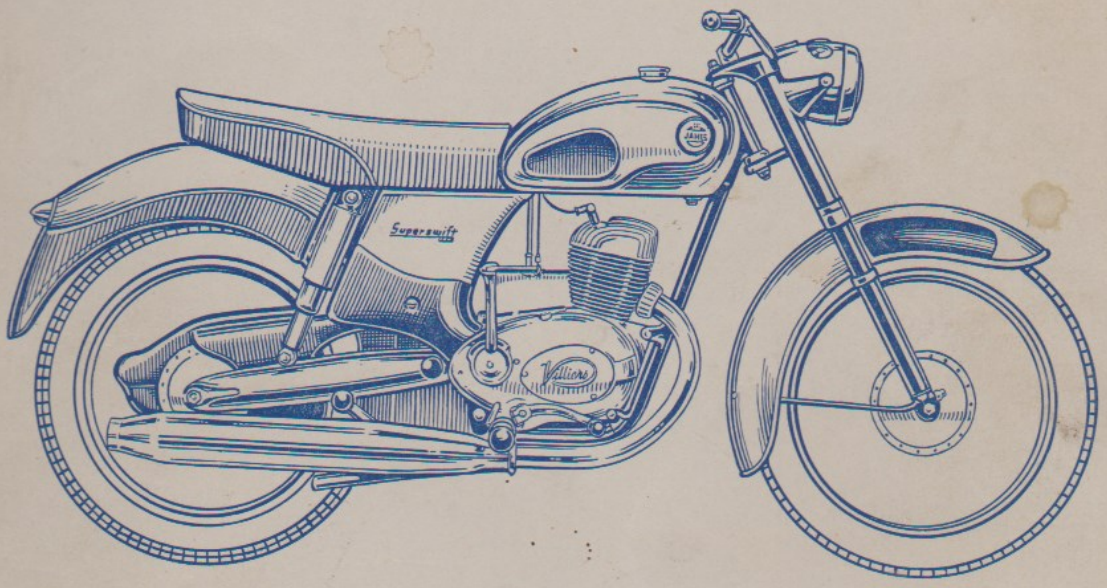
JAMES INSTRUCTION BOOK

SUPERSWIFT 250



MODEL M25

MANUFACTURERS

JAMES MOTOR CYCLES LTD · GREET · BIRMINGHAM · 11

PRICE : FOUR SHILLINGS AND SIXPENCE

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.

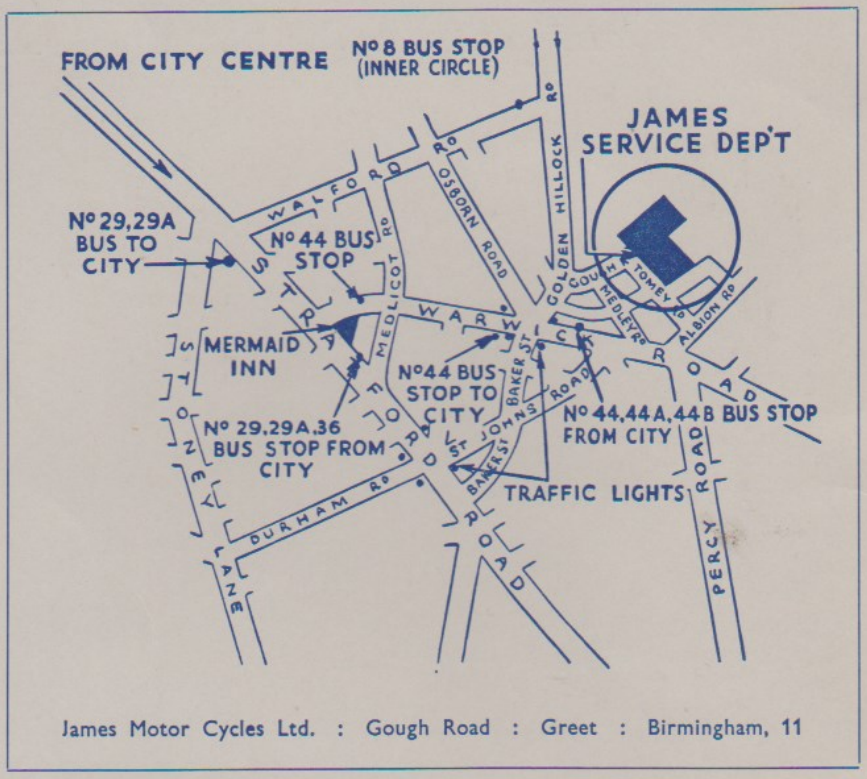
For the benefit of owners visiting the Factory Service Department we give below a plan indicating our position and Corporation 'bus services to and from City centre.

HOURS OF BUSINESS FOR CALLERS :

MONDAY TO FRIDAY
8.00 a.m. to 12.30 p.m.
1.30 p.m. to 5.30 p.m.

SATURDAY
8.00 a.m. to 12 noon

(Not Open on National Holidays)



James Motor Cycles Ltd. : Gough Road : Greet : Birmingham, 11

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.

CRANKSHAFT. Available as service exchange.

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

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.

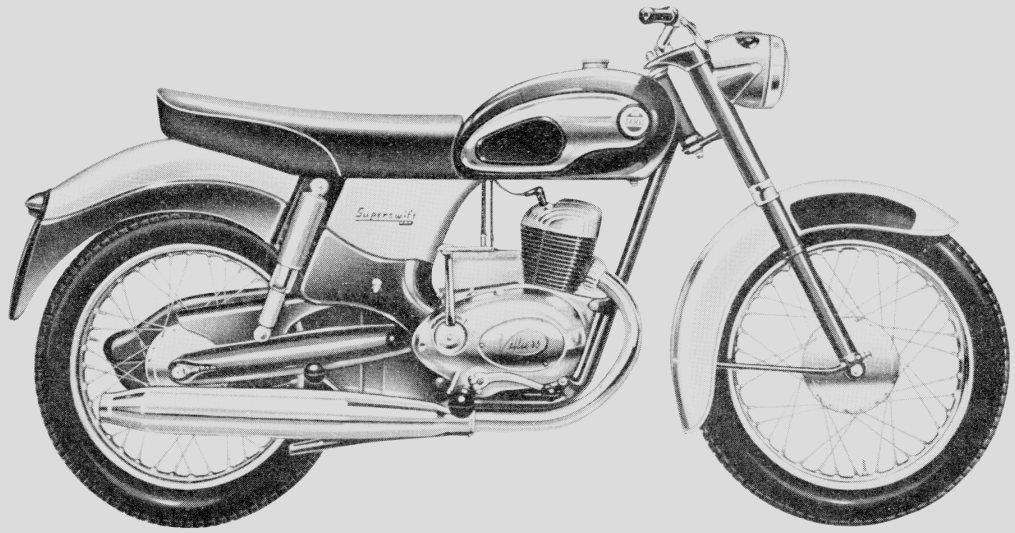
CYLINDER. The importance of accurate reboring cannot be over-emphasised and exchange cylinders rebored by our Service Department are ground to standard oversize limits and fitted with new oversize piston and rings.

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

JAMES

SUPERSWIFT 250

MODEL M25



Skilled design and construction have made your motor cycle as safe as possible. It has first-class steering and brakes and is very easy to handle in traffic. The very manoeuvreability 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, your machine 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, and many hours of exhilerating pleasure of a kind that is exclusive to motor cyclists.

We hope 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 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.

It is in your interest to observe these instructions carefully.

The service life, driving safety, and reliablity of your machine depend on the care you give it. Please consider this booklet as a guide destined to bring you quickly and safely to your destination.

James Motor Cycles Limited

GREET : BIRMINGHAM, 11 : ENGLAND

Telephone : Victoria 2211 (5 lines) **Telegrams : JAMESGREET BIRMINGHAM (Telex)**

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ILLUSTRATIONS

General Information

FRAME AND ENGINE NUMBERS.

Your James motor cycle is stamped with frame and engine numbers and it is in your interests to record these numbers in the spaces below. The numbers enable identification of the machine and must be quoted in any correspondence relating to your motor cycle.

FRAME NUMBER : On the left-hand side of the steering head tube.

ENGINE NUMBER : On top of crankcase, offside.

RECORD YOUR FRAME AND ENGINE NUMBERS HERE FOR REFERENCE

FRAME NUMBER	
ENGINE NUMBER	

FREE SERVICE SCHEME. *(UNITED KINGDOM)*

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

This service is arranged by the supplying dealer to whom the **Free Service Card** must be handed. This voucher will be found in the tool box upon taking delivery of a new motor cycle.

The **INSPECTION AND SERVICE** consists of :

(a) Check, and, if necessary, adjust :
  (1) Contact breaker points.
  (2) Sparking plug.
  (3) Clutch.
  (4) Chains.
  (5) Wheel bearings.
  (6) Brakes.
  (7) Forks and rear suspension.
  (8) Alignment of wheels.
  (9) Tyre pressures.

(b) Tighten all external nuts and bolts, including cylinder bolts.
(c) Check all lighting equipment.
(d) Clean out carburetter and adjust mixture.
(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.

THE MACHINE AND THE LAW. *(UNITED KINGDOM).*

Every motor cycle used on the public roads of Great Britain must be registered and carry the registration numbers and licence disc allotted to it. The dealer from whom the machine is bought will generally attend to all matters legally essential before it is used on the public roads.

TO REGISTER A NEW MACHINE.

Send the Local Motor Tax Department the following :

(a) Form " RF1/2," duly completed.
(b) The certificate of insurance.
(c) The invoice you receive from your dealer when you purchased the machine.
(d) The appropriate registration fee.

In due course you will receive :

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

The Registration Book and the Licence Disc will bear the registration numbers that have been allotted to your machine and will also show the date the road licence expires. Your number plates must then be painted, in white upon a black background, with the registration numbers in characters of even thickness as follows :

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

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

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

Although it is not legally necessary to carry your Driving Licence, Insurance Certificate and Registration Book while driving your machine, it should be noted that Police Officers have authority to ask for the Driving Licence and Insurance Certificates at any time.

SPEEDOMETER. A speedometer **MUST** be fitted to all motor cycles over 100 cc. It is supplied as standard equipment on your machine.

LAMPS. During the official **" LIGHTING UP "** hours the machine must exhibit a white light facing forwards and a red light facing rearwards. The rear number plate must be adequately illuminated by a white light.
Each electric light bulb **MUST** be marked with its " Wattage." (Beware of cheap, imported bulbs, that do not have this marking).
All motor cycles made by us have electric equipment that complies with the law regarding position, size of bulbs, marking on bulbs and the correct illumination of the rear number plate.

REFLECTOR. All solo motor cycles **MUST** display a reflector on the rear mudguard as well as a tail light. Reflectors should be $1\frac{1}{2}$" in diameter mounted so that the reflecting surface faces squarely to the rear at a height between 15" and 42" from the ground. The tail light incorporates a reflector surface which complies with British traffic regulations.

Newcomers to motor cycling and indeed all who are making their first acquaintance with the " Superswift " 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.

PETROL TAP. On left 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 STRANGLER. On top of carburetter. Close to enrich mixture for starting open as engine warms.

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

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.

MAJOR REPAIRS

The contents of this booklet are intended to give the owner a working knowledge of his machine and to enable him to carry out normal adjustments, maintenance and simple repairs. Where major repairs are concerned, we strongly advise the amateur mechanic to leave well alone and entrust difficult jobs, should they ever arise, to a qualified mechanic. Splitting the crankcase halves, for instance, is a very difficult matter and demands great skill and care, while years of experience are needed to replace a big end assembly and true the shafts. Our Repairs Department is fully equipped and major repairs carry a full three months' guarantee. With these facilities at the disposal of owners, we feel that it will repay our customers not to attempt too much but to keep within the limits outlined in this book.

Riding

FUEL. When the machine first comes into the hands of the rider it will be ready, but for fuel, for the road. For full instructions on fuel and lubrication please refer to page 7.

STARTING. See that there is sufficient fuel in the tank. Ensure gear lever is in NEUTRAL by rolling machine slightly forwards and backwards. (Neutral is between bottom and second gear).

Pull fuel tap to ON position.

Press down the plunger on top of the carburetter body and depress tickler until fuel appears.

Open twist grip about a quarter of its travel.

Standing over machine, depress kickstarter with a steady swinging movement.

When engine starts do not forget to release the plunger on top of carburetter as soon as possible.

Re-starting when the engine is warm will require no flooding of the carburetter, neither will it be necessary to depress the air control plunger.

FAILURE TO START. Commonly caused by over flooding carburetter. If repeated kicks fail to start after flooding (when cold) shut off the fuel supply, open throttle wide and clear crankcase of excessive fuel by turning the engine over rapidly with the kick starter pedal until it fires. Then do not close throttle but keep wide open until engine revolutions have built up and running is normal.

ERRORS IN STARTING. Mistakes often made whilst starting a motor cycle are :—

Opening throttle too wide, thus destroying 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.

Tickling the carburetter insufficiently. This operation must produce a head of fuel on the top of the carburetter body.

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

ON THE ROAD. Having started and warmed up the engine and sitting astride the machine, disengage the clutch and engage low gear by moving gear pedal upwards with toe. Next, release the clutch lever slowly and as the machine starts to move forward, open the throttle gently to enable the engine to take up the load. Increase speed gradually and when well under way, disengage the clutch, close the throttle a little and select second gear by pressing the pedal down. The gear change foot pedal must be moved to the full extent of its travel when selecting a gear.

The change from a high gear to a lower gear is made in a similar manner. A little practice will probably be necessary in order to change gear with ease and certainty, with all movements correctly synchronised, but the gears are very easy to manipulate and will present little difficulty. The gear change mechanism on a new machine is generally a little stiff and will ease considerably when the machine has been run-in.

STOPPING. Before slowing down glance to the rear to ascertain what vehicles are following and if necessary give the signal " I am going to slow down." (Full details of road signals will be found in The Highway Code available from H.M. Stationery Office).

When slowing down, change into a lower gear. The engine will thus assist the wheel brakes. As speed decreases to a few m.p.h., raise the clutch and select neutral, applying the brakes for the last few yards before stopping. When stopping (except in emergencies) apply the brakes gently and gradually. When the machine is to be left standing for any length of time, it is advisable to turn off the fuel supply when approaching destination, allowing the engine to use up the supply of fuel in the carburetter whilst coming to rest. This avoids the possibility of oil globules separating from the petrol and choking a carburetter jet.

RIDING IN TRAFFIC. In slow moving traffic engage lower gears. This permits the engine to run smoothly and enables overtaking to be accomplished in the minimum of time. The engine must never be allowed to labour, and the judicious selection of the right gear will prolong the life of the engine and the transmission system. Slipping the clutch should be avoided. Whenever in doubt about overtaking, always hang back.

RUNNING-IN. The manner in which a new motor cycle is driven during the first 1000 miles (1600 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.

Two-stroke engines are quickly run in, owing to their simple and efficient design. However, here, 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 one third throttle opening for the first 1,000 miles. Never let the engine labour on hills or in traffic, but change down to a lower gear so that the engine turns over lightly at all times.

After 1,000 miles greater throttle openings and short bursts of speed may be indulged in, but full throttle running over long periods should always be avoided. During the running-in period many other parts " bed down " and all nuts should be checked with a spanner for tightness after 200 miles. Check also the contact and spark plug gap, chain, and brake adjustments.

Road Craft

Take a pride in your riding technique : there are, unfortunately, a few motor cyclists whose reckless driving constitutes a menace, not only to themselves but to other road users. Your example of courteous, careful and unobtrusive riding will materially contribute to road safety and to the reputation of a fine sport.

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 linings. 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 labouring ; a good driver will learn to anticipate such a condition, and change down early.

When changing gear move the foot lever 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 into the verge. Never accelerate into a bend.

When using the brakes, apply gentle pressure at first, increasing in strength as the road speed decreases. Never brake hard unless the machine is vertical.

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 lowered.

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 you 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 learnt 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, 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 7.

AFTER THE FIRST 200 MILES

Examine the contact breaker points (see page 13).

Check nuts and bolts for tightness. Tighten if necessary.

Check adjustment of rear chain (see page 25).

Check steering head bearings (see page 9).

EVERY 500 MILES

Inspect oil level in gearbox and primary chaincase. If necessary top up with recommended oil. See Fig. 1.

Check contact breaker gap.

WEEKLY

Inspect tyres and check pressures (see page 10).

EVERY MONTH (every Fortnight in summer)

Clean battery terminals and top-up with distilled water (see page 24).

EVERY 1,000 MILES

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 page 7).

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

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.

Decarbonise when the need is apparent (see page 18).

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.

CHROMIUM PLATING. In damp weather, small spots of rust-like deposits 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.

Lubrication

Oil is the life blood of your motor cycle, 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. 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. See lubrication chart.

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 oil of good repute. Brands recommended are listed on page 7.

GEARBOX. Castrol XL (SAE 30) is recommended for the gearbox. The gearbox filler plug and dipstick are combined and positioned as shown in fig. 1. The oil capacity of the gearbox is approximately 1·2 pints and the oil level should be maintained to the notch cut in the dipstick. The oil level should be checked with the dipstick resting on top of the gearbox casing, and with the machine standing on level ground. A drain plug is provided at the base of the gearbox and it is recommended that the oil is replaced every 5,000 miles. **Do not over fill.**

SPEEDOMETER DRIVE. This is built into the gearbox, the drive gears being totally enclosed and lubricated by the gearbox oil. The flexible speedometer drive cable, however, requires periodical lubrication as recommended, care being taken to leave the last 12 inches clear of grease at the Speedo Head end.

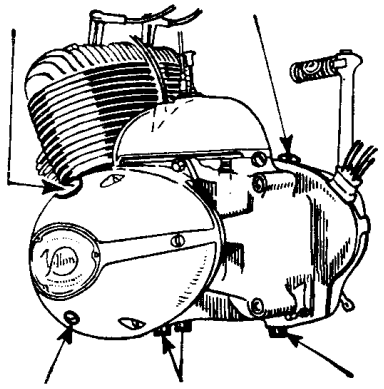


Fig. 1

CHAINCASE. The chaincase houses the primary drive chain and clutch. Castrolite (SAE 20) is used in the chaincase, filler and oil level plugs being provided. (See fig. 1). When filling the chaincase both plugs should be removed and oil fed in until it commences to run out of the level plug hole. Allow any surplus oil to drain off before replacing the plugs. Change oil 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 in the front forks 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. Rear driving chain should be removed occasionally for lubrication particularly under winter conditions.

Clean chain in paraffin allow to drain and wipe. Then immerse in one of the greases recommended, heated to just fluid state. Leave in soak for at least ten minutes while maintaining grease fluidity. Then hang to drain off surplus and replace.

Engine oil is a poor substitute for one of the recommended greases and if used the chain should be allowed to soak for several hours to ensure penetration to all joints, hanging to drain off surplus before fitting.

LIST OF RECOMMENDED LUBRICANTS

	SHELL	B.P.	CASTROL	MOBIL
ENGINE Petrol/Oil Ratio 20 : 1 unless otherwise stated	Shell 2T Mixture or Shell 2T Two stroke Oil	B.P. Zoom or Energol Two Stroke Oil	Castrol XL Castrol Two Stroke Oil (16 : 1)	MobilMix TT (16 : 1)
GEARBOX & CHAINCASE	Shell X–100/30	Energol SAE 30	Castrol XL	Mobiloil A
REAR CHAIN and SPEEDOMETER CABLE	Shell Retinax A	Energrease L2	Castrolease LM	Mobilgrease MP
WHEEL HUBS and STEERING HEAD BEARINGS	Shell Retinax A	Energrease L2	Castrolease LM	Mobilgrease MP
OIL CAN and CYCLE PARTS	Shell X–100 50	Energol SAE 50	Castrol XL	Mobiloil A
FRONT FORK	Shell X–100 20/20W	Energol SAE 20W	Castrolite	Mobiloil Arctic

PLEASE NOTE : 16 : 1 ratio—1 pint oil to 1 gallon petrol and 20 : 1 ratio—$\frac{1}{2}$ pint oil to $1\frac{1}{4}$ gallons petrol. Where two-stroke engine oil is not available please use SAE 30 Grade oils, recommended brands as above at ratio 20 : 1.

Front Fork

DESCRIPTION. The construction of the Telescopic Fork 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.

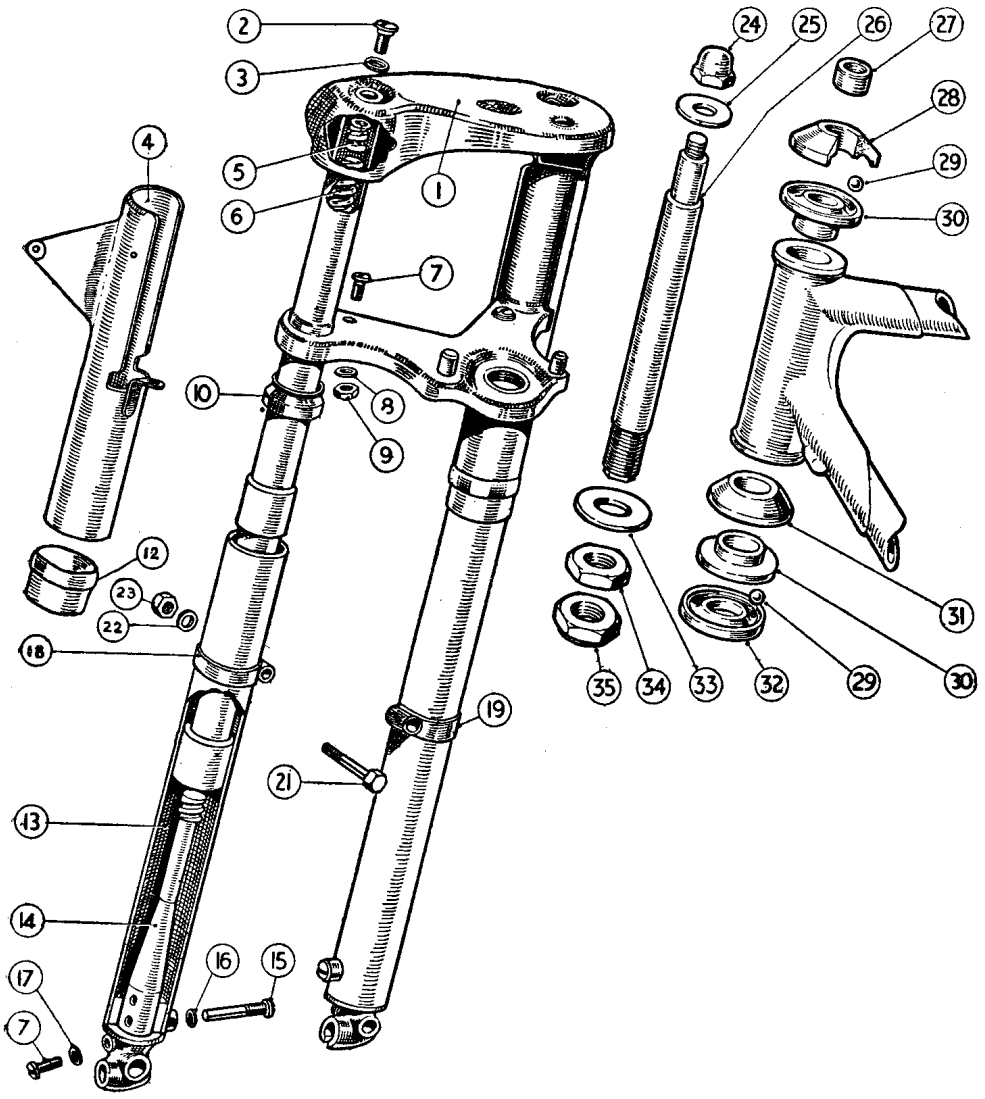
As the fork slider and damper tube move upward against the resistance of the main spring, oil is forced up through the annular clearance between the damper tube and the slider leg. Because the damper tube is tapered, the clearance diminishes progressively, resulting in increased hydraulic resistance 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.

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 recommended oil (see above and page 29). 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 8) 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.** *(continued page 9)*

Front Fork



1 Fork "H" member.
2 Screw, inner tube, top.
3 Washer, fibre, inner tube top screw.
4 Tube, cover, top, left and right.
5 Adaptor, inner tube top screw.
6 Spring, main.
7 Screw, top cover tube and drain plug.
8 Washer, shakeproof top cover tube screw.
9 Nut, top cover tube screw.
10 Seal, oil, fork tubes.
12 Sleeve, end, top cover tube.
13 Extension, slider.
14 Tube, damper.
15 Screw, retaining damper tube
16 Washer, fibre, damper tube retaining screw.
17 Washer, fibre, drain plug.
18 Clip, mudguard attachment, left.
19 Clip, mudguard attachment, right.
21 Bolt, mudguard attachment clip.
22 Washer, mudguard attachment clip bolt.
23 Nut, mudguard attachment clip bolt.
24 Nut, domed, head stem, top.
25 Washer, head stem top domed nut.
26 Stem, head.
27 Spacer, head stem.
28 Race, adjusting top.
29 Bearings, ball, head races.
30 Race, frame head lug, top and bottom.
31 Cover, dust, bottom ball race.
32 Race, fork crown, bottom.
33 Washer, head stem bottom nuts.
34 Nut, adjusting, head stem, bottom.
35 Nut, lock, head stem, bottom

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, 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 8) after which it will be possible to withdraw the stem itself (26, page 8) 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 and also care must be taken to remove distance piece and shims before removing fork. These are located beneath top plate. 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 8).

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 to be fitted.

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

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.

The removal of rear suspension unit 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.

To remove bearings from hubs the spindle should be tapped gently with a mallet, from the brake side ; thus the bearing and spindle can be removed complete. The remaining bearing can then be tapped out from the opposite side.

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.

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 cable.

Slacken nearside pinch nut, lightly tapping it with a spanner to release mudguard stay. With the use of a $\frac{7}{16}$" Whit. open ended spanner or tommy bar, unscrew spindle complete and withdraw it from the hub. This will allow the removal of wheel from forks.

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. Screw in spindle (a smear of grease over the nuts and the mudguard cotters will prevent rust and facilitate subsequent wheel removals). Tighten the spindle and the mudguard stay nut on the brake side.

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 is 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. Unscrew the knurled brake rod adjuster and 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 reconnected, (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

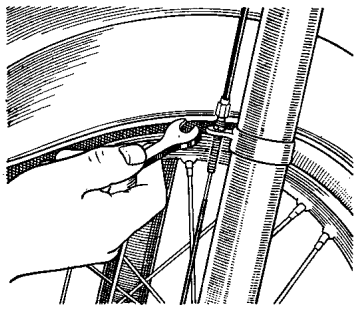
has been removed, it is a good plan to adjust chain tension before replacing it. To do so, it is essential to have someone sitting on the machine with the stand retracted so that the rear suspension is compressed to the normal riding position. Chain tension should then be checked in several positions 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 ½" chain whip. Having obtained correct chain adjustment, tighten the spindle nuts and adjuster lock nuts.

Refit bottom chaincase cover and adjust the rear brake.

WHEEL ALIGNMENT

It is wise always to 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.



FRONT BRAKE CABLE ADJUSTMENT

BRAKES

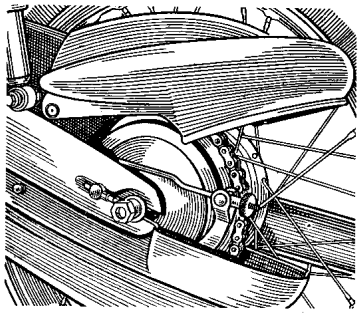
If the brakes are correctly adjusted and oil is never used to lubricate the bearings, the brakes will require no attention for many thousands of miles.

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

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

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.

REAR BRAKE FINGER ADJUSTMENT



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.

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.

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.

For recommended tyre pressures see page 28.

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 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 ½" up the shaft. The white spot on side of outer-cover should be positioned over valve.

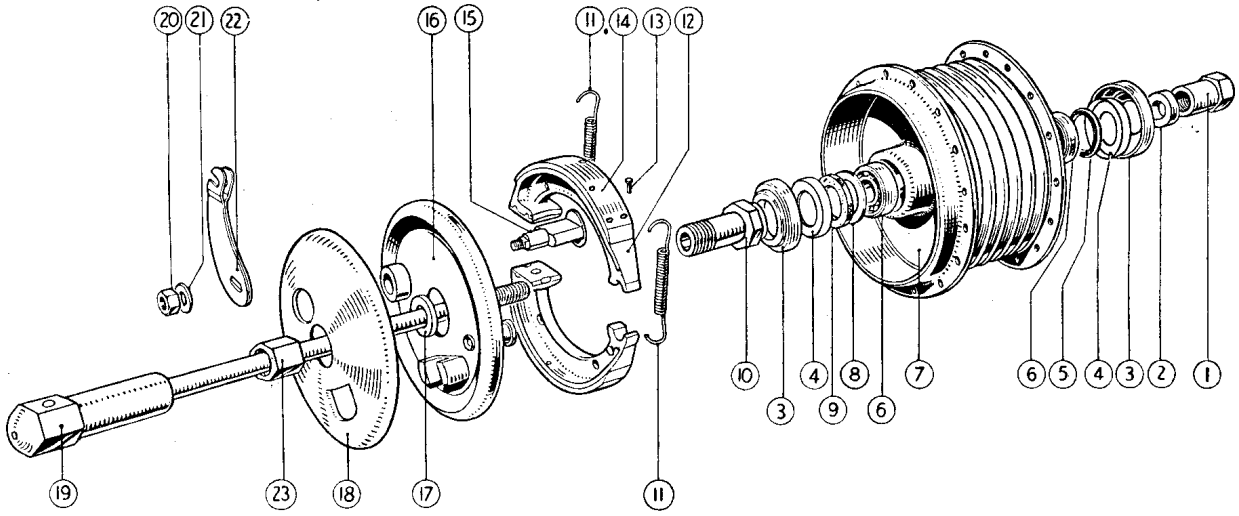
Move free edge of cover over rim opposite valve and work round rim, equally on either side of valve until a few inches remain free. The valve should be in the centre of this free length and no difficulty should be experienced in getting it over the edge of rim providing the rest of the cover is right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

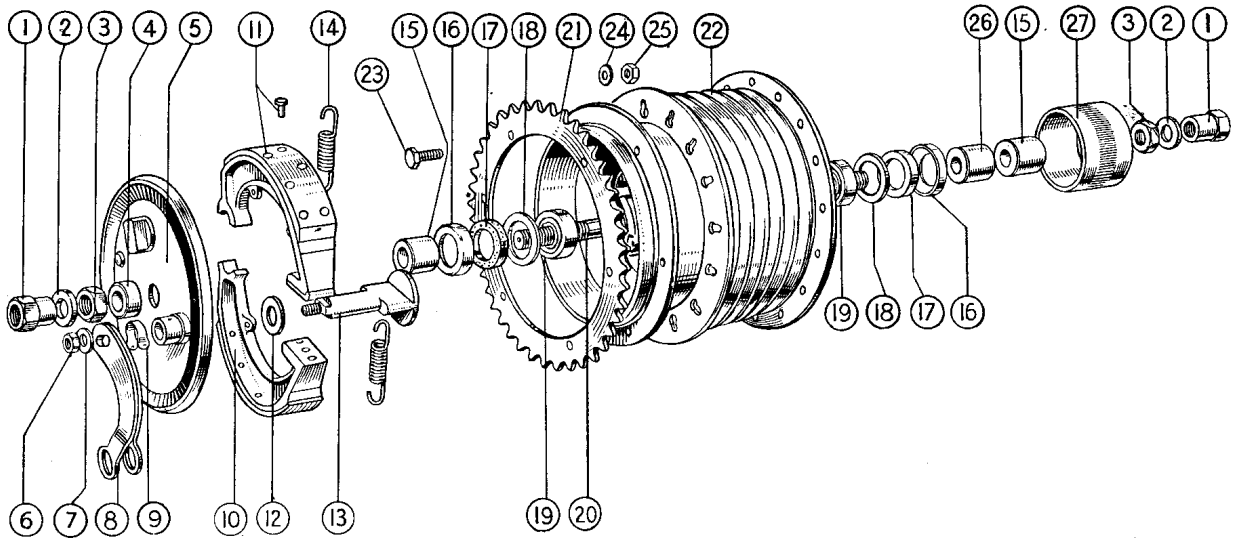
When fitting new tyres it is a good plan to smear a little soft soap around the rim to ease the cover on.

FRONT HUB ASSEMBLY



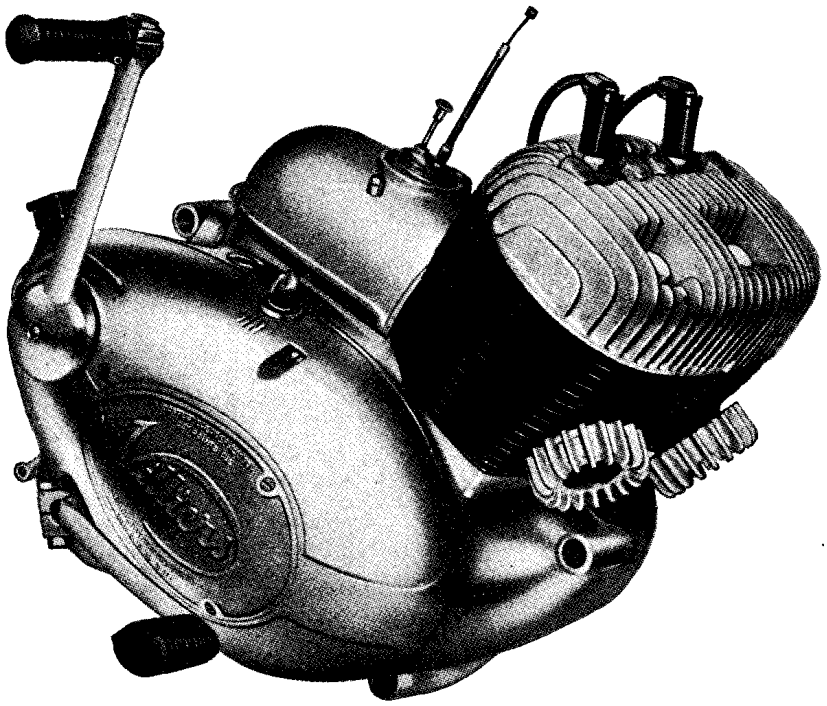
1 Spindle nut.
2 Spacer.
3 Enclosure cup cover.
4 Enclosure cup cover.
5 Rubber seal.
6 Journal bearing.
7 Hub shell.
8 Enclosure steel washer.
9 Felt seal.
10 Back plate spacer.
11 Brake shoe spring.
12 Brake shoe.
13 Brake lining rivet.
14 Brake lining.
15 Brake cam.
16 Brake plate.
17 Spacer.
18 Domed cover.
19 Spindle.
20 Cam lever nut.
21 Plain washer.
22 Cam lever.
23 Spacer nut.

REAR HUB ASSEMBLY



1 Spindle nut $\frac{9}{16}$" × 26.
2 Plain washer $\frac{9}{16}$" × 10 swg.
3 Locknut $\frac{9}{16}$" × 26 × $\frac{3}{8}$" thick.
4 Spacer $\frac{5}{16}$" thick.
5 Brake back plate.
6 Brake shoe, lining and rivets.
7 Return spring.
8 Brake cam.
9 Hub cover.
10 Brake cam lever.
11 Brake cam roller.
12 Plain washer.
13 Hex nut $\frac{5}{16}$" × 26 t.p.i.
14 Plain washer.
15 Spacer $\frac{1}{2}$" thick.
16 Seal enclosure cup.
17 Felt seal.
18 Seal enclosure washer.
19 Journal bearing 42 × 15 × 13 mm.
20 Spindle $\frac{9}{16}$" dia.
21 Chain sprocket — 50 teeth.
22 Hub shell.
23 Hex bolt $\frac{1}{4}$" × 26 t.p.i.
24 Shakeproof washer.
25 Hex nut.
26 Speedometer gearbox.
27 Spacer $\frac{7}{8}$" thick.

Power Unit



THE VILLIERS 2T ENGINE UNIT

Quality and the ability to give long and reliable service are the primary considerations in the production of the Villiers 2T Engine Unit, but when servicing eventually becomes necessary it is very important that the correct tolerances are maintained and it is, therefore, essential that only genuine Villiers spares are used.

This section is intended to be a guide for routine maintenance only of the Engine Unit. For complete overhaul instructions please consult the Villiers Workshop Manual for two-stroke engine gear units obtainable from the James Service Dept., price 6/–.

CLUTCH AND PRIMARY DRIVE

The drive from the engine to the multi-plate clutch is by a pre-stretched endless roller chain running in the oil bath chaincase. No attention is necessary beyond that of lubrication and occasional adjustment of the push rod and clutch lever. Whilst the clutch is engaged, i.e. driving, there must be clearance between the end of the push rod and the clutch lever. An adjuster having a slotted end is provided for clutch lever adjustment, and this can be reached with a screwdriver through a hole in the right-hand cover. The adjuster screw should be positioned until there is $\frac{1}{16}$" free movement between the bottom end of the clutch lever and the right-hand cover. The clutch control cable adjuster should then be positioned to permit the inner cable to move freely over at least $\frac{1}{8}$". It is most important that there is no end pressure on the push rod whilst the clutch is engaged.

ADJUSTMENT OF CLUTCH PUSH ROD. In order to maintain satisfactory operation of the clutch, it is necessary for the effective length of the push rods to remain within certain limits. This adjustment is carried out by means of the adjuster situated in the centre of the clutch cap nut.

When carrying out this adjustment, it is preferable to remove the clutch lever so that the extent to which the push rod protrudes through the gearbox end cover can be measured. The correct setting is for the push rod to protrude $\frac{5}{16}$" and the adjusting screw in the clutch cap nut should be turned until this setting is obtained. It is most important that the adjuster screw lock nut is securely tightened after carrying out any adjustments. Under normal conditions of running adjustment of the push rods should not be necessary unless new push rods and/or clutch components have been fitted, but it is recommended that the push rod setting be checked at the time of changing the oil in the chaincase as the push rod adjusting screw is then readily accessible. After adjusting the push-rods the clutch lever and cable should be checked for freedom of movement.

Do not slip the clutch when in motion, except when getting away from a standing start, otherwise rapid wear of the clutch linings will occur. When stopping for any length of time at traffic lights, etc., move the gear lever to the neutral position and engage the clutch.

FLYWHEEL MAGNETO GENERATOR

Both the ignition and battery charging circuits are fed from coils mounted on the armature plate on the right-hand side of the engine. The flywheel is fastened to the right-hand drive shaft to an extension of which is fitted the cam which operates the contact breakers. A wiring diagram of the complete installation is given on page 24, and from this it will be noted that two ignition coils and a selenium rectifier, together with battery and lighting set complete the electrical equipment.

IGNITION TIMING

There are two completely separate ignition circuits, each being energised by one of the coils on the armature plate. The contact breaker assemblies are mounted on separate base plates, and each can be rotated round the centre line of the ignition cam, thus giving independent timing of each cylinder.

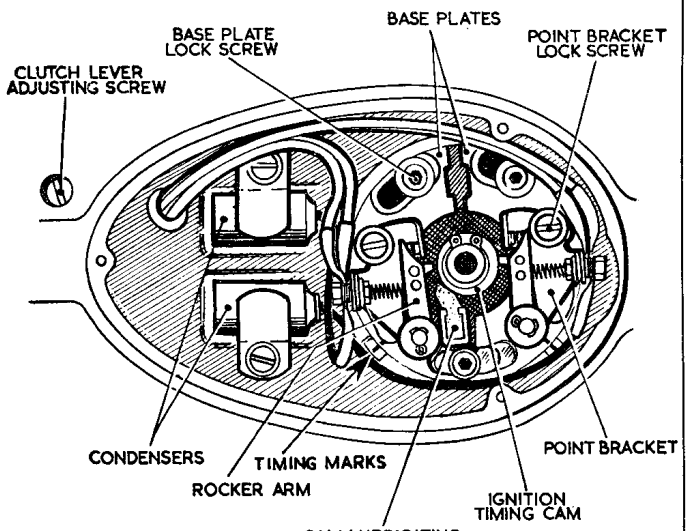


Fig. 2.

Reference to fig. 2 will show the three socket headed screws which lock the contact breaker base plates in position ; as the ignition timing is correctly set at the works it is not advisable to release these screws. It is essential to keep all electrical connections clean and tight, and to maintain the contact breaker point gaps at ·012″/·015″. Adjustment of the gap is carried out as follows :—

Rotate engine until the left-hand contact breaker is in the fully open position, i.e. with the left-hand (drive side) piston in the top dead centre position. Release left-hand point bracket lock screw and adjust contact breaker point gap to ·012″/·015″, using the screwdriver and feeler gauge provided with the engine. Securely re-tighten lock screw. Repeat the operation with the right-hand contact breaker (with the right-hand piston, magneto side, in the top dead centre position).

Should it be necessary to re-set the ignition timing, the solder must first be removed from the three socket headed screws. Having checked that the contact breaker gap setting is correct (·012″/·015″), rotate the engine until the left-hand piston is positioned $\frac{3}{16}$″ before top dead centre, and then release the bottom socket headed screw and the screw securing the left-hand contact breaker bracket.

Rotate the bracket until the contact breaker points are just opening. Lock the base plate fixing screw, rotate the engine until the right-hand piston is $\frac{3}{16}$″ before top dead centre, and adjust the right-hand contact breaker base plate until the contact breaker points commence to open.

After re-checking the timing of each cylinder, tighten the bottom socket headed screw and check that the other two screws are securely tightened. To check piston positions accurately, both cylinder heads should be removed.

A felt lubricating pad is provided for the contact breaker cam, and occasional soaking of the pad in molten high melting point grease is recommended to ensure silent operation of the contact breakers and to reduce the wear on the fibre heel of the rocker arms.

IGNITION COILS. Each ignition coil is mounted in a moulded case with external screwed connections, and no attempt should be made to dismantle these assemblies.

An ignition switch with key is mounted on the right-hand cover and this enables the engine to be immobilised when the machine is left unattended.

A multi-pin plug and socket carry the electrical connections from the engine to the ignition coils and battery charging circuits, and it is most important to ensure that the plug contacts are clean and secure, otherwise trouble may be experienced with both ignition and lighting circuits.

AIR FILTER AND CARBURETTER COVER. The filter fitted to the carburetter cover is designed to prevent foreign matter being drawn into the engine with the intake of air.

Despite the large area of the filter periodical cleaning is necessary ; the filter element is easily removed for washing in petrol or paraffin and then dipping in petroil before replacing. Care should be taken to ensure correct re-fitting of the filter gauze, as during the cleaning operation it may spring open thus causing difficulty in making proper contact with the felt washer, particularly at the smaller end. An elastic band placed round the smaller diameter will greatly facilitate this operation — the band afterwards being cut through and drawn out.

When re-fitting the cover ensure that the felt washer is in position on the carburetter body, locate the cover on the two dowels and press forward so that the face makes contact with the cylinders when the knurled screw is tightened.

CARBURETTER. Villiers Type S.22/2 is fitted to a detachable inlet pipe connecting the inlet ports of the two separate cylinder castings. Access is obtained by releasing the cover fixing screw and removing the carburetter cover.

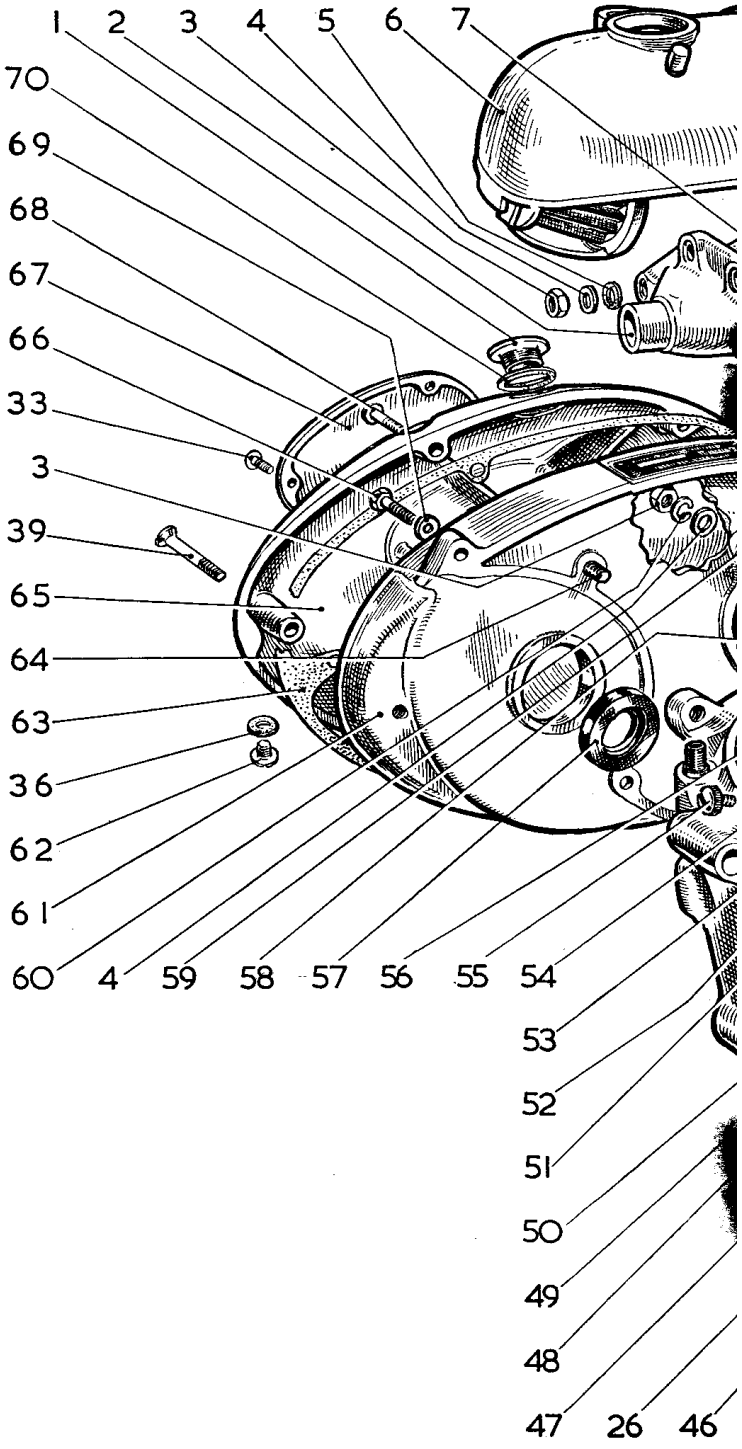
All air entering the carburetter passes through the filter housed in the cover. A strangler slide for easy starting operates within the throttle, control being by a short rod protruding through the top of the carburetter.

Provision is made for adjustment of the slow-running mixture, by means of a screw on the right-hand side of the carburetter, and for the taper needle, slotted to engage in a spring clip attached to the throttle. As the carburetter is set during initial bench testing of the engine, and again when the complete machine is tested by the manufacturer, it should not be necessary to make other than very minor adjustments to the taper needle or slow-running mixture control screw.

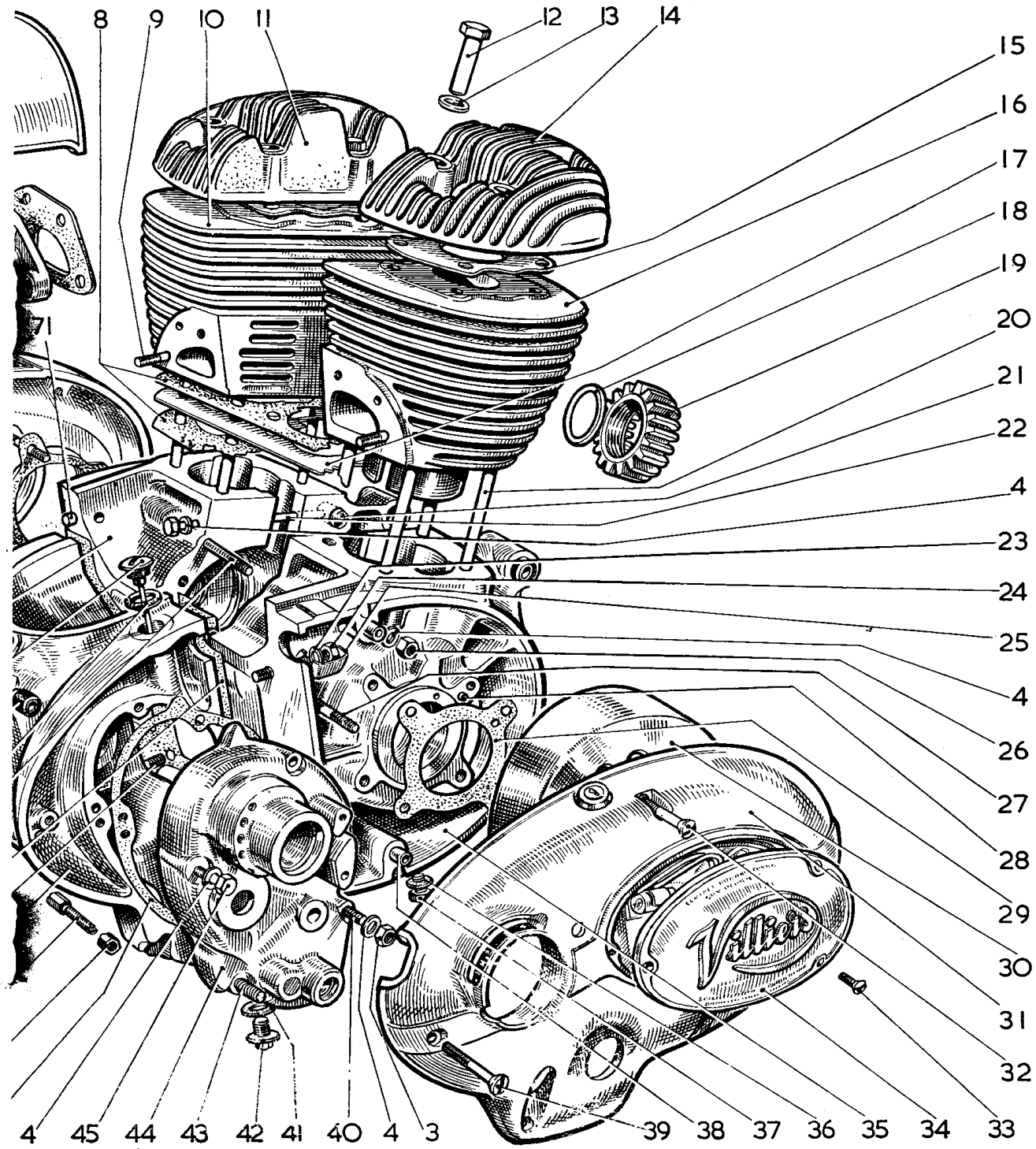
The main jet which controls the flow of petrol through the carburetter at the higher throttle openings is located in the bottom of the float chamber, and can be unscrewed for cleaning. A petrol filter is incorporated in the banjo fitting connecting the petrol pipe to the carburetter. The flow of fuel into the float chamber is controlled by a fuel needle, seating in a brass bush, operated by a lever which engages with the top of the float. Both the fuel needle and bush are accessible after the float cup, float and needle operating lever have been removed.

OPERATION OF CARBURETTER. The handlebar twistgrip (or lever) control operates the throttle slide and thereby regulates the amount of mixture entering the engine, whilst the carburetter itself automatically meters and atomises the correct amount of fuel to give the necessary mixture strength. To achieve this automatic control of the mixture strength, the carburetter incorporates main-jet

1 Cap, filler, chaincase.
2 Pipe, inlet.
3 Nut, standard hexagon.
4 Washer, plain.
5 Washer, insulating, inlet pipe stud.
6 Cover, carburetter and air filter group.
7 Washer, joint, inlet pipe.
8 Washer, joint, cylinder base.
9 Stud, fixing, inlet pipe.
10 Cylinder, left hand.
11 Head, cylinder, left hand.
12 Nut, cylinder and head studs.
13 Washer, cylinder and head studs.
14 Head, cylinder, right hand.
15 Washer, joint, cylinder head.
16 Cylinder, right hand.
17 Plate, joint, cylinder.
18 Washer, exhaust pipe nut.
19 Nut, exhaust pipe.
20 Stud, fixing, cylinder and head.
21 Trunnion, pinch bolt
22 Bolt, pinch, left hand crankcase.
23 Washer.
24 Nut.
25 Clip, cable.
26 Nut, small hexagon.
27 Stud, fixing, crankcase.
28 Dowel, armature plate.
29 Washer, joint, armature plate.
30 Magneto assembly.
31 Cover, right hand, (less contact breaker cover and ignition switch).
32 Screw, right hand cover.
33 Screw, contact breaker cover and left hand nameplate.
34 Cover, contact breaker.
35 Crankcase, right hand.
36 Washer, drain and level screws.
37 Screw, drain.
38 Dowel, crankcase right hand cover.
39 Screw, right hand cover and chain case.
40 Stud, long, gearbox end cover.
41 Washer, gearbox drain plug.
42 Plug, drain, gearbox.
43 Stud, short, gearbox end cover.
44 Cover, end, gearbox, bushed.
45 Bolt, gearbox end cover.
46 Washer, joint, gearbox end cover.
47 Adjuster, clutch cable.
48 Gearbox shell, bushed.
49 Stud, gearbox/crankcase.
50 Washer, joint, gearbox/crankcase.
51 Stud, aligning, crankcase.
52 Washer, dipstick.
53 Bush, mounting lug, crankcase.
54 Dipstick, gearbox.
55 Screw, carburetter cover.
56 Crankcase, left hand.
57 Seal, oil, chaincase.
58 Washer, joint, crankcase/chaincase.
59 Stud, fixing, chaincase rear half.
60 Washer, spring, $\frac{1}{4}$".
61 Chaincase, rear half.
62 Screw, oil level, chaincase.
63 Washer, joint, chaincase.
64 Screw, fixing.
65 Chaincase, front half.
66 Screw, fixing, chaincase/gearbox.
67 Cover, nameplate, left hand.
68 Screw, short, chaincase front half.
69 Washer, screw.
70 Washer, filler cap.
71 Dowel, gearbox.



Assembly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Villiers

and pilot-jet systems. At idling speeds the carburetter draws fuel from the pilot-jet and, as the throttle is gradually opened, the fuel is then drawn in turn from the pilot " progression " hole and the main-jet system.

(a) **Pilot-Jet System.** (See Figs. 3 & 4). At idling speeds, when the throttle is nearly closed, the pilot outlet hole A is subject to the very high engine suction, and petrol is, therefore, drawn from the float chamber through the pilot tube B, and the pilot outlet hole. The calibrated pilot-jet is contained in the top of the pilot tube. At the same time, a filtered supply of air is drawn from the mouth of the carburetter through passage C, through the variable air-jet D, and is then pre-mixed with the fuel in the small chamber E. The pilot adjuster screw F varies the size of the pilot air-jet, and therefore, the pilot mixture strength — to richen mixture, turn screw clockwise.

When the throttle slide is opened a small amount beyond that required for idling, the suction on the pilot outlet hole is reduced, but at the same time, the suction on the pilot " progression " hole G increases. A further supply of petrol is, therefore, drawn through the " progression " hole, and prevents the weak spot which would otherwise occur due to the fall off in supply from the pilot hole before the main jet comes into full operation.

It follows from the preceding remarks that whenever the throttle is shut off whilst the engine speed is high (such as on long downhill sections), the pilot system is subject to the full engine suction, and petrol will flow into the engine from the pilot outlet hole. As the engine is not firing under these conditions, this fuel supply will tend to build up in the crankcase and cylinder and cause severe " four-stroking " or " eight-stroking " when the throttle is opened again.

To overcome this an automatic air bleed to the pilot has been incorporated, which relies upon the matching of two slots, one in the throttle slide R and the other in the carburetter body S. When the throttle slide is shut, these two line up and air can flow from the front of the carburetter through the throttle slide and down passages H and J into the pilot system. The high depression on the pilot system is then destroyed. In all other throttle positions, the two slots do not line up, and no air can pass to the pilot system through these passages.

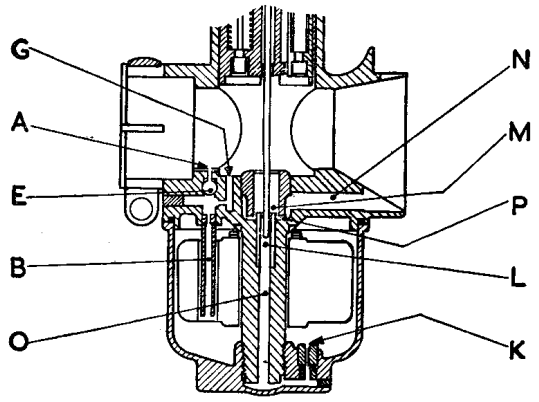


Fig. 3.

(b) **Main Jet System.** As the throttle slide is opened further beyond the idling and progression positions, the engine suction has its effect upon the main-jet system, and petrol is drawn from the float chamber through the calibrated main-jet K and the needle-jet L and into the small pre-mixing chamber M. There the petrol is atomised by the filtered secondary air which is drawn from the mouth of the carburetter along passage N, and which enters the centre-piece O through four small holes P. The rich petrol-air mixture then flows from the pre-mixing chamber into the main mixing chamber, where it meets the main air stream. The effective size of the needle-jet L depends upon the throttle slide position (as the taper needle is fixed to the slide), and the sizes of the needle-jet and the needle are chosen to give correct carburation over the range.

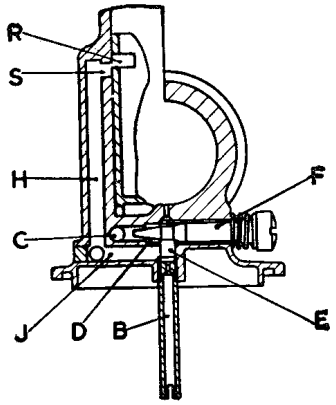


Fig. 4.

TUNING THE CARBURETTER. Before any attempt is made to tune the carburetter it is essential that the engine is in good mechanical condition. This means that there should be no air leaks at any of the joints, there should be a good spark at the plug points and also that there is no restriction in the fuel supply. It is also important of course, that the carburetter is clean internally, and that the air filter is not obstructed.

There are three adjustments for tuning the carburetter, but each of these has its full effect at a particular part of the throttle range, and should therefore, only be used for tuning that particular part of the range. There is also a definite sequence for the tuning which must be adhered to in order that the results achieved with one adjustment are not upset by the next adjustment.

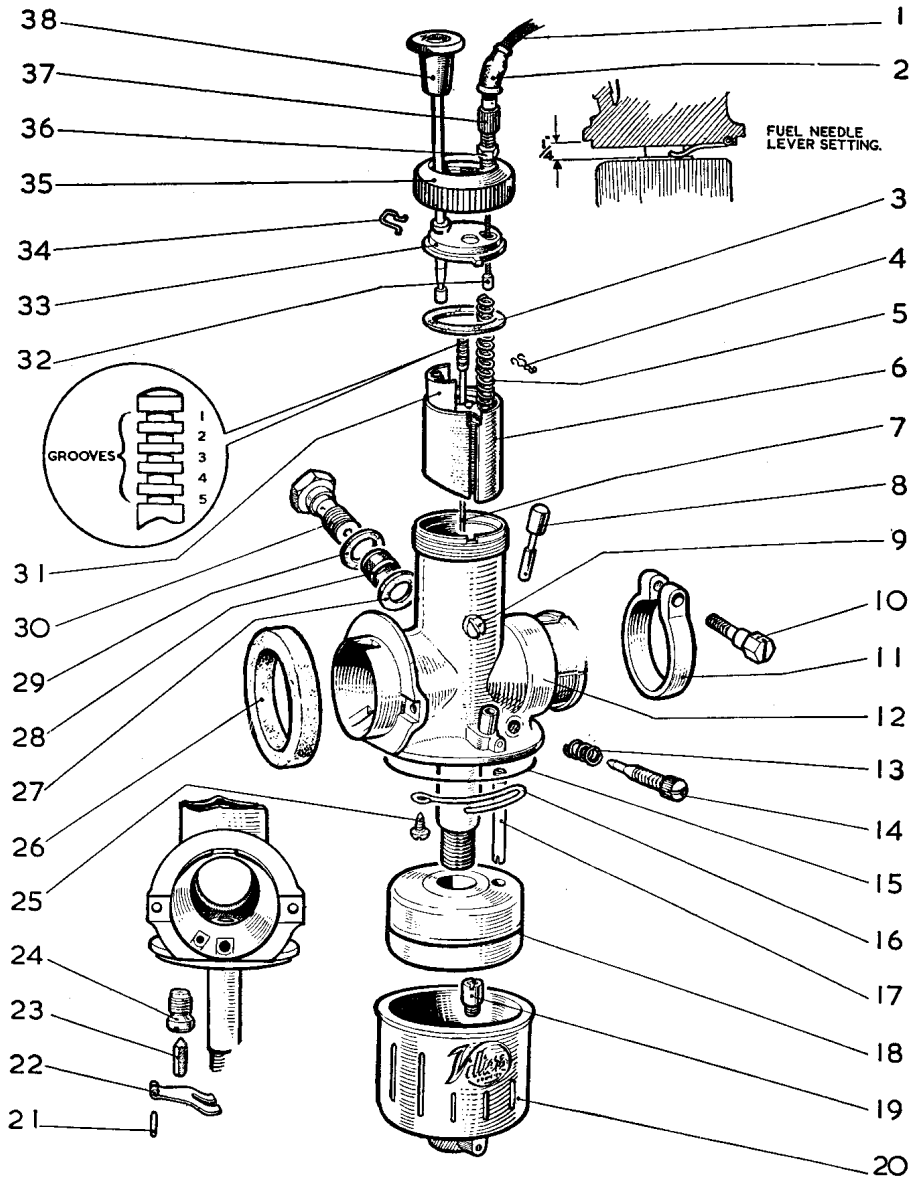
The sequence of tuning, with the necessary adjustments, is given below :—

(1) **Main Jet. Throttle Range—$\frac{3}{4}$ to Full.** In order to obtain the correct main-jet size, the engine must be tested at full throttle in top gear. If the engine lacks power, detonates badly or runs better with the strangler slightly closed, a larger main-jet is required. Should the engine " four-stroke " or improve momentarily after the petrol has been switched off, a smaller jet is required. After de-clutching and stopping the engine quickly the sparking plug should have a shiny black appearance if the correct main-jet is fitted. As an additional guide the engine should tend to " four-stroke " at full throttle in bottom gear on level ground (or high engine speeds in neutral), but not in any higher gears.

(2) **Pilot Jet. Throttle Range—Closed to $\frac{1}{8}$ open.** The pilot jet must be set when the machine is stationary with the engine running at the required idling speed. To richen mixture, screw in the pilot adjuster screw, and to weaken, unscrew pilot adjuster. The mixture must be set as weak as possible consistent with a steady reliable idling speed and good engine acceleration from this throttle position. If the mixture strength is set too rich, trouble will be experienced with the fuel build-up in the crankcase when the throttle is shut with the engine still running fast. Should this latter fault be present after adjusting the pilot, unscrew pilot a further half turn.

(continued on page 18)

CARBURETTER TYPE S.22/2 *Fig. 5*



1 Throttle cable complete with adjuster and nipple.
2 Cover, cable adjuster.
3 Washer, top disc.
4 Circlip, needle locating.
5 Spring, throttle return.
6 Throttle, No. 3 cut-away.
7 Needle, No. 3½.
8 Rod, tickler, with cap.
9 Screw, throttle guide.
10 Screw, body clip.
11 Clip, carburetter body.
12 Body, carburetter, complete with diffuser plug and needle jet.
13 Spring, pilot jet needle.
14 Needle, pilot jet.
15 Washer, float chamber joint.
16 Spring, tickler.
17 Jet, pilot 35 c.c.
18 Float.
19 Jet, main, 170 c.c.
20 Chamber, float.
21 Pin, fuel needle lever hinge.
22 Lever, fuel needle.
23 Needle, fuel.
24 Bush, fuel needle.
25 Screw, tickler spring.
26 Washer, felt carburetter sealing.
27 Washer, banjo, small hole.
28 Gauze, petrol filter.
29 Washer, banjo, large hole.
30 Screw, banjo.
31 Strangler slide.
32 Nipple, cable, throttle end.
33 Disc, top.
34 Clip, spring.
35 Ring, carburetter top.
36 Nut, cable adjuster.
37 Adjuster, cable.
38 Strangler knob and spindle.

The throttle slide is made with a cut-away on the carburetter inlet side which influences the depression on the main-jet system between $\frac{1}{8}$" and $\frac{1}{4}$" open.

(3) **Taper Needle Adjustment. Throttle Range—$\frac{1}{4}$ to $\frac{3}{4}$ open.** The taper needle, which operates with the throttle, controls the mixture strength over most of the " cruising range " and must be set correctly for economic fuel consumption and good acceleration.

To weaken the mixture lower the needle by engaging the spring retaining clip in a lower numbered slot and to richen the mixture raise the needle by engaging the clip in a higher numbered slot (see Fig. 5). Should it be found necessary to alter the position of the needle re-check the pilot jet setting as this may have been affected by other adjustments.

TO CHANGE THE TAPER NEEDLE. The retaining spring should be moved to one side after which the taper needle can be lifted upwards and out of the throttle.

TO CHANGE THE FUEL NEEDLE. To obtain access to the fuel needle remove the carburetter float cup, which, incidentally, contains the main-jet screwed into the bottom. The fuel needle lever, located in the body, is retained by a pivot pin, the removal of which will release the lever and allow the fuel needle to be taken from its bush, (which also can be extracted by unscrewing should wear make replacement necessary). Fuel needle lever setting is illustrated in Fig. 5.

TO REASSEMBLE CARBURETTER. Clean the various components making sure that the tickler vent hole is clear. and that the main-jet is screwed tightly into the float chamber. Replace float and check that float chamber seating ring is properly located in the recess in the carburetter body. Screw float cup into position, taking care not to overtighten.

Replace throttle in body at the same time guiding the taper needle into hole in top of centrepiece. A guide screw in in the carburetter body will prevent the throttle being replaced unless it is correctly positioned. Locate top disc in top of body and screw on top ring. If the carburetter has been removed from the engine, make sure when re-fitting that the body is pushed on to the manifold as far as possible, and that it is set upright. There are four narrow slots in the body to allow the securing clip to function, and if the manifold stub does not extend past the end of the slots, air will be drawn in causing hard starting and erratic running.

The carburetter has a banjo petrol pipe fitting inside of which is a fine mesh filter gauze which should be periodically cleaned by dipping in petrol. Be sure that when replacing the petrol pipe the fibre washers make a petrol tight joint, otherwise fuel will be wasted.

DECARBONISING

The places where carbon forms most rapidly are the cylinder head, top of piston, exhaust port, and silencer. Carbon deposits on the piston and cylinder head will reduce the compression space, eventually causing pre-ignition and rough running, whilst heavy deposits in the exhaust pipe and silencer will cause " back pressure " resulting in loss of power, over-heating, and high fuel consumption.

In order to maintain engine efficiency, it is advisable to remove carbon from cylinder heads and piston crowns after every 5,000 miles, or when engine becomes sluggish and loses power. Before commencing to decarbonise, remove sparking plugs from the cylinder heads. The exhaust pipe nuts should also be unscrewed, and the silencers and exhaust pipes removed. Unscrew the eight nuts on cylinder head fixing bolts and lift the two heads clear of the cylinders.

Scrape all deposit from the inside of the heads, taking care not to damage the joint faces. With each piston at the top of its stroke, remove all carbon. Wipe off any loose particles from around the edges of the piston, and after turning the crankshaft so that each piston in turn is at the bottom of its stroke scrape out any carbon from exhaust stubs and from the edges of the ports in the cylinder bore.

The latter operation is best done from the outside of the cylinder, care being taken to avoid scratching the cylinder bore ; a piece of soft cloth placed in the cylinder will help to prevent this, and also stop any particles of carbon from falling through transfer passages. Make sure that all loose carbon is removed before assembling, and that the fins of the cylinders are clean. The gaskets fitted between the cylinder heads and barrels may not be damaged, but it is advisable to renew them.

It should not be necessary to remove cylinders in under 10,000 miles, but when doing so each should be taken off separately whilst its respective piston is in the lowest position.

Before cylinders are lifted remove inlet pipe and joint washers.

Caution. Immediately below the inlet pipe is the head of crankcase pinch bolt ; do not unscrew or tighten this bolt as it is carefully tightened to 80 lb./inches, furthermore the greatest difficulty may be found in re-engaging the bolt with the trunnion should it be unscrewed.

It is only necessary to remove the pinch bolt when splitting the crankcases.

To remove a piston from its connecting rod, a pair of thin nosed pliers should be used to take out a spring circlip which will allow the gudgeon pin to be pushed clear of the small end bush. If carbon deposits prevent removal by hand, the use of an extractor of the band type is recommended, in which case it will be necessary to remove both circlips.

Each piston is marked " front " so that it may be re-fitted in its original position, and care should be taken to fit to original cylinder.

Carbon will also form in the grooves behind the piston rings, and to remove this deposit the rings must be sprung off ; care being taken to place them in such a position that they may be replaced on the piston in their original groove.

The expander ring, which will be found behind the lower ring and fitted to prevent noise due to " piston slap " whilst the engine is cold, will also have to be cleaned. In time the expander ring will tend to lose its temper because of the heat, therefore it is advisable when decarbonising to renew this ring.

Piston rings should be bright over their whole surface, indicating that they are in complete contact with the cylinder bore. Check the gap between the ends of each ring by placing them in turn inside the cylinder bore and pushing in a short way with the skirt of a piston. Should the gap exceed ·030", checked by feeler gauges, wear is excessive and a new ring should be fitted. When fitting new rings, always check the gap before fitting to the piston.

This measurement should not be less than ·007", or more than ·011".

When replacing cylinders, fit new base washers to crank-case. Smear cylinder bore and piston surfaces with clean

engine oil, and fit cylinder barrel over piston taking care not to twist the cylinder. Ensure that each piston ring is fully compressed in its groove with the ends correctly fitting on the locating pegs as the barrel passes over it.

Re-fit cylinder heads with new gaskets in position, and lightly tighten the four nuts on each cylinder.

The inlet pipe should then be fitted, and taking care that the four insulating washers are in position, lightly tighten the four nuts ensuring that the two faces of the inlet port are aligned. Finally, on each cylinder head tighten the four nuts in diagonal rotation to prevent the possibility of cylinder head distortion, followed by the final tightening of the nuts on the inlet pipe.

RE-BORING. After the machine has done a considerable mileage, cylinder bores may become worn, as indicated by a ridge at the top of each bore. The cylinder bore should be checked by means of a dial gauge, and if the measurement is ·008" or more larger than the original size, the cylinder should be returned to the works for re-boring and fitting of over-size piston with rings.

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

SUPPRESSORS — There are suppressors built into the plug caps.

CLEANING THE PLUGS. 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.

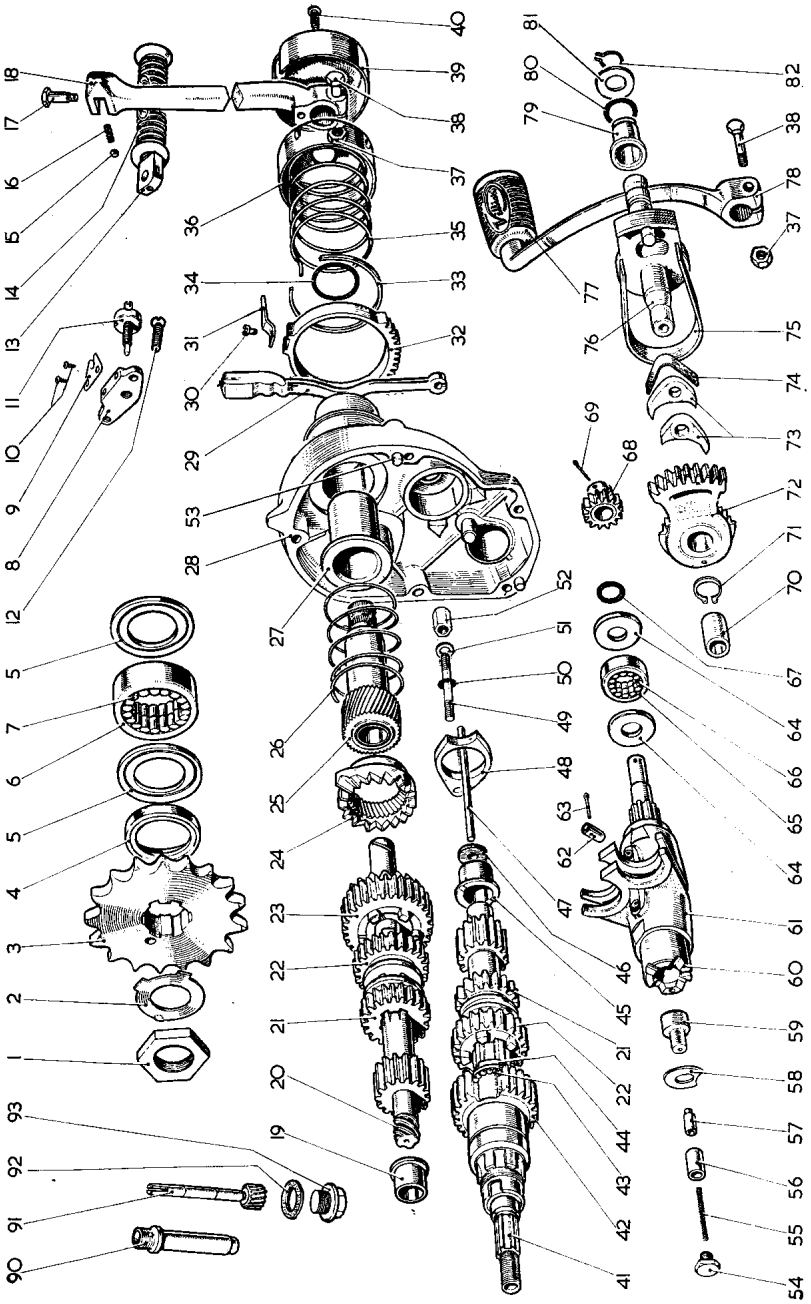
When replacing plugs it is advisable to use a little graphite paste as this will prevent thread stripping.

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

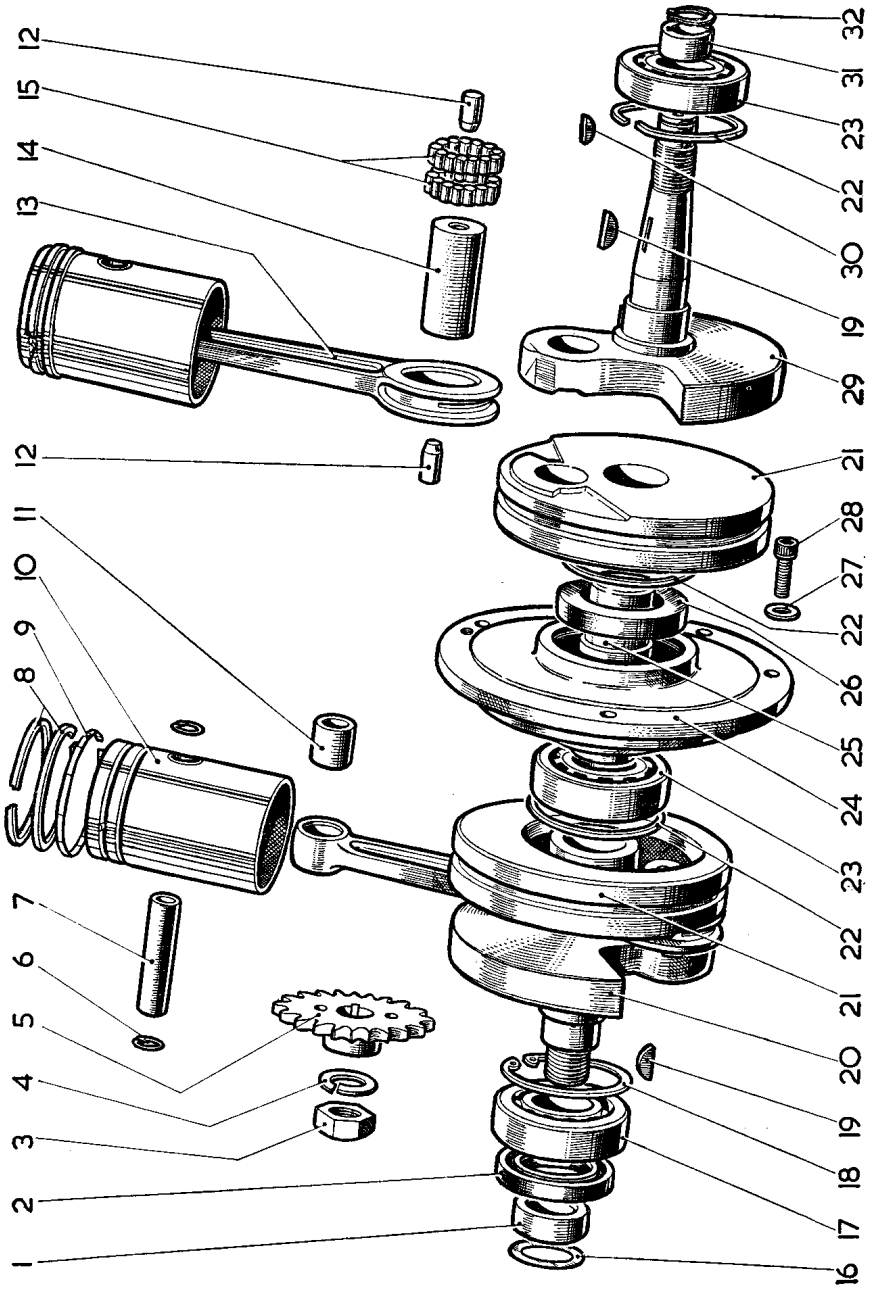
GEARBOX GROUP (*See page 20*)

1 Nut, final drive sprocket.
2 Lockwasher, final drive sprocket.
3 Sprocket, final drive.
4 Oil seal, gearbox.
5 Washer, thrust, high gear wheel bearing.
6 Bearing, high gear wheel outer race.
7 Roller, high gear wheel bearing.
8 Bridge, clutch.
9 Plate, locking, clutch adjuster.
10 Screw, locking plate.
11 Screw, clutch adjusting, external.
12 Screw, clutch bridge.
13 Pedal, kickstart.
14 Rubber, kickstart pedal.
15 Ball, kickstart pedal spring $\frac{1}{4}$".
16 Spring, kickstart pedal.
17 Pin pivot, kickstart pedal.
18 Lever, kickstart.
19 Bush, layshaft.
20 Layshaft with pinion, 17T.
21 Gear, sliding, without dogs, 20T.
22 Gear, sliding, with dogs, 24T.
23 Pinion, kickstart ratchet, 29T.
24 Ratchet, kickstart.
25 Shaft, kickstart.
26 Spring, ratchet, kickstart.
27 Bush, housing, kickstart.
28 Cover, end, gearbox, bushed.
29 Lever, clutch.
30 Screw, gear indicator.
31 Pointer, gear indicator.
32 Ring, gear indicator.
33 Circlip, gear indicator.
34 Ring sealing, kickstart shaft.
35 Spring, return, kickstart.
36 Cover, kickstart spring.
37 Nut, kickstart lever and gearchange bolt.
38 Bolt, kickstart and gearchange levers
39 Cover, kickstart.
40 Screw, kickstart lever cover.
41 Mainshaft 15T ($\frac{1}{4}$" hole).
42 Pinion, high gear, 27T.
43 Ball, high gear pinion thrust race, $\frac{3}{16}$".
44 Washer, pressure, mainshaft.
45 Bush, mainshaft.
46 Washer, rubber, mainshaft ($\frac{1}{4}$").
47 Rod, push, clutch operating.
48 Stop, kickstart ratchet.
49 Stud, kickstart stop and clutch bridge.
50 Washer, sealing.
51 Washer, kickstart stop stud.
52 Nut, kickstart stop stud.
53 Dowel, end cover (2).
54 Plug, end, plunger.
55 Spring, plunger.
56 Bush, plunger.
57 Plunger, cam barrel.
58 Washer, thrust, cam barrel.
59 Pin, bearing, cam barrel.
60 Cam barrel.
61 Fork, sliding gear (2).
62 Peg, guide, sliding gear fork (2).
63 Pin, split, sliding gear fork peg (2).
64 Washer, thrust, cam bearing (2).
65 Bearing, outer race.
66 Roller, cam barrel bearing, $\frac{3}{16}$" × $\frac{3}{16}$" (24).
67 Seal, cam barrel.
68 Pinion, cam barrel, (gear indicator).
69 Pin, split, gear indicator pinion, $1\frac{1}{8}$" × $\frac{3}{32}$".
70 Bush, operating spindle, gearbox body.
71 Circlip, spindle.
72 Ratchet and quadrant, assembly.
73 Pawl, gear control (2).
74 Spring, pawl.
75 Spring, gear control.
76 Spindle, assembly.
77 Rubber, gear change lever.
78 Lever, gear change.
79 Bush, operating spindle, gearbox end plate.
80 Seal, operating spindle.
81 Washer, operating spindle.
82 Circlip, operating spindle.
83 Lever, gear change.
84 Rubber, gear change lever.
85 Spring, gear change ratchet.
86 Bush, operating spindle, gearbox end plate.
87 Seal, operating spindle.
88 Washer, operating spindle.
89 Circlip, operating spindle.
90 Bush, speedometer drive.
91 Worm wheel, speedometer drive.
92 Washer, speedometer housing plug.
93 Plug, speedometer housing.

Gearbox Assembly

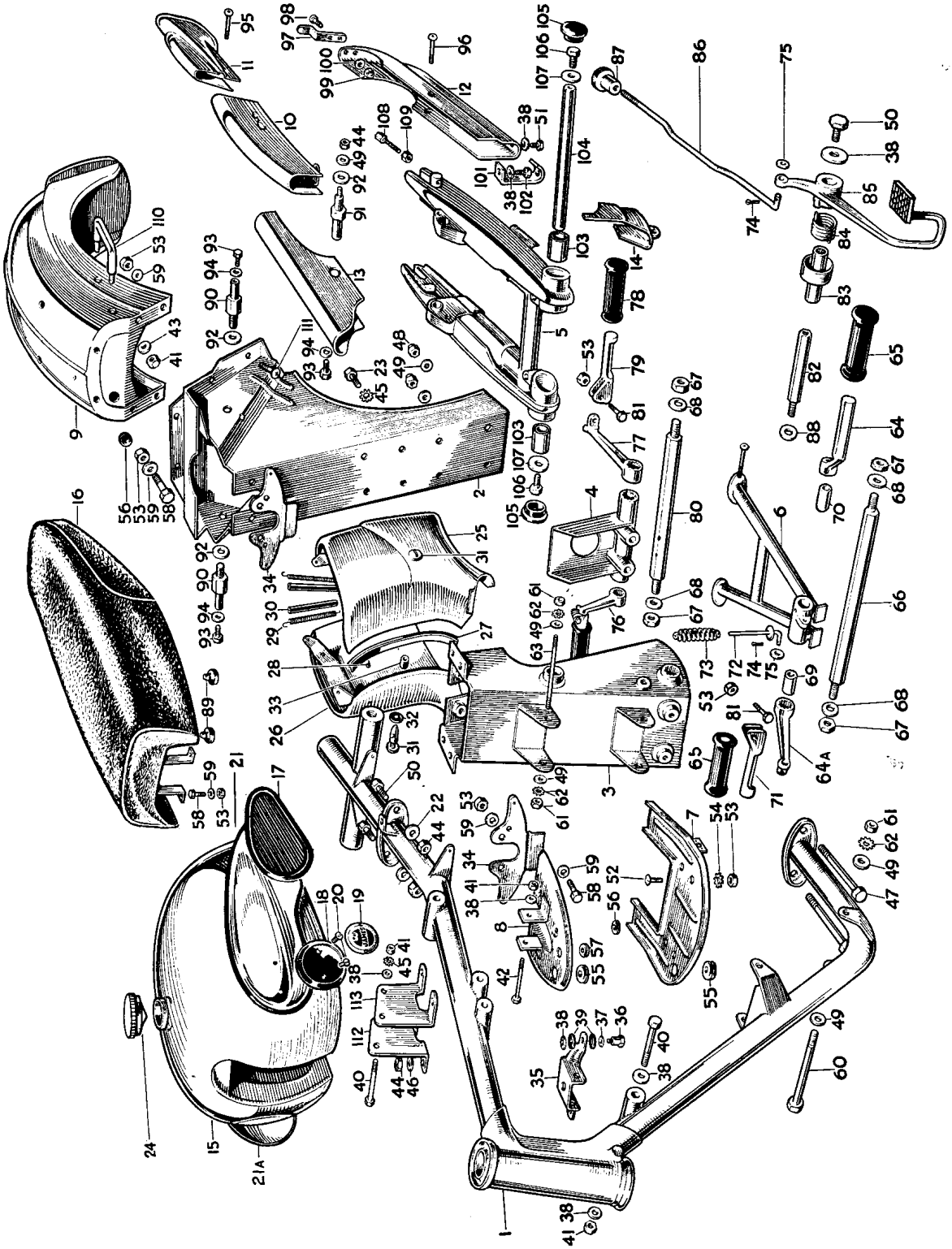


PISTON AND CRANKSHAFT GROUP



1 Distance piece, engine sprocket.
2 Seal, oil, left hand driveshaft.
3 Nut, engine sprocket.
4 Washer, spring, driveshaft
5 Sprocket, engine.
6 Circlip, gudgeon pin.
7 Pin, gudgeon.
8 Ring, piston, standard.
9 Ring, expander.
10 Piston, standard.
11 Bush, connecting rod small end.
12 Plug, crankpin.
13 Connecting rod with bush.
14 Crankpin.
15 Roller, crankpin. and cage.
16 Shim, engine sprocket.
17 Bearing, ball, 25 × 52 × 15 m/m.
18 Circlip, drive side bearing.
19 Key, engine sprocket and flywheel.
20 Shaft, driving, left-hand.
21 Wheel, drive shaft, centre.
22 Circlip, drive shaft, bearing.
23 Bearing, roller, 25 × 52 × 15 m/m.
24 Plate, crankcase centre.
25 Shaft, centre, standard.
26 Seal, oil, centre plate.
27 Washer, crankcase centre plate.
28 Screws, crankcase centre plate.
29 Shaft, driving, right hand.
30 Key, ignition cam.
31 Cam ignition.
32 Circlip, ignition cam.

Frame Assembly



FRAME ASSEMBLY COMPONENTS

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

Lighting

LIGHTING SET. A Wiring Diagram will be found on page 24.

The output of the magneto lighting coils is converted to direct current by means of a selenium rectifier. With the switch in the "OFF" or "L" position only one lighting coil is operative, thus providing a charge to the battery, which is sufficient to more than balance the consumption of the headlamp pilot, tail and speedometer bulbs. The "H" position of the switch brings into circuit the other lighting coil, which is connected in parallel, thus providing the full output of the magneto. The bulbs used in conjunction with this lighting set are listed on page 24.

RECTIFIER

The central fixing bolt is isolated from electrical connections, therefore no special care need be taken to make a clean contact with the frame of the machine. The casing of the rectifier, however, should not be allowed to come into contact with the machine as it can easily be damaged. It is necessary to allow good ventilation around the rectifier, and the position adopted by us should not be altered.

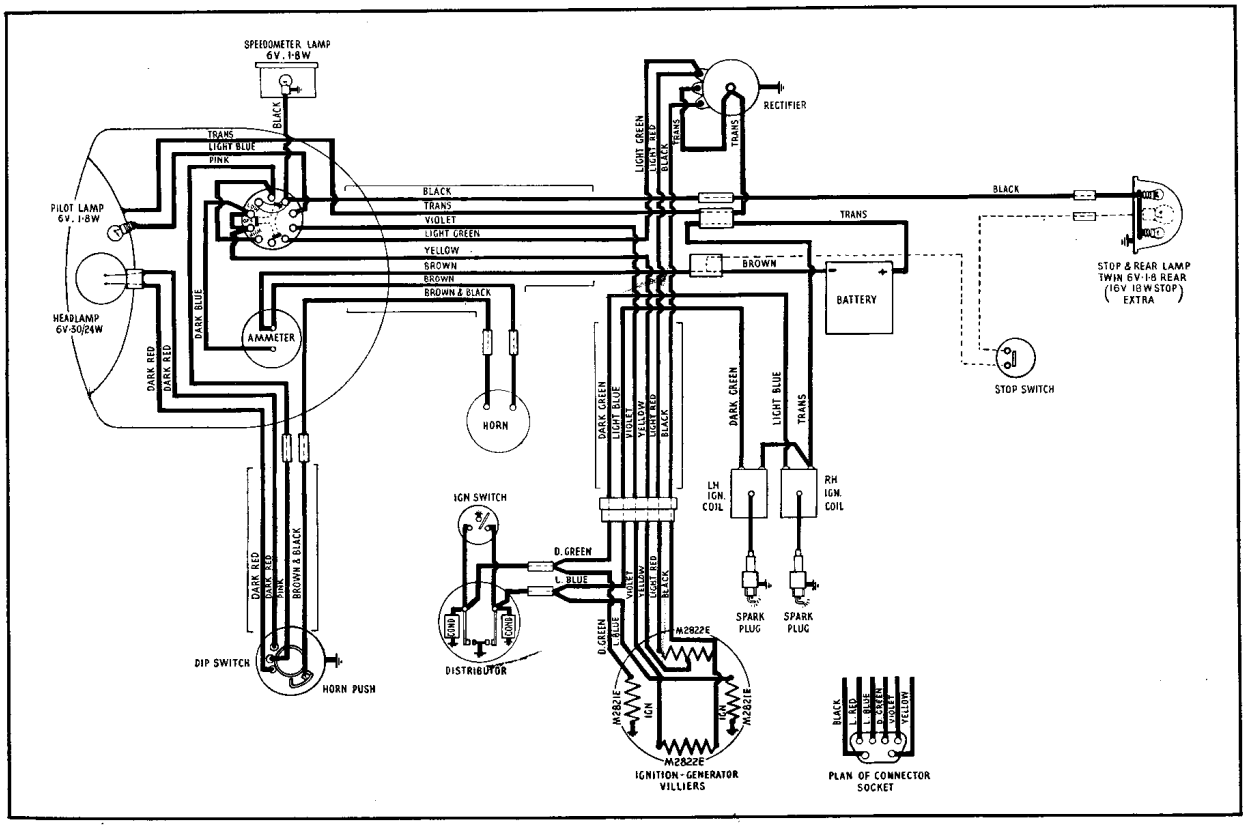
In order to preserve the tropical sealing of the rectifier, the centre bolt must not be turned, loosened, or disturbed in any way.

IMPORTANT. To avoid damage to the rectifier the engine should not be run with the battery disconnected unless the cables to the outer terminals of the rectifier are first removed and insulated.

Alternatively, the lighting switch may be left in the "H" position, though care must be exercised to avoid high engine speeds and consequent overloading of the lamps. The centre lead runs to earth and need not be disturbed.

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

PREPARATION OF ELECTROLYTE. In the U.K. and countries where the temperatures are normally below 90°F (32°C) electrolyte of 1·270 S.G. is required, *viz :* 1 part acid (1·835 S.G.) to 2·8 parts distilled water. In tropical climates where temperatures frequently rise above 90°F., electrolyte of 1·210 S.G. is recommended *viz :* 1 part acid (1·835 S.G.) to 4 parts distilled water.



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

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

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

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 MILEAGE 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 become completely discharged ; 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 lampholder, lamp and reflector assembly is such that when the bulb is correctly positioned, no focussing is required. The reflector and front glass are cemented on original assembly and no attempt should be made to separate them. While, 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 round 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.

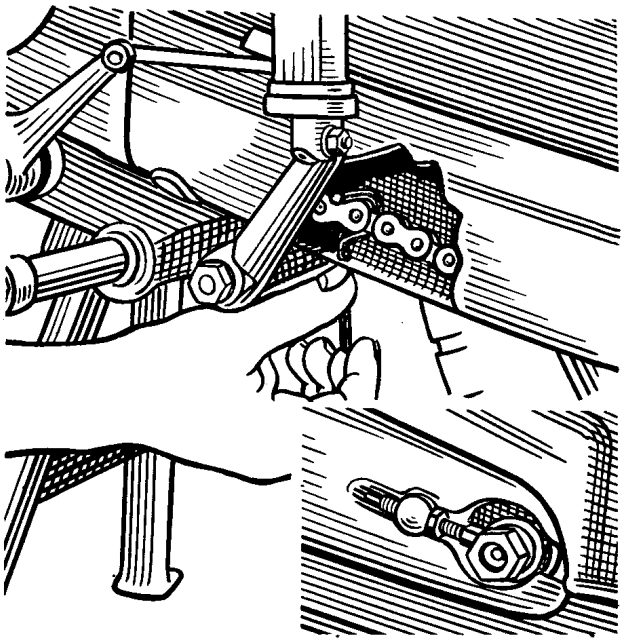
Transmission

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.

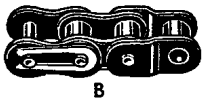
The front chain is fully enclosed in an oil bath and consequently wear will be negligible over a long period. The rear chain, being exposed and more heavily loaded is more likely to give trouble through neglect and should be regularly checked for tension and frequently lubricated.

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.

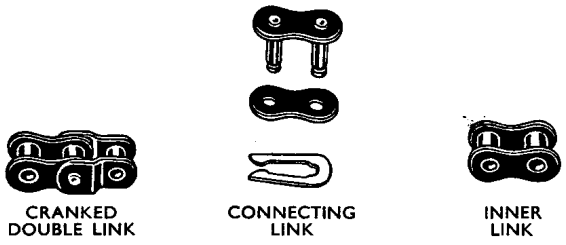


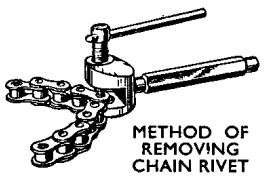
ALTERATION TO LENGTH OF REAR CHAIN. If chain has an even number of pitches, that is, a cranked link is not used in the chain, remove the rivets holding the second pair of outer link plates (see A) which will shorten the chain by four rollers and two pairs of outer link plates. Replace with a cranked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

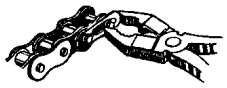


If chain has an odd number of pitches, remove rivets holding the second pair of outer links (see A) (first pair will be cranked) and replace with single connecting link and inner link (B).

CHAIN COMPONENTS







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.

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. Commence with the removal of the complete exhaust pipe and silencer by unscrewing the finned exhaust pipe nut and silencer attachment bolt. Then by loosening the clamp between silencer and exhaust the two parts may be separated. Then unscrew the fixing pin and nut retaining the inner baffle to silencer and the baffle can then be withdrawn. The whole system can then be flushed out by pouring in a solution of household detergent and boiling water. The flushing process should be repeated two or three times to remove all carbon and oil deposits.

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.
If no fuel, even when tap is on and fuel is in tank.	Choked petrol pipe, filter on tap, filter in banjo. Fuel needle sticking in seating.	Remove and clean out. Dismantle carburetter and fit new 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.	Plug points may be oily or soqted 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.
		Clean and adjust point gap to .015".
	Moisture on insulation of condenser.	Clean and dry out.
	Damaged insulation on wires connecting contact breakers to coils or condensers.	Replace.
	Bad contact of pins in connector socket or between leads from contact breakers to coils.	Rectify.
	Damaged insulation of leads from connector to energising coils causing short to earth, making coils inoperative.	Rectify.
	Faulty condenser.	Replace.
	Faulty ignition coil.	Replace coil unit.
If above tests are satisfactory, but engine will not start.	Mixture may be too rich due to use of strangler, or incorrect setting of taper needle.	Open throttle wide and depress kick-starter several times to clear engine of petrol. Adjust taper needle. Drain crankcase.
	Air leaks at carburetter stub or inlet pipe joint, causing weak mixture.	Correct.
	Incorrect ignition timing.	Check, following instructions given.

SEQUENCE OF TESTING	POSSIBLE TROUBLE	REMEDY
ENGINE FOUR OR EIGHT STROKES		
Strangler may not be fully open or taper needle too high. Air filter may need cleaning.	Mixture too rich.	Lower taper needle by fitting spring clip into a higher slot.
Check by watching for excessive smoke from exhaust pipe or silencer.	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 plugs.	Overhaul. Replace with recommended type.
	Loss of compression.	Tighten cylinder head bolts. Replace worn piston rings.
	Incorrect " petroil " mixture.	Correct mixture is 1 part oil, 20 parts petrol. (See also page 7).
	Excessive carbon deposit on piston crowns and cylinder heads.	Decarbonise.
	Exhaust system choked with carbon.	Clean out silencer and exhaust pipes.
	Incorrect carburetter setting.	Check and adjust.
	Air filter choked.	Clean. See instructions on air filter.
	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 inlet pipe, crankcase and cylinder base joints.	Tighten all joints.
	Crankcase drain screws loose or missing.	Tighten or replace.
	Worn crankshaft bearings or leaking oil seals.	Replace.
	Ignition timing too far advanced.	Correct, following instructions given on page 13.
ENGINE SUDDENLY STOPS FIRING	Sparking plug leads detached.	Replace.
	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. leads.	Dry out.

Technical Data

ENGINE — Villiers 2T.

CAPACITY — 250 cc.

STROKE — 63·5 mm.

BORE — 50 mm.

COMPRESSION RATIO — 8·2 to 1.

IGNITION TIMING — Points commence to open $\frac{3}{16}$" before T.D.C.

CONTACT BREAKER — Gap, ·012"/·015".

SPARKING PLUG — Type, Lodge HH14. Gap, ·018"/·025".

CARBURETTER — Villiers S22/2.
Taper Needle : No. $3\frac{1}{2}$. Main Jet : 170 cc.
Needle setting : No. 3 groove. Pilot jet : 35 cc.
Throttle : No. 3.

SPROCKETS — Engine : 20 teeth × $\frac{3}{8}$" pitch.
Clutch : 43 teeth × $\frac{3}{8}$" pitch.
Gearbox : 18 teeth × $\frac{1}{2}$" pitch.
Rear wheel : 52 teeth × $\frac{1}{2}$" pitch.

CLUTCH — Multiplate with friction inserts.

CHAINS — Primary drive : Renold No. 110 ·038×60 pitches. Final drive : $\frac{1}{2}$" pitch × ·335" roller × ·305" width. 127 links.

CHAIN ADJUSTMENTS — Primary chain : The primary chain is pre-stretched before fitting. Rear chain : $\frac{3}{8}$" to $\frac{1}{2}$" whip at tightest point with rider astride machine.

GEARBOX RATIOS — 1 to 1 — 1·32 to 1 — 1·9 to 1 — 3·06 to 1.

GEAR RATIOS — 6·21 to 1. 8·23 to 1. 11·8 to 1. 19·00 to 1.

BALL & ROLLER BEARINGS —
Driving Shaft, left-hand outer (1), 25×52×15mm. No. 125, 3 spot ball bearing.
Driving centre, right-hand outer (2), 25×52×15mm. No. R.125, roller bearing.
High gear pinion, gearbox, $\frac{1}{4}$" dia. × $\frac{1}{4}$" long roller, 38 per set.
Cam barrel bearing, gearbox, $\frac{3}{16}$" dia. × $\frac{3}{16}$" long roller, 24 per set..
Clutch sprocket race, $\frac{3}{16}$" dia. × $\frac{3}{16}$" long roller, 24 per set.
Crankpin roller (with cage), $\frac{1}{4}$" dia. × $\frac{5}{16}$" long, 18 per set.

Crankpin diameter, standard	·7983"/·7980"
Crankpin diameter, o/size	·7993"/·7990"
Con rod big end diameter, standard	1·2986"/1·2981"
Con rod big end diameter, o/size	1·2996"/1·2991"
Con rod big end, side clearance, total	·012"/·008"
Centre shaft, diameter of ends, standard	·980"/·9797"
Centre shaft, diameter of ends, o/size	·981"/·9807"

SMALL END BEARINGS —

Gudgeon Pin, diameter	·493"/·4927"
Gudgeon Pin bush, in piston	·4935"/·4930"
Gudgeon pin bush, in con rod	·4936"/4931"·

PISTON AND PISTON RINGS —

Compression ring, standard size	1·9705 dia.
End gap, in position	·011"/·007"
Maximum permissible gap	·03"
Ring clearance in groove. Total	·0042"/·0022"
Oversize piston rings	Std. plus ·015"
Piston skirt clearance in cylinder bore	Min. ·0035"

HUB BEARINGS — Front : 35×15×11 mm. Rear : 42×15×13 mm.

STEERING HEAD BEARINGS — $\frac{1}{4}$" balls (17 top, 17 bottom).

WHEEL RIM SIZES — Front and Rear : WM12—18".

TYRE SIZES — Front and Rear : 3·25"×18".

TYRE PRESSURES — Solo : Front, 16 lb. Rear, 19 lb. With passenger : Front, 16 lb. Rear, 25 lb.

SPOKES — Front : $6\frac{3}{8}$"×10 G. N.S. $6\frac{1}{2}$"×10 G. O.S. Rear : $6\frac{9}{16}$"×10 G.

BRAKE DRUM DIAMETER — Front and Rear : 6" (15·25 c.m.).

TOTAL BRAKING AREA — 22 sq. in. (142 c.m.²).

FUEL TANK CAPACITY — $2\frac{3}{4}$ imperial gallons (12·5 litres approx.).

FUEL MIXTURE — 20 parts of petrol to 1 part of oil.

GEARBOX OIL CAPACITY — Fill to dipstick level, 1·2 pints.

CHAINCASE OIL CAPACITY — Fill to oil level plug.

FRONT FORK OIL CAPACITY — 55 cc.

SPEEDOMETER — Smith's magnetic, illuminated.

SPEEDOMETER CABLE LENGTH — 55" (140 c.m.).

WHEELBASE (Static) — 52" (132 c.m.).

SEAT HEIGHT — 30" (76 c.m.).

LENGTH OF TWINSEAT — 25" (63·5 c.m.).

GROUND CLEARANCE — $5\frac{1}{2}$" (14 c.m.).

WIDTH OVER HANDLEBARS — $27\frac{1}{2}$" (69 c.m.).

OVERALL LENGTH — 80" (203 c.m.).

APPROX. WEIGHT — 300 lb. (140 kgs.).

GUARANTEE

NOTICE. 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.

TERMS AND CONDITIONS OF SALE AND GUARANTEE

1. In this Guarantee the word "machine" refers to the motor cycle, scooter, motor cycle combination or sidecar as the case may be purchased by the Purchaser.

2. In order to obtain the benefit of this Guarantee, the Purchaser must correctly complete the attached registration form and return it to us within fourteen days of the purchase.

3. We will supply free of charge, a new part in exchange for, or if we consider repair sufficient will repair free of charge any part proved within six months of the date of purchase of any new machine, or within three months of its renewal or repair in the case of a part already renewed or repaired, to be defective by reason of our faulty workmanship or materials. We do not undertake to bear the cost of fitting such new or repaired part or accessory.

4. Any part considered to be defective must be sent to our Works, carriage paid, accompanied by the following information :—
   (a) Name of purchaser and his address.
   (b) Date of purchase of machine.
   (c) Name of dealer from where the purchase was made.
   (d) Engine and Frame numbers of machine.

5. This Guarantee shall not extend to defects or damage appearing after misuse, neglect, abnormal stress or strain, or the incorporation or affixing of unsuitable attachments or parts and in particular .—
   (a) Hiring out.
   (b) Racing and Competitions.
   (c) Adaptation or alteration of any part or parts after leaving our Works.
   (d) The attaching of a sidecar in a manner not approved by us or to an unsuitable motor cycle.

   This Guarantee shall not extend to machines whose trade mark, name or manufacturing number has been altered or removed or in which has been used any part not supplied or approved by us, or to tyres, saddles, chains, speedometers, revolution counters and electrical equipment or to parts supplied to the order of the Purchaser and different from our standard specification.

6. Our liability and that of our dealer who sells the machine, shall be limited to that set out in paragraph 3, and no other claims including claims for consequential damage or injury to person or property, shall be admissible.

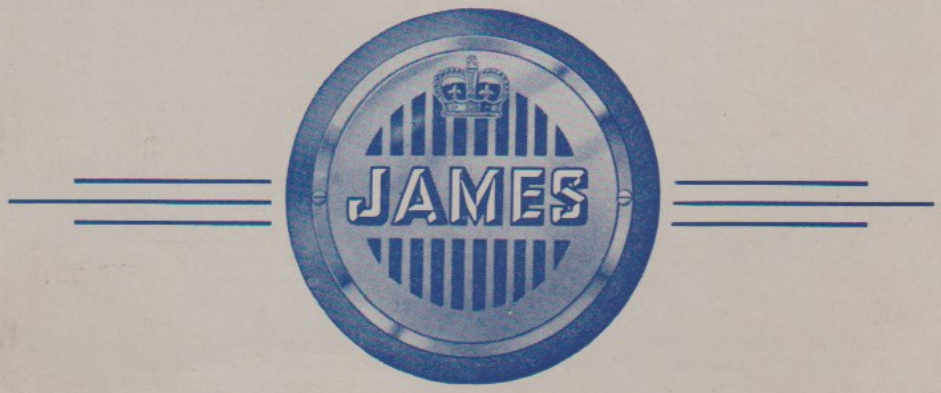
   All other conditions and warranties statutory or otherwise and whether express or implied are hereby excluded and no guarantee other than that expressly herein contained applies to the machine to which this Guarantee relates or any accessory or part thereof.

REPAIRS GUARANTEE

1. Whilst the highest standard of workmanship and materials is aimed at, we cannot accept liability for any defects appearing more than three months after the machine, assembly or component has left our Works after being repaired.

2. We will repair or replace at our option free of charge any defective work, materials or parts relating to the repairs carried out by us appearing within that time but shall not be under any further or other liability for any other loss or damage whether direct or consequential and our liability shall be limited to the cost of so making good.

3. We do not accept liability in respect of parts of proprietary manufacture, e.g. tyres, saddles, chains, speedometers, revolution counters and electrical equipment which may be used by us in effecting a repair. All other conditions and warranties statutory or otherwise express or implied are hereby excluded.



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