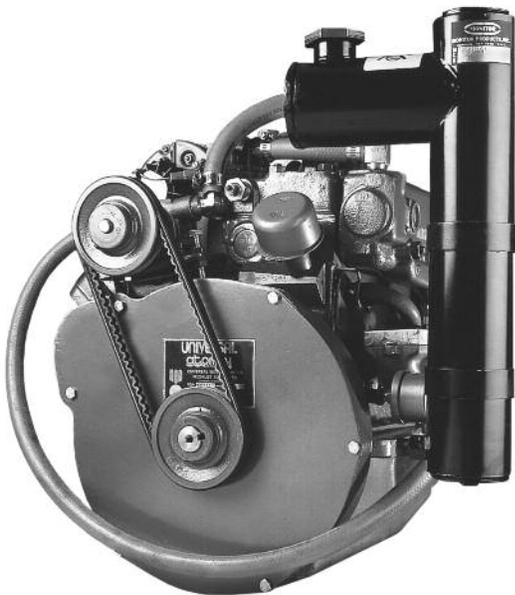




GENERAL:

Fresh Water Cooling Systems are now used on virtually every marine engine currently being produced for pleasure sail boats. In addition to the obvious advantage of preventing corrosion, enclosed cooling systems allow engines to run at higher and more efficient temperatures; and on boats with hot water heaters they provide hotter water for domestic use.

The Moyer Marine Inc. Fresh Water Cooling kit requires two inches clearance in front of the engine to accommodate a V-belt driven sea water pump which mounts above the starter as in the following photo.



The kit includes all necessary mounting hardware except hoses and clamps. The vertical heat exchanger is 16" tall and is designed to be mounted remotely from the

engine. It can be located in virtually any location on the boat, as long as the filler cap is the highest point in the cooling system. (See page 6 for a drawing of the heat exchanger.)

The kit includes a Moyer Marine 501 pedestal pump to move sea water through the heat exchanger. This pump uses the same impeller as the MMI 502 flange pump and the Oberdorfer Model 202M series pumps which are commonly used on sea water cooled engines.

After installing the kit, the original sea water pump will draw cooled water from the fresh water outlet of the exchanger (rather than from the sea water thru-hull) and pump it through the engine. After circulating through the engine, the fresh water returns to the fresh water inlet of the exchanger to be cooled and re-circulated (rather than exiting through the exhaust).

The new sea water pump receives water from the thru-hull and pumps it through the sea water side of the exchanger. When it comes out of the exchanger, the sea water is routed to the exhaust system as before to be discharged. (See schematic on page 5)

INSTALLATION INSTRUCTIONS

GENERAL: There is frequently a lot of concern over the effects of installing a fresh water cooling system on older engines which may have unknown amounts of

scale and/or other perceived ailments of old age.

As a general rule, any engine which is not having overheating problems at the present time, should have no problems after installing the fresh water cooling system; and will only benefit from the installation.

INSTALLING THE POWER TAKE-OFF (PTO) SHAFT:

- 1) Remove the flywheel cover.
- 2) Remove all flywheel retaining nuts.
- 3) Slip the PTO shaft over the flywheel studs. Like the flywheel, the PTO will only go over the flywheel studs one way. Make sure that the roll pin in the end of the crank shaft is well centered so that it will not interfere with the ID of the PTO shaft.
- 4) Install the flywheel nuts, flywheel cover, and the 4" x 1" pulley over the PTO shaft. Be sure to install the key way in the pulley, and then tighten its' set screw.

INSTALLING THE SEA WATER PUMP:

- 1) Remove the upper mounting bolt on the starter.
- 2) The sea water pump is pre-assembled to its' bracket so as to facilitate this step. Install the sea water pump assembly over the starter, and reinstall the starter bolt through the lower hole in the pump bracket.

The pump mounting hole in the bracket nearest the center of the engine is elongated to allow for some adjustment of the pump to align its' pulley with the pulley on the PTO shaft.

NOTE: It is best to leave all bolts in the pump/bracket assembly a bit loose until the following adjustments are made:

3) Adjust the pump assembly in the following sequence:

~ Align the pulley of the sea water pump as close as possible with the PTO shaft pulley, and then tighten the 5/16" mounting bolts in the base of the pump. During this step, it is best to have the upper starter mounting bolt snug enough so that the pump mount will be in its' final position in terms of the pulley alignment, but loose enough to allow the mount to move up and down until final belt tension adjustment is made.

~ Install the pump drive belt and adjust tension so that approximately 1/2" to 3/4" of play remains at the center of the belt. Either side of the belt can be checked. After adjusting, secure the adjusting bolt with its' locking nut.

~ Tighten the upper starter mounting bolt.

~ Re-check alignment of the pump and PTO pulleys. If, after tightening the starter bolt, the alignment of these two pulleys shifted; loosen the pump mounting bolts and adjust as necessary.

4) When all adjustments are made, re-check that all mounting bolts (including the set screw in the sea water pump pulley) are tight.

INSTALLING THE HEAT EXCHANGER:

The heat exchanger is shipped with its' mount pre-assembled to facilitate mounting. Bolts or screws (1/4") can be used as appropriate once its' location is decided upon. These mounting fasteners are not provided in the kit.

If the selected location of the exchanger is more than 4 feet (or so) from the engine, the size of connecting hoses for the engine coolant loop should be increased from 1/2" (which is normal) to 5/8" so that head loss can be kept low.

The only other consideration in locating the heat exchanger is that its' filler cap should be the highest point in the system, so that when it is removed, coolant won't spill out over the top of the filler neck.

If it is necessary to mount the exchanger with its' filler neck lower than some other part of the system (as is sometimes the case with hot water heaters located high in a cockpit locker), a spring loaded check valve should be installed just downstream of the outlet of the exhaust manifold.

This check valve will prevent the engine coolant within the hot water heater from draining back through the engine and flooding the heat exchanger. (See schematic on back page.)

Mount the expansion tank so that the level in the tank will always be at, or (preferably) below, the top of the fill tube of the exchanger. This precaution will prevent antifreeze from ever overflowing the exchanger when the fill cap is removed.

INSTALLING THE SEA WATER HOSES:

NOTE: Be sure to close the thru-hull valve before removing existing hoses.

1) In connecting the sea water hoses in the following steps, it may be necessary to replace one or two existing hose barb fittings if their hose ends are not 5/8".

2) Connect three new 5/8" sea water hoses as follows:

~ From the sea water thru-hull to the inlet of the sea water pump.

~ From the outlet of the sea water pump to the sea water inlet of the exchanger

~ From the sea water discharge of the exchanger to the water discharge fitting on the exhaust system. If the original discharge point on the exhaust system does not have a 5/8" hose fitting, it will need to be changed to accommodate the 5/8" hose.

INSTALLING FRESH WATER HOSES:

Connect two new 1/2" fresh water hoses as follows:

~ From the inlet of the fresh water pump (the original engine mounted pump) to the hose barb on the fresh water outlet (the lower outlet) of the exchanger.

~ From the 1/2" hose barb on the outlet of the manifold to the fresh water inlet of the heat exchanger.

NOTE: In the case of hot water heater installations, the engine coolant hose from the outlet of the manifold should go directly to the inlet of the hot water heater. (See schematic on page 5)

START-UP:

- 1) Fill the heat exchanger with a 50/50 mixture of marine grade anti-freeze and water. In areas where regulations allow, any good quality automotive permanent anti-freeze will suffice. Have at least 2 quarts of additional mixture on hand to add as soon as engine is started. Let the filler cap off of the exchanger until it is topped off after start-up to avoid air being trapped in the system.
- 2) Open sea water thru-hull.
- 3) Start engine.
- 4) Check for a good discharge of sea water out of the exhaust which should start in 15 seconds (or so).
- 5) As soon as sea water flow is established, check the level of coolant in the heat exchanger and add as necessary to maintain a level approximately 1 1/2" below the filler cap. While topping off the heat exchanger, check for a good flow of coolant entering through the fresh water inlet.

NOTE: On early model engines, a manual valve should be installed in the recirculating loop so that the loop can be closed for initial start-up. This action will purge the engine of air. As soon as the system is filled, the valve should be opened.

TROUBLE SHOOTING:

General: In warmer climates, it is normal for the engine to run hotter than it did while

being raw water cooled. Temperatures of 185 to 190 degrees are not uncommon at cruise power settings in southern areas.

As stated previously, if there were no problems being experienced within the cooling system before installing the fresh water cooling kit, there should be no problems to deal with after installation. Most start-up problems are associated with one of the following:

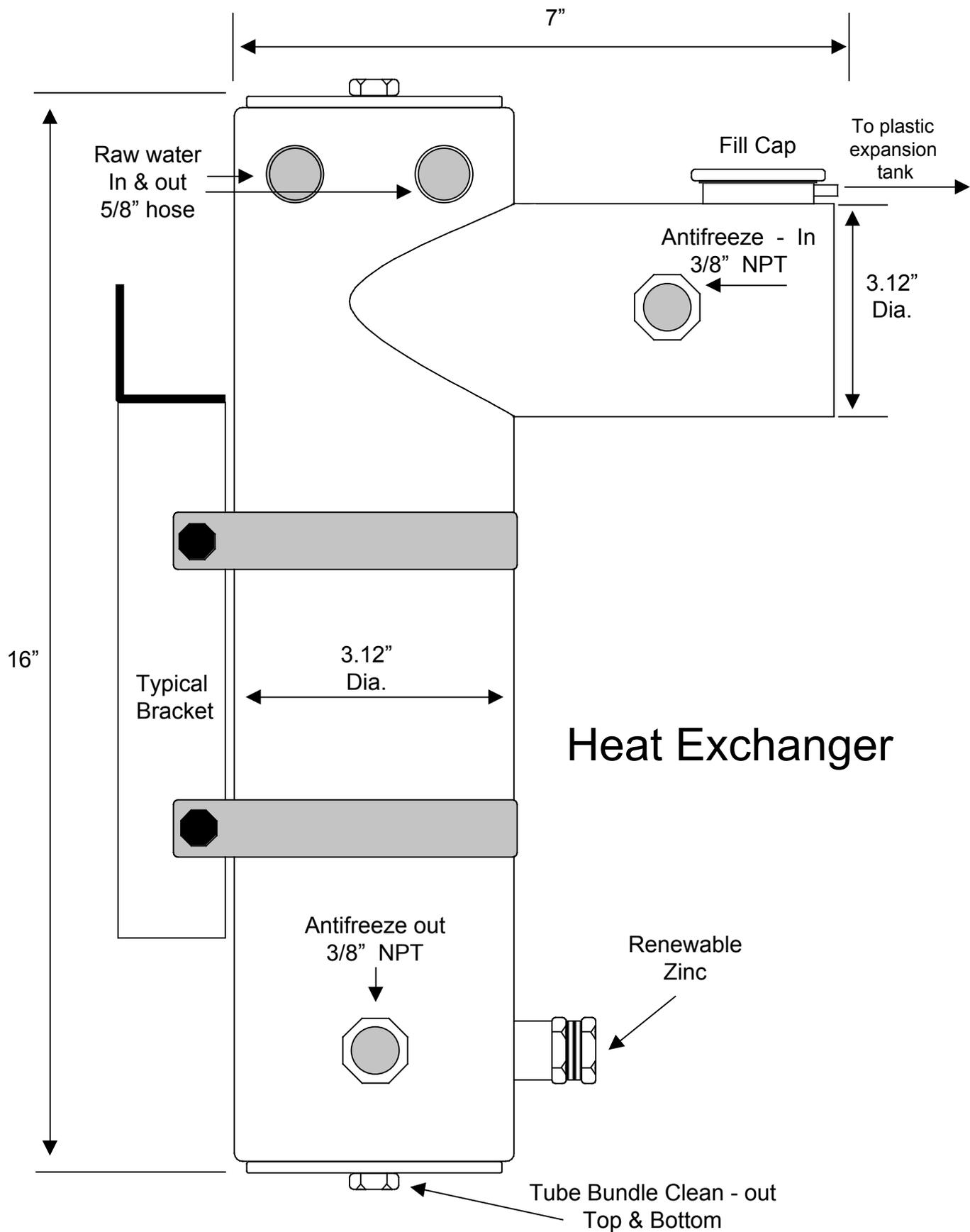
~ Check for incorrect hose connections:

Connections to the Sea Water Pump may be incorrect. If you look at the front of the pump, it would appear that the counter-clockwise rotation would draw water into the right hand port and discharge it out of the left hand port. This is not the case.

The pressure gradient within the pump is such that water is actually drawn into the left hand port and discharged out of the right hand port, which is opposite to what would seem logical.

~ Check for too much flow through the by-pass loop:

If temperature exceeds 190 degrees, it is likely that the thermostat is not able to fully close the by-pass loop due to a faulty thermostat housing or restrictions within the block or head. This condition can be confirmed by temporarily squeezing the by-pass hose closed. If temperature lowers immediately, check the condition of the thermostat housing. If it is badly deteriorated, either replace it or install a spring loaded check valve (or manual valve) in the by-pass loop to provide a bit of back pressure to force more coolant through the block.



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