WORKSHOP
MAINTENANCE MANUAL
FOR THE

Royal Enfield

350 BULLET 1949—55
500 BULLET 1953—55

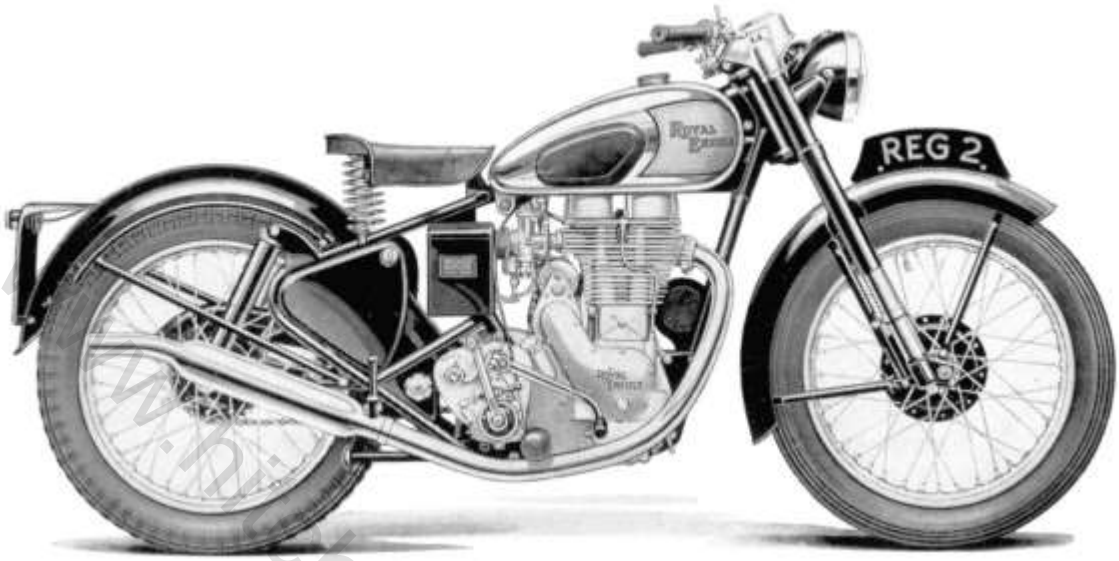
MAN 8

ROYAL ENFIELD WORKSHOP MANUAL

Contents

1949-55 350 Bullet and 1953-1955 500 Bullet

ROYAL ENFIELD WORKSHOP MANUAL



350 BULLET 1951

350 BULLET 1955

ROYAL ENFIELD WORKSHOP MANUAL

SECTION A2a
Technical Data
350 Bullet 1948-1955

Cubic Capacity ... ... 346 c.c.
Stroke ... ... 90 mm.
Bore ... ... Nominal .. 70 mm.
Actual 69.874 mm./2.751 in.
(Rebore to .020 in. when wear exceeds .0065 in. and again to .040 in. after a further .0065 in. wear.)

Compression Ratios:
Up to and including 1954 6.5 to 1
Up to and including 1955 7.25 to 1

Piston Diameter-
Bottom of Skirt-Fore and Aft 69.811/69.786 mm.
Top Lands ... 69.32/69.27 mm.
Piston Rings
Width-Plain Rings. (Two) .0635/.0625 in.
Scraper Ring. (One) .156/.155 in.
Radial Thickness ..... .3.085/2.833 mm.
Clearance in Grooves-Plain Rings .003/.001 in.
Scraper Ring .004/.002 in.
(Renew Piston Rings when gap exceeds 1/16 in.)
Oversize Pistons and Rings available up to +0.060 in.

Piston Boss Internal Diameter .7501/.7499 in.
Gudgeon Pin Diameter .... .7501/.7499 in.
Con. Rod Small End Diameter .7507/.7505 in.
Con. Rod Big End Diameter.....1.62625/1.62575 in.
Crank Pin Diameter .....1.24900/1.24875 in.
Con. Rod Floating Bush:
Outside Diameter ..... .1.6235/1.6230 in.
Inside Diameter ..... .1.2502/1.2498 in.
Width .736/.739 in.
Driving Side Main Bearings Type
SKF.RLS8 x 2 (Early Engines)
SKF.RLS8 x 1 and SKF.CRL8 x 1 (Later Engines)
Outside Diameter 2.25 in.
Inside Diameter ..... 1 in.
Width .625 in.
Timing Side Main Roller Bearing-
Outside Diameter ....1.876/1.875 in.
Inside Diameter ....1.5002/1.4998 in.
Width ..... .4425/.4405 in.
Size of Rollers:
Diameter ..... .2500/.2490 in.
Length ..... .328/.327 in.
Graded rollers are available in steps of .0001 from .2490 to .2500 in.
Rocker Bearing Inside Diameter ... .626/.625 in.
Rocker Spindle Diameter ..... .6240/.6235 in.

Inlet Valve Stem Diameter ..... .3430/.3425 in.
Exhaust Valve Stem Diameter .3410/.3405 in.
Valve Guide Internal Diameter .3447/.3437 in.
Valve Guide External Diameter .6275/.6270 in.
Guide Hole in Cylinder Head .622/.623 in.

Tappet Stem Diameter .375/.374 in.
Tappet Guide Internal Diameter..... .3760/.3752 in.
Tappet Guide External Diameter.... .7510/.7505 in.
Guide Hole in Crankcase .750/.749 in.

Tappet Clearance with cold engine-
Inlet ..... Nil
Exhaust ..... Nil

Valve Spring Free Length-
Inner ..... 2.02 in.
Outer .... 2.095 in.
(Renew when reduced by 3/16 in.)

Valve Timing with .012 in. clearance-
Exhaust Opens ....75° before B.D.C
Exhaust Closes ....35° after T.D.C.
Inlet Opens .... 30° before T.D.C.
Inlet Closes ....60° after B.D.C.

Cam Spindle External Diameter ... .6240/.6235 in.
Cam Bush Internal Diameter .... .6255/.6250 in.
Cam Lift .... .3125 in.
Valve Lift (approximately) .... .3125 in.

Magdyno-
Speed .... 1/2 Engine Speed
Points ..... .012/.015 in.
Timing ....1/2 - 7/16 in. before T.D.C.

Engine Sprocket 25 Teeth
Clutch Sprocket (all models) ....56 Teeth
Final Drive Sprocket .....15 Teeth

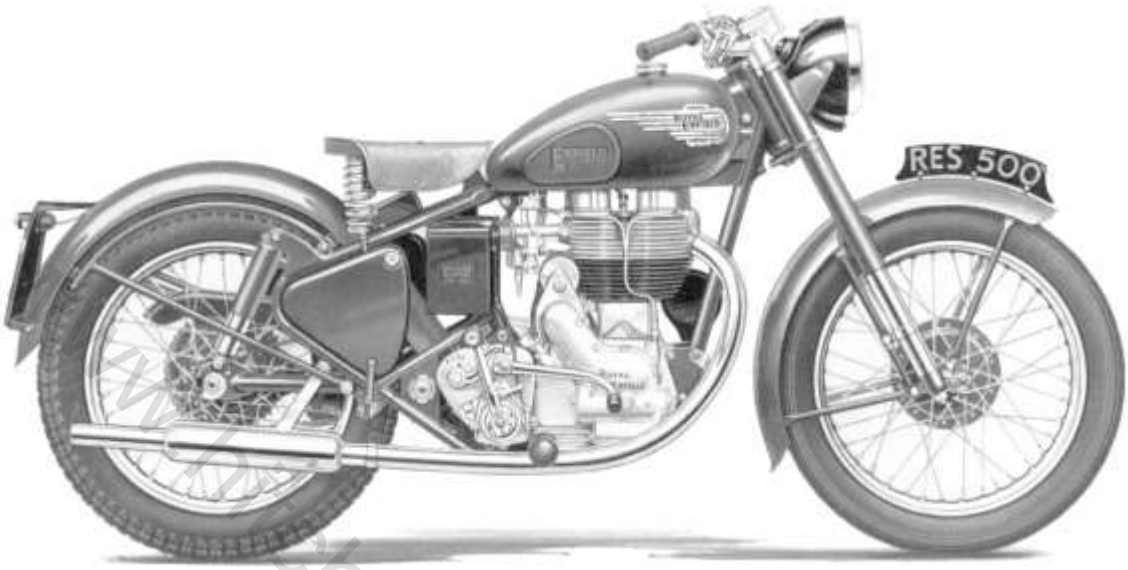
Primary Chain-
Type ....Duplex No. 114038
....Endless
Length .... 90 Pitches
Width .... .628 in.
Pitch .... .375 in.

Feed Oil Pump
Speed ....1/12 Engine Speed
Piston Diameter... ..... .24975/.24950 in.
Stroke ....5 in.

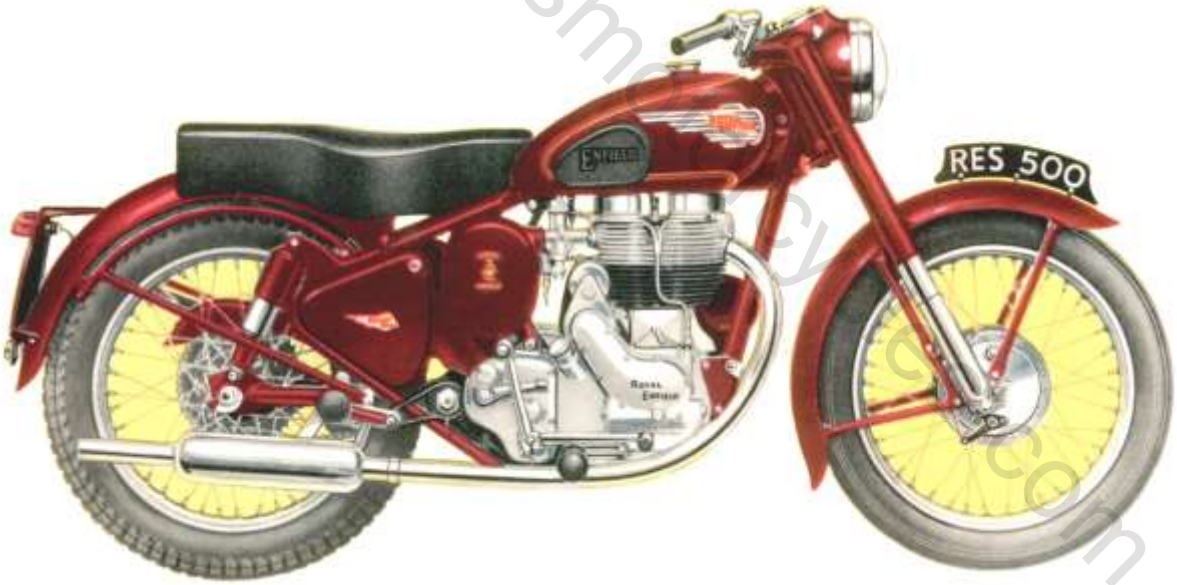
Return Oil Pump
Speed ....1/12 Engine Speed
Piston Diameter... ..... .37475/.37450 in.
Stroke ....375 in.

Sparking Plug-
Type ..... Lodge H.14, KLG F.70, Champion L10S
Diameter... 14 mm.

ROYAL ENFIELD WORKSHOP MANUAL



500 BULLET 1953



500 BULLET 1955

ROYAL ENFIELD WORKSHOP MANUAL

SECTION A2b

Technical Data

" 500 Bullet Engine " 1953-1955

Cubic Capacity ... ... 499 c.c.
Stroke ... . 90 mm.
Bore ... ... Nominal .. 84 mm.
Actual .. 3.30725/3.30675 in.
(Rebore to .020 in. when wear exceeds .008 in. and again to .040 in. after a further .008 in. wear.)
Compression Ratio .... 6.75 to 1
Piston Diameter.
Bottom of Skirt.Fore and Aft ... 3.3047/3.3042 in.
Top Lands ... . 3.284/3.281 in.
Piston Rings
Width.Plain Rings (Two) ... .063/ .062in.
Scraper Ring (One) ... .156/.155 in.
Radial Thickness ..... .115/.108 in.
Clearance in Grooves.Plain Rings .0035/.0015 in.
Scraper Ring .0035/.0015 in.
(Renew Piston Rings when gap exceeds 1/16 in.)
Oversize Pistons and Rings available.. .up to 0.60 in.

Piston Boss Internal Diameter ... .7500/.7497 in.
Gudgeon Pin Diarreter ..... .7500/.7497 in.
Con. Rod Small End Diameter ..... .7507/.7505 in.
Con. Rod Big End Diameter ..... 1.62625/ 1.62575 in.
Crank Pin Diameter ... ... 1.24900/1.24875 in.
Con. Rod Floating Bush.
Outside Diameter ....1.6235/1.6230 in.
Inside Diameter .... 1.2502/12498 in.
Width , Late 1953 onwards..... .983/.980 in.
Width, Early 1953 models..... .736/.739 in.

Driving Side Main Ball and Roller Bearings
SKF.CRL.8 and SKF.RLS.8.
Outside Diameter .... 2.25 in.
Inside Diameter .... 1 in.
Width .... .625 in.

Timing Side Main Roller Bearing..
Outside Diameter ..... 1 .876/ 1 .875 in.
Inside Diameter ... .1.5002/1 4998 in.
Width .... .750 in.

Size of Rollers.
Nominal Size .....1/4 in. dia. x 21/64 in. long
Diameter .... .2500/.2490 in.
Length ..... .328/.327 in.

Rocker Bearing Inside Diameter .626/.625 in.
Rocker Spindle Diameter ..... .6240/.6235 in.
Inlet Valve Stem Diameter .3430/.3425 in.
Exhaust Valve Stem Diameter .3410/.3405 in.
Valve Guide Internal Diameter .3447/.3437 in.
Valve Guide External Diameter .6275/.6270 in.
Guide Hole in Cylinder Head .626/.625 in.

Tappet Stem Diameter .... .375/.374 in.
Tappet Guide Internal Diameter ... .3760/.3752 in.
Tappet Guide External Diameter . 7510/.7505 in.
Guide Hole in Crankcase .... .750/.749 in.

Tappet Clearance with cold engine
Inlet ... Nil
Exhaust .... Nil

Valve Spring Free Length
Inner ..... 2.032 in.
Outer .... 2.095 in.
(Renew when reduced by 3/16 in.)

Valve Timing with 012 in. clearance.
Exhaust Opens ..... .75° before B.D.C.
Exhaust Closes ..... 35° after T.D.C.
Inlet Opens ..... . 40° before T.D.C
Inlet Closes ..... 70° after B.D.C.

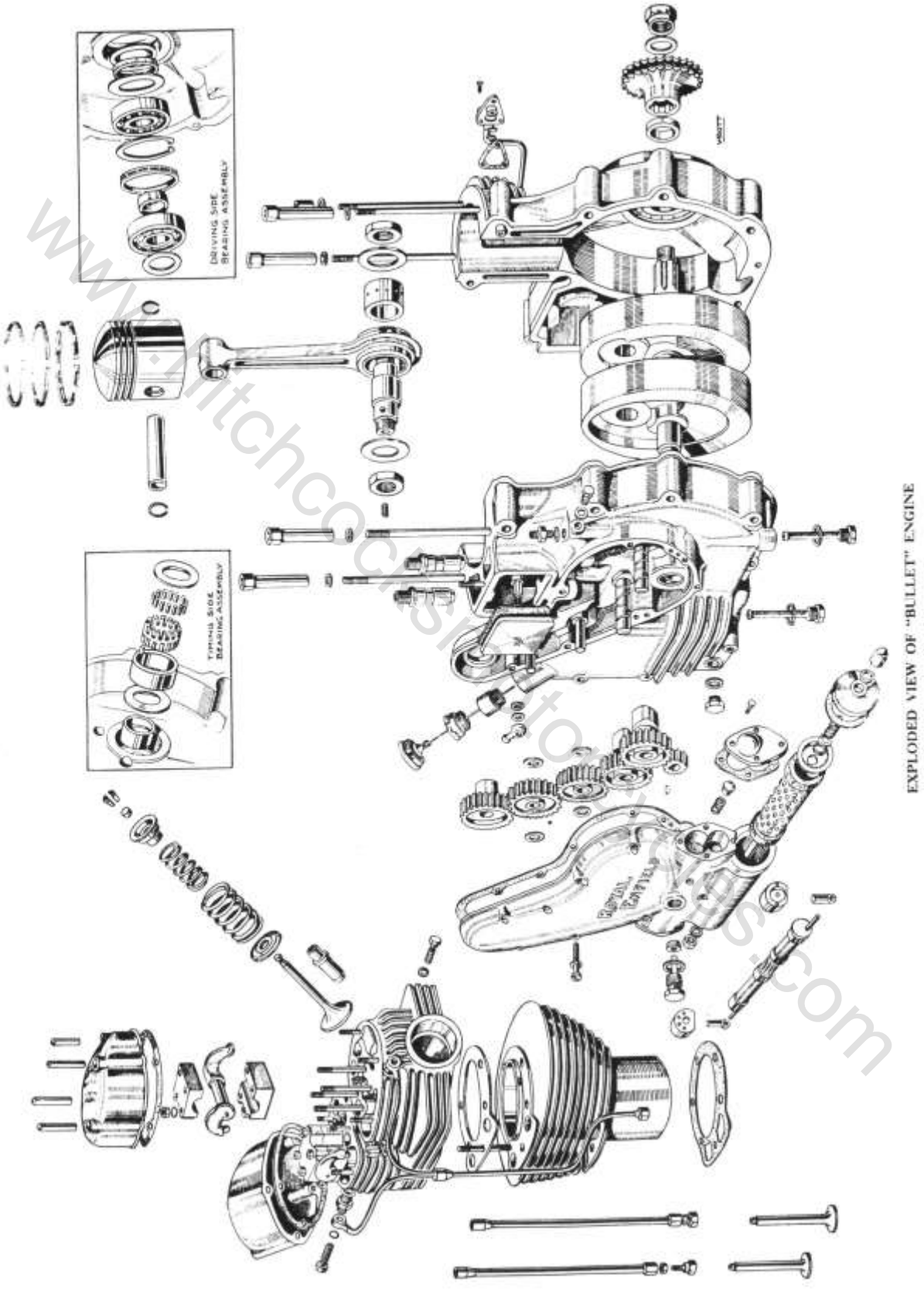
Cam Spindle External Diameter ... .6240/.6230 in.
Cam Bush Internal Diameter ..... .6255/.6250 in.
Cam Lift ..... .3125 in.
Valve Lift (approximately) ..... .3125 in.

Magdyno
Speed .... 1/2 Engine Speed
Points .... .012/.015 in.
Timing (Advanced)..... ....5/16 in. before T.D.C.

Engine Sprocket ....25 Teeth
Clutch Sprocket .....56 Teeth
Final Drive Sprocket.
Solo ....21 Teeth
Sidecar ....18 Teeth
Primary Chain..
Type ..... Duplex No. 114038
.... Endless
Length ....90 Pitches
Width .... .628 in.
Pitch .... .375 in.

Feed Oil Pump
Speed .... 1 /12 Engine Speed
Piston Diameter ..... .24975/.24950 in.
Stroke .... .5 in.
Return Oil Pump
Speed .... .1/12 Engine Speed
Piston Diameter ..... .37475/.37450 in.
Stroke .... .5 in.
Sparking Plug
Type ....Lodge HLN, KLG FE80
Champion NA8 Long Reach
Diameter ....14 mm.

ROYAL ENFIELD WORKSHOP MANUAL



EXPLODED VIEW OF "BULLET" ENGINE
Fig. 1

ROYAL ENFIELD WORKSHOP MANUAL

SECTION B2

Engine Specification

" 350 and 500 Bullet" Models (Standard)

1. Engine

The engine is a 346 or 499 c.c. vertical single cylinder four-stroke with separate cylinder head and fully enclosed pressure-fed overhead valve gear. It has dry sump lubrication with the oil tank integral with the crankcase and a built-up steel crankshaft.

2. Cylinder Head

The cylinder head is die-cast from aluminium alloy with ample finning to ensure adequate cooling. The valve inserts are of austenitic iron and are shrunk in so that they are replaceable (except on early models).

The large bore induction port is streamlined and blended to the valve seating.

3. Cylinder

The cylinder barrel is of cast iron, with internal tunnels enclosing the push rods.

The bore of the 350 engine is nominally 70 m.m. and the stroke 90 m.m., giving a cubic capacity of 346 c.c.

The bore of the 500 engine is nominally 84 m.m. and the stroke 90 m.m., giving a cubic capacity of 499 c.c.

4. Piston

The piston is of low expansion aluminium alloy, heat treated, and form-turned oval. There are three piston rings, the top two of which are compression rings. The top ring is chromium plated and the bottom one taper ground. The third ring is for oil control and is slotted.

Different compression ratios are available as follows:

350 c.c. Engine	6, 6.5, 7, 7.5, 8 and 10 to 1.
500 c.c. Engine	6.5, 8 and 9 to 1.

5. Connecting Rod

The connecting rod is produced from a stamping of Hiduminium RR56 light alloy. The little end bearing is of alloy direct on to the gudgeon pin. In case of wear after long service the little end can be bored out and fitted with a bush, but this is rarely necessary.

The big end has a hardened chrome steel bush pressed in and a floating bush made from mild steel and whitemetalled.

6. Crankcase

The combined crankcase and oil tank are die-cast from light alloy in two halves, being split vertically.

7. Crankshaft and Flywheel

The crankshaft is built up from two steel flywheels bolted to the crank pin and bolted and keyed to the engine shafts, the whole being carefully balanced.

8. Main Bearings

On the driving side there are two bearings, one ball and one roller,***** both having inner and outer races, while on the timing side there are a roller bearing, with the rollers running on the shaft
and a plain phosphor bronze bush for retaining oil in the timing chest.

9. Cams

The cams are integral with the cam pinions, being machined from carbon steel and case hardened. They have internal bronze bushes running on fixed spindles in the timing chest. The cam profiles are produced with silencing ramps to ensure quiet running.

10. Valves

The inlet valve is machined from a stamping of Siliconchrome valve steel and the exhaust valve is of austenitic steel.

11. Valve Gear

The valves are operated from the cams by means of large flat-based guided tappets, high quality tubular steel push rods, with steel cups,
and overhead rockers. Two compression springs are fitted to each valve.

***** Earlier "350 Bullet" engines had two ball bearings on the driving side.

12. Timing Drive

The cams are located in the timing chest and are driven at half engine speed from the crankshaft by a positive geared drive.

The magdyno is driven from the inlet cam pinion through two idler pinions which also act as a gear pump to return the oil from the timing chest to the oil tank.

13. Ignition and Lighting System

The lighting and ignition are supplied from a Lucas Magdyno, which consists of a magneto running at 1/2 engine speed and a dynamo running at 1.1/2 engine speed.

14. Carburetter (See Sections F1 and F2).

350 c.c. Engine Amal Type 276CX/lA.
Amal Type 376/29 Monobloc.
500 c.c. Engine Amal Type 289T/lA.

15. Air Filter

The air supply to the carburettor is cleaned by a Vokes Micro-Vee felt and gauze dry filter,

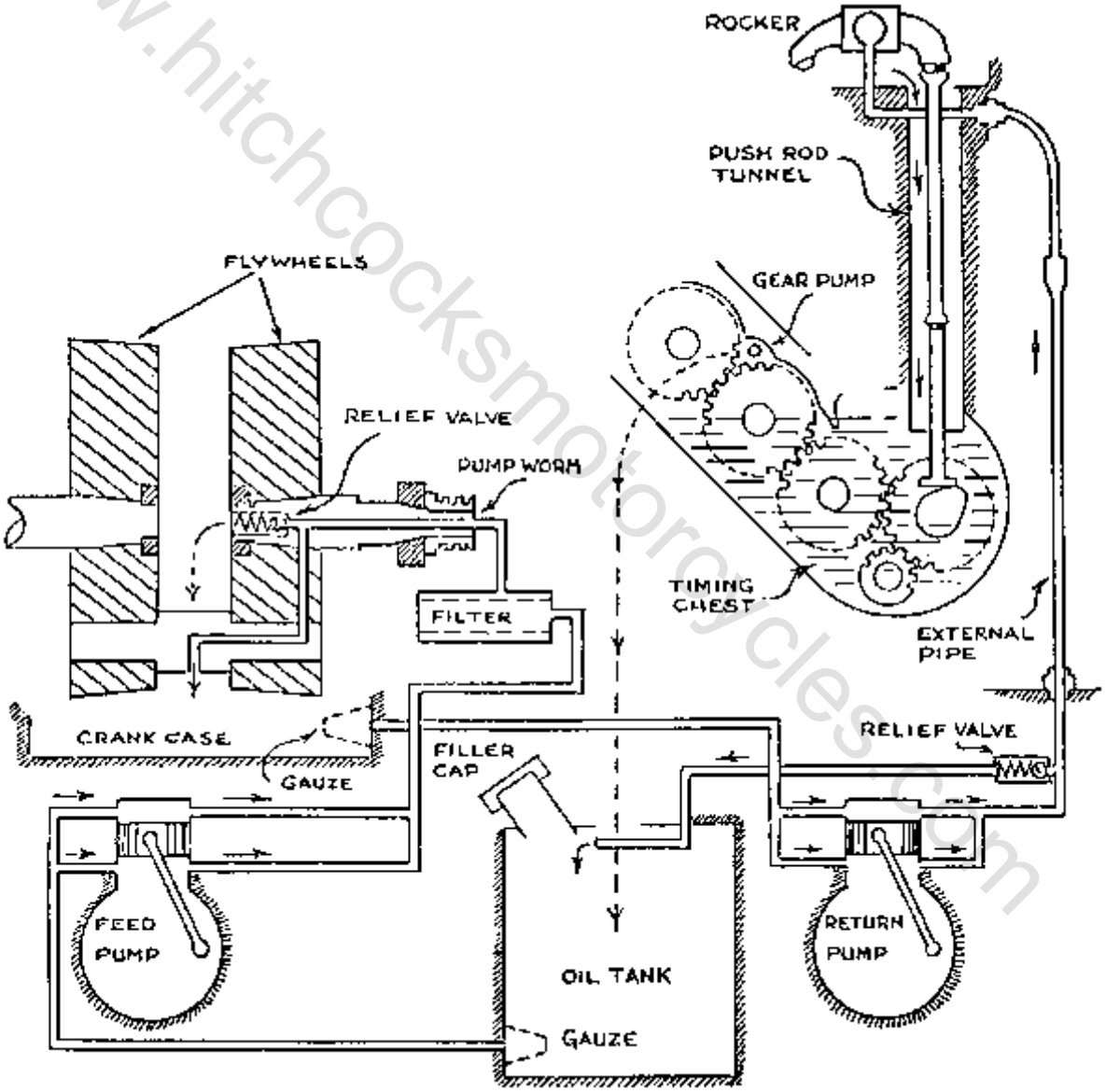


Fig. 2

housed in a box bolted to the frame behind the carburettor.

16. Lubrication System

Lubrication is by the Royal Enfield Dry-Sump which is entirely automatic and positive in action.

The oil tank is integral with the crankcase, ensuring the full rate of circulation immediately the engine is started and rapid heating of the oil in cold weather.

There are two piston type oil pumps running at 1/12 engine speed, positively driven from the timing side engine shaft through a worm gear.

The feed pump at the rear of the timing cover is for pumping oil from the tank to the big end bearing. This oil drains to the bottom of the crankcase and is pumped by the return pump back to the tank.

Some of the return oil is by-passed to the cylinder head for lubricating the rocker gear, whence it flows down the push rod tunnels to the timing chest.

From here it is returned to the tank by the two idler pinions in the timing drive which act as a gear pump.

The return pump has a capacity of approximately double that of the feed pump, which ensures that oil does not accumulate in the crank-case.

Both pumps are double-acting, but the two sides of the feed pump are interconnected, thereby giving an augmented and more even supply to the big end. Both sides of the return pump are also interconnected for draining the crankcase.

Separate spring-loaded relief valves control the pressure to the big end and to the valve gear. The oil supply to the big end is through internally drilled passages and that to the valve gear is through an external pipe.

Gauze strainers are provided for the feed oil leaving the tank and for the return oil from the crankcase. In addition, the feed oil to the big end is pumped under pressure through a large capacity felt filter.

An important feature of the design of this filter is that the internal arrangement is such that, should it be neglected and become clogged, the oil pressure will lift the spring and cap off its Seating thereby automatically by-passing the filter so that the big end will not be deprived of lubrication, even though the oil may be dirty.

17. Breather

The efficient operation of the breather is of paramount importance to the performance of the engine because it acts as a non-return valve between the crankcase and the outside atmosphere, causing a partial vacuum in the crankcase and rocker boxes which prevents the passage of oil into the cylinder and consequent smoking and oiling of the plug.

On the 500 c.c. engine the breather is located on the driving side of the crankcase and consists of a small housing containing two pen-steel discs covering two holes drilled in the crankcase.

Accurate seating of the discs is ensured by a pen-steel plate held between the breather body and the crankcase.

On early 350 c.c. engines the breather consists of a disc in the engine sprocket securing nut. On later engines there is a fibre disc located in a small housing mounted on the crankcase immediately behind the magdyno.

18. Gearbox

The gearbox is bolted on to the back of the crankcase and has four speeds, which are foot controlled, and a patented neutral finder. All gears are in constant mesh, changes being effected by robust dog clutches.

The standard gear ratios are as follows:
350 c.c. Solo 5.67, 7.37, 10.20, 15.75 to 1.
500 c.c. Solo 4.91, 6.40, 8.85, 13.65 to 1.
500 c.c. Sidecar 5.72, 7.45, 10.30, 15.90 to 1.

19. Clutch

On the "500 Bullet" the clutch has five pressure plates and five friction plates, including the sprocket which is lined on both sides with friction material. The other friction plates have cork or "Klinger" inserts which give smooth operation and freedom from slipping in the presence of oil. The clutch centre is fitted with shock absorbers consisting of rubber blocks.

The clutch on the "350 Bullet" is similar to that described above except that it has four pressure plates and four friction plates, and the clutch centre is solid.

350 BULLET OIL PUMP DIAGRAMS

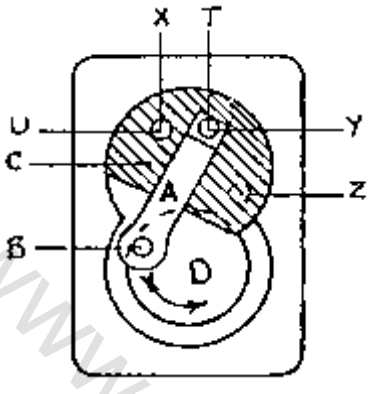
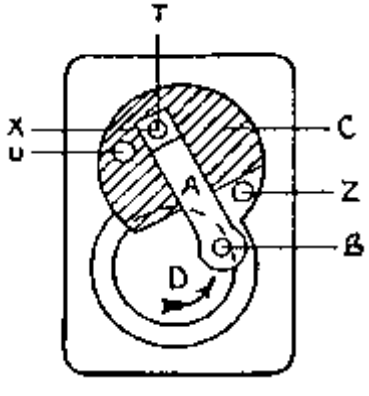


Fig. 3A

FEED PUMP POSITION 1



FEED PUMP POSITION 2

The ports in the housing are connected as follows
X - delivery to big end.
Y - suction from oil tank
Z - suction from oil tank

Position 1. The plunger A is being drawn out of the cylinder hole in the disc C by the action of the peg B on the shaft D. The port T in the disc C registers with the suction port Y in the housing, so that oil is drawn into the cylinder from the oil tank. At the same time the port U in the disc registers with the delivery port X in the housing, so that oil blow the disc in the housing is forced through U and X to the big end.

Position 2. The plunger A is being pushed into the cylinder hole in the disc C. The port T in the disc now registers with the delivery port X in the housing, so that oil is forced out of the cylinder to the big end. At the same time the suction port Z in the housing is uncovered by the disc and oil is drawn into the housing below the disc from the oil tank.

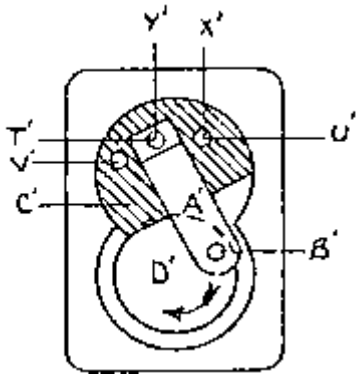
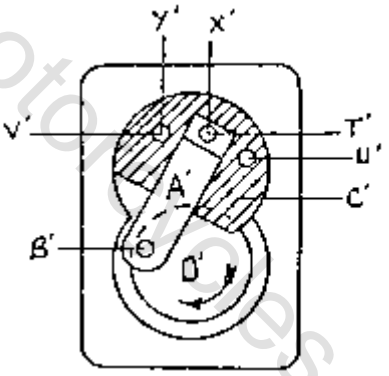


Fig. 3B

RETURN PUMP POSITION 1



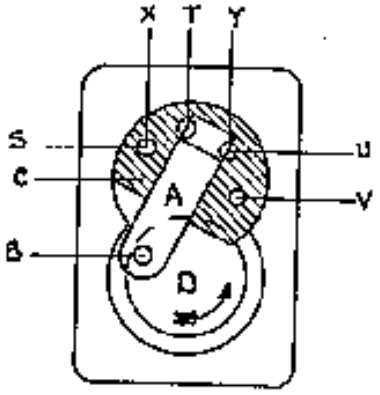
RETURN PUMP POSITION 2

The ports in the housing are connected as follows
X' - delivery to rocker gear
Y - suction from crankcase.

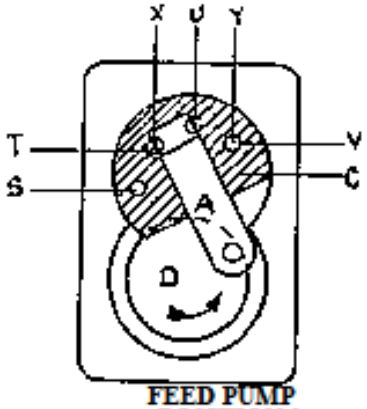
Position 1. The plunger A' is being drawn out of the cylinder hole in the disc C'. The port T' in the disc registers with the suction port Y' in the housing, so that oil is drawn into the cylinder from the crankcase sump at the same time the port U' in the disc registers with the delivery port X' in the housing, so that oil below the disc in the housing is forced through U' and X' to the rocker gear.

Position 2. The Plunger A' is being pushed into the cylinder hole in the disc C. The port T' now registers with the delivery port X' in the housing, so that oil is forced out of the cylinder to the rocker gear. At the same time, the port V' in the disc registers with the suction port Y' in the housing, so that oil is drawn into the housing below the disc from the crankcase sump through V' and Y'.

500 BULLET OIL PUMP DIAGRAMS



FEED PUMP
POSITION 1



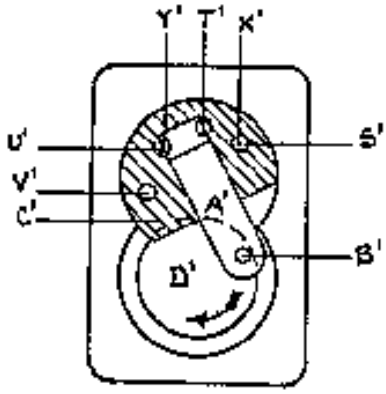
FEED PUMP
POSITION 2

Fig. 4A

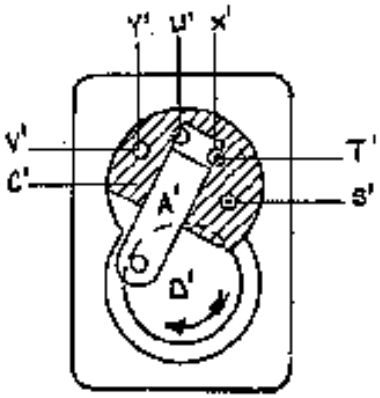
The ports are connected as follows:
X - in the housing is the delivery to the big end.
Y - in the housing is the suction from the oil tank.
S and V - are drilled through the disc.
T and U - are drilled from the underside of the disc into the cylinder hole.

Position 1. The plunger A is being drawn out of the cylinder hole in the disc C by the action of the peg B on the shaft D. The port U in the disc C registers with the suction port Y in the housing so that oil is drawn into the cylinder from the oil tank. At the same time the port S in the disc registers with the delivery port X in the housing so that oil below the disc in the housing is forced through S and X to the big end.

Position 2. The plunger A is being pushed into the cylinder hole in the disc C. The port T in the disc now registers with the delivery port X in the housing so that oil is forced out of the cylinder to the big end. At the same time the port V in the disc registers with the suction port Y in the housing and oil is drawn into the housing below the disc from the tank.



RETURN PUMP
POSITION 1



RETURN PUMP
POSITION 2

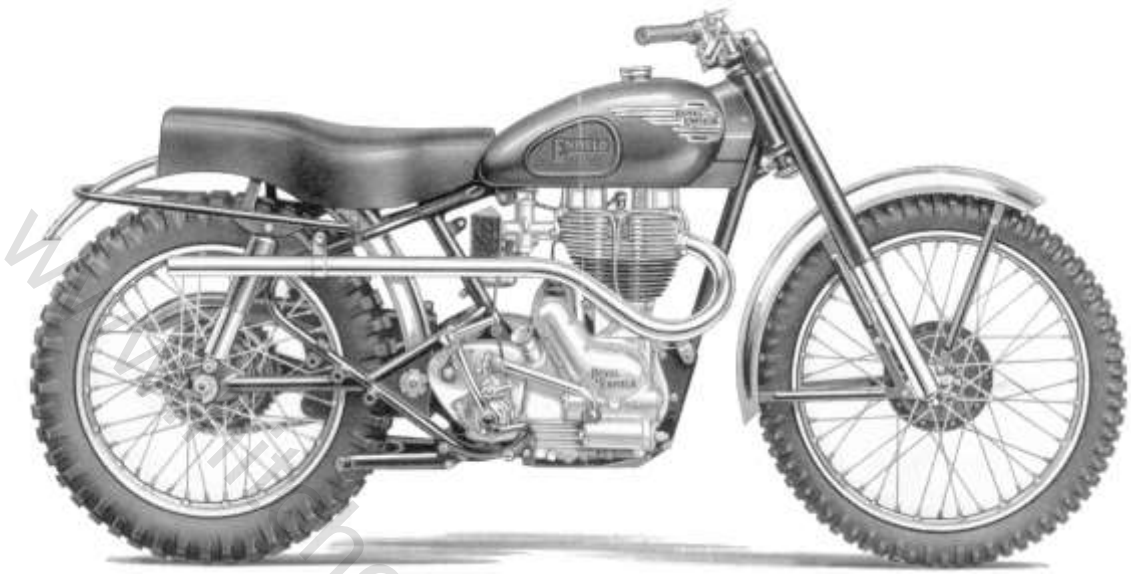
Fig. 4B

The ports arc connected as follows:
X - in the housing is the delivery to the rocker gear.
Y - in the housing is the suction from the crankcase.
S and V - are drilled through the disc.
T and U – are drilled from the underside of the disc into the cylinder hole.

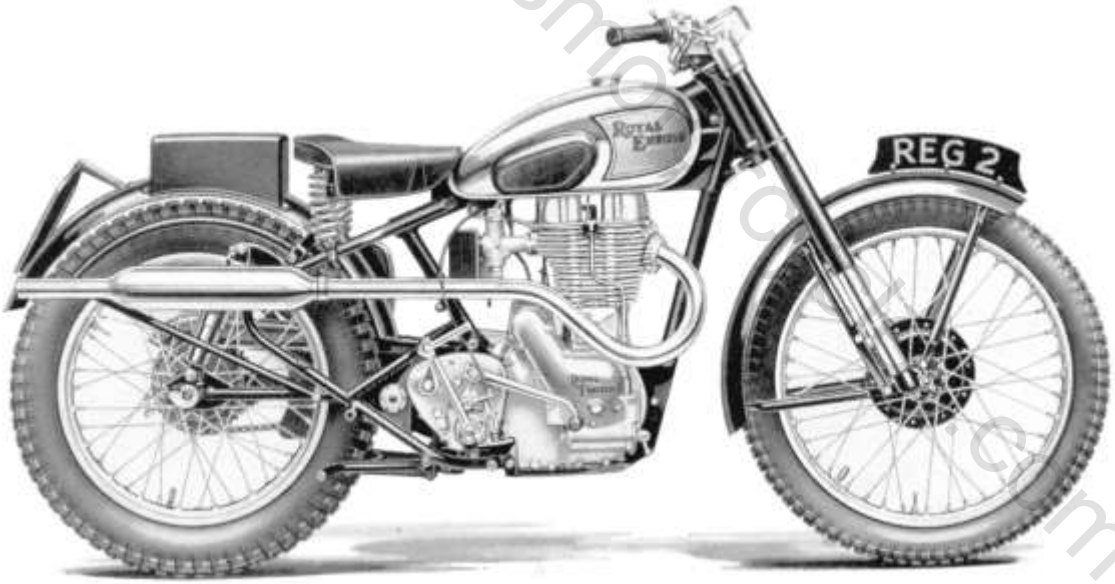
Position 1. The plunger A' is being drawn out of the cylinder hole in the disc C by the action of the peg B' on the shaft D'. The port U' registers with the suction port Y' in the housing, so that oil is drawn into the cylinder from the crankcase sump. At the same time the port S' in the disc registers with the delivery port X' in the housing, so that oil below the disc to the housing is forced through S' and X' to the rocker gear.

Position 2. The plunger A' is being pushed into the cylinder hole in the disc C. The port T' in the disc now registers with the delivery port X' in the housing, so that oil is forced out of the cylinder to the rocker gear. At the same time the port V' in the disc registers with the suction port Y' in the housing so that oil is drawn into the housing below the disc from the crankcase sump through V and Y'.

ROYAL ENFIELD WORKSHOP MANUAL



350 + 500 BULLET SCRAMBLES 1954



350 BULLET TRIALS 1951

ROYAL ENFIELD WORKSHOP MANUAL

SECTION C2
Service Operations with Engine in Frame
350 Bullet 1949 - 1955
500 Bullet 1953 - 1955

1. Removal of the Timing Cover

First place a tray under the engine to catch the oil which will escape when the cover is removed.

Remove the exhaust pipe and silencer.

Remove nine screws from the cover, taking care not to lose the sealing washers, one for each screw.

Draw off the timing cover, tapping it lightly if necessary.

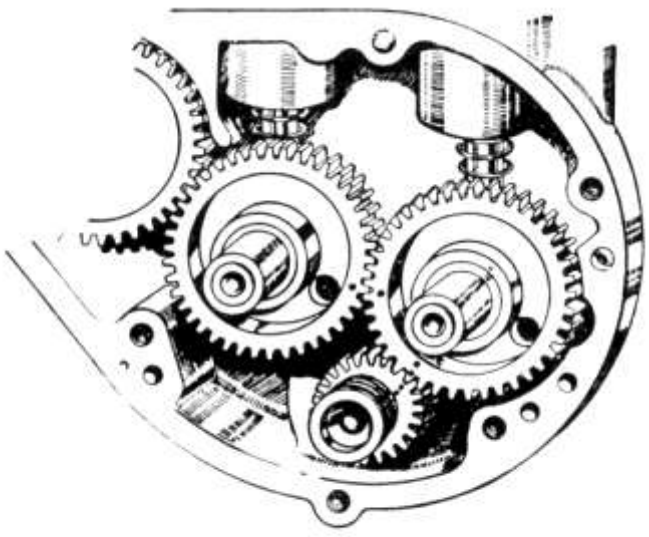
In refitting the timing cover see that the joint washer is correctly located over the oil holes, using a little grease (not compound) to hold it in position.

See that the cork plug is in position in the hole in the pump worm. If the plug is damaged it should be renewed to ensure oil pressure to the big end bearing.

When refitting the timing cover it is important that the engine is turned gently forwards while the cover is being put in place. This will help the engagement of the pump worm with the pump spindle and prevent damage to the gears.

The filter chamber should be filled with clean oil before the timing cover is refitted.

To verify that the oil pumps are working after replacing the timing cover, start the engine up and remove the oil filler cap so that the return of oil through the relief valve can be seen. It may take several minutes before there is sufficient oil in the engine for the return flow through the relief valve to commence.



VALVE TIMING MARKS
Fig. 1

2. Valve Timing

The cams are integral with the cam pinions and the position for correct timing is marked on the pinions by small dots.

Rotate the engine to top dead centre and put the exhaust (or right-hand) cam pinion in position so that the pair of dots on it are opposite the pair of dots on the timing pinion on the crankshaft.

Put the inlet (or left-hand) cam pinion in position so that the single dot on it is opposite the single dot on the exhaust cam pinion.

The correct timing at .012 in. tappet clearance is as follows

"350 Bullet"

Exhaust opens 75° before bottom dead centre.
Exhaust closes 35° after top dead centre.
Inlet opens 30° before top dead centre.
Inlet closes 60° after bottom dead centre.

"500 Bullet"

Exhaust opens 75° before bottom dead centre.
Exhaust closes 35° after top dead centre.
Inlet opens 40° before top dead centre.
Inlet closes 70° after bottom dead centre.

3. Tappet Adjustment

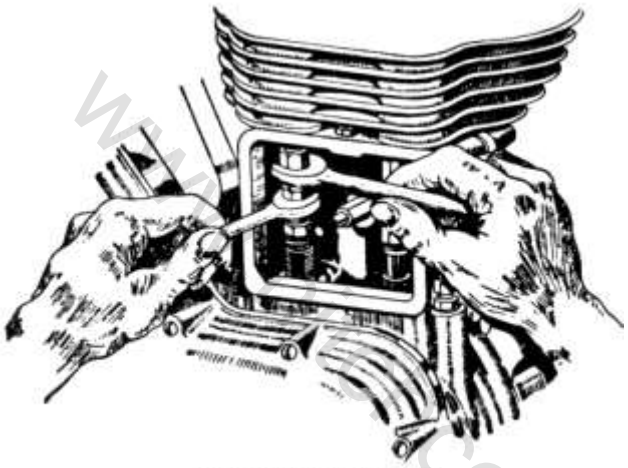
The tappets are adjusted by the ball and socket joints which are located in a compartment at the side of the cylinder and access to which is obtained by removing the inspection cover.

Before checking the clearance or making any adjustment, rotate the engine until the piston is at the top of the firing stroke. This will ensure that both valves are closed and that the tappets are well clear of the silencing ramps on the cams. If the cylinder head has been dismantled, make sure that the end caps have been put back on the valve stems.

Because of the ball and socket joints at the bottom of the push rods, the tappet clearance cannot be measured there, but between the valve

stems and rockers, with the rocker box covers removed. To remove the rocker box covers the petrol tank must be taken off. (See subsection 5.)

The correct clearance is nil or as little as possible with the engine COLD.



ADJUSTING TAPPETS
Fig. 2

To make the adjustment hold the push rod bottom end (top hexagon) and turn the locknut (middle hexagon) to the left. Screw the push rod cup (bottom hexagon) to the left to take up clearance or to the right to increase the clearance, at the same time holding the push rod bottom end (top hexagon). Lock the adjustment by tightening the locknut against the push rod end and then re-check the clearance.

Owing to the initial bedding down of the wearing surfaces, the tappets on new engines may require adjustment after the first few hundred miles.

4. Ignition Timing

The setting of the ignition timing depends upon the position of the magdyno pinion relative to the magdyno shaft.

To obtain access to the magdyno pinion it is necessary to remove the timing cover (see Subsection 1).

The pinion is mounted on a smooth taper on the magdyno shaft and held in position by a nut (Right Hand Thread). To remove the pinion undo the nut and use the special extractor tool supplied with the tool kit.

Before setting the timing, adjust the contact breaker points to a clearance of .012 - .015 in. when fully opened and put the ignition lever in the full advance position. See that the stop screw in the magneto cam plate is in the end of the slot and that the plate is not sticking.

To set the timing, turn the engine until the piston is 7/16 in. – 1/2 in. for the 350cc. Engine, or 5/16 in. for the 500cc. Engine, before top dead centre on the compression stroke, i.e., with both valves closed.

Insert a piece of thin tissue paper between the points of the contact breaker and turn the magneto forwards or clockwise, looking on the contact breaker, until the paper can just be pulled out. Give the pinion a sharp tap to secure it on the shaft and then lock it by tightening the nut.

5. Removal of the Petrol Tank

Turn off the petrol tap.
Disconnect the petrol pipe.
Remove the two bolts which secure the tank to the frame at the front and rear and it can then be lifted clear.

6. Removal of the Cylinder Head

Remove the petrol tank (see Subsection 5).
Disconnect the engine steady.
Disconnect the plug lead and oil pipe.
Remove the exhaust pipe.
Push the carburetter back clear of the studs after removing the fixing nuts.
Remove the rocker-box covers.
Remove the decompressor cable from the lever on the handlebar.
Turn the engine until both valves are closed.
Remove the rockers and bearings complete by undoing four 1/4 in. nuts on each.
Lift out the push rods.
Remove six nuts, taking care not to lose the washers.
Remove the 1/4 in. nut above the tappet chest to avoid possible damage to the crankcase.
Lift the cylinder head off the barrel, tapping it gently beneath the exhaust and inlet ports with a hide hammer to break the carbon seal. Do not tap the fins.

When fitting the head again, apply jointing compound to both sides of the gasket, replace the six nuts and tighten them progressively and diagonally from one side to the other to prevent distortion.

Replace the 1/4 in. nut above the timing chest.

Replace the push rods with the adjustable parts downwards, remembering that the shorter rod is the inlet.

Replace the rockers and bearings, making sure that the oil feed holes are at the bottom and that the caps and bases are in line when tightened down. A sharp tap with a hammer on the end of the rocker will help to ensure this. See that the valve stem caps are in place.

After the engine has been run long enough to get thoroughly hot, the tightness of the nuts should be re-checked.

It will be found convenient for this purpose to use a small auxiliary petrol tank while the engine

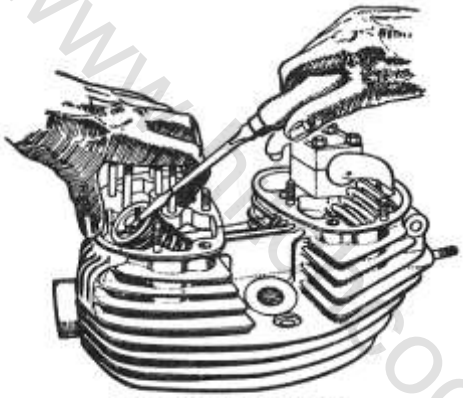
is being warmed up on the stand, because all the cylinder head nuts are not accessible with the proper tank in position.

See that the rocker box gaskets are intact and replace the rocker box covers.

After tightening the cylinder head nuts with the engine hot, recheck the tappet clearance at some convenient time when the engine is cold.

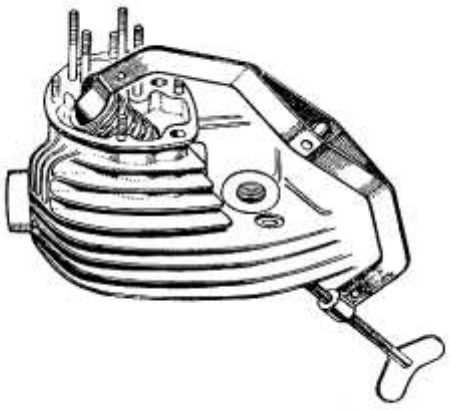
7. Removal of the Valves

Remove the cylinder head and rockers (see Subsection 6).



VALVE CAP REMOVAL
Fig. 3

Prise away the hardened steel thimble or end cap. If this has stuck it can be removed by means of a screwdriver.



VALVE SPRING COMPRESSOR
Fig. 4

Using a suitable compressing tool, compress the valve springs and remove the split conical collets from the end of the valve stem.

Slacken back the compressing tool and release the springs.

Withdraw the valve and place its springs, top spring collar (and bottom collar if it is loose), the end cap and split conical collets together in order that they may be reassembled with the valve from which they were removed.

Deal similarly with the other valve in the head.

If the valve will not slide easily through the valve guide, remove any slight burrs on the end of the valve stem with a carborundum stone. If the burrs are not removed and the valve is forced out, the guide may be damaged.

8. Removal of the Rockers

See Subsection 6.

9. Removal of the Valve Guides

To remove the valve guides from the head two special tools are required which can easily be made.

The first is a piece of tube with an internal bore of not less than 7/8 in.

The second is a mandrel about 4 in. long made from 9/16 in. diameter bar with the end turned down to 11/32 in. diameter for 1/2 in.

Support the cylinder head on the tube which fits over the collar of the valve guide. Using the mandrel, force the guide out of the head with a hand press or by using a hammer.

To fit a new guide, support the head at the correct angle and use a hand press and the same mandrel. If a hand press is not available and the guide is replaced by a hammer, use the mandrel to prevent damage to the guide and treat with great care.

It is necessary to re-cut the valve seat to the correct profile and grind in the valve after a guide has been replaced.

10. Removal of the Cylinder Barrel

Remove the Cylinder Head (see Subsection 6).

Put the piston at bottom dead centre.

Remove the 1/4 in. nut above the tappet chest and lift the barrel off.

When replacing the cylinder barrel, clean off the joint faces and fit a new paper washer.

11. Removal of the Piston

Remove the cylinder head and cylinder barrel (see Subsections 6 and 10).

With the tang of a file remove, the wire circlip retaining the gudgeon pin on the timing side.

Extract the gudgeon pin using Special Tool No.E.5477 (use adaptor if necessary), having first

marked the pin so that it, and the piston, may be replaced the same way round, i.e. split skirt to the front.

During this operation put a piece of clean rag in the top of the crankcase to prevent foreign matter getting in. In particular, take care not to drop the circlip in the crankcase.

12. Decarbonising

Having removed the cylinder head as described in Subsection 6, scrape away all carbon, bearing in mind that you are dealing with aluminium which is easily damaged. Scrape gently to avoid scoring the combustion chamber or the valve seats, which are of austenitic iron shrunk into the head. Be careful not to injure the joint face which beds down on to the head gasket.

Do not, in any circumstances, use caustic soda or potash for the removal of carbon from aluminium alloy.

Scrape away all carbon from the valve heads and beneath the heads, being careful not to cause any damage to the valve faces.

If the piston rings are removed, the grooves can be cleaned out and new ones fitted. For cleaning the grooves a suitable tool is a piece of broken ring thrust into a wooden handle and filed to a chisel point.

While the cylinder and piston are not in position, cover the crankcase with a clean cloth to prevent the ingress of dust and dirt of all kinds. Do not, of course, attempt to scrape the carbon from the piston when the mouth of the crankcase is open.

13. Grinding in the Valves

Wipe the valve faces clean and examine them carefully. If they are at all pitted, have the faces recut. Pay similar attention to the valve seats in the head; excessive grinding will form a pocket and the gas flow will be restricted. The angle of the valve face should be 45 degrees to the axis of the valve stem.

To grind a valve, smear the seating with a little grinding in compound, place a light, short coil spring over the valve stem and beneath the head, insert the valve into its appropriate guide, press it on to the seat, using a tool with a suction cup and with a backwards and forwards rotary motion, grind it on to its seat. Alternatively, use a tool which grips the valve stem and pulls the valve on to its seat. Frequently lift the valve and move it round so that an even and true seating is obtained. Continue grinding until a bright ring is visible on both valve and seating.

14. Reassembly after Decarbonising

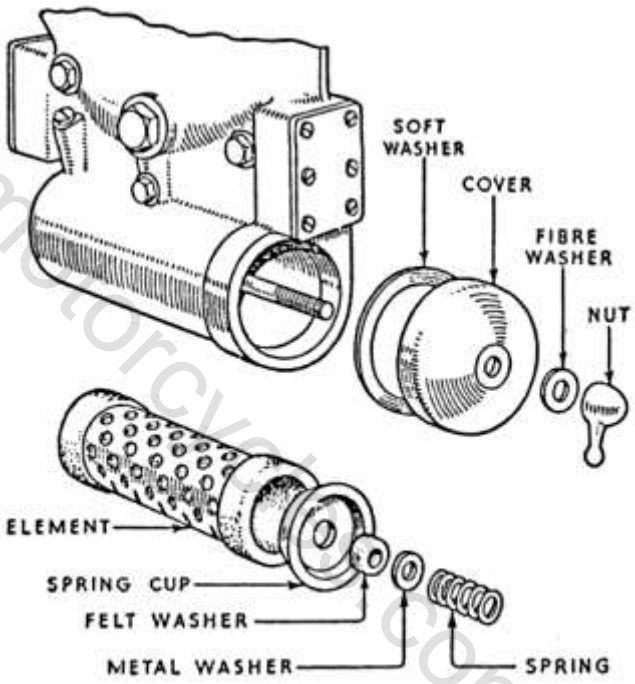
Before building up the engine, see that all parts are scrupulously clean and place them conveniently to hand on a clean sheet of brown paper.

When reassembling the engine, it is advisable to fit a new paper washer between the cylinder barrel and the crankcase.

Smear clean oil over the piston and space the ring gaps, having replaced the rings if these have been removed. The taper ring is marked "TOP" on the upper face. Lower the piston over the connecting rod and insert the gudgeon pin. Fit the circlip securing the gudgeon pin.

If the piston ring gaps exceed 1/16 in. when the rings are in position in the barrel, new rings should be fitted. The correct gap for new rings is between .011 in. and .015 in. The gap should be measured in the least worn part of the cylinder, which will be found to be the extreme top or bottom of the bore.

Oil the cylinder bore and lower the barrel over the piston and seat it gently on the paper washer. Tighten down the nut above the tappet chest and replace the cylinder head and rockers as described in Subsection 4.



DETAIL OF FELT OIL CLEANER

Fig. 5

15. Cleaning the Oil Filter

The oil filter is located in the timing cover immediately below the oil pumps. The felt element should be taken out and washed in petrol after the first 500 miles and every subsequent 2,000 miles. Fit a new element every 5,000 miles.

The filter element is removed by unscrewing the nut holding the end cap in position. When reassembling the filter after cleaning, take care that no grit or other foreign matter is sticking to it. After emptying the filter chamber it is essential to run the engine slowly for about five minutes to ensure that oil is reaching the big ends. If the timing cover has been removed, fill the filter chamber with clean oil before replacing the cover.

16. Overhaul of Oil Pumps

Remove the timing cover, as described in Subsection 1.

Remove the end plates from both pumps.

Remove the pump discs and plungers.

Remove the pump spindle which can be pulled out from the front or return pump end.

Check the fit of the plungers in the pump discs which should have a minimum of clearance but should be able to be moved in and out by hand.

If, when fitting a new disc or plunger, the plunger is found to be too tight a fit, carefully lap with metal polish until it is just free. If the pump disc is not seating properly or if a new pump disc is being fitted, it should be lapped to the seating with Special Tool No. E.5425, using carborundum 360 fine paste or liquid metal polish, until an even grey surface is obtained.

Replacement pump discs have a lip left on the flat, at the opposite side to the lapped face. The purpose of this is to hold the disc central in the housing during lapping-in. It should be filed off before the pump is finally assembled, care being taken not to damage the lapped face.

Wash all passages, etc., thoroughly with petrol after lapping to remove all traces of grinding paste.

Check the pump disc springs for fatigue by assembling in the timing cover and placing the pump covers in position. The latter should be held 1/8 in. off the timing cover if the springs are correct.

In the case of the 500 c.c. engine see that the steel end pads are in position on the outer ends of the springs.

The pump spindle should be renewed if excessive wear has taken place on the teeth.

Re-assemble the oil pumps, replacing the paper cover gaskets if necessary. Before fitting each cover fill the pump chamber with clean oil.

Having assembled the pumps, lay the timing cover flat and fill the oil ports by means of an oil-can. Turn the pump spindle with a screwdriver in a clockwise direction looking on the front and it can then be seen whether the pumps are operating correctly.

Before replacing the timing cover on the engine, fill the filter chamber with clean oil.

The oil feed to the big end can be checked by partially unscrewing the feed plug in the timing cover between the oil pumps while the engine is running and the oil return to the tank can be checked by removing the oil filler cap.

17. Removal of Pump Worm and Timing Pinion

Remove the timing cover as described in Subsection 1.

Unscrew the worm shaft by a hexagon head behind the worm, using Special Tool No. E.5451. **This is a Left Hand Thread**.

Withdraw the timing pinion by means of a flat chisel placed behind the pinion and tap gently.

When refitting the timing cover see that the cork plug is in position in the hole in the pump worm and is undamaged.

18. Removal of the Magdyno Pinion

Remove the timing cover and take off the hexagon nut holding the pinion.

Extract the pinion with the Special Tool supplied with tool kit.

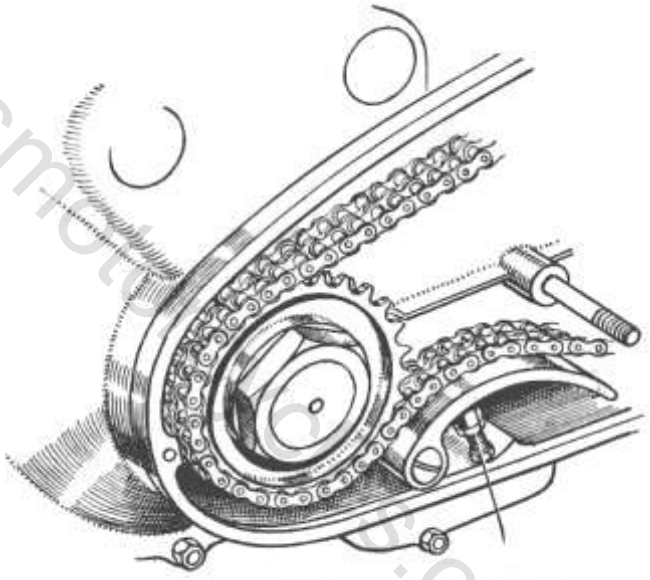


Fig. 2 ADJUSTER

To take up slack in the primary chain, unscrew the locknut and turn the adjuster beneath the curved slipper until correct chain tension is obtained; re-tighten the locknut.

19. Primary Chain Adjustment

Access to the primary chain adjuster is gained by removing the primary chain cover, which is held in position by a single nut. Before removing the nut

place a tray under the engine to catch the oil from the chaincase.

Beneath the bottom run of the chain is a curved slipper on which the chain rests and which may be raised or lowered by turning the adjusting screw after having first slackened the locknut.

The chain should be adjusted so that there is ¼ in. up and down movement at the centre of the top run of the chain.

After replacing the chain cover, remember to replenish the chaincase with oil.

20. Removal of the Engine Sprocket

The primary chain is endless and it is therefore necessary to remove both the engine and clutch sprockets simultaneously.

Unscrew the engine sprocket nut so that the engine sprocket, which is mounted on splines, can then be removed with the clutch sprocket (on some early models the sprocket was mounted on a taper instead of splines).

To remove the clutch sprocket unscrew the three clutch spring pins and lift away the spring cap, springs and distance pieces, clutch front plate, centre or plate retaining ring and the assembly of the driving and driven clutch plates. The clutch sprocket can then be withdrawn from the clutch centre after removal of the large circlip which secures it.

21. Removal of the Tappets and Guides

It is only necessary to remove the tappets and guides if they have become worn.

To remove the guides use Special Tool No. E.5410.

The guide should have an interference fit of .0015 in. to .0025 in. in the crankcase and can be driven in with a bronze drift, care being taken when the guide is nearly home to avoid damaging the collar. Excessive hammering may close up the bore of the guide which would necessitate removing the tappet and reaming again. In no circumstances should the guide be reamed in position on the 350cc. engine as swarf might get into the recess in the guide.

22. Dismantling the Breather

If the breather is not operating efficiently, it may cause pressure in the crankcase, instead of a partial vacuum, giving rise to smoking or overoiling.

500cc. Engine. See that the discs and backplate are clean and undamaged and that the discs are seating properly.

When re-assembling the breather, apply jointing compound very sparingly to the back of the steel plate taking great care to keep it away from the discs or their seatings

350cc. Engine. Unscrew the body of the breather and examine the disc. If it is faulty, a new breather unit should be fitted as the disc cannot readily be taken out of the body.

23. Removal of the Clutch

Remove the engine sprocket and clutch sprocket together as described in Subsection 20.

To remove the clutch centre, hold the clutch with Special Tool No. E.4871, and remove the centre retaining nut and washer with a box spanner.

The clutch centre can then be withdrawn from the shaft with Special Tool No. E.5414.

If the circlip is not removed the sprocket and clutch centre can be removed together.

24. Removal of the Final Drive Sprocket

Remove the clutch as described in Subsection 23.

Remove the primary chain tensioner.

Remove the rear half of the primary chaincase by taking out three socket screws.

Remove the grub screw locking the final drive sprocket nut.

Hold the sprocket and remove the nut (Right Hand Thread). The sprocket can then be withdrawn.

25. Pressure Relief Valves

There are two Pressure Relief Valves in the oil feeds to the big end and to the rocker gear respectively. Their function is to prevent excessive pressure and their setting is not critical. The feed to the rocker gear comes from the return oil from the crankcase to the tank.

The pressure relief valves are set before leaving the Works and should not normally require to be disturbed. If, however, it is found necessary to dismantle either of them, they can be reset as follows:

Rocker Feed Relief Valve. This is located on the outside of the crankcase immediately below the lower end of the external oil pipe. It has a hexagon head and can be removed complete by unscrewing it out of the case.

The valve itself cannot be dismantled and, if found to be faulty, should be replaced by a new one.

Big End Relief Valve. This is located in the timing-side crankshaft and can only be adjusted when the crankshaft has been dismantled. It consists of a 5/16 in. diameter steel ball and spring held in position by a screwed plug.

The valve is set to open when the oil pressure exceeds about 35 lbs per square inch and when set correctly there is a movement of about 3/32 in. of the ball off the seat. This can be measured without dismantling the crankshaft by pushing a thin rod through the hole in the pump worm with the oil feed plug in the timing cover removed.

If the crankshaft is dismantled for any reason, it is always advisable to fit a new spring to the relief valve in case the original one has become weak.

If the valve is set to give too high a pressure, the pump disc will be forced off its seating.

26. Removal of the Magdyno

Remove the magdyno pinion. (See Subsection 18.)

Unscrew the nut on the fixing strap bolt and swing the strap clear. The magdyno can then be withdrawn.

In replacing the magdyno, see that the felt washer, retainer and spring are in position.

500 BULLET 1954

ROYAL ENFIELD WORKSHOP MANUAL

500 BULLET RACER 1954

TECHNICAL DATA

	Bore & Stroke	Petrol Tank Capacity	Oil Tank Capacity	Weight	Wheelbase	Ground Clearance
"350" Scrambles	70 × 90 mm.	2 gallons	4 pints	320 lbs.	54 inches	7 inches
"500" Scrambles	84 × 90 mm.	2 gallons	4 pints	328 lbs.	54 inches	7 inches
"350" Racer	70 × 90 mm.	2 gallons	4 pints	305 lbs.	54 inches	6½ inches
"500" Racer	84 × 90 mm.	2 gallons	4 pints	315 lbs.	54 inches	6½ inches
"350" Trials	70 × 90 mm.	2 gallons	4 pints	320 lbs.	54 inches	7 inches
"500" Trials	84 × 90 mm.	2 gallons	4 pints	328 lbs.	54 inches	7 inches

The following gear ratios are available:

With kickstarter:

No. 12	1,	1·4,	2·15,	3·3
No. 14	1,	1·4,	1·98,	3·3
No. 16	1,	1·3,	1·67,	2·14

Racing close ratio, no kickstarter:

No. 1	1,	1·09,	1·28,	1·65
No. 3	1,	1·18,	1·4,	1·8
No. 5	1,	1·18,	1·4,	2·13

In addition the following sprockets can be supplied:

Model	Engine Sprocket	Countershaft Sprocket
"350 Bullet"	20 or 25	14, 15, 16, 17, 18, 19.
"500 Bullet"	25 or 29	14, 15, 16, 17, 18, 19, 20, 21.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION D2
Service Operations with Engine Removed

1. Removal of the Engine from the Frame

Disconnect the battery leads and remove the battery.
Turn off the petrol and disconnect the petrol pipe.
Take the slides out of the carburettor.
Remove the air cleaner.
Remove the exhaust pipe.
Disconnect the electric horn leads.
Disconnect the control cable from the magdyno.
Disconnect the engine steady.
Remove the rear chain.
Remove the footrest bar.
Support the engine on a suitable box or wood block.
Remove the centre stand and the stand stop.
Remove the front engine plates.
Remove the bolt securing the rear engine plate to the frame.
Lift out the engine.

2. Removal of the Gear Box

Remove the primary chain case, engine sprocket and clutch (see Section C.2, Subsection 24).

Remove four 3/8 in. nuts and the gearbox can then be withdrawn from the engine.

3. Dismantling the Crankcase

350 + 500 c.c. Engine. Drain the oil tank by removing the drain plug.

Having removed the engine from the frame as described in Subsection 1, dismantle the cylinder head, barrel, piston, timing gear, magdyno, etc., as described in Section C.2.

Remove the nuts on the driving side of the engine from four fixed studs at the rear of the crankcase.

Remove six studs passing through the crankcase.

The two halves of the crankcase can then be separated.

The timing side outer roller race and the bronze bush will remain in the timing side half of the crankcase.

The driving side ball race and the driving side outer roller race will remain in the driving side half of the crankcase.

The driving side inner roller race and the inner distance piece will remain on the engine shaft.

The flywheel assembly may be difficult to remove from the driving side of the crankcase owing to the shaft being a tight fit in the inner race of the ball bearings. This is particularly likely in the earlier engines with two ball bearings. In this case push the shaft out of the bearings using crankshaft extractor E.5121.

4. Main Bearings

To remove the Outer roller race(s) (or inner ball race on earlier 350 Bullet engines) from the crankcase halves, heat to 100°C or more and drop the half case sharply on a flat block of wood or bench, when the race(s) will drop out, together with the distance piece in the case of the driving side and the thrust washer in the case of the timing side.

Remove the circlip from the driving side crankcase and re-heat to remove the second ball race.

To replace the bearings, heat the crankcase and press in the races in the following order

Driving Side. Use Special Tool No. 4817.
Small steel washer.
Cork oil-retaining washer
Large steel washer.
Ball bearing complete.
Circlip.
Outer distance piece*
Outer roller race*
* On 500 and later 350 engines. (On early 350 engines a distance piece and inner ball race)

Timing Side. Use Special Tool No. 4816.
Steel thrust washer. Outer roller race.

Care must be taken to see that the lead on the outside of the outer roller race enters the case first to make sure that it is square with the housing.

5. Replacement of the Cam and Idler Spindles

To remove the cam spindles heat the crankcase and tap the spindles out from inside.

To remove the idler spindles heat the crankcase as before, hold the spindles in a vice and tap the crankcase lightly with a hide hammer.

To replace the spindles use Special Tool No. E.6462 which is a locating plate for all the spindles.

Start the spindles in the holes in the crankcase by tapping them lightly.

Offer the locating plate to the spindles, making sure that they are all upright. Tap the plate over the spindles until it touches the timing chest face, having first made sure that the latter is quite clean.

Drive the spindles home with a small hammer (not heavier than 1/2 lb.) and a drift.

Remove the locating plate.

6. Flywheel Assembly

350 c.c. Engine. The flywheel assembly consists of the crankshaft and the connecting rod.

To dismantle the crankshaft remove the set screws securing the crankpin nuts.

Holding the crankshaft in a Special Jig, No. E.2775, remove the crankpin nuts.

Using E.2775, with a pair of steel bars (about 1 in. x 3/8 in. x 9 in. long) placed across, press out the crankpin with a hand press.

The connecting rod can then be removed.

Turn the crankshaft over in the jig and repeat with the other side if necessary.

To remove the main shafts, remove the set screws from the shaft nuts and unscrew the nut. Drive the shafts out with a hammer and drift.

To replace the main shafts, reverse the above process, making sure that the keys are a good fit.

To re-assemble the crankshaft, press the crankpin into the timing side flywheel, making sure that the oil hole is in the correct position and that the thrust washer is facing the right way, i.e., with the chamfer away from the flywheel.

Test the oil passages with an air line or oil gun to make sure that they are clear.

Smear oil over crankpin and floating bush.

Put the floating bush over the crankpin.

Put the connecting rod over the floating bush.

Place the other thrust washer over the crankpin, also with the chamfer away from the flywheel.

Press the driving side flywheel on.

Put the flywheel in the assembly jig E.2775, to ensure that the flywheels and shafts are in line and replace the nuts, tighten securely and refit the set screws.

Test the oil passages again to ensure that they are clear.

If the same crankpin has been put back, it will be necessary to drill out the grub screw, in order to clean the oil passages after which a new grub screw must be fitted.

Mount the crankshaft between centres and true up to .0005 in. on either side of the shafts.

If the readings for the two shafts are high on opposite sides, the error can be corrected by gently tapping either or both of the flywheels.

If the readings are high on the same side of the two shafts, it is probably due to dirt or foreign matter in the joints and the crankshaft should be dismantled again, carefully examined and cleaned and re-assembled.

500 c.c. Engine. The flywheel assembly consists of the crankshaft and the connecting rod.

To dismantle the crankshaft remove the set screws securing the crankpin nuts.

Holding the crankshaft in a special jig, No. E.2775, remove the crankpin nuts.

Using E.2775 with a pair of steel bars (about 1 in. x 3/8 in. x 9 in. long) placed across, press out the crankpin with a hand press.

The connecting rod can then be removed.

Turn the crankshaft over in the jig and repeat with the other side if necessary.

To remove the timing side main shaft, take the set screw from the shaft nut and unscrew the nut. Drive the shaft out with a hammer and drift. To replace the timing side shaft, reverse the above process, making sure that the key is a good fit and that the nut is tightened securely by means of a box spanner with a 12 in. tommy bar.

The driving shaft has no nut but is secured by tightening the sprocket nut after the assembly of the engine. It should be pressed in and out with a hand press or a hammer and drift. If the latter is used care must be taken not to damage the centre.

To re-assemble the crankshaft, press the crankpin into the timing side flywheel, making sure that the oil hole is in the correct position and that the thrust washer is facing the right way, i.e., with chamfer away from the flywheel.

Test the oil passages with an air line or oil gun to make sure that they are clear.

Put the floating bush over the crankpin.

Put the connecting rod over the floating bush.

Place the other thrust washer over the crankpin, also with the chamfer away from the flywheel.

Press the driving side flywheel on.

Put the flywheel in the assembly jig, E.2775, to ensure that the flywheels and shafts are in line and replace the nuts, tighten securely and refit the set screws.

Test the oil passages again to ensure that they are clear.

If the same crank pin has been put back, it will be necessary to drill out the grub screw, in order to clean the oil passages after which a new grub screw must be fitted.

Mount the crankshaft between centres and true up to .0005 in. on either side of the shafts.

If the readings for the two shafts are high on opposite sides, the error can be corrected by gently tapping either or both of the flywheels.

If the readings are high on the same side of the two shafts, it is probably due to dirt or foreign matter in the joints and the crankshaft should be dismantled again, carefully examined and cleaned and re-assembled.

7. Reassembly of the Crankcase

Replace the outer roller races, etc., in the crankcase halves as described in Subsection 4.

Fit the inner distance piece and the rollers and cage in the driving side crankcase.

Lay the thrust washer on the bearing.

Assemble the flywheel into the bearing, if necessary using the sprocket nut with suitable packing piece to draw the driving shaft through the inner race(s) of the ball bearing(s).

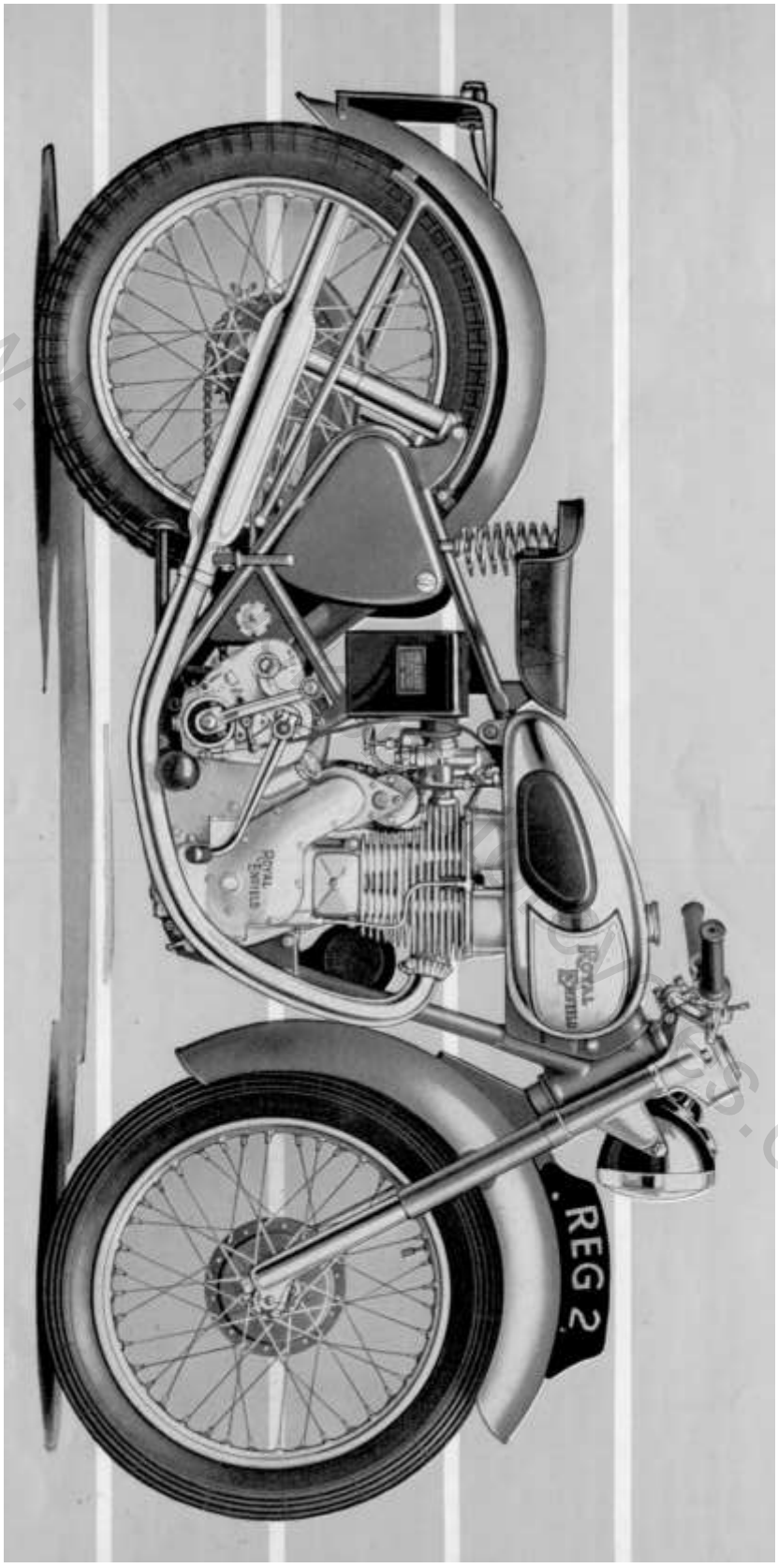
Make sure that the crankcase face is clean and apply jointing compound to it.

Put the thrust washer on the timing side shaft and the rollers and cage.

Put the magdyno straps over the studs in the timing side crankcase and place the latter in position over the flywheel.

Bolt the two halves of the crankcase together, making sure that the joint matches correctly so that the cylinder base is flat.

ROYAL ENFIELD WORKSHOP MANUAL



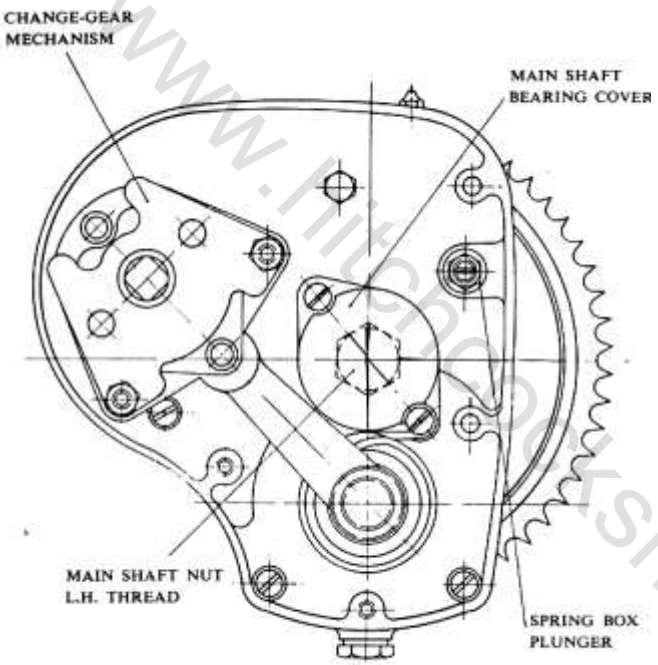
350 BULLET 1949

ROYAL ENFIELD WORKSHOP MANUAL

SECTION E1

Gearbox and Clutch

" Meteor 700" " 500 Twin " " 500 Bullet" " 350 Bullet"



GEARBOX WITH OUTER COVER REMOVED
Fig. 1

1. Removal of Gearbox

This is described in section Dl or D2. The gearbox can, however, be completly dismantled with the engine in the frame except for removal of the inside operator and the bearings in the gearbox shell.

2. To Dismantle the Gearbox

First remove the kickstart crank, the gear changelever and the neutral finder and pointer.

Remove the top small inspection cover and disconnect the clutch cable.

Remove four screws and the gearbox outer cover can then be detached.

Remove the gear change mechanism by taking off the two nuts securing it.

Remove the main shaft bearing cover which is attached by two screws.

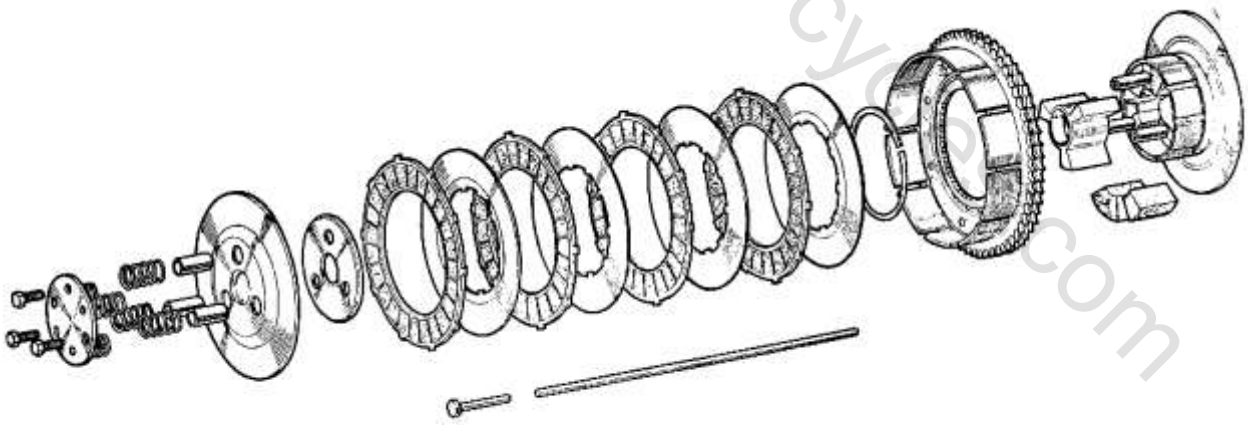
Remove four cheese-headed screws and hexagon bolt.

Remove the spring box locating plunger nut and washer.

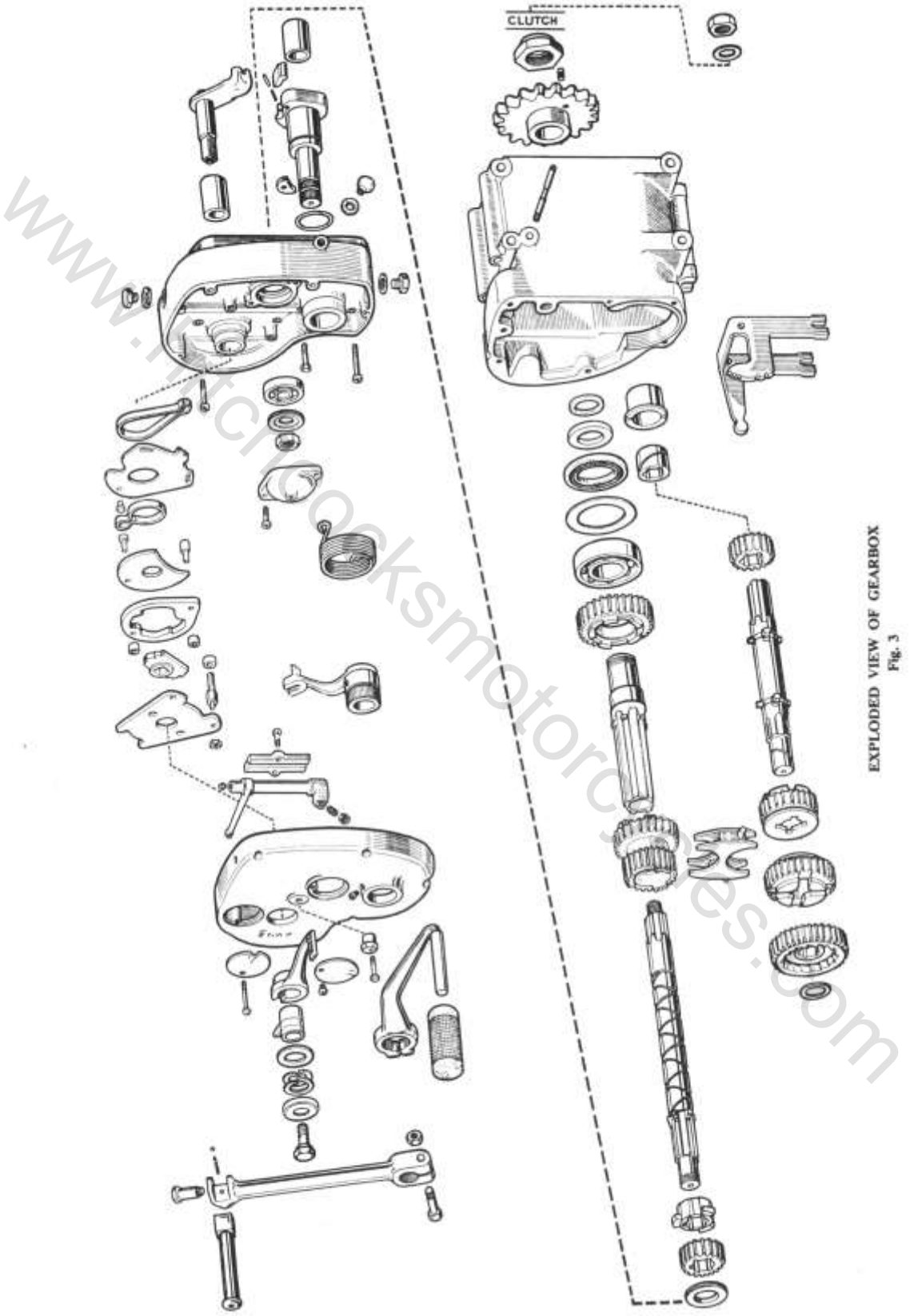
Remove the main shaft nut **(Left Hand Thread).**

The gearbox inner cover can then be removed

The mainshaft can be drawn straight out if the clutch has been removed, which, however, should be done before taking off the gearbox cover.



EXPLODED VIEW OF CLUTCH
Fig. 2



EXPLODED VIEW OF GEARBOX
Fig. 3

(See Section C1 or C2.) The top gear pinion and dog will come away with the mainshaft.

The layshaft can then be removed and the 2nd and 3rd gears drawn off the final drive sleeve together with the operator fork.

To take out the final drive sleeve, the final drive sprocket must be removed and this is preferably done before removing the inner cover. (See Section C1 or C2.)

3. Removal of the Ball Races

The mainshaft ball bearings can be removed by using a stepped drift 1.7/16 in.–1.11/64 in. diameter for the bearing in the box and 13/16 in.-39/64 in. diameter for the bearing in the cover.

When refitting the bearings stepped drifts of 2.5/16 in.-1.11/64 in. diameter and 1.11/16 in.-39/64 in. diameter must be used for the bearings in the box and cover respectively.

Note the felt washer in the recess behind the larger main shaft bearing and the dished pen-steel washer between the bearing and the felt washer. The second dished pen-steel washer, if fitted, has a smaller central hole and is on the other side of the main shaft bearing and is nipped between the inner face of the bearing and the shoulder on the final drive sleeve. See that both of the dished pen-steel washers have their raised portions facing towards the clutch and final drive sprocket.

4. Gear Change Mechanism

If the two nuts securing the gear change ratchet mechanism are slackened, the adjuster plate can be set in the correct position. In this position the movement of the gear lever necessary to engage the ratchet teeth will be approximately the same in each direction.

If the plate is incorrectly adjusted, it may be found that, after moving from top to third or from bottom to second gear, the outer ratchets do not engage the teeth on the inner ratchets correctly.

If, when fitting new parts, it is found that the gears do not engage properly, ascertain whether a little more movement is required or whether there is too much movement so that the gear slips right through second or third gear into neutral. If more movement is required, this can be obtained by filing the adjuster plate very slightly at the points of contact with the pegs on the ratchet ring.

If too much movement is already present, a new adjuster plate giving less movement must be fitted.

5. Re-Assembling the Gearbox

The procedure is the reverse of that given in Subsection 2 but the following points should be noted:

If the main shaft top gear pinion and dog have been removed, make sure that the dog is replaced the right way round or third and top gears can be engaged simultaneously.

Make sure that the trunnions on the operator fork engage with the slots in the inside operator.

See that the main shaft is pushed right home (It may tighten in the felt washer inside the final drive shaft nut.)

The layshaft top gear and kickstarter pinion should be assembled on the layshaft and the kickstarter shaft and ratchet assembled on to it before fitting the end cover. Do not forget the washer on the layshaft between the kickstarter pinion and the kickstarter shaft.

The joint between the gearbox and the inner cover should be made with gold size, shellac or a similar jointing compound.

Make sure that all parts are clean before commencing assembly. In normal climates the recesses in the gearbox should be packed with soft grease and the box should be filled up to the correct level with gear oil. (See Subsection 9.) On no account must heavy yellow grease be used.

6. Dismantling and Re-assembly of the Clutch

The method of removing the clutch is described in Section C1 or C2.

When re-assembling, note that two of the steel plates are dished and that the other(s) are flat. The correct order of assembly is shown on the exploded drawing.

Do not forget to replace the cush rubber plate retaining cover before fitting the pressure plate.

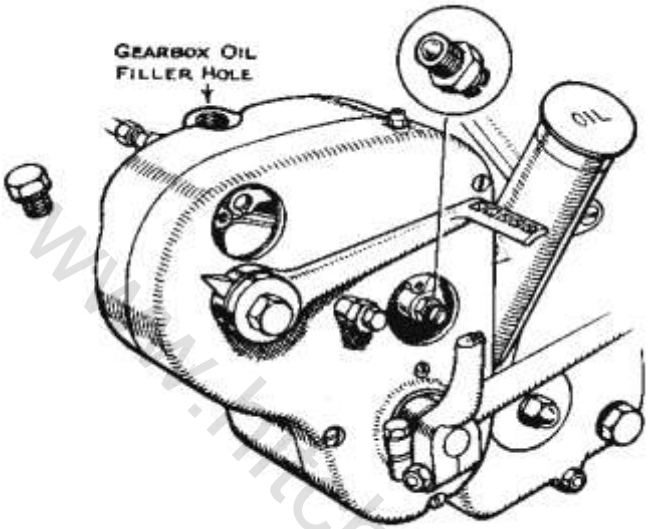
Make sure that the distance tubes inside three of the springs pass through the holes in the pressure plate. The other three springs are located by means of bosses on the clutch cap.

Tighten the spring pins as far as they will go If the clutch lifts unevenly it is probable that one of the springs has taken a set, in which case new springs should be fitted.

7. Adjustment of the Clutch Control

It is essential that there should be about 1/16 in. free movement in the clutch cable, to ensure that all the spring pressure is exerted on the plate.

There are two points of adjustment for the clutch cable. The first is at the top of the gearbox just behind the oil filler plug and is provided for taking up any stretch in the cable. The adjustment is made by screwing the collar in or out of the gearbox shell. The connection between the end of the cable and the horizontal lever can be seen if the top small inspection cover on the front of the gearbox is removed. Tighten the locknut on the screwed collar after adjustment has been made.



CLUTCH ADJUSTMENT ON CURRENT GEARBOXES
Fig. 4

The other point of adjustment is behind the lower inspection cover on the front of the gearbox and is for compensating for wear on the clutch plate inserts. To make the adjustment, remove the inspection cover, slacken the locknut central screw. Tighten the locknut after adjustment has been made.

The reason for the two points of adjustment is to enable the lever behind the cover to be kept in its proper position whether the need for adjustment is caused by plate wear or cable stretch.

Owing to initial bedding down of the clutch plate inserts, the clutch control may require adjustment after the first few hundred miles with a new machine. This point should therefore be examined soon after delivery and adjustment made if necessary.

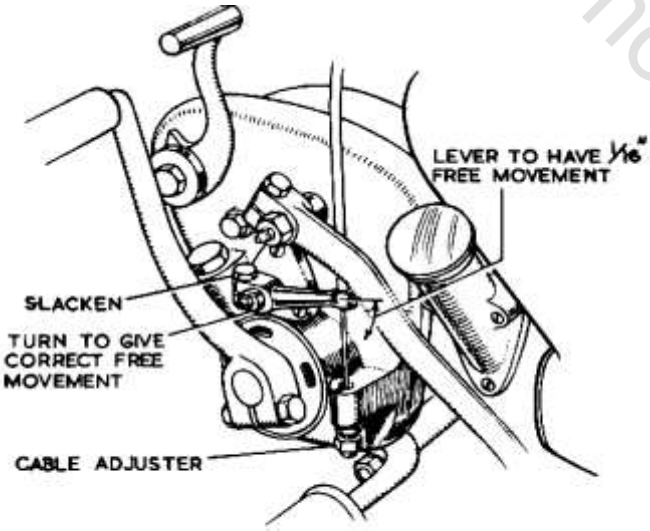
On earlier models the clutch operating mechanism is exposed on the front of the gearbox, but the adjustments are, however, the same in principle as those described above.

The cable adjustment is at the bottom of the front of the gearbox just in front of the kickstart lever. The collar is screwed in or out of a lug on the gearbox cover and is secured by a locknut as before.

The other adjustment is made by slackening the clamping bolt in the horizontal lever and turning the lever on its spindle, which is the end of the operating worm in the gearbox cover.

When correctly adjusted, the lever should be approximately square with the cable when the clutch is fully lifted.

The position of the lever endwise on the worm spindle is important and it should be positioned so that it does not foul the kickstart lever.



CLUTCH LEVER AND CABLE ADJUSTMENTS ON EARLY GEARBOXES
Fig. 5

8. Adjustment of the Neutral Finder

The neutral finder is adjusted by means of an eccentric stop secured to the front of the gearbox cover by a bolt which limits the travel of the operating pedal. Slacken the bolt and turn the eccentric stop until the correct movement of the pedal is obtained.

9. Gearbox Oil Level

The gearbox is replenished with oil by removing a plug in the top and the correct level can be checked by removing a second plug lower down on the right hand side looking at the cover.

On earlier models a dip-stick is attached to the filler plug for measuring the level of the oil or was provided loose in the tool kit.

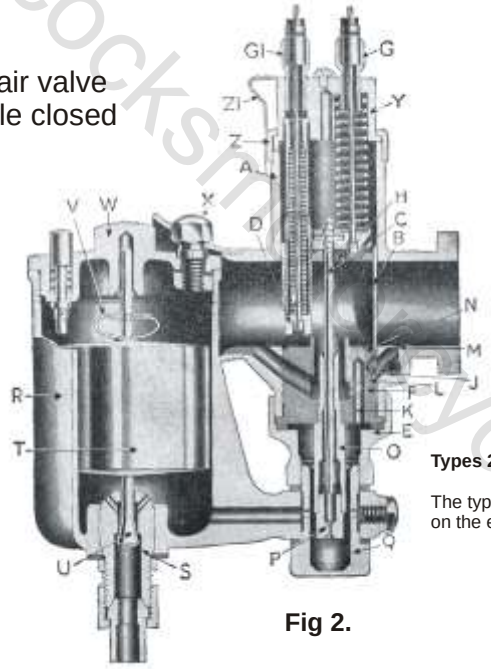
On some models the filler plug is on the side of the gearbox and in such cases the oil should be level with the plug hole and no dip-stick is required. The oil will be found to run into the box more easily on these models if the engine is started up and allowed to tick over so that the gears and shafts rotate.

ROYAL ENFIELD WORKSHOP MANUAL
AMAL NEEDLE TYPE CARBURETTER

MODEL	YEAR	CARB NUMBER	CHOKE DIAMETER	MAIN JET	NEEDLE JET	NEEDLE POSITION	THROTTLE VALVE	PILOT
350 BULLET	1948-55	276CX/1A	1	140	106	3	4	0.037
350 BULLET	1956-58	376/29	1	180	106	3	3.1/2	0.25
350 BULLET	1959-62	376/215	1.1/16	190	106	3	4	30
350 BULLET TRIALS	1948-55	276EX/1A	15/16	140	106	3	4	0.037
350 BULLET AMERICAN	1960/61	389/57	1.3/16	260	106	3	4	30
350 BULLET WORKS REP	1958-61	376/29	1	180	106	3	3.1/2	0.25
500 BULLET	1953-55	289T/1A	1.1/8	180	106	2	3	0.037
500 BULLET	1956-58	389/9	1.1/8	200	106	2	3.1/2	30
500 BULLET BIGHEAD	1959-62	389/34	1.3/16	220	106	2	3.1/2	30
500 BULLET BIGHEAD WITH AIR FILTER	1959-62	389/34	1.3/16	250	106	2	3.1/2	30
500 BULLET FURY	1959-62	T3GP	1.1/2	380	109	3	4	-

CARBURETTER WITH PILOT JET SYSTEM

Showing air valve and throttle closed



Types 274, 275, 276 and 289

The type numbers are found on the engine connection

Fig 2.

Your carburetter may be vertical, inclined or horizontal, but diagrammatically this view applies to all models, the variation being in the attachment to the engine and of the float chamber.

TWO DESIGNS

Fig. 2 above is the sectioned view of the standard Amal carburetter as shown on sheet 1, figure 1. This is the standard design where the primary air to the main jet and the pilot jet system comes in jointly through the main air intake, see figure 3, sheet 3. The type numbers are 274, 275. 276 and 289.
An alternative design is made where the primary air to the main jet comes in through four visible ports around the base of the mixing chamber, and where also the air supply to the pilot jet system is separate. The type numbers of these carburetters are 74, 75, 76, and 89.

These tuning instructions apply to both the above designs.

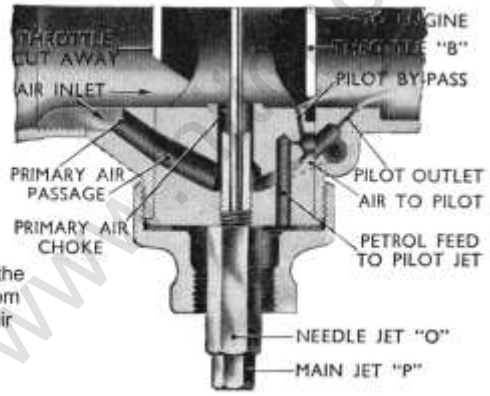
HOW IT WORKS AND PART NAMES

A. Mixing Chamber
B. Throttle Valve (see sheet 6)
C. Jet Needle and Clip above
D. Air Valve
E. Mixing Chamber Union Nut
F. Jet Block
G. Cable Adjuster (Throttle)
Gl. Cable Adjuster (Air)
H. Jet Block Barrel
J. Pilot hole (see sheet 6)
K. Passage to Pilot
L. Pilot Air Passage
M. Pilot Mixture Outlet
N. Pilot By-pass
O. Needle Jet
P. Main Jet (see sheet 6)
Q. Float Chamber Holding Bolt
R. Float Chamber
S. Needle Valve Seating
T. Float
U. Float Needle Valve
V. Float Needle Clip
W. Float Chamber Cover
X. Float Chamber Lock Screw
Tickler (to left of W.)
Y. Mixing Chamber Top Cap
Z. Mixing Chamber Lock Ring
ZI. Security Spring for above

The carburetter proportions and atomises the right amount of petrol with the air that is sucked in by the engine because of the correct proportions of jet sizes and the main choke bore. The float chamber maintains a constant level of fuel at the jets and cuts off the supply when the engine stops.
The throttle control from the handlebar controls the volume of mixture and therefore the power, and at all positions of the throttle the mixture is automatically correct. The opening of the throttle brings first into action the mixture supply from the pilot jet system for idling, then as it progressively opens, via the pilot by-pass, the mixture is augmented from the main jet, the earlier stages of which action is controlled by the needle in the needle jet. The main jet does not spray directly into the mixing chamber, but discharges through the needle jet into the primary air chamber, and goes from there as a rich petrol-air mixture through the primary air choke into the main air choke. This primary air choke has a compensating action.
The carburetters usually have a separately-operated mixture control called an air valve, for use when starting from cold, and until the engine is warm; this control partially blocks the passage of air through the main choke.
This design of carburetter offers perfectly simple and effective tuning facilities.

Fig 3.
This section view does NOT apply if your carburetter has FOUR EXTERNALprimary air holes at the base of the mixing chamber. It is for carburetters with the primary air inlet in the main air intake.

Diagrammatic section of carburetter showing only the lower half of the throttle chamber with the throttle a little open and the internal primary air passages to the main jet and pilot system



If the carburetter should flood whilst the engine is not running, the overflow from the main jet will run into the primary air passages and trickle out from there through a small hole seen at the side of the carburetter body.

HINTS AND TIPS

STARTING *from cold*. Flood the carburetter by depressing the tickler sharply three or four times, and close the air valve: set the ignition, approximately half retarded. Then shut the throttle and open it a little, eg: about one eighth open, see diagram on sheet 7 position 2, then kick-start. If it is too much open starting will be difficult.
STARTING, *engine hot*. Do not flood the carburetter, but close off the air lever. Set the ignition and close the throttle, then open the throttle about one eighth of its travel and kick-start. If the carburetter has been flooded and won't start because the mixture is too rich - open the throttle wide and give the engine several turns to clear the richness, then start again with the throttle one eighth open, and air lever wide open. Generally speaking it is not advisable to flood at all when an engine is hot.
STARTING, *general*. By experiment, find out if and when it is necessary to flood, also note the best position for the air lever and the throttle for the easiest starting (some carburetters have the throttle stop fitted with a starting position on to which the throttle must be shut down).

CABLE CONTROLS. See that there is a minimum of backlash when the controls are set back and that any movement of the handlebar does not cause the throttle to open; this is done by the adjusters on the top of the carburetter. See that the throttle shuts down freely.

PETROL FEED, verification. Detach petrol pipe union at the float chamber end; turn on petrol tap momentarily and see that fuel gushes out. Avoid petrol pipes with vertical loops as they cause air locks. *Flooding* may be due to a worn or bent needle or a leaky float, but nearly all flooding with new machines is due to impurities (grit, fluff, etc.) in the tank, so clean out the float chamber periodically until the trouble ceases. If the trouble persists, the tank might be drained, swilled out, etc. Note that if a carburetter, either vertical or horizontal, is flooding with the engine stopped, the overflow from the main jet will not run into the engine, but out of the carburetter through a hole at the base of the mixing chamber.

FIXING CARBURETTER AND AIR LEAKS. Erratic slow running is often caused by air leaks, so verify there are none at the point of attachment to the cylinder or inlet pipe, check by means of an oil can and eliminate by new washers and the equal tightening up of the flange nuts. Also in old machines look out for air leaks caused by a worn throttle or worn inlet valve guides.

BANGING IN EXHAUST may be caused by too weak a pilot mixture when the throttle is closed, it may also be caused by too rich a pilot mixture and an air leak in the exhaust system, the reason in either case is that the mixture has not fired in the cylinder and has fired in the hot silencer. If the banging happens when the throttle is fairly wide open, the trouble will be ignition not carburation

BAD PETROL CONSUMPTION of a new machine may be due to flooding, caused by impurities from the petrol tank lodging on the float needle seat and so prevent its valve from closing. If the machine has had several years use, flooding may be caused by a worn float needle valve. Also bad petrol consumption will be apparent if the throttle needle jet "O" (see fig. 2) has worn; it may be remedied or improved by lowering the needle in the throttle, but if it cannot be then the only remedy is to get a new needle jet.

AIR FILTERS. These may affect the jet setting, so if one is fitted afterwards to the carburetter the main jet may have to be smaller. If a carburetter is set with an air filter and the engine is to run without it, take care not to overheat the engine due to too weak a mixture; testing with the air valve (sheet 5,~4) will indicate if a larger main jet and higher needle position are required.

FAULTS, read sheet 5. The trouble may not be carburation; if the trouble cannot be remedied by making the mixture richer or weaker with the air-valve, and you know the petrol feed is good and the carburetter is not flooding, the trouble is elsewhere.

RE-ASSEMBLING after *dismantling*. Note particularly that the mixing chamber nut E (fig. 2, sheet 2) is tightened up tight onto the washer that holds the jet block F (fig. 2 sheet 2), otherwise petrol will leak up. When replacing the throttle see that the throttle needle goes into the centre hole in the choke block and once in, note the throttle works freely when the mixing chamber top ring Z is screwed down firmly and held by spring Z1. Float chamber lid, to remove,first loosen screw X (FIG. 2). To remove float, pinch the bow V (fig. 2), and pull; when replacing, slip overneedle and slide down till bow jumps into the needle groove. Care required to avoid bending needle

PARTS TO TUNE UP WITH

(A). This fig. 4 is two diagrammatic sections of the carburetter to show :-
1. The throttle stop screw
2. The pilot screw

(b), **THROTTLE STOP SCREW.**
Set this screw to prop the throttle open sufficiently to keep the engine running when the twist grip is shut off.

(c), **PILOT AIR SCREW.**
This screw regulates the strength of the mixture for idling and for the initial opening of the throttle. The screw controls the suction on the pilot petrol jet by metering the amount of air that mixes with the petrol.

NOTE.- The air for the pilot jet may be admitted internally or externally according to one or other of the designs, but there is no difference in tuning.

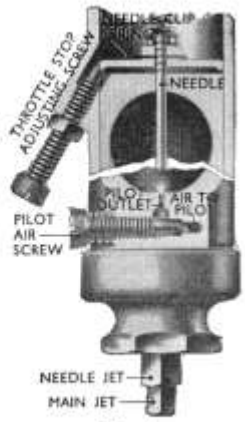


Fig. 4.

(d), **MAIN JET.** The main jet controls the petrol supply when the throttle is more than three-quarters open, but at smaller throttle openings although the supply of fuel goes through the main jet, the amount is diminished by the metering effect of the needle in the needle jet.

Each jet is calibrated and numbered so that its exact discharge is known and two jets of the same number are alike. NEVER REAMER A JET OUT, GET ANOTHER OF THE RIGHT SIZE. The bigger the number the bigger the jet
To get at the main jet, undo the float chamber holding bolt Q (sheet 2). The jet is screwed into the needle jet so if the jet is tight, hold the needle jet carefully with a spanner, whilst unscrewing the main jet.

(e), **NEEDLE AND NEEDLE JET.** The needle is attached to the throttle and being a taper, either allows more or less petrol to pass through the needle jet as the throttle is opened or closed throughout the range, except when idling or nearly full throttle. The needle jet is of a defined size and is only altered from standard when using alcohol fuels.
The taper needle position in relation to the throttle opening, can be set according to the mixture required, by fixing it to the throttle with the needle clip spring in a certain groove (see above illustration), thus either raising or lowering it. Raising the needle richens the mixture and lowering it weakens the mixture at throttles openings from quarter to three-quarters open (see illustration sheet 7).

(f), **THROTTLE VALVE CUTAWAY.** The atmospheric side of the throttle is cut away to influence the depression on the main fuel supply and thus gives a means of tuning between the pilot and needle jet range of throttle opening. The amount of cutaway is recorded by a number marked on the throttle, eg. 6/3 means throttle type 6 with number 3 cutaway; Larger cutaways, say 4 and 5, give weaker mixtures, and 2 would give a richer mixture.

(g), **AIR VALVE,** is only used for starting and running when cold, and for experimenting with, otherwise run with it wide open.

(h), **TICKLER,** a small plunger spring loaded in the float chamber lid. When pressed down on the float the needle valve is pushed off its seat and so "flooding" is achieved. Flooding temporarily enrichens the mixture until the level of the petrol subsides to normal.

HOW TO TRACE FAULTS

There are only **TWO** possible faults in carburation; either **RICHNESS** of mixture or **WEAKNESS** of mixture, so in case of trouble, decide which is the cause, by;

1. **Examining the petrol feed.** Verify jets and passages are clear.
   Verify ample flow.
   Verify there is no flooding.
2. **Looking for air leaks.** At the connection to the engine.
   Or due to leaky inlet valve stems.
3. **Defective or worn parts.** Slack throttle or worn needle jet.
   The mixing chamber union nut not tightened up, or loose jets.
4. **TEST WITH THE AIR VALVE,** to see if by richening the mixture, the results are better or worse.

INDICATIONS OF:

RICHNESS.
Black smoke in exhaust.
Petrol spraying out of the carb.
Four strokes, eight stroking.
Heavy, lumpy running.
Heavy petrol consumption.
- *If the jet block F is not tightened up by washer and nut E, richness will be caused through leakage of petrol.*
- *Air cleaner choked up.*
- *Needle jet worn large.*

Sparking plug sooty.

WEAKNESS
Spitting in carburetter.
Erratic slow running.
Overheating.
Acceleration poor.
Engine goes better if;
- throttle not wide open
  or air valve is partially closed
- *Has air cleaner been removed*
- *Jets partially choked up*

REMOVING the silencer or running with a racing silencer requires a richer setting and a larger main jet.

NOTE:
Verify correctness of fuel feed, stop air leaks, check over ignition and valve operation and timing. DECIDE BY TEST WHETHER RICHNESS OR WEAKNESS IS THE TROUBLE AND AT WHAT THROTTLE POSITION. See throttle opening diagrams, sheet 7.

PROCEDURE:
If at a particular throttle opening you partially close the air valve and the engine goes better, weakness is indicated. If the running is worse, richness is indicated. THEN YOU PROCEED TO ADJUST THE APPROPRIATE PART AS INDICATED AT THE BOTTOM OF SHEET 7 FOR THAT THROTTLE POSITION.

FAULT AT THROTTLE POSITIONS (Indicated on sheet 7)

TO CURE RICHNESS
1, Fit smaller main jet.
2, Screw out pilot air screw.
3, Fit a throttle with larger cut-away
4, Lower needle one or two grooves

TO CURE WEAKNESS
1, Fit larger main jet
2, Screw pilot air screw in.
3, Fit a throttle with smaller cut-away.
4, Raise needle one or two grooves.

NOTE: It is not correct to cure a rich mixture at half throttle by fitting a smaller main jet because the main jet may be correct for power at full throttle, the correct way is to lower the needle.

CHANGING FROM STANDARD PETROLS TO SPECIAL FUELS, such as alcohol mixtures will, with the same setting in the carburetter, certainly cause weakness of mixture and possible damage from overheating.

HOW TO TUNE UP

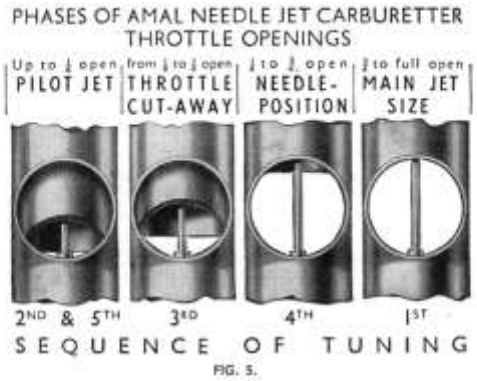


FIG. 5.

TUNE UP IN THE FOLLOWING ORDER ONLY, by so doing you will not upset good results obtained.

READ REMARKS ON SHEET 5 AND 6 for each tuning device and get the motor going perfectly on a quiet road with a slight up gradient so that on test the engine is pulling.

1st. MAIN JET with throttle in position 1 (sheet 7) If at full throttle the engine runs 'heavily', the main jet is too large. If at full throttle by slightly closing the throttle or air valve, the engine seems to have better power, the main jet is too small. With a correct sized main jet, the engine at full throttle should run evenly and regularly with maximum power. If you are testing for speed work, ensure that the main jet size is sufficient for the mixture to be rich enough to keep the engine cool, and to verify this, examine the sparking plug after taking a fast run, de-clutching and stopping the engine quickly. If the plug body at its end has a cool appearance, the mixture is correct, if sooty the mixture is rich, if however there are signs of intense heat, the mixture is too weak, and a larger main jet is required.

2nd. PILOT JET WITH THROTTLE IN POSITIONS 2 AND 5.
With the engine idling too fast with the twist grip shut off and the throttle shut down on to the throttle stop screw, and ignition set for best slow running; a) loosen the stop screw nut and screw down until engine runs slower and begins to falter. Then screw the pilot air screw in or out to make the engine run regularly and faster. b) Now gently lower the throttle stop screw until the engine runs slower and just begins to falter, then lock the nut lightly and begin again to adjust the pilot air screw to get the best slow running. f this second adjustment makes the engine run too fast, go over the job again a third time. Finally, lock up tight the throttle stop screw nut without disturbing the screws position.

3rd. THROTTLE CUT AWAY with throttle in position 3 (sheet 7). If, as you take off from the idling position, there is objectional spitting from the carburetter, slightly richen the mixture by screwing in the air screw sufficiently, but if this is not effective, screw it back again, and fit a throttle with a smaller cut away. If the engine jerks under load at this throttle position and there is no spitting, either the throttle needle is too high or a larger throttle cut away is required to cure the richness.

4th. NEEDLE with throttle in position 4 (sheet 7). The needle controls a wide range of throttle opening and also the acceleration. Try the needle in as low a position as possible, eg: with the clip in a groove as near the top as possible. If acceleration is poor and with the air valve partially closed the results are better, raise the needle by two grooves. If much better, try lowering the needle by one groove and leave it where it is best. *NOTE, if the mixture is still too rich with the clip in groove number one (nearest the top), the needle and needle jet probably needs replacing due to wear.*

5th FINALLY go over the idling again for final touches.

TUNING TWIN ENGINES WITH TWIN CARBURETTERS

(where each cylinder has it's own carburetter)

To start with, slacken the throttle stop screws and put the twist grip into the shut off position, to allow the throttle to shut off. There should be a slight back-lash in the cables where back-lash can be obtained, if necessary, by screwing in the cable adjusting screws on the top of the carburetter.

Then, with the handlebars in the normal position, and with the throttles closed, adjust the cable adjusting screws so that on the slightest opening of the twist grip, both throttles begin to open simultaneously.

To set the carburetters, follow the procedure as given on sheet 7 overleaf, and bear in mind these "hints" which may be useful. Main jet sizes are selected by checking the effect of the mixture on the sparking plugs, after taking a run at full throttle over a straight piece of road. The smallest pair of jets that give the best maximum speed is usually correct provided that the plugs do not show any signs of excessive heat. It might be that for really critical tuning, one carburetter might require a slightly different jet size from the other.

For slow running, set the twist grip to make the engine run slowly but just faster than a "tick over". Then gently screw in the throttle stops to just hold the throttles in that position, and return the twist grip into the shut position, leaving the engine running on the throttle stops.

The next thing to do is to set each carburetter according to paragraph 2, on sheet 7, to obtain the idling by screwing down the throttle stop screws and adjusting the pilot air screws accordingly.

Regarding the setting of the pilot jets, a fairly satisfactory method is to detach one sparking plug lead, and set the pilot air adjusting screw on the other cylinder as a single unit, and then reversing the process to the other cylinder. It may be found that when both leads are connected to the sparking plugs, the engine runs slightly quicker than desirable. If this happens, a slight readjustment of the throttle stop screws will put this right. It is essential that the speed of idling on both cylinders is approximately the same, as this will either make or mar the smoothness of the get-away on the initial opening of the throttle.
It is essential with twin carburetters that the throttle slides are a good fit in the bodies, and also that there is no suspicion of air leaks at either of the flange attachments to the cylinder.

With regards to the lower end of the throttle range, which is always the more difficult to set, one can only take excessive pains to make quite sure that the control cables are perfectly adjusted, without any excessive back-lash or difference in the amount of back-lash between one carburetter and another, otherwise one throttle slide will be out of phase with the other, and so resulting in uneven running.

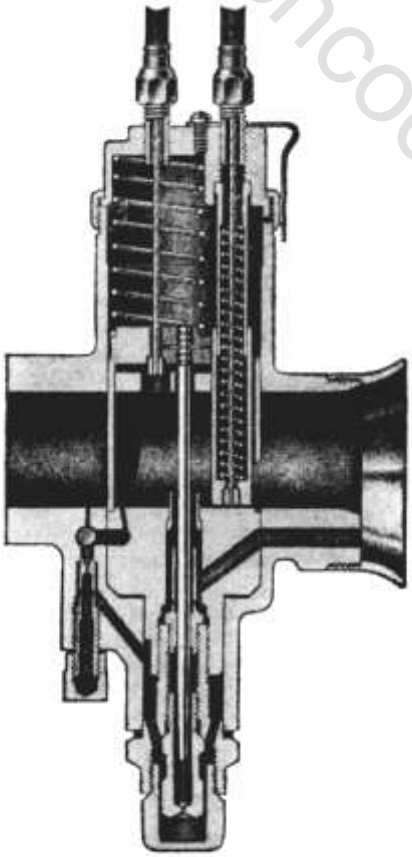
To check the opening of the throttles simultaneously, shut the twist grip back so that the throttles are resting on the throttle stop screws in their final position of adjustment. Then, insert the fingers into the air intakes and press them on the throttles. With the other hand, gently open with the twist grip and feel the throttles lift off their stops at the same time.

Amal Monobloc Carburetter

1. General Description

The Amal Monobloc Carburetter has been introduced as an improvement on the earlier standard needle type. In general it gives better petrol consumption, combined with improved starting and acceleration from low speeds and a small increase in maximum speed.

The float chamber is integral with the mixing chamber and contains a pivoted barrel-shaped float operating on a nylon fuel needle. There is a considerable leverage ratio between the float and the needle and, in consequence, flooding is rare unless there is dirt on the needle seating.



SECTION THROUGH MIXING CHAMBER, SHOWING AIR VALVE AND THROTTLE CLOSED

Fig. 1

The supply of air to the engine is controlled by a throttle slide which carries a taper needle operating in the needle jet. The needle is secured to the throttle slide by a spring clip fitting in one of five grooves and the mixture strength throughout a large proportion of the throttle range is controlled by the position of this needle in the slide and by the size of the jet in which it works. There is, however, a restricting or main jet at the bottom of the needle jet and the size of this controls the mixture strength at the largest throttle openings. At very small throttle openings petrol and air are fed to the engine through a separate pilot system, which has an outlet at the engine side of the throttle. The air supply to this pilot system is controlled by the pilot air screw and the slow running of the engine can be adjusted by means of this screw and a stop which holds the throttle open a very small amount. The throttle slide is cut away at the back and the shape of this cut-away controls the mixture at throttle openings slightly wider than that required for slow running. There is a compensating system to prevent undue enriching of the mixture with increasing engine speed, this system consisting of a primary choke surrounding the upper end of the needle jet through which air is drawn in increasing quantities as the depression in the main choke increases. This air supply and the supply to the pilot system are taken from two separate ducts in the main air intake to the carburetter so that all the air passing to the engine can be filtered by fitting an air cleaner to the main carburetter air intake.

Two small cross holes in the needle jet, at a level just below the static level in the float chamber, permit petrol to flow into the primary choke when the engine is not running or when it is running at very low speeds, thus forming a well of petrol which will be drawn into the engine on starting or accelerating from low speeds. At moderately high engine speeds the level of petrol in the float chamber falls slightly and in consequence no more fuel flows through the cross holes in the needle jet so that the petrol well remains empty until the engine slows down or stops.

A handlebar controlled air slide is provided to enrich the mixture temporarily when required.

2. Tuning the Carburetter(s)

The throttle opening at which each tuning point is most effective is shown in Fig. 2. It should be remembered, however, that a change of setting at

any point will have some effect on the setting required at other points; for instance, a change of main jet will have some effect on the mixture strength at half throttle which, however, is mainly controlled by the needle position. Similarly an alteration to the throttle cut-away may affect both the needle position required and the adjustment of the pilot air screw. For this reason it is necessary to tune the carburetter in a definite sequence, which is as follows:

First-Main Jet. The size should be chosen which gives maximum speed at full throttle with the air control wide open. If two different sizes of jet give the same speed the larger should be chosen for safety as it is dangerous to run with too weak a mixture at full throttle.

Second-The pilot air screw should be set to give good idling. Note that the pilot jet is detachable and two sizes are available, 25 c.c. and 30 c.c. If the pilot air adjusting screw requires to be screwed out less than half a turn the larger size pilot jet should be used; if the air screw requires to be screwed out more than 2-3 turns fit the smaller size of pilot jet.

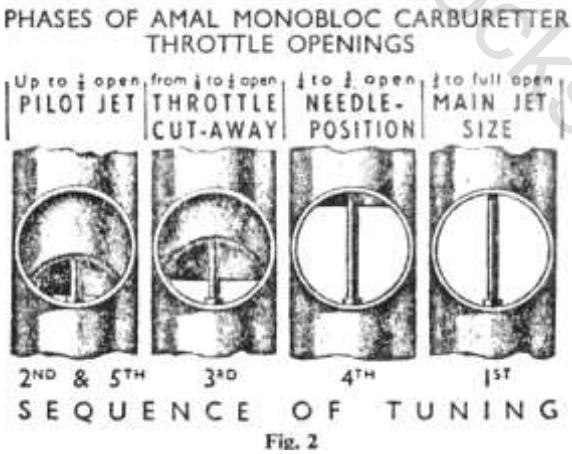


Fig. 2

Third-the throttle valve should be selected with the largest amount of cut-away which will prevent spitting or misfiring when opening the throttle slowly from the idling position.

Fourth-The lowest position of the taper needle should be found consistent with good acceleration with the air slide wide open.

Fifth-The pilot air screw should be checked to improve the idling if possible. When setting the adjustment of the pilot air screw this should be done in conjunction with the throttle stop. Note that the correct setting of the air screw is the one which gives the fastest idling speed for a given position of the throttle stop. If the idling speed is then undesirably fast it can be slowed down by unscrewing the throttle stop a fraction of a turn.

It will be noted that of the four points at which adjustments are normally made, i.e., pilot air screw, throttle cut-away, needle position and main jet size, the first and third do not require changing of any parts of the carburetter. Assuming that the carburetter has the standard setting to suit the particular type of engine any small adjustments occasioned by atmospheric conditions, changes in quality of fuel, etc., can usually be covered by adjustment of the pilot air screw and raising or lowering the taper needle one notch. If, however, the machine is used at very high altitudes or with a very restricted air cleaner a smaller main jet will be necessary. The following table gives the reduction in main jet size required at different altitudes:

Altitude, ft.	Reduction, %
3,000	5
6,000	9
9,000	13
12,000	17

In the case of carburetters for engine running on alcohol fuel considerably larger jets are needed. In most cases a No. 113 needle jet will be required and the main jet size will require to be increased by an amount varying from 50% to 150% according to the grade of fuel used.

If the engine is run on fuel containing a small proportion of alcohol added to the petrol, a rough and ready guide is that the main jet should be increased by 1 % for every 1 % of alcohol in the fuel. In most cases alcohol blends available from petrol pumps do not contain sufficient alcohol to require any alteration to the carburetter setting.

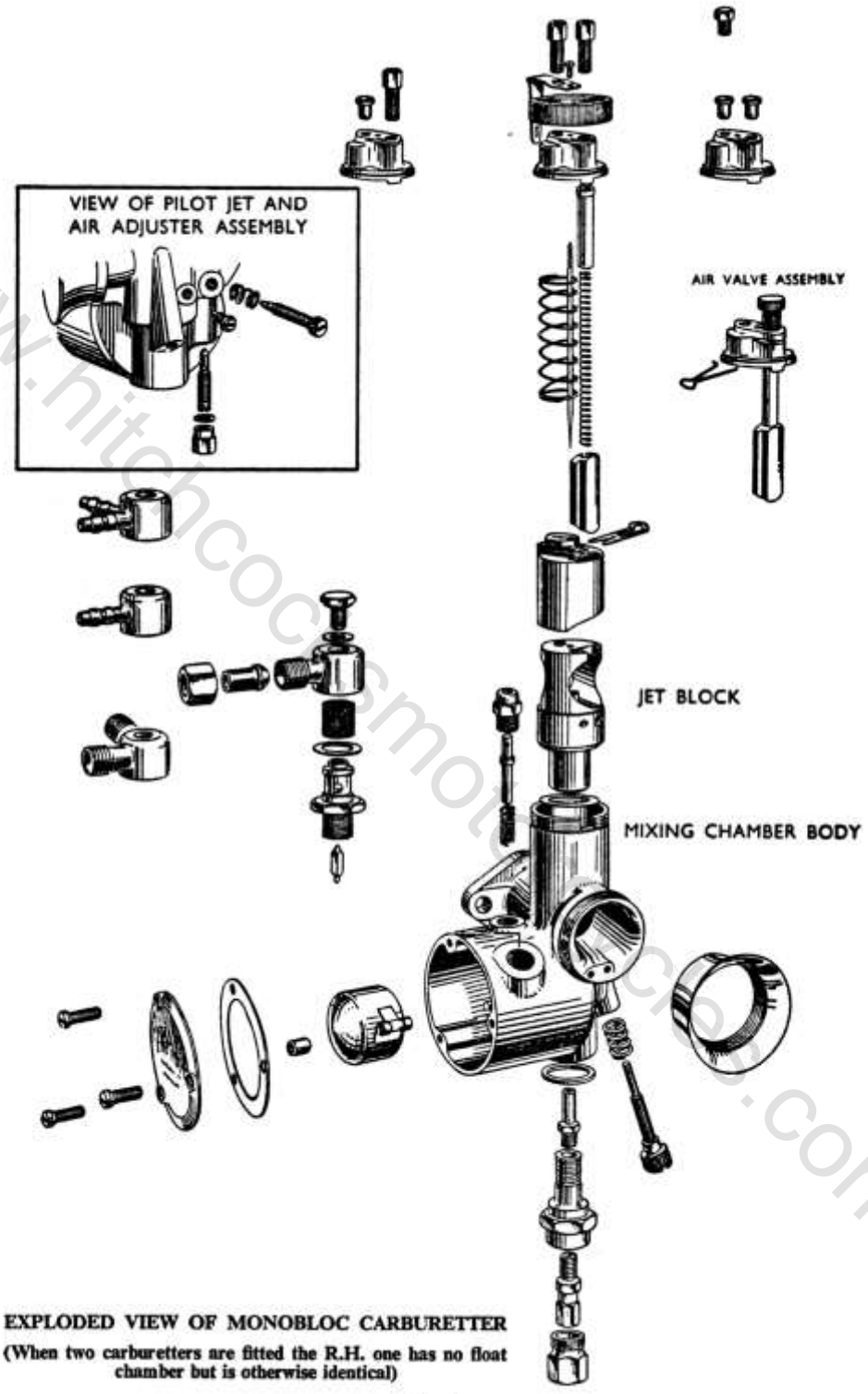
The range of adjustment of the taper needle and the pilot air screw are determined by the size of the needle jet and of the pilot outlet respectively. Standard needle jets have a bore at the smallest point of .1065 in. and are marked 106. Alternative needle jets .1055 in., .1075 in., .109 in. and .113 in. bore are available and are marked 105, 107, 109 and 113 respectively.

The standard pilot outlet bore is .025 in. but in some cases larger size pilot outlets are used. Since the pilot outlet is actually drilled in the body of the carburetter it is necessary to have a carburetter with the correct size pilot outlet if the best results are to be obtained.

The accompanying table shows the standard settings for Amal Monobloc Carburetters used on Royal Enfield motor cycles.

Both instruments used for the twin carburetter models are identical in all respects but for the float chamber arrangement, which is as follows:

The carburetter which supplies the left-hand cylinder has an integral float chamber which



EXPLODED VIEW OF MONOBLOC CARBURETTER

(When two carburetters are fitted the R.H. one has no float chamber but is otherwise identical)

Fig. 3

also controls the fuel supply via a connecting pipe to the right-hand instrument which does not have a float chamber in unit with it.

It is important that the pilot air screws of both carburetters are in identical positions, relative to one another, the same applying to the throttle valves when seated on their stops. This is essential for an even smooth tickover and low-speed running. The speed of the tickover is regulated by these four adjuster screws. For an instant pick-up, both throttle valves must commence to rise from their stops simultaneously, when the twist grip is rotated. This is obtained by adjusting the twin control cables. Each main jet needle must be in the third groove.

Both air slides, operated from a single handlebar lever, must open and close identically, as failure to do this may result in one slide not opening fully, with a resultant loss of power.

It is most important that all of these adjustments are carried out in a thorough and careful manner if the maximum power and smoothness is to be obtained.

The "ears" to be found on the leading edges of the battery and toolbox lids are to shield the carburetter air intakes and so prevent misfiring at maximum revs.

3. Dismantling Carburetter

The construction of the carburetter is clearly shown in Fig. 3.

If the float chamber floods, first make sure that there is no dirt on the fuel needle seating. Owing to the use of a nylon needle and the leverage ratio between float and needle, flooding is very unlikely with this type of carburetter unless dirt is present or, of course, the float is punctured.

If it is necessary to remove the jet block note that this is withdrawn from the upper end of the mixing chamber after unscrewing the jet holder. Be careful not to damage the jet block when removing or refitting it. Note that the large diameter of the jet block pulls down on to a thin washer.

A single strand of an inner control cable is useful for clearing the small passages in the jet block and care must be taken not to enlarge these by forcing the wire through them. Compressed air from a pipe line or a tyre pump is preferable. A choked main jet should be cleared only by blowing through it.

4. Causes of High Petrol Consumption

If the petrol consumption is excessive first look for leaks either from the carburetter, petrol pipe, petrol tap(s) or tank. If coloured petrol is in use this will readily indicate the presence of any small leaks which otherwise might pass unnoticed. If the petrol system is free from leaks, carefully set the pilot adjusting screw as described in Subsection 2 to give the correct mixture when idling. Running with the pilot adjusting screw too far in is a common cause of excessive petrol consumption. If the consumption is still heavy try the effect of lowering the taper needle in the throttle slide by one notch. Do not fit a smaller main jet as this will not affect consumption except when driving on nearly full throttle and may make the mixture too weak at large throttle openings, thus causing overheating. Remember that faults in other parts of the machine can have a marked effect on petrol consumption. Examples of this are binding brakes, chains too tight or out of line and, in particular, under-inflated tyres.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION G1c
Lucas Magdyno
Model MOIL for Single Cylinder Engines

1. General.

The Magdyno is a base-fixed magneto and dynamo unit, the body of the magneto portion being arranged to carry a standard strap-fixed dynamo. A shock absorbing drive is arranged between the magneto and dynamo portions. The magneto portion has a wound rotating armature and a high energy magnet case integral with the body.

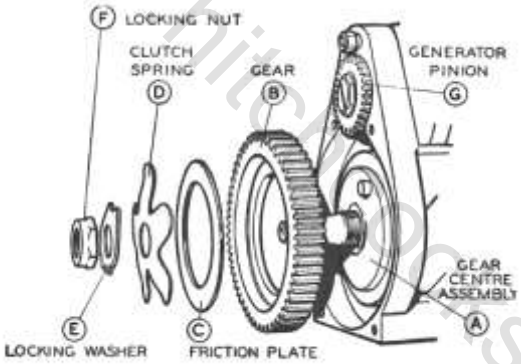


Fig. 1

The shock absorbing drive is incorporated in the larger of the two gears which transmit the drive from the magneto shaft to the dynamo and is shown exploded in Fig. 1. This drive, whilst permitting maximum dynamo output to be obtained, reduces peak shock loadings on the teeth of a bakelised fabric gear to a minimum value. The drive is taken from metal gear centre A, keyed to the magneto shaft, to fabric gear B by means of friction plate C and clutch spring D. A peg projecting from gear centre A prevents relative movement of the gear centre and tension spring D. In the event of a back-fire or an electrical short-circuit, slip will occur between the contacting surfaces of fabric gear B and gear centre A.

2. Routine Maintenance

2(a). Lubrication

To be carried out every 3,000 miles.

The cam is lubricated by a wick located in the contact breaker casting (see Fig. 2). To reach the wick, remove the backing spring and spring arm by withdrawing the single securing screw. The wick is carried in a hollow hexagon headed screw which can now be withdrawn. Take care not to lose the insulating washer or tube. Moisten the wick with a few drops of thin machine oil and refit the hollow screw.

At this stage, bend back the brass locking tag from the hexagon head of the contact breaker securing screw and withdraw the screw. The contact breaker can now be removed. Take out the tappet which actuates the spring arm and lightly smear it with thin machine oil. Extract the wire ring and remove the face cam. Lightly smear both sides of the cam with Mobilgrease No. 2.

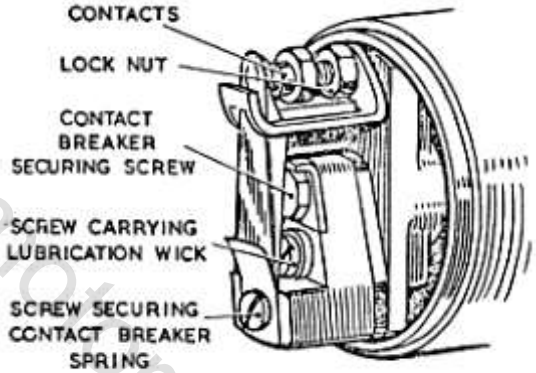


Fig. 2

Refit the cam, taking care that the stop peg in the housing and the plunger of the timing control engage with their respective slots. Note that a recess is provided for the "eye" of the wire ring.

Check that the tappet moves freely in the contact breaker casting.

Thread the special tag washer on the contact breaker securing screw and place the flat edge of the washer against the location provided for it in the contact breaker casting. Tighten the screw and lock it by bending the tag washer against one of the hexagon flats.

Wipe away any dirt or grease from the contacts with a petrol-moistened cloth. If necessary, use a very fine carborundurn stone to polish the contacts, re-cleaning

afterwards with a petrol moistened cloth.

Refit the spring arm and backing spring. The bent portion of the spring arm must curve outwards. Place a lock washer over the fixing screw and tighten.

The main bearings of the Magdynos are packed with grease during manufacture and need no attention until a general overhaul is undertaken.

2 (b). Adjustments

Check every 3,000 miles.

(i) Setting contact breaker gap. The contact breaker gap must be set to 0.012 in. - 0.015 in, when the contacts are fully separated. To adjust the gap, turn the engine until the contacts are fully opened. Slacken the locking nut of the adjustable contact and turn the contact by its hexagon head until a feeler gauge of appropriate thickness is a sliding fit in the gap. Tighten the lock nut and recheck the gap.

(ii) Adjusting the timing control cable. Any slackness in the cable can be taken up by sliding the waterproofing rubber shroud up the cable and turning the hexagon headed cable adjuster. After adjusting, return shroud to its original position over the adjuster and central barrel.

2 (c). Cleaning

To be carried out every 6,000 miles.

Check the contact breaker contacts and, if necessary, clean them as described in Subsection 2(a). Wipe the outside of the magneto to remove dirt or grease. Check the cable adjuster and control barrel for signs of water ingress.

Remove the high tension pick-up and polish with a soft dry cloth. The carbon brush must move freely in its holder. If necessary, clean it with a petrol-moistened cloth. Should the brush be worn to within 1/8 in. of the shoulder it must be renewed.

Whilst the pick-up moulding is removed, clean the slip ring track and flanges by holding a soft dry cloth against them with a suitably shaped piece of wood while the engine is slowly turned.

The high tension cable must be kept clean and dry.

2 (d). Renewing High Tension Cable

If, on inspection, the high tension cable shows signs of deterioration, it must be replaced, using neoprene covered rubber cable. To fit a new high tension cable, bare the end for about 3/8 in., thread the knurled moulded nut over the cable and thread the bared cable through tile washer removed from the old cable (see Fig. 3).

Bend back the strands radially and screw the nut into the pick-up moulding.

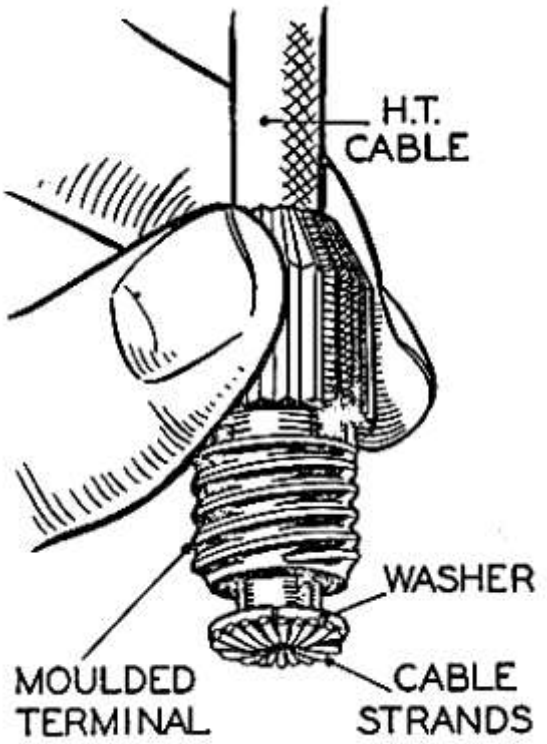


Fig. 3

2 (e). Renewing Timing Control Cable

The Bowden timing control cable should be renewed if it becomes frayed, otherwise moisture may enter the contact breaker housing.

To do this, slip back the rubber shroud and, by means of the hexagon at the base, unscrew the control barrel. If the cable and the plunger to which it is attached are now pulled upwards, the cable nipple can be disengaged from the plunger slot.

Soften the solder and remove the nipple.

Thread the new length of cable through the rubber shroud, cable adjuster, control barrel, scaling washer and restoring spring. Solder the nipple to the end of the cable. Engage the nipple with the slot in the plunger and screw the control barrel into the body, ensuring that the sealing washer is correctly fitted between the barrel and the body.

Take up any slackness in the cable by means of the adjuster before refitting the rubber shroud in position.

2 (f). Contact Breaker Spring

The correct contact breaker spring pressure, measured at the contacts, is 28-36 oz.

3. Testing Magdyno in Position on Engine

To locate cause of misfiring or failure of ignition, check as follows:

(i) Remove the sparking plug from the engine. Hold the end of the H.T. cable about 1/8 in. from the cylinder block and crank the engine. If strong and regular sparking is produced the fault lies with the sparking plug, which must be cleaned and adjusted or renewed.

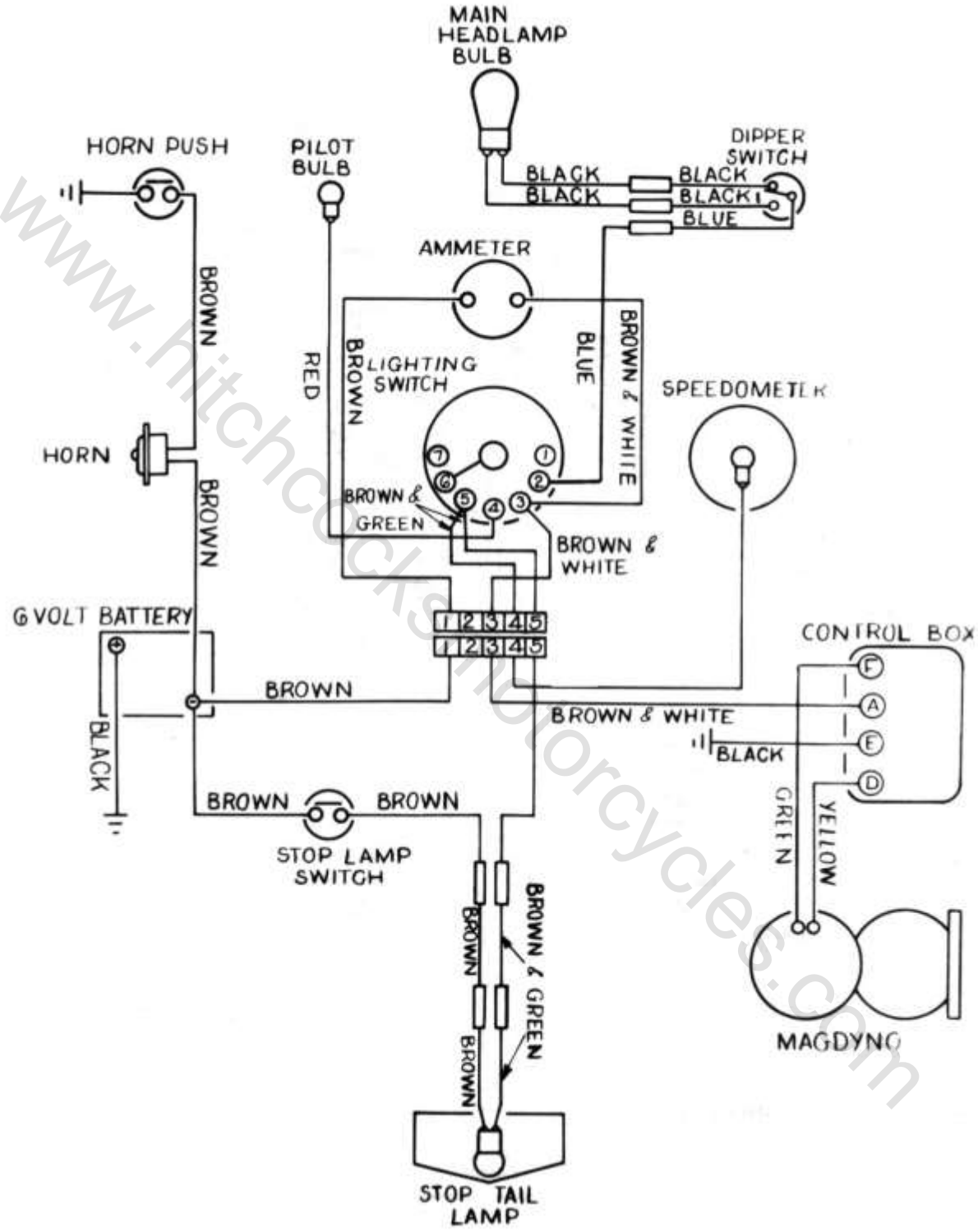
(ii) If no sparking is produced, examine the H.T. cable and, if necessary, renew it as described above in Subsection 2 (d).

(iii) Very occasionally the fault may be due to a cracked or punctured pick-up moulding. This type of fault is not easily detected by inspection and a check should be made by substitution.

(iv) If the Magdyno has recently been replaced or removed it may be incorrectly timed (see Section C2, Subsection 4.)

(v) Check the contact breaker for cleanliness and correct contact setting as described in Subsection 2 (a).

If the cause of faulty operation cannot be traced from the foregoing checks, the cause may be an internal defect in the Magdyno. The Magdyno should therefore be removed from the engine for attention by a Lucas Agent.



ROYAL ENFIELD WORKSHOP MANUAL

SECTION G2b

Lucas Dynamo Model E3LM

Used on all Models fitted with Magdyno

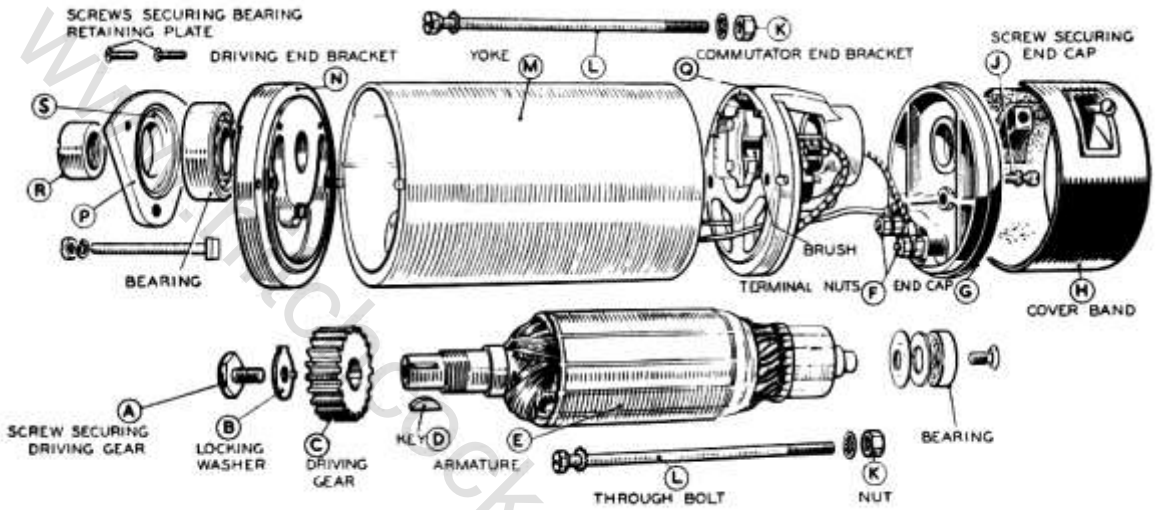


Fig. 1

1. General

The dynamo is a shunt-wound two-pole machine, arranged to work in conjunction with a regulator unit to give an output which is dependent on the state of charge of the battery and the loading of the electrical equipment in use. When the battery is in a low state of charge, the dynamo gives a high output, whereas, if the battery is fully charged, the dynamo gives only a trickle charge to keep the battery in a good condition without overcharging. In addition, an increase of output is given to balance the current taken by the lamps when in use. Model E3LM (see Fig. 1) is designed to be the upper portion of the "Magdyno" and has an output of 60 watts.

2 (a). Lubrication

No lubrication is necessary, as the ball bearings are packed with H.M.P. grease, which will last until the machine is taken down for a general overhaul, when the bearings should be repacked.

2 (b). Inspection of Commutator and Brush Gear

About once every six months remove the cover band for inspection of commutator and brushes, see Subsection 4(a) (vi).

3. Test Data

Cutting-in speed (Dynamo Cold)
1,050 – 1,200 r.p.m. at 7 volts

Output test
8.5 amps at 1,850 – 2,000 r.p.m. at 7 volts*

Field resistance
2.8 ohms

Brush spring tension
16 – 20 oz.

*On resistance load of 0.82 ohm.

4 (a). Testing in Position to Locate Fault in Charging Circuit

In the event of a fault in the charging circuit, adopt the following procedure to locate the cause of trouble.

(i) Check that the dynamo and regulator units are connected correctly. The dynamo terminal "D" should be connected to the regulator unit terminal "D" and dynamo terminal "F" to regulator terminal "F."

(ii) Remove the cables from the dynamo terminals " D " and " F " and connect the two terminals with a short length of wire.

(iii) Start the engine and set to run at normal idling speed.

(iv) Connect the negative lead of a moving coil voltmeter, calibrated 0-10 volts, to one of the dynamo terminals and connect the positive lead to a good earthing point on the dynamo yoke or engine. Reverse voltmeter connections on negative earth machines.

(v) Gradually increase the engine speed, when the voltmeter reading should rise rapidly and without fluctuation. Do not allow the voltmeter reading to rise above 10 volts and do not race the engine in an attempt to increase the voltage. It is sufficient to run the dynamo up to a speed of 1,000 r.p.m. If there is no reading, check the brush gear, as described in (vi) below. If there is a low reading of approximately 1/2 volt, the field winding may be at fault, see Subsection 4(d). If there is a reading of approximately 1.1/2 to 2 volts, the armature winding may be at fault, see Subsection 4 (e).

(vi) Remove the cover band and examine the brushes and commutator. Hold back each of the brush springs and move the brush by pulling gently on its flexible connector. If the movement is sluggish, remove the brush from its holder and ease the sides by lightly polishing on a smooth file. Always replace brushes in their original positions. If the brushes are worn so that they do not bear on the commutator or if the brush flexible is exposed on the running face, new brushes must be fitted.

Test the brush spring tension with a spring scale (see Fig. 2). The correct tension is 16 - 20 oz. and new springs must be fitted if the tension is low.

If the commutator is blackened or dirty, clean it by holding a petrol-moistened cloth against it while the engine is turned slowly by means of the kick start, with sparking plug(s) removed.

Re-test the dynamo as in (v) above. If there is still no reading on the voltmeter there is an internal fault and the complete unit should be replaced if a spare is available. Otherwise the unit must be dismantled, see Subsection 4 (b) for internal examination.

(vii) If the dynamo is in good order, restore the original connections. Connect regulator unit terminal "D" to dynamo terminal "D" and regulator terminal "F" to dynamo terminal "F" and check the regulator.

4 (b). To Dismantle

Remove the dynamo from the motor cycle. To detach the dynamo from the Magdyno, unscrew the hexagon headed nut from the driving end cover and slacken the screws securing the band clip.

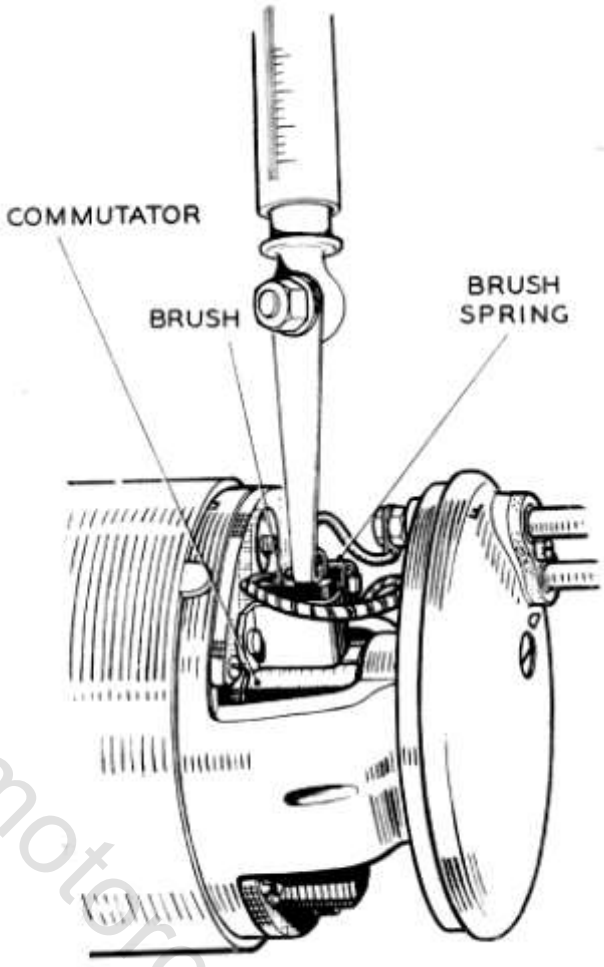


Fig. 2

To dismantle the dynamo proceed as follows: Bend back the tag on the washer "B" locking the screw "A" (see Fig. 1). Remove this screw, withdraw the gear "C" from the shaft with the aid of an extractor and remove the key(s) "D" from the shaft.

(ii) Remove the cover band "H," hold back the brush springs and lift the brushes from their holders.

(iii) Take out the screw "J" with spring washer from the centre of the black moulded end cap "G." Draw the cap away from the end bracket, take off terminal nut "F" and spring washer, and lift the connections off the terminals.

(iv) Unscrew and remove from the drive end bracket the two through bolts "L"securing the drive end bracket "N" and commutator end bracket "Q" to the yoke "M." Hold the nuts “K” at the commutator

at the commutator end while unscrewing the bolts and take care not to lose the nuts.

(v) Draw the drive end bracket complete with armature "E" out of the yoke.

(vi) Remove the nut "R" and press the armature out of the drive end bracket by means of a hand press.

(vii) Remove the bearing retaining plate "P" from the end bracket. This is secured by two screws and a long threaded bolt.

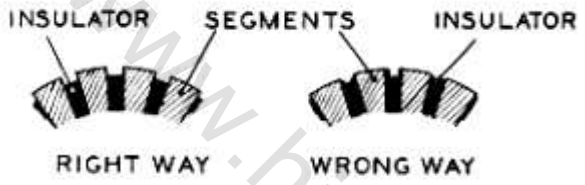


Fig. 3

(viii) Take out the screw securing the green field coil lead with the yellow sleeve to commutator end bracket and remove the end bracket "Q" withdrawing the connectors through the slot in the insulating plate.

(ix) Unscrew the three screws securing the insulating plate to the commutator end bracket and remove the plate with brush gear.

4 (c). Commutator

Examine the commutator. If it is in good condition it will be smooth and free from pits or burnt spots. Clean with a petrol-moistened cloth. If this is ineffective, carefully polish with a strip of very fine glass paper while rotating the armature.

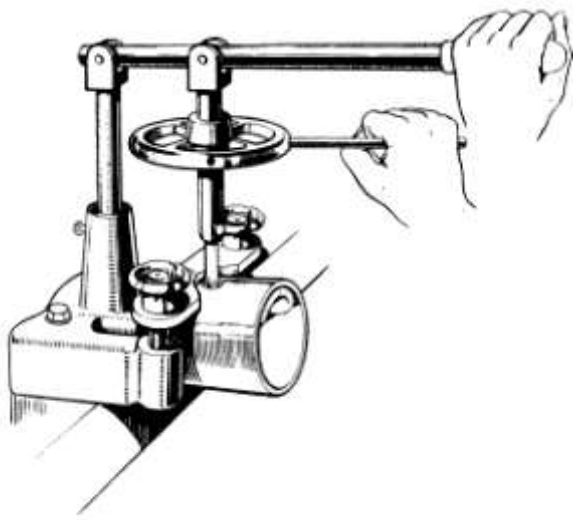


Fig. 4

To remedy a badly worn commutator, mount the armature with or without the drive end bracket in a lathe, rotate at high speed and take a light cut with a very sharp tool. Do not remove more metal than is necessary. Polish the commutator with very fine glass paper.

Undercut the insulation between the segment, to a depth of 1/32 in. with a hacksaw blade ground down until it is only, lightly thicker than the insulation (see Fig. 3.)

4 (d) Field Coil

Measure the resistance of the held winding by means of an ohm-meter. It this is not available connect a 6-volt D.C. supply with an ammeter in series with the coil. The ammeter reading should be approximately 2 amps. No reading on the ammeter indicates an open circuit in the field winding.

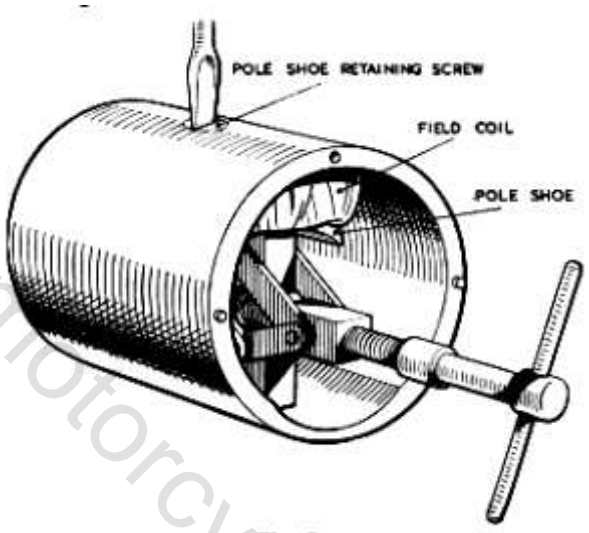


Fig. 5

To check for an earthed coil, connect a main, test lamp between one end of the coil and the yoke. If the bulb lights, there is an earth between coil and yoke.

In either case, unless a replacement dynamo is available, the field coil must be replaced but this should only be attempted if a wheel-operated screwdriver and pole shoe expander are at hand, the latter being especially necessary to ensure that there will be no air gap between the pole shoe and the inner face of the yoke.

To replace the field coil, proceed as follows

(i) Unscrew the pole shoe retaining screw by means of the wheel-operated screwdriver (see Fig. 4).

(ii) Draw the pole shoe and field coil out of the yoke and lift off the coil.

(iii) Fit the new field coil over the pole shoe and place it in position inside the yoke. Take care to ensure that the taping of the field coil is not trapped between the pole shoe and the yoke.

(iv) Locate the pole shoe and field coil by lightly tightening the fixing screw, insert the pole shoe expander (see Fig. 5), open to its fullest extent and tighten the screw. Remove the expander and give the screw a final tightening with the wheel-operated screwdriver. Lock the screw in position by caulking, that is, by tapping some of the metal of the yoke into the slot in the head of the screw.

4. (e). Armature

The testing of the armature winding requires the use of a voltdrop test or a growler. If these are not available, the armature should be checked by substitution. No attempt should be made to machine the armature core or to true a distorted armature shaft.

4 (f). Bearings

Ball bearings are fitted to both the commutator and drive end brackets. When the bearings become worn to such an extent that they allow side movement of the armature shaft, they must be replaced. To replace the ball bearing at the commutator end proceed as follows :

(i) Remove the screw from the end of the armature shaft and, using a caliper type extractor, draw the bearing off the shaft.

(ii) Wipe out the bearing housing and pack the new bearing with H.M.P. grease.

(iii) Position the bearing on the end of the shaft and press it squarely home, applying pressure on the inner journal of the bearing.

To replace the ball bearing at the drive end proceed as follows :

(i) Remove the bearing retaining plate from the drive end bracket as previously described.

(ii) Press the bearing out of the end bracket, using a metal drift locating on the inner journal of the bearing. Wipe out the bearing housing and pack the new bearing with H.M.P. grease.

(iii) Position the bearing in its housing and press it squarely home, applying pressure on the outer journal of the bearing.

4 (g). Reassembly

In the main, the reassembly of the dynamo is a reversal of the operation described in Subsection 4(b), bearing in mind the following points :

(i) The field coil lead fitted with the short length of yellow tubing must be connected, together with the eyelet of the earthed brush, to the commutator end bracket by means of the screw provided.

(ii) The second field coil lead must be connected

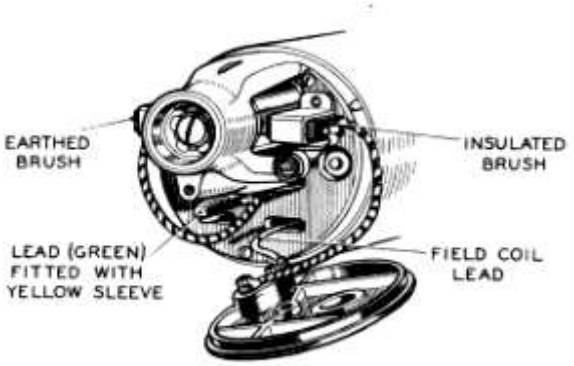


Fig. 6

to terminal "F" on the moulded cap (see Fig. 6).

(iii) The unearthed brush flexible lead must be connected direct to terminal "D" on the moulded end cap.

(iv) Take care to refit the cover band in its original position and make sure that the securing screw, when of flush-fitting pattern, does not "short" on the brush gear.

5. Dynamo Polarity

All replacement motor cycle dynamos are despatched from the Works suitable for immediate use on positive earth systems. If the negative terminal of the battery is earthed on the machine for which the replacement dynamo is intended, it will be necessary to re-polarize the dynamo before use to make it suitable for negative earth.

Similarly, if a dynamo has been incorrectly connected on the motor cycle and its polarity has become reversed, then it must be re-polarized.

To do this, fit the dynamo to the motor cycle but do not at this stage connect the cable to the "D" and "F" terminals. Temporarily connect a length` of wire to the unearthed terminal of the battery and hold the other end of this wire in contact with dynamo terminal "F" for a few seconds only. This serves to re-polarize the dynamo. The temporary connection can now be removed and the original cables connected to "D" and "F" terminals.

The practice of closing the cut-out points to reverse the dynamo polarity is not recommended, as this method allows a high initial surge of current from the battery to pass through the armature, which can damage the windings, insulation, etc. and result in a decreased service life of the machine.

Generally speaking, motor cycles manufactured up to and including 1951 had the negative terminal of the battery connected to the frame. With a few exceptions, i.e. Miller coil ignition sets and rectifier sets on two-stroke machines, all Royal Enfield machines in current production have the positive terminal earthed.

SECTION G3a

Control Box

Used on Models G, J2, "350 Bullet," "500 Bullet," "500 Twin," "Meteor 700," 1950 onwards

MODEL RB107

1. General

In Model RB107 control box, the regulator and cut-out contacts are positioned, for ease of access, above their respective armatures. It will be noticed that some of the internal electrical joints are resistance brazed.

2. Setting Data

(a) Cut-out

Cut-in voltage .....6.3-6.7 volts
Drop-off voltage ....4.8-5.3 volts

(b) Regulator

Setting on open circuit relative to ambient temperature :

10° C. (50° F.) ....7.7-8.1 volts
20° C. (68° F.) ....7.6-8.0 volts
30° C. (86° F.) ....7.5-7.9 volts
40° C (104° F.) …… …….. … 7.4-7.8 volts

3. Servicing

Before making any adjustment to the regulator, ensure that the dynamo and battery are in order. When a sound battery does not keep in a charged condition, or if the dynamo output does not fall when the battery is fully charged, the following procedure should be adopted :

(a) Checking the wiring between battery and regulator

Remove the control box from its mountings and withdraw the cable from terminal "A" (see Fig. 1) and connect it to the negative terminal of a voltmeter.

Connect the positive terminal of the voltmeter to an earthing point on the machine. If a voltmeter reading is given, the circuit from the battery to terminal "A" is in order.

If there is no voltmeter reading, examine the wiring between the battery and the control box for defective cables or loose connections. Re-connect the cable to terminal "A."

Check that the dynamo terminal "D" is connected to control box terminal "D"and that the cable is in good condition. Similarly, check the cable between terminals "F" at the dynamo and control box.

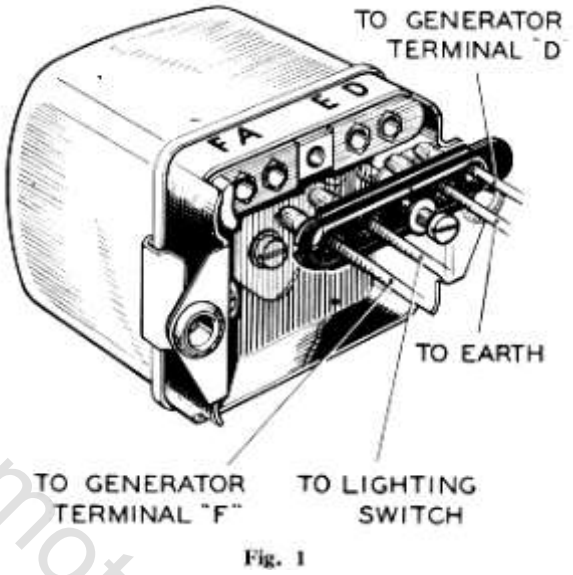


Fig. 1

(b) Checking the electrical setting of the regulator

The regulator is carefully set during manufacture and, in general, it should not be necessary to make further adjustment. If, however, the charging system is suspected it is important that only a good quality moving coil voltmeter (0-20 volts) is used to check the system. The electrical setting of the regulator can be checked without removing the cover from the control box.

Withdraw the plug-in connectors a small distance, so that a voltmeter connection can be made to terminals "D" and "E."

Connect the negative lead of the voltmeter to control box terminal "D" and the positive lead to terminal "E."

Remove the negative terminal from the battery. If coil ignition is fitted, run a temporary connection from the negative terminal of the battery to the "SW" terminal of the coil.

With the ignition switch in the "OFF" position, start the engine.

Slowly increase the speed of the engine until the voltmeter needle "flicks" and then steadies. Note this value and stop the engine.

If this value lies outside the limits given in para. 2(b), the regulator setting must be adjusted.

If the value is within the limits, examine the cut-out as described in para 3(c).

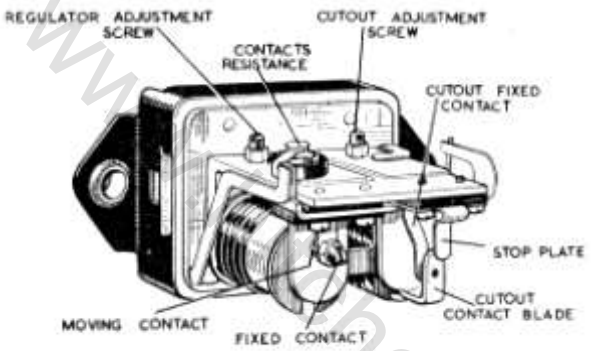


Fig. 2

(e) Adjusting the electrical setting of the regulator

Adjustment of the regulator requires removal of the control box cover. This is facilitated by removing the control box from the machine and providing temporary connections. Loosen the control box cover securing clips by slackening the securing screws set in the base of the control box, and lift off the cover.

It is important that regulator adjustments are carried out with the control box supported in a similar position to that on the machine.

Restart the engine.

Slacken the locknut of the regulator adjusting screw (see Fig. 2) and turn the screw in a clockwise direction to raise the setting or an anti-clockwise direction to lower the setting. Turn the screw only a fraction of a turn at a time and then tighten the locknut. Repeat as above until the correct setting is obtained.

Adjustment of regulator open-circuit voltage should be completed within 30 seconds; otherwise heating of the shunt winding will cause false settings to be made.

Stop the engine.

Remake the original connections and replace the cover. Ensure that the cover seats correctly on the sealing washer.

N.B.-A dynamo run at high speed on open circuit will build up a high voltage. Therefore, when adjusting the regulator, do not run the engine up to more than half throttle or a false setting will be made.

(d) Checking the electrical setting of the cutout

If the regulator is correctly set but the battery is still not being charged, the cut-out may be out of adjustment.

Replace the control box in the testing position, remake the temporary connections and remove the control box cover. Connect a voltmeter between terminals "D" and "E."

Start the engine and slowly increase the speed until the cut-out contacts close. Note the voltage at which this occurs and stop the engine. This should be 6.3-6.7 volts. If operation of the cut-out takes place outside these limits, it will be necessary to adjust.

(e) Adjusting the electrical setting of the cutout

Restart the engine.

Slacken the locknut securing the cut-out adjusting screw and turn the adjusting screw in a clockwise direction to raise the voltage setting or in an anti-clockwise direction to reduce the setting.

Turn the screw only a fraction of a turn at a time and then tighten the locknut. Test after each adjustment by increasing the engine speed and noting the voltmeter reading at the instant of contact closure.

Stop the engine.

Electrical setting of the cut-out, like the regulator, must be made as quickly as possible because of temperature-rise effects. Tighten the locknut after making the adjustment.

N.B.-if the cut-out does not operate, there may be an open-circuit in the wiring of the cut-out and regulator unit, in which case the unit should be removed for examination or replacement.

Battery Model PUZ7E

1. General

The model PUZ7E (see Fig. 1) is a "drycharged" battery and is supplied without electrolyte but with its plates in a charged condition. When the battery is required for service it is only necessary to fill each cell with sulphuric acid of the correct specific gravity. No initial charging is required, but the battery must be left to stand at least one hour after filling before putting the machine into service and then adjusting the acid level if necessary.

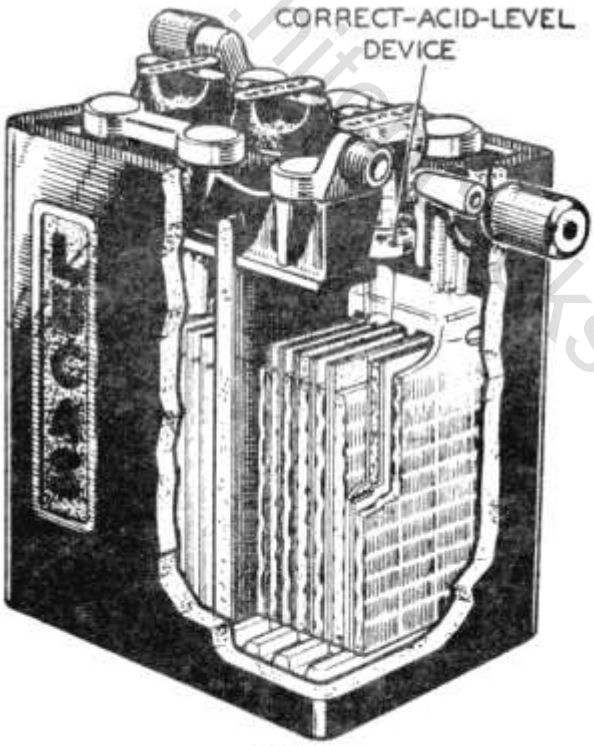


Fig. 1

2. Preparation for Service

The electrolyte is prepared by mixing together distilled water and concentrated sulphuric acid, using lead-lined tanks or suitable glass or earthenware vessels. Slowly add the acid to the water, stirring with a glass rod. Never add water to the acid, as this causes dangerous spurting of the concentrated acid. The specific gravity of the filling electrolyte depends on the climate in which the battery is to be used.

Specific gravity of electrolyte for filling "dry-charged" batteries :

Climates below 90°F. (32°C.)	Climates above 90°F. (32°C.)
Filling, 1·270	Filling, 1·210

The approximate proportions of acid and water to obtain these specific gravities :

To obtain specific gravity (corrected to 60°F.) of :	Add 1 vol. of 1·835 S.G. acid (corrected to 60°F.) to :
1·270	2·9 vols. of water.
1·210	4·0 vols. of water.

Heat is produced by the mixture of acid and water, the electrolyte should be allowed to cool before pouring it into the battery.

The specific gravity of the electrolyte varies with the temperature. For convenience in comparing specific gravities, they are always corrected to 60° F., which is adopted as a reference temperature.

The method of correction is as follows :

For every 5°F. below 60°F., deduct .002 from the observed reading to obtain the true specific gravity at 60°F. For every 5°F. above 60°F. add .002 to the observed reading to obtain the true specific gravity at 60°F.

The temperature must be that indicated by a thermometer having its bulb actually immersed in the electrolyte and not the ambient temperature.

Fill the cells to the tops of the separators, in *one operation.* The battery filled in this way is 90% charged. When time permits, a short freshening charge for no more than four hours at the normal recharge rate of 1.5 amp. should be made.

3. Routine Maintenance

Fortnightly (or more frequently in hot climates) examine the level of electrolyte in the cells and if necessary add distilled water to bring the level up to the tops of the separators. The use of a Lucas Battery Filler will be found helpful, as it ensures that the correct electrolyte level is automatically maintained and also prevents distilled water from being spilled on the top of the battery (see Fig. 2).

Occasionally examine the terminals, clean and coat them with petroleum jelly. Wipe away all

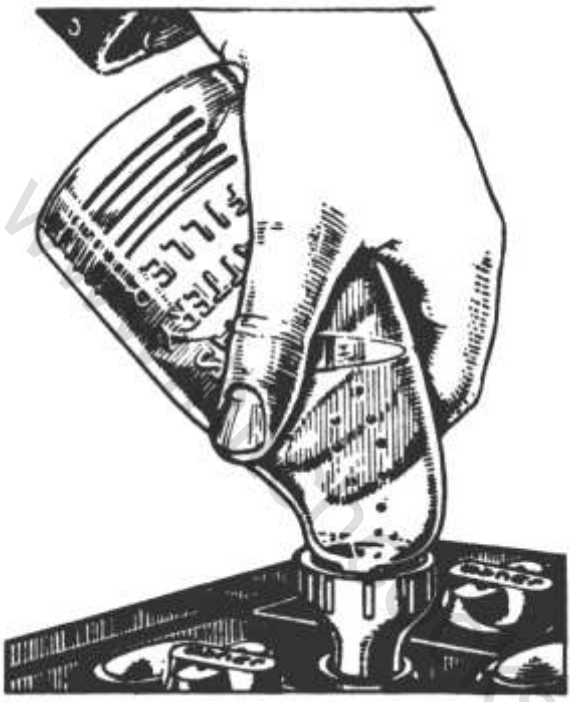


Fig. 2

dirt and moisture from the top of the battery and ensure that the connections are clean and tight.

4. Servicing

If the battery is subjected to long periods of night parking with the lights on, without suitable opportunities for recharging, a low state of charge is to be expected.

Measure the specific gravity of the acid of each cell in turn with a hydrometer (see Fig. 3).

The following table shows the state of charge at different values of specific gravities

State of Charge	Temperature under 90°F.	Temperature over 90°F.
Battery fully charged ...	1·270—1·290	1·210—1·230
Battery about half charged ...	1·190—1·210	1·130—1·150
Battery fully discharged ...	1·110—1·130	1·050—1·070

If the battery is discharged, it must be recharged, either on the motor cycle by a period of daytime running or from an external D.C. supply at the normal recharge rate of 1.5 amp.

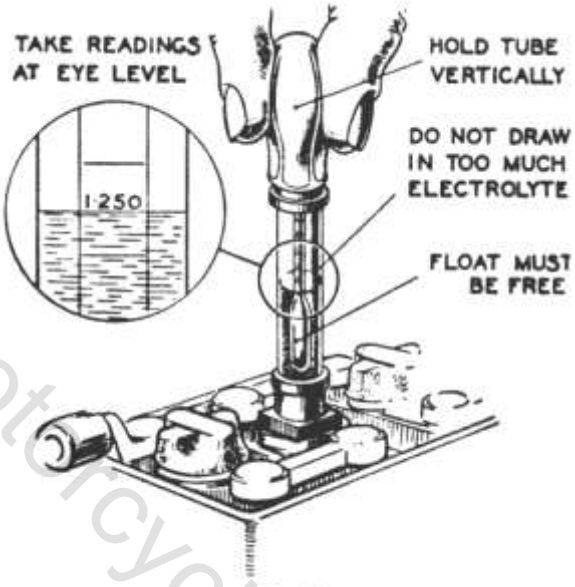


Fig. 3

SECTION G5a

Head and Tail Lamps

Used on Models G, J2, " 350 Bullet," " 500 Bullet," " 500 Twin," "Meteor 700," 1950 onwards

1. Headlamp

In all the above Models the headlamp incorporates the Lucas Light Unit MCF700. This is either fitted into a lamp shell (see Figs. 1 and 2) carried on brackets in front of the facia panel type of fork head and housing a switch, ammeter and parking lamp, or, on later models, is built into the Casquette fork head which contains twin parking lamps as well as the ammeter and switch. On machines fitted with coil ignition the ammeter has a red central window with the ignition warning light beneath.

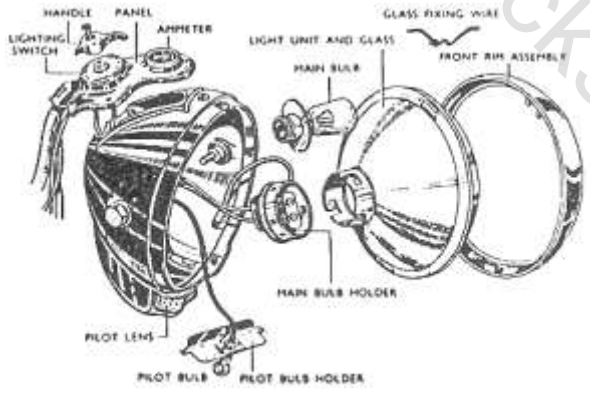


Fig. 1

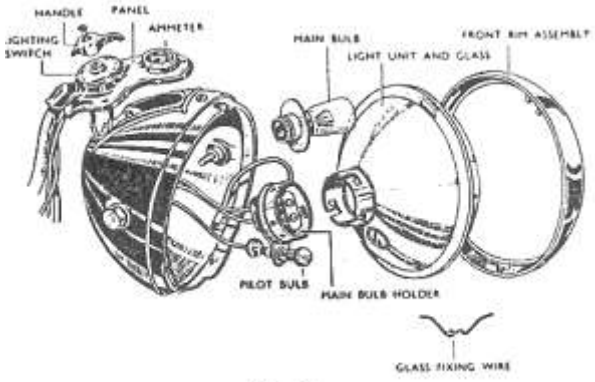


Fig. 2

2. Lucas Light Unit

The unit incorporates a combined reflector and front lens assembly (see Fig. 3). This construction ensures that the reflector and lenses are permanently protected, thus the unit keeps its high efficiency over a long period. A "prefocus" bulb is used, the filaments of which are accurately positioned with respect to the reflector, thus no focusing device is necessary.

The bulb has a large cap and a flange, which has been accurately positioned with relation to the bulb filaments during manufacture. A slot in the flange engages with a projection on the inside of the bulb holder positioned at the back of the reflector.

A bayonet-fitting adaptor with spring-loaded contacts secures the bulb firmly in position and carries the supply to the bulb contacts.

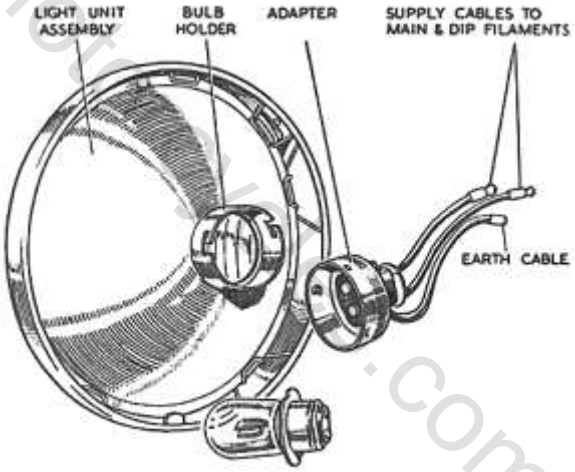


Fig. 3

The outer surface of the lens is smooth to facilitate cleaning. The inner surface is formed of a series of lenses which determine the spread and pattern of the light beams.

In the event of damage to either the lens or reflector a replacement light unit must be fitted.

3. Replacing the Light Unit and Bulb

Slacken the securing screw at the top of the headlamp rim. Remove the front rim and Light Unit assembly.

Withdraw the adaptor from the Light Unit by twisting it in an anti-clockwise direction and pulling it off. Remove the bulb from its locating sleeve at the rear of the reflector.

Disengage the Light Unit securing springs from the rim and lift out the Light Unit.

Position the new unit in the rim so that the word "TOP" on the lens is correctly located when the assembly is mounted on the headlamp. Refit the securing springs ensuring that they are equally spaced around the rim.

Replace the bulb and adaptor. The bulb must be the Lucas "prefocus" type, 6v. 30/24 watt Lucas No. 312.

Locate the bottom of the Light Unit and front rim assembly in the headlamp shell or in the fixing rim attached to the Casquette fork head. Press the front on and tighten the securing screw at the top of the headlamp.

4. Parking Lights

In the case of lamps having separate shells the parking bulb may be mounted either to show through a hole in the back of the main reflector (Fig. 1) or may be mounted in a separate housing beneath the lamp shell (Fig. 2). In the case of lamps fitted into a Casquette fork head twin parking lights are provided. In all cases the bulb is the same, i.e. 6v. 3 watt M.B.C. Lucas Part No. 988.

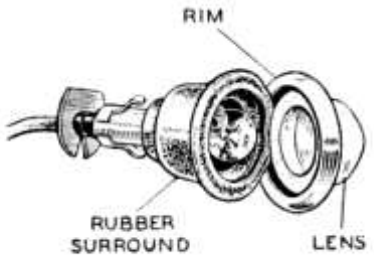


Fig. 4

Access to the parking bulb in the case of lamps with separate shells is obtained by removing the light unit as described in Subsection 2. In the case of lamps in which the parking bulb shows through a hole in the main reflector the bulb holder assembly should be removed. This will come away bringing with it the parking bulb which will then be readily accessible.

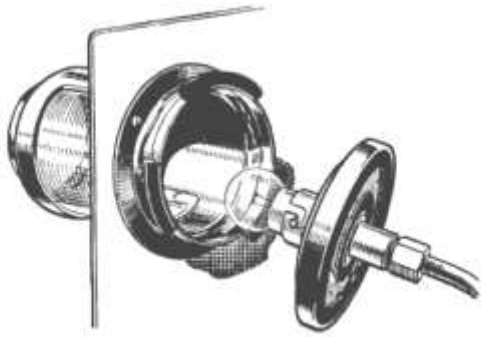


Fig. 5

In the case of lamps having the underslung parking light the parking bulb holder can be lifted out of the lamp shell after removal of the light unit.

In the case of lamps fitted into Casquette fork heads access to the parking bulbs is obtained by removing the parking lamp rim (see Fig. 4). This may merely be forced over the edge of the rubber lamp body or in the case of later machines is additionally secured by means of a small fixing screw. After removal of the lamp rim the parking lamp lens can be pulled out of the rubber body, after which the bulb will be accessible.

5. Tail Light

Earlier machines used a circular metal-bodied tail light, either Lucas No. MT110 (Fig. 5) or No. 480 (Fig. 6). In the former case, access to the bulb is obtained by removing the back of the lamp, which will come away bringing the bulb with it. In the latter case, the front of the lamp is removed, leaving the bulb carrier in position. In either case the bulb is the same, that originally fitted being 6 volt 3 watt S.B.C., Lucas Part No. 200, which, however, on machines of over 250 c.c. should now be replaced by 6 volt 6 watt S.B.C. Lucas No. 205.

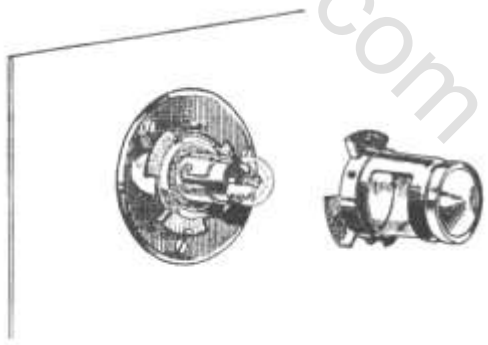


Fig. 6

Recent machines use lamps with red plastic covers, either Type 529 (Fig. 7), which is a tail lamp only; 525 (Fig. 8), which is a combined stop and tail lamp; or 564 (Fig. 9), which is a combined stop and tail lamp and reflector.

Access to the bulb is obtained by removing the two screws which secure the plastic cover.

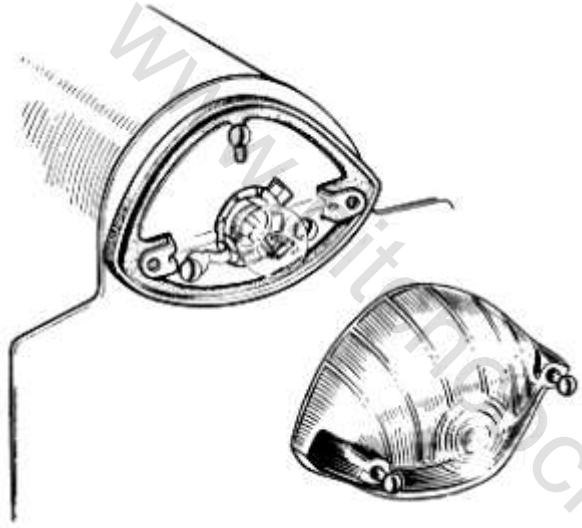


Fig. 7

The correct bulb for the 529 lamp is either Lucas No. 988 6volt 3 watt M.B.C. or No. 951 6volt 6 watt M.B.C.

The correct bulb for the stop tail lights 525 and 564 is either Lucas No. 352 6volt 3/18 watt or Lucas No. 384 6volt 6/18 watt. The 3 watt or 6 watt filament provides the normal tail light, while the 18 watt filament is illuminated on movement of the brake pedal.

6 watt bulbs are now required by law in Great Britain on machines of more than 250 c.c. capacity.

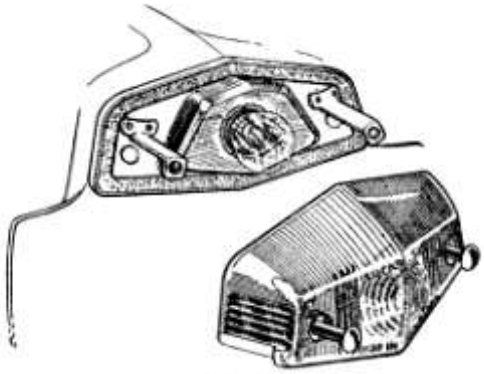


Fig. 8

Care must be taken that the leads to the stop tail lamp are correctly connected, as the use of the 18 watt filament on the normal tail light will not only discharge the battery but could cause trouble from excessive heat affecting the plastic cover. At the same time, the 3 or 6 watt filament, if used as a stop-tail light will be ineffective in bright sunlight.

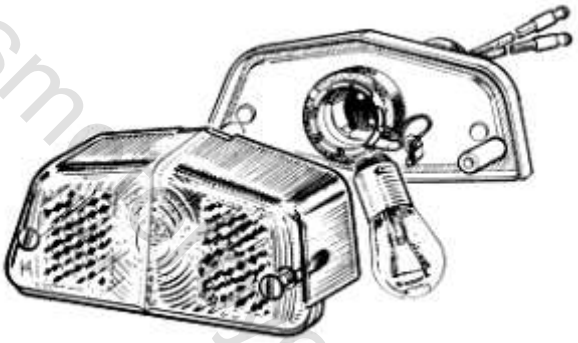


Fig. 9

ROYAL ENFIELD WORKSHOP MANUAL

Royal Enfield

Motor Cycle Prices

1954 SEASON

SPRING FRAME MODELS	Retail Price £ s. d.	Purchase Tax £ s. d.	Total £ s. d.
"Ensign" 148 c.c. Two stroke ...	78 0 0	15 12 0	93 12 0
"250 Clipper" 248 c.c. O.H.V. ...	135 0 0	27 0 0	162 0 0
"350 Bullet" 346 c.c. O.H.V. ...	155 0 0	31 0 0	186 0 0
"500 Bullet" 499 c.c. O.H.V. ...	170 0 0	34 0 0	204 0 0
"500 Twin" 496 c.c. O.H.V. ...	185 0 0	37 0 0	222 0 0
"Meteor 700" 692 c.c. O.H.V. ...	195 0 0	39 0 0	234 0 0
STANDARD MODELS	£ s. d.	£ s. d.	£ s. d.
Model S. 248 c.c. O.H.V. ...	115 0 0	23 0 0	138 0 0
Model G. 346 c.c. O.H.V. ...	135 0 0	27 0 0	162 0 0
Model J.2. 499 c.c. O.H.V. ...	145 0 0	29 0 0	174 0 0
SPECIAL COMPETITION MODELS	£ s. d.	£ s. d.	£ s. d.
"350 Bullet" - Trials & Scrambler	160 0 0	32 0 0	192 0 0
"350 Bullet" - Short Circuit Racer	175 0 0	35 0 0	210 0 0
"500 Bullet" - Trials & Scrambler	175 0 0	35 0 0	210 0 0
"500 Bullet" - Short Circuit Racer	190 0 0	38 0 0	228 0 0
EXTRA EQUIPMENT	£ s. d.	£ s. d.	£ s. d.
Legshields ("Ensign")	1 17 6	*	1 17 6
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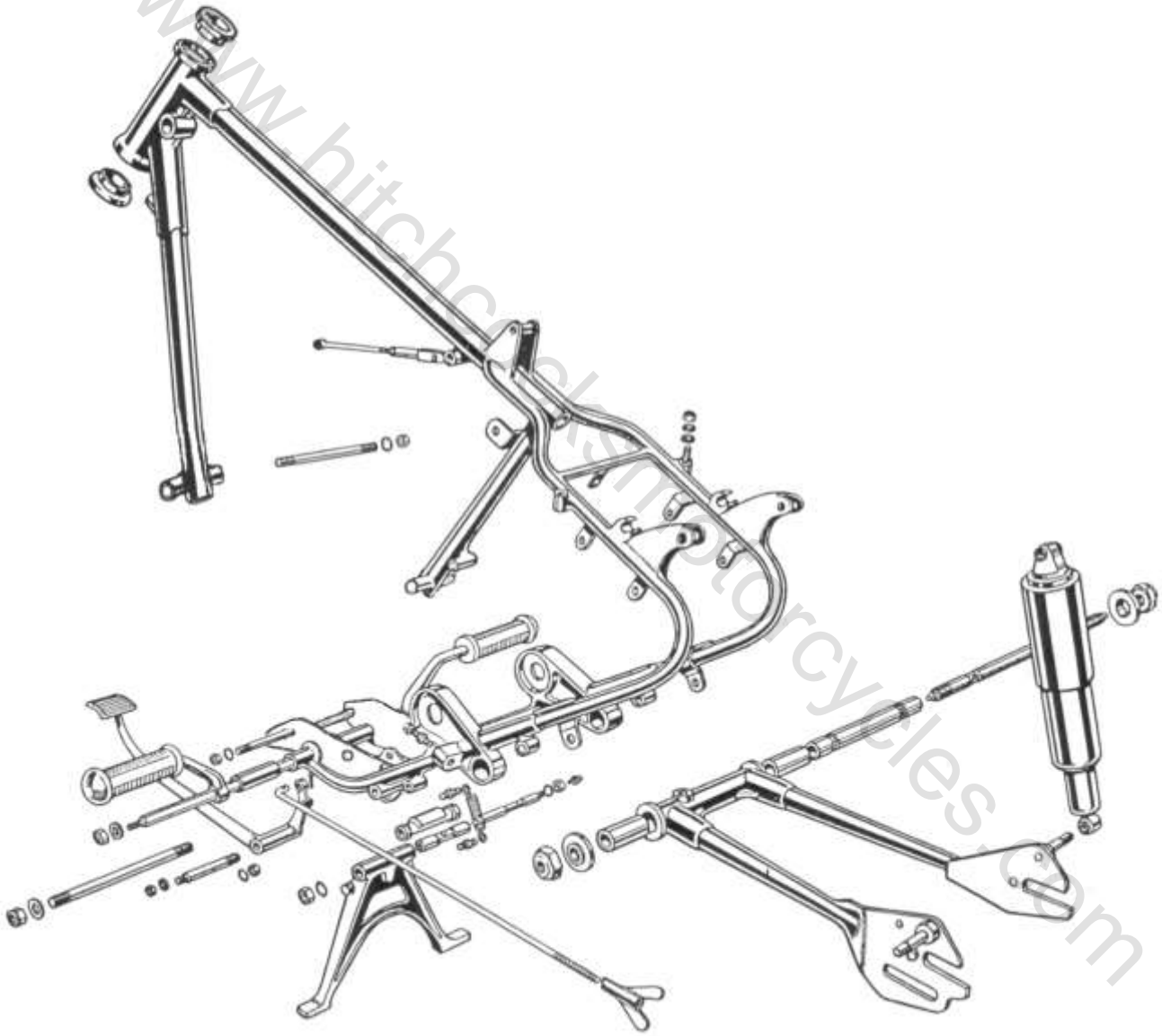
Pannier Set on Spring Frame Models	5 10 0	1 2 0	6 12 0
Dual Front Brake on "350 Bullet," "500 Bullet," and "500 Twin" Models	5 0 0	1 0 0	6 0 0
Sidecar Forks, Gear and Steering Damper on Model J.2., "500 Bullet" and "Meteor 700"	1 17 6	7 6	2 5 0
Magdyno, Lighting Set on Trials Models ...	8 10 0	1 14 0	10 4 0

1st November, 1953. *Tax Free—Supplied separately.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION H1
FRAME



EXPLODED VIEW OF LATE 1954-1955 350 BULLET AND 500 BULLET FRAME

1. Description of Frame

The frames used on the above models are basically identical, with swinging arm rear suspension, but there are some small differences in the lugs for engine attachment, the method of attachment of the pivot point for the swinging arm and in the width between the brackets supporting the upper ends of the rear suspension units. For part numbers of frames see appropriate spares lists.

The frame is built throughout of cold drawn weldless steel tubing with brazed or welded joints, liners being fitted where necessary for extra strength. All the main frame members are made of chromemolybdenum alloy steel tubing which retains its strength and resistance to fatigue after brazing or welding.

The swinging arm unit which forms the chain stays is provided with large diameter phosphor bronze bushes and pivots on a stout steel tube which is secured to the main frame by a long bolt passing through the pivot lugs. Hardened steel thrust washers are provided to deal with side thrust. The torsional rigidity of the swinging arm unit helps to maintain the rear wheel upright in the frame and thus relieves the wheel spindle of bending stresses to which it is subject with other types of rear suspension.

2. Steering Head Races

The steering head races, 34085, are the same at the top and bottom of the head lug and are the same for all models. They are easily removed by knocking them out with a hammer and drift and new races can be fitted either under a press or by means of a hammer and a wooden drift.

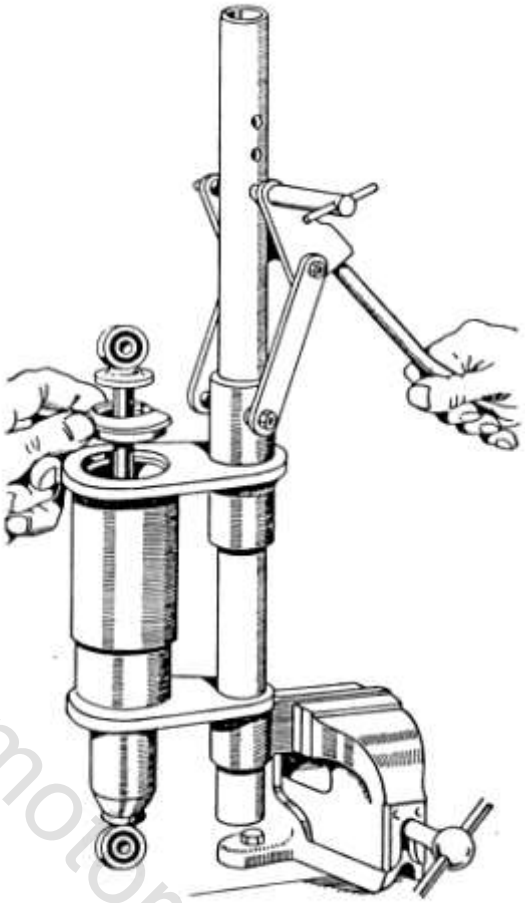
3. Removal of Rear Suspension Unit

The rear suspension units are readily removed by undoing the top pivot pin nut, driving out the pivot pin, then hinging the suspension unit back on the lower pivot pin, removing the lower nut and pushing the suspension unit off the pivot pin welded to the fork end.

4. Servicing Rear Suspension Units

(a) Proprietary Units. The proprietary units fitted to most 1954 and all 1955 models are sealed and servicing of the internal mechanism can be carried out only by the manufacturers.

The rubber bushes in the top and bottom eyes can easily be renewed and the spring can be removed by pushing down on the top spring cover so as to release the split collar above it. After removal of the split collar the top cover and spring can be lifted off. When reassembling, the spring should be greased to prevent rust and squeaking if it should come into contact with either of the covers.

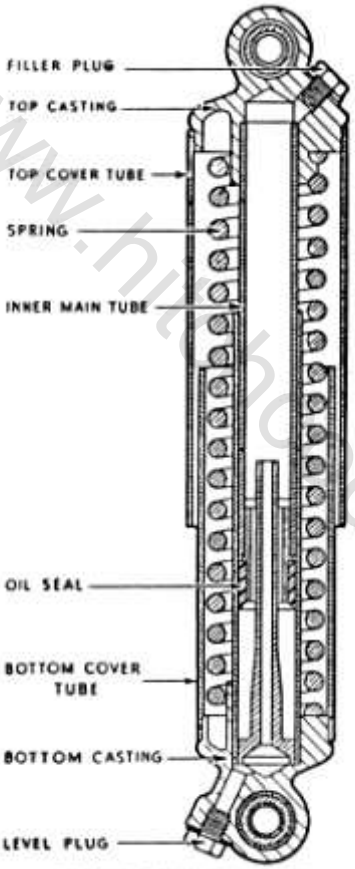


REAR SPRING COMPRESSOR
Fig. 2

The standard solo springs have a rate of 100-105lb. per inch and it is not difficult to compress these by hand. Heavier springs having a rate of 130lb. per inch are available which may require the use of a spring compressor, as shown in Fig. 2.

(b) Royal Enfield Units. Mark 1. Enfield rear suspension units, Part Number 34276 or 36451, are shown in Fig. 3. Units having Part No. 34276 are fitted with springs of .252 in. diameter wire (Part No. 34284) having a rating of approximately 200lb per inch (when fitted on

the scrolls). Units having Part No. 36451 have a spring of .264in. diameter wire (Part No. 35494) having a rating of approximately 250lb. per inch. The free overall length of both types of spring is 7.3/4 in. New springs should be fitted if they have set more than 1/8 in.



ROYAL ENFIELD UNIT
MARK I
Fig. 3

This type of suspension unit was fitted on "350 Bullet" and "500 Twin" Models up to the early part of the 1954 season, and on the "250 Clipper" Model up to the later part of the 1954 season.

To dismantle the unit, remove it from the machine, grip the lower end of the bottom casting in a vice, unscrew the top cover tube, place a suitable bar through the Silentbloc bush in the top casting and turn so as to unscrew the spring from the scroll on either the top or bottom casting.

The top casting with the inner main tube (which is brazed into it) and the oil seal can now be withdrawn from the outer main tube and bottom casting. If the spring has remained attached to the bottom casting, unscrew the bottom cover tube and unscrew the spring from the scroll on the bottom casting, if necessary tapping it with a hammer and a blunt chisel. The outer main tube is brazed into the bottom casting and the hollow damper post is brazed into the main tube.

Oil tightness of these units depends on the condition of the edge of the oil seal which must be handled with great care. The synthetic rubber seal is bonded to a hollow metal plug which forms the valve port in the hydraulic damping system. If the oil seal needs renewing the easiest way to remove it from the inner main tube is to pass a 13/32 in. diameter bar through the hollow plug to prevent it closing in, then grip the oil seal in a vice, pass a bar through the eye in the top casting and pull and twist to withdraw the hollow metal plug from the end of the main tube. Take care not to damage the new seal when fitting it.

After reassembling, remove the oil filler and level plugs and fill with one of the following oil, until it runs out through the level plug orifice:

Castrolite; Vacuum Arctic ;
Shell X-100. 20/20w; Essolube 20;
B.P. Energol S.A.E. 20.

Wait till the oil has ceased running, then replace the oil filler and level plugs.

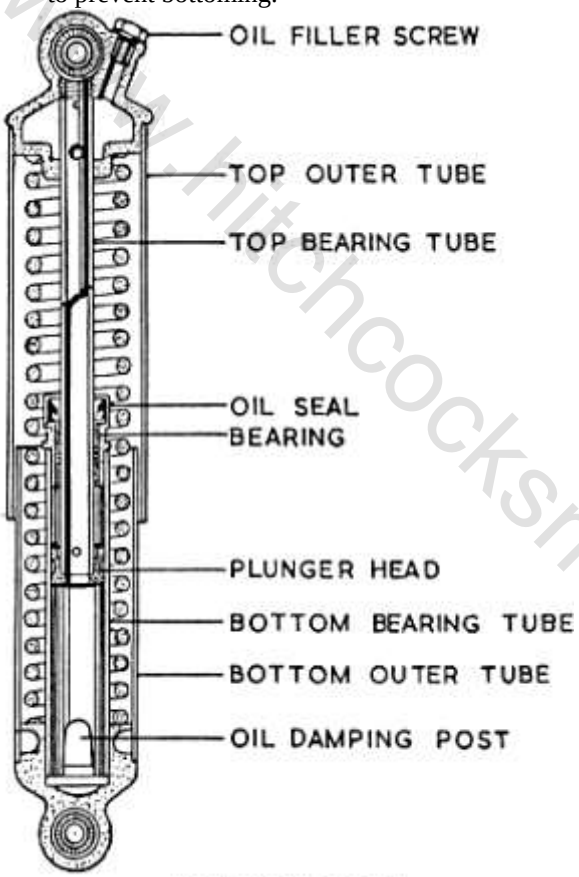
(c) Royal Enfield Units. Mark II. Enfield rear suspension units, Part No. 38109, are shown in Fig. 4. This type provides positive damping on the rebound stroke and in consequence does not need the spring to be anchored on scrolls. The range of movement is greater than the Mark I dampers and on account of this and the improved damping the ride is better, particularly on extended rough sections. The spring rate is 150 lb. per inch.

This type of unit was fitted on the "Meteor 700" model up to the early part of the 1954 season and on the "500 Bullet" model up to the later part of the 1954 season.

The Plunger Head contains a disc valve which on the bump stroke provides only a slight restriction to passage of oil between the inside of the bottom bearing tube and the damper chamber which is bounded by the inside wall of the upper end of the bottom bearing tube, the outer wall of the lower end of the top bearing tube, the upper surface of the plunger head and the lower end of the bearing bush. Since there is not room in the damper chamber for all the oil displaced on the bump stroke, provision is made for the surplus to pass up the inside of the top bearing tube and into the hollow top end casting.

On the rebound stroke the disc valve in the plunger head closes under pressure in the damper chamber, so that the oil is forced past the clearance between the plunger head and the inside wall of the bottom bearing tube, thus providing positive damping on the rebound stroke.

At the end of the bump stroke the Oil Damping Post enters the open end of the top bearing tube thus providing a hydraulic cushion to prevent bottoming.



ROYAL ENFIELD UNIT
MARK II
Fig. 4.

To dismantle the unit, remove it from the machine, grip the lower end of the bottom casting in a vice and unscrew the top outer tube. Now insert a thin spanner .820 in. across flats between the coils of the spring to engage the flats on the top bearing and oil seal assembly, unscrew this and withdraw the top casting, top bearing tube and plunger head from the bottom bearing tube, bottom casting and outer tube assembly.

The spring can now be lifted away. Its original free length is 8.3/4 in. If it has closed more than 1/8 – 3/16 in. a new spring should be fitted.

If it is required to renew the bearing bush or oil seal, the plunger head must be dismantled by unscrewing it from the top bearing tube and then lifting away the Oil Control Valve and circlip, the top bearing assembly comprising the oil seal and bearing bush in a housing can now be withdrawn from the lower end of the top bearing tube. The oil seal and bearing bush are secured in the housing by spinning over the end of the latter. A new assembly must therefore be fitted if either oil seal or bearing require renewing.

After reassembly of the plunger head, fill the bottom bearing tube with oil of one of the grades given below. Remove the oil filler screw from the top casting, replace the spring, and carefully insert the plunger head into the bottom bearing tube, pushing it down slowly so as to spill as little oil as possible and allow time for oil to enter the damper chamber and pass up the inside of the top bearing tube. Tighten down the top bearing and oil seal assembly with a thin spanner inserted between the coils of the spring.

Now use a mandrel press or a vertical drilling machine to compress the damper unit fully and carefully insert oil through the filling orifice until the unit is completely full. Slightly release the pressure and then compress again fully several times to remove air bubbles. Release the pressure to allow the spring to expand about 1 in. before replacing the oil filler plug.

Use one of the following grades of oil:
Castrolite; Vacuum Arctic;
Shell X-I00 20/20w; Essolube 20;
B.P. Energol S.A.E. 20.

5. Removal of Swinging Arm Chain Stays

First remove one of the pivot pin nuts and pull the pivot pin out from the other end. To release the pivot bearing it is necessary to spread the rear portion of the frame, using the frame expander E.5431, which will spread the frame sufficiently to enable the spigots on the thrust washers to clear the recesses in the pivot lugs forming part of the frame.

If it is necessary to remove the bronze bushes these can be driven out by means of a hammer and a suitable drift and new bushes can be fitted under a press without difficulty. After fitting the bushes they must be reamed to .844/.843 in.

6. Centre Stand

To remove the centre stand unscrew the nut from one end of the stand spindle, knock out the

latter and withdraw the stand complete with its bearing sleeve after disconnecting one end of the stand spring. Note that the position of the stand when raised is controlled by the stop on the rear engine plate spacer, Part No. 35060. This should be adjusted so that the stand is as high as possible without actually hitting the exhaust pipe.

7. Wheel Alignment

Note that it is not possible to guarantee that the wheels are correctly aligned when the same notch position is used on both adjuster cams. It is therefore not sufficient to count the notches and use the same position on both sides of the machine. The only way to guarantee that the wheels are in line is to check the alignment from front wheel to back using either a straight edge or a piece of taut string. The alignment should be checked on both sides of the machine and if the front and rear tyres are of different section allowance must be made for this.

It is usual to check the alignment of the wheels at a point about six inches above the ground but, if the alignment is checked also towards the top of the wheels, it will be possible to ascertain whether or not the frame is twisted so as to cause one wheel to be leaning while the other is vertical. To do this it is always necessary to remove the mudguards and, unless a straight edge cut away in its centre portion is available, it will be necessary also to remove the cylinder, toolboxes, battery, etc., in order to allow an unbroken straight edge or a piece of taut string to contact the front and rear tyres.

8. Lubrication

The steering head races, swinging arm pivot bearing and stand pivot bearing should be well greased on assembly. The swinging arm pivot and stand pivot are provided with grease nipples but no nipples are provided for the steering head as experience has shown that the provision of nipples at this point causes trouble through chafing and cutting of control and lighting cables. If the steering head bearings are well packed they will last for several years or many thousands of miles.

Recommended greases are Castrolease (Heavy), Mobilgrease (No. 4), Esso Grease, Energrease C.3 or Shell Retinax A.

SECTION J1

Front Fork

With Casquette and Aluminium Alloy Bottom Tubes

1. Description

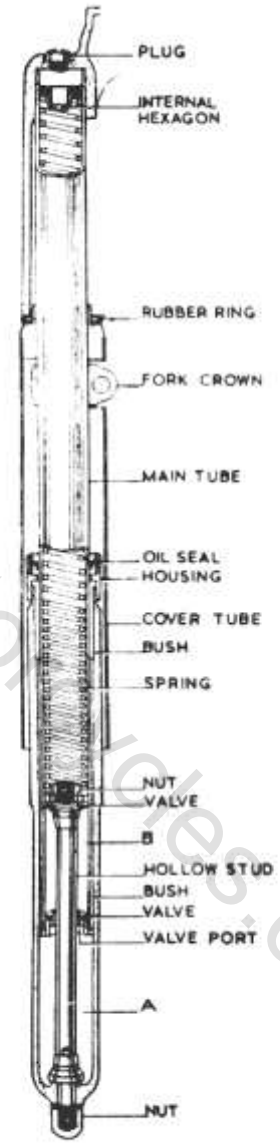
The telescopic fork consists of two legs each of which comprises a main tube of chrome molybdenum alloy steel tubing which is screwed into the Casquette fork head at the upper end and securely clamped to the fork crown. Fitted over the lower end of the main tube is the bottom tube made of high strength aluminium alloy with an integral lug which carries the wheel spindle. Fitted on the lower end of the main tube is a steel bush which is a close fit in the bore of the bottom tube. The upper end of the bottom tube carries a bronze bush which is a close fit over the outside diameter of the main tube. The bush is secured to the bottom tube by mean, of a threaded housing which contains an oil seal. A stud known as the "spring stud" is fitted in the lower end of the bottom tube and a valve port is secured to the lower end of the main tube. As the fork operates oil is forced between the spring stud and the bore of the valve port forming a hydraulic damping system. A compression spring is fitted inside the main tube between the upper end of the spring stud and the upper end of the main tube. The lower end of the main tube and upper end of the bottom tube are protected by a cover secured to the fork crown.

A special fork is available for sidecar machines. This has bottom tubes with extended wheel lugs giving less trail and is fitted with stronger springs and a steering damper.

2. Operation of the Fork

The fork provides a range of movement of 6 in. from the fully extended to the fully compressed position. The movement is controlled by the compression spring and by the hydraulic damping system. The hydraulic damping is light on the bump stroke and heavier on the rebound stroke, thus damping out any tendency to pitching or oscillation without interfering unduly with the free movement of the fork when the wheel encounters an obstacle.

The fork is filled with a light oil (S.A.E. 20) to a point above the lower end of the fork spring so that the damper chamber "B" is always kept full of oil.



SECTION OF FORK LEG

Fig. 1

Upward movement of the wheel spindle forces oil from the lower chamber "A" through the annular space between the spring stud (38067) and the bore of the main tube valve port (38138) into the damper chamber "B." During this stroke the pressure on the underside of the valve plate (38073) causes this to lift so that oil can also pass from "A" to "B" through the eight holes in the valve body. Since, however, the diameter of chamber "B" is less than that of chamber "A" there is not room in "B" to receive all the oil which must be displaced from "A" as the fork operates. The surplus oil passes through the cross hole in the spring stud and up the centre hole in the stud, spilling out through the nut (38076) which secures the upper end of the spring stud to the bronze guide at the lower end of the fork spring.

On the rebound stroke the oil in the damper chamber "B" is forced through the annular space between the spring stud and the bore of the main tube valve port. During this stroke pressure in chamber "B" closes the two disc valves at the upper and lower ends of the chamber so that the only path through which the oil can escape is the annular space between the spring stud and the port. Damping on the rebound stroke is therefore heavier than on the bump stroke. At the extreme end of either bump or rebound stroke a small taper portion on the spring stud enters the

MAIN TUBE SPANNER

Fig. 2

bore of the valve port, thus restricting the annular space and increasing the amount of damping. At the extreme end of the bump stroke the larger diameter taper on the oil control collar (38075) enters the main counterbore of the valve port thus forming a hydraulic cushion to prevent metal to metal contact.

3. Dismantling the Fork to Replace Spring, Oil Seal or Bearing Bushes

Place the machine on the centre stand, disconnect the front brake control and remove the front wheel and mudguard complete with stays. Unscrew the bottom spring stud nut (38080) which will allow oil to run out of the fork down to the level of the cross hole in the

MAIN TUBE SEAL GUIDE

Fig. 3

spring stud. Now knock the spring stud upward into the fork with a soft mallet, thus allowing the remainder of the oil to escape. Pull the fork bottom tube down as far as possible, thus exposing the oil seal housing (38157). Unscrew this housing either by mean of a spanner on the flats with which it is provided or by using the gland nut handgrips (E.5417). The bottom tube can now be withdrawn completely from the main tube, leaving the bottom tube bush, oil seal housing and oil seal in position on the main tube.

Now unscrew the main tube valve port using "C" spanner (E5418). The spring stud and spring can now be withdrawn from the lower end of the main tube.

The steel main tube bush (38156) can now be tapped off the lower end of the tube, if necessary using the bottom tube bush for this purpose. Before doing this, however, it is advisable to mark the position of the bush with a pencil line so as to ensure reassembling it in the same position on the main tube. The reason for this is that these bushes are finish ground to size after fitting on to the tubes so as to ensure concentricity. After removal of the main

removal of the main tube bush the bottom tube bush, oil seal housing and oil seal can be removed.In case of difficulty in removing the main tube bush it is possible to withdraw the oil seal housingafter loosening the crown clip bolt 39038, removing the plug screw 38968 and unscrewing the main tube from the fork-head by means of a hexagon bar .500 in. across flats (Unbrako wrench W. 11) or the special tool shown in Fig. 2.

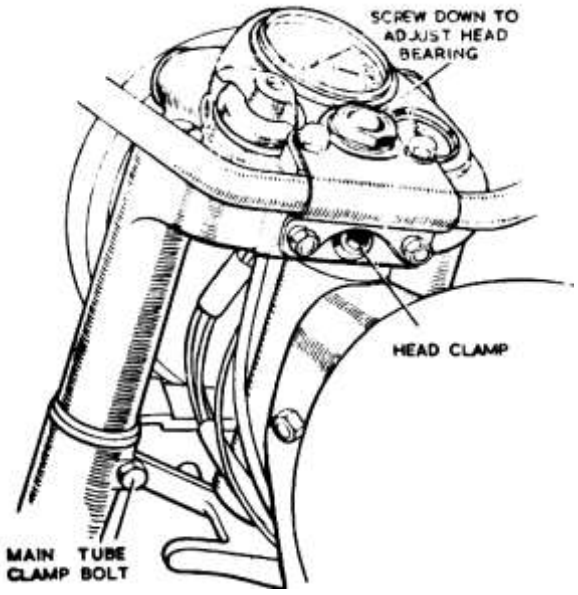
4. Spring

Solo and Sidecar springs are available. The free length of each is 20.1/2 ins. The spring should be replaced if it has closed by more than 1 inch.

5. Reassembly of Parts

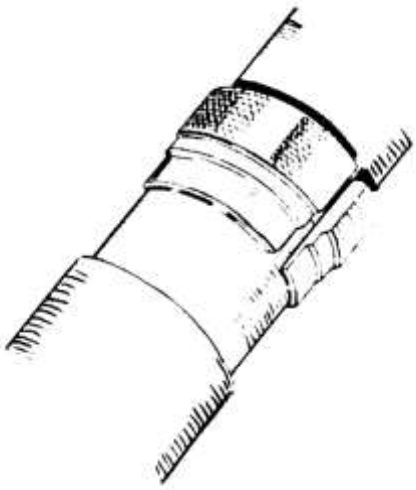
When refitting the oil seal, or fitting a new one, great care must be exercised not to damage the synthetic rubber lip which forms the actual seal. If the seal has been removed from the upper end of the main tube and is refitted from this end a special nose piece (Fig. 3) must be fitted over the end of the tube to prevent the thread from damaging the oil seal.

The spring stud is a tight fit in the hole at the lower end of the bottom tube. Once the stud has been entered in the hole push the bottom tube up sharply against the spring until two or three threads on the stud project beneath the end of the bottom tube. Now fit the nut and washer and pull the stud into position by tightening the nut. If necessary fit the nut first without the washer until sufficient thread is projecting to enable the washer to be fitted.



SHOWING THE POSITIONS OF THE CLAMP BOLTS SECURING THE STEERING STEM AND FORK TUBES

Fig. 4



OUTER COVER CENTRALISING BUSHES

Fig. 5

6. Steering Head Races

The steering head bearing consists of two deep groove thrust races each containing nineteen 1/4 in. diameter balls. The bearing is adjusted by tightening the steering stem locknut after loosening the ball head clip screw and both the fork crown clamp bolts. The head should be adjusted so that, when the front wheel is lifted clear of the ground, a light tap on the handlebars will cause the steering to swing to full lock in either direction, while at the same time there should be only the slightest trace of play in the bearings. When testing for freedom of movement the steering damper, if fitted, should be disconnected by unscrewing the anchor plate pin. Do not forget to tighten the ball head clip screw and fork crown clamp bolts. Before tightening the latter make sure that the cover tubes are located centrally round the main tubes so that the bottom tube does not rub inside the cover tube. A pair of split bushes (Fig. 5) is useful to ensure centralisation of the cover tubes.

7. Removal of Complete Fork

The fork complete with front wheel and mudguard can be removed from the machine if necessary by adopting the following procedure.

The leads to the lighting switch and ammeter should be disconnected from the battery, regulator, tail lamp, etc. at their lower ends or by means of the plug and socket connectors when these are provided. The switch and ammeter are push fits into the rubber bushes (LU/365408) in the fork head.

Disconnect the speedometer drive from the speedometer head and unscrew the steering damper knob and rod (if fitted) after removal of the split pin through the lower end of the rod. Undo the steering damper anchor plate pin so as to disconnect the damper from the frame of the machine.

Remove the two plug screws (38968) and loosen the steering head clip bolt and the two fork crown clamp bolts.

Now unscrew the fork main tubes from the fork head and the steering stem locknut from the top of the steering stem, turning each tube and the nut a turn or two at a time. When the nut has been removed from the steering stem and the main tubes have been completely unscrewed from the fork head the complete fork and wheel with steering stem can be lifted out of the head lug of the frame.

8. Lubrication

The lubrication of the fork bearings is effected by the oil which forms the hydraulic damping medium. All that is necessary is to keep sufficient oil in the fork to ensure that the top end of the bottom spring stud is never uncovered even in the full rebound position. The level of oil in the fork can be gauged by removing the top plug screw and inserting a long rod about 3/8 in. diameter. If slightly tilted this will ledge against the nut at the upper end of the bottom spring stud and indicate the level of oil above the stud. If the fork is empty to start with, the quantity required is approximately 7.1/2 fluid ounces in each leg. Recommended grades of oil are Castrolite, Mobiloil Arctic, Essolube 20, B.P. Energol S.A.E. 20 and Shell X-100 20/20W.

9. Air Vents

The earlier forks of this type were provided with holes at the upper end of each main tube communicating with small vent holes in the Casquette head. Experience has shown that on rough roads oil may escape through these air vents which in consequence are now omitted. Escape of oil from the earlier forks can be largely eliminated by fitting specially long plug screws, which are available. The Part Number is 40118. If these are fitted and the final vent hole is stopped up with a wooden plug, leakage at this point is impossible. Fitting the special plug screws alone is sufficient in most instances.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION J3

Front Fork

With Facia Panel and Aluminium Alloy Bottom Tubes

Used on " 500 Bullet," 1953 ; "Meteor 700," 1953

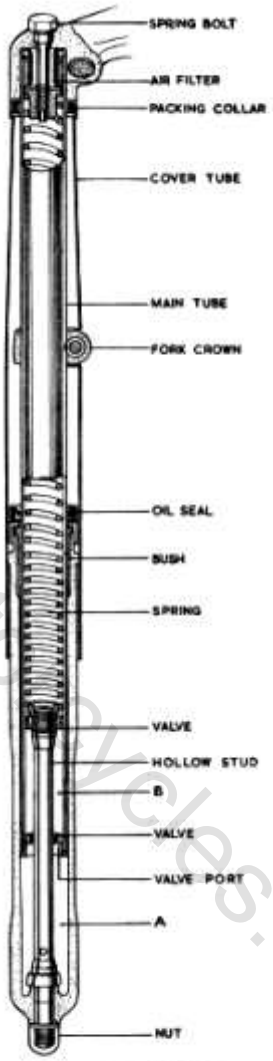
1. Description

The telescopic fork consists of two legs each of which comprises a main tube of chrome molybdenum alloy steel tubing which is securely clamped to the Facia Panel Fork Head and to the fork crown. Fitted over the lower end of the main tube is the bottom tube made of high strength aluminium alloy with an integral lug which carries the wheel spindle. Fitted on the lower end of the main tube is a steel bush which is a close fit in the bore of the bottom tube. The upper end of the bottom tube carries a bronze bush which is a close fit over the outside diameter of the main tube. The bush is secured to the bottom tube by means of a threaded housing which contains an oil seal. A stud, known as the "spring stud," is fitted in the lower end of the bottom tube and a valve port is secured to the lower end of the main tube. As the fork operates oil is forced between the spring stud and the bore of the valve port forming a hydraulic damping system. A compression spring is fitted inside the main tube between the upper end of the spring stud and the upper end of the main tube. The main tube and upper end of the bottom tube are protected by a one-piece cover secured to the fork crown and carrying a pressed steel lamp bracket welded to it.

A special version of the fork is available for sidecar use. This has a modified fork head and fork crown setting the main tubes 1.1/2 in. further forward thus giving less trail and providing lighter steering when used with a sidecar. These sidecar forks also are fitted with a steering damper and have stronger springs.

2. Operation of Fork

The fork provides a range of movement of 6 in. from the fully extended to the fully compressed position. The movement is controlled by the compression spring and by the hydraulic damping system. The hydraulic damping is light on the bump stroke and heavier on the rebound stroke, thus damping out any tendency to pitching or oscillation without interfering unduly with the free movement of the fork when the wheel encounters an obstacle.



SECTION OF LEG

Fig. 1

The fork is filled with a light oil (S.A.E. 20) to a point above the lower end of the spring so that the damper chamber "B" is always kept full of oil. Upward movement of the wheel spindle forces oil from the lower chamber "A" through the annular space between the spring stud (38067) and the bore of the main tube valve port (38138) into the damper chamber "B." During this stroke the pressure on the underside of the valve plate (38073) causes this to lift so that oil can also pass from "A" to "B" through the eight holes in the valve body. Since, however, the diameter of chamber "B" is less than that of chamber "A" there is not room in "B" to receive all the oil which must be displaced from "A" as the fork operates. The surplus oil passes through the cross hole in the spring stud and up the centre hole in the stud, spilling out through the nut (38076) which secures the upper end of the spring stud to the bronze guide at the lower end of the fork spring.

On the rebound stroke the oil in the damper chamber "B" is forced through the annular space between the spring stud and the bore of the main tube valve port. During this stroke pressure in chamber "B" closes the two disc valves at the upper and lower ends of the chamber so that the only path through which the oil can escape is the annular space between the spring stud and the port. Damping on the rebound stroke is therefore heavier than on the bump stroke. At the extreme end of either bump or rebound stroke a small taper portion on the spring stud enters the bore of the valve port thus restricting the annular space and increasing the amount of damping. At the extreme end of the bump stroke the larger diameter taper on the oil control collar (38075) enters the main counterbore of the valve port thus forming a hydraulic cushion to prevent metal to metal contact.

3. Dismantling the Fork to Replace Spring, Oil Seal or Bearing Bushes

Place the machine on the centre stand, disconnect the front brake control and remove the front wheel and mudguard complete with stays. Unscrew the bottom spring stud nut (38080) which will allow oil to run out of the fork down to the level of the cross hole in the spring stud. Now knock the spring stud upwards into the fork with a soft mallet, thus allowing the remainder of the oil to escape. Pull the fork bottom tube down as far as possible, thus exposing the oil seal housing (38157). Unscrew this housing either by means of a spanner on the flats with which it is provided or by using the gland nut hand grips (E4912). The bottom tube can now be withdrawn completely from the main tube, leaving the bottom tube bush, oil seal housing and oil seal in position on the main tube.

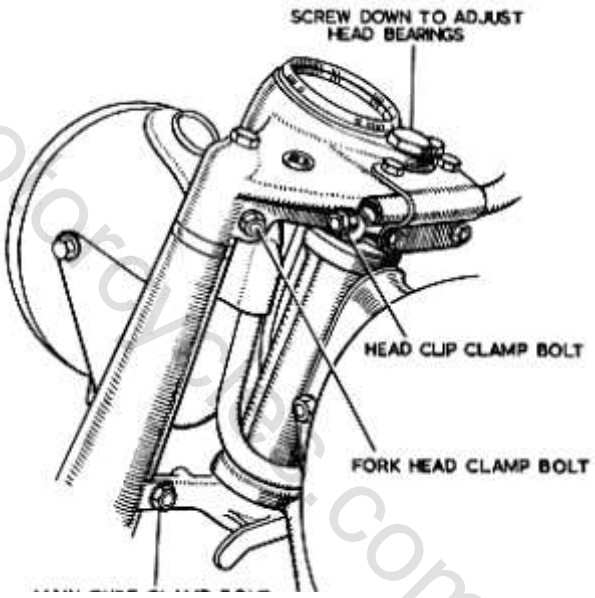
Now unscrew the main tube valve port using "C" spanner (E5418). The spring stud and spring can now be withdrawn from the lower end of the main tube.

The steel main tube bush (38156) can now be tapped off the lower end of the tube, if necessary using the bottom tube bush for this purpose. Before doing this, however, it is advisable to mark the position of the bush with a pencil line so as to ensure reassembling it in the same position on the main tube. The reason for this is that these bushes are finish ground to size after fitting on to the tubes so as to ensure concentricity. After removal of the main tube bush the bottom tube bush, oil seal housing and oil seal can be removed.

In case of difficulty in removing the main tube bush it is possible to withdraw the oil seal housing from the upper end after removal of the main tube from the fork head and fork crown, as described in paragraphs 6 and 7.

4. Spring

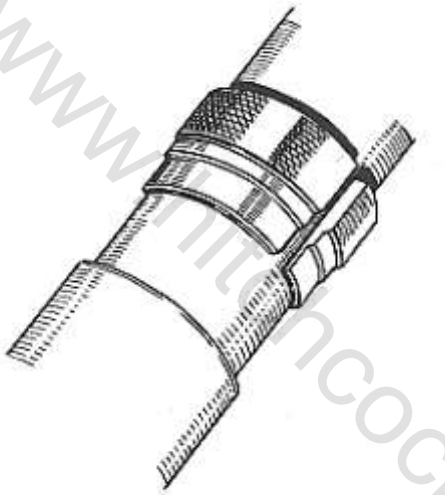
Solo and sidecar springs are available. The free length of each is 20.1/2 in. The spring should be replaced if it has closed by more than 1 inch.



SHOWING THE POSITIONS OF THE CLAMP BOLTS SECURING THE STEERING STEM AND FORK TUBES

5. Steering Head Races

The steering head bearing consists of two deep groove thrust races each containing nineteen 1/4 in. diameter balls. The bearing is adjusted by tightening the steering stem locknut after loosening the nuts on the three pinch bolts which secure the fork head to the steering stem and to the two main tubes. The head should be adjusted so that when the front wheel is lifted clear of the ground a light tap on the handlebars will cause the steering to swing to full lock in either direction, while at the same time there should be only the slightest trace of play in the bearings. When testing for freedom of movement the steering damper, if fitted, should be disconnected by unscrewing the anchor plate pin.



OUTER COVER CENTRALISING BUSHES

Fig. 3

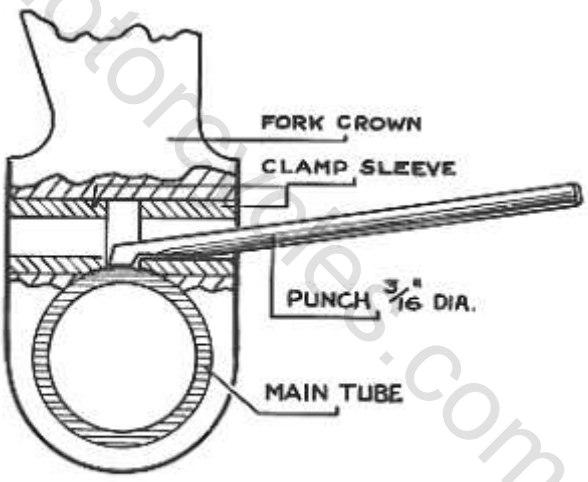
Adjustment of the steering head depends on the ability of the fork head to slide on the steering stem and on the fork main tubes. A rubber washer is interposed between the fork head and the top of the lamp bracket tube to permit the necessary movement. If this rubber washer is fully compressed while there is still some play in the steering head it will be necessary to remove the fork head (see paragraph 6) and shorten the lamp bracket tube by, say, 1/32 in. Alternatively, if the lamp bracket tube is loose when the steering head is correctly adjusted, it can be tightened by fitting an additional steel washer (Part No. 35974) beneath the rubber washer.

It is also possible that the steering head cannot be adjusted because the main tube is bottoming in the recess in the fork head in which it fits. In this case the nuts on the fork crown clamp stud, must be loosened and the sleeves separated (see paragraph 7) thus permitting the main tubes to slide through the fork crown. Do not forget to tighten the fork head pinch bolts and the nuts on the fork crown clamp studs after adjusting the steering head. Before tightening the latter make sure that the cover tubes are located centrally round the main tubes so that the bottom tube does not rub inside the lower end of the cover tube. A pair of split bushes (Fig. 3) is useful to ensure centralisation of the cover tubes.

6. Removal of Facia Panel Fork Head, Spring, etc.

To remove the Facia Panel Fork Head for access to the lamp bracket tubes (or to change the fork spring without disturbing the bearings) proceed as follows-disconnect all control cables at the handlebar end and remove the headlamp from the lamp brackets. The switch panel can conveniently be removed from the back of the lamp so that the body of the lamp can be removed completely.

Now remove the two Fork Spring Guide Bolts from the fork head, unscrew the nuts on the fork head clip bolt and the two main tube clip bolts, remove the three clip bolt sleeves and knock out the three clip bolts. The facia panel fork head can now be tapped gently upwards with a hide mallet or a hammer and a wooden drift but care must be taken to hit only the more solid parts of the fork head, i.e. beneath the handlebar clip and at the back of the main tubes, avoiding the underside of the comparatively thin portion in front of the speedometer.



DRIFT FOR PARTING CLAMP SLEEVES

Fig. 4

After removal of the fork head the lamp bracket tubes can be lifted straight off and the springs can be withdrawn from the upper end of the main tubes.

7. Removal of Main Tubes

To remove the main tubes first dismantle the fork as described in paragraph 3 then remove the facia panel fork head and lamp bracket tubes as described in paragraph 6. Now remove one nut from each of the fork crown clamp studs, remove the studs and separate the clamp sleeves with a drift of the form shown in Fig. 4. Now knock the main tubes out of the fork crown either upwards or downwards as may be most convenient. If the machine has been in an accident and the tube is badly bent both above and below the fork crown, it may be necessary to cut through the tube with a hacksaw before it can be withdrawn.

8. Reassembly of Parts

No difficulty should be experienced with this. When refitting the main tube use the lamp bracket tube as a guide to its correct position in the fork crown. The small shoulder some 1.1/2 in. from the upper end of the tube should be 1/8 in. above the top of the lamp bracket tube when the latter is in position on the fork crown. With the main tube in this position tighten the fork crown clamp screws before fitting the facia panel fork head.

The cover tube must be fitted in position on the fork crown and the clamp sleeves placed in position before the main tube is fitted. To keep the clamp sleeves in position it is convenient to insert a short piece of tube or bar in the eye of the fork crown before putting the cover tube in position. The short piece of tube will be pushed out when inserting the main tube. Before tightening the nuts on the three fork head clip bolts make sure that the bolt heads and the sleeves are correctly positioned with the cut-away portion engaging the main tube or steering stem. Failure to do this may result in a cracked fork head.

When refitting the oil seal or fitting a new one great care must be exercised not to damage the synthetic rubber lip which forms the actual seal. If the seal has been removed from the upper end of the main tube and is refitted from this end a special nose piece (Fig. 5) must be fitted over the end of the tube to prevent the thread from damaging the oil seal.

MAIN TUBE SEAL GUIDE

Fig. 5

The spring stud is a tight fit in the hole at the lower end of the bottom tube. Once the stud has been entered in the hole push the bottom tube up sharply against the spring until two or three threads on the stud project beneath the end of the bottom tube. Now fit the nut and washer and pull the stud into position by tightening the nut. If necessary fit the nut first without the washer until sufficient thread is projecting to enable the washer to be fitted.

9. Lubrication

The lubrication of the fork bearings is elected by the oil which forms the hydraulic damping medium. All that is necessary is to keep sufficient oil in the fork to ensure that the top end of the bottom spring stud is never uncovered even in the full rebound position. The level of oil in the fork can be gauged by removing the top plug screw and inserting a long rod about 3/8 in. diameter. If slightly tilted this will ledge against the nut at the upper end of the bottom spring stud and indicate the level of oil above the stud. If the fork is empty to start with the quantity required is approximately 7.1/2 fluid ounces in each leg. Recommended grades of oil are Castolite, Mobiloil Arctic, Essolube 20, B.P. Energol S.A.E. 20 and Shell X-100 20/20 w.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION J4
Front Fork
With Facia Panel and Steel Bottom Tubes
Used on "350 Model G," "500 Model J2," 1951 onward:
" 350 Bullet," " 500 Twin," 1950-53 inclusive

1. Description

The telescopic fork consists of two legs each of which comprises a main tube of chrome molybdenum alloy steel tubing which is securely clamped to the facia panel fork head at the upper end and to the fork crown. Filled over the lower end of the main tube is the bottom tube made of steel tubing with a forged steel fork end flash-welded to it.* Fitted on the lower end of the main tube is a bronze bush which is a close fit in the bore of the bottom tube. The upper end of the bottom tube carries a bronze bush which is a close fit over the outside diameter of the main tube. The bush is secured to the bottom tube by means of a gland nut with an oil seal fitted inside it. A stud, known as the "spring stud," is fitted in the lower end of the bottom tube and a valve port is secured to the lower end of the main tube. As the fork operates oil is forced through the annular space between the bore of the valve port and the outside diameter of the "spring stud," which is formed with a double taper. Thus hydraulic damping is provided which is light at the normal position of the fork and becomes increasingly effective towards each end of the fork's travel. A compression spring is fitted inside the main tube and is secured by scrolls so that it is in tension on the rebound. The lower end of the main tube and upper end of the bottom tube are protected by a cover tube screwed to the fork crown. The upper end of the main tube is covered by a tube with a pressed steel lamp bracket welded to it.

The fork is filled with a light oil (S.A.E. 20) up to a level above the valve port, this oil providing both the damping medium and the lubricant for the bearings.

A special version of the fork is available for sidecar use. This has a modified fork head and fork crown setting the main tubes 1.1/2 in. further forward, thus giving less trail and providing lighter steering when used with a sidecar. These sidecar forks also are fitted with a steering damper and have stronger springs.

**On early models the fork end was made of aluminium alloy screwed on to the bottom tube.*

2. Dismantling Fork to Replace Spring, Oil Seal or Bearing Bushes

Place the machine on the stand and in the case of Model "G" or "J2" place a box beneath the crankcase to raise the front wheel from the ground. Disconnect the front brake control and remove the front wheel and mudguard complete with stays. Unscrew the oil level plug after placing a tray to catch any oil which may run out. Undo the nut which secures the spring stud to the fork end and knock the spring stud upwards into the fork with a soft mallet, thus allowing the remainder of the oil to escape.

Unscrew the outer cover tube using the hand grips E4912 thus exposing the gland nut which can be unscrewed with the hand grips E5417 using a bar through the bracket for the wheel spindle to prevent the bottom tube from turning. The bottom tube can now be withdrawn completely from the main tube leaving the bottom tube bush, oil seal and gland nut on the main tube.

Now unscrew the main tube valve port using "C" spanner E5418. The spring stud and spring can now be withdrawn from the lower end of the main tube.

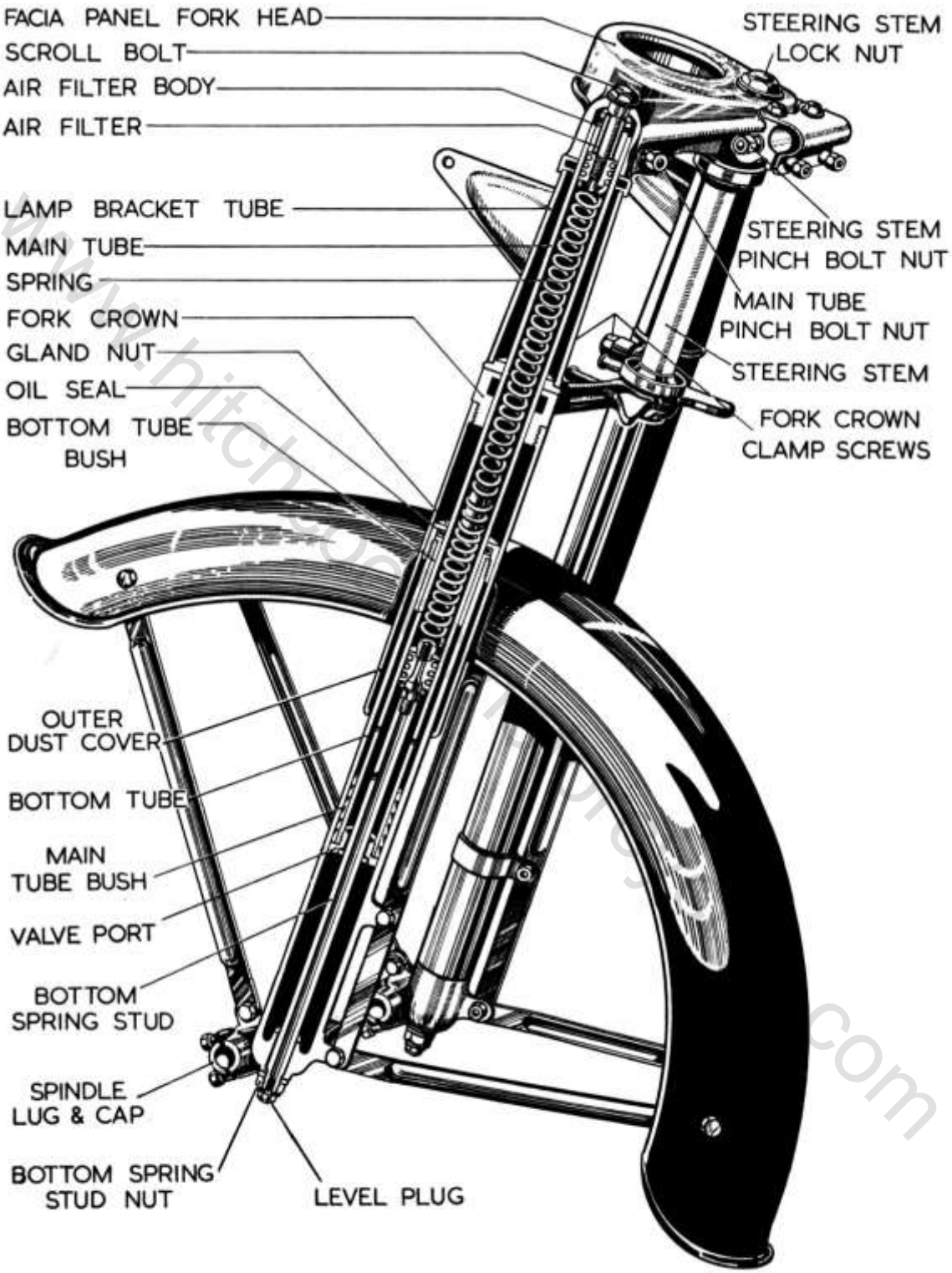
The bronze main tube bush can be now tapped off the lower end of the tube using the bottom tube bush for this purpose. The bottom tube bush, oil seal and gland nut can then be withdrawn.

3. Spring

The original length of the spring is 19 in. overall. A new spring should be fitted if the old one has set by more than 1 inch.

4. Steering Head Races

The steering head bearing consists of two deep groove thrust races each containing 19 x 1/4" diameter balls. The bearing is adjusted by



SECTIONED VIEW OF TELESCOPIC FORK
Fig. 1

tightening the steering stem locknut after loosening the nuts on the three pinch bolts which secure the fork head to the steering stem and to the two main tubes. The head should be adjusted so that when the front wheel is lifted clear of the ground a light tap on the handlebars will cause the steering to swing to full lock in either direction, while at the same time there should be only the slightest trace of play in the bearings. When testing for freedom of movement the steering damper, if fitted, should be disconnected by unscrewing the anchor plate pin.

Adjustment of the steering head depends on the ability of the fork head to slide on the steering stem and on the fork main tubes. A rubber washer is interposed between the fork head and the top of the lamp bracket tube to permit the necessary movement. If this rubber washer is fully compressed while there is still some play in the steering head, it will be necessary to remove the fork head (see paragraph 5) and shorten the lamp bracket tube by, say, 1/32 in. Alternatively, if the lamp bracket tube is loose when the steering head is correctly adjusted, it can be tightened by fitting an additional steel washer (Part No. 35974) beneath the rubber washer.

It is also possible that the steering head cannot be adjusted because the main tube is bottoming in the recess in the fork head in which it fits. In this case the fork crown clamp screws must be loosened, thus permitting the main tubes to slide through the fork crown. Do no forget to tighten the fork head pinch bolts and the fork crown clamp screws after adjusting the steering head.

5. Removal of Facia Panel Fork Head, Spring, etc.

To remove the Facia Panel Fork Head for access to the lamp bracket tubes (or to change the fork spring without disturbing the bearings) proceed as follows - disconnect all control cables at the handlebar end and remove the headlamp from the lamp brackets. The switch panel can conveniently be removed from the back of the lamp so that the body of the lamp can be removed completely.

Now unscrew the two Fork Spring Scroll Bolts from the fork head, unscrew the nuts on the fork head clip bolt and the two main tube clip bolts, remove the three clip bolt sleeves and knock out the three clip bolts. The facia panel fork head can now be tapped gently upwards with a hide mallet or a hammer and a wooden drift but care must be taken to hit only the more solid parts of the fork head, i.e. beneath the handlebar clip and at the back of the main tubes, avoiding the underside of the comparatively thin portion in front of the speedometer.

After removal of the fork head the lamp bracket tubes can be lifted straight off and the springs can be withdrawn from the upper end of the main tubes after unscrewing the oil level plug and the nut which secures the spring stud to the fork end and knocking the spring stud upwards.

6. Removal of Main Tubes

To remove the main tubes first dismantle the fork as described in paragraph 2, then remove the facia panel fork head and lamp bracket tubes as described in paragraph 5. Now loosen the fork crown clamp screws and knock the main tubes out of the fork crown either upwards or downwards as may be most convenient. If the machine has been in an accident and the tube is badly bent both above and below the fork crown, it may be necessary to cut through the tube with a hacksaw before it can be withdrawn.

7. Reassembly of Parts

No difficulty should be experienced with this. When refitting the main tube, use the lamp bracket tube as a guide to its correct position in the fork crown. The small shoulder some 1.1/2 in. from the upper end of the tube should be flush with the top of the lamp bracket tube when the latter is in position on the fork crown. With the main tube in this position, tighten the fork crown clamp screws before fitting the facia panel fork head.

If new oil seals have been fitted it may be found that the action of the fork is very stiff when the gland nuts are tightened down fully. In this case the nuts may be left half a turn or so slack until the seals have freed off, after which they should be tightened down. Note that the seal, must be fitted with the larger bore uppermost, i.e. with the scraping edges facing downwards.

When refitting the three clip bolts, which secure the fork head to the main tubes and steering stem, make sure that the clip bolts and their sleeve, are correctly fitted so that the cut-away portions of them bear against the tubes. Any attempt to tighten the nuts with the bolts or sleeves incorrectly fitted may result in cracking the facia panel fork head.

8. Lubrication

The lubrication of the fork bearings is effected by the oil which forms the hydraulic damping medium. The oil level is fixed by a cross hole in the spring stud leading to a drilled passage terminating in the oil level plug. To fill each fork leg to the correct level remove the plug screws from the fork head and the oil level plugs from the fork end. Pour oil in at the top until it runs out at the bottom of the fork. Wait till oil has stopped running and replace level plugs and plug screws.

Recommended grades of oil are Castrolite, Mobiloil Arctic, Essolube 20, B.P. Energol S.A.E. 20, Shell X-100 20/20 w.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION Kl

Front Wheel

With Dual 6 in. Brake

Fitted to " Meteor 700," 1953 onwards; "500 Twin," "500 Bullet," "350 Bullet," 1955 onwards

1. Removal from Fork

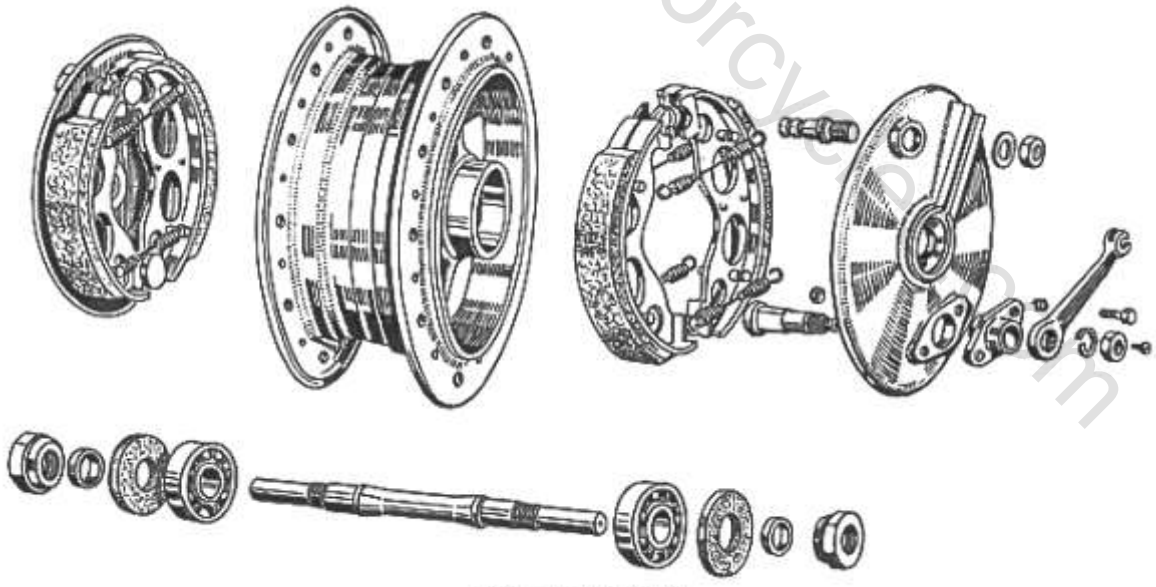
To remove the front wheel from the fork place the machine on the centre stand and front stand, if fitted, or alternatively with sufficient packing (about 2 in.) beneath each side of the stand to lift the wheel clear of the ground when tilted back on to the rear wheel. Slacken brake cable adjustments and disconnect cables from handlebar lever and from operating cam levers on hub. Unscrew the four nuts securing the fork bottom tube lug caps (Part No. 38593) and allow the wheel to drop forwards out of the front fork. Make sure that the machine stands securely on the rear wheel and centre stand - if necessary place a weight on the saddle or a strut beneath the fork to ensure this.

2. Removal of Brake Cover Plate Assemblies

Lock the brake "on" by pressure on the operating lever, 38905 (R.H.) or 38906 (L.H.), and unscrew the cover plate nuts 31347. The right and left hand cover plate assemblies can then be withdrawn from the respective brake drums.

3. Removal of Brake Shoes and Springs

This is best done by unscrewing the pivot pin locknuts, 28715, and the operating lever nuts, 10314, after which the assembly of brake shoes, return springs, pivot pin and operating cam can be removed from the cover plate by light blows with a hammer and drift on the ends of the pivot pin and the operating cam. The return springs, 29236, can then be unhooked from the spring



DUAL FRONT BRAKE
Fig. 1

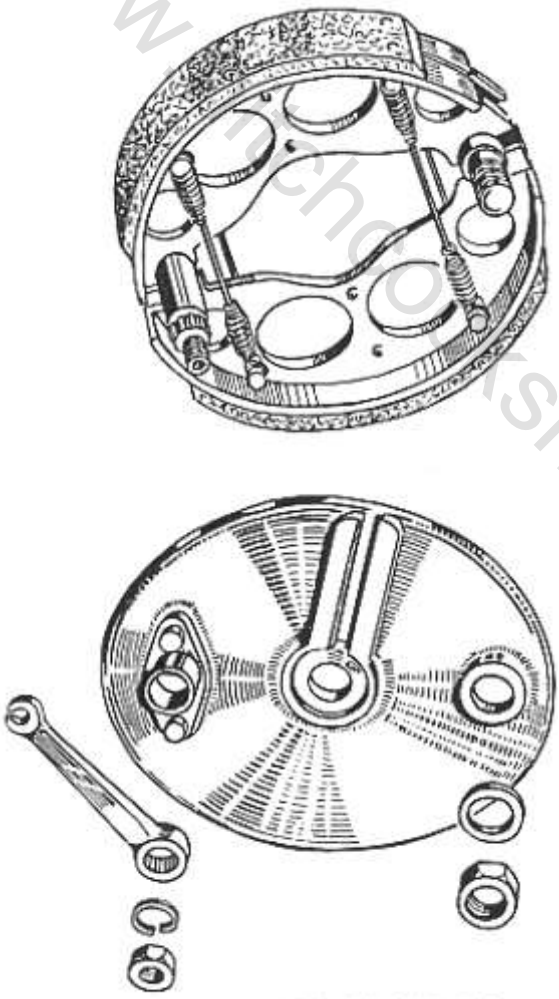
posts in the brake shoes thus allowing the whole assembly to fall apart.

4. Replacing Brake Linings

Brake linings are supplied either in pairs ready drilled complete with rivets (Part No. 37786BX) or ready fitted to service replacement brake shoes (Part No. 38042). When riveting linings to shoes secure the two centre rivets first so as to ensure that the lining lies flat against the shoe. Standard linings are Ferodo MR41, which are drilled to receive cheese headed rivets.

5. Removal of Hub Spindle and Bearings

To remove the hub spindle and bearings having already removed the brake cover plate assemblies, lift out the felt washers, Part No. 21466, and distance pieces, Part No. 30538. Now hit one end of the wheel spindle with a copper hammer or mallet, thus driving it out of the hub bringing one bearing with it and leaving the other in position in the hub. Drive the bearing off the spindle and insert the latter once more in the hub at the end from which it was removed. Now drive the spindle through the hub the other way, when it will bring out the remaining bearing.



REMOVAL OF BRAKE SHOE ASSEMBLY
Fig. 2

6. Hub Bearings

These are deep groove single row journal ball bearings 5/8 in. i/d by 1.9/16 in. o/d by 7/16 in. wide. The Skefko Part No. is RLS5. Equivalent bearings of other makes are Hoffmann LS7, Ransome and Manes LJ5/8 in., Fischer LS7.

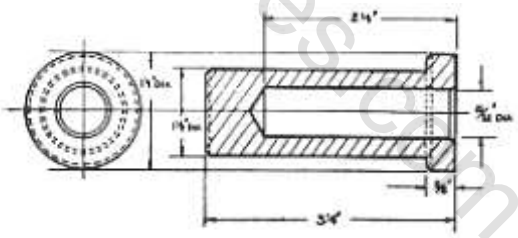
7. Fitting Limits for Bearings

The fit of the bearings in the hub barrel is important. The bearings are locked on the spindle between shoulders and the distance pieces, 30538 which in turn are held up by the cover plate nuts 31347. In order to prevent endways pre-loading of the bearings it is essential that there is a small clearance between the inner edge of the outer race of the bearing and the back of the recess in either end of the hub barrel. To prevent any possibility of sideways movement of the hub barrel on the bearings it is, therefore, necessary for the bearings to be a tight fit in the barrel but this fit must not be so tight as to close down the outer race of the bearing and thus overload the balls. The following are the manufacturing tolerances which control the fit of the bearings. The figures for the bearings themselves are for SKF bearings but other manufacturers tolerances are similar.

Bearing o/d	1.5622/1.5617 in.
Housing bore	1.5620/1.5616 in.
Bearing bore	.6252/.6247 in.
Shaft diameter	.6252/.6248 in.

8. Refitting Ball Bearings

To refit the bearings in the hub, two hollow drifts are required, this is shown in Fig. 3. One



DRIFT FOR REFITTING BEARINGS
Fig. 3

bearing is first fitted to one end of the spindle by means of the hollow drift; the spindle and bearing are then entered into one end of the hub barrel which is then supported on one of the hollow drifts. The other bearing is then threaded over the upper end of the spindle and driven home by means of the second hollow drift either under a press or by means of a hammer which will thus drive both bearings into position simultaneously. In order to make quite sure that there is clearance between the inner faces of the outer bearing races and the bottom of the recesses, fit the distance washers, 30538, and the cover plate nuts, 31347, with either the cover plates themselves or additional packing washers behind the nuts. Tightening the nuts should not have any effect on the ease with which the spindle can be turned. If tightening the nuts makes the spindle hard to turn this may be taken as proof that the bearings are bottoming in the recesses in the hub barrel before they are solid against the shoulders on the spindle. In this case the bearing should be removed and a thin packing shim fitted between the inner race and the shoulder on the spindle.

9. Reassembly of Brake Shoes onto Cover Plates

Assemble each pair of shoes with their return springs on to the pivot pin and operating cam, putting a smear of grease in the grooves of the pivot pin and on the operating faces of the cam. Now fit the assembly into the cover plate, putting a smear of grease on to the cylindrical bearing surface of the operating cam and secure with the pivot pin locknut, 28715, and washer, 17551. Fit the operating lever, 38905 or 38906, on its splines in a position to suit the extent of wear on the linings and secure with the nut, 10314, and washer, 14613. Note that the position of the operating levers may have to be corrected when adjusting the brake after refitting the wheel. The range of adjustment can be extended by moving these levers on to different splines. Limit of wear is reached when the cam is turned through nearly 90° with the brake hard on so that there is a danger that the operating springs cannot return the brake to the off position.

10. Floating Cam Housings

Note that the cam housings, Part No. 26836, are intended to be left free to float. The bolt holes in the cam housings are slotted and the securing pins, Part No. 252, are provided with double coil spring washers beneath their heads to enable them to be tightened sufficiently to prevent the cam housings moving under the influence of road shocks, while at the same time they can be, and should be, left free enough to be capable of being moved by hand in the direction of the slots. The pins, 252 are secured by locknuts, 7916, which are centre punched as an additional precaution.

The leading shoes (i.e. those towards the rear of the machine) have a servo action which render them more effective than the trailing shoes. This servo action causes the linings on the leading shoes to wear more quickly than those on the trailing shoes and at the same time tends to lift the leading shoes off the cams and press the trailing shoes harder on to the cams. With a fixed cam housing the result is that the majority of the cam pressure is applied to the less efficient trailing shoe. By leaving the housing free to float, the cam can follow up the leading shoe thus maintaining equal pressure between the cam and the two shoes and so making full use of the more efficient leading shoe. Owing to the servo action the wear on the leading shoe with a floating cam housing is greater than that of the trailing shoe and in time the limit of float of the cam housing will be reached, after which the brake will continue to function as a fixed cam brake with some loss of efficiency. This can be restored by removing the shoes and fitting them in the opposite positions. Floating cam brakes are self-centering and there is no need to take any special precautions to see that the two linings are of equal thickness or that the brake shoe assembly is centered in the drum.

11. Refitting Brake Cover Plates

After assembling the brake shoe pivot pins and operating cams into the cover plates repack the hub bearings with grease. The recommended greases are Castrolease (Heavy), Mobilgrease (No. 4), Esso Grease, Energrease C3 or Shell Retinax A. These are all medium heavy lime soap or aluminium soap greases. The use of H.M.P. greases which have a soda soap base is not recommended as these tend to be slightly corrosive if any damp finds its way into the hubs.

Before fitting the distance washers and felt washers make sure that the inside of the brake drums are quite clean and free from oil or grease, damp, etc and replace the brake cover plate assemblies. Securely tighten the cover plate nuts, 31347.

12. Wheel Rim

The rim is Type WM2-19 in. plunged and pierced with forty holes for spoke nipples. The spoke holes are symmetrical, i.e. the rim can be assembled to the hub either way round. Rim diameter after building is 19.062 in., tolerances on the circumference of the rim shoulders where the tyre fits being 59.930/59.870 in. The standard steel measuring tape for checking rims is 5/16 in. wide, .011 in. thick and its length is 59.964/ 59.904 in.

13. Spokes

The spokes are of the single butted type 8-10 gauge with 90° countersunk heads, angle of bend 95°-100°, length 6.5/8 in., thread diameter .144 in., 40 threads per inch, thread form British Standard Cycle.

14. Wheel Building and truing

The spokes are laced one over two and the wheel rim must be built central in relation to the nuts which secure the brake cover plates. The rim should be trued as accurately as possible, the maximum permissible runout both sideways and radially being plus or minus 1/32 in.

15. Tyre

The standard tyre is Dunlop 3.25-19 in. ribbed tread.

When removing the tyre always start close to the valve and see that the edge of the cover at the other side of the wheel is pushed down into the well in the rim.

When replacing the tyre fit the part by the valve last, also with the edge of the cover at the other side of the wheel pushed down into the well.

If the correct method of fitting and removal of the tyre is adopted, it will be found that the covers can be manipulated quite easily with the small levers supplied in the toolkit. The use of long levers and/or excessive force is liable to damage the walls of the tyre. After inflation make sure that the tyre is fitting evenly all the way round the rim. A line moulded on the wall of the tyre indicates whether or not the tyre is correctly fitted. If the tyre has a white mark, indicating a balance point, this should be fitted near the valve.

16. Tyre Pressure

The recommended pressure for the front tyre is 181b. per square inch for wheel loads up to 240 lb.

17. Lubrication

Two greasing points are provided both of which lead grease to the centre of the hub barrel. Unless the barrel is packed full with grease on assembly (which is apt to lead to trouble through grease finding its way past the felt seals on to the brake linings) these greasing points are of little value and the best way to grease the bearings is by packing them with grease after dismantling the hub as described above.

Note that the brake cams are drilled for grease passages but the ends of these are stopped up with countersunk screws instead of being fitted with grease nipples. This is done to prevent excessive greasing by over-enthusiastic owners. If the cams are smeared with grease on assembly they should require no further attention but in case of necessity it is possible to remove the screws, fit grease nipples in their place and grease the cams by this means.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION K2

Front Wheel

With Single 6 in. Brake
Fitted to 250 Clipper, Model S, G, J and J2.
Also 350 + 500 Bullet, and 500 Twin up to the end of 1954

1. Removal from Fork

To remove the front wheel from the fork, place the machine on the centre stand (in the case of the spring frame models) with sufficient packing (about 2 in.) beneath each side of the stand to lift the wheel clear of the ground when tilted back on to the rear wheel. In the case of Models S, G and J place the machine on the rear stand and place a suitable box or block beneath the crankcase to lift the front wheel clear of the ground. Slacken the brake cable adjustment and disconnect the cable from the handlebar lever and from the operating cam lever on the hub. Unscrew the four nuts securing the fork bottom tube lug caps (Part No. 38593) and allow the wheel to drop forwards out of the front fork. Make sure that the machine stands securely on the rear wheel and centre stand-if necessary place a weight on the saddle or a strut beneath the fork to ensure this.

2. Removal of Brake Cover Plate Assy.

Lock the brake "on" by pressure on the operating lever and unscrew the cover plate nut. The cover plate assembly can then be withdrawn from the brake drum.

3. Removal of Brake Shoes and Springs

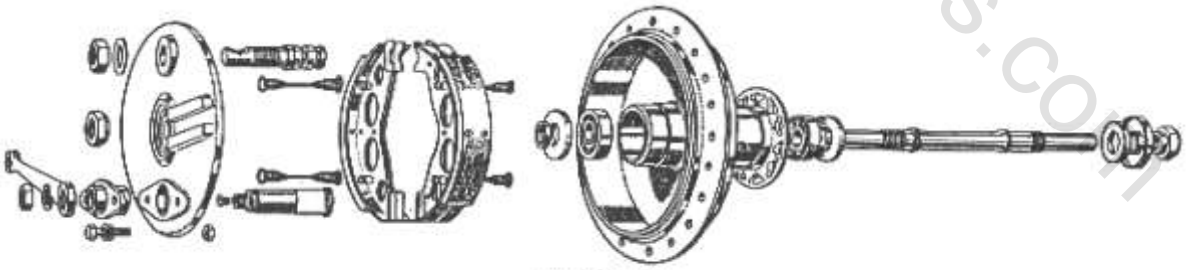
This is best done by unscrewing the pivot pin locknuts and the operating lever nuts after which the assembly of brake shoes, return springs, pivot pin and operating cam can be removed from the cover plate by light blows with a hammer and drift on the ends of the pivot pin and the operating cam. The return springs can then be unhooked from the spring posts in the brake shoes thus allowing the whole assembly to fall apart.

4. Replacing Brake Linings

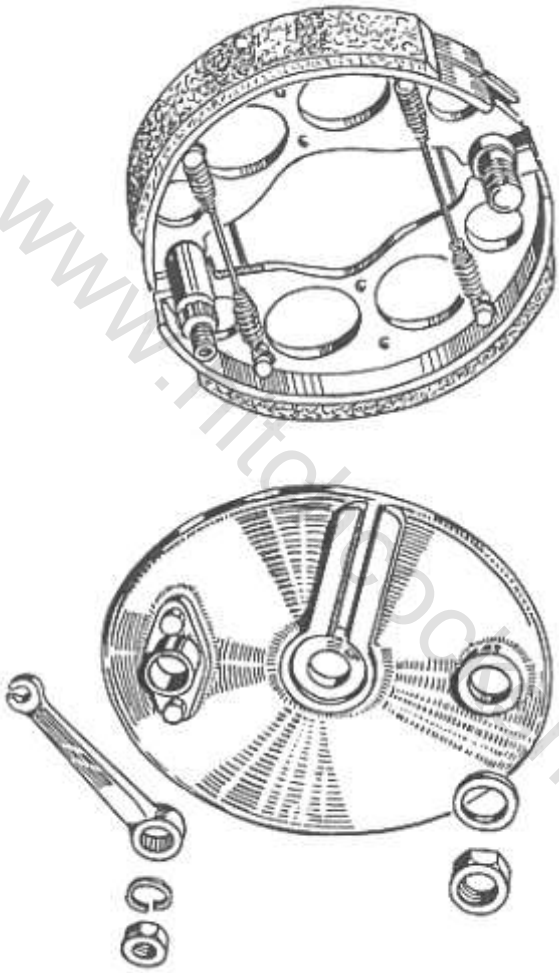
Brake linings are supplied either in pairs ready drilled complete with rivets (Part No. 37786BX) or ready fitted to service replacement brake shoes (Part No. 38042). When riveting linings to shoes secure the two centre rivets first so as to ensure that the lining lies flat against the shoe. Standard linings are Ferodo MR41, which are drilled to receive cheese headed rivets.

5. Removal of Hub Spindle and Bearings

To remove the hub spindle and bearings having first removed the brake cover plate, unscrew the retaining nut and remove the dust excluder from the non-brake side of the hub. Now remove the felt washers and the distance washer from the brake side and hit one end of the spindle with a copper hammer or mallet, thus driving it out of the hub bringing one bearing with it and leaving the other in position in the hub. Drive the bearing off the spindle and insert



FRONT HUB
Fig. 1



REMOVAL OF BRAKE SHOE ASSEMBLY
Fig. 2

the latter once more in the hub at the end from which it was removed. Now drive the spindle through the hub the other way, when it will bring out the remaining bearing.

6. Hub Bearings

These are deep groove single row journal ball bearings, 5/8 in. i/d by 1.9/16 in. o/d by 7/16 in. wide. The Skefko Part No. is RLS5. Equivalent bearings of other makes are Hoffmann LS7, Ransome and Marles LJ5/8 in., Fischer LS7.

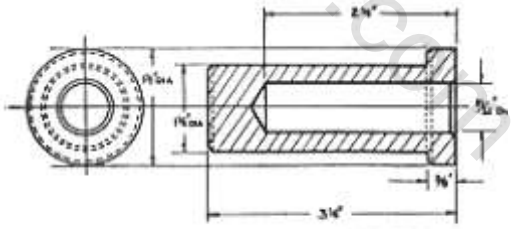
7. Fitting Limits for Bearings

The fit of the bearings in the hub barrel is important. The bearings are locked on the spindle between shoulders and the distance pieces, 30538, which in turn are held up by the nuts on the spindle. In order to prevent endways pre-loading of the bearings it is essential that there is a small clearance between the inner edge of the outer race of the bearing and the back of the recess in either end of the hub barrel. To prevent any possibility of sideways movement of the hub barrel on the bearings it is, therefore, necessary for the bearings to be a tight fit in the barrel but this fit must not be so tight as to close down the outer race of the bearing and thus overload the balls. The following are the manufacturing tolerances which control the fit of the bearings. The figures for the bearings themselves are for SKF bearings but other manufacturers' tolerances are similar.

Bearing o/d	1.5622/1.5617 in.
Housing bore	1.5620/1.5616in.
Bearing bore	.6252/.6247 in.
Shaft diameter	.6252/.6248 in.

8. Refitting Ball Bearings

Note that the two ends of the spindle are not identical. The end with the longer plain portion between the thread and the shoulder is fitted to the brake side of the wheel. To refit the bearings in the hub two hollow drifts are required, as shown in Fig. 3. One bearing is first fitted to one end of the spindle by means of the hollow drift; the spindle and bearing are then entered into one end of the hub barrel which is then supported on one of the hollow drifts. The other bearing is then threaded over the upper end of the spindle and driven home by means of the second hollow drift either under a press, or by means of a hammer, which will thus drive both bearings into position simultaneously. In order to make quite sure that there is clearance between the inner faces of the outer bearing races and the bottom of the recesses, fit the distance washer, cover plate, dust excluder and the



DRIFT FOR REFITTING BEARINGS
Fig. 3

nuts on the spindle. Tightening the nuts should not have any effect on the ease with which the spindle can be turned. If tightening the nuts makes the spindle hard to turn this may be taken as proof that the bearings are bottoming in the recesses in the hub barrel before they are solid against the shoulders on the spindle. In this case the bearing should be removed and a thin packing shim fitted between the inner race and the shoulder on the spindle.

9. Reassembly of Brake Shoes to Cover Plate

Assemble the shoes with their return springs on to the pivot pin and operating cam, putting a smear of grease in the grooves of the pivot pin and on the operating faces of the cam. Now fit the assembly into the cover plate, putting a smear of grease on to the cylindrical bearing surface of the operating cam and secure with the pivot pin locknut and washer. Fit the operating lever on its spline in a position to suit the extent of wear on the linings and secure with the nut and washer. Note that the position of the operating lever may have to be corrected when adjusting the brake after refitting the wheel. The range of adjustment can be extended by moving this lever on to a different spline. Limit of wear is reached when the cam is turned through nearly 90° with the brake hard on so that there is a danger that the operating springs cannot return the brake to the off position.

10. Floating Cam Housing

Note that the cam housing is intended to be left free to float. The bolt holes in the cam housing are slotted and the securing pins are provided with double coil spring washers beneath their heads to enable them to be tightened sufficiently to prevent the cam housing moving under the influence of road shocks, while at the same time it can be, and should be, left free enough to be capable of being moved by hand in the direction of the slots. The pins are secured by locknuts which are centre punched as an additional precaution.

The leading shoe (i.e. the one towards the rear of the machine) has a servo action which renders it more effective than the trailing shoe. This servo action causes the lining on the leading shoe to wear more quickly than that on the trailing shoe and at the same time tends to lift the leading shoe off the cam and press the trailing shoe harder on to the cam. With a fixed cam housing the result is that the majority of the cam pressure is applied to the less efficient trailing shoe. By leaving the housing free to float the cam can follow up the leading shoe thus maintaining equal pressure between the cam and the two shoes and so making full use of the more efficient leading shoe. Owing to the servo action the wear on the leading shoe with a floating cam housing is greater than that of the trailing shoe and in time the limit of float of the cam housing will be reached, after which the brake will continue to function as a fixed cam brake with some loss of efficiency. This can be restored by removing the shoes and fitting them in the opposite positions. Floating cam brakes are self-centering and there is no need to take any special precautions to see that the two linings are of equal thickness, or that the brake shoe assembly is centered in the drum.

11. Refitting Brake Cover Plate

After assembling the brake shoe pivot pin and operating cam into the cover plate repack the hub bearings with grease. The recommended greases are Castrolease (Heavy), Mobilgrease (No. 4), Esso Grease, Energrease C3 or Shell Retinax A. These are all medium heavy lime soap or aluminium soap greases. The use of H.M.P. greases which have a soda soap base is not recommended as these tend to be slightly corrosive if any damp finds its way in to the hubs.

Before fitting the distance washer and felt washer make sure that the inside of the brake drum is quite clean and free from oil or grease, damp, etc. and replace the brake cover plate assembly. Securely tighten the cover plate nut.

12. Wheel Rims

The rim used on the 250 Clipper and Model "S" is type WM1-19 in., internal width 1.60 in. The rim used on the other models is type WM2-19 in., internal width 1.580in.

The rim diameter after building is the same in each case, i.e. 19.062 in., the tolerances on the circumference of the rim shoulders where the tyre fits being 59.930/59.870 in. The standard steel measuring tape for checking rims is 5/16 in. wide, .011 in. thick and its length is 59.964/59.904 in. All rims are pierced with forty holes for spoke nipples.

Note that two makes of rim are used "Dunlop" and "Palmer Jointless." These differ in the positions of the pierced spoke holes. The Dunlop rims have a group of three holes on one side of the centre line, then a single hole on the other side, a further group of three and a single hole and so on. Palmer rims have the holes alternately spaced either side of the centre line. Both rims are interchangeable and both use the same length spokes but the method of lacing the wheel is different (see Subsection 14). Neither types of the wheel rim are symmetrical and care must be

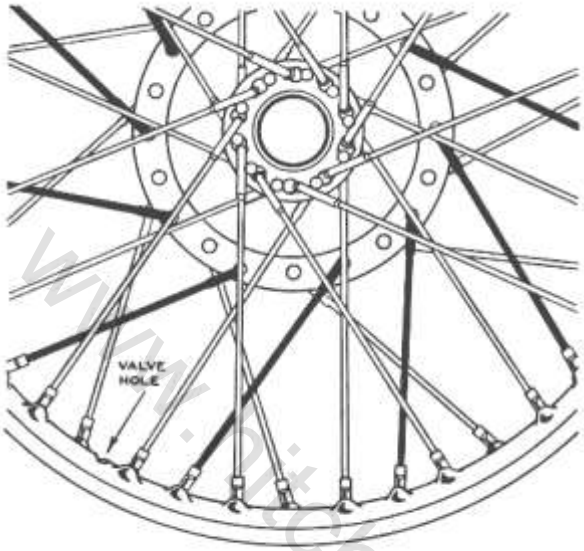


Fig. 4A Dunlop Rim

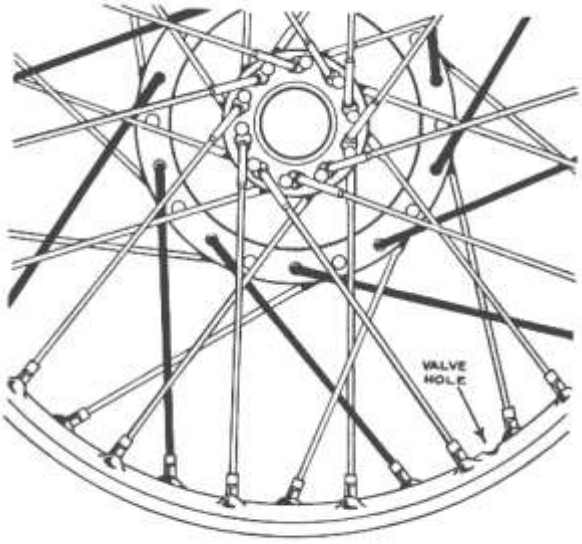


Fig. 4B Palmer Rim

WHEEL LACING

taken that they are built the right way round into the wheel.

13. Spokes

The spokes are of the single butted type 8-10 gauge with 90° countersunk heads, angle of bend 95°-100°, length 6.5/8 in. brake drum side, 8.1/2 in. spoke flange side, thread diameter .144 in., 40 threads per inch, thread form British Standard Cycle.

14. Wheel Building and Truing

The spokes are laced one over two on the brake side and one over three on the spoke flange side of the wheel. The wheel must be built central in relation to the faces of the nuts on the spindle. The rim should be trued as accurately as possible, the maximum permissible run-out both sideways and radially being plus or minus 1/32 in.

Figs. 4A and 4B show the difference between the lacing when using Dunlop and Palmer rims. The key to correct lacing is the inside spokes to the large flange on the brake drum side which must slope in the direction shown in Fig. 4. With the Dunlop rim this spoke goes to the middle hole of one of the groups of three (see Subsection 12) and the rim must be built into the wheel so that these groups of three holes are on the right of the centre line when the brake drum is on the left, i.e. the inside spokes to the large flange cross from the left to the right of the centre line.

With the Palmer rim the spokes from the large flange on the brake drum side go to the more steeply angled holes in the rim which must be on the left of the centre line when the brake drum is on the left, i.e. none of the spokes crosses from left to right of the centre line.

15. Tyres

Standard tyres on the "250 Clipper" and "Model S" are Dunlop 3.00-19 in. Lightweight Reinforced and on the other models Dunlop 3.25-19 in. Ribbed.

When removing the tyre always start close to the valve and see that the edge of the cover at the other side of the wheel is pushed down into the well in the rim.

When replacing the tyre fit the part by the valve last, also with the edge of the cover at the other side of the wheel pushed down into the well.

If the correct method of fitting and removal of the tyre is adopted it will be found that the tyres can be manipulated quite easily with the small levers supplied in the toolkit. The use of long levers and/or excessive force is liable to damage the walls of the tyre. After inflation make sure that the tyre is fitting evenly all the way round the rim. A line moulded on the wall of the tyre indicates whether or not the tyre is correctly fitted. If the tyre has a white mark, indicating a balance point, this should be fitted near the valve.

16. Tyre Pressures

The load which the tyre will carry at different inflation pressures is shown below :

Tyre Section Inches	Inflation Pressure—lb. per sq. in.		
	18	20	24
	Load per tyre—lb.		
3·00	180	200	240
3·25	240	280	300

17. Lubrication

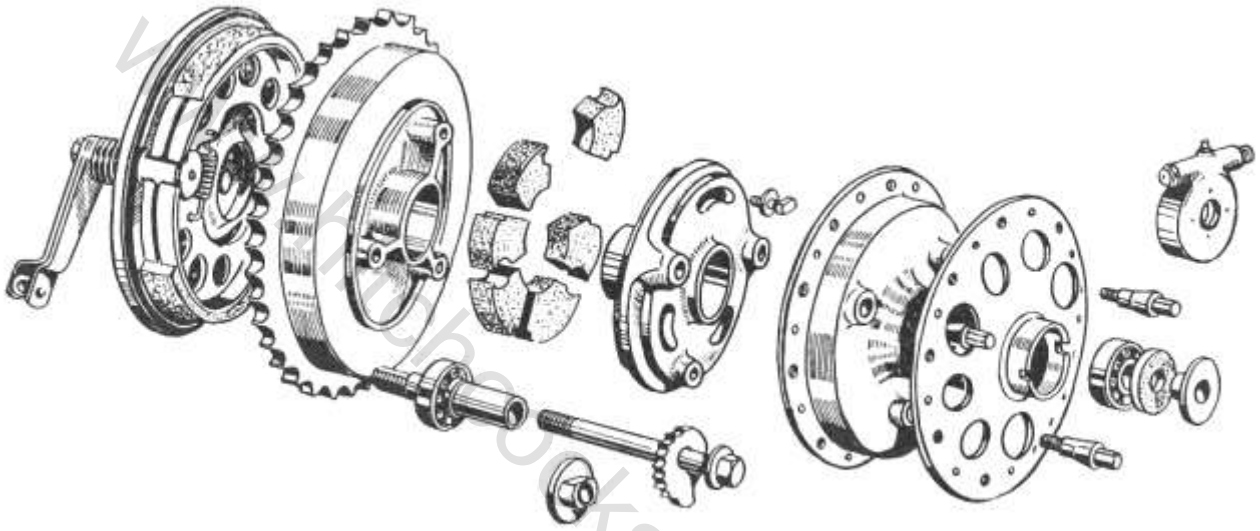
A greasing point is provided in the centre of the hub barrel. Unless the barrel is packed full with grease on assembly (which is apt to lead to trouble through grease finding its way past the felt seals on to the brake linings) this greasing point is of little value and the best way to grease the bearings is by packing them with grease after dismantling the hub as described above.

Note that the brake cam is drilled for a grease passage but the end of this is stopped up with a countersunk screw instead of being fitted with a grease nipple. This is done to prevent excessive greasing by over-enthusiastic owners. If the cam is smeared with grease on assembly it should require no further attention but in case of necessity it is possible to remove the screw, fit a grease nipple in its place and grease the cam by this means.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION L1

Rear Wheel (Detachable Type)



DETACHABLE REAR WHEEL
Fig. 1

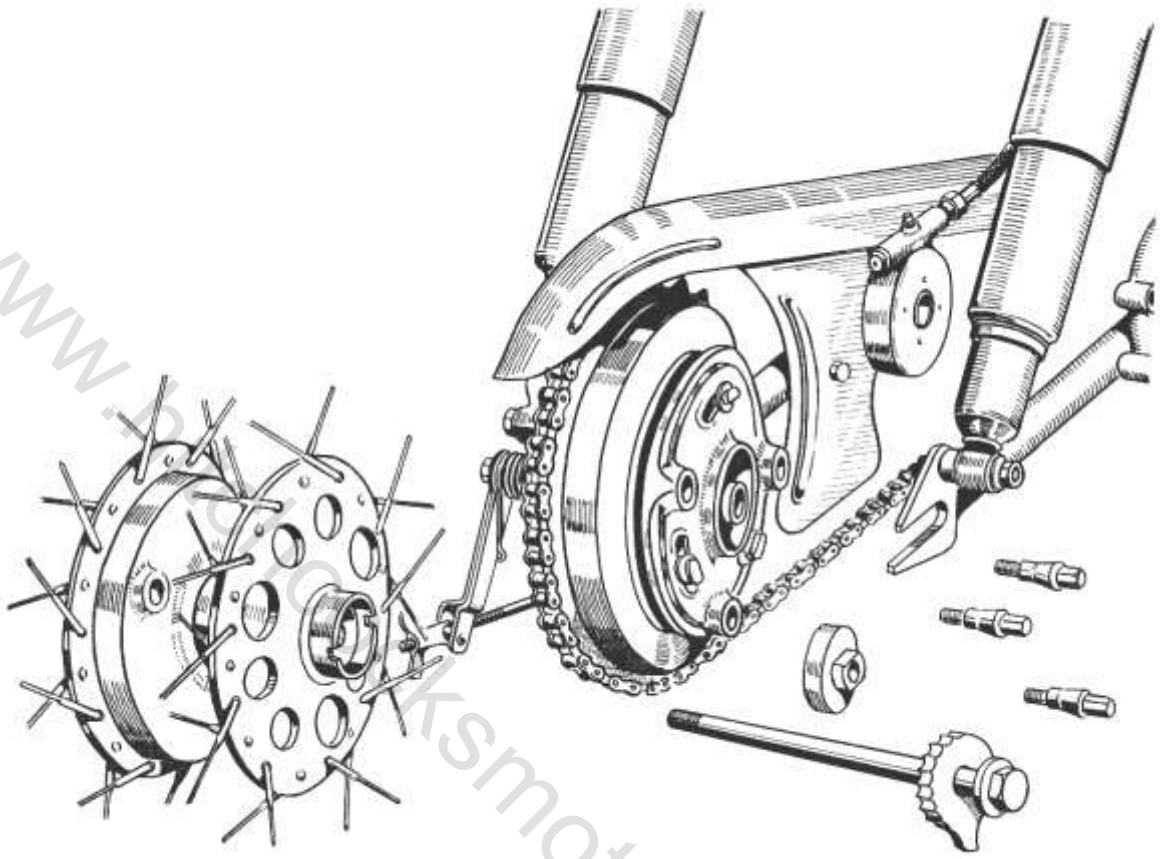
1. Description

This wheel is of the "detachable" type which enables the main portion of the wheel to be removed from the machine without disturbing the chain or brake. The wheel incorporates the well known Enfield cush drive and also a 7 in. internal expanding brake.

2. Removal and Replacement of Main Portion of Wheel for Tyre Repairs, etc.

Place the machine on the centre stand, if necessary putting packing pieces beneath the legs of the stand to lift the wheel clear of the ground. Remove the dual seat (if fitted) and the detachable portion of the rear mudguard. Unscrew the three attachment bolts, 39316. Unscrew the loose section of the spindle, 39336, and withdraw this together with the chain adjuster cam, 36649, preferably marking this to ensure that it is replaced in the same position. Now slide the distance collar, 39323, out of the fork end and lift away the speedometer drive gearbox which can be left attached to the driving cable. The spacing collar, 39321, and the felt washer behind it may now be removed to prevent risk of them falling out when manipulating the tyre. If, however, these are too tight a fit in the hub to come out easily they may be left in place. The main body of the wheel can now be pulled across to the right hand side of the machine, thus disengaging it from the fixed section of the hub barrel and the cush drive shell and enabling the wheel to be lifted out of the machine.

When replacing the main portion of the wheel reverse the foregoing procedure, locating the wheel by the loose section of the spindle with the speedometer drive gearbox and distance collar in position before replacing the three attachment bolts, 39316. The cush drive shell can be prevented from rotating when turning the wheel to line up the holes for the attachment bolts if the machine is placed in gear or the rear brake is operated. When replacing the speedometer drive gearbox care must be taken to ensure that the driving dogs inside the gearbox engage with the slots in the end of the hub barrel. Before tightening the centre spindle make sure that the speedometer drive gearbox is correctly positioned so that there is no sharp bend in the driving cable.



REMOVAL OF MAIN PORTION OF WHEEL
Fig. 2

3. Removal and Replacement of Complete Wheel for Access to Brake

Place the machine on the centre stand and remove the dual seat (if fitted) and detachable portion of the rear mudguard as if for removal of the main portion of the wheel only. Disconnect the rear driving chain at the spring link and remove the chain from the rear wheel sprocket leaving it in position on the gearbox countershaft sprocket. Unscrew the rear brake rod adjusting nut completely and depress the brake pedal so as to disengage the rod from the trunnion in the brake operating lever. Unscrew the brake cover plate anchor nut, 7598, and remove this together with the washer behind it. Unscrew the loose section of the spindle, 39336, two or three turns and the spindle nut, 36651, by a similar amount. Mark the chain adjuster cams to ensure replacing in the same position.* Disconnect the speedometer driving cable and slide the wheel out of the fork ends, tilting it so as to disengage the end of the brake shoe pivot pin from the slot in the fork end.

When replacing the wheel make sure that the dogs on the gear in the speedometer drive gearbox are engaged with the slots in the end of the hub barrel. Make sure also that the speedometer drive gearbox is correctly positioned so that there is no sudden bend in the driving cable. When replacing the

* Note that the wheel is not necessarily correctly lined up when the same notch position is used on both adjuster cams. Once the position of the cams which gives correct alignment has been found this alignment will, however, be maintained if both cams are moved the same number of notches.

connecting link in the driving chain make sure that the closed end of the spring link points in the direction of travel of the chain. Replace the chain adjuster cams in their original positions or, if necessary, turn each of them the same number of notches to tension the chain and maintain correct wheel alignment. Do not forget to refit the brake rod and adjust the brake so that the wheel turns freely when the brake is off, while at the same time only a small travel of the brake pedal is necessary to put the brake on.

4. Removal of Brake Shoes for Replacement Fitting New Linings, etc.

Remove the complete wheel as described above, then remove the spindle nut, 36651, chain adjuster and the distance collar, 39315, thus permitting the complete brake cover plate with operating cam, pivot pin, shoes and return springs to be lifted off the hub spindle. The brake shoes can then be removed after detaching the return springs.

5. Replacing Brake Linings

Brake linings are supplied either in pairs ready drilled complete with rivets, 37787BX, or ready fitted to service replacement brake shoes, 38043. When riveting linings to shoes secure the two centre rivets first so as to ensure that the lining lies flat against the shoe. Standard linings are Ferodo MR41 which are drilled to receive cheese headed rivets.

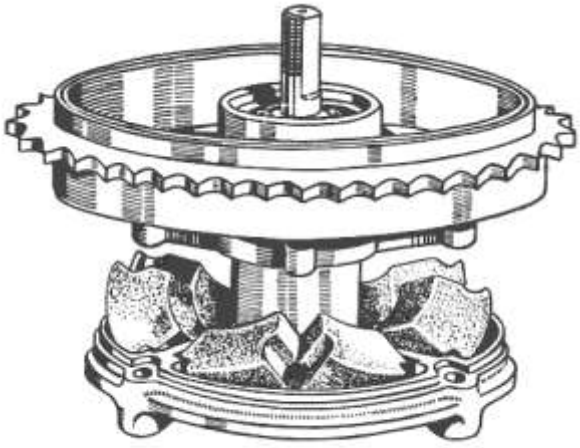
6. Removal of Brake Operating Cam and Brake Shoe Pivot Pin

The pivot pin is threaded into the torque plate, from which it can be unscrewed after removing the locknut 39351. (Note the Part Number of the torque plate only is 36527 while the thin pressed steel cover plate is 36526. These two are riveted together and supplied as one unit Part Number 32525).

To remove the operating cam unscrew the nut, 10314, which secures the operating lever to the splines on the cam. A sharp tap on the end of the cam spindle will now free the lever after which the cam can be withdrawn from its housing.

7. Cush Drive

The sprocket/brake drum, 39301, is free to rotate on the hub barrel. Three radial vanes are formed on the back of the brake drum and three similar vanes are formed on the cush drive shell, 39302. Six rubber blocks are fitted between the vanes on the brake drum and those on the cush drive shell, thus permitting only a small amount of angular movement of the sprocket/brake drum relative to the hub barrel and transmitting



RE-ASSEMBLY OF CUSH DRIVE
Fig. 3

both driving and braking torques and smoothing out harshness and irregularity in the former.

If the cush drive rubbers become worn so that the amount of free movement measured at the tyre exceeds 1/2 in. to 1 in., the rubbers should be replaced. To obtain access to them remove the complete wheel as described above, then unscrew the loose section of the spindle, 39336, completely and also the three attachment bolts, 39316. The main portion of the wheel can then be lifted away from the assembly consisting of the fixed section of the hub barrel, fixed portion of the spindle, sprocket/brake drum complete with brake and the cush drive shell. Now remove the brake cover plate complete with brake shoes as described above, thus giving access to the three cush drive ring locking pins, 8718. Unscrew these and then unscrew the cush drive pins, 39310, thus enabling the sprocket/brake drum to be separated from the cush drive shell, after which the six cush drive rubbers can be lifted out.

When reassembling the cush drive the entry of the vanes between the rubbers will be facilitated if the latter are fitted into the driving shell first and then tilted. The rubbers should be liberally painted with soapsuds to facilitate entry of the vanes. The three cush drive pins, 39310, should be tightened as far as possible and then slackened back half to one turn to enable the locking pins, 8718, to be fitted.

When reassembling the cush drive, coat the inside of the bore of the sprocket/brake drum liberally with grease where it fits over the hub barrel. Put grease also behind the washers on the three cush drive pins, 39310.

8. Removal of Ball Bearings

To remove the ball bearings take the complete wheel out of the machine and separate the main portion of the wheel from the sprocket/brake drum cush drive shell assembly as described above. To remove the bearing from the fixed section of the hub barrel first remove the brake cover plate complete with brake shoe assembly; then remove the felt washer, 9484, and distance collar, 11203. Now screw the loose section of the spindle into the fixed section and drive out the bearing by hitting the hexagon headed end of the loose section of the spindle.

To remove the bearing from the loose half of the hub barrel first lift away the distance collar, 39323, speedometer drive gearbox, the spacing collar, 39321, and the felt washer, 9484. Now enter the loose section of the spindle into the distance tube, 39312, from the driving sprocket end and drive out the distance tube with the two distance tube washers, 39313, and the bearing by means of a hammer and drift applied to the hexagon headed end of the loose section of the spindle.

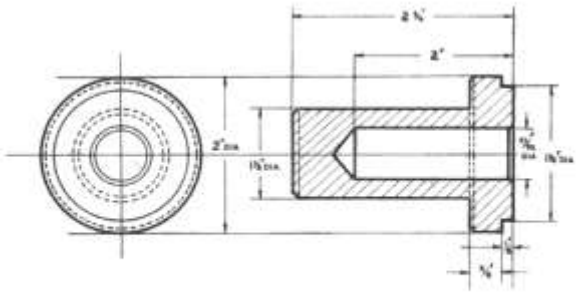
9. Hub Bearings

These are deep groove single row journal ball bearings 5/8 in. i/d by 1.13/16 o/d by 5/8 in. wide. The Skefko Part Number is RMS5. Equivalent bearings of other makes are Hoffmann MS7, Ransome and Marles MJ5/8 in., Fischer MS7.

10. Fitting Limits for Bearings

The fit of the bearings in the hub barrel is important. The bearings are locked on to the spindle by the various distance pieces. In order to prevent endways pre-loading of the bearings, it is essential that, when everything is locked up, there is a small clearance between the inner edge of the outer race of the bearing and the back of the recess in each half of the hub barrel. To prevent any possibility of sideways movement of the hub barrel on the bearings it is, therefore, necessary for the bearings to be a tight fit in the barrel but this fit must not be so tight as to close down the outer race of the bearing and thus overload the balls. The following are the manufacturing tolerances which control the fit of the bearings. The figures for the bearings themselves are for SKF bearings, but other manufacturers' tolerances are similar.

Bearing o/d	1.8122/1.8117 in.
Housing bore	1.8115/1.8110in.
Bearing bore	.6252/.6247 in.
Shaft diameter (Loose side)	.624/.622 in.
Shaft diameter (Fixed side)	.6252/-6248 in.



DRIFT FOR REFITTING BEARING (FIXED SECTION)

Fig. 4

11. Refitting Ball Bearings

In order to prevent the possibility of endways pre-loading of the bearings the following procedure should be followed carefully when fitting new bearings or refitting old ones

(a) The bearing in the fixed section of the hub barrel should be fitted first together with the fixed section of the spindle using a special drift, as shown in Fig. 4, preferably under a press, if necessary using light hammer blows. This drift prevents the bearing being pushed right down to the bottom of its recess.

(b) The bearing in the loose half of the barrel is pressed in using either the drift part of E.4823, or a suitable piece of tube 1.3/4 in. diameter with the end ground square so as to put pressure on the outer race of the bearing only. This bearing should be pressed or knocked only about half way into its recess at the present stage.

(c) The two parts of the wheel are put together and the three attachment bolts, 39316, are fitted and tightened.

(d) The bearing in the loose half of the barrel is now driven home by means of the same drift until further movement is prevented by the inner face of the inner race coming against the end of the distance tube, 39312.

As a check that the bearings are fitted correctly the loose section of the spindle and the spindle nut, 36651, can be fitted with suitable distance pieces beneath them so that, when the spindle and spindle nut are tightened, pressure is put on to the inner races of the bearings. When tightened solid the spindle should still be quite free to turn with the fingers. If the spindle is free before the nuts are tightened but not free afterwards, it is evident that there is end load on the bearings due to the bearing in the loose half of the hub not having been fitted deep enough in its recess. In this case the outer race should be tapped home with a tubular drift.

12. Reassembly of Brake Shoes, Pivot Pin and Operating Cam into Cover Plate

No difficulty should be experienced in carrying out these operations. Make sure that the pivot pin is really tight in the cover plate and put a smear of grease in the grooves of the pivot pin and on the operating face of the cam; also on to the cylindrical bearing surface of the operating cam if this has been removed. Fit the operating lever and trunnion, 23371, on its splines in a position to suit the extent of wear on the linings and secure with the nut. The range of adjustment can be extended by moving the lever on to a different spline.

13. Centering Cam Housing

Note that the bolt holes in the cam housing, 26347, are slotted, thus enabling the brake shoe assembly to be centered in the drum. It is not intended that on rear brakes the cam housing should be left free to float but the shoes should be centered by leaving the screws, 26309 and 35140, just short of dead tight. The brake cover plate assembly with the shoes should then be fitted over the spindle into the brake drum and the brake applied as hard as possible by means of the operating lever. This will centre the shoes in the drum. The screws should then be tightened dead tight and secured with the locknuts. If the shoes are not correctly centered the brake will be either ineffective or too fierce, depending on whether the trailing or leading shoe first makes contact with the drum. With the brake assembly correctly centered and the screws securing the cam housing correctly tightened wear on both linings should be approximately equal.

14. Final Reassembly of Hub before Replacing Wheel

Before replacing the felt washers which form the grease seals, pack both bearings with grease. Recommended greases are Castrolease (Heavy), Mobilgrease (No. 4), Esso Grease, Energrease C3 or Shell Retinax A. These are all medium heavy lime soap or aluminium soap greases. The use of H.M.P. greases which have a soda soap base is not recommended as these tend to be slightly corrosive if any damp finds its way into the hubs.

Make sure that the inside of the brake drum is quite free from oil or grease, damp, etc. Replace the felt washers, distance collars, the brake cover plate assembly, speedometer drive gearbox, distance collars, 39315 and 39323, chain adjuster cams, the loose section of the spindle and the spindle nut 36651. The wheel is then ready for reassembly into the machine.

15. Wheel Rim

The wheel rim is type WM2-19 in. plunged and pierced with forty holes for spoke nipples. The spoke holes are symmetrical, i.e. the rim can be assembled to the hub either way round. The rim diameter after building is 19.062 in., the tolerances on the circumference of the rim shoulders where the tyre fits being 59.930/59.870 in. The standard steel measuring tape for checking rims is 5/16 in. wide, .011 in. thick and its length is 59.964/ 59.904 in.

16. Spokes

The spokes are of the single butted type 8-10 gauge with 90° countersunk heads, angle of bend 95°-100°, length 6.5/8 in., thread diameter .144 in., 40 threads per inch, thread form British Standard Cycle.

17. Wheel Building and Truing

The spokes are laced one over two and the wheel rim must be built central in relation to the outer faces of the distance collars 39315 and 39323. The rim should be trued as accurately as possible, the maximum permissible run-out both sideways and radially being plus or minus 1/32 in.

18. Tyre

The standard tyre is Dunlop 3.50-19 in. Universal tread.

When removing the tyre always start close to the valve and see that the edge of the cover at the other side of the wheel is pushed down into the well in the rim.

When replacing the tyre fit the part by the valve last, also with the edge of the cover at the other side of the wheel pushed down into the well.

If the correct method of fitting and removal of the tyre is adopted it will be found that the covers can be manipulated quite easily with the small levers supplied in the toolkit. The use of long levers and/or excessive force is liable to damage the walls of the tyre. After inflation make sure that the tyre is fitting evenly all the way round the rim. A line moulded on the wall of the tyre indicates whether or not the tyre is correctly fitted. If the tyre has a white mark indicating a balance point, this should be fitted near the valve.

19. Tyre Pressures

The recommended pressures for the rear tyre are 16 lb. per square inch for wheel loads not

exceeding 280 lb, 18 lb per square inch for loads up to 320 lb., 20 lb. per square inch for loads up to 350 lb., 24 lb. per square inch for loads up to 400 lb., 28 lb. per square inch up to 450 lb. and 32 lb. per square inch up to 500 lb.

20. Lubrication

A greasing point is provided in the centre of the hub barrel. Unless the barrel is packed full with grease on assembly (which is apt to lead to trouble through grease finding its way past the felt seals on to the brake linings) this greasing point is of little value and the best way to grease the bearings is by packing them with grease after dismantling the hub as described above.

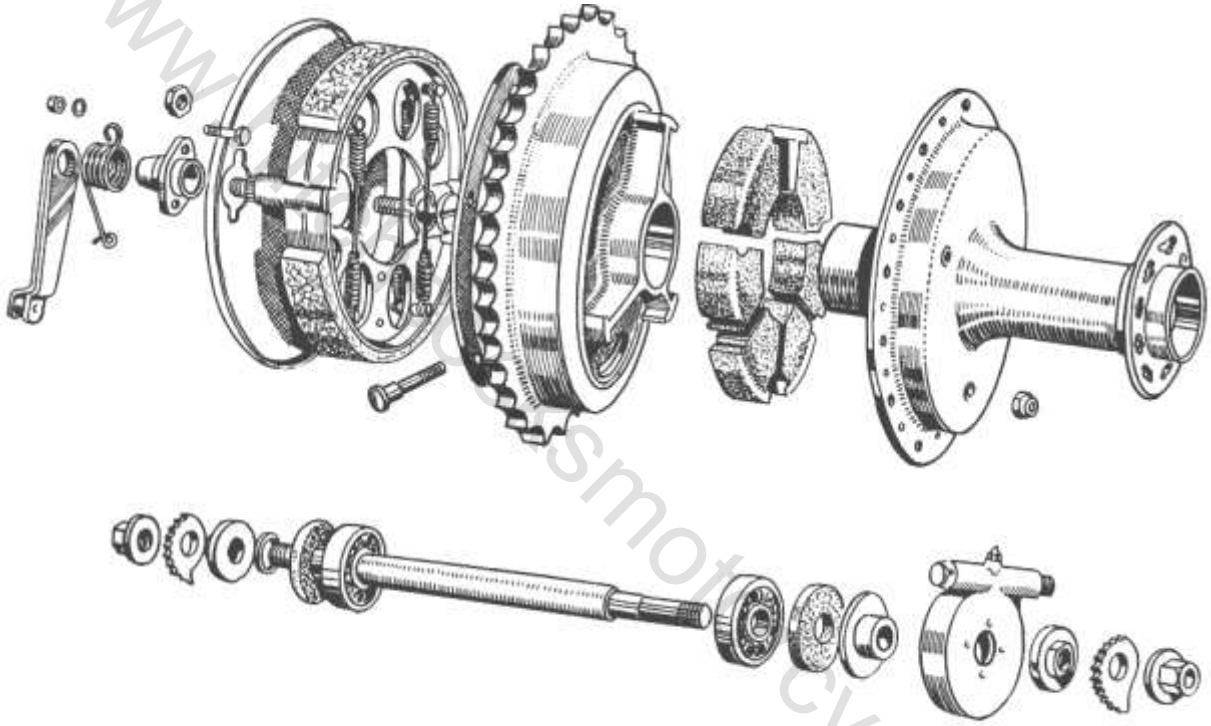
Note that the brake cam is drilled for a grease passage but the end of this is stopped up with a countersunk screw instead of being fitted with a grease nipple. This is done to prevent excessive greasing by over-enthusiastic owners. If the cam is smeared with grease on assembly it should require no further attention but in case of necessity it is possible to remove the screw, fit a grease nipple in its place and grease the cam by this means.

ROYAL ENFIELD WORKSHOP MANUAL

SECTION L2

Rear Wheel (Non-Detachable Type)

Part No. **36788 for " 500** Twin" and " 350 Bullet"; Part No. **37278** for "Meteor **700"** and " 500 Bullet."



REAR HUB
Fig. 1

1. Description

These instructions cover the servicing of two different rear wheels, both of the non-detachable type incorporating a rubber cush drive and an internal expanding brake. Both types have a solid spindle and give a 3 in. chain line.

The heavier type used on the Meteor 700 and 500 Bullet has a 7 in. diameter brake drum while the lighter type used on the 500 Twin and 350 Bullet has a 6 in. diameter brake.

2. Removal and Replacement of Wheel

Place machine on the centre stand, if necessary putting packing pieces beneath the legs of the stand to lift the wheel clear of the ground. Remove the dual seat, if fitted, and the detachable portion of the rear mudguard. Disconnect the rear driving chain at the spring link and remove the chain from the rear wheel sprocket, leaving it in position on the gearbox countershaft sprocket. Unscrew the rear brake rod adjusting nut completely and depress the brake pedal so as to disengage the rod from the trunnion in the brake operating lever. Unscrew the brake cover plate anchor nut and remove this together with the washer behind it. Disconnect the speedometer driving cable, loosen the spindle nuts and mark the chain adjuster cams to ensure replacing in the same position. Slide

the wheel out of the fork ends, tilting it so as to disengage the end of the brake shoe pivot pin from the slot in the fork end.

When replacing the wheel make sure that the dogs on the speedometer drive gearbox are engaged with the slots in the end of the hub barrel. Make sure also that the speedometer drive gearbox is correctly positioned so that there is no sudden bend in the driving cable. Make sure that the closed end of the spring link points in the direction of travel of the chain. Replace the chain adjuster cams in their original positions or, if necessary, turn each of them the same number of notches to tension the chain and maintain correct wheel alignment. Do not forget to refit the brake rod and adjust the brake so that the wheel turns freely while the brake is off, while at the same time only a small travel of the brake pedal is necessary to put the brake on.

3. Removal of Brake Shoes for Replacement, Fitting New Linings, etc.

Remove the complete wheel as described above, then remove the left hand spindle nut, chain adjuster and distance collar, thus permitting the complete brake cover plate with operating cam, pivot pin, shoes and return springs to be lifted off the hub spindle.

In the case of the 7 in. brake fitted to the "Meteor 700" and "500 Bullet" models, the brake shoes can then be removed, after detaching the return springs.

In the case of the 6 in. brake fitted to the "500 Twin" and "350 Bullet" Models, unscrew the pivot pin locknut and the operating lever nut, after which the assembly of the brake shoes, return springs, pivot pin and operating cam can be removed from the cover plate by unscrewing the pivot pin and applying light blows with a hammer and drift on the end of the operating cam. The return springs can then be unhooked from the spring posts in the brake shoes, thus allowing the whole assembly to fall apart.

4. Replacing Brake Linings

Brake linings are supplied either in pairs ready drilled complete with rivets, Part No. 37786BX (6 in. shoes) or 37787BX (7 in. shoes), or ready fitted to service replacement brake shoes, Part No. 38042 (6 in. shoes) or 38043 (7 in. shoes). When riveting linings to shoes secure the two centre rivets first so as to ensure that the lining lies flat against the shoe. Standard linings are Ferodo MR41 which are drilled to receive cheese headed rivets.

5. Removal of Hub Spindle and Bearings

To remove the hub spindle and bearings, having already removed the brake cover plate assembly and speedometer drive gearbox, lift out the felt washers and distance pieces then hit one end of the spindle with a copper hammer or mallet thus driving it out of the hub, bringing one bearing with it and leaving the other in position in the hub. Drive the bearing off the spindle and insert the latter once more in the hub at the end from which it was removed. Now drive the spindle through the hub in the opposite direction, when it will bring out the remaining bearing.

6. Hub Bearings

These are deep groove single row journal ball bearings. The lighter bearings used in the "350 Bullet" and "500 Twin" hubs are 5/8 in. i/d by 1.9/16 in. o/d by 7/16 in. wide. The Skefko Part No. is RLS5. Equivalent bearings of other makes are Hoffmann LS7, Ransome and Marles LJ 5/8 in., Fischer LS7.

The heavier bearings used in the "Meteor 700" and "500 Bullet" Models are 5/8 in. i/d by 1.13/16 in. o/d by 5/8 in. wide. The Skefko Part No. is RMS5. Equivalent bearings of other makes are Hoffmann MS7, Ransome and Marles MJ5/8 in., Fischer MS7.

7. Fitting Limits for Bearings

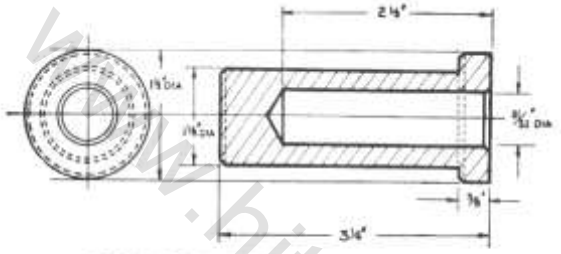
The fit of the bearings in the hub barrel is important. The bearings are locked on the spindle between shoulders and the distance pieces, which in turn are held up by the cover plate nuts. In order to prevent endways pre-loading of the bearings it is essential that there is a small clearance between the inner edge of the outer race of the bearing and the back of the recess in either end of the hub barrel. To prevent any possibility of sideways movement of the hub barrel on the bearings it is, therefore, necessary for the bearings to be a tight fit in the barrel but this fit must not be so tight as to close down the outer race of the bearing and thus overload the balls. The following are the manufacturing tolerances which control the fit of the bearings. The figures for the bearings themselves are for SKF bearings but other manufacturers' tolerances are similar.

	"350 Bullet" and "500 Twin"	**"Meteor 700" and "500 Bullet"**
Bearing o/d	1.5622/1 5617 in.	1 8122/1 8117 in.
Housing bore	1.5620/1.5615 in.	1.8115/1.8110in.
Bearing bore	.6252/.6247 in.	.6252/.6247 in.
Shaft diameter	.6252/.6248 in.	.6252/.6248 in.

8. Refitting Ball Bearings

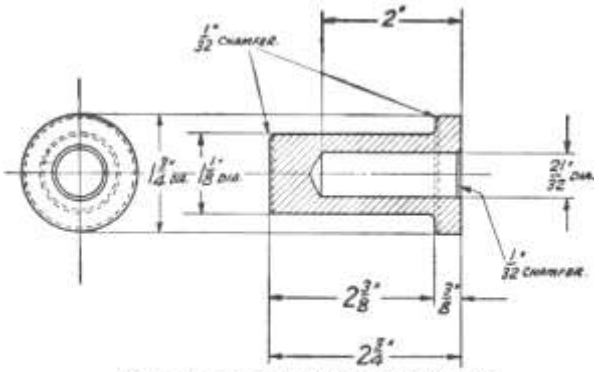
To refit the bearings in the hub two hollow drifts are required, as shown in Figs. 2 and 3. One bearing is first fitted to one end of the spindle by means of the hollow drift; the spindle and bearing are then

entered into one end of the hub barrel which is then supported on one of the hollow drifts. The other bearing is then threaded over the upper end of the spindle and driven home by means of the second hollow drift either under a press or by means of a hammer which will thus drive both bearings into position simultaneously.



DRIFT FOR REFITTING BEARINGS
"350 Bullet" "500 Twin"
Fig. 2

In order to make quite sure that there is clearance between the inner faces of the outer bearings and the bottom of the recesses fit the distance washers against the inner races of the bearings and either fit the assembly of brake cover plate, speedometer gearbox, etc., or make up this distance with tubular distance pieces. Fit and tighten the spindle nuts. Tightening the



DRIFT FOR REFITTING BEARINGS
"Meteor 700" "500 Bullet"
Fig. 3

nuts should not have any effect on the ease with which the spindle can be turned. If tightening the nuts makes the spindle hard to turn this may be taken as proof that the bearings are bottoming in the recesses in the hub barrel before they are solid against the shoulders on the spindle. In this case the bearing should be removed and a thin packing shim fitted between the inner race and the shoulder on the spindle.

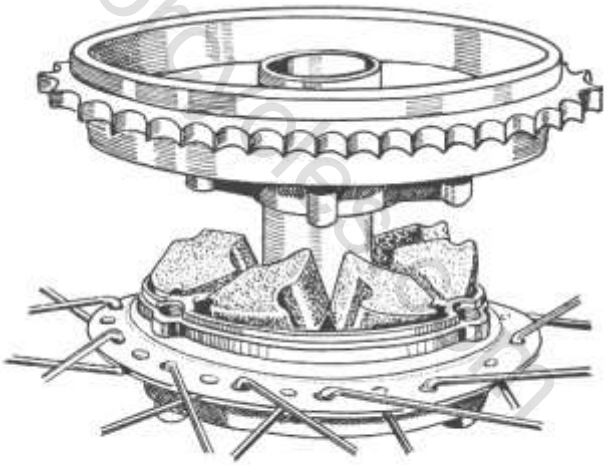
9. Removal of Brake Operating Cam and Brake Shoe Pivot Pin

The method of doing this has already been described in Paragraph 3 dealing with the 6 in. brake. The method is precisely the same for the 7 in. brake except that, owing to the different type of return springs used, it is, in this case, possible to remove the shoes from the pivot pin and operating cam before the latter are removed from the cover plate.

10. Cush Drive

The sprocket/brake drum is free to rotate on the hub barrel. Three radial vanes are formed on the back of the brake drum and three similar vanes are formed on the cush drive shell. Six rubber blocks are fitted between the vanes on the brake drum and those on the cush drive shell, thus permitting only a small amount of angular movement of the sprocket/brake drum relative to the hub barrel and transmitting both driving and braking torque and smoothing out harshness and irregularity in the former.

If the cush drive rubbers become worn so that the amount of free movement measured at the tyre exceeds 1/2 in. to 1 in., the rubbers should be replaced. To obtain access to them remove the complete wheel as described above, remove the brake cover plate complete with the brake shoe assembly, unscrew the three Simmonds nuts at the back of the cush drive shell, if necessary holding the studs, 32431, by means of the flats on the heads inside the brake drum. Drive out the three studs into the brake drum after which the sprocket/brake drum can be separated from the cush drive shell and the six cush drive rubbers can be lifted out.



REASSEMBLY OF CUSH DRIVE
Fig. 4

When reassembling the cush drive the entry of the vanes between the rubbers will be facilitated if the latter are fitted into the driving shell first and then tilted. The rubbers should be liberally painted with soapsuds to faciliate entry of the vanes.

When reassembling the cush drive coat the inside of the bore of the sprocket/brake drum liberally with grease where it fits over the hub barrel and also put grease on the inner face of the lockring, 10097. The three Simmonds nuts should be tightened down solid as there is a shoulder on the stud which prevents tightening of the nuts from locking the operation of the cush drive.

11. Reassembly of Brake Shoes, Pivot Pin and Operating Cam into Cover Plate

No difficulty should be experienced in carrying out these operations. Make sure that the pivot pin is really tight in the cover plate and put a smear of grease in the grooves of the pivot pin and on the operating face of the cam; also on the cylindrical bearing surface of the operating cam if this has been removed. Fit the operating lever and trunnion on its splines in a position to suit the extent of wear on the linings and secure with the nut. The range of adjustment can be extended by moving the lever on to a different spline.

12. Centering Cam Housing

Note that the bolt holes in the cam housing are slotted, thus enabling the brake shoe assembly to be centered in the drum. It is not intended that on rear brakes the cam housing should be left free to float but the shoes should be centered by leaving the screws just short of dead tight. The brake cover plate assembly with the shoes should then be fitted over the spindle into the brake drum and the brake applied as hard as possible by means of the operating lever. This will centre the shoes in the drum. The screws should then be tightened dead tight and secured with the locknuts. If the shoes are not correctly centered the brake will be either ineffective or too fierce, depending on whether the trailing or leading shoe first makes contact with the drum. With the brake assembly correctly centered and the screws securing the cam housing correctly tightened wear on both linings should be approximately equal.

13. Final Reassembly of Hub before replacing Wheel

Before replacing the felt washers which form the grease seals, pack both bearings with grease. Recommended greases are Castrolease (Heavy), Mobilgrease (No. 4), Esso Grease, Energrease C3 or Shell Retinax A. These are all medium heavy lime soap or aluminium soap greases. The use of H.M.P. greases which have a soda soap base is not recommended as these tend to be slightly corrosive if any damp finds its way into the hubs.

Make sure that the inside of the brake drum is quite free from oil or grease, damp, etc. Replace the felt washers, distance collars, the brake cover plate assembly, speedometer drive gearbox, distance collars, chain adjuster cams, the loose section of the spindle and the spindle nut. The wheel is then ready for reassembly into the machine.

14. Wheel Rims

The rim fitted to both types of wheel is WM2-19 in. pierced with 40 holes for spoke nipples. The internal width is 1.580in. and the diameter after building 19.062 in., the tolerance on the circumference of the rim shoulders where the tyre fits being 59.930/59.870 in. The standard steel measuring tape for checking rims is 5/16 in. wide, .011 in. thick and its length is 59.964/59.904 in.

Note that two makes of rim are used "Dunlop" and "Palmer Jointless." These differ in the positions of the pierced spoke holes. The Dunlop rims have a group of three holes on one side of the centre line, then a single hole on the other side, a further group of three and a single hole and so on. Palmer rims have the holes alternately spaced either side of the centre line. Both rims are interchangeable and both use the same length spokes but the method of lacing the wheel is different (see paragraph 16). Neither type of rim is symmetrical and care must be taken that they are built the right way round into the wheel.

15. Spokes

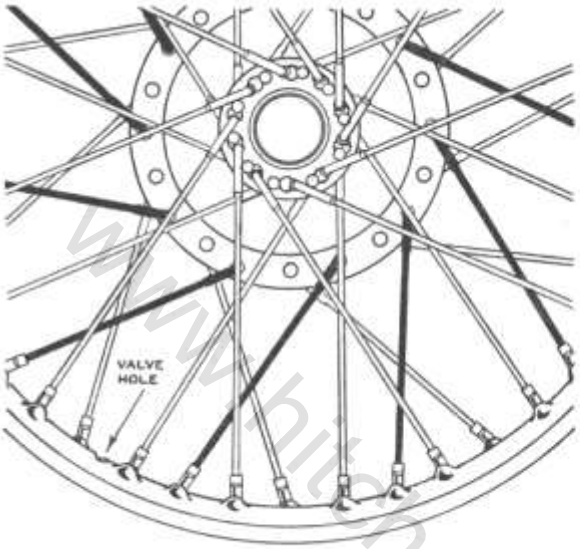
The spokes are of the single butted type 8-10 gauge with 90° countersunk heads, angle of bend 95°100°, thread diameter .144in., 40 threads per inch, thread form British Standard Cycle. Spoke lengths are as follows.

"Meteor 700," and "500 Bullet,"
Cush drive side, 7.3/4 in.
Spoke flange side 8.1/2 in.

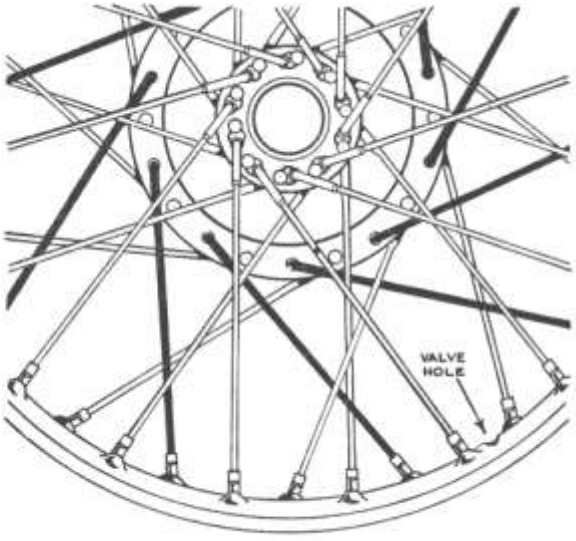
"500 Twin" and "350 Bullet,"
Cush drive side, 7.7/8 in.
Spoke flange side 8.5/8 in.

16. Wheel Building and Truing

The spokes are laced one over three. The wheel must be built central in relation to the outer faces of the distance collars which fit



DUNLOP RIM
Fig. 5A



PALMER RIM
Fig. 5B

between the fork ends. The rim should be trued as accurately as possible, the maximum permissible run-out both sideways and radially being plus or minus 1/32 in.

Fig. 5 shows the difference between the lacing when using Dunlop and Palmer rims. The key to correct lacing is the inside spokes to the large flange on the cush drive shell which must slope in the direction shown in Fig. 5. With the Dunlop rim this spoke goes to the middle hole of one of the groups of three (see paragraph 14) and the rim must be built into the wheel so that these groups of three holes are on the right of the centre line when the cush drive is on the left, i.e. the inside spokes to the large flange cross from the left to the right of the centre line.

With the Palmer rim the spokes from the large flange on the cush drive shell go to the more steeply angled holes in the rim which must be on the left of the centre line when the cush drive is on the left, i.e. none of the spokes crosses from left to right of the centre line.

17. Tyres

Standard tyres are Dunlop 3.50-19 in. Universal tread except on the "350 Bullet" where a 3.25-19 in. Universal tyre is used.

When removing the tyre always start close to the valve and see that the edge of the cover at the other side of the wheel is pushed down into the well in the rim.

When replacing the tyre fit the part by the valve last, also with the edge of the cover at the other side of the wheel pushed down into the well.

If the correct method of fitting and removal of the tyre is adopted it will be found that the covers can be manipulated quite easily with the small levers supplied in the toolkit. The use of long levers and/or excessive force is liable to damage the walls of the tyre. After inflation make sure that the tyre is fitting evenly all the way round the rim. A line moulded on the wall of the tyre indicates whether or not the tyre is correctly fitted. If the tyre has a white mark, indicating a balance point, this should be fitted near the valve.

18. Tyre Pressures

The load which the tyre will carry at different inflation pressures is shown below:

Tyre Section Inches	Inflation Pressures—lb. per sq. in.					
	16	18	20	24	28	32
	Load per tyre—lb.					
3·25	200	240	280	350	400	440
3·50	280	320	350	400	450	500

19. Lubrication

A greasing point is provided in the centre of the hub barrel. Unless the barrel is packed full with grease on assembly (which is apt to lead to trouble

through grease finding its way past the felt seals on to the brake linings) this greasing point is of little value and the best way to grease the bearings is by packing them with grease after dismantling the hub as described above.

Note that the brake cam is drilled for a grease passage but the end of this is stopped up with a countersunk screw instead of being fitted with a grease nipple. This is done to prevent excessive greasing by over-enthusiastic owners. If the cam is smeared with grease on assembly it should require no further attention but in case of necessity it is possible to remove the screw, fit a grease nipple in its place and grease the cam by this means.

SECTION M2

Special Tools

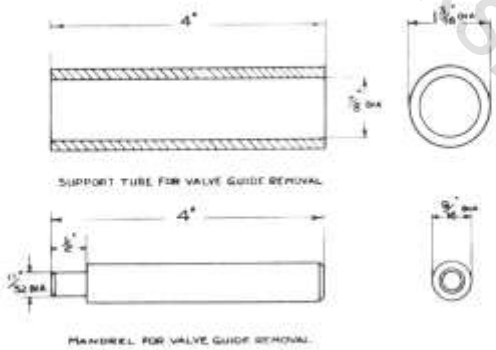
For "Bullet " Models

ROYAL ENFIELD WORKSHOP MANUAL

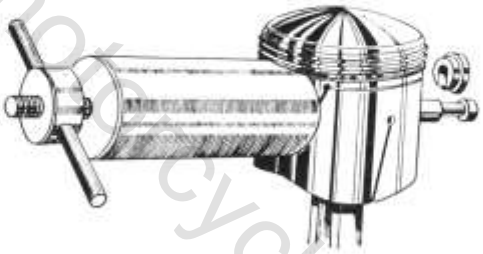
Special Tools for "Bullet" Engines

14835
MAGDYNO PINION EXTRACTOR

TE.1124
VALVE SPRING COMPRESSOR



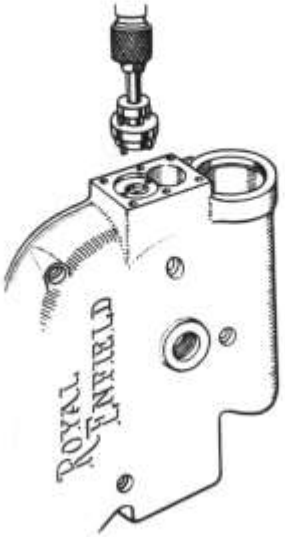
VALVE GUIDE MANDRELS



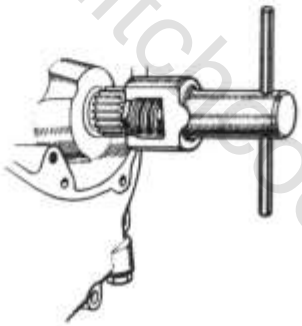
E.5477
GUDGEON PIN EXTRACTOR

Special Tools for "Bullet" Engines

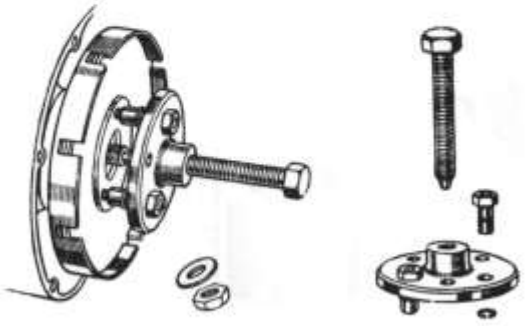
TE.1167
VALVE GRINDING TOOL



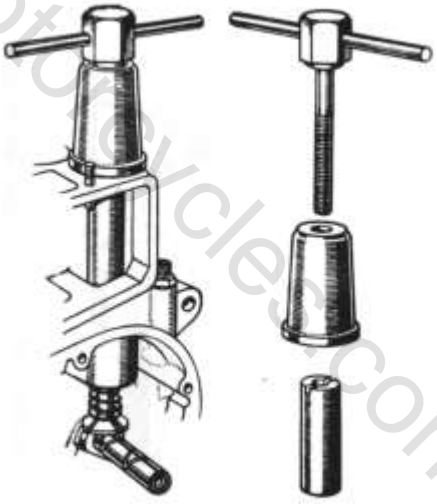
E.5425
PUMP DISC LAPPING TOOL



E.5451
PUMP WORM SHAFT SPANNER



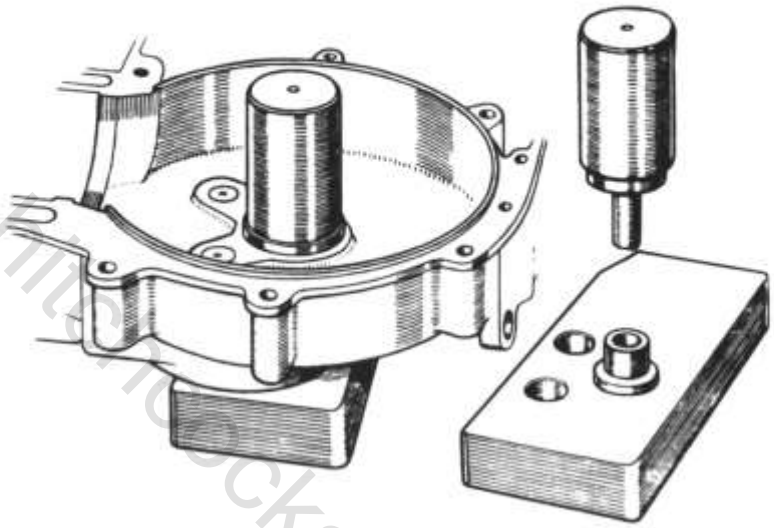
E.5414
CLUTCH CENTRE EXTRACTOR



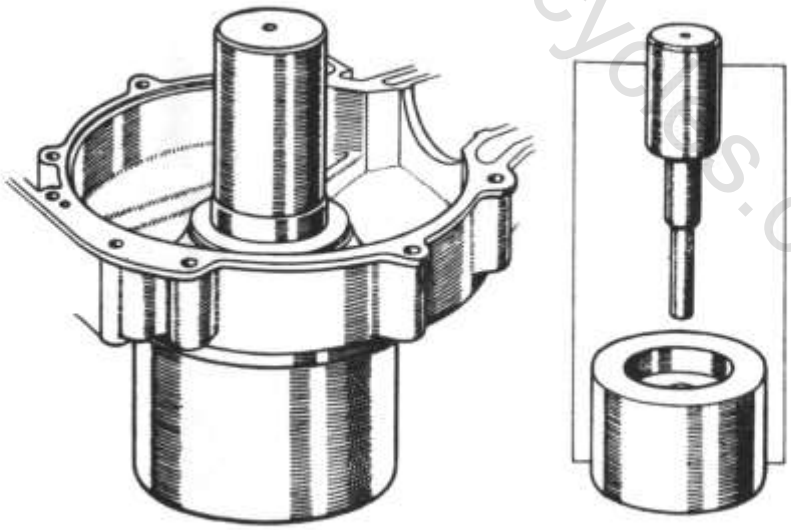
E.5410
TAPPET GUIDE EXTRACTOR

Special Tools for "Bullet" Engines

TOOLS FOR FITTING BUSHES

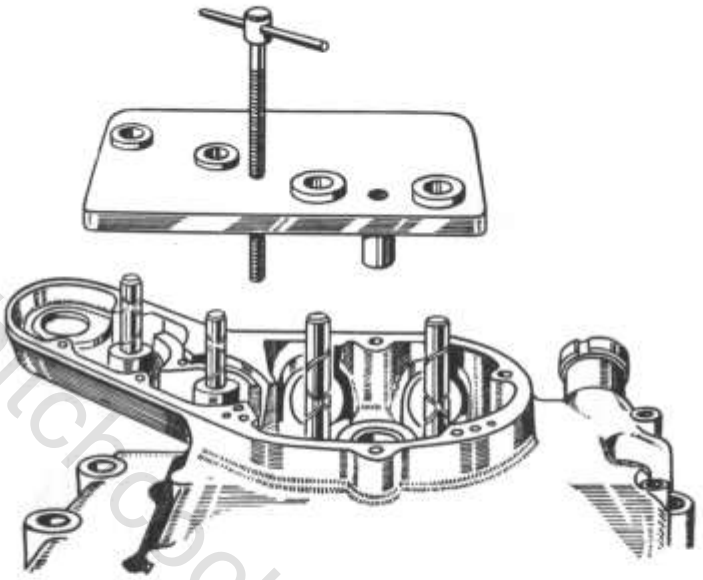


E.4816
ROLLER RACE ASSEMBLY, TIMING SIDE

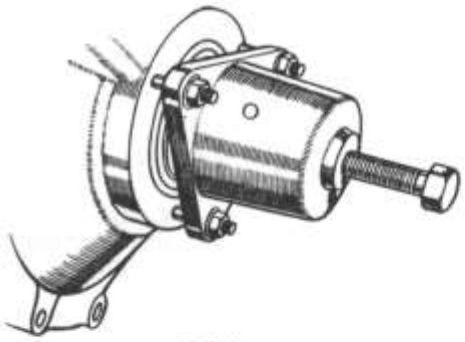


E.4817
BEARING ASSEMBLY, DRIVING SIDE

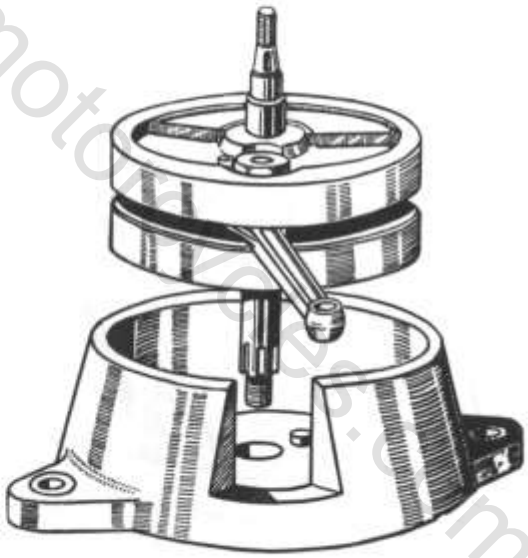
Special Tools for "Bullet" Engines



E.6462
LOCATING PLATE FOR ASSEMBLY OF CAM SPINDLES



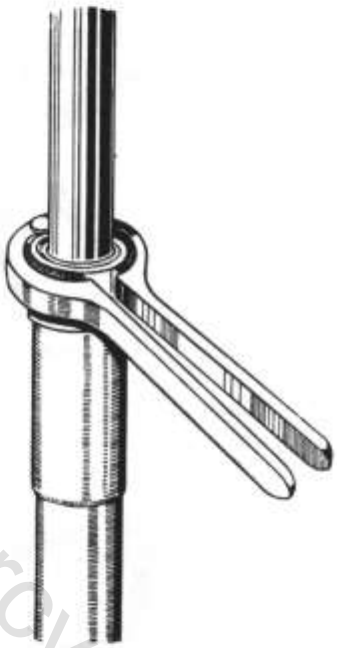
E.5121
CRANKSHAFT EXTRACTOR



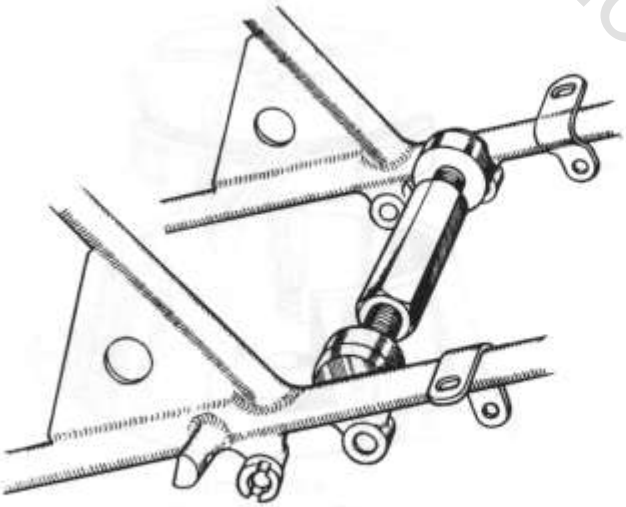
E.2774/E.2775
CRANKSHAFT POT OR JIG
for "350 Bullet" (E.2775) and "500 Bullet" (E.2774)

Special Tools for "Bullet" Frames and Forks

E.5418
LOCKRING SPANNER



E.4912
GLAND NUT AND OUTER TUBE
HAND GRIPS



E.5431
FRAME EXPANDER

NOTES

NOTES

SPARES for ROYAL ENFIELD & AMAL

HITCHCOCK'S MOTORCYCLES
ROSEMARY COURT
OLDWICH LANE WEST
CHADWICK END
SOLIHULL
B93 0EY ENGLAND

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