ORCA
MARINE COOLING SYSTEMS
BELLINGHAM, WA 98226

Mercruiser 6.2L	**Installation Instructions**	**400555**
2002 Wet V-Drive	**09/10/2003**	**Full System**

1. We recommend you disconnect the batteries while doing any work on your engine. Flush and drain the engine block according to your owner's manual. Remove the plastic engine shroud from the top of the spark arrestor. Disconnect all hoses from the existing thermostat housing. Remove the Water Distribution Housing and the hoses attached to it. Remove the plastic manifold attached to the Water Distribution Housing and the hoses connected to it. Disconnect the wires from the alarm and temperature sending units. Remove the sending units. Remove the thermostat housing, clean the gasket surface and plug the hole with a rag to prevent small parts falling in.

2. Disconnect the 3/8" drain hoses from their "push-lock" fittings on each side of the engine block just above the oil pan. Measure 3-1/4" from each end of the plastic "push-lock" female fitting and cut each hose. Slide a #02 size 4 clamp over the stub hose and then insert the 3/8" white plastic plug. Tighten the clamp. Fit the stub hoses back on the existing "push-lock" male fittings to act as caps.

3. Remove the exhaust elbows or elbows/risers from the exhaust manifolds and carefully clean the gasket surfaces. Temporarily plug the opening in the exhaust manifold with a rag until replacement. If you have a riser make sure you clean the surfaces between the riser and the exhaust elbow as well.

4. NO RISER. Thread the 1H x 3/4M 90 brass hose elbows into the hole at the top front of the port exhaust manifold and face it towards the thermostat housing. The hose elbow in the stb side may need to face slightly outward on an engine with the heat riser tube to route the hose around it. <u>These fittings are the antifreeze return to the heat exchanger.</u>

5. 3 OR 6 INCH RISERS. The risers will have the 45 degree brass hose elbow installed facing inward and horizontal. The 6 inch riser must have the 3/4 hole at the top next to the exhaust elbow and the elbow installed in this hole. If your 6 inch riser does not have the 3/4 threaded hole you must have one machined into it - taking care to not break through the water jacket. <u>These fittings are the antifreeze return to the heat exchanger.</u>

GASKETS

Block-off gaskets for a full system always go directly beneath the exhaust elbow. The pass-thru gaskets will go between the exhaust manifold and the bottom of a riser.

6. Replace the 3/4" plug in the front of the elbow with the 1H x 3/4M 90 brass hose elbow. Face them into the center of the engine. These are your raw water out fittings. Place a full flow gasket between the bottom of the riser (if equipped) and the exhaust manifold. If no riser you will not use these gaskets. Set the block-off gaskets on top of the exhaust manifold, or on top of the riser and replace the exhaust elbow. Install the 1H x 3/4M 90 brass hose elbows in the bottom of the exhaust manifold and face them forward. You will reinstall the 1" hoses connecting the bottom of the exhaust manifold to the water outlet.

7. The new thermostat housing has 3 – 3/8" NPTF holes machined into it and a recess on top for the new thermostat. The housing will have the holes facing forward when installed on the engine. The 3 holes are tapered pipe threads and caution must be used to not over-tighten the fittings. Use pipe thread compound for the threads. NOTE: YOU CANNOT USE TEFLON OR ANY OTHER NON-CONDUCTIVE THREAD SEALER ON THREADS THAT CONDUCT ELECTRICITY. Insert the temperature sending unit into the hole on the starboard side. The 3/8" x 5/8" hose barb will go into the center hole, facing starboard and the ECM alarm sensor will go into the port hole.

8. Remove the 3/4" plug from the top of the circulating pump and replace it with the 3/4" x 5/8" brass hose barb. (If you are installing a heater see below) Thread the 8mm studs in the thermostat boss and snug with fingers. Slip on the 3/8OD x 4-1/4 copper sleeve and then set the #5-A gasket in place. NOTE: This gasket has 4 small brass rivets for electrical continuity; it MUST go on first. Set the thermostat housing on next, brass fittings facing forward with the thermostat recess on top. If not installing a heater you will connect the two 5/8" hose barbs with the 5/8" wire hose and two #08 hose clamps. Reconnect the sending unit wires. Set the new 160° thermostat (1-small hole) in place with the center cone up. Drop a #5 fiber gasket on next, then the steel, saddle mounting bracket, another #5 fiber gasket, the KA-118 water outlet and secure loosely with the 8mm nuts and lock washers. NOTE: You may have to use the 1/2" thermostat spacer to clear the intake plenum.

HEATER: Connect the inlet (pressure) side of the heater to the thermostat housing 5/8 brass hose barb and the outlet (suction) side of the heater to the circulating pump 5/8 brass hose barb.

9. Disconnect the 1-1/4" raw water supply hose at the fitting joining it to the bottom of the 1-3/4" circulating pump hose. Loosen the clamp holding the 1-3/4" hose to the circulating pump and temporarily remove the hose. If your hose is an equal diameter thru the whole length you will use the copper elbow with the 3" extension and trim the existing 1-3/4" circulating pump hose. Use a small section of the trimmed hose to connect the lower end back to the pump. If it is belled at each end and a smaller diameter in the mid-section you will use the 1-1/2 copper connector to section the hose. Place cushion tape on the saddle brackets and set the heat exchanger temporarily in place. Connect the 1-1/4" x 36" wire hose between the fitting on the heat exchanger and the end of the fuel cooler on the port side of the engine. If the 1-1/4 raw water in comes over the engine alongside the port valve cover you will use the 1-1/4 copper connector to fit the hose to the heat exchanger.

10. Insert the 1-3/4" angled fitting on the bottom of the heat exchanger into the trimmed 1-3/4" hose. Once in place, secure with the #32 ss clamps in the kit. Adjust the heat exchanger so the fill neck is straight up and the unit is parallel to the front of the engine. Use 2 of the 1" hoses in the kit to connect the antifreeze return fittings on the manifold or riser to the heat exchanger.

11. Position the 1" x 1" x 1-1/4" 90° tee behind the thermostat housing. Measure, cut and fit the 1" hoses in the kit to fit between the raw water out fittings and the copper tee. You may have to turn and splice the hoses with the 1 x 4 copper connectors. Connect the tee to the heat exchanger with the 1-1/4 x 7 hose. Secure all clamps.

12. Check all hoses and fittings under the heat exchanger to make sure the clamps are tight and that no hoses are potentially touching moving parts. If needed use the HD black cable ties to hold them in position.

13. If you are installing the recovery bottle on the heat exchanger follow these directions. If not, see the CAUTION on the last page. Remove the plastic recovery bottle from its cage bracket. Clamp the bracket upside down in a vise so the mounting bracket eyes are hidden about 1/2" below the top of the jaw. Bend so the eyes are 90° away from the center of the bracket so they will not interfere with the replacement of the plastic recovery bottle. Loop the 5.25" T-bolt clamps around the heat exchanger and the saddle brackets making sure the male end of the thread is pointing upward. Place a 5/16" ss flat washer on each side of the eyelet, set over the clamp threads and then the nut.

Tighten the clamp so the cap on the bottle is level with the top of the heat exchanger. Attach and trim the 5/16" clear hose between the bottom of the recovery bottle and the vent tube on the pressure cap. The 5/16" clear vinyl tube in the kit is the overflow tube in case the recovery bottle becomes full.

14. Fill the heat exchanger with a maximum 50/50 mix of antifreeze and distilled water. Follow the directions on the antifreeze for your area. Idle the engine with the pressure cap off until you see the liquid begin to move in the heat exchanger. You may need to add solution as the engine draws down the mixture. It should stabilize just below the base of the fill neck before you place the pressure cap back on. Once you place the pressure cap on, DO NOT REMOVE IT AGAIN WHILE HOT. SERIOUS BURNS OR INJURY CAN OCCUR FROM ESCAPING STEAM. If your temperature gauge indicates an overheating situation you should shut down the engine and allow it to cool. Once cool, adjust the level in the recovery bottle as indicated.

CAUTION:

INSTALLATION OF THE PLASTIC COOLANT RECOVERY BOTTLE IS CRITICAL TO THE OPERATION OF THIS SYSTEM.

IT MAY BE INSTALLED ANYWHERE IN THE ENGINE COMPARTMENT BUT MUST MAINTAIN THE LIQUID LEVEL BETWEEN THE COLD LINE AND THE HOT LINE AT ALL TIMES.

THE RECOVERY BOTTLE ALLOWS FOR THE EXPANSION AND CONTRACTION OF THE ANTI-FREEZE SOLUTION IN NORMAL OPERATION.