San Juan Engineering Heat exchangers provide thermostatically controlled fresh water cooling for marine engines. Its compact installation does not increase the height, width, or length of the overall engine dimensions, allowing for installation in most existing engine compartments. Designed to ensure years of satisfactory service, the entire unit is constructed of pure copper with silver alloys. This system is built by quality craftsmen that have made San Juan Engineering the leader in their field for over 40 years.

San Juan Engineering Heat Exchangers prolong engine life by preventing corrosion in the cylinder block and manifolds. Antifreeze solution can be added to the coolant if the boat is used in extreme cold weather. Only draining the sea water side of the cooling system from the zinc anode in the heat exchanger is required when the boat is not in operation.

Installation is simple. All necessary parts are supplied and no special tools are required.

1. All instructions are given while facing the front of the engine. The alternator is on the left hand side, the power steering pump on the right hand side.

2. Disconnect battery cables. Drain the engine block (both sides) and both exhaust manifolds.

3. Locate original thermostat housing assembly. Remove the sending units on each side of housing. Save. Carefully remove all hoses and clamps from housing, use care not to destroy them, they will be used later. Remove housing from engine. Discard original housing, thermostat, lifting strap, bolt and plastic retainer.

4. Clean thermostat housing gasket surface on the intake manifold. Insert new thermostat with (2) 1/8 holes, button end down (figure 1). Position the new thermostat gasket between the thermostat and new SJE thermostat housing. Secure thermostat housing with the (2) 3/8" X 7/8 bolts and lock washers. Tighten the two bolts firmly and evenly.

Use caution when tightening threaded fittings. Never over tighten and always use a back-up wrench on threaded NPT female fittings i.e., temperature sending units and zinc anodes.

5. Remove the 1/2" pipe plug from the intake manifold and save for later. This is located slightly in front and to the left of the thermostat, next to left valve cover. Cross Assembly: Thread 1/2" X 3/8" bushing and 3/8" close nipple, 3/8" cross and 3/8" NPT to 5/8" hose 90 degree fitting together for by-pass hose. Thread temperature sending units into the threaded holes in cross. Tighten both senders firmly, using caution not to over tighten. We recommend using pipe thread sealant when installing threaded fittings. Always use a back-up wrench on threaded NPT female fitting i.e., temperature sending units and zinc anode. The two wire connector may not reach the sending unit you installed in the by-pass brass tee. It may need to be pulled out of the loom and taped. USE CAUTION: Cut the loom, extend wires, make connection, and re-tape wires.
6. Remove the 1/2" pipe plug located on the left hand side of the fresh water pump, just above the large 1-3/4" suction hose. Thread (1) 1/2" pipe to 5/8" hose straight fitting into this hole. Tighten. Using the 14" piece of 5/8" hose and (2) #8 hose clamps, plumb these two fittings together. For the cleanest installation, this hose length should be trimmed to suit. This is your fresh water by-pass and can also be used for a heater. For a heater plumb the bottom of the heater to the by-pass outlet next to the thermostat assembly, the top of the heater to the outlet at the water pump.

**IMPORTANT:** When connecting cabin or hot water heater, certain requirements must be met:

A. Supply hose (from engine to heater) and return hose (from heater to engine) MUST NOT EXCEED 5/8 in. (16 mm) inside diameter.

B. Make heater connections ONLY at locations described in the following instructions.

C. Check complete system for leaks after heater is connected into cooling system.

D. Check for overheating condition (of engine) after heater is connected.

**CAUTION!**

Heater must be mounted lower than the fill cap on the heat exchanger. If the heater is higher than the fill cap on the heat exchanger as some coolant is lost from the system, an air pocket may form in the closed cooling system. This can cause the engine to overheat.

7. Remove the upper 3/8" bolt behind the belt tensioner (figure 2). Install bracket #MC-326-3-RH using: (1) 3/8 NC X 1-1/2 long bolt, washer, lock washer, and (3) spacer washer behind mounting bracket.

8. Remove the 3/8" bolt located just above the engines circulating pumps left side mounting Point. Install bracket #MC-326-4-LH using: (1) 3/8 NC X 1-1/4 bolt, washer and lock washer.

9. Remove the (2) 3/4" pipe plugs from the right hand exhaust manifold assembly. The top plug comes out of the riser, the bottom plug out of the exhaust manifold. Use the brass 3/4" pipe to 1" 90 degree hose fitting from your SJE kit to thread into the hole in the riser.

10. Repeat these procedures to the left hand side. Remove (2) 3/4" pipe plugs from left hand side.

11. Separate the right hand riser from the exhaust manifold by loosening the hose clamps at the exhaust outlet and then removing the (4) 9/16" head bolts on the top. With the assembly separated, thread the brass 3/4" pipe to 1" hose 90 degree fitting provided in your kit into the hole in the exhaust manifold. Be sure that this fitting is facing towards the thermostat housing. Clean the gasket surface thoroughly and replace with the new block-off gasket provided. This gasket allows the exhaust manifold to be cooled with engine water rather than raw water. Re-install riser to the manifold, tighten the bolts and hose clamps evenly and firmly. IMPORTANT: Replace both plastic fittings on the bottom of the manifolds with the metal fittings from your kit.

12. Repeat these procedures to the left hand side.

13. Carefully re-route the right hand 3/4" raw water hose that leads from the bottom of the right hand exhaust manifold. It will now run above the belt tensioner bracket and behind bracket #MC-326-3-RH. With the original hose clamp connect this hose to the spud on the right side of the thermostat assembly. Connect the 3/4" hose leading from the bottom of the left hand exhaust manifold to the spud on the left. Again use the original hose clamp and this hose does not need to be re-routed (Figure 2). Using figure #2 as reference, bend the lifting strap towards the rear of the engine just enough so when the heat exchanger is installed there is clearance between the heat exchanger and the lifting strap.

14. Set the (2) rubber strips onto the cradle of the mounts then, place the heat exchanger on the brackets. Use the large #80 or #550 hose clamps to secure. Leave Heat exchanger loose on the mounts until all hoses are installed then clamp firmly.
15. Carefully cut the 1-1/4" raw water hose on the right hand side of the engine. Use the hose cutting guide insert sheet to acquire the correct length. This hose is referred to as "Hose A". With hose cut to length, slide original hose clamp loosely over hose and slip hose over the 1-1/4" spud located on the lower right hand end of the heat exchanger. Tighten hose clamp firmly.

16. Using the hose cutting guide, carefully cut the 1-1/2" fresh water suction hose located on the left hand side of the fresh water pump. Referred to as "Hose B" in the cutting guide. Loosely slide the original hose clamp over the hose and slip hose onto the 1-1/2" spud located on the bottom left hand side of the heat exchanger. Tighten hose clamp firmly.

17. Use the 10-1/2" piece of 1" hose and (2) #16 hose clamps to connect the brass fitting, threaded into the right hand exhaust manifold to the fresh water spud on the right end of the heat exchanger. Use the 25" piece of 1" hose and (2) #16 hose clamps to connect left side.

18. Use the 1" X 10" hose and (2) #16 hose clamps to connect the brass 1" elbow, threaded into the right hand riser, to the raw water spud on the upper right end of the heat exchanger. This hose length may need to be trimmed. Use the 20" piece of 1" hose and connect to the 90 degree fitting on the exhaust outlet on the left side.

19. This system uses a recovery type accumulator tank for the expansion of the coolant and also removal of air from the system. Secure the plastic expansion tank in best location for checking fluid. Cut a piece of 5/16" hose to connect the spud at the heat exchanger fill neck to the spud at the bottom of the expansion tank. Use the (2) 5/16" spring clamps to secure the hose.

20. Fill accumulator tank to cold line. Fill through the fill cap neck on the heat exchanger until full. Continue to fill until water is overflowing at the fill neck. As it is IMPORTANT to remove all air from the system, leave the fill cap off after starting engine and be prepared to refill water into the fill neck as AIR is removed and water level drops. All air must be out of system if it is to work properly. This may take 10 minutes, or more of running the engine in neutral at 1,000 to 1,500 RPM at the dock. Do Not run the engine at all without a water supply to the water inlet on the lower unit. The sea water pump will be damaged or destroyed if run dry. When you are sure all air has been purged from the system and water level has stabilized at the fill neck, and it is full, install the fill cap. DO NOT remove the fill cap when engine is HOT! NOTE OPTION: Expansion tank may be mounted in the transom area or wherever desirable.

21. The zinc anode retards corrosion in the raw water side of the cooling system. Check occasionally and replace when 3/4 eroded.

22. Check to make sure all hose clamps and bolts are firmly tightened before moving on to the start-up procedures.
### PARTS LIST

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<tr>
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<td>MC 332-1 Installation Manual</td>
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### Hose Clamps

- #80 or #550 HE Bracket
- #10, Fresh Water By-Pass
- #20 Rubber Cap
- 1/2” X 5/8” NPT to Hose Fresh Water By-Pass
- 3/4” XI”, NPT to Hose 90 degree
- 3/8” Tee
- 3/8” NPT Close Nipple
- 1/2” X 3/8” NPT Bushing
- 5/8” Hose X 3/8” NPT 90 degree fitting
- 3/8” NCX7/8”
- 3/8” NC X 2-1/4”
- 3/8” Hat Washer
- 3/8” Lock Washer
- 3/8” NC X 1-1/2”

### Fittings

- Rubber Strips
- #MC 330 TR

### Gaskets

- MC 332-33

### Packed by

Date

Fonn#MC -332-00
MC 331 - MC 332
HOSE CUTTING GUIDE

HOSE "B"
ORIGINAL HOSE

DISCARD THIS PIECE

CUT

HOSE "A"

DISCARD THIS PIECE

CUT

ORIGINAL HOSE