



INSTRUCTION TO SERVICE

ITS: 58486

SECTION:	234 WATER FILTER.
WRITTEN BY:	Michael Rooney
SUBJECT:	Retrofit isolation valves to the fuel cell coolant filter installation.

ITS58486

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PROCEDURE:

1. Review and perform the steps in the High Voltage Service Preparation Section #4 1.6 of the Service Manual before beginning work on the bus. Ensure that personnel have the appropriate High Voltage training and High Voltage protective (PPE) equipment.
2. Open the curbside rear access door and locate the 24/12 volt battery switch and high voltage interlock switch.
 - a. Review the De-energizing Procedure section #4 1.6.4.1 of the Service Manual.
 - b. Rotate the 24/12 volt battery switch to the OFF position. Lock and tag the switch and retain key.
 - c. Switch the High Voltage Interlock Switch to the HV OFF position. Lock and tag the switch and retain key.
 - d. Ensure the Energy Storage System (ESS) Manual Service Disconnect cap is removed per the following steps and stowed in a locked location to which you only have access.
 - 1) Using the clamp-on current probe and DMM, ensure that there is no current flowing in the cables connecting to the ESS Manual Disconnect Plug.

⚠ WARNING: NEVER remove the ESS Manual Disconnect Plug while current is flowing through it. The High Voltage may create a long enough ionized gas path during circuit interruption to bridge the contacts of the switch base and therefore continue current flow. This ionized gas is very hot and can cause burns, fire & electrical shock.

- 2) Remove the manual Service Disconnect (MSD) cap from receptacle by pressing on tabs and pulling.
NOTE: For removal of MSD press on tabs located on side and pull – up half way and press on tab located mid-way and pull up.
- 3) Install a color-coded insulating cover, that is open circuited, in the Manual Disconnect receptacle.

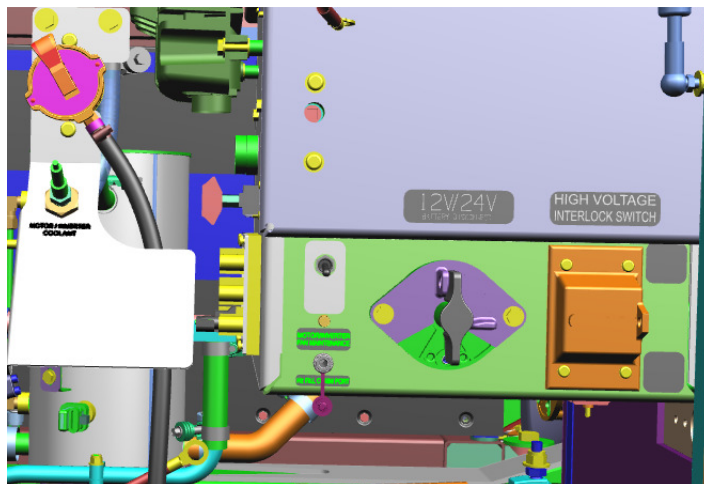


Figure 2: Location of 12/14 Volt & High Voltage Interlock Switches.

3. Open the rear access door and locate the fuel cell coolant filter behind the rear bumper at the curb side by the tail lights.

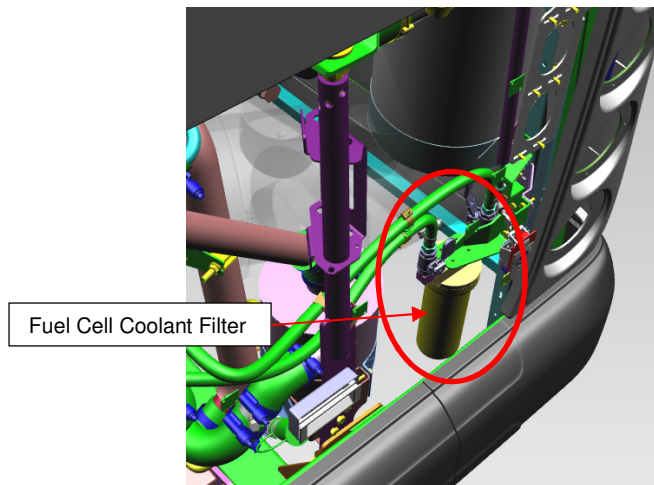


Figure 2: Location of Fuel Cell Coolant Filter (shown with retrofit installed).

4. Remove the drain plug from the lower radiator tube and open the petcock drain valve at the bottom of the radiator. Drain the coolant using a suitable container to catch the fluid.
5. Disconnect the hoses that run to and from the fuel cell coolant filter. Set the hose clamps aside for re-use.
6. Remove the two bolts that attach the coolant filter and bracket to the chassis and set them aside for re-use. Remove the coolant filter and bracket from the bus.
7. On the work bench, remove the two screws that hold the bracket to the coolant filter and set the screws and bracket aside for re-use. Mark the filter and bracket to ensure it can be re-assembled in the correct orientation.
8. Remove the two 90 degree elbow fittings used to attach the hoses to the coolant filter. Separate the hose barb fittings from the 90 degree elbow fittings. Discard the elbow fittings and set the hose barb fittings aside for re-use.
9. Install two new 90 degree elbow fittings NF P/N 766861 on the coolant filter using Loctite 567 thread sealant NF P/N 8110442 on the threads. Install the fittings finger tight and apply two full turns past finger tight. Orient the elbow fittings in the same direction to those removed earlier.
10. On each elbow fitting, install a new ¼ turn valve NF P/N 766874 using Loctite 567 thread sealant NF P/N 8110442 on the threads. Install the fittings finger tight and apply two full turns past finger tight. Orient the valve handles as seen in Figure 3.
11. Install the hose barb fittings removed earlier in the new ¼ turn valves on the coolant filter using Loctite 567 thread sealant NF P/N 8110442 on the threads. Install the fittings finger tight and apply two full turns past finger tight.
12. Re-install the bracket removed earlier on the coolant filter using the original screws. Prior to installing the screws apply Never Seize NF P/N 5928660 to the threads.

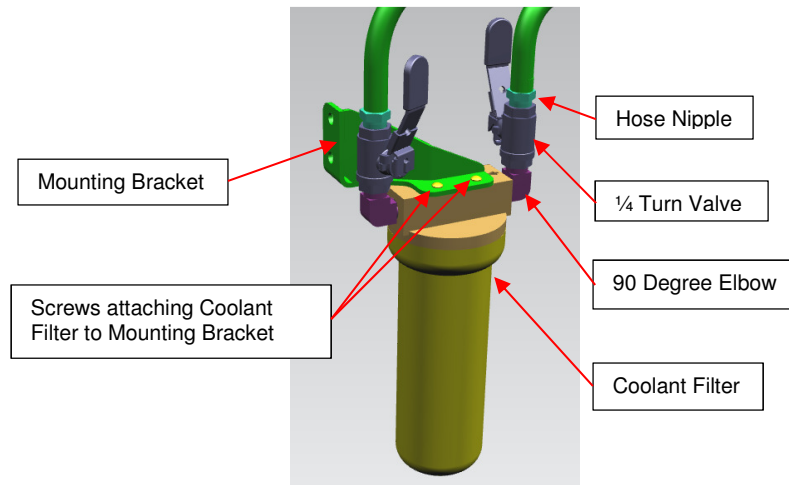


Figure 3: Coolant Filter With ¼ Turn Valves.

13. Re-install the coolant filter and bracket in the bus using the original hardware.
14. Re-route the coolant filter supply and return lines to run behind the curb side chassis strut. See Figure 4A & 4B. Re-orient the coolant hose attachment clip and use it to attach the supply and return lines to the HVAC drain line.
15. Re-install the coolant filter supply and return lines on the hose barbs in their original orientation. Tighten the hose clamps and check to ensure that the ¼ turn valves are in the open position.

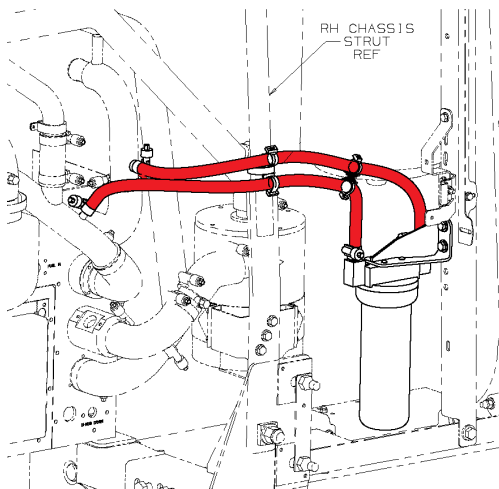


Figure 4A: Hose Routing Before Retrofit.

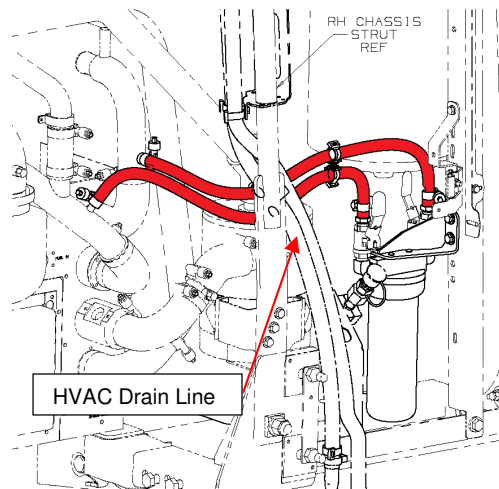


Figure 4B: Hose Routing After Retrofit.

16. Re-fill the fuel cell cooling system. Refer to the Service Manual for coolant specifications.
17. Remove all tools and debris and return the bus to service condition.



18. Use the following Energizing Procedure (Section #4 1.6.4.2 in Service Manual) to re-establish power to the bus.

⚠ WARNING: DO NOT touch cable terminations until checking to ensure there is no voltage between any of these cables and with respect to vehicle chassis.

While connecting HV cables continuously monitor with the DMM for the inadvertent appearance of HV. If HV appears, dress in PPE and trouble shoot why the HV appeared and resolve.

- a. Remove the color coded insulating cover.
- b. Install the ESS Manual Disconnect cap.
- c. Close all HV access panels, doors, enclosures.
- d. Remove the lock/tag from the 24/12 volt Battery Disconnect Switch. Rotate the 24/12 volt battery switch to the ON position.
- e. Remove the lock/tag from the High Voltage Interlock Switch. Rotate the HV Interlock to the ON position.
- f. Remove Safety barricade with warning lights and "Danger High Voltage" signs around the vehicle perimeter.

19. Close and secure the outside access doors.

LABOUR ESTIMATE

	Operation	Men	Hours	Labour Time M X HR
1	Retrofit isolation valves to the fuel cell coolant filter installation.	1	1.25	1.25

PARTS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1	766861	ELB - 90 ½ NPT X ½ NPT SST	2	EA	
2	8110442	LOCTITE 567 – THREAD SEALANT	0.010	EA	
3	766874	VALVE – ¼ TURN ½ NPT SST	2	EA	
4	5928660	NEVER SEIZE	0.010	EA	

SPECIAL TOOLS REQUIRED

Item	Part Number	Description	Qty. per Coach	Units	Notes
1		No Special Tools Required			