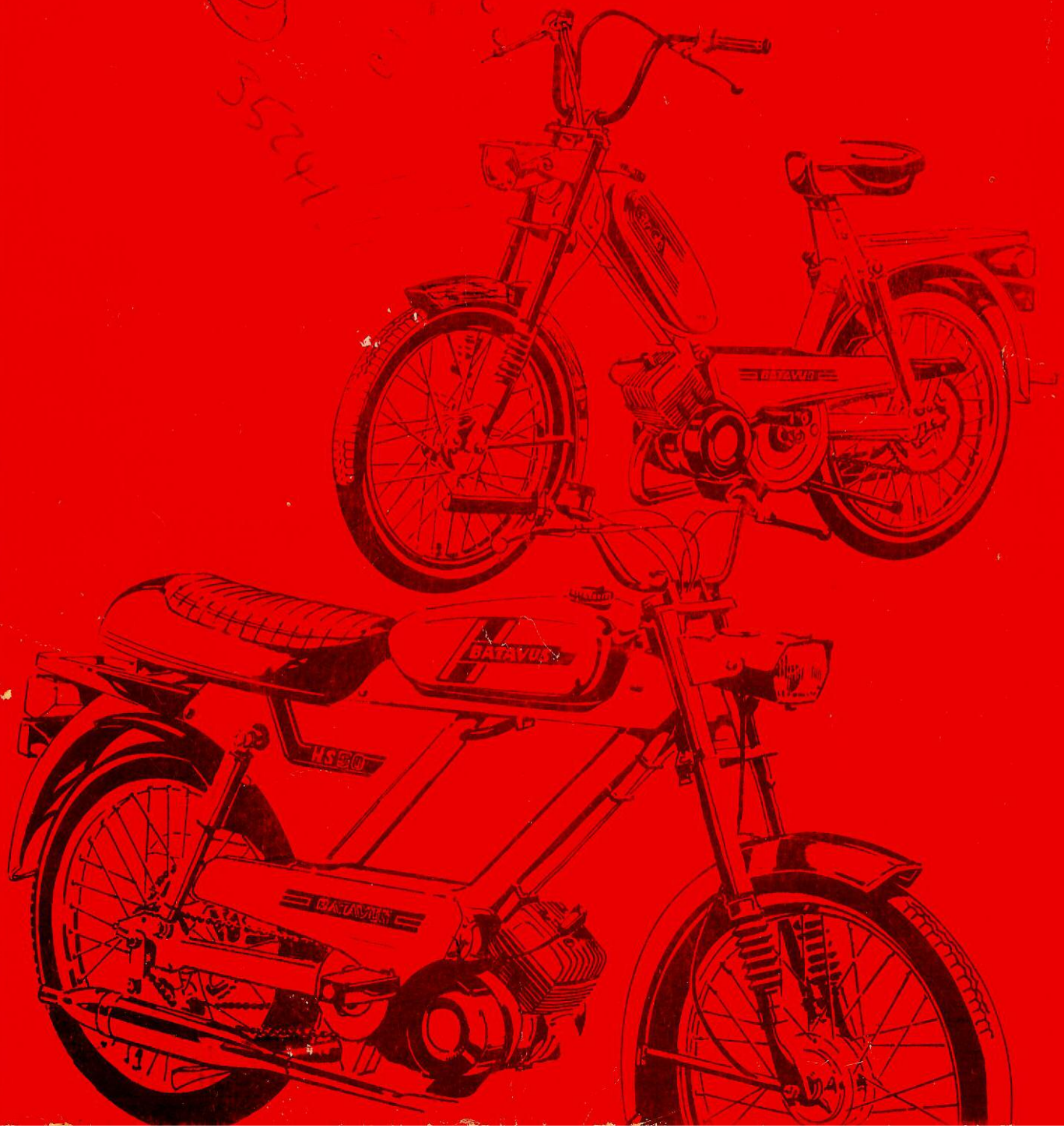
THE BOOK OF

BATAVUS

BY J.W. HARRISON



THE BOOK OF BATAVUS

A GUIDE TO THE ECONOMIC OPERATION, MAINTENANCE AND REPAIR OF BATAVUS SINGLE SPEED MOPEDS

BY

J.W. HARRISON

WITH ACKNOWLEDGEMENTS TO BATAVUS INTERCYCLE BV
AND LAURA MOTOREN BV.

'THE QUALITY TOUCH OF THE EXPERT DUTCH'

INTRODUCTION

Mopeds are intended to provide cheap, reliable, easy to use personal transport and should be designed with this in mind. They must have enough performance to cope with everyday traffic and local conditions (including hills) with an economy of around 150 miles per gallon. Maintenance must be simple so as to fall well within the scope of any reasonable mechanic thereby limiting the likely expense on trade service and providing an opportunity for knowledgeable owners to undertake their own work.

Batavus mopeds meet these requirements probably better than any of their competitors and this Manual will be well understood by the vast majority of riders and, of course, mechanics.

CONTENTS

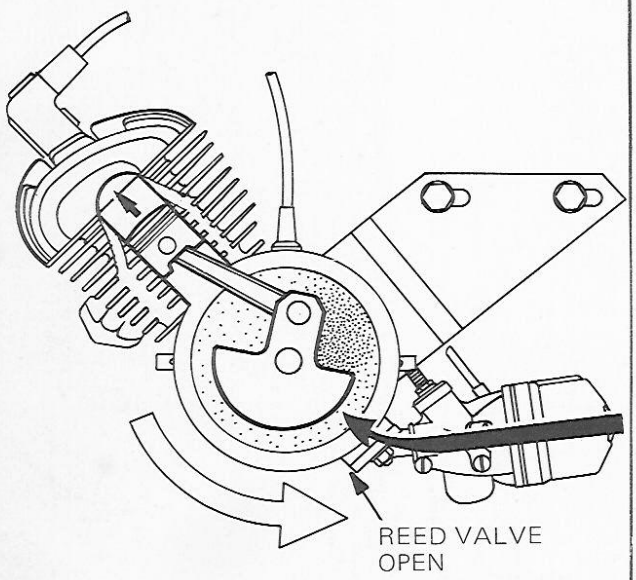
SECTION 1

UNDERSTANDING BASIC PRINCIPLES.

A. ENGINE

The laura M48–2 engine is a two stroke unit which means that the mixture of petrol and air on which it runs is compressed twice before combustion – once in the crankcase (primary compression) and then in the actual combustion chamber (secondary compression). Transfer between these two compression chambers is via a port or passage cast into the cylinder. There is a power stroke every revolution of the engine. The drawings below will help those who are not familiar with the two stroke principle to understand it.

PISTON ASCENDS drawing fresh charge into crankcase.
Previous charge is compressed in the combustion chamber ready for ignition.



PISTON DESCENDS compressing and transferring the new charge.

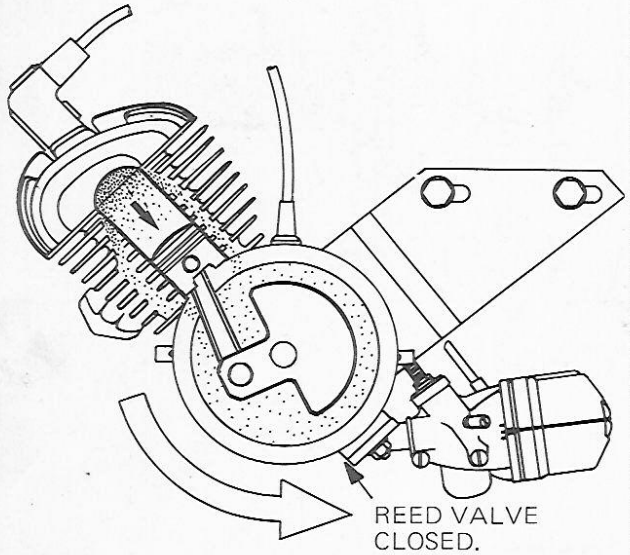


Fig. 1. The 2 stroke cycle.

Following secondary compression the mixture is ignited and burnt (it should not explode) to provide power by pushing down on the top of the piston and rotating the crankshaft via the connecting rod assembly. Ignition is achieved by means of an electrical spark across the plug electrodes and this spark is provided by a Bosch generator mounted on the right hand side of the crankshaft. Spark plugs all look very much alike but are graded to match particular engine temperatures. It is absolutely vital to continuous efficiency for the correct grade of plug to be used.

Where the Laura M48 engine differs from many of its competitors is in the way in which the petrol/air mixture is drawn into the crankcase. On all Batavus single speed mopeds the mixture is drawn directly into the case from the carburettor by way of a **reed valve** (figs. 1 & 2) which is activated by variations in pressure created by the piston as it reciprocates. This arrangement ensures efficient crankcase filling and eliminates the waste of valuable petrol vapour which can occur in engines using other methods of intake control. It is one of the reasons for the excellent fuel economy achieved by the Batavus range.

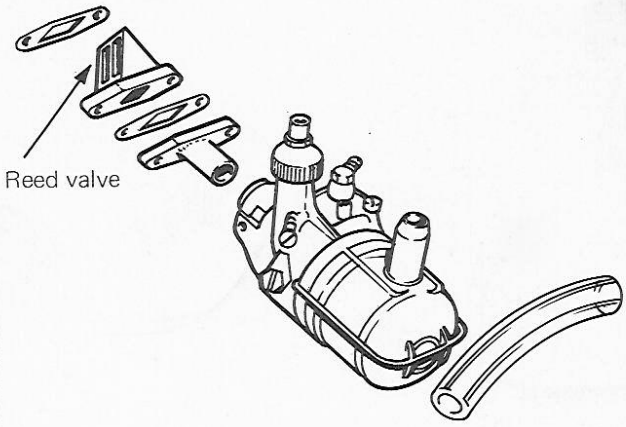


Fig. 2. Reed valve and carburettor.

B. TRANSMISSION

Power from the engine is transmitted by an automatic clutch mounted directly on the L/H side of the crankshaft, through a toothed V Belt to a countershaft pulley and then via a roller chain on the left of the moped to the rear wheel. Pedal power for starting purposes is transmitted from the pedals through the R/H roller chain, across the rear wheel spindle, via the L/H chain and V Belt to the clutch housing. Only when the clutch is "locked" by using the handlebar start lever will pedal power actually turn the engine crankshaft.

The automatic clutch takes up the drive as engine speed increases. This is achieved by using the increasing centrifugal force generated by the engine speed to push forward the rear pressure plate thus sandwiching the friction plate between the pressure and end plates. Fig. 3 is a section through the clutch and it will be seen that only when this sandwich is tight will the crankshaft and clutch housing turn at the same speed.

Centrifugal forces act on a coil spring A which is filled with ball bearings and then screwed nose into tail. When the force builds up the spring is stretched and increases in effective diameter. As it does so it rides up a ramp B formed in the clutch housing and pushes the pressure plate C forward gradually taking up the drive by "sandwiching" clutch plate D between pressure plate C and end plate E.

The V Belt and chain transmissions will be familiar to most people. Simple adjustments are provided in both cases.

All parts in solid black must turn whenever the engine is running as they are directly connected to the crankshaft.

Items dotted are free to rotate in relation to solid black parts until Balls 'A' move out under centrifugal force and ride up Ramps 'B' pushing Pressure Plate 'C' against Friction Plate 'D' and End Plate 'E'.

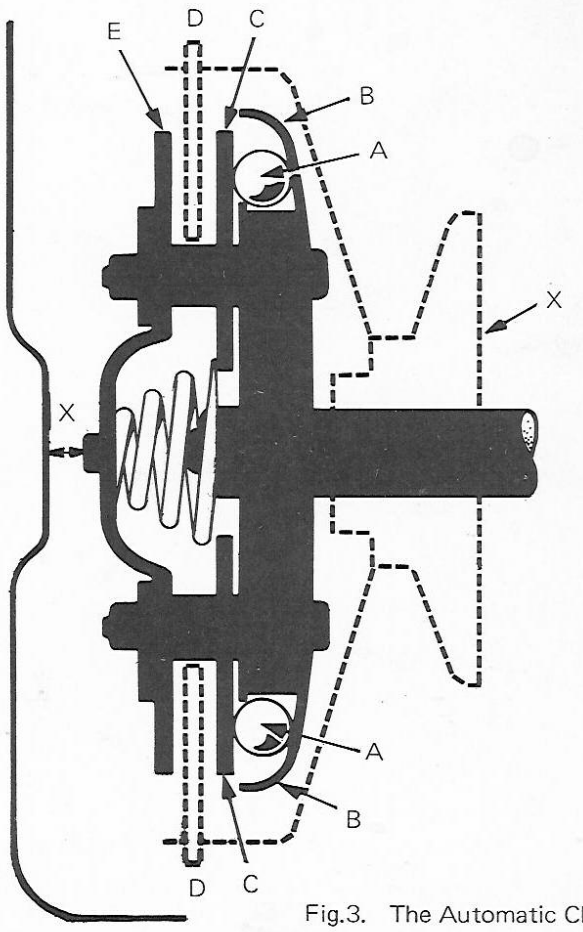


Fig.3. The Automatic Clutch

C. LIGHTS

There is no battery to require service or replacement as lighting is provided by A.C. current produced by the same Bosch generator which produces the H.T. spark for ignition. The lighting circuit is, of course, separate from the ignition circuit although the same rotating magnets are used for both purposes. The control switch is mounted on the handlebar. Wattage of the bulbs is calculated to absorb the energy which the lighting coils are capable of generating and any change in the rating will result in continuous failure if the total bulb wattage is reduced or poor lights if it is increased. The engine must of course be running before any lights are available.

Electrical circuits employ an earth return arrangement. That is to say that the frame of the moped is used to complete all electrical circuits thus eliminating the need for a second wire to and from all lights, horn etc.

NOTE:
Turn signals operated by a nickel cadmium battery automatically recharged by the standard generator can be fitted to all BATAVUS mopeds. These signals are approved by the manufacturers and details are available from BATAVUS dealers.

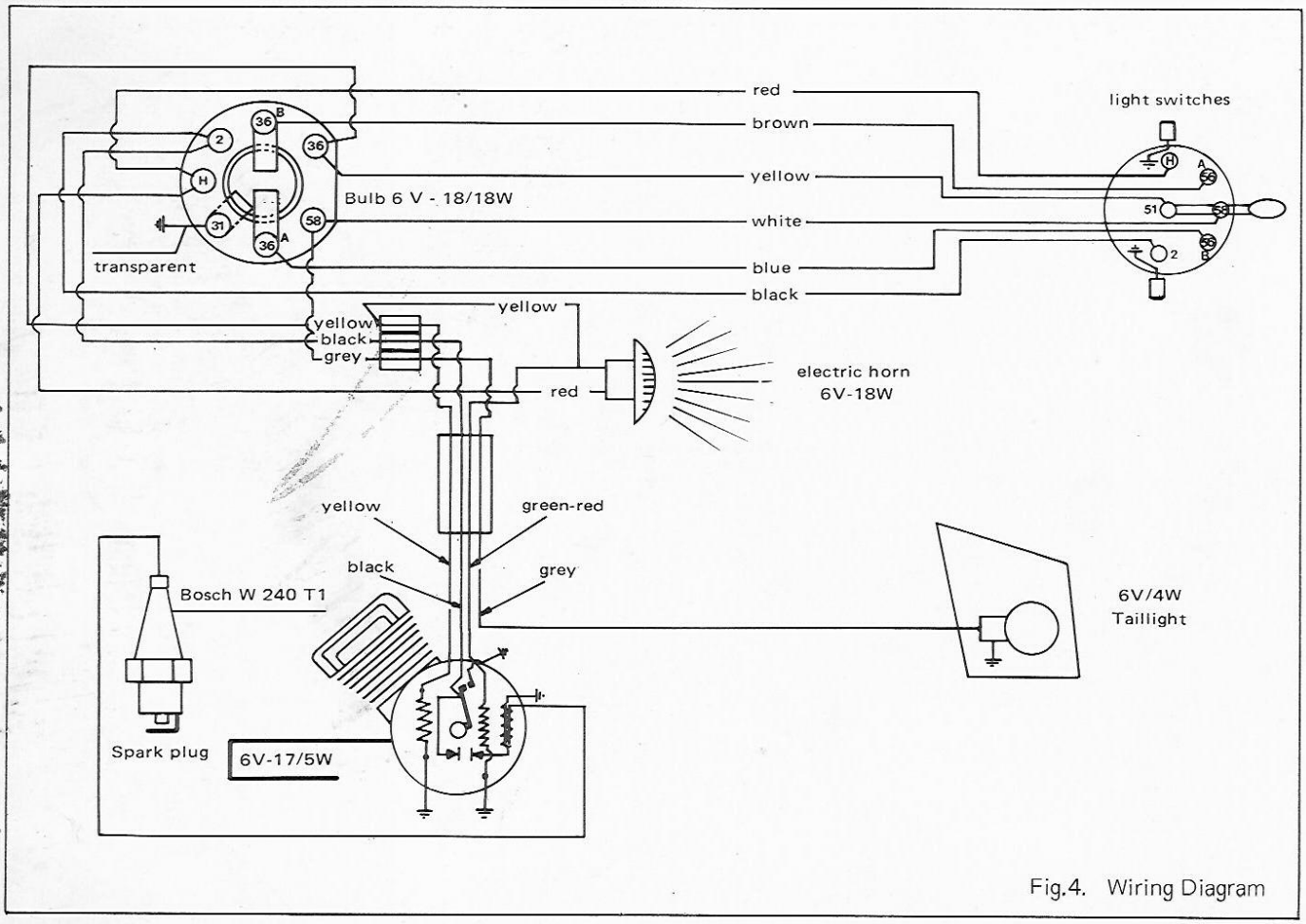


Fig.4. Wiring Diagram

D. FUEL SUPPLY

The engine runs on a mixture of petrol and oil in the ratio of 1 part oil to 25 parts petrol. The fuel tank is large enough to allow riders to refill direct at garages rather than by drawing fuel in a separate can. This facility is very useful but care should always be taken to switch off the fuel tap when refilling and to shake the machine from side to side to completely mix the oil and petrol before re-opening the tap. This prevents neat oil from choking the fuel lines.

From the tank petroil flows past the tap (which incorporates a reserve control) through a pipe to the Encarwi carburettor (Fig. 2.) This meters the amount of petroil according to the air intake which in turn depends on engine speed and throttle opening. A correct mixture is fed to the engine through the reed valve previously described.

For starting from cold a choke is provided. This is operated from the R/H handlebar and simple restricts the amount of air intake and increases the depression (or suction) over the jet and thus provides the richer mixture needed for a cold start.

E. SUSPENSION

Front suspension is by telescopic forks with internal springs. No provision is made for oil damping.
On all but Starglo models rear suspension (known as Cushride) is by means of a pivotting fork mounted on silentblocs with the unusual feature of the engine fitted to the forward end of the fork so isolating the rider from any small degree of engine vibration and ensuring constant chain tension. This arrangement has the added advantage of using the engine to counterbalance the rear wheel and assists generally in rider comfort. Starglo models employ conventional swinging arm rear suspension.

F. BRAKES

Brakes follow conventional practice being single leading shoe type in the wheel hubs. They are operated by cables from handlebar levers. Fig. 5. indicates the method of operation.

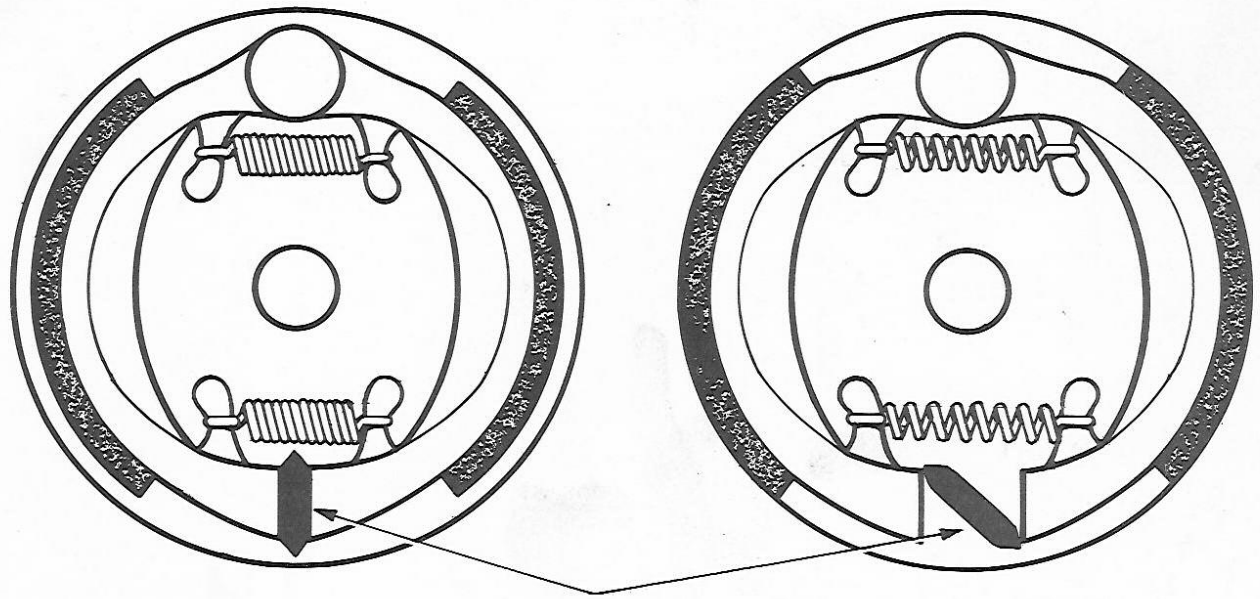


Fig.5. Brake Operation

SECTION 2

ROUTINE MAINTENANCE AND ADJUSTMENT.

A. MAINTENANCE SCHEDULE

Maintenance Point	Task	Mileage			Ref. Sec.
		500	1500	2500	
Air Filter	Wash in petrol and dip in SAE 40	X			3C
Brake Cam Spindles	Lubricate with 2 drops of light oil	X			
Carburettor	Clean and adjust			X	2C 3C
Chain (Drive)	Adjust & Lubricate	X			2F
Chains (both)	Remove, clean & Lubricate		X		2F
Control Cables	Lubricate and adjust		X		2B
Contact Breaker	Clean & Adjust	X			4A
Exhaust System	Decarbonise		X		4E
Front Forks	Models except Compact – Grease Compact – No routine maintenance		X		
Pedals	Re-pack with grease		X		
Pulley Bearing	Grease	X			4K
Spark Plug	Clean & Adjust	X			2E
Speedo Drive	Grease		X		
Steering Head	Re-pack with grease		X		
V Belt	Check & Adjust	X			4J
Wheel Hubs	Re-pack with grease		X		

B. CABLES AND CONTROLS

Start Lever and Cable — Approximately every 500 miles check the condition and adjustment of the starter mechanism.

Remove the left hand engine cover by releasing the two spring retaining clips with a screwdriver. (Take care not to lose them !) Release the engine end of the start cable by pulling out the nipple with a pair of pliers. Measure the distance X (Fig. 3) which should be between 1.5 – 2 mm. If it is not, remove the spring steel lever by undoing two retaining bolts under the crankcase, place the short end of the lever in a suitable vice and bend in the required direction. Re-check.

Once the correct free clearance has been obtained, re-fit the start cable and re-check clearance. It should now be between 0.5 – 1 mm. If it is not, adjust by releasing the inner cable retaining screw in the plastic lever on the handlebar and pull or release the inner cable as required to achieve the correct setting. Re-tighten retaining screw and replace the engine cover.

Brake Cables —Both brake cables are provided with adjusters on the handlebar lever clamps. Precise adjustment is a matter of personal choice within quite wide limits. Riders with small hands will achieve maximum efficiency with rather more free play in the cables than will be required by riders with larger hands. However, under no circumstances must the cables be so slack as to permit contact between the lever and handlebar grip. Always ensure adequate clearance to allow for the abnormal pressures applied in an emergency stop.

In addition to the lever end cable adjuster the rear brake is equipped with a reversible cable stop at the wheel end. When turned so that the cable stop is forward of its pivot, this permits further adjustment at the handlebar end. In no circumstances should a machine be used with the cam levers forward of the cam centre line as this reduces efficiency. Brakes in this condition are dangerous and new shoes should be fitted.

Throttle Cable —This cable is provided with an adjuster in the twist grip clamp. There must always be about 1.5mm free play in the throttle cable to avoid any possibility of overriding the slow running adjustment by means of the tapered screw in the carburettor body.

C. CARBURETTOR

The Encarwi S22 instrument is extremely simple and has limited facilties for adjustment. If the engine is running satisfactorily leave well alone.

Periodically check the free play on the choke cable which must be between 1 – 2 mm at the handlebar lever to ensure that the choke valve opens fully. Too little clearance will result in four-stroking.

If the engine idling speed is too high or too low this can be corrected simply by turning the adjuster screw (Fig.14). Turn clockwise to increase engine idling speed – anti-clockwise to reduce it. Always adjust engine idling speed when the engine is hot and the control cable is properly adjusted.

No adjustment is provided for the main jet operation but alternative main jets are available to meet special circumstances.

D. CONTACT BREAKER

Wear and deterioration of the contact breaker assembly and resultant change in gap is inevitable and can have a serious effect on the running of the engine. Check for general condition and adjustment at intervals of about 500 miles.

Remove the righthand engine cover by releasing the two spring retaining clips. Turn the magneto flywheel clockwise until the points have opened fully – at which time it is possible to gain access to them through a hole in the flywheel housing.

If this is simply a routine check – measure the gap with suitable feeler gauges. The gap can be anywhere between 0.35 mm and 0.55 mm and provided it is within these wide tolerances and that the engine is running satisfactorily do not be tempted to re-adjust. Examine for any slight deterioration in contacts and clean with fine emery paper on a steel blade if necessary. (Simply insert the emery and move back and forth to remove slight oxidisation, etc.)

If the engine is not running as well as usual, if the contact breaker gap is outside the specified tolerances or if the contacts show signs of pitting it is wise to remove the magneto flywheel and to proceed as in section 6A.

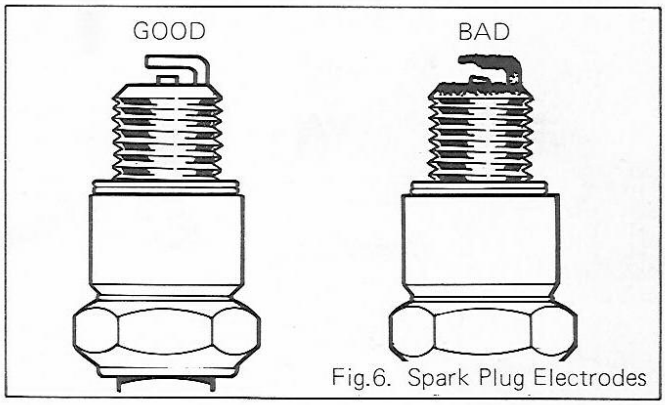


Fig.6. Spark Plug Electrodes

E. SPARK PLUG

Remember to use only the correct grade of plug. Serious consequences may result from the use of the wrong grade.

Every 500 miles remove the spark plug and examine the electrodes. These should be a light brown in colour and free from pitting or general erosion. See Fig.6 for plugs in good and bad condition.

Replace with a new plug if there is any marked tendency towards the bad condition illustrated.

A black sooty deposit on the electrodes indicates that the mixture is too rich and will probably have the effect of four stroking.

A white deposit indicates overheating and may be a sign of a weak mixture or of the use of the wrong grade of plug. Weak mixture may result from slight tilting of the carburettor on its manifold and this can be corrected by rotating a degree or two anti-clockwise when looking from behind. If this fails to correct the condition – and the plug is of the correct type – try a main jet two numbers up from that which is fitted. Do not exceed this size.

If any case, clean the plug thoroughly and check the gap before refitting. Cleaning is best done by a garage on a sandblasting machine and to make this easier to achieve it is wise for owners to carry a spare plug. Re-set the gap to 0.5 mm by carefully bending the outer electrode.

F. CHAIN TENSIONING

The right side (pedal-) chain is kept to the right tension by means of an automatic tensioner. Total up and down movement of the left side (driving) chain should not exceed 20mm (10mm upwards and 10mm downwards).

If this movement is exceeded, the chain should be tightened by releasing the rear axle nuts and pulling the rearwheel backwards by means of both adjusters situated at the end of the rearfork.

See that the wheel remains exactly in the centre of the rear fork. Afterwards the axle nuts must be securely tightened again. Always ensure free rotation of the wheel on completion of this adjustment.

Automatic chain tensioner.

Check from time to time that the tensioner sprocket is central to the chain line and lubricate the spindle and bush with a few drops of light oil.

G. V BELT ADJUSTMENT

The belt will almost certainly need adjustment at the first 300 mile service.

Remove the engine cover shield(s) to expose the top run of the belt and the mounting cradle. Slacken the two through bolts holding the cradle to the main frame. This allows movement of the engine to achieve correct belt tension.

Slacken off the lock nut on the adjuster screw located on the left side of the machine and screw in the adjuster to tension the belt. The belt is in correct adjustment when **very light** finger pressure on the top run can easily depress it by 0.5cm as illustrated (Fig. 30). Over tightening of the belt may result in premature wear of the clutch and/or pulley bearings. Retighten the adjuster lock nut and mounting bolts. Refit cover shield(s).

SECTION 3

DISMANTLING THE ENGINE UNIT.

A. REMOVAL OF ENGINE UNIT

This is necessary to permit repairs fo the crankcase assembly.

Remove two bolts from the front of the exhaust pipe where it joins the cylinder barrel and one bolt from the silencer mounting bracket. Take off the exhaust assembly complete..

Remove the engine cover shield(s). Rubber packing pieces are fitted between the shield and the frame on models Go-Go and HS50.

If the screws are undone only just sufficiently to release them from the frame lugs the rubbers will remain on the screw threads and will enable easy refitting of the shield when the time comes.

Take off both plastic engine side covers.

On the L/H (clutch) side disconnect the start cable from the spring steel lever and remove the lever by undoing two retaining bolts under the crankcase. The drive belt can now be removed – first ease off the rear pulley and then lift off the front pulley between the clutch housing and the crankcase.

Disconnect the wiring harness plug behind the cylinder casting. Release the air silencer clip and remove the air silencer and filter. Release the carburettor clamp screw and pull the carburettor backwards and down from the intake manifold.

Take off the generator flywheel using service tool 485002 as described in section 3B. The mounting bolts are now exposed and when they have been removed the engine can be lifted from its mounting plates.

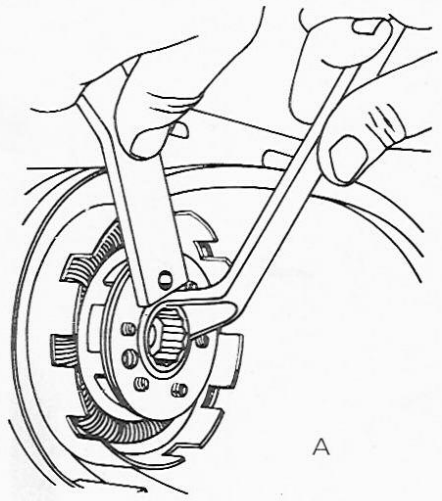
B. DISMANTLING ENGINE

With the engine removed from the frame dismantling on the bench can proceed.

Remove the clutch by undoing six retaining nuts to release the outer pressure plate. Whilst undoing the last two nuts keep light pressure on the centre boss to **counter the light spring pressure which will be felt.** After all nuts are removed release the end plate gently and the six undulated washers will be forced off the end of the studs and should be caught.

Take off and set aside the small locking plate, the outer pressure plate, the conicle spring, the friction plate and the inner pressure plate, storing them in that order for examination and re-assembly.

Now, by means of a small screwdriver prise the clutch operating spring out of its trough in the clutch centre. With a screwdriver and light hammer tap back the centre nut locking washer where it has been turned over against one face of the nut. Using service tool number 485005 hold the clutch centre Fig.7A and by means of a ring spanner undo the centre nut which has a normal right hand thread. Take off and discard the locking washer as a new one must be fitted on re-assembly. Reversing service tool No.485005 and locating on the clutch centre by means of two of the standard clutch retaining nuts Fig.7B, pull the clutch centre from the crankshaft by screwing in the pressure bolt on the service tool. Only light pressure is needed for this operation as the clutch centre is located on two parallel flats on the crankshaft and is unlikely to be very tight.



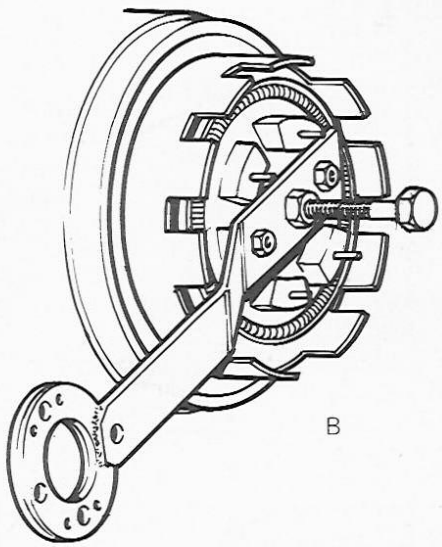


Fig.7. Dismantling the Clutch

Removal of the clutch centre exposes the clutch saucer spring washer and perhaps two other plain hardened steel washers, depending on the design of the particular unit concerned. Remove these, noting the order of the washers and the direction in which the saucer spring is fitted.

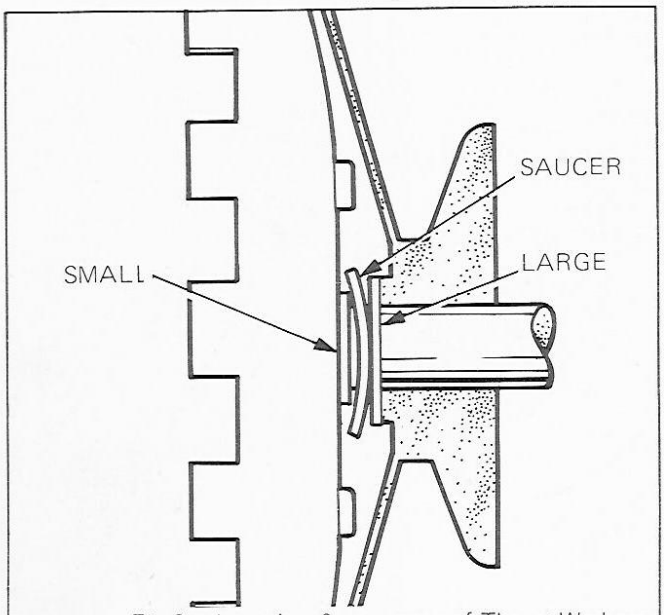


Fig.8. Location & sequence of Thrust Washers

Now the clutch housing can be pulled from the shaft on which it rotates on a special needle roller bearing. Note that there is a small oil seal at the outer end of this bearing which prevents loss of crankcase compression past the bearing rollers. Removal of the clutch housing reveals the drive side crankcase oil seal.

Turning to the magneto flywheel on the other side of the engine, hold the rotor with service tool number 485010 and by means of a thin wall tube spanner undo the centre nut which has a normal righthand thread. Remove the plain and serrated washers. Take service tool No.485002 and unscrew the centre bolt until its end is flush with the inner face of the tool; screw the tool into the centre of the magneto flywheel as far as it will go and then, applying pressure to the centre bolt, pull the flywheel from the crankshaft. This may call for considerable pressure as the flywheel is keyed to a taper on the end of the crankshaft and is likely to be very tight. The magneto stator plate, with its high tension and lighting coils, contact breaker and condenser, is now exposed.

Remove this plate by undoing three screws which pass through elongated slots on the plate periphery. Remove the plug cap from the plug lead and take off any plastic sleeving which may be on the low tension leads from the generator. Apply a light film of grease to all leads and carefully remove them from the rubber grommet in the crankcase casting. This can be a difficult operation as, in order to ensure a complete water seal, the leads are a very tight fit in the grommet. The H.T. lead can be particularly difficult, but because it is comparatively stiff it can be pushed from the outside towards the centre of the crankcase to ease removal. Under no circumstances must this lead be pulled by means of the H.T. coil otherwise the coil may well be irreparably damaged.

For contact breaker inspection see Section 6A

To test the HT coil remove by undoing two retaining screws and check the coil on a test bench. Do not exceed a spark gap of 8 mm as to do so may damage a good coil.

Before testing the condenser it is desirable to remove the HT coil connection. This calls for the quick application of a hot soldering iron. Removal and refitting of the condenser must be done from the rear of the stator plate using a 12 mm dolly to avoid damage. When re-connecting the HT coil wire also use a hot soldering iron as prolonged heat may damage a good condenser.

Examine the insulated post assembly and ensure that the washers are properly fitted to avoid earthing of the contact breaker spring.

Release the four cylinder head nuts and take off the spring washers. Lift the cylinder head from the barrel, noting that there is no gasket.

The cylinder barrel is now also free to be removed and should be lifted carefully away from the crankcase. As the piston nears the bottom of the bore the connecting rod and piston skirt should be supported to avoid the possibility of damage when completely free. By means of suitable thin-nosed pliers remove the gudgeon pin circlips. They are springy and unless the crankcase is to be completely dismantled care must be taken to cover the crankcase mouth before endeavouring to remove the circlips otherwise they may be dropped into the case. Never use a fluffy material for this purpose. The gudgeon pin is fully floating, i.e., it is not located in either the piston or the connecting rod small end bearing, and can be pushed out with a suitable tool. Care must, however, be taken not to damage either the bearing surfaces of the piston boss or the inner bearing surface of the small end bush. Take great care when placing the piston on one side that it is protected from the possibility of damage, as it is an expensive item to replace.

Remove the cylinder base gasket and discard. New gaskets should always be fitted on re-assembly.

Remove the carburettor reed valve by undoing two retaining screws and pulling out from the crankcase. Be careful not to damage the small leaf springs which are vital to the correct performance of the engine. If light can be seen past the valve seats a new reed valve complete is required.

With a suitable screwdriver, release from the magneto side the 6 cheese-headed screws which hold the crankcase halves together. These screws are all the same length and can be replaced in any order. There are no washers in this assembly.

Now hold one side of the crankcase and, using a hide mallet, carefully drive the two cases apart by lightly tapping the end of the crankshaft. It is important not to apply excessive force and to avoid the necessity for this it is preferable for the crankcase nearest to the end of the shaft to which pressure is being applied to be heated to about 80°C to release the outer ball race. In heating the case, cover the oil seal with a large diameter washer before applying the flame. The seal will, in any case, need to be renewed, but it is wise to avoid direct application of a flame to a rubber seal at any time.

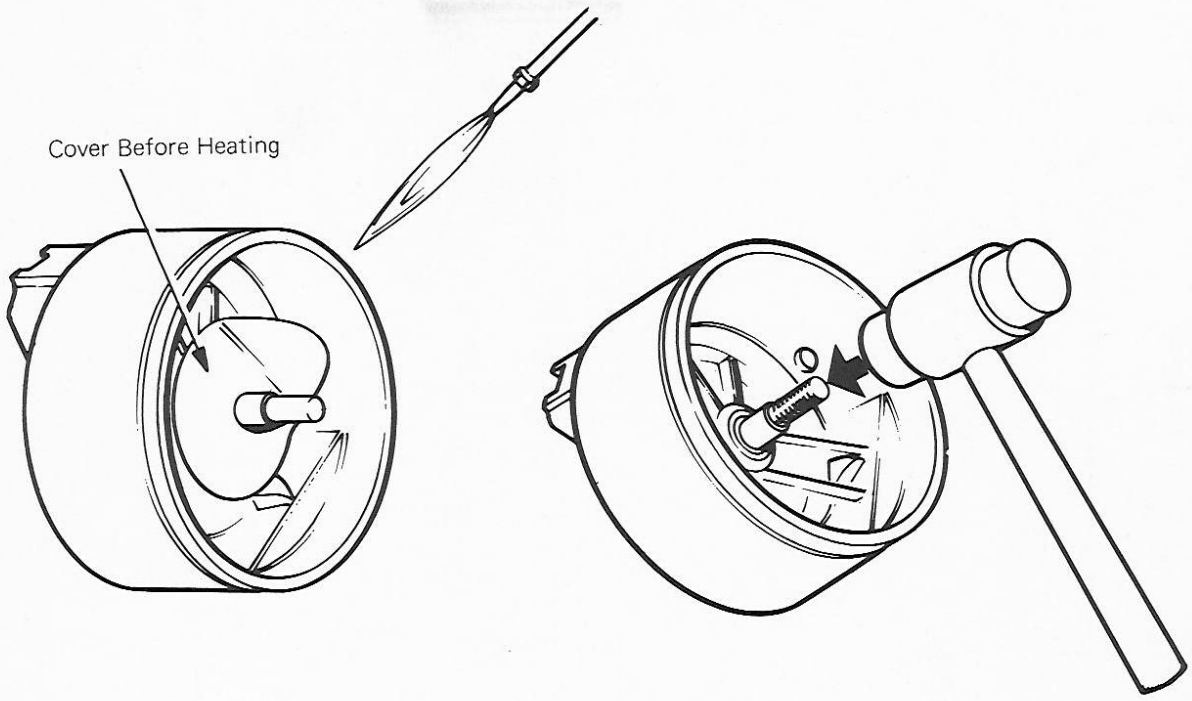


Fig.9. Separating the Crankcase Halves

In a similar manner remove the crankshaft from the other case. With the exception of the oil seals and the bearings which remain on the crankshaft, dismantling is now complete.

The seal on the drive side of the engine is located by a circlip between the seal and the bearing. The seal can be removed and replaced without completely dismantling the crankcase. Service tool No.485011 avoids damage on fitting the new seal.

The seal on the magneto side can also be removed without completely dismantling the crankcase assembly, but very great care is needed in prising out and replacing if this is done. Levers must not be pivotted on the magneto housing as it may easily crack and on fitting a new seal there is the possibility of damage to the lip because it is impossible to use the special adaptor 485007 which is designed to avoid this. The adaptor should always be used on refitting the crankshaft after complete dismantling of the assembly.

The two main bearings are identical and can be examined in position on the crankshaft. They must be tight on the shaft and completely free to rotate with no sign of play or damage to the tracks which will be indicated by a roughness in rotation.

If there is any indication that the bearings are not in perfect condition they should be removed from the shaft with service tool No.485009 and replaced. Service tool 485009 is a special split clamp which, when the loose collar is pulled back from the jaws, can be opened to pass over the bearing to permit the thin extractor lip to be fitted under the bearing, after which the two halves of the clamp are pressed together and held firmly in position by means of the loose collar, whilst pressure is applied via the centre extractor screw to the end of the crankshaft, thus pulling the bearing from the shaft.

On refitting bearings always support the crankshaft assembly as in Fig.10A. Heat the bearing to approx 80°C by immersing in hot oil and drive on to the shaft with tool No.485001.

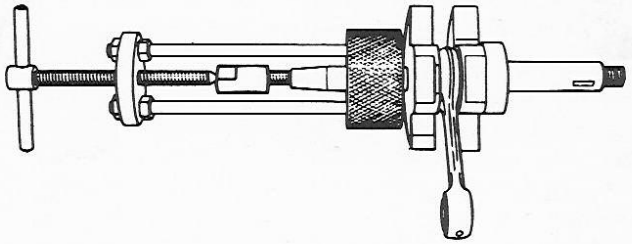


Fig.10. Removing Main Bearings from Crankshaft

The big end bearing is a roller type and there should be no up and down movement at any point in its rotation. Like the main bearing it should be free to rotate without roughness and there should be very little side play.

Replacement Big End/Connecting Rod Assemblies are available but special equipment is necessary for fitting. If a suitable press is available then the crankshaft assembly can be dismantled and rebuilt by a skilled mechanic using the usual technique of supporting the upper half of the assembly on strong steel bars whilst the crank pin is pressed out and then reversing the assembly to remove from the other half. Flywheels must be very carefully marked to ensure extreme accuracy on re-assembly.

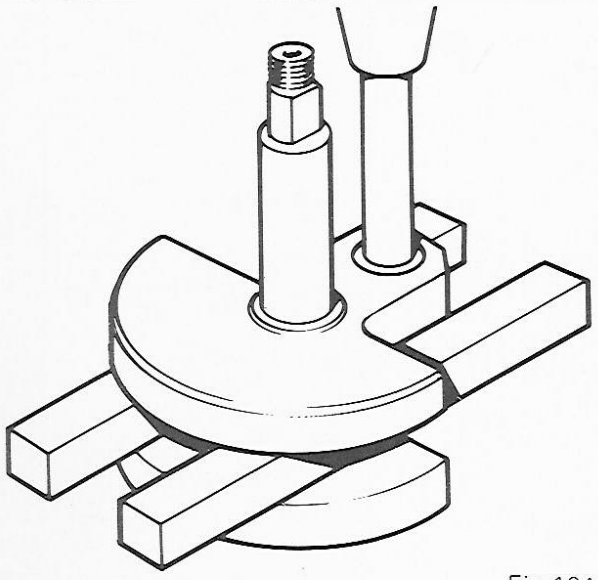


Fig. 10A

RE-ASSEMBLY is the reverse of dismantling (including the heating of cases when refitting the crankshaft) but care should be taken at all stages to ensure correct location of bearings, careful fitting of new gaskets noting that the gasket between the two crankcase halves is a two-piece part, and when the crankcase assembly has been completed a check should be made to ensure free rotation of the shaft and correct alignment of the connecting rod. Alignment is checked by fitting the piston to the connecting rod but leaving off the piston rings. Replace the cylinder over the bare piston and locate firmly using spacers in place of the cylinder head. Take a pointed instrument and check by moving the piston that its natural position is in the centre of the bore with no tendency to apply constant pressure on one side or the other.

If there is evidence of the rod being out of true it can be straightened by holding the rod carefully by means of a home-made tool, and applying pressure in the required direction with a length of steel rod 8 mm in diam., and 20 cm long through the small end bush. Great care must be taken throughout this operation.

Check the piston ring gaps by placing each in turn in the bottom of the cylinder barrel and ensure accurate alignment in the bore by means of the bare piston. Check the gap as in Fig.12. This should be between 0.2 mm and 0.5 mm. Any excess gap can only be corrected by the replacement of the piston rings and this is vital if good performance is to be achieved.

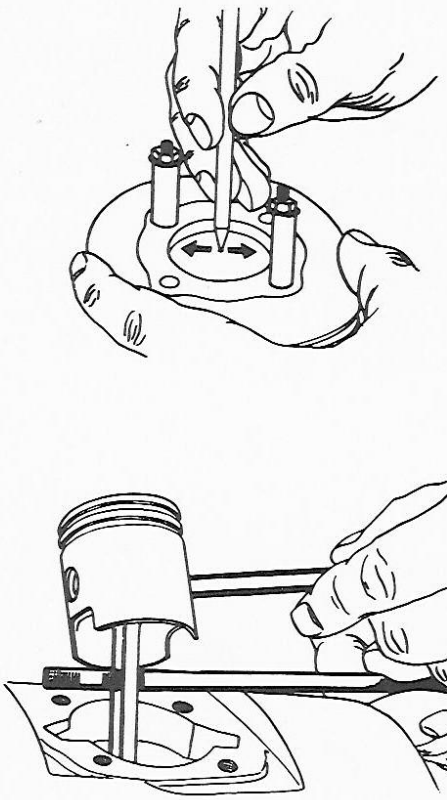


Fig. 11. Checking & Correcting Con-Rod Alignment.

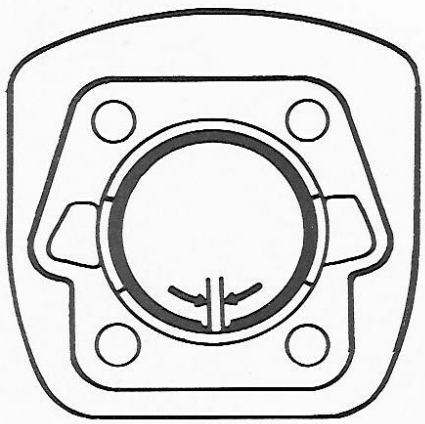


Fig.12. Piston Ring Gap — Measurement

When refitting the piston to the connecting rod, note that the arrow on the piston crown points forward and that the piston rings are located in their grooves by small pegs (Fig. 29) towards the rear of the piston. It is vital that the piston ring gaps coincide with these pegs as otherwise the rings will be broken on reassembly with a possibility of other additional damage. Rings must always be 'free' in their grooves – if they are not gas leaks and loss of power will result.

Before refitting the cylinder head carefully examine the face of the cylinder and of the head itself. If there are any traces of burning on either face both should be carefully rubbed down on a surface plate using fine carburundum paste. In manufacture a high degree of accuracy is achieved on these faces but service conditions can result in distortion and performance will be affected if this condition is not corrected.

Before refitting the reed valve make sure that it is clean and that all spring steel valves appear to be in good order.

On refitting the stator plate apply **one drop** of oil to the contact breaker pivot spindle and felt pad. **DO NOT EXCEED.**

Refit the magneto in reverse order to dismantling. When the flywheel has been relocated check that there is a 0.2 mm air gap between the inner rim of the flywheel and the core shoes. Any adjustment is made by very slightly slackening the coil locating screws and moving the coil by tapping lightly using a soft dolly against the coil core. **Never place the dolly against the core shoes or the coil windings.**

After refitting the flywheel it will be necessary to re-time the engine and re-check contact breaker settings and flux timings. See Section 6A.

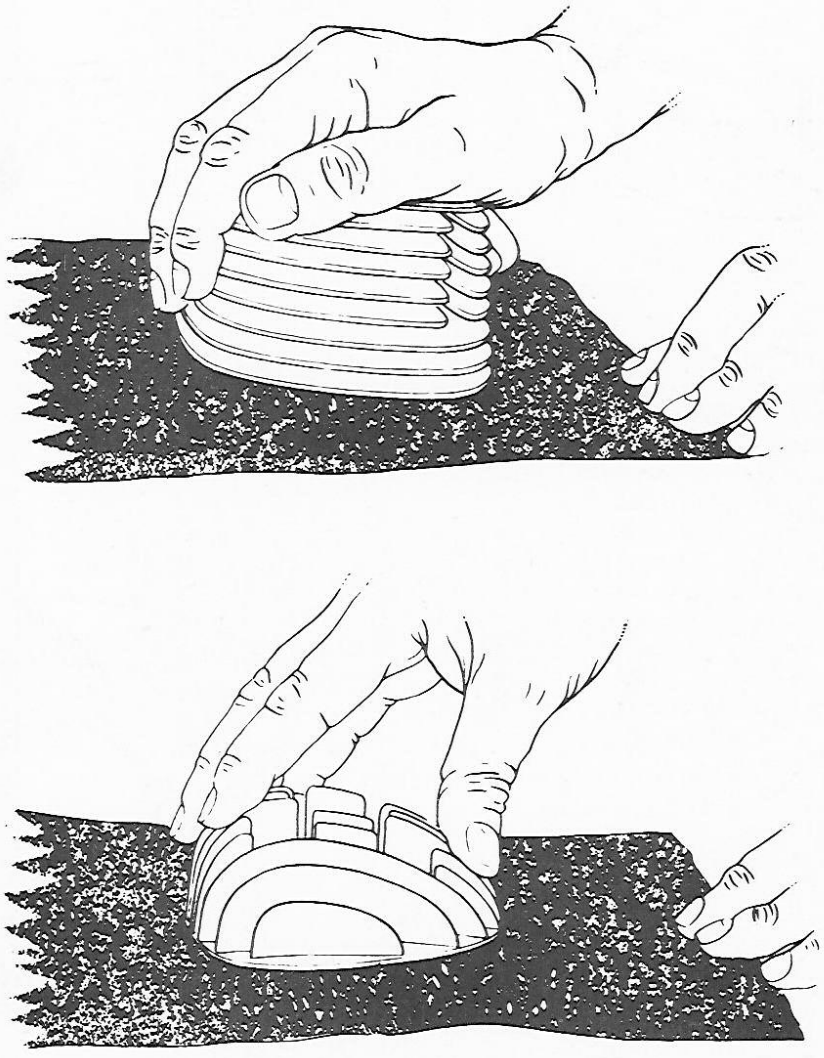


Fig.13. Refacing Cylinder Head and Barrel

C. REMOVAL, DISMANTLING and RE-ASSEMBLY of CARBURETTOR

From the R/H side of machine release the wire clip retaining the air silencer (air cleaner body) and remove the silencer down and to the rear. Attached to the silencer body is a plastic intake tube which need not be removed unless damaged or blocked.

In the "open end" of the air silencer is a wire gauze air cleaner which can be pulled from the housing. Clean in petrol and immerse in SAE40 oil before re-assembly (allow to drain).

Slacken the carburettor pinch bolt and pull the carburettor backwards from the intake tube.

Still from the righthand side of the machine release the carburettor top by unscrewing with thumb and finger. Disconnect the choke cable from the choke valve (Fig.14) by releasing the retaining spring wire and pulling the cable nipple from the valve slot.

Disconnect fuel pipe and remove carburettor from throttle cable and valve leaving the valve in position on end of cable.

Clean the exterior of the carburettor before proceeding further.

Unscrew the main jet holder and examine jet. **Never** clean a jet by means of a needle or wire. **Always** blow clear with a high pressure air line. Remove the float chamber top by undoing two retaining screws and take out the float. Check, by shaking, for leaks and examine the needle point and needle seating for damage. (A magnifying glass is essential). Check, by rotating, that the float needle is true.

Remove the fuel pipe banjo and examine filter. Thoroughly clean all parts as necessary.

Re-assembly is a simple reverse procedure but take care to fit the float with pointed needle uppermost. After fitting the float chamber top check that the float is free in its seatings by shaking. A rattle should be heard.

When all carburettor parts have been refitted to the body the whole unit can be reconnected to the throttle valve and cable. Clean the valve and ensure that the slot in the valve locates over the guide inside the body. Screw on the carburettor top tightly with thumb and finger. Re-connect choke cable and position retaining spring.

Re-fit the assembly to the intake tube and ensure that the instrument is vertical.

Replace the air intake assembly noting the location of the various parts as in Fig.14.

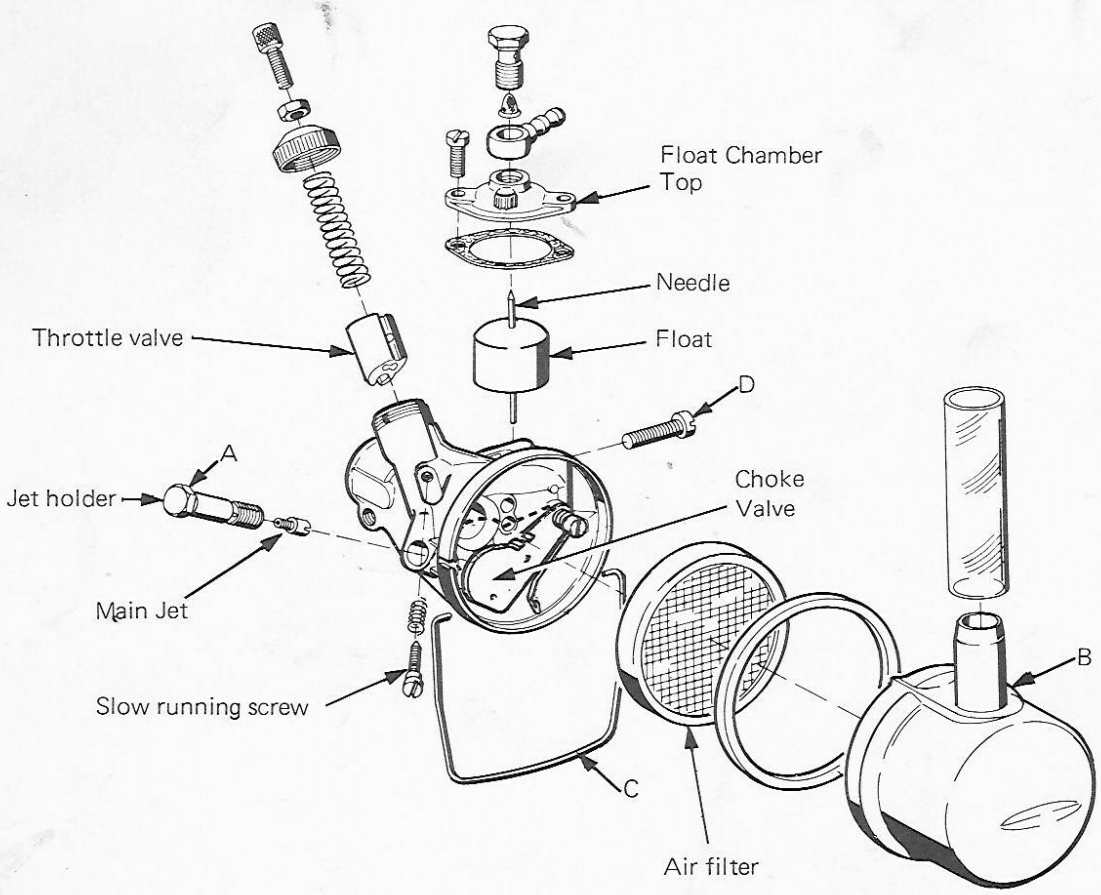


Fig. 14. The Encarwi Carburettor

SECTION 4

DISMANTLING THE FRONT FORKS.

There are two types of forks fitted to single speed Batavus mopeds – Type A, which is common to all models except the Compact, and Type B, the shorter Compact fork. Both are of telescopic design, grease lubricated with no hydraulic damping.

Type A It is not necessary to remove the fork assembly from the frame in order to dismantle individual fork legs. Dismantling is made especially easy because the bottom yoke and each of the two outer fork tubes together with the headlamp mountings form one welded 'H' piece which cannot be broken into its component parts. This means that the assembly remains relatively rigid while each of the legs is dismantled.

To dismantle the fork legs it is necessary to remove the front wheel by undoing the two retaining nuts and releasing the speedometer and brake cables, after which the wheel can be dropped from the forks. Take off the front mudguard and remove the 'U' section stabiliser by slackening both clampingbolts, holding the stabiliser in the stabiliser clamps. It is not necessary to remove these bolts completely, simply to slacken them to permit the 'U' piece to be pulled upwards from its location. Undo both acorn nuts from the top of the fork legs and remove the two plain washers. Take off the fork crown nut and lift off the top fork yoke. This now exposes a second nut at the top of each fork leg and these too must be removed using a suitable box spanner. If only one leg is to be dismantled, then only the nut at the top of that leg need be removed. Underneath is an undulated washer which must also be taken off. The fork leg can now be pulled downwards through its rubber gaiter and free from the fork top section. Since it cannot be replaced without first removing the rubber gaiter this should now be taken off the bottom of the 'H' section.

Examination of the fork leg will show that it operates in the outer fork tube on split nylon bushes. Two types are in use, the first being split completely into two half sections, whilst the later type is split on one side only and can be removed in one piece. The locating method is, however, common to both types. There are two holes in each side of the fork tube and the small spigots on the inside of the bush locate into these holes. **Some bushes** have only one locating peg on each half and in these cases the bushes must be fitted so as to completely cover all four holes. A machine will cover very high mileages without wear on these bushes, but if there is any trace of scoring or other damage they should be replaced on re-assembly.

The coil spring against which the fork is compressed in use is located in the fork tube simply by screwing onto depressions formed in the wall of the tube. It is removed by unscrewing as with a normal righthand thread.

If, for some reason, the stabiliser bracket is removed from a fork leg, remember that it is always the first item to be replaced. It cannot be refitted once the bushes are in situ or with the fork leg assembled to the 'H' crown. If the fork leg has been bent it should always be replaced as it cannot satisfactorily be re-trued, and in the case of damage to the lower fork leg a very careful examination must be made of the 'H' section since it is very likely that this too has been damaged.

Dismantling of the other leg is an identical procedure.

If the complete fork is to be removed from the frame it is necessary to proceed by undoing the bearing lock nut (and top cup) from the fork crown whilst holding the 'H' section in position to avoid collapse of the bearing assembly. When the cup has been unscrewed from the head tube, the assembly can be lowered gently from the

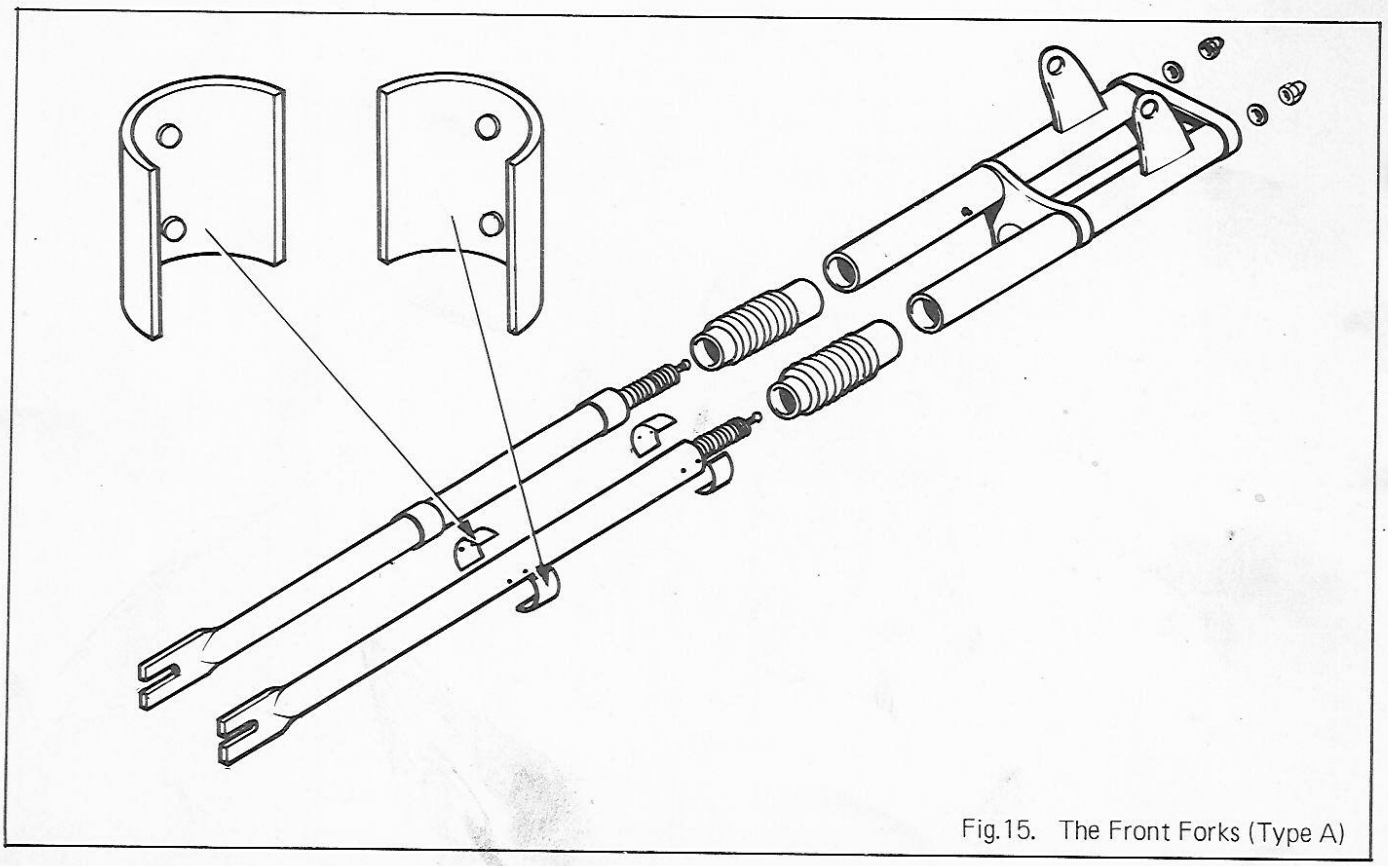


Fig.15. The Front Forks (Type A)

frame, taking care to catch any ball bearings which may be released in the process. After removal, all bearings, cups and cones must be scrutinised for signs of wear or damage and if there is any evidence of this they must be replaced on re-assembly. The lower cone is located by means of a serrated shim which must be replaced if a new cone is fitted.

Re-assembly of the fork is in reverse order except that after the stabiliser brackets have been fitted to their fork legs, the rubber bellows should be placed over the tubes before the bearings are re-located.

If this is not done, difficulty will probably be experienced in forcing the bearing through the rubber bellows.

The only adjustments necessary are those of the steering-head bearings which should permit the forks to turn freely in the frame head stock with the very minimum of backward and forward movement. Otherwise the only adjustment is the relative positioning of the stabiliser clamps.

On re-fitting the fork tubes remember the undulated washer followed by the thin nut which hold the spring in the top 'H' section before the top yoke is re-fitted.

When re-assembly is complete a few shots of grease through the nipples provided is desirable to ensure adequate lubrication.

Type B Remove the front wheel and mudguard as for Type A.

To remove the fork assembly from the frame, undo the fork head nut and slacken the two bolts, one at the top of each fork leg. These bolts operate expanders within the fork tubes and should not be completely removed otherwise the expanders will drop to the bottom of the fork tubes. Lift off the top yoke.

The headlamp brackets can now be lifted from the fork tubes, after which the bearing adjuster nut and cone can be removed from the head tube whilst the weight of the fork is taken to avoid loss of bearings as the forks drop from the steering head. Once the nut and top cone have been removed the assembly can be lowered from the frame, taking care to catch the bearings as this is done. Bearings, cups and cones should be examined for signs of wear or damage and replaced if any evidence of this is found. Note that the bottom cone is located on the tube by a steel shim which must always be replaced on re-assembly.

With the forks out of the machine remove the 'U' shaped stabiliser by undoing the two bolts on each leg. Hold the lower fork slider and unscrew in an anti-clockwise direction. This will release the spring from the bottom fork leg which can then be pulled from the assembly, usually together with its rubber dust seal. Two nylon bearings similar to those used in Type A are now exposed and can be removed for replacement as necessary. If, for some reason, the spring is to be taken from the fork leg, this is done by driving out the small peg from the holes underneath the top bush when the spring will be released. The legs themselves can be removed from the bottom yoke by undoing the nut beneath the yoke (Fig.17). Dismantling is now complete and re-assembly is in reverse order except that again it is desirable for the rubber dust seal to be placed on the leg before the bearings, otherwise difficulty may ensue.

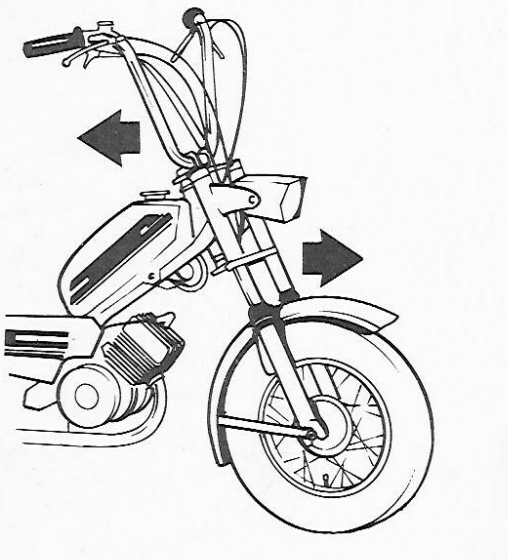


Fig. 16. Checking steering head adjustment

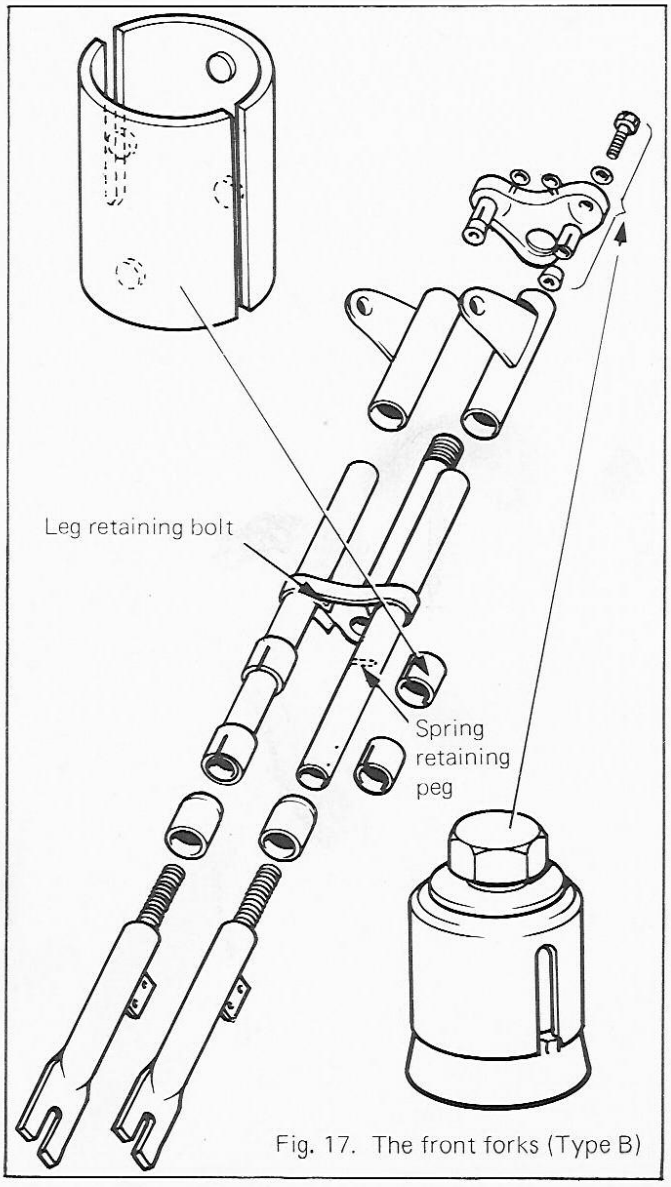


Fig. 17. The front forks (Type B)

SECTION 5

WHEELS AND BRAKES

The wheels and brakes on all Batavus mopeds are of simple but effective design. Removal from the frame is a matter only of slackening the retaining nuts on each side of the spindle, releasing brake and speedometer cables and, in the case of rear wheels, pedal and drive chains, after which the wheels can be pulled from the forks or swinging arm. Once on the bench, dismantling of the brakes and hubs is again a simple matter.

Take off both the retaining nuts and pull the brake plate from the spindle. This now reveals an inner nut which, together with the inner nut on the other end of the spindle, locks the bearing cones. Holding the cone with a suitable cone spanner, undo the locknut on the side opposite the brake drum. When the nut has been removed the cone can be simply unscrewed from the spindle and will reveal the bearings on that side of the assembly. The spindle, complete with the other cone, can now be pulled through the hub towards the brake drum side. During this operation the ball bearings will be freed and should be caught to avoid the inconvenience of picking them off the garage floor. It is always wise to replace bearings whenever a hub is dismantled.

At this stage it is possible to examine the bearing surface of the cups and cones which should be replaced if there is any evidence of wear or damage. Should it be necessary to replace the cups they are simply driven from the assembly with a suitable drift. On re-assembly care must be taken not to over-tighten the bearings, which should be adequately greased and free to rotate with no sign of roughness and the very minimum of spindle rock.

Wheel building is not within the compass of this book since it is a specialised craft.

Wear on brake linings will be evident by uneven thickness, and they should be replaced if this is apparent. It is important that the drum is free from serious scoring and again this should be replaced following specialist examination if in his opinion it is unsuitable for further use.

SECTION 6

FAULT LOCATION AND CORRECTION.

The most difficult part of fault diagnosis may well be the problem of conveying from rider to mechanic an accurate picture of what has happened. Standard practice in writing trouble shooting manuals is to use curt phrases such as "fuel starvation" followed by a list of possible causes. This is all very well if one assumes that all riders are aware that what has caused their moped to stop is "fuel starvation" but this is a dangerous assumption. We prefer to adopt a more practical approach and use instead the sort of descriptions which we have heard owners employ in an effort to convey to dealers the nature of their difficulty.

A) "It became more and more difficult to start and finally would only start if I replaced or cleaned the plug. Now it won't go at all".

For each engine type there is a minimum requirement of electrical energy at the plug if easy starting is to be assured. As engines become carboned up and spark plug electrodes erode this requirement may well increase. At the same time wear and contamination will be taking place on the ignition contacts and the amount of energy being produced by the generator will be decreasing. As the two figures – plug requirement/energy available – grow closer together the machine will become progressively more difficult to start and although a new plug may provide a temporary cure there will come a time when starting will prove impossible.

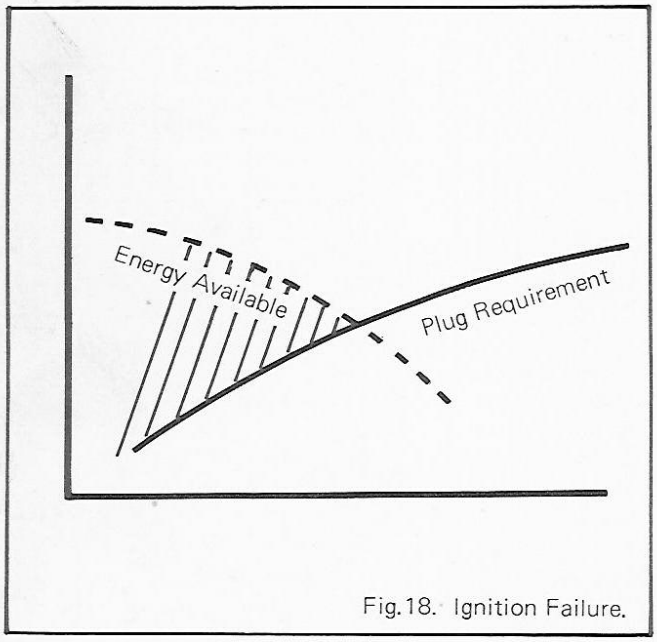


Fig.18. Ignition Failure.

Obviously it is better to act before the final failure occurs. In any case there is a golden rule in attending to electrical problems – short cuts do not pay. Therefore proceed logically and thoroughly as follows:-

Remove the spark plug cover and plug.
Remove the right side engine cover.
With a suitable box spanner undo the centre nut which retains the magneto flywheel and take off the serrated and plain washers. Then with service tool No.485002 pull the flywheel off its taper (Fig. 19)
(Note – the tool should be screwed into the flywheel as far as possible before pressure is applied to the centre bolt to release the taper).

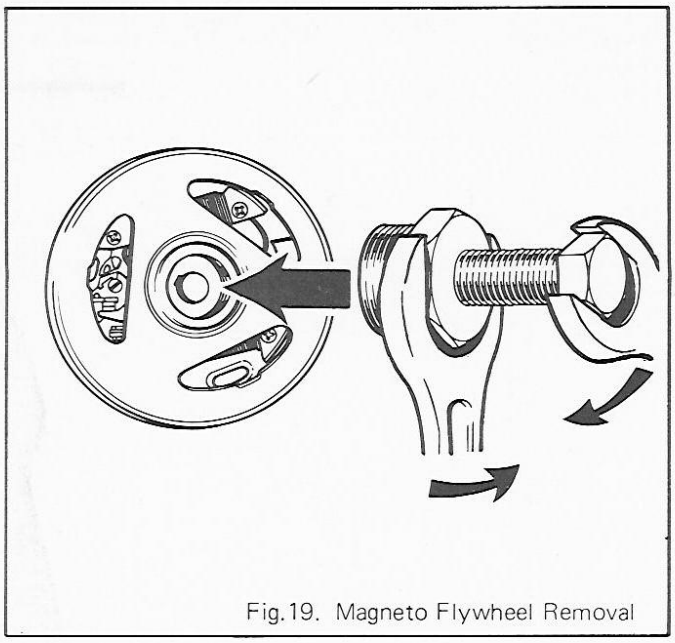


Fig.19. Magneto Flywheel Removal

Now you have free access to the contacts and coils and can examine their condition without the problem of directing lights through holes in the flywheel.

Closely examine the c/b points for pitting, malalignment and general cleanliness. Whilst it is possible to clean scale from contact surfaces with emery cloth on a thin steel blade, it is unwise to attempt to eliminate deep pitting or serious malalignment. If there is any doubt about the condition of contacts it is much cheaper in the long run to replace them than to attempt a temporary cure.

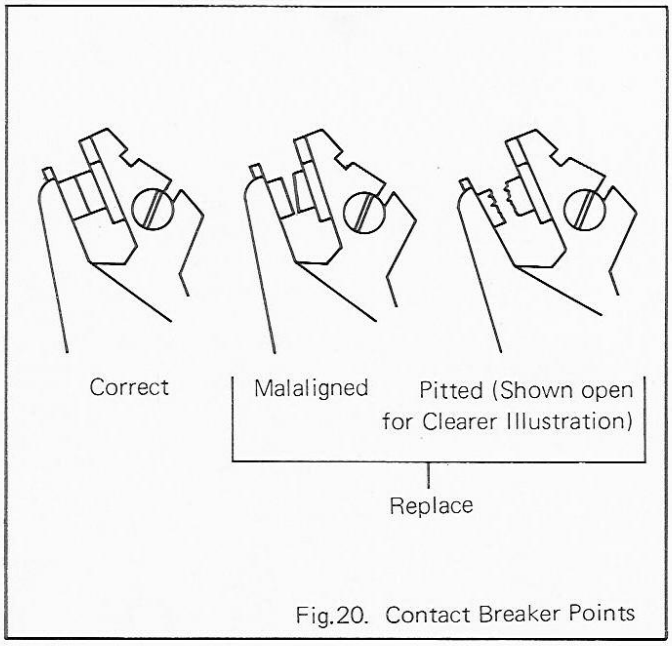
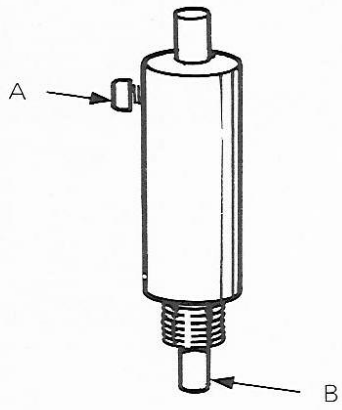


Fig.20. Contact Breaker Points

Examine and clean all coils. Damage is unlikely so long as the flywheel has at all times been properly secured during previous running.

Ensure that the key is still in its slot in the crankshaft and turn the crankshaft so that the key points towards the condenser. Carefully refit the flywheel noting that the key remains in proper location. Replace washer and nut. Lightly hammer the spanner tommy bar to ensure secure fitting.

Although it is now possible to proceed with the retiming of the engine without the use of special tools it is advisable to employ a timing tool, part no. 485004. This is available from any Batavus dealer and will ensure time saving and accuracy.



Timing Tool 485004 Fig.21. Timing Tool

Slacken the rod retaining screw A of the timing tool and push the centre rod B into the housing until its lower end is flush with the end of the threads. Re-tighten the retaining screw. Now screw the tool into the engine plug hole as far as possible using finger pressure. Slacken the retaining screw and allow the rod to fall to the top of the piston. Turn the engine slowly clockwise until the rod reaches its highest point (TDC). To ensure absolute accuracy rock the flywheel backwards and forwards whilst watching the markings on the centre rod. Mark the rod with a fine pencil (or note the precise marking slot) at the top of the tool housing. Turn the engine again clockwise until the top of the rod is flush with the top of the housing. At this point the C/B points are accessible for gap adjustment.

An alternative, even more accurate, way of piston location for timing purposes is by means of a dial gauge. The method of use is similar to that with service tool No.485004, except that the measurements can be more easily and accurately read from the instrument's dial. Always ensure that the gauge is firmly bolted to the engine before use.

Slacken the C/B locating screw A and adjust the points gap to o.45mm as indicated in fig.22. Retighten the screw and recheck the C/B gap to ensure that it has not moved whilst retightening.

Insert Screwdriver Blade and turn to open (anti-clock) or close (clock) the C/B points.

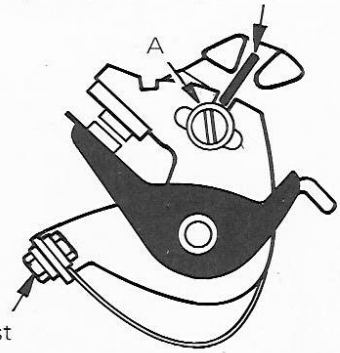


Fig.22. Contact Breaker Adjustment

Return the engine to TDC by revolving the flywheel anti-clockwise. Continue turning anticlockwise until the rod descends 2 mm (2 slots in the centre rod). Retighten the rod retaining screw. This is the optimum timing position. With the piston held lightly against the timing rod by slight pressure clockwise on the flywheel, make two clear pencil marks - one on the crankcase and another exactly in line with it on the rim of the flywheel. Remove the timing tool. Turn the engine anticlockwise about 20° and then clockwise again whilst carefully watching the C/B points. By rocking backwards and forwards establish the exact point at which the contacts begin to open.

This exact point can be difficult to fix precisely simply by watching the C/B points. There are a number of ways of ensuring accuracy but the simplest (and therefore the most likely to be used) is to insert a piece of cigarette paper between the points and pull very gently on this as the flywheel is turned clockwise towards the opening position. When this is reached the paper will slip out easily. The thickness of cigarette paper can be ignored for practical purposes.

For increased accuracy it is desirable to connect an electrical circuit through the points using a 6v battery and bulb. Connect one battery lead to the insulated post (Fig.22) then take a lead from "A" to one of the bulb connections. If the second battery lead is then attached to the other bulb connection the bulb will light so long as the points are closed. Rotation of the engine as described above will extinguish the light at the precise point at which the contacts begin to open.

Hold the flywheel at this point and check the relative position of the two pencil lines on flywheel and crankcase. If they are in line, the engine is correctly times. If not, proceed as follows :-

Advanced	Retarded
Engine advanced. Retard by slackening the 3 screws securing the stator plate to the crankcase and turn the plate clockwise.	Engine retarded. Advance by slackening the 3 screws securing the stator plate to the crankcase and turn the plate anticlockwise.

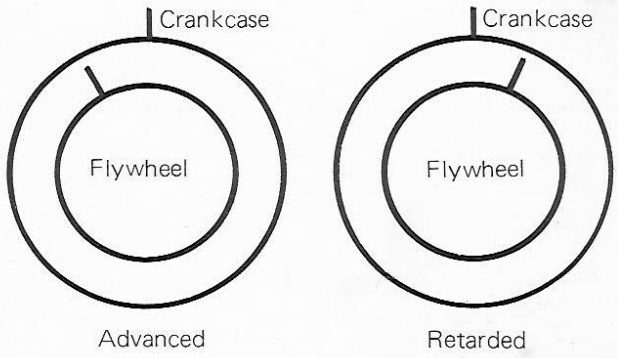


Fig. 23. Timing adjustment

When you have established the correct stator plate setting so that the C/B points open when the marks on the flywheel and crankcase are in correct alignment you have set the timing of the spark in relation to the piston at the midpoint in the permitted tolerance which is from 1.8mm – 2.2mm BTDC. This allows secondary adjustments to be made without the danger of taking the timing outside this tolerance.

With the flywheel marks exactly aligned (and therefore the C/B points just opening) measure the distance between the heel of the moving magnet A and the nose of the HT coil B. This can be done either by marking the flywheel at the appropriate places or by using a simple cardboard gauge The distance **must** be between 7 – 11 mm (Fig. 24). If it is greater it **must** be reduced by opening the C/B points a little. If it is less it **must** be increased by closing the C/B points.

Proceed in .002 stages in either case. A correct setting will not require more than two C/B adjustments and when it has been achieved the magnetic flux timing will be correct and a good ignition spark should result.
Only if these adjustments fail should you consider replacement of the HT coil or condenser.

B. "Engine starts OK and runs for about ½ mile and then stops. If I leave it a while it will restart but do the same thing again."

The most likely cause of this condition is fuel starvation resulting from a blocked air vent in the filler cap. Petrol is fed from the tank to the carburettor by gravity and it follows that as petrol flows from the tank it must be replaced by air. Unless this happens a partial vacuum will be created within the tank and this will soon be sufficient to counteract the "gravitational pull" on the petroil in the pipe. The fuel will cease to flow and when the level of fuel in the carburettor falls sufficiently the engine will stop.

To prevent this happening the fuel filler cap is "vented" – that is to say the air can get into the tank through the cap and so avoid the build-up of a vacuum. Sometimes these vents become blocked in service – very occasionally they may even be blocked in manufacture. Test for this condition by running the machine without the fuel filler cap. If the trouble disappears you have isolated the cause and the real cure is to replace the fuel cap as it is very difficult to clear blocked vents due to the design which allows breathing without petrol seepage. As an immediate temporary cure however, a 1/16" hole can be drilled through the cap.
Always remove the cap before attempting to drill.

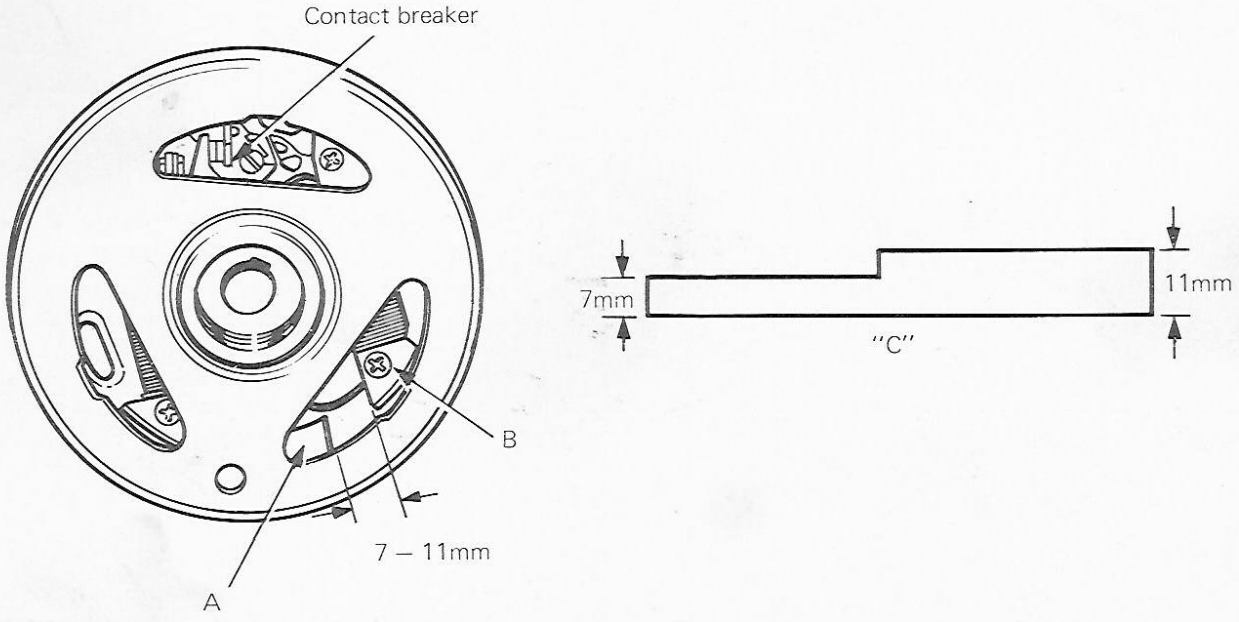


Fig. 24. Magneto Rupture Gap.

It is possible for similar symptoms to be the result of ignition coil failure due to a breakdown of internal insulation as the coil heats up. In this case of course no improvement will be achieved by running without the filler cap and when the engine stops an immediate check should be made to see whether or not a spark is occurring at the plug.
To do this simply remove the plug cap and plug (take care, they will be hot) and having refitted the plug in the cap rotate the engine with the pedals whilst holding the plug in contact with the cylinder head. If no spark can be seen at the plug electrodes complete the check as in Fig. 25 taking care to hold only insulated parts – i.e. the plug cap and the screwdriver plastic handle.

A good ignition coil with the right flux timing and properly clean and adjusted contacts should make a spark at kick over speed strong enough to jump a 3 - 4 mm gap. If no spark occurs on this test allow the machine to cool and retest. If a spark now occurs your trouble is likely to be faulty insulation inside the HT coil and it should be replaced.

For instructions on checking the other vital electrical settings see Para. A.

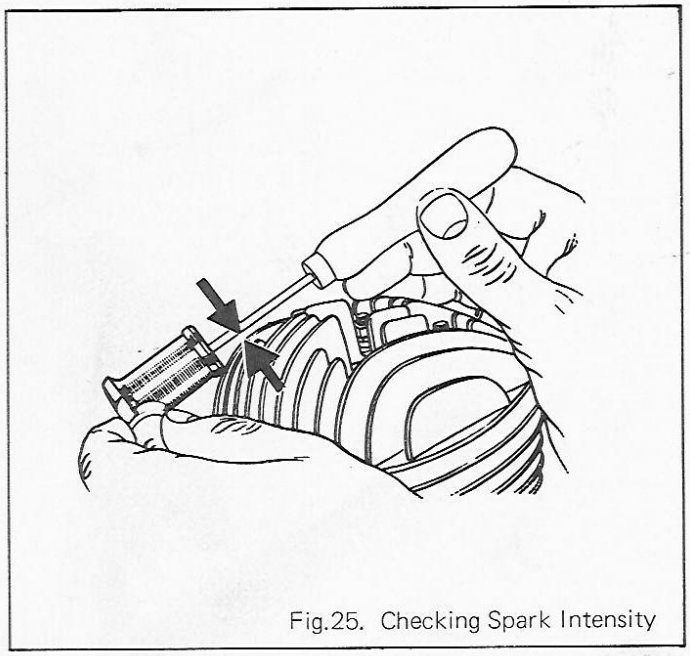


Fig.25. Checking Spark Intensity

C. "At 30 mph the bike hesitates and only picks up again if I close the throttle."

Probably this is the phenomena known as four stroking. The engine will not sound as usual and may be described as "popping and banging". The cause is an over rich mixture, i.e. the ratio of petrol to air is higher than it should be. There are three possible reasons for this happening :-

Carburettor tilted on its stub.
Main jet too large or loose in jet holder.
Choke cable not allowing the valve to return fully to the off position.

Carburettor tilted –

The carburettor is mounted under the engine on a cylindrical sleeve. It is not too easy to ensure vertical mounting and care should be taken whenever the instrument clamp is slackened.
Excessive 4 stroking may indicate that the carburettor is so positioned that the jet is lower than it should be in relation to the petoil level in the float chamber.

To correct this condition slacken the pinch bolt and carefully rotate the carburettor clockwise when looking from behind. Do not overdo this correction as a weak mixture will result.

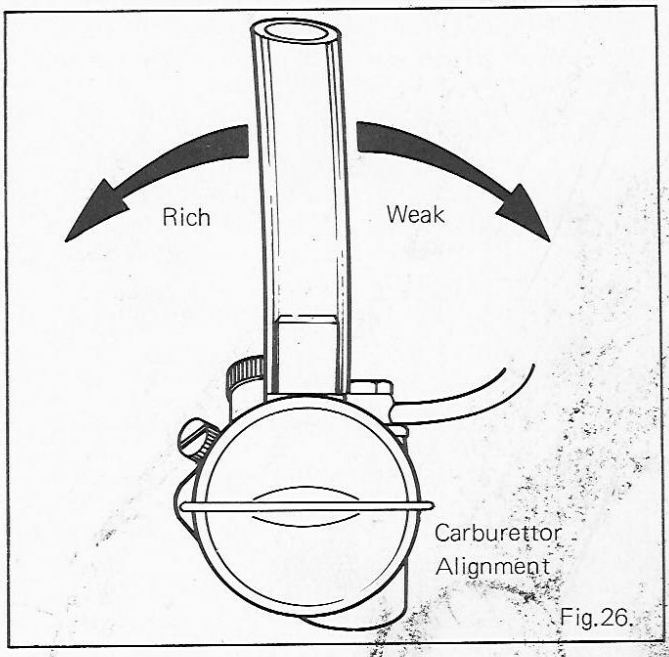


Fig.26.

Main Jet too Large –

The standard main jet is No. 58. A number 56 can be supplied and this will eliminate 4 stroking from this cause. However, a small degree of 4 stroking is permissible and since power will be slightly reduced by fitting a No. 56 jet owners may prefer to "drive through" the speed at which the problem occurs.
To replace the main jet :-
Lean the machine to the right. Just in front of the belt pulley locate the brass jet holder on the carburettor. (A. Fig 14).
Remove this noting that the brass is soft and easily damaged. When removed the jet holder will be seen to hold a smaller separate brass screwed jet. Carefully unscrew and replace with new jet. **NEVER** attempt to clean a jet by probing with a needle or other similar device. **ALWAYS** clean by blowing through the jet.

Choke Cable not allowing valve to return to 'off' position –

Because there is no cable adjustment provided this condition could only result from an error in manufacture and is very unlikely to occur. To check for this fault it is first necessary to remove the air silencer B. Fig. 14, and intake tube by releasing the wire clip C and withdrawing backwards and downwards. Next slacken pinch bolt D and pull the whole carburettor so that you can look into the bell mouth. The choke valve E should look as it does in Fig. 14. The dotted line indicates an incorrect location which can be rectified by shortening the outer cable.

D. "The bike lost its power – It's O.K. if I start downhill but starting on the flat it is very slow off the mark."

or

"It's got no acceleration. Once it gets going it's O.K."

Probably this has nothing to do with engine power. The more likely cause is that for some reason the automatic clutch has either stuck in drive or is taking up the drive earlier than intended.

The simplicity of design of the clutch mechanism makes correction of either problem a simple and speedy matter provided once again that investigation proceeds in a logical manner.

Dealing first with the possibility that the clutch is stuck in drive. Check by turning the pedals with the machine on its stand. If the clutch is locked the engine will turn and start without the start lever being used. This means that the clutch housing on which the belt runs is in permanent connection with the crankshaft and this will be due to :-

Incorrect adjustment of the start cable.
The friction plate blistering through heat and becoming thick enough to take up all the clearance which originally existed between the pressure plates.
The rear pressure plate tight on the centre bosses and failing to release.
Failure of the centrifugal spring to return to its proper seat when the engine slows down.
Wear on the saucer washer causing the rear of clutch centre to foul the front of the clutch housing.
Seizure of the clutch housing needle bearing.

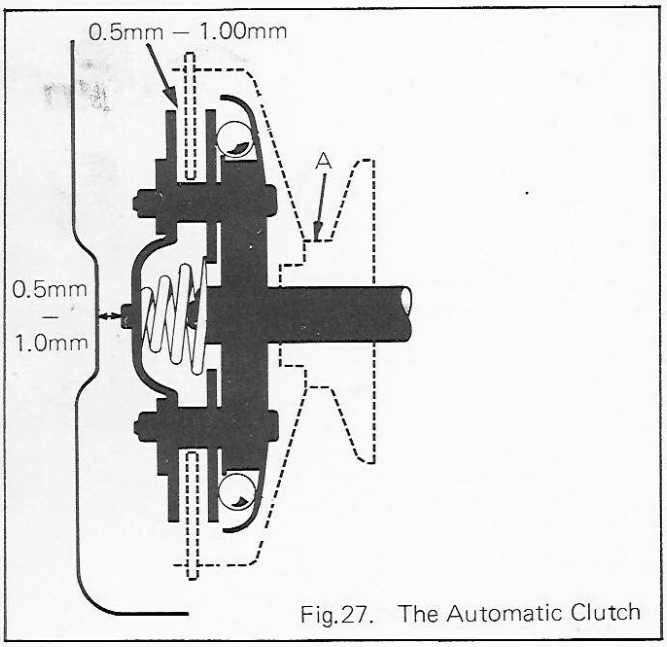


Fig.27. The Automatic Clutch

Proceed as follows :

Remove the left hand engine cover.
Measure the clearance between the clutch start lever and the clutch end or outer pressure plate. This gap should be 0.5mm–1.00mm but would need to be nil to be the cause of the acceleration problem.

If there is a gap between the lever and end plate next measure the gap, if any, between the clutch plates. This is done simply by inserting a feeler gauge between the friction plate and the end plate. The gap should be between 0.5mm and 1.00mm.

Whatever the result of the measurement it will be necessary to dismantle the assembly. The reason for taking the measurement is to give a lead to the actual cause. A nil clearance indicates a blistered plate, a tight rear pressure plate or a spring which has not properly returned to its seat.
A satisfactory clearance indicates :- wear on the saucer washer or a seized clutch housing bearing.
Remove the start lever arm by taking out the two 5mm bolts from under the left side of the carburettor shield and detach from the start cable. Hold the clutch assembly with a screwdriver between two of the six lock nuts and release, but not remove, the other four; turn the clutch and release the two remaining nuts. Press firmly with your thumb on the centre boss and take off all six nuts. Gently release the thumb pressure at the same time holding your other hand underneath the assembly to catch six thin washers which will be pushed off as the spring tension is released. The circular locking plate will also drop off and can be placed on one side as it will not be the cause of the problem. Next remove the endplate and examine for distortion which will be shown up by evidence on the inner face that it has not been in full contact with the friction plate. Take out the friction plate and examine for blisters or other damage. Blisters will be seen as bright high spots if the plate is held edge on to the light. Blistered or scored plates must be renewed. Now remove the inner pressure plate noting as you do so that it is free to move easily on the clutch centre. Again check for distortion.

With a very small screwdriver lever off the coil spring which will be seen located on the boss of the clutch centre. This should be a complete circle with ball bearings inside. If it has "broken" fit a new one on re-assembly as re-fitting the balls is a difficult and time consuming exercise.
Check for wear on the rear of the pressure plate and on the spring coil. There will be a ring on the back of the plate but it need only be replaced if it is possible to feel a groove with your finger nail, (or, of course, if it was tight on the centre when you tried to remove it).

It should now be possible to revolve the clutch housing independently of the hub. Do this by rotating the pedals. If all is well the clutch hub will remain stationery and there will be no cracking or scraping noises. Should the hub turn or evidence of damage he heard then you must proceed to remove the clutch hub. With a screwdriver blade and light hammer tap back the lockwasher from the centre nut. Hold the clutch hub with service tool 485005 and undo the centre but which has a normal R/H thread. Again using tool 485005 pull off the clutch hub which is located by two flats on the crankshaft. Behind the hub is a saucer washer (and on later assemblies one or more flat hardened steel washers). Examine this for signs of wear and replace (including flat washers if fitted) if it is damaged. Hold the clutch housing firmly and attempt to "rock". There is, of course, a running clearance on a good bearing but if you feel that the "rock" is excessive remove the drive belt and pull off the clutch housing. If the bearing is damaged it should be replaced.

Clean everything, except the housing bearing and fibre plate, in petrol and reassemble in reverse order (the bearing must be greased). Fit clutch housing to crankshaft using service tool No. 485006 to prevent damage to the oil seal as it passes the shoulders on the shaft.

Replace saucer washer (saucer to the outside) and flat steel washer if fitted. Lightly grease.
Replace clutch hub. Always fit a new lock washer.
Now check that the housing and hub can be freely rotated independent of each other.

Very lightly grease the inner face of the clutch hub using a molydenum based grease and refit the centrifugal spring. Slide the rear pressure plate on to the centre making sure it moves easily. Fit the friction place – always new if the original was scored or blistered.
Replace the conical spring followed by the endplate which must fit over the centre bosses, the locking plate, washers and nuts.
Now measure the clearance between the plates which must be between 0.5mm and 1.0mm. Again check that the clutch housing is free to move independent of the clutch hub.
Refit and adjust the start lever arm.

A less likely cause of poor acceleration (but with a good performance once you have reached around 25 m.p.h.) is that the reed valve (Fig. 2) is damaged or prevented by dirt from working efficiently. Correct functioning of the reeds becomes less important as engine speed increases and the incoming mixture charge has sufficient momentum to act as the valve against which primary compression takes place. Whilst engine speed is low there will be a tendency to blow back through the carburettor and power will be very much reduced.
The remedy for this condition is to remove the carburettor followed by the reed valve and to examine the latter for dirt or damage. If dirt can be seen stuck to the reeds or valve body it must be very carefully washed off with petrol. Should there be any sign of damage the valve assembly must be replaced.
Obviously after thousands of miles the reeds may become "tired" and not perform well even though they appear to be in good order. Should you suspect this condition try a new valve and note the difference in performance. This is a case where substitution is about the only way to isolate the problem.

E. "The power has fallen off gradually over the last few hundred miles – now its quite slow."

The gradual reduction in performance indicates that the trouble is due to a build up of carbon deposits in the combustion chamber and/or the exhaust system. Take off the exhaust pipe and silencer and disconnect the two at the joint. Undo the nut inside the silencer tail pipe and pull off the silencer end. This will reveal a baffle which can also be pulled out of the silencer body. Clean the carbon from all parts. If you feel that there may be a buildup of carbon in the exhaust pipe this can be removed by plugging one end and filling with a strong solution of caustic soda. Do not spill on to the chrome plate and take care to avoid getting any of the solution on your skin or eyes. Leave for up to 12 hours.

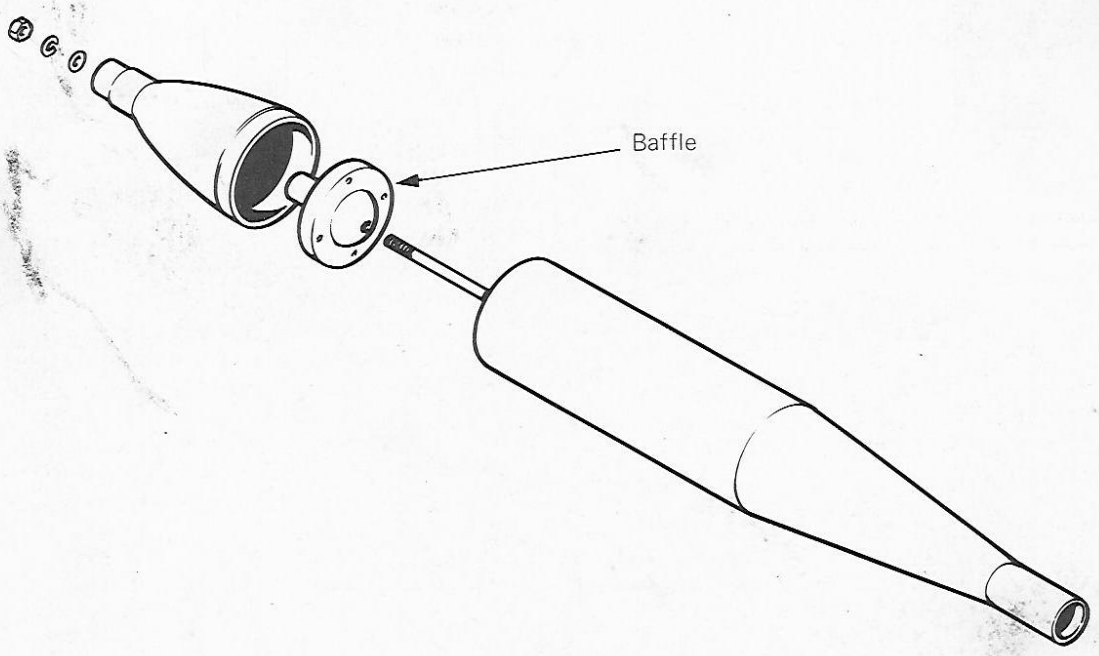


Fig. 28. Silencer Baffle Assembly

Take off the four nuts securing the cylinder head and remove the head. There is no gasket. Now very carefully lift off the cylinder (it may be necessary to "shock" this with a light blow from a piece of wood or hide hammer).
As the cylinder is removed the piston will be freed and care must be taken to support it as it leaves the bore.
Scrape all carbon from the exhaust port.
Scrape carbon from the inside of the cylinder head with a soft scraping tool and finish by washing in petrol. Cover the crankcase hole with rag (avoid fluffy material) and clean the top of piston. Do no scrape the carbon which will have built up above the top piston ring as this helps to provide a complete gas seal. Scrape all carbon deposits from the cylinder ports and wash thoroughly in petrol.
Examine the piston rings. They should be free in their respective grooves and you should note that they are prevented from turning when inside the cylinder by a small peg in each of the ring grooves. The gap of the ring must always be over these pegs otherwise damage will result on attempting to re-build.

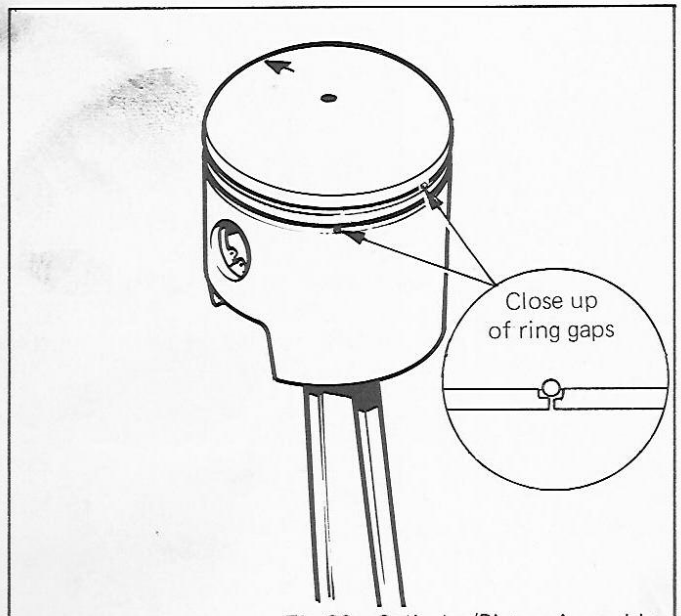


Fig.29. Cylinder/Piston Assembly

Renew the cylinder base gasket, carefully replace the cylinder at the same time feeding in the rings which should be lightly oiled. Refit the cylinder head and complete reassembly of the exhaust system using two new gaskets at the cylinder end.

After a high mileage it is inevitable that wear will take place on the rings and cylinder bore. This too will reduce power.
Replacement of rings is dealt with in Section 3B.

F. "When I stop at traffic lights the engine jerks and bumps and stops when the bike stops."

See section 6D. This problem may also be due to the clutch sticking.

G. "I refilled the tank a few minutes ago at my local garage and now the bike won't start."

Almost certainly due to neat oil entering the fuel pipe and carburettor. This results from refilling a nearly empty tank without first turning off the petrol tap. Neat oil, if placed in the tank first, will flow through the tap and into the fuel pipe. The bike will usually start and run O.K. for a few minutes before becoming sluggish and stopping.

The cure is to pull the petrol pipe off the tap and carburettor and blow it clear of oil. Take off the carburettor by undoing clamp bolt (Fig. 14). Remove the float chamber top and drain all petrol and oil from the float chamber. Drain the fuel tank and refill with a correctly mixed petroil mixture. Replace the carburettor and fuel pipe.

The petroil drained from the tank can be stored in a suitable clean container and re-used as a top-up mixture – say 1 pt at a time into a well filled tank. This will not seriously upset the petrol/oil ratio.

H. "I continually see patches of 'oil' under the machine when it is parked."

The only oil in the machine is that which you mixed with the petrol and the problem is probably due to dirt on the float needle seating in the carburettor. To clear, remove the carburettor and take off the float chamber top. Blow on the needle valve seat with a high pressure air line and examine the seat and needle taper.

While you have access to the float it is wise to lift it out and shake it to reveal any evidence of a leak, which will be shown by fuel in the float itself. Also examine both ends of the needle in case it has at some time been bent. The only cure in either case is to fit a new float.

I. "The engine just stopped dead and now makes a noise if I try to start it."

This sounds like a seizure of the piston in the cylinder – something almost totally unknown on the M48 engine. The probable cause is lack of oil in this fuel. To check remove the cylinder as in section 6E and examine the piston and cylinder.

If damage is evident proceed to check the big end for excess play or stiffness. To do this pull upwards on the connecting rod until the crank turns to its TDC position. Then holding the rod between finger and thumb sttempt to move up and down without turning the crankshaft. Any up and down play indicates wear on the bearing (note – some side-play is permissable). If no evidence of up and down play, turn the crankshaft and feel for tightness or roughness – at various points check carefully for up and down play.

Any sign of bearing damage means that the engine must be completely stripped. See Section 3B.
If the bearing appears sound then there is likely to be some cause of seizure involving ignition or fuel settings. Check :-
Is the correct spark plug fitted ? a wrong plug can cause detonation and build up heat.
Is the carburettor on straight ? If the jet is high the mixture will be weak. See Fig. 26.
Is there an air leak at the cylinder head ? (indicated by "scorch" marks on the face.
Is the ignition timing correct ? See Sect. 6A.
If there is evidence of big end failure the probable cause of this and the piston seizure is lack of oil in the petrol. The main bearings are also likely to be damaged. In this case a complete engine strip is called for. See Section 3B.

J. "The engine is making knocking and rattling noises."

There are two possible causes for this – either the engine is worn after a high mileage or damaged through lack of oil, or the clutch centre is loose on the crankshaft. Check for engine wear and follow instructions in section 3B.
The clutch centre will only be the cause of the noise if it has been running loose and the flats have begun to wear into a complete circle. It is very unlikely that the crankshaft has

been damaged and the cure is to fit a new clutch centre and to ensure that a new locking washer is properly turned over against the securing nut.

K. "Although I pull the start lever the engine does not turn when I pedal to start."

This could be due to a bent start lever at the clutch end. This would cause the lever to foul the case before pushing in the endplate. The answer is to straighten the lever and replace. See Section 2B.

More likely, however, is the possibility that the belt is too slack. It may work when the engine is driving the machine but not when the stresses are reversed as in starting. Re-adjust the belt by removing the engine cover shield, slackening the through bolts and turning the adjuster screw after the locknut has been released. The belt is properly adjusted when it can be easily depressed 0.5 cm with the weight of one finger as in fig. 30.

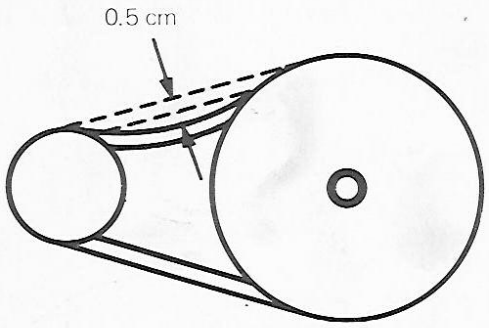


Fig.30. Belt Adjustment.

L. "With the engine ticking over the noise level is just as usual but when I rev the engine on the stand or try to drive away the machine screams loudly."

This is caused by a dry or damaged needle bearing in the countershaft pulley. If only a very small distance has been covered with the machine in this condition a very simple cure can be effected by applying grease with a special grease gun HA0004 through the nipple in L/H end of the pedal crank axle. Provided no damage has been done to the bearings or shaft the noise will disappear almost immediately. If it does not you must remove the pulley for examination. Remove the engine cover shield and proceed as follows :- Check for sideways movement of the crank by pulling and pushing. Excess play (more than 0.1mm) indicates wear on the distance bushes and this must be taken out on re-assembly.

Undo the nut from the L/H crank cotter (note the direction in which the cotter is fitted) and with a smart hammer blow drive the cotter from the crank.

Take off the crank followed by the spacer.

Release the drive chain connecting link and pull the chain off the front sprocket which is attached to the rear of the countershaft pulley.

The pulley can now be removed from the axle, followed by the inner thrust washer.

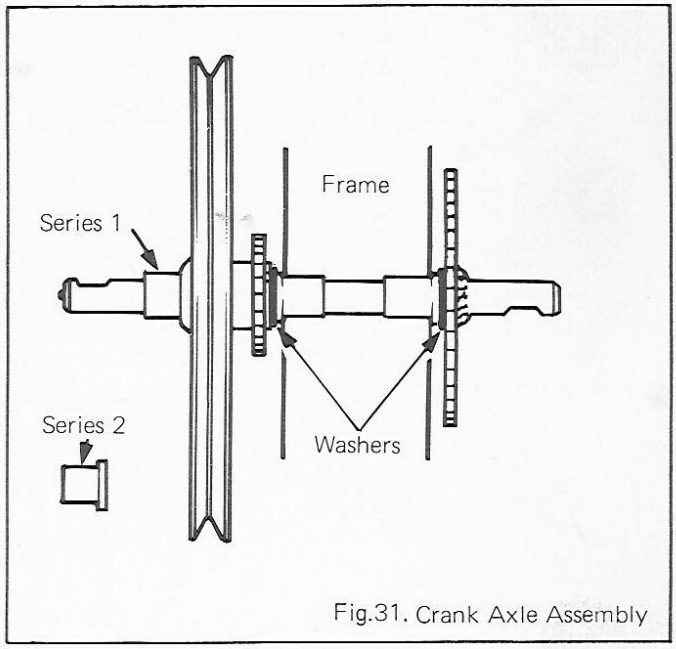


Fig.31. Crank Axle Assembly

Thoroughly clean the pulley bearings and examine for damage. This may not be too easy to see and a magnifying glass is a great help. If damage or wear is apparent the bearings must be extracted and new bearings fitted. This is a simple operation with no hidden difficulties – however, be careful when fitting new bearings to avoid damaging the cages.

Whilst you have the pulley removed examine the small sprocket for signs of wear on the teeth. Any tendency to "pointing" or "hooking" calls for replacement if rapid wear on the rear chain is to be avoided.

When you are satisfied that the pulley is in good order and ready for re-fitting you should lay it on one side while examining the crank axle. This can be done without actually removing it from the machine but you will be well advised to clean it thoroughly so as to reveal any signs of wear or damage. The most likely problem is wear at the area on which the pulley revolves. This can be measured with a micrometer but a quite satisfactory guide to the shaft's condition is to feel with your thumb nail for signs of a ridge at the sides of the bearing area. If you can feel a ridge the shaft should be pulled to the R/H side after releasing the pedal chain idler and easing the chain from the sprocket which is welded to the crank axle. Note the spacing washer. If a replacement axle is to be fitted you should remove the R/H pedal crank and refit on the new crank axle. Grease the new axle and replace. Refit the pedal chain.

Now examine the shim washers and spacers.

If wear is suspected replace all these parts.

Re-assemble in reverse order as in Fig. 31. Refit the crank and cotter loosely and check for shaft end float. Shim out excess movement with washers immediately behind the pedal crank. When you have achieved a clearance of 0.2mm check the pulley alignment as illustrated. Should the large pulley be too far in toward the frame this can be corrected by moving shims from the outside of the pulley to the inside and vice versa.

Also check the pulley for distortion by revolving and measuring the gap between it and the steel rule. Maximum deflection should be no more than 1mm.

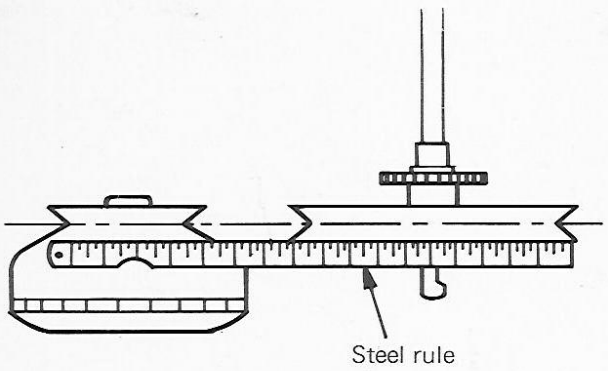


Fig.32. Pulley Alignment

When pulley alignment is correct refit the pedal crank and chain. Remember the chain link must be fitted with its closed end forward when on the top run of the chain. Give the pulley bearings a good supply of grease through the nipple in the end of the axle. Your trouble should now be over.

M. "The engine refuses to run slowly — it revs up on the stand without me turning the throttle — and the power has fallen off"

This complaint indicates that the main crankshaft gas seals are suspect and probably need to be replaced. When seals fail the engine cannot produce its full power because the leaks allow air to be drawn in to the crankcase other than through the carburettor and the mixture transferred to the combustion chamber is therefore "weak". Furthermore the descending piston cannot properly compress the gases in the crankcase.

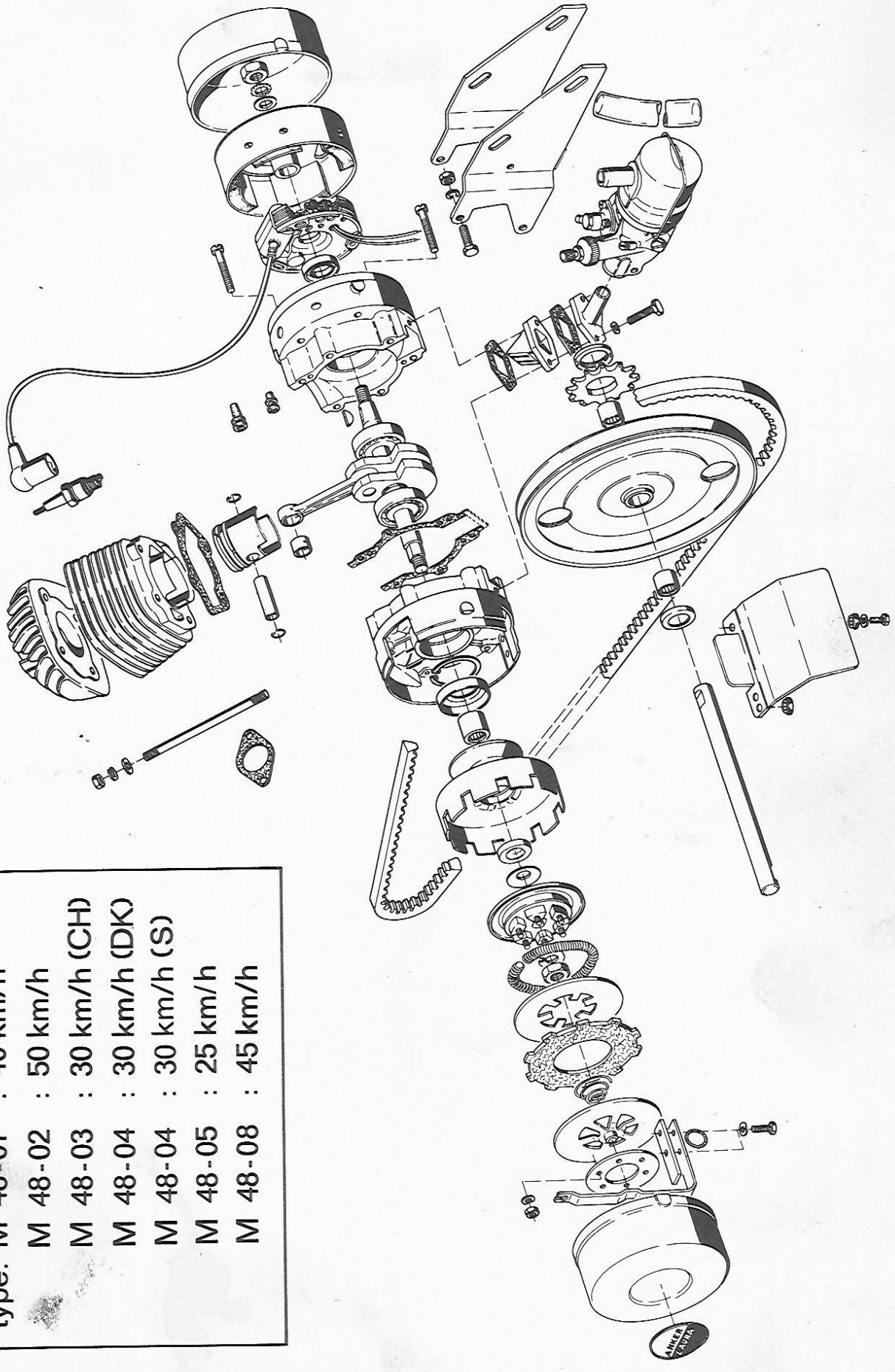
Test for this condition by examining the areas around the clutch and generator assemblies for signs of oil mist (usually this will cause dirt and dust to adhere to the parts). Then remove the carburettor and attach a pipe to the intake manifold.

Take out the sparking plug and place the piston at TDC. Now blow smoke through the pipe whilst holding a finger over the plug hole. Any leaks from the mainshaft seals will be indicated by smoke from behind the clutch and magnetos.

If seal failure is confirmed the only remedy is to fit new seals. The procedure for this is described in Section 3B.

SECTION 7

THE ENGINE - EXPLODED VIEW



type:		
M 48-01	:	40 km/h
M 48-02	:	50 km/h
M 48-03	:	30 km/h (CH)
M 48-04	:	30 km/h (DK)
M 48-04	:	30 km/h (S)
M 48-05	:	25 km/h
M 48-08	:	45 km/h

SECTION 8
TECHNICAL DATA

Engine type	Laura M48-2 Single cylinder 2 stroke with reed valve induction.
Bore	40mm.
Stroke	38mm.
Capacity	47.78cc.
Compression Ratio	7 : 1
Approximate Power	2.4 BHP at 5000RPM.
Torque	0.3 MKG at 3000RPM.
Cylinder	Cast iron (Perlitic)
Cylinder head	Alloy — no gasket.
Piston oversizes	40.25 and 40.50 mm.
Piston ring gap	0.2mm — 0.5mm.
Gudeon pin dia.	12m (0.472")
Crankshaft	Pressed assembly.
Main bearing	Ball type 6302.
Big end bearing	Caged needle.
Clutch bearing	Needle.
Pulley bearings	Two needle (sealed)
Ignition	Bosch Magneto (clockwise rotation)
Rupture distance	7 — 11mm (see Section 6A)
Timing	1.8 — 2.2 mm BTDC.
Contact gap	0.35 — 0.55 mm.
Lighting coils (2)	6v x 17w + 5w.
Clutch plate clearance	0.50mm — 0.75mm.
Spark plug	Bosch W240 TI.
Carburettor	Encarwi S22 with manual choke bore. size.
Main jet	No. 58.
Counter Shaft Sprocket	13T.
Brake sizes	Compact (both) 80mm Others Front 80mm. Rear 70mm.

GENERAL DATA

Weight	38.5 — 40 KG.	
Overall length	Compact	1499 mm
	Others	1651 mm
Overall height	GoGo/HS50	966 mm
	Compact	978 mm
	Bronco	1092 mm
Seat height	HS50/Compact	711 mm
	GoGo	738 mm
	Bronco	787 mm
Tank capacity	Compact/Starglo	3 litres
	Others	3.5 litres
Wheels	Compact	10 x 3.00
	Bronco (rear)	16 x 2.25
	Others	16 x 2.00

SECTION 9

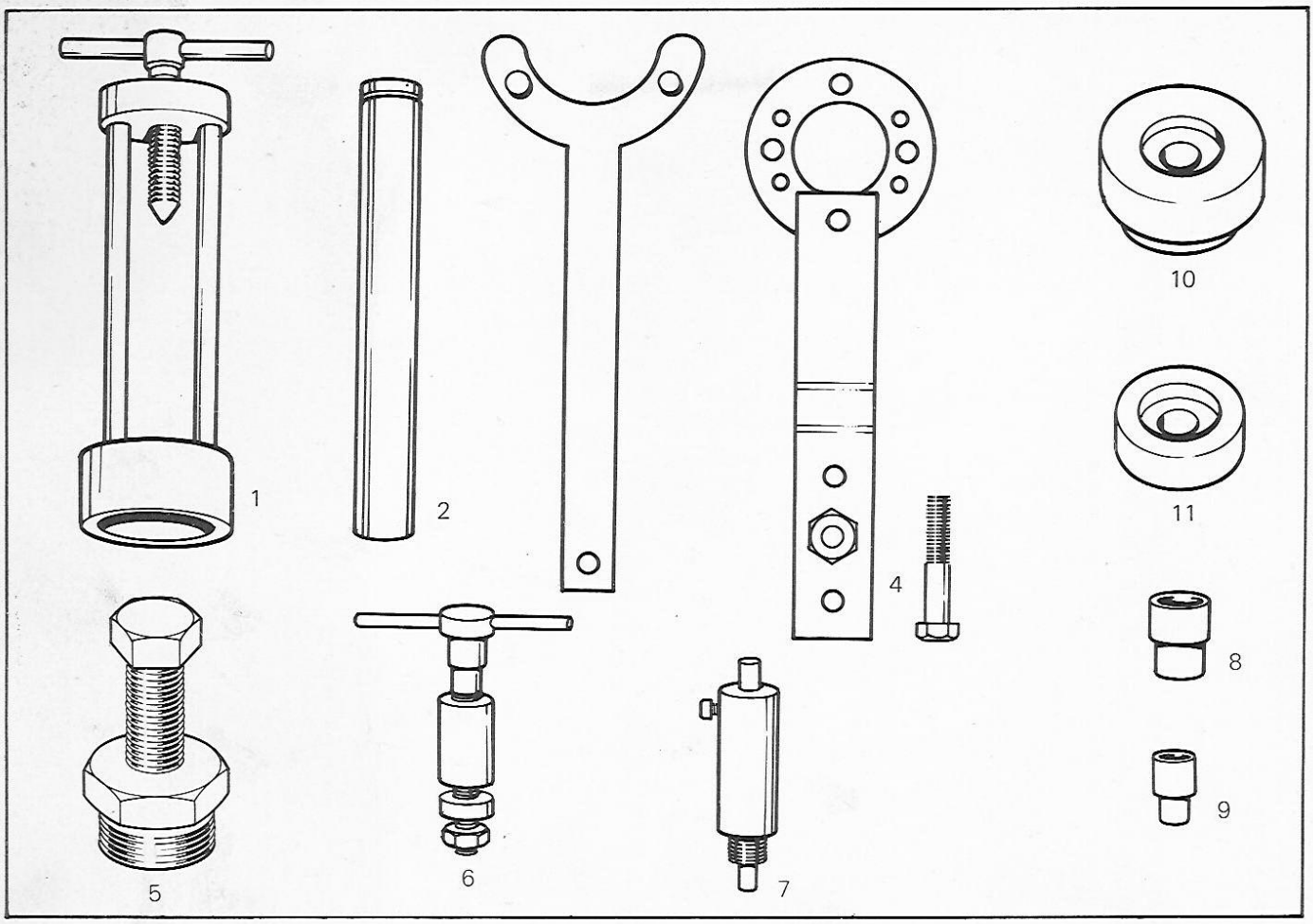
LIST OF ILLUSTRATIONS

ACCESSORIES

A full range of approved accessories is available from your BATAVUS dealer.

SECTION 10

SERVICE TOOLS

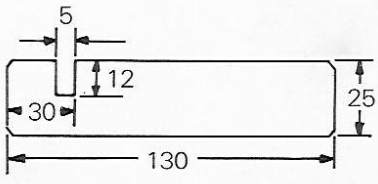


SPECIAL TOOLS

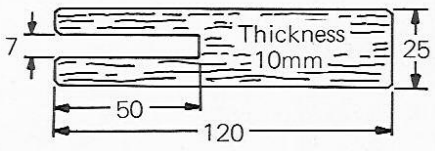
nr.		
1	Extractor for crankshaft bearings	485009
2	Dolly for fitting crankshaft bearings	485001
3	Flywheel steady	485010
4	Combined steady and puller for clutch hob	485005
5	Flywheel extractor	485002
6	Press for little end bush	485003
7	Ignition timing tool	485004
8	Fitting sleeve for clutch oil seal	485006
9	Adapter M10 for crankshaft	485007
10	Fitting tool for oil seal	485011
11	Fitting tool for oil seal	485012

SELF MADE TOOLS (all sizes in millimetres)

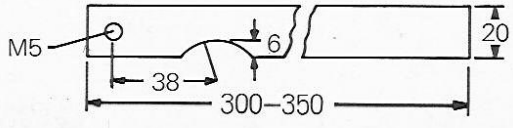
Connecting Rod Aligning Tool



Wooden Fork to support Piston when fitting Cylinder



Special Lever to tighten Vee-Belt.



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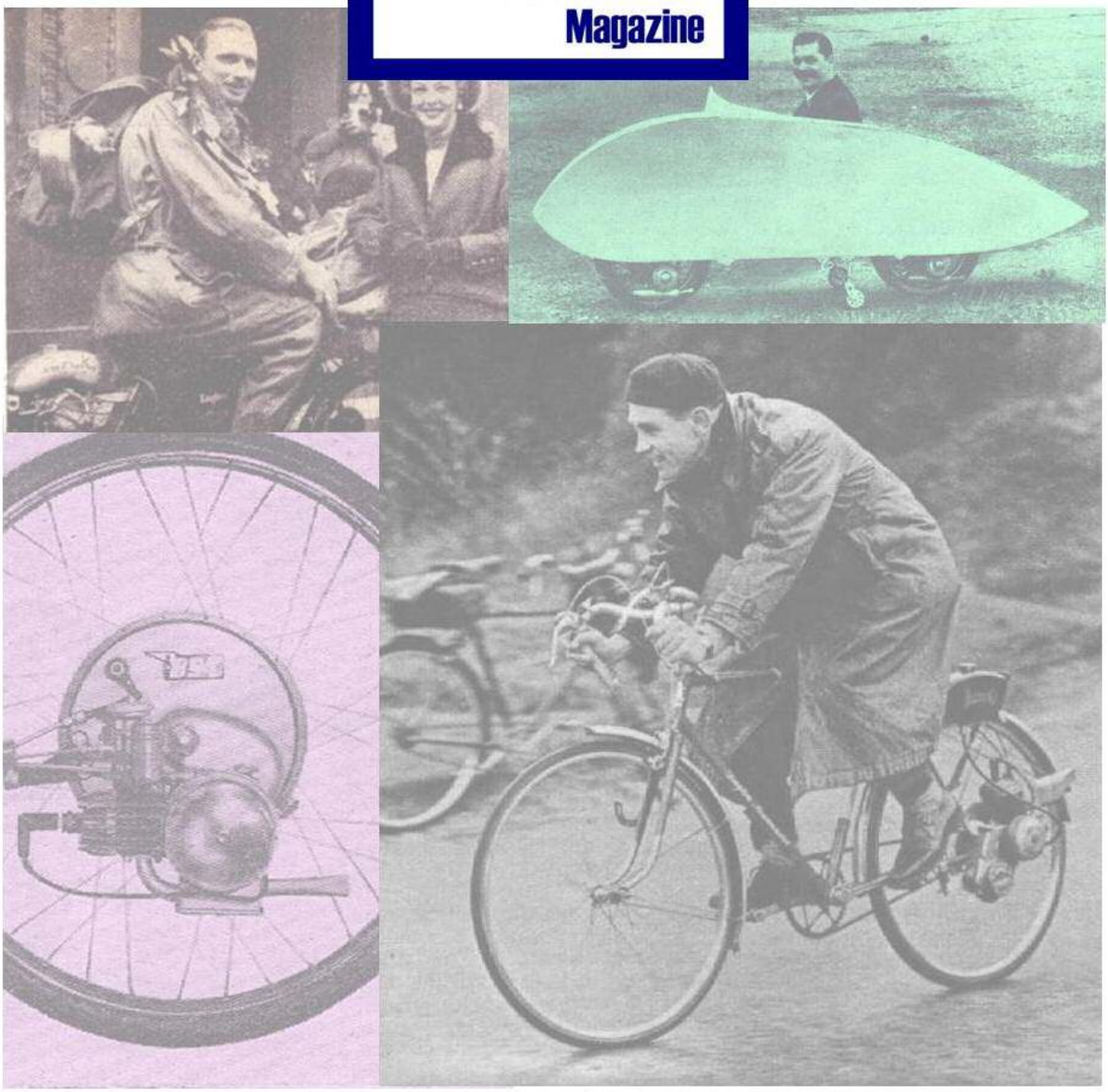

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