POLARIS®
WATERCRAFT

2002 OCTANE SERVICE MANUAL

PART NUMBER 9918096

Standard Torque Specifications

The following torque specifications are to be used as a general guideline. Use standard torque values for the appropriate size fastener when torque values are not specified. **Always consult the specific manual section for torque values of fasteners and use of locking agent.**

RECOMMENDED TORQUE SPECIFICATION STAINLESS STEEL FASTENERS (SAE)		
Bolt Size	**Threads/Inch**	**Torque**
8	18 & 32	28 in. lbs.
10	24 & 32	40 in. lbs.
1/4	20 & 28	8 ft. lbs.
5/16	18 & 24	14 ft. lbs.
3/8	16	25 ft. lbs.
3/8	24	28 ft. lbs.
7/16	14	40 ft. lbs.
1/2	13	58 ft. lbs.
1/2	20	70 ft. lbs.

RECOMMENDED TORQUE SPECIFICATION STAINLESS STEEL FASTENERS (METRIC)	
Bolt Size	**Torque**
5mm	45-52 in. lbs.
6mm	66-78 in. lbs.
8mm	13-16 ft. lbs.
10mm	26-30 ft. lbs.
12mm	40-44 ft. lbs.

- To convert in. lbs. to ft. lbs. divide by 12
- To convert ft. lbs. to Nm multiply foot pounds by 1.356.
- To convert Nm to ft. lbs. multiply Nm by .7376.

Periodic Maintenance Schedule

DESCRIPTION	Pre-Ride	Pre-season	1 Mo./ 25 Hrs	3 Mo./ 50 Hrs	6 Mo./ 100 Hrs	Tune Up Item
ENGINE						
Engine corrosion protection/fogging (daily-salt water)	L**	L	L			
Exhaust cooling hoses elbow fittings in pump		I/C		I/C		•
Exhaust hose condition		I		I		
Engine mounts (Replace if removed for engine service)		I			I	•
Water inlet and outlet hoses and clamps		I	I	I	R	
Spark plugs / Compression test		I/R		I	I/R	•
Engine fastener re-torque (cyl head / cyl base, exhaust)		I		I	I	•
FUEL SYSTEM						
Fuel filter		R	I			•
Throttle and choke cables	I	I/L/A		L		•
Carburetor (see engine fogging procedure) synchronize		A/C			A	•
Fuel cap gasket	I	I	I	I	R	
Fuel lines, related hose clamps, check valves and hose inspection, fuel system pressurization		I			I	•
Vent system check-valves; hose routing		I				•
Fuel system pressure/vacuum test		I				
Fuel Tank Hold-Down Straps	I	I	I			
JET PUMP						
Drive shaft coupler assembly and bearing housing		I/L	I/L*		I/L	•
Bilge system pick-up screens and hoses	I/C	I/C				•
Cooling water inlet screen / hoses, clamps	I/C	I/C				•
Jet pump intake grate fasteners and condition		I		I		•
Impeller condition and impeller clearance		I			I	•
ELECTRICAL						
Battery condition, fluid level	I	I				•
Battery vent hose condition/routing (must be clear)		I		I		•
Battery and starter cables(clean connections / tight)		I		I	I	•
Ground cables-condition, corrosion, fastener torque		I		I	I	
Lanyard cord/engine stop switch	I	I				•

KEY

I=Inspect, A=Adjust C=Clean R=Replace item L=Lubricate

* Perform every 15 hrs. or one month when operated in salt water. **Perform daily when operated in salt water.

Engine Break-In Procedure

Properly “breaking-in” the engine is important to the life of any engine. The first tank of fuel is considered the “break-in” period. To “break-in” the engine, use a 32:1 fuel-to-oil ratio. After the “break-in” period, use a 40:1 fuel-to-oil ratio.

The preferred method for mixing fuel and oil together is to have a fuel container 1/2 full of the amount of fuel you want to mix. Weigh the required amount of oil in a plastic cup, then empty into fuel container and mix. After mixing, add the remaining fuel.

Formula: 1 US Gallon = 128oz. ÷ 40 (Desired Ratio) = 3.2 oz. for 1 US Gallon of fuel.

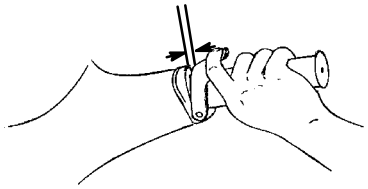
Two-cycle Engine Fuel-To-Oil Ratio Chart		
Gallons of Fuel	**32:1 (Break In)**	**40:1 Ratio (Normal Operation)**
5	20 ounces	16 ounces
10	40 ounces	32 ounces

Engine - Continued

Throttle / Choke Cable Inspection

1. Check for smooth throttle opening and closing in all handlebar positions. Throttle operation should be smooth and lever must return freely without binding.
2. Inspect cable for proper routing, kinks, or damage.
3. Inspect both ends of cable and replace if frayed, kinked or damaged.

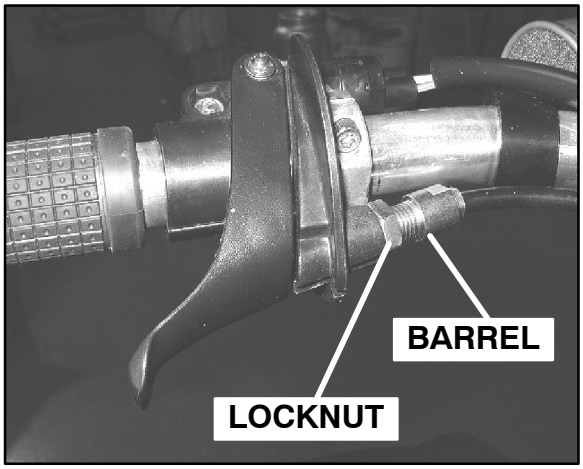
Throttle Lever Free Play



Throttle Lever Freeplay
.020 - .060″ (.5 - 1.5 mm)

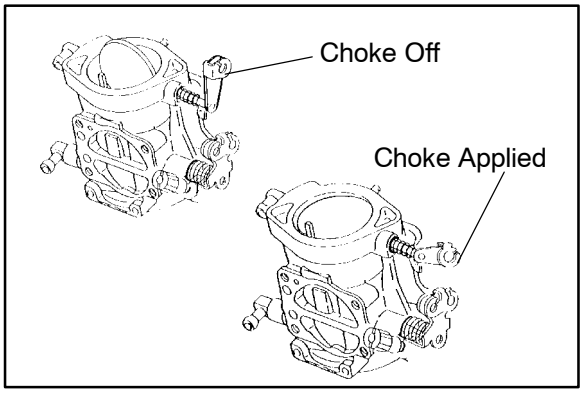
Throttle Cable Adjustment

1. Throttle cable adjustment determines the throttle lever freeplay. Always adjust throttle cable to obtain the correct throttle lever freeplay.
2. To adjust, loosen the locknut on the upper throttle cable adjuster. Turn the barrel clockwise or counter-clockwise to either loosen or tighten the throttle cable until the specified throttle lever freeplay is achieved.
3. Tighten nuts securely and re-check lever free play. Turn bars from full left to full right through entire range of motion and verify that at least the minimum lever play is present in all handlebar positions. Be sure cable is routed properly through the handlebar pad and down the steering post.



Choke Cable Adjustment

1. Locate the choke cable mount on the carburetor.
2. Pull choke knob out to completely close the choke plates. If choke plates do not completely close, loosen the locknut at the carburetor-choke cable boss. Turn the choke cable barrel clockwise or counter-clockwise to either loosen or tighten the choke cable. Correct adjustment is achieved when the choke plates completely close when the choke knob is pulled out.

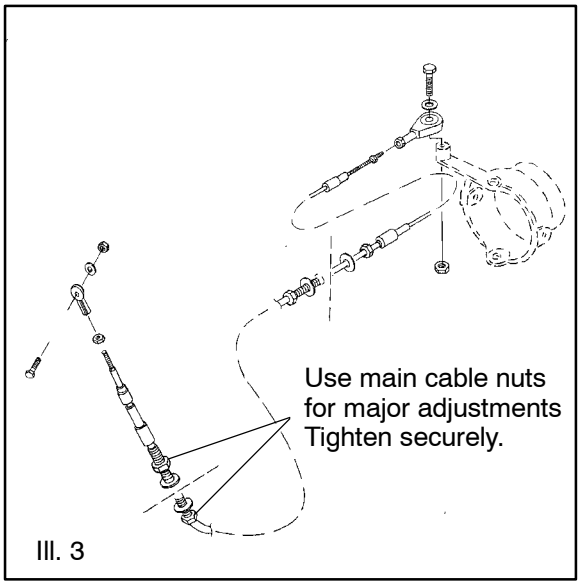


Adjustment Procedure - Continued

4. Use main cable adjuster nuts to make major adjustments. Adjuster nuts are located at forward end of cable near steering assembly. See Ill. 3.

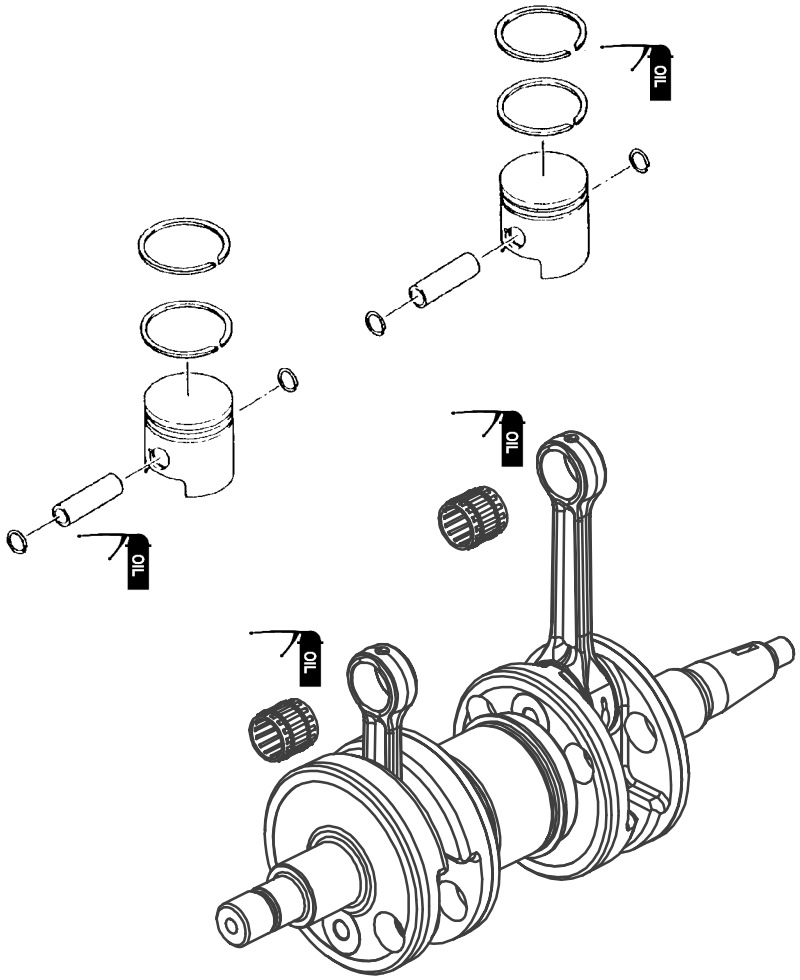
5. Using two 11/16″ open end wrenches, hold one nut and loosen the other. Lengthen or shorten cable to adjust nozzle centering. Tighten cable nuts securely after adjustment is complete.

6. Turn handlebars to left and right through entire steering range. The bars should move freely and smoothly without binding. If resistance or binding is evident check rod end positioning, cable condition, and routing to locate and correct the cause.



Ill. 3

2002 Octane Piston Assembly



Disassembly Procedure	Notes
A . . . . . Wearing appropriate eye protection, remove the c-clips from pistons.	NEVER re-use c-clips.
B . . . . . Remove pins from pistons.	Use piston pin puller: PN PU-45255 w/ PU-45248.
C . . . . . Remove pistons from connecting rods.	
D . . . . . Remove rings from pistons and discard.	
Reference inspection procedures on page prior to assembly.	
Assembly Procedure	**Notes**
1 . . . . . Install small-end needle bearings in connecting rods.	Liberally lubricate the bearing rollers and small-end.
2 . . . . . Engage the piston pin in one end of the piston.	Liberally lubricate the piston pin.
3 . . . . . Install a c-clip on the opposite end of the installed pin.	Use c-clip installation tool: PN 2870773. Always wear eye protection. Position c-clip opening towards the top of the piston.
4 . . . . . Install new rings.	Lubricate rings with oil prior to installation. Verify ring end gaps engage around tabs.
5 . . . . . Install each piston.	Verify arrow on top of piston faces the exhaust-side. Push pin through piston and small-end bearing. Following procedure from step 3, install the second c-clip.

Engine Inspection - Continued

Crankshaft Truing

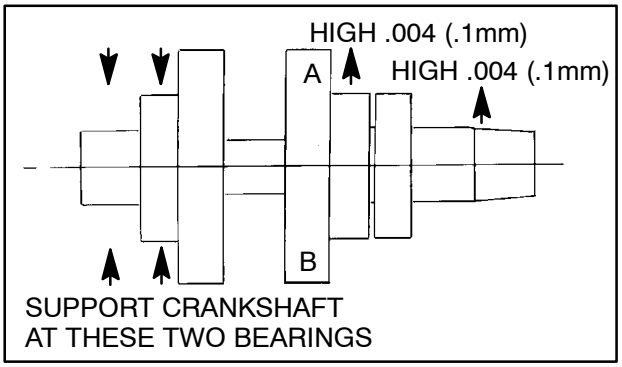
Lubricate the bearings and clamp the crankshaft securely in the holding fixture. Place the center section in the holding fixture and then straighten the remaining end. If truing the crankshaft requires striking with a hammer, always be sure to re-check previously straightened areas to verify truing. Refer to the illustrations below.

Crankshaft Alignment Fixture

PN 2870569

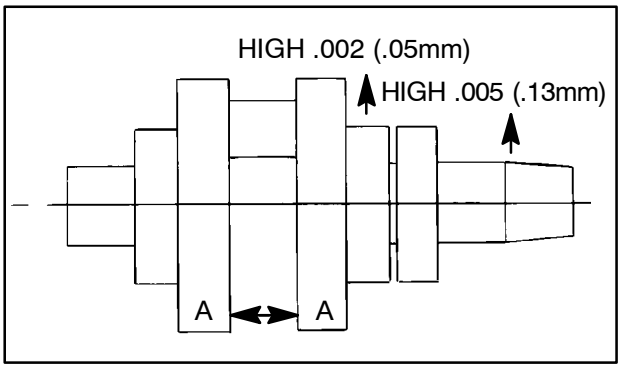
NOTE: The rod pin position in relation to the dial indicator position tells you what action is required to straighten the shaft.

1. To correct a situation like the one shown in the illustration at right, strike the shaft at point A with a brass hammer.



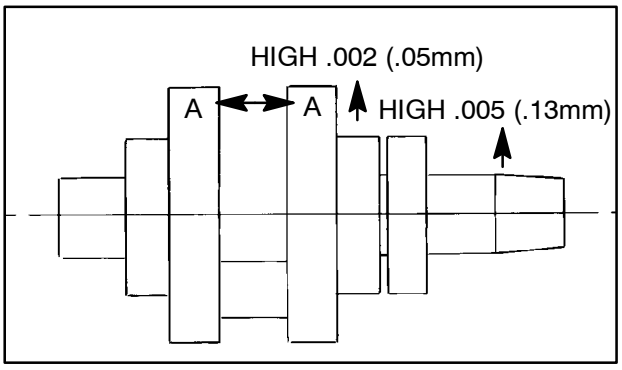
NOTE: The rod pin position in relation to the dial indicator position tells you what action is required to straighten the shaft.

2. To correct a situation like the one shown in the illustration at right, squeeze the crankshaft at point A. (Use tool from alignment kit).

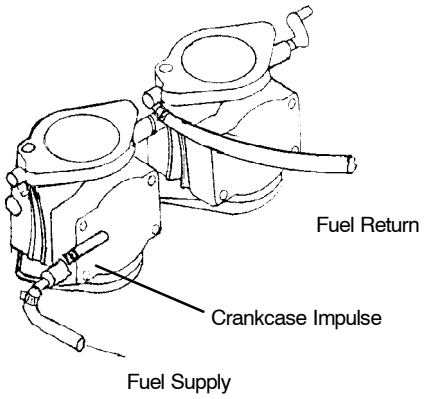


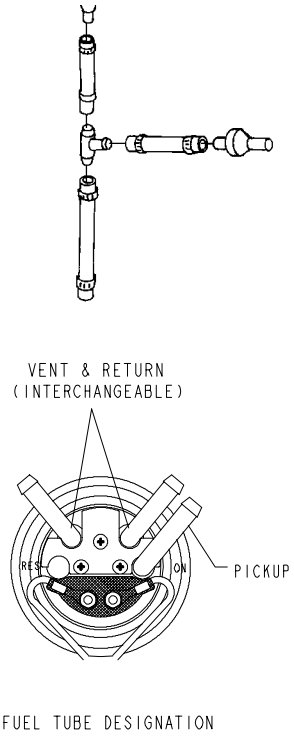
3. If the crank rod pin location is 180° from the dial indicator (opposite that shown above), it will be necessary to spread the crankshaft at the A position as shown in the illustration at right. When rebuilding and straightening a crankshaft, straightness is of utmost importance. Runout must be as close to zero as possible.

NOTE: Maximum allowable runout is .004″ (.1 mm).

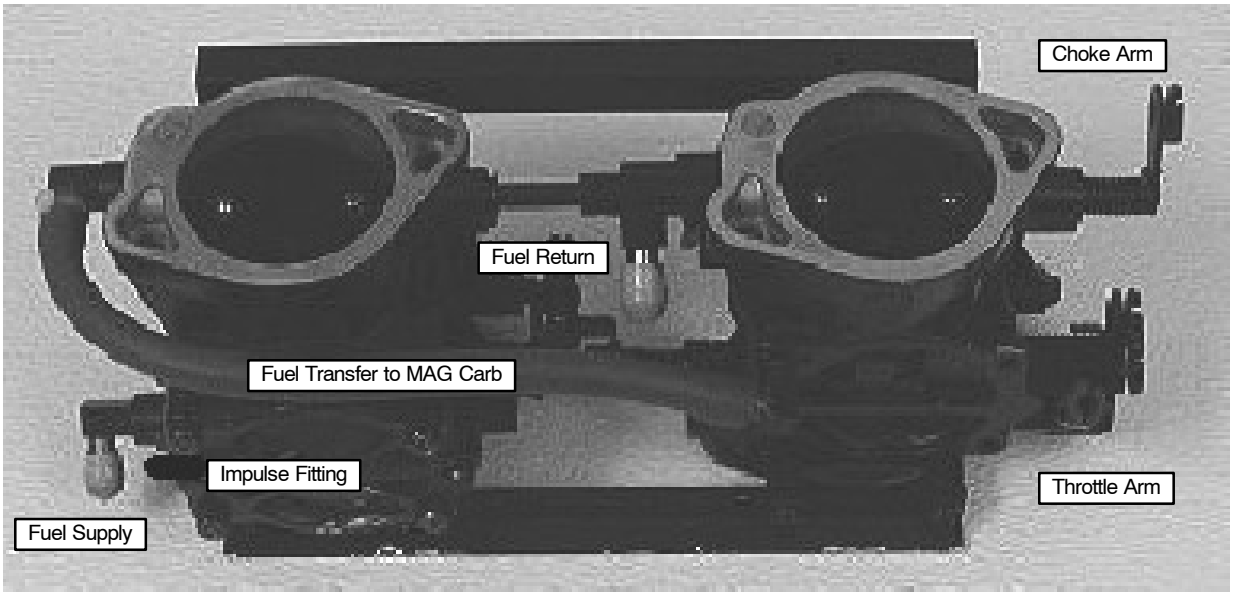


Vent / Fuel Line Delivery Exploded View - Octane



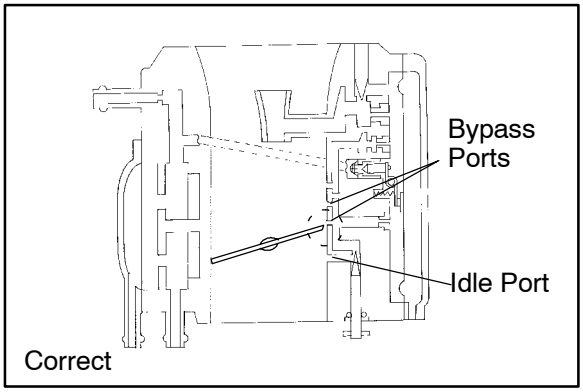


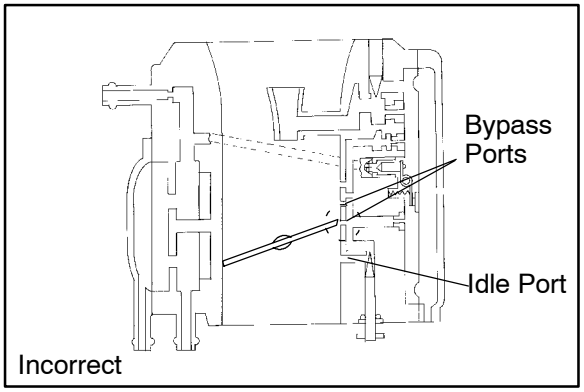
FUEL TUBE DESIGNATION



Carburetor Assembly - Continued

6. Apply Loctite™ 242 to screws and install diaphragm cover with drain hole facing downward. Use care when using Loctite™ to ensure it does not enter the carburetor or linkages.
7. Grease all exposed shafts and springs with Polaris Premium All Season Grease.
8. Manually synchronize carburetors. Look down each carb bore and verify throttle plates are just below first bypass hole (not on or above). Adjust accordingly with idle stop screw.





NOTE: These are initial settings from which additional fine tuning may be necessary.

Polaris Premium All Season Grease

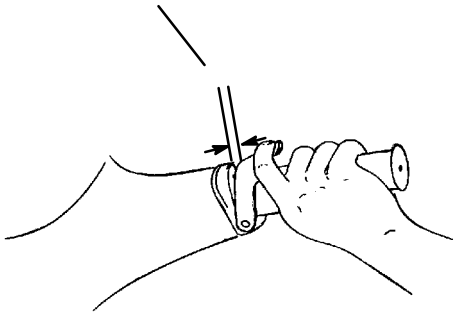
PN 2871322 3 oz. Cartridge
PN 2871423 14 oz. Cartridge

Throttle / Choke Cable Inspection

1. Check for smooth throttle opening and closing in all handlebar positions. Throttle operation should be smooth and lever must return freely without binding.
2. Inspect cable for proper routing, kinks, or damage.
3. Inspect both ends of cable and replace if frayed, kinked or damaged.

Throttle Lever Freeplay
.020 - .060″ (.5 - 1.5 mm)

Throttle Lever Free Play



Pump Alignment

CAUTION:

During production, pump alignment is determined by installing simulated pump and engine fixtures to the watercraft. With the fixtures installed, shims are inserted between the engine plate–to–engine mounts and between the pump assembly–to–hull mounting locations.

Prior to ANY engine or pump removal, the exact number and locations for these shims should be noted for use during re–assembly.

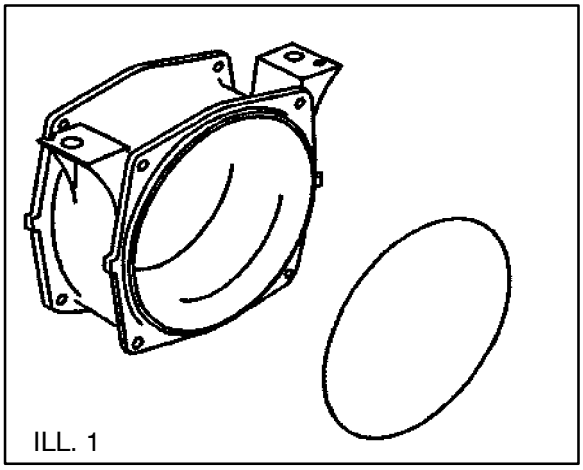
The drive coupler is the key to any attempt to align the engine with the driveline. With the coupler dampener removed, a feeler gauge can be used to measure the axial clearance between the two coupler faces when both the engine and pump assemblies are installed. When differences occur, shims should be added between the engine plate and engine mounts.

The pump assembly is aligned to the hull at a pre–determined angle. Any deviation from the original angle requires realignment of the engine and drive couplers.

Pump Alignment Process

NOTE: The following process assumes that all essential pump parts have been removed from the hull.

1. Attach the pump mount to the hull. (ILL. 1)
   - Always use a new o–ring.
   - Apply a thin bead of marine grade silicone to mating surfaces.
   - Torque mounting bolts to specification before silicone cures.
   - Allow silicone to cure.
2. Obtain stator housing with impeller assembly attached.
3. Obtain diffuser and the four (4) mounting bolts that attach the stator and diffuser to the pump mount.

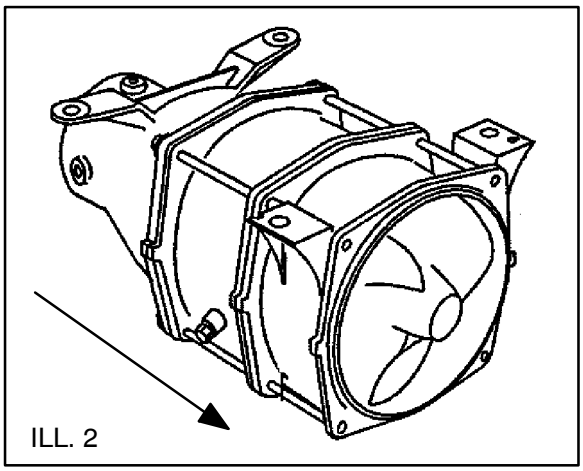

ILL. 1

4. Insert the stator into the pump mount, then the diffuser. Have an assistant hold the two pieces in place while inserting and hand–tightening the four (4) mounting bolts. (ILL. 2)

NOTE: Verify that the stator and diffuser are seated correctly and evenly while tightening mounting bolts.

5. Torque mounting bolts to specification.

NOTE: If installed correctly, there we be a small gap between the rear mounting arms and the bottom of the hull. Do not install washers at this point.


ILL. 2

Electrical Testing

Charging System Testing - Unregulated Voltage - Carbureted Models

1. Open electrical box to gain access to components.
2. Turn multimeter to Volts AC position.
3. Disconnect the Yellow and Red/Pur wires from the terminal board and CDI module. Connect one of the tester leads to the Yellow stator wire and the other lead to the Red/Pur stator wire.
4. Start the engine. While observing the voltage reading, increase engine speed to about 3000 RPM. Reading should be above 20 VAC. If output is low, test the stator battery charge coils with an ohmmeter and compare to specification: .75 ohms.

Charging System Testing - Regulated Voltage - Carbureted Models

1. Turn multimeter to volts DC and connect the leads across the battery terminals.
2. Start and briefly run the engine at 3000 RPM. Measured voltage should be around 14-14.5 VDC. A higher reading may indicate a regulator problem or a poor ground. A lower reading may indicate an excessive system load, stator problem, or a faulty regulator or wire connection.
3. If DC voltage is low, check all connections and charge the battery prior to re-test.

NOTE: The regulator/rectifier is located within the LR module. It is not serviceable and must be replaced if suspect.

Start / Stop Switch Testing - All Models

1. Set multimeter to Ohms position.
2. Unplug the start switch harness from the connector located on handle bar.
3. Connect one of the test leads to the RED/PUR pin, and the other to the Y/R pin.
4. Press the start button. Resistance readings should be .3 ohms or less. Replace switch assembly if readings are above expected range.
5. Insert tether into stop switch. Connect meter leads with BLK and BLK/Y pins. Readings should indicate O.L.
6. Push stop button with tether installed, reading should indicate continuity.
7. Remove tether, readings should indicate continuity.

Tether Switch Testing - All Models

1. Set multimeter to Ohms position.
2. Unplug the start / stop switch harness from the connector located under the handle bar cover.
3. Connect one of the test leads to the Black/Yellow pin, and the other to the Black pin.
4. Disconnect the tether cord. Resistance readings should be .3 ohms or less. If resistance readings are out of range, replace the switch.
5. Connect the tether cord. An OPEN reading should be indicated on the multimeter. If not, replace the switch.

Bilge Pump Testing

Power to the bilge pump is supplied by the LR-31-2 regulator/rectifier. When the LR senses that the engine is running via the YELLOW stator wire, the LR provides 12 Vdc on the ORANGE circuit.

The bilge pump circuit consists of a ORANGE/BLK and BLK wire. The BLK is grounded to the ground strap, while the ORANGE/BLK is terminated to the FUSED-protected ORANGE/BLK tab on the terminal board.

To test the bilge pump while the boat is not running, terminate the ORANGE/BLK wire to any RED/PUR tab on the terminal board. If the bilge pump will not run, check the circuit for any short circuits. If none are found, replace the pump.

If the bilge pump does not turn on when the boat is running, follow this process:

1. Verify that ACv is present on the YELLOW stator wire when the engine is running. If not, verify cause.
2. Replace LR module and re-check.

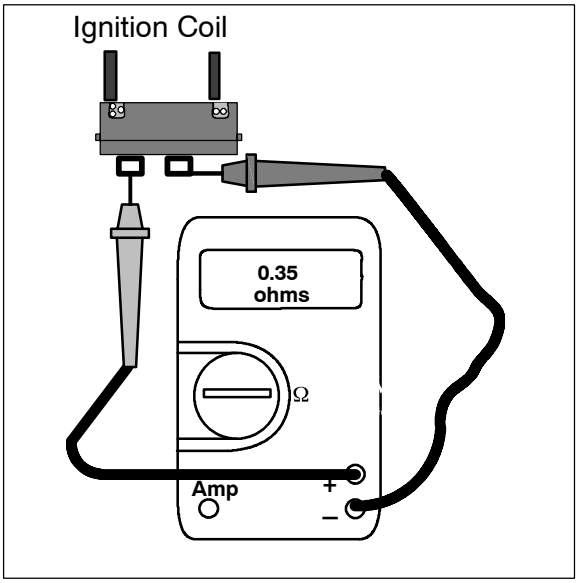
If the bilge pump does not turn off when the engine stops, check the bilge pump OR/BLK circuit for shorts to battery voltage. If none are found, replace the LR module.

PVL Ignition Troubleshooting - Continued

3. Open electrical box. Check the primary side resistance of the ignition coil tabs:

SPECIFICATION:

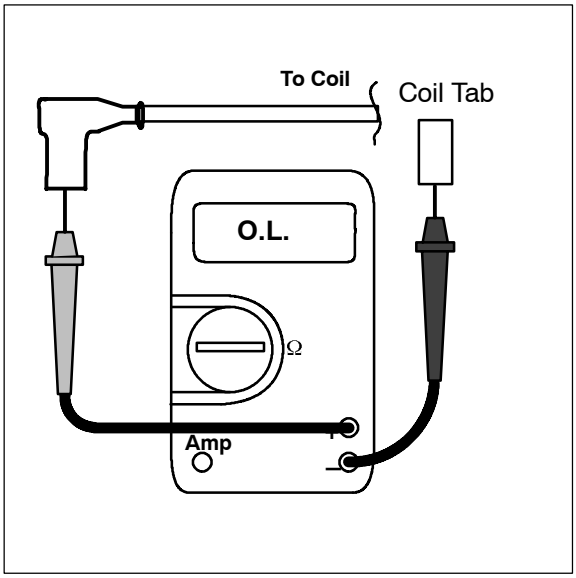
0.35 ohms



4. Check the secondary side resistance of the ignition coils. Coil tab to each secondary lead:

SPECIFICATION:

O.L. OPEN



5. If the readings are still out of range, open the electrical box and remove the plug wire(s).

SPECIFICATION:

3700 - 4540 ohms