TOYOTA MARINE Sports

Technical Service Bulletin #39

Direct Drive Fresh Water Cooling System

Revision #2

May 30, 2000

NOTE: The Shower option cannot be installed on any model with the Closed Water Cooling system.

Parts Needed

Fresh Water Cooling Kit, **Direct Drive** – MEH0011108

Kit Includes

Heat Exchanger, DD – MEH001110801	Fill Neck Assembly w/cap, DD – MEH001110802
Tubular Thermostat Housing – MEH001110803	Bracket, Heat Exchanger, DD – MEH001110804
Expansion Tank – MEH001110805	Gasket, Throttle body – 9043020017
Gasket, Thermostat housing – MEH001110807	Hose, DD, water pump to heat exchange – MHO001110808
Hose, Tube assembly top inlet to thermostat housing – MHO00111809	Hose, Tube assembly middle inlet to thermostat housing – MHO001110810
Hose, DD, tube assembly bottom to heat exchange – MHO001110811	Hose, Fill neck assembly, top inlet to thermostat - MHO001130301
Hose, DD, Fill neck, bottom, 90deg to heat exchange – MHO001130401	Hose, DD, Stbd exhaust manifold to heat exchange – MHO001110814
Hose, DD, Port exhaust manifold to heat exchange – MHO001110815	Qty 2 – Hose, expansion tank inlet & outlet – MHO001110816
Bracket, DD, expansion tank – MEH001110817	Qty 4 – Hose clamp, VT300i #25 – 9008046259
Qty 8 - Hose clamp, VT300i #23 – 9008046260	Qty 4 – Hose clamp, VT300i #8 – 9008046261
Qty 4 - Hose clamp, #24, SS – MHC0010024	Qty 4 – Hose clamp, #72, SS – MHC0010072
Pads, DD, set of 15, nonskid – MGR0011502	Bolt, M10-1.25, 18mm – 91512-B1016
Bolt, M8-1.25, 12mm – 9034108005	Adhesive, silicone, 3M, 3oz – MCT0011302
Sleeve, Thermostat housing – MEH001110806	Qty 2 – Bolt, 5/16-18X2-1/2",SS – MFSY200548

1999 Model Year Parts

To fit a 1999 model with a **Perko** switch, replace and order the following two items.

Roca Battery switch – MBA0011230	Bracket – MHH0011602

Tools Needed

Philips screwdriver	Flathead screwdriver	Ratchet
18mm socket	12mm Socket	Hose puller
Liquid dish soap	Hose cutter	10mm Allen wrench

Always be sure to wear OSHA approved eye protection when using a drill or other rotary tools as these have the potential to throw debris into the air.

Procedure

Step 1 – Engine Preparation

First, unscrew and remove the engine box and move it to a safe location. Next, unscrew and remove the engine cover. Finally, unscrew and remove the garboard drain.

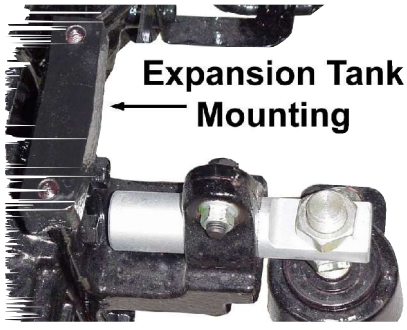
Step 2 – Hose Removal

Remove and discard the port Exhaust to Thermostat Housing hose and the Water Pump to Thermostat Housing hose. Next, remove and discard the starboard Exhaust to Thermostat Housing hose, but save the hose clamp fastening it to the engine. This clamp will need to be reused later. Once the hose is removed, loosen the bolt holding the hose bracket to the engine and rotate the bracket clockwise until it is in a horizontal position.

Step 3 – Heat Exchanger Bracket

First, prepare the Heat Exchanger bracket by applying the large sanopad to the bottom, and two thin strips to the exchanger cradle. The sanopad will isolate the various components to prevent vibration noise.
In the bilge, remove the two nuts, lock washers, and washers securing the aft tracking fin to the hull. Once the nuts and lock washers have been removed the bolts securing the tracking fin must be removed from below and replaced with two 5/16-18X3” bolts. Before replacing the bolts in the tracking fin fill the holes with silicone to seal the bolts against leaking. Next, install the Heat Exchanger bracket in the bilge and secure it to the tracking fin bolts using the nuts, lock washers, and washers removed earlier. To properly tighten the bracket, be sure no cables or hoses are underneath the bracket and that the tracking bolts are held from below while the nuts are tightened down. Tighten the nuts to 25 ft-lbf +/- 20%.
Next, place the Heat Exchanger in the bracket so that the outside drain plug is on the starboard side. Do not fasten the Heat Exchanger to the bracket until all the hoses have been installed. This is for the purpose of adjusting the hose in case of kinking. Finally, reapply Teflon tape to the garboard drain plug and reinstall it.

Step 4 – Expansion Tank



First, apply sanopad to the inside sides and the bottom of the Expansion Tank bracket.
Next, locate on the aft, starboard side of the transmission next to the motor mount the expansion tank mount. Fasten the Expansion Tank bracket to this mounting location using the 18mm M10-1.25 bolt in the aft bolt hole and tighten to 28 ft-lbf +/- 20%. The bracket must be mounted so that the top support arm is aligned with the mounting point nearest to the aft, starboard engine cover support. Attach the Expansion Tank bracket support arm to the mounting point using the 12mm M8-1.25 bolt and tighten to 6 ft-lbf +/- 20%. Finally, attach the short section of clear hose to the Expansion Tank

outlet on the top of the bottle and feed the unattached end downward to the bilge, fastening it to the exhaust hose to prevent binding in the prop shaft.

Step 5 – Thermostat Housing

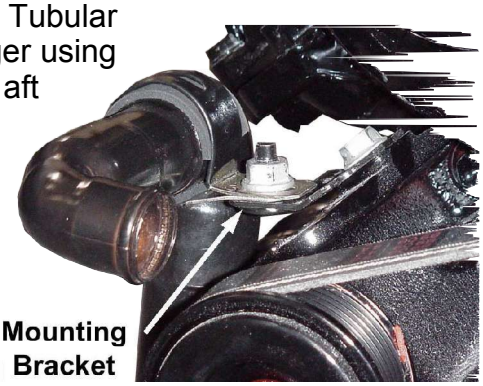
First, remove the three 12mm thermostat housing mounting bolts holding the thermostat housing closed and remove the housing cover and the thermostat. Next, insert the Thermostat Housing Sleeve into the thermostat housing and the thermostat unit. Install the Thermostat Housing Gasket and check the o-ring for proper fit. Finally, reinstall the thermostat housing and tighten the bolts to 14ft-lbf +/- 20%.

Step 6 – Port Side Hose Installation

Note: All hoses in Steps 6 & 7 are cut to a standard length. Some hoses may need slight trimming to fit properly depending on exact height and position of the engine mounting. All hose clamps should be tightened to 2ft-lbf +/- 30%.
First, connect and clamp the port exhaust manifold hose to the port side 45-degree pipe on heat exchanger. Next, connect the water pump hose to the inlet pipe on the port side of the heat exchanger. This hose must be as close to the exhaust hose as possible to prevent interference with the motor box cover. This hose may kink during installation if it is too long, some slight resizing may be necessary.
Connect the Fill Neck Assembly to the inside starboard thermostat-housing inlet using the 4” hose provided. The bottom of the fill tube connects to the remaining inlet on the heat exchanger. Finally, connect the top of the Fill Neck Assembly to the Expansion tank with the clear tubing by running the tubing down the port and aft wiring harness to the bottom hose position on the Expansion tank. **Note: The hose clamp securing the clear tube to the top of the Fill Neck Assembly must have the tightening screw facing downward to prevent the clamp from interfering with the Fill Neck cap.**

Step 7 – Starboard Side Hose Installation

First, connect the top inlet on the Tubular Assembly to the starboard thermostat-housing outlet. This hose must be positioned a minimum of 3 /4” away from the belt pulley to prevent rubbing. Next, connect the port thermostat-housing outlet to the middle inlet on the Tubular Assembly. Finally, attach the Tubular Assembly to the starboard bow side of the Heat Exchanger using the short 90-degree section of hose. Finally, connect the aft starboard outlet on the Heat Exchanger to the starboard exhaust manifold.



The Tubular Assembly must be fastened to the bracket adjusted in Step 2 using the same clamp that held the starboard Exhaust to Thermostat Housing hose to the bracket. Tighten the bracket nut to 13 ft-lbf +/- 20%.
The Tubular Assembly is fastened to the engine bracket on the top 90-degree elbow. After the Tubular Assembly is fastened to the bracket it must have a piece of sanopad attached between the tube and the alternator to prevent vibration noise.

Step 8 – Securing The Heat Exchanger

First, connect the bottom of the Fill Neck Assembly to the Heat Exchanger using the short section of straight hose. This hose will have to be bent into a 90 degree elbow to connect the two components. **Note: Care must be taken to prevent damaging the hose on the ends of the Ski Pylon bolts.** Next, apply strips of sanopad to the Heat Exchanger where the four hose clamps will fasten it to the bracket. Finally, fasten the Heat Exchanger to the Heat Exchanger Bracket using 4 hose clamps tightened to 2 ft-lbf +/- 20%.

Step 9 – Bleeding The System

Before filling the Closed Water Cooling system with coolant remove the throttle cap using a 10mm Allen wrench located aft and port of the air filter. Remove the Fill Neck Assembly fill cap. Once the throttle cap has been removed add premixed coolant and water to the engine though the Throttle opening until over flowing. Next, loosen the Coolant Drain on the Heat Exchanger until a steady flow of coolant drains. Retighten the Coolant drain and refill the engine through the Throttle opening. Next, fill the Overflow Tank, and the Fill Neck Assembly. Finally, reinstall the Throttle cap and the Fill Neck Assembly Cap and water test the system.

Note: During water testing be sure to test the boat under load. A water test with the boat on the trailer or using a 'fake-a-lake' is not sufficient stress to bring the engine to a point where an air bubble or kinked hose will cause an over heat situation.

Step 10 – Draining The System

To drain the fresh water half of the Closed Water Cooling system remove the drain plug located on the bottom port side of the Heat Exchanger unit and allow the water to drain into the bilge after removing the aft and garboard drain plugs. To drain the coolant from the Closed Water Cooling system you must first remove the three hose clamps securing the Heat Exchanger to the Heat Exchanger Bracket. Next, remove the garboard drain plug and place a bucket under the boat to catch the coolant as it drains from the bilge. Finally, lift up the Heat Exchanger and remove the drain plug located at the center, bottom of the unit.