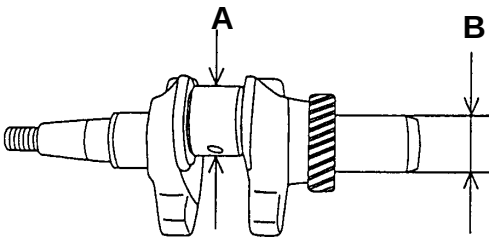
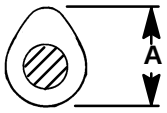
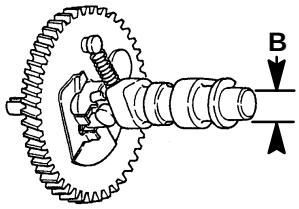
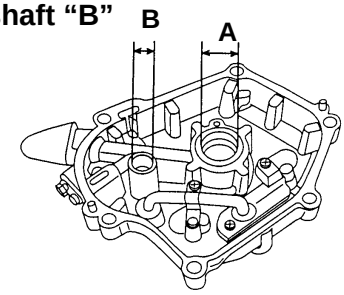
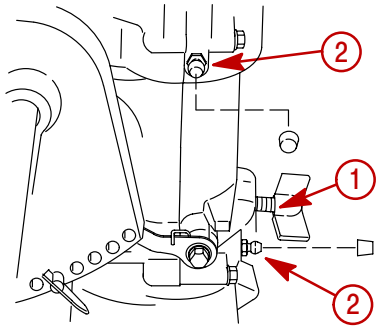
Service Manual Outline

CRANKSHAFT	**Crankshaft Runout** **Diameter of Crank Pin (A)** **Outer Diameter of Crankshaft in Oil Pan Bearing (B)** 	Less than 0.002 in. (0.05 mm) 1.179 - 1.177 in. (29.94 - 29.91 mm) 0.983 - 0.982 in. (24.98 - 24.96 mm)
CAMSHAFT	**Camshaft Dimensions** **Intake/Exhaust "A"** **4 (1999 & 2000)** **5 (1999 & 2000)** **6 (2000)** **4/5/6 (2001 & Newer)** **Bearing Diameter "B"**  	0.993 in. (25.24 mm) 1.047 in. (26.59 mm) 1.115 in. (28.33 mm) 1.115 in. (28.33 mm) 0.550 in. (13.98 mm)
OIL PAN	**Inside Diameter of Oil Pan Bearing:** **Crankshaft "A"** **Camshaft "B"**  **Crankshaft to Oil Pan Bearing Clearance** **Camshaft to Oil Pan Bearing Clearance**	0.985 in. (25.01 mm) 0.5515 in. (14.01 mm) 0.0006 - 0.0015 in. (0.015 - 0.040 mm) 0.0008 - 0.002 in. (0.02 - 0.05 mm)

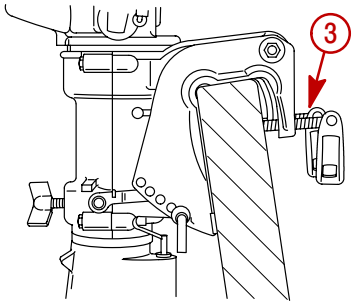
Lubrication Points

Lubricate Points 1 thru 5 with Quicksilver 2-4-C with Teflon Marine Lubricant or Special Lubricant 101.

1. Co-Pilot – Lubricate threads.
2. Swivel Bracket – Lubricate fitting.

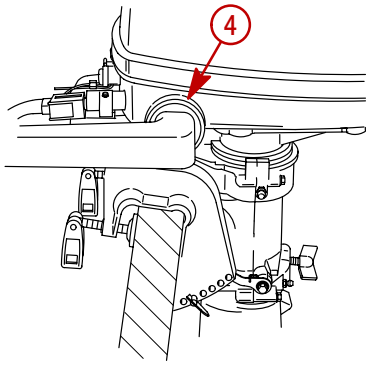


3. Transom Clamp Screws – Lubricate threads.

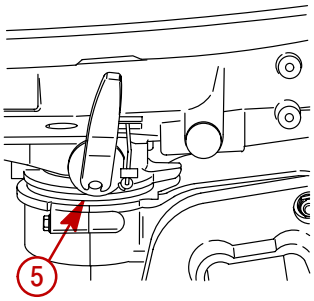


NOTE: *Lubricating points 4 and 5 require disassembly of the product. These points should be lubricated at least once a year by an authorized dealer.*

4. Tiller Handle Rubber Bushing – Lubricate internal diameter.



5. Shift Handle Detent – Lubricate detent.



Following Complete Submersion

Submerged While Running (Special Instructions)

When an engine is submerged while running, the possibility of internal engine damage is greatly increased. If, after engine is recovered and with spark plugs removed, engine fails to turn over freely when turning flywheel, the possibility of internal damage (bent connecting rod and/or bent crankshaft) exists. If this is the case, the powerhead must be disassembled.

Salt Water Submersion (Special Instructions)

Due to the corrosive effect of salt water on internal engine components, complete disassembly is necessary before any attempt is made to start the engine.

Fresh Water Submersion (Special Instructions)

1. Recover engine as quickly as possible.
2. Remove cowling.
3. Flush exterior of outboard with fresh water to remove mud, weeds, etc. DO NOT attempt to start engine if sand has entered powerhead, as powerhead will be severely damaged. Disassemble powerhead if necessary to clean components.
4. Drain engine oil. Do not refill engine oil at this time.
5. Drain carburetor and clean fuel pump assembly.
6. Remove spark plug and get as much water as possible out of powerhead. Most water can be eliminated by placing engine in a horizontal position (with spark plug holes down) and rotating flywheel.
7. Pour alcohol into carburetor throat (alcohol will absorbed water). Again rotate flywheel.
8. Turn engine over and pour alcohol into spark plug opening and rotate flywheel.
9. Turn engine over (place spark plug openings down) and pour engine oil into throat of carburetor while rotating flywheel to distribute oil throughout crankcase.
10. Again turn engine over and pour approximately one teaspoon of engine oil into spark plug opening. Again rotate flywheel to distribute oil in cylinder.
11. Dry all wiring and electrical components using compressed air.
12. Reinstall spark plug.
13. Refill engine crankcase with fresh oil.
14. Attempt to start engine, using a fresh fuel source. If engine starts, it should be run for at least one hour to eliminate any water in engine.
15. If engine fails to start, determine cause (fuel, electrical or mechanical). Engine should be run within 2 hours after recovery of outboard from water, or serious internal damage may occur. If unable to start engine in this period, disassemble engine and clean all parts. Apply oil as soon as possible.

Notice to Installer and Owner

This manual as well as safety labels posted on the outboard use the following safety alerts to draw your attention to special safety instructions that should be followed.

⚠ DANGER

DANGER – Immediate hazards which WILL result in severe personal injury or death.

⚠ WARNING

WARNING – Hazards or unsafe practices which COULD result in severe personal injury or death.

⚠ CAUTION

CAUTION – Hazards or unsafe practices which could result in minor injury or product or property damage.

Boat Horsepower Capacity

U.S. COAST GUARD CAPACITY	
MAXIMUM HORSEPOWER	XXX
MAXIMUM PERSON CAPACITY (POUNDS)	XXX
MAXIMUM WEIGHT CAPACITY	XXX

Do not overpower or overload your boat. Most boats will carry a required capacity plate indicating the maximum acceptable power and load as determined by the manufacturer following certain federal guidelines. If in doubt, contact your dealer or the boat manufacturer.

⚠ WARNING

Using an outboard that exceeds the maximum horsepower limit of a boat can: 1. cause loss of boat control 2. place too much weight at the transom altering the designed flotation characteristics of the boat or 3. cause the boat to break apart particularly around the transom area. Overpowering a boat can result in serious injury, death, or boat damage.

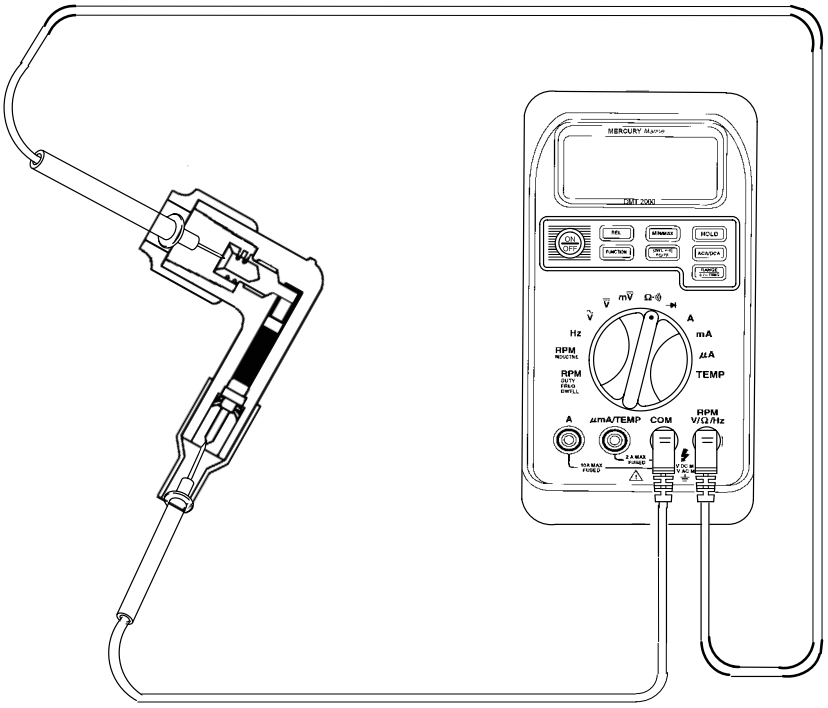
Selecting Accessories For The Outboard

Genuine Mercury Marine Quicksilver Accessories have been specifically designed and tested for your outboard.

Mercury Marine Quicksilver accessories are available from Mercury Marine dealers.

Some accessories not manufactured or sold by Mercury Marine are not designed to be safely used with your outboard or outboard operating system. Acquire and read the installation, operation, and maintenance manuals for all your selected accessories.

3500 - 5200Ω



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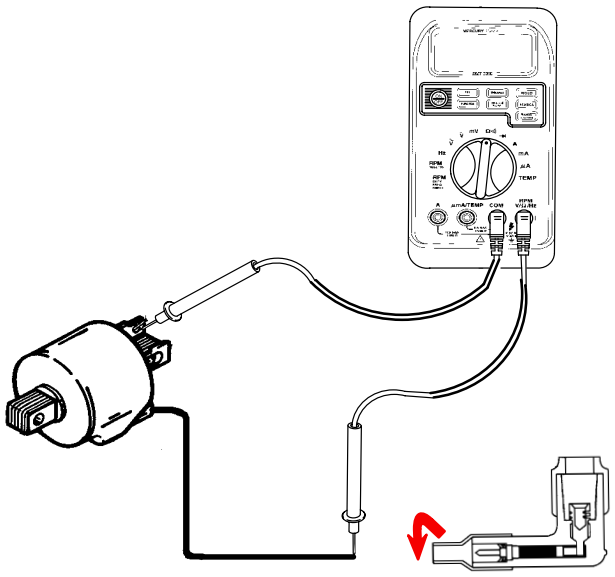
3000-4400Ω



3. If meter readings are other than specified, replace ignition coil. Refer to “Ignition Component Removal Installation,” following.

Test Procedures

IMPORTANT: When using an ohmmeter for any resistance test, always zero meter movement whenever scales are changed.

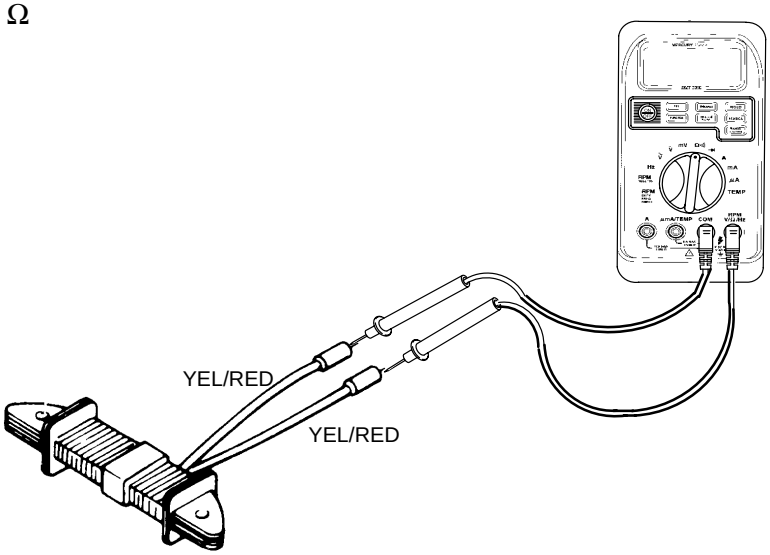
Lighting Coil

⚠ CAUTION

DO NOT rotate flywheel during test or damage to meter may result.

1. Use an ohmmeter to perform the following test.

0.31 - 0.47 Ω

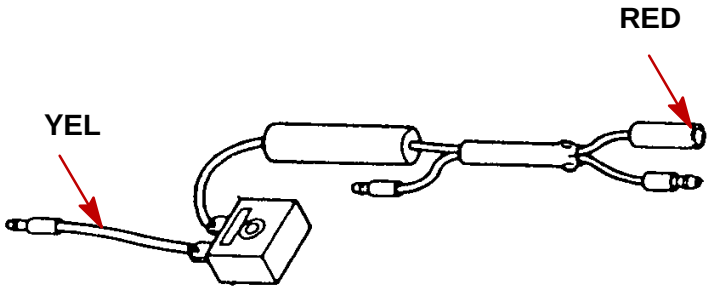


2. If meter readings are other than specified, replace lighting coil. Refer to “Ignition Components Removal and Installation,” following.

Rectifier Diode Test (Optional)

CONTINUITY TEST

1. Connect ohmmeter between YEL and RED rectifier leads (note reading), then reverse test leads. Continuity should be found in only one direction.
2. Replace rectifier if reading are the same for both tests.



FUEL SYSTEM

Section 3A - Fuel Pump & Integral Fuel Tank

Table of Contents

3 A

Specifications

FUEL SYSTEM	**Fuel Pump Type**	External (Plunger/Diaphragm)
	Fuel Pump:	
	Pressure	2.5 - 5.0 psi (17 - 35 kPa)
	Plunger Stroke	0.059 in. (1.5 mm)
	Diaphragm Stroke	0.059 in. (1.5 mm)
	Fuel Tank Capacity	3.2 US Gallons

Quicksilver Lubricants and Service Aids

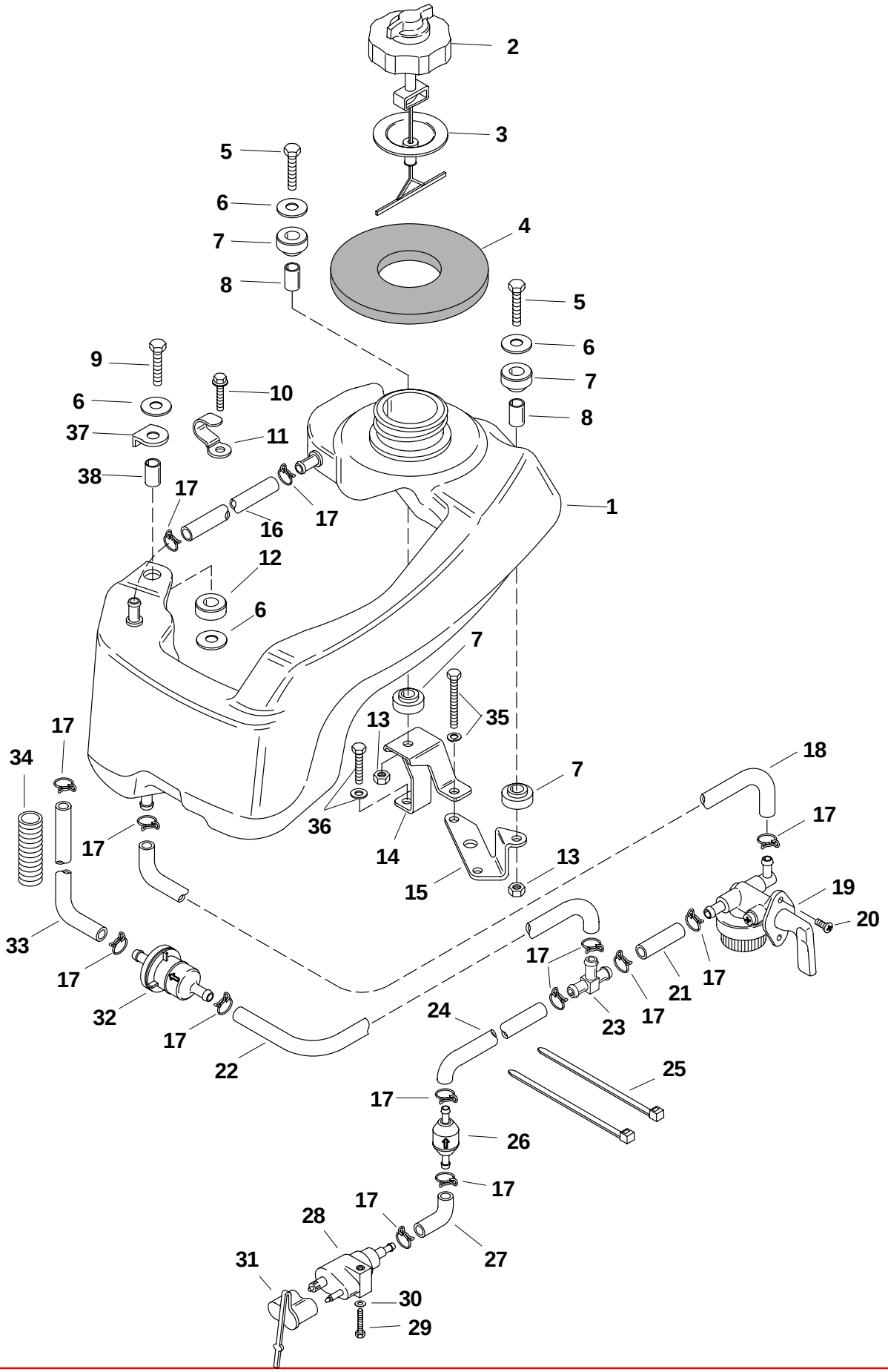
Part No.	Description
92-828000A12	4-Cycle Outboard Oil

⚠ WARNING

FIRE AND EXPLOSION HAZARD. Observe fire prevention rules, particularly NO SMOKING. Before servicing any part of the fuel system, disconnect electrical system at the battery. Drain the fuel system completely. Use an approved container to collect and store fuel. Wipe up any spillage immediately. Materials used to contain spillage must be disposed of in an approved receptacle. Any fuel system service must be performed in a well ventilated area.

FUEL LEAKAGE FROM ANY PART OF THE FUEL SYSTEM CAN BE A FIRE AND EXPLOSION HAZARD WHICH CAN CAUSE SERIOUS BODILY INJURY OR DEATH. Careful periodic inspection of the entire fuel system is mandatory, particularly after engine storage. All fuel components, including fuel tanks, whether plastic, metal, or fiberglass, fuel lines, primer bulbs, fittings, swelling, and must be inspected for corrosion. Any sign of leakage or deterioration necessitates replacement before further engine operation.

INTEGRAL FUEL TANK (4 HP MODELS ONLY)



Emissions Information

Manufacturer's Responsibility

Beginning with 1998 model year engines, manufacturers of all marine propulsion engines must determine the exhaust emission levels for each engine horsepower family and certify these engines with the United States Environmental Protection Agency (EPA). A certification decal/emissions control information label, showing emission levels and engine specifications directly related to emissions, **must** be placed on each engine at the time of manufacture.

Dealer Responsibility

When performing service on all 1998 and later outboards that carry a certification, attention must be given to any adjustments that are made that affect emission levels.

Adjustments must be kept within published factory specifications.

Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the prescribed certification standards.

Dealers are **not** to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications.

Exceptions include manufacturers prescribed changes, such as that for altitude adjustments.

Owner Responsibility

The owner/operator is required to have engine maintenance performed to maintain emission levels within prescribed certification standards.

The owner/operator is **not** to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

Exceptions:

- Carburetor jets may be changed for high altitude use in accordance with factory recommendations.
- Single engine exceptions may be allowed with permission from the EPA for racing and testing.

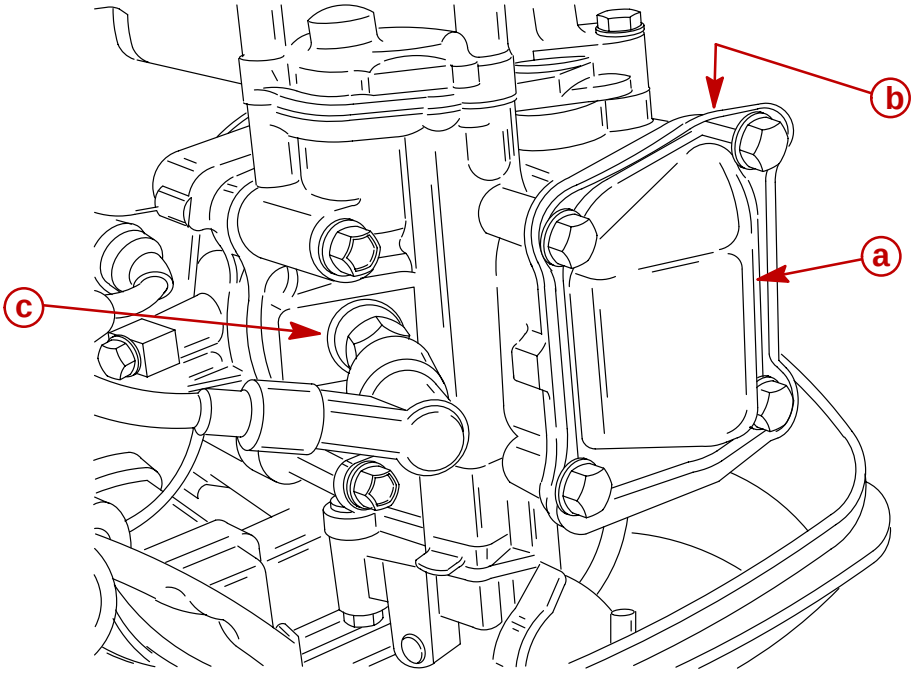
Adjustments

Valve Clearance

IMPORTANT: Make all valve adjustments while engine temperature is cool.

NOTE: *Inspect cover gasket for cuts or tears. Replace gasket if damaged.*

1. Remove cylinder cover and spark plug.



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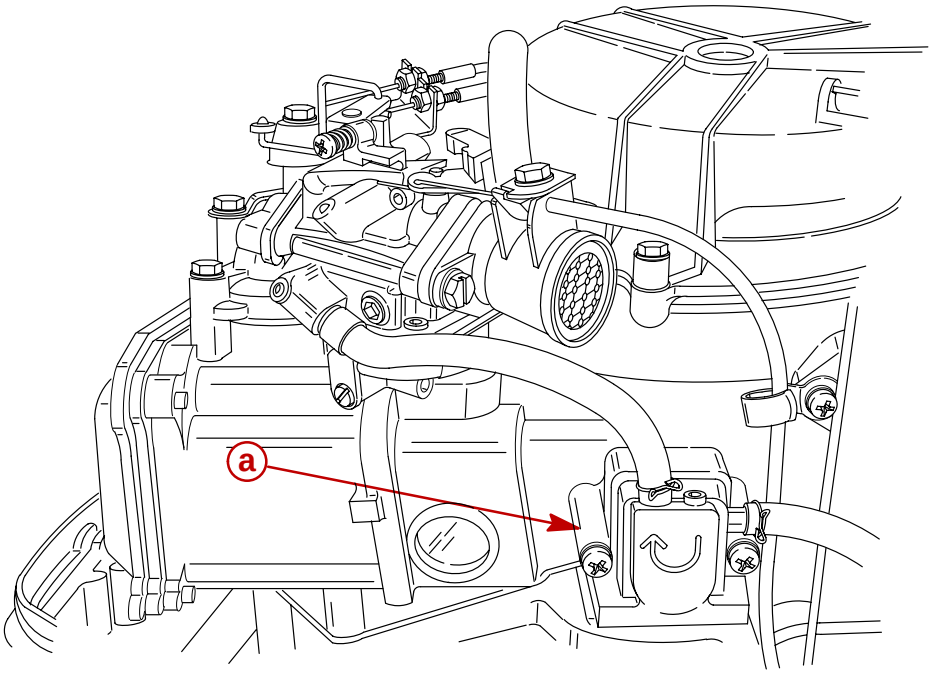
a - Cylinder Head Cover
b - Cover Gasket
c - Spark Plug

2. Remove fuel pump.



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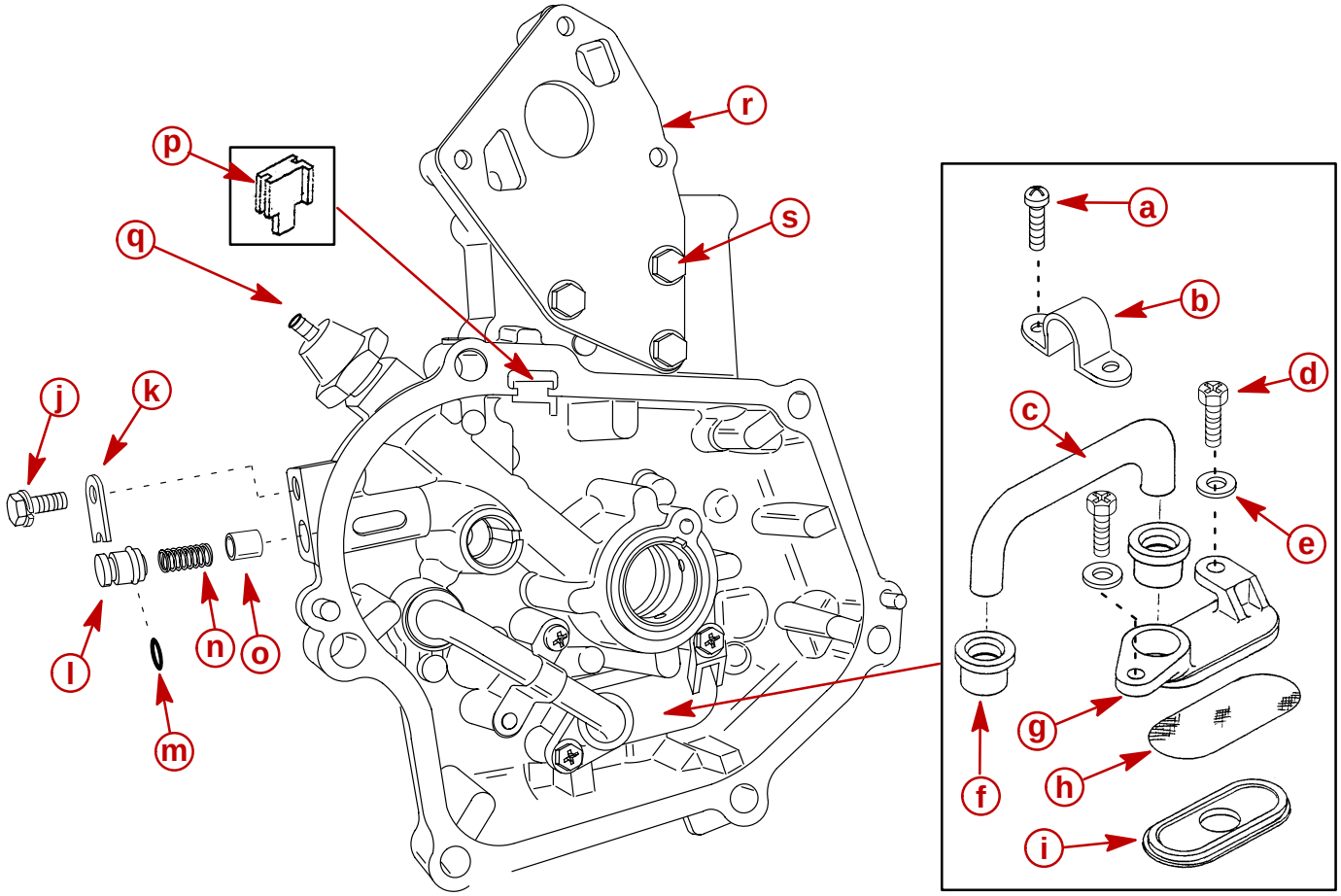
a - Fuel Pump

7. Disassemble the oil pan.

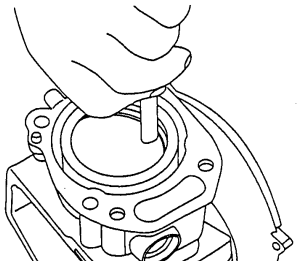


a - Screw M5 x 16 mm
b - Clamp
c - Pipe
d - Screw (2) M5 x 16 mm
e - Washer
f - Seal (2)
g - Body
h - Strainer
i - Cup
j - Bolt M6 x 16 mm
k - Cover
l - Seat
m - O-Ring Seal
n - Spring
o - Plunger
p - Grommet
q - Oil Pressure Sensor
r - Exhaust Plate with Gasket
s - Bolt (3) M6 x 20 mm

Measuring Piston Ring End Gap

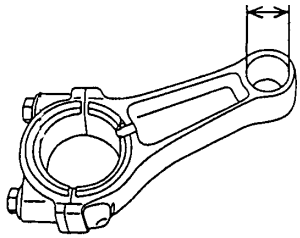
	Standard Value	Out of the Limit
Top	0.006 - 0.014 in. (0.15 – 0.35 mm)	If 0.020 in. (0.5 mm) or more requires replacement
Second	0.012 - 0.020 in. (0.30 – 0.50 mm)	If 0.028 in. (0.7 mm) or more requires replacement
Oil	0.008 - 0.016 in. (0.20 – 0.40 mm)	If 0.024 in. (0.6 mm) or more requires replacement

Push piston rings into cylinder approximately 0.8 in. (20 mm) deep. Push in the rings using the piston.



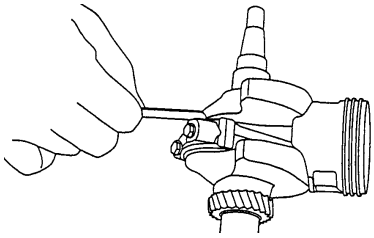
Measuring Diameter of the Small End of Connecting Rod

Standard Value	Out of the Limit
0.6303 in. (16.01 mm)	If 0.6315 in. (16.04 mm) or more requires replacement



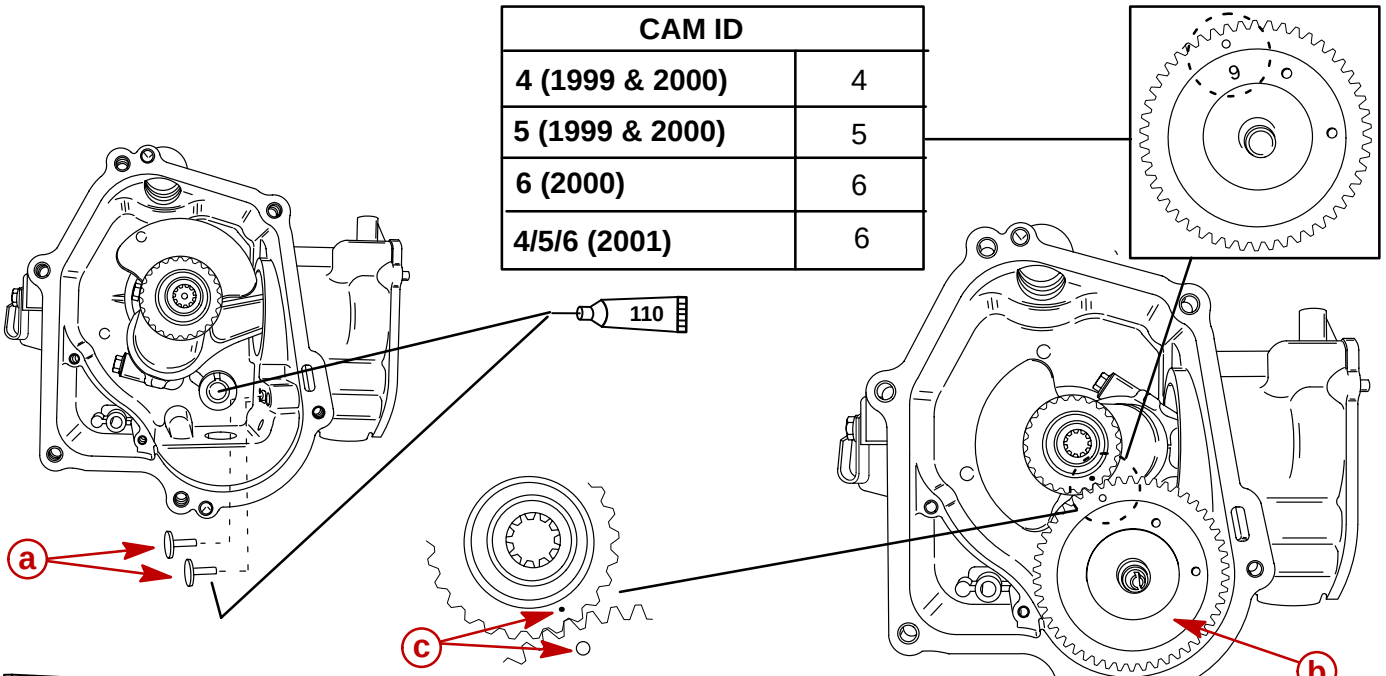
Measuring Side Clearance of the Big End of Connecting Rod

Standard Value	Out of the Limit
0.008 - 0.016 in. (0.2 – 0.4 mm)	If 0.027 in. (0.7 mm) or more requires replacement



17. Install the lifters at this time.
18. Reassemble the camshaft. Align the mark on the camshaft with the mark on the timing gear.

CAM ID	
4 (1999 & 2000)	4
5 (1999 & 2000)	5
6 (2000)	6
4/5/6 (2001)	6



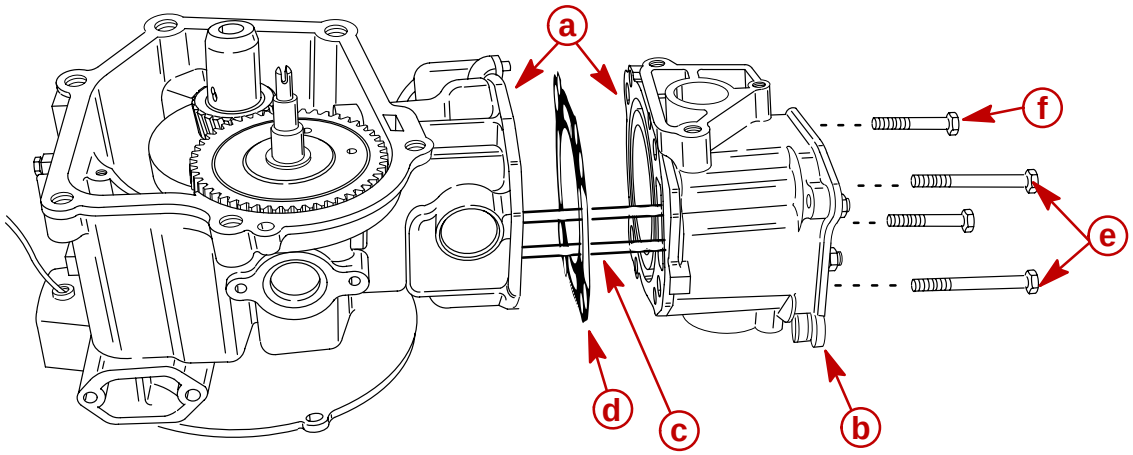
110 4-Stroke Outboard Oil (92-828000A12)

a - Lifters
b - Camshaft
c - Alignment Marks

19. Reinstall the cylinder head.

NOTE: *Be sure cylinder head and cylinder block gasket surfaces are clean and free of oil.*

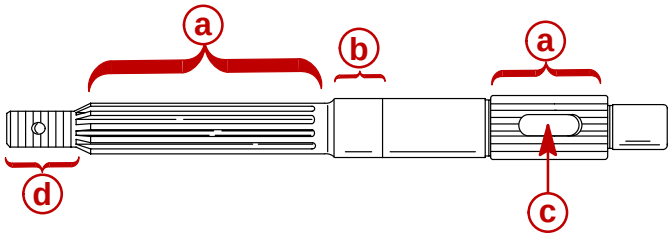
Cylinder Head Bolt Torque
18 lb-ft (24.5 Nm)



a - Make Sure Gaskets Surfaces are Clean and Free of Oil
b - Cylinder Head
c - Push Rods (2)
d - Gasket
e - Bolt (2) M8 x 90 mm
f - Bolts (2) M8 x 60 mm

Propeller Shaft

1. Replace propeller shaft if any of the following conditions exist:
   a. Splines are twisted or worn.
   b. Oil seal surfaces are deeply grooved; allowing water to enter gear housing.
   c. Sliding clutch slot worn.
   d. Propeller nut threads stripped, damaged or excessively worn.



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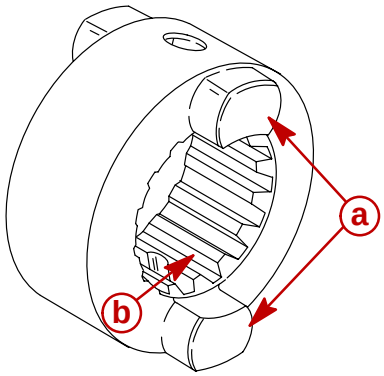
2. Check propeller shaft for straightness. Place shaft on either balance wheels or “V” blocks and rotate shaft while observing spline area for bend (wobble). Replace shaft (if bent).

Sliding Clutch

1. Replace sliding clutch if jaws are rounded or chipped or splines are damaged or worn.



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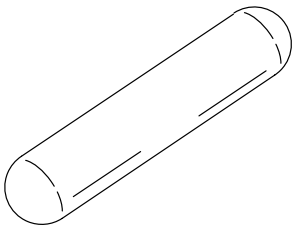
a - Jaws
b - Splines

Cam Follower

1. Replace cam follower if end of follower shows signs of wear.



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Water Pump Components

1. Replace water pump components if worn, grooved or if components show evidence of over heat or other damage.