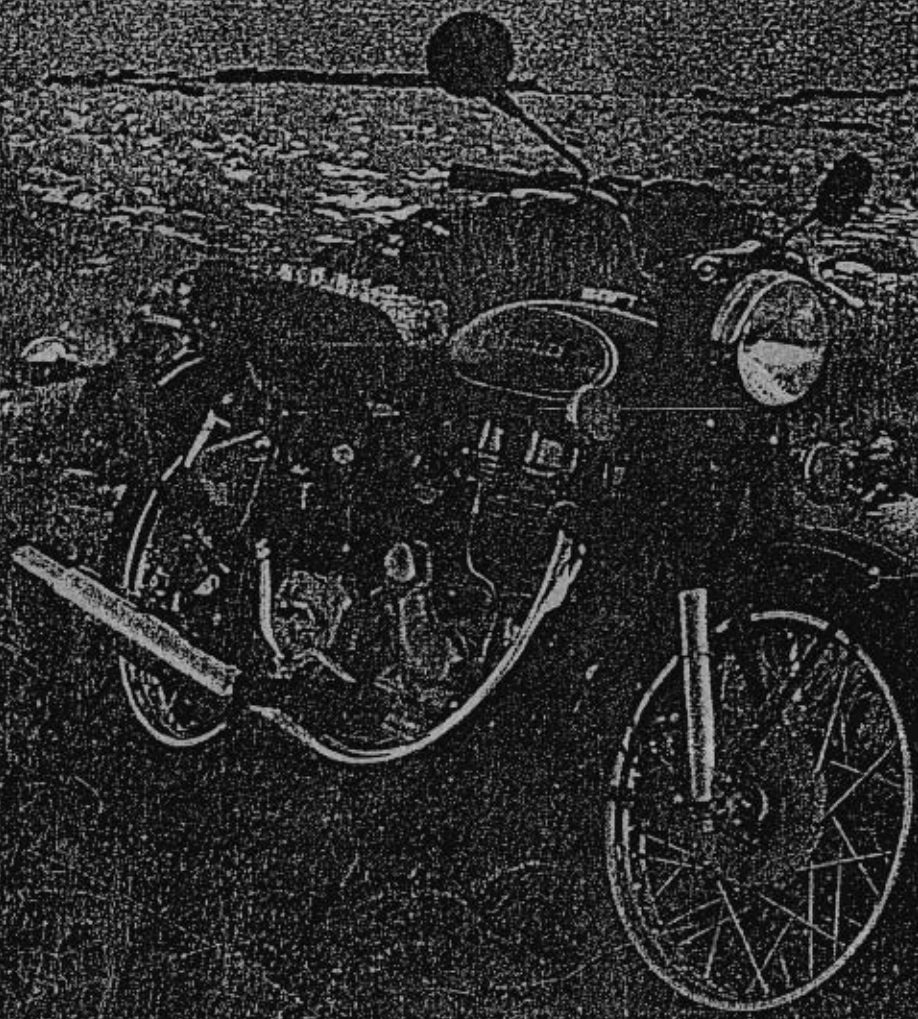
A2

WORK SHOP MANUAL

BULLET



ENFIELD

INDEX

PREFACE

We take pleasure in releasing this Maintenance Manual as a guide to good service. Most of the servicing can well done by the average owner. Numerous diagrammatic Sketches and photo illustrations have been introduced for better understanding. However for an owner who feels uncertain of his ability to, undertake any stripping and re-building for a major overhaul, we strongly recommend that the work be done by an authorised 'ENFIELD DEALER/DISTRIBUTOR. Needless to mention that the use of proper service maintenance tools and genuine Enfield spares will ensure best results.

Whilst every care is taken to ensure that the information in this manual is correct, no liability can be accepted by Royal Enfield or the publisher for loss, damage or injury caused due to errors or omissions in the informations given.

PRECAUTIONS AND GENERAL INSTRUCTIONS

- Observe the following points without fail, when dismantling and reassembling Motor-cycle parts.
- Be sure to replace packings, gaskets, circlips. 'O' rings and cotter pins with new ones, for 'safe riding'.
- Tighten bolts & nuts starting from the larger diameter ones to the smaller diameter and from inside to outside diagonally, with specified tightening torque.
- Use always genuine spares and recommended grade of oils only.
- When using a torque wrench for checking, always loosen the bolt or nut by half turn and then tighten to the specified torque. Never use torque wrench for loosening a bolt or nut.

BUYING SPARE PARTS

When ordering spare parts for your Motorcycle it is advisable to deal direct with the Enfield official dealer/distributor, who should be able to supply most of the parts ex-stock.

Always quote the Engine Number and Frame Number and description of part required. It is advisable to indicate the colour scheme especially while ordering parts for frame, side panels,tank, mudguards, etc.,

ROUTINE MAINTENANCE

Introduction

Periodic routine maintenance is a continuous process that commences immediately after the machine is used. It must be carried out at specified mileage recordings, or an a calendar basis if the machine is not used frequently.

Maintenance should be regarded as an insurance policy, to keep the machine in peak condition and to ensure long, trouble free service.

The various maintenance tasks are described under their respective mileage and period. The intervals between the various maintenance tasks serves only as a guide. As the machine gets older or used under particularly adverse conditions, it would be advisable to reduce the period between each check.

For ease of reference each service operation is described in detail under the relevant heading. In order to carryout the routine maintenance tasks, a good selection of general workshop tools is absolutely essential.

Included in the kit must be a range of metric ring or combination spanners, a selection of phillips head screw drivers and pair of circlip pliers.

No special tools are required for the normal routine maintenance tasks. The tools contained in the tool kit supplied with every new machine will prove adequate for each task, or if they are not available, the tools found in the average household will usually suffice.

Daily

A daily check of the Motorcycle is essential both from mechanical and safety aspects. It is a good idea to develop this checking procedure in a specific sequence so that it will ultimately become as instinctive as actually riding the machine. Done properly, this simple checking sequence will give advanced warning of impending mechanical failures and conditions which may jeopardize the safety of the rider.

- Clean the motorcycle with a clean cloth.
- Check engine oil level,using the dipstick provided in the oil tank cap. Maintain oil level upto 'H' mark. If necessary top up oil to the required level.
- Check proper operations of all controls viz. clutch, accelerator, brakes, all lights and horns.
- Check tyre pressure, with a pressure gauge. Check tyre pressure when the tyres are cold. It is worth purchasing a small pocket pressure gauge which can be relied upon, to give consistent readings than garage forecourt gauges which tend to be less dependable.
- Tyre Pressure Front: 32 PSI - Rear: 36 PSI.
- Check tyres for foreign materials and remove them to prevent possible punctures.
- Check for adequate fuel in the petrol tank, for the journey planned.
- Check for proper charging of the battery after starting the machine.

Monthly - 300 Miles/500 Kms

- Check oil levels - engine & clutch
- Check contact breaker gap and adjust if necessary
- Check and adjust tappet clearance if necessary
- Check clutch, throttle and front brake cables and adjust if excessive play noticed
- Lubricate rear chain
- Adjust front & rear brakes
- Check wheel rims, for excessive runout, breakage of spokes and tyres for cracks or cuts.
- Check condition of battery and electrolyte level, and top up with distilled water upto the level provided.

Tri monthly - 3000 miles/5000 kms

- Clean, and adjust plug gap or replace spark plug.
- Check and service contact breaker points.
- Check and adjust Ignition timing.
- Check and adjust valve tappet clearance.
- Clean airfilter.
- Clean, tune up carburettor.
- Clean fuel tap gauze.
- Clean fuel tank and fuel lines.
- Check and adjust clutch.
- Adjust front & rear brakes
- Check front fork oil level.
- Check all electrical connections and functions of head light, trafficator, horn, speedometer, etc.

Six monthly - 6000 Miles/10,000 kms

Carry out all the operations mentioned for Tri monthly service and check the following:

- Change oil-engine & clutch.
- Clean or replace oil filter
- Change front fork oil
- Check front & rear brake linings and replace if necessary
- Check for play in steering head bearings and adjust
- Check operation of steering lock and lubricate if necessary
- Check operation of side stand and condition of spring.

TECHNICAL SPECIFICATIONS - BULLET - 350 CC

Engine

Single Cylinder 4 Stroke with Overhead Valve

Cubic Capacity	:	346 c c
Stroke	:	90 mm.
Bore-Nominal	:	:70 mm
Actual	:	69.875 mm/2.751 in.
Compression Ratio	:	7.25 : 1
Compression Pressure	:	110 ± 5 PSI (recommended)
Engine output	:	18 BHP / 5625 RPM
Torque	:	2.74 kgm/2875 RPM
Piston and piston rings:		
Ring clearance in grooves	:	(Dimensions for new components)
Plain (2)	:	.001/.003"
Scraper	:	.002/.004"
Ring end gap in bore	:	.015/.020"
Maximum ring gap permissible	:	0.030"
Gudgeon pin diameter	:	.7498/.7500"
Crank pin diameter	:	1.24875/1.249"
Connecting rod small end diameter	:	.7505/.7507"
Crankshaft:		
Driving side Ball bearing	:	25 x 62 x 17 mm (6305)
Roller bearing	:	25 x 62 x 17 mm (NU 305 or N 305)
Timing side Roller bearing	:	25 x 52 x 15 mm (NU205 or N 205R)
Cam lift	:	.3125 in.
Valve lift	:	.3125 in.
Valve timing with .012" clearance		
Exhaust opens	:	75° BTDC
Exhaust closes	:	35° ATDC
Inlet opens	:	30° BTDC
Inlet closes	:	60° ATDC
Rocker bearing inside diameter	:	.625/.626" (Dimensions for new Components)
Rocker spindle diameter	:	.6235/.624"
Inlet valve stem diameter	:	.3425/.3430"
Exhaust valve stem diameter	:	.3405/.3410"
Valve guide internal diameter	:	.3437/.3447"
Valve guide external diameter	:	.6270/.6275"
Tappet guide internal diameter	:	.3752/.3760"
Tappet guide external diameter	:	.7505/.7510"
Lubrication	:	Dry sump, Oil tank integral with crank case
Clutch	:	Wet multiplate,Oil immersed
Engine sprocket	:	25 teeth
Clutch Sprocket	:	56 teeth
Primary drive chain	:	3/8" pitch Duplex chain.

Gear Box:		
Overall gear ratios	:	5.32, 7.26, 9.80, & 14.80
Mainshaft ball bearings	:	Small - 6303
	:	Large - 6206
Final drive sprocket	:	16 teeth
Rear drive chain	:	5/8" pitch chain
Brake drum sprocket	:	38 teeth
Carburettor	:	Mikcarb-VM-24
Main jet	:	90
Pilot jet	:	25
Contact Breaker (Coil ignition):		
Points gap	:	0.14/0.16" (0.35 to 0.4 mm)
Timing before T.D.C.	:	1/32" (0.8 mm)
Spark plug	:	14 mm. diameter B7HS (NGK) or equivalent
Spark plug gap	:	0.46 to 0.50 mm
Condenser (Capacitor)	:	0.18 to 0.25 M.F.D.
Suspension:		
Front	:	Telescopic, hydraulic damping
Stroke	:	155 mm
Rear	:	Pivoted fork with shock absorbers
Wheel Rim Type	:	WM 2- 19
Tyre Size	:	3.25 x 19 (Front)
Wheel Bearings :		3.50 x 19 (Rear)
(Front & Rear)	:	17 x 40 x 12 mm (6203) or 6203 ZZ
Brakes	:	Mechanical, internally expanding shoe type
Front	:	178 mm x 38 mm Twin Leading shoes
Rear	:	153 mm x 25 mm Single Leading Shoe
Fuel tank:		
Full Tank Capacity	:	14.5 litres
Reserve Capacity	:	1.25 litres
Oil Capacity & Grade:		
Oil Tank	:	2.25 litres, SAE 20 W 50
Fork	:	200 ml. on each leg. Hydraulic oil or SAE-10 W 30
Clutch	:	420 ml. approximately SAE20 W 40
Gear box	:	700 grams of veedol '00' grease (for topping up use SAE-20 W 50)
Dimensions:		
Weight (Dry)	:	163Kg.
Pay load (Max)	:	172Kg.
Ground clearance	:	14 cm. (140 mm)
Overall length	:	212 cm (2120 mm)
Overall width	:	75 cm (750 mm)
Saddle Height	:	85 cm. (850 mm)
Wheel base	:	137 cm (1370 mm)
Electricals:		
System	:	12 V DC

TECHNICAL SPECIFICATIONS - BULLET - 500 CC

Engine

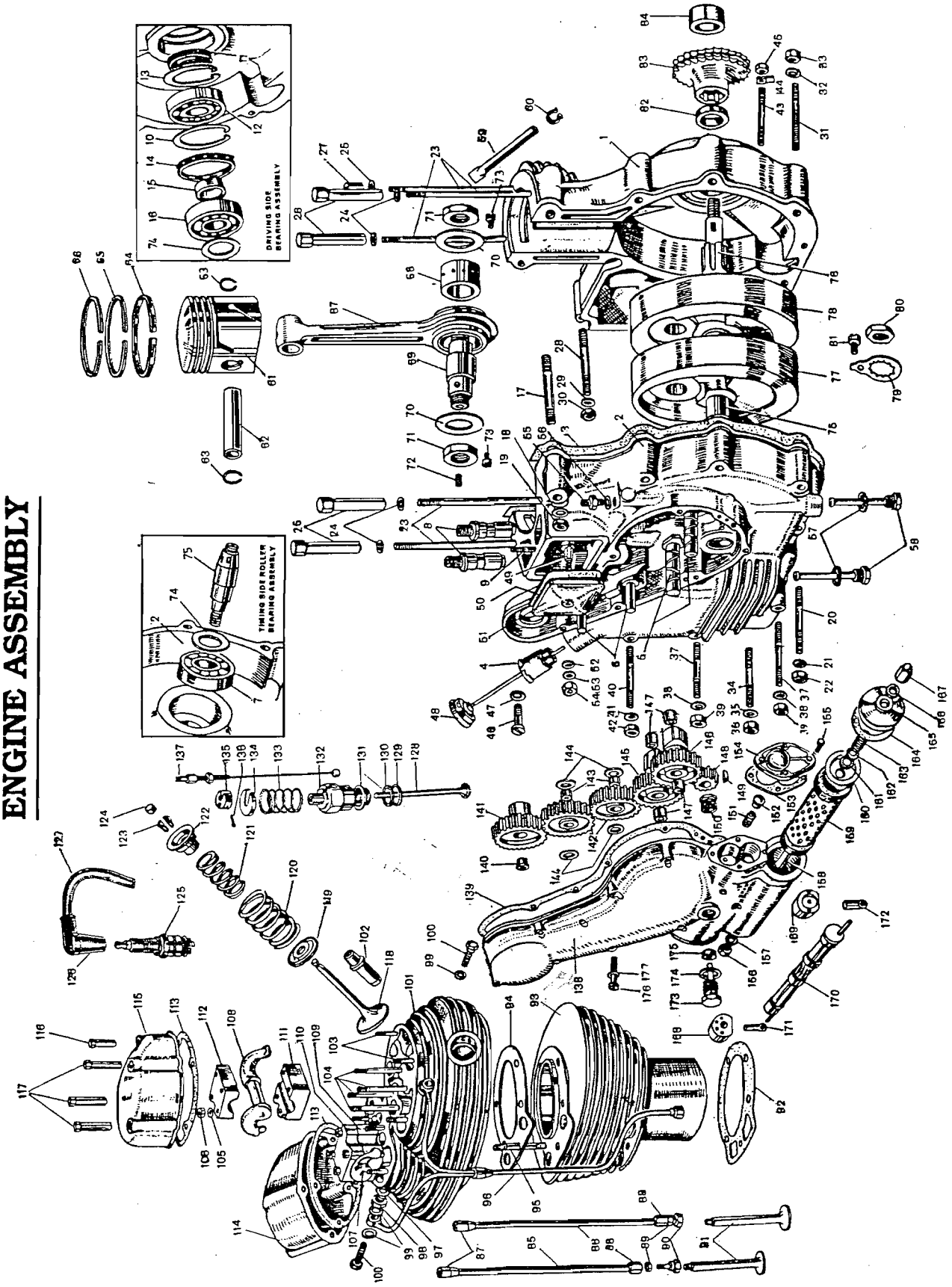
Single Cylinder 4 Stroke with overhead Valve

Cubic Capacity	:	499 CC
Stroke	:	90 mm
Bore-Nominal	:	84 mm
Actual	:	83.96/83.97 mm
Compression Ratio	:	6.5:1
Compression Pressure	:	110 ± 5 PSI (Recommended)
Engine output	:	22 BHP/5400 RPM
Torque	:	3.5 Kgm/3000 RPM
Piston and piston rings :		
Ring clearance in grooves	:	(Dimensions for new components)
Plain(2)	:	.001/.003"
Scraper	:	.002/.004"
Ring end gap in bore	:	.015/.020"
Maximum ring gap permissible	:	0.039"
Gudgeon pin diameter	:	.7498/.7500"
Crank pin diameter	:	1.24875/1.249"
Connecting rod small end diameter	:	.7505/.7507"
Crankshaft :		
Driving side Ball bearing	:	25 x 62 x 17 mm (6305)
Roller bearing	:	25 x 62 x 17 mm (NU 305 or N 305)
Timing side Roller bearing	:	25 x 52 x 15 mm (NU 205 or N 205R)
Cam lift	:	.3125 in
Valve lift	:	.3125 in.
Valve timing with .012" clearance		
Exhaust opens	:	75° BTDC
Exhaust closes	:	35° ATDC
Inlet opens	:	30° BTDC
Inlet closes	:	60° ATDC
Rocker bearing inside diameter	:	.625/.626" (Dimensions for new Components)
Rocker spindle diameter	:	.6235/.6240"
Inlet valve stem diameter	:	.3425/.3430"
Exhaust valve stem diameter	:	.3405/.3410"
Valve guide internal diameter	:	.3437/.3447"
Valve guide external diameter	:	.6270/.6275"
Tappet guide internal diameter	:	.3752/.3760"
Tappet guide external diameter	:	.7505/.7510"
Lubrication	:	Dry sump, Oil tank integral with crank case
Clutch	:	Wet multiplate, Oil immersed
Engine sprocket	:	25 teeth
Clutch	:	56 teeth
Primary drive chain	:	3/8" pitch Duplex chain.

Gear box :

Overall gear ratios	:	5.01, 6.83,9.22 & 13.93
Overall gear ratios	:	Small - 6303
	:	Large - 6206
Final drive chain	:	17 teeth
Rear drive chain	:	5/8" pitch chain
Carburettor	:	Mikcarb-VM-28
Mainjet	:	110
Pilot jet	:	25
Contact Breaker (Coil ignition) :		
Points gap	:	0.14/0.16" (0.35 to 0.4 mm)
Timing before T.D.C	:	1/32" (0.8 mm)
Spark plug	:	NGK BR 8 ES or equivalent
Spark plug gap	:	0.46 to 0.50 mm
Condenser (Capacitor)	:	0.18 to 0.25 M.F.D
Suspension :	:	
Front	:	Telescopic, Hydraulic damping
Stroke	:	155 mm
Rear	:	Pivoted fork with shock absorbers
Wheel Rim Type	:	WM 2- 19
Tyre size	:	3.25 x 19 (Front)
	:	3.50 x 19 (Rear)
Wheel Bearings :		
(Front & Rear)	:	17 x 40 x 12 mm (6203) or 6203 ZZ
Brakes	:	Mechanical, internally expanding shoe type
Front	:	178 mm x 38 mm Twin leading shoes
Rear	:	153 mm x 25 mm Single leading shoe
Fuel tank :	:	
Full Tank Capacity	:	14.5 litres
Reserve capacity	:	1.25 litres
Oil Capacity & grade :		
Oil tank	:	2.25 litres, SAE-20W50
Fork	:	200 ml. on each leg. Hydraulic Oil or SAE 10W30
Clutch	:	420 ml. approximately SAE-20W40
Gear Box	:	700 grams of veedol '00' grease (for topping up use SAE 20W50)
Dimensions :		
Weight (Dry)	:	168 Kg.
Pay load (Max)	:	172 Kg.
Ground clearance	:	14 cm (140 mm)
Overall length	:	212 cm (2120 mm)
Overall width	:	75 cm (750 mm)
Saddle Height	:	85 cm (850 mm)
Wheel base	:	137 cm (1370 mm)
Electricals :		
System	:	12V DC

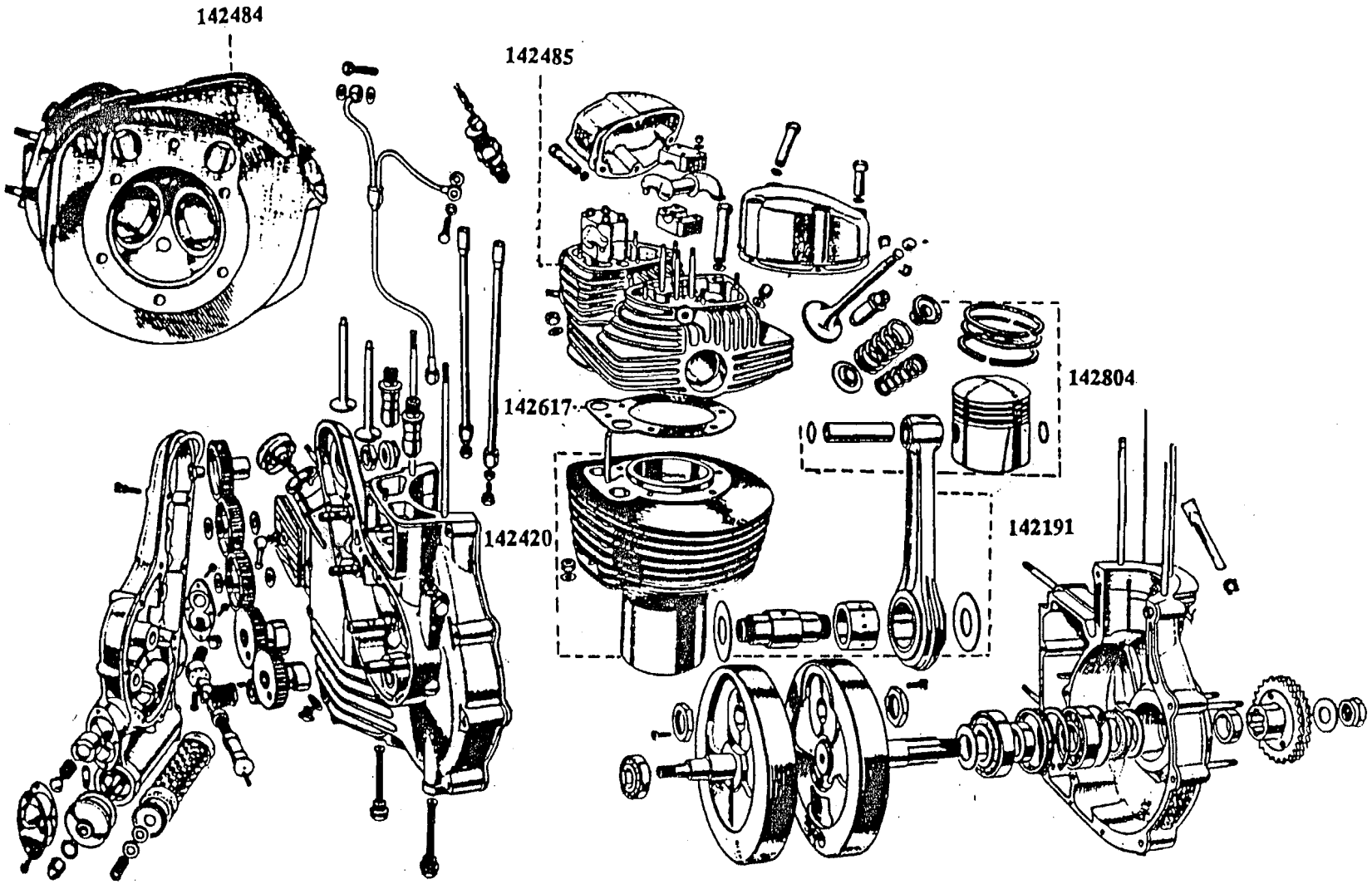
ENGINE ASSEMBLY



ENGINE PARTS

1. Crankcase D/S
2. Crankcase T/S
3. Joint washer
4. Oil filler cap collar
5. Cam spindle
6. Idler pinion spindle
7. Timing shaft roller bearing
8. Tappet guide
9. Cylinder base stud
10. Circlip (Seegar)
11. Oil seal
12. Ball bearing
13. Circlip (Seegar)
14. Distance tube (outer)
15. Distance tube (inner)
16. Roller bearing
17. Stud, Crank Case Neck
18. Washer, Crank Case Neck Stud
19. Nut, Crank Case Neck Stud
20. Stud, Crank Case Bottom Joint
21. Washer, Crank Case Bottom Joint
22. Nut, Crank Case Bottom Joint
23. Head & Cylinder stud
24. Washer, Head and Cylinder Stud
25. Washer, Head and Cylinder Stud
26. Nut, Head and Cylinder Stud
27. Nut, Head and Cylinder Stud
28. Crank Case Stud, below Distributor
29. Washer, below Distributor
30. Nut, below distributor
31. Stud-Front engine plates
32. Washer, Front Engine plate
33. Nut, Front Engine Plate
34. Read engine plates
35. Washer, Rear Engine Plate
36. Nut, Rear Engine Plate
37. Stud, Crank Case Rear Joint
38. Washer, Crank Case Rear Joint
39. Nut, Crank Case Rear Joint
40. Stud, Crank Case Rear Joint
41. Washer, Crank Case Rear Joint
42. Nut, Crank Case Rear Joint
43. Stud-Chaincase attachment
44. Oil Seal Retainer
45. Nut, Oil Seal Retainer
46. Distributor flange pin
47. Distributor flange pin Washer
48. Oil filler cap
49. Tappet cover stud
50. Washer, Tappet Cover Stud
51. Tappet Cover
52. Washer (Fibre), Tappet Cover Stud
53. Washer (Steel), Tappet Cover Stud
54. Tappet cover nut
55. Oil pipe union
56. Washer, Oil Pipe Union
57. Washer Oil filter Gause
58. Oil feed & return filters
59. Breather pipe
60. Breather pipe clip
61. Piston
62. Gudgeon lpin
63. Circlip
64. Piston ring (scraper)
65. Piston ring (compression) lower taper
66. Piston ring (compression) top, chrome
67. Connecting rod
68. Connecting rod floating bush
69. Crank pin
70. Thrust washer
71. Crank pin nut
72. Crank pin oil hole grub screw
73. Crank pin nut keeper screw
74. Thrust washer
75. Timing shaft
76. Driving shaft
77. Fly wheel T/S
75. Fly wheel D/S
79. Lock ring
80. T/S shaft nut
81. Lock ring screw
82. Engine sprocket distance tube
83. Engine sprocket 25T
84. Alternator distance tube

BELLET 500 CC ENGINE ASSEMBLY



FOR THE PART NOS. SHOWN IN THE FIG. PLEASE REFER PARTS LIST.

85. Push rod inlet
86. Push rod, exhaust
87. Push rod end, top
88. Push rod end, bottom
89. Push rod cup lock nut
90. Push rod cup
91. Tappet
92. Cylinder barrel joint washer
93. Cylinder barrel
94. Cylinder head joint washer
95. Stud, Cylinder Base
96. Rocker oil pipe complete
97. Rocker Oil Union Bush Washer
98. Oil union bush
99. Washer Oil Pipe banjo Union
100. Oil pipe banjo
101. Cylinder head
102. Valve guide
103. Stud, Rocker Box
104. Stud, Rocker Bearing
105. Washer, Rocker Bearing
106. Nut, Rocker Bearing
107. Rocker, inlet
108. Rocker, exhaust
109. Rocker bearing inlet
110. Rocker bearing cap, inlet
111. Rocker bearing, exhaust
112. Rocker bearing cap, exhaust
113. Gasket
114. Rocker box, inlet
115. Rocker box, exhaust
116. Nut (short) Rocker Box
117. Nut (long) Rocker Box
118. Valve
119. Valve spring collar, bottom
120. Valve spring, outer
121. Valve spring, inner
122. Valve spring collar, top
123. Valve split collar
124. Valve stem cap
125. Spark plug
126. Spark plug cap
127. H.T. Lead
128. Decompressor valve
129. Washer, Decompressor body
130. Washer, Decompressor body
131. Washer (Plain), Decompressor body
132. Decompressor body
133. Spring, Decompressor
134. Spring Cap, Decompressor
135. Cable block
136. Cable block split pin
137. Decompressor cable assembly
138. Timing cover
139. Timing cover joint washer
140. Distributor pinion nut
141. Distributor pinion 40T
142. Idler pinion 40T
143. Idler pinion bush
144. Idler pinion thrust washer
145. Cam, inlet
146. Cam, exhaust
147. Cam bush
148. Timing pinion 20T
149. Key
150. Oil pump worm
151. Oil pump disc spring
152. Spring end pad
153. Gasket Oil Pump Cover
154. Oil pump cover
155. Oil pump cover screw
156. Nut, Oil Cleaner Stud
157. Washer, Oil Cleaner Stud
158. Stud, Oil Cleaner
159. Oil cleaner element
160. Oil cleaner spring cap
161. Felt washer
162. Thrust washer
163. Oil cleaner spring
164. Washer, Oil Cleaner Cap
165. Oil cleaner cap
166. Washer, Oil Cleaner Cap Nut
167. Nut, Oil Cleaner Cap
168. Oil pump disc (feed)
169. Oil pump disc (return)
170. Oil pump spindle
171. Plunger (feed)
172. Plunger (return)
173. Oil feed plug
174. Washer
175. Cork oil retainer
176. Timing cover screw
177. Spring Washer, Timing Cover Screw

ENGINE

Decarbonising:

After a few thousands of Kms. of run the carbon build up in the engine will cause general falling off in power, accompanied by increased fuel consumption and starting trouble. Decarbonising will normally be necessary approximately every 8,000 Kms. and this can be carried out without removing the engine from the frame. The mileage between decarbonising will vary from machine to machine depending upon the type of usage. A machine used for frequent short journeys will need more attention than one which is used for fast long distance touring.

1. Removal of the petrol tank

Close the petrol tap. Disconnect the fuel hose from petrol tap end.

Remove the two studs which holds the petrol tank to the frame and pull the tank upwards.

2. Removal of the Cylinder head

Remove the engine steady eye bolt.

Disconnect the high tension lead from the spark plug. Remove rocker oil pipe.

Remove the exhaust pipe and silencer.

Remove the air filter by undoing the bolts on the sides of the air filter body.

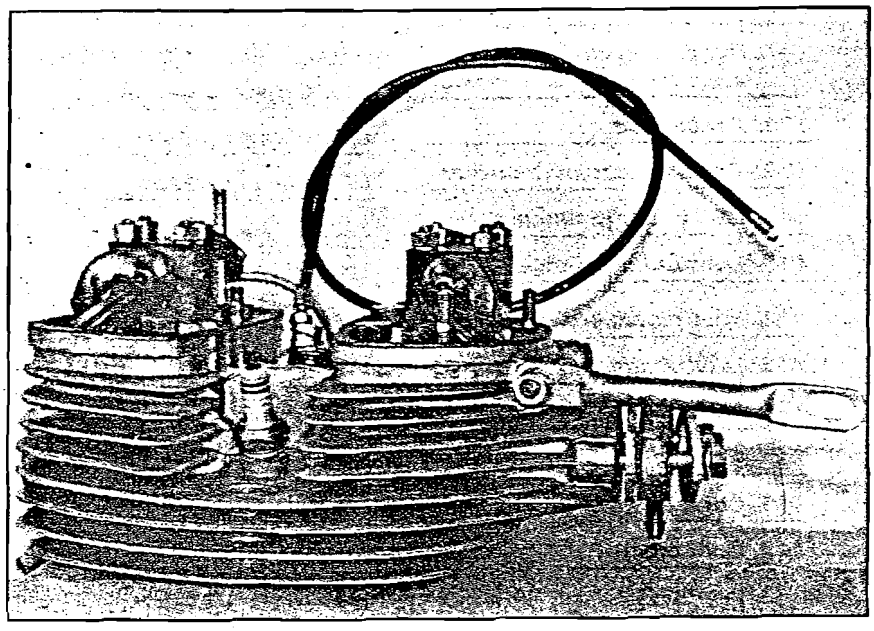
Push the carburettor back clear of the studs after removing the fixing nuts.

Remove the rocker box covers.

Remove the decompressor cable from the lever end of the handle bar (LH side)

Crank the engine until both valves are closed. (Keep in Compression stroke).

CYLINDER HEAD



Remove the rocker arms and bearings completely after removing the four 3/16" nuts on each.

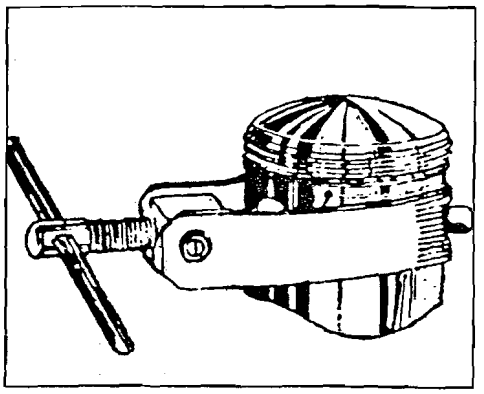
Lift out the push rods both inlet & exhaust.

Remove the six cylinder head nuts & washers.

Lift the cylinder head off the barrel, tapping it genly beneath the exhaust and inlet ports with a wooden mallet. Do Not tap the fins.

3. Removal of Cylinder and Piston

REMOVAL OF PISTON



Slacken the two clamp nuts on top of the crank-case neck.

Remove the 1/4" nut above the tappet chest and lift the barrel

Remove the circlip retaining the gudgeon pin on the timing side of piston taking care not to drop the circlip into the crank case.

Extract the gudgeon pin using special Tool PED 2015 (with adaptor if necessary), so that the pin 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. Finally cover the crankcase with a clean cloth to prevent ingress of dust and dirt.

4. Removal of Valves

VALVE SPRING COMPRESSOR

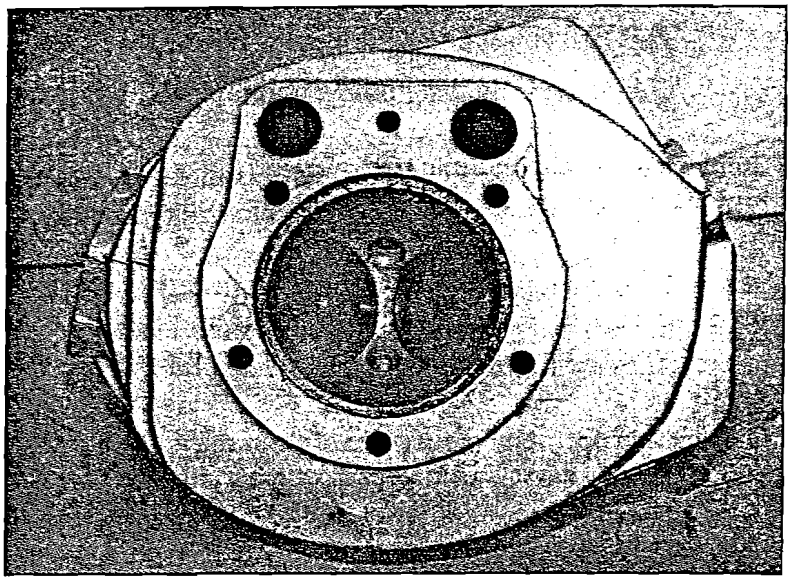
To remove the valves from the cylinder head, first lift off the end caps from the valve stems. If this has stuck, it can be removed by a screw driver. Using compressing tool PED 2018 ST compress the valve springs and remove the split collars from the valve tip. Slacken back the compressing tools and release the springs.

Withdraw the valve and place its springs, top spring collar, bottom collar, the end cap and split conical collars together in order that they may be reassembled with the valve from which they were removed.

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 or by using a fine Jeweller's file to remove any sharp edge or burr. If the burrs are not removed and the valve is forced out, the valve guide may be damaged.

5. Decarbonising the Cylinder head - Combustion Chamber

CYLINDER HEAD



Remove carbon from the valves, ports and combustion chamber by scrapping. Take care not to cause any damage to the valve faces or valve seat inserts. Scrape gently to avoid scoring the cylinder head.

DO NOT, under any circumstance, use caustic soda or potash for the removal of carbon from aluminium alloy.

Remove the piston rings carefully. For cleaning the grooves in the piston, a piece of broken piston ring thrust into a wooden handle and filed to a chisel point can be used.

6. Piston and Rings

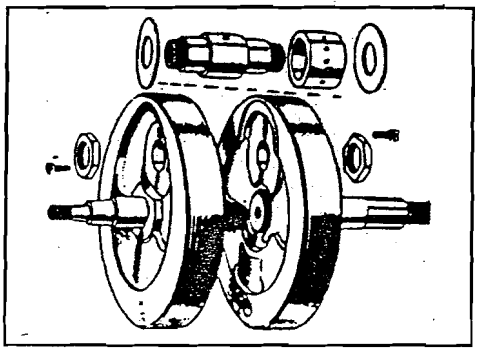
If the piston rings are in good condition they can be put back, taking care to fit them in their original grooves and the same way up. If the rings show brown or black patches or if their gaps, are more than specified service limits (Page 79), when in position in the barrel, new rings should be fitted. The correct gap for new rings is given in the technical specifications (pages 6 & 8) for 350 and 500cc. The gap should be measured in the least worn part of the cylinder which will be found at the top or bottom of the bore.

Only For 350cc:

The original size of the cylinder bore is 2.751" (69.875mm). If the wear at any point in the bore exceeds .008" the cylinder should be rebored to .020" and an oversize piston fitted. (It should be rebored to .040" after a further .008"wear). Piston sizes available are .020" and .040" oversize.

The original side clearance between the piston rings and grooves is .003". If the grooves show a wear of .005" the piston should be replaced.

CRANKSHAFT BIG END BEARING

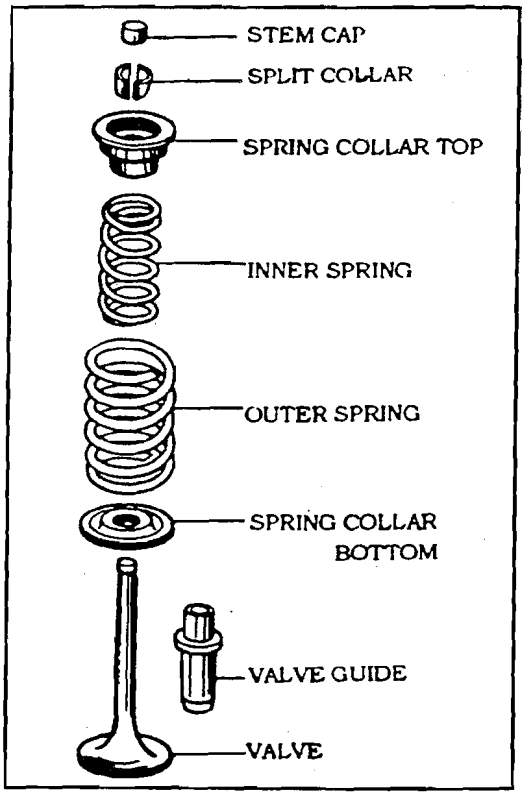


7. Big end bearing inspection

Examine the condition of the big end while the piston is removed. About .010" - .020" end float is permissible and it will be possible to rock the connecting rod slightly. The big end has a floating bush with an original clearance of approximately .003" However, if a DEFINITE up and down play can be felt, engine should be stripped further to have the big end renewed.

8. Valves, Valve Guides and springs

VALVE & SPRING ASSEMBLY



Wear on the valve stems can be seen on examination and if a definite step has formed, the valves should be renewed. Before replacing the valves, they must be ground on to their seats, if good faces are not formed with a reasonable amount of grinding, the seats must be cut with a cutter (included angle 90°) and the valve refaced in a universal grinder. Do not attempt to form good seats by an excessive amount of grinding. This will cause pocketing and restrict the flow of gases. If a pocket has already been formed this must be removed by cutting with a valve seat cutter larger in diameter than the valve head.

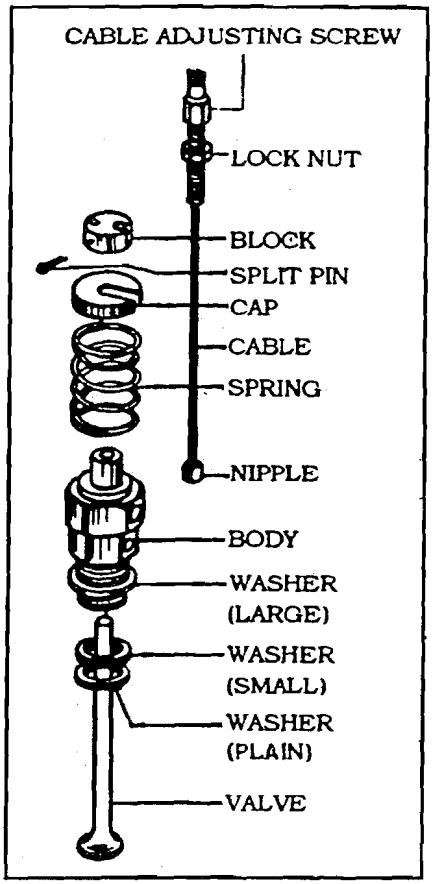
Test the valve guides for wear by trying the fit of a new valve in them. Both valves should be quite free, but the exhaust valve has more clearance (.002") than inlet valve.

To remove the valve guides from the head, two special tools are required which can be easily made. The first is a piece of tube with an internal bore of not less than 7/8". The second is a mandrel about 4" long made from 9/16" diameter bar with the end turned down to 1/3" diameter for a length of 1/2". 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, the guide can be replaced using a hammer and a mandrel, to prevent damage to the guide.

Check the length of the valve springs which are originally 2.020" and 2.095" for the inner and outer springs respectively. If these have reached the specified service limits, they should be renewed.

DECOMPRESSOR ASSEMBLY



9. Decompressor

If the decompressor holds compression and operates freely, there is no need to interfere with it except to remove the carbon from the head of the valve. If the valve is leaking, it will be necessary to regrind it on its seat. This can be done without completely dismantling it. Having disconnected the control cable from the handle bar, unscrew the decompressor from the cylinder head. Compress the spring and remove the spring cap. Unscrew the adjusting screw and locknut from the cable block and pull the cable sideways out of the block. Push the spring.

upwards and pull the cable nipple out of the body, It will now be possible to remove the cable and nipple through the spring, leaving the decompressor body and spring detached from the control cable.

The spring and the cap should now be replaced. The valve may be ground in by applying a thin coating of grinding paste on the seat of the valve and twisting it to and fro by means of the cable block at its upper end and occasionally lifting the valve from its seat. Do not rotate the valve through a complete revolution before lifting, as this will groove the seat. After grinding, wash the whole assembly thoroughly in petrol, opening and shutting the valve while doing so. Make sure that all traces of grinding paste have been removed. If the paste should get into the cylinder serious damage would be caused.

If the valve shows a tendency to stick-up in the body but otherwise is satisfactory, this can be cured by washing in petrol, though in this case it will not be necessary to disconnect the control cable.

If the decompressor valve is badly burnt or bent it must be replaced.

10. Re-assembly after Decarbonising

Before building up the engine, see that all parts are scrupulously clean and place them on a clean tray, work bench or over a clean sheet of paper. While re-assembling it is advisable to fit a new gasket between the cylinder barrel and the crankcase.

Smear clean oil over the piston and space the ring gaps. The second ring is a taper ring and is marked TOP on the upper surface.

WARNING: This mark should be on top when fitted. Reversing the ring will result in pumping of oil into the cylinder and consequent smoking.

Place the piston over the connecting rod small end ensuring the split skirt is facing the front and insert the gudgeon pin. Secure the gudgeon pin with the circlips. Oil the cylinder bore and gently push barrel over the piston while keeping the rings compressed in their grooves and seat it gently on the barrel gasket. Refit the 1/4" nut above the timing chest.

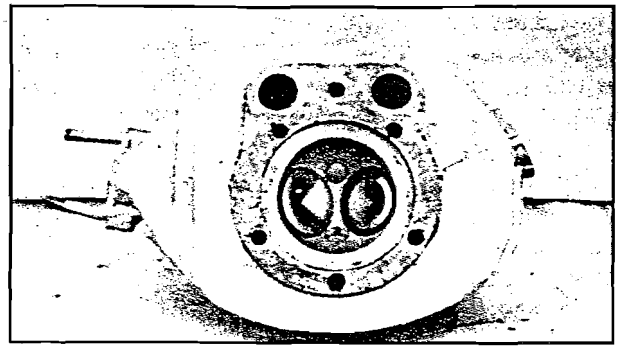
When fitting the head again, apply jointing compound sparingly on both sides of the gasket, Replace the six nuts and tighten them progressively and diagonally from one side to the other to prevent distortion.

WARNING: Excess compound may block oilways.

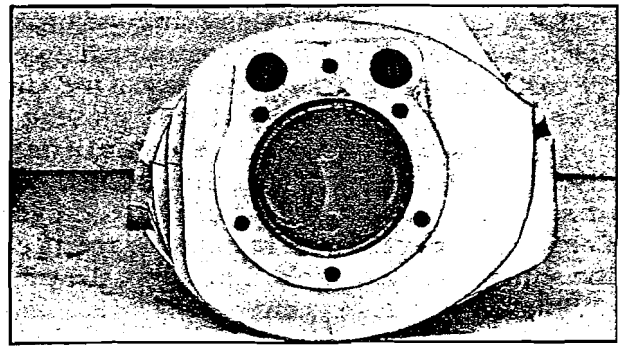
Place the push rods with the adjustable parts downwards. The shorter pushrod is the Inlet. Ensure valve stem caps are fixed on the valve stems. Position the rockers and bearings, making sure that the oil feed holes are at the bottom and that the caps and bases are in line when tightened down. Adjust the push rods after ensuring piston is in 'TDC' on compression stroke. The silencer could be cleaned of carbon using a hot caustic soda solution, if necessary.

NOTE: The cylinder head and base nuts should be checked again for tightness, after the engine has been run long enough to get it thoroughly warm. Tighten the clamp nuts on crankcase finally. For torque tightening or cy. head nuts please refer torque chart on PageNo. 100

CYLINDER HEAD 350CC



CYLINDER HEAD 500 CC



SERVICE OPERATION -

WITH ENGINE ON FRAME

1. Removal of the Timing cover

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

Remove the exhaust pipe and silencer. Remove ten screws from the timing cover, taking care not to lose the sealing washers, one for each screw.

NOTE: When removing or refitting the timing cover it is important that the engine is gently cranked. This will prevent damage of the pump worm or the pump spindle.

Draw off the timing cover, tapping it lightly if necessary with a wooden mallet.

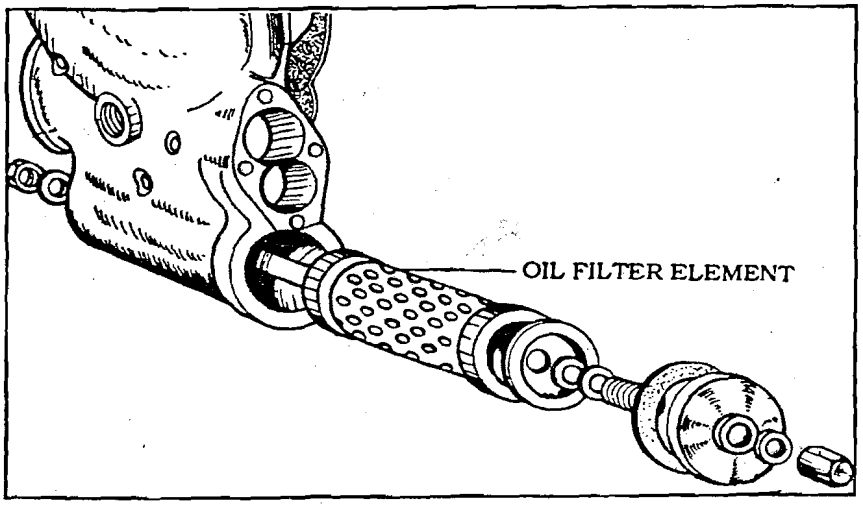
While refitting the timing cover ensure that the joint washer is correctly located over the oil holes, using a little grease (not compound) to hold it in position.

Ensure 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 flow to the big end bearing.

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

Ensure proper functioning of oil pump by checking oil flow at rocker ripe union when the engine is running at slow speed. Slacken the oil pipe banjo union to see the oil-flow and clamp it again properly. Wipe the oil that has oozed out.

OIL FILTER ELEMENT IN TIMING COVER



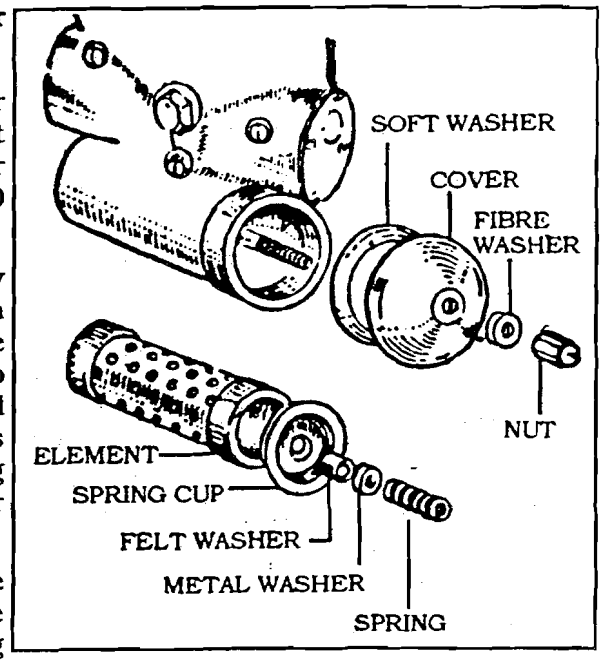
VALVE TIMING MARKS

2. Cleaning/Replacement of Oil Filter Element - Oil Feed and Return Filters

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 800 Kms. and subsequently, every 4,000 Kms. Fit a new element every 8,000 Kms.

The filter element can be removed by unscrewing the nut holding the end cap in position. When re-assembling the filter take care that no grit or other foreign matter is sticking to it. After replacing the filter element it is essential to run the engine at idling for about five minutes to ensure that oil reaches the big end. If the timing cover has been removed, fill the filter chamber with clean oil before replacing the cover.

The feed and return filters are fixed on the drain plugs in oil sump and crank case. These can be cleaned by rinsing in a solvent and during reassembly ensure the filters are not twisted.



3. Overhauling of Oil feed and return Pumps

—Remove the timing cover.

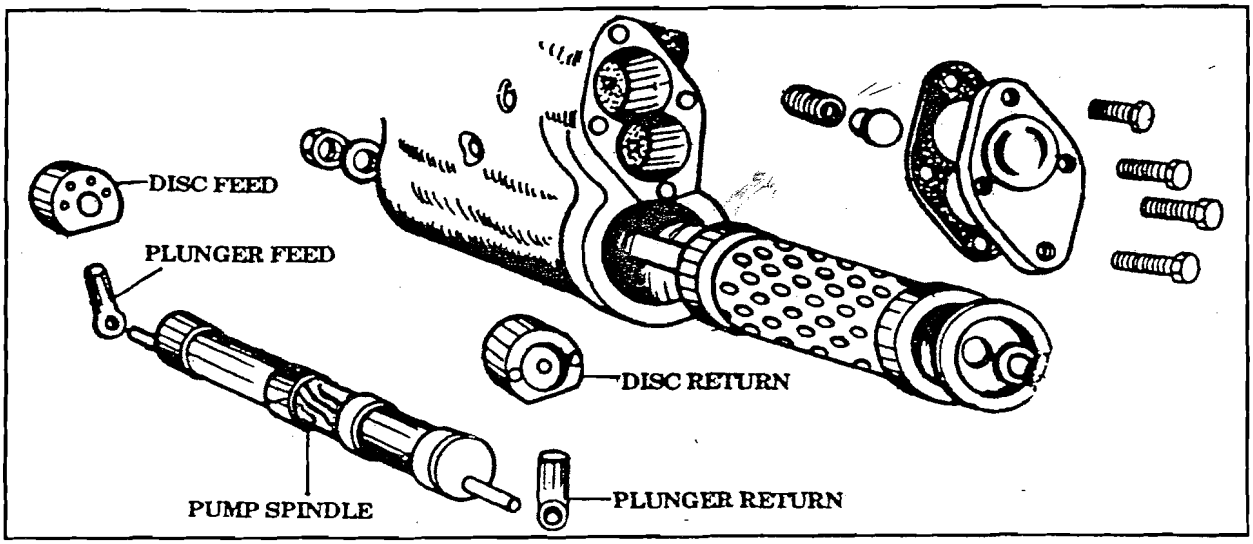
—Remove the end covers from both pumps.

—Remove the pump discs and plungers.

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

—Check the fit of the plungers in the pump discs which should be sliding fit and should be able to be moved in and out by hand.

OIL FEED & RETURN PUMPS ASSY.



When matching a plunger in the pump disc, if it is found to be too tight a fit, carefully lap the plunger in the pump disc. Using metal polish until it is just free.

If the pump disc is not seating properly in the timing cover or if a new pump disc is fitted, it should be ensured that the pump disc matches properly and has a perfect seating in the timing cover.

Lap the discs in the timing cover with fine metal lapping paste or liquid metal polish using special tools PED 2034 ST for feed pump disc and PED 2035 ST for return pump disc, until a fine, grey surface is obtained on the pump disc face.

NOTE: Replacement pump discs have a lip left at the opposite side of 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 should be taken not to damage the lapped face.

Wash all components and passages, 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"off the timing cover if the springs are correct. The pump spindle should be renewed if excessive wear has taken place on the teeth.

Reassemble the oil pumps, replacing the cover gaskets. 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 using an oil can. Turn the pump spindle with a screwdriver in a clockwise direction and it can then be checked whether the pumps are operating correctly. Before replacing the timing cover on the engine, fill the filter chamber with clean oil and fit the filter element.

NOTE: With the engine running, the oil feed to the big end can be checked by partially unscrewing the feed plug in the timing cover between the oil pumps and the oil return can be checked by slackening the rocker pipe banjo bolt on the cylinder head and observing the oil flow.

4. Removal of Pump Worm and Timing Pinion

Unscrew the pump worm using the hexagon head behind the worm, with special tool PED 2006. Withdraw the timing pinion using special tool PED 2013.

CAUTION: The worm nut has a left hand thread. When turned clock wise the worm nut can be loosened and when turned anticlockwise the worm nut gets tightened.

NOTE: When refitting the timing cover ensure that the cork is in position in the worm nut and is undamaged. This forms a seal between the oil feed plug and the oil passage in the crank shaft, timing side. If necessary this should be replaced and care should be taken to have it fitted correctly.

CAUTION: If this cork is not fitted or damaged, the oil feed to the big end bearing through the timing shaft will tend to escape past this point causing starvation of lubrication to the big end bearing leading to premature failure of the big end floating bush, engine bearings and other parts.

5. Removal of Contact breaker housing.

Loosen the distributor pinion nut and pull out the distributor pinion off the distributor shaft after removing the idler pinions.

Loosen and remove the three screws which secure the spigotted contact breaker housing and seperate from crankcase. Remove the contact breaker cover. Remove the base plate after removing the two hex bolts securing it.

Pull out the contact breaker shaft from the housing. The two sintered bushes provided in the housing would have to be replaced only if excessive radial play is noticed on the distributor shaft.

Reassembly is just the reverse process of dismantling but take care to replace the washer between the contact breaker housing and the crank case.

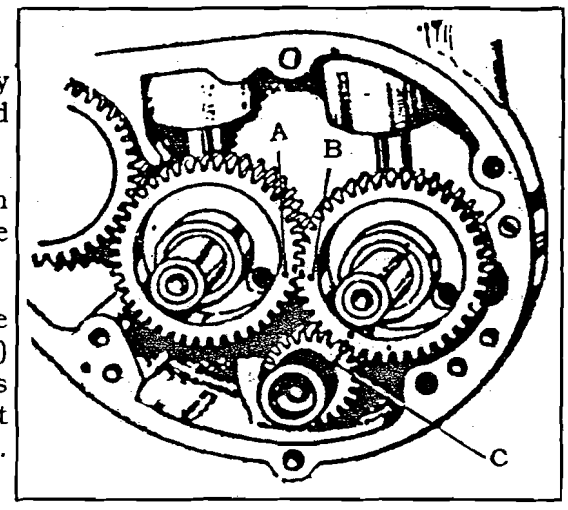
DETAIL OF FELT OIL CLEANER

6. Valve Timing

The cams are integral with the cam pinions. They have internal sintered iron bushes running on fixed spindles in the timing chest.

The cams and the timing pinion are provided with timing marks to set proper valve timing. The procedure is detailed below.

Bring the piston to TDC position. Match the exhaust cam (provided with two sets of punch marks) with the timing pinion so that the two punch marks coincide on both. Match the inlet cam to the exhaust cam so that the single punch mark coincide on both. Push the cams home towards the crankcase.

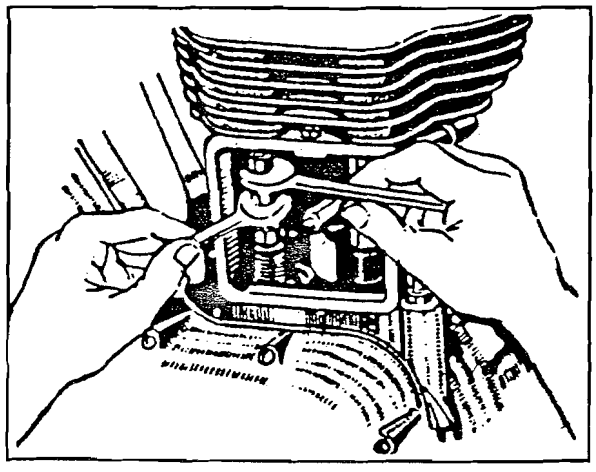


A: MARK ON INLET CAM
B: MARK ON EXHAUST CAM
C: MARK ON TIMING PINION

7. Tappet Adjustment - Cold

It is very essential to ensure that the valves are closed fully during the closing period of the cam. The tappet clearance should be adjusted properly to achieve this and to cater to certain amount of thermal expansion of the working components. We recommend 'NIL' clearance for the tappets to be set at cold. Provision for adjustment is given at the bottom end of the push rod which sits over the tappet. Access to this is by removing the tappet cover.

ADJUSTING TAPPETS



Proceed as follows for adjustments. Bring the piston to TDC at the end of compression stroke, so that both the valves are at the closed position. This may be ensured by seeing the valve timing marks, if the timing cover is open or through ammeter needle in its centre position, when ignition is switched on.

Check the push rods. They must rotate thumb free without any up and down play.

In case the push rods do not rotate freely or if up and down play is noticed, the push rods need to be adjusted.

Loosen the lock nut in the adjuster, by holding the top nut. Thread in or out, the bottam adjuster, till the correct push rod freeness is achieved. Retighten the lock nut after adjustments are complete.

CAUTION: If the cylinder head has been disturbed for any attention, ensure proper fitment of valve stem caps and rocker bearings before proceeding to tappet adjustment.

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

8. The Clutch - 350cc and 500 cc

The 350cc clutch has five driven plates and four driving plates, including the friction disc on the sprocket.

The 500cc clutch is similar to that of 350cc. except that there are six driven plates and five driving plates.

Also the lugs on the clutch sprocket and the splines on clutch centre are longer.

9. Removal of the Clutch

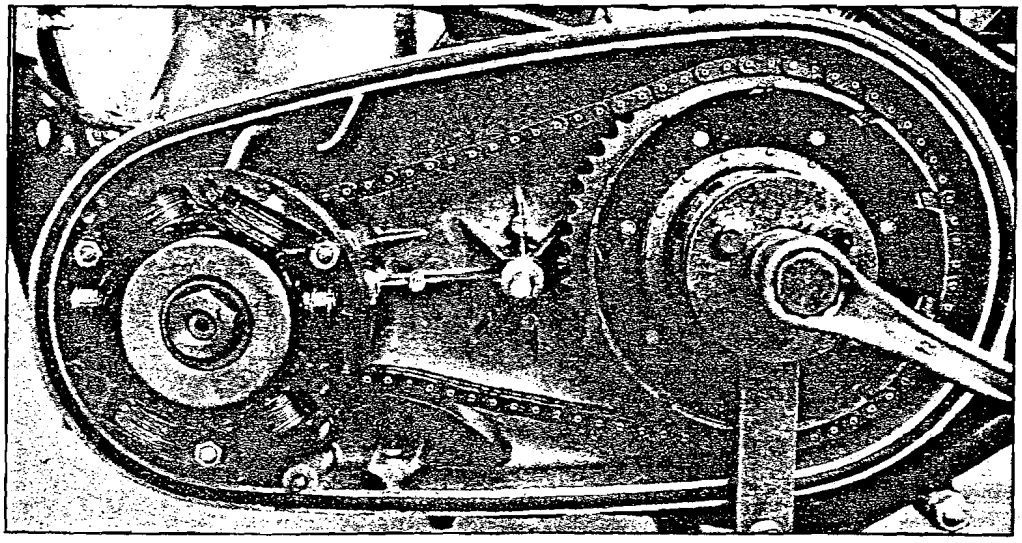
Remove the L.H. front foot rest. Place a tray beneath the primary chain case to collect the oil in the chain case. Remove the centre nut in the chain case outer and remove the cover.

To remove the clutch unscrew the clutch spring pins. Lift away the spring cap, springs, clutch front plate, clutch pad in main shaft. The assembly of driving and driven clutch plates and the clutch retaining spring. The clutch sprocket can then be withdrawn along with the chain and engine sprockets (see point 10).

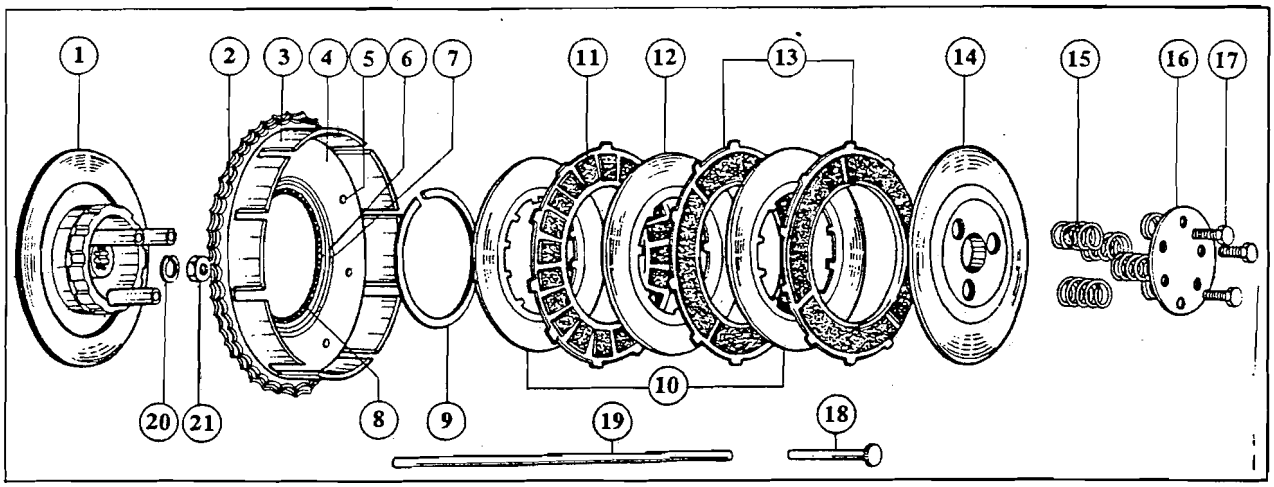
The clutch centre can be removed only after the engine sprocket, primary chain and the clutch sprocket has been removed.

To remove the clutch centre hold the clutch with a brake bar (Special Tool No. PED 2025) and remove the centre retaining nut and washer with a box spanner. The clutch centre can then be withdrawn from the shaft using extractor (Special Tool No. PED 2005).

REMOVAL OF CLUTCH ASSEMBLY

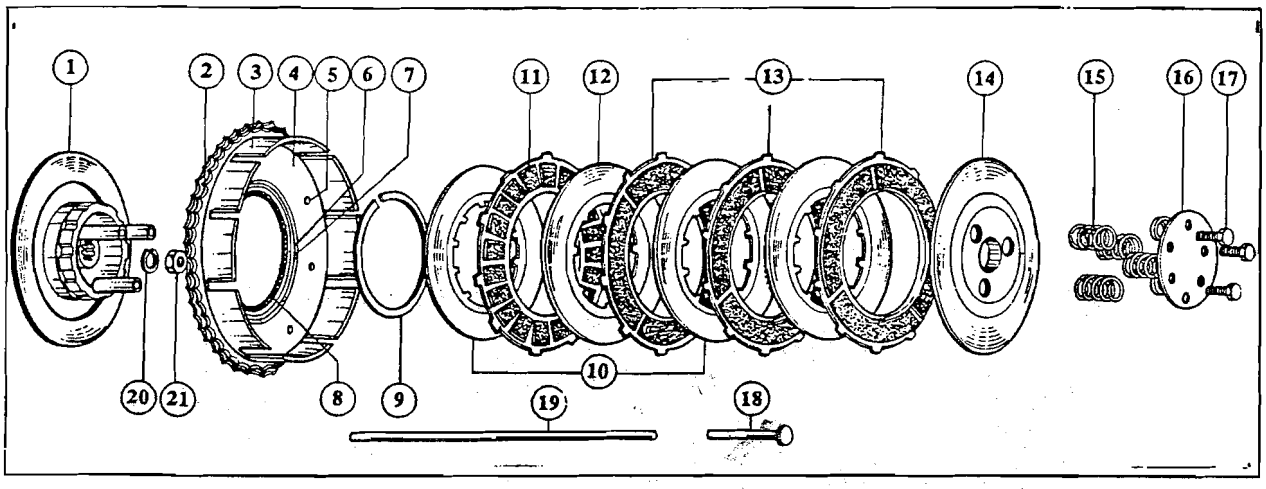


CLUTCH ASSEMBLY - 350CC



1. Clutch centre and back plate assembly
2. Clutch sprocket 56 T & drum assembly
3. Clutch sprocket drum (N/S)
4. Clutch sprocket friction disc
5. Clutch sprocket friction disc rivet
6. Clutch sprocket ball cage (N/S)
7. Clutch sprocket ball cage rivets (N/S)
8. Clutch sprocket balls (3/16" dia) (N/S)
9. Clutch retaining spring
10. Clutch intermediate plate (dished)
11. Clutch plate (insert type)
12. Clutch intermediate plate (flat)
13. Clutch bonded plate assembly
14. Clutch front plate
15. Clutch spring
16. Clutch cap
17. Clutch spring screw
18. Clutch pad
19. Clutch rod
20. Washer main shaft (spring)
21. Nut main shaft (Nyloc)

CLUTCH ASSEMBLY - 500 CC



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15. Clutch spring
16. Clutch cap
17. Clutch spring screw
18. Clutch pad
19. Clutch rod
20. Washer main shaft (spring)
21. Nut main shaft (Nyloc)

10. Removal of Engine and Clutch sprockets

Remove the alternator stator by undoing three nuts. The primary chain is endless hence it is necessary to remove both the engine and clutch sprockets simultaneously. Remove the central hexagon nut securing the alternator rotor, which can then be drawn off, taking care not to lose the key. The engine sprocket is mounted on splines and can be removed along with the clutch sprocket using extractor PED 2004 ST

11. Removal of Final Drive Sprocket

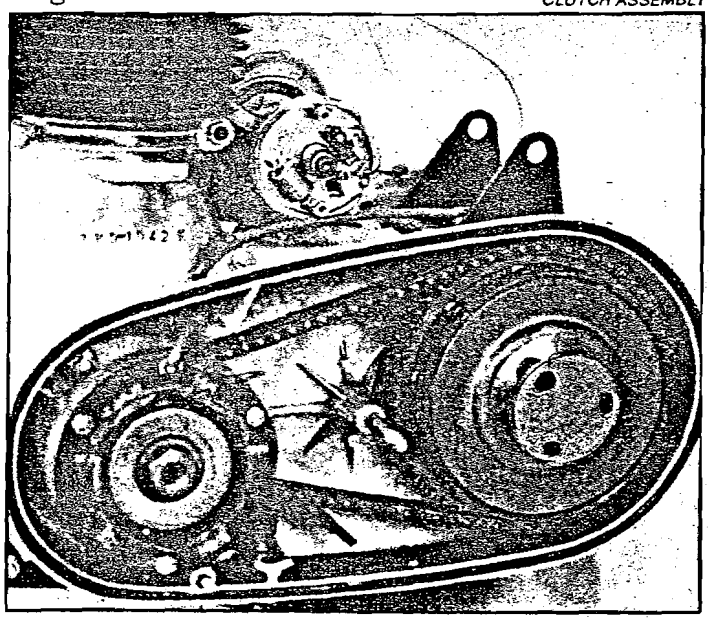
Remove the clutch as described above. Remove the primary chain tensioner. Remove the primary chaincase inner by removing three nuts. Remove the folding of the tab washer which is provided for locking the final drive sprocket nut. Hold the sprocket and remove the nut (right hand thread). The sprocket can then be withdrawn.

12. Re-assembly of the Clutch Plates

When re-assembling the clutch plates the following order must be observed. The clutch pad must be fitted into the main drive shaft, plain dished plate (dish projecting out wards).

Friction plate with inserts, plain flat plate. friction plate bonded, plain dished plate (dish projecting inwards). friction plate bonded, clutch front plate 3 springs on the clutch centre lugs.

CLUTCH ASSEMBLY



In the case of 500cc one more plain flat plate and one friction plate will also have to be fixed after the plate with inserts has been assembled.

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 spring should be fitted.

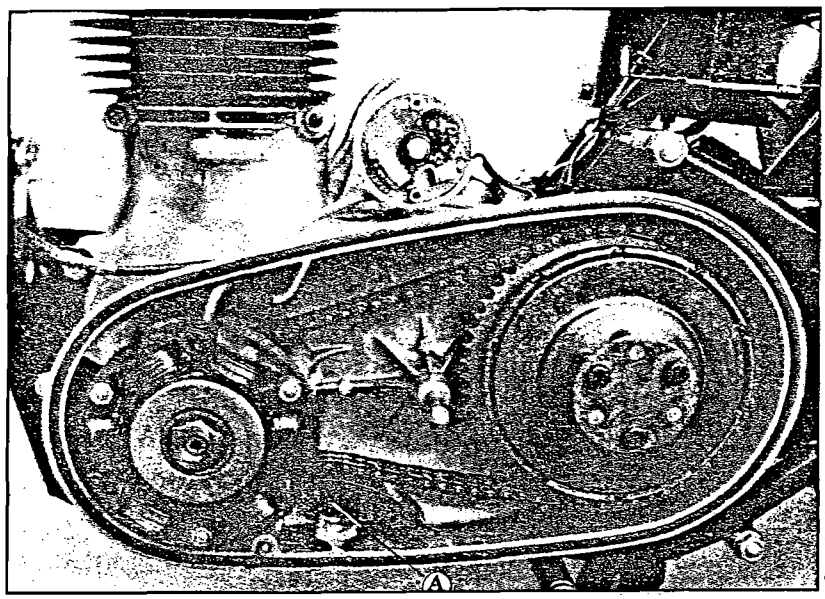
The friction plate with inserts should be renewed if badly worn or when the inserts have become loose in their plate. The bonded friction plates require renewal when worn or charred. (A light change to a blackish colour should not be mistaken as charred). Excessive or premature wear of the plates is due to either running the vehicle at half clutch application or depriving the clutch plates of oil, with insufficient or no oil in the clutch chain case.

13. 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 collect the oil from the chaincase.

Beneath the bottom run of the chain is a curved slipper chain tensioner pad on which the chain rests. This can be raised or lowered by turning the adjusting screw below the chain tensioner pad after having first slackened the locknut.

PRIMARY CHAIN ADJUSTMENT



A. ADJUSTER

The chain should be adjusted so that there is 1/4" up and down movement at the centre of the top run of the chain. Remember to check the chain tension at 3 or 4 places and then adjust accordingly. Ensure that the chain tensioner pad moves freely and the lock nut of the adjuster is retightened after carrying out the adjustment. The chain is to be renewed if its length has increased by 3/4" than the length of a new chain.

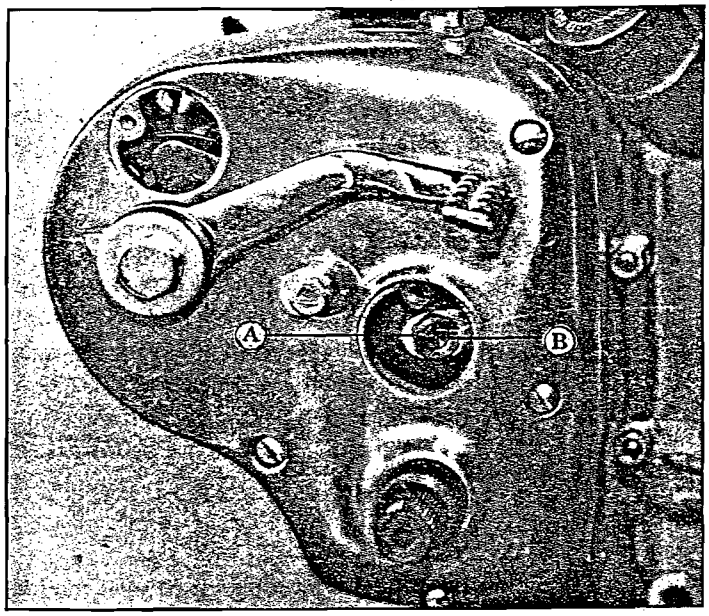
After replacing the chain cover, remember to replenish the chaincase with oil (SAE 20) up to the level plug in outer chain case(approx - Qty.. - 430 to 450 ml.)

14. Adjustment of the Clutch control

It is essential that there should be about 3 to 4mm free movement in the clutch cable, to ensure that all the spring pressure is exerted on the plates.

There are two points of adjustment on the clutch cable. The first is the midway adjuster at the middle of the cable just above the chain case. The adjustment is made by screwing the adjuster screw in or out of the adjuster body. Tighten the locknut on the screwed collar after adjustment has been made.

CLUTCH ADJUSTMENT ON GEAR BOX



The other point is at the handle bar end. Loosen the lock nut and thread in the adjuster to increase play and vice versa to reduce play. Tighten lock nut after carrying out adjustment. However if the adjusters have reached their maximum position then the adjustment can be carried out in the gear box outer cover. Before proceeding on the adjustment, turn in both cable adjusters to their fully closed position (fully in position).

To make the adjustment, remove the inspection cover, slacken the locknut and turn the central screw in, to get the desired free play on the clutch lever at the handle bar end. Tighten the locknut after adjustment has been made.

Owing to initial bedding down of the clutch plate inserts, the clutch control may require adjustment after the first few hundred Kms with a new machine. This point should therefore be examined soon after delivery and adjustment made if necessary. Initially, excessive play in the cable can be taken up through midway adjuster and the adjuster at the handle bar end.

NOTE: The clutch adjuster ball and clutch rod may require cleaning and greasing around 6000 miles/10000Kms of run. To do this, loosen and carefully remove the clutch adjuster from its position, taking care not to drop it into the gear box outer cover.

Start the engine and tilt the motorcycle towards the gear box side, so that the clutch rod can be removed. Wash thoroughly, the clutch rod and adjuster and look for chipped or worn clutch rod ends and free rotation of the clutch adjuster ball.

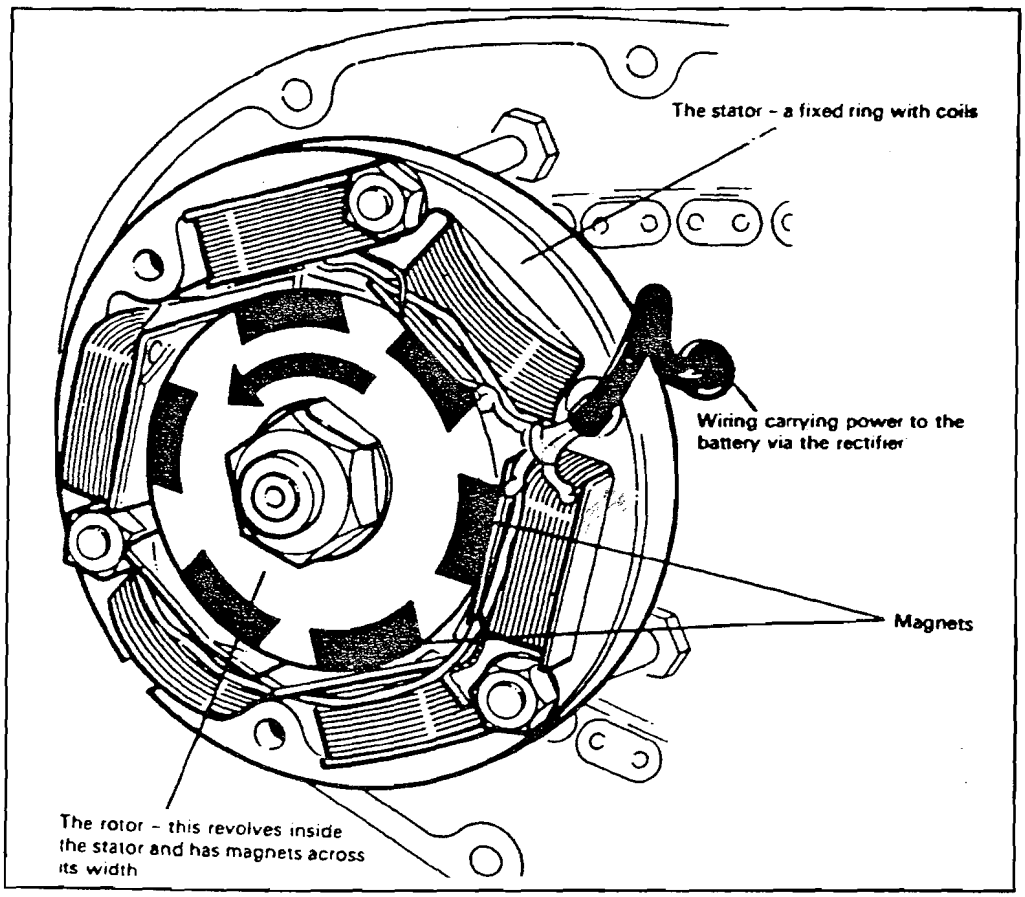
Smear multipurpose grease on the clutch rod and reassemble into the mainshaft. Smear grease on the clutch adjuster ball and carefully reassemble in its location. Adjust the adjuster to ensure free play is maintained on handle bar end and tighten lock nut.

15. Fitting the Alternator

The alternator consists of two parts, the stator and the rotor. The stator is mounted on to the primary chaincase inner by three studs and nuts.

The rotor, which contains the permanent magnet, is mounted on the end of the drive shaft and is located by a key and secured by a special nut and spring washer. The designed radial air gap between the rotor and the poles of the stator is 0.25mm (0.010") and care must be taken when refitting to see that it is not less than 0.15mm (0.006") at any point.

SINGLE PHASE ALTERNATOR



Fit the rotor first, making sure that it is located concentrically on the end of the drive shaft. Attention must be given to the proper seating of the key. Finally secure the rotor with the appropriate washer and nut.

Having fitted the rotor, the stator may then be fitted on to the chaincase inner with the coil connections facing outwards. Replace the shake proof washers and the nuts on the studs and tighten gently. Insert six strips (preferably non magnetic material) 0.15mm (0.006") thick and 25.4mm (1") wide. Check whether the strips are free in position. If one or more of the strips are not free, gently tap stator (at the opposite end) to centralise the same such that all the strips become free. Tighten the stator nuts and ensure the strips move freely. Gently crank engine, recheck the strips are free. Repeat this process at 3 or 4 places and then withdraw the strips.

16. Function of 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 crank case and outside atmosphere, causing a partial vacuum in the crankcase and rocker boxes which prevents the passage of oil into the cylinder. If the breather is not acting efficiently it may cause pressure in the crankcase instead of partial vacuum, giving rise to smoking or oiling of the plug.

17. Gear Box

The gears, ratchet mechanism etc, of the gear box can also be serviced without dismantling the engine from the frame.

Please refer page 33 for dismantling the gear box.

SERVICE OPERATIONS

ENGINE REMOVED FROM FRAME

1. Removal of the Engine from the Frame

A. Disconnect alternator leads, **B.** Disconnect the spark plug cap. Suppressor cap **C.** Turn off petrol tap and disconnect the fuel pipe, **D.** Remove carburettor assy. along with throttle cable, **E.** Remove the air filter assy., **F.** Remove the exhaust pipe and Silencer, **G.** Disconnect the engine steady bolt, **H.** Remove the rear chain, **I.** Remove the footrest (L.H.), **J.** Support the engine on a suitable box or wood block, **K.** Remove the centre stand and the stand stop, **L.**Remove the front engine plates and the small bolt fixing the stand spring bracket and fixes rear mudguared, **M.** Remove the stud securing the rear engine plate to the frame, **N.** Slide out the engine.

2. Removal of the Gearbox

Remove the primary chaincase outer, clutch assembly, stator and rotor, engine sprocket and clutch sprocket. Remove the clutch centre and chain case inner.

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

3. Dismantling the Crankcase

Drain the oil tank by removing the feed and return filter assembly plugs located in the crank-case bottom.

Having removed the engine from the frame dismantle the cylinder head, barrel, piston, timing gear, etc., as described in the chapter "Decarbonising".

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 by undoing nuts.

The two halves of the crankcase can then be separated.

The driving side outer race of bearings will remain in the driving side half of the crankcase.

The driving side bearing inner race and the inner distance piece will remain on the engine shaft. (Crank shaft)

The flywheel assembly may be removed from the driving side of the crankcase.

4. Removal and Reassembly of main bearings

1. Clean the crank case thoroughly as any trace of oil in the crankcase will burn and discolour the bearing race while heating the crank case.

2. Heat the crankcase in an oven or apply the naked flame of a blow lamp on the circumferential area of the bearing boss and not directly on the bearing race. When the crankcase gets heated up fairly, tap the crankcase on a wooden block (with bearing race facing downwards) gently so that it will drop down due to the expansion of the bearing boss.

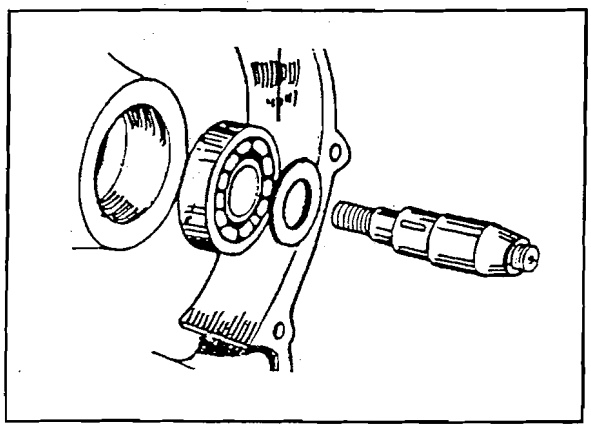
3. Remove the circlip from the driving side crankcase and reheat to remove the ball bearing.

Inspect the bearings before assembly. The bearing should spin smoothly. Rotated dry, it may appear to be slightly noisy but there should be no signs of corrosion, nor must there be any appreciable radial slackness. The outer race of the roller bearing must be preferably smooth and bright with no evidence of cracks or pitting. The individual rollers must show no signs of wear and should rotate smoothly in the cage. It is recommended to replace with new bearings, once they are removed from the crankcase.

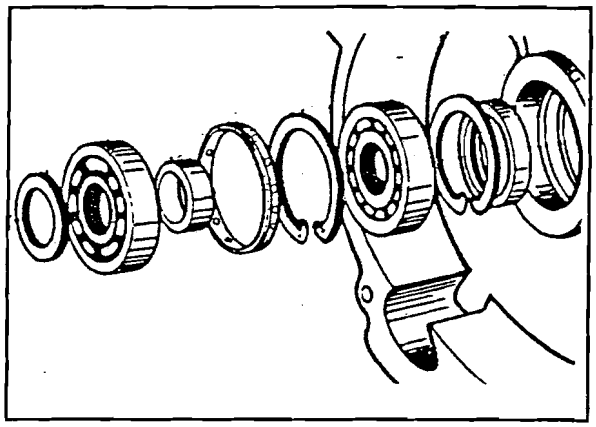
Reheat the crank cases to reassemble the bearings in the crankcase. Assemble the ball bearing in the D/S. Crankcase after fitting the circlip. Locate the other circlip, distance tubes outer and inner and then assemble the roller bearing outer race.

Ensure that the bearings are seated properly in the crank case and the outer roller race is flush with the crank case.

TIMING SIDE ROLLER BEARING ASSEMBLY



DRIVING SIDE BEARING ASSEMBLY



5. Replacement of the Cam Idler Spindles

When wear is noticed or step formation seen on the spindle, it should be replaced. To remove the cam spindle, heat the crankcase and tap the spindles out from inside.

To remove the idler pinion spindles, heat the crankcases as before, hold the spindles in a vice and tap the crankcase lightly with a nylon/wooden hammer.

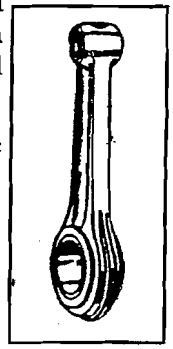
To replace the cam spindles, locate the spindles in respective holes in the timing side crankcase and drive the spindles in home with a small hammer (1/2 lb.) and a drift. Make sure that the spindles are upright and parallel to each other.

6. Connecting Rod

Wear in the hardened steel big end bush will be shown by a formation of a ridge round the centre of the bearing surface corresponding with the oil groove in the white metal floating bush. If this wear is excessive the connecting rod should be replaced.

Excessive wear on the small end of the connecting rod can be easily seen. The Gudgeon Pin will show a rocking motion if wear is excessive.

CONNECTING ROD



7. Flywheel Assembly

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. (PED 2037) Remove the crankpin nuts.

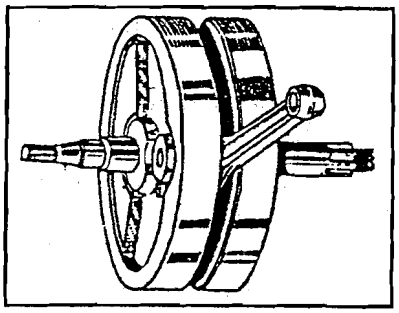
Using PED 2037, with a pair of steel bars (about 1" x 3/8 x 9" long) placed across, between the fly wheel disc, press out the crankpin using a hand press.

The connecting rod can then be removed along with floating bush.

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

To remove the timing shaft, remove 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" tommy bar.

FLYWHEEL ASSEMBLY



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 with a hand press or a hammer and drift. If the latter is used care must be taken not to damage the centre. It has a collar which butts against the flywheel disc.

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

Test the oil passages using an oil can to make sure that they are clear.

Assemble the floating bush over the crankpin.

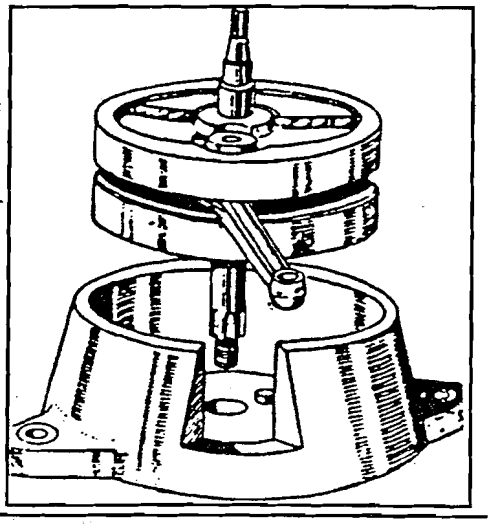
Assemble the connecting rod over the floating bush and smear engine oil.

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

Use a brass drift and hammer for pressing the D/S flywheel.

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

FLYWHEEL IN A JIG



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 old grub screw, in order to clean the oil passages after which a new grub screw must be fitted.

Mount the crankshaft between the centres of a lathe or on a pair of vee block and true upto .001" 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.

8. Re-assembly of the Crankcase

Replace the bearings, etc., in the crankcase halves after heating the crankcase as described earlier. (Refer page No 29)

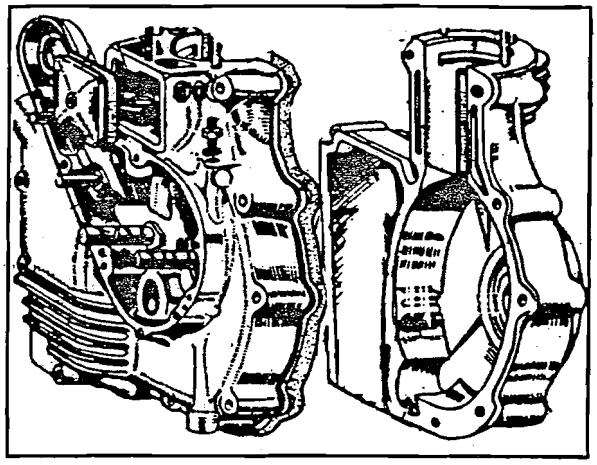
Fit the inner distance piece in the driving side crankcase.

Fit the thrust washer on the drive shaft. Fit the bearing inner race on the drive shaft. Assemble the flywheel into the bearing. if necessary using the sprocket nut with a suitable spacer to draw the driving shaft through the inner race of the ball bearing.

Make sure that the crankcase face is clean and apply jointing compound to it and fix the crankcase gasket in position.

Put the thrust washer on the timing side shaft and press the bearing inner race.

TWO HALVES OF CRANKCASE T/S & D/S



Place the timing side crankcase in position over the flywheel and gently tap with a wooden mallet.

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

Rotate the drive shaft by hand and check for freeness to ensure correctness in assembly and press the oilseal on to the drive side of the crankcase from outside, ensuring proper seating.

For 500cc

Press the oil seal on the timing side of the crankcase and ensure proper seating.

GEAR BOX

NOTE: Before atempting to remove the internal parts. Please ensure that the clutch assy. has been dismantled alongwith F.D. sprocket

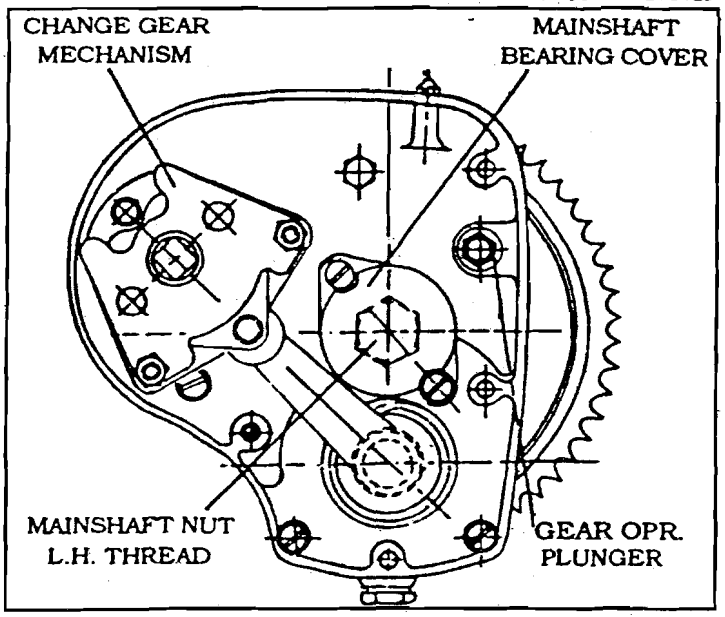
1. Removal of Gear box from engine

This has already been described earlier

2. Dismantling the Gear box

The gear box can be completely dismantled with the engine in the frame except for the removal of the inside operator and the bearings in the gear box case. Remove the kick starter crank, the gear change lever and the neutral finder. Remove the top and bottom small inspection covers and disconnect the clutch cable, after loosening clutch adjuster. Remove four screws and the gear box outer cover can then be detached. Remove the foot control plate assembly and foot control short by taking off the two nuts securing it. Remove the main shaft bearing cover which is attached by two screws.

GEAR BOX WITH OUTER COVER REMOVED



The gear box is bolted on to the back of the crankcase and has fourspeeds, which are foot-controlled, and a patented neutral finder. All gears are in constant mesh, changes being effected by robust dog clutches.
The internal gear ratios are 2.77 : 1 (1st Gear), 1.84 : 1 (2nd gear) 1.36 : 1 (3rd gear) and 1 : 1 (Top gear)

CAUTION: Hold the Kick starter returning spring eyelet by means of a long screwdriver to prevent it from rebounding (and causing damage) while the main shaft bearing cover screw is removed.

The main shaft can be drawn straight out, if the clutch has been removed, which, however, should be done before taking off the gear box inner cover. The top gear pinion and dog will come away with the mainshaft.

The layshaft can then be removed and the second and third gears drawn off the final drive sleeve together with the operator fork.

NOTE: To take out the main shaft sleeve, the final drive sprocket must be removed and this is preferably done before removing the inner cover.

3. Removal of the Ball Bearings

The mainshaft ball bearings can be removed by using a stepped drift of 0.437" (11 mm) & 1.171" (29.77,mm) in diameter for the bearing in the case and 0.812" (20.64 mm) & 0.515" (13.1 mm) in diameter for the bearing in the cover.

When refitting the bearing stepped drifts of 2.31" (58.7mm) & 1.171" (29.7mm) diameter and 1" (25.4mm) in diameter, must be used for bearings in the case and cover respectively.

4. Gear Change Mechanism

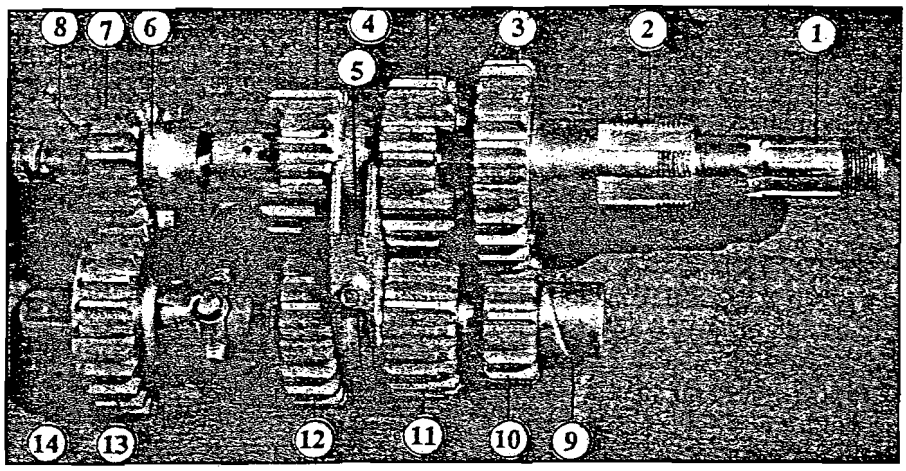
If the two pins securing the gear change ratchet mechanism are slackened, the adjuster plate can be set in the desired position. In this position the movement of the gear lever, necessary to engage the ratchet teeth will be approximately the same in each direction.

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

When fitting new parts, if 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, even after adjusting the adjuster plate then this can be obtained by filing the foot control stop plate very slightly at the points of contact with the pegs on the ratchet ring.

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

CHANGE GEAR MECHANISM



1. *Main shaft*
2. *Main Shaft sleeve*
3. *Main shaft low gear pinion 25T*
4. *Main shaft sliding gear 21T & 18T*
5. *Gear operator fork*
6. *Main shaft high gear pinion dog*
7. *Main shaft high gear pinion 15 T*
8. *Main shaft oil thrower inner*
9. *Lay shaft splined bush*
10. *Lay shaft low gear pinion 15T*
11. *Lay shaft second gear pinion 19T*
12. *Lay shaft third gear pinion 22T*
13. *Lay shaft high gear and K/S wheel 25T*
14. *Lay shaft*

4.1 Gear box with Continental controls.

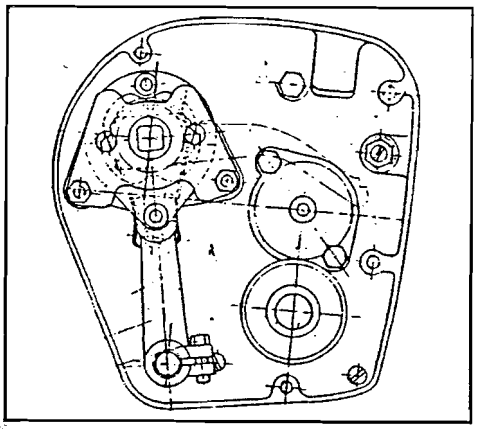
The procedure for dismantling the gear box with continental controls is the same as described earliar.

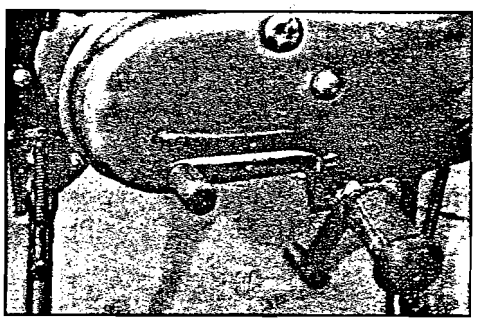
While dismantling the gear change mechanism care should be taken to disconnect the foot control lever from the gear shift shaft after loosening the hex bolt. The circlip provided on the gear shift shaft should also be removed prior to removing the inner cover.

Grease nipples are provided on the shift shaft and gear lever on the left side of the motorcycle for periodical greasing to ensure smooth operation of shift shaft and gear lever.

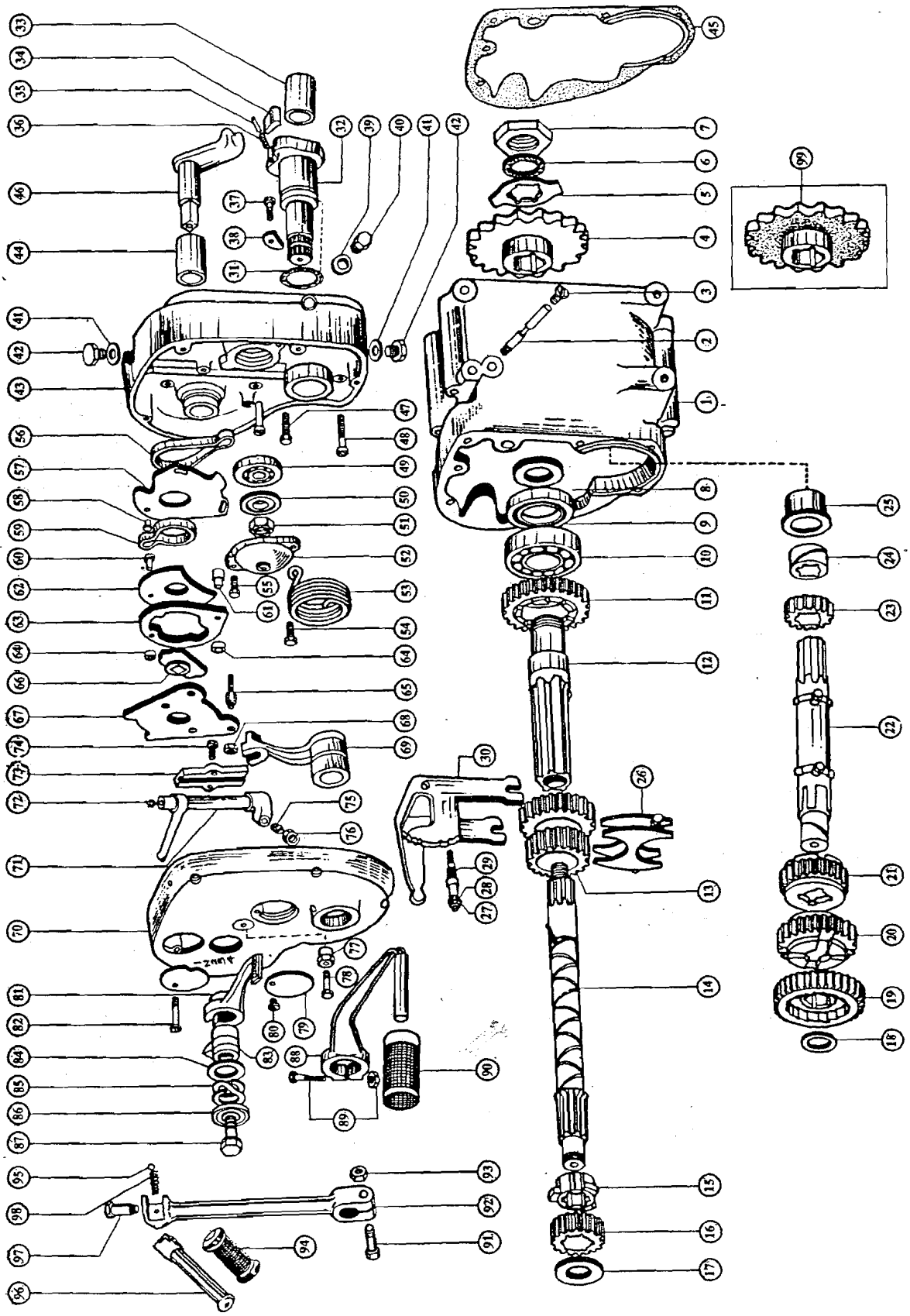
If excessive gear lever travel is noticed and gear engagement becomes difficult, the plastic bushes provided at the gear linkages would have worn out and will have to be replaced with new bushes to reduce play in the linkages.

GEAR BOX WITH CONTINENTAL CONTROLS





EXPLORED VIEW OF GEAR BOX ASSEMBLY



GEAR BOX - DESCRIPTION

1. Gear box case with bush
2. Gear operator pin
3. Bush gear operator pin
4. Drive sprocket (16-T)
5. Lock washer (D/sprocket)
6. Lock nut felt washer
7. Lock nut (D/sprocket)
8. Drive sprocket distance piece
9. Oil seal
10. Main shaft ball bearing (Large)
11. Main shaft low gear pinion (25T)
12. Main shaft sleeve
13. Sliding gear (21T & 18T)
14. Main Shaft
15. High gear pinion dog
16. High gear pinion (15T)
17. Oil thrower (inner)
18. F/s spindle distance washer
19. Lay shaft high gear & K/s wheel (25T)
20. Third gear pinion (22T)
21. Second gear pinion (19T)
22. Layshaft
23. Low gear pinion (15T)
24. Splined bush
25. Bush (case end)
26. Gear operator fork
27. Nut gear operator (inside)
28. Washer gear operator selector
29. Gear operator selector assembly
30. Gear operator (inside)
31. F/s spindle 'O' ring
32. F/s spindle with bush
33. Lay shaft bush
34. Foot starter pawl
35. Plunger
36. Plunger spring
37. Stop plate bolt
38. Stop plate
39. Washer oil level plug
40. Oil level plug
41. Washer oil filler & drain plug
42. Oil filler & drain
43. End cover with bush
44. Bush foot control operator shaft
45. Washer gear box case joint
46. Foot operator shaft with lever
47. Gear box cover bolt
48. Gear box cover screw
49. Main shaft ball bearing (small)
50. Oil thrower (outer) main shaft
51. Main shaft nut (LH Thread) (F/s end)
52. Ball bearing cap
53. K/s return spring
54. Cap pin (Long)
55. Cap pin (Short)
56. F/c lever return spring
57. Adjuster plate
58. Spring stop
59. F/c ratchet spring
60. F/c plate spring stop
61. Ratchet operating pin
62. F/c plate
63. Ratchet (outer)
64. F/c plate pin bush
65. F/c adjuster plate pin
66. F/c Ratchet (inner)
67. F/c stop plate & spring retainer
68. Nut (foot control adjuster plate)
69. F/c lever short (inside)
70. F/c cover c/w. Clutch lever, bearing cap & pins
71. Clutch lever
72. Clutch lever grease nipple
73. Clutch lever bearing cap
74. Clutch lever bearing block pin (1/4" x 3/16")
75. Clutch lever adjuster with screw & ball
76. Nut clutch lever adjuster
77. Neutral lever eccentric bush
78. Neutral lever stop pin
79. Clutch adjustment inspection cap
80. Inspection pin short
81. Neutral lever
82. Cap pin (long)
83. Gear indicator
84. Washer for neutral lever spring
85. Neutral lever spring
86. Spring cap
87. Neutral lever securing pin
88. Foot change lever
89. Pinch bolt & nut
90. Foot change lever rubber
91. Bolt kick starter crank
92. Kick starter crank
93. Nut kick starter crank bolt
94. Rubber kick starter crank
95. Kick starter pedal pall
96. Kick starter pedal
97. Kick starter pedal pivot pin
98. Kick starter pedal spring
99. Drive sprocket (17.T) For 500 cc

Note: F/s means Foot Starter
F/c means Foot control

5. Re-assembling the Gear box

The procedure is the reverse of that given above for dismantling 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 be tight because of 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 kickstarter shaft.

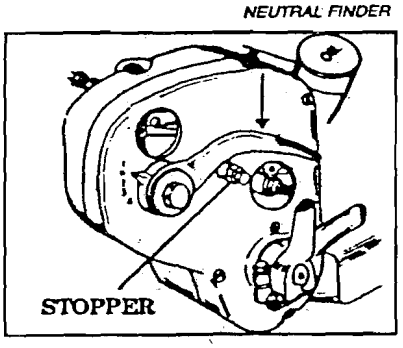
The joint between the gear box and the inner cover should be made with shellac or any similar jointing compound.

Make sure that all parts are clean before commencing assembly. The gear box should be packed with soft grease (veedol 'oo' grease or equivalent) filled up to the correct level.

On no account must heavy yellow grease be used.

6. Adjustment of the Neutral Finder

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



7. Lubrication of the Gear box

Current machines have the gear box filler plug at the top of the box and a level plug at the rear. Remove both plugs and fill, with the machine on levelground until the oil commences to flow from the level plug.

Check the level every 800 to 1,600 Km. when the gear box is warm.

For initial filling up of gear box VEEDOL '00' grease is recommended. During routine maintenance, topping up may be done with SAE 50 oil.

The capacity is 700 grams (Approx.) of 'OO' grease mixed with SAE 50 grade oil to a thick consistency.

LUBRICATION SYSTEM

Lubrication system is by Dry Sump and effected by an automatic and positive double action oil pumps.

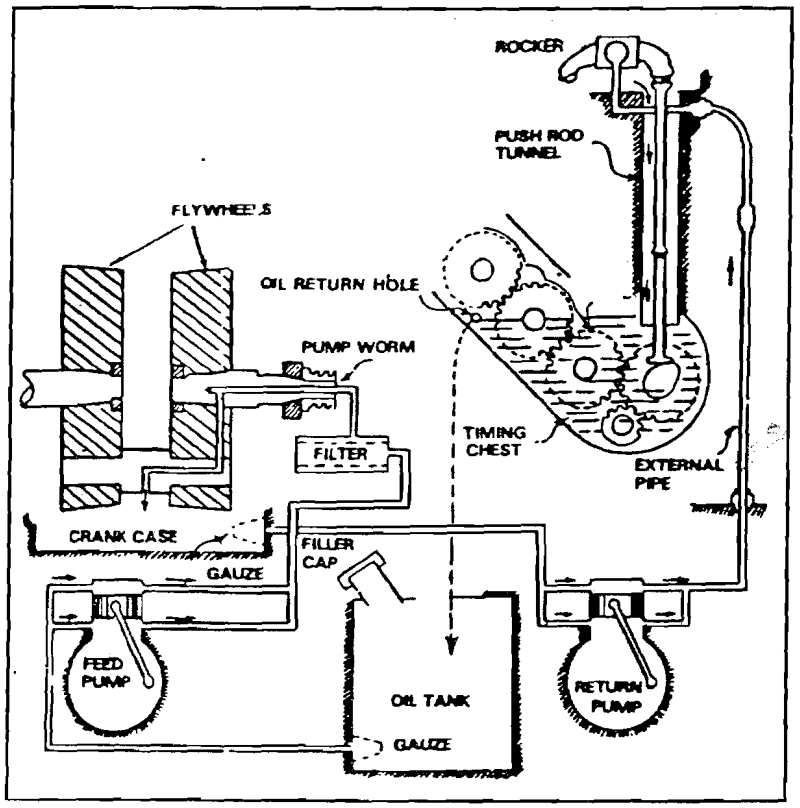
The oil tank is integral with the crankcase, for ensuring the full rate of oil circulation immediately when the engine is started and for rapid heating of the oil in cold weather. The capacity of the oil sump is 2.25 Ltrs. (SAE 50 grade). There are two piston type oil pumps running at 1/12 of engine speed positively driven by the worm gear on the timing shaft.

The feed pump is at the rear of the timing cover (Left side when viewed from the front) and pumps oil from the oil tank, through the oil filter to the big end through the timing shaft. After lubrication of the big end bearings, the oil splashes and lubricates the cylinder barrel walls and drains to the bottom of the crank case.

The return pump (front side of the timing cover) draws the oil from the crank case through the drilled passage and passes through the rocker oil pipe and lubricates the rocker bearings and valve spring mechanism and flows down though the push rod tunnels into the timing cover chest.

From here, the drained oil is pumped back to the oil tank though a hole (drilled in the RH crankcase). by the two idler pinions. The return pump has a capacity of approximately double that of the feed pump, which ensures that oil does not accumulate in the crankcase. If allowed to accumulate it will lead to smoke - oil splash through breather pipe and starvation of oil to rocker arm bearings.

LUBRICATION SYSTEM

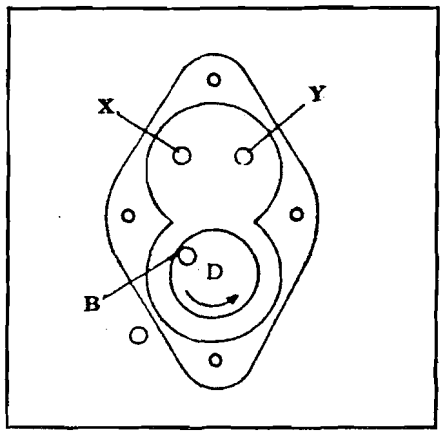


Both pumps are double acting, but two sides of feed pump are inter-connected, thereby giving an augmented and even supply to the big-end. Return pump is also inter-connected for effective scavenging from crank case.

Gauze strainers are provided for both feed and return filters from the crankcase to ensure oil is free from dirt and sludge.

Oil Filter: The oil filter has a special and important feature in design. In the case of clogged filter or should it be neglected the oil pressure will lift the spring and cap off of its seat, thereby automatically by-passing the filter so that the big end bearings will not be deprived of lubrication, even though the oil may be dirty.

OIL PUMP DIAGRAMS



FEED PUMP

PORTS IN THE TIMING COVER

Y - Suction from Oil tank

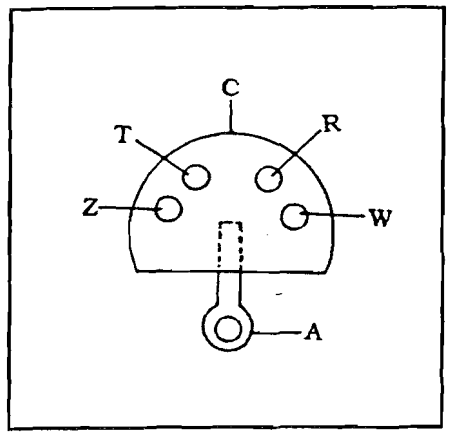
X -Delivery to big end.

Position 1: The plunger A is drawn out of the feed pump disc C, by the peg B in the spindle D, due to its rotation.

The suction port T in the pump disc aligns with the suction port Y in the timing cover and oil from the tank is drawn into the pump disc as the plunger is drawn out.

Simultaneously. the through hole W in the disc registers with the delivery port X in the timing cover.

The outward movement of the plunger forces the accumulated oil in the annular space in the timing cover to be delivered to the big end bearings through the oil filter element.



FEED PUMP

PORTS IN FEED PUMP DISC

T - Suction port

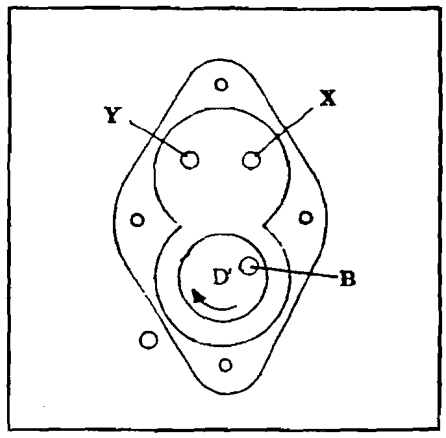
R - Delivery port

W, Z - Through holes

Position 2:- As the pump spindle rotates further the plunger A is pushed into the pump disc C.

The delivery port R in the pump disc registers with the delivery port X in the timing cover. The oil in the pump disc is forced out through these ports, by the plunger for supply to the oil filter element and to the big ends.

Simultaneously the through hole Z, in the pump disc registers with the suction port Y in the timing cover and draws oil from the tank, into the annular space in the timing cover, due to inward movement of the plunger into the disc.



RETURN PUMP

PORTS IN THE TIMING COVER

Y' - Suction from Crankcase

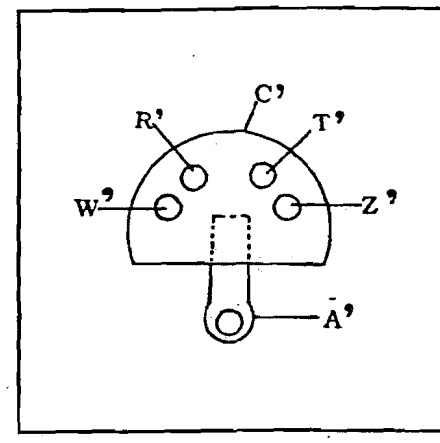
X' - Delivery to Rockery

Position 1:- The plunger A' is drawn out of the return pump disc C' by the peg B on the spindle D, due to its rotation.

The suction port T' in the pump disc registers with the suction port Y' in the timing cover and oil from the crank case is drawn into the pump disc as the plunger is drawn out.

Simultaneously, the through hole W' in the disc registers with the delivery port X' in the timing cover.

The movement of the plunger forces the accumulated oil in the annular space in the timing cover to be delivered to the cylinder head.



RETURN PUMP

PORTS IN THE RETURN PUMP DISC

T' - Suction Port

R' - Delivery Port

W' Z' - Through holes

Position 2:- As the pump spindle rotates further the plunger A' is pushed into the pump disc C'

The delivery port R' in the pump disc registers with the delivery port X' in the timing cover. The oil in the pump disc is forced out through these ports, by the plunger, for supply to the cylinder head.

Simultaneously the through hole Z' in the pump disc registers with the suction port Y' in the timing cover and draws oil from the crank case chamber into the annular space in the timing cover due to inward movement of the plunger into the disc.

FRAME REAR SUSPENSION

1. Description of Frame

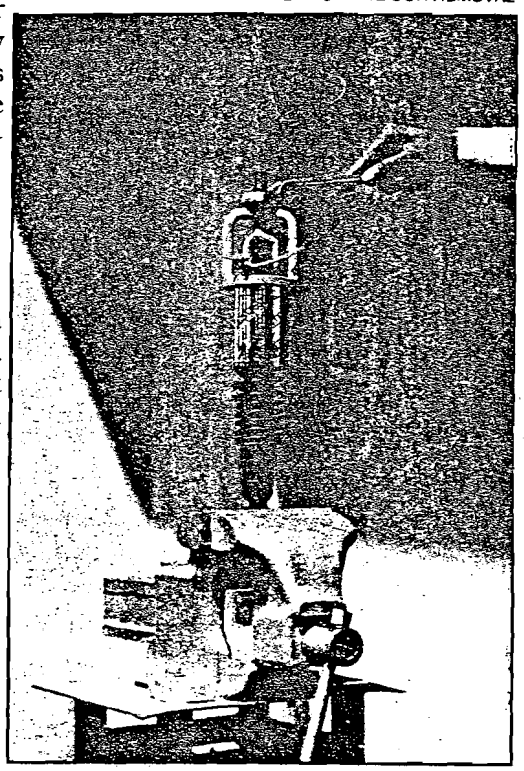
The frame is built of special cold drawn welded steel tubing incorporating reinforcements wherever necessary, for extra strength.

The swinging arm unit forms the chainstay and is fitted with rubber bonded 'silent-bloc' bushes. The swinging arm unit is secured to the main frame by a long bolt passing through the pivot lugs.

2. Removal of Rear Spring Box Unit/ Servicing Rear Spring Box

Remove the top pivot pin nut, drive out the pivot pin, then hinge the suspension unit back on the lower pivot pin. After removing the lower nut, the unit may be pushed off the pivot pin welded to the fork end. It is a sealed unit and the internal mechanism cannot be serviced. Outer dust cover can be removed using special tool PED- 2039 for cleaning coil spring.

REAR SPRING BOX REMOVAL



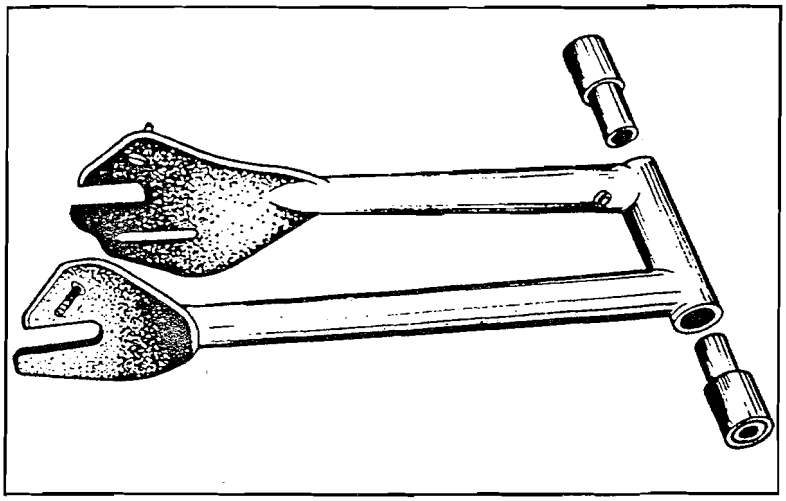
3. Removal of Swinging Arm Chain Stay

Remove the rear wheel, chain. rear sprocket and brake cover plate assembly from the swinging arm chain stay. Remove one of the pivot nuts and pull the pivot pin from the other end. The chainstay can then be pulled out of the frame.

The life of the rubber bonded 'silent-bloc bushes is very high. But if it is necessary to replace the bushes, the inner sleeves will have to be pressed out first on a press. The rubber can then be taken away from the outer sleeves by pliers. The outer sleeves can be driven out by means of a hammer and a suitable drift.

Replace the rubber bonded bushes in the swinging arm, using a suitable drift, press one bush from one end of the pivot bearing tube under a press, until the metal outer sleeve is flush with the end face of the pivot bearing tube. While pressing, it must be ensured that pressure is exerted only on the outer sleeve and not on the inner sleeve of the bush, as axial pressure on the inner sleeve would destroy the bonding of the rubber to the metal sleeves. Similarly press the second bush from the other side of the pivot bearing tube until the metal outer sleeve is flush with its end face.

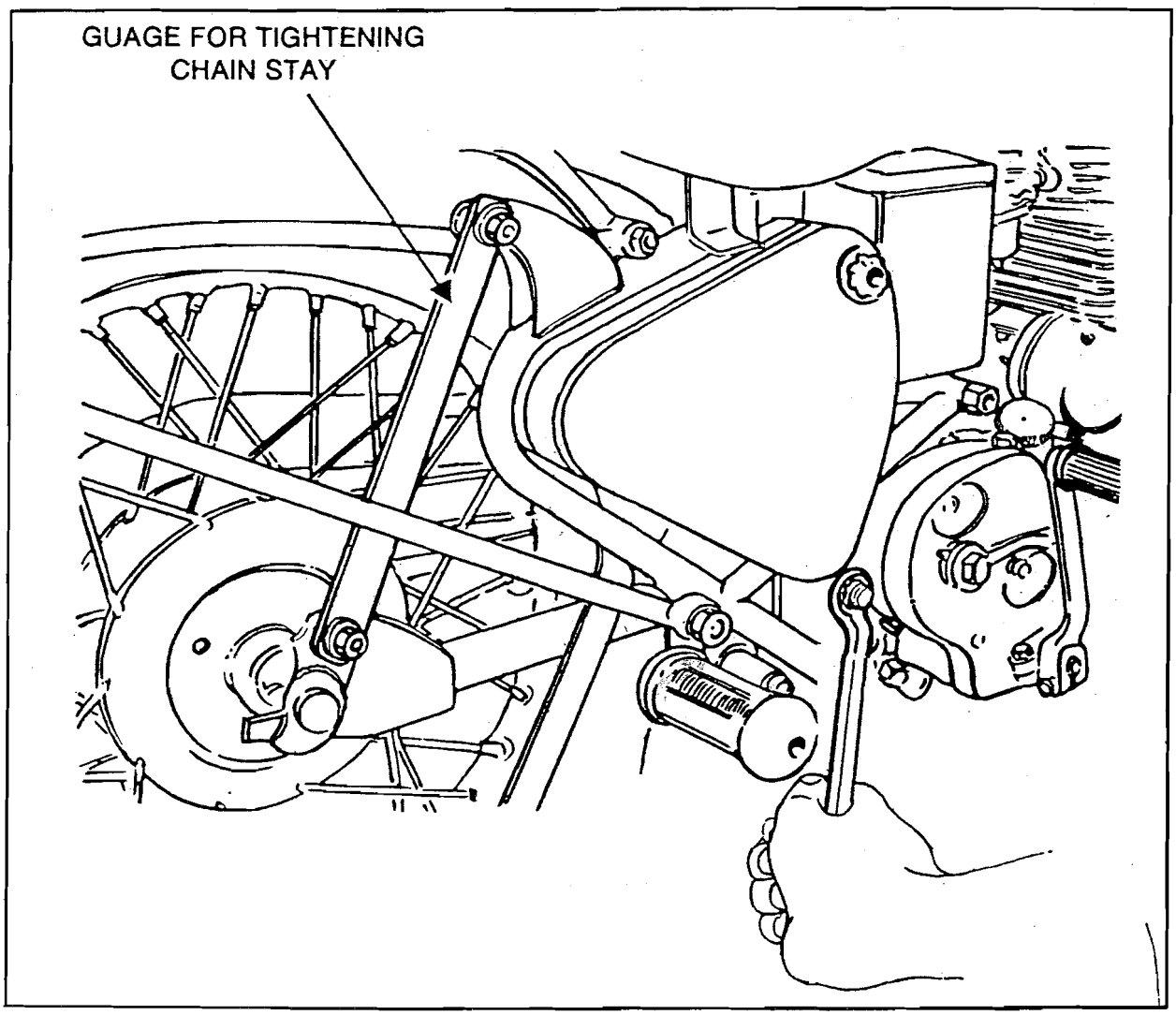
While assembling, the swinging arm fitted with rubber bonded 'silent-bloc' bushes, to the frame, the pivot nuts should be fully tightened only with the swinging arm positioned in the mid-stroke of the spring boxes, i.e., when the centre distance between the spring box top mounting hole in the frame and the bottom mounting pin on the swinging arm is 9.75". This is recommended so that, the rubber bush will be subjected to minimum angular movement in either direction from the mid stroke.



position of the spring box. The special tool for alignment of swing arm to be used. (PED 2044). No maintenance is necessary for the swinging arm pivot.

4. Centre Stand

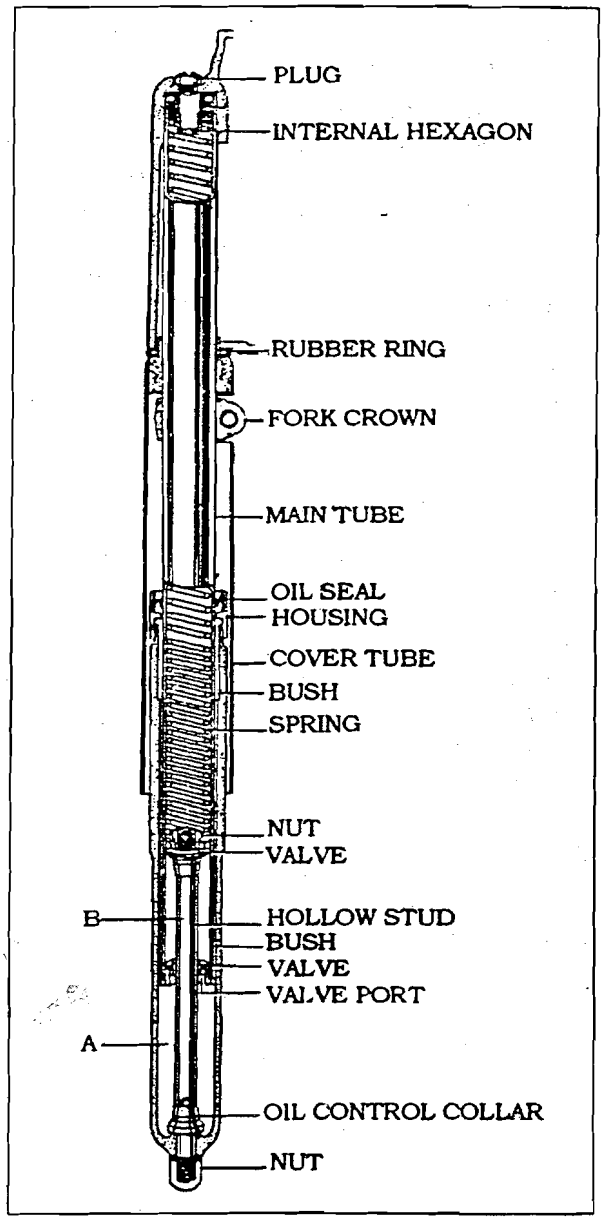
To remove the centre stand take out the split pins & washers from both the ends of the stand spindle. Drift out the spindle and withdraw the stand complete after disconnecting both the ends of the stand springs.



FRONT FORK (Hydraulically damped)

1. Description

SECTION OF FORK LEG



The telescopic fork consists of two legs each of which comprises a main tube of 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 cast iron bush which is a close fit over the outside diameter of the main tube. These bushes are not being fitted on to the latest Front Fork Assemblies. The bush is secured to the bottom tube by means of a threaded housing which contains two oil seals. 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.

2. Operation of the Fork

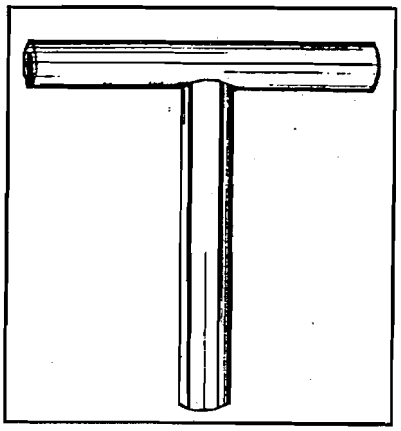
The fork provides a range of movement of 6" from the fully extended to the fully compressed position. The movement is controlled by the compression spring and by the hydraulic damping system. The hydraulic damping is light on the bump stroke and heavier on the rebound stroke, thus damping out any tendency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

The fork is filled with a light oil (S.A.E. 30) 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 and the bore of the main tube valve port into the damper chamber 'B'. During this stroke the pressure on the underside of the valve plate 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 no 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 which secures the upper end of the spring stud to the 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 pump 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 enters the main counterbore of the valve port thus forming a hydraulic cushion to prevent metal to metal contact.

3. Dismantling the Fork

MAIN TUBE SPANNER PED-2026



Place the machine on the centre stand, disconnect the front brake control cable & speedometer connection and remove the front wheel and mudguard complete with stays. Unscrew the bottom spring, stud nut 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. In the latest version the oil seal housing is eliminated and the oilseals are provided as an integral part of bottom tubes. Hence by pulling the bottom tube downwards the same can be removed from the forkmain tubes. [For old type front forks: Unscrew this housing by means of a spanner on the flats with which it is provided. 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 special tool PED 2026. The spring stud and spring can now be withdrawn from the lower end of the main tube.

NOTE: In the latest version the oilseal housing and steel bush has been eliminated on introduction of integral oil seals in the bottom tubes.

The steel main tube bush 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 so as to ensure re-assembling it in the same position on the main tube. The reason for this is that these bushes are ground to size, after fitting on to the tubes, so as to ensure concentrictly. After removal of the main tube bush,

bottom tube bush and oil seal housing, the main tube can be removed using tool PED 2036ST. Before attempting to loosen the main tubes ensure that the 2 pinch bolts on the fork crown bottom has been sufficiently loosened to allow the main tubes to rotate.

4. Spring

The free length of the spring is 20 1/2". The spring should be replaced if it has closed by more than 1 inch.

5. Re-assembly

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.

NOTE: (Only for Old Type Forks) If the oil seal housing has been removed from the upper end of the main tube and is refitted from this end, a special nose piece must be fitted over the threaded end of the tube to prevent damage to 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 located 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.

6. Removal of Complete fork Assembly

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 at their lower ends or by means of the plug and socket connectors when these are provided.

Disconnect the speedometer drive from the speedometer head.

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

Unscrew the fork main tubes from the head lamp casing 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 head lamp casing, the complete fork and wheel with steering stem can be removed.

7. Lubrication

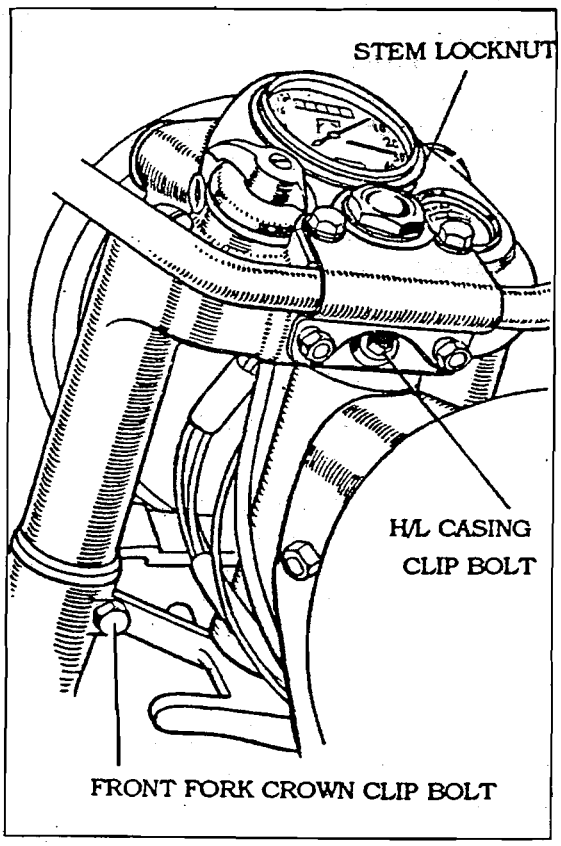
The lubrication of the fork internal parts is effected by the oil which forms the hydraulic damping medium. All that is necessary is to keep sufficient oil in the fork to ensure that the top end of the bottom spring stud is never uncovered even in the full rebound position. The level of oil in the fork can be gauged by removing the top plug screw and inserting a long rod about 3/8" diameter. If slightly tilted this will wedge against the nut at the upper end of the bottom spring stud.If the oil is above the spring stud, it will leave a trace on the long rod, which can be seen on removal. This trace of oil implies that oil level is correct. If the fork is empty to start with, the quantity required is approximately 200ml in each leg. Recommended grade of oil is hydraulic oil or SAE 10 W 30.

8. Steering Head Races

The steering head races are the same at the top and bottom of the head lug. They are easily removed by knocking them out with a hammer and drift and new races can be fitted either by a press or by means of a hammer and wooden drift. The steering head bearing consists of two deep groove thrust races each containing nineteen 1/4" 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 handlebar will cause the steering to swing to full lock in either direction, while at the same time there should be only the slight trace of play in the bearings.

The play can be felt by keeping a finger across the head races just below the ball head on the top ball race. 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, as shown in figure is useful to ensure centralisation of the cover tubes.

ADJUSTI *ADJUSTMENT OF HEAD BALL-RACE*



SEQUENCE FOR ADJUSTMENT

1. Loosen the Head lamp casing clip bolt by using an Allen key (Size - 5mm)
2. Loosen the front fork crown clip bolts (2 Nos.)
3. Then screw down the steering stem lock nut by $\frac{1}{2}$ thread to $\frac{3}{4}$ thread initially and check the play once again. If necessary further tightening can be done.

Note: Over tightening of this Steering stem lock nut will result in vehicle drag.

9. Lubrication-Steering Head

The steering head races and stand pivot bearing should be well greased on assembly. 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 with grease initially they will last for several years or many thousands of kilometres.

WHEELS

FRONT WHEEL

1. Removal from Fork

To remove the front wheel from the fork place the machine on the centre stand with sufficient packing beneath the stand to lift the front wheel clear off the ground when vehicle is tilted back. Slacken the brake cable adjustment and disconnect the cable from the handlebar lever and from the operation cam lever on the hub.

Disconnect speedometer driving cable. Unscrew the four nuts securing the fork Lug caps and allow the wheel to drop forward 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 dual seat or a strut beneath the front end of engine near Frame down tube to ensure this.

2. Dismantling

Lock the brake 'on', by applying the front brake, and unscrew the cover plate nut. (For Front brake with twin leading shoes loosen the lock nuts on the link rod and turn link rod so that both brake shoes become free and are not in contact with the brake drum) The cover plate assembly can then be withdrawn from the brake drum.

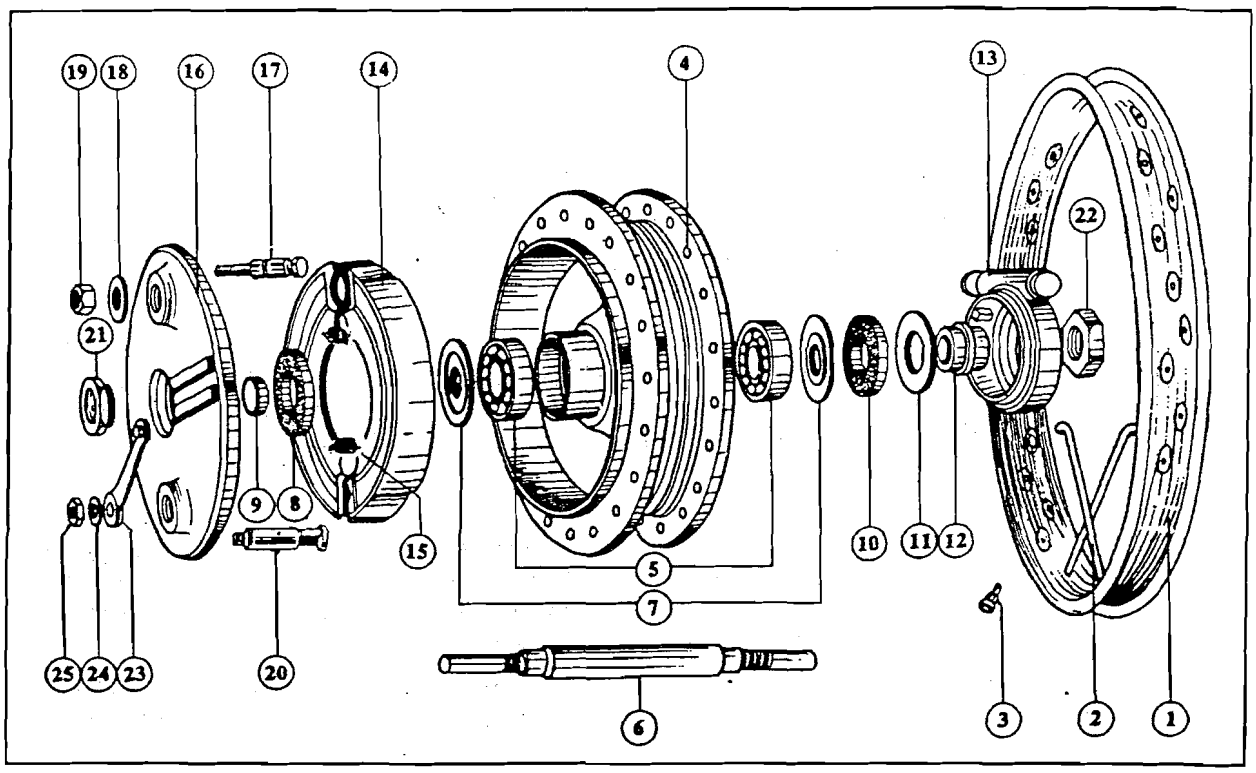
The brake shoes can be removed after detaching the return springs. Brake linings are supplied in pairs and are of 'Bonded' type hence linings cannot be separated and refixed with new linings.

To remove the operating cam unscrew the nut, 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. The brake shoe pivot pin can be removed after unscrewing the nut which secures it to the cover plate.

To remove the hub spindle and bearings, having first removed the brake cover plate, unscrew the retaining nut by holding the spindle on a benchvice with soft jaws. Remove speedo drive assembly and the felt washer from the otherside of the hub. Remove the felt washer and the distance washer from the brake drum side and hit one end of the spindle with a brass or plastic 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 through the end from which it was removed. Now drive the spindle through the hub, the other way, which will bring out the other bearing.

3. 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 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 races in either end of the barrel. To prevent any possibility of sideways movement of the hub barrel on the bearing 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 ball race in the bearing

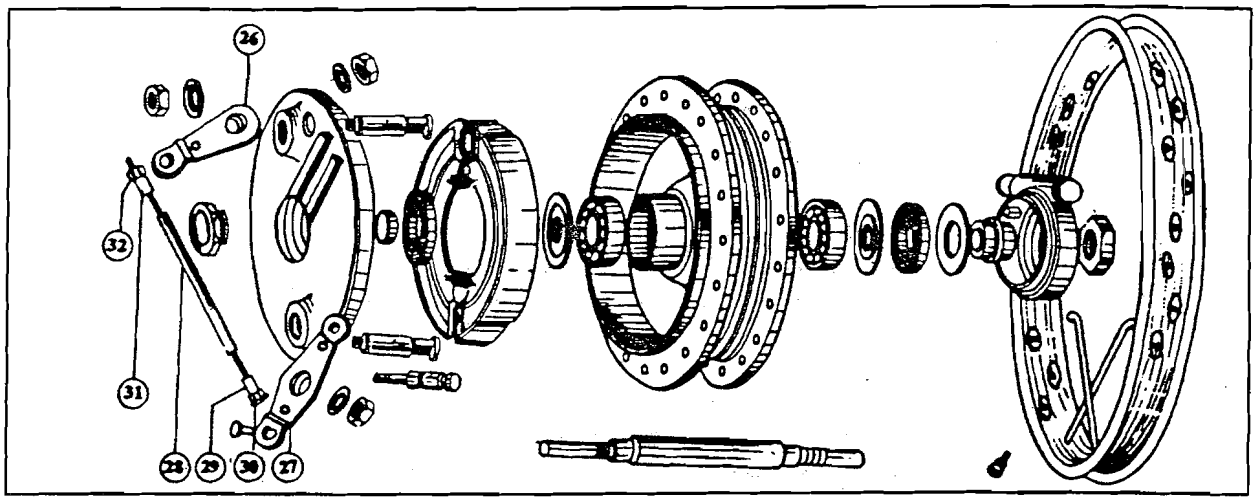


1. Front Wheel rim (WM 2-19)
2. *Front Wheel spokes (outer)*
3. *Front Wheel spokes nipples*
4. *Front hub assembly (7" dia)*
5. *Front hub journal bearing (SKF 6203)*
6. *Front hub spindle*
7. *Front hub felt retainer*
8. *Front hub felt washer (drum side)*
9. *Front hub cover plate distance collar*
10. *Front hub felt washer (speedo side)*
11. *Front hub felt washer retainer (speedo side)*
12. *Front hub speedo drive spacing collar*
13. *Speedo drive complete*
14. *Front brake shoe c/w lining S/L*
15. *Front brake shoe spring (7" dia)*
16. *Front brake cover plate (7" dia.) S/L*
17. *Front brake shoe pin (7" dia.) S/L*
18. *Washer front brake shoe pin S/L*
19. *Nut front brake shoe pin S/L*
20. *Front brake operating cam (7" dia) S/L*
21. *Nut front hub cover plate*
22. *Front hub spindle nut (speedo side)*
23. *Front brake operating cam lever (7" dia)(S/L)*
24. *Washer front brake operating cam lever (S/L)*
25. *Nut front brake operating cam lever S/L*

4. Re-assembly

To refit the bearings in the hub, two hollow drifts (Special Tool No. PED 2011) are required. One bearing is first fitted to one end of the spindle by means of the hollow drift. The spindle and bearing are then inserted into one end of the hub barrel, which is then supported on one of the hollow drifts. The other bearing is then inserted 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 in the hub, fit the distance washers, cover plate, dust excluder and the nuts on the spindle. Tightening the nuts should not have any effect on the ease with which the spindle can be rotated.



26. F/B operating lever (short) T/L
27. *Front brake lever long T/L*
28. *Link Rod Ft. Brake T/L*
29. *L/Rod Trunion (RH Thread) T/L*
30. *L/Rod Trunion Nut (RH) T/L*
31. *L/Rod Trunion (LH) T/L (NF)*
32. *L/Road Trunion Nut (LH) T/L*
33. *Front brake shoes C/W lining T/L*
34. Front Brake Cover Plate T/L
35. *Front brake shoe pin T/L*
36. *Washer Front brake shoe pin T/L*
37. *Nut Front brake shoe pin T/L*
38. *Front brake operating cam*
39. *Washer front brake operating cam*
40. *Nut front brake operating cam.*

If tightening the nuts makes the spindle hard to turn, the bearings are bottoming in the recesses in the hub barrel and the inner races are not resting on the shoulder of the spindle. In this case, the bearing should be removed and a thin packing shim should be fitted between the inner race and the shoulder on the spindle.

Assemble the operating cam into cover plate after smearing grease, on the pivot pin and the cylindrical bearing surface of the operating cam. Fit the operating lever, on its splines 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.

NOTE: Before replacing the felt washers which form the grease seals, pack all bearings with medium/lime soap or aluminium soap greases or multipurpose grease. 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 dampness finds its way into the hubs.

Make sure that the inside of the brake drum is quite free from oil or grease, dampness, etc. When replacing the speedo drive, make sure that the dogs on the speedo drive are correctly engaged with the slots in the end of the hub barrel. Make sure that the speedo drive is correctly positioned, so that the speedo cable would not be too stretched or will not have any sharp bends. Replace the felt washers, distance collars, and brake cover plate and securely tighten the spindle nuts.

REAR WHEEL

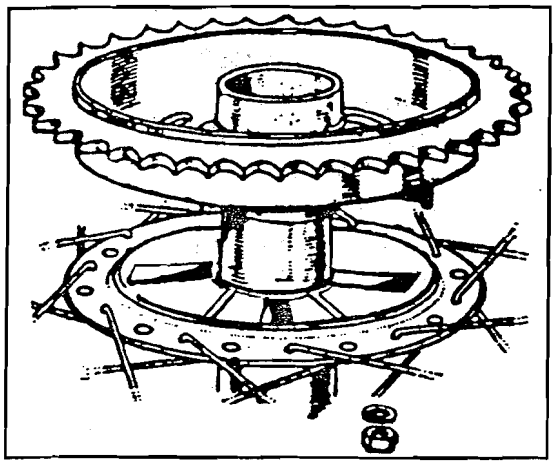
1. Removal of wheel - quickly-detachable type

The rear wheel is quickly detachable without disturbing the sprocket. Place vehicle on centre stand. Remove the split pin and the castle nut securing the long spindle which is located on the sprocket side. Slide out the long spindle from the wheel and remove both the spacers from the RH side fork end. Tilt the vehicle and slide out the wheel from the chainstay. For assembly reverse the process but take care to engage the cush rubbers properly on the driving lugs.

2. Cush Drive

Four rubber blocks are fitted in the pockets of centre hub and four radial vanes are formed on the back of the rear sprocket/brake drum, thus transmitting both driving and braking torque and smoothening out harshness and irregularity in the former.

RE-ASSEMBLY OF CUSH DRIVE



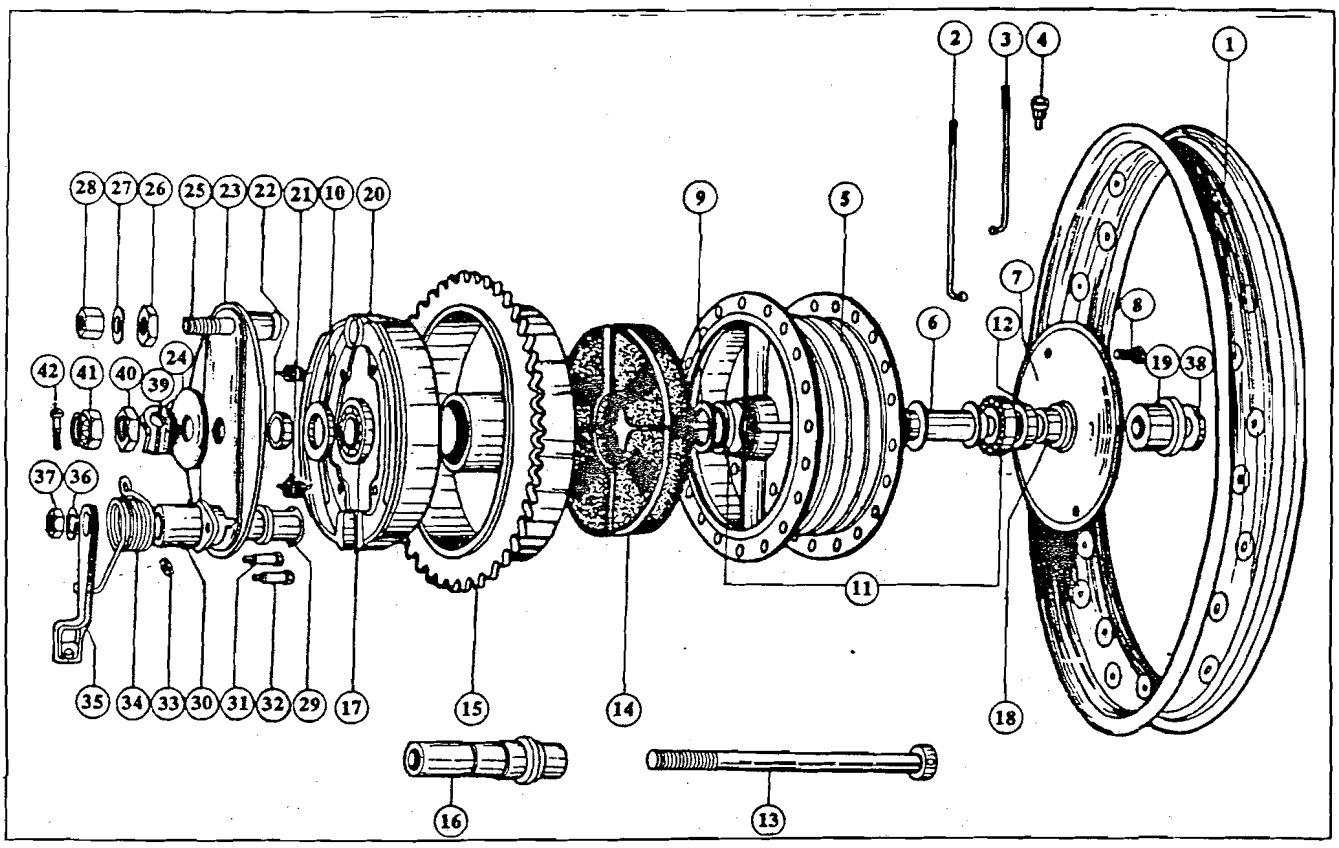
If the cush drive rubbers are worn, and the amount of free movement measured at the tyre exceeds 1/2" to 1", the rubbers should be replaced. The condition of the cush drive rubber in the rear wheel can be gauged by placing the machine on the rear stand, applying the rear brake and rotating the rear wheel.

The cush rubbers are fixed in the pockets of centre hub by means of buttons provided in the rubber blocks, thus the rubbers are prevented from falling down when wheel is removed or refitted.

3. Removal and re-assembly of rear wheel sprocket

Removal of sprocket is necessary only if replacement of sprocket or attention to brakes is required. Remove the wheel as described above. Remove the brake rod nut and disconnect the brake rod from the operating lever. Be sure to 'DISCONNECT' the stop light switch from the link, otherwise the switch will get damaged. Remove the securing bolts of the chainguard at both front and rear ends and remove the chain guard. Disconnect the chain link. Remove the securing nuts from brake anchor and wheel spindle. Unwrap the chain from the rear sprocket. Slide out the rear sprocket assembly from the chainstay.

For re-assembly proceed in the reverse order . Make sure that the inside of the brake drum is quite free from oil grease dampness etc. Ensure the chain lock clip is fitted in the right direction so that the closed end of the clip is towards the direction of motion. The rear chain should be inspected for wear before assembly. It should be renewed when its length has increased by 1-1/8" than a new chain. The rear Chain can be adjusted by slackening the wheel spindle nuts and brake anchor shoe pin nut and turning the notched cam plate.



1. Rear wheel rim WM 2-19
2. Rear wheel spokes (dust cover side-outer)
3. Rear wheel spokes (dust cover side-inner)
4. Rear wheel spokes nipples
5. Centre hub with barrel
6. Rear hub bearing spacer assy.
7. Rear hub dust cover
8. Rear hub dust cover screw
9. Rear hub barrrel 'O' ring
10. Rear hub grease seal (small)
11. Rear hub journal bearing
12. Rear hub grease seal (small)
13. Rear hub spindle (long)
14. Rear hub sprocket cush rubber
15. Rear hub sprocket 38T
16. Rear hub spindle (short)
17. Rear hub bearing (large)
18. Distance collar (dust cover inner side)
19. Rear hub distance collar (dust cover outerside)
20. Rear brake shoe c/w lining (bonded)
21. Rear brake shoe spring
22. Rear brake cover plate distance collar
23. Rear brake cover plate assembly
24. Rear hub distance collar (drum side)
25. Rear brake shoe pin
26. Nut rear brake shoe pin
27. Washer rear braake shoe pin (plain)
28. Shoe pin nut rear brake anchor
29. Rear brake operating cam
30. Rear brake cam bush
31. Rear brake operating cam bush pin (long)
32. Rear brake operating cam bush pin (short)
33. Rear brake operating cam bush pin locknut
34. Rear brake return spring
35. Rear brake operating Cam Lever Assy
36. Washer rear brake lever
37. Nut rear brake lever
38. Rear hub adjuster (RH)
39. Rear hub adjuster (LH)
40. Locknut (Rear hub spindle)
41. Nut rear hub spindle
42. Rear hub spindle split pin

4. Dismantling the Rear Brake Shoes.

After separating the cover plate from sprocket assy, unscrew the brake shoe pivot pin lock nut and the operating lever nut. The assembly of 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 spring can then be unhooked from the brake shoes.

Brake linings are supplied in pairs and are of bonded type hence linings cannot be seperated and refixed with new linings.

5. Removal of bearing from centre hub and re-assembly

The bearing from the centre hub can be removed by inserting a small rod of 6 mm dia. Insert the rod through the bearing at one end and through the slit provided, at the ends of the bearing distance tube. Hit the rod with a small mallet on radially opposite sides of the bearing. The other bearing also can be removed by hitting it from opposite side after the removal of grease seal.

To remove the hub spindle (short) and bearings from the brake drum, having already removed the brake cover plate assy., hit outer end of the spindle with a brass hammer or mallet thus driving it out of the bearing. Now the grease seal and the bearing from the brake drum can be removed one after the other.

The fit of the bearings in the hub barrel is important as in the case of Front wheel.

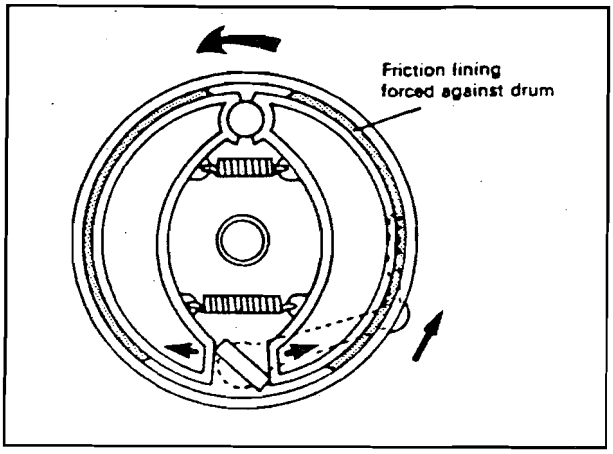
To fit the bearings in the hub, use the two hollow drifts proceed as follows. In order to make sure that there is clearance between the inner faces of the bearings and the bottom of the recess, first fit the sealed bearing at the cush drive side of the centre hub so that the bearing will sit in the housing flush with the boss face. Then place the distance tube from other end and press the second bearing and also the grease seal. (small)

NOTE: Before replacing the bearings in the centre hub as well as sprocket brake drum, pack with medium/heavy lime soap or aluminium soap grease. The use of HMP grease which have soda soap base is not recommended as these tend to be slightly corrosive if any dampness finds its way into the hub.

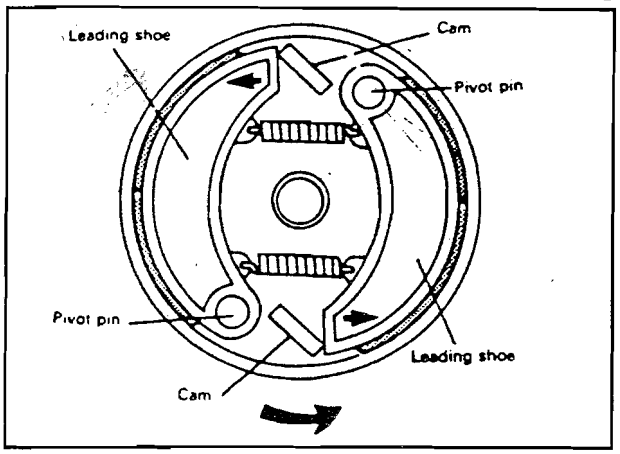
6. Re-assembly of brake shoes

Make sure that the brake shoe pivot pin is really tight in the cover plate and smear grease in the grooves of the pivot pin and on the operating face of the cam. Also smear grease on the

OPERATION OF A SINGLE LEAD SHOE - DRUM BRAKE



OPERATION OF A TWIN LEAD SHOE - DRUM BRAKE

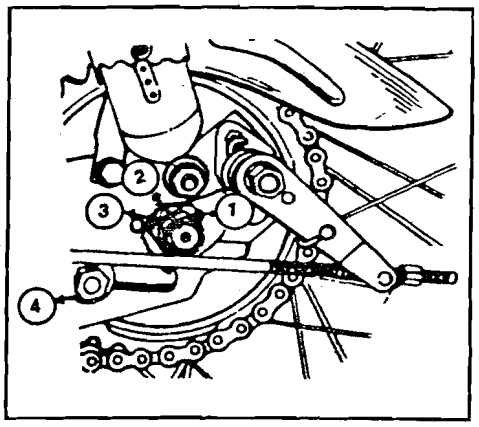


cylindrical bearing surface of the operating cam, if this has been removed. Fit the operating lever on its splines in a position to suit the extent of wear on the linings and secure with the nut. The range of adjustment can be extended by moving the lever on to a different spline.

Note that the bolt holes in the cover plate for locating the rear brake cam bush are slotted, to enable the brake shoe assy, to be centered in the drum. The brake cover plate assy with the shoes should 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 brake cover plate assembly should then be removed and the screws should then be tightened fully and secured with the lock nuts. If the shoes are not correctly centred, 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 assy, correctly centered and screws securing the cam housing correctly tightened wear on both linings should be approx equal.

7. Adjustment of Drive Chain

DRIVE CHAIN ADJUSTMENT



Check slackness of the drive chain every 1000 Kms. and adjust if necessary. The frequency of adjustment depends entirely on the rider habits and usage conditions. If the chain is adjusted too loose or too tight, the chain may either jump off the sprocket or might break, causing serious damage to vehicle/engine parts and may also lead to a serious accident.

The Procedure for Adjusting the rear chain is as follows;

Place the vehicle on its centre stand on a firm flat surface.Unfold and remove the split pin (1) on the castle nut on LH side of rear wheel. Loosen the castle nut (2). Loosen the stub axle nut (3) and rear brake anchor pin nut (4). Move the cam adjusters to the same number of notches on either side of the axle. Rotate the rear wheel and check the chain tension on the top run of the chain. The minimum free play of the chain should be 25 to 30 mm with the vehicle on its centre stand. Check the wheel alignment of front and rear wheel, using a straight edge or by means of stretching a rope from the front wheel to rear wheel. Retighten the stub axle nut. Rotate the rear wheel, apply the rear brake hard and hold the rear brake pedal firmly in the depressed position so that the brake assembly is centralised in the brake drum. Retighten the brake anchor pin nut. Release the brake pedal. Ensure that the chain adjuster on the RH side is butting against the peg on the chain stay and is not disturbed from its adjusted position. Retighten the castle nut fully such that the split pin hole is aligned. Locate the split pin in position and bend out the split ends. Check the chain tension again at 3 or 4 places by rotating the wheel and ensure the free play is 25 to 30 mm on the top run.

8. Wheel Alignment

NOTE: 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.

It is usual to check the alignment of the wheels at a point about six inches above the ground. 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 that 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, tool boxes, battery etc., in order to allow straight edge or a piece of taut string to contact the front and rear tyres.

In the later models a punch mark is provided on both the chain adjusters. These punch marks can be used as reference marks and the chain adjusters must be moved by the same number of notches from this punch mark to ensure proper wheel alignment.

9. General

1. Wheel Rims

The rim fitted to the wheel is WM 2.19" pierced with 40 holes for Locating the spoke nipples.

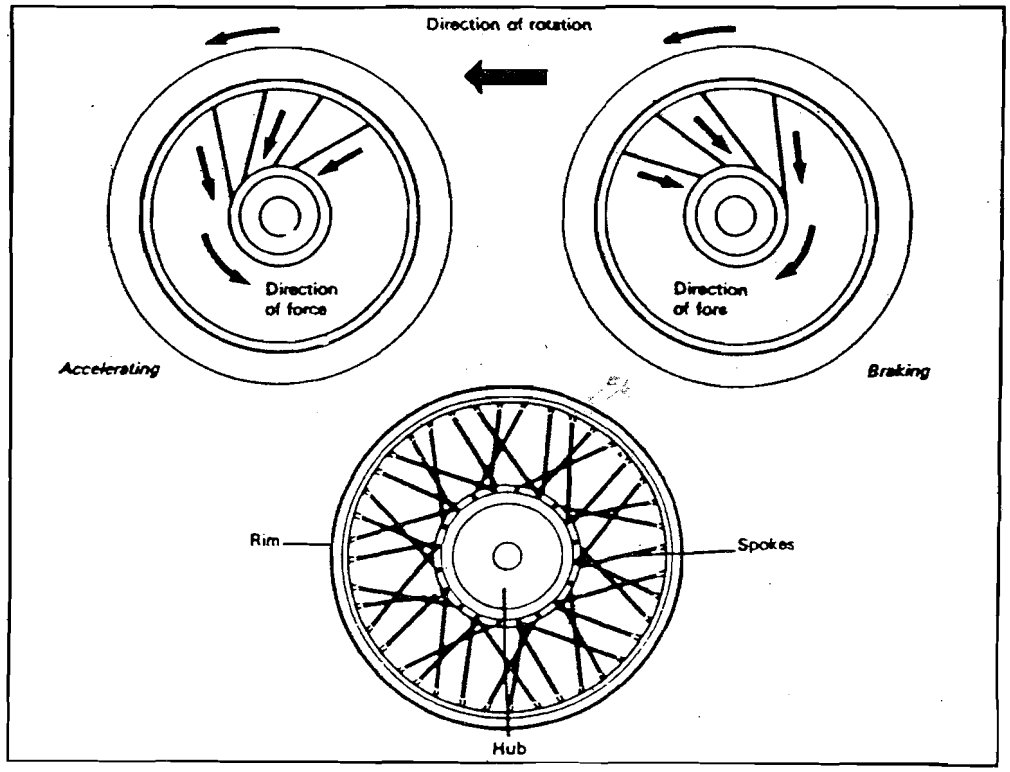
2. Spokes

The spokes are of plain type 4 mm dia with 90 degree counter sunk heads, angle of bend 80 to 95 degree. Thread diameter is 4.4 mm x 0.7 pitch thread. Spoke lengths are 170 mm for the rear wheel and 165 mm for the front wheel.

3. Wheel Building and Truing

The spokes are laced in such a way that wheel must be built centrally in relation to the outer faces of the distance collars which fit 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".

SPOKE LOADINGS IN A WIRE WHEEL



The key to correct lacing is the inside and outside spokes from the flange must slope down in the opposite direction as in the figure. The spokes are in opposite direction to the inner two spokes. In the group of four spokes laced, the inner spokes of each flange are sloping down in the opposite direction of the outer two spokes of the next grouping of four spokes and so on.

4. Lubrication

Front and rear wheel bearings are lubricated by packing them with grease every 10,000 Kms. after dismantling the hub and requires no further attention.

5. Tyres

Standard tyres are of size 3.25.19" for Front & 3.50.19" for Rear.

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 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 tyre levers. 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.

Please refer the attached diagrams in Page No.59 for correct procedure for removal and refitting of tyres.

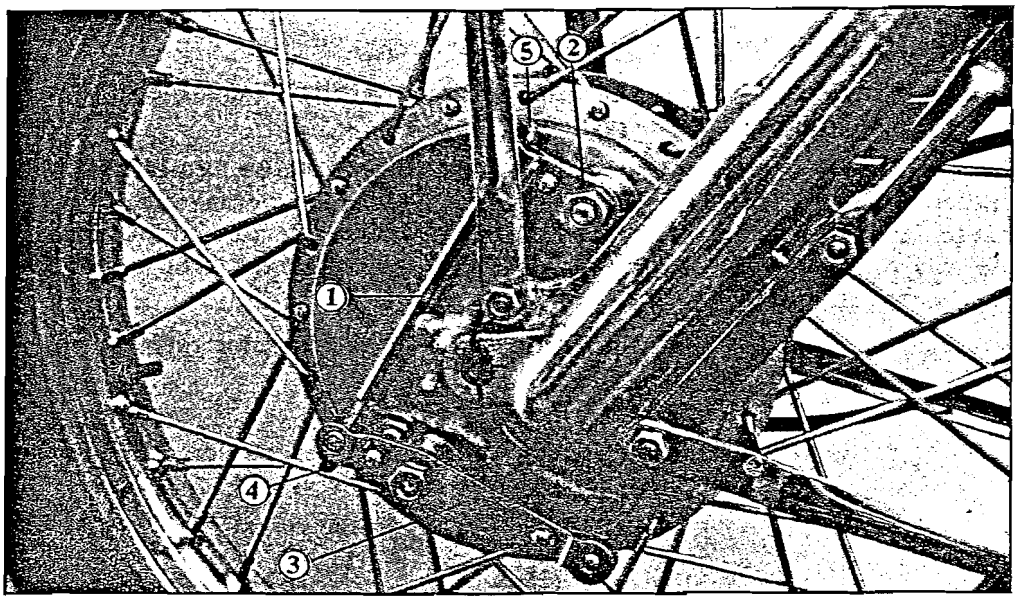
ADJUSTMENT OF BRAKES

1. Front Brake Twinleading Arrangement - Bullet 350/500 CC

All Bullet 350 & 500 cc models are fitted with twinleading front brakes for effective braking. These are with bonded type brake shoes of 7" diameter.

Where brake judder or sponginess is experienced and the cause is narrowed down to uneven braking of the front wheel, the procedure to adjust the same is as follows:

TWIN LEADING BRAKE ARRANGEMENT



1. *Link rod*
2. *F/B Opperating Lever (Short)*
3. *F/B Operating Lever (Long)*
4. *L/Rod Turning Nut (RH)*
5. *L/Rod Trunion Nut (LH)*

2. Procedure For Adjustment of Brakes

2.1 Front wheel removed from the vehicle

Hold the front wheel spindle in a benchvice with soft jaws to avoid damage to spindle. Remove the brake cover plate by loosening the nut and clean the brake drum and brake shoe assembly.

Mark four or five lines with a chalk across the shoe lining surfaces and assemble the cover plate to the wheel and clamp it firmly with the nut. Hold the brake cam levers so that the brake shoes are binding lightly on to the drum and rotate the wheel in the normal direction of rotation (anti-clock wise direction looking from brake drum end). Remove the Brake cover plate and observe the marks on the brake shoe surfaces. If the contacts are uniform, the marks on the shoes would have been erased uniformly. If the mark on one side is not erased, it indicates that the brake shoe has to be moved towards the drum through adjustment provided. For example: if the shoe bearing on the cam connected to the short lever has the chalk marks intact then the shoe should be moved outwards towards the drum. For this adjustment, refit the cover plate assembly, hold the longer brake lever pulled fully in the operating direction so that the brake shoe is binding on the drum and proceed as follows:

NOTE: Check the locknuts for threading - RH or LH.

Loosen the locknuts provided at both the ends of link rod and rotate the link rod clockwise so as to move the short lever more towards the normal direction of the operation i.e. towards the longer lever.

Stop adjusting when the shoe has moved and touches the brake drum which can be felt while making the adjustment through the link rod. Then lock the two lock nuts provided at the end of link rod. If the marks on the shoe operated by the longer lever are not erased, carry out above adjustments in the reverse manner (anticlockwise) ensuring that both the brake shoes are in contact with the drum uniformly.

CAUTION: Do not attempt to rotate the link rod without loosening the locknuts and do not overtighten the lock nuts on the link rod. The link rod threads might snap if either of the above is done.

2.2. Without Removing Front Wheel From Vehicle

Increase cable play by threading in the adjuster either at handle bar end or at fork bottom tube end.

Loosen the link rod lock nuts sufficiently at the top and bottom (L & R threads).

Apply front brake and hold the lever (Do not release the brake till the adjustment is complete). This would ensure that the brake shoe nearest to the drum would be in contact with the brake drum.

Turn the link rod right to left (clockwise) or in the opposite direction simultaneously checking whether the short lever moves towards the long lever or vise versa.

Turning the link rod would be easy till the other shoe also comes in contact with the brake drum and thereafter resistance would be felt and would be difficult to rotate further.

Release the hand lever and check for free rotation of the front wheel (No brake binding should be felt and wheel should rotate free).

Hold link rod in position and tighten lock nuts just sufficiently.Adjust the brake cable adjusters such that brake lever travel is 20 to 30 mm from its resting position.

NOTE:1. The Link rod is provided with the LH and RH thread for the above adjustments. Hence the correct trunions and Lock nuts are to be used at the respective threaded ends. (Refer Diagram)

2. Link rod adjustment can be made to compensate for the lining wear in the normal service life which avoids repositioning of the levers.

3. Any excessive play in the Brake cable can be corrected by using the adjuster provided in the Front Brake Lever end at the handle bar and through the adjuster provided on the left hand fork bottom tube assembly.

CAUTION:1. If you are in doubt, please contact the authorised Dealer/Distributor for their guidance and for correct adjustment of the front brakes.

2. Any mal-adjustment of the brake system will render the brakes inneffective and will affect the safety of the rider.

2.3. Rear Brake

Set brake pedal resting position with respect to the foot rest by adjusting the stop bolt provided on the left side on the main frame.

Turn the adjusting nut on the brake rod, clock wise to reduce pedal travel and vise versa to increase pedal travel.

The recommended travel is 20 to 30 mm. Rotate rear wheel and check for free rotation and ensure no brake binding occurs.

TYRES - REMOVAL AND REPLACEMENT

1. At some time or other the need will arise to remove and replace the tyres, either as a result of a puncture or because renewal is required to offset wear. To the inexperienced, tyre changing represents a formidable task, yet if a few simple rules are observed and the technique learned the whole operation is surprisingly simple.

2. To remove the tyre from either wheel, first detach the wheel from the machine. Deflate the tyre by removing the valve insert and when it is fully deflated push the beading of the tyre away from the wheel rim on both sides so that the beading enters the centre well of the rim. Remove the locking cap and push the tyre valve into the tyre.

3. Insert two tyre levers close to the valve, on either side of the valves and lever the edge of the tyre over the outside of the wheel rim. Very little force should be necessary; if resistance is encountered it is probably due to the fact that the tyre beading have not come off the wheel rim all around the tyre.

4. Once the tyre has been edged over the wheel rim, it is easy to work around the wheel rim so that the tyre is completely free on one side. At this stage, the inner tube can be removed.

5. Working from the other side of the wheel, ease the other edge of the tyre over the wheel rim. Continue to work around the rim until tyre is free completely from the rim.

6. If a puncture has necessitated the removal of the tyre, reinflate the inner tube and immerse it in water to trace the source of the leak. Mark its position and deflate the tube. Dry the tube and clean the area around the puncture with a petrol soaked rag. When the surface has dried, apply rubber solution and allow this to dry before removing the protective sticker from a patch and applying the patch to the surface.

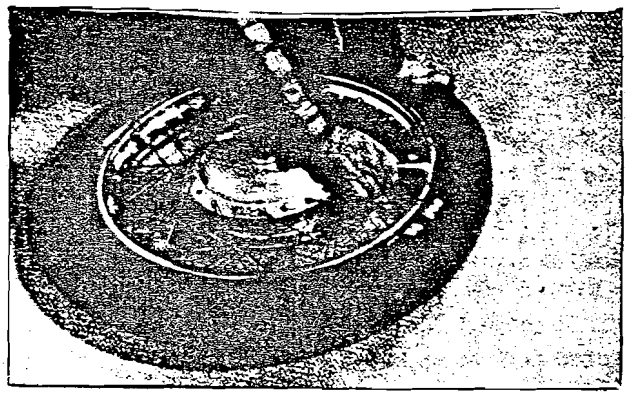
7. It is best to use a patch of the self-vulcanising type, which will form a very permanent repair. Note that it may be necessary to remove another protective covering from the top surface of the patch, after it has sealed in position. Inner tubes made from synthetic rubber may require a special type of patch and adhesive if a satisfactory bond is to be achieved.

8. Before replacing the tyre, check the inside of it to remove the foreign particle which caused the puncture. Check the outside of the tyre, particularly the tread area, to make sure nothing is trapped that may cause a further puncture.

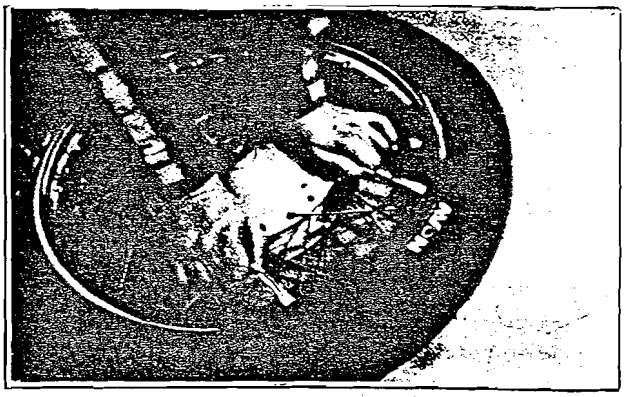
9. If the inner tube has been patched on a number of past occasions, or if there is tear or large hole, it is preferable to discard it and fit a new tube.

10. To replace the tyre, inflate the inner tube just sufficiently for it to assume a circular shape. Then push it into the tyre so that it is enclosed completely. Lay the tyre on the wheel at an angle and insert the valve through the rim tape and the hole in the wheel rim. Attach the locking cap on the first few threads, sufficient to hold the valve captive in its correct location.

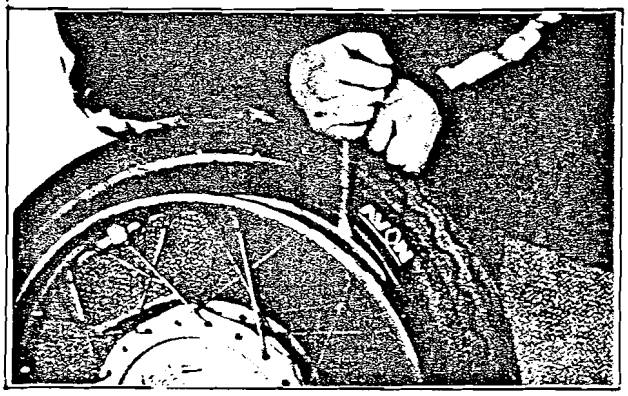
11. Starting at the point furtherest away from the valve, push the tyre beading over the edge of the wheel rim until it is located in the central well. Continue to work around the tyre in the fashion until the whole of one side of the tyre is on the rim. It may be necessary to use a tyre lever during the final stages.



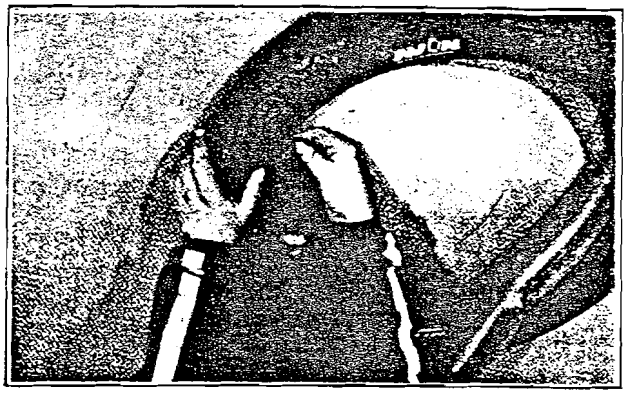
Tyre removal: Deflate inner tube and insert lever in close proximity to tyre valve.



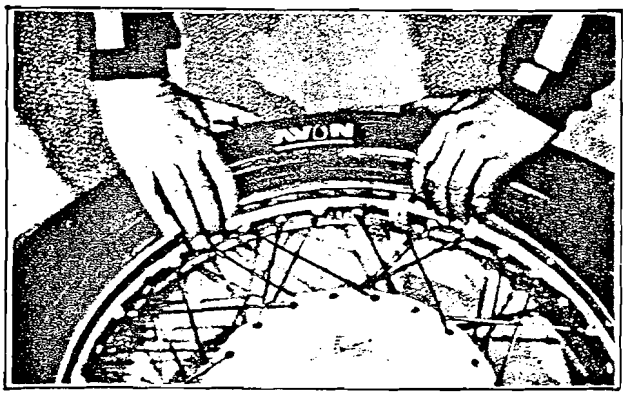
Use two levers to work bead over the edge of rim.



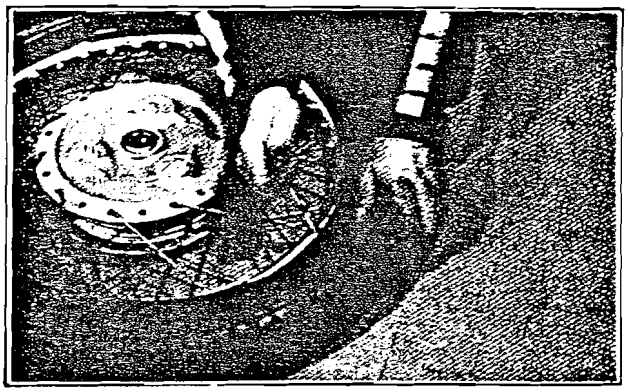
When first bead is clear, remove tyre as shown.



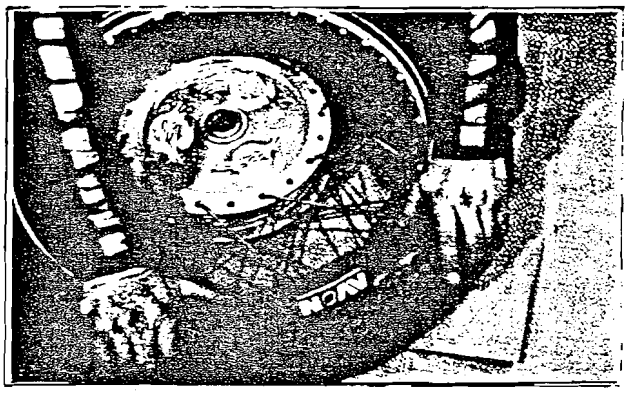
Tyre fitting: Inflate inner tube and insert in tyre.



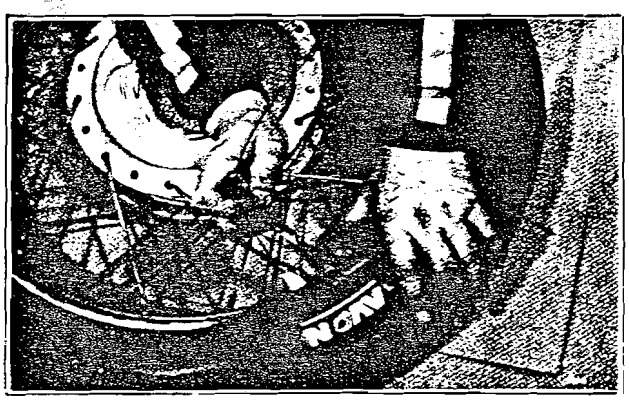
Lay tyre on rim and feed through hole in rim.



Work first bead over rim. Using lever in final section.



Use similar technique for second head, finish at tyre valve position.



Push valve and tube up into tyre when fitting final section, to avoid trapping.

12. Make sure that there is no pull on the tyre valve and again commencing with the area furtherest from the valve, ease the other beading of the tyre over the edge of the rim. Finish with the area close to the valve, pushing the valve up into the tyre until the locking cap touches the rim. This will ensure the inner tube is not trapped, when the last section of the beading is edged over the rim with a tyre lever.

13. Check that the inner tube is not trapped at any point. Reinflate the inner tube, and check that the tyre is seated correctly around the wall of the tyre on both sides, which should be equidistant from the wheel rim at all points. If the tyre is unevenly located on the rim, try bouncing the wheel when the tyre is at the recommended pressure. It is probable that one of the beading has not pulled clear of the centre well.

14. Always run the tyres at the recommended pressures and never under or over-inflate. See specifications for recommended pressures.

15. Tyre replacement is aided by dusting the side walls, particularly in the vicinity of the beading with a liberal coating of French chalk.

16. Never replace the inner tube and tyre without the rim tape in position. If this precaution is overlooked there is a good chance of the ends of the spoke nipples chafing the inner tube and causing a series of punctures.

17. Never fit a tyre which has a damaged tread or side walls. Apart from the legal aspects there is a very great risk of a blow-out, which can have serious consequences on any two wheel vehicle.

18. Tyre valves rarely give trouble but it is always advisable to check whether the valve itself is leaking before removing the tyre. Do not forget to fit the dust cap which forms an effective second seal. This is especially important on a high performance machine, where centrifugal force can cause the valve insert to retract and the tyre to deflate without warning.

CAUTION: Sudden deflation may cause an accident, particularly if it occurs in the front wheel.

IGNITION AND LIGHTING SYSTEM

1. General

The A.C., Lighting and Ignition system comprises of seven main components:

(i) Alternator (stator & rotor). (ii) Regulator and Rectifier (RR Unit) (iii) Ignition coil, (iv) Contact breaker unit with automatic timing control, (v) Lighting switch, (vi) Ignition switch, (vii) 12V. Battery.

When the engine is started, the alternator generates AC energy which passes through the rectified as DC energy. This rectified DC gets regulated by the regulator and charges the battery depending on battery and load conditions.

2. Alternator

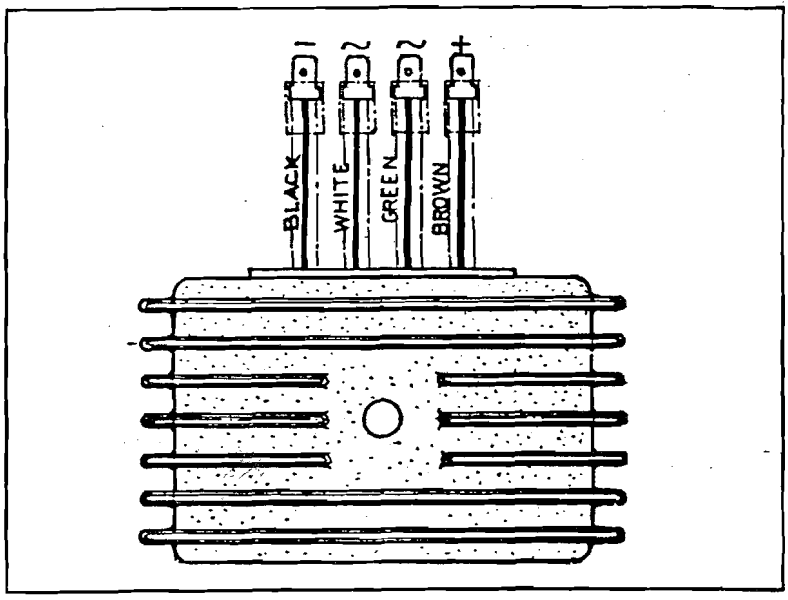
The alternator comprises of two main components, a stator and a rotor. The stator carries three pairs of series-connected coils. The rotor is a permanent magnet. The stator and rotor can be separated without the need to fit magnetic keepers to the rotor poles.

As the rotor turns, paid and repeated reversals of flux take place in the coil cores. These lines cut through the turns of the coil and induce alternating voltages in that coil. External connections are taken from these coils to a regulator rectifier.

3. Regulator-Rectifier unit

The alternator which consists of stator and rotor has three pairs of series connected coils. The alternator output is directly connected to regulator rectifier AC input terminals.

RECTIFIER CUM REGULATOR

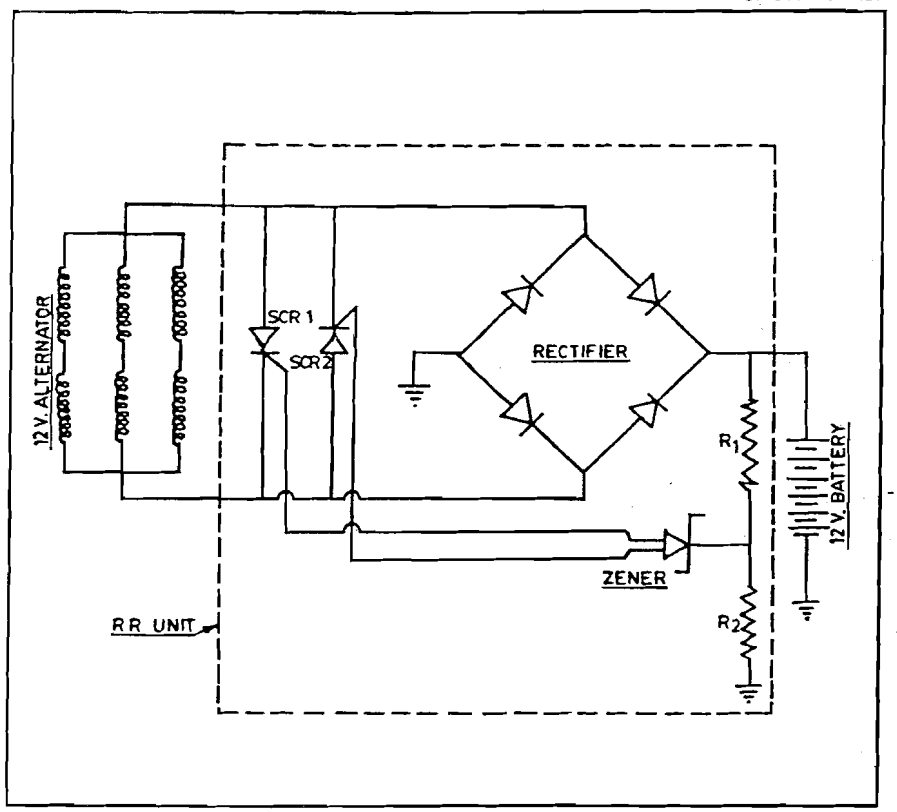


The control circuit of regulator rectifier unit monitors the battery voltage and regulates the charging current to the battery according to pre-set regulating range (Range: old:13.8 volts to 14.6 volts. New: maximum of 15.5 volts)

During the day running period ie: ignition load alone, the battery voltage rises rapidly and the regulator starts regulating the charging current to the battery.

When the head light is switched 'ON' more current is drawn from the battery and the regulator in turn allows higher current to flow into the battery for charging.

CIRCUIT DETAILS

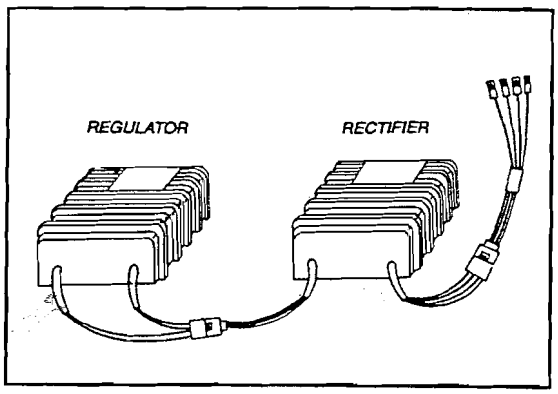


4. New type Regulator - Rectifier. (on Vehicles produced after July 1995)

This is an improved version of the previous regulator cum rectifier.

It is mounted under the seat dual.

NEW REGULATOR AND RECTIFIER



The input and output connections are the same as in the old unit.

Salient feature:

The modified regulator, rectifier has the advantage that in the event of the regulator failing and the ammeter not indicating charge, the regulator can be disconnected from the circuit and charging will take place without any regulation of current.

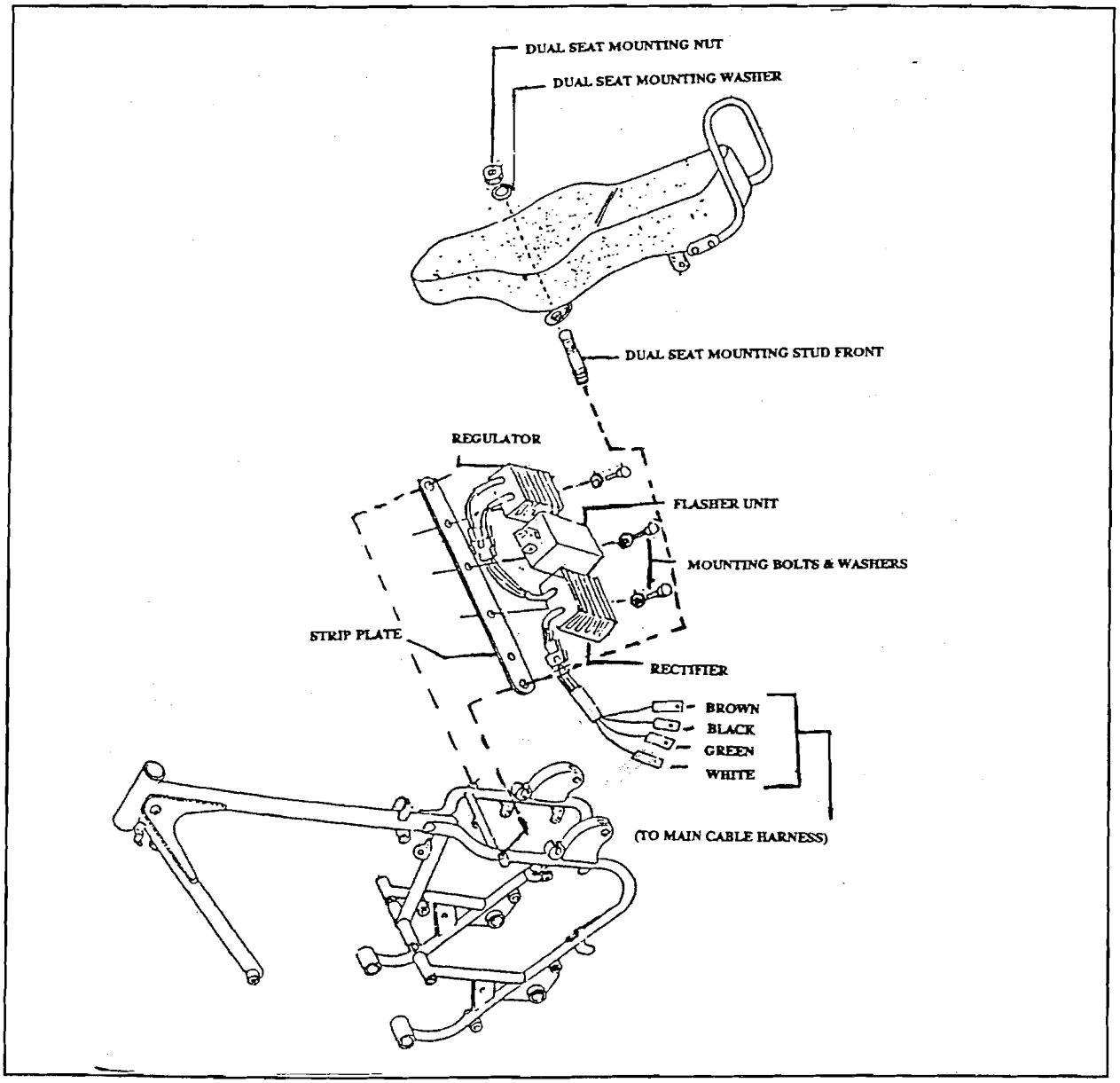
Also the regulator or the rectifier can be replaced individually in the event of a failure.

CAUTION: In case the regulator is faulty and has been disconnected from the circuit, it should be replaced through the nearest authorised Enfield dealer to prevent over charging of the battery and subsequent damage to the battery and other electrical systems.

5. Mounting arrangement of new regulator - rectifier Unit.

1. Remove 4 wire connections from regulator cum rectifier which is mounted on the fixed mudguard of the vehicle (just, below the ignition coil)
2. Remove the dual seat mounting and dual seat.
3. Fix the new strip plate (assembled with rectifier/regulator / flasher unit) on to the front mounting studs of the seat.
4. Connect the rectifier wires to the main cable harness. Connect like colour wires together.
5. Connect the flasher unit wire.
6. Reassemble the deal seat over the strip and tighten.

MOUNTING ARRANGEMENT OF NEW REGULATOR - RECTIFIER



6. Routine Maintenance

The alternator and regulator rectifier requires no maintenance apart from ensuring that all connections are clean and tight.

If the rotor, stator, engine crankshaft or rear half of the chaincase have been disturbed, the airgap between the rotor and stator should be checked for a minimum of 0.006" gap.

The ignition coil is located beneath the seat. It should be kept clean and the terminals kept tight. When the high tension cable shows signs of perishing or cracking it must be renewed.

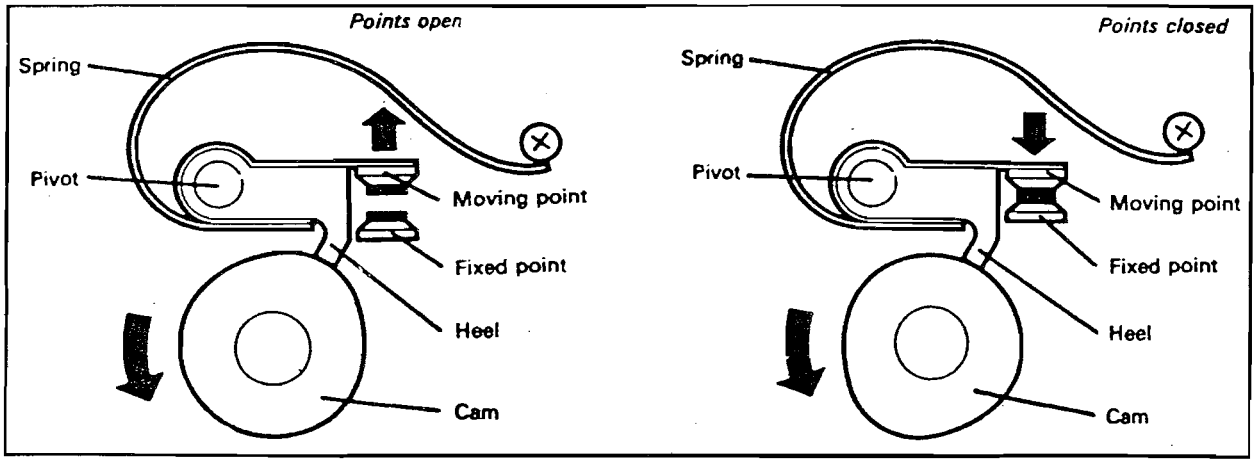
7. Contact Breaker Unit/Contact Set

The contact breaker setting should be checked after the first 800 Kms. running and subsequently every 5,000 Kms. (3000 miles)

Cleaning contact breaker points

Remove the contact breaker cover and examine the contacts. If they are dirty or pitted, they must be cleaned by polishing with a fine carborandum stone or very fine emery cloth. Afterwards wipe away any dirt or metal dust with a petrol moistened cloth.

CONTACT BREAKER OPERATION



Setting contact breaker gap.

To check or reset the gap, turn the engine over slowly until the piston is at TDC on compression stroke and the contacts are seen to be fully open. Insert 0.35 to 0.40 mm (0.014" - 0.16") feeler gauge between the contacts. Slacken the screw 'A' securing the fixed contact plate and adjust the position of the plate until the gap is the thickness of the feeler gauge and tighten. If the gap is correct, the gauge will be a sliding fit.

Setting ignition timing.

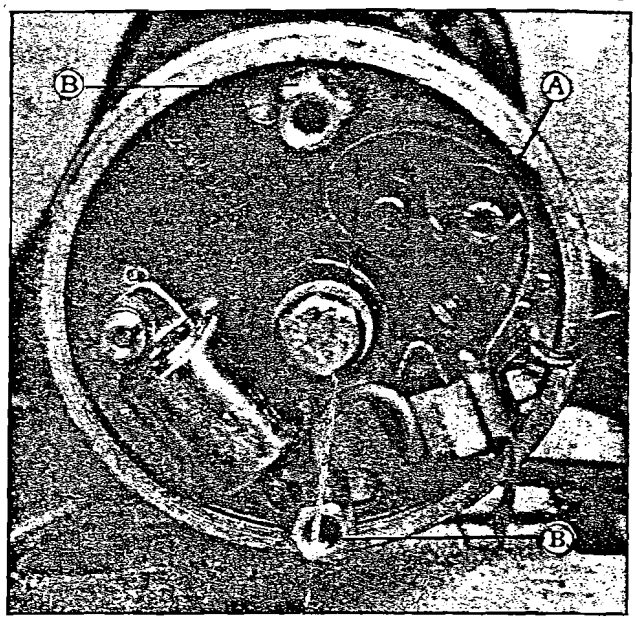
To check or reset the ignition timing, rotate, the crankshaft in the normal direction until the piston is just before TDC and the contact breaker points just commence to open. (The best way to check the opening of points is to switch on the ignition and crank the engine slowly until the ammeter needle just returns to its central position. The points should just commence to open at this position. Check the position of the piston which should now be 0.8mm before TDC on the compression stroke. At this position slacken the two screws B. Swing the base plate to the left to advance or to the right to retard the ignition. Retighten the two screws such

that the CB points gap just commenses to open. To check whether the adjustment is correct, insert a thin strip of tissue paper between the points and gently pull out the paper which should not get damaged and should be sliding fit.

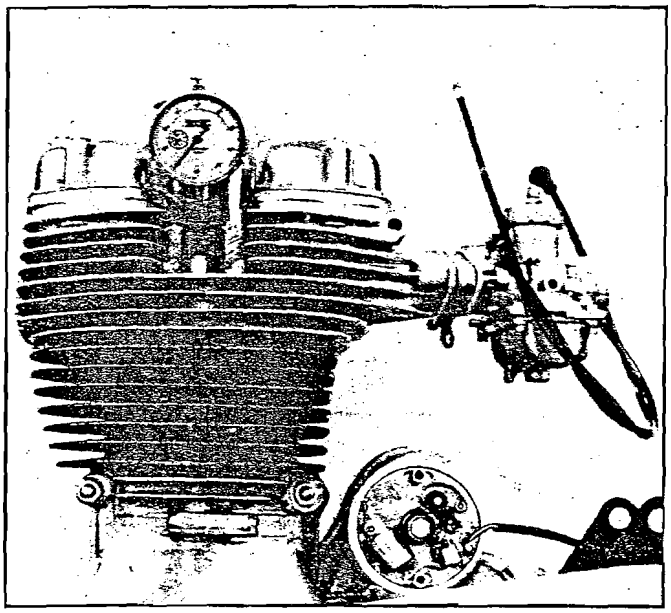
The most accurate method of setting timing is by using a dial gauge. Remove spark plug and fix a dial gauge on the spark plug hole using a suitable adaptor. Crank engine gently so that piston is at TDC on compression stroke. With the piston at TDC rotate the dial such that the needle aligns with zero on the dial gauge.

Set the C.B. point gap at 0.35 to 0.4mm and rotate the crank shaft in the opposite direction such that the piston will be 0.8mm before TDC (This can measured on the dial gauge). Now reset the base plate so that the points just commenses to open. This can be checked by connecting a 12v bulb and the CB point in series with a battery. When the points are in contact the bulb Will glow and when they just open the bulb will not glow

CONTACT POINTS



TIMING - USING DIAL GAUGE



Lubrication (every 5,000 Kms.)

Smear the surface of the cam very tightly with mobile grease No.2, non creep oil or clean engine oil. Apply a drop of clean engine oil on the contact breaker pivot. Make sure no grease or oil gets in between the contact points.

8. Automatic Timing Control

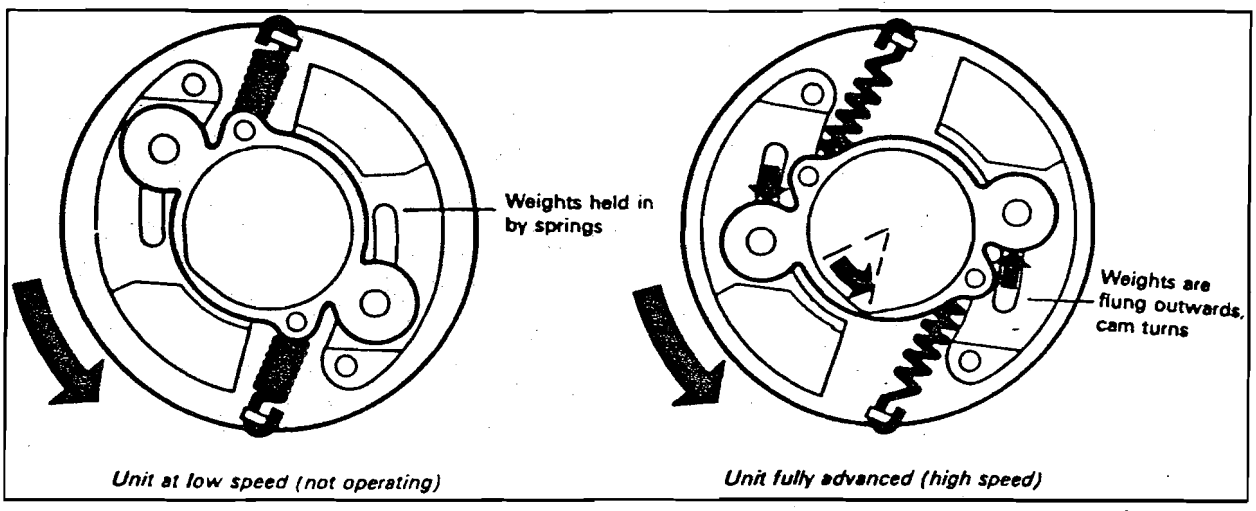
The automatic timing mechanism provided in the contact breaker housing helps in automatically advancing the ignition timing with relation to engine speed at higher RPM.

When servicing the CB points the cam should be checked for free movement in the clockwise direction and that it is not stuck.

To obtain access to the unit, remove contact braker cover and the base plate assembly.

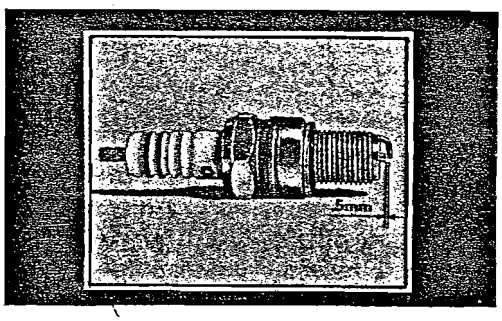
Apply a drop of clean engine oil on the fly weight pivots and the spring eyelets.

AUTOMATIC TIMING UNIT (ATU) OPERATION



9. Spark Plug

SPARK PLUG



Owing to electrode burning, the electrode gap widens in operation and may impair the performance and economy of the motorcycle. Therefore, the electrodes should be cleaned and adjusted to its specified gap - i.e. 0.46 to 0.50 mm. Check the electrode gap every 5,000 Km. and clean and adjust if necessary

Spark Plug		Type	Ref. No.
350cc	-	NKG	B7HS
500cc	-	NGK	BR8ES

10. Battery

The battery is a 12 Volt. 5 or 5.5 Amp. hour capacity battery. Every week the filler cap of each cell should be unscrewed so that distilled water can be added to bring the acid level above the top of the seperators if found low. (For US/ Canada battery used is 12V 7 AH)

DO NOT add tap water as this contains impurities. Acid should not be added unless this is accidentally spilled out of the battery. In case of spillage, it should be replaced by dilute sulphuric acid of the same specific gravity as in the cells. Keep the battery terminals clean, and free from corrosion by coating with pure vaseline (not grease). Many lighting troubles can be traced to unseen corrosion between the battery leads and the terminals in the battery. The corrosion takes place much more frequently at the battery terminals than at other electrical contacts.

The state of charge of the battery is indicated by the specific gravity of its electrolyte. If specific gravity falls to 1.110, the battery must be recharged using an external D.C. supply at the normal recharge rate of 0.5 Amp.

NOTE: If the battery is subjected to long periods of night parking with the lights on, it may be necessary to recharge the battery before using the motorcycle.

11. Head Lamp

A) Regular and UK Models

The unit consists of a reflector and front lens assembly which are permanetly stuck together to prevent water and dust from entering inside and spoiling the reflector.

A prefocus bulb is used, hence no focusing device is required to be fitted. The bulb has a large flange and cap. A slot in the flange helps in correctly positioning the bulb in the reflector. A spring loaded bulb holder, when assembled on the reflector ensures the bulb is held in position.

The bulb is connected to the wiring harness with the help of lucar connectors. The bulb is 12 V 40/45 watts.

To replace the bulb in the light unit, loosen the top screw on the fixing rim and remove the front rim and light assembly taking care to disengage the lug at the bottom of the front rim from the fixing rim. Disconnect the lucar connectors from the bulb terminals. Gently press and twist the bulb holder in the anticlockwise direction to remove the bulb holder.Remove the bulb out of the reflector.

Reassembly of the headlight bulb is the reverse order of the procedure mentioned above but care should be taken to locate the bulb and holder correctly in the reflector.

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

To remove the light unit from the front rim, remove the securing spring clips holding the light unit to the rim and remove the light unit from the rim.

While reassembling the light unit ensure the word 'top' on the lens is towards the top of the rim and secure the spring clips in the fixing rim ensuring that they are equally spaced around the rim.

B) US/ Canada Models

These models are fitted with an aiming device to meet the regulations in US and Canada.

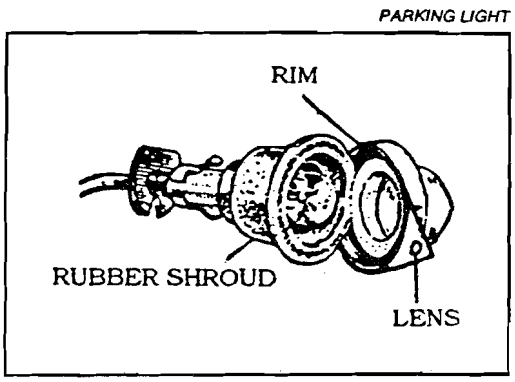
The light unit is a sealed beam. In the event of the head light bulb fusing the complete sealed beam needs to be replaced.

The dismantling of the head light assembly in the same except that the sealed beam is located in the aiming device housing. The sealed beam is located on a spring loaded screw on one side and by means of 2 springs connected to the housing.

12. Parking Lights

Access to the parking bulbs is obtained by removing the parking lamp rim (see fig.) This forces over the edge of the rubber lamp body and 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.

Bulb - Parking Lamp - 12V - 2W



13. Stop and Tail Lamp

The rear lamp is a combined stop and tail light and also incorporates a reflector.

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

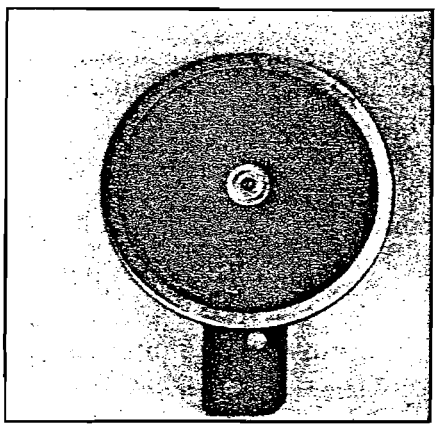
The correct bulb is 12 volt 6/18 Watt or 5/21 Watt. The 6 Watt filament provides the normal tail light, while the 18 Watt filament is illuminated by movement of the brake pedal and while operating front brake lever.

Care must be taken while replacing a new tail light assy so 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 excessive heat affecting the plastic cover. At the same time, the 6 Watt filament, if used as stop light, will be ineffective in bright sunlight or at night when the tail light filament is illuminated.

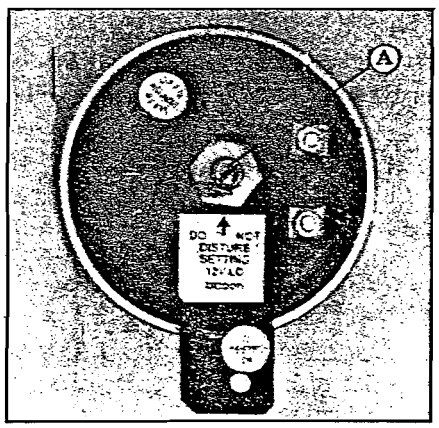
14) Horn

The machine is fitted with a 12V x 3 Amps D.C. Horn. This is a sealed unit and should never be tampered with. A screw is provided with a locking nut at the back of the horn for tone adjustment. Do not meddle with it unless it requries adjustment. If the horn gives only a choking sound, or does not vibrate, it does not mean that the horn has broken down. The trouble may be due to a discharged battery, a loose connection, or short-circuit in the wiring of the horn. It is also possible that the performance of the horn may deteriorate due to its mounting becoming loose.

HORN-FRONT VIEW



HORN-REAR VIEW



A - TONE ADJUSTING SCREW

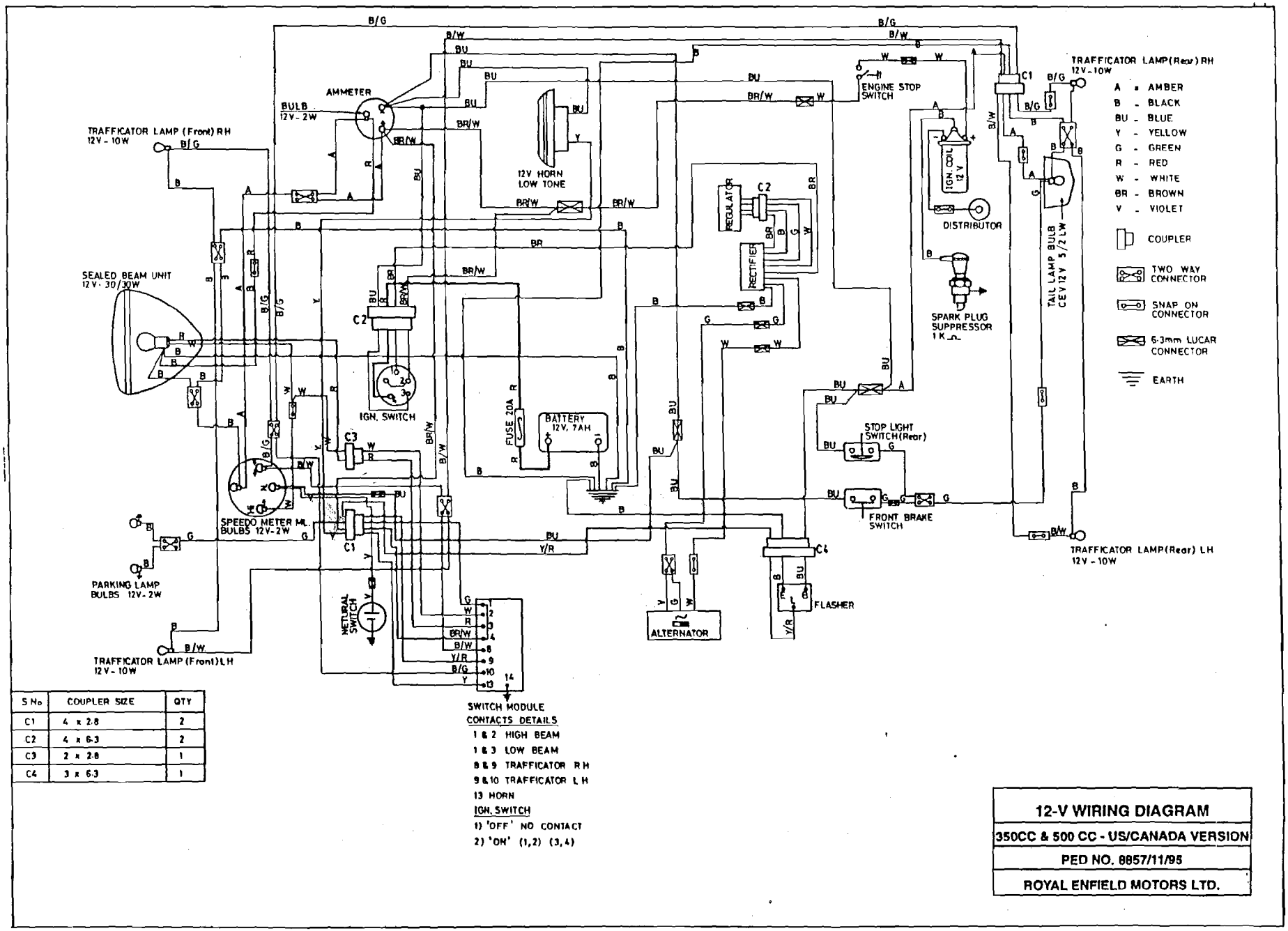
However a setting screw is provided which is covered by a protective rubber cap. "B"

If the horn sound is feeble then minor corrections are possible by means of this setting screw.

To carry out adjustments please proceed as follows:

- Remove protective rubber cap
- Turn in the small screw very carefully at the same time check for functioning of the horn
- Stop adjusting when the desired sound level is obtained.
- Refit the protective rubber cap over screw when adjustment is complete.

NOTE: IF the adjusting screw is turned in too much the horn would only give a choking sound or if it is turned out too much the sound would be very feeble.



S No	COUPLER SIZE	QTY
C1	4 x 2.8	2
C2	4 x 6.3	2
C3	2 x 2.8	1
C4	3 x 6.3	1

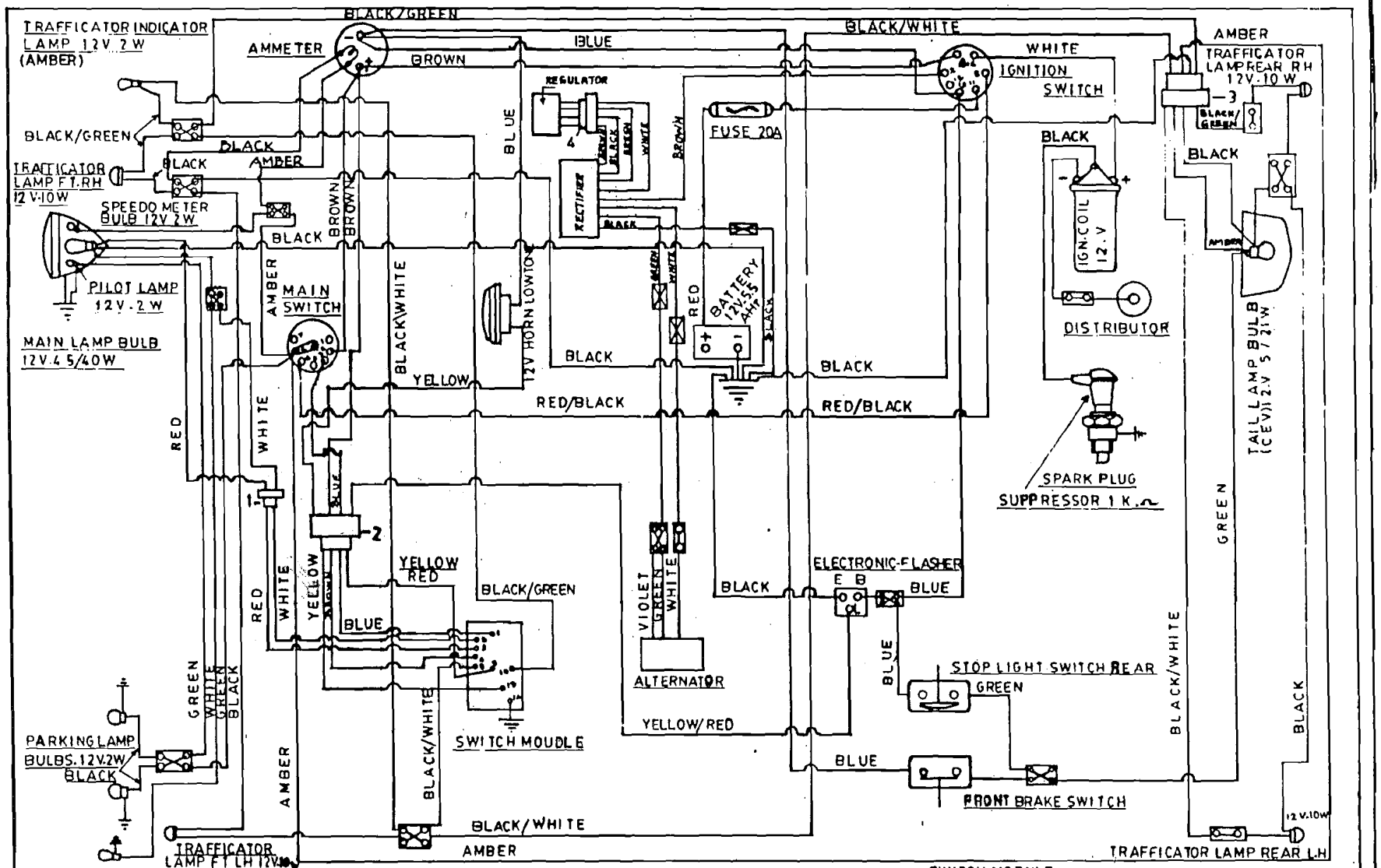
SWITCH MODULE
CONTACTS DETAILS
1 & 2 HIGH BEAM
1 & 3 LOW BEAM
8 & 9 TRAFFICATOR R H
9 & 10 TRAFFICATOR L H
13 HORN
IGN. SWITCH
1) 'OFF' NO CONTACT
2) 'ON' (1,2) (3,4)

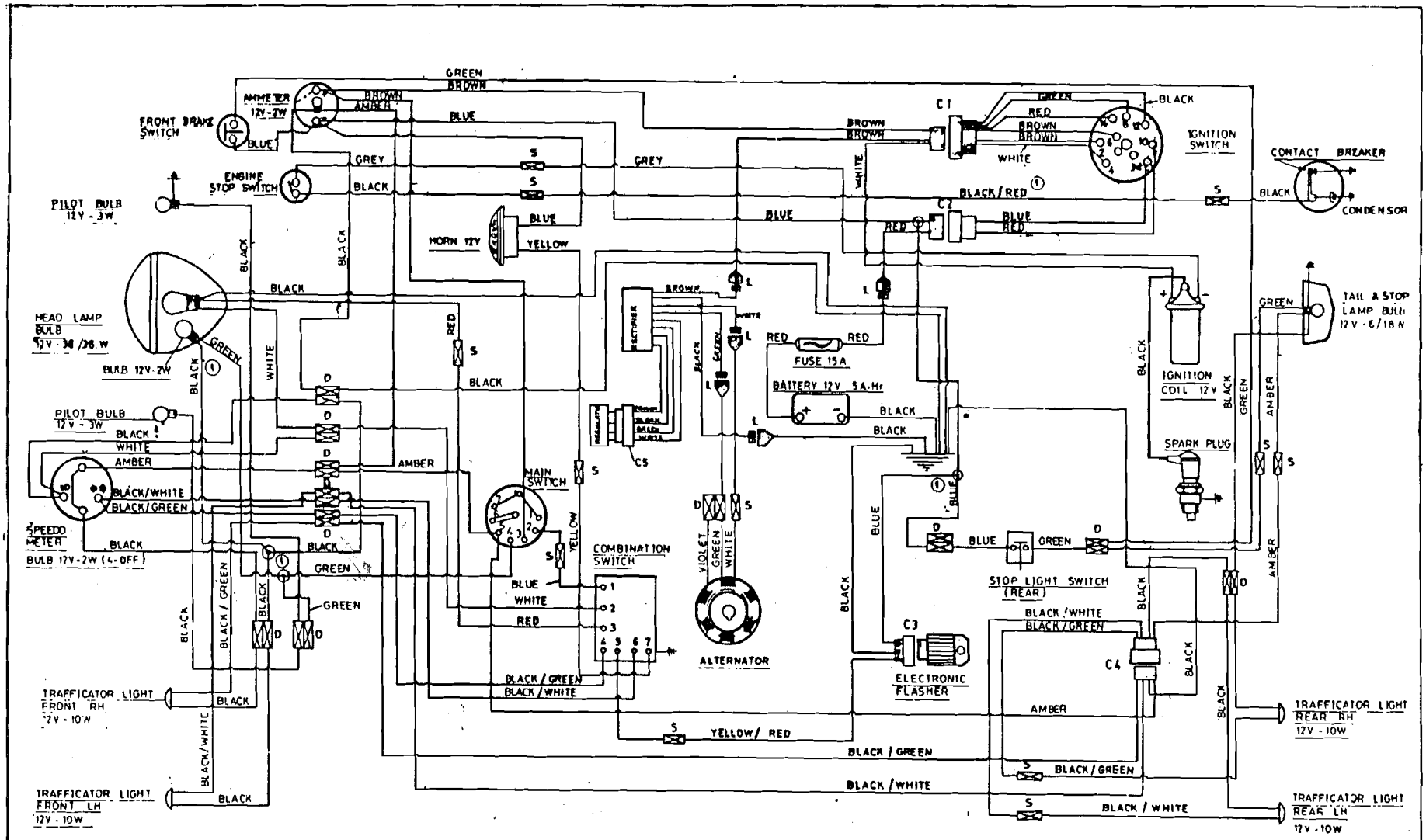
12-V WIRING DIAGRAM

350CC & 500 CC - US/CANADA VERSION

PED NO. 8857/11/95

ROYAL ENFIELD MOTORS LTD.


TRAFFICATOR INDICATOR LAMP 12V.2W (AMBER)
AMMETER
BLACK/GREEN
BROWN
BLUE
REGULATOR
RECTIFIER
FUSE 20A
BLACK/WHITE
WHITE
IGNITION SWITCH
AMBER
TRAFFICATOR LAMP REAR RH 12V.10W
BLACK/GREEN
BLACK
AMBER
TRAFFICATOR LAMP F.T.RH 12V.10W
SPEEDO METER BULB 12V.2W
BROWN
BLACK
IGN.COIL 12.V
DISTRIBUTOR
PILOT LAMP 12V.2W
MAIN SWITCH
BLACK/WHITE
12V HORN LOW/HIGH
BATTERY 12V.5.5 AH
RED
YELLOW
BLACK
RED/BLACK
MAIN LAMP BULB 12V.45/40W
SPARK PLUG SUPPRESSOR 1 K.Ω
TAIL LAMP BULB (CEV) 12.V 5/21W
GREEN
WHITE
YELLOW
VIOLET
ELECTRONIC FLASHER
E B
BLUE
STOP LIGHT SWITCH REAR
GREEN
SWITCH MOUDLE
ALTERNATOR
YELLOW/RED
FRONT BRAKE SWITCH
PARKING LAMP BULBS.12V.2W
BLACK
TRAFFICATOR LAMP F.T.LH 12V.10W
TRAFFICATOR LAMP REAR L.H
12 V.10W
HIGH BEAM INDICATOR LAMP (BLUE) 12V.2W
4 X 6.3 COUPLER 1 No
2 X 2.8 COUPLER 1 NO.
4 X 2.8 COUPLER 2 NOS.
6.3mm LUCAR CONNECTOR
TWO WAY CONNECTOR
SNAP ON CONNECTOR
EARTH
MAIN SWITCH
1.P.4 5&6
2.OFF 3 4&6
3.H.HEAD LAMP 2 3&6
IGNITION CUM BATTERY CUT OFF
1.IGNITION(2,4&)(11,13)
2 PARKING (8,11)(2,4,15)
SWITCH MODULE
1&2.HIGH BEAM
1&3.LOW BEAM
8&9.TRAFFICATOR R.H.
9&10.TRAFFICATOR L.H.
14. HORN
12-V WIRING DIAGRAM
350CC & 500 CC - UK VERSION
PED NO. 8858/11/95
ROYAL ENFIELD MOTORS LTD.



DETAILS OF COUPLERS			
CODE	PLACE	QTY	SIZE
C1	IGNITION SWITCH	1	6 x 2.8
C2	IGNITION SWITCH	1	2 x 6.3
C3	FLASHER	1	3 x 6.3
C4	TAIL END HARNESS	1	4 x 2.8
C5	COUPLER	1	4 X 6.3

CONTACTS	
IGNITION SWITCH	SWITCH MODULE
OFF - NO CONTACTS IGN - (2,4,6) (10, 14) EMG - (2,4,16) (8,12)	HORN - 7 HI-BEAM - 1&2 LOW BEAM - 1&3 FLASHER LH - (6&7) " RH - (5&8) H/L SWITCH OFF - (2&5) P - (3,4&5) (R&7) H - (2,3&5) (R&1)

	COUPLER (C)	4
	TWO WAY CONNECTORS(D)	11
	SNAP ON CONNECTORS(S)	12
	6.3 LUCAR CONNECTOR(L)	5
	EARTH	
	INTERNAL JOINT	4

12-V WIRING DIAGRAM

350CC & 500 CC - REGULAR VERSION

PED NO. 8859/11/95

ROYAL ENFIELD MOTORS LTD.

ELECTRICAL CONNECTION DETAILS

1. Alternator assembly

The three output wires from the alternator should be connected to the main cable harness through snap on connectors.

Connect the wires as follows:

Alternator		*Wiring Harness*		
		UK	US/Canada	Regular
White	to	white	white *	white
Violet & green	to	green	green	green

** In certain Vehicles the wire colour is violet*

CAUTION: Do not interchange the above connections to prevent overcharging of the battery.

2. Regulator cum Rectifier

The connections are as follows:

regulator	*Wiring Harness*		
	UK	US/Canada	Regular
Brown	Brown(+ve)	Brown (+ve)	Brown(+ve)
Black	Black(-ve)	Black(-ve)	Black(-ve)
Green	Green(AC)	Green(AC)	Green(AC)
White	White(AC)	White(AC)	White(AC)

3. Ignition Coil

(LT connections) Uk Version: connect white wire from terminal no.6 of ignition switch to +ve terminal of coil and black/white wire from CB point assembly to -ve terminal of coil.

US/Canada: Connect white wire from engine stop switch at the handle bar to +ve terminal of the coil and black wire from CB point assembly to -ve terminal of the coil.

Regular version: Connect whitewire from terminal no.4 of ignition switch +ve terminal of coil and grey wire from engine stop switch to -ve of the coil

HT connections: Connect HT lead to the centre of the coil and the spark plug cap

4. Stop - Run switch on handle bar

Only for US/Canada and Regular versions

US/Canada: Connect brown/white wire from switch to -ve terminal of ammeter

Regular:Connect black wire from switch to CB Point.

5. Battery

Connect the earth wire (black) from harness to - ve terminal of the battery and the main wire (red) from the fuse carrier to the +ve terminal of the battery.

Caution: Do not connect the battery to the main cable harness without the fuse carrier and never interchange the battery terminal connections.

6. Ignition Switch

The ignition switch has basically 3 positions. The functions and connections are given below. The wire connections are through non interchangeable couplers.

UK Version

Key position (rider seated)	Control Contacts
Centre	Ignition off, battery circuit off, key can be removed
Clockwise	Ignition and battery Circuits ON Terminals(2,4,6) (11 & 13) are connected. Key cannot be removed
Anticlockwise	Ignition off, battery circuit ON. Pilot and tail lamp glows. Key can be removed to facilitate night time parking with pilot lights ON

Terminal Connections	
Terminal Number	Wire Colour
11 (+ve from battery)	Red
13	Blue
2 (+ve from RR unit)	Brown
4	Brown
6	white

Regular version:

The ignition switch is the same as UK version switch except that the switch has no function in the anticlockwise position and the terminal connections are different as follows:

Terminal Connections	
Number	Wire colour
2 (+ve from RR unit	Brown
4	White
6	Brown
10 (+ve from battery)	Red
14	Blue

US/Canada Version

The ignition switch is located on the head lamp casing in place of the head light switch.

Position 1 Ignition and battery circuits off.

Position 2 & 3: All circuits ON and headlight illuminates moment switch is ON.

7. Main Light Switch

This switch is applicable only to UK and regular versions. The main light switch is located on the head lamp casing and has 3 positions.

P	pilot lamps on
Off	all lights off
H	Pilot and head light ON.

In the UK version the centre position is off and in the Regular version the extreme left is of position.

The wiring connections are as follows:

UK Version		Regular Version	
Wire Colour	Terminal No.	Wire Colour	Terminal No.
Brown	2	Blue	2
Blue	3	Brown	3
Red	5	Green	4
Green & Amber	6	Amber	5

8. Handle Bar Switch

The handle bar switch provided on the left side of the handle bar consists of head lamp high & low switch (head lamp day flash only in UK & US/canada versions) trafficator switch and horn push button. The wires are presoldered to the terminals and connections are through couplers and snap on connectors. The colour of the wiring connections are given for reference purposes.

Terminal No	Wires colour			Connections for
	Uk	US/Canada	Regular	
1	Blue	green	Blue	H-lamp supply
2	Red	Red	White	H-lamp Hi beam
3	White	White	Red	H-lamp Lo beam
4	Brown	Brown	-	H-lamp day flash
4	-	-	Black/green	Trafficators Lamps
5	-	-	Yellow/red	Trafficator supply
6	-	-	Black/white	Trafficator lamps
7	-	-	Yellow	Horn
8	Yellow/red	Yellow/red	-	Trafficator supply
9	Black/white	Black/white	-	Trafficator lamps
10	Black/green	Black/green	-	Trfficator lamps
13	Yellow	Yellow	-	Horn

9. Horn

Connect the lucar terminals blue and yellow to the horn and ensure the protective sleeve is in position over the connections.

10 Brake light switches

There are 2 switches provided, one near the front brake lever and the other inside the LH tool box.

The connections are blue and green wires

The front brake light switch connects inside the head lamp casing, using lucar connectors, and the rear brake wire connections are through snap on connectors

NOTE: Ensure all earth connections are clean and firm and the wires are fully inserted into the snap on connectors lucar terminals and couplers.

Check and correct any electrical faults before replacing blown fuse links.

Do Not interchange battery terminal connections and regulator cum rectifier connections.

CARBURETTOR

Bullet Motorcycles are fitted with MIKCARB Carburettors

350cc	-	VM-24 Type
500cc	-	VM-28 Type

Function

The function of the carburettor is to provide combustible Air- fuel mixture by breaking the fuel into tiny particles - in the form of vapour and mixing the fuel vapour with air in a proper ratio and deliver it into the engine combustion chamber.

In general, all carburettors are designed to provide the engine with the designed ratio of automised fuel-air mixture at the required quantity levels to cater to both load and road speed of engines.

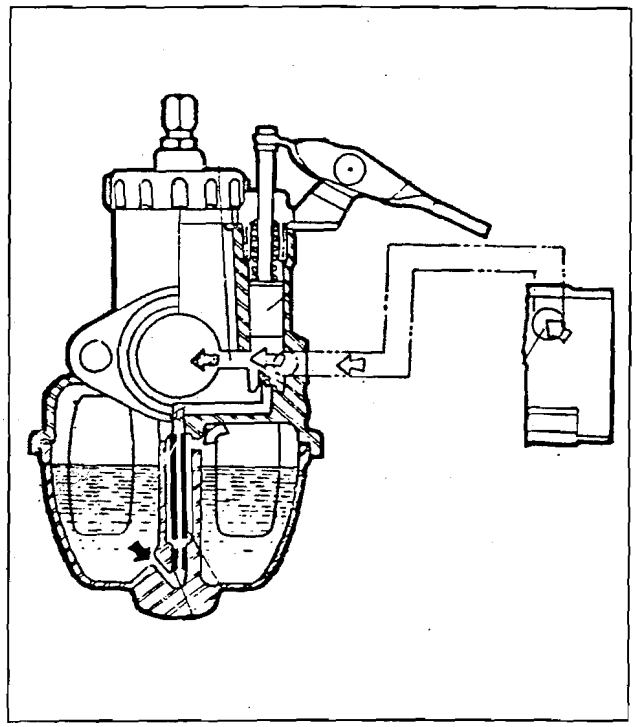
In the Mikcarb carburettors fitted to 350cc and 500cc Bullet Motorcycles, the automisation and mixing of fuel and air is carried out by THREE systems, viz.:-

— STARTING JET SYSTEM or CHOKE SYSTEM

— PILOT JET SYSTEM

— MAIN JET SYSTEM

STARTING JET SYSTEM



1. Starting Jet System

The starting jet system provided in this carburettor is to aid starting, under adverse condition such as that experienced during cold winter mornings.

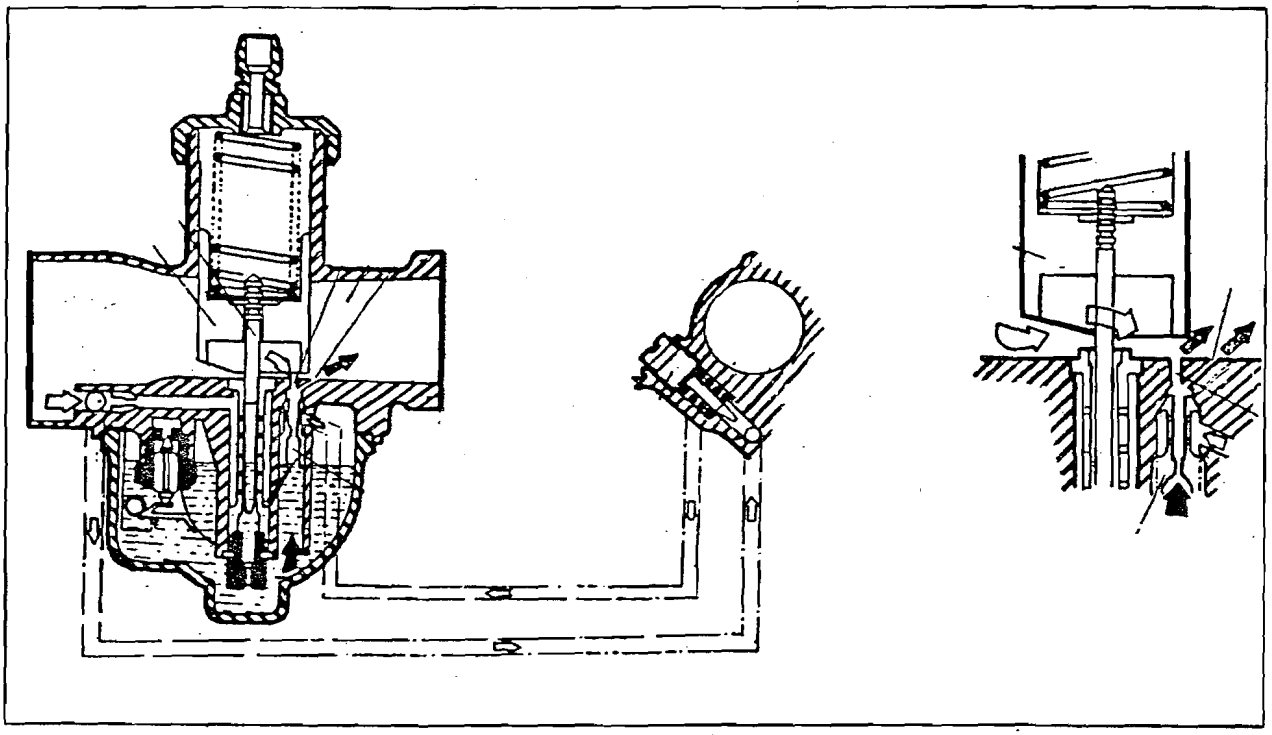
The starting jet system comes into operation, when the choke lever is pushed down and thereby lifting the choke plunger from its seat. This enables an additional quantity of fuel to be supplied to the engine in addition to that of pilot jet system.

This action makes the fuel air mixture to become richer for better startability.

2. Pilot Jet System

The pilot jet system supplies the engine requirements at lower engine speeds only, i.e. during idling rpm. This function is carried out by the pilot jet and pilot air screw. The pilot air screw governs the air fuel mixture ratio. Adjusting the screw by screwing in beyond the specified limits would make the mixture rich and vice versa.

PILOT JET SYSTEM



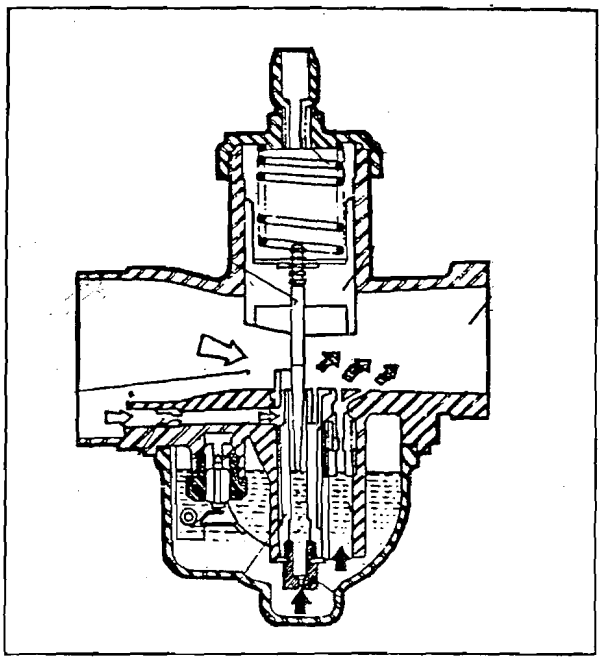
3. Main Jet System

The main jet system comes into operation at speeds above idling, i.e. the moment throttle slide is lifted. When once the main jet system becomes functional, it provides to the by-pas circuit for the pilot jet system. As such, the pilot jet system becomes totally inoperative during main jet system operation.

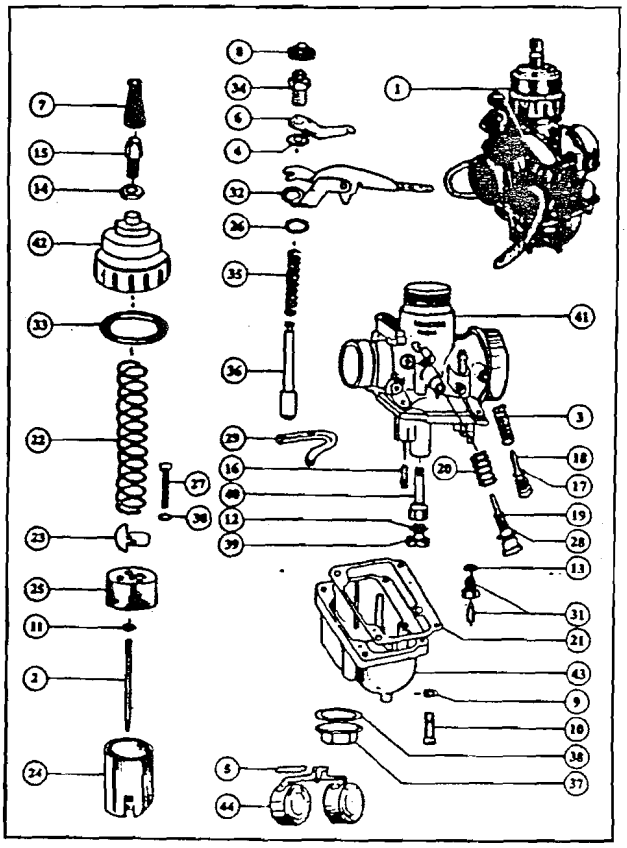
This main jet system comprises of the main jet, the needle jet and the taper needle. The fuel flows through the main jet (also known as metering jet) during the main jet operation.

The taper needle, which is mounted on the throttle slide, while operated up and down increases or reduces the cross sectional area between the needle jet bore and the needle. This in turn monitors the quantity of atomised fuel supplied with respect to engine speed & load.

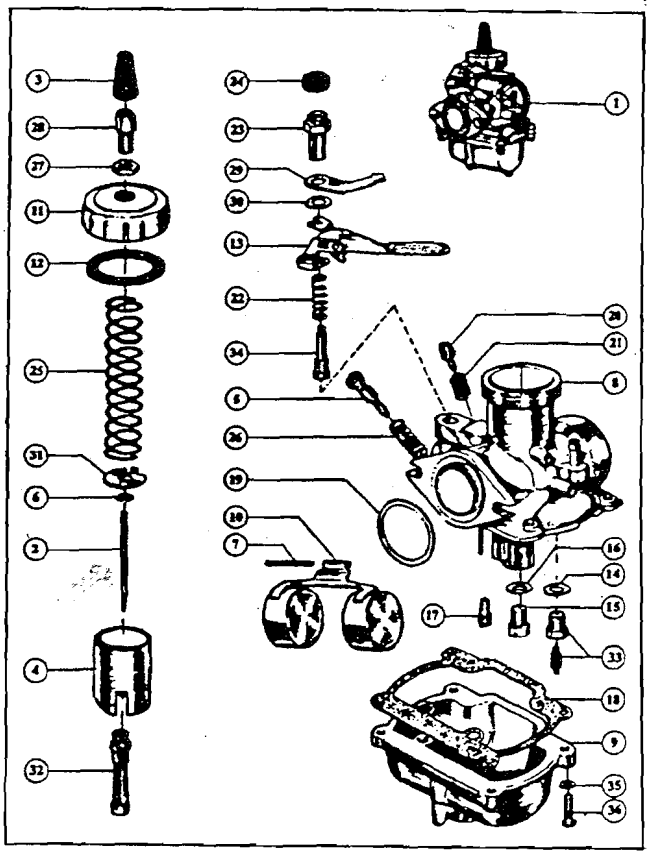
MAIN JET SYSTEM



MIKCARB CARBURETTOR VM28 (500 C.C.)



MIKCARB CARBURETTOR (VM 24 - 350 CC)



The taper needle shank has five grooves in it, so that, it can be set in relation to the throttle slide. If the needle is set higher on the throttle slide, the quantity of fuel that is being supplied would become much more, than if it would have been set at a lower position. However, it is to be noted thatt the fuel supplied is governed by the above mechanism only on part throttle condition. With the throttle fully opened, the fuel supplied is monitored by the main jet only. The recommended position for the Needle Lock is the 2nd or 3rd groove from bottom.

4. Servicing

The carburettor should be cleaned thoroughly with petrol only. Ensure that all parts are in serviceable condition. Before mounting the carburettor, always ensure that the slide is free to move up and down by operating the throttle twist grip. Also ensure that the starter piston (choke plunger) is properly set in position.

CAUTION: Never user a sharp instrument or wire to clean the carburettor parts especially jets and passages. If the passages are blocked, use only pressurised air to clear the passages. Handle all parts gently and with great care. Run down all threaded attachments gently. Never use force.

5. Mounting

Special care must be exercised while mounting the carburettor. Ensure positioning of carburettor is vertical and the gasket, 'O' Ring is serviceable, to prevent any air/gas leak.

In 500cc models, Rubberised Inlet Manifold is fitted. To check the condition for any crack, or otherwise a cracked manifold will result in starting trouble and erratic idling speed.

6. Setting Idling

It is always recommended to set idling speed of the engine while the engine is still warm, i.e. after a short run.

The procedure for setting idling speed is:

a) Start the engine and warm up for 2 to 3 minutes.

b) Turn the pilot air screw down to the bottom and reduce the engine RPM to the slowest rate, using the idle adjusting screw.

c) Open out the air screw slowly and keep watch on engine speed. At a point, engine speed will increase. Find the position where the engine RPM is maximum and the engine firing uniform. This is normally between 2 to 3 half turns of the air screw (360° + 180° Turns) from its fully closed position.

d) Now adjust the idling RPM once more with the idling screw.

NOTE: 1. Take out any excessive play in the throttle cable.

2. Turn the handle bar to left side & right side to ensure that the throttle cable is free and does not foul with anyother part in the routing of the cable.

Besides the above two settings, no other settings to the carburettor is required for normal operating conditions.

SERVICE LIMITS					
SL No	COMPONENT	350 cc		500 cc	
		mm	Inches	mm	Inches
1.	Small end (Gudgeon pin)	19.11	0.752	19.11	0.752
2.	Crankshaft big end-axial play	0.55	0.021	0.55	0.021
3.	Crankshaft Runout	0.08	0.003	0.08	0.003
4.	Connecting rod twist	0.075	0.002	0.075	0.002
5.	Crankshaft axial play in crank case	2.80	0.11	2.80	0.11
6.	Cylinder Barrel wear (To be measured approx 20mm from top)	70.078	2.759	84.125	3.312
7.	Piston Wear (To be measured approx 015mm from bottom (skirt)	69.636	2.741	83.725	3.296
8.	Bore to Piston Clearance				
	(bore - piston diameter)	0.715	0.007	0.175	0.007
9.	Piston ring end Gap in bore	0.75	0.030	1.00	0.039
10.	Ring to Groove clearance				
	- Compression rings	0.150	0.006	0.178	0.007
	- Oil ring (Scraper ring)	0.187	0.007	0.229	0.009
11.	Valve stem to Valve guide clearance.				
	- Inlet	0.075	0.003	0.075	0.003
	- Exhaust.	0.10	0.004	0.10	0.004
12.	Valve spring free length				
	- Inner	48.20	1.897	48.20	1.897
	- Outer	50.04	1.970	50.04	1.970
13.	Clutch Steel Plate Distortion	0.15	0.006	0.15	0.006
14.	Clutch Friction Plates Thickness				
	-Bonded	4.00	0.157	4.00	0.157
	-with Insets	4.30	0.169	4.30	0.169
15.	Clutch Plate lug width	6.00	0.236	6.00	0.236
16.	Clutch spring free length	25.5	1.004	25.5	1.004
17.	Wheel axle shaft run out	0.2	0.008	0.2	0.008
18.	Wheel rim run out	2.0	0.078	2.0	0.078
19.	Brake lining thickness	2.0	0.078	2.0	0.078
20.	Brake drum internal diameter	153.50	6.043	153.50	6.043
21.	Front fork main tube run out	0.05	0.002	0.05	0.002
22.	Front fork spring free length	527	20.75	527	20.75

TROUBLE SHOOTING : BULLET MOTOR CYCLES

COMPLAINT : ENGINE DIFFICULT / DOES NOT START

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Crank the engine several times. How is the cranking pressure?	Kick starter pedal moves freely.	1) Clutch slippage :	
		• No clutch cable free play	¤ Adjust clutch cable play
		• Stuck clutch cable	¤ Clean and free the cable
		• Weak clutch springs	¤ Change the clutch springs
		• Worn out clutch plates	¤ Replace the clutch plates
		2) Compression weak:	
		• Loose spark plug	¤ Tighten the spark plug
		• Tight tappet adjustment	¤ Adjust the tappet correctly
		• Blown cylinder head gasket	¤ Change the gasket
		• Leaky valves	¤ Lap the valves
		• Worn out/scored cylinder	¤ Rebore to next over size
		• Worn out piston rings	¤ Replace piston rings
		• Jammed piston rings	¤ Clean and fit
		• Glazed cylinder	¤ Rebore the cylinder to next o.s.
		• Leaky decompressor	¤ Check and change the gaskets
			¤ Lap the decompressor valve
		• Loose cylinder head nuts	¤ Tighten the nuts
		3) Kick starter pawl slipping	Change the pawl / spring
	Cranking pressure OK		
2. Remove the fuel hose from the carburetor. Turn the fuel tap to ON/Reserve. Does fuel flow to carburetor?	No, it doesn't	• No fueld in the tank	¤ Fill up the tank
		• Blocked fuel tank cap vent	¤ Clear the vent
		• Chocked fuel tap	¤ Clean fuel tap
	Yes, it flows		
3. Check fuel. How is it?	It is stale, gives an offensive odour	• Vehicle not used for long periods	¤ Clean petrol tank and carburator and fill the tank with fresh petrol
	It is adultered	• Kerosene/Diesel in Petrol	¤ Select a reliable pump
	Petrol is OK		

TROUBLE SHOOTING : ENGINE DIFFICULT / DOES NOT START

CHECK	OBSERVATION	CAUSES	REMEDIES
4. Switch 'on' ignition and crank engine. Does the amp. meter needle deflect?	a) No, it doesn't	• Kill switch circuit open	¤ Check and correct
		• Defective ignition switch	¤ Replace ignition switch
		• Snapped battery connection	¤ Check and correct
		• Snapped LT lead	¤ Check and correct
		• CB points not closing	¤ Adjust the points
		• Open primary circuit	¤ Check and correct
		• Fully discharged battery	¤ Charge the battery
	b) Yes, it always remains in discharged position	• Shorted kill switch	¤ Replace the kill switch
		• Shorted ignition switch	¤ Replace ignition switch
		• C.B. points not opening	¤ Adjust CB points
		• Shorting at CB points	¤ Check and correct
	c) It is OK		
5. Remove spark plug. Cover the spark plug hole with thumb. Crank engine several times. How is the petrol smell? Is there petrol stain on thumb?	a) No petrol smell. No fresh petrol stain on thumb.	• Stuck open slide valve	¤ Free the slide valves
		Less petrol flow to the bowl	
		• Blocked carburator fuel inlet	¤ Clean the passage
		• Stuck closed, float needle	¤ Clean and free float needle
		• Float height too high	¤ Adjust float height
		• Blocked pilot jet/pilot discharge orifice	¤ Clear the jet/discharge orifice
		• Warped inlet flange	¤ Face the flange
		• Loose inlet fasteners	¤ Tighten fasteners
	b) Heavy petrol smell. Petrol wets thumb.	Too rich air petrol mixture from carburetor:	
		• Dirt on float needle seat	¤ Clean the needle seat
		• Damaged float needle valve	¤ Replace the needle valve
		• Punctured float assembly	¤ Repair/Replace the float
		• Float height adjusted too low	¤ Adjust float to right height
		• Loose/Worn out pilot jet	¤ Tighten/Replace pilot jet
		• Blocked pilot jet bleed holes	¤ Clean the jet bleed holes
		• Stuck open choke	¤ Check, clean and fit the choke
		• Choke on hot engine	¤ Pull choke to 'off' position
		• Air screw too far in	¤ Adjust the air screw
	c) Too much oil on thumb	For causes and remedies refer to high lub oil consumption	
	d) It is normal		

6. Clean spark plug electrode tips. Set gap. Connect it to HT lead. Earth its body. Turn ignition switch 'on'. Ensure 'kill switch' is in Run position. Crank the engine. How is the spark?	a) No spark	• Defective spark plug • Defective plug cap • Open primary circuit • Defective H.T. coil	¤ Change the plug ¤ Change the cap ¤ Check and correct ¤ Change the HT coil
	b) Red/Yellow spark	• Defective HT lead • Excessive electrode gap • Loose connections • Dirty, pitted CB points • Discharged battery • Defective HT coil	¤ Replace HT lead ¤ Adjust the gap ¤ Tighten all connections ¤ Clean and adjust CB points ¤ Re-charge the battery ¤ Change HT coil
	c) Side spark or Intermittent spark	• Cracked spark plug insulator • Loose connections • Foulded spark plug • Cracked HT lead	¤ Change the spark plug ¤ Tighten connections ¤ Clean and adjust the gap ¤ Change the HT lead
	d) Light blue solid spark		
7. Is the spark plug of right specification	No	• Shorter reach spark plug	¤ Replace with right plug
	Yes		
8. Is the ignition timing correct?	No	• Too far advanced / retarded ignition timing	¤ Adjust ignition timing
	Yes, it is correct		
Then, now, engine should start easily			

NOTE:

1. Combustion elements : Fuel, Air and Heat.
2. Right compression heats up the air petrol mixture. Light blue spark at the right time ignites it and engine starts.
3. Right compression pressure for bullet - 6.5 kg/cm^2 to 8.5 kg/cm^2.
4. Check ignition coil as follows : Remove spark plug cap from H.T. lead. Turn ignition switch 'on'. Hold the H.T. lead end about 8 m.m. away from cylinder head. Crank the engine. Continuous light blue spark jumping from the lead indicates the primary circuit and the HT coil are OK.

COMPLAINT : LOW IDLING PROBLEM

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Does the engine cut off suddenly when the throttle is closed but remain running as long as throttle remain partly open?	a) Yes, it cuts off.	• Throttle stop screw too far out	¤ Adjust throttle stop screw
		• Air screw too far in	¤ Adjust air screw
		• Pilot jet blocked	¤ Clean pilot jet
		• Pilot discharge orifice blocked	¤ Clean the pilot orifice
		• Weak compression	¤ Check and correct
		• Too far advanced ignition	¤ Check and adjust
		• Too far open CB points	¤ Check and adjust
		• Stuck open auto adv. ign. unit	¤ Check and correct
	b) No, it does not cut off		
2. How is the engine running in throttle fully closed position?	a) It gradually cuts off without excessive smoke	• Loose carburator mounting	¤ Tighten the mounting
		• Warped carburator flange	¤ Check and correct
		• Air screw too far out	¤ Adjust the air screw
		• Loose LT connection	¤ Tighten the connections
	b) It cuts off gradually with smoke and heavier exhaust sound	Excessive fuel flow to the engine :	
		• Air screw too far in	¤ Adjust air screw
		• Dirt between float needle valve and seat	¤ Clean needle value and seat
		• Damaged float needle valve	¤ Replace float needle valve
		• Punctured float	¤ Replace float
		• Faulty float height adjustment	¤ Correct float height
	c) OK		
3. Is the engine low idle rpm higher?	a) Yes, it is higher	• No throttle cable free play	¤ Adjust throttle cable play
		• Throttle stop screw fully in	¤ Adjust as required
		• Stuck throttle inner cable	¤ Clean/Replace cable
		• Partly stuck open slide valve	¤ Clean and free the slide valve
		• Restricted fueld flow to float chamber	¤ Check and correct
		• Aux air screw move out	¤ Check and adjust
		• Air screw too far out	¤ Adjust the air screw
	b) No, it is not		
4. Does the engine low idle erratically?	a) Yes, it does	• Air screw too far out	¤ Adjust the air screw
		• Auxiliary air screw too far out	¤ Adjust auxiliary air screw
		• Suction leakage	¤ Check and correct
		• Worn out slide valve	¤ Replace slide valve
	b) No, it doesn't		
5. Does the engine misfire and cut off?	a) Yes, it does	• Excessive spark plug gap	¤ Adjust gap to 0.5 mm
		• Fouled spark plug	¤ Clean and adjust spark plug
		• Faulty HT coil/cord	¤ Replace the HT coil/cord
		• Dirty CB points	¤ Clean and readjust
		• Water in petrol	¤ Replace petrol
		• Low level of petrol in float chamber	¤ Adjust the float height to 29 ± 1mm
	b) No, it doesn't		

COMPLAINT : LOW IDLING PROBLEM

CHECK	OBSERVATION	CAUSES	REMEDIES
6. With ignition on, kick the engine. Is there a severe kick back?	Yes	• Too far advanced ignition timing • High compression pressure	¤ Adjust ignition timing ¤ Check and correct
	No		
Engine would now low idle smoothly			

NOTE	:	Find out induction leakage by :
METHOD 1	:	Pour some petrol at the suspected joint. If engine cuts off, there is suction leakage at that joint.
METHOD 2	:	Pour some lube oil or apply grease at the suspected joint. If the slow running improves, there is leakage at that joint.

COMPLAINT : LOSS OF POWER

CHECK	OBSERVATION		CAUSES	REMEDIES
1. Is the load on engine O.K?	a)	No, it is over loaded.	• Excessive pay load • Low tyre presure • Tight chain - Primary and Rear • Brake binding • Too much oil in gear box or primary chain case. • Sticky wheel bearing	¤ Reduce pay load ¤ Inflate the tyre to right pressure ¤ Adjust chain tension ¤ Adjust brake ¤ Drain and correct ¤ Clean and lubriacte the bearings
	b)	Yes		
2. Does the road speed increase in proportion with engine rpm?	a)	No	Clutch slippage : Causes & remedies as given for 'clutch slippage' complaint (Page 14).	
	b)	Yes		
3. How is the smoke?	a)	Excessive smoke	• Adulterated petrol • Carburator flooding • Blocked air bleed holes • Blocked air jet • Stuck open choke plunger • Chocked air filter • Weak spark • Too far retarded ignition timing • Poor compression : Causes & remedies as given for weak compression in check 1 in 'engine difficult to start'.	¤ Replace Petrol ¤ Check and correct ¤ Clean the bleed holes ¤ Clean the air jet ¤ Check and correct ¤ Clean air filter ¤ Check and correct ¤ Adjust ignition timing
	b)	No smoke	• Blocked petrol jets • Too less petrol in float chamber	¤ Clean them ¤ Check and correct
	c)	Normal		
4. Does the engine over heat?	a)	Yes	Causes and remedies as given for the complaint 'engine over heting' (Page 14).	
	b)	No		
Then, the engine will have full power.				

COMPLAINT : HIGH LUB OIL CONSUMPTION

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Check the parked place. any oil spot on the ground?	Yes, External oil leaks	• Loose drain plugs	¤ Tighten the plugs
		• Loose joints	¤ Tighten fasteners
		• Damaged gaskets	¤ Replace the gaskets
		• Damaged sealing surface	¤ Face / Replace the parts
	No		
2. Start the engine. How is the oil throw from the breather pipe?	Excessive oil throw from breather for few minutes when the engine is started first time in the day	• Excessive oil in oil tank	¤ Drain and correct the level
		• Timing shafthole in crankcase worn out	¤ Turn it and fit a bush
		• Excessive run out of timing shaft	¤ Replace the crank shaft
		• Crankcase mounting nuts loose	¤ Tighten them in sequence after loosening them by 1/4 turn
		• Gasket between oil tank and crankcase housing damaged	¤ Replace the gasket
		• Porocity / Blow hole in crankcase	¤ Chang the crankcase
	Excessive oil throw from breather through out the engine operation	• Air vent in lus. oil dip stick cover blocked	¤ Clean the vent hole
		• Return pump not operating	¤ Check and correct it
		• Blocked return pump passages	¤ Clean the blockages
		• Excessive blow by	¤ Check and correct
	No oil throw from breather		
3. Start the engine and accelerate. How is the smoke?	Excessive white smoke	• Wrong grade or recycled lub oil	¤ Use SAE 20w - 50 oil
		• Worn out valve guide or valve stem	¤ Replace valve guide and valve
		• Piston, piston rings or cylinder wall worn out	¤ Replace the worn out parts
		• Connecting rod bent	¤ Replace the connecting rod
		• Wrong piston ring fitment	¤ Fit the ring correctly
	No white smoke		
The oil consumption will then be OK.			

NOTES :

a) Oil seepage into crank case when engine is at rest, results in the flywheel dipping through the accumulated oil. When engine is started the resultant excessive oil splash causes oil escape through breather during the first few minutes of engine operation.

b) Failure of return pump causes excessive oil accumulation in crank case throughout engine operation. The fly wheels dip through it. Excessive splash thus caused ends up with continuous oil through from the breather.

c) Excessive blow-by results in excessive gas flow through the crank case to the breather. The flowing gas picks up the splashed oil at the crank case. This ends up with continuous oil throw from the breather.

COMPLAINT : HIGH LUB OIL CONSUMPTION

d)		Method of checking oil circulation :
1	:	Remove the tappet Inspection door. Continuous oil flow through the push rod while the engine is in operation indicates proper oil circulation.
2	:	Loosen the banjo union at the cylinder head. Engine in idling, oil flow from this joint indicates proper oil circulation upto this point.
3	:	While engine is idlling, loosen the feed plug. Solid oil flow from here indicates proper functioning of feed pump.
e)		Method of finding oil leaks to crankcase from cork seal, crank shaft timing end bush & joint between crank case and oil tank :
1	:	Keep the motor cycle on a level ground.
2	:	Remove the return pump filter plug and drain the oil completely from crank case chamber / flywheel chamber.
3	:	Check and top up oil in tank to 'H' mark on dip stick.
4	:	Refit the return pump filter plug.
5	:	Keep the motor cycle in this way for 24 Hrs. During this period do not crank or start the motor cycle.
6	:	Now, remove the return pump filter plug and collect the oil that may drain from the crank case in a bow. If no oil is draining, there is no leakage from oil tank and timing chest to crank case.
7	:	If oil get collected and oil level in sump is unchanged then leakage is from T chest.
f)		Method of checking return pump operation :
1	:	Ride the vehicle for one or two kms or start and run the engine for 10 mts.
2	:	Keep the motor cycle on stand and switch off the engine.
3	:	Remove the return pump filter plug and collect the draining oil in a bowl.
4	:	About 50 to 75 ml oil will normally be there to drain. If oil drained measure more than 100 ml, operation of return pump can be suspected.

COMPLAINT : LOW MILEAGE

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Does the customer report any other performance problem?	No, he doesn't	External petrol leakage	Check and stop leakage
		Poor driving techniques : • Clutch and brake riding • Racing starts • Too many revving • Sudden accelerations • Over loading • Frequent brake application • Under / over speeding • Continuours low gear operation • Lugging the vehicle	¤ Educate the customer ¤ Educate the user
		• Too few kms running per day	¤ Take mileage test and satisfy customer
		• Continuous riding oil connects office	¤ Avoid congested traffic
		• Under filling of fuel	¤ Select reliable fuel pump
		• Parking the vehicle in sun	¤ Park it in shade
		• Fault odometer / odo drive	¤ Check and correct
		• Bald Tyres	¤ Replace tyres
		• Under inflated tyres	¤ Inflate tyres
	Yes, he does		
2. Is the engine over loaded?	Yes, it is over loaded	• Excessive pay load	¤ Carry correct pay load
		• Tight primary / secondary chain	¤ Adjust chain tension
		• Too much thick oil in clutch or gear box	¤ Drain and maintain level
		• Sticky wheel bearing	¤ Clean and lubricate
		• Under inflated tyres	¤ Inflate to right pressure
		• Birdling brakes	¤ Adjust the brakes
		• Wheel misalignment	¤ Adjust the belts
3. Does the engine cold start easily without putting choke 'ON'	Yes, it does	• Higher petrol level in float chamber	¤ Adjust the float height
		• Partially open choke	¤ Check and correct
		• Chocked air filter element	¤ Clean and fit the element
	No, starting is normal		

COMPLAINT : LOW MILEAGE

CHECK	OBSERVATION	CAUSES	REMEDIES
4. Does the road speed increase with engine rpm?	No, it doesn't	Clutch slippage : Causes and remedies as given for 'clutch slippage' problem (Page 15)	
	Yes, it does		
5. Is there excessive white smoke?	Yes	Causes and remedies as given against white smoke in high lub. oil consumption (Page 7)	
	No		
6. Does the engine misfire?	Yes, it does	• Foulded spark plug • Too much spark plug electrode gap • Cracked spark plug insulator • Defective condenser • Dirty/pitted C.B. points • Defective HT coil • Too rich air petrol mixture	¤ Clean the spark plug ¤ Adjust the gap ¤ Change the spark plug ¤ Replace the condenser ¤ Clean and adjust the points ¤ Replace them ¤ Check and correct
	No, it doesn't		
7. Is there starting problem, poor pickup and more smoke?	Yes	• Weak spark • Too far retarded ignition timing • Low compression • Too much oil entry into combustion chamber	¤ Check and correct ¤ Check and adjust ignition timing ¤ Check and correct ¤ Check and correct
	No		
8. Does the engine over heat?	Yes, it overheats	For causes and remedies refer to engine over heating complaint (Page 11)	
	No, it doesn't		
Now the vehicle mileage will be good.			

ENGINE OVER HEATING

CAUSES	REMEDIES
• Too lean air petrol mixture (characterised by loss of power)	¤ Check and correct
• Too far advance ignition timing (characterised by kick back while starting and combustion knocks)	¤ Adjust the timing
• Excessive carbon deposit in cylinder (Characterised by post ignition)	¤ Decarbonise the engine
• Dirty / Blocked cooling fins	¤ Clear and clean the fins
• Lub oil starvation	¤ Check and correct
• Wrong grade lub oil	¤ Change the oil
• Engine over loaded	¤ Reduce the load
• Wrong spark plug	¤ Replace it with correct plug
• Less working clearances between moving parts	¤ Check and correct

COMPLAINT : ENGINE NOISY IN OPERATION

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Start and accelerate the engine. Any high intensity continual, gas leakage sound?	Yes	• External compression leakage • Exhaust gas leakage	¤ Check and correct ¤ Check and correct
	No		
2. Start and run the engine. Any continuous air flow sound?	Yes	• Cracked / damaged air below • Torn / damaged air filter	¤ Change it ¤ Change it
	No		
3. Is there humming / howling noise	Yes	• Tight gears	¤ Check and correct the back lash
	No		
4. Is there a continuous metallic tapping noise?	Yes	• Excessive tappet clearance • Excessive small end clearance • Dry auto adv. ign. unit • Loose valve stem cap • Damaged cams • Loose rocker in bush	¤ Adjust the tappets ¤ Check and change the worn part ¤ Check and lubricate ¤ Change the cap ¤ Change the cam wheels ¤ Change the bush
	No		
5. Is there a continuous grinding like noise	Yes	• Worn out ball bearing	¤ Replace them
	No		
6. Does the knock reduce with increasing engine temperature?	Yes	• Too much clearance between piston and cylinder	¤ Change the worn out part
	No		
7. Does the noise increase with temperature	Yes	• Engine over heating • Excessive compression ratio • Too far advanced ignition	¤ Check and correct ¤ Check and correct ¤ Check and adjust
	No		
8. Does the knock increase with the load?	Yes	• Worn out floating bush • Loose chain adjuster • Loose engine sprocket	¤ Change the floating bush ¤ Check and correct ¤ Replace the sprocket
	No		
Then, the engine would run smoothly.			

COMPLAINT : PREMATURE WEAR OF ENGINE COMPONENTS

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Is there any suction leakage or air filter damage?	Yes	• Cracked or improperly fitted air filter • Induction system joint leakages	¤ Replace the air filter or properly fit it ¤ Check and correct
	No		
2. Is the petrol dirty adulterated?	Yes	• Rusted tank • Water contaminants in petrol • Torn fuel tap filter • Adulterated petrol	¤ Clean the tank ¤ Replace the petrol ¤ Replace the filter ¤ Change the petrol
	No		
3. Is engine oil dirty	Yes	• Neglected maintenance • Use of recycled oil	¤ Replace oil at regular intervels ¤ Use specified oil
	No		
4. Does the engine over heat?	Yes	For causes and remedies refer to Engine over heating complaint.	
	No		
5. Does the engine produce unusual sounds / knocks?	Yes	• Excessive clearance loose adjustments • Worn out bearings / component surfaces	¤ Check and correct ¤ Check and correct
	No		
Keep the causes of premature wear away to ensure long life for engine components.			

Note : Use of non-genuine parts causes premature wear.

COMPLAINT : FLAME AT THE CARBURATOR (BACK FIRE)

CAUSES	REMEDIES
• Too lean air petrol mixture • Use of smaller size Jets • Over heated engine • Leaky in take valve	¤ Check carburettor setting and adjust ¤ Change the jets ¤ Check and correct ¤ Check and adjust tappet ¤ Lap the valve on its seat

COMPLAINT : FLAME AT THE SILENCER (AFTER FIRE)

CAUSES	REMEDIES
• Defective spark plug	¤ Clean & adjust or replace
• Too rich air fuel mixture	¤ Adjust carburettor
• Retarded ignition timing	¤ Check and adjust ignition timing
• Leaky Exhaust valve	¤ Adjust tappet
	¤ Lap the valve

COMPLAINT : CLUTCH SLIPPAGE

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Does the road speed increase with engine rpm?	No	Clutch slippage :	
		• No clutch lever free play	¤ Adjust clutch cable free play
		• Worn out clutch plates	¤ Replace clutch plates
		• Weak pressure springs	¤ Replace springs
		• Glazed steel plate / clutch plates	¤ Replace the glazed plates
		• Distorted pressure plates	¤ Replace the distorted plates
	Yes		
Then there is no clutch slippage			

COMPLAINT : CLUTCH DRAGGING

CHECK	OBSERVATION	CAUSES	REMEDIES
1. Does the vehicle tend to move on engaging gear though clutch lever is fully depressed?	Yes	• Excessive clutch lever free play	¤ Check and adjust
		• Distored steel plates	¤ Replace steel plates
		• Dirty/high viscous oil	¤ Replace with SAE 10w-30 oil
		• Broken friction plates	¤ Replace the broken plates
		• Damaged clutch rod and ball adjuster	¤ Replace the damaged part
	No		
Then there is no clutch dragging			

COMPLAINT : GEARS DIFFICULT TO ENGAGE

CAUSES	REMEDIES
• Clutch drag	¤ Check and correct
• Tight gears	¤ Check and correct
• Faulty selector mechanism adjuster plate adjustment	¤ Check and adjust
• Too tight gear operator selector assy. adjustment	¤ Check and adjust

COMPLAINT : PREMATURE WEAR OF DRIVE CHAIN AND SPRODECT

CAUSES	REMEDIES
• Too tight chain adjustment	¤ Adjust the chain to its normal slackness
• Too loose chain adjustment	¤ Adjust the chain to its normal slackness
• Over loading of motorcycle	¤ Reduce the load
• Misalignment of F.D sprocket with rear wheel sprocket due to faulty chain adjustment	¤ Adjust the chain tension properly
• Too much dirt on chain	¤ Clean and lubricate
• Chains roller and pin runs dry	¤ Clean and lubricate
• Faulty cush drive	¤ Replace cush drive

COMPLAINT : TYRE / TUBE DAMAGES PREMATURELY

INDICATIONS	CAUSES	REMEDIES
Excessive wear at the tread edges	• Low tyre inflation pressure	¤ Inflate the tyres to the right pressure
Tyre side wall cracks	• Low tyre inflation pressure	¤ Inflate the tyres to the right pressure
Tube inner nozzle snaps	• Low tyre inflation pressure	¤ Inflate the tyres to the right pressure
Excessive wear at tread centre	• Excessive tyre inflation pressure	¤ Inflate the tyre to the right pressure
Tyre wears in batches	• Defective tyre	¤ Change the tyre
	• Frequent sudden braking	¤ Avoid sudden braking
	• Defective suspension	¤ Check and rectify

COMPLAINT : BRAKE LESS EFFECTIVE

CAUSES	REMEDIES
• Excessive clearance between brake shoe and drum	¤ Adjust the brake
• Oily shoes	¤ Replace shoes
• Glazed shoes and drum	¤ Remove the glaze with emery paper
• Worn out brake shoes	¤ Replace brake shoes
• Wornout drum	¤ Replace the drum
• Bend back plate	¤ Replace back plate
• Misaligned brake shoe in drum	
• Struck brake cam	

COMPLAINT : BRAKE BINDING

CAUSES	REMEDIES
• Brake shoe return spring broken/weak	¤ Replace the spring
• Too tight brake adjustment	¤ Adjust the brakes correctly
• Jammed cams	¤ Lubricate the cams
• Brake pedal jam	¤ Lubricate
• Bend brake rod	¤ Straighten the brake rod

COMPLAINT : BRAKE SQEAKING

CAUSES	REMEDIES
• Dust in brake drum	¤ Clean the brake drum
• Glazed brake shoes / drum	¤ Roughen the shoe face/drum face
• Bent back plate	¤ Change the plate
• Water on brake shoes	¤ Apply the brake several times
• Misaligned wheel	¤ Align the wheel
• Hard brake shoe linings	¤ Replace the shoe linings
• Totally wornout shoes	¤ Replace the shoes

COMPLAINT : FRONT FORK HITTING NOISE

CAUSES	REMEDIES
• Too less oil in the fork (hits at the end of the compression stroke)	¤ Top up the oil level
• Weak coil springs (hits at the end of compression stroke)	¤ Replace springs with new ones
• Worn out spring stud (hits at the end of expansion stroke)	¤ Replace it with new
• Loose main tube fitment	¤ Tighten the main tubes

COMPLAINT : WHEEL WOBBLING

CAUSES	REMEDIES
• Loose wheel axle nut	¤ Tighten the nuts
• Loose spokes	¤ True the wheels
• Bend wheel rim	¤ Replace the wheel rim
• Retreaded tyre	¤ Replace with new tyre
• Loose steering adjustments	¤ Adjust steering properly
• Worn out chain stay pivot bushes	¤ Change the bushes
• Loose wheel bearing	¤ Change the wheel bearing

BULLET 350 CC/500 CC - TORQUE VALUES

ENGINE

ITEM	Kg-m	LB-inch
Rocker Bearing Stud Nut (3/16")	1.30	112.0
Crank Pin Nut (7/8")	13.80	1200.0
Timing Shaft Nut (3/4")	9.20	800.0
Cylinder Head Nut (5/6")	3.30	285.0
Crankcase Joint Nut (M6 1/4")	0.90	78.0
Crankcase Joint Nut (M8 5/16")	1.10	95.0
Gearbox Endcover Bolt (1/4")	1.00	85.0
F.D. Sprocket Lock Nut (1 3/16")		
Alternator Nut (Rotor) (9/16")	5.50	475.0
Clutch Mounting Nut (9/16")	5.50	475.0
Main Shaft Nut in Gear Box (5/8")	6.50	565.0
Rocker Box Studnut	1.45	125.0
Oilfeed and Return Filter Assy.	3.00	260.0
Rocker Oil Pipe Banjo Union	1.00	85.0
Rocker Oil Screwed Bush	1.60	138.0
Oil Feed Plug	1.60	138.0
Oil Cleaner Cap Nut	1.40	120.0
Chaincase Front att. nut	1.40	120.0

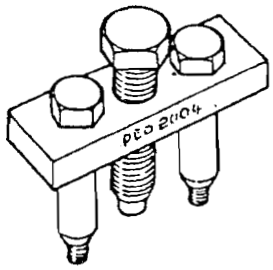
CHASSIS

Frame Stud Nut-Gear Box (1/2")	3.20	277.0
Front Engine Plate Stud Nut (1/2")	3.20	277.0
Rear Engine Plate Stud Nut (Bot.) (3/8")	2.00	175.0
Rear Brake Cam Lever Nut (7/15")	2.00	175.0
Chainstay Stud Nut (1/2")	3.50	300.0
Front Fork End Cap Nut (5/16")	1.30	112.0
Rear Wheel Lock Nut (M22)	7.50	650.0
Rear Wheel Spindle Castle Nut (M16)	6.50	565.0
Rear Shock Absorber Upper (3/8")/Lower Nut (3/8")	2.50	215.0
Front Mudguard Stay Screw Nut (1/4")	0.30	25.0
Front Engine Plate Stud Nut (M8)	1.50	130.0
Front Mudguard Stay Stud Nuts (5/16")	1.20	104.0
Handle Bar Clip Bolt (5/16")	3.30	286.0
Handle Bar Clip & Seat Stud Nuts (5/16")	2.40	208.0
Main Footrest Nuts (3/8")	1.20	104.0
Coil Fixing Bolt and Nuts (M6)	0.45	40.0
Regulator Fixing Nut (M6)	0.45	40.0
Rear Mudguard Carrier Stud Nut (Top) (3/8")	2.00	175.0
Rear Mudguard Carrier Stud Nut (Bottom) (7/16")	2.50	216.0
Rear Engine Plate Stud Nut (M8)	1.50	130.0
Eye Bolt Stud Nut (5/16")	1.50	130.0
Tank Fixing Nut (3/8")	1.60	140.0

SPECIAL TOOLS LIST

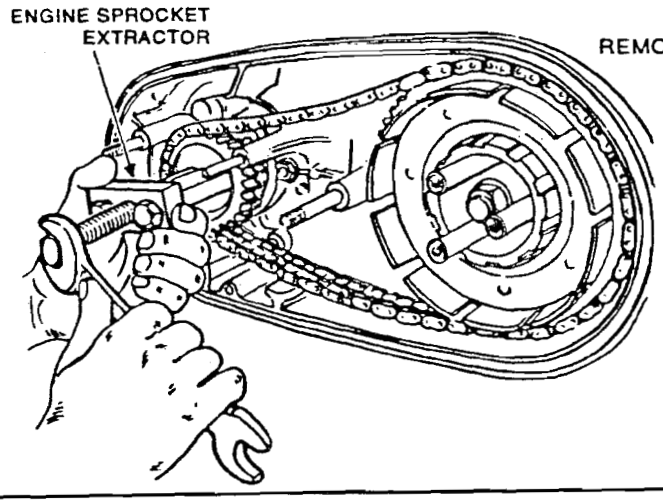
COMMON FOR 350cc & 500cc

PED 2004 ST



ENGINE SPROCKET EXTRACTOR

APPLICATIONN : REMOVAL OF ENGINE SPROCKET



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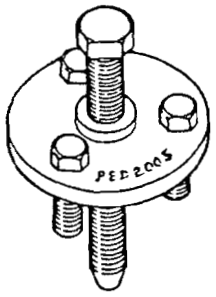
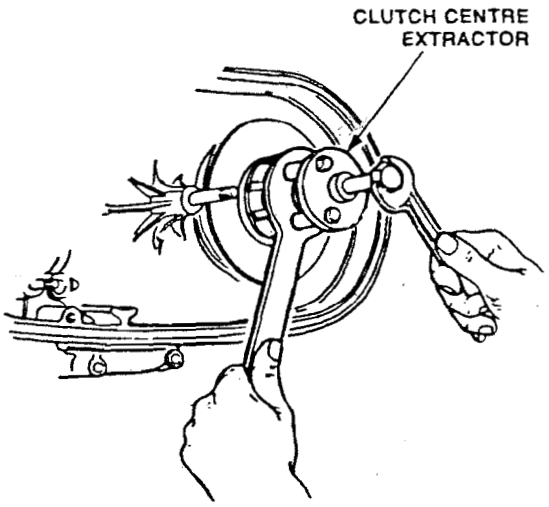


CLUTCH CENTRE EXTRACTOR

APPLICATION : REMOVAL OF CLUTCH CENTRE AND BACK PLATE ASSY.



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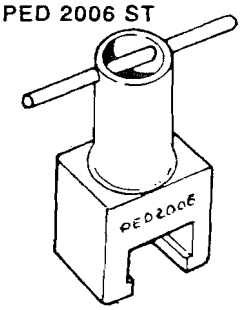
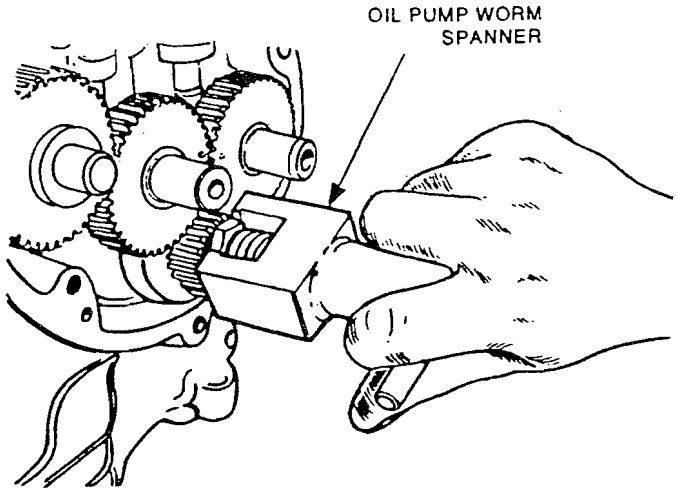
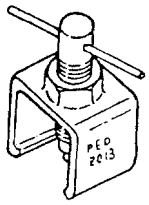


OIL PUMP WORM SPANNER

APPLICATION : REMOVAL AND FITMENT OF OIL WORM NUT

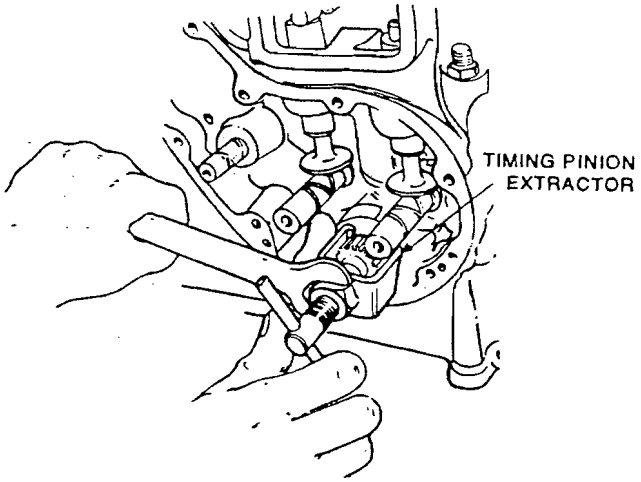


PED 2013 ST

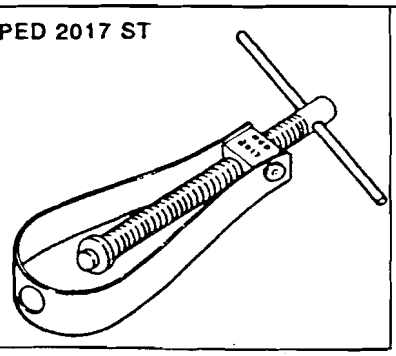


TIMING PINION EXTRACTOR

APPLICATION : REMOVAL OF TIMING PINION

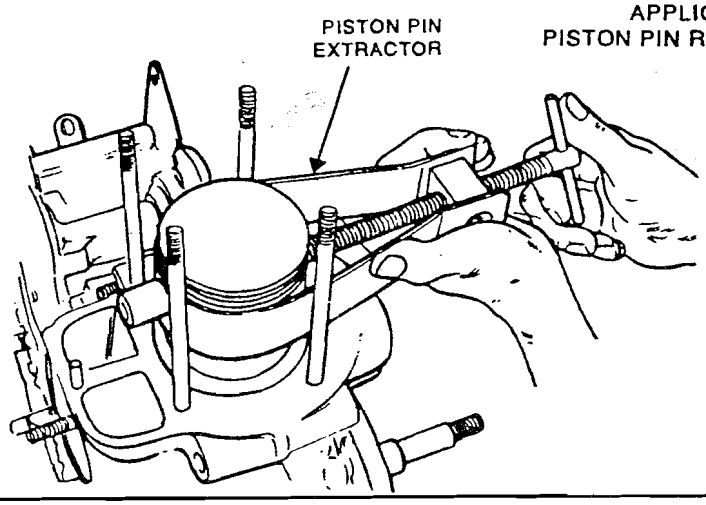


PED 2017 ST

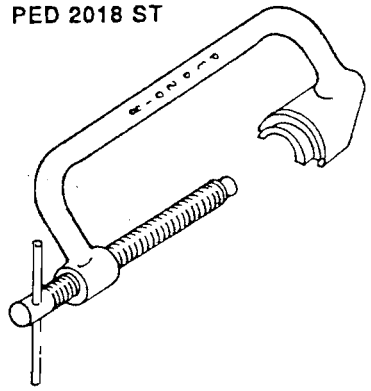


PISTON PIN EXTRACTOR

APPLICATION : PISTON PIN REMOVAL

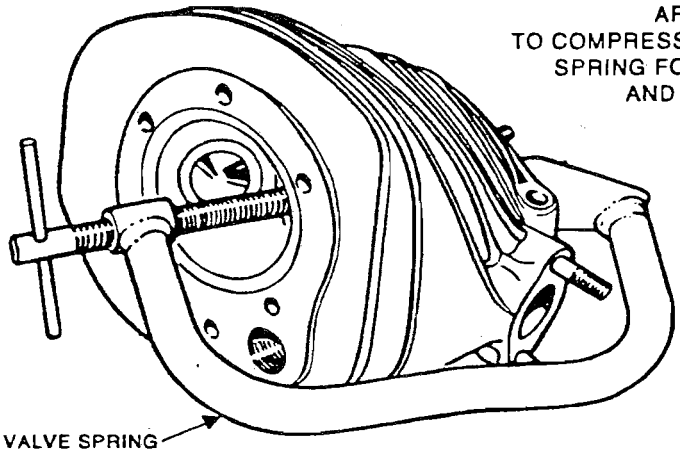


PED 2018 ST



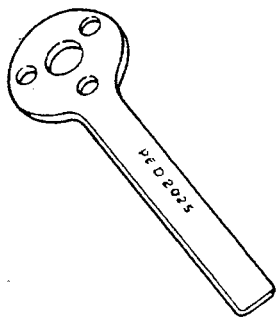
VALVE SPRING COMPRESSOR

APPLICATION :
TO COMPRESS THE VALVE SPRING FOR REMOVAL AND FITMENT OF VALVE



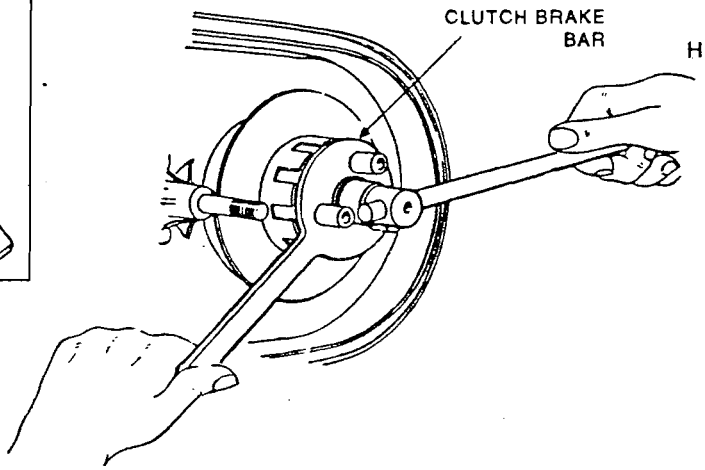
VALVE SPRING COMPRESSOR

PED 2025 ST



CLUTCH BRAKE BAR

APPLICATION :
HOLDING THE CLUTCH CENTRE AND BACK PLATE ASSY.

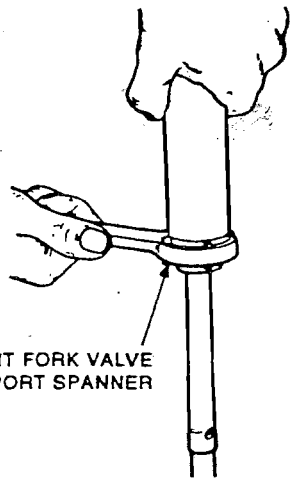


CLUTCH BRAKE BAR

PED 2026 ST

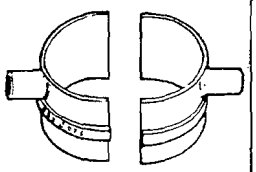
FRONT FORK VALVE PORT SPANNER

APPLICATION :
REMOVAL AND FITMENT OF VALVE PORT



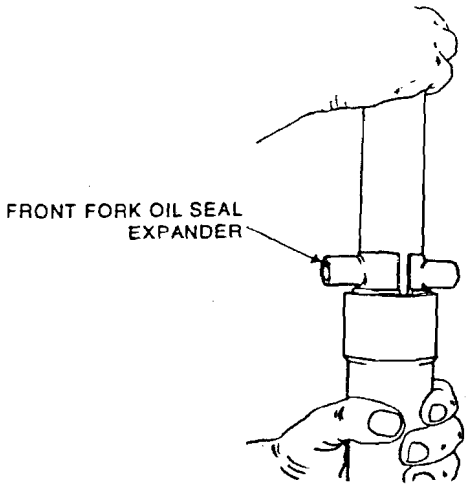
FRONT FORK VALVE PORT SPANNER

PED 2076 ST

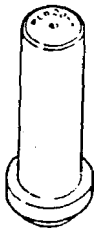


FRONT FORK OIL SEAL EXPANDER

APPLICATION :
FOR EXPANDING OIL SEAL WHILE INSERTING MAIN TUBE INTO BOTTOM TUBE OF FRONT FORM

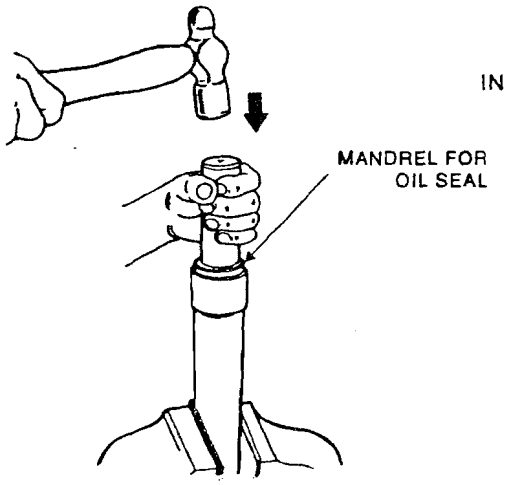


PED 2077 ST

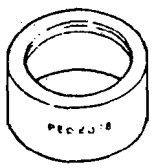


MANDREL FOR OIL SEAL

APPLICATION :
FITMENT OF OIL SEAL IN FRONT FORK BOTTOM TUBE



PED 2078 ST



SLEEVE FOR REMOVING FRONT FORK OIL SEAL

APPLICATION :
REMOVAL OF OIL SEAL FROM FRONT FORK BOTTOM TUBE

Metric conversion tables

Inches	Decimals	Millimetres
1/64	0.0156265	0.3969
1/32	0.03125	0.7937
3/64	0.046875	1.1906
1/16	0.0625	1.5875
5/64	0.78125	1.9844
3/32	0.09375	2.3812
7/64	0.109375	2.7781
1/8	0.125	3.1750
9/64	0.140625	3.5719
5/32	0.15625	3.9687
11/64	0.171875	4.3656
3/16	0.1875	4.7625
13/64	0.203125	5.1594
7/32	0.21875	5.5562
15/64	0.234375	5.9531
1/4	0.25	6.3500
17/64	0.265625	6.7469
9/32	0.28125	7.1437
19/64	0.296875	7.5406
5/16	0.3125	7.9375
21/64	0.328125	8.3344
11/32	0.34375	8.7312
23/64	0.359375	9.1281
3/8	0.375	9.5250
25/64	0.390625	9.9219
13/32	0.40625	10.3187
27/64	0.421875	10.7156
7/16	0.4375	11.1125
29/64	0.453125	11.5094
15/32	0.46875	11.9062
31/64	0.48375	12.3031
1/2	0.5	12.7000
33/64	0.515625	13.0969
17/32	0.53125	13.4937
35/64	0.546875	13.8906
9/16	0.5625	14.2875
37/64	0.578125	14.6844
19/32	0.59375	15.0812
39/64	0.609375	15.4781
5/8	0.625	15.8750
41/64	0.640625	16.2719
21/32	0.65625	16.6687
43/64	0.671875	17.0656
11/16	0.6875	17.4625
45/64	0.703125	17.8594
23/32	0.71875	18.2562
47/64	0.734375	18.6531
3/4	0.75	19.0500
49/64	0.765625	19.4469
25/32	0.78125	19.8437
51/64	0.796875	20.2406
13/16	0.8125	20.6375
53/64	0.828125	21.0344
27/32	0.84375	21.4312
55/64	0.859375	21.8281
7/8	0.875	22.2250
57/64	0.890625	22.6219
29/32	0.90625	23.0187
59/64	0.921875	23.4156
15/16	0.9375	23.8125
61/64	0.953125	24.2094
31/32	0.96875	24.6062
63/64	0.984375	25.0031

Millimetres to Inches

mm	Inches
0.01	0.00039
0.02	0.00079
0.03	0.00118
0.04	0.00157
0.05	0.00197
0.06	0.00236
0.07	0.00276
0.08	0.00315
0.09	0.00394
0.1	0.00394
0.2	0.00787
0.3	0.01181
0.4	0.01575
0.5	0.01969
0.6	0.02362
0.7	0.02756
0.8	0.3150
0.9	0.3543
1	0.03937
2	0.07874
3	0.11811
4	0.15748
5	0.19685
6	0.23622
7	0.27559
8	0.31496
9	0.35433
10	0.39370
11	0.43307
12	0.47244
13	0.51181
14	0.55118
15	0.59055
16	0.62992
17	0.66929
18	0.70866
19	0.74803
20	0.78740
21	0.82677
22	0.86614
23	0.90551
24	0.94488
25	0.98425
26	1.02362
27	1.06299
28	1.10236
29	1.14173
30	1.18110
31	1.220447
32	1.25984
33	1.29921
34	1,33858
35	1.37795
36	1.41732
37	1.4567
38	1.4961
39	1.5354
40	1.5748
41	1.6142
42	1.6535
43	1.6929
44	1.7323
45	1.7717

Inches to Millimetres

Inches	mm
0.001	0.0254
0.002	0.0508
0.003	0.0762
0.004	0.1016
0.005	0.1270
0.006	0.1524
0.007	0.1778
0.008	0.2032
0.009	0.2286
0.01	0.254
0.02	0.508
0.03	0.762
0.04	1.016
0.05	1.270
0.06	1.524
0.07	1.778
0.08	2.032
0.09	2.286
0.1	2.54
0.2	5.08
0.3	7.62
0.4	10.16
0.5	12.70
0.6	15.24
0.7	17.78
0.8	20.32
0.9	22.86
1	25.4
2	50.8
3	76.2
4	101.6
5	127.0
6	152.4
7	177.8
8	203.2
9	228.6
10	254.0
11	279.4
12	304.8
13	330.2
14	355.6
15	381.0
16	406.4
17	431.8
18	457.2
19	482.6
20	508.0
21	533.4
22	558.8
23	584.2
24	609.6
25	635.0
26	660.4
27	685.8
28	711.2
29	736.6
30	762.0
31	787.4
32	812.8
33	838.2
34	863.6
35	889.0
36	914.4