Moyer Marine inc.

Atomic - 4
Fresh Water Cooling Kit

PARTS

For installation help, please watch the fresh water cooling video, found in the video tech tips section, under the support menu of our website.

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.

Moyer Marine Fresh Water Cooling kits are available in both a front or side mounted configuration. The front mounted kit requires two inches of clearance in front of the engine to accommodate a V-belt driven seawater pump which mounts above the starter.

Both front and side mounted kits include 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.

The exchanger can be located in virtually any location on the boat, as long as the filler cap is the highest point in the cooling system.

Both front and side mounted kits include a Moyer Marine 501 pedestal pump to move seawater through the heat exchanger.

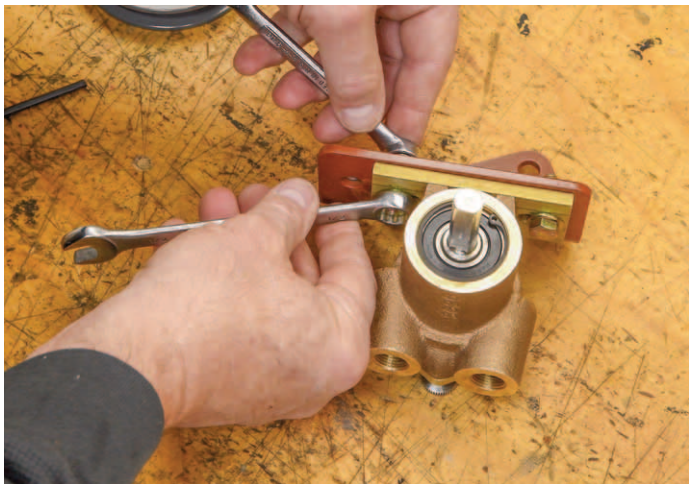
This pump uses the same impeller as the MMI 502 flange pump and the Oberdorfer Model 202M series pumps which are commonly used on seawater cooled engines.

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

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

FRONT MOUNTED KIT INSTALLATION:

(For both kits, please reference illustrations, pages 4-7).



Mounting seawater pump to front mounted bracket

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 (photo 1).

4) Install and retorque the flywheel nuts to 35 foot-pounds, and then reinstall the flywheel cover. Next install the 4" x 1" pulley over the PTO shaft. Be sure to install the key way in the pulley, and then tighten its' set screws.

INSTALLING THE SEAWATER PUMP:

1) Remove the upper mounting bolt on the starter.

2) Install the seawater pump to it's bracket using the supplied fasteners, adding the stainless steel adjusting bolt and nut to the bracket, then reinstall the starter bolt through the hole in the pump bracket. The bracket and pump will now be on top of the flywheel housing (photo 2).

The pump mounting holes in the bracket are elongated to allow for some adjustment of the pump to align its' pulley with the pulley on the PTO shaft.

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

3) Adjust the pump assembly in the following sequence:

- Align the pulley of the seawater 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 lose enough to allow the mount to move up and down until final belt tension adjustment is made.

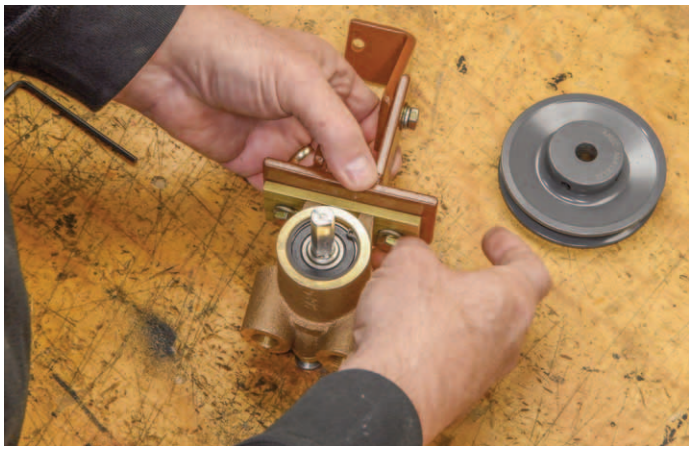
- Install the pump drive belt and fine tune the pulley alignment. Then, using the stainless steel adjusting bolt adjust tension so that approximately 1/2" to 3/4" of play remains at the center of the belt. Either side of the belt can be checked. After adjusting, secure the adjusting bolt with its' locking nut. (photo 3).

- 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 seawater pump pulley) are tight.

SIDE MOUNTED KIT INSTALLATION:



Mounting seawater pump to side mounted bracket

INSTALLING THE SEAWATER PUMP:

1) Loosen the alternator mounting bolt (at the lifting eye bracket), and the alternator support arm bolt allowing the alternator to lower freely. Remove the alternator belt and set aside, it will not be needed.

2) Remove the outermost aft housing bolt which is located directly to the right of the water pump flange. Set this bolt aside, it will not be needed (photo 4).

3) Remove the pivot bolt from the bracket, and separate the right angle section from the rest of the bracket. Bolt the right angle section to the aft housing using the 2" bolt and washer supplied in the kit (photo 5,6,7). **NOTE:** The extra 5/16" x 3/4" bolt and washers packaged with the pump bracket may be ignored, unless you have an early model accessory drive which has a 5/16" threaded hole in it's side to use as an additional mounting point.

5) Loop the supplied belt over the alternator pulley first, then down behind and under the accessory drive pulley. Angle the pump/bracket assembly and locate it's pulley behind the belt. Once the belt is over all three pulleys, reassemble the pump bracket using the pivot bolt, tighten the pivot bolt, but not fully. Leave loose enough to pivot the pump (photo 8,9,10).

6) Pivot the pump until the pump pulley is in alignment with the alternator and accessory drive pulleys, then tighten the pivot bolt. If necessary loosen the pump pulley set screws and tap the pulley in or out until the belt is as straight as possible, then retighten set screws (photo 11).

7) Pivot the alternator up until approximately 1/2" of belt play remains between the pulleys, then tighten the alternator support bracket bolt. Finally tighten the alternator mounting bolt at lifting eye bracket (photo 12).

INSTALLING THE HEAT EXCHANGER:

If the selected location of the exchanger is more than 4 feet (or so) from the engine, the size of connecting hoses for the antifreeze 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's 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 after the rear 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.

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 overfilling the exchanger when the fill cap is removed.

INSTALLING THE SEAWATER HOSES:

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

In connecting the seawater 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".

Connect three new 5/8" seawater hoses as follows:

1) From the seawater thru-hull to the inlet of the seawater pump.

2) From the outlet of the seawater pump to the seawater inlet of the exchanger

3) From the seawater discharge of the exchanger to the water entry 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 or adapted to accommodate the 5/8" hose.

INSTALLING FRESH WATER HOSES:

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

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

2) From the 1/2" hose barb on the outlet of the manifold to the antifreeze inlet of the heat exchanger (the fitting just below the fill cap).

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.

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 seawater thru-hull.

3) Start engine.

4) Check for a good discharge of seawater out of the exhaust which should start in 15 seconds (or so).

5) As soon as seawater 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:

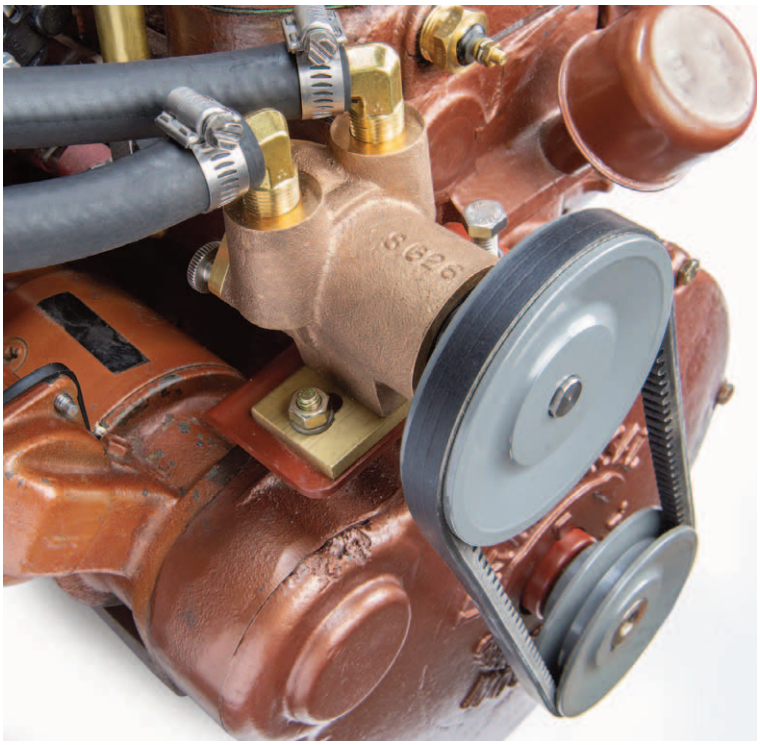
- Check for incorrect hose connections:

Connections to the seawater 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, (when facing the pump, or looking down the shaft) which is opposite to what would seem logical.

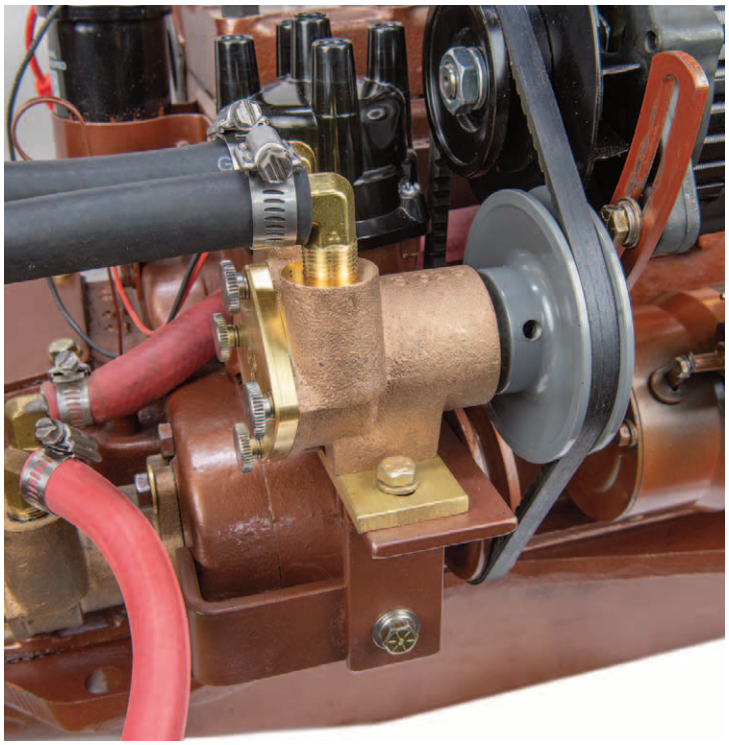
- Check for too much flow through the by-pass loop:

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, corroded thermostat housing or restrictions within the block or head. This condition can be confirmed by temporarily squeezing the by-pass hose closed. If the temperature lowers immediately, check the condition of both the thermostat housing and the thermostat and replace if necessary.

For additional cooling troubleshooting and maintenance, please refer to the cooling section in your Moyer Marine Service and Overhaul Manual.



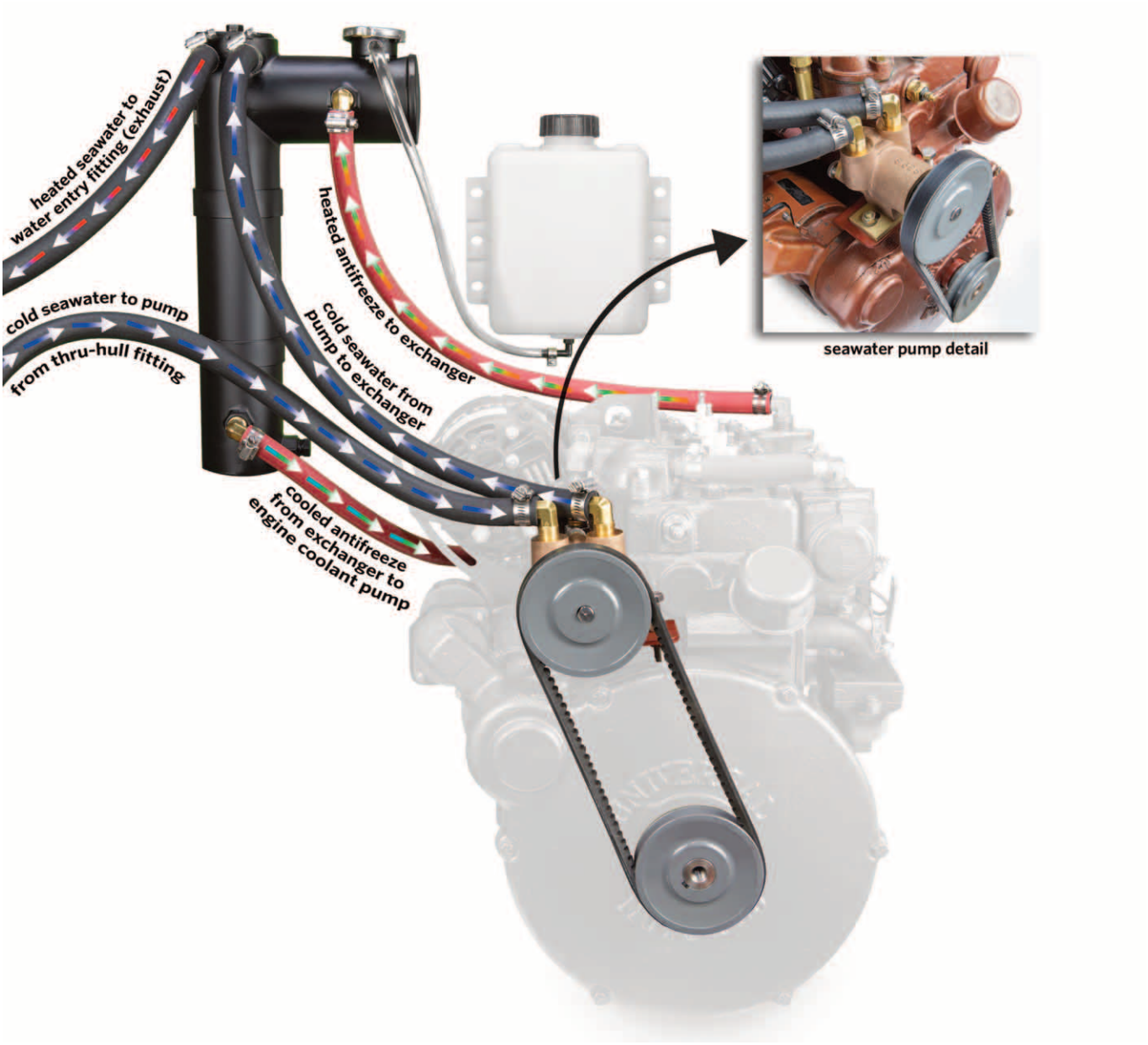
Front mounted pump with bracket pulleys and belt



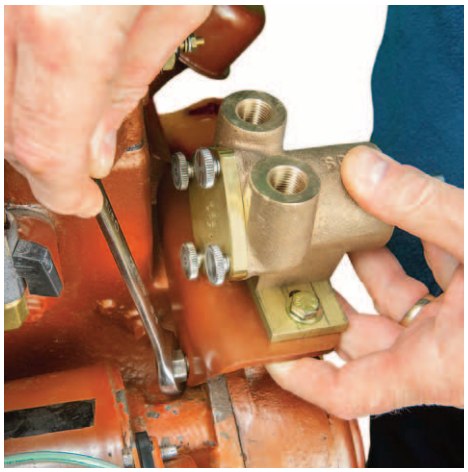
Side mounted pump with bracket pulley and belt

Front mounted fresh water cooling kit

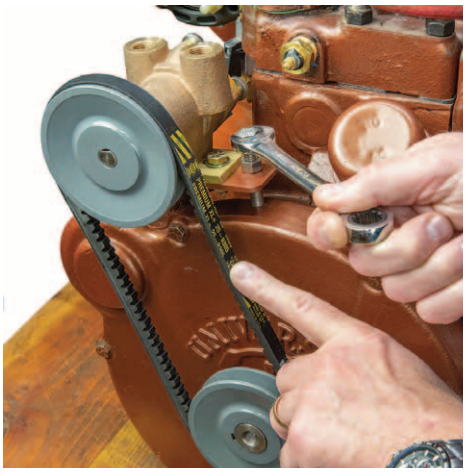
(hoses sold separately by the foot)



Install PTO shaft over flywheel studs (flywheel housing cover removed) (photo 1).



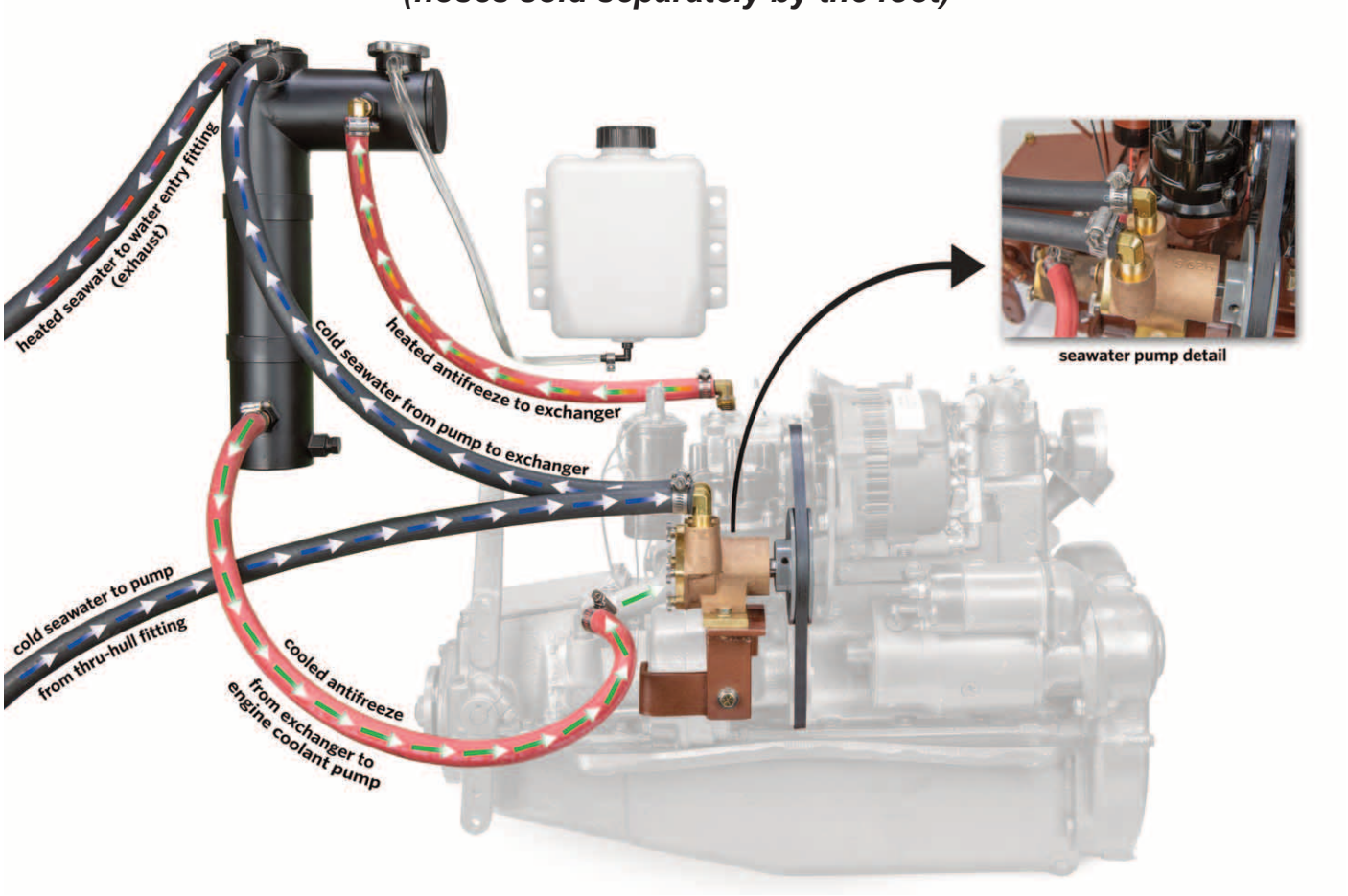
Mount seawater pump/bracket assembly using the upper starter bolt (photo 2)

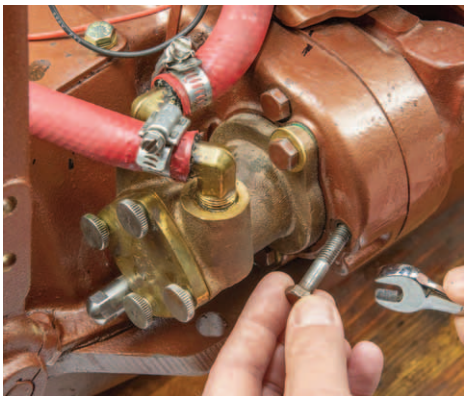


Tension belt after pulleys have been aligned, and pump bolts have been fully tightened (photo 3).

Side mounted fresh water cooling kit

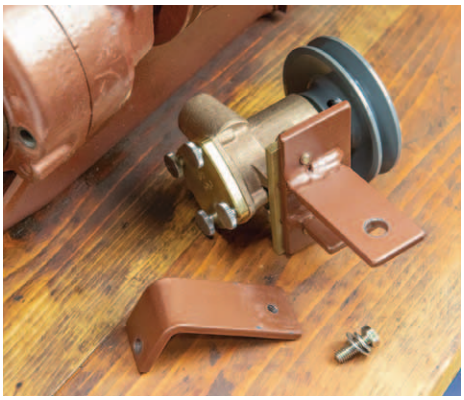
(hoses sold separately by the foot)



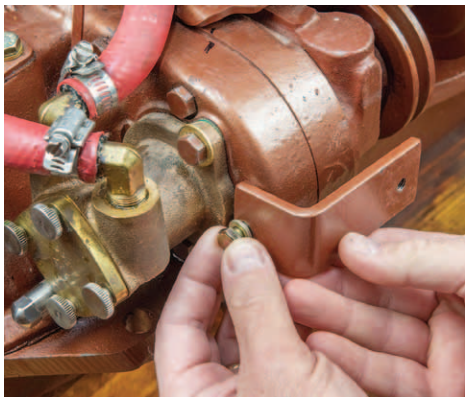


Remove aft housing bolt directly to the right of water pump (photo 4).

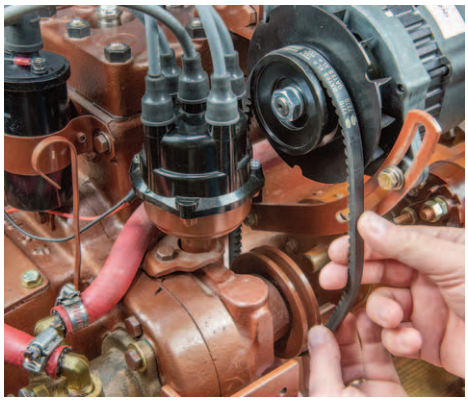
Remove right angle from pump bracket by removing pivot bolt (photo 5).



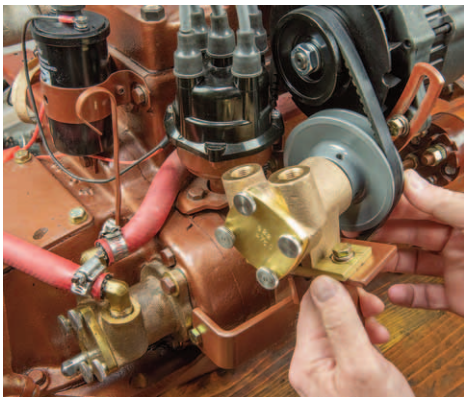
Disassembled pump bracket showing right angle section and pivot bolt (photo 6).



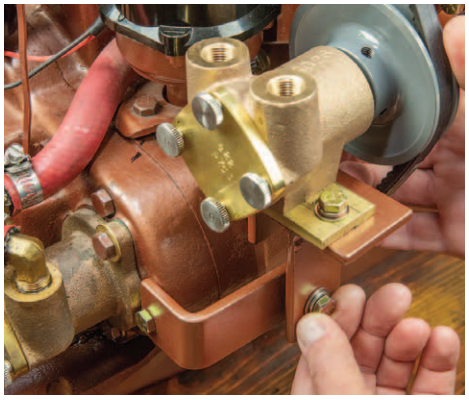
Bolt the right angle section from pump bracket to the aft housing using supplied 2” bolt and washer from kit (photo 7).



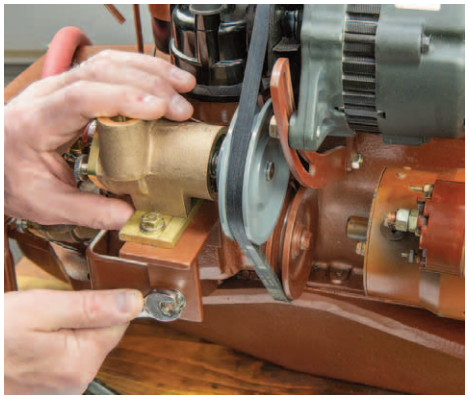
Slip belt over alternator then behind and under accessory drive pulley (photo 8).



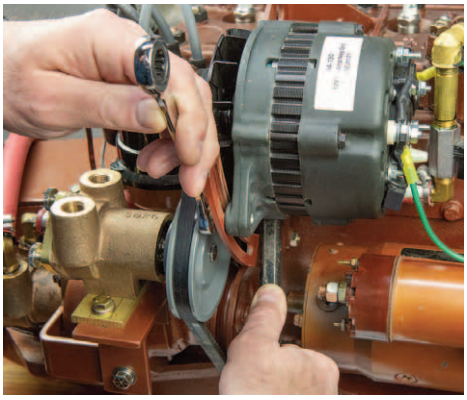
Angle the pump pulley behind belt. (photo 9).



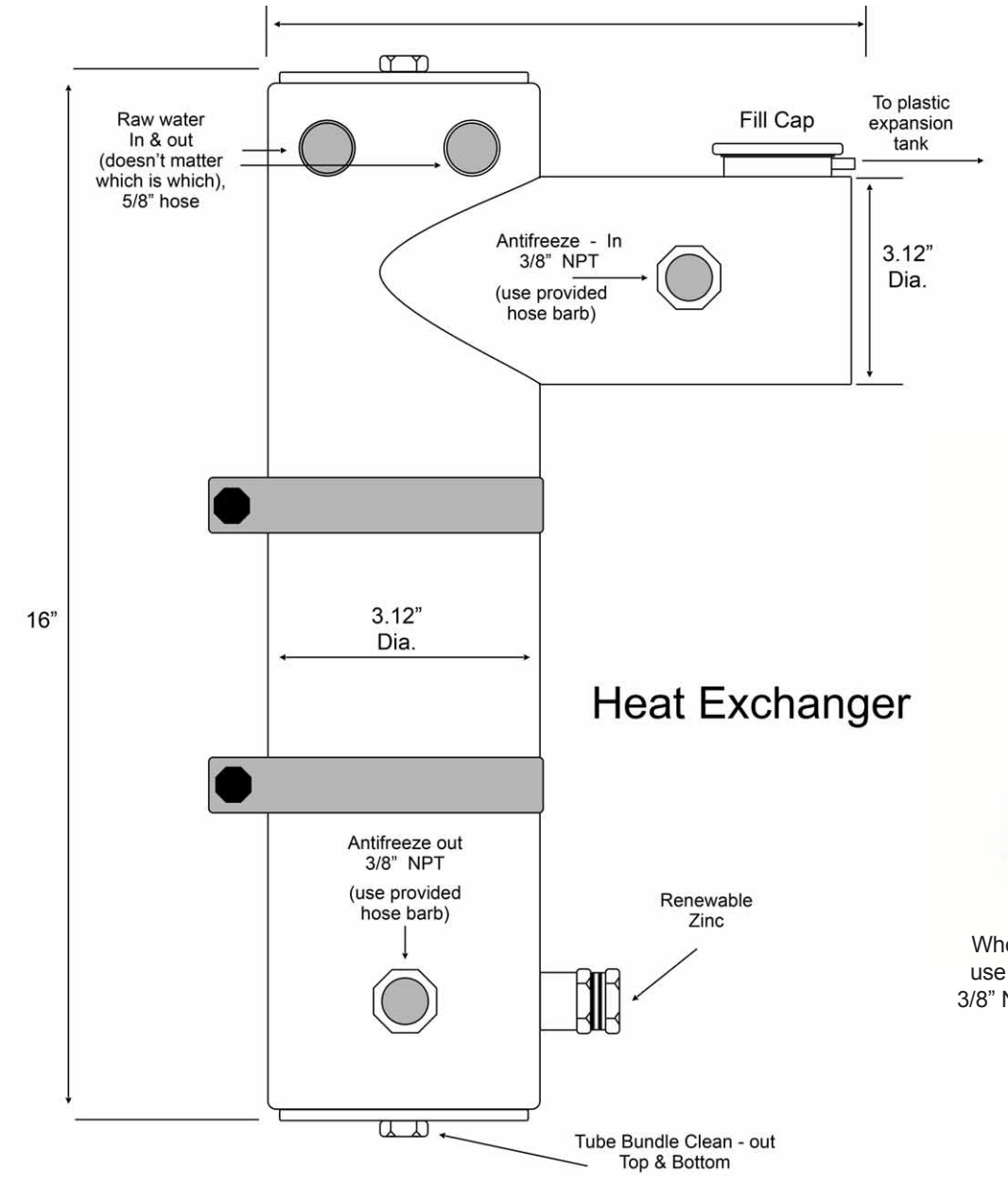
With belt around all 3 pulleys, reassemble pump bracket using the pivot bolt, leaving loose enough to pivot (photo 10).

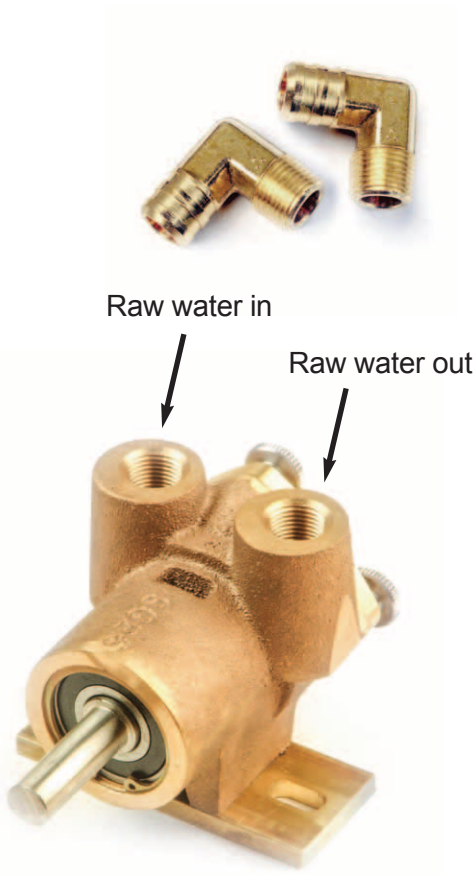


Pivot pump as needed to align pulleys, then tighten pivot bolt. If needed loosen pulley set screws and tap pulley in or out to fine tune alignment, then retighten set screws (photo 11).



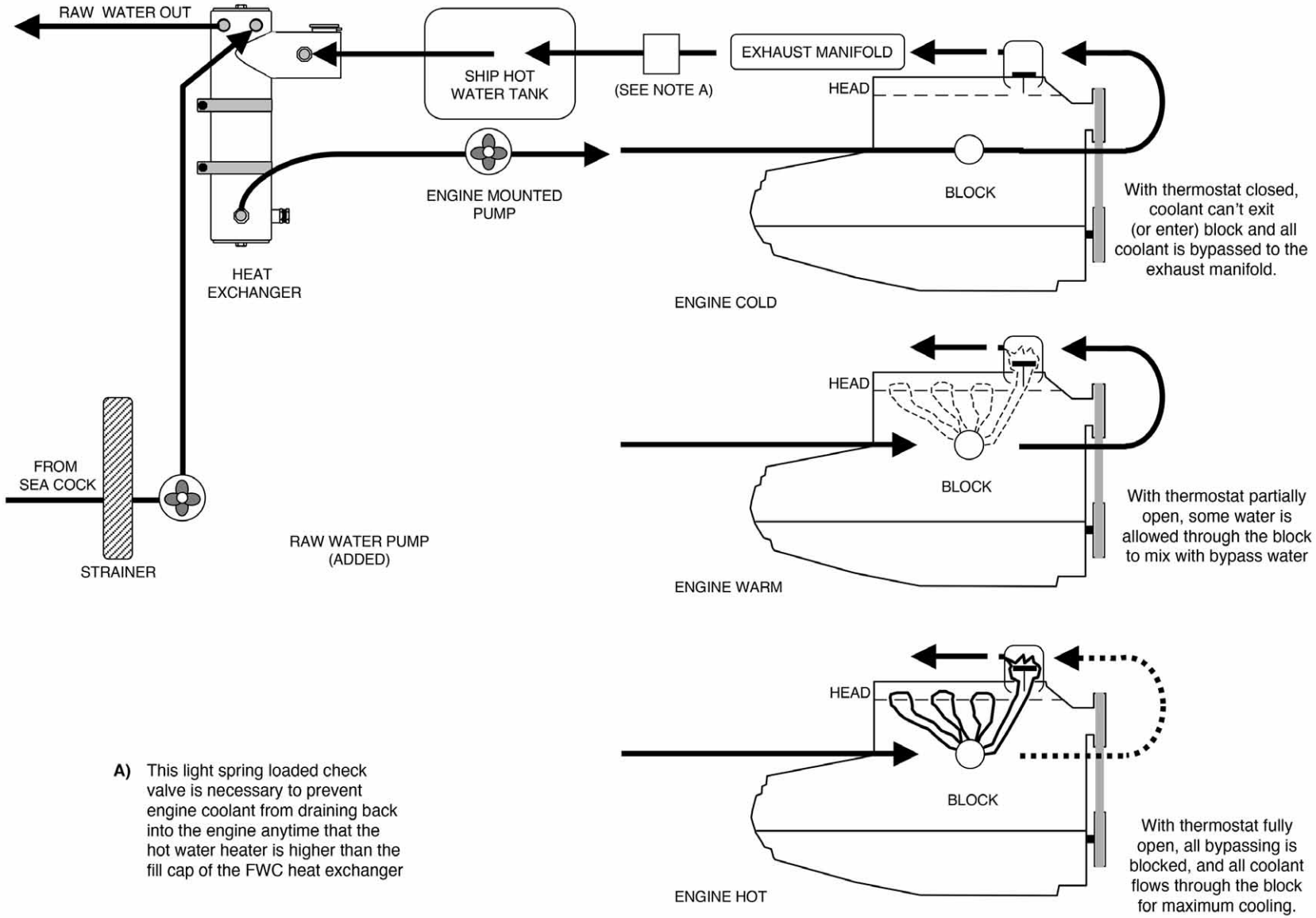
Using pry bar, pivot alternator up and tighten alternator support arm bolt. Allow 1/2” of belt play between pulleys. Tighten alternator mounting bolt at lifting eye bracket (photo 12).





When plumbing your raw (seawater) pump, use the two hose barbs provided in your kit, 3/8” NPT x 5/8” hose barb, 90°. Use Permatex sealer on threads.

FWC FLOW SCHEMATIC



A) This light spring loaded check valve is necessary to prevent engine coolant from draining back into the engine anytime that the hot water heater is higher than the fill cap of the FWC heat exchanger