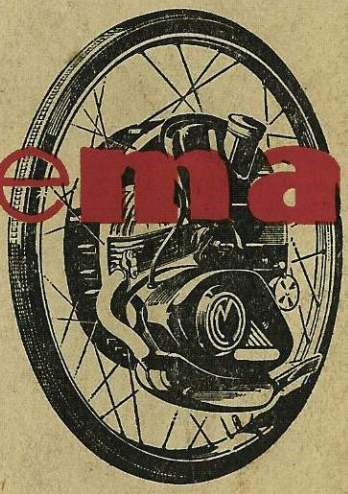
Riggs No A06

# Cyclemaster



# WORKSHOP MANUAL

EMBODYING ALL INFORMATION UP TO SEPT. 1956

WHEEL NO:
114429

PRICE SIX SHILLINGS


*PUBLISHED BY*

**CYCLEMASTER LIMITED**

*HEAD OFFICE AND FACTORY*

TUDOR WORKS · CHERTSEY ROAD, BYFLEET, SURREY · Tel. BYFLEET 3145

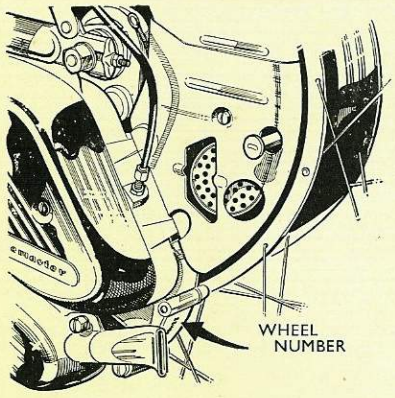
*SALES DEPARTMENT*

154a SHEPHERDS BUSH ROAD · LONDON · W.6. · Tel. RIVerside 3149

*(Please address all technical correspondence to Head Office)*

# Cyclemaster

# WORKSHOP MANUAL




*Please quote the wheel number in all correspondence.*

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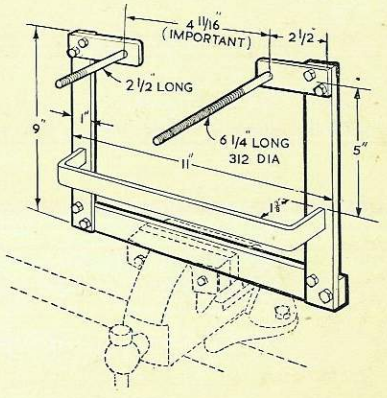
## ENGINE STAND




The straightforward framework shown in this illustration is indispensable for dismantling and reassembling the engine.

Without it, makeshift methods will be used: spindles will be clamped in vices, and so on.

Up to Wheel No. 127165 (Export 126197), the thread of the shorter bolt must be $\frac{1}{4}$" B.S.F. After these numbers the size is $\frac{5}{16}$" B.S.F.

# GENERAL INFORMATION

This Workshop Manual covers the servicing of all Cyclemaster models from the first. Modifications and improvements have been introduced from time to time and all supplements dealing with these have been embodied in this one book. The engine numbers at which these changes were introduced are given below.

The Cyclemaster engine has been described as being "built like a watch". In some ways this is true, for the object of the designers was to pack into the smallest space possible an engine that would function efficiently and indefinitely with the minimum of attention.

From time to time, however, service will be required, either routine attention such as decarbonizing, or repairs as a result of accident or misuse.

Cyclemaster Ltd. recommend that whenever possible all servicing work should be entrusted to an authorised Dealer, who has much special equipment to enable him to do the work quickly and efficiently at a reasonable charge.

Owners with mechanical knowledge, however—who wish to carry out their own servicing work—will find all necessary information clearly set out in this Manual.

All the operations are described in non-technical language, and when a part number is referred to this is given in brackets. The special tools and equipment described can be obtained from your Cyclemaster dealer.

It is of the utmost importance that the most scrupulous cleanliness should be observed whenever any work is being done upon this highly-efficient engine.

## ENGINE

| | WHEEL NUMBERS 1 to 73500. | 73501 onwards. |
|---|---|---|
| Type | 2-stroke | 2-stroke |
| Bore | 32 mm. | 36 mm. |
| Stroke | 32 mm. | 32 mm. |
| Capacity | 25.7 c.c. | 32 c.c. |
| Compression Ratio | 6.2 : 1 | 6.2 : 1 |
| Developed b.h.p. | 0.6 (approx.) | 0.8 (approx.) |
| Speed | 4,500 r.p.m. at 20 m.p.h. | 4,500 r.p.m. at 20 m.p.h. |

(Wheel number is stamped on underside of casting above exhaust fishtail—see illustration on page 1.)

## CLUTCH

| | |
|---|---|
| Type | Single plate in oil bath. |
| Free travel | $\frac{1}{4}$ in. at tip of hand lever. |
| Lubricant | S.A.E. 140. (Viz.: Castrol D: Energol 140: Esso 140: Mobilube C: Shell Spirax C.) 50 c.c. See note 6. |

## FUEL SYSTEM

| | |
|---|---|
| Carburettor | Amal. (Wheel Nos. 1 to 102900.) |
| Carburettor | B.E.C. Type B.1. (Wheel Nos. 104451 onwards.) |
| Fuel consumption | Approx. 230 m.p.g. with 32 c.c. engine: 250 m.p.g. with 25.7 c.c. engine. |
| Fuel tank capacity | $2\frac{1}{2}$ pints (approx.). |
| Mixture | Petrol and S.A.E. 30 oil (viz.: Cyclemaster Superfine: Castrol XL: Energol 30: Essolube 30: Mobiloil A: Shell X100/S.A.E 30). Mixture ratio 25 : 1. This ratio should never be varied. |

## HUB

| WHEEL NUMBERS 1 to 50000. | 50001 onwards. |
|---|---|
| Ordinary free-wheel hub. | B.S.A. New Eadie Coaster. |

## IGNITION SYSTEM.

### WHEEL NUMBERS 1 to 76750.

| | |
|---|---|
| Magneto | Wico-Pacy Bantamag. |
| Spark plug | K.L.G. 14 mm. F.50. |
| Plug gap | .018″ to .020″. |
| Contact breaker gap | .018″. |

### WHEEL NUMBERS 76751 onwards.

| | |
|---|---|
| Magneto | Wipac (Series 90), with lighting coil. |
| Spark plug | K.L.G. 14 mm. F.50. |
| Plug gap | .018″ to .020″. |
| Contact breaker gap | .018″. |

## PERFORMANCE

| | |
|---|---|
| Climbing Capacity | 6-7% (approx.) without pedals |
| Maximum speed | 20-25 m.p.h. |

## TRANSMISSION

Chains

## TYRES

Dunlop "Carrier."
45-50 lbs. sq. in. (see note 2).

## RATIOS

Engine-clutch—3.2 to 1.
Clutch-wheel—5.6 to 1.
Overall—18 to 1.

## WHEEL

Construction—see note 1
Rim size—26″ × $1\frac{1}{2}$″.
(Wheel Nos. 1—102604.)
Rim size—26″ × $1\frac{3}{4}$″.
(Wheel Nos. 102605 onwards.)
Weight—see note 5.

1. **WHEEL CONSTRUCTION.** The Cyclemaster rim is of heavier gauge steel than is normally used for bicycle wheels, and the angle of the spokes is different. These two reasons make it undesirable to build a Cyclemaster engine into any other rim.
2. **TYRE PRESSURES.** Oversize balloon tyres, 2 in. section, are available for both rim sizes. For these the tyre pressure should be adjusted to 35 to 45 lbs., according to the weight of the rider.
3. **MULTI-SPEED GEARS.** Internal hub type multi-gears cannot be used with Cyclemaster. The external chain type can be used up to wheel No. 50000, but no addition of this kind is recommended.
4. **TANDEMS.** Cyclemaster can be used with tandems, but naturally performance and economy will be affected by the greater weight.
5. **WEIGHT OF WHEEL.** The Cyclemaster wheel complete weighs approximately 34 lbs., but the weight added to the bicycle when Cyclemaster replaces the standard wheel is only 24-28 lbs.
6. **CLUTCH CHAMBER LUBRICANT.** The petrol filler cap holds 50 c.c. and should be used as a measure when filling an empty clutch chamber. It is most important NOT to overfill.
7. **CORRESPONDENCE.** Dealers and Owners, in their own interests, should give the wheel number in all correspondence, as it is impossible for us to take action without this information. (See illustration on page 1.)

## TO FIT WHEEL

The $\frac{3}{8}$" diameter of the Cyclemaster spindle may be too great for the existing lugs in the fork. If it is, the lugs should be filed so that the spindle slips into them freely—but with the minimum of play.
When filing the lugs take an equal amount of metal off both lower edges.
Whenever possible, file the lower edges *only*, but if the top edges must be filed as well take an equal amount off each.

* * *

Generally it is necessary to open out the rear forks slightly when fitting a Cyclemaster.
In order to maintain satisfactory alignment of (*a*) front and rear wheels, and (*b*) the chain from pedals to rear wheel, the increased width of the Cyclemaster wheel has to be allowed for on the left-hand side of the machine looking towards the front.
The total width required is $4\frac{15}{16}$", but for the reason given above it is necessary to open out the left leg of the seat and chain stays slightly more than the other.
When the wheel is in position, check the distances between the rim (at the top) and each seat stay. They should be the same. If they are not, adjust as necessary; movement of the forks to the left will bring the rim nearer to the left-hand seat stay, and *vice-versa*.
After the forks have been opened out, the lugs must be returned to parallel with each other and with the rim of the wheel, both in the horizontal and in the vertical plane. When this has been done, proceed as below:—

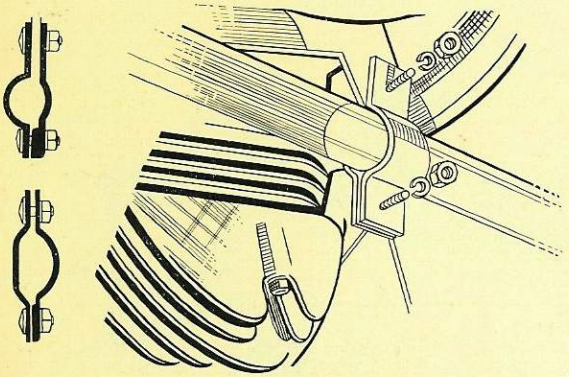
**1.** Return the wheel into the frame. Check once again to see that the rim is still central between the seat stays.

**2.** Fit chain, making sure spring link is correctly assembled. If of open limb type, head should face in direction of drive.

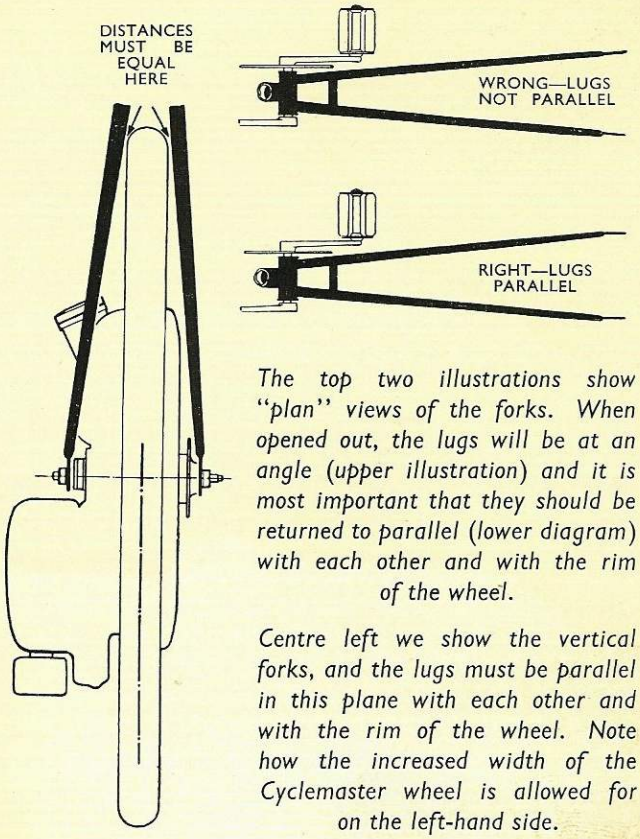
**3.** Position adjusters (if fitted).

**4.** Make sure washer each side is *outside* slotted fork.

**5.** Fit engine locating bracket, and connect to lug on Cyclemaster engine. The locating bracket will be found bolted to the lug on the engine. Feed bolt in from back, fit spring washer and nut on thread, but do not tighten. It is a good idea to put one turn of insulating tape around fork under the clip to protect the enamel.



*The correct fitting of the engine locating bracket is most important. Brackets for both "D" section and "O" section forks (as illustrated) are available.*




*The top two illustrations show "plan" views of the forks. When opened out, the lugs will be at an angle (upper illustration) and it is most important that they should be returned to parallel (lower diagram) with each other and with the rim of the wheel.*

*Centre left we show the vertical forks, and the lugs must be parallel in this plane with each other and with the rim of the wheel. Note how the increased width of the Cyclemaster wheel is allowed for on the left-hand side.*

**6.** Adjust tension of chain from pedal sprocket to wheel sprocket. The chain should be tighter than on an ordinary cycle. Total movement, up and down, of lower length of chain, should be no more than $\frac{3}{4}$".
**7.** Check wheel for alignment between chain stays.
**8.** Tighten hub nuts.
**9.** Re-check tension of chain.
**10.** Finally tighten nut of bolt securing lug to bracket.
**11.** Connect mudguard stays.
**12.** Connect clutch and throttle control cables.
**13.** Connect spark plug lead.
**14.** Connect head and tail lamp leads on models fitted with magneto embodying lighting coil.
**15.** Check hub adjustment (wheels No. 50001 onwards).
**16.** Check tension of chain from clutch to drum.

### VERY LIGHT SPORTS FRAMES

Except for the slight thrust from the frame fixing bracket, no added stress is put on a cycle frame when a Cyclemaster is fitted to it, the whole weight of the Cyclemaster being carried on its own spindle and bearings. The frame fixing bracket locates the engine and also the fixed parts of the hub. The engine exerts a slight upward thrust which is reversed on application of the brake.
In view of the increased efficiency of the back-pedalling brake (see p. 7), it is suggested that, as a precaution, some reinforcement is added to the *very light-weight sports type of frame*. An extra round type frame bracket is fitted to the left-hand seat stay approximately 12" above the wheel spindle. The two brackets are then connected by a strip of metal from the upper hole of the chain stay bracket to the lower hole of the seat stay clip.
These parts are available as an extra. Part No. X.21.

## TO REMOVE WHEEL

**1.** Move brake blocks out of the way if rim brakes are fitted.

**2.** See that flex to rear light (if fitted) will not be fouled as wheel is removed.

**3.** Release mudguard stays.

**4.** Remove throttle control lever from handlebar.

**5.** Remove clutch control lever from handlebar.

**6.** Remove rubber straps that hold both cables to frame.

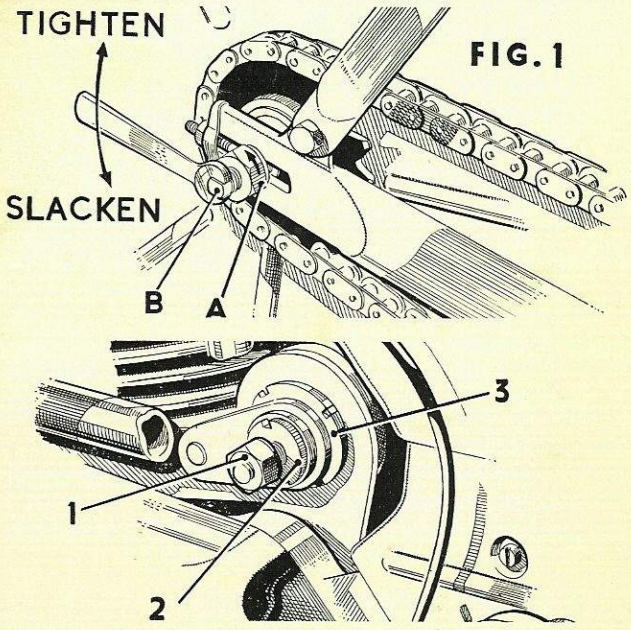
**7.** Disconnect lead from spark plug.

**8.** Remove chain from pedal sprocket by taking out spring link: replace link as soon as chain is off.

**9.** Disconnect lighting lead from push-in connector (models with lighting coil in magneto only).

**10.** Slacken off "D" or "O" clip which locates engine to frame. Slide clip along fork out of the way, and replace bolt, nut and washer in position.

**11.** Slacken hub spindle nut on each side until wheel is comfortably slack, with ample free play, but do not remove nuts. Rock wheel free of frame, and remove.




*The two illustrations above show the method of adjusting the New Eadie Coaster Hub. Nut 2 is not fitted on some wheels. Nut 3 is used only for adjusting tension of chain from clutch to drum.* *(See page 5.)*

## HUB ADJUSTMENT

**Wheels No. 50001 onwards (New Eadie Coaster Hub).**

When the wheel leaves the factory the hub is adjusted so that there is an excessive amount of play in the wheel bearings. Final adjustment is required when the wheel is fitted to the bicycle. *This check is most important.*

**1.** Slacken off nuts 1 and 2 and nut A.

**2.** Using a spanner on the flats, turn spindle B (anti-clockwise to slacken, clockwise to tighten) until the wheel revolves freely but with the minimum amount of play. *If difficulty is experienced in obtaining the necessary adjustment when rotating the spindle, check that the cone at the driving end of the spindle is fully tightened against the shoulder.*

**3.** Tighten all nuts and check again.

Development in servicing techniques has shown that nut 2 may be omitted from the assembly and adjustments are carried out by means of nuts 1 and A thus saving one operation. The deletion of nut 2 does, however, mean that the engine assembly has a certain amount of play until nut 1 is tightened fully, so extra care must be taken when offering the wheel to (or removing it from) the bicycle.

If nut 2 is left in position it must be tightened properly. If it is removed, or was not fitted originally, all references to it may be ignored.

### IMPORTANT

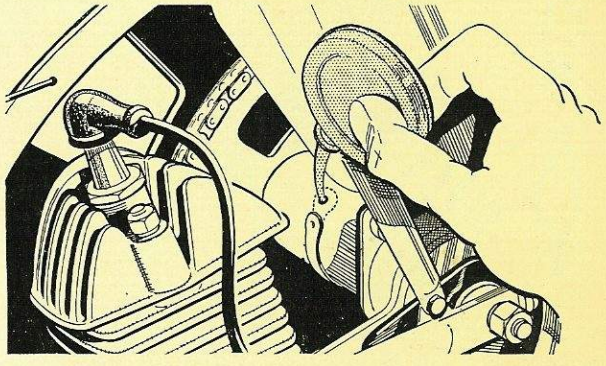
So that there is no possibility of riding the machine with excessive pressure on the bearings it is most important that some play can be felt. There must, however, be not more than $\frac{1}{32}$" measured at the wheel rim. When testing for this play, make certain that the wheel is clear of the ground. It is impossible to assess accurately the amount of play if the weight of the bicycle is on the wheel bearings. **Hub bearing adjustment must be checked as part of the first service, and whenever the wheel is re-fitted after removal.**

### SECONDARY CHAIN

Finally, check and if necessary adjust tension of chain from clutch to drum (see illustration and instructions on page 5).

### HUB LUBRICATION

It is most important that the coaster hub should be lubricated weekly, by means of a few drops of light machine oil through the oil hole in the hub, which is covered by a spring clip. The few cases of hub brake trouble that have been brought to our notice have all been due to lack of lubrication at this point.



*The lubrication hole in the New Eadie Coaster Hub.*

## WHEEL BEARINGS

**Wheels No. 1 to 50000 (Free Wheel Hub):—**

These are ball journal bearings, similar to those often used in motor cars but of course smaller. They are not adjustable.

These bearings are packed with grease during assembly, and sealed against the entry of dirt and wet. They should not require attention for at least 6,000 to 8,000 miles, when they should be dismantled, cleaned and repacked. As a precaution, however, they should always be inspected when an engine is removed from the wheel for any reason. Should undue wear be suspected, proceed as follows:—

**1.** Remove engine from wheel (if not already out).
**2.** Ascertain which bearing is faulty by checking freedom of movement of spindle at each end.
**3.** If (A.09) first remove lock nut (T.04) and distance piece (T.08) from spindle.
**4.** Press out spindle (T.12). The ballrace should come with it.
**5.** Remove faulty race by tapping it off.
**6.** Examine felt ring (T.11); fit new one if necessary.
**7.** Press on new bearing.
**8.** Press spindle into hub housing.
**9.** Replace distance piece.
**10.** Replace lock nut.

* * *

If bearing (T.10) is faulty:—

**11.** Remove lock nut (T.04) and distance piece (T.08).
**12.** Press out spindle (T.12).
**13.** Pull out felt ring (T.07).
**14.** Remove oil retainer ring (T.06) using Extractor CA 7.
**15.** Remove circlip (T.09) with round-nosed pliers.
**16.** Tap out bearing (T.10) from other end.
**17.** Fit new bearing. Replace circlip (T.09).
**18.** Fit new oil retainer ring (T.06) if necessary. Fit new felt ring (T.07) if necessary.
**19.** Replace spindle (T.12).
**20.** Re-fit distance piece (T.08).
**21.** Re-fit and tighten lock nut (T.04).
**22.** Replace engine.

## FREE WHEEL LUBRICATION

Cyclemaster wheels up to and including No. 50000 had no back pedalling brake and weekly lubrication of the free wheel through the oil hole provided is most important. With a pedal cycle the free wheel is in use for only a low percentage of the time—only, in fact, when the owner is not pedalling. With Cyclemaster, however, it is in use most of the time, since the owner pedals very seldom. The free wheel should be inspected whenever the wheel is in for service. It may be removed—when necessary—by using a small drift in the two slots alternately. The thread is *right hand.*

## SPOKES

The simplest and most effective way of checking spokes for tightness is to tap them lightly with a screwdriver. There should be a light metallic ring; a dull sound indicates slackness.

In no circumstances should spokes ever be tightened without first removing outer cover, tube and tape or the tube may be punctured in several places.

A tool for tightening the spokes may be bought at any cycle shop.

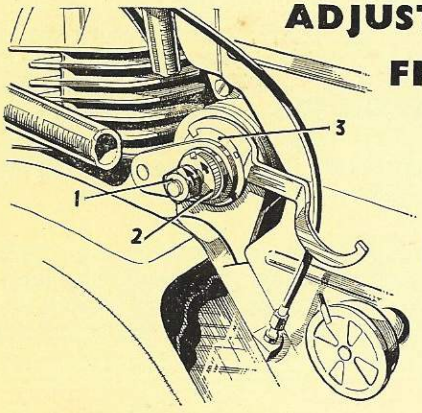
Whenever spokes are adjusted the wheel should be checked for alignment immediately after, and a careful examination of the inside of the rim should be made. Any spoke which is "proud" of its nut should be filed down before tape, tube and cover are replaced.

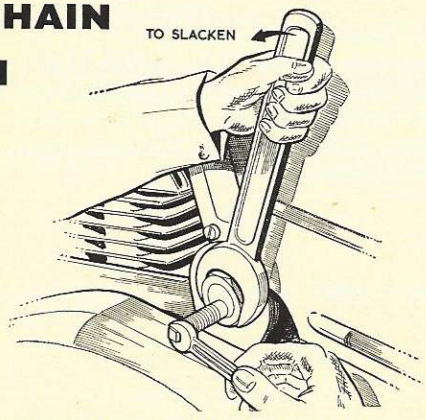
With Wheel No. 102065 the 26″ × 1¾″ rim was introduced. The spokes used with this type of rim are shorter and of heavier gauge and are not interchangeable with spokes fitted to the 26″ × 1½″ model.

All current production wheels are now fitted with a small brass washer under the head of each spoke. When replacing a spoke on either a 1¾″ or 1½″ wheel, a washer should be fitted. This washer is supplied against Part No. U.11 and is suitable for both models.

## ADJUSTMENT OF CHAIN FROM CLUTCH TO DRUM

*(To be checked every three months).*




### WHEELS WITH NEW EADIE COASTER HUB

Slacken nut 1 and thin lock-nut 2 (if fitted). Using a thin C spanner (or tapping lightly with suitable drift) adjust eccentric 3 to allow not more than ½″ total slack in chain. Tighten nuts 2 and 1. Re-check tension.

### WHEELS WITH ORDINARY HUB

Remove wheel and undo large hexagon nut. Place spanner on square end of hub spindle and adjust to allow not more than ½″ total slack in chain. Hold hub spindle firm, tighten large hexagon nut. re-check

*See also illustration on p. 29 (Top left)*

# FIRST SERVICE

After a Cyclemaster has covered approximately 150 miles it should have an initial servicing as set out below.

**1.** Inspect level of oil in clutch chamber. Top up if necessary. Do not overfill. (Page 20.)

**2.** Inspect and adjust clutch. (Page 20.)

**3.** Check cylinder head, engine mounting bolts (S.10 and S.05) and exhaust bolts. Tighten if necessary.

**4.** Check contact breaker points. Adjust if necessary. (Page 15 Bantamag) (Page 18 Wipac Series 90.)

**5.** Check chain from clutch to drum. (Page 5.)

**6.** Check wheel for alignment.

**7.** On wheels with New Eadie Coaster hub check and adjust hub bearings. (Page 4.)

**8.** Inspect sparking plug. Adjust points if necessary. Examine all surfaces of plug which are exposed in combustion chamber; they should be light brown colour.

If dark: mixture is too rich or too oily. If mixture too rich, see page 11 (Amal) or page 13 (B.E.C.).

If surfaces are covered with pearl-like formations, engine is running too hot, and spark is probably too far retarded. Correct timing as described on page 20.

**9.** Tighten exhaust cylinder nut (R.36) with engine hot.

# TO REMOVE THE ENGINE

*To remove the engine it is necessary to take the wheel from the cycle (refer to page 4 for detailed instructions).*

**Wheels No. 1 to 50000 (Free Wheel Hub)**

**1.** Remove wheel from cycle.

**2.** Remove air filter, carburettor cover plate and "CM" cover.

**3.** With petrol tap in "off" position, disconnect flexible pipe (H.62) from carburettor and remove petrol tank by removing three screws (R.04) and three spring washers (B.03). Replace screws and washers in tapped holes in suspension bracket.

**4.** Unscrew large hexagon nut (T.14) and remove plain washer from hub spindle, turn square end of hub spindle until spindle is at lowest point of eccentric (this slackens chain from clutchshaft to drum). Then withdraw engine, lifting it clear of chain. Retain, if fitted, spacing washers from behind suspension bracket.

**Wheels No. 50001 onwards (Coaster Hub)**

**1.** Remove wheel from cycle.

**2.** Remove air filter (Amal carburettor only), remove carburettor cover plate and "CM" cover.

**3.** With petrol tap in "off" position, disconnect flexible pipe (H.62) from carburettor (Amal). In case of models fitted with the B.E.C. carburettor (from wheel No. 104451), remove the banjo union screw below the petrol tap, leave pipe and banjo union attached to carburettor and replace screw and washers in petrol tap. Remove petrol tank by removing three screws (R.04) and three spring washers (B.03). Replace screws and washers in tapped holes in suspension bracket

**4.** Remove lock ring (U.44) and washer, and gently lever off brake arm (S.04) which is a push fit on the cone. Rotate eccentric (S.03) until chain from clutchshaft to drum is at its slackest. If the engine is then rocked gently the eccentric may be withdrawn with the fingers. Tilt engine slightly so that chain can be removed from clutchshaft sprocket. Then withdraw engine, lifting it clear of chain.

## ENGINE STAND

To facilitate work on the engine we recommend the use of the framework illustrated on page 1.

First remove the suspension bolts (see illustration on page 28) then place engine in stand. The long bolt takes the place of the main engine bolt (S.05) and the short bolt screws into the tapped hole in the front of the engine suspension bracket.

## WHEEL ASSEMBLY

Whenever the engine is removed, opportunity should be taken of examining chain, sprockets and wheel bearings and also of cleaning the drum.

# NEW EADIE COASTER HUB

**Wheels No. 50001 onwards**

This hub requires a bedding-down period for the working parts to attain their greatest efficiency. How long depends entirely upon the way the machine is used.

## LUBRICATION

Lack of lubrication will cause the brake band to become dry and sticky. Operation of the brake in this condition will put excessive strain on the fixed parts of the hub which in turn may cause breakage of the locking tongues. We cannot emphasize too strongly the necessity of oiling the hub every week. (See also page 4.)

## FIRST STEPS

Should inadequate braking be reported, first check the hub bearings (see page 4). If these are slack, greater effort will be required to produce any given braking effect.

Check the tightness of driving sprocket (U.25) on the driving piece (U.29) and also the tightness of the left-hand thread locking ring (U.24).

If the above are all in order, there is nothing else that can be done externally, and the hub must be dismantled as detailed below.

## TO DISMANTLE HUB

**1.** Remove engine from wheel (see page 6.)

**2.** Holding spindle (U.23) by flats, remove brake cone (U.42). (The popularity of luggage carriers and pannier bags has made it desirable to increase the length of the spindle to $7\frac{1}{8}$", and the thickness of the spindle nuts to $\frac{7}{16}$". The part number is unchanged and all replacements are now of the new pattern.)

**3.** Withdraw spindle from opposite side of wheel, taking with it the driving piece (U.29) and retainer (U.32).

**4.** Withdraw actuator (U.34) and brake band (U.39).

**5.** Gently lever off dust cover (U.40) from end of hub shell (U.18).

**6.** Lift out bearing assembly (U.30).

**7.** Inspect bore of shell (U.18). The original internal dimensions are 1.342" to 1.345". If there is wear in excess of .015", or if the internal surface of the shell is pitted or scored, or if bearing grooves are pitted, a new shell must be fitted.

**8.** It is most important that the rivets holding the hub shell to the wheel drum and driving sprocket are correctly fitted. They should never be tampered with, and if any are loose the wheel must be returned to Cyclemaster Ltd., for servicing with their special equipment.

**9.** If examination shows the hub shell to be in good condition, the next step is to remove the spindle (U.23) from the driving piece (U.29).

**10.** Remove circlip (U.33).

**11.** Withdraw roller retainer (U.32) together with five rollers (U.31). Examine for wear and renew if necessary.

**12.** Withdraw bearing assembly (U.30). Examine for wear and renew if necessary.

**13.** Examine cones (U.22) and (U.42) for pitting in track. Look also for signs of wear on expander taper of (U.42). Renew if necessary.

**14.** Using a suitable drift, drive out oil seal (U.27).

**15.** Remove ten ball bearings (U.28), examine and renew if necessary.

**16.** Examine all working surfaces of actuator (U.34). Should bad wear, scoring or other deterioration be evident, fit new part.

**17.** Make certain that wings of retainer (U.35) bear lightly on the inside of the brake band assembly (U.39). Very light friction should be felt. This retainer also holds in place two rollers (U.36) and is in turn held in position by a small washer (U.37) and circlip (U.38).

**18.** The brake band assembly (U.39) consists of a phosphor-bronze ring slotted on one side in the form of a V. It holds together two halves of a steel bush and the rivet fitted to one half of the bush prevents rotational movement of the phosphor-bronze ring.

**19.** A series of grooves are cut round the outside of the phosphor-bronze ring, and when wear is such that these grooves cannot be seen, a new part must be fitted. It is necessary to replace the entire brake band assembly (U.39).

**20.** The tapered surfaces at each end of the inner bore of the steel bush must be free from scoring, pitting or other visible signs of wear. It is important that the tongues which project inwards are a good fit in the brake cone (U.42).

*Brake Band (Part No. U.*39).
Increased efficiency of the back-pedalling brake has been achieved by a small change in design. The number of grooves in the phosphor-bronze ring has been increased and the position of the locating rivet altered. The new type can be identified by holding it with the split in the phosphor-bronze ring to the top and the locating tongues away from you. The rivet is positioned at 10 o'clock in the new pattern, and 2 o'clock in the original type.
The part number is unaltered and all replacements are now of the new pattern.

## TO REASSEMBLE HUB

Before beginning to reassemble, bearings and working surfaces must be thoroughly cleaned and coated with a good quality light grade bearing grease.

**1.** Place the five rollers (U.31) in the retainer (U.32).

**2.** The bearing assembly (U.30) should be in position on the driving piece (U.29) with the plain end facing the sprocket. If not in position, fit it at this stage.

**3.** Holding the driving piece (U.29) with the small end downwards, feed it into the roller retainer (U.32).

**4.** Fit circlip (U.33) on end of driving piece.

**5.** Fit a new oil seal (U.27). Never in any circumstances use the old one again.

**6.** Position the ten ball bearings (U.28) in the outer end of the driving piece.

**7.** Place bearing assembly (U.30) in end of hub away

from driving sprocket, *with plain side of retainer facing outwards.*

**8.** Fit dust cover (U.40) so that edges are level with outer surfaces of hub.

**9.** Place the actuator (U.34) into the bore of the brake band assembly (U.39) away from the keys which lock the band on to the brake cone (U.42).

**10.** Feed the above assembly into the bore of the hub, from the driving side. The end with the locking keys must go in first.

**11.** Place the brake cone (U.42) into the end of the hub away from the driving sprocket. See that oil retainer (U.41) is in position, and take care to mate the tongues in the brake band assembly with the slots in the inner end of the cone.

**12.** Fit the driving piece assembly (U.29) into the driving end of the hub, rotating it slightly anti-clockwise.

**13.** If the bearing cone (U.22) has been removed from the spindle (U.23) screw it back so that it is hard up against the shoulder at the end of the thread. This end of the spindle is threaded only on the small diameter.

**14.** Feed in the wheel spindle (U.23) from the driving side, and screw it into the brake cone at the same time. The brake cone must be held against its bearing while this operation is being carried out.

**15.** Continue to screw spindle into cone until all bearing play has disappeared. Then slacken back half a turn pending final adjustment.

**16.** Place chain from clutchshaft to drum over drum sprocket.

**17.** Refit engine and mate chain with sprocket on clutchshaft.

**18.** Refit eccentric sleeve (S.03) with thick side of bush on top.

**19.** Position brake arm (S.04) with slotted hole over the flats of the brake cone and the smaller hole bearing on the pin of the engine suspension bracket.

**20.** Refit washer and lock ring (U.44) on the end of the spindle. Rotate the eccentric until the tension of chain to drum is approximately correct (see page 5) and also adjust the hub bearings (page 4) before refitting the wheel. Finally, tighten lock ring hard up against brake arm (S.04).

**Driving sprocket (U.25) must be fully tightened up to the dust cover (U.26) and the driving piece (U.29).**

**Locking Ring (U.24) must be hard up against sprocket (ring has left-hand thread).**

# ENGINE

## GENERAL DESCRIPTION

The Cyclemaster has a two-stroke engine of special design. Crankcase, cylinder and head are separate castings, so closely finished that no gasket is used between cylinder and head.

Connecting rod and crankshaft are supplied as a unit and must always be removed and replaced as a unit. In no circumstances should any attempt be made to separate these parts.

The crankshaft is carried in three main bearings, and is straddle-mounted.

Lubrication is provided by the oil in the fuel (25 parts petrol to 1 part oil).

## METHOD OF OPERATION

The mixture produced by the carburettor (which also contains the engine lubricant) is fed to a port in the gas-tight crankcase, the entry being controlled by the disc valve illustrated. This valve requires no adjustment, and is not likely to wear or go wrong.

All other valves are merely ports in the castings opened and closed at the right moments by the reciprocal movements of the piston.

As the piston rises, it compresses the mixture in the combustion chamber above it, and at the same time creates a depression in the gas-tight crankcase below it.

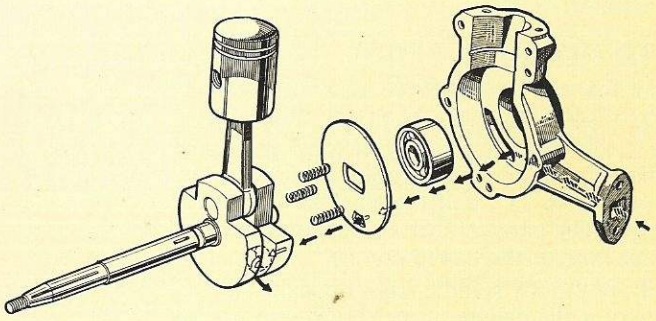


*Diagram showing the path of the gas through the disc valve.*

The disc valve is then in the open position, so that the depression causes a fresh charge of gas to enter the crankcase.

When the mixture in the combustion chamber is fired, the piston is driven down on the power stroke, and as it descends it uncovers the exhaust port in the cylinder wall.

The disc valve in the crankcase is now closed, and as the downward movement of the piston continues, so the fresh charge below it is compressed, and the pressure forces it, through passages in the casting, from below the piston to the combustion chamber above it, when the cycle of operation is repeated.

It will be noted that the piston does not follow the conventional two-stroke design, but has a slightly convex top. The roof of the combustion chamber and the piston top form a symmetrical shape, making for much more efficient combustion and therefore improved performance and economy.

# CARBURETTOR—AMAL

**Wheel Nos. 1—104450**

## GENERAL DESCRIPTION

The engine speed is controlled by the carburettor throttle which is operated by a single lever on the handlebar. On the inlet of the carburettor there is an air filter with a strangler shutter which should be open except for starting from cold.

The carburettor is set, at the factory, to give the maximum performance with economy, but simple adjustments are provided should there be evidence of a mixture that is either too weak or too rich.

The carburettor consists mainly of three parts:—

**1.** The float chamber containing a float and needle.

**2.** The mixing chamber containing a throttle piston, throttle needle, a needle-jet and a main jet which screws into the lower end of the needle-jet and so controls the maximum supply.

**3.** An air filter with strangler shutter.

The float chamber is bolted to the mixing chamber and a petrol-tight joint is made by a gasket; a filter gauze is also inserted between the two.

## METHOD OF OPERATION

The petrol tank contains a filter, and fuel flows through this by gravity to the carburettor float chamber, where a needle valve maintains the correct level in the conventional way.

The fuel is again filtered as it passes from float chamber to jet chamber.

Whilst the main jet controls the maximum supply of fuel, this amount is modified until the throttle is wide open, by a taper needle passing through the throttle and being held in the throttle by a spring; this taper needle works in the needle jet and its function is to limit the supply of petrol until the throttle is wide open.

The position of the needle in the throttle affects the mixture.

Five grooves are cut into the top, or thick, end of this tapered needle. A copper clip is sprung into one of these grooves, and controls the depth to which the needle is allowed to go down into the needle jet, and thus regulates the intake of fuel.

On initial setting, the copper clip is located in the middle groove, and it should not be changed unless there is definite evidence that the mixture is wrong. If the clip is put into the groove nearest the end of the needle the mixture will be weaker, but if put into the groove farthest from the end the mixture will be richer.

## POSSIBLE FAULTS

*Flooding*. Most often caused by dirt or impurities in the fuel lodging in the needle seating, so preventing the valve closing. A bent needle will cause flooding. A most rare occurrence would be a punctured float that had become petrol-logged.

Has the float needle slipped out of the float clip?

*Too rich a mixture* (smoky exhaust) can be caused by the choke being closed, or dirty; by flooding or by a loose needle jet or main jet.

*Too weak a mixture* can be caused by an obstruction to the flow of fuel by choked filters or a choked main jet. Water getting into the fuel supply can produce this also.

## TO REMOVE CARBURETTOR

Push fuel tap to "off" position, then remove air cleaner, carburettor cover and flexible pipe from tank to carburettor.

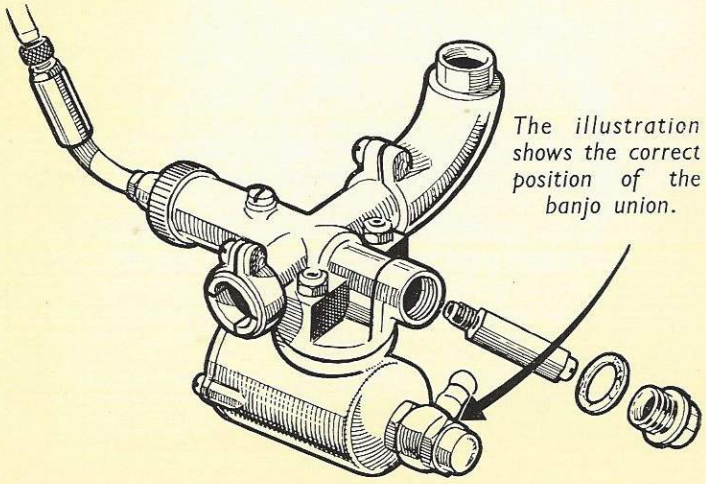
Loosen screw clip where fuel pipe to crankcase joins carburettor and lift carburettor free, with cable still connected.

Unscrew carburettor from knurled cap of mixing chamber then withdraw the throttle piston and tapered needle.

## TO INSPECT FLOAT

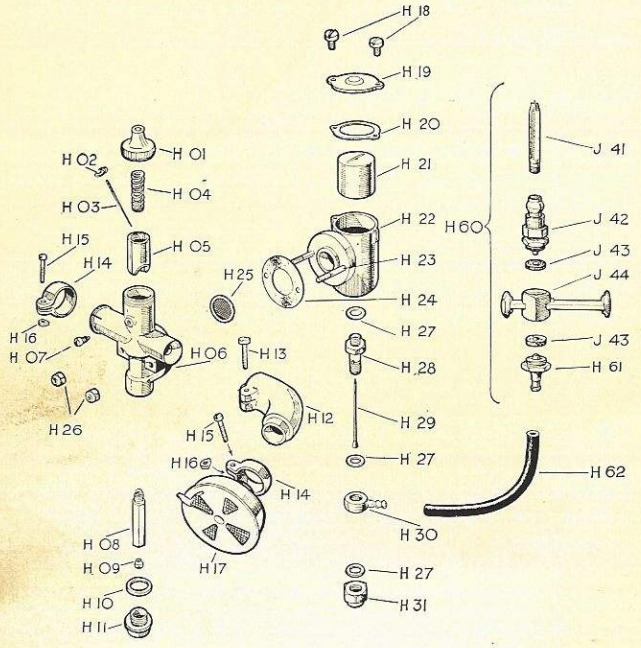
Take off top of float chamber by removing two screws. Then from under float chamber remove banjo nut and union. Retain fibre washers at each side of union.

Now simply press down the needle gently but firmly till it springs out of the wires on the float; then pull out from the underside.



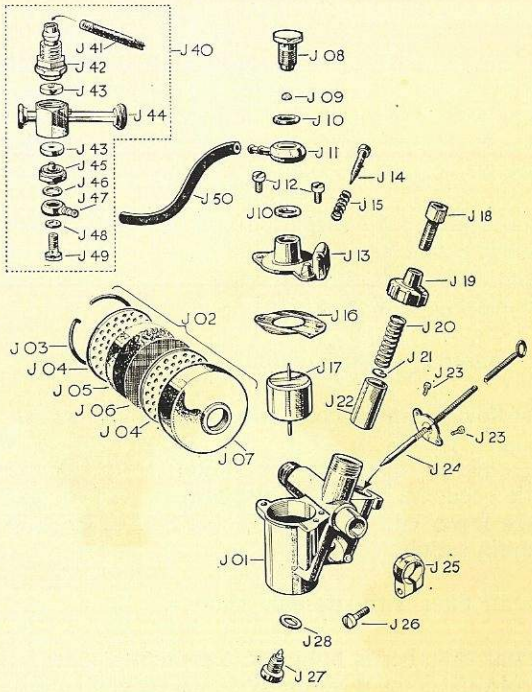
*The illustration shows the correct position of the banjo union.*

## THE AMAL CARBURETTOR

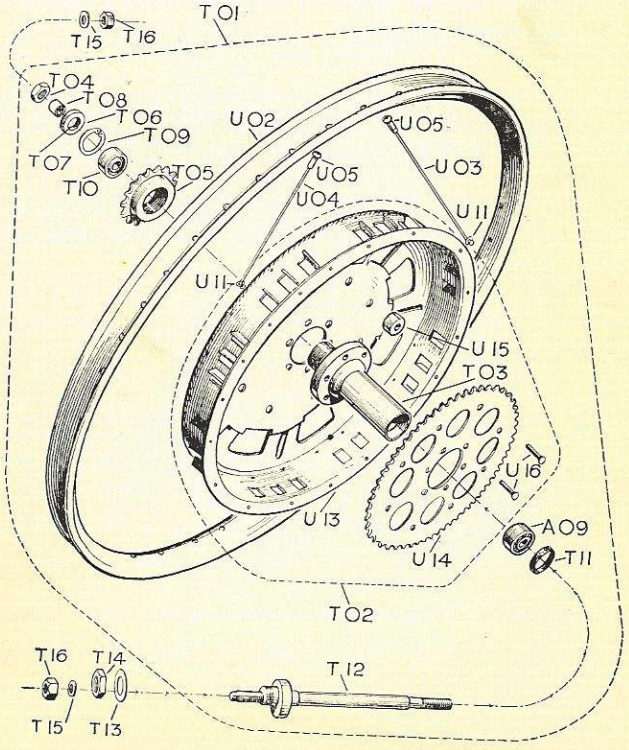



## THE BEC CARBURETTOR

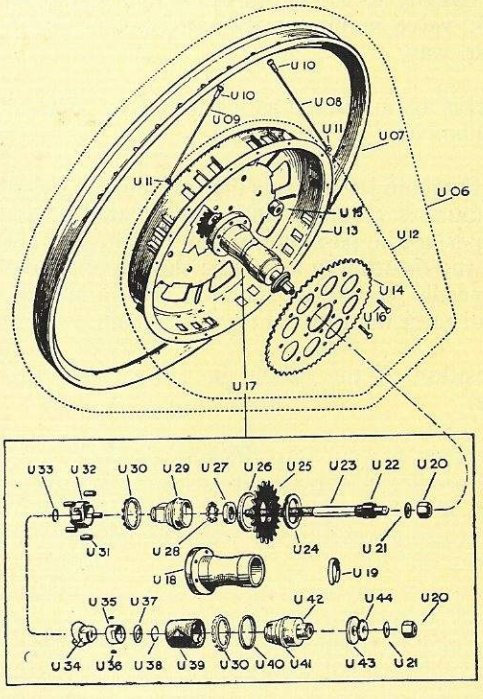
(Introduced at Engine No. 104,451)




## WHEELS 1 to 50000 (Free Wheel Hub)




## WHEELS 50001 ONWARDS (Coaster Hub)



Thoroughly clean. Fit new float if necessary.

To re-assemble, reverse this procedure, being particularly careful to see that retaining wires on top of float are correctly located in groove in needle. The "arm" of the banjo union must be in line with the wheel spindle, as shown in illustration and care must be taken not to over-tighten.

### TO CLEAN JET

With special "CM" spanner (supplied with wheel) remove hexagon nut at lowest point of mixing chamber. Then unscrew jet, apply air line and blow through. The jet should never be cleaned with wire. To re-assemble, reverse the procedure.

### TO CLEAN FILTER

There are two filters which must be kept clean; one is in the fuel tank, the other between mixing chamber and float chamber. To clean the latter:—

Dismantle float chamber from mixing chamber by removing the two nuts on the flange. Remove the gauze filter and wash it in petrol. When re-assembling, it is advisable to fit a new gasket. If new nuts are required, always use the special self locking type. Part No. H.26.

### TO ADJUST MIXTURE

Remove carburettor and take out throttle piston and needle (see "To remove carburettor," page 9).

Free end of control wire first from handlebar lever, and then from slot in piston (wire simply fits into slot, and is held by a nipple on the end, which pushes into a recess in the throttle).

Remove needle complete with spring clip.

On the upper (thick) end of the tapered needle will be seen five circular grooves. A copper clip fits into the centre one, and locates the needle in the carburettor piston. If the copper clip is not in the centre groove, the setting has been altered since the carburettor left the makers.

### MIXTURE TOO RICH

One of the first signs of a too-rich mixture is a thin film of oil deposited on the rim of the wheel by the exhaust system, and the first thing to do is to look at the choke, which may be closed, or dirty. If the choke is in order the copper clip described in the paragraph above must be moved to a higher groove. This will allow the tapered needle to sink further into the needle jet, and so restrict the flow of fuel.

### MIXTURE TOO WEAK

Move copper clip to lower groove. This will prevent the tapered needle going down so far into the jet tube, and so permit a greater flow of fuel.

### TO REASSEMBLE

**1.** Place the long taper end of the needle into the deep recess in the throttle; it will hang there on the clip.

**2.** Place coil spring round the control wire.

**3.** Locate the wire in slot in throttle piston and pull the nipple into the recess provided. See that the coil spring fits into the throttle and holds the needle clip down.

**4.** Offer up piston to mixing chamber. On the outside of the mixing chamber will be seen a small grub screw, the other end of which stands slightly proud inside the mixing chamber. This proud end mates with the other vertical groove in the throttle piston—i.e. the one exactly opposite that in which the control wire is fitted.

**5.** Replace knurled cap and refit the wire into the control lever.

**6.** Refit carburettor to engine by reversing the dismantling procedure. Before tightening clamp screw make sure that the float chamber is vertical.

### TO RENEW THROTTLE CABLE

**1.** Pull outer casing of cable away from lever. Open throttle lever fully, and remove the inner cable from the slot in the lever.

**2.** Remove carburettor from engine and unscrew knurled cap.

**3.** Free cable from throttle piston, and remove knurled cap and spring.

**4.** Fit knurled cap to new cable.

**5.** Pull on inner wire of cable and place spring over it.

**6.** Fit cable to throttle piston, making certain that the tapered needle and circlip are in position. Replace assembly and screw up knurled cap.

**7.** Refit carburettor to engine.

**8.** Reconnect cable to handlebar lever.

**9.** Adjust screw where cable enters carburettor so that the throttle closes fully, but with the minimum of free play in cable.

## CARBURETTOR—B.E.C.

**Wheel No. 104451 onwards**

### GENERAL DESCRIPTION

From Wheel No. 104451 the B.E.C. type B.1 carburettor is fitted instead of the Amal type (see page 9). It has been designed specially for the Cyclemaster engine and incorporates an automatic mixture control which replaces the manually operated strangler shutter. With the B.E.C. carburettor it is not necessary to dismount, after starting from cold, to adjust the mixture.

It is simple and robust in design and, apart from routine cleaning of the air filter, requires little attention.

The carburettor consists mainly of four parts:—

1. The float chamber containing a float and needle.

2. The mixing chamber containing a throttle piston, main jet and adjustable air bleed.

(NOTE.—There is no tapered needle.)

3. A starting well (underneath and parallel with the mixing chamber) containing a spring-loaded needle valve operated by the easy starting control.

4. An air filter.

The float chamber, mixing chamber and starting well are cast as one unit, with the mixing chamber at an angle to allow easy access to the throttle cable and adjuster. The float chamber is, of course, mounted vertically. The air filter body is screwed into the main part of the carburettor, but dismantling is unnecessary except in cases of damage.

Petrol is gravity fed (through two filters) from the petrol tank to the float chamber. The chamber is conventional, but with its needle and valve in the cover (which is bolted to the float chamber itself with a paper gasket in between). The air vent in the projection on the float chamber cover reduces the likelihood of petrol spilling out of the carburettor when the going is very bumpy.

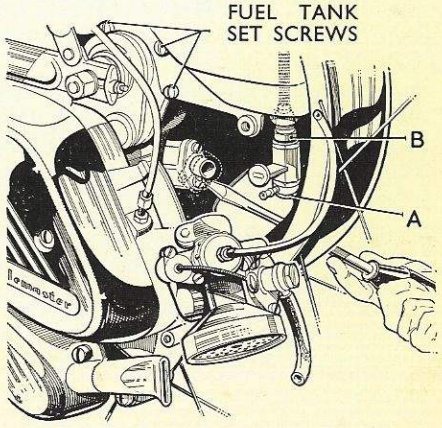
Additional petrol is allowed into the mixing chamber when starting from cold. By lifting the easy starting control the spring-loaded valve in the starting well is opened. Neat petrol then flows from the float chamber into the well. The level of the petrol in the well is controlled by the level of the petrol in the float chamber, and overflowing is impossible no matter how long the needle valve is held open—about five seconds is, in actual fact, the average time needed to fill the well. The well is connected to the mixing chamber by a small drilling, and petrol is drawn into the chamber through this drilling until the well is empty. This additional petrol combines with that drawn through the main jet to give an extra rich starting mixture.

## TO REMOVE CARBURETTOR

Push fuel tap to "off" position and take off carburettor cover plate.

Undo banjo union bolt (A) beneath petrol tap and remove banjo union with petrol pipe attached. Do not lose the two fibre washers.

Go round to the other side of the wheel and get one of the openings in the wheel drum into such a position that you can get a screwdriver through it on to the screw head of the clamp which fixes the carburettor to the engine. Slacken this screw a little and gently ease off the carburettor.




*Removing the BEC carburettor from the engine. In this drawing the fuel tap nipple has had to be shown pointing the wrong way.*

Unscrew knurled cap of mixing chamber and pull out throttle piston. This and the spring will remain attached to the cable.

## STARTING WELL

There is nothing to go wrong in this part of the carburettor. The only movable part is the needle which is kept on its seating by a spring. When servicing the carburettor, however, it is advisable to take out the needle by removing the two cover screws and clean out the chamber; there is no paper joint under the cap. It is most important that the air vent, a slot in the top face of the chamber, is not restricted.

## TO INSPECT FLOAT

Take off float chamber cover by removing two screws and then lift out the float assembly. The assembly should be replaced if inspection shows that either the float or the needle is faulty. The needle seat is pressed into the cover casting, and can only be supplied complete with the cover. Before reassembling, make certain that the drillings for the air bleed screw and vent are free from obstructions.

## TO REASSEMBLE

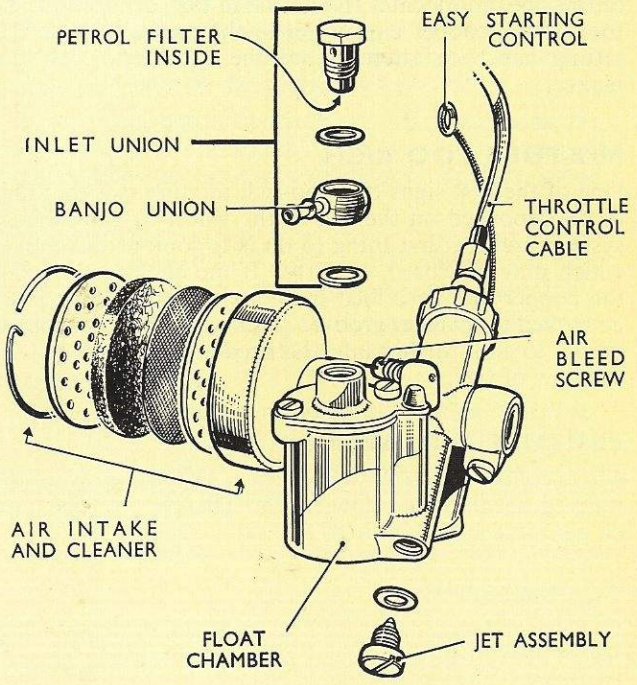
Place the float assembly into the float chamber with the pointed end of the needle uppermost. The plain part at the bottom must fit into the guide bush at the base of the float chamber.

Fit a *new* paper gasket between float chamber and float chamber cover, making sure that the air holes are aligned correctly over the airway drillings.

Guide the pointed end of the needle into its seating in the float chamber cover, and screw cover down.

## TO CLEAN JET

With a screwdriver, loosen the jet assembly nut located at the lowest part of the mixing chamber and remove jet assembly with your fingers. Do not lose the fibre washer.




*The B.E.C. Carburettor*

Blow through the tiny hole in the top of the jet (with an air line if available). The jet should never be cleaned with wire.

To reassemble, reverse the procedure, making sure that the fibre washer is replaced. This is important.

The conical face of the jet forms a petrol-tight seating between the well in the jet and the jet tube above it. Any leakage past this seating will have the same effect as fitting a larger jet. If the seating face inside the mixing chamber has become damaged in any way the complete carburettor should be returned to Cyclemaster, Limited for rectification.

## TO CLEAN FILTERS

There are two filters which must be kept clean; one is in the fuel tank; the other within the banjo union bolted to the float chamber cover. To clean the latter:—

Undo the hexagon nut and remove the bolt, washer, banjo union and other washer. The gauze filter is located inside the bolt.

When lifting out the filter do not damage the gauze.

Clean out both the bolt and banjo union and then replace the filter inside the bolt, carefully pressing it in so that no distortion takes place.

To reassemble, hold the bolt upside down and replace *one* fibre washer. Then fit the banjo union (with its recess nearer the head of the bolt) and the other washer. Keeping everything in position with your fingers, turn the assembly the right way up and screw it back into the float chamber cover. The arm on the banjo union (which takes the petrol pipe) should be over the letters "KS" in the word "Bucks" on the float chamber cover. Tighten well.

## TO CLEAN AIR FILTER

Remove the circlip at the end of the filter and extract the complete "inside." Wash everything in clean petrol, allow it to dry, and dip the gauze strainer in oil. Refit the parts in the order shown in the diagram. The pierced plates have their convex sides pointing away from the carburettor. Make certain that the spring ring is correctly located in its groove. Dismantling, cleaning and reassembling the air filter can easily be carried out without removing the carburettor from the engine.

## TO ADJUST MIXTURE

The only adjustment is carried out by means of the air bleed screw. To weaken the mixture, turn the screw anti-clockwise. To enrich the mixture, turn it clockwise. The average setting is between one and three complete turns back from the fully-closed position.

## MIXTURE TOO RICH

If the correct adjustment cannot be obtained by means of the air bleed screw:—

**1.** Clean the air filter.

**2.** Check that the paper gasket between the float chamber and float chamber cover is not choking the airways. If it is, enlarge the holes in the gasket carefully.

**3.** Blow through the air-ways drilled in the carburettor body.

**4.** Check that the main jet is seating correctly (see " To Clean Jet," page 12).

Slight modifications have now been made to the throttle piston so that a weaker mixture is obtained at small throttle openings.

The new piston replaces the original pattern without alterations to any other part of the carburettor. All replacements from our Parts Department are of the new pattern. They are identified by examination of the bottom face which has a small slot cut in it from the recess to the outer diameter in the same direction as the gas flow.

The original piston had a small hole drilled axially right through. To prevent flow of air through this hole a brass disc was fitted under the spring. If fitting a new type piston the brass disc may be left out.

## MIXTURE TOO WEAK

If the correct adjustment cannot be obtained by means of the air bleed screw:—

**1.** Check petrol pipe for kinks or obstructions.

**2.** Check filters (see "To Clean Filters" and "Petrol Tap").

**3.** Check main jet (see "To Clean Jet").

**4.** Check that the float chamber gasket is not damaged.

## DRYING UP

If drying up occurs when the engine is pulling, check as follows:—

**1.** Check that petrol filler cap vent hole is not blocked.

**2.** Make sure petrol tank is not empty.

**3.** See that petrol tap is fully on.

**4.** Examine petrol pipe for kinks.

If the fault does not lie with any of the above, check the two petrol filters (see "To Clean Filters" and "Petrol Tap").

## PETROL TAP

Inside the petrol tank and attached to the top of the petrol tap is a tubular gauze filter. To clean this, remove the petrol tap and then screw out the filter. Before replacing, it should be cleaned both inside and out.

The seatings in the petrol tap are small cork washers which should be replaced if there is a leak. Dismantle the tap and, when refitting, tighten both screw caps fully. Test the carburettor cover plate for position before tightening Nut B (see illustration on page 12). Never attempt to change the position of the tap unless this nut is slack.

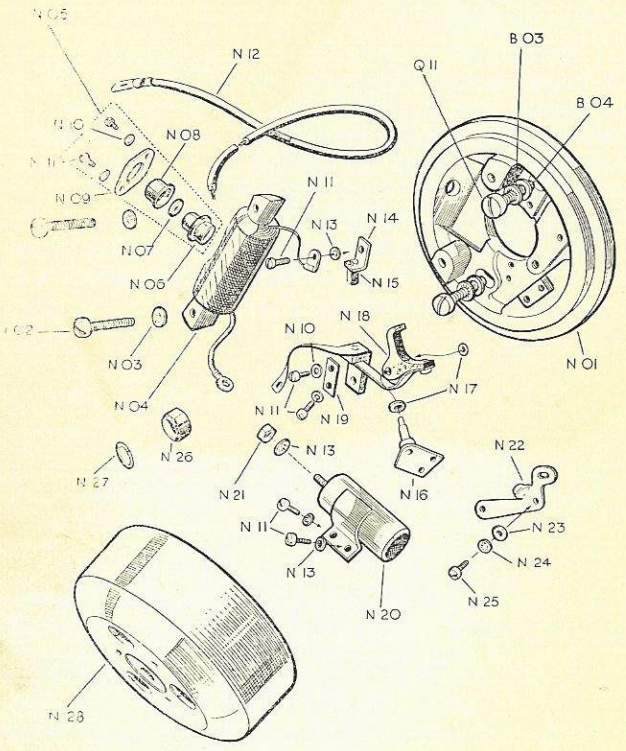
## TO REFIT CARBURETTOR

**1.** Replace throttle piston and spring in mixing chamber. The groove in the slide must locate with the key inside the mixing chamber, and the cut-away portion of the piston must face towards the air cleaner. Screw up knurled cap.

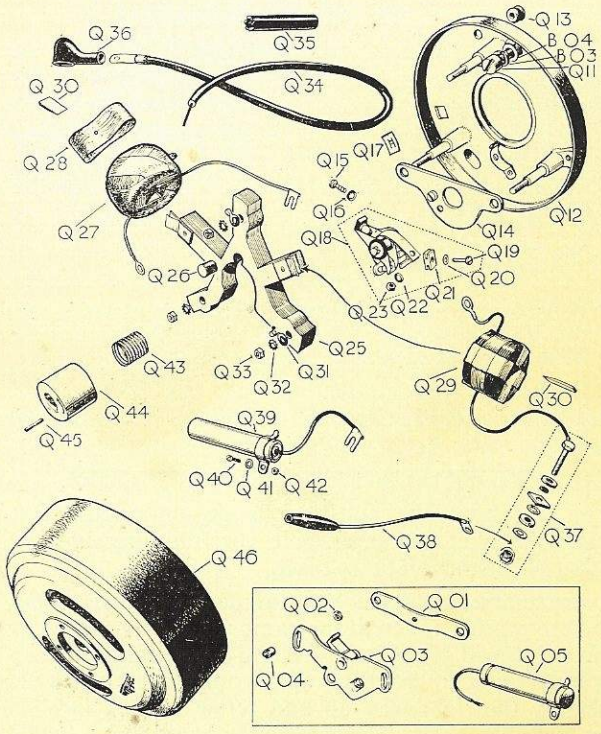
**2.** Make sure petrol inlet banjo union assembly is fitted correctly (see " To Clean Filters,") and refit petrol pipe (if this was removed).

**3.** Fit petrol tap banjo union to other end of pipe, with its recess uppermost.

## WICO-PACY BANTAMAG
**Type FW 1132 Z (Wheels No. 1 to 76750)**

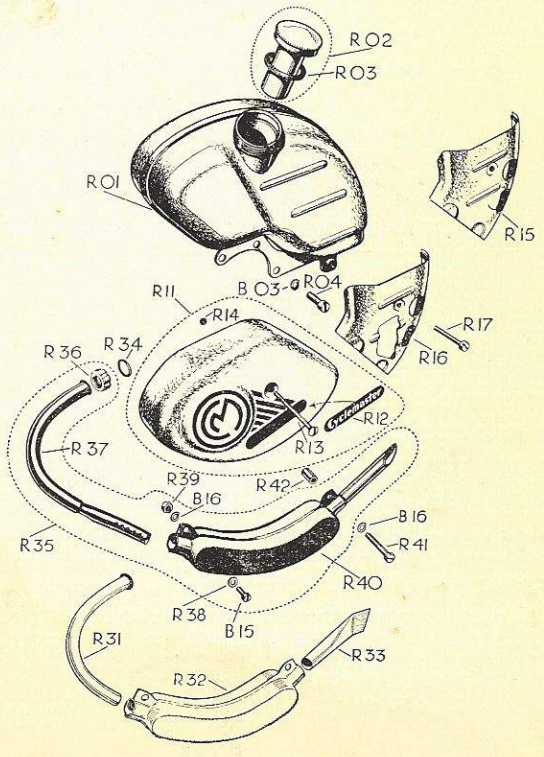



## WIPAC SERIES 90 MAGNETO MARK 1 AND 3
**(Wheel No. 76751 onwards.)**



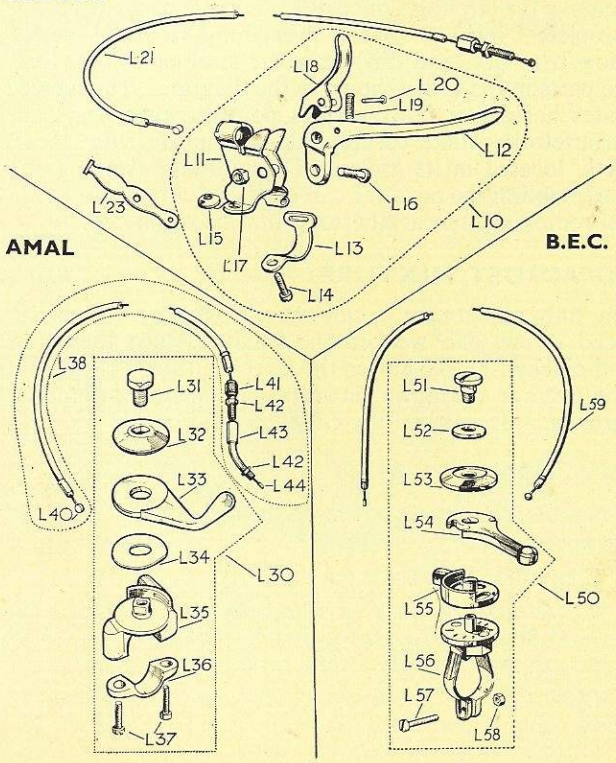

*Parts in the panel are used only in the magnetos of wheels Nos. 76751 to 107827.*

## TANK, COVER PLATES and EXHAUST




## CONTROLS

### CLUTCH



**4.** Fit the carburettor on the engine, making sure that the float chamber is upright.

**5.** Tighten clamp screw through hole in wheel drum.

**6.** Refit banjo union under petrol tap. Put the smaller washer on the banjo bolt first; feed the bolt through the banjo union which was left suspended on the petrol pipe. Fit the other washer and screw Nut A (page 12) into the petrol tap assembly. Tighten well.

**7.** Replace carburettor cover.

### TO RENEW THROTTLE CABLE

**1.** Remove centre screw, washer and disc from handlebar control. Pull out cable and replace disc, washer and screw.

**2.** Remove carburettor cover plate and unscrew knurled cap from mixing chamber. Draw out assembly.

**3.** Remove cable from throttle piston, noting order of piston, brass washer (if fitted) and spring.

**4.** Remove knurled cap from cable.

**5.** Place knurled cap and spring on new cable. Place brass washer inside piston and fit cable to piston, with the cut-away portion of the piston farthest from knurled cap. Now no brass washer is used. (See " Mixture Too Rich," page 13).

**6.** Refit assembly to carburettor and carburettor to engine (see page 13).

**7.** Refit cable to handlebar control, making sure that the disc seats correctly (projection under disc fits into slot in body), and that the convex side of the washer is next to the head of the centre-screw.

## IGNITION—BANTAMAG

**Wheels No. 1 to 76750**

### GENERAL DESCRIPTION

The Bantamag flywheel magneto may be examined and serviced simply by removing the "CM" engine cover. The complete assembly consists of two main parts:—

(*a*) The Rotor fly-wheel, which is balanced statically,

(*b*) The Stator.

Upon the Stator is mounted the condenser, coil and contact breaker.

All normal service work can be carried out through holes in the rotor, without removing the wheel.

If condenser or coil have to be replaced, the rotor must be removed as described later.

### LUBRICATION

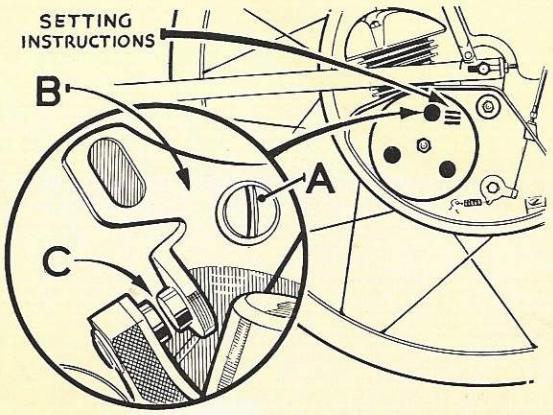
Lubrication is provided by means of a greased pad. This should seldom require attention, but if on inspection it appears dry, the pad should be removed and grease kneaded into it.

### CONTACT BREAKER

**1.** Turn the rotor until the hole on the right is the one with the gap setting instructions for C.C.W. rotation beside it. The points will then be fully open, and adjustment can be carried out through that hole.

**2.** Slacken locking screw.

**3.** With a screwdriver, move arm which is normally fixed, until gap is right. The maximum gap should be ·018", and we recommend that the points should be set so that a .015" feeler will *just* pass through. After setting, tighten locking screw and re-check.




*How to inspect and adjust the contact breaker points on Wheels No. 1 to 76750. To adjust the points; slacken screw A and move the plate B as necessary to open or close the points C. When correct tighten A and recheck.*

### PLUG LEAD CONNECTION

The hard wire from the high tension coil should fit into the centre of the plug lead in contact with the wire, but not piercing the insulation. It is most important that this connection is correctly made before fitting the insulation bush over the joint. The diameter of this bush is larger at one end and this fits into the magneto back-plate. If assembled the wrong way round, excessive pressure is exerted on the connector assembly, but insufficient on the rubber grommet which grips the plastic cover of the lead. The insulation bush should be replaced if examination shows any signs of breakdown or tracking.

### OTHER CONNECTIONS

All coil, condenser and point screws should be tight and make a good electrical contact. Make certain that there is sufficient clearance between the condenser connection tag and any other part of the magneto. If fitting a new coil, make certain that the laminations of the core fit squarely on the back-plate. Insulation material in this joint may affect the position of the coil in relation to the magnets of the flywheel.

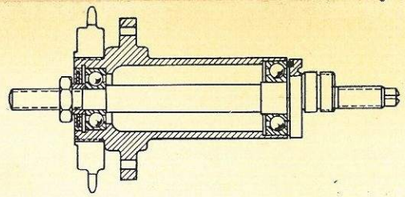
### OPERATING CAM

The operating cam should be a good fit on the crank-shaft, but as long as there is no rotational movement it will operate satisfactorily; a loose cam will, however, eventually develop this fault. Replace any loose cam with a new one.

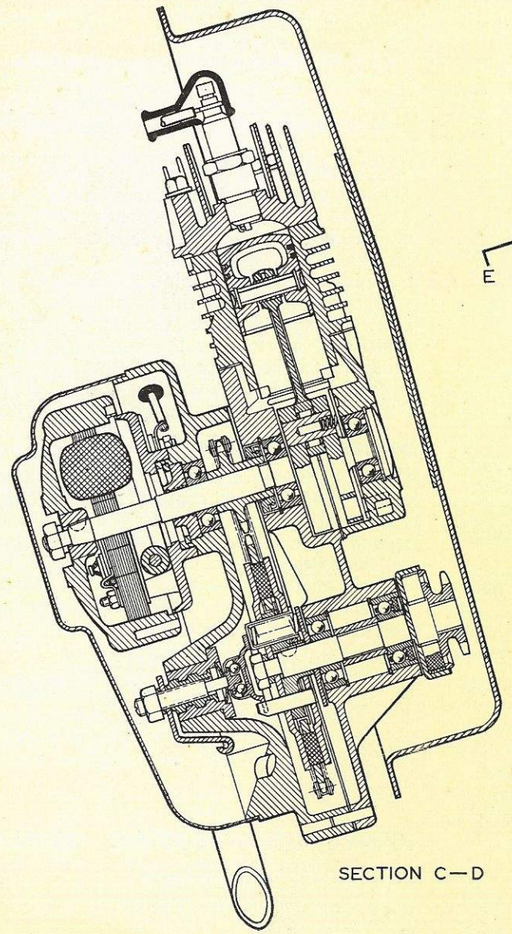
## IGNITION—WIPAC SERIES 90

**Wheels No. 76751 onwards**

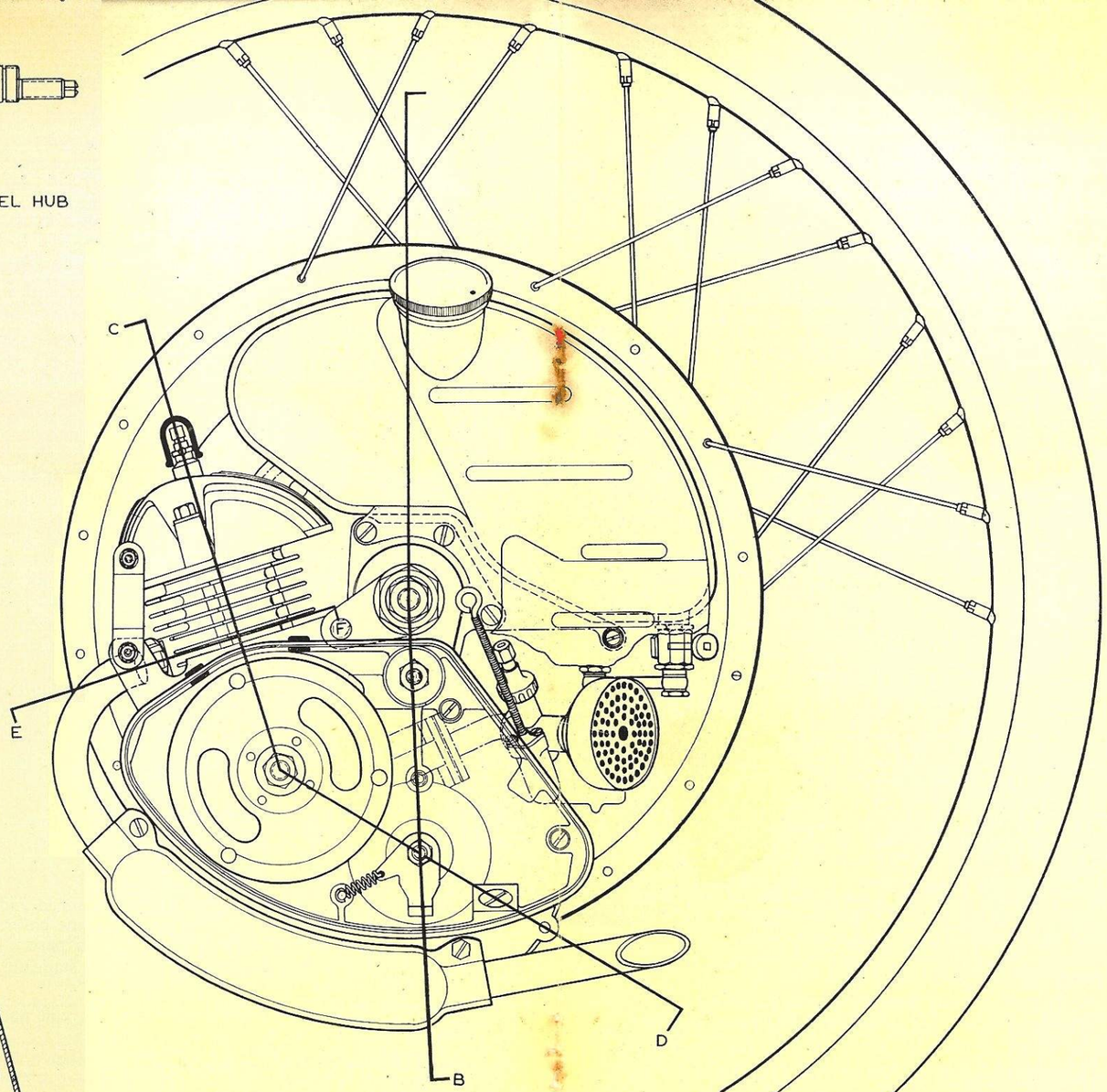
From Wheel No. 76751 onwards the Bantamag magneto has been replaced by a new unit embodying a lighting coil. This is the Wipac Series 90 magneto. It is inter-changeable with the Bantamag, but the complete unit (stator-assembly, rotor and crankshaft cam) must always

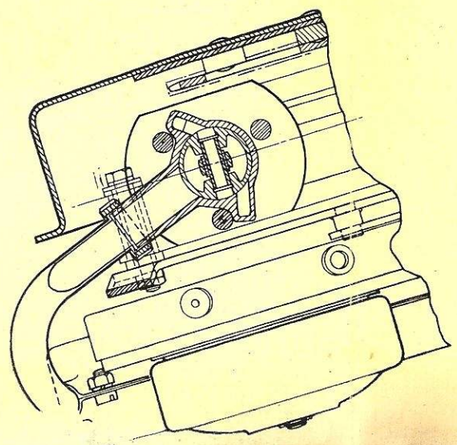


SECTION THROUGH FREE WHEEL HUB

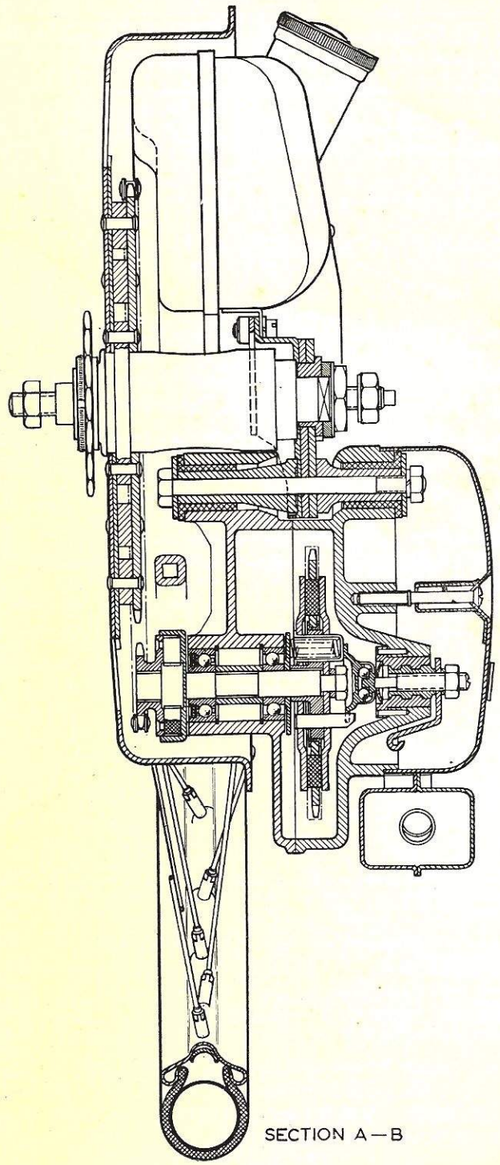


SECTION C—D



SECTION E—F



SECTION A—B

be used together. In no circumstances should any attempt be made to use the rotor of one type with the stator of the other.

The new unit consists of two main parts.

(*a*) The rotor-flywheel which is balanced statically and which houses the magneto;

(*b*) The stator which carries the condenser, coil and contact breaker for the ignition, and the lighting coil.

The lighting lead is connected to a terminal at the back of the stator, and it protrudes from the crankcase in the form of a "push in" connector. The leads from head and tail lamps fit in this connector.

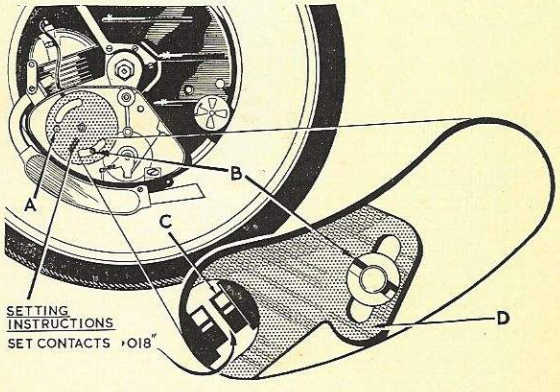
The total output is 6 volts, 8.7 watts, and bulbs which together at least give this capacity should be fitted to the lamps. For the headlamp we recommend a 6-volt 1 amp bulb (6 watts) and for a rear light a 6-volt ·45 or ·5 amp bulb (3 watts).

Alternative bulbs giving a brighter headlight can be supplied, viz., 6 volt 8 watts for the headlamp and 6 volts 1 watt for the tail. It is essential that these two bulbs are *always* used in conjunction.

## CONTACT BREAKER Wheel Nos. 76751—107827

Turn the rotor until the slots are in the "setting" position shown below—that is so that the contact breaker points are *just* visible immediately beneath the words "Set Contacts .018″." In this position the contact-breaker points will be fully open, and a .015″ feeler gauge should *just* pass between them. (.018″ is the maximum gap.)

If the points need adjustment, slacken nut B (which is already visible) half a turn. Then move the rotor until nut A becomes visible. Slacken this half a turn also. Next, turn the rotor until the points are, once again, just visible beneath the words "Set Contacts .018″." Move the plate (D) until the gap between the points (C) is correct.




*To examine and inspect the contact breaker points on Wheel No. 76751 to 107827.*

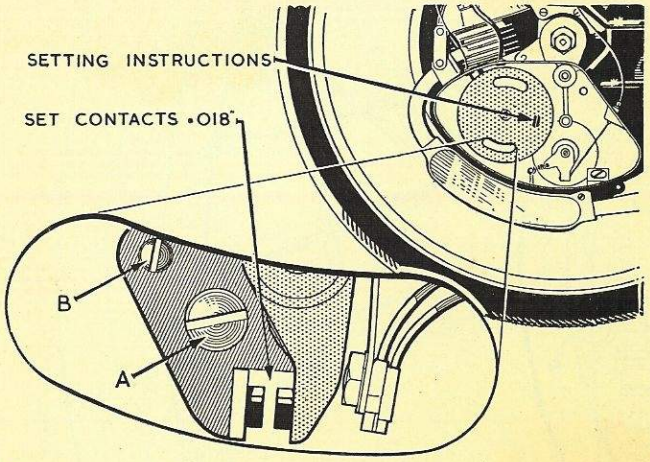
Tighten the two nuts B and A again in that order. It is necessary to turn the rotor when tightening the contact-breaker assembly plate, but it should always be turned back to the "setting" position for the purpose of re-checking the gap after tightening the nuts.

The contact points are mounted on a plate as an assembly, and complete assemblies only are supplied. When fitting a contact plate assembly, make sure that the lower end of the pivot fits into the location hole of the breaker arm support plate before fitting the nuts.

Connections from this assembly to the condenser and coil are soldered.

## CONTACT BREAKER Wheel Nos. 107828 onwards

From Wheel No. 107828, modifications to the position of the flywheel key, together with a modified contact breaker, alter the method of setting the points. For these models, proceed as shown in the diagram and details below:—




*To examine and inspect the contact breaker points on Wheels No. 107828 onwards.*

Turn the rotor until the points are fully open, *i.e.*, when they are in the *centre* of the lower inspection slot. In this position a .015″ feeler gauge should just pass between them. If adjustment is necessary, slacken the locking screw A a quarter of a turn, then rotate the adjusting screw B until the gap is correct. Re-tighten A and re-check the adjustment to make sure that the gap did not alter when you tightened the locking screw. The *maximum* gap must be no more than .018″.

As with the earlier pattern the contact points are mounted on a plate and, if replacement is necessary, a new assembly must be fitted.

## INTERCHANGEABILITY

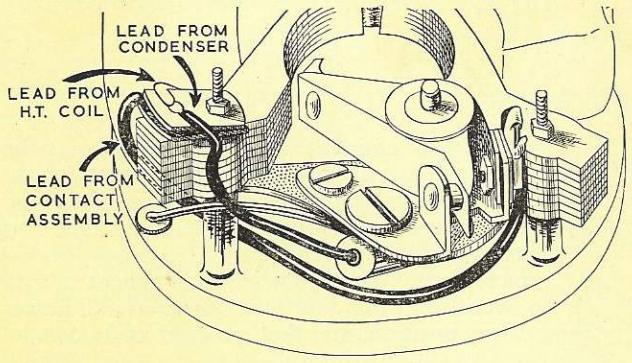
Rotors with the new keyway position are easily recognised. There is a shallow recess for the crankshaft washer and nut, while the earlier pattern has a flat face. Either type Series 90 rotor can be used with either type Series 90 stator, providing that the appropriate rotor position is used when adjusting the points. (See diagrams above and left.)

Contact-breaker point assemblies are also interchangeable, but must be fitted complete with their correct mounting plate. This is clamped under the core assembly, which must be removed to change the plate.

When fitting a new type assembly to an old type stator, longer connection leads from both coil and condenser have to be fitted, and it is essential that, when doing this, efficient and correctly insulated joints are made.

Supplies of the original contact-breaker assembly (Series 90 Mark 1) may be in short supply, so a suitable conversion set is available. It consists of the later pattern assembly together with a mounting plate, a short lead and terminal block. The mounting plate goes under the core assembly in place of the earlier pattern (Part No. Q.01). The terminal block fits under the core mounting nut to the left of the points so that the leads from the condenser and coil easily reach it.

Connections must be soldered and all leads positioned so that they are clear of rotating parts and do not obstruct use of a screwdriver for tightening the stator screws.




*How to fit the new type contact breaker to Wheels No. 76751 to 107827.*

### CONDENSER AND COIL (Both types Series 90)

The condenser can be removed without dismantling the core, by disconnecting the lead and then undoing the clamp screw. The condenser can then be withdrawn between the core and the edge of the stator.

To replace either the lighting coil or ignition coil, first remove the coil and core assembly from the stator, disconnect the leads, and turn back the brass location tags. Then pull off the coils. When replacing them or fitting new ones it is most important that they should be pushed right home and the brass location tags turned over securely. Any slackness should be taken up by a fibre packing wedge (Part No. Q.30).

The thickness of the core has been reduced by using only 10 laminations instead of 11. The packing piece is intended to take the place of one thickness. When fixing a new H.T. coil to the original 11 lamination type, the sharp edges, particularly at the outer end, should be smoothed off with a fine file and emery cloth. Pushing a new H.T. coil on to this type of core can cause damage to the inside of the coil if the edges are sharp.

On some of the earlier models, the earth connection for the lighting coil is soldered to the underside of the brass location plate. The latest type has a tag which is clamped under one of the core attachment nuts.

On the latest models a plastic band covers the connection between the high-tension lead and the coil. This should be fitted to the earlier types when they are being serviced. Its Part No. is Q.28. No attempt should ever be made to solder the high-tension lead to the brass tag of the coil. Excessive heat in this area may do serious damage to the internal connections and insulation.

When reassembling the coil and core assembly to the stator plate, make sure that the back of the coil is not pressing against the casting. If necessary, the casting should be cut away to ensure clearance.

### OPERATING CAM (Both types Series 90)

The cam is held away from the crankshaft shoulder by a spring and the cam should be in contact with the inner face of the rotor hub. Care must be taken not to assemble this cam the wrong way round, or incorrect point timing will result. An arrow shows the direction of rotation. Always check this on assembly.

If the cam has been removed from the crankshaft, make certain when refitting it that the heel of the moving contact is clear of the side face of the cam. The rotor should not be refitted until the cam is almost in its working position, and there is no danger of breaking the moving contact by side pressure. The contact assembly plate should be moved as far as possible in an anti-clockwise direction during this operation, since this movement will lift the heel of the moving contact away from the cam.

When refitting the stator screws, care must be taken to avoid damaging the leads connecting coil and condenser to the moving contact. On a few early models of this magneto, it is necessary to insert the lower screw before the stator is offered up to the crankcase. On current production there is more clearance but great care is still necessary.

### LUBRICATION (Both types Series 90)

The cam which operates the points is lubricated by a piece of felt located in the stator core. This should be regreased once a quarter, by removing it and squeezing a good quality bearing grease into it. Wipe away all surplus lubricant before refitting. You can use a few drops of engine oil instead, if you like, but this must only be added in *very* small quantities. Excess oil will run down on to the contact points and stop the magneto from working.

## IGNITION—General Information

### (BANTAMAG AND SERIES 90)

### CRANKSHAFT KEY

Careless refitting of the flywheel can displace the crankshaft key and rotation of the engine in this condition will cause irreparable damage to the coil. It is possible to detect any movement of the key by observation through one of the holes in the flywheel.

### DRAINAGE HOLE

A drain hole is now drilled at the lowest point in the Cyclemaster cover, so that any excessive moisture caused by condensation or otherwise can drain off. It has also been found that this reduces any tendency for oxidization of the points. If your engine has no such drainage hole, we recommend that you should drill one; it should be $\frac{1}{8}$" in diameter and approximately $\frac{3}{8}$" from the inside edge of the cover, in line with the centre of the Cyclemaster nameplate.

### POSSIBLE FAULTS

If there is no spark, we recommend the following sequence of operations:—

**1.** Examine sparking plug, without removing wheel or plug, for:—

(*a*) fitting of terminal;

(*b*) moisture on insulator, or lead;

(*c*) tightness in head: if it is slack, earthing will be poor;

(*d*) soundness of lead.

Correct any faults, and test for spark.

**2.** Examine contact-breaker points for cleanliness, pitting, wear, gap (should be .018″ when fully open).

**3.** Examine contact-breaker arm for sticking on fulcrum pin.

**4.** If still no spark, examine junction of plug lead with coil. (If Bantamag see "Plug Lead Connection" on page 15.)

**5.** If still no spark, check condenser and ignition coil, making certain that their connections are clean and tight.

### IGNITION TIMING

To check the timing, remove the spark plug and turn the engine until the piston is in the T.D.C. position. Mark the flywheel and crankcase in line, and then rotate the flywheel in an anti-clockwise direction for almost one complete turn. When the mark on the flywheel is about $\frac{7}{8}$″ to the right of the mark on the crankcase, the contact breaker points should just be starting to open. If adjustment is necessary proceed as follows:—

**1.** Turn rotor until elongated slots at top and bottom of stator can be seen.

**2.** Slacken both screws.

**3.** To advance spark, turn stator in a clockwise direction.

**4.** To retard spark, turn stator anti-clockwise.

**5.** Tighten screws.

### IGNITION SUPPRESSOR

The law now demands that all new motor car and motorcycle electrical ignition apparatus is fitted with suppression equipment which satisfactorily overcomes interference with television reception.

From engine 117074 a 5,000 ohm resistor is installed in the sparkplug lead. It is positioned in the lead between the back of the stator plate and the rubber grommet in the engine casting.

In the very unlikely event of failure it is necessary to remove the magneto to fit a new one.

For attachment to any engine not already equipped it is quite satisfactory to position it outside the engine casing between the crankcase grommet and the sparkplug terminal. To do this the magneto need not be removed. A special suppressor to fit the Cyclemaster plug lead is available from dealers. (Part No. Q.35.)

Do not use the type of suppressor which fits on to the sparkplug, as this reduces the clearance between the plug terminal and the wheel drum.

## CLUTCH

A single plate wet clutch embodying cork segments is fitted. It operates constantly in an oil bath, the level of which must be inspected once every three months.

Remove the "CM" cover plate. In the right-hand lower corner of the casting now revealed will be seen a taper plug with a screwdriver slot in it. Remove this plug.

Oil should just cover the lower part of the chain which you can see through the hole; if it does not, then the clutch chamber requires topping up with best quality gear oil. Never overfill. (As a guide, oil should just show on the tip of a screwdriver blade inserted $\frac{3}{4}$″ below the face of the filler plug hole.) For approved oils, see page 2.

Replace taper plug and engine cover.

### ADJUSTMENT

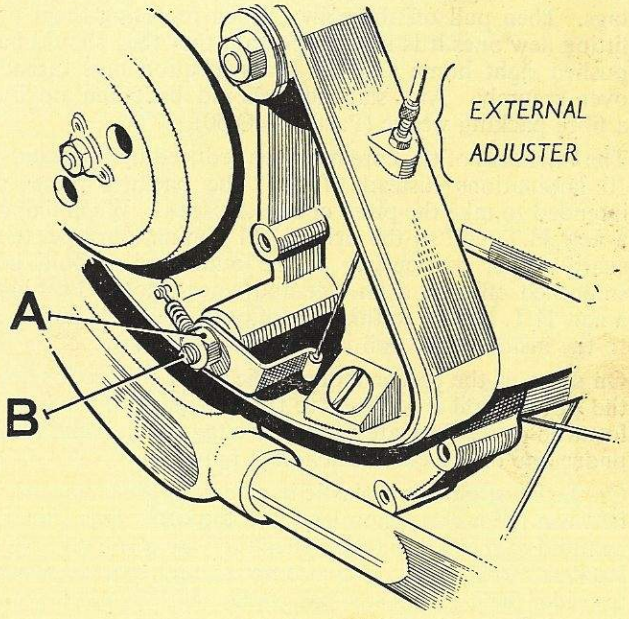
When the clutch is correctly adjusted there should be $\frac{1}{4}$″ free travel at the tip of the control lever on the handlebar. An external adjuster is provided where the control cable enters the casting. Slacken lock nut, and screw adjuster upwards to reduce the free travel: downwards to increase it. When sufficient adjustment can no longer be obtained in this way turn the external adjuster to the mid-way position, and then proceed as follows:—

Remove the "CM" cover plate. The clutch operating rocker, to which the control wire is attached, will now be revealed. Hold adjuster (B) with screwdriver while slackening locknut (A) with spanner.

To obtain less free travel, turn adjuster to RIGHT ("screw up").

To obtain more free travel, turn adjuster to LEFT ("unscrew").

Hold adjuster with screwdriver and tighten locknut. Check free travel at handlebar control then replace engine cover.




*How to adjust the clutch.*

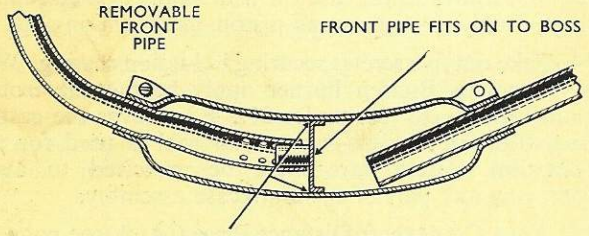
## TRANSMISSION SHOCK ABSORBER

On the outer end of the clutch shaft is mounted a chain sprocket which transmits the drive to the inside of the drum. This sprocket is driven by the use of four rubber blocks which fit in between tongues on the sprocket and tongues on the shaft. It is held in position by a locating ring and taper pin. Replacement rings are provided with one hole only drilled. When fitting a new ring, it is most important to press it on to the shaft with the one hole in line with the hole through the shaft. Correct alignment for the taper pin is maintained by drilling through the existing holes to the other side of the collar. It is also most important that the taper pin fits the hole correctly. A No. 48 drill should be used, followed by a $\frac{3}{32}$" taper reamer. From Engine No. 91043, the sprocket is held in position by rivets through the sprocket into the drive housing. If any part of this assembly requires replacement or attention, it should be returned to our Service Department.

## EXHAUST SYSTEMS

Up to Wheel No. 113407 exhaust systems cannot be dismantled. Except for cleaning the fishtail with wire, the decarbonizing of the silencer can only be achieved by cutting a hole in its side and rewelding it afterwards, or by burning the silencer over a gas ring until the carbon inside flakes off. As much as possible of the loosened carbon is then shaken out through the front pipe.

From Wheel No. 113408 a new type exhaust system has been introduced. There is no fishtail to clean and those parts of the silencer which become blocked with carbon can be cleaned by dismantling the silencer from the exhaust pipe.




**1.** Remove complete exhaust system and clamping screw where exhaust pipe enters silencer (in a few cases there is no screw—it is a push fit).

**2.** Rotate silencer very slightly and "work" it away from exhaust pipe.

**3.** Thoroughly clean the perforations that are now visible in the end of the exhaust pipe. Look into the silencer. In its centre is a baffle plate which should have a hole in each corner. Make sure that these holes are free of carbon (use a piece of stiff wire or a knitting needle). Shake out any loose particles of carbon.

**4.** Refit exhaust pipe to silencer (the illustration shows the correct method of assembly). As when dismantling, rotate the silencer as little as possible when refitting. (The most convenient method of assembly is to hold the silencer upside down in the left hand, and insert the exhaust pipe by holding it in the right hand with its curved portion at approximately 4 o'clock.)

**5.** Refit exhaust system to engine. From wheel No. 127166 (Export 126198) a hexagon head screw is used at the rear and it is locked in position by a tab washer. It is advisable always to fit a new one. (Part No. R.43) Finally tighten clamp screw where exhaust pipe enters silencer.

# DECARBONIZING

Before deciding to decarbonize, see that the exhaust system is not choked. (See above.)

If there is still a falling off in power, decarbonizing is probably indicated. The best way to check this is to inspect the exhaust port. Unscrew the ring holding the exhaust pipe to the cylinder and remove the exhaust system. Looking into the cylinder you should see a well defined rectangle approximately $\frac{5}{8}$" wide by $\frac{5}{16}$" deep. Any substantial change in size or shape indicates that decarbonizing is necessary.

If the port is free from carbon and yet the engine still loses power, check the ignition timing as described under "Ignition."

The decarbonizing of the Cyclemaster engine is a straightforward operation, but up to Wheel No. 111859 it cannot be done without removing the engine from the wheel, as both head and cylinder foul the wheel drum.

From Wheel No. 111860 onwards all engines are fitted with a modified cylinder head, special sleeve nuts and shorter studs. The cylinder head can be removed without taking the engine from the wheel. On these models, operations 1 to 3 (below) can be carried out while the wheel is still fitted to the bicycle. With models *before* Wheel No. 111860 the wheel must be removed from the bicycle *and* the engine removed from the wheel.

To remove engine, see page 6.

**1.** Remove exhaust system. So that no strain will be put on the piston and connecting rod, it is important to loosen the flange nut (R.36) before slackening the cylinder head nuts. Then lift cylinder head by removing three nuts. There is no cylinder head gasket.

**2.** Scrape carbon away from head, from top of the piston and from inside top of cylinder beyond limit of piston travel. Do not use sharp tools for decarbonizing the piston crown or cylinder head—the surface of these components should not be scratched. Always blow away fragments of carbon with air line or tyre pump, being most careful to see that no carbon is blown into the inlet ports.

**3.** Examine inlet and exhaust ports. If the two inlet ports are clean, the exhaust port can be scraped at this stage and the engine reassembled. If, however, the inlet ports also require scraping, the cylinder must be removed, and the logical thing to do is leave the exhaust port until the cylinder is off and then clean all three together.

When scraping out ports do not make sharp edges which may damage piston.

### Wheel Nos. 111860 onwards

If the cylinder is to be removed the engine will have to be taken out at this stage.

**4.** To remove the cylinder, use two nuts on each stud as illustrated on page 28. Remove studs with spanner and lift cylinder straight up: do not attempt to twist it, or there will be a serious risk of breaking the piston rings. There is a paper gasket between cylinder and crankcase. A new one will be required. Part No. B.10.

**5.** It is important to remove carbon from the piston ring grooves. The rings are delicate, and must be eased off by using shims, evenly spaced around the piston. The crankcase should be packed with rag while cleaning the grooves, to keep out carbon.

**6.** When refitting rings, make sure that they are correctly located, with the gap of each fitting over the small projection in each groove. (See special instructions on page 23 and page 26.)

Always oil the cylinder wall before refitting the head. Use engine oil very sparingly.

**7.** When refitting exhaust system do so after the cylinder head nuts have been tightened. Always *recheck* all head and exhaust bolts for tightness with the engine *hot*.

## TO DISMANTLE THE ENGINE

**1.** Remove engine from wheel (page 4).

**2.** Remove carburettor, induction pipe and gasket by undoing two set screws, with spring washers, securing induction pipe flange to engine casting.

**3.** Free clutch cable (L.21) by releasing cable from operating crank (F.01).

**4.** Remove clutch adjuster locknut (A.21), spring washer (A.20), crank (F.01); withdraw 2-start screw (F.04) together with setting screw (F.03) from casting.

**5.** Take out screw and distance piece holding exhaust tail pipe.

**6.** Slacken ring nut (R.36) securing exhaust to cylinder. Remove, with copper asbestos washer.

**7.** Undo nut (A.21) from end of crankshaft spindle. Remove with spring washer (A.20). Use Rotor Retaining Arm CA.11 (see page 28) for holding the magneto rotor while slackening the nut. (Bantamag only.)

**8.** Withdraw rotor with extractor CA.1 or CB.1 (see page 28). Screw in the screws until the bite is felt, then turn key. Should an extractor having screws without shoulders be adapted for use, great care must be taken not to screw down too far.

**9.** Remove Woodruffe key (A.15) from crankshaft.

**10.** On wheel Nos. 76751 onwards, remove cam, driving key and spring.

**11.** Remove two setscrews (Q.11), washers (B.04) and spring washers (B.03) securing stator, and withdraw stator, pulling spark plug lead *and grommet* (B.28) through hole in casting. (Grommet must be removed, as lead terminal will not pass through it.) Disconnect lighting lead if fitted.

**12.** On wheels No. 1 to 76750, remove circlip and cam.

**13.** Undo and take out tapered filler plug from clutch chamber. Drain off lubricant: replace plug.

**14.** To remove the clutch housing casting, Clutch Housing Casting Extractor CA.2 is required. (See page 28.)

First, remove 6 setscrews (B.22) (there are no washers)—4 inside the chamber, 2 out. There are also two locating dowels, one free, one blind; the free one (just below the tapered filler plug) must be tapped out. Then screw the threads of the extractor into the tapped holes from which you withdrew the set screws holding the stator.

Next apply a spanner to the extractor; withdraw the casting. While doing this, watch that the clutch end thrust assembly (F.08) does not fall.

**15.** Lift away clutch end thrust assembly.

**16.** Using Ball Race Extractor CA.3 illustrated on page 28, withdraw outer ball race (A.09) from driving end of crankshaft.

**17.** Undo clutch retaining locknut (F.09) and spring washer (A.20), using box spanner.

**18.** Ease off clutch assembly, crankshaft sprocket and chain (which is endless and therefore cannot be removed by undoing a link). Do not lose the four small springs and cups inserted in the face of the inner clutch plate.

**19.** Remove and retain the Woodruffe keys from the crank and clutch shafts, then remove clutch thrust plate (F.17).

**20.** Take out spark plug and lift cylinder head—3 nuts and washers. For decarbonizing instructions, see page 21.

**21.** To remove cylinder, use two nuts on each stud (as shown on page 28) and remove studs with spanner. In lifting off cylinder, do not twist or you may break the piston rings. There is a paper gasket between cylinder and crankcase. This should always be discarded and a new one fitted. (Part No. B.10).

**22.** With round-nosed pliers, take out two circlips (each end of gudgeon pin) and press out gudgeon pin with Piston and Gudgeon Pin Tool CB. 10 as illustrated on page 29. Piston comes away with tool.

**23.** To remove rings, ease off with shims of metal under rings, evenly spaced around piston, as shown on page 28.

**24.** Take out five screws securing induction casting. With blowlamp or Bunsen burner apply heat evenly round main bearing (to just under 212° F.). Lever the casting free with screwdriver—no special tool is used for this operation. Great care must be exercised to avoid damaging any part of the crankcase assembly.

**25.** Place Crankshaft Distance Piece CA. 9 (see page 28) between cheeks of crankshaft. Put two other pieces of metal across casting faces either side of crankshaft; place in press and press out.

**26.** Draw remaining ball races from crankshaft, using Ball Race Extractor CA. 3 and CA. 4 in conjunction with Ball Race Clamp CA. 5. (See illustrations on page 28).

**27.** Remove disc valve, being careful not to lose the three springs behind it. If disc is scored or worn, scrap it and fit a new one.

**28.** Press clutch spindle through housing. One ball race, with a distance piece, will come away with the spindle, and may be withdrawn by using Ball Race Extractor CA. 3 in conjunction with Ball Race Clamp CA. 5. (See illustration on page 28.)

**29.** Remove two circlips and press the other bearing from the casting.

**30.** With Wheels 1—91043 remove drive housing and examine rubber segments which give the cushioned drive: renew if there are signs of deterioration (tip segments slightly to lead in).

# BEFORE RE-BUILDING THE ENGINE

## PISTON CLEARANCE

The piston of the Cyclemaster is tapered towards the top, to allow for the greater expansion at the top caused by the burning gases. Clearances should be:—

**Wheels No. 1 to 73500**

.004″ at crown; .002″ at bottom of skirt.

**Wheels No. 73501 onwards**

.0046″ at crown; .003″ at bottom of skirt.

If wear has taken place, we do not recommend re-boring or honing, as special equipment is required for this delicate operation. A new cylinder and piston should be fitted.

## PISTON RINGS

New pistons are complete with rings. Should you have to replace broken rings in service, it is most important to see that the grooves are thoroughly clean.

The new type rings are not machined with special end faces for clearing the locating peg. The ring with the plain gap is thicker, has therefore greater radial pressure. This ring replaces all previous types without alteration to the piston, but the new type piston is fitted with a longer locating pin and the original pattern ring must not be fitted to it. With the new rings the minimum clearance between locating pin and piston ring ends should be .006″, and this can best be tested by fitting one ring to its mating groove, inserting the piston and ring into the bottom of the cylinder bore, rotating the piston lightly to and fro to make certain that there is a minimum of .006″ clearance. The gap in this ring is cut to .067″ during manufacture and this clearance gives satisfactory results. When testing the ring do not push the piston too far in the cylinder, otherwise there is a danger of fouling one of the ports.

## CRANKSHAFT AND CON-ROD

Crankshaft and connecting-rod are supplied as an assembly, which must never be dismantled. In the unlikely event of trouble, fit a new assembly complete. To disconnect piston, remove circlips and press out gudgeon pin in the usual way or by using special Piston and Gudgeon Pin Tool CB. 10 as shown on page 29.

There should be slight play only in the little end.

If re-bushing is indicated, press out old bush and fit new one. Drill three oil holes to correspond with those in the little end. Clean off all rough edges and burrs, and ream out to give a clearance of approximately .0005″.

## ASSEMBLING PISTON

Piston and con-rod may be assembled by using the same special tool as was used for removing the gudgeon pin (see page 29).

## CASTINGS

(*a*) In no circumstances should any attempt be made to switch separate castings between different engines. Each set must always be kept *as a set*.

(*b*) It is of the utmost importance that every part should be scrupulously clean.

(*c*) It will be necessary to warm the various castings. For this purpose there is nothing better than a supply of boiling water, in which each casting may be immersed at the appropriate moment. This will raise it to exactly the right temperature, and the heat will evaporate the water as soon as the casting is withdrawn.

## CLUTCH

Always examine clutch faces and corks for wear. Fit new parts as necessary. Should new corks be fitted, these must be accurately surfaced, be true with each side of the clutch wheel, and equidistant.

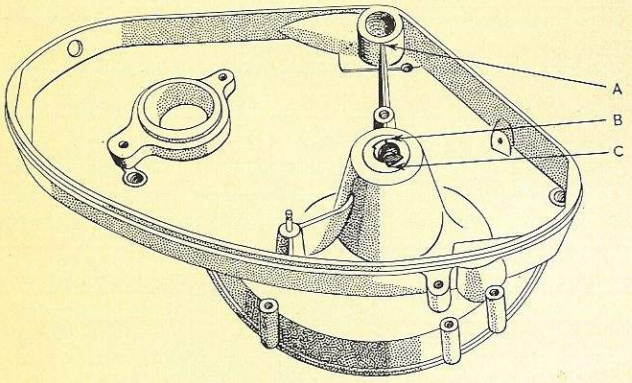
Stand clutch springs (F.16) on surface plate and check for relative height, as unevenness will cause clutch slip. In the event of unevenness, fit four new springs—do not replace one or two only.

Place clutch assembly *without chain* on to clutch shaft, and check for truth. Faulty alignment will cause clutch slip. If out of truth, fit new chain wheel or cork inserts.

Check fit of clutch hob inside brass bearing ring. There should be no play at all. If any is felt, renew both hob and centre plate assembly.

## CLUTCH OPERATING BUSH

The position of the clutch operating bush in the crankcase is important. On assembly the bush is correctly located before drilling the holes in the crankcase for the locking pins. When fitting a new bush, position it so that the openings for the two-start screw are in line with the web on the outside of the clutch housing.




*Shows the correct location for the clutch operating bush. Points A, B and C should be in line.*

## DISC VALVE

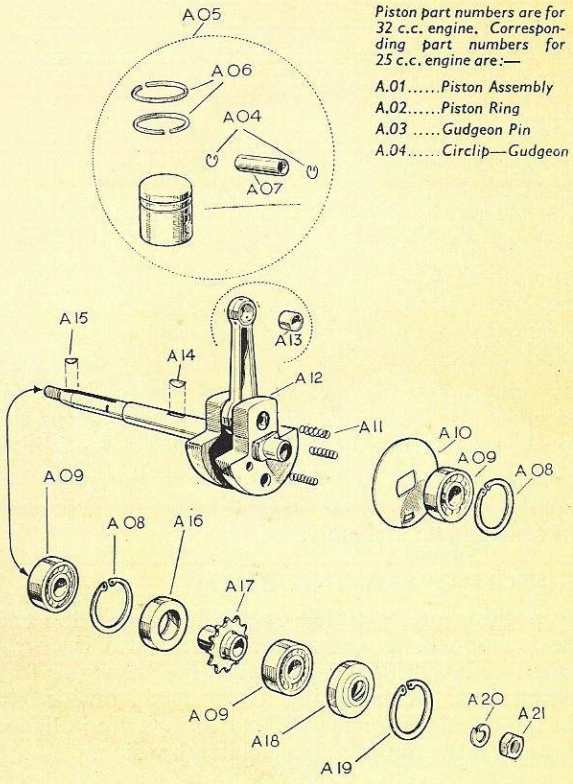
The disc valve should be carefully inspected; if it is scored or worn, scrap and fit a new one.

## ENGINE MOUNTING BUSHES

From Wheel No. A53283 (Export from 50017) the steel sleeve (S.08) has been shortened slightly to allow for an alteration to the crankcase boss. The new sleeve is supplied under part No. (S.08).

The new sleeve (S.08) is for use in those machines where the crankcase mounting boss is machined in line with the outer end of the clutchshaft bore. The old sleeve (S.08) can be used with any model.

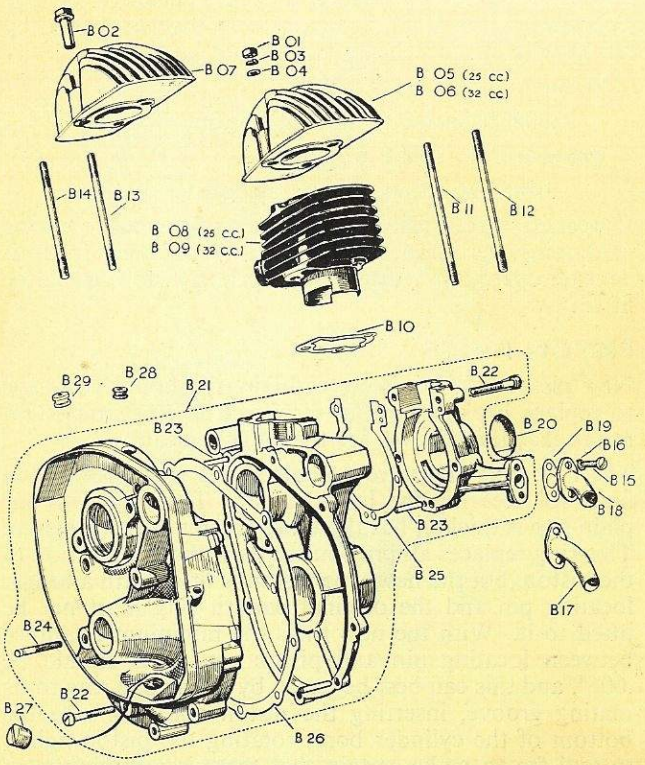
## PISTON and CRANKSHAFT



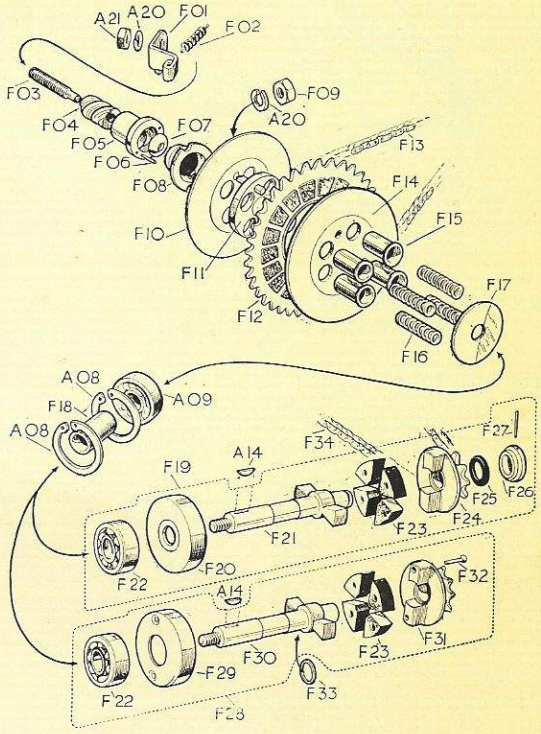

*Piston part numbers are for 32 c.c. engine. Corresponding part numbers for 25 c.c. engine are:—*

*A.01.....Piston Assembly*
*A.02.....Piston Ring*
*A.03 .....Gudgeon Pin*
*A.04.....Circlip—Gudgeon Pin*

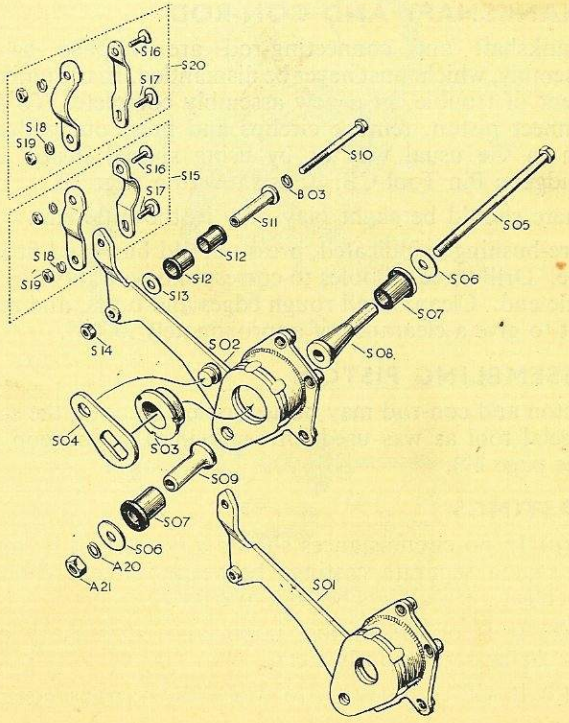
## CYLINDER and CRANKCASE




## CLUTCH




## ENGINE SUSPENSION



The respective lengths of the sleeves are:—

| | | | |
|---|---|---|---|
| (S.08) (OLD) | ... | ... | 2.124″ |
| (S.08) (NEW) | ... | ... | 2.104″ |

The flexible engine mounting bushes should be examined, and if there are signs of deterioration replace by new ones.

Up to wheel number 127165 (Export 126197) the steel sleeve of the front engine mounting should be fitted with the flange on the drive side (Right Hand). From these wheel numbers no sleeve is used, instead there is a larger diameter shouldered bolt. (See paragraph 44, page 27.)

### CRANKCASE SEAL. Part No. B.20.

There is an oil and gas seal in the induction casting, behind the short end of the crankshaft. There should be no need to remove this ever, but should it be damaged or removed accidentally, a new one must be fitted with extreme care.

Before fitting, support the inner face of the casting; this is important. Without this support the casting may be distorted.

The seal is convex, and drops into the casting easily. It is advisable to apply a good sealing compound before inserting, taking care not to use any excess which would find its way into the main bearing.

Using a dolly with a face less concave than the seal is convex, tap lightly so that the metal of the seal bites into the softer metal of the casting.

As an additional precaution, carefully peen the edge of the casting over the disc.

### OVERSIZE CYLINDER STUDS

In the event of the casting holes becoming stripped, oversize studs are available. The part numbers are B.12 for the earlier cylinder head and B.14 for the quickly detachable cylinder head. The thread which screws into the crankcase is $\frac{9}{32}$″ Whit. Taps are available from dealers (part Nos. X.33 and X.34).

## RE-BUILDING THE ENGINE

**1.** If piston has been removed, reassemble to con-rod as described on page 23.

**2.** Put three springs (A.11) into recesses in crankshaft cheek. Lightly oil disc valve (A.10) and fit on to rectangular shoulder on short end of crankshaft. Make sure that disc moves freely.

The hole in the disc must correspond with the hole in the cheek. If disc is new, the marked face goes towards crankshaft. If the old one is being replaced, it must go back as it came off as indicated by markings of wear.

**3.** Using Crankshaft Distance Piece CA. 9 (see page 29) between cheeks of crankshaft, press lightly-oiled bearing (A.09) on to short end of shaft, against disc valve making certain that valve is correctly aligned with flats on crankshaft. Bearing must go right home to shoulder. Still using distance piece, press similar bearing (lightly oiled) on to long end of crankshaft. Bearing must go right home to shoulder.

**4.** Fit three circlips (A.08) in casting (one in bore for crankshaft; two in bore for clutch spindle).

**5.** If drive housing (F.20) and ball race (F.22) have been removed from clutch spindle (F.21), replace the four rubbers (F.23) and re-assemble. Lightly oil bearing. The oil seal side of the bearing must face the drive housing.

From wheel No. 91043, if there is a recess where the drive housing goes over the shaft, make certain that the distance washer is replaced between the ball race (F.22) and the shoulder of the shaft. Latest type shafts have the shoulder machined so that it projects beyond the face of the drive housing. It is most important that either this shoulder or a distance washer tightens on the inner part of the ball race to ensure that the drive housing does not come in contact with the rest of the bearing.

**6.** Warm inner crankcase casting in boiling water. It is advisable to warm it thoroughly, and to carry out operations 7 and 8 as quickly as possible. If resilient engine mounting bushes are in position, they will not be damaged, as they are heat proof, oil proof and petrol proof.

**7.** Press clutch spindle assembly into casting. Turn over casting and fit distance piece (F.18) to clutch spindle. Lightly oil second bearing (A.09) and press into casting on to other end of clutch spindle.

**8.** The crankshaft assembly must now be fitted, and Distance Piece CA. 9 must again be used (see page 29). The inner face of the casting should be located on stout metal supports, one each side of crankshaft, and pressure applied to the short end of the crankshaft. Make sure that the piston is in the recess formed by the half chamber, to avoid damage to con-rod. When crankshaft assembly is home, remove from press, but leave distance piece between cheeks.

**9.** If oil seal (A.16) was removed press into crankcase over long end of crankshaft while casting is still warm, the open end faces inwards, and the oil seal should be pressed down to circlip.

**10.** Fit paper gasket (B.25) to face of casting. On early models no gaskets were used, but their use in service is now recommended for all engines.

**11.** Warm small casting in boiling water, and with distance piece still in position between cheeks of crankshaft, fit over dowels; insert five screws (B.22) and tighten. There are no washers. From this stage, until cylinder is fitted, great care must be taken not to damage piston or rings. In particular, the engine should not be rotated unnecessarily.

**12.** If resilient engine mounting bushes were removed they should now be re-fitted, complete with metal sleeves. The flanges of the metal sleeves face one another between the two larger castings—with space to take the mounting bracket later. The assembly should now be placed in the special fitment shown on page 1, and the fitment placed in a vice.

**13.** Insert key (A.14) and fit sprocket (A.17) to crankshaft. (See paragraph 17.)

**14.** Lightly oil clutch spindle (F.21) and fit thrust plate (F.17) with central shoulder towards ball race. Fit Woodruffe key (A.14).

**15.** Take clutch plate (F.14) with large hole in centre and hold with convex side downwards. Take clutch hob (F.11) and insert short ends of pins into holes in plate. Fit clutch chain wheel with cork segments (F.12) over long ends of pins. Plate may go either way. Take clutch plate (F.10) with small hole in centre, and fit with convex side uppermost. Turn this assembly over and insert four spring cups (F.15) and four springs (F.16) as illustrated on page 29.

**16.** Fit primary chain (F.13) to clutch sprocket.

**17.** Pull crankshaft sprocket out slightly (but not far enough to disengage with Woodruffe key) and fit chain to this sprocket and clutch assembly on to clutch spindle simultaneously.

**18.** Fit washer (A.20) and thin lock nut (F.09) to clutch spindle and tighten lock nut. The crankshaft sprocket *must* be pressed home simultaneously so that side pressure is not exerted on the chain.

**19.** Apply a light touch of grease to clutch end thrust assembly (F.08). The purpose of the grease is merely to hold the assembly while the next casting is being fitted.

**20.** Warm clutch housing casting.

**21.** Press in, from outer side of casing, grooved oil ring (A.18). Fit circlip (A.19), same side of casting and press in ball race (A.09) from other side.

**22.** Ensure that oil seal which is staked in behind clutch operating bush (F.05) is still in position then fit paper gasket (B.26).

**23.** Remove assembly from special fitment and check that clutch thrust assembly (held by grease, see 19) is still in position.

**24.** Insert free dowel, and using a circular metal support on the only machined surface left exposed, place assembly in press with long end of crankshaft uppermost. (See illustration on page 29.) Using blind dowel as a guide, position clutch housing, but before pressing home insert engine suspension bracket (S.02). Press home casting and replace assembly in special fitment. Secure casting with six screws (B.22). Tighten in staggered fashion; there are no washers. Tap home dowel using small punch.

**25.** Insert clutch operating 2-start screw (F.04) and fit adjusting screw (F.03). Drop clutch operating crank (F.01) on to flats on 2-start screw. Secure with spring washer (A.20) and lock nut (A.21). The cheek support should now be removed from between cheeks of crankshaft.

**26.** Oil disc valve and con-rod big end very lightly; excessive oil applied at this stage will cause smoke for a considerable period after the machine is in use again.

**27.** Take new gasket (B.10), lightly smear with grease to hold it in position, and place on crankcase.

**28.** Place metal support each side of con-rod and lower piston until it rests on supports.

**29.** Lightly oil piston rings and bottom of cylinder (B.09). Make sure gaps in piston rings mate with pegs in grooves.

**30.** With Piston Ring Sleeve CA. 8 or CB. 8 (see page 29), compress rings and lower cylinder over piston, with exhaust port to left. Owing to the shape of the skirt, when the cylinder is down a certain distance the ring compressor will no longer be effective, but a small screw driver will provide the slight pressure necessary to compress the rings the very slight amount now required. The cylinder must be pushed straight on and not "wriggled." Remove metal supports and press barrel home.

**31.** Insert three studs (B.11). Screw down by hand, and then, using nut and lock nut, tighten with box spanner.

**32.** Drop on cylinder head. NOTE.—There is no gasket at this joint, and sealing compound should be used. Fit three washers and three nuts. Tighten evenly. (From wheel No. 111859 there are no washers to fit.)

**33.** Fit spark plug temporarily, to keep out dirt. Turn crankshaft, until keyway is uppermost.

**34.** On models up to and including 76750, fit cam. This has a peg to locate in keyway; the pegged end goes on last. Then press "D" circlip into retaining channel in crankshaft; the D section can register in groove either side.

**35.** Take magneto stator, and feed the plug lead through hole in casting—pushing grommet (B.28) into casting at the same time. On models with dynamo lighting, connect lead to terminal on back of magneto. Position stator on locating spigot of casting. Knead grease into lubricating wick. On wheel Nos. 1 to 76750 the wick must be fitted to *trail* on the cam. Insert two screws (Q.11) with two spring washers (B.03) and two plain washers (B.04) through elongated holes in stator into tapped holes in casting. Screws should be central in elongated holes. Tighten screws most carefully (see special instructions on page 19). Tapped holes in casting do not go right through. The plain and spring washers must, therefore, be fitted to both screws. Make sure that the washers tighten on to the stator plate. If one screw is shorter fit this to the upper hole.

**36.** On wheels No. 76751 onwards, fit spring on to crankshaft followed by driving key and cam. Cam is marked with arrow showing direction of rotation and must be fitted accordingly.

**37.** Check contact breaker points (remove spark plug and put nut on end of crankshaft to turn). Replace plug.

**38.** Take Woodruffe key (A.15) and make sure it is a fairly tight fit in the slot, as it is most important that this key does not move during operation 39.

**39.** Clean inside of rotor—using air line or tyre pump, and fit to crankshaft. On wheels numbered 76751 onwards take care to see that the cam is almost in its working position. If it is not, the moving contact may be damaged by side pressure. Great care must be exercised to ensure that the Woodruffe key does not move. It is advisable to use an inspection lamp and watch this key through the hole in the rotor. Assemble rotor with spring washer (A.20) and nut (A.21). (See more detailed instruction under "Ignition").

**40.** Fit spark plug. Test for compression. If there is leakage at the cylinder head face this must be trued up by scraping and lapping.

**41.** Insert clutch cable (L.21) through hole in casting, and screw in adjuster half way. (This makes maximum adjustment at this point available). With screwdriver, turn adjuster so that clutch operating crank (F.01) is in a convenient position, and connect up cable and pull-off spring (F.02). Leave final adjustment until engine is on cycle.

**42.** Thoroughly clean exhaust system and fishtail, and blow through with air line. (See " Exhaust Systems," page 21.)

**43.** Fit exhaust system to cylinder with copper asbestos washer (R.34) and nut (R.36). Leave slack. Assemble exhaust system to casting by means of screw (R.41), spring washer or tab washer and distance piece (R.42). If the screw has a hexagon head always use a tab washer and turn the tabs over securely, then tighten exhaust system all round. Re-check with engine hot. (See "Exhaust Systems," page 21.)

**44.** Remove engine from special fitment. Insert bolt (S.05) with washer (S.06) each end through bushes of engine suspension bracket (put into position in operation 24). Put spring washer (A.20) on threaded end and start nut (A.21). Leave slack. Insert bolt (S.10) with spring washer (B.03) under head at small end of suspension bracket. Plain washer (S.13) goes between mounting and suspension bracket. The steel sleeve (S.11) should be fitted so that its flange is under the bolt head. These bolts (S.05) and (S.10) must be *fully* tightened on to the steel distance sleeves inside the rubber mounting bushes; it is not sufficient to tighten the bolts until resistance is felt. On models with New Eadie Coaster Hub bolt (S.10) is longer, and is fitted with a lock nut. Bolt must be tightened hard down on to the steel sleeve before lock nut (S.14) is tightened.
From wheel No. 127166 (export 126198) the front engine suspension bolt (S.10) and sleeve (S.11) are replaced by a shouldered bolt (S.22). It is important to fit a washer (S.23) under the head of this bolt. A washer with a smaller hole (S.24) is clamped between the shoulder of the bolt and the engine suspension bracket. The threaded portion of the new bolt is $\frac{5}{16}$" B.S.F. It will not, therefore, fit into the earlier type of suspension bracket unless this part is modified. As before the bolt should be tightened fully home and a lock nut fitted.

**45.** Fit flanged induction pipe (B.17) to crankcase with gasket (B.19), two spring washers (B.16) and two screws (B.15).

## MODELS WITHOUT NEW EADIE COASTER HUB

**46.** Rotate the spindle in the Cyclemaster wheel so that the cam is at its highest point (i.e., slackest chain position, as for removal of engine). Then place endless chain (F.34) on sprocket of drum. Offer engine to wheel spindle and feed on slowly, picking up chain on clutch sprocket at the same time.

**47.** Fit plain washer and large hexagon nut (T.14). Hold square end of spindle with spanner, and tighten hexagon nut as far as possible. Then slacken off sufficiently to adjust chain by turning spindle to move eccentric. There should be a total movement of $\frac{1}{2}$". When correct, tighten hexagon nut (still holding spindle) and then re-check tension.

## MODELS WITH NEW EADIE COASTER HUB

**48.** Refit eccentric sleeve (S.03) with thick side of bush to top. Position brake arm (S.04) with slotted hole over the flats of the brake cone and the smaller hole on the pin of the engine suspension bracket. Refit washer and lock ring (U.44) on the end of the spindle. Adjust chain from clutchshaft to drum by means of eccentric. Total up-and-down movement should be $\frac{1}{2}$". Tighten lock ring (U.44) hard up against brake arm (S.04).

## ALL MODELS

**49.** Fit petrol tank with three screws (R.04) and three spring washers (B.03). Screws go into tapped holes in suspension bracket. Check that tank does not foul drum.

**50.** Fit carburettor to induction pipe. A perfect fit here is essential. Should it foul the petrol tank, slacken tank mounting screws and adjust; if necessary the holes in the tank flange may be elongated.

**51.** Fit flexible pipe from tank to carburettor. Make sure banjo nipple is in line with the wheel spindle. Fit carburettor cover plate with screw (R.17).

**52.** Fit air cleaner. (Amal carburettor only.)

**53.** Fit wheel to cycle. Connect clutch and throttle controls.

**54.** Adjust chain from clutch to drum (see page 5).

**55.** Adjust clutch (see page 20).

**56.** Remove tapered filler plug and add clutch chamber lubricant, using the petrol filler cap as a measure. This chamber *must not* be overfilled.

**57.** Put small supply of petroil in tank and start engine.

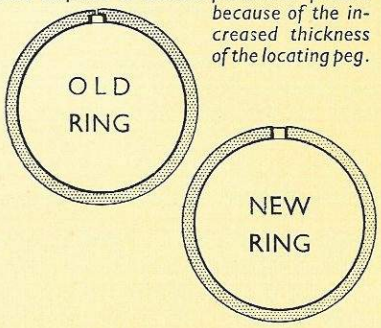
**58.** Check action of clutch.

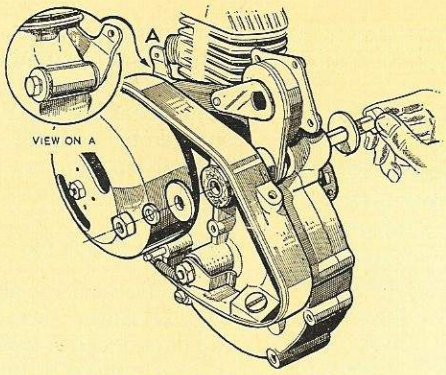
**59.** Stop engine and fit "CM" plate.

**60.** Check hub bearing adjustment on models with Eadie Coaster Hub. See page 4.

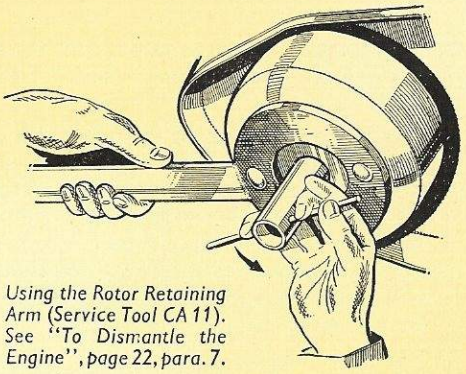
**61.** Road test.

The old and new piston rings compared. The new ring will fit all pistons, but the old ring cannot be fitted to current production pistons because of the increased thickness of the locating peg.

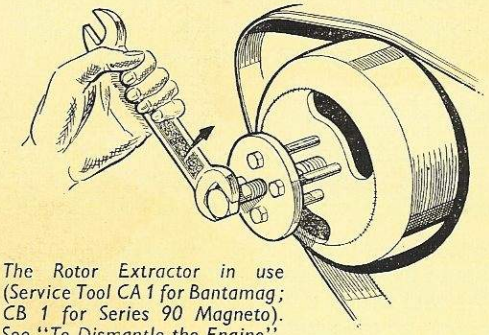


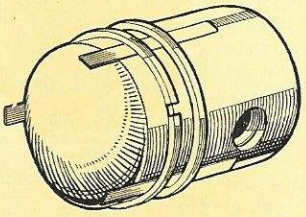

Removing the engine suspension bolts. See page 6.



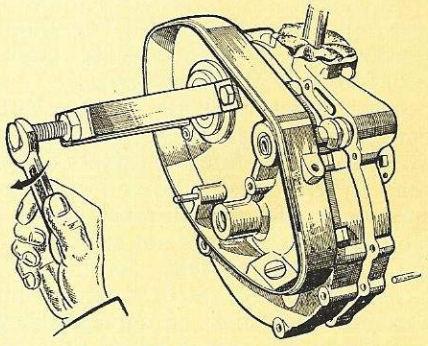
Using the Rotor Retaining Arm (Service Tool CA 11). See "To Dismantle the Engine", page 22, para. 7.



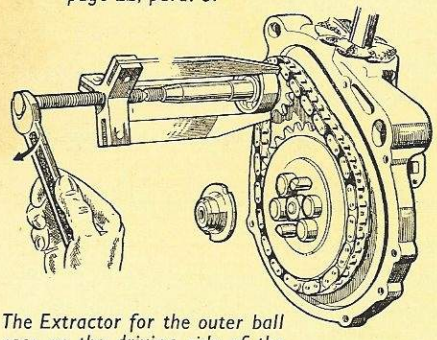
The Rotor Extractor in use (Service Tool CA 1 for Bantamag; CB 1 for Series 90 Magneto). See "To Dismantle the Engine", page 22, para. 8.



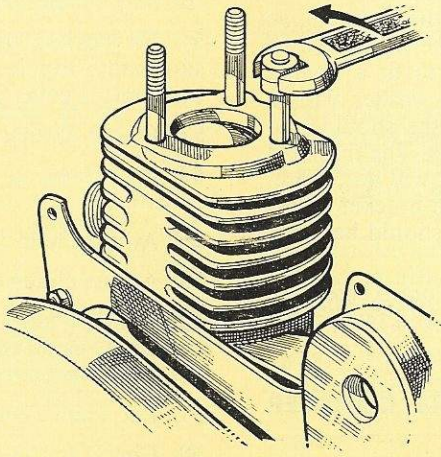
Easing off the piston rings. See page 22, para. 23.



How to use the Clutch Housing Casting Extractor (Service Tool CA 2). See "To Dismantle the Engine", page 22, para. 14.

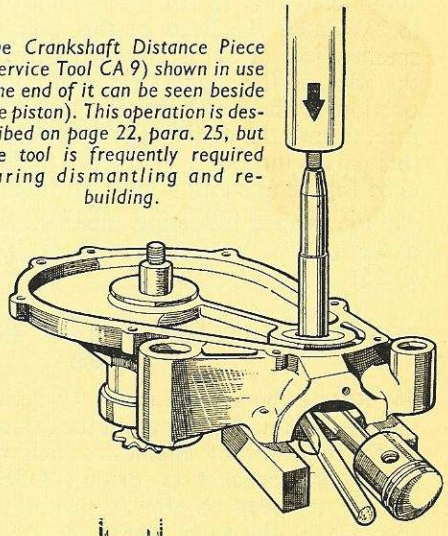


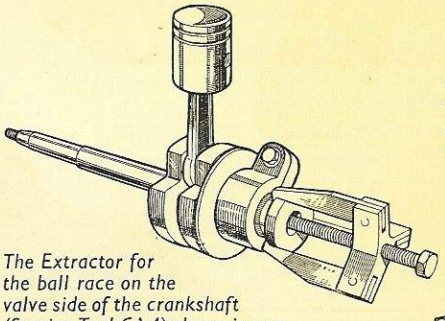
The Extractor for the outer ball race on the driving side of the crankshaft (Service Tool CA 3). See "To Dismantle the Engine", page 22, para. 16.



Using two nuts on the studs to withdraw them and so remove the cylinder. See page 22, para. 21.

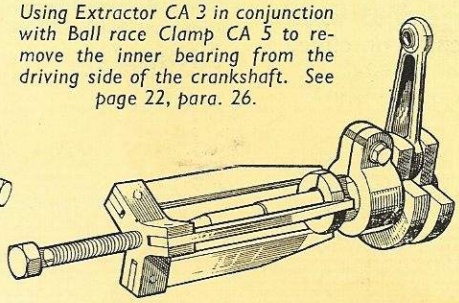
The Crankshaft Distance Piece (Service Tool CA 9) shown in use (the end of it can be seen beside the piston). This operation is described on page 22, para. 25, but the tool is frequently required during dismantling and rebuilding.

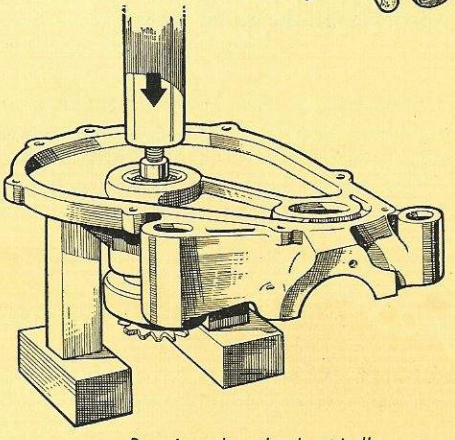




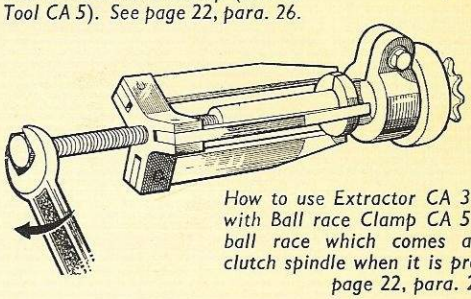
The Extractor for the ball race on the valve side of the crankshaft (Service Tool CA 4) shown in use with the Ball race Clamp (Service Tool CA 5). See page 22, para. 26.

Using Extractor CA 3 in conjunction with Ball race Clamp CA 5 to remove the inner bearing from the driving side of the crankshaft. See page 22, para. 26.

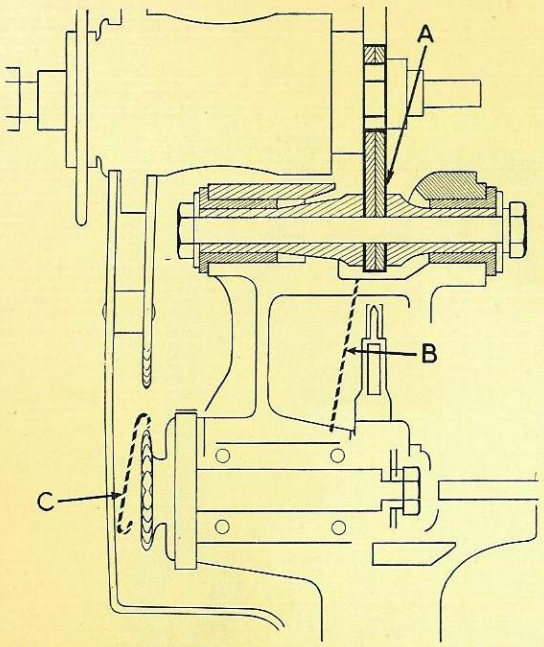




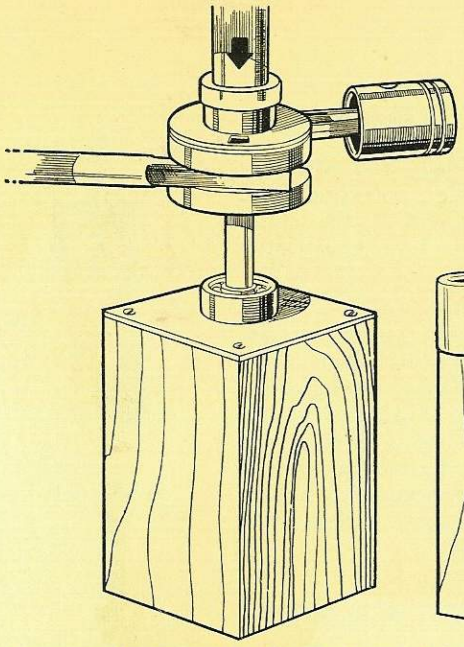
Pressing the clutch spindle from the housing. See page 22, para. 28.



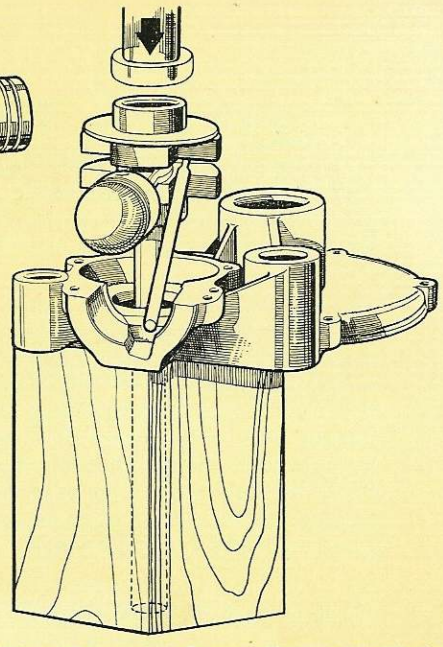
How to use Extractor CA 3 in conjunction with Ball race Clamp CA 5 to remove the ball race which comes away with the clutch spindle when it is pressed out. See page 22, para. 28.




*This illustration shows how a bent suspension bracket (A) or loose engine mounting bolt can cause a slack secondary chain*

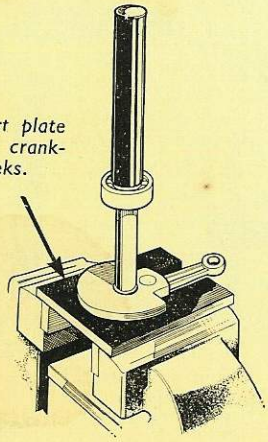


*Pressing the bearings on to the short and long ends of the crankshaft. Note use of Distance Piece (Service Tool CA 9).*

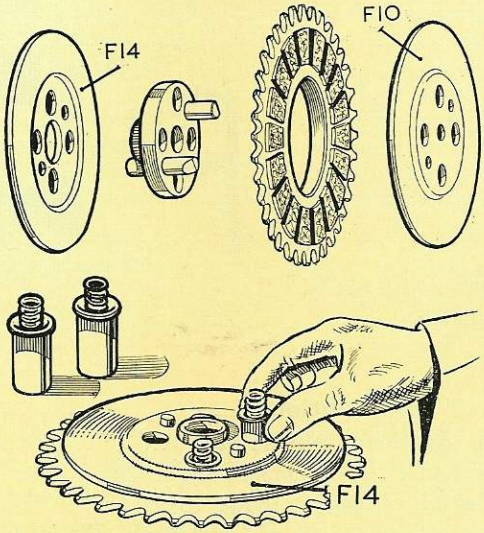


*Fitting the crankshaft assembly—again with the use of Distance Piece CA 9. See page 25, para. 8.*

*Note.—Support plate goes between crankshaft cheeks.*

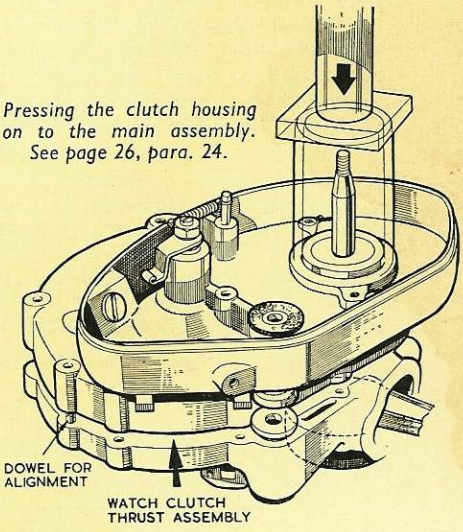


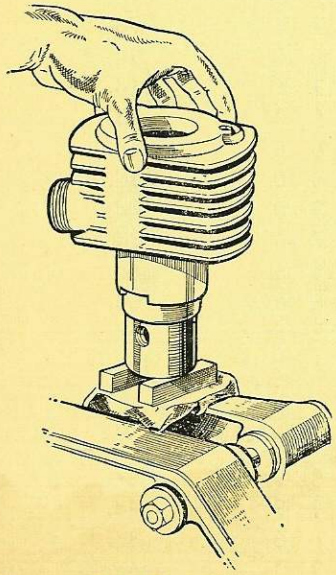
*An alternative method of fitting inner ball races to the crankshaft if no suitable press is available. The tools shown are CA 13 and CA 14.*



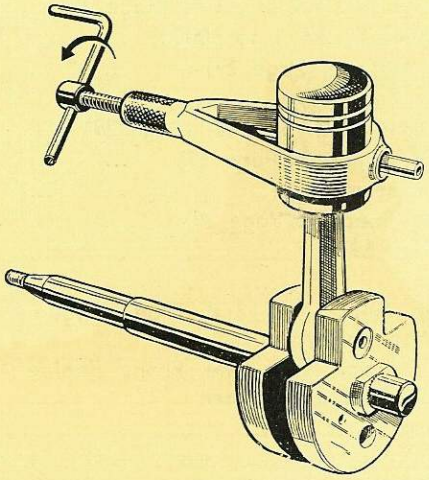

*The correct way to assemble the clutch. See page 26, para. 15.*

*Pressing the clutch housing on to the main assembly. See page 26, para. 24.*

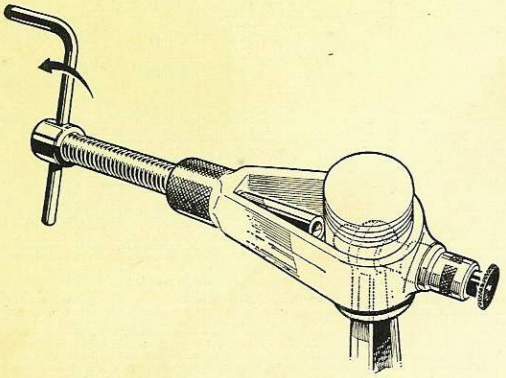


*The use of the Piston Ring Sleeve (Service Tool CA 8 for 25.7 c.c. engines, CB 8 for 32 c.c. engines). See page 26, para. 30.*



*How the Piston and Gudgeon Pin Tool CA 10 is used for extracting the Gudgeon Pin from 25.7 c.c. engine piston. See page 22, para. 22. CB 10 is an alternative tool which fits both pistons.*



*The locating fitment shown is supplied with the Piston and Gudgeon Pin Tool (CA 10 is illustrated) for use when refitting piston to con-rod. The pin of the fitment serves as a mandrel to locate the little end in position, and its length is such that it serves as a stop to prevent further movement when the gudgeon pin is properly home. CB 10 is an alternative tool which fits both pistons. See "Before Re-building the Engine," page 23.*

## SERVICE TOOLS

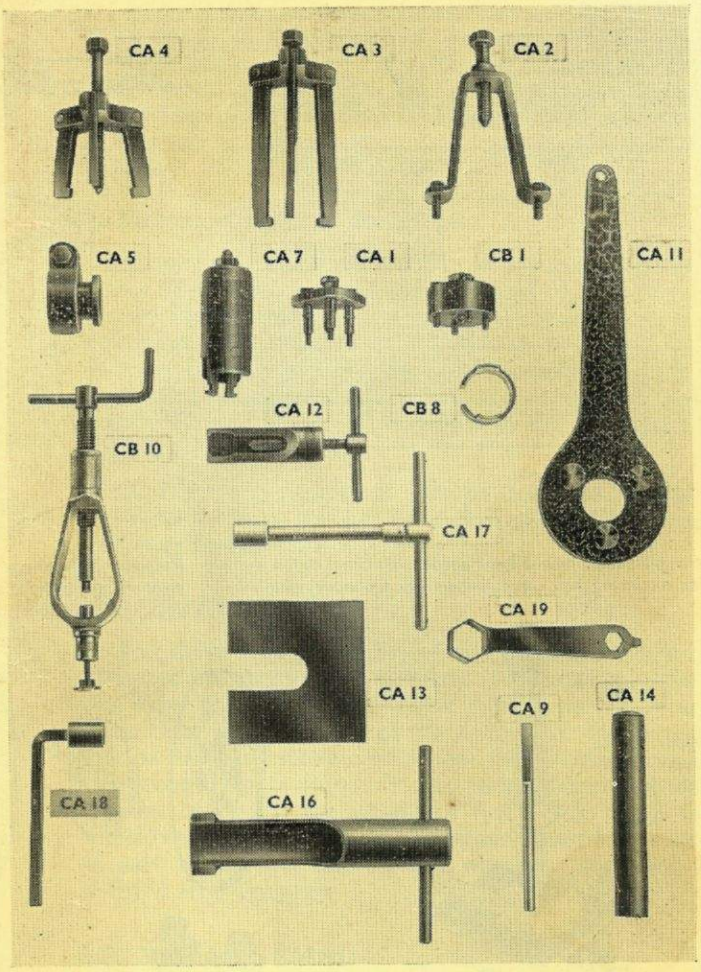
Cyclemaster can be maintained, and ordinary repairs carried out, with no other tools than those which most owners already have about the house, together with the special spanner supplied with the wheel.

For overhaul, and other work which involves partial or complete dismantling, certain special tools are required. These have been designed and made in conjunction with Cyclemaster engineers, and their use is described and illustrated in this Manual. Where a page reference is given in the list below, it means that an illustration will be found on that page. The other tools may not be absolutely necessary, but their use will reduce the time required for certain work.

## REPLACEMENT PARTS

Cyclemaster owners are advised, in their own interests, to see that when replacements are required, only genuine Cyclemaster Parts are fitted. These parts are made to the same drawings, from the same materials, on the same machines as the parts used to build the original wheel. They are subjected to the same severe inspections and are therefore identical in specification and quality. Genuine Parts can be easily obtained from any of over a thousand Cyclemaster Dealers, and they are so reasonable in price that it is not worth the risk of trying to "make do" with anything else.

ALWAYS GIVE THE WHEEL NUMBER (See Page 1) WHEN ORDERING PARTS OR WRITING.




| Tool No. | Description | Retail Price £ s. d. | Postage |
|---|---|---|---|
| CA 1 | Flywheel Extractor (Bantamag) (Page 28) ... ... ... | 5 0 | 6d. |
| CB 1 | Flywheel Extractor (Series 90 Magneto) (Page 28) ... ... | 5 0 | 6d. |
| CA 2 | Clutch Housing Casting Extractor (Page 28) ... ... | 12 6 | 9d. |
| CA 3 | Ball Race Extractor (Driving Side of Crankshaft) (Page 28) | 1 7 6 | 9d. |
| CA 4 | Ball Race Extractor (Valve Side of Crankshaft) (Page 28) | 1 6 6 | 9d. |
| CA 5 | Ball Race Clamp (For use with CA 3 & CA 4) (Page 28) ... | 12 6 | 6d. |
| CA 7 | Oil Retainer Extractor (Wheels Nos. 1 to 50000) ... ... | 1 5 0 | 9d. |
| CB 8 | Piston Ring Sleeve (32 cc. engine) (Page 29) ... ... | 6 6 | 6d. |
| CA 9 | Crankshaft Distance Piece (Page 29) ... ... ... ... | 4 0 | 3d. |
| CB 10 | Piston and Gudgeon Pin Tool (Both pistons) (Page 29) ... | 1 9 0 | 9d. |
| CA 11 | Flywheel Retaining Arm (Bantamag) (Page 29) ... ... | 7 6 | 9d. |
| CA 12 | Magneto Cam Remover (Bantamag) ... ... ... ... | 18 6 | 6d. |
| CA 13 | Piston Rest and Crankshaft Support (Page 29) ... ... | 6 6 | 6d. |
| CA 14 | Ball Race Fitting Tube (Page 29) ... ... ... ... | 3 0 | 6d. |
| CA 16 | Exhaust Nut Spanner ... ... ... ... ... ... | 17 6 | 9d. |
| CA 17 | O.B.A. Spanner (Cylinder Head Nut and Front Engine Mounting Bolt)—Workshop Pattern ... ... ... ... | 11 9 | 6d. |
| CA 18 | O.B.A. Spanner (Cylinder Head Nut and Front Engine Mounting Bolt)—Owner's Tool Kit Pattern ... ... | 3 9 | 6d. |
| CA 19 | Sparking Plug Spanner ... ... ... ... ... ... | 1 9 | 6d. |
| CA 20 | Tyre Valve Adaptor ... ... ... ... ... ... | 6 | 3d. |
| CA 21 | Feeler Gauge Set ·015" and ·018" ... ... ... ... | 2 3 | 6d. |
| CA 22 | "C" Spanner—Eccentric Bush (use with CA 17 or 18) ... | 1 6 | 3d. |

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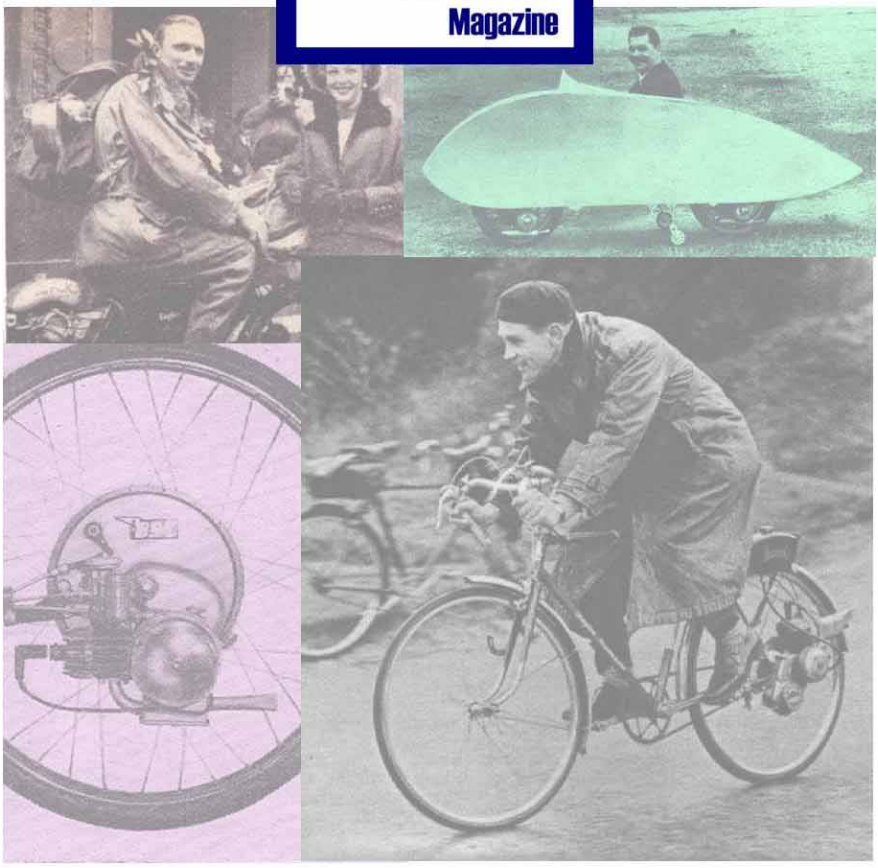

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