

INSTRUCTION BOOK

for the O.H.V.

**Royal Enfield**  
★ *'Made like a Gun'* ★

1956-61

"350 BULLET" AND "500 BULLET"

1958-61 "350 CLIPPER"

AND

TRIALS "WORKS REPLICA"

1958 onwards

**MOTOR CYCLES**

Price 2/-

INSTRUCTION BOOK

for the O.H.V.

**Royal Enfield**

\* 'Made like a Gun' \*

1956-61

"350 BULLET" AND "500 BULLET"

1958-61 "350 CLIPPER"

AND

TRIALS "WORKS REPLICA"

1958 onwards

**MOTOR CYCLES**

THE  
ENFIELD CYCLE COMPANY  
LIMITED

Head Office and Works :  
REDDITCH, WORCESTERSHIRE

Telegrams :  
"Cycles, Phone, Redditch"

Telephone :  
Redditch 4222 (9 lines)

ILLUSTRATIONS

<i>Fig. No.</i>	<i>Description</i>	<i>Page</i>
1	Control Diagram ... ..	7
2	Detail of Felt Oil Cleaner ... ..	14
3	Removal of Valve End Caps by means of a Screwdriver	20
4	A Terry Valve Compressor in use ... ..	21
5	Adjusting Tappets ... ..	24
6	Valve Timing Marks ... ..	28
7	Wiring Diagram ... ..	33
8	Clutch Lever and Cable Adjustments, "350 and 500 Bullets" and "350 Clipper" ... ..	37
9	Clutch Lever and Cable Adjustments, Trials "Works Replica" ... ..	38
10	Assembling Rear Hub Cush Drive ... ..	40
11	Rear Chain Adjustment ... ..	42
12	Telescopic Front Fork ... ..	44
13	Exploded View of Q.D. Rear Hub ... ..	48

CONTENTS

	<i>Page</i>		<i>Page</i>
Technical Data ... ..	4	Engine Bearings ... ..	25
Foreword ... ..	6	Removal of Engine from the Frame ... ..	26
<b>OPERATION OF THE MOTOR CYCLE</b>		Dismantling the Crankcase ... ..	27
Controls ... ..	6	Re-assembly of Crankcase—	
Starting the Engine ... ..	8	Valve Timing ... ..	28
To Start the Machine ... ..	8	Fitting the Alternator ... ..	29
Driving Hints ... ..	9	Ignition Timing ... ..	30
Running-in ... ..	10	Sparking Plugs ... ..	32
<b>LUBRICATION</b>		Lighting Set ... ..	33
Lubrication of the Engine ... ..	11	Carburettor ... ..	33
Detergent Oils ... ..	11	Air Cleaner ... ..	36
Lubrication Routine for the Engine ... ..	13	<b>TRANSMISSION</b>	
Multi-grade Oils ... ..	14	Enfield Four-Speed Gear ... ..	36
Felt Oil Filter ... ..	16	Clutch ... ..	37
Lubrication of the Gearbox ... ..	16	Adjustment of Clutch Control ... ..	38
Lubrication of Chains ... ..	16	Patent Cush Drive Rear Hub ... ..	39
Grease Gun Lubrication ... ..	16	Adjustment of Chains ... ..	41
Lubrication of the Front Fork and Rear Suspension Unit ... ..	17	Brake Adjustment ... ..	41
<b>TROUBLE ON THE ROAD</b>		Steering Head Adjustment ... ..	42
Engine Stops owing to lack of Petrol ... ..	17	<b>TELESCOPIC FRONT FORK</b>	
Engine Misfires or Stops owing to faulty Ignition ... ..	18	Construction ... ..	43
Other Causes of Engine Stoppage ... ..	19	Dismantling ... ..	45
Clutch Trouble ... ..	20	<b>REAR SUSPENSION</b> ... ..	46
<b>OVERHAULING THE ENGINE</b>		<b>MISCELLANEOUS</b>	
Decarbonising ... ..	20	Removal of Wheels. Detachable Rear Mudguard ... ..	46
Removal of Cylinder Head ... ..	20	Quickly Detachable Rear Wheel ... ..	47
Removal of Cylinder and Piston ... ..	22	Removal of Tyres ... ..	49
Removal of Valves ... ..	22	Expanding Hub Brakes ... ..	50
Removal of Carbon ... ..	23	Wheel Bearings ... ..	50
Grinding-in Valves ... ..	23	Cleaning ... ..	50
Re-assembly of Engine after Decarbonising ... ..	23	<b>A DOZEN DON'TS FOR DRIVERS</b> ... ..	51
Tappet Adjustment ... ..	24	<b>MOTOR CYCLE GUARANTEE</b> ... ..	52

TECHNICAL DATA

	350 CLIPPER
Engine type ... ..	Four-stroke
Number of cylinders ... ..	1 o.h.v.
Cylinder head ... ..	Light alloy
Cubic capacity (c.c.) ... ..	346
Bore and stroke (mm.) ... ..	70×90
Compression ratio ... ..	6.75 to 1
B.H.P.×R.P.M. ... ..	17 at 5,500
Carburetter ... ..	Amal Monobloc
Lighting and charging set ... ..	Lucas A.C. Rectifier
Ignition ... ..	D.C. Coil
Primary drive chain ... ..	$\frac{3}{8}$ " duplex
Final drive chain ... ..	$\frac{5}{8}$ " pitch
Rear suspension ... ..	Pivoted fork hydraulic damping
Front fork ... ..	Telescopic automatic lubrication
Hubs:	
Front ... ..	Light alloy full width
Rear ... ..	Q.D.
Gear ratios (solo) ... ..	5-15, 7-03, 9-5, 14-32
Tyre sizes:	
Front, Dunlop ribbed (ins.) ... ..	3.25×17
Rear, Dunlop studded (ins.) ... ..	3.25×17
M.P.H. per 1,000 r.p.m. in top gear ... ..	13.65
Approx. maximum speed (m.p.h.) ... ..	75
Approx. petrol consumption (m.p.g.) ... ..	80-85
Petrol tank capacity (gallons) ... ..	3 $\frac{1}{4}$
Oil tank capacity (pints) ... ..	4
Gearbox oil capacity (pints) ... ..	$\frac{3}{4}$
Brake diameter and width:	
Front (ins.) ... ..	6×1
Rear (ins.) ... ..	7×1
Seat height approx. (ins.) ... ..	30
Wheelbase (ins.) ... ..	54
Overall width (ins.) ... ..	26
Ground clearance (ins.) ... ..	6
Weight (lbs.) ... ..	365
Equipment ... ..	—

TECHNICAL DATA

	350 BULLET	500 BULLET	TRIALS WORKS REPLICA
Engine type ... ..	Four-stroke	Four-stroke	Four-stroke
Number of cylinders ... ..	1 o.h.v.	1 o.h.v.	1 o.h.v.
Cylinder head ... ..	Light alloy	Light alloy	Light alloy
Cubic capacity (c.c.) ... ..	346	499	346
Bore and stroke (mm.) ... ..	70×90	84×90	70×90
Compression ratio ... ..	7.75 to 1	7.25 to 1	7.25 to 1
B.H.P.×R.P.M. ... ..	21 at 6,500	27 at 5,750	19 at 6,000
Carburetter ... ..	Amal Monobloc	Amal Monobloc	Amal Monobloc
Lighting and charging set ... ..	Lucas A.C. Rectifier	Lucas A.C. Rectifier	—
Ignition ... ..	D.C. Coil	D.C. Coil	Magneto
Primary drive chain ... ..	$\frac{3}{8}$ " duplex	$\frac{3}{8}$ " duplex	$\frac{3}{8}$ " duplex
Final drive chain ... ..	$\frac{5}{8}$ " pitch	$\frac{5}{8}$ " pitch	$\frac{5}{8}$ " pitch
Rear suspension ... ..	Pivoted fork hydraulic damping	Pivoted fork hydraulic damping	Pivoted fork hydraulic damping
Front fork ... ..	Telescopic hydraulic damping	Telescopic hydraulic damping	Telescopic hydraulic damping
Hubs:			
Front ... ..	Light alloy full width	Light alloy full width	Light alloy full width
Rear ... ..	Q.D.	Q.D.	Q.D.
Gear ratios (solo) ... ..	5-15, 7-03, 9-5, 14-32	4-91, 6-7, 9-05, 13-65	7-56, 10-58, 16-25, 22-68
Tyre sizes:			
Front, Dunlop ribbed (ins.) ... ..	3.25×17	3.25×19	2.75×21
Rear, Dunlop studded (ins.) ... ..	3.25×17	3.25×19	4.00×19
M.P.H. per 1,000 r.p.m. in top gear ... ..	13.65	15.5	10-14
Approx. maximum speed (m.p.h.) ... ..	80-85	90-95	—
Approx. petrol consumption (m.p.g.) ... ..	80-85	70-75	60-65
Petrol tank capacity (gallons) ... ..	3 $\frac{1}{4}$	4 $\frac{1}{2}$	2 $\frac{1}{2}$
Oil tank capacity (pints) ... ..	4	4	4
Gearbox oil capacity (pints) ... ..	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$
Brake diameter and width:			
Front (ins.) ... ..	7×1 $\frac{1}{2}$	6×1 dual	6×1
Rear (ins.) ... ..	7×1	7×1	7×1
Seat height approx. (ins.) ... ..	30	31	31
Wheelbase (ins.) ... ..	54	54	53
Overall width (ins.) ... ..	26	26	29 $\frac{1}{2}$
Ground clearance (ins.) ... ..	6	6 $\frac{1}{2}$	6 $\frac{1}{2}$
Weight (lbs.) ... ..	365	375	309
Equipment ... ..	Stop light Prop stand	Stop light Prop stand	Prop stand

# Royal Enfield "350 Bullet," "500 Bullet," "350 Clipper" and "Works Replica" Trials Models

**1 Foreword.** As fast sports machines for normal road use, as machines specially equipped for Trials or for Scrambles and short circuit racing, these Royal Enfield models have set a high standard of excellence.

Comfort and road holding are assured by oil-damped telescopic front fork and rear suspension systems, while dual front brakes add to the safety.

Most of the instructions given for the "350 Bullet" apply to the Trials Model, but owners should take note of the following points of interest or difference.

## OPERATION OF THE MOTOR CYCLE

**2 Controls.** The driver should familiarise himself with the positions and method of operation of the various controls so that their use becomes instinctive. The controls are shown diagrammatically below and in most cases the method of operation is obvious. The following notes may, however, be of assistance:—

**Decompressor.** Operate by lifting lever on left handlebar to stop engine. Can also be used when descending a very steep hill having a difficult surface. If engine is hard to kick over compression when starting, the decompressor can be raised momentarily to release compression.

**Gear Control.** Move up for change to lower gear. Move down for change to higher gear.

**Kick Starter.** Operate with long swinging kick.

**Neutral Finder.** To find neutral from 2nd, 3rd or top gear, press neutral finder down as far as it will go, with the clutch lifted and the machine still rolling. The neutral finder is not fitted to machines in Trials trim.

## "BULLET," "350 CLIPPER" AND "WORKS REPLICA"

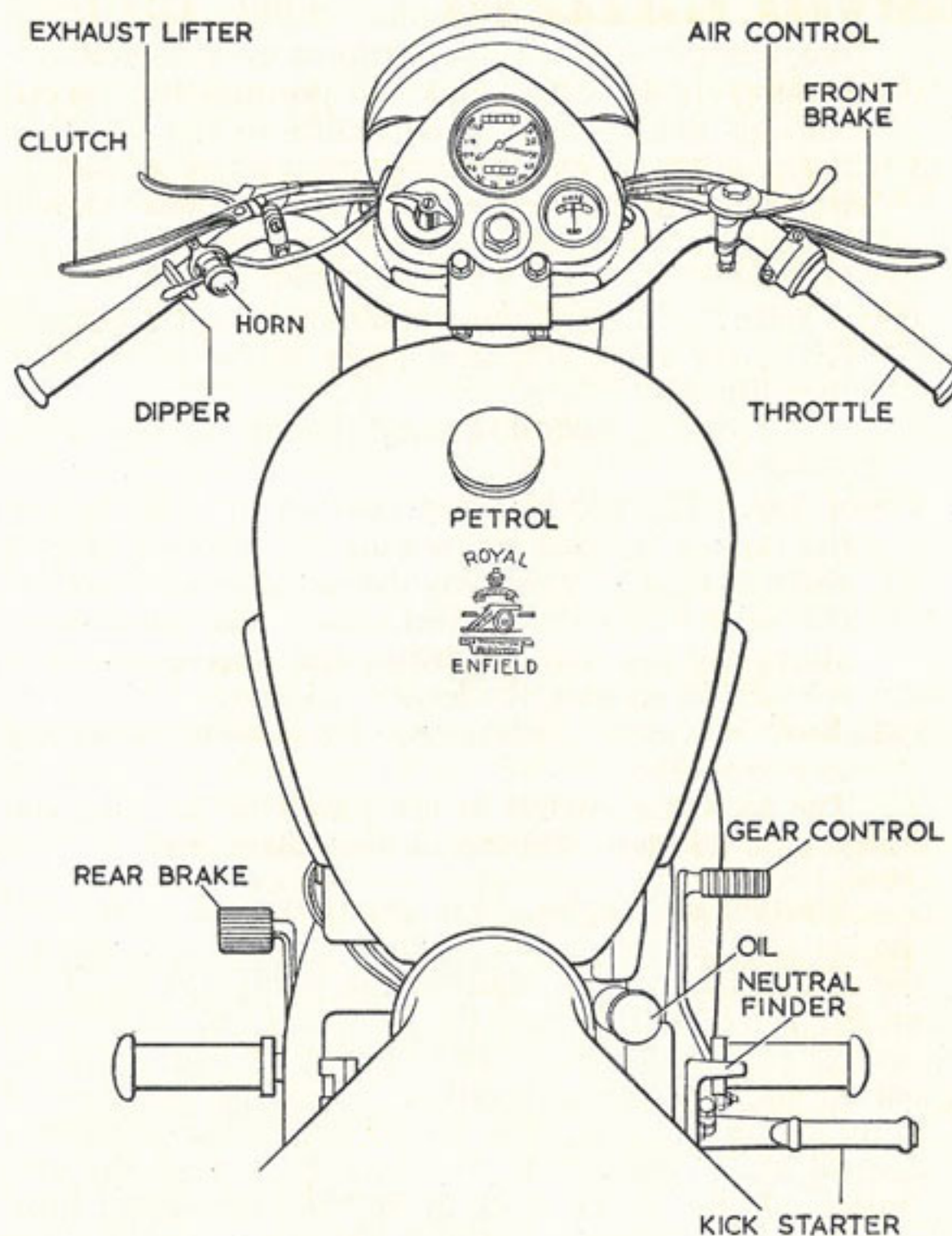


Fig. 1—Control Diagram

**Lighting Switch.** Position L gives headlamp pilot bulb and tail light. Position H gives headlamp main bulb and tail light.

**Ignition.** In addition to the lighting switch, there is an ignition key type switch mounted in the toolbox of

models fitted with coil ignition. When the key is in the central position the ignition is switched off; turning to the right gives the position for normal starting and running, and turning to the left gives the position for emergency starting when the battery is completely discharged. The ignition should always be switched off when the machine is left standing.

**Petrol Filler.** To open, turn anti-clockwise till catch is felt, push down and turn again as far as possible, then lift off.

To close, push down and turn to right as far as possible.

**Petrol Tap.** The two-level tap beneath the near side of the tank is opened by pushing the hexagon-shaped end and closed by pushing the round end. To retain the reserve supply of fuel, move the small lever above the tap anti-clockwise; the reserve supply is released by moving the lever clockwise.

**Oil Filler.** On engine crankcase. Operates the same way as petrol filler.

The following control is not shown in the diagram:

**Carburettor Tickler.** On top of float chamber.

- 3 **Starting the Engine.** Fill the tank with petrol and the oil tank in the engine crankcase with oil. Always use one of the oils recommended in paragraph 9. Turn on the petrol and depress the tickler of the carburettor once or twice until petrol can be felt in the float chamber, **but do not flood the carburettor.** Place the gear control in the neutral position, close the air lever, open the throttle control about one-eighth, and smartly depress the kick starter. If the engine fails to fire first or second time, repeat with a slightly different throttle opening. The best position for starting will soon be found from experience. When starting a warm engine, do not depress the tickler on the carburettor or the mixture will become too rich.

- 4 **To Start the Machine.** Pull up the clutch lever. Engage the lowest gear by pressing the foot control up

as far as possible and then releasing it. Slowly release the clutch lever, at the same time accelerating the engine by opening the throttle slightly and the machine will move away without jar or jerk. When the machine has attained sufficient speed (about 12 m.p.h.) de-clutch, at the same time closing the throttle and changing to second gear by pressing the foot control downwards as far as it will go and then releasing it. Let in the clutch gradually and open the throttle again until the speed of the machine is sufficient to require a change into third gear (about 25 m.p.h.), when the foregoing operations are repeated. Finally, change up to top gear when sufficient speed has been attained in third (about 35 m.p.h.).

**Note.** The above speeds apply to the machine in its standard form and are intended only as a rough guide for making a normal get-away on a level road. When starting up a steep hill rather higher speeds should be used in the intermediate gears.

Once top gear is engaged and the machine is running at a comfortable speed, the air lever should be fully opened.

- 5 **Driving Hints.** For normal running on the level the air lever can be left fully open, the speed being controlled by the throttle, but when accelerating or climbing a hill it may be necessary, while the engine is cold, to partly close the air lever in order to prevent "pinking" or knocking. In general, however, it is far better to leave the air control alone and change to a lower gear as soon as the engine shows any signs of "pinking." This is a sports engine which on the standard gear ratios is capable of 60 m.p.h. in third gear and over 40 m.p.h. in second, so that changing down on a hill will usually enable a faster climb to be made and at the same time eliminate the tendency to "pinking" when "slogging" at low speeds.

To stop the machine, close the throttle and apply the brakes. Before coming to rest find neutral by lifting the clutch and moving the neutral finder (with the foot) downwards as far as it will go. All machines are set at

the Works so that the engine "ticks over" when the throttle lever is shut. To stop the engine, therefore, it is necessary to operate the decompressor or ignition switch. Alternatively the throttle stop can be set so as to allow the throttle to close completely.

An indicator is fitted to the foot-operated gear control showing which gear is engaged. To obtain neutral from bottom gear, first engage second by moving the gear control downwards, then press downwards on the neutral finder.

Note that the positions of the handlebars, footrests, and all controls (including the gear lever and the brake pedal) are adjustable. A rider cannot have proper control of his motor cycle unless he is comfortable and the controls are conveniently situated. Riders should set the controls to suit their individual requirements.

- 6 **Running-in.** All Royal Enfield motor cycles have a special oval formed piston which minimises the risk of seizure with a new engine. Nevertheless careful running-in is highly desirable if the best results are to be obtained.

It is recommended, therefore, that a new machine should not be driven at a speed exceeding 35 m.p.h. for the first 200 miles, and, until at least 500 miles have been covered, the throttle should not be opened above half way, except for very short periods. After this distance short bursts of speed are desirable in order to hasten the bedding down of the thrust faces of the piston. Gradually increase the duration of these speed bursts until the machine will stand large throttle openings for indefinite periods. Note the importance of **progressively** increasing the work done by the engine. Running 1,000 miles at 30 m.p.h. will **not** bed down the piston to enable it to withstand continuous high speed running. Piston temperature is the important factor and this depends not only on speed and throttle opening, but also on how long that particular throttle opening has been sustained. Thus a machine after the preliminary 200 miles might stand full throttle for half a mile and yet pull up if driven at three-quarter throttle for five miles or so.

If the engine is run too long on a large throttle opening and shows the slightest tendency to pull up or seize, **lift the clutch and close the throttle.** Even if a seizure then occurs it will do little or no damage and after cooling for a minute or two the piston will free itself. If a seizure does occur, the piston should be examined by a competent mechanic to have any high spots eased down.

### LUBRICATION

- 7 **Lubrication of the Engine.** Positive lubrication by filtered oil is provided to the big-end bearing and to the valve gear; the main engine bearings, the piston and cylinder, are lubricated by splash, and the timing gears by drainage from the valve gear.

As in other Royal Enfield models, double-acting feed and scavenge pumps are employed. Primary and secondary sides of the feed pump deliver oil from the tank to the main feed plug and so through the drilled crankshaft to the big-end bearing. This oil passes through a gauze filter before it reaches the pump and is forced through the large felt filter before it reaches the bearings. A spring-loaded ball valve at the inner end of the timing side crankshaft opens under excessive pressure and allows surplus oil to escape to the sump.

The return pump draws oil from the sump and passes it to the rocker gear. Another ball valve is interposed in this pipe line and, at a pre-determined pressure, opens and diverts unwanted oil to the reservoir. From the rocker boxes, oil drains down the push rod tubes to the timing case. Here it lubricates the timing gears which themselves form a gear pump to send the used oil along a passage to the storage tank.

A breather is taken from the upper part of the crankcase on the drive side, through a flap valve and a pipe which directs oil mist on to the rear chain.

- 8 **Detergent Oils.** Many of the oils which we recommend contain detergent additives designed to counteract ring sticking and sludge formation.

The degree of detergency varies not only between one make and another but in some cases between different grades of the same make and may even be different for the same grade and make of oil in different parts of the world.

If one of the more highly detergent oils is used in an engine containing large deposits of sludge which have accumulated when running on another grade of oil this sludge will be loosened and may cause seizure and other trouble due to blockage of filters and oilways.

For this reason the following procedure should be carried out when changing to one of the more highly detergent oils, particularly if the engine has been used on a normal grade of oil or has not had the oil drained and changed at regular intervals as recommended in paragraph 9.

- (1) Drain the engine when the oil is hot and refill with the detergent oil.
- (2) Run the machine at moderate speed for not more than 50 miles.
- (3) Drain the engine again when the oil is hot, flush out the oil tank with detergent oil, remove, clean and replace filters (preferably fit new felt filter element). Refill with detergent oil.
- (4) When machine has run a further 100 miles check condition of filters. If clogged, repeat operation (3).

**Note.** Although the detergent additive in the oil keeps the engine clean and prevents sludge formation, it naturally becomes used up in the process. If an engine has a very low oil consumption so that "topping up" is seldom (if ever) necessary, the additive may all become used up, in which case sludge formation will occur at the normal rate. It is, therefore, just as important to drain the engine at regular intervals with a detergent oil as with one having no detergent additive.

Your dealer will advise you which makes and grades of oil in your country have sufficient detergency to necessitate the above enumerated precautions being taken.

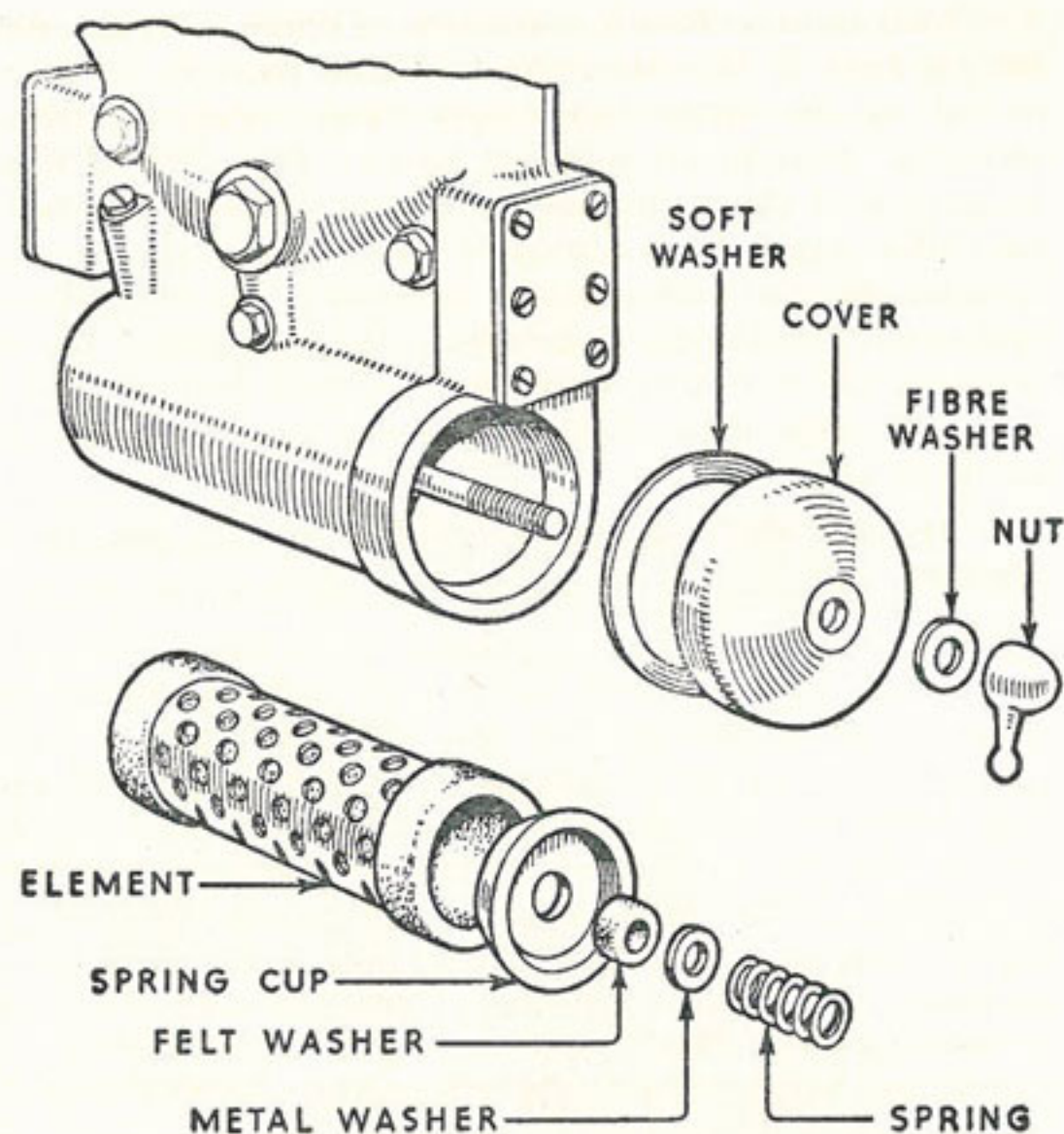
- 9 **Lubrication Routine for the Engine.** Never allow the oil tank to become empty. Since there is no reserve of oil in the sump, an empty tank means immediate shortage of oil to the working parts. The oil level should be kept well above the bottom of the dipstick attached to the filler cap. By keeping a large quantity of oil in circulation, its temperature is kept low, and the oil retains its lubricating qualities for long periods. Do not, however, fill the tank to within a higher level than 2 in. below the top of the filling orifice, or oil may escape past the filler cap.

We recommend the following oils for use in our engines:

Requirements	Castrol	Mobiloil	Esso Extra Motor Oil	B.P. Energol	Shell X-100 Motor Oil
Engine (summer)	Grand Prix	D	40/50	S.A.E. 50	50
Engine (winter)	XXL	BB	40/50	S.A.E. 40	40
Gearbox ...	Grand Prix	D	40/50	S.A.E. 50	50
Chains—front ...	Castrolite	Arctic	20W/30	S.A.E. 20	20
rear ...	Grand Prix	D	40/50	S.A.E. 50	50
Grease Gun ...	Castrolite (Heavy)	Mobilgrease MP	Esso Grease	Energol C. 3	Retinax A
Front Forks ...	Castrolite	Arctic	20W/30	S.A.E. 20	20

If difficulty is experienced in obtaining the grades recommended for hot climates or summer use, the alternatives for winter use or cold climates can be used. These flow freely when cold and at the same time have adequate heat-resisting properties. The importance of efficient lubrication cannot be over-estimated. The use of cheap oils is false economy and we strongly recommend the oils mentioned above, as we have found from experience that these are the most suitable for our engines. It is advisable to specify the brand as well as the grade, and as an additional precaution oil should be bought from branded cabinets or sealed containers.





DETAIL OF FELT OIL CLEANER

Fig. 2

**Multi-grade Oils.** Some of the manufacturers of the lubricants in the table above offer special engine lubricants, the viscosity of which is less sensitive than usual to temperature changes. These are classed as S.A.E. 10W/30 or 10W/40 oils. Their use will facilitate starting at low temperatures but may result in an increase in the rate of oil consumption. In general these oils are of too low a viscosity for use in Royal Enfield "Bullet" engines except for machines used exclusively for short journeys in cold weather. These oils are all of a highly detergent nature and the precautions given in paragraph

8 should be followed if a change to them is made after a long period of use on a non-detergent oil.

Castrolite and Esso Extra Motor Oil 20W/30 are of a mild multi-grade character (S.A.E. 20W/30) and have only mild detergent properties. While these oils are also too low in viscosity for general use in these engines, they can be used in winter for short journeys if difficulty is experienced with starting owing to the gumminess of the normal oils recommended for winter use. No special precautions are necessary when changing to these oils.

During the running-in period we recommend the addition of Acheson's Colloidal Graphite to the oil in the engine.

After the first 500 miles and subsequently about every 2,000 miles, the oil should be drained from the tank, timing case and felt oil filter (see next paragraph). The drain plug for the tank is at the base of the crankcase below the oil filler and there are two plugs screwed upwards into the bottom of the crankcase below the felt filter chamber. These have gauze filters which should be cleaned. The tank and sump should be swilled through with clean oil. This procedure is conveniently carried out when the engine is being decarbonised. The oil will flow more readily if the plugs are removed at the conclusion of a ride, alternatively the tank and sump may be allowed to drain overnight. Waste of oil is reduced by allowing the oil level in the tank to become reasonably low before draining.

To drain the oil from the timing case remove the feed plug and lean the machine over on its right-hand side. The main oil feed plug screwed into the timing case cover abuts against a cork oil seal located in a recess in the oil pump worm nut. It is important that this be preserved in first class condition and a new one should be fitted if the state of the existing one is at all doubtful. Any leakage at this point will, among other things, result in starvation of the engine bearings. After draining the timing case the oil fed into it will not be returned

to the tank until the normal level in the timing case has been restored. This will cause an apparent loss of about half a pint of oil.

**10 Felt Oil Filter.** The construction of this is clearly shown in Fig. 2. The felt filter element should be cleaned by washing in petrol every 2,000 miles, and should be renewed every 5,000 miles.

**11 Lubrication of the Gearbox.** Current machines have the gearbox filler plug at the top of the box and a level plug at the front. Remove both plugs and fill, with the machine on an even keel, until the oil commences to flow from the level plug.

Check the level every 500 to 1,000 miles when the gearbox is warm.

On the "Works Replica" the filler plug is situated immediately below the gear position indicator. With the machine on an even keel, top up the gearbox with oil to the level of the filler.

**12 Lubrication of Chains.** The front chain case should be filled with oil up to the level of the overflow plug. This is the small plug in the side of the case at a lower level than the filling orifice. The chain will thus be kept clean and well lubricated, giving a silent and efficient drive.

The rear chain should be lubricated at frequent intervals with engine oil or grease, and should be removed about every 2,000 miles, and after washing in paraffin should be soaked in melted tallow.

**13 Grease Gun Lubrication.** The rear suspension pivot bearing, rear brake pedal, gear control and speedometer drive, should be greased with a grease gun every 200 miles or once a week.

Early type hubs are fitted with grease nipples and grease should be applied very sparingly, so as to avoid the

possibility of grease finding its way into the brakes; but should this inadvertently happen, remove the brake shoes, scrape the linings thoroughly, wash in petrol, clean the brake drums and re-assemble. Later type hubs are not provided with grease nipples, being packed with grease on assembly.

Use one of the following greases in the gun:—

Castrolase (Heavy), Shell Retinax A Grease,

\*Esso Grease, Energrease C.3, or Mobilgrease MP.

#### LUBRICATION OF THE FRONT FORK AND REAR SUSPENSION UNIT

**14** The front fork legs are each filled with  $7\frac{1}{2}$  fluid ounces of oil on assembly and should require no further addition. Unless oil seepage is noticed on the sliding member, nothing need be done. Such seepage could only occur as a result of a worn oil seal or badly worn bushes; the remedy is obvious.

The rear spring boxes are completely sealed and will not leak unless excessive wear has occurred. In this event, replacement shock absorber units must be fitted.

#### TROUBLE ON THE ROAD

**15** Royal Enfield Motor Cycles enjoy a wonderful reputation for reliability. Trouble on the road is very unusual; nevertheless stoppages may sometimes occur, and it is hoped that the following hints may help towards the speedy location of the trouble.

**16** **Engine Stops owing to lack of Petrol.** This is the commonest form of engine stoppage. The first symptoms are irregular firing, which is temporarily cured by closing the air lever. Make sure that there is plenty of petrol in the tank. If so, disconnect the petrol pipe at the carburettor end and turn on the tap. If a good flow of petrol occurs, the stoppage is probably in the jet itself. If the flow from the petrol pipe is restricted, the stoppage lies either in the petrol tap or in the pipe itself.

\*Known as Esso Cup Grease in overseas countries.

- 17 **Engine Misfires or Stops owing to faulty Ignition.** The symptoms in this case are that the engine will not run regularly and is very hard to start. In other cases the engine may suddenly "cut out" without any warning. First see that the high tension lead has not become disconnected at either end and is not worn or burnt through, allowing the bare wire to touch some metal part of the machine. See also that the plug insulator and high tension lead are not wet.

If all the above are in order remove the sparking plug and hold it with the body touching the engine cylinder, but with the terminal clear of the machine and connected to the high tension lead. Turn the engine by the kick starter. If a good spark is obtained at the plug points, the ignition is in order and the trouble lies elsewhere. If no spark, or a very weak spark, is obtained, remove the plug and hold the end of the high tension wire about  $\frac{1}{8}$  in. from the metal part of the machine and rotate the engine. If a spark is obtained from the wire, the fault lies with the sparking plug. If this is oily or sooty it can be taken apart and cleaned, but if the points are red and burnt the plug has been too hot and a new one should be fitted, preferably of the type recommended in paragraph 33. The gap between the plug points should be .018 in. to .025 in.

With all coil ignition models, when checking for a spark at the plug or plug lead the ignition must be switched on. Failure to obtain a spark may be due to the battery being discharged, in which case a spark should be obtained if the ignition switch is set to the emergency start position.

If the plug is satisfactory, the trouble lies in the ignition system. See that the contact breaker points are clean and that they open and close properly. These should open to the thickness of the gauge supplied. If necessary, remove the contact breaker by unscrewing the centre screw and clean out the housing behind it. This should be free from oil or damp. Also remove the carbon brush holder and clean the slip ring with rag pushed down with a piece of wood.

## 18 Other Causes of Engine Stoppage.

- (1) **Water in Carburettor.** The symptoms are usually intermittent misfiring and banging in the silencer following a heavy rainstorm.  
The remedy is to clean out the float chamber and jets.
- (2) **No Clearance at Tappets.** This is apparent by an entire lack of compression when turning over with the kick starter. The remedy is to adjust the tappets.
- (3) **Sticking Valve.** In this case there is no compression and excessive tappet clearance, the valve remaining partly open. The valve may free itself on cooling, but sometimes it is necessary to dismantle the engine to free the valve.
- (4) **Broken Valve.** This trouble is very rare and is usually caused by consistent over-driving of the machine and by neglect of the tappet clearances (see paragraph 27). The symptoms are that the engine "cuts out" suddenly and stops with no tappet clearance. Furthermore, it is not possible to obtain any clearance at the tappets. A valve breakage on an O.H.V. engine is likely to have very serious consequences.
- (5) **Seized Piston.** This is caused by over-driving a new machine before the engine is properly "run in." The symptoms are loss of power and a tendency to "pink," followed by the engine locking up solid. An aluminium piston will always free itself if allowed to cool. If the clutch was withdrawn and the throttle closed before the final seizure the consequences may not be serious, but the cylinder and piston should be examined as soon as possible by a competent mechanic to have any score marks removed. A seizure may also occur through running with insufficient oil, in which case the consequences will be far more serious.

**19 Clutch Trouble.** A slipping clutch may be caused by lack of clearance in the control (see paragraph 39).

A binding clutch is caused by too much slack in the control wire. New clutches sometimes tend to bind until the inserts have bedded down dead level.

### OVERHAULING THE ENGINE

**20 Decarbonising.** When an engine has been in use for some time, carbon deposit forms on the piston and cylinder head and the engine must be partly dismantled to allow this deposit to be scraped off and the valves to be re-ground.

The time when decarbonising becomes necessary will be indicated by an increased tendency to "pink" and will occur after approximately the first 2,000 to 2,500 miles, and subsequently at intervals of about 5,000 miles.

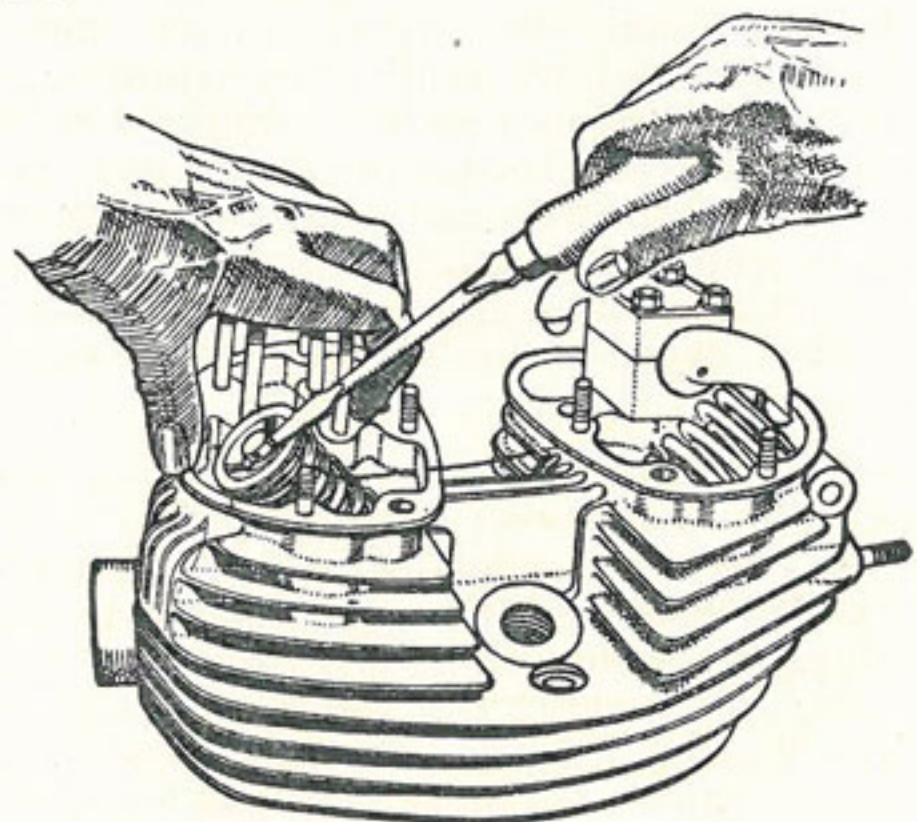


Fig. 3

### REMOVAL OF CYLINDER HEAD

**21 "350 Bullet," "350 Clipper," "Works Replica" and early type "500 Bullet."** For early models first remove

the petrol pipe and the two bolts which secure the front and rear ends of the tank, and remove the latter. (If necessary, the front saddle attachment bolt or the dual seat, must be removed.) All later models have one stud at the front of the petrol tank. Remove this, and raise the rear of the tank, thereby disengaging the clip from the frame. The tank may then be removed. Next remove the covers over the valve gear, the carburettor, exhaust pipe and silencer, the decompressor valve and sparking plug, after disconnecting the control cable at the handlebar end. Remove the rocker bearing caps and rockers and lift the push rods out of their tubes. The cylinder head can then be lifted off after unscrewing the four sleeve nuts on the long studs through the cylinder barrel, the one on the short stud between the push rods and the one opposite the sparking plug.

**Later Model "500 Bullet."** Remove the cylinder head steady bar, exhaust pipe, carburettor, plug lead and the decompressor cable at the handlebar end. Disconnect the rocker oil feed pipes. Unscrew the four long

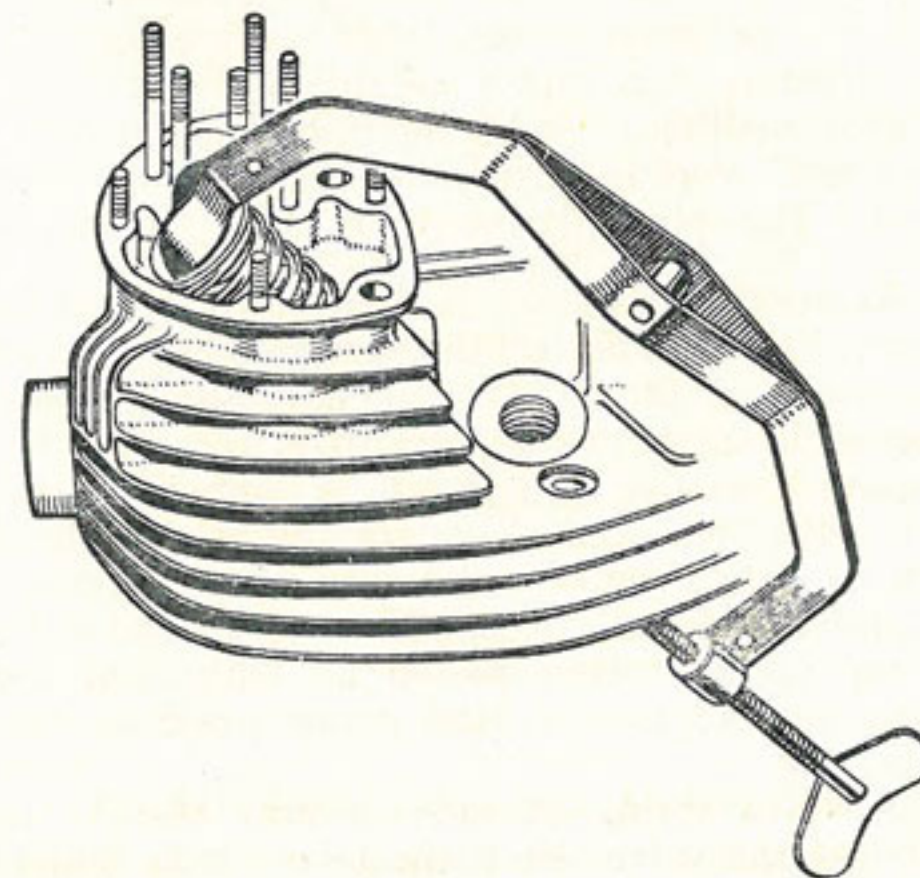


Fig. 4

nuts on the top of the head, the nut adjacent to the sparking plug and a sleeve nut by the decompressor. Withdraw the five studs from the crankcase—they have squared ends to take a spanner.

Remove the rocker covers, rockers and push rods. The rockers are removed by undoing the nuts at either end; one of these nuts is bored and tapped to take the oil union. Slide out the spindle, taking care that the spring washer at the push rod end and the plain washer at the other end do not fall down the push rod tunnel. Withdraw the push rods and lift the head.

With the engine out of the frame, the head may be lifted without dismantling the rocker gear.

- 22 Removal of Cylinder and Piston.** While it is not strictly necessary to remove the cylinder barrel and piston, this should preferably be done so that the condition of the piston, rings and big-end bearing can be examined. To remove the cylinder barrel after removal of the head, unscrew the single nut between the push rod tubes and lift the barrel off. To remove the piston, push out the gudgeon pin, after removal of one of the wire retaining clips with a suitable tool (such as the tang end of a small file) and lift the piston off the rod. Mark the piston so as to ensure re-assembling the same way round. The split skirt should be to the front.

- 23 Removal of Valves.** To remove the valves from the cylinder head, first lift off the hardened end caps from the valve stems, if fitted. If these have stuck, they can be removed by means of a screwdriver (see Fig. 3). Then compress the valve springs with a suitable compressor, lift out the split conical collars and release the springs, when the valves can be withdrawn. Fig. 4 shows a Terry compressor in use. Keep the split conical collars and the top spring collars paired up with their respective valves and replace in the same positions when re-assembling.

A valve spring compressor may also be used for removing the valves from the later "500 Bullet" head, which is of different design to that shown in Fig. 4.

The valves of later models "350 & 500 Bullets" are not fitted with removable end caps.

- 24 Removal of Carbon.** Remove carbon from the valves, ports, combustion chamber, piston top and ring grooves by scraping carefully, taking care not to dig into the aluminium. **On no account must potash solution be used for decarbonising as it will attack the cylinder head and piston, both of which are made of aluminium alloy.**
- 25 Grinding-in Valves.** Smear the valve seats with a little grinding compound, replace the valve in position and rotate it with a semi-rotary motion with a valve grinding tool, frequently lifting it off its seat and gradually working the valve round so that each point on the valve face comes into contact with each part of the seat. Continue grinding until a bright ring is obtained on both the valve and its seating.

If the valve or seats are very badly pitted and will not form good faces with a reasonable amount of grinding, the parts should be returned to the Works for new seats to be cut. Excessive grinding forms a pocket which restricts the flow of the gases.

Do not interchange the inlet and exhaust valves as they are of different materials as well as being different in diameter.

**Cams.** Standard type cams are fitted and recommended for the "Works Replica" machine for all normal trials work. Riders who may obtain and fit special cams should note that, by doing so, the engine performance will be altered and may be quite unsatisfactory for use in trials; the power low down in the speed range will be affected considerably.

- 26 Re-assembly of Engine after Decarbonising.** When re-assembling the engine, take great care to have all parts perfectly clean and put clean oil on the piston, particularly round the rings. The cylinder base joint must be made with a paper washer. The cylinder head joint should be made with a new gasket. When tightening down the cylinder head nuts, work diagonally from one to another

to ensure pulling the joint down dead level. When replacing the valve rockers and caps put a little oil on each rocker and make sure that the rocker is free after the cap has been tightened down. If necessary, a sharp tap on the end of the rocker will usually free it. Do not forget to replace the valve stem end caps if fitted.

The cylinder head nuts should be checked again for tightness, after the engine has been run long enough to get it thoroughly warm.

The silencer fitted to later "350 & 500 Bullets" may be dismantled for cleaning by removing the  $\frac{5}{16}$  in. nut in the tail; the tail piece and central body may then be slid off the long central stud located in the front portion of the silencer.

- 27 **Tappet Adjustment.** To adjust the tappets of all but the 1958-59 "350 Clipper" models, remove the inspection cover from the side of the crankcase. The exhaust tappet should be adjusted so that the push rod is just free, and the inlet so that the push rod is just binding when the engine is cold.

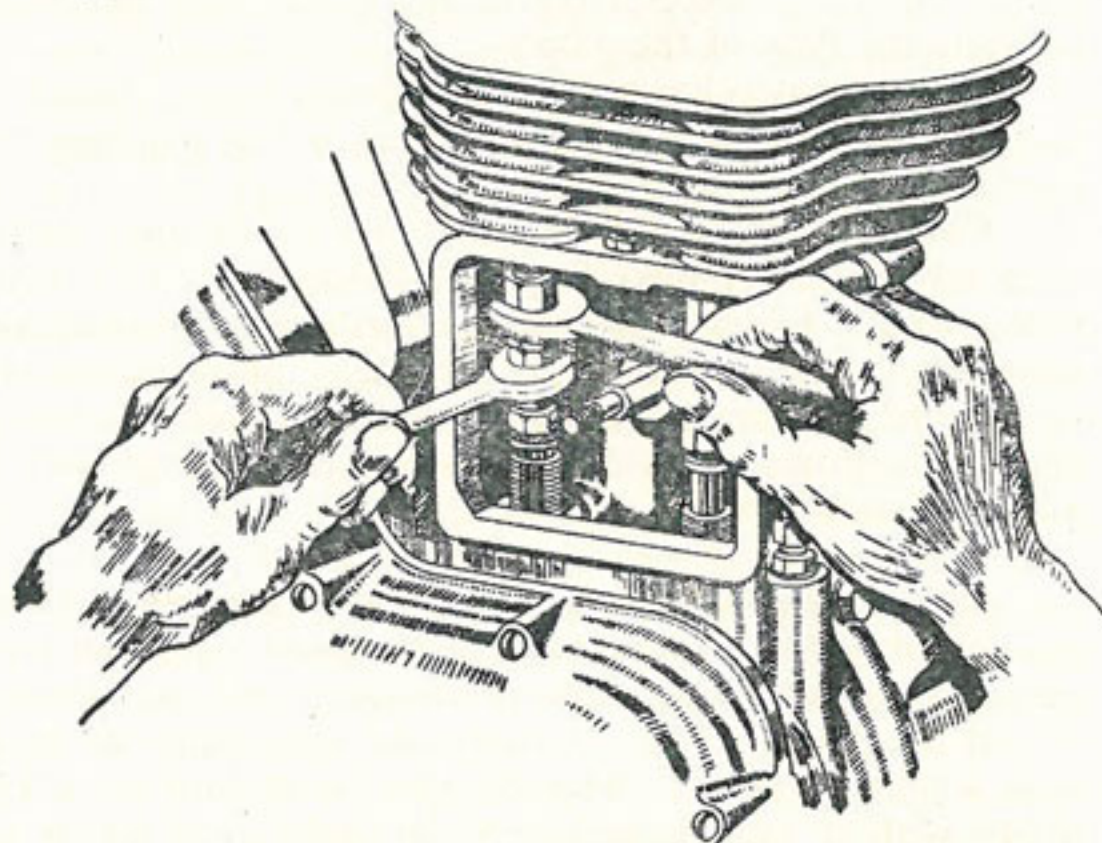


Fig. 5—Adjusting Tappets

To make the adjustment (see Fig. 5) hold the push rod bottom end (top hexagon) and the locknut (middle hexagon). Unlock by turning the locknut to the left and make the adjustment by screwing the push rod cup (bottom hexagon) to the left to take up clearance or to the right to give more clearance, at the same time holding the push rod bottom end. Finally, lock up the locknut against the push rod end and check the clearance after finally tightening the locknut.

On the 1958-59 "350 Clipper" engine the inlet tappet must be set so that the push rod is free to spin (.002 in. clearance) and the exhaust tappet with very slight up and down clearance (.004 in. clearance).

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

### ENGINE BEARINGS

- 28 The bearings fitted to all Royal Enfield engines are of adequate dimensions and, provided a plentiful supply of clean oil is kept in the tank, will give long and trouble-free service. The big-end bearing consists of a special floating bush, which has been found to give better results than either ball or roller bearings for this application. Ball and roller bearings are used for the driving side main bearings, a roller bearing and a plain bush being fitted on the timing side.

A small amount of end float should be present in the main bearings before the engine sprocket nut is tightened and some "shake" may be present in the big-end. If, however, after long use, definite up and down play can be felt in the big-end or main shaft bearings, it is best to send the crankcase, flywheels and connecting rod to a Service Dealer or back to the Works for the worn parts to be replaced, as special appliances are necessary to ensure the correct assembly of these parts.

The gudgeon pin is fully floating and of large diameter. When the engine is cold it should be a free working fit in the small end bush and a push fit in the piston bosses.

29 **Removal of the Engine from the Frame.** Disconnect the stop-lamp and tail-lamp leads at the socket and remove the rear mudguard and dual seat. Turn off the petrol tap and disconnect the petrol pipe. On later "Bullets," "350 Clippers" and "Works Replica" models, remove the front tank stud and lift away the petrol tank. In the case of earlier models it is necessary to remove two bolts to free the petrol tank. Empty the tool and battery box of all the contents and remove the box from the frame; it is held by four pins and nuts, two at the rear and two at the top.

Remove the rear chainguard and the short guard at the gearbox end; disconnect the chain link and remove the chain. Disconnect the horn and earth wire from the rectifier.

Remove the exhaust pipe and the carburettor or take out the carburettor slides, leaving the carburettor secured to the induction pipe. Detach the cylinder head steady.

Leave the machine on the stand, but have a box or block to take the weight of the engine. Take the  $\frac{5}{16}$  in. studs from the front engine plates and the  $\frac{5}{16}$  in. stud from below the gearbox. Slacken the  $\frac{1}{2}$  in. stud from below the gearbox. Slacken the  $\frac{1}{2}$  in. stud further along and disconnect the stand spring. Remove the right-hand footrest and ease the engine and gearbox free from the right-hand side of the machine.

Removal of the engine and gearbox will be facilitated if the cylinder head, cylinder, piston and primary chaincase are removed first. The method of removal of the cylinder head, cylinder and piston is described in paras. 21 and 22. To remove the primary chaincase unscrew the single bolt which secures the cover.

On later "Bullet," "350 Clipper" and "Works Replica" models, undo the three nuts which secure the alternator to the locating ring within the chaincase. Withdraw the stator of the alternator, and remove the locating ring after unscrewing the three attachment screws.

Earlier models have three small distance pieces butting against the lugs in the chaincase for positioning the stator and not an adaptor ring.

Undo the large hexagon securing the rotor to its shaft and withdraw the rotor. The chain is endless so that it is necessary to remove both engine and clutch sprockets simultaneously. Both 350 c.c. and 500 c.c. engines have drive sprockets splined to the drive shaft and secured by a large hexagon nut and washer.

To remove the clutch sprocket, unscrew the three clutch spring pins, then lift away the spring cap, springs and distance pieces, clutch front plate, centre retaining ring and the assembly of driving and driven clutch plates. The clutch sprocket can be withdrawn from the centre after removal of the large circlip which secures it. The clutch centre itself must now be withdrawn, this being mounted on splines on the gearbox mainshaft held up with a nut with a right-hand thread. The back half of the chaincase can now be lifted off after removal of the three nuts securing it to the crankcase.

30 **Dismantling the Crankcase.** After removal of the engine from the frame drain the oil tank and remove the cylinder and piston and the primary chain case, chain and sprockets, if not already done. The gearbox can now be withdrawn from the back of the crankcase after unscrewing the four nuts which secure it.

Before dismantling the engine further, drain the oil from the timing cover, oil tank and flywheel chamber, by removal of the drain plugs. Next unscrew the timing cover screws and tap off the cover. Then remove the distributor or magneto driving pinion. This is a taper fit on its shaft, and is tapped for a small extractor which will be found in the toolkit. Now lift out the two cam wheels and the intermediate driving pinions for the distributor or magneto drive.

To remove the tappets and guides from both "350 Bullet" and "500 Bullet" engines, an extractor tool must be used, and the tappet guides are threaded to take this tool. In the absence of such a tool a narrow punch can

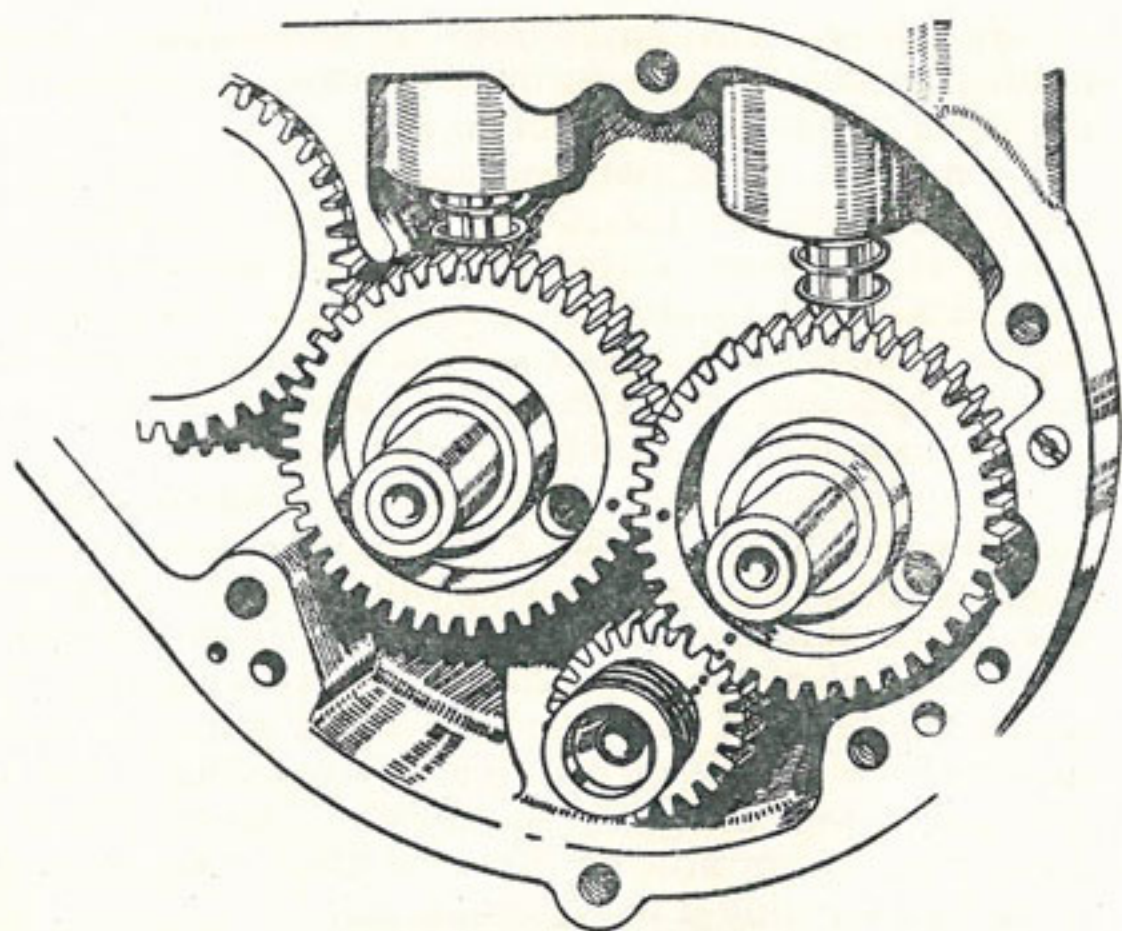


Fig. 6—Valve Timing Marks

be used to drive out the tappet guide, but this is a method which should be used only in case of emergency.

The oil pump drive, which has a left-hand thread, must be screwed off the engine shaft and the driving pinion must then be removed—it is keyed on to the shaft before the crankcase can be parted.

It is now only necessary to remove the bolts holding the two halves of the crankcase together, when these can be separated.

Later "Bullet" and "350 Clipper" models have coil ignition, a contact breaker housing, complete with automatic advance and retard, replacing the magneto of earlier models. The "Works Replica" still retains magneto ignition.

- 31 **Reassembly of Crankcase—Valve Timing.** No difficulty should be experienced with this. Take care to have all parts scrupulously clean and put some clean oil on all bearings and on the cams.

**Fitting the Alternator.** The alternator consists of two parts, the stator and the rotor. The stator, mounted on an adaptor ring in the case of later "Bullets," "350 Clipper" and "Works Replica," is fitted to the back half of the primary chaincase, being held in position by three screws. Earlier models have the stator held in position by three studs and distance pieces. The rotor, which contains the permanent magnets, is mounted on the end of the crankshaft and is secured by a nut and located by a key.

The radial air gap between the rotor and the poles of the stator should be .020 in. in all positions and care must be taken when refitting to see that it is not less than .010 in. at any point.

Fit the rotor first, making sure that it is located concentrically on the end of the crankshaft. Attention must be given to the seating of the key because a badly fitting key may cause the rotor to run unevenly. The nut holding the rotor in position is secured by a tab washer.

Having fitted the rotor, replace the adaptor ring with the three screws and put the stator in position with the coil connections facing outwards on later "Bullets," "350 Clipper" and "Works Replica." With earlier models it is necessary to fit the three distance pieces over the three studs in the chaincase and then to fit the stator with coil connections facing outwards.

Replace the nuts and shakeproof washers only fingertight and insert six strips (preferably of magnetic material) .015 in. thick and about  $\frac{1}{8}$  in. wide between the rotor and each pole piece.

Tighten the stator nuts and withdraw the strips.

Check the air gap with narrow feelers and, if less than .010 in. at any point, remove the stator and file or grind the pole piece carefully until the correct gap is obtained.

The valve timing is marked and the cam wheels should be so assembled that the two dots on the small pinion are in line with the two on the exhaust cam wheel, while at the same time the single dot on the exhaust cam wheel is in line with the single dot on the inlet cam wheel (see Fig. 6).



For those who wish to check the valve timing, the opening and closing points are given below:

**"350 Bullet," "500 Bullet," "350 Clipper" and "Works Replica."**

Exhaust opens  $75^\circ$  before bottom dead centre.

Exhaust closes  $35^\circ$  after top dead centre.

Inlet opens  $40^\circ$  before top dead centre.

Inlet closes  $70^\circ$  after bottom dead centre.

These points are all given at  $.010$  in. tappet clearance for "350 Bullet," and at  $.012$  in. for the "500 Bullet," "350 Clipper" and "Works Replica." It is important that these clearances should be used when checking, as the first part of the valve lift is comparatively slow and a small variation in clearance considerably alters the opening and closing points. For running, set to the clearances given in para. 27.

The joint between the halves of the crankcase should be made with shellac, seccotine, or a similar jointing. The timing cover joint must be made with the special washer between the surfaces.

When replacing the tappets and guides note that the longer tappet operates the exhaust valve.

If the oil pumps have been stripped down, see that they are assembled correctly—the large plunger goes in the return pump, which is the one in front of the timing cover. Do not omit the spring washer between the pump disc and the cover plate. This is essential to the correct functioning of the pump.

**32 Ignition Timing.** Early "350 Bullet" and "500 Bullet." The setting of the ignition depends upon the position of the sprocket relative to the magneto shaft.

To obtain access to the magneto sprocket it is necessary to remove the timing cover.

The sprocket is built into the automatic advance device and is mounted on a smooth taper on the magneto shaft. It is held in position by a nut (right-hand thread).

To remove the sprocket and auto-advance device, unscrew the nut and screw in Extractor W14835 which will withdraw the sprocket from the shaft.

Before setting and timing, adjust the contact breaker points to a clearance of  $.012$  in. when fully opened.

Because of the auto-advance mechanism, the timing is normally in the "retard" position when the engine is stationary.

Rotate the two halves of the coupling relatively to each other against the springs, i.e., into the "advance" position, and hold it in this position with a piece of wire.

To set the timing, turn the engine until the pistons are  $\frac{1}{2}$  in. to  $\frac{7}{16}$  in. ("350 Bullet") and  $\frac{3}{8}$  in. to  $\frac{5}{16}$  in. ("500 Bullet") before top dead centre on the compression stroke, i.e., with both valves closed.

Insert a thin piece of tissue paper between the points of the contact breaker and turn the magneto forwards until the paper can just be pulled out.

Tighten the sprocket and auto-advance device on to the magneto shaft; taking care that it does not slip.

Remove the piece of wire holding the auto-advance mechanism.

The timing can be checked by removing the cap from the magneto and holding the cam in the advanced position, which is  $\frac{3}{8}$  in. before top dead centre, without the necessity of taking off the timing cover.

**"350 Bullet," "500 Bullet," 1960 onwards, and "350 Clipper," 1958 onwards.** The engine must be checked and set in the fully retard position.

Gap setting should be  $.015$  in. to  $.018$  in. and the engine should be timed so that the contacts are on the point of opening when the piston is  $\frac{1}{8}$  in. before T.D.C. (all three models) on the compression stroke.

The best way to check the opening point is to switch on the ignition and rotate the engine slowly until the ammeter needle returns to its central position.

“BULLET,” “350 CLIPPER” AND “WORKS REPLICA”

To adjust the timing, slacken the clamping bolt on the contact breaker housing and rotate the housing. If the timing cover has been dismantled, start with the contact breaker housing so that the name on the cover is roughly horizontal.

“Works Replica,” 1958 onwards. The setting of the ignition depends upon the position of the sprocket relative to the magneto shaft.

To obtain access to the magneto sprocket it is necessary to remove the timing cover.

The sprocket is mounted on a smooth taper on the magneto shaft. It is held in position by a nut (right-hand thread).

To remove the sprocket, unscrew the nut and screw in Extractor W14835, which will withdraw the sprocket from the shaft.

Before setting and timing, adjust the contact breaker points to a clearance of .012 in. when fully opened.

To set the timing, turn the engine until the piston is  $\frac{7}{16}$  in. before top dead centre on the compression stroke, i.e., with both valves closed, and ignition fully advanced.

Insert a thin piece of tissue paper between the points of the contact breaker and turn the magneto forwards until the paper can just be pulled out.

Tighten the sprocket on to the magneto shaft; taking care that it does not slip.

33 **Sparkign Plugs.** The following are the plugs which we have found most suitable for these models for normal road work, and for Reliability Trials with the standard compression ratio:—

“350 Bullet” and “350 Clipper.”

Lodge H14. K.L.G. F70. Champion L7 or L10.S.

“500 Bullet.”

Lodge HLN. K.L.G. FE80. Champion N5 or NA-8.

“Works Replica” Trials Model.

Lodge HN.

“BULLET,” “350 CLIPPER” AND “WORKS REPLICA”

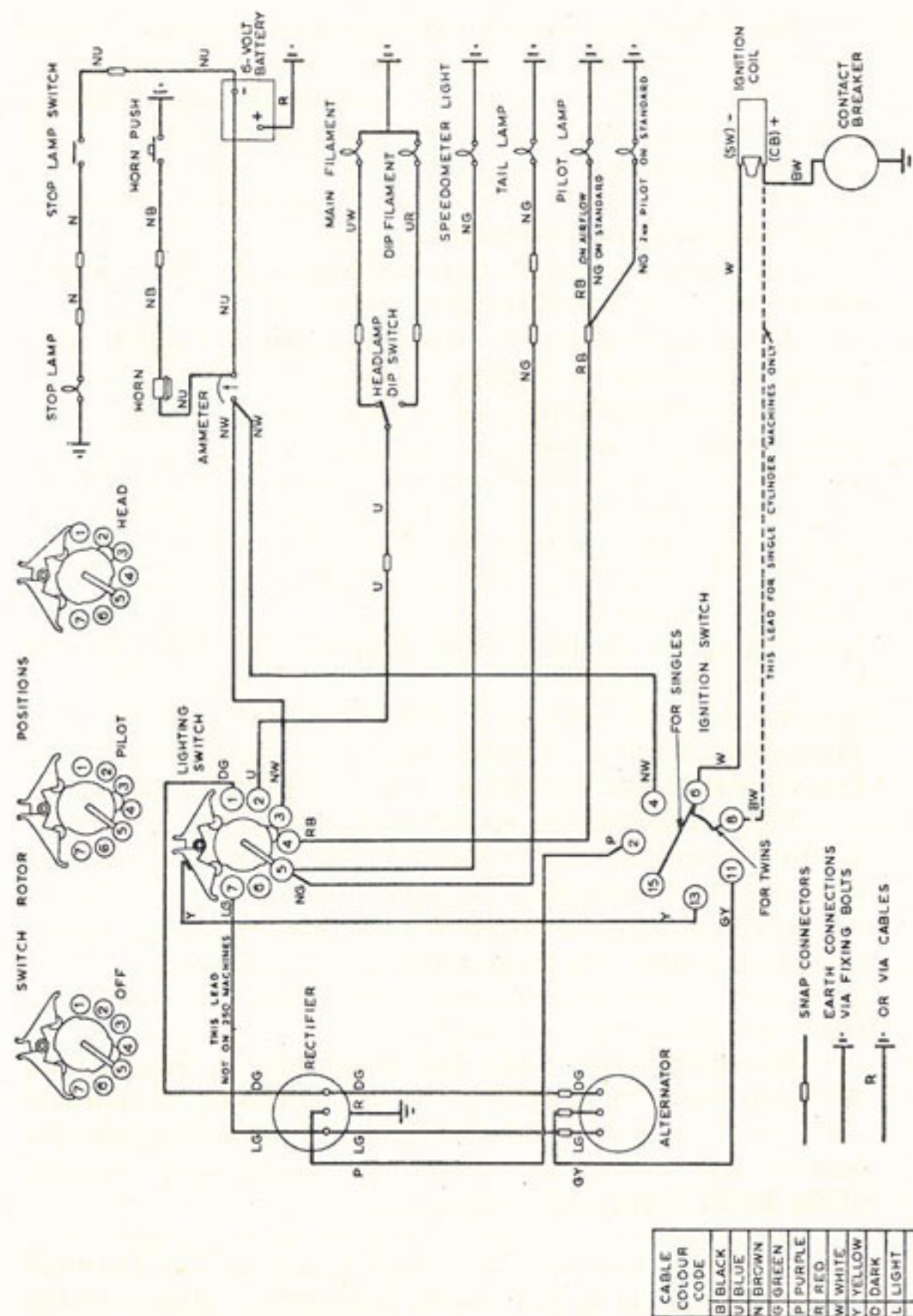


Fig. 7—Wiring Diagram.

W084 941 11

34 **Lighting Set.** The battery on a new model is sent out "dry-charged." It must be filled with sulphuric acid of density 1.270 (1.210 in temperatures above 90°F.) made by adding one volume of acid density 1.835 to 2.9 volumes of distilled water (4.0 volumes of water to obtain acid density of 1.210). Acid should always be added to water, not vice-versa.

It is important that each cell should be filled in one operation to the top of the separators.

Allow the battery to stand at least one hour after filling before putting it into service. If time permits, a short freshening charge of not more than four hours at 1.0 amp. may be given.

The alternator on the machine will keep the battery well charged provided the motor cycle is not left standing for excessive periods with the lights on.

The following are the correct bulbs for use in the head and tail lamps:—

**Head lamp (main light twin filament),** 6 volts—30×24 watts, pre-focus type.

**Stop-tail lamp,** 6 volts—3×18 watts, S.B.C.

**Pilot lights,** 6 volts—3 watts, M.B.C.

**Speedometer light,** 6 volts—1.8 watt (.3 amp.), M.B.C.

When the lighting switch is in the "high" position, a finger-operated switch on the left handlebar can be used to dip the light. The speedometer is illuminated when either the main or pilot bulbs are on.

The various wires or leads in the system should be examined occasionally to make sure that they have not become disconnected or chafed.

The acid level in the battery should be maintained at the top of the separator by the addition of distilled water at regular intervals. **Regular attention to the battery and wiring will ensure the satisfactory working of the lighting system.**

35 **Monobloc Carburettor.** This is a simple instrument having integral float and mixing chambers. Access to the float is gained by removing the three screws holding the float chamber cover. Between the latter and the body is a gasket which must not be damaged.

The nylon float needle seats in the feed member which is screwed into the carburettor and is provided with a fine gauze filter.

Below the instrument is the jet holder screwed into the jet block. The latter should never need removal. Into the bottom of the jet holder the main jet is screwed and may be reached simply by removing the cap nut below it. The jet holder will have to be removed to reach the needle jet which is screwed into the top of the jet holder. A smaller cap nut covers the pilot jet which may be unscrewed with a screwdriver for cleaning purposes. At right angles to this jet is the spring-loaded pilot air screw by means of which the slow running may be adjusted. A similar, rather larger screw forms a throttle stop by means of which the throttle may be set so that the engine ticks over when the twist grip is fully home. The throttle slide carries a taper needle, raising or lowering which enriches or weakens the fuel mixture. An air slide, operated by a handlebar lever, is used, primarily for starting from cold. Beyond keeping the feed pipe gauze clean, the float needle seating and all jet orifices clear, and the possible adjusting of the slow running, the carburettor is not likely to need attention. Do not fit a smaller main jet in the attempt to improve fuel consumption.

#### WARNING

In view of the possibility of petrol from a slightly flooding carburettor running through the induction system—it is desirable that the petrol tap is turned off when the machine is left standing for more than a few minutes—otherwise dilution of the lubricating oil may result in excessive engine wear.

The following are the correct carburettor settings:—

"350 Bullet," "350 Clipper" and "Works Replica"	"500 Bullet"
Main Jet c.c.	220 with Air Cleaner (250 without Air Cleaner)
"350 Bullet" only	
Needle Jet	106

Needle Position	3	Needle Position	3
Throttle Valve	376/4	Throttle Valve	389/3½
Pilot Jet c.c.	30	Pilot Jet c.c.	30

Full particulars of the carburettor are given in a booklet issued by the makers.

- 36 **Air Cleaner** (where fitted). The air cleaner ensures that no dust or grit reaches the interior of the engine, thus preventing rapid wear of the cylinder. The air cleaner **does not cause any loss of speed.** This contains a dry felt element which **must not be oiled.** It is cleaned by brushing and blowing with compressed air. On the "Works Replica" model, the air cleaner should be washed in petrol and allowed to dry before refitting.

### TRANSMISSION

- 37 **Enfield Four-Speed Gear.** This gearbox is very simple in operation and provided it is kept well lubricated will give long and trouble-free service. A **special feature is that the gears are controlled by a single striking fork so that it is quite impossible to engage two gears at once no matter how much wear has taken place.**

The foot control lever is mounted directly on the box and consequently the gear cannot get out of adjustment. It may, however, be found that the gear control lever is too close to, or too far from the footrest. In this case, slacken the pin securing the lever to the operating mechanism on the box, remove the lever and replace it one serration higher or lower as required.

On these machines a **special neutral finder lever** is fitted. This enables neutral to be found immediately from second, third or top gears. Forward and downward travel of this lever is limited by a stop sleeve. If the lever fails to locate neutral, loosen the hexagon-headed screw which secures the sleeve, and turn the latter. The sleeve is eccentric so that rotating it adjusts the position of the neutral finder at the end of its travel.

On the "Works Replica" Trials model, overall gear ratios may be altered by the fitting of countershaft sprockets having 15, 16, 18 or 19 teeth. These are available together with gears which provide a variety of internal ratios. Details may be obtained on application. A neutral finder is not fitted to the "Trials" gearbox.

- 38 **Clutch.** The clutch is of the multi-plate type. If clutch slip occurs, first make sure that there is some slack in the control wire (see next paragraph). If this is in order, the clutch plates should be examined. To do this remove the front half of the primary chaincase and unscrew the three pins near the centre of the clutch. The springs and plates may now be lifted away. If the inserts are worn flush with the metal or are burnt, they should be renewed. If the machine has been run for some time with a slipping clutch, new springs as well as new inserts may be required.

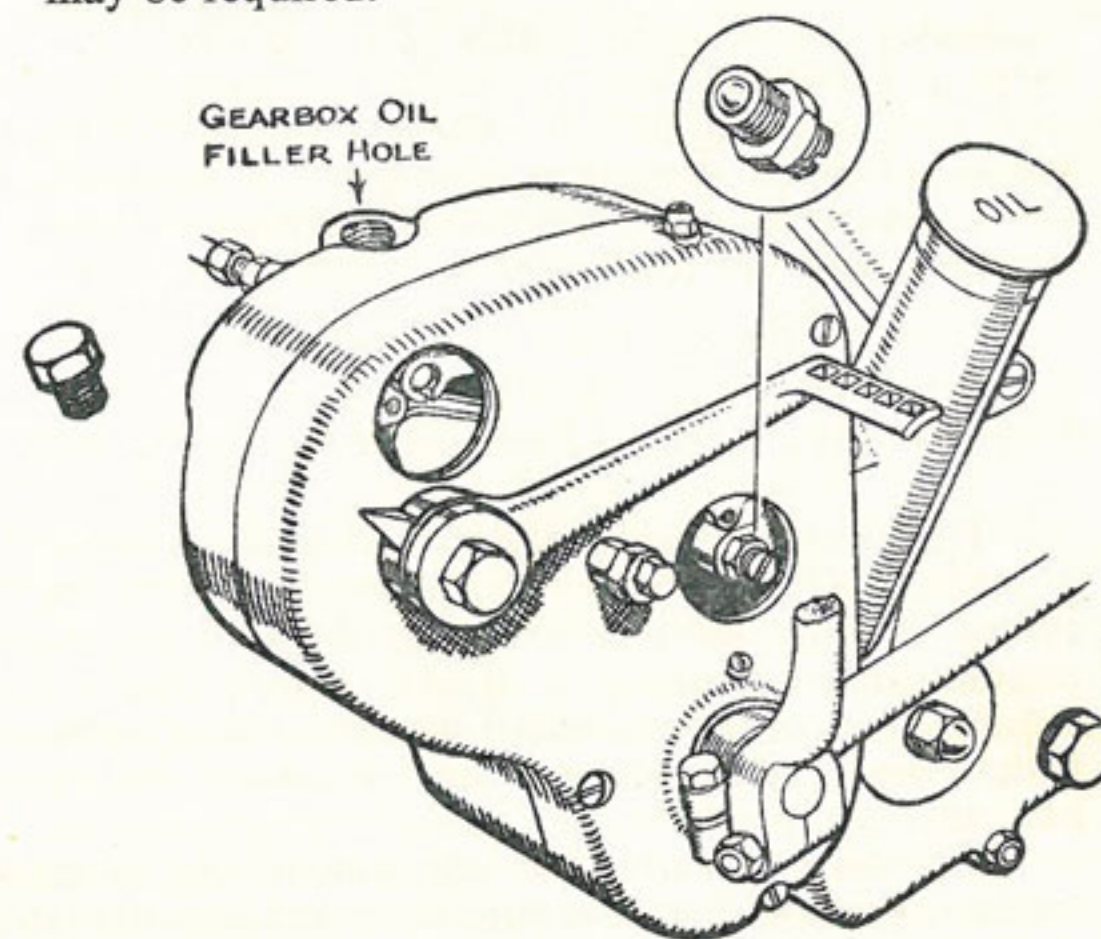


Fig. 8—Clutch Lever and Cable Adjustments ("350 and 500 Bullets" and "350 Clipper")

- 39 **Clutch Control.** "350" and "500 Bullet," and "350 Clipper." On the gearbox end cover are two inspection holes covered by metal discs. The upper one of these gives access to the cable end of the clutch operating lever, which should have  $\frac{1}{16}$  in. free movement. This is important if clutch slip and subsequent damage to the clutch plates are to be avoided.

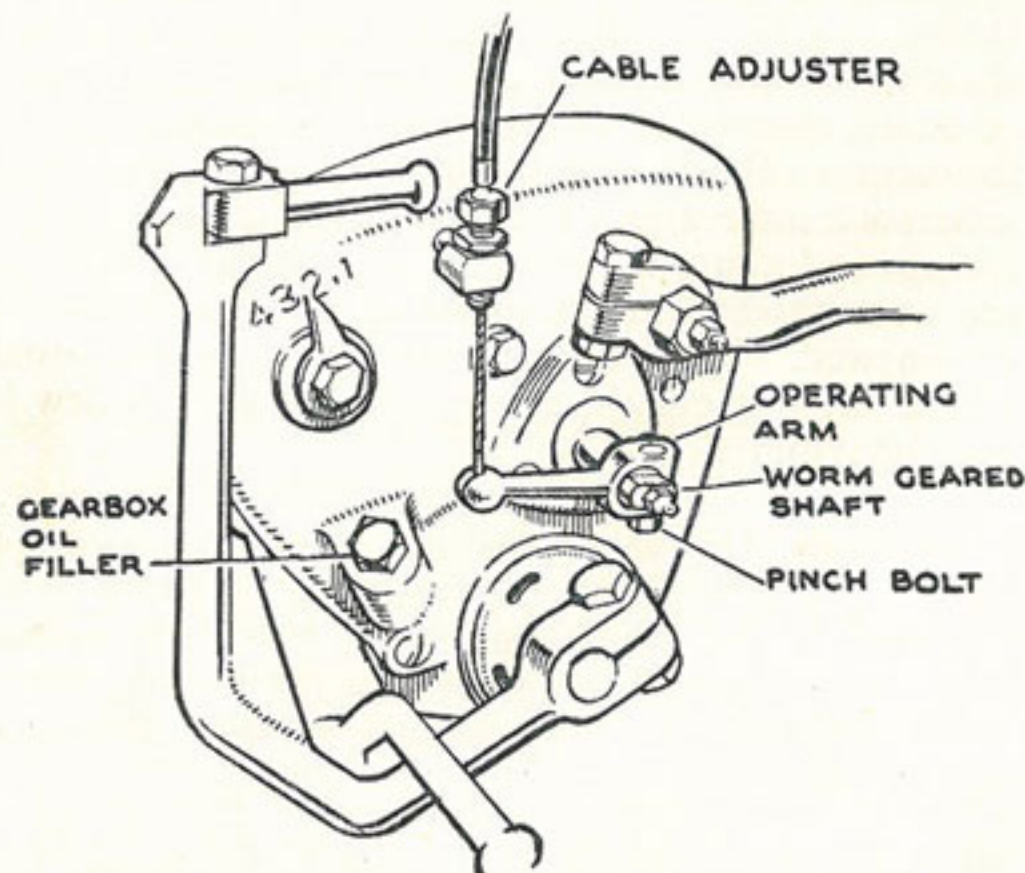


Fig. 9—Clutch Lever and Cable Adjustments (Trials "Works Replica")

The lower hole gives access to the adjustment which is made by slackening back the nut and screwing the slotted adjuster inwards or outwards until the desired clearance is obtained.

There is also an adjuster for the clutch cable just behind the oil filler and this is used to take up stretch that may occur in the cable.

**"Works Replica."** For adjustment on this model, slacken the pinch bolt securing the operating lever to its shaft, and rotate the shaft by means of a spanner on the flats provided for this purpose. This shaft rotates on a

worm type thread, and by turning in a clockwise direction it is moved in towards the gearbox, so reducing the free movement, and vice versa.

Turn the shaft in an anti-clockwise direction, half a turn or so, in order to ensure free movement in the withdrawal mechanism. Then turn the shaft in a clockwise direction until resistance is felt. Turn back a quarter of a turn to give the necessary free play. Push the operating lever downwards to ensure that the handle bar lever is fully home, and tighten the pinch bolt. If, after checking, there is not quite the correct amount of free movement, this can be rectified at the cable adjuster on the gearbox. There should be approximately  $\frac{1}{8}$  in. free movement at the hand lever before clutch spring tension is felt.

It is important to keep the end of the clutch push rod and the ball in the end of the adjuster screw well greased.

**NOTE.** Owing to the initial bedding down of the clutch friction material, it frequently happens that the clearance in the clutch control is taken up during the first few hundred miles with a new machine. This point should therefore be examined soon after delivery and adjustment made if necessary.

- 40 **Patent Cush Drive Rear Hub.** All Royal Enfield four-stroke motor cycles are fitted with a patent cush drive rear hub, which takes up the drive from the countershaft to the rear wheel with great flexibility and smoothness. This hub has a marked effect on the running of the machine, absorbing all engine shocks and preventing any snatching of the driving chain, consequently minimising wear on the rear tyre. The drum on the driving side of the rear hub is provided with three metal vanes, and the inside of the driving sprocket has three similar vanes. On each side of the vanes in the hub is placed a block of solid rubber, and the vanes on the inside of the driving sprocket fit between these blocks. When in position there is a block of rubber and a metal vane alternately.

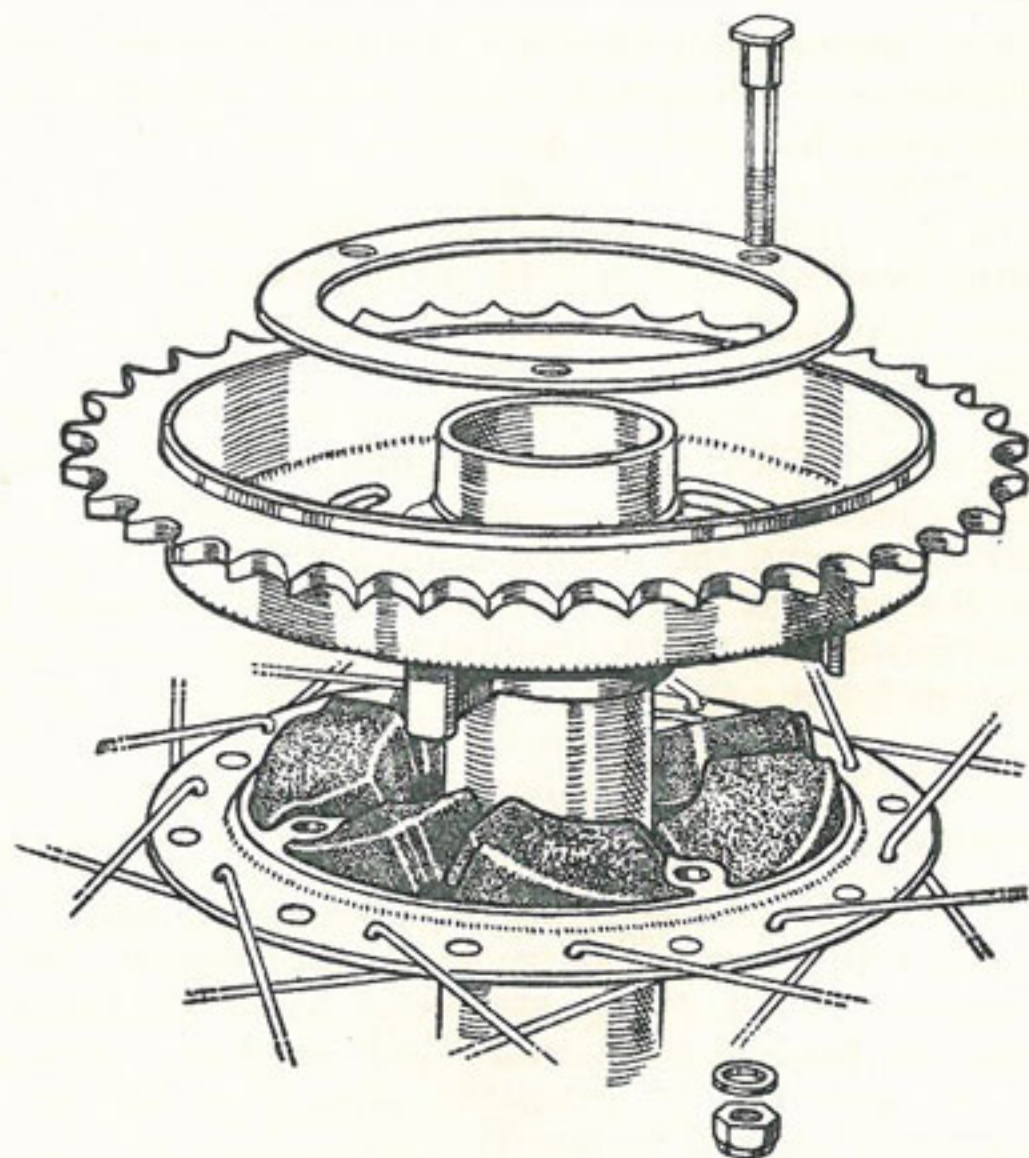


Fig. 10—In assembling the cush drive hub, set the rubbers against each other, as shown, to provide a lead for the vanes

This cush drive hub is so simple that the only parts likely to wear are the lock ring and rubber blocks which, however, will last a considerable time. Examine every 10,000 miles and renew if necessary.

To renew rubbers, or refit them if the cush drive has been dismantled, place the rubbers in the hub leaning at an angle against each other as shown in the illustration in Fig. 10. Insert the opposing vanes between them, having first coated the vanes lightly with soap—not oil—to ease their entry. Administer a good hefty blow (though not too heavy to cause damage) to drive the vanes home, put on the sprocket lock ring, and secure it with the nuts and washers.

- 41 **Adjustment of Chains.** The duplex primary chain is provided with a curved slipper type of adjuster which is accessible after removing the chain cover which is secured by a single nut.

The slipper adjuster is provided with a set screw and locknut which should be adjusted so that there is about  $\frac{1}{4}$  in. up and down free movement in the top run of the chain.

The rear chain is adjusted by means of cam-shaped adjusters on the rear wheel spindle. These bear against fixed pegs in the fork ends. Any adjustment is made by slackening the spindle nuts and brake anchor nut and turning the cam plates until the required chain tension is achieved. Test this by spinning the wheel and feeling the up and down play as described for the front chain. In this case, however, allow  $\frac{1}{2}$  in. movement. Move each cam plate the same number of notches to maintain correct wheel alignment. If the wheels can be lined up only by having one adjuster engaging a different notch from the other, check the chain line and if this is correct all will be well, but if wheel alignment and chain alignment cannot be achieved together, the probability is that the frame has been bent as a result of some mishap.

After adjusting the rear chain, the rear brake operating rod may also require adjustment. Should it be necessary to remove this chain, it is important that, when replacing the connecting link, the spring fastening is so fitted that the split end points in the opposite direction to that in which the chain travels.

- 42 **Brake Adjustment.** Rear brake adjustment is carried out by means of a wing nut at the end of the brake-operating rod. Two milled nuts beneath the outer casing of the brake cables adjust the front brakes. In either case, screw up the adjuster until the brake is hard on, then gently slacken back until the wheel will spin freely without any trace of the brake shoes rubbing the drums. Adjust each side of the brake equally so that the compensating device at the handlebar lever is square with the bar when the brake is applied. The brake arms, splined

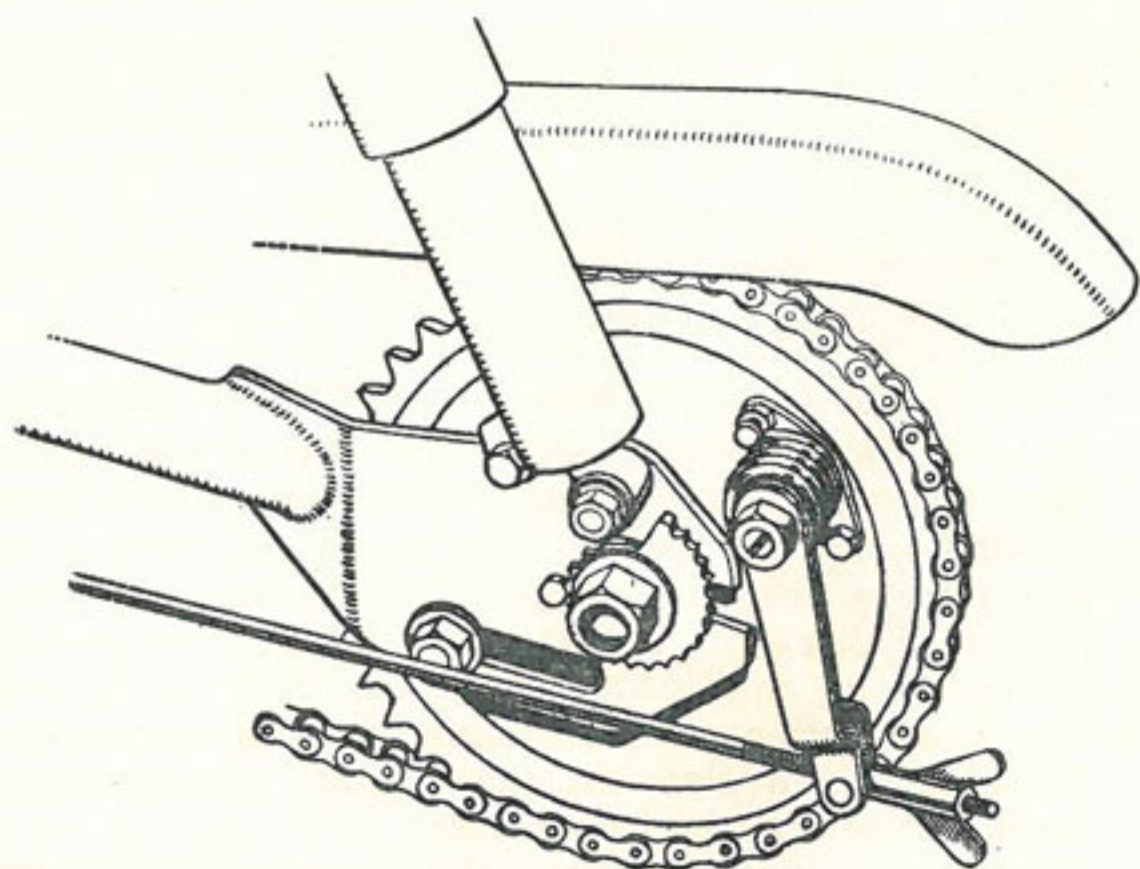


Fig. 11—The rear chain is adjusted by slackening the wheel spindle nuts and turning the notched cam plates on either side of the wheel fork. A wing nut on the end of the brake rod adjusts the rear brake

to the cam spindles, may be removed and turned to engage the splines in a different position. In this way a further means of brake adjustment is possible.

Both wheels have deep groove journal ball races which require no adjustment.

The "500 Bullet" has the dual front brake with the two adjustments, but the "350 Bullet," "350 Clipper" and "Works Replica" have a single front brake with a single adjustment nut.

- 43 **Steering Head Adjustment.** Take the weight off the front wheel by placing a box or block beneath the crankcase. Loosen the clamp or wedge bolt with a special key placed in the internal hexagon of the nut beneath the handlebar clip. Loosen also the two clamp bolts securing the main tubes of the fork legs to the fork

crown. Take up play in the head bearing by tightening down the large, central nut just behind the speedometer. Do this gently and test, meanwhile, for diminution in shake. When correctly adjusted, there should be no perceptible play, but the steering must be perfectly free so that the wheel and fork assembly will fall over to full lock when given the slightest push in either direction. Tighten all three clamp bolts after making the adjustment.

"Works Replica." The clamp bolt on this model is the long one just below and parallel with the handlebars.

### TELESCOPIC FRONT FORK

- 44 **Construction.** A light alloy casting, known as a "Casquette," houses the head lamp, parking lamps, ammeter, switch and speedometer.

The ammeter, switch and small lamps are held in place by rubber sleeves and the lamp glasses of the small lamps are held in rubbers which are tightened on to them by the plated rims.

Each fork leg is thrust upwards into this light casting and the main tubes are screwed into it, a key, fitting into an internal hexagon at the top of each tube, being used for the purpose. The main tubes are further secured by clamp bolts at the fork crown, and a wedge bolt holds the steering head stem at the upper end. This latter is accessible from behind the handlebar mounting.

Between the top tube covers—which are part of the "Casquette"—and the fork crown are rubber washers which allow for any variation brought about by adjustment of the head bearings.

The bottom or sliding tube encases the lower part of the main tube and has, screwed to its upper end, an oil seal housing which, besides containing the oil seal, retains the top bush in the sliding tube. Screwed into the base of the main tube is a valve port which also secures the bottom bush.

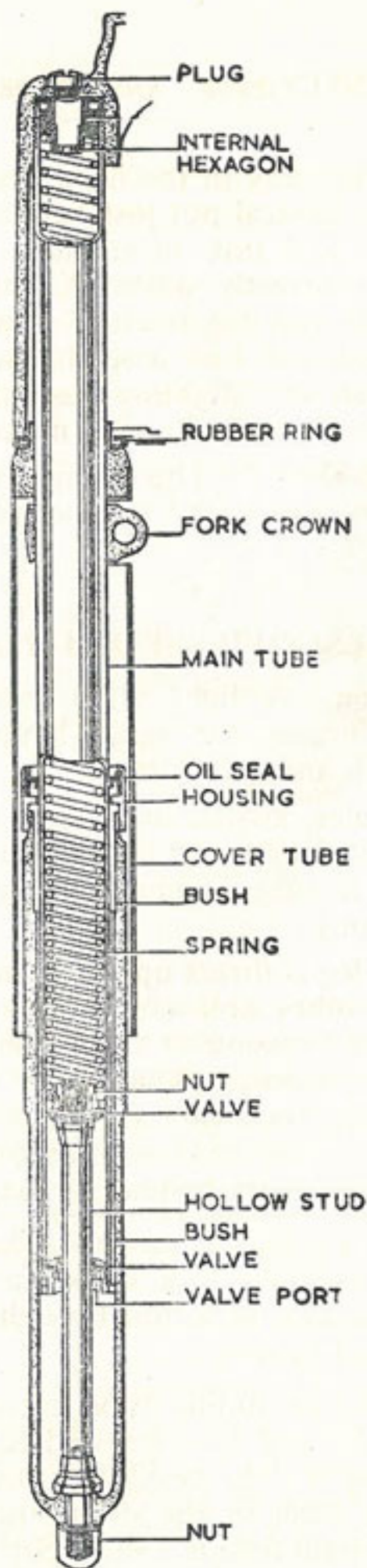


Fig. 12—Telescopic Front Fork

---

 "BULLET," "350 CLIPPER" AND "WORKS REPLICA"
 

---

In this fork a two-phase spring is used, and it abuts against spring guides at top and bottom.

Thrusting upwards from the base of the sliding tube is a hollow spring stud which passes through the bottom valve port and has the bottom spring guide attached to its upper end by a nut. This spring guide has a ring of ports similar to those in the bottom valve port and each ring of ports is controlled by a valve plate or flap valve.

As the spring is compressed, both valve ports remain open, oil passes freely through them and no damping is achieved. Under very severe shocks, however, an oil control collar at the base of the sliding tube comes into play, trapping oil, and forming a cushion to check movement. On the rebound, both flap valves close and oil is forced to return through very restricted passages, thus damping the rebound movement of the fork.

- 45 **Dismantling.** Remove the wheel, having first disconnected the brake cable. Remove the screwed plugs from the "Casquette" above the fork legs, slacken the clamp bolts which hold the main tube in the fork crown, and then, using the special key, unscrew the fork main tube from the "Casquette." The bottom tube, main tube and all internal parts may now be withdrawn downwards. During this operation, it will, of course, be necessary to support the engine on a suitable block or box.

Remove the nut from below the bottom sliding tube and, with a tin below the fork leg to catch escaping oil, tap the hollow bolt upwards with a hammer and a soft drift. Allow the oil to drain away. Unscrew the oil seal housing from the top of the sliding tube and slide it clear of the main tube together with the top bush. The sliding tube can now be slid downwards off the main tube. Unscrew the bottom valve port from the main



tube, thus freeing the bottom bush and slide it over the lower end of the hollow stud. Remove the stud from the main tube and, if desired, unscrew the nut from the top of the stud to remove the valve port.

**Front Fork.** On the "350 Bullet," "350 Clipper" and "Works Replica," the wheel is held by two fork end caps. These will have to be removed and the stud now protruding from the centre of the fork leg should be tapped upwards. Other dismantling should be carried out as described above.

### REAR SUSPENSION

- 46 **Rear Suspension Units.** Each spring unit may be removed by undoing the retaining bolts top and bottom. Rubber bushes at either end may be pressed out and new ones fitted in case of wear, and the springs also may be renewed. To do this, push the cover down—preferably with the aid of a press—lift out the collar at the top, lift up the outer spring cover and then the spring.

### MISCELLANEOUS

- 47 **Removal of Wheels. Detachable Rear Mudguard.** To facilitate tyre repairs and the removal of the rear wheel, the rear mudguard on these machines is made quickly detachable, it being only necessary to remove the two nuts securing the dual seat supporting bracket and front end of the lifting handles to the top of the rear spring box attachment bracket. The dual seat and rear portion of the mudguard can then be lifted off. Having done this, remove the nut on the pin retaining the brake anchor plate and the brake adjusting wing nut, disconnect the rear chain at the spring link, disconnect the speedometer cable, loosen the spindle nuts and slide the wheel out of the slotted fork end, tilting it slightly to disengage the brake anchor pin from its slot.

To remove the front wheel, place the machine on the stand, disconnect the front brake, remove the nuts securing the caps to the fork ends, lift the front of the

machine and the wheel will drop out. The central stand is sufficiently near the point of balance for the machine to stand on it and either the front or rear wheel with the other one removed.

- 48 **Quickly Detachable Rear Wheel.** The main portion of this wheel can be removed from the machine without disturbing the chain, or the rear brake operation and anchorage.

Place the machine on the centre stand and remove the detachable rear mudguard. Unscrew the right-hand spindle nut and withdraw the loose section of the spindle together with the chain adjuster cam, preferably marking this to ensure that it is replaced in the same position. Slide the distance collar out of the fork end and lift away the speedometer drive gearbox which can be left attached to the driving cable. Remove the spacing collar and felt washer. The main body of the wheel can now be pulled across to the right-hand side of the machine, thus disengaging the six driving pins from the cush drive shell and enabling the wheel to be lifted out of the machine.

When replacing the wheel reverse the foregoing procedure, taking care, when replacing the speedometer drive gearbox, 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.

To remove the wheel complete with sprocket and brake drum first disconnect the rear driving chain and remove the brake cover plate anchor nut and the brake adjusting wing nut. Unscrew the loose section of the spindle two or three turns and the left-hand spindle nut by a similar amount. 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.

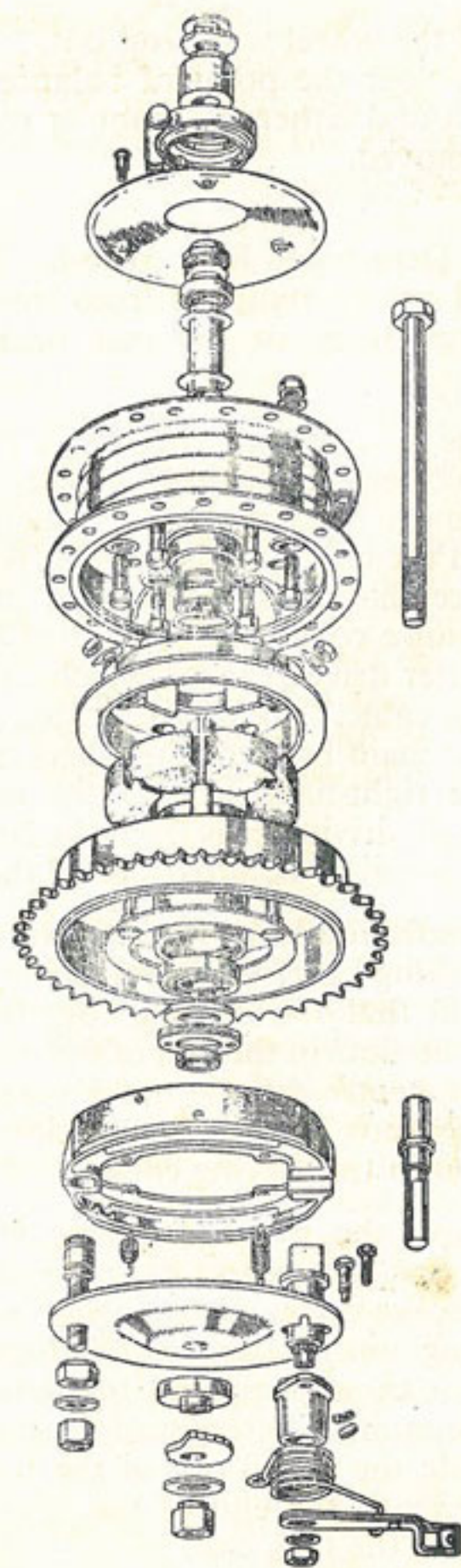


Fig. 13—Exploded View of Q.D. Rear Hub

- 49 **Removal of Tyres.** The wired-on tyres fitted are easily removed if the correct procedure is adopted. Deflate the tyre by unscrewing the inside of the valve with the key formed on the dust cap. Remove the milled lock-nut securing the valve to the rim. At a point opposite the tyre valve, press the walls of the tyre down into the well in the centre of the rim, and work the walls down into the well as far as possible in either direction. It will then be found possible to lever the cover off, starting at a point near the valve and working in either direction. When replacing the cover reverse this procedure, starting opposite the valve and finishing close to it with the tyre at the opposite side of the wheel pressed down into the rim. When only slightly inflated, see that the wired edges are in their proper places, not down in the well. As a check on this, examine the fine line moulded on the wall of the tyre near the rim. This should be about a quarter of an inch from the rim, all the way round.

It is not always appreciated that punctures in the rear tyre can be repaired with the wheel in position. If the puncture is caused by a nail or similar object, whose position is known, it will be found convenient to remove the mudguard, leave the wheel in position, remove one side of the cover and expose sufficient of the tube to enable the puncture to be repaired.

When a pillion passenger is carried or when a side-car is attached, tyre pressure should be increased to carry the extra load. The precise pressure for each wheel will depend upon the load on that particular wheel, but we give the following recommendations of minimum pressures for the guidance of owners.

**"350 Bullet" and "350 Clipper."**

Front: 18 lb. per sq. in.

Rear: 23 lb. per sq. in.; if pillion passenger carried,  
32 lb. per sq. in.

**"500 Bullet."**

Front: 18 lb. per sq. in.

Rear: 23 lb. per sq. in.; if pillion passenger carried,  
32 lb. per sq. in.

**With Single-Seater Sidecar.**

Front: 22 lb. per sq. in.

Rear: 25 lb. per sq. in.

Sidecar Wheel: 16 lb. per sq. in.

If a pillion passenger is carried in addition to a sidecar then the rear tyre pressure should be increased to not less than approximately 32 lb. per sq. in.

**50 Expanding Hub Brakes.** Brake adjustment has already been dealt with and there is little to say except that Royal Enfield front brakes have their cam spindles mounted in the cover plates in such a manner that they are not rigidly anchored, but are free to float within a certain limit. This means that when the brake is applied, the shoes centralise themselves and make positive contact with the drum surfaces all round.

Should more rapid wear of the lining on the leading shoe be noticed, this does not indicate a fault. It is due to the servo action of this shoe and is to be expected.

**51 Wheel Bearings.** The bearings of both wheels are single row, deep groove journal races. These have been proved by extensive tests to be superior to cup and cone bearings and are adequate to deal with both radial and thrust loads. They require no adjustment.

**52 Cleaning.** The enamelled portions of the machine are best cleaned with cold water, using a brush for the wheels. A hose pipe is the ideal, but if buckets must be used, the parts can be prevented from drying with a "smeary" finish by swilling several buckets of cold water over the machine after washing.

The engine, gearbox and any other parts which are greasy should be brushed with paraffin.

We recommend the use of "Autobrite" for enamel parts and polished alloy parts. For chromium, we recommend "3-IN-ONE" Stop Rust Chrome Cleaner.

**A DOZEN DON'TS FOR DRIVERS**

**DON'T** let in the clutch with a jerk. This practice places unfair strains on the engine, transmission and tyres.

**DON'T** leave the brakes alone till the last moment and then have to apply them hard. This is only asking for skids and tearing miles off your tyres.

**DON'T** slam the throttle open suddenly. Give your machine an easy life and it will repay you.

**DON'T** drive on the decompressor. Its purpose is to help in starting and stopping the engine.

**DON'T** slip the clutch to save changing gear. The clutch is for use, but this is abusing it.

**DON'T** be afraid of the lower gears. They also are for use. On the other hand—

**DON'T** race the engine in a low gear when it will readily pull a higher one. This is abuse.

**DON'T** try to economise in grease or oil. They are cheaper than repair bills.

**DON'T** neglect the essential adjustments, particularly the tappets and the clutch control. If you do—

**DON'T** blame the makers for the inevitable consequences.

**DON'T** run your tyres too soft. They are expensive, but air is cheap.

**DON'T** hesitate to consult our Service Department at any time.

“BULLET,” “350 CLIPPER” AND “WORKS REPLICA”

## MOTOR CYCLE GUARANTEE

### TERMS & CONDITIONS OF SALE

1. In this Guarantee the word “machine” refers to the new motor cycle, scooter, motor cycle combination or sidecar, as the case may be, purchased by the Purchaser.
2. In order to obtain the benefit of this Guarantee, the Purchaser must correctly complete the registration form and return it to us within fourteen days of the purchase.
3. We will supply, free of charge, a new part in exchange for, or, if we consider repair sufficient, will repair free of charge any part proved within six months of the date of purchase of any new machine, or within three months of its renewal or repair in the case of a part already renewed or repaired, to be defective by reason of our faulty workmanship or materials. We do not undertake to bear the cost of fitting such new or repaired part or accessory.
4. Any part considered to be defective must be sent to our Works, carriage paid, accompanied by the following information:—
  - (a) Name of Purchaser and his address.
  - (b) Date of purchase of machine.
  - (c) Name of dealer from whom the purchase was made.
  - (d) Engine and frame numbers of machine.
5. This Guarantee shall not extend to defects or damage appearing after misuse, neglect, abnormal stress or strain, or the incorporation or affixing of unsuitable attachments or parts and in particular:—
  - (a) Hiring out.
  - (b) Racing and competitions.
  - (c) Adaptation or alteration of any part or parts after leaving our Works.
  - (d) The attaching of a sidecar in a manner not approved by us or to an unsuitable motor cycle.

This Guarantee shall not extend to machines whose trade mark, name or manufacturing number has been altered or removed, or in which has been used any part not supplied or approved by us, or to tyres, saddles, chains, speedometers, revolution counters, and electrical equipment or to parts supplied to the order of the Purchaser and different from our standard specification.

6. Our liability and that of our dealer who sells the machine shall be limited to that set out in paragraph 3 and no other claims, including claims for consequential damage or injury to person or property, shall be admissible.

All other conditions and warranties statutory or otherwise and whether express or implied are hereby excluded and no guarantee other than that expressly herein contained applies to the machine to which this Guarantee relates or any accessory or part thereof.

### REPAIRS GUARANTEE

1. While the highest standard of workmanship and materials is aimed at, we cannot accept liability for any defects appearing more than three months after the machine, assembly or component, has left our Works after being repaired.
2. We will repair or replace, at our option, free of charge any defective work, materials or parts relating to the repairs carried out by us appearing within that time but shall not be under any further or other liability for any other loss or damage whether direct or consequential and our liability shall be limited to the cost of so making good.
3. We do not accept liability in respect of parts of proprietary manufacture; e.g. tyres, saddles, chains, speedometers, revolution counters and electrical equipment which may be used by us in effecting a repair. All other conditions and warranties, statutory or otherwise, express or implied are hereby excluded.

### NOTICE

We do not appoint Agents for the sale on our behalf of our Motor Cycle or other goods, but we assign to Motor Cycle Dealers areas in which we supply to such Dealers exclusively for re-sale in such areas. No such Dealer is authorised to transact any business, give any warranty, make any representations or incur any liability on our behalf.