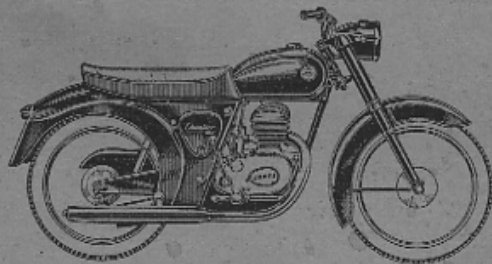


# JAMES

INSTRUCTION BOOK

1958 MODEL LI7

CAVALIER 175



MANUFACTURERS :

JAMES MOTOR CYCLES LTD  
GREET, BIRMINGHAM 11

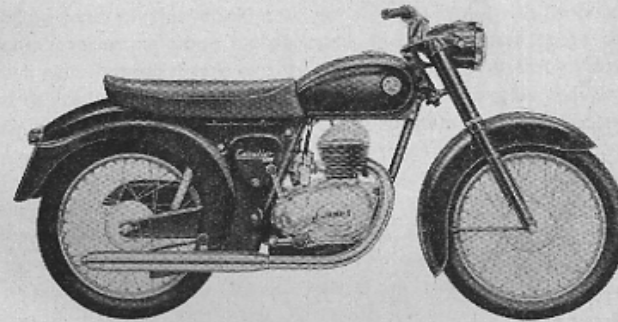
PRICE: 2/6



# **INSTRUCTION BOOK**

## **1958 CAVALIER**

**MODEL L17**



**JAMES MOTOR CYCLES LIMITED**  
**GREET : BIRMINGHAM, 11 : ENGLAND**

Telephone : VICToria 2211

Telegrams : JAMESGREET, BIRMINGHAM (Telex)

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## Foreword

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

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

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

**James Motor Cycles Limited**

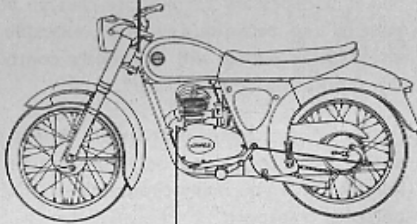
GREET : BIRMINGHAM, 11

APRIL, 1958

## General Information

### FRAME AND ENGINE NUMBERS.

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

FRAME NUMBER	
	

FRAME NUMBER: This will be found stamped on the left-hand side of the steering head lug.

ENGINE NUMBER: This is stamped on the front of the crankcase above the 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 box upon taking delivery of a new motor cycle.

The **INSPECTION AND SERVICE** consists of:

- |                                       |                                |
|---------------------------------------|--------------------------------|
| (a) Check, and, if necessary, adjust: |                                |
| (1) Contact breaker points.           | (6) Brakes.                    |
| (2) Sparking plug.                    | (7) Forks and rear suspension. |
| (3) Clutch.                           | (8) Alignment of wheels.       |
| (4) Chains.                           | (9) Tyre pressures.            |
| (5) Wheel bearings.                   |                                |
- (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 motor cycle used on the public roads of Great Britain must be registered and carry the registration numbers and licence disc allotted to it. The dealer from whom the machine is bought will generally attend to all matters legally essential before it is used on the public roads.

#### TO REGISTER A NEW MACHINE

Send the Local Motor Tax Department the following:

- 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:

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

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

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

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

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

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

#### SPEEDOMETER.

A speedometer **MUST** be fitted to all motor cycles over 100 cc. It is supplied as standard equipment on the James Cavalier 175.

#### LAMPS.

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

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

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

## Controls

**FILLER CAP.** On top of fuel tank. Incorporates oil measure for petrol mixture. (4 measures of oil to one gallon of petrol). Push in and pull out.

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

**AIR SHUTTER.** Slide fitted on carburettor air filter. Close to enrich mixture for starting. Use in conjunction with tickler.

**TICKLER.** Small knob on carburettor body. Depress until petrol appears on carburettor body, to provide rich mixture for starting.

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

**KICK STARTER.** Vertical lever with folding crank on right of gearbox. Use to start engine.

**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.** Horizontal lever in front of right foot-rest. Move UP to select a lower gear. Move DOWN to select a higher gear. Neutral will be found between First (Bottom) and Second gear.

The pedal will always return to the same position and the foot should be removed from lever between each gear change. Always grip 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.** In front of L/H footrest. Press down to operate rear brake.

**IGNITION SWITCH.** Key in slot situated on top of lighting switch — top left of headlamp (see diagram page 36).

**LIGHTING SWITCH.** The lighting switch is incorporated in the ignition switch assembly, but operates independently, and is situated at the top left of the headlamp.

Anti clockwise .. .. . No lamps in use.  
1st position clockwise .. .. . Parking lights in use.  
2nd position clockwise .. .. . Headlamp, tail light and speedo light in use.

**DIPSWITCH.** On left handlebar. Deflects main headlamp beam downwards and to the left. Prevents dazzling oncoming drivers.

## Riding

**FUEL.** When the machine first comes into the hands of the rider it will be ready, but for fuel, for the road.

James two-stroke engines employ the petrol method of lubrication and the recommended ratio is 1 part of oil (SAE 30) to 20 parts of petrol. It is advisable to mix the fuel in a tin before filling the tank, but if this is not possible make sure the tap is turned off, pour oil into the tank before the petrol and shake the machine from side to side. The filler cap incorporates an oil measure. If this is used 4 measures of oil per 1 gallon of petrol provide the correct ratio. Another method is to mix  $\frac{1}{4}$  pint of oil with  $\frac{1}{4}$  gallons of petrol.

For recommended oils see page 10.

A small reserve of fuel, sufficient to cover 3 to 5 miles, is provided. If it is necessary to use it, incline the machine to the right.

**STARTING.** See that there is sufficient fuel in the tank.

Open fuel tap .. .. . pull tap out.

Engine gear lever is in neutral .. with indicator at "N" check by rolling machine slightly forwards and backwards.

Close air shutter .. .. . when engine is cold it may be necessary to prod the tickler a few times to flood the carburettor. With warm engine there is no need to use the tickler and air shutter need not be fully closed.

Adjust throttle .. .. . by slightly opening twistgrip about  $\frac{1}{4}$ th of its travel.

Ease over compression .. .. standing over the machine, idly turn over the engine by means of the kickstarter so that the piston is over compression with the kickstarter at the top of its stroke.

Turn on ignition switch (with key) to position IGN. Use position EMG only for emergencies when battery is flat. (If EMG ignition is used for starting, it should be switched over to IGN as soon as the engine is running). It is advisable to remove key from ignition switch when the machine is not required for use.

Start engine .. .. . by firmly depressing kickstarter to the full extent of its travel. It is important that the engine should be turned over compression and that the actual starting "kick" should be purposeful to avoid a "kick-back."

Allow engine to warm up .. the air shutter should be opened as the engine warms up.

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

**ERRORS IN STARTING.** Mistakes often made whilst starting a motor cycle are:— Opening throttle too wide; thus destroying the advantage of a rich mixture.

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

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

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

**ON THE ROAD.** Novices are recommended to drive the machine slowly in bottom gear (for short distances only, of course) whilst making themselves familiar with the controls. This is best done by bringing the machine to rest and then restarting by a gradual engagement of the clutch several times. When this can be done without stopping or racing the engine, speed can be increased slightly and a change to the next gear made. Raise the clutch lever and move the foot pedal to the required position, after which the clutch lever must be gently released, while the throttle should be opened slightly to take the drive on the higher gear.

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

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

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

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

**RUNNING-IN.** The manner in which a new motor cycle is driven during the first 1000 miles (1600 kms.) can make or mar its eventual performance and useful life, and owners are therefore strongly advised to exercise great care during the vital "running-in" period. Despite the most careful manufacture and assembly, new bearing surfaces have microscopic idiosyncrasies not entirely suited to the opposite surface and the initial period of "light duties" will give those working parts a mirror finish impossible to achieve by machinery.

Two-stroke engines are quickly run in, owing to their simple and efficient design. However, here, as in everything else, treatment must follow the dictates of common sense, and not too much should be attempted on the first ride. Do not exceed one third throttle opening for the first 1,000 miles. Never let the engine labour on hills or in traffic, but change down to a lower gear so that the engine turns over lightly at all times.

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

## Road Craft

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

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

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

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

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

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

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

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

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

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

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

Always reduce speed when your visibility is lowered.

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

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

## TRAINING FOR BEGINNERS.

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

## Lubrication

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

**ENGINE.** The Petroil system of lubrication employed for the two-stroke engine is practically fool proof. A definite proportion of oil is mixed with the petrol in the tank and passed through the carburettor in an atomized form. The recommended ratio is 1 : 20. When the charge is in the crankcase a proportion of oil separates out as the result of heat and the driving action, and remains in the crankcase where it is splashed on to the moving parts by the rotating crankshaft. The remaining oil in the petroil mixture entering the combustion chamber, serves to lubricate the piston and cylinder wall. As the amount of fuel used increases with the power output, it will be seen that a greater quantity of oil is supplied under arduous conditions.

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

The filler cap fitted to our machines incorporates an oil measure. 4 oil measures per gallon of petrol provides a ratio of ONE part oil to TWENTY parts petrol. Half a pint of oil mixed with one and a quarter gallons of petrol gives the correct 1 to 20 ratio.

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

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

**GEARBOX.** The power lost in the transmission is an appreciable percentage of the total power of the engine and only by correct lubrication can the loss be reduced to the minimum. It is impossible to avoid contamination of the lubricating oil with minute particles of metal worn from the gear teeth and operating parts. If these particles are allowed to accumulate in the box, they will accelerate wear of gears and bearings. It is therefore desirable to drain and replenish the gearbox with fresh oil every 5,000 miles. Always drain after a run when the oil is warm and runs out easily. Check the oil level regularly and top up if necessary. Overfilling will not improve lubrication and is liable to cause leakage.

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

**FRONT FORKS.** The front forks have hydraulic damping and are self lubricating. They are filled with the correct grade and quantity of oil at the works and should require no attention for thousands of miles. If the machine has been used very strenuously it may be desirable to change the oil at 5,000 miles.

**REAR SUSPENSION.** The rear damper unit does not require lubrication or attention. Do not, under any circumstances lubricate the bonded rubber torsion bushes.

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

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

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

**RECOMMENDED LUBRICANTS.** (All seasons U.K. and Overseas)

	WAKEFIELD	MOBIL	SHELL	B.P.	ESSO
ENGINE	Castrol XL	Mobiloil A	Shell 2T	Energol SAE 30	Essolube 30
GEARBOX	Castrol Grand Prix	Mobiloil D	Shell X-100 50	SAE 50	Essolube 50
CHAINCASE	Castrol Grand Prix	Mobiloil D	Shell X-100 50	SAE 50	Essolube 50
REAR CHAIN	Castrolase Graphited	Mobilgrease MP or Mobilgrease No. 2	Shell Retinax A	Energol C 3	Esso Grease Esso Chassis Grease
HUBS & HEAD BEARINGS	Castrolase Heavy	Mobilgrease MP or Mobil Hub Grease	Shell Retinax A	Energol C 3	Esso Grease Esso Bearing Grease
OIL CAN CYCLE PARTS	Castrol Grand Prix	Mobiloil D	Shell X-100 50	Energol SAE 50	Essolube 50
FORK	Castrolite	Mobiloil Arctic	Shell X-100 20/20W	Energol SAE 20W	Essolube 20

**WE DO NOT RECOMMEND SELF-MIXING OILS FOR USE WITH THE 175 cc. ENGINE.**

## Maintenance

The efficiency and economy of your James can only be preserved 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. Wipe off any surplus before replacing.

### AFTER THE FIRST 200 MILES.

- Check and if necessary reset contact breaker points 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 recommended oil. FILL TO OIL LEVEL PLUG ON CHAINCASE AND TO LEVEL SCREW (BEHIND KICKSTARTER PEDAL).

### EVERY 1,000 MILES.

- Check, adjust and oil control cables, levers and twistgrip.
- Check adjustment of rear chain. If rollers appear dry, oil with brush. In winter lubricate more frequently. If chain has collected much dirt remove, 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.

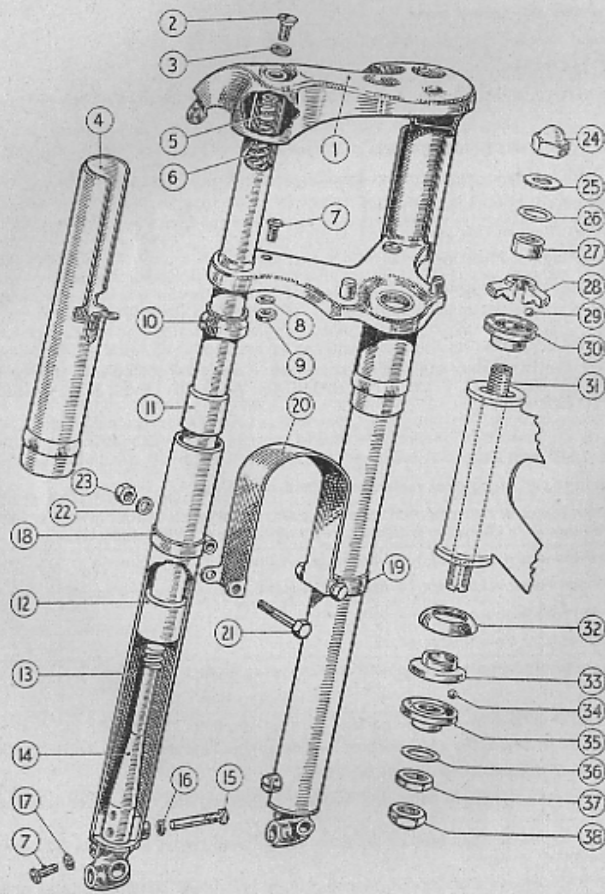
### EVERY 5,000 MILES.

- Drain and refill chaincase and gearbox, whilst engine is warm. DO NOT OVERFILL. Make thorough examination of lighting cables.
- Check front fork hydraulic damping. Top up with an oil can through oil level holes if necessary.
- Grease speedometer gearbox. Take care not to over-grease as excess lubricant may reach the brake linings.
- Check and if necessary dismantle, steering head and wheel bearings. Clean and pack with fresh grease.

## Front Fork

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

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



When the maximum diameter of the damper post enters the end of the tube, clearance is restricted, thus providing a hydraulic limit stop. Rebound damping is provided by oil drag.

### FORK DATA.

Total movement :  $4\frac{1}{2}$  ins.  
 Maximum loading : 584 lbs.  
 Oil capacity : 55 cc. or 1 tank filler cap measure per fork leg.  
 Recommended oil : SAE 20.

**MAINTENANCE.** The telescopic fork is self lubricating and normally requires no attention beyond changing the hydraulic damping oil every 5,000 miles. The old oil should be drained by removing the two domed screw drain plugs (7) and the fork depressed a few times to clear all remaining fluid. Do not depress the fork too vigorously as oil may be ejected suddenly. Replace drain plugs and washers. If washers are damaged fit new replacements. With the machine on the stand remove the filler plugs (2) and refill each leg with one tank filler cap measure of recommended oil.

**DISMANTLING FORK.** If the fork has been damaged, it is best to remove it complete and obtain a Service Exchange unit. To remove the fork, follow this sequence ; detach fuel pipe, remove tank, tilt front of twinseat and disconnect wiring connections, noting position of wires. Free the wiring harness from the frame and take off handlebar dip switch. When speedometer cable has been disconnected inside the lamp shell, the complete headlamp may be removed.

Next, drain oil from fork sliders, take out front wheel and remove mudguard, allowing the bridge piece attachment clips to drop to bottom of sliders. Unscrew hex bolt in centre of top plate and partially withdraw steering column complete with adjusting and locknuts from the bottom, allowing the spacer under the top plate and the top fork race to be taken off. Further withdrawal of the column downwards enables the complete fork to be separated from the frame.

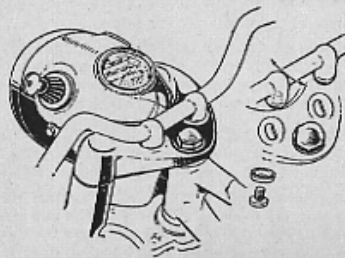
If it is desired to dismantle the slider units, the fork sliders complete with oil seals and springs may be withdrawn after removing top filler plug screws. Care should be taken not to damage the oil seals when pulling them over the bearings. When re-assembling, it will be necessary to ease the seals over the bearings with a strip of thin metal, care being taken not to cut the synthetic seal. The springs and damper posts are retained within the tube by bolts (15).

**ADJUSTING THE STEERING STEM.** The machine should be raised on the stand and a box or other means of support placed under the engine to lift the front wheel off the ground. With the hands holding the fork legs, need for adjustment can be detected by trying to rock the fork bearings. If there is any perceptible play in the bearings, use two 1" spanners to turn the adjusting and locknuts under the fork crown. The adjusting nut is the thin nut behind the thicker locknut. Adjustment should be

- |  |   |   |
|--|---|---|
| 1 Top plate, inner legs and fork crown unit.     | 13 Slider tube and fork end.                    | 26 Shim—(fitted when required).                     |
| 2 Filler plug $\frac{1}{4}$ " $\times$ 26 t.p.i. | 14 Damper post.                                 | 27 Spacer.  |
| 3 Fibre washer $\frac{3}{8}$ ".                  | 15 Damper post fixing bolt.                     | 28 Upper fork race.                                 |
| 4 Outer cover sleeve.                            | 16 Fibre washer $\frac{3}{8}$ ".                | 29 Ball bearing $\frac{1}{2}$ " (17).               |
| 5 Top spring adaptor.                            | 17 Special washer.                              | 30 Upper frame race.                                |
| 6 Coil spring.                                   | 18 Mudguard bridge clip L.H.                    | 31 Steering stem.                                   |
| 7 Domed screw $\frac{1}{2}$ " $\times$ 26 t.p.i. | 19 Mudguard bridge clip R.H.                    | 32 Enclosure cup—lower frame                        |
| 8 Shakeproof washer.                             | 20 Mudguard bridge.                             | 33 Lower frame race. (race.                         |
| 9 Hex nut $\frac{1}{2}$ " $\times$ 26 t.p.i.     | 21 Clip bolt $\frac{1}{4}$ " $\times$ 26 t.p.i. | 34 Ball bearing $\frac{1}{2}$ " (17).               |
| 10 Oil seal.                                     | 22 Plain washer $\frac{1}{2}$ " dia.            | 35 Lower fork race.                                 |
| 11 Upper fork bearing.                           | 23 Hex nut $\frac{1}{2}$ " $\times$ 26 t.p.i.   | 36 Plain washer $\frac{3}{8}$ " dia.                |
| 12 Lower fork bearing.                           | 24 Steering stem nut $\frac{1}{2}$ ".           | 37 Adjusting nut $\frac{1}{2}$ " $\times$ 26 t.p.i. |
|  | 25 Plain washer $\frac{1}{2}$ " dia.            | 38 Locknut $\frac{1}{2}$ " $\times$ 26 t.p.i.       |



such that no play may be felt yet the bearings are free to rotate and not too tight. When tightening the locknut make sure the adjusting nut and the locknut are firmly locked together. Test for slackness after the first 200 miles and subsequently every 1,000 miles.



**ADJUSTING THE HANDLEBAR POSITION.** Handlebar angle adjustment is provided by two extensions with hemispherical bases locating in slotted concave recesses in the fork top plate and retained in position by two large hex bolts and dished spacers. To adjust the handlebar position, the two hex bolts under the top plate should be slackened with a plug spanner and the handlebar rotated to the desired position before retightening.

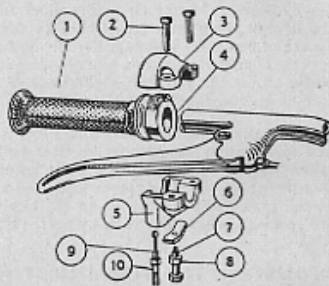
**ADJUSTING THE TWISTGRIP.** Adjustment of the spring tension on the twist-grip sleeve is effected by means of a screw and locknut in the bottom half of the twist-grip casting. To increase tension turn the screw clockwise and tighten locknut.

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.

#### TWIST-GRIP COMPONENTS.

- 1 Twistgrip rubber.
- 2 Clamp pin 1 BA.
- 3 Upper clip.
- 4 Rotating sleeve.
- 5 Lower clip.
- 6 Friction spring.
- 7 Adjusting pin 1 BA.
- 8 Adjusting pin locknut.
- 9 Cable socket.
- 10 Throttle cable.



**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 on top of the carburetter.

## Rear Suspension

**DESCRIPTION.** The rear wheel is mounted in a pressed steel fork pivoted within the centre section on rubber-steel torsion bushes. The bushes are spaced by a shouldered pivot tube and pressed into the ends of the fork torque tube. The fork is attached to the centre section by two  $\frac{1}{2}$ " bolts passing through the re-inforced pressing into the tapped ends of the pivot tube. Two barrel coil springs in compression and a damper unit form the suspension medium. Lugs welded to the top of the fork arms provide lower attachment points for the coil springs, which pass through rubber grommets in the centre section and are bolted to fixed lugs on the rear transverse member of the dorsal tube. Angularity of movement is taken up in the springs.

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

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

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

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

**REPLACING SPRINGS.** To remove the rear fork, raise the motor cycle on the stand, disconnect the rear chain and brake rod, slacken the spindle nuts, take out the rear wheel and remove the cushion seat, attached by six  $\frac{1}{4}$ " bolts (2 either side and 2 inside the rear mudguard). Next remove the damper unit by unscrewing upper and lower attachment bolts. When this is completed remove the two  $\frac{1}{2}$ " pivot bolts on the sides of the centre section and unscrew the uppermost spring retaining nuts.

Before attempting to remove the fork from the centre section, it is necessary to detach one of the springs by unscrewing the bottom hexagon. This will allow the fork to be withdrawn with one spring attached. The spring can be removed later.

To re-assemble the rear suspension, one of the new springs should be fitted to the fork and the second spring loosely attached to the upper fixing lug. With rubber grommets in position, the fork can be manipulated into the centre section to locate the first spring into its top fixing lug and to screw the second spring to its fork attachment lug. The pivot bolts can now be replaced. Before tightening the top spring retaining nuts make sure there is a  $\frac{1}{8}$ " gap between the adjusting nut (under upper lug) and spring stud nut (nearest top coil of spring). Replace the damper unit.

#### REAR SUSPENSION DATA.

Total rear fork movement at rear spindle  $3\frac{1}{4}$ ".

Load for spring in normal riding position 350 lb.

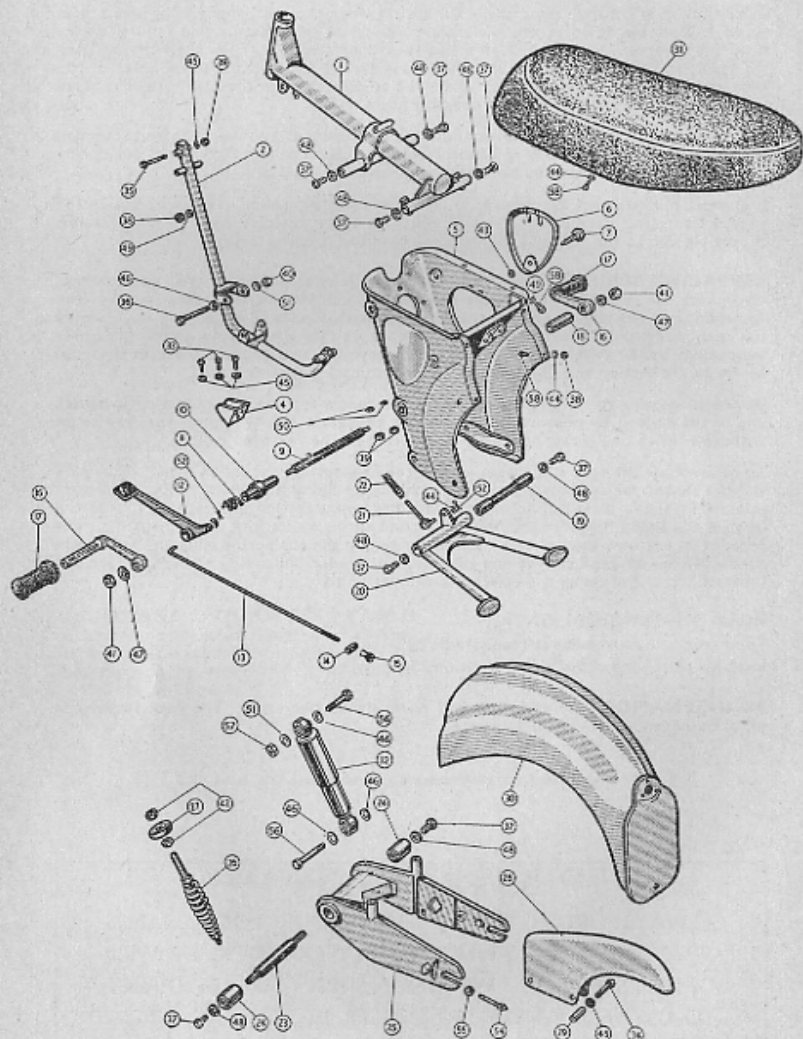
**MAINTENANCE.** No attention will normally be necessary. The rear suspension pivot bushes must NEVER be lubricated.

#### SPARE PARTS

ALWAYS ORDER SPARES FROM YOUR LOCAL JAMES STOCKIST. IF HE CANNOT SUPPLY EX-STOCK, HE WILL ORDER SPECIALLY. WE ONLY SUPPLY SPARES DIRECT TO OWNERS WHERE NO DEALER IS TO HAND OR IN EXTREME EMERGENCIES

## FRAME AND REAR SUSPENSION COMPONENTS.

See key at foot of page 17.



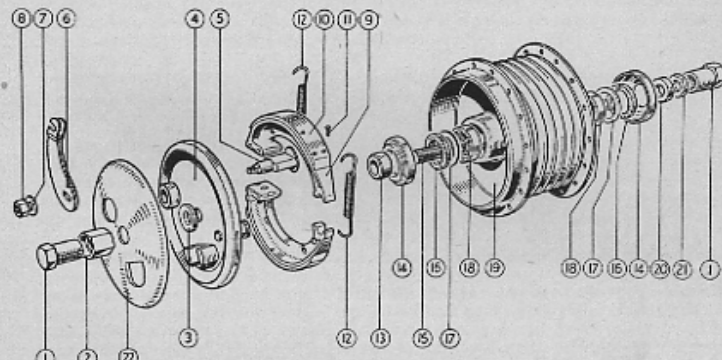
## Wheels and Brakes

**HUBS AND BEARINGS.** Both hubs are greased when new and no further lubrication will be required for several thousand miles, when it is advisable to dismantle the hubs for examination of the bearings. The old grease should then be cleaned out with petrol or \*paraffin and the hubs packed with fresh lubricant when 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.

\* Kerosene

**BRAKES.** Brake cable or rod adjustment should be such that only a slight movement of the lever or pedal is sufficient to operate the brake, but at the same time, the wheels must spin freely when the brakes are off. To obtain the correct adjustment, screw up the adjuster until the liners are just fouling the drum, then slack off two complete turns. Do not forget to reset the brake rod adjustment after adjusting the rear chain. Never use oil to lubricate the bearings as it may spread to the brake lining surface and render the brakes ineffective.

### FRONT HUB BREAKDOWN.

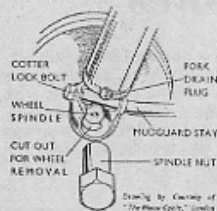


- 1 Spindle nut  $\frac{1}{2}$ " x 26 t.p.i.
- 2 Recessed hex nut  $\frac{1}{2}$ " x 26 t.p.i.
- 3 Spacer  $\frac{1}{8}$ " thick.
- 4 Brake cam.
- 5 Brake cam.
- 6 Brake cam lever.
- 7 Special washer.
- 8 Hex nut  $\frac{1}{2}$ " x 26 t.p.i.
- 9 Brake shoe.
- 10 Brake lining.
- 11 Rivets.

- 12 Return spring.
- 13 Spacer  $\frac{1}{2}$ " thick.
- 14 Bearing seal enclosure cup.
- 15 Spindle  $\frac{1}{2}$ " dia.
- 16 Felt seal.
- 17 Seal washer.
- 18 Journal ball bearing.
- 19 Hub shell and brake drum.
- 20 Spacer  $\frac{1}{2}$ " thick.
- 21 Locknut  $\frac{1}{2}$ " x 26 t.p.i. x  $\frac{1}{4}$ ".
- 22 Hub cover.

### KEY TO MAIN FRAME COMPONENTS.

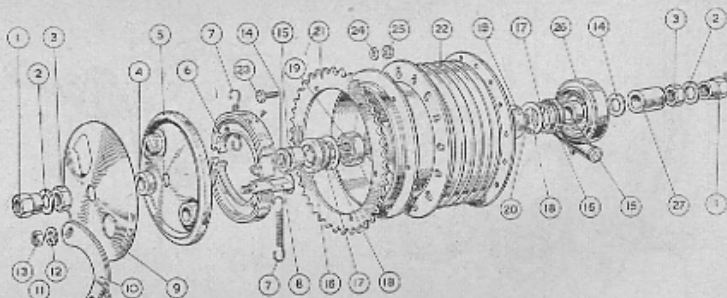
- |                                 |                                 |                                   |
|---------------------------------|---------------------------------|-----------------------------------|
| 1 Frame dorsal tube.            | 13 Brake rod.                   | 24 Rear suspension torsion bush.  |
| 2 Engine loop tube.             | 14 Brake lever roller.          | 25 Rear suspension pivoting fork. |
| 4 Rear engine lug.              | 15 Brake rod adjuster.          | 26 Rear suspension coil spring    |
| 5 Centre section pressing.      | 16 Footrest hanger.             | 27 Rear suspension rubber grom-   |
| 6 Toolbox lid.                  | 17 Footrest rubber.             | mett.                             |
| 7 Toolbox thumb screw.          | 18 Footrest spacer R.H.         | 28 Chainguard.                    |
| 9 Footrest brake pedal hex bar. | 19 Stand pivot tube.            | 29 Chainguard spacer.             |
| 10 Brake pedal spring housing   | 20 Stand.                       | 30 Mudguard and number plate.     |
| and spacer.                     | 21 Stand operating rod.         | 31 Twinseat.                      |
| 11 Return spring.               | 22 Stand spring.                | 32 Damper unit.                   |
| 12 Brake pedal.                 | 23 Rear suspension torque tube. |                                   |



**REMOVING FRONT WHEEL.** To remove the front wheel place machine on the stand and disconnect front brake cable nipple at the brake cam lever. Slacken the mudguard stay cotter bolts three or four turns and tap head firmly to release cotter before removing spindle nuts. The wheel will now drop clear through the spindle cut outs in the fork ends. When replacing the wheel make sure the brake back plate anchor fork engages over the locating boss on the left fork leg and replace spindle nuts loosely. Tighten the left (brake side) spindle nut first, then tighten the right side spindle nut, after which the cotter bolt on the brake side should be locked up. Next, roll the machine off the stand and sitting astride it, bounce the forks vigorously a few times

to enable the right fork leg to assume its correct lateral position on the spindle nut. Tightening up the right cotter bolt will lock the fork in the correct position. The importance of following this procedure cannot be over-emphasised, as failure to refit the wheel correctly may cause malalignment affecting the fork action and resulting in premature wear of fork components.

### REAR HUB BREAKDOWN.

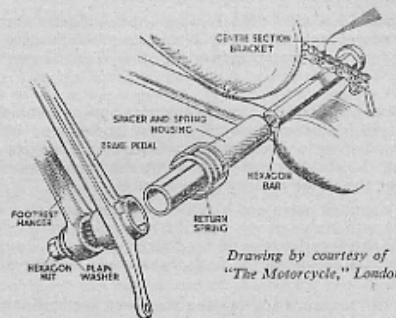


- |   |   |
|---|---|
| 1 Spindle nut $\frac{1}{2}$ " x 26.                     | 15 Spacer $\frac{1}{2}$ " thick         |
| 2 Plain washer $\frac{1}{2}$ " x 10 swg.                | 16 Seal enclosure cap.                  |
| 3 Locknut $\frac{1}{2}$ " x 26 x $\frac{1}{2}$ " thick. | 17 Felt seal.                           |
| 4 Spacer $\frac{1}{2}$ " thick.                         | 18 Seal enclosure washer.               |
| 5 Brake back plate.                                     | 19 Journal bearing 42 x 15 x 13 mm.     |
| 6 Brake shoe, lining and rivets.                        | 20 Spindle $\frac{1}{2}$ " dia.         |
| 7 Return spring.  | 21 Chain sprocket 46 teeth              |
| 8 Brake cam.  | 22 Hub shell.                           |
| 9 Hub cover.  | 23 Hex bolt $\frac{1}{2}$ " x 26 c.p.i. |
| 10 Brake cam lever.                                     | 24 Shakeproof washer.                   |
| 11 Brake cam roller.                                    | 25 Hex nut.                             |
| 12 Plain washer.  | 26 Speedometer gearbox.                 |
| 13 Hex nut $\frac{1}{4}$ " x 26 c.p.i.                  | 27 Spacer $\frac{1}{2}$ " thick         |

**REMOVING REAR WHEEL.** Place machine on stand, disconnect chain, taking care not to let it trail on the ground, detach brake rod adjuster and speedo drive gland nut. Slacken both spindle nuts. The wheel can then be eased out. When replacing, make sure the back plate locking boss is engaged 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 to always check wheel alignment after removal. The simplest way is to use a thin piece of string stretched taut across both wheels with the front wheel pointing straight ahead. The string should just touch each tyre at both sides of the wheel 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.



### ADJUSTING FOOTRESTS AND REAR BRAKE PEDAL.

The footrests are mounted on a hexagon bar passing through the centre section bracket. Serrations in the footrest hangers provide the method of adjustment. Tubular spacers are fitted over the hexagon bar, the L.H. spacer serving as the brake pedal pivot and carrying the return spring. To adjust the brake pedal position, it is only necessary to slacken the nut at the end of the L.H. footrest hanger and to rotate the pedal and spacer to the desired

position before tightening, thus locking the spacer between the centre section bracket and the footrest hanger. After re-setting the brake pedal, remember to re-adjust the rear brake rod by means of the knurled adjuster.

**SPEEDOMETER DRIVE.** If the speedometer drive has been removed do not forget to replace the distance piece behind it as if the engaging projections on the speedo drive are tight in the locations on the hub, the speedo drive will be damaged.

The speedometer cable has a knurled nut at the front where it joins the speedometer head and a hexagon to connect it to the rear 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.

**REPLACEMENT SPOKES.** Spoke breakages rarely occur, but if foreign touring is envisaged it is a good plan to carry a few spare spokes. It is possible to replace a spoke without removing the tyre, but there is always a danger of the spoke protruding beyond the nipple into the well of the wheel and puncturing the rim tape and inner tube. We therefore advise owners to remove the tyre and have spokes fitted by a motor cycle repairer, who will grind off any surplus length. If fitted by the owner, the spokes should be filed or ground off flush with the end of the nipple in the well of the rim. (For spoke sizes see page 46).

**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:** Front 16 lbs. Rear 24 lbs.

If a passenger is carried, rear tyre pressure should be increased to 30 lbs.

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

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

Ensure correct alignment of the wheels.

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

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

**TYRE REMOVAL.** Remove valve cap and rim nut and deflate tyre by unscrewing the inner valve. A small key for unscrewing the valve is provided on top of the valve cap. Push outer-cover right into wheel rim well opposite valve, and insert tyre lever under cover as near the valve as possible. If the opposite side is properly in the well the edge of the cover should come over the rim without using force.

Work until the cover is off one side of the rim, then remove inner-tube by pushing valve up through hole and gently easing out. If it is desired to take the tyre right off, proceed in the same way — pushing into well, inserting lever in other side and working off.

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

Move free edge of cover over rim opposite valve and work round rim, ensuring that inner tube is not pinched, equally on either side of valve until a few inches remain free. The valve should be in the centre of this free length and no difficulty should be experienced in getting it over the edge of rim providing the rest of the cover is right down in the well.

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

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

## Transmission

**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 motor cycles 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 approximately  $1\frac{1}{4}$ " 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  $\frac{1}{4}$ " and  $\frac{3}{8}$ " 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 made 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.** Obtain a piece of strong 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.

The best way to do the job is as follows:

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

Immerse chain in 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.

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

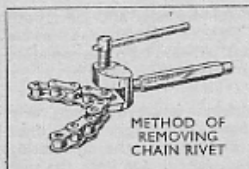


If chain has an odd number of pitches, remove rivets holding the second pair of outer links (see A) (first pair will be cranked) and replace with single connecting link and inner link (B).



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

\* Kerosene



METHOD OF REMOVING CHAIN RIVET

### CHAIN COMPONENTS



METHOD OF REPLACING SPRING-CLIP



CRANKED DOUBLE LINK



CONNECTING LINK



INNER LINK

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

Primary chain : Renold No. 110038, 58 links,  $\frac{3}{8}$ " pitch,  $\frac{1}{2}$ " roller, .225" wide, pre-stretched.

Rear chain : Perry 118 links,  $\frac{1}{2}$ " pitch, .335" roller, .205" wide.

### SPARE PARTS SUPPLY

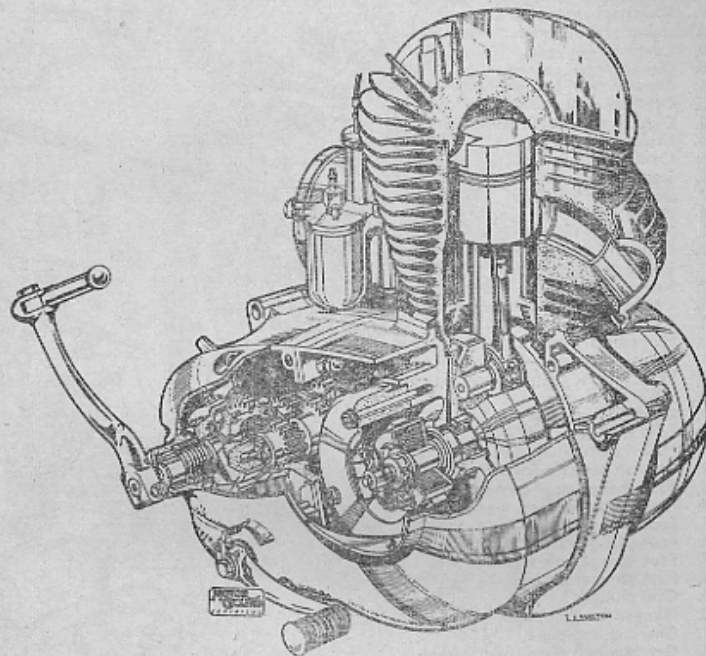
James motor cycles are sold through appointed Dealers each of whom keeps at least a minimum stock of the spares most likely to be needed. We therefore strongly urge owners in their own interests to obtain their spares requirements from our appointed Dealers. When our Dealer is out of stock we will execute by return any urgent order received from him, always providing stocks are available at the factory.

In an emergency — for instance should a James owner be touring and out of contact with a James Dealer — we will supply direct against cash with order or by C.O.D. post. In this case, the fullest information as to the owners' requirements, including engine and frame numbers should be forwarded to us.

Normally the James Factory — to — Dealer organisation is the best and quickest way for an owner to obtain spares. We are always pleased to put owners into touch with their nearest James Dealer(s).

## Power Unit

175 cc. MODEL 17T TWO STROKE ENGINE AND 4 SPEED GEARBOX.

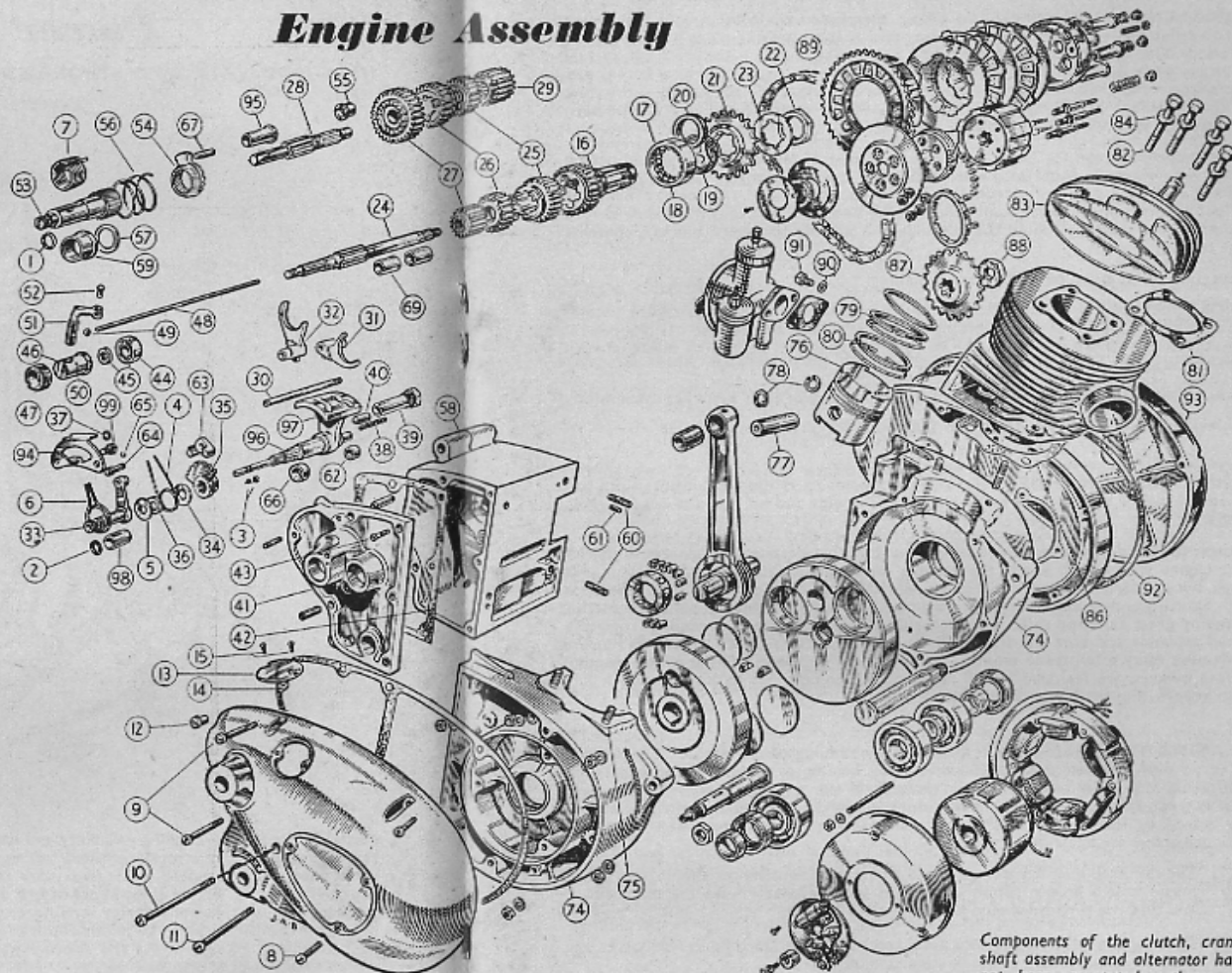


Noted for its almost unflinching reliability and its appetite for hard work, the 175 cc. 17T two-stroke engine is a highly efficient power unit which, provided it is thoughtfully maintained and lubricated, will give years of service without requiring any major replacements. By virtue of its simplicity, it is cheap and easy to maintain and even owners with no previous motor cycling 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 motor cycle repairer or ourselves.

**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 Assembly

1. Kick start shaft "O" ring.
2. Foot change spindle "O" ring.
3. Foot change ratchet spindle "O" ring.
4. Foot change pawl spring.
5. Pawl spring washer, outer.
6. Foot change pedal return spring.
7. Kick start return spring.
8. Cover screw, short.
9. Cover screw, long.
10. Cover screw, centre.
11. Cover screw, bottom.
12. Oil level plug and washer.
13. Clutch cable inspection cover.
14. Cover gasket.
15. Cover screw.
16. Sleeve gear.
17. Sleeve gear bearing.
18. Sleeve gear bush.
19. Sleeve gear oil seal.
20. Axle sprocket spacer.
21. Sleeve gear sprocket.
22. Sleeve gear sprocket nut.
23. Sleeve gear sprocket lockwasher.
24. Gearbox mainshaft.
25. Mainshaft 3rd gear. Layshaft 3rd gear.
26. Mainshaft 2nd gear. Layshaft 2nd gear.
27. Mainshaft 1st gear. Layshaft 1st gear.
28. Layshaft.
29. Layshaft fixed gear.
30. Foot change striker shaft.
31. Mainshaft selector fork.
32. Layshaft selector fork.
33. Foot change pawl carrier.
34. Pawl spring washer, inner.
35. Foot change ratchet.
36. Foot change ratchet shaft nut.
37. Foot change bolt washer.
38. Cam plunger spring.
39. Cam plunger bolt.
40. Plunger for cam plate.
41. Gearbox end plate.
42. Gearbox end plate cover gasket.
43. Gearbox end plate cover screw.
44. Mainshaft bearing.
45. Bearing nut.
46. Clutch operator body.
47. Clutch operator locking ring.
48. Clutch rod.
49. Clutch operating ball.
50. Operator body peg.
51. Clutch lever.
52. Clutch lever trunnion and nipple.
53. Kick start shaft.
54. Kick start ratchet.
55. Kick start layshaft bush.
56. Kick start ratchet spring.
57. Kick start shaft thrust washer.
58. Gearbox shell.
59. Layshaft bush.
60. Gearbox attachment stud.
61. Gearbox dowel.
62. Foot change ratchet shaft inner bush.
63. Foot change ratchet pawl.
64. Foot change pawl carrier pawl pin.



65. Foot change pawl pin circlip.
66. Foot change ratchet shaft bush (outer).
67. Kick start stop pin.
68. Sleeve gear bushes.
73. Air filter gauze retaining ring.
74. Crankcase halves T.S. and D.S.
75. Cylinder base stud.
76. Piston.
77. Gudgeon pin.
78. Gudgeon pin circlip.
79. Compression ring.

- Piston ring chrome plated.
80. Pressure ring.
  81. Cylinder head gasket.
  82. Cylinder head bolt.
  83. Cylinder head.
  84. Cylinder head bolt washer.
  86. Cylinder base gasket.
  87. Engine sprocket.
  88. Crankshaft D./S nut.
  89. Primary chain.
  90. Carburettor bolt washer.
  91. Carburettor bolt.

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

92. Front chain cover gasket.
93. Front chain cover.
94. Foot change stop plate.
95. Kick start bush, inner.
96. Foot change ratchet shaft.
97. Cam segment.
98. Foot change bush, outer.
99. Foot change bolt.

**LUBRICATION OF ENGINE.** In order to maintain the efficiency of the engine and to reduce wear to a minimum it is essential that all moving parts are adequately lubricated. The system adopted for the 17T two-stroke engine is the PETROIL system in which a given quantity of oil is mixed with the petrol. As the mixture first enters the crankcase and then into the cylinder, all working parts are adequately lubricated, and as the amount of fuel used will increase with the power output, it will be seen that a greater quantity of oil is supplied under arduous conditions.

The recommended ratio for James Cavalier is one part of oil to twenty parts of petrol. An oil measure tube is fitted to the fuel tank filler cap and four measures of oil should be mixed with each gallon of petrol. It is best to mix the fuel in a tin before filling the tank but if this is inconvenient push fuel tap off and pour the oil in the tank before the petrol. The machine should then be shaken from side to side to mix the contents of the tank.

Always push the fuel tap to OFF before refuelling.

**PETROIL DISPENSING PUMPS.** Other oil Companies whose lubricants are recommended in this manual provide dispensing equipment which ensures the use of a petrol/oil mixture for 2-stroke engines in the correct proportions. Service by means of such equipment is approved by us.

It pays to buy oils of good repute and the following brands are recommended :

**Mobiloil A, Shell 2T, Castrol XL, BP Energol SAE 30 and Essolube 30.**

**ENGINE MAINTENANCE.** Periodical decarbonising is the only maintenance job the average owner will want to tackle on the 17T engine and full instructions are given on page 27.

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 a James 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 James Repairs Department 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 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 carburetter, 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.** 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 44 and 45).

Having made sure that there is " petrol " in the tank, and that the tap is in the ON position, depress the tickler on the carburetter to ensure that there is no blockage in the fuel supply, either in the tap, fuel pipe, banjo union or fuel needle seating. If the fuel supply is clear, fuel will spurt from the vent hole in the side of the tickler cap.

Being satisfied that fuel is reaching the carburetter, next unscrew the sparking plug, and with the high tension lead still attached, lay the plug on the cylinder head. 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, hold the H.T. lead  $\frac{1}{8}$ " from cylinder head. Clean or change the sparking plug if there is a good spark from the H.T. lead.

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

**PETROL CONSUMPTION.** The carburetter 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 carburetter 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 carburetter 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  $\frac{1}{2}$  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 carburetter 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 also 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 the intervals between decarbonising is considerably lengthened. 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.** For ease of working, remove the petrol tank by disconnecting the petrol pipe and removing the tank fixing bolts. 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, instead apply a little penetrating oil round the plug threads and repeat the process.

Take away the cylinder head steady and remove in turn the four cylinder head bolts. Lift the cylinder head vertically until the projections on it are clear of the cylinder barrel.

Some difficulty may occur in separating the cylinder head from the cylinder barrel, particularly after a long interval between decarbonising. In such an event, one or two light blows with a soft faced mallet *ON THE FRONT OF THE CYLINDER HEAD* will cause separation.

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 as one unit. Do not unduly rock the exhaust pipe sideways, which can distort the pipe and cause gas leakage. Take off the petrol pipe, unscrew the cap on the carburettor body and pull out the throttle slide. Wrap the slide in a piece of clean rag and attach it to a convenient position on the frame rail to avoid damage. Remove rear engine lug bolt and Footrest bar allowing loop tube to swing forward. Take off the four cylinder base nuts and spring washers.

**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 raised vertically 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.

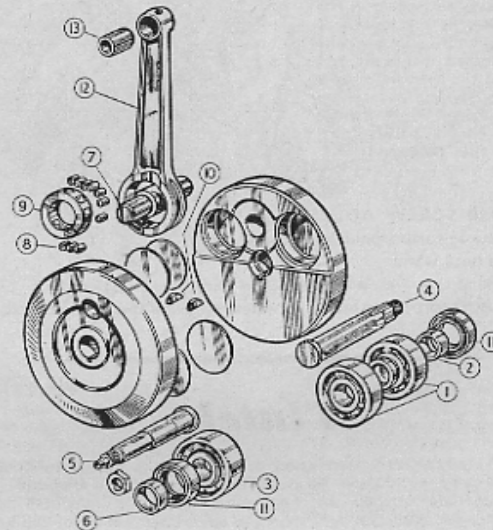
The rings must be perfectly free in the ring grooves, carbon formed in the ring grooves will prevent free movement. When removing the rings they should be expanded with care and only sufficiently to clear the piston ring grooves.

The top compression ring is chrome plated (to reduce cylinder wear) and taper faced, which must be correctly fitted. Its position is indicated by the word *TOP* etched on the horizontal ring face. Expander rings are used behind the two lower rings, to eliminate mechanical noise. After prolonged use the expander rings can lose tension due to heat and should be replaced, particularly when new compression rings are fitted.

The normal piston ring gap is  $.006''$  minimum, maximum permissible gap is  $.025''$ . Piston rings supplied by our Spares Department do not require fitting, as the gap is allowed for in the process of manufacture. 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, which will ensure the ring is square with the cylinder bore, the gap can be checked by feeler gauges. The normal cylinder bore sizes are given in the Technical Data. When cylinder wear is to the extent of  $.008''$  or more, the cylinder should, whenever possible, be returned to the Service Department, who maintain a rotary exchange service, providing the wear does not exceed plus  $.030$  inches.

**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.

#### CRANKSHAFT ASSEMBLY



Crankshaft unit complete.

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

**REFITTING THE CYLINDER.** If desired the carburettor can be detached and cleaned before fitting the cylinder.

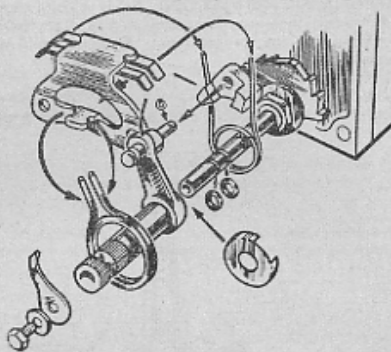
Remove any broken pieces of base washer from the flange also the crankcase face. Thoroughly clean the ports and cylinder bore. Apply a little jointing compound to one side of the new base washer and stick it to the cylinder. Apply some clean oil on the piston and cylinder bore. A generous chamfer is used on the cylinder to facilitate fitting. Offer up the cylinder and compress in turn the three piston rings, then gently lower 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. Detach the silencer from the exhaust pipe and remove any burnt oil or carbon from the slots in the exhaust pipe, also from the silencer outlet. 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 as described in chapter on ignition and lighting. Apply a little graphite grease on the sparking plug threads, refit the plug and H.T. cable.



#### PILOT JET AIR SCREW ADJUSTMENT.

1. Set air screw  $1\frac{1}{2}$  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 adjuster on the gearbox cover. 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. Use a receptacle under the primary drive cover to catch oil, remove the cover secured by five screws. Unscrew one or two turns the adjuster lock nut (16) shown in illustration of clutch assembly on page 31. With a screwdriver, screw in the adjuster (6) until contact with the push rod can be felt, unscrew the adjuster (6) 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, tighten the locknut. Replace the primary drive cover and refill with oil to the required level, a level plug is fitted for this purpose.

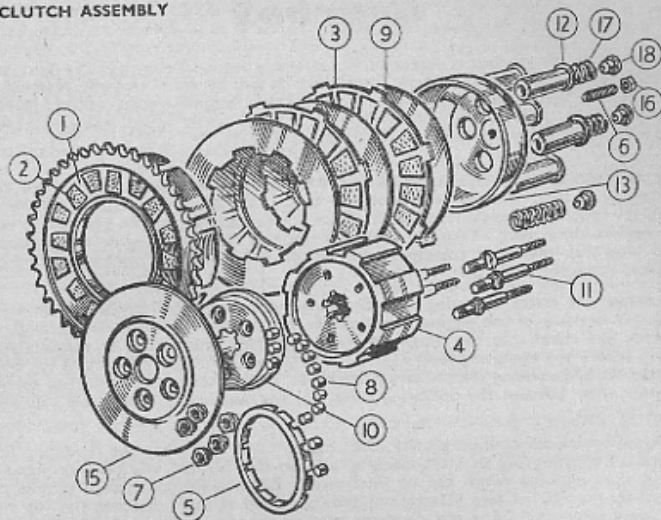
Clutch slip should be dealt with promptly otherwise the friction plates will be damaged and the clutch springs affected by heat. The normal free length of the clutch springs are  $1\frac{1}{8}$ ", the clutch pushrod length is  $8\frac{1}{16}$ ".

When replacement clutch friction plates are required, owners are advised to use the service exchange scheme by fitting serviced clutch friction plates.

**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 as previously described. Unscrew in turn the five clutch spring adjusting screws, take away the clutch spring pressure

#### CLUTCH ASSEMBLY



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

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  $1\frac{1}{2}$ " across flats, the engine sprocket nut is  $\frac{11}{16}$ " across flats.

Engage top gear, use 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 gear-box 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 this page.

**TO RE-ASSEMBLE THE CLUTCH.** Apply a little anti-centrifuge 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 correctly position the clutch spring adjusting nuts (18) adjust each nut until the slotted end is just flush with the end of the clutch spring stud (11), then unscrew each nut two complete turns. The position of these nuts can be varied slightly to ensure that the pressure plate (13) 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. During initial assembly shim washers .004" or .008" thick are used between the gearbox face which abuts against the crankcase to correctly adjust the pre-stretched primary drive chain.

**TO REMOVE GEARBOX END COVER.** Engage first gear, remove the kickstarter pinch bolt, the gear indicator and bolt. Take off the kickstarter crank and leave the footchange pedal in position. Place a receptacle under the gearbox to catch oil, remove drain plug. Take out 6 screws securing right side engine cover also the level plug (12), the cover complete with the footchange can be removed taking care to avoid damaging the gasket.

Disconnect the clutch operating cable and unscrew the adjuster. It will be seen in the exploded drawing of the engine unit that the clutch push rod protrudes through the gearbox end cover into the clutch operator body (46) which must be partially withdrawn before the operating lever (51) can be removed. Follow instructions for clutch adjustment by removing the primary drive cover, then unscrew the clutch rod adjuster several turns. Lift out the operating lever (51) and watch for the  $\frac{3}{8}$ " steel ball which will drop out.

Unscrew the clutch operating body lock ring (47) and take away the operating body (there is a locating peg in the housing which can also fall out) the gearbox mainshaft nut is then exposed which can be unscrewed. Remove the footchange spindle nut, a washer, the ratchet (see illustration) then a second washer. Remove the top right end plate screw (43). The end plate can now be taken away from the gearbox shell. A light tap at the rear of the cover with a mallet will facilitate removal. The kickstarter crank can be temporarily fitted to assist in pulling off the end cover.

**NOTE :** The figures in parenthesis refer to the illustration on pages 24 and 25.

**DISMANTLING THE KICKSTARTER.** When the gearbox end cover is removed, the kickstarter mechanism will come out with the cover. The face ratchet pinion (54) is under tension of the ratchet spring (56) to remove this pinion temporarily fit the kickstarter crank and relieve the spring tension, the pinion will then be released. To remove the kickstarter shaft prise out the end of the return spring from its anchorage, the shaft can then be extracted.

**REFITTING THE GEARBOX END COVER.** With the kickstarter mechanism assembled the end plate can be refitted in the reverse order described for dismantling. The gasket must be undamaged to avoid oil leakage. The only necessary precaution is to ensure that the foot change operating parts are in correct order by first fitting the thin washer with the largest diameter hole over the shaft for the footchange spindle before the gearbox end cover is fitted. After fitting the end cover the thick washer goes over the spindle followed by the footchange ratchet, the washer for the pawl spring (34) and finally the footchange ratchet and shaft nut (36). The assembly is clearly shown in the illustration, particular note should be made of the pawl spring location. The outer pawl spring washer is shaped to hold it in position, whilst the cover is refitted.

To facilitate assembly the location and screw lengths (measured under the screw head) are detailed as seen looking at the engine and gearbox cover from the right side of the machine.

Top and bottom right 1 inch (2 off).

Top centre  $3\frac{3}{8}$  inches.

Bottom centre  $2\frac{1}{2}$  inches.

Top and bottom left  $1\frac{1}{8}$  inches (2 off).

Level plug extreme left.

When the assembly is completed, ensure the gearbox drain plug is firmly tightened and refill with  $1\frac{1}{2}$  pints of S.A.E. 50 oil, as shown in the list of recommended lubricants.

**TO REMOVE THE SLEEVE GEAR SPROCKET.** It is preferable to remove this sprocket with the end plate in position. Follow the instructions to dismantle the clutch as far as "Remove simultaneously the clutch and engine sprocket."

Take off the rear portion of the primary drive cover, after removing the five fixing screws. The nut securing the sleeve gear sprocket is firmly tightened and has a **LEFT HAND** thread. A well fitting ring spanner is required to release it after turning back the tab washer. Engaging top gear and pressing the rear brake pedal will prevent the gear sprocket turning, whilst the nut is unscrewed.

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

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

**TO REMOVE GEARBOX INTERNALS.** If the gearbox is to be completely dismantled, remove parts in the following order:— the clutch, sleeve gear sprocket and the gearbox end cover.

With the gears exposed unscrew the selector fork shaft (30) using a spanner on the two flats machined on it, the gear, shafts and operating mechanism can then be withdrawn. The spring loaded plunger (40) and cam plunger bolt are situated immediately below the sleeve gear sprocket.

**TO ASSEMBLE GEARBOX INTERNALS.** Fit the mainshaft with gears in the sequence shown in the illustration on pages 24 and 25. Ensure the plunger and spring for the cam segment (40-38) are in position, then insert the cam segment assembly. Take up the selector fork with the projection at 3 o'clock (31) and put the fork in the slot for the slider gear with the projection in the profiled slot in the cam segment.

Fit the layshaft (28) with gears (25 and 29), i.e. fixed and free pinion. Take up the sliding gear (26) fit the remaining selector fork into the sliding gear, slip the gear on the layshaft and engage the projection in the cam segment slot. Line up the selector forks and refit the shaft and tighten. Fit the low gear pinion to complete the assembly.

## Exhaust System and Silencer

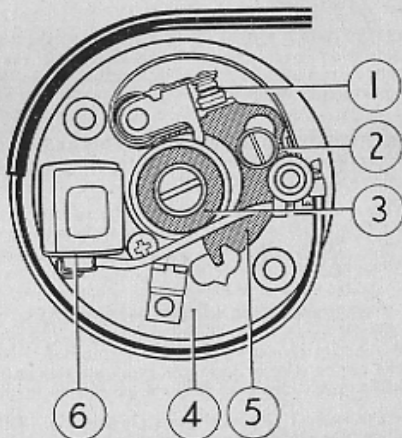
The exhaust gases of two stroke engines contain vaporised oil which forms a deposit inside the exhaust pipe and silencer. After a considerable mileage the accumulation of carbonised oil may impair performance and it is, therefore, advisable to remove the exhaust system for cleaning, this can be done by first unscrewing the exhaust pipe attachment bolt at cylinder, and then the silencer fixing bolt. Finally, by unscrewing the nut at rear of silencer the two components can be separated. The whole system may then be flushed out by pouring in a solution of household detergent and boiling water. In severe cases caustic soda may be used, but great care should be taken to avoid damage to the chromium plating. The flushing process should be repeated two or three times to remove all carbon and oil deposits.

**IMPORTANT.** The slot located in the rear end of the silencer must be kept clear of carbon deposit, due to the fact that a stoppage will impair performance.

## Ignition and Lighting

### LUCAS ALTERNATOR EQUIPMENT.

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



- 1 Contact points.
- 2 Locking screw.
- 3 Cam.
- 4 Base plate.
- 5 Adjuster plate.
- 6 Condenser.

**THE CONTACT BREAKER.** The contact breaker can be examined by removing the James name plate mounted on the right side engine cover. As the contact breaker gap affects the ignition timing it is important that the correct contact point gap is maintained, which is .014—.016. To check the contact point gap, rotate the engine until the points are at maximum separation, or when the heel of the Tufnol pivot is central with the peak of the timing cam. Check the gap with a feeler gauge, if the gap varies with the gauge the points must be re-adjusted. To do this, with the engine in the same position, slacken one or two turns the cheeseheaded screw, situated between the spring anchorage and the contact points, which secures the movable contact plate. A screwdriver can be applied in the required direction and to set the gap to the feeler gauge thickness. Retighten the screw after adjustment.

The contacts must be free from grease or oil. If they are burned or blackened, clean with a fine carborundum stone or fine emery cloth, wiping the points afterwards with a petrol moistened rag. The points can be cleaned more easily if the moving contact arm is removed after unscrewing the nut securing the end of the spring. Use a little H.M.P. or anti-centrifuge grease on the felt lubricating pad and squeeze out excess, before refitting the cover plate.

**TIMING THE ENGINE.** The normal ignition advance is  $\frac{1}{4}$ " or 33 degrees before top dead centre. The cam operating the contact breaker is a taper fit on the flywheel shaft.

Before setting, or checking the ignition timing, first check the contact breaker gap (see details for contact breaker).

The operating cam is self extracting and it will become detached from the flywheel shaft as the central screw is turned anti-clockwise.

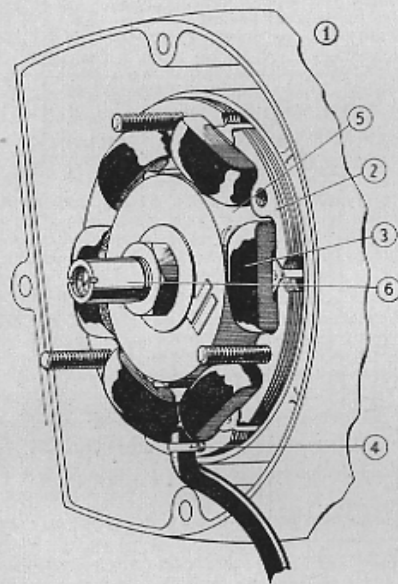
An incorrect contact breaker gap or ignition timing can adversely affect engine performance, thus it is essential that these settings are accurate. Owing to the angularity between the piston crown and the sparking plug aperture in the cylinder head, the use of a timing rod, or wire through the sparking plug aperture is not recommended.

As it is a simple matter to remove the cylinder head, as previously described, the piston movement can be accurately measured with the cylinder head removed. Turn the engine until the piston is at top dead centre of the stroke, place a straight edge across the cylinder barrel, turn the engine BACKWARDS until the piston movement is  $\frac{1}{4}$  inch before top dead centre, which can be measured with a rule placed against the straight edge and in contact with the piston crown.

The exact position where the contact points separate is best found by inserting a piece of cigarette paper between the contact points, then with the operating cam in position, turn it clockwise slowly, when a light pull on the cigarette paper will indicate when the points are starting to separate. In this position tighten the cam fixing screws and re-check the timing.

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

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



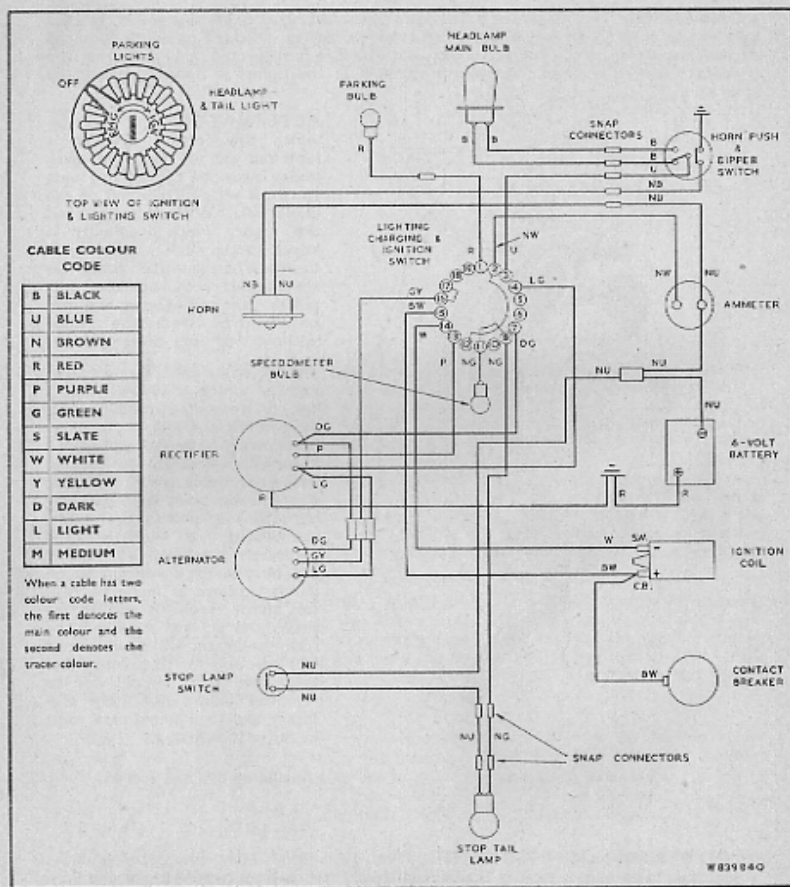
The laminated stator has six poles each of which is wound with a coil of enamelled copper wire. These coils are vacuum impregnated with a special varnish to make them resistant to harmful effects of heat, oil and petrol. There is no point in interfering indiscriminately with the stator, the housing into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

1. Alternator complete.
2. Stator ring.
3. Coils (set of six).
4. Lead unit (including clip and screw).
5. Rotor.
6. Cam unit.

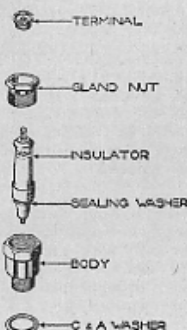
**HIGH TENSION IGNITION COIL.** The coil is fitted in the compartment under the saddle. The unit is factory sealed and should not be tampered with in any way.

**IGNITION FAILURE.** Serious trouble in the form of condenser breakdown is very rare and any ignition failure will generally be due to the condition of the sparking plug or the contact breaker points, or faulty insulation of the H.T. lead or other connections. The first step in dealing with ignition trouble should be to remove plug from engine and examine the points to see whether they are oily and the gap correctly set between .018" and .022". If the insulator is fouled with oil and carbon there may be sufficient leakage to prevent correct sparking and cleaning will be necessary. Fitting a new plug will readily show whether the failure is due to plug or not. The plug lead should then be examined for cracks or other faults. The contact breaker can then be examined to see whether the points are opening correctly. When the points are fully open there should be a gap of .015". The surfaces must also be clean and free from oil and severe pitting. A piece of stiff paper will usually remove oil or grease. If the points are burned

### IGNITION AND LIGHTING WIRING DIAGRAM



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.



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

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

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

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

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

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

- (a) Ensure ignition timing is correct and contact breaker gap is between .012" — .015".
- (b) The carburetter 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.

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

**THE RECTIFIER.** The rectifier is a device which allows current to flow in one direction only. It is connected to provide full-wave rectification of the alternator output current.

The rectifier requires no maintenance beyond checking that the connections are clean and tight. **The nut clamping the rectifier plates together must not, under any circumstances be slackened as it has been carefully set during manufacture to give correct performance.** A separate nut is used to secure the rectifier to the frame of the motor cycle and it is important to check periodically that the rectifier is firmly attached to its mounting bracket under the twinseat.

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

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

**BATTERY.** PUZSE-10 "dry charged" batteries are supplied without electrolyte, but with their plates in a charged condition. No initial charging is required and to bring the battery into service it is only necessary to fill the cells with electrolyte, prepared by mixing concentrated sulphuric acid and distilled water. The cell filler holes are sealed to exclude moisture and air before the battery is brought into service and the seals should be removed immediately before electrolyte is poured in.

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

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

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

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

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

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

Every month (every fortnight in Summer) remove battery, clean terminals and top up the three cells to  $\frac{1}{4}$ " above the level of the plates with distilled water — NOT tap water, as this contains impurities detrimental to the battery. Pour the distilled water through a glass funnel or syringe.

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

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

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

Battery acid is highly corrosive; therefore, throw away any cleaning rags used to clean the battery lest their use on other parts of the machine causes rust.

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

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

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

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

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

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## 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 (9) for depressing the float to give a greater supply of petrol for starting when the engine is cold. A filter shutter on the main air intake provides for air regulation when starting the engine from cold. 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.

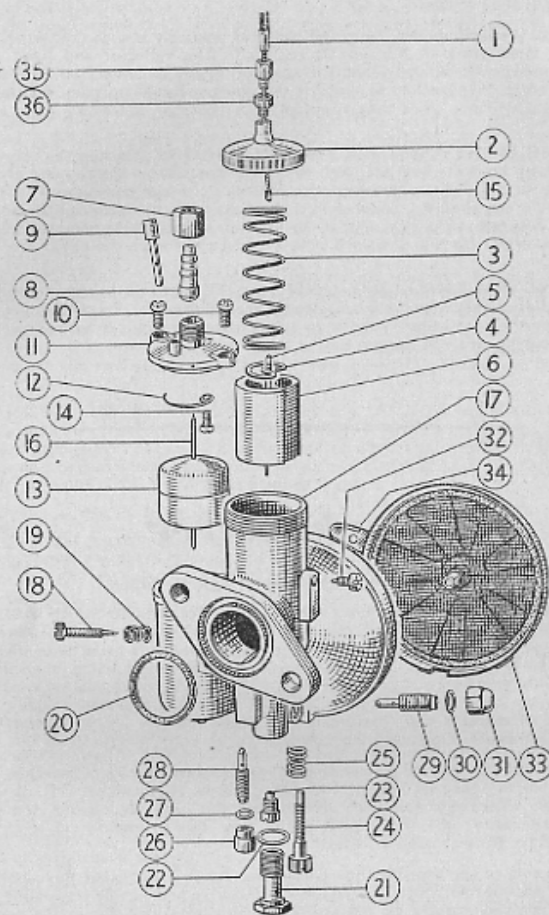
At small throttle openings, as for starting, idling and slow-running, a petrol/air mixture is drawn from the pilot jet system, fuel being fed via the main jet (29), through the pilot jet (28) where it mixes with air entering the pilot air passage, the resultant mixture then passing out of the pilot outlet and pilot by-pass where it mixes with air passing through the main air choke.

Further opening of the throttle then brings into action a petrol/air mixture from the primary air choke, fuel which has passed the main jet 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 intimately mixed with the main in-coming 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  $\frac{2}{3}$  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  $\frac{2}{3}$  to full throttle, it is solely the size of the main jet.

### MAINTENANCE OF THE CARBURETTER.

**Petrol Feed.** Ensure that an ample supply of petrol is reaching the carburetter, test by disconnecting the petrol feed pipe from the float chamber and turn on the fuel supply to see if petrol gushes out from the feed pipe.

## CARBURETTER COMPONENTS.



- |                                |                               |                               |
|--------------------------------|-------------------------------|-------------------------------|
| 1 Cable.                       | 12 Tickler spring.            | 23 Needle jet.                |
| 2 Mixing chamber top cap.      | 13 Float.                     | 24 Throttle stop screw.       |
| 3 Throttle spring.             | 14 Spring securing screw.     | 25 Spring.                    |
| 4 Needle clip.                 | 15 Cable nipple.              | 26 Pilot jet nut.             |
| 5 Jet needle.                  | 16 Float needle.              | 27 Washer.                    |
| 6 Throttle slide.              | 17 Carburettor body.          | 28 Pilot jet.                 |
| 7 Petrol feed union nut.       | 18 Pilot air adjusting screw. | 29 Main jet.                  |
| 8 Tickler.                     | 19 Spring.                    | 30 Washer.                    |
| 9 Tickler.                     | 20 "O" ring.                  | 31 Cover nut.                 |
| 10 Float chamber cover screws. | 21 Jet plug.                  | 32 Slide locating screw.      |
| 11 Float chamber cover.        | 22 Fibre washer.              | 33 Filter and strangler unit. |

**Float Chamber.** Check that there is no continual flooding of the float chamber, caused by the float needle (16) not shutting off correctly, due to foreign matter on the needle or its seating. To clean the float chamber, remove the two cover screws (10), when the cover (11), needle (16) and float (13) can be removed. Wash out the float chamber and its cover complete with needle seating using clean petrol, wipe the needle clean. Ensure no abrasive material is used in the latter operation. When re-assembling the float chamber parts, ensure that the float needle is assembled correctly, that is, with the pointed end uppermost. Nearly all flooding with new machines is due to foreign matter (grit, fluff, etc.) in the petrol tank — so clean out the float chamber periodically, until the trouble ceases. If the trouble persists the tank should be drained and swilled out, etc.

**Main and Pilot Jet (29 and 28).** Check that no foreign matter is obstructing their passageways. To extract the jets from the carburettor, first remove their cover nuts (26 and 31) the jets exposed can then be removed with the use of a screw-driver. 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.

**Needle Jet (23).** Check that no foreign matter obstructs its passageways. Unscrew the jet plug (21) from the carburettor body, then unscrew the needle jet (23) by means of a screwdriver. (Note: care must be taken that the screwdriver head fits correctly into the jet slot). Wash in clean petrol and blow through passageway.

### ADJUSTMENT OF CARBURETTER.

Carburettors as supplied by the makers for fitting to specific machines should under normal condition only require adjustment of the throttle stop adjusting screw (24), pilot air adjusting screw (18), 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 (18) 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 (24) 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 carburettor (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 carburettor supplied should, under normal conditions, only require adjustment of: the throttle stop adjusting screw, pilot air adjusting screw.

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

## 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, i.e., butter muslin.

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

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

**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, primary chaincase, gearbox and carburetter, and regular cleaning will not only improve the appearance of the machine but will avoid dirt stains on trouser legs and shoes. A clean engine unit is also easier and more pleasant to maintain.

Such parts can be cleaned with a stiff brush dipped in petrol or 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.

**TOOLS.** The standard tool kit supplied with new machines consists of:

- |                           |                                   |
|---------------------------|-----------------------------------|
| 1 Plug spanner.           | 1 .720/.820 double ended spanner. |
| 1 Feeler gauge.           | 1 .525/.601 double ended spanner. |
| 1 Screwdriver.            | 1 .338/.448 double ended spanner. |
| 2 Steering head spanners. | 2 Tyre levers.                    |
| 1 Pair pliers.            | 1 Hand pump.                      |
| 1 Allen key.              |                                   |

### Optional Equipment.

- |                          |                         |
|--------------------------|-------------------------|
| Legshield/Engine cover.  | Windscreen.             |
| Pannier frames and bags. | Pillion footrests.      |
| Stop-light.              | Windscreen and fairing. |

## Service Department

**SPARES AND REPAIRS.** Genuine James spare parts are obtainable from James Dealers almost everywhere. The name of the nearest stockist will be gladly forwarded on receipt of a stamped addressed envelope.

If a James Dealer cannot supply from stock, he will order specially. We can only supply direct in emergency or where no James Dealer is at hand. In such circumstances, please quote James Part Number as per Spares List, price 5/- (or enclose pattern) together with full frame and engine numbers. Owners in Great Britain and Northern Ireland should note that unless money is sent to cover order, (add 1/- in the £1 to cover packing and postage), we despatch C.O.D. post up to 15 lbs. Minimum C.O.D. postage is 2/-.

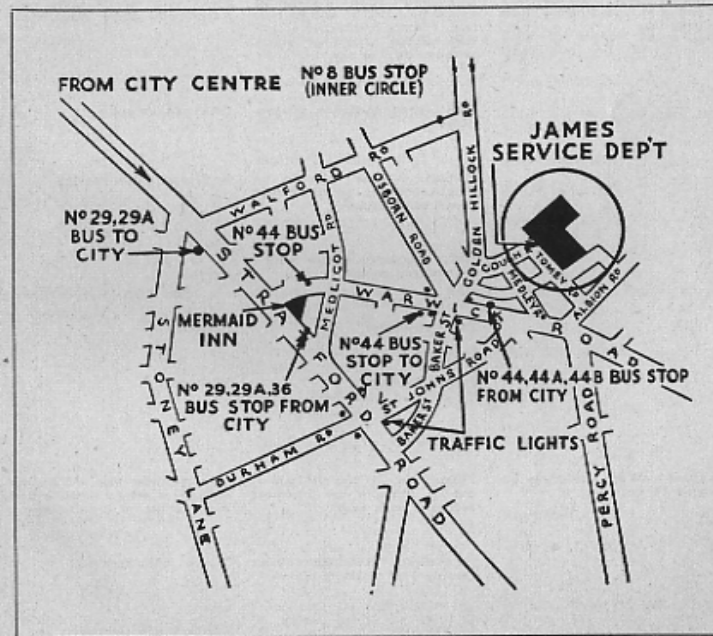
When ordering spare parts, owners are advised to produce the original part as pattern, and to quote their full frame and engine numbers to ensure identification.

Instructions regarding repairs should be clear and definite, otherwise the cost may be greater than expected. We shall be pleased to give estimates for repairs if parts are sent to us for that purpose. If the estimate is accepted, no charge will be made for the preliminary examination, but should the owner decide not to have the work carried out, a nominal charge may be made to cover the cost of whatever work may have been done to prepare the estimate. Parts sent to us as patterns or for repairs, should have attached to them a label with the sender's full name and address. Instructions regarding such parts should be sent separately.

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

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

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



## Tracing Faults

Sequence of Testing	Possible Trouble.	Remedy.
<b>Engine will not start.</b>		
Depress tickler on carburetter to check whether fuel is reaching carburetter.	No fuel reaching carburetter, air lock in petrol pipe.	Ignition switched on 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.	Remove and clean out.
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 $\frac{1}{2}$ " 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 to .015". Clean.
	Moisture on insulation of condenser.	Clean and dry out.
	Damaged insulating sleeving on wires connecting contact breaker to coil or condenser.	Replace with new sleeving.
	Faulty connection to low tension wire of ignition coil.	Correct.
	Faulty condenser.	Replace.
	Faulty ignition coil.	Replace.
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 carburetter joint causing weak mixture.	Tighten joints evenly.
	Incorrect ignition timing.	Check, instruction given.

## TRACING FAULTS—(continued)

Sequence of Testing.	Possible Trouble.	Remedy.
<b>Engine Four or Eight Strokes.</b>		
Air lever may not be fully open or taper needle in too a high position.	Mixture too rich.	Lower taper needle by moving to a WEAKER position after releasing the circlip.
Check by watching for excessive smoke from exhaust pipe or silencer.	Engine may four stroke for a little while after standing due to accumulation of oil in crankcase.	Usually ceases when engine has been running for a few minutes unless too much oil has been mixed with the petrol.
	Flooding of carburetter.	Persistent flooding is usually due to dirt under fuel needle seating, or sticking fuel needle, damaged seating or punctured float.
<b>Engine Lacks Power.</b>		
	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.	Correct mixture is 1 part oil, 20 parts petrol.
	Excessive carbon deposit on piston crown and cylinder head.	Decarbonise.
	Exhaust system choked with carbon.	Clean out silencer and exhaust pipes.
	Incorrect carburetter setting.	Check and adjust.
	Obstruction in fuel supply.	Clean out tap, fuel pipe and filters.
	Incorrect ignition timing.	Check and adjust.
	Brakes binding.	Adjust.
	Driving chains too tight.	Adjust.
<b>Engine will not run Slowly.</b>		
	Weak mixture due to air leaks at carburetter joints, crankcase and 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.
<b>Engine Suddenly Stops Firing.</b>		
	Sparking plug lead detached.	Replace.
	Plug points bridged by oil, carbon, or deposit caused by use of loaded petrol.	Clean or replace.
	Short circuit of high tension lead to frame possibly by water on H.T. lead.	Insulate. If wet, dry out.



## Technical Data—Cavalier 175

### MODEL L17

Engine	17T two-stroke.
Cubic Capacity	172 cc. (10.5 cu. ins.).
Stroke	63 mm. (2.48 ins.).
Bore	59 mm. (2.3235 ins.).
Rebore Sizes	To be announced later.
Compression Ratio	8.25 to 1.
Ignition Timing	Points begin to open $\frac{1}{4}$ " before T.D.C.
Contact Breaker Gap	.014"/.016".
Sparking Plug Type	Lodge CCL 14.
Sparking Plug Gap	.018"/.022".
Correct Lamp Bulbs	Head-main 6v. 30/24w. twin filament, pre-
AC/DC lighting-battery rectifier	Head-pilot 6v. 3w. M.B.C. [focus. Tail .. 6v. 3w. M.E.S. Speedo .. 6.5v. .3 amp. M.B.C.
Carburettor	Amal type 370/1. Needle "E" Normal setting 3rd. notch Throttle No. 4. [from top.
Sprockets (standard)	Engine .. 18T $\frac{3}{8}$ " pitch. Clutch .. 43T $\frac{3}{8}$ " pitch. Gearbox .. 16T $\frac{1}{2}$ " pitch. Rear Wheel .. 46T $\frac{1}{2}$ " pitch.
Chains	Primary .. $\frac{3}{8}$ " x $\frac{1}{4}$ " x .225" 58 links. Final Drive $\frac{1}{2}$ " x .335" x .205" 118 links.
Chain Adjustment	Primary: pre-stretched. Rear (machine on stand) $1\frac{1}{4}$ " whip approx. (rider seated) $\frac{1}{2}$ " to $\frac{3}{4}$ " whip. 4 speed 6-9, 8-96, 12-77, 20-37 to 1.
Overall Gear Ratios (standard)	Front, 15 x 35 x 11 mm. Rear, 15 x 42 x 13 mm.
Hub Bearings	1-1, 1-13, 1-85, 2-92, to 1.
Internal Gearbox Ratios	Drive side (2) .. $\frac{3}{4}$ " x $1\frac{7}{8}$ " x $\frac{9}{16}$ ". Flywheel side (1) .. $\frac{3}{4}$ " x $1\frac{7}{8}$ " x $\frac{9}{16}$ ". Steel rollers (8) .. $\frac{1}{4}$ " x $\frac{3}{8}$ ".
Engine Main Bearings	
Engine Big End Bearings	$\frac{1}{4}$ " balls 17 top—17 bottom.
Steering Head Bearings	
Wheel Rims	WM1-18 front and rear.
Tyres	3-00 x 18 L/W. front and rear.
Tyre Pressures—(normal solo)	Front 16 lbs. Rear 24 lbs.
Spokes	Front R.H. 10 s.w.g. x $6\frac{1}{8}$ " (18). L.H. 10 s.w.g. x $6\frac{1}{8}$ " (18). Rear 10 s.w.g. x $6\frac{9}{16}$ " (36).
Brake Drum Diameters	5" front and rear.
Brake Lining Width	$\frac{3}{4}$ ".
Total Braking Area	13 sq. in.
Fuel Tank Capacity	2 $\frac{1}{2}$ gallons.
Fuel Mixture	20 : 1 petrol-oil mixture.
Oil Capacities: Chaincase	Fill to drain plug level.
Gearbox	Fill to level screw immediately behind K.S. crank.
Forks	55 cc. per leg (1 filler cap measure).
Wheelbase—static	49 $\frac{1}{2}$ ".
Seat Height	29".
Ground Clearance	5".
Width Over Bars	26".
Overall Length	76 $\frac{1}{2}$ ".
Approx. Weight	240 lbs.

## 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.

We give the following guarantee with our motor cycles, motor cycle combinations and sidecars, including all accessories and component parts other than tyres, saddles, chains and lighting and electrical equipment, and other than accessories and component parts supplied to the order of the Purchaser and differing from those comprised in the standard specifications supplied with our motor cycles, motor cycle combinations and sidecars, but including accessories and parts supplied by way of exchange as hereinafter provided. This guarantee is given in place of any implied conditions or warranties or any liabilities whatsoever statutory or otherwise; no guarantee except that hereinafter contained and no conditions or warranty whatsoever statutory or otherwise is given or is to be implied, nor are we to be under any liability whatsoever except under the guarantee hereinafter contained. Any statement, description, condition or representation contained in any catalogue, advertisement, leaflet or other publication shall not be construed as enlarging, varying or overriding anything herein contained. In the case of machines (a) which have been used for "hiring out" purposes or (b) any motor cycle and/or sidecar used for any dirt track, cinder track or grass track racing or competitions (or any competition of any kind within an enclosure for which a charge is made for admission to take part in or view the competition) or (c) machines from which the trade mark, name or manufacturing number has been altered or removed or (d) any machines in which parts have been used not supplied by or approved by the motor cycle manufacturer or (e) any machine from which the silencing system as fitted by the manufacturer has been partially or wholly removed or interfered with, no guarantee, condition or warranty of any kind statutory or otherwise, is given or is to be implied, nor are we to be under any liability whatsoever in respect of any such machine. We guarantee, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and be in force for six months only in U.K. and ninety days overseas from date of purchase, or date of exchange in case of any accessory or part supplied by way of exchange as hereinafter provided, and damages for which we make ourselves responsible under this guarantee are limited to the free repair of or supply of a new part or accessory in exchange for the part of the motor cycle, motor cycle combination or sidecar or accessory which may have proved defective. We undertake, subject to the conditions mentioned below, to make good in manner aforesaid any part or accessory covered by this guarantee which has proved defective within the said period. We do not undertake to replace or refix or bear the cost of replacing or refixing any such new part or accessory in the motor cycle, motor cycle combination or sidecar. As motor cycles, motor cycle combinations and sidecars are easily liable to derangement by neglect or misuse, this guarantee does not apply to defects caused by wear and tear, misuse or neglect.

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

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

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

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

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

**REPAIRS**—Any motor cycle, motor cycle combination or sidecar sent to us to be plated, enamelled or repaired will be repaired upon the following conditions, i.e., we guarantee that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, such guarantee to extend and be in force for three months only from the time such work shall have been executed, and this guarantee is in lieu and in exclusion of all conditions and warranties statutory or otherwise, and all liabilities whatsoever and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.



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