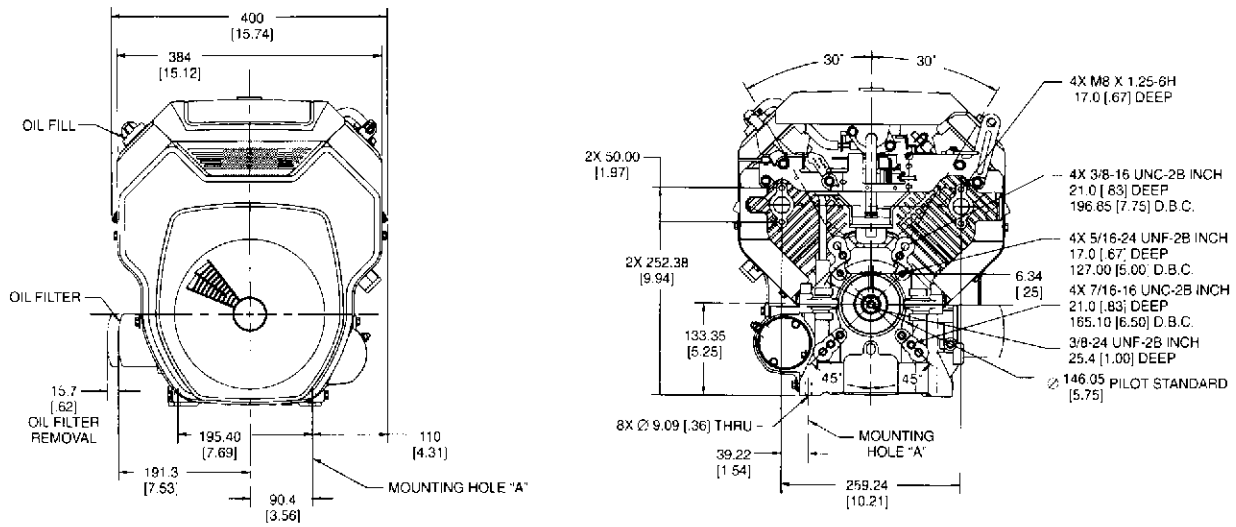
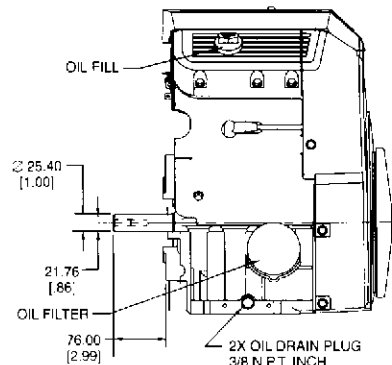
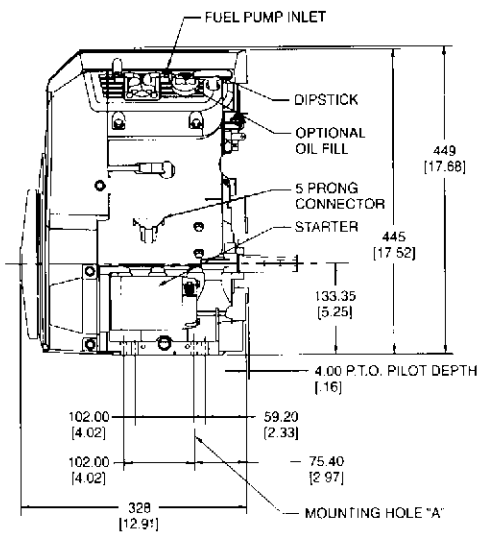


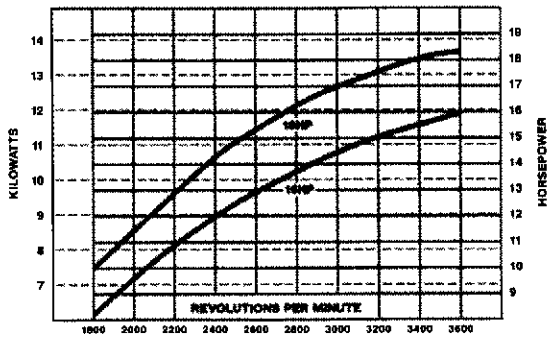
# Section 1 Safety and General Information



DIMENSIONS IN MILLIMETERS  
INCH EQUIVALENTS SHOWN IN [ ]



**HP**



**Torque**

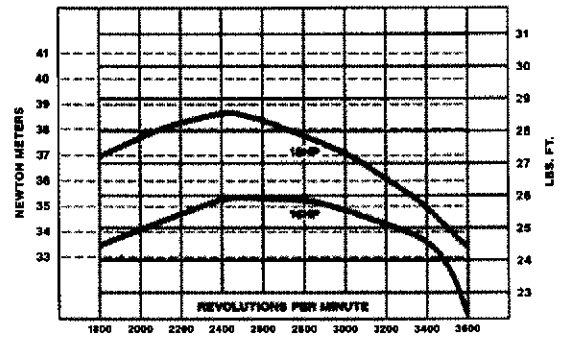


Figure 1-4. Typical Engine Dimensions, Torque, and Horsepower Curves OHC 16-18 HP.

## Section 1 Safety and General Information

Description	TH16 & TH18
<b>General Specifications<sup>1</sup></b>	
Power (@ 3600 RPM, corrected to SAE J1349)	
TH16 .....	11.9 kW (16 HP)
TH18 .....	13.4 kW (18 HP)
Peak Torque (See Torque Curve) @ 2500 RPM	
TH16 .....	35.5 N·m (26.2 ft. lb.)
TH18 .....	40 N·m (29.5 ft. lb.)
Bore	
TH16 .....	73 mm (2.87 in.)
TH18 .....	75 mm (2.95 in.)
Stroke	
TH16 .....	62 mm (2.44 in.)
TH18 .....	65 mm (2.56 in.)
Displacement	
TH16 .....	519cc (31.7 cu. in.)
TH18 .....	574cc (35.0 cu. in.)
Compression Ratio	
TH16 .....	7.8:1
TH18 .....	8.4:1
Dry Weight .....	43 kg (90 lb.)
Oil Capacity (with filter) .....	1.4 L (1.5 U.S. qt.)
Angle of Operation - Maximum (At Full Oil Level) All Directions .....	25°
<b>Blower Housing and Sheet Metal</b>	
M5 Fasteners Torque .....	4.0 N·m (35 in. lb.)
M6 Fasteners Torque (into crankcase) .....	7.3 N·m (65 in. lb.)
M6 Fasteners Torque (into sheet baffle) .....	4.0 N·m (35 in. lb.)
Rectifier Fastener Torque .....	4.0 N·m (35 in. lb.)
<b>Camshaft</b>	
End Play	
#1 Side .....	0.000/0.700 mm (0.000/0.0275 in.)
#2 Side .....	0.000/1.300 mm (0.000/0.0512 in.)
Running Clearance .....	0.025/0.105 mm (0.0010/0.0041 in.)
Bore I.D.	
New	
Front .....	32.000/32.025 mm (1.2598/1.2608 in.)
Rear .....	24.800/24.825 mm (0.9764/0.9774 in.)

<sup>1</sup>Values are in Metric units. Values in parentheses are English equivalents. Lubricate threads with engine oil prior to assembly.

## Section 1

### Safety and General Information

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#### Camshaft (Cont.)

##### Bore I.D. (Cont.)

###### Max. Wear Limit

Front .....	32.04 mm (1.2614 in.)
Rear .....	24.84 mm (0.9779 in.)

##### Camshaft Bearing Surface O.D.

###### New

Front .....	31.920/31.975 mm (1.2567/1.2589 in.)
Rear .....	24.720/24.775 mm (0.9732/0.9754 in.)

###### Max. Wear Limit

Front .....	31.91 mm (1.2562 in.)
Rear .....	24.71 mm (0.9728 in.)

#### Carburetor

Carburetor Mounting Fasteners Torque ..... 9.9 N·m (88 in. lb.)

Carburetor Adjustments ..... Non-Adjustable Idle Fuel and Main Fuel

#### Connecting Rod

##### Cap Fastener Torque (torque in increments)

6 mm step-down ..... 11.3 N·m (100 in. lb.)

##### Connecting Rod-to-Crankpin Running Clearance

New .....	0.056/0.030 mm (0.0022/0.0012 in.)
Max. Wear Limit .....	0.07 mm (0.0028 in.)

Connecting Rod-to-Crankpin Side Clearance ..... 0.250/0.740 mm (0.0098/0.0291 in.)

##### Piston Pin End I.D.

New .....	17.015/17.023 mm (0.6699/0.6702 in.)
Max. Wear Limit .....	17.04 mm (0.6708 in.)

#### Crankcase

##### Governor Cross Shaft Bore I.D.

New .....	8.025/8.050 mm (0.3159/0.3169 in.)
Max. Wear Limit .....	8.07 mm (0.3177 in.)

Breather Cover Mounting Fasteners ..... 5.6 N·m (50 in. lb.)

Oil Drain Plugs ..... 13.6 N·m (10 ft. lb.)

Crankcase Halves Mounting Screw Torque ..... 24.4 N·m (216 in. lb.)

#### Crankshaft

End Play ..... Not Adjustable

##### Crankshaft Sleeve Bearing I.D.

New .....	45.071/45.111 mm (1.7744/1.7760 in.)
Max. Wear Limit .....	45.12 mm (1.7764 in.)

##### Crankshaft to Sleeve Bearing

Running Clearance - New ..... 0.030/0.090 mm (0.0012/0.0035 in.)

**Crankshaft (Cont.)**

**Flywheel End Main Bearing Journal**

O.D. - New .....	45.021/45.041 mm (1.7725/1.7735 in.)
O.D. - Max. Wear Limit.....	44.95 mm (1.7696 in.)
Max. Taper .....	0.02 mm (0.0008 in.)
Max. Out-of-Round .....	0.02 mm (0.0008 in.)

**PTO End Main Bearing Journal**

O.D. - New .....	45.021/45.041 mm (1.6107/1.6116 in.)
O.D. - Max. Wear Limit.....	44.95 mm (1.7696 in.)
Max. Taper .....	0.02 mm (0.0008 in.)
Max. Out-of-Round.....	0.02 mm (0.0008 in.)

**Connecting Rod Journal**

O.D. - New .....	31.948/31.966 mm (1.2578/1.2585 in.)
O.D. - Max. Wear Limit.....	31.93 mm (1.2571 in.)
Max. Taper .....	0.02 mm (0.0008 in.)
Max. Out-of-Round.....	0.02 mm (0.0008 in.)

**Crankshaft T.I.R.**

PTO End, Crank in Engine .....	0.015 mm (0.0006 in.)
Entire Crank, in V-Blocks.....	0.010 mm (0.0004 in.)

**Cylinder Bore**

**Cylinder Bore I.D.**

<b>New</b>	
TH16 .....	73.006/73.031 mm (2.8742/2.8752 in.)
TH18 .....	75.025/75.050 mm (2.9537/2.9547 in.)
<b>Max. Wear Limit</b>	
TH16 .....	73.07 mm (2.8767 in.)
TH18 .....	75.09 mm (2.9563 in.)
Max. Out-of-Round .....	0.13 mm (0.005 in.)
Max. Taper .....	0.13 mm (0.005 in.)

**Electric Starter**

Starter Mounting Fastener Torque .....	7.9 N·m (70 in. lb.)
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**Timing Belt**

Belt Tensioner Mounting Screw Torque .....	7.3 N·m (65 in. lb.)
Belt Tension Torque .....	3.4/4.5 N·m (30/40 in. lb.)

**Fan/Flywheel**

Fan Fastener Torque .....	9.9 N·m (88 in. lb.)
Flywheel Retaining Screw Torque .....	66.4 N·m (49 ft. lb.)

**Governor**

**Governor Cross Shaft to Crankcase**

Running Clearance .....	0.013/0.075 mm (0.0005/0.0030 in.)
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**Governor Cross Shaft O.D.**

New .....	7.975/8.012 mm (0.3140/0.3154 in.)
Max. Wear Limit .....	7.96 mm (0.3134 in.)

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#### Governor (Cont.)

Governor Bushing to Camshaft  
Running Clearance ..... 0.045/0.160 mm (0.0018/0.0063 in.)

#### Governor Bushing I.D.

New ..... 32.020/32.080 mm (1.2606/1.2630 in.)  
Max. Wear Limit ..... 32.09 mm (1.2634 in.)

#### Ignition

Spark Plug Type (Champion® or Equivalent) ..... RC12YC

Spark Plug Gap ..... 0.76 mm (0.030 in.)

Spark Plug Torque ..... 24.4/29.8 N·m (18/22 ft. lb.)

Ignition Module Air Gap ..... 0.20/0.30 mm (0.008/0.012 in.)

Ignition Module Fastener Torque ..... 4.0/6.2 N·m (35/55 in. lb.)

#### Muffler

Muffler Retaining Nuts Torque ..... 24.4 N·m (216 in. lb.)

#### Oil Filter

Oil Filter Torque ..... 5.6/9.0 N·m (50/80 in. lb.)

Oil Filter Nipple Torque ..... 40.7 N·m (30 ft. lb.)

Oil Sentry™ Pressure Switch ..... 3.4 N·m (30 in. lb.)

#### Piston, Piston Rings, and Piston Pin

Piston Pin Bore to Piston Pin (Select Fit) ..... 0.006/0.016 mm (0.0002/0.0007 in.)

#### Piston Pin Bore I.D.

New ..... 17.006/17.012 mm (0.6695/0.6698 in.)  
Max. Wear Limit ..... 17.025 mm (0.6703 in.)

#### Piston Pin O.D.

New ..... 16.996/17.000 mm (0.6691/0.6693 in.)  
Max. Wear Limit ..... 16.995 mm (0.6691 in.)

#### Top Compression Ring-to-Groove Side Clearance

TH16 ..... 0.040/0.085 mm (0.0016/0.0033 in.)  
TH18 ..... 0.040/0.085 mm (0.0016/0.0033 in.)

#### Middle Compression Ring-to-Groove Side Clearance

TH16 ..... 0.030/0.080 mm (0.0012/0.0031 in.)  
TH18 ..... 0.030/0.076 mm (0.0012/0.0030 in.)

#### Oil Control Ring-to-Groove Side Clearance

TH16 ..... 0.046/0.201 mm (0.0018/0.0079 in.)  
TH18 (min.) ..... 0.070 mm (0.0028 in.)

Top Compression Ring End Gap ..... 0.180/0.380 mm (0.0071/0.0150 in.)

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**Piston, Piston Rings, and Piston Pin (Cont.)**

**Middle Compression Ring End Gap**

TH16 .....	0.180/0.440 mm (0.0071/0.0173 in.)
TH18 .....	0.180/0.450 mm (0.0071/0.0177 in.)

**Piston Thrust Face O.D.<sup>2</sup>**

**TH16**

New .....	72.966/72.984 mm (2.8727/2.8734 in.)
Max. Wear Limit .....	72.839 mm (2.8677 in.)

**TH18**

New .....	74.966/74.984 mm (2.9514/2.9521 in.)
Max. Wear Limit .....	74.839 mm (2.9464 in.)

**Piston Thrust Face-to-Cylinder Bore<sup>2</sup> Running Clearance**

TH16 .....	0.022/0.065 mm (0.0009/0.0026 in.)
TH18 .....	0.041/0.084 mm (0.0016/0.0033 in.)

**Speed Control**

Speed Control Bracket Assembly Fastener Torque .....	9.9 N·m (88 in. lb.)
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**Stator**

Stator Mounting Screw Torque .....	4.0 N·m (35 in. lb.)
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**Throttle/Choke Controls**

Governor Control Lever Fastener Torque .....	9.9 N·m (88 in. lb.)
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**Valve Cover**

Valve Cover Fastener Torque .....	5.6 N·m (50 in. lb.)
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**Valves**

Intake Valve Stem-to-Valve Guide Running Clearance .....	0.038/0.076 mm (0.0015/0.0030 in.)
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Exhaust Valve Stem-to-Valve Guide Running Clearance .....	0.050/0.088 mm (0.0020/0.0035 in.)
---	------------------------------------

**Intake Valve Guide I.D.**

New .....	6.038/6.058 mm (0.2377/0.2385 in.)
Max. Wear Limit .....	6.13 mm (0.2413 in.)

**Exhaust Valve Guide**

New .....	6.038/6.058 mm (0.2377/0.2385 in.)
Max. Wear Limit .....	6.19 mm (0.2437 in.)

**Valve Guide Reamer Size**

Standard .....	6.048 mm (0.2381 in.)
0.25 mm O.S. ....	6.298 mm (0.2480 in.)

Intake Valve Minimum Lift .....	7.50 mm (0.295 in.)
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Exhaust Valve Minimum Lift .....	7.50 mm (0.295 in.)
----------------------------------	---------------------

Nominal Valve Seat Angle .....	45°
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<sup>2</sup>Measure 6 mm (0.236 in.) above the bottom of the piston skirt at right angles to the piston pin.

# Section 1

## Safety and General Information






### Valves (Cont.)

#### Valve Lash






Intake .....	0.013/0.064 mm (0.0005/0.0025 in.)
Exhaust .....	0.076/0.127 mm (0.0030/0.0050 in.)

### General Torque Values

#### Metric Fastener Torque Recommendations for Standard Applications

Tightening Torque: N·m (in. lb.) + or - 10%						
	Property Class					Noncritical Fasteners Into Aluminum
Size						
<b>M 4</b>	1.2 (11)	1.7 (15)	2.9 (26)	4.1 (36)	5.0 (44)	2.0 (18)
<b>M 5</b>	2.5 (22)	3.2 (28)	5.8 (51)	8.1 (72)	9.7 (86)	4.0 (35)
<b>M 6</b>	4.3 (38)	5.7 (50)	9.9 (88)	14.0 (124)	16.5 (146)	6.8 (60)
<b>M 8</b>	10.5 (93)	13.6 (120)	24.4 (216)	33.9 (300)	40.7 (360)	17.0 (150)






Tightening Torque: N·m (ft. lb.) + or - 10%						
	Property Class					Noncritical Fasteners Into Aluminum
						
<b>M10</b>	21.7 (16)	27.1 (20)	47.5 (35)	66.4 (49)	81.4 (60)	33.9 (25)
<b>M12</b>	36.6 (27)	47.5 (35)	82.7 (61)	116.6 (86)	139.7 (103)	61.0 (45)
<b>M14</b>	58.3 (43)	76.4 (55)	131.5 (97)	184.4 (136)	219.7 (162)	94.9 (70)

### Torque Conversions

N·m = in. lb. x 0.113
N·m = ft. lb. x 1.356
in. lb. = N·m x 8.85
ft. lb. = N·m x 0.737

**Section 1**  
**Safety and General Information**

**1**

<b>Tightening Torque: N·m (in. lb.) + or - 20%</b>				
<b>Bolts, Screws, Nuts and Fasteners Assembled Into Cast Iron or Steel</b>				<b>Grade 2 or 5 Fasteners Into Aluminum</b>
	 <b>Grade 2</b>	 <b>Grade 5</b>	 <b>Grade 8</b>	 
<b>Size</b>				
<b>8-32</b>	2.3 (20)	2.8 (25)	-----	
<b>10-24</b>	3.6 (32)	4.5 (40)	-----	
<b>10-32</b>	3.6 (32)	4.5 (40)	-----	2.3 (20)
<b>1/4-20</b>	7.9 (70)	13.0 (115)	18.7 (165)	3.6 (32)
<b>1/4-28</b>	9.6 (85)	15.8 (140)	22.6 (200)	-----
<b>5/16-18</b>	17.0 (150)	28.3 (250)	39.6 (350)	7.9 (70)
<b>5/16-24</b>	18.7 (165)	30.5 (270)	-----	-----
<b>3/8-16</b>	29.4 (260)	-----	-----	17.0 (150)
<b>3/8-24</b>	33.9 (300)	-----	-----	-----
<b>Tightening Torque: N·m (ft. lb.) + or - 20%</b>				
<b>Size</b>				
<b>5/16-24</b>	-----	-----	40.7 (30)	-----
<b>3/8-16</b>	-----	47.5 (35)	67.8 (50)	-----
<b>3/8-24</b>	-----	54.2 (40)	81.4 (60)	-----
<b>7/16-14</b>	47.5 (35)	74.6 (55)	108.5 (80)	-----
<b>7/16-20</b>	61.0 (45)	101.7 (75)	142.4 (105)	-----
<b>1/2-13</b>	67.8 (50)	108.5 (80)	155.9 (115)	-----
<b>1/2-20</b>	94.9 (70)	142.4 (105)	223.7 (165)	-----
<b>9/16-12</b>	101.7 (75)	169.5 (125)	237.3 (175)	-----
<b>9/16-18</b>	135.6 (100)	223.7 (165)	311.9 (230)	-----
<b>5/8-11</b>	149.2 (110)	244.1 (180)	352.6 (260)	-----
<b>5/8-18</b>	189.8 (140)	311.9 (230)	447.5 (330)	-----
<b>3/4-10</b>	199.3 (150)	332.2 (245)	474.6 (350)	-----
<b>3/4-16</b>	271.2 (200)	440.7 (325)	637.3 (470)	-----