

SPECIFICATIONS 650cc MODELS

LUBRICATION SYSTEM

OIL PUMP	
Body material	Brass
Bore diameter: Feed	.40625/40675 in.
Scavenge	.48771/4872 in.
Plunger diameter: Feed	.40620/40623 in.
Scavenge	.4872/4869 in.
Valve spring length	1/2 in.
Bail diameter	7/32 in.
Aluminum crosshead width	.4971/498 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.)
Spring length	1.17/32 in.
Load at 1 3/16 in.	12/12 1/2 lb.
Rate	37 lb./in.

OIL PRESSURE

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

OIL PRESSURE SWITCH

Operating pressure	7-11 lb./sq. in.
--------------------	------------------

ENGINE

BASIC DETAILS

Bore and stroke	2.795 × 3.228 in. (71 × 82mm)
Cubic capacity	40 cu. in. (649cc)
Compression ratio	9:1
Power output (bhp @ rpm)	47 @ 6,700

CRANKSHAFT

Crankshaft type	Forged two-throw crank with bolt-on flywheel. Located by the timing side main bearing
Main bearing (drive side) size and type	2 13/16 × 1 1/4 × 13/16 in. Single lipped roller bearing
Main bearing (timing side) size and type	2 13/16 × 1 1/4 × 13/16 in.
Main bearing journal diameter	1.1247/1.1250 in.
Main bearing housing diameter	2.8095/2.8110 in.

Big end journal diameter	1.6235/1.6240 in.
Minimum grind diameter	1.6035/1.6040 in.
Crankshaft end float	.003/.017 in.

TIMING SIDE MAIN BEARING

(After Engine No. GE27209)	
Main bearing, size and type	72 × 30 × 19mm
Main bearing, journal diameter	1.1812/1.1808 in. (30/29.99mm)

CONNECTING RODS

Length (centers)	6.499/6.501 in.
Big end bearings—type	Steel backed white metal
Bearing side clearance	.012/.016 in.
Bearing diametric clearance	.0005/.0020 in.

PISTON PIN

Material	High tensile steel
Fit in small end bushing	.0005/.0012 in. clearance
Diameter	.6882/.6885 in.
Length	2.151/2.156 in.

SMALL END BUSHING

Material	Phosphor bronze
Outer diameter	.8140/.8145 in.
Length	1.030/1.031 in.
Finished bore diameter	.6890/.6894 in.

CYLINDER BLOCK

Material	Cast iron
Bore size	2.7948/2.7953 in.
Maximum oversize	2.8348/2.8353 in.
Tappet guide block housing diameter	.999/.9985 in.

CYLINDER HEAD

Material	D.T.D. 424 Aluminum
Intake port size	1 3/16 in. dia. tapering to 1 1/8 in.
Exhaust port size	1 3/8 in. diameter
Valve seatings:	
Type	Cast-in
Material	Cast iron

VALVES

Stem diameter: Intake	.3095/.3100 in.
Exhaust	.3090/.3095 in.
Head diameter: Intake	1.592/1.596 in.
Exhaust	1.434/1.440 in.
Exhaust valve material	21/4NS

SPECIFICATIONS 650cc MODELS (continued)

VALVE GUIDES

Material Aluminum—Bronze
 Bore diameter (intake and exhaust) .3127/.3137 in.
 Outside diameter (intake and exhaust) .5005/.5010 in.
 Length: Intake 1.31/.32 in.
 Exhaust 2.11/.64 in.

**VALVE SPRINGS (RED SPOT INNER)
 (GREEN SPOT OUTER)**

	Outer	Inner
Free length	1 1/2 in.	1 17/32 in.
Total number of coils	5 3/4	7 1/4
Total fitted load:		
Valve open	143 lbs.	155 lbs.
Valve closed	75 lbs.	87 lbs.
Fitted length (valve closed):		
Inner	1 3/16 in.	1 1/8 in.
Outer	1 7/32 in.	1 5/32 in.

VALVE TIMING

Set all tappet clearances @ .002 in. (.5mm) for checking

Intake opens	34° B.I.D.C.
Intake closes	55° A.B.D.C.
Exhaust opens	55° B.D.C.
Exhaust closes	34° A.T.D.C.

ROCKERS

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

CAMSHAFTS

Journal diameter: Left .8100/.8105 in.
 Right .8730/.8735 in.
 Diametric clearance: Left .0010/.0025 in.
 Right .0005/.0020 in.
 End float .013/.020 in.
 Cam lift: Intake and exhaust .314 in.
 Base circle diameter .812 in.

TAPPETS

Material High tensile steel body—Stellite tip
 Tip radius 1.125 in.
 Tappet diameter .3110/.3115 in.
 Clearance in guide block .0005/.0015 in.
 Exhaust tappet has flat, 3/32 in. tail, 1.884 in./1.881 in. below top of tappet. Flat is .032 in. deep, and oil hole is .047 in. diameter.

TAPPET GUIDE BLOCK

Diameter of bores .3120/.3125 in.
 Outside diameter 1.0000/.9995 in.
 Interference fit in cylinder block .0005/.0015 in.

CAMSHAFT BEARING BUSHINGS

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 intake 1.104/1.114 in.
 Left exhaust .932/.942 in.
 Right intake and exhaust 1.010/1.020 in.
 Interference fit in crankcase: Left .001/.002 in.
 Right .0010/.0025 in.

TIMING GEARS

Intake and exhaust camshaft pinions: 50
 No. of teeth .000/.001 in.
 Interference fit on camshaft
 Intermediate timing gear: 47
 No. of teeth .5618/.5625 in.
 Bore diameter
 Intermediate timing gear bushing: Phosphor bronze
 Material .5635/.5640 in.
 Outside diameter 4.990/.4995 in.
 Bore diameter .6775/.6825 in.
 Length .0005/.0015 in.
 Working clearance on spindle .4980/.4985 in.
 Intermediate wheel spindle: .0005/.0015 in.
 Diameter
 Interference fit in crankcase
 Crankshaft pinion: 25
 No. of teeth + .0003/— .0005 in.
 Fit on camshaft

SPECIFICATIONS 650cc MODELS (continued)

REAR SUSPENSION	
Type	Swinging fork controlled by combined coil spring/hydraulic damper units
Spring details:	
Fitted length	8 in.
Free length	8.3/16 in.
Mean coil diameter	1 3/4 in.
Spring rate	145 lbs./in.
Color code	Blue/yellow
Load at fitted length	38 lb.
WHEELS, BRAKES AND TIRES	
WHEELS	
Rim size: Front and rear	WM2-19 front, WM2-18 rear
Type: Front	Spoke—single cross lacing
Rear	Spoke—double cross lacing
Spoke details: Front: Left side	20 off 8/10 SWG butted
Right side	5 1/2 in. U.H. straight
Right side	10 off 8/10 SWG butted
Right side	4.25/32 in. U.H. 78° head
Right side	10 off 8/10 SWG butted
Right side	4 7/8 in. U.H. 100° head
Right side	20 off 8/10 SWG butted
Right side	7 9/16 in. U.H. 90° head
Right side	20 off 8/10 SWG butted
Right side	7 7/8 in. U.H. 90° head
WHEEL BEARINGS	
Front and rear, dimensions and type	20 X 47 X 14mm—Ball Journal
Front and rear, spindle dia. (at bearing journals)	7862/7867 in.
STANDARD REAR WHEEL	
Bolt size for detachable sprocket	1/4 in. dia. X 13/16 in. U.H. X 26 C.E.I.
Number of bolts	8
Q.D. REAR WHEEL	
Bearing type	3/4 X 1 7/8 X 9/16 in. Ball Journal
Bearing sleeve: journal diameter	.7500/.7495 in.
Brake drum bearing	7/8 X 2 X 9/16 in. Ball Journal
Bearing sleeve: journal diameter	.8745/.8740 in.
Bearing housing: internal diameter	1.9890/1.9980 in.

REAR WHEEL DRIVE		See "Gearbox"
Gearbox sprocket		46
Rear wheel sprocket teeth		
Chain details:		
No. of links	104	
Pitch	5/8 in.	
Width	3/8 in.	
Speedometer drive gearbox ratio	2:1	
Speedometer cable length	65 ins.	
BRAKES		
Type	Internal expanding twin leading shoes	
Drum Diameter: Front	8 in. ± .002 in.	
Rear	7 in.	
Lining thickness: Front	.183/.193 in.	
Rear	.177/.187 in.	
Lining area: Front	24.4 sq. in.	
Rear	14.6 sq. in.	
TIRES		
Size: Front	3.25 X 19 in.	
Rear	3.50 X 18 in.	
Tire pressure: Front	24 lb./sq. in.	
Rear	24 lb./sq. in. (1.685 kg/sq. cm.)	
		(1.685 kg/sq. cm.)
FRONT FORKS		
TELESCOPIC FORK		
Type	Telescopic—Shuttle valve damping	
Spring details:		
Solo	Sidexar	
Free length	9 3/4 in.	
No. working coils	12 1/2	
Spring rate	26 1/2 lb. in.	
Gauge	6 SWG	
Color code	Yellow/blue	
Dampener sleeve	Yellow/green	
Length	2 1/8 in.	
Internal diameter	1.387—1.393 in.	
Material	Black polypropylene	
Bushing details:		
Length	1 in.	
Outer diameter	1.498/1.499 in.	
Inner diameter	1.3065/1.3075 in.	
	Top bush	.870/.875 in.
	Bottom bush	1.4935/1.4945 in.
		1.2485/1.2495 in.

SPECIFICATIONS 650cc MODELS (continued)

TELESCOPIC FORK (continued)

Stanchion diameter 1.3025/1.3030 in.
 Working clearance in top bushing .0035/.0050 in.
 Fork leg bore diameter 1.498/1.500 in.
 Working clearance of bottom bushing .0035/.0065 in.
 Shuttle valve:
 Outer diameter (large) 1.018/1.016 in.
 Outer diameter (small) 0.875/0.874 in.

ELECTRICAL SYSTEM

ELECTRICAL EQUIPMENT

Battery type (12v.) PUZ 5A
 Rectifier type ZDS 506
 Alternator type RM 19
 Horn type (12v.) 6H
 Bulbs:
 Headlight (L/H dip) No. Type
 Parking light 414 50/40 watts—pre-focus
 Stop and tail light 989 6 watts—MOC
 Speedometer light 380 6/21 watts—offset pin
 Ignition warning light 987 3 watts—MCS
 High beam indicator light 281 2 watts (BA 7S)
 281 2 watts (BA 7S)
 Zener diode type ZD 715
 Coil type (2 off) MA12 (12v.) 2 off
 Contact breaker type 6CA
 Fuse rating 35 amp.

GENERAL

Fuel tank 4 gal. (4.8 U.S. gals., 18 liters)
 Oil tank 6 pint (7 1/4 U.S. pints, 3 liters)
 Gearbox 7/8 pint (500cc)
 Primary chaincase 3/4 pint (350cc)
 Telescopic fork legs 1 1/3 pint (200cc)

BASIC DIMENSIONS

Wheel base 55 in. (140 cm)
 Overall length 84 in. (214 cm)
 Overall width 27 1/2 in. (70 cm)
 Overall height 38 in. (97 cm)
 Ground clearance 5 in. (13 cm)

WEIGHTS

Empty weight 365 lb. (166 kgm)
 Engine unit (dry) 130 lb. (59 kgm)

TORQUE WRENCH SETTINGS (DRY)

Flywheel bolts 33 lb. ft. (4.6 kgm)
 Conn. rod bolts 28 lb. ft. (3.9 kgm)
 Crankcase junction bolts 13 lb. ft. (1.8 kgm)
 Crankcase junction studs 20 lb. ft. (2.8 kgm)
 Cylinder block nuts 35 lb. ft. (4.8 kgm)
 Cylinder head bolts (3/8 in. dia.) 18 lb. ft. (2.49 kgm)
 Cylinder head bolt (5/16 in. dia.) 15 lb. ft. (2.1 kgm)
 Rocker box nuts 5 lb. ft. (.7 kgm)
 Rocker box bolts 5 lb. ft. (.7 kgm)
 Rocker spindle domed nuts 22 lb. ft. (3.0 kgm)
 Oil pump nuts 5 lb. ft. (.7 kgm)
 Kickstart ratchet pinion nut 45 lb. ft. (6.3 kgm)
 Clutch center nut 30 lb. ft. (4.1 kgm)
 Rotor fixing nut 20 lb. ft. (2.8 kgm)
 Stator fixing nuts 10 lb. ft. (1.4 kgm)
 Primary cover domed nuts 10 lb. ft. (1.4 kgm)
 Headlamp pivot bolts 10 lb. ft. (1.4 kgm)
 Headrace sleeve nut pinch bolt 15 lb. ft. (2.1 kgm)
 Stanchion pinch bolts 25 lb. ft. (3.5 kgm)
 Front wheel spindle cap bolts 25 lb. ft. (3.5 kgm)
 Brake cam spindle nuts 20 lb. ft. (2.8 kgm)
 Zener diode fixing nut 1.5 lb. ft. (.21 kgm)
 Fork cap nut 80 lb. ft. (11.1 kgm)

N.B.—18 lb. ft. replaces earlier recommendation of 25 lb. ft. for 3/8 in. dia. cylinder head bolts for all unit construction 650cc models.