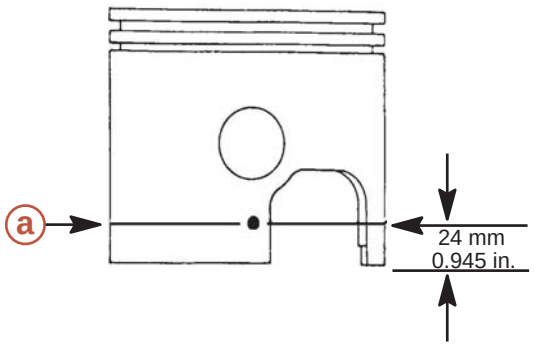
MERCURY Racing Service Bulletin

☐ Warranty Information ☑ Service Information Outboard No. 2002-07
☐ Parts Information

Circulate to: ☐ Sales Manager ☐ Accounting ☐ Service Manager ☑ Technician ☐ Parts Manager

▲ = Revised March 2003. This bulletin supercedes the previous bulletin 2002-07R1 November 2002.

250XS OptiMax Specifications (S/N 0T651982 & Up)

Model 250XS OptiMax		
POWER	250XS OptiMax	186 kw (250 hp)
RPM	Full Throttle RPM Range	5500-5800
	Idle RPM (In Gear)	570
	RPM Limiter	5900
OUTBOARD WEIGHT	51 cm. (20 in.)	229 kg (505 lb.)
	63 cm (25 in.)	238 kg (525 lb.)
	76 cm (30 in.)	245 kg (540 lb.)
CYLINDER BLOCK	Type	60° Vee Two Cycle V-6
	Displacement	3044 cc (185 cu. in.)
STROKE	Length	76.2 mm (3.00 in.)
CYLINDER BORE	Diameter (Std)	92.075 mm (3.625 in.)
	Taper/Out of Round/Wear Maximum	0.076 mm (0.003 in.)
	Bore Type	Cast Iron
CRANKSHAFT	Maximum Runout	0.0508 mm (0.002 in.)
PISTON	Piston Type	Cast-Aluminum
		Diameter: 91.9226 mm ± 0.0127 mm (3.6190 in. ± 0.0005 in.) Dimension "A" at Right Angle (90°) to Piston Pin
COMPRESSION RATIO		6.2:1
COMPRESSION	Using a fully charged battery, throttle shutters wide open, and cylinder block warm	862 kPa (125 psi)
REEDS	Type/Material	5 pedal, single stage carbon fiber

Model 250XS OptiMax		
ENGINE COOLING	Thermostat Controlled Thermostat Opening Temperature	49 °C (120 °F)
	Water Pressure	
	–Minimum @ Idle –Minimum @ WOT –Maximum @ WOT	10.3 kPa (1.5 psi) 69 kPa (10 psi) 172 kPa (25 psi)
	Poppet Valve Opening	41 kPa (6 psi)
DIRECT INJECTION	Injector Quantity	6
	Injectors are Crank Angle Driven by ECM	
	– #1 Cylinder	BRN/PNK + RED/BLU Leads
	– #3 Cylinder	ORG/PNK + RED/BLU Leads
	– #5 Cylinder	BLU/PNK + RED/BLU Leads
	– #2 Cylinder	RED/PNK + RED/BLU Leads
	– #4 Cylinder	YEL/PNK + RED/BLU Leads
	– #6 Cylinder	PPL/PNK + RED/BLU Leads
	Fuel Line Pressure @ Injectors	758 kPa (110 psi)
	Air Pressure	655 kPa (95 psi)
	Fuel/Air Differential	103 kPa (15 psi)
	High Pressure Electric Fuel Pump Amperage Draw	5 - 9 Amps
	Low Pressure Electric Fuel Pump Amperage Draw	1 - 2 Amps
	Low Pressure Electric Fuel Pump Output	6 - 9 Amps
	Fuel Injector Ohm Resistance	1.8 ± 0.1 Ω
	Direct Injector Ohm Resistance	1.3 ± 0.3 Ω
FUEL SYSTEM	Fuel System Type	Gasoline With Oil Injection
	Required Gasoline	Unleaded 91 Octane Minimum
	Gasoline/Oil Ratio – @ Idle – @ WOT	ECM Controlled 50:1
	Fuel Pressure – Crankcase Pump – @ Idle – @ WOT	13.7 - 20.5 kPa (2-3 psi) 41.0 - 54.8 kPa (8-10 psi)

Model 250XS OptiMax		
OIL INJECTION	Recommended Oil	TC-W3 Premium Plus 2 Cycle Outboard Oil
	Engine Oil Tank Capacity	1.42 liters (1.5 US qt)
	In Boat Oil Tank Capacity	11.4 liters (3 US gal)
	Testing Oil Pump	Activate Auto Prime through DDT. Pump Should Discharge 134 cc of Oil
ENGINE GUARDIAN SYSTEM	Situations Which Cause Guardian System to Reduce Available Engine Power	Percent of Engine Power Available
	During Engine Break-in	100%
	Low Oil in Engine Oil Tank	95%
	Critical Low Oil in Engine Oil Tank	5%
	Loss of Oil from Oil Pump	5%
	Low Block Water Pressure and/or High Engine Temperature	From 100% down to 4%
	Faulty Sensor (horn, block psi, coolant temp.)	95%
	Battery Voltage Out of Limits	<10 v = 0% < 11.5 v = 50% 11.5 v – 16 v = 100% >16 v = 50% >17 v = 0%
STARTING SYSTEM	Starter Draw (Under Load)	170 Amperes
	Starter Draw (No Load)	60 Amperes
	Minimum Brush Length	65.4 mm (0.25 in.)
	Battery Rating	1000 (Minimum) Marine Cranking Amps 800 (Minimum) Cold Cranking Amps 105 Amp Hours

Model 250XS OptiMax		
IGNITION SYSTEM	Firing Order	1-2-3-4-5-6
	Ignition Type	Digital Inductive
	Spark Plug Type	NGK PZFR6H
	Spark Plug Gap	0.965 mm (0.038 in.)
	Maximum Timing	Not Adjustable; Controlled by PCM
	Idle Timing	Not Adjustable; Controlled by PCM
	Throttle Position Sensor	
	@ Idle @ W.O.T	0.4 - 1.3 VDC 4.0 - 4.7 VDC
	Crank Position Sensor Air Gap	Not Adjustable
CHARGING SYSTEM	Alternator Type	Delco Remy 12V, 50 Amp., neg. grd.
	Alternator Output (Regulated)	32 - 38 @ 2000 rpm @ Battery* 52 - 60 @ 2000 rpm @ Alternator
	Brush Length	Std Exposed Length: 10.5 mm (0.413 in.) Min. Exposed Length: 1.5 mm (0.059 in.)
	Voltage Output	14.1 Volts
	Regulator Current Draw	0.15 mA (Ign. Switch Off) 30.0 mA (Ign. Switch On)
RECOMMENDED GEAR CASE OIL	All Model Gear Cases	Hi-Performance Gear Lube
GEAR HOUSING FLEET MASTER	Gear Ratio	1.75:1 12/21 Teeth
	Gearcase Capacity (Approximate)	828 ml (28.0 fl oz)
	Pinion Height	0.635 mm (0.025 in.)
	Forward Gear Backlash 1.75:1	0.508 mm - 0.635 mm (0.020 in. - 0.025 in.)
	Reverse Gear Backlash Standard & Counter Rotation	0.76 mm - 1.52 mm (0.030 in. - 0.060 in.)

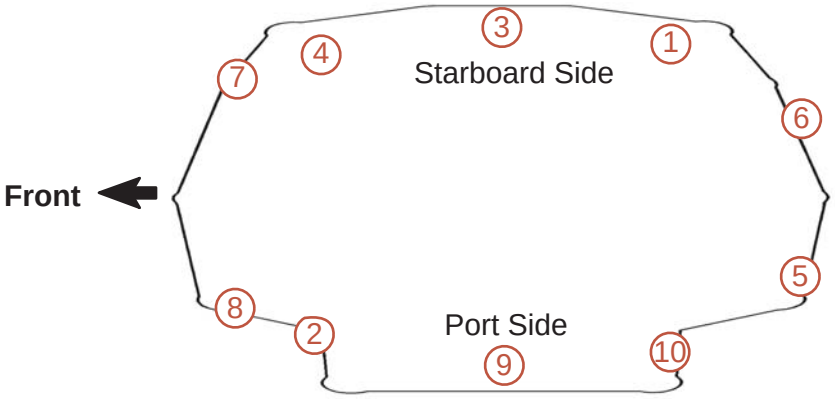
Model 250XS OptiMax		
GEAR HOUSING TORQUE MASTER	Gear Ratio	1.75:1 12/21 Teeth
	Gearcase Capacity (Approximate)	828 ml (28.0 fl oz)
	Pinion Height	0.635 mm (0.025 in.)
	Forward Gear Backlash 1.75:1	0.508 mm - 0.635 mm (0.020 in. - 0.025 in.)
	Reverse Gear Backlash Standard & Counter Rotation	0.76 mm - 1.52 mm (0.030 in. - 0.060 in.)
GEAR HOUSING SPORT MASTER	Gear Ratio	1.75:1 12/21 Teeth
	Gearcase Capacity (Approximate)	828 ml (28.0 fl oz)
	Pinion Height	0.635 mm (0.025 in.)
	Forward Gear Backlash – 1.75:1 – Standard & Counter Rotation	0.508 mm - 0.635 mm (0.020 in. - 0.025 in.)
	Reverse Gear Backlash Standard & Counter Rotation	0.76 mm - 1.52 mm (0.030 in. - 0.060 in.)
MID SECTION	Transom Height	L = 508 mm (20 in.) XL = 635 mm (25 in.) XXL = 762 mm (30 in.)
	Full Trim / Tilt Range (Standard)	71°
	Power Trim (Tilt Range)	19°
	Full Trim / Tilt Range (Offshore)	72°
	Maximum amount of acceptable trim system leak down (travel) in 24 hrs.	25.4 mm (1 in.)
	Steering Pivot Range	Offshore & Standard 60°
	Tilt Pin Adjustment Positions	4
	Allowable Transom Thickness	6.03 cm (2-3/8 in.)

Powerhead Torque and Lube Specifications

QTY	Description	TORQUE			LUBRICANTS
		Nm	lb-in.	lb-ft.	
1	Flywheel Locknut	170		125	
4	Lower End Cap Bolts	9.5	85		
6	Spark Plugs	27		20	
60	Reed Attaching Screws	2.8	25		
12	Reed Block Mounting Bolts	1st - Snug tight 2nd - Torque to 5 Nm (45 lb-in.) 3rd - Torque to 10 Nm (90 lb-in.)			#271 Loctite
3	Fuel Rail Mounting Bolts	44.5		33	
12	Air Plenum/Reed Block Assembly Plate Screws	19.8	175		#271 Loctite
7	Vapor Separator Cover Screws	3.5	30		
8	Crankcase Cover Bolts (M10X80)	40.5 Nm (30 lb-ft) then tighten additional 90°			Light Oil*

* Place oil on underside of bolt head only (not on threads).

QTY	Description	TORQUE			LUBRICANTS
		Nm	lb-in.	lb-ft.	
14	Crankcase Cover Bolts (M8X35)	28.5		21	
40	Cylinder Head Bolts	27 Nm (20 lb-ft) then tighten additional 90°			Light Oil*
12	▲ Piston Rod Bolts	1st - Torque: 1.6 Nm (15 lb-in.) 2nd - Torque: 40.5 Nm (30 lb-ft) Turn bolts additional 90° after 2nd Torque			Light Oil*
10	▲ Powerhead to Mid-Section Nuts (Using tool 91-840912)	1st - Snug tight all locknuts in sequence 2nd - Torque all locknuts to 34 Nm (25 lb-ft) in sequence 3rd - Torque locknuts 1 through 8 to 54 Nm (40 lb-ft) in sequence			



2003 Model 250 XS Wiring Diagram

1 - #1 fuel injector
2 - #2 fuel injector
3 - #3 fuel injector
4 - #4 fuel injector
5 - #5 fuel injector
6 - #6 fuel injector
7 - #1 direct injector
8 - #2 direct injector
9 - #3 direct injector
10 - #4 direct injector
11 - #5 direct injector
12 - #6 direct injector
13 - #1 fuel pump
14 - #2 fuel pump
15 - Shift switch
16 - To ground
17 - Main power relay
18 - Fuses (4)
19 - Slave solenoid
20 - To ground
21 - 60 Amp alternator
22 - Starter solenoid
23 - Starter
24 - To 12 Volt battery (+ cable)
25 - Trim UP relay
26 - Trim DOWN relay
27 - To ground
28 - Trim pump
29 - Cowl trim switch
30 - Remote trim switch
31 - Crank sensor
32 - Oil pump
33 - Low oil switch
34 - MAP sensor
35 - Block pressure sensor
36 - Throttle position indicator
37 - Air temperature sensor
38 - Starboard head temperature sensor
39 - Port head temperature sensor
40 - Compressor temperature sensor
41 - Water in fuel sensor
42 - Diagnostic connector

43 - Accessory power
44 - Data bus (control area network)
45 - Boat harness (digital sensor)
46 - Remote control 47 - Propulsion control module (PCM)
47 - Propulsion control module (PCM)
48 - To ground
49 - Ignition coil #1
50 - Ignition coil #2
51 - Ignition coil #3
52 - Ignition coil #4
53 - Ignition coil #5
54 - Ignition coil #6
55 - Coil driver #1 and #4
56 - Coil driver #3 and #6
57 - Coil driver #2 and #5

See attached 2003 Model 250 XS Wiring Diagram