

GENERAL INFORMATION

TORQUE WRENCH DATA

Rocker standard stud nuts	21 lbs. ft. (2.9 kg. m.)
Cylinder head stud nuts	55 lbs. ft. (7.6 kg. m.)
Big end cap bolts	60/65 lbs. ft. (8/9 kg. m.)
Main bearing cap nuts	80 lbs. ft. (11 kg. m.)
Flywheel setbolts	67 lbs. ft. (9.25 kg. m.)

MANUFACTURING DIMENSIONS

CYLINDER HEAD

	<i>inches</i>	<i>mm.</i>
Width of valve seats .. .. .	.078	1.98
Note: Valve seat angle for both inlet and exhaust seats is 45°.		
Bore size for valve guides .. .. .	.626/.625	15.9/15.87
Valve guide outside diameter (std.) .. .. .	.6267/.6262	15.92/15.91
Note: Interference fit between valve guide and cylinder head bore is .0012/.0007 in. (0.03/.018 mm.)		
Exhaust valve seat inserts (service replacement only)—		
Recess bore diameter	1.625/1.624	41.27/41.25
Recess depth .. .. .	.25/.248	6.35/6.3
Insert outside diameter	1.6285/1.6275	41.36/41.33
Insert thickness .. .. .	.25/.248	6.35/6.3
Note: Interference fit between insert and cylinder head recess is .003/.0045 in. (.076/.114 mm.).		

VALVES AND VALVE GUIDES

	<i>inches</i>	<i>mm.</i>
Total length of valves	5.330/5.314	135.38/134.98
Valve head diameter—		
Inlet	1.745/1.741	44.32/44.22
Exhaust	1.515/1.511	38.48/38.38
Note: Valve seat angle is 45° for the inlet valve and 44° 45'/44° 25' for the exhaust valve.		
Valve stem diameter .. .. .	.3735/.3728	9.49/9.47
Valve guide inside diameter .. .. .	.376/.375	9.55/9.53
Note: Clearance between valve guide and valve stem is .0032/.0015 in. (.082/.038 mm.).		
Total length of valve guide	2.60	66.04
Note: Dimension from top face of cylinder head to valve guide top is .700 in. (17.78 mm.).		

VALVE SPRINGS (DUAL TYPE)

	<i>inner</i>	<i>outer</i>
Free lengths	1.94 in. (49.28 mm.)	2.22 in. (56.39 mm.)
Solid length not to exceed	0.77 in. (19.56 mm.)	0.9 in. (22.86 mm.)
Load at fitted length	25 lbs. (11.34 kg.) at 1.6 in. (40.64 mm.)	56 lbs. (25.4 kg.) at 1.75 in. (44.45 mm.)
Number of free coils	4.4	3.75

ROCKER GEAR

	<i>inches</i>	<i>mm.</i>
Rocker shaft.		
Outside diameter .. .. .	.811/.8117	20.6/20.62
Total length	13.5	342.9
Rocker.		
Bore diameter .. .. .	.8125/.8135	20.64/20.66
Push Rod.		
Total length	12.78/12.789	324.61/324.84
Tappet.		
Outside diameter .. .. .	.9996/.9991	25.39/25.38
Total length	2.82	71.63

DISTRIBUTOR DRIVING PINION

Thrust washer thickness .. .. .	.101/.099	2.57/2.52
Pinion bush inner (in crankcase).		
Inside diameter (fitted) .. .. .	.6885/.6875	17.49/17.46
Overall length .. .. .	.75	19

CAMSHAFT AND BEARINGS

	<i>inches</i>	<i>mm.</i>
Camshaft journal diameter.		
Front	1.8720/1.8730	47.55/47.57
Front Intermediate	1.8470/1.8480	46.91/46.94
Rear Intermediate	1.8080/1.8090	45.92/45.95
Rear	1.7785/1.7795	45.17/45.20
Camshaft bearing internal diameter (fitted).		
Front	1.8750/1.8740	47.68/47.65
Front intermediate	1.8500/1.8490	47.04/47.02
Rear intermediate	1.8110/1.8100	46.00/45.97
Rear	1.7815/1.7805	45.30/45.28

Note: Clearance between camshaft and camshaft bearing is .003/.001 in. (.076/.025 mm.) for all cases.

Thrust plate thickness2057/.2047	5.23/5.2
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Note: End float between thrust plate and camshaft is .005/.003 in. (.127/.076 mm.).

TIMING CHAIN AND WHEELS

Timing chain.		
Pitch .. .. .	.375 in. (9.53 mm.)	
Number of pitches	72	
Chain tensioner spring		
Free length	4 in. (101.6 mm.)	
Spring strength	8 lbs. (3.6 kg.) at 2.75 in. (69.85 mm.)	
Number of free coils	48	
Crankshaft timing wheel.		
Number of teeth	25	
Camshaft timing wheel.		
Number of teeth	50	

FLYWHEEL AND STARTER RING

Starter ring.		
Number of teeth	118	

CYLINDER BLOCK

Cylinder barrel bore diameter.

Note: The bores are graded as shown below. The grade letter is stamped on the top face, camshaft side, of the cylinder block.

						<i>inches</i>	<i>mm.</i>
Grade A	..	..	..	..	..	3·7495/3·7490	95·24/95·22
„ B	..	..	..	..	..	3·7500/3·7495	95·25/95·24
„ C	..	..	..	..	..	3·7505/3·7500	95·26/95·25
„ D	..	..	..	..	..	3·7510/3·7505	95·28/95·26
„ E	..	..	..	..	..	3·7515/3·7510	95·29/95·28
Main bearing bore diameter (less bearing)	..	..				2·9170/2·9165	74·09/74·08

CRANKSHAFT AND MAIN BEARINGS

						<i>inches</i>	<i>mm.</i>
Crankshaft main journal diameter.							
Standard	..	..	..	..	..	2·7500/2·7495	69·85/69·84
·020 in. Undersize	..	..	..	..	..	2·7300/2·7295	69·34/69·33
·040 in. Undersize	..	..	..	..	..	2·7100/2·7095	68·83/68·81
Crankshaft main bearing internal diameter (fitted).							
Standard	..	..	..	..	..	2·753/2·751	69·93/69·88
·020 in. Undersize	..	..	..	..	..	2·733/2·731	69·42/69·37
·040 in. Undersize	..	..	..	..	..	2·713/2·711	68·91/68·86

Note: Clearance between crankshaft journal and crankshaft main bearing is ·003/·0015 in. (·038/·076 mm.).

Crankshaft main journal length.

Front	..	..	..	..	..	1·754/1·746	44·55/44·35
Centre	..	..	..	..	..	1·802/1·798	45·77/45·67
Rear	..	..	..	..	..	1·802/1·800	45·77/45·72
Intermediate	..	..	..	..	..	1·502/1·498	38·15/38·05

Crankshaft main bearing length.

Front, centre and rear	..	..	..	..	..	1·60	40·64
Intermediate	..	..	..	..	..	1·30	33·02

Thrust washer thickness.

Standard	..	..	..	..	..	·093/·091	2·36/2·31
·005 in. Oversize	..	..	..	..	..	·098/·096	2·5/2·44

Note: Thrust washers to be selected to give ·006/·004 in. (·15/·102 mm.) end float.

CONNECTING RODS

						<i>inches</i>	<i>mm.</i>
Crankshaft crankpin diameter.							
Standard	..	..	..	..	..	2·2495/2·2490	57·14/57·13
·020 in. Undersize	..	..	..	..	..	2·2295/2·2290	56·63/56·62
·040 in. Undersize	..	..	..	..	..	2·2095/2·2090	56·12/56·11
Connecting rod big end bearing internal diameter (fitted).							
Standard	..	..	..	..	..	2·251/2·250	57·18/57·15
·020 in. Undersize	..	..	..	..	..	2·231/2·230	56·67/56·64
·040 in. Undersize	..	..	..	..	..	2·211/2·210	56·16/56·13

Note: Clearance between crankshaft crankpin and connecting rod big end bearing is ·002/·0005 in. (·05/·01 mm.).

Crankshaft crankpin length	..	..	..	..	..	1·502/1·500	38·15/38·1
Connecting rod big end width	..	..	..	..	..	1·492/1·490	37·9/37·85

Note: Big end side float is ·012/·008 in. (·3/·2 mm.).

CONNECTING RODS (Continued)

Connecting rod small end bore diameter (less bush)	1·2507/1·2497	31·77/31·74
Connecting rod small end width	1·25	31·75
Connecting rod length (centre to centre)	8·251/8·249	209·58/209·53

Note: Connecting rod alignment between big and small ends must be parallel to within $\cdot 00025$ in. ($\cdot 00625$ mm.) per 1 in. (25·4 mm.).

PISTONS AND GUDGEON PINS

†Piston skirt diameter.

Note: The pistons are graded to conform with the cylinder bores, thereby enabling selective fitting. The grade letter is stamped on the crown of the piston.

	<i>inches</i>	<i>mm</i>
Grade A	3·7460/3·7455	95·15/95·14
„ B	3·7465/3·7460	95·16/95·15
„ C	3·7470/3·7465	95·17/95·16
„ D	3·7475/3·7470	95·18/95·17
„ E	3·7480/3·7475	95·19/95·18

†This measurement must be taken at the bottom of the piston skirt and at right angles to the gudgeon pin bore, see Fig. 25, Page 26.

*Gudgeon pin bore diameter (in piston)	1·1250/1·1246	28·58/28·57
*Gudgeon pin outside diameter	1·1250/1·1248	28·58/28·575
*Gudgeon pin to be fitted, when the piston has been heated to 170°F. (76·6°C.).		
Gudgeon pin bush internal diameter (fitted) ..	1·1254/1·1250	28·59/28·58
Note: Gudgeon pin fit in small end bush (fitted) is size to $\cdot 0006$ in. ($\cdot 015$ mm.) clearance.		
Gudgeon pin overall length	3·246/3·250	82·45/82·55

PISTON RINGS

	<i>inches</i>	<i>mm.</i>
Ring gap (fitted).		
Top (plain compression)	$\cdot 010/\cdot 014$	$\cdot 254/\cdot 356$
Second (taper compression)	$\cdot 011/\cdot 016$	$\cdot 279/\cdot 406$
Third (scraper, groove width $\cdot 115$ in. (2·92 mm.))	$\cdot 011/\cdot 016$	$\cdot 279/\cdot 406$
Lower (scraper, groove width $\cdot 094$ in. (2·39 mm.))	$\cdot 010/\cdot 014$	$\cdot 254/\cdot 356$
Ring width.		
Compression	$\cdot 0937/\cdot 0927$	2·38/2·36
Scraper	$\cdot 1875/\cdot 1865$	4·76/4·74
Lower scraper	$\cdot 1875/\cdot 1870$	4·76/4·75

Note: Piston ring clearance in all grooves is $\cdot 0035/\cdot 002$ in. ($\cdot 089/\cdot 051$ mm.).

FUEL PUMP

Diaphragm spring.		
Free length	2·5 in. (63·5 mm.)	
Load and working length	8·25 lbs. (3·74 kg.) at $\frac{91}{64}$ in. (16·27 mm.)	

WATER PUMP

	<i>inches</i>	<i>mm.</i>
Diameter of spindle	$\cdot 6302/\cdot 6297$	16·01/16·00

DRIVE BELT (WATER PUMP AND DYNAMO)

	<i>inches</i>	<i>mm.</i>
Inside circumference.		
“C” and “E” Models except C.589, C.510, C.5FT and C.5FP Models	46·2	1173·5
C.589, C.510, C.5FT and C.5FP Models Only..	47·7	1211·7
Depth of belt	0·5	12·7
Width of belt (outside edge)	·875	22·2

Note: Angle of belt “V” form is 40°.

FULL FLOW FILTER

	<i>inches</i>	<i>mm.</i>
Free length of relief valve spring	2·885	73·25
Free length of by-pass valve spring	3·875	98·42
Diameter of relief valve ball	$\frac{1}{2}$	12·7
Diameter of by-pass valve ball	$\frac{9}{16}$	14·29

OIL PUMP

	<i>inches</i>	<i>mm.</i>
Driving shaft.		
Overall length	11·6	294·64
Outside Diameter	·6265/·6260	15·91/15·9
Driving wheel.		
Overall length	1·599/1·598	40·61/40·58
Outside diameter	1·5000/1·4995	38·1/38·09
9 teeth on a pitch circle diameter	1·125	28·57
Internal diameter	·6260/·6250	15·9/15·87
Idler wheel.		
Overall length	1·599/1·598	40·61/40·58
Outside diameter	1·5000/1·4995	38·1/38·09
9 teeth on a pitch circle diameter	1·125	28·57
Internal diameter	·6290/·6280	15·97/15·95
Note: Back lash between idler and driving wheels is ·018 in. (·45 mm.) maximum and ·010 in. (·25 mm.) minimum.		
Idler wheel pin.		
Overall length	2·85	72·39
Outside diameter	·6265/·6260	15·91/15·9
Thickness of cover joint gasket.		
Uncompressed	·006	·15
Compressed	·004	·102

CLUTCH

Thrust springs—Load at fitted length		
“C” Models, except C.541 models	185 lbs. (83·9 kg.)	at 1·6875 in. (42·86 mm.)
C.541 and “E” Models Only	140 lbs. (63·5 kg.)	at 1·688 in. (42·87 mm.)

SPECIAL TOOLS

The special tools referred to in this workshop manual are manufactured and distributed by :—

Messrs. V. L. Churchill & Co. Ltd.,
Walnut Tree Walk,
Lambeth North,
London, S.E.11.

with whom we have collaborated on questions of design.

These tools are listed in the following :—

Churchill Tool No.

Description

ENGINE

RG.4	Lifting Eye Bolts.
RG.6	Timing Cover Centraliser.
RG.10	Valve Guide Remover and Replacer.
RG.11	Main Bearing Cap Remover.
RG.12	Camshaft Timing Wheel Remover.
RG.32	Camshaft Bearing Remover and Replacer.
RG.46	Cylinder Head Lifting Handles.
RG.53	Engine Removal Skids.
RG.316	Valve Seat Cutters.
RG.375A	Crankshaft Spigot Bearing Remover.
RG.540	Valve Seat Insert Remover.
RG.6056	Recess Cutter for Valve Seat Insert.
RG.6057/D.9	Valve Seat Insert Pilot Drift.
RG.6201	Small End Bush Remover and Replacer.
RG.6513	Valve Spring Compressor.

COOLING SYSTEM

RG.1	Water Pump Impellor Remover.
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CLUTCH

RG.99	Clutch Assembly Jig—5-ton “ C ” and “ E ” Models.
RG.199	Clutch Assembly Jig—7-ton “ C ” Models, except Early C.589 and C.510 Models.