

SAN JUAN FRESH WATER COOLING SYSTEMS

3.0 Litre LX With V-Belts "On Engine Mount" Block Only Cooling Kit #MC-327 Installation Instructions

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 craftsman that have made San Juan Engineering the leader in their field for over 39 years.

San Juan Engineering Heat Exchangers prolong engine life by preventing corrosion in the cylinder block. A hot water heater or cabin heater is now possible with fresh water cooling.

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

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

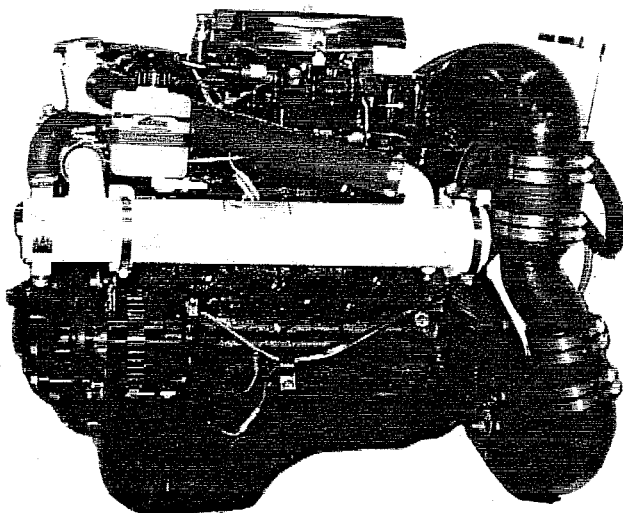
1. All instructions are given while facing the front of the engine. The alternator is on the right hand side, the fuel pump on the left hand side.

2. Drain engine block, lower right side of engine near flywheel housing.

3. Locate the original thermostat housing at Top, Front, Center of the engine. Remove all the hoses from the housing, leaving their other ends attached. Now, remove wire from temperature sending unit and remove the sending unit. SAVE.

4. Remove and discard the original housing (it is secured by two horizontal bolts into the front of the cylinder head). Take the NEW water outlet casting from kit. Using the bushing supplied, re-install the temperature sending unit into the upper hole on the right side. Then install new housing onto engine using one new 3/8" X 1-1/2" and 1" bolts and a gasket where original housing was removed. Re-connect wire. Also, install plugs supplied in remaining holes in housing assembly. Place the new thermostat into water outlet recess. BE SURE POINTED END IS UP. Then lay gasket over thermostat and place the new thermostat housing on top. Bolt housing in place.

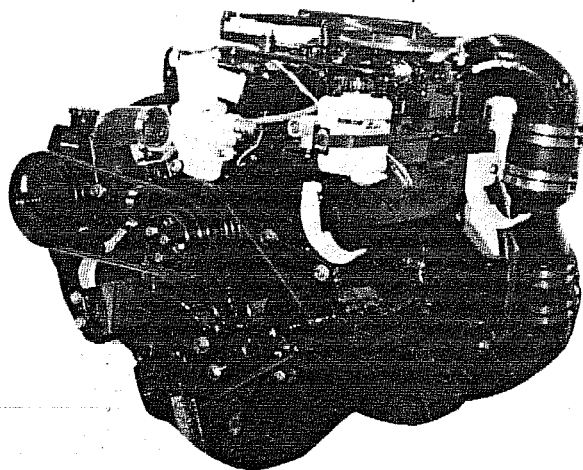
5. The heat exchanger location is along the right side of the engine. Secure mounts to the engine exhaust manifold, mount and clamp heat exchanger. NOTE: Zinc anode end of the heat exchanger is forward.



SAN JUAN ENGINEERING & MANUFACTURING CO.

766 Marine Drive Bellingham, Washington 98225 USA PH: (360) 734-1910 FAX: (360) 734-9683

6. Install 1-3/4" X 10-1/2" hose to heat exchanger and heater return fitting and clamp. Install 1-1/2" X 18" hose from thermostat housing to rear of the heat exchanger and clamp. Remove 1" straight fitting from front, top of manifold and install 3/4" NPT X 1" 90 degree elbow then use the existing 1" elbow hose from front of manifold to front of heat exchanger and clamp. Use the existing hose from oil cooler re-route to back of the heat exchanger, cut to fit and clamp.



7. If an auxiliary hot water heater is to be installed use 1/2" NPT hole in the lower housing on the left side to the **LOWER FITTING** on heater. Use the 3/8" NPT hole on the heater return fitting for return from the top of the heater.

IMPORTANT: When connecting cabin heater 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.

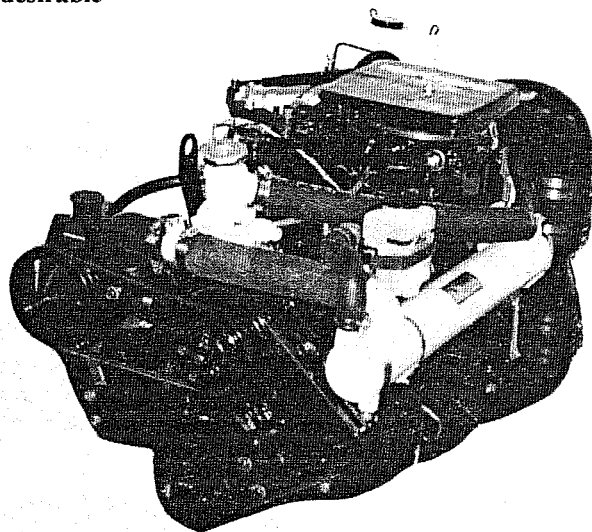
D. Check for overheating condition (of engine) after heater is connected.

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 and some coolant is lost from the system, an air pocket may form in the closed cooling system. This can cause the engine to overheat.

8. 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.

9. 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!** Coolant capacity is approximately 14 quarts. **NOTE OPTION:** Expansion tank may be mounted in the transom area or wherever desirable



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

11. Check to make sure all hose clamps and bolts are firmly tightened before moving on to the start-up procedures on reverse side, (Sheet 1A).

3.0 Litre LX With V-Belts "On Engine Mount" Block Only Cooling Kit #MC-327

PARTS LIST

<u>Part Number</u>	<u>Qty.</u>	<u>Description</u>
MC-327-0	1	Installation Manual
MC-327-1	1	Heat Exchanger
MC-327-2	1	Thermostat Assembly, Upper
MC-327-3	1	Thermostat Assembly, Lower
MC-327-4	2	Hanging Brackets
MC-327-5	1	Heater Return Fitting
MC-327-6	1	Expansion Tank Kit
MC-327-7	1	Thermostat 330-160 (with one 1/8" hole)

Hoses

MC-327-8	1	1-1/2" X 18"
MC-327-9	1	1-3/4" X 10-1/2"

Hose Clamps

MC-327-10	2	#48
MC-327-11	2	#28
MC-327-12	2	#24

Gaskets

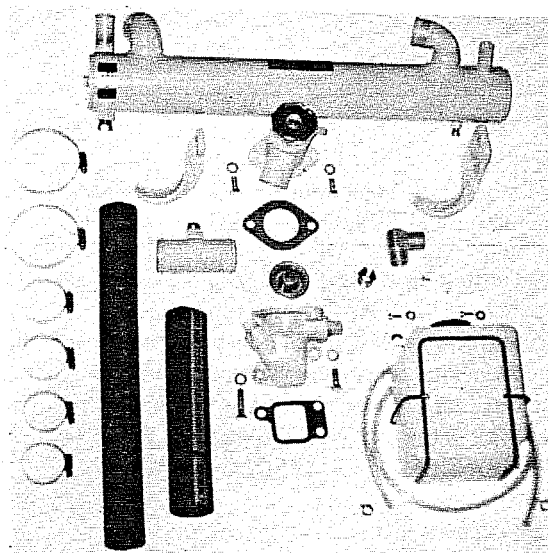
MC-327-13	1	Thermostat, GMT-1 Upper
MC-327-14	1	Thermostat, #10140501 Lower

Fittings

MC-327-15	1	3/4" NPT to 1" Hose 90 degree
MC-327-16	1	3/8" X 1/2" Bushing

Bolts, Nuts, & Washers

MC-327-17	2	3/8" X 7/8"
MC-327-18	1	3/8" X 1-1/2"
MC-327-19	1	3/8" X 1"
MC-327-20	4	3/8" Lock Washer



CAUTION! Never start an engine dry. Boat must be in the water or have water supplied to the sea water intake on either inboard or stern drive units, before engine is started.

The water pump's rubber impellers will be ruined or their efficiency seriously impaired if they are run dry, even for a minute or two.

1. Install all drain plugs and close all drain cocks firmly.
2. Open the seacock that supplies sea water to the engine pump (inboards and some large stern drive engines).
3. Fill the cooling system with permanent coolant (50/50 mixture). Do Not put on the fill cap until the cooling water level has stabilized.

NOTE: The initial coolant filling rarely removes all the air from the system. When the engine is started the water level usually will drop as the circulating pump forces air out of the system. Refill immediately.

4. Also, as quickly as possible, check to be sure that sea water is flowing. On inboards this is usually at the exhaust outlet in the transom. On stern drives where exhaust exits through the "foot" or lower unit, feel the exhaust hoses.

They should not get hot. If you are not sure, loosen the sea water hose where it connects to the heat exchanger and carefully slip it off just enough to determine that water is flowing through it. In either case if water is not flowing, STOP THE ENGINE and investigate why not.

5. Warm up engine at 1200 to 1500 R.P.M. Make visual checks for water leaks. Maintain water level in fill neck. The system will often require refilling several times, as the air works out.

6. After the engine warms up to normal, stop it. Then firmly snug up each and every hose clamp. Remember too tight is as bad as too loose. Frequently clamps are located out of sight, so look under manifolds, etc.

7. Install the fill cap, if you are satisfied the water level has stabilized.

8. Check all V belts for proper tension.

NOTE: Where the engine's temperature gauge has a needle pointing to RED and GREEN colors, usually the GREEN is about 140 degree F. RED starts about 160 degree F., this is the NORMAL temperature with fresh water cooling. So do not assume that the engine is overheating because the needle is in the LOW part of the gauge's Red sector. This can be confirmed by simply removing the fill cap and placing a common cooling thermometer into the water of a warm engine idling at the dock. Compare that temperature reading with the gauge's numbers or color.

SUGGESTIONS FOR ROUTINE MAINTENANCE

- A. Be very careful when removing the fill cap when the engine is warm. Normal pressure in the system can spray out hot coolant.

- B. Coolant will usually be down an inch or two below the fill neck, when the engine is cold. If you fill it up, that water will be forced out through the overflow hose, as the engine warms up, due to normal expansion.

- C. Some engines have parts that are not protected by the anti-freeze. Consult your engine manual to determine which points require draining after use in freezing weather or when laying up for winter. Replace zinc anode in step D, if eroded away.

- D. The heat exchanger should have the sea water drained from it. Usually the sea water drain plug also holds a zinc anode. Loosen rear end cover slightly for draining raw water. Sea water pumps can be drained by loosening their back cover or removing it's lower hose.

- E. It is not uncommon to have incorrect temperature gauges. If in doubt, follow instructions in the second NOTE. This can prevent a lot of useless hunting.

- F. Should there be a coolant loss which cannot be found, pour several small bottles of common food coloring dye into the system. Fill with water, replace the fill cap, warm up engine and let it cool down completely. Any external seepage should be easily detected. Feel out of sight places with your hand. The dye will show up quickly if there is a leak! The dye is harmless and can be left in the system.

- G. Water pumps with rubber impellers should have their impellers removed and checked each season or after 200 hours use. The blades can take a set and may have to be replaced for top efficiency. Most stern drive units have a rubber impellered pump in the lower unit. This also will require periodic servicing. On inboards with visible wet exhaust, do not try to judge a pump's output by the water flowing out the exhaust, as several gallons per minute variation, visually is not readily apparent.

- H. Some models of heat exchangers have rubber end caps, which are easily removed but require extreme care in replacing. Where there is a baffle inside, the slot in the cap MUST ENGAGE THAT BAFFLE PERFECTLY or the engine WILL OVERHEAT. - DO NOT REMOVE THE END CAPS, UNLESS IT IS ABSOLUTELY NECESSARY-

There is really no mystery to a fresh water cooling system. Basically if the correct amounts of fresh and sea water are being moved through the system, it has to work! For long and trouble free service from your engine, it is always best to make routine checks frequently to avoid problems later.

REMEMBER - the operator has a direct responsibility to frequently observe all the gauges on the instrument panel and take appropriate action should they vary from normal. Because everyone can become careless at one time or another we strongly recommend a good "alarm" system to protect your engine from damage due to overheating, low oil pressure, etc.

Actually there is little maintenance to do- Basically it amounts to:

1. Check water level daily
2. Check V belt tension weekly.
3. Check hose clamps monthly.
4. Check zinc anode every two months.
5. Check or replace rubber impellers in water seasonally, (some engines may have two rubber impeller pumps) or anytime engine temperature is above normal.
6. Check hoses for deterioration yearly.