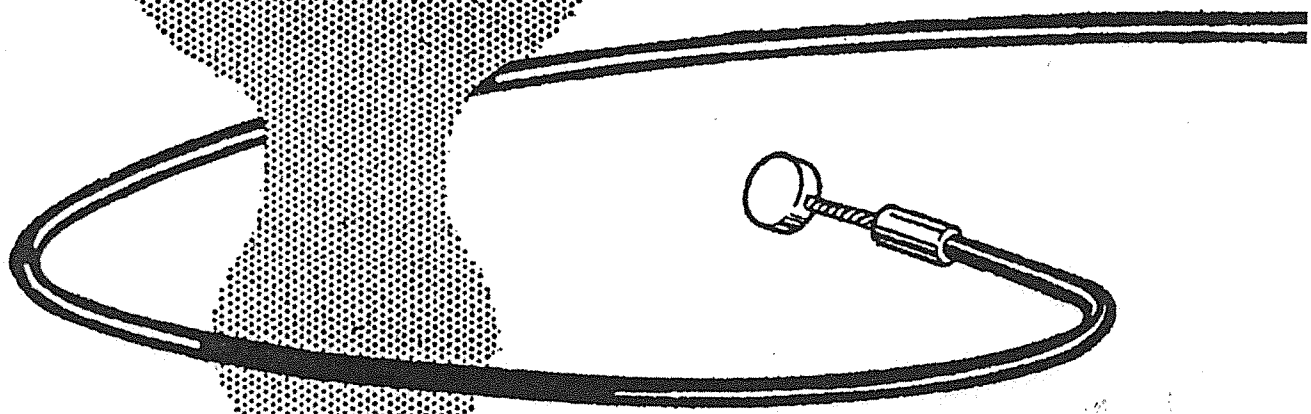
TRIUMPH



WORKSHOP INSTRUCTION MANUAL

FOR MODELS 1956 1962

SPEED TWIN
TIGER 100
TROPHY TR5
THUNDERBIRD
TIGER 110
TROPHY TR6
T120 BONNEVILLE

INSTRUCTION MANUAL No. 17

FOR

TRIUMPH

Motorcycles

THUNDERBIRD
TIGER 110
TROPHY TR6
BONNEVILLE 120
SPEED TWIN (5T)
TIGER 100
TROPHY TR5

FROM

Engine No. 0945
and D101 onwards

SEPTEMBER, 1956 Onwards

TRIUMPH ENGINEERING CO LTD
MERIDEN WORKS · ALLESLEY · COVENTRY · ENGLAND
TELEPHONE MERIDEN 331 TELEGRAMS "TRUSTY COVENTRY"

INTRODUCTION

This Maintenance Manual has been compiled to enable the owner to service his motorcycle and thoroughly to understand its mechanism. The book is written on a practical basis and no attempt has been made to introduce the theoretical side.

Although the book is comprehensive in its instruction regarding major overhauls, we strongly advise the uninitiated to entrust such work as the repair of engines, telescopic forks and gearboxes, to a recognised Triumph Dealer who will have the necessary facilities and special workshop tools available. Remember that the purchase of special tools can be very expensive when only required for limited use.

Each section of the book is headed by a general description. It is then followed by a complete account of the dismantling, inspection and re-assembly of units and final assembly. This has been compiled in the most simple form to obviate any difficulties on the part of the operator, who may be a newcomer to motorcycling or not fully conversant with repair procedure. Each chapter deals with a specific operation (i.e. Dismantling the Engine) which is then broken down into sub-paragraphs. The sequence in which they are broken down is the correct dismantling and assembly procedure. To avoid confusing the operator during this procedure, the sub-assemblies (i.e. Cylinder Head or Crankshaft Assembly) are dealt with as separate units under the heading "Dismantling, Preparation and Assembly of Units".

The book is well illustrated with exploded and assembled illustrations of the main units, which will give the operator a comprehensive view of the internal parts before commencing an operation and will also assist during assembly.

Finally, remember that if the essential adjustments are neglected and only casual attention is paid to the lubrication and periodical maintenance, reliability will be affected and in time the servicing costs will be very high.

If additional information is required, please consult a Triumph Distributor or Dealer who will always be pleased to assist. Should any difficulty then arise, write to the Triumph Service Department **quoting the model and full engine number.** The latter is stamped on the left hand crankcase just below the cylinder base flange as shown in the example below.

EXAMPLE — 6T-019727

PROPRIETARY FITTINGS

Ancillary equipment which is fitted to our motorcycles is of the highest quality and is guaranteed by the manufacturers and not by ourselves. Any repairs or claims should be sent to the actual maker, or one of their accredited agents who will always give owners every possible assistance. The following are the addresses of the various manufacturers.

Carburetters	Amal Ltd., Holdford Road, Witton, Birmingham, 6. S.U. Carburetter Co. Ltd., Wood Lane, Erdington, Birmingham, 24.
Chains	Renold Chains Ltd., Wythenshawe, Manchester.
Electrical Equipment	J. Lucas Ltd., Great Hampton Street, Birmingham, 18.
Rear Suspension	Girling Ltd., Birmingham Road, West Bromwich, Staffordshire.
Sparking Plugs	Champion Sparking Plugs Co. Ltd., Feltham, Middlesex. K.L.G. Sparking Plugs Ltd., Cricklewood Works, London, N.W.2. Lodge Plugs Ltd., Rugby, Warwickshire.
Speedometers	Smith's Industries Ltd., Cricklewood Works, London, N.W.2.
Tyres	Dunlop Rubber Company Ltd., Fort Dunlop, Birmingham, 24.

TRANSMISSION		
Gearbox—Type	Positive Selection (Foot operated)	
Speeds	Four	
Gear Ratios	Solo	Sidecar
4th—Top	4.67	5.12
3rd—Third	5.55	6.1
2nd—Second	7.88	8.65
1st—Bottom	11.4	12.5
R.P.M./10 m.p.h. Top Gear	625	685
CLUTCH		
Type	Langite in Oil	
SPROCKETS	Solo	Sidecar
Engine	22 teeth	20 teeth
Gearbox	18 teeth	18 teeth
Clutch	43 teeth	43 teeth
Rear Wheel	43 teeth	43 teeth
CHAIN		
Primary-Front-Pitch	$\frac{1}{2}'' \times .335'' \times \frac{5}{16}''$	
Links	70	
Secondary-Rear-Pitch	$\frac{5}{8}'' \times .400'' \times \frac{1}{8}''$	
Links	98 Solo	
CAPACITIES		
Fuel Tank	4 galls.	(18 litres)
Oil Tank	5 pints	(3 litres)
Gearbox	$\frac{2}{3}$ pint	(400 c.c.)
Primary Chaincase	$\frac{1}{4}$ pint	(150 c.c.)
Front Forks (each leg)	$\frac{1}{4}$ pint	(150 c.c.)
TYRE SIZES		
Front	3.25 × 18 in.	
Rear	3.50 × 18 In.	
SUSPENSION		
Front	Telescopic	
Rear	Swinging Fork	
BRAKES		
Type	Internal Expanding	
Front Diameter	8 in.	(20.32 cm.)
Rear Diameter	7 in.	(17.78 cm.)
OVERALL DIMENSIONS		
Seat Height	30 in.	(76.2 cm.)
Wheel Base	54.75 in.	(139 cm.)
Length	83.25 in.	(212 cm.)
Width	28.5 In.	(72 cm.)
Ground Clearance	5 in.	(12.7 cm.)
WEIGHT		
Unladen	392 lbs.	(177 kilos)

TRANSMISSION

Gearbox—Type	Positive Selection (Foot operated)	
Speeds	Four	
Gear Ratios:—	Solo	Sidecar
4th—Top	4.67	5.12
3rd—Third	5.55	6.1
2nd—Second	7.88	8.65
1st—Bottom	11.4	12.5
R.P.M./10 m.p.h. Top Gear	625	685

CLUTCH

Type	Langite in Oil

SPROCKETS

	Solo	Sidecar
Engine	22 teeth	20 teeth
Gearbox	18 teeth	18 teeth
Clutch	43 teeth	43 teeth
Rear Wheel	43 teeth	43 teeth

CHAIN

Primary-Front-Pitch	$\frac{1}{2}$" × .335" × $\frac{5}{16}$"
Links	70
Secondary-Rear-Pitch	$\frac{5}{8}$" × .400" × $\frac{3}{8}$"
Links	98 Solo

CAPACITIES

Fuel Tank	4 galls.	(18 litres)
Oil Tank	5 pints	(3 litres)
Gearbox	$\frac{3}{4}$ pint	(400 c.c.)
Primary Chaincase	$\frac{1}{4}$ pint	(150 c.c.)
Front Forks (each leg)	$\frac{1}{4}$ pint	(150 c.c.)

TYRE SIZES

Front	3.25 × 18 in.
Rear	3.50 × 18 in.

SUSPENSION

Front	Telescopic
Rear	Swinging Fork

BRAKES

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Rear Diameter	7 in. (17.78 cm.)

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Width	28.5 in.	(72 cm.)
Ground Clearance	5 in.	(12.7 cm.)

WEIGHT

Unladen	390 lbs.	(176 kilos)

TRANSMISSION

Gearbox—Type	Positive Selection (Foot operated)
Gear Ratios:—	
4th—Top	4.88
3rd—Third	5.81
2nd—Second	8.25
1st—Bottom	11.9
R.M.P./10 m.p.h. Top Gear	638

CLUTCH

Type	Langite in Oil

SPROCKETS

Engine	21 teeth
Gearbox	18 teeth
Clutch	43 teeth
Rear Wheel	43 teeth

CHAIN

Primary-Front-Pitch	$\frac{1}{2}$" × .335" × $\frac{5}{16}$"
Links	70
Secondary-Rear-Pitch	$\frac{5}{8}$" × .400" × $\frac{1}{8}$"
Links	98

CAPACITIES

Fuel Tank	3 galls. (13.5 litres)
Oil Tank	5 pints (3 litres)
Gearbox	$\frac{2}{3}$ pint (400 c.c.)
Primary Chaincase	$\frac{1}{4}$ pint (150 c.c.)
Front Forks (each leg)	$\frac{1}{4}$ pint (150 c.c.)

TYRE SIZES

Front	3.25 × 19 in.
Rear	4.00 × 18 in.

SUSPENSION

Front	Telescopic
Rear	Swinging Fork

BRAKES

Type	Internal Expanding
Front Diameter	8 in. (20.32 cm.)
Rear Diameter	7 in. (17.78 cm.)

OVERALL DIMENSIONS

Seat Height	30.5 in. (77.5 cm.)
Wheel Base	55.25 in. (140.3 cm.)
Length	86.25 in. (219 cm.)
Width	28.5 in. (72 cm.)
Ground Clearance	5 in. (12.7 cm.)

WEIGHT

Unladen	393 lbs. (178 kilos)

TRANSMISSION

Gearbox—Type	Positive Selection (Foot operated)
Speeds	Four
Gear Ratios:—	
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Engine	21 teeth
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Gearbox	$\frac{3}{4}$ pint (400 c.c.)
Primary Chaincase	$\frac{1}{4}$ pint (150 c.c.)
Front Forks (each leg)	$\frac{1}{4}$ pint (150 c.c.)

TYRE SIZES

Front	3.25 × 19 in.
Rear	4.00 × 18 in.

SUSPENSION

Front	Telescopic
Rear	Swinging Fork

BRAKES

Type	Internal Expanding
Front Diameter	8 in. (20.32 cm.)
Rear Diameter	7 in. (17.78 cm.)

OVERALL DIMENSIONS

Seat Height	30.5 in. (77.5 cm.)
Wheel Base	55.25 in. (140.3 cm.)
Length	86.25 in. (219 cm.)
Width	28.5 in. (72 cm.)
Ground Clearance	5 in. (12.7 cm.)

WEIGHT

Unladen	393 lbs. (178 kilos)

CONTROLS—INSTRUMENTS

The position and application of the controls is explained by assuming that the rider is sitting on the machine.

As the layout is not identical on all machines differences will be shown by inserting the model type after the caption.

Clutch Lever. On left side of handlebar. The clutch is also operated by the gearchange lever and before adjustment, see Gearbox Section, Page 71.

Front Brake Lever. On right side of handlebar. Always apply gentle pressure to the lever and use in conjunction with the rear brake.

Throttle Control. This is a twistgrip operated by the right hand. Twist towards the rider to open. There is a knurled knob which can be used to adjust the friction on the rotor to personal choice.

Magneto Control Lever (TR6). On left side of handlebar. Open the lever (clockwise) to retard the ignition.

Carburetter Air Control Lever (TR6). On right side of handlebar. Close the lever (anti-clockwise) to shut the air valve. On the 6T and T110 the air valve is controlled by a knob on the top of the carburetter. Press the knob down and twist to shut the air valve.

Horn Push and Dipper Switch. On left side of handlebar. Push the cap to sound the horn and operate the lever to raise or lower the headlamp beam.

Ignition Cut-Out Button. On left side of handlebar (TR6 and T120) or in centre of nacelle (T110). Depress to stop engine.

Speedometer. Registers speed, trip and total mileage. To return the trip indicator to zero, pull down and twist the knurled knob beneath the instrument. On the 6T and T110 the knob is carried on a flexible extension reached from the rear of the nacelle. Illumination of the speedometer is controlled by the main lighting switch.

Lighting Switch. On nacelle (T110) or on the frame beneath the nose of the twinseat (TR6 and T120). Turn the lever to operate.

OFF	ALL LIGHTS OFF
L	TAIL AND PARKING LIGHT ON
H	TAIL AND HEADLIGHT ON

Kickstarter. This is behind the right footrest. All models have the fixed pedal type with the exception of the TR6 ; this model has the folding pedal type.

ADJUSTMENT OF CONTROLS AND RIDING POSITION

When first taking over the machine, the rider should adjust the various controls to suit his own individual requirements.

Footrests. The left footrest is located by four pegs and the right footrest by two pegs. The footrests are non-adjustable and the securing nuts should be checked periodically for tightness.

Gear Change Lever. This is fitted to a serrated shaft. To re-position, slacken off the set-screw and ease the lever off the serrations. Replace in a convenient position and tighten up the set-screw.

Footbrake Pedal. The rear brake pedal is adjustable for position. The free movement is adjustable by the finned nut on the rear end of the operating rod.

Handlebars. Adjustment is made by slackening off the four "U" bolts, nuts and turning the handlebar to the desired position. The TR6 & T120 handlebar is clipped to the top lug by four set-screws and by releasing these the handlebar can be adjusted in a similar manner. Ensure that either set-screws or nuts are securely tightened to avoid handlebar slip.

Control Levers. If the clamping screws which secure the lever assemblies to the handlebar are slackened, the control can be moved to suit the rider's preference.

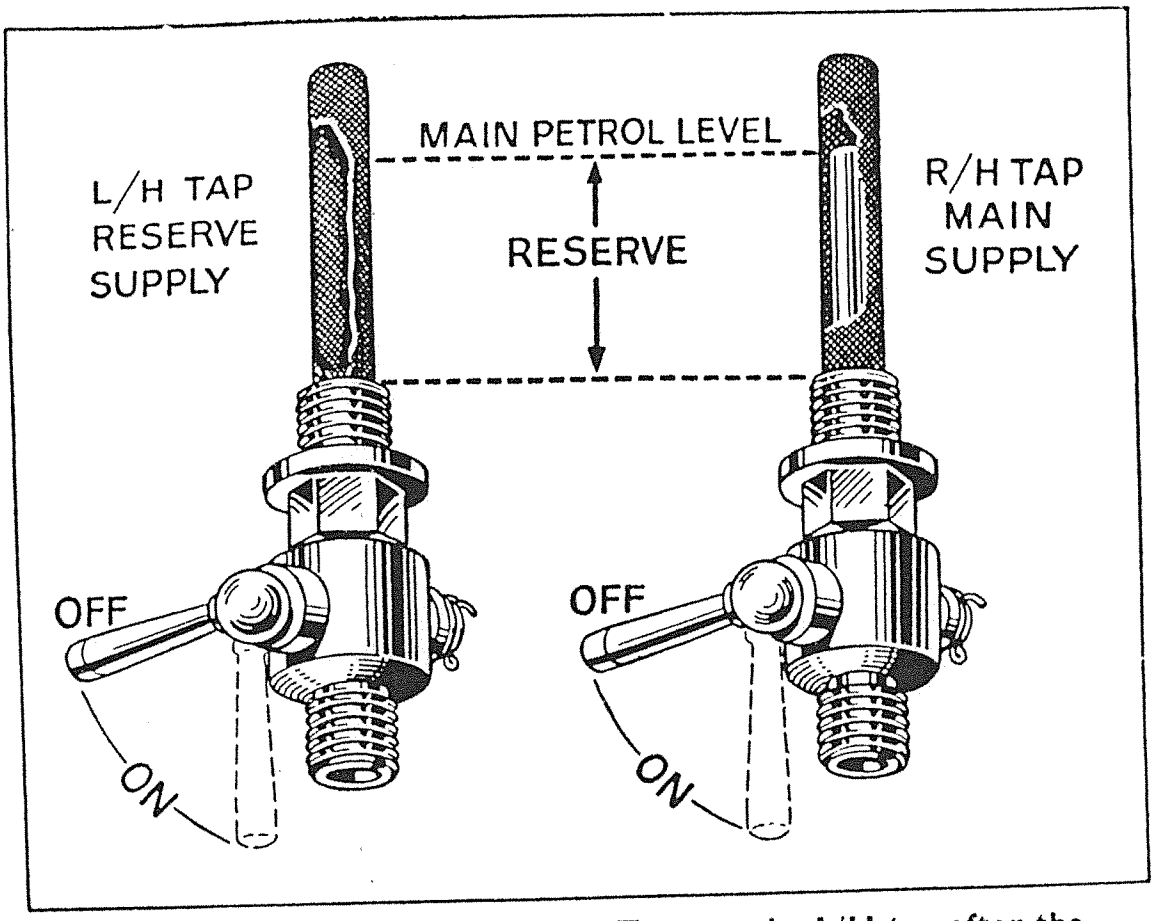
Twinseat. This cannot be adjusted for height, but has been designed to suit the average rider.

When placing a machine with Swinging Arm rear springing on the prop stand, pull the rear of the machine upwards. If this is not done the rear suspension units will eventually extend against the damping and the movement may cause the machine to fall over.

CONTROL CABLES

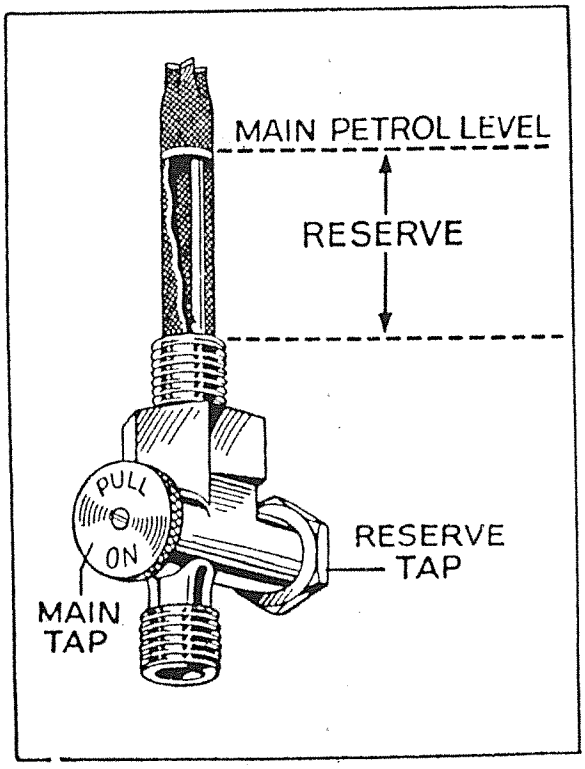
ADJUSTMENT POSITIONS

Throttle Cable. The adjuster is located in the cable, approximately 12" from the twistgrip, except on earlier 6T models where the adjustment is made on the right side of the S.U. carburetter. For Bonneville 120 adjustment, see page 142.



Fitted to Models TR6 and T110—Turn on the L/H tap after the supply from the R/H tap is exhausted.

NOTE.—The Bonneville 120 has no reserve and both taps should always be used.



Fitted to 6T—Pull out the hexagon headed plunger for reserve supply. The main tap plunger MUST be left in ON position.

Fig. 2. PETROL TAP POSITIONS.

On the left side of the carburetter is the jet lever and to increase the mixture strength for a COLD start raise the lever. No predetermined position can be stated owing to the different starting characteristics of the various engines, but the rider will soon find the most suitable lever position. The lever should be put in the lowest position when the engine is warm.

Turn the engine over by the kickstarter until compression can be felt on one cylinder. Re-position the kickstarter pedal to almost the horizontal position by freeing the clutch.

Switch on the ignition by turning the key in the centre of the lighting switch to the position "IGN", open the throttle about $\frac{1}{8}$ turn and then depress the kickstarter pedal smartly when the engine should fire immediately, if not, re-position the throttle and jet lever.

Failure to start the engine after the controls have been re-set may be due to a flat battery ; in this case turn the ignition key to "EMG" which is the emergency start position. Depress the kickstarter when the engine will fire. Once the engine is running the ignition key MUST be returned to the "IGN" position as the engine should not be run longer than is absolutely necessary in the "EMG" position. (For special running conditions on the "EMG" circuit see page 157).

When the engine starts, close the twistgrip to a brisk tickover. While the engine is COLD the jet lever should be raised sufficiently to keep the engine running fast and evenly and should remain in that position until it is warm enough to run with the lever fully depressed. It will be noted that the lever is friction loaded and can, therefore, be set in any position for any length of time according to climatic conditions. For this reason, no specific time for the RICH running condition can be stated.

Always turn the petrol taps "OFF" when parking the machine.

RUNNING-IN

For many years, motorcyclists were advised to ride their new machines at a speed not in excess of 30 m.p.h. for the first thousand miles. With a modern machine of high, or comparatively high performance, this type of running-in is entirely useless, and at the end of the one thousand miles only very little improvement will have been effected in the bearing surfaces of the engine.

Running-in should be carried out progressively, and it is necessary for the rider to make what may be termed a very definite arrangement with himself before he starts riding the new machine. He should make up his mind never to be bustled during the running-in period and to ride at his own speed entirely irrespective of the speed of other traffic. It is, naturally, annoying when one owns a high performance machine

ENGINE LUBRICATION SYSTEM

The dry sump lubrication system is employed on all Triumph engines. The oil is fed by gravity from the oil tank via a filter and pipe to the pressure side of the oil pump. The pump is a double plunger type, fitted with two non-return valves. From this point the oil is forced through drilled passageways to the crankshaft, and from the big end the oil issues in the form of a fog to lubricate the pistons and the other internal engine parts.

The oil pressure is controlled by means of a release valve situated in the timing cover. This valve serves two purposes, first to release excessive oil pressure and secondly to indicate the pressure by visible means. The valve consists of a piston, main spring, secondary spring, oil seal and button indicator. When the engine is running the valve is forced back by oil pressure on the secondary spring, this being indicated by the button projecting through the cover nut. Excessive pressure will move the piston back still further on the main spring and allow oil to be by-passed through the release valve body to the crankcase, from there to be scavenged to the oil tank.

After lubricating the engine, oil falls to the bottom of the crankcase where it is filtered. The crankcase oil return pipe which can be seen protruding through the filter after the sump plate has been removed, then returns the oil to the suction side of the oil pump to be returned to the oil tank. The suction oil pump plunger has twice the capacity of the pressure side, in order to make certain that no surplus oil remains on the floor of the crankcase. To lubricate the valve rockers, oil is taken from the return scavenge pipe by tapping the supply just below the oil tank. The oil, after being forced through the rocker spindles, lubricates the valve stems and push rod cups. The oil drains from the valve wells in the cylinder head into the push rod cover tubes, where it then lubricates the tappets and finally drains into the sump.

LUBRICATION MAINTENANCE

ENGINE

The system employed is simple and will function over a long period of time without attention to the actual pumping mechanism. On the other hand, failure to observe the elementary precautions of changing the oil and cleaning the filters at regular intervals, may cause a complete breakdown due to foreign matter entering the system.

If the oil tank cap is removed after the engine has been started, it will be noted that the return of oil to the tank via the stack pipe (seen just inside the filler aperture) is intermittent. The reason for this is that the scavenge side of the oil pump has a greater capacity than the feed side. Therefore, the crankcase sump is kept free of oil under normal running conditions and the scavenge pump will draw air until the crankcase scavenge pipe is again submerged in oil. The air which is forced into the oil tank is vented out via an outlet pipe into the primary chaincase.

In the event of a lubrication fault, the following causes have been listed to assist in diagnosing trouble:—

OIL TANK

The level in the oil tank should be 1½ in. (4 cm.) below the filler cap. Further addition of oil will cause excessive venting into the primary chaincase due to lack of air space. Always ensure that the vent pipe is clear as any obstruction will cause a back pressure in the oil tank, which in turn will prevent adequate scavenging by the oil pump, resulting in an oil flooded crankcase.

OIL PUMP

The only part likely to show wear after a considerable mileage is the oil pump block which can be replaced very cheaply. The plungers and the pump body being constantly immersed in oil, wear is negligible. It is unnecessary therefore, to suspect these parts if the lubrication is at fault. Should the non-return valve balls not be seating properly, the pump will not function satisfactorily. The remedy is to remove the oil pump and unscrew the two plugs situated under the oil pump body to remove the balls and springs. All parts should then be washed in petrol to remove any foreign matter, and when replacing the balls they should be given a sharp tap onto their seatings before re-assembly. Prime the pump with oil before fitting.

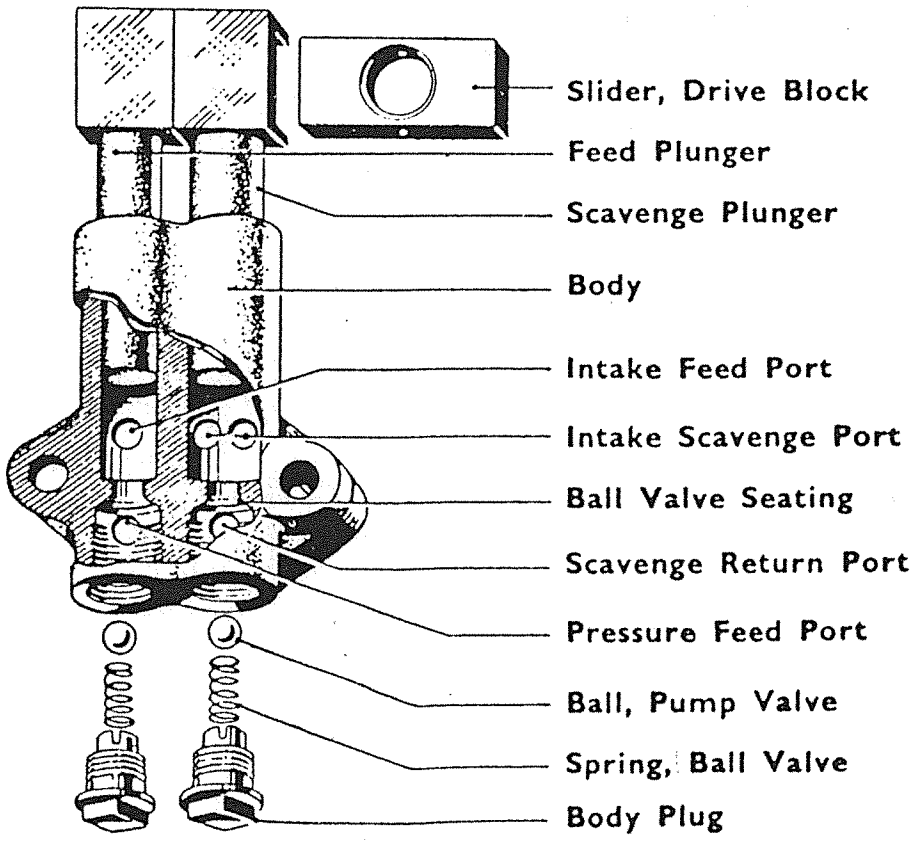


Fig. 4. OIL PUMP.

pipe banjos to the rocker spindles, when a steady drip of oil should emerge. It is advantageous to flood the rocker mechanism if the machine has been "laid up" for an appreciable time, or even after de-carbonising, etc. To do this, start the engine and then remove the oil tank filler cap, when a finger can be placed over the scavenge outlet pipe, thus forcing the oil through the rocker spindles, rockers and to the push rods. NOTE:—Always use the correct grade of oil as recommended on page 180. Cheap, inferior or the incorrect grade of oil will shorten the life of the engine.

GEARBOX

The gearbox is lubricated by oil and under no circumstances should a heavy viscous oil or grease be employed. Splash oil is fed to all parts including the enclosed gearchange and kickstarter mechanism to ensure complete lubrication. For oil changing and routine maintenance see page 28.

PRIMARY CHAINCASE

The primary chaincase houses the clutch, primary drive chain, engine sprocket and the alternator unit. Care should always be taken to ensure that the correct oil level is maintained ; the lubricant qualities are not reduced by condensation if the correct grade oil (SAE 20) is employed. Failure to observe these elementary instructions may result in a burnt out clutch, chain failure, and possibly damage to the alternator unit. If an oil of a higher viscosity than SAE 20 is used, the clutch plates will be difficult to separate, thus causing extremely noisy gear changing. For oil changing and routine maintenance see page 28.

CYCLE PARTS

The steering head races and wheel bearings are packed with grease on assembly. They should be dismantled and repacked with the correct grade of grease every 10,000 miles (15,000 kms.). The swinging fork pivot should be lubricated with a high-pressure grease gun every 1,500 miles (2,500 kms.) until grease is forced from each end of the pivot bearing. The front and rear brake cam spindles also should be given one shot at the above intervals.

CHAINS

The front chain is enclosed and positively lubricated (See Primary Chaincase, page 28). The rear chain however is lubricated by controlled oil splash from the primary chaincase. The method used is an oil trough in the rear of the inner chaincase and a hole drilled to atmosphere. In the outer cover a corresponding hole is drilled and tapped, into which a tapered needle valve is screwed, the taper entering the hole in the inner cover. By screwing the valve in or out the oil supply to the rear chain is decreased or increased accordingly.

CONTROLS

The control cables require lubricating at intervals, as, if they become dry, stiffness in operation will result. A good plan is to remove the cable at the handlebar end, wrap a piece of brown paper around the top end of the casing to form a funnel, securing it in position by a rubber band. If thin machine oil is then fed into the funnel and allowed to remain overnight, it will trickle down the casing and lubricate the inner wire.

ROUTINE MAINTENANCE AFTER RUNNING-IN PERIOD

	APPROXIMATE MAINTENANCE PERIODS		PAGE No.
	Miles.	*Kilometres.*	
ENGINE			
Check oil and replenish if necessary	250	400	25
Drain oil tank when warm and re-fill ...	1,500	2,500	28
Clean oil filters	1,500	2,500	28
Check and adjust tappets	3,000-4,000	5,000-6,000	34
Clean and adjust sparking plugs	2,000-3,000	4,000-5,000	172
Decarbonise and top overhaul	10,000-12,000	15,000-18,000	35
GEARBOX			
Check oil and replenish	1,000	1,500	83
Drain oil (when warm) and re-fill	5,000	6,000	83
Check clamp bolts	1,000	1,500	92
PRIMARY CHAINCASE			
Drain oil and re-fill (if the mileage is not covered, change monthly)	1,000	1,500	28
Check cover security screws	1,000	1,500	91
FORKS			
Drain oil and re-fill	5,000	8,000	96
Renew bushes, bearings and oil seals	20,000	30,000	100
Check play in headraces	5,000	8,000	96
Re-pack headraces with grease	10,000	15,000	96
SWINGING FORK			
Apply grease with gun	1,500	2,500	134
WHEELS			
Re-pack with grease	10,000	15,000	115
Check wheel bearings	2,000-3,000	4,000-5,000	115

See pages 180 and 181 for recommended lubricants.

THE ENGINE

CRANKCASE

The crankcase is cast in two halves from aluminium alloy and is designed to provide maximum rigidity. The crankshaft is supported by two heavy duty ball bearings one in either crankcase half. The camshafts are housed transversely in the upper part of the crankcase and they operate in phosphor bronze bushes. The camshaft fitted to operate the inlet push rods is so designed that crankcase pressure is released to atmosphere through a rotary disc valve. Located in the timing side crankcase are the timing gears and the oil pump.

FLYWHEEL AND CRANKSHAFT

The balanced two throw crankshaft and flywheel are bolted together to make a complete unit. The "H" section connecting rods are forged from RR56 Hiduminium alloy and the bottom caps are steel stampings, the two parts being bolted together with two high-tensile bolts. Insert bearing shells are fitted, and are also available in .010 in. and .020 in. undersizes.

CYLINDER BLOCK

The cylinder block is made from high grade cast-iron. The bottom flange locates and retains the fixed tappet guide blocks.

PISTONS

The pistons are die-cast "LO-EX" aluminium alloy, each fitted with two compression and one scraper ring. The gudgeon pins are a tight push fit in the pistons and are held in position by spring steel circlips.

CYLINDER HEAD

The cylinder head houses the inlet and exhaust valves. Two separate rocker boxes complete with the rockers are bolted to the head to operate the valves. The heads are made from either cast-iron or die-cast aluminium alloy. The latter have cast-iron valve seats cast into the head during the manufacture.

LUBRICATION

Dry sump lubrication is employed. The system is operated by a twin plunger reciprocating oil pump. See page 23 for further information.

CARBURATION

Either by Amal or S.U. carburetter.

IGNITION

Either by Lucas magneto or Lucas alternator.

INDEX TO FIG. 6 CRANKCASE ASSEMBLY 6T

Index No.	Description.
1	Block, cylinder.
2	Washer, cylinder base.
3	Head, cylinder.
4	Gasket, cylinder head.
5	Bolt, short.
6	Bolt, medium.
7	Bolt, long.
8	Stud, inlet manifold.
9	Valve.
10	Guide, valve.
11	Spring, valve inner.
12	Spring, valve outer.
13	Collar, valve.
14	Cup, valve spring.
15	Cotter, valve split.
16	Crankcase.
17	Stud, cylinder base.
18	Stud, cylinder base (Dowel).
19	Nut, stud.
20	Nut, stud.
21	Dowel, cylinder base stud.
22	Stud, magneto to crankcase.
23	Nut, stud.
24	Stud, oil junction block.
25	Nut, stud.
26	Dowel, oil junction block.
27	Dowel, timing cover.
28	Stud, oil pump.
29	Nut, stud.
30	Filter, oil.
31	Washer, filter cover joint.
32	Cover, filter.
33	Stud, filter cover.
34	Nut, stud.
35	Body, oil pump.
36	Plunger, oil pump feed.
37	Plunger, oil pump scavenge.
38	Block, oil pump slider.
39	Ball, oil pump valve.
40	Spring, oil pump valve.
41	Plug, oil pump.
42	Washer, oil pump.
43	Body, oil release valve.
44	Piston, valve.
45	Cap, release valve.
46	Washer, body.
47	Washer, cap.
48	Spring, main.
49	Shaft, indicator.
50	Tube, rubber.
51	Spring, auxiliary.
52	Nut, shaft.
53	Cover, timing.
54	Plug, timing cover.
55	Screw, short.
56	Screw, long.
57	Spindle, intermediate wheel.
58	Tappet.
59	Block, guide.
60	Screw, lock.
61	Rod, push.
62	Tube, cover.
63	Washer, lower.
64	Washer, upper.
65	Box, inlet rocker.
66	Box, exhaust rocker.
67	Gasket, rocker box.
68	Stud, rocker box.
69	Nut, stud.
70	Cap, inspection.
71	Washer, cap.
72	Bolt, rocker box.
73	Rocker, valve R.H.
74	Rocker, valve L.H.
75	Ball pin, rocker.
76	Adjusting pin.
77	Locknut.
78	Washer, thrust.
79	Washer, thrust.
80	Washer, spring.
81	Spindle, rocker.
82	Seal, spindle.
83	Nut, dome.
84	Pipes and block, oil tank to engine.
85	Washer, oil pipe block
86	Connection, oil pipe (rubber)
87	Connection, oil pipe (rubber)
88	Exhaust adaptor.

INDEX TO FIG. 7 CRANKSHAFT ASSEMBLY 6T

Index No.	Description.
1	Piston.
2	Ring, top compression.
3	Ring, centre compression.
4	Ring, scraper.
5	Gudgeon pin.
6	Circlip.
7	Flywheel.
8	Crankshaft.
9	Bolt.
10	Rod, connecting.
11	Bush, small end.
12	Bolt, rod to cap.
13	Nut, rod to cap.
14	Bearing, T/S.
15	Bearing, D/S.
18	Clamping washer.
19	Bush, camshaft, T/S.
20	Bush, camshaft, D/S.
21	Bush, camshaft D/S (Breather).
22	Pinion, timing.
23	Key, timing pinion.
24	Nut, timing pinion.
25	Camshaft.
26	Wheel, camshaft.
27	Key, camshaft wheel.
28	Nut, exhaust camshaft.
29	Nut, inlet camshaft (pump drive).
30	Wheel, intermediate gear.
31	Bush, intermediate wheel.
32	Pinion, distributor.
33	Pin, distributor pinion.
34	Circlip, distributor pinion.
35	Washer (Brass).
36	Valve, crankcase rotary.
37	Disc, rotary valve.
38	Spring, rotary valve.
39	Sprocket, engine.
40	Key, rotor.
41	Nut, sprocket and rotor.
42	Clamping washer.
43	Rotor.
44	Washer, locking.
45	Oil seal.

Rocker Adjuster Pin. Slacken off the adjuster pin locknut and screw down the adjuster until it just contacts the valve tip. For remaining details on model 6T read (a) and (b) and for TR6, T110 & T120 read (a) and (c).

(a) When the adjuster contacts the valve tip, hold the adjuster firmly with the spanner and tighten up the locknut with the other spanner. Grip the rocker adjuster between thumb and forefinger and move the rocker sideways to test for freedom of movement. Now test the up and down movement where the clearance between the adjuster and valve tip should be just perceptible.

(b) In order to obtain the 0.010" (0.25 mm.) clearance, first take particular note of the squared end of the adjuster and with both spanners in position, slacken the locknut slightly, taking care not to move the adjuster whilst doing so. Now slacken off the adjuster ONE FLAT ($\frac{1}{4}$ turn) and, maintaining it in the new position, re-tighten the locknut.
Carry out the same procedure with each tappet.

(c) The clearance on the exhaust valve can be estimated by first adjusting the tappet as in (a), paragraph (one). To obtain the 0.004" (0.10 mm.) clearance, slacken back the adjuster HALF A FLAT ($\frac{1}{8}$ turn). This may be slightly in excess of the clearance figure but the error is on the right side. For the inlet clearance, only slightly slacken off the adjuster so that when the rocker is held between thumb and forefinger and operated in an up and down movement, a distinct "click" can be heard when the adjuster strikes the valve tip.

DECARBONISING

The engine should be decarbonised only when it shows definite signs of requiring this attention. Falling off in power, loss of compression, noisy operation, and more difficult starting are all signs that the engine needs decarbonising. The engine will probably run at least ten thousand miles (15,000 kms.) between the decarbonising periods.

It should be noted that it is entirely unnecessary to remove the cylinder block when decarbonising the engine. We strongly recommend that this part is not taken off unless it is proposed to fit new piston rings or do some other work on the engine which necessitates the removal of the block. The engine will run more smoothly and give better service if the piston rings are left undisturbed.

Gasket sets are available for all models, and it is recommended that the correct set for the model is obtained before commencing the work.

Before commencing the operation, clean off any dirt, grease, etc., with paraffin or a suitable degreasing agent. Secondly obtain two boxes : one for the cylinder head, etc., and the other for nuts, washers, etc. By doing this the operator will not have to search the four corners of the garage for the vital nut to complete the job.

RE-ASSEMBLY

First anneal the head gasket and copper washers by heating to cherry redness and plunging into cold water.

Push Rod Covers. Place in position with new rubber washers. The locating discs must have the push rod holes across the machine.

Cylinder Head. Place the head on the block and screw the four outer bolts finger-tight.

Inlet Rocker Box. Stick the gaskets to the rocker boxes with a smear of grease and fit new push rod cover washers. Place the inlet push rods on the tappets and turn the engine with the kickstarter until both tappets have dropped as low as possible. Hold the box above the head and insert the torque stay bolts singly while tilting the box. Lower the rocker box into position, making sure that the rocker ends engage with the push rods and screw down the bolts. Insert the two short bolts and FINALLY THE THREE NUTS (6T TWO NUTS).

Rocker Drain Pipes (6T). Fit the adaptors with annealed copper washers and tighten carefully.

Exhaust Rocker Box. Fit this in the same way as the inlet rocker box.

Cylinder Head Bolts. Tighten the cylinder head bolts diagonally, starting with the central four. The correct torque loading is 18 ft./lbs. The short rocker box bolts and nuts should also be tightened. Turn the engine with the kickstarter and watch each valve as it opens to check that the push rods are correctly fitted.

Tappet Adjustment. Adjust the tappet clearances as detailed on page 34 and replace the rocker inspection caps.

Torque Stays. Replace the torque stays and tighten the fixings.

Carburetters. If the carburetter has been dismantled, complete the re-assembly and test the operation of the slide. On models with alloy cylinder heads fit a new paper washer and the insulating block. On all models fit a new "O" ring seal in the groove in the carburetter body. Replace the carburetter and tighten the nuts alternately. Check the operation of the carburetter slide again, and if sticking now occurs, suspect over-tightening of the nuts or distortion of the flange.

Rocker Feed Pipe. Replace the rocker feed pipe with new or annealed copper washers. If the banjos tend to turn, use a spanner on the flats to retain them.

Petrol Tank. Place the three small and one large rubber buffers in position and then fit the tank. Be careful that the tank does not trap the control cables or rocker feed pipe. Replace the rear cross bolt and tighten the front securing nut just sufficiently to hold the tank on the buffers. The strap must NOT be so tight that all movement is prevented. Connect the petrol pipes.

REMOVING THE ENGINE FROM THE FRAME

Petrol Tank. Turn off the petrol tap or taps and disconnect the petrol pipes. Slacken the nut which secures the front of the retaining strap and then remove the rear cross bolt. Lift off the tank and collect the three rubber buffers.

Exhaust System. Slacken the exhaust pipe finned clip bolts, remove the pipe to bracket bolts, the silencer steady nuts and silencer hanger bolts. Remove each pipe and silencer as an assembly. (TR.6. Also slacken the branch pipe clip bolt).

Torque Stays. Detach the torque stays by removing the two nuts and frame bolt. (T120, torque stay is a flat plate which supports the float chamber and plate, float chamber and pipes should be removed as an assembly).

Carburetter—Amal. Remove the air cleaner connection and unscrew the two flange nuts. Withdraw the carburetter from the fixing studs.

Rocker Feed Pipe. Unscrew the acorn nuts holding the pipe to the rocker feed pipe. If the banjos tend to turn, use a spanner on the flats to retain them. Ease the pipe off the spindles.

Control Cables. Disconnect the magneto cable at the handlebar end and coil it neatly close to the magneto.

Footrests. Remove both footrests leaving the fixing rod in position.

Brake Pedal. Take out the split-pin securing the rod to the pedal. Unscrew the pedal spindle nut and withdraw the pedal.

Primary Chaincase, Alternator, Engine Sprocket and Clutch. Remove these parts as described on page 84.

Oil Pipes. Place a tray under the engine and disconnect the oil pipes junction block from the crankcase.

Front Engine Plate. (6T & T110) First remove the cover plate which is secured by one screw. (All Models) Support the crankcase underneath the sump and remove the two studs and two bolts and lift off the front engine plate. Also remove the long crankcase to frame stud.

Rear Engine Plates. Remove the two upper studs holding the crankcase to the engine plates. Slacken the bottom stud and those holding the engine plates to the frame. Tilt the engine to the rear of the machine to release the bottom stud from the slots and then lift the engine out of the frame.

Oil Pump. Take off the two securing nuts and slide the pump off the studs.

Crankshaft and Camshaft Nuts. Remove these nuts. Note that the camshaft has a L.H. THREAD (turn clockwise to unscrew) and the crankshaft nut has a R.H. THREAD (turn anti-clockwise to unscrew).

Distributor Gear (Coil). Remove the circlip from the drive pinion boss groove, which retains the pin locking the drive gear on the shaft. Remove the pin when the gear and steel thrust washer can be withdrawn.

Magneto Gear. Unscrew the securing nut and screw into the gear centre the withdrawal tool (DA50/1) which is supplied with the tool kit. When the tool is in position, tighten the centre bolt when the gear will be withdrawn from the shaft.

Automatic Timing Device. To remove, unscrew the centre bolt which has a self-extracting thread.

Camwheels. If the bushes in the timing side crankcase are not worn, it is unnecessary to remove the camwheels as the crankcase can be split without detaching them. The removal of these gears necessitates the use of the special withdrawal tool Z89. Screw the body of the tool "C" on to the threaded portion of the camwheel (See Fig. 11), and by screwing the extractor bolt "A" in the camwheel is withdrawn from the shaft.

Intermediate Gear Wheel. Remove from the spindle.

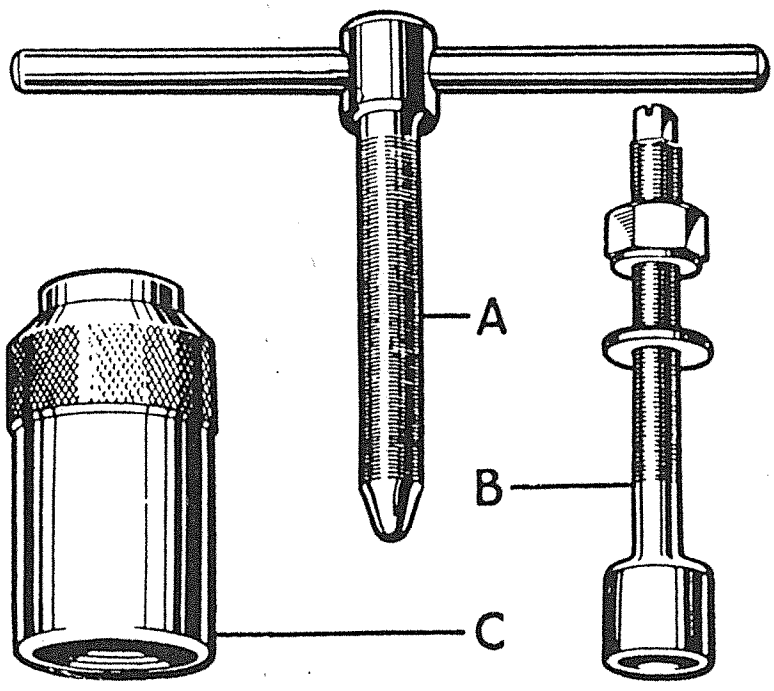


Fig. 10.

CAMWHEEL REMOVAL AND REPLACEMENT TOOL, Z89.

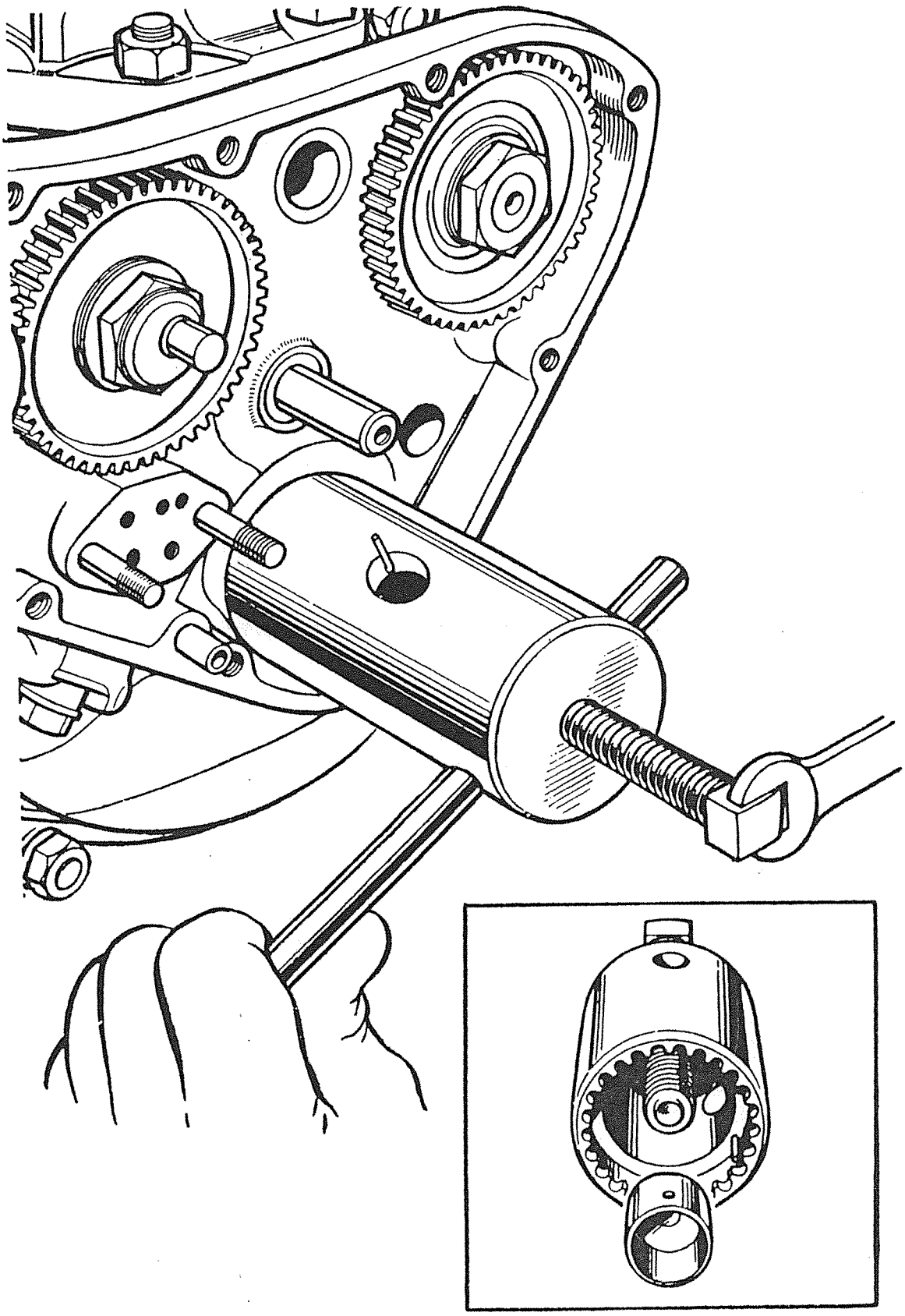


Fig. 12. REMOVING THE CRANKSHAFT PINION WITH TOOL Z121.

Clean the valves and remove any burnt oil from the stems ; if the valve faces are pitted they can be re-ground, but excessive grinding by machine is not advisable as the heat transference of the valve will be adversely affected. The stem of the valve should be inspected for wear and scuffing and if either is pronounced, it should be replaced.

Removing Carbon from Cylinder Head. Remove the carbon with a flat round headed scraper from the head spheres and ports. Take particular care when cleaning around the valve seatings to avoid damage to the faces. Inspect the valve seats for pitting or pocketing and the valve guides for ovality. Remember, if the valve guides are changed, the valve seatings must be re-cut. The same applies to a valve replacement or a valve which has had the seating face re-ground.

Replacing the Valve Guides. To remove the old guide place a shoulder drift into the guide from the inside of the combustion chamber and drive out. When fitting the new guide, grease the outer diameter and drive into the cylinder head from the top. Always use a shoulder drift when doing this operation and drive in the guide carefully to avoid damage.

Re-cutting the Valve Seats. A job such as this can normally be undertaken by your dealer at a moderate cost. After the seats have been re-cut, they should be blended to give an even seating of approximately $\frac{3}{32}$in. (2.38 mm.).

Grinding-in the Valves. This should be done with a fine carborundum grinding-in paste. First smear a little around the valve face and insert the stem into the new valve guide. Attach the valve grinding tool to the stem tip and commence to grind the valve face to the valve seating, using a semi-rotary movement, occasionally lifting the valve and turning through 180°. Continue this process until a uniform seat results. Remove the valve and wash thoroughly in petrol or paraffin and examine the seating. A surer method is to apply a thin even smear of "Engineer's marking blue" to the face of the valve. Rotate the valve one complete revolution and then remove it for inspection.

A thin uniform line, free from pit marks or other surface blemishes on valve face and valve seat indicates that the seating is satisfactory. After completion, the part must be thoroughly washed to remove all traces of the grinding-in compound.

Assembling the Cylinder Head. First ensure that all parts are thoroughly clean, then oil the valve stems and guides. Place a valve into its respective guide (Note, inlet are marked "IN" and exhaust "EX") and holding the valve head against the seat, turn the head on its side and fit the lower spring cup over the guide and then the inner and outer spring and finally the top collar. Compress the springs with a compressor tool until the split cotters can be fitted into the collar and around the valve stem cut-away. Release the pressure on the compressor tool and remove. Tap the stem head of the valve smartly to ensure correct replacement of the cotters. Repeat the operation to the other valves. The exhaust pipe stubs on the alloy heads are screwed into the exhaust ports and tightness must be ensured before replacing the cylinder head. Do not replace the rocker boxes at this stage.

RECOMMENDED REBORE OVERSIZES ARE AS FOLLOWS:—

Cast Iron Block	+.010"/+.020"/+.040"	500 c.c.
Cast Iron Block	+.010"/+.020"	650 c.c.
Alloy Block	+.010"/+.020"	500 c.c.

It will be noted that the alloy block can only be re-bored to a maximum of +.020", this is due to the fact that cylinder liners are fitted. Further re-boring would thin down the liner beyond safety limits. It is possible to change the liners, but work such as this should only be entrusted to a competent engineering concern, who will have the necessary equipment.

Tappets. The base of the tappets have a "Stellite" tip fitted ; this material has great resistance to wear and under general running conditions, the tappets will not require changing until a considerable mileage has been covered. The centre of the tip may show signs of indentation which is caused by the peak of the cam. This does not however indicate wear and the tappet can be re-installed.

Tappet Blocks. It is not necessary to remove the tappet blocks from the cylinder base for inspection ; the amount of wear can be estimated by rocking the tappet head. The tappet stem should be a sliding fit in the tappet block bores and the tappet base must fit snugly in the block base. Slackness at these points will cause excessive mechanical clatter. To remove the tappet blocks from the cylinder base flange, place the cylinder block downwards on the bench, remove the locking screw and drift the tappet block out of the cylinder flange. When fitting the new tappet block, grease the outer surface and if possible support the cylinder flange (See Fig. 13). Do not forget to line up the locking screw hole in the tappet block to that in the flange. Replace the locking screw.

Pistons. If the pistons are to be further employed, the rings and gudgeon pins when removed from each piston should be kept separate to ensure correct replacement. Carefully clean away the carbon deposit from the piston crown, taking particular care not to scratch the metal surface. The light deposit of burnt oil on the piston skirt should be removed by rubbing with a rag which has been dipped in petrol. Never in any circumstances use an emery cloth. To clean the ring grooves, it is advantageous to use an old broken ring by inserting the broken end into the groove and working it around the circumference. Clean out the oil drain holes in the scraper ring groove and thoroughly wash the piston. On the inside surface of the piston rings will be found a light deposit of carbon which must be removed if the rings are to be re-fitted.

Now roll each ring around its respective groove to ensure that it does not stand proud of the piston after being fitted correctly and compressed. Before fitting new rings, the gap must be checked in the lowest part of the cylinder bore. The ring must lie square to the bore for checking purposes and to ensure this, place the bottom of the piston skirt onto the ring and ease it down the bore. Check the gap with feeler gauges.

VALVE PUSH RODS AND COVER TUBES

Push Rods. Examine the end cups for chips around the edge, slackness on the tube and general wear inside the cups. For any of these faults, the push rods must be renewed. Bent push rods can cause undue noise and loss of power, so before replacing them to the engine, examine each one for straightness by rolling them on a true surface which could show up any irregularity.

Cover Tubes. If oil leakage is to be avoided after an overhaul, always ensure that the ends are tight on the tubes and in no way damaged.

CRANKCASE UNIT

Main Bearing. Press out the timing and driving side main bearings and oil seal. This can be more easily accomplished by warming the crankcase. Wash thoroughly and dry out with compressed air if possible as this will tend to remove any small particles of foreign matter. Spin the outer race to test the bearing for roughness and then inspect the balls and track for signs of indentation or pitting. Finally, test the end float which should be negligible in a good bearing. Replace if any fault is shown.

Crankcase. Wash the crankcase halves and inspect all stud fixings for security and the casting for cracks or damage. Remember, if one half of the crankcase is damaged, a complete new crankcase must be purchased as these are machined in pairs. The camshaft bushes normally show very little signs of wear until a considerable mileage has been covered. To make a rough check, fit the camshaft into the bearing and ascertain the up and down movement. If it is desirable that the bushes are changed, proceed as in the following paragraph.

Camshaft Bushes. To remove the bushes in the timing side half, heat (100°C approx.) the crankcase around the bush housing when the bushes can be easily pressed out. While the case is still warm, press in the new bushes, ensuring that the oil hole is lined up with the drillway in the housing. The removal of the drive side bushes is a little more difficult and it is necessary to cut a thread in the bushes with a tap before heating the crankcase. When this is done, re-insert the tap and hold the square end in the vice when the crankcase can be gently tapped away with a hide hammer leaving the bush attached to the tap. Located behind the rear bush is the breather valve porting disc. Before replacing the new bush, ensure that this disc is correctly positioned on the locating peg.

If the temperature of the crankcase half has dropped, re-heat and then press in the new bushes. The phosphor bronze bushes are machined to size before pressing in, and only the smallest amount of metal need be removed when reaming. To ensure accurate alignment, the two halves should be bolted together before reaming.

Scavenge Pipe. Check this pipe for security and ensure that a perfect oil seal is made where it enters the crankcase in the pump position. Failure at this point would reduce oil scavenge to the minimum.

Crankshaft and Connecting Rod Assembly. The dismantling, overhaul and assembly of this unit is a job that is normally undertaken by the dealer, or at the works. If the owner wishes to carry out this work, he must have a certain amount of mechanical ability and a good workshop.

Dismantling.
Remove the three radial bolts securing the flywheel and slide the flywheel off the shaft, inverting it to clear the crank webs. Remove the plug in the right hand end of the shaft and take out the sludge trap tube for cleaning.

Inspection and Identification. Wash all parts thoroughly and examine the bearing surfaces.

	New	
Crank big-end journal size	1.6235"	(4.1237 cm.)
	1.6240"	(4.1250 cm.)
Connecting rod big-end size	1.6250"	(4.1275 cm.)
	1.6255"	(4.1288 cm.)
Connecting rod small end	0.6885"	(1.7488 cm.)
	0.6890"	(1.7501 cm.)
Gudgeon pin size	0.6882"	(1.7480 cm.)
	0.6885"	(1.7488 cm.)
Connecting rod side float	0.0290"	(0.737 mm.)
	0.0320"	(0.813 mm.)

Light score marks on the crank big-end journals can be carefully eased down with smooth emery but after this operation the parts must be carefully washed again. If the cranks are scored, the connecting rod big-end shells will also be scored and must be changed. These bearings are completely prefinished and under no circumstances may the bearings be scraped or the connecting rod joint faces filed. If the damage is beyond repair, service re-ground cranks and big-end shells can be obtained from a dealer in the following UNDERSIZES:—

Cranks	—0.010"—0.020"
Connecting rod big-end shells	—0.010"—0.020"

The small end bush wear can be detected by inserting the gudgeon pin into the bush. If in good condition the pin should be a smooth working fit in the bush, no rock being in evidence. To replace the bush, press out the old one and at the same time insert the new. Ensure that the oilways are aligned. When reaming the bush, care must be taken to ensure that the bore is parallel with the big-end.

The final examination is the fit of the main bearings on the crank timing and driving shafts. The bearings should be a tight push fit ; a loose fitting bearing would tend to cause crankcase "rumble". Worn shafts may be built up with copper plating.

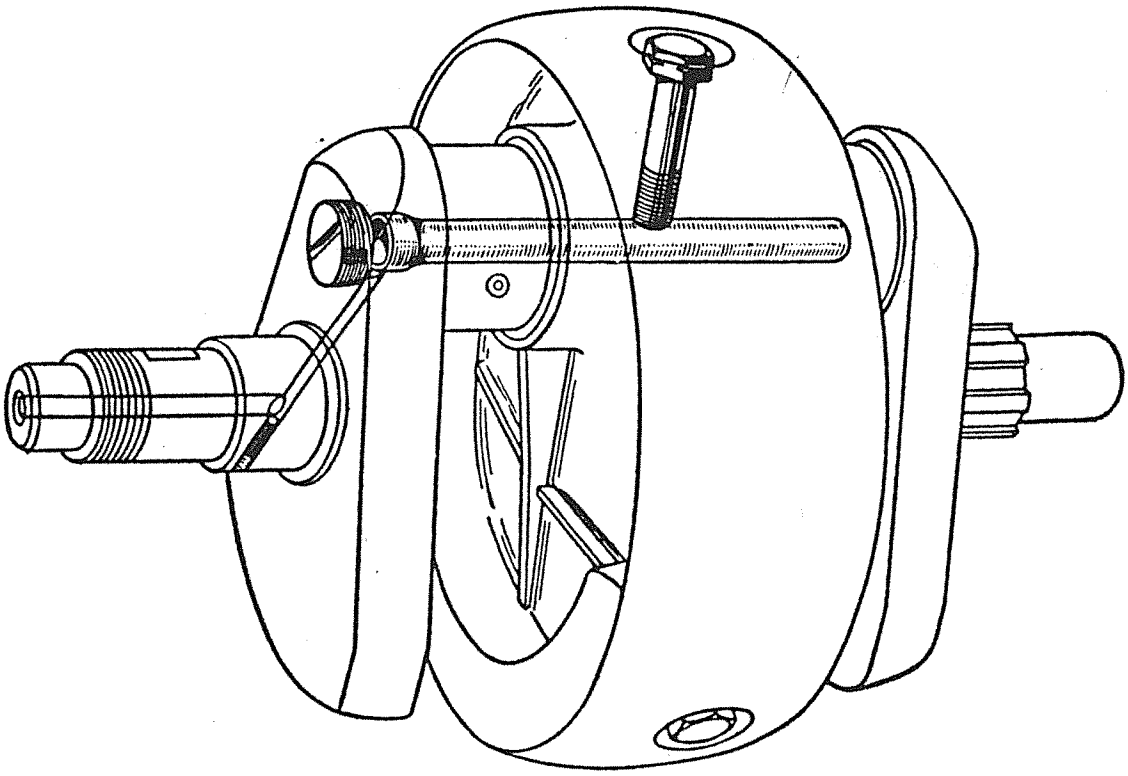


Fig. 15. ONE-PIECE CRANKSHAFT, SHOWING OIL TUBE.

CONNECTING ROD,
BOLT STRETCH
.004-.005 in.
(.102-.127 mm.)

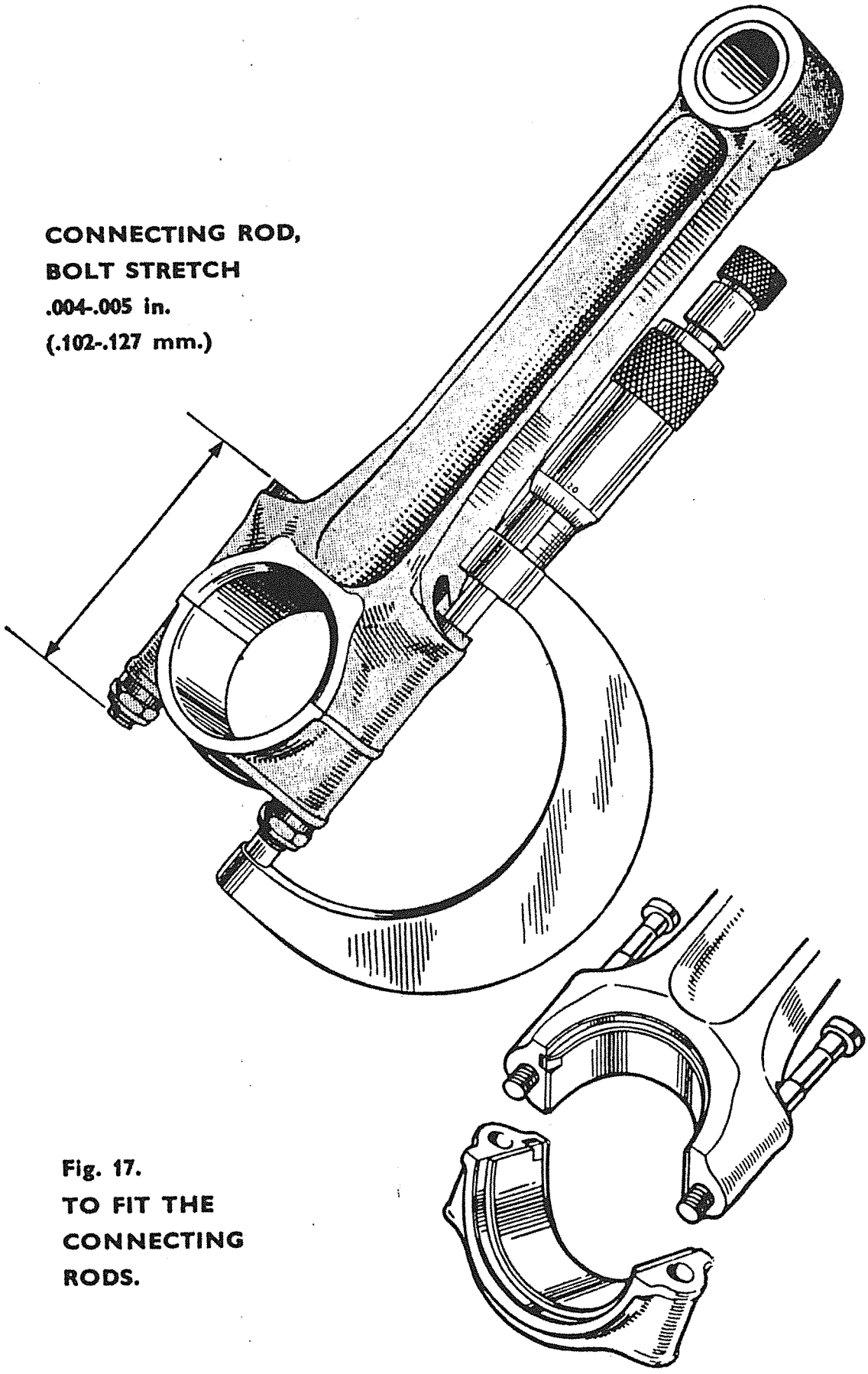


Fig. 17.
TO FIT THE CONNECTING RODS.

Crankshaft Pinion. Fit the plain washer and Woodruff key to the engine shaft and assemble the pinion (shoulder side to the engine) to the shaft. When the pinion is correctly positioned to the key it must be fully located by tapping it onto the shaft with a hollow punch. Do not fit the nut at this stage.

Camwheels. To fit these, special tool Z89, Fig. 10, must be employed. First assemble the keys to the camshafts, then screw on the centre tool (B). Slide the camwheel over the tool and engage the keyway onto the key. Screw onto the camwheel thread the outer tool (C), and onto (B), the left hand nut. Screw down the nut until it contacts the outer tool, then, to prevent the camshaft turning when the nut is screwed down, hold the end of the rod (B) with a suitable tool. When the camwheel is fully located remove the tool and then fit the opposite camwheel. Do not attempt to punch the camwheels onto the shafts, as the key will be brought into contact with the shaft bushes and may cause considerable damage.
If the operator cannot avail himself of the special tool, the camshafts and camwheels can be assembled before the two halves of the crankcase are fitted together. Fit the camshafts to the timing side crankshaft half and then support them, when the camwheels can be aligned to the keys and punched into position.

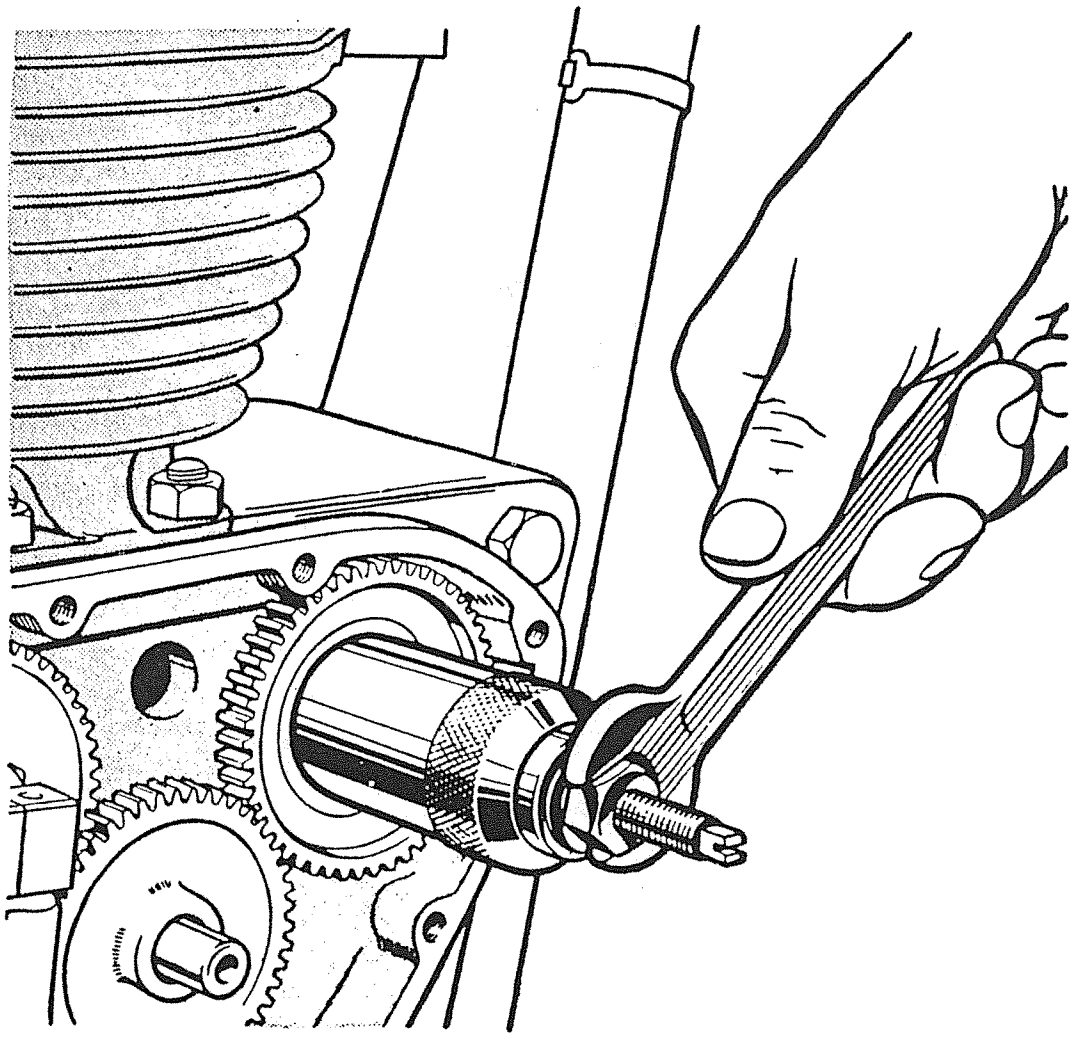


Fig. 18. REPLACING THE CAMWHEEL.

Valve Timing. Assemble the intermediate wheel in the position shown on page 58 for your particular model.

Pinion and Camwheel Nuts. Replace the pinion nut (R.H.), followed by the exhaust camshaft nut (L.H.), and finally the inlet camshaft nut (L.H.), which has the eccentric drive peg for the oil pump. Ensure that these nuts are well secured.

Oil Pump. Prime the pump with oil and fit to the crankcase with a new joint washer. Ensure that the washer is positioned correctly and not covering any oilways.

Magneto. Assemble the magneto to the crankcase and secure with the three nuts.

Magneto Driving Gear. Fit the gear to the magneto shaft and loosely screw on the nut.

Distributor. See Ignition Timing, page 67.

Pistons. If replacing the old pistons, they must be fitted to their appropriate connecting rods. Lubricate the small end bushes and fit the pistons to the rods. Carefully insert the gudgeon pins until they abut against the circlips already in the piston boss. Now fit the two remaining circlips and ensure that they are in grooves. If in doubt regarding the serviceability of the circlips, always fit new ones, the cost of

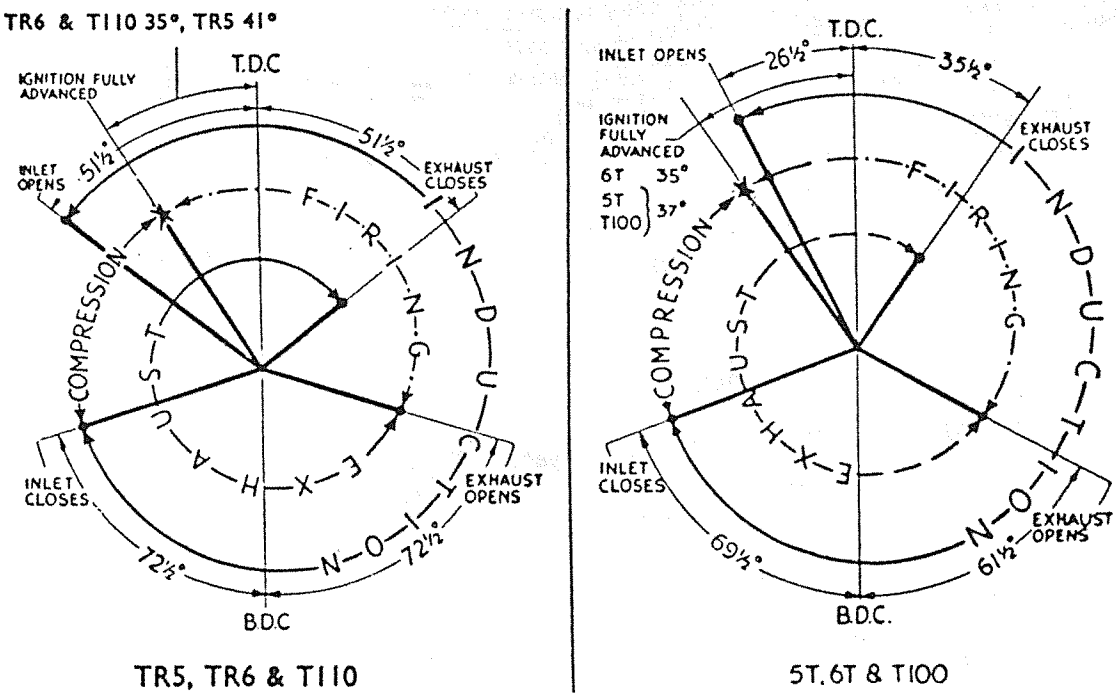


Fig. 20. TIMING DIAGRAMS.

See pages 6-13 and 176-179 for checking figures, including T120.

Ignition Timing. The timing of the engine can be carried out at this stage if desired. The information given on page 67 (Magneto) and page 68 (Coil) applies when the cylinder head is fitted. The marked timing stick should be discarded in favour of a depth gauge, by which means an accurate measurement can be made directly on top of the piston.

RE-ASSEMBLY

First anneal the head gasket and copper washers by heating to cherry redness and plunging into cold water.

Inlet Manifold. Assemble the inlet manifold to the cylinder head with the new joint washers. In the case of the cast-iron cylinder head, we recommend the use of jointing compound with the joint washers. The reason for this is that as the manifold and cylinder head are manufactured from dissimilar metals, a slight amount of "weave" takes place between them which may cause the washer to become dislodged.

Push Rod Covers. Place in position with the new rubber washers. The locating discs must have the push rod holes across the machine.

Cylinder Head. Place the head on the block and screw the four outer bolts finger tight.

Inlet Rocker Box. Stick the gaskets to the rocker boxes with a smear of grease and fit new push rod cover washers. Place the inlet push rods on the tappets and turn the engine with the kickstarter until both tappets have dropped as low as possible. Hold the box above the head and insert the torque stay bolts singly while tilting the box. Lower the rocker box into position, making sure that the rocker ends engage with the push rods and screw down the bolts. Insert the two short bolts and FINALLY THE THREE NUTS (6T TWO NUTS).

Rocker Drain Pipes (6T). Fit the adaptors with annealed copper washers and tighten carefully.

Exhaust Rocker Box. Fit this in the same way as the inlet rocker box.

Cylinder Head Bolts. Tighten the cylinder head bolts diagonally, starting with the central four. The correct torque loading is 18 ft. lbs. The short rocker box bolts and nuts should also be tightened. Turn the engine with the kickstarter and watch each valve as it opens to check that the push rods are correctly fitted.

Ignition Timing. If the timing has been left until this stage is reached, reference should be made to page 67 (Magneto) and page 68 (Coil).

Timing Cover. Smear the joint face with jointing compound and assemble the cover to the crankcase. Employ a well fitting screwdriver when tightening the screws.

Oil Release Valve Indicator. Fit the joint washer and screw the assembly into the timing cover.

Tappet Adjustment. Adjust as described on page 34 and replace the four inspection caps.

Exhaust System. Fit the exhaust pipes and silencers to the machine and connect up all fixings before finally tightening.

Petrol Tank. Place the three small and one large rubber buffers in position and then fit the tank. Be careful that the tank does not trap the control cables or rocker feed pipe. Replace the rear cross bolt and tighten the front securing nut just sufficiently to hold the tank on the buffers. The strap must NOT be so tight that all movement is prevented. Connect the petrol pipes.

Testing. Start the engine and immediately check that the oil pressure indicator button is protruding. If it is not starting to protrude, stop the engine at once and then proceed to investigate the cause. Run for a short while and if necessary adjust the slow running settings on the carburetter.

NOTE

When the motorcycle has covered the first 250 miles after its overhaul, it is wise to check all nuts and bolts to ensure that they have not become loose due to the engine "bedding down".

Fitting the Camwheel. First fit the intermediate wheel. It is now necessary to fit the camwheel to the shaft without disturbing it or the intermediate wheel. This is made possible by aligning one of the three keyways with the camshaft key and the teeth in line with the teeth on the intermediate wheel. When aligned, press on the camwheel (See Fig. 18), page 57.

Checking the Valve Closing. Turn the crankshaft backwards until the rocker adjuster clearance is nil, which should give the point of closing of the valve as 34 degrees after T.D.C.

It should be appreciated that due to tolerances in manufacture, wear, etc., it may not be possible to obtain the exact degree figures quoted. Points of opening and closing should be within 3 degrees either way, if the error is more, the camwheel must be extracted and one of the remaining two keyways tried. Do not forget to mark the keyway already tried with an indelible pencil to prevent it being accidentally tried again.

INLET CAMSHAFT TIMING

Repeat the exhaust procedure by fitting the inlet rocker box, timing side push rod and adjusting the clearance between rocker adjuster and valve to give 0.020in. (0.50 mm.).

Setting the Crankshaft. Turn the crankshaft backwards until the exhaust valve closes and the disc reading is 55 degrees after B.D.C.

Setting the Inlet Camshaft. Rotate the camshaft "ANTI-CLOCKWISE" until all play between the rocker adjuster pin and valve tip is taken up (valve closing).

Fitting the Camwheel. Assemble in the same manner as in the exhaust camshaft procedure.

Checking Valve Opening. Rotate the engine forward until there is no play between the rocker adjuster and valve tip when the point of opening should be approximately 34 degrees before T.D.C. (The exhaust valve is now open).

As a final check, the drive side cylinder push rods may be fitted and the timing of the drive side cylinder checked. If any discrepancy (up to 4 degrees) is found between the two cylinders, it should be equalised. To do this, it will be necessary to remove the camwheel and select another keyway. When the timing has been corrected, insert the new figures in the "Record Table" overleaf, thereby obviating this last operation for subsequent assemblies. Mark the camwheels to ensure correct re-assembly.

IGNITION TIMING (MAGNETO)

(Assuming that the magneto is in position and the timing cover is removed).

Magneto Wheel. Unscrew the securing nut and screw into the gear centre the withdrawal tool DA50/1 which is supplied with the toolkit. When the tool is in position, tighten the centre bolt and the gear will be withdrawn from the shaft. The automatic timing device is released by unscrewing the central bolt which has a self-extracting thread. Next, set the contact breaker points to .012 in. fully open.

Sparking Plugs. Remove both plugs.

Piston Positioning. Unscrew the rocker inspection caps. Engage TOP gear and then rotate the rear wheel in the correct direction for forward travel, watching the valve operation in the L.H. (DRIVE SIDE) cylinder. When the INLET valve closes, continue gently to rotate the rear wheel until the piston reaches the top of the stroke (This is known as "TOP DEAD CENTRE"—T.D.C.). The correct piston position can be felt with the timing stick by rocking the rear wheel to and fro. When the T.D.C. has been found, mark the lowest part of the timing stick which is visible at eye level and remove the stick ; make a further mark (the correct distance for the particular model, see pages 6-13) above the first mark. Now re-insert the timing stick into the cylinder and rotate the rear wheel backwards until the piston has fallen about 1 in. (2.5 cm.), then reverse the rotation and slowly bring the piston up to the desired mark on the timing stick. This procedure eliminates any error due to backlash in the timing gears.

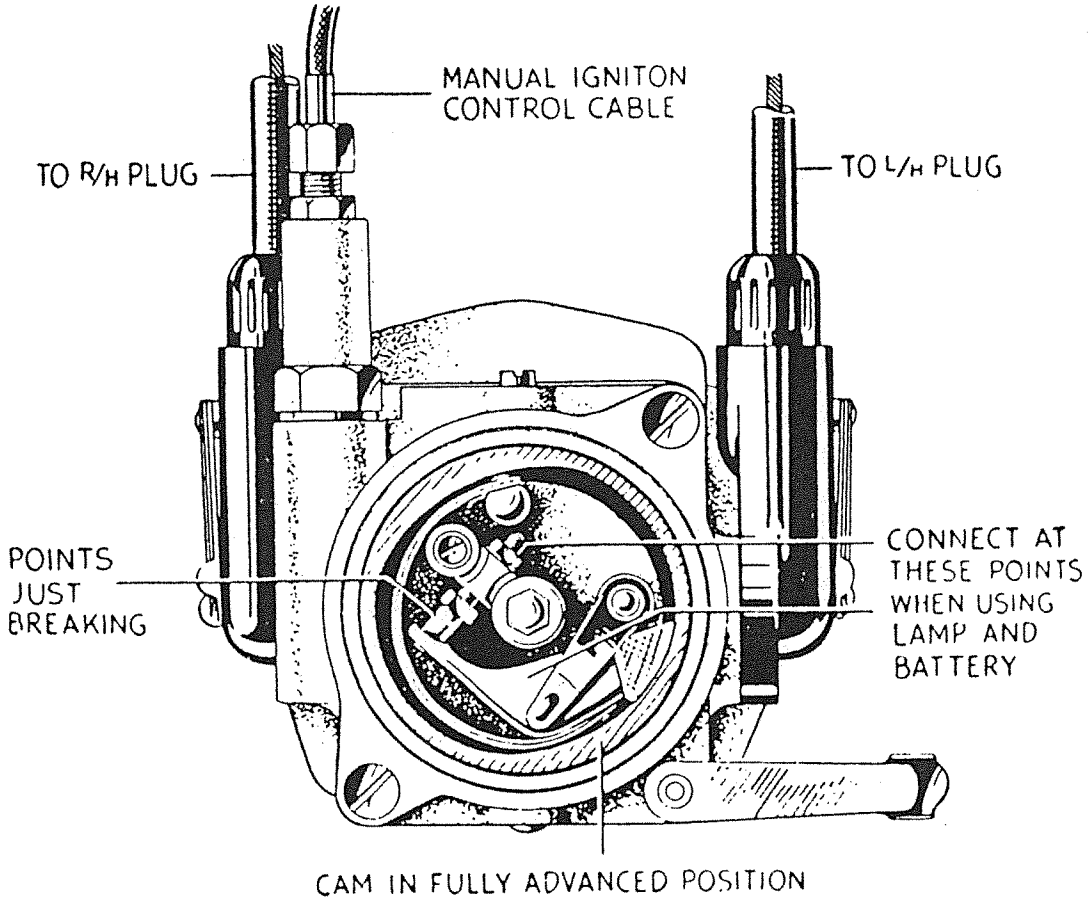


Fig. 22. MAGNETO IN TIMING POSITION.

lever clamping bolt in this position. If a long screwdriver is held against the slotted head of the clamping bolt from the underside of the engine, the nut can be tightened more easily. With R.H. cylinder (Timing Side) at T.D.C. on compression stroke (both valves closed) rotate the rotor arm clockwise until the contact breaker points are just beginning to open, when the rotor arm is pointing to the rear of the machine, Holding the rotor arm in this position, slide the thrust washer, followed by the drive pinion, onto the distributor shaft so that the hole in the pinion boss lines up with the hole in the distributor shaft. Mesh the pinion into the nearest position on the mating pinion and slide the locking pin through the wheel and shaft, retaining it in position by placing the circlip in the groove in the pinion boss. The distributor is now in the best position for final timing and adjustment of the contact breaker points.

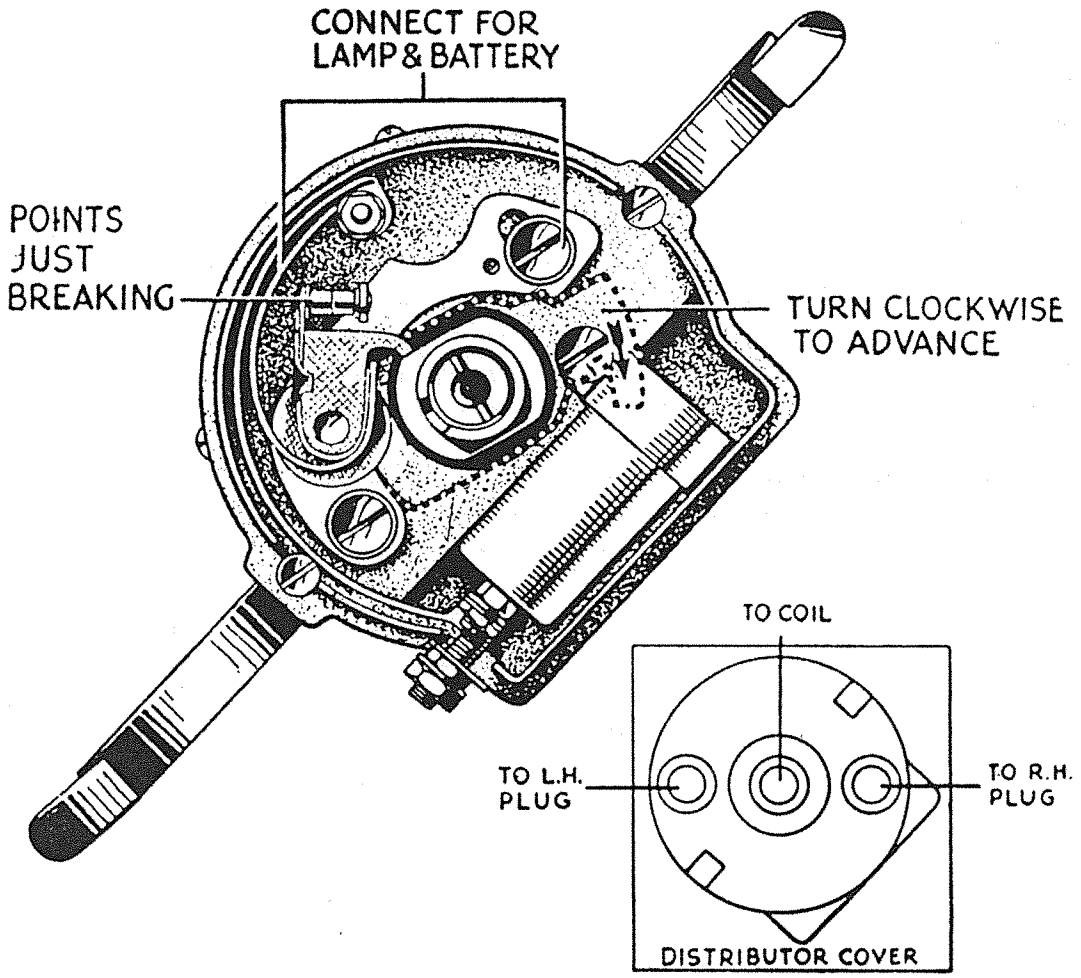


Fig. 23. DISTRIBUTOR IN TIMING POSITION.

GEARBOX WITH SLICKSHIFT

The gearbox employed has four speeds and is very robustly constructed. It will require very little attention, and, if its oil change intervals are strictly adhered to and the security of its clamping bolts occasionally checked, the life of the gearbox will be greatly prolonged.

For the rider who wishes to use his machine in one or more of the various competitions or for road racing, a set of gears can be made available to suit the particular conditions. To change from STANDARD to WIDE ratio, four gears are required, namely—mainshaft high, mainshaft second, layshaft high and layshaft second. The speedometer driven gears will also have to be changed to correct the speedometer to gearbox ratio. To fit CLOSE ratio gears a complete set is required and as no provision is made for the speedometer gears, a sealing plug is supplied. A tachometer driven off the cam gear is employed for the purpose of checking the engine revolutions when close ratio gears are fitted. On page 182 an "Engine Revolution" and "Gear Ratio" chart will be found which will assist the rider in choosing a suitable combination of gears.

Briefly, the gearbox operates in the following manner:

Gear selections are made by depressing or raising the pedal. The pedal is attached to the plunger quadrant which is spring loaded on either side of its axis. After the pedal has been operated, it will automatically return to the central position for the next selection. When the pedal is depressed the upper quadrant plunger moves under the guide plate, whereas the lower one, being released, connects with the gear operating quadrant which is geared to the camplate.

The camplate is rotated by the gear quadrant, the movement being arrested by a spring loaded plunger which is sprung into a notch in the camplate periphery. As the camplate rotates, the gear selector forks which are connected, move along their spindle and in turn shift the gears. Fig. 25 shows clearly all the working parts and before attempting to dismantle the gearbox, the illustration should be carefully studied.

The Slickshift gearchange mechanism automatically disengages the clutch when the gearchange pedal is operated. The principle of operation is illustrated in Fig. 24. A cam is connected to the pedal and whenever the pedal is operated either for an upward or downward gearchange, the cam contacts a roller attached to the clutch operating lever. The clutch lever is also connected by cable to a lever on the left handlebar and may be operated in the normal manner if desired. It is recommended that the Slickshift is used for gearchanging on the move and the handlebar lever used to make standing starts. It is suggested that the rider acquaints himself with the following paragraphs before using the Slickshift on the machine, as a few moments' study of the principles involved will be amply repaid. The Bonneville 120 is not fitted with Slickshift, although the gearbox is similar externally.

To Move Off. To secure a clean engagement of bottom gear, it is necessary that the controls should be adjusted so that the machine idles slowly and reliably. On models equipped with manual ignition control, the lever should be retarded for ⅜ to ½ of its travel. The handlebar lever gives a larger movement at the clutch than the foot pedal and should be used for selecting bottom gear and moving off.

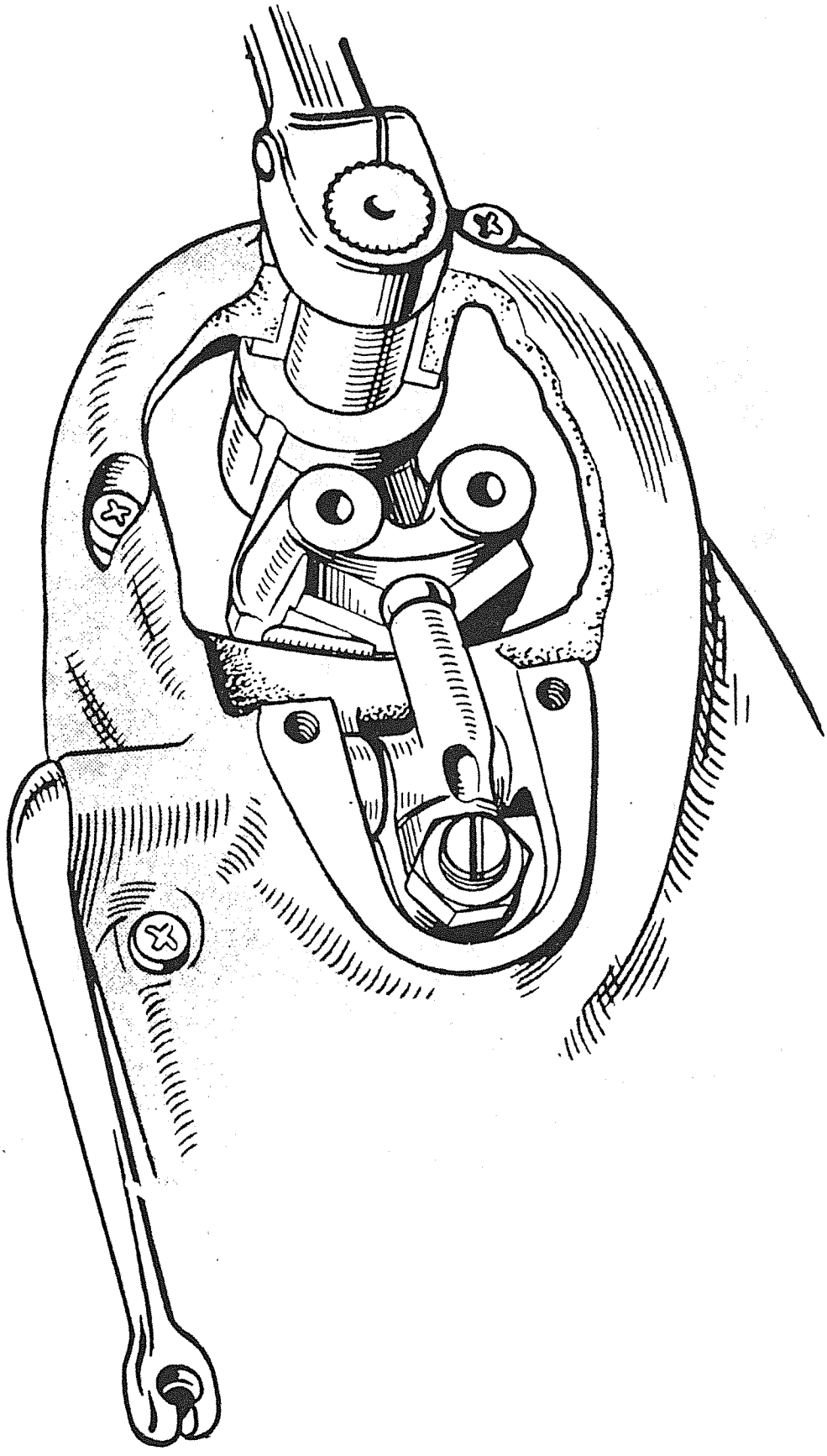


Fig. 24. SLICKSHIFT GEARCHANGE MECHANISM.

INDEX TO FIG. 25. GEARBOX (COMPONENT PARTS).

Index No.	Description.
1	Casing.
2	Dowel.
3	Stud.
4	Nut.
5	Washer.
6	Cover, outer.
7	Cover, inner.
8	Stud.
9	Nut.
10	Washer.
11	Stop, kickstarter.
12	Cover, inspection.
13	Joint washer.
14	Plug, level and drain.
15	Washer.
16	Mainshaft.
17	Bush.
18	Key.
19	High gear.
20	Bush.
21	Third gear.
22	Second gear.
23	Layshaft.
24	Third gear.
25	Second gear.
26	Bottom gear.
27	Bush.
28	Bearing.
29	Oil seal.
30	Circlip.
31	Bearing.
32	Circlip.
33	Bush, layshaft.
34	Peg.
35	Blanking disc.
36	Bush, camplate.
37	Bush, gearchange spindle.
38	Bush, gearchange spindle.
39	Bush, kickstarter.
40	Bush, speedometer.
41	Sealing ring.
42	Quadrant, selector.
43	Spindle.
44	Camplate.
45	Roller.
46	Plunger, indexing.
47	Domed nut.
48	Spring.
49	Selector fork, mainshaft.
50	Selector fork, layshaft.
51	Rod, selector forks.
52	Plate, plunger guide.
53	Stud.
54	Nut.
55	Washer.
56	Quadrant, gearchange.
57	Plunger, gearchange.
58	Spring.
59	Pedal, gearchange.
60	Bolt.
61	Rubber, gearchange.
62	Spring, pedal return.
63	"O" ring.
64	Nut.
65	Washer.
68	Crank, kickstarter,
69	Rubber, kickstarter.
70	Cotter, kickstarter.
71	Spring, kickstarter return.
72	Peg, spring anchor.
73	Quadrant, kickstarter.
74	Axle, kickstarter.
75	Pinion.
76	Ratchet.
77	Spring, ratchet.
78	Nut.
79	Tab washer.
80	Sleeve.
81	Sprocket.
82	Nut.
83	Lever, clutch operating.
84	Arm, clutch operating.
85	Peg, arm to lever.
86	Washer, serrated.
87	Adjuster, clutch rod.
88	Nut, adjuster, locking.
89	Rod, clutch operating.
90	Pinion, speedometer drive.
91	Peg.
92	Gear, speedometer drive.
93	Thrust washer.
94	Peg, camplate bush.
95	Screw.
96	Washer.
97	Rubber, kickstarter spindle.
98	Split pin.
99	Peg, roller to arm.
100	Roller, clutch operating.
101	Filler plug.
102	Joint washer.

Gearbox Inner Cover. Bend back the tab on the kickstarter ratchet and pinion lockwasher and, placing a block between the gearbox sprocket and the vice to prevent the sprocket revolving, undo the securing nut. Withdraw the ratchet and pinion assembly complete. Remove the four screws securing the inner cover to the shell. Tap to break the joint seal and remove the cover. Care should be taken to prevent the contents of the gearbox from coming away with the inner cover.

Gear Cluster. Remove the gear selector fork rod. Slide the mainshaft from the case until the clutch end comes free from the high gear. Taking care not to lose the rollers from the selector forks, remove the gear clusters from the gearbox in one assembly. The only gear remaining is the high gear which is held in position by the sprocket nut (See page 79).

The gearbox is now completely broken down into units and it is proposed to deal with these units separately in such a way that the fitter can dismantle, overhaul and re-assemble the major unit assemblies.

By doing the work in this manner the assembly of the gearbox is simplified in that there is no sub-assembly to bother about while concentrating on the correct assembly of the complete unit.

DISMANTLING, PREPARATION AND ASSEMBLY OF UNITS

GEARBOX OUTER COVER

Kickstart Assembly. Remove the kickstarter crank cotter pin and slide the pedal off the shaft. Withdraw the quadrant and spring assembly from the bush. Check the quadrant for chipped teeth and spindle wear, and the spring for fatigue cracks especially at the centre. Change if necessary. Replace the assembly in exactly the opposite way, making sure that the centre of the spring re-engages with the same spline on the quadrant spindle shaft (See Fig. 26, page 78).

Replace the shaft and quadrant assembly in the outer cover and place the rubber sealing tube over the shaft on the outside of the cover. Wind back the shaft one turn to pre-load the spring and insert the cotter with the threaded end towards the front of the machine.

Clutch Operation Mechanism. The internal arm is secured to the clutch operating lever by a peg screw, which has a shakeproof washer beneath the head. The roller on the forward end of the arm engages with the cam on the gearchange quadrant and the roller must turn freely. If it is desired to dispense with Slickshift for special purposes such as competition use, this may be done by removing the roller. The ball in the adjuster screw should be free to turn and undamaged. N.B.—The clutch operating rod used with the Slickshift is shorter than previously used and is chamfered at the adjuster end.

Bearing. Remove the retaining circlip and press the bearing out ; thoroughly degrease it and dry with compressed air if possible. Check for roughess, pitting, indentation and end float ; make sure that the inner race is a tight push fit on the mainshaft. When replacing, heat the casing and then press the bearing into position. Re-fit the circlip, ensuring correct engagement in the groove. Liberally oil the bearing.

Speedometer Drive. Using a soft metal drift against the spindle gear, gently tap the drive gear and bush out of its housing. Examine the gear for worn teeth and check the fit in the bush. To replace, fit the thrust washer over the gear spindle and thread the spindle into the bush. Fit the assembly into the cover, gear first. Fit the oil seal into the annular groove in the bush and press the bush into position until the keyway in the bush lines up with the screw hole.

Kickstarter Ratchet and Pinion. This assembly has already been removed to take off the inner cover. The pinion and ratchet should be checked for chipped or broken teeth and the spring for fatigue. Replace after the inner cover is back in place.

GEAR CLUSTER

Gears. Examine all the gears thoroughly for chipped, fractured or worn teeth. Check the internal splines and bushes, making sure that the splines are free on their respective shafts, with no tendency to bind, and the bush in the layshaft low gear is not worn.

GEARBOX CASING

Camplate and Plunger Assembly. Unscrew the acorn nut at the base of the main casing and withdraw the camplate plunger and spring. Remove the camplate from the bush. Make sure that the plunger works freely in its housing. Check the spring for fatigue. Examine the camplate carefully for signs of wear in the roller tracks as such wear will make gear selection difficult and damage to the gears may result. Change the camplate if a worn track is evident. To replace, fit the camplate spindle into the bush and screw the plunger assembly (pointed end engaging the camplate) into the plunger housing. Secure the camplate in the TOP (4th) gear position (see Fig. 27).

Chain Sprocket. Place a small aluminium block between a sprocket tooth and the vice, to stop the sprocket rotating, and unscrew the sprocket nut. It may be necessary to tap the end of the spanner with a hammer to free the nut. Ease away the sprocket.

High Gear, Oil Seal and Mainshaft and Layshaft Bearings. Remove the two long casing to outer cover studs and the two dowels, casing to inner cover and press the high gear out and into the casing. Ease the oil seal from the housing and discard.

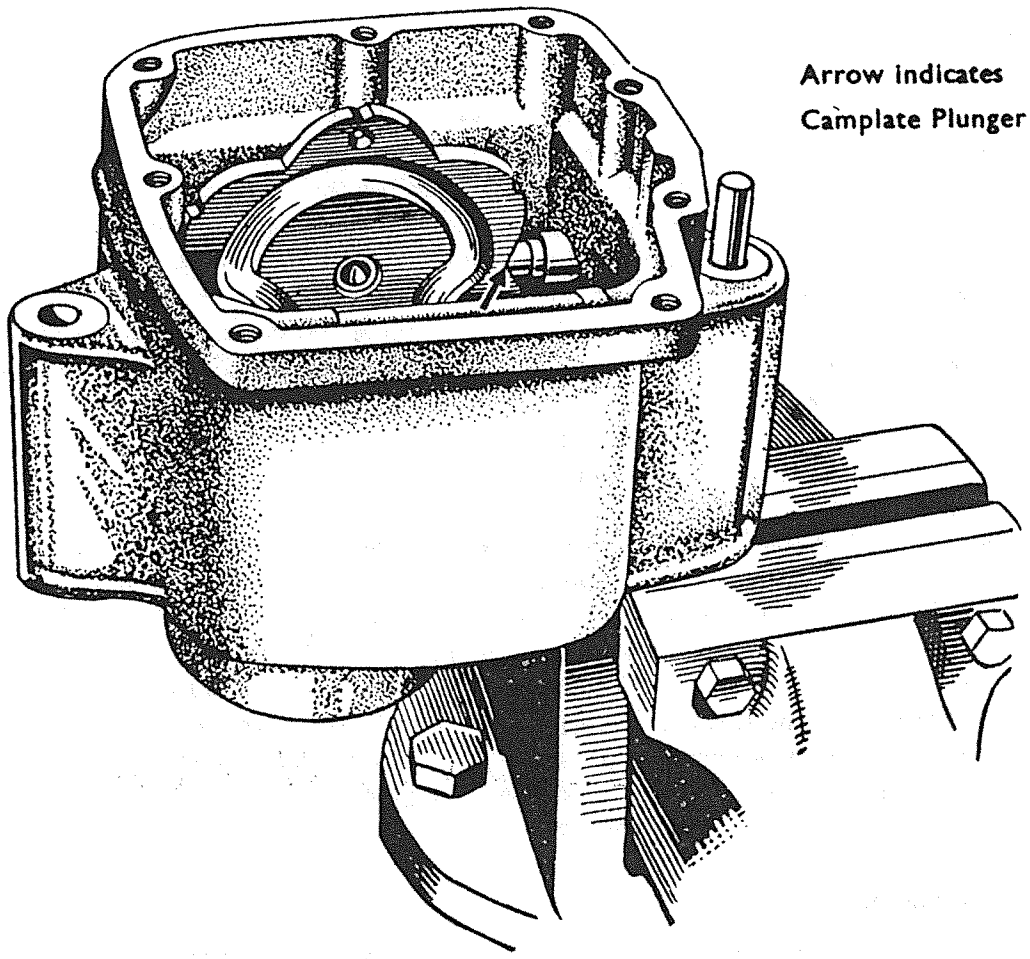


Fig. 27. GEARBOX CASING IN VICE.
Showing the Camplate in the top (4th) gear position.

Layshaft Gears. Assemble the third and second gear with the selector fork grooves facing inwards to the layshaft and high gear. Apply grease to the roller and fit to the larger selector fork peg. Fit the larger selector fork into the g. ɔoves, with the shaft of the selector above the layshaft and the camplate roller towards the open end of the gearbox. Lubricate the layshaft bush and lightly smear the shaft with oil. Install the thrust washer if the box is fitted with needle roller layshaft bearings. Lower the layshaft assembly into the gearbox, small gear first, until the camplate roller can be engaged on the camplate track. Oil the selector rod and thread it very carefully through the selector forks, shoulder end first, and engage it in the locating hole in the clutch end of the casing. Oil the mainshaft and thread it through the mainshaft gears. Place the layshaft low gear over the layshaft end with the internal teeth facing inwards. Place a straight edge over the gearbox end and test the clearance between the running face of the layshaft low gear and the outer face of the inner casing. Minimum allowable clearance is 0.005 in. (0.13 mm.) If the clearance is less than specified, the layshaft bush cannot have been fully located, or, if it has, the face of the bush must be cleaned up. Remember that a layshaft seizure means a locked rear wheel. Fit the second thrust washer to a needle roller box.

Rear Panels (6T & T110). Replace as detailed on page 16.

Air Filter. Replace the air filter connection.

Speedometer Cable. Insert the cable end into the gearbox, ensuring that it mates with the driving spindle, and then tighten up the attachment nut.

Clutch Cable. Connect cable nipple to clutch operating arm.

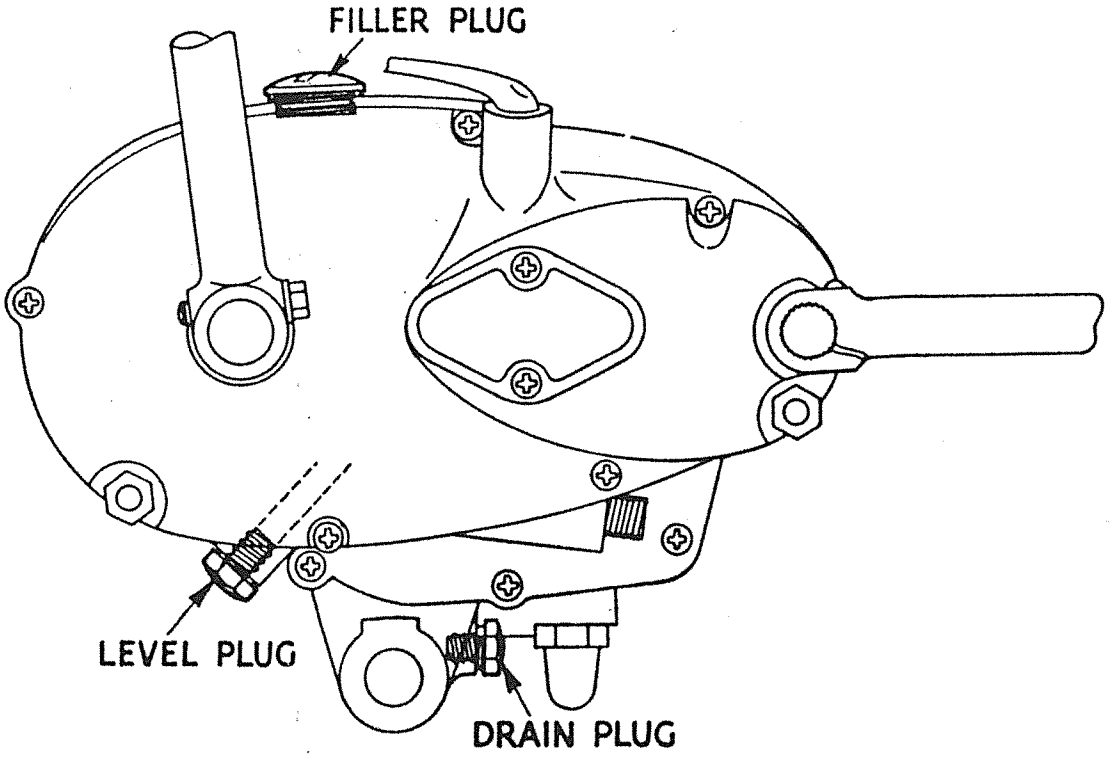
Right Footrest and Spindle. Insert the spindle through the engine plates from the right side, ensuring that the distance piece is correctly located. Fit the short distance piece over the footrest spindle between the primary inner cover and engine plate.

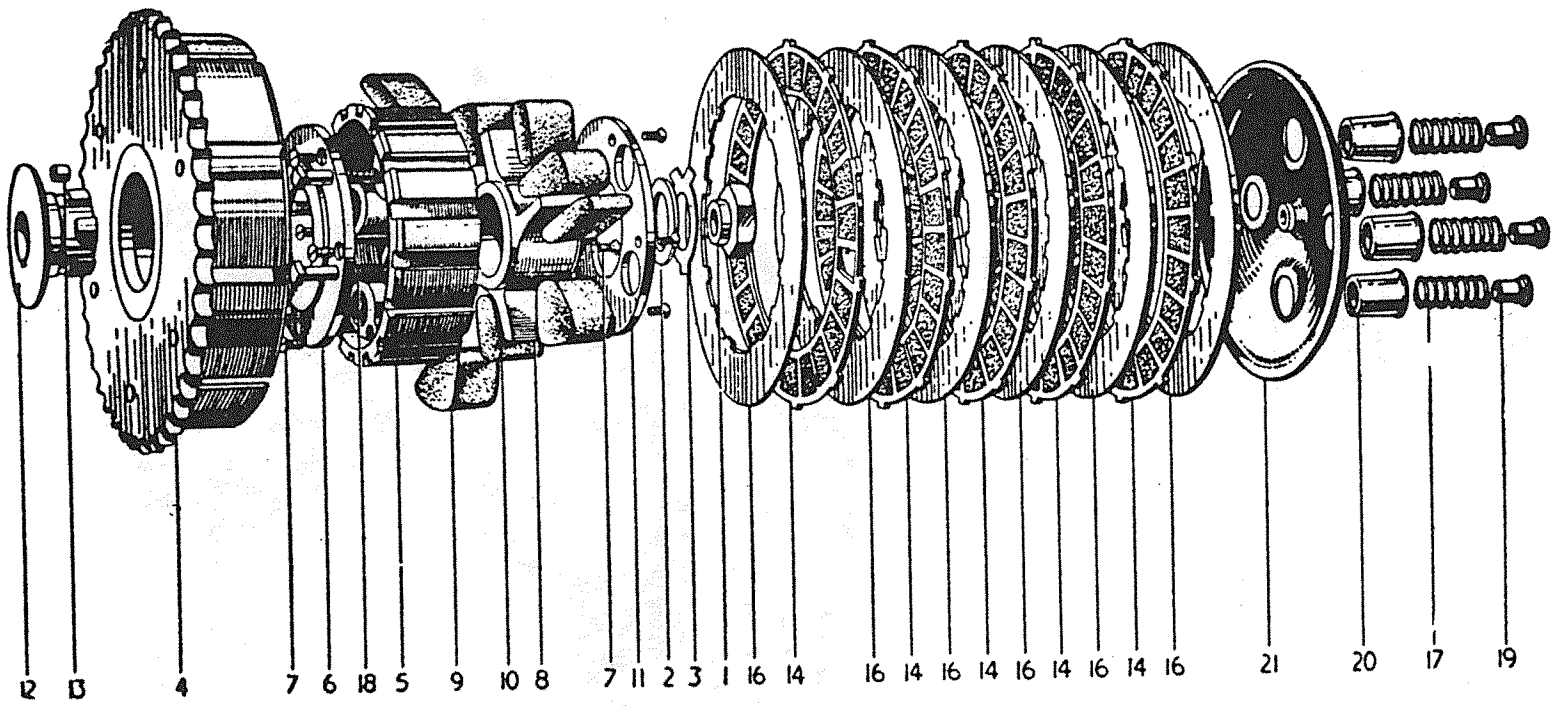
Primary Chaincase, Alternator, Clutch and Engine Sprocket. Replace as described on page 90, but before replacing the chaincase outer cover, check the primary chain adjustment as described on page 92.

Left Footrest. Fit to spindle and securely tighten the nut.

Footbrake Pedal. Grease the pedal spindle and fit the pedal. Replace the spring washer, plain washer and securing nut. Connect operating rod to pedal, placing the plain washer over the rod end, and secure with a split pin.

Exhaust System. Refit the exhaust pipe and silencer assemblies.





INDEX TO FIG. 28. CLUTCH AND SHOCK ABSORBER.

Index No.	Description.
1	Nut, clutch to mainshaft.
2	Washer, plain.
3	Washer, lock.
4	Housing, clutch sprocket.
5	Centre, clutch.
6	Plate, inner shock absorber retaining.
7	Screw.
8	Spider, shock absorber.
9	Rubber insert, driving.
10	Rubber insert, rebound.
11	Plate, outer shock absorber.
12	Hub, clutch.
13	Roller, housing to hub.
14	Plate, driving.
16	Plate, driven.
17	Spring, clutch pressure.
18	Pin, clutch pressure spring.
19	Nut, clutch pressure spring pin.
20	Cup, clutch pressure spring.
21	Plate, clutch pressure.

DISMANTLING CLUTCH

Note.—When this stage has been reached, reconditioned clutch plates or new absorber rubbers can be fitted. Full instructions for fitting the shock absorber rubbers are contained in the shock absorber section, page 89. Fitting the new rubbers is just as easy with the shock absorber on or off the machine.

The instructions below cover complete dismantling but may be varied if it is not desired to remove the primary transmission completely.

Alternator Stator. Remove the three nuts and ease the stator off the adaptor, taking care not to damage the insulation. Disconnect the triple snap connector and pull the output cable clear off the inner chaincase. Remove the stator adaptor which is secured by three flange-headed bolts.

Engine Sprocket and Rotor. Remove sufficient plates from the clutch housing to insert the locking tool shown in Fig. 30. Bend back the locking tabs and place a well-fitting box spanner and tommy bar on the nut. In the majority of cases the nut can be unscrewed by jarring the tommy bar with a hammer against the inertia of the flywheel. If it is difficult to move, engage Top gear and apply the rear brake. Collect the tab washer, rotor, key and plain washer.

Clutch Sprocket and Shock Absorber. With the locking tool still in position, bend back the locking tabs and remove the clutch securing nut in the same way. Collect the tab washer and plain washer. Screw in the body of the extractor DA50/1 to the full depth of the thread in the clutch hub. Tighten the centre bolt to release the hub from the taper. The engine sprocket, chain and clutch can now be removed as an assembly. Collect the key from the gearbox mainshaft.

PREPARATION AND INSPECTION

Clutch Springs. The free length of new springs is 4 plate clutch, 1.5 in. (3.81 cm.) and 5 plate clutch, 1.969 in. (5.0 cm.). The Bonneville 120 clutch spring is the same length but is made of thicker wire. If a spring has shortened more than 0.1 in. (2.5 mm.) or is distorted, replace it with a new one, or preferably a complete set.

Friction Plates. Wash in paraffin and examine the segments for wear and general condition. The segments should protrude $\frac{1}{32}$ in. (0.8 mm.) on each side of the plate when new, and show no signs of burning. The driving tongues should be a good fit in the clutch housing.

Steel Plates. These must be perfectly flat and free from scoring. They have a bonderised finish and must NOT be polished.

Clutch Hub. Inspect the bearing surface for pitting and indentation. The splines should be a push fit into the shock absorber spider and not allow any radial movement.

Clutch Rollers. The diameter when new is 0.2500 to 0.2495 in. (6.350 to 6.337 mm.). If they are undersize fit a new set.

Clutch Sprocket and Housing. Inspect the condition of the sprocket teeth. If these are worn or damaged they will cause rapid chain wear. Next examine the bearing surface for pitting or indentation. Finally check that the outer strengthening band is secure and that the driving slots are not worn or stepped.

Shock Absorber. Remove the four screws and outer cover plate and press out the spider from the back. The spider should be a good working fit in the holes in the plates and also the inner faces of the plates adjacent to the arms of the spider should not be worn or damaged. If in doubt, check these points by assembling the parts without the rubbers. To obtain satisfactory results, check the fit between the splines on the spider and hub before assembly.

To replace the rubbers, insert the four large (drive) rubbers and use a broad-bladed screwdriver, as in the illustration, to hold the spider while inserting three of the small (rebound) rubbers. Use a slight smear of thin oil to replace the last rubber. Replace the cover plate and tighten the screws securely.

Engine Sprocket and Primary Chain. Place the key in the gearbox mainshaft. Assemble the engine sprocket, primary chain and clutch to the shafts. (N.B.—The ground boss on the engine sprocket must be towards the crankcase and the connecting link on the chain outwards). Next secure the clutch with the flat washer (cupped side out), tab washer and nut. Replace the locking plate (Fig. 30) and tighten the nut, which must be secured by the tab washer.

Alternator. Fit the plain washer, key, rotor, tab washer and nut. Tighten the nut and secure it with the tab washer. Remove the locking plate from the clutch. Replace the adaptor ring and secure it with three bolts. Fit the stator and secure it with the three nuts. Check that there is clearance between rotor and stator at each pole. Pull the output cable through the inner cover so that there is no loop which can be cut by the chain. See page 158.

Clutch Plates. The friction plates are best assembled dry, commencing with a plain steel plate and fitting each alternately. Insert the clutch operating rod in the mainshaft with the chamfered end at the operating lever. Fit the pressure plate complete with cups and then the springs and nuts. Screw down the nuts so that about $\frac{1}{8}$ in. (3.2 mm.) of the pin shows through. Now hold the clutch lever and operate the kickstarter so that the pressure plate revolves. If the adjustment is correct it will lift by an equal amount all round. In most cases it will be necessary to increase the loading slightly on one or two springs until it does lift evenly. This operation is most important to secure a smooth clutch operation.

Clutch Cable Adjustment. Slacken off or disconnect the cable and adjust the screw inside the inspection cover (see page 82) until there is $\frac{1}{16}$ in. (1.6 mm.) free movement at the end of the operating lever. Now connect the cable and adjust it to allow $\frac{1}{8}$ in. (3.2 mm.) free movement at the handlebar lever.

Outer Cover. Adjust the primary chain as described on page 92. Grease the paper joint washer and place it on the inner cover. Fit the outer cover and insert the screws. Tighten the screws working outwards alternately from the centre. Pour $\frac{1}{4}$ pint (150 c.c.) of S.A.E. 20 grade oil into the case.

Footrest and Brake Pedal. Replace the footrest and tighten the securing nut. Connect up the brake pedal, test the free movement and adjust as necessary.

Exhaust Pipe and Silencer. Fit the assembly to the machine and tighten the fixings.

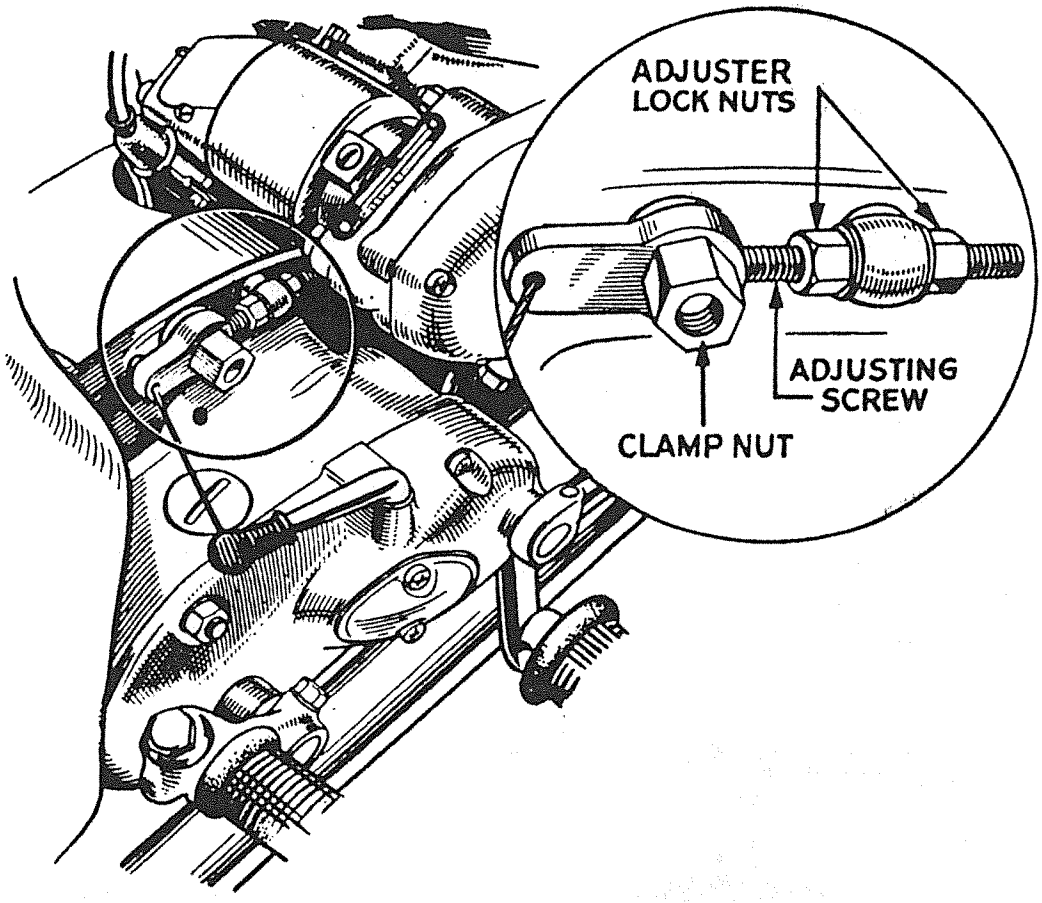


Fig. 32. GEARBOX IN POSITION showing adjustment points.

Adjusters. These are located on the wheel spindle and swinging fork end lugs. To TIGHTEN the chain, turn the adjuster nuts clockwise an equal number of turns until the chain tension is correct. To SLACKEN the chain tension, reverse the procedure and push the wheel forward against the adjuster end plates. Tighten the wheel spindle nuts.

Brake. Check adjustment.

CHAIN MAINTENANCE

Although both chains are lubricated, it is advisable to remove the rear chain at intervals and thoroughly clean and re-grease (See below).

Cleaning and Greasing the Rear Chain. Remove all external dirt by brushing vigorously with a wire brush. Soak the chain in a paraffin bath, moving it about until the joints are washed clean. Finally rinse in clean paraffin and leave to drain and dry. The chain after drying will then be ready for lubricating. Immerse the chain in a bath of grease which has been melted over a pan of boiling water. The chain should remain in the bath for five to ten minutes, being moved about freely to ensure penetration of the grease into the chain bearings. Allow the grease to cool to its normal state, then take the chain out of the bath, wipe off the surplus grease and

replace the chain on the machine. When fitting the spring clip fastener on the connecting link, care must be taken to ensure correct fitting. The fastener is roughly the shape of a fish and, if it is remembered that a fish swims nose first and the fastener is fitted so that the nose (closed end) is always proceeding in the forward direction when the machine is running, the fitter will have an easy aid to memory. It is a good plan to carry out this cleaning and greasing service at the beginning of the winter, half-way through the winter and at the commencement of the summer.

ALTERATIONS AND REPAIRS

If the chains have been correctly serviced, very few repairs will be necessary. Should the occasion arise to repair, lengthen or shorten a chain, a rivet extractor and a few spare parts will cover all requirements.

To SHORTEN a chain containing an EVEN NUMBER OF PITCHES remove the dark parts shown in No. 1 and replace by cranked double link and single connecting link, No. 2.

No. 1

No. 2

To SHORTEN a chain containing an ODD NUMBER OF PITCHES remove the dark parts shown in No. 3 and replace by a single connecting link and inner link as No. 4.

No. 3

No. 4

To REPAIR a chain with a broken roller or inside link, remove the dark parts in No. 5 and replace by two single connecting links and one inner link as No. 6.

No. 5

No. 6

Fig. 33. CHAINS.

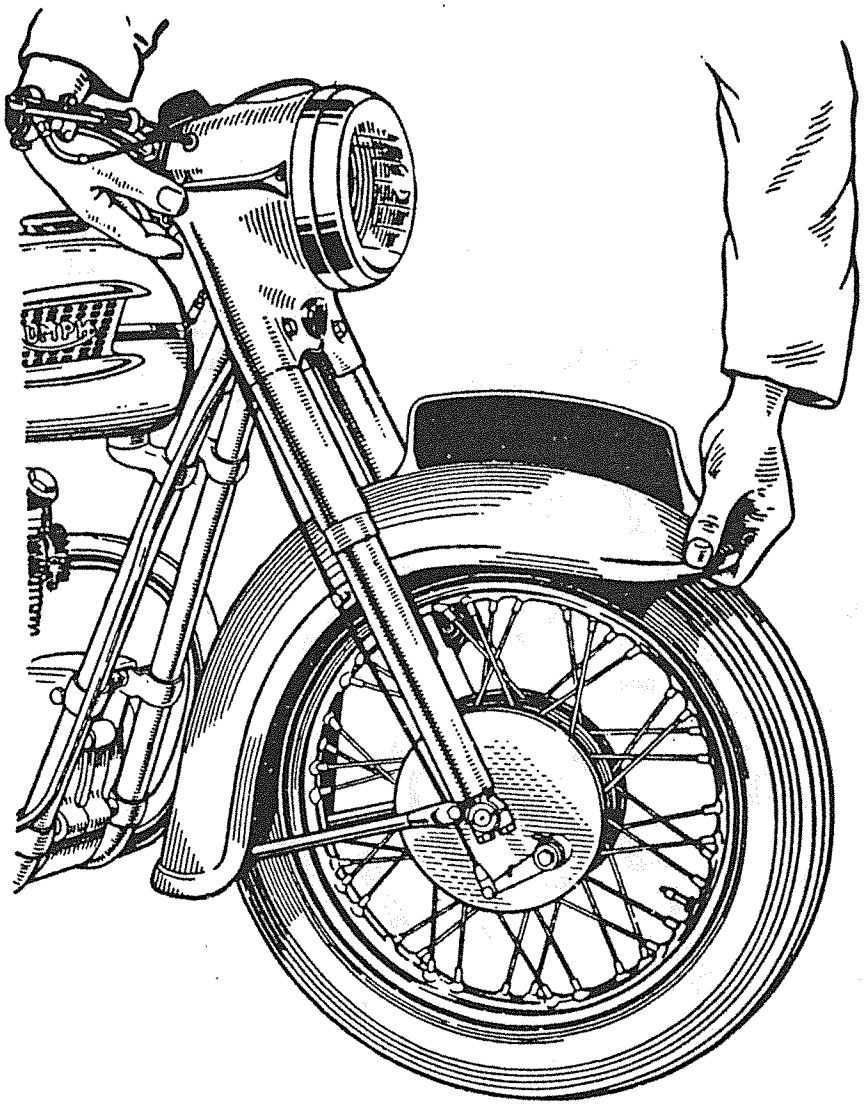


Fig. 35. TO TEST THE ADJUSTMENT OF THE STEERING HEAD RACES.

Testing. The fork should move to the full lock position in both directions under its own weight. If the movement is sluggish, slacken off the adjuster nut slightly more and test again. When the adjustment is correct, tighten the top lug pinch bolt.

If it is not possible to adjust the bearings so that the fork moves freely from lock to lock without any fore and aft play, the balls and races are worn or damaged and must be replaced with a complete new set.

INDEX TO FIG. 36

TELESCOPIC FORK

Index No.	Description.	Index No.	Description.
1	Lug, fork top.	29	Washer, fibre.
2	Bolt, pinch.	30	Nut, cap.
3	Nut.	31	Bearing, lower.
4	"U" Bolt.	32	Nut, retaining.
5	Nut.	33	Spring.
6	Lug, middle and stem.	34	Washer, aluminium.
7	Nut, fork stem.	35	Bolt, flanged.
8	Bolt, pinch.	36	Washer, steel.
9	Nut.	37	Cone, bottom.
10	Cover, nacelle L.H.	38	Sleeve, damper.
11	Cover, nacelle R.H.	39	Bolt, locating.
12	Top, nacelle.	40	Knob, steering damper.
13	Motif, L.H.	41	Plate, damper anchor.
14	Motif, R.H.	42	Bolt.
15	Sleeve, oil seal.	43	Nut.
16	Member, bottom L.H.	44	Disc, friction.
17	Member, bottom R.H.	45	Washer, star.
18	Plug, drain.	46	Clip, speedo cable.
19	Washer, fibre.	47	Pin, tube guide.
20	Cap, spindle.	48	Tube, guide upper.
21	Bolt.	49	Tube, guide lower.
22	Nut, dust excluder.	50	Rod, restrictor.
23	Seal, oil.	51	Washer, spring support.
24	Bearing, upper.	52	Cone and dust cover.
25	Sleeve, damping.	53	Horn grille.
26	Washer, rubber.	54	Screw.
27	Stanchion.	55	Washer.
28	Plug, filler.		

leg and collect the restrictor rod assembly. Replace the leg in the vice and unscrew the dust excluder sleeve nut. Special tool No. Z.127 may be needed to extract the stanchion, which will come out carrying with it the sleeve nut, steel washer, top bearing, damping sleeve and bottom bearing. Undo the hydraulic stop nut and pull off the various parts.

TO DISMANTLE, PREPARE AND ASSEMBLE THE UNITS

First thoroughly degrease all parts and lay them out for inspection. If the mileage covered is more than 20,000 miles (30,000 kms.) it is recommended that all bushes and seals are changed.

Stanchions. Check that the stanchion is true by rotating it between centres or by rolling it on a flat surface, preferably a surface plate. If the stanchion is to be used again after straightening, the bow should not exceed $\frac{3}{16}$ in. (4.8 mm.). The owner is not advised to undertake the servicing of a fork in this condition; it should be returned to a Triumph dealer for a service replacement assembly.

Top Lug and Middle Lug. If the machine has been involved in an accident these lugs will require expert attention. No attempt should be made to carry out this work without the necessary jigs.

Bottom Cover Tubes. Examine the tubes for distortion or indentations and scrap them if defective. Check that all threads are in good condition.

Springs. The free length of the spring is: 6T, T110, $18\frac{5}{16}$ in. (46.5 cm.), TR6, T120, $19\frac{1}{16}$ in. (48.4 cm.) when new, and provided that the springs are within $\frac{1}{2}$ in. (1.2 cm.) of this length and are not otherwise damaged, they are fit for further use.

Steering Races. The cups, cones and balls should be examined for pitting or wear, and if any are found to be defective the complete set should be changed.

Top and Bottom Race: 20 $\frac{1}{4}$ in. (6.35 mm.) diameter balls each.

Friction Damper. Examine the friction damper assembly for traces of oil, grease, rust, etc. Renew the friction disc if at all worn and the spring plate if weak or broken.

To Align the Forks. If an alignment jig is available, proceed as follows:—

A suitable jig is available from the Triumph Spares Department, through your Dealer, under Part No. Z103 (see page 104).

Fit the wheel spindle in position and place the jig on the lower fork members as indicated in the illustration. To avoid scratching the enamel finish on the fork members, apply a smear of grease at the four points. Hold it firmly and if the alignment is correct, contact will be made at all four points marked "X". If the jig does not make contact at "A" or "B", it will be necessary to make an adjustment. Slacken off the top lug and middle lug pinch bolts. If the jig can be rocked at "A" this indicates that "D" is too far forward. To remedy, strike the top lug at point "D" a sharp blow with a hide mallet and then make a further check with the jig; if the error is at "B" the application is the same, only at point "C". When the adjustment is satisfactory, tighten the pinch bolts and make another check.
If no jig is available, continue to assemble the forks, and after fitting the mudguard, wheel and handlebars, tighten the top lug pinch bolt but leave the middle lug pinch bolts loose. Now grasp the handlebars and pump the fork up and down until it moves freely without binding or sticking. Tighten the middle lug pinch bolts.

Stanchion Cap Nuts. After aligning the fork, tighten the stanchion cap nuts. Make sure that the nacelle bottom cover tubes are central and are not fouling the sliding members. To rectify, slacken the middle lug pinch bolts and hold the cover tube central while re-tightening. *To ensure satisfactory fork operation. the cap nuts and pinch bolts must be tightened securely.* Replace the remaining horn grille screw and nut.

Handlebar. Fit the handlebars, with the horn under the two front "U" bolt nuts, and tighten the "U" bolts evenly.

Mudguard. Replace the front stand and front mudguard.

Front Wheel. Replace as instructed on page 121.

Nacelle Top Unit. Replace and connect the wires and speedometer cable as instructed on page 169.

Headlamp. Replace as instructed on page 169.

TO CHANGE THE MAIN SPRINGS

Rest the crankcase on a suitable box so that the front wheel is clear of the ground. Lift the nacelle top unit as described on page 168, the slack in the electrical cables will be sufficient, but it will be necessary to disconnect the speedometer cable. Undo the handlebar "U" bolts and raise the handlebar sufficiently to unscrew the cap nuts. Lift out the old springs and insert the new. Insert the cap nuts carefully so that the guide tubes engage with each other and tighten. Replace the handlebars and nacelle top.

FORK SPRING IDENTIFICATION

		Free Length (New)	*Colour*
6T/T110 ...	SOLO ...	... 18$\frac{5}{16}$ in. (46.5 cm.)	Black
6T/T110 ...	SIDECAR ...	... 18$\frac{5}{16}$ in. (46.5 cm.)	Red/White
TR6/T120 ...	SOLO ...	... 19$\frac{1}{16}$ in. (48.4 cm.)	Black/White
TR6/T120 ...	SIDECAR ...	... 19$\frac{1}{16}$ in. (48.4 cm.)	Black/Red

REMOVING THE FORK FROM THE FRAME

The following refers to all models with the exception of the Trophy. For these models, the operator should disconnect the lighting plug at the headlamp, remove the headlamp, handlebars and steering damper knob and proceed from "Stanchion Cap Nuts". First remove the front wheel, mudguard, headlamp assembly and nacelle top unit as described on pages 115, 166 and 168 and proceed as follows:-

Handlebar. Detach control levers and loosen the twistgrip retaining screw. Unscrew four nuts from the handlebar retaining "U" bolts. Slide the handlebar out of the twistgrip sleeve and through the rubber grommets.

Stanchion Cap Nuts. Using a ring spanner to avoid damage to the nut heads, unscrew the two large stanchion cap nuts. A suitable spanner is available under Part Number D.220.

Top Lug. Remove the crown and stem sleeve nut, undo the top lug pinch bolt, and, using a soft metal drift, give the top lug a sharp blow from underneath to loosen it from the taper of the stanchions. Remove the damper anchor plate bolt and raise the top lug lifting with it the two stanchion nuts which in turn carry the pressure tube and spring assembly, and the lower fork crown is eased downwards from the frame. The complete fork assembly can be withdrawn from the frame as there is sufficient clearance between the top of the fork crown stem and the underside of the top lug. If care is taken, the top ball race can be left undisturbed and the balls collected from the lower race as the clearance becomes sufficient.

If the mechanic does not wish to disturb the steering column, carry out the first two operations and proceed as follows:—

Middle Lug Pinch Bolts. Remove both bolts.

Trophy Models. Slacken the gaiter clips.

Top Lug. Undo the top lug pinch bolt and loosen the top lug with a sharp blow as described.

Oil. Remove the drain plugs at the bottom tube covers and let the oil drain out.

Pressure Tube Body Bolt. Remove these bolts from the base of the bottom cover tube.

Pressure Tube Assembly and Spring. Withdraw from the forks by lifting the stanchion cap nuts.

Fork Legs. Remove from the middle lug by pulling downwards.

INDEX TO FIG. 38. TELESCOPIC FORK.

Index No.	Description.
1	Lug, fork head.
2	Bolt, pinch.
3	Nut.
4	"U" bolt.
5	Nut.
6	Crown and stem.
7	Nut, sleeve.
8	Bolt, pinch.
9	Nut, stop.
10	Cover, nacelle, N.S.
11	Cover, nacelle, O.S.
12	Nacelle, top.
13	Motif, N.S.
14	Motif, O.S.
15	Washer, rubber.
16	Cover, bottom tube, N.S.
17	Cover, bottom tube, O.S.
18	Plug, drain.
19	Washer.
20	Cap, wheel spindle.
21	Bolt, spindle cap.
22	Sleeve, dust excluder.
23	Washer, felt.
24	Washer.
25	Washer.
26	Bearing, upper.
27	Stanchion.
28	Plug, oil filler.
29	Washer.
30	Nut, cap.
31	Bearing, stanchion, lower.
32	Nut, hydraulic stop.
33	Spring, fork.
34	Rod, oil restrictor.
35	Restrictor, oil.
36	Cup.
37	Pin, cup.
38	Nut.
39	Tube, pressure.
40	Body, pressure tube.
41	Sleeve, pressure tube.
42	Socket, screw.
43	Washer, aluminium.
44	Cone and dust cover.
45	Cone.
47	Knob, damper assy.
48	Washer, damper.
49	Sleeve.
50	Pin, securing.
51	Plate, damper anchor.
52	Bolt, anchor plate.
53	Nut.
54	Disc, friction.
55	Plate, friction.
56	Clip, speedometer cable.
57	Horn grille.
58	Screw.

Ball Races. Cups, cones and balls should be examined for indentation and pitting and changed if necessary.

All Models ... 20 ¼in. (6.35 mm.) diam. balls. Top and Bottom.

Friction Damper. Examine the friction damper assembly for traces of oil, grease rust, etc. Renew the friction disc if at all worn and the spring plate if weak or broken.

PRESSURE TUBE ASSEMBLY

Restrictor Rod. Fit the pin to the restrictor rod, then the cup, restrictor, and finally the locking nut.

Pressure Tube. Screw the lower valve body to the pressure tube and insert the restrictor rod assembly. Slide the top support sleeve over the restrictor rod and screw onto the pressure tube.

Checking. To ensure correct operation of the valve, place the assembly in a tin of oil and pump the rod up and down. When the pressure tube is filled, the upward movement of the rod should be restricted and the downward movement unrestricted.

Spring and Cap Nut. Fit the spring over the restrictor rod and compress until the rod can be gripped with a pair of pliers. Screw the cap nut into position and release the spring.

ASSEMBLING AND INSTALLING THE FORK (NACELLE TYPE)

Before commencing to assemble the fork, lubricate all parts.

Stanchion Bearing. Fit the bearings to the stanchions and lock with the hydraulic stop nut. Check the bearings for freedom of movement.

Drain Plugs. Screw the drain plugs into the bottom cover tube, ensuring tightness.

Dust Excluder. Fit a new felt washer to each dust excluder cap making sure that the two thin metal washers are on either side of the felt.

Bottom Cover Tube Assembly. Assemble the stanchion to the bottom cover tube and fit the top bearing. Screw on the dust excluder and check the movement of the stanchions which should be free and smooth.

Steering Races. If the steering column assembly has been dismantled, grease the cups in the frame and press the balls onto them.

Fork Crown and Stem and Top Lug. Assemble the fork crown and stem and top lug to the steering column and tighten down the sleeve nut until the steering moves freely from side to side with no up and down movement. Fit and tighten the pinch bolts and lower damper parts.

Pressure Tube Assembly. Assemble as described.

Lubrication. Fill the forks as described.

Cap Nut. Tighten the cap nuts as described.

Fork Crown Pinch Bolt. Tighten the bolts.

Gaiter Clips. Fit and tighten.

Handlebars. Fit the handlebars to the top lug and connect all levers and cables.

Headlamp. Fit the headlamp to the forks and connect the lighting plug.

Speedometer. Re-fit speedometer and cable.

Steering Damper. Re-fit the steering damper knob making sure that the steel thrust washer is in position.

Mudguard. Replace to the fork and secure all fastenings.

Wheel. Replace as described.

CHANGING THE MAIN SPRINGS

In order to change the main springs, or to fit stronger ones for sidecar purposes, the operator should remove the headlamp and nacelle cover as described on page 168 and the handlebars as described on page 107 and proceed as follows:—

Cap Nuts. Unscrew the two cap nuts in the top lug.

Spring. Grip the spring which should now be showing, and force it down until the restrictor rod can be gripped with a pair of pliers.

Restrictor Rod. Unscrew the cap nuts from the restrictor rod and secure a piece of soft wire to the rod before releasing the spring. This enables the operator to retain control of the restrictor rod during removal and replacement of the spring. Repeat the operation on the other fork leg and re-assemble the forks in exactly the reverse procedure. The fork springs have a colour identification as follows:—

Solo	**Red**
Sidecar	**Blue**
Extra-Heavy Sidecar	**Purple**

FRONT WHEEL

The front wheel as fitted to all models requires very little maintenance beyond re-packing the hub with clean grease every 10,000 miles (15,000 kms.). The wheel bearings are of the ball journal type and therefore require no adjustment. The rim is 19 in. diam. (WM2-19) fitted with a 3.25 × 19 in tyre. The 5T, 6T and TR5 models have a full width hub containing a 7 in. (17.78 cm.) diam. brake. The hub is built into the rim with 40 identical, straight-pull spokes. The TR6, T100 and T110 models have an 8 in. (20.32 cm.) diam. brake drum bolted to the hub, and two lengths of spoke are used each with two different head angles. Later TR6, T100, T110 and all T120 Models have a full width hub containing an 8 in. (20.32 cm.) diameter brake. Except for its greater diameter it is identical to the full width hub fitted to the 5T, 6T and TR5.

TO REMOVE THE FRONT WHEEL FROM THE FORKS

Brake Cable. Remove the split pin and pivot pin from the lower end of cable.

Anchor Plate Bolt (Earlier TR6, T100 & T110 only). Unscrew the nut and remove the bolt securing the anchor plate to the fork leg.

Spindle Cap Bolts. Unscrew the spindle cap bolts (two on each fork leg).

Front Stand. Lower the front stand by loosening the retaining nut at the rear of the mudguard and swing the stand forward. The front wheel can now be withdrawn from the forks.

TO DISMANTLE THE FRONT WHEEL

Anchor Plate Nut. Hold the spindle in a vice with soft jaws, or alternatively hold the spindle by clamping it in one fork leg with the wheel outwards, and unscrew the anchor plate retaining nut.

Anchor Plate. Hold the brake lever slightly on and lift out the anchor plate assembly.

Left Wheel Bearing. Remove the circlip and drive out the bearing and dust cover by means of a hide mallet on the wheel spindle.

Bearing Retaining Ring. Remove the right wheel bearing retaining ring with a peg spanner. **N.B.**—This ring has a L.H. thread.

Right Wheel Bearing. Use the wheel spindle and hide mallet to drive out the remaining wheel bearing. There is a backing ring fitted only in the full width hub.

TO DISMANTLE THE FRONT BRAKE ANCHOR PLATE

Brake Shoes. Remove the return springs and the brake shoes will be released from the anchor plate.

Brake Operating Lever and Cam Spindle. Unscrew the retaining nut and take off the brake operating lever. Withdraw the cam spindle from the anchor plate. It is unnecessary to remove the brake shoe fulcrum pin.

INDEX TO FIG. 40. FRONT WHEEL

Index No.	Description.	Index No.	Description.
1	Cover plate.	13	Plate, brake anchor.
2	Circlip, L.H. bearing.	14	Spring, lever return.
3	Dust cover.	15	Lever, brake operating.
4	Bearing, ball journal.	16	Washer.
5	Spindle.	17	Nut, brake lever.
6	Nipple, spoke.	18	Spring, shoe return.
7	Spoke.	19	Pin, shoe fulcrum.
8	Hub and brake drum.	20	Lining, brake.
9	Backing ring.	21	Rivet, brake lining.
10	Ring, bearing securing.	22	Nut, anchor plate.
11	Brake shoe c/w lining.	23	Washer.
12	Cam, brake operating.	24	Nut, fulcrum pin.

INSPECTION AND REPLACEMENT OF WORN PARTS

Washing. All parts with the exception of the brake shoes, should be thoroughly washed with petrol or paraffin.

Anchor Plate. This should be examined for cracks and distortion and excessive wear in the brake cam housing.

Brake Cam. Clean out the greaseways and remove any rust. Re-fill the greaseways with clean grease.

Ball Bearings. Clean and dry the bearings thoroughly. Compressed air should be used for drying out if possible. Test the end float and inspect the balls for any signs of indentation or pitting. Change the bearings if they are not up to the required standard. Pack the bearing with grease before replacing in the hub.

Return Springs. Inspect for signs of fatigue and renew if necessary.

Brake Drum. Inspect the brake drum for wear, ovality or scoring. If there is ovality or score marks, the drum will have to be detached from the wheel and skimmed. If it is necessary to skim more than .010 in. (0.254 mm.) from the drum it should be scrapped. After skimming the brake drum, the wheel will have to be re-built and trued up.

Brake Shoes. If the brake adjuster has been fully taken up, the brake shoe linings must be changed. Do not pack the heel of the shoe in an endeavour to make an adjustment. New linings and rivets can be purchased from a Triumph Dealer, but if the owner wishes, he can exchange the brake shoes for a re-conditioned set at very little extra cost. If the old brake shoes are to be used for further service, inspect the rivet heads as these must be below the surface of the lining. Rivets which show signs of contact with the brake drum can be lowered by using a suitable round punch. Support the shoe at the point where the rivet is to be knocked down.

INDEX TO FIG. 41. FRONT WHEEL (Earlier TR6, T100 & T110)

Index No.	Description.	Index No.	Description.
1	Bearing, ball journal.	18	Circlip, L.H. bearing.
2	Spindle.	19	Dust cover.
3	Spoke, 90° head.	20	Bolt, drum to hub.
4	Nipple, spoke.	21	Spoke, short 95° head.
5	Spoke, 88° head.	22	Spoke, short 80° head.
6	Hub.	23	Drum, brake.
7	Lockplate.	24	Cam, brake operating.
8	Nut.	25	Bearing, ball journal.
9	Pin, shoe fulcrum.	26	Ring, bearing securing.
10	Shoe, brake trailing.	27	Shoe, brake leading.
11	Lining, brake shoe.	28	Spring, shoe return.
12	Rivet, brake lining.	29	Plate, brake anchor.
13	Washer.	30	Spring, lever return.
14	Nut, fulcrum pin.	31	Lever, brake operating.
15	Cover plate (alternative).	32	Washer.
16	Gauze, anchor plate.	33	Nut, brake lever.
17	Screw, gauze securing.	34	Nut, anchor plate.

TO ASSEMBLE THE FRONT BRAKE ANCHOR PLATE

Brake Cam. Grease the spindle of the brake cam and insert it into the housing on the brake anchor plate. Fit the return spring over the spindle (long end away from the anchor plate) and tap the lever arm on to the square shoulder with the lever arm in the same line as the cam. Fit the washer and nut and tighten.

Brake Shoes. Place the two shoes on the bench in their relative positions. Fit the return springs to the retaining hooks, then, taking a shoe in each hand and at the same time holding the springs in tension, position the shoes to the anchor plate. By turning the top of the shoes inwards the assembly can be placed over the cam and fulcrum pin and snapped down into position by pressing on the outsides of the shoes. Floating brake shoes must have the steel thrust pads next to the fulcrum pin and the linings at the trailing end of the shoe relative to the direction of rotation (See page 120).

ASSEMBLING THE FRONT WHEEL

Preparation. Thoroughly clean the inside of the hub and brake drum. Pack the ball races with grease.

Right Wheel Bearing. A backing ring must first be placed in the full width hub. Press the bearing into the hub and secure it with the L.H. threaded bearing retaining ring.

Spindle. Turn over the wheel and insert the spindle and pack about one eggcupful of clean grease into the hub.

Left Wheel Bearing. Press the remaining bearing in position, followed by the dust cap and circlip. Lightly tap the wheel spindle from the right side, to press the bearing close up against the dust cap and circlip.

TO REPLACE THE FRONT WHEEL

Place the wheel in position in the forks and swing the front stand backward. If available add a small weight in front of the parcel grid so that the fork legs rest on the wheel spindle.

Spindle Caps. Hold the spindle caps in position and screw the bolts a few turns into the fork legs. The spindle is recessed at the bolt positions and it may be necessary to move the wheel a little from side to side before the bolts can be inserted. Do not tighten the bolts yet.

Brake Anchorage. On the full width hub models make sure the anchor peg on the fork leg engages with the channel on the anchor plate. On the earlier TR6, T100 and T110 models insert the brake anchor bolt and tighten it securely.

Spindle Cap Bolts. Tighten the bolt evenly, keeping the space between the cap and fork leg equal, in front of, and behind the wheel spindle.

Brake Cable. Refit the brake cable to the abutment and insert the pivot pin and split pin. Check the cable adjustment.

Front Stand. Tighten the front stand securing nut.

IMPORTANT: ALL MODELS

SLACKEN THE BRAKE SHOE FULCRUM PIN NUT AND APPLY THE BRAKE HARD, KEEPING THE PRESSURE ON THE LEVER WHILE THE NUT IS RE-TIGHTENED, IN ORDER TO CENTRALISE THE BRAKE SHOES.

REAR CHAINGUARD

The rear chainguard extends round the rear sprocket and to remove the complete rear wheel it is necessary to slacken the securing nut and bolt near the bottom of the left suspension unit and swing the chainguard upwards. There is one additional bolt on the TR5 and TR6 models which must be removed, securing the guard to a clip on the brake torque stay.

The Quickly Detachable rear wheel may be removed from all models without disturbing the chainguard, leaving the brake drum and sprocket in position.

REAR WHEEL

This wheel is mounted on journal ball bearings and therefore requires no adjustment. Slackness in the bearing can be checked by first placing the machine on the central stand and then testing the lateral movement which should be hardly perceptible if the bearings are in good condition.

REMOVING THE REAR WHEEL FROM THE FRAME

Rear Chain. Depress the gear lever to make sure that the gearbox is not in neutral. This prevents the chain rotating on the gearbox sprocket and falling off when the spring link is removed. Remove the spring link and clear the chain from the sprocket.

Brake Torque Stay. Remove the rear nut and loosen the front nut and bolt.

Brake Adjusting Nut. Unscrew this nut and remove the brake rod from the lever arm.

Spindle Nuts. Unscrew the two spindle nuts and remove from the spindle.

Chain Adjuster Assembly. Pull the wheel back in the frame a short distance and disconnect the adjuster assembly from the spindle.

DISMANTLING THE REAR WHEEL

Brake Anchor Plate. Unscrew the anchor plate nut and hold the brake lever against the spring tension just sufficiently to permit the removal of the anchor plate.

Spindle. Remove the anchor plate distance piece and knock out the spindles, taking care not to damage the thread.

INDEX TO FIG. 43. REAR WHEEL

Index No.	*Description.*	*Index No.*	*Description.*
1	Nut, spindle.	18	End plate, adjuster.
2	Locknut, anchor plate.	19	Nut.
3	Lever, cam operating.	20	Nut, cam lever.
4	Plate, anchor.	21	Spring, cam lever return.
5	Shoe, c/w lining.	22	Spring, shoe return.
6	Lining, shoe.	23	Cam, operating.
7	Rivet, lining.	24	Locking screw, bearing retaining ring.
8	Distance piece, L.H. bearing.	25	Ring, bearing retaining.
9	Brake drum and sprocket.	26	Ring, L.H. bearing backing.
10	Lockplate.	27	Hub.
11	Bolt, drum to hub.	28	Spoke, 76° head.
12	Distance piece.	29	Nipple, spoke.
13	Spoke, 80° head.	30	Spoke, 100° head.
14	Spoke, 97° head.	31	Spindle.
15	Bearing.	32	Cap, dust.
16	Nut, R.H. bearing retaining.	33	Distance piece.
17	Adjuster, chain.	34	Rim, wheel.

ASSEMBLING THE REAR BRAKE ANCHOR PLATE

Brake Shoe Cam. Grease the spindle of the cam and insert it into the housing from the inside of the brake anchor plate. Place the return spring in position (long end away from the anchor plate) and tap the lever arm onto the square shoulder at right angles to the flat side of the cam. Fit the lever nut and tighten.

Brake Shoes. Place the two shoes side by side in the positions which they will occupy in the drum. Fit the return springs to the retaining hooks, then, taking a shoe in each hand and at the same time holding the springs in tension, position the shoes to the anchor plate. With floating brake shoes see page 120. By turning the top of the shoes inwards, the assembly can be placed over the cam and the fulcrum pin and snapped down into position by pressing on the outside of the shoes.

ASSEMBLING THE REAR WHEEL

Brake Drum. If the brake drum and sprocket has been removed for rectification, it should be secured in position with the eight locking nuts. Ensure that four locking washers are used both on the inside and the outside of the brake drum. Tap the locking tabs up the sides of the bolts to lock them.

Bearing, Brake Drum Side. Place the locking ring into the hub from the brake drum side until it contacts the small shoulder inside the hub. Press the bearing in, up to the backing ring, and secure in position by tightening the ring nut. Lock the nut with the grub screw.

Bearing, R.H. Side. Turn the wheel brake drum downwards and insert the bearing distance piece into the hub until it contacts the brake drum side bearing. Press the R.H. side bearing into the hub, followed by the dust cover.

Spindle. Insert the spindle through the bearings and secure the spindle (opposite brake drum) in the vice. Do not forget to protect the spindle threads against damage by fitting soft clamps over the vice jaws.

Anchor Plate Assembly. Fit the distance piece (shouldered end towards the operator) and, holding the brake lever slightly towards the "ON" position to overcome the tension of the return spring, fit the anchor plate over the spindle and to the brake drum. Replace the anchor plate securing nut to the spindle and securely tighten.

Shouldered Spindle Nut. Remove the wheel from the vice and replace with the brake anchor plate downwards, this time holding the spindle nut. Fit and screw down the shouldered nut until it is hard against the bearing.
The wheel is now ready for assembly to the frame.

Brake Torque Stay. Remove the rear nut.

Spindle Sleeve Nut. Unscrew this nut and remove the brake drum assembly from the frame.

DISMANTLING THE BRAKE DRUM AND SPROCKET ASSEMBLY

Anchor Plate Assembly. Hold the lever arm against the tension of the spring to prevent the brake shoes from binding and lift the anchor plate assembly away from the brake drum.

Brake Drum Spindle Sleeve. Push this sleeve out of the brake drum, applying pressure on the threaded end.

Bearing. Remove the bearing retaining circlip with a pair of thin nosed circlip pliers and tap out the bearing, dust cap and felt washer.

DISMANTLING THE ANCHOR PLATE ASSEMBLY

Brake Shoes. Take off both brake shoe return springs and remove the brake shoes.

Brake Shoe Cam. Remove the nut and washer securing the lever arm to the cam spindle and take off the lever arm. Withdraw the cam from the plate.

INSPECTION AND REPLACEMENT OF WORN PARTS

The examination of the wheel parts is exactly as described on page 124, for the non Q.D. standard rear wheel, except for the following differences:-

Brake Drum and Hub Splines. These should be a push fit into one another.

Brake Drum Bearing. Wash in petrol and when dry, check for pitting and indentation of the balls or race tracks and end float. Scrap if this is in evidence.

Sleeves. Examine the threads and the cone fittings on both. Also check the fit of the bearings as any slackness would cause a certain amount of wheel shake.

Felt Washer and Hub to Brake Drum Rubber Seal. When overhauling the wheel, the washers and seal should be replaced to ensure against loss of grease and grease penetration into the brake drum.

ASSEMBLING THE REAR BRAKE ANCHOR PLATE

Brake Shoe Cam. Grease the spindle of the cam and insert it into the housing from the inside of the brake anchor plate. Place the return spring in position (long end away from the anchor plate) and tap the lever arm onto the square shoulder at right angles to the flat side of the cam. Fit the lower nut and tighten.

Brake Shoes. Place the two shoes side by side in the positions which they will occupy in the drum. Fit the return springs to the retaining hooks, then, taking a shoe in each hand and at the same time holding the springs in tension, position the shoes to the anchor plate. By turning the top of the shoe inwards the assembly

can be placed over the cam and the fulcrum pin and snapped down into position by pressing on the outside of the shoe. With floating shoes see Page 120. Wind the brake lever arm anti-clockwise to engage the return spring.

ASSEMBLING THE BRAKE DRUM AND SPROCKET ASSEMBLY

Bearing. Insert the shim steel grease retainer. Pack the bearing with High Melting Point Grease (see page 180). Press the bearing into the brake drum and fit the felt dust excluder and washer on top. Secure in position with the circlip.

Spindle Sleeve (Short). Slide the spindle sleeve, threaded end first, through the dust cover, bearing and brake drum.

Anchor Plate Assembly. Hold the brake lever arm towards the "ON" position and slide the anchor plate assembly over the spindle sleeve and into the brake drum.

REPLACING THE BRAKE DRUM AND SPROCKET IN THE FRAME

Brake Drum and Sprocket. Position to the swinging fork and ensure that the stud on the anchor plate is located in the brake torque stay hole and screw the nut in position.

Rear Brake Rod. Engage the rod in the lever trunnion and screw on the adjuster nut.

Chain Adjuster. Fit over the sleeve and engage the end plate to the fork end. Screw on the adjuster nut to hold the adjuster in position.

INDEX TO FIG. 44. QUICKLY DETACHABLE REAR WHEEL

Index No.	*Description.*	*Index No.*	*Description.*
1	Nut, L.H. side sleeve.	20	Spindle.
2	Nut, cam lever.	21	Adjuster, chain.
3	Plate, anchor.	22	End plate, adjuster.
4	Shoe c/w lining.	23	Nut.
5	Lining, shoe.	24	Lever, brake cam.
6	Rivet, lining.	25	Spring, cam lever return.
7	Brake drum and sprocket.	26	Spring, shoe return.
8	Felt washer.	27	Cam, brake operating.
9	Retainer, brake drum bearing.	28	Bearing, brake drum.
10	Rim, wheel.	29	Sleeve, brake drum.
11	Bearing, taper roller.	30	Circlip, bearing retaining.
12	Sleeve, bearing.	31	Cap, dust.
13	Hub.	32	Ring, bearing backing.
14	Spoke, 14A. Spoke.	33	Seal, hub to drum dust.
15	Spoke, 15A. Spoke.	34	Nipple, spoke.
16	Cap, dust.	35	Ring, bearing backing.
17	Locknut, bearing.	36	Felt washer.
18	Collar, spindle distance.	37	Distance piece, R.H. bearing.
19	Collar, spindle.	38	Grease retainer.

TYRES

The Dunlop Motorcycle Tyres as fitted to all models, are of the wire bead type and are fitted into a well-base rim. The wire bead ensures that there will be no stretch in the tyre and in combination with the well-base rim, provides for easy fitting and removal of the tyres and the safe use of air pressures.

TYRE PRESSURE

Tyre pressure should always be carefully maintained as an insufficiently inflated tyre is a prevalent cause of failure of the tyre walls. The actual pressure at which the tyres should be maintained, is a matter for experiment and depends on the rider's weight and also the weight of a passenger and luggage if carried.

DUNLOP RECOMMENDED TYRE PRESSURES (SOLO)

MODEL.		TYRE SIZE.	INFLATION. PRESSURE. P.S.I.	Kgms/sq.cm.
5T, 6T, T110 & T120	FRONT	3.25	20	1.4
	REAR	3.50	20	1.4
T100	FRONT	3.25	20	1.4
	REAR	3.50	20	1.4
TR5 & TR6	FRONT	3.25	20	1.4
	REAR	4.00	18	1.3

These inflation pressures are based on a rider's weight of 170 lb.

When additional weight is added, reference should be made to the Dunlop Booklet which advises the necessary increased inflation pressure.

EXAMINATION

Especially during the period when the roads are being tarred and gritted, the tyres should be examined periodically and any sharp pieces of stone removed from the treads. If they are allowed to remain, no immediate damage may be done, but they will later work right through the cover and puncture the tube.

REMOVING THE TYRE

Valve Cap and Core. Unscrew the valve cap and use the specially shaped end to unscrew the valve core and deflate the tyre. Unscrew the knurled nut and with the valve cap and core, place the parts where they will be free from dirt and grit.

Preparation of Tyre and Levers. It is advisable to lubricate the cover beads with a little soapy water before commencing to remove the tyre. Levers should be dipped in this solution before each insertion.

Inner Tube. Inflate the inner tube just sufficiently to round it out without stretch, dust it with french chalk and insert it into the cover, leaving it protruding beyond the beads for about 4 inches either side of the valve.

Lubrication. Here again it is a wise precaution to lubricate the beads and levers with soapy water.

First Bead. Squeeze the beads together at the valve position to prevent the tube from slipping back inside the cover and push the cover towards the rim, threading the valve through the valve holes in the rim band and rim. Allow the first bead to enter the well of the rim and the other bead to lie above the level of the rim flange. Working from the valve, press the first bead over the rim flange by hand, moving forward in small steps and making sure that the part of the bead already dealt with lies in the well of the rim. If necessary, use a tyre lever for the last few inches.

Second Bead. Press the second bead into the well of the rim diametrically opposite the valve. Insert a lever as close as possible to the point where the bead passes over the flange and lever the bead into the flange, at the same time pressing the fitted part of the bead into the well of the rim. Repeat until the bead is completely over the flange, finishing at the valve position.

Valve. Push the valve inwards to make sure that the tube near the valve is not trapped under the bead. Pull the valve back and inflate the tyre. Check that the fitting line on the cover is concentric with the top of the rim flange and that the valve protrudes squarely through the valve hole. Fit the knurled rim nut and valve cap.

SECURITY BOLT

The rear tyre is fitted with a security bolt and although the basic procedure for fitting and removing the tyre is the same, the following additional instructions should be followed:-

REMOVING THE TYRE

Valve Cap and Core. Remove as described and deflate the tyre.

Security Bolt and Nut. Unscrew the nut and push the bolt through the inside of the cover.

First Bead. Remove as described.

Security Bolt. Remove from rim.

Inner Tube. Remove as described.

Second Bead. Remove as described.

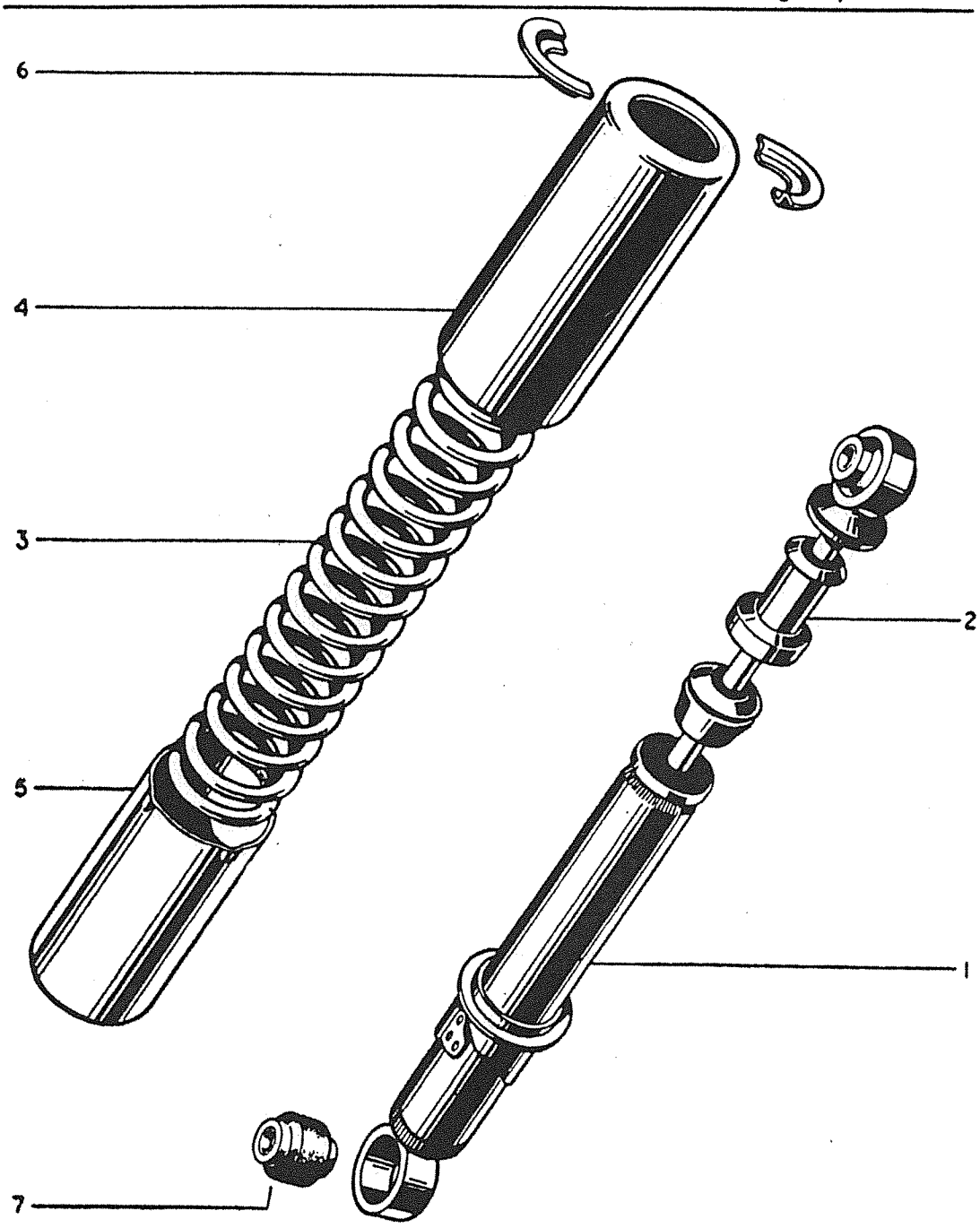


Fig. 46. GIRLING HYDRAULIC SUSPENSION UNIT

INDEX TO FIG. 46. GIRLING HYDRAULIC SUSPENSION UNIT.

Index No.	Description.	Index No.	Description.
1	Damper unit.	5	Dust cover, inner.
2	Bump stop.	6	Spring retainer.
3	Main spring.	7	Bonded bush and sleeve.
4	Dust cover, outer.		

TWISTGRIP CONTROL

A quick-action twistgrip throttle control is fitted. The damping of the rotor is controlled by a knurled adjuster nut fitted in the twistgrip. To increase the damping, screw in the adjuster until the friction is sufficient to hold the rotor sleeve in any position. Remember that the twistgrip will close immediately the hand is removed to give a road signal if the damping device is not sufficiently adjusted. Maintenance of the twistgrip calls only for light grease lubrication when assembled.

DISMANTLING

Cable Thimble. Unscrew the thimble from the twistgrip head. This is usually made easier by pulling on the cable adjacent to the twistgrip. When unscrewed, the cable simply pulls out of the twistgrip.

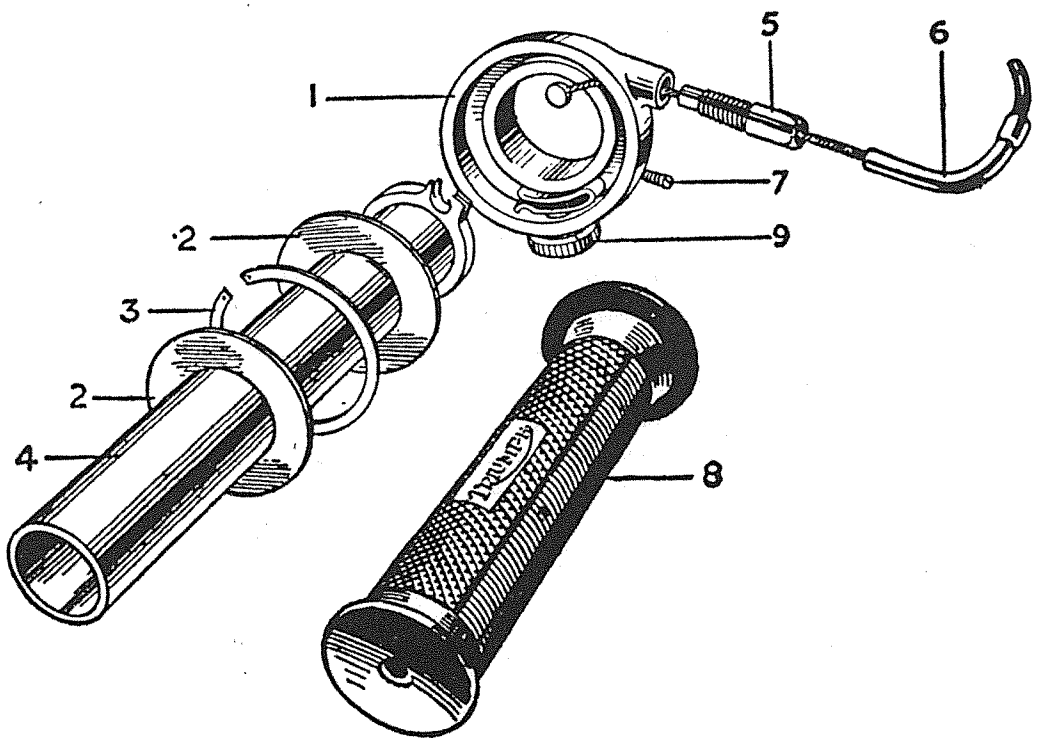


Fig. 47. TWISTGRIP.

Index No.	*Description.*	*Index No.*	*Description.*
1	**Head assembly.**	6	**Guide tube.**
2	**Plate, retaining.**	7	**Grub screw.**
3	**Circlip.**	8	**Grip, rubber.**
4	**Sleeve assembly.**	9	**Screw, friction adjuster.**
5	**Thimble, cable.**		

FITTING A SIDECAR

First prepare the motorcycle. Fit an engine sprocket having 2 or 3 teeth less than the solo sprocket. Replace the springs in the rear suspension units with 150 lb. rate springs. The appropriate front fork springs (see pages 105 and 113) should be fitted and additionally if a machine with rear panels is being converted, fit longer fork legs available under part number CP.183.

There are fixing points on the frame of the motorcycle at the top and bottom of the seat tube. For frames with the single front down tube a lug is also available for fixing to the front engine plates. Any other connections are provided by the sidecar manufacturers. Fittings on the front down tube should be fitted as high as possible with the smaller part projecting in front of the tubes.

THE CONNECTION MUST BE CLEAR OF THE MUDGUARD WHEN THE FORKS ARE FULLY COMPRESSED, OR THE STEERING MAY JAM WHEN BRAKING HEAVILY.

The following settings give good results although many experienced sidecar drivers may have their own preferences. The sidecar wheel should be 6 in. ahead of the rear wheel and toe-in $\frac{3}{8}$ in. measured at the front wheel. The motorcycle should be upright when the outfit is carrying its normal load, that is it will probably lean towards the sidecar when unladen.

With most makes of sidecar it is necessary to remove the centre stand to allow for the bottom connection, but a light jack and bracket are available for 1954-59 models under part number CP.153.

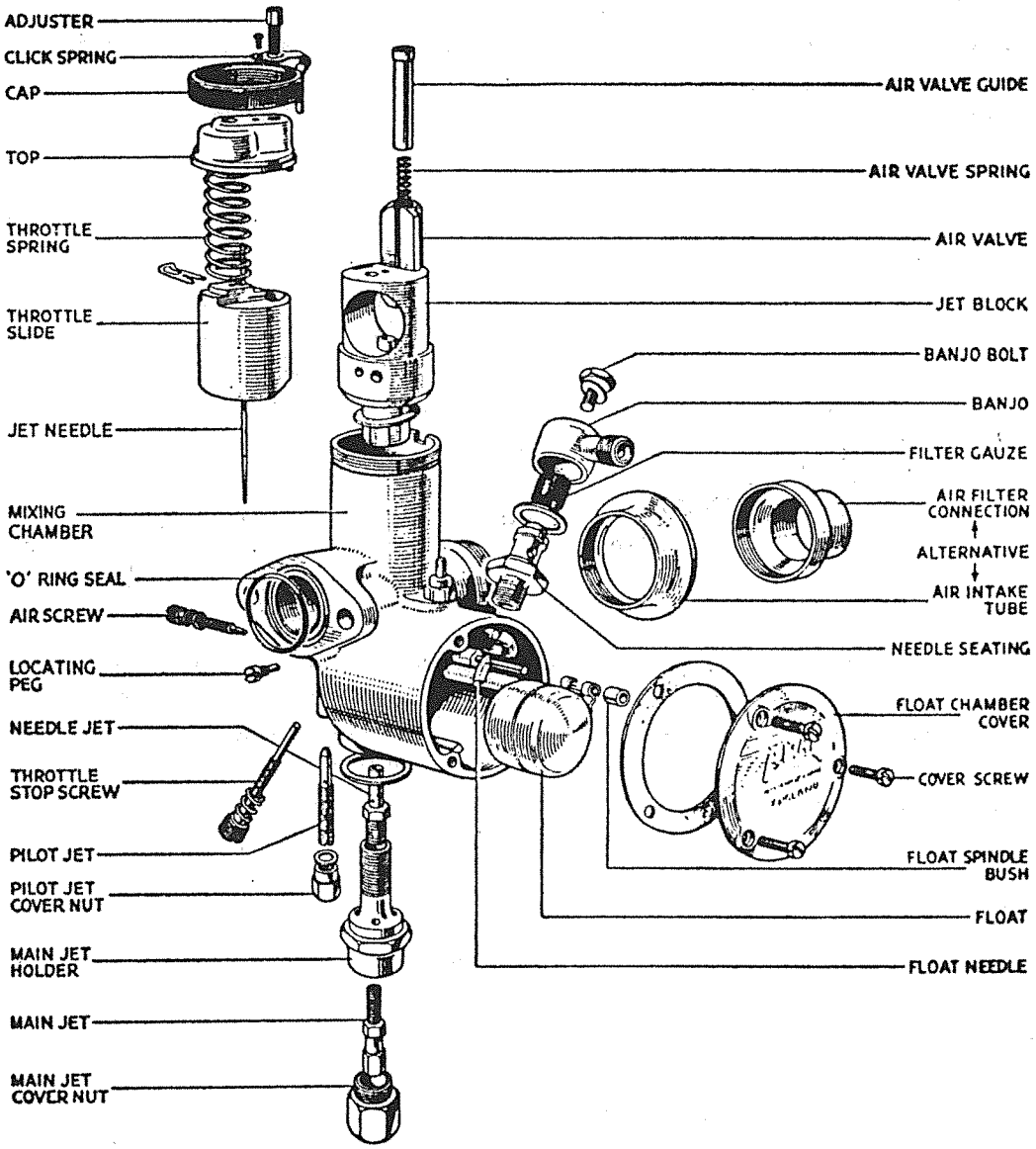


Fig. 48. AMAL MONOBLOC CARBURETTER.

AIR FILTER

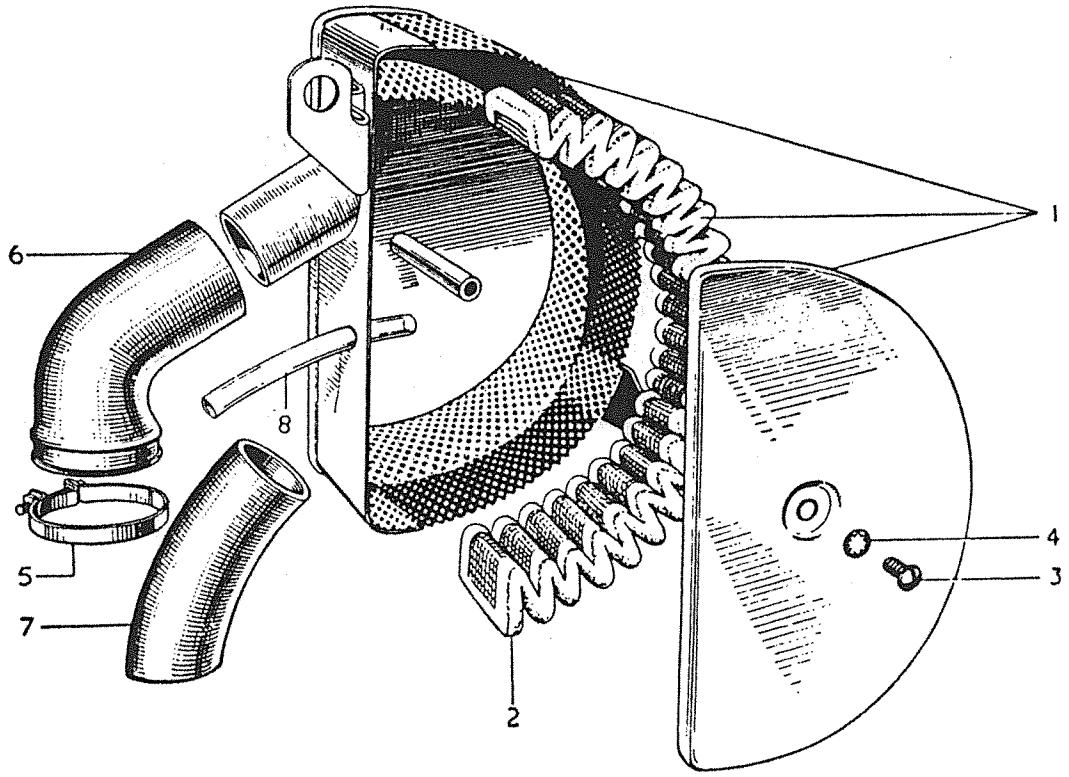


Fig. 49. AIR FILTER.

INDEX TO FIG. 49. AIR FILTER

Index No.	Description.	Index No.	Description.
1	Filter assembly.	6	Connection, Amal carburetter to filter (rubber).
2	Element, filter.	7	Connection, S.U. carburetter to filter (rubber) 6T.
3	Screw, cover.	8	Vent pipe, carburetter to filter, 6T.
4	Washer, shakeproof.		
5	Clip, connection to carburetter.		

SERVICING THE FILTER

To service the filter, the oil tank must first be detached. This operation necessitates the removal of the three fixing bolts and disconnection of the oil pipes. Disconnect the rubber sleeve and remove the air filter.

To remove the filter element, unscrew the screw securing the cover, when the latter can be removed and the element extracted.

THE S.U. M.C.2 CARBURETTER*

ADJUSTMENT AND TUNING

The S.U. Carburetter is of the automatically expanding type in which the cross sectional area of the air passage, and the effective orifice of the jet are variable. The choice of the needle which governs the effective orifice of the jet is settled for a particular engine after considerable testing, both on the engine test bed and afterwards on Road Test, with Premium Grade Petrols, and it is not, therefore, a common requirement that the needle type should be changed from the maker's original specification. Low grade and alcohol blended petrols may require the substitution of a richer than standard needle.

The standard needle is M9, but sidecar machines are sometimes improved by fitting M7. If any doubt arises as to the correctness of the type fitted, this can be checked by first removing the suction chamber and then slackening the side needle screw when the needle can be pulled out and its markings by numbers or letters checked. These identifying letters and numbers may be rolled round the shank, or stamped on the flat end of it. If, therefore, an alteration to mixture strength is required this needle alone should be changed, as all jets are of standard size and as THE JET ADJUSTING NUT IS FOR SETTING THE IDLING ONLY.

It is most important that the needle is fitted with its shoulder FLUSH WITH THE FACE OF THE PISTON, as shown in the diagram.

When detaching the suction chamber and piston assembly from the main carburetter body (necessary when checking or changing the needle) it will be necessary to remove the OIL CAP. After the two side screws have been removed lift the assembly off the carburetter body. This will call for a certain amount of manual dexterity, as the suction chamber can only be lifted a limited amount. One hand is required to lift the suction piston upwards inside the chamber against the piston spring, whilst the other steadies the suction chamber. The complete unit can then be moved sideways, clear of the main instrument, but great care must be taken to see that the JET NEEDLE IS NOT BENT.

When re-fitting the suction chamber and piston the procedure is, of course, reversed, and the piston should be held as high up as possible inside the suction chamber whilst the assembly is guided carefully into the piston bore and jet in the main body. A slot in the small piston diameter registers with a riveted brass guide in the body.

Tuning the carburetter, which should only be carried out after the engine has reached its normal running temperature, is confined to correct idling adjustment by means of the throttle stop screw, which governs the amount of throttle opening for IDLING SPEED, and the jet adjusting nut (18) which controls the IDLING MIXTURE. Screwing this nut up weakens the mixture and down enriches it.

NOTE. This nut must not be forced, as this may set the jet off centre.

**All references to numbers in the script apply to Fig. 51 only.*

INDEX TO FIG. 50. S.U. CARBURETTER (COMPONENT PARTS)

Index No.	Description.	Index No.	Description.
1	Body.	33	Pivot pin, long.
2	Adaptor, throttle barrel.	34	Pivot pin, short.
3	Screw, adaptor to body.	35	Bolt.
4	Gasket, adaptor to body.	36	Washer, fibre.
5	Abutment, throttle cable.	37	Washer, spring.
6	Screw.	38	Washer.
7	Screw, plug 2 B.A.	39	Nut.
8	Washer.	40	Split pin.
9	Chamber, suction complete.	41	Spring, return.
10	Spring, piston.	42	Chamber, float.
11	Washer, thrust.	43	Lid, float chamber.
12	Screw, needle.	44	Float.
13	Needle, jet.	45	Needle and seat.
14	Screw.	46	Lever, hinged.
15	Washer, spring.	47	Pin, hinge.
16	Washer, oil cap.	48	Washer, fibre.
17	Oil cap, octagonal.	49	Washers, 2-fibre, 1-brass.
18	Jet.	50	Washer, float chamber lid.
19	Screw, jet.	51	Bolt, holding.
20	Bearing, jet top half.	52	Nut, float chamber lid.
21	Bearing, jet bottom half.	53	Cap, brass.
22	Washer, copper.	54	Throttle spindle.
23	Washer, copper.	56	Disc throttle.
24	Ring, sealing (Brass).	57	Screw.
25	Ring, sealing (Cork).	59	Lever, throttle.
26	Washer, gland (Brass).	60	Bolt.
27	Washer, gland (Cork).	61	Nut.
28	Spring.	62	Washer.
29	Nut, adjusting.	63	Screw, adjusting.
30	Spring.	64	Spring, adjusting screw lock.
31	Lever, jet.	65	Spring, lever return.
32	Link, jet.		

WARNING. Move one "flat" of the nut round at a time and remember to apply slight downward pressure on the jet lever to ensure that the jet follows the adjusting nut, as the jet lever spring (Pt. No. 4872/1) is not strong enough to do this of itself (as in car practice), its sole purpose being to retain the jet against vibration in the position set by the rider. Three "flats" in either direction should be sufficient to identify progress; excess movement would indicate an air leak in the induction system or an ignition fault. A correct idling mixture gives an even beat with a colourless exhaust—too rich a mixture gives a trace of black in the exhaust with a rhythmical or regular misfire—too weak a mixture gives a splashy irregular type of misfire with a marked tendence to stop. To test remove the plug (29) and lift the piston $\frac{1}{16}$ in. (1.5 mm.) with a thin rod. If the mixture is correct the engine will stop, but if it is too rich the engine will speed up.

DEFECTS IN OPERATION

When an engine runs erratically, faults other than carburation can be contributory causes. Before interfering with the carburetter, the following possibilities should be considered:—

(*a*) Compression—Equal pressure in both cylinders; check tappet clearances.
(*b*) Moisture condensation (water)—Examine float chamber and H.T. cables.
(*c*) Ignition System—Inspect the distributor points, clean and adjust if necessary.

Contact breaker and condenser condition is most important. Sparking plugs should be cleaned and re-gapped (See Technical Data) and pressure tested. Correct timing is vital to good idling, in particular excessive advance and faulty operation of the automatic mechanism must be rectified.

(*d*) Check for air leaks:—

(i) Between the MANIFOLD and CYLINDER HEAD.
(ii) Between the MANIFOLD and CARBURETTER.
(iii) Between the TWO HALVES of the CARBURETTER.
(iv) at the SUCTION CHAMBER CAP.

If, however, the engine and ignition are found to be faultless the following points should be checked on the carburetter:—

STICKING OF PISTON

The symptoms here are either stalling and a refusal of the engine to run slowly or, alternatively, lack of power accompanied by excessive fuel consumption. This defect is easily detectable. When the engine is not running the piston should rest upon the bridge (28). When raised by the hand through the air intake, the piston should drop freely and strike the bridge sharply and distinctly. To do this the filter rubber connection must first be removed.

If it becomes prematurely arrested in its downward movement, or appears unduly reluctant to break away from its position of rest on the bridge when an attempt is made to raise it from this position, the jet should be lowered by means of its lever, and the test repeated.

If the symptoms persist, it can be assumed that either the large diameter of the piston is making contact with the bore of the suction chamber, or the small diameter with the carburetter body, or that the piston rod is not sliding freely within its bush.

When, on the other hand, sticking has been eliminated by the act of lowering the jet, the indication is that the needle is binding on the jet either due to its being bent or to the latter being out of centre. Normally the needle should never touch the jet orifice when correctly assembled.

(If visual evidence clearly indicates needle wear and jet ovality, both should be renewed).

Rectification should be conducted as follows according to the diagnosis:—
Dirt or contact between the piston and suction chamber, or sticking of the piston rod in its bush.

FLOODING FROM FLOAT CHAMBER OR MOUTH OF JET

Flooding may occur due to a punctured float, or to dirt between the float chamber needle valve and its seating. To remedy either defect, the float chamber lid should be removed and the necessary cleaning, float replacement or repair effected. The needle and seating unit number is T2, to identify which two ring grooves are machined around the seating.

Flooding may also occur if the original manufacturer's setting of the hinged fork lever (11) in the top of the float chamber has been disturbed, possibly causing the petrol level to be higher than normal, this higher level giving a slow petrol bleed over the jet bridge. The setting figure for this fork is that with the fork pressing the needle home on its seating, a $\frac{3}{8}$in. (9.5 mm.) diameter test bar should just slide easily between the curve of the fork and the circular facing of the float lid casting.

Flooding may also be caused by a bad seal between the float needle and its seating, and which may sometimes be restored by giving the needle a few light taps with a delicate instrument such as the handle of a screwdriver:

ROUGH HANDLING WILL RENDER THE PARTS SCRAP.

Leakage from bottom of Jet

If persistent slow leakage is observed in the neighbourhood of the jet head, it is probable that the jet gland washer (7) and its lower counterpart, together with the locking screw washer (19) require replacement. The jet lever (23) should first be detached from the jet head, the locking screw (15) removed, and the entire jet and jet bush assembly withdrawn. On re-assembly, great care should be taken to replace all parts in their correct situations, as shown in the diagram. Re-centring of the jet, as previously described, will of course be necessary after this operation.

HINTS AND TIPS

These are a few of the points to which the Owner should pay particular attention in order to maintain minimum fuel consumption and maximum power.

1. The Float Chamber. If rough running and poor idling are suddenly experienced, the internal float chamber condition is usually responsible. To overcome this trouble remove the float chamber every two months and thoroughly clean. When replacing, do not overtighten the lid sleeve nut as this will cause distortion and leakage of fuel at the joint between lid and float chamber.

2. Air Leaks. Leakage at the manifold to engine and carburetter to manifold will completely upset the smooth performance of the engine.

3. Sticking Piston. Dirt, corrosion or malalignment of the jet will cause the piston to stick. Make sure that the suction chamber and piston are perfectly dry and clean, and that the PISTON ROD, which must move freely in its bush, IS OILED. Before attempting to re-centre the jet try the effect of turning it through 180°. It may have been replaced in the opposite position, in the mixture lever.

4. Throttle Spindle. Overstressing the throttle spindle torsion return spring is a common fault. This causes the coils to bind before full throttle is attained, and may disturb the whole mechanism. Incorrect positioning of the movable throttle lever may do the same.

LUCAS ELECTRICAL EQUIPMENT

DYNAMO LIGHTING AND MAGNETO IGNITION

DYNAMO

Output Control. The dynamo works in conjunction with a regulator unit to give compensated voltage control. Although combined structurally, the regulator and cut-out are electrically separate. Both are accurately adjusted during manufacture and should not be tampered with.

The regulator provides a completely automatic control. It causes the dynamo to give an output which varies according to the load on the battery and its state of charge. When the battery is discharged, the dynamo gives a high output, but if the battery is fully charged then the dynamo gives only a trickle charge so as to keep the battery in good condition. In addition to controlling the output of the dynamo according to the condition of the battery, the regulator provides for an increase of output to balance the current taken by the lamps when in use.

The cut-out is an automatic switch which connects the dynamo to the battery only when the dynamo voltage exceeds the battery voltage, or conversely, which disconnects to prevent the battery discharging through the dynamo windings.

The dynamo output is accurately set to suit the requirements of the motorcycle and in normal service the battery will be kept in a good condition. If due to special running conditions it is found that the battery is not kept in a charged condition or is being overcharged, the regulator should be re-set by a Lucas Service Depot or Agent. Accurate measuring equipment is required to set the regulator correctly.

Ammeter Readings. Normally, during day time running when the battery is in good condition, the dynamo gives only a trickle charge so that the ammeter needle should show only a small deflection to the "+" side of the scale.

A discharge reading should be observed immediately after switching on the headlamp. This usually happens after a long run when the battery voltage is high. After a short time the battery voltage will drop and the regulator will respond, causing the dynamo output to balance the lamp load.

Lubrication. No lubrication is required to these models as ball bearings are fitted at both ends. These bearings are packed with grease during assembly and will last until the machine is taken down for a general overhaul.

Inspection of Brushgear and Commutator. Every six months, remove the commutator cover and inspect the brushgear and commutator. The brushes, which are held in boxes by means of springs, must make firm contact with the commutator. Move each brush to see that it is free to slide in its holder; if it sticks, remove it and clean with a cloth moistened with petrol. Care must be taken to replace the brushes in their original position, otherwise they will not "bed" properly on the commutator. If after long service the brushes have become worn to such an extent that they will not bear properly on the commutator they must be replaced. Always use genuine Lucas brushes, which should be fitted by a Service Agent so that they can be properly bedded to the commutator.

Examine the commutator, which should be free from any trace of oil or dirt and should have a highly polished appearance. Clean a dirty or blackened commutator by pressing a clean dry cloth against it whilst the engine is slowly turned over by means of the kickstarter crank. (It is an advantage to remove the sparking plugs before doing this). If the commutator is very dirty, moisten the cloth with petrol.

MAGNETO

The magneto is of rotating armature pattern, having its magnet cast into the body, so eliminating joints and improving the weatherproof properties of the magneto. The ignition timing is controlled by a manual lever situated on the handlebar.

Lubrication—Every 3,000 miles (5,000 kms.). The cam is supplied with lubricant from a felt pad contained in a pocket in the contact breaker housing. A small hole in the cam fitted with a wick, enables the oil to find its way to the surface of the cam. Remove the contact breaker cover, turn the engine over until the hole in the cam can be clearly seen and then carefully add a few drops of thin machine oil. Do not allow any oil to get on or near the contacts. If the cam ring is removed, the wick should be taken out and soaked in thin machine oil. Wipe the wick to remove surplus oil, before replacing.

The contact breaker rocker arm pivot also requires lubrication and the complete contact breaker must be removed for this purpose. Take out the hexagon-headed screw from the centre of the contact breaker and carefully lever the contact breaker off the tapered shaft on which it fits. Push aside the rocker arm retaining spring, lift off the rocker arm and lightly smear the pivot with Mobilgrease No. 2 or an equivalent grease.

Remove the cam ring, which is a sliding fit in its housing, and lightly smear inside and outside surfaces with Mobilgrease No. 2. Removal and re-fitting of the cam can be made easier if the handlebar control lever is half retarded, thus taking the cam away from its stop pin. Allow one or two drops of thin machine oil to the felt cam lubricator in the housing. Re-fit the cam, taking care that the stop peg in the housing and the timing control plunger engage with their respective slots.

If an earthing brush is fitted at the back of the contact breaker base, see that it is clean and can move freely in its holder, before re-fitting to the contact breaker. When replacing the contact breaker, take care to ensure that the projecting key on the tapered portion of the contact breaker base engages with the keyway cut in the magneto spindle, otherwise the timing of the magneto will be affected. Replace the contact breaker securing screw and tighten with care.

The armature bearings are packed with grease during assembly, and will not need attention until the motorcycle is dismantled for general overhaul, when it is advisable to have the magneto inspected by a Lucas Service Depot or Agent.

LUCAS RM 14, RM 13/15 AND RM 15

A.C./D.C. LIGHTING AND IGNITION

GENERAL DESCRIPTION

Under NORMAL running conditions, electrical energy in the form of rectified A.C. passes through the battery from the alternator—the rate of charge depending on the position of the lighting switch. When no lights are in use, the alternator output is sufficient only to supply the ignition coil and to trickle-charge the battery. When the lighting switch is turned to the "PILOT" or "HEAD" positions, the output increases proportionately.

Under EMERGENCY starting conditions, trickle-charging continues whilst an ignition performance similar to that from a magneto is obtained. AFTER THE ENGINE HAS BEEN STARTED, NORMAL RUNNING IS RESUMED BY TURNING THE IGNITION KEY FROM "EMG" to "IGN". IF THE BATTERY MUST BE REMOVED, THE ENGINE CAN BE RUN TEMPORARILY WITH THE IGNITION SWITCH IN THE "EMG" POSITION PROVIDING THAT THE BATTERY NEGATIVE INPUT CABLE (BROWN) IS EARTHED TO THE FRAME. UNDER THESE CONDITIONS NO LIGHTS ARE AVAILABLE.

CIRCUIT DETAILS

The alternator stator carries three pairs of series-connected coils, one pair being permanently connected across the rectifier bridge network. The purpose of this latter pair is to provide some degree of charging current for the battery whenever the engine is running.

Connections to the remaining coils vary according to the positions of the lighting and ignition switch controls. When no lights are in use, the alternator output from the battery charging coil is regulated to a minimum by interaction of the rotor flux set up by current flowing in the short circuited coils.

In the "PILOT" position these latter coils are disconnected and the regulating fluxes are consequently reduced. The alternator output therefore increases and compensates for the additional parking light load. In the "HEAD" position, the alternator output is further increased by the connection of all three pairs of coils in parallel.

EMERGENCY STARTING (IGNITION SWITCH AT EMG.)

With this circuit the contact breaker is arranged to open when the alternating current in the windings reaches a maximum. The ignition coil primary winding and the contact breaker are connected in series. When the contacts separate H.T. current is induced in the coil secondary windings, thus producing a spark at the plug.

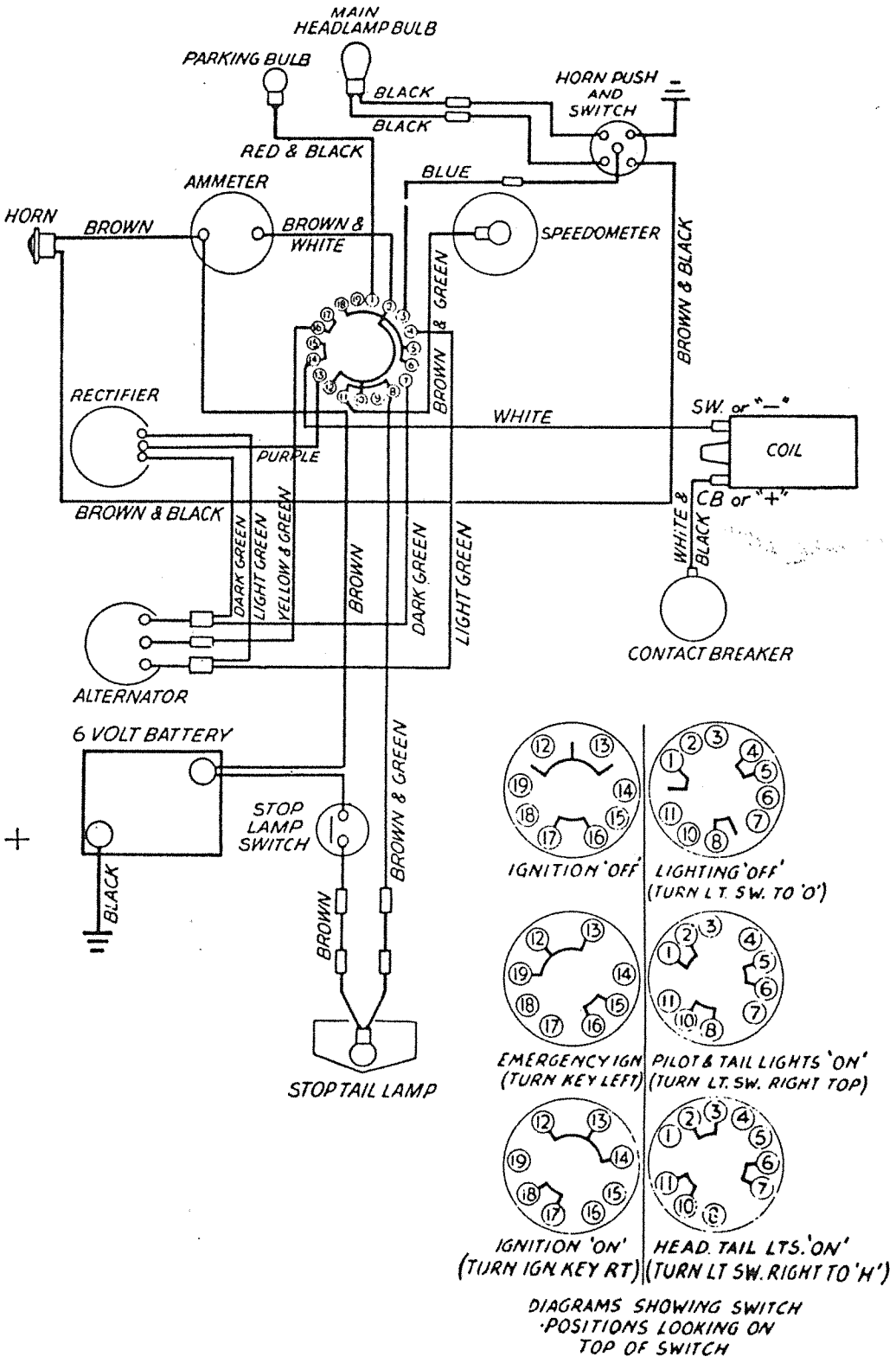


Fig. 54. WIRING DIAGRAM (5T & 6T).

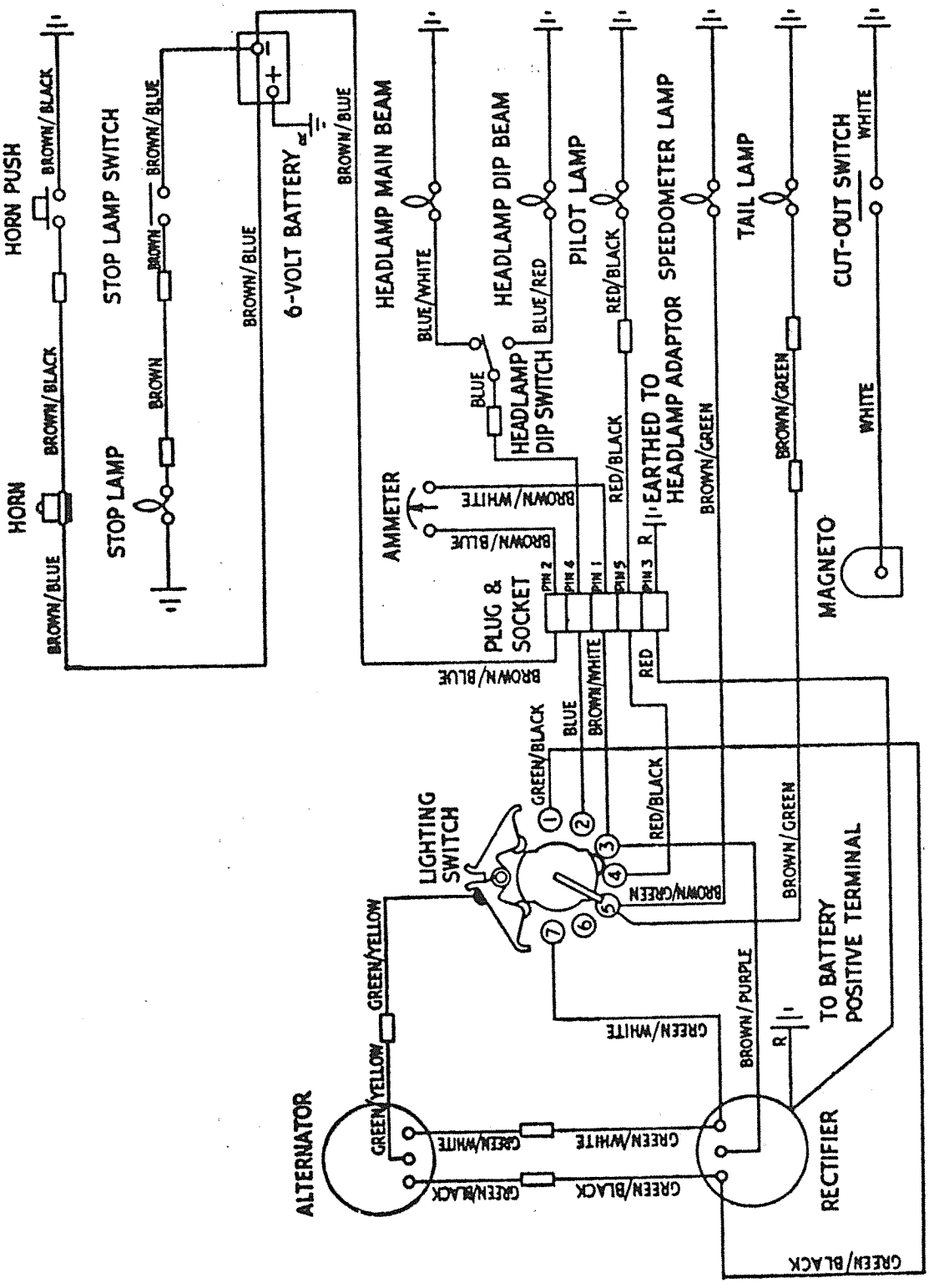


Fig. 56. WIRING DIAGRAM (LATER T110, TR6 & T120).

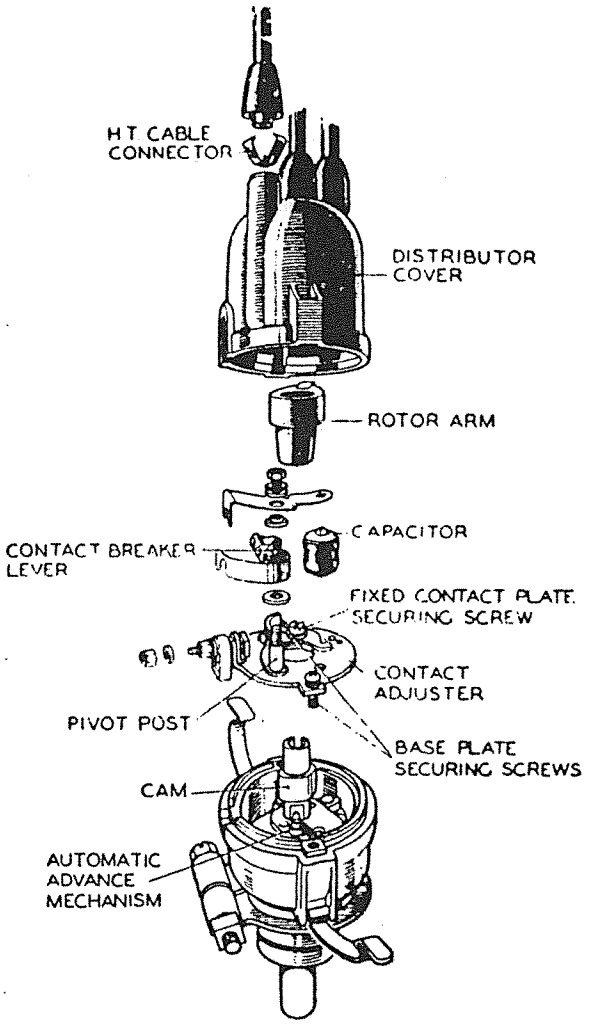


Fig. 58. DISTRIBUTOR, MODEL 18 D2.

Cleaning: Every 6,000 miles (10,000 kms.)

Remove the distributor cover and wipe it inside and outside with a clean, dry, fluffless cloth.

Examine the contact breaker. The contacts must be free from grease or oil. If they are burned or blackened, clean with fine carborundum stone or very fine emery cloth, afterwards wiping away any dirt or metal dust with a clean petrol-moistened cloth.

The easiest way to clean the contacts is to first take off the moving contact, by unscrewing the nut securing the end of the spring and lifting off the spring washer, spring and bush. Clean the pivot pin and smear it very lightly with clean engine oil before replacing the moving contact and spring.

BEFORE SEARCHING FOR AN IGNITION FAULT, ALWAYS CHECK OVER ALL ELECTRICAL CONNECTIONS; CLEAN AND TIGHTEN IF NECESSARY.

ENGINE WILL NOT START. NO SPARK AT PLUGS

Note. To check, remove the plugs and place them on the cylinder head after re-fitting the connector. Turn the ignition switch to "IGN" (clockwise) and kick over the engine. The plugs should fire with a blue spark. If there is no spark, turn switch to "EMG" (anti-clockwise) and test again.

Plug Oily, Fouled or Faulty. Clean thoroughly, preferably in a plug cleaning machine, re-set the points gap to 0.020 in. (0.50 mm.) and re-fit. Replace with correct grade plug if faulty.

Distributor, Coil or Condenser Faulty

Distributor. See that the cover is properly fitted and the clips secure. Check the gap of the contact breaker points and clean and adjust if necessary (see page 162).

Coil. First clean the coil, particularly between the cable connections. To check the low tension circuit, connect a voltmeter between the coil terminal marked "SW" or "—" and earth. If there is no reading with the ignition switched on there is a fault in the switch or the lead to the coil. Next connect the voltmeter between the coil terminal marked "C.B." or "+" and earth. No reading here with the ignition switched on indicates a fault in the coil primary winding. If these tests show that the low tension primary circuit is in order, remove the coil H.T. lead from the distributor cover. Remove the cover and rotate the engine until the contact points are closed. Switch on the ignition and hold the end of the coil H.T. lead about ¼ in. (6 mm.) from the cylinder block. Flick the contact points open with the finger and a spark should pass to the cylinder block. No spark indicates a fault in the coil H.T. winding. Any fault in a coil can only be corrected by fitting a new unit.

Condenser. To test the condenser, switch on the ignition and connect a volt meter across the open contacts. If there is no reading, remove the condenser and re-test. If a reading on the meter is then obtained, the condenser is faulty and should be changed.

ENGINE WILL NOT START WITH SWITCH ON "IGN" BUT STARTS ON "EMG".

Battery discharged due to short circuit, poor condition due to age or damage, prolonged use for parking or low rate or charge from alternator. Have battery charged from external source and equipment checked by an authorised Lucas Agent or Triumph Dealer as soon as possible.

On the French headlamp, release the two clips securing the adaptor and remove the adaptor. Take out the defective bulb by pressing it in and turning to the left. When replacing the bulb, engage the three points on the bulb in the slots of the adaptor, press in and turn to the right to secure. Replace the adaptor with the projection on the adaptor engaging in the slot on the headlamp and secure by re-fastening the clips. Re-fit the rim to the nacelle, locating the bottom of the rim first. Tighten the securing screw and check the beam setting.

SETTING THE HEADLAMP BEAM

To check the headlamp beam setting, place the motorcycle in front of a light coloured wall at a distance of about 25 feet (8 metres). The machine should be carrying its normal load during this check, since the weight of the rider (and pillion passenger) may affect the setting. Switch on the main beam. This should be directed straight ahead and parallel with the ground. The beam is adjusted on the Trophy models by slackening the two headlamp securing bolts and tilting the lamp to the correct angle. On the models with the nacelle headlamp, loosen the two small screws on either side of the lamp fixing ring, and raise or lower the beam by pulling out or pressing in, the bottom of the ring. When the required adjustment has been obtained, re-tighten the two screws.

With the Lucas pre-focus type bulb fitted in these lamps, the filament is correctly positioned during manufacture in relation to the focal point of the reflector. No further focusing is necessary.

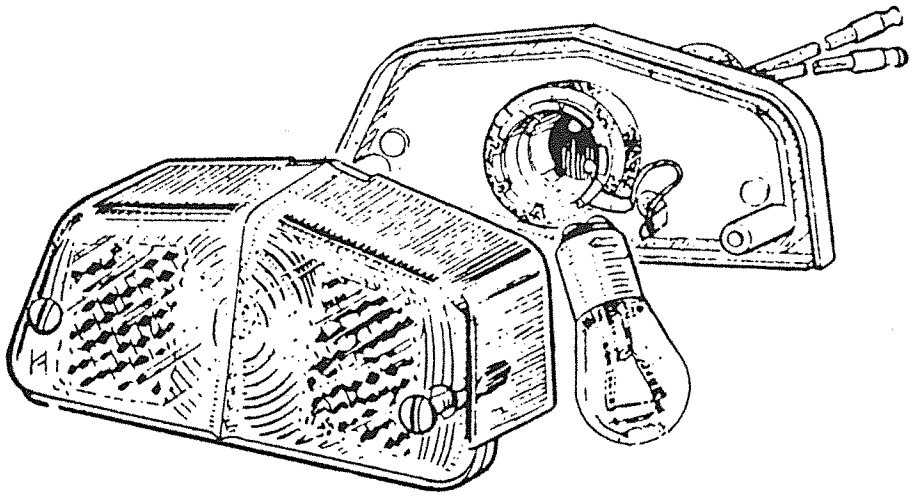


Fig. 59. Stop-Tail Lamp Model 564 incorporating Reflex Reflectors.

Horn. Disconnect both leads.

Dipswitch Lead to Light Switch. Disconnect at the light switch (No. 2 position).

Assembly. Re-assemble in the reverse manner.

REMOVAL (A.C. Equipped Models)

Dismantle as for T100 & T110 to "Rear Nacelle Retaining Screws" and proceed as follows:—

Lighting and Ignition Switch. Unscrew the small grub screw at the side of the plastic switch lever and pull the lever away from the switch. Unscrew the brass nut around the switch body, remove the name disc and push the switch through into the nacelle.

Horn. Disconnect the black lead from the horn terminal.

Speedometer. Unscrew the speedometer drive cable at the head and detach the speedometer light.

Ammeter. Disconnect the brown leads at the ammeter: one from the L.H. terminal and two from the R.H. terminal.

NOTE

If it is intended to remove the top unit only, it is unnecessary to proceed any further. If the forks are to be removed however, it will be necessary to disconnect the blue lead from the dipper switch to switch position number 3 and also the red and black pilot light lead. Both these leads are fitted with snap connectors.

Assembly. Re-assemble in the reverse manner.

BATTERY

Topping Up

During charging, water is lost by gassing and evaporation and this must be replaced to maintain the battery in a healthy condition. Once a month or more often in warm climates, the level of the electrolyte in the cells of the battery must be examined; if necessary, distilled water must be added to bring the electrolyte just level with the top of the separators.

Never use a naked light when examining the condition of the cells, as there is a danger of igniting the gas coming from the active materials.

The MLZ 7E battery with the translucent casing must not be filled to the top of the separators. The battery must be lifted and distilled water added up to the line moulded in the casing.

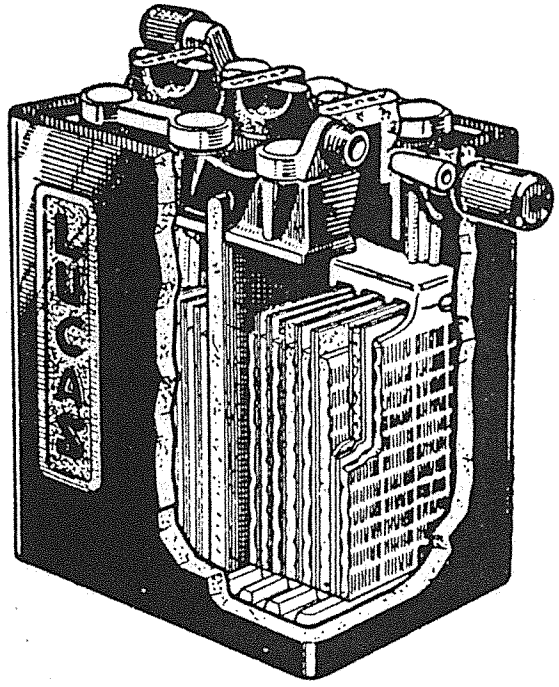
Never leave the battery in a discharged condition. If the motorcycle is to be out of use for any length of time have the battery fully charged and every fortnight, give it a short refreshing charge to prevent any tendency for the plates to become permanently sulphated.

Detachable Cable Connectors

When connecting the battery, unscrew the knurled nut and withdraw the collet or cone shaped insert, noting that it is not interchangeable with the collet in the other terminal. Bare the end of the cable for about one inch and thread one bared end through the knurled nut and collet. Bend back the cable strands over the narrow end of the collet and insert the collet and cable into the terminal block. Secure the connection by tightening the knurled nut.

Battery Earth

The A.C. Lighting-Ignition Unit and dynamo unit have been designed for positive (+ve) earth systems. If the battery connections are reversed the equipment will be damaged.



Battery model PU7E/9, showing correct-acid-level device and detachable cable connectors.

Fig. 61. BATTERY MODEL PU7E/9.

ELECTRIC HORNS

These horns, before being passed out of the Works, are adjusted to give their best performance, and will give a long period of service without any attention.

When the sparking plug is removed for examination, the insulator will show one of the following conditions:—

ASH WHITE. This is a sign that the plug is over-heating. Usual cause is the mixture strength too weak (a common cause being a faulty carburetter to manifold or manifold to cylinder head joint washer) or the ignition too far retarded.

DULL BLACK. This indicates that the plug is running too cold or, in other words the insulator is insufficiently hot to burn off the carbon. This is caused by too rich a mixture or the engine left running with a generous slow running setting (pilot air adjusting screw).

LIGHT BROWN. This shows that the mixture strength is correct and the engine is running at the right temperature.

Before re-fitting the plugs, make sure that the copper washers are not defective in any way. If they have become worn and flattened, fit new ones to ensure that a gastight joint is obtained.

When installing plugs, first screw the plugs down by hand as far as possible, then use spanner for tightening only. Always use a tubular box spanner to avoid possible fracture to the insulator, but do not under any circumstances use a movable wrench. Paint splashes, accumulation of grime dust etc., on the top half of the insulator are often responsible for poor plug performance. Plugs should be wiped frequently with a clean rag.

To save petrol and prevent difficult starting, plugs should be cleaned and tested at regular intervals, and it is suggested that this service be performed at your garage on a special "Air Blast" service unit. Plugs which are allowed to remain oily and dirty with corroded electrodes will seriously impair the efficient running of the motor and waste precious petrol.

To obtain maximum efficiency from the engine and also to maintain good petrol consumption which the motorcycle has when new, plugs should be changed at regular intervals as old plugs are wasteful and cause poor and sluggish running. We recommend inspection, cleaning and testing every 3,000 miles (5,000 kms.), and it will be found economical to replace with new ones annually.

TOOLKIT

Part No.	*Description.*	*Purpose.*
D.360	Spanner, open ended $\frac{1}{8}$ in. × $\frac{5}{32}$ in. Whit.	General
D.361	Spanner, open-ended $\frac{3}{16}$ in. × $\frac{1}{4}$ in. Whit.	,,
NA.55	Spanner, open-ended $\frac{1}{4}$ in. × $\frac{5}{16}$ in. Whit.	,,
DA.16	Spanner, open-ended $\frac{3}{8}$ in. × $\frac{7}{16}$ in. Whit.	,,
PA.57	Spanner, closed $\frac{1}{2}$ in. × $\frac{9}{16}$ in. Whit.	Wheel nuts
D.311	Spanner, closed $\frac{5}{8}$ in. × $\frac{11}{16}$ in. Whit.	Wheel nuts
D.362	'C' Spanner and Tappet Key	Suspension units
D.87	Spanner, box	Sparking plugs
D.336	Screwdriver, Phillips head	General
D.363	Tyre lever—screwdriver	,,
D.364	Tyre lever—clutch key	Clutch adjustment
DA.50/1	Extractor	Clutch hub
415116	Spanner	Contact breaker points
WA.58	Tool roll	
D.49	Tyre inflator (15$\frac{1}{4}$ in. long)	
D.296	Tyre inflator (12 in. long)	

MODEL	5T	6T	T100	T110 & TR6	TR5	T120
CARBURETTER. Type ...	376	S.U. MC2	376	376	376	376 (2)
Main Jet	200	0.090 in.	220	250	220	240
Needle Jet	.1065	—	.1065	.1065	.1065	.1065
Needle Type	C	M9	C	C	C	C
Needle Position	3rd	—	3rd	3rd	3rd	3rd
Throttle Valve	376/3½	—	376/3½	376/3½	376/3½	376/3½
Pilot Jet	30	—	25	25	25	25
GEAR RATIOS. Top ...	5.0	4.57	5.0	4.57	5.24	4.57
3rd	5.95	5.45	5.95	5.45	6.24	5.45
2nd	8.45	7.75	8.45	7.75	8.85	7.75
Bottom	12.20	11.20	12.20	11.20	12.80	11.20
ENGINE SPROCKETS Solo	22	24	22	24	21	24
Sidecar	19	21	19	21	—	—
CHAIN LENGTH Primary ½ in. × .305 in. ...	70	70	70	70	70	70
Rear ⅝ in. × ⅜ in. ...	100	101	100	101	100	101
TYRE SIZE. Front ...	3.25 × 19	3.25 × 19	3.25 × 19	3.25 × 19	3.25 × 19	3.25 × 19
Rear ...	3.50 × 19	3.50 × 19	3.50 × 19	T110 3.50×19 TR6 4.00×18	4.00 × 18	3.50 × 19
BRAKE SIZE. Front—in.	7	7	8	8	7	8
Rear—in.	7	7	7	7	7	7

MODEL	6T	T110	TR6	T120
CARBURETTER. Type	376	376	376	376 (2)
Main Jet	270	250	250	240
Needle Jet	.1065	.1065	.1065	.1065
Needle Type	C	C	C	C
Needle Position	3rd	3rd	3rd	3rd
Throttle Valve	376/3½	376/3½	376/3½	376/3½
Pilot Jet	25	25	25	25
GEAR RATIOS. Top	4.46	4.46	4.66	4.66
3rd	5.30	5.30	5.55	5.55
2nd	7.55	7.55	7.88	7.88
Bottom	10.9	10.9	11.38	11.38
ENGINE SPROCKET. Solo	23	23	22	22
Sidecar	20	20	—	—
CHAIN LENGTH. Primary ¼ in. × 305 in.	70	70	70	70
Rear ⅝ in. × ⅜ in. ...	99	99	99	99
TYRE SIZE. Front	3.25 × 18	3.25 × 18	3.25 × 19	3.25 × 19
Rear	3.50 × 18	3.50 × 18	4.00 × 18	3.50 × 19
BRAKE SIZE. Front—in.	7	8	8	8
Rear—in.	7	7	7	7

RECOMMENDED LUBRICANTS

OVERSEAS

UNIT	CALTEX	MOBIL	B.P.	CASTROL	ESSO	SHELL
Engine—Above 90°F.	Caltex SAE.40	Mobiloil AF	Energol SAE.40	Castrol XXL	Esso Extra	Shell X-100 40
32°—90°F.	Caltex SAE.30	Mobiloil A	Energol SAE.30	Castrol XL	Motor Oil	Shell X-100 30
Below 32°F.	Caltex SAE.20W	Mobiloil Arctic	Energol SAE.20W	Castrolite	20W/40	Shell X-100 20-20W
Gearbox	Caltex SAE.50	Mobiloil D	Energol SAE.50	Castrol Grand Prix	Esso Extra Motor Oil 50	Shell X-100 50
Primary Chaincase	Caltex SAE.20W	Mobiloil Arctic	Energol SAE.20W	Castrolite	Esso Extra Motor Oil 20W/40	Shell X-100 20-20W
Telescopic Fork						
Above 90°F.	Caltex SAE.50	Mobiloil D	Energol SAE.50	Castrol Grand Prix	Esso Extra	Shell X-100 50
60°—90°F.	Caltex SAE.30	Mobiloil A	Energol SAE.30	Castrol XL	Motor Oil	Shell X-100 30
Below 60°F.	Caltex SAE.20W	Mobiloil Arctic	Energol SAE.20	Castrolite	20W/40	Shell X-100 20-20W
Wheel Bearings, Swinging Forks, Steering Races	Marfak Multipurpose 2	Mobilgrease M.P.	Energrease L2	Castrolease L.M.	Multipurpose Grease H	Shell Retinax A
Easing Rusted Parts	Caltex Penetrating Oil	Mobil Spring Oil	Energol Penetrating Oil	Castrol Penetrating Oil	Esso Penetrating Oil	Shell Donax P

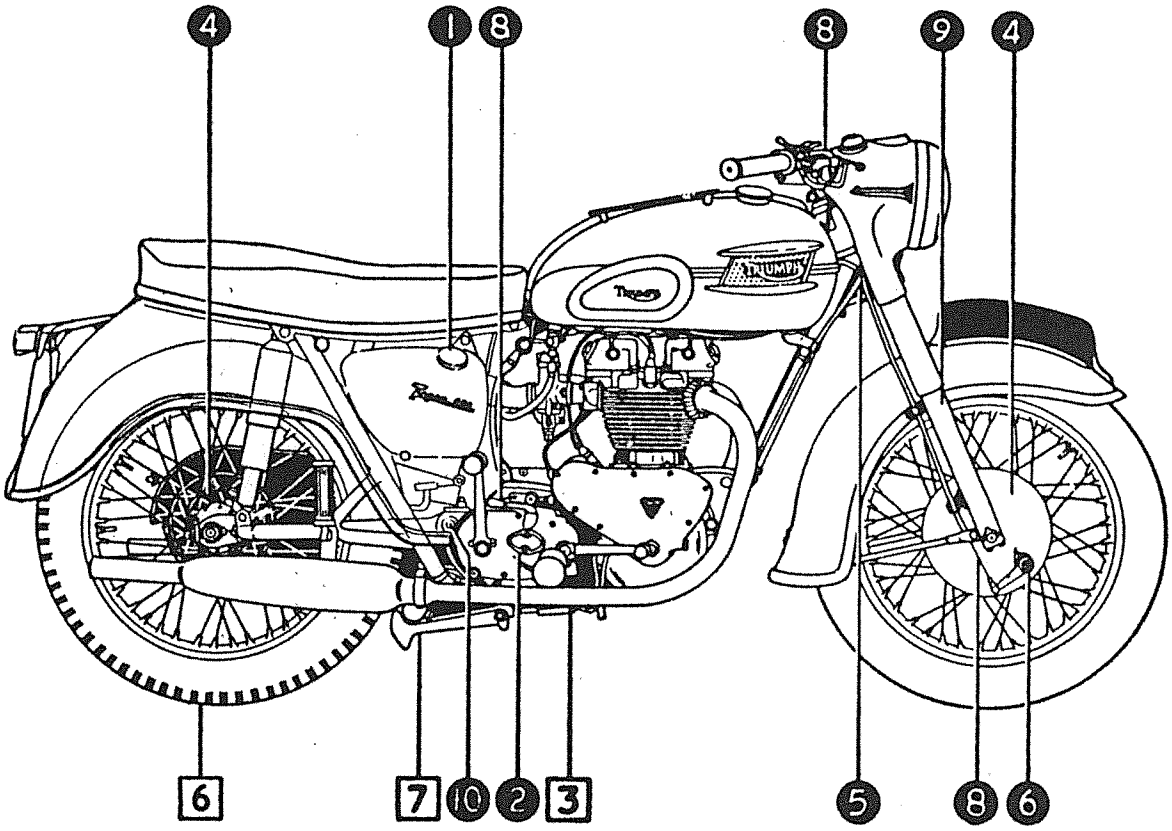


Fig. 63. LUBRICATION CHART.

No.	Part	S.A.E.	No.	Part	S.A.E.
1	Engine Oil Tank	20 or 30	7	Footbrake Pedal Spindle	Grease
2	Gearbox	50	8	Exposed Cables	20
3	Primary Chaincase	20	9	Fork (Hydraulic)	20
4	Wheel Hubs	Grease	10	Swinging Fork Spindle	Grease
5	Steering Head	Grease	OIL-CAN LUBRICATION All Brake Rod Joints and Pins		
6	Brake Cam Spindle	Grease			

FAULT FINDING

ENGINE STOPS

No Petrol or Fuel obstruction	Check Fuel in Tank. Supply at Carburetter if no supply. Remove Pipes and Tank Filters if necessary.
Choked Main Jet	See Page 142.
Water on H.T. Leads, Pick-ups or Sparking Plug	Dry Ignition System.
Water in Float Chamber	Remove Carburetter and clean out.
Vent Hole in Petrol Tank Filler Cap choked ...	Clean out Vent Hole.
Battery lead off (Coil)	Re-connect.

ENGINE MISFIRES

Defective or oiled Sparking Plug	Clean and test Plugs.
Water fouling Main Jet	Clean Carburetter.
Incorrect Contact Breaker Gap	Check and adjust to 0.012 in.-0.015 in. (Magneto) 0.014 in.-0.016 in. (Coil) (0.30-0.40 mm.) ,, (0.36-0.40 mm.) ,,
Contact Points burned and arcing	Remove Points and true with a Carborundum Stone. Replace and re-gap; change Condenser if trouble persists. This fault can be caused by continuous running in the "EMG" position (Coil).
Weak or broken Valve Spring	See Page 35 for Replacement.
Partial obstruction of Petrol Supply	Clean out Carburetter and check Petrol supply at Carburetter end.
Slow Running Orifice choked	See Page 142.
H.T. Cable perished and shorting to frame ...	Replace H.T. Cable.
Sparking Plug insulation cracked	Replace Sparking Plug.
Condenser failing	See Page 165.
H.T. Cable on Coil faulty (Coil Ignition) ...	Replace.

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