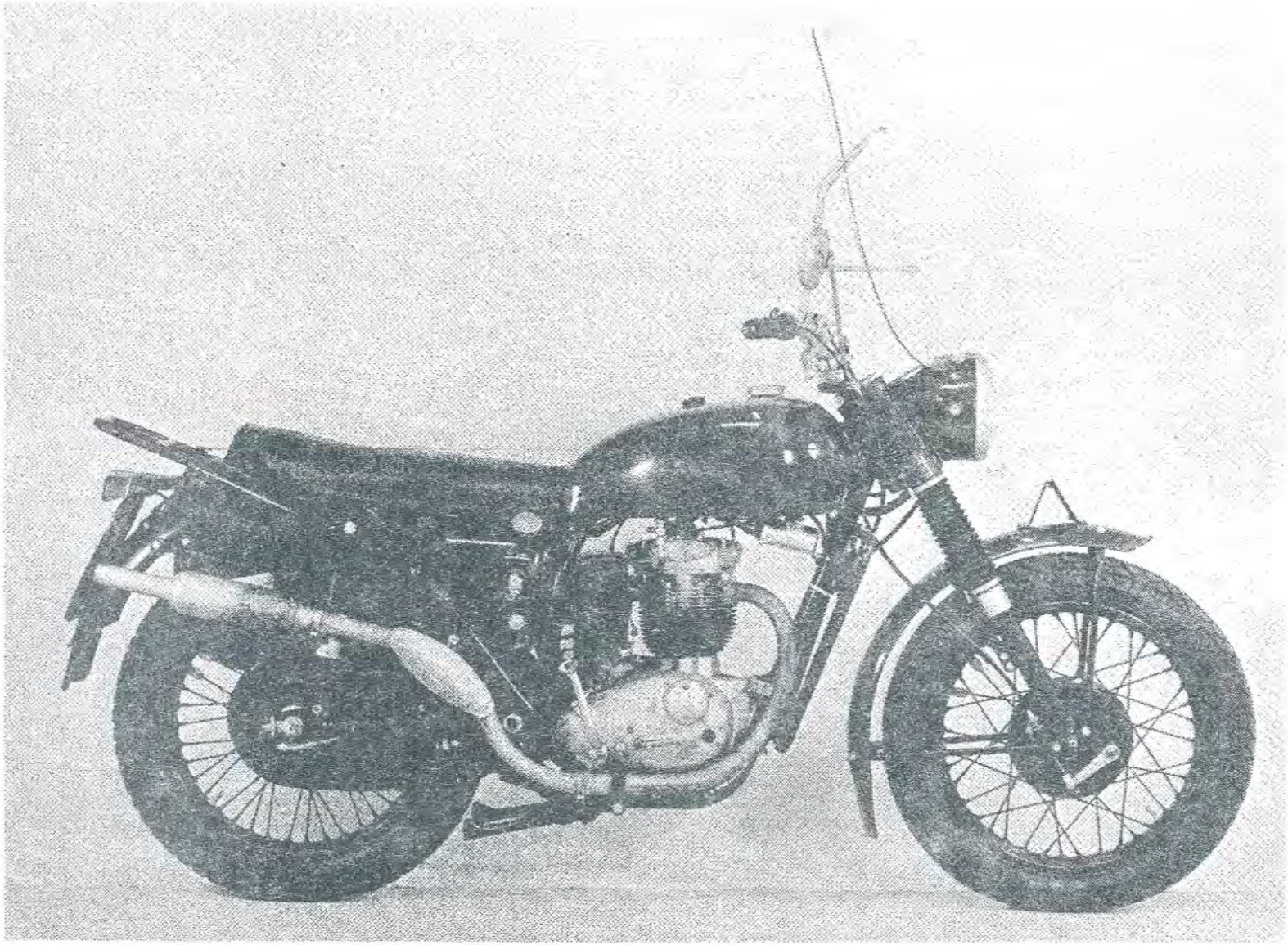
WORKSHOP MANUAL

FOR

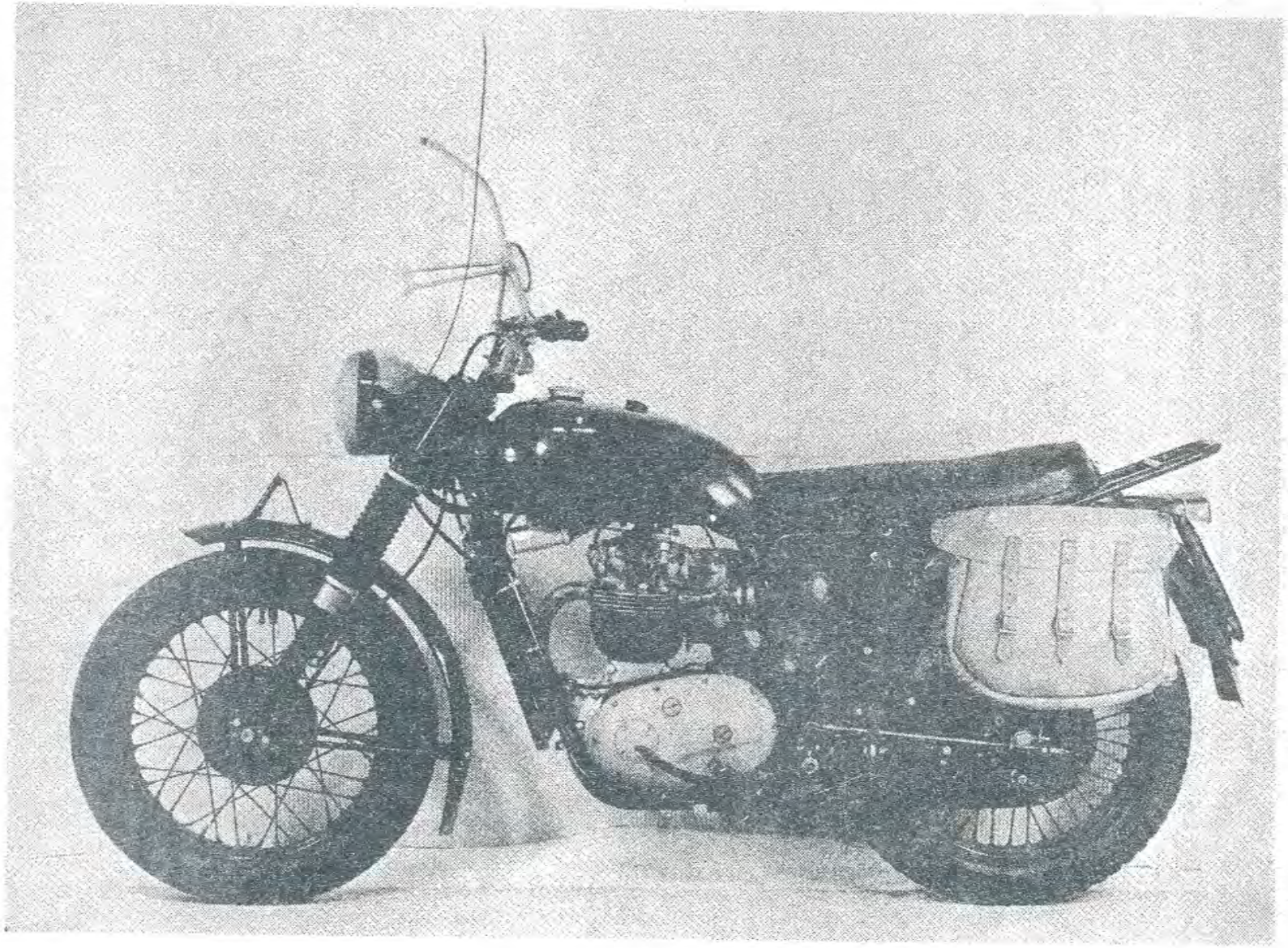
MODEL B.40. VICTOR W.D.

Publication Reference No. 00-4133/2/67

Service Department
B.S.A. MOTOR CYCLES LTD.
Telephone VICtoria 2381
ARMOURY ROAD
BIRMINGHAM 11, ENGLAND



MODEL B40 VICTOR A.W.D. (RIGHT-HAND SIDE)



MODEL B40 VICTOR A.W.D. (LEFT-HAND SIDE)

INTRODUCTION

This manual has been compiled to provide comprehensive service information to assist the workshop fitter in carrying out satisfactory repair work or basic maintenance on the B40 A.W.D. motor-cycle.

It should be noted that the manual is divided into sections dealing with major assemblies and these are sub-divided into the individual operations required for maintenance or repair. By using this arrangement, it is hoped that the manual will also be found most useful as a quick work of reference.

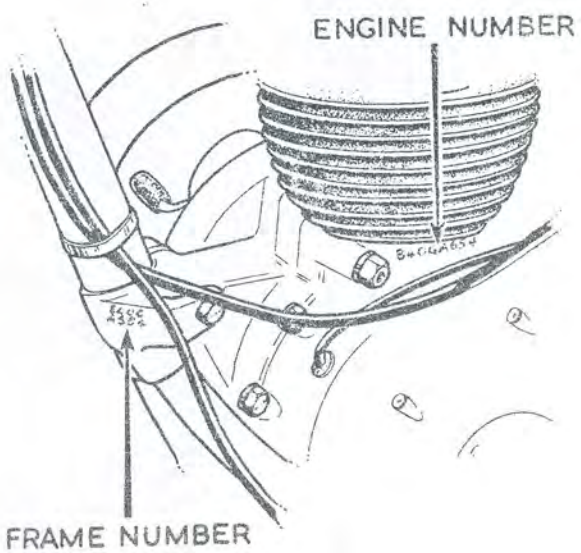
All the information and data given throughout the manual is correct at the time of publication but, because of the constant development of B.S.A. motor-cycles, changes in the specifications are inevitable.

Should the manual be found to be at variance with the B.S.A. machine in question, it is advised tha that the Service Department be contacted, where up-to-date information will be quickly provided.

ENGINE AND FRAME NUMBERS

Both the engine and frame numbers, together with prefix and suffix letters, must be quoted in full on any correspondence relating to the machine or on any enquiry regarding this manual, to the Service Department

The engine number is stamped on the left-hand side of the crankcase immediately below the cylinder base. The frame number is stamped on the left-hand side of the front engine mounting lug as indicated in the drawing below.



PROPRIETARY PARTS

Equipment not of our manufacture which is fitted to our motor-cycles is of the highest quality and is guaranteed by the manufacturers and not by us. Any complaints or repairs should be sent to the manufacturer concerned or their accredited agents who will give every possible assistance. The following are the manufacturers concerned:—

BATTERY	Varly Dry Accumulators Limited, By-Pass Road, BARKING, Essex.
CARBURETTER	Amal Limited, Holdford Road, Witton, BIRMINGHAM 6.
CHAINS	Renold Chains Limited, Wythenshawe, MANCHESTER.
ELECTRICAL EQUIPMENT	Joseph Lucas Limited, Gt. Hampton Street, BIRMINGHAM 18. *and* Wipac Group Sales Ltd., London Road, BUCKINGHAM.
REAR DAMPERS	Girling Limited, Birmingham Road, WEST BROMWICH, Staffs.
SPARK PLUG	Champion Sparking Plug Company Limited, FELTHAM, Middlesex.
SPEEDOMETER	Smith's Motor Accessories Limited, Cricklewood Works, LONDON N.W.2.
TYRES	Dunlop Company Limited, Fort Dunlop, BIRMINGHAM 24.

TECHNICAL ADVICE

B.S.A. Service Department staff are experienced in dealing with technical problems of all kinds and will be pleased to help in the event of difficulty. The correct address of the Service Department is as follows:—

B.S.A. MOTOR CYCLES LIMITED.
SERVICE DEPARTMENT,
ARMOURY ROAD,
BIRMINGHAM 11.

Telephone No. VICtoria 2381

In all communications the model must be quoted with full engine and frame numbers together with all prefix or suffix letters.

REMOVING THE MOTOR-CYCLE FROM THE CASE

Check that the packing case is the RIGHT WAY UP before dismantling. The TOP has stencilled markings on it, the bottom does not.

Prise off the top boards with a suitable pinch bar and take out the top packing material. Take off one side of the case and remove the four wooden packing case supports from the top.

Note that one support is held by two bolted brackets to the handlebar clamp lugs. The rear support carries the front and rear safety bars, but these may be left attached to the support until they are to be fitted to the motor-cycle.

Carefully withdraw the machine from the case and check that you have all the loose parts before discarding the wrappings. Retain the **Test Card** in case you may find it necessary to report any loss of parts or damage during transit. Small items, such as the footrests, handlebar clamp brackets, etc., will be found in the pannier bag. The saddle and windscreen assembly are each packed separately.

Put the machine on to its centre stand and proceed to fit the loose components.

NOTE:—It is most important that new self-locking nuts are used during assembly. Once a nut of this type has been used, the locking device becomes inoperative, rendering the nut unfit for further use.

FITTING THE HANDLEBAR

Place the handlebar, complete with controls and cables, in position and fit the clamp brackets loosely. When a suitable handlebar position has been determined, the four clamp fixing bolts can be tightened.

Check each control for correct operation and make adjustments as necessary.

FITTING THE SAFETY BARS

Detach the safety bars from the packing case rear support, which will have been removed during case dismantling.

Place the front safety bar in position against the frame down-tube and attach loosely to the lower holes in the steering head plates, using one bolt, spacer (between the plates) and nut. Take out the front engine mounting bolt which also secures the exhaust pipe bracket. The spacer on the bolt is only fitted for packing purposes and should now be discarded.

Locate the lower brackets of the safety bar over the engine mounting lug and secure, together with the exhaust pipe bracket, with the nut and bolt. The top fixing bolt can now be tightened fully. Finally, connect the brown/blue and brown/black leads to their respective terminals on the horn.

The rear safety bars are in two halves and can only be fixed together when in position below the saddle support rail. Ensure that the bars are the correct way round, i.e., fixing plates angled to the front, before securing together with the two "Nyloc" nuts and washers. Pass the two "U" bolts over the saddle support rail at each side and fix loosely to the safety bars with four "Nyloc" nuts and washers. The angled fixing plates should now be secured to the lugs on the sub-frame, using the existing nuts and bolts. Note that the right-hand bolt also retains the exhaust pipe bracket.

Finally, tighten all the fixing bolts and nuts and check for rigidity.

FITTING THE SADDLE

Engage the front bracket, beneath the saddle, with the frame tie-bar and locate the rear fixing studs with the support rail brackets. Reach below the saddle at the rear and fit the spacers, washers and nuts on to the studs. Tighten the nuts evenly and check that the saddle is secure.

FITTING THE FOOTRESTS

Note that the front footrests are "handed" and, because of the cut-away in the bosses, can only be fitted one way. The right-hand footrest is correctly located with the boss cut-away at the top and is secured by a single nut and bolt. The left-hand footrest is fixed to its stud by one nut and washer, the boss cut-away being at the front.

The pillion footrests are pre-assembled to their anchor bolts and, like the front footrests they are "handed", the shorter anchor bolt being the right-hand one. Each assembly is secured to the frame brackets by one nut with a spring washer and plain washer.

FITTING THE WINDSCREEN

The windscreen support members are assembled to the base of the screen and to complete the assembly it will only be necessary to fix the central bolt through the screen centre. Take off the nut, washer, liner and one half of the grommet. Pass the bolt through the hole in the screen and replace the small liner, grommet, washer and nut, so that the screen is held between the grommet halves. The support members are held together at each side with clips, the bolts for which can now be tightened.

Take out the lower nuts and bolts from the handlebar clips and loosen the top bolts. Open up each clip and fit over the handlebar, taking care not to lose the split liners. Replace the lower clip bolts and nuts and check that the liners are correctly positioned within the clips. Adjust the position of the screen so that it is central and upright, then tighten all four clip bolts evenly.

FITTING THE REAR-VIEW MIRROR

Release the lower clip bolt in the same manner as detailed for the windscreen clips. Position the mirror on the right-hand half of the handlebar, next to the brake lever, replace the clip bolt and nut and, after checking that the split liner is correctly located, tighten the clip fixing bolts.

Loosen the bolts on the smaller clips and adjust the mirror to give good, unobstructed rear vision from the riders position. Finally, tighten all clip bolts and recheck the setting.

BATTERY

The battery is filled with acid and will require its first charge before being put into service. Full details of the first charge procedure are given on page G.2 of the manual.

When the charge operations are complete, connect the cables to their appropriate battery terminals, the red cable being the positive (+) or earth wire.

FINAL CHECK

Before the motor-cycle is put into service every nut, bolt and screw must be checked for security and correct fitting. It should be noted that 90% of all vibration problems, leading to missing nuts, fractures and rattles, can be traced to loose engine mountings. Do not simply take it for granted that the factory has done everything right, take the precaution of checking everything yourself.

Ensure also, that suitable adjustments have been made to the control cables and that each control functions correctly.

STARTING THE MOTOR-CYCLE

Fill the oil tank, primary chaincase and gearbox to the required levels with correct grades of oil, full details of which are given in Section A of the manual. Pour some petrol into the fuel tank, switch on the ignition and start the engine. While the engine is running take off the oil tank filler cap and check that the oil is circulating correctly through the return pipe. After replacing the filler cap the machine will be complete and ready for use.

The individual rider may find it necessary to adjust the footbrake, handlebar, controls etc., to suit his requirements. Details of these adjustments and full instructions on riding the machine will be found in the instruction manual.

CONTENTS

INDEX

ENGINE

PISTON

Material	"Lo-Ex" Aluminium	
Compression ratio	7.0 : 1	
Clearance (bottom of skirt)	.0021"—.0024"	(.06554—.06096 mm.)
Clearance (top of skirt)	.0051"—.0054"	(.12954—.13716 mm.)
(both measured on major axis).		

PISTON RINGS

Material—compression (top)	Brico BSS.5004 (chrome-plated)	
(centre)	Brico 8	
—scraper	Brico BSS.5004	
Width—compression (top and centre) ...	.0625"	(1.5875 mm.)
Width—scraper	.125"	(3.175 mm.)
Depth	.120"—.127"	(3.048—3.2258 mm.)
Clearance in groove	.001"—.002"	(.0254—.0508 mm.)
Fitted gap—(maximum)	.014"	(.3556 mm.)
Fitted gap—(minimum)	.009"	(.2283 mm.)

OIL PUMP

Pump body material	Zinc base alloy	
Type	Double gear	
Drive ratio	.5 : 1	
Non-return valve spring (free length) ...	.5"	(12.7 mm.)
Non-return valve spring ball (diameter) ...	.25"	(6.35 mm.)
Oil pressure relief valve spring (free length) ...	.6094"	(15.4781 mm.)
Oil pressure relief valve ball (diameter) ...	.3125"	(7.9375 mm.)

CAMSHAFT

Journal diameter (left-hand)	.5598"—.5603"	(14.2189—14.2316 mm.)
Journal diameter (right-hand)	.7480"—.7485"	(18.9992—19.0119 mm.)
Cam lift (inlet and exhaust)	.2610"	(6.6294 mm.)
Basic circle radius	.386"	(9.8044 mm.)

CAMSHAFT BEARING BUSHES

Bore diameter (fitted) left-hand	.561"—.562"	(14.2494—14.2748 mm.)
Bore diameter (fitted) right-hand	.7492"—.7497"	(19.0297—19.04238 mm.)
Outside diameter (left-hand)	.719"—.720"	(18.2626—18.2880 mm.)
Outside diameter (right-hand)	.908"—.909"	(23.0632—23.0886 mm.)
Camshaft clearance (left-hand)	.0012"—.0017"	(.03048—.0432 mm.)
Camshaft clearance (right-hand)	.0012"	(.03048 mm.)

VALVES

Seat angle (inclusive)	90°	
Head diameter (inlet)	1.470"—1.475"	(37.338—37.465 mm.)
Head diameter (exhaust)	1.407"—1.412"	(35.737—35.864 mm.)
Stem diameter (inlet)	.3095"—.3100"	(7.861—7.874 mm.)
Stem diameter (exhaust)	.3090"—.3095"	(7.848—7.861 mm.)

VALVE GUIDES

Material	Cast-iron	
Bore diameter	.3120"—.3130"	(7.9248—7.950 mm.)
Outside diameter	.5005"—.5010"	(12.7127—12.7254 mm.)
Length	1.859"	(47.2186 mm.)
Cylinder head interference fit	.0005"—.0025"	(.0127—.0635 mm.)

VALVE SPRINGS

Free length (inner)	1.625"	(41.275 mm.)
Free length (outer)	2.03125"	(51.5937 mm.)
Fitted length (inner)	1.30"	(33.02 mm.)
Fitted length (outer)	1.37"	(34.798 mm.)

VALVE TIMING

Tappets set to .020" (.508 mm.) for checking purposes only.

Inlet opens B.T.D.C.	26°
Inlet closes A.B.D.C.	70°
Exhaust opens B.B.D.C.	61.5°
Exhaust closes A.T.D.C.	34.5°

TAPPET CLEARANCE (Cold)

Inlet	.008"	(.2032 mm.)
Exhaust	.010"	(.254 mm.)

IGNITION TIMING

Piston position (B.T.D.C.) fully advanced ...	.280"	(7.112 mm.)
Crankshaft position (B.T.D.C.) fully advanced	33.5°	
Contact breaker gap setting	.015"	(.381 mm.)

SPARK PLUG

Type	Champion N5	
Gap setting	.020″ (minimum)	(.508—.635 mm.)
	.025″ (maximum)	
Thread size	14 mm. dia. × .75″ reach	(19.05 mm.)

CYLINDER BARREL

Material	Close grained cast-iron	
Bore size (standard)	79 mm.	
Stroke	70 mm.	
Capacity	343 c.c.	
Oversizes	.020″ & .040″	(.508 & 1.016 mm.)

CYLINDER HEAD

Material	Aluminium alloy	
Inlet port size	1.0625″	(26.9875 mm.)
Exhaust port size	1.376—1.378″	(34.9504—35.0012 mm.)

CARBURETTER

Type	Amal L626/4 (concentric float chamber)	
Main jet	130	
Pilot jet	20	
Needle jet size	.106″	(2.6924 mm.)
Needle position	2	
Throttle valve	3	
Nominal choke size	26 mm.	
Throttle slide return spring (free length)	3.0625″	(77.7875 mm.)

BEARING DIMENSIONS

Clutch roller (25)	.1875″ × .1875″	(4.7025 × 4.7025 mm.)
Con-rod big-end bush (bore)	1.8110″—1.8116″	(45.9994—46.0146 mm.)
Con-rod big-end needle roller	38 × 46 × 20 mm.	
Con-rod small-end bush (bore)	.7503″—.7506″	(19.0576—19.0652 mm.)
Crankshaft bearing (drive-side)	25 × 62 × 17 mm.	
Crankshaft bearing (gear-side)	25 × 62 × 17 mm.	
Crankshaft diameter (drive-side & gear-side)	.9841″—.9844″	(24.9961—25.0038 mm.)
Gearbox layshaft bearings (drive-side and gear-side)	0.5″ × .625″ × .8125″	(12.7 × 15.875 × 20.6375 mm.)
Gearbox layshaft diameter (drive-side and gear-side)	.6245″—.625″	(15.8623—15.8750 mm.)
Gearbox mainshaft bearing (drive-side)	30 × 62 × 16 mm.	
Gearbox mainshaft bearing (gear-side)	.625″ × 1.5625″ × .4375″	(15.875 × 39.2875 × 11.1125 mm.)
Gearbox mainshaft diameter (drive-side)	.7485″—.749″	(19.0119—19.0246 mm.)
Gearbox mainshaft diameter (gear-side)	.6245″—.625″	(15.8623—15.8750 mm.)
Gearbox sleeve pinion (internal diameter)	.752″—.753″	(19.1008—19.1262 mm.)
Gearbox sleeve pinion (external diameter)	1.179″—1.180″	(29.9466—29.9720 mm.)
Gudgeon pin diameter	.750″—.7502″	(19.05—19.055 mm.)

TRANSMISSION

CLUTCH

Type	Multi-plate with integral cush drive	
Number of plates:		
Driving (bonded segments)	4	
Driven (plain)	5	
Overall thickness of driving plate and segments	.167"	(4.242 mm.)
Clutch springs	4	
Free length of springs	1.65685"	(42.0687 mm.)
Clutch push rod (length)	9.0"	(228.6 mm.)
Clutch push rod (diameter)	.1875"	(4.7025 mm.)

GEAR RATIOS

Gearbox—top	1.0
third	1.57
second	2.36
first	3.05
Overall—top	5.94
third	9.33
second	14.02
first	18.12

SPROCKETS

Engine	23 teeth
Clutch	52 teeth
Gearbox	19 teeth
Rear wheel	50 teeth

CHAIN SIZES

Primary	Duplex .375" × 70 pitches
Transmission	.5" × 118 pitches

FRAME AND FITTINGS

FRONT FORKS

Type	Coil-spring (hydraulically damped)	
Springs—free length	10.375"—10.50"	(263.525—266.70 mm.)
spring rate	25/27 lb./in.	
number of coils	21½	
colour identification	Nil	

REAR DAMPERS

Type	Coil-spring (hydraulically damped)	
Springs—free length	8.40"	(213.36 mm.)
spring rate	100 lb./in.	
colour identification	Green/pink	

SWINGING ARM

Bush type	Bonded rubber	
Bush diameter	1.250"—1.253"	(31.75—31.8262 mm.)
Housing diameter	1.247"—1.248"	(31.673—31.699 mm.)
Interference fit	.002"—.006"	(.0508—.1524 mm.)
Spindle diameter	.810"—.811"	(20.570—20.595 mm.)

FRONT FORK BUSHES

Outer diameter (top)	1.4750"—1.4755"	(37.465—37.477 mm.)
Outer diameter (bottom)	1.473' -1.474"	(37.414—37.439 mm.)
Inner diameter (top)	1.250 —1.251"	(31.750—31.755 mm.)
Inner diameter (bottom)	1.2485"—1.2495"	(31.711—31.737 mm.)
Working clearance (top)	.0005"	(.0127 mm.)
Working clearance (bottom)	.002"—.003"	(.0508—.0762 mm.)
Length (top)	2.125"	(53.975 mm.)
Length (bottom)	1.25"	(31.75 mm.)
Shaft diameter	1.248"—1.249"	(31.699—31.7246 mm.)
Sliding tube bore diameter	1.475"—1.477"	(37.465—37.515 mm.)
Damper tube bush (outer diameter)	.6165"—.6185"	(15.6591—15.7099 mm.)
Damper tube bush (inner diameter)	.339"—.340"	(8.6106—8.636 mm.)
Damper tube bush (length)	.53125"	(13.4937 mm.)

WHEELS, BRAKES AND TYRES

WHEELS

Rim size and type (front)	WM2-18	
Rim size and type (rear)	WM3-18	
Spoke sizes:		
front (long) 20	10 s.w.g. × 8.3125"	(3.251 × 211.1375 mm.)
front (short) 20	10 s.w.g. × 7"	(3.251 × 177.80 mm.)
rear (long) 20	10 s.w.g. × 7.4375"	(3.251 × 188.9125 mm.)
rear (short) 20	10 s.w.g. × 7.375"	(3.251 × 187.325 mm.)

WHEEL BEARINGS

Front (left-hand and right-hand)	.875" × 2" × .5625" single seal	
Rear hub (left-hand and right-hand) ...	.875" × 2" × .5625" single seal	
Rear brake drum	.875" × 2" × .5625" double seal	
Spindle diameter (front)	.8740"—.8745"	(22.199—22.212 mm.)
Spindle diameter (rear, left-hand)	.8745"—.8750"	(22.212—22.225 mm.)
Spindle diameter (rear, right-hand)	.685"—.686"	(17.399—17.424 mm.)

BRAKES

Front (diameter)	7"	(177.8 mm.)
Front (width)	1.125"	(28.575 mm.)
Rear (diameter)	7"	(177.8 mm.)
Rear width)	1.125"	(28.575 mm.)
Lining thickness (front and rear)	.15625"	(3.9687 mm.)
Lining area sq./in. (sq./cm.)—front and rear	15.48 (99.84)	

TYRES

Size (front)	3.25" × 18"	(82.55 × 457.2 mm.)
Size (rear)	3.50" × 18"	(88.9 × 457.2 mm.)
Pressure (front)	17 p.s.i. (1.195 kg/sq. cm.)	See page F.16
Pressure (rear)	19 p.s.i. (1.336 kg/sq. cm.)	

ELECTRICAL EQUIPMENT (6 volt)

Alternator type	Lucas RM.19 (encapsulated)
Contact breaker	Lucas 4CA
Coil	Lucas MA6
Battery	Varley MC7/12N
Bulbs (headlight)	30/24 watt
Bulbs (stop/tail light)	6/18 watt
Bulbs (speedometer light)	3 watt
Bulbs (pilot light)	3 watt
Bulbs (ignition warning light)	2 watt

CAPACITIES

Fuel tank	3.5 galls. (15.911 litres)
Oil tank	5 pints (2.841 litres)
Primary chaincase	0.5 pint (.284 litres)
Gearbox	.75 pint (.426 litre)
Front fork (each leg)	0.34 pint (.1893 litre)

BASIC DIMENSIONS

Wheelbase	53″	(134.62 cm.)
Overall length	82″	(208.28 cm.)
Handlebar width	27.5″	(69.85 cm.)
Seat height	32″	(81.28 cm.)
Ground clearance	7″	(17.78 cm.)

WEIGHTS

Machine unladen	350 lbs.	(158.75 kg.)

INDEX

ROUTINE LUBRICATION

Ref. No.	
	DAILY
1.	Examine Oil Level in Tank.
	EVERY 1,000 MILES
2.	Grease Control Cables.
3.	Grease Brake Pedal Pivot.
4.	Oil Brake Rod Joints.
	EVERY 2,000 MILES
5.	Drain and Refill the Oil Tank.
5.	Clean Oil Tank Filter.
6.	Clean Crankcase Filter.
7.	Check Oil Level in Gearbox.
8.	Check Oil Level in Primary Chaincase.
9.	Grease Central Stand (2).
10.	Oil Brake Cam Spindles.
11.	Grease Speedometer Drive Unit.
14.	Examine and if necessary renew Oil Filter Cartridge.
	EVERY 5,000 MILES
7.	Drain and Refill Gearbox.
8.	Drain and Refill Primary Chaincase.
12.	Lubricate Contact Breaker Cam.
12.	Lubricate Auto-advance Mechanism.
	EVERY 10,000 MILES
13.	Drain and Refill Front Forks.
	Grease Wheel Bearings.
	Grease Steering Head Bearings.

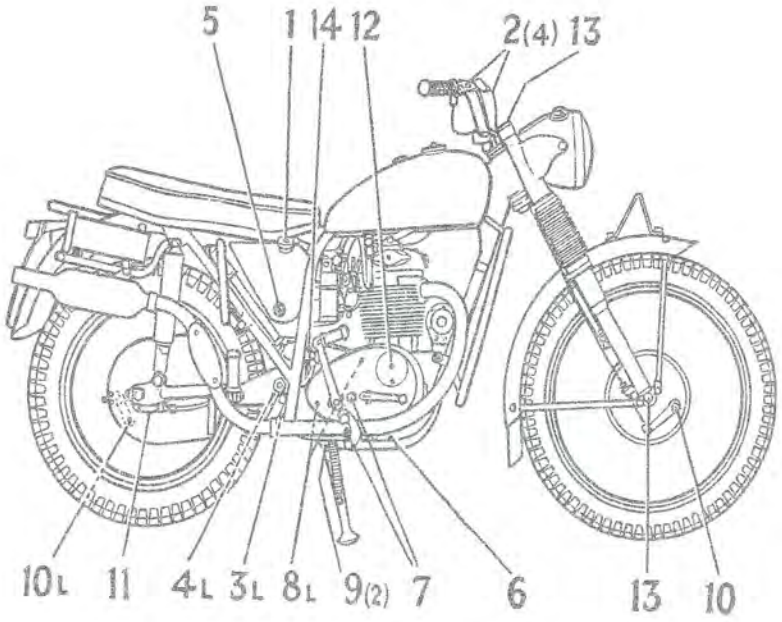


FIG. A.1. *Key lubrication points.*
(L indicates left-hand side, remainder right-hand or both sides).

RECOMMENDED LUBRICANTS

UNITED KINGDOM

	Mobil	B.P.	Castrol	Esso	Shell	Regent	NATO code
Engine:							
Summer ...	BB	SAE 40	XXL	Extra 40/50	X100-40	Havoline SAE 40	
Winter	A	SAE 30	XL	20W/30	X100-30	SAE 30	
Gearbox	—	90 E.P.	90 E.P.	—	90 E.P.	—	
Primary Chaincase ...	Arctic	SAE 20W	Castrolite	Extra 20W/30	X100-20W	Havoline SAE 20W	
Front Fork ...	Arctic	SAE 20W	Castrolite	Extra 20W/30	X100-20W	Havoline SAE 20W	
Wheel Bearings Swinging Arm Steering Head	Mobil-grease MP	Ener-grease L2	Cast-rolease LM	Multi-purpose H	Retinax A	Marfak 2	

OTHER COUNTRIES

	Mobil	B.P.	Castrol	Esso	Shell	Caltex	NATO code
Engine:							
Above 32°C. ...	Mobil AF	Energol 40	XXL	SAE 40/50	X100-40	SAE 40	
0° to 32°C. ...	Mobil A	Energol 30	XL	SAE 20W/40	X100-30	SAE 30	
Below 0°C. ...	Mobil Arctic	Energol 20W	Castrolite	SAE 10W/30	X100-20W	SAE 20W	
Gearbox	—	90 E.P.	90 E.P.	—	90 E.P.	—	
Primary Chaincase ...	Mobil Arctic	Energol 20	Castrolite	SAE 20W/40	X100-20W	SAE 20W	
Front Fork:							
Above 32°C. ...	Mobiloil D	Energol 50	Grand Prix	SAE 40	X100-50	SAE 50	
15°C. to 32°C.	Mobiloil A	Energol 30	XL	SAE 20W/40	X100-30	SAE 30	
Below 15°C. ...	Mobiloil Arctic	Energol 20W	Castrolite	SAE 10W/30	X100-20W	SAE 20W	
Wheel Bearings Swinging Arm Steering Head	Mobil-grease MP	Ener-grease L2	Cast-rolease LM	Multi-purpose H	Retinax A	Marfak 2	

WARNING:—A vegetable-base oil must not be used in the primary chaincase because of possible harmful effects on the electrical equipment.

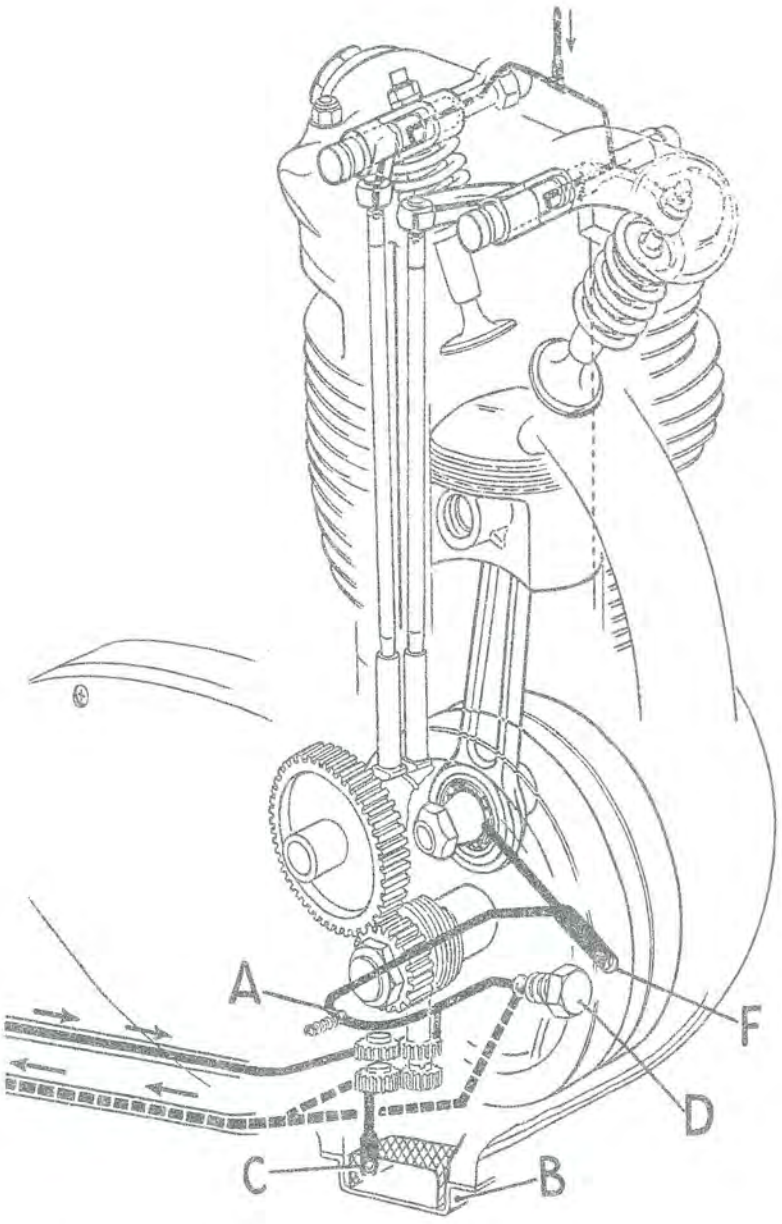


FIG. A.2. *Engine lubrication diagram showing the ball valves.*

THE LUBRICATION SYSTEM

The lubrication system is of the dry sump type, i.e., the oil is fed by gravity from a tank to a double-gear pump situated in the crankcase base at the right-hand side (see Fig. A.2).

The top set of gears in the pump draws oil from the tank through a gauze filter and circulates it under pressure, past a pressure release valve (D), a non-return valve (A) and through the drilled crankshaft to the big-end bearing. Excess oil is thrown off by centrifugal force, on to the cylinder walls, the underside of the piston (to lubricate the gudgeon pin) and fills various wells to lubricate the camshaft and gears.

After lubricating the various internal components of the engine, the oil drains down into the crankcase.

From here the lower, and larger set of pump gears, draws oil from the gauze sump filter through another non-return valve (C) and pumps it back to the tank at a greater rate than that of the feed side. This ensures that the sump never floods; hence the term "dry sump."

The oil return pipe is tapped to provide a supply of oil at low pressure to the valve rocker gear.

This pipe is connected by means of a twin union to the left-hand side of the cylinder head.

The oil is fed through the rocker shafts, lubricating the rocker ball pins, adjuster screws and finally the tappets as it drains back into the crankcase.

External Oil Filter

The external oil filter is inserted in the oil return pipe between the crankcase and oil tank.

The filter cartridge should be examined at regular intervals (quoted on page A.2).

Remove the locking wire from the cap-nut and, whilst supporting the filter bowl, unscrew the nut. Withdraw the bowl, taking care not to lose the special sealing washers, and extract the filter cartridge.

Wash the cartridge thoroughly in clean petrol and allow to dry before inspecting it.

If the cartridge no longer appears serviceable, discard it and fit a new one, as it is, most important that the oil flow is not obstructed by a blocked-up cartridge.

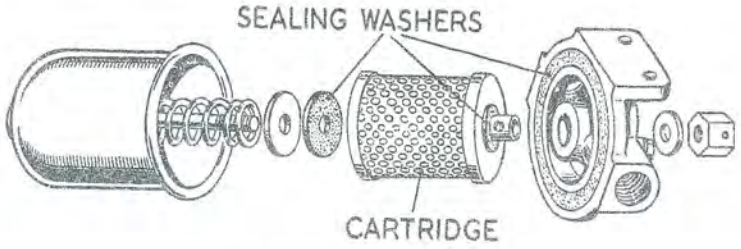


FIG. A.3. *The external oil filter.*

After cleaning the remainder of the components in petrol, allow to dry before reassembling. Do not omit to rewire the cap-nut in position.

Finally, start the engine and check all joints for signs of leakage.

Changing the Oil and Cleaning the Filters

The oil tank filter is screwed into the lower right-hand corner of the tank (see Fig. A.4). Obtain a suitable receptacle with a piece of stiff material to use as a chute and unscrew the small drain plug fitted in the filter plug and allow the oil to drain.

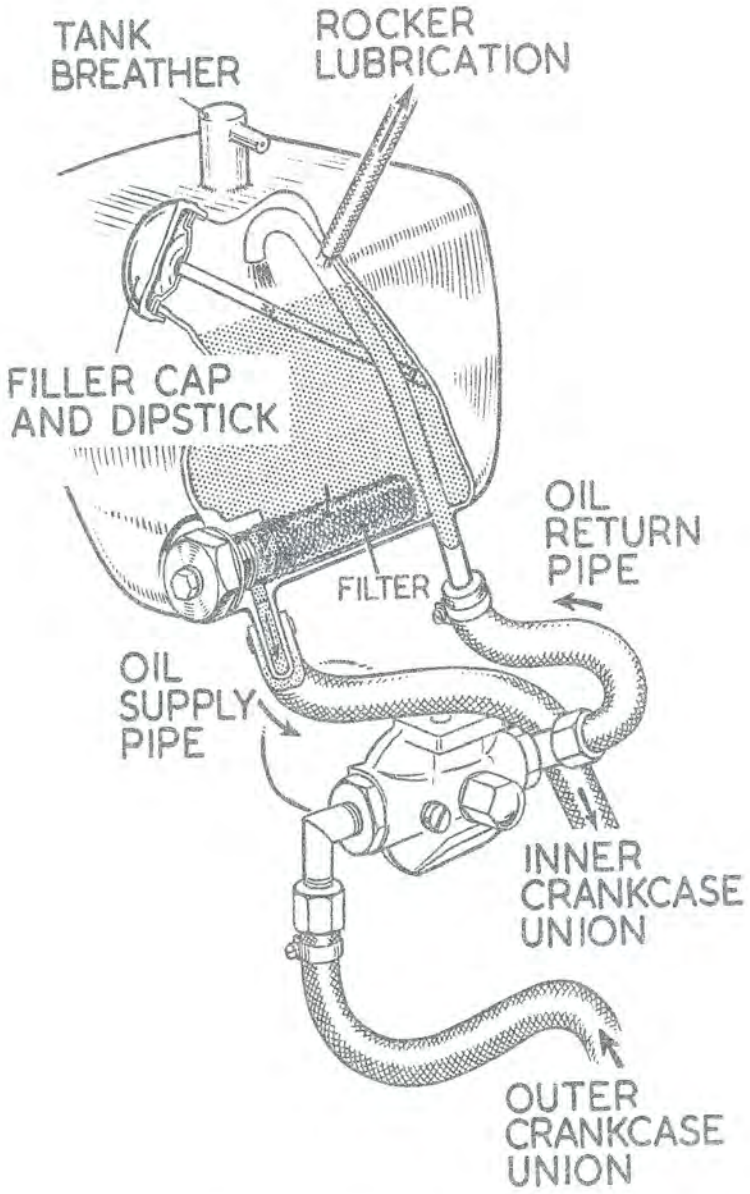


FIG. A.4. *Oil tank and filter.*

The filter plug should now be removed, washed in clean petrol and allowed to dry.

Lean the machine towards the right-hand side to drain off any remaining oil in the tank.

To gain access to the crankcase filter, first take off the crankcase shield.

Again using a suitable receptacle to catch the oil, unscrew the four nuts holding the sump filter to the crankcase, take off the shakeproof washers and remove the filter. Also disconnect the supply and scavenge pipes at the crankcase union (one nut).

Allow the oil to drain, wash the filter thoroughly in petrol, and clean off the old jointing material from the filter and crankcase. If there is any sign of damage to the old gasket, replace it on reassembly.

After reassembling the various components, check each joint for soundness and refill the oil tank with correct grade of oil (see page A.3.)

The tank capacity is approximately five pints.

Scavenge Non-return Valve
Whilst changing the oil it is a good point to check the scavenge pipe non-return valve for correct operation. Using a piece of wire, pull the ball up off its seating and allow it to drop of its own weight. If the ball will not drop it indicates a build-up of sludge which can usually be cleared by immersing the pipe in petrol for a short period.

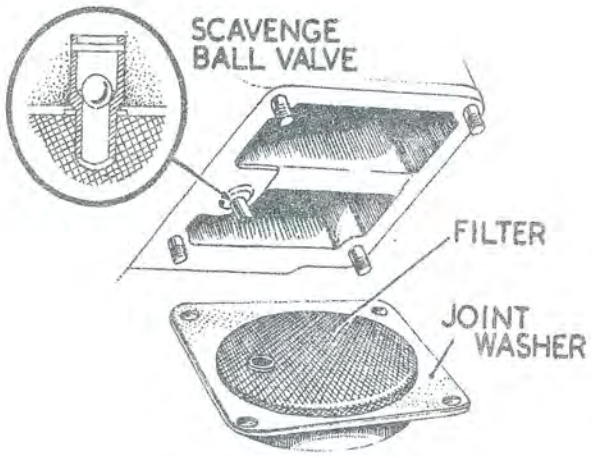


FIG. A.5.

If there has been a tendency for the crankcase to fill with oil after standing overnight, so causing the engine to emit clouds of smoke when started, it is quite possible that the feed line non-return valve is not seating properly thus allowing oil to run back from the tank. This is the valve in the inner timing cover described on page A.8.

Crankcase Oil Pipe Union
The oil pipe union is secured to the crankcase with one nut. If the small rubber sealing rings in the oil pipe union are damaged, they must be replaced.

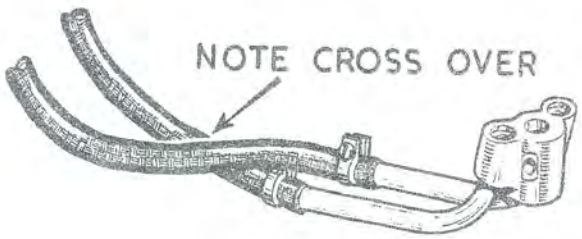


FIG. A.6.

NOTE:—The oil pipes are correctly fitted when crossed over, i.e., the outer pipe from the tank is attached to the inner connection on the crankcase.

Crankcase Breather
The short crankcase breather pipe emerges from the timing case near to the clutch cable abutment.

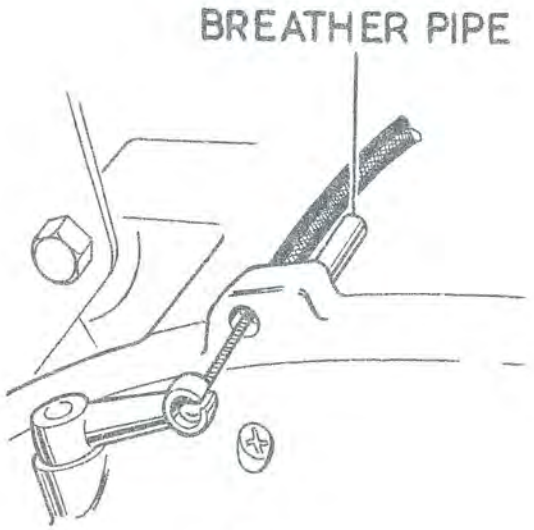


FIG. A.7.

It is most important that this pipe is unobstructed and a regular examination should be made to ensure this.

OIL PRESSURE AND NON-RETURN VALVES

A constant oil pressure is maintained by the release valve situated on the front right-hand side of the crankcase (see Fig. A.8), the plug of which is painted red.

To prevent the oil pressure becoming excessive, the valve opens and releases the excess oil direct into the crankcase from where it is returned to the tank.

The valve is pre-set at the works and there is no point in altering the setting. However, after prolonged use, the spring does tend to weaken

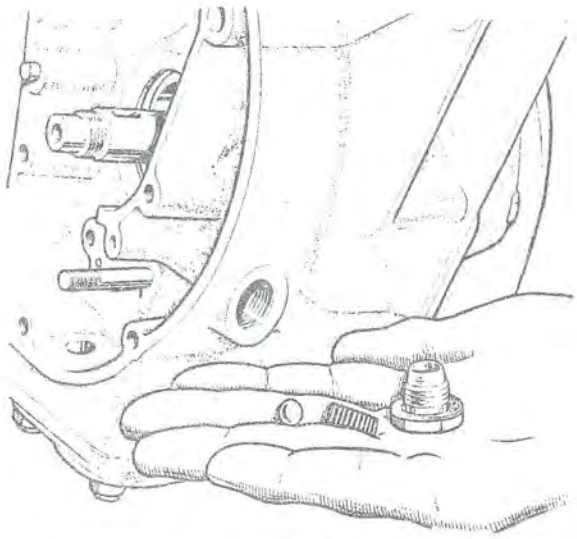


FIG. A.8.

and corrode and must then be replaced. If there is corrosion it is wise to replace the ball also, after first cleaning the valve body.

To remove the valve, simply unscrew the large hexagon plug. Ensure that the fibre washer is fit for further use.

Low Oil Pressure

Low oil pressure is dangerous since insufficient oil is likely to be delivered to the engine components. The possible causes of low pressure being:—

1. Insufficient oil in the tank. Check the level and the return after replenishing. If the return is correct it will show as a mixture of oil and air issuing from the return pipe.
2. Tank and sump filters or external filter partly blocked, preventing the free passage of oil.
3. Badly worn oil pump or big-end bearing in need of attention.
4. Oil pipes incorrectly connected, when the pump would be inducing air through the return pipe.

Syphoning

This, one of the more common troubles, happens when one of the non-return ball valves is sticking off its seating. It can also be caused by a badly worn pump or one which is loose on its mounting.

Indications of syphoning are clouds of smoke from the exhaust when the engine is first started after standing overnight.

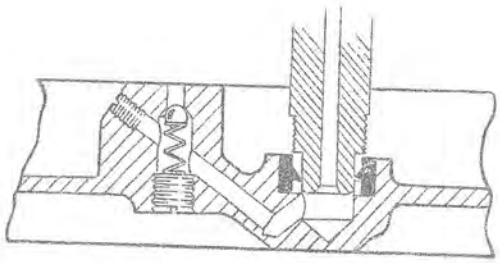


FIG. A.9. *Non-return valve.*

The feed line non-return valve consists of a ball and spring and is located in the inner timing cover (see Fig. A.9). After unscrewing the retaining plug, the valve spring and ball can be removed for examination.

Should there be any doubt about the condition of the valve components renew them.

The non-return valve in the scavenge pipe is described on page A.7.

DISMANTLING AND REASSEMBLING THE OIL PUMP

Having removed the oil pump from the engine, take out the four screws from base of pump, releasing the base plate and top cover from the pump body.

The driving spindle and driving worm gear are secured to the top cover with one nut and spring washer. Before removing the worm gear, make careful note of the way in which it is fitted to assist in rebuilding.

Wash all the parts thoroughly in petrol and allow to dry before examining. Look for foreign matter jammed in the gear teeth and deep score marks in the pump body. These will be evident if the oil changing has been neglected. Slight

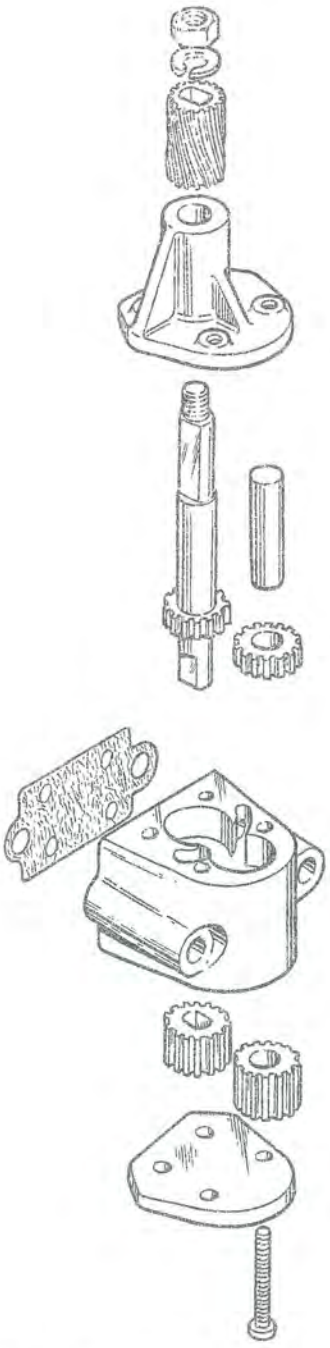


FIG. A.10. *Oil pump exploded.*

marks can be ignored, but any metal embedded in the gear teeth must be removed.

The most likely point of wear will be found on the driving gear teeth; if these are worn to the extent that the sharp edges have gone then they must be renewed.

Rebuilding the Pump

Absolute cleanliness is essential when rebuilding the oil pump.

Insert the driving spindle (with fixed gear) into pump top cover, fit the worm drive and secure in position with nut and spring washer.

Fit the driven spindle and gear into the cover, place the assembly on top of the pump body and insert the lower gears. Apply clean oil to the gears and refit the base plate with four screws.

Finally, check the joint faces for parallelity; if the housing face is not level, it will be distorted when bolted to the crankcase and may prevent the pump from working.

CONTACT BREAKER

The contact breaker is situated on the outer timing cover and it is essential that no engine oil gets into the contact breaker housing. To prevent this, there is an oil seal pressed into the inner timing cover behind the auto-advance unit.

Lubrication of the contact breaker cam and the auto-advance unit pivot points, however, is necessary.

The contact breaker cam is lubricated from an oil-soaked felt wick which should have a few drops of engine oil (S.A.E. 20 or 30) applied every 5,000 miles (8,000 kilometres)—see Fig. A.11.

To lubricate the auto-advance unit it is necessary to remove the contact breaker plate. First mark across the plate and the housing so that it can be replaced in exactly the same position. Take out the fixing screws and withdraw the contact breaker plate.

The pivot points of the auto-advance unit should be lightly oiled, again at 5,000 mile (8,000 kilometre) intervals.

After lubricating, replace the plate to the marks, but if the timing has been upset, follow the instructions on pages B.32–35.

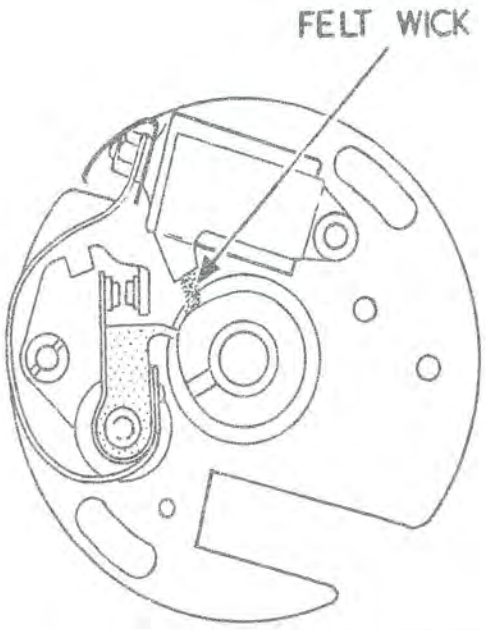


FIG. A.11. *Contact breaker.*

GEARBOX LUBRICATION

The gearbox, having its own oilbath, is independant of the engine for lubrication but, for the same reason, the oil level must be checked and any loss due to leakage made good.

The layshaft gears run in the oilbath and oil being carried by or thrown off these gears lubricates the mainshaft gears, bearings and bushes.

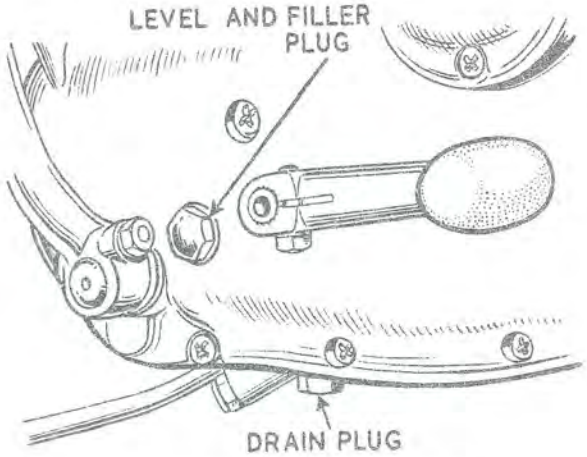


FIG. A.12. *The gearbox level and drain plugs.*

To drain the oil first take out the oil level plug then unscrew the drain plug which is accessible through an aperture in the crankcase shield. The oil will drain more easily if it is warm after running the engine.

After draining, replace the drain plug making sure that the rubber "O"-ring is in good condition.

With the machine standing upright on level ground, replenish the gearbox with correct grade of oil until surplus oil begins to flow from the level hole. Replace the plug securely and do not omit the "O"-ring.

Recommended grades of oil are quoted on page A.3, capacities on page GD.7 and checking frequency on page A.2.

PRIMARY DRIVE

Like the gearbox, the primary chaincase, having its own oilbath, is independant of the engine but the level of oil must be checked periodically and the oil drained and replaced as indicated in the routine maintainance sheet, page A.2.

The oilbath in the primary chaincase does not lubricate the chain only, the clutch being contained in the same case is dependant on this oil supply for its efficient functioning. A drip feed is also provided for the rear chain through an oil well and nozzle at the back of the chaincase.

There are two of the chaincase cover screws which have their heads painted red; they are situated mid-way along the lower rim of the case, the rear one being the oil level screw (C) and the front is the drain screw (D)—see Fig. A.13.

Note that the drain screw is fitted with an aluminium washer to ensure oil-tightness.

The oil level screw is fitted with a sleeve, nut and also secures the front section of the chain-

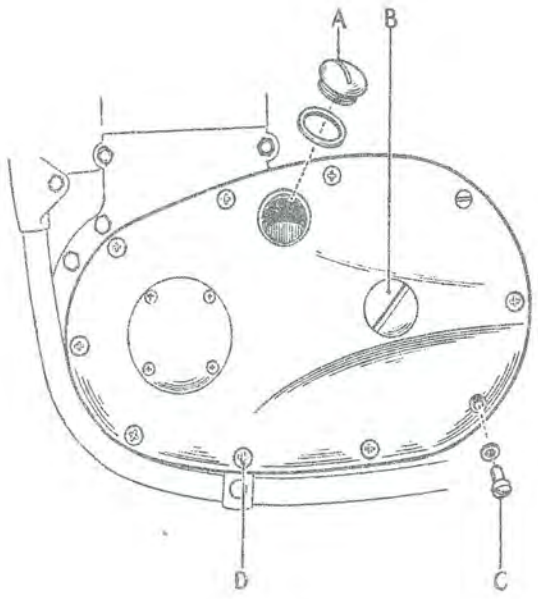


FIG. A.13.

To drain the oil, take out the chain inspection cap (A) at the top of the case and the drain screw.

Cap (B) is only removed to enable clutch adjustments to be carried out.

After draining, replace the drain screw, take out level screw and pour oil through the inspection cap hole until it commences to run out of the level screw hole. Replace level screw and inspection cap. The machine should be upright and on level ground when this operation is carried out to ensure correct level of oil.

Oil containing molydbenum disulphide or graphite must NOT be used in the primary chaincase.

When replenishing, use only the grades recommended on page A.3.

REAR CHAIN

Oil thrown off the primary chain is collected in a small well at the back of the primary case from which a drip feed is supplied to the rear chain.

This may not, however, be adequate in some circumstances and it is advisable to supplement the drip feed by occasionally applying oil to the chain links with an oil can.

The best method of lubrication is to remove the chain every 2,000 miles, wash thoroughly in paraffin and allow to drain, then immerse it in melted tallow to which powdered graphite has been added.

Hang the chain over the grease tin to allow the surplus grease to drain off. If the tin is covered after use it can be used many times, but always use care when melting the tallow.

When replacing the chain, make sure that the spring clip of the connecting link has its closed end pointing in the direction of travel of the chain (i.e., forwards on the top run).

STEERING HEAD

The steering head bearings are packed with grease on assembly and only require repacking at the intervals quoted on page A.2. Removal and replacement of the steering is dealt with on pages E.2 and E.3 in the fork section.

Wipe out all the old grease from the bearing cups and clean the ball bearings, by rolling them in a clean rag.

After cleaning, carefully examine the bearings, cups and cones for pitting, corrosion or cracks, and renew if necessary.

The fresh grease will hold the ball bearings in position during reassembly. Check that the grease is as quoted on page A.3.

There are several methods for determining the correct number of ball bearings to use, but the most effective method is to fill the cup completely with ball bearings and then extract one. The correct number of ball bearings for each cup is twenty.

FRONT FORK

The oil contained in the fork legs not only lubricates the bearing bushes, but also acts as the damping medium. Because of the latter function, it is essential that the amount of oil in each fork leg is exactly the same.

Oil leakage mid-way up the forks usually indicates that an oil seal has failed and requires replacement; this is dealt with on page E.5 covering the dismantling and reassembly of the forks.

Correct period for changing the oil as quoted on page A.2 is every 10,000 miles (16,000 kilometres) but if this mileage is not covered within a year than it is suggested that the oil be changed every twelve months.

To drain the oil, unscrew the fork cap-nuts and the small drain plugs in the lower ends of the fork sliding members. Allow the oil to drain out then, whilst standing astride the machine, apply the front brake and slowly depress the forks a few times to drain any oil remaining in the system.

Replace the drain plugs, raise the cap-nuts a few inches and pour 1/3-pint of oil into each fork leg (see page A.3 for recommended grades of oil).

Ensure that the rubber sealing washer and special retainer are correctly fitted below the damper rod locknut before replacing the cap-nuts.

WHEEL BEARINGS

The wheel bearings are packed with grease on assembly and only require repacking at the intervals given on page A.2.

The bearings should be removed as quoted on pages F.4, F.5 and F.6. After removal, the bearings must be washed thoroughly in paraffin and, if possible, an air line should be used to blow out any remaining grit or paraffin.

Pack with correct grade of grease as quoted on page A.3 after assembling the first bearing.

Do not over-lubricate and avoid handling the brake shoes with greasy hands.

CONTROL CABLES

Exposed sections of inner cables should be lubricated periodically (see page A.2).

All the control cables are provided with grease nipples so that the inner cables can be lubricated more adequately.

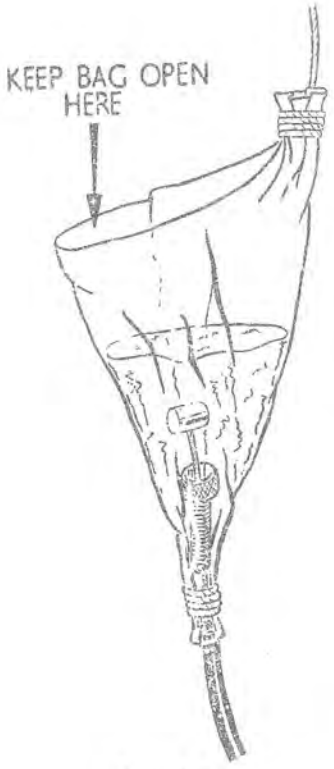


FIG. A.14.

The most satisfactory way, however, is to induce a flow of oil between the inner cable and casing by using a simple oil reservoir as shown in Fig. A.14 and leaving the cable for several hours.

During their manufacture, the inner cables are greased with a molybdenum based grease which forms a semi-permanent lubricant and should

therefore give long service before needing attention.

SPEEDOMETER CABLE

It is necessary to lubricate the speedometer cable to prevent premature failure of the inner wire. Care is also necessary to avoid over-zealous greasing which may result in the lubricant entering the instrument head. For lubricating, it is only necessary to unscrew the cable nut at the speedometer drive unit and withdraw the inner wire. The grease should be applied sparingly to the wire and the top six inches must not be greased.

FIG. A.15.

INDEX

INDEX

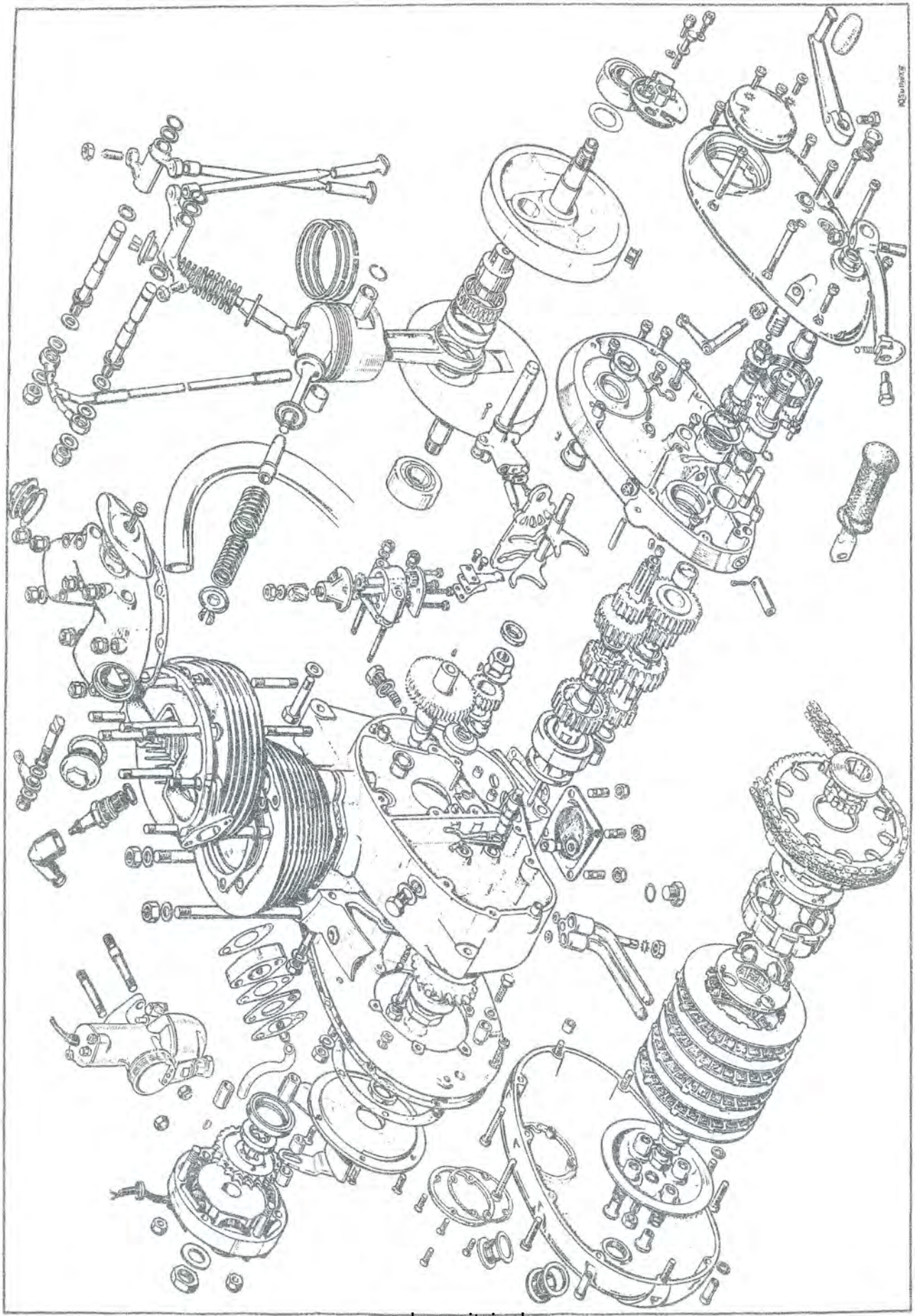


FIG. B1. *Engine exploded.*

DESCRIPTION

The o.h.v. four-stroke engine is of the unit construction type and has a single cylinder barrel of close-grained cast-iron.

A special "Lo-Ex" aluminium piston having one plain (chrome-plated) compression ring, one tapered compression ring and one scraper ring is used on a 'H'-section connecting rod, employing a needle roller big-end assembly.

Two balanced flywheels each with a crankshaft, are pressed on to a taper-fit crankpin, the unit revolving on two large roller bearings housed in the crankcase.

The aluminium alloy cylinder head has cast-in, heavy duty cast-iron valve seats and removable valve guides. Housed within the top of the cylinder head are two valve rocker spindles, carrying the inlet rocker at the rear and the exhaust rocker at the front.

The one-piece camshaft operates in two bushes, one of phosphor bronze and the other of sintered bronze.

Contained within the primary drive case on the left-hand half of the crankcase are the clutch assembly, primary chain and the alternator. The alternator unit consists of a six-coil stator, mounted on three studs and a rotor, secured to the drive-side shaft.

A vertically mounted oil pump of the double gear type is driven off a worm wheel on the gear-side crankshaft and supplies oil to the big-end assembly, piston, cylinder walls and the timing gears.

The gearbox, at the rear of the right-hand half of the crankcase, and the primary chaincase are independent of the engine lubrication system and each contain their own oilbath.

Power from the engine is transmitted through the engine sprocket and duplex primary chain to the clutch assembly which has a built-in cush drive. Here the drive is taken up by the bonded friction plates and is transmitted through the four-speed constant-mesh gearbox to the final drive sprocket.

DECARBONISING

Decarbonising or "top overhaul" as it is sometimes called, means the removal of carbon deposits from the combustion chamber, piston crown, valve heads and inlet and exhaust ports, and to restore a smooth finish to these surfaces. Obviously, whilst the upper portion of the engine is dismantled for this purpose, opportunity will be taken to examine the valves, valve seats, springs, guides, etc., for general "wear and tear", hence the term "top overhaul."

Carbon, produced by combustion taking place in the engine when running, is not harmful providing it is not allowed to become too heavy and therefore likely to cause pre-ignition or other symptoms which may impair the engine performance.

The usual symptoms indicating the need for decarbonising, are an increased tendency for the engine to "pink" (metallic knocking sound when under load), a general decrease in power and a tendency for the engine to run hotter than usual. An increase in petrol consumption may also be apparent.

Preparing to Decarbonise

Before commencing with the work, it is advisable to have the following equipment available:—

Spanners for 3/16 in. W., 1/4 in. B.S.F. to 5/16 in. W., 3/8 in. B.S.F.
Set of scrapers
Set of feeler gauges
Supply of fine grade emery cloth
Jointing compound or cement

Valve grinding tool No. 65–9240, and coarse/fine grade grinding paste
Valve spring compressor No. 61–3340
Clean engine oil
Pieces of hard wood to support piston
Top overhaul gasket No. 00–3164
Gudgeon pin circlips No. 66–954 (2)
Valve springs (set) Nos. 68–475 (outer) and 40–169 (inner)
Paraffin and clean rag for cleaning

Perfect cleanliness is essential to ensure success in any service task so, before starting a job such as this, make sure that you have a clean bench or working area on which to operate and room to place parts as they are removed.

To facilitate removal of the cylinder head, first take off the petrol tank (see page B.12).

With the tank removed, the engine steady bracket can be disconnected, together with the exhaust valve lifter assembly, after the inner cable has first been extracted through the slot in the end of the operating lever.

The exhaust pipe is a push-fit into the cylinder head and can be withdrawn after releasing the frame bolt and tail pipe clip.

Next, remove the seat (as described on page D.8), then disconnect and take off the battery, leaving its carrier in position.

Loosen completely, the carburetter adaptor hose clips and pull the hose away from the carburetter intake flange The carburetter can now be released from its studs and tied back out of the way. If necessary, the control cable can be detached as detailed on page D.11.

The oil feed pipe to the rocker spindles should now be removed and the sparking plug taken out.

Removing the Cylinder Head

Set the piston at top dead centre on the compression stroke (both valves closed) and take off the six nuts holding the cylinder head to the barrel.

Leave the rocker box assembly in position on the cylinder head, and raise the latter until it clears its fixing studs. Rotate the whole assembly about the push rods so as to clear the frame top tube, and lift off. Take the push rods out of their housing. The rocker box can now be removed from the cylinder head, thus exposing the valves and springs.

If it is necessary to dismantle the rockers and spindles, take care to renew any damaged rubber sealing rings. Refer to Fig. B.2 for details of correct reassembly.

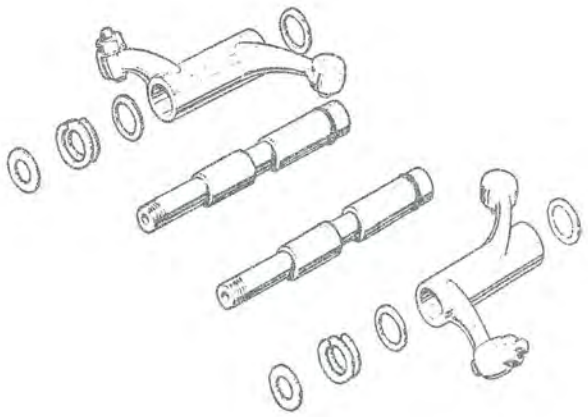


FIG. B.2. *Valve rocker assembly.*

Removing the Valve Springs

Using service tool No. 61–3340 or similar valve spring compressor, compress each spring until the split collets can be removed. The valve springs and top collars can now be lifted from the valve stems, swilled in paraffin, then placed on a numbered board to indicate their position in the cylinder head.

The springs may have settled through long use and they should therefore be checked in accordance with the dimensions quoted on page GD.3.

If the springs have settled appreciably, or there are signs of cracking, they should be replaced.

Push Rods

Examine the push rod end cups to see if they are chipped, worn or loose, and check that the rods are not bent by rolling them on a flat surface (i.e., a piece of plate glass). If any of these faults are evident the rod(s) should be renewed.

Valve Guides

Check the valves in the guides; there should be no excessive side-play or evidence of carbon build-up on that portion of the stem which operates in the guide. Carbon deposits can be removed by careful scraping and very light use of fine grade emery cloth. If there are signs of scoring on the valve stems, indicating seizure, both valve and guide should be renewed.

An old valve guide can be driven out with service tool No. 61-3382 but, the aluminium head should first be heated by immersing in hot water. The new guide can be driven in with the same punch whilst the head is still warm. Note that the exhaust guide is counterbored at the end which protrudes into the port.

Whenever new guides have been fitted, each valve seat must be refaced with a piloted valve seat cutter, to ensure that the seat is concentric with the guide bore.

Valves

Valve heads can be refaced on a valve refacer but if pitting is deep or the valve head is burnt, than a new valve must be fitted and ground-in.

The valve seats in the cylinder head are unlikely to require any attention, but if they are marked, they should be refaced with valve seat cutter tool No. 61-3300, used with pilot No. 61-3293 and holder No. 61-3290. The seat angle is 45 degrees.

Sometimes when the engine has been decarbonised many times, valves become "pocketed". This is when the valve head and seat are below the surface of the combustion chamber, so impairing the efficiency of the valve and affecting the gas flow. The "pocket" should be removed with a special 30-degree angle cutter before re-cutting the seat or grinding-in the valve.

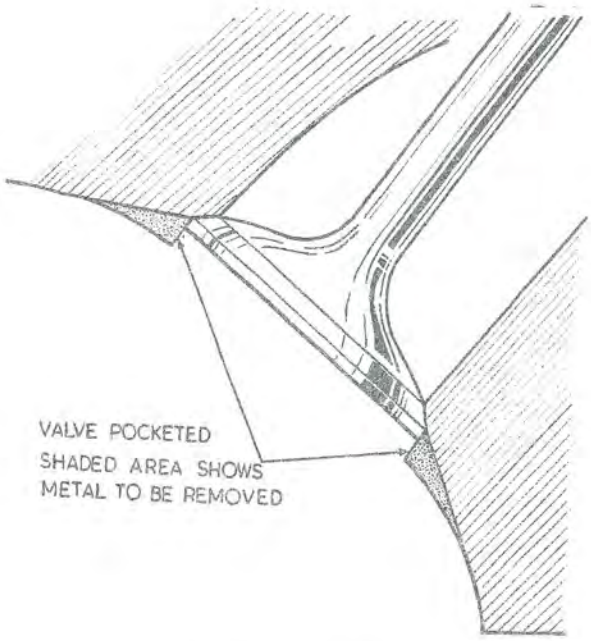


FIG. B.3. *Pocketed valve.*

Valve Grinding

If the valves have been renewed or refaced they must be lightly ground-in to their seats to ensure a good gas-seal.

This operation is carried out only after all carbon deposits have been removed from the combustion chamber.

Removal of carbon from the head, inlet and exhaust ports can be carried out with scrapers or rotary files, but whichever method is used, great care must be taken to avoid scoring the valve seats.

A final "polish" can be achieved with the use of fine emery cloth wetted by paraffin.

Do not attempt to decarbonise the cylinder head by immersing it in caustic soda solution; the solution has a harmful effect on aluminium.

Having removed all traces of carbon, smear a small quantity of fine grinding paste over the face of the valve and return the valve to its seat.

Now, using service tool No. 65-9240, rotate the valve backwards and forwards, maintaining steady pressure. Every few strokes, raise the valve and turn it to a new position. A light spring inserted under the valve head greatly assists in raising the valve to enable it to be re-positioned.

Grinding should be continued until the mating surfaces of both the valve and seat show a uniform matt finish all round.

NOTE:—Prolonged grinding-in of the valve does not produce the same results as re-cutting and must be avoided at all costs.

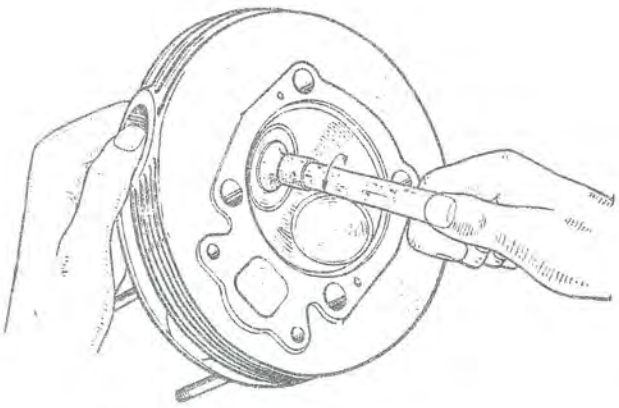


FIG. B.4. *Grinding-in valve.*

Re-assembling the Cylinder Head

Before reassembling the valves and springs, all traces of grinding paste must be removed from both the valves and their seats.

Smear each valve stem with clean engine oil and replace the valves in the head.

Fit the spring cup, valve springs (with close coils at the bottom), and top collar over each valve stem, then compress the springs with service tool No. 61-3340 to allow the split collets to be inserted in the top collar. A little grease on the valve stem will assist in keeping the collets in position as the valve springs are released.

Make sure that the collets are correctly seated in the recess on the valve stem.

Cylinder Barrel

Unless the condition of the engine indicates that the piston, piston rings or cylinder bore require attention, the cylinder barrel should not be disturbed.

If the bore is worn it can sometimes be detected by placing the fingers on top of the piston and attempting to push the piston backwards and forwards in the direction of flywheel rotation. Symptoms indicating faulty piston rings might include heavy oil consumption and poor compression, but only if the valves are known to be in good order. If the valves require attention they are much more likely to be the cause of such symptoms.

Excessive piston slap when warm may indicate a worn bore or severe damage through seizure.

The cylinder bore can be measured for wear with a suitable dial gauge, after moving the piston to the bottom of the bore.

If the barrel is not being removed, bring the piston to the top of the bore and, after plugging the push rod opening with clean rag, proceed to remove the carbon from the piston crown. A stick of tinsmiths solder, flattened at one end, provides an ideal scraper tool and will not damage the alloy piston.

Always leave a ring of carbon around the edge of the piston crown and around the top of the cylinder bore. This will help to provide an additional seal.

After cleaning the piston crown, rotate the engine to lower the piston and wipe away any loose carbon from the cylinder wall.

The cylinder barrel and head joint faces must also be cleaned ,care being taken not to damage the faces by scoring with the scraper.

Such score marks would result in gas leakage, loss of compression or even burning of the cylinder head face.

Removing Cylinder Barrel

To remove the cylinder barrel, rotate the engine until the piston is at the bottom of its travel, then lift the barrel upwards until the piston emerges from the base of the bore. Steady the piston as it comes free from the cylinder so that it is not damaged by violent contact with the crankcase mouth. As soon as the cylinder has been withdrawn, cover the crankcase with a clean rag to prevent the entry of foreign matter.

Examine the cylinder carefully for wear and if a deep ridge has formed at the top of the bore then the barrel will require attention.

The barrel will also require attention if there is any deep scoring as this will cause loss of compression and excessive oil consumption.

The cylinder barrel bore is of close-grained cast-iron, enabling a ½ mm. and 1 mm. rebore to be carried out for use with oversize pistons.

Removing the Piston

It is not necessary to remove the piston unless it requires replacement or further dismantling of the engine is to be carried out.

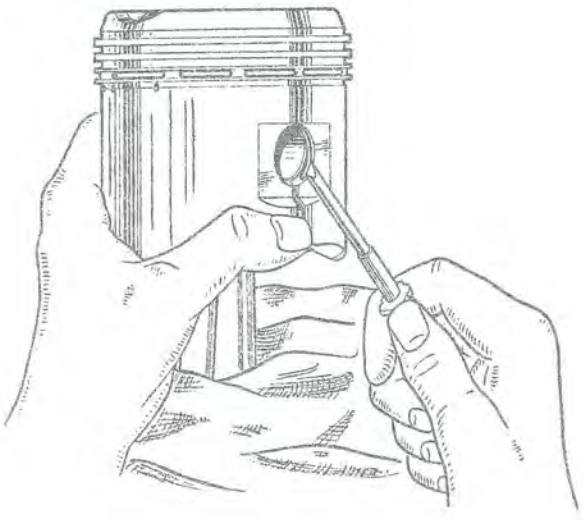


FIG. B.5. *Removing circlip.*

To remove the piston from its connecting rod, it will first be necessary to prise out one of the gudgeon pin circlips using a suitable pointed instrument in the notch provided.

Before the gudgeon pin can be withdrawn the piston must be thoroughly warmed by wrapping it in a rag that has been soaked in hot water and wrung out. Alternatively an electric iron can be applied to the piston crown until enough heat is obtained.

When the piston is warm, tap out the gudgeon pin with a suitable drift, supporting the piston to avoid any side strain on the connecting rod.

If the gudgeon pin comes out easily before the piston is warm then the pin or bush is worn and will need replacement.

After freeing the piston, mark the inside of the piston skirt so that it can be replaced the correct way round.

Piston Rings

The outside face of each piston ring should possess a smooth metallic surface and any signs of discolouration means that the rings are in need of replacement.

The rings should also retain a certain amount of "springiness" so that when released from the barrel, the ends of each ring lie at least 3/16 in. apart.

Each ring should be free in its groove but with minimum side clearance. If the rings tend to stick in the grooves, remove them and clean out all the carbon from the groove and the inside face of the ring. Care is necessary to permit only a minimum amount of movement when removing the rings as they are very brittle and can be broken easily.

A piece of a broken piston ring, ground as a chisel, will provide a useful tool for removing carbon deposits from the ring grooves.

To check the piston ring gaps, place each ring in the least worn part of the cylinder bore (usually at the bottom) and locate it with the top of the piston to ensure it is square in the bore.

Measure the gap between the ends of the ring with a feeler gauge. The correct gap when new is between .009—.014 in. and although an increase of a few thousandths of an inch is permissible, any large increase to, say .025 in. indicates the need for a replacement ring.

It is advisable to check the gap of a new ring before fitting, and if the gap is less than .007 in. the ends of the ring must be carefully filed to the correct limit.

The top compression ring is chromium-plated and must always be used at the top. The second compression ring has a taper outside face and its upper surface is marked "top" to ensure correct fitting.

If the ring is fitted upside down, oil consumption will become excessive.

Small-end Bush

Small-end bush wear is normally very slight, but when excessive it can cause an unpleasant high pitched tapping sound.

The gudgeon pin should be a good sliding fit in the bush but if there is considerable up and down movement, then the bush should be replaced.

The bush can be changed in one operation by pushing the old bush out and, at the same time, pressing the new one in with service tool No. 61-3653. The new bush must be correctly aligned with the oil hole and reamed to .7503—.7506 in. after pressing into the connecting rod.

Reassembly after Decarbonising

Scrupulous cleanliness must be observed when reassembling, and each component should be smeared with fresh oil before replacing.

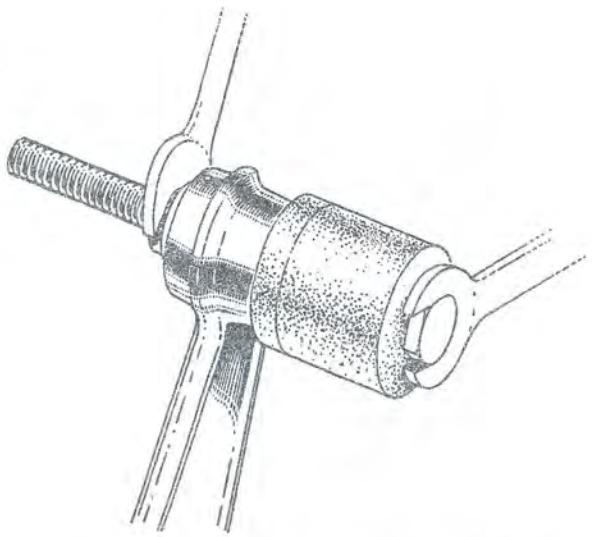


FIG. B.6. *Using service tool No.* 61-3653.

Warm the piston before inserting the gudgeon pin and ensure that the piston is the correct way round before fitting. Always use new gudgeon pin circlips and see that they are pressed well down into their grooves.

If the circlips should come adrift or if one is omitted, the cylinder barrel will be damaged and may require replacement.

Use a new cylinder base washer and support the piston with two pieces of hard wood placed across the crankcase, under the piston skirt.

The piston ring gaps must always be equally spaced round the piston that is, at 120 degrees apart to restrict gas leakage through the gaps to the minimum.

Using the piston ring slipper, service tool No. 61-3707, compress the rings so that they are just free to move and replace the barrel.

The slipper will be displaced as the piston enters the bore.

Take off the slipper and remove the hard wood supports, allowing the barrel to drop on to the crankcase.

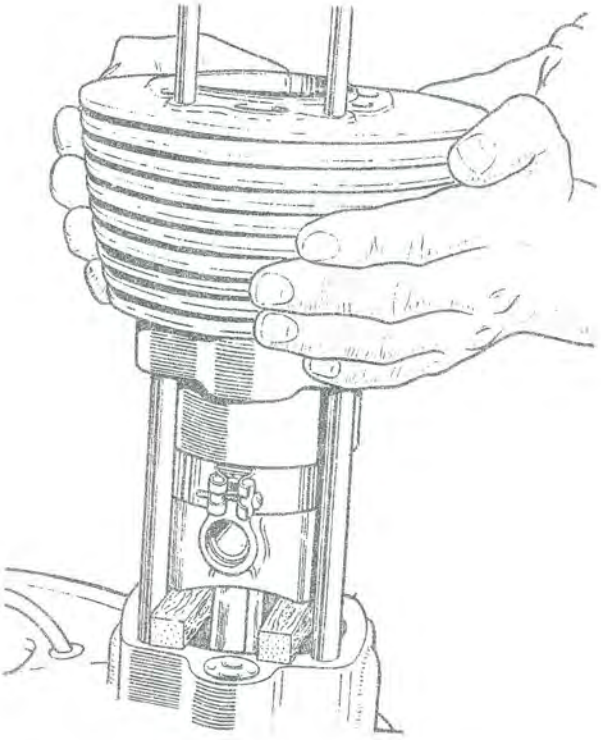


FIG. B.7. *Replacing cylinder barrel.*

Insert the two push rods down the barrel aperture, on to their respective tappets, the outer one operating the inlet push rod (see Fig. B.8).

Place the cylinder head gasket in position and refit the head, complete with rocker box.

The push rod inspection cover should be removed so that the upper ends of the rods can be fitted to their appropriate rocker arms. Note that the top of the exhaust push rod is painted red for identification purposes.

In order to avoid any undue strain on the head or rocker box from valve spring pressure, the piston should be set at top dead centre on the compression stroke. Alternatively, the valve rocker adjusters should be completely slackened off.

Now, using a suitable torque wrench, tighten the six cylinder head fixing nuts firmly and evenly to the figures quoted on page H.1. Check that the push rods are correctly located in their proper positions and tighten the rocker box fixing nuts.

Replace the inspection cover with its sealing washer.

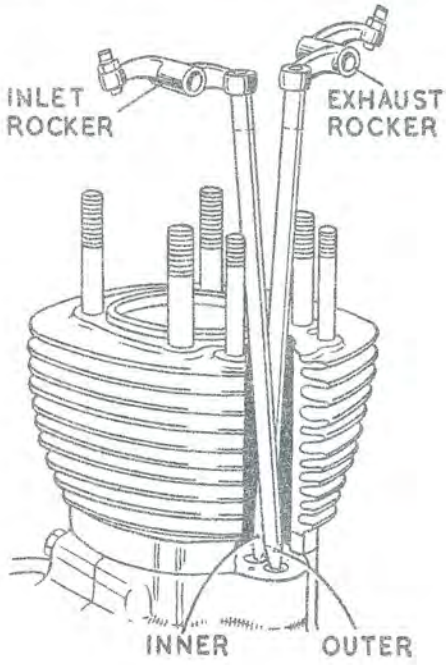


FIG. B.8.

Fit the carburetter, replacing the spacers in their correct sequence, the alloy packing piece being nearest to the cylinder head, the heat-resistant gasket next to the carburetter with paper gaskets between each item. Locate the rubber hose adaptor between the carburetter intake flange and the air cleaner, then secure with the clips. Replace the seat, followed by the exhaust system and engine steady bracket. Next, replace the petrol tank, reconnect the petrol pipes and refit the exhaust valve lifter assembly. Do not omit to re-connect the carburretter overflow pipe.

Replace the spark plug, reconnect the rocker oil feed pipe and finally, adjust the valve clearances as described on page B.11.

If the engine was removed for decarbonising, see pages B.12 and B.13 for details of replacement.

Checking Valve Clearances

The clearances between the top of each valve stem and the rocker adjusting pin, must be set when the engine is quite cold.

Remove the rocker caps and take out the sparking plug, to enable the engine to be rotated easily by means of the kickstart pedal.

Set the piston at top dead centre on the compression stroke (both valves closed) and using a feeler gauge, check that the fully open gaps for the inlet and exhaust valves are as follows:—

.008 in. (inlet) and .010 in. (exhaust)

If the clearance requires adjusting slacken the locknut (A) and adjust the pin (B) until the correct gauge will just slide between the valve stem and pin (see Fig. B.9).

Holding the pin in its new position, retighten the locknut.

Check the clearance again to make sure that the setting has not altered whilst tightening the locknut.

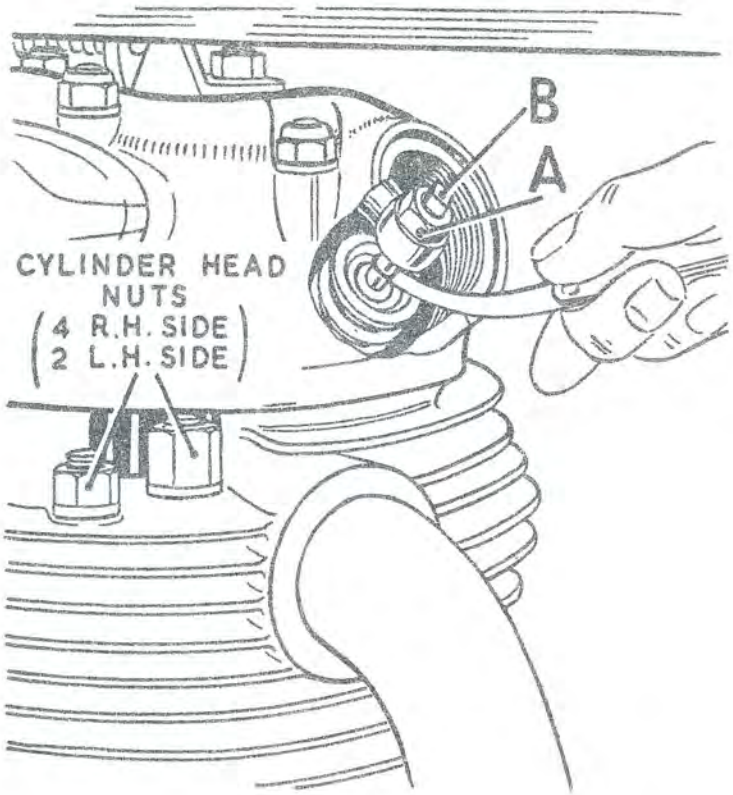


FIG. B.9. *Checking valve clearances.*

REMOVING THE ENGINE UNIT

During the process of removing the engine unit, keep careful watch for any nuts or bolts which are found to be loose or have worn considerably.

Such parts are no longer safe and must be replaced.

Examine the wiring for places where the insulation may have rubbed through and protect with a few turns of good insulating tape. The owner should bear in mind that a bare wire can cause an electrical short-circuit which may set the machine on fire.

Procedure for removal of the engine unit is as follows:—

(a) First, remove the petrol tank. It will not be necessary to drain this, but only to turn off the petrol taps and detach the pipes at the carburetter. Take off the strap which carries the coil and holds the tank at the lower front. The petrol tank is mounted on rubber pads and is secured by a single bolt, which passes through a rubber sleeve in the tank centre, to its anchorage on the frame.

Remove the rubber cap from the top of the tank, unscrew the nut, and withdraw the tank complete with rubber sleeve, petrol pipes, etc., leaving the fixing bolt attached to the frame.

(b) Release the exhaust pipe from the front engine mounting bolt and loosen the tail pipe clip.

The exhaust pipe is a push-fit into the cylinder head port and can now be withdrawn from the front.

(c) Remove the crankcase shield and drain the oil system as detailed on page A.5.

Uncouple the rocker oil feed pipes and the supply and scavenge pipes union beneath the crankcase.

(d) Disconnect the generator and the contact breaker cables from the snap-connectors, behind the engine. Also disconnect the high-tension lead and take out the sparking plug.

(e) Take off the seat and release the flexible connection between the carburetter and the air cleaner by loosening the retaining clips.

After unscrewing the fixing nuts, the carburetter can be withdrawn from the studs and tied back out of the way.

(f) Remove the engine steady tie bar and bracket, complete with exhaust valve lifter assembly, which can remain attached to its cable after first releasing from the operating lever.

(g) Disconnect the oil pipe union nuts at the elbow joints on the external oil filter. Remove the two fixing bolts with self-locking nuts and withdraw the filter complete.

Take off the battery and remove its carrier. This is secured by one bolt on the frame down tube, two self-locking nuts on the frame cross-member lugs and one nut and bolt on the engine mounting plate.

(h) It will now be necessary to remove both sections of the chaincase (see page D.5).

(i) Finally uncouple the rear chain at its spring link, detach it from the gearbox sprocket and disconnect the clutch cable.

The engine/gearbox unit is mounted in the frame at three points. At the rear the attachment is by two triangular plates.

These plates are welded to the frame down tube, the engine being held by one bolt. A second fixing point is located below the crankcase, comprising one long bolt through the crankcase and frame lugs. The third attachment point is at the frame front down tube. Whilst withdrawing the final fixing bolt, great care should be taken to avoid trapping the hand or fingers, as the engine may shift its position suddenly.

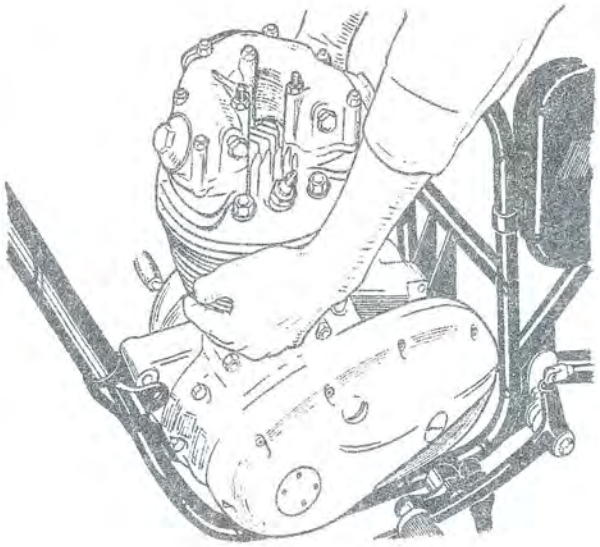


FIG. B.10. *Removing the engine.*

Raise the engine at the front until it is clear of the frame lug, then tilt it backwards.

It will be necessary at this stage to disengage the engine lug from the rear frame brackets.

The engine unit can now be lifted out from the left-hand side of the frame.

Replacement of the engine unit is a reversal of the above procedure for removal, but a check must be made to ensure that all nuts and bolts are tightened securely and that the handlebar controls are suitably re-adjusted.

TRANSMISSION

Description

Power from the engine is transmitted through the engine sprocket and primary drive chain to the clutch chainwheel, then via the clutch driving and driven plates to the cush drive or shock absorber unit and gearbox mainshaft.

The drive is then transmitted through the four-speed gearbox to the final drive sprocket and finally, to the rear wheel.

The clutch cush drive, as its name implies, smooths out the drive as the engine power impulses fluctuate.

The clutch, when operated correctly, enables the rider to stop and start his machine smoothly without stalling the engine, and assists in providing a silent and effortless gearchange.

Thus it will be evident that the satisfactory operation of one part of the transmission system is dependent on another part. In other words, if one part is worn or faulty, it can very often prevent other parts from working properly.

The dismantling and reassembly of the primary drive can if necessary, be carried out with the engine unit in the frame, but will be treated in the following notes, as though the unit were on a work bench.

Removing Primary Drive Cover

Before the cover can be removed, the footrest must be taken off. This is secured to its taper shaft by one nut.

Drain the oil as described on page A.10 and take out the fixing screws from around the outer edge of the cover. Note the positions of the sleeve nuts, one of which screws on to the rear chain oiler screw. The screws are of different lengths and a careful note should be made of their respective locations to facilitate refitting.

If the cover joint has not already been broken, tap the cover gently with a hide mallet to release, but have a suitable receptacle underneath to catch any remaining oil. Depress the brake pedal and withdraw the cover.

Clutch Dismantling

Remove the locking wires and the four spring retaining nuts (P) Fig. B.15, and withdraw the springs with their cups. The pressure plate and the remaining clutch plates can then be taken out. If these are the only items requiring attention, the clutch need not be dismantled further.

Before unscrewing the clutch centre nut, it will be necessary to lock the chainwheel and centre together with service tool No. 61-3774, and to insert a bar through the connecting rod small-end bush. If a service tool is not available, engage top gear and lock the gearbox sprocket with a length of chain held in a vice. Flatten the tab washer under the clutch centre nut and unscrew the nut, which has a normal right-hand thread.

Take off the nut, tab washer and distance piece. The clutch push rod may now be withdrawn but do not attempt to remove the chainwheel at this stage.

Generator Removal

The generator comprises the rotor, fitted to the engine shaft, and the stator which is mounted on three studs around the rotor, both being detailed in the electrical section.

Before the clutch chainwheel, chain or engine sprocket can be removed, the generator must be taken off.

To remove the stator, take off the three nuts and pull the generator lead through the rubber grommet in the back of the chaincase. Take care not to damage the windings of the coils when pulling the stator off its studs. Note that the stator unit is fitted with the lead on the outside.

The primary chain tensioner can now be taken off but make careful note of the spacer positions.

Bend back the tab of the lockwasher under the engine shaft nut and unscrew the nut (right-hand thread). Pull off the rotor and take out the small Woodruff key from the shaft to avoid losing it.

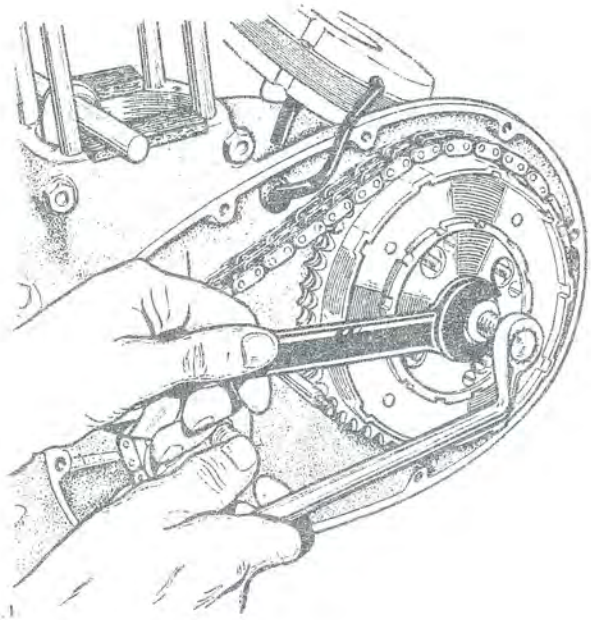


FIG. B.11. *Freeing clutch sleeve.*

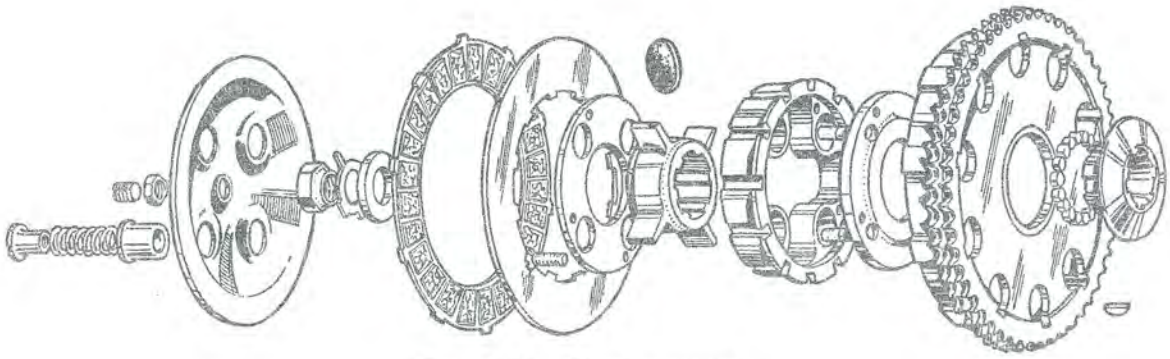


FIG. B.12. *Clutch exploded.*

With extractor No. 61–3583, the clutch sleeve can now be freed from the tapered mainshaft, enabling the clutch chainwheel, chain and engine sprocket to be withdrawn together.

Inspecting the Clutch

The four driving plates have segments of special friction material which are securely bonded in the metal. These segments should all be complete, unbroken and not displaced. Even if there is no apparent wear or damage to the plates or segments, the overall thickness of each segment should be measured and if the extent of wear is more than .030 in. (.75 mm.), the plates should be replaced. Standard thickness is .167 in. (4.242 mm.).

The tags on the outer edge of the plates should be a reasonable fit in the chainwheel slots and should not be "hammered" up. If there are burrs on the tags or the segments are damaged, the plates should be renewed.

The plain driven plates should be free from score marks and perfectly flat. To check the latter, lay the plate on a piece of plate glass; if it can be rocked from side to side, it is buckled and should be replaced.

Cush Drive

To inspect the cush drive rubbers which are within the clutch centre, take out the four countersunk head screws adjacent to the clutch spring housings and prise off the retaining plate.

The rubbers should be quite firm and sound, and should not be disturbed unless wear or damage is suspected.

When refitting the clutch rubbers it may be found necessary to use a lubricant ,in which case a liquid soap is recommended.

Do not use oil or grease.

Clutch Chainwheel

Examine the slots for wear; if they are corrugated or the teeth are hooked and thin, the chainwheel should be replaced.

Check the chainwheel roller bearing for up and down movement. Slight play is permissible but if excessive, the bearings should be renewed.

Gearbox or Final Drive Sprocket

Access to the gearbox sprocket can only be obtained when the clutch has been removed.

Take out the six screws holding the circular plate at the back of the primary case, break the joint and remove the plate with its oil seal.

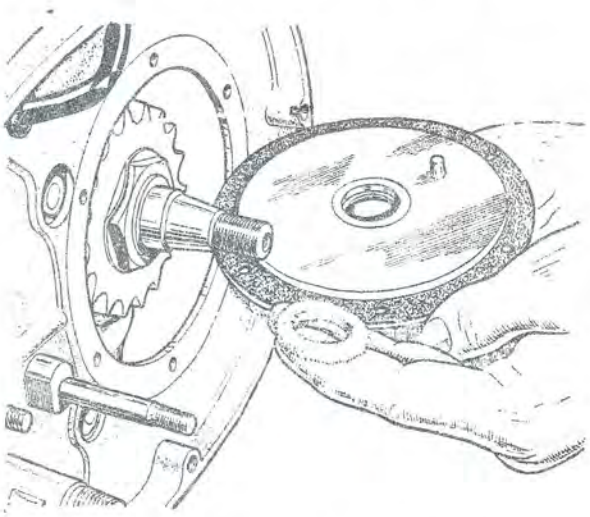


FIG. B.13. *Primary case back plate.*

Look for signs of oil leakage down the back of the cover. If leakage is evident, change the oil seal, taking care to see that it is fitted the correct way round with the lip of the seal to the inside of the primary case.

A felt washer is fitted between the circular plate and the sprocket fixing nut, preventing the entry of grit which may damage the small oil seal. If the washer no longer appears serviceable, replace it.

If it is necessary to change or renew the gearbox sprocket, first place a length of chain round the sprocket and lock in a vice with a suitable bolt, then flatten the tab washer and unscrew the large nut. The sprocket can now be pulled off the mainshaft splines.

If the oil seal is suspected of being faulty or leakage has occurred it should be renewed. Check that the sprocket boss is not worn or damaged as this would quickly damage a new seal.

If the sprocket boss is smooth and not scored it can be replaced, but lightly oil the boss to avoid damaging the seal as the sprocket is pressed home.

Reassemble in the reverse order but do not omit to turn the tab washer over the nut after tightening.

Clutch Operation

As already indicated, the clutch being part of the transmission system, carries power to the rear wheel, but by separating the driving and driven plates this connection is broken.

The disengagement is achieved by operating the clutch lever, the force imposed being transmitted via the clutch cable to the clutch lever in the timing case. The lever, working on the rack-and-pinion principal, drives the push rod through the hollow gearbox mainshaft, forcing the pressure plate out; so compressing the clutch springs and freeing the plates.

To ensure smooth clutch operation, it is essential that the spring pressures are equal and that the pressure plate runs "true."

See below for details of clutch adjustments.

Reassembling the Primary Drive

Place the felt grit protection washer in position against the sprocket securing nut and replace the circular cover, using a new paper gasket jointed on one side only.

If the clutch sleeve has been removed from the chainwheel, smear the sleeve with grease and place the 25 rollers in position. Now, slide the chainwheel over the rollers and fit the clutch centre over the splines of the sleeve.

Pass the stator leads through the back of the primary chaincase. This operation may be found difficult if left to a later stage.

The engine shaft distance piece should not have been disturbed, but if it was removed for any reason, it must now be refitted with the chamfered side outwards.

See that the Woodruff keys are fitted to both mainshafts and that they are a good fit in the keyways.

Place the primary chain around both the engine and clutch sprockets, pulling the chain taut.

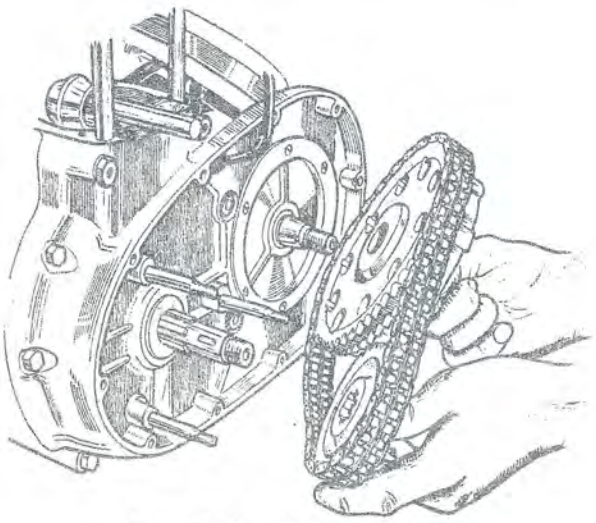


FIG. B.14. *Fitting primary drive.*

Pick up the engine sprocket, chain and chainwheel with both hands, pass the stator unit through the chain and slide the sprockets on to their respective shafts. It will be necessary to turn the clutch chainwheel to locate over the keyed shaft. Place the thick washer with the recess outwards in position against the clutch sleeve, then the tab washer and fixing nut. After tightening the nut, lock in position with the tab washer.

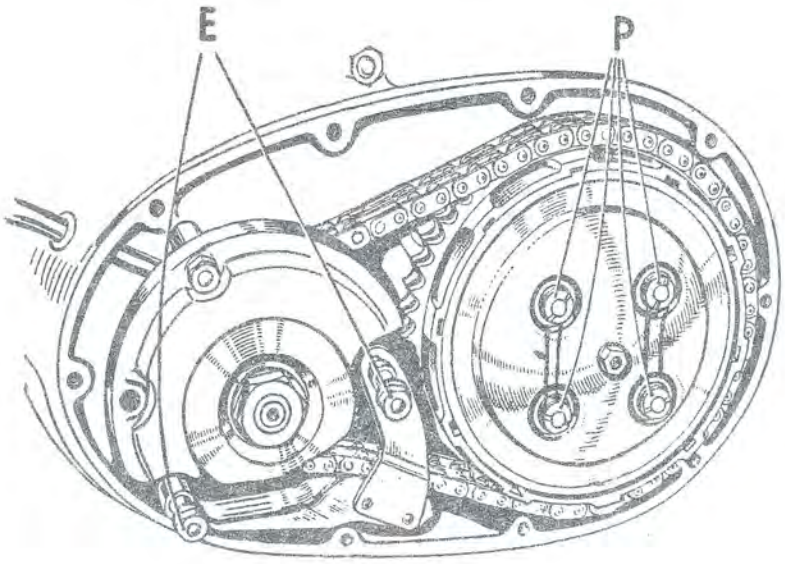


FIG. B.15.

Replace the clutch plates, starting with one plain then one segmented plate and so on alternately, there being five plain plates and four segmented plates. Insert the clutch push rod into the hollow mainshaft.

Place the pressure plate in position and fit the four spring cups with springs, which should be of equal length. If in any doubt about the condition of the springs, renew them.

Screw on the four spring nuts (P) Fig. B.15, with the special screwdriver No. 61-3700 until the underside of each head is approximately ⅛ in. from the face of each cup.

If the springs are compressed excessively, the handlebar lever will be stiff to operate. On the other hand, if the spring pressure is insufficient the clutch will tend to slip. Check the accuracy of the spring setting by declutching and depressing the kickstart lever, when it will be seen if the pressure plate is running "true" or not. If necessary, adjust each nut accordingly to correct any "run-out."

When the spring setting has been determined the clutch movement can be adjusted by means of the central screw and locknut on the pressure plate.

Replace the rotor on to the keyed engine shaft with its "Lucas" marked face outwards and fit the tab washer and nut.

Turn the tab over the nut after tightening securely.

Replace the primary chain tensioner into the two lower stator studs (E) Fig. B.15 with appropriate spacers.

Fit the stator on to its studs with the cables on the outside, at the top, and fix loosely with the self-locking nuts. It is important that the air gap between the rotor and the stator pole pieces is equal all round. The gap can be checked with a .008 in. feeler gauge and any variation should be corrected. Adjust the primary chain tensioner to give approximately ⅛ in. free play on the top run of the chain between the sprockets. Finally, tighten the stator fixing nuts.

Having completed the assembly of the primary drive, the primary cover can now be replaced. Apply jointing cement to both faces of the chaincase and, using a new gasket, replace the cover. Ensure that the fixing screws and two sleeve nuts are fitted in their correct positions and that the rear chain oiler is replaced.

Refit the footrest and, after adjusting for desired height tighten the fixing nut.

See that the oil level and drain screws are correctly located in the lower edge of the case and are fitted with aluminium washers.

CONTACT BREAKER

Description

The contact breaker assembly is contained within a circular compartment in the inner timing cover, its cover being secured by two screws.

The assembly comprises the contact breaker plate, on which are mounted the contacts and condenser (capacitor). An oil seal is fitted in the back of the housing and prevents oil from reaching the assembly. The automatic advance/retard unit, mounted behind the plate, consists of two spring-loaded bob-weights coupled to the contact breaker cam and is secured in the tapered hole of the camshaft by one central bolt and washer.

The bob-weights, when the engine is stationary, are held closed by the springs, retaining the contact breaker cam in the fully retarded position. This is necessary to make starting easier and considerably reduces "kick-back" on the kickstart lever.

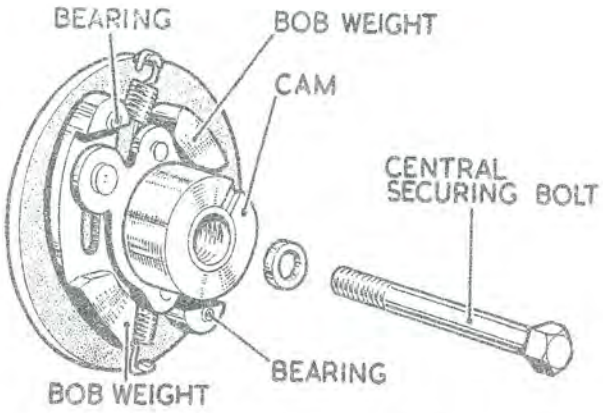


FIG. B.16. *Automatic advance unit.*

As the engine revolutions increase, centrifugal force carries the bob-weights outwards progressively turning the cam into the direction of rotation, thus advancing the ignition.

The elongated holes in the contact plate enable the plate to be moved backwards and forwards around the cam, so providing a means of fine adjustment for ignition timing.

Removing the Contact Breaker

Before removing the contact plate, scribe a mark across the plate and housing so that it can be replaced in exactly the same position, otherwise the ignition will have to be retimed.

Disconnect the condenser cable at its snap connector, unscrew the two pillar bolts and take off the plate complete with contacts, condenser and cable.

To remove the auto-advance unit and cam, first take out the central fixing bolt then free the unit from its taper with service tool No. 61–3761.

Avoid removing the auto-advance unit unnecessarily as the timing will have to be reset. During reassembly refit loosely and retime the ignition as detailed on page B.32.

Contact Breaker Points

To change or inspect the contact points unscrew and remove the barrel nut inside the C-shaped spring and take off the nut securing the spring and lead to the condenser. The movable contact can now be lifted off, followed by the fibre washer and fixed contact.

The contacts must be free from grease or oil. If they are blackened or burnt, clean with a fine carborundum stone or very fine emery cloth. Wipe away any traces of dirt or metal dust with a clean rag, moistened with petrol.

When replacing, do not omit to fit the fibre washer between the contacts. Also ensure that the insulating strip is fitted on to the condenser terminal before the spring or cable.

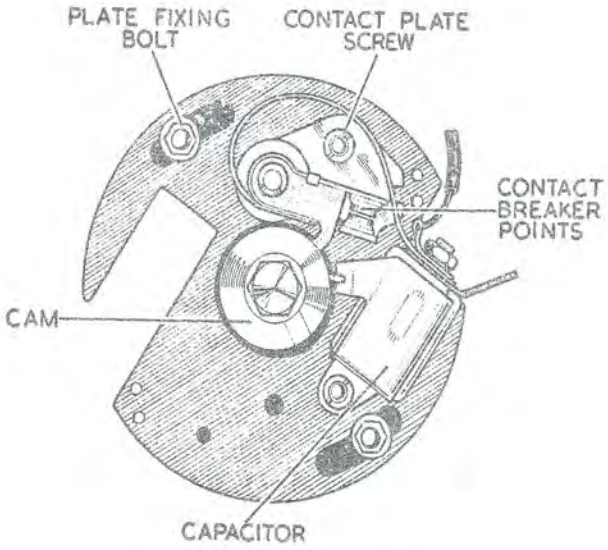


FIG. B.17. *Contact breaker unit.*

It will now be necessary to reset the contact points gap. Revolve the engine until the fibre heel is on the peak of the cam, loosen the fixed contact screw and move the contact accordingly to give the correct gap of .015 in. (.381 mm.). Tighten the contact screw and re-check the setting.

It is advisable to check the ignition timing after carrying out any adjustment to the contact breaker points as a variation in the contact points gap tends to alter the timing. Widening the points gap advances the ignition; closing the gap retards the ignition. Although this variation is very slight, it must be remembered that accurate timing is important in the operation of the ignition system.

See pages B.32 to B.35 for full details of ignition timing.

TIMING COVERS

To obtain access to the timing gears or the gearbox components it will be necessary to remove the covers on what is known as the timing or gear-side of the engine. It will be assumed that the primary drive has been dismantled as described on previous pages.

To remove the outer cover, first take off the gearchange and kickstart pedals, then take out the ten cover retaining screws, noting their respective locations. The cover, complete with contact breaker plate and clutch operating mechanism, can now be withdrawn, exposing the auto-advance unit and kickstart mechanism. Note that the contact breaker lead is held by a spring clip under one of the inner timing cover screws.

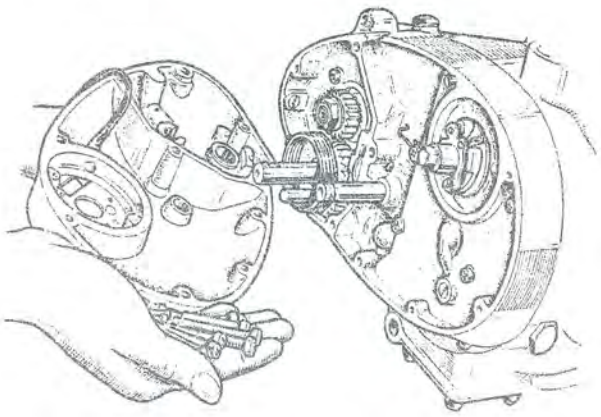


FIG. B.18. *Removing outer timing cover.*

If the clutch operating lever is to be removed, care must be taken to avoid losing the operating rack and ball which are loosely located on the inside of the outer cover.

It is not necessary to remove the kickstart quadrant or spring unless they require attention.

To release, free the spring from the kickstart spindle and withdraw the quadrant complete with layshaft needle bearing. When fitting a new spring, first locate the hooked end of the spring in the quadrant slot then "wind-up" the spring in a clockwise direction and slip the eye of the spring on to its stud. The quadrant bush is a push-fit into the outer timing cover.

Remove the contact breaker auto-advance unit as described on page B.18.

Take out the seven fixing screws and note that the contact breaker cable clip fits under the uppermost central fixing screw. The inner cover joint can be broken by tapping gently around the edges with a mallet.

The cover, complete with kickstart ratchet, gear cluster and gearchange assembly can now be eased away, leaving only the oil pump and timing gears exposed.

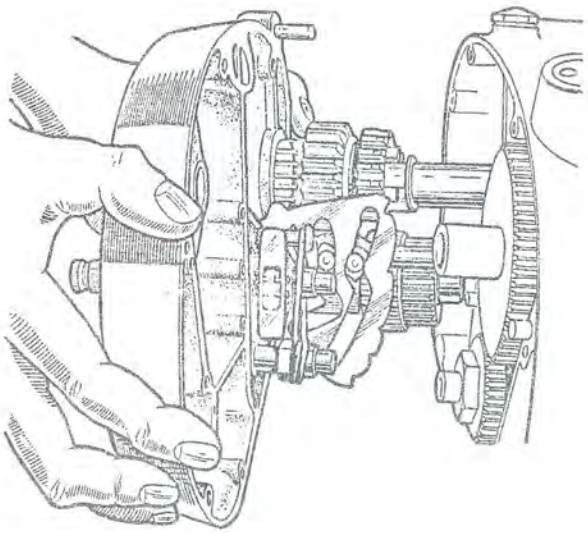


FIG. B.19. *Removing inner timing cover.*

Take care not to lose the loose fitting thrust washer on the end of the layshaft.

Note that the camshaft bush in the cover is located by a small peg to ensure correct alignment of the oil holes during reassembly.

Check that the oil seals in the covers are not damaged and are fit for further use.

OIL PUMP, TIMING GEARS AND TAPPETS

Oil Pump Removal
During engine dismantling, the oil pump need not be removed unless it is known to be faulty.

Use a suitable bar through the connecting rod to lock the flywheel, flatten the tab washer under the crankshaft nut and unscrew the nut.

Pull off the crankshaft pinion, using extractor No. 61-3773 with appropriate legs. The oil pump worm drive need not be disturbed unless further engine dismantling is to be carried out, in which case the extractor should be used with the special legs.

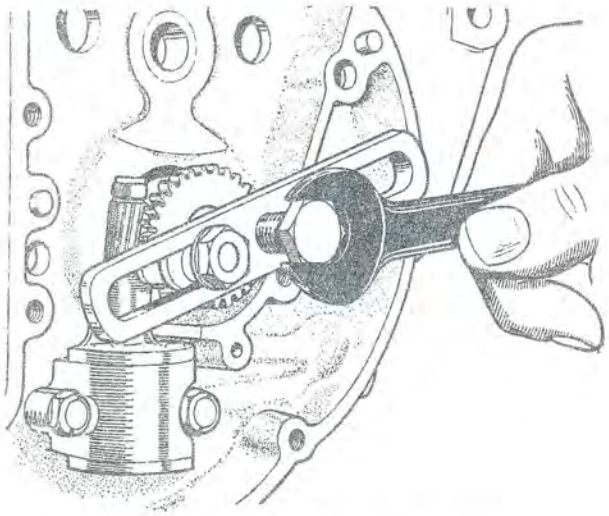


FIG. B.20. *Using tool No.* 61-3773.

Unscrew the two self-locking nuts from the main body of the pump and pull the pump off its studs.

It is not advisable to dismantle the oil pump unless it is suspected that there is possible damage caused by neglected periodical oil changes.

Full details of dismantling and rebuilding the oil pump are given on pages A.8 and A.9.

Replacing the Oil pump
Ensure that the joint faces are clean, apply a smear of grease to a new gasket and place the gasket in position on the crankcase face. Locate the pump over the studs, replace the fixing nuts and tighten evenly to a torque wrench setting of 7 lb./ft. to avoid distortion.

Timing Gears
Careful examination of the timing gears will show that there are marks on the faces of the gears, adjacent to the gear teeth.

These marks are to assist in correct reassembly, so ensuring precise valve timing. It is good practice to familiarise oneself with them before removing the gears (see Fig. B.21).

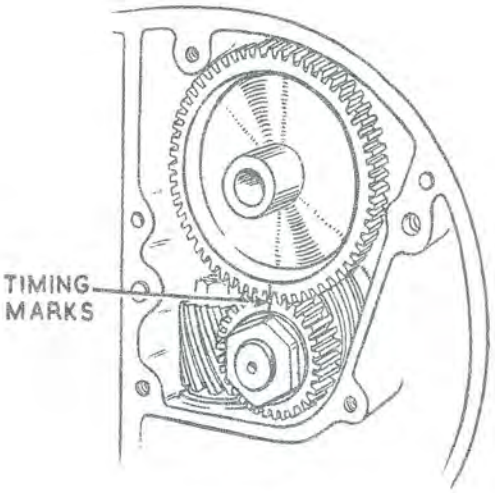


FIG. B.21.

The removal of the crankshaft pinion and oil pump worm drive is described in the section dealing with oil pump removal.

Pull the camshaft, with pinion, from its location in the crankcase and allow the tappets to fall clear. The pinion is a push-fit on to the keyed end of the camshaft.

Tappets
Examine both ends of each tappet for signs of excessive wear or chipping and make sure that they are quite free to move in their locations in the crankcase. If there are signs of "scuffing"

on the feet, they should be replaced. The camshaft must also be examined as this may be damaged too.

When replacing the tappets, ensure that the small oil holes are facing towards the gearbox.

Reassembly of the timing gear is the reversal of the above procedure for dismantling, but care must be taken to match the timing marks on the pinions.

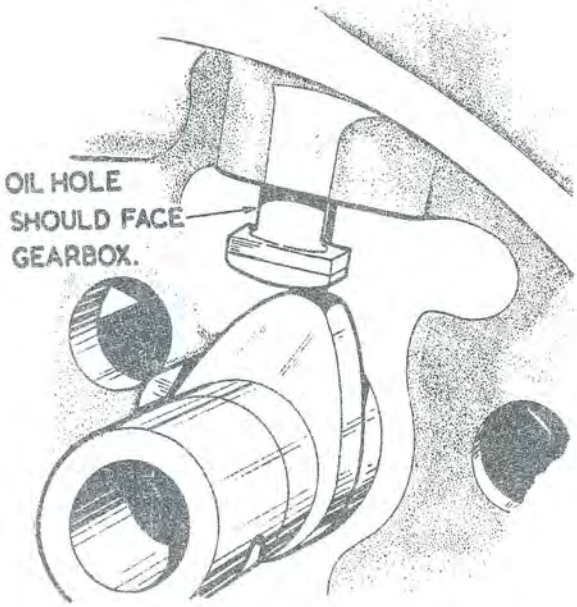


FIG. B.22. *Correct fitting of tappets.*

GEARBOX DISMANTLING

Gearchange Mechanism

First remove the timing covers, as detailed on page B.19.

Press in the cam plate plungers with a suitable flat bladed instrument and withdraw the gearchange quadrant complete with spring.

The spring-loaded plungers are retained by a small plate, secured with one screw.

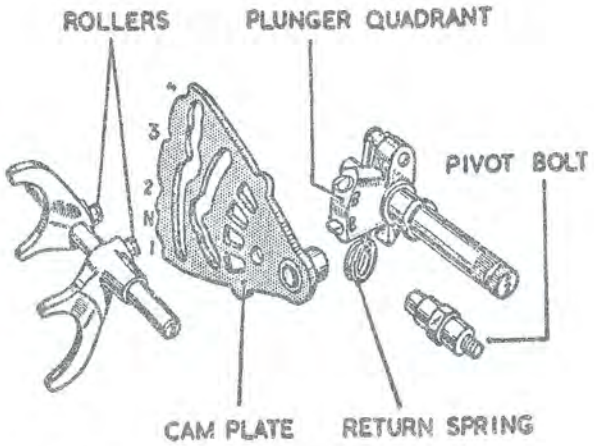


FIG. B.23. *Gearchange mechanism.*

The gearchange return spring pivot bolt need not be disturbed.

Take out the large split pin from the outside of the cover and withdraw the cam plate pivot pin. This job will be simplified if a suitable bolt is screwed into the pin enabling the pin to be extracted with pliers (see Fig. B.24).

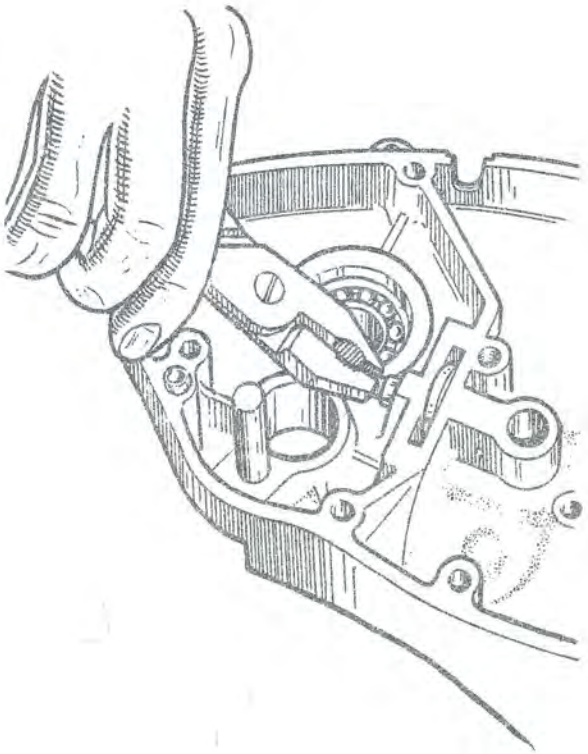


FIG. B.24. *Removing the cam plate pivot pin.*

The cam plate can now be withdrawn from its slot, complete with selector forks and spindle, the layshaft with fixed top gear, second gear and sliding gear (third), and the mainshaft sliding gear (second). The large layshaft low gear with its bronze bush can now be removed. Note that the top face of the cam plate is stamped with a letter "T" (see Fig. B.26) to ensure correct re-assembly. By fitting the cam plate upside down, the gearchange positions will be reversed.

Check the cam plate for wear in the cam tracks and the plunger "windows."

Also check that the quadrant plungers are not chipped or worn and are quite free in their housings.

The cam plate locating spring plates are secured to the gear-side crankcase half with two small bolts. If they are damaged or no longer retain their springiness, then they must be replaced.

Any damage or wear to these parts will make a good gearchange impossible.

Gear Cluster

Proceed as detailed above, when it will be seen that only the mainshaft with its third and low gear, remains on the inner timing cover.

To remove first grip the shaft in a vice using soft metal clamps, unscrew the kickstart ratchet nut then take off the special washer, spring, ratchet pinion, sleeve and driving pinion. The gearbox mainshaft can now be withdrawn from the cover bearing, together with its low gear and third gear.

The smaller gear is a press-fit on to the shaft, so retaining the larger gear which has a spacer between it and the end of the splines.

If it is necessary to change either of these gears, the shaft must be pressed out of both gears at the same time, an operation which requires a good press properly mounted on a workbench.

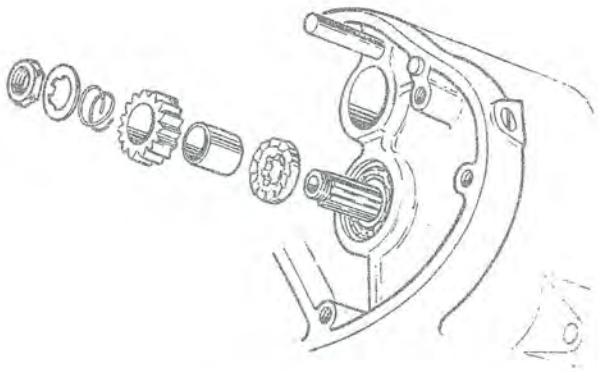


FIG. B.25. *Kickstart ratchet.*

The layshaft second gear is held against the fixed gear (high) by one circlip.

When examining the gears, look for cracked, chipped or scuffed teeth, the latter will show (if present) on the thrust faces of the teeth and in severe cases, might even have broken through the case hardening.

Gearbox Bearings

When examining the gearbox bearings and bushes for wear, do not overlook the bronze bushes in the layshaft low gear and the main-shaft high gear. The mainshaft high gear is still in the crankcase at this stage.

The layshaft has needle roller bearings at each end, one in the crankcase and one in the kick-start quadrant boss.

The mainshaft has two ball journal bearings, one at each end. To gain access to the left-hand bearing, first remove the gearbox sprocket (as detailed on page B.15), then drive the high gear sleeve pinion through into the gearbox.

After prising out the oil seal, the bearing can be pressed out from the inside of the cover.

NOTE:—Before attempting to remove any bearing or bush from an aluminium case, the case should first be heated. The bearing can then be pressed out and the replacement fitted whilst the case is still hot.

The right-hand mainshaft bearing can be pressed out from the inside of the inner cover, after first removing the circlip.

GEARBOX REASSEMBLY

It will be assumed that all bearings, bushes and oil seals have been replaced as necessary.

If it has been removed, replace the cam plate, correct way round, in the cover slot (see Fig. B.26 for guidance), insert the pivot pin and secure with the split pin.

Insert the mainshaft fitted with its low gear and third gear, into the cover bearing, replace the kickstart ratchet assembly and secure with the fixing nut. It will be necessary to hold the mainshaft in a vice, using soft metal clamps, to tighten the nut fully.

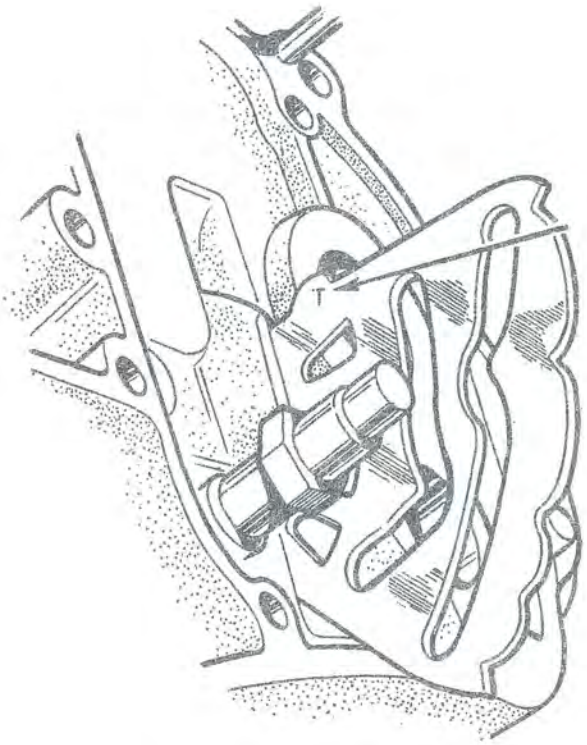


FIG. B.26.

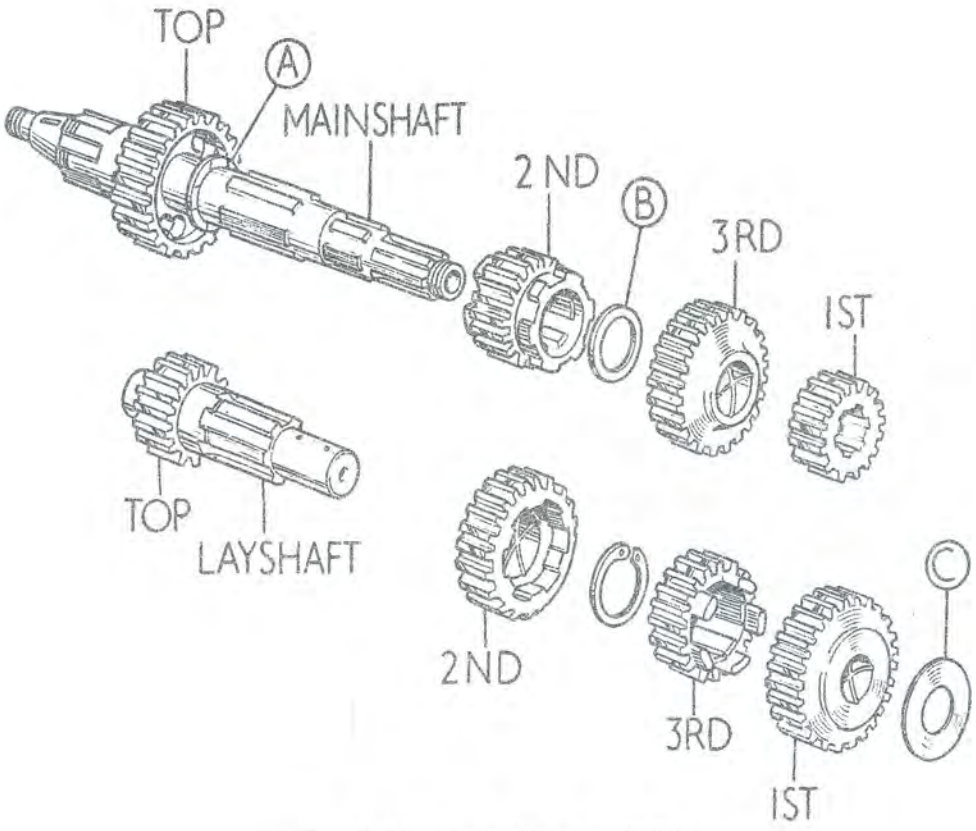


FIG. B.27. *Gear cluster exploded.*

Holding the cover face down, place the layshaft low gear with its shim (c) Fig. B.27, and sliding gear (third) in position on the cover. Fit its selector fork, the roller being located in the lower cam plate track.

Next fit the mainshaft sliding gear (second) with the appropriate spacers (see opposite). Replace its selector fork and locate the fork roller in the upper cam track. Insert the spindle through the selector fork bosses and locate in the cover.

The layshaft, with its remaining two gears (fixed high gear and second gear) can now be passed through the gears on the cover, into the kickstart boss needle roller.

Fit the gearchange return spring to the quadrant and replace the assembly in the cover, locating the spring loop over the pivot bolt. It will be necessary, whilst carrying out this operation, to press in the plungers with a suitable flat bladed instrument, before finally engaging the plungers with the cam plate "windows" as the quadrant is pressed home.

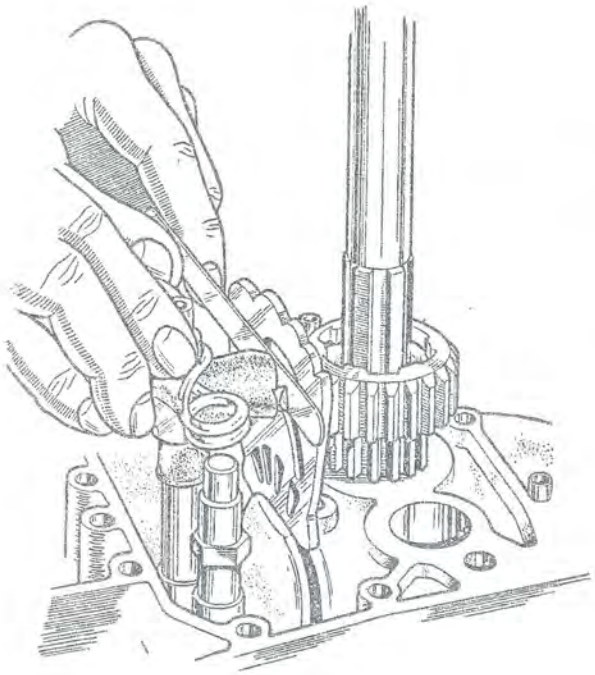


FIG. B.28. *Fitting the gearchange quadrant*

The mainshaft, being locked to the inner cover, does not need checking for end float but excessive movement between the gears and the ends of the splines must be corrected by fitting the appropriate spacers. See Fig. B.27 for position of each spacer, the thicknesses and part numbers of which are as follows:—

(A) .093—.094 in. (40-3020);
.098—.099 in. (40-3126);
.103—.104 in. (40-3127);

(B) .070—.071 in. (40-3119);
.075—.076 in. (40-3019);
.080—.081 in. (40-3120);

(C) Standard shim (40-3258)

Before proceeding with assembly, check the gear selection for correct operation.

SEQUENCE OF GEAR CHANGING

To understand this description of the gear changing sequence, it will be necessary to refer to the various drawings and to understand some of the terms used.

(1) CAM PLATE—this is the large fan-shaped component that has "windows" for the gearchange quadrant plungers, cam tracks for the selector fork rollers and notches to locate the gear positions.

(2) CAM PLATE LOCATING SPRING PLATES—these are secured to the crankcase, the larger of which locates in the cam plate notches at various gear positions.

(3) QUADRANT PLUNGERS—these are held in the gearchange quadrant and operate in the cam plate "windows."

(4) SELECTOR FORKS—each selector fork has a roller which locates in the cam plate tracks. When the cam plate is turned about its pivot pin, these selector forks are moved backwards and forwards.

(5) SLIDING GEARS—both the layshaft and the mainshaft have one sliding gear each. They are operated by the selector forks and are carried along the splined shafts.

The gears must always be in the neutral position for starting the engine, this is the position shown in Fig. B.29.

The spring plate is holding the cam plate by the second notch. At the other end of the cam plate the selector quadrant plungers are compressed ready to operate either way the pedal is moved.

When the pedal is moved down, to engage first gear, the plungers will enter the cam plate and move it to first gear position, this in turn will operate the layshaft selector fork and will mesh the layshaft sliding gear with the layshaft first gear.

Reference to Fig. B.30 will now show the quadrant plunger in the second window ready to move the cam plate from first to second gear.

This time the cam plate moves in the opposite direction and again operates the layshaft selector fork moving the layshaft sliding gear in the opposite direction to mesh with the second gear.

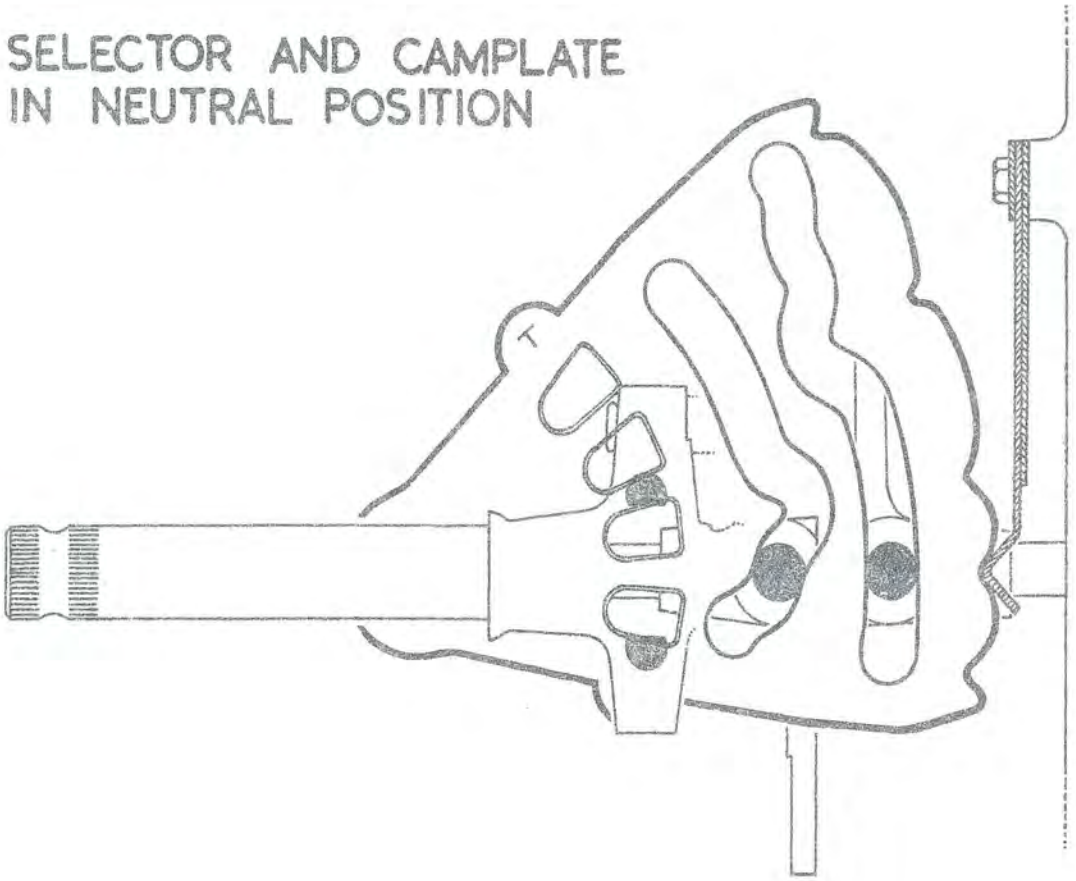
Reference to Fig. B.31 will show both quadrant plungers in the cam plate windows ready to move the gears from second to first or neutral or back again.

When the cam plate is moved to third gear position as will be seen by reference to Fig. B.32, the action moves both selector forks, drawing the layshaft sliding gear to a neutral position and moving the mainshaft third gear. Again the quadrant plungers are ready to move the gears either way.

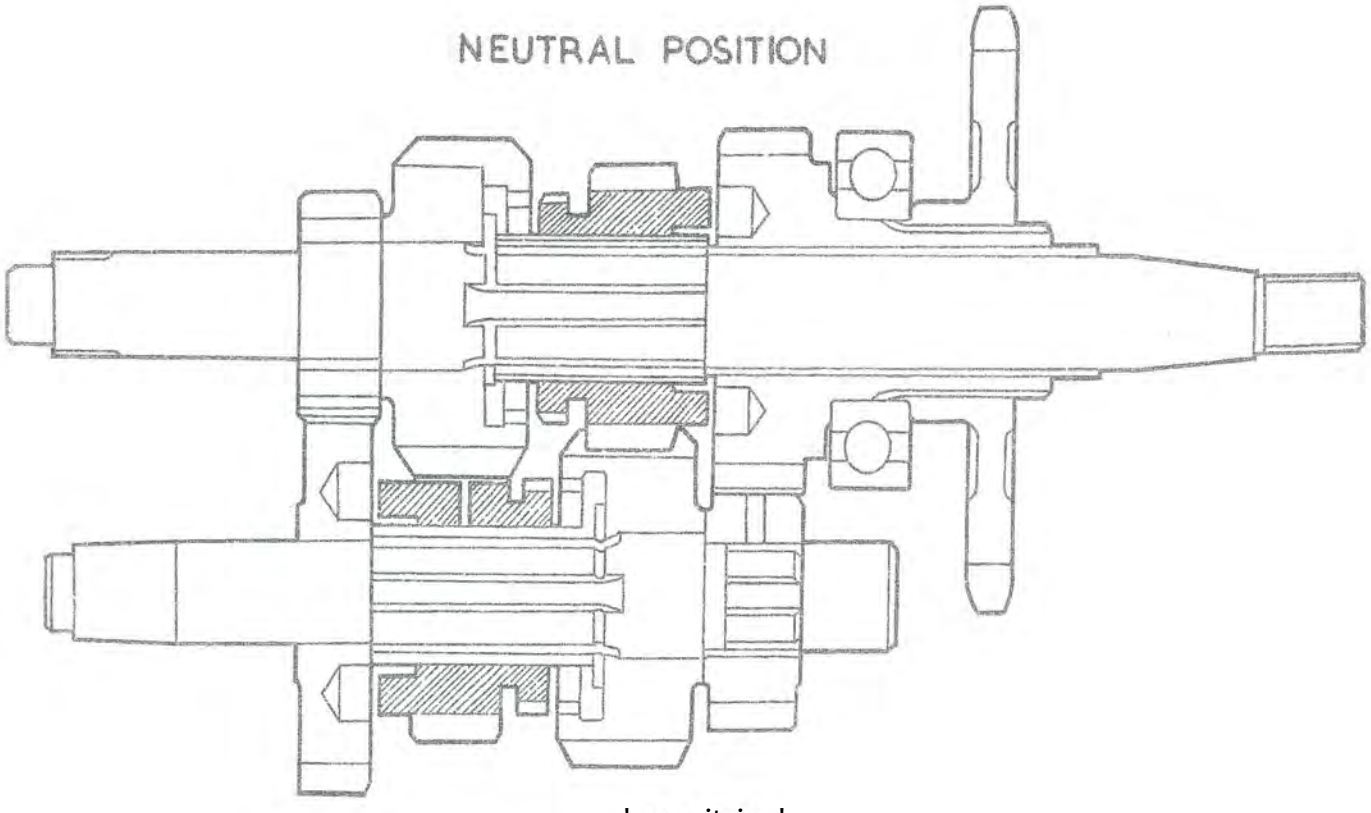
Finally, the move into fourth or top gear (Fig. B.33) operates the mainshaft selector fork only, again sliding the gear the opposite way to mesh with the sleeve pinion. After each movement of the gearchange pedal the quadrant returns to a static position so that the plungers are ready to operate the cam plate. The large spring plate at the large end of the cam plate is the positive gear location and it also serves to steady the cam plate whilst the quadrant plungers are returning to their static position.

NOTE:—The cam plate can be reversed if required, to give an opposite gearchange action.

SELECTOR AND CAMPLATE
IN NEUTRAL POSITION



NEUTRAL POSITION



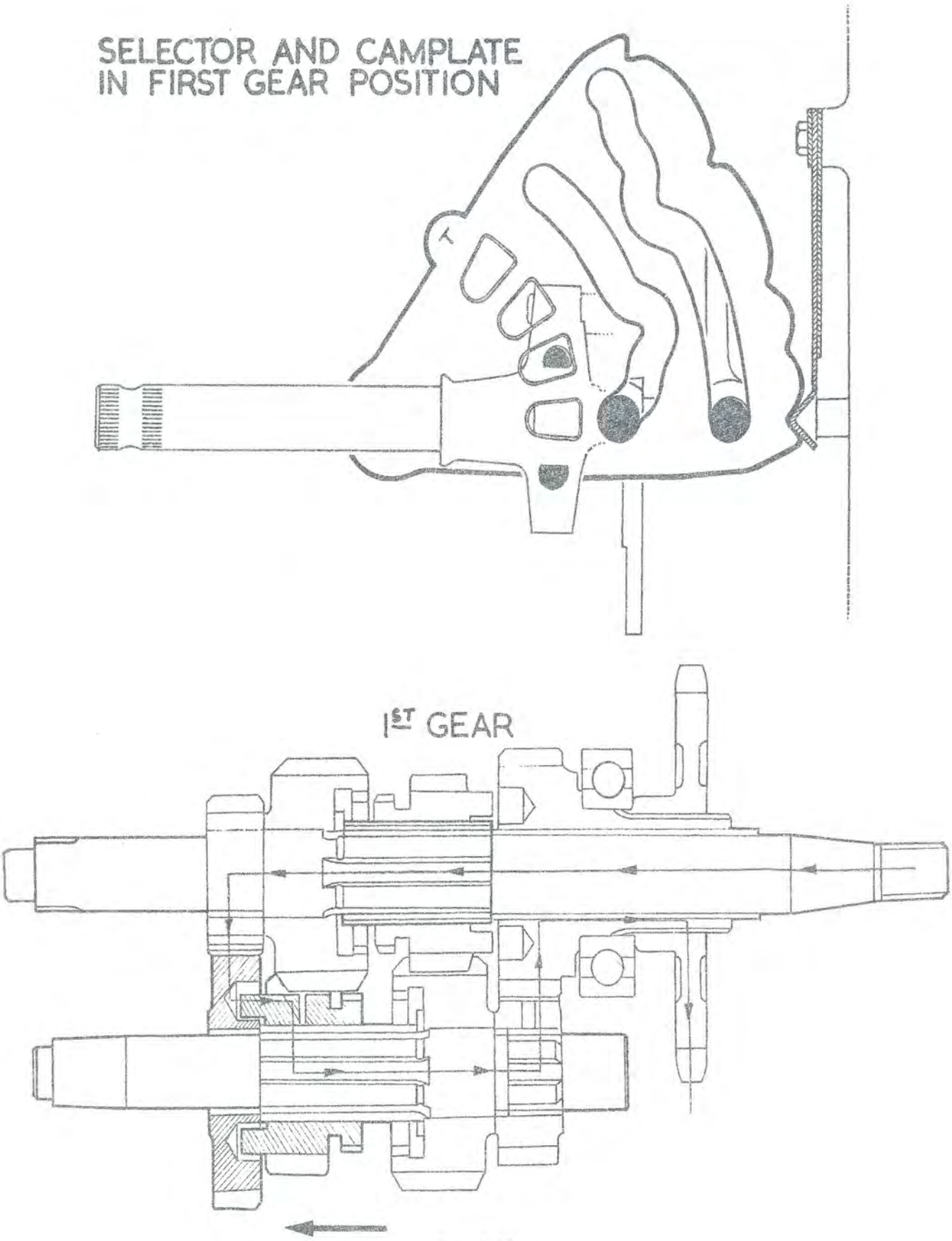


FIG. B.30.

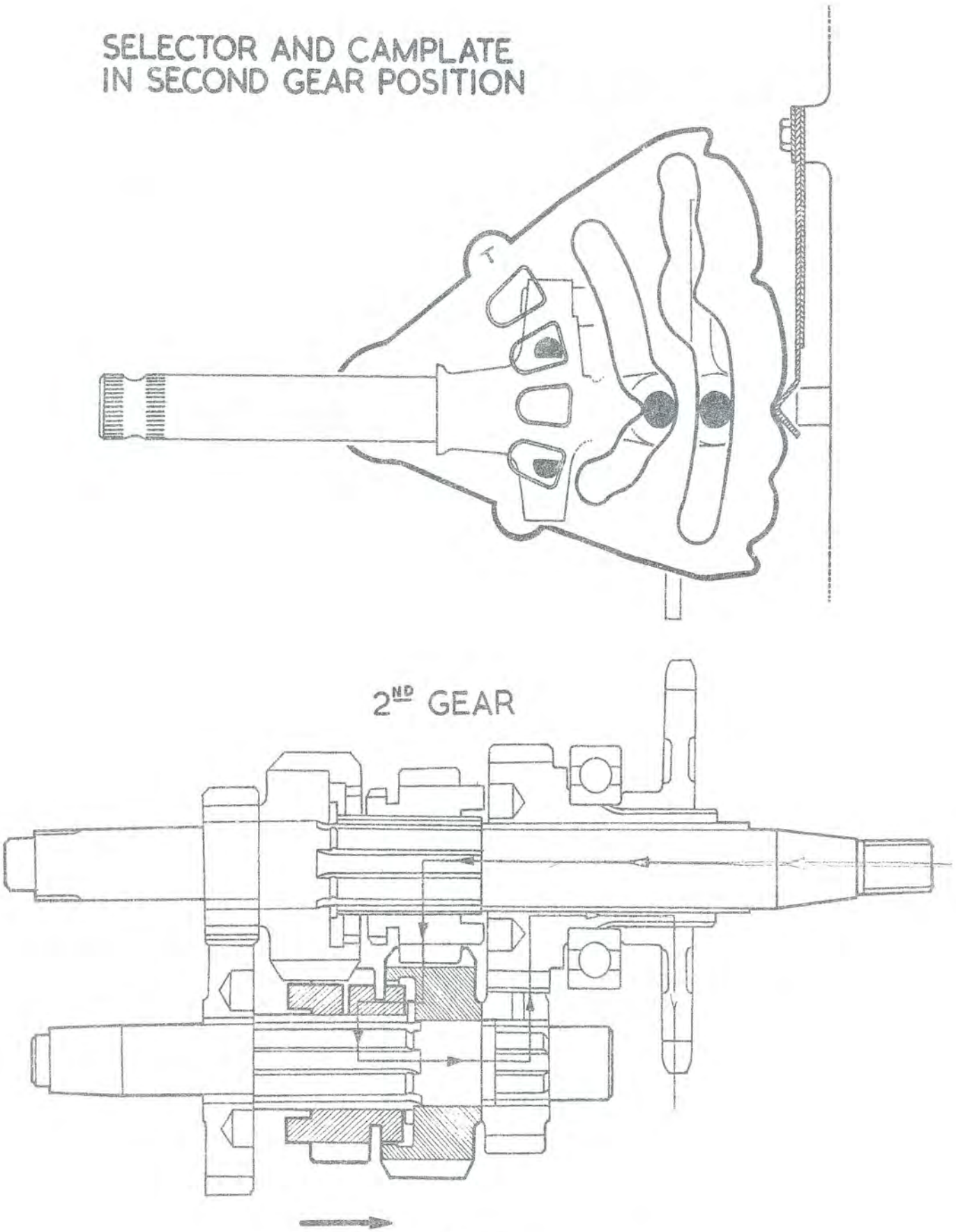
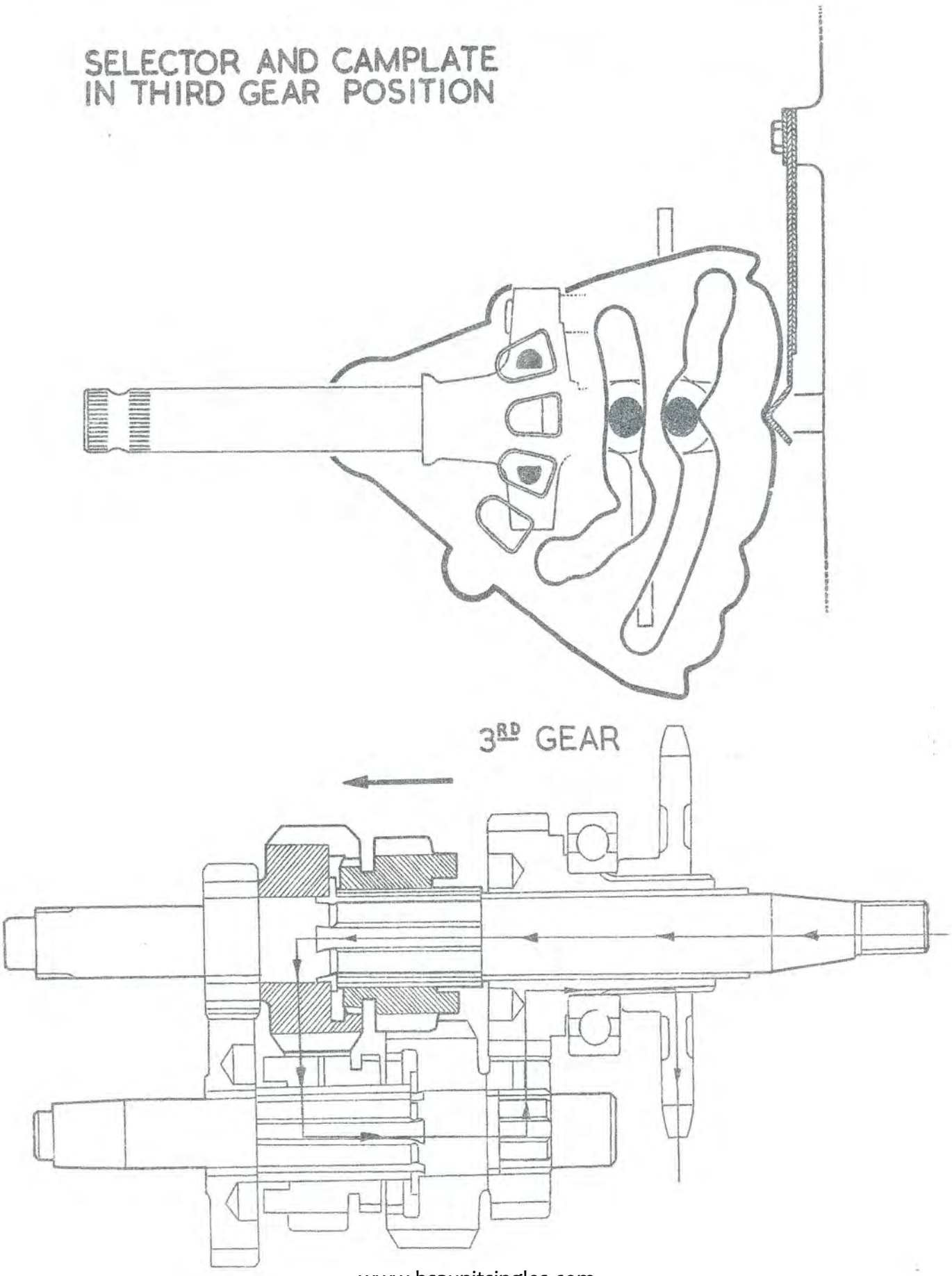
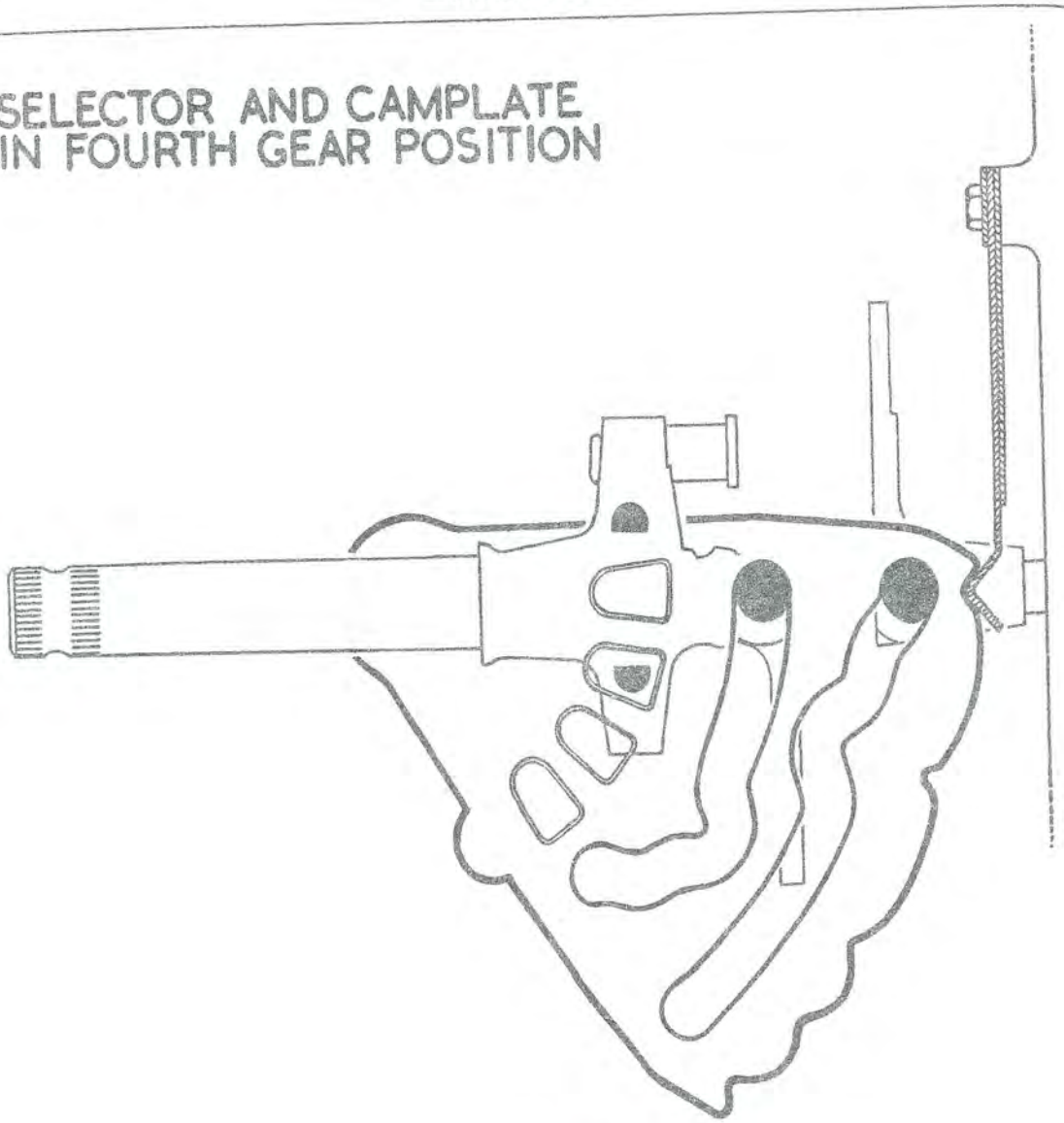


FIG. B.11

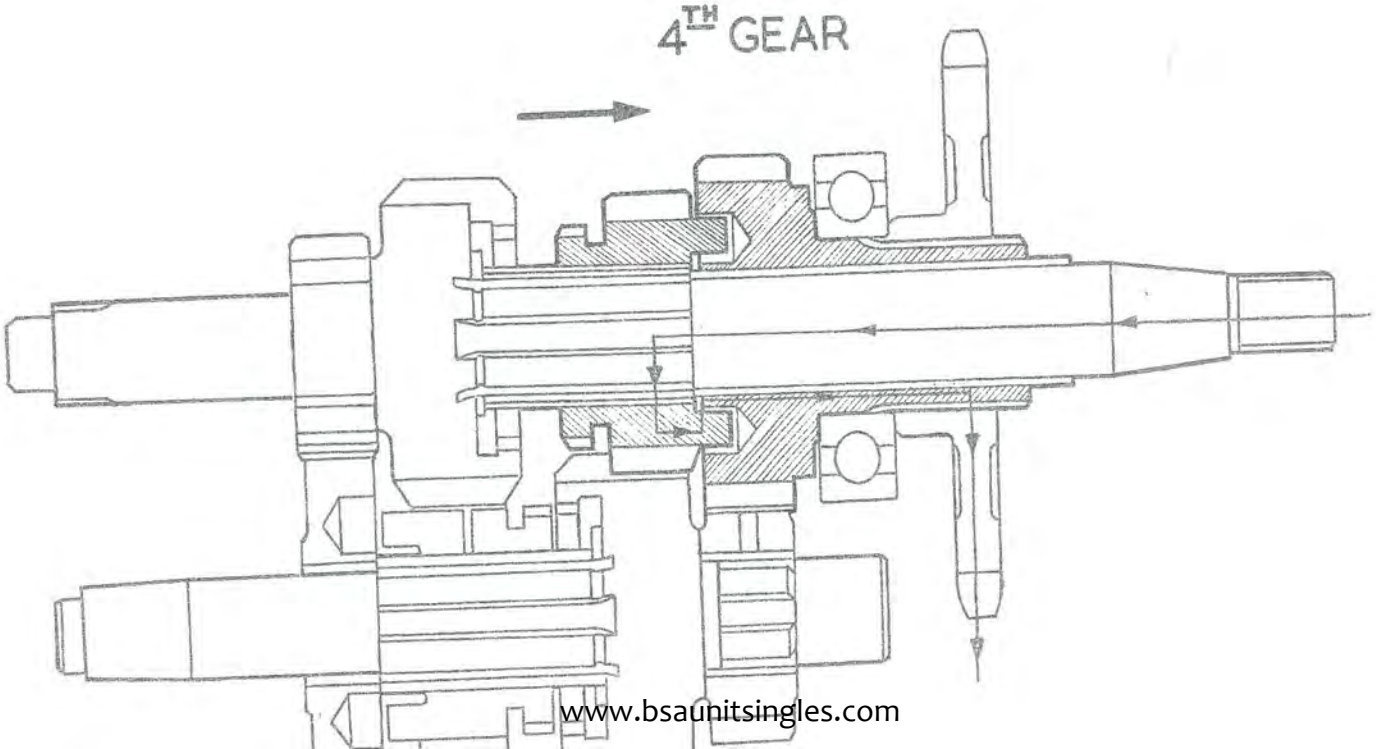
SELECTOR AND CAMPLATE
IN THIRD GEAR POSITION



SELECTOR AND CAMPLATE
IN FOURTH GEAR POSITION



4TH GEAR



SPLITTING THE CRANKCASE HALVES

Before attempting to part the crankcase halves, first remove the primary drive assembly, timing covers and timing gear as described on previous pages.

Working on the primary side of the crankcase, first remove the three bolts at the lower front of the case then take off the four stud nuts; two from the centre of the case and two from the cylinder base.

The sump filter and the oil pipe union may be left on the crankcase unless they require cleaning or replacement.

Remove any Woodruff keys which may still be in the shafts, noting their particular locations, and break the crankcase joint by tapping gently with a hide-mallet.

Do not attempt to prise the crankcase halves apart by using a tool between the joint. This will only damage the joint faces, resulting in oil leaks. The best method to use is to tap the gear-side shaft with a hide-mallet, so enabling the drive-side half of the case to be drawn away complete with flywheel assembly. The flywheel assembly can now be carefully tapped out of the drive-side case. Take care not to lose the gear-side shaft spacing shim.

Do not omit to replace the oil seal for the drive-side bearing.

BIG-END AND FLYWHEEL ASSEMBLY

The flywheels are a press-fit on to the tapered ends of the crankpin and no attempt should be made to part them unless the services of an expert mechanic and a fully equipped workshop are available.

Should the big-end assembly require replacement, it is advisable to obtain a works reconditioned unit through your dealer. If, however, it has been decided to renew the big-end assembly, the flywheels must be parted using service tool No. 61-3771.

Place the flywheels in the bolster and position suitable stripping bars as shown in Fig. B.34. Using the punch, drive out the crankpin and take off the uppermost flywheel. Reverse the lower flywheel in the bolster and again drive out the crankpin.

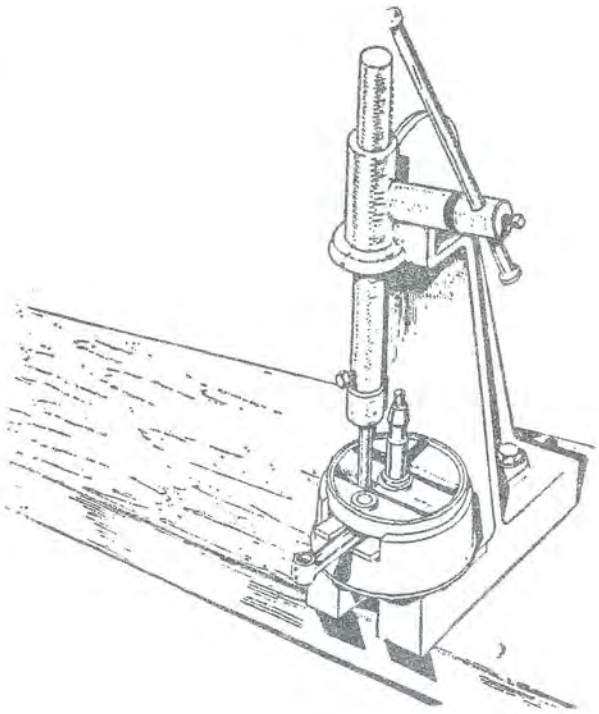


FIG. B.34. *Parting the flywheels.*

Having renewed the big-end assembly, place the gear-side flywheel in the bolster and locate the crankpin over the flywheel hole so that the oil hole in the crankpin will line-up with the oil-way in the flywheel. It is most important that these holes are not obstructed. Press the crank-pin firmly in position and, using a bridge piece over the crankpin hole, press the drive-side fly-wheel on to the crankshaft until it is fully home. Check the oil-ways for clearance.

The flywheel assembly will now have to be "trued."

Place the bearings on to the shafts and mount the assembly in vee-blocks. True-up the fly-wheels as indicated in Fig. B.36, using a dial indicator gauge for checking.

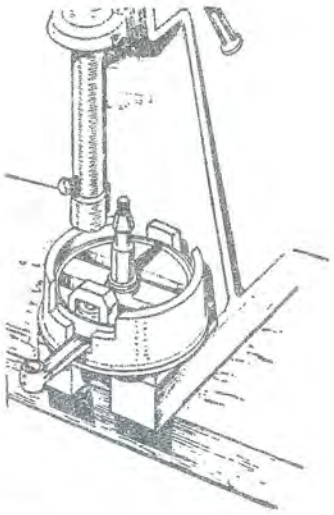


FIG. B.35. *Reassembly of the flywheels.*

Each wheel should be "trued" to within .005 in., the drive-side shaft to within .002 in. and the gear-side shaft to within .0005 in.

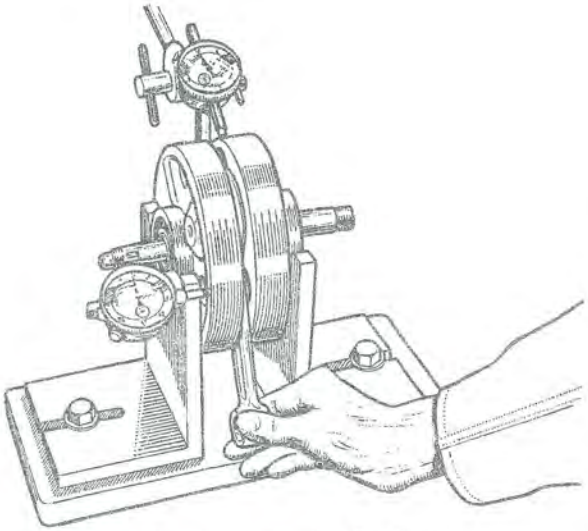


FIG. B.36. *Checking the flywheels.*

REASSEMBLING THE CRANKCASE

Assuming that the bearings, bushes and oil seals have been checked and, where necessary, replaced, the crankcase can now be reassembled.

Place the flywheel assembly into the drive-side case. This operation will be simplified if the case is supported on a large block of wood, deep enough to keep the end of the shaft clear of the workbench.

Replace the shim on the gear-side shaft; these are available in thicknesses of .010 in. (40–66) and .015 in. (40–69).

Apply a coating of jointing compound to the joint faces of each crankcase half and refit the gear-side case.

Replace the three bolts at the front of the case and the four nuts (two at the base of the cylinder and two in the primary case).

Tighten bolts and nuts evenly, to avoid distorting the joint faces.

Check that the flywheel assembly rotates quite freely. If it does not, then the alignment may be incorrect and the cause of the trouble must be rectified.

Fit the engine shaft sprocket distance piece and the oil pump worm drive thrust washer, each with its chamfered face outwards. The sprocket distance piece is available in three thicknesses to provide accurate alignment of the primary chain in relation to the clutch sprocket. The sizes are as follows: .294—.297 in.; .309—.312 in.; .324—.327 in.

Reassembly from this point is described in the previous sections, but do not omit to replace the keys in the ends of the shafts before fitting the pinions or sprockets.

IGNITION TIMING

Before carrying out any check on the ignition timing, the contact points gap should first be verified and, if necessary, re-adjusted as described on page B.18.

Remove the sparking plug to enable the engine to be rotated without any resistance due to compression. If the engine is in the frame, it will also help if top gear is obtained, so that the engine may be turned either backwards or forwards by [illegible] of the rear wheel.

Piston Position

Before checking the ignition timing, the piston must first be set at the recommended position before top dead centre on its compression stroke (both valves closed).

This position can be set most accurately with the aid of a degree plate. The primary chaincase should first be removed and the degree plate mounted centrally on the engine shaft (see Fig. B.37). A suitable pointer should then be attached to some convenient part of the engine with the point adjacent to the plate.

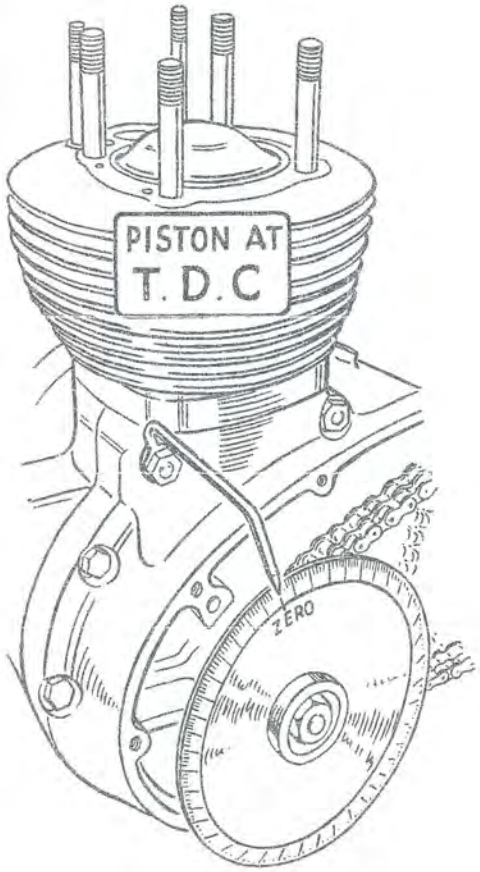


FIG. B.37.

Rotation of the engine through several degrees near the top dead centre position produces very little piston movement, making the top dead centre position extremely difficult to find. It is preferable, therefore, to use a suitable stop (such as a dummy plug with a projection into the cylinder head) so that the piston can be brought gently against it by rotating the engine as far as the piston will allow in each direction. If degree plate readings are taken in each position and the point mid-way between them is calculated, this will be the precise top dead centre.

Having determined top dead centre of the piston, set the pointer to the zero mark on the degree plate.

Rotate the engine backwards about 45° then bring it forward slowly to the desired reading of 33½° on the plate.

Alternatively a dial indicator can be used to measure the piston movement. It must be mounted on to the cylinder head with its long rod projecting through the sparking plug hole.

At piston top dead centre position the dial should read zero. The engine must then be rotated until the piston position is at .280 in. before top dead centre on the compression stroke.

At this stage the auto-advance unit should be freed from its taper and rotated until the contact points are about to open. This will give an approximate setting on which to base the final ignition timing.

Setting the Contact Breaker Cam

The simplest way to set the ignition timing, that is the point at which the compressed charge in the combustion chamber is ignited, is to set it statically.

Unfortunately, due to manufacturing tolerances this is not the ideal because, whilst it will set the timing of the engine for tick-over speeds, the firing at wide throttle openings will vary due to differences in the amount of automatic-advance.

The automatic-advance functions by centrifugal force acting on spring-loaded bob-weights which will advance the ignition timing as the engine revolutions rise. Since exact timing accuracy is required at operating speeds it is better to time the engine in the fully advanced

position so transferring any variations in the firing to the tick-over or low engine speeds when it can least affect the performance.

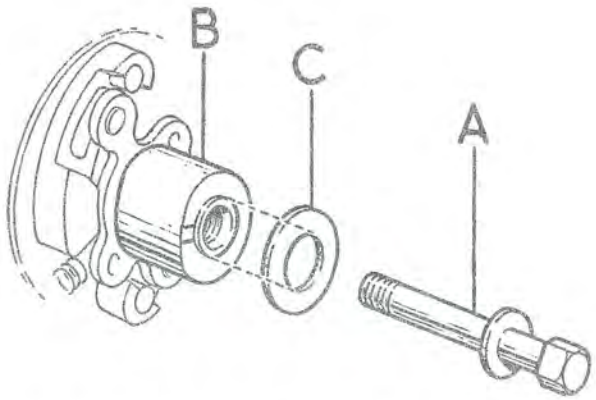


FIG. B.38. *Setting the contact breaker cam.*

Whilst setting the ignition timing, therefore, the contact breaker cam must be locked in the fully advanced position.

Carefully remove the central fixing bolt (A) with washer from the contact breaker cam (B) and temporarily fit another washer (C) having a hole just large enough to clear the cam inner bearing (see Fig. B.38), thus allowing the washer to bear against the top face of the cam.

Replace the bolt, but before tightening, rotate the cam in an anti-clockwise direction until the bob-weights are fully expanded, hold in position and tighten the bolt. Care must be taken during this operation to avoid releasing the whole mechanism from its location.

Setting the Ignition Timing

Having locked the contact breaker cam in the fully advanced position and with the piston at 33½° or .280 in. before top dead centre, the ignition timing can now be set.

An accurate means of checking the opening of the contact points can be made by connecting a battery and bulb in circuit with the points (see Fig. B.39).

Attach one lead between the "C" spring and the battery terminal. Take a second lead from the other battery terminal to a bulb, then from the base of the bulb to a good earthing point on the machine.

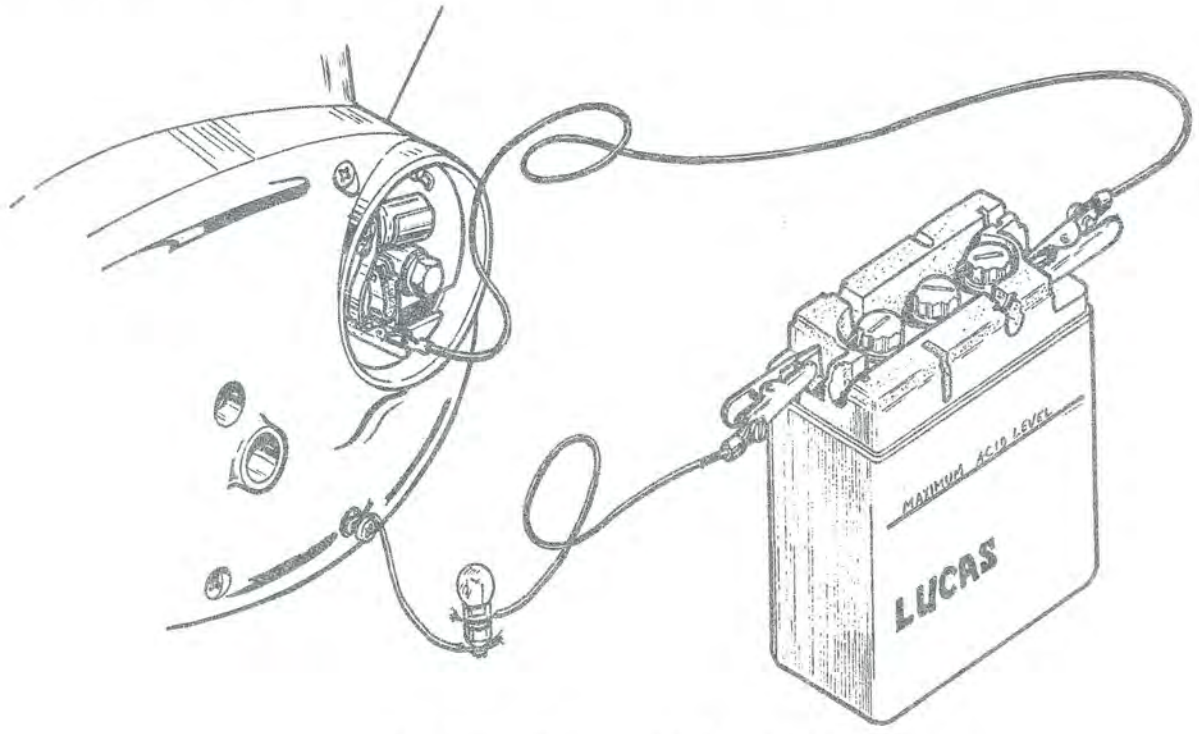


FIG. B.39. *Battery and bulb in circuit.*

As soon as the contact points open, the circuit will be broken and the light will go out.

Loosen the contact breaker plate pillar bolts and rotate the plate either backwards or forwards until the points are just opening.

Hold the plate in this position, tighten the pillar bolts and recheck the setting. There should be no change in the fully-open gap setting.

Do not forget to remove the large washer, fitted temporarily behind the contact breaker fixing bolt, otherwise the auto-advance mechanism will be inoperative.

The importance of accurate ignition timing cannot be over emphasized. Care and patience must be taken to ensure that the final setting is in accordance with the recommended figures.

INDEX

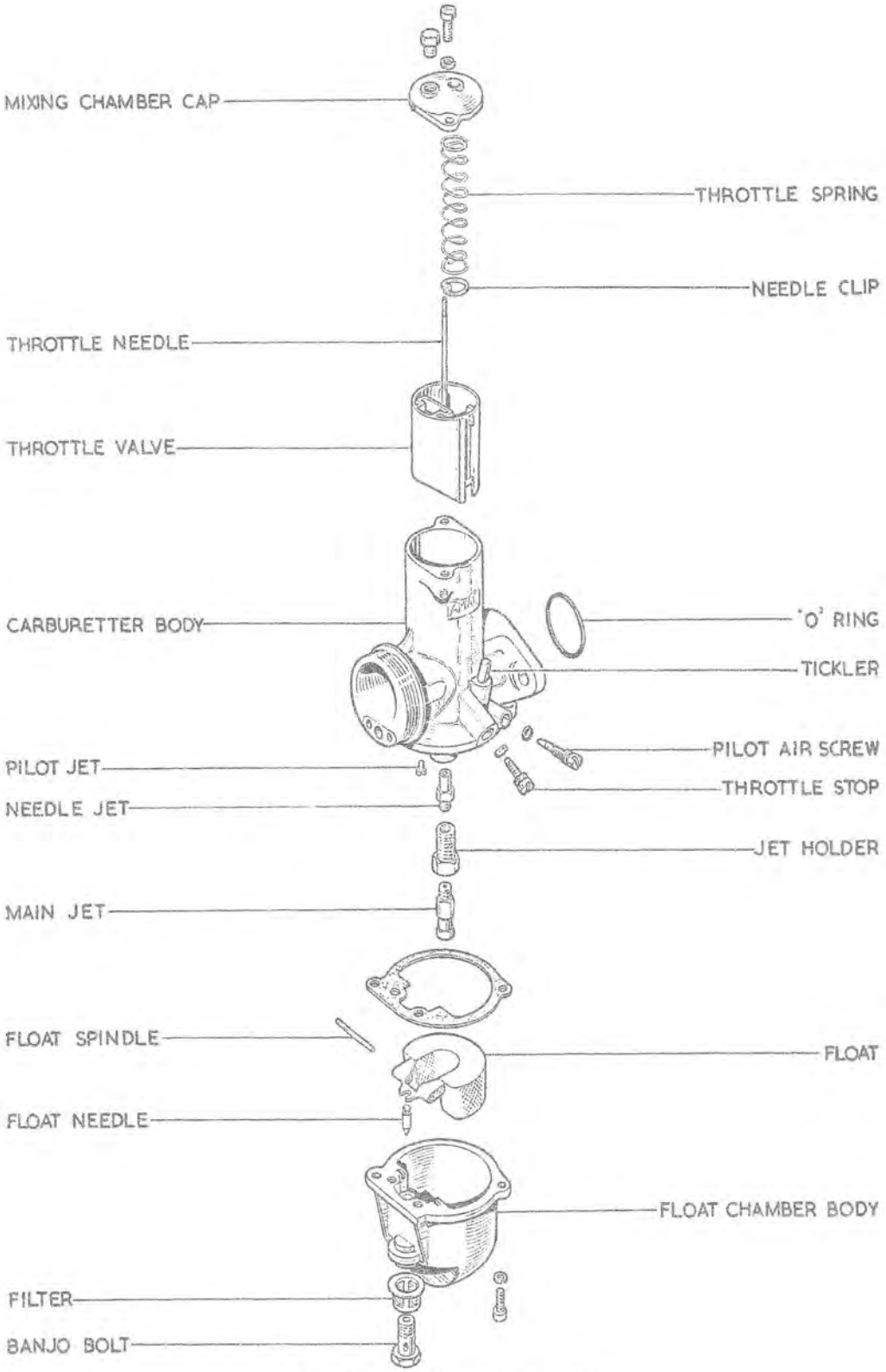


FIG. C.1. *Carburetter exploded.*

DESCRIPTION

The Victor machine is fitted with an Amal carburetter, incorporating a concentric carburetter.

The carburetter, because of its jets and choke bore, proportions and atomises just the right amount of petrol and air which provides a highly inflammable mixture. The mixture is drawn into the engine and ultimately burnt within the cylinder head, hence the term "combustion chamber."

The float chamber maintains a constant level of fuel at the jets and incoporates a valve which cuts off the supply when the engine stops.

The throttle, being operated from the handlebar twist grip, controls the volume of mixture and therefore the power.

When the engine is ticking-over, the mixture is supplied by the pilot jet. As the throttle is opened, via the pilot by-pass, the pilot mixture is augmented by the supply from the main jet; the initial stages of which, being controlled by the taper needle in the needle jet.

The pilot supply is controlled by a small, screw-type jet situated within the concentric float chamber.

The main jet does not spray directly into the mixing chamber, but discharges through the needle jet into the primary air chamber, and goes from there as a rich petrol/air mixture through the primary air choke, into the main air choke. This primary air choke has a compensating action in conjunction with bleed holes in the needle jet, which serves the double purpose of compensating the mixture from the needle jet and allowing the fuel to provide a well outside and around the needle jet, which is available for snap acceleration.

DISMANTLING AND REBUILDING THE CARBURETTER

Loosen the clip at the carburetter intake and pull away the air cleaner connection. The overflow pipe may be left in position on the adaptor. Unscrew the two fixing nuts and withdraw the carburetter from its mounting studs; it will not be necessary to detach the cable from the twist grip.

Take put the two Phillips-head fixing screws and remove the carburetter top cover complete with throttle valve assembly. Compress the throttle spring and remove the needle clip to release the needle. Whilst still compressing the spring, push the cable downwards to release the nipple from its location in the valve. Take care not to lose the needle clip when taking off the spring and top cover.

Unscrew the "banjo" bolt which secures the fuel pipe "banjo" connector to the float needle seating block and withdraw the nylon filter.

The float chamber is secured to the base of the mixing chamber by two screws with spring washers. On removal ,it will be noted that the float spindle is a press-fit into the chamber body and that the needle is retained in position by the rear forked end of the float.

The pilot jet, needle jet and main jet (with holder) can now be unscrewed from the mixing chamber base.

Take out the throttle stop adjusting and pilot air adjusting screws and ensure that the small rubber "O" ring on each screw is in good condition before replacing.

The float chamber tickler (or primer) consists of a spring and plunger, splayed at one end to retain it in the mixing chamber. This item should not be subjected to a great deal of wear and is therefore unlikely to require replacement.

Having dismantled the carburetter, carefully clean all parts in petrol (gasolene). Hard deposits on the carburetter body are best removed with a light grade wire brush. After washing the parts in clean petrol, allow to dry and ensure that all holes or small drillings are free from dirt. A hand pump is ideal for "blowing through" any blockages in the drillings. Inspect the component parts for wear and check that the jets are in

accordance with the recommended sizes given in General Data.

Reassembly is simply a reversal of the above instructions but remember to replace any gaskets or "O" rings that appear unserviceable. Refer to Fig. C.1 for guidance.

INSPECTING THE CARBURETTER COMPONENTS

The parts most liable to show wear after considerable mileage are the throttle valve slide and the mixing chamber.

(1) Inspect the throttle valve slide for excessive scoring of the front area and check the extent of wear on the rear slide face. If wear is apparent, the slide should be renewed; be sure to fit slide with correct degree of cut-away (see General Data).

(2) Check the throttle return spring for efficiency. Check also that it has not lost its compressive strength by measuring the free length and comparing it with the figure given on page GD.4.

(3) Examine the needle jet for wear or possible scoring and check the tapered end of the needle for similar signs.

(4) Check the float needle for efficiency by inserting it into the float needle seating block, pouring a small amount of petrol (gasolene) into the aperture surrounding the needle and checking it for leakage.

(5) Ensure that the float is not punctured by shaking it to see if it contains any fuel. Do not attempt to repair a damaged float. If there is any doubt about its condition, replace it with a new one.

(6) Check the petrol filter that fits over the needle seating block, for any possible damage to the mesh. If the filter has parted from its supporting structure it will allow the petrol (gasolene) to pass through unfiltered.

HINTS AND TIPS

Throttle Cable
See that there is a minimum of backlash when the twist grip is turned back and that any movement of the handlebar does not cause the throttle to open.

Use the adjuster on the cable to obtain the correct setting and ensure that the throttle slide shuts down freely.

Petrol Feed
Unscrew the float chamber "banjo" bolt, remove the "banjo", and take off the filter gauze from the needle seating.

Ensure that the filter gauze is undamaged and free from all forgeign matter. To check fuel flow before replacing the "banjo", turn on petrol tap momentarily and see that fuel gushes out.

Flooding
This may be due to a worn needle or a punctured float, but is more likely due to impurities (grit, fluff, etc.) in the tank. This trouble can sometimes be cleared by periodically cleaning out the float chamber. If however, the trouble persists the tank must be drained and swilled out.

Carburetter Air Leaks
Erratic slow-running is often caused by air leaks between the joints at the carburetter flange and the cylinder head (see Fig. C.2) and can be detected by applying oil around the joints. Eliminate by fitting new washers and tightening the flange nuts evenly to a torque wrench setting of 10 lbs./ft. (1.383 Kg/m).

Also check that the rubber sealing ring in the carburetter flange is undamaged and located correctly.

On much used or old machines look for air leaks caused by a worn throttle or a worn inlet valve guide.

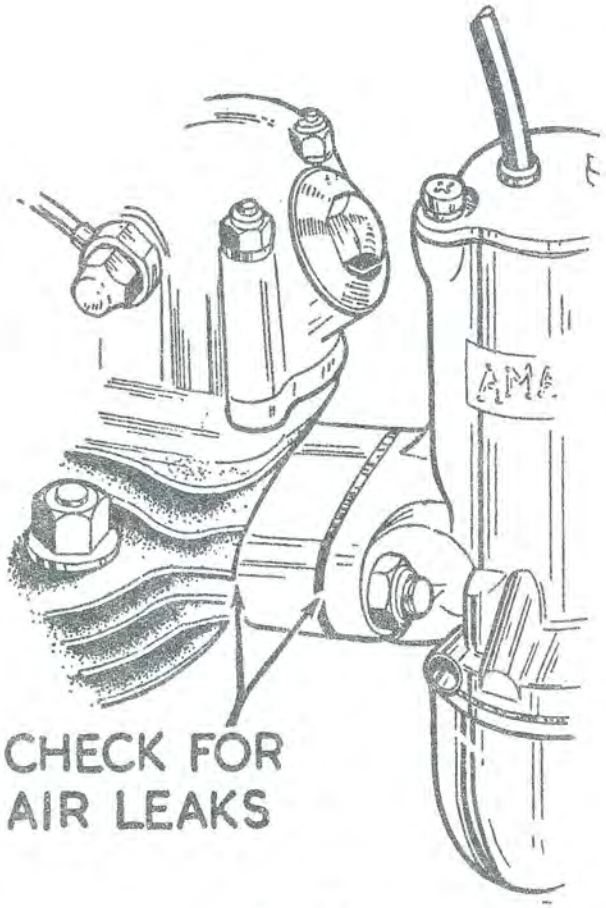


FIG. C.2.

Banging, in Exhaust
This may be caused by too weak a pilot mixture when the throttle is closed or nearly closed. It may also be caused by too rich a pilot mixture and an air leak in the exhaust system. The reason in either case is that the mixture has not fired in the cylinder but has fired in the hot silencer.

If the banging occurs when the throttle is fairly wide open, the trouble will be traced to ignition, not carburation.

Excessive Petrol Consumption
If this cannot be corrected by normal adjustments, it may be due to flooding caused by impurities from the petrol tank lodging on the float needle seat, so preventing its valve from closing. The float needle should also be checked for wear or damage.

High comsumption can also be caused by a worn needle jet and may be remedied or improved by lowering the needle in the throttle. If this method is unsatisfactory, then a new needle and needle jet will have to be fitted.

There are many other causes of high petrol consumption and it should not be assumed that the fault lies in the carburetter alone.

Air Filters
If a carburetter is first set with an air filter and the engine is then run without, the jet setting may be affected and care must be taken to avoid overheating the engine due to too weak a mixture. Testing with the air supply will indicate if a larger main jet and higher needle position are required.

Effect of Altitude on a Carburetter
Increased altitude tends to produce a rich mixture; the greater the altitude, the smaller the main jet required. Carburetters ex-works are suitably set for use in altitudes of up to approximately 3,000 feet. Carburetters used constantly in altitudes of between 3,000 to 6,000 feet should have a reduction in main jet size of 5%. A further reduction of 4% should be made for every 3,000 feet in excess of 6,000 feet altitude.

No adjustment can be made to compensate for lost power due to rarified air.

TRACING FAULTS

Faults likely to occur in carburation can be placed in one of two categories; either richness or weakness of petrol/air mixture.

Indications of Richness
Black smoke in exhaust.
Petrol spraying out of carburetter.
Four-strokes, eight-stroking.
Two-strokes, four-stroking.
Heavy lumpy running.
Sparking plug sooty.

Indications of Weakness

Spitting back in carburetter.
Erratic slow-running.
Overheating.
Engine goes better if throttle is almost closed.

Having established whether the mixture is too rich or too weak, check if caused by:—

(1) Petrol feed—check that jets and passages are clear, that filter gauze in float chamber "banjo" connection is not choked with foreign matter, and that there is ample flow of fuel. Also ensure there is no flooding.

(2) Air leaks—usually at the flange joint or due to worn inlet valve stem and guide.

(3) Defective or worn parts—such as a loose-fitting throttle valve, worn needle jet, loose jets.

(4) Air cleaner choked-up.

(5) An air cleaner having been removed.

(6) Removal of the silencer—this requires a richer setting.

Having ensured that the fuel feed is correct and that there is no air leaks etc., check the ignition, valve operation and timing. Now test to see if the mixture is rich or weak by partially covering the carburetter inlet and noting how the engine runs. If the engine runs better, weakness is indicated, but if the engine runs worse then the mixture is too rich.

To remedy, proceed as follows:—

To Cure Richness

Position 1. Fit smaller main jet.
Position 2. Screw out pilot air adjusting screw.
Position 3. Fit a throttle with a larger cut-away (see paragraph E, page C.7).
Position 4. Lower needle one or two grooves (see paragraph D, page C.7).

To Cure Weakness

Position 1. Fit larger main jet.
Position 2. Screw pilot air adjusting screw in.
Position 3. Fit a throttle with a smaller cut-away (see paragraph E, page C.7).
Position 4. Raise needle one or two grooves (see paragraph D, page C.7).

(Positions 1, 2, 3 and 4 refer to positions of throttle openings as shown in Fig. C.4, page C.7).

NOTE:—It is incorrect to attempt to cure a rich mixture at half-throttle by fitting a smaller jet because the main jet may be correct for power at full throttle. The correct method is to lower the throttle needle.

VARIABLE SETTINGS AND PARTS

The following paragraphs have reference letters for guidance and should be read in conjunction with the sectioned diagram (Fig. C.3), indicating the variable parts.

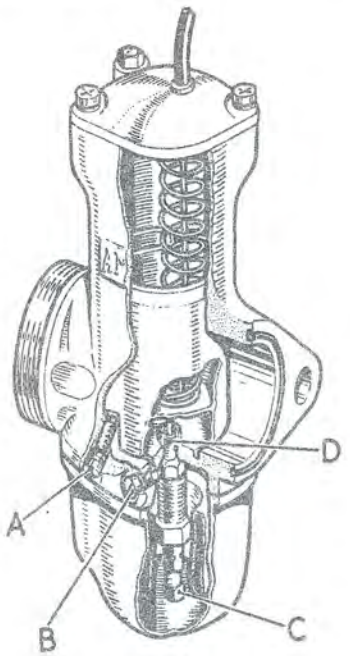
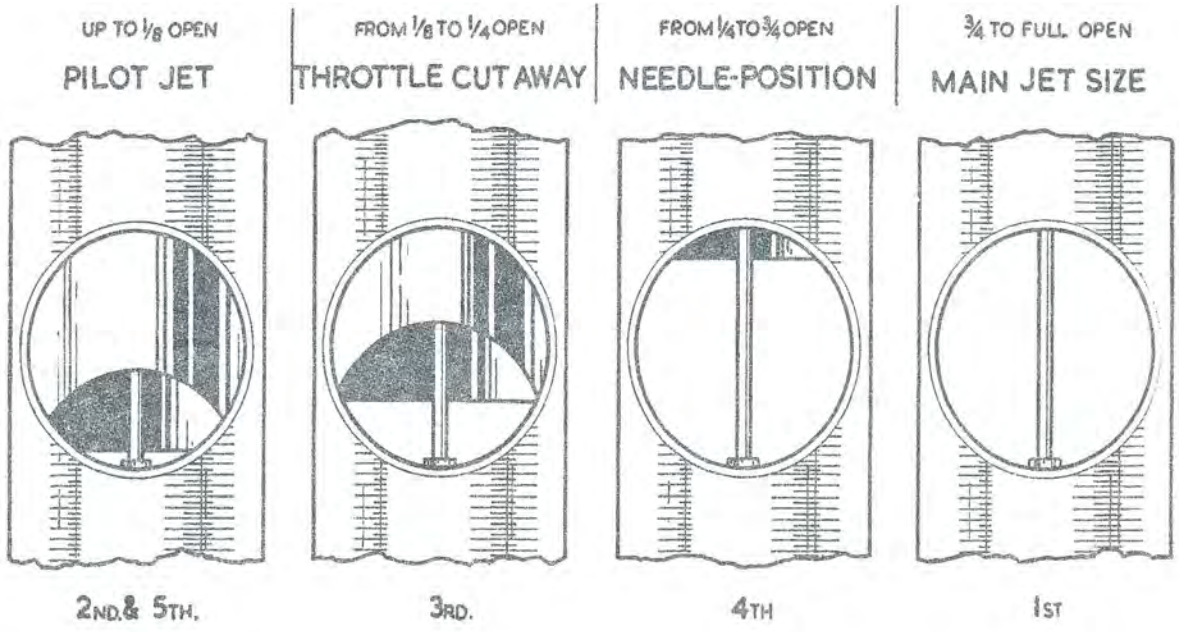


FIG. C.3.

(A) **Throttle Adjusting Screw**
Set this screw to hold the throttle open sufficiently to keep the engine running when the twist grip is shut off.



SEQUENCE OF TUNING

FIG. C.4.

(B) **Pilot Air Adjusting Screw**

This screw regulates the strength of the pilot mixture for "idling" and for the initial opening of the throttle. The screw controls the depression on the pilot jet by metering the amount of air that mixes with the petrol.

(C) **Main Jet**

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

Each jet is calibrated and numbered so that its exact discharge is known and two jets of the same number are alike. Never ream out a jet, get another of the right size. The bigger the number the bigger the jet.

To gain access to the main jet the float chamber must first be removed (two screws). The main jet can now be unscrewed from its holder in the mixing chamber base.

(D) **Needle and Needle Jet**

The needle is attached to the throttle valve and being taper—either allows more or less petrol to pass through the needle jet as the throttle is opened or closed throughout the range, except when idling or nearly full throttle. The taper needle position in relation to the throttle opening can be set according to the mixture required by fixing it to the throttle valve with the jet needle clip in a certain groove, thus either raising or lowering it. Raising the needle richens the mixture and lowering it weakens the mixture at throttle openings from quarter to three-quarters open.

(E) **Throttle Valve Cut-away**

The atmospheric side of the throttle is cut away to influence the depression on the main fuel supply and thus gives a means of tuning between the pilot and needle jet range of throttle opening. The amount of cut-away is recorded by a number marked on the throttle valve, viz. 389/3½ means throttle valve type 389 with number 3½ cut-away; larger cut-aways, say 4 and 5, give weaker mixtures and 2 a richer mixture.

(F) **Tickler or Primer**
This is a small spring-loaded plunger, in the carburetter body. When pressed down on the float, the needle valve is allowed to open and so "flooding" is achieved. Flooding temporarily enriches the mixture until the level of the petrol subsides to normal.

TUNING THE CARBURETTER

Tune up in the following order
Read remarks on pages C.6 and C.7 for each tuning device and get the motor going perfectly on a quiet road with a slight up-gradient so that on test, the engine is pulling under load.

1ST. **Main Jet** with throttle in position 1 (Fig. C.4). If at full throttle the engine runs "heavily", the main jet is too large. If at full throttle, the engine seems to have better power when the throttle is eased off or the carburetter intake is slightly covered, then the main jet is too small.

With the correct sized main jet, the engine at full throttle should run evenly and regularly with maximum power.

If testing for speed work, ensure that the main jet size is sufficient for the mixture to be rich enough to maintain a cool engine. To verify this, examine the sparking plug after taking a fast run, declutching and stopping the engine quickly. If the sparking plug has a cool appearance the mixture is correct; if sooty, the mixture is rich; if, however, there are signs of intense heat, the plug being very white in appearance, the mixture is too weak and a larger main jet is necessary.

2ND. **Pilot Jet** (Fig. C.4) with throttle in positions 2 and 5. With engine idling too fast with the twist grip shut off and the throttle shut down on to the throttle adjusting screw, and ignition set for best slow-running: (1) Screw out throttle adjusting screw until the engine runs slower and begins to falter, then screw pilot air adjusting screw in or out, to make engine run regularly and faster. (2) Now gently lower the throttle adjusting screw until the engine runs slower and just begins to falter, adjust the pilot air adjusting screw to get best slow-running, if this second adjustment leaves the engine running too fast, go over the job a third time.

3RD. **Throttle Cut-away** with throttle in position 3 (Fig. C.4). If, as you take off from the idling position, there is an objectionable spitting from the carburetter, slightly richen the pilot mixture by screwing in the air screw. If this is not effective, screw it back again, and fit a throttle with a smaller cut-away. If the engine jerks under load at this throttle position and there is no spitting, either the jet needle is much too high or a larger throttle cut-away is required to cure richness.

4TH. **Needle** with throttle in position 4 (Fig. C.4). The needle controls a wide range of throttle openings and also the acceleration. Try the needle in as low a position as possible, viz. with the clip in a groove as near the top as possible; if acceleration is poor and with the carburetter inlet partially covered, the results are better, raise the needle by two grooves; if very much better try lowering the needle by one groove and leave it where it is best. If mixture is still too rich with clip in groove number 1 nearest the top, the needle jet probably wants replacement because of wear. If the needle itself has had several years' use replace it also.

5TH. **Finally**, go aver the idling again for final touches.

INDEX

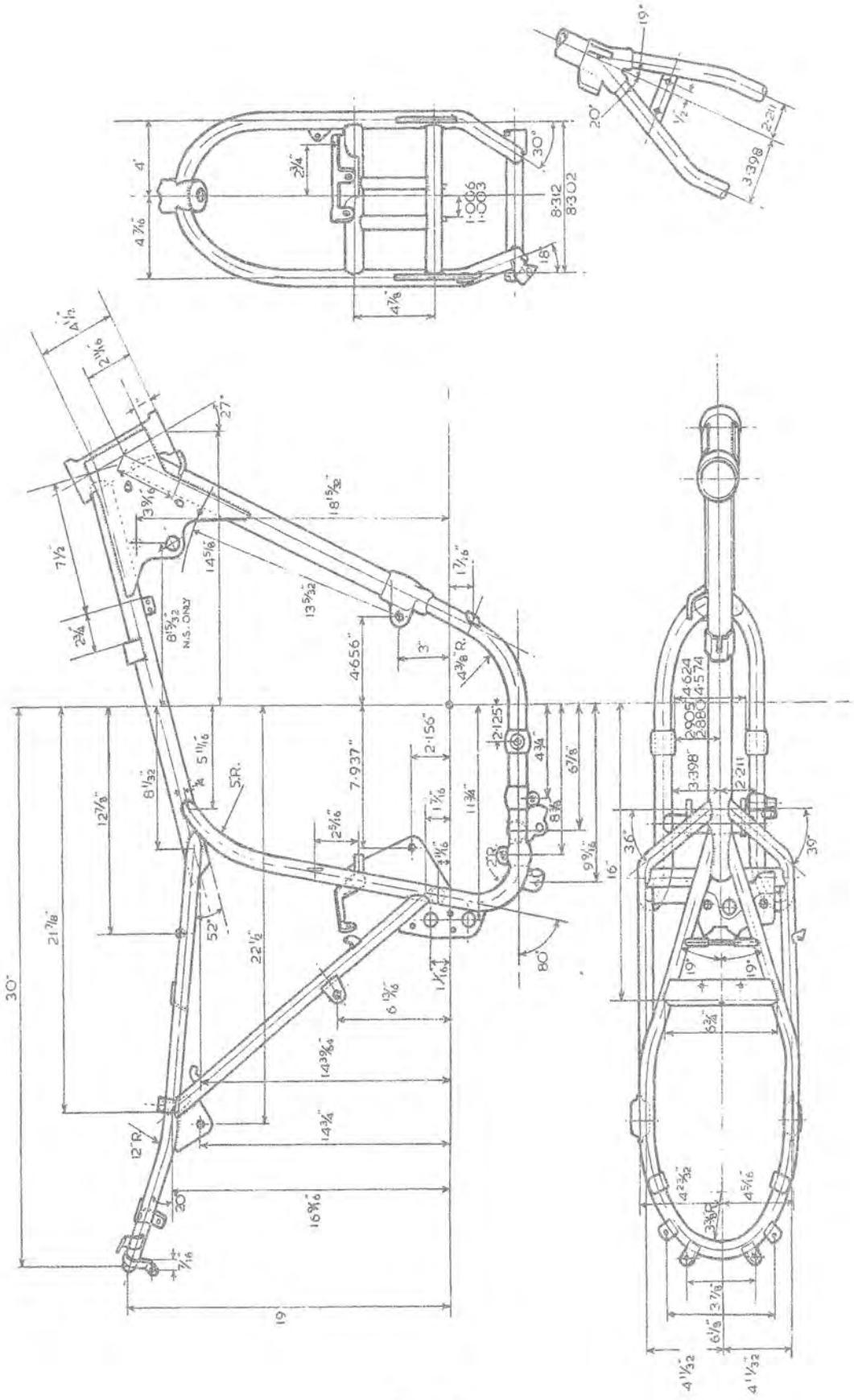


FIG. D.1.

FRAME ALIGNMENT

The only satisfactory way of checking the Victor frame for correct alignment is on an engineers setting-out table. In addition to the table, which should be approximately 5 ft. × 3 ft., the following equipment will also be necessary.

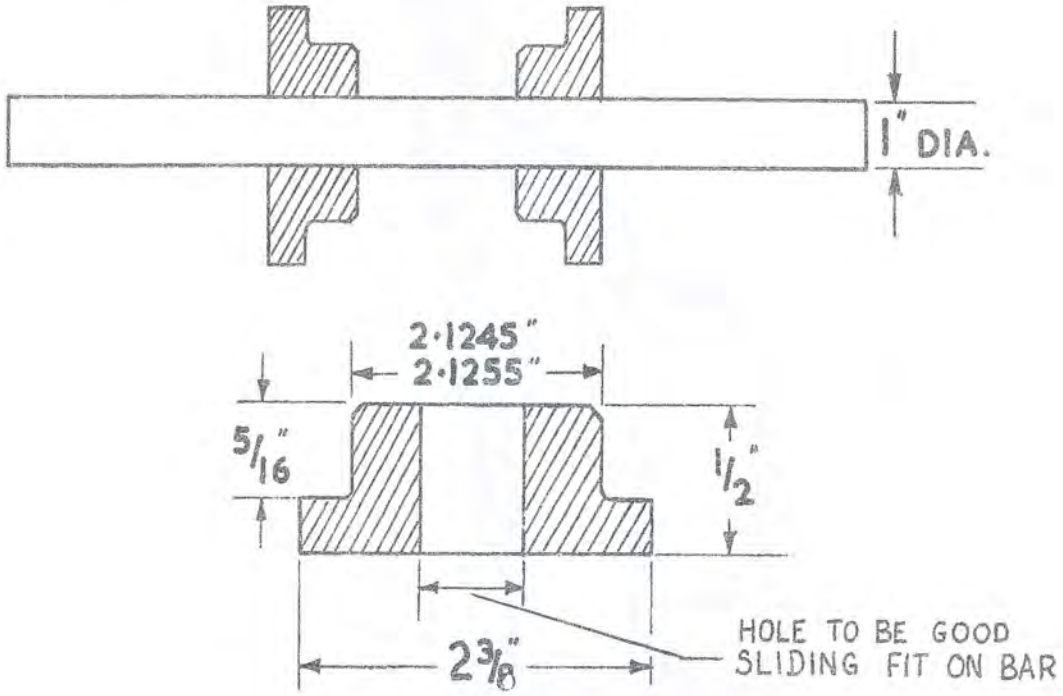


FIG. D.2. *Steering head mandrel.*

One mandrel and two blocks, as in Fig. D.2.

One mandrel or bar for swinging arm pivot, 13/16 in. diameter × 12 in. long.

One large set-square.

One 18 in. Vernier height gauge or large scribing block.

One pair of large "V" blocks and several adjustable height jacks.

If a scribing block is used, then an 18 in. steel rule will also be required. The mandrels must be straight and round, otherwise measurements will be affected. Figure D.3 shows the basic set-up for checking the frame, though variations can of course be used according to the facilities available.

Place the blocks into the steering head, insert the mandrel and support with the "V" blocks at one end of the table. Check the mandrel at each end to ensure that it is parallel with the surface of the table. Insert the 13/16 in. diameter mandrel through the swinging arm pivot hole.

Now, using jacks or packing pieces, set the frame horizontal to the table so that checks taken at points (A) are the same.

If the frame has suffered damage in an accident, it may not be possible to set points (A) parallel in which case points (B) can be used.

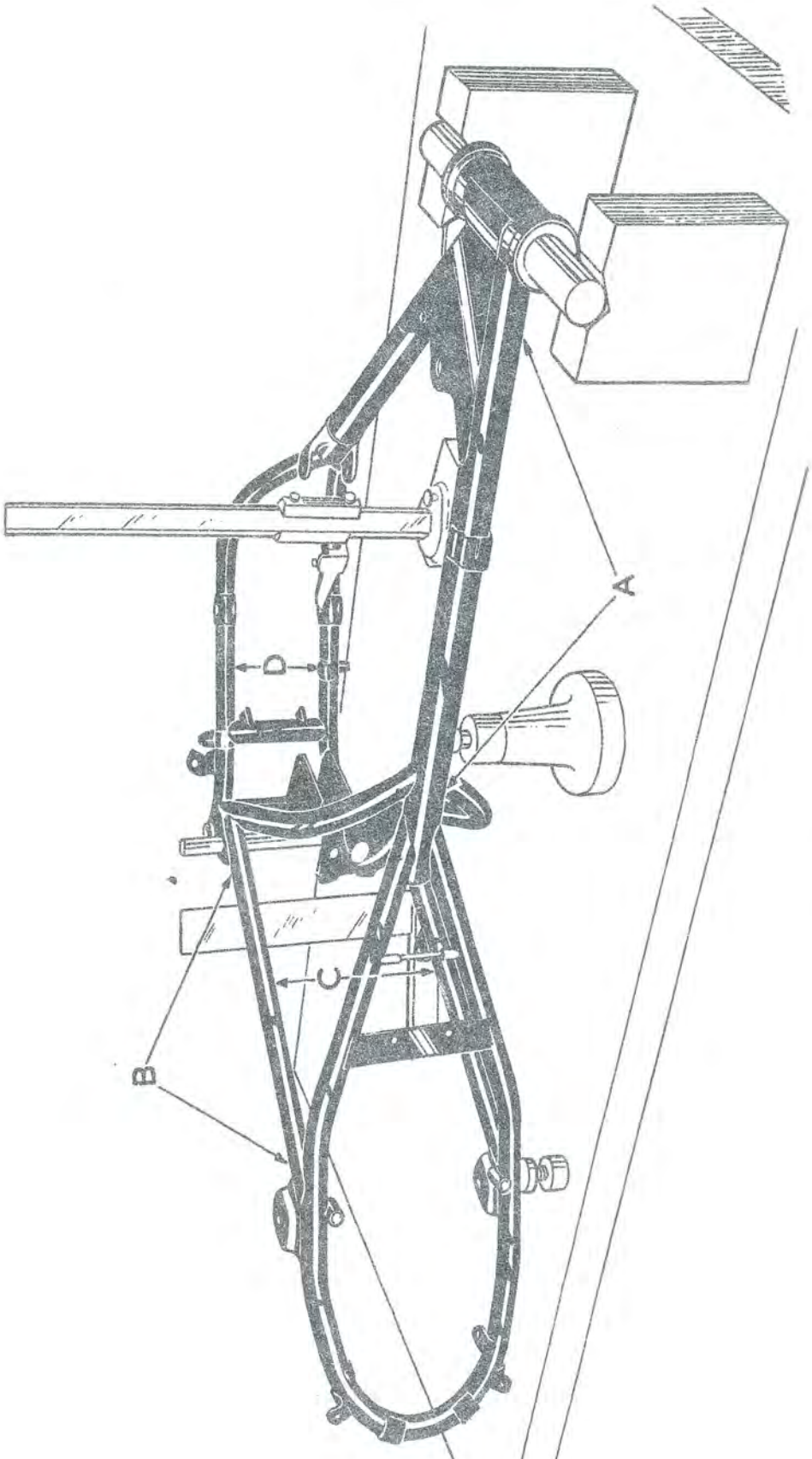


FIG. D.3. *Setting-up the frame.*

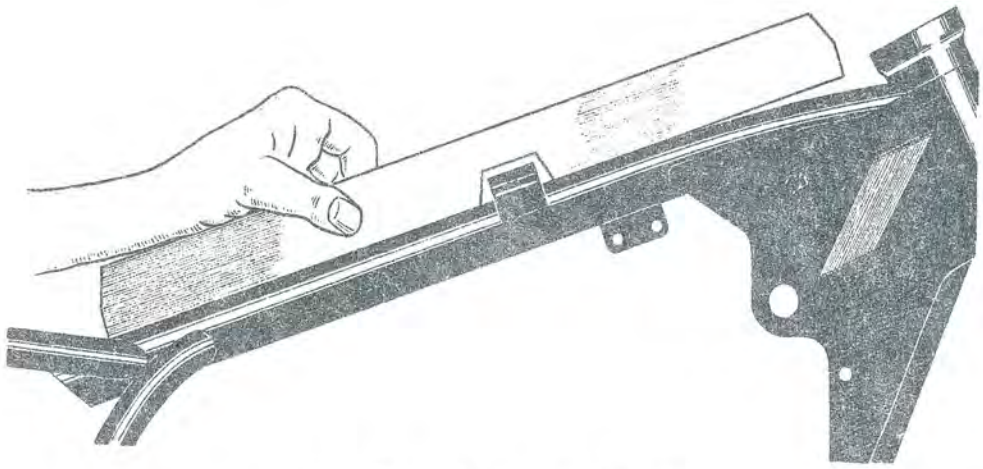


FIG. D.4. *Showing bent top tube.*

Sometimes if the machine has been subjected to a frontal impact, the main tube may remain parallel at points (A) but will be bent as shown in Fig. D.4. A straight-edge, made from a piece of good quality hardboard can be used for this purpose, but the checking edge must be quite straight.

When the frame is set parallel to the surface table, the mandrel through the swinging arm pivot holes should be vertical. This can be checked using the set-square and internal calipers or a slip gauge between the mandrel and the square. The set-square should touch both the upper and lower tubes together at points (C) and (D) if the frame is true and correctly set-up on the table. To find the frame centre line, take the height of the main tube and subtract half the diameter of the tube.

Checks can now be taken at the engine mounting lugs and other points of the frame. Errors at any point should not exceed $\frac{1}{32}$ in. (.79 mm.).

CHAINCASE

Remove the two halves of the rear section. These are secured to the swinging arm brackets by four bolts. Note that the lower rear fixing bolt also secures the brake torque arm.

To release the front section, first take out the primary chaincase oil level screw (painted red) with nut, then withdraw the lower half of the case from around the sprocket. The top half is held by one of the primary cover fixing screws and a sleeve nut.

After removal of the chaincase, see that the rubber sleeve over the swinging arm spindle housing is in good condition.

When replacing the front section of the chaincase note that the halves are located together by means of a peg and cup at the front.

REAR SHOCK ABSORBERS

The rear shock absorbers, or dampers, are of the coil spring type, hydraulically damped and are mounted on bonded rubber bushes at each end.

The only dismantling that can be carried out is for the removal and replacement of the springs.

The bolt securing the left-hand damper at the top also holds the pannier frame and support rail. Note carefully, the position of its spacer. The top fixing bolt of the right-hand damper retains the toolbox support and the support rail.

To remove a damper, take out the top fixing bolt with nut and washers and unscrew the lower fixing nut. Pull the damper off the stud at the bottom and withdraw from the top frame bracket.

The removal and replacement of the mounting bushes will be found much easier if a little liquid soap is applied.

The damper springs are graded at 100 lb./in. rate and have green/pink identification markings.

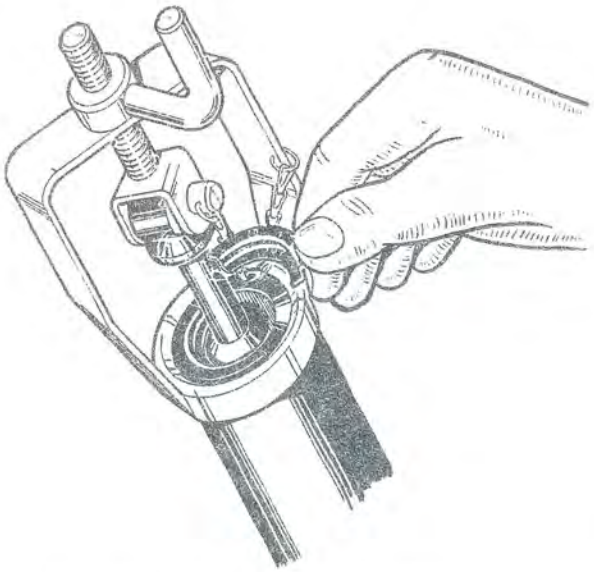


FIG. D.5. *Using tool No.* 61-3503.

If the springs are to be changed, the spring must first be compressed with Service Tool No. 61-3503 to allow the split collets to be removed (see Fig. D.5). After removing the tool, the dust shield can be lifted off, allowing the spring to be taken out. Having renewed the spring and re-fitted the dust cover, the spring will have to be compressed with the service tool again to enable the split collets to be inserted.

Do not lubricate the plunger rod or bushes.

The dampers have three load positions, light medium and heavy (see Fig. D.6) and they must be set in the "light load" position before dismantling. A "C" spanner for this adjustment, is provided in the toolkit.

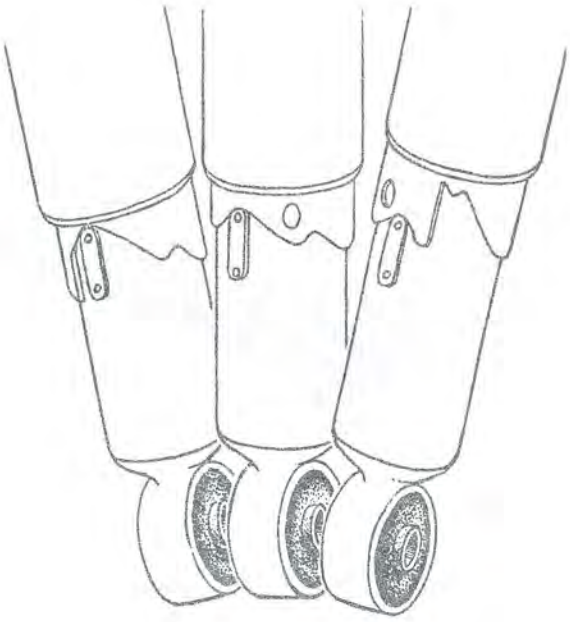


FIG. D.6. *Cam ring positions.*

SWINGING ARM

Removal

Take off the rear wheel, chaincase, dampers and rear brake pedal as described on pages F.5 and F.6, D.5 and D.9 respectively.

Remove the large nut and lockwasher securing the swinging arm spindle at the right-hand side and unscrew the spindle flange retaining bolt from the opposite side. The brake light switch is fixed to the spindle flange by two screws with washers and must now be removed before driving the spindle out from the right-hand side. Now, using a raw-hide mallet, tap the left-hand side of the swinging arm downwards and the right-hand side upwards to release it from the frame plates.

Replacement is the reversal of the above procedure for removal but, do not tighten the large spindle nut until the dampers have been refitted.

Bushes

Each of the two bushes fitted to the swinging arm fork consist of two steel sleeves, bonded together with rubber. The inner sleeve is slightly longer than half the width of the fork in the frame, the two inner sleeves are locked together on the end faces, so placing the rubber under tension when the fork moves.

Under normal circumstances, the bushes will last the life of the machine, but should they require renewal, the rubber will have to be first removed. This can be done by progressively burning out the rubber with thin rods or strips of metal which have been heated. When sufficient rubber has been burnt away, drive out the inner sleeves, after which the outer sleeves can be removed with a suitable drift.

Alignment

Before checking the swinging arm, it must be established that the bushes are in good condition.

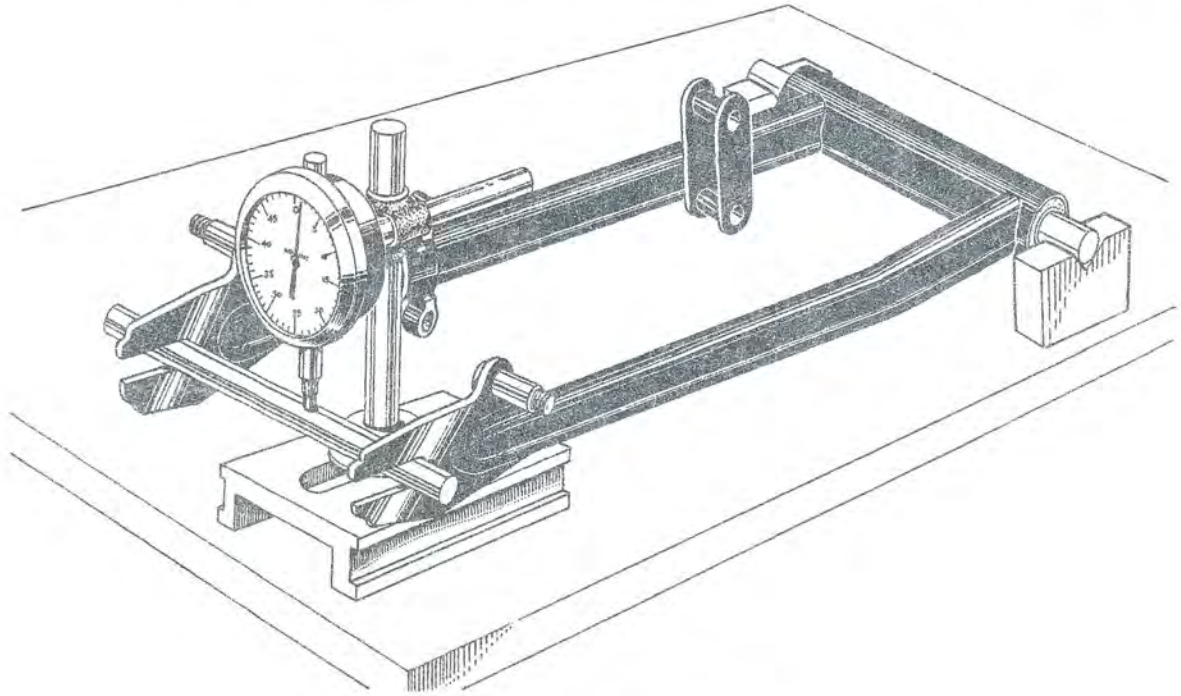


FIG. D.7. *Checking the swinging arm.*

Using the same mandrel that was used for the swinging arm pivot on the frame (see page D.3), set the swinging arm in "V" blocks as shown in Fig. D.7. Another mandrel 9 in. long × ⅝ in. diameter should be inserted through the fork ends. Both mandrels should be parallel to the surface table. Should there be less than ¼ in. malalignment of the swinging arm fork it is permissible to correct it by means of a suitable lever but, care must be taken to avoid causing further damage.

To check that the forks are square to the pivot, they must be set-up at 90° to the position illustrated, so that the pivot is vertical. Next, find the centre of the pivot and check that the fork ends etc., are in accordance with the dimensions shown in Fig. D.8.

When there is considerable malalignment in either frame or swinging arm, it is recommended that a works reconditioned unit is fitted.

NOTE:—There may also be a variation in the rear dampers and a careful examination should be made of the overall length between the mounting eyes. It is possible that one damper may be weaker than the other, caused by the "settling" of a spring. If this should be the case, it is advisable to renew the springs in both dampers.

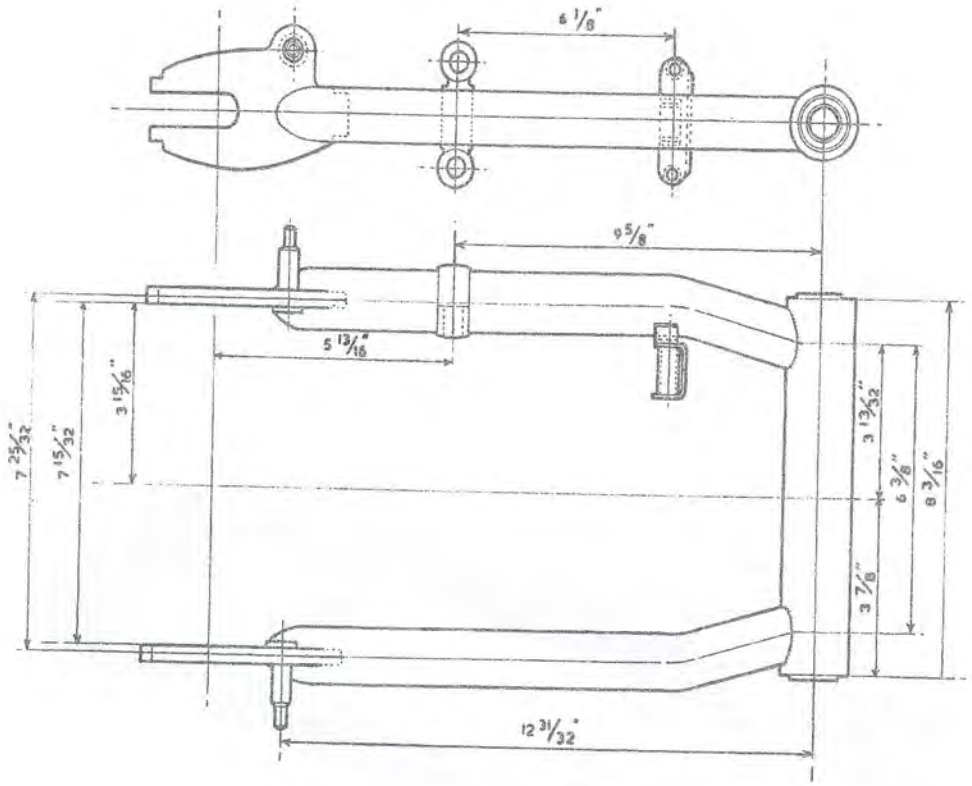


FIG. D.8. *Swinging arm dimensions.*

SADDLE

The saddle is mounted on a bracket at the rear, which is secured to the frame member by two self-locking nuts with spacers. To remove, reach below the saddle, unscrew the nuts and take off the spacers. The saddle can then be withdrawn backwards to disengage its clip from the front mounting rod.

The clip is held to the base of the saddle by two nuts with washers.

Replace in the reverse order, making sure that the clip engages correctly with the front mounting rod.

PROP STAND

The prop stand is secured to the frame lug with one bolt and lockwasher. Bend back the tabs of the lockwasher and unscrew the bolt. The return spring will be released as the stand is drawn off the frame lug.

CENTRE STAND

The centre stand is held in position with a plain steel bar drilled at both ends for split pins, centre distance piece, two spring washers and two plain washers.

To remove the stand it is only necessary to remove the split pin from one side and draw the pivot pin out from the opposite side.

When replacing the stand, note that the spring washers are fitted outside the stand, then the plain washer and finally the split pin.

Grease nipples are provided in each stand lug to lubricate the pivot.

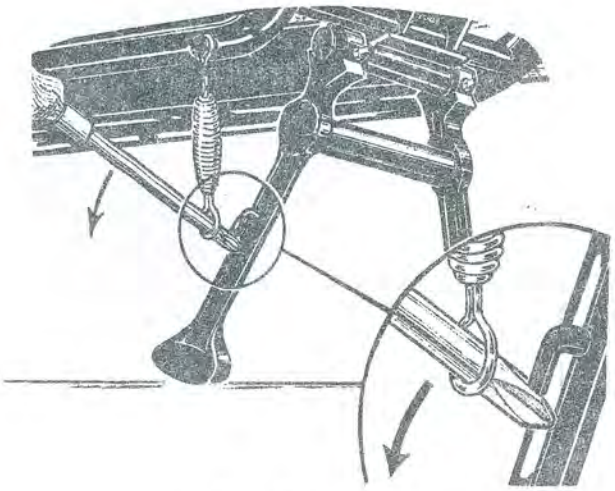


FIG. D.9.

Stand Spring

The simplest way to replace the stand spring is to use a Phillips-type screwdriver. Place the eye of the spring over the frame anchorage, insert the screwdriver in the other eye, place the screwdriver slot under the hook on the stand and lever downwards to press the spring over the hook (see Fig. D.9).

REAR BRAKE PEDAL

Release the spring clip that holds the brake rod to the pedal and allow the rod to fall clear. Remove the central fixing bolt with large plain washer from the fulcrum pin and take off the pedal with return spring. The fulcrum pin is fixed to the frame with one large nut and washer.

REAR MUDGUARD

It is unnecessary to remove any other component when taking the rear mudguard off the machine, but more access will be gained to some of the fixing bolts if the pannier bag and frame are first removed.

Reach below the top left-hand side of the guard and unscrew the rectifier retaining nut, being careful not to allow the bolt to revolve. Release the rectifier and carefully tie it up out of the way to avoid any damage.

Disconnect both the brown and brown/green cables from their snap connectors below the number plate bracket and pull the cables through the mudguard grommet.

The mudguard is held by six nuts and bolts with plain washers, there being two at the lower front (below the battery carrier), two at the saddle rear fixing brackets and two at the pannier rear support bracket. After releasing from its fixing points, the mudguard can be eased gently away from the rear, around the rear wheel.

The rear number plate and tail lamp assembly is secured to the mudguard by three nuts and bolts with plain washers.

If the mudflap has been removed, ensure that the clamp strip is replaced correctly.

Replace in the reverse order and check that the tail lamp connectors are in good order and the cables are not "bared" at any point.

IMPORTANT NOTE:—When tightening the rectifier fixing nut, hold the bolt head firmly with a second spanner to prevent it from turning. If this precaution is not taken, the plates may twist and break the internal connections.

CARBURETTER AIR FILTER

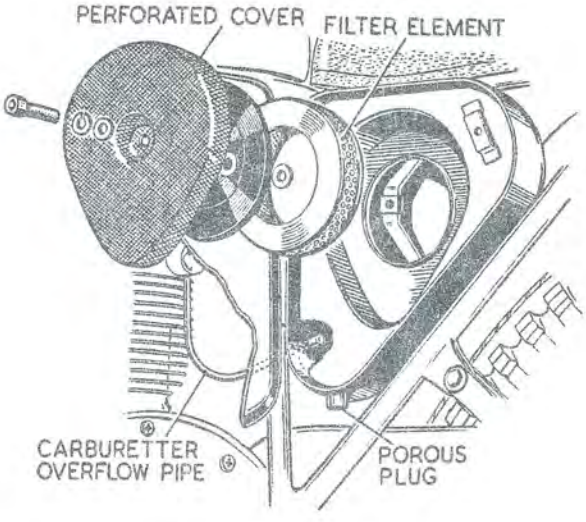


FIG. D.10.

The carburetter filter should be regularly examined at intervals of 1,000 miles (1,600 Km.), but if the machine is used under exceptionally severe conditions a weekly examination must be made. Running the machine with a badly choked filter will cause restricted maximum speed, an increase in fuel consumption and many other carburation troubles.

The hinged filter box lid is held closed by an "Oddie" stud which requires a single turn to release. Using a suitable "Allen" key, unscrew the central socket head screw from the recess in the perforated cover. The cover, circular plate and the filter itself can now be taken off.

The filter is composed of paper elements and it is therefore inadvisable to attempt to clean it. If it appears to be contaminated with excessive quantities of dirt, replace it with a new unit.

A drain plug of porous sintered steel is provided at the base of the filter box and allows surplus petrol from the carburetter overflow pipe to drain away, without admitting particles of dust. The plug is retained by a spring circlip and should occasionally be removed for cleaning.

OIL TANK REMOVAL

Take out the drain plug and drain the oil from the tank. Remove the saddle (page D.8).

Loosen the small oil pipe clips at the tank and disconnect the rocker box oil feed pipe and the main oil feed and return pipes (noting cross-over of pipes).

The oil tank is secured to the frame cross member, at the top rear, by a single rubber-mounted bolt (see Fig. D.11). Three rubber buffers support the tank at the front, one at the top and two at the base.

Before attempting to remove the oil tank, it will be necessary to lower the rear mudguard on to the wheel, to provide sufficient clearance for the withdrawal of the tank.

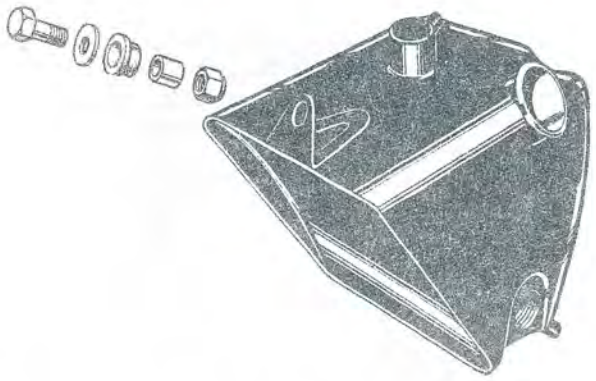


FIG. D.11. *Oil tank mounting.*

First, pull out the tank rubber buffers and remove the two fixing bolts with large washers and nuts, securing the mudguard front to the lower frame bracket. Also take out the two bolts with nuts and washers, holding the mudguard top to the rear of the saddle support rail. Now, slip the front edge of the mudguard behind the swinging arm pivot and push the guard gently downwards on to the top front of the rear wheel.

After releasing the oil tank from the top frame member, the tank can be lowered and withdrawn from the right-hand side of the frame.

Replacement of the tank is a reversal of the above instructions but, after replacing the oil pipes, check that there is no oil leakage. The rubber buffers that support the tank are simply a press-fit into the frame brackets. If they have become saturated with oil, it is advisable to renew them.

HEADLAMP REMOVAL

Slacken the rim retaining screw, situated at the top of the headlamp. Pull the rim away from the top and disengage from the clip at the base to release the light unit assembly. Press the main bulb adaptor inwards, rotate it to the left and lift it off. Pull out the sparking bulb holder from its location in the reflector, withdraw the light unit and rim assembly and place to one side. To avoid damage, the bulbs should now be taken out of their holders.

Disengage the light switch and ignition switch cable sockets (press-fit) then, making careful note of their respective locations, disconnect the cables at the ammeter terminals. Pull out the ignition warning light and speedo light bulb holders and take out the bulbs.

Release the speedometer drive cable by unscrewing the knurled ferrule at the base of the instrument head and pull the cable from the headlamp.

By displacing the large rubber grommet at the base of the headlamp shell, the harness complete with switch sockets can now be withdrawn from the shell. Note on reassembly, that the harness is held securely by a spring clip inside the headlamp shell.

Finally take out the two fixing bolts with washers and spacers from the fork leg brackets and withdraw the headlamp complete. The speedo head is held in place by two nuts and a bridge arrangement.

Replace in the reverse manner, making sure that all connections are secure and that the cables are not "bared" at any point.

CONTROL CABLE REPLACEMENT

Throttle Cable

First turn the twist grip to open the throttle, then, whilst pulling the cable sleeve, release the grip to allow the slotted cable stop to be removed. Now remove the two screws from the twist grip control and take off the top half to expose the cable nipple. Ease the nipple out of the grip and remove the cable.

Fit the replacement cable to the grip by inserting it up through the lower half and locating the nipple in its slot. Replace the top half of the grip, but, before tightening the screws, check that the grip turns freely. Do not replace the cable stop at this stage.

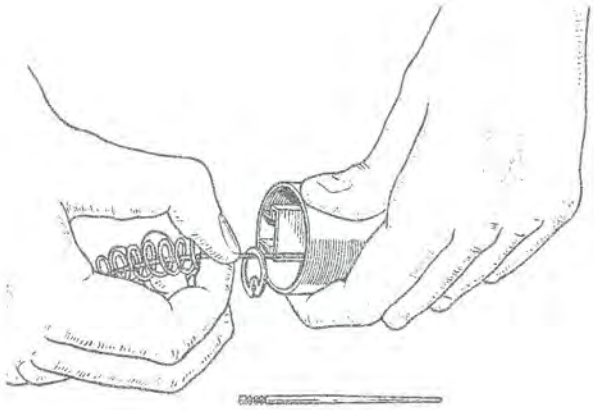


FIG. D.12. *Removing throttle cable.*

Proceed by removing the petrol tank (see page B.12) and detaching the cable from the frame clips.

Take out the two Phillips-head fixing screws and withdraw the carburetter top cover complete with throttle valve assembly. Compress the throttle spring, raise the needle with clip and after making careful note of its position, remove the needle clip to release the needle. Whilst still compressing the spring, push the cable downwards to release the nipple from its location in the valve. Take care not to lose the needle clip when taking off the spring and top cover.

Before fitting the replacement cable, first slide the small rubber dust cover on to the outer cable, then pass the cable through the top cap, spring and needle clip. Whilst compressing the spring, insert the cable nipple through the valve needle hole and locate to one side. Fit the valve needle and secure with the spring clip in the correct needle groove (second from the top). Assemble the throttle valve to the carburetter body, making sure that the needle enters the needle jet squarely. Locate the peg on the throttle valve with the slot in the mixing chamber and fit the top cap. Do not tighten the cap fixing screws until the throttle valve has been checked for correct operation.

Finally, attach the cable to the frame, replace the cable stop at the twist grip and adjust the cable as necessary (see page C.4).

Front Brake Cable

To remove the front brake cable, first completely loosen the cable adjusters and unscrew the nut and bolt holding the toggle to the lever on the brake cover plate. Now, pull the cable adjuster away from the handlebar lever bracket and slip the cable nipple out of the lever.

Replacement is simply a reversal of the above procedure but do not omit to re-adjust the brake cable and test the efficiency of the brake thoroughly before using the machine.

Clutch Cable

Unscrew and remove the handlebar lever fulcrum bolt and nut. Slacken the cable adjuster and swing the control lever away from the bracket, allowing the cable nipple to be released.

The adjuster and cable can now be withdrawn from the bracket. It will now be possible to release the nipple at the other end of the cable from the clutch actuating lever.

Replace the cable in the reverse manner and adjust as necessary to give correct operation.

NOTE:—After adjustment, the control lever on the timing cover should take up a position approximately parallel with the timing cover joint face, when operated.

Exhaust Valve Lifter Cable

Undo the handlebar control lever pivot bolt and nut. Pull the lever away from the bracket and disconnect the cable nipple.

Now, working from the right-hand side of the machine, pull the cable outer cover out of its location in the valve lifter lever and raise the cable to release (see Fig. D.13). Screw out the cable adjuster from the bracket and withdraw the cable complete with adjuster and spring.

After replacing the cable, use the cable adjuster and locknut on the bracket to obtain the correct setting. Ensure that there is ample slack in the cable to allow the exhaust valve to close properly whilst the lever is not operated.

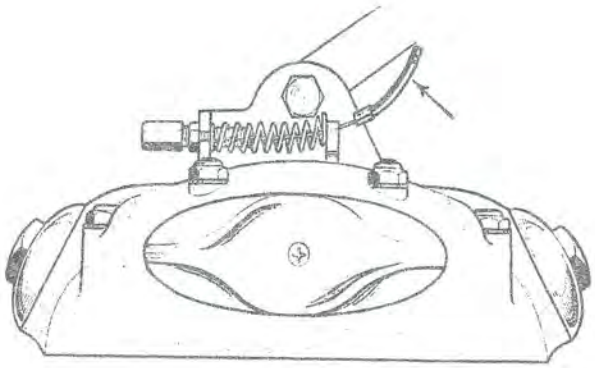


FIG. D.13.

INDEX

DESCRIPTION

The forks are of robust design and therefore require the minimum of maintenance, apart from the periodical oil changes as detailed on page A.12.

ADJUSTING STEERING HEAD RACES

It is most important that the steering head races are always correctly adjusted.

Place a strong support underneath the engine so that the front wheel is raised clear of the ground then, standing in front of the wheel, attempt to push the lower fork legs backwards and forwards. Should any play be detected, the steering head must be adjusted.

Care is necessary to distinguish between play in the head races and play in the fork bushes.

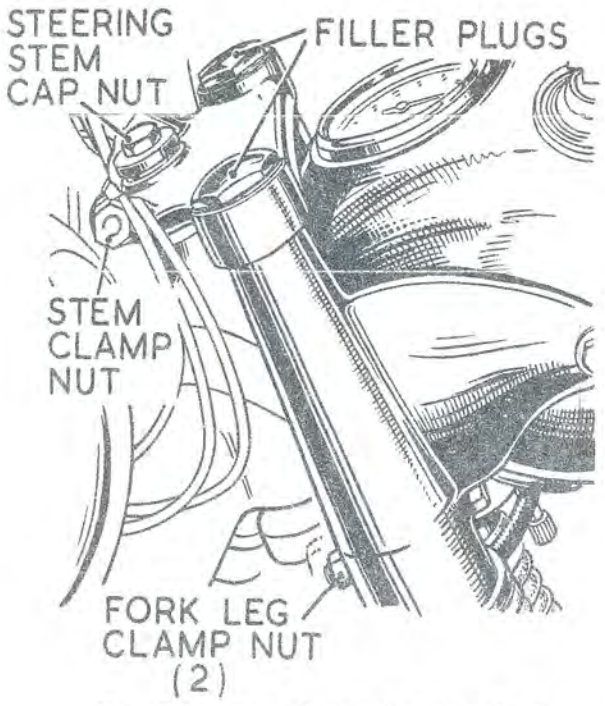


FIG. E.1. *Front fork and steering head.*

In some cases there may be both.

If possible, ask a friend to place the fingers of one hand lightly round the top head races whilst the forks are being pushed and pulled. Any play will be felt quite easily by the fingers.

It should be possible to turn the forks from side to side quite smoothly and without any "lumpy" movement. If the movement is "lumpy", the balls are indented into the races or broken. In either case they and the cups and cones should be renewed.

To adjust the steering head assembly, slacken the clamp nuts (Fig. E.1.), then tighten down the steering stem cap-nut until adjustment is correct. There should be no play evident in the races but great care must be taken not to over-tighten, or the ball bearings will become indented into the races, making steering extremely difficult and dangerous.

Having carried out the adjustment, tighten the clamp nuts securely. Recheck the adjustment.

RENEWING HEAD RACES

The steering head can be dismantled without stripping the forks but sufficient slack must be obtained in the headlamp cable harness and the front brake cable disconnected, to allow the column to be drawn out of the head.

If required, the headlamp can be removed, as detailed on page D.10.

Protect the fuel tank with a piece of cloth, take out the four bolts securing the handlebar clips and place the handlebar on the tank.

Slacken the clamp nuts and take off the steering stem cap-nut. Unscrew and pull upwards, the fork filler plugs. To release from the internal damper rod, loosen the locknut beneath the plug and unscrew from the rod.

Then, using a raw-hide mallet, strike the under sides of the top yoke alternately to release from the tapered legs. Place the top yoke to one side and draw the steering stem down and out of the head, taking care not to lose the bearings, which

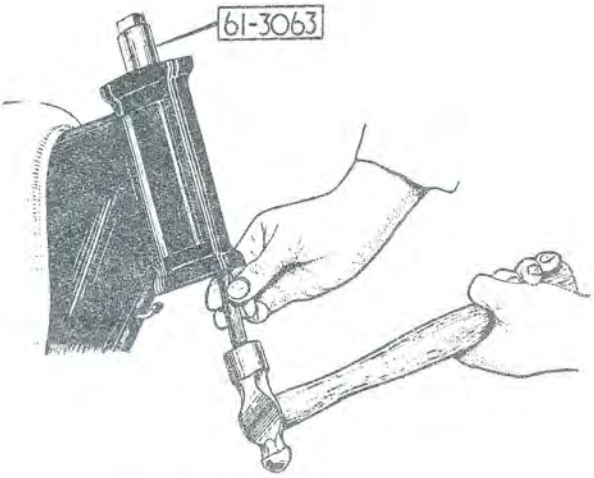


FIG. E.2. *Removing the top cup.*

will be released as the stem is withdrawn. There should be twenty ¼ in. diameter steel balls in each race (see page A.11 for details on lubrication).

The two bearing cones differ slightly in size but the cups are identical.

The lower cone can be prised off the column but, when fitting the replacement, care must be taken to see that the cone is seated squarely. For this purpose a length of heavy gauge steel tubing, long enough to clear the column and 1¼ in. in diameter is most useful for driving the cone on to its seating.

The cups can be removed with the aid of Service Tool No. 61-3063. Slacken off the nut on the tool sufficient to allow the tool to be screwed into the cup, then tighten the nut until the tool is expanded tightly into the cup threads. Drive out the cup with a suitable bar from inside the head tube (as shown in Fig. E.2).

Remove the tool by loosening the nut and repeat the procedure for the other cup.

When fitting replacement cups, see that they enter their housings squarely. Do not drive the cup in with a drift against the radius of the ball race as this will impose undue strain and is liable to fracture the cup. If possible, use a piece of steel bar or tube having a diameter slightly less than that of the cup sides. A suitable drift would be as shown in Fig. E.3.

After replacing the cups and bottom cone, grease the cups and assemble 20 balls into each cup. Slide the column back into the head, replace the top cone and dust cover then fit the top yoke. Screw on the cap-nut and adjust the steering as quoted on page E.2.

Reassembly from this point is simply a reversal of the dismantling procedure.

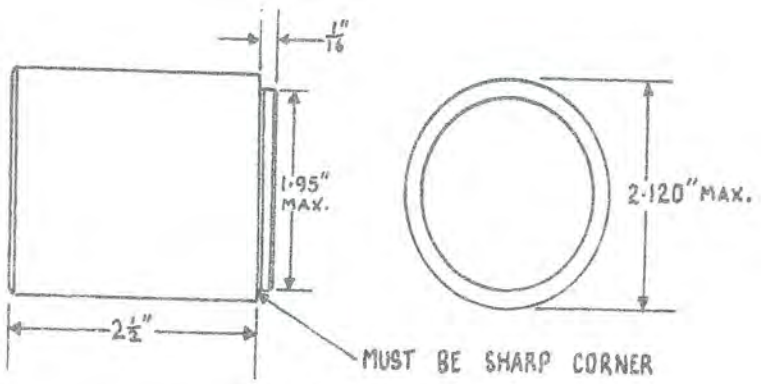


FIG. E.3. *Cup drift.*

REMOVING THE FORK LEGS

Before commencing work on the forks, it is advisable to have the following servicing tools and replacements available:—

(a) 65-5451 Oil seal (2)
(b) 65-5424 Top bush (2)
(c) 41-5137 Lower bush (2)
(d) 41-5144 Damper rod bush (2)
(e) 61-3350 Service tool
(f) 61-3005 Service tool
(g) 61-3006 Service tool
(h) 61-3007 Service tool
(i) 61-3765 Service tool

and a length of No. 5 twine, approximately 15 in. long.

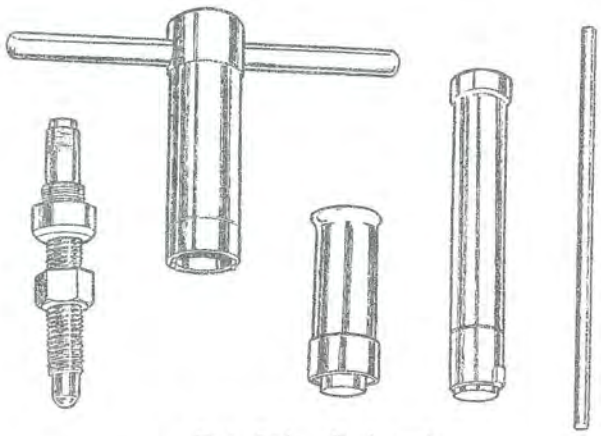


FIG. E.4. *Fork tools.*

Remove the front wheel as described on pages F.2 and F.3, then take off the front mudguard. Drain the oil from each fork leg (see page A.12) and slacken off the clamp nuts in the bottom yoke.

Slacken the top clip on the rubber bellows and withdraw from the outer sleeve.

Unscrew the fork leg cap and raise it sufficiently to enable the damper rod locknut (beneath the filler plug) to be loosened. The plug can then be unscrewed from the damper rod top. Screw Service Tool No. 61-3350 (minus the large nut and washer) into the top of the fork leg, take a firm grasp of the lower sliding member and strike the top of the service tool sharply with a mallet. This will release the leg from its taper fit in the top yoke, allowing the complete leg to be withdrawn.

Loosen the lower fixing clip and remove the rubber bellows.

Note that a fibre washer and steel washer are fitted to the fork leg, directly below the bottom yoke.

The fork outer sleeve is secured to the bottom yoke by the pinch bolts and need not be disturbed.

The fork springs can now be pulled out of the oil seal holder and checked for wear. If replacement springs are required, smear them with grease before fitting.

DISMANTLING THE FORK LEG

To assist in dismantling, hold the fork leg firmly in a soft-jawed vice at its wheel spindle lug. Slide Service Tool No. 61-3005 over the main tube and engage the dogs with the slots at the base of the oil seal holder.

Whilst pressing down firmly on the tool, turn anti-clockwise to unscrew the holder.

Remove the tool and slide the holder upwards until it locks on the tapered section of the tube, but do not use force or the oil seal may be damaged.

The main tube assembly can now be withdrawn from the lower sliding member.

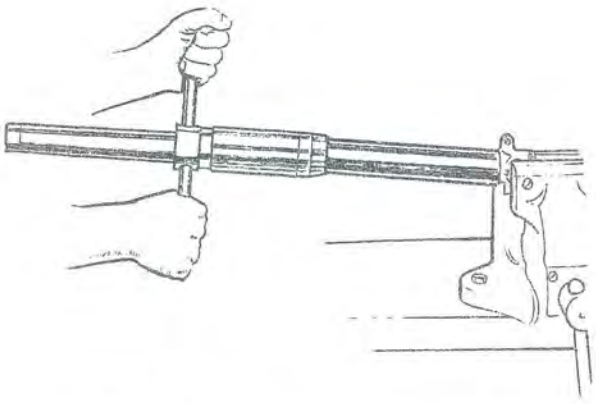


FIG. E.5. *Removing oil seal holder.*

Grip the unground portion of the tube in a vice, using soft clamps, and unscrew the large nut at the base of the shaft, enabling the bushes, spacer and oil seal assembly to be withdrawn.

The damper tube is retained in the lower sliding member at its base by one large "Allen" screw.

After removing the "Allen" screw, take out the two circlips at the damper tube top releasing the damper rod with valve and bush.

The damper valve assembly is secured to the damper rod by one nut (see Fig. E.6 for correct assembly).

The rubber sealing washer and special retainer, immediately below the damper rod top locknut need not be disturbed unless they require renewal.

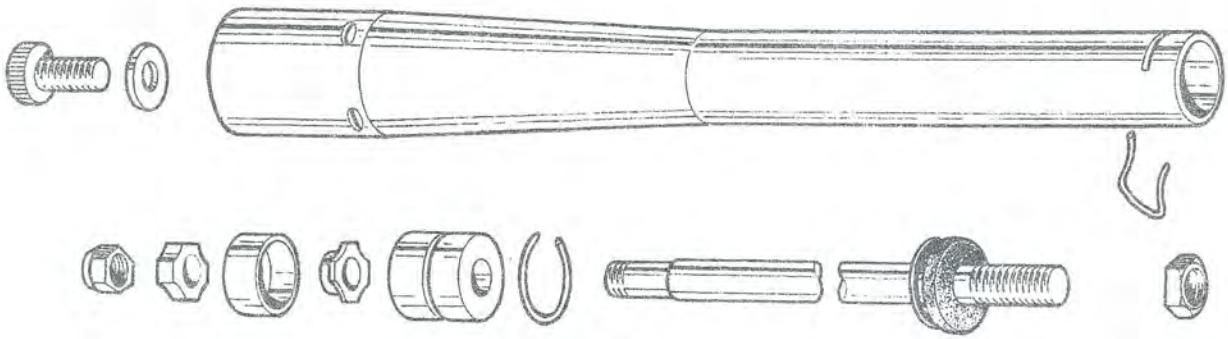


FIG. E.6.

OIL SEALS

If it is necessary to change an oil seal, place the lower edge of the holder on a wooden block and insert Service Tool No. 61-3006 into the top of the holder. Give the tool a sharp blow with a hammer and the seal will be driven out.

To fit a replacement seal, coat the outside with a good jointing compound and, whilst still wet, enter the seal squarely into the holder with the open side upwards. Drive the seal home with Service Tool No. 61-3007.

Care must be taken to avoid damaging the feather edge of the oil seal and this should be greased before reassembly.

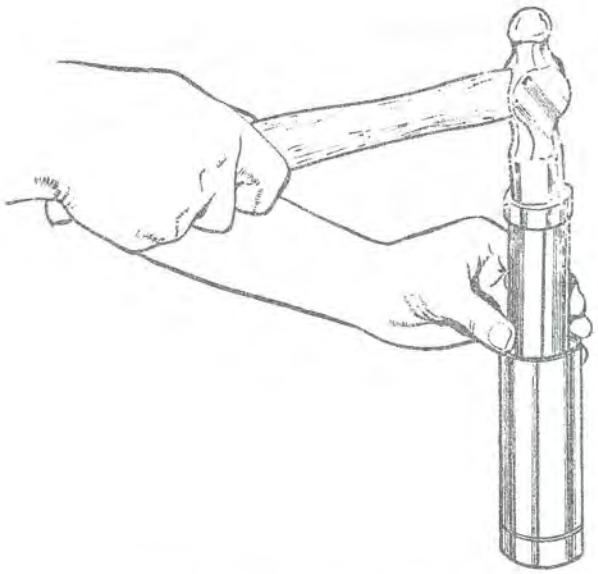


FIG. E.7. *Removing oil seal.*

REBUILDING THE FORK LEG

Reassembly is carried out in the reverse order to the dismantling procedure. Cleanliness is essential and before attempting to reassemble, clean all the components thoroughly. It is advisable to also clean the workbench on which the forks will be rebuilt.

NOTE:—During final assembly, screw down the oil seal holder on to one turn of twine round the groove at the end of the screw thread (see Fig. E.8). This will provide an additional oil seal.

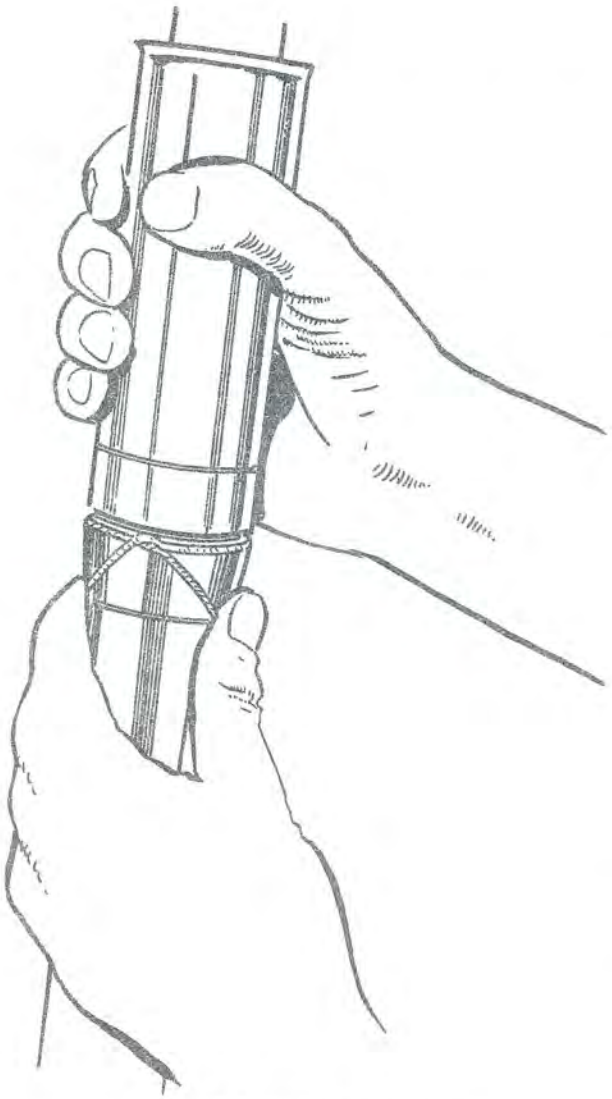


FIG. E.8. *Using the twine.*

REPLACING THE FORK LEG

Fit the rubber bellows to the fork leg and secure with the lower fixing clip.

Replace the steel washer and fibre washer over the fork leg to ensure a good seal below the bottom yoke. Screw Service Tool No. 61–3350 (minus the nut and collar) into the top of the fork leg and pass the assembly up through the two yokes. Fit the collar and nut, and tighten the latter until the leg is drawn firmly home into its taper. Tighten the clamp nuts in the bottom yoke before removing the tool.

Using Service Tool No. 61–3765, raise the damper rod to the top of the tube to enable the filler plug to be screwed on to the rod.

Ensure that the rubber sealing washer and special retainer are correctly fitted directly below the damper rod locknut.

Repeat the operations on the other fork leg, refill with the correct amount of oil (⅓ pint to each leg) and screw down the filler plugs firmly.

Final assembly is of course, simply a reversal of the procedure for dismantling.

FORK ALIGNMENT

After replacing the forks legs, mudguard and wheel, it may be found that the fork is incorrectly aligned.

To rectify this, the front wheel spindle must first be screwed up tight into the right-hand leg and the pinch bolt in the left-hand leg slackened off. Also loosen the filler plugs and the clamp nuts in both the bottom and top yokes. The forks should now be pumped up and down several times to line them up and then tightened up from bottom to top, that is, wheel spindle, bottom yoke clamp nuts, filler plugs and finally, the steering stem clamp nut in the top yoke.

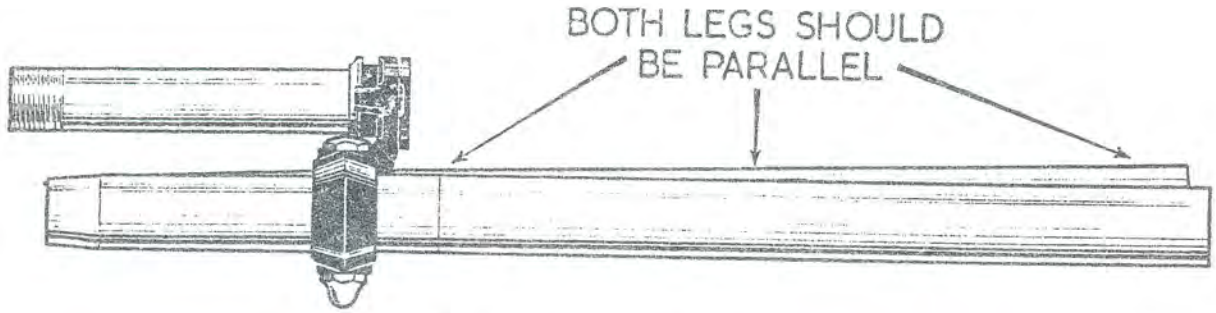


FIG. E.9. *Bottom yoke twisted.*

If, after this treatment, the forks still do not function satisfactorily then either the fork tubes are bent or one of the yokes are twisted.

The tubes can only be accurately checked for straightness with special equipment such as knife-edged rollers and dial gauges. Special gauges are also required to check the yokes. It is possible, however, to make a reasonable check of the tubes by rolling them on a good flat surface such as a piece of plate glass, but it is not a simple operation to straighten a bent tube. It is far better to obtain a factory serviced unit.

If the tube is obviously bent but not kinked, then it may be possible to carry out a reasonable repair with a little patience and care. Find the highest point on the bend, then with wooden blocks supporting each end, give the tube a sharp blow with a soft mallet and recheck. If a hammer is to be used, remember to protect the tube with a piece of wood. The measure of success will of course depend on the extent of the damage and the skill of the operator.

This job is vastly improved upon and simplified if a suitable press is available to the repairer. The damper rods and tubes should now be checked in a similar manner.

Having checked the tubes for straightness and reset as necessary, the top and bottom yokes can now be checked. First, assemble the two tubes into the bottom yoke so that a straight edge across the lower ends is touching all four edges of the tubes, then tighten the pinch bolts. Now view them from the side; the two tubes should be quite parallel. Alternatively, the lower 12 in. of the tubes can be placed on a surface plate, when there should be no rocking.

If the tubes are not parallel, as in Fig. E.9, then it will be necessary to reset the yoke, providing the error is not excessive.

To reset, hold one tube in a vice on the unground portion (using soft clamps) and re-position the other tube, using a longer and larger diameter tube to obtain sufficient leverage. Having checked the tubes this way, check the gap between them on the ground portion.

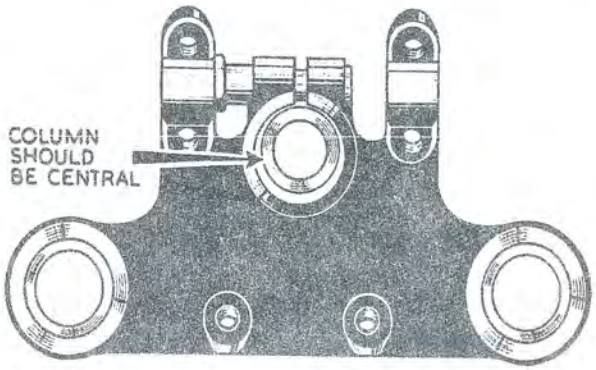


FIG. E.10. *Bent steering column.*

The next step is to place the top yoke in position over the tubes, when the steering column should be quite central. Figure E.10 shows a bent steering column.

The final step is to check if the tubes are parallel when assembled into the top yoke only. In this case the bottom yoke can be fitted loosely on the tubes, acting as a pilot only.

Though it is permissible to rectify slight errors in alignment by resetting, it is much safer to replace the part affected especially when there is excessive malalignment.

HYDRAULIC DAMPING

Figure E.11 shows a sectional view of a front fork leg extended.

Note the four 3/32 in. diameter bleed holes in the main tube and the transfer holes at the base of the damper tube.

When the forks are compressed, a double damping action takes place within each fork leg. As the fork leg rises, oil in the damper tube is compressed by the valve and is forced through the transfer holes, into the main tube. At the same time, the oil in the main tube is also being compressed and is forced upwards between the outside of the damper tube and the top tube bush. The pressure of the oil increases as the gap narrows around the tapered damper tube, progressively slowing the fork spring action.

When the top tube begins to fill with oil which can no longer be compressed, the oil passes through the bleed holes and into the area between the fork leg and top tube bushes. Eventually the point of maximum compression is reached and is cushioned by the remaining oil in the main reservoir.

As the fork leg begins to extend again, the oil in the area between the two fork bushes is compressed and forced through the four bleed holes, back into the main tube.

The damper valve, as it rises, creates a vacuum and draws oil into the damper tube, via the transfer holes, thus providing a smooth cushioned motion.

It will be seen therefore, that each leg should contain the same amount of oil (⅓ pint) to provide uniform damping.

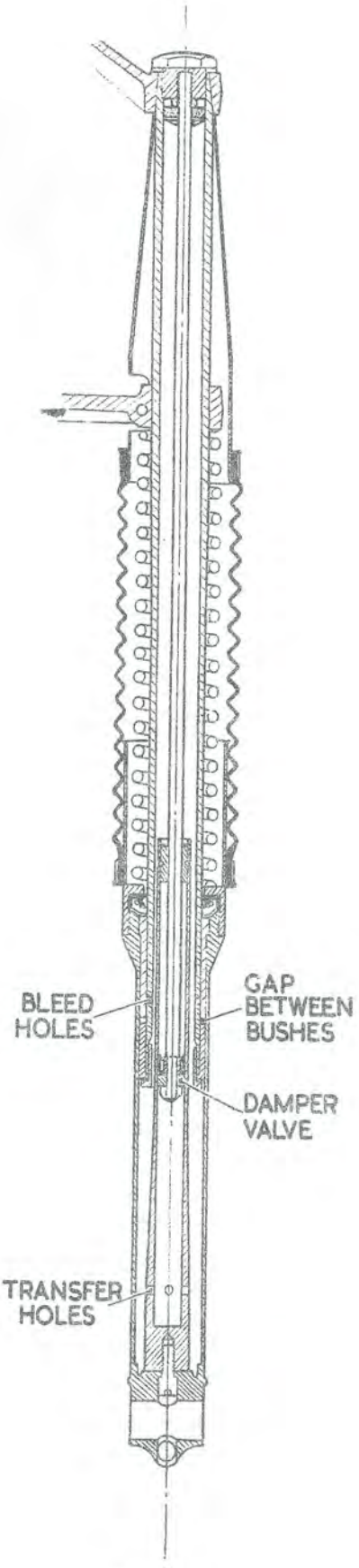


FIG. E.11.

INDEX

FRONT WHEEL

Front Wheel Removal

First, place a box or small wooden trestle underneath the crankcase to raise the front wheel clear of the ground.

Screw in the brake adjuster completely and disconnect the front brake cable by unscrewing the nut and bolt holding the toggle to the brake plate lever.

Having released the cable toggle, unscrew and remove the cable adjuster with cable (see Fig. 1B).

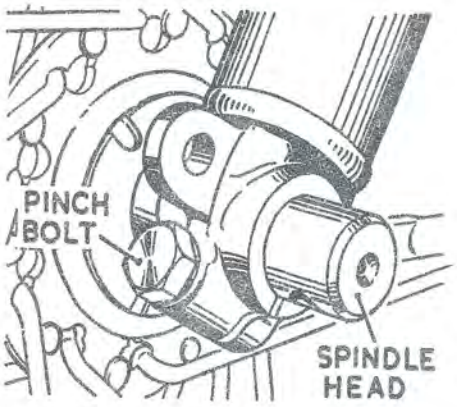


FIG. F.1A.

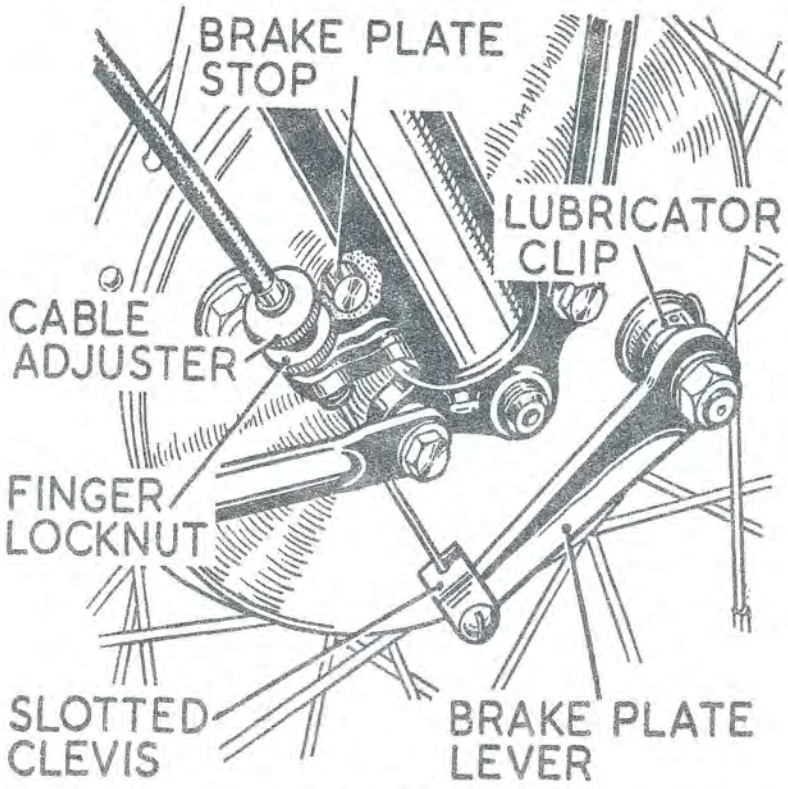


FIG. F.1B.

Slacken off the pinch bolt at the bottom of the left-hand fork leg, insert a stout tommy-bar through the hole in the wheel spindle head and unscrew it from the hub. Note that the spindle has a left-hand thread and unscrews by turning in a clockwise direction.

Support the wheel as the spindle is withdrawn and when free, the wheel can be pulled away from the right-hand fork leg and withdrawn from the machine.

Do not allow the wheel to fall on to the bush which projects from the brake drum side of the hub. Although the bush is firmly pressed in, it may, if subjected to a sharp blow, be forced into the hub.

Should this occur, however, the bush can be retrieved and re-positioned with the aid of the wheel spindle.

Front Wheel Replacement

Insert the wheel between the fork legs and screw in the spindle in an anti-clockwise direction, until it is almost tight. Locate the brake plate anchor peg in the recess on the inside of the right-hand fork leg and tighten the wheel spindle fully.

Before locking the spindle with the pinch bolt, depress the forks once or twice to enable the left-hand fork end to position itself on the spindle. It is most important that this precaution is observed, otherwise the fork leg may be clipped out of position and will not function correctly.

Finally, tighten the pinch bolt and reconnect the brake cable. For details on brake adjustments see page F.7.

Front Brake Cam

Lubrication of the cam spindle is made via an oil hole in the cam boss (see Fig. F.3). Move aside the spring clip to expose the hole and apply just sufficient oil to ensure that the cam can be operated easily.

Avoid over-lubricating as the oil may reach the brake linings and affect the braking performance.

Front Brake Shoes

The brake plate is a push-fit on the bush (1) see

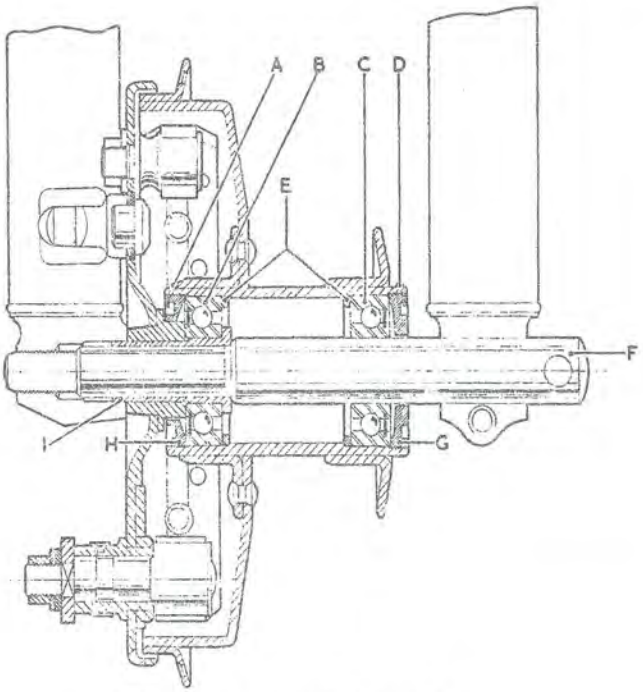


FIG. F.2. *Section of front hub.*

Fig. F.2. The brake shoes can be removed by levering them outwards and upwards off the cam and fulcrum pin. It is also possible to remove the brake shoes complete with springs, cam and fulcrum pin after first unscrewing the nuts on the outside of the plate. The springs are very strong: take care not to trap the fingers behind the shoes.

The brake shoes are of the conventional type (not floating) and can be fitted either side.

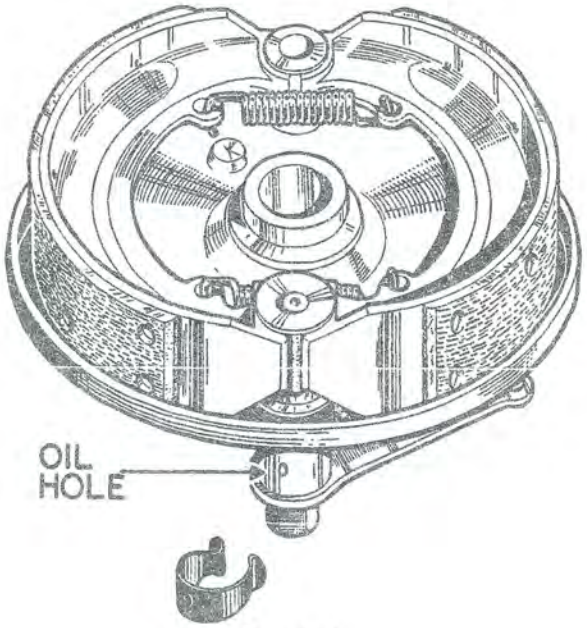


FIG. F.3.

A hole is provided in the base of the brake plate to enable any water in the drum to drain away quickly. Check that it is not blocked with dirt or mud.

If the brake linings require replacement, the notes on relining the shoes (page F.8) may be of some assistance.

Checking Front Wheel Bearings

Pull off the brake cover plate and remove the split pins at each side of the hub (see Fig. F.4). Unscrew the bearing retainers (which have normal right-hand threads) using Service Tool No. 61-3694.

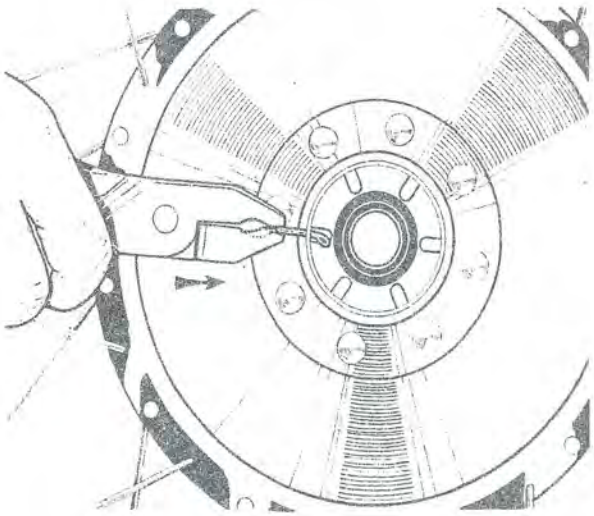


FIG. F.4. *Removing split pin.*

Replace the wheel spindle and drive out the brake side bearing together with the bush (1) by gently tapping the spindle head with a hide-mallet. If a suitable mallet is not available, protect the spindle head with a piece of hard-wood before striking.

By inserting the spindle and bush from the right-hand side, it will be possible to drive out the left-hand bearing. Both bearing are the same size and are therefore interchangeable.

To examine the bearings, wash thoroughly in paraffin and blow out with a high-pressure air line if possible. Examine carefully for signs of roughness, indicating broken balls or damaged tracks, or excessive play.

Fitting New Bearings

Ensure that the steel thrust washers (E) are correctly located in the hub shell and fit the right-hand bearing with the oil seal outwards. It is essential that the bearings are pressed in absolutely square to the housing and the force applied must be on the outer ring, not on the inner ring.

Screw in the bearing retainer using Service Tool No. 61-3694 and secure with the split pin.

Insert the bush (1) and then the wheel spindle (threaded end first) into the bearing from the left-

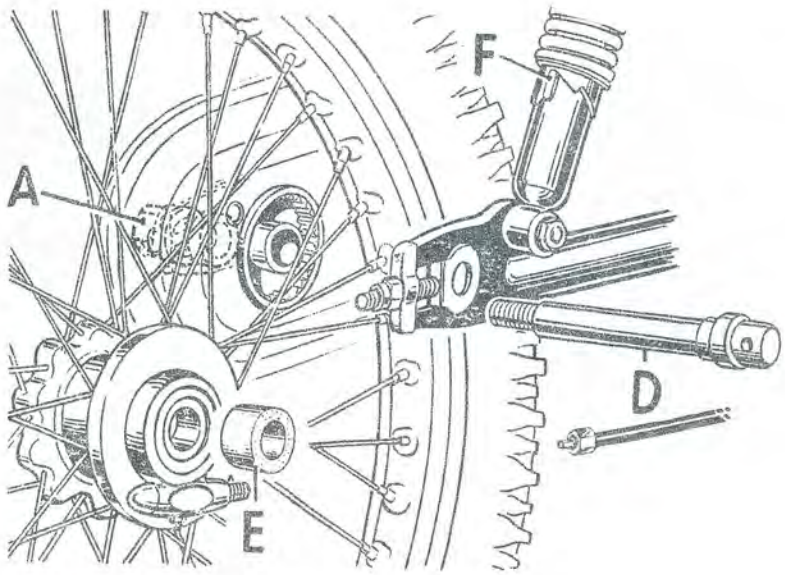


FIG. F.5. *Removal of rear wheel.*

hand side and tap the spindle gently home until the shoulder of the bush rests on the inner ring of the bearing.

Apply a liberal coating of grease on to the inner face of each bearing. Place the left-hand bearing over the spindle (with oil seal outwards) and drive it into the housing. Finally, replace the bearing retainer and split pin.

REAR WHEEL

Rear Wheel Removal and Replacement

Removal of the rear wheel does not affect the chain or brake adjustments.

Disconnect the speedometer drive cable at the hub then unscrew and withdraw the wheel spindle (D) Fig. F.5, using a suitable steel bar through the head. It has a normal right-hand thread and is therefore unscrewed in an anti-clockwise direction.

The outer collar (E) should fall clear on removal of the spindle and the wheel can then be pulled away from the brake drum and withdrawn from the machine.

The speedometer drive unit can now be pulled away from the hub.

It will not be necessary to disturb the wheel nut (A) on the left-hand side, as this retains the brake drum assembly.

Replace in the reverse manner but do not omit to refit the spindle outer collar.

Wheel Hub Bearings

The hub is fitted with two identical single-seal bearings which are a light press-fit on to the hollow spindle in the hub shell. The brake drum bearing is the same size as the hub bearings, but has a double oil seal.

Unscrew the bearing retainer on the left-hand side; this has a left-hand thread and is unscrewed in a clockwise direction.

Using a drift slightly under .875 in. diameter, drive out the hollow spindle from the left-hand side, releasing the right-hand bearing, inner collar and the hub end cover from the right-hand side. Note position of the felt washer and its retaining rings.

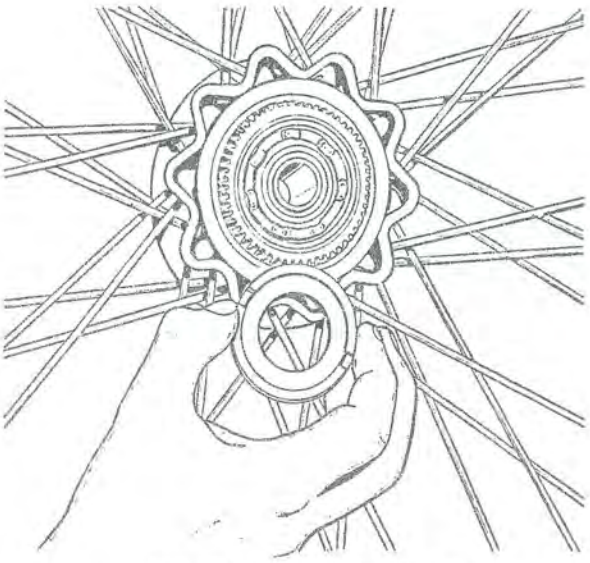


FIG. F.6. *Bearing retainer.*

The left-hand bearing and its thrust washer can now be driven out from the right-hand side.

The rubber oil seal for the left-hand bearing need not be disturbed and may be left in the hub.

To examine the bearings, wash thoroughly in paraffin and if possible, blow out with a high pressure air line. Examine each bearing carefully for signs of roughness indicating broken balls or damaged tracks, or excessive play.

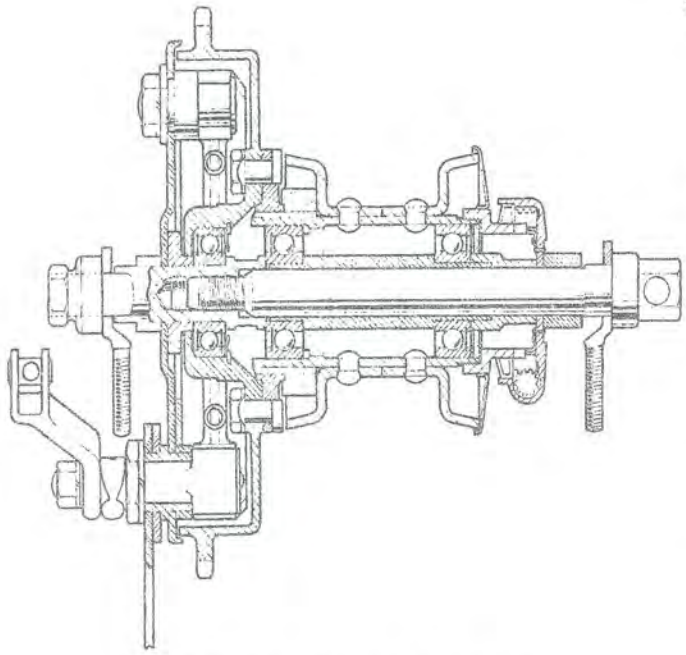


FIG. F.7. *Section of rear hub.*

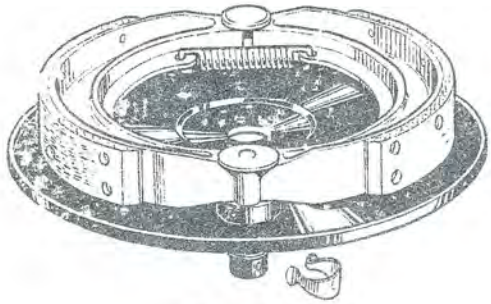


FIG. F.8.

Reassembly of the hub is simply the reverse of the dismantling procedure but, when pressing the bearings in, apply pressure only to the outside ring of the bearing and ensure that the retainer on the left-hand side is quite tight.

Note that the hollow spindle is fitted with the short end on the left-hand side and also that the bearings are fitted with their oil seals outwards.

Rear Brake Drum and Bearing

The brake drum is retained in the rear fork end by the spindle nut and the bolt securing the brake anchor strap (link) and chaincase bracket to the swinging arm lug.

To remove the drum, first take off the chaincase rear section, as detailed on page D.5. Disconnect the rear chain at its spring link and unscrew the brake rod adjusting sleeve. Take off the spindle nut (the anchor strap (link) fixing bolt will have been removed with the chaincase) and withdraw the complete brake drum assembly.

Take off the outer collar and lift the brake plate, complete with brake shoes and springs, off the spindle.

There is no need to disturb the cam spindle unless it is to be replaced, in which case the position of the brake lever should be noted to assist in reassembly.

The brake shoes and springs can be removed in the usual way.

Take off the left-hand inner collar, which is a push-fit into the hub.

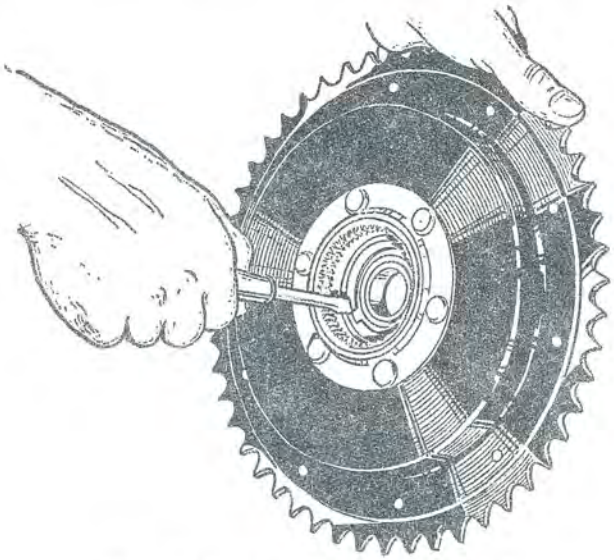


FIG. F.9. *Releasing bearing circlip.*

To remove the bearing, first drive out the spindle from the left-hand side and release the bearing circlip with shim. The bearing can now be driven out from the front of the drum using a suitable drift.

Reassembly is the reverse of the dismantling procedure but, do not omit to replace the shim under the bearing circlip so that it seats on the outer ring of the bearing, not the inner ring.

It should not be necessary to disturb the driving flange unless it is known to be worn and is being replaced.

To remove the flange, flatten the locking plates, unscrew the six bolts and withdraw.

When fitting the new flange, see that it enters the drum squarely and that the mating surfaces are clean. Replace the six bolts and, after tightening the nuts evenly, turn the edges of the locking plates over.

If the chainwheel teeth are hooked or the inside of the brake drum is badly scored, then the unit must be replaced.

Brake Drum Replacement

See that the spindle is pressed well into the bearing and replace the cover plate complete with brakes, shoes etc. Fit the outer collar and place the assembly into the fork end. If the chain adjuster was taken out, replace it and screw on the spindle nut. If the chain tension was correct, there will be no need to make any adjustment now. Do not tighten the spindle nut until the wheel has been replaced, so that the alignment can be made for the complete assembly (see page F.11).

See that the bolt securing the brake anchor strap and chaincase to the bracket on the swinging arm lug, is tightened securely.

BRAKE ADJUSTMENTS

The brakes must be adjusted to give maximum efficiency at all times and for this to be maintained, the shoes should be just clear of the drum when the brake is off, and close enough for immediate contact when the brake is applied. The brakes must not be adjusted so closely, however, that they are in continual contact with the drum; excessive heat may be generated, resulting in deterioration of braking efficiency.

The front brake adjuster is situated on the lower fork leg and rotation of the screwed sleeve alters the effective length of the cable, so adjusting the position of the shoes in the drum. The locknut should be tightened after adjustment.

A self-locking cable adjuster is also provided at the handlebar lever.

The rear brake is adjusted by turning the self-locking sleeve in a clockwise direction (viewed from the rear of the machine), to shorten the effective length of the brake rod and so open the shoes in the drum. A small adjuster bolt and locknut is provided on the brake pedal to allow the pedal movement to be varied according to the rider's requirements.

Note that if maximum efficiency is to be obtained, the angle between the brake cable or rod and the operating lever on the brake plate should not exceed 90° when the brake is fully applied.

Both front and rear brake operating levers have serrated cam holes, enabling them to be removed and replaced in a new position to give finer brake adjustment.

When new brake shoes have been fitted or if, during dismantling of the wheel, the fulcrum pin was disturbed, the shoes must be centralised within the drum.

To do this, slacken the fulcrum pin nut and operate the brake cam so as to open the brake shoes. The fulcrum pin will then position itself in the housing until both shoes are pressing equally on to the drum. Tighten the fulcrum pin nut firmly and release the brake.

REAR CHAIN ADJUSTMENT

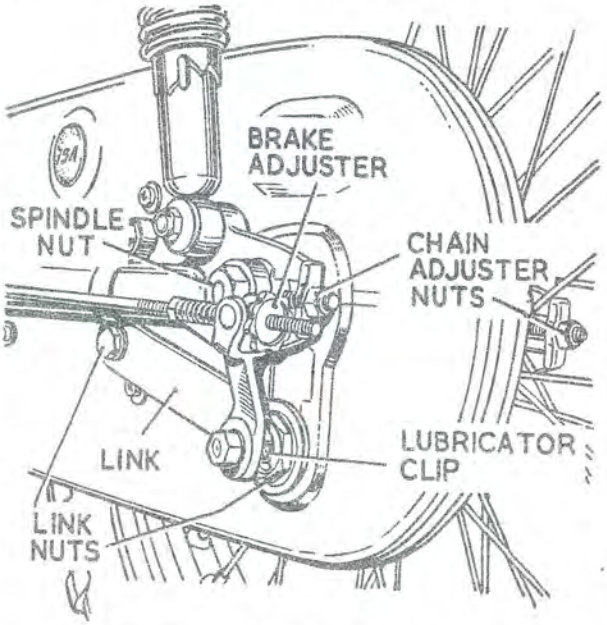


FIG. F.10. *Rear chain adjustment.*

The rear chain must be adjusted when the wheel is at the lowest point of the suspension travel (when the wheel is raised clear of the ground).

Rotate the wheel slowly until the tightest point on the chain is found, then check its up and down movement in the centre of the chain run. This can be checked through the aperture in the upper half of the chaincase when the rubber plug is removed. The total movement should be 1⅛ in. and if it varies from this setting, the chain must be adjusted by moving the rear wheel either forwards, to increase slackness or backwards, to reduce slackness. As chains invariably stretch periodical inspection and adjustment is essential.

To adjust the chain, first slacken the wheel spindle nuts, the anchor strap (link) fixing bolt and large nut, then the brake rod adjusting sleeve. Tighten both chain adjuster nuts evenly until the correct chain setting is obtained.

After adjustment, tighten the wheel spindle nuts and anchor strap (link) bolt and nut, re-check the setting of the chain and adjust the rear brake.

It is advisable to check the wheel alignment after any adjustment to the rear chain has been made; full details of this are given on page F.11.

RENEWING BRAKE LININGS

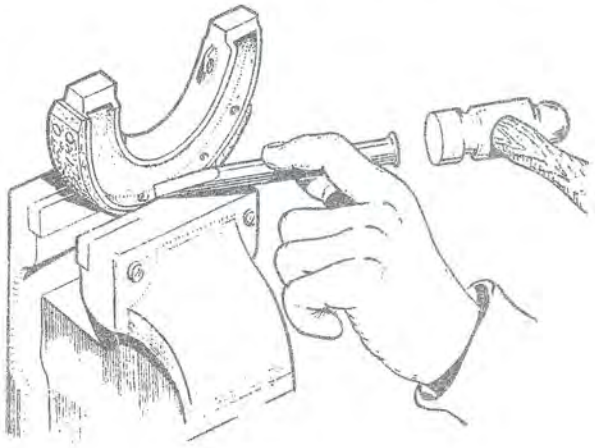


Fig. F.11.

Hold the shoe firmly in a vice and, using a good sharp chisel, cut off the peened-over portion of the rivet as shown above.

Drive out the rivets with a suitable pin punch and discard the old lining. Reverse the shoe in the vice and draw-file the face of the shoe to remove any burrs.

Clamp the new lining tightly over the shoe and, using the shoe holes as a jig, drill straight through the lining with a 5/32 in. diameter drill.

Remove the clamps and, holding the lining carefully in the vice, counterbore or countersink (according to the type of rivet used) each hole to no more than two-thirds the thickness of the lining, i.e., if the lining is $\frac{3}{16}$ in. thick, then the counterbore must not be deeper than $\frac{1}{8}$ in.

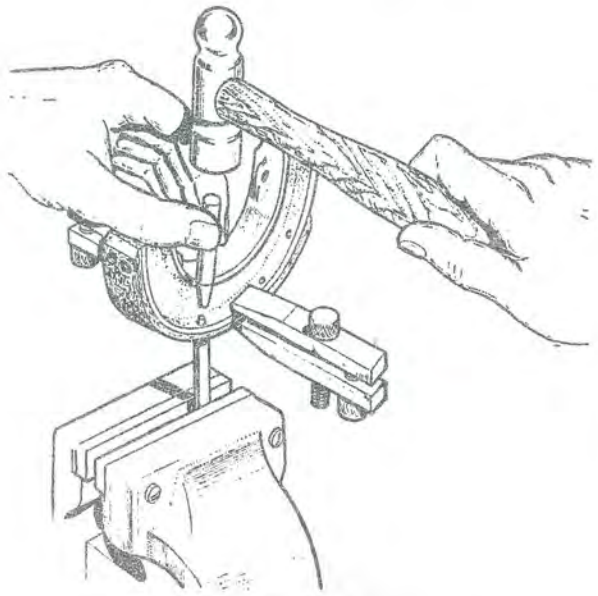


FIG. F.12.

Having prepared the linings for riveting, start at the centre and position the lining with one or more rivets.

Place a suitable mandrel in the vice, clamp the linings to the shoes with either small "G" or toolmakers clamps and peen-over the rivets as shown in Fig. F.12, working alternatively outwards from the centre.

The mandrel used in the vice must be flat on the end and the diameter should be no more than that of the rivet head. It will also help to bed the rivet down if a hollow punch is used before peening.

NOTE:--If the clamps are used correctly, that is, next to the rivet being worked on, the linings can be fitted tightly to the shoe.

If the linings are fitted incorrectly, a gap will occur between the lining and the shoe, resulting in efficient and "spongy" braking.

When the riveting is completed, file a good chamfer at each end of the lining to approximately half its depth and lightly draw-file the face of the lining to remove any fraze caused by the drilling.

WHEEL BUILDING

This is a job which is best left to the specialist as it is essential that the wheel is laced correctly and that when truing, the spokes are correctly tensioned.

It is however, possible to avoid trouble by periodically examining the wheels. As spokes and nipples bed down the tension will be lost and unless this is corrected the spokes will chafe and ultimately break.

Periodically test the tension either by 'ringing", that is striking with a metal tool or by placing the fingers and thumb of one hand over two spokes at a time and pressing them together.

If tension has been lost there will be no ringing tone and the spokes will move freely across each other.

When a spoke needs tensioning, the nipple through the rim must be screwed further on to the spoke but at the same time, the truth of the wheel must be checked and it may be necessary to ease the tension at another part of the wheel in order to maintain its truth.

It will therefore be obvious that spoke replacement, spoke tensioning or wheel truing are not operations to be treated lightly.

Careful examination of the wheel will show that for every spoke there is another pulling in the opposite direction and that the adjacent spoke goes to the opposite side of the hub.

Increasing the tension tends to pull the rim so, to counteract this, it is sometimes necessary to increase the tension on the spoke or spokes either side to maintain the truth of the wheel.

With a little care and patience it is possible for the unskilled to at least re-tension the spokes but, turn each nipple only a little at a time as, once the spoke is under tension only a fraction of a turn is sometimes sufficient to throw the rim badly out of truth.

SECURITY BOLTS

Sometimes, particularly if a tyre is under-inflated, it will creep around the rim taking the tube with it.

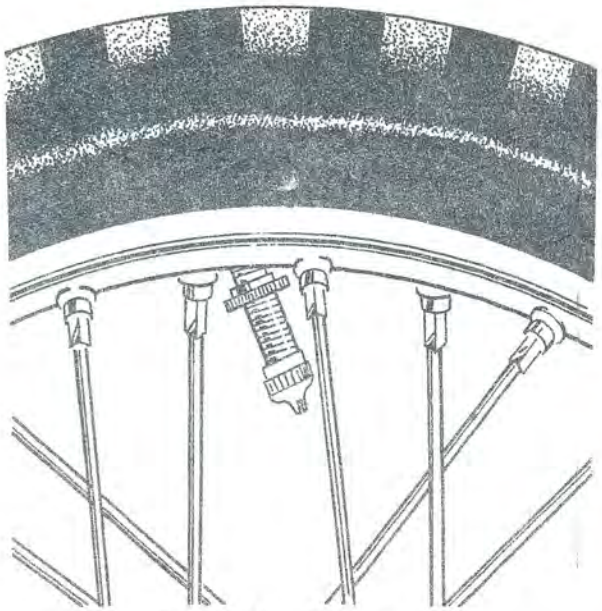


FIG. F.13. *Tyre creeping.*

If this is not stopped, it will ultimately pull the valve from the tube. Therefore, the wheel rims are fitted with security bolts; one on the front wheel and two on the rear.

Before attempting to remove or replace a tyre, the security bolts must be completely loose.

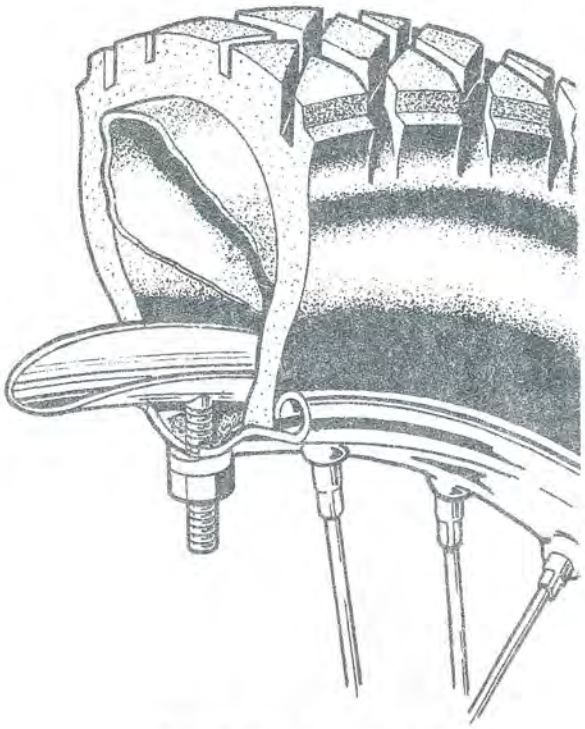


FIG. F.14. *Security bolt.*

WHEEL BALANCING

When a wheel is out of balance it means that there is more weight in one part than in another. This is very often due to variation in the tyre and at moderate speeds will not be noticed but at high speeds it can be very serious, particularly if the front wheel is affected.

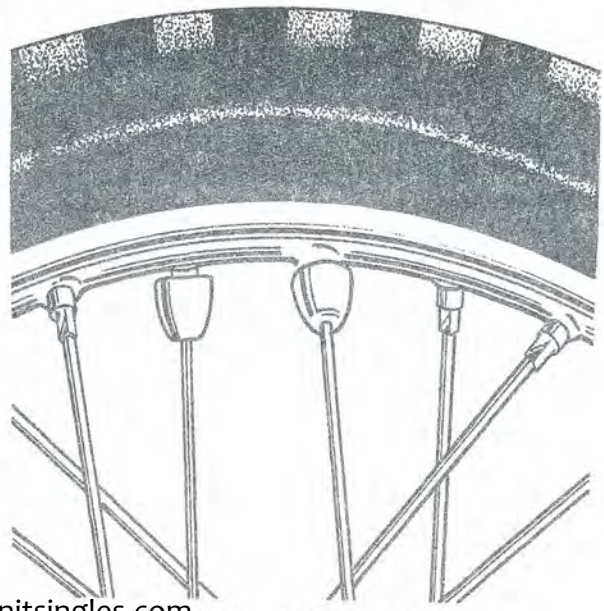


FIG. F.15. *Balance weights.*

Weights are attached to the spokes to counteract any out-of-balance but, if the weights have been removed and the balance is lost, then the wheel must be re-balanced as detailed below.

Before starting, ensure that the wheel is absolutely free and revolves quite easily. If the rear wheel is being treated remove the driving chain.

With the wheel clear of the ground spin it slowly and allow it to stop on its own. Now mark the top of the wheel or tyre and repeat two or three times to check.

If the wheel stops in the same place the extra weight must be added at the marked spot.

The next step is to ascertain how much weight is to be added, this can be done by sticking small pieces of plasticine to the nipples and recheck until the wheel will stop in any position without moving.

Having ascertained how much weight is required, a balance weight of exactly the same amount must be attached to the spokes at the spot originally marked.

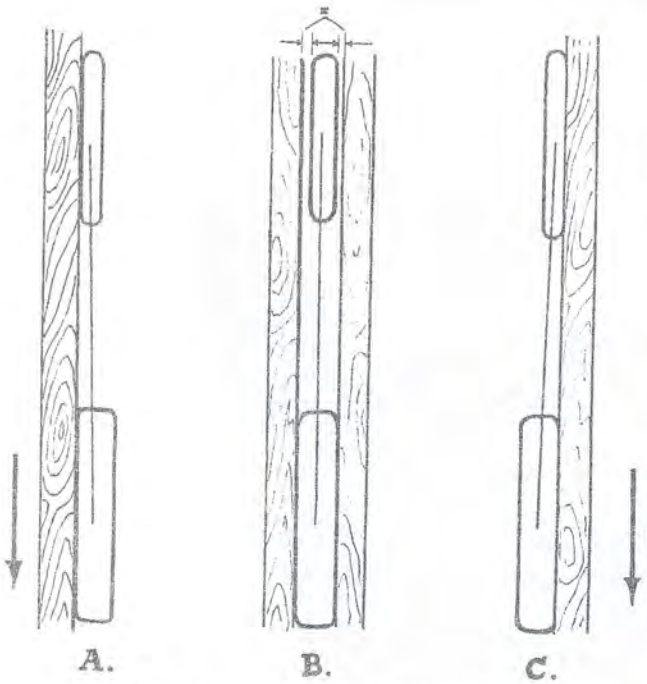


FIG. F.16. *Checking alignment.*

WHEEL ALIGNMENT

Steering will be affected if the wheels are the slightest bit out of alignment (out of track).

Since the front wheel cannot be adjusted in this respect, it is the rear wheel which must be aligned to the front wheel. The adjustment will be necessary whenever the chain is adjusted or the wheel removed. It is also necessary to adjust the rear brake whenever re-alignment has been carried out.

To check the alignment of the wheels a straight-edge of timber or steel is required approximately 80 in. long.

The straight-edge should be laid on blocks four to six inches high (alternately) each side of the machine.

If the tyres are the same size and the wheels in alignment the straight-edge will be touching the tyres at four points on each side.

If the front tyre is of smaller section then it should be as drawing (B) Fig. F.16.

If the alignment is as either (A) or (C) then the rear chain adjusters must be moved as indicated by the arrows to correct the alignment.

Assuming that the chain adjustment is correct the movement of the rear wheel will be made on the right-hand side chain adjuster which should be screwed in or out as necessary after the spindle nuts have been slackened off.

A machine suffering accidental damage may have wheels so out of alignment that they cannot be corrected in this way. Frame, fork or wheel geometry may be basically upset, in these cases a specialist repairer can probably reset any offending assembly using information in Section D.

TYRE REMOVAL

There are a few points about tyres which should be thoroughly understood.

(1) The beads have wire cores which cannot be stretched over the rim flanges without damage.

(2) Removal and replacement will be simpler if the beads are pressed right down into the well of the rim except at the point being "worked". The well is the centre section.

(3) The tyre beads will slip over the rim quicker and damage will be avoided if the beads and the levers are lubricated with soapy water.

Unscrew and remove the valve core to deflate the tyre.

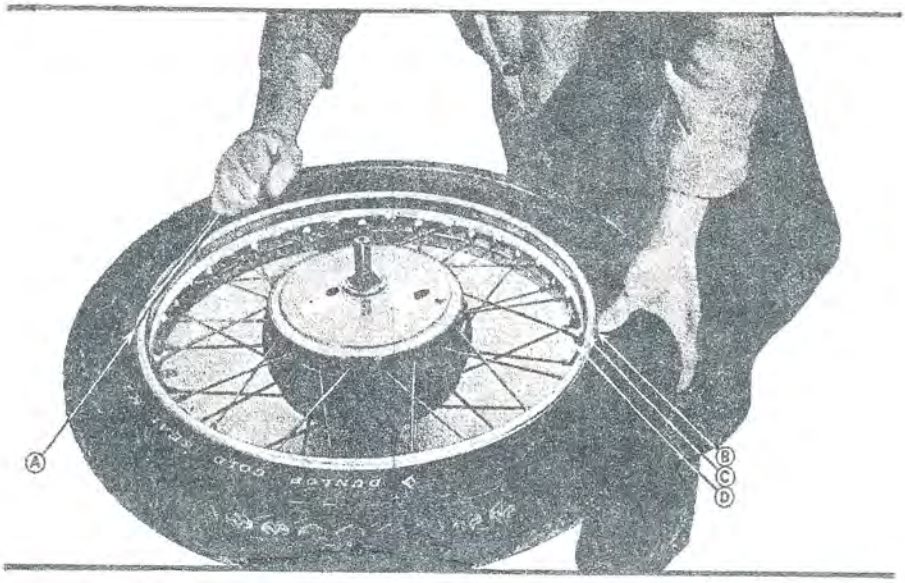


FIG. F.17.

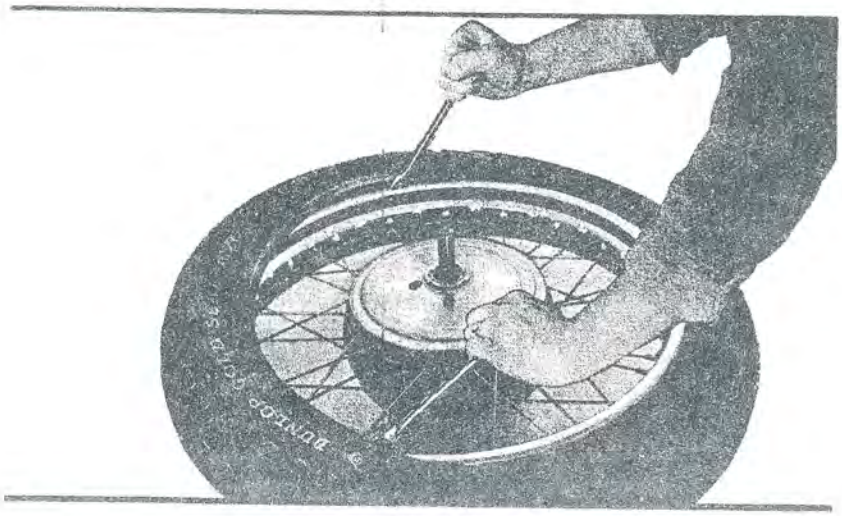


FIG. F.18. *Removing the first bead.*

Some valve caps are designed for this purpose but, if the cap is plain and a core removal tool is not available, depress the centre of the valve and keep "treading" the tyre to expel the air. Remove the nut(s) on the security bolt(s) and push the bolt(s) into the cover.

Press each bead off its seat into the well of the rim.

Insert the lever at the valve position, and while levering, press the bead into the well diametrically opposite the valve.

It will not be possible to pull the cover bead at (A), Fig. F.17, over the rim flange until the cover bead at (B) is pushed off the bead seat (C) down into the well (D). Then the cover bead at (A) comes over the rim flange easily.

Insert a second lever close to the first and prise the bead over the flange holding the free part with the other lever.

Remove one lever and insert further along the tyre continuing every two to three inches until the bead is completely removed (see Fig. F.18).

Take care when inserting levers not to pinch the inner tube as this will result in a puncture. Take out the security bolt(s), lift the valve out of the rim and remove the tube.

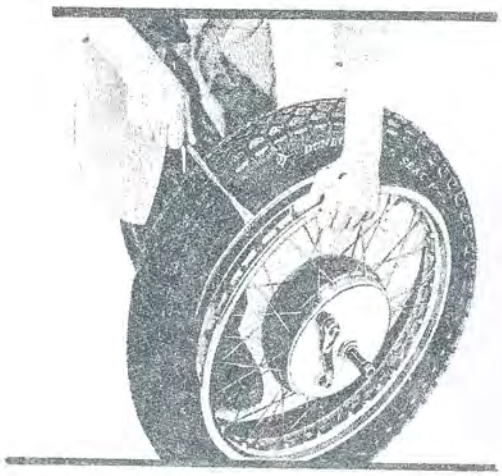


FIG. F.19.

Stand the wheel upright, insert a lever between the remaining bead and the rim and pull the cover back over the flange as in Fig. F.19. Do not forget to press the bead diametrically opposite the lever into the centre of the rim and to apply a soapy solution to the rim flange.

TYRE REPLACEMENT

Before a tyre—new or used—is replaced, it should be carefully checked inside and outside for loose objects or nails, flints, glass and cuts. Do not forget that although there may be nothing visible outside there could be a nail projecting inside. When repairing a tyre or tube be patient and see that the area of the repair is absolutely clean before applying solution. A rag dampened with petrol will help to clean the area, but it must be completely dry before solution is applied.

Remember that when replacing the tyre, it is very easy to cause another puncture by nipping the inner tube with the levers.

Some new tyres have balance adjustment rubbers inside the casing, they are not patches and should not be disturbed.

When there is a white spot near the tyre bead, it should be placed at the security bolt position on the front wheel or midway between the security bolts on the rear wheel. This will ensure a high degree of tyre balance

If the spokes have been tensioned, or replaced, see that they are not projecting through the nipples. File flush any that are showing through. Replace the rim tape with the rough side next to the rim.

Place the security bolt(s) in position and fix loosely with nut(s). Fit the tube in the tyre and inflate just sufficient to round it out without stretch.

Too much air makes fitting difficult, and too little will make the tube more liable to be nipped by the levers. Dust the tube and inside the cover with dusting chalk.

Lubricate the cover beads and the rim flanges with a soap and water solution or liquid soap.

Pull the tube slightly out of the cover so that it protrudes about 1 in. beyond the beads for about 4—5 in. each side the valve as in Fig. F.20.

Squeeze the beads together at the valve to prevent the tube slipping back and offer the cover to the rim as shown in Fig. F.21, at the same time passing the valve through the holes in the tape and rim.

Allow the lower bead to go into the well of the rim and the upper bead to be above the rim flange.

Working from the valve outwards, press the lower bead over the rim flange by hand, moving along in short stretches, and ensuring that the bead lies right down in the well of the rim—this is most important (see Fig. F.22). If necessary use a tyre lever for the last few inches as in Fig. F.23.

Turn the wheel over and check that the bead is concentric with the rim before proceeding further.

Reverse the wheel again and press the upper 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 over at the same time pressing a fitted portion into the well of the rim.

FIG. F.20. *Cover and tube assembled ready for fitting.*

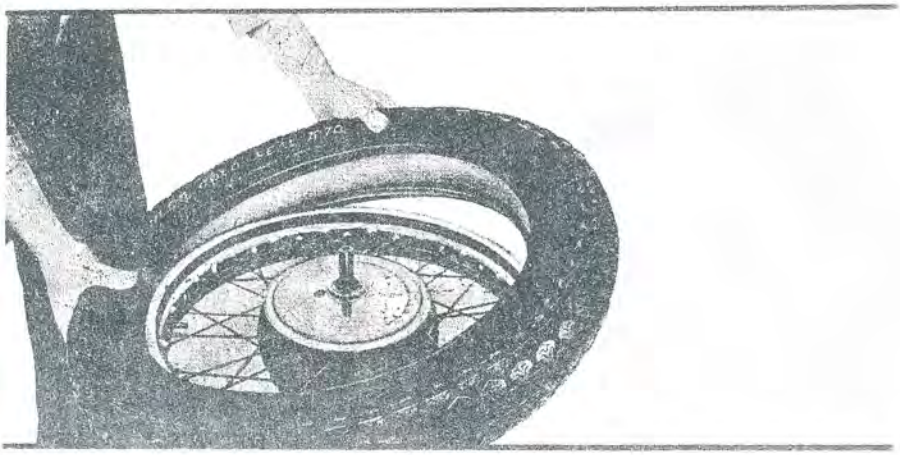


FIG. F.21. *Centralizing rim in the tyre.*

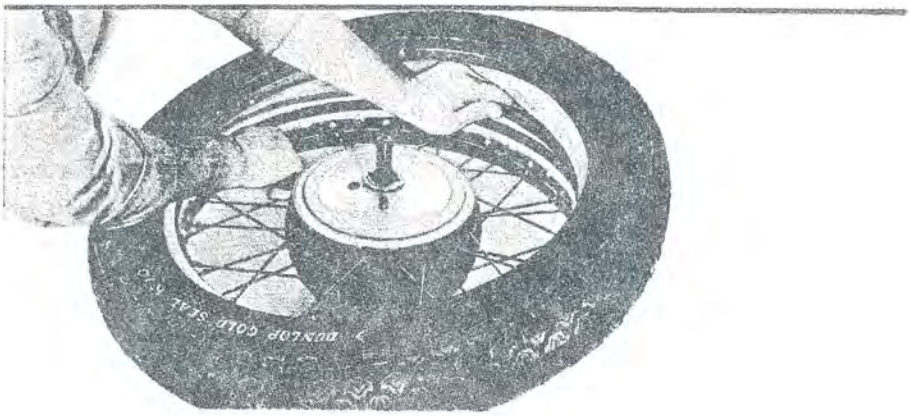


FIG. F.22. *Fitting the first bead.*

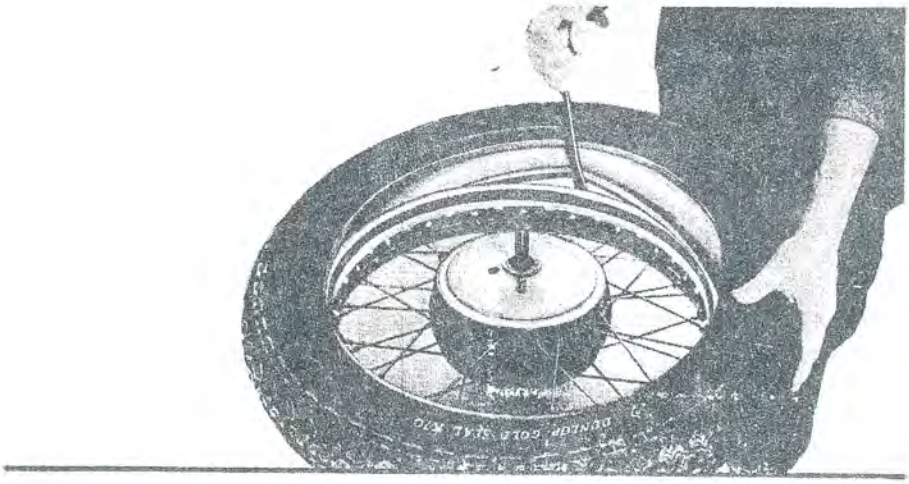


FIG. F.23. *Completing the fitting of the first bead.*

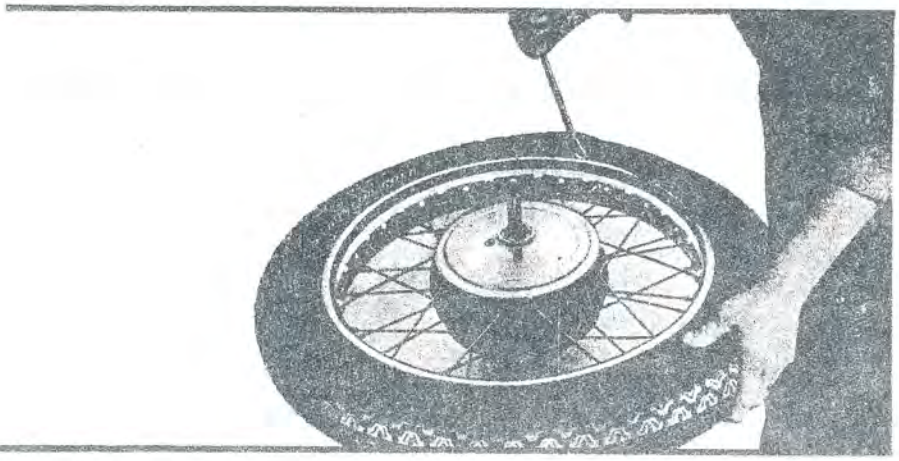


FIG. F.24. *Completing the fitting of the second bead.*

Repeat progressively round the tyre until the bead is completely over the flange, finishing at the valve (see Fig. F.24).

Push the valve inwards to ensure that the tube adjacent to the valve is not trapped under the bead, then pull the valve back firmly into position. Also ensure that the tube is resting on the flap(s) of the security bolt(s) and is overlapping the sides.

Before inflating, check that the fitting line on the tyre wall just above the bead on each side is concentric with the rim.

If necessary bounce the wheel to help seat the tyre but, see that there is adequate pressure to prevent damaging the tyre or tube and only use moderate force. If the tyre will not seat, it is better to release the pressure, apply soap solution to lubricate and re-inflate.

Inflate to the required pressure and check fitting lines again. Inflation should not be too rapid, particularly at the commencement, to allow the beads to seat correctly on the rim.

See that the valve protrudes squarely through the valve hole before screwing down the knurled nut and replacing the dust cap.

Finally, tighten down the nut(s) on the security bolt(s).

TYRE PRESSURES

The recommended inflation pressures of 17 p.s.i. (front tyre) and 19 p.s.i. (rear tyre) are based on a riders' weight of 140 lb. If the riders' weight exceeds 140 lb. the tyre pressure should be increased as follows:—

FRONT TYRE:—Add 1 lb. per square inch for every 28 lb. in excess of 140 lb.

REAR TYRE:— Add 1 lb. per square inch for every 14 lb. in excess of 140 lb.

It is further recommended that when carrying a pillion passenger or equipment giving additional weight, the inflation pressures should be increased in relation to the actual load on each tyre, as indicated in the chart below. To find the load on each tyre, place the front and rear wheel in turn, on to a weighbridge. The reading should be taken when the rider is seated on the machine together with the additional weights.

	Inflation pressures (lb. per sq. in.)					
	16	18	20	24	28	32
	Load Per Tyre (lb.)					
FRONT	200	230	260	320	380	440
REAR	280	310	335	390	450	500

INDEX

INTRODUCTION

The electrical system is supplied from an encapsulated generator, model RM.19, contained in the primary chaincase and driven from the engine shaft. The generator alternating current is selected by the respective positions of the lighting and ignition switches before being converted into a direct current by the rectifier.

The current supplied to the ignition system is controlled by a contact breaker, driven direct from the camshaft.

Routine maintenance needed by the various components is detailed in the following sections. Whilst cheching the electrical system, opportunity should be taken to ensure that all wiring connections and frame earthing points are clean and secure.

ALTERNATOR

The alternator consists of a spigot-mounted 6-coil laminated stator (encapsulated) and a rotor, carried on and driven by the left-hand engine shaft.

The rotor has an hexagonal steel core, each face of which carries a high-energy permanent magnet keyed to a laminated pole tip. The pole tips are riveted circumferentially to aluminium side plates, the assembly being cast in aluminium and machined to give a smooth external finish.

There are no rotating windings, commutator brushgear, bearings or oil seals and consequently the alternator requires no maintenance apart from occasionally checking that the snap connectors in the output cables are clean and tight.

If rotor removal is necessary, there is no need to fit magnetic keepers to the rotor poles. When removed, wipe off any swarf which may have been attracted to the pole tips and put the rotor in a clean place until required for refitting.

BATTERY INSPECTION AND MAINTENANCE

Description

The Varley model MC.7/12N is a 6 volt lead-acid battery having similar characteristics to all lead-acid batteries, except for its construction. The plates and separators are assembled and compressed together, forming a solid porous block. Acid, which is required for the working of the battery is held by absorption in the block, so gravity readings are therefore unnecessary and cannot be taken.

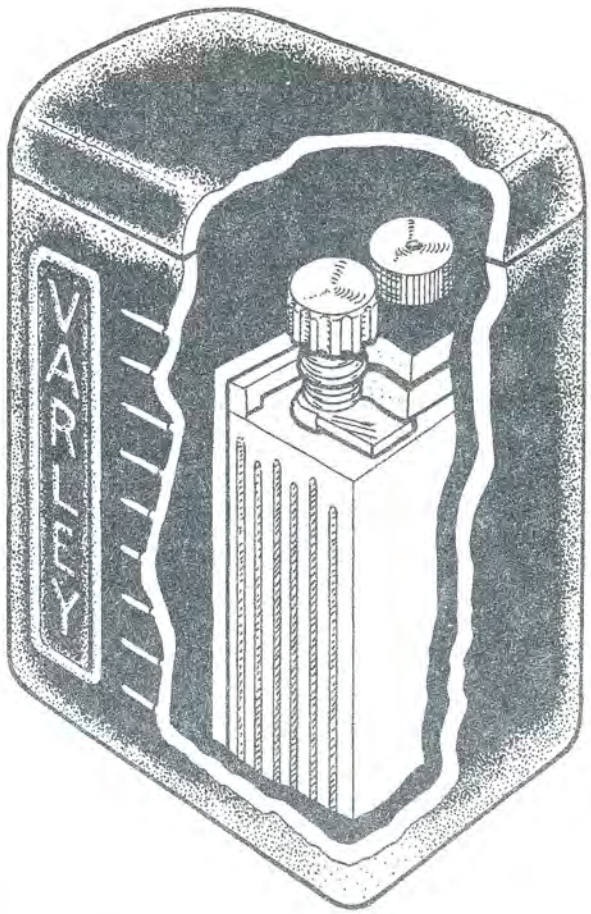


FIG. G.1. *Cut-away view of battery.*

PART (A) **First Charge Instructions**

To prepare a filled but uncharged battery for service, the following instructions should be carried out:—

(1) Remove the sealing tape and unscrew the vent stoppers. Check that the electrolyte is visible above the top of the perforated strip and, if necessary, restore the level with acid of 1.270 specific gravity (see charts on pageG4).

(2) The battery must now be put on a charge rate of 1 ampere for 90 hours.

(3) During the whole of the first charge period, the electrolyte level should be maintained above the plate/separator block. When topping-up the battery, during a charge, use only an acid of 1.270 specific gravity (see charts on page G4). The vent stoppers should be replaced but do not screw them down.

(4) The first charge period should be continuous. If, for any major reason, the current is cut, the open circuit time should be allowed for.

(5) The charge will be complete when all the cells are gassing freely and battery voltage remains constant for five consecutive half-hourly readings.

(6) After charge, allow the battery to stand for a period of 30 minutes to complete the absorption, then remove the surplus electrolyte. Dry the top of the battery, screw down the vent stoppers and apply a coating of silicone grease to the terminals before putting the battery into service.

(7) A fully charged battery should read at least 6.3 volts on an open circuit.

PART (B) **Routine Maintenance**

(a) When not in use:—

To keep the battery in good condition until it is put into service or during any time that is not in use, it should be given a "freshening" charge once every month. This should be carried out at a rate of 1½ amperes for 6 hours.

(b) When in use:—

During normal operation, the generator will maintain the battery in a charged condition.

Every 1,000 miles (1,600 km.) or monthly, the battery will require topping-up with a small quantity of distilled water in order to keep the plates and separators in a moist condition. Normally, a teaspoonful of distilled water per vent is sufficient.

NOTE:—After allowing the battery to stand for 15 minutes, remove all surplus liquid by either syphoning or allowing to drain.

Topping-up should be carried out after and not before a journey.

It is also good practice to regularly clean the battery top and examine the terminals. If they are corroded, scrape them clean and smear them with a petroleum jelly or a silicone grease. Also check that the holes in the vent plugs are not obstructed.

The state of the battery charge can be checked with a moving coil voltmeter, the readings of which can be compared with the figures given below, to indicate an approximate state of charge.

Fully discharged ...	5.7 volts or under
Partially discharged ...	6.15 volts or under
Open circuit, fuliy charged	6.3 volts or over
On charge, fully charged	7.8 volts or over

PART (C) **Recharging on the Bench**

If the battery is allowed to get abnormally dry it should be topped-up with distilled water before and during charge. When the charge is completed, all surplus liquid should be drained off.

In the event of the battery capacity becoming reduced after it has been in constant use for some considerable time, it should be topped-up with a weak acid solution, instead of distilled water, for one or two charges.

The battery should be recharged at a rate of ¾ ampere for 24 hours.

PART (D) **Specific Gravity of Electrolyte for Filling the Battery**

Climates normally below 80°F. (26.6°C.)		Tropical climates over 80°F. (26.6°C.)	
Filling	Fully charged	Filling	Fully charged
1.270	1.270–1.290	1.210	1.210–1.230

To obtain a specific gravity strength of 1.270 at 60°F. (15.5°C.) add one part by volume of 1.840 specific gravity acid to 3.2 parts of distilled water.

To obtain a specific gravity strength of 1.210 at 60°F. (15.5°C.) add one part by volume of 1.840 specific gravity acid to 4.3 parts of distilled water.

NOTES:—

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

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

The temperature must be indicated by a thermometer having its bulb actually immersed in the electrolyte and not the ambient temperature. To take a temperature reading tilt the battery sideways and then insert the thermometer.

PART (E) **Maximum permissible Electrolyte Temperature during Charge**

Climates normally below 80°F (27°C)	Climates frequently above 80°F (27°C)
100°F (38°C)	120°F (49°C)

PART (F) **Emergency Starting (discharged battery)**

An "EMERGENCY" starting position is provided on the ignition switch for use if the battery has become discharged and a normal start cannot be made. Under these conditions, the alternator is connected direct to the ignition coil, allowing the engine to be started independently of the battery. It should be noted that with the ignition switch in this position and the engine running, the battery receives a charging current, so that its terminal voltage begins to rise. This rising voltage opposes the alternator voltage and due to the reducing amount of energy thus available for transfer to the coil, misfiring occurs. This, incidentally, serves as a reminder to switch back to the normal position, when the coil will be operating under battery ignition, and full power will be available.

PART (G) **Running without a Battery**

If it is required in an emergency to run the machine without the battery in position, unscrew the terminals and remove the battery. The NEGATIVE lead which previously went to the battery must be earthed to the frame, and the stop light must be disconnected. If this is not done the rectifier may be seriously damaged.

COIL IGNITION SYSTEM

Description

The coil ignition system comprises an ignition coil mounted below the petrol tank, and a contact breaker unit fitted in the timing cover. Apart

from cleaning in-between the terminals, and checking the connections for soundness, the coil will not require any other attention. Testing the ignition coil is amply covered in Part (C), page G.6, whilst testing the contact breaker is detailed in Part (D).

The best method of approach to a faulty ignition system is to first check the low-tension circuit for continuity as shown in Part (A), then follow the procedure laid out in Part (B) to locate the fault(s).

Failure to locate a fault in the low-tension circuit indicates that the high-tension circuit or sparking plug is faulty, and the procedure detailed in Part (E) must be adopted. Before commencing any of the following tests, however, the contact breaker and sparking plug gaps must be cleaned and adjusted to eliminate this possible source of fault.

PART (A) Checking the Low-tension Circuit for continuity

To check whether there is a fault in the low-tension circuit and to locate its position, the following tests should be carried out:—

Turn the ignition switch to the "IGN" position and slowly crank the engine. At the same time, observe the ammeter needle, which should fluctuate between zero and a slight discharge, as the contact breaker points open and close respectively.

If the ammeter needle does not fluctuate in the described way, then a fault in the low-tension circuit is indicated.

First, examine the contact breaker points for pitting, piling or presence of oxidation, oil, or dirt, etc. Clean and ensure that the gap is set correctly to .015 in. (.381 mm.) as described on page B.18.

PART (B) Fault finding in the Low-tension Circuit

To trace a fault in the low-tension wiring, turn the ignition switch to "IGN" position and then crank the engine until the contacts are opened, or alternatively, place a piece of insulating material between the contacts whilst the following test is carried out:—

For this test it is assumed that the wiring is fully connected as shown in the wiring diagram, page G.16. With the aid of a 0—15 volt D.C. voltmeter and two test-prods make a point to point check along the low-tension circuit starting at the battery and working right through to the ignition coil, stage by stage, in the following manner, referring to the relevant wiring diagram.

(1) First, establish that the battery is earthed correctly by connecting the voltmeter across the battery negative terminal and the machine frame earth. No voltage reading indicates that the red earthing lead is faulty. Also, a low reading would indicate a poor battery earth connection.

(2) Connect the voltmeter between the ignition coil (—) terminal and earth. No voltage reading indicates a breakdown between the battery and the coil (—) terminal, or that the switch connections or ammeter connections are faulty.

(3) Connect the voltmeter between both of the ammeter terminals in turn and earth. No reading on the "load" side indicates that either the ammeter is faulty or there is a bad connection along the brown and blue lead from the battery, and a reading on the "battery" side only indicates a faulty ammeter.

(4) Connect the voltmeter between ignition switch "feed" terminal and earth. No reading indicates that the brown and white lead has faulty connections. Check for voltage at the brown/white lead connections at rectifier, ammeter and lighting switch terminals 2 and 10.

(5) Connect the voltmeter across ignition switch "load" terminal and earth. No reading indicates that the ignition switch is faulty and should be replaced. Battery voltage reading at this point but not at the ignition coil (—) terminal indicates that the white lead has become "open circuit" (broken or disconnected).

(6) Disconnect the black/white lead from the (+) terminal of the ignition coil. Connect the voltmeter across the (+) terminal of the coil and earth. No reading on the voltmeter indicates that the coil primary winding is faulty and a replacement ignition coil should be fitted.

(7) With the contact points open, reconnect the ignition coil lead and then connect the voltmeter across the contact points. No reading indicates that there is either a faulty connection or the internal insulation has broken down in the contact breaker condenser (capacitor).

If the condenser is suspected, then a substitution should be made and a retest carried out.

PART (C) **Ignition Coil**

The ignition coil consists of a primary and secondary winding, wound concentrically about a laminated soft iron core, the secondary winding being next to the core.

The primary and secondary windings of the coil have 310 turns and 17,000—17,600 turns respectively of enamel-covered wire, the secondary being much finer. Each layer is paper insulated from the next on both primary and secondary windings.

To test the ignition coil on the machine, first ensure that the low-tension circuit is in order as described in Part (A), then disconnect the high-tension lead from the sparking plug. Turn the ignition switch to the "IGN" position and crank the engine until the contacts are closed.

Flick the contact breaker lever open a number of times whilst the high-tension lead from the ignition coil is held about $\frac{3}{16}$ in. away from the cylinder head. If the ignition coil is in good condition a strong spark should be obtained, if no spark occurs this indicates the ignition coil to be faulty.

Before a fault can be attributed to the ignition coil it must be ascertained that the high-tension cable is not cracked or showing signs of deterioration, as this may often be the cause of misfiring etc. It should also be checked that the ignition points are actually making good electrical contact when closed and that the moving contact is insulated from earth (ground) when open. It is advisable to remove the ignition coil and test it by the method described below.

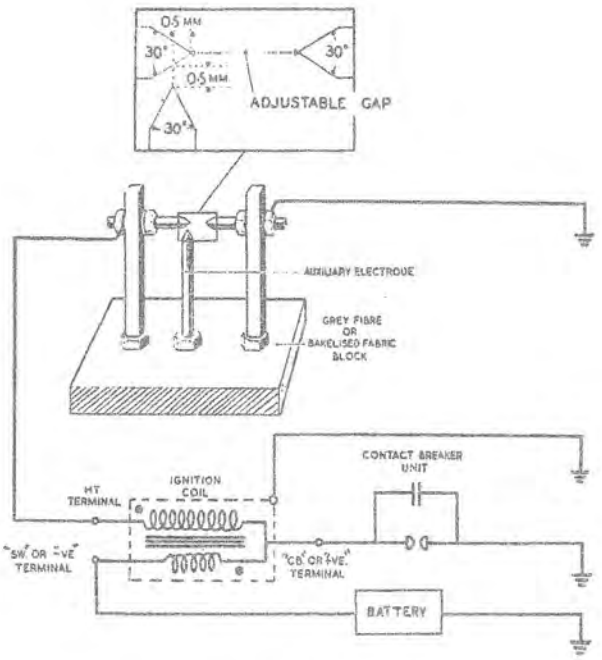


FIG. G.2. *Ignition coil test rig.*

Bench Testing Ignition Coil

Connect the ignition coil into the circuit shown in Fig. G.2 and set the adjustable gap to 9 mm. With the contact breaker running at 100 r.p.m., not more than 5% missing should occur at the spark gap over a period of 15 seconds. The primary winding can be checked for short-

circuit coils by connecting an ohmeter across the low-tension terminals. The reading obtained should be within the figures quoted below (at 20°C.).

PRIMARY RESISTANCE	
Minimum	Maximum
3.0 ohms	3.4 ohms

PART (D) **Contact Breaker**

Faults occurring at the contact breaker are in the main due to, incorrect adjustments of the contacts or the efficiency being impaired by piling, pitting or oxidation of the contacts due to oil etc. Therefore, always ensure that the points are clean and that the gap is adjusted to the correct working clearance as described on page B.18.

To test for a faulty condenser, first turn the ignition switch to "IGN" position, and then take voltage readings across the contacts when open. No reading indicates that the condenser internal insulation has broken down. Should the fault be due to a condenser having a reduction in capacity, indicated by excessive arcing when in use, and overheating of the contact faces, a check should be made by substitution.

Particular attention is called to the periodic lubrication procedure for the contact breaker which is given on page A.9. When lubricating the parts ensure that no oil or grease gets on to the contacts.

If it is felt that the contacts require surface grinding then the complete contact breaker unit should be removed as described on page B.18, and the moving contact disconnected by unscrewing the securing nut from the condenser terminal. Grinding is best achieved by using a fine carborundum stone or very fine emery cloth, afterwards wiping away any trace of dirt or metal dust with a clean petrol (gasolene) moistened cloth. The contact faces should be slightly domed to ensure point contact. There is no need to remove the pitting from the fixed contact. When refitting the moving contact do not forget to refit the insulating shield to the condenser terminal and apply a smear of grease to the contact breaker cam and moving contact pivot post. Lubricate the felt pad.

PART (E) **Checking the High-tension Circuit**

If ignition failure or misfiring occurs, and the fault is not in the low-tension circuit, then check the ignition coil as described in Part (C). If the coil proves satisfactory, ensure that the high-tension cable is not the cause of the fault.

If a good spark is available at the high-tension cable, then the sparking plug suppressor cap or the sparking plug itself may be the cause of the fault. Clean the sparking plug and adjust the electrodes to the required setting as described on page G.8 and then reset the engine for running performance. If the fault re-occurs then it is likely that the suppressor cap is faulty and should be renewed.

SPARKING PLUG

It is recommended that the sparking plug be inspected, cleaned and tested every 2,000 miles (3,200 km.) and a new one fitted every 10,000 miles (16,000 km.).

To remove the sparking plug a box spanner (13/16 in., 19.5 mm., across flats) should be used and if any difficulty is encountered a small amount of penetrating oil should be placed at the base of the sparking plug and time allowed for penetration.

Examine the plug for signs of petrol (gasolene) fouling. This is indicated by a dry, sooty, black deposit, which is usually caused by over-rich carburation, although ignition system defects such as a faulty contact breaker, coil or condenser defects, or a broken or worn out cable may be additional causes.

Examine the plug for signs of oil fouling. This will be indicated by a wet, shiny, black deposit on the central insulator. This is caused by excessive oil in the combustion chamber during combustion and indicates that the piston rings or cylinder bore is worn.

To rectify this type of fault the above mentioned items should be checked with special attention given to carburation system.

Over-heating of the sparking plug electrode is indicated by severely eroded electrode and a white, burned or blistered insulator. This type of fault can be caused by weak carburation or over-advanced ignition timing, although plugs which have been operating whilst not being screwed down sufficiently can easily become overheated due to heat that is normally dissipated through to the cylinder head not having an adequate conducting path. Over-heating is normally symptomised by pre-ignition, short plug life, and "pinking" which can ultimately result in piston crown failure. Unnecessary damage can result from over-tightening the plugs. To achieve a good seal between the plug and cylinder head, screw the plug in by hand on to its gasket, then lightly tighten with a box spanner.

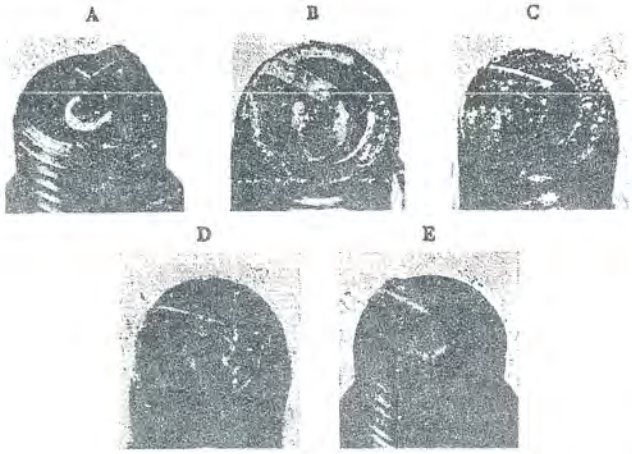


FIG. G.3. *Sparking plug diagnosis.*

A plug of the correct grade will bear a light flaky deposit on the outer rim and earth electrode, and these and the base of the insulator will be light chocolate brown in colour. A correct choice of plug is marked (A). (B) shows a plug which appears bleached, with a deposit like cigarette ash; this is too "hot-running" for the performance of the engine and a cooler-running type should be substituted.

A plug which has been running too "cold" and has not reached its self-cleaning temperature is shown at (C). This has oil on the base of the insulator and electrodes, and should be replaced by a plug that will burn off deposits and remove the possibility of a short-circuit. The plug marked (D) is heavily sooted, indicating that the mixture has been too rich, and a further carburation check should be made. At illustration (E) is seen a plug which is completely worn out and in need of replacement.

To clean the plug it is preferable to make use of a properly designed proprietary plug cleaner. The makers instructions for using the cleaner should be followed carefully.

When the plug has been carefully cleaned, examine the central insulator for cracking and the centre electrode for excessive wear. In such cases the plug will have completed its useful life and a new one should be fitted.

Finally, the sparking plug electrode should be adjusted to the correct gap setting of .025 in. (.635 mm.). Before refitting sparking plug the threads should be cleaned by means of a wire brush and a minute amount of graphite grease smeared on to the threads. This will prevent any possibility of thread seizure occurring.

If the ignition timing and carburation settings are correct and the plug has been correctly fitted, but over-heating still occurs, then it is possible that carburation is being adversely affected by an air leak between the carburetter and the cylinder head. This possibility must be checked thoroughly before taking any further action. When it is certain that none of the above mentioned faults are the cause of over-heating then the plug type and grade should be con-

Normally the type of plug quoted in General Data is satisfactory for general use of the machine, but in special isolated cases, conditions may demand a plug of a different heat range. Advice is readily available to solve these problems from the plug manufacturer who should be consulted.

CHARGING SYSTEM

Description

Always ensure that the ignition switch is in the "OFF" position whilst the machine is not in use.

To locate a fault in the charging circuit, first check the charging rate in the three-switch position as shown in Part (A). Proceed then to test the alternator as described in Part (B). If the alternator is satisfactory, the fault must lie in the charging circuit, hence the rectifier must be checked as given in Part (C), and then the wiring and connections as shown in Part (D).

PART (A) **Checking the D.C. Input to Battery**

For this test the battery must be in good condition and a good state of charge, therefore before conducting the test ensure that the battery is up to the required standard, or alternatively, fit a good replacement battery.

Connect a D.C. ammeter (0—15 amp.) in series between the battery main lead (brown/blue) and battery negative terminal and then start the engine and run it at approximately 3,000 r.p.m.

NOTE:—Ensure that the ammeter is well insulated from the surrounding earth points otherwise a short-circuit may occur.

Operate the lighting switch and observe the ammeter readings, for each position of the switch. The observed figures should not be less than those tabulated on Page G.15. If the readings are equal to or higher than those given, then the alternator and charging circuit are satisfactory. If the readings are lower than those quoted, then the alternator must be tested as described in Part (B).

PART (B) **Checking the Alternator Output**

Disconnect the three alternator output cables and run the engine at 3,000 r.p.m.

Connect an A.C. voltmeter (0—15 volts) with 1 ohm load resistor in parallel with each of the alternator leads in turn as shown in the Table, on Page G.15, and observe the voltmeter readings. A suitable 1 ohm load resistor can be made from a piece of nichrome wire as shown in Part (E), page G.12.

The test is conducted by connecting a voltmeter and the 1 ohm load resistor between the following cables and note the readings:—

(a) White/green and green/black cables—voltmeter should read 4.0 volts (min.).

(b) White/green and green/yellow cables—voltmeter should read 6.5 volts (min.).

(c) White/green and joined green/black and green/yellow cables—voltmeter should read 8.5 volts (min.).

From the results obtained, the following deductions can be made:—

(1) If the readings are all equal to or higher than those quoted then the alternator is satisfactory.

(2) A low reading on any group of coils indicates either that the leads concerned are chafed or damaged due to running on the chains or that some turns of the coils are short-circuited.

(3) Low readings for all parts of the test indicate that either the green/white lead has become chafed or damaged due to rubbing on the chains or that the rotor has become partially demagnetized. As the latter is an extremely rare occurrence it is advisable to check by substitution before returning the rotor to the manufacturer for re-magnetization. If it is found that the rotor has become demagnetized, check that it has not been caused by a faulty rectifier and that the battery is of correct polarity.

(4) A zero reading for any group of coils indicates that a coil has become disconnected, is open-circuit, or is earthed.

(5) A reading obtained between any one lead and earth indicates that coil windings or connections have become earthed.

If any of the above mentioned faults occur, always check the stator leads for possible chain damage before attempting repairs or renewing the stator.

It is beyond the scope of this manual to give instruction for the repair of faulty stator windings. However, the winding specification is given in the Table, on Page G.15 for those obliged to attempt repair work.

PART (C) **Rectifier Maintenance and Testing**

The rectifier is a silicon semi-conductor device which allows current to flow in one direction only. It is connected to provide full wave rectification of alternator output current.

The rectifier requires no maintenance beyond checking that the connections are clean and tight. The nuts clamping the rectifier plates together must not under any circumstances be slackened. A separate nut is used to secure the rectifier to the motor-cycle and it is important to check periodically that the rectifier is firmly attached to its mounting bracket.

When tightening the rectifier securing nut, hold the spanner as shown in Fig. G.4, for if the plates are twisted, the internal connections will be broken. Note that the circles marked on the fixing bolt and nut indicate that the thread form is ¼ in. U.N.F.

Testing the Rectifier

To test the rectifier, first disconnect the brown/white lead from the rectifier centre terminal and insulate the end of the lead to prevent any possibility of a short-circuit occurring ,and then connect a D.C. voltmeter (with 1 ohm load resistor in parallel) between the rectifier centre terminal and earth.

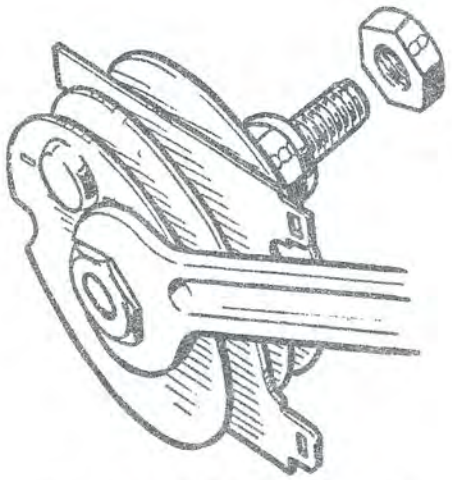


FIG. G.4. *Refitting the rectifier.*

Disconnect the alternator green/black lead and reconnect to rectifier green/black terminal by means of a jumper lead.

NOTE:—Voltmeter positive terminal to frame earth (ground) and negative terminal to centre terminal on rectifier.

Ensure that all the temporary connections are well insulated to prevent a short-circuit occurring then turn the ignition switch to "IGN" position and start the engine.

With the engine running at approximately 3,000 r.p.m. observe the voltmeter readings. The reading obtained should be at least 7.5 volt minimum.

(1) If the reading is equal to or slightly greater than that quoted, then the rectifier elements in the forward direction are satisfactory.

(2) If the reading is excessively lower than the figures given, then check the rectifier earthing bolt connection. If the connection is good then a replacement rectifier should be fitted.

(3) If the reading is lower than the figures quoted or zero readings are obtained, then the rectifier or the charging circuit wiring is faulty and the rectifier should be disconnected and bench tested so that the fault can be located.

Note that all of the above conclusions assume that alternator A.C. output figures were satisfactory. Any fault at the alternator will, of course, reflect on the rectifier test results. Similarly any fault in the charging circuit wiring may indicate that the rectifier is faulty. The best method of locating a fault is to disconnect the rectifier and bench test it as shown below.

Bench Testing the Rectifier

For this test the rectifier should be disconnected and removed. Before removing the rectifier, disconnect the leads from the battery terminals to avoid the possibility of a short-circuit occurring.

Connect the rectifier to a fully charged 12 volt battery of approximately 40 ampere/hours capacity at the 10 hour rate, and 1 ohm load resistor, and then connect the D.C. voltmeter in the V2 position, as shown in Fig. G.6.

Note the battery voltage (should be 12 volt) and then connect the voltmeter in V1 position whilst the following tests are conducted.

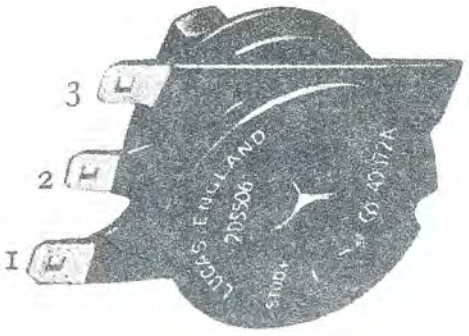


FIG. G.5. *The rectifier showing terminal connections.*

A voltmeter in position V1 will measure the volt drop across the rectifier plate. In position V2 it will measure the supply voltage to check that it is the recommended 12 volts on load.

In Fig. G.7, the rectifier terminal markings (1), (2) and (3) are as shown physically in Figs. G.5 and G.6, while terminal (4) represents the rectifier centre bolt. (1) and (3) are the A.C. input terminals while (2) and (4) are the D.C. output terminals (—ve and +ve respectively).

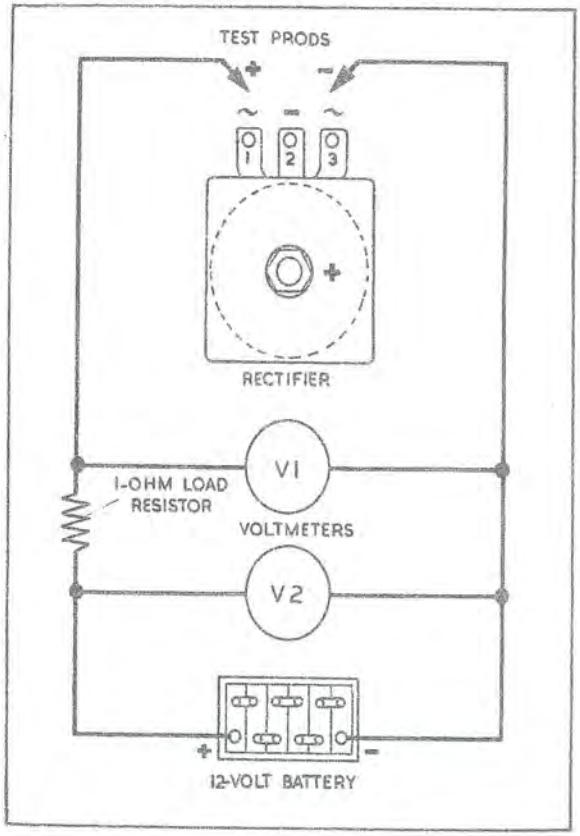


FIG. G.6. *Bench testing the rectifier.*

TEST 1.

With the test leads, make the following connections but keep the testing time as short as possible to avoid over-heating the rectifier cell: (*a*) 1 and 2, (*b*) 1 and 4, (*c*) 3 and 4, (*d*) 3 and 2. Each reading should not be greater than 1.5 volts with the battery polarity as shown.

TEST 2.

Reverse the leads or battery polarity and repeat Test 1. The reading obtained should be the same as the battery voltage (V2).

If the readings obtained are not within the figures given, then the rectifier internal connections are shorting or aged and the rectifier should be renewed.

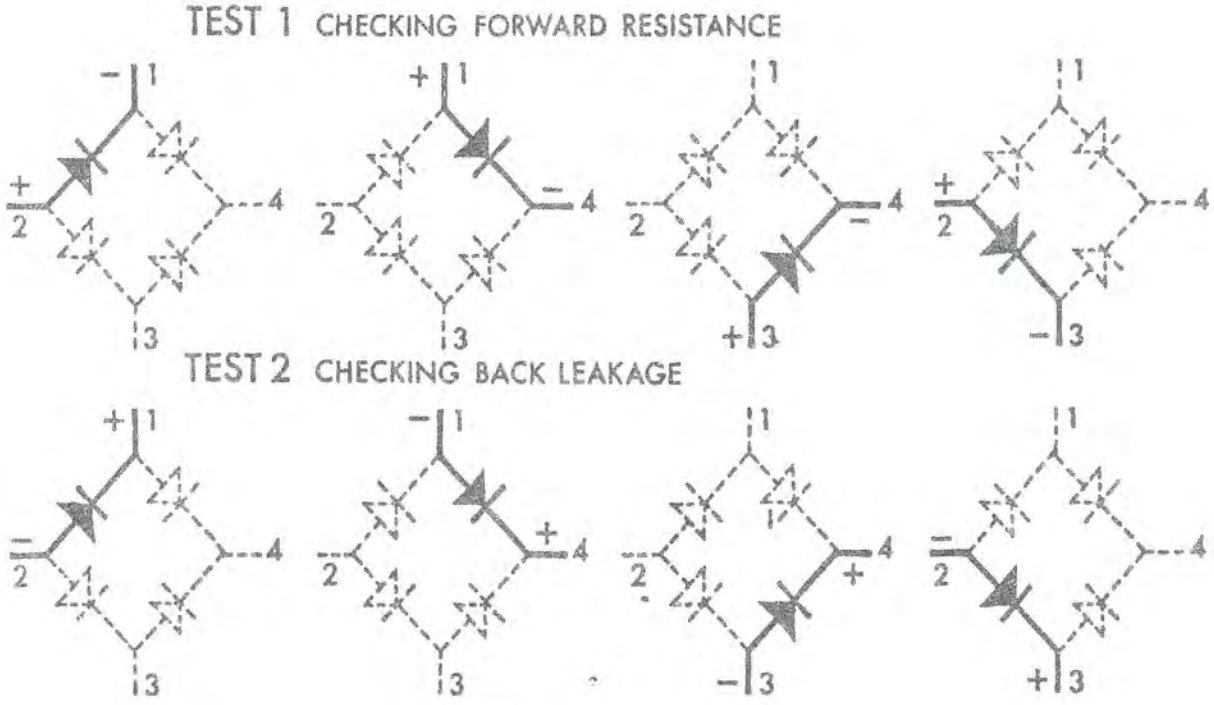


FIG. G.7. *Rectifier test sequence.*

PART (D) **Checking the Charging Circuit for Continuity**

These three tests utilise the machine's own battery to test for continuity or breakdown in the A.C. section of the charging system.

For this series of tests, the battery must be in a good state of charge and the alternator leads must be disconnected at the snap connectors so that there is no possibility of demagnetizing the rotor.

(1) First, check that there is voltage at the rectifier centre terminal by connecting a D.C. voltmeter, with 1 ohm load resistor in parallel, between the rectifier centre terminal and earth, remember (+ve) positive earth (ground). The voltmeter should read battery volts. If it does not, there is a faulty connection in the wiring and test (1), (3) and (4) in Part (B), page G.5, should be carried out to locate the fault.

(2) Connect the green/black lead from the wiring harness to the rectifier centre terminal, by means of a jumper lead. Turn the ignition switch to "IGN" position and the lighting switch to "HEAD" position, and connect a D.C. voltmeter (with 1 ohm resistor in parallel) between green/black lead at rectifier from harness and earth. The voltmeter should read battery voltage. If it does not, the leads to ignition switch terminals 17 and 18 should be checked and the leads to the lighting switch terminals 5 and 7 should also be checked. With the lighting switch in "PILOT" position no reading should be obtained between green/black and earth or green/white and earth at the rectifier.

PART (E) **Constructing a 1 ohm Load Resistor**

The resistor used in the following tests must be accurate and constructed so that it will not overheat otherwise the correct values of current or voltage will not be obtained.

A suitable resistor can be made from 4 yards (3¾ metres) of 18 s.w.g. (.048 in., i.e., 1.2 mm. diameter) nichrome wire by bending it into two equal parts and calibrating it as follows:—

(1) Fix a heavy gauge flexible lead to the folded end of the wire and connect this lead to the positive terminal of a 6 volt battery.

(2) Connect a D.C. voltmeter (0—10 volts) across the battery terminals and an ammeter (0—10 amp.) between the battery negative terminal and the free ends of the wire resistance, using a crocodile clip to make the connection.

(3) Move the clip along the wires, making contact with both wires until the ammeter reading is numerically equal to the number of volts shown in the voltmeter. The resistance is then 1 ohm. Cut the wire at this point, twist the two ends together and wind the wire on an asbestos former approximately 2 in. (5 cm.) diameter so that each turn does not contact the one next to it.

ELECTRIC HORN

Description

The horn is of a high frequency single-note type and is operated by direct current from the battery. The method of operation is that of a magnetically operated armature, which impacts on the core face, and causes the tone disc of the horn to vibrate. The magnetic circuit is made self-interrupting by contacts which can be adjusted externally.

If the horn fails to work, check the mounting bolts etc., and horn connection wiring. Check the battery for state of charge. A low supply voltage at the horn will adversely effect horn performance. If the above checks are made and the fault is not remedied, then adjust the horn as follows.

Horn Adjustment

When adjusting and testing the horn do not depress the horn push for more than a fraction of a second or the circuit wiring may be overloaded.

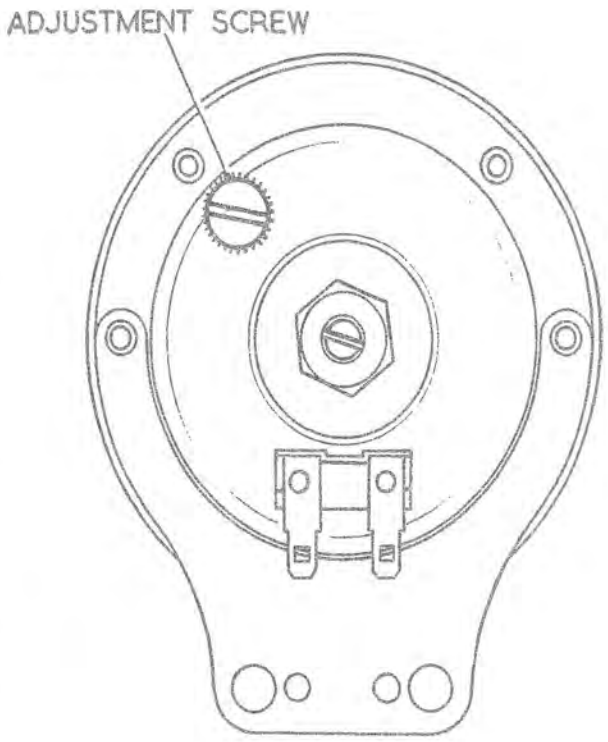


FIG. G.8.

A small serrated adjustment screw situated near the terminals (see Fig. G.8) is provided to take up wear in the internal moving parts of the horn. To adjust, turn this screw anti-clockwise until the horn just fails to sound, and then turn it back (clockwise) about one-quarter to half a turn.

HEADLAMP

Description

The headlamp is of the pre-focus bulb light unit type and access is gained to the bulb and bulb holder by withdrawing the rim and light unit assembly. To do this slacken the screw at the top of the headlamp shell just behind and adjacent to the rim and prise off the rim and light unit assembly.

The bulb can be removed by first pressing the cylindrical adapter inwards and turning it anti-clockwise. The adapter can then be withdrawn and the bulb is free to be removed.

When fitting a new bulb, note that it locates by means of a cut-away and projection arrangement. Also note that the adapter can only be replaced one way, the tabs being staggered to prevent incorrect reassembly. Check the replacement bulb voltage and wattage specification and type before fitting.

Focussing with this type of unit is unnecessary and there is no provision for such.

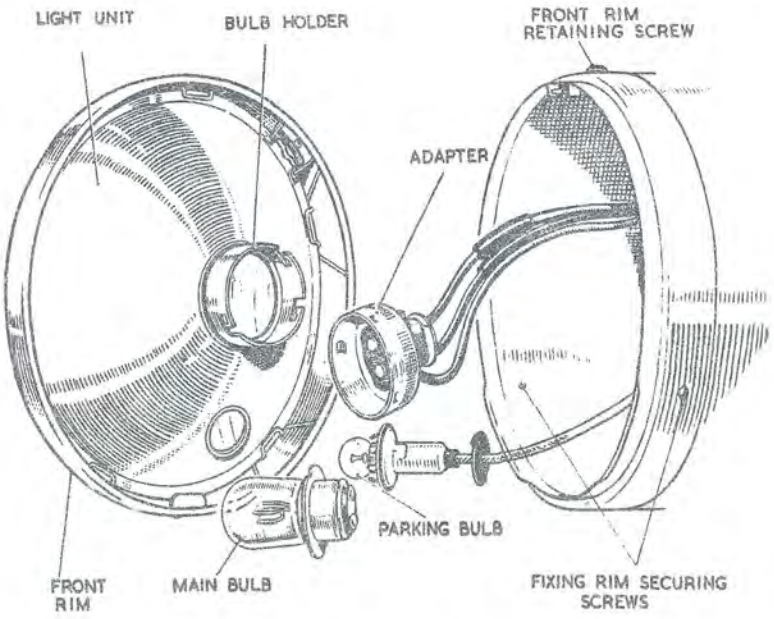


FIG. G.9. *Headlamp dismantled.*

Beam Adjustment

When the motor-cycle carries its normal load, the headlamp full-beam should project straight ahead and parallel with the road surface.

To achieve this, place the machine on a level road pointing towards a wall at a distance of 25 feet away, with a rider and passenger, on the machine, slacken the two small screws on the adapter rim at either side and tilt the beam unit until the beam is focused at approximately two feet six inches from the base of the wall. Do not forget that the headlamp should be on "full beam" lighting during this operation.

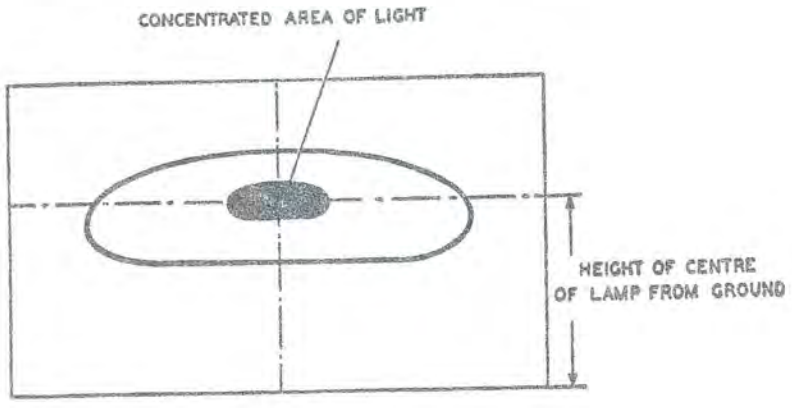


FIG. G.10. *Beam adjustment.*

TAIL AND STOP LAMP UNIT

Access to the bulb in the tail and stop lamp unit is achieved by unscrewing the two slotted screws which secure the lens. The bulb is of the double filament offset pin type and when a replacement is carried out, ensure that the bulb is fitted correctly. Check that the two supply leads are connected correctly and check the earth (ground) lead to the bulb holder is in satisfactory condition.

When refitting the lens, do not over-tighten the fixing screws or the lens may fracture as a result.

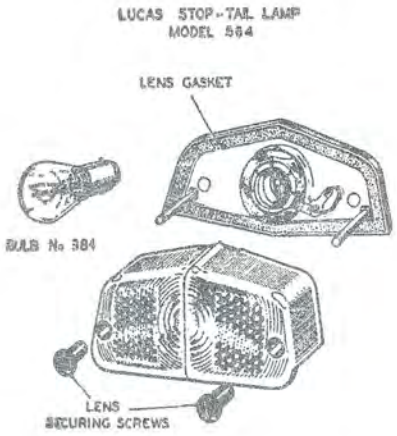


FIG. G.11. *Stop and tail lamp dismantled.*

OTHER LIGHT UNITS

The headlamp shell contains the speedometer light, the ignition warning light and the parking light, access being gained to each of them by first removing the rim and light unit assembly.

Each bulb holder is a push-fit into its respective component, and the bulbs are located by means of a peg arrangement, except for the speedometer light which has a screw type bulb.

ADDITIONAL INFORMATION

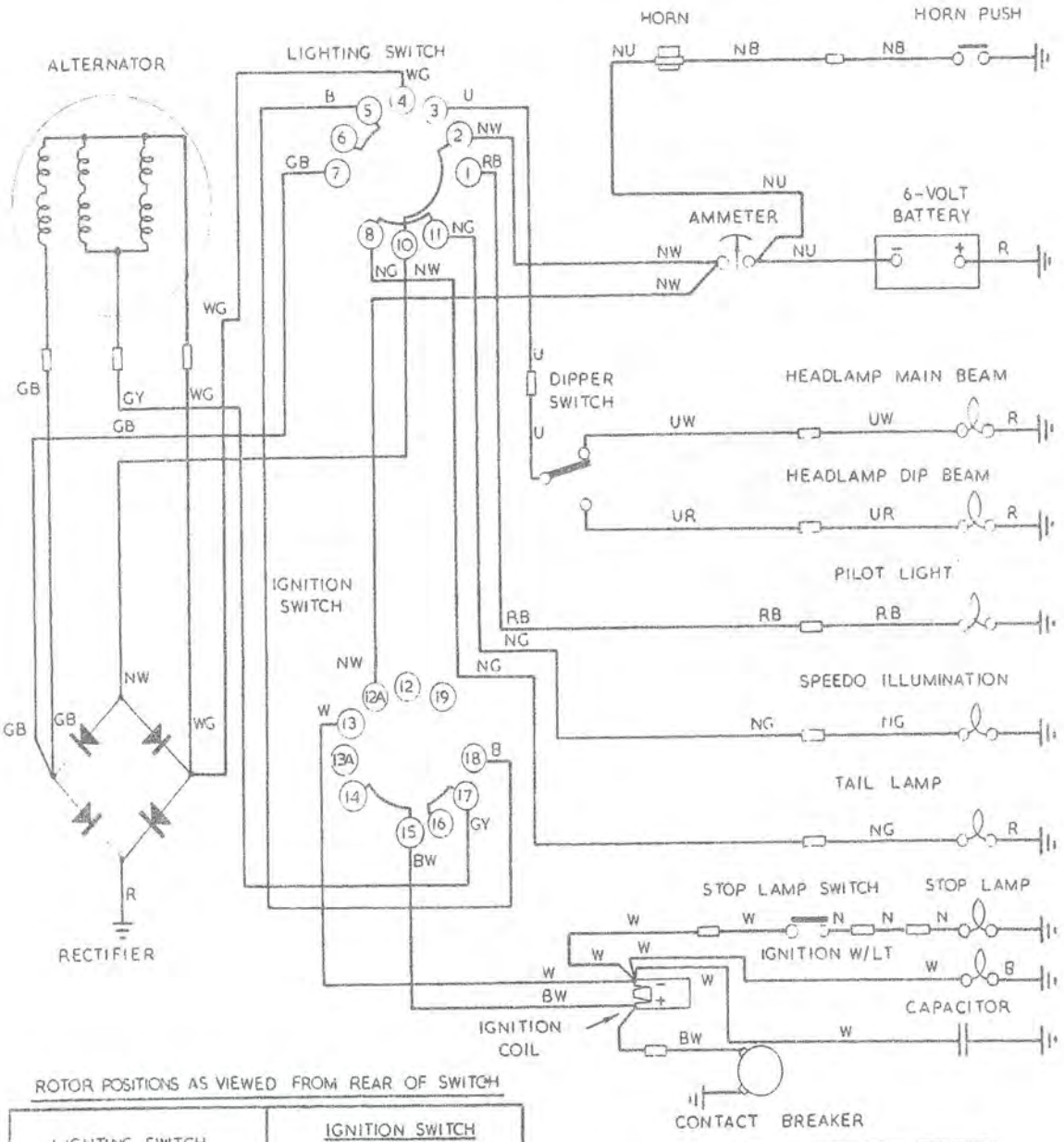
Alternator and Stator Details—Specifications and Output Figures

Stator No.	System Voltage	D.C. Input to Battery amp. at 3,000 r.p.m.			Alternator Output Minimum A.C. Volts at 3,000 r.p.m.			Stator Coil Details		
		Off	Pilot	Head (Main Beam)	A	B	C	No. of Coils	Turns Per Coil	S.W.G.
47162	6 volt	4.8	3.8	1.8	4.0	6.5	8.5	6	140	22

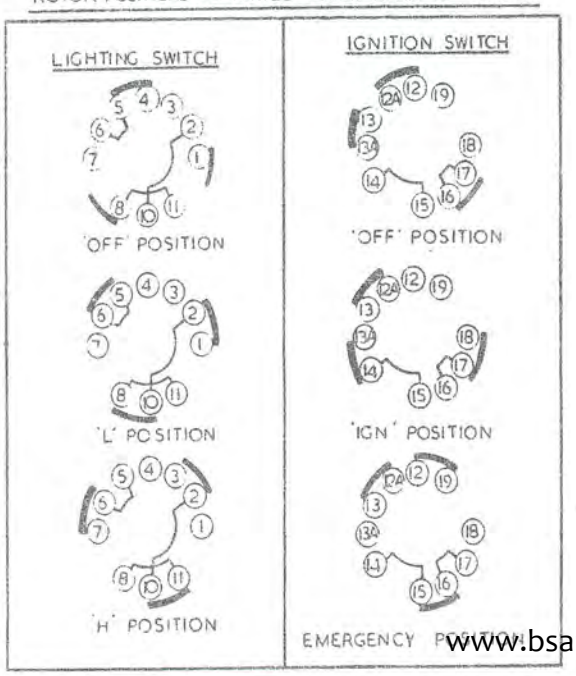
A—White/green and green/black.

B—White/green and green/yellow.

C—White/green and green/black—green/yellow connected.



ROTOR POSITIONS AS VIEWED FROM REAR OF SWITCH



CABLE COLOUR CODE	
B	BLACK
U	BLUE
N	BROWN
G	GREEN
P	PURPLE
R	RED
W	WHITE
Y	YELLOW

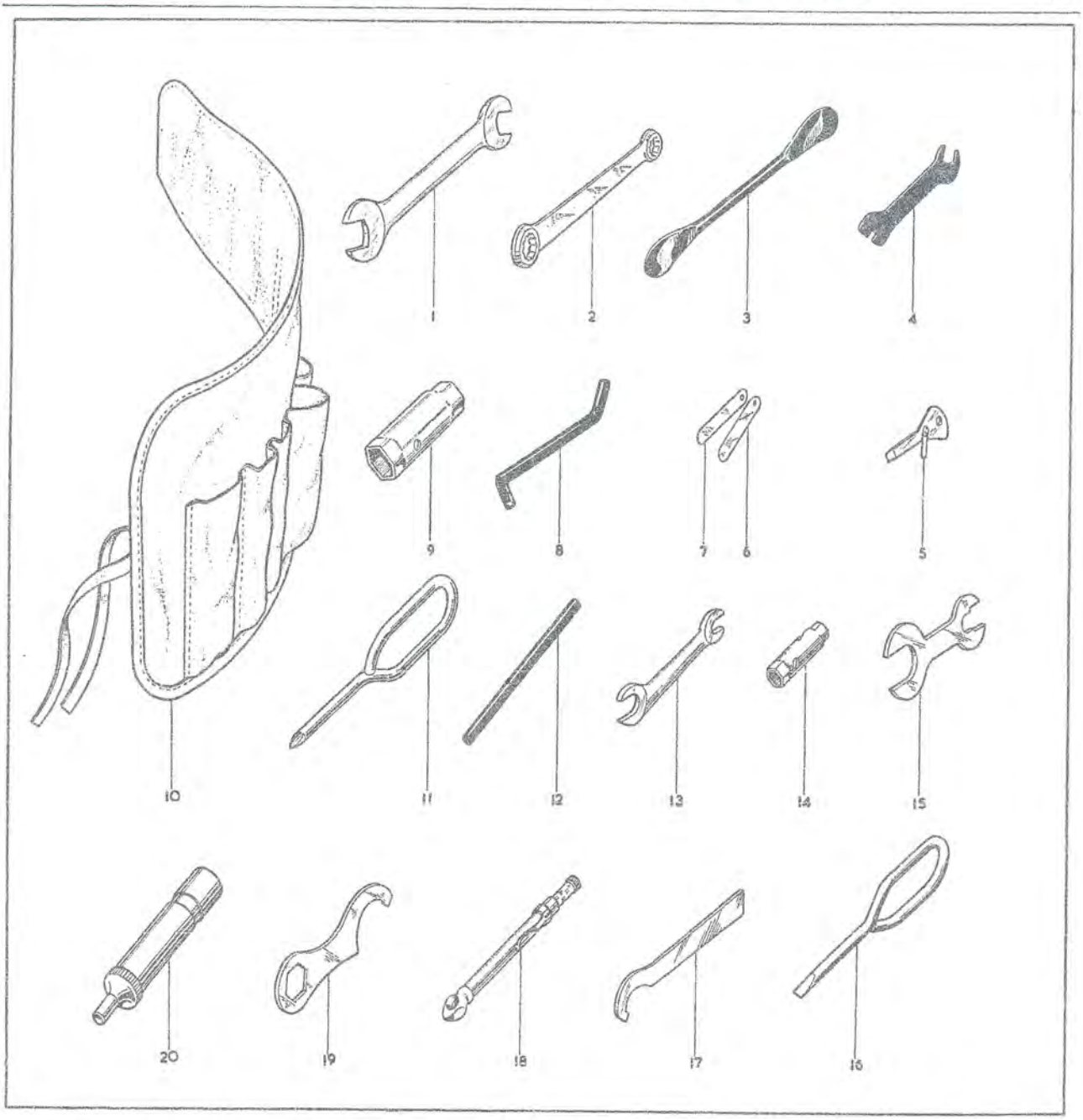
SNAP CONNECTORS

R EARTH CONNECTIONS MADE VIA CABLE OR VIA FIXING BOLTS

The following are recommended torque wrench settings for important nuts and bolts used on the machine:—

Application	Thread Dia. and Form	T.P.I.	Hex. (A/F)	Torque lb./ft. (kg./m.)
Carburetter flange nuts (SL) ...	5/16" B.S.C.	26	0.525"	10 (1.383)
Clutch centre nut	½" B.S.C.	20	0.820"	60–65 (8.295–8.987)
Crankshaft pinion nut	⅝" B.S.F.	20	0.919"	35–40 (4.839–5.530)
Cylinder barrel nuts	⅜" B.S.C.	26	0.595"	28–30 (3.871–4.148)
Cylinder head stud nuts	5/16" B.S.C.	26	0.525"	18–20 (2.489–2.765)
Fork leg pinch bolts	5/16" B.S.C.	26	0.525"	18–20 (2.489–2.765)
Kickstart ratchet nut	½" B.S.C.	20	0.705"	60 (8.295)
Oil pump stud nuts (SL)	¼" B.S.C.	26	0.445"	7 (.968)
Rotor fixing nut	⅝" B.S.C.	20	1.010"	60 (8.295)
Valve cover nuts	5/16" B.S.C.	26	0.525"	10 (1.383)
Valve cover nuts	¼" B.S.C.	26	0.440"	5–7 (0.691–0.968)

Abbreviations: A/F — Across Flats.
B.S.C. — British Standard Cycle.
B.S.F. — British Standard Fine.
SL — Self-locking.
T.P.I. — Threads Per Inch.



Listed on this page are the tools needed to assist in carrying out both routine maintenance and minor repair work on the machine. The tools should all be found in the toolbox, but it is recommended that a periodical check is made to ensure that the toolkit is complete at all times.

CHECK LIST

1. Open-ended spanner .720" (18.288 mm.) and .830" (21.082 mm.) A/F.
2. Ring spanner .445" (11.303 mm.) and .600" (15.240 mm.) A/F.
3. Tyre lever (2 off).
4. Tappet spanner .265" (6.731 mm.) and .530" (13.462 mm.) A/F.
5. Screwdriver for contact breaker.
6. Feeler gauge .008" (.2032 mm.).
7. Feeler gauge .010" (.254 mm.).
8. Tommybar for box spanner.
9. Box spanner .840" (21.336 mm.)
11. Phillips screwdriver.
12. Tommybar for box spanner.
13. Open-ended spanner.533" (13.538 mm.) and .608" (15.443 mm.) A/F.
14. Box spanner .440" (11.176 mm.) and .525" (13.335 mm.) A/F.
15. Open-ended spanner 1.025" (26.035 mm.); .716" (18.186 mm.) and .826" (20.980 mm.) A/F.
16. Screwdriver.
17. [illegible] spanner for damper adjustment.