# INSTRUCTION TO SERVICE

| ITS: 5591 | |
|---|---|
| **SECTION:** | 231 Cooling System |
| **WRITTEN BY:** | Michael Rooney |
| **SUBJECT:** | ISE Cooling Loop Bypass Removal |

# ITS5591

## PROCEDURE:

1. Turn the main battery disconnect switch to the “OFF” position.

⚠ **WARNING: ALWAYS discharge the Ultra Capacitors before performing maintenance on this vehicle. Refer to Section 5 of the service manual under 2.17 *Discharging the Ultra Capacitors* for the discharge procedure.**

2. Locate the center three chesterfield seats at the rear of the passenger compartment. Pivot the seats upward and install the prop rod to allow access to the removable panels under and behind the seats. Figure 1.

☞ **NOTE: Take care while working around the raised seats, head clearance is limited.**

3. Using a square key, release the access cover latches and remove the access covers. Figure 1.


**Figure 1: Access Openings Under The Chesterfield Seats.**

4. Locate the upper and lower coolant manifolds, generator and two electric drive motors. Figure 2.

5. Check to ensure that upper manifold header and components are plumbed as follows: Figure 2.
   a. Street side branch of the upper manifold header should be closed off.
   b. Second from street side branch of the upper manifold header should be plumbed to the street side port of the street side electric drive motor.
   c. Curb side branch of the upper manifold heater should be plumbed to the lower port of the generator.
   d. Second from curbside branch of the upper manifold header should be plumbed to the streetside port of the curbside electric drive motor.

6. Check to ensure that lower manifold header and components are plumbed as follows: Figure 2.
   a. Street side branch of the lower manifold header should be plumbed to the coolant pump.
   b. Second from street side branch of the lower manifold header should be plumbed to the curb side port of the street side electric drive motor.
   c. Curb side branch of the lower manifold heater should be plumbed to the upper port of the generator.
   d. Second from curbside branch of the lower manifold header should be plumbed to the curb side port of the curbside electric drive motor.

**NOTE: Most buses have a bypass hose connecting the upper and lower manifold headers as well as a Y-connection to the electric drive motors which will require modification.**

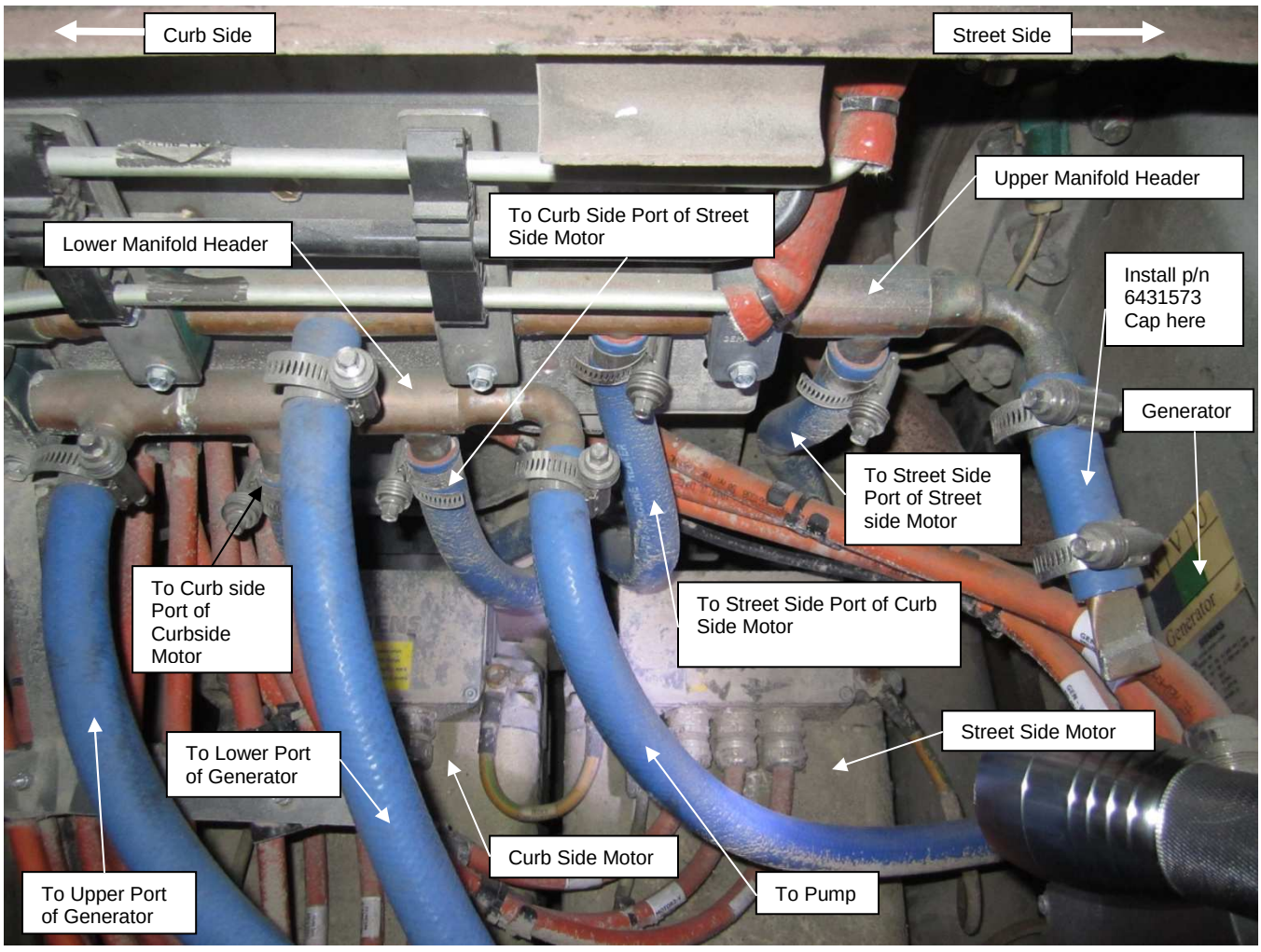


**Figure 2: Hose Layout on Upper/Lower Manifold Headers**

7. If the hose layout at the upper and lower manifold headers does not match Figure 2 and or the bypass hose is present, the hoses will have to be reconfigured.
   a. Drain the coolant from the electronics cooling loop.
   b. Change the hose connections as necessary to match the configuration shown in Figure 2. Use ¾" hose NF P/N 106197 and hose clamps NF P/N 274935 as needed. Torque hose clamps to 56-62 IN-LBS.
   c. Refill the cooling system.
8. Locate the street side branch of the upper manifold. Figure 2.
   a. Use a Rotary Tube Cutter to cut the end of the tube to remove the bead.
   b. Check that the end cut is square and that there are no burrs or damage. Use some emery paper to clean up the exterior surface of the tube if necessary.
   c. Install the nut, washer and tapered washer from the cap NF P/N 6431573 over the tube. Fig 3, Picture #1.
   d. Push the plug into the end of the tube and install the nut on the plug finger tight then turn an additional ¼ turn. Fig 3, Picture #2.

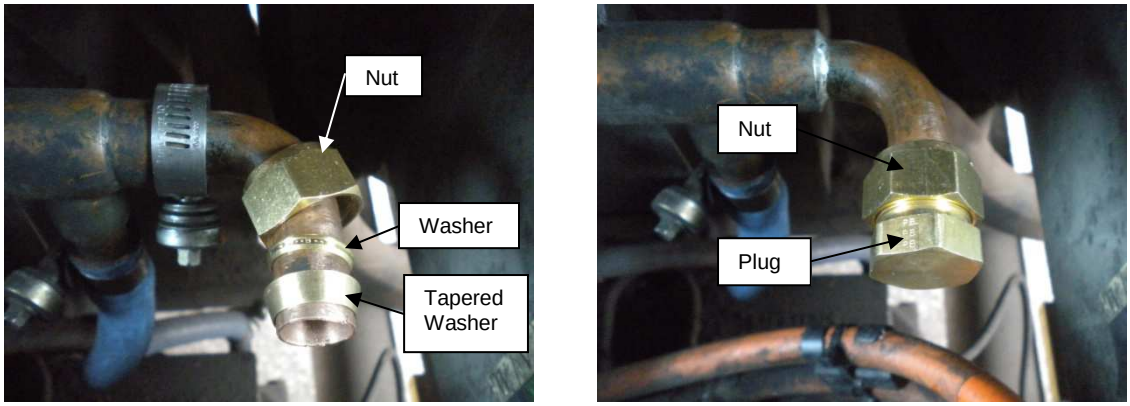


**Figure 3: Bypass Tube Plug Installation.**

9. Open the curb side rear access door and locate the coolant circulation pump.
10. Check to make sure that the hoses are connected according to Figure 4.

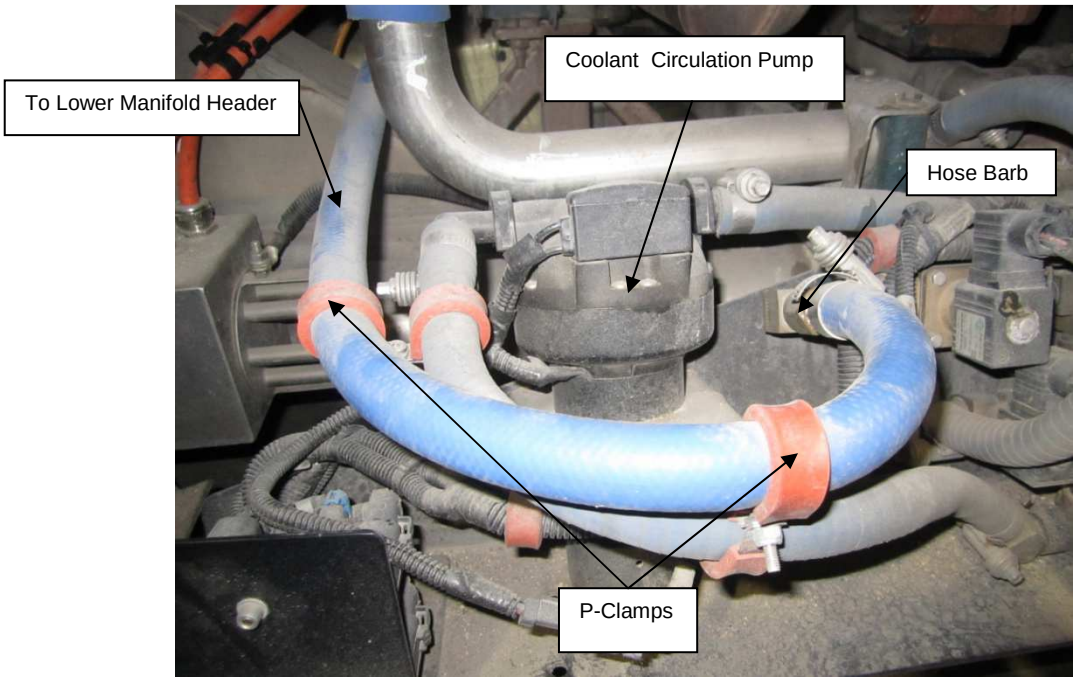


**Figure 4: Hose Layout at Coolant Circulation Pump.**

11. Disconnect the hose that connects the manifold to the pump at the pump hose barb. Figure 4
12. Remove the P-clamps that locate the hose and remove the hose. Figure 4.
13. Remove the hose barb threaded into the pump and replace with the new hose barb NF P/N 218169.

    **NOTE: To prevent leaks it is necessary to use NPT thread sealant on the hose barb threads.**

14. Install a new length of hose NF P/N 106197 from the pump hose barb to the coolant manifold and secure with new P-clamps NF P/N 247227 in the original locations. Figure 4.
15. Refill the cooling system and check for leaks.
16. Re-install the access covers.
17. Lower the rear chesterfield seats.
18. Turn the main battery disconnect switch to the “ON” position.
19. De-aerate the cooling system by topping off the electronics cooling system with fresh coolant while running pumps with master switch on. Continue to run pumps for ten minutes after full fill to de-aerate. Coolant level should be checked after the test drive and refilled as necessary.
20. Remove all tools and debris to return coach to service condition.

## LABOUR ESTIMATE

| | Operation | Men | Hours | Labour Time M X HR |
|---|---|---|---|---|
| 1 | ISE Cooling Loop Bypass Removal | 1 | 1.0 | 1.0 |

## PARTS REQUIRED

| Item | Part Number | Description | Qty. per Coach | Units | Notes |
|---|---|---|---|---|---|
| 1 | 106197 | SPEC-HTR HOSE 0.75 ID | 5.2 | FT | |
| 2 | 274935 | CLAMP-1.125 DIA TUBE | 6 | EA | |
| 3 | 6431573 | PARKER ¾" CAP, A-LOK® | 1 | EA | |
| 4 | 218169 | COUPLER-1/2PIPEX3/4BARB | 1 | EA | |
| 5 | 247227 | CLAMP-P 1.000 | 3 | EA | |

## SPECIAL TOOLS REQUIRED

| Item | Part Number | Description | Qty. per Coach | Units | Notes |
|---|---|---|---|---|---|
| | | NO SPECIAL TOOLS REQUIRED | | | |