A

WORKSHOP MANUAL

For the Three Cylinder

TRIUMPH TRIDENT

MODEL T160

750cc (45 cubic inch)

with Electric Starter

From Engine Number 00101

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INTRODUCTION TO THIS MANUAL

This Workshop Manual has been compiled to provide service information for 750cc (45 cu.in.) TRIUMPH T160 ELECTRIC START 'TRIDENT' MODEL owners wishing to carry out basic maintenance overhaul and repair work on both this early T150 and the later T160 Electric Start versions of this model.

The technical content has been brought together and presented in a matching style to that of the original factory T150 model workshop manual, but has of course been totally updated and rewritten to incorporate not only the features specifically exclusive to the Electric Start version of the Trident, but at the same time cover the Disc Front and Rear Brakes incorporated on some of the later T150 and Rocket 3 Models; details of which were not included in the earlier T150 Model and Rocket 3 Workshop Manuals of that time. This version then should also be of considerable assistance to late T150 Trident and Rocket 3 owners in this category. The actual procurement and collation of the technical information to provide this Publication achieved finality some considerable time following closure of Norton Villiers Triumph International at Kitts Green in Birmingham, when co-incidentally the production of the actual Triumph T160 Electric Start Model of the Trident, being built and assembled at the B.S.A. Factory at Small Heath came to a final end.

The total staff involved in the design, manufacture, production and servicing of this machine thereby having become made redundant quietly folded their tents and disappeared their many and several ways in search of fresh fields and pastures new. The collected T160 Model knowledge was suddenly dispersed and scattered overnight. It was felt that the accumulated knowledge of the writers Colleagues should not be lost following the demise of this famous name and that every attempt should be made to preserve and present this information for the record and for ultimate use. The writer therefore decided to collect whatever material that was immediately available, and then seek the urgent aid of his colleagues (the actual Technical Staff from the original Company making the Trident.)

Generous contributions and material has enabled this manual to be brought to completion and although it is now some considerable time after the end of the manufacture of the model concerned it was nevertheless felt that the full range of information contained herein would undoubtedly prove invaluable to current Trident owners wishing to keep this prestigeous machine in first class condition, even more importantly as the inevitable time approaches, be totally authoratative for those who will inevitably be engaged on the overhaul and ultimate restoration of this much sought after representative of a very successful high performance motorcycle.

The first section of this manual therefore provides a GENERAL DATA SECTION in Ready Reference form, detailing all the original and recommended drawing and manufacturing dimensional data of all moving and wearing components and indicating the established optimum fits, limits and tolerances.

The layout of this general data section follows the same sequence of the main sections in the body of the manual, corresponding to normally established procedures of strip down, examination and rebuild.

The T160 'ELECTRIC START' version electrical equipment is fully described and illustrated, followed by a final section which deals with the originally recommended service tools some of which were developed, drawn, part numbered but sadly never saw the light of day; others which most likely by now prove to be no longer avaiable. However the author felt that it would be worthwhile including the illustrations and references to allow the well equipped or keenly adaptable reader to devise his own methods and solutions along the lines so indicated, thereby allowing proper protection of the components during the operation in the manner originally intended.

It has always been accepted as useful practice to include in any manual the relevant Conversion and Reference Charts. Here we have also included those previously found useful from the earlier publication, and will be found at the end of this Manual.

John R. Nelson

FOREWORD

All Triumph Trident T150 and T160 Models incorporated the same engine and frame numbering principles utilising a two letter prefix prior to the machines own individual number. This was followed immediately by the model type designation, the complete sequence preceeded and ended by a circular stamped limiting ident thereby preventing any subsequent form of illegal alteration or amendment.

The engine number is to be found on the left side of the engine, immediately below the cylinder block flange, the numbers being stamped onto a raised embossed pad – a further aid to counter-feiture.

The prefix letters indicate both year and month of manufacture.

The first prefix letter indicates the month and year of manufacture as follows:–

Month of Manufacture	
A	January
B	February
C	March
D	April
E	May
G	June
H	July
J	August
K	September
N	October
P	November
X	December

Year of Manufacture	
J	1974
K	1975
N	1976
P	1977
X	1978
A	1979
B	1980

The third section is a numerical block of five figures which comprise the engine number commencing at 00101.

The fourth section indicated the model designation.

Example	Month	Year	Number	Model
	N	J	00101	T160

The frame number is stamped on the left side of the frame, in front of the fuel tank.

The frame bears the same serial number as the engine unit fitted into it and hence were identical at the time of original manufacture.

ANCILLARY EQUIPMENT AND PROPRIETARY FITTINGS

Carburetters	Amal Ltd. Holdford Road Witton Birmingham 6.
Chains	Renold Chains Ltd. Wythenshawe Manchester.
Electrical Equipment	J Lucas Ltd. Great Hampton Street, Birmingham 18.
Rear Suspension	Girling Ltd. Birmingham Road, West Bromwich Staffs.
Sparking Plugs	Champion Sparking Plug Company Ltd. Feltham Middx.
Instruments	Smiths Industries Ltd. Cricklewood Works London NW2.
Tyres	Dunlop Rubber Company Ltd. Fort Dunlop Birmingham 24.

CONTENTS

GENERAL DATA

TRIDENT

MODEL T160

750 c.c. (45 cu. ins.)

VALVE GUIDES

Material	Hidural 5
Inside diameter (Inlet and exhaust)	·313"/·312" (7·950/7·924 mm.)
Outside diameter (Inlet and exhaust)	·5005/·5010 in. (12·7127/12·7254 mm.)
Length: Inlet	1·875 in. (47·625 mm.)
Exhaust	1·875 in. (47·625 mm.)

VALVE SPRINGS (RED AND WHITE)

Free length: Inner	1·468 in. (37·2872 mm.)
Outer	1·600 in. (40·64 mm.)
Total number of coils: Inner	6
Outer	5½
Total fitted load	
Valve open: Inner	88 lbs. (39·952 kg.)
Outer	121 lbs. (54·934 kg.)
Valve closed: Inner	37–40 lbs. (16·798–18·144 kg.)
Outer	48–53 lbs. (21·792–24·062 kg.)

VALVE TIMING

Set all tappet clearances @ 0·020 in (0·50 mm) for checking (Method 1):

- 50° Inlet opens, before T.D.C.
- 64° Inlet closes, after B.D.C.
- 67° Exhaust opens, before B.D.C.
- 47° Exhaust closes, after T.D.C.

Set all tappets Zero clearance for checking only (Method 2):

- At piston T.D.C. (Exhaust Stroke)
- Inlet valve open 0·125/0·135 in (3·18/3·4 mm
- Exhaust valve open 0·125/0·135 in (3·18/3·4 mm)
- (measured on valve top collar)

ROCKERS

Bore	·5002/·5012 in. (12·7050/12·7304 mm.)
Rocker spindle diameter	·4990/·4995 in. (12·6746/12·6873 mm.)
Tappet clearance (cold): Inlet	·006 in. (0·1524 mm.)
Exhaust	·008 in. (0·2032 mm.)

CAMSHAFTS

Journal diameters	1·061/1·060 in. (26·9494/26·9240 mm.)
Diametral clearances	·0025/·001 in. (0·0635/0·0254 mm.)
End float	·007/·021 in. (·178/0·305 mm.)
Cam lift: Inlet and exhaust	·329 in. (8·3566 mm.)
Base circle radius	·406 in. dia. (10·3124 mm.)

TAPPETS

Tip radius	1·125 in. (28·575 mm.)
Tappet diameter	·3115/3105 in. (7·9121/7·8994 mm.)
Clearance in guide block	·0025/·001 in. (0·0635/0·0254 mm.)

TAPPET GUIDE BLOCK

Diameter of bores	·3130/·3125 in. (7·9502/7·9375 mm.)
Outside diameter	1·1577/1·1572 in. (29·4055/29·3929 mm.)
Interference fit in cylinder block	·002/·001 in. (0·0508/0·0254 mm.)

IGNITION TIMING

Crankshaft position (B.T.D.C.) Fully advanced	38°
Piston position (B.T.D.C.) Fully advanced	·357 in. (9·0678 mm.)

TACHOMETER DRIVE

Drive gear shaft	·280/·279 in. dia. (7·112/7·087 mm.)
Drive gear housing	·2822/·2807 in. dia. (7·168/7·130 mm.)
Driven gear shaft	·2410/·2405 in. dia. (6·121/6·109 mm.)
Bush (plain)	·2435/·2425 in. dia. (6·185/6·160 mm.)
Bush (flanged)	·2435/·2425. in. dia. (6·185/6·160 mm.)

TIMING GEARS

Inlet and exhaust camshaft pinions:	
No. of teeth	50
Fit on camshaft	·000/·001 in. (·000/·0254 mm.)
Intermediate timing gear	
No. of teeth	47
Bore	·8745/·8740· (22·2123/22·1996 mm.)
Bush bore	·6892/·6885 in. (17·5056/17·4879 mm.)
Intermediate wheel spindle	
Diameter	·6880/·6877 in. (17·475/17·467 mm.)
Crankshaft pinion:	
No. of teeth	25
Fit on crankshaft	+·0005 in. (+·0127 mm.) —·0005 in. (—·0127 mm.)

CONTACT BREAKER (7CA)

Gap setting	·014–·016 in. (0·355–0·406 mm.)
Advance range	12° (24° crankshaft)
Fully advanced at	2,000 r.p.m.

RATIOS

Internal ratios:	5th (Top)	1·00 : 1
	4th	1·19 : 1
	3rd	1·40 : 1
	2nd	1·837 : 1
	1st (Bottom)	2·585 : 1
Overall ratios:	5th (Top)	4·92
	4th	5·85
	3rd	6·89
	2nd	9·04
	1st (Bottom)	12·71
Engine R.P.M. @ 10 M.P.H. in 5th (Top) gear		663
Transmission sprocket teeth		19

GEAR DETAILS

Mainshaft high gear:	
Bearing type	$1\frac{3}{16}$" × $1\frac{1}{16}$" × $\frac{7}{8}$" Needle roller
Bearing length	·875/·865 in. (22·23/21·97 mm.)
Spigot diameter	1·5077/1·5072 in. (38·36/38·28 mm.)

GEARBOX SHAFTS

Mainshaft:	
Left end diameter	·8103/·8098 in. (20·58/20·57 mm.)
Right end diameter	·7494/·7498 in. (19·044/19·054 mm.)
Length	10·37 in. (263 mm.)
Layshaft:	
Left end diameter	·6875/·6870 in. (17·46/17·404 mm.)
Right end diameter	·6875/·6870 in. (17·46/17·404 mm.)
Length	6·47 in. (164·33 mm.)

BEARINGS

Mainshaft bearing (left) (Supplied with gear)	$1\frac{1}{2}$ × $2\frac{1}{2}$ × $\frac{5}{8}$ in. Roller bearing
Mainshaft bearing (right)	$\frac{3}{4}$ × $1\frac{7}{8}$ × $\frac{9}{16}$ in. Ball Journal
Layshaft bearing (left)	$\frac{11}{16}$ × $\frac{3}{4}$ × $\frac{3}{4}$ in. Needle roller
Layshaft bearing (right)	$\frac{11}{16}$ × $\frac{7}{8}$ × $\frac{3}{4}$ in. Needle roller
Layshaft 1st gear (bush fitted)	
Bore	·810/·809 in. (20·574/20·548 mm.)
Shaft diameter	·8075/·8070 in. (20·511/20·498 mm.)
Layshaft 2nd gear (bush fitted)	
Bore	·810/·809 in. (20·574/20·548 mm)
Shaft diameter	·8075/·8070 in. (20·511/20·498 mm.)
Layshaft 4th gear (bush fitted)	
Bore	·8103/·8093 in. (20·582/20·556 mm.)
Shaft diameter	·8078/·8073 in. (20·518/20·505 mm.)

KICKSTART RATCHET MECHANISM

Bush bore	·751/·752 in. (19·0754/19·1008 mm.)
Spindle working clearance in bush	·0012/·0026 in. (·0304/·0660 mm.)
Ratchet spring free length	$\frac{1}{2}$ in. (12·7 mm.)

KICKSTARTER

Crank spindle dia.	·748/·747 in. (18·999/18·974 mm.)
Crank bush bore	·753/·752 in. (19·126/19·101 mm.)

GEARSHIFT MECHANISM

Plungers:	
Outer diameters	·4315/·4320 in. (10·9601/10·9728 mm.)
Working clearance in bore	·0005/·0015 in. (0·0127/·0381 mm.)
Plunger springs:	
No. of working coils	12
Free length	$1\frac{1}{4}$ in. (31·75 mm.)
Inner bush bore (Gearchange fork)	·5632/·5622 in. (14·3053/14·2799 mm.)
Clearance on shaft	·0025/·001 in. (0·0635/0·0254 mm.)
Outer bush bore	·753/·751 in. (19·1262/19·0754 mm.)
Clearance on shaft	·0045/·002 in. (0·1143/0·0508 mm.)
Quadrant return springs:	
No. of working coils	11
Free length	$1\frac{3}{4}$ in. (44·45 mm.)
Camplate plunger spring:	
Free length	2·14 in. (58 mm.)
No. of working coils	19
Camplate plunger housing bore	·4385/·4375 in. (11·138/11·1125 mm.)
Camplate plunger diameter	·4365/·4355 in. (11·087/11·0617 mm.)

FRONT FORKS

TELESCOPIC FORK

Type	Telescopic—oil damping
Spring details:	
Free length	19·50 in. (495·3 mm.)
No. working coils	58·5
Rate	35 lb./in. 6·25 kg./cm. kg./m.)
Gauge	7 s.w.g.
Colour code	Orange and red
Stanchion diameter: (top)	1·3550/1·3537 in.(34·417/34·3846 mm.)
(bottom)	1·3616/1·3605 in.(34·5846/34·5567 mm.)
Outer member bore	1·365/1·363 in. (33·15/33·1 mm.)
Tachometer cable length	30 in (762 mm.)

ELECTRICAL EQUIPMENT

Battery	Lucas MCZ/9-8
Coil	Lucas 17 M 6
Contact breaker unit	Lucas 7CA
Generator	Lucas RM 21
Horn	Lucas 6H
Rectifier	Lucas 2DS.506
Zener Diode	Lucas ZD.715
Bulbs—headlamp (main)	Lucas 370. 45/40 watt
—headlamp (pilot)	Lucas 989. 6 watt
—warning lamps	Lucas 281. 2 watt
—stop-tail lamp	Lucas 380. 21/6 watt
—speedometer/tachometer illumination	Lucas 504 2.2 watt
—direction indicators	Lucas 382. 21 watt
Condenser Pack	Lucas 2CP
Flasher unit	Lucas 8FL
Headlamp	Lucas SS700P.
Handlebar switch (right)	Lucas 169 SA
Handlebar switch (left)	Lucas 181.SA
Ignition switch	Lucas 149 SA
Rear stop switch	Lucas 118 SA
Fuse rating	35 amperes
Sparking Plugs	
—Type	Champion N3
—Gap setting	·020 in. (·50 mm.)
—Thread size	14 mm. × $\frac{3}{8}$ in. reach
Starter Motor	Lucas M3
Ballast resistor	Lucas 41790
Neutral indicator	Lucas 147SA
Starter relay	Lucas 22RA
Solenoid	Lucas 17S 76849

MISCELLANEOUS

CAPACITIES

Fuel tank	Alternatives—5¼ U.S. galls. (4⅓ Imp. galls. 20 liters) —3 U.S. galls. (2½ Imp. galls. 11 liters)
Oil tank	6 U.S. pints (5 Imp. pints) (3·0 liters)
Transmission (Gearbox)	1¾ U.S. pints (1½ Imp. pints) 850 cm³)
Primary chaincase	¾ U.S. pints (⅝ Imp. pints) (350 cm³)
Front forks (each leg)	210 c.c.

BASIC DIMENSIONS

Wheel base	58 in. (147·5 cm.)
Overall length	88 in. (223·5 cm.)
Overall width	29 in. (73·5 cm.)
Overall height	46·5 in. (118 cm.)
Ground clearance	7 in. (17·8 cm.)
Seat height	31·25 in. (79·4 cm.)
Unladen weight	503 lbs. (228 kg.)

TORQUE WRENCH SETTINGS (DRY)

Conn. rod bolts	21·5/22·5 lb.ft. (2·967/3·105 kg.m.)
Crankcase junction bolts	12 lb.ft. (1·659 kg.m.)
Crankcase junction studs	15 lb.ft. (2·074 kg.m.)
Cylinder block base nuts	20/22 lb.ft. (2·765/3·042 kg.m.)
Cylinder head bolts/nuts	18 lb.ft. (2·489 kg.m.)
Rocker box nuts	6lb.ft. (·83 kg.m.)
Rocker box bolts	6 lb.ft. (·83 kg.m.)

SECTION A

LUBRICATION SYSTEM

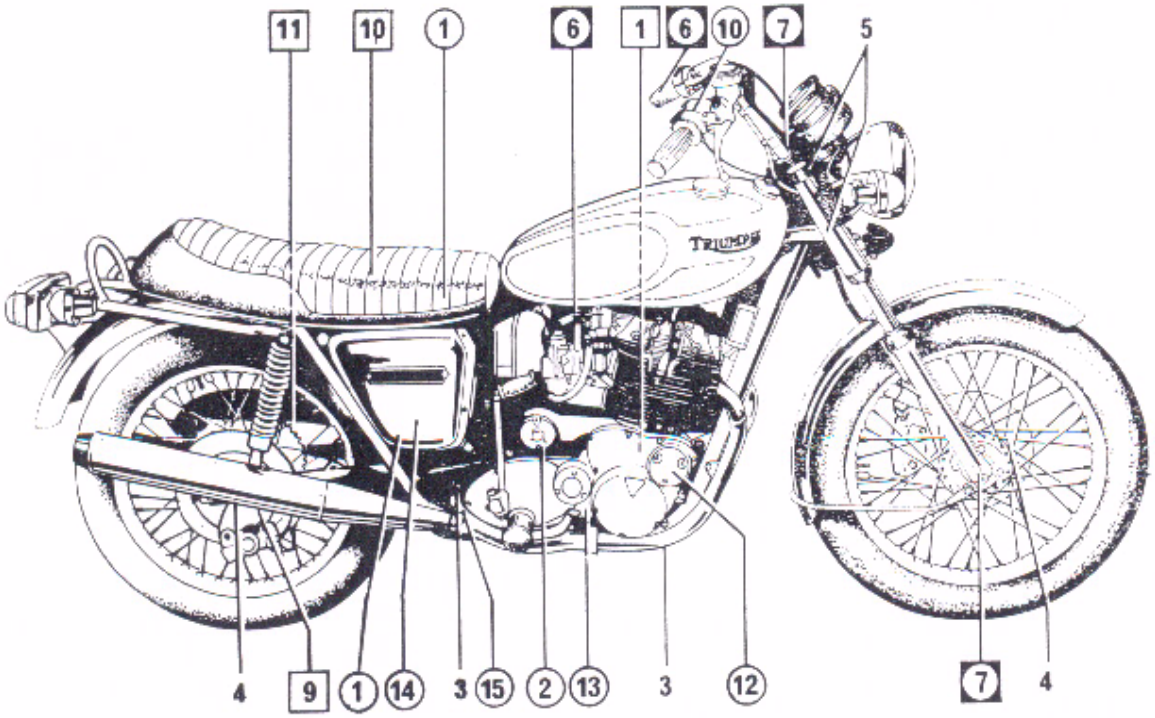


Fig. A1. LUBRICATION CHART
Numbers in circles refer to right side of machine
Numbers in squares refer to left side of machine
Other numbers refer to center of machine

Ref. No.	*Description*	*S.A.E. Oil Grade*
1	Engine oil tank	20/50
1	Primary chaincase	20/50
2	Transmission (gearbox)	90 E.P.
3	Oil filter compartment ..	20/50
4	Wheel bearings	Grease
5	Stearing head bearings ..	Grease
6	Exposed cables, balljoints, linkage, carb. etc.	10/30
7	Telescopic fork	Auto trans. fluid
8	Swinging fork pivot	Grease
9	Speedometer drive unit ..	Grease
10	Hydraulic brake reservoirs ..	Spec 329 (D.O.T. 3-U.S.A.)
11	Rear chain	20/50
12	Contact breaker and auto-advance	Thin Grease / 20/50

SECTION A2

FACTORY RECOMMENDED LUBRICANTS (All Markets)

UNIT	MOBIL	CASTROL	B.P.	ESSO	SHELL	TEXACO
Engine and Primary Chaincase	Mobiloil Super	Castrol GTX or Castrol XL 20/50	B.P. Super Visco-Static	Uniflo	Shell Super Motor Oil	Havoline Motor Oil 20W/50
Transmission (Gearbox)...	Mobilube GX 90	Castrol Hypoy	B.P. Gear Oil SAE 90 EP	Esso Gear Oil GX 90/140	Shell Spirax 90 EP	Multigrear Lubricant EP 90
Telescopic Fork	Mobil ATF 210	Castrol T.Q.F.	B.P. Autron 'B'	Esso Glide	Shell Donax T.7	Texomatic 'F'
Wheel Bearings, Swinging Fork and Steering Races Speedometer Drive Unit.	Mobilgrease MS or Mobilgrease Super	Castrol LM Grease	B.P. L2	Esso Multipurpose Grease H	Shell Retinax A	Marfak All Purpose
Easing Rusted Parts ...	Mobil Handy Oil	Castrol Penetrating Oil	—	Esso Penetrating Oil	Shell Easing Oil	Graphited Penetrating Oil

The above lubricants were recommended for all operating temperatures above—18°C (0°F).

THE OIL TANK

Open the twin seat and remove the tank filler cap. Place a tray below the drain plug, remove this and allow approximately ten minutes for the oil to drain. Disconnect the feed line union nut and unscrew the large hexagonal headed filter. Wash it thoroughly in clean kerosene (paraffin).

It is advisable to wash out the oil tank with flushing oil (obtainable from most garages) or, if this is not available kerosene (paraffin) will serve as a substitute However, if this is used, ensure that all traces are removed from the interior of the tank prior to re-filling with oil. (For the correct grade of oil see Section A2).

NOTE: The level in the tank should be up to the top line on the dipstick. Further addition of oil will cause excessive venting through the breather pipe due to lack of air space.

THE FULL-FLOW FILTER

This filter is of the disposable type and should be renewed every 3,000 miles (5,000 Km) when the oil is changed.

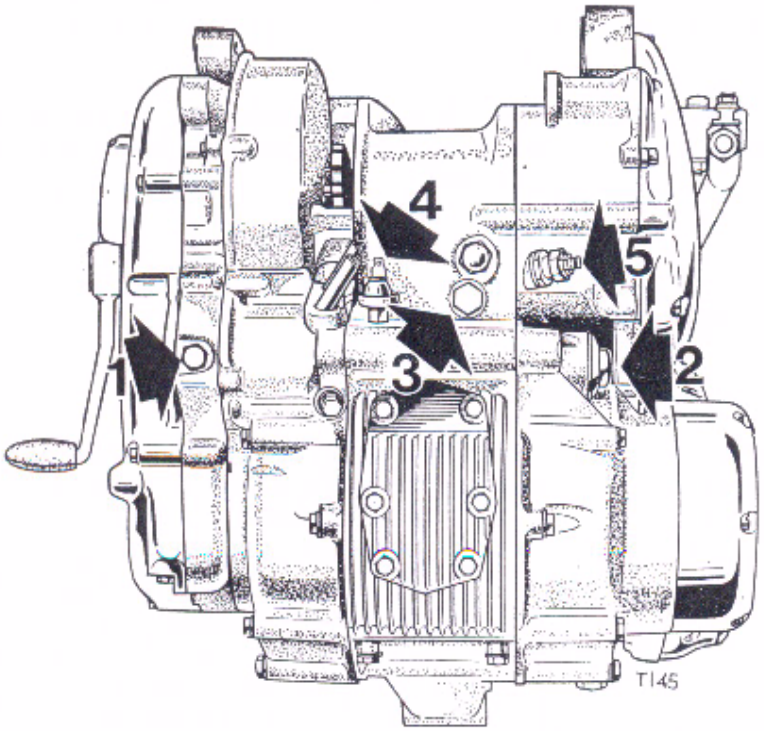
To remove the filter, unscrew the large hexagonally headed cap from below the forward end of the transmission outer cover (Item 2, Fig. A4). Remove the spring, and withdraw the element.

THE NEW ELEMENT MUST BE FITTED WITH THE OPEN END INWARDS, OTHERWISE THE OIL SUPPLY WILL BE CUT OFF.

A rubber sealing ring is located at the inner end of the element. Ensure that this is not omitted.

Add a small quantity of engine oil to the filter compartment before re-assembling the filter. Replace the spring and cap, ensuring that the 'O' ring seal is in good order. Replenish the oil tank to dip-stick level, and if, for any reason, the oil cooler has been removed, re-check and if necessary top-up the tank after approximately five miles.

Special Note: To ensure immediate lubrication of internal parts, following replacement of the filters, add half a pint of engine oil to the crankcase and operate the starter pedal twenty or thirty times (with the ignition switched off) until oil is seen issuing from the return pipe in the tank. The oil can be inserted through the spark timing plug aperture on the front of the crankcase at the right side and it will be necessary to allow sufficient space in the tank to accommodate this oil. This procedure should also be followed when the motor cycle has not been used for an appreciable time.



1. **Primary chaincase drain plug**
2. **Cartridge oil filter housing cap**
3. **Gearbox drain and level plugs**
4. **Oil pressure switch**
5. **Neutral Indicator switch**

Fig. A4. Transmission drain and filler plugs

To prevent the loss-of oil from the oil cooler and oil tank the ends of the pipes should be plugged as they are disconnected.

When the valve has been removed the hexagonal domed cap can be unscrewed from the main body, thus releasing the piston which should be withdrawn.

Thoroughly clean all parts in (kerosene) paraffin and inspect for wear. If any defect is apparent, e.g. scoring of piston, spring fracture, etc. the whole unit must be replaced. When screwing the relief valve unit into the crankcase, fit a new fibre washer between the body and the crankcase. (Figure A5).

SECTION A7

REMOVING AND REPLACING THE OIL PUMP

The oil pump (Fig. A6). is mounted in the drive side crankcase, protruding through the inner primary chaincase, and driven by a train of gears from the crankshaft. Since the moving parts continually operate in oil, the degree of wear should be very slight, though after considerable mileage, the pump may require renewal.

To gain access to the oil pump, remove the outer primary chaincase (Section C5) and the inner primary chaincase (Section C7). This will, of course, include removal of the oil pump drive gear. Remove the four 'cross-slot' screws holding the oil pump to the crankcase and the pump can be withdrawn. The remaining two slot headed screws serve to hold together the three portions of the oil pump body, and should not be disturbed.

Upon reassembly ensure that a new gasket is fitted between the oil pump and crankcase. Check that the oil pump is properly located over the dowel in the crankcase recess.

Having fitted the pump, do not over-tighten the 'cross-slot' screws, which are of small diameter, threaded into alloy. Fit a new 'O' ring seal into the recess surrounding the pump body.

Replace the transmission and chaincases as in Sections C5, C8, and C9.

Do not forget, when fitting the oil pump gear, to apply Loctite compound to the securing screw threads.

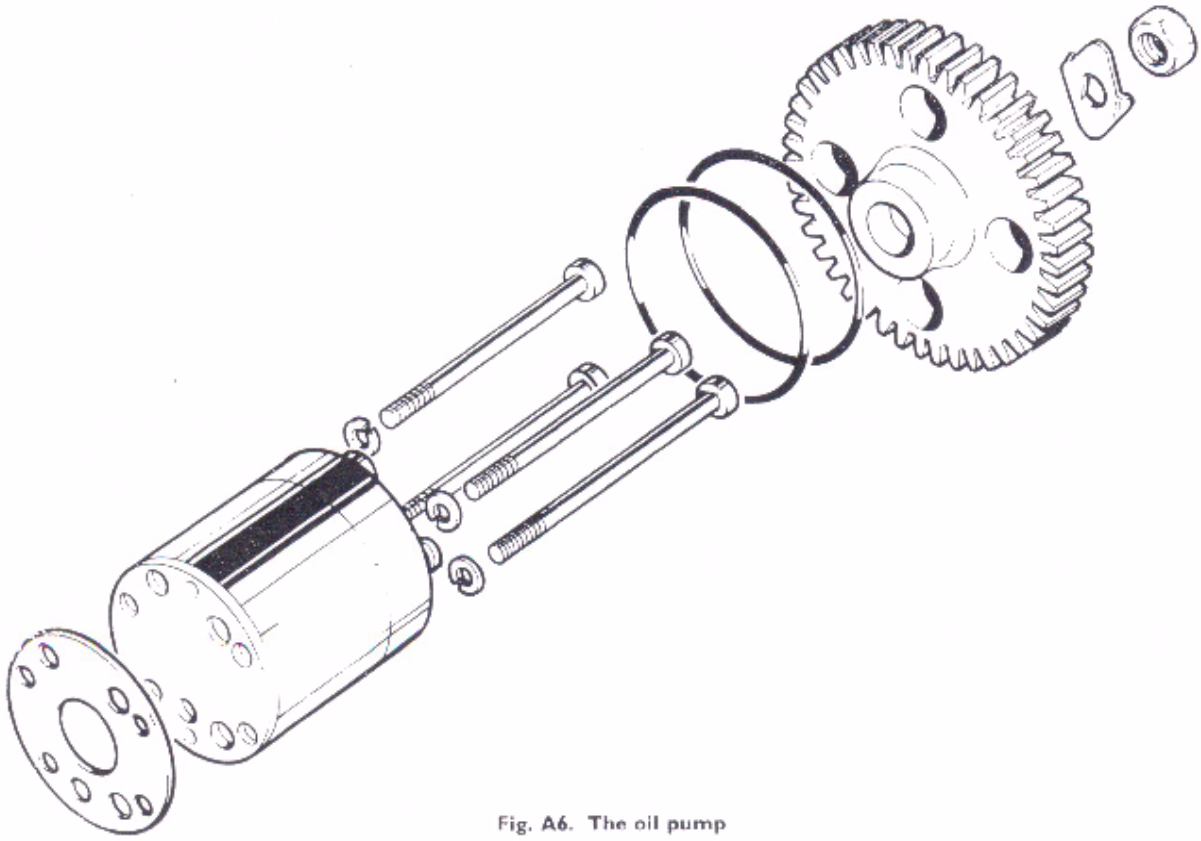


Fig. A6. The oil pump

SECTION A10

ANTI-DRAIN VALVE

The anti-drain valve is situated in the crankcase centre section adjacent to the oil pump housing. The purpose of the valve is to prevent oil draining through from the feed side of the pump when the engine is stationary overnight, or when the pump has suffered a great deal of wear. If this condition is evident (indicated by voluminous smoke from the exhaust), it must be assumed that the ball of this valve is sticking, or is being held off its seating by some means. To clean the ball and spring, hold the cupped hand beneath the valve, remove the plug from the crankcase, and collect the ball and spring. (Fig. A8). Wash these carefully in kerosene (paraffin) and replace having made sure that the ball seating is free of foreign matter.

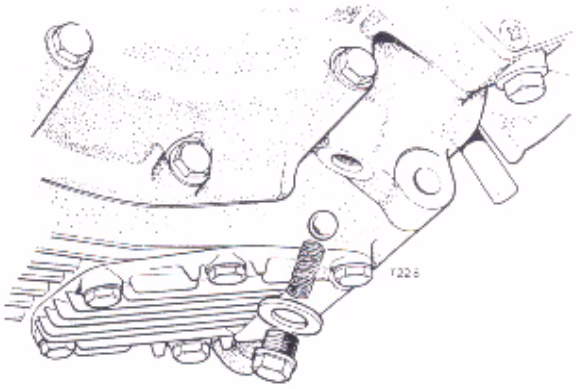


Fig. A8. Anti-drain valve

SECTION A11

CONTACT BREAKER LUBRICATION

The contact breaker is situated in the timing cover, and it is imperative that no oil from the engine lubrication system reaches the contact breaker chamber. For this purpose, there is an oil seal at the back of the contact breaker unit, pressed into the timing cover. However, slight lubrication of the cam spindle at the slot K and auto advance pivots L is necessary. Also lubricate the moving arm of the contact breakers at pivots J, with one spot of engine oil.

On initial assembly the three felt lubricating wicks are impregnated with Shell Retinax "A" grease, and at intervals of 3,000 miles, three drops of clean engine oil should be applied to each wick, in order to lubricate the cam and nylon heels. If this operation is not carried out, premature wear will occur on each of the nylon heels.

The cam spindle must be lubricated with one drop of clean engine oil at the same time. Similarly, one drop of oil must be applied to governor pivots "M" (Fig. A.9). Check that the governor weights move freely, and that if the cam "K" is turned by hand against the spring tension and then released, the weights are seen to open and close.

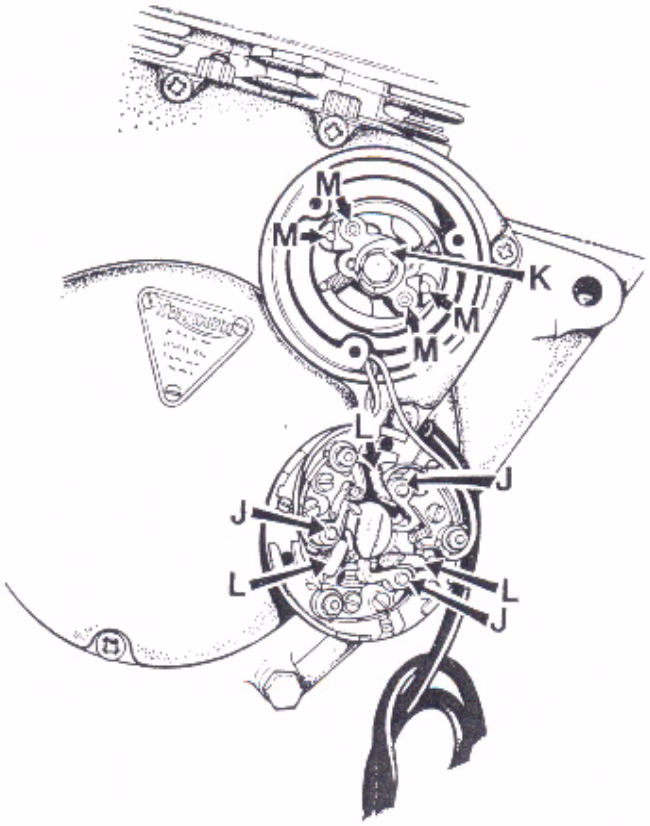


Fig. A9. Contact breaker lubrication points

SECTION A14

REAR CHAIN LUBRICATION AND MAINTENANCE

On earlier editions, the rear chain feed is taken from a union situated in the neck of the oil tank (see Fig. A12). The rate of flow of oil to the chain can be controlled by means of a screw located in the and the screw should union be turned clockwise to reduce the flow and counter clockwise to increase it.

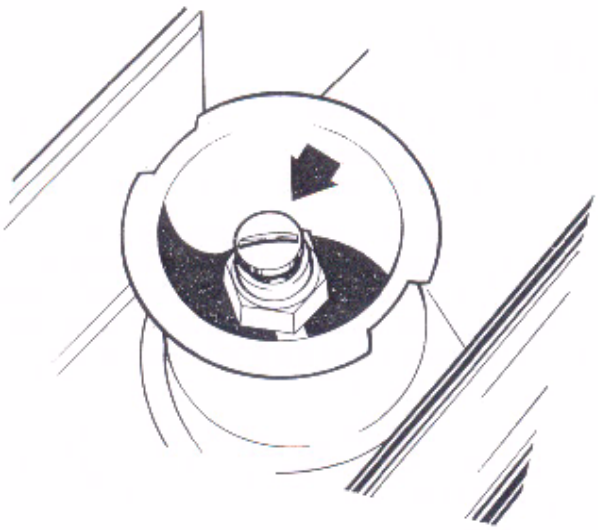


Fig A12. Rear chain oil feed adjustment

Disconnect the connecting link and remove the chain. If available, connect an old chain to the end of the chain being removed, and draw it on to the gearbox sprocket until the chain to be cleaned is clear of the machine and can be removed.

Remove all deposits of road dust etc. by means of a wire brush. Clean thoroughly in kerosene or paraffin and allow to drain.

Inspect the chain for excessive wear of the rollers and pivot pins and check that the elongation does not exceed 1½%. To do this first scribe two marks on a flat table exactly 12½ inches (31,75 cm.) apart, place the chain opposite the two marks. When the chain is compressed to its minimum free length the marks should coincide with two pivot pins 20 links apart. When the chain is stretched to its maximum free length, the extension should not exceed ¼ in. (6,25 mm.). If it is required to remove a faulty link, or shorten the chain, reference should be made to Section C14.

To lubricate the chain, immerse it in MELTED grease (melt over a low flame, or, more safely, over a pan of boiling water) and allow it to remain in the grease for approximately 15 minutes, moving the chain occasionally to ensure penetration of the grease into the chain bearings. Allow the grease to cool, remove the chain from the bath and wipe off the surplus grease.

The chain is now ready for refitting to the machine.

NOTE: The connecting link retaining clip must be fitted with the nose-end facing in the direction of motion of the chain.

SECTION A15

GREASING THE STEERING HEAD BALL RACES

The steering head races are packed with grease on assembly, and require re-packing with the correct grade of grease at the interval stated in Section A1.

Removal and replacement of the bearing races is comprehensively covered in the front fork section.

When the races are removed, they should be cleaned in kerosene (paraffin), and the tapered surfaces should be cleaned likewise, then inspected for wear, cracking, or pocketing. If any of these faults are apparent, the whole bearing must be replaced.

Apply a fresh supply of grease to the races before reassembly.

SECTION A19

LUBRICATING THE CONTROL CABLES

The control cables can be periodically lubricated at the exposed joint with a light grade of oil (see Section A2).

A more thorough method of lubrication is that of feeding oil into one end of the cable by means of a reservoir. For this, the cable can be either disconnected at the handlebar end only, or completely removed.

The disconnected end of the cable should be threaded through a thin rubber stopper and the stopper pressed into a suitable narrow necked can with a hole in its base. If the can is then inverted and the lubricating oil poured into it through the hole, the oil will trickle down between the outer and inner cables. It is best to leave the cable in this position overnight to ensure adequate lubrication.

SECTION A20

SPEEDOMETER AND TACHOMETER CABLE LUBRICATION

The speedometer and tachometer cables should be lubricated by means of grease (see Section A2 for correct grade). It is not necessary to remove the cables completely, but only to disconnect them from the instruments, and withdraw the inner cables. Unscrew the union nuts at the base of both speedometer and tachometer, withdraw the inner cables, and clean in kerosene (paraffin). Smear the surfaces with grease except for six inches (15 cm) nearest to the speedometer and tachometer heads. The cables are now ready to be inserted into the outer casings and excess grease wiped off. Care should be taken that the "squared" ends of the inner cables are located in their respective "square" housings before the union nuts are tightened, and that the 'spade' end of the tachometer cable is correctly located in its driving tongue.

SECTION A21

BRAKE PEDAL SPINDLE LUBRICATION

The brake pedal spindle is carried in a boss, which forms part of the rear engine mounting plate, and should be lubricated at intervals with oil.

For this purpose, a small hole is drilled in the boss and, preferably, the oil should be applied from a pressure oil can.

SECTION B

ENGINE

DESCRIPTION

The inclined engine is of unit construction, having three cylinders, a 120 degree crankshaft, and three aluminium alloy mating crankcase sections. The transmission housing is an integral part of the centre crankcase, and the clutch and primary transmission are housed in separate cases, bolted on to the main crankcase sections.

The aluminium alloy cylinder head has cast-in Austenitic valve seat inserts, and houses the overhead valves, which are operated by rocker arms housed in detachable alloy rocker boxes. Six aluminium push rods operate the rocker arms,which are each fitted with adjusters, accessible when the rocker box covers are removed.

The aluminium alloy die cast pistons each have two compression rings and one oil scraper ring. The connecting rods are of H Section RR56 alloy, with detachable end caps. These incorporate steel backed renewable "shell" type bearings. Each of the connecting rod caps is machined from a steel stamping and held in position by means of two high tensile steel bolts, which are tightened to a predetermined extension figure, to give the correct working clearance for the bearing on the crankshaft journals.

The inlet and exhaust camshafts are fitted transversely in the upper part of the crankcase, and are driven by a train of timing gears from the right side of the crankshaft. One end of the exhaust camshaft drives the adjustable contact breaker which is fitted with an automatic advance and retard mechanism, and the opposite end drives the tachometer cable.

The three-throw one piece crankshaft is supported by two "shell" type bearings, a roller bearing at the right side, and a ball bearing at the left side. The two plain inner main bearings are each retained by an alloy cap held by studs and self locking nuts, which are tightened to a predetermined torque setting.

The big-end bearings and the two inner main bearings are lubricated under pressure by oil which flows through drillings in the crankcase and crankshaft, from the double gear oil pump. Oil pressure in the lubrication system is governed by means of a relief valve, which is situated at the rear of the engine behind the inner primary chaincase cover.

The aluminium alloy cylinder barrel is fitted with Austenitic iron liners, and houses the pressed-in aluminium alloy tappet guide blocks. Power from the engine is transmitted through the engine sprocket and primary chain to the shock absorber unit, diaphragm clutch, and five speed constant mesh transmission. Primary chain adjustment is given by a pivotted rubber lined tensioner, which is immersed in the primary chain oil bath.

The electrical generator set consists of a rotor which is fitted to the right end of the crankshaft and a six coil stator which is mounted on three pillar bolts inside the timing cover. A starter motor and solenoid are mounted on the crankcase behind the cylinder block, the motor pinion engaging with a gear ring pressed on to the clutch body.

Carburation is by three Amal type 626 concentric carburetters with a common linkage.

connection is located under the nut of the top bolt. It is most essential that this connection is replaced on re-assembly using a new self locking nut. The small nut and bolt, holding the brake fluid pipe to the engine plate, should also be removed. Unscrew and take off the forward adjuster nut on the rear brake pinch rod. This will enable the engine plate, complete with footrest, brake pedal and operating lever, to be lifted clear of the brake operating mechanism and the frame.

To remove the long engine securing bolt from beneath the crankcase, take off the nut and spring washer at the left end, and withdraw the bolt from the right side. Note that on the right side there is a spacer fitted between the crankcase and the frame tube. Disconnect the horn, then remove it from the left front engine bracket. Take off the nut and washer from the left end of the front engine securing stud, and withdraw the stud, also remove the bottom of the two bolts holding the left front engine bracket to the frame. Slacken the top bolt, when the bracket can be swung to one side, as shown in Fig. B2. The bolt can then be slightly tightened to hold the bracket in this position. The engine unit is now ready to be lifted from the frame, but owing to the weight of the unit, (180 lbs. approximately), it is advisable to employ the use of two lifting bars, which can be located one in the front engine mounting lug, and one in the top rear left side engine plate mounting lug (Fig. B2). This operation will require two people, situated at either side of the crankcase. The most satisfactory method of removing the engine is to raise it and turn the unit counter-clockwise, while viewed from the top of the machine, in order to clear the front crankcase lug. The unit will then lift out to the left side.

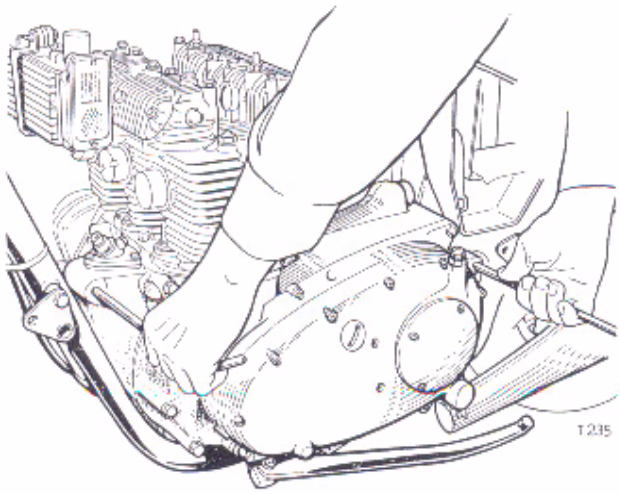


Fig. B2. Location of engine lifting bars is identical procedure for that of T160 Model

REPLACING THE UNIT

To replace the complete engine unit, it should be lifted into the frame again, (utilising the two lifting bars in the same positions as for the removal), transmission (gearbox) first, from the left side. The front of the unit can then be swung round into position. Replace the bottom mounting stud, from the right side, ensuring that the spacer is fitted in the correct position, between the crankcase lug and the bottom frame tube, on the right side of the machine. Replace the nut and spring washer.

Slacken the top bolt, holding the left front engine plate, and swivel the plate round, so that the appropriate hole lines up with the hole in the crankcase lug, then replace the stud, washer, and nut. Replace the bottom bolt, and tighten both that and the top one. Replace the left side rear engine plate, ensuring that the two spacers are refitted between the rear crankcase lugs and the engine plate. Refit the remaining bolts, washers, and self locking nuts, and the large swinging arm lug bolt and thick plain washer. Replace the right side engine plate, carefully engaging the brake operating lever with the brake rod, and replacing the adjusting screw. Secure the plate with the bolts, washers, and self locking nuts, and the large central collar nut. Slide the air filter to clutch cover rubber pipe over the crankcase sleeve, and connect both the stator and contact breaker leads (colour to colour).

Refit the chain over the transmission (gearbox) sprocket, and over the rear wheel sprocket. Fit the split link, ensuring that the closed end of the link is to the front end of the machine when positioned on the top run of the chain. If any difficulty is experienced in refitting the chain, remove the rear wheel, (Section F5), engage top gear, offer the chain to the top of the sprocket, and, with the aid of a second operator using the kickstart, slowly wind the chain over the sprocket. Reconnect the oil pipes under the engine, and tighten the securing clips. Ensure that the oil feed pipe from the bottom of the oil tank leads to the top small stub below the crankcase. The oil pipe from the larger bottom stub connects to the rocker

SECTION B2

REMOVING AND REPLACING ROCKER BOXES

Open the twinseat and remove the screw securing the left side panel, and withdraw it from two locating pegs on the rear frame. Disconnect the fuse from the negative lead from the battery, turn both fuel taps off, and remove the fuel tank (Section E1). Take off the ground (earth) leads from the extended studs and then the tachometer cable retaining loop. Remove the domed nuts securing the rocker feed pipes. Withdraw the feed pipes from both rocker spindles, and retain the four copper washers. If these are to be used again, they should first be annealed by heating to a dull red color and plunged into cold water. Disconnect the three high tension leads, and to avoid possible damage at a later stage remove all three sparking plugs.

Remove four bolts and plain washers, from each rocker box inspection cover, and withdraw both covers. If any difficulty is experienced light taps from a hide faced mallet should effectively remove these covers. Remove three socket head screws from inside each rocker box, followed by the end bolts (outside). Unscrew the eight rocker box bolts starting from the centre, noting their positions because of their varying lengths (including the extended studs) and lift both rocker boxes away from the cylinder head. Remove the six push rods and four push rod cover tubes together with their bottom cups and seals.

Keep careful note of the location of each push rod, which must be replaced in the same position as when removed.

Remove the securing bolts in the reverse order to that shown in Fig. B12, i.e. slacken the highest number first.

When refitting, ensure that the joint surfaces of both the rocker boxes and cylinder head are clean. Lightly grease the new rocker box gaskets, and position these on the cylinder head. Refit the four push rod tubes, ensuring that the cups are refitted the correct way up (see Fig. B3) and that new seals are fitted at both the top and bottom of each tube together with new gaskets below the bottom cups.

Refit the push rods, two in each right side tube, and one in each left side tube in the same position as they were originally fitted. Remove the two inspection covers from the inlet rocker box, and lower the rocker box onto the cylinder head. Each push rod can be located on to its respective rocker arm with the aid of a pair of thin nosed pliers. Ensure that the push rod tube and oil seal are positioned correctly in their recesses in the rocker box.

Fig. B3. Arrangement of push rod tube seals

Refit the four rocker box bolts and plain washers, ensuring that the two shorter bolts are fitted in the centremost holes. Lightly tighten these bolts, and refit three socket head screws, and two end bolts and plain washers.

Repeat this procedure for the exhaust rocker box and when assembled tighten the rocker box and cylinder head bolts in the sequence shown (Fig. B12). The correct torque figure is given in the GENERAL DATA, page GD 7.

Following re-assembly of the remaining items the valve rocker clearances should be adjusted (Section B5).

SECTION B4

STRIPPING AND REASSEMBLING THE ROCKER BOXES

Removal of the rocker spindles from the rocker boxes is best achieved by driving them out, using a soft metal drift. When the spindles are removed, the rocker arms and washers can be withdrawn. All parts should be thoroughly cleaned in kerosene, (paraffin), and the oilways in the spindles should be cleaned with a jet of compressed air.

Remove the 'O' rings from the rocker spindles and renew them.

If it is required to renew the rocker ball pins, the old ones should be removed by means of a suitable drift. New ones should then be pressed in.

To ensure an oil-tight seal between the rocker box and cylinder head, in cases where an oil leak cannot be cured by fitting new gaskets, the joint surface of the rocker box should be linished to remove any irregularities.

An effective finish can be achieved by lightly rubbing the junction surface on a sheet of emery cloth mounted on a truly flat surface (such as a piece of plate glass).

The following method of assembly incorporates the use of a home made alignment bar, which can be made from a $\frac{7}{16}$ in. dia. bar $\times$ $9\frac{1}{2}$ in. long by grinding a taper at one end.

Smear the plain washers with grease and place them against the cast bosses or rocker arms as shown in Fig. B5.

Commencing from the left end of each rocker box (i.e. end with larger hole), fit the rocker arms. Compress each Thackery washer (double-coil) with thin nosed pliers and assemble these. Align each rocker in turn with the alignment bar. When all the arms and washers are correctly aligned, remove the bar.

Lubricate the spindle with engine oil, and slide it, complete with 'O' ring, through the ring compressor tool 60-2221 (Fig. B4) and as far as possible into the rocker box. Finally tap it home with a hammer and soft metal drift, and remove the tool.

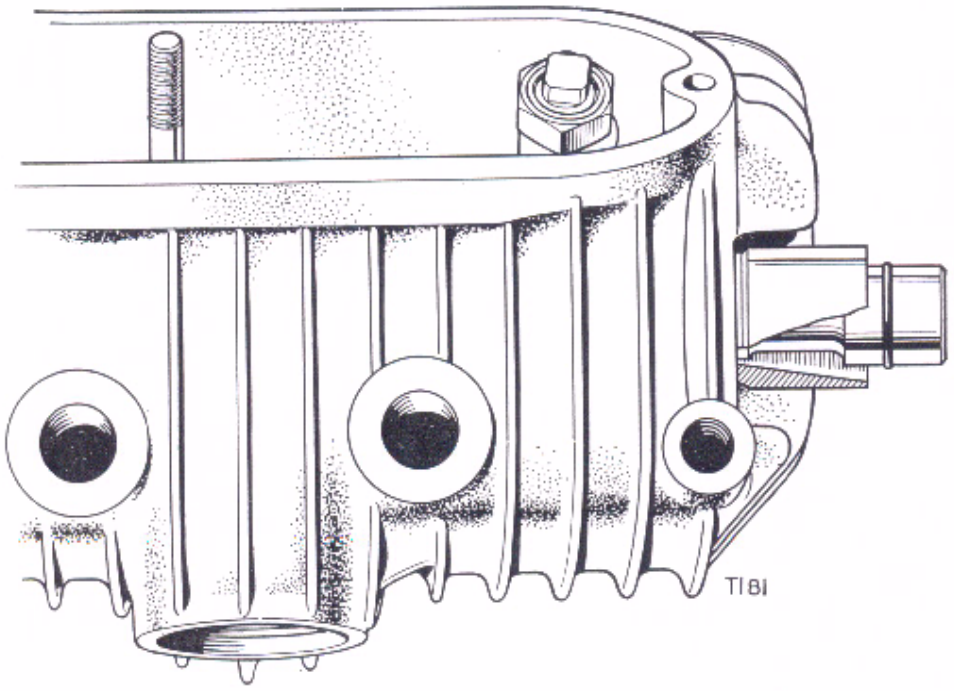


Fig. B4. Refitting rocker spindle using service tool 60-2221

SECTION B5

ADJUSTING THE VALVE ROCKER CLEARANCES

The valve rocker clearances should be checked and if necessary, adjusted every 3,000 miles (5,000 Km). The correct clearance for the type of camshaft employed, ensures that a high valve operating efficiency is maintained, and that the valves attain their maximum useful life.

NOTE: Adjustment should only be made when the engine is cold.

Access to the rocker arm adjuster screws and locknuts is obtained by removing both the inlet and exhaust rocker inspection covers. These are retained by four bolts and plain washers.

Adjustment is carried out with a ring spanners (.5" AF) and an open end spanner (.25" AF).

Disconnect the H.T. leads and remove the spark plugs. This will enable the engine to be turned easily without resistance due to compression. Set the machine on its centerstand, select top gear, and position the crankshaft (and hence the rockers) by turning the rear wheel.

Commencing with the inlet rockers, turn the engine until any two rocker arms are "on the rock".

This is a condition whereby the two corresponding valves are open by equal amounts. In this case it will be approximately $\frac{1}{16}$ in. One valve is almost closed, and the other is just opening (see Fig. B6).

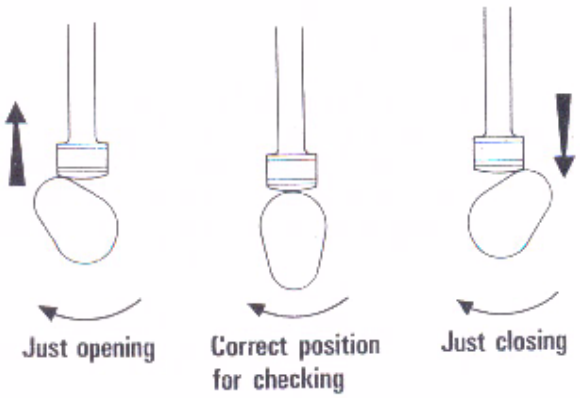


Fig. B6. Position of camshaft for valve setting

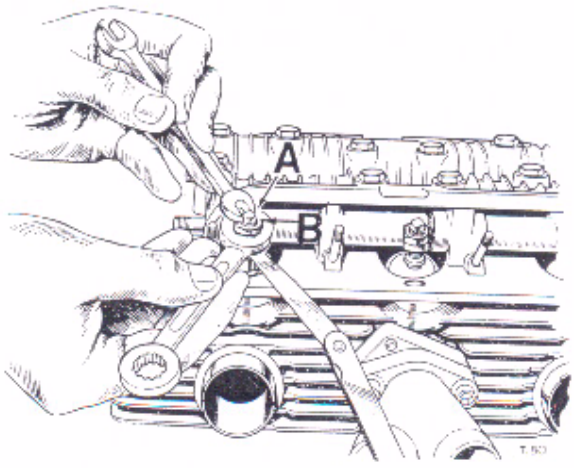


Fig. B7. Adjusting valve rocker clearances

At this stage the third valve is in the correct position for setting.

The correct rocker clearances are:
Inlet 0.006 in.
Exhaust 0.008 in.

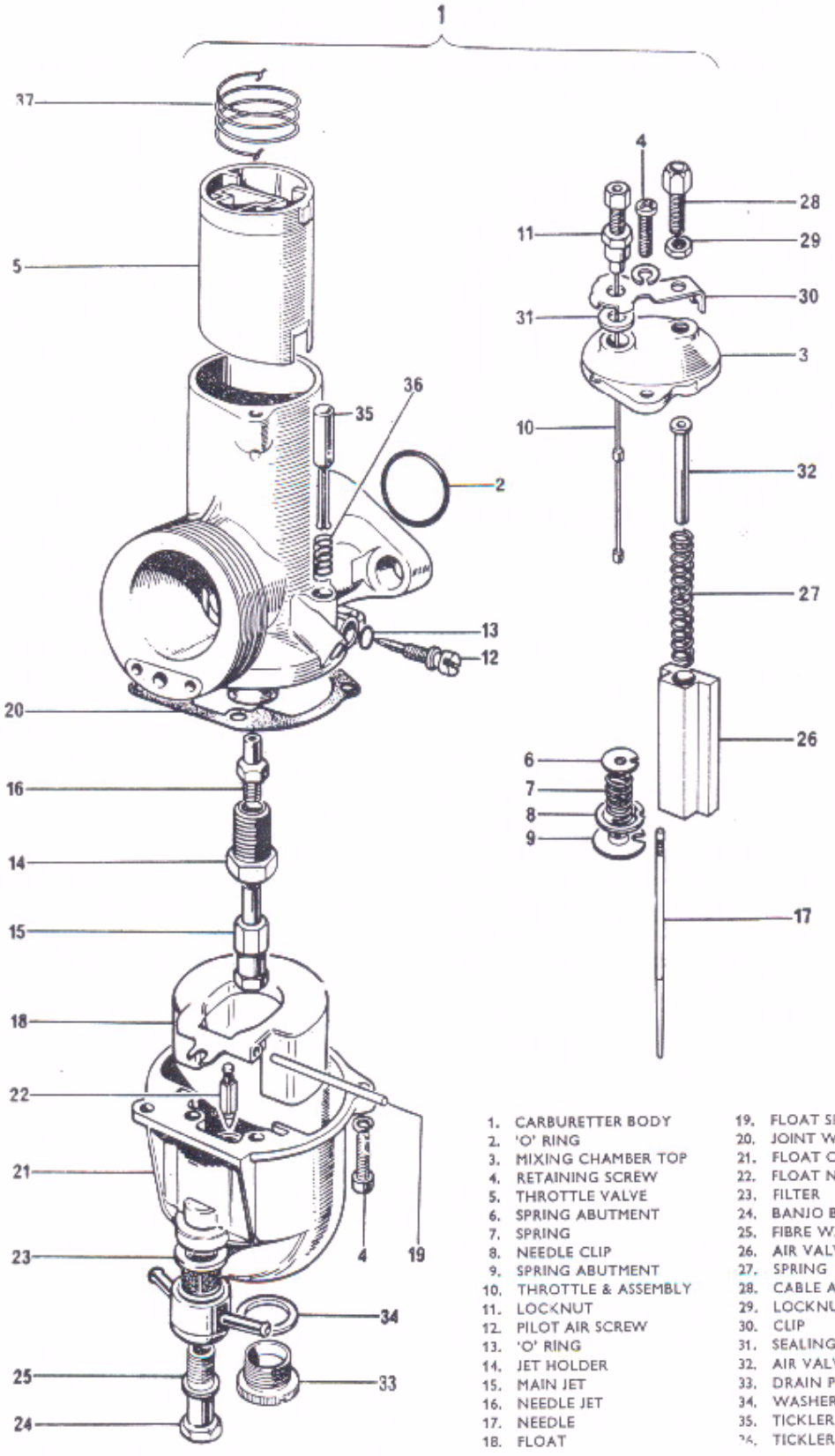
Referring to Fig. B7, to adjust the clearance, slacken the locknut B and **unscrew** the adjuster A by a small amount, e.g. half a turn. Insert a feeler gauge of the correct thickness between the adjuster screw and the valve stem, and screw down the adjuster until it lightly pinches the gauge. Hold the adjuster at this position with a wrench, tighten the locknut, and withdraw the gauge.

Adjust the remaining clearances in a similar manner.

Note: Before commencing the above operation, it is advisable to give the end of the adjuster screw a light tap to make sure that the ball is properly seated in the screw.

Replace the inspection covers, renewing the gaskets if any damage is evident. Refit the spark plugs and the H.T. leads. (Each H.T. lead has a numbered plastic sleeve, No. 1 applying to the right side cylinder).

NOTE: The inspection covers are not interchangeable.



1. CARBURETTER BODY
2. 'O' RING
3. MIXING CHAMBER TOP
4. RETAINING SCREW
5. THROTTLE VALVE
6. SPRING ABUTMENT
7. SPRING
8. NEEDLE CLIP
9. SPRING ABUTMENT
10. THROTTLE & ASSEMBLY
11. LOCKNUT
12. PILOT AIR SCREW
13. 'O' RING
14. JET HOLDER
15. MAIN JET
16. NEEDLE JET
17. NEEDLE
18. FLOAT
19. FLOAT SPINDLE
20. JOINT WASHER
21. FLOAT CHAMBER
22. FLOAT NEEDLE
23. FILTER
24. BANJO BOLT
25. FIBRE WASHER
26. AIR VALVE
27. SPRING
28. CABLE ADJUSTER
29. LOCKNUT
30. CLIP
31. SEALING RUBBER
32. AIR VALVE GUIDE TUBE
33. DRAIN PLUG
34. WASHER
35. TICKLER PIN
36. TICKLER PIN SPRING

Fig. B9. Exploded view of carburetter

It is advisable to wash individual parts several times in a quantity of clean gasoline (petrol) to ensure absolute cleanliness. Allow the parts to dry but if possible use a jet of compressed air from such as a hand pump or air line to clear all holes and drillings. Inspect all parts for wear and check that the jets are in accordance with those recommended in GENERAL DATA, page GD4.

Reassembly is a reversal of the aforegoing, referring to Fig. B9, for guidance.

During reassembly fit a new "O" ring at the pilot air screw, and new fibre washers in replacement of any which may have deteriorated. Be careful to locate both ends of the float spindle in the float chamber recesses provided and note that the float needle is assembled with its pointed end downwards. When the mixing chamber body is assembled to the carburetor valve, air valve and carburetor cap, take special care that the locating peg is lined up with the groove in the body.

SECTION B10

INSPECTING THE CARBURETTER COMPONENTS

The only parts liable to show wear after considerable mileage are the throttle valve, mixing chamber and the air valve.

(1) Inspect the throttle valve for excessive scoring to the front area and check the extent of wear on the rear face. If wear is apparent the valve should be renewed. In this case, be sure to replace the valve with the correct degree of cutaway (see "General Data").

(2) Examine the air valve for excessive wear and check that it is not actually worn through at any part. Check the fit of the air valve in the throttle valve. Ensure that the air valve spring is serviceable by inspecting the coils for wear.

(3) Inspect the throttle return spring for efficiency, signs of cracking, or breakage and loss of compressive strength.

(4) Check the needle jet for wear or possible scoring and carefully examine the tapered end of the needle for similar signs.

(5) Examine the float needle for wear by inserting it into the inverted float needle seating block pouring a small amount of gasoline (petrol) into the aperture surrounding the needle and checking it for leakage.

(6) Ensure that the float does not leak by shaking it, to hear if it contains any fuel. Do not attempt to repair a damaged float. A new one can be purchased for a small cost.

(7) Check the fuel petrol filter, which fits over the needle seating block, for any possible damage to the mesh. This would allow the gasoline (petrol) to by-pass it un-filtered.

SECTION B11

RESETTING THE CARBURETTERS

The carburetor assembly must be removed from the machine in order to synchronise the throttle slides. Refer to Section B8 for the removal procedure.

SYNCHRONISING THE THROTTLE VALVES

Remove the air filter and arrange the carburetor and inlet manifold assembly, on a work bench. Examine the throttle valves through the engine side of the carburetors, and re-set the adjuster screw (above each carburetor) until the valve on one carburetor is open approximately 0.010 inches. Compare the other two valves, and adjust their heights by screwing the individual adjusters clockwise to lower the valves, and counter-clockwise to raise the valves. There is a locknut on each adjuster, and this should be tightened when the adjustment is completed.

The difference in valve heights is easily visible (see Fig. B11).

ALTITUDE

The settings given on page GD4 are those normally recommended and will be suitable for most atmospheric conditions. They are intended for altitudes up to 3,000ft. (1000m). Above this height some reduction in main jet size is necessary to provide a balanced mixture. For altitudes between 3,000 ft. and 6,000 ft. (2,000 m.) a reduction in main jet size by 5 per cent is usually necessary, and for every 3,000 ft. increase over 6,000 ft. a further 4 per cent is required.

If the float bowl is removed (screws N Fig. B12) take care not to damage the float and make sure the gasket R is in good condition before replacing.

Refit the carburetor assembly to the machine (Section B8) and adjust the throttle stop screw to give an idling speed of approximately 500 r.p.m.

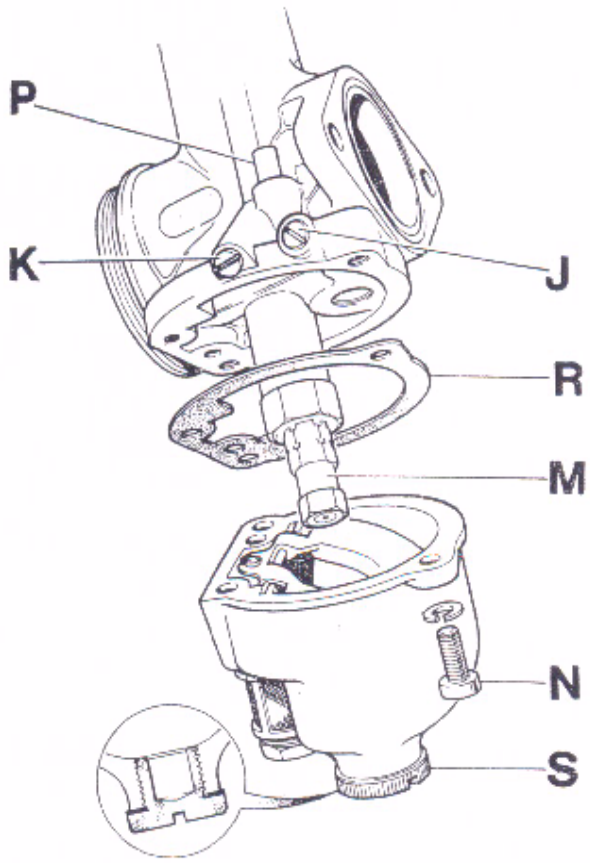


Fig. B. 12. The float chamber and jets

SECTION B12

REMOVING AND REFITTING THE CYLINDER HEAD ASSEMBLY

Proceed as in Section B2, removing and replacing the rocker boxes.

Slacken the exhaust pipe clips at the collector box below the engine. Remove the bolt which couples the inner exhaust pipes (in front of the cylinder head), and slacken the finned clips on the outer exhaust pipes adjacent to the head. The pipes can now be drawn forwards off the exhaust stubs using, if necessary, a mallet for this purpose.

Remove the carburetor and air cleaner assembly (Section B8), and remove the four remaining cylinder head securing nuts and plain washers, one turn at a time, until the load has been released. Lift the cylinder head off the locating studs, and remove the gasket.

If the gasket is in good condition, it may be re-used, but it should first be annealed by heating to a dull red heat and plunging edgeways into cold water. If in doubt about the efficiency of the gasket, it must be replaced by a new one.

REFITTING THE CYLINDER HEAD

Ensure that the junction surfaces of the cylinder block, and head are clean. Before assembling the gasket, a coating of Silastic sealant Q3-3305, or equivalent product, must be applied around the six dowel holes, on the top face only. Then place the gasket in position over the cylinder barrel studs and dowels.

Lower the cylinder head into position and fit the four outer cylinder head nuts and plain washers finger tight. Continue as described in Section B2, refitting the rocker boxes. (see Fig. B13)

The valve springs should be inspected for cracks and fatigue, the latter being determined by the spring length, which should be checked against that given in the General Data, page GD3. If the spring has settled by more than $\frac{1}{16}$ in. it must be replaced.

All parts should be thoroughly cleaned in kerosene (paraffin) and allowed to drain before reassembling.

* Assemble the inner and outer springs and top and bottom cups over the valve guide, then slide the valve into position having first lubricated the stem with a small amount of graphited oil.

Compress the springs with the Service tool and slide the split cotters into the exposed groove in the valve stem.

When the assembly is completed it is advisable to tap the end of each valve stem with a hide faced mallet to ensure that the cotters are fitted securely.

*** Each outer spring has a closed coil (i.e. reduced pitch) at one end. This end carries the colour code identification, and must be fitted towards the cylinder head.**

SECTION B14
RENEWING THE VALVE GUIDES

The valve guides can be extracted using service tool 61-6063 as shown in the illustration B16.

The same method may be employed to fit the new guide, except that the replacement portion of the tool is used, to avoid causing damage to the knife edge of the guide.

When re-assembling, lightly grease the valve guide and ensure that the guide is pressed in until the shoulder is flush with the cylinder head.

When new guides have been fitted it is necessary to re-cut the valve seats in the cylinder head and grind in the valves (section B16).

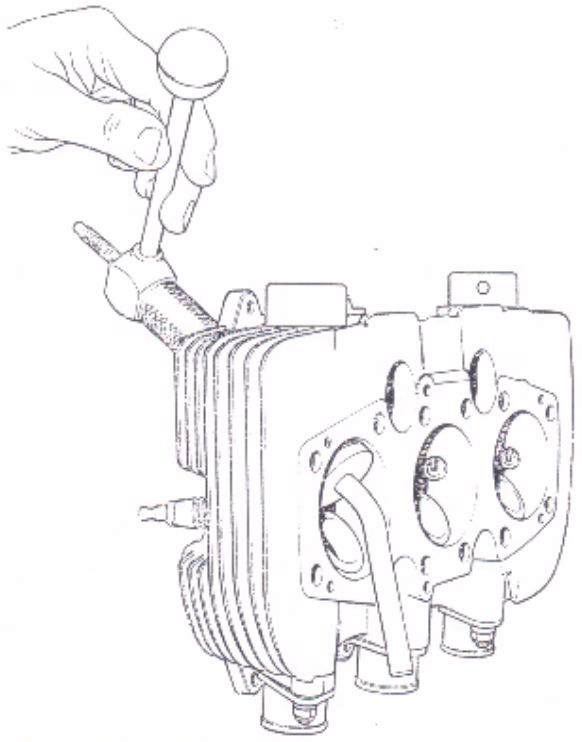


Fig. B16. Using assembly tool to replace valve guide

SECTION B15
DECARBONISING

Decarbonising involves the removal of carbon deposits from the piston crowns, combustion chambers, ports, valve heads, etc.

The presence of carbon, which is one of the products of combustion, is not harmful to the engine providing that it is removed before the deposits become excessive and therefore likely to cause pre-ignition or other faults which may impair performance.

The usual symptoms, indicating the need for decarbonising are, a tendency to "pink" (metallic knocking sound when under load), a general falling

To grind in the valve use a fine grade carborundum grinding paste but before returning the valve to its seat, insert a light spring under its head to assist in raising the valve when rotating to a new position see Fig. B18. Place a small amount of paste evenly on the valveseat and replace the valve in its guide with a holding tool attached.

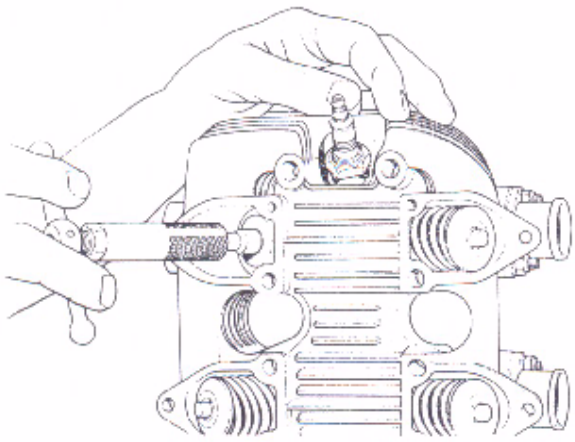


Fig. B18. Valve grinding

Use a semi-rotary motion, occasionally lifting the valve and turning it through 180°. Continue this process until the face and seat show a uniform matt finish all round. Wash the parts in kerosene (paraffin) to remove the grinding paste. Apply a smear of "Engineer's" marking blue to the seat of the valve. Rotate the valve through one revolution and inspect both seats. Successful valve grinding will give an unbroken ring of blue on the valve seat.

Alternatively, assemble the springs and split cotters and pour a small amount of kerosene (paraffin) into the port. It should not penetrate the seating for at least 10 seconds if a good seal has been achieved.

Prior to reassembling the cylinder head, ensure that all traces of "Blue" or grinding paste are removed by thoroughly washing in kerosene (paraffin).

SECTION B17

REMOVING AND REPLACING THE CYLINDER BLOCK AND TAPPETS

Proceed as in Sections B2 and B12, for removal and replacement of the cylinder head and rocker boxes.

Remove the cylinder base nuts, and plain washers. First, release the load on each nut in turn, starting from the outer nuts and working in a diagonal pattern and then remove. Secure the six cam followers using rubber bands or "O" rings so that they will not drop into the crankcase mouth as the block is lifted. The tappet guide blocks will remain in the cylinder block. Gently lift the cylinder block over the three pistons, ensuring that as each piston is released, its connecting rod is protected from being scratched or suffering other possible damage. A scratch could initiate a fatigue failure. Sleeves made of sponge rubber taped together and fitted over the connecting rods will make ideal protectors. (See Fig. B19).

When the cam followers are removed from the tappet guide blocks, ensure that they are stored in their correct order of removal, because they must be replaced in the same order to avoid excessive cam and tappet wear. Wash all parts thoroughly in clean gasolene (petrol).

If it has been decided to fit new piston rings, then the cylinder bores must be lightly honed as described in Section B21.

The joint surfaces of both the cylinder block and crankcase must be clean. Before replacing the cylinder block, assemble the cam followers into the tappet guides. Make sure that they are fitted in the correct position. It is advisable to use a new gasket.

SECTION B20

REMOVING AND REFITTING THE PISTONS

It is most important that the connecting rod protective rubbers are securely fitted at this stage.

First, thoroughly warm the piston to avoid the risk of damaging the wrist pin hole during extraction of the pin. This is simply accomplished by applying a heated electric iron for a few moments to the piston crown.

Remove the circlips from the pistons with the aid of a pair of circlip pliers. Withdraw the wrist pins using a proprietary tool (Fig. B21).

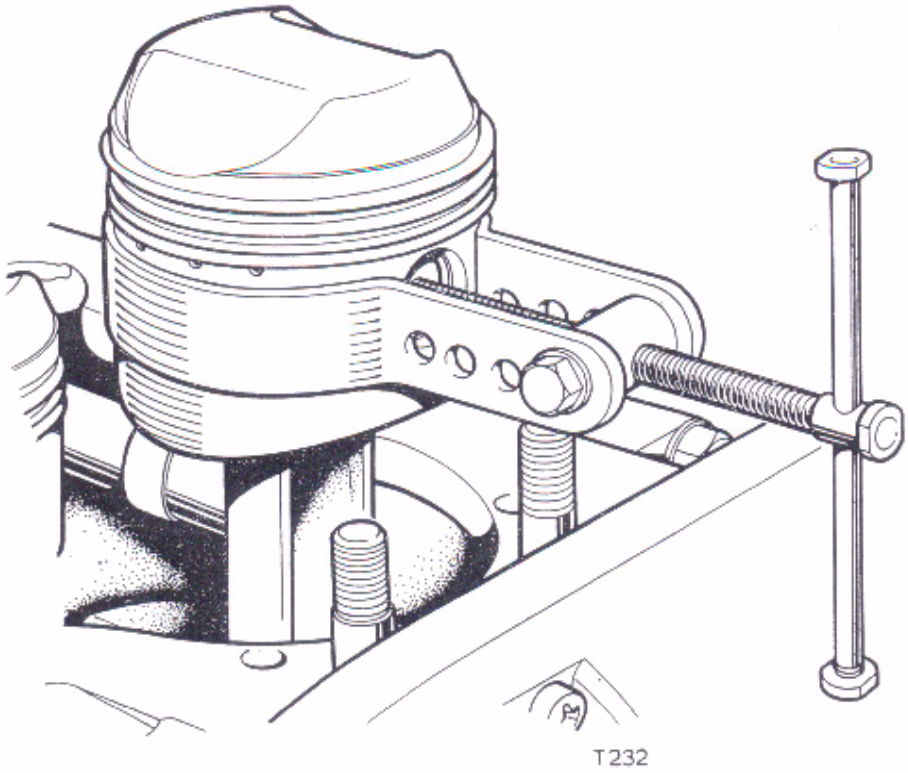


Fig. B21. Removing a piston

Alternatively in the absence of such a tool the pistons may be removed by driving out the wrist pin with a suitable drift after warming the pistons as already described. However, this is not a recommended practice, and may result in a damaged piston or distorted connecting rod. **The need for care cannot be over-stressed when using this method to remove the wrist pin.** When the pistons are removed they should be suitably scribed inside so that they can be refitted in their orignial positions. Each piston has "FRONT" stamped on the crown.

When refitting the pistons first place the inner circlip in position to act as a stop, then press the wrist pin into position using the proprietary tool.

It is advisable to renew the six circlips; this can be done for neglible cost.

If there is no alternative but to drive the wrist pin into position with a drift, the piston should first be heated to 100 degrees centigrade (boiling water temperature) to assist assembly. Dry thoroughly before use.

Finally, check that all the wrist pin retainer circlips are in position, and are correctly fitted. **This is extremely important.**

SECTION B22

INSPECTING THE PISTONS AND CYLINDER BORES

PISTONS

Check the thrust areas of the piston for signs of seizure or scoring.

High spots, leading seizures, are indicated by bright patches and scoring, following a seizure, is shown by deep scratches and injury to the surface of the piston. High spots may be removed with a **few** strokes of a fine file. Sometimes, following a seizure, the rings become trapped and again careful action with a file or scraper is required to release them.

The piston skirt is of a special oval form and is designed to have limited working clearance within the bores. The clearances are given in GENERAL DATA, page. GD4.

Prior to inspection, ensure that both the cylinder bores and pistons are clean and free from dirt, etc. Any deposits of burnt oil round the piston skirt can be removed by using a gasolene (petrol) soaked cloth.

NOTE: The top lands on pistons have a greater working clearance than that at the skirt and thus allow the top piston ring to be viewed from above, and the piston to be rocked slightly. However, this is not critical; it is the skirt clearances that are all important.

CYLINDER BORES

The maximum wear usually occurs within the top half inch of the bore, whilst the portion below the piston ring working area remains relatively unworn. Compare the diameters, measured at right angles to the wrist (gudgeon) pin, to obtain an across the thrust faces, i.e. estimate of the wear. A difference between these figures in excess of ·005 in. (·13 mm.) indicates that a rebore is necessary. Compare the figures obtained with those given below so that accurate information for the actual wear can be obtained.

An approximate method for determining the wear in a cylinder bore is that of measuring the piston ring gap at various depths in the bore and comparing with the gap when the ring is at the bottom of the cylinders. The difference between the figures obtained, when divided by three (an approximation of π) equals the wear on the diameters. As above, if the difference exceeds ·005 in. (·13 mm.), this indicates that a rebore is necessary.

SECTION B23

TABLE OF SUITABLE REBORE SIZES

Piston size ins. (mms.)		Bore ins.	Size mms.
Standard	Max.	2·6366	66·970
	Min.	2·6355	66·942
·010 (0·254 mm.)		2·6466	67·224
		2·6455	67·196
·020 (0·508 mm.)		2·6566	67·478
		2·6555	67·450
·040 (1·016 mm.)		2·6766	69·986
		2·6755	67·958

NOTE: Standard cylinder blocks are marked on the upper fin with the letters H, M or L as a production facility. These symbols should be removed by filing when a block has been re-bored. The recommended piston clearance is given in General Data, page GD4.

Retighten the securing screw, and recheck the gap.

Revolve the motor until the second nylon heel is in line with the scribed mark and proceed as before.

Repeat this procedure for the third contact set.

NOTE: Setting the spark timing is fully described in Sections B26 and B27.

SECTION B26

RE-SETTING THE SPARK TIMING

STATIC TIMING

It should be noted that the firing order is cylinder numbers one, three, two. The three leads as shown in Fig. B24 are coloured White and Black for number one cylinder (right side), Yellow and Black for number three cylinder (left side) and red and black for number two cylinder (centre).

Before the spark timing is adjusted, the contact breaker points gap must be checked, and if not within the specified 0·014 in. to 0·016 in., they must be adjusted as described in Section B25.

The blanking plug for the spark timing hole is located at the front of the timing side of the crankcase, at the position shown in Fig. B25. This plug should be removed

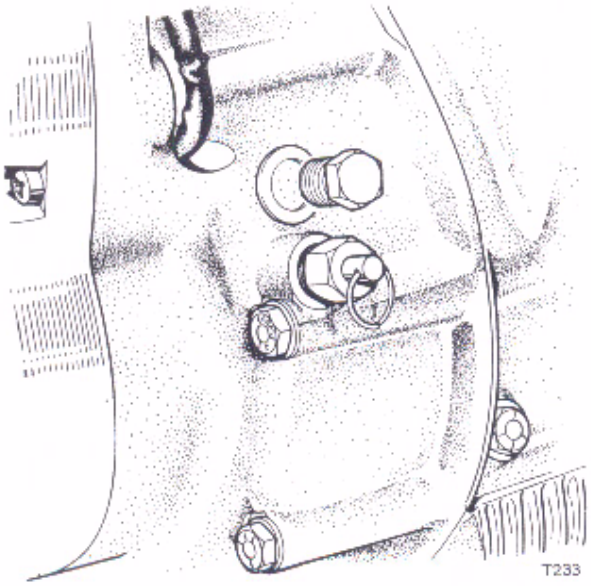


Fig. B25. Showing location tool in use

Remove both rocker covers, three sparking plugs and engage high gear to allow the engine to be rotated with the rear wheel. Rotate the engine forwards until top dead centre (TDC) is located on number one cylinder, with both valves closed (i.e. clearance on both tappets). Screw the service tool into the crankcase, and apply light finger pressure to the plunger. Turn the rear wheel slowly backwards, whereupon the plunger will locate in the hole drilled in the crankshaft web. The piston is now locked at 38° before TDC which is the correct spark timing position. If the auto advance unit has been removed, it should only be assembled loosely. Slacken and remove the auto advance central bolt, and fit an oversized washer A under the bolt (Fig. B26). When the bolt is tightened, the new washer will lock the cam in position. The auto advance unit should be replaced in such a position that number one points (Black and White lead) are just opened (0·0015 ins.) when the auto advance is locked in the full advance, (i.e. full clockwise) position.

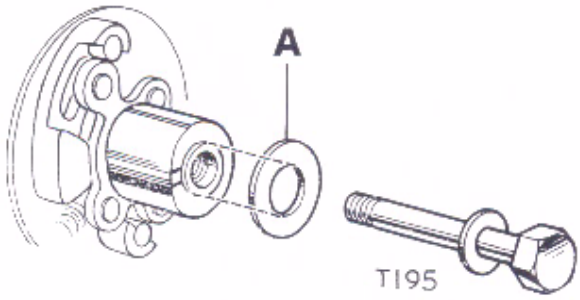


Fig. B26. Locking the auto advance mechanism

Recheck this setting and if found incorrect, the secondary back plate securing screw should be slackened, and the eccentric screw D (Fig. B24) turned to achieve the desired position. Retighten the securing screw, and recheck the point gap. If this is found to be satisfactory, withdraw the timing locating plunger. Establish the TDC position on the compression stroke on number three cylinder (Yellow/Black lead). Rotate the engine backwards until the timing plunger is felt to locate. If the contact points do not commence to open with the auto advance unit still locked in the full advance position slacken the secondary back plate securing screw C, and adjust the points on the eccentric screw D.

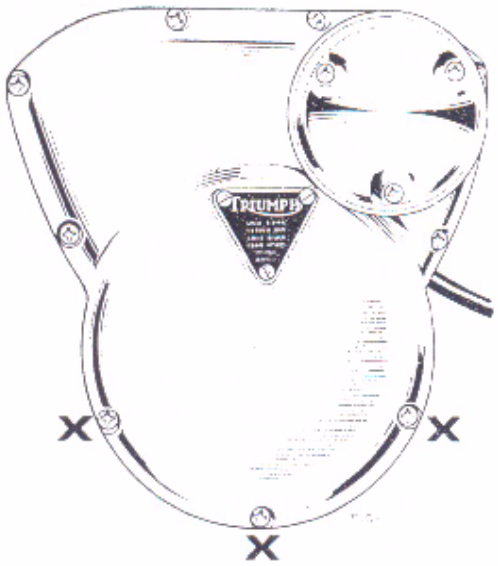


Fig. B28. Position of screws

To refit the timing cover insert the oil seal protector tool 60-7013 into the end of the camshaft. Apply jointing compound to the joint surface of the timing cover, and refit the cover over the protector tool. The long screws are situated at the lower half of the cover. Securely tighten all screws. (See page GD8).

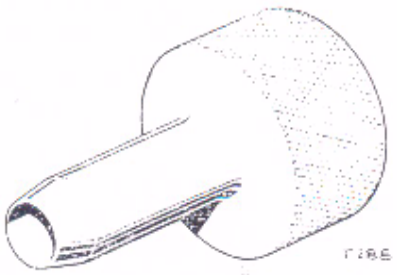


Fig. B29. Oil seal protector 60-1810

Before refitting the cover, clean off all traces of old jointing compound from both the timing cover and crankcase faces. Examine the contact breaker housing oil seal for signs of cracks or other damage. If necessary, renew the seal by prising the old one out with a screwdriver, and fitting a new seal with spring side towards the engine. The seal must be tapped home level with the inner surface of the cover.

Withdraw the tool through the contact breaker housing. Replace the spark advance and retard mechanism, contact breaker, etc. as detailed in Section B24.

Adjust the C.B. points (section B25).

Finally reset the spark timing (Section B26.).

SECTION B29

EXTRACTING AND REFITTING THE VALVE TIMING PINIONS

Before attempting to remove any of the valve timing pinions, it is necessary to release the load on the camshafts, caused by valve spring compression. This can be achieved by removing the rocker boxes (Section B2) or by slackening the valve rocker adjusters.

Remove the contact breaker (Section B24), the timing cover (Section B28), and the alternator rotor and stator which are retained by three locking nuts and washers and a large nut and tab washer on the crankshaft.

Select low gear and if possible obtain the services of an assistant to apply the rear brake.

Remove the camwheel retaining nuts, bearing in mind that they have LEFT HAND threads, and hence must be turned clockwise to release.

Remove the circlip which retains the intermediate pinion, and withdraw the thrust washer. (Fig. B30).

CAMSHAFT PINIONS

To facilitate extraction of both the inlet and exhaust camshaft pinions tapped holes ($\frac{1}{4}$ in. U.N.F.) are provided for extractor screws. (A protection washer or cap must be placed over the end of the camshaft to prevent damage by the center bolt of the extractor tool). These must be tightened alternately.

A spacing washer is fitted behind the pinion, and if removed should be placed in safe-keeping.

RE-ASSEMBLY

Replace the spacing washer and re-fit the key to the shaft.

Fit the pinion with the chamfer and timing dot outwards.

Assembly of the pinion is aided by service tool 61-6024, which consists of a tubular drift and guide, and ensures correct alignment.

Screw the guide onto the crankshaft, and slide the pinion over it, after having greased the pinion bore. Align the key and key way, and drive the pinion onto the crankshaft.

SECTION B30

VALVE TIMING

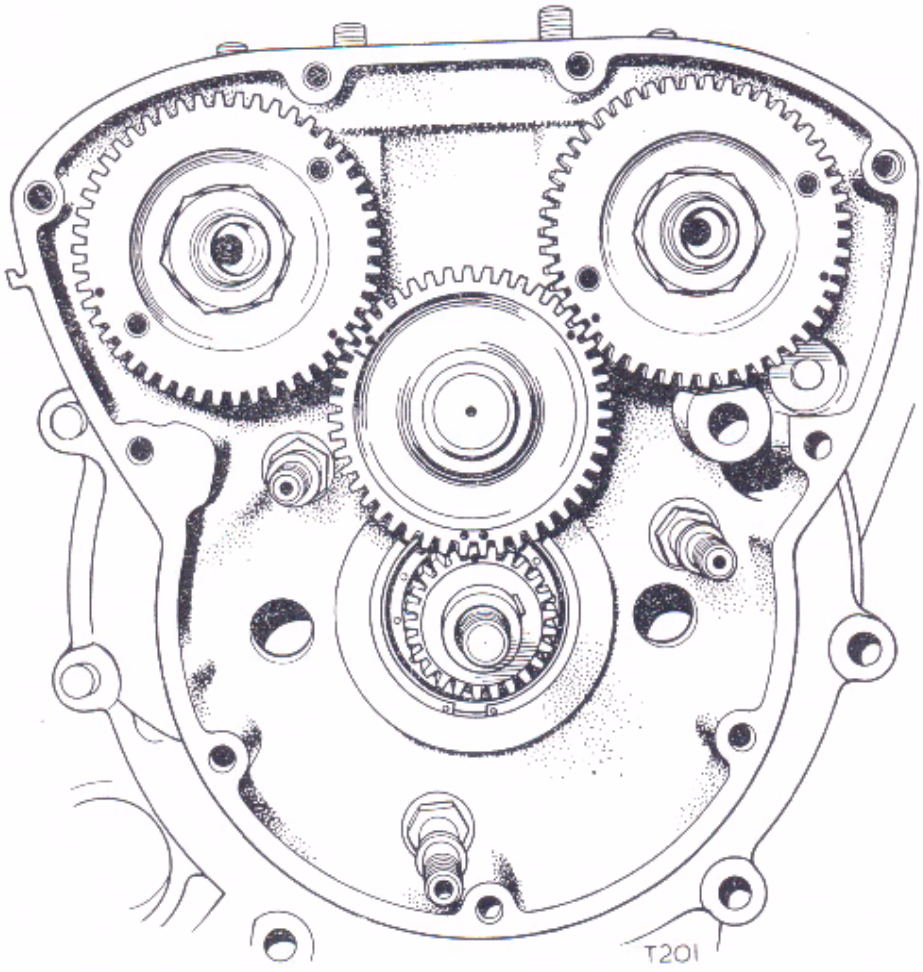


Fig. B33. Valve timing marks

Position the crankshaft and camshaft pinions so that the relevant timing marks are towards the intermediate pinion spindle. Assemble the intermediate wheel so that the timing marks coincide (see Fig. B33).

When checking the valve timing against the figures given in GENERAL DATA, it should be noted that these are relative to a valve rocker clearance of .020 in. for checking only.

It is advisable at this stage to remove the oil pressure release valve (Section A6). The tachometer drive can now be removed from the crankcase (Section B36).

Remove four self locking nuts and washers from the main bearing caps, and as the caps are located on waisted studs, the crank should be lifted to free them. **Under no circumstances should the caps be prised off.** After removing the crankshaft the connecting rods and big end shells can be removed. The caps are retained by self locking nuts, and after removal of the connecting rods the caps should be refitted to them to ensure that they are reassembled to the corresponding connecting rods.

The gearbox sprocket and high gear should be removed (Sections D7, D11) in order to check the condition of the high gear bearing and oil seal. If these parts are worn they should be replaced. Do not attempt to use a seal which has shown signs of leakage. Remove six nuts and plain washers securing the sump plate to the centre crankcase section, and then the plate, two gaskets and the metal gauze filter. This filter should be cleaned thoroughly in gasolene (petrol). It is advisable, at this stage, to remove the anti-drain valve (Section A10), and also the two main bearing oil way plugs, which are situated at the front of the centre crankcase, above the finned base. These oil ways should be cleared with compressed air line (See Fig. B36).

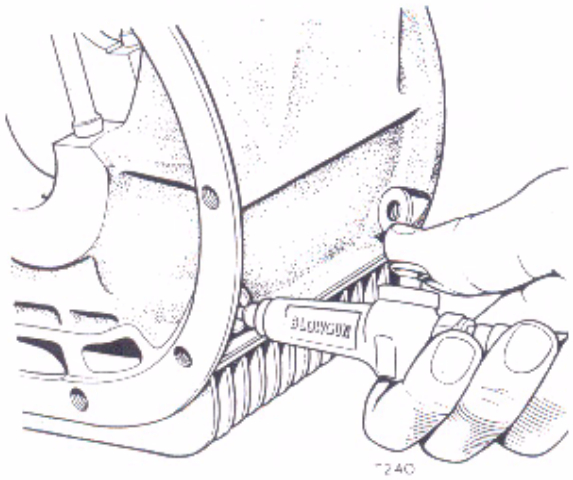


Fig. B36. Cleaning the crankcase oilways

CRANKCASE RE-ASSEMBLY

Prior to reassembly, all parts should be thoroughly washed in kerosene (paraffin) and should be scrupulously clean. All traces of old jointing compound should be removed from the crankcase joint faces.

Replace the gearbox high gear and gearbox sprocket (Sections D7, D11), and the assembled tachometer drive unit (Section B36).

Assemble the lower main bearing shells into the crankcase, ensuring that the locking tab is to the rear on both shells. The top shell should be fitted into the main bearing caps, again ensuring that the locking tabs are to the rear of each shell.

When fitting the crankshaft to the centre crankcase, the connecting rods must be assembled to the crankshaft, and suitably protected from damage. See Fig. B19. The crankshaft should be fitted with the large diameter threaded end to the left hand side. Refit the main bearing caps complete with shells, and ensure that they are fitted in the same order as they were removed. Replace two plain washers and two self locking nuts on each cap, and tighten down to the torque figure given in GENERAL DATA page GD8. Check that the crankshaft rotates freely.

Replace the oil pressure release valve (Section A6), the anti-drain valve (Section A10), and two oil way blanking plugs and fibre washers. Any suspect fibre washers should be renewed.

Assemble the sump plate, ensuring that two new gaskets are fitted, one above the gauze filter, and one below. The sump plate is fitted with the pocketed end towards the rear of the engine.

During the remainder of the assembly, observe the following procedures.

Ring seals are fitted in the recesses at either side of the oil filter housing on the centre crankcase section. If the seals appear damaged in any way they should be renewed.

The housings for the cross shaft seals were themselves sealed on assembly, with loctite sealant (grade 542) which should again be applied to the longer outer diameter and the adjacent face i.e. the portion which fits into the outer case sections. Examine the seals carefully and renew these if showing any imperfections.

Apply jointing compound to the joint surface of the left side crankcase section, lubricate the main

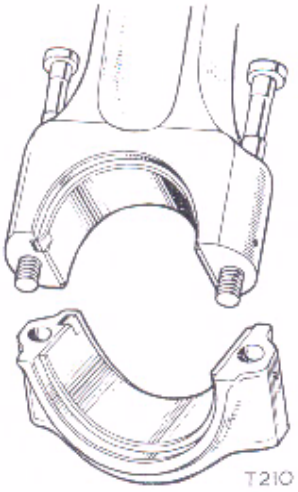


Fig. B38. Refitting a connecting rod

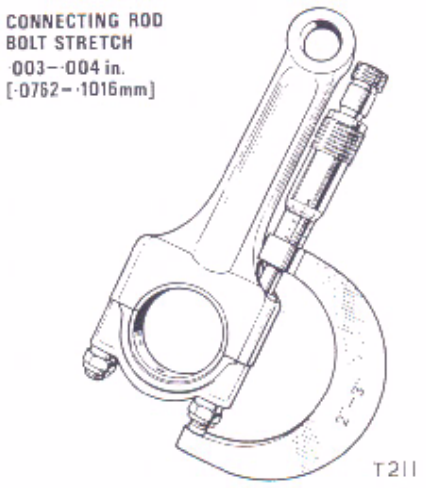


Fig. B39. Checking the bolt extension

Refit the bolts and screw on the nuts, a turn at a time, and tighten the nuts to the torque figure given on page GD7, or in the absence of a torque wrench to the bolt extension figure given (see Fig. B39).

SECTION B34

INSPECTING THE CRANKCASE COMPONENTS

In preparation for inspection, thoroughly clean the crankcase, main bearings, crankshaft and connecting rods, etc., in kerosene (paraffin) and allow them to drain. If there is an air pump accessible, then dry the components with a jet of compressed air and examine them as follows:–

(1) BIG-END & CENTER MAIN BEARINGS

The extent of wear to the bearing journals can be determined by inspecting the bearing surfaces for scoring, and by measuring the diameter of the journals with a micrometer. Light score marks can be reduced with smooth emery cloth, but ensure that all parts are carefully washed after this operation.

Where a journal has been only lightly scored, the shell bearings should be renewed. If the scoring and wear is extensive, the journals should be reground to a suitable size, as given below.

NOTE: The replaceable white metal shell bearings are pre-finished to give the correct diametral clearance. Under no circumstances should the bearings be scraped or the end cap joint faces filed.

BIG-END BEARINGS

Shell bearing marking	*Suitable crankshaft size*	
	in.	mm.
Standard:—	1·6235 1·6240	41·237 41·250
Undersize:— —·010	1·6135 1·6140	40·983 40·996
—·020	1·6035 1·6040	40·729 40·742
—·030	1·5935 1·5940	40·475 40·488
—·040	1·5835 1·5840	40·221 40·234

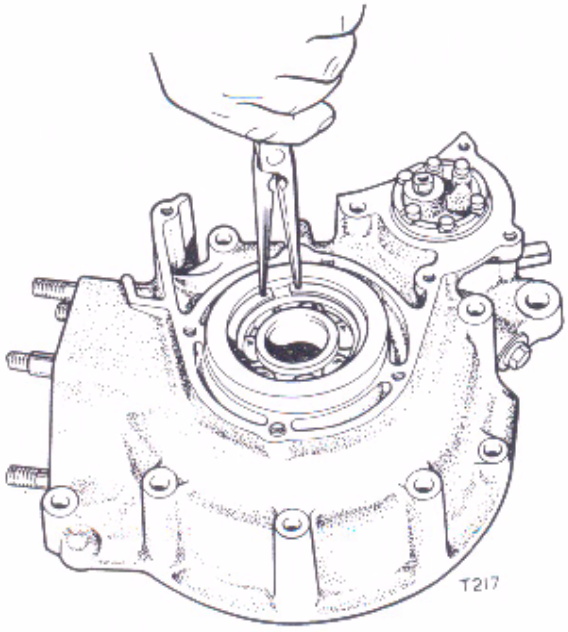


Fig. B40. Removing a circlip

The right side bearing is a roller type, and the inner portion is withdrawn with the crankshaft.

To remove and replace the outer race, employ the procedure previously described for the left bearing, but using service tool 61-6020.

The inner portion should be extracted from the crankshaft with the aid of service tool No. 60-3677 See Fig. B42 and replaced with a hollow drift. A small amount of Triumph Loctite should be applied to the crankshaft before refitting the inner portion.

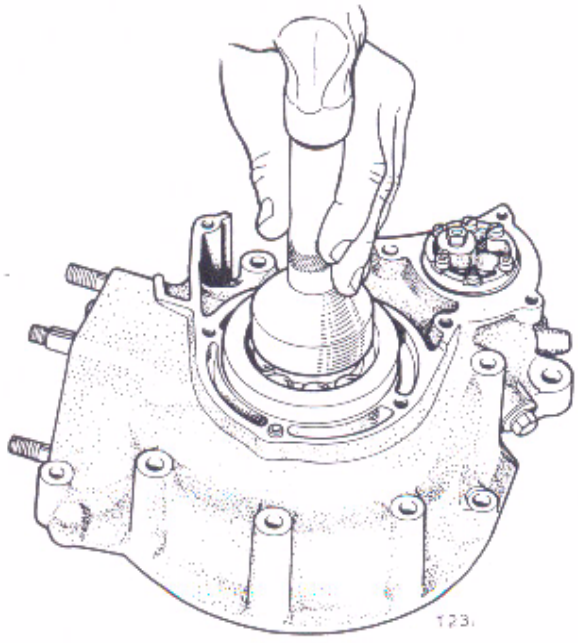


Fig. B41. Replacing a bearing

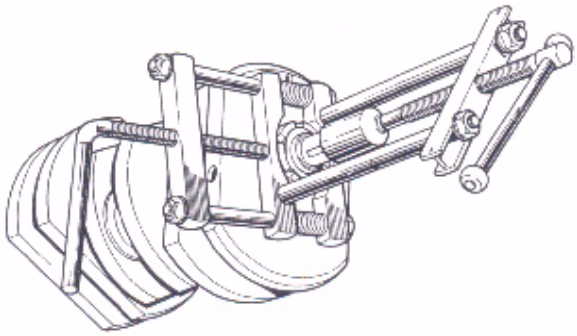


Fig. B42. Extracting right side bearing inner spool

To replace the centre bearing shells, they should be gently lifted away from either the bearing caps or crankcase supports. Use a small screwdriver, and lift each shell from beneath the locating tab. Ensure that each cap and support is clean, and refit the new shells, taking care to ensure that the tabs are located correctly in the machined slots.

SECTION C

PRIMARY DRIVE

SECTION C3

ADJUSTING THE CLUTCH OPERATING MECHANISM

Remove the inspection plate and gasket from the outer primary chaincase, to allow access to the clutch operating mechanism.

Very little movement is required in the clutch pull rod to disengage the friction plate; there must be a clearance of approx. 0.002 in. between the rear face of the large adjuster nut and the ball bearing in the actuating plate. If too much clearance is allowed, then it may be found impossible to disengage the clutch. On the other hand, if excessive clearance is present, the clutch friction plate will constantly slip, and will eventually burn out.

ADJUSTMENT

Withdrawal of the footrest rubber simplifies removal of the inspection cover 'A' Fig. C3, which provides access to the clutch operating mechanism. Completely slacken off the cable adjuster at the handlebar and also at the chaincase at 'A' Fig. C2. Extract the cable from the handlebar lever.

Hold the sleeve nut M and release the small locknut R. Still holding the nut M stationary, unscrew the operating rod P with a screw-driver until the clearance between the rear-face of the sleeve nut and the thrust bearing (behind the nut) is only just taken up, i.e. the rod P has no end-play.

Re-assemble the cable, which must then have all slackness removed by means of adjuster A. (Fine adjustment only, is provided at the handlebar). Now screw-in the rod P just sufficiently to give a trace of end play (0.002 in.) (0.012 mm) and tighten locknut R. This end-play is essential and will give the correct amount of cable slackness at the handlebar.

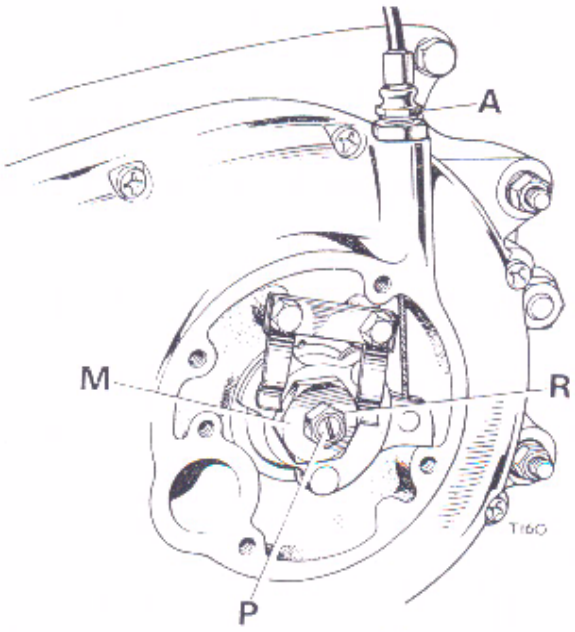


Fig. C2. Showing clutch adjustment

Adjustment of the clutch operation must not be made by means of the cable only. The above sezuence of instructions must always be followed Take the greatest care during any minor cable adjustment at the handlebar, that in the process, the clutch is not partially freed.

SECTION C4

ADJUSTING THE PRIMARY CHAIN

The primary chain is of the duplex type, and is non-adjustable, since the centres of the engine mainshaft and transmission mainshaft are fixed. Provision for take-up of wear in the chain is made by means of a rubber faced slipper blade, pivoted below the lower run of the chain. The free movement in the chain can be felt with the finger, after removing the slotted inspection plug from the chaincase, with the ENGINE STOPPED.

To adjust, first apply pressure to the starter pedal by hand, to remove all slackness from the bottom run of the chain, when there should be approx. $\frac{3}{16}$ in. (5 mm) of free play in the top run. Fig. C3.

To reduce excessive slackness, remove the sealing cover A, release the locknut B, and screw the

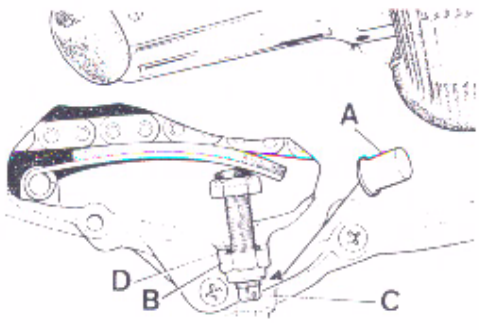


Fig. C3. Primary chain adjustment

SECTION C6
REFITTING THE CLUTCH COVER
(For removal, see Section C7)

Check that the oil seal in the centre of the cover is not cut, or otherwise damaged. If it is necessary to renew the seal, drive it out using a shouldered drift, and tap the new seal into position, lip towards the gearbox, and level with the outer boss of the cover.

Ensure that the joint surfaces are clean, and tap the clutch gently home to the crankcase with a hide hammer, until the spigot on the cover locates in the crankcase recess. Fit and tighten up the three screws.

SECTION C7
DISMANTLING THE PRIMARY DRIVE
(To gain access to the clutch)

Before commencing operations, engage a gear as an aid to releasing various nuts. Remove the outer primary chainscase and associated fittings (See Section C5) and collect the needle roller thrust bearing from the centre of the chainwheel. Note the order of bearings and washers. Remove the gearshift quadrant from the crosshaft, following release of the self locking nut. Straighten the washer which secures the engine sprocket nut, and remove this, using a tabular wrench, tommy bar and hammer. There is no tab washer under the chainwheel nut, but before attempting removal, cover the threads of the clutch pull rod with a strip of sellotape, to prvenet damage to the oil seal on removal. Both sprockets are then ready for withdrawal. Note that the sprockets and primary chain must be removed as a set, because the chain is "endless" i.e. it is not fitted with a connecting link, and hence cannot be removed independently (See Section C12). Carefully preserve the shims removed from behind the engine sprocket.

Straighten the tab washer and remove the nut holding the oil pump drive gear to the pump spindle. Take off the gear which is located on a taper diameter, and will require the use of universal extractor set 61-3808. The outrigger bearing for the cross shaft must next be dismantled. Straighten the tab washer and unscrew the two set pins which will release the bearing, spacing sleeve, and locating plate, all of which can be then withdrawn. Do not disturb the pinion on the crankshaft, but draw the intermediate idler gear off its spindle.

Remove the long bolts securing the inner chain case to the crankcase, together with all the screws, when the chaincase is free to be removed. The clutch is now exposed. This is a sliding fit on the splines of the clutch hub, and can be withdrawn complete with pull rod.

SECTION C9

PRIMARY CHAIN SPROCKET ALIGNMENT

It is essential that the primary chain misalignment does not exceed 0.010 in.

Owing to the design of the primary transmission, the engine and shock absorber sprockets cannot be accurately aligned with the customary use of a straight edge, unless used in conjunction with a cutaway primary outer cover (Fig. C6).

Normal manufacturing tolerances, which apply to the inner and outer primary covers, and all other components from which the shock absorber is constructed, create a variation in the amount of shock absorber end-float. Since operation of the clutch presses the shock absorber assembly against its thrust bearing, the end float present in each particular engine unit must be eliminated before checking the alignment.

If either of the primary covers, or any component part of the shock absorber, is changed for any reason, the amount of end-float will almost certainly alter. It is also necessary to account for variations in the thickness of the primary cover gasket.

Sprocket alignment must be checked without the chain in position.

Replace the engine sprocket, together with any shims formerly fitted between the sprocket and the oil pump drive gear behind it. Drive the sprocket home with a tubular drift.

Carefully clean the joint face of the inner cover and add the gasket.

Replace the chainwheel assembly onto the clutch shaft splines and then fit the needle roller thrust bearing to the inner face of the chainwheel.

At this stage, the cutaway outer primary chaincase is necessary. As shown in Fig. C6 the cover requires only three equally spaced fixing holes and the needle roller bearing and thrust washer in situ. The remainder of the cover can be cut away.

Pull the shock absorber chainwheel to abut to the cutaway chaincase and hold in this position.

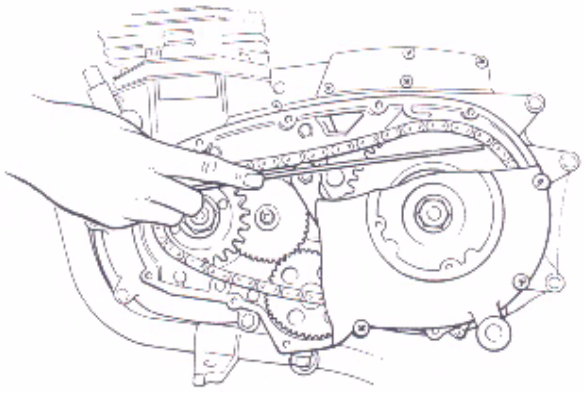


Fig. C6. Cutaway outer primary cover

Lay a steel straight edge, about 12 inches long, across the face of the chainwheel (**not** across the central boss) and check against the face of the engine sprocket. If re-alignment is necessary, remove the engine sprocket with the Service tool as shown in illustration Fig. C7, and add (or extract) shims of appropriate thicknesses behind the sprocket. Again, drive the sprocket home and make a final check of the alignment.

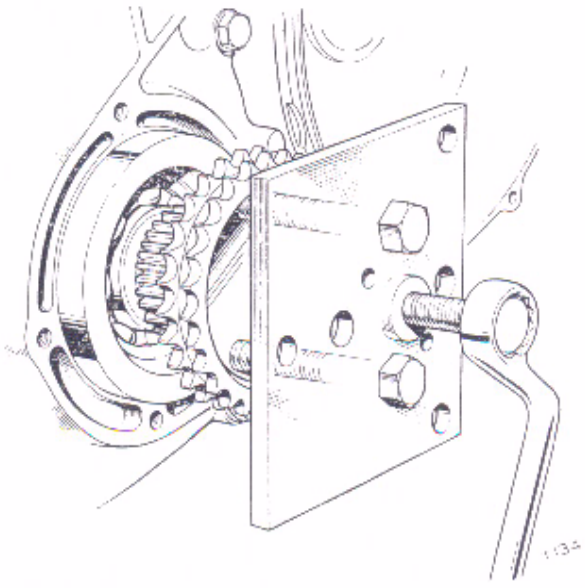


Fig. C7. Extracting the engine sprocket

SECTION C11

RENEWING SHOCK ABSORBER RUBBERS

When the outer primary chaincase is removed access will be gained to the chainwheel and shock absorber assembly. If the shock absorber rubbers are to be renewed, it is recommended that the chainwheel assembly be removed completely and mounted on a special jig, which can be held securely in a vice. This is shown in Fig. C9 together with the special leverage bar which will be essential for this task. The jig and bar can be made up to the dimensions shown in Fig. C10.

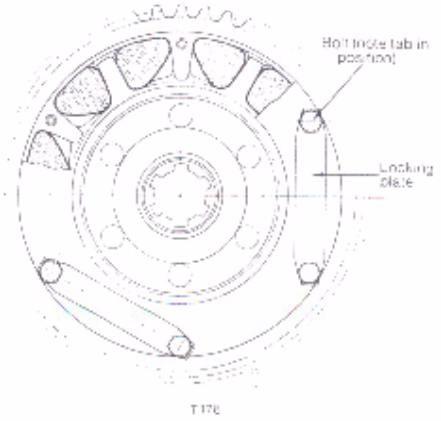


Fig. C9. Late type with common rubbers (Showing also the later retaining plate fixing using locking plates and bolts)

The chainwheel shock absorber retaining plate is secured with locking plates and bolts. Straighten the tabs before attempting to remove the bolts.

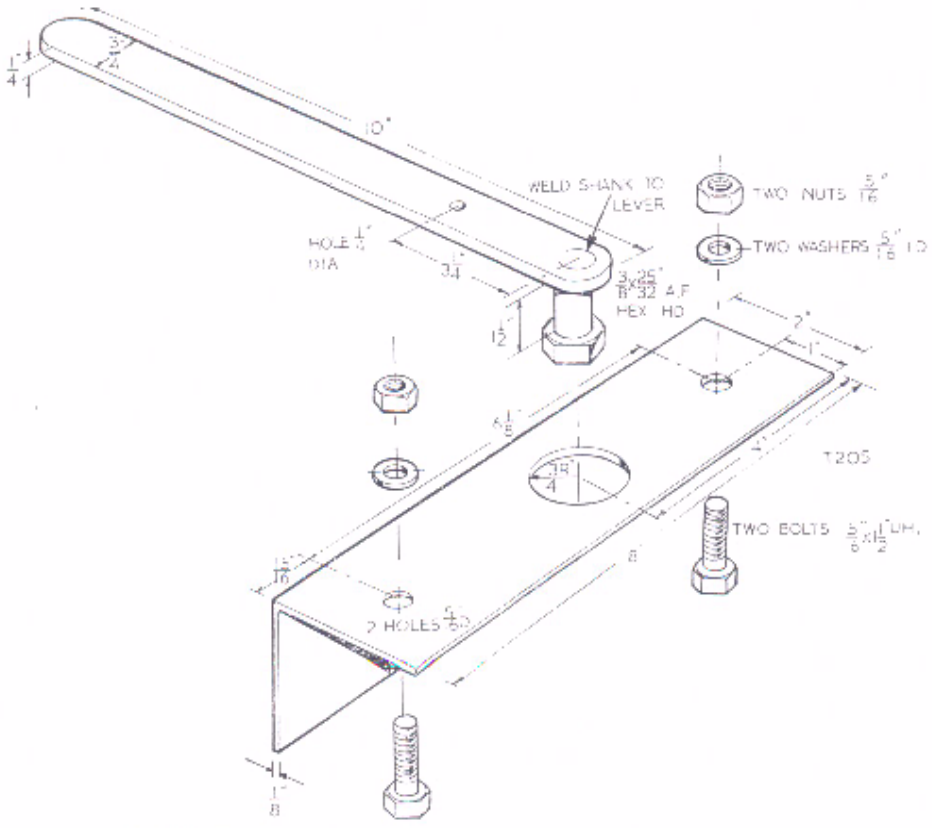


Fig. C10. Sketch of shock absorber mounting plate and leverage bar

SECTION C13

INSPECTION OF PRIMARY DRIVE COMPONENTS

(1) Inspect the primary chain for excessive wear of the rollers and pivot pins, and check that the elongation does not exceed 1½%. To do this, first scribe two marks on a flat surface exactly 14 in. (35.5 cm.) apart, then after degreasing or washing the chain in kerosene (paraffin), place the chain opposite the two marks. When the chain is compressed to its minimum free length the marks should coincide with the centres of two pivot pins 32 links apart. When the chain is stretched to its maximum free length the extension should not exceed 0.2 ins. (6.25 mm.).

Inspect the condition of the sprocket teeth for signs of hooking and pitting.

A very good method of indicating whether the chain is badly worn or not is to wrap it round the chainwheel and attempt to lift the chain from its seating at various points around the sprocket. Little or no lift indicates that both the sprocket and chain are in good condition.

If the engine sprocket is a tight fit on the crankshaft, there is no cause for concern, as such a fit is to the best advantage.

(2) Check the fit between the shock absorber spider and the clutch shaft splines. The spider should be a push fit onto the splines and there should not be any rotary movement.

Similarly check the fit of the engine sprocket splines on the crankshaft. Again there should not be any rotary movement.

(3) Check that the shock absorber spider is a good working fit in the inner and outer retaining plate and that the arms of the spider have not caused excessive score marks on the inner face of the housing. Check the working clearance by assembling the shock absorber unit without the rubbers.

SECTION C14

REAR CHAIN ALTERATIONS AND REPAIRS

If the chains have been correctly serviced, very few repairs will be necessary. Should the occasion arise to repair, lengthen or shorten the chain, a rivet extractor, as shown in Fig. C12, and a few spare parts will cover all requirements.

(1) 

To shorten a chain containing an even number of pitches, remove the dark parts shown in (1) and replace by crank double link and single connecting link as shown in (2).

(2) 

(3) 

To shorten a chain containing an odd number of pitches remove the dark parts shown in (3) and replace by a single connecting link and inner link as shown in (4).

(4) 

(5) 

To repair a chain with a broken roller or inside link, remove the dark parts shown in (5) and replace by two single connecting links and one inner link as shown in (6).

(6) 

Fig. C11. Rear chain alterations

SECTION D

TRANSMISSION (GEARBOX)

SECTION DI

SEQUENCE OF GEARSHIFTING

The gearshift is operated by the pedal on the left side of the machine, the pedal being splined to the gearshift spindle, with which is combined the plunger housing. The two spring loaded plungers project from the housing, so that, as the gear pedal is moved up and down, the plungers locate in the teeth at the outer end of the quadrant. This is pivoted in the centre and the inner teeth engage with the captive pinion on the camplate. See Fig. D2.

Figs. D3(i) to D3(vi) illustrate the camplate with its plunger, and the engaging pins of the selector forks which can be seen in the camplate tracks. The three sliding pinions are moved along the mainshaft and layshaft by the selector forks. The neutral positions of the camplate and gears are shown in Fig. D3(ii).

When the pedal is depressed to engage low gear (first), the camplate is turned anti-clockwise, moving the layshaft selector fork to mesh the sliding first gear with the dog-lock on the end of the layshaft. (The dog-lock is illustrated in Fig. D1).

As second gear is selected by lifting the pedal, the second layshaft selector fork brings the sliding third gear into mesh with the layshaft second gear, while the previous selector fork disengages first gear from the dog-lock.

Movement of the gear lever in the same direction will select third gear by moving the mainshaft sliding gear into mesh with the mainshaft third gear, At the same time the second layshaft selector disengages second gear.

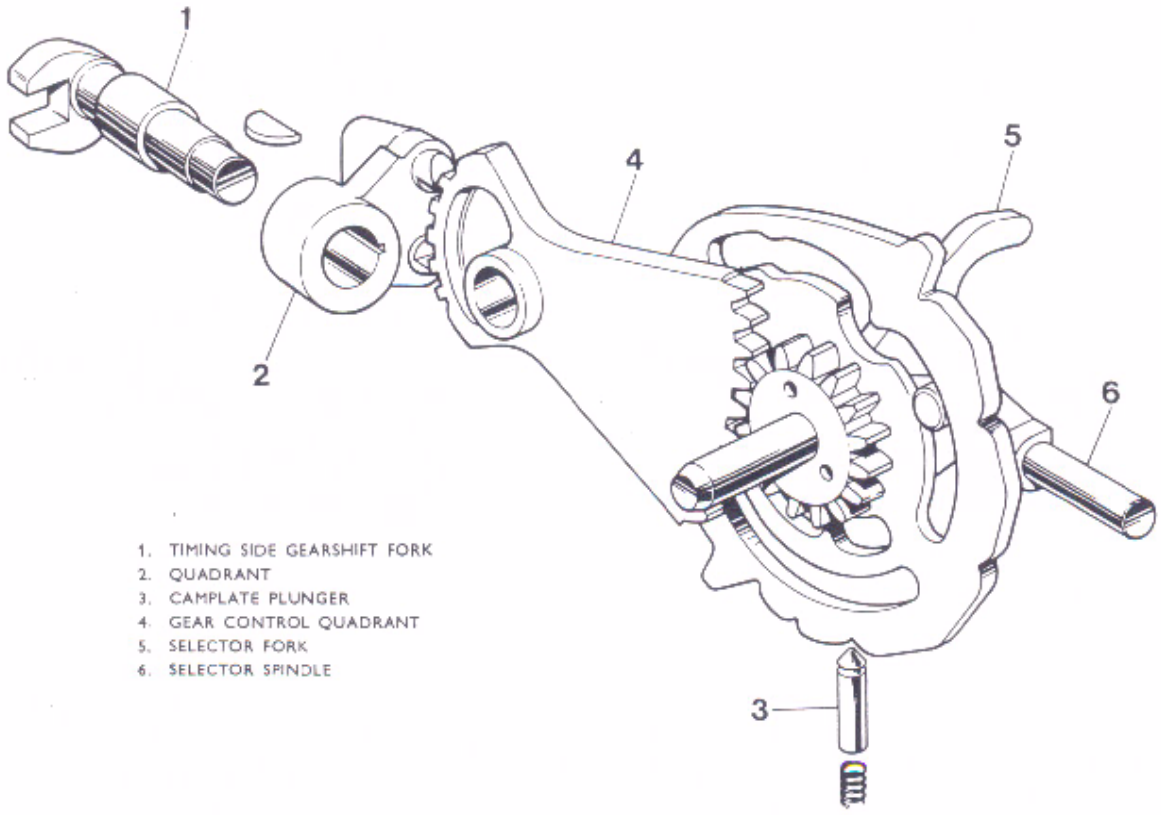


Fig. D2. Gear selection components

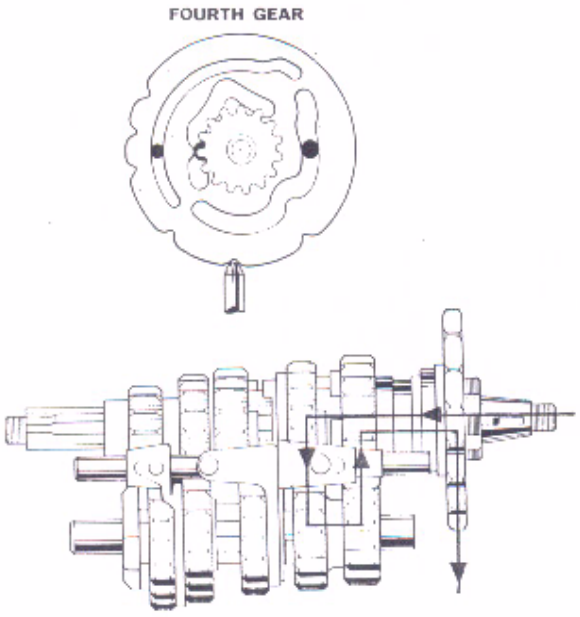


Fig. D3(v)

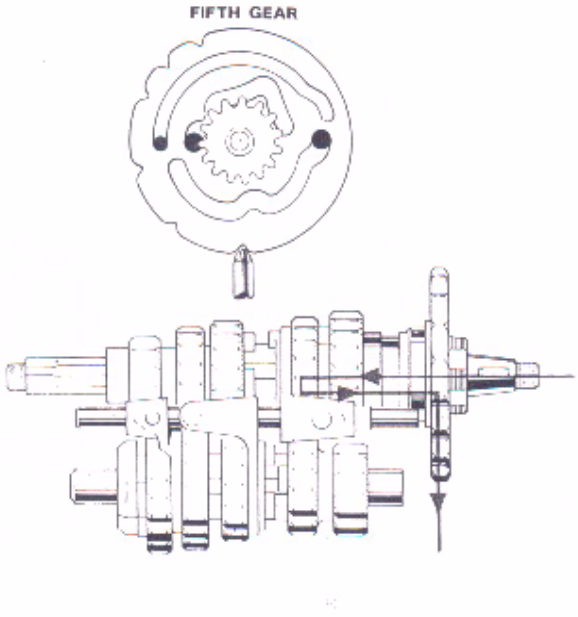


Fig. D3(vi)

SECTION D2

REMOVING AND REPLACING THE TRANSMISSION OUTER COVER ASSEMBLY

Remove the right side footrest. Place a drip tray underneath the transmission (gearbox), and unscrew the filler plug and drain plug ('S' and 'T' Fig. D4).

Engage top gear. This will allow several otherwise difficult nuts to be unscrewed more easily, by subsequently applying the rear brake when required.

Unscrew the three screws (two long and one short) which secure the round inspection cover. Take off the cover. Remove the self-locking nut on the end of the cross shaft, and take off the washer.

Take out the screws around the periphery of the outer cover, and also the retaining nuts. Depress the kickstart lever, until the first tooth of the quadrant engages. Strike the lever downwards with the palm of the hand. This should free the cover.

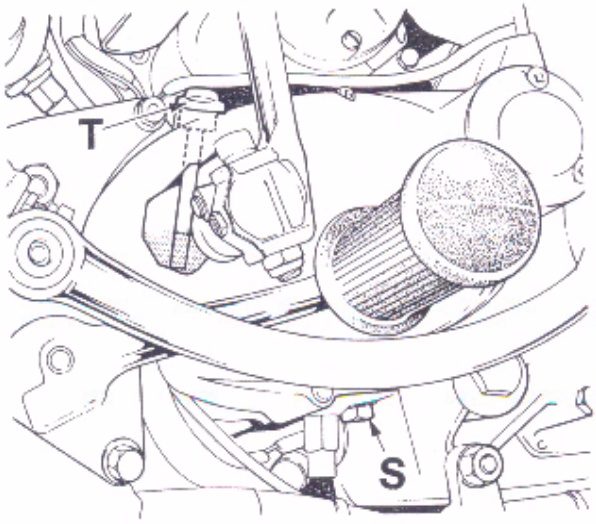


Fig. D4
Draining the transmission

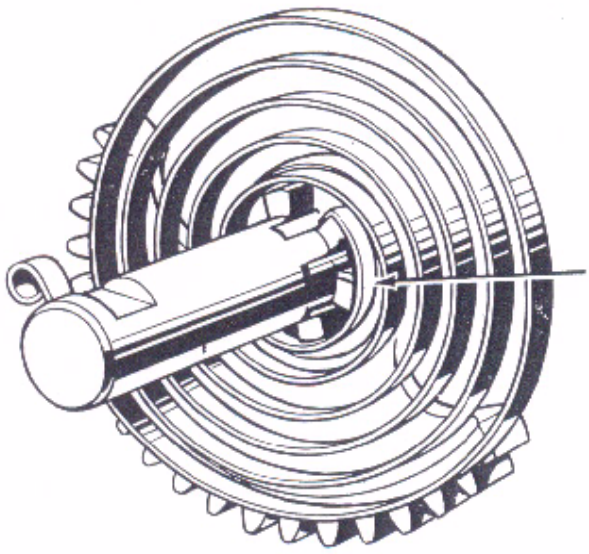


Fig. D6. Kickstart quadrant and spring. Arrow indicates correct spring location.

To reassemble the mechanism, first refit the sleeve, spring, pinion and ratchet to the transmission mainshaft, and reassemble the tab washer. Then screw on the retaining nut to the torque figure given in "General Data". **Do not over-tighten the retaining nut as this may result in failure of the inner steel sleeve.**

Fit the return spring to the kickstart quadrant as shown in Fig. D6. Assemble the spindle into the kicl start bush, and locate the return spring onto the anchor peg at the rear of the cover. Fit the oil seal over the spindle, and assemble the kickstart crank, locking it into position with the cotter pin from the rear. Refit the outer cover as shown in Section D2. Do not forget to refit the oil seal. Refill the gearbox with the correct grade of lubricant (Section A2).

SECTION D4

DISMANTLING AND REASSEMBLING THE GEARSHIFT MECHANISM

Remove the four nuts and locking washers securing the guide plate. Withdraw the plate, curved return springs, and plungers and springs. Thoroughly clean the parts in kerosene (paraffin) and inspect them for wear etc., as shown in Section D6.

Use a smear of oil to assist re-assembly. When refitting the retainer plate, remember that a locking washer fits under each of the four nuts.

Refit the springs and plungers, taking care that they are not suddenly ejected from their seats during assembly.

It is unlikely that the gearshift fork will need to be removed, but if, for any reason, it does, it should be remembered that it is keyed in the quadrant. It will therefore be necessary to use a drift or an arbor press to part these items, and a similar procedure will be required to reassemble them.

SECTION D5

DISMANTLING AND REASSEMBLING THE GEARSHIFT CROSS SHAFT

Remove the Left side footrest, and also the primary drive outer cover, after draining the oil from the primary drive assembly. Remove the nut and washer from the end of the cross over shaft. Note the position in which the cross shaft quadrant is fitted, and remove the quadrant from the shaft.

Take off the transmission outer cover on the right side of the machine, as described in Section D2. The cross-over shaft can then be withdrawn from the right side. Note that the splined end of the shaft is to the right side of the machine.

Reassembly is mainly a reversal of the dismantling procedure. The cross-shaft quadrant on the drive side should be fitted in the position from which it was removed (See Fig. D7).

Next, refit the transmission outer cover, taking care to position the cross shaft link lever ready for fitting onto the splines of the cross shaft as the cover is tapped home. The refitting procedure is detailed in Section D2.

On the primary drive side, check that the gasket is in good condition. If any doubt exists, it should be replaced. Use a smear of grease when locating it on the joint face.

the kickstart return spring for fatigue cracks and signs of wear, particularly at the centre where it engages on the splines of the spindle.

(2) Examine the kickstart spindle bush for wear. If the required measuring instruments are not available, use the spindle as a gauge and feel the amount of play.

(3) Examine the kickstart ratchet mechanism for wear, paying particular attention to the ratchet teeth, ensuring that they have not become chipped or rounded. Check that the thin steel bush is a clearance fit in the kickstart pinion, and that the spring is not badly worn.

(4) Finally, check that the kickstart stop peg is firmly pressed into the inner cover, and is not distorted.

SECTION D7

RENEWING KICKSTART AND GEARSHIFT SPINDLE BUSHES

If it is found necessary to renew the kickstart spindle bush, this should be done by completely stripping the outer cover of its assembly parts and heating it to 100·C. (boiling water temperature), then driving the bush out using a suitable shouldered drift. Press in the new bush while the cover is still hot.

Adopt a similar procedure for removal of the outer cover gearshift spindle bush. The inner cover bush does not usually wear much, even after great mileage has been covered. However, if it is required to renew the bush, the inner cover should be removed (Section D8), and the camplate operating quadrant disconnected.

Using a suitable tap (e.g. $\frac{3}{4}$ in. dia. × 10 Whit.), cut a thread in the bush to a depth of $\frac{3}{4}$ in.; heat the cover to 100·C., then reinsert the tap, or, preferably, a suitable bolt. Grip the bolt (or tap) firmly in a vice, then drive the cover away, using a hide mallet, until the bush is free.

A press or suitably shouldered drift is required to drive in the new bush, which should be done whilst the cover is still hot.

SECTION D8

DISMANTLING THE TRANSMISSION (GEARBOX)

Remove the outer cover as shown in Section D2, leaving the transmission with 5th (top) gear selected.

Remove the rear right engine mounting plate, together with the rear brake pedal (See Section B1 page B5).

Straighten the tags on the lock washer, and unscrew the kickstart pinion ratchet retainer nut from the end of the mainshaft. This should be easily achieved with 5th (top) gear selected and the rear brake applied.

Remove the outer primary cover, and dismantle the drive, shown in Section C, not forgetting, finally, to remove the key from the transmission mainshaft.

The gearbox inner cover is retained by a socket screw, two cross head screws, and a bolt (See Fig. D8). When these are removed, the cover can be released by tapping it outwards with a hide mallet.

Withdraw the engaging dog from the layshaft (See Fig. D9). Then remove the circlip from the end of the layshaft with a pair of circlip pliers. Pull the selector rod out and then remove the layshaft first gear with its selector fork. Withdraw the second gear from the layshaft and then remove the mainshaft complete with first, second, and third gears in position. Remove the mainshaft fourth and layshaft third gears with their selector forks, and then withdraw the layshaft with the fifth and fourth gears in position. Detach the two brass thrust washers which locate over the needle roller bearings. Before removal of the camplate, the mainshaft high gear will have to be detached from the gearbox sprocket, and withdrawn from the crankcase. This can be done by removing the circular plate from the primary inner cover at the rear of the clutch, tapping back the bent-over portion of the locking plate, and unscrewing the large hexagonal gearbox sprocket nut (1.875" across the flats). To facilitate removal of the nut, Workshop Tool number 60-6125

SECTION D9

INSPECTION OF THE TRANMISSION (GEARBOX) COMPONENTS

Thoroughly clean all parts in kerosene (paraffin) and check them for wear and fatigue, as follows:—

(1) Inspect the housing and inner cover for signs of cracking and damage to the joint faces. Check that the location dowels are in their correct positions in the gearbox and inner cover (2 dowels each). In preparation for re-assembly, clean all the joint faces.

(2) Examine both the mainshaft and layshaft for signs of fatigue, damaged threads, and badly worn splines. Check the extent of wear to the bearing diameters of both shafts by comparing them with the figures given in "General Data". Examine the shafts carefully for signs of seizure. Excessive frictional resistance and seizure will be indicated by local coloring on the shaft.

(3) Check the layshaft needle roller bearing by inserting the layshaft and feeling the amount of play.

(4) Inspect the mainshaft bearings for roughness due to pitting or indentation of the ball/roller tracks. Note that the high gear bearing operates directly in a roller bearing pressed into the left side crankcase half. If wear is apparent at the high gear bearings (check general data for high gear spigot dimensions), it will be necessary to replace the roller bearing *and* the high gear. **Under no circumstances should the bearing or the high gear be replaced independently.**
Check the inner cover bearing by feeling the amount of side play of the centre track. It should not be possible to detect any movement by hand if the bearing is in good condition. The mainshaft should be a push fit in the inner cover bearing.

(5) Examine the gears thoroughly, for chipped, fractured or worn teeth. Check the internal splines, dogs and bushes. Make sure that the splines are free on their respective shafts without any tendency to bind, and that the bushes in the mainshaft third gear, layshaft second gear, and layshaft first gear, are not loose, or excessively worn. Again, reference should be made to the dimensions given in "General Data".

(6) Check that the selector fork rod is not grooved, and that it is a good fit in the casing and the inner cover. Inspect the selector fork running faces for wear. This will have occurred only if the gearbox is being continually used with a badly worn mainshaft bearing.

(7) The gear selector camplate should be inspected for signs of wear in the selector tracks. Excessive wear will occur if the mainshaft bearing has worn badly. Check the fit of the camplate spindle in its housing. Examine the camplate gear wheel for excessive wear. Difficulty will be encountered in gear selection if this gear is badly worn, causing subsequent damage to the gears.

(8) Inspect the mainshaft high gear needle roller bearings for roughness or fracture. Check the mainshaft diameter with the "General Data", and check for surface pitting or damage due to scoring.

SECTION D10

RENEWING MAINSHAFT AND LAYSHAFT BEARINGS

MAINSHAFT

The bearings are a press fit in their respective housings and that on the right side is retained by a spring circlip to prevent sideways movement due to end thrust. To remove this bearing, first lever out the circlip, then heat the cover to approximately 100°C. (boiling water), and drive out the bearing, using a suitably shouldered drift. The new bearing should be pressed or drifted in whilst the cover is still hot, using a suitable tubular drift onto the outer race. Do not forget to refit the circlip.

To remove the high gear bearing on the left of the machine, first remove the screws and oil seal holder. Carefully heat the casing locally to approximately 100°C., then drive out the bearing from the inside of

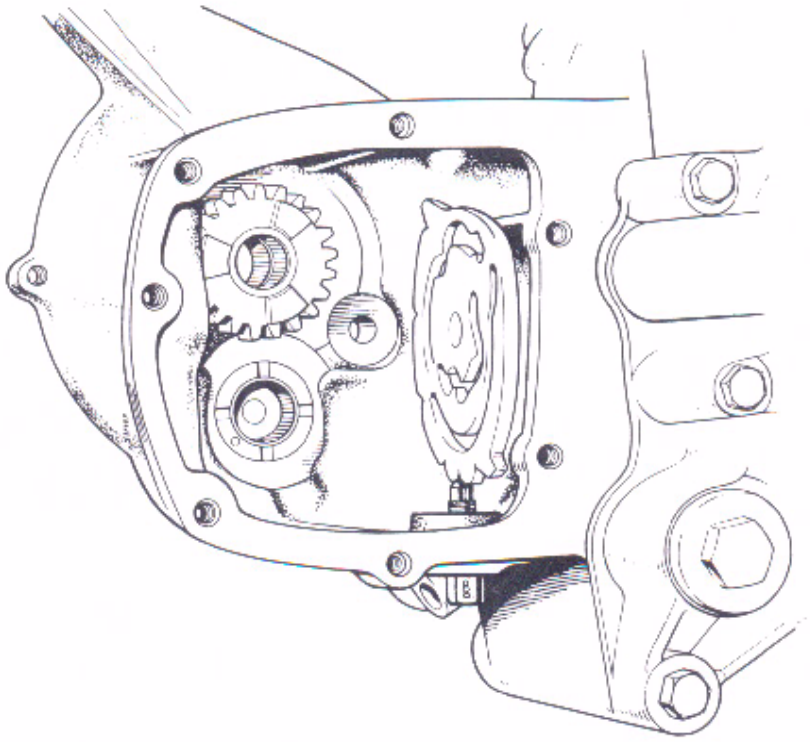


Fig. D13. Reassembling the transmission (gearbox). Illustration indicates camplate in the neutral gear position

Re-mesh the rear chain with the sprockets and replace the connecting link. Apply the rear brake and tighten the sprocket securing nut as tight as possible, using service tool 61-6061.

Locate the thrust washer over the inner needle roller bearing. The washer can be held in position by smearing it rear surface with grease. Note that the grooved surface is towards the layshaft. (See Fig. D 13).

Set the camplate in the neutral gear position (See Fig. D 13). Lubricate the needle roller bearings in the high gear (use oil recommended in Section A2) and layshaft bearing. Place the mainshaft fourth gear with its respective selector fork onto the mainshaft. See Fig. D 1. This selector fork has a large engaging pin and no cuttaway on the housing. Assemble the shaft into the high gear using a heavy grease to retain the selector fork on the gear and in the camplate track. Replace the layshaft assembly with fifth and fourth gears into the gearbox and engage with the mainshaft fifth and fourth gears (note that with the gearbox in the neutral position none of the sliding dogs will be engaged).

Replace the layshaft third gear with its respective selector fork (See Fig. D 1). This selector fork has a large engaging pin and a cuttaway on the selector housing. Then replace the mainshaft third gear and engage with the layshaft third. Replace the layshaft second gear after first lubricating the bush with oil. Replace the combined first and second gear onto the mainshaft. Replace the layshaft bottom gear with its selector fork (this selector fork has a small diameter engaging pin and a cuttaway to match the previous selector fork. See Fig. D 1. Replace the selector rod. Fit the circlip onto the end of the layshaft and the engaging dog up against the circlip. Turn the camplate towards the inner cover from the top, thereby placing the gearbox into the first gear position (note engaging dog on layshaft will be in mesh with the dogs on the layshaft first gear).

Check the camplate operating quadrant is moving freely in the inner cover and position the bronze layshaft washer over the needle roller bearing in the inner cover. Again, use grease to hold the thrust washer in position during assembly.

SECTION D12

CHANGING THE TRANSMISSION (GEARBOX) SPROCKET

Remove the left side footrest. Place a suitable container beneath the centre of the chaincase, and remove the drain plug. Allow a few minutes for the case to drain, and then remove the outer chaincase (Section C5), the primary drive (Section C7), the inner chaincase, the clutch, and the clutch cover (Section C6).

Tap the tab washer clear of the transmission sprocket retaining nut. Leave the chain in place and uncrew the transmission sprocket securing nut, using Service tool 61-6061. The rear chain may now be disconnected, and the transmission sprocket withdrawn. The sprocket will need to be removed using the extractor 61-6046.

Before fitting the new sprocket, check that the transmission case oil seal is in good condition, and that the rear chain is not excessively worn. Check the stretch, as shown in Section A14.

If the old chain is to be retained for further use, it should be thoroughly cleaned in kerosene (paraffin) and lubricated in a grease bath. Lubricate the pinion boss with oil, fit a new locking plate gasket, and slide the sprocket over the transmission mainshaft and high gear. When the sprocket is located on the splines, screw on the securing nut finger tight, then re-connect the chain.

With the rear brake applied, tighten the nut as tight as possible, and tap over the lockplate.

SECTION E

FRAME AND ATTACHMENT DETAILS

SECTION E1

REMOVING AND REPLACING THE FUEL TANK

Turn both fuel taps to the "off" position, then unscrew both unions and disconnect the feed pipes at the taps. Open the twin seat, then unscrew the rear securing screw complete with mounting rubbers, cups, etc. Carefully note the order of assembly.

Raise the rear end of the tank and then lift the whole tank upwards to draw it off the rubber buffers attached to the frame top tube, and which locate in pockets in the tank center tunnel. Take great care not to damage the tank enamel.

When re-mounting the tank, these buffers must be retained, because they prevent metal-to-metal contact between tank and frame. Fit the front end first, and lower the rear end into position. Re-assemble the flexible mounting in the sequence shown in Fig. E2 and note that one rubber pad is plain, while the other is spigotted.

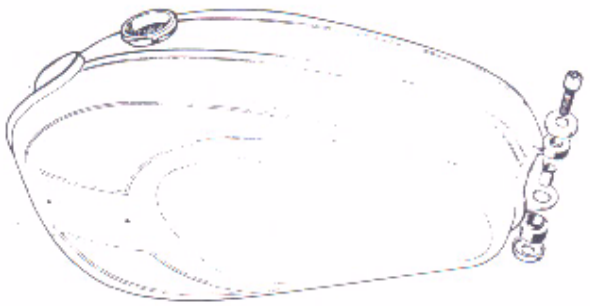


Fig. E2. Assembly order of fuel tank mountings

SECTION E2

REMOVING AND REPLACING THE STYLING COVERS

To remove the right side styling cover remove the two cross-head screws which secure the cover to the oil tank, and withdraw the cover.

To remove the left side styling cover, open the twinseat and unscrew the plastic securing knob at the top front of the panel. Slide it forwards off the two mounting pegs at the rear to remove from the frame.

Refitting the panels is a direct reversal of the above.

SECTION E3

REMOVING AND REPLACING THE OIL TANK

Open the twin seat and disconnect the breather pipe from its branch just in front of the filler. Unfasten the securing clip and disconnect the pipe running from the top front of the oil tank (this leads to the right side of the oil cooler). Remove the right side styling cover, after taking out the two cross-head screws. With a drain tray beneath the machine, disconnect the feed pipe union nut at the bottom front of the tank and allow several minutes whilst the tank completely drains. Remove the gauze filter (large hexagon head).

Unfasten the front top mounting nut, releasing the seat retaining wire, and push the slot headed peg clear of the spigotted rubber.

Then unfasten the rear top mounting nut and washer in a similar manner.

Lift the tank off the bottom rubber-sleeved spigot and move the top inwards. The bottom can then be pulled outwards and down until the tank is clear of the frame.

To remount the tank, fit the top first, upwards and behind the top rear frame rail. The tank can then be positioned over the bottom mounting spigot. Do not omit the rubber sleeve.

SECTION E5

REMOVING AND REFITTING THE REAR FENDER, LIFTING HANDLE, ETC.

Remove the nuts on the upper suspension unit bolts and withdraw these sufficiently to clear the lifting handle. The bolts need not be completely removed. Disconnect the multi-pin connection in the wiring cables to the rear lite. Note that when re-connection is made, the cable colors must correspond i.e. red to red, etc.

The rear portion of the fender is secured to the front part (plastic) by two nuts and bolts on a bridge member and a further two bolts clip it to the rear frame loop. When all four bolts are removed, this portion of the guard can be lifted out, together with all its fittings, such as tail lite assembly, number plates, indicator lites, and wiring harness.

The fender may now be dismantled on a bench. The tail lite carrier is attached to the fender by a stud with its nut inside the fender, while the number plate and tail lite support plate are secured by four nuts and bolts. Two bolts attach the lifting handle to the fender. The handle can be taken off following removal of the tail lite carrier. Great care must be taken when any of the wiring harness is uncoupled at the snap connectors, to make sure that, on re-assembly, the correct colors are joined together, and it will be advisable to use small adhesive labels on the cables to facilitate this requirement.

If the suspension unit bolts have been completely withdrawn, note that they should be re-assembled with their heads on the outside of the machine. To remove the front section of the rear fender (plastic), the harness clip must be released from the front face of the toolbox portion, and an oil pipe clip from the left side of the toolbox. (Access to the latter is given by removal of the left styling cover).

Following removal of the lower fixing bolt (near the swinging arm pivot) the front portion of the fender may be manipulated clear of the frame.

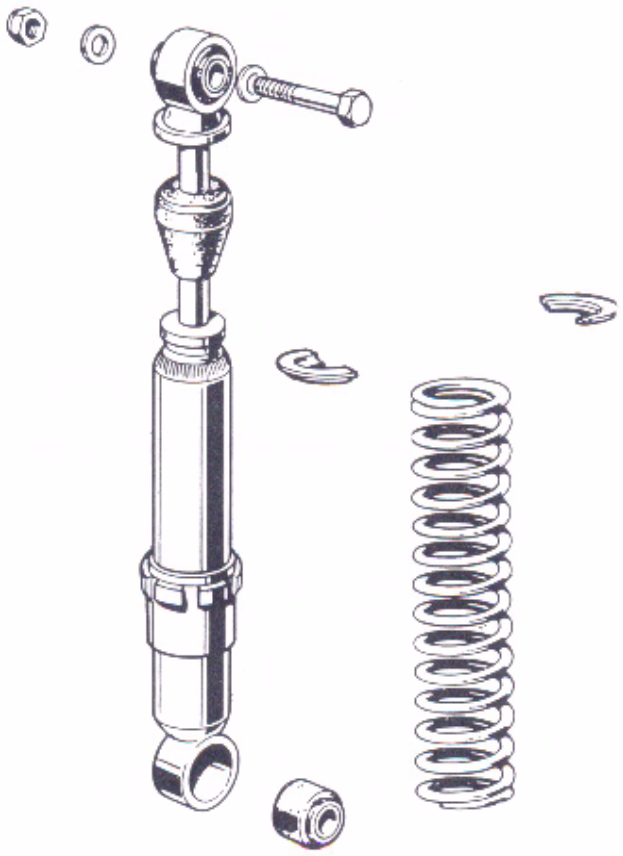


Fig. E5. Exploded view of the rear suspension unit

SECTION E8

DISMANTLING AND REASSEMBLING THE SUSPENSION UNITS

To dismantle the suspension unit and remove the spring, it is required to compress the spring whilst the two semi-circular spring retainer plates are removed. To do this first turn the cam until it is in the "light-load" position, then carefully grip the bottom lug in a vice. Do NOT grip the body.

Use Girling Service Tool as shown in Fig. E7, but if not available, compress the spring sufficiently to allow the two retainers to be extracted. The same tool is used for replacing or renewing the spring.

The damper unit should be checked for leakage, bending of the plunger rod, and damping action. Check the bonded pivot bushes for wear, and ensure that the sleeve is not loose in the rubber bush. The position of any washers should be noted.

The bushes can be renewed easily by driving out the old one and pressing in the new one using a smear of soapy water to assist assembly.

When reassembling check that the cam is in the light load position before compressing the spring.

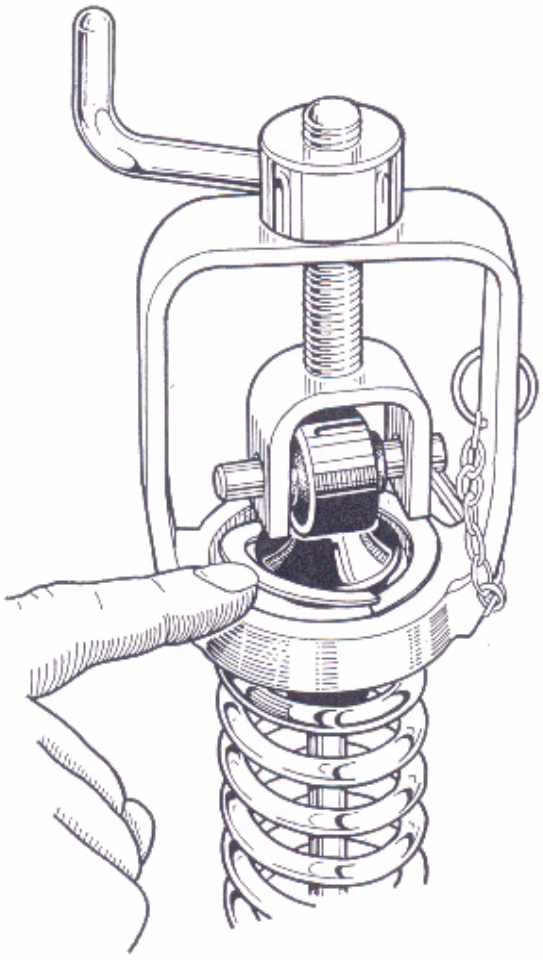


Fig. E7. Using Girling tool to dismantle suspension unit

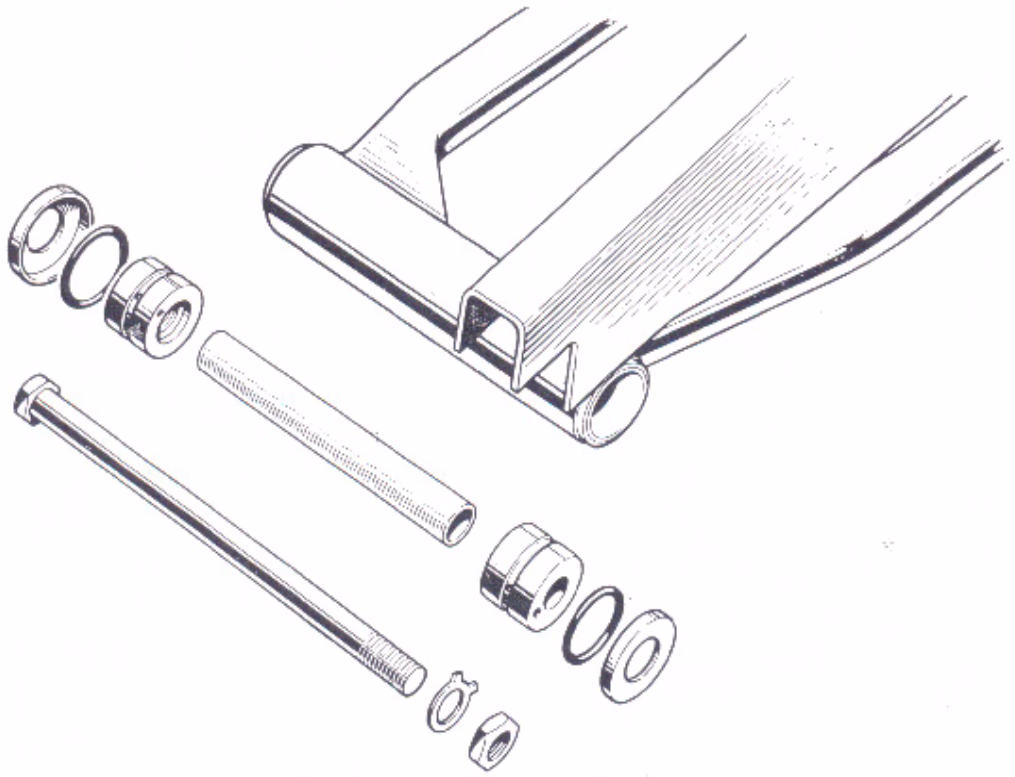


Fig. E9. Exploded view of swinging fork assembly

All parts should be thoroughly cleaned in kerosene (paraffin) and inspected for wear, paying particular attention to the clearance between the bobbins and bushes in the pivots. Check the dimensions with those given on page GD6. If the wear is excessive i.e. more than ·008"-·010" the bushes and/or bobbins will have to be renewed. This is described in Section C10. The parts should be assembled as shown in the illustration Fig. E9. During assembly, make sure that the bobbins and bushes are well greased and the space surrounding the distance tube should be greased-packed (see Fig. E12). Recommended grades of grease are given in the table on page A5.

The 'O' rings should be inserted into their housings and fitted over the ends of the fork cross tube. Position the fork in the frame pivot lug and insert the spindle from the right side. Tighten the spindle in the frame until the fork can just be moved upwards and downwards with little effort. Fit the tab washer and securing nut to the left side of the spindle. Tighten the latter and lock with the washer.

Note.—When the bushes etc., are sound, but sideplay is evident, this can be rectified by taking out the distance tube and reducing its overall length, by either machining or filing. It is essential that the tube ends are kept parallel with each other during such operations.

SECTION E11

REMOVING AND REPLACING THE REAR FRAME

Remove the styling covers (Section E2), disconnect and remove both the battery and the battery carrier (Section E4). Lift the twinseat, disconnect the check wire at the seat pan, and remove two bolts and spring washers holding the front hinge to the twinseat pan. Slide the seat complete with rear hinge plate off the rear frame hinge pin.

Slacken the clamp bolts at both muffler/collector box joints, then remove the two bolts securing each muffler to the pillion footrest mounting brackets. This should free both mufflers for removal.

Disconnect the spade connectors at the various items of electrical equipment, at the same time labelling each connector, so that it can be replaced on its proper terminal, on re-assembly.

Remove the oil tank (Section E3).

Remove the rear wheel (Section F17).

Remove the rear suspension (Section E7).

Remove the rear chainguard and swinging arm (Section E9).

Remove the rear fender (Section E5).

Take off the left and right side rear engine mounting plates, complete with footrests.

Ensuring that the machine is supported securely on the center stand, remove two bolts and two nuts and bolts holding the bottom of the rear frame to the front frame, and lastly, remove the top bolt and nut (located just to the rear of the gas tank), at which point, the rear frame is free to be withdrawn.

If the spade type connectors were not properly marked when dismantling, refer to the wiring diagram (Section H19) when re-connecting the electrical units.

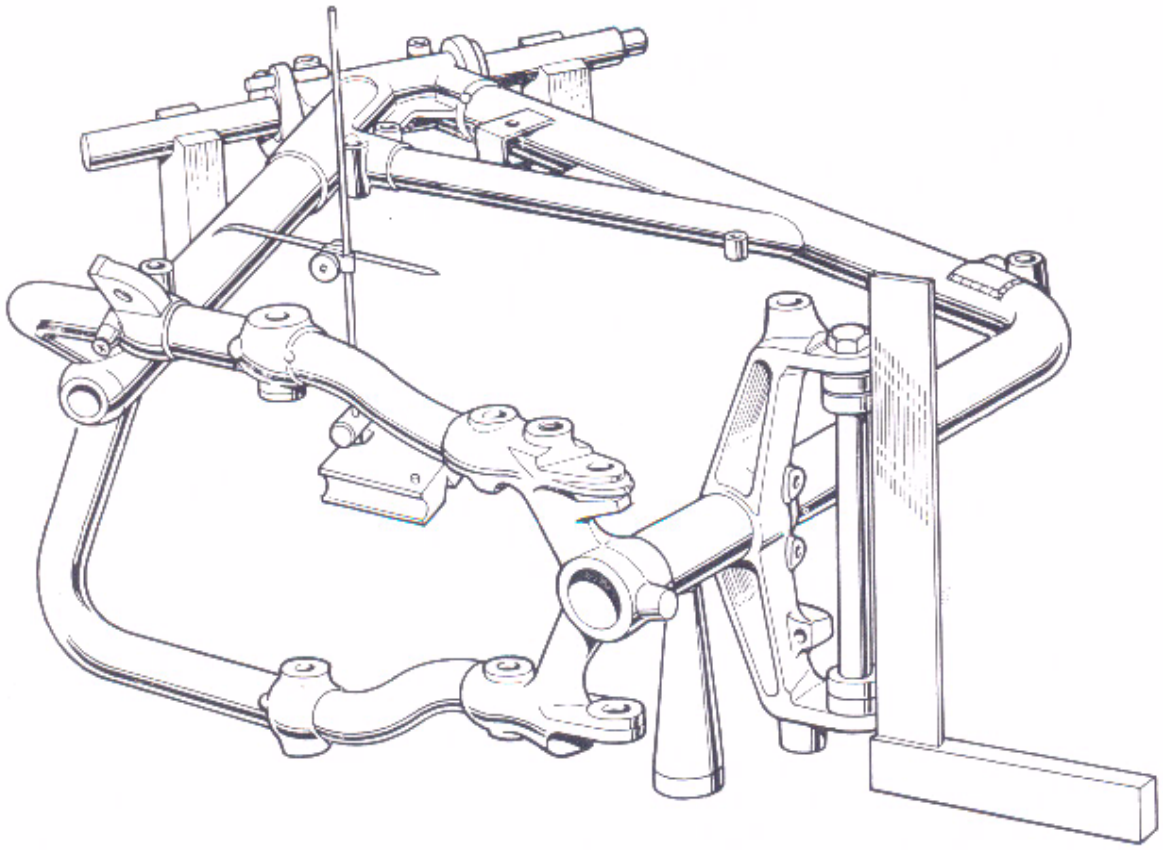


Fig. E14. Checking the front frame alignment

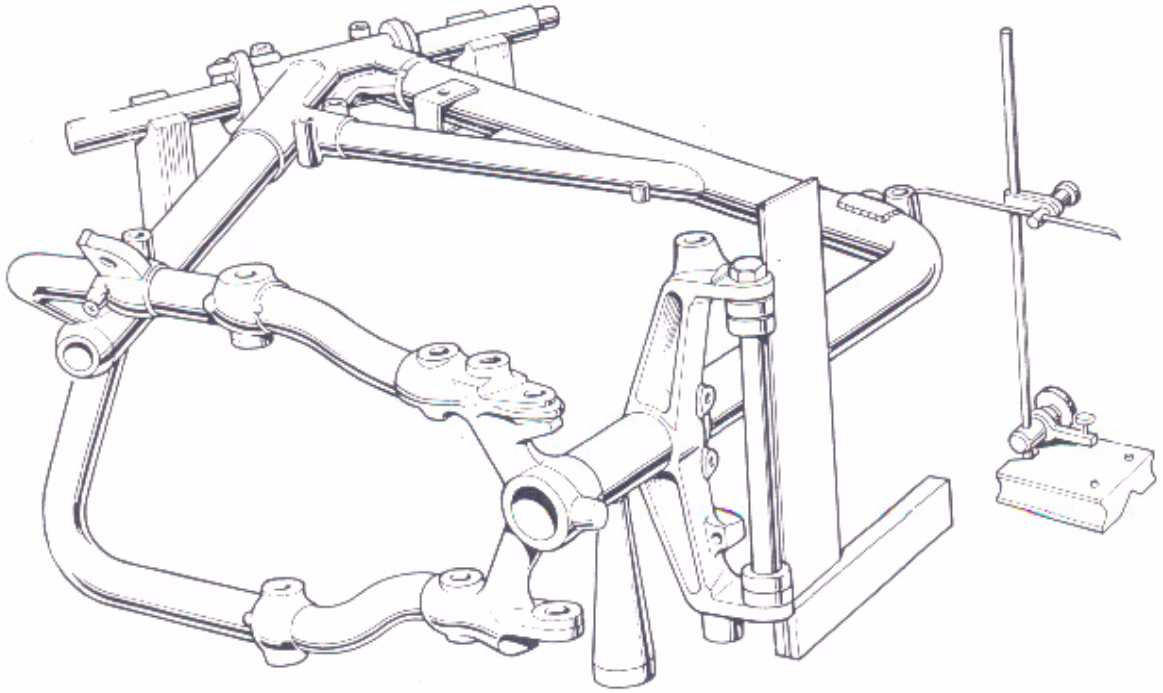


Fig. E15. Checking the front frame alignment

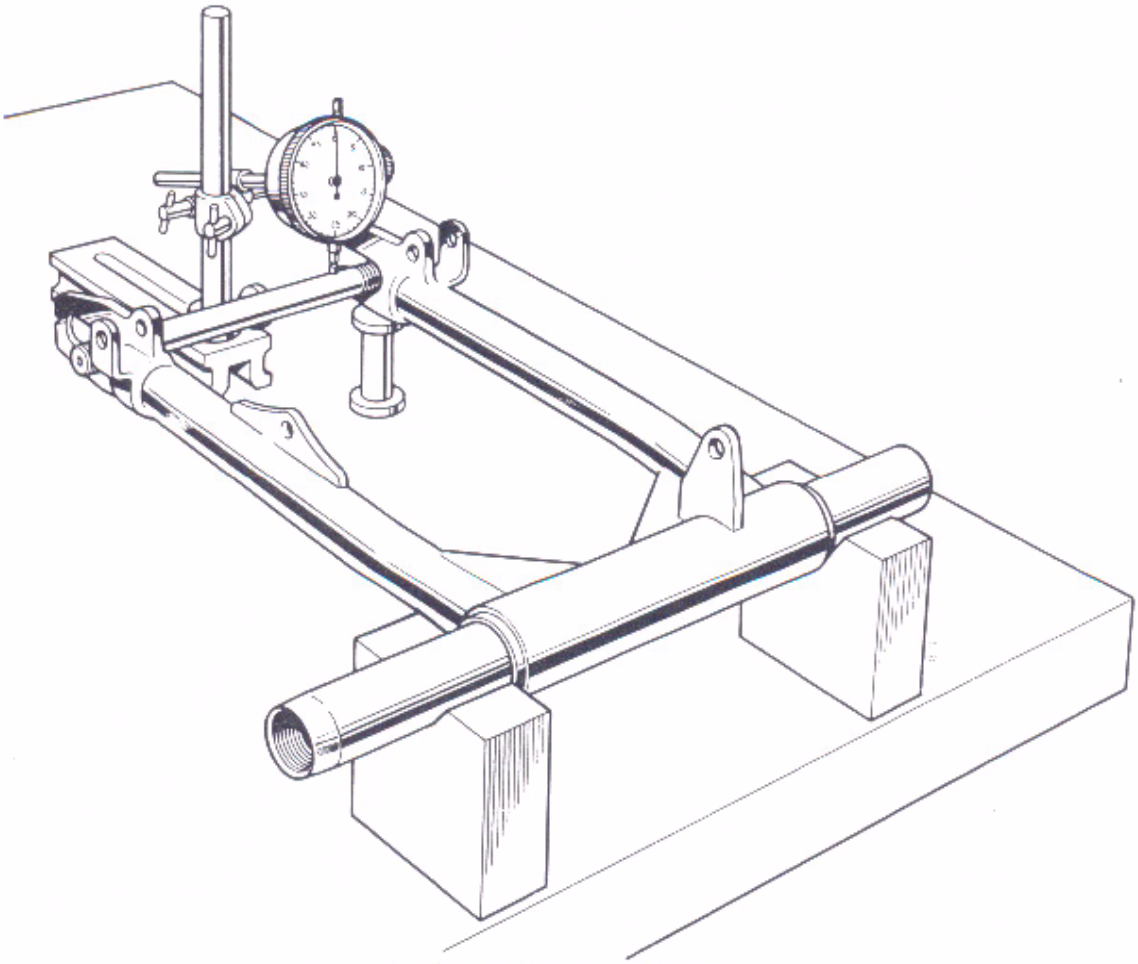


Fig. E17. Checking the swinging fork

more than $\frac{1}{16}$in. (1.5 mm.), out of line otherwise the suspension units will be working under excessive stress.

SWINGING FORK

It is necessary to verify that the centre line of the pivot spindle is in the same plane as the centre line of the rear wheel spindle. To do this, first place a tube, or bar of suitable diameter, into the swinging fork bearing bushes, then mount the swinging fork on two "V" blocks, one either side, and clamp it lightly to the edge of the checking table. Fit the rear wheel spindle into the fork end slots or, alternatively, use a straight bar of similar diameter, then support the fork end so that the arms are approximately horizontal. Height readings should then be taken at both ends of the wheel spindle to establish any mis-alignment (Fig. E17).

Next, check that the distance between the fork ends is as given in "General Data".

It is now necessary to lever the fork ends in the correcting direction until the wheel spindle can be inserted and found to be parallel with the pivot bush centre line. To do this, a bar of about 4 ft. length by $1\frac{1}{4}$ in. will be necessary.

It is now that great care is required. Insert the bar at the end of the swinging fork adjacent to the suspension unit mounting brackets so that it is over the "high" fork leg and under the "low" fork leg. Exert gentle pressure at the end of the bar, then insert the spindle and re-check the alignment. Repeat this procedure using increased loads until the spindle height readings show that the swinging arm is now slightly misaligned in the opposite direction. A small leverage now applied from the other side will bring the wheel back to parallel.

Note: Apply the leverage bar as near as possible to the suspension unit brackets, otherwise the tubes may become damaged. DO NOT USE THE FORK ENDS.

SECTION E15

REPAIRS

Repairs covered in this section are simple operations requiring only a minimum of special tools. The type of repairs possible with these tools are those such as small dents to mudguards, caused by flying stones, or slight grooves which have not affected a large area or torn the metal. The tools required are shown below in Fig. E20.

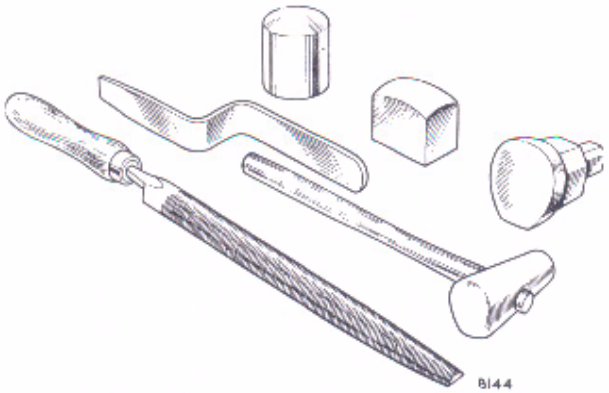


Fig. E20. Tools used for panel repairs

REMOVAL OF DENTS

To remove small dents a spoon and suitably shaped dolly block are required. A suitable spoon can be made from a file by grinding off the teeth, on one side, and polishing the surface. It will be necessary to carefully anneal the file before attempting to crank it to the shape shown in Fig. E21.

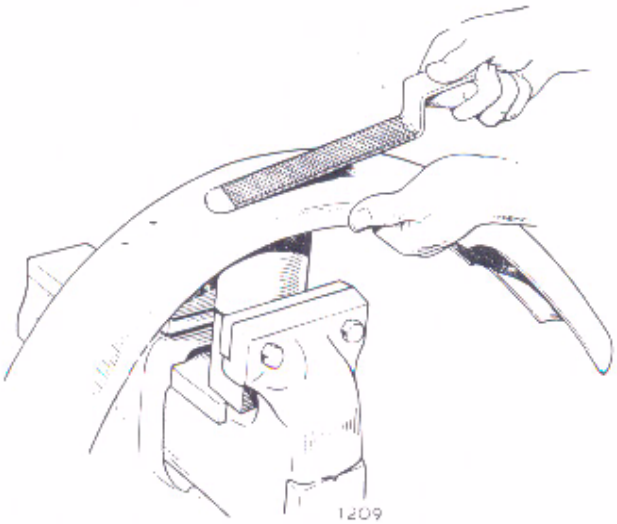


Fig. E21. Removing a dent with a dolly block and spoon

Place the dolly block underneath the panel then hammer the dent(s) carefully with the spoon until something like the original contour is achieved. Lightly file the surface to show any high spots there may be and use the dolly and spoon to remove them.

Note.—Do not file more than is necessary to show up the high spots. Care should be taken to keep filing to a minimum otherwise serious thinning of the metal will occur.

Where denting has occured without resultant damage to the paint-work the dent(s) may be removed whilst the paintwork is preserved by careful use of a polished spoon and dolly block.

Dents which are comparitively larger may be removed whilst the paintwork is preserved by placing a "sandbag" against the outer surface and hammering the inside of the panel with a suitably shaped wooden mallet. A "sandbag" can be made from a piece of 18 in. square leather by folding it and packing it tightly with sand. Finally, finish off using a suitable dolly block and polished spoon as required.

Note.—It is not advisable to use a hammer because hammer-blows tend to stretch the surrounding metal, giving rise to further complications. Also, unless the aim is true, damage of a more serious nature may result.

Where a fuel tank has become damaged the repair work should only be entrusted to a competent panel beater.

The first coat should be thinned in the ratio of 50% cellulose thinners to 50% paint. Subsequent coats should have a higher proportion of thinners as shown below.

	Cellulose Thinners	*Paint*
1st Coat	50%	50%
2nd Coat	60%	40%
3rd Coat	70%	30%
4th Coat	80%	20%

Between each coat, the surface may be "flatted" by hand, with 320 or 400 abrasive paper as required.

Allow at least 10 minutes between each coat, and after the final coat leave overnight, or 24 hours if possible. For most purposes, the 2nd coat of finishing is more than adequate.

POLISHING

The final colour coat must be completely dry before cutting and polishing. Using a clean rag, rub down with brass polish, or fine cutting paste, and burnish to a high gloss, using a clean mop, before applying a suitable wax polish for protection and shine.

SECTION F

BRAKES, WHEELS, AND TIRES

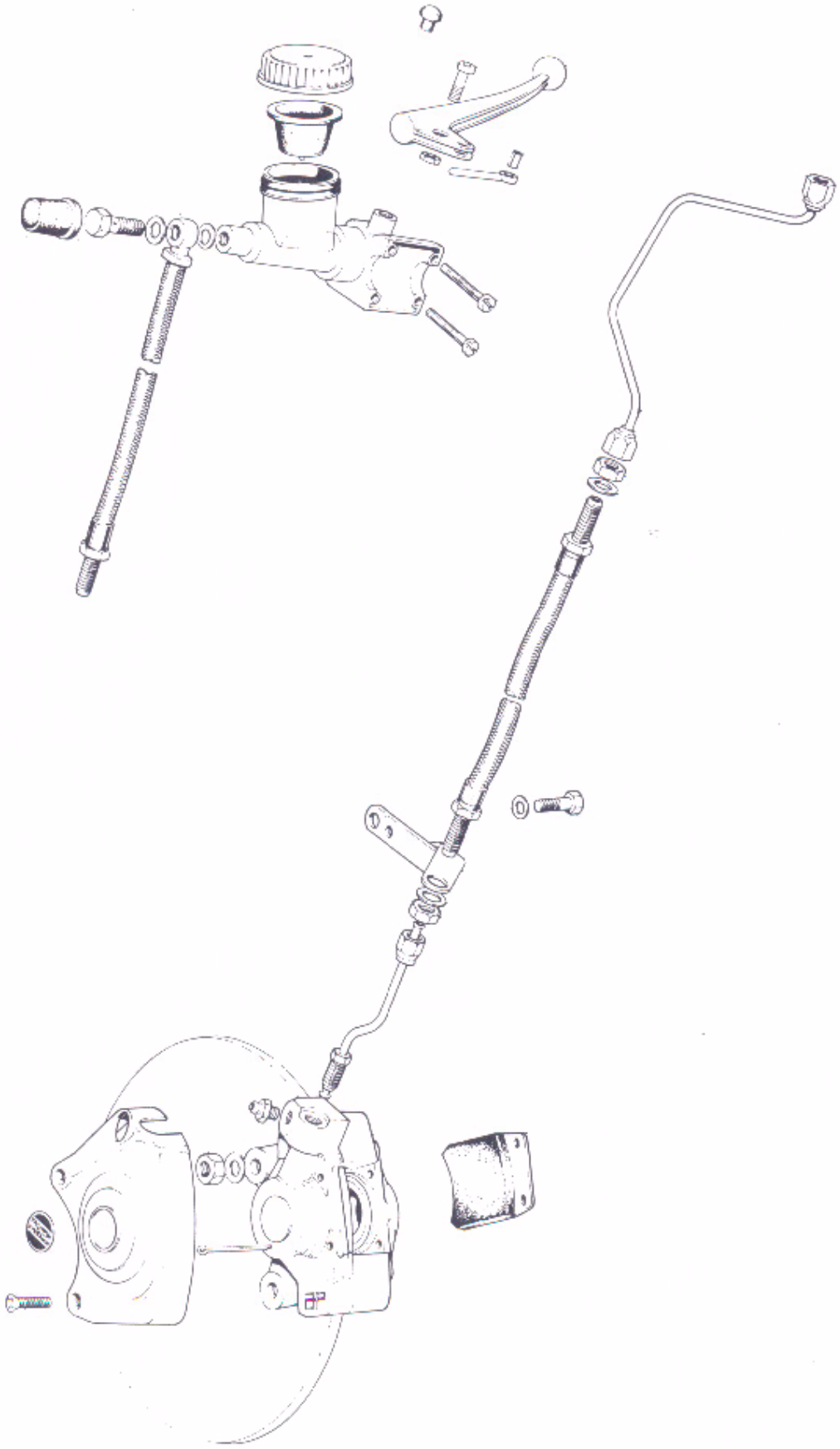


Fig. F1. Disc brake components (Front)

SECTION F6

FLUSHING THE HYDRAULIC SYSTEM

The capacity of the reservoir is such that, even when the brake pads are excessively worn, there is sufficient fluid retained in the reservoir to allow the brake to be operated, so that, under normal conditions, the fluid should not require replenishment. However, if the hydraulic system has been contaminated by foreign matter, or other fluids, it should be flushed out and refilled with new fluid. The system should be flushed out, in any case, once every three years.

Pump all the fluid out of the system, by opening the bleed screw, and operating the front brake lever a few times, after connecting a pipe to the bleed screw, in order to collect the fluid in a container. Fill the master cylinder reservoir with methylated spirits, and pump out through the bleed screw, in a manner similar to that previously described.

Having ensured that all the methylated spirit has passed through the bleed screw, replenish the master cylinder reservoir with the specified grade of brake fluid. The capacity is approximately 60 cm^3 for the front brake, and 80 cm^3 for the rear brake, and the special fluid to be used must conform with DOT 3, Federal Motor Vehicle Standards 116 (for U.S.A.). Lockheed Braking Fluid to specification 329 should be used in other parts of the world.

Finally, "bleed" the brake, as described in Section F7.

IMPORTANT NOTE.

If the system has been contaminated by a mineral oil, all rubber parts, including flexible hoses, must be replaced.

SECTION F7

BLEEDING THE SYSTEM (GENERAL)

Remove the cap and diaphragm from the reservoir and fill with the correct hydraulic fluid (see Fig. F3). Throughout the whole operation, maintain the fluid level at not less than $\frac{1}{2}$ full, to avoid any risk of introduction of air at this point.

Attach a rubber or other flexible tube firmly to the bleed nipple, (on the top right side of the caliper), as shown in Figure F4, submerging the free end of the tube in a quantity of braking fluid in a clean glass jar. The tube outlet must remain submerged throughout the whole operation, and if the operation is being carried out single handed, must also be looped as shown in the illustration Figure 4, to ensure that there is a "head" of fluid between the top of the loop and the bleed nipple, as a safeguard, to prevent air from being drawn back into the system when operating the control lever or pedal.

Unscrew the bleed nipple one complete turn (with the rubber tube still attached) and operate the lever or pedal steadily to its fullest extent. Any air in the system will be expelled through the tubing and be observed as bubbles rising in the jar. When the lever or pedal reaches the inner end of its stroke, tighten down the bleed nipple and allow the lever or pedal to return to its normal position without assistance.

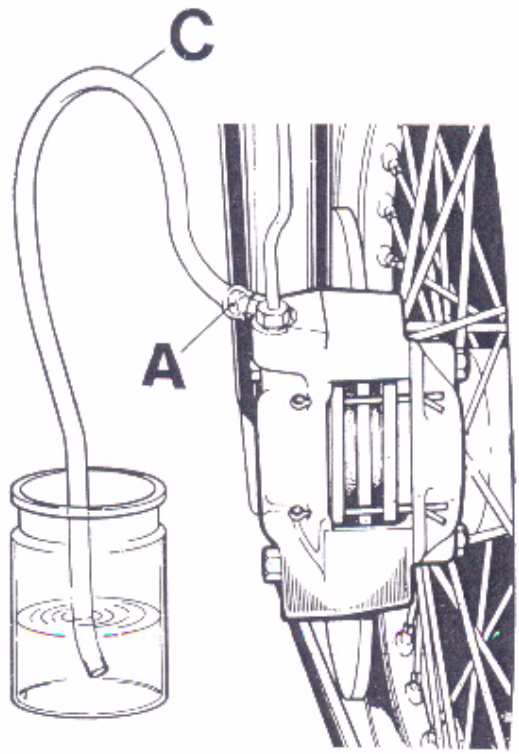
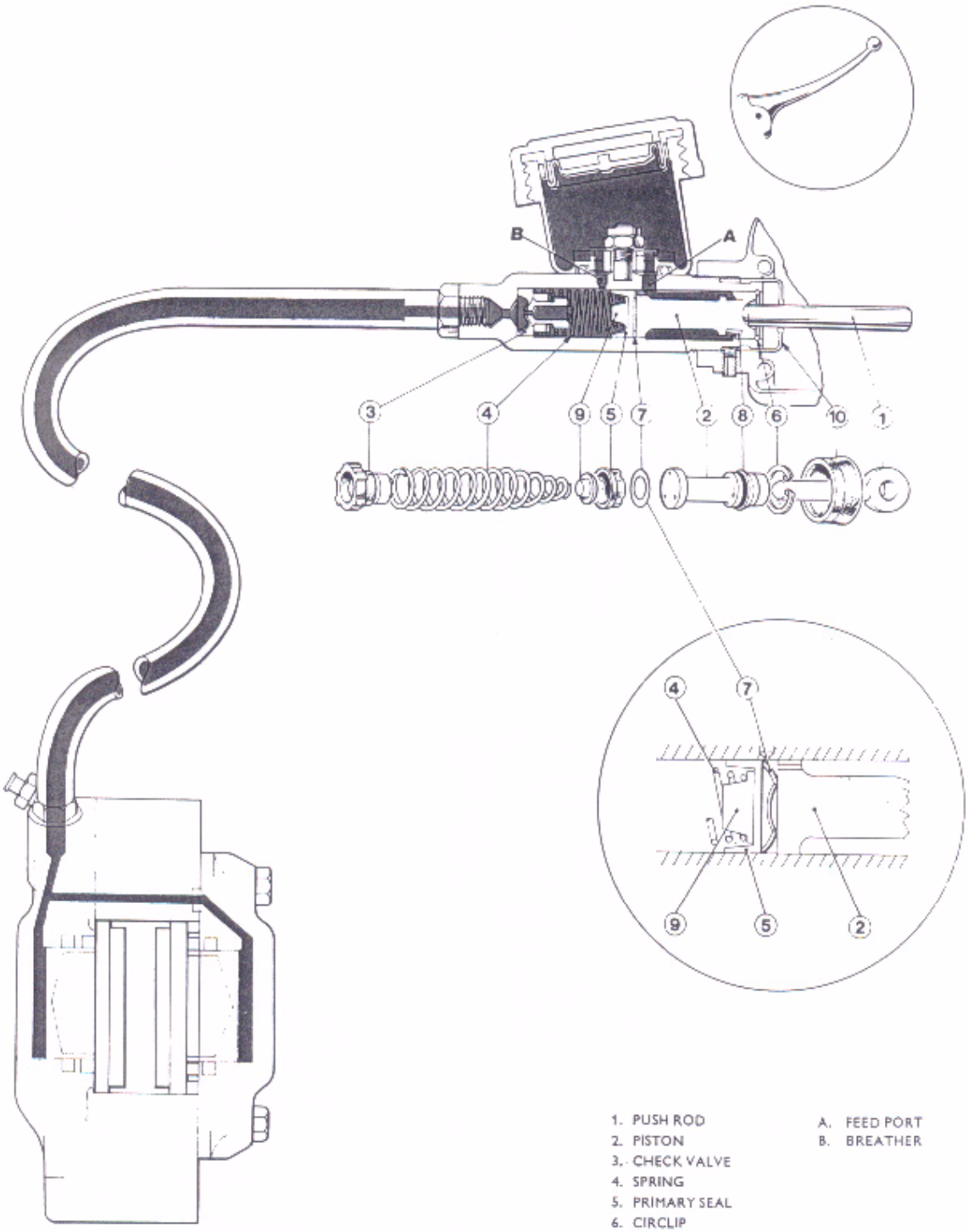


Fig. F4. Bleeding brake system



1. PUSH ROD
2. PISTON
3. CHECK VALVE
4. SPRING
5. PRIMARY SEAL
6. CIRCLIP
7. PISTON WASHER
8. SECONDARY SEAL
9. SPRING RETAINER
10. DUST COVER

A. FEED PORT
B. BREATHER

Fig. F5. Hydraulic flow diagram

Meanwhile, fluid returning from the wheel cylinder lifts the check valves (3) away from its seat, and re-enters the cylinder. When the piston has fully returned, a small breather port (B) is uncovered, which allows a release of excess fluid to the reservoir and also compensates for contraction and expansion of the fluid, due to changes in temperature. The purpose of the check valve (3) is to prevent the re-entry into the master cylinder of fluid pumped into the line during the "bleeding" operation, thus ensuring a fresh charge of fluid at each operation of the brake.

SECTION F11

FRONT BRAKE CYLINDER

Removal and dismantling procedure is as follows. First, drain the system of fluid (See Section F6). Remove the rubber hose from the end of the master cylinder. Remove the brake lever and push rod by unscrewing the pivot bolt. Unscrew the four retaining screws that hold the right switch console, and remove the master cylinder from the handlebars. Detach the reservoir bowl from the cylinder, by removing the attachment nut from the inside (See Item 12 Fig. F6). Note assembly of washer, spacer, and 0 ring. Remove the grub screw that locks the cylinder in position in the switch housing (See Fig. F6), and then unscrew the cylinder. Detach the rubber boot from the end of the cylinder.

Using the push rod (1), depress the piston in the cylinder, to relieve the load on the spring, and remove the circlip (6). Remove the piston (2), piston washer (7), primary seal (5), return spring (4), and check valve (3). The removal of the primary seal (5) may be simplified by applying gentle air pressure to the pipe connection at the end of the cylinder.

Remove the secondary seal (8) by stretching it over the flange of the piston. Renew all seals, and check the bore of the cylinder for deep score marks. If such damage is apparent, a new cylinder should be fitted.

It is important that all parts are meticulously cleaned with brake fluid before assembly. Do not use petrol, trichlorethylene, or any other cleaning agents to wash the parts.

Fit the secondary seal (8) onto the piston (2), so that the lip of the seal faces towards the head (drilled end) of the piston. Gently work the seal around the groove with the fingers, to ensure that it is properly seated. Fit the spring retainer (9) onto the small end of the spring (4) and the check valve (3) onto the large end. Insert the spring assembly onto the cylinder bore, large end first. Insert the primary seal (5) into the cylinder bore, lip foremost taking care not to damage or turn back lip. The piston washer (7) should then be inserted into the barrel with the dished side towards the primary seal (5) followed by the piston, head (drilled end) innermost. Push the piston inwards with the end of the push rod, and refit the circlip (6) making sure that the circlip beds evenly in its groove. Refit the boot (10) by stretching it over the barrel. Refit the reservoir bowl, not forgetting the 0 ring, and test the cylinder by filling the reservoir, and pushing the push rod and piston inwards, allowing it to return unassisted. After a few applications, fluid should flow from the outlet connection at the cylinder end.

Fit the return spring. Empty the cylinder of fluid, and proceed to reassemble the cylinder barrel into the switch housing. At this stage the final position of the cylinder barrel in the housing must be determined. It will be noted, from Fig. F5, that the lip of the primary seal (5) must be $\frac{1}{16}$ in. behind the breather port, and the reservoir set at an angle of 10° to the vertical. The milled flats on the threaded end of the cylinder are machined relative to the 10° position, and the appropriate one must be used when assembly takes place.
The following method can be used to determine the correct linear position of the cylinder barrel.

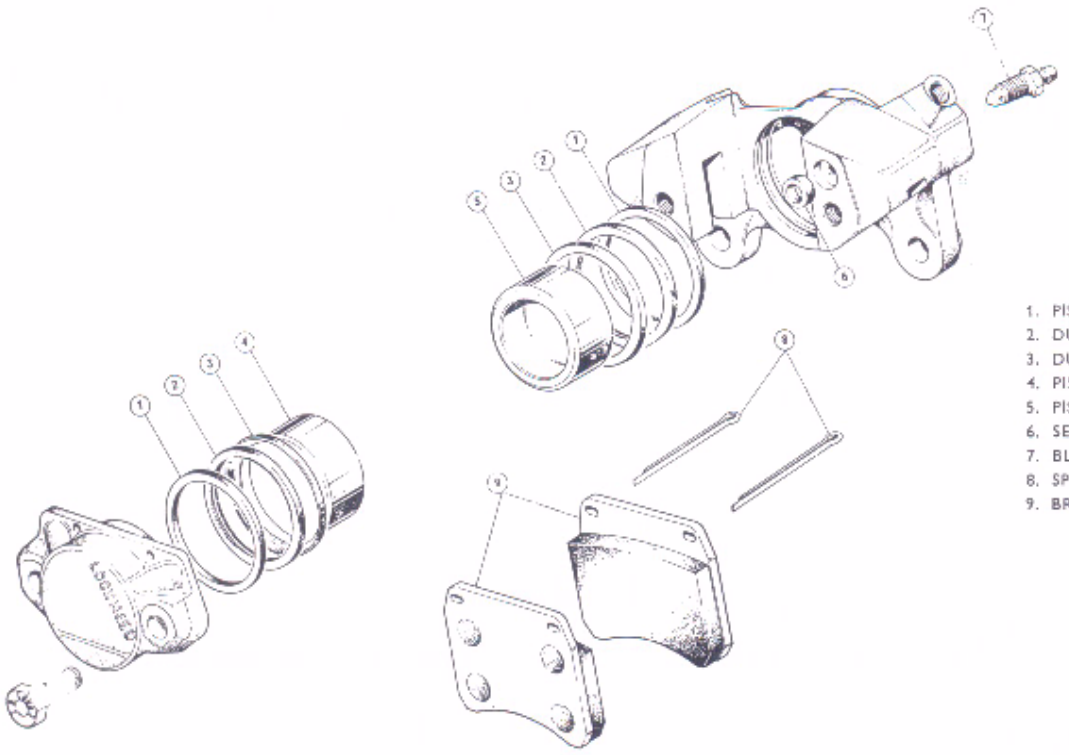
(a) Remove the reservoir from the cylinder.

(b) Reassemble the front brake lever and push rod to the switch housing.

(c) Screw the cylinder barrel into the switch housing, whilst holding the brake lever in the closed position, until it will screw no further.

rings (1) from the grooves in the piston bores, by inserting a blunt screwdriver under each ring, taking care not to damage the grooves.

Dry the new sealing rings (1) and smear them with Lockheed disc brake lubricant. Refit them into the groove of each piston bore, so that the large side is nearer the open end of the bore. Gently work the sealing rings into their respective grooves with the fingers, to ensure correct seating. Dry the pistons, and coat with Lockheed disc brake lubricant. Offer up the pistons, closed end first, squarely to the bores in the caliper, and press the pistons fully home. Dry the dust seals, and coat with Lockheed disc brake lubricant. Fit a dust seal into a metal retainer, and position both squarely in the mouth of one piston bore, with the dust seal facing the bore. Press the dust seal into the mouth of the piston bore, using a "G" clamp and support plate, until its outer edges are flush with the bore. Repeat with the second dust seal and retainer. Fit new brake pads (See Section F4). Refit the brake caliper. Reconnect the hydraulic feed pipe, and "bleed" the system, as in Section F7/8. Refit the protection cover.



1. PISTON SEAL
2. DUST SEAL
3. DUST SEAL COVER
4. PISTON
5. PISTON
6. SEAL
7. BLEED NIPPLE
8. SPLIT PINS
9. BRAKE PADS

Fig. F7. Front and Rear Brake Caliper

SECTION F14

REPLACEMENT PARTS

Operation of the brake causes high pressure in the pipeline and other components, and it is therefore essential that when any parts are renewed, manufacturers components only are fitted. Copper piping must not be used as a substitute for the standard product, and the flexible pipes must also be to the manufacturers specification. The use of incorrect components, materials, or hydraulic fluid, may lead to brake failure, with possible serious consequences, and also invalidates the warranty.

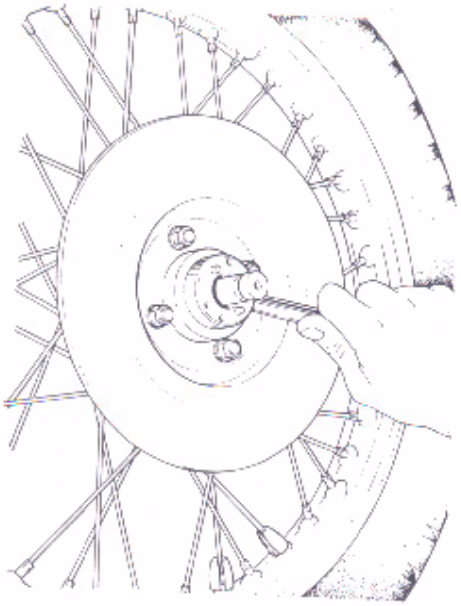


Fig. F8. Removal of left side bearing lock ring

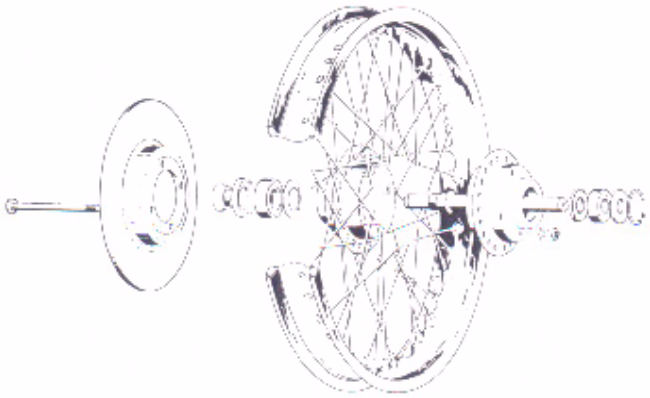


Fig. F9. Exploded view of front wheel bearing arrangement

SECTION F17

REMOVING AND REPLACING REAR WHEEL

Place the machine on its center stand. It will be found helpful to place stand on a thick board or block, so as to provide additional height. With a gear engaged, remove the chain connecting link. Take the chain off the rear chainwheel, but do not remove it from the transmission (gearbox) sprocket, so as to assist replacement. The speedometer driving cable should then be disconnected at the speedometer gearbox.

Remove the spindle nut (on the right side of the machine), and partly withdraw the spindle from the opposite side, until its end clears the swinging arm on the right side. This will release the chain adjuster and the brake torque arm, complete with brake caliper. Steady the brake torque arm as it is freed, as it will drop down. The wheel, complete with its spindle and other components on the left side, can then be extracted and lowered to the ground.

It is most important that the brake should not be applied whilst the wheel is out of the fork, otherwise the pistons behind the brake pads may be forced out of position. To avoid this condition, a packing piece should be inserted between the brake pads.

Care should also be taken not to disturb the setting of the chain adjusters. Stand at the left side of the wheel, facing across the machine, which should be tilted towards the operator. Reach over the seat and take the wheel out rearwards, to the right of the machine.

Replace in reverse order, taking care split link is fitted with closed end facing forward on top run of chain. It is also important to ensure the driving dogs on the speedometer gearbox are correctly mated with the slots in the drive ring.
After replacing the wheel, check the chain adjustment and wheel alignment, to ensure that all is is order.

IMPORTANT. Before using the motorcycle again, apply the brake several times, to restore full brake pressure, and check that it is functioning correctly.

It is advisable to lightly grease the wheel spindle when replacing, so as to facilitate future withdrawals of this item.

Refer to Section F17 regarding wheel replacement.

The chainwheel and the brake disc are retained by four long studs which pass through the hub. The hub itself consists of two halves which are pressed together during production. It is not advisable to separate the two half hubs, otherwise difficulty may be experienced with spoke tensioning etc. The chainwheel or the brake disc can be removed without interfering with the hub assembly itself.

SECTION F19

FRONT AND REAR WHEEL ALIGNMENT

When the rear wheel has been fitted into the swinging arm, it must be aligned correctly with the front wheel, for otherwise misalignment will cause steering to be affected adversly and both tires and chains to wear excessively.

Check alignment with the motorcycle on the centre stand. Tie a 7ft long (20 m) length of string round the section of the tire and draw the free end through between the centre stand and frame, thence to the rear wheel. This provides, in effect, a straight edge as shown in Fig. F11. Draw the string taut so that it is in a straight line from end to end. For the wheels to be in line the string must touch both tire walls at two points as shown. Any correction should be made at the right side adjuster.

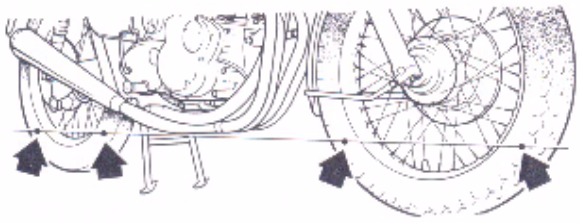


Fig. F11. Checking the wheel alignment

SECTION F20

WHEEL BALANCING

When a wheel is unbalanced, it is often due to variations in weight distribution in the tires, which are usually marked on the wall with a white spot(s) to indicate the lightest part. At moderate speeds, an unbalanced wheel may not be noticed, but at high speeds, however, the unbalanced forces can seriously effect the handling of the machine, more especially if the front wheel is affected.

Wheel balancing can be achieved by fitting standard one ounce and half ounce weights, as required. All front wheels are balanced complete with tire and tube before leaving the factory but it is advisable for the balance to be checked after the initial stiffness of the wheel bearings has been eliminated, following the break-in process. If for any reason the tire is removed it should be replaced with the white balancing "spot" level with the valve. If a new tyre is fitted, existing weights should be removed and the wheel re-balanced, adding weights as necessary until this condition is achieved. A wheel is in balance when, if it is turned gently and released, it shows no tendancy to stop in any particular position. Make sure that the brake is not binding while the balancing operation is being carried out.

With the wheel clear of the ground, turn it gently and allow it to stop. Mark the top of the wheel or tire and repeat two or three times to check.

If the wheel stops in the same place each time, extra weight must be added at the marked spot.

Next, ascertain how much weight is required by adding small pieces of modelling clay to the spoke

A checking gauge suitable for Trident wheels can be made from two pieces of mild sreel bar, as shown in Fig. F13 and this should be used to register from the hub to the wheel rim edge using the dimensions shown in the following chart. In the case of the rear wheel, use the hub brake disc face for checking: on the front wheel, dimension from the dummy disc facing.

WHEEL	RIM SIZE	DIMENSION POINT	DIMENSION IN.	DIMENSION MM.
FRONT	WM2	DUMMY DISC FACE	$\frac{15}{32}$"	12.7
REAR	WM3	DISC FACE	$\frac{1}{2}$"	11.9

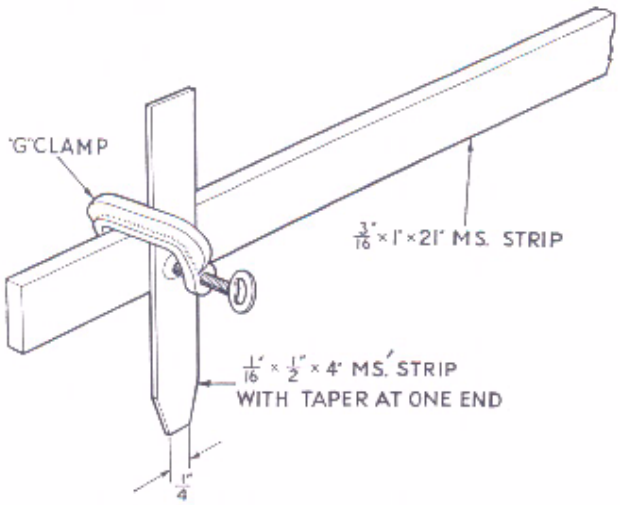


Fig. F13. Suggested wheel building gauge.

SECTION F22

REAR CHAIN ADJUSTMENT

Any adjustment of the rear chain must be made with the motorcycle on its centre stand. Movement of the wheel is controlled by adjuster A at each end of the spindle, which must first be released by slackening the nut on the right side.

The adjuster bolts C must be tightened by the same amount, after releasing locknut D, in order to preserve chain alignment, until the total free play at the centre of the chain run is $\frac{3}{4}$". Be sure to tighten the spindle nut. Movement of the wheel does not effect the brake.

Note: Before using the motorcycle, apply the brake several times and check that it functions normally.

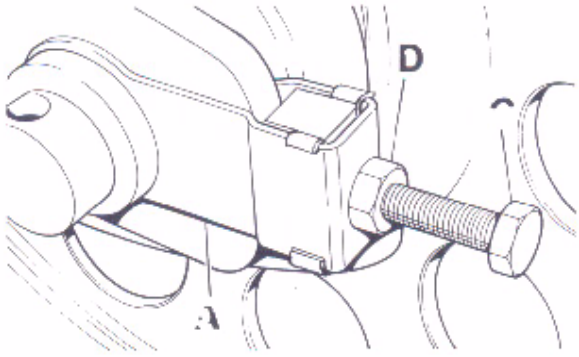


Fig. F14. The rear chain adjusters.

Wheel alignment.

If the wheel alignment was correct originally, and the adjuster nuts were tightened equally, the wheels should remain in alignment. If in doubt, check as described in Section F19.

A positive oil feed to the rear chain is taken from the return side of the oil tank. Adjustment of the rate of flow is made by removing the tank cap and rotating a screw which will be observed in the neck. Turn the screw clockwise to reduce the flow and anti-clockwise to increase it. (See Fig. A12).

Remember that when replacing the tire, it is very easy to cause another puncture by nipping the inner tube with the levers, unless great care is excercised.

Some new tires have balance adjustment rubbers inside the casing. **They are not patches and should not be disturbed.**

When there is a white spot(s) near the bead it should be placed at the valve position or, if two security bolts are fitted, midway between the bolts. If one security bolt is fitted the white spot(s) should be located at this position.

If the spokes have been tensioned, or renewed, they must not project through the nipples. File flush any that are showing through.

First place the rim band into the well of the rim and make sure that the rough side of the band is fitted against the rim and that the band is central in the well. Replace the valve core and inflate the inner tube sufficiently to round it out without stretch. Dust it with french chalk and insert it into the cover with the valve located at the white "balancing spot" leaving the tube protruding outside the beads for about four inches either side of the valve (Fig.F18). At this stage it is advisable to lubricate the beads and levers with soapy water.

Squeeze the beads together at the valve position to prevent the tube from slipping back inside the tire and offer the cover to the rim, as shown in Fig.F19 at the same time threading the valve through the valve holes in the rim band and rim. Allow the first bead to enter the well of the rim and the other bead to lie above the level of the rim flange.

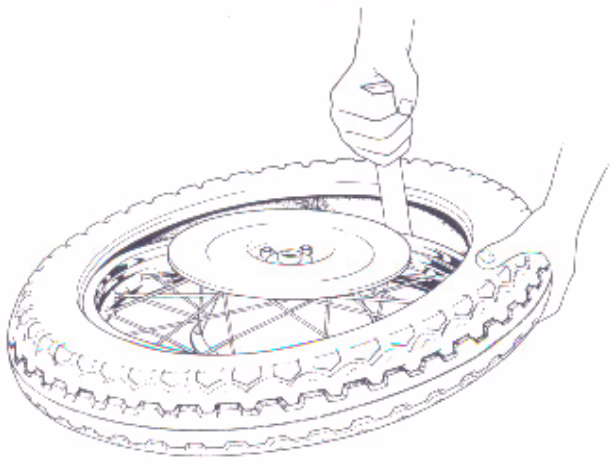


Fig. F20. Levering the first bead onto the rim

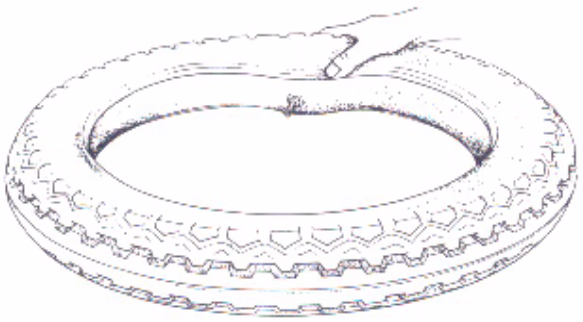


Fig. F18. Cover and tube assembled ready for fitting to the wheel

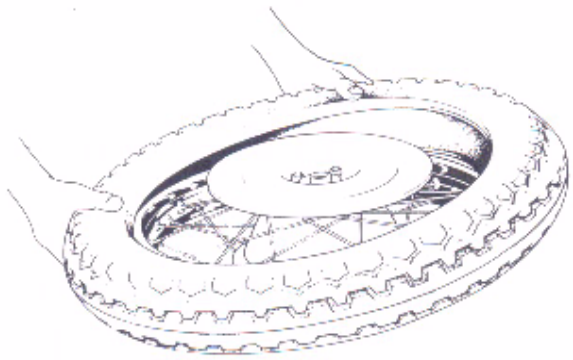


Fig. F19. Refitting the tire to the wheel.

Working from the valve, press the first bead over the rim flange by hand, moving forward in small steps and making sure that the part of the bead already dealt with, lies in the well of the rim. If necessary use a tire lever for the last few inches, as shown in Fig.F20. During this operation continually check that the inner tube is not trapped by the cover bead.

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 closely as possible to the point where the bead passes over the flange and lever the bead into the flange, at the same time pressing the fitted part of the bead into the well of the rim. Repeat until the bead is completely over the flange, finishing at the valve position (See Fig. F21).

SECTION F24

SECURITY BOLTS

If a tire is used in an under-inflated condition it will creep round the rim, taking the tube with it and will ultimately cause the valve to be pulled from the tube.

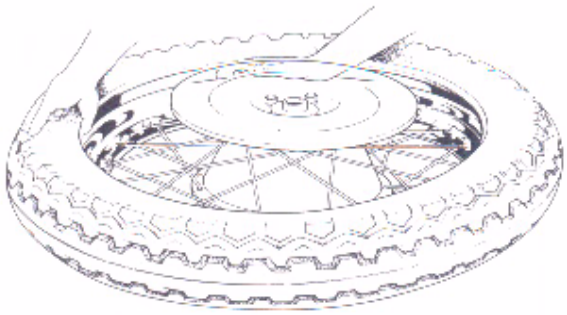


Fig. F22. Placing the security bolt in position.

It is, therefore, usual to fit two security bolts to the rear wheel spaced at 120° each side of the valve.

To fit the bolts, remove the tire and tube, mark the bolt positions and drill the rim between two spoke nipples to the required size of the bolt.

After removing any burr from the holes, fit the bolts quite loosely and replace the tire so that the covered portion of the security bolt is inside the tire (see Fig. F22).

Check that the tire is correctly positioned, inflate to the required pressure, and tighten the nuts on to the rim.

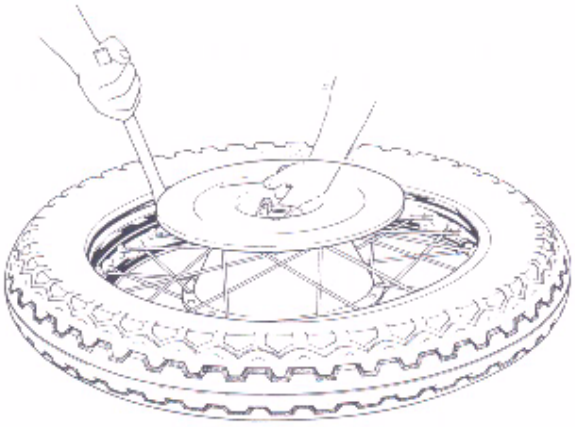


Fig. F23. Refitting the second bead with the security bolt in position.

SECTION G

TELESCOPIC FORKS

DESCRIPTION

The front fork is of the telescopic type, using high grade steel tube stanchions. They are hard chromium plated, and then ground to an extremely fine surface.

The alloy sliding members are precision bored and provide the bearing for the stanchion. The main springs are enclosed within the stanchion, and locate on the damper tube.

An oil seal is contained in the top lip of each sliding member, and is protected by a rubber dust cover.

Oil is contained in each sliding member, and serves the dual purpose of damping and lubrication. It is added by removal of the stanchion cap nuts, and drained at the plugs provided.

Damping of the telescopic action is achieved by the use of a damper valve in conjunction with a series of bleed holes and slots in the damper tube.

SECTION G1

STEERING HEAD ADJUSTMENT

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

Stand astride the motor cycle and place the finger tips of the left hand on the joint between the steering column and the top bearing cover. Apply the front brake and rock the machine backwards and forwards, when any play will be felt immediately by the left hand.

To adjust the bearings, support the crankcase on a box so that the front wheel is clear of the ground, and slacken the pinch bolt A, (Fig. G2), at the rear of the upper steering yoke. Tighten the adjusting nut B on the steering stem until **only a trace of play is present** on the bearings. The steering must be free and the forks should turn smoothly from lock to lock. If the movement is harsh, the adjustment is tight or the bearings are damaged and must be renewed. When adjustment is correct, tighten the clamp bolt.

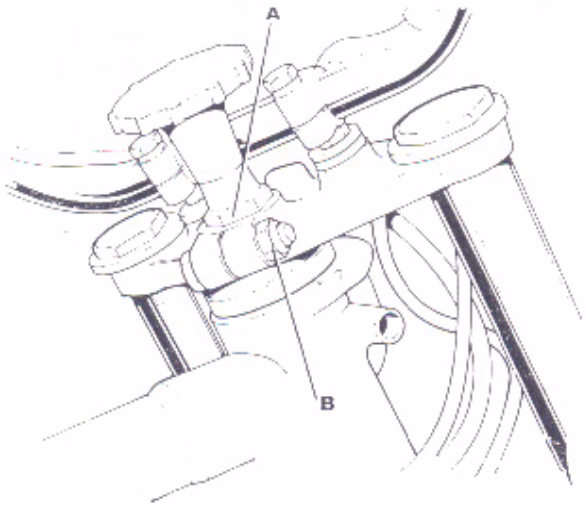


Fig. G2. Steering head adjustment

SECTION G2

DISMANTLING AND REASSEMBLING THE FORK LEGS

Before commencing work on the forks, it is advisable to have the following service tools and replacement parts available.

(a) Oil seals for dust excluder (2)
(b) Oil seal for damper valve (2)
(c) Service tool 61-6113

Unscrew the small drain plugs at the bottom of each fork leg, taking care not to lose the small fibre seals. Have a receptacle handy to catch the oil. Work the forks up and down a few times, in order to pump the oil out.

Place a strong support under the engine taking care not to damage the exhaust assembly. Remove the front wheel (See Section F15) and the front mudguard Drain the front brake fluid, as described in Section F6.

The oil seal contained in the top of the fork leg can be removed with a tool of the design shown in Fig. G4. This tool can be simply manufactured from a strip of mild steel material, approximately 12 inches long by 1 inch wide, and $\frac{3}{16}$ — $\frac{1}{4}$ inch in depth. The design is such that the tool does not come into direct contact with the aluminium fork leg, but every care must be taken to prevent misuse of the tool causing damage to the leg. As an alternative, a long tyre lever, carefully used, will suffice.

Note. When using either of these tools, remove the seal by working around the periphery of the fork leg, otherwise the tool will ruin the lip of the seal. Make sure the housing is clean and free from burrs at the top edge, and insert the new seal into the housing using the following method:-

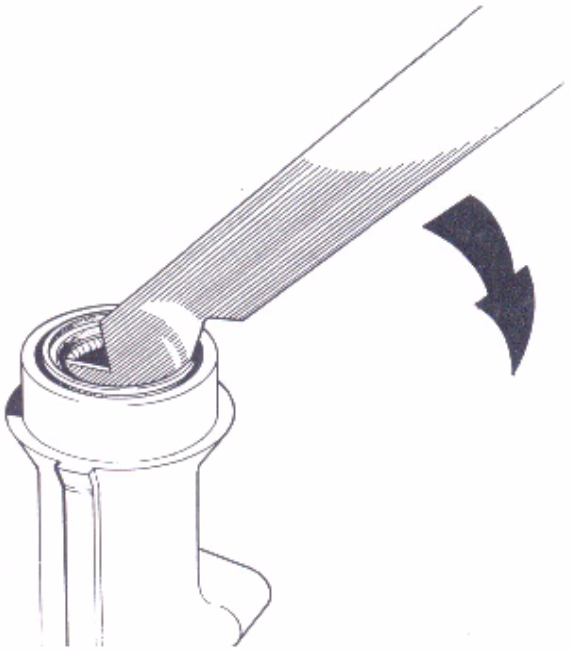


Fig. G4. Removing the oil seal from the fork leg

Reassemble the stanchion into the fork leg, and place a small polythene bag over the lip of the stanchion. Push the oil seal over the stanchion and down into the position on the fork leg. It is important that polythene is used, because the lip of the stanchion has a sharp edge that may easily scratch or damage the precision edge of the seal. Even a scratch which may not be readily visible to the eye will cause leakage at the seal.

A drift will be required to insert the oil seal into the housing. This can be simply fabricated from an early type steel fork outer member. A turned shoulder will have to be machined and brazed or welded to one end of the fork leg. See Fig. G5 for details. It is important to assemble the oil seal with the stanchion in position, because the seal must sit squarely in the counter bore, otherwise leakage will occur.

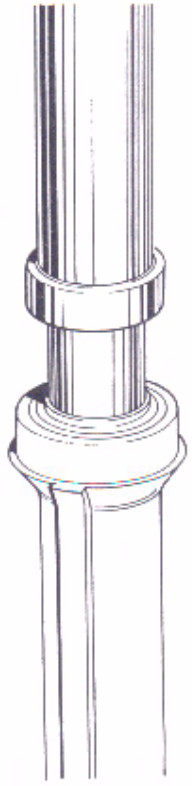


Fig. G5. Replacing the oil seal

The stanchion can now be removed.

Check all components for cleanliness and wash in gasoline (petrol) if necessary. Examine the bore of the stanchion and clean with a cloth pushed through the bore.

When reassembling the fork leg, replace the valve assembly into the bottom of the stanchion. Apply a little Loctite to the aluminium retaining nut, and tighten to a torque of 25 ft/lbs.

Check that the small special sealing washer is located in the well in the base of the fork leg. (If this washer shows signs of damage or wear, it must be replaced).

Push the rubber dust cover onto its location groove on the fork leg and then replace the leg of the stanchion.

As the leg is refitted onto the stanchion the stem of the damper valve assembly must be located on the

SECTION G4

FORK ALIGNMENT

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

To rectify this, the wheel spindle cap nuts must first be screwed up tight on the right side leg and the spindle cap nuts on the left side leg slackened off. Also loosen the stanchion top caps and the pinch bolts in both the bottom and top yokes. The forks should now be worked up and down several times to line them up, and the various connections tightened from bottom to top, that is, wheel spindle, bottom yoke pinch bolts, top caps and finally, the steering stem pinch bolt in the top yoke.

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

The stanctions can only be accurately checked for straightness with special equipment such as a surface plate. Special gauges are also required to check the yokes. It is possible, however, to make a reasonable check of the stanctions by rolling them on a surface plate or flat surface such as a piece of plate glass, but it is not a simple operation to straighten a bent tube, and a new part may be necessary.

Check the stanctions for truth by rolling them slowly on a flat checking table. A bent stanction may be realined if the "bow" does not exceed $\frac{5}{32}$ in. To realine the stanction, a hand press is required. Place the stanction on two "V" blocks, one at either end, and apply pressure to the raised portion of the stanction. By means of alternately pressing in this way, and checking the stanction on a flat table, the amount of bow can be reduced until it is finally removed.

Having checked the stanctions for straightness, and reset as necessary, the top and bottom yokes can now be checked. First, assemble the two stanctions 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 examine them from the side when the two stanctions should be quite parallel. Alternatively, the lower 12 in. of the stanctions can be placed on a surface plate, when there should be no rocking.

To reset, hold one stanction in a vice (using soft clamps) and reset the other stanction, using a longer and larger diameter tube so to obtain sufficiant leverage. Having checked the stanctions in this way, check the gap between them.

The next step is to place the bottom yoke in position over the stanctions, and tighten the clip bolts, when the steering stem should be centrally disposed between the two stanctions.

The final step is to check if the tubes are parallel when assembled into the top yoke only. In this caes the bottom yoke can be fitted loosely on the tubes, 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 misalignment.

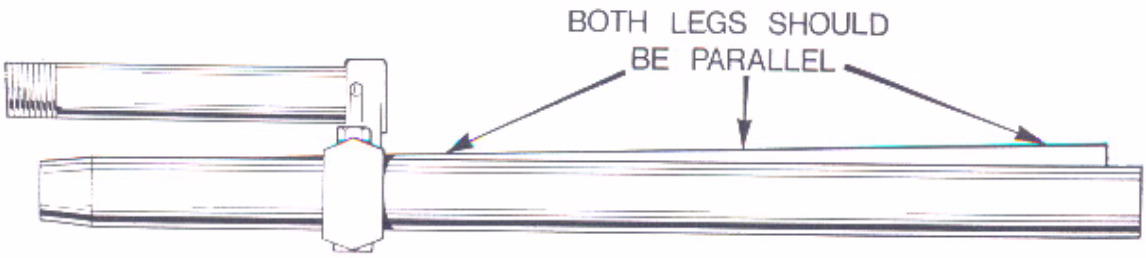


Fig. G7. Fork leg alignment

SECTION G5

HYDRAULIC DAMPING

Note the valve assembly which is retained in the bottom of the fork leg. Bleed holes are contained in the valve stem, and in a sub-assembly at the top of the stem. This sub-assembly incorporates a damper valve, which acts as a restrictor.

Oil is contained in the fork sliding member, the level of which is always above the valve assembly. On compression of the fork the oil is forced through bleed holes or slots in the damper tube. As the travel increases the bleed apertures are progressively sealed off by a plastic sleeve, and the damping increases until the stanchion is trapped on a cushion of oil, which acts as the final bump stop. During this operation, a vacuum is created in the space formed between the bottom of the stanchion and the damper valve. Oil is transferred into this compartment through the bleed holes in the damper tube.

On expansion of the forks, the oil in this newly formed compartment is compressed, the damper valve closes, and the oil is bled through small holes in the damper valve itself, and then progressively through the apertures in the damper tube. During this operation oil is transferred back in to the bottom member, in readiness for the next compression of the forks.

SECTION H

ELECTRICAL SYSTEM

H1. PART A. ROUTINE MAINTENANCE

Every week examine the level of the electrolyte in each cell. Lift the battery out of the carrier so that the filling line can be seen. Add distilled water until the elctrolyte level reaches this line.

Note.– On no account should the battery be topped up to the separator guard but only to the maximum line.

With this type of battery, the acid can only be reached by a miniature hydrometer, which would indicate the state of the charge.

Great care should be taken when carrying out these operations not to spill any acid or allow a naked flame near the electrolyte. The mixture of oxygen and hydrogen given off by a battery on charge, and to a lesser extent when when standing idle, can be dangerously explosive.

The readings obtained from the battery electrolyte should be compared with those given in the table below. If a battery is suspected to be faulty it is advisable to have it checked by a Lucas Service Centre or Agent.

SPECIFIC GRAVITY OR ELECTROLYTE FOR FILLING THE BATTERY

U.K. and Climates normally below 90°F (32.2°C)		Tropical Climates over 90°F (32.2°C)	
Filling	Fully charged	Filling	Fully charged
1.260	1.280/1.300	1.210	1.220/1.240

Every 1,000 miles (1,500 km.) or monthly, or more regularly in hot climates the battery should be cleaned as follows. Remove the battery cover and clean the battery top. Examine the terminals: if they are corroded scrape them clean and smear them with a film of petroleum jelly, such as vaseline.
Remove the vent plugs and check that the vent holes are clear.

H.1 PART B. MAXIMUM PERMISSABLE ELECTROLYTE TEMPERATURE DURING CHARGE

Climates normally Below 80°F (27°C)	Climates between 80–100°F (27–38°C)	Climates frequently above 100°F (38°C)
100°F (38°C)	110°F (43°C)	120°F (49°C)

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 .020 from the observed reading to obtain the true specific gravity at 60°F. For every 5°F. above 60°F., add .020 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 side-ways and then insert into the elctrolyte.

H3 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:-

First inspect the in-line fuse in the battery earth cable (brown/blue lead) and replace if suspect.

Check also the cut-out switch; this can be done by disconnecting the white, and white/yellow lead from the right handlebar switch and connecting them together. This will complete the ignition circuit by by-passing the cut-out switch.

H3 PART B. FAULT FINDING IN THE LOW TENSION CIRCUIT

To trace a fault in the low tension wiring, turn the ignition switch on and then place a piece of insulating material between all sets of contacts whilst the following test is carried out.

Note. Disconnect the Zener Diode before the test is carried out. To do this remove the brown/blue lead from the Diode centre terminal.

For this test, it is assumed that the twinseat is lifted and the wiring is fully connected as shown in the wiring diagram, Section H20. With the aid of a 0-15 range D.C. voltmeter and 2 test-prods, make a point to point check along the low tension circuit starting at the battery and working right through to the ignition coils, stage by stage, in the following manner, referring to the wiring diagram in Section H20.

(1) First, establish that the battery is earthed correctly by connecting the volt meter across the battery negative terminal and the machine frame earth. No voltage reading indicates that the red earthing lead is faulty. Check the fuse in the main negative lead. Also, a low reading would indicate a poor battery earth connection, or a discharged battery.

(2) Connect the voltmeter in turn between each ignition coil (–Ve) terminal and earth on all three coils. No voltage reading indicates a breakdown between the battery and the coil (–Ve) terminal, ot that the switch connections are faulty.

(3) Connect the voltmeter between ignition switch input terminal and earth. No reading indicates that the brown and blue lead has faulty connections. Check for voltage at the brown/blue lead connections at rectifier.

(4) Connect the voltmeter across ignition switch output terminal (2) 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 (–Ve) terminals indicates that the ballast resistor has become "open circuit" or become disconnected. Remember that the ballast resistor is by-passed, and the ignition coils fed directly from the battery via the Starter relay, when the starter button is depressed.

(5) Connect the voltmeter across the (+Ve) terminal of each coil and earth in turn. No reading on the voltmeter between any one coil and earth indicates that the coil primary winding is faulty and a replacement ignition coil should be fitted.

(6) With insulating material still retained between the three sets of contacts, connect the voltmeter across each set of contacts in turn. No reading between any one set of contacts and earth indicates that there is a faulty connection or the internal insulation has broken down in one of the condensers.

If a condenser is suspected then a substitution should be made and a re-test carried out.

(7) Finnaly, reconnect the Zener Diode brown/white lead and then connect the volt meter between the Zener Diode centre terminal and earth. To volt meter should read battery volts. If it does not the Zener Diode is faulty and a substitution should be made. Refer to Section H6 (page H13) for the correct procedure for testing a Zener Diode on the machine. Ignition coil check procedure is given in Section H3 part C.

Particular attention is called to the periodic lubrication procedure for the contact breaker which is given in Section A11. When lubricating the parts ensure that no oil or grease gets onto the contacts.

If it is felt the contacts require surface grinding then the complete contact breaker unit should be removed as described in Section B24 and the moving contacts removed by unscrewing the nut which secures the low tension lead, removing the lead and nylon bush. The spring and contact point can be removed from the pivot spondle. Repeat this procedure for the other contact points.

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 (gasoline) 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 reassembling, the nylon bush is fitted through the low tension connection tab, and through the spring location eye. Apply a smear of grease to the C.B. cam and moving contact pivot post. Every 3,000 miles and/or contact replacement, apply two drops of clean engine oil to the rear of the three lubricating felt wicks.

H3 PART E. CHECKING THE HIGH TENSION CIRCUIT

If ignition failure or mis-firing occurs, and the fault is not in the low tension circuit, then check the ignition coils as described in Part C. If the coils prove satisfactory, ensure that the high tension cables are 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 in Section H4 and then re-test the engine for running performance. If the fault recurs then it is likely the suppressor caps are faulty and these should be renewed.

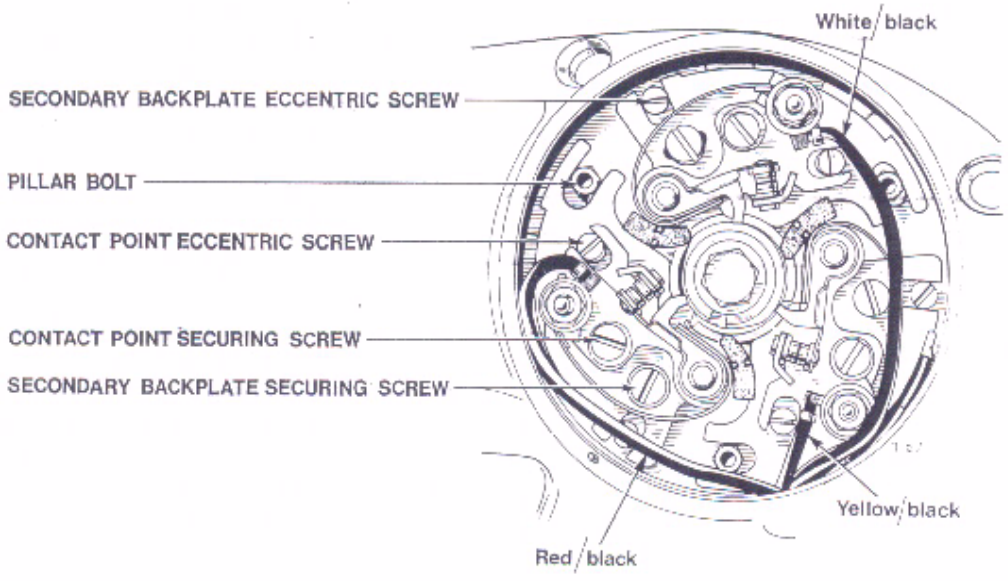


Fig. H4. Contact breaker assembly type 7CA

When the plugs have been carefully cleaned, examine the central insulators for cracking and the centre electrode for excessive wear. In such cases the plugs have completed their useful life and new ones should be fitted.

Finally, before re-fitting the sparking plugs the electrodes should be adjusted to the correct gap setting of .020 in. (.5mm.). Before refitting sparking plugs the threads should be cleaned by means of a wire brush an a minute amount of graphite grease smeared onto the threads. This will prevent any possibility of threads seizure occurring.

If the ignition timing and carburation settings are correct and the plugs have 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, manifold 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 considered.

Normally the type of plugs quoted in "General Data" are 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.

Note– if the air filter has been removed it will affect the carburation of the machine and hence may adversely affect the grade of sparking plugs fitted.

SECTION H5

CHARGING SYSTEM

DESCRIPTION

The charging current is supplied by the two lead alternator, but due to the characteristics of alternating current the battery cannot be charged direct from the alternator. To convert the alternating current to direct current a full wave bridge silicon type rectifier is connected into the circuit. The alternator gives full output, all the alternator coils being permanently connected across the rectifier.

Excessive charge is absorbed by the Zener Diode which is connected across the battery.

Always ensure that the ignition switch is in the "OFF" position whilst the machine is not in use, to prevent overheating of the ignition coils, and discharging the battery.

To locate a fault in the charging circuit, first test the alternator as described in H5 Part B. If the alternator is satisfactory, the fault must lie in the charging circuit, hence the rectifier must be checked as given in Section H5 Part C (page H10) and then the wiring and connections as shown in Section H5 Part D (page H12).

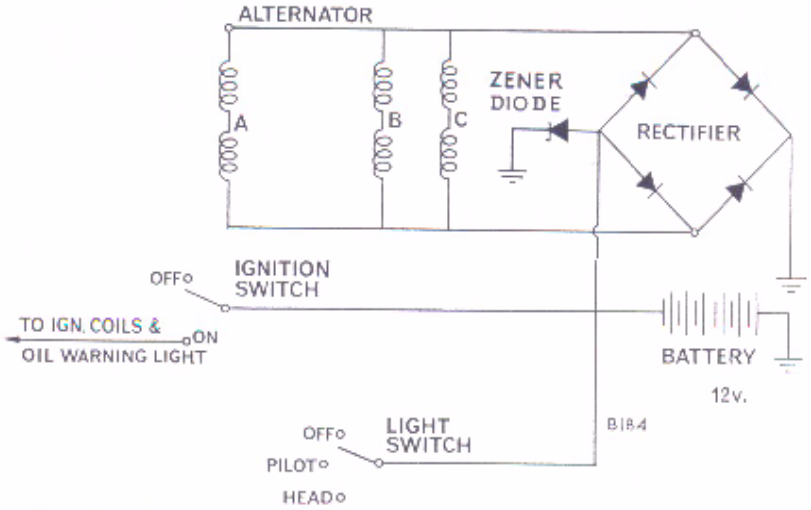


Fig. H6. Schematic diagram of 12 volt charging circuit with Zener Diode

TESTING THE RECTIFIER

For test purposes disregard the end earth (ground) terminal on later rectifiers.

To test the rectifier, first disconnect the brown/blue 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.

Note.–Voltmeter positive terminal to frame earth (ground) and negative terminal to centre terminal on rectifier.

With the engine running at approximately 3,000 r.p.m. (approximately 45 m.p.h. in top gear) observe the voltmeter reading. The reading obtained should be at least 7.5V minimum.

(i) If the reading is equal to or slightly greater than that quoted, then the rectifier elements in the forward direction are satisfactory.

(ii) If the reading is excessively higher than the figures given, then check the rectifier earthing bolt connection.

(iii) 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.–All of the above conclusions assume that the 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 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 12 volt battery and 1 ohm load resistor, and then connect the D.C. voltmeter in the V2 position, as shown in Fig. H10. Note the battery voltage (should by 12V) and then connect the voltmeter in V1 position whilst the following tests are conducted.

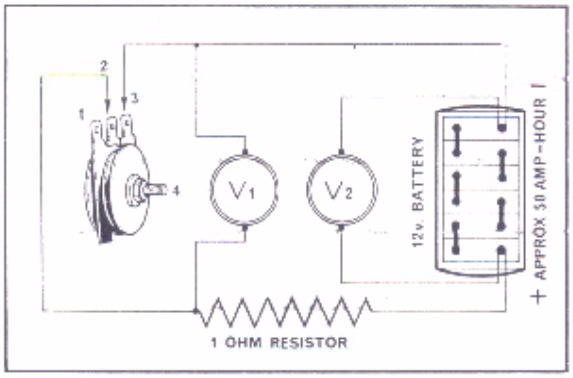


Fig. H8. Bench testing the rectifier

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.

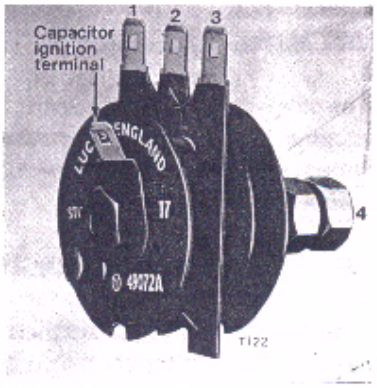


Fig. H9. Rectifier–showing terminal connections for bench tests 1 and 2

(2) Connect a D.C. voltmeter (0–15V) across the battery terminals and an ammeter (0–10 amp) between the battery negative 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 indicated on 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 inches (5 cm.) dia. so that each turn does not contact the one next to it.

SECTION H6

ZENER DIODE CHARGE CONTROL

DESCRIPTION

The Zener Diode output regulating system uses all the coils of the 6-coil alternator connected permanently across the rectifier, provides automatic control for the charging current. It will only operate successfully where it is connected in parallel with the battery as shown in the wiring diagram (Section H20 Fig. H28). The Diode is connected direct to the centre terminal of the rectifier.

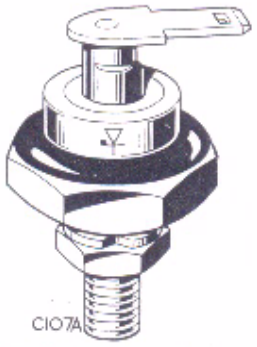


Fig. H11. Zener Diode

Assuming the battery is in a low state of charge its terminal voltage (the same voltage is across the Diode) will also be low, therefore the maximum charging current flow into the battery from the alternator. At first none of the current is by-passed by the Diode because of it being non-conducting due to the low battery terminal volts. However, as the battery is quickly restored to a full state of charge, the system voltage rises until at 13.5 volts the Zener Diode is partially conducting, thereby providing an alternative path for a small part of the charging current. Small increases in battery voltage results in large increases in Zener conductivity until, at approximately 15 volts about 5 amperes of the alternator output is by-passing the battery.

The battery will continue to receive only a portion of the alternator output as long as the system voltage is relatively high.

Depression of the system voltage, due to the use of headlamp or other lighting equipment, causes the Zener Diode current to decrease and the balance to be diverted and consumed by the components in use.

If the electrical loading is sufficient to cause the system voltage to fall to 13.5 volts, the Zener Diode will revert to a high resistance state of non-conductivity and the full generated output will go to meet the demands of the battery.

With the specially designed heat sink, the Zener Diods is able to absorb the full output of the alternator.

MAINTENANCE

Provided a firm flat "metal to metal" contact is maintained between the base of the Diode and the surface of the heat sink, to ensure adequate heat flow, no maintenance will be necessary. Ensure that the earth connection to the diode is a good one.

SECTION H7

ZENER DIODE LOCATION

The Zener Diode ("A" Fig. H13) is mounted on a bracket below the headlamp, and the aluminium heat-sink ("B" Fig. H13) is finned to assist cooling. The order of assembly is shown in Fig.H13.

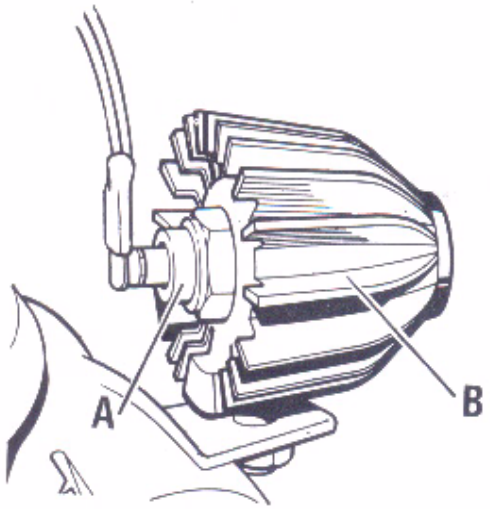


Fig. H13. Finned heatsink

To remove diode only, disconnect the brown/blue double "Lucar" connector from the diode. Remove the black plastic plug from the front of the heat sink (See Fig. H13) and unscrew the "nyloc" nut which secures the Diode. When refitting, the Diode nut must be tightened with extreme care. (Maximum tightening torque 22/28 lb./in.)

Tak off the finned heat sink, remove the front bolt from the retaining bracket. A double red (ground) earth wire is attached at this point.

DO NOT ATTACH THE (GROUND) EARTH LEADS BETWEEN THE DIODE BODY AND HEATSINK

SECTION H8

ELECTRIC HORNS

DESCRIPTION

The horn is of a high frequency single note type and is operated by a direct current from the battery. The method of operation is that of a magnetically operated armature, which impacts on the cone 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 affect horn performance.

If the horn still fails to operate, make the following checks:-

(1) Eliminate the horn push circuit by earthing WI-terminal with a temporary wire. If the horns then operate, check the horn push and associated wiring.

(2) Having carried out test one and the horn still fails to operate, apply a direct feed to the horn with a temporary link.

If the above checks are made and the fault persists, then adjust the horn as follows:–

SECTION H10

REMOVING AND REFITTING THE HEADLAMP

Disconnect the leads from the battery terminals then slacken the light unit securing screw at the top of the headlamp. Prise the rim of the light unit free. Detach the pilot bulb-holder from the unit, and disconnect the three bulbholder leads at the snap connectors. Disconnect the two terminals from the switch by loosening the small retaining screws. Pull out the warning light bulbs from their holders at the back of the shell, and disconnect the red ground (earth) wire. The indicator body and attachment stalk can be removed from the headlamp by unscrewing the nut situated against the headlamp bracket.

This nut is an integral part of the attachment stalk, and screws into a captive nut on the inside of the headlamp shell.

By bending the two retaining clips away from the rubber grommet at the rear of the head-lamp shell, it will be possible to remove the harness through the resulting aperture. Reassembly is the reversal of the above procedure, but reference should be made to the wiring diagram in Section H20. Finally set the headlamp main beam as detailed in Section H9.

SECTION H11

TAIL AND STOP LAMP UNIT

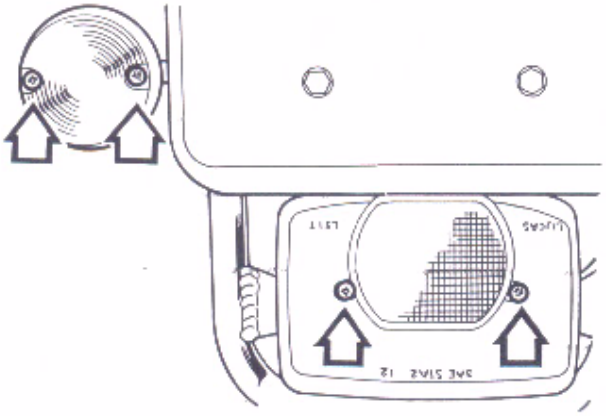


Fig. H16. Access to tail/stop light and direction indicator bulbs

Access to the bulbs in the tail and stop lamp unit is acheived 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 ground (earth) lead to the bulb holder is in satisfactory condition.

When refitting the lens, do not overtighten the fixing screws or the lens may fracture as a result.

SECTION H12

FUSES

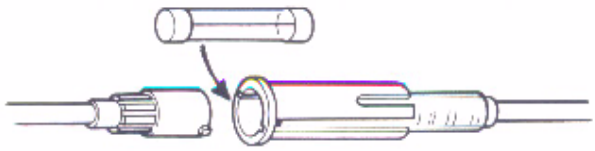


Fig. H17. Exploded view of fuseholder assembly

The fuse is to be found on the brown/blue live lead from the battery negative terminal. It is housed in a quickly detachable shell and is of 35 amp fuse rating.

Before following any fault location procedure always check that the fuse is not the source of the fault. A new fuse-cartridge should be fitted if there is any doubt about the old one.

The fuse rating must not under any circum-stances be above 35 amp.

SECTION H15

WARNING LAMPS

Warning lamps are fitted into the binnacle assembly, mounted on the handlebars. (Fig. H20). The blue light (A) indicates high beam. The amber warning light (B) serves the flasher lamps, and becomes illuminated in conjunction with them when they are operational.

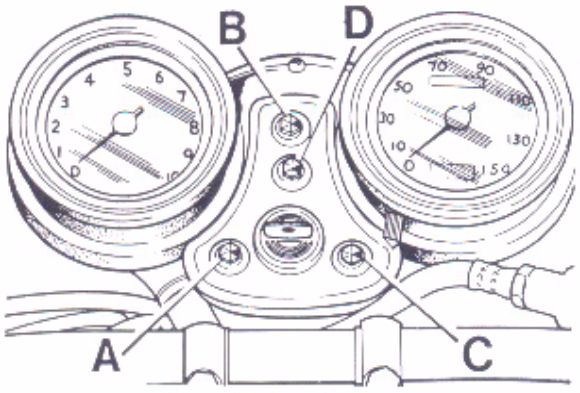


Fig. H20. The warning lights

The red warning light (C) is connected into the ignition circuit, and also to an electrically controlled oil pressure switch, situated at the timing cover.

This results in the warning light operating as soon as the ignition is turned on, with the engine stopped, but extinguishes as oil pressure develops beyond a predetermined minimum critical pressure when the motor is running. If the red light comes on during normal running, the engine should be stopped, and an investigation made immediately, in an effort to determine the cause of the problem. Serious damage to the unit could arise if there is any shortage of lubrication. Neutral gear, between first and second ratios, is indicated by a green light (D). This comes on only when neutral is engaged.

Access to the bulbs themselves can be obtained by the method described in *Section* H13.

SECTION H16

STOP LAMP SWITCHES

The front and rear stop lamp switches are both sealed units requiring no maintenance, other than a routine check on the security and cleanliness of terminals. The front stop switch is fitted into the front brake operating lever (see section F9), whilst the rear stop switch is located on the right side rear engine plate, near the pivot of the rear brake operating lever.

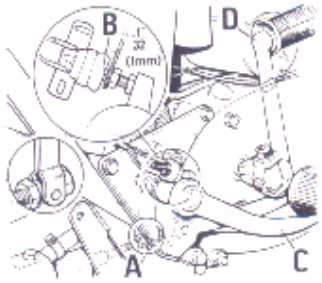


Fig. H21. Front and rear stop lamp switches

SECTION H17

OIL PRESSURE SWITCH

The oil pressure switch is a sealed unit fitted into the crankcase behind the oil pump.
The oil switch is designed to operate at 7–11 lb. pressure, at which stage the oil warning light will be extinguished. There is no simple method of checking the function of the switch, except by substitution.

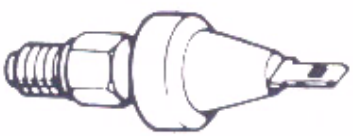


Fig. H22. Oil pressure switch

TESTING

The efficiency of a stored capacitor can be determined fairly accurately with the aid of a voltmeter (scale 0–12 volts) connected to the terminals of a charged capacitor and the steady, not instantaneous reading on the meter noted. The procedure is as follows:–

(a) Connect the capacitor(s) to a 12-volt supply and leave connected for 5 seconds. Observe carefully the polarity of connections, otherwise the capacitor may be ruined.

(b) Disconnect the supply leads and allow the charged capacitor to stand for at least *5 minutes.*

(c) Connect the voltmeter leads to the capacitor and note the steady reading, This should not be less than 9.0 volts for a serviceable unit.
If the reading is less than 9.0 volts, the capacitor is leaking and must be replaced.

If a voltmeter is not available a rough check can be made by following the procedures in (a) and (b) and using a single strand of copper wire instead of the voltmeter to short-circuit the capacitor terminals. A good spark will be obtained from a serviceable capacitor at the instant the terminals are shorted together.

WIRING AND INSTALLATION

The capacitor is fitted into the spring and should be mounted with its terminals downwards. The capcitor negative terminal *and* Zener Diode must be connected to the rectifier centre (D.C.) terminal (brown/white), and the positive terminal must be connected to the centre bolt earthing terminal.

The mounting spring should be attached to any convenient point near the battery carrier.

SERVICE NOTES

Before running a 2MC equipped machine with the battery disconnected it is essential that the *battery negative lead be insulated* to prevent it from reconnecting and shorting to earth (frame of machine). Otherwise, the capacitor will be ruined. This can be done by removing the fuse from its holder and replacing it with a length of ¼in. dia. dowel rod or other insulating medium.

A faulty capacitor may not be apparent when used with a battery system. To prevent any inconvenience arising, periodically check that the capacitor is serviceable by disconnecting the battery to see if the machine will start and run in the normal manner, with full lighting also available.

WARNING

Do not run the machine with the Zener Diode disconnected, as the 2MC capacitor will be damaged due to excessive voltage.

Should the engine fail to start without the battery, substitute a new 2MC capacitor. If the engine still refuses to start, check the wiring between the capacitor and rectifier for possible open or short circuit conditions. Also check the earth connections.

If difficulty is encountered in starting with a battery fitted, disconnect the 2MC capacitor to eliminate the possibility of a short circuit

STARTER MOTOR SLUGGISH

Check that the battery is fully charged.

If the starter motor operates, but only slowly, and with great effort, the main starter circuit should be checked for voltage drop. Disconnect the ignition coils by removing connections, or depressing the "kill button". Using a D.C. voltmeter, connect one probe to battery positive, and other probe to battery negative. This provides a "battery voltage" value. Move probe from battery negative to main feed terminal of solenoid. Voltage reading should not be more then ½ volt below reading across battery. If more than this, replace cable.

Move probe from battery positive to solenoid starter connection. Voltage reading should not be more than ½ volt below reading across battery. If more, clean and tighten solenoid connections and re-test. If still reading more than ½volt, replace solenoid.

Move probe from solenoid starter terminal to starter terminal, and probe from solenoid feed terminal to solenoid starter terminal. Depress starter button. If volt drop exceeds ½ volt, replace cable.
Move probe from starter terminal to starter body, and probe from solenoid starter terminal to starter terminal. Depress starter button. Volt drop should not exceed ½ volt. If more, remove starter. Move probe from starter body to earth stud on engine, and probe from starter terminal to starter body. Depress starter button. Volt drop should not exceed ½ volt. If more, remove starter, clean the starter/engine mating faces, and retighten.

Move probe from engine earth stud to battery positive terminal, and from starter body to engine earth stud. Depress starter button. Volt drop should not exceed ½ volt. If more, replace cable. The total volt drop between negative and starter body, and between starter body and battery positive, must not exceed one volt. If it does, all connections must be removed, cleaned, and retightened.

TO REMOVE STARTER ASSEMBLY

Disconnect battery leads. Remove the starter solenoid leads and three screws securing the housing to the clutch cover. Lift assembly clear.

TO REMOVE DRIVE ASSEMBLY

Tap back circlip collar. Remove circlip on intermediate shaft. Remove pivot pin. Slide drive assembly off intermediate shaft, together with lever mechanism and solenoid plunger. Remove circlip at rear of drive, and separate from override spring. Remove lever.
The drive can be serviced complete, or the override spring only replaced.

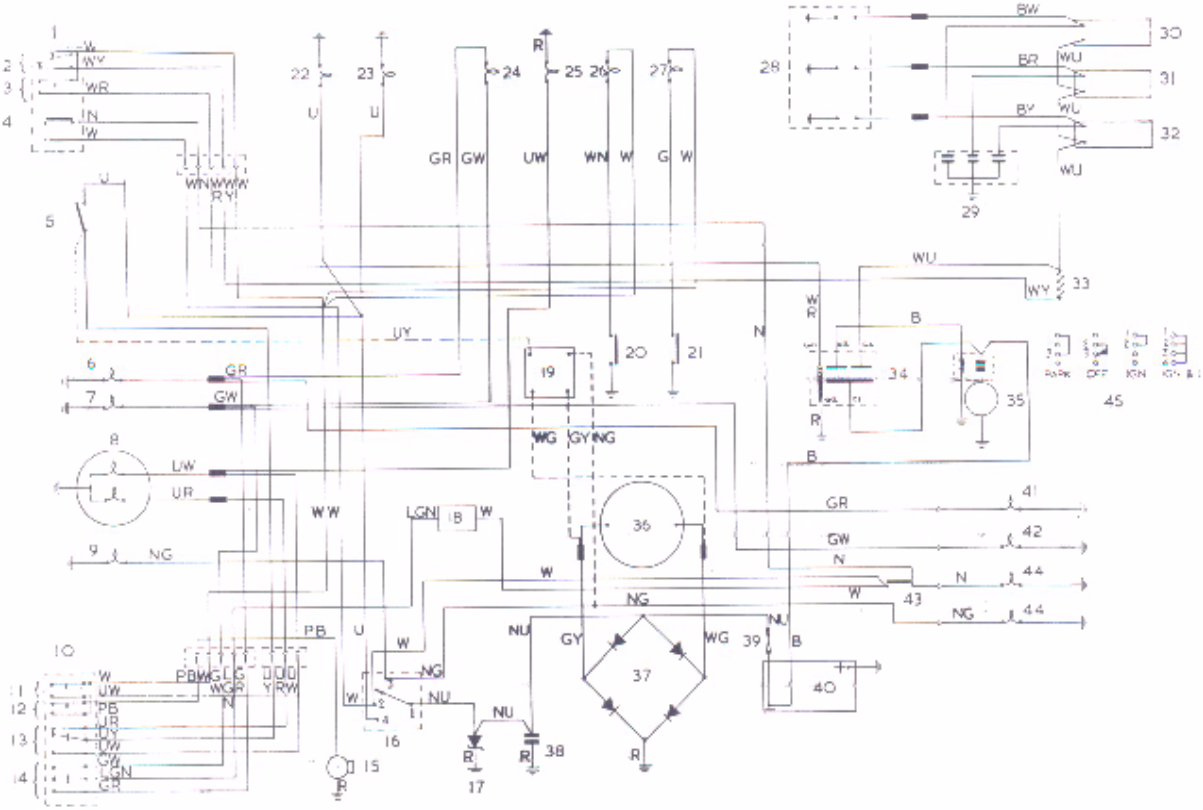
TO REMOVE SOLENOID

Remove solenoid/starter lead. Take off the remaining solenoid nut. Slide solenoid off plunger, collecting the return spring. Lift the plunger off the lever assembly.
The solenoid can be serviced complete, or the return spring only changed. (It should be noted that replacement solenoids are supplied less nuts. Care should be taken, therefore, to ensure that the original nuts are not misplaced).

TO REMOVE THE STARTER MOTOR

Take off the starter/solenoid lead. Remove two nuts from the housing studs, and take out the headed screw inside the housing (behind the drive). Before reassembling, ensure that the pinion has adequate lubrication by careful greasing.
The starter motor can be serviced complete, or stripped down, and specific parts replaced.

SECTION H20
WIRING DIAGRAM



WIRING DIAGRAM SYMBOLS

1 RIGHT HANDLEBAR SWITCH GROUP
2 KILL SWITCH
3 STARTER SWITCH
4 FRONT BRAKE SWITCH
5 HEADLITE/PARK SWITCH
6 FRONT DIRECTION INDICATOR (left)
7 FRONT DIRECTION INDICATOR (right)
8 HEADLITE BULB (Main beam, upper)
(Dipped beam, lower)
9 PARKING BULB
10 LEFT HANDLEBAR SWITCH GROUP
11 HEADLITE FLASHER (except earlier models)
12 HORN SWITCH
13 HEADLITE BEAM (Dipped, upper)
(Main, lower)
(Upper RH)
14 DIRECTION INDICATOR SWITCH (Centre off)
(Lower LH)
15 HORN
16 PANEL LITING-IGNITION SWITCH
17 ZENER-DIODE
18 DIRECTION INDICATOR "FLASHER" UNIT
19 HEADLITE WARNING UNIT
(North America only)
20 OIL PRESSURE SWITCH
21 NEUTRAL INDICATOR SWITCH
22 SPEEDOMETER
23 TACHOMETER
24 WARNING LITE (direction indicator)
25 WARNING LITE (main headlite beam)
26 WARNING LITE (oil pressure)
27 WARNING LITE (neutral switch)
28 CONTACT BREAKER ASSEMBLY
29 CAPACITORS
30 COIL RH
31 COIL CENTER
32 COIL LH
33 BALLAST RESISTOR
34 STARTER RELAY
35 STARTER
36 ALTERNATOR
37 RECTIFIER
38 ELECTROLYTIC CAPACITOR
(Not standard fitment)
39 FUSE
40 BATTERY
41 REAR DIRECTION INDICATOR (left)
42 REAR DIRECTION INDICATOR (right)
43 REAR BRAKE SWITCH
44 STOP/REAR LITE (Stop-upper)
(Rear-lower)
45 LITING AND IGNITION SWITCH POSITIONS

SNAP CONNECTORS
GROUND (Earth)

CABLE COLOR CODE	
B	BLACK
U	BLUE
N	BROWN
G	GREEN
Y	YELLOW
P	PURPLE
R	RED
W	WHITE
D	DARK
L	LITE

Fig. H28. Wiring Diagram

SECTION J

WORKSHOP SERVICE TOOLS

INTRODUCTION

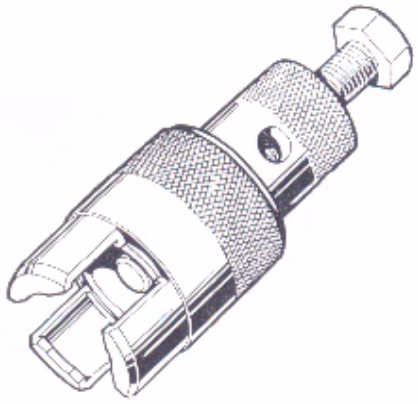
This section of the Workshop Manual illustrates pictorially the workshop service tools that were once available for carrying out the major dismantling and re-assembly operations on the 750 c.c. Trident Motorcycle. The author's felt that providing these illustrations would in many cases facilitate local fabrication or adaption from existing equipment.
The section is divided into sub-sections relating to the main section heading in this manual, illustrating:–

(a) those tools mentioned and used in the appropriate section text;

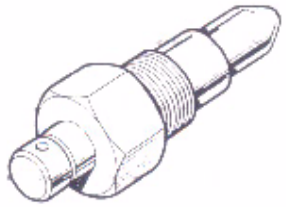
(b) certain tools that may be found useful, but are not mentioned in the text.

Note: Superseding Triumph (Meriden) Part numbers are provided in brackets.

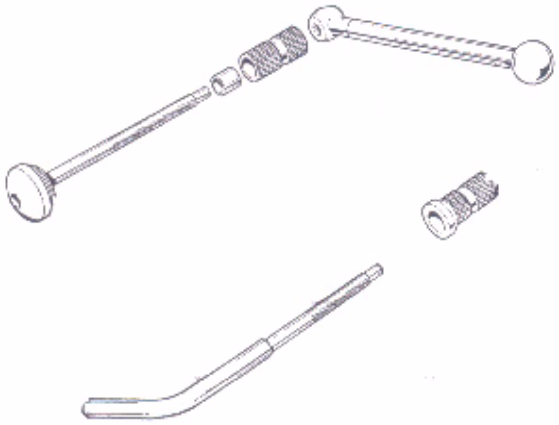
ENGINE (CONTINUED)



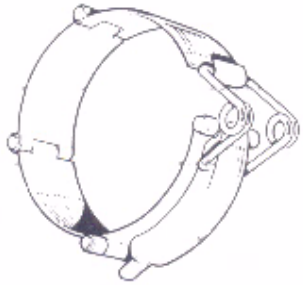
61-6019 Crankshaft pinion extractor



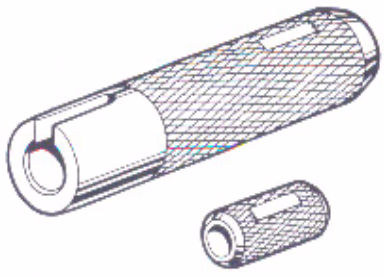
(60-1858) Ignition timing plug and body



61-6063 Valve guide removal and replacement tool

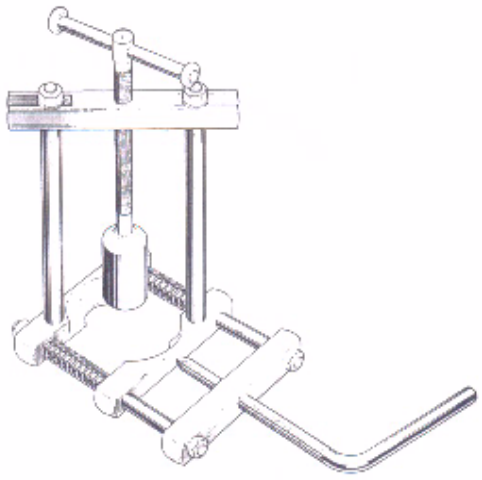


61-6052 Piston ring clamp

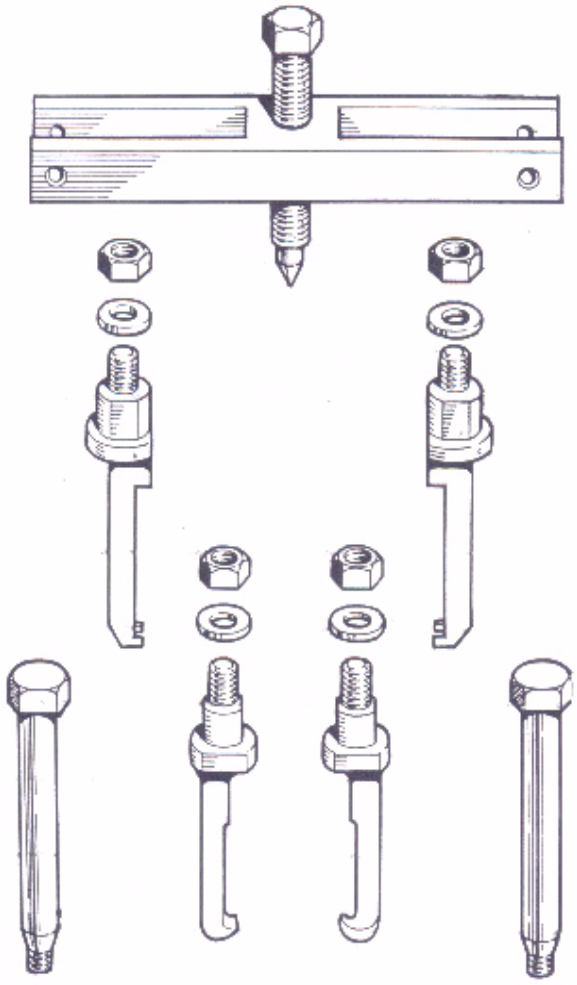


61-6024 Crankshaft pinion replacement drift and guide

ENGINE (CONTINUED)



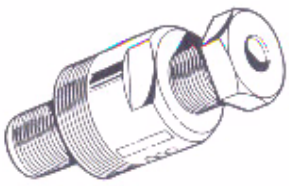
60-3677 Crankshaft bearning removal tool (inner race)



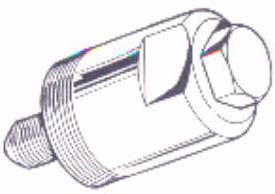
61-3808 *Universal extractor*

SECTION J2

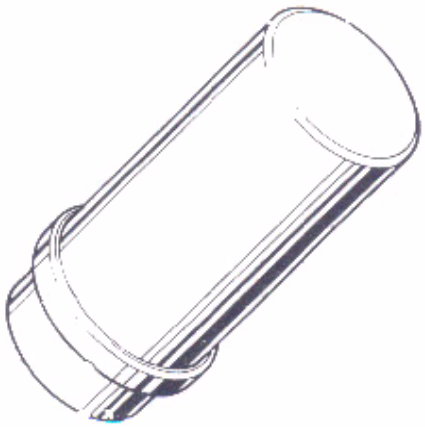
TRANSMISSION



60-1862 Shock absorber extractor



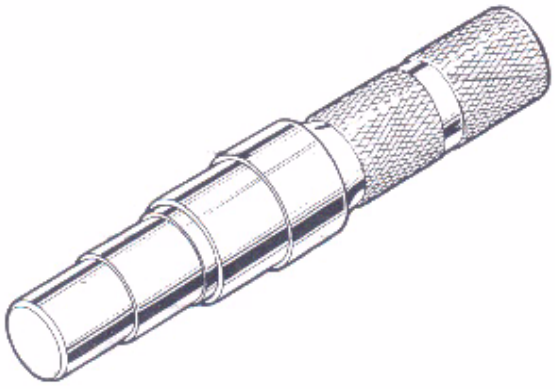
60-1860 Clutch hub extractor



Headrace bearing drift 61-6121

SECTION J 5

FRAME



61-6050 Swinging arm bush assembly tool

CONVERSION

TABLES

FRACTIONS TO DECIMALS AND MILLIMETRES

Fractions			Decimals	mm.
		1/64	·015625	·3969
	1/32		·03125	·7937
		3/64	·046875	1·1906
1/16			·0625	1·5875
		5/64	·078125	1·9844
	3/32		·09375	2·3812
		7/64	·109375	2·7781
1/8			·125	3·1750
		9/64	·140625	3·5719
	5/32		·15625	3·9687
		11/64	·171875	4·3656
3/16			·1875	4·7625
		13/64	·203125	5·1594
	7/32		·21875	5·5562
		15/64	·234375	5·9531
1/4			·25	6·3500
		17/64	·265625	6·7469
	9/32		·28125	7·1437
		19/64	·296875	7·5406
5/16			·3125	7·9375
		21/64	·328125	8·3344
	11/32		·34375	8·7312
		23/64	·359375	9·1281
3/8			·375	9·5250
		25/64	·390625	9·9219
	13/32		·40625	10·3187
		27/64	·421875	10·7156
7/16			·4375	11·1125
		29/64	·453125	11·5094
	15/32		·46875	11·9062
		31/64	·484375	12·3031
1/2			·5	12·7000

Fractions			Decimals	mm.
		33/64	·515625	13·0969
	17/32		·53125	13·4937
		35/64	·546675	13·8906
9/16			·5625	14·2875
		37/64	·578125	14·6844
	19/32		·59375	15·0812
		39/64	·609375	15·4781
5/8			·625	15·8750
		41/64	·640625	16·2719
	21/32		·65685	16·6687
		43/64	·671875	17·0656
11/16			·6875	17·4625
		45/64	·703125	17·8594
	23/32		·71875	18·2562
		47/64	·734375	18·6531
3/4			·75	19·0500
		49/64	·765625	19·4469
	25/32		·78125	19·8437
		51/64	·796875	20·2406
13/16			·8125	20·6375
		53/64	·828125	21·0344
	27/32		·84375	21·4312
		55/64	·859375	21·8281
7/8			·875	22·2250
		57/64	·890625	22·6219
	29/32		·90625	23·0187
		59/64	·921875	23·4156
15/16			·9375	23·8125
		61/64	·953125	24·2094
	31/32		·96875	24·6062
		63/64	·984375	25·0031
1				25·4000

DRILL SIZES

Letter	Size	Letter	Size
A	·234	N	·302
B	·238	O	·316
C	·242	P	·323
D	·246	Q	·332
E	·250	R	·339
F	·257	S	·348
G	·261	T	·358
H	·266	U	·368
I	·272	V	·377
J	·277	W	·386
K	·281	X	·397
L	·290	Y	·404
M	·295	Z	·413

Number	Size	Number	Size	Number	Size	Number	Size
1	·2280	14	·1820	27	·1440	40	·0980
2	·2210	15	·1800	28	·1405	41	·0960
3	·2130	16	·1770	29	·1360	42	·0935
4	·2090	17	·1730	30	·1285	43	·0890
5	·2055	18	·1695	31	·1200	44	·0860
6	·2040	19	·1660	32	·1160	45	·0820
7	·2010	20	·1610	33	·1130	46	·0810
8	·1990	21	·1590	34	·1110	47	·0785
9	·1960	22	·1570	35	·1100	48	·0760
10	·1935	23	·1540	36	·1065	49	·0730
11	·1910	24	·1520	37	·1040	50	·0700
12	·1890	25	·1495	38	·1015	51	·0670
13	·1850	26	·1470	39	·0995	52	·0635

WIRE GAUGES

No. of Gauge	Imperial Standard Wire Gauge		Brown and Sharpe's American Wire Gauge	
	Inches	Millimetres	Inches	Milletres
0000	·400	10·160	·460	11·684
000	·372	9·448	·410	10·404
00	·348	8·839	·365	9·265
0	·324	8·299	·325	8·251
1	·300	7·620	·289	7·348
2	·276	7·010	·258	6·543
3	·252	6·400	·229	5·827
4	·232	5·892	·204	5·189
5	·212	5·384	·182	4·621
6	·192	4·676	·162	4·115
7	·176	4·470	·144	3·664
8	·160	4·064	·128	3·263
9	·144	3·657	·114	2·906
10	·128	3·251	·102	2·588
11	·116	2·946	·091	2·304
12	·104	2·641	·081	2·052
13	·092	2·336	·072	1·827
14	·080	2·032	·064	1·627
15	·072	1·828	·057	1·449
16	·064	1·625	·051	1·290
17	·056	1·422	·045	1·149
18	·048	1·219	·040	1·009
19	·040	1·016	·035	·911
20	·036	·914	·032	·811
21	·032	·812	·028	·722
22	·028	·711	·025	·643
23	·024	·609	·023	·573
24	·022	·558	·020	·511
25	·020	·508	·018	·454
26	·018	·457	·016	·404
27	·0164	·416	·014	·360
28	·0148	·375	·012	·321
29	·0136	·345	·011	·285
30	·0124	·314	·010	·254

PINTS TO LITRES

	0	1	2	3	4	5	6	7	8
—	—	·568	1·136	1·705	2·273	2·841	3·841	3·978	4·546
¼	·142	·710	1·279	1·846	2·415	2·983	3·552	4·120	4·688
½	·284	·852	1·420	1·989	2·557	3·125	3·125	4·262	4·830
¾	·426	·994	1·563	2·131	2·699	3·267	3·836	4·404	4·972

GALLONS (IMPERIAL) TO LITRES

	0	1	2	3	4	5	6	7	8	9	
—		4·546	9·092	13·638	18·184	22·730	27·276	31·822	36·368	40·914	—
10	45·460	50·005	54·551	59·097	63·643	63·189	72·735	77·281	81·827	86·373	10
20	90·919	95·465	100·011	104·557	109·103	113·649	118·195	122·741	127·287	131·833	20
30	136·379	140·924	145·470	150·016	154·562	159·108	163·645	168·200	172·746	177·292	30
40	181·838	186·384	190·930	195·476	200·022	204·568	209·114	213·660	218·206	222·752	40
50	227·298	231·843	236·389	240·935	245·481	250·027	254·473	259·119	263·605	268·211	50
60	272·757	277·303	281·849	286·395	290·941	295·487	300·033	304·579	309·125	313·671	60
70	318·217	322·762	327·308	331·854	336·400	340·946	245·492	350·038	354·584	359·130	70
80	363·676	368·222	372·768	377·314	381·860	386·406	390·952	395·498	400·044	404·590	80
90	409·136	413·681	418·227	422·773	427·319	431·865	436·411	440·957	445·503	450·049	90

POUNDS PER SQUARE INCH TO KILOGRAMS PER SQUARE CENTIMETRE

	0	1	2	3	4	5	6	7	8	9	
—		0·070	0·141	0·211	0·281	0·352	0·422	0·492	0·562	0·633	—
10	0·703	0·773	0·844	0·914	0·984	1·055	1·125	1·195	1·266	1·336	10
20	1·406	1·476	1·547	1·617	1·687	1·758	1·828	1·898	1·969	2·039	20
30	2·109	2·179	2·250	2·320	2·390	2·461	2·531	2·601	2·672	2·742	30
40	2·812	2·883	2·953	3·023	3·093	3·164	3·234	3·304	3·375	3·445	40
50	3·515	3·586	3·656	3·726	3·797	3·867	3·937	4·007	4·078	4·148	50
60	4·218	4·289	4·359	4·429	4·500	4·570	4·640	4·711	4·781	4·851	60
70	4·921	4·992	5·062	5·132	5·203	5·273	5·343	5·414	5·484	5·554	70
80	5·624	5·695	5·765	5·835	5·906	5·976	6·046	6·117	6·187	6·257	80
90	6·328	6·398	6·468	6·538	6·609	6·679	6·749	6·820	6·890	6·960	90

B.S.W. SCREW THREADS

Dia. of bolt (inch)	Threads per inch	Dia. tap drill (inch)	Core dia.
1/4	20	·1968	·1860
5/16	18	1/4	·2412
3/8	16	5/16	·2950
7/16	14	23/64	·3460
1/2	12	13/32	·3933
9/16	12	15/32	·4558
5/8	11	17/32	·5086
11/16	11	37/64	·5711
3/4	10	41/64	·6219
13/16	10	45/64	·6844
7/8	9	3/4	·7327
15/16	9	13/16	·7952
1	8	55/64	·8399

B.S.F. SCREW THREADS

Dia. of bolt (inch)	Threads per inch	Dia. tap drill (inch)	Core dia.
7/32	28	·1770	·1731
1/4	26	·2055	·2007
9/32	26	·238	·2320
5/16	22	·261	·2543
3/8	20	·316	·3110
7/16	18	3/8	·3664
1/2	16	27/64	·4200
9/16	16	·492	·4825
5/8	14	35/64	·5335
11/16	14	39/64	·5960
3/4	12	21/32	·6433
13/16	12	23/32	·7058
7/8	11	25/32	·7586
1	10	57/64	·8719
1-1/8	9	1	·9827
1-1/4	9	1-1/8	1·1077
1-3/8	8	1-15/64	1·2149
1-1/2	8	1·358	1·3399
1-5/8	8	1-31/64	1·4649

U.N.C. SCREW THREADS

Dia.	No. of thds.	Core dia.	Tap drill
1/4 in.	20	·1959 in.	5·20 mm.
5/16 in.	18	·2524 in.	6·60 mm.
3/8 in.	16	·3073 in.	8·00 mm.
7/16 in.	14	·3602 in.	9·40 mm.
1/2 in.	13	·4167 in.	10·80 mm.
9/16 in.	12	·4723 in.	12·20 mm.
5/8 in.	11	·5266 in.	13·50 mm.
3/4 in.	10	·6417 in.	16·50 mm.
7/8 in.	9	·7547 in.	49/64 in.
1 in.	8	·8647 in.	22·25 mm.
1-1/8 in.	7	·9704 in.	63/64 in.
1-1/4 in.	7	1·0954 in.	1-7/64 in.
1-3/8 in.	6	1·1946 in.	1-13/64 in.
1-1/2 in.	6	1·3196 in.	1-21/64 in.
1-3/4 in.	5	1·5335 in.	1-35/64 in.
2 in.	4-1/2	1·7594 in.	1-25/32 in.

U.N.F. SCREW THREADS

Dia.	No. of thds.	Core dia.	Tap drill
1/4 in.	28	·2113 in.	5·50 mm.
5/16 in.	24	·2674 in.	6·90 mm.
3/8 in.	24	·3299 in.	8·50 mm.
7/16 in.	20	·3834 in.	9·90 mm.
1/2 in.	20	·4459 in.	11·50 mm.
9/16 in.	18	·5024 in.	12·90 mm.
5/8 in.	18	·5649 in.	14·50 mm.
3/4 in.	16	·6823 in.	11/16 in.
7/8 in.	14	·7977 in.	0·804 in.
1 in.	12	·9098 in.	23·25 mm.
1-1/8 in.	12	1·0348 in.	26·50 mm.
1-1/4 in.	12	1·1598 in.	29·50 mm.
1-3/8 in.	12	1·2848 in.	1·290 in.
1-1/2 in.	12	1·4098 in.	36·00 mm.

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