

High Performance Fresh Water Cooling Kit Instructions



by



Performance Product Technologies

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**PERFORMANCE PRODUCT
TECHNOLOGIES**

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HP FRESH WATER
COOLING KIT
INSTRUCTIONS
300-1200 HP Engines

IMPORTANT

Before you unpack the kit and start installation, make sure you have the correct kit for your engine by studying these installation instructions. Be sure you have selected the proper kit, from the list below, for the amount of HP that your engine produces:

HP424RH-K1 (300-500 HP)
HP427RH-K1 (500-700 HP)
HP524RH-K1 (700-900 HP)
HP527RH-K1 (900-1200 HP)

Hoses, heat exchanger brackets and mounting fasteners are not supplied with this kit due to such a wide variety of mounting possibilities. The follow hose sizes are required with lengths dependent on installation:

5/16" ID – Bleed and Overflow
5/8" ID – Fill and Expansion
3/4" ID – Fixed Bypass
1" ID – Thermostat Bypass (for HP424/HP427 Kits) & Port and Starboard Manifold
1-1/4" ID – Thermostat Bypass (for HP524/HP527 Kits) & Raw Water Inlet
1-1/2" ID – HX Inlet
1-3/4" ID – Circ Pump Inlet

The fastener for the expansion bottle (item #12) will require a 3/8" fastener with a countersunk head. The type of thread will depend on the configuration of the component being mounted to.

Sometimes installation problems can occur due to engine variations and boat builder or owner modifications. If you encounter such problems, call Performance Product Technologies (PPT) for support during normal business hours at 405.533.3812.

If you, by mistake, received the wrong kit for your type of engine or run into other insurmountable installation problems you may return an undamaged kit for exchange or credit. To get return authorization, call PPT with information about the problem and how the kit was purchased.

The installer must make sure that the overall installation is safe and in accordance with Coast Guard and industry standards.

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Installation Steps

1. Drain engine block by removing plugs from both, lower sides of engine.
2. Remove any thermostat housing or water neck mounted to the intake manifold. Scrape this surface clean without damaging the sealing surface. Ensure that no gasket material falls into the intake manifold. This gasket material could get lodged in the heat exchanger and lower it's performance.
3. If your engine is new, flush engine briefly with fresh water through t'stat opening. Use a garden hose with a rag around it to keep the larger particulate out of your engine. If your engine is used, a more thorough flushing may be needed.
4. Align the intake cover adaptor gasket (item #9) on the opening of the intake manifold and place the intake cover adaptor (item #6) over the gasket ensuring that the two small holes are aligned with the intake manifold threads. Place o-ring (item #9) into groove and insert the intake cover into place in contact with the o-ring. Place intake cover retainer over intake cover and tighten the two 3/8" fasteners (item #11) finger tight until the orientation of the intake cover has been determined. Torque to 20-25 lb-ft once the orientation has been set.

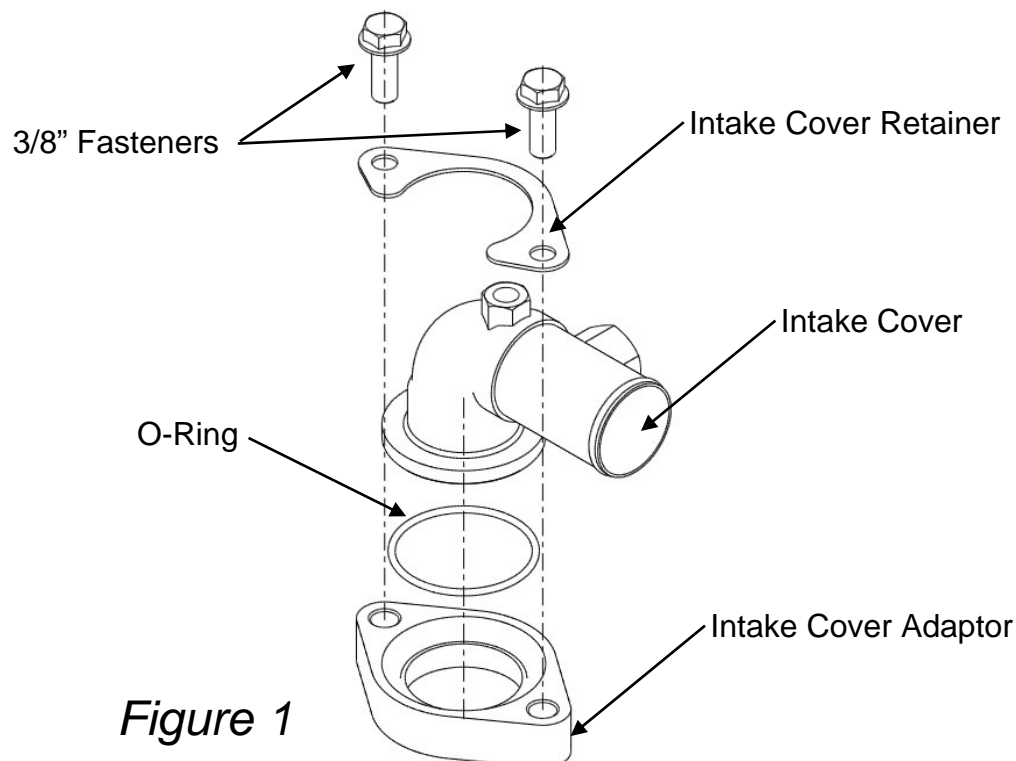


Figure 1

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5. Install 90 deg fitting (item #18) into top of the intake cover and on top of the circulating pump. Orient as required. See Figure 3.
6. If a water crossover (connects to the front of the engine block) is installed, remove it at this time. Scrape this surface clean without damaging the sealing surface. Ensure that no gasket material falls into the engine block. This gasket material could get lodged in the heat exchanger and lower it's performance. To ensure proper cooling, an engine circulating pump should be installed (in place of the crossover if applicable) with the following specifications:
 - 300-500HP → capable of flowing 50 GPM Minimum @ 5000 RPM
 - Engine block pressure (minimum) = 23 psi @ 5000 RPM
 - Engine block pressure (target) = 25-35 psi @ 5000 RPM
 - 500-1200HP → capable of flowing 100 GPM @ 5000 RPM Minimum
 - Engine block pressure (minimum) = 25 psi @ 5000 RPM
 - Engine block pressure (target) = 28-38 psi @ 5000 RPM

Notes:

- a) For raw water temperatures in excess of 80° F, the raw water supply system should meet the following specifications:
 - 300-500HP → capable of flowing 28 GPM @ 5000 RPM
 - Heat Exchanger inlet pressure (raw water) = 20 psi Minimum @ 3000 RPM
 - 500-1200HP → capable of flowing 35 GPM @ 5000 RPM
 - Heat Exchanger inlet pressure (raw water) = 25 psi Minimum @ 3000 RPM
 - For raw water temperatures below 80° F, 300-500HP applications can decrease these specifications by 20%, 500-1200HP applications can be decreased by 10%.
- b) Block pressure should be checked on either side of the engine block via the ¼" NPT drain hole. Typically, lower pressures indicate air in the system or a blockage causing decreased flow.
- c) Heat exchanger raw water inlet pressure should be checked via the ¼" NPT fitting on the raw water inlet hose connection.
- d) If the circulating pump flow specifications are unknown, it is advised that a circulating pump with known flow values be purchased. Flow specifications are typically supplied by the pump manufacturer.

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7. Mount heat exchanger (HX) as close to front of engine as possible so as to minimize the length of hoses required and the pressure drops introduced by hose lengths. The heat exchanger should be supported in two locations no more that 24" apart (see Figure 2).

Note: These HXs can weigh up to 50 pounds with fluid and with wave hop g-forces in excess of 10g, that weight can be increased to 500 pounds! Take care in mounting your HX for protection of both the HX and your boat! If you plan on mounting the HX to the bulkhead of the boat, be sure to use large washers on the front and backside of each mounting fastener (use at least four fasteners to mount the HX).

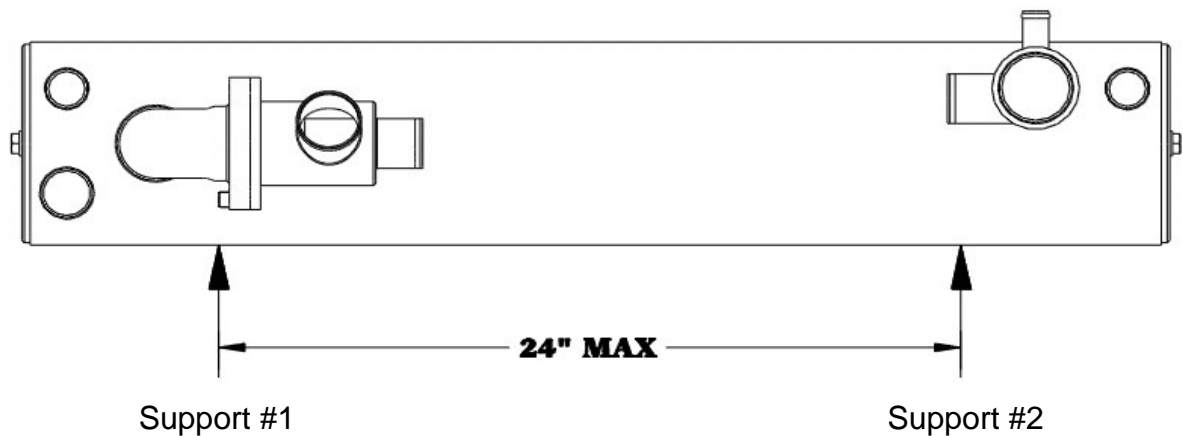


Figure 2

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8. Mount expansion bottle (item #12) using the expansion bottle bracket (item #14) so that the 5/16" hose connection on the bottle is higher than the elbow fitting on the intake cover (see Figure 3).

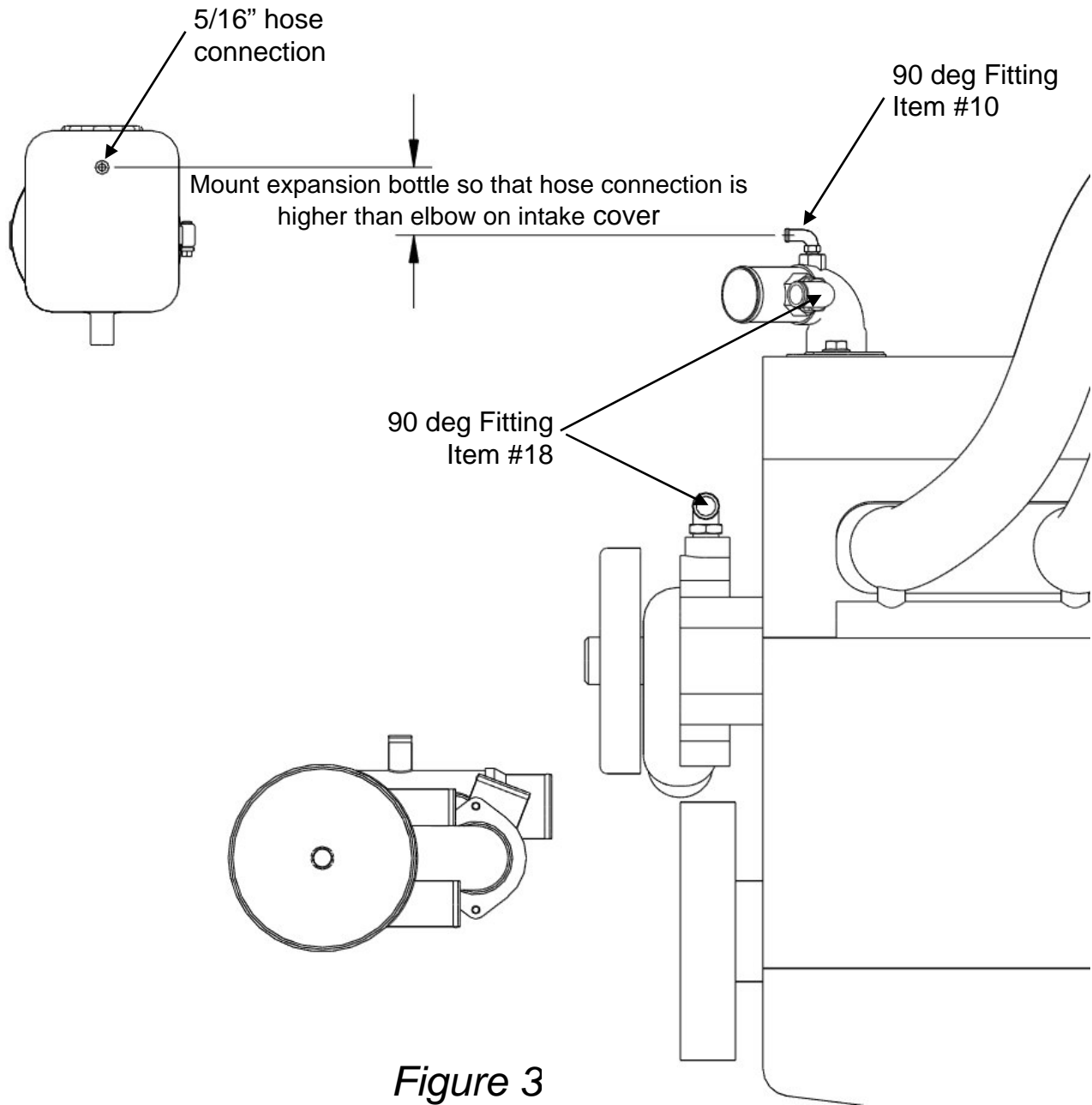


Figure 3

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9. If necessary, loosen the two 1/4" cap screws retaining the thermostat housing and reorient to the desired position. Once the desired position has been established, secure the thermostat housing with the two 1/4" cap screws (see Figure 4).

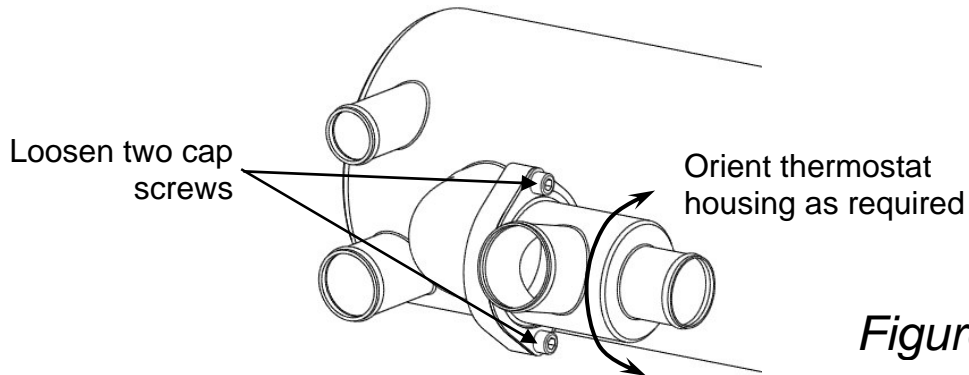


Figure 4

10. Connect the hoses as shown in Figures #5 and #6. If a sharp turn is required for the circulating pump inlet, use 1-3/4" OD 90° elbow (item #17)

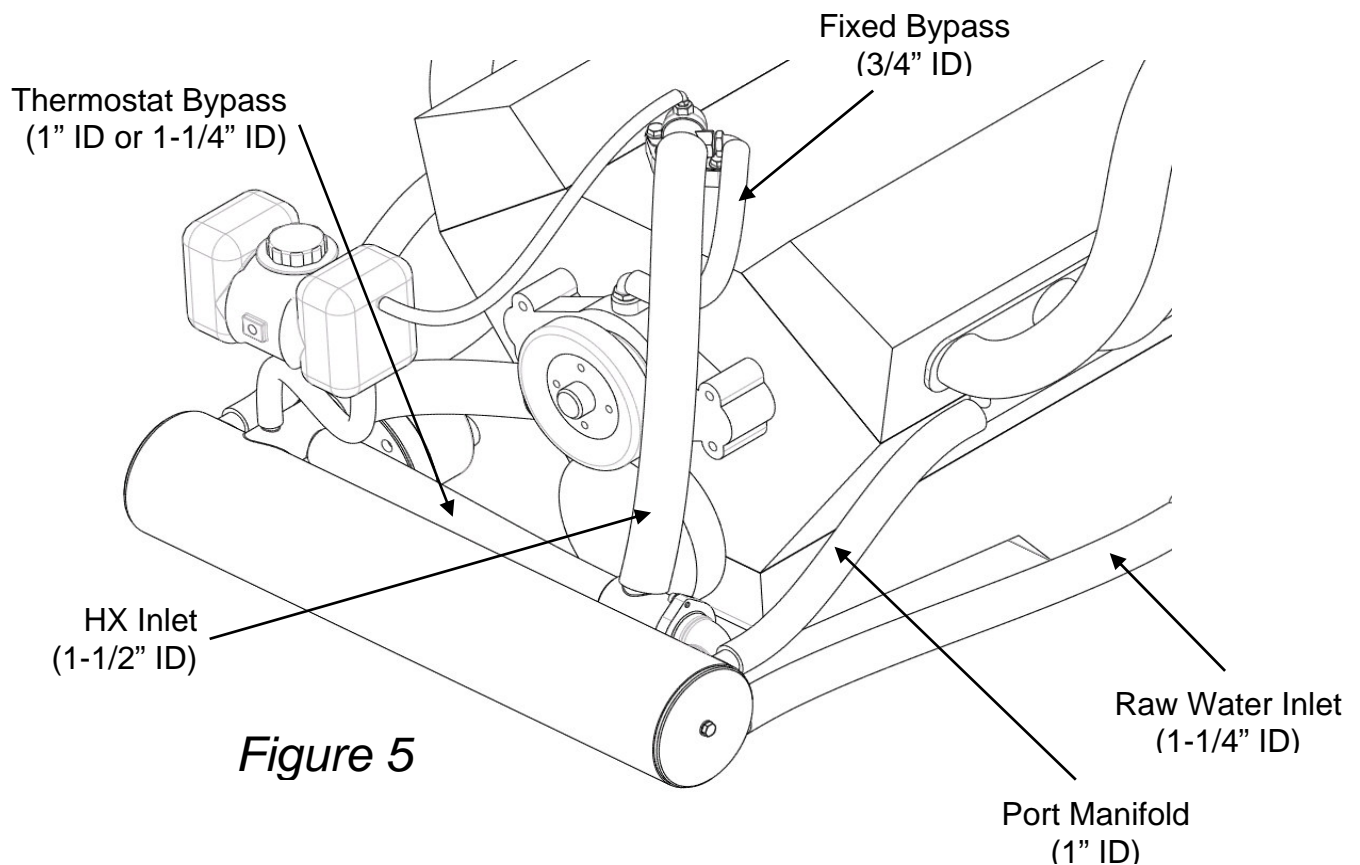


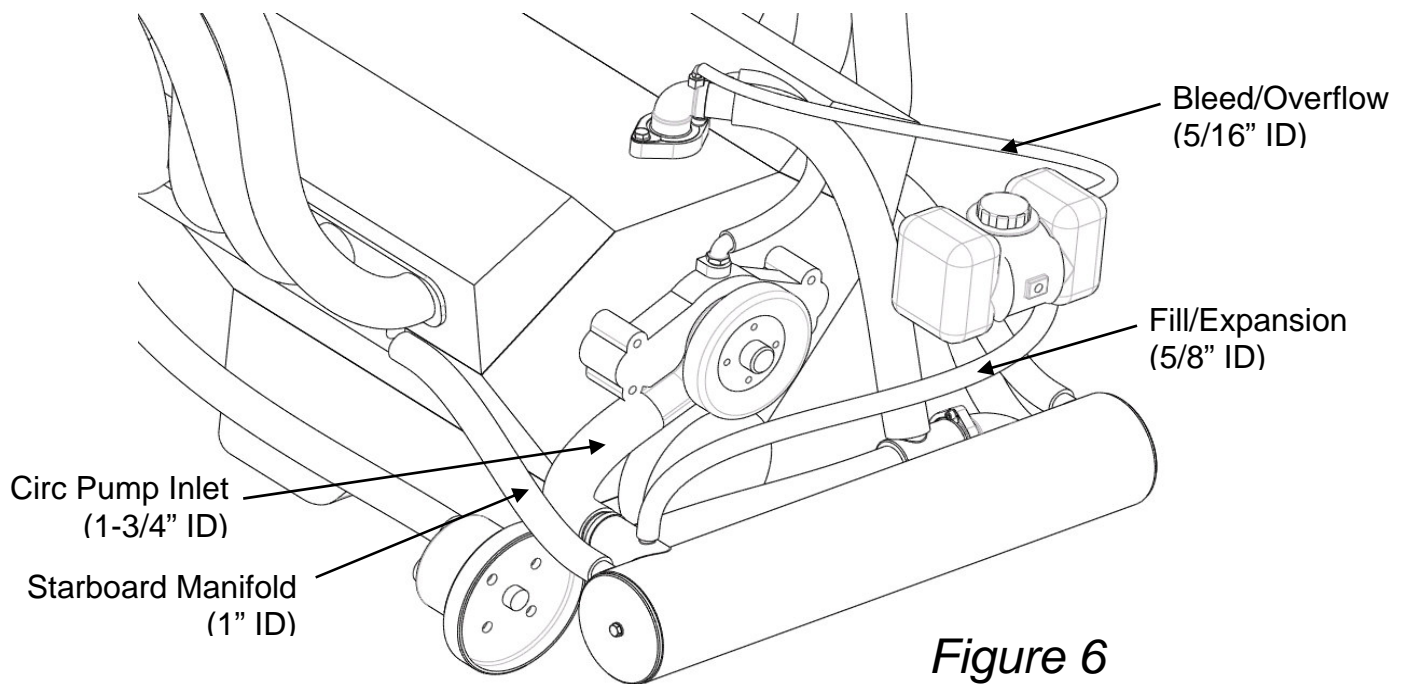
Figure 5

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11. Double check total installation and make sure all fasteners, fittings, and hose clamps are tightened properly.

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12. An initial fill and flush is recommended although not necessary for a brand new engine. This fill is to check the system for leaks and to help remove any sediment that remains in spite of the cold water flush that was performed as part of the installation. Remove cap from expansion bottle and begin filling with clean water. Fill until the fluid level is between the 'Max' and 'Min' mark on the expansion bottle. Most of the air should be purged from the system. Start the engine and check for any leaks while allowing the engine to reach thermostat opening temp (160 deg F). Check expansion bottle to ensure that the level has not dropped. If it has, add more water until the level is again between the two marks. If everything appears to be functioning properly, take your boat for a test run. Gradually, in steps, increase power while observing temperature gauge. Temperature may increase slightly from those at idle level. If decelerating quickly, a brief, temporary temperature increase may be observed. If the temperature on the gauge appears abnormal, make sure that the gauge is accurate before taking additional steps. If everything functions normally, return to dock, stop engine and let it cool down. After complete cool down, drain and flush the system completely.

If engine is old, it may be desirable to keep the engine operating for some time with plain clean water. Periodically during the season repeat the draining - flushing procedures before converting to the correct antifreeze solution.

If engine is new, refill system with maximum 50% antifreeze, 50% water and repeat the process. You should run the lowest % antifreeze that your environmental conditions will allow without freezing. See Table 1 for the proper antifreeze percentage for your conditions.

% Antifreeze	Temp at which ice forms (°F)
50%	-30°
40%	-9°
30%	5°
20%	19°
10%	26°

Table 1

DO NOT USE PROPYLENE GLYCOL FOR YOUR MIXTURE. We recommend Havoline Dexcool™ or equivalent extended life, low/non silicate ethylene glycol.

13. We strongly recommend that you install an audible "buzzer" type alarm. These overheat alarms should include a high water temperature and low oil pressure switches.

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Parts List

<u>Item Number</u>	<u>Part Number</u>	<u>Quantity</u>	<u>Description</u>
1	****	1	Heat Exchanger Assembly
2	N/A	1	Housing - Thermostat
3	5000-1709	1	Thermostat - 160 deg, w/ Bypass Disk
4	4500-1622	1	Seal - Thermostat
5	4300-1767	2	1/4-20 x .50" HX Cap Screw
6	4000-2622	1	Adaptor - Intake Cover
7	2500-2632	1	Cover - Intake
8	4500-2635	1	O-ring - #136, 1.987 x .103, Nitrile
9	4500-1381	1	Gasket - Intake Cover Adaptor
10	3000-2650	2	Fitting - 90 deg Elbow (1/8" NPT x 5/16" Barb)
11	4300-1730	2	Screw - 3/8-16 x 1.00, HX Flange
12	5000-2587	1	Bottle - Expansion, Dog-Bone Style
13	5000-2588	1	Cap - Pressure, Plastic
14	5000-2595	1	Bracket - Expansion Bottle
15	N/A	1	Screw - 3/8-16 x .75" Lag, Countersunk
16	5200-1610	2	Clamp - Hose, Worm Gear, 4.5" Dia
17	3106-1286	1	Elbow - 90 deg, 1-3/4" OD
18	3000-2665	2	Fitting - 90 deg Elbow, 1/2" NPT x .75" Hose Barb

**** Heat Exchanger Assembly part number depends on the kit ordered