

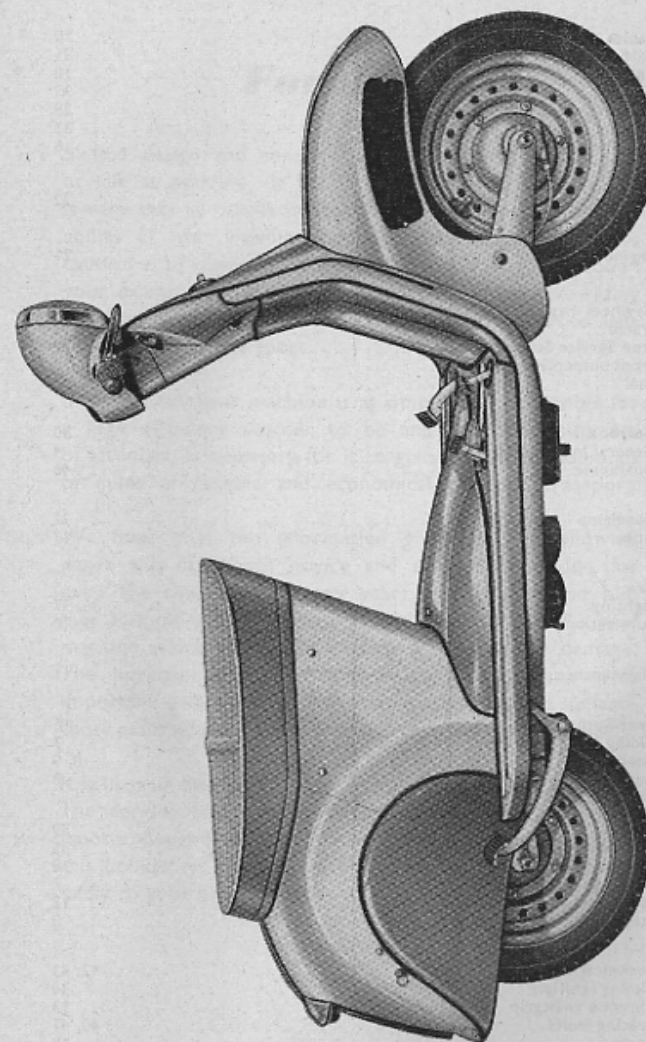
James

150
SCOOTER

INSTRUCTION BOOK

PRICE 3/-

**JAMES MOTOR CYCLES LTD
GREET, BIRMINGHAM 11**



150 SCOOTER

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Foreword

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

In operation, your machine is as simple as it is possible for a high efficiency scooter 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.

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 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 machine 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 reliability of your scooter depend on the care you give it. Please consider this booklet as a guide destined to bring you quickly and safely to your destination.

General Information

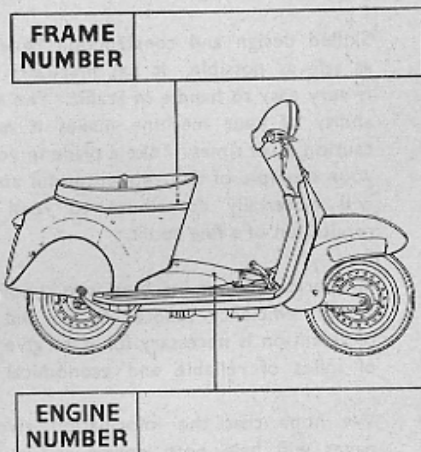
FRAME AND ENGINE NUMBERS.

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

FRAME NUMBER : Under twin-seat above battery compartment.

ENGINE NUMBER : On top of crankcase front engine lug.

RECORD YOUR FRAME AND ENGINE NUMBERS HERE FOR REFERENCE.



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 compartment upon taking delivery of a new machine.

The **INSPECTION AND SERVICE** consists of :

- | | |
|--|--------------------------|
| (a) Check, and, if necessary, adjust : | |
| (1) Contact breaker points. | (5) Wheel bearings. |
| (2) Sparking plug. | (6) Brakes. |
| (3) Clutch. | (7) Alignment of wheels. |
| (4) Chains. | (8) Tyre pressures. |
| (b) Tighten all external nuts and bolts, including cylinder bolts. | |
| (c) Check all lighting equipment. | |
| (d) Clean out carburettor 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 scooter used on the public roads of Great Britain must be registered and carry the registration numbers and licence disc allotted to it. The dealer 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 :

- Form "RF1/2," duly completed.
- The certificate of insurance.
- The invoice you received from your dealer when you purchased the machine.
- The appropriate registration fee.

In due course you will receive :

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

The Registration Book and the Licence Disc will bear the registration numbers that have been allotted to your scooter 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 plates must be $1\frac{3}{4}$ " high, $1\frac{1}{4}$ " wide and $\frac{3}{16}$ " 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 of $\frac{1}{2}$ " 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 Certificate at any time.

SPEEDOMETER.

A speedometer **MUST** be fitted to all scooters 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 machines made by us have electric equipment which complies with the law regarding position, size of bulbs, marking on bulbs and the correct illumination of the rear number plate.

REFLECTOR.

All solo scooters **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.

Controls

FILLER CAP. On top of fuel tank under twinseat.

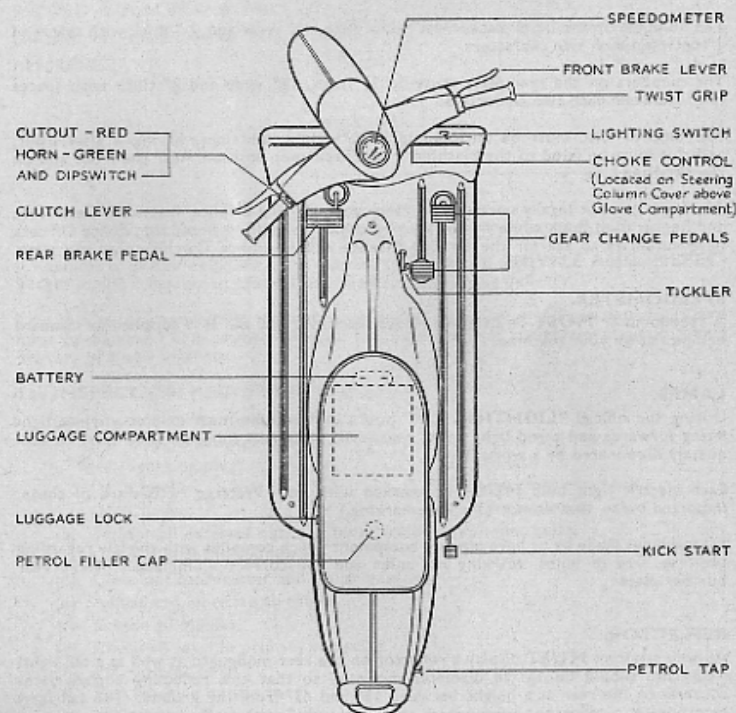
FUEL TAP. Offside rear mudguard. Pull knob to turn fuel ON. Push in to turn fuel OFF. Always push knob to Off position when stopping for any length of time.

FUEL RESERVE. A small reserve of fuel, sufficient to cover approximately 10 miles, is provided. If it is necessary to use it, with tap in "ON" position, turn the knob to the right and again pull.

CHOKE LEVER. Situated on steering column cover below lock on offside. To enrich mixture for starting the lever should be pushed away from rider in a closed position. When the engine runs satisfactorily the lever should be pulled towards rider to extent of travel.

TICKLER. Small rod protruding through offside floorboard. Depress once or twice to provide rich mixture for starting, but **DO NOT FLOOD.**

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



STARTER PEDAL. Offside, at rear of footboard. Use to start engine (depress).

CLUTCH LEVER. On left handlebar. Pull towards handlebar to release engine drive from rear wheel. Use when moving away from rest and also when changing gear. Always ease the clutch in gently.

GEAR CHANGE PEDAL. (Foot operated). The two pedals situated offside front floorboard. Depress forward pedal to select a lower gear. Depress rear pedal to select a higher gear. Neutral is between First (Bottom) and Second gear.

The pedals always return to the same position and the foot should be removed from lever between each gear change. Use the clutch lever when changing gears.

FRONT BRAKE LEVER. On right handlebar. Grip to operate front brake. Apply in conjunction with rear brake for maximum braking efficiency.

REAR BRAKE PEDAL. Located nearside floorboard. Press down to operate rear brake.

LIGHTING SWITCH. (Rectifier/Battery lighting). In instrument panel (offside). Switch has three positions:

L	Pilot and rear lamps lit.
OFF	No lamps in use.
H	Head and rear lamps lit.

DIPSWITCH, HORN AND CUT-OUT BUTTONS. On left handlebar.

LOCKS. Always be sure to lock both steering and twinseat when parking.

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 pages 9 and 10.

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.

Close air lever, and depress tickler once or twice.

Open twist grip about a quarter of its travel.

Standing to rear of machine, depress kickstarter with a steady swinging movement. When engine starts do not forget to open the choke lever as soon as possible.

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

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 scooter are:—

Opening throttle too wide, thus destroying the advantage of a rich mixture.

Tickling the carburettor insufficiently.

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 depressing forward gear pedal 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 depressing rear pedal. Change into top gear at approximately 25 m.p.h. The gear change foot pedals must be moved to the full extent of their 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 it is essential to turn off the fuel supply.

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 scooter is driven during the first 1,000 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 runnings 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 scooterists 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 to labour; 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 over-taking. 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.

Lubrication

Oil is the life blood of a scooter and it is most important that the correct type and quantity be employed in order to reduce power losses and wear to a minimum.

ENGINE LUBRICATION — PETROL SYSTEM. This method of engine lubrication is very simple and practically foolproof. Oil is mixed with the petrol and since the mixture enters both crankcase and cylinder, all working parts receive a constant and fresh film of oil. As the amount of fuel used increases with wider throttle openings, a greater quantity of oil is supplied under arduous conditions. The recommended mixture is given in the chart on page 10. The mixture should preferably be prepared and well stirred in a can before filling the tank, but if this is not practicable, close the fuel tap and pour oil in the tank before the petrol, then shake the machine to ensure thorough mixing. Certain oil companies provide special petrol dispensing pumps and these can be set to supply the correct mixture. Always use a recommended brand at the specified ratio.

USE OF ANTI-CORROSIVE OILS. When two stroke engines are used for short journey work exclusively, the temperature does not rise sufficiently to vaporise the corrosive products of combustion and it is then that in certain circumstances, condensa-

tion occurs which gives rise to subsequent corrosion. For this reason we strongly recommend the use of anti-corrosive oils, and those shown in the Shell, B.P., Wakefield and Mobil columns at the foot of this page have these properties.

GEARBOX AND CHAINCASE LUBRICATION. New machines are normally supplied with the correct grade and quantity of lubricant. It is, however, advisable to check oil levels before riding a new model.

The gearbox combined filler plug and dipstick is on top of the gearbox. To check oil level, remove engine cover by half turning rear and front locking screws and lifting away, unscrew and remove dipstick and wipe it before checking that oil reaches the level notch with the dipstick resting on the top of the case. The primary chaincase has a filler plug at the side of the chaincase. The screw in the centre holds the primary case cover in position. The oil level plug is situated at lower half of cover.

FRONT SUSPENSION. Does not require lubrication.

WHEELS AND STEERING HEAD BEARINGS LUBRICATION. These items are packed with grease when new. They should however, be examined from time to time and it is advisable to dismantle, clean out with paraffin and pack with fresh grease every 5,000 miles.

REAR CHAIN. If the rollers appear dry, oil with a brush and engine oil. Every 5,000 miles, remove and wash the chain in paraffin and soak in molten tallow or recommended grease. Access is gained by removing nearside wheel cover by turning the Oddie fastener located at rear of spat and pulling down and out.

STARTER CHAIN. Apply same method of lubrication as for rear chain. Access is gained by removing engine cover.

CONTROL CABLES. Control cables should be well lubricated to ensure smooth and sensitive operation. Cables may be oiled by squirting oil along the exposed lengths of inner cable and operating the control levers, but the limited movement makes it difficult for the oil to run through the entire length. If cables become stiff it is best to remove them completely and adopt the following procedure: Suspend the cable vertically and arrange a small "cup" either as a small paper cone attached to the outer cable by cellulose tape or moulded in plasticine, leaving the end of the outer cable exposed within the "cup." The cone can then be filled with oil which will slowly seep down the entire length of the cable. Cables should be left suspended over-night before replacing.

Small lengths of exposed inner cable should be smeared with grease. After a considerable mileage, cables may get damaged and replacements can be purchased from official stockists. Part numbers should be quoted (see page 11).

REVISED LIST OF RECOMMENDED LUBRICANTS.

	SHELL	B.P.	WAKEFIELD	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 Two Stroke Oil (16 : 1)	MobilMix TT (16 : 1)
GEARBOX and CHAINCASE	Shell X-100 30	Energol SAE 30	Castrol XL	Mobiloil A
REAR CHAIN and STARTER CHAIN	Shell Retinax A	Energol L2	Castrolase Graphited	Mobilgrease MP
WHEEL HUBS and STEERING HEAD BEARINGS	Shell Retinax A	Energol L2	Castrolase Heavy	Mobilgrease MP
OIL CAN and CYCLE PARTS	Shell X-100 30	Energol SAE 30	Castrol XL	Mobiloil A

PLEASE NOTE: 16 : 1 ratio = $\frac{1}{2}$ pint oil to 1 gallon petrol and 20 : 1 ratio = $\frac{1}{4}$ pint oil to 1 gallon petrol.

Where two-stroke engine oil is not available please use SAE 30 Grade oils, recommended brands as above at ratio 20 to 1.

Throttle cable .. 005559
Front brake cable .. 005557
Rear brake cable .. 005558

Clutch cable .. 005563
Speedometer cable 005009
Choke cable .. 006172

MISCELLANEOUS PARTS. SAE 30 Grade Oil is suitable for all small parts, cables, controls, brake pivots, stand pivots, etc. We recommend that these items be attended to every 1,000 miles but more frequent lubrication may be desirable in wet weather. Nuts and bolts should be smeared to prevent corrosion.

Avoid excessive use of oil on the control levers. It is likely to run along the levers and make them slippery and unpleasant to operate. If the levers become loose at pivot point, slackness can be taken up by tightening the pivot pin and locknut.

Maintenance

The efficiency and economy of your machine can be preserved only by careful and regular attention to adjustments and lubrication. Neglect will result in poor performance, rapid depreciation and unnecessary expense.

By adhering to the following simple maintenance plan and the correct lubricants, wear will be reduced to the minimum and maximum performance obtained.

EVERY WEEK.

Inspect tyres and check pressures.
Clean sparking plug.
Clean chrome and enamel parts.

EVERY MONTH.

Remove battery, and top up with distilled water to level indicator. Wipe off any surplus before replacing.

AFTER THE FIRST 200 MILES.

Check and if necessary reset contact breaker point gap.
Check all nuts and bolts for tightness.
Check adjustment of rear chain.
Check steering head bearings.
Check adjustment of brakes.

EVERY 500 MILES.

Inspect oil level in gearbox and primary chaincase. If necessary top up with correct grade of oil. See pages 9, 10, 43.

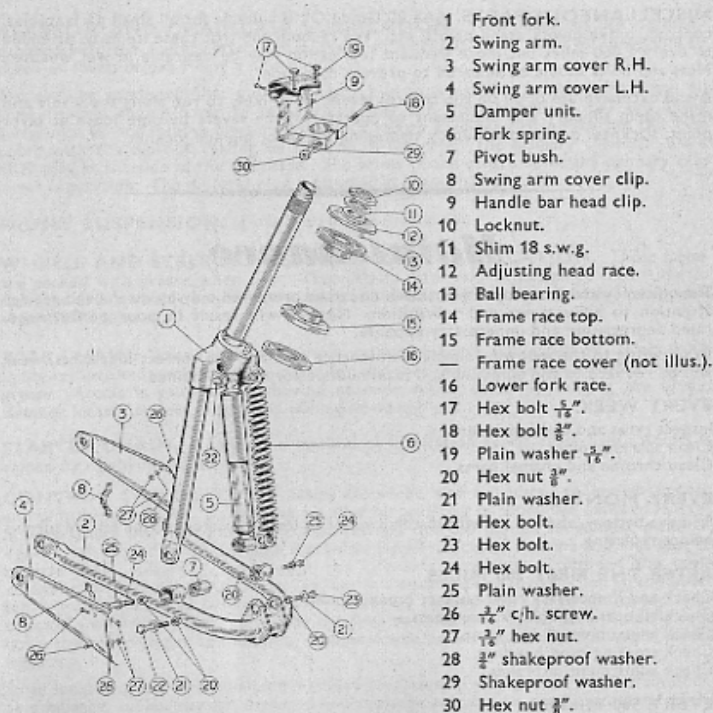
EVERY 1,000 MILES.

Check, adjust and oil control cables, levers and twistgrip.
Check adjustment of rear chain and starter chain. If rollers appear dry, oil with brush. In winter lubricate more frequently. If chains have collected much dirt remove, clean and grease.
Check adjustment of steering head bearings.
Oil front and rear brake pivot points, centre stand, etc.
Clean and re-oil carburettor air filter.
Clean carburettor union filter gauze.
Check and adjust contact breaker and sparking plug gaps.
Clean out slots at rear of silencer.

EVERY 5,000 MILES.

Drain and refill chaincase and gearbox, whilst engine is warm. See pages 9, 10, 43. Make thorough examination of lighting cables.
Grease speedometer gearbox and lubricate speedometer cable.
Check and if necessary dismantle, steering head and wheel bearings. Clean and pack with fresh grease.
Lubricate contact breaker cam grease pad. See pages 34 and 35.
Dismantle and clean exhaust system. See page 39.

Front Suspension



The front suspension unit consists of one tension coil spring and one sealed damper unit attached to the steering tube and, supporting the swinging arm. The front suspension unit will not require lubrication or adjustment.

REMOVAL OF FRONT SUSPENSION AND FRONT MUDGUARD. Begin by removing front wheel see page 16. When this is completed, remove steering locknut cover (located under headlamp cowl) by means of the four retaining screws. Disconnect control cables, electric cables and speedometer cable. Unscrew pin from steering head clamp and lift handlebar complete with headlamp cowl clear. Unscrew and remove steering stem locknut and head race. The front suspension unit and mudguard can now be withdrawn complete. At this point great care should be taken to avoid losing the ball bearings.

ADJUSTING STEERING STEM. With the machine on the stand and front wheel clear of the ground, check the play in head races by removing steering locknut cover, placing the thumbs across bearings and grasping the front mudguard with hand to produce a slight rocking motion which will indicate the degree of bearing looseness.

When this has been determined slacken off steering stem locknut. The adjustment should be such that no play may be felt yet the bearings are free to rotate. After screwing down the adjuster race (12) retighten locknut and replace locknut cover.

HANDLEBAR AND HEADLAMP ADJUSTMENT. Normally it will be necessary to adjust the handlebar only when the headlamp beam requires correction. Proceed as follows: first unfasten the headlamp sealed beam unit and slacken the front handlebar clip bolt (located under headlamp cowl) sufficiently to allow gradual adjustment. It is advisable to check beam alignment with light unit in position. When this has been carried out once again remove light unit from cowl, tighten handlebar clip bolt securely and replace light unit.

ADJUSTING THE TWISTGRIP. Adjustment of the spring tension on the twist-grip sleeve is effected by means of a screw and locknut in the bottom half of the twist-grip casting. To increase tension slacken locknut and tighten up adjuster screw: tighten locknut.

Adjustment should be such that the grip is easy to operate but remains in position when the hand is removed for signalling, etc.

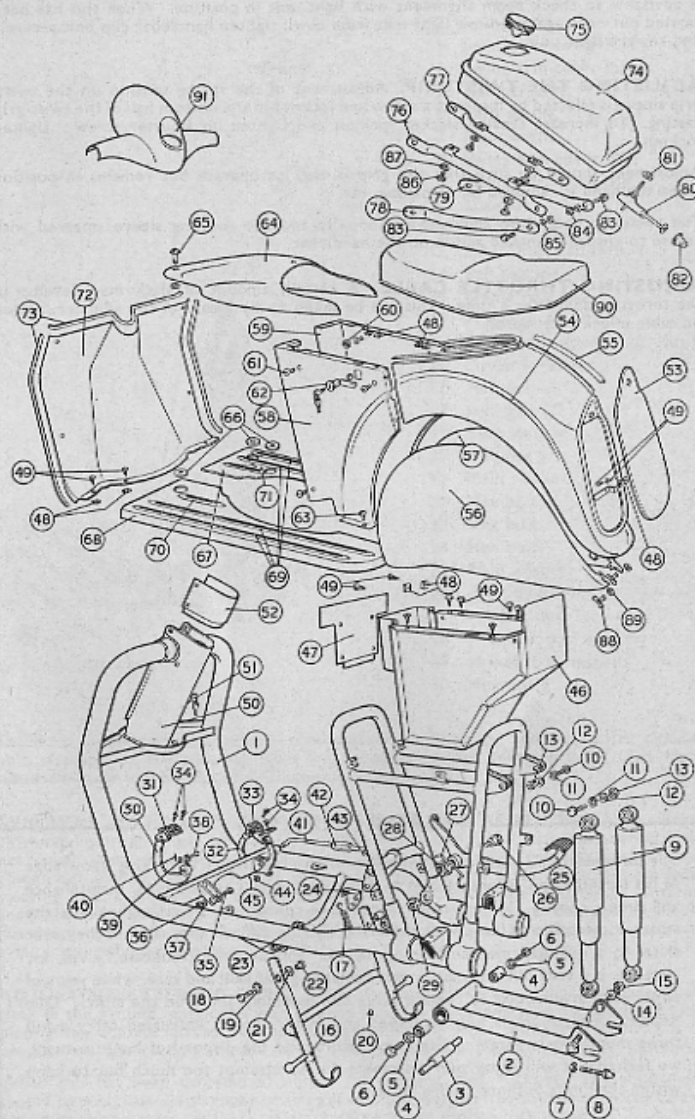
The twistgrip should be removed periodically and the rotating sleeve smeared with grease to ensure a smooth action on the handlebar.

ADJUSTING THROTTLE CABLE. A certain amount of slack may develop in the throttle cable after a time; this can be taken up by means of the adjuster located on cable under front apron.

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 or ourselves. 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 entrusted carry a full three months' guarantee. With these facilities at the disposal of James owners, we feel that it will repay our customers not to attempt too much but to keep within the limits outlined in this book.

Frame and Rear Suspension



KEY TO MAIN FRAME COMPONENTS.

- | | |
|---|--|
| 1 Main frame. | 46 Luggage compartment. |
| 2 Swing arm. | 47 Battery plate. |
| 3 Pivot tube. | 48 Speed nuts. |
| 4 Pivot bush. | 49 Speed screws. |
| 5 Plain washer (pivot tube). | 50 Steering column cover. |
| 6 Hex bolt (pivot tube) $\frac{1}{2}$ ". | 51 Steering lock assembly. |
| 7 Hex nut (chain adjuster lock). | 52 Steering lock top cover. |
| 8 Chain adjuster bolt. | 53 Rear number plate. |
| 9 Damper unit. | 54 Rear mudguard. |
| 10 Damper unit hex bolt $\frac{3}{8}$ ". | 55 Rear mudguard plastic strip. |
| 11 Damper unit shakeproof washer $\frac{3}{8}$ ". | 56 Rear wheel spat L.H. |
| 12 Damper unit plain washer $\frac{3}{8}$ ". | 57 Rear wheel spat R.H. |
| 13 Damper unit hex nut $\frac{3}{8}$ ". | 58 Side panel L.H. |
| 14 Damper unit plain washer (btm) $\frac{5}{16}$ ". | 59 Side panel R.H. |
| 15 Damper unit hex nut (btm) $\frac{5}{16}$ ". | 60 Hex nut side panel fixing. |
| 16 Centre stand. | 61 Cheesehead screw side panel fixing. |
| 17 Centre stand spring. | 62 Luggage compartment lock assembly. |
| 18 Centre stand pivot bolt $\frac{3}{8}$ ". | 63 Cheesehead screw centre panel to floor board. |
| 19 Centre stand shakeproof washer. | 64 Floor board centre panel. |
| 20 Centre stand rubber buffer. | 65 Dzus fastener centre panel fixing. |
| 21 Centre stand plain washer. | 66 Rubber grommets. |
| 22 Centre stand shouldered nut. | 67 Floor board R.H. |
| 23 Floor board support bracket L.H. | 68 Floor board L.H. |
| 24 Floor board support bracket R.H. | 69 Floor board treads. |
| 25 Kick start pedal. | 70 Floor board treads. |
| 26 Kick start pedal pivot bolt. | 71 Floor board treads. |
| 27 Kick start pedal return spring. | 72 Front shield pressing. |
| 28 Kick start pedal plain washer. | 73 Plastic beading. |
| 29 Kick start pedal pivot bolt nut. | 74 Petrol tank. |
| 30 Foot brake pedal. | 75 Filler cap. |
| 31 Foot brake pedal pad. | 76 Petrol tank bracket top L.H. |
| — Foot brake pedal rubber (Not illus.). | 77 Petrol tank bracket top R.H. |
| 32 Gear change pedals. | 78 Petrol tank bottom stay L.H. |
| 33 Gear change pedals pads. | 79 Petrol tank bottom stay R.H. |
| — Gear change pedals rubbers (Not illus.). | 80 Petrol tap. |
| 34 Pedal pad screws. | 81 Fibre washer. |
| 35 Pedal pivot bolt. | 82 Rubber grommet. |
| 36 Pedal pivot bolt nut. | 83 Hex bolt tank stay. |
| 37 Pedal pivot bolt washer. | 84 Hex nut tank stay. |
| 38 Clevis pin. | 85 Plain washer. |
| 39 Clevis pin washer. | 86 Hex bolt tank fixing. |
| 40 Split pin. | 87 Plain washer. |
| 41 Gear change rod front. | 88 Wing Dzus fastener. |
| 42 Gear change rod adjusting nut. | 89 Wing Dzus fastener rubber. |
| 43 Gear change rod rear. | 90 Twin seat. |
| 44 Gear change rod washer. | 91 Handlebar cover. |
| 45 Gear change rod split pin. | |

Rear Suspension

The rear wheel is mounted in a tubular steel fork pivoted within the frame on rubber-steel torsion bushes. The bushes are spaced by a shouldered pivot tube and pressed into the fork. The fork is attached to the frame by two $\frac{1}{2}$ " bolts which are screwed into the shouldered pivot tube. Two damper units form the suspension medium. Studs at the rear of the fork arms provide lower attachment points for the dampers which are secured to the main frame at the top. For further information refer to illustration on page 14.

MAINTENANCE. No attention will normally be necessary. The rear suspension pivot bushes must NEVER be lubricated.

Wheels and Brakes

HUBS AND BEARINGS. Both hubs are greased when new and no further lubrication will be required for several thousand miles. It is advisable to dismantle the hubs for examination of the bearings at approximately 5,000 miles. The old grease should be cleaned out with petrol or paraffin and the hubs packed with fresh grease before re-assembling. When dismantling and assembling the hubs refer to exploded drawings. If bearings or seals show any sign of wear, fit replacements. The need to exclude dirt from the bearings cannot be over emphasised.

BRAKES. Brake cable 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 obtain the correct adjustment, screw up the adjuster until the liners are just fouling the drum, then slack off until the wheel spins freely.

Never use oil to lubricate the bearings as it may easily spread to the brake lining surface and render the brakes ineffective.

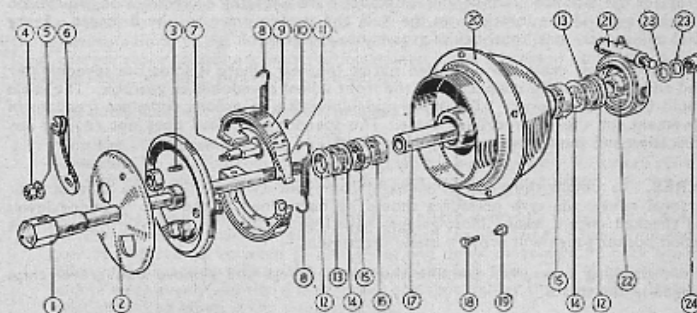
REMOVING FRONT WHEEL. Raise the machine on its stand and disconnect front brake cable by lifting cam lever and unhooking nipple. It may be necessary to screw down the adjuster to allow sufficient slack in the cable. Unfasten speedometer drive cable from speedometer gearbox. Unscrew offside spindle nut and while holding the wheel steady, withdraw spindle at nearside. Thus the wheel can be pulled clear.

REMOVING REAR WHEEL. Place machine on stand, remove both wheel covers, disconnect chain, taking care not to let it trail on the ground, detach brake cable. Slacken both spindle nuts. The wheel can then be eased out. When replacing, make sure the back plate torque stop is engaged in its groove in the fork end. After replacing the rear wheel, remember to check chain adjustment, rear brake adjustment and wheel alignment.

CHECKING 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 centres.

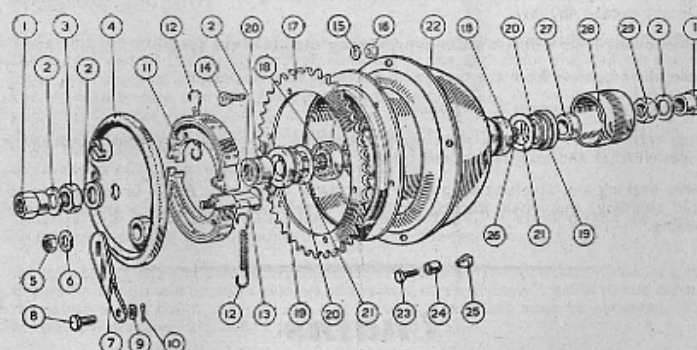
An alternative method is to use a perfectly straight board placed alongside the wheels so that it touches each one. If necessary turn the handlebar so that the front wheel touches the board at two points. If both tyres do not make contact at two points, slacken the rear wheel spindle nuts and turn adjusters until wheel is correctly aligned.

FRONT HUB BREAKDOWN.



- | | |
|--|-----------------------------|
| 1 Front spindle. | 13 Felt washer. |
| 2 Domed cover. | 14 Enclosure washer. |
| 3 Brake plate. | 15 Journal bearing. |
| 4 Hex nut. | 16 Locating pressing. |
| 5 Washer. | 17 Hub distance tube. |
| 6 Cam lever. | 18 Hex bolt (wheel fixing). |
| 7 Cam. | 19 Hex nut chamfered. |
| 8 Brake shoe spring. | 20 Hub shell. |
| 9 Brake lining. | 21 Speedometer gearbox. |
| 10 Brake lining rivets. | 22 Spacer. |
| 11 Brake shoes complete. | 23 Washer. |
| 12 Brake shoe slipper (not illustrated). | 24 Spindle nut. |

REAR HUB BREAKDOWN.



- | | |
|----------------------------|-----------------------------|
| 1 Spindle nut. | 16 Sprocket fixing nut. |
| 2 Washer. | 17 Sprocket. |
| 3 Hex nut. | 18 Journal bearing. |
| 4 Brake plate. | 19 Enclosure cup. |
| 5 Hex nut. | 20 Felt seal. |
| 6 Plain washer. | 21 Enclosure washer. |
| 7 Cam lever. | 22 Hub shell. |
| 8 Clevis pin. | 23 Hex bolt (wheel fixing). |
| 9 Clevis pin washer. | 24 Tapped spacer. |
| 10 Split pin. | 25 Chamfered nut. |
| 11 Brake shoes. | 26 Spindle. |
| 12 Brake shoe spring. | 27 Spacer. |
| 13 Brake cam. | 28 End cover. |
| 14 Sprocket fixing screw. | 29 Hex nut. |
| 15 Sprocket fixing washer. | |

SPEEDOMETER DRIVE. If the speedometer drive has been removed do not forget to replace the distance piece behind it because if the engaging projections on the speedo drive are tight in the locations on the hub, the speedo drive will be damaged. Every 5,000 miles insert small quantity of grease into the gearbox.

The speedometer cable has a knurled nut at the rear where it joins the speedometer head and a hexagon to connect it to the front wheel speedometer gearbox. The cable should be removed every 5,000 miles and lubricated to ensure complete freedom of movement for the inner driving cable. The speedometer head does not require any lubrication and should never be interfered with.

TYRES. To obtain the greatest mileage from your tyres and for the sake of your personal safety, the tyre pressures should be maintained at the recommended levels and checked once a week. Most garages have free air lines with pressure gauges, but a good pocket gauge will prove a useful investment.

When checking pressures, examine the outer covers and remove odd gravel chips wedged in the treads.

RECOMMENDED TYRE PRESSURES. With a total weight of 416 lbs. (10 stone solo rider) the following applies:—Front wheel carrying 168 lbs. weight requires 16 lbs. pressure. Rear wheel carrying 248 lbs. weight requires 16 lbs. pressure.

With passenger and/or luggage carried refer to the following table:—

Weight per wheel	Tyre Pressure
240 lbs.	16 lbs.
270 lbs.	18 lbs.
290 lbs.	20 lbs.
340 lbs.	24 lbs.
380 lbs.	28 lbs.
440 lbs.	32 lbs.
*480 lbs.	36 lbs.

Example: 10 stone rider and 11 stone passenger—Front wheel (176 lbs. weight) requires 16 lbs. pressure. Rear wheel (394 lbs. weight) requires 27 lbs. pressure.
*Do not exceed 480 lbs.

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

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

Ensure correct alignment of the wheels.

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

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

Chains

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.

ADJUSTING THE REAR CHAIN. Correct rear chain adjustment is particularly important on scooters with pivoted fork rear suspension as movement of the rear wheel causes variations in the sprocket centres with resultant changes in chain tension.

The rear chain should be adjusted after the first 200 miles and subsequently every 1,000 miles. Adjustment is obtained by moving the rear wheel forwards or backwards in the slotted fork ends which are fitted with adjusting bolts and locknuts to enable the wheel spindle to be set in the desired position. Since the rear chain tightens under load, correct chain adjustment must be maintained if the maximum useful life is to be obtained from the chain, sprockets and bearings.

To check and adjust rear chain tension, proceed as follows:

1. Raise the unladen machine on the stand and measure the amount of up and down movement on the bottom run of the chain midway between sprocket centres. The rear chain should have $\frac{3}{4}$ " to 1" movement in this static position.
2. Retract the stand and sit on the machine. If there is no-one to help you, feel the bottom run of the chain by reaching down with the left hand. Chain whip should now be reduced to between $\frac{1}{8}$ " and $\frac{1}{4}$ " up and down movement. Check again in different positions by rolling the machine a little at a time. This is because chains seldom wear evenly and there is generally one spot tighter than the rest. Measurement should be taken at the tightest point.
3. If chain whip is greater or smaller, slacken the rear spindle nuts and turn both adjusters until the correct chain tension is obtained. Tighten locknuts and spindle nuts and check again with the wheel in different positions. Always turn the adjusters an equal number of turns to ensure correct wheel adjustment.

REMOVING AND REFITTING REAR CHAIN. Remove engine cover and near-side rear wheel cover. Obtain a piece of thin string about 10 feet long. Place the machine on the stand and turn the rear wheel until the connecting link is positioned near the rear sprocket and remove the connecting link. Pass the string through the hole of the end link on the top run and knot the two ends of the string together. Now pull the bottom run of the chain backwards with one hand while keeping the string taut with the other hand. As the end of the top run of the chain is disengaged from the gearbox sprocket, the string will lie one strand each side of the sprocket teeth. When the chain is well clear, cut one side of the string about 12" from where it is looped through the chain link.

The string should be left in position for refitting or replacing the chain. To refit, thread the longer end of the string through the hole in the end chain link and tie the two loose ends together. Then pull the string from the rear end at the same time guiding the chain to engage over the gearbox sprocket teeth. Keep on pulling until the chain encircles the rear wheel sprocket. Remove the string and refit the connecting link, making sure the closed end of the spring clip faces in the direction of rotation. To avoid the chain picking up any dirt or grit on the garage floor, it is advisable to lay some sheets of clean newspaper under the machine.

CLEANING AND LUBRICATING THE CHAIN. A chain cannot be cleaned merely by drenching with oil while in position on the machine.

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

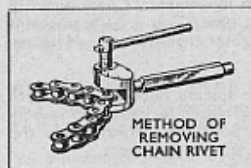
Immerse chain in tin containing graphited grease that has been heated until fluid over a pan of boiling water. Move the chain about in the grease until the grease has cooled off to normal semi-solid state. Remove chain from grease and wipe off surplus.

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

SHORTENING REAR CHAIN. If chain has an even number of pitches, that is, if 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 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).



METHOD OF REMOVING CHAIN RIVET

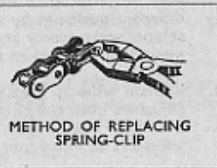
CHAIN COMPONENTS



CRANKED DOUBLE LINK



CONNECTING LINK



METHOD OF REPLACING SPRING-CLIP



INNER LINK

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 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.

REPLACEMENT CHAINS. After considerable mileage, chains will require replacing owing to wear and stretch. These can be purchased either from your motor cycle dealer or from the factory.

For rear and primary chain specifications see page 42.

Power Unit

150 MODEL 15H TWO STROKE ENGINE AND 3 SPEED GEARBOX.

Noted for its almost unfailing reliability and its appetite for hard work, the 149 cc. 15H two-stroke engine is a highly efficient power unit which, provided it is thoughtfully maintained and lubricated, will give years of service without requiring any major replacements. By virtue of its simplicity, it is cheap and easy to maintain and even owners with no previous scooter experience can confidently tackle normal adjustments, maintenance and minor repairs. In the case of major repairs, should they ever arise, we strongly advise the amateur mechanic to entrust the job to a qualified repairer.

OPERATION OF TWO-STROKE ENGINE. In the cylinder walls are arranged four holes or ports, viz.: one inlet port which permits the air fuel mixture to enter the crankcase, two transfer ports which, through passages in the sides of the cylinder, are in communication with the crankcase, and one exhaust port through which the burned charge is allowed to escape. Movement of the piston in a vertical direction is arranged to cover and uncover the ports at suitable times so that the mixture is first drawn from the carburettor through the inlet port into the crankcase. There it is compressed and then forced through the transfer passage into the cylinder above the piston, where it is further compressed. It is then ignited by a spark from the plug, and after expansion due to heat, escapes through the exhaust port into the exhaust pipe and silencer.

ENGINE MAINTENANCE. Periodical decarbonising is the only maintenance job the average owner will want to tackle on the 15H engine and full instructions are given on page 22.

The exploded drawings herewith are self-explanatory, but despite the apparent simplicity of the engine we strongly advise the average owner not to attempt major repair jobs himself, but to entrust the work to an authorised Service Agent or to our own Repairs Department. Splitting and re-assembling the crankcase halves, for instance, is a difficult matter demanding great care and skill, whilst considerable experience is needed to replace a big end assembly and true the shafts. Major repairs undertaken by the Factory Repairs Department 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 of this book.

LOCATING TROUBLES. For the satisfactory running of the engine it is essential that three main conditions are fulfilled, and by making a systematic and intelligent investigation the faults can usually be located. If the engine stops, symptoms will generally give a clue to the cause, but where this is not the case, the trouble can be more easily traced by following a definite method of investigation. The three conditions mentioned above are as follows:

- (1) The required quantity of petrol-and-air mixture must enter the engine, which means that a proper supply of fuel has to be available from the carburettor, and that the throttle should open and close freely.
- (2) The sparking plug must give a good spark, at the right time in relation to the position of the piston on its upward stroke.
- (3) The engine must be in good mechanical condition, with no air leaks at the various joints.

There must also be efficient compression of the air in the cylinder and crankcase. This can be easily checked by putting the gearbox into the neutral position, and rotating the crankshaft by means of the kickstarter. On every revolution a definite resistance should be felt, caused by the air in the cylinder being compressed.

Making a Preliminary Check. (To gain easy access remove engine cover, see page 10). When the cause of the trouble is not evident, carry out a preliminary check covering the following points; if this fails to trace the cause reference should be made to the "Tracing Faults" Chart (pages 40 and 41).

Having made sure that there is "petrol" in the tank, and that the tap is in the "ON" position, depress the tickler two or three times (location shown in illustration on page 14) to ensure that there is no blockage in the fuel supply, either in the tap, fuel pipe, banjo union or fuel needle seating.

Being satisfied that fuel is reaching the carburettor, next unscrew the sparking plug, and with the high tension lead still attached, lay the plug on the cylinder. Turn the engine by means of the kickstarter, and if there is a good spark, it is possible that the ignition timing is incorrect. If there is no spark, remove H.T. lead from plug cover, hold the H.T. lead $\frac{1}{2}$ " from cylinder. Clean or change the sparking plug if there is a good spark from the H.T. lead.

Finally examine the carburettor controls to make certain that the throttle is actually opening when the twist grip lever is moved and that the choke control is operating correctly.

PETROL CONSUMPTION. The carburettor is correctly set before the machine leaves the factory. An alteration to the main jet or throttle slide is unnecessary, as the correct sizes for best performances and petrol consumption have been selected after prolonged tests. Alteration to the carburettor setting must be confined to the location of the taper needle, attached to the throttle slide, or the pilot mixture regulating screw.

A guaranteed petrol consumption cannot be given as so many factors are involved, and once the carburettor is correctly set the petrol consumption is governed by the internal condition of the engine, the speed at which the machine is driven and, most important of all, the amount of throttle used.

Lowering the taper needle will weaken the mixture up to $\frac{3}{4}$ throttle, but this alteration can also impair acceleration.

If an increase in petrol consumption becomes apparent, its cause should be investigated, and reference to details on "tracing faults" should be made, to find a remedy.

TO CONSERVE PETROL DO NOT :—

Flood the carburettor unnecessarily.

Leave the machine standing with the petrol tap on.

Indulge in the practice of "blipping the throttle."

Use an unnecessary amount of throttle to accelerate.

DECARBONISING. There is no fixed mileage, or stipulated interval, when the engine should be decarbonised, and the necessity for this work is usually indicated by a deterioration in the performance and petrol consumption. When a machine is used continually for short journeys, the formation of carbon deposit in the combustion chamber and in the exhaust system will be more acute than on a machine which is used for frequent long journeys.

With the availability of high octane fuel, detonation or "pinking" is uncommon, consequently decarbonising is less frequently needed. The exhaust port is designed to prevent a carbon formation at this point of the system, in contrast an accumulation of burnt oil or carbon in the exhaust system can cause back pressure which will impair both performance and petrol consumption.

In the event of a loss of performance, it should be verified that the contact breaker gap or sparking plug are not at fault before the cylinder head is removed.

In the case of a machine that is used mainly for short journeys, driving at full throttle, where permissible, for a reasonable distance, will tend to dislodge loose carbon from the combustion chamber and exhaust system, and act as a "tonic" to the engine.

When decarbonising, have available a replacement cylinder head gasket, cylinder base washer and if the engine has covered considerable mileage — a set of new piston rings.

REMOVING THE CYLINDER HEAD. With engine cover and floorboards removed detach the H.T. cable at the sparking plug end and unscrew the plug. Should the plug become difficult to remove, do not use force; apply a little penetrating oil round the plug threads.

Take away the cylinder head steady and remove in turn the four cylinder head bolts.

Some difficulty may occur in separating the cylinder head from the cylinder barrel, particularly after a long interval between decarbonising. In such an event, replace plug and blow head off with compression charge by depressing starter pedal.

Carbon deposit formed on the sphere of the cylinder head and on the projections can be removed with a suitable tool, taking care not to scratch the machined surfaces. Do not use emery cloth or similar abrasive material for this purpose.

As it is a simple matter to remove the cylinder, the piston can be dealt with more effectively and without the risk of particles of carbon entering the transfer ports and crankcase if the cylinder is removed.

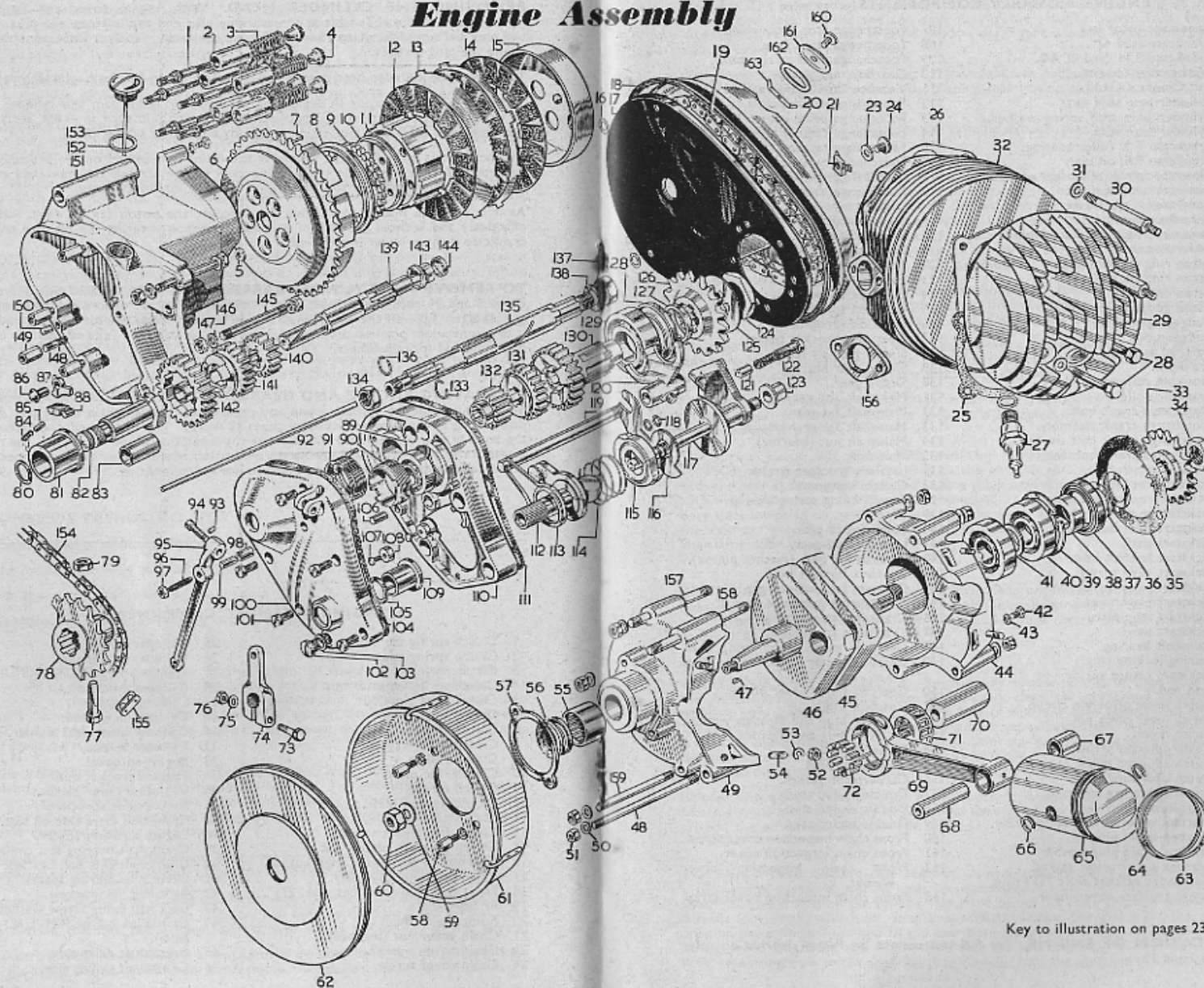
TO REMOVE THE CYLINDER BARREL. Remove the exhaust pipe and silencer. Do not unduly rock the exhaust pipe sideways, which can distort the pipe and cause gas leakage. Take off the petrol pipe and carburettor complete for cleaning and attach it to a convenient position on the frame rail to avoid damage. Take off the four cylinder base nuts and spring washers.

SEPARATING ENGINE AND GEARBOX. This necessitates the removal of the power unit from the scooter frame and removal of primary chain case cover plus the dismantling of clutch as described on pages 28 and 29. This completed, the extraction of the studs at rear of crankcase will facilitate the separation of the two units. The removal of remaining joint studs will enable the separation of crankcase halves, thus permitting access to main bearings which are interference fit in crankcase.

ENGINE ASSEMBLY COMPONENTS

- | | |
|--|--|
| 1 Clutch spring stud. | 25 Cylinder head gasket. |
| 2 Clutch spring cups. | 26 Cylinder base gasket. |
| 3 Clutch spring. | 27 Sparking plug H.L.N. |
| 4 Clutch spring adjuster nut. | 28 Cylinder head bolt. |
| 5 Clutch back plate nut. | 29 Cylinder head. |
| 6 Clutch back plate. | 30 Cylinder head stud. |
| 7 Clutch sprocket. | 31 Cylinder head steel washer. |
| 8 Clutch roller cage. | 32 Cylinder barrel. |
| 9 Clutch rollers. | 33 Engine sprocket. |
| 10 Clutch race plate. | 34 Engine sprocket nut. |
| 11 Clutch centre. | 35 Chaincase inner gasket. |
| 12 Clutch friction plate. | 36 Shim engine sprocket. |
| 13 Clutch plain plate. | 37 Crankcase drive side oil seal. |
| 14 Clutch friction front plate. | 38 Engine sprocket spacer. |
| 15 Clutch pressure plate front. | 39 Crankshaft bearing loc. circlip. |
| 16 Gearbox to chaincase paper washer. | 40 Crankshaft D.S. ball bearing. |
| 17 Chaincase inner assembly. | 41 Drive side bearing spacer. |
| 18 Front chain cover rubber seal. 27 $\frac{1}{2}$ " | 42 Back half fixing screw. |
| 19 Primary chain. | 43 Back half fixing screw washer. |
| 20 Front chain cover. | 44 Crankcase halves R.H./L.H. (sold in pairs). |
| 21 Chain cover nut (trapped). | 45 Crankshaft drive side. |
| 23 Chain cover washer. | 46 Crankshaft timing side. |
| 24 Chain cover screw. | |

Engine Assembly



Key to illustration on pages 23 and 26

ENGINE ASSEMBLY COMPONENTS—continued

47	Generator rotor key.	107	Footchange stop piece rivet.
48	Crankcase stud 4 1/8".	108	Footchange stop piece.
49	Crankcase R.H. (see ill. 44).	109	Footchange pawl carrier bush.
50	Washer crankcase stud.	110	Gearbox inner cover.
51	Nut Crankcase stud.	111	Gearbox inner cover gasket.
52	Cylinder base stud nut.	112	Footchange ratchet shaft.
53	Cylinder base stud spring washer.	113	Footchange pedal return spring.
54	Cylinder base stud.	114	Footchange ratchet spring.
55	Crankcase T.S. roller bearing.	115	Footchange ratchet.
56	Crankcase T.S. oil seal.	116	Footchange ratchet actuating plate.
57	Generator crankcase spacer washer.	117	Footchange ratchet segment shaft.
58	Generator studded nut.	118	Footchange ratchet segment shaft "O" ring.
59	Generator rotor washer.	119	Striker shaft.
60	Generator rotor nut.	120	Selector fork.
61	Generator back plate assembly.	121	Camplate plunger.
62	Generator cover.	122	Camplate plunger bolt and spring.
63	Piston ring chrome (top).	123	Footchange ratchet shaft bush.
64	Piston ring (bottom).	124	Gearbox sprocket nut.
65	Piston only.	125	Gearbox sprocket lockwasher.
66	Piston gudgeon pin circlip.	126	Gearbox sprocket.
67	Gudgeon pin bush.	127	Gearbox sprocket spacer.
68	Gudgeon pin.	128	Sleeve gear oil seal.
69	Con rod assembly.	129	Sleeve gear bearing.
70	Crankpin.	130	Sleeve gear.
71	Crankpin roller cage.	131	Mainshaft 2nd gear.
72	Crankpin rollers.	132	Mainshaft 1st gear.
73	Footchange crank bolt.	133	Mainshaft 1st gear circlip.
74	Footchange crank assembly.	134	Mainshaft nut (bearing).
75	Footchange crank bolt washer.	135	Mainshaft.
76	Footchange crank bolt nut.	136	Layshaft 3rd gear circlip.
77	Sprocket pinch bolt.	137	Clutch fixing nut.
78	Starter sprocket.	138	Clutch fixing spring washer.
79	Starter sprocket bolt nut.	139	Layshaft.
80	Kickstart shaft "O" ring.	140	Layshaft 3rd gear.
81	Kickstart shaft bush.	141	Layshaft 2nd gear.
82	Kickstart shaft.	142	Layshaft 1st gear (ratchet pinion).
83	Kickstart layshaft bush.	143	Gearbox layshaft bush.
84	Kickstart pawl spring.	144	Gearbox layshaft end cap.
85	Kickstart pawl spring pin.	145	Gearbox to crankcase stud 3".
86	Kickstart plate rivet.	146	Crankcase stud washer.
87	Kickstart stop plate.	147	Crankcase stud nut.
88	Kickstart pawl.	148	Gearbox inner cover fixing stud.
89	Mainshaft bearing.	149	Gearbox inner cover fixing stud nut.
90	Bearing locking ring.	150	Gearbox inner cover dowel.
91	Kickstart return spring.	151	Gearbox shell.
92	Push rod.	152	Oil filler plug and dipstick washer.
93	Clutch lever pivot pin circlip.	153	Oil filler plug and dipstick.
94	Clutch lever pivot pin.	154	Kickstart chain.
95	Clutch lever.	155	Connecting link.
96	Clutch adjuster screw.	156	Carburettor gasket.
97	Clutch adjuster screw nut.	157	Double ended stud.
98	Clutch operating bush.	158	Double ended stud.
99	Clutch operating roller.	159	Double ended stud.
100	Gearbox outer cover.	160	Front chain inspection cover screw.
101	Gearbox outer cover fixing screw.	161	Front chain inspection cover.
102	Gearbox drain plug.	162	Front chain inspection cover washer.
103	Gearbox drain plug washer.	163	Front chain inspection cover strap.
104	Gearbox outer cover gasket.		
105	Footchange ratchet shaft "O" ring.		
106	Dowel gearbox cover inner.		

LUBRICATION OF ENGINE. For full instructions on Petroil lubrication refer to pages 9 and 10.

NOTE : The piston rings are located by metal pegs in the piston ring grooves, to prevent the rings turning and the ends fouling the transfer ports. It is, therefore, imperative that the cylinder is eased gently away from crankcase without rotary movement to avoid piston ring breakage.

With some clean rag in the throat of the crankcase and wrapped round the piston skirt, the crown and recess each side of the piston can be carefully scraped to remove carbon deposits.

Any unburnt oil or carbon formed in the cylinder exhaust port should also be removed.

TO REMOVE THE PISTON. Using a pair of thin nosed pliers, remove one of the gudgeon pin circlips. The gudgeon pin is a close fit in the piston and if pieces of rag immersed in boiling water are placed on the piston crown in relays, this will cause the piston to expand and enable the gudgeon pin to be pushed out. If the pin resists removal, do not use force, but carefully scrape round the recess for the circlip to remove a burr or burnt oil. With the pin removed, lift off the piston and mark the inside of the skirt to indicate which way it was fitted, for re-assembly.

The piston rings should not be removed without good reason. Gas leakage past the piston rings is indicated by brown patches on the cylinder contact area or on the ring extremities ; rings so affected should be discarded and new ones fitted.

The rings must be perfectly free in the ring grooves : carbon formed in the ring grooves will prevent free movement. When removing the rings they should be expanded with care and only sufficiently to clear the piston ring grooves.

The top compression ring, (which must be correctly fitted) is chrome plated (to reduce cylinder wear) and taper faced. Its position is indicated by the word TOP etched on the horizontal ring face.

The normal piston ring gap is .009" minimum : maximum permissible gap is .014". To check the ring gap, place the ring in the unworn part of the cylinder (crankcase end) and push it down about one inch, using the piston skirt to ensure the ring is square with the cylinder bore. The gap can be checked by feeler gauges. The normal cylinder bore sizes are given on page 42. When cylinder wear is to the extent of .008" or more, the cylinder should, whenever possible be rebored or be returned to the Service Department for rotary exchange.

REFITTING THE PISTON. Apply a little clean oil on the gudgeon pin and in the bush. Gently pre-heat the piston and fit it on the connecting rod in its original position and introduce the gudgeon pin. Fit the circlip with a rotary motion and verify it is snugly in its groove.

REFITTING THE CYLINDER. Remove any broken pieces of base washer from the flange and the crankcase face. Thoroughly clean the ports and cylinder bore. Apply a little jointing compound to one side of the new base washer and stick it to the cylinder. Apply some clean oil on the piston and cylinder bore. A generous chamfer is used on the cylinder to facilitate fitting. Offer up the cylinder and compress in turn the two piston rings, then gently ease the cylinder into position. Fit the four spring washers and base nuts and tighten these diagonally, not one side at a time.

Before refitting the exhaust pipe and silencer, it is opportune to clean these parts internally and externally. Refer to instructions given on page 39. Refit the exhaust system, the carburettor and throttle control.

TO REFIT THE CYLINDER HEAD. A new cylinder head gasket is preferable. If the original gasket is used, it must be undamaged if a gas tight joint is to be made. Clean the gasket face on the cylinder head and barrel : a little graphite grease on the threads for the cylinder head bolts is beneficial. Locate the gasket on the cylinder, position the cylinder head and fit the four head bolts and washers. These bolts should be tightened diagonally and firmly. See that the sparking plug is in order. Apply a little graphite grease to the sparking plug threads, refit the plug and H.T. cable.

PILOT JET AIR SCREW ADJUSTMENT.

1. Set air screw 3 half turns from fully closed position.
2. Run engine until warm.
3. With engine at tick over, adjust air screw until even firing occurs.
4. Finally adjust throttle stop screw until desired idling speed is obtained.

Clutch

CLUTCH ADJUSTMENT. Attention to the clutch is usually confined to adjustment of the operating mechanism. To avoid clutch slip or clutch drag, the clutch should have $\frac{1}{8}$ of an inch slack between the clutch outer casing and the clutch cable. Without such slack the operating mechanism will be pre-loaded causing wear on the operating parts, also clutch slip. Conversely, excessive slack in the clutch cable will prevent separation of the friction plates and cause the clutch to drag, thus making the gear selection difficult. As the clutch inserts tend to settle down, this has the effect of lengthening the clutch push rod, as the width of the friction inserts is slightly reduced. To deal with clutch drag, or clutch slip, first unscrew the clutch cable adjuster lock nut and run down the adjuster as far as it will go. Unscrew one or two turns the adjuster lock nut (97) shown in illustration of clutch assembly on pages 24—25. With a screwdriver, screw in the adjuster until contact with the push rod can be felt, unscrew the adjuster exactly half a turn and retighten the locknut, taking care the adjuster does not move. Complete the adjustment by unscrewing the clutch cable adjuster until there is $\frac{1}{8}$ " slack between the outer casing and the adjuster and tighten the locknut.

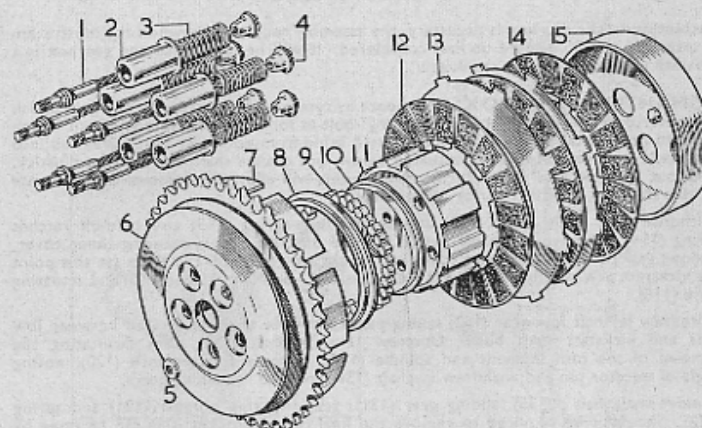
Clutch slip should be dealt with promptly otherwise the friction plates will be damaged and the clutch springs affected by heat. The normal free length of the clutch springs is $1\frac{1}{2}$ ", the clutch push rod length is $8\frac{1}{2}$ ".

DISMANTLING THE CLUTCH — NOTE: Nuts and screws in the clutch and gearbox assembly have a right hand thread, with the exception of the nut retaining the gearbox rear chain sprocket, which has a left hand thread.

Commence by removing the primary drive cover by undoing centre screw. Unscrew in turn the five clutch spring adjusting screws, take away the clutch spring pressure plate complete with the spring cups and springs, leaving the steel and friction plates free for removal. The front chain is endless, consequently the clutch and engine sprockets are removed simultaneously. A box key is required to unscrew the nut on the gearbox mainshaft securing the clutch hub and sprocket. The shaft nut is $\frac{11}{16}$ " across flats, the engine sprocket nut is 1" across flats.

Engage top gear, using a good fitting spanner on the engine sprocket nut, apply pressure on the rear brake pedal, then hit the end of the spanner with one or two light hammer blows which will loosen the sprocket nut. With a box key use the same method to unscrew the gearbox shaft nut. Both the engine sprocket and clutch hub are on splined shafts, and usually they can be pulled off simultaneously after both nuts have been removed. If difficulty is experienced the careful use of two screwdrivers placed behind the sprockets will have the desired effect. For access to the clutch bearing unscrew the five nuts securing the clutch studs and back plate. The clutch bearing arrangement is shown in the illustration on page 29.

CLUTCH ASSEMBLY.



- | | |
|-------------------------------|--------------------------|
| 1 Clutch spring stud. | 9 Roller bearings. |
| 2 Clutch spring cup. | 10 Race plate. |
| 3 Clutch spring. | 11 Clutch centre. |
| 4 Clutch spring adjuster nut. | 12 Friction plate. |
| 5 Nut. | 13 Plain plate. |
| 6 Back plate. | 14 Front friction plate. |
| 7 Clutch sprocket. | 15 Pressure plate. |
| 8 Roller cage. | |

TO RE-ASSEMBLE THE CLUTCH. Apply a little heavy grease to the cage for the clutch bearing to retain the 12 rollers, whilst the cage is fitted to the clutch race plate, and assemble parts in the reverse order described for dismantling. The five clutch stud nuts should be peened or centre popped for security.

To position correctly the clutch spring adjusting nuts (4) adjust each nut until the slotted end is just flush with the end of the clutch spring stud (1), then unscrew each nut two complete turns. The position of these nuts can be varied slightly to ensure that the pressure plate (15) is withdrawn parallel to steel plate behind it, when the clutch is operated.

Gearbox

If attention to the gearbox is necessary, the assembly sequence shown in the illustration on pages 24 and 25, should be first considered. It will be noted that the gearbox is a separate unit bolted to the crankcase.

DISMANTLING GEARBOX. Commence by removing kickstart lever and gear pedal. The outer cover, which is secured by one $\frac{1}{2}$ " bolt at forward end and one $\frac{3}{4}$ " nut at top end, can now be taken off. Disconnect clutch cable from operating arm. Drain oil into receptacle by means of oil plug, situated below foot change shaft, and remove dipstick. Take out 5 screws and clutch thrust roller; this will allow the removal of outer case (at this stage the kickstart spring is accessible).

Withdraw gear pedal shaft (112) and centralizing spring (113) and take-off ratchet spring (114). Remove mainshaft nut (R.H.) and unscrew 5 nuts securing inner cover, remove gasket. Then the inner cover can be tapped gently off the studs (at this point the kickstart pawl and spring (88, 91) are accessible). Remove ratchet (115) and actuating plate (116).

Withdraw layshaft low gear (142) taking particular note of shims located between low gear and kickstart shaft bush. Unscrew selector shaft (119), thus facilitating the removal of the cam segment and spindle (117). Extract selector fork (120), noting angle of selector pin and withdraw layshaft (139) and two remaining gears.

Remove mainshaft (135), sliding gear (131), gear indexing plunger (121) and spring (122). Should it be required to remove the final drive sprocket, this can be done by straightening locking washer and unscrewing retaining nut (L.H.) and removing chain from sprocket (this will permit removal of sleeve gear).

* To facilitate the withdrawal of the mainshaft (135) the clutch assembly must be removed from the power unit.

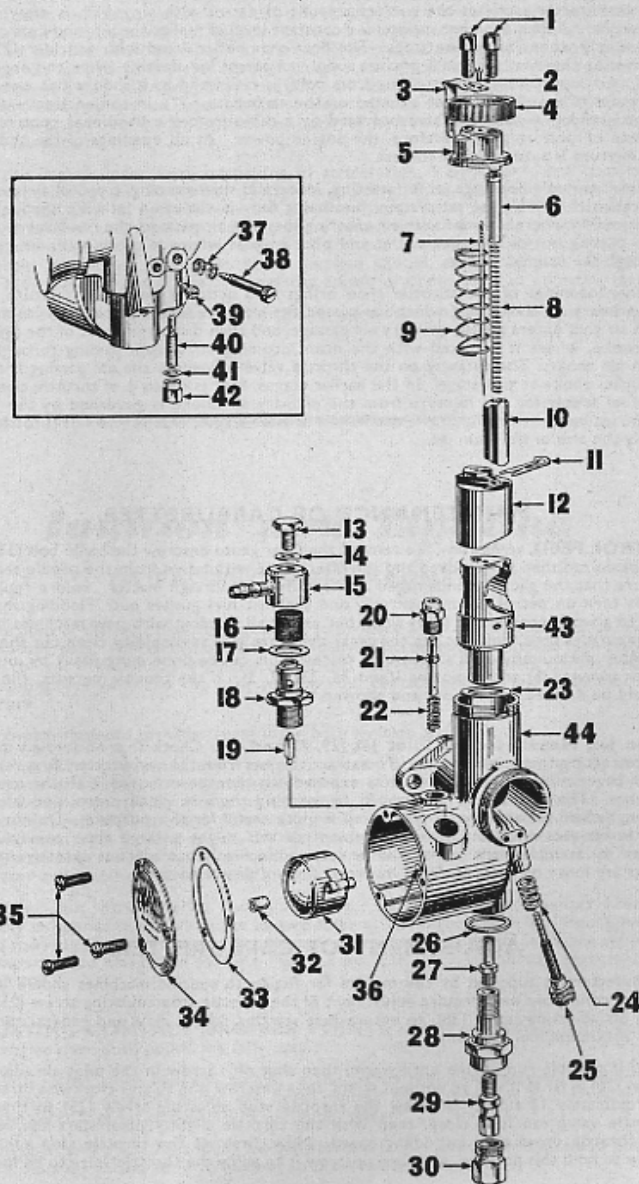
RE-ASSEMBLY OF GEARBOX. Reverse the previously explained procedure, carefully noting the following points:—

1. Be absolutely certain that components are replaced in correct order and position.
2. Check that all joint faces are free from bruises and damage.
3. Gaskets should be renewed to ensure freedom from oil leaks.
4. Smear joint faces with sealing compound.

CARBURETTER COMPONENTS.

- | | |
|--|-------------------------------------|
| 1. Cable adjusters. | 23. Washer for jet block. |
| 2. Fixing screw for cap springs. | 24. Throttle stop screw spring. |
| 3. Cap spring for top with adjuster ferrule. | 25. Throttle stop screw. |
| 4. Mixing chamber top cap ring. | 26. Main jet holder washer. |
| 5. Mixing chamber top (std). | 27. Needle jet. |
| 6. Air valve guide. | 28. Main jet holder. |
| 7. Taper needle. | 29. Main jet (specify size). |
| 8. Air valve spring. | 30. Main jet cover nut. |
| 9. Throttle valve spring. | 31. Float complete. |
| 10. Air valve. | 32. Float spindle bush. |
| 11. Needle clip. | 33. Float chamber cover joint. |
| 12. Throttle valve (specify cutaway). | 34. Float chamber cover. |
| 13. Banjo bolt. | 35. Float chamber cover screws. |
| 14. Banjo bolt washer. | 36. Float hinge spindle. |
| 15. Banjo single. | 37. Air adjusting screw spring. |
| 16. Filter gauze. | 38. Air adjusting screw. |
| 17. Banjo washer. | 39. Locating peg for jet block. |
| 18. Needle seating. | 40. Pilot jet. |
| 19. Float needle. | 41. Pilot jet cover nut washer. |
| 20. Tickler body. | 42. Pilot jet cover nut. |
| 21. Tickler. | 43. Jet block $\frac{1}{8}$ " bore. |
| 22. Tickler spring. | 44. Mixing chamber body, type 375. |

AMAL MONOBLOC TYPE 375/37 Carburetter



HOW THE CARBURETTER WORKS.

The carburetter atomises the correct amount of petrol with air which is drawn into the engine. A float chamber maintains a constant level of fuel at the jets and cuts off the fuel supply when the engine stops. The float chamber is fitted with a tickler (21) for depressing the float to give a greater supply of petrol for starting when the engine is cold. Air regulation (when starting from cold) is facilitated by a slide which operates, by means of a push/pull lever situated on the carburetter (1), in conjunction with the throttle slide. A throttle valve operated by a cable from the handlebar controls the volume of mixture and, therefore, the engine power. At all openings of the throttle, the mixture is automatically correct.

At small throttle openings, as for starting, idling and slow-running, a petrol/air mixture is drawn from the pilot jet system, fuel being fed via the main jet (29), through the pilot jet (40) where it mixes with air entering the pilot air passage, the resultant mixture then passing out of the pilot outlet and pilot by-pass where it mixes with air passing through the main air choke.

Further openings of the throttle then brings into action a petrol/air mixture from the primary air choke, fuel which has passed the main jet needle and needle jet mixing with air that enters via the primary air passage, and then discharging out of the primary air choke, where it is mixed with the main incoming air stream passing through the main air choke. The cutaway on the throttle valve influences the air passing through the main choke at this stage. In the earlier stages, that is up to $\frac{1}{2}$ of throttle opening, the fuel supply for the mixture from the primary air choke is governed by the taper of the jet needle working in the needle jet, at later stages, that is $\frac{1}{2}$ to full throttle it is solely the size of the main jet.

MAINTENANCE OF CARBURETTER.

PETROL FEED, verification. To remove the filter gauze unscrew the banjo bolt (13) and the banjo can then be removed and the filter gauze withdrawn from the needle seating. Ensure that the gauze is undamaged and free from all foreign matter. Before replacing banjo turn on petrol tap momentarily and see that fuel gushes out. Flooding may be due to a worn needle or a leaky float, but nearly all flooding with new machines is due to impurities (grit, fluff, etc.) in the tank, therefore it is advisable to clean out the float chamber periodically until the trouble ceases. This can be done quite easily by undoing cover screws (35) and removing items 34, 33, 32, 31. If the trouble persists, the tank should be drained, swilled out and allowed to dry.

Main Jet, Needle Jet and Pilot Jet (29, 27 and 40). Check that no foreign matter is obstructing their passageways. To extract the jets from the carburetter, first remove their cover nuts (30 and 42) the jets exposed can then be removed with the use of a spanner. The jets should be cleaned by washing them in clean petrol and blowing through their passageways (a tyre pump is quite useful for this purpose). Do not prod or reamer jets with any sharp implement as this might enlarge their passageways. When re-assembling the jets should be screwed in firmly but without excessive strain, if jets are loose on their seatings, incorrect flow of petrol occurs.

ADJUSTMENT OF CARBURETTER.

Carburetters as supplied by the makers for fitting to specific machines should under normal conditions only require adjustment of the throttle stop adjusting screw (25) and pilot air adjusting screw (38), to ensure best starting, idling, slow and general running with maximum fuel economy.

First, if possible run engine until warm, then shut off. Screw in the pilot air adjusting screw (38) as far as it will go without strain, then unscrew it in an anti-clockwise direction approximately $1\frac{1}{2}$ turns. Unscrew the throttle stop adjusting screw (25) so that the throttle valve can fully close, then with the throttle slightly open start the engine and throttle down to a fast idling speed. Now, first set the throttle stop adjusting screw to hold this position, and then unscrew it to allow the throttle valve to be further

closed and the engine to slow down until it begins to falter, then screw the pilot air adjusting screw in or out until the engine runs regularly and faster. Then further unscrew the throttle stop adjusting screw until the closing of the throttle valve again makes the engine run slower and just begin to falter, then again adjust the pilot air adjusting screw to get best slow running. If, after this second adjustment, the engine is still running too fast, carry out the same procedure a third time. After each adjustment of the throttle stop adjusting screw and pilot air adjusting screw, test that the engine does not falter or cut out when the throttle is opened fairly quickly; if the engine does falter or cut out, the adjustment has been set for too slow running resulting in an over-weak pilot mixture.

With the engine under load, or pulling, if acceleration is poor, or there is spitting back in the carburetter (indicating a too weak mixture), raise the needle by one groove at a time and leave in position where it functions best. If the engine runs heavily and lumpy, the mixture is too rich, causing heavy consumption. Remedy this by lowering the needle one groove at a time, until a satisfactory running position is reached. As previously mentioned, the carburetter supplied should, under normal conditions, only require adjustment of the throttle stop adjusting screw, pilot air adjusting screw.

After the best position of the needle jet has been found again check over the slow running.

Ignition and Lighting

(WIPAC FLYWHEEL MAGNETO).

The purpose of the high tension magneto is to produce a hot spark across the points of the sparking plug. A magneto consists principally of permanent magnets, a high tension coil, a contact breaker and a condenser. In this magneto the magnets are secured to the rotating flywheel, and the high tension coil, contact breaker and condenser are stationary.

The flywheel magneto provides current for both ignition and lighting.

If it is necessary to remove the flywheel magneto, begin by removing engine cover, floorboards and flywheel cover, unscrew centre nut (left hand thread) and washer. Withdraw flywheel (1) by means of extractor. Disconnect generator wires at snap connections, and H.T. at plug. Remove the two screws from stator, thus facilitating its withdrawal from locating spigot. Whilst holding the stator, undo the adaptor screw thus permitting the generator shroud to be removed from crankcase. This leaves the stator and electrical harness in situ ready for re-assembly.

The stator unit which carries the ignition coil, lighting coils and contact breaker assembly is secured to the crankcase by two screws. The high tension lead from ignition coil to sparking plug is detachable by unscrewing from armature plate, and when refitting it is important to make sure that the high tension lead is screwed firmly into the high tension coil.

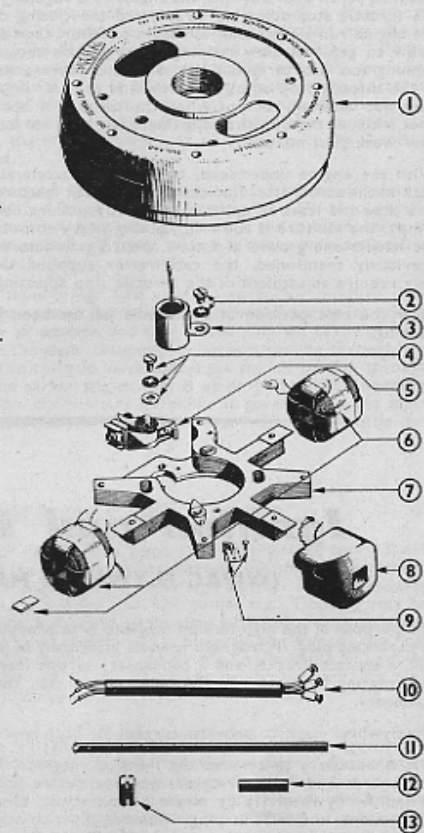
ADJUSTING CONTACT BREAKER POINTS. Remove flywheel outer cover. Turn engine over until points are fully open.

Test with feeler gauge between points. If the points require adjustment slacken the fixing screw and carefully move the fixed contact plate by means of a screwdriver until the correct gap is obtained .018". Tighten screw.

The breaker point setting should be adjusted only in the manner described and at no time should the breaker arm be bent to provide adjustment.

FLYWHEEL MAGNETO

- 1 Flywheel and cam unit.
- 2 Fixing set (condenser).
- 3 Condenser.
- 4 Fixing set (contact breaker).
- 5 Contact breaker.
- 6 Low tension coil.
- 7 Core and plate assembly.
- 8 High tension coil.
- 9 Grease pad.
- 10 Low tension lead (4 connections).
- 11 High tension lead.
- 12 Sleeve.
- 13 Grommet.



If the contact points need replacing both the fixed and movable points must be replaced at the same time.

NOTE: After every 5,000 miles it is necessary to relubricate the cam grease pad. This is done by removing the pad and squeezing and working into it a Summer grade oil motor transmission grease. **Do not use ordinary grease.**

REPLACEMENT OF IGNITION AND LIGHTING COILS. First bend back coil retainer strip then release coil lead from contact breaker fixing post, then unsolder earth leads from lead clamp. Considerable force may be necessary to remove coil from core as a fibre wedge is used to ensure a tight fit and a varnish adherent is also used to secure the lighting coils.

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

The first step in dealing with ignition trouble should be to remove plug from engine and examine the points to see whether they are oily and the gap correctly set at $\cdot 020''$. If the insulator is fouled with oil and carbon there may be sufficient leakage to prevent correct sparking and cleaning will be necessary. Fitting a new plug will readily show whether the failure is due to plug or not. The plug lead should then be examined for cracks or other faults. The contact breaker can then be examined to see whether the points are opening correctly. When the points are fully open there should be a gap of $\cdot 018''$. The surfaces must also be clean and free from oil and severe pitting. A piece of stiff paper will usually remove oil or grease. If the points are burned or pitted they should be cleaned with a fine carborundum stone if available, otherwise fine emery cloth can be used, wiping off any traces of metal or emery dust with petrol-soaked rag. As a result of wear on the heel of the rocker arm bearing on the cam, the point gap will be reduced. This wear should be negligible if the felt oiling pad is kept moist with a suitable lubricant.

A weak or faulty condenser can be detected by badly burnt and pitted contacts or a continuous intense blue spark across the contacts when running. A very small white spark across the points when running is normal.

The condenser can be removed by undoing the screw securing it and releasing the lead from the terminal post.

SPARKING PLUG. A Lodge HLN plug is fitted as original equipment. This plug will stand up to the maximum power output of the engine without pre-ignition and if the carburettor mixture is correct, little trouble should be experienced. The sparking plug gap should be checked every 2,000 miles and reset to $\cdot 020''$. It is a good plan to carry a spare plug of the correct type so that when the plug in use requires cleaning, it can be removed and the clean spare inserted in its place. Keep the spare plug well wrapped up to protect the all important points.

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

CLEANING THE PLUG. Wash in petrol, scraping insulator with a knife or rubbing with a fine emery to remove carbon and wash again. The electrodes should be very carefully scraped. **DO NOT** rub a wire brush over the points — this will have a ruinous effect. Set point gaps to $\cdot 020''$ by tapping **OUTSIDE** electrodes — **NEVER** attempt to bend the central electrode. Coat the thread with "Oil Dag" or Graphite paste.

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

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

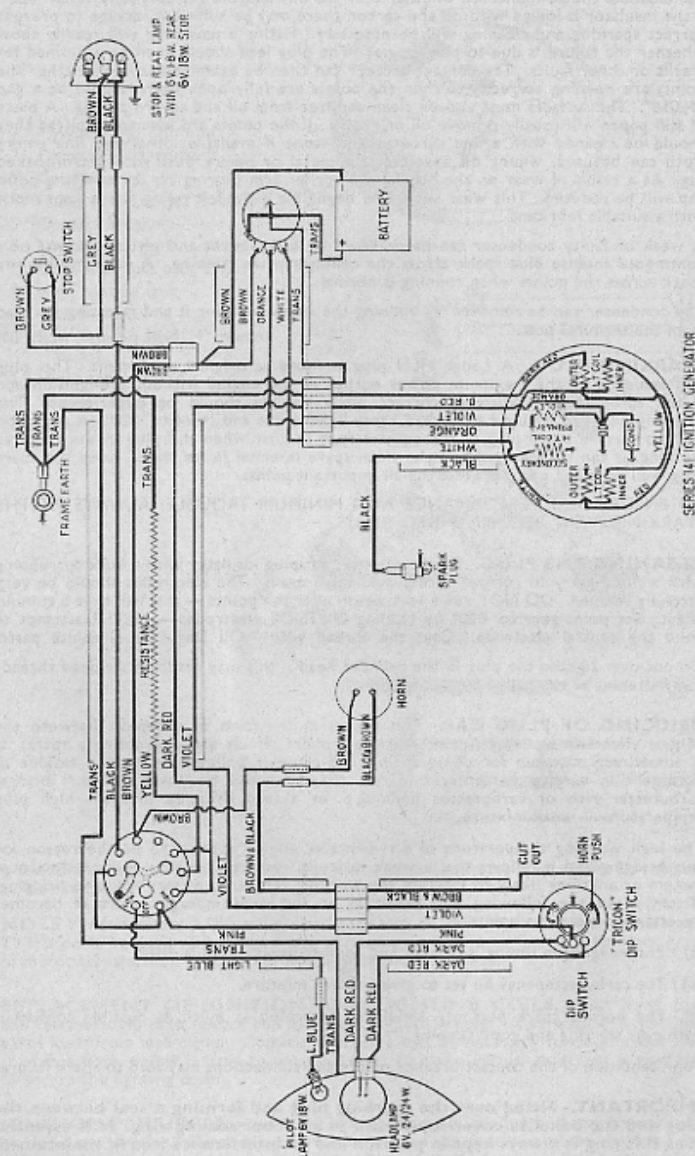
The high working temperature of a two-stroke engine appears to be the reason for this bridging and it follows that a weak mixture, retarded ignition, a choked exhaust system or anything likely to increase the working temperature may result in bridging. Attention to the following will result in an increased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

- (a) Ensure ignition timing is correct and contact breaker gap is $\cdot 018''$.
- (b) The carburettor may be set to give a richer mixture.
- (c) The normal spark plug gap should be increased as much as possible consistent with easy starting and good running.

Poor condition of the contact breaker points and connections may lead to spark failure.

IMPORTANT. Fitted over the sparking plug and forming a seal between the plug and the bakelite cover-suppressor is a rubber sealing ring. It is essential that this ring is always kept in position and an interference free fit maintained. Removal of this component may result in engine cut-out during wet weather.

RECTIFIER BATTERY LIGHTING.



REPLACEMENT BULBS (Rectifier Battery Lighting). Refer to page 42.

Your scooter is equipped with a rectifier-battery lighting set. The rectifier is located beneath the battery under twinseat.

Parking lights and other accessories are always operated on current obtained from the battery.

The advantage of this system is that the rider can be completely independent of the state of charge in the battery for night driving.

When the switch is in the H position, no light can be obtained at the main bulb when the engine is not running, because in this position the bulb is not connected to the battery and no current is being produced by the generator.

In all the other switch positions the lamps are independent of engine speed, as they are connected to the battery through the headlamp switch.

It is recommended that the "H" position should be used on every possible occasion, as by this means no current is being taken from the battery. In addition to this, a small charge will also be given to the battery when the engine is running at moderate speeds.

NOTE: Go over all cables regularly, especially those leading to and from the Rectifier, and make sure that none of them is fraying. Should any show signs of doing so bind them at once with plenty of insulating tape and ensure that they are no longer able to flap about.

ALWAYS REFER TO WIRING DIAGRAM WHEN CHECKING CONNECTIONS OR REPLACING CABLES.

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 is mounted in the reflector under the main bulb.

The design of the lamp holder, lamp and reflector assembly is such that when the bulb is correctly positioned, no focussing is required.

The reflector and front glass are made up as one assembly and no attempt should be made to separate them. The components cannot be purchased separately.

TAIL LIGHT. Of Wico-Pacy design, the new tail light incorporates a reflecting surface complying with British traffic regulations. Twin bulbs are employed.

STOP LIGHT. A stop light switch is fitted and provision made inside the tail light for a stop light bulb — 6 volt, 18W, S.B.C.

REMOVING LIGHT UNIT AND RIM. Slacken the bolt on top of the lamp body at the front, pull the rim outwards from the top and, as the front comes away, raise slightly to disengage bottom tag from lamp shell. Twist the back shell in an anti-clockwise direction and pull it off. 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 screwdriver blade, at the same time working away from the edges.

REPLACING LIGHT UNIT AND RIM. Lay the light unit in the rim so that the location block on the unit engages with the forked brackets on the rim. Replace the clips by springing in, so that they are evenly spaced around the rim. To replace the back shell, engage the projections on the inside of the back shell with the slots in the holder, press on and secure by twisting it to the right. Engage bottom tag on headlamp rim with the small slit in the shell, and gently force the top of the rim back into the shell, after which re-tighten the locking bolt on the top of lamp body.

BATTERY — POSITIVE EARTH. Your machine is equipped with a 6 volt Lucas type MLZ7E "dry charged" battery. Supplied without electrolyte (mixture of concentrated sulphuric acid and distilled water), but with the plates in a charged

condition. Your dealer will attend to the adding of the necessary electrolyte before the battery is brought into use. Then it will be necessary only to top it up to the level mark with distilled water at regular intervals, see page 11.

IMPORTANT

Provided that the negative battery lead is suitably insulated, and the wiring is in good condition, no damage to the Rectifier will occur if the engine is used without the battery. It should, however, be clearly understood, that the switch should not be put to the "PARKING" position whilst the engine is running.

BATTERY MAINTENANCE. 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 from the machine, clean terminals, and top-up the three cells to the level indicator mark 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; the positive is earthed to reduce this effect to a minimum, but 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. Rainwater 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 damage.

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

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.

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.

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 a lead-acid type batteries.

Exhaust System and Silencer

The exhaust gases of two stroke engines contain 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. This can be done by first unscrewing the exhaust pipe attachment bolt at cylinder, and then the silencer fixing bolt. The silencer can be separated from the exhaust pipe by means of the nut and washer located at the tail end. To dismantle the silencer remove the four small self-tapping screws. At this stage the silencer should be thoroughly cleaned with a stiff brush, and the exhaust pipe flushed out three or four times with a solution of household detergent and boiling water.

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, magneto and brake linings.

Never garage a dripping machine after a wet run. Remove moisture by dabbing gently with a soft cloth, e.g., 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 wheels rim 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 deposit may be observed on chromium plating. It is not rust but the action of certain salts used in the plating process. If attended to in good time such spots can easily be removed by rubbing with a good brand of chromium polish. NEVER USE HOUSEHOLD METAL POLISH ON CHROMIUM PLATING.

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

ALUMINIUM ALLOY CASTINGS. A certain amount of road dirt and oil will inevitably gather on the cast alloy surfaces of the engine crankcase, gearbox and carburetter, and regular cleaning will improve the appearance of the machine. A clean engine unit is also easier and more pleasant to maintain.

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

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

Tracing Faults

Sequence of Testing.	Possible Trouble.	Remedy.
Engine will not start.		
Depress tickler on carburettor to check whether fuel is reaching carburettor.	No fuel reaching carburettor, air lock in petrol pipe.	Turn tap to ON, refill tank, clean 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 carburettor 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 $\frac{1}{4}$ " from cylinder fins.	Plug points may be oily or sooted up, if no spark at end of H.T. lead, contact breaker point gap may be too narrow or points pitted or dirty or oily.	Clean plug or fit new one. Adjust point gap, see page 42. Clean.
	Moisture on insulation of condenser.	Clean and dry out.
	Damaged insulating sleeving on wires connecting contact breaker to coil or condenser.	Replace with new sleeving.
	Faulty connection to low tension wire of ignition coil.	Correct.
	Faulty condenser.	Replace.
	Faulty ignition coil.	Replace.
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 kickstarter several times to clear engine of petrol, drain crankcase.
	Air leaks at carburettor manifold joint causing weak mixture.	Tighten joints evenly.
	Incorrect ignition timing.	Check instruction given.
Engine Four or Eight Strokes.		
Air Control lever may not be fully open or taper needle in a too high position. Air filter may need cleaning.	Mixture too rich.	Lower taper needle by moving to a WEAKER position.

TRACING FAULTS — (continued).

Sequence of Testing.	Possible Trouble.	Remedy.
Engine Four or Eight Strokes — continued		
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 carburettor.	Persistent flooding is usually due to dirt under fuel needle seating, or sticking fuel needle, damaged seating or punctured float.
Engine Lacks Power.		
	Engine out of tune, bearings worn. Unsuitable sparking plug.	Overhaul. Replace with recommended type.
	Loss of compression.	Tighten cylinder head bolts. Replace worn piston rings.
	Incorrect "petrol" mixture.	Refer to page 10.
	Excessive carbon deposit on piston crown and cylinder head.	Decarbonise.
	Exhaust system choked with carbon.	Clean out silencer and exhaust pipes.
	Incorrect carburettor setting.	Check and adjust.
	Air cleaner choked.	Wash in petrol, drain and dip in thin oil.
	Obstruction in fuel supply.	Clean out tap, fuel pipe and filters.
	Incorrect ignition timing.	Check and adjust.
	Brakes binding.	Adjust.
	Driving chain too tight.	Adjust.
Engine will not run Slowly.		
	Weak mixture due to air leaks at carburettor stub or manifold joints, crankcase cylinder base joints.	Tighten all joints evenly. Renew "O" rings.
	Crankcase drain screw loose or missing.	Tighten or replace.
	Worn crankshaft bearings or leaking seal.	Replace.
	Ignition timing too far advanced.	Correct.
Engine Suddenly Stops Firing.		
	Sparking plug lead detached.	Replace.
	Plug points bridged by oil, carbon, or deposit caused by use of leaded petrol.	Clean or replace.
	Short circuit of high tension lead to frame possibly by water on H.T. lead.	Insulate. If wet, dry out.

Specification

Engine	15H two-stroke unit.
Cubic Capacity	149 cc. (9.0 cu. ins.).
Stroke	62.69 mm. (2.468").
Bore	55 mm. (2.167").
Rebore Sizes	+015", +030".
Compression Ratio	7 to 1.
Ignition Timing	Points commence to open $\frac{3}{32}"$ (20 $\frac{1}{4}"$) before T.D.C.
Contact Breaker Gap	.018" maximum.
Sparking Plug Type	Lodge HLN.
Sparking Plug Gap	.020".
Correct Lamp Bulbs	Head-main 6v. 24/24w. twin filament, pre-focus. Head-pilot 6v. 1-8w. Tail (twin) 6v. 1-8w. Speedo 6v. 1-8w. Stop light 6v. 1-8w.
Carburettor	Type: Amal 375. Size of main jet: No. 110. Taper needle: No. B. Normal needle setting: 2nd notch from top. Choke size: $\frac{1}{16}"$. Throttle slide: 3 $\frac{1}{2}$. Pilot jet: 25.
Sprockets	Engine: 23 teeth. Clutch: 43 teeth. Gearbox: 16 teeth. Rear: 50 teeth.
Chains	Primary: Renold $\frac{3}{8}" \times \frac{1}{4}" \times .225"$ pre-stretched. 60 links. Rear: Renold $\frac{1}{2}" \times .335" \times .205"$. 103 links.
Rear Chain Adjustment	Unladen: $\frac{2}{3}"$ to 1" whip. Laden: $\frac{3}{8}"$ to $\frac{1}{2}"$ whip at tightest point.
Gearbox Ratios	1, 1.47, 2.58 to 1.
Overall Gear Ratios	Bottom: 15.1 to 1. Second: 8.58 to 1. Top: 5.84 to 1.
Engine Bearings	Drive side: (2) SKF—RLS6. Timing side: (1) Torrington JH—1612.
Big End Bearings	Rollers: $\frac{1}{4}"$ dia. $\times \frac{3}{8}"$ long (8 caged rollers) $\frac{1}{4}"$ dia. $\times \frac{3}{8}"$ long.

Hub Bearings	Front and Rear Journal: 20 balls $\frac{1}{4}"$ dia., 15 $\times$ 42 $\times$ 13 mm. Skefko 6302.
Steering Head Bearings	Top and Bottom 21 balls $\frac{1}{4}"$ dia.
Tyre Sizes	Front and Rear: 3.50" $\times$ 12".
Tyre Pressures	See page 18.
Brake Drum Diameter	Front and Rear: 5" (12.7 cm.).
Total Braking Area	13 sq. ins. (84 cm. ²).
Fuel Tank Capacity	1 $\frac{3}{8}$ Imperial gallons (7.6 litres).
Fuel Mixture	Refer to pages 9 and 10.
Oil Capacity of Gearbox	Approx. 22 fluid oz. Fill to oil level mark on dipstick.
Oil Capacity of Primary Case	Approx. 2 fluid oz.
Speedometer	Smiths magnetic type.
Speedometer Cable	Front wheel drive, length 3' (No. 005009).
Wheelbase	48 $\frac{5}{8}"$ (123.6 cm.).
Seat Height	30" (76 cm.).
Ground Clearance	5 $\frac{1}{2}"$ (14 cm.).
Width Over Bars	26 $\frac{1}{2}"$ (67.7 cm.).
Overall Length	72" (183 cm.).
Approx. Weight	270 lb. (123.2 kilos).
Platform Width	20" (50.8 cm.).

TOOLS: The standard tool kit supplied consists of:

1 Plug Spanner.	1 Tyre Inflator.
2 Steering Head Spanners.	1 Feeler Gauge.
2 Tyre Levers.	

PLEASE NOTE: In order to meet normal requirements the following common tools should be added to your kit:

1 Phillips Screwdriver.	1 Adjustable Spanner.	1 Pair Pliers.
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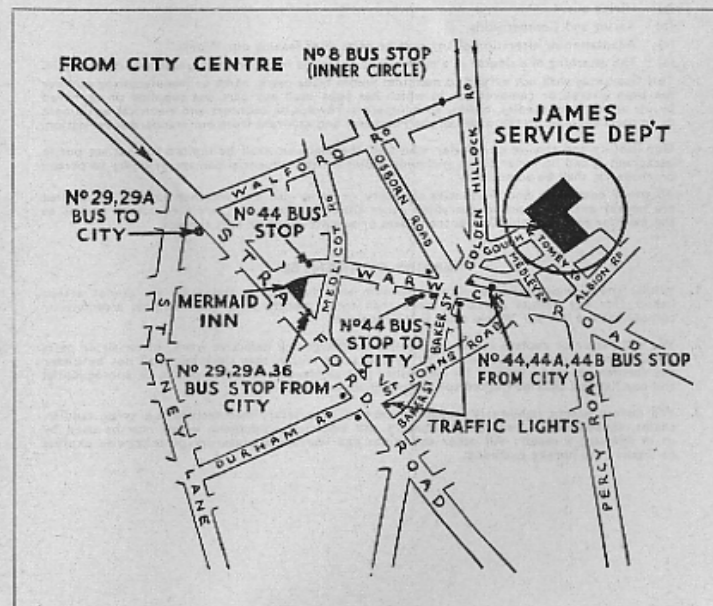
IT PAYS TO INSIST UPON GENUINE JAMES ACCESSORIES

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.

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

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.

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



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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