



INSTRUCTION TO SERVICE

ITS: 6273

SECTION:	231 Cooling System
WRITTEN BY:	Mike Pearson
SUBJECT:	Replace Coolant Surge Tank

ITS6273

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PROCEDURE:

1. Turn the main battery disconnect switch to the “OFF” position.
2. Open the engine compartment door.
3. Open the interior engine access door.
4. Open the radiator access door.
5. Isolate the heating system loop from the engine as follows, See Figure 1:
 - a. Close the coolant outlet valve②, located in coolant line between the engine and the booster pump.
 - b. Close heating system return valve①, located in heating system return line close to lower radiator tube.

⚠ CAUTION: To avoid personal injury from hot coolant, DO NOT work on the engine if it is hot and the coolant is steaming. Allow the engine to cool before working on the cooling system.

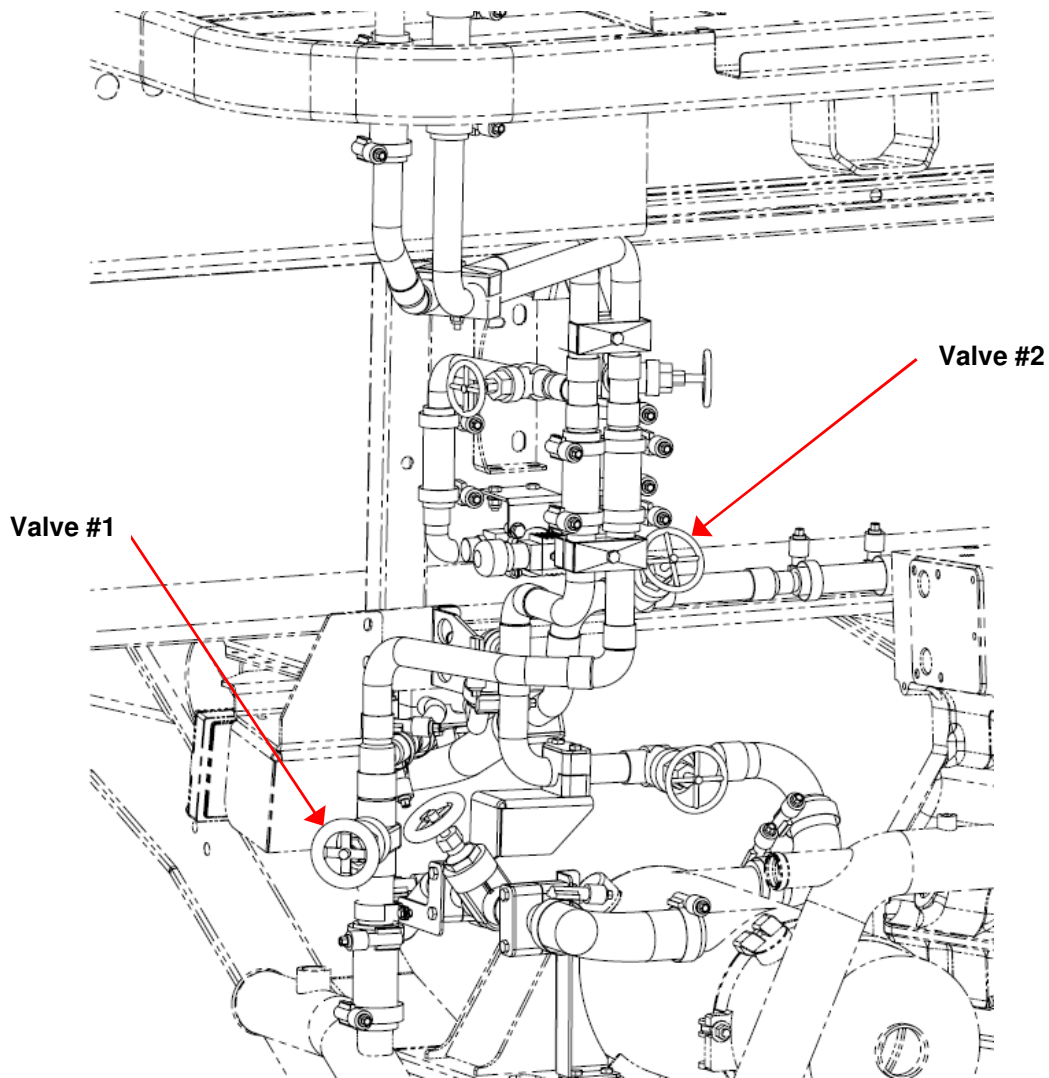


Figure 1: Booster Pump Lines



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6. Relieve the cooling system pressure by lifting the vent lever on the surge tank pressure relief cap. Remove and discard the coolant pressure cap once the pressure has been relieved. See Figure 2.

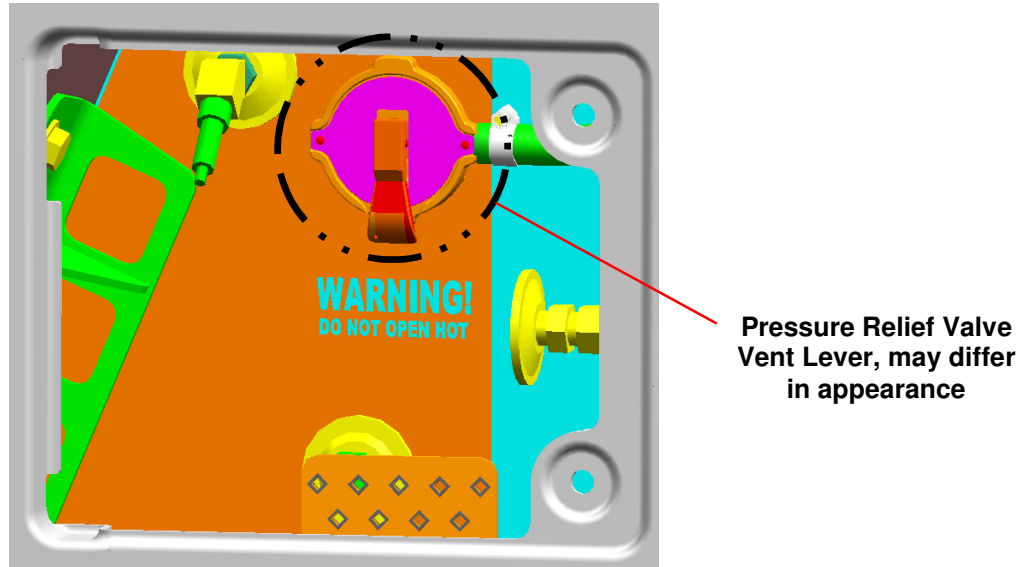


Figure 2: Surge Tank Pressure Relief

- NOTE:** If coolant is to be recovered, make sure container is clean and chemical free. If not, used coolant must be recycled or disposed of in accordance with municipal, state and federal government regulations.

7. Place a suitable container under the radiator drain cock. Open the drain cock and drain engine coolant until level is below the surge tank drop tube then close the drain cock. See Figure 3.

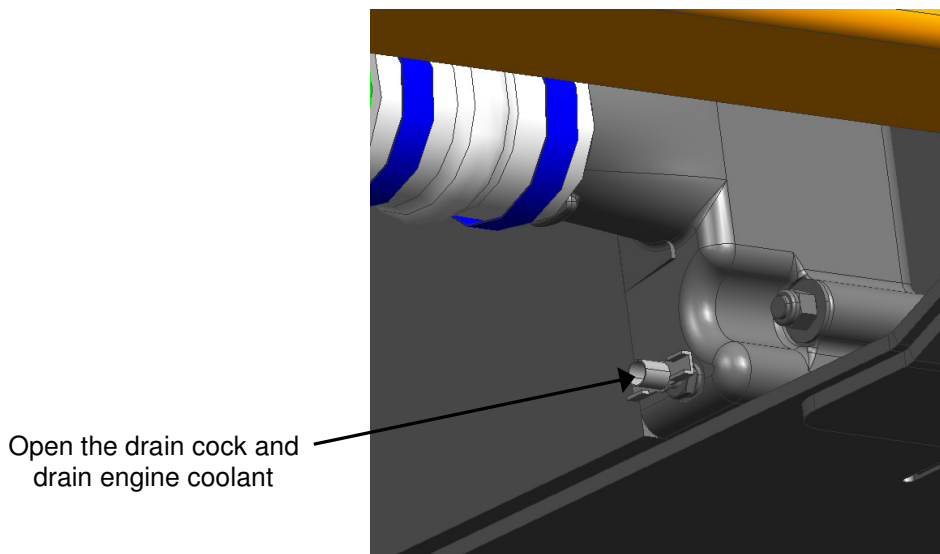


Figure 3: Drain Engine Coolant



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8. Disconnect and tie back the existing coolant hose from the surge tank radiator cap neck, set aside hose clamp for reuse later in this document. See Figure 4.

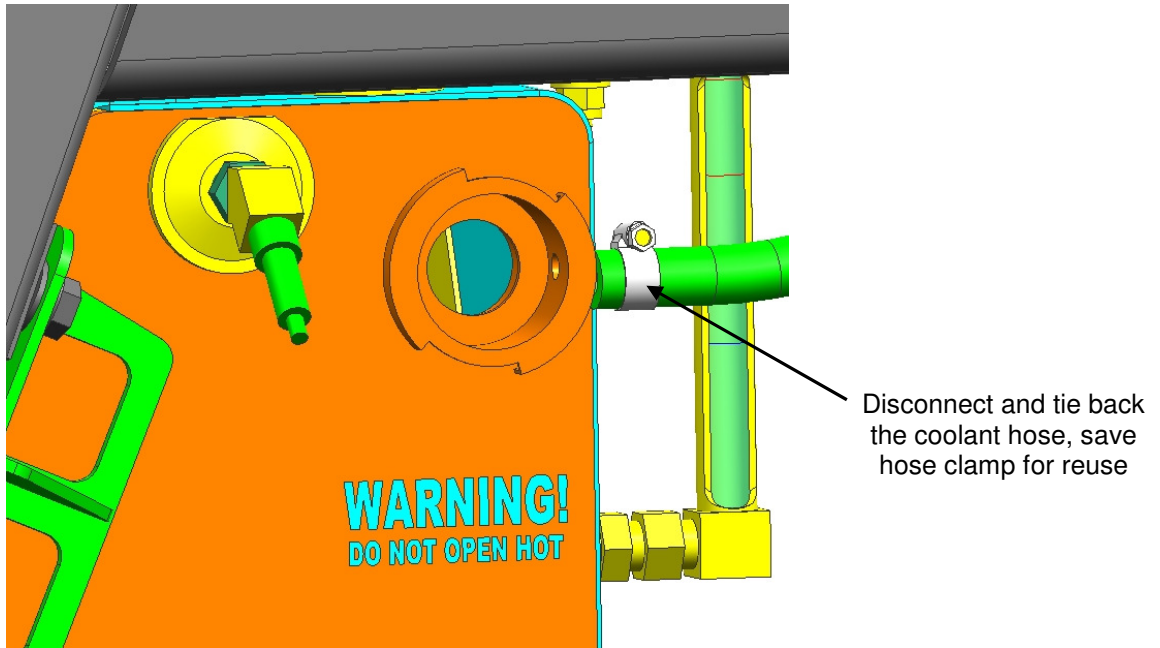


Figure 4: Surge Tank Coolant Hose Removal

9. Disconnect and tie back the existing low coolant sensor harnesses. See Figure 5.
10. Disconnect, tag and tie back all remaining coolant hoses to the surge. See Figure 5.

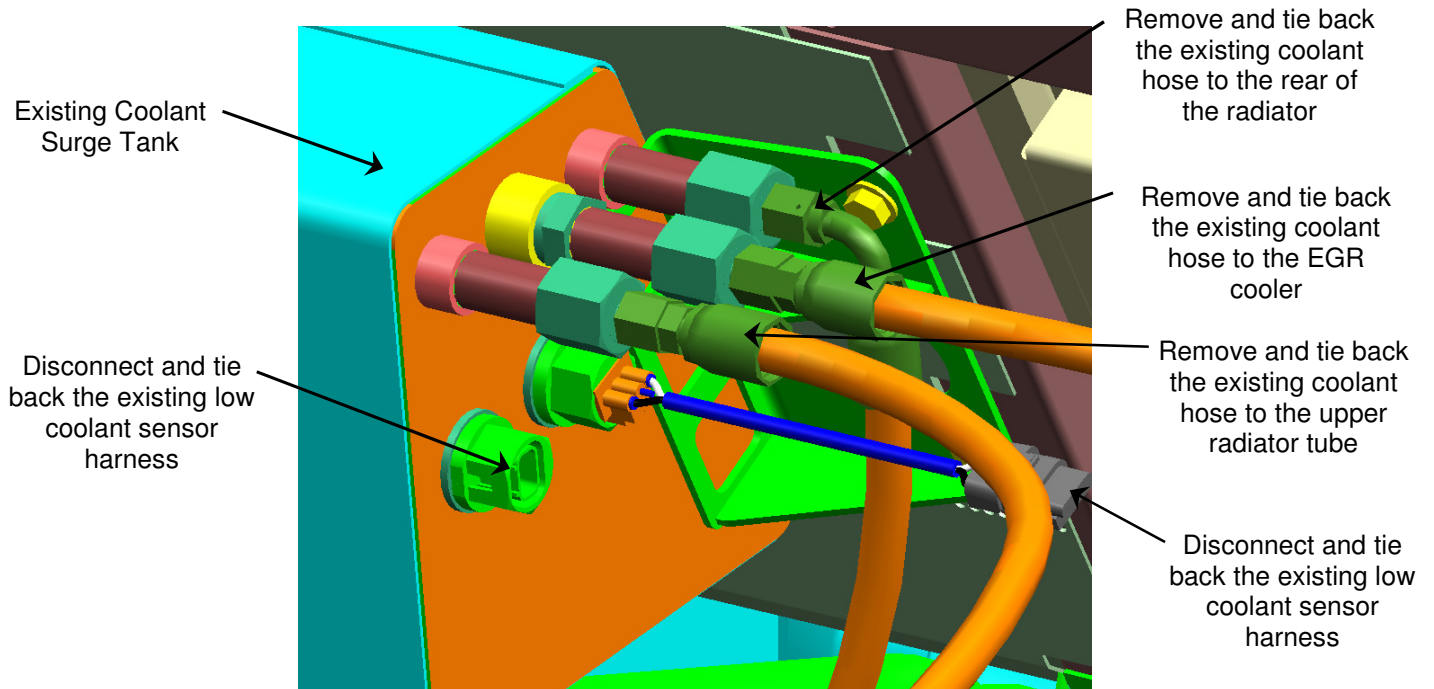


Figure 5: Remove Surge Tank Hose Assemblies



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11. Remove and save the existing HVAC B-pump coolant lines that run underneath the surge tank as well as the existing hose connections, clamps and hardware for reuse later in this install. See Figure 6.

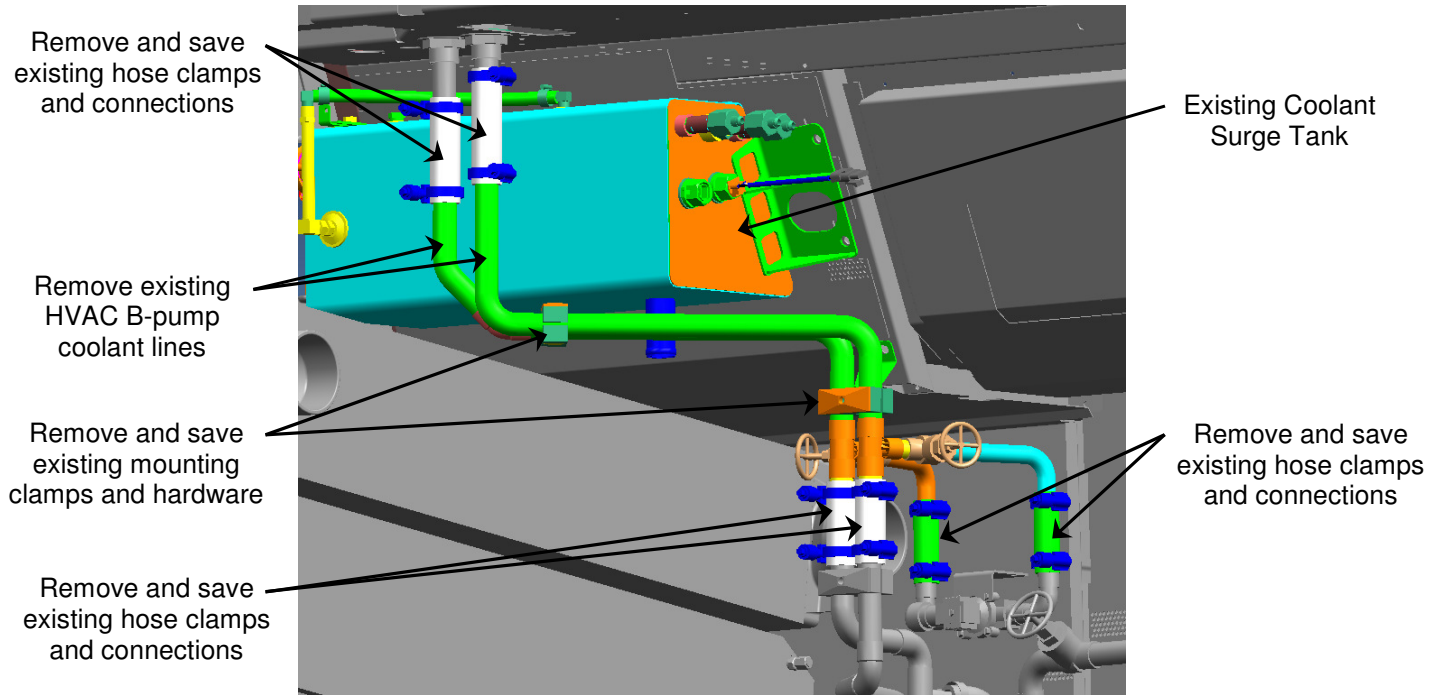


Figure 6: HVAC B-pump Coolant Line Removal

12. Remove and save the existing surge tank drop tube as well as the existing hose connections, clamps and hardware for reuse later in this install. See Figure 7.

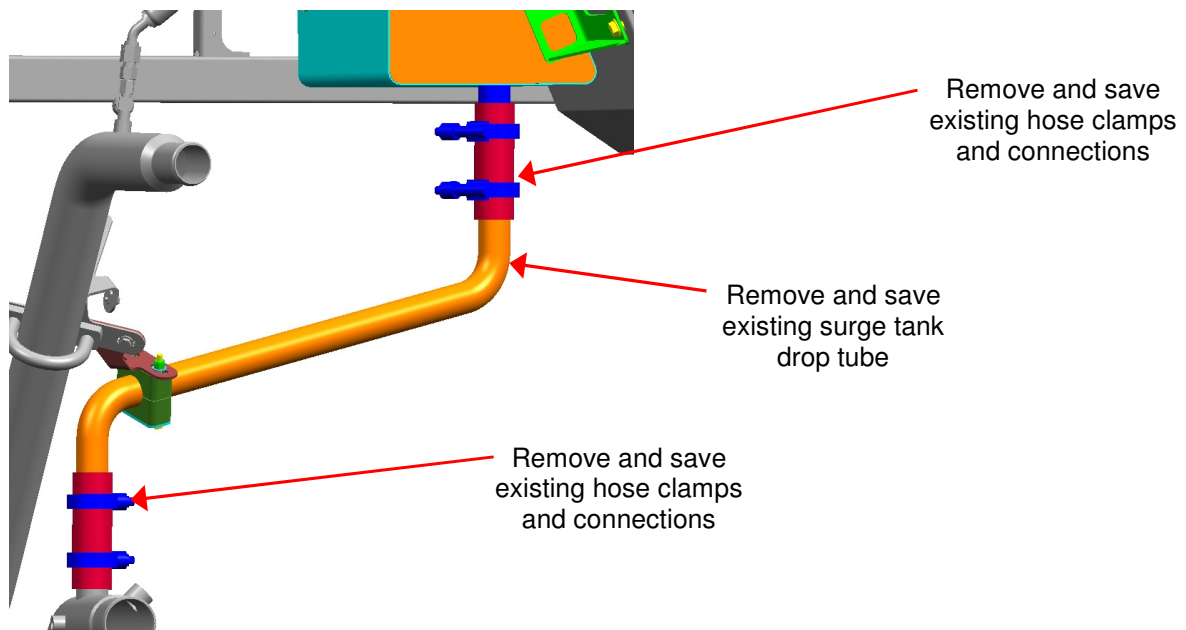


Figure 7: Surge Tank Drop Tube Removal



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13. Remove the mounting hardware securing the surge tank mounting flanges to the vehicle structure and set aside for reuse later in this install. Remove surge tank. See Figure 8.

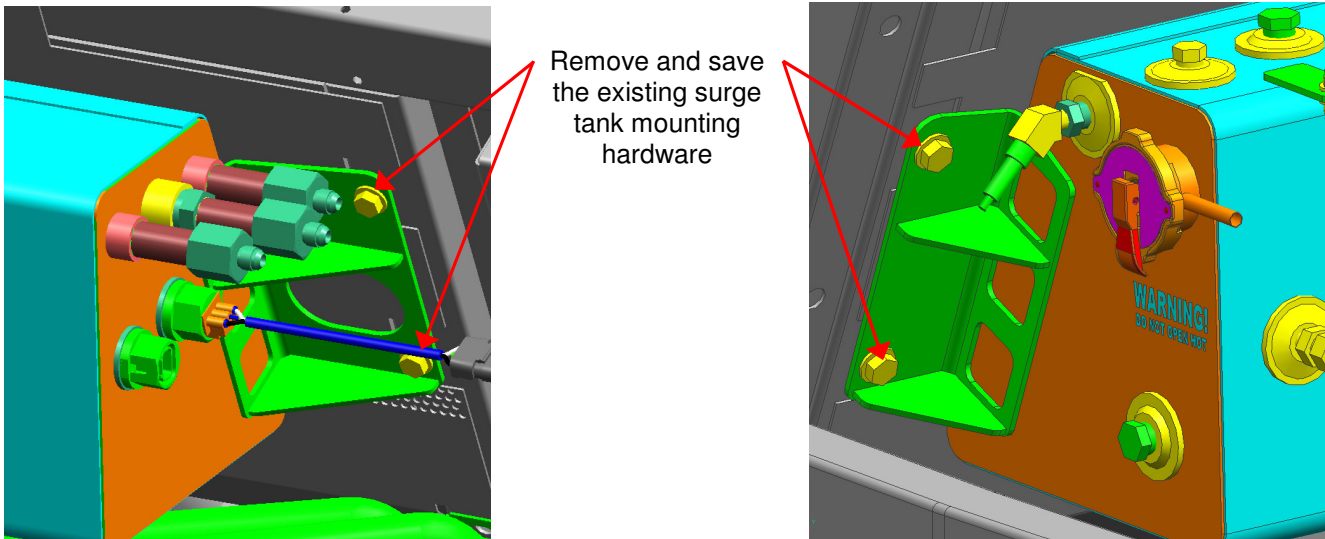


Figure 8: Remove Surge Tank Mounting Hardware

Surge Tank Assembly

14. Place new surge tank p/n 615411 on a clean bench and ensuring the tank is free from debris and/or contaminants assemble as follows:
 - a. Install bushing p/n 5952466 into surge tank center $\frac{3}{4}$ " MPT port as per Step 19. See Figure 9.
 - b. Install union p/n 473532 (x3) into newly installed bushing from Step 14a and open $\frac{1}{2}$ " FPT ports (x2) as per Step 19. See Figure 9.
 - c. Install adapter p/n 498928 (x3) onto the newly installed unions from Step 14b as per Step 19. See Figure 9.
 - d. Install Low coolant sensor p/n 610634 (x2) into the M20 ports. Torque sensors to 14-16 ft*lbs dry, orientation is not important. See Figure 9.

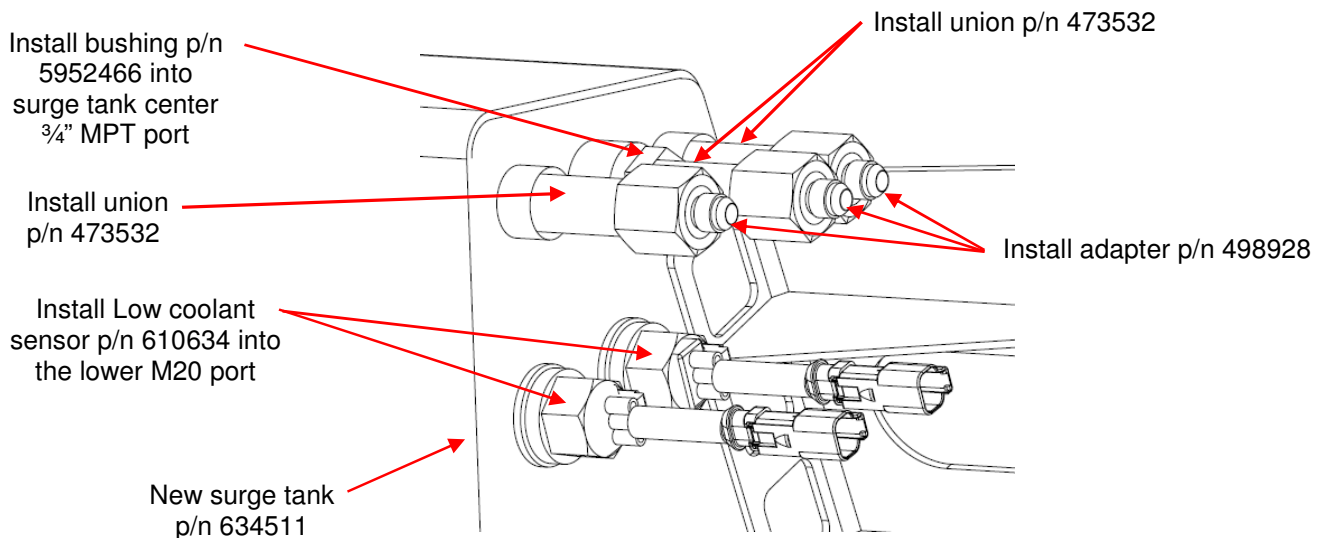


Figure 9: Partial Surge Tank Assembly



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- e. Install 1/4" plug p/n G127951 and 3/4" plug p/n G127952 into corresponding ports on the top of the surge tank as per Step 19. See Figure 10.
- f. Install bushing p/n 5959829, 45° elbow p/n 5955052 and shrader valve p/n 5956167 into the side port of the surge tank as per Step 19. The shrader valve is to face down as shown in Figure 10.
- g. Install coolant level gauge p/n 409349 into the bottom front surge tank port as per Step 19. See Figure 10.
- h. Apply permatex p/n 8112019 to both sides of gasket p/n 102963 and adhere gasket to pressure cap neck p/n 617218. See Figure 10.
- i. Install the neck and gasket from Step14h on surge tank as per Figure 10 and secure using washer p/n 50W04000BK (x4) and cap screw p/n G426816 (x4). Torque screws to 75 in*lbs. See Figure 10.
- j. Install coupler p/n 336110 to the newly installed neck as per Step 19. See Figure 10 for location.
- k. Install radiator cap p/n 470238.

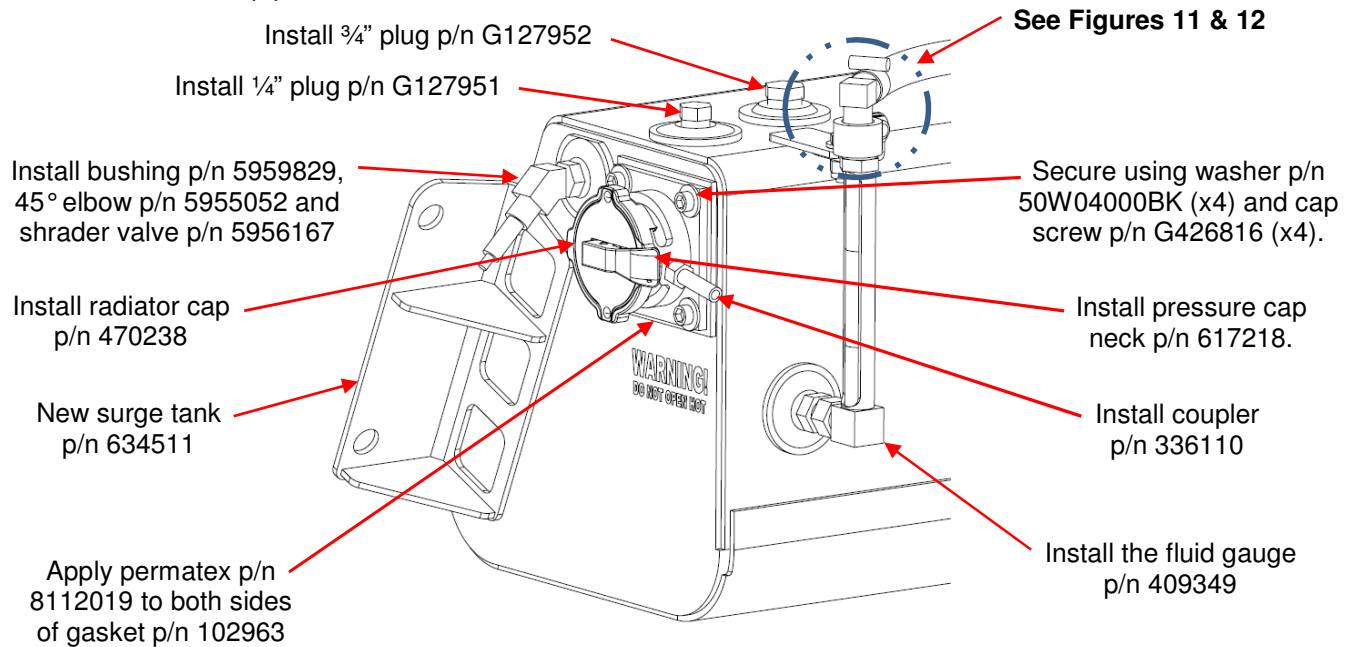


Figure 10: Partial Surge Tank Assembly

- 15. Install new 90° elbows p/n 216632 (x2) into the threaded surge tank port and gauge installed in Step 14g as per Step 19. Locate and orient as shown in Figure 11.

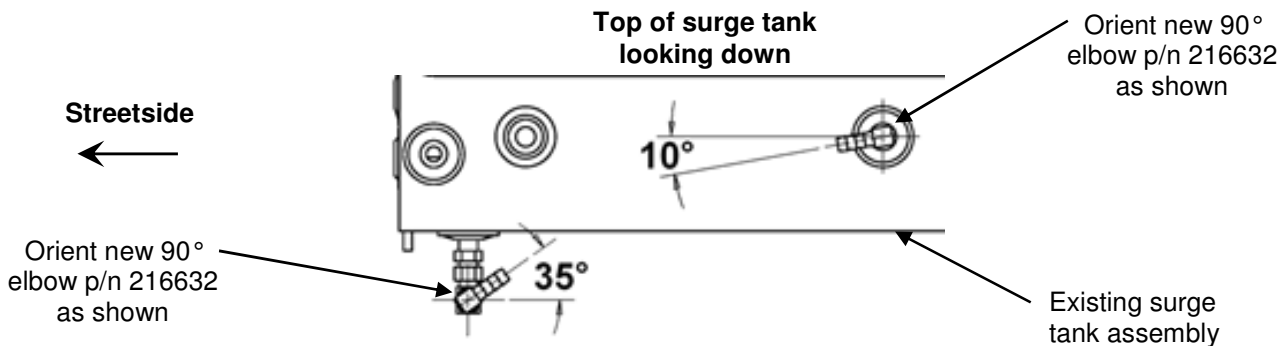


Figure 11: Surge Tank Fitting Installation



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16. Install approx. 13" of hose p/n 376677 between the barbed elbows installed in Step 15 and secure using clamp p/n 131322 (x2). See Figure 12.
17. Loosely install bracket assembly p/n 498573 to the underside of the existing mounting plate on the surge tank using bolt p/n 10B04012, washer p/n 10W04000 (x2) and nut p/n 40N04000. See Figure 12.
18. Secure the top of the coolant level gauge installed in Step 14g to the surge tank bracket installed in Step 17 using p-clip p/n 092585 and screw p/n 14S00008. See Figure 12. Tighten bracket assembly bolt from Step 17.

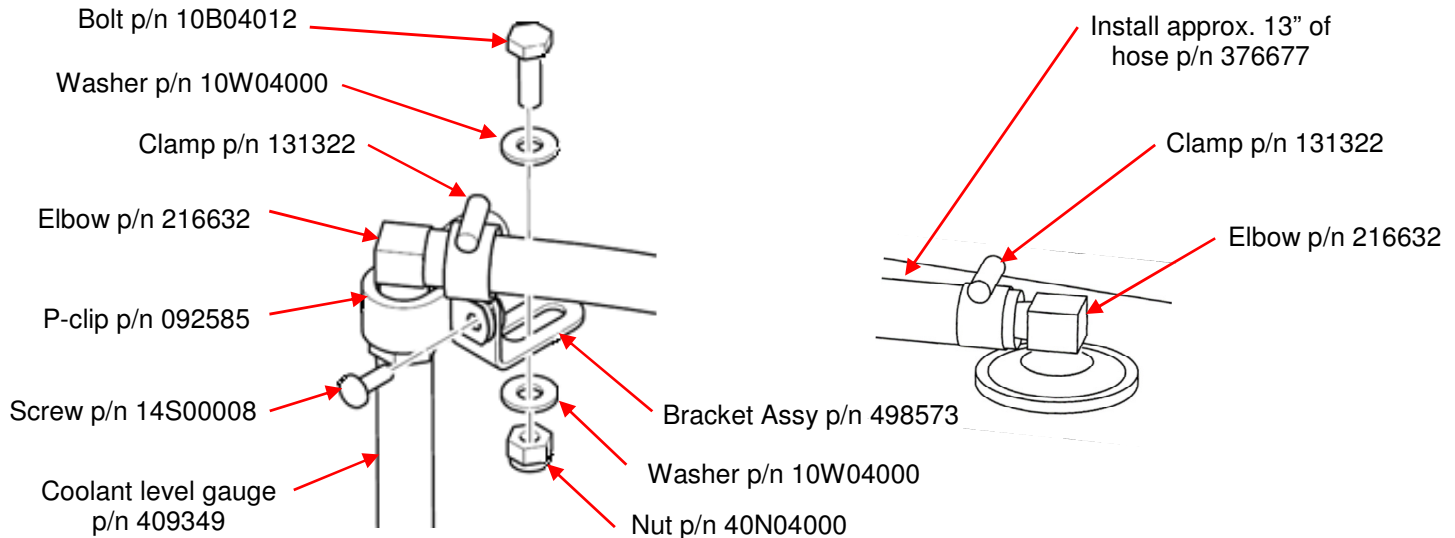


Figure 12: Surge Tank Coolant Gauge Installation

19. Fitting installation:
 - a. Inspect the threads to be sure they are not damaged or contain slivers, burrs, dirt or other contaminants.
 - b. Apply thread sealant p/n 81 10442 evenly, without air pockets, around the circumference of the thread, leaving the first $\frac{1}{2}$ to $1 \frac{1}{2}$ threads unpasted and extend to completely cover a minimum of the next three threads. Ensure that orifices remain unblocked. **Note: Threads supplied with Vibra-Seal coating (red dry seal) do not require additional thread sealant.**
 - c. Install the fitting finger tight.
 - d. Apply two full turns past finger-tight.

Surge Tank Installation

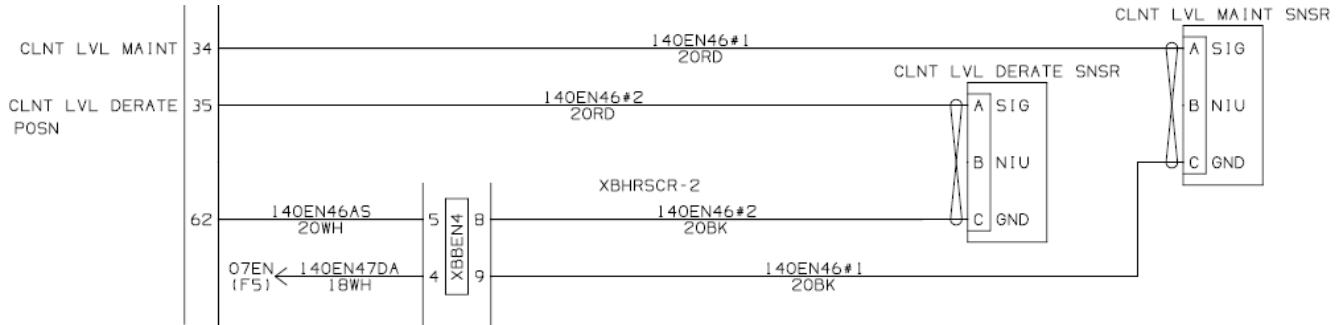
20. Ensuring the newly assembled tank is free from debris or contaminants install using the hardware removed in Step 13 align tank mounting flange holes with the existing weld nuts in the bus structure, reference Figure 8.
21. On both existing surge tank low coolant sensor harnesses (bottom: low engine coolant derate sensor, top: low coolant warning sensor) cut off the existing 3 circuit tower as close as possible to the connector of the disconnected harness and terminate each wire with the supplied terminal (NF P/N 198432).
22. Insert wire 140EN46#2 (red) into supplied 2-pin Deutsch tower p/n 130029 from Kit p/n 166949 at cavity 1 (SIG).
23. Insert wire 140EN46#2 (black) into supplied 2-pin Deutsch tower p/n 130029 from Kit p/n 166949 at cavity 2 (GND).
24. Once the tower has been pinned insert the wedge lock p/n 130030 from Kit p/n 166949.



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- 25. Connect the newly terminated low coolant harness from Steps 21 thru 24 to the newly installed surge tank low coolant derate sensor from Step 14d. See Figure 13 for correct rework wiring schematic.

Existing Low Coolant Sensor Circuits



Reworked Low Coolant Sensor Circuits

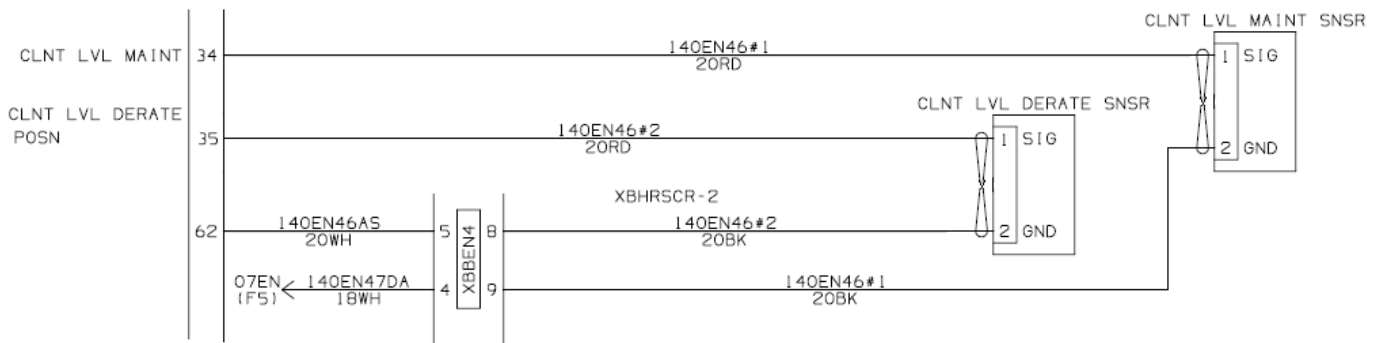


Figure 13: Surge Tank Derate Low Coolant Sensor Circuit.

- 26. Re-connect the surge tank low coolant level sensor electrical connections removed in Step 9. Reference Figure 5.
- 27. Re-install the surge tank drop tube, connections and clamps removed in Step 12.
- 28. Re-install the HVAC coolant lines, clamps and connectors that run underneath the surge tank removed in Step 11. Reference Figure 6.
- 29. As per Step 19 re-install the surge tank coolant lines removed in Step 10. Reference Figure 5.
- 30. Close side surge tank access door.
- 31. Turn the main battery disconnect switch to the "ON" position.
- NOTE:** It will be necessary to perform a cooling system deaeration procedure prior to starting the engine if any other maintenance activity was performed on the heating system that could have introduced a significant amount of air into the cooling system. Refer to Section 2.3.4. "Fill & Deaeration" in the New Flyer Service Manual.
- 32. Start the engine and inspect for leaks. Top up fluid as required.
- 33. Close the engine compartment door.
- 34. Close the interior engine access door.
- 35. Close the radiator access door.



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LABOUR ESTIMATE

	Operation	Men	Hours	Labour Time M X HR
1	Replace Coolant Surge Tank	1	3.0	3.0

PARTS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1	216632	Barb-Hose 1/4 x 3/8 ID	2	EA	
2	376677	Hose-EH225-06 Silicone	1.08	FT	
3	131322	Clamp-Breeze .44 x .78	2	EA	
4	14S00008	Screw-Machine #10 x 1/2"	1	EA	
5	092585	Clamp-P 0.625	1	EA	
6	10W04000	Washer-Flat 1/4"	2	EA	
7	40N04000	Locknut-Hex 1/4"	1	EA	
8	10B04012	Bolt-Hex 1/4"unc x 3/4	1	EA	
9	615411	Assembly-Surge Tank	1	EA	
10	8110442	Loctite 567 - Thread Sealant	.01	EA	
11	102963	Gasket-Surge Tank	1	EA	
12	409349	Gauge-4.53" viewable	1	EA	
13	470238	Cap-Radiator 16 PSIG Lev-R-Vent	1	EA	
14	610634	Sensor-Coolant Level Float	2	EA	
15	336110	Fitting-Coupler 5/16"	1	EA	
16	498573	Assy-Brkt Sight Glass Clamp	1	EA	
17	5952466	Bushing-1/2 FPT x 3/4" MPT	1	EA	
18	5955052	Elbow-45°	1	EA	
19	5956167	Shrader Valve	1	EA	
20	5959829	Bushing-.25 MPT x .13 FPT	1	EA	
21	G127951	Plug-Brass 1/4" MPT	1	EA	
22	G127952	Plug-3/4" MPT	1	EA	
23	473532	Union-1/2" NPT Brass	3	EA	
24	166949	Kit-2 Circuit Tower, Deutsch	2	EA	
25	5958112	Tyrap-7" Black	8	EA	
26	198432	Terminal-20 GA #16 Socket	4	EA	
27	498928	Adapter-1/2" FPT x -6 JIC SST	3	EA	



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28	G426816	Screw-Shoulder Cap .25 x .75	4	EA	
29	8112019	Permatex Gasket	0.01	EA	
30	617218	Neck-Pressure Cap AL	1	EA	
31	50W04000BK	Washer-Flat 1/4" BLK	4	EA	