



2002 - 2003
Fresh Water
Cooling Installation
Instructions -
V-Drive
Kit RK147046A



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FWC KIT INSTALLATION INSTRUCTIONS - RK147046A

INSTALLATION NOTES AND RECOMMENDATIONS

PCM Technical Support, Warranty and Dealer Assistance:

- Phone: (803) 345-0050
- Fax: (800) 321-3797
- E-mail: mschneider@pleasurecraft.com

REFERENCES:

The following manuals are required to effectively perform this installation procedure. If you do not have a copy of each of these manuals, obtain copies prior to beginning this installation procedure.

L510013 Marine Illustrated Parts Manual Model MP5.0/5.7L MY 2002 - 2004

L510010-03 Owner's Operation and Maintenance Manual

NOTE: Use pipe sealant with Teflon on all fittings being installed during these procedures. Loctite™ 565, PST Pipe Sealant, Part No. 56541 or equivalent is recommended.



WARNING

Do not remove cooling system filler cap when the engine is hot. Allow the engine to cool and then remove the pressure cap slowly, allowing the pressure to vent. Hot coolant, under pressure, may discharge violently and cause severe burns.

V-DRIVE INSTALLATION

IMPORTANT: Thoroughly read these instructions before beginning this installation procedure. Due to model variations between '02 and '03 model years, continuing product improvements, and O.E.M. considerations, variations exist. If the motor you are installing the kit on is already equipped with a crank mounted raw water pump, you will skip steps 11 through 18 and step 42 of this procedure. Kit items 17-33, 55-56 will not be used. Other variations are addressed within the text of this procedure.

Installation of the fresh water cooling system, on some V-drive applications, will require the relocation of the transmission oil cooler and transmission oil cooler lines. Provisions should be made to recover oil spilled from the lines.

Installation of the fresh water cooling system on V-drive applications will require relocation of both the low pressure fuel pump and the FCC, and servicing of the high pressure supply and return fuel lines. To complete the installation procedure you will require a fuel gauge equipped with a pressure release valve, an approved container to vent gasoline into, and the proper tools for releasing the fuel lines from the fuel rails. Provisions should be made to recover any fuel spilled. Observe all safety warnings and cautions when working on the fuel system.

Additionally, to relocate the new LPFP bracket, an engine mount will need to be removed and reinstalled. Make sure that the proper equipment required to hoist the engine is available and in good working order. Observe all associated safety cautions when operating lifting equipment.



WARNING

Fire and Explosion Hazard - Gasoline is extremely flammable and highly explosive, and, if ignited, can cause serious bodily injury or death. Careful inspection of the entire fuel system including, but not limited to, fuel tanks, fuel lines, fuel filters and all fittings is mandatory, especially after periods of storage. Replace any component that shows signs of leakage, corrosion, deterioration, swelling, hardening or softening.



WARNING

Extreme caution must be exercised when servicing the fuel system and/or replacing fuel filter. Gasoline is extremely flammable and highly explosive under certain conditions. Be sure the ignition key is off and do not smoke, or allow open flame in the area while servicing. Wipe up any spilled fuel immediately.



WARNING

Visually inspect unit for fuel leaks before operating the engine. If fuel leaks are present, DO NOT operate the engine, repair immediately.



WARNING

Make sure that there are no fuel leaks before closing the engine hatch.

PARTS DELETED - 5.7L, V-BELT, V-DRIVE - R/W

FIGURE 1-1

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
*1	R045135A	Hose , r/w pump to tstat housing	1
*2	RS3858	Clamp , 1 1/4"	2
3	R090082	Clamp , strap	1
4	RS1527	Nut , strap clamp attaching	1
5	R025031	Housing , tstat, lower	1
6	RM0121	Gasket , tstat housing, lower	1
7	R026002	Thermostat , 160° F	1
8	RM0258	Gasket , tstat housing, upper	1
9	R025033	Housing , tstat, upper	1
10	98333080	Bolt , tstat housing	2
11	RS2179	Lock Washer , tstat housing	2
12	98223035	Bolt , tstat housing	1
13	93920000	Lock Washer , tstat housing	1
14	R020002	Sender , water temperature	1
15	TBD	Plug , intake, (water temp sender)	1
16	R045048	Hose , r/w supply to engine	1
17	RS3852	Clamp , 1 3/4"	2
18	R045107	Hose , r/w dump	2
19	RS3851	Clamp , 1"	4
*20	R045021F	Hose , trans. oil cooler to r/w pump	1
*21	RS5858	Clamp , 1 1/4"	2
*22	R090082	Clamp , strap	1
23	R060060	Hood	1
24	R143141	Decal , hood, "PCM Excalibur"	1
25	R143142	Decal , hood, "Excalibur"	2
26	R143143	Decal , hood, spec	1
*27	R143158	Decal , hood, "3 Star" emission '03 MY, ONLY, SN 430913 and higher	1
28	R090204	Bracket , FCC/LPFP	1
29	R143114	Decal , "WARNING" FCC/LPFP Brkt	1
30	RA085071	Fuel Line , LPFP to FCC	1
31	RA085090B	Fuel Line , HP supply to rail	1
32	RA085091B	Fuel Line , HP return from rail	1

PARTS DELETED - 5.7L, V-BELT, V-DRIVE - R/W

FIGURE 1-1

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
*33	RS0279	Bolt , 10-Pin Bracket attaching	1
*34	RS2179	Lock Washer , 10-Pin Bracket attaching	1
35	R096144A	Bracket , plug wire clip	1
36	R096144	Bracket , plug wire clip	1
37	RA121062C	Harness , fuel pump jumper (V-drive)	1
*38	R065046	Pulley , raw water pump drive belt	1
*39	R065048	Pulley , alternator drive belt	1
*40	90315100	Bolt , pulleys to crankshaft balancer	3
*41	RS2180	Lock Washer , pulleys to crankshaft balancer	3
*42	R066026	Belt , raw water pump drive	1
*43	RA057031	Raw Water Pump Assembly	1
*44	R065047	Pulley , raw water pump	1
*45	RS0775	Bolt , raw water pump pulley attaching	3
*46	RS2179	Lock Washer , r/w pump pulley attaching	3
*47	RS0282	Bolt , raw water pump mounting	2
*48	RS2179	Lock Washer , raw water pump mounting	2
*49	R090264	Bracket , raw water pump adjust	1
*50	RS0327	Bolt , adjustment brkt to mount	2
*51	RS2181	Lock Washer , adjustment brkt to mount	2
*52	R090263	Bracket , raw water pump mount	1
*53	RS0307	Bolt , mount to block	2
*54	RS2181	Lock Washer , mount to block	2
*55	RA045007B	Hose , transmission oil	1
*56	RA045007K	Hose , transmission oil	1
*57	RS0306	Bolt , trans. cooler attaching	1
*58	RS2180	Lock Washer , trans. cooler attaching	1
*59	RS1028	Nut , trans. cooler attaching	1

IMPORTANT: ITEM NUMBERS MARKED WITH AN “*” MAY OR MAY NOT BE DELETED DEPENDING ON YOUR ENGINE CONFIGURATION. BE SURE TO READ ALL INSTRUCTIONS THOROUGHLY BEFORE PERFORMING THE FWC KIT INSTALLATION INSTRUCTIONS. REFER TO MANUAL L510013 FOR PARTS BREAKOUT.

PARTS ADDED - 5.7L, V-BELT, V-DRIVE -F/W

FIGURE 1-2

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	R020003	Sender , water temperature	1
2	R090260	Bracket , coolant fill riser	1
3	98223016	Bolt , fill riser brkt attaching	2
4	RS2672	Lock Washer , fill riser brkt, attaching	2
5	RS7068	Flat Washer , fill riser brkt, attaching	2
6	R034047	Coolant Fill Riser	1
7	R034006A	Cap , coolant fill riser	1
8	RS0252	Bolt , fill riser mounting	2
9	RS2179	Lock Washer , fill riser mounting	2
10	RS1026	Nut , fill riser mounting	2
11	R025015A	Housing , FWC thermostat	1
12	R026002F	Thermostat , 160° F	1
13	R047189	O-Ring , thermostat housing	1
14	RS6531	Bolt , thermostat housing attaching	2
15	RS2179	Lock Washer , thermostat housing attaching	2
16	R024055	Elbow , 1/8 NPT X 1/4 vent hose	1
*17	R065045	Pulley , crankshaft	1
*18	RA057026	Raw Water Pump Assembly , crank driven	1
*19	R009161	Bolt , r/w pump mounting	3
*20	RS2180	Lock Washer , r/w pump mounting	3
*21	R090177A	Bracket , raw water pump mounting	1
*22	R094038	Grommet , rubber	1
*23	RS0302	Bolt , r/w pump brkt mounting	2
*24	RS2180	Lock Washer , r/w pump brkt mounting	2
*25	RS0280	Bolt , r/w pump to brkt attaching	1
*26	RS2179	Lock Washer , r/w pump to brkt attaching	1
*27	RS2673	Flat Washer , r/w pump to brkt attaching	1
*28	R090013A	Bracket , trans. oil cooler mounting	1
*29	RS0302	Bolt , cooler clamp to brkt attaching	1
*30	RS2180	Lock Washer , cooler clamp to brkt attaching	1
*31	RS1028	Nut , cooler clamp to brkt attaching	1

PARTS ADDED - 5.7L, V-BELT, V-DRIVE -F/W

FIGURE 1-2

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
*32	RA045007S	Hose , transmission oil to cooler, 17"	1
*33	RA045007T	Hose , transmission oil to cooler, 31"	1
34	R090188	Bracket , FCC	1
35	R143114	Decal , "WARNING"	1
36	R090223	Bracket , LPFP	1
37	RA085090A	Fuel Line , HP supply, FCC to rail	1
38	RA085091A	Fuel Line , HP return, rail to FCC	1
*39	R090265	Bracket , heat exchanger	1
*40	RS0281	Bolt , (-265) brkt, heat exchanger attaching	2
*41	RS2179	Lock Washer , (-265) brkt, heat exchanger	2
*42	R090266	Bracket , heat exchanger	1
*43	RS0304	Bolt , (-266) brkt, heat exchanger attaching	2
*44	RS2180	Lock Washer , (-266) brkt, heat exchanger	2
45	RS0302	Bolt , engine harness ground to head	1
46	RS2180	Lock Washer , harness ground to head	1
47	R101013	Wire , H.E. ground	1
48	R094040	Isolator , rubber, adhesive	1
49	RA147046	Heat Exchanger	1
50	R094041	Isolator , rubber	2
51	RS3857	Clamp , 4"	2
52	RS1078	Nut , w/lock washer, H.E. grd. stud	1
53	R045025	Hose , r/w dump, 1"	2
54	RS3851	Clamp , 1"	4
*55	R045113	Hose , trans. oil cooler to r/w pump	1
*56	RS3858	Clamp , 1 1/4"	2
57	R045146	Hose , circ. pump to H.E.	1
58	RS3852	Clamp , 1 3/4", circ. pump	1
59	RS3868	Clamp , 1 1/2", H.E.	1
60	R045102A	Hose , r/w pump to H.E.	1
61	RS3858	Clamp , 1 1/4"	2

PARTS ADDED - 5.7L, V-BELT, V-DRIVE -F/W

FIGURE 1-2

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
62	R045124	Hose , coolant fill riser to H.E.	1
63	RS3851	Clamp , 1"	2
64	R045144	Hose , t-stat housing to H.E.	1
65	RS3858	Clamp , 1 1/4"	2
66	R045132	Hose , coolant fill riser to t-stat housing	1
67	RS3870	Clamp , 1/4"	2
68	R045139	Hose , overflow bottle to coolant fill riser	1
69	R127084	Clamp , 1/4"	2
70	R146002	Coolant Overflow Bottle w/cap	1
71	RS0282	Bolt , overflow bottle mounting	2
72	RS2673	Flat Washer , overflow bottle mounting	2
73	RS2179	Lock Washer , overflow bottle mounting	2
74	RS1027	Nut , overflow bottle mounting	2
75	R060061A	Hood	1
76	R143141	Decal , hood, "PCM Excalibur"	1
77	R143142	Decal , hood, "Excalibur"	2
78	R143143	Decal , hood, spec	1
*79	R143158	Decal , hood, "3 Star" emission '03 MY, ONLY, SN 430913 and higher	1

IMPORTANT: ITEM NUMBERS MARKED WITH AN "*" MAY OR MAY NOT BE USED DEPENDING ON YOUR ENGINE CONFIGURATION. BE SURE TO READ ALL INSTRUCTIONS THOROUGHLY BEFORE PERFORMING THE FWC KIT INSTALLATION INSTRUCTIONS. REFER TO MANUAL L510013 FOR PARTS BREAKOUT.

FWC KIT INSTALLATION INSTRUCTIONS - V-DRIVE

FWC KIT INSTALLATION - V-DRIVE

1. Disconnect the negative battery terminal cable.
2. Remove the hood (Figure 1-1, item 23) from the engine. The hood is not required to complete the installation. Save the hood retention nuts for installation of the new hood later in this procedure.
3. Remove the thermostat housing, water temperature sender, and associated hoses.

NOTE: The complete thermostat housing with hoses, temp sender, and thermostat can be removed as an assembly. (Figure 1-1, items 1-22)

- a. Disconnect the wire connected to the water temperature sender (Figure 1-1, item 14), located in the lower thermostat housing.
- b. Loosen the hose clamps of the raw water dump hoses at each exhaust manifold connection, the raw water pump hose at the raw water pump, the raw water pump hose retaining clamp and retaining nut on the lower port stud of the circulating pump, and the raw water supply to engine hose at the circulating pump.

IMPORTANT: Some V-drive applications route the output of the raw water pump to the V-drive gear instead of going to the t-stat housing. Do not disconnect the hose at the raw water pump. Instead disconnect the raw water supply hose at the thermostat and remove the hose retaining clamp and nut at the lower port circulating pump mounting stud, then continue with this procedure.

- c. Remove the two bolts and lock washers (Figure 1-3) attaching the thermostat housing assembly to the intake manifold.
 - d. Remove, from the engine, the thermostat assembly, all hoses and clamps. Clean thermostat gasket from the intake manifold. None of these parts are required to complete the installation.
4. Remove and discard the plug located right, front of the intake manifold. Figure 1-3.

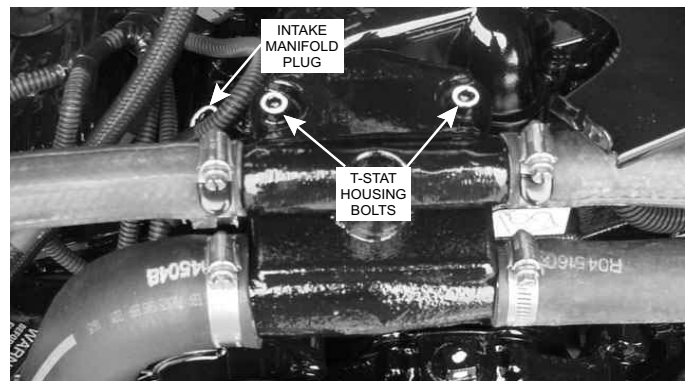


Figure 1-3 Disconnect Points - Steps 3 - 4.

NOTE: Use pipe sealant with Teflon on all fittings being installed during these procedures. Loctite™ 565, PST Pipe Sealant, Part No. 56541 or equivalent is recommended.

5. From the kit, install the Water Temperature Sender (Figure 1-2, item 1) into the intake manifold, where the plug was removed, and reconnect the temperature sending wire to the sensor. This is the wire disconnected in step 3a.
6. Remove 90° hose fittings from the (engine) front of each exhaust manifold and the plug fitting from the rear of each exhaust manifold.

Install the hose fittings in the (engine) rear of each exhaust manifold, with the hose barb facing inboard. Install the plugs in the front of each exhaust manifold. Be sure to clean the threads of each fitting, then apply PST prior to installation.

FWC KIT INSTALLATION INSTRUCTIONS - V-DRIVE

NOTE: Use pipe sealant with Teflon on all fittings being installed during these procedures. Loctite™ 565, PST Pipe Sealant, Part No. 56541 or equivalent is recommended.

7. From the kit, install the Coolant Fill Riser Bracket using (2) Bolts (*metric), (2) Lock washers, and (2) Flat washers (Figure 1-2, items 2 - 5). The bracket is installed to the existing bracket on the (engine) starboard side of the intake manifold.
8. From the kit, install the Coolant Fill Riser onto the Coolant Fill Riser Bracket using (2) bolts, (2) lock washers, and (2) nuts (Figure 1-2, items 6-10). The fill riser is mounted on the exhaust elbow side of the bracket. Install pressure cap onto fill riser.
9. From the kit, install the Thermostat, O-ring, and Thermostat Housing using (2) Bolts, (2) Lock washers, (Figure 1-2, items 11 - 15).
10. From the kit, install the Vent Hose Fitting (Figure 1-2, item 16) into the Thermostat Housing. The hose barb should be positioned to starboard, approximately parallel with the Thermostat Housing outlet.

*** IMPORTANT: STEPS 11 - 18 ARE ONLY PERFORMED IF YOUR ENGINE IS EQUIPPED WITH A V-BELT DRIVEN RAW WATER PUMP.**

11. Remove the v-belt driven raw water pump and all associated brackets. This can be done as an assembly including pump, bracket, mount, pulley, and belt. Disconnect water hoses connected to the input and output of the pump. Remove the (2) bolts and (2) lock washers securing the r/w pump mount to the block. The pump, drive belt and all associated components will not be required to complete this procedure.
12. Remove the crankshaft pulleys. Loosen the alternator adjusting strap bolt to relieve tension on the alternator v-belt. Remove the (3) bolts and (3) lock washers securing the pulleys to the crankshaft balancer. Remove the crankshaft balancer retaining bolt and flat washer. Remove both pulleys and discard the pulleys. Retain the crankshaft balancer bolt and flat washer, and at least (2) of the pulley retaining bolts.

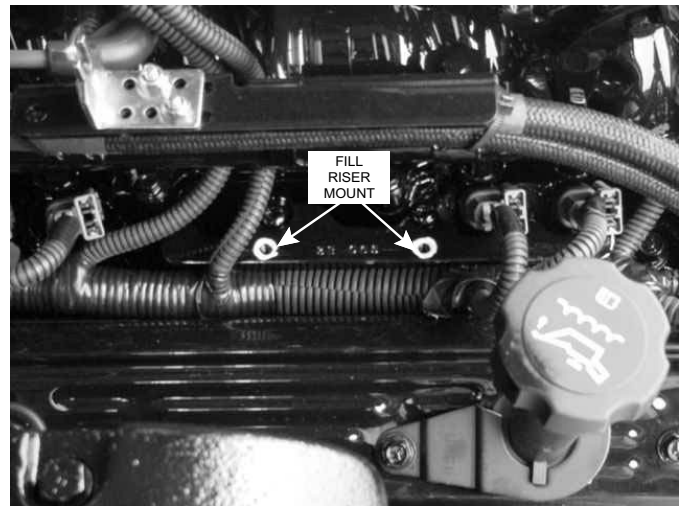


Figure 1-4 Coolant Fill Riser Bracket Location

13. From the kit, install the new Alternator Drive Belt Pulley (Figure 1-2, item 17). Locate the pulley onto the crankshaft balancer, using (2) of the pulley bolts removed in step 12, install the bolts through two of the screw holes and hand tighten to properly locate the pulley. Install the crankshaft balancer retaining bolt and flat washer, then **torque to 70 lb.ft.** Remove the (2) bolts used to properly locate the pulley.
14. Reinstall the alternator v-drive belt on the crankshaft pulley and alternator pulley. Do not set tension on the v-belt at this time.
15. From the kit, install the Crank Driven Raw Water Pump using (3) bolts and (3) lock washers to the crankshaft balancer (Figure 1-2, items 18-20). Once the pump is installed, by hand, rotate the pump until the pump's mounting boss is positioned toward the bottom of the boat.
16. From the kit, locate the Raw Water Pump Mounting Bracket, Rubber Grommet, Raw Water Pump to Brkt. mounting (1) bolt, (1) flat washer, (1) lock washer, and Bracket Mounting (2) bolts, and (2) lock washers (Figure 1-2, items 21 - 27). Install the rubber grommet into the large hole of the bracket. Locate the r/w pump mounting boss into the rubber grommet, then locate the bracket mounting holes with the block mounting holes (holes vacated when old r/w mount was removed), secure the bracket to the block using (2) bolts and (2) lock washers (Figure 1-2, items 23 - 24). Ensure that the r/w pump mounting boss does not come out of the rubber grommet when tightening bracket mounting bolts.

FWC KIT INSTALLATION INSTRUCTIONS - V-DRIVE

16. (continued) Secure the r/w pump to the bracket using (1) bolt, (1) lock washer, and (1) flat washer through the bottom of the bracket, through the rubber grommet into the r/w pump mounting boss.
17. Set the proper tension on the alternator belt. 1/2" deflection at mid-point of belt, and secure alternator strap adjusting bolt.

NOTE: The following procedure involves the relocation of the Transmission Oil Cooler and oil hoses. Have materials in place to absorb any transmission fluid spilled.

IMPORTANT: In most cases, engines equipped with the v-belt driven r/w pump will have the oil cooler located on the starboard rear of the engine. If your engine has the oil cooler located on the starboard rear of the engine, you must perform step 18.

18. Relocate the Transmission Oil Cooler from its rear, starboard location to engine port front motor mount.
 - a. Disconnect water hoses connected to the input and output of the cooler. The water hose connected to the output of the cooler should be removed completely from the engine. You will have to release the hose clamp securing the hose to the starboard side of the engine by removing the bolt and lock washer securing it at the starboard front engine mount; after the clamp is removed reinstall the bolt and lock washer into the motor mount.

NOTE: It is recommended that the transmission fluid be removed from the transmission at this time. This will help minimize the amount of fluid spilled during the cooler relocation process.

- b. Disconnect and remove the transmission oil hoses from the oil cooler and the transmission and discard hoses. Have materials available to absorb transmission fluid that will spill from the lines, cooler, and transmission.

- c. Remove the oil cooler, with mounting clamp attached, from the engine. The cooler clamp will be secured to the engine either by a ground stud bolt on the bell housing or a bolt, lock washer, and nut through a mounting hole on the bell housing. If it was secured by the ground stud, replace the ground stud and all grounds after removal of the cooler; if it was secured by a bolt, lock washer, and nut, those items may be discarded.
- d. The transmission oil line fittings need to be re-indexed. Remove the top fitting on the transmission, clean the threads, coat threads with PST, and reinstall the fitting so it is facing the front of the engine at an approximate 45° angle to port. Remove the lower port oil line fitting on the transmission, clean the threads, coat the threads with PST, and reinstall the fitting so it is facing down with a slight angle toward the engine.

NOTE: To minimize transmission fluid spillage in the boat, once the cooler has been removed from its mounting point, perform step e on a work bench.

- e. The transmission oil line fittings will need to be re-indexed. Remove the oil line fittings from the oil cooler. Clean the threads thoroughly, apply PST to the fitting threads, and reinstall the fittings into the oil cooler so the rear fitting is parallel with the cooler facing the rear of the engine, and the forward fitting is facing the rear at a slight up angle to allow for oil hose attachment. See Figure 1-5.

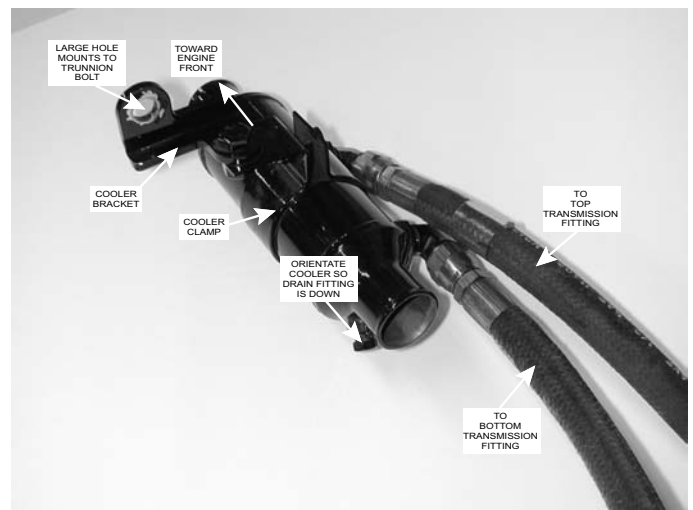


Figure 1-5 Transmission Oil Cooler, Reconfigured

FWC KIT INSTALLATION INSTRUCTIONS - V-DRIVE

- f. From the kit, locate the Oil Cooler Bracket, (1) bolt, (1) lock washer, (1) nut, and (2) Transmission Oil Hoses (Figure 1-2, items 28 - 33). If necessary, loosen the cooler clamp and orientate the cooler to the position shown in Figure 1-5. Tighten the clamp. Attach the cooler bracket to the cooler clamp as shown in Figure 1-5. Attach the shorter of the two transmission oil line hose to the rear oil fitting of the cooler. Attach the longer transmission oil line hose to the forward fitting on the oil cooler.

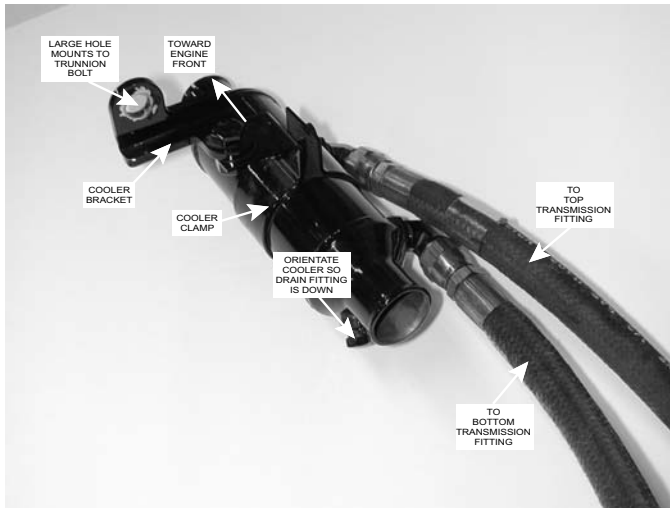


Figure 1-5 Transmission Oil Cooler, Reconfigured

- g. Mount the assembled cooler to the engine port front motor mount trunnion bolt. Remove the nut and lock washer from the trunnion bolt, slide the oil cooler bracket onto the trunnion bolt and secure with the nut and lock washer.

Once installed the cooler may need to be rotated up or down slightly for best fit. Make sure all mounting hardware is secure if loosened for fit adjustment.

- h. Route the transmission oil line hoses under the remote oil filter lines. Attach the shorter transmission oil line hose to the bottom fitting on the transmission, and the longer hose to the upper fitting on the transmission. Make sure all oil line hose connections are secure.

IMPORTANT: CHECK TRANSMISSION FLUID LEVEL. IF IT IS NOT TO THE "FULL" MARK OF THE DIPSTICK, ADD FLUID AT THIS TIME UNTIL FLUID LEVEL INDICATES FULL.



WARNING

Extreme caution must be exercised when servicing the fuel system and/or replacing fuel filter. Gasoline is extremely flammable and highly explosive under certain conditions. Be sure the ignition key is off and do not smoke or allow open flame in the area while servicing. Wipe up any spilled fuel immediately.

IMPORTANT: Installation of the fresh water cooling system on V-drive applications will require relocation of both the low pressure fuel pump and the FCC, and servicing of the high pressure supply and return fuel lines. To complete the installation procedure you will require a fuel gauge equipped with a pressure release valve, an approved container to vent gasoline into, and the proper tools for releasing the fuel lines from the fuel rails. Provisions should be made to recover any fuel spilled. Observe all safety warnings and cautions when working on the fuel system.

Additionally, to relocate the new LPFP bracket, an engine mount will need to be removed and reinstalled. Make sure that the proper equipment required to hoist the engine is available and in good working order. Observe all associated safety cautions when operating lifting equipment.

19. Disconnect electrical connections to the FCC and LPFP fuel pumps.
20. At the schrader valve located on the fuel rail, use the appropriate tool and approved container to bleed fuel pressure from the fuel lines. Release the fuel line retaining clips (IF EQUIPPED) from both the high pressure supply and return fuel lines, at the fuel rail. Using the appropriate tool, release both lines from the fuel rail. Fuel lines will contain some residual fuel, take appropriate measures to minimize fuel spillage. Remove both the HP supply and HP return fuel lines from the FCC and discard. Refer Figure 1-6.
21. Disconnect the fuel tank return line from the FCC. Keep line elevated and use appropriate measures to minimize fuel leakage.
22. Disconnect the fuel tank supply line from the LPFP. Keep line elevated and use appropriate measures to minimize fuel leakage.

FWC KIT INSTALLATION INSTRUCTIONS - V-DRIVE

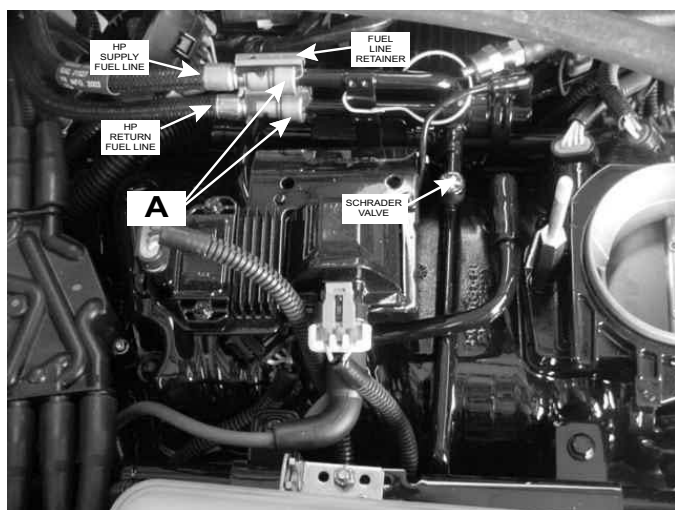


Figure 1-6 Fuel Rail Service Points

24. Remove (3) bolts and (3) lock washers securing the FCC/LPFP bracket to the rear of the engine's port head. Remove bracket with FCC and LPFP attached and set aside.

NOTE: The bracket and spark plug wire clip bracket will not be reused. The FCC bracket attaching hardware, FCC, FCC attaching hardware, and fuel fittings will be reused in later steps, as will the LPFP with its associated hardware.

IMPORTANT: The FCC and LPFP will contain fuel, make sure they are temporarily stored in an upright position so fuel will not spill from them.

25. From the kit, locate the new FCC Bracket (Figure 1-2, item 34), install the bracket using the (3) bolts and (3) lock washers, retained from step 24, to the front of the engine's starboard head. From the kit, affix "WARNING" decal (Figure 1-2, item 35) on the top surface of the FCC Bracket.



WARNING

Extreme caution must be exercised when servicing the fuel system and/or replacing fuel filter. Gasoline is extremely flammable and highly explosive under certain conditions. Be sure the ignition key is off and do not smoke or allow open flame in the area while servicing. Wipe up any spilled fuel immediately.

26. Disconnect the Low Pressure Fuel Pump fuel line from the FCC. Remove the (3) FCC attaching bolts, keeping the FCC in an upright position, to avoid spilling any fuel, install the FCC onto the new FCC Bracket (installed in step 25), using the FCC attaching bolts. The FCC should orientate into the new bracket so the electrical harness comes through the bracket at the point nearest the engine's circulating pump pulley.
27. From the kit, install the new HP supply to rail, fuel line (Figure 1-2, item 37), to the FCC. From the kit, install the new HP return from rail, fuel line (Figure 1-2, item 38), to the FCC. Fuel lines will route to the rear of the engine along the starboard side of the intake manifold and bend around to the port side fuel rail connections. Follow the steps below to ensure good connections at the fuel rail.
 - a. Push the fuel lines, near the connection point (A), onto the fuel rail.
 - b. Pull on the fuel lines near the connection point (A) with an approximate force of 10 lb.ft. (44 N). There will be some movement due to the design of the connection. If the fuel lines do not become separated from the fuel rail when force is applied, the fuel lines are connected and sealed properly.
 - c. If either of the fuel lines become separated from the fuel rail, reassemble by pushing the fuel line(s) back on to the fuel rail until a "click" is heard. After reassembling the fuel line(s), repeat step (b) to verify the proper connection.
 - d. If your engine was equipped with fuel line retaining clips, reinstall the clips on both fuel lines.
28. Position an engine hoist over the engine. Make connections between the engine lift rings and the hoist. Slowly adjust tension on the hoist until a firm tension is achieved on the lift apparatus. You do not need to elevate the engine, just relieve pressure on the engine mount.
 - a. Loosen the nut on the engine's front starboard trunnion bolt. Lightly tap the bolt to release it from the trunnion.
 - b. Remove the (3) bolts and (3) lock washers securing the engine mount to the block.

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28. c. Slide the motor mount along the trunnion away from the block. Position the LPFP Bracket (Figure 1-2, item 36) between the mount and the block. Slide the mount back to the block and secure the mount and LPFP bracket with the (3) bolts and (3) lock washers removed in step (b).
- d. Relieve tension on hoist and remove lifting apparatus.
29. On the old FCC/LPFP Bracket, retaining all attaching hardware, remove the LPFP from the bracket, and install the LPFP onto the new LPFP Bracket. The output fitting of the LPFP will face forward (engine front). See Figure 1-7.
30. Reconnect the output of the LPFP to the input of the FCC.



Figure 1-7 LPFP Bracket and LPFP Relocated



WARNING

Extreme caution must be exercised when servicing the fuel system and/or replacing fuel filter. Gasoline is extremely flammable and highly explosive under certain conditions. Be sure the ignition key is off and do not smoke or allow open flame in the area while servicing. Wipe up any spilled fuel immediately.



WARNING

With the relocation of the FCC/LPFP new fuel lines may need to be run from the fuel tank to the FCC return and LPFP input. Use marine approved 3/8" fuel line. DO NOT splice extra length onto the existing lines in order to make connection to the FCC/LPFP.

31. Connect return-to-tank fuel line to FCC.
32. Connect fuel tank supply line to LPFP input.
33. Remove the Fuel Pump Jumper Harness from the main engine harness. Connect FCC and LPFP to the main engine harness.

NOTE: LPFP harness connection may be tied off to the main engine harness. Cut tie wrap and route forward and down to make connection to the LPFP.

34. Remove the starboard plug wire retaining bracket, located on the rear of the starboard head. Reinstall bolt and lock washer securing dipstick tube bracket.

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NOTE: For steps 35 -37 of this procedure parts added and relocated will vary according to the Bell Housing installed on your engine. Refer to Figure 1-8 for Bell Housing differences. Figure 1-8A is distinguished by having 'PCM' cast into the upper center surface and is a bottom mount starter only housing. Figure 1-8B is the current style Bell Housing and is distinguished by being able to accept either top mount or bottom mount starters dependent upon application.

35. Relocate the 10-Pin Bracket to the lower top mount starter block-off plate bolt, or to the upper starboard transmission mounting bolt. Refer to Figure 1-8. If a ground wire was secured at the 10-Pin Bracket mounting point, relocate this ground wire to the lower mounting hole on the rear of the starboard head using (1) bolt and (1) lock washer, from the kit (Figure 1-2, items 45-46). If the 10-Pin bracket was originally secured with a ground stud bolt (typical of Figure 1-8B) return the bolt to its original location and tighten. If the 10-Pin was secured by a bolt and lock washer (typical of Figure 1-8A) you may discard the bolt and lock washer.
36. From the kit, install the Heat Exchanger Ground Wire (Figure 1-2, item 47) at the upper port bell housing mounting bolt. Refer to Figure 1-8 for exact location.
37. From the kit, install the Heat Exchanger Bracket (Figure 1-2, items 39 - 44) to the bell housing. For the bell housing pictured in Figure 1-8A use items 39-41 from the kit, for the bell housing pictured in Figure 1-8B use items 42-44 from the kit.

38. From the kit, cut the rubber isolator with adhesive into thirds (Figure 1-2, item 48). Affix the isolator onto the Heat Exchanger Bracket in the center and inboard of each of the mounting clamp holes.

NOTE: The Remote Oil Lines will route behind (engine side) the H.E. Bracket.

39. From the kit, obtain the Heat Exchanger (Figure 1-2, item 49). Mount the Heat Exchanger assembly to the H.E. Bracket using (2) 4" Hose Clamps (Figure 1-2, item 51). Do not fully tighten the clamps, at this time.
40. From the kit, use the Nut w/lock washer (Figure 1-2, item 52) to secure the ground wire to the H.E. ground stud.

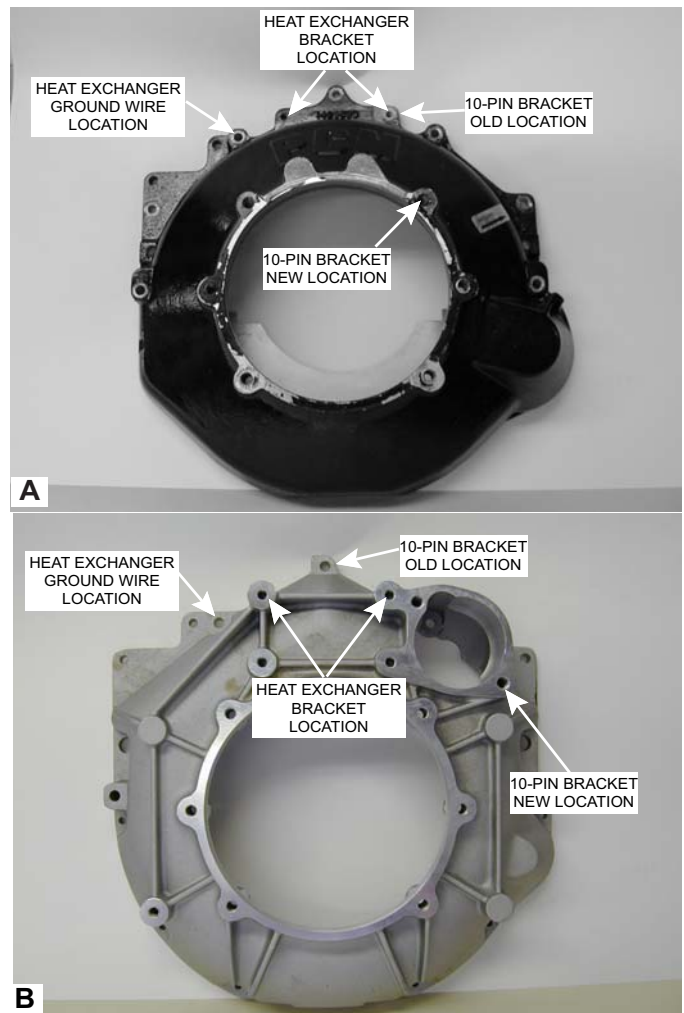


Figure 1-8 Bell Housing Configurations and Accessory Mounting Locations

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41. From the kit, install the (2) Raw Water Dump Hoses, using (4) 1" Hose Clamps, (Figure 1-2, items 53-54) to the H.E. 1" outboard fittings and to the 90° fittings installed in rear ports of the exhaust manifolds.

NOTE: The r/w dump hoses may need to be trimmed slightly, at the H.E. side, to prevent them from rubbing on the corner of the engine heads.

42. If you performed steps 11-18 of this procedure, from the kit, install the Cooler to R/W Pump Hose (Figure 1-2, item 55) using hose clamps provided (Figure 1-2, item 56). The hose may need to be trimmed at the cooler side to provide a smooth fit. Hose will attach to the lower fitting of the crank driven r/w pump.
43. From the kit, install the Circulating Pump to Heat Exchanger Hose (Figure 1-2, item 57). Use 1-3/4" hose clamp (Figure 1-2, item 58) at the circulating pump and use 1-1/2" hose clamp (Figure 1-2, item 59) at the H.E. The hose may need to be trimmed at the heat exchanger end to provide a smooth fit.
44. From the kit, install the R/W Pump to Heat Exchanger Hose (Figure 1-2, item 60) using 1-1/4" hose clamps (Figure 1-2, item 61).

IMPORTANT: If your V-drive application routes the output of the raw water pump directly to the V-drive gear unit; you will not use the Raw Water Supply Hose supplied in the kit. Connect the output of the Crank Driven Raw Water Pump to a hose going to the V-drive gear unit and the cooling hose coming from the V-drive gear unit to the rear fitting (r/w input) of the heat exchanger, as your application requires. Hoses disconnected as part of this procedure may be of sufficient length to accomplish this or you may need to order 1-1/4" i.d. water hose of sufficient length from the O.E.M. or other source.

45. From the kit, install the Coolant Fill Riser to Heat Exchanger Hose (Figure 1-2, item 62), using 1" hose clamps (Figure 1-2, item 63). The moulded end of the hose will connect to the fill riser and the end of the hose connecting to the H.E. may need to be trimmed to provide a smooth fit.
46. From the kit, install the Thermostat Housing to Heat Exchanger Hose (Figure 1-2, item 64), using 1-1/4" hose clamps (Figure 1-2, item 65).

47. From the kit, install the Coolant Fill Riser to thermostat Housing Hose (Figure 1-2, item 66), using 1/4" hose clamps (Figure 1-2, item 67). This hose connects to the nipple fitting located on the engine front of the fill riser and routes inside the oil fill tube to the thermostat housing fitting.
48. From the kit, locate the Coolant Overflow Bottle w/Cap, Coolant Overflow Hose, 1/4" Hose Clamps, and Overflow Bottle mounting hardware, (2) bolts, (2) flat washers, (2) lock washers, and (2) nuts (Figure 1-2, items 68-74). Attach the coolant overflow hose to the overflow bottle using 1/4" hose clamp. Mount the Overflow Bottle to the Heat Exchanger Bracket using the (2) bolts, flat washers, lock washers and nuts. Bolt with flat washer on the bottle side and lock washer and nut on bracket side. Route the overflow hose under the H.E. then up and forward to the engine rear fitting on the coolant fill riser and secure with 1/4" hose clamp.
49. Ensure that the H.E. r/w and f/w drains are facing straight down. From the kit, install a rubber isolator (Figure 1-2, item 50) under each of the H.E. mounting clamps, then tighten clamps securing the H.E. to the H.E. Mounting Bracket.

IMPORTANT: If you performed step 18 of this procedure, relocation of the transmission oil cooler will require a new water intake hose between the cooler and the seacock (or sea strainer, depending upon application). Hoses disconnected during this procedure may be of sufficient length to accomplish this or you may need to order 1-1/4" i.d. water hose of sufficient length from the O.E.M. or other source. Ensure that this connection is made before you operate the engine.

50. Remove the engine block drain plugs and drain any remaining water from the engine block. Reinstall block drain plugs.
51. Make sure that ALL drain plugs are properly installed and all hose connections (fuel, oil, and water) are secure.

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FILLING FRESH-WATER COOLING SYSTEM

A new extended life engine coolant known as DEX-COOL™ is recommended for use in your engine. It is imperative to note the following about DEX-COOL™ engine coolant:

- IT IS PINK IN COLOR TO DISTINGUISH IT FROM CONVENTIONAL COOLANT.
- THE SERVICE CHANGE INTERVAL ON ENGINES BUILT WITH DEX-COOL™ IS 5 YEARS.
- TO MAINTAIN FULL CORROSION PROTECTION DURABILITY, DEX-COOL™ MUST NOT BE MIXED WITH CONVENTIONAL (CONTAINING SILICATE) ENGINE COOLANTS.
- DEX-COOL™ IS AN ETHYLENE GLYCOL BASED PRODUCT, THEREFORE, BOIL AND FREEZE PROTECTION ARE MEASURED IN THE SAME FASHION AS CONVENTIONAL COOLANTS.

TO FULLY REALIZE ITS MANY ADVANTAGES, DEX-COOL™ MUST NEVER BE MIXED WITH CONVENTIONAL COOLANTS.

DEX-COOL™ can become contaminated by inadvertently topping-off with conventional coolant, adding conventional coolant to the system or even if fill/drain containers are shared between coolants. If contamination occurs, the cooling system must be immediately drained and flushed, and refilled with DEX-COOL™. No short-term damage will occur, however, the service interval will be reduced from 5 years to 2 years.

The fresh-water cooling side of the cooling system must be filled with a 50/50 mixture of DEX-COOL™ (or equivalent, which meets GM6277M) extended life antifreeze and water solution.

IMPORTANT: More than 50% antifreeze solution can contribute to an overheating condition.

52. Reconnect negative terminal of the battery.
53. Remove the pressure cap from the Coolant Fill Riser.
54. Prepare 5 gallons of DEX-COOL™ 50/50 solution. Slowly fill the system with antifreeze solution until the system is full. Coolant Fill Riser will be full to the top.

55. Prime the fuel system. Turn the ignition key to the ON position for 5 seconds, turn the key OFF for 10 seconds, and repeat 1-3 times.



WARNING

Visually inspect unit for fuel leaks before operating the engine. If fuel leaks are present, DO NOT operate the engine, repair immediately.

56. Start the engine and operate at idle speed (650-1000 RPM) to purge air from the system. Continue to add coolant until the coolant level remains constant, install the pressure cap on the Coolant Fill Riser. Then add coolant to the Overflow Bottle to the "Full" mark on the bottle.



WARNING

Visually inspect unit for fuel leaks. If fuel leaks are present, DO NOT operate the engine, repair immediately.



WARNING

Make sure that there are no fuel leaks before closing the engine hatch.

57. Continue to run the engine until it reaches normal operating temperature. Check for fuel leaks, oil leaks, fresh water coolant leaks, and raw water leaks at all fittings and connections. Correct all leaks, as required.



WARNING

Do not remove cooling system filler cap when the engine is hot. Allow the engine to cool and then remove the pressure cap slowly, allowing the pressure to vent. Hot coolant, under pressure, may discharge violently and cause severe burns.

FWC KIT INSTALLATION INSTRUCTIONS - V-DRIVE



WARNING

Do not remove cooling system filler cap when the engine is hot. Allow the engine to cool and then remove the pressure cap slowly, allowing the pressure to vent. Hot coolant, under pressure, may discharge violently and cause severe burns.

NOTICE: It is not necessary to remove pressure cap to check coolant levels. Check Overflow Bottle daily and keep filled to between the 'ADD' and "FULL" level indicated on the bottle.

58. Continue to run the engine at normal operating temperature. Verify engine operating temperature and thermostat operation. Check the Overflow Bottle for the proper level and add coolant if necessary.
59. Turn engine off. Check transmission fluid level. If the level is not to the 'FULL' mark on the dipstick add fluid to bring it to the proper level.
60. From the kit, affix decals to the new hood (Figure 1-2, items 75-79) and attach the hood to the engine with the retention nuts removed in step 2.



WARNING

Make sure that there are no fuel leaks before closing the engine hatch.

Installation of the Fresh Water Cooling Kit on a V-Drive application is complete.

FIGURE 2-1, FWC WATER FLOW DIAGRAM

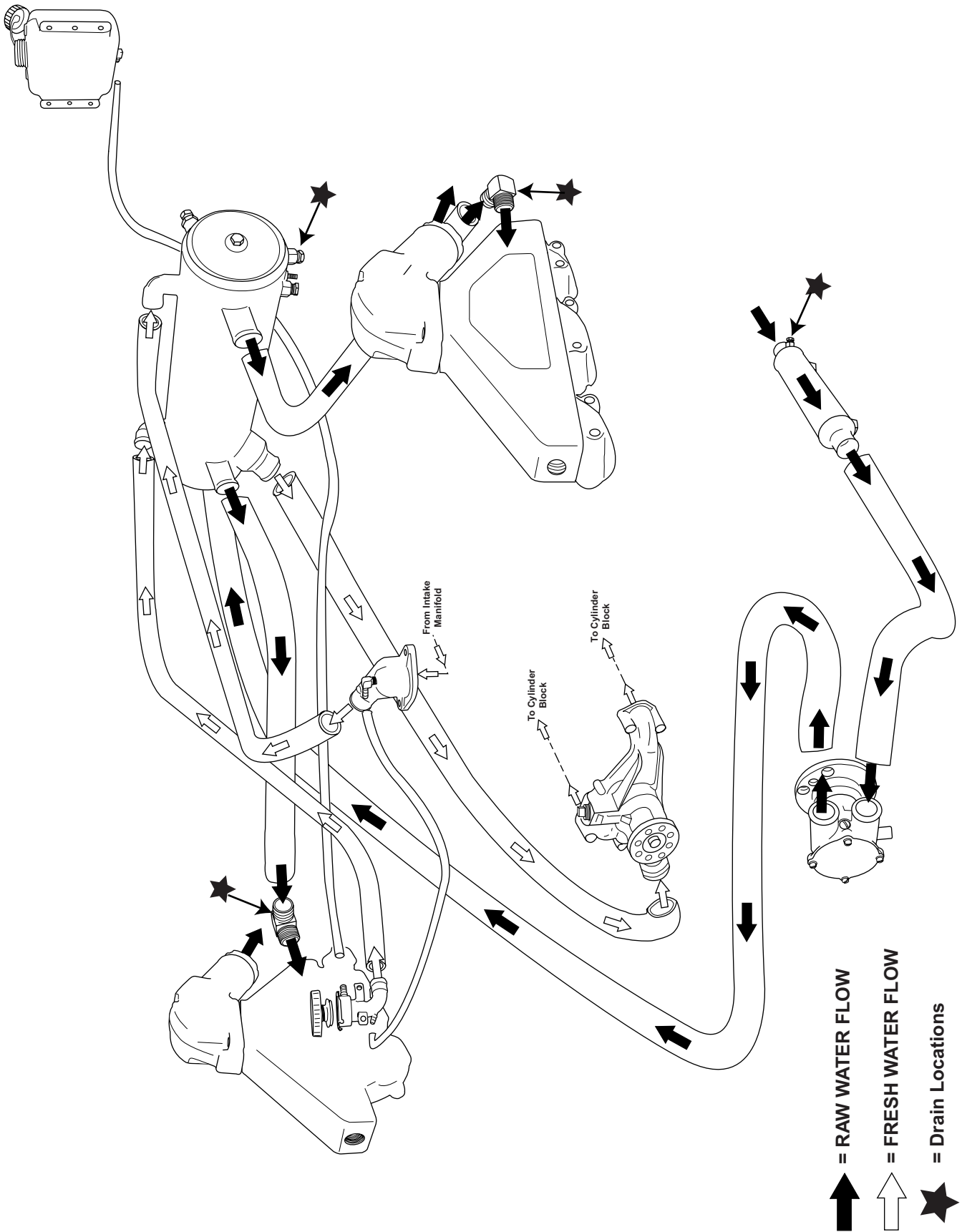


Figure 2-1 Fresh-Water Cooling System (5.7L)