Return spring. | 111 | "Unbrako" screw $\frac{1}{4}$ " b.s.c. $\times \frac{1}{2}$ " long. |
| 36 | Shouldered bolt. | 74 | Split pin $\frac{1}{16}$ " dia. $\times \frac{3}{4}$ " long. | 112 | Head steady plate R.H. |
| 37 | Plain washer $\frac{3}{8}$ " dia. | 75 | Plain washer $\frac{1}{4}$ " dia. | 113 | Head steady plate L.H. |
| 38 | Plain washer $\frac{5}{16}$ " dia. | 76 | Hanger for pillion footrest—offside. | | |

EXHAUST SYSTEM AND SILENCER.

The exhaust gases of two stroke engines contain a percentage of vaporised oil which forms a deposit inside the exhaust pipe and silencer. After a considerable mileage the accumulation of carbonised oil may impair performance and it is, therefore, advisable to remove the exhaust system for cleaning. The silencer fitted to Commodore 250 models is of unit construction and to clean it, it is best to remove the complete exhaust pipe and silencer by unscrewing the finned exhaust

pipe nut and silencer attachment bolt. The whole system may then be flushed out by pouring in a solution of household detergent and boiling water. In severe cases caustic soda may be used, but great care should be taken to avoid damage to the chromium plating. The flushing process should be repeated two or three times to remove all carbon and oil deposits.

SERVICE DEPARTMENT

REPAIRS AND SPARES

Hours of business for callers :

MONDAY to FRIDAY ONLY

8 a.m. to 12.30 p.m. :: :: 1.30 p.m. to 5.30 p.m.

For the convenience of owners

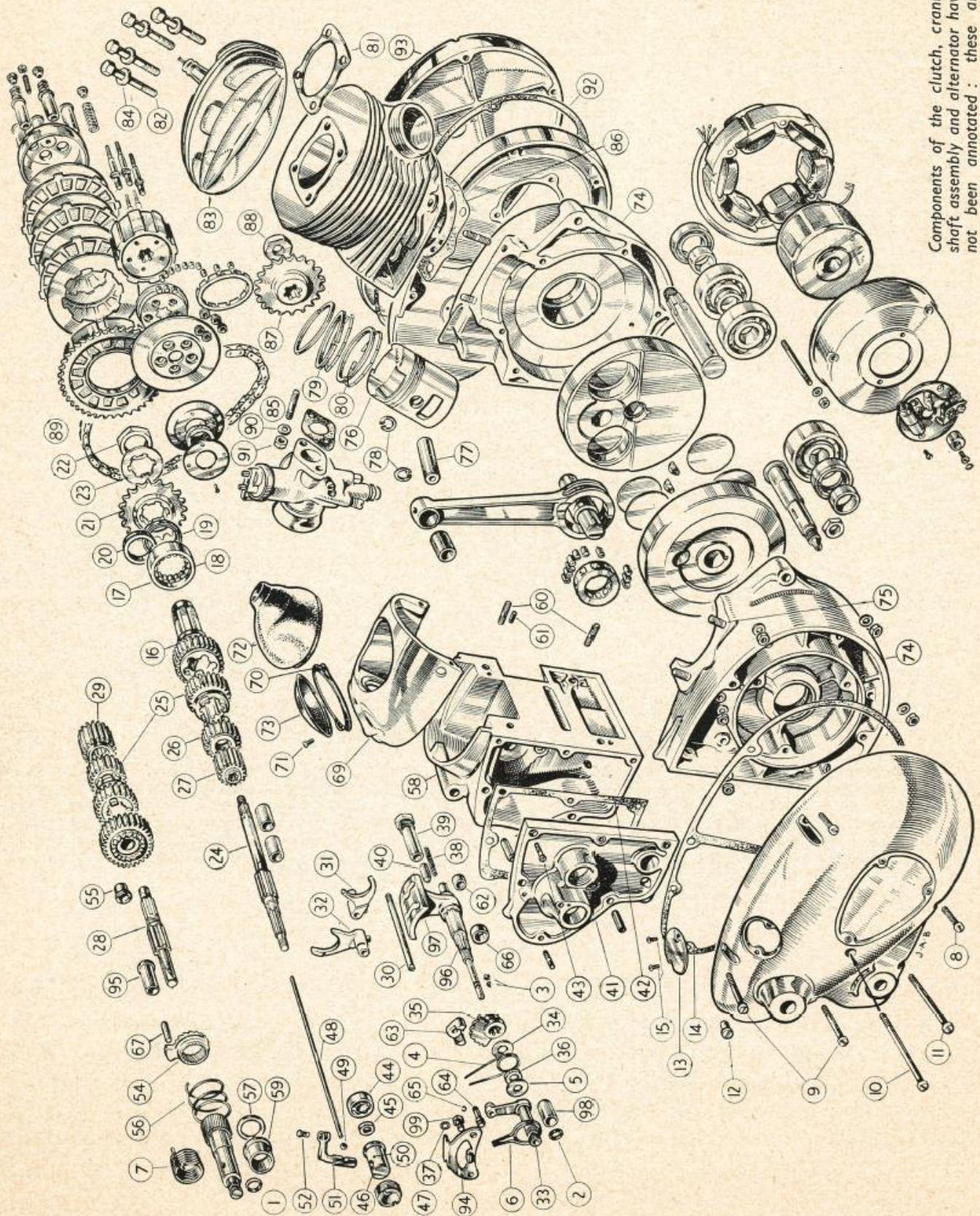
SPARES STOCKISTS

accredited by us are appointed for most districts.

The name and address of your nearest stockist will be advised upon request.

REPAIRS AT THE WORKS BY APPOINTMENT ONLY—PLEASE

Engine Assembly



Components of the clutch, crankshaft assembly and alternator have not been annotated: these are dealt with separately on other pages.

GEARBOX.

The four speed gearbox is a separate light alloy component bolted up to the back of the crankcase as will be seen by the exploded diagrams. The layshaft runs in plain bronze bushes and the sleeve pinion is supported by a roller bearing. Gear selection is by means of fork arm members which register in the mainshaft and layshaft sliders, the movement being governed by a profiled cam member. The kick-starter end mechanism employs face ratchets brought into engagement by the rotation of the helical splined kick-starter shaft. Upon removal of the left-hand outer cover, clutch and chaincase inner cover, it will be seen that the gearbox is a separate unit attached to the crankcase assembly by means of two nuts on each side. With the power unit removed from the frame, the gearbox can be separated from the crankcase if required.

KICK-STARTER CRANK. It is necessary to remove crank in order to dismantle the outer case. When the case is removed it will be seen that the return spring is fitted around the kick-start axle, one end is anchored in a drilled hole in the gearbox end cover, the other end is anchored in a hole in the kick-start axle.

GEARBOX END COVER. The right-hand aluminium engine cover can be removed after taking away the foot-change indicator bolt and the six screws in the cover recesses and by so doing the contact breaker mechanism need not be interfered with in any way. It should be carefully noted, however, that this outer cover is in fact the reservoir for the gearbox, so that as the outer cover is removed some provision should be made to catch the lubricant as it comes away from the gearbox. Renew the washer always on re-assembly. A further point also should be made in as far as when the cover is removed it will bring with it the foot-change mechanism at the same time. This is not a complete sub assembly and, therefore, only assumes its operative position when it is assembled correctly. The chief point to bear in mind is that when offering the cover up to the rest

of the gearbox, the pawl must of necessity be between the hairpin spring. Great care will be needed to ensure this. The clutch operating lever can then be lifted from the steel dome, but care should be taken not to lose the ball which may fall out. Thereafter the screwed ring retaining the clutch operator body will need to be removed by its right-hand thread and the body then will come away without further hindrance, do not lose locating peg. This will give immediate access to the nut on the end of the mainshaft which again can be unscrewed by means of its right-hand thread. There remains then the selector shaft assembly to be dealt with. There is a right-hand threaded nut on the end of the shaft followed by a washer, after which the ratchet plate can be withdrawn along the splines of the shaft.

NOTE : This must be refitted in correct position otherwise gear selection will be rendered impossible.

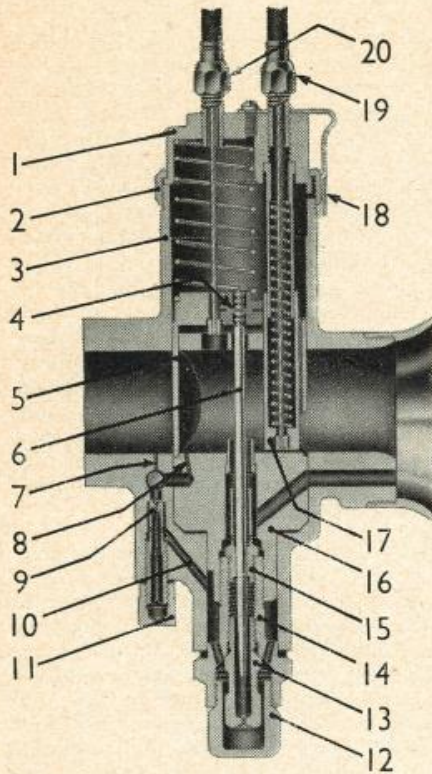
The gearbox inner cover is thus exposed to full view and prior to its removal the screw in the upper most position on the face plate only needs to be removed. The end plate is now free to be withdrawn and although it may offer some little resistance at first owing to the fit of the dowels, the use of force should be avoided. Further dismantling of the gearbox internals will then be easy to follow, particularly if reference is made to the illustration.

GEARBOX LUBRICATION. Oil capacity of the gearbox is approximately $1\frac{3}{4}$ pts. With the machine propped upright on its two wheels the level should not be higher than the screw to the left-hand side of the kick-starter shaft. Lubricant, therefore, will be fed through the filler plate attached by means of the two screws with the level screw previously referred to removed. As soon as the lubricant reaches the indicated level, therefore, the screw will be replaced and some little time should be given to enable the lubricant to transfer itself from the outer to the inner cover. The importance of this is to ensure that the level is not measured hurriedly which would otherwise indicate an abnormal level in the outer cover with very considerably less in the inner cover.

ENGINE ASSEMBLY COMPONENTS.

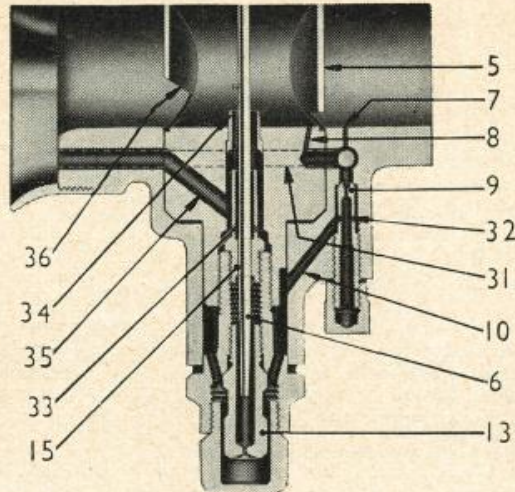
1. Kick start shaft "O" ring.
2. Foot change spindle "O" ring.
3. Foot change ratchet spindle "O" ring.
4. Foot change pawl spring. [ring.
5. Pawl spring washer, outer.
6. Foot change pedal return spring.
7. Kick start return spring.
8. Cover screw, short.
9. Cover screw, long.
10. Cover screw, centre.
11. Cover screw, bottom.
12. Oil level plug and washer.
13. Clutch cable inspection cover.
14. Cover gasket.
15. Cover screw.
16. Sleeve gear, bare.
17. Sleeve gear bearing.
18. Sleeve gear bush.
19. Sleeve gear oil seal.
20. Axle sprocket spacer.
21. Sleeve gear sprocket.
22. Sleeve gear sprocket nut.
23. Sleeve gear sprocket lockwasher.
24. Gearbox mainshaft.
25. Mainshaft 3rd gear. Layshaft 2nd gear.
26. Mainshaft 2nd gear. Layshaft 3rd gear.
27. Mainshaft 1st gear.
28. Layshaft.
29. Layshaft fixed gear.
30. Foot change striker shaft.
31. Mainshaft selector fork.
32. Layshaft selector fork.
33. Foot change pawl carrier, bare.
34. Pawl spring washer, inner.
35. Foot change ratchet.
36. Foot change ratchet shaft nut.
37. Foot change bolt washer.
38. Cam plunger spring.
39. Cam plunger bolt.
40. Plunger for cam plate.
41. Gearbox end plate.
42. Gearbox end plate cover gasket.
43. Gearbox end plate cover screw.
44. Mainshaft bearing.
45. Bearing nut.
46. Clutch operator body.
47. Clutch operator locking ring.
48. Clutch rod.
49. Clutch operating ball.
50. Operator body peg.
51. Clutch lever.
52. Clutch lever trunnion and nipple.
53. Kick start shaft, bare.
54. Kick start ratchet.
55. Kick start layshaft bush.
56. Kick start ratchet spring.
57. Kick start shaft thrust washer.
58. Gearbox shell.
59. Layshaft bush.
60. Gearbox attachment stud.
61. Gearbox dowel.
62. Foot change ratchet shaft inner
63. Foot change ratchet pawl. [bush.
64. Foot change pawl carrier pawl pin.
65. Foot change pawl pin circlip.
66. Foot change ratchet shaft bush (outer).
67. Kick start stop pin.
69. Carburetter cover.
70. Carburetter air seal ring.
71. Carburetter choke fixing screw.
72. Carburetter rubber cover.
73. Air filter gauze retaining ring.
74. Crankcase halves T.S. and D.S.
75. Cylinder base stud.
76. Piston, bare.
77. Gudgeon pin.
78. Gudgeon pin circlip.
79. Compression ring.
- Piston ring chrome plated.
80. Pressure ring.
81. Cylinder head gasket.
82. Cylinder head bolt.
83. Cylinder head.
84. Cylinder head bolt washer.
85. Induction stud.
86. Cylinder base gasket.
87. Engine sprocket.
88. Crankshaft D/S. nut.
89. Primary chain.
90. Carburetter stud washer.
91. Carburetter stud nut.
92. Front chain cover gasket.
93. Front chain cover.
94. Foot change stop plate.
95. Kick start bush, inner.
96. Foot change ratchet shaft, bare.
97. Cam segment.
98. Foot change bush, outer.
99. Foot change bolt.

Carburetter



Section through mixing chamber, showing air valve and throttle closed.

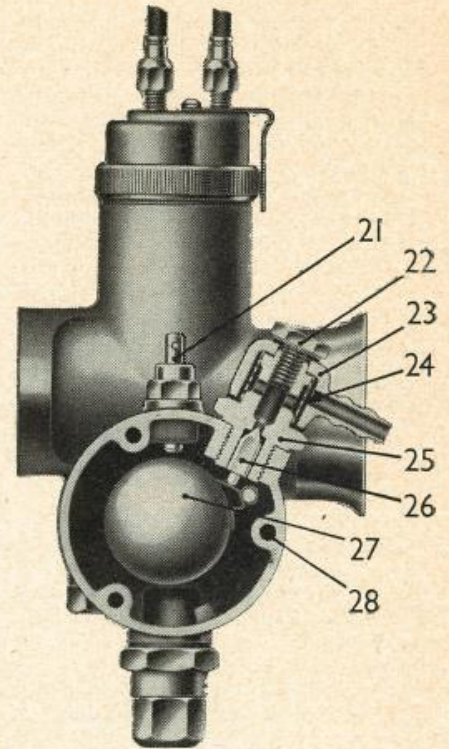
1. Mixing chamber top.
2. Mixing chamber cap.
3. Carburetter body.
4. Jet needle clip.
5. Throttle valve.
6. Jet needle.
7. Pilot outlet.
8. Pilot by-pass.
9. Pilot jet.
10. Petrol feed to pilot jet.
11. Pilot jet cover nut.
12. Main jet cover.



Sectional illustrations of carburetter type 389.

Diagrammatic section of carburetter showing only the lower half of the throttle chamber with the throttle a little open — and the internal primary air passages to the main jet and pilot system.

13. Main jet.
14. Jet holder.
15. Needle jet.
16. Jet block.
17. Air valve.
18. Mixing chamber cap spring.
19. Cable adjuster (air).
20. Cable adjuster (throttle).
21. Tickler.
22. Banjo bolt.
23. Banjo.
24. Filter gauze.



Section through float chamber.

25. Needle seating.
26. Needle.
27. Float.
28. Side cover screws.
29. Pilot air adjusting screw.
30. Throttle adjusting screw.
31. Air to pilot jet.
32. Feed holes in pilot jet.
33. Bleed holes in needle jet.
34. Primary air choke.
35. Primary air passage.
36. Throttle valve cut-away.

HOW IT WORKS.

Some of the information given in this section is duplicated elsewhere in the book. This is intentional to avoid the need to cross reference.

The carburetter proportions and atomises the right amount of petrol with the air that is drawn in by the engine because of the correct proportions of jet sizes and the main choke bore. The float chamber maintains a constant level of fuel at the jets and cuts off the supply when the engine stops. The throttle control from the handlebar regulates the volume of mixture and therefore the power, and at all positions of the throttle the mixture is automatically correct. The opening of the throttle brings first into action the mixture supply from the pilot jet system for idling, then as it progressively opens, via the pilot by-pass, the mixture is augmented from the main jet, the earlier stages of which action is controlled by the needle in the needle jet. The pilot jet system is supplied by a pilot jet which is detachable for cleaning purposes and which when assembled in the carburetter body is sealed by a cover nut. The main jet does not spray directly into the mixing chamber, but discharges through the needle jet into the primary air chamber,

and goes from there as a rich petrol-air mixture through the primary air choke into the main air choke. This primary air choke has a compensating action in conjunction with bleed holes in the needle jet, which serve the double purpose of air compensating the mixture from the needle jet and allowing the fuel to provide a well outside and around the needle jet, which is available for snap acceleration.

There is a separately-operated mixture control called an air valve, for use when starting from cold, and until the engine is warm; this control partially blocks the passage of air through the main choke.

This design of carburetter offers perfectly simple and effective tuning facilities.

HINTS AND TIPS

STARTING from cold. Flood the carburetter by depressing the tickler sharply three or four times, and close the air valve. Then shut the throttle and open it a little, viz., about one-eighth open, see page 30 position 2, then kick-start. If it is too much open starting will be difficult.

STARTING, engine hot. Do not flood the carburetter but close the air valve. Close the throttle, then open the throttle about one-eighth of its travel and kick-start. If the carburetter has been flooded and will not start because the mixture is too rich — open the throttle wide and give the engine several turns to clear the richness, then start again with the throttle one-eighth open, and air valve wide open. Generally speaking it is not advisable to flood at all when engine is hot.

STARTING, general. By experiment, find out if and when it is necessary to flood, also note the best position for the air valve and the throttle for the easiest starting.

CABLE CONTROLS. See that there is a minimum of backlash when the controls are set back and that any movement of the handlebar does not cause the throttle to open ; this is done by the adjusters on the top of the carburetter. See that the throttle shuts down freely.

PETROL FEED, verification. To remove the filter gauze unscrew the banjo bolt (22, page 28) the banjo can then be removed and the filter gauze withdrawn from the needle seating. Ensure that the filter gauze is undamaged and free from all foreign matter. Before replacing banjo turn on petrol tap momentarily and see that fuel gushes out. *Flooding* may be due to a worn needle or a leaky float, but nearly all flooding with new machines is due to impurities (grit, fluff, etc.) in the tank — so clean out the float chamber periodically till the trouble ceases. If the trouble persists, the tank might be drained, swilled out, etc.

FIXING CARBURETTER AND AIR LEAKS. Erratic slow running is often caused by air leaks, so verify there are none at the point of attachment to the cylinder or inlet pipe — check by means of an oil can and eliminate by new washers and the equal tightening up of the flange nuts. On later models a sealing ring is fitted into the attachment flange of the carburetter. Also in old machines look out for air leaks caused by a worn throttle.

BANGING IN EXHAUST may be caused by too weak a pilot mixture when the throttle is closed or nearly closed — also it may be caused by too rich a pilot mixture and an air leak in the exhaust system ; the reason in either case is that the mixture has not fired in the cylinder and has fired

in the hot silencer. If the banging happens when the throttle is fairly wide open the trouble will be ignition — not carburation.

BAD PETROL CONSUMPTION of a new machine may be due to flooding, caused by impurities from the petrol tank lodging on the float needle seat and so prevent its valve from closing. Flooding may be caused by a worn float needle valve. Also bad petrol consumption will be apparent if the needle jet (15, page 28) has worn ; it may be remedied or improved by lowering the needle in the throttle, but if it cannot be — then the only remedy is to get a new needle jet.

AIR FILTERS. If a carburetter is set with an air filter and the engine is run without it, take care not to overheat the engine due to too weak a mixture ; testing with the air valve will indicate if a larger main jet and higher needle positions are required.

EFFECT OF ALTITUDE ON CARBURETTER. Increased altitude tends to produce a rich mixture. The greater the altitude, the smaller the main jet required. Carburetters ex-works are set suitable for altitudes up to 3,000 feet approximately. Carburetters used constantly at altitudes 3,000 to 6,000 feet should have a reduction in main jet size of 5 per cent., and thereafter for every 3,000 feet in excess of 6,000 feet altitude further reductions of 4 per cent. should be made.

RE-ASSEMBLING

RE-ASSEMBLING after dismantling. See that the washer on the bottom of the jet block is in good condition, otherwise fuel will leak across its face causing rich erratic running, if the washer is faulty it should be replaced by a new one. When replacing the throttle see that the jet needle goes into the centre hole in the jet block and once in, note the throttle works freely when the mixing chamber cap (2, page 28) is screwed down firmly and held by spring (18, page 28).

When re-assembling the float see that the narrow leg portion of its hinge is uppermost, as this operates the needle. Care should be taken to see that the joint faces of the side cover and body are not damaged or bruised and that the joint washer is in good condition, otherwise difficulty will be experienced in making a petrol tight joint.

ADJUSTMENTS

There are two likely faults in carburation, either richness or weakness of mixture.

INDICATIONS OF :—

RICHNESS.

Excessive smoke in exhaust.
Petrol spraying out of carburetter.
Four-stroking.
Heavy, lumpy running.
Sparking plug sooty.

WEAKNESS.

Spitting back in carburetter.
Erratic slow running.
Overheating.
Acceleration poor.
Engine goes better if :—
Throttle is not wide open or Air Valve is partially closed.

If richness or weakness is present, check if caused by :—

- | | |
|--|---|
| <p>(1) Petrol feed.</p> <p>(2) Air leaks.</p> <p>(3) Defective or worn parts.</p> <p>(4) Air cleaner being choked up.</p> <p>(5) An air cleaner having been removed.</p> | <p>Check that jets and passages are clear, that filter gauze in float chamber banjo connection is not choked with foreign matter, and that there is ample flow of fuel.</p> <p>Check there is no flooding.</p> <p>At the connection to the engine.</p> <p>As a loose fitting throttle valve, worn needle jet, loose jets.</p> |
|--|---|

Removing the silencer or running with a straight through pipe requires a richer setting.

Having verified the correctness of the fuel feed and that there are no air leaks, check over ignition and timing. Now at throttle position shown in illustration bottom right, test to see if mixtures are rich or weak. This is done by partially closing the air valve, and if engine runs better, weakness is indicated, but if engine runs worse richness is indicated.

To remedy, proceed as follows :—

To cure richness.

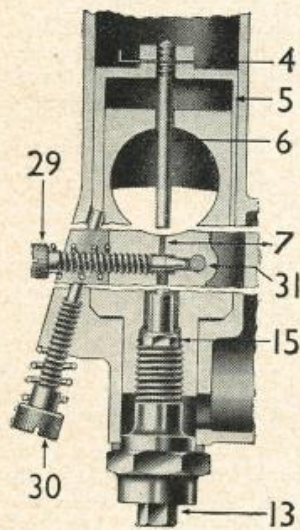
- Position 1. Fit smaller main jet.
- Position 2. Screw out pilot air adjusting screw.
- Position 3. Fit a throttle with larger cutaway (para. F).
- Position 4. Lower needle one or two grooves (para. E).

NOTE. It is not correct to cure a rich mixture at half throttle by fitting a smaller main jet because the main jet may be correct for power at full throttle : the proper thing to do is to lower the needle.

To cure weakness.

- Fit larger main jet.
- Screw in pilot air adjusting screw.
- Fit a throttle with smaller cutaway (para. F).
- Raise needle one or two grooves (para. E).

PARTS TO TUNE UP WITH



(a) This illustration is three diagrammatic sections of the carburettor to show the throttle adjusting screw (30), and the pilot air adjusting screw (29).

(b) THROTTLE ADJUSTING SCREW.

On two stroke engines a "tick over" position should be avoided—adjust so that when throttle is in its lowest position it stops the engine.

(c) PILOT AIR ADJUSTING SCREW.

This screw regulates the strength of the mixture for "idling" and for the initial opening of the throttle. The screw controls the depression on the pilot jet by metering the amount of air that mixes with the petrol.

(d) **MAIN JET.** The main jet controls the petrol supply when the throttle is more than three-quarters open, but at smaller throttle openings although the supply of fuel goes through the main jet, the amount is diminished by the metering effect of the needle in the needle jet.



Each jet is calibrated and numbered so that its exact discharge is known and two jets of the same number are alike. NEVER REAMER A JET OUT, GET ANOTHER OF THE RIGHT SIZE. The bigger the number the bigger the jet.

To remove the main jet unscrew the main jet cover, the exposed main jet can then be unscrewed from the jet holder.

(e) **NEEDLE AND NEEDLE JET.** The needle is attached to the throttle valve and being taper — either allows more or less petrol to pass through the needle jet as the throttle is opened or closed throughout the range, except when idling or nearly full throttle.

The taper needle position in relation to the throttle opening

can be set according to the mixture required by fixing it to the throttle valve with the jet needle clip in a certain groove (see illustration left), thus either raising or lowering it. Raising the needle richens the mixture and lowering it weakens the mixture at throttle openings from quarter to three-quarters open (see illustration below). The needles are marked with the letter D. The needles in some cases are marked with a number in addition to a letter.

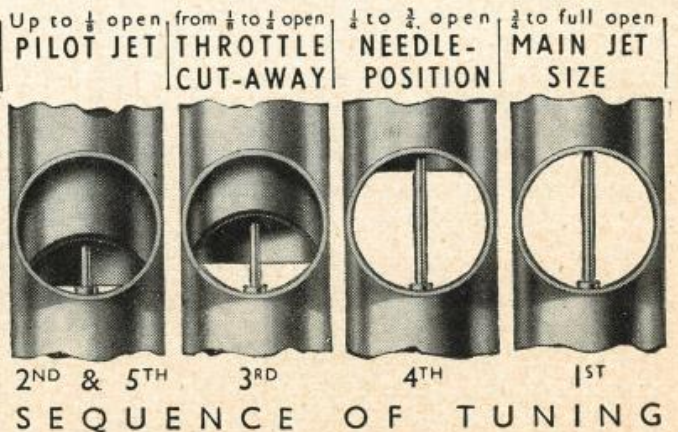
(f) **THROTTLE VALVE CUT-AWAY.** The atmospheric side of the throttle is cut away to influence the depression on the main fuel supply and thus gives a means of tuning between the pilot and needle jet range of throttle opening. The amount of cut-away is recorded by a number marked on the throttle valve, viz : 389/3 means throttle valve type 389 with No. 3 cut-away ; larger cut-aways, say 4 and 5, give weaker mixtures and 2 a richer mixture.

(g) **AIR VALVE** is used only for starting and running when cold, and for experimenting with, otherwise run with it wide open.

(h) **TICKLER**, a small plunger spring loaded, in the float chamber wall. When pressed down on the float, the needle valve is allowed to open and so "flooding" is achieved. Flooding temporarily enriches the mixture until the level of the petrol subsides to normal.

HOW TO TUNE UP

PHASES OF AMAL NEEDLE JET CARBURETTER THROTTLE OPENINGS



TUNE UP IN THE FOLLOWING ORDER.

NOTE. The carburetter is automatic throughout the throttle range — the air valve should always be wide open except when used for starting or until the engine has warmed up. We assume normal petrols are used.

READ REMARKS ON PAGES 29 AND 30 for each tuning device and get the motor going perfectly on a quiet road with a slight up gradient so that on test the engine is pulling:

1st. MAIN JET with throttle in position 1 (see page 30). Test the engine for full throttle; if when at full throttle, the power seems better *with the throttle less than wide open* or with the air valve closed slightly the main jet is too small. If the engine runs "heavily" the main jet is too large. If testing for speed work note the jet size is rich enough to keep engine cool, and to verify this, examine the sparking plug by taking a fast run, declutching, and stopping engine quickly. If the plug body at the end has a cool appearance the mixture is correct; if sooty, the mixture is rich: if however there are signs of intense heat the mixture is too weak and a larger jet is necessary.

2nd. PILOT JET (see page 30) with throttle in positions 2 and 5.

With the throttle set so that the engine is turning over at very low revs, screw pilot air adjuster in or out to make the engine run regularly and faster. Now close the throttle just a shade until the engine runs slower and just begins to

falter, adjust the pilot air screw by trial and error until the best slow running is obtained; if this second adjustment makes the engine run too fast go over the job again a third time.

3rd. THROTTLE CUT-AWAY with throttle in position 3 (see page 30).

If, as you take off from the idling position, there is objectionable spitting from the carburetter, slightly richen the pilot mixture by screwing in the air screw sufficiently, but if this is not effective, screw it back again, and fit a throttle with a smaller cut-away. If the engine jerks under load at this throttle position and there is no spitting, either the jet needle is much too high or a larger throttle cut-away is required to cure richness.

4th. NEEDLE with throttle in position 4 (see page 30).

The needle controls a wide range of throttle opening and also the acceleration. Try the needle in as low a position as possible; viz., with the clip in a groove as near the top as possible; if acceleration is poor and with air valve partially closed the results are better, raise the needle by two grooves; if very much better try lowering needle by one groove and leave it where it is best. If mixture is still too rich with clip in groove No. 1 nearest the top — the **needle jet** probably wants replacement because of wear. If the needle itself has had several year's use, replace it also.

5th. FINALLY go over the idling again for final touches.

Tracing Faults

SEQUENCE OF TESTING	POSSIBLE TROUBLE	REMEDY
ENGINE WILL NOT START Depress tickler on carburetter to check whether fuel is reaching carburetter.	No fuel reaching carburetter, air lock in petrol pipe.	Turn tap to ON, refill tank, clear air vent in filler cap. Turn on reserve tap where fitted.
If no fuel, even when tap is on and fuel is in tank.	Choked petrol pipe, filter on tap, filter in banjo.	Remove and clean out. Dismantle carburetter and fit new fuel needle.
Test for spark by holding sparking plug body on cylinder head.	Leak along insulation of plug or high tension lead.	Try a new plug of the type recommended and/or new H.T. lead.
If still no spark: Test for spark at end of H.T. lead held $\frac{1}{8}$ " from cylinder fins.	Ignition not switched on.	Remedy.
	Plug points may be oily or sooted up. If no spark at end of H.T. lead, contact breaker point gap may be too narrow, or points pitted or dirty or oily.	Clean plug or fit new one. Adjust contact breaker point gap to .015". Clean.
	Moisture on insulation of condenser.	Clean and dry out.
	Damaged insulating sleeving on wires connecting contact breaker to coil or condenser.	Replace with new sleeving.
	Faulty connection to low tension wire of ignition coil.	Correct.
	Faulty condenser.	Replace.
	Faulty ignition coil.	Replace.

FAULT FINDING CHART — continued

SEQUENCE OF TESTING	POSSIBLE TROUBLE	REMEDY
ENGINE WILL NOT START If above tests are satisfactory but engine will not start.	Mixture may be too rich due to flooding or incorrect setting of taper needle.	Open throttle and air levers wide and depress kick-starter several times to clear engine of petrol, adjust taper needle, drain crankcase.
	Air leaks at carburetter stub or manifold joint causing weak mixture.	Correct.
	Incorrect ignition timing.	Check, following instructions given.
ENGINE FOUR OR EIGHT STROKES Air lever may not be fully open or taper needle in a too high position. Check by watching for excessive smoke from exhaust pipe or silencer.	Mixture too rich.	Refer instructions under carburetter.
	Engine may four stroke for a little while after standing due to accumulation of oil in crankcase.	Usually ceases when engine has been running for a few minutes unless too much oil has been mixed with the petrol.
	Flooding of carburetter.	Persistent flooding is usually due to dirt under fuel needle seating, or sticking fuel needle, damaged seating or punctured float.
ENGINE LACKS POWER	Engine out of tune, bearings worn. Unsuitable sparking plug. Loss of compression.	Overhaul. Replace with recommended type. Tighten cylinder head bolts. Replace worn piston rings.
	Incorrect " petrol " mixture.	Correct mixture is 1 part oil, 24 parts petrol.
	Excessive carbon deposit on piston crown and cylinder head.	Decarbonise.
	Exhaust system choked with carbon.	Clean out silencer and exhaust pipes.
	Incorrect carburetter setting.	Check and adjust.
	Obstruction in fuel supply.	Clean out tap, fuel pipe and filters.
	Incorrect ignition timing.	Check and adjust.
	Brakes binding.	Adjust.
	Driving chains too tight.	Adjust.
ENGINE WILL NOT RUN SLOWLY	Weak mixture due to air leaks at carburetter stub or manifold joint, crankcase and cylinder base joints.	Tighten all joints.
	Crankcase drain screw loose or missing.	Tighten or replace.
	Worn crankshaft bearings or leaking seal.	Replace.
	Ignition timing too far advanced.	Correct.
ENGINE SUDDENLY STOPS FIRING	Sparking plug lead detached.	Replace and tighten nut.
	Plug points bridged by oil, carbon, or deposit caused by use of leaded petrol.	Clean or replace.
	Short circuit of high tension current by water on H.T. lead.	Dry out.

Service Department

SPARES AND REPAIRS

Genuine James spare parts are obtainable from James Dealers almost everywhere. The name of the nearest stockist will be gladly forwarded on receipt of a stamped addressed envelope. If a James Dealer cannot supply from stock, he will order specially. We can only supply direct in emergency or where no James Dealer is at hand. In such circumstances, please quote James Part Number (or enclose pattern), together with full frame and engine numbers. Owners in Great Britain and Northern Ireland should note that unless money is sent to cover order, (add 1/- in the £1 to cover packing and postage), we despatch C.O.D. post up to 15 lbs. Minimum C.O.D. postage is 2/-.

Instructions regarding repairs should be clear and definite, otherwise the cost may be greater than 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 will be made for the preliminary examination, but should the

owner decide not to have the work carried out, a nominal charge may be made to cover the cost of whatever work may have been done to prepare the estimate. Parts sent to us as patterns or for repairs, should have attached to them a label with the sender's full name and address. Instructions regarding such parts should be sent separately.

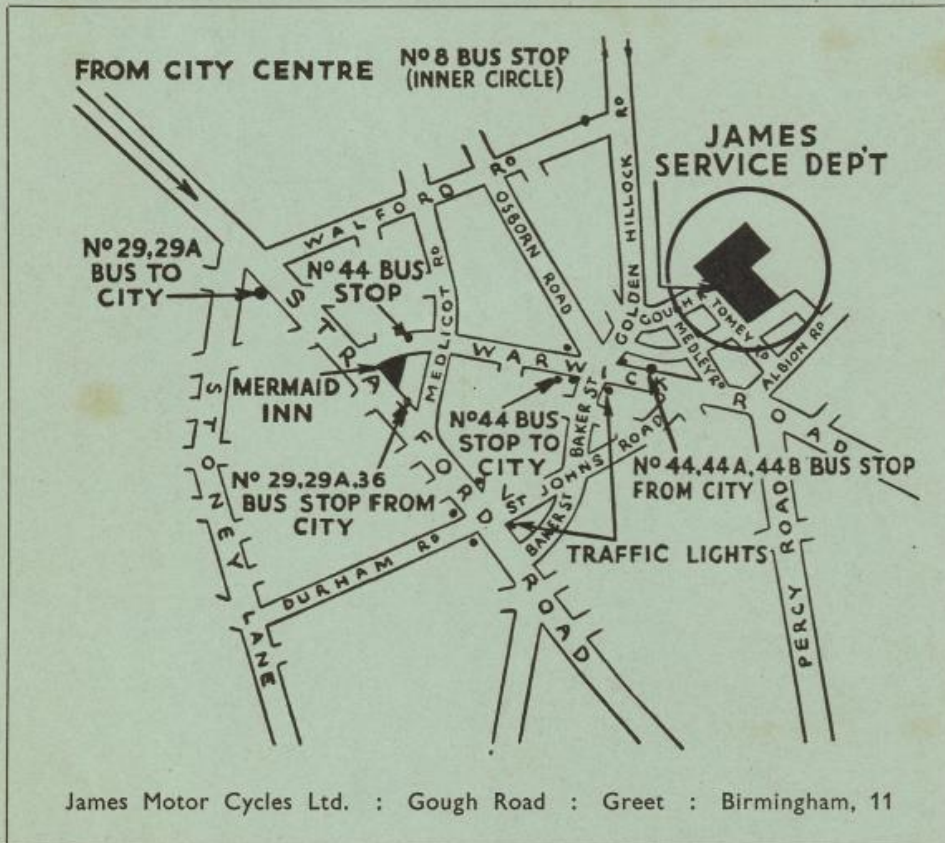
Customers wishing to retain old parts which are replaced during overhaul or repair should state so before work commences, as normally such parts are scrapped upon removal. If it is necessary to bring a machine, or parts, to the works for an urgent repair, it is essential that an appointment be made beforehand. This can be done by letter or telephone, and will avoid disappointment.

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

For the benefit of owners visiting the Factory Service Department we give below a plan indicating our position and Corporation bus services to and from City centre.

HOURS OF BUSINESS FOR CALLERS :

8.30 a.m. to
12.30 p.m.
1.30 p.m. to
5.30 p.m.



OPEN FROM MONDAY TO FRIDAY
(Not Open on National Holidays)

ROTARY EXCHANGE SERVICE

As a result of fair wear and tear, it is inevitable that certain parts will eventually require special attention and owners of JAMES machines will save both time and expense by taking advantage of the exchange service available for the replacement of major parts and units. Reconditioned components supplied under this scheme carry a full six months guarantee. Prices are available from our Service Department.

Parts to be exchanged under the Rotary Exchange Service should be handed to an official JAMES dealer or sent direct to the factory with appropriate instructions. We reserve the right to refuse badly damaged parts which cannot be satisfactorily reconditioned.

FORK. Owners are advised not to interfere with the fork unless absolutely necessary. If the fork has been damaged, service replacement units are available.

REAR SUSPENSION UNITS. Special jigs are used for assembling and stripping the units and should replacements prove necessary, the worn units should be returned complete.

BRAKE SHOES AND LININGS. Although replacement linings and rivets can be supplied, it is preferable to return the complete brake shoe and worn liner for replacement.

CYLINDER. The importance of accurate reboring cannot be over-emphasised and exchange cylinders rebored by our Service Department are ground to standard oversize limits and fitted with new oversize piston and rings.

CLUTCH PLATES. If the plates are not warped or otherwise damaged, they can be exchanged for reconditioned plates with accurately ground new cork inserts.

CRANKSHAFT. Available as service exchange.



GUARANTEE

We give the following guarantee with our motor cycles, motor cycle combinations and sidecars, including all accessories and component parts other than tyres, saddles, chains and lighting and electrical equipment, and other than accessories and component parts supplied to the order of the Purchaser and differing from those comprised in the standard specifications supplied with our motor cycles, motor cycle combinations and sidecars, but including accessories and parts supplied by way of exchange as hereinafter provided. This guarantee is given in place of any implied conditions or warranties or any liabilities whatsoever statutory or otherwise; no guarantee except that hereinafter contained and no conditions or warranty whatsoever statutory or otherwise is given or is to be implied, nor are we to be under any liability whatsoever except under the guarantee hereinafter contained. Any statement, description, condition or representation contained in any catalogue, advertisement, leaflet or other publication shall not be constructed as enlarging, varying or overriding anything herein contained. In the case of machines (a) which have been used for "hiring out" purposes or (b) any motor cycle 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 altered or removed or (d) any machines in which parts have been used not supplied by or approved by the motor cycle manufacturer or (e) any machine from which the silencing system as fitted by the manufacturer has been partially or wholly removed or interfered with, no guarantee, condition or warranty of any kind statutory or otherwise, is given or is to be implied, nor are we to be under any liability whatsoever in respect of any such machine. 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 in U.K. and ninety days overseas from date of purchase, or date of exchange in case of any accessory or part supplied by way of exchange as hereinafter provided, and damages for which we make ourselves responsible under this guarantee are limited to the free repair of or supply of a new part or accessory in exchange for the part of the motor cycle, motor cycle combination or sidecar or accessory which may have proved defective. We undertake, subject to the conditions mentioned below, to make good in manner aforesaid any part or accessory covered by this guarantee which has proved defective within the said period. We do not undertake to replace or refix or bear the cost of replacing or refixing any such new part or accessory in the motor cycle, motor cycle combination or sidecar. As motor cycles, motor cycle 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 motor cycle in such a manner as to cause damage or calculated to render the latter unsafe when ridden.
2. The use of a motor cycle or of a motor cycle and sidecar combined, when carrying more persons or a greater weight than for which the machine was designed by the manufacturers.
3. The attaching of a sidecar to a motor cycle by any form of attachment not provided, supplied or approved by the manufacturers, or to a motor cycle which is not designed for such use.

We do not guarantee tyres, saddles, chains or lighting and electrical equipment, or any accessories or component parts supplied to the order of the Purchaser differing from those comprised in the standard specifications supplied with our motor cycles, motor cycle combinations or sidecars. As regards all such tyres, saddles, chains, lighting and electrical equipment, accessories and component parts, no guarantee, condition or warranty of any kind statutory or otherwise is given or is to be implied, and we are to be under no liability whatsoever in respect thereof.

CONDITIONS OF GUARANTEE—If a defective part or accessory should be found in our motor cycles, motor cycle combinations or sidecars, or in any part or accessory supplied by way of exchange as before provided, 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 frame number of the machine, the date of purchase or the date when the alleged defective part or accessory 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.

REPAIRS—Any motor cycle, motor cycle 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, and this guarantee is in lieu and in exclusion of all conditions and warranties statutory or otherwise, and all liabilities whatsoever and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.

NOTE—We do not appoint agents for the sale on our behalf of our motor cycles or other goods, but we assign to motor cycle 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. Published retail prices are for delivery free of charge at Dealers' premises. All goods are offered for sale subject to the price ruling at the time of delivery. All prices and specifications are subject to alteration without notice.