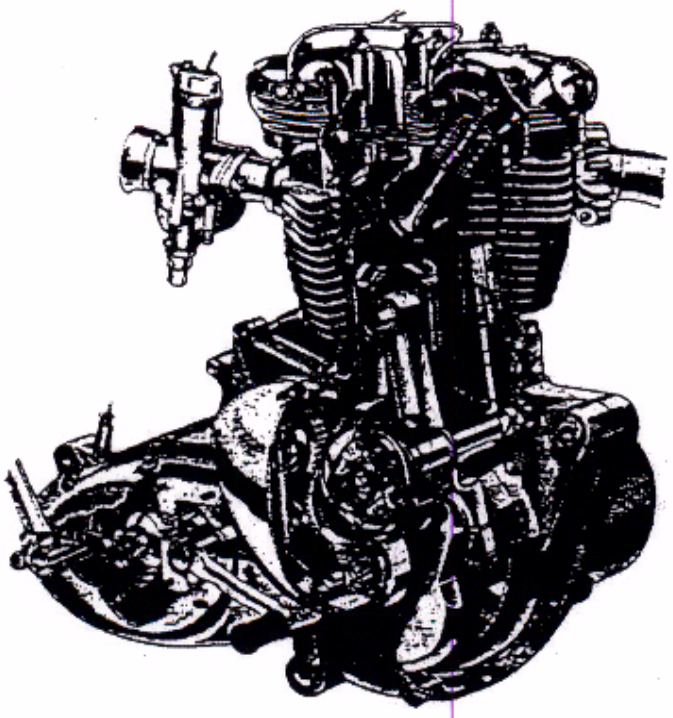
TRIUMPH

WORKSHOP MANUAL



UNIT CONSTRUCTION 650 c.c. TWINS

6T TR6 · T120 · FROM ENGINE No. DU 101

1963-1965

WITH TECHNICAL INFORMATION SECTION FOR 1963

INTRODUCTION

THIS manual has been compiled and prepared to provide the necessary service information for workshop, fitter, technical staff and individual owner, wishing to carry out basic maintenance and repair work on the TRIUMPH 650 c.c. series of unit construction twin cylinder models.

GENERAL DATA for all models within the above range is provided in ready reference form, and a separate section covering Service Tools is fully illustrated at the end of this manual.

The manual is divided into sections dealing with major assemblies, throughout the machine, each section sub-divided into sequence order corresponding to normal operations of strip down, examination and rebuilding procedure.

ENGINE AND FRAME NUMBERS

NOTE: The engine number is located on the left hand side of the engine immediately below the cylinder barrel to crankcase flange. The engine type is incorporated as a prefix to the engine number.

The frame number of the machine is stamped on the left side of the machine, on the frame headlug, beneath the top fork lug, and forward of the fuel tank.

Both the engine and frame numbers should be given IN FULL in any correspondence relating to the machine either with the main Distributor or the Triumph Service Department.

CONTENTS

FACTORY SERVICE ARRANGEMENTS

CORRESPONDENCE

Technical Advice, Guarantee Claims and Repairs

Communications dealing with any of these subjects should be addressed to the **SERVICE DEPARTMENT.**

In all communications the full engine number complete with all prefix letters and figures should be stated. This number will be found on the L.H. side of the crankcase just below the cylinder flange.

TECHNICAL ADVICE

It will be appreciated how very difficult it is to diagnose trouble by correspondence and this is made impossible in many cases because the information sent to us is so scanty. Every possible point which may have some bearing on the matter should be stated so that we can send a useful and detailed reply.

REPLACEMENT PARTS

Replacement parts are no longer supplied direct from the factory to the individual owner. They should be obtained from the nearest local Triumph dealer.

There is a nation-wide network of stockists, a list of which is available from the factory on request.

REPAIRS

Before a motorcycle is sent to our Works an appointment must be made. This can be done by letter or telephone. When an owner wishes to return his machine for guarantee repairs, he should first consult his Dealer as we do not normally accept machines in our Repair Shop until the Dealer has inspected them. Frequently the Dealer can overcome the trouble without the delay and expense of sending the machine to the Works. This avoids the machine being out of use for some days when it could be on the road. Where parts such as cylinders, petrol tanks, etc., are forwarded for repair, they should be packed securely so as to avoid damage in transit. The owner's name and address should be enclosed together with full instructions. In the case of complete motorcycles, a label showing the owner's name and address should always be attached and all accessories such as tools, inflator, handlebar mirrors and other parts removed.

SERVICE EXCHANGE RECONDITIONED UNITS

A range of service exchange reconditioned units is available from the Factory Service Department. This list includes petrol tanks, front forks, front and rear frames, clutch plates, brake shoes, etc., which are supplied after the return of the original equipment for inspection and acceptance. Operation of this scheme is maintained solely through the Dealer network.

TRIUMPH GUARANTEE

1. In this Guarantee the word "machine" refers to the motor cycle, scooter, motor cycle combination or sidecar as the case may be, purchased by the Purchaser.

2. In order to obtain the benefit of this Guarantee, the Purchaser must have correctly completed the registration form and returned it to us within fourteen days of the purchase.

3. We will supply, free of charge, a new part in exchange for, or, if we consider repair sufficient, will repair free of charge any part proved within six months of the date of purchase of any new machine, (three months overseas) or within three months of its renewal or repair in the case of a part already renewed or repaired, to be defective by reason of our faulty workmanship or materials. We do not undertake to bear the cost of fitting such new or repaired part or accessory.

4. Any part considered to be defective must be sent to our Works, carriage paid, accompanied by the following information:—
   (a) Name of purchaser and his address;
   (b) Date of purchase of machine;
   (c) Name of dealer from whom the purchase was made;
   (d) Engine number and model.

5. This Guarantee shall not extend to defects or damage appearing after misuse, neglect, abnormal stress or strain, or the incorporation or affixing of unsuitable attachments or parts and in particular:—
   (a) Hiring out;
   (b) Racing and Competitions;
   (c) Adaptation or alteration of any part or parts after leaving our Works;
   (d) The attaching of a sidecar in a manner not approved by us or to an unsuitable motor cycle.

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

6. Our liability and that of our dealer who sells the machine, shall be limited to that set out in this guarantee, and no other claims including claims for consequential damage or injury to person or property, shall be admissible. All other conditions and warranties statutory or otherwise and whether express or implied are hereby excluded and no guarantee other than that expressly herein contained applies to the machine to which this Guarantee relates or any accessory or part thereof.

7. We reserve the right to modify or deviate from the Published Specification without notice.

PROPRIETARY FITTINGS

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

Carburetters ... Amal Ltd.,
Holdford Road, Witton,
Birmingham, 6.

Chains ... ... Renold Chains Ltd.,
Wythenshawe, Manchester.

Electrical Equipment J. Lucas Ltd.,
Great Hampton Street,
Birmingham, 18.

Rear Suspension ... Girling Ltd.,
King's Road, Tyseley,
Birmingham, 11.

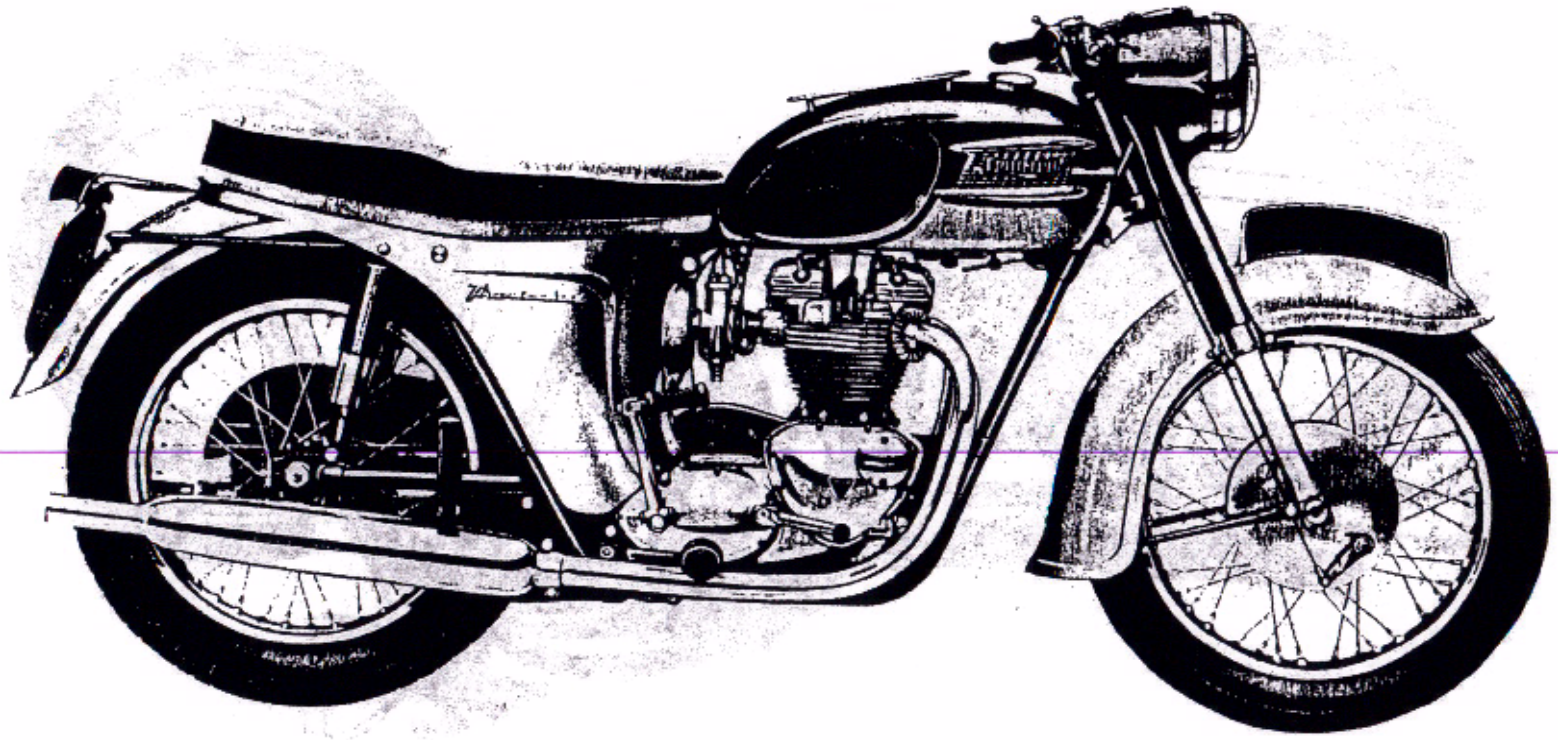
Sparking Plugs Champion Sparking Plugs Co. Ltd.
Feltham Middlesex.

Speedometers Smith's Motor Accessories Ltd.,
Cricklewood Works,
London, N.W.2.

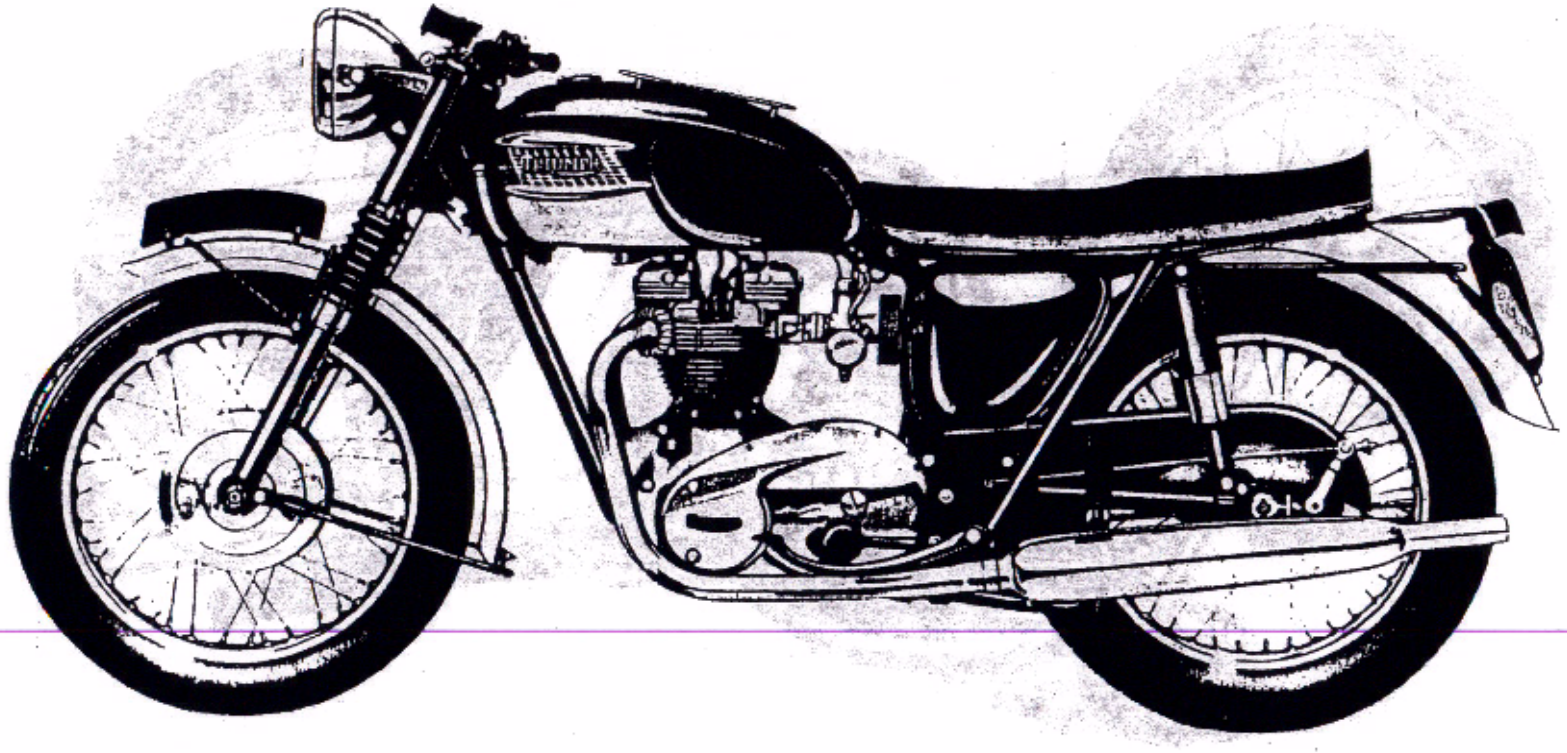
Tyres ... Dunlop Rubber Company Ltd.,
Fort Dunlop,
Birmingham, 24.

The Avon India Rubber Co. Ltd.,
Melksham,
Wilts.

TRIUMPH 650 c.c. UNIT CONSTRUCTION TWINS

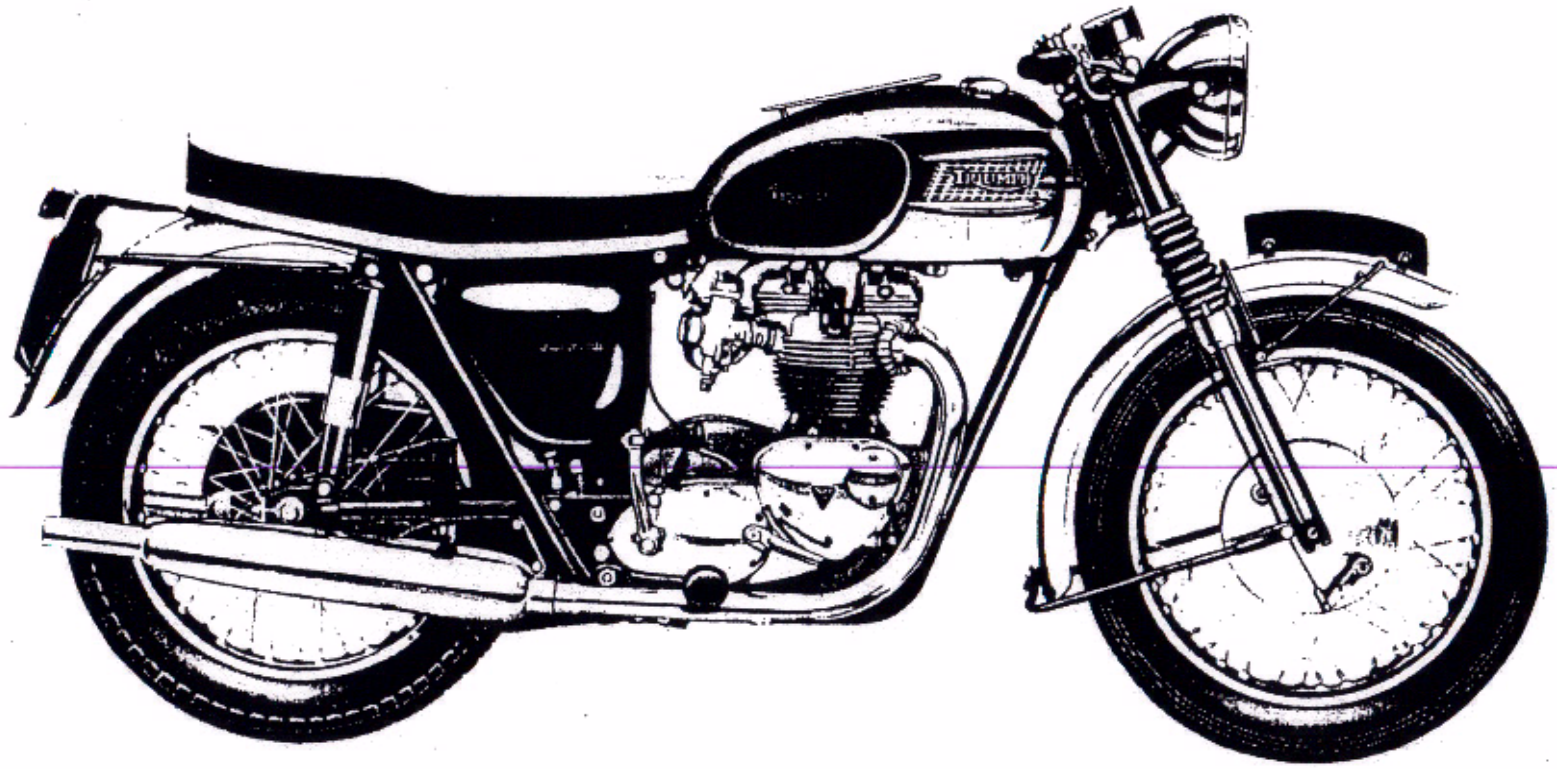


650 c.c. TRIUMPH THUNDERBIRD (6T)

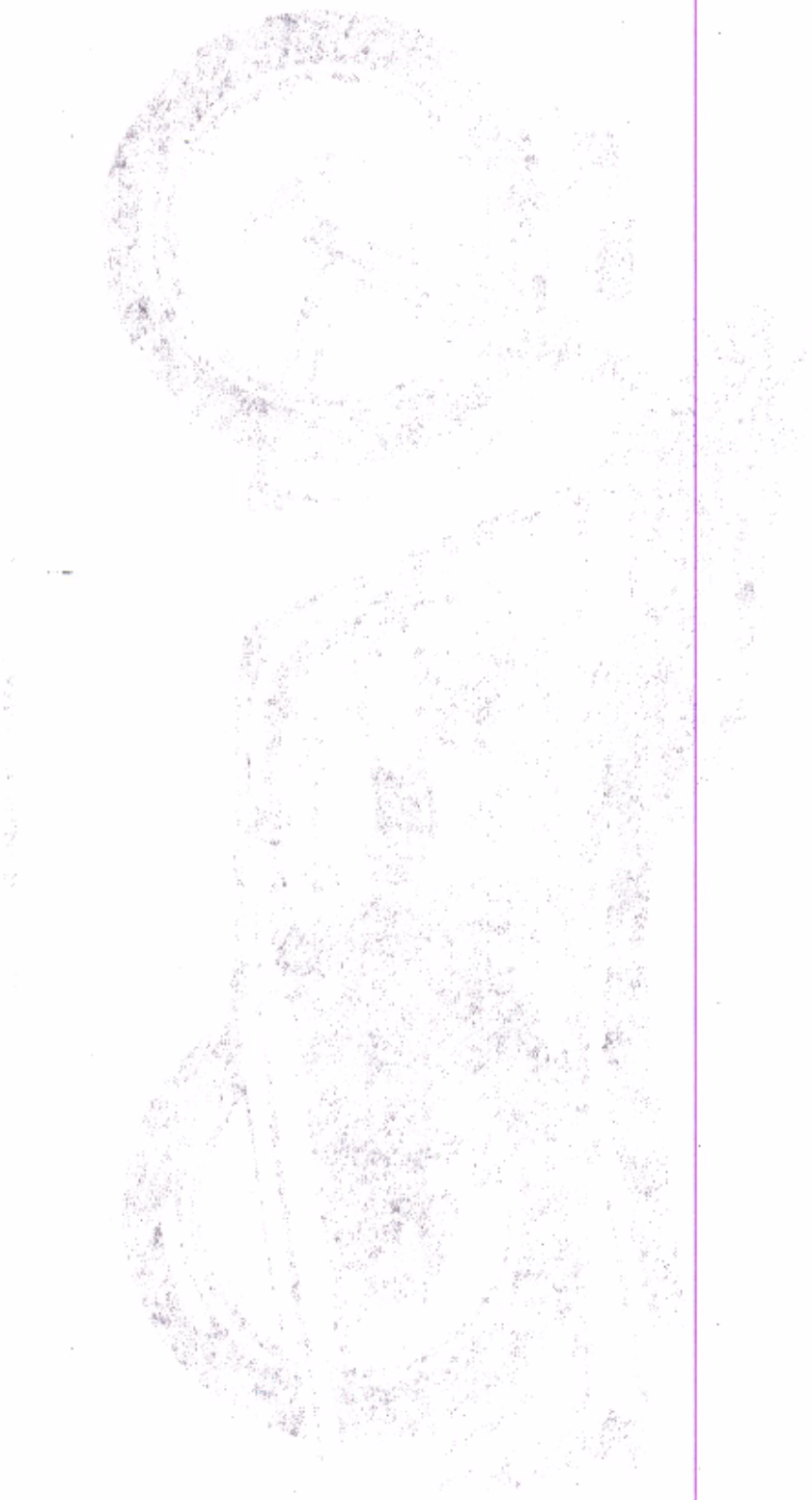


650 c.c. TRIUMPH TROPHY (TR6)

TRIUMPH 650 c.c. UNIT CONSTRUCTION TWINS



650 c.c. TRIUMPH BONNEVILLE 120 (T120)



GENERAL DATA

6T Thunderbird

TR6 Trophy

T120 Bonneville

Also Alternative Fitments for TR6 and T120 Sports Models

Note:—Throughout this Section, read **All** Models as for 6T Thunderbird, unless otherwise detailed under the particular Model

GENERAL DATA

MODEL 6T—THUNDERBIRD

LUBRICATION SYSTEM

OIL PUMP

Body material	Brass
Bore diameter: Feed	·3748/·3753 in.
Scavenge	·4372/·4377 in.
Plunger diameter: Feed	·3744/·3747 in.
Scavenge	·4369/·4372 in.
Valve spring length	$\frac{1}{2}$ in.
Ball diameter	$\frac{7}{32}$ in.
Aluminium crosshead width	·497/·498 in.
Working clearance in plunger heads	·0015/·0045 in.

OIL PRESSURE RELEASE VALVE

Piston diameter	·5605/·5610 in.
Working clearance	·001/·002 in.
Pressure release operates	60 lb./sq. in. (4·22 kg./sq. cm.)
Indicator spring length (Free)	$\frac{9}{16}$ in.
Release spring length (Free)	$\frac{11}{32}$ in.

OIL PRESSURE

Normal running	65/80 lb./sq. in.
Idling	20/25 lb./sq. in.

ENGINE

BASIC DETAILS

Bore and stroke	71 × 82 mm.
Bore and stroke	2·795 × 3·228 in.
Cubic capacity	649 c.c. (40 cu. in.)
Compression ratio	7·5 : 1
Capacity of combustion chamber	50 c.c. (3·05 cu. in.)
Power output (B.H.P. @ R.P.M.)	37 @ 6,700

CRANKSHAFT

Type	Forged two-throw crank with bolt-on flywheel
Main bearing, size and type	$2\frac{13}{16} \times 1\frac{1}{8} \times \frac{13}{16}$ in. Ball Journal
Main bearing journal dia.	1·1247/1·1250 in.
Main bearing housing dia.	2·8095/2·8110 in.
Big end journal dia.	1·6235/1·6240 in.
Min. regrind dia.	1·6035/1·6040 in.
Crankshaft end float	·003/·017 in.

CONNECTING RODS

Length (centres)	6·499/6·501 in.
Big end bearings—type	Steel backed white metal
Bearing side clearance	·012/·016 in.
Bearing diametral clearance	·0005/·0020 in.

GUDGEON PIN

Material	High tensile steel
Fit in small end bush	·0005/·0012 in. clearance
Diameter	·6882/·6885 in.
Length	2·151/2·156 in.

SMALL END BUSH

Material	Phosphor bronze
Outer dia.	·8140/·8145 in.
Length	1·030/1·031 in.
Finished bore dia.	·6890/6894 in.

PISTONS

Material	Aluminium Alloy—die casting	
	Eng. No. DU.101 to DU.5824	Eng. No. DU.5825 onwards (Heat gap)
Clearance: Top of skirt	·0088/·0098 in.	·0046/·0057 in.
Bottom of skirt	·0033/·0043 in.	·0016/·0027 in.
Gudgeon pin hole dia.	·6882/·6886 in.	

PISTON RINGS

Material	Cast Iron
Compression rings (tapered):	
Width	·0615/·0625 in.
Thickness	·092/·100 in.
Fitted gap	·010/·014 in.
Clearance in groove	·001/·003 in.
Oil control ring:	
Width	·092/·100 in.
Thickness	·124/·125 in.
Fitted gap	·010/·014 in.
Clearance in groove	·0005/·0025 in.

VALVES

Seat angle (included)	90°
Head diameter: Inlet	1 1/2 in.
Exhaust	1 11/32 in.
Stem diameter Inlet	·3095/·3100 in.
Exhaust	·3090/·3095 in.

VALVE GUIDES

Material	Cast Iron
Bore diameter (Inlet and exhaust)	·3127/·3137 in.
Outside diameter (Inlet and exhaust)	·5005/·5010 in.
Length: Inlet	2 7/32 in.
Exhaust	2 1/32 in.

VALVE SPRINGS (Red Spot)

	Outer	Inner
Free length	1 3/8 in.	1 17/32 in.
Total number of coils	5 1/2	7 1/2
Total fitted load:		
Valve open	125 lbs.	
Valve closed	50 lbs.	

VALVE TIMING

Set all tappet clearances @ ·020 in. (·5 mm.) for checking

Inlet opens	25° before top centre
Inlet closes	52° after bottom centre
Exhaust opens	60° before bottom centre
Exhaust closes	17° after top centre

ROCKERS

Material	High tensile steel forging
Bore dia.	·5002/·5012 in.
Rocker spindle diameter	·4990/·4995 in.
Tappet clearance (cold): Inlet	·002 in. (·05 mm.)
Exhaust	·004 in. (·10 mm.)

TAPPETS

Material	High tensile steel body—Stellite tip
Tip radius	·750 in.
Tappet diameter	·3110/·3115 in.
Clearance in guide block	·0005/·0015 in.

6T THUNDERBIRD—(cont)

TAPPET GUIDE BLOCK

Diameter of bores	·3120/·3125 in.
Outside diameter	1·0000/·9995 in.
Interference fit in cylinder block	·0005/·0015 in

CAMSHAFTS

Journal diameter: Left	·8100/·8105 in.
Right	·8730/·8735 in.
Diametral clearance: Left	·0010/·0025 in.
Right	·0005/·0020 in.
End float	·013/·020 in.
Cam lift	·305 in.
Base circle diameter	·812 in.

CAMSHAFT BEARING BUSHES

Material	High density sintered bronze
Bore diameter (fitted): Left	·8125/·8135 in.
Right	·874/·875 in.
Outside diameter: Left	1·0010/1·0015 in.
Right	1·126/1·127 in.
Length: Left inlet	1·104/1·114 in.
Left exhaust	·932/·942 in.
Right inlet and exhaust	1·010/1·020 in.
Interference fit in crankcase: Left	·001/·002 in.
Right	·0010/·0025 in.

TIMING GEARS

Inlet and exhaust camshaft pinions:	
No. of teeth	50
Interference fit on camshaft	·000/·001 in.
Intermediate timing gear:	
No. of teeth	47
Bore diameter	·5618/·5625 in.
Intermediate timing gear bush:	
Material	Phosphor bronze
Outside diameter	·5635/·5640 in.
Bore diameter	·4990/·4995 in.
Length	·6775/·6825 in.
Working clearance on spindle	·0005/·0015 in.
Intermediate wheel spindle	
Diameter	.4980/.4985 in.
Interference fit in crankcase	.0005/.0015 in.
Crankshaft pinion:	
No. of teeth	25
Fit on crankshaft	+ ·0003/— ·0005 in.

IGNITION TIMING

	Eng. No. DU.101 to DU.5824	Eng. No. DU.5825 onwards
Crankshaft position: (B.T.D.C.)		
Static timing	7°	11°
Fully advanced	35°	35°
Piston position: (B.T.D.C.)		
Static timing	1/64 in. (·4 mm)	1/32 in. (·9 mm.)
Fully advanced	13/32 in. (10 mm.)	13/32 in. (10 mm.)
Advance range:		
Contact breaker	14°	12°
Crankshaft	28°	24°

CONTACT BREAKER

Gap setting	·014–·016 in. (·35–·40 mm.)
Advance range	12° or 14°
Fully advanced at	2,000 r.p.m.

CYLINDER BLOCK

Material	Cast iron
Bore size	2·7948/2·7953 in.
Maximum oversize	2·8348/2·8353 in.
Tappet guide block housing diameter	·9990/·9985 in.

CYLINDER HEAD

Material	D.T.D. 424 Aluminium Alloy
Inlet port size	1 1/4 in. dia.
Exhaust port size	1 1/8 in. dia.
Valve seatings:	
Type	Cast-in
Material	Cast Iron

FUEL SYSTEM

Carburetter:	
Amal type	376/303
Main jet size	230
Pilot jet size	25
Needle jet size	·106
Needle type	C
Needle position	3
Throttle valve:	
Type	376/4
Return spring free length	2 1/2 in.
Carburetter nominal bore size	1 1/16 in. diameter
Air cleaner type	Dry felt or paper element

TRANSMISSION

CLUTCH DETAILS

Type	Multiplate with integral shock absorber
No. of plates: Driving (bonded)	6
Driven (plain)	6
Pressure springs:	
Number	3
Free length	1 13/16 in.
No. of working coils	9 1/2
Spring rate	113 lbs./in.
Approximate fitted load	62 lbs.
Bearing rollers:	
Number	20
Diameter	·2495/·2500 in.
Length	·231/·236 in.
Clutch hub bearing diameter	1·3733/1·3743 in.
Clutch sprocket bore diameter	1·8745/1·8755 in.
Thrust washer thickness	·052/·054 in.
Engine sprocket teeth	29
Clutch sprocket teeth	58
Chain details	Duplex endless—3/8 in. pitch × 84 links

CLUTCH OPERATING MECHANISM

Conical spring:	
Number of working coils	2
Free length	13/32 in.
Diameter of balls	3/8 in.
Clutch operating rod:	
Diameter of rod	7/32 in.
Length of rod	11·880/11·890 in.

GEARBOX

6T THUNDERBIRD—(cont)

RATIOS

Internal ratios (Std.) 4th (Top)	1·00 : 1
3rd	1·19 : 1
2nd	1·69 : 1
1st (Bottom)	2·44 : 1

	Solo	Sidecar
Overall ratios: 4th (Top)	4·60	5·11
3rd	5·47	6·08
2nd	7·77	8·64
1st (Bottom)	11·43	12·51
Engine R.P.M. @ 10 M.P.H. in 4th (Top) gear	616	685
Speedometer gear ratio	1·50 : 1	1·67 : 1
Gearbox sprocket teeth	20	18

GEAR DETAILS

Mainshaft high gear:	
Bore diameter (bush fitted)	·8135/·8145 in.
Working clearance on shaft	·0032/·0047 in.
Bush length	2⅛ in.
Bush protrusion length	1/16 in.
Layshaft low gear:	
Bore diameter (bush fitted)	·8135/·8145 in.
Working clearance on shaft	·0025/·0045 in.

GEARBOX SHAFTS

Mainshaft:	
Left end diameter	·8098/·8103 in.
Right end diameter	·7494/·7498 in.
Length	10 43/64 in.
Layshaft:	
Left end diameter	·6845/·6850 in.
Right end diameter	·6845/·6850 in.
Length	6 21/64 in.
Camplate plunger spring:	
Free length	2½ in.
No. of working coils	22
Spring rate	5·6 lb./in.

BEARINGS

High gear bearing	1½ × 2½ × ⅝ in. Ball Journal
Mainshaft bearing	¾ × 1⅞ × 7/16 in. Ball Journal
Layshaft bearing (left)	11/16 × ⅜ × ¾ in. Needle Roller
Layshaft bearing (right)	11/16 × ⅜ × ¾ in. Needle Roller

KICKSTART OPERATING MECHANISM

Bush bore diameter	·751/·752 in.
Spindle working clearance in bush	·003/·005 in.
Ratchet spring free length	½ in.

GEARCHANGE MECHANISM

Plungers:	
Outer diameter	·4315/·4320 in.
Working clearance in bore	·0005/·0015 in.
Plunger springs:	
No. of working coils	12
Free length	1½ in.
Inner bush bore diameter	·6245/·6255 in.
Clearance on shaft	·0007/·0032 in.
Outer bush bore diameter	·7495/·7505 in.
Clearance on shaft	·0005/·0025 in.
Quadrant return springs:	
No. of working coils	9½
Free length	1½ in.

FRAME AND ATTACHMENT DETAILS

HEAD RACES

No. of balls: Top	20
Bottom	20
Ball diameter	$\frac{1}{4}$ in.

SWINGING FORK

Bush type	Pre-sized, steel-backed—phosphor bronze
Bush bore diameter	1·4460/1·4470 in.
Sleeve diameter	1·4445/1·4450 in.
Distance between fork ends	$7\frac{1}{2}$ in.

REAR SUSPENSION

Type: Swinging fork controlled by combined coil spring/hydraulic damper units

Spring details:	*Solo*	*Sidecar*
Fitted length	8 in.	$8\frac{3}{4}$ in.
Free length	$8\frac{3}{16}$ in.	$8\frac{7}{16}$ in.
Mean coil diameter	$1\frac{1}{2}$ in.	$1\frac{1}{2}$ in.
Spring rate	145 lbs./in.	150 lbs./in.
Colour code	Blue/yellow	Blue/red
Load at fitted length	38 lb.	73 lb.

WHEELS, BRAKES AND TYRES

WHEELS

Rim size: Front and rear	WM2-18 (Q.D REAR WM3-18)
Type: Front	Spoke—single cross lacing
Rear	Spoke—double cross lacing
Spoke details: Front	40 off 8/10 SWG butted $5\frac{1}{16}$ in. U.H. Straight
Rear: Left side	20 off 8/10 SWG butted $7\frac{9}{16}$ in. U.H. 90° head
Right side	20 off 8/10 SWG butted $7\frac{7}{8}$ in. U.H. 90° head

WHEEL BEARINGS

Front and rear, dimensions and type	20×47×14 mm.—Ball Journal
Front and rear, spindle diameter (at bearing journals)	·7862/·7867 in.

Q.D. REAR WHEEL

Bearing type	·75×1·8504×·566 in. Taper Roller
Bearing sleeve: journal diameter	·7500/·7495 in.
Brake drum bearing	$\frac{7}{8}\times2\times\frac{9}{16}$ in. Ball Journal
Bearing sleeve: journal diameter	·8745/8740 in.
Bearing housing: internal diameter	1·9990/1·9980 in.

REAR WHEEL DRIVE

Gearbox sprocket	See "Gearbox"
Rear wheel sprocket teeth	46
Chain details:	
No. of links: Solo	103
Sidecar	102
Pitch	$\frac{3}{8}$ in.
Width	$\frac{3}{8}$ in.

BRAKES

Type	Internal expanding
Drum Diameter: Front	8 in. ± .002 in.
Rear	7 in. ± .002 in.
Lining thickness: Front	·183/·193 in.
Rear	·177/·187 in.
Lining area: Front	16·2 sq. in.
Rear	14·6 sq. in.

6T THUNDERBIRD (cont)

TYRES

Size: Front	3·25×18 in.
Rear	3·50×18 in.
Tyre pressure: Front	20 lb./sq.in. (1·4 kg./sq. cm.)
Rear	20 lb./sq. in. (1·4 kg./sq. cm.)

FRONT FORKS

TELESCOPIC FORK

	Telescopic—Oil Damping	
Type	Eng. No. DU.101 to DU.5824	Eng. No. DU.5825 onwards
Spring details: Solo		
Free length	17 11/16 in.	8¾ in.
No. of working coils	52	13
Spring rate	32 lb./in.	30 lb./in.
Colour code	Black/Green	Unpainted
Spring details: Sidecar		
Free length	18 1/16	8¾
No. of working coils	58	15
Spring rate	37 lb./in.	37 lb./in.
Colour code	Red/white	Yellow/white

	Sintered bronze	
Bush details: Material	Top bush	Bottom bush
Length	1 in.	·870/·875 in.
Outer diameter	1·498/1·499 in.	1·4935/1·4945 in.
Inner diameter	1·3065/1·3075 in.	1·2485/1·2495 in.
Stanchion diameter	1·3025/1·3030 in.	
Working clearance in top bush	·0035/·0050 in.	
Fork leg bore diameter	1·498/1·500 in.	
Working clearance of bottom bush	·0035/·0065 in.	

ELECTRICAL SYSTEM

6 VOLT MACHINES: (Eng. No. DU.101-DU.5824)

Battery type	6v.—MLZ9E or ML9E
Rectifier type	Lucas 2DS506
Alternator type	Lucas RM.19
Horn	8H (6v.)

Bulbs (6v.)	No.	Type
Headlight	Lucas 373	30/24 watts, pre focus
Parking light	Lucas 988	6 watts—MCC
Stop and tail light	Lucas 384	6/18 watts, offset pin
Speedometer light	Smiths P52305	2 watts special

Coil type	Lucas MA6 (6v.)
Contact breaker type	Lucas 4CA (14°)

12 VOLT MACHINES (Eng. No. DU.5825 onwards)

Battery type	MK9E, 6v.—2 in series
Rectifier type	Lucas 2DS506
Alternator type	Lucas RM.19
Horn	8H, 12v.

Bulbs	No.	Type
Headlight	Lucas 414	50/40 watts, pre focus
Parking light	Lucas 222	4 watts—MCC
Stop and tail light	Lucas 380	6/21 watts, offset pin
Speedometer light	Lucas 987	2 watts MES

Zener diode type	ZD.715
Coil type	Lucas MA.12 (12v.) 2 off
Contact breaker type	Lucas 4CA (12°)
Fuse rating	25 amp.

SPARKING PLUGS

Type	Champion N4
Plug gap settings	·020 in. (·50 mm.)
Thread size	14 mm. × ¾ in. reach

GENERAL

CAPACITIES

Fuel tank	4 gall. (4·8 U.S. galls., 18 litres)
Oil tank	5 pint (6 U.S. pints, 3 litres)
Gearbox	$\frac{7}{8}$ pint (500 c.c.)
Primary chaincase	$\frac{5}{8}$ pint (350 c.c.)
Telescopic fork legs	
Frame No. DU.101 to DU.5824	$\frac{1}{4}$ pint (175 c.c.)
Frame No. DU.5825 onwards	$\frac{1}{3}$ pint (190 c.c.)

BASIC DIMENSIONS

Wheel base	55 in. (140 cm.)
Overall length	84 in. (214 cm.)
Overall width	27½ in. (70 cm.)
Overall height	38 in. (97 cm.)
Ground clearance	5 in. (13 cm.)

WEIGHTS

Unladen weight	370 lb. (168 kgm.)
Engine unit (dry)	130 lb. (59 kgm.)

TORQUE WRENCH SETTINGS (DRY)

Flywheel bolts	33 lb. ft. (4·6 kg.m.)
Conn. rod bolts	28 lb. ft. (3·9 kg.m.)
Crankcase junction bolts	13 lb. ft. (1·8 kg.m.)
Crankcase junction studs	20 lb. ft. (2·8 kg.m.)
Cylinder block nuts	35 lb. ft. (4.8 kg.m.)
Cylinder head bolts ($\frac{3}{8}$ in. dia.)	25 lb. ft. (3·5 kg.m.)
Cylinder head bolt ($\frac{7}{16}$ in. dia.)	15 lb. ft. (2·1 kg.m.)
Rocker box nuts	5 lb. ft. (·7 kg.m.)
Rocker box bolts	5 lb. ft. (·7 kg.m.)
Rocker spindle domed nuts	22 lb. ft. (3·0 kg.m.)
Oil pump nuts	5 lb. ft. (·7 kg.m.)
Kickstart ratchet pinion nut	45 lb. ft. (6·3 kg.m.)
Clutch centre nut	50 lb. ft. (7 kg.m.)
Rotor fixing nut	30 lb. ft. (4·1 kg. cm.)
Stator fixing nuts	20 lb. ft. (2·8 kg.m.)
Primary cover domed nuts	10 lb. ft. (1·4 kg.m.)
Headlamp pivot bolts	10 lb. ft. (1·4 kg.m.)
Headrace sleeve nut pinch bolt	15 lb. ft. (2·1 kg.m.)
Stanchion pinch bolts	25 lb. ft. (3·5 kg.m.)
Front wheel spindle cap bolts	25 lb. ft. (3·5 kg.m.)
Brake cam spindle nuts	20 lb. ft. (2·8 kg.m.)
Zener diode fixing nut	1.5 lb. ft. (·21 kg.m.)
Fork cap nut	80 lb. ft. (11·1 kg.m.)

GENERAL DATA

MODEL TR6—TROPHY

FOR DATA NOT GIVEN HERE REFER TO GENERAL DATA—MODEL 6T

ENGINE

BASIC DETAILS

Bore and stroke	71 × 82 mm.
Bore and stroke	2·795 × 3·228 in.
Cubic capacity	649 c.c. (40 cu. in.)
Compression ratio	8·5 : 1
Capacity of combustion chamber	43·3 c.c. (2·64 cu. in.)
Power output (B.H.P. @ R.P.M.)	40 @ 6,500

PISTONS

Material	Aluminium Alloy—Die Casting
Clearance: Top of skirt	·0088/·0098 in.
Bottom of skirt	·0033/·0043 in.
Gudgeon pin hole diameter	·6882/·6886 in.

VALVE SPRINGS (White Spot)

	Outer	Inner
Free length	2 1/32 in.	1 3/8 in.
Total No. of coils	6 1/2	7
Tot fitted load:		
Valve open	130 lbs.	
Valve closed	77 lbs.	

VALVE TIMING

Set all tappet clearances @ ·020 in. (·50 mm.) for checking

- Inlet opens 34° before top centre
- Inlet closes 55° after bottom centre
- Exhaust opens 48° before bottom centre
- Exhaust closes 27° after top centre

ROCKERS

Material	High tensile steel forging
Bore diameter	·5002/·5012 in.
Rocker spindle diameter	·4990/·4995 in.
Tappet clearance (Cold): Inlet	·002 in. (·05 mm.)
Exhaust	·004 in. (·05 mm.)

CAMSHAFTS

Journal diameter: Left	·8100/·8105 in.
Right	·8730/·8735 in.
Diametral clearance: Left	·0010/·0025 in.
Right	·0005/·0020 in.
End float	·013/·020 in.
Cam lift: Inlet	·314 in.
Exhaust	·296 in.
Base circle diameter	·812 in.

IGNITION TIMING

Crankshaft position (B.T.D.C.)	Eng. No. DU.101 to DU.5824	Eng. No. 5825 onwards
Static timing	11°	15°
Fully advanced	39°	39°
Piston position (B.T.D.C.)		
Static timing	1/32 in. (·9 mm.)	1/16 in. (1·6 mm.)
Fully advanced	7/16 in. (11·5 mm.)	7/16 in. (11·5 mm.)
Advance range:		
Contact breaker	14°	12°
Crankshaft	28°	24°

FUEL SYSTEM

	Eng. No. DU.101 to DU.5824	Eng. No. DU.5825 onwards
Carburetter		
Amal type	376/40	389/97
Main jet size	250	310
Pilot jet size	25	25
Needle jet size	·106	·106
Needle type	C	D
Needle position	3	1
Throttle valve:		
Type	376/3½	389/3½
Return spring free length	2½ in	2½ in.
Carburetter nominal bore size	1 1/16 in diameter	1 1/16 in. diameter
Air cleaner type	Dry felt or paper element	

GEARBOX

RATIOS

Internal ratios: 4th (Top)	1·00 : 1
3rd	1·19 : 1
2nd	1·64 : 1
1st (Bottom)	2·44 : 1

Overall ratios:	Solo	Sidecar
4th (Top)	4·48	5·41
3rd	5·76	6·44
2nd	8·17	9·15
1st (Bottom)	11·80	13·40
Engine R.P.M. @ 10 M.P.H. in 4th (Top) gear	630	705
Speedometer drive ratio	1·50	1·67
Gearbox sprocket teeth	19	17

FRAME AND ATTACHMENT DETAILS

REAR SUSPENSION

Spring details:	Solo	Sidecar
Fitted length	8½	8½
Free length	8½	8½
Mean coil diameter	1½ in.	1½ in.
Spring rate	100 lb./in.	150 lb./in.
Colour code	Green/green	Blue/red
Load at fitted length	28 lb.	73 lb.

WHEELS, BRAKES AND TYRES

WHEELS

Rim size: Front	WM2–19
Spoke details: Front	40 off 8/10 SWG butted 5½in. U.H. straight
Rim size: Rear	WM3–18

REAR WHEEL DRIVE

Gearbox sprocket teeth	See "GEARBOX"
Rear wheel sprocket teeth	46
Chain details:	
No. of links: Solo	103
Sidecar	102
Pitch	⅜ in.
Width	⅜ in.

TYRES

Size: Front	3·25 x 19 in.
Rear	4·00 x 18 in.
Tyre pressures: Front	20 lb./sq. in. (1·4 kg./sq. cm.)
Rear	18 lb./sq. in. (1·3 kg./sq. cm.)

TR6 TROPHY—(cont)

FRONT FORKS, NB:—AFTER DU.5825, AS 6T

Spring details: Solo	Eng. No. DU.101 to D.U.5824
Free length	19 1/16 in.
No. of working coils	56
Spring rate	30 lb./in.
Colour code	Black/white
Spring details: Sidecar	
Free length	19 1/16 in.
No. of working coils	58
Spring rate	37 lb./in.
Colour code	Black/red

ELECTRICAL SYSTEM

ELECTRICAL EQUIPMENT

Battery type	6v.—MLZ9E or ML9E
Rectifier type	Lucas 2 DS 506
Alternator type	Lucas RM.19
Horn	8H (6v.)

Bulbs: (6v.)

	No.	Type
Headlight	Lucas 312	30/24 watts—pre focus
Parking light	Lucas 988	6 watt—MCC
Stop and tail light	Lucas 384	6/18 watts—offset pin
Speedometer light	Lucas 990 or Smiths P.52305	2 watts—special

Coil type	Lucas MA6 (6v.)
Contact breaker type	Lucas 4CA
Fuse rating	25 amp.
Sparking plugs:	
Type	Champion N4 (Long reach)
Plug gap setting	·020 in. (·50 mm.)
Thread size	14 mm.

GENERAL

BASIC DIMENSIONS

Wheel base	55 in. (140 cm.)
Overall length	84 1/2 in. (215 cm.)
Overall width	27 in. (68·5 cm.)
Overall height	38 in. (97 cm.)
Ground clearance	7 in. (18 cm.)

WEIGHTS

Unladen weight	363 lbs. (165 kgm.)
Engine unit (Dry)	130 lbs. (59 kgm.)

GENERAL DATA

MODEL T120—BONNEVILLE

FOR DATA NOT GIVEN HERE REFER TO GENERAL DATA—MODEL 6T

ENGINE

BASIC DETAILS

Bore and stroke	71 × 82 mm.
Bore and stroke	2·795 × 3·228 in.
Cubic capacity	649 c.c. (40 cu. in.)
Compression ratio	8·5 : 1
Capacity of combustion chamber	43·3 c.c. (2·64 cu. in.)
Power output (B.H.P. @ R.P.M.)	46 @ 6,500

PISTONS

Material	Aluminium Alloy—Die Casting
Clearance: Top of skirt	·0093/·0103 in.
Bottom of skirt	·0038/·0048 in.
Gudgeon pin hole diameter	·6882/·6886 in.

VALVES

	Eng. No. DU.101 to DU.5824	Eng. No. DU.5825 onwards
Seat angle (Inlet and exhaust)	90° included angle	90° included angle
Head diameter: Inlet	1½ in.	1 19/32 in.
Exhaust	1 11/32 in.	1 7/32 in.
Stem diameter: Inlet	·3095/·3100 in.	·3095/·3100 in.
Exhaust	·3090/·3095 in.	·3090/·3095 in.

VALVE GUIDES

Material	Aluminium—Bronze
Bore diameter (Inlet and exhaust)	·3127/·3137 in.
Outside diameter (Inlet and exhaust)	·5005/·5010 in.
Length: Inlet	1 31/32 in.
Exhaust	2 11/64 in.

VALVE SPRINGS (White Spot)

	Outer	Inner
Free length	2 1/32 in.	1¾ in.
Total number of coils	6½	7
Total fitted load:		
Valve open	130 lbs.	
Valve closed	77 lbs.	

VALVE TIMING

Set all tappet clearances @ ·020 in. (·5 mm.) for checking

Inlet opens	34° before top centre
Inlet closes	55° after bottom centre
Exhaust opens	48° before bottom centre
Exhaust closes	27° after top centre

ROCKERS

Material	High tensile steel forging
Bore diameter	·5002/·5012 in.
Rocker spindle diameter	·4990/·4995 in.
Tappet clearance (cold): Inlet	·002 in. (·05 mm.)
Exhaust	·004 in. (·10 mm.)

CAMSHAFTS

Journal diameter: Left	·8100/·8105 in.
Right	·8730/·8735 in.
Diametral clearance: Left	·0010/·0025 in.
Right	·0005/·0020 in.
End float	·013/·020 in.
Cam lift: Inlet	·314 in.
Exhaust	·296 in.
Base circle diameter	·812 in.

T120 BONNEVILLE—(cont)

IGNITION TIMING

	Eng. No. DU.101 to DU.5824	Eng. No. DU.5825 onwards
Crankshaft position (B.T.D.C.):—		
Static timing	11°	15°
Fully advanced	39°	39°
Piston position (B.T.D.C.):—		
Static timing	$\frac{1}{32}$ in. (·9 mm.)	$\frac{1}{16}$ in. (1·6 mm.)
Fully advanced	$\frac{7}{16}$ in. (11·5 mm.)	$\frac{7}{16}$ in. (11·5 mm.)
Advance range:		
Contact breaker	14°	12°
Crankshaft	28°	24°

CYLINDER HEAD

Material	D.T.D. 424 Aluminium Alloy
Inlet port size	$1\frac{1}{16}$ in. dia. ($1\frac{1}{8}$ in. dia DU.5825 onwards)
Exhaust port size	$1\frac{3}{8}$ in. dia.
Valve seatings:	
Type	Cast-in
Material	Cast iron

FUEL SYSTEM

	Eng. No. DU.101 to DU.5824	Eng. No. DU.5825 onwards
Carburetters (2 off):		
Amal type	376/286	389/203
Main jet size	240	260
Pilot jet size	25	25
Needle jet size	·106	·106
Needle type	C	D
Needle position	2	3
Throttle type		
Type	376/3½	389/3
Return spring free length	2½ in.	2½ in.
Carburetter nominal bore size	$1\frac{1}{16}$ in.	$1\frac{1}{8}$ in.
Air cleaner type	Twin—Paper element—if fitted	

GEARBOX

RATIOS

Internal ratios:	4th (Top)	1·00 : 1	
	3rd	1·19 : 1	
	2nd	1·64 : 1	
	1st (Bottom)	2·44 : 1	
Overall Ratios:		Solo	Sidecar
	4th (Top)	4·85	5·41
	3rd	5·78	6·45
	2nd	8·20	9·16
	1st (Bottom)	11·82	13·25
Engine R.P.M. @ 10 M.P.H. in 4th gear		650	725
Speedometer gear ratio		1·50	1·67
Gearbox sprocket teeth		19	17

FRAME AND ATTACHMENT DETAILS

REAR SUSPENSION

Spring details:	Solo	Sidecar
Fitted length	8 in.	$8\frac{3}{8}$ in.
Free length	$8\frac{1}{16}$ in.	$8\frac{7}{8}$ in.
Mean coil diameter	$1\frac{3}{4}$ in.	$1\frac{3}{4}$ in.
Spring rate	145 lb./in.	150 lb./in.
Colour code	Blue/yellow	Blue/red
Load at fitted length	38 lb.	73 lb.

WHEELS, BRAKES AND TYRES

WHEELS

Rim size: Front	WM2–18
Spoke details: Front	40 off 8/10 SWG butted 5 1/16 in. U.H. straight
Rim size: Rear	WM3–18 (Q.D.) WM2–18 (Std.)

REAR WHEEL DRIVE

Gearbox sprocket teeth	See "GEARBOX"
Rear wheel sprocket teeth	46
Chain details:	
No. of links: Solo	103
Sidecar	102
Pitch	⅜ in.
Width	⅜ in.

TYRES

Size: Front	3·25×18 in.
Rear	3·50×18 in.
Tyre pressures: Front	20 lb./sq. in. (1·4 kg./sq. cm.)
Rear	20 lb./sq. in. (1·4 kg./sq. cm.)

FRONT FORKS, NB:—AFTER DU.5825, AS 6T

Spring details: Solo	Eng. No. DU.101 to D.U.5824
Free length	17 11/16 in.
No. of working coils	52
Spring rate	32 lb./in.
Colour code	Black/green
Spring details: Sidecar	
Free length	18⅜ in.
No. of working coils	58
Spring rate	37 lb./in.
Colour code	Red white

ELECTRICAL SYSTEM

ELECTRICAL EQUIPMENT

Battery type	6V—MLZ9E or ML9E
Rectifier type	Lucas 2DS506
Alternator type	Lucas RM.19
Horn	8H (6v.)

Bulbs:

	No.	Type
Headlight	Lucas 312	30/24 watts pre focus
Parking light	Lucas 988	4 watts—MCC
Stop and tail light	Lucas 384	6/18 watts offset pin
Speedometer light	Lucas 990 or Smiths P.52305	2 watts special

Coil type	Lucas MA6 (6v.)
Contact breaker type	Lucas 4CA
Fuse rating	25 amp.
Sparking plugs:	
Type	Champion N4
Plug gap settings	·020 in. (·50 mm.)
Thread size	14 mm.×⅜ in. Reach

GENERAL

BASIC DIMENSIONS

Wheelbase	55 in. (140 cm.)
Overall length	84 in. (214 cm.)
Overall width	27 in. (68·5 cm.)
Overall height	38 in. (97 cm.)
Ground clearance	5 in. (13 cm.)

WEIGHTS

Unladen weight	363 lb. (165 kg.m.)
Engine unit (dry)	130 lb. (59 kg.m.)

GENERAL DATA

ALTERNATIVE FITMENTS FOR SPORTS MODELS TR6 AND T120

ENGINE

PISTONS (11 : 1 C.R.)

Material	Aluminium Alloy—Die Casting
Clearance: Top of skirt	·0093/·0103 in.
Bottom of skirt	·0073/·0083 in.
Gudgeon pin hole diameter	·6882/·6886 in.

IGNITION TIMING A.C. Magneto (E.T.) Ignition equipment

Crankshaft position (B.T.D.C.)	
Static timing	29°
Fully advanced	39°
Piston position (B.T.D.C.)	
Static timing	$\frac{1}{4}$ in. (6·3 mm.)
Fully advanced	$\frac{7}{16}$ in. (11·5 mm.)
Advance range:	
Contact breaker	5°
Crankshaft	10°

CONTACT BREAKER A.C. Magneto (E.T.) Ignition equipment

Gap setting	·014–·016 in. (·35–·40 mm.)
Advance range	5°
Fully advanced at:	2,000 R.P.M.

CYLINDER HEAD (T120)

Material	D.T.D. 424 Aluminium Alloy
Inlet port size	$1\frac{3}{16}$ in. diameter, tapering to $1\frac{1}{8}$ in.
Exhaust port size	$1\frac{3}{8}$ in. diameter
Valve seatings:	
Type	Cast-in
Material	Cast iron

FUEL SYSTEM

Carburetter (T120)	
Amal type	389/95
Main jet size	330
Pilot jet size	25
Needle jet size	·106
Needle type	D
Needle position	2
Throttle valve:	
Type	389/4
Return spring free length	$2\frac{1}{2}$ in.
Carburetter nominal bore size	$1\frac{3}{16}$ in. diameter
Air cleaner type	Paper element

GEARBOX

RATIOS

Internal ratios (Close):	4th (Top)	1·00 : 1
	3rd	1·09 : 1
	2nd	1·30 : 1
	1st (Bottom)	1·695 : 1
Internal ratios (Wide):	4th (Top)	1·00 : 1
	3rd	1·425 : 1
	2nd	2·21 : 1
	1st (Bottom)	2·915 : 1
Gearbox sprocket		15, 16, 17, 18, 19 or 20 teeth

FRONT FORKS

TELESCOPIC FORK

Oil restrictor assembly:	
Rod diameter	·3115/·3125 in.
Cup outer diameter	·5845/·5855 in.
Body bore diameter	·590/·592 in.

ELECTRICAL SYSTEM

ELECTRICAL EQUIPMENT A.C. Magneto (E.T.) Ignition equipment

Alternator type		RM19E.T.
Horn, type		Clear hooter, A.C. 585, S.G.
Coil type		3 E.T.
Condensers (Capacitors)		54441582
Contact breaker type		Lucas 4CA
Lighting system:		
Bulbs (6v.):	No.	Type
Headlight	Lucas 166	24/24 watts—Pre Focus
Stop and tail light	Lucas 384	6/18 watts—Offset pin
Sparking plugs:		
Type		Champion N58R
Plug gap setting		·020 in. (·5 mm.)
Thread size		14 mm. × ⅜ in. reach

GENERAL

CAPACITIES

Fuel tank	3½ gall. (4 U.S. galls., 14·75 litres).

MODIFICATIONS FOR 1965 MODELS (ENGINE NO. DU13375 ONWARDS)

LUBRICATION SYSTEM

OIL PRESSURE RELEASE VALVE

Spring length	1 17/32 ins.
Load at 1 7/16 in.	12/12¼ lbs.
Rate	37 lb./ins.

FRONT FORKS

Engine Numbers and Model

	DU101—DU5824			DU5825—DU13374		DU13375—	
STANCHIONS	6T	TR6	6T	6T	TR6 & T120	6T	TR6 & T120
Part Number	H1123	H1299	H1595	H1695	H1649	H1890	H1889
Length	20 7/8 in.	22 3/16 in.	20 7/8 in.	22 in.	22 in.	22 in.	22 in.
One 1/16 in. Filler Hole	Yes	No	No	Yes	No	Yes	No
Damping Holes:— Level from Bottom—5/8 in.	2 No. 42 holes	2 No. 42 holes	2 No. 42 holes	—	—	—	—
—4½ in.	—	—	—	2 1/16 in.	2 1/16 in.	—	—
—3 1/16 in.	4 1/16 in.	4 1/16 in.	4 1/16 in.	2 3/16 in.	2 3/16 in.	2 3/16 in.	2 1/16 in.
—2 3/16 in.	—	—	—	2 3/16 in.	2 3/16 in.	2 3/16 in.	2 3/16 in.
—1⅛ in.	2 No. 42	2 No. 42	2 No. 42	2 No. 42	2 No. 42	2 No. 42	2 No. 42
	To use 6T type stanchion where appropriate for TR6 or T120, solder up the filler hole. Note:—No. 42 hole is 0·0935 in.						
DAMPER SLEEVE Length	4 5/16 in.	3 11/16 in.	4 5/16 in.	3⅛ in.	3⅛ in.	2⅛ in.	2⅛ in.

Internal Diameter ... 1·387/1·393 ins.

SPRINGS

	Solo	*Sidecar*
Free length	9¾ in.	9¾ in.
No. working coils	12¼	15¼
Spring rate	26¼ lb. in.	32¼ lb. in.
Gauge	6 SWG	5 SWG
Colour code	Yellow/blue	Yellow/green

WHEELS, BRAKES AND TYRES

Q.D. REAR WHEEL (All Models)

Bearing Type	⅜ × 1⅛ × 7/16 in. Ball journal
Bearing sleeve: journal dia.	·7500/·7495 in.
Brake drum bearing	⅞ × 2 × 7/16 in. Ball journal
Bearing sleeve: journal dia.	·8745/·8740 in.
Bearing housing: internal dia.	1·9990/1·9980 in.

SECTION A

LUBRICATION SYSTEM

SECTION A1

ROUTINE MAINTENANCE

	Section
Every 250 miles (400 Kms.)	
Check level in oil tank	A4
Check level in primary chaincase	A12
Lubricate rear chain	A13
Every 1,000 miles (1,600 Kms.)	
Change oil in primary chaincase	A12
Lubricate control cables	A18
Grease swinging fork pivot	A17
Remove rear chain for cleaning and greasing	A13
Every 1,500 miles (2,400 Kms.)	
Change engine oil	A4
Every 3,000 miles (4,800 Kms.)	
Check gearbox oil level	A11
Check front forks for external oil leakage	A16
Grease brake pedal spindle	A20
Every 6,000 miles (9,600 Kms.)	
Change oil in gearbox	A11
Change oil in front forks	A16
Every 12,000 miles (19,200 Kms.)	
Grease wheel bearings	A15
Grease steering head bearings	A14

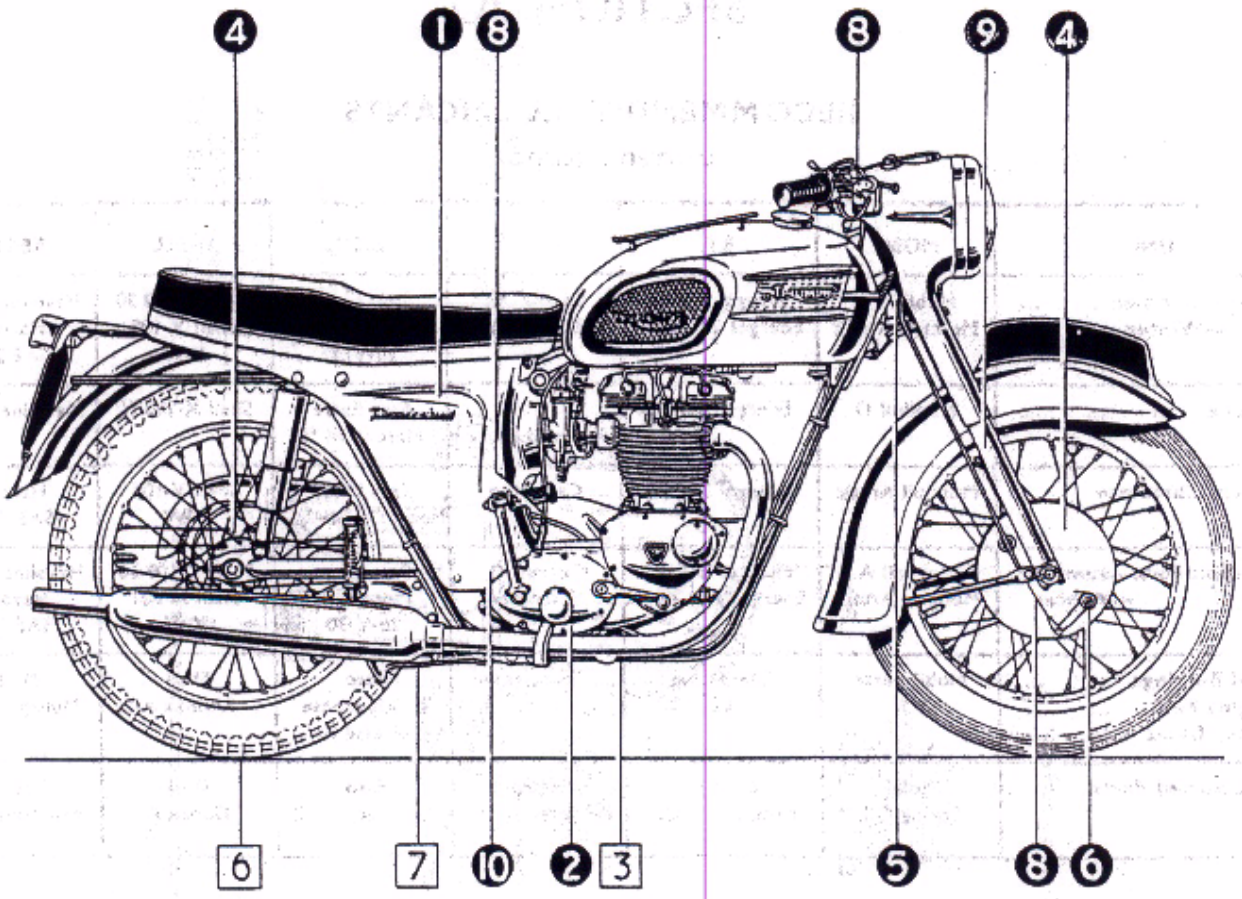


Fig. A1. LUBRICATION CHART
Numbers in circles refer to right side of machine
Numbers in squares refer to left side of machine

GUIDE TO LUBRICATION POINTS

Illustration No.	*Description*	*SAE Oil grade*
1	Engine oil tank	20 or 30
2	Gearbox	30
3	Primary chaincase	20
4	Wheel hubs	Grease
5	Steering head	Grease
6	Brake cam spindle	Grease
7	Brake pedal spindle	Grease
8	Exposed cables	20
9	Telescopic fork	20 or 30
10	Swinging fork pivot	Grease
—	All brake rod joints and pins ...	20

SECTION A17

LUBRICATION NIPPLES

Both the brake operating camshafts and the swinging fork pivot bearings should be lubricated by means of the lubrication nipples.

The brake camshafts have integral lubrication nipples. Care should be taken that the surface of the nipple is not damaged. Slight distortion may be removed with a fine grade file.

The front and rear wheel brake cam and spindle bearing surfaces should be sparingly lubricated with the correct grade of grease (Section A2). This can be done by giving the lubrication nipples on the ends of the camshafts one stroke each from a grease gun. However, if the grease does not penetrate, the brake cams should be removed and cleaned thoroughly in paraffin (kerosene). The cam bearing surfaces should then be greased on reassembly.

SWINGING FORK PIVOT

The greasing nipple is situated centrally underneath the swinging fork and should be given several strokes with a high pressure grease gun until grease is forced through each end of the pivot bearings.

If the grease does not penetrate then the pivot must be removed to ensure adequate lubrication. Removal of the swinging fork is detailed in section E10. When the fork is removed the sleeves and distance tube should be withdrawn and all parts should be thoroughly cleaned out in paraffin (kerosene) and allowed to drain.

Reassembly is a reversal of the above instructions. The space surrounding the distance tube should be carefully packed with the correct grade of grease, and the sleeves should be well greased on their bearing surfaces.

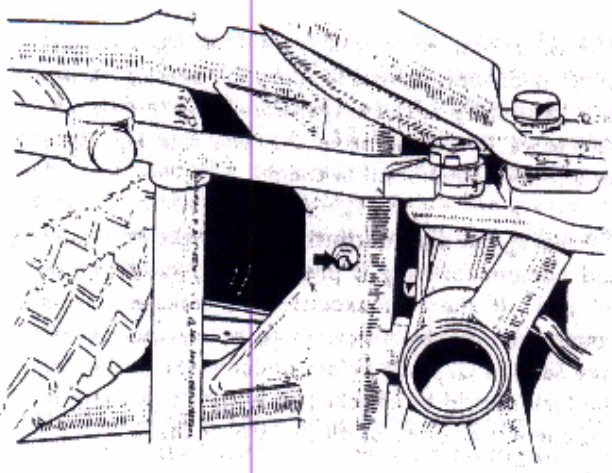


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Fig. A12. Swinging fork pivot lubrication nipple

SECTION A18

LUBRICATING THE CONTROL CABLES

The control cables can be periodically lubricated at the exposed joints with a thin 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 A19

SPEEDOMETER CABLE LUBRICATION

The speedometer cable should be lubricated by means of grease (see Section A2 for correct grade).

It is not necessary to completely remove the cable, but only to disconnect it from the speedometer and withdraw the inner cable. To do this on nacelle models first remove the headlamp unit by slackening the securing screw adjacent to the speedometer on the nacelle. Unscrew the union nut at the base of the speedometer, withdraw the inner cable and clean it in paraffin (kerosene). Smear the surface with grease, except for 6 in. (15 cm.) nearest to the speedometer head.

The cable is now ready to be offered into the outer casing and excess grease wiped off. Care should be taken that both "squared" ends of the inner cables are located in their respective "square" drive housings before the union nut is tightened.

SECTION A20

BRAKE PEDAL SPINDLE LUBRICATION

The brake pedal spindle is bolted to the left rear engine mounting plate. The spindle should be covered with a fresh supply of grease occasionally otherwise corrosion and inefficient operation may result.

To gain access to the spindle, slacken off the rear brake rod adjustment, unscrew the brake pedal retaining nut and withdraw the pedal.

Remove any rust from the spindle with fine emery. Clean the bore of the pedal and smear the spindle with grease (see Section A2) prior to refitting.

Do not forget to replace the spring and plain washer between the retaining nut and brake pedal.

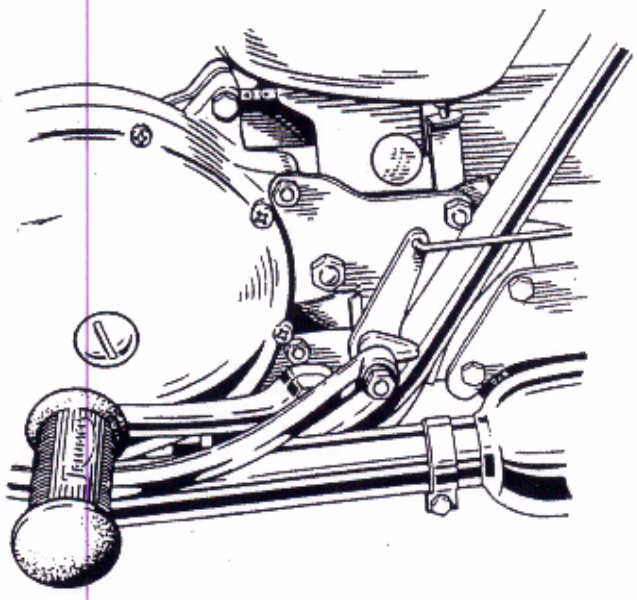

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Fig. A13. Brake pedal spindle lubrication

SECTION A21

OIL PRESSURE RELEASE VALVE

From engine number DU13375 the two spring type oil pressure release valve has been superseded by a single spring type (see Fig. A14).

To remove the complete oil pressure release valve unit from the crankcase, unscrew the hexagonal nut adjacent to the crankcase surface. When removed, the cap can then be unscrewed from the body thus releasing the spring and piston.

Thoroughly wash the parts in paraffin (kerosene) and inspect for wear. The piston should be checked for possible scoring and the valve body filter for possible blockage or damage. Check to see that the spring length compares with the figure given in "General Data".

Reassembly is carried out in exactly the reverse manner described above, not forgetting to use two new fibre washers.

When dismantling or reassembling the oil pressure release valve **DO NOT** hold the valve body in a vice as this may cause distortion and result in serious damage.

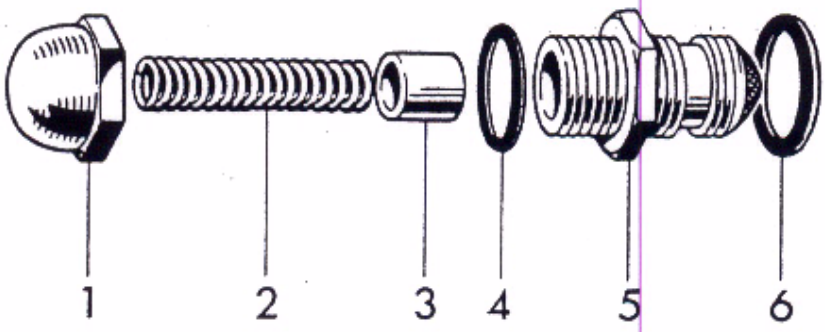

Fig. A14. Oil Pressure Release Valve

1. Cap
2. Main spring
3. Piston
4. Fibre washer
5. Valve body
6. Fibre washer

SECTION B

ENGINE

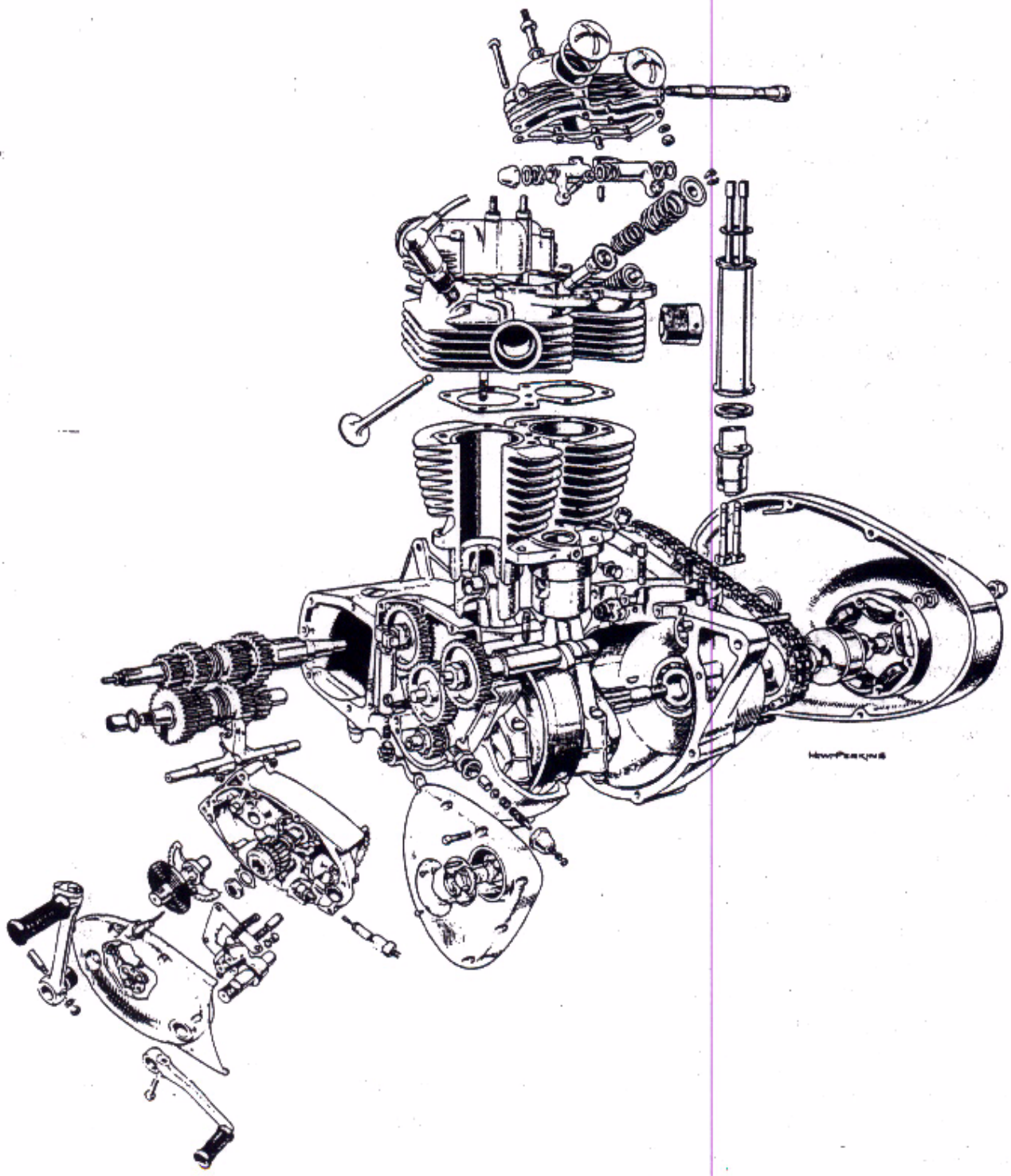

Fig. B1. Exploded view of 650 c.c. engine gearbox unit

DESCRIPTION

The engine is of unit construction having two aluminium alloy mating crankcase halves, the gearbox housing being an integral part of the right half-crankcase and the primary chain case an integral part of the left half-crankcase.

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. Four aluminium alloy push rods operate the rocker arms, which are each fitted with adjusters, accessible when the rocker box inspection caps are removed.

Lo-Ex aluminium alloy die cast pistons each have two compression rings and one oil scraper ring. The connecting rods are of H Section in RR56 Hiduminium alloy, with detachable caps, and incorporate steel-backed renewable "shell" 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 of the bearings on the crankshaft journals.

The inlet and exhaust camshafts operate in sintered bronze bushes which are housed transversely in the upper part of the crankcase. The inlet and exhaust camshafts are driven by a train of timing gears from the right end of the crankshaft. The inlet camshaft also operates the oil pump and rotary breather valve disc, whilst the exhaust camshaft drives the adjustable contact breaker, which is fitted with an automatic advance and retard unit, and the tachometer cable (when fitted).

The two-throw crankshaft has a detachable shrunk-on cast-iron flywheel which is held in position by three high tensile steel bolts, locked by the use of "TRIUMPH LOCTITE" sealant and tightened to a pre-determined torque figure.

The big end bearings are lubricated at pressure with oil which travels along drillings in the crankcase and crankshaft from the double plunger oil pump: oil pressure in the lubrication system is governed by means of the oil pressure release valve situated at the front of the engine, adjacent to the timing cover.

The cylinder barrel is made from a high-grade cast-iron and houses the press-fit tappet guide blocks.

Power from the engine is transmitted through the engine sprocket and primary chain to the shock absorbing clutch unit and four speed gearbox. Primary chain tension is governed by an adjustable rubber-pad chain tensioner which is immersed in the primary chain oil bath.

The electrical generator set consists of a rotor, which is fitted to the left end of the crankshaft, and a six coil stator which is mounted on three pillar bolts inside the primary chain housing.

Carburation is by an Amal monobloc carburetter with integral float chamber. On the Bonneville high compression sports model, two such carburetters are used.

SECTION B1

REMOVING AND REPLACING THE ENGINE UNIT

Turn the fuel tap to the "OFF" position and disconnect the feed pipes. Cut the fuel tank bolt-securing wire, then unscrew three fuel tank mounting bolts. Raise the fuel tank at the rear to remove it. On models with the nacelle type head lamp the two rear nacelle securing screws will have to be removed to gain sufficient clearance for tank removal.

Disconnect the leads from the battery terminals and "Lucar" connectors from the left and right ignition coils. Remove the top and bottom coil mounting bolts and distance pieces. The ignition coils will then be free to be removed. **Care should be taken not to damage the light alloy casing of the ignition coils: indentations caused to the outer casing may ultimately result in ignition failure.**

Unscrew the four nuts securing the torque stays to the cylinder head and remove the front and rear torque stay mounting bolts and distance pieces, then remove the torque stays.

Disconnect the speedometer cable from underneath the speedometer and remove any necessary frame clips so that the cable is free. On models of the nacelle type the headlamp unit will have to be removed to gain access to the underside of the speedometer. To do this, slacken the screw in the headlamp rim, adjacent to the speedometer dial, then carefully lever off the headlamp unit.

Disconnect the tachometer cable (if fitted) by unscrewing the union nut at the front of the engine, adjacent to the push rod cover tube, and withdrawing the cable.

On machines that are fitted with rear enclosure panels, remove the two front panel junction screws and unscrew the two domed nuts from both the left and right panels. Finally, unscrew two nuts securing the panels just below the rear of the fuel tank, then remove both panels. Remove the distance piece from each of the engine plates and place them in safe keeping.

On models fitted with one carburetter slacken the clamping screw and remove the air cleaner. Unscrew the securing nuts and withdraw the carburetter. Note that there is a spring washer under each of the four nuts, on the twin carburetter models. Remove any necessary cable clips and place the carburetter(s) well clear of the engine in a safe position.

Unscrew the two domed nuts from the rocker spindles and disconnect the rocker oil feed pipe. Care should be taken not to bend the pipe excessively as this may ultimately result in the pipe fracturing.

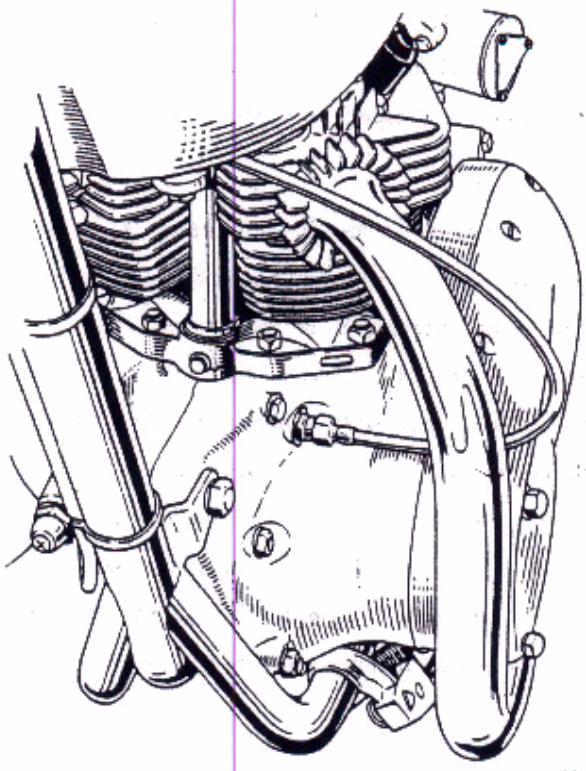

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Fig. B2. Tachometer drive cable and adaptor

To drain the oil tank remove the drain plug from the base of the oil tank and allow the oil to drain for approximately 15 minutes. The oil feed pipe and return pipe should then be disconnected from the base of the oil tank. On earlier models the drain plug is absent, and in this case the oil tank should be drained by unscrewing the union nut and disconnecting the oil feed pipe. Where the oil pipe rubber connectors are secured by means of circular clips, the clips should be slackened prior to disconnecting the rubber connectors.

At this stage it is advisable to drain the oil from the gearbox and primary chaincase by removing the respective drain plugs. The sump should also be drained; this can be done by unscrewing the hexagon-headed filter drain plug situated underneath the engine adjacent to the bottom engine mounting lug. (See Fig. A3, reference No. 4).

Slacken off the clutch adjustment at the handlebar and withdraw the rubber seal from the clutch abutment at the gearbox. Unscrew the abutment and detach the clutch cable.

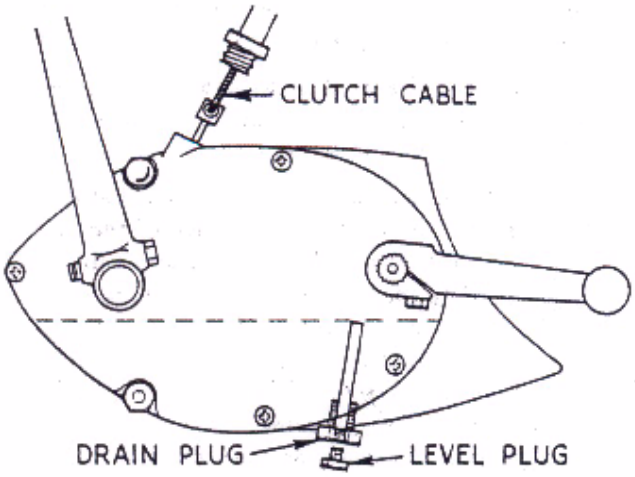

Fig. B3. Clutch cable adjustment and gearbox drain plug

Slacken the left and right finned clip bolts, silencer clip bolts and the nuts securing the exhaust pipes underneath the engine. Drive the exhaust pipe free with a hide mallet. Where siamesed pipes are fitted, the pipe junction clip should also be slackened.

On earlier models, where the footrests are fitted direct onto the frame, underneath the engine, it will be necessary to remove them. To do this first remove the brake pedal and swing it clear. Unscrew the nuts from the two bolts securing the footrests, then give each footrest a sharp tap in a downward direction.

Remove the connecting link from the rear chain and withdraw the chain from mesh with the gearbox sprocket, then disconnect the generator leads underneath the engine (3 snap connectors).

To avoid damage to the chainguard, when the engine is being removed, it should be moved rearwards several inches. This can be achieved by slackening the rear chainguard bolt and removing the front securing bolt. The guard should then be lifted upwards and rearwards until it is well clear.

Remove four bolts (and a nut on models without rear enclosure panels) securing each of the left and right rear engine mounting plates and withdraw the plates. Remove a nut and washer from one end of each of the front and bottom engine mounting studs, the engine should now be loose in the frame.

Finally to gain clearance for removal of the engine unit from the LEFT, remove the following:—

(1) The two right-side rocker box-to-torque stay bolts.

(2) The two right-side screws securing the front and rear rocker cap retainer springs.

(3) The left side lower bolts securing the rear frame to the front frame.

If the front and lower engine mounting studs are now withdrawn the engine will be free to be removed. It is recommended that removing the engine should be aided by the use of a hoist or the help of a second operator, due to the engine weight, which is approximately 135 lbs.

Should difficulty be experienced in removing the engine, an easier removal can be facilitated by first detaching the rocker boxes. For details of this see Section B2.

Replacement is a reversal of the above instructions, but do not forget to refit the bolts in (1), (2) and (3) above when the engine is loosely positioned. When replacing the ignition coils, remember that the connector terminal end of each coil faces towards the rear of the machine. To ensure that the wiring harness is re-connected correctly refer to the appropriate wiring diagram in Section H11.

Do not forget to fit the distance pieces on the coil mounting bolts, torque stay mounting bolts, and, in particular, the lower engine mounting stud: also, attention is called to the distance pieces fitted to the bottom panel mounting studs on the left and right of the machine in the case of models fitted with the rear enclosure panels.

For the correct grade and quantity of lubricant for the engine, gearbox and chaincase, see Section A2.

SECTION B2

REMOVING AND REPLACING THE ROCKER BOXES

Disconnect the leads from the battery terminals and remove the fuel tank as detailed in Section E1.

Disconnect the high tension cables and wiring harness from the left and right ignition coils. Remove the top and bottom coil mounting bolts and distance pieces. The ignition coils will then be free to be removed. Care should be taken not to damage the light alloy casings of the ignition coils as indentations may ultimately result in ignition failure.

Unscrew the four nuts securing the torque stays to the rocker boxes and remove the front and rear torque stay mounting bolts and distance pieces. The torque stays should then be removed.

Unscrew the two domed nuts from the rocker spindles and disconnect the rocker oil feed pipe. Care should be taken not to bend the pipe excessively as this may ultimately result in a fracture.

Remove the rocker inspection caps.

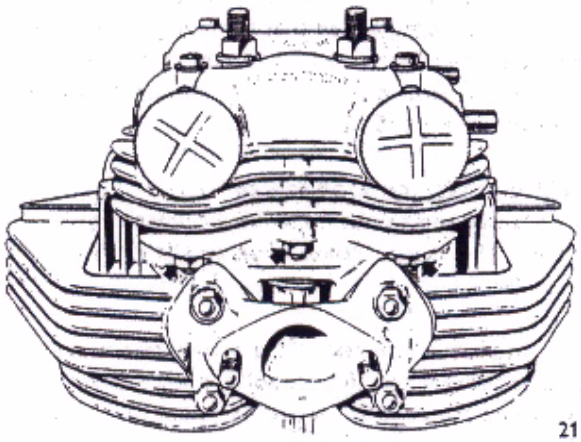

Fig. B4. Rocker box securing nuts

Unscrew three nuts from the studs fitted to the underside of the exhaust rocker box. Remove the outer exhaust rocker box securing bolts and unscrew the central cylinder head bolts. (Note that, at this stage the rocker box may rise slightly, due to a valve spring being compressed). The exhaust rocker box is now free to be removed. The procedure is the same for the inlet rocker box, but the two outer securing nuts indicated in Fig. B4 may not have sufficient clearance to be removed; if this is the case, they should be initially slackened and finally unscrewed at the last stage, prior to removal, when the rocker box can be lifted slightly.

Care should be taken to collect the six plain washers which are fitted (one beneath each of the underside securing nuts), as they sometimes adhere to the cylinder head flanges and may be subsequently lost.

After completion of the rocker box removal operation, the push rods should be withdrawn and stored in the order of their removal so that they can be replaced in their original positions.

The junction surfaces of the rocker boxes and cylinder head should be cleaned for reassembly, by means of a soft metal scraper.

Replacement is a reversal of the above instructions, but remember to fit new gaskets between the rocker boxes and cylinder head.

When replacing the push rods place a small amount of grease into the bottom cup of each of the push rods, then locate the push rods, one at a time, by means of feeling the engagement of the tappet ball end and the push rod cup, and then testing the resistance to lifting caused by suction between the dome of the tappet and push rod cup. When the push rods are correctly located, remove the sparking plugs and turn the engine over until the INLET push rods are level and at the bottom of their stroke. The inlet rocker box should then be assembled. Repeat this procedure for the exhaust rocker box.

Remember that the four central cylinder head through bolts should be fitted first and that the underside nuts are tightened last. Before finally clamping the rocker boxes in position, check that the valves are being operated by turning the engine over slowly.

Do not forget the distance pieces which fit over the engine torque stay mounting bolts and coil mounting bolts.

NOTE: It can be seen that the four double ended bolts also serve to retain the cylinder head and should be tightened first. The correct torque figures are given in GENERAL DATA, and sequence, in Fig B12.

Before fitting the rocker oil feed pipe the four copper washers which fit over the rocker spindle should be annealed by quenching in water from cherry red heat. Finally, remove any scale that may have formed. Annealing softens the copper thus giving it better sealing qualities.

SECTION B3

INSPECTING THE PUSHRODS

When the pushrods have been removed, examine them for worn, chipped or loose end-cups; also check that the push rod is true by rolling it slowly on a truly flat surface (such as a piece of plate glass).

Bent pushrods are found to be the cause of excessive mechanical noise and loss of power and should be straightened if possible, or, preferably, renewed.

SECTION B4

STRIPPING AND REASSEMBLING THE ROCKER BOXES

Removal of the rocker spindles from the rocker boxes is best achieved by driving 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 paraffin (kerosene) and the oil drillings in the spindles and rocker arms should be cleaned with a jet of compressed air.

Remove the oil seals 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 with the drilled flat towards the rocker spindle.

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 finished to remove any irregularities.

An effective finish can be achieved by first extracting the rocker box studs (two nuts locked together on the stud should facilitate an easy removal) then lightly rubbing the junction surface on a sheet of emery cloth mounted on a truly flat surface (such as a piece of plate glass).

Assembly of the washers, rocker arms and spindles into the rocker box is assisted by the use of service tool Z111.

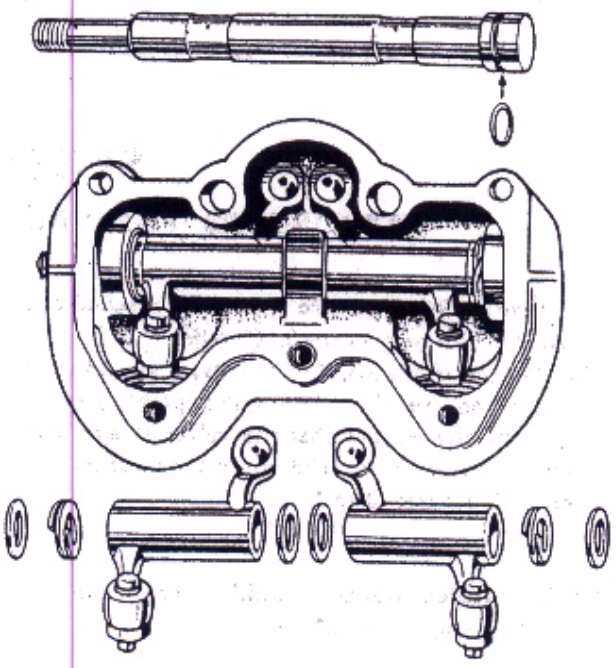

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Fig. B5. Rocker box assembly

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. bolt x 6 in. long by grinding a taper at one end.

B7

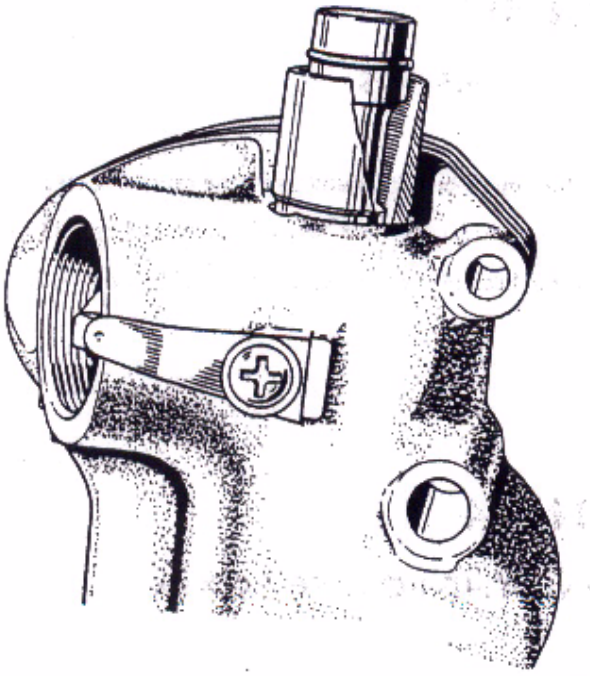

Fig. B6. Refitting the rocker spindle

Before commencing re-assembly of each rocker box, note there is one plain washer in each box which has a smaller diameter bore. This is the thrust washer through which the smaller diameter of the spindle enters, and is assembled last, against the right hand inner face of the rocker box.

Smear two plain washers with grease and place them one either side of the centre bearing boss. Place the left rocker arm in position, bringing it into line with the alignment tool and slide a plain washer and a spring washer (in the order shown in Fig. B5) into position. Carefully repeat this procedure for the other rocker arm and spring washer and slide the thrust washer with the smaller internal bore into position. Finally bring both rocker arms into line with the alignment bar.

Lubricate the spindle with oil and slide it (complete with oil seal) through the compressor (Z111) and as far as possible into the rocker box, finally tapping it home with a hammer and soft metal drift (see Fig. B6).

SECTION B5

ADJUSTING THE VALVE ROCKER CLEARANCES

The valve rocker clearance should be checked and adjusted if necessary every 3,000 miles (4,800 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 lives. The correct clearances are given in "General Data".

NOTE: Adjustments should only be made when the engine is COLD.

Access to the rocker arm adjuster screws and locknuts is gained by removing the slotted inspection caps from the rocker boxes. Adjustment is aided by the toolkit spanners D361 ($\frac{7}{16}$ in. Whit. spanner) and D362 (tappet key).

First, remove the left and right sparking plugs to relieve compression, then slacken the four lock nuts securing the square-headed adjuster screws. Slowly turn the engine over until the left exhaust valve is fully open; the right tappet is then resting on the base-circle diameter of the cam-form opposite to the cam-lobe; the clearance for the right exhaust valve can then be set (see Fig. B7). Carefully turn the adjuster screw in the required direction until the correct feeler gauge just slides between the valve stem and the screw. Re-check the gap after the locknut has been tightened.

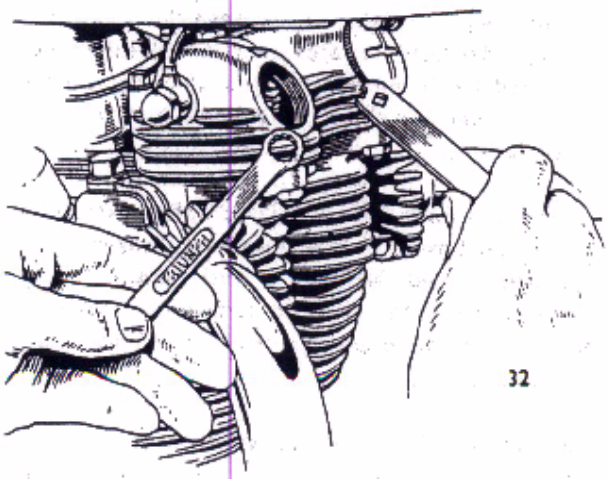

Fig. B7. Adjusting the valve rocker clearance

Repeat this procedure for the left exhaust valve and both of the inlet valves, ensuring that the clearances are in accordance with those given in "General Data".

An alternative way of setting the valve rocker clearance which is approximate but sufficient when carefully carried out, is that of using the pitch of the thread on the adjuster screw as a vernier scale.

The thread is $\frac{5}{16}$ in. x 26 C.E.I. hence the pitch is ·038 in. Therefore, $\frac{1}{4}$ turn of the adjuster screw represents ·010 in. approx.

If the adjuster screw is initially turned until it is finger tight on the valve stem, so that the rocker arm can only be moved sideways; then, by slackening the screw $\frac{1}{4}$ turn, a clearance of approximately ·010 in. will result. Similarly, slackening the screw $\frac{1}{8}$ turn will give a clearance of ·005 in.

SECTION B6

REMOVING AND REPLACING THE AIR CLEANER

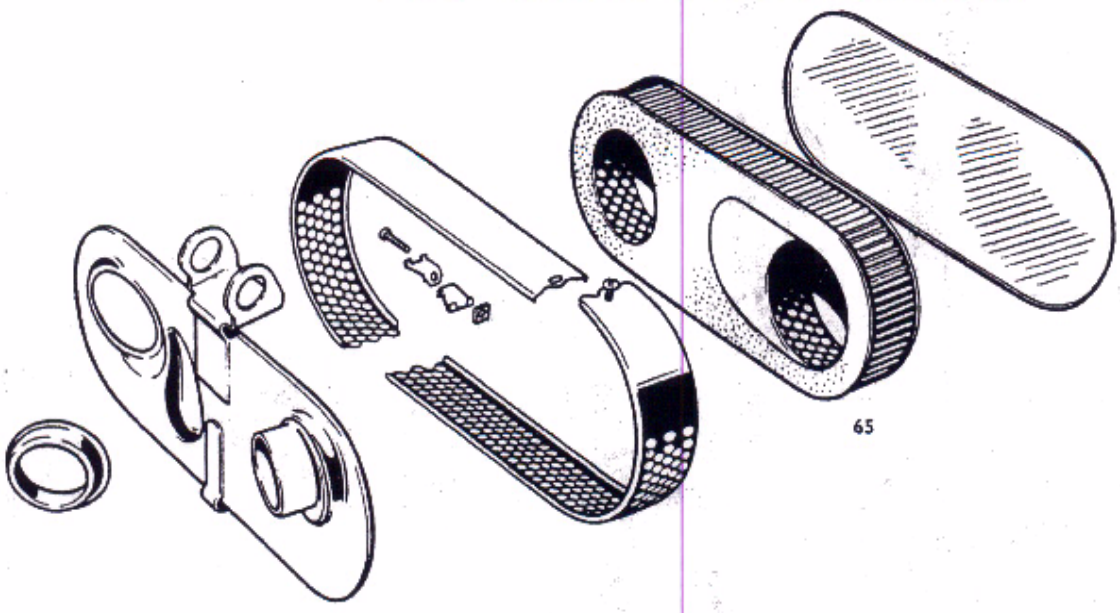

Fig. B8. Air cleaner—model T120

6T and TR6

On models with one carburetter where rear enclosure panels are fitted it will first be necessary to remove the right panel. This is done by unscrewing the two front panel junction screws, two domed nuts and a nut just below the rear of the fuel tank. In the case of a TR6 the switch panel should be removed (Section E3). Then, when the central circular clip is slackened it should be possible to slide the air cleaner off the carburetter adaptor, and withdraw it. If difficulty is encountered it is possible to remove the air cleaner by dismantling it. To do this remove the screwed clip which secures the outer perforated case, then remove the back plate, filter and finally, slide the front plate from over the carburetter adaptor.

Dry felt elements should be carefully rinsed in paraffin (kerosene) and allowed to drain thoroughly. Under no circumstances should the filter be soaked with oil. Paper elements should be blown clean with a jet of compressed air.

Replacement is the reversal of the above instructions but do not forget to tighten the perforated case clip and the circular clip securing the air cleaner to the carburetter.

T120

The T120 model is fitted with a combined air cleaner for some markets, and the Spare Parts Catalogue lists the parts required. This type of air cleaner has a paper element which should be removed and cleaned with a jet of compressed air, or renewed, as necessary. **This paper element should not be washed or immersed in any liquid.**

SECTION B7

CARBURETTER—DESCRIPTION

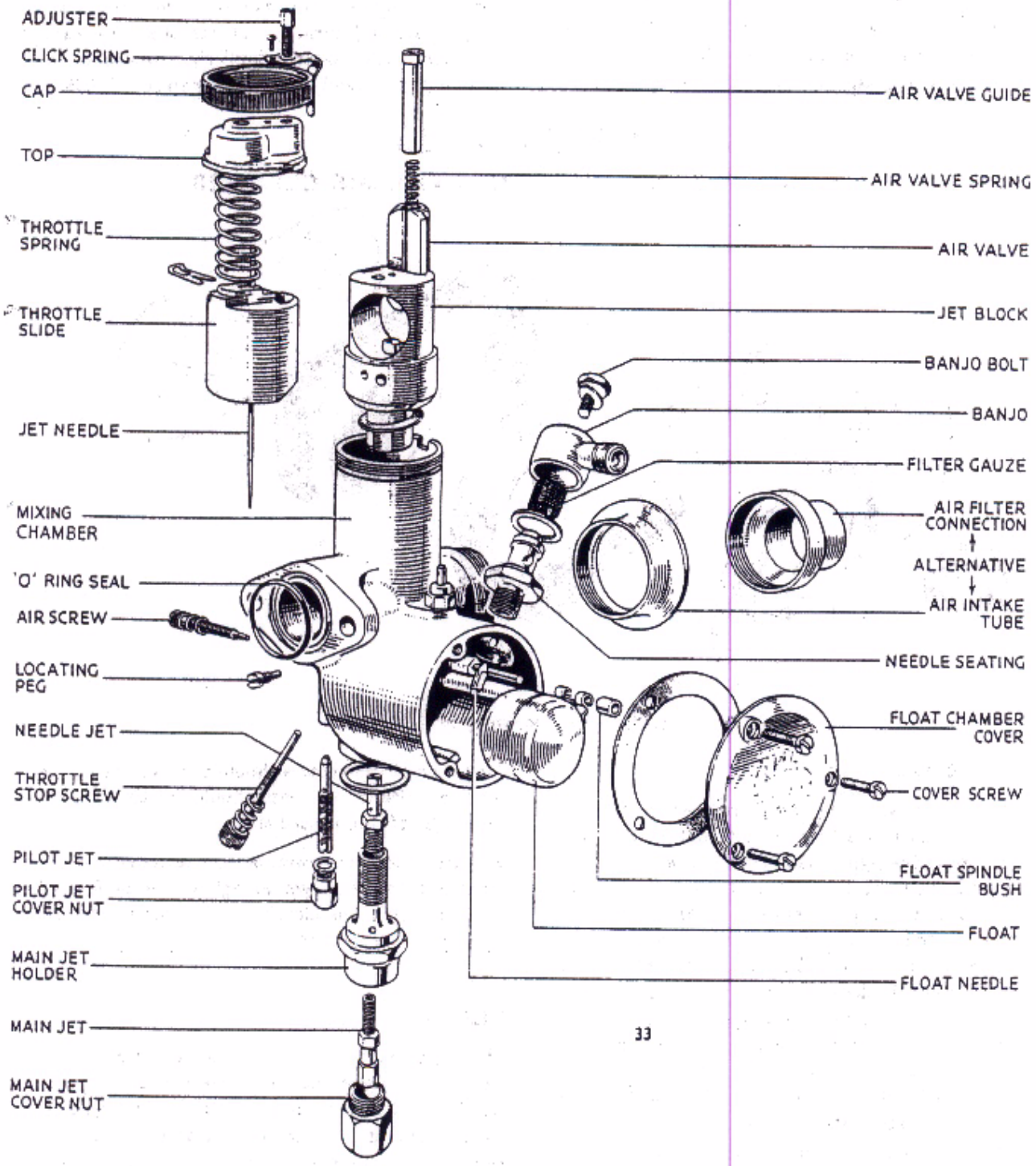

Fig. B9. Exploded view of carburetter

The 6T and TR6 are each fitted with an Amal monobloc carburetter which is fully adjustable. Briefly, it operates in the following way:

When the engine is idling, mixture is supplied from the pilot jet system, then as the throttle slide is raised, via the pilot by-pass. With the throttle just opening the mixture is controlled by the tapered needle working in the needle jet and finally by the size of the main jet. The pilot system is supplied by a pilot jet, which is detachable for cleaning purposes and which when assembled into the carburetter body is sealed by a cover. The main jet does not feed direct into the mixing chamber but discharges through the needle jet into the primary air chamber and the fuel goes from there as a rich petrol-air mixture through the primary air choke into the main air choke.

This primary air choke has a compensating action in conjunction with bleed holes in the needle jet, which serves the double purpose of air-compensating the mixture from the needle jet, and allowing the fuel to provide a well, outside and around the needle jet, which is available for snap acceleration.

The idling mixture is controlled by the pilot air screw which governs the amount of air that is allowed to mix with the fuel at tick-over speeds.

The throttle stop screw is used to adjust the slide so that the throttle is kept open sufficiently to keep the engine running at a slow tick-over, when the twist-grip is closed.

SECTION B8

REMOVING AND REPLACING THE CARBURETTER

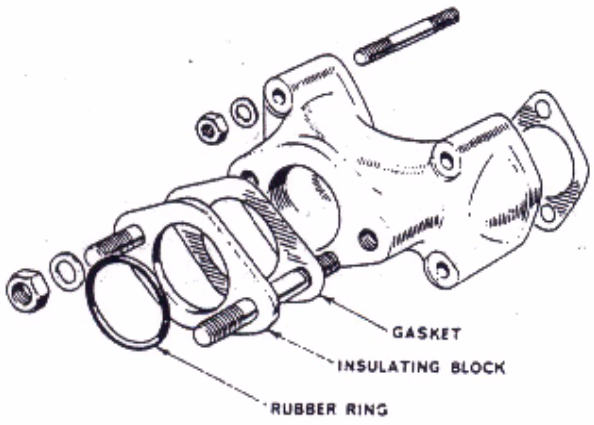

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Fig. B10. Manifold assembly

First, remove the air cleaner as shown in Section B6, then unscrew the serrated cap nut which is held in position by a ratchet spring at the top of the carburetter.

Ensure that the fuel taps are in the "OFF" position and disconnect the fuel pipes. Unscrew the two carburetter flange securing nuts then carefully withdraw the carburetter from over its mounting studs. To achieve this the carburetter should be tilted upwards slightly so that it clears the frame.

As the carburetter is lowered the slide should be withdrawn and carefully wrapped in a piece of cloth until it is required to re-fit the carburetter.

The insulating block and rubber "O" ring seal should be examined for damage which might impair their sealing qualities. If there is the slightest doubt about their serviceability, they should be renewed.

When replacing the carburetter, great care should be taken to ensure that the slide does not become damaged as it is lowered into the mixture chamber of the carburetter. This operation may require manipulation due to the slide having to locate over a peg and the needle, which must fit into the needle jet housing within the carburetter. In the event of great difficulty being encountered check that the slot in the air slide is to the right then offer the air slide to the carburetter with the carburetter held in a vertical position.

Ensure that the rubber "O" ring seal and insulating block are correctly fitted, then slide the carburetter into position. Locate the cap and screw on the serrated cap nut. When re-fitting the carburetter securing nuts do not forget to fit the plain washers, and do not over-tighten the nuts. Re-fitting continues as a reversal to the above instructions.

SECTION B9

STRIPPING AND REASSEMBLING THE CARBURETTER

When the carburetter is removed, disconnect the slide assembly from the throttle cable and air control cable (if fitted). To do this, first remove the needle retaining spring clip, then compress the slide return spring, pushing the nipple of the throttle cable down through the slot until it is free.

Unscrew three slotted screws and withdraw the float chamber cover and remove the float spindle bush, the float, then withdraw the triangular section float needle.

Unscrew the banjo bolt which secures the fuel pipe banjo connector to the float needle seating block and withdraw the banjo, filter and junction washers. Unscrew the needle seating block. Unscrew the tickler body then withdraw the tickler and spring.

Unscrew the air screw and throttle stop screw, then the main jet cover nut from the bottom of the body. Unscrew the main jet, main jet holder and needle jet. To release the jet block re-insert the main jet holder, until a few threads are engaged then tap it with a hide mallet. This will release the jet block through the carburetter body.

Unscrew the pilot jet cover, and unscrew the pilot jet. All that remains to be removed then is the hexagonal locating peg, the end of which can be seen protruding within the mixing chamber.

Thoroughly clean all parts in petrol (gasolene). Deposits on the carburetter body are best removed by a light grade wire brush. It is advisable to wash the parts several times each in a clean quantity of petrol, to avoid particles of dirt remaining. Allow the parts to drain, preferably using a jet of compressed air from such as a hand pump to ensure that all holes and drillings are free from blockage.

Inspect the component parts for wear and check that the jets are in accordance with the recommended sizes given in "General Data".

Apart from one or two points that are mentioned below, reassembly is a reversal of the above instructions, referring to Figure B9 for guidance.

Do not replace any fibre washer that looks unserviceable. It is advisable to purchase replacement washers before removing the carburetter.

When replacing the jet block, ensure that the fibre washer is in position; align the location slot in the jet block with the locating peg in the carburetter housing and drive the block home.

Finally, note that the float spindle bush fits on the outside end of the spindle, and that the float pressure pad is upper-most so that the float needle rests on it.

SECTION B10

INSPECTING THE CARBURETTER COMPONENTS

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

(1) Inspect the throttle valve slide for excessive scoring to the front area and check the extent of wear on the rear slide face. If wear is apparent the slide should be renewed. In this case, be sure to replace the slide with the correct degree of cut-away (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 jet block. Ensure that the air valve spring is serviceable by inspecting the coils for wear.

(3) Inspect the throttle return spring for efficiency and check that it has not lost compressive strength by measuring its length and comparing it to the figure given in "General Data".

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

(6) Ensure that the float does not leak by shaking it to see 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 petrol filter, which fits over the needle seating block, for any possible damage to the mesh. Ensure that the filter has not parted from its supporting structure, thus enabling the petrol (gasolene) to by-pass it un-filtered.

SECTION B11

CARBURETTER ADJUSTMENTS

Throttle Stop Screw. This screw, which is situated on the right side of the carburetter sloping upwards and is fitted with a locking spring, should be set to open the throttle sufficiently to keep the engine running at a slow tick-over, when the twist-grip is closed.

Pilot Air Screw. To set the idling mixture, this screw, which is situated on the right side, is also fitted with a locking spring, and should be screwed in to enrichen the tick-over mixture or outwards to weaken it. As a guide to its approximate required position, screw it in fully, then unscrew it approximately 2¼ turns.

The screw controls the suction on the pilot jet by metering the amount of air which mixes with the petrol.

Needle and Needle Jet. Carburation is governed by the cut-away and needle jet in varying degrees from when the throttle is just open to when it is approximately ¾ full throttle. The needle jet orifice is governed by the position of the needle. Machines are delivered from the factory with the needle in one notch above the specified position, and the needle should be lowered to the correct notch after 500 miles (800 km.).

Throttle Valve Cutaway. The amount of cut-away to the bottom of the throttle valve slide is indicated by a number marked on the slide, e.g. 376/3½ means throttle type 376 with number 3½ cutaway; a larger number such as 4 means that the throttle valve slide has a slightly larger cutaway and consequently gives a weaker mixture during the period of throttle opening through which a cutaway is effective, i.e. from just open to approximately ¼ throttle. Similarly, 3 indicates a slightly smaller cutaway and a slightly stronger mixture.

Jet Sizes. The recommended jet sizes are given in "General Data" and changing from these to any other size it is left entirely to the discretion of the rider. The main jet is operative from approximately ¼ to full throttle, this is when the needle jet orifice ceases to have any reduction effect on the petrol flow.

SECTION B12

REMOVING AND REFITTING THE CYLINDER HEAD ASSEMBLY

Proceed as detailed in Section B7 for removal of the rocker boxes and pushrods.

Slacken the two finned clip bolts and the silencer clip bolts; slacken the exhaust pipe bracket nuts and drive the right-hand exhaust pipe free with a hide mallet. Repeat for the left exhaust pipe where twin exhaust pipes are fitted. In the case of a siamese-type exhaust system, the left-to-right exhaust pipe junction clip should also be slackened and the right exhaust pipe tapped with a hide mallet until it is free; the left exhaust pipe can then be easily removed.

Unscrew the left and right carburetter flange nuts and remove them complete with spring washers. Both carburetters should then be withdrawn from over the studs and placed well clear of the cylinder head. On models where one carburetter is fitted the manifold securing nuts should be unscrewed and the manifold withdrawn when the cylinder head is removed. Note that there is a plain washer under each of the four manifold securing nuts.

Unscrew the remaining five cylinder head bolts, a turn at a time, until the load has been released, and then remove the cylinder head, if necessary, sliding it forward to release the inlet manifold.

Remove the push rod cover tubes and renew the rubber seals if they are worn or have given long service.

The copper cylinder head gasket should be either renewed or reconditioned by annealing it to restore the sealing qualities of the copper. Annealing is achieved by heating the gasket to cherry-red heat and quenching it in water; finally, remove any scale that may have formed by means of a piece of fine grade emery cloth.

REFITTING THE CYLINDER HEAD

Ensure that the junction surfaces of the cylinder block, gasket and cylinder head are clean. Grease the gasket and place it in position (check that all 9 bolt holes are lined up) and locate the push rod cover tubes (complete with top and bottom oil seals) onto the tappet guide blocks.

Lower the cylinder head into position and fit the four outer cylinder head bolts finger tight, also, fit the central bolt finger tight.

Align the push rod cover tubes, as shown in Fig. B11, and replace the push rods in their original positions.

Carefully rotate the crankshaft until both of the inlet push rods are at the bottom of their stroke, then lower the inlet rocker box into position, ensuring that the push rods are engaged correctly, then fit the two central cylinder head through bolts finger tight. Screw in the two outer inlet rocker

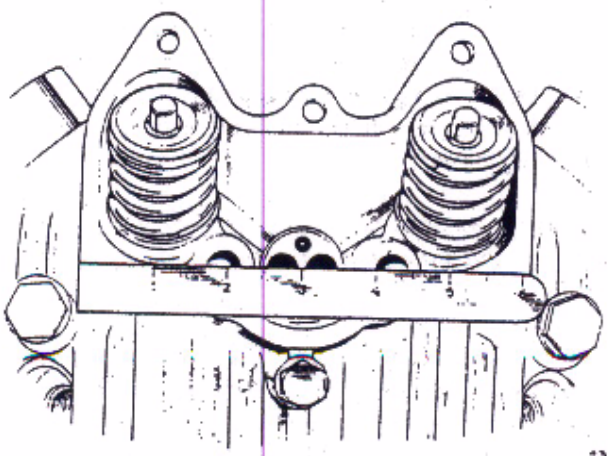

Fig. B11. Aligning the push rod cover tubes

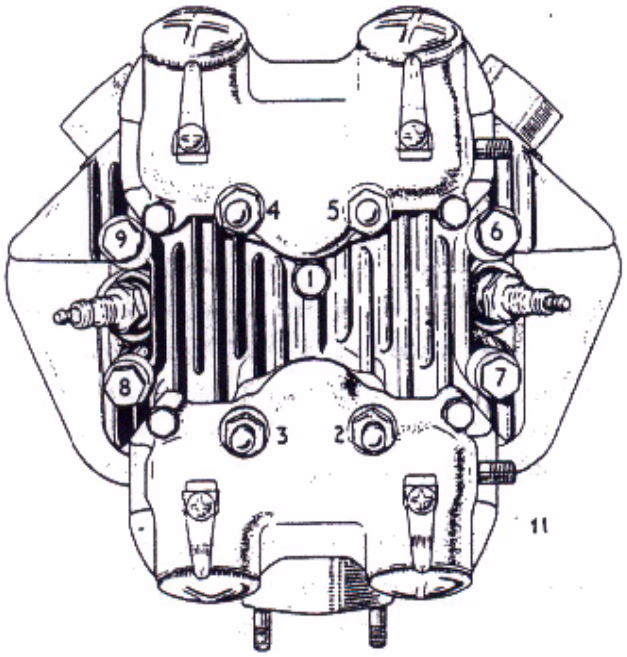

Fig. B12. Cylinder head bolt tightening sequence

box bolts and fit the three underside retaining nuts, with plain washers. Repeat this procedure for the exhaust rocker box.

Tighten the nine cylinder head bolts in the order given in Fig. B12 and to the torque settings given in "General Data". Finally tighten the remaining inlet and exhaust rocker box retaining nuts and bolts.

Reassembly then continues in the reverse order to the removal instructions. To obtain the correct valve rocker clearance settings, reference should be made to Section B5.

SECTION B13

REMOVING AND REFITTING THE VALVES

Removal of the valves is facilitated by means of a "G" clamp type valve spring compressor. When the spring is compressed sufficiently, the split cotters can be removed with a narrow screwdriver, and the valve spring withdrawn when the compressor is released. As each valve is removed it should be marked so that it can be replaced in its original position.

NOTE: The inlet valves are marked "IN" and the exhaust valves "EX".

Fitting a new or reground valve necessitates seating by the grinding in process described in Section B16, but it does not necessitate recutting the cylinder head valve seat unless new valve guides have been fitted.

The valve springs should be inspected for fatigue and cracks, and checked for wear by comparing them with a new spring or the dimension given in "General Data".

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

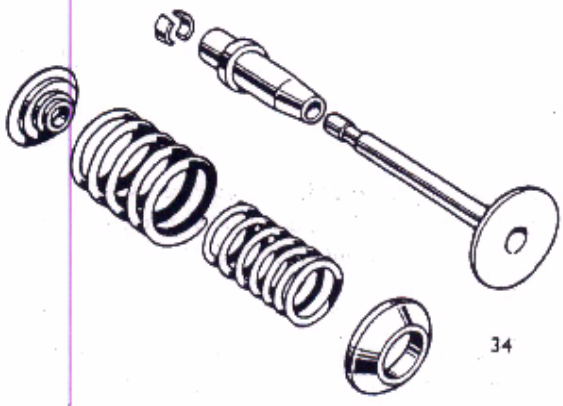

Fig. B13. Valve components

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

Compress the springs and slide the two halves of the split cotter into the exposed groove in the valve stem.

SECTION B14

RENEWING THE VALVE GUIDES

The valve guides can be pressed or driven out using service tool Z16, with the cylinder head inverted on the bench. A suitable drift can be made by obtaining a 5 inch length of $\frac{1}{2}$ in. diameter mild steel bar (EN8) and machining one end to $\frac{5}{16}$ in. diameter for a length of 1 inch.

The same method may be employed to fit the new guide, although the use of a press is recommended. In either case lightly grease the valve guide to assist assembly. Ensure that the guide is pressed in until the shoulder is flush with the cylinder head.

NOTE: Where a cylinder head has CAST IRON valve guides, the two LONG valve guides are fitted in the INLET position. On a cylinder head fitted with BRONZE valve guides, it is the two SHORT valve guides that are fitted in the inlet position.

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

SECTION B15

DECARBONISING

It is not normally advisable to remove the carbon deposits from the combustion chamber and exhaust ports until symptoms indicate that decarbonising is necessary.

Such symptoms as falling off in power, loss of compression, noisy operation and difficult starting are all indications that decarbonising may be necessary.

When the cylinder head is removed unscrew the sparking plugs and clean them in paraffin (kerosene), or preferably have them grit-blasted and checked. Before fitting the plugs, check that the gap setting is correct (see "General Data").

If special decarbonising equipment is not available then a blunt aluminium scraper or a piece of lead solder flattened at one end, should be used to remove the carbon deposits. Do not use a screwdriver or a steel implement of any kind on an aluminium surface.

When removing the deposits from the piston crown, a ring of carbon should be left round the periphery of the pistons to maintain the seal. Also the carbon ring round the top of the cylinder bore should not be disturbed. To facilitate this an old piston ring should be placed on top of the piston, level with the top surface of the cylinder block.

Remove the valves as shown in Section B13 then remove the carbon deposits from the valve stems, combustion chamber and ports of the cylinder head. Remove all traces of carbon dust by means of a jet of compressed air or the vigorous use of a tyre pump, then thoroughly clean the cylinder head and valves in paraffin (kerosene). Finally, check the valves for pitting. If necessary, the valves can be ground-in as shown in Section B16.

SECTION B16

RE-SEATING THE VALVES

Where the valve guides have been renewed or the condition of a valve seat is doubtful, it is advisable to re-cut the cylinder head valve seat then grind in the valve, using a fine grade grinding-in paste.

It is important that the cylinder head valve seat and the valve guide bore should be concentric. For the purpose of re-cutting the valve seats the following service tools are available.

Z53	Valve seat cutter (45°)
Z50	Blending cutter (spherical form)
Z54	Arbor with pilot.

The valve seat cutting operation should be carried out with the greatest care, and only a minimum amount of metal should be removed.
After the seats have been re-cut, they should be blended to give an even seating of $\frac{3}{32}$ in. (2.4mm.).

Examine the face of the valve to see if it is pitted, scored or damaged. If necessary, the face can be reground, but excessive re-grinding is not advisable for this adversely affects the heat transference properties of the valve and will ultimately result in critical pocketing.

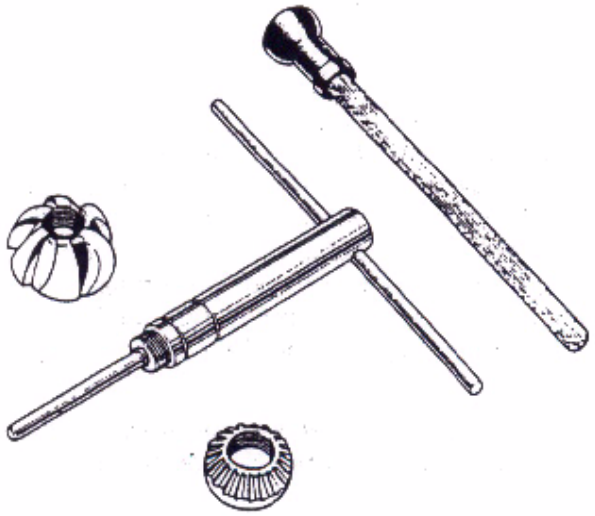

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Fig. B14. Valve seating tools

The stem of the valve should be inspected for wear or scuffing and if either is pronounced, the valve should be renewed.

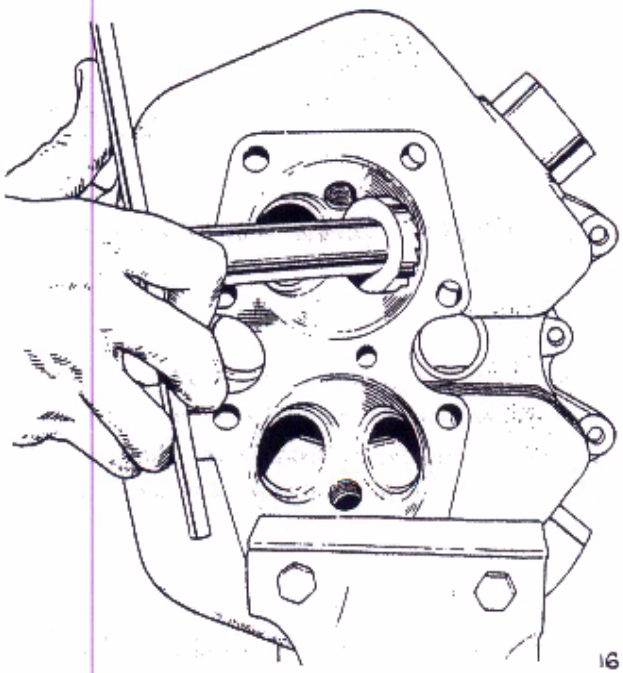

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Fig. B15. Cutting a valve seat

To grind in the valve use a fine grade carborundum grinding paste. Place a small amount evenly on the valve seat and place the valve in its guide with a holding tool attached.

Use a semi-rotary motion, occasionally lifting the valve and turning it through 180°. Continue this process until a uniform seal results. Wash the parts in paraffin (kerosene) 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 paraffin (kerosene) 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 paraffin (kerosene).

B17

SECTION B17

REMOVING AND REPLACING THE CYLINDER BLOCK AND TAPPETS

Wedge a dis-used shock absorber rubber, or a suitable retainer between the inlet and exhaust tappets to prevent the tappets from falling through the tappet block into the crankcase when the cylinder block is removed.

Unscrew eight nuts from the base of the cylinder block and carefully raise the block clear of the pistons. Remove the cylinder base gasket and ensure that the two locating dowels are in their correct position in the crankcase.

Remove the tappets from the cylinder block storing them in the order of their removal, and thoroughly clean all parts in paraffin (kerosene). It is important that the tappets are replaced in their original positions; failure to observe this may result in subsequent excessive tappet and cam wear.

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

Reassembly is a reversal of the above instructions, but care should be taken to ensure that the cylinder block is correctly located over the two dowels in the left half-crankcase.

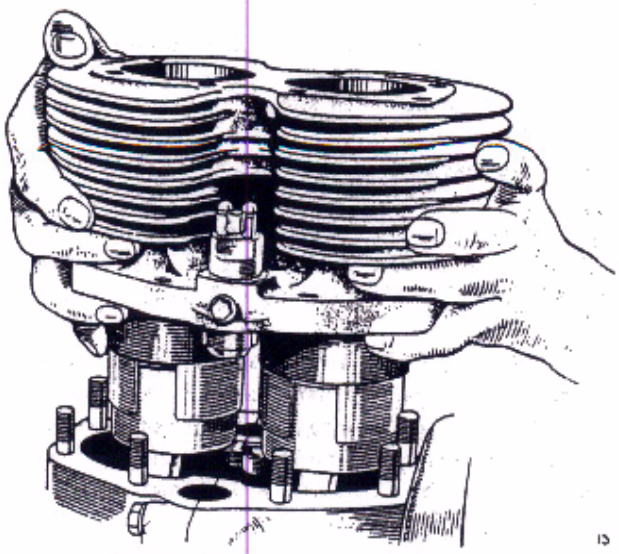

Fig. B16. Refitting the cylinder block

The tappets should be well lubricated prior to wedging them in their original positions in the tappet guide blocks. To facilitate an easy assembly of the cylinder block over the pistons, two collars, part number Z22, are required. The collars should be placed over the pistons to compress the piston rings, and withdrawn over the connecting rods when the pistons are sufficiently engaged in the block. Refit the eight cylinder base nuts.

NOTE: The smaller cylinder block retaining nuts should be fitted to the four central studs.

SECTION B18

INSPECTING THE TAPPETS AND GUIDE BLOCKS

The base of the tappet is fitted with a "Stellite" tip. This material has good wear resisting qualities but the centre of the tip may show signs of slight indentation. If the width of the indentation exceeds $\frac{3}{32}$ in. then the tappet should be renewed.

It is not necessary to remove the tappet guide blocks for inspection purposes; the extent of wear can be estimated by rocking the tappet whilst it is in position in the guide block. It should be a sliding fit with little or no sideways movement, (see "General Data" for working clearances).

Excessive play between the tappets and guide block may cause undesirable mechanical noise.

SECTION B19

RENEWING THE TAPPET GUIDE BLOCKS

Place the cylinder block in an inverted position on the bench. Remove the locking screw and drift out the guide block using service tool Z23, as shown in Fig. B17.

To fit the new guide block, first grease the outer surface to assist assembly, then align the location hole in the guide block and cylinder block base, and drive in the guide block using Z23, until the shoulder is flush with the flange.

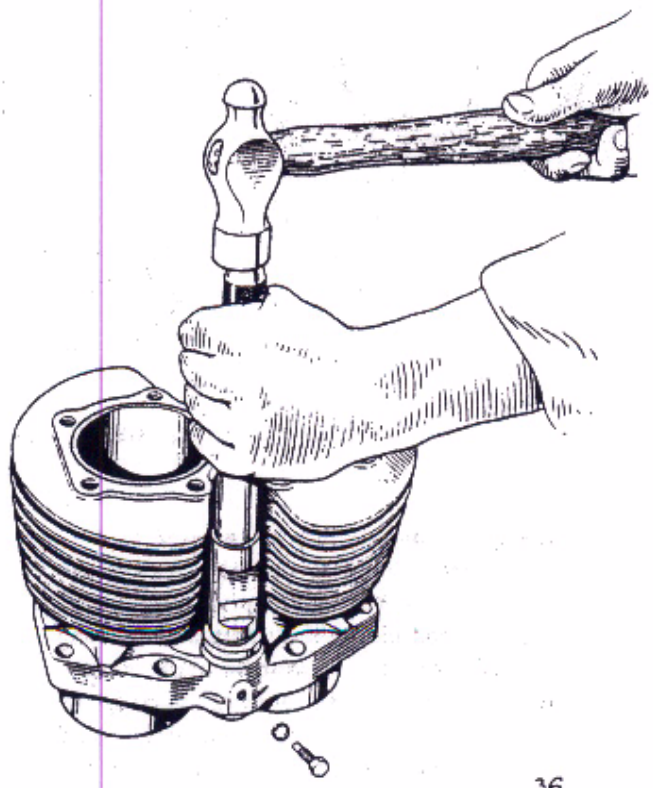

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Fig. B17. Refitting a tappet guide block

B19

SECTION B20

REMOVING AND REFITTING THE PISTONS

Removal of the pistons is facilitated by service tool Z72 (see Fig. B18). Remove the inner and outer circlips and press out the gudgeon pin with the service tool. The pistons are then free to be removed.

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

It is advisable to renew the four circlips; this can be done for negligible cost.

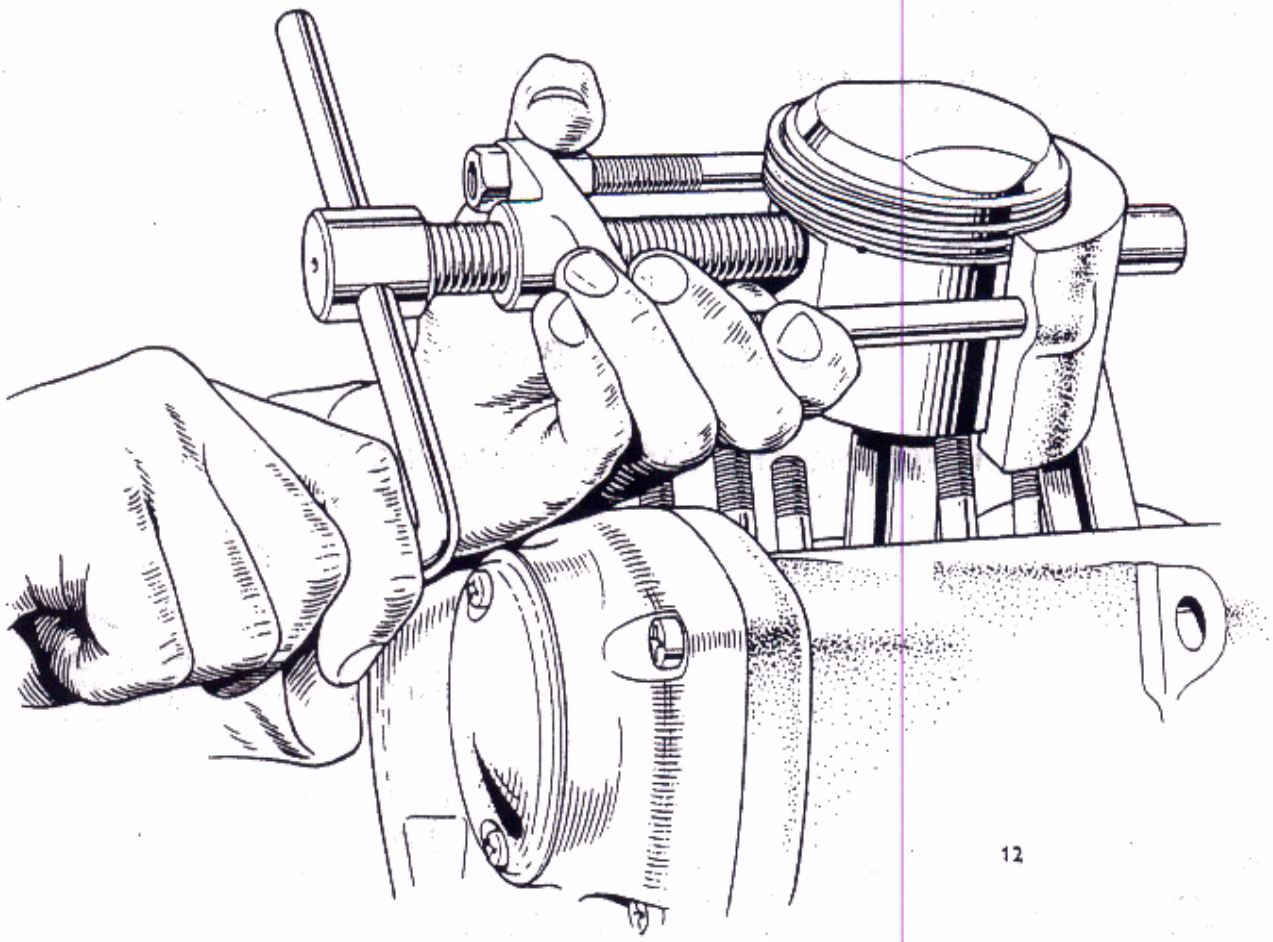

Fig. B18. Removing a piston

Alternatively, the pistons may be removed by driving out the gudgeon pin with a suitable drift. However, this is not a recommended practice, and may result in a damaged piston or distorted connecting rod. **The need for care cannot be overstressed when using this method to remove the gudgeon pin.** When the pistons are removed they should be suitably scribed inside so that they can be refitted in their original positions.

If there is no alternative to driving the gudgeon pin into position with a drift, the piston should be heated to 100°C (boiling-water temperature), to assist assembly.

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

SECTION B21

REMOVING AND REPLACING THE PISTON RINGS

There should be little difficulty in removing piston rings, if the following procedure is adopted. Lift one end of the top piston ring out of the groove and insert a thin steel strip between the ring and piston. Move the strip round the piston, at the same time lifting the raised part of the ring upwards with slight pressure. The piston rings should always be lifted off and replaced over the top of the piston.

If the piston rings are to be refitted the carbon deposits on the inside surface of the rings must be removed and the carbon deposits in the piston ring grooves must also be removed.

When fitting new piston rings, the bores must be lightly honed with a fine-grade emery cloth so that the new piston rings can become bedded down properly. The honing should be carried out with an oscillatory motion up and down the bore until an even "criss-cross" pattern is achieved. The recommended grade of emery for this purpose is 300. Thoroughly wash the bores in paraffin (kerosene) and check that all traces of abrasives are removed.

Pistons and rings are available in ·010, ·020, ·030 and ·040 inches. (·254, ·508, ·762 and 1·016 mm.) oversizes. When fitting new rings the gap must be checked in the lowest part of the cylinder bore. The ring must lie square to the bore for checking purposes, and to ensure this, place the piston crown onto the ring and ease it down the bore. Check the gap with feeler gauges.

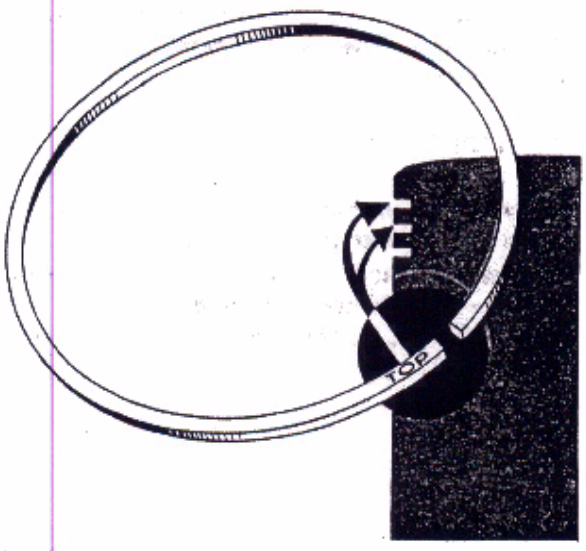

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Fig. B19. Refitting a tapered piston ring

Piston rings, when new, should have the following gap clearances:

Compression ring gap:	·010" to ·014" (·25 to ·35 mm.)
Scraper ring gap:	·010" to ·014" (·25 to ·35 mm.)

Refitting the piston rings is straight forward, but check that the two compression rings are fitted the right way up.

The two taper compression rings are marked "TOP" to ensure correct assembly, and should be fitted with the "TOP" marking towards the cylinder head (see Fig. B19).

SECTION B22

INSPECTING THE PISTONS AND CYLINDER BORES

PISTONS

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

The piston skirt is of a special oval form and is designed to have limited working clearances within the bore. The clearances are given in "General Data".

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

NOTE: The top lands of the piston have working clearance varying from ·016 in. to ·020 in. and thus allows 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 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 gudgeon pin, to obtain an accurate 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 an accurate figure for the actual wear can be determined.

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 cylinder. The difference between the figures obtained, when divided by 3 (an approximation of π) equals the wear on the diameter. As above, if the difference exceeds ·005 (·13 mm.), this indicates that a rebore is necessary.

SECTION B23

TABLE OF SUITABLE RE-BORE SIZES

Piston marking in. (mm.)	*Suitable bore sizes*	
	in.	mm.
Standard:—	2·7948 2·7953	70·993 71·006
Oversizes:— +·010 (·254 mm.)	2·8048 2·8053	71·247 71·260
+·020 (·508 mm.)	2·8148 2·8153	71·501 71·514
+·030 (·762 mm.)	2·8248 2·8253	71·755 71·768
+·040 (1·016 mm.)	2·8348 2·8353	72·009 72·022

SECTION B24

RENEWING THE SMALL END BUSHES

The small end bush wear, which normally is very slight, can be estimated when sliding the gudgeon pin through the bush. If it is in good condition the pin will be a sliding fit in the bush, with no play being in evidence.

Renewal of the small end bushes can be easily achieved by using the new bush to press out the old one. For this purpose a threaded bolt, about 4 in. long and a $1\frac{1}{4}$ in. long piece of tube with an inside diameter of $\frac{7}{8}$ in. will be required.

Place a suitable washer and the new bush onto the bolt, then offer it into the old bush. Place the piece of tube and a suitable washer over the bolt and screw the nut on finger-tight. Centralise the bush and tube and align the oilway in the new bush with that in the connecting rod. When the nut is tightened the new bush will extract the old one.

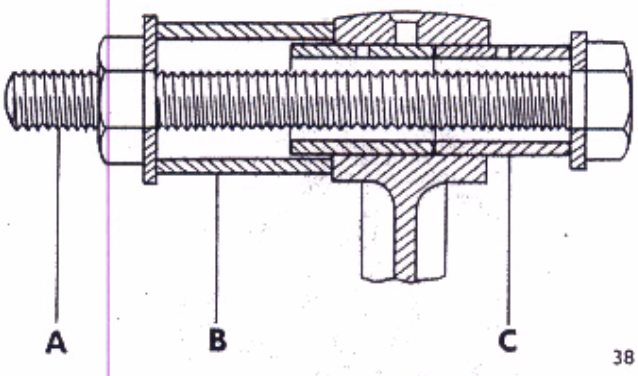

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Fig. B20. Extracting a small end bush

Finally, ream the bore of the bush to the size given in "General Data", taking care not to allow any metallic particles to enter the crankcase. When reamering the bush, ensure that its bore is parallel with the big-end bore.

SECTION B25

REMOVING AND REPLACING THE CONTACT BREAKER

The contact breaker mechanism is housed in the timing cover on the right of the engine and is driven by the exhaust camshaft. It consists of two sets of points (one per cylinder), two capacitors (condensers) and a fully automatic centrifugal type advance and retard mechanism. The working parts are protected by a circular cover and gasket. The engine oil is prevented from entering the contact breaker cavity by means of an oil seal fitted to the inner wall of the timing cover. The complete contact breaker unit can be removed from the timing cover with the aid of service tool D484.

First, disconnect the leads from the battery terminals then remove the two screws and withdraw the outer cover and gasket. Remove the centre bolt and screw in service tool D484, until the cam unit is released from its locking taper in the camshaft. Unscrew the tool and remove the cam unit.

To completely detach the contact breaker unit it will be necessary to disconnect the two leads from the ignition coils and remove the appropriate frame clips so that the leads can be withdrawn through the holes in the crankcase and timing cover.

It is advisable to make a note of the degree figure which is stamped on the back of the cam unit, as this indicates the advance range, which it is necessary to know for accurate static timing purposes.

Prior to replacing the cam unit it is advisable to add a small drop of lubricating oil to the pivot pins. The cam unit slot should be located on the peg in the camshaft and the centre bolt screwed in and tightened.

B23

The base plate should be re-positioned so that the set of points with the black/yellow lead is rearmost and with the pillar bolts in the centres of the timing adjustment slots.

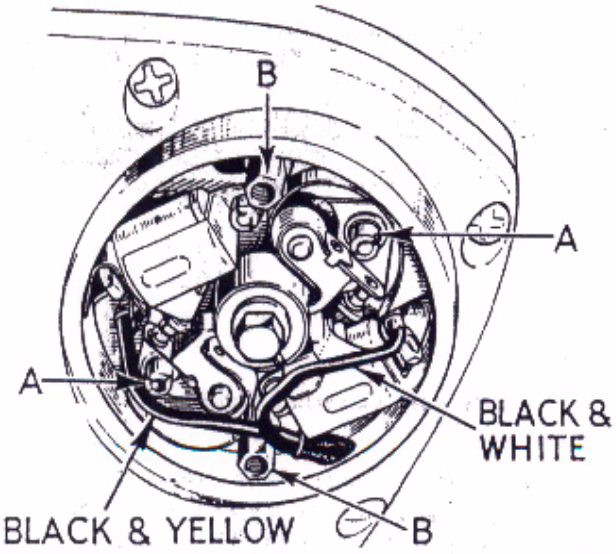

Fig. B21. Ignition contact breaker

To adjust contact breaker gaps slacken sleeve nuts 'A'. To rotate contact breaker base plate for setting ignition timing slacken pillar bolts 'B'.

For earlier models without the peg and slot arrangement in the cam unit and exhaust camshaft, the following procedure should be adopted to set the cam unit in its correct relative position in the camshaft:—

First set the base plate so that the pillar bolts are in the centres of their respective slots, then tighten the pillar bolts. Select 4th (top) gear and remove the left and right sparking plugs and all four rocker caps, then turn the engine over until the RIGHT piston is approximately $\frac{1}{32}$ in. (·9 mm) before top centre on its compression stroke (both valves closed). Turn the contact breaker cam unit until the REAR set of contact breaker points are just about to open and tighten the centre bolt. Note that the cam should be turned clockwise viewed from the right side of the machine.

Note:—

Setting the ignition timing to the correct figure for the model, is fully described in Sections B30, B31 and B32. When the correct setting is achieved, ensure that the contact breaker bolts are tight, then fit the cover and gasket.

SECTION B26

REMOVING AND REPLACING THE TIMING COVER

Remove the contact breaker as described in Section B25.

Unscrew the eight recessed screws which serve to retain the timing cover and if necessary tap the cover on the front blanking plug with a hide mallet until the cover is free. When the cover is removed, the crankshaft and contact breaker oil seals should be inspected for wear and cracks and renewed if necessary. To remove the crankshaft oil seal, the retainer circlip must first be removed by means of long-nosed pliers or a narrow screwdriver.

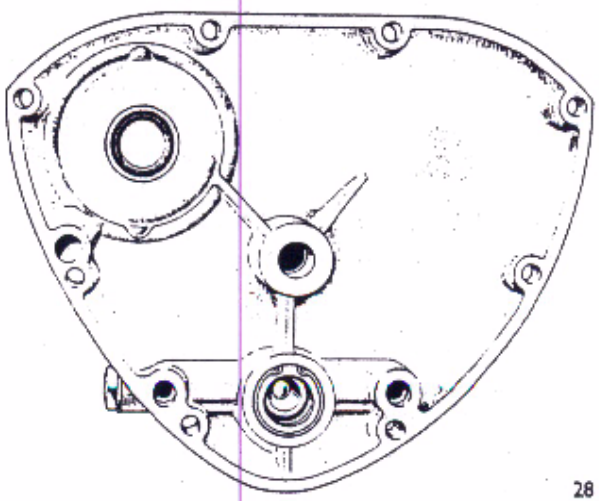

Fig. B22. Timing cover oil seal location

Unscrew the hexagonal plug from the front edge of the cover and thoroughly clean all parts in paraffin (kerosene). Clean out the oil drillings with a jet of compressed air and replace the plug and copper washer.

To replace the cover, first check that the oil seals are facing in the correct direction (see Fig. B22) and that the circlip is located correctly in its groove, then carefully clean the junction surfaces of the timing cover and crankcase and remove any traces of used jointing compound. Apply a fresh coat of a suitable proprietary jointing compound evenly over the timing cover junction surface. Screw the tapered adaptor pilot (service tool D486) into the exhaust camshaft and smear it with oil to assist assembly. Check that both the location dowels are in their correct positions, slide the cover into position and screw in the eight recessed screws.

Finally, replace the contact breaker assembly and reset the ignition timing as shown in Sections B30, B31 and B32.

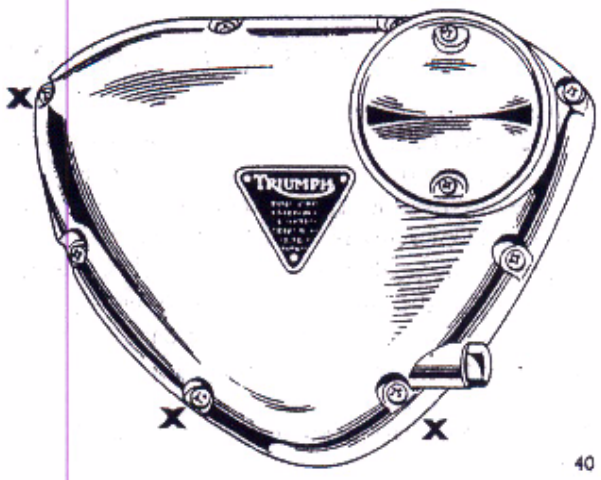

Fig. B23. Location of three long screws in timing cover

NOTE: The three longer screws should be fitted in the holes marked "X" in Fig. B23.

SECTION B27

REMOVING AND REPLACING THE OIL PUMP

To remove the oil pump, first remove the contact breaker mechanism, and the timing cover as described in Sections B25 and B26.

The oil pump is held in position by two conical nuts. When these are removed, the oil pump can be withdrawn from the mounting studs. The paper gasket should be renewed.

Full details concerning inspection, testing and rectification of the oil pump are given in Section A7.

When replacing the oil pump, care should be taken to ensure that the new gasket is fitted correctly and that the cones of the conical nuts and washers fit into the counter-sunk holes in the oil pump body.

SECTION B28

EXTRACTING AND REFITTING THE VALVE TIMING PINIONS

Before attempting to remove any of the valve timing gears it is necessary to release the load on the camshafts caused by compressed valve springs. This should be done by removing the rocker boxes as detailed in Section B2, or may be achieved by sufficiently slackening the valve clearance adjuster screws; however, this is not always advisable as it may result in a push rod becoming disengaged.

Remove the contact breaker as detailed in Section B25.

Remove the timing cover as described in Section B26 and the oil pump as shown in Section B27. Select 4th (top) gear, apply the rear brake and unscrew the nuts retaining the camshaft and crankshaft pinions, then withdraw the intermediate wheel.

NOTE: The camshaft pinion retainer nuts have LEFT-HAND threads. The crankshaft pinion retainer nut has a RIGHT-HAND thread.

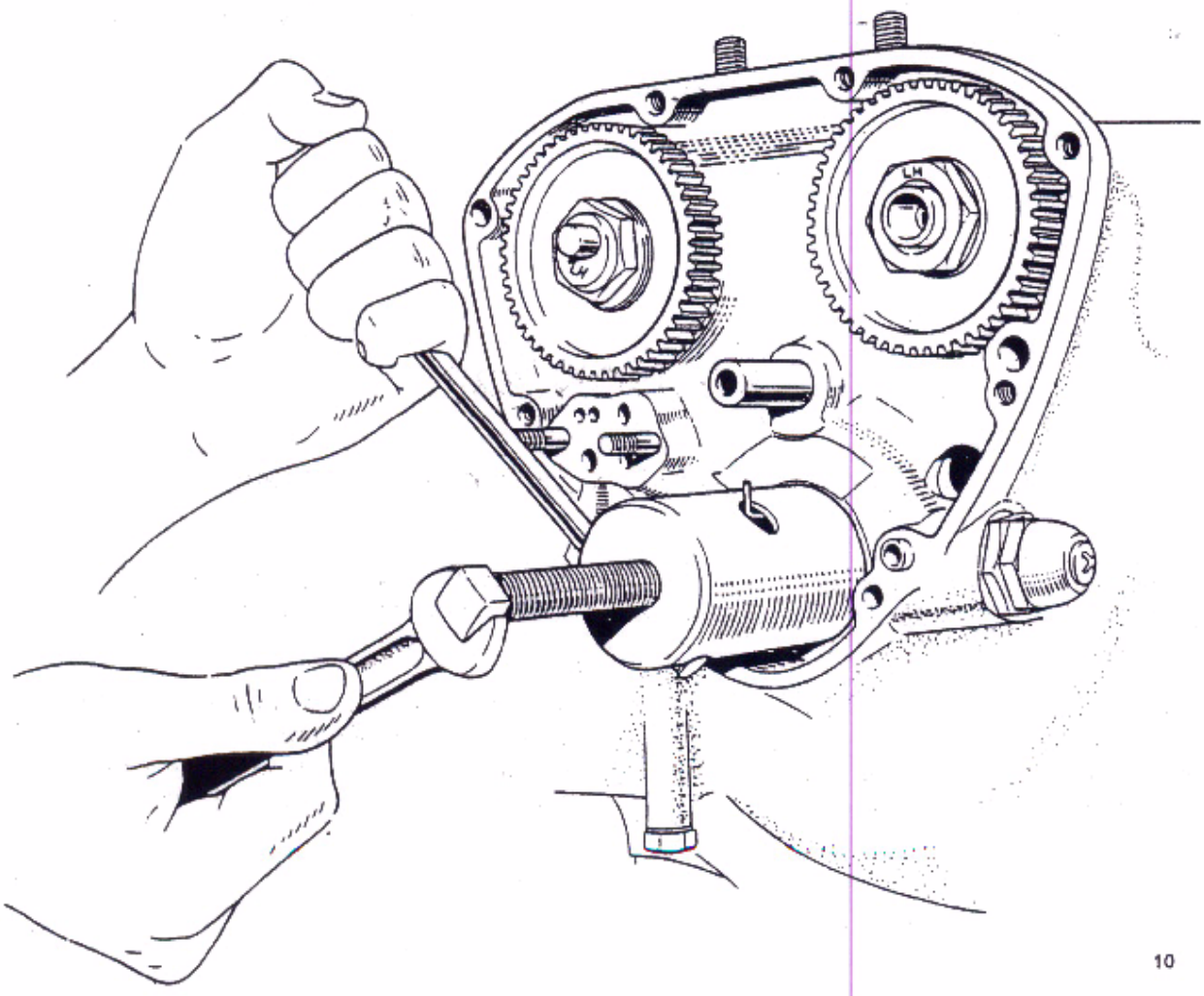

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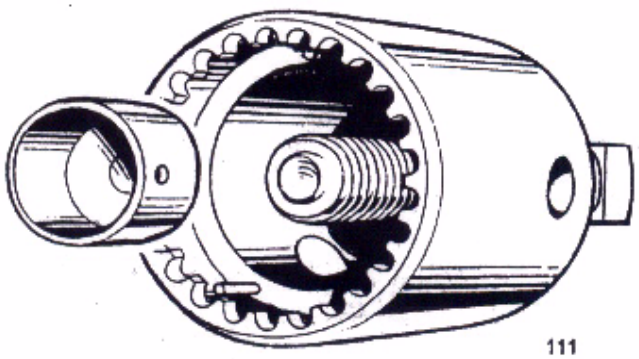
Fig. B24. Extracting the crankshaft pinion

CRANKSHAFT PINION

Removal of the crankshaft pinion is facilitated by service tool Z121, which consists of a protective cap and extractor body, complete with extractor bolt. This tool, which has been in use for several years, has been modified to cater for the later models, which are fitted with a wider crankshaft pinion, by increasing the counter-bore depth from $\frac{1}{2}$ in. to $\frac{3}{4}$ in.

To extract the pinion, first press the protection cap over the end of the crankshaft, then place the extractor over the pinion and turn it slightly until the location pin can be pressed into position. Using a tommy bar and spanner the crankshaft pinion can then be extracted (see Fig. B24). When this is achieved, the key and (clamping washer if fitted) should be removed and placed in safe-keeping.



111

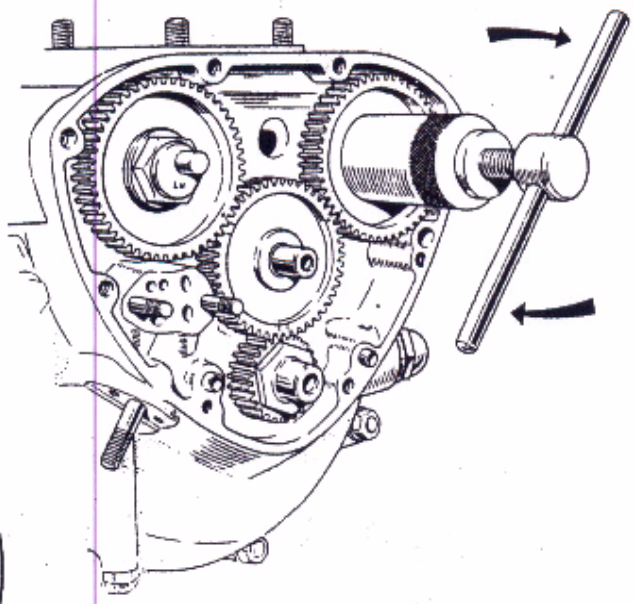
Fig. B25. Extractor tool Z121 showing protection cap which fits over crankshaft

Refitting the crankshaft pinion is aided by service tool Z79 which consists of a tubular drift and a guide, to ensure correct alignment.

When replacing the clamping washer (if fitted) ensure that the chamfered side is towards the crankshaft shoulder. Screw the guide onto the crankshaft. Smear the bore of the crankshaft pinion with grease to assist assembly and position it over the guide, so that the counter bore is outwards. Align the key and keyway and drive the pinion onto the crankshaft.

CAMSHAFT PINIONS

To facilitate extraction and replacement of camshaft pinions extractor adaptor Z145 and replacer adaptor Z144 should be used in conjunction with existing service tool Z89.



02

Fig. B26. Extracting camshaft pinion using Z89

To extract the pinion, first screw on the extractor body, then screw in the extractor bolt; the pinion will then be withdrawn from the camshaft (see Fig. B26).

In the case of the exhaust camshaft, extractor adaptor Z145 should be positioned in the end of the camshaft to avoid damage to the contact breaker location taper. A smear of grease applied to the adaptor should hold it in position. The location keys in each of the camshafts are a tight fit, and may be left in position if it is not intended subsequently to remove the camshafts from the crankcase.

When replacing the pinions, first check that the keys are located correctly, then screw the replacer adaptor Z144 into the assembler bolt and onto the camshaft.

The camshaft pinion should be lubricated to assist assembly, and the extractor body screwed onto it (remember that it is a left-hand thread). When this is done, slide the pinion and body over the replacer bolt, align the key and correct keyway and screw on the replacer nut and washer.

REFITTING THE INTERMEDIATE WHEEL

Turn the camshafts and crankshaft timing until the marks are towards the intermediate wheel spindle, then offer the wheel to the spindle with the timing marks aligned as shown in Fig. B28, for the particular model. Fourth gear should then be selected and the rear brake applied, so that the camshaft and crankshaft pinion retainer nuts can be tightened to the correct torque (see General Data). Reassembly then continues as a reversal of the above instructions.

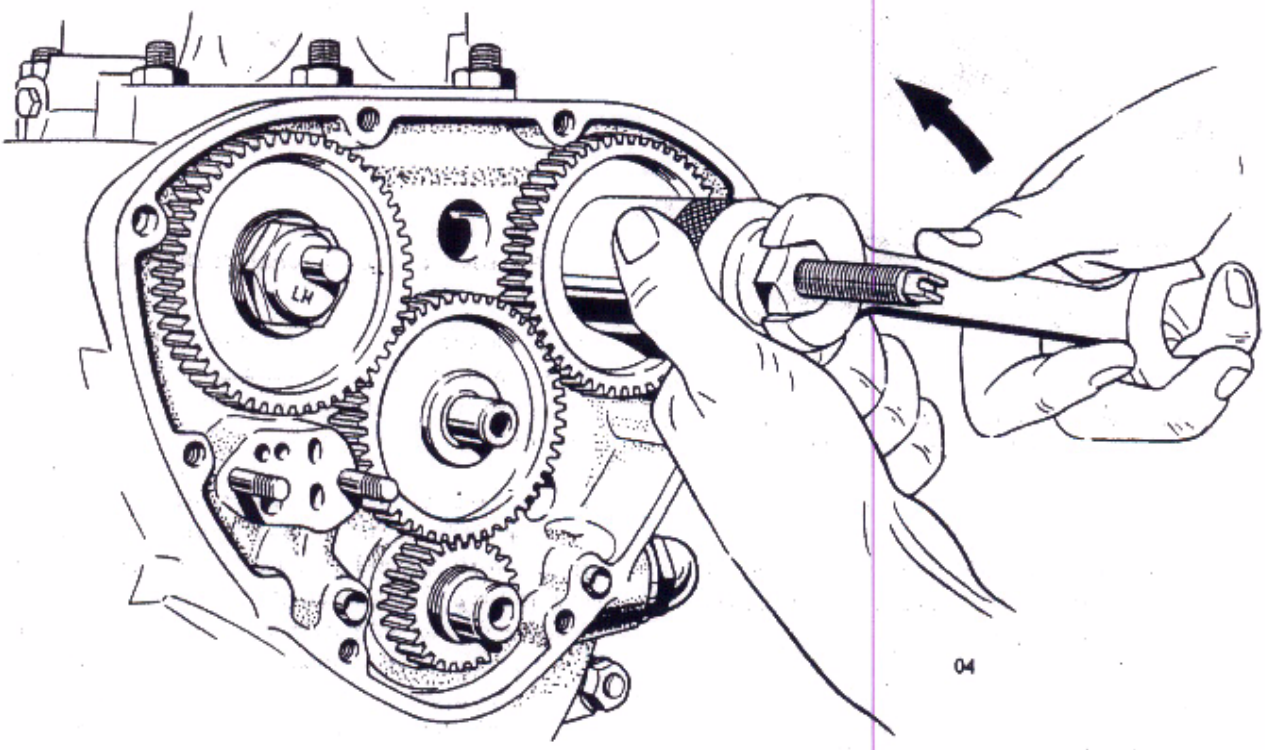
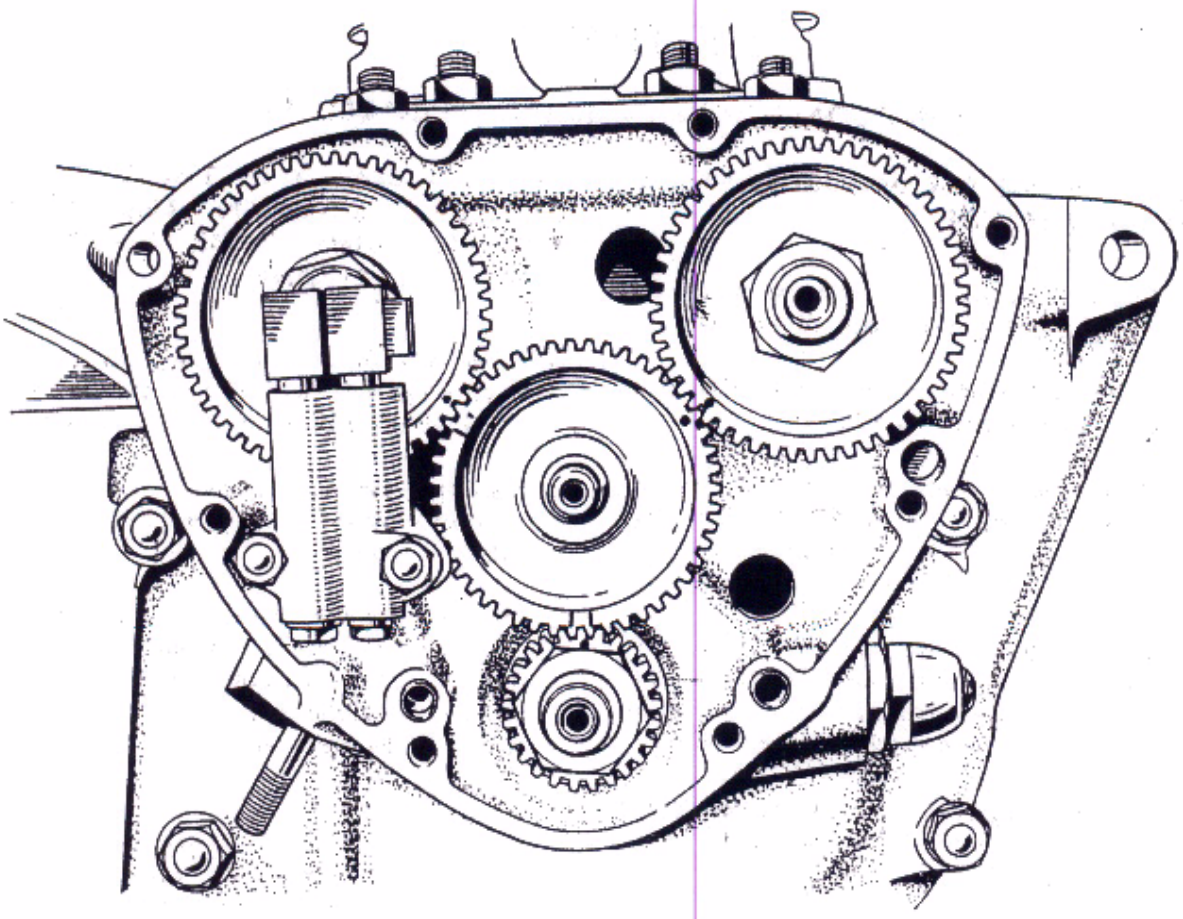


Fig. B27. Refitting the camshaft pinions



03

Fig. B28. Intermediate wheel location

(1) Exhaust camshaft pinion dot aligned with dot on intermediate wheel.

(2) Crankshaft pinion dot aligned with twin dashes on intermediate wheel.

(3) Inlet crankshaft pinion. Dot aligned with:—(a) Short dash for 6T.

(b) Long dash for TR6 and T120.

SECTION B29

VALVE TIMING

The valve timing is sufficiently accurate for machines which are to be used under normal conditions, when the intermediate wheel is assembled in the position shown in Fig. B28, and the camshaft pinions are located by means of the keyway directly opposite the timing mark.

If a machine is to be used in sporting events, where maximum performance is required, the valve timing should be dealt with as detailed in the special "Tuning" Bulletin which is available from the works on request.

It should be noted that, due to the intermediate wheel having a prime number of teeth, the timing marks only coincide every 94th revolution, thus there is no cause for alarm if the timing marks will not readily re-align.

When checking the valve timing against the figures given in "General Data" for the particular model, it should be noted that these figures are relative to a valve rocker clearance of ·020 in. (·5 mm.) for checking only.

B29

SECTION B30

IGNITION TIMING — INITIAL PROCEDURE

TO ESTABLISH THE ACCURATE STATIC IGNITION SETTING

(1) Check the General Data Section for the correct fully advanced ignition setting for the machine.

(2) Check the auto advance range stamped on rear of auto advance cam mechanism.

(3) Double the auto advance range and subtract the figure from the FULL ADVANCE setting for the machine. This is the correct STATIC SETTING for the engine.

(4) Use this figure for setting the position of the C.B. points opening, when assembling the contact breaker mechanism, using a degree plate or timing disc attached to the engine.

(5) Convert this figure in degrees to the equivalent piston movement B.T.C. if a timing stick is to be employed.

CONVERSION CHART—ENGINE DEGREES TO RELATIVE PISTON POSITION

Crankshaft position (B.T.D.C.)	*Piston position (B.T.D.C.)*	
Degrees	in.	mm.
7	·015	·38
8	·020	·51
9	·025	·64
10	·030	·76
11	·038	·96
12	·045	1·14
13	·054	1·30
14	·060	1·52
15	·068	1·73
16	·077	1·96
17	·087	2·20
18	·095	2·42
19	·108	2·75
20	·120	3·05
21	·135	3·45

INITIAL ASSEMBLY OF THE CONTACT BREAKER MECHANISM AND AUTO ADVANCE UNIT PRIOR TO FINAL TIMING THE ENGINE

(1) Remove both sparking plugs and all four rocker box caps. Set the engine at T.D.C. with both valves closed in the right hand cylinder.

(2) Assemble the auto advance unit into the exhaust camshaft, locating on the camshaft peg where it is fitted.

(3) Assemble the C.B. plate, taking care not to trap the C.B. leads, assembling the plate so that the C.B. points connected to the black/yellow leads are located at 7 o'clock. Loosely assemble the hexagon pillar bolts and flat washers.

On machines where an engine camshaft peg is not fitted, rotate the auto advance mechanism until a position is reached where the rear set of C.B. points will just commence to open.

(4) Lock the auto advance cam into the taper, using the central fixing bolt.

NOTE: When using the timing disc or degree plate:

If the degree disc is to be attached to the exhaust camshaft, the indicated setting and advance range will be half that of the engine, as the camshaft rotates at half engine speed.

EXAMPLE OF STATIC SETTING CALCULATION

T120 IGNITION TIMING = 39° B.T.C. Fully advanced.

C.B. range stamped on auto advance cam = 12°.

Twice 12° = 24°

Full advance 39° — 24° = 15° B.T.C. "STATIC SETTING".

SECTION B31

STATIC IGNITION TIMING

(1) Rotate the engine so that the fibre heel of the C.B. points have just passed beyond the ramp of the auto advance cam, and just reached the full open position. Set the point gap 0·015 in.

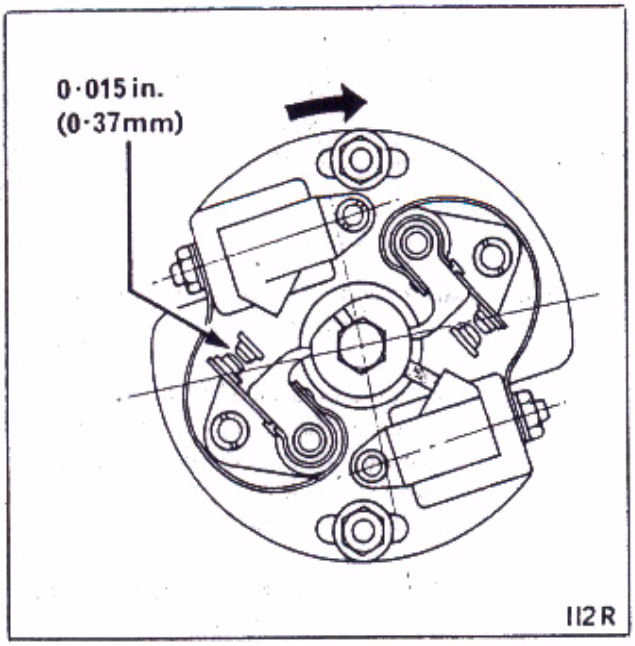


Fig. B29(a). Setting the contact breaker point gap for the right cylinder (black/yellow) lead, illustrating position of the cam where points are just fully open

(2) Rotate the engine "forwards" through 360° and set the second set of points in the corresponding position on the cam. Set these points at a gap of 0·015 in.

(3) Rotate engine and establish accurate T.D.C. This can be done using a short rod inserted through the spark plug hole and sighting along the line of the top of the cylinder head fins.

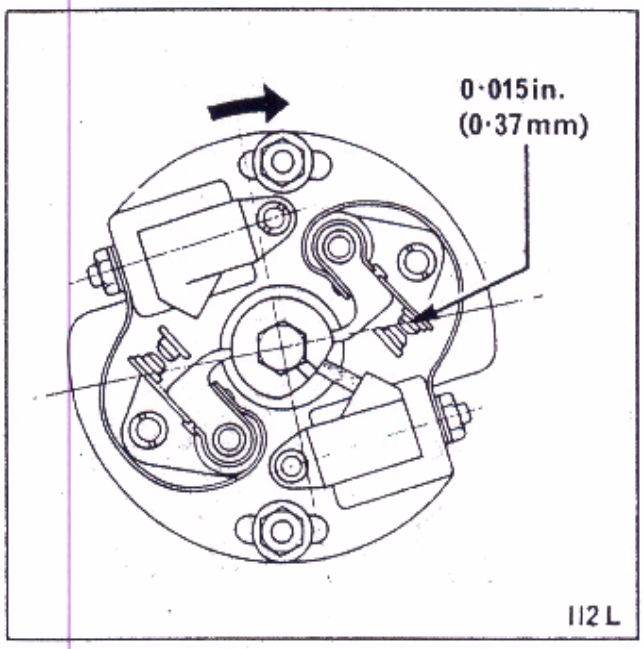


Fig. B29(b). Setting contact breaker point gap for the left cylinder (black/white) lead, illustrating the second position of the cam, where the points have just achieved the fully open position

If the machine is put in top gear, small increments in crank rotation and piston movement can be achieved by rotating the rear wheel slowly, and accurate piston T.D.C. established by "swinging" the engine either side of T.D.C. Mark the timing stick at T.D.C. Mark a second position on the timing stick ABOVE the T.D.C. mark appropriate to the specified timing for the machine, i.e. "piston movement before T.D.C.". (See Section B30, STATIC SETTING).

(4) Rotate the engine "backwards" beyond this mark and then slowly reverse the rotation "forwards" until the timing mark is set in line with the top of the cylinder head fins.

(5) Rotate the C.B. back plate on its slots until a position is reached where the points just open (check using a battery and light, or an 0·0015 in. feeler gauge. Alternatively, if a battery is fitted to the machine and the ignition switch turned to "IGN", the position where the points open can be identified by the ammeter needle giving a "flick" back to zero).

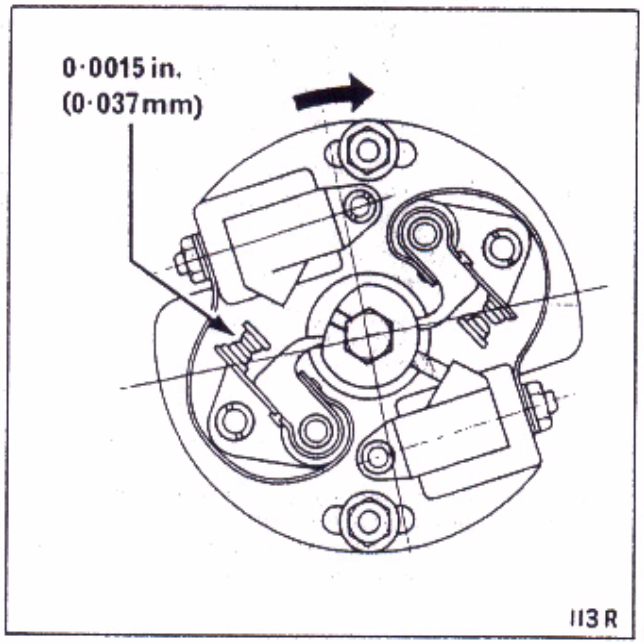


Fig. B30(a). Contact breaker points just opening on the right cylinder. With the engine set at the correct STATIC SETTING, the C.B. back plate assembly should be adjusted in the slots, to a position where the C.B. points just commence to open.

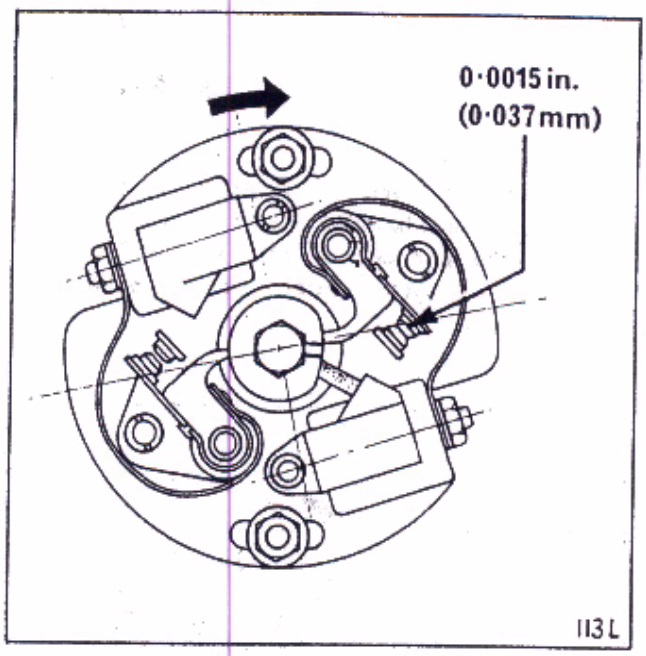


Fig. 30(b). Contact breaker points just opening on the left cylinder

Rotate the engine through 360° and repeat (4) above. The other set of C.B. points should just have opened. If not, the accuracy of spark on the second set of C.B. points can be corrected by adjusting the points gap.

NOTE: To advance the spark, open the points, approximately 0·001 in. for each engine degree required, and to retard, close the points setting similarly. Minor adjustments to left cylinder C.B. points setting to ensure accurate ignition timing are permissible.

SECTION B32

IGNITION TIMING USING A STROBOSCOPIC LIGHT

(1) Fit the Timing Disc adaptor shaft and Timing Disc, either to the engine mainshaft, or into the camshaft auto advance unit, and set the pointer, fixed to a convenient bolt on the engine, to read T.D.C.

(2) Engage top gear, and use a timing stick with a suitable mark which aligns along the top of the cylinder head fins at about 1 in. of piston movement. (For greater accuracy, use a Dial Test Indicator through the spark plug hole).

Rotate the engine either side of T.D.C. by rocking the rear wheel, to exactly the same measured point of movement on the stick (or D.T.I.), setting the pointer so that it reads an equal number of degrees either side of T.D.C. on the degree disc.

THE ENGINE IS NOW READY TO BE TIMED ACCURATELY.

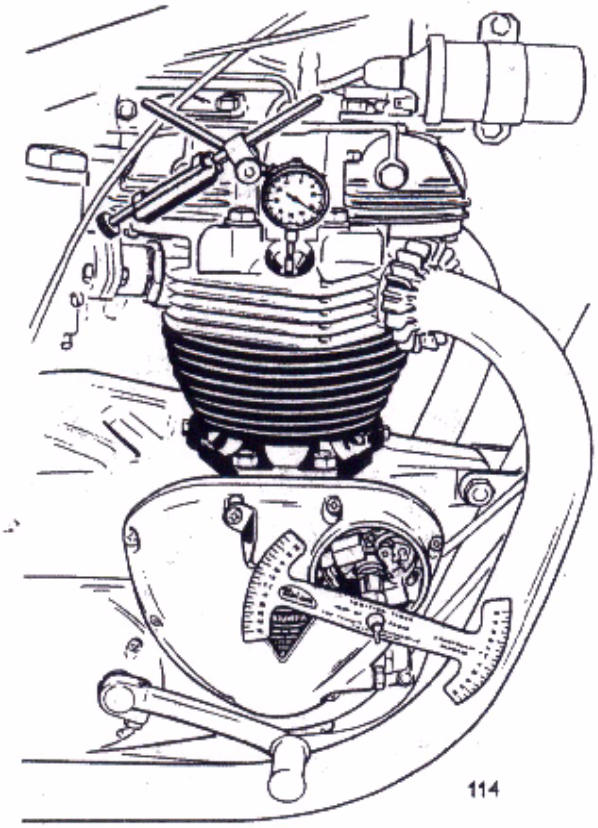


Fig. B31. Engine fitted with timing disc and dial indicator

NOTE: When using a stroboscope powered by 6 or 12 volt batteries as an external power source, do not use the machine's own battery equipment. (A.C. pulses in the low tension machine wiring, can trigger the stroboscope, and give false readings).

(3) Connect the stroboscope to the right hand spark plug lead and start the engine. Read the strobo-light on the disc, revving the engine up until the auto advance range is fully achieved. Check against the correct specification and adjust the C.B. back plate on its slots until the correct advanced timing is accurately set.

(4) Repeat (3) above for L.H. plug and adjust the accuracy of the spark on the C.B. points adjustment.

NOTE: To advance the spark, open the points, approximately 0·001 in. for each engine degree required, and to retard, close the points setting similarly.

Minor adjustments to the left cylinder C.B. points gap setting, to ensure accurate ignition timing are permissible.

(5) Check back on the stroboscopic reading and slow tickover for range of advance on both cylinders, for efficient action of the auto advance unit, remembering the most important final setting is at fully advanced, both cylinders.

Timing the engine stroboscopically with a timing disc ensures that both plugs are firing at exactly similar angular crank rotation (i.e. piston movement), at fully advanced ignition, that is at full power, thereby ensuring the smoothest, most vibration free engine running condition and ensuring maximum engine power output.

It also eliminates variations encountered in differing auto advance ranges due to possible non-standard components, uneven wear, etc., etc.

SECTION B33

DISMANTLING AND REASSEMBLING THE CRANKCASE ASSEMBLY

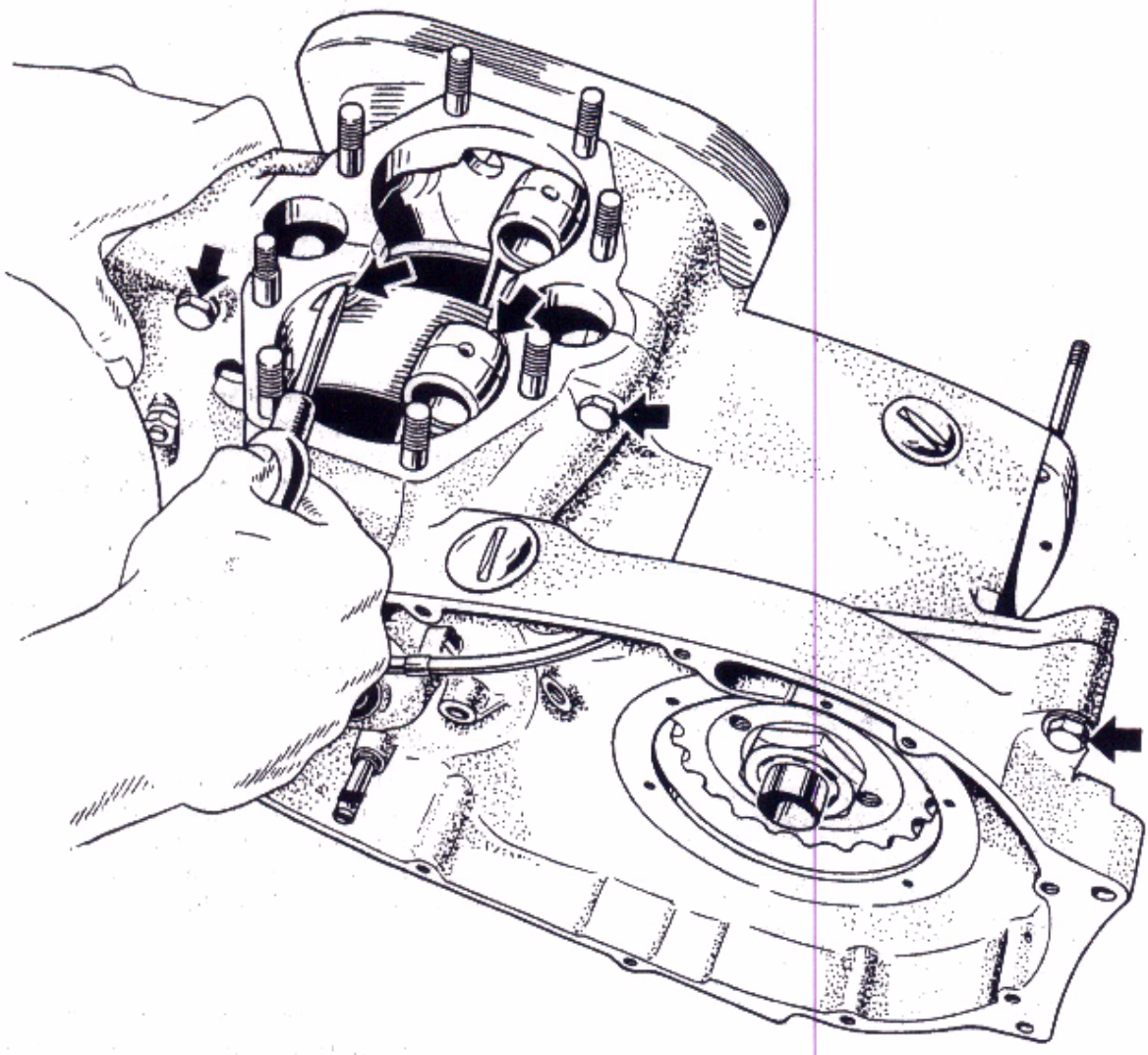


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Fig. B32. Removing the crankcase junction screws

It is advisable to partially dismantle the engine unit whilst it is fixed to the motorcycle, then remove the remaining crankcase assembly and dismantle it on a work bench.

Proceed as described in Section B1 for removal of the engine unit, but leave the rear chain connected and the engine firmly mounted in the frame by means of the front and bottom engine mounting bolts. Remove the outer primary cover as shown in Section C3 then disconnect the generator leads underneath the engine (three snap connectors).

Unscrew three nuts securing the stator and withdraw it from over the mounting studs. Do not try to withdraw the leads at this stage.

Remove the pressure plate and clutch plates as detailed in Section C4. Select 4th gear and apply the rear brake, then unscrew the clutch hub securing nut and extract the clutch hub as shown in Section C9. When the primary chain has been threaded over the stator the sleeve nut should be unscrewed and the stator leads withdrawn.

Remove the gearbox outer cover and dismantle the gearbox (see Section D) then remove the rocker boxes, cylinder head, block and pistons as shown in Sections B2, B12, B17 and B20 respectively, then disconnect the control cable(s) and remove the carburetter(s).

Remove the contact breaker, timing cover and oil pump (Sections B25, B26 and B27) then extract the crankshaft pinion. If it is required to inspect or change the camshafts or bushes, the camshaft pinions should also be extracted.

Remove the front and bottom engine mounting studs, disconnect the rear chain and remove the crankcase assembly.

Grip the crankcase firmly in a vice by means of the bottom mounting lug and unscrew the three bolts and the two screws shown in Fig. B32, then remove the remaining four studs and unscrew two nuts adjacent to the gearbox housing. The crankcase-halves may now be parted using extractor tool No. Z151. When the halves are apart, withdraw the crankshaft assembly and store it carefully, then remove the rotary breather valve from within the inlet camshaft bush in the left half-crankcase.

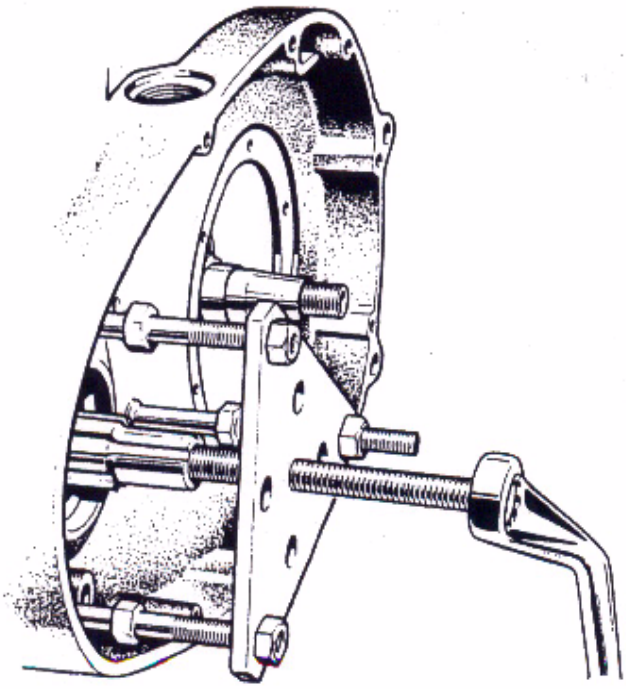

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Fig. B33. Parting the crankcase halves

REASSEMBLY

Prior to reassembly, the junction surfaces should be carefully scraped clean, giving special attention to the location spigot and dowels.

Mount the left half-crankcase on its side on two wooden blocks, or a bench with a hole in for crankshaft clearance, lubricate the main bearings and camshaft bushes. Place the rotary breather valve and spring into the camshaft bush, then assemble both camshafts ensuring that the slot in the end of the inlet camshaft engages the projection of the breather disc valve. Assemble the crankshaft into position ensuring that it is right home in the bearing by giving it a sharp blow with a hide mallet.

Apply a fresh coat of jointing compound to the junction surface of the left half-crankcase then lubricate the main bearings and camshaft bushes in both halves of the crankcase. Position the con-rods centrally and lower the right half-crankcase into position over the crankshaft. When the halves are mated, check the crankshaft and camshafts for freedom of rotation. The crankshaft should revolve freely whilst the camshafts should offer little or no resistance to rotation by hand.

Refit the crankcase securing bolts and studs, and tighten them until they are just "pinched-up". Check that the cylinder block junction surface of the crankcase is level.

If there is a slight step between the two halves, this should be corrected by tapping the front and rear of the crankcases as required, until a level surface is achieved. The crankcase securing bolts should then be tightened, a turn at a time, to the torque figures given in "General Data". The bolts arrowed in Fig. B32 should be tightened first, then the two inner screws, and so on.

Reassembly then continues as a reversal of the dismantling instructions. Prior to refitting the cylinder block, pour $\frac{1}{6}$ pint of oil into the crankcase.

SECTION B34

STRIPPING AND REASSEMBLING THE CRANKSHAFT ASSEMBLY

Grip the crankshaft conveniently in a suitable vice and place rag over any sharp edges to avoid the connecting rods becoming damaged. Mark the connecting rods, caps and crankshaft so that they can be replaced in their original positions.

NOTE: The connecting rod, cap and nut are centre punched on initial assembly so that the cap may be refitted correctly relative to the connecting rod.

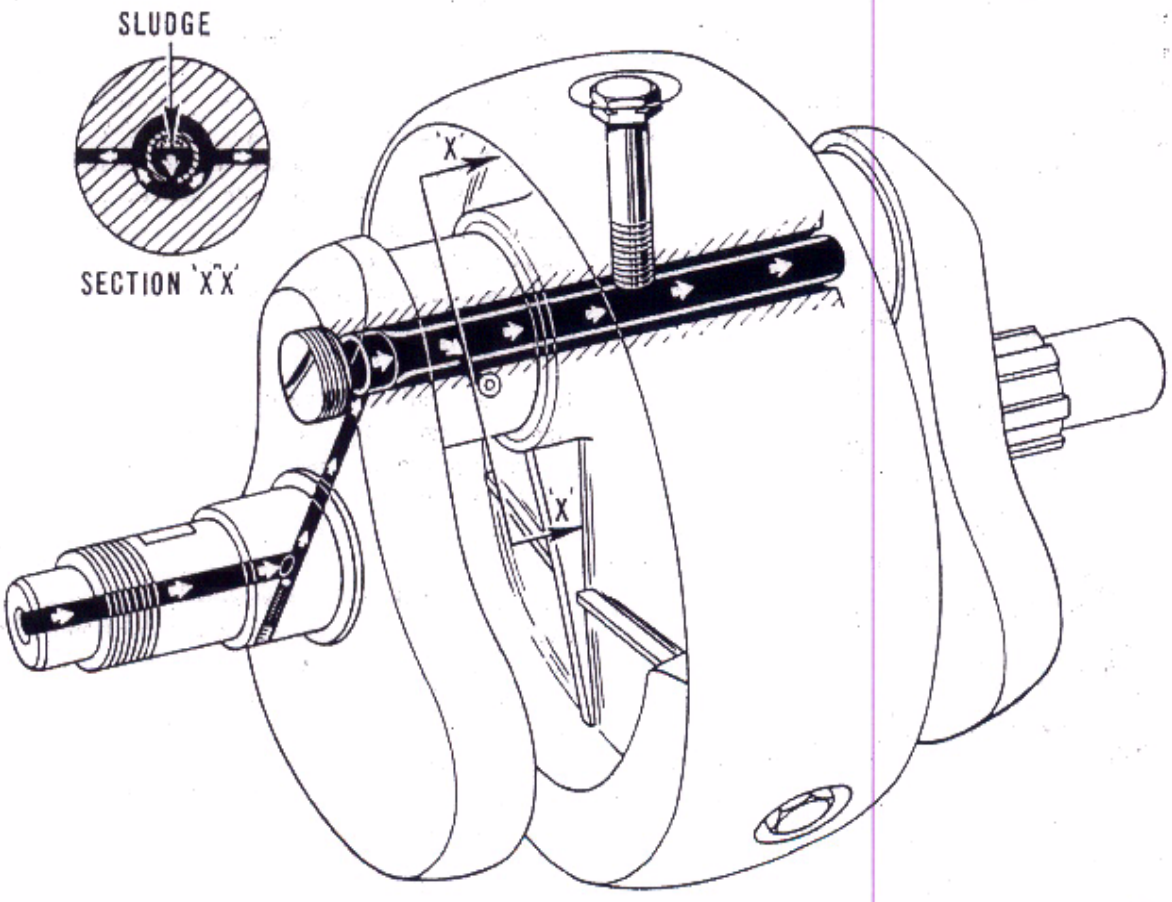

Fig. B34. Sectional view of crankshaft—showing oil tube

Unscrew the cap retainer nuts, a turn at a time to avoid distortion, then remove the caps and connecting rods. Refit the nuts to their respective bolts to ensure correct reassembly.

Using a large impact screwdriver, unscrew the oil tube retainer plug from the right end of the big-end journal. If difficulty is encountered, drill a $\frac{1}{4}$ in. dia. hole to $\frac{1}{8}$ in. depth in the crankshaft, to remove the centre punched indentation which locks the oil tube retainer plug in position.

Unscrew the flywheel bolt adjacent to the big-end journal, then withdraw the oil tube using a hooked rod located in the flywheel bolt location hole (see Fig. B34).

Thoroughly clean all parts in paraffin (kerosene) then clean the oil drillings using a jet of compressed air. Particular attention should be given to checking that each oil drilling is free from blockage.

To remove the flywheel, unscrew the remaining two bolts and press out the crankshaft, using a press which can give a load of up to 5 tons. (Ensure that there is a centre punch mark on the RIGHT side of the flywheel before removing; this enables the flywheel to be replaced in its original position).

Replacing the flywheel is best done when the oil tube is correctly located in position. Offer the oil tube into the crankshaft with the flywheel bolt holes in the tube and crankshaft aligned. Insert a flywheel bolt temporarily to locate the oil tube in position.

Tightly screw in the plug and centre punch the crankshaft opposite the slot so that the plug is locked in position.

To re-assemble the flywheel it should be heated to 100°C., then placed over the crankshaft (which should be cold) with the centre punch mark to the RIGHT. It will be necessary to turn the flywheel through 180° to get it over the crankshaft web. Turn it to its correct position relative to the crankshaft as soon as this is achieved, and align the bolt holes.

The flywheel bolts should be tightened to the torque figure given in "General Data" using a small amount of proprietary sealant such as "TRIUMPH LOCTITE" to obviate any possibility of the bolts working loose.

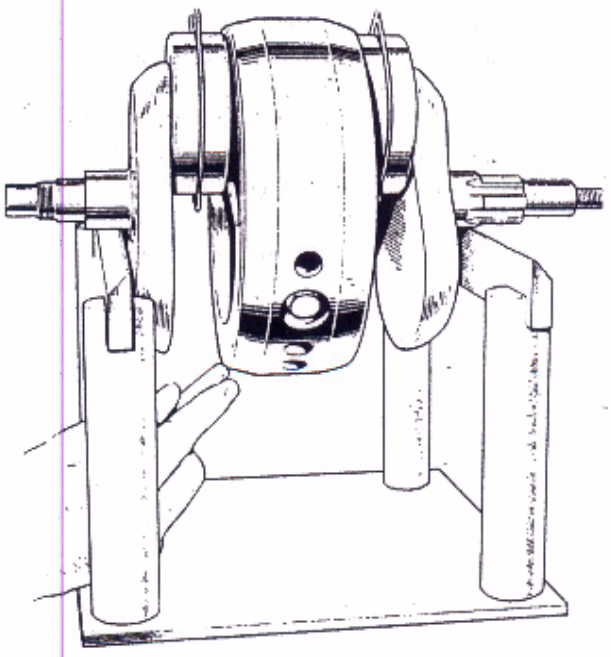

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Fig. B35. Balancing the crankshaft

If a new or re-ground crankshaft or a new flywheel has been fitted, the assembly should be re-balanced, using two service balance weights Z138 (689 gms. each). Place the assembly on true horizontal knife edges, resting it on the left and right main bearing diameters. Allow the assembly to come to rest, then mark the lowest point of the flywheel with chalk. Turn the assembly through 90° and if it returns to the same position drill a $\frac{3}{8}$ in. dia. hole centrally, adjacent to the chalk mark, to a depth of approximately $\frac{1}{2}$ in.

Repeat the balancing procedure again making a chalk mark as necessary, and drill further holes until the assembly will come to rest in any position when placed on the knife edges. The drilled holes should have a distance of approximately $\frac{3}{4}$ in. between centres.

Finally, thoroughly wash the assembly in paraffin (kerosene) and check that the oil-ways are free from blockage.

SECTION B35

REFITTING THE CONNECTING RODS

First, ensure that the connecting rod and cap and both the front and rear of the bearing shells are scrupulously clean, then offer the shells to the rod and cap and locate the shell tabs into their respective slots. Smear the bearing surfaces with oil and refit the rod and cap to their original journals, ensuring that the centre punch marks are aligned and that the tab location slots are adjacent (see Fig. B36).

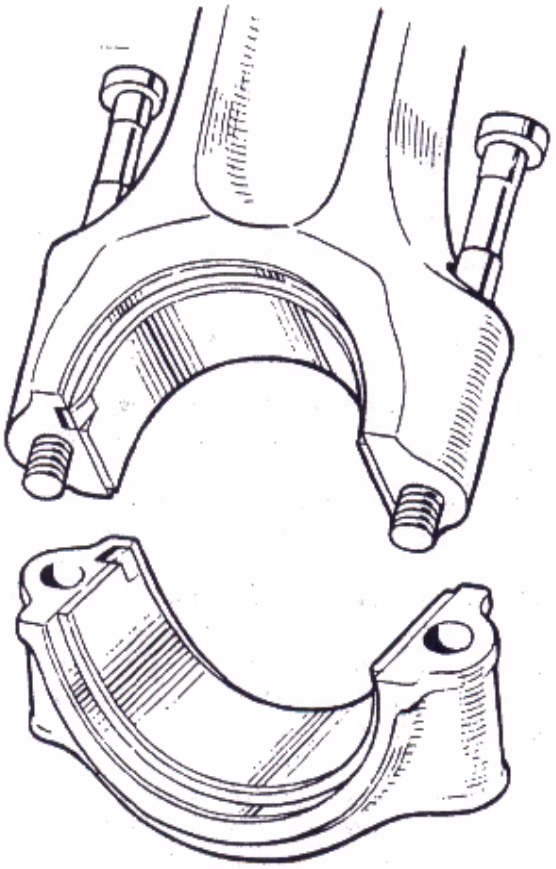

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Fig. B36. Refitting the connecting rods

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

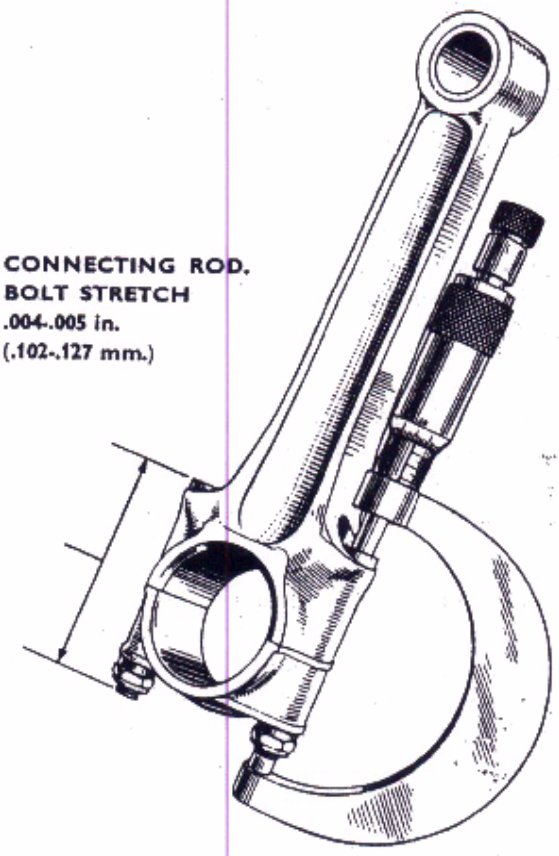

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Fig. B37. Refitting the connecting rods

Refit the bolts and screw on the nuts, a turn at a time, until the centre punch marks on the rod and nut coincide. If new bolts or nuts are fitted then tighten them to the given torque figure, or, preferably, the bolt extension figure given in Fig. B37.

Finally, force oil through the drilling at the right end of the crankshaft with a pressure oil can until it is expelled from both big-end bearings, thus indicating that the oil passages are free from blockage and full of oil.

SECTION B36

INSPECTING THE CRANKCASE COMPONENTS

In preparation for inspection, thoroughly clean the crankcase-halves, main bearings, crankshaft and connecting rods, etc., in paraffin (kerosene) 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 BEARINGS

The extent of wear to the big-end journals can be determined by inspecting the bearing surfaces for scoring and by measuring the diameter of the journals. 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 slightly scored the big-end shell bearings should be renewed. If the scoring and wear is extensive the big-end journals should be reground to a suitable size as given below.

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

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

Service reground crankshafts are obtainable from a TRIUMPH dealer or from the TRIUMPH ENGINEERING CO. LTD., SERVICE DEPARTMENT.

(2) MAIN BEARINGS

Clean the bearings thoroughly in paraffin (kerosene), then dry them with a jet of compressed air. Test the bearing for roughness by spinning. Check the centre race for side-play and inspect the balls and tracks for any signs of indentation and pocketing. Examine the main bearing diameters on the crankshaft for wear. The bearings should be a tight push fit on the crankshaft and a press fit in the crankcase. A loose fitting bearing would tend to cause crankcase "rumble". The correct diameters of the main bearing journals are given in "General Data".

(3) CAMSHAFTS AND BUSHES

The camshaft bushes normally show very little sign of wear until a considerable mileage has been covered. A rough check on the wear can be made by inserting the camshaft into the bearing and feeling the up and down movement. An exact check can be made by measuring the camshaft with a micrometer and measuring the camshaft bushes with calipers. The working clearance figures are given in "General Data". Wear on the cam form will be mainly centred on the opening flank of the cam and on the lobe of the cam. Particular attention should be given to these areas when examining the cam form for grooving. In a case where there is severe grooving the camhsaft and tappet followers should be renewed.

A method of estimating the extent of wear on the cam form is that of measuring the over-all height of the cam and the base-circle diameter. The difference is the cam lift. If all other aspects of the camshaft are satisfactory and the wear on the cam form does not exceed 0·010 in., then the camshaft may be used for further service.

SECTION B37

RENEWING THE MAIN BEARINGS

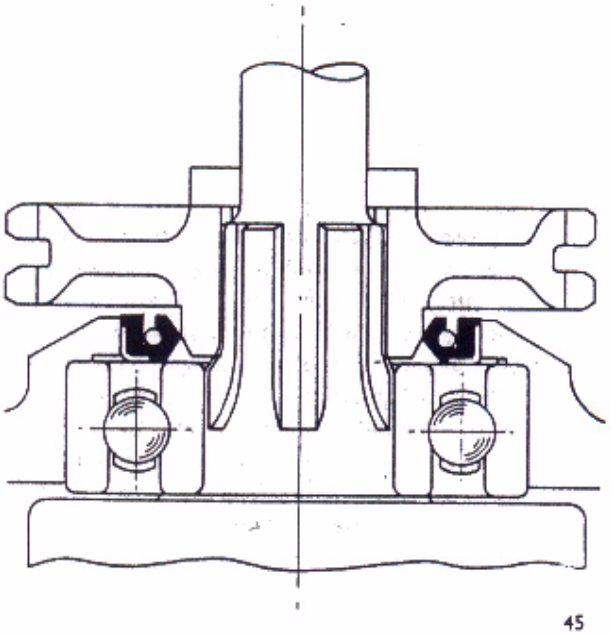

Fig. B38. Oil seal—left half-crankcase

To remove either bearing, heat the crankcase to approximately 100°C and drive the bearing inwards using service tool Z14. Alternatively, a suitable drift can be made from a piece of 1¼ in. diameter mild steel bar, about 6 in. long by turning it to 1⅛ in. diameter for ½ in. at one end.

The oil seal can be removed from the left half-crankcase by driving it outwards, in the opposite direction to the bearing after the bearing is removed. It is advisable to renew the oil seal, even if it does not appear badly worn.

To assemble the new bearing, first ensure that the main bearing housing is clean, then heat the crankcase to approximately 100°C. and drive in the bearing using a tubular drift onto the outer race. Ensure that the bearing enters its housing squarely. If possible, use a press. Suitable dimensions for the drift are 2¾ in. outside diameter x 6 in. long.

When the bearings are in position, press the oil seal into place in the left half-crankcase (see Fig. B38).

SECTION B38

RENEWING CAMSHAFT BUSHES

To remove the camshaft bushes in the RIGHT half-crankcase heat the crankcase to 100°C. and drive the bush out from the outside, using a suitable drift. While the crankcase is still hot, drive in the new bush, ensuring that the oil feed hole in the bush and the crankcase drilling are aligned. A suitable drift for this purpose can be made from a 6 in. long piece of M.S. bar of 1⅛ in. diameter, by machining a pilot on one end ⅞ in. diameter x 1 in. long.

To remove the camshaft bush from the LEFT half-crankcase, a tap is necessary. An ideal size is ⅞ in. diameter x 9 Whit. When a good thread has been cut in the old bush, heat the crankcase (100°C.) and screw in a suitable bolt. Grip the bolt in a vice and drive the crankcase with a hide mallet until the bush is removed. Do not attempt to lever the bush out of position with the bolt, or the case may be damaged. If the tap is used in place of the bolt, care must be taken not to give too hard a knock to the crankcase or the brittle tap may break.

Retained behind the inlet camshaft bush is the breather valve porting disc, which is located by means of a peg. When renewing the bush ensure that the disc is located correctly on the peg.

The sintered bronze camshaft bushes are machined to size before pressing in, therefore only the smallest amount of metal will need to be removed when they are renewed. See "General Data" for reaming sizes and working clearances.

When reaming is completed, the crankcase must be thoroughly washed in paraffin (kerosene) and allowed to drain. Preferably, use a jet of compressed air to ensure that all swarf is removed.

SECTION B39

CRANKSHAFT LOCATION

Prior to engine number DU13375 the crankshaft was located from the right main bearing. Models subsequent to engine number DU13374 have the crankshaft located from the left main bearing. This involves a new engine sprocket, discarding the washer behind the timing pinion and a new crankshaft timing pinion. If it is wished to incorporate this feature in an engine prior to engine number DU13375 use the engine sprocket and timing pinion shown in the No. 3 Replacement Parts Catalogue. EITHER THE OLD ENGINE SPROCKET, WASHER AND PINION OR THE NEW SPROCKET AND PINION CAN BE USED BUT THEY MUST NOT BE MIXED.

SECTION B40

ESTABLISHING TOP DEAD CENTRE POSITION

When setting the ignition timing as described in Sections B30 and B31 the T.D.C. position can be quickly found using workshop tool D571/2. The blanking plug on top of the crankcase immediately behind the cylinder block is removed and the body of the tool is screwed into its place. Having removed both sparking plugs and engaged top gear, rotate the rear wheel forwards until the pistons are just coming up towards T.D.C. Then the plunger is inserted in the body of the tool and the rear wheel is rotated forwards slowly until the plunger locates itself in the centre flywheel. The T.D.C. position has now been established.

This modification applies to models from DU13375 onwards.

SECTION C6

ADJUSTING THE CLUTCH PRESSURE PLATE

When the pressure plate is refitted or requires adjustment, the following procedure should be observed. With neutral selected, sit astride the machine, disengage the clutch, then depress the kickstart-pedal and observe the rotation of the pressure plate; it should revolve true relative to the clutch housing. If it does not do so, the three slotted nuts must be initially adjusted so the ends of the clutch pins are flush with the heads of the nuts. The nut is prevented from unscrewing by a "pip" on the underside and to unscrew a nut, a narrow screwdriver should be used to hold the spring away from the "pip" of the nut as shown in Fig. C5.

When the nuts are flush with the end of the pins depress the kickstart again and mark the "high-spot" with chalk, then screw in the nearest nut(s) about half a turn and try again. Repeat this procedure until the plate rotates evenly without "wobbling".

SECTION C7

RENEWING SHOCK ABSORBER RUBBERS

When the primary cover and clutch plates are removed, access is gained to the shock absorber unit, which consists of a housing, paddle or spider, inner and outer cover plates and shock absorbing rubbers.

To remove the rubbers for inspection or renewal, first unscrew the three screws which serve to retain the shock absorber cover plate and lever the plate free, using a suitable small lever.

The shock absorber rubbers can be prised out of position, using a sharp pointed tool, commencing by levering out the smaller rebound rubbers first.

When the three small rebound rubbers are removed the large drive rubbers will be free to be withdrawn.

If the rubbers show no signs of punctures or cracking, etc., they can be refitted, but remember that a slight puncture in the rubber can ultimately result in the rubber disintegrating.

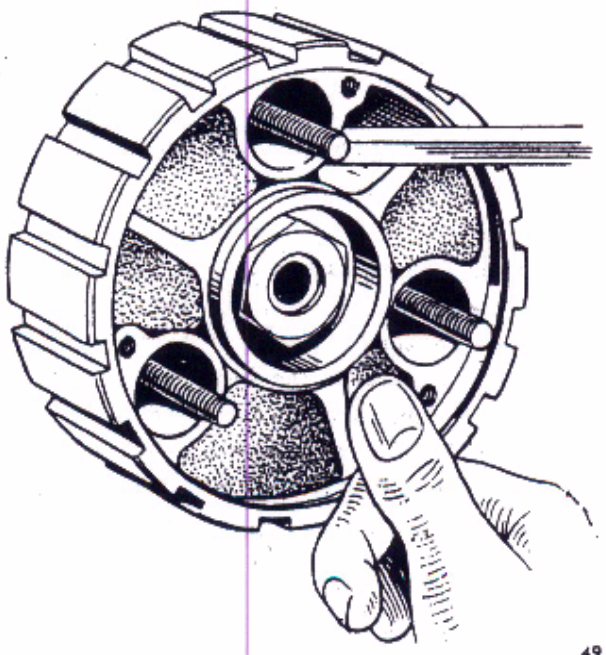

Fig. C6. Replacing the shock absorber rubbers

To replace the shock absorber drive and rebound rubbers, first install all three of the larger drive rubbers in position as shown in Fig. C6. Follow through by inserting and replacing the smaller rebound rubbers. It may prove necessary to lever the shock absorber spider arms using a small tommy bar or similar to facilitate assembly, but this operation can be accomplished 'in situ' on the machine without the need for special tools or equipment, or necessity for removing the complete unit from the machine.

Although the rubbers are of an oil resistant type, it is not advisable to use oil or grease as an aid to reassembly as this may shorten the working life of the rubber.

Ensure that the three shock absorber outer cover screws are tight. Use a screwdriver that engages the complete length of the screw slot. Apply Triumph "LOCTITE" to the screw threads before final assembly.

SECTION C8

REMOVING AND REPLACING THE STATOR AND ROTOR

First disconnect the three stator leads from underneath the engine (three snap connectors) then, with the primary cover removed, unscrew the three stator retaining nuts and withdraw the stator from over the mounting studs and withdraw the lead from the sleeve nut. If any difficulty is encountered, unscrew the sleeve nut and the lead can then be withdrawn easily. To remove the rotor unbend the tab washer and unscrew the mainshaft nut using a box spanner and mallet, or, alternatively, select 4th (top) gear and apply the rear brake, then unscrew the nut.

Check the rotor carefully for signs of cracking or fatigue failure.

When replacing the rotor ensure that the key is located correctly, then tighten the nut to the torque figure given in "General Data".

When refitting the stator, ensure that the side of the stator with the leads connecting the coils together is outermost, then tighten the retaining nuts to the torque figure given in General Data Section. Insert the lead into the sleeve nut and connect the three wires to those of the same colour code underneath the engine. Check that the position of the lead is such that it cannot foul the chain.

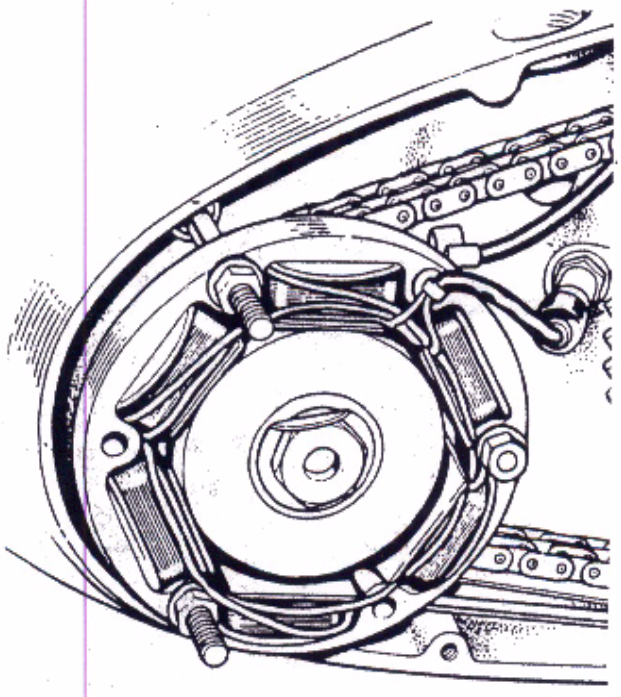

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Fig. C7. Showing stator location on crankcase

Finally, rotate the crankshaft and ensure that the rotor does not foul the stator. It should be possible to insert a feeler gauge of 0·008 in. (0·2 mm.) thickness between each of the stator pole pieces and the rotor.

SECTION C9

REMOVING AND REPLACING THE CLUTCH AND ENGINE SPROCKETS

Remove the primary cover as shown in Section C3, then remove the pressure plate and clutch plates, as shown in Section C4. Insert the locking plate Z13 into the clutch housing and remove the stator and rotor as described in Section C8. Remove the rotor key and distance piece and slacken off the chain tensioner. Unbend the locking tabs and unscrew the clutch hub securing nut then remove the tab washer and cup washer.

As the primary chain is of the endless type, the clutch and engine sprockets have to be extracted simultaneously using extractor DA50/1 and extractor tool Z151 as shown in Figs. C8 and C9.

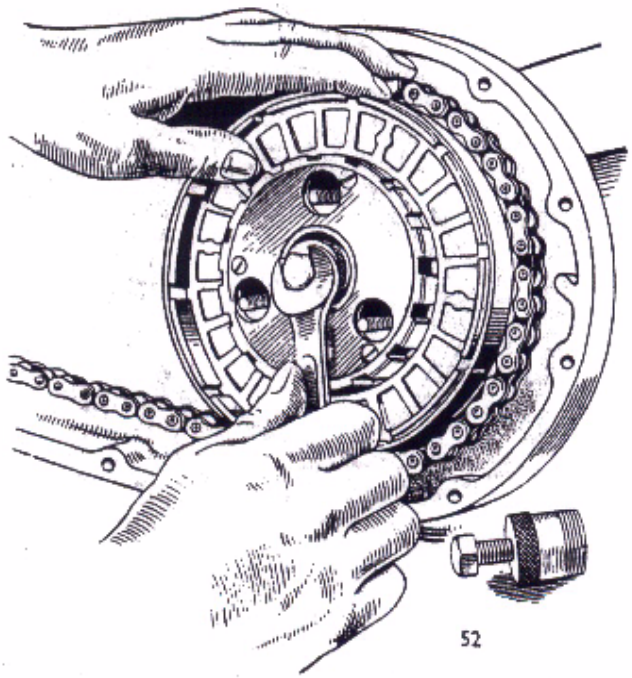

Fig. C8. Extracting the clutch centre, using extractor DA 50/1 and locking plate Z13

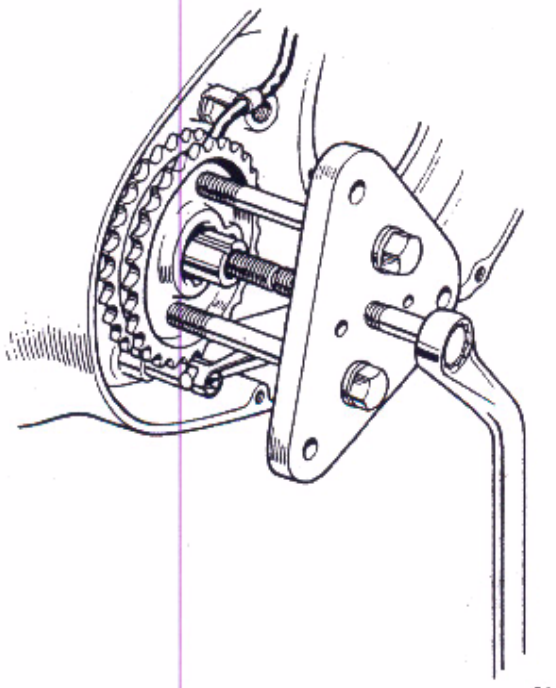

Fig. C9. Extracting the engine sprocket, using service tool Z151

Screw the body of extractor DA50/1 into the clutch hub until the maximum depth of thread is engaged, then tighten the centre bolt until the hub is released. When this is achieved, assemble the engine sprocket extractor, No. Z151, and screw in the centre bolt and extract the engine sprocket.

Press out the hub from the shock absorber to release the sprocket, thrust washer, rollers and threaded pins.

Finally, remove the key from the gearbox mainshaft and check that the oil seal in the primary chain inner cover is a good fit over the high gear bush. To renew this oil seal the circular cover should be removed. When replacing the cover, use a new paper gasket and ensure that the oil seal is pressed in with the lip relative to the cover as shown in Fig. C10.

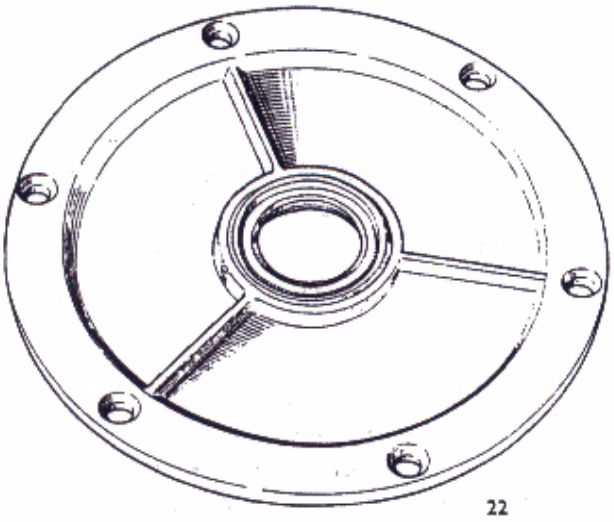

Fig. C10. Oil seal in gearbox sprocket detachable cover

Thoroughly clean all parts in paraffin (kerosene) and inspect them for wear or fatigue as shown in Section C10.

Grease the clutch hub and fit the thrust washer and 20 of the correct rollers. Do not use $\frac{1}{4}$ in. $\times \frac{1}{4}$ in. rollers. Place the sprocket in position and press on the shock absorber complete with the three threaded pins. If the splines are loose use Triumph "LOCTITE".

When replacing the primary chain and sprockets, ensure that the taper ground boss of the engine sprocket is towards the crankshaft main bearing and the oil seal. With the gearbox mainshaft key carefully in position, locate the clutch hub onto the mainshaft taper and tap it slightly to lock it onto the taper.

Place the primary chain over the engine sprocket and drive the sprocket onto the crankshaft.

Offer the clutch locking tool Z13 into the clutch plate housing and then refit the cup washer, tab washer and clutch securing nut.

NOTE: The cup washer fits with the cup side out and the tab washer fits with the long tab located in the hole in the bore of the shock absorber spider.

Engage fourth gear, apply the rear brake and tighten the clutch securing nut to the torque figure given in "General Data".

Do not forget to fit the distance piece between the engine sprocket and rotor and remember to refit the rectangular section rotor locating key. Reassembly then continues as a reversal of the above instructions. Finally, replenish the chaincase with the recommended grade of oil (see Section A2).

Note.—Alternatively, the clutch sprocket may be removed by prising out the twenty roller bearings and allowing the sprocket to move both outwards and forwards until it can be unmeshed from the primary chain. This alternative only applies if the shock absorber assembly can readily be detached from the hub to allow access to the rollers.

SECTION C10

INSPECTION OF THE TRANSMISSION 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 12 in. (30·5 cm.) apart, then after degreasing or washing the chain in paraffin (kerosene), 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 ¼ in. (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 clutch sprocket and attempt to lift the chain from its seating at various points round the sprocket. Little or no lift indicates that both the sprocket and chain are in good condition.

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

Similarly check the fit of the engine sprocket splines onto the crankshaft. Again, there should not be any radial movement.

If either the spider or the engine sprocket are tight fitting on the clutch hub and crankshaft respectively, there is no cause for concern as such a fit is to the best advantage.

(3) Check the clutch hub roller bearing diameter, the rollers themselves and the bearing of the clutch sprocket for excessive wear and pitting etc. Measure the rollers, clutch hub and clutch sprocket bearing diameters and compare them with the dimensions given in "General Data".

If the diameters of the rollers are below the bottom limit, they should be renewed. When purchasing new rollers ensure that they are in accordance with the dimensions given in "General Data". In particular, check that the length is correct.

(4) Check that the shock absorber spider is a good working fit in the inner and outer retaining plates and that the arms of the spider have not caused excessive score marks on the inner faces of the retaining plates. A good idea is to check the working clearance by assembling the shock absorber unit without the rubbers.

(5) Inspect the clutch operating rod for bending, by rolling it on a flat surface such as a piece of plate glass. Check that the length of the rod is within the limits given in "General Data". This component should not be replaced with anything other than a genuine Triumph spare part. The ends of the rod are specially heat treated to give maximum wear resistance.

SECTION C11

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 a chain, a rivet extractor, as shown in Fig. C13, 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 cranked double link and single connecting link (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 (4).

(4) 

(5) 

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

(6) 

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Fig. C12. Rear chain alterations

RIVET EXTRACTOR (PART NUMBER 167)

The rivet extractor can be used on all motorcycle chains up to $\frac{3}{4}$ in. pitch, whether the chains are on or off the wheels.

When using the extractor:—

(1) Turn screw anti-clockwise to permit the punch end to clear the chain rivet.

(2) Open the jaws by pressing down the lever (see below).

(3) Pass jaws over chain and release the lever. Jaws should rest on a chain roller free of chain link plates (see below).

(4) Turn screw clockwise until punch contacts and pushes out rivet end through chain outer link plate. Unscrew punch, withdraw extractor and repeat complete operation on the adjacent rivet in the same chain outer link plate. The outer plate is then free and the two rivets can be withdrawn from opposite sides with the opposite plate in position. Do not use the removed part again.

When the alterations are finished the chain should be lubricated as shown in Section A13.

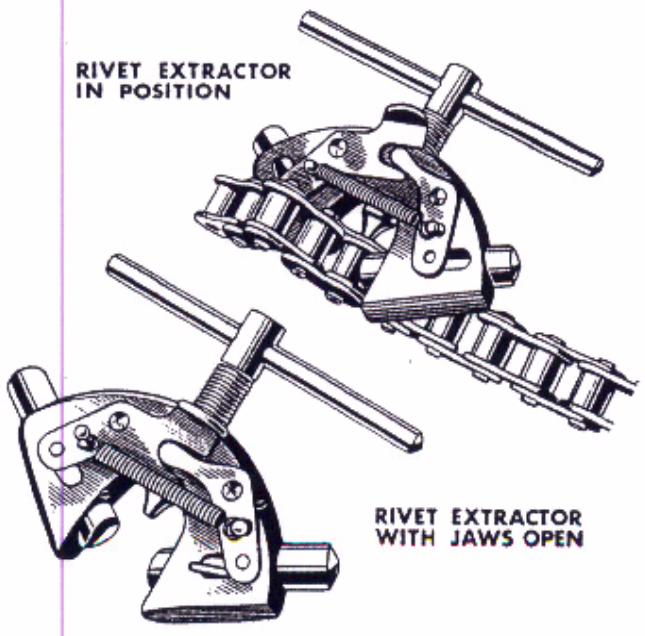

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Fig. C13. Chain link rivet extractor, part number 167

SECTION D

GEARBOX

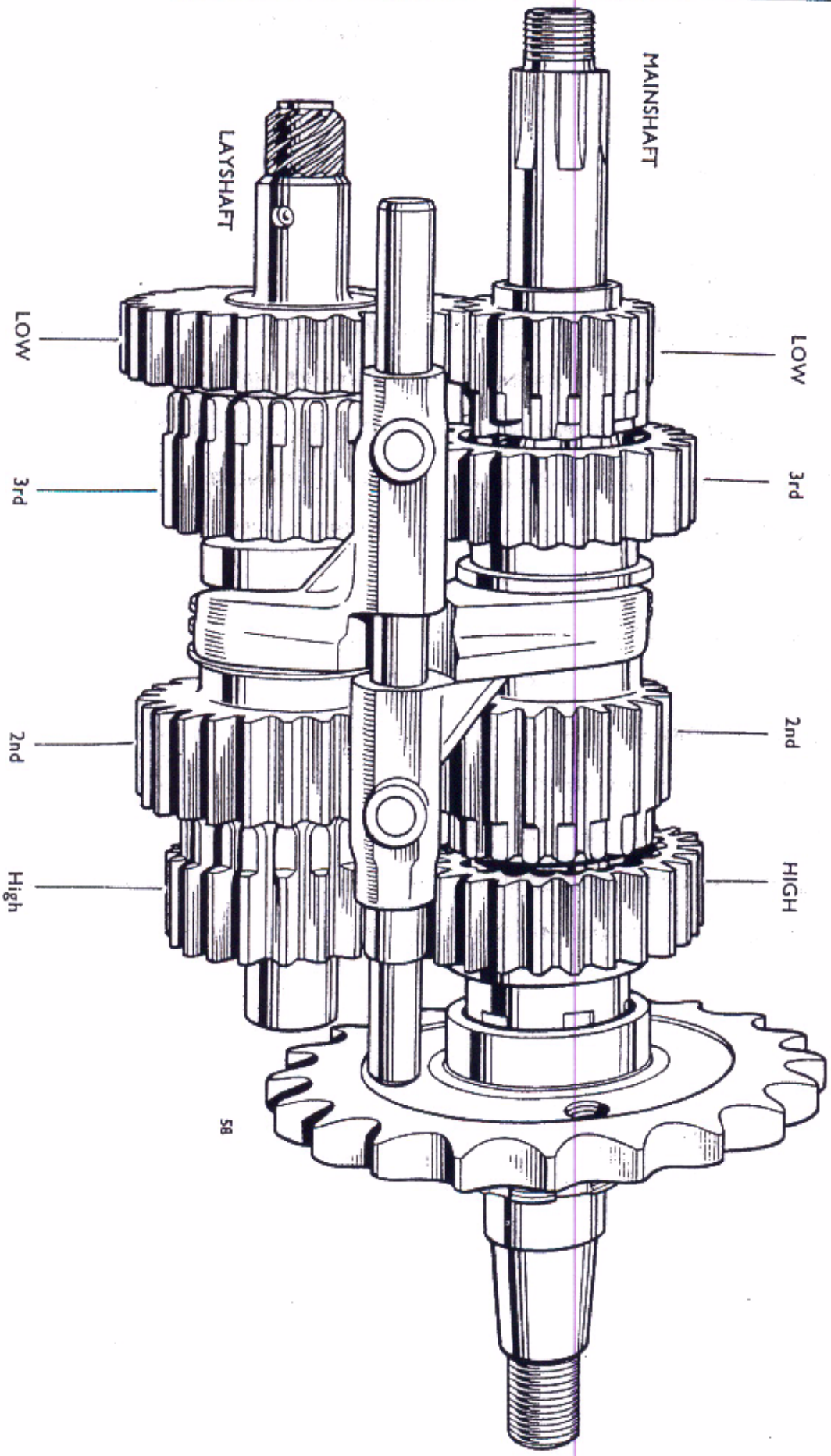

Fig. D1. Plan of Gearbox Components

DESCRIPTION

The Triumph unit construction twin cylinder models are all fitted with a four-speed gearbox which is an integral part of the right half crankcase. The gearbox inner and outer covers are made of aluminium alloy D.T.D. 424 which gives the utmost rigidity and strength. Gears are manufactured from high quality nickel steel and subsequently case hardened and are designed to withstand heavy loading.

The mainshaft is supported by heavy duty ball races at each end, and the layshaft by special needle roller bearings which are pressed into the casing and inner cover.

The speedometer drive, which is enclosed in the inner cover is taken from the layshaft by means of spiral drive gears. Keyed to the left end of the gearbox mainshaft is the multi-plate clutch, which runs in oil and is operated by a thrust rod which fits through the centre of the gearbox mainshaft.

The clutch operating mechanism, kickstarter quadrant and the gearchange quadrant are all housed in the gearbox outer cover.

To meet special demands for certain sporting events there are available alternative close ratio and wide ratio gears which enables the gearbox to be suitably converted for road racing and trials riding respectively. For details of the parts required for such a changeover, consult the appropriate TRIUMPH Replacement Parts Catalogue.

SECTION D1

REMOVING AND REPLACING THE GEARBOX OUTER COVER ASSEMBLY

Slacken the right exhaust pipe finned clip bolt, silencer clip bolt and the nut securing the lower bracket of the right exhaust pipe underneath the engine. Remove the right exhaust pipe by driving it in a forward direction. Unscrew the right footrest securing nut and withdraw the footrest. In addition, on 6T machines, remove two domed nuts, two front panel junction screws and the top nut securing the right panel. The panel is then free to be removed.

Slacken off the clutch cable adjustment at the handlebar and remove the slotted adaptor from the abutment at the gearbox. Unscrew the abutment and disconnect the cable from the clutch actuating spoke. Place a drip tray underneath the gearbox and unscrew the gearbox filler plug and drain plug.

Engage 4th (top) gear. This will facilitate removal of several otherwise difficult nuts to be unscrewed by subsequently applying the rear brake when required.

Unscrew the top and bottom hexagonal nut and the recess screws from the periphery of the gearbox cover. Depress the kickstart lever slightly and tap the cover until it is free.

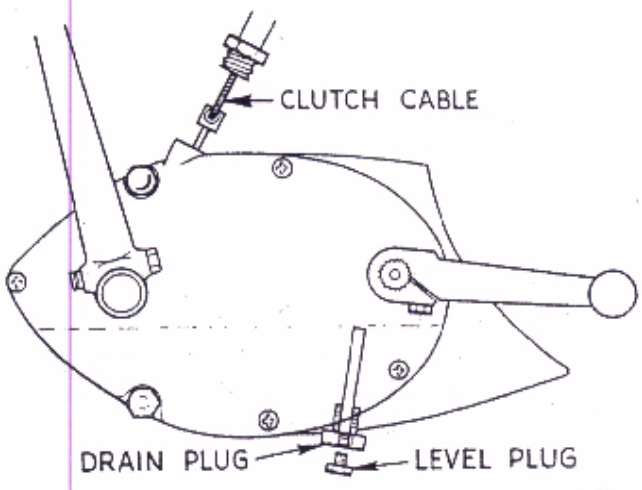

Fig. D2. Showing gearbox oil level and oil drain plugs

When the cover is removed, the gear-change mechanism, kickstart mechanism and clutch operating mechanism will be accessible. The gearchange pedal should be carefully raised then depressed, to control the release of the plungers and springs from the gearchange quadrant.

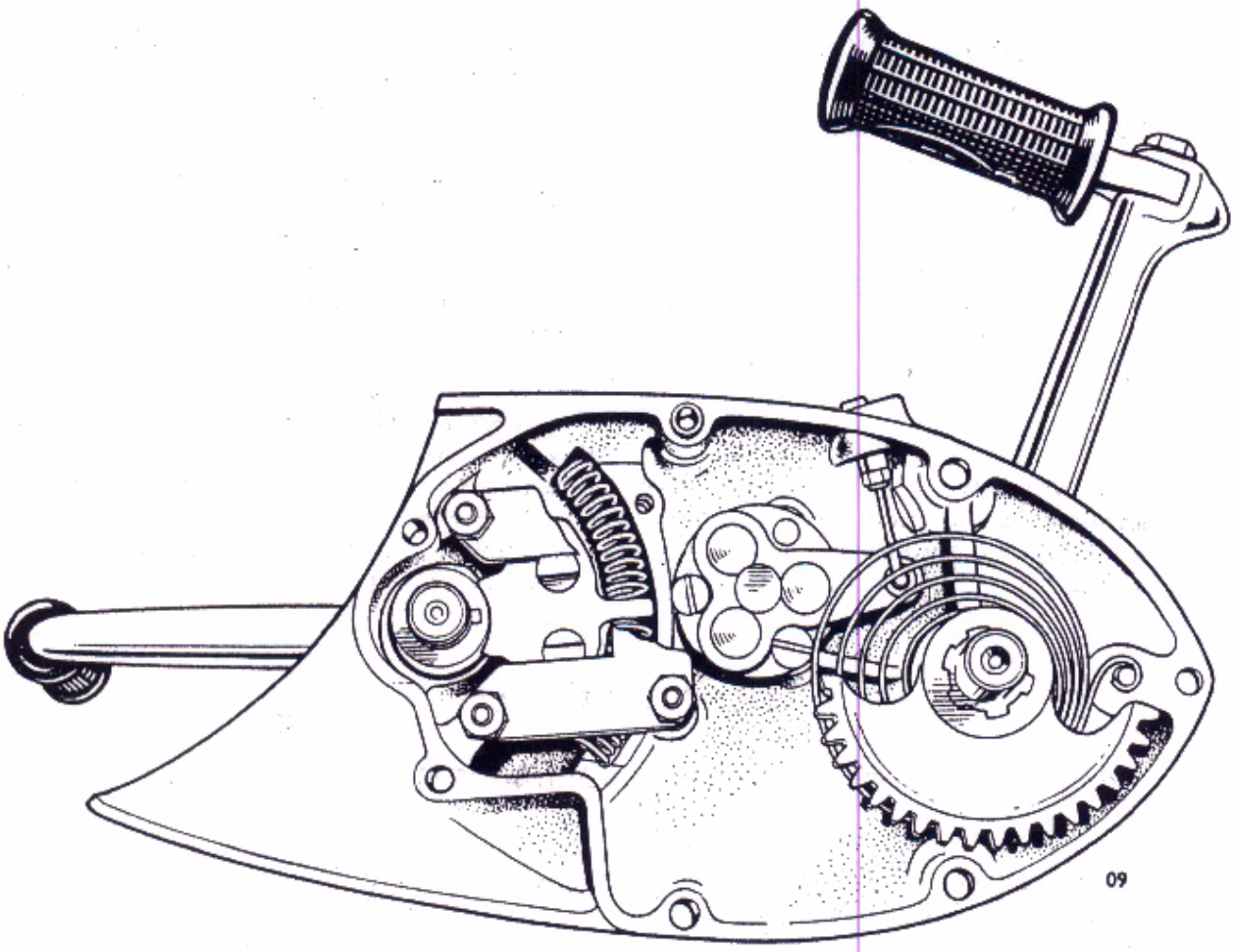

Fig. D3. Gearbox outer cover, showing gearchange mechanism, clutch operating mechanism and kick-start quadrant

Prior to refitting the outer cover ensure that the junction surface is clean and free from any deposits of old jointing compound, then thoroughly clean it in paraffin (kerosene). Apply a fresh coat of jointing compound to the junction surface and ensure that the two location dowels are in position.

Turn the kickstart pedal until it is half way down its operational stroke and offer the cover to the gearbox. Check that the kickstart pedal returns to its normal fully-returned position. Reassembly then continues as a reversal of the above instructions. Finally, refill the gearbox to the correct level with the recommended grade of oil (see Section A2).

SECTION D2

DISMANTLING AND REASSEMBLING THE KICKSTART MECHANISM

Slacken the kickstarter crank cotter pin nut about two or three turns and release the cotter pin from its locking taper by using a hammer and a soft metal drift. Slide the pedal off the shaft and withdraw the quadrant and spring assembly. Apply the rear brake, bend back the tab on the lock washer and unscrew the kickstart ratchet pinion securing nut from the gearbox mainshaft. Withdraw the pinion, ratchet, spring and sleeve, then thoroughly clean all parts in paraffin (kerosene) and inspect them for wear etc., as shown in Section D4.

If the kickstarter quadrant is to be renewed the spindle should be driven out using a hammer or press and the gear quadrant pressed onto the spindle so that the kickstart crank location flat is positioned correctly relative to the quadrant (see Fig. D4).