



Ford F-450 / F-550 Chassis Cab Liquid Propane Autogas Fuel System — Aft-Cab Tank

Revision History		
-AA	Initial Release	7/2013
-AA2	Revised VECI Label and Text (pg 26)	8/22/2013
-AB	Document Version Update	10/2013

Installation Instructions

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REMOVING THE POWERTRAIN CONTROL MODULE

- Using a scan tool, check for all diagnostic trouble codes. Correct all trouble codes before continuing.
- Depressurize the fuel rails using the procedure described in the *Ford Workshop Manual Section 310-00 Fuel System, General Information*.
- Disconnect the battery terminals and remove the battery.
- Remove the powertrain control module (PCM) following the procedure in the *Ford Workshop Manual, Section 303-14, Electronic Engine Controls*. Disconnect the three PCM connectors by lifting the levers over the connector back shell and pulling the connectors from the PCM sockets. Disconnect the OEM PCM harness push-pin to allow easier ROUSH CleanTech under hood harness installation. Remove the two nuts and position the PCM wiring harness connectors aside. Keep all fasteners for reuse. **Figures 1.1 and 1.2.**
- Disconnect the mass air flow (MAF) sensor connector and remove the air cleaner assembly including the air filter cover, degas bottle hose, air box and intake air box adapter. Separate the air cleaner cover, MAF sensor and air box from the adapter independently. **Figures 1.3–1.5.**



Figure 1.1

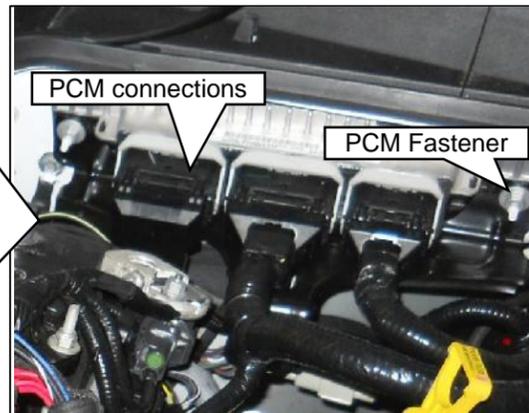


Figure 1.2

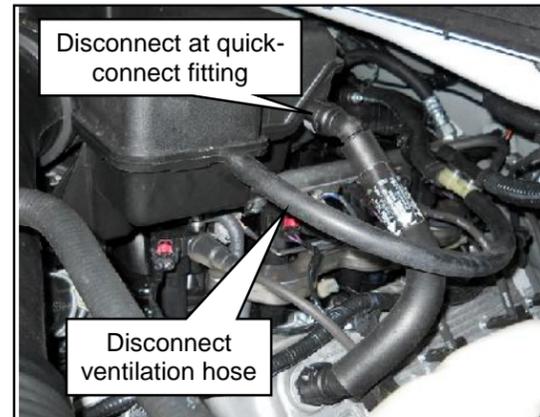


Figure 1.3



Figure 1.5

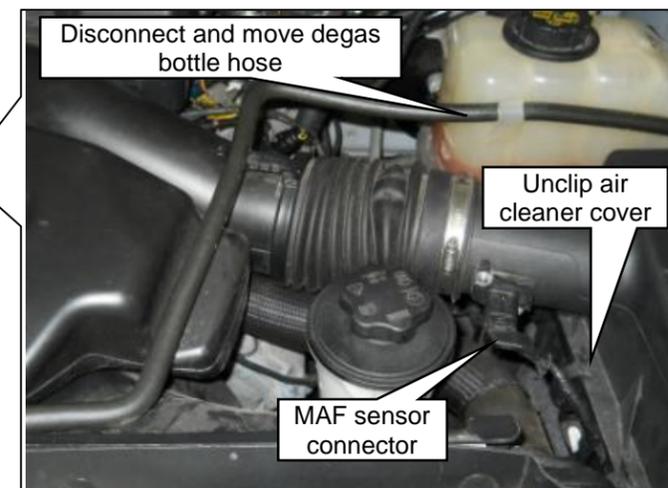
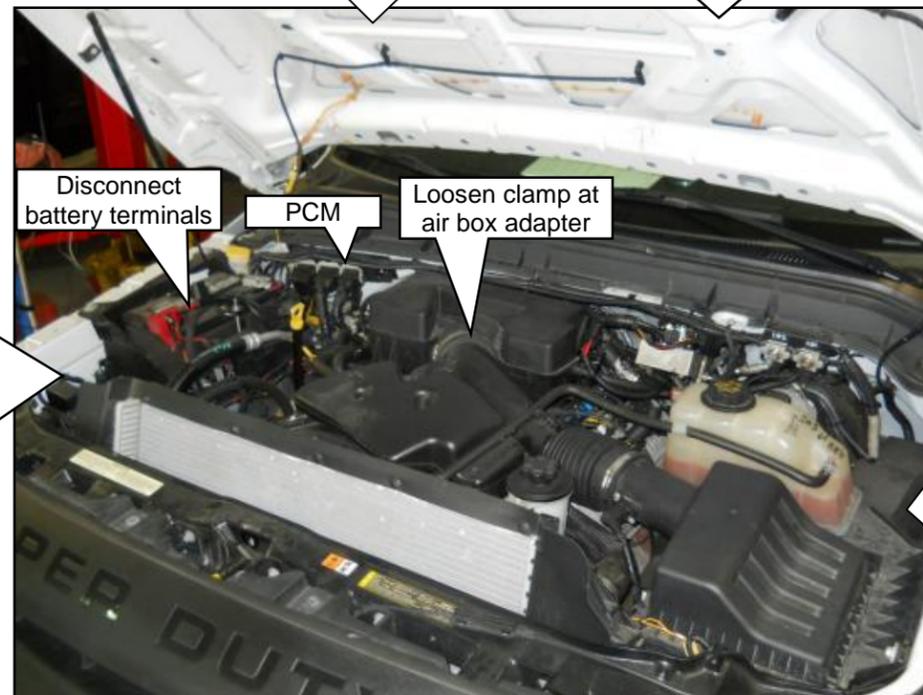


Figure 1.4

SENDING THE PCM FOR REPROGRAMMING

ROUSH CLEANTECH	
E-450 PROPANE PCM LABEL	
Purchaser's Full Name:	_____
Purchaser's Address:	_____
Vehicle Model Year:	_____ (Month at installation)
Vehicle Test Drive:	_____
Vehicle Identification Number:	_____
<input type="checkbox"/> Air/Fit Tag Included	_____
GVWR (Pound):	_____
GVWR (Kilogram):	_____
Propane Fuel Tank Serial Number:	_____

	Ford Motor Company
VEHICLE EMISSION CONTROL INFORMATION	
Conforms to regulations: 2008 MY FFV	
U.S. EPA: IT2B8 LDT4	
OBD: F II	Fuel: Gasoline/Ethanol
California: Not for sale in states with California emissions standards.	
TWC/HO2S/SFI No adjustments needed.	
5.4L-Group: 8FMXT05.44HF	
Evap: 8FMXR0250NBR	
▽8W7E-9C485-R R L	SAMPLE

Figure 1.5

- Write the requested information, including the gross vehicle weight rating (GVWR), on the PCM Return Label (P-01F010-A). The group information is found on the original vehicle emission control information (VECI) label (example: 5.4L - Group: 8FMXT05.44HF). The propane fuel tank serial number is located on the raised serial badge welded to the side of the tank. Once all information has been completed, apply the label to the back side of the PCM.

Note: Do NOT alter or remove the original VECI label from the vehicle. This label is required by law. Failure to heed this notice may void all warranties. **Figure 1.5.**

- Pack the PCM securely in the shipping box (P10C2-SB-A) provided. Enter your name and address in the **FROM** area of the shipping label provided and apply the label to the box.
- Call for a **FedEx package pickup**. Dial 1-800-463-3339, then 0, and speak to an agent in person. Do NOT use the automated option to schedule a pickup.

FedEx will deliver the package to ROUSH CleanTech via overnight service. ROUSH CleanTech will reprogram the PCM during the day in which it is received and return it to you via overnight service.

Included with the returned newly flashed PCM will be a ROUSH CleanTech VECI label and supplemental instructions for installing the new VECI label.

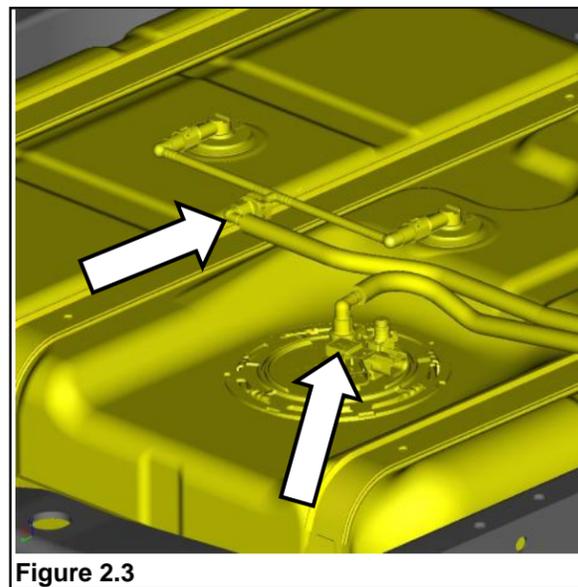
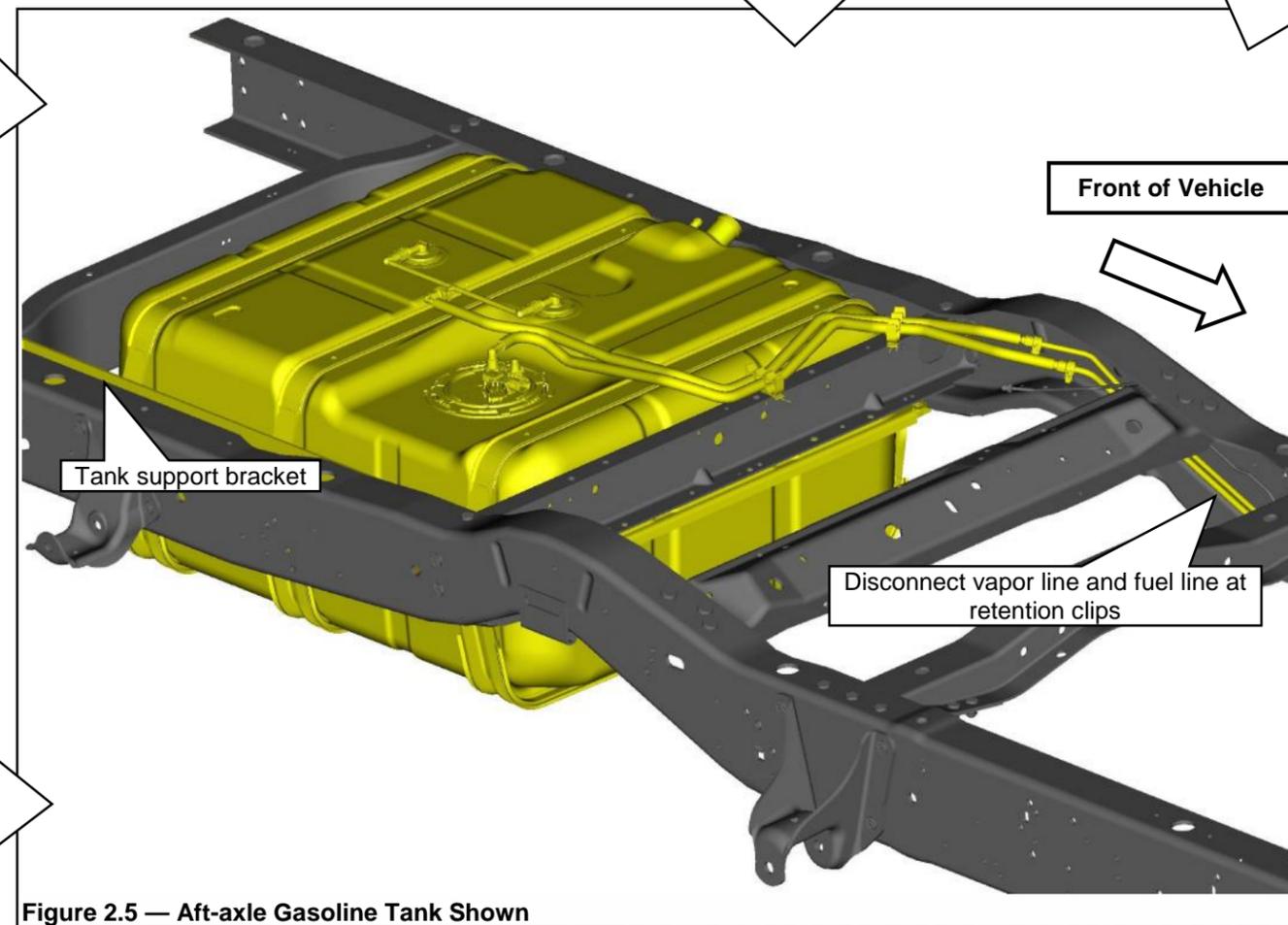
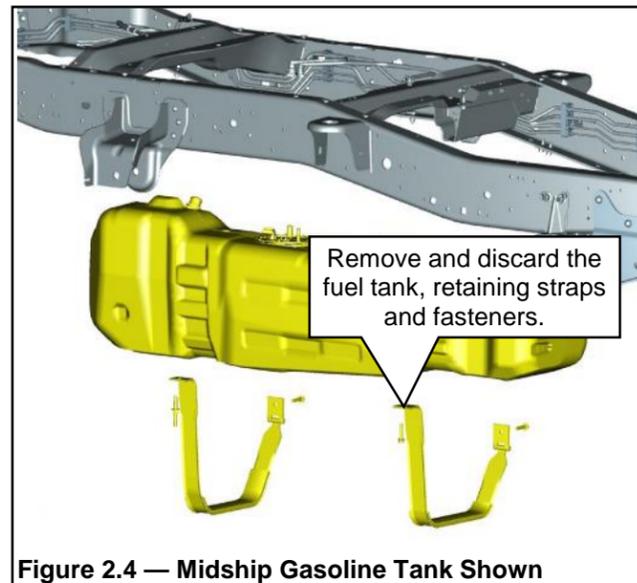
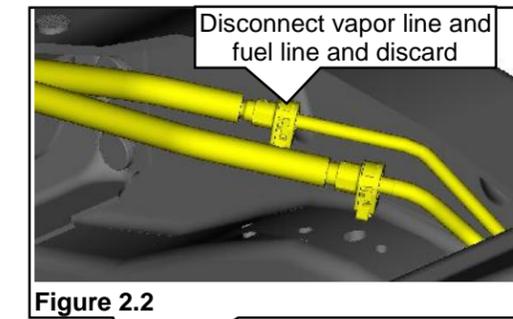
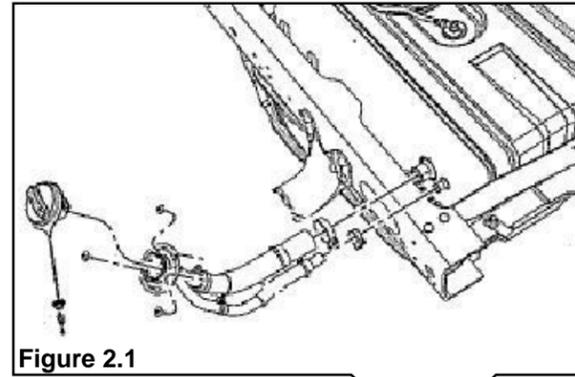
Note: ROUSH CleanTech Certified Installers authorized to perform on-site PCM flashing should consult the appropriate training materials for proper VECI label selection and disposition. Failure to follow the training guidelines properly could result in non-conformance to federal and local regulations.

REMOVING OEM FUEL TANK

Refer to the *Ford Workshop Manual, Section 310-01, Fuel Tank and Lines*, for instructions on removing the original fuel tank, tank shield and hardware.

Note: Remove only the fuel and vapor lines, do NOT remove the brake lines when following the *Ford Workshop Manual* procedure.

1. Disconnect the fuel tank filler pipe and vent hose from fuel tank. **Figure 2.1.**
2. Disconnect vapor line and fuel supply line from fittings at tank and frame rail. **Figures 2.2 and 2.3.**
3. Remove supports, brackets and straps as needed and remove fuel tank. See **Figures 2.4 and 2.5.**
4. If applicable, remove inner frame support at right side of tank.



REMOVING OEM REAR FUEL AND VAPOR LINES

1. Remove vapor line from retaining clips on frame rail, disconnect from evaporative canister and discard.
Figures 3.1 and 3.2.
2. Remove gasoline rear fuel supply line from retaining clips. Leave clips in place for new fuel lines.
Figures 3.3, 3.4 and 3.5.



Figure 3.4 — OEM Midship Tank: Canister Location

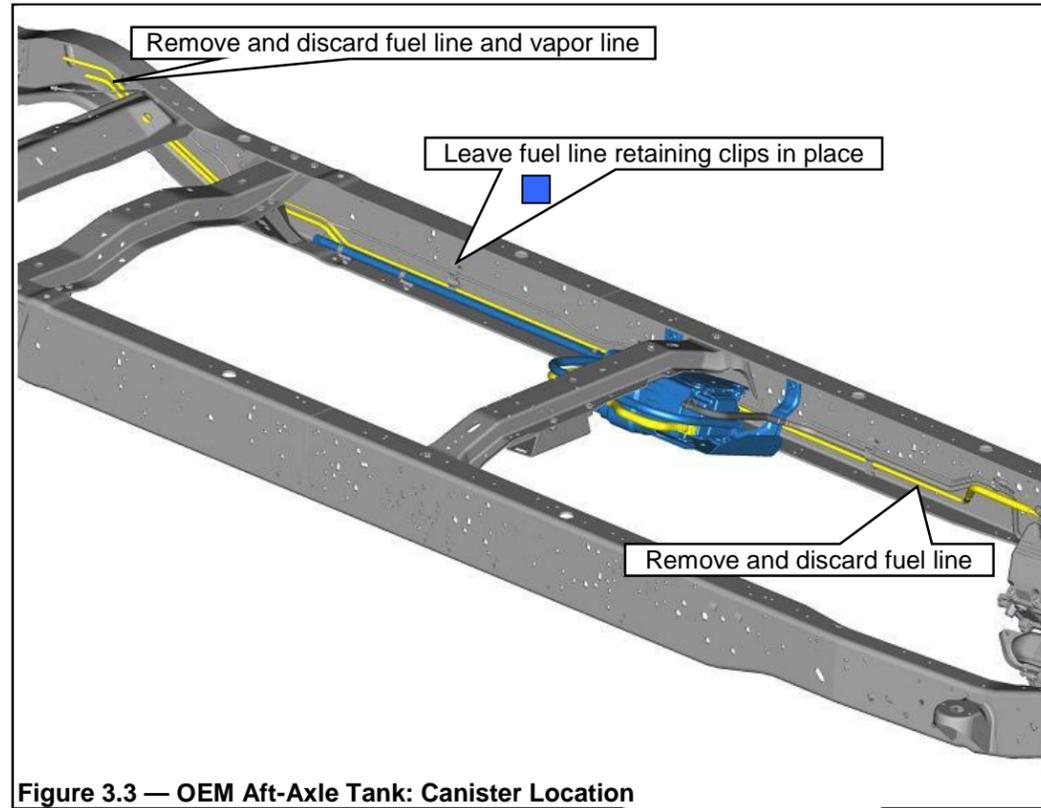


Figure 3.3 — OEM Aft-Axle Tank: Canister Location

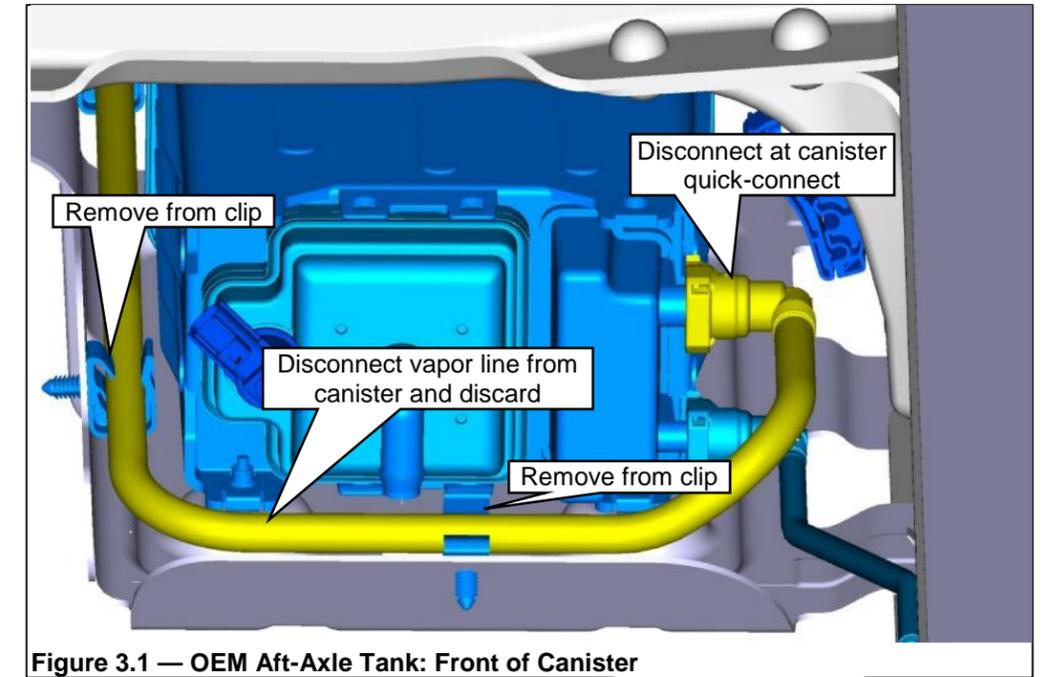


Figure 3.1 — OEM Aft-Axle Tank: Front of Canister

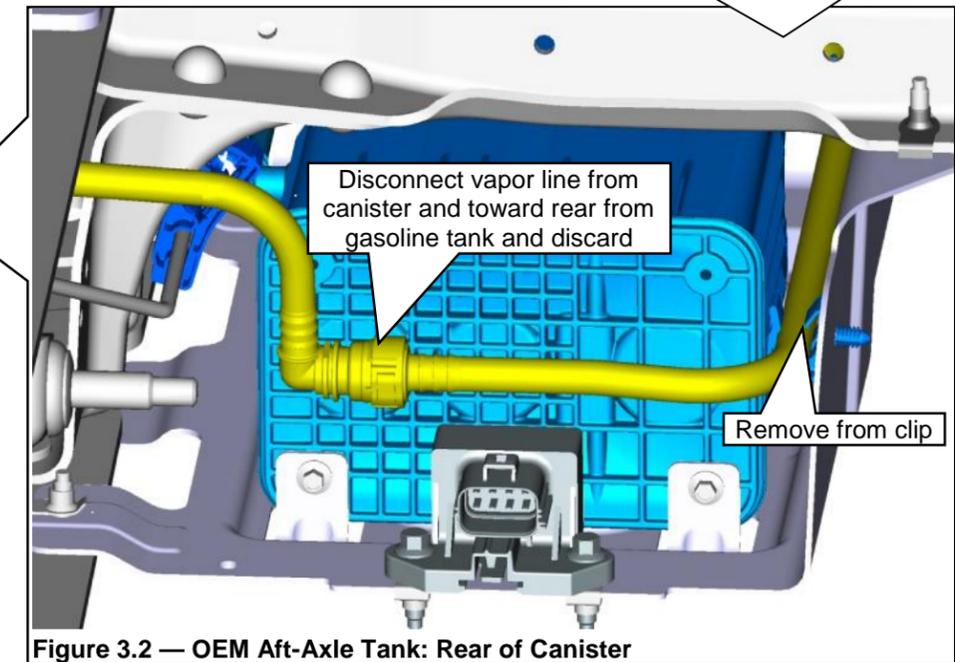


Figure 3.2 — OEM Aft-Axle Tank: Rear of Canister

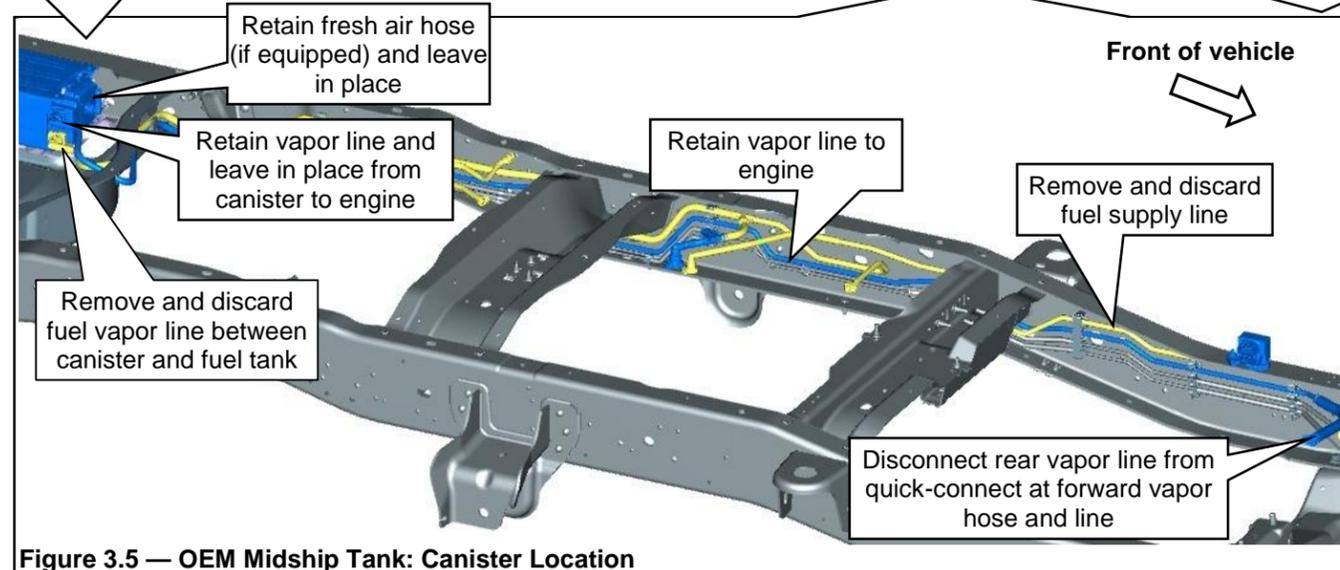


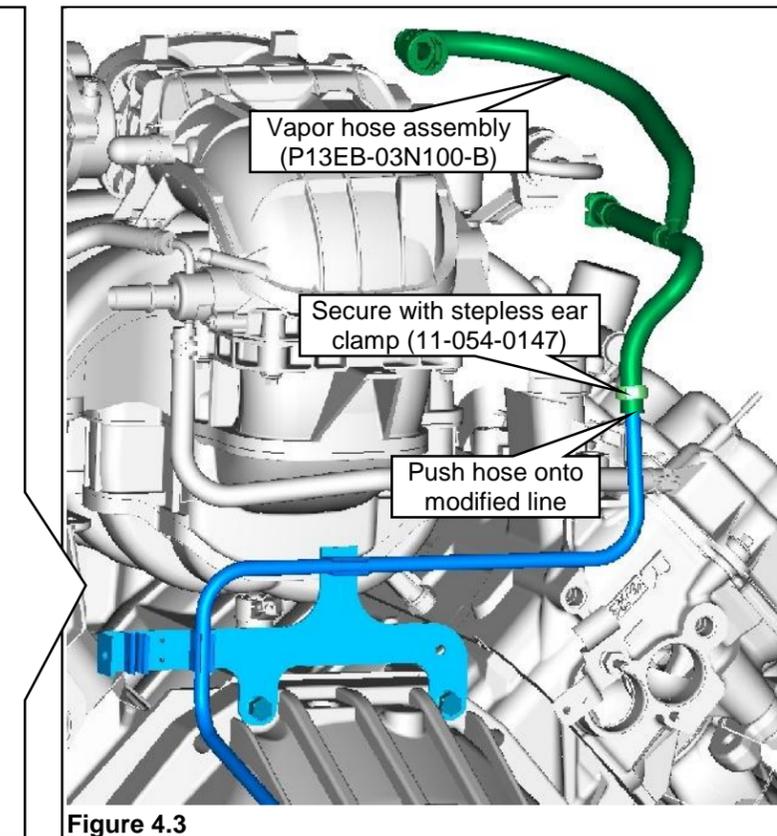
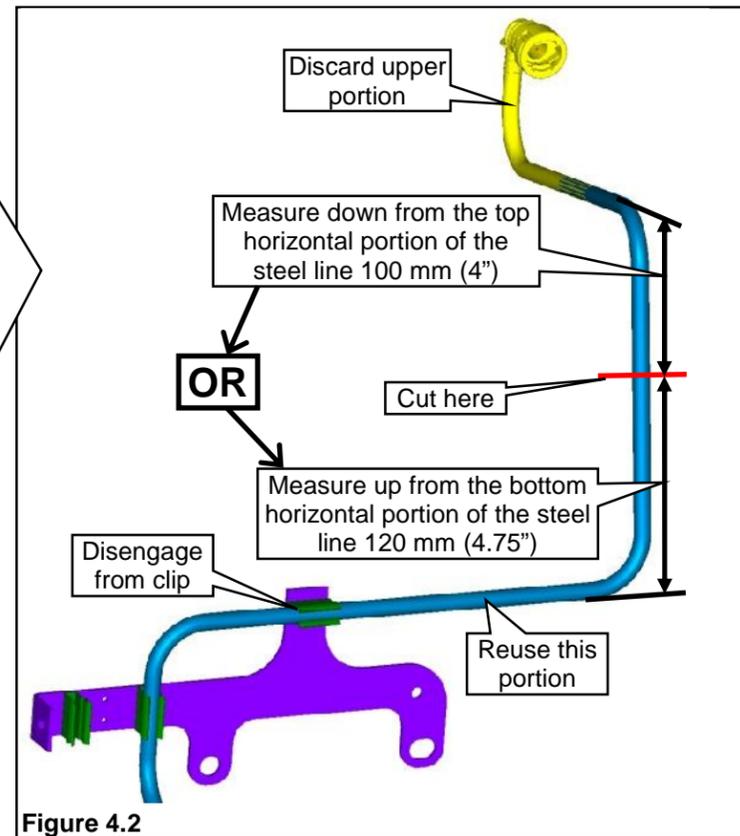
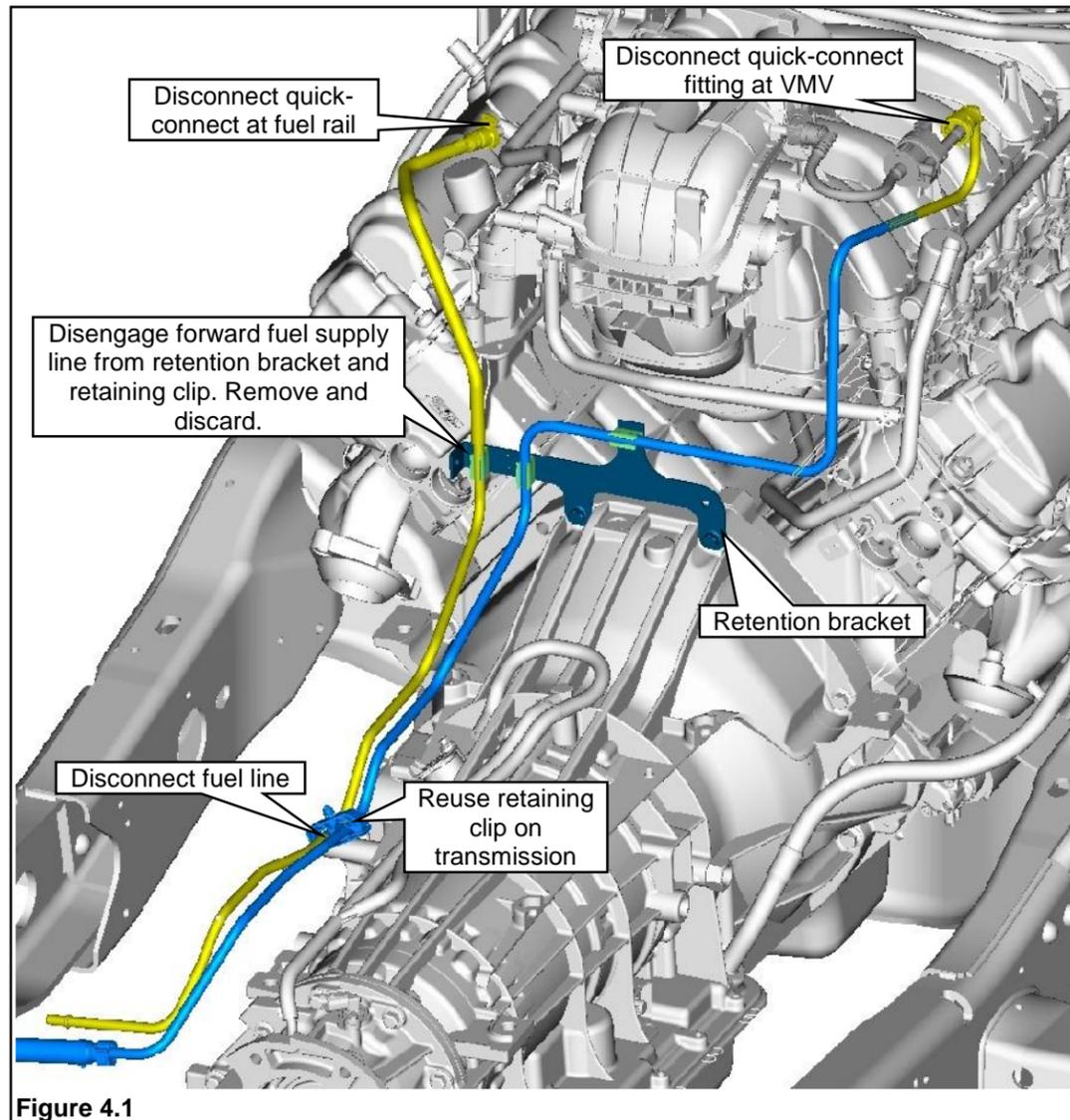
Figure 3.5 — OEM Midship Tank: Canister Location

REMOVING OEM FORWARD FUEL SUPPLY LINE AND MODIFYING VAPOR LINE

Refer to the *Ford Workshop Manual, Section 310-01, Fuel Tank and Lines*, for complete instructions on removing the original forward fuel supply line.

If installing this kit on an unfinished vehicle (no box or bed installed), the filler pipe, fuel supply and vapor lines (at tank) can be removed along with the fuel tank.

1. Disengage the gasoline forward fuel supply line from retention clips, disconnect from fuel rail and discard the line. **Figure 4.1.**
2. Disconnect the OEM vapor line from the VMV on the engine. **Figure 4.1.**
3. Disengage the vapor line from the retention bracket upper clip on the transmission for access for cutting the line for modification.
4. Modify the OEM steel vapor line by cutting the line in the area indicated so that the new vapor hose assembly can be installed. Use a tubing cutter to make the cut. Discard the upper portion and reuse the lower portion. **Figure 4.2.**



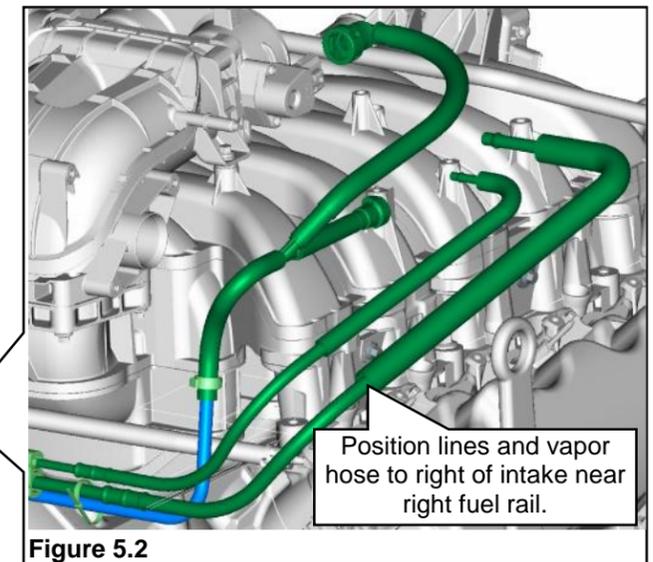
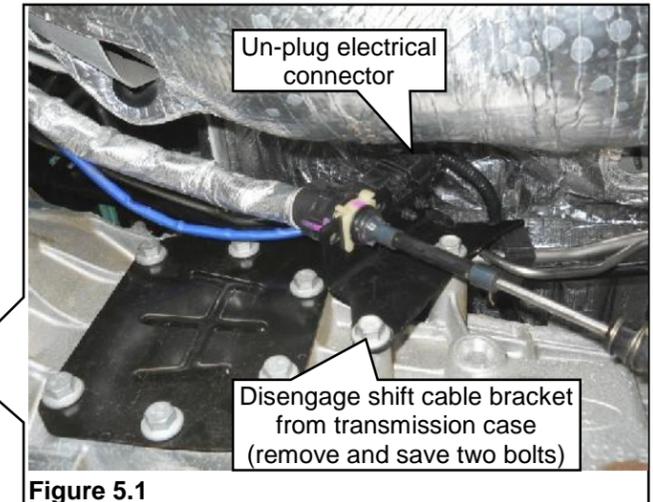
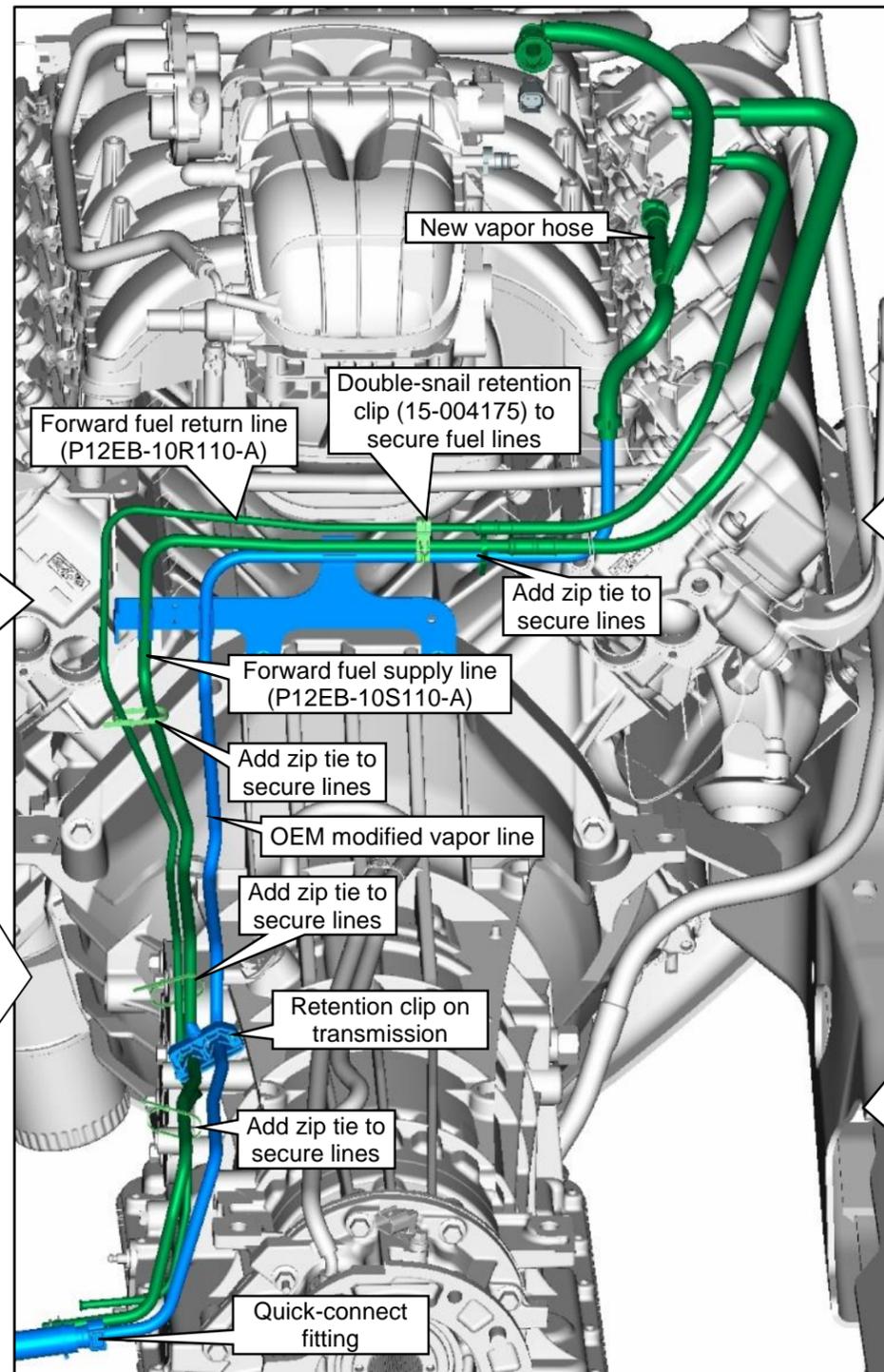
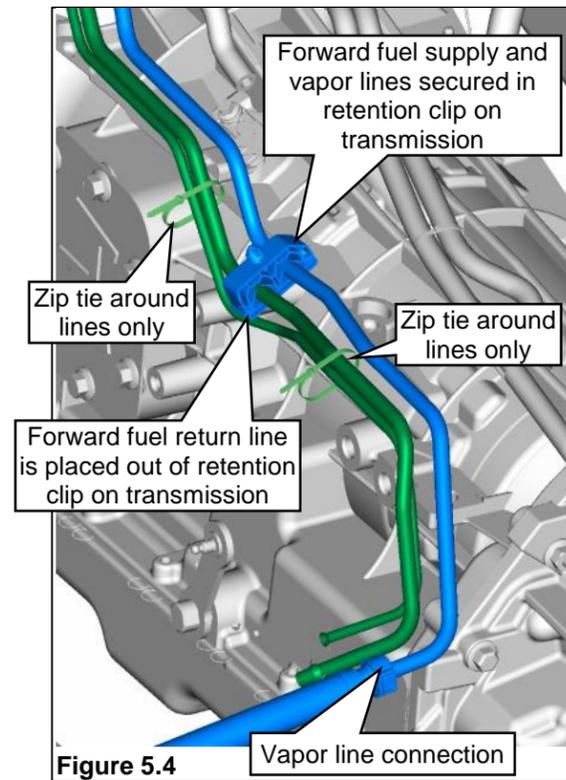
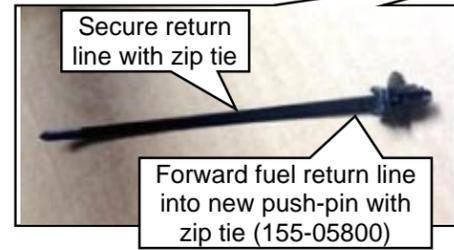
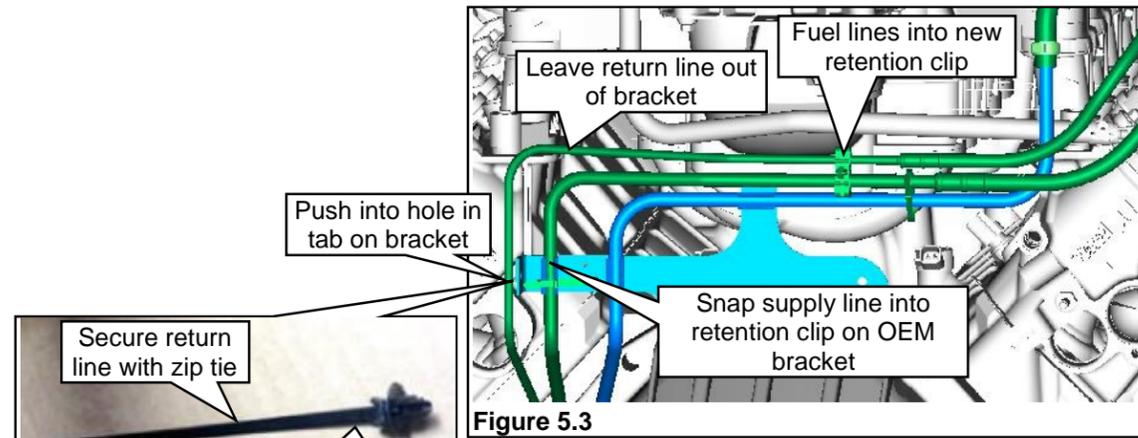
INSTALL NEW VAPOR HOSE ASSEMBLY TO MODIFIED VAPOR LINE

- Attach the ROUSH CleanTech vapor hose assembly to the modified OEM steel vapor line. Using the stepless ear clamp (14.1 x 16.6, labeled "16"), secure the hose to the line. Refer to the *Special Tools* section for more information. **Figure 4.3.**

INSTALLING NEW FORWARD FUEL LINES

After removing original gasoline fuel line, temporarily position ROUSH CleanTech forward fuel supply and return lines, along with the modified vapor line and new vapor hose so lines and hose extend into the engine compartment near the intake manifold. Final installation is after fuel rail pressure control module (FRPCM) has been installed.

1. Disconnect the shifter cable bracket located on the left side of the transmission (remove and save the two bolts and disconnect the electrical connector). **Figure 5.1.**
2. Install forward fuel supply line and forward fuel return line. Follow the routing of the original line and run the new lines above the LH exhaust heat shield into transmission bracket retaining clips and up into engine compartment over to the right side of the engine. **Figures 5.2 and 5.3.**
3. Install the lines into the retention clip on the transmission. If not done, connect the modified vapor line into the OEM vapor line quick-connect fitting. **Figure 5.4.**
4. Install the shift cable bracket. Tighten the two bolts and connect the electrical connector. **Figure 5.1.**



PREPARING ENGINE COMPARTMENT

Refer to the *Ford Workshop Manual, Section 303-04, Fuel Charging and Controls — 6.8L (3V)*, for complete instructions on removing the fuel rails and injectors. Some original parts will be reused. The components in this section may be saved, discarded or new. Refer to color key.

1. Disconnect the intake manifold runner control (IMRC) actuator electrical connector as needed. **Figure 6.1.**
2. Unplug the electrical harness connector from OEM VMV.
3. Disconnect the VMV hose quick-connect fitting from the throttle body adapter. **Figure 6.2.**
4. Remove the bolt securing the bracket and remove the VMV assembly (hose, VMV and bracket) for modification. **Figure 6.2.**
5. Separate the hose with quick-connect from the VMV. Pull the OEM VMV bracket out of the VMV. Discard the hose, bracket and bolt. **Figure 6.3.**
6. A new VMV mounting bracket found in hardware kit P12EB-ENGKIT-A is to be installed onto the FRPCM. The VMV and rubber isolator will be pushed onto the new bracket after the bracket has been installed. **Figure 6.3.**
7. Slide the abrasion sleeve onto the VMV engine purge hose. Connect the VMV engine purge hose assembly to the VMV and secured with a stepless ear clamp (labeled "18"). **Note:** This clamp should NOT be tightened until after the orientation between the VMV and hose is correct with the assembly installed. **Figure 6.4.**

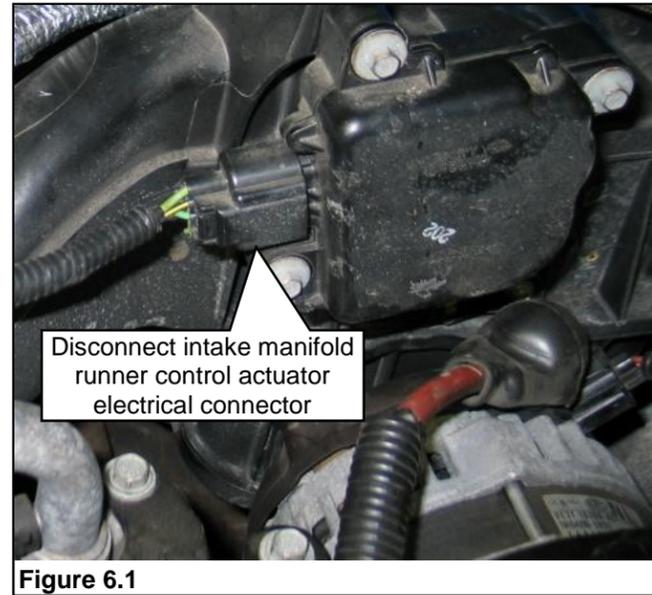


Figure 6.1

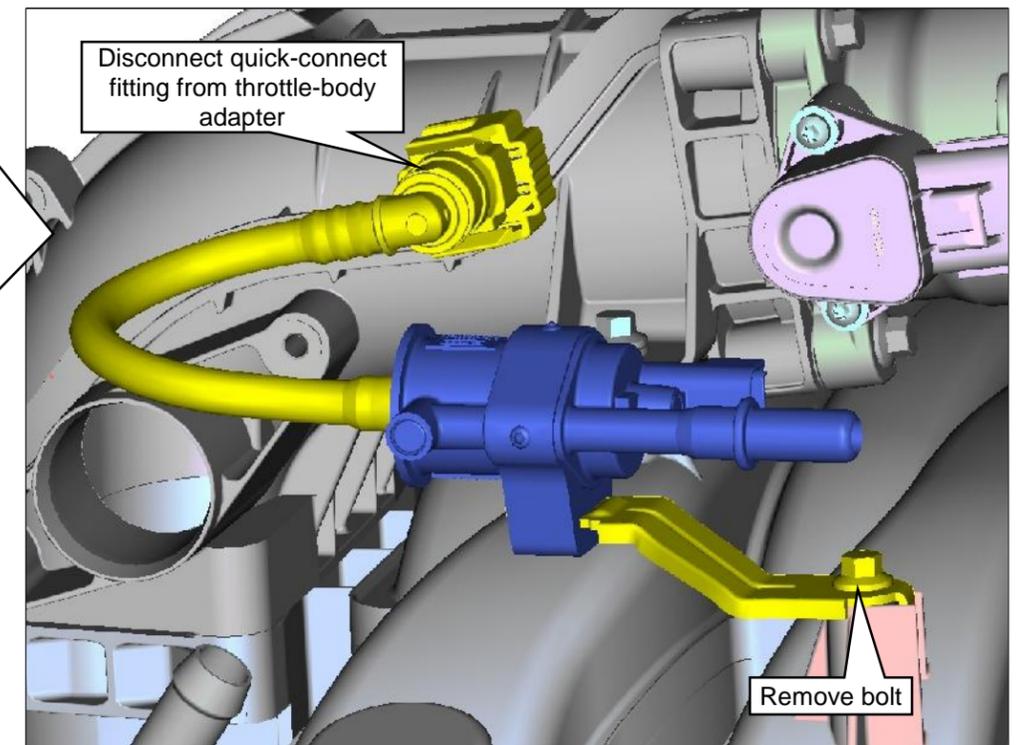


Figure 6.2

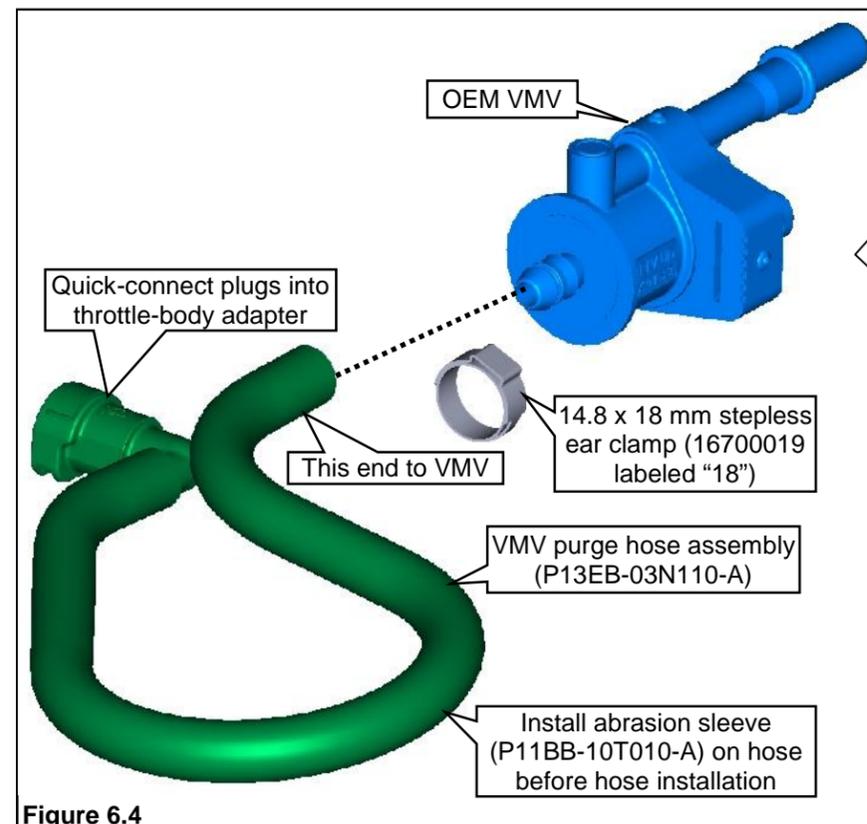


Figure 6.4

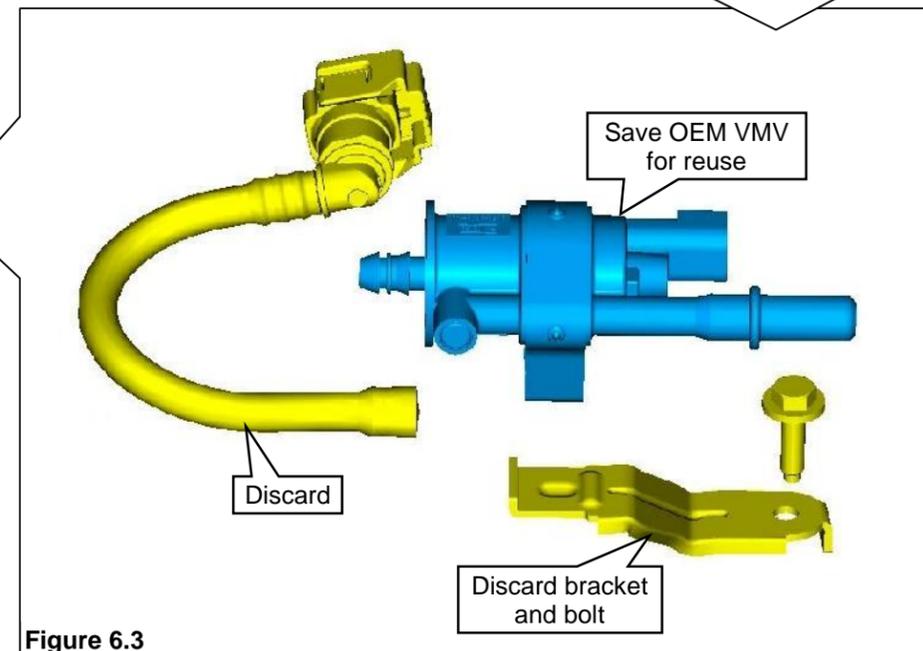
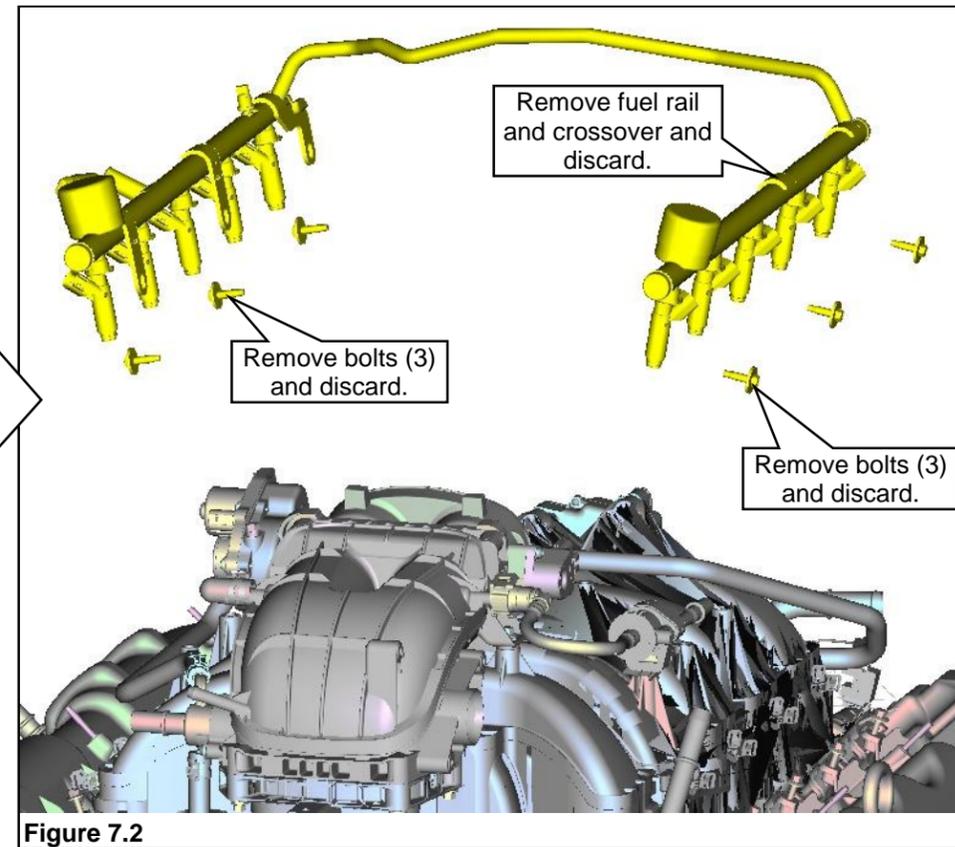
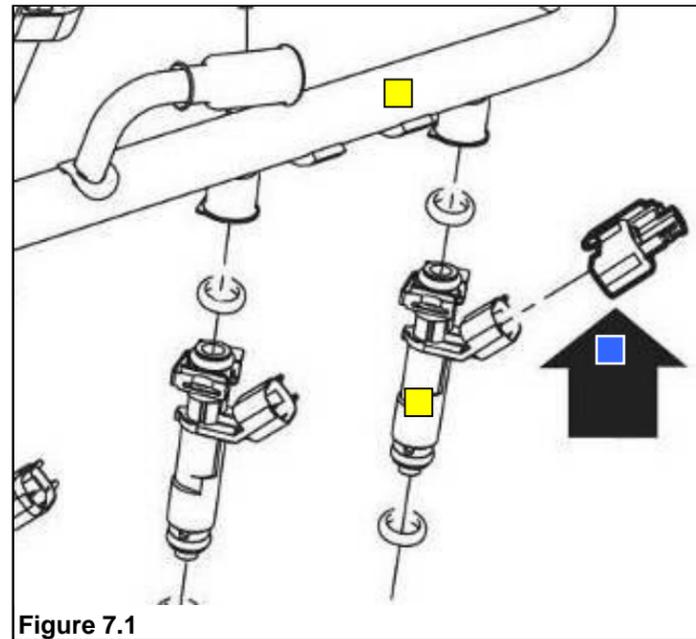


Figure 6.3

ROUSH CleanTech Liquid Propane Autogas Fuel System: Ford F-450 / F-550 Chassis Cab

8. If necessary, remove the engine wiring harness from the mounting studs on the valve cover.
9. Disconnect electrical connector from each OEM fuel injector. **Figure 7.1.**
10. If not already done, using a Ford-approved fuel line removal tool, disconnect the fuel supply line from the left fuel rail. **Figure 7.1.**
11. Remove the six fuel rail mounting bolts and fuel rail assembly (with crossover hose). **Figure 7.2.**
12. Discard fuel rail assembly and bolts.



INSTALLING NEW FUEL RAILS AND FUEL RAIL RETURN FUEL LINE ASSEMBLY

1. If necessary, disconnect coil electrical wires (and ignition coils if necessary) for clearance.
2. Install three fuel rail mounting brackets to each fuel rail. Tighten the screws to 8–12 Nm. **Figures 8.2 and 8.5.**
3. Using engine oil (Motorcraft SAE 5W-20 or equivalent), lubricate lower O-rings on injector nozzles before seating rail assemblies.
4. Position left hand fuel rail assembly onto driver side of intake manifold and fully seat nozzles. Using three M6 x 1.0 x 16 bolts found in hardware kit P12EB-ENKIT-A, secure fuel rail to intake manifold. Tighten bolts to 8–12 Nm. **Figure 8.3.**
5. Position right hand fuel rail assembly onto passenger side of intake manifold and fully seat nozzles. Using three M6 x 1.0 x 16 bolts found in hardware kit P12EB-ENKIT-A, secure fuel rail to intake manifold. Tighten bolts to 8–12 Nm. **Figure 8.4.**
6. Orient and install fuel rail return line assembly onto forward ends of fuel rails. Push to connect fittings. **Figure 8.1.**

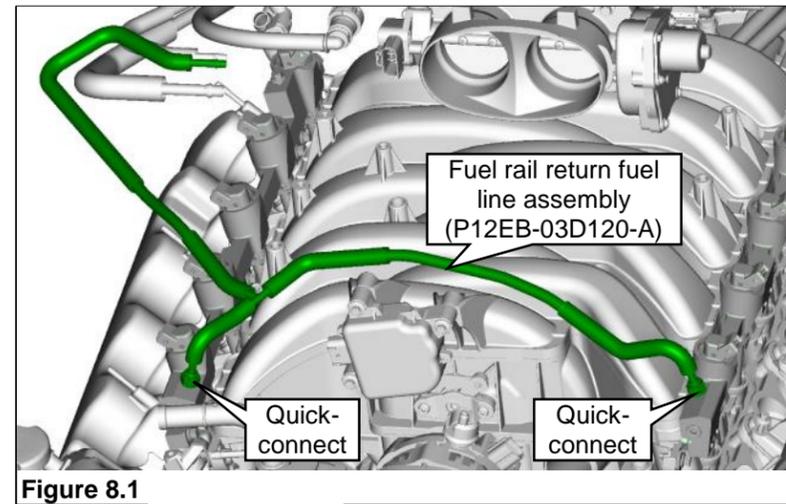


Figure 8.1

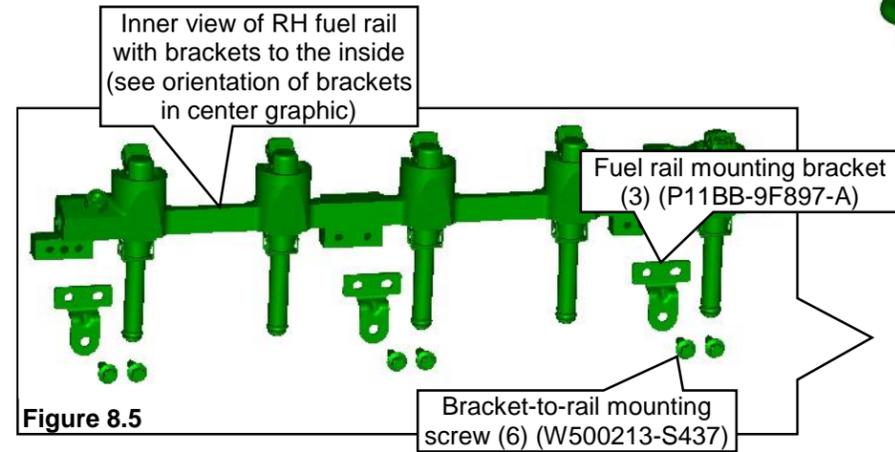


Figure 8.5

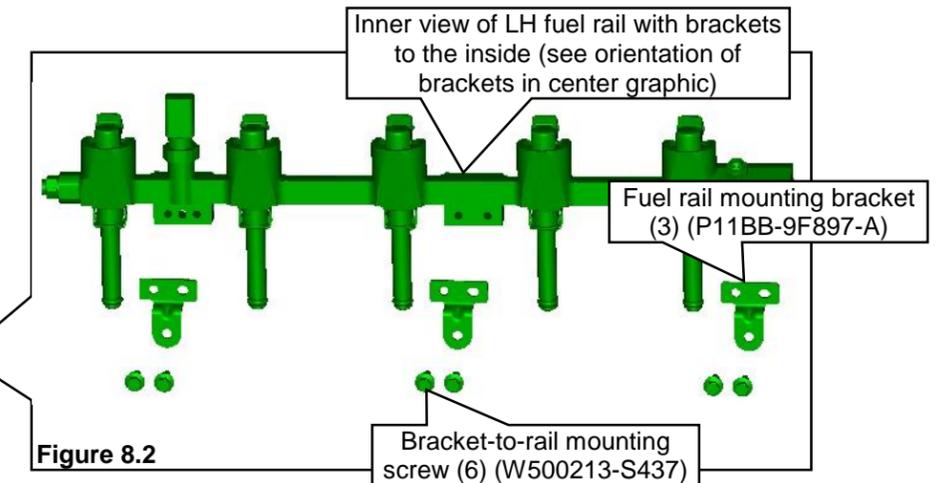
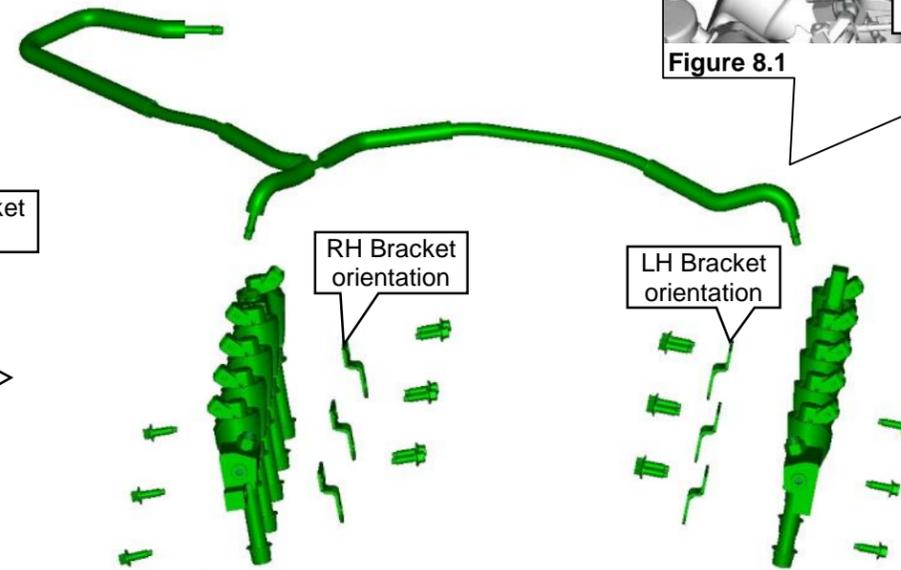


Figure 8.2

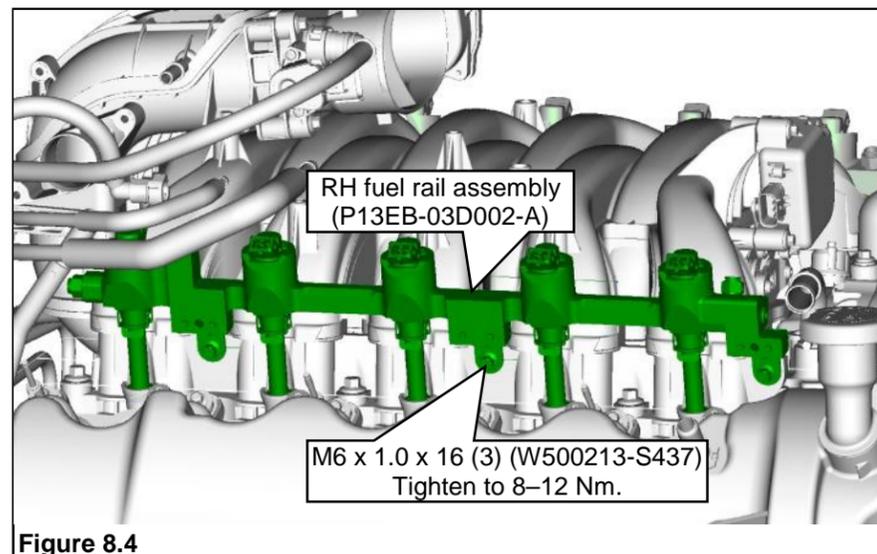


Figure 8.4

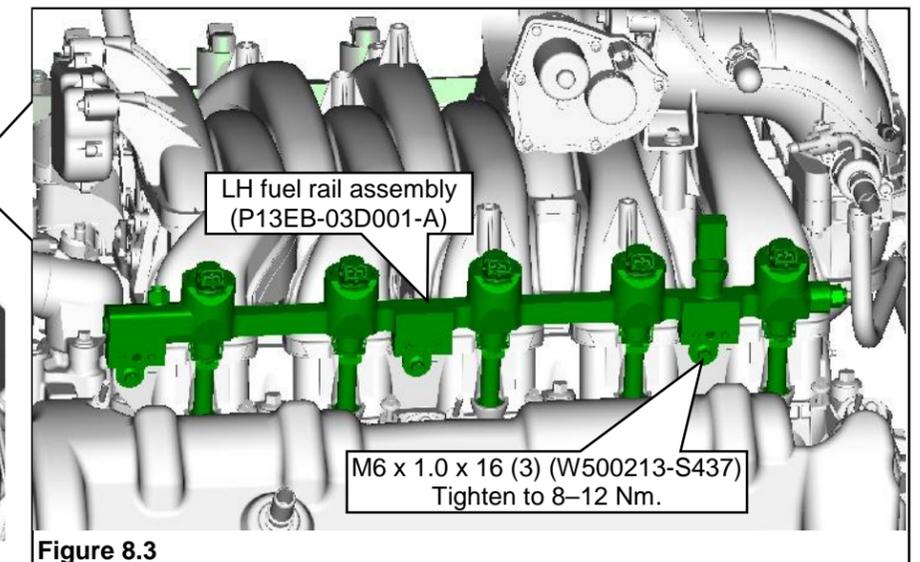
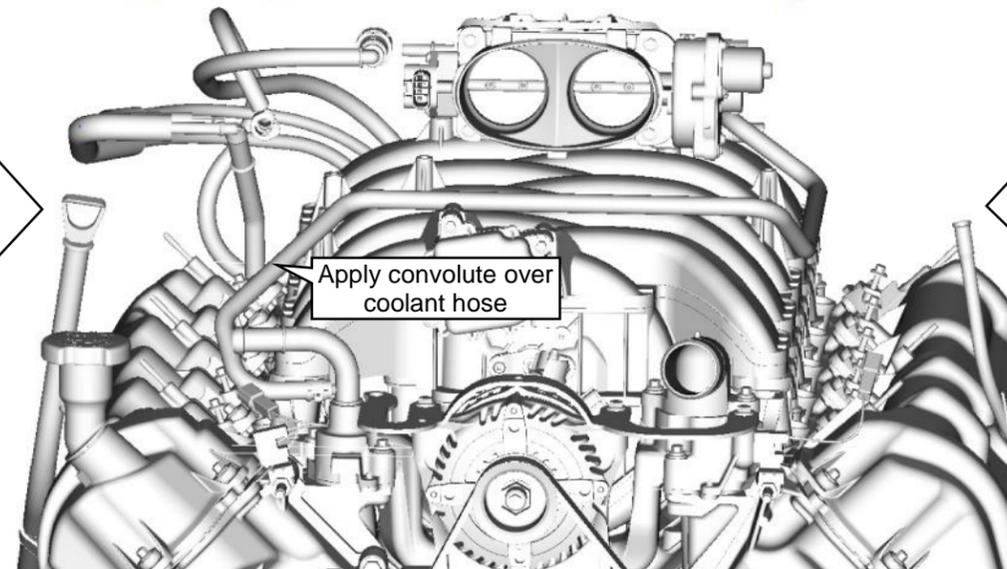
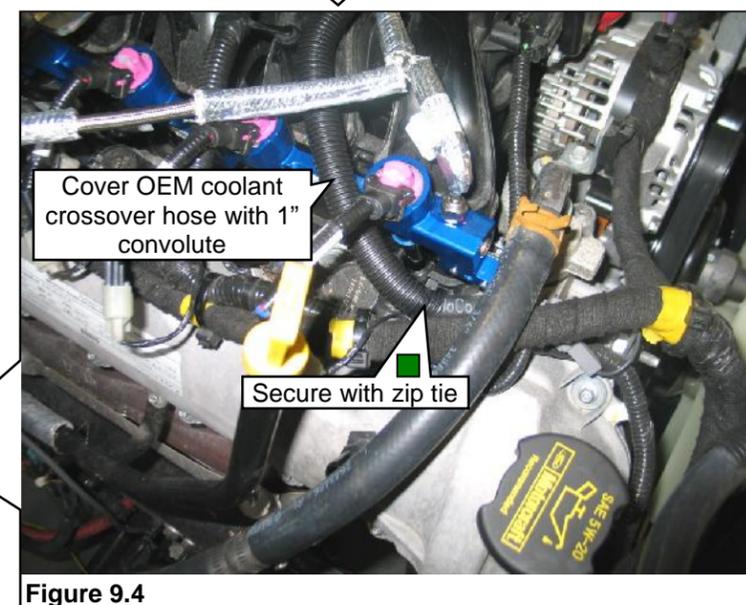
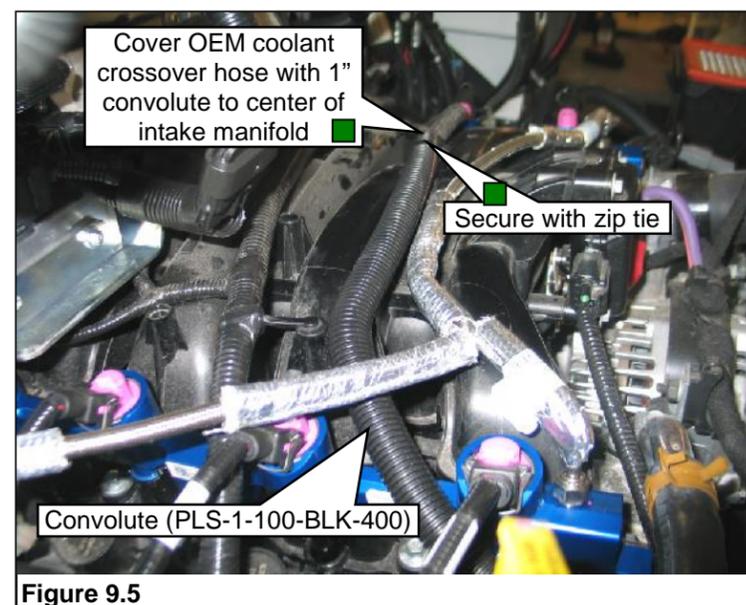
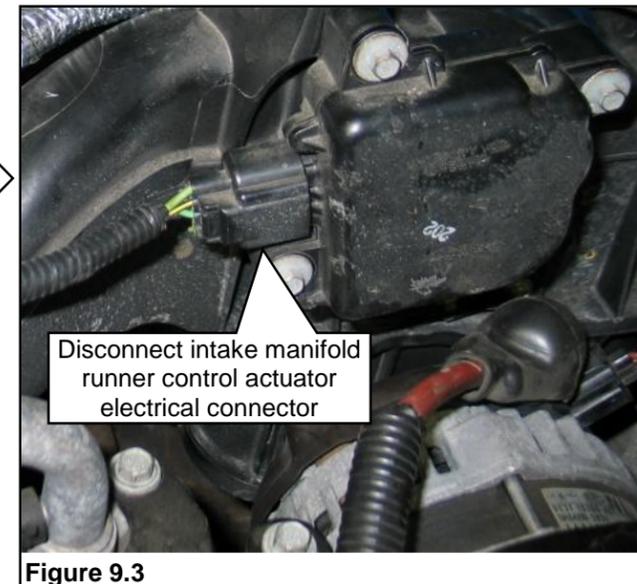
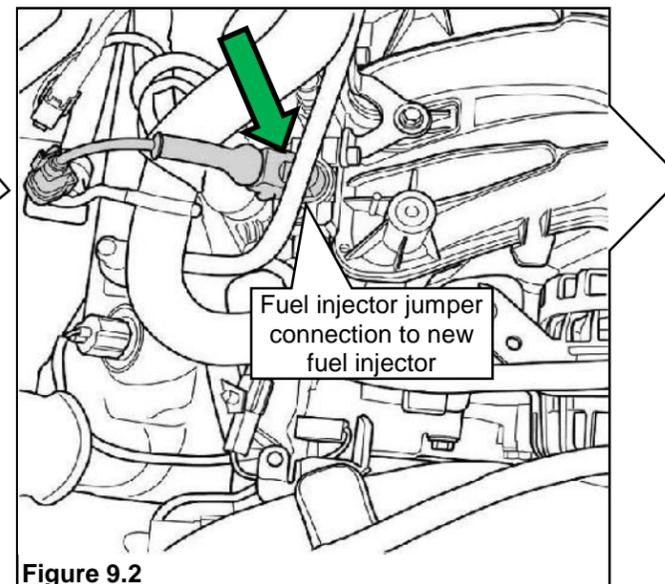
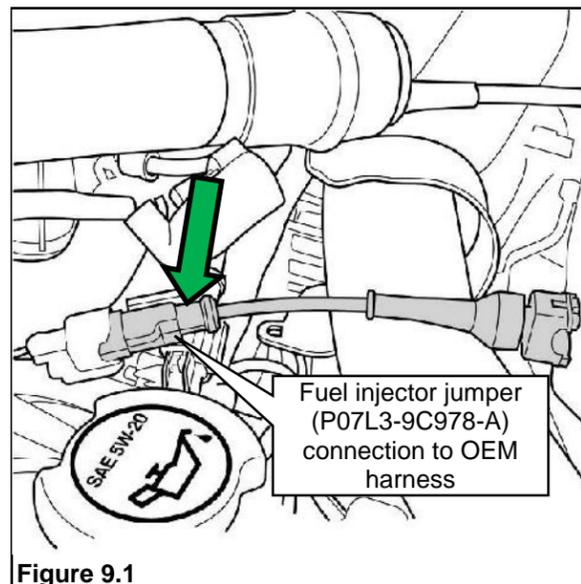


Figure 8.3

ROUSH CleanTech Liquid Propane Autogas Fuel System: Ford F-450 / F-550 Chassis Cab

7. If applicable, connect coil wires.
8. Connect a fuel injector jumper to each original fuel injector harness connector. The ten jumpers can be found in hardware kit P12EB-ELECKIT-A. Connect opposite end of each jumper to its respective fuel injector. **Figures 9.1 and 9.2.**
9. Connect the intake manifold runner control (IMRC) actuator electrical connector. **Figure 9.3.**
10. Add a 400 mm length of 1" convolute to the OEM coolant crossover hose and secure the convolute with two zip ties, one at each end. The convolute should span to the center of the intake manifold and is installed to prevent chafing at the right fuel rail. **Figures 9.4 and 9.5.**



INSTALLING FUEL RAIL PRESSURE CONTROL MODULE

The following parts are found in hardware kit P12EB-ENGKIT-A.

1. Remove the OEM throttle body adapter M6 x 20 mounting bolt. Reuse this bolt to help secure the FRPCM bracket. **Figure 10.2.**
2. Position the FRPCM mounting bracket to the engine. **Figure 10.3.** Install the OEM throttle body adapter bolt, the button head bolt in the depression of the bracket and a third bolt at the rear of the bracket into the right fuel rail. Tighten bolts to 8–12 Nm.
3. Position the FRPCM to the bracket and align the four holes. **Figure 10.4.**
4. Loosely install two M6 x 16 bolts into the front bracket of the FRPCM. **Figure 10.5.**
5. Position the VMV bracket to the FRPCM inner rear hole with the tab of the bracket rearward. Loosely install two M6 x 62 bolts through the FRPCM into the FRPCM bracket. **Figure 10.6.** Tighten all four bracket bolts to 8–12 Nm.

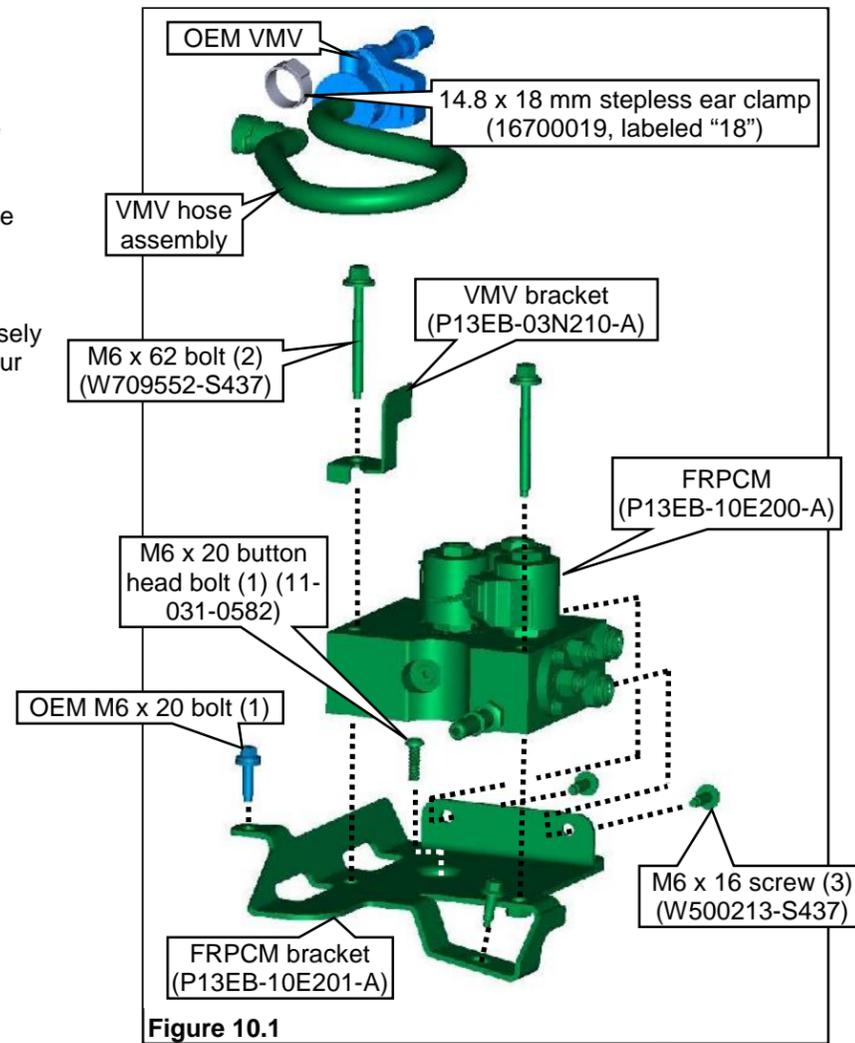


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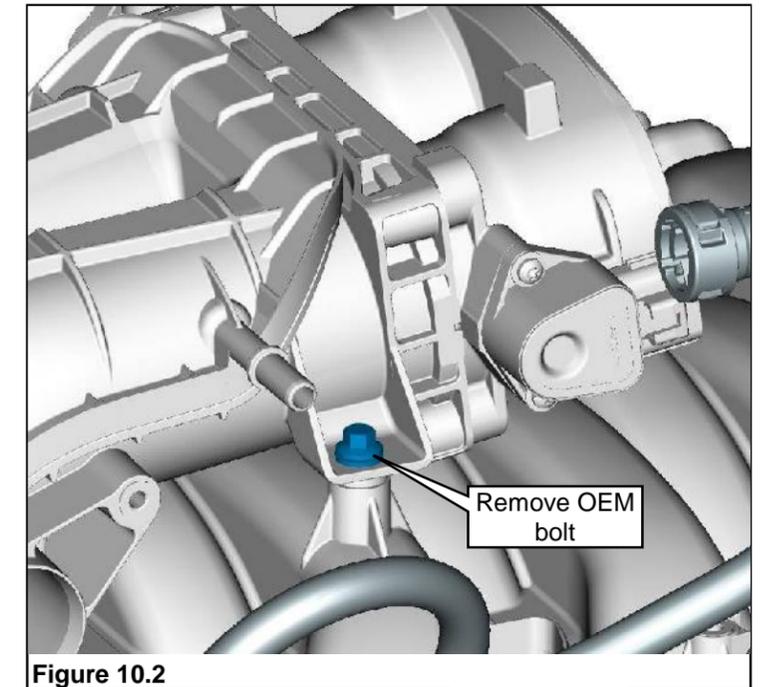


Figure 10.2

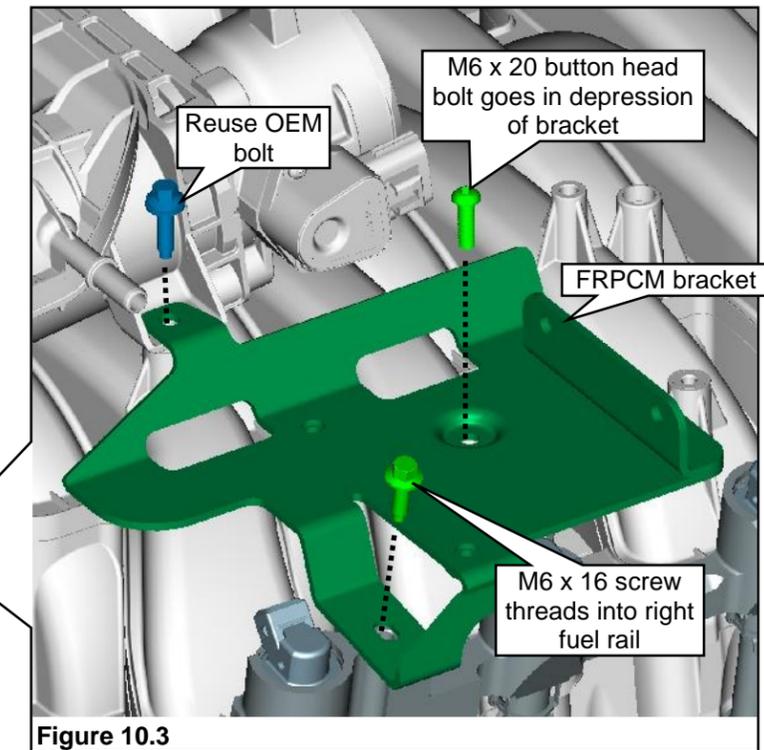


Figure 10.3

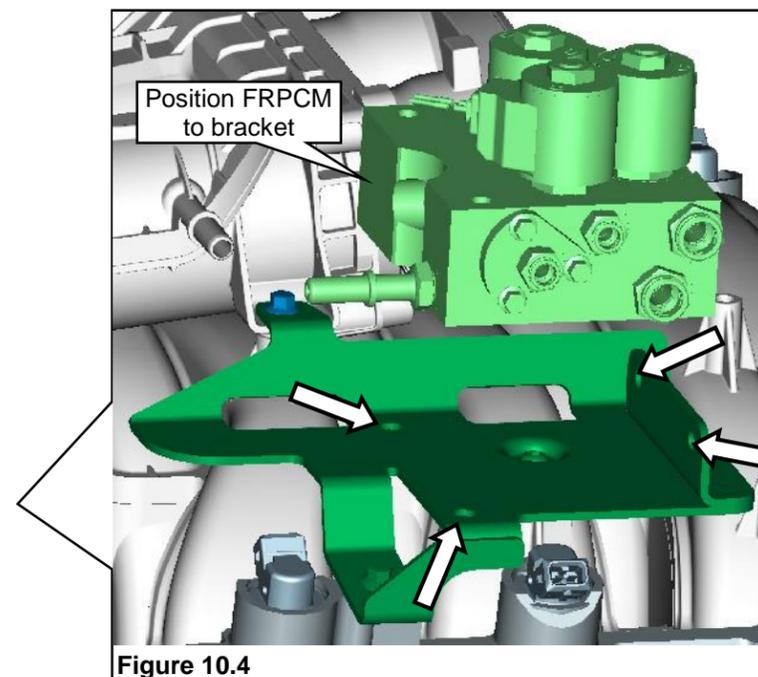


Figure 10.4

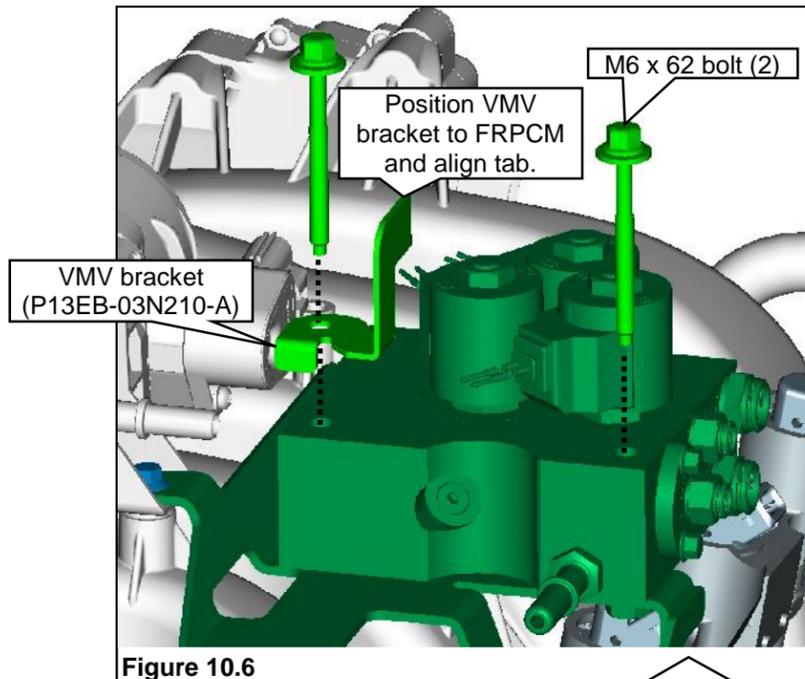


Figure 10.6

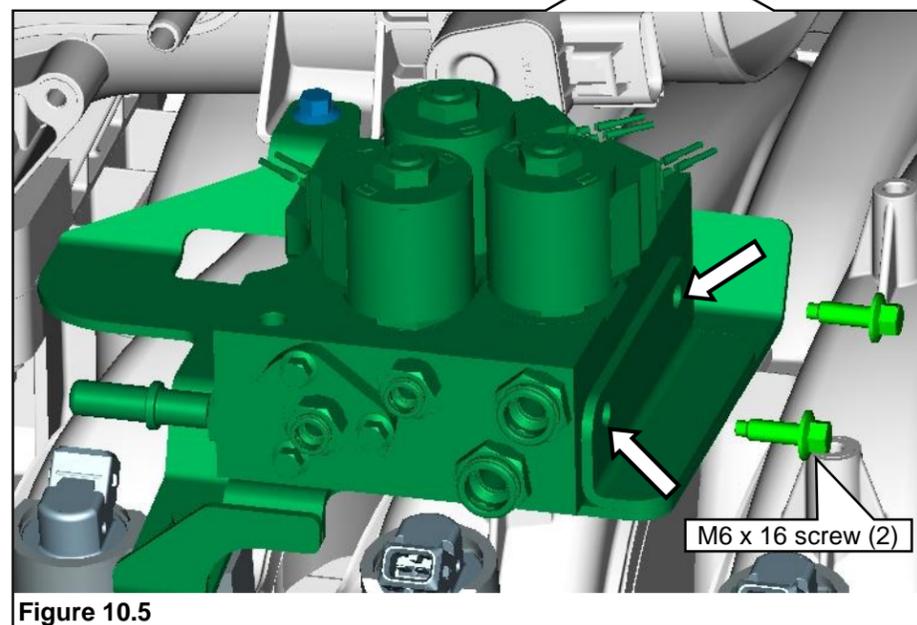


Figure 10.5

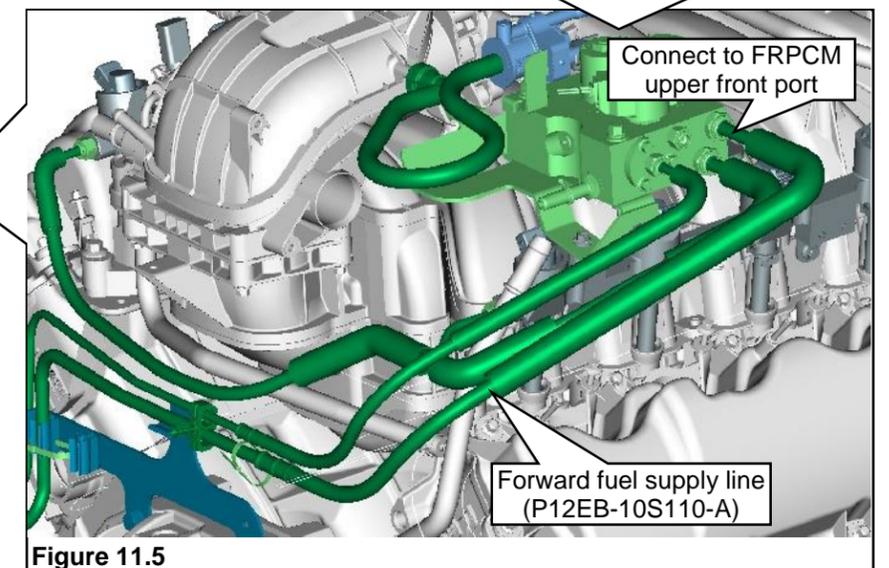
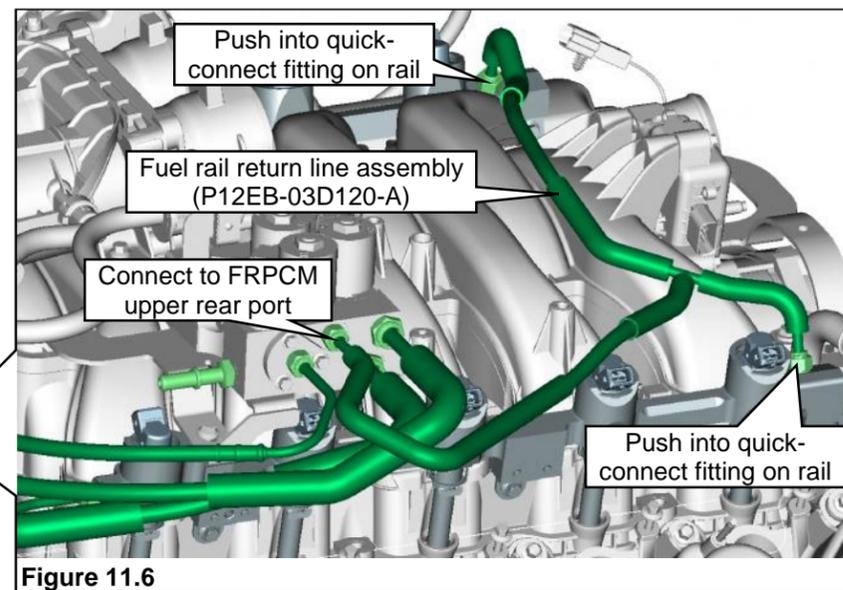
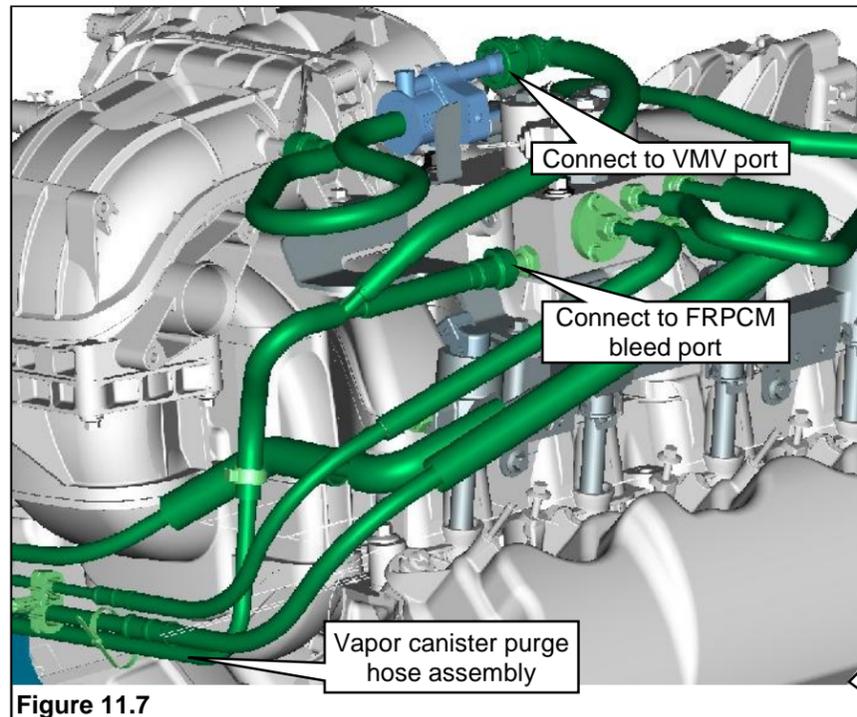
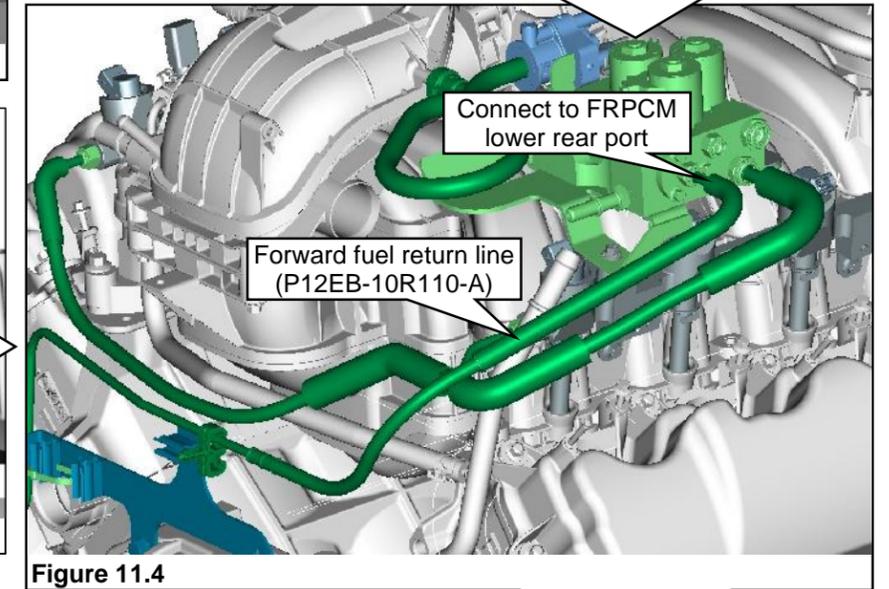
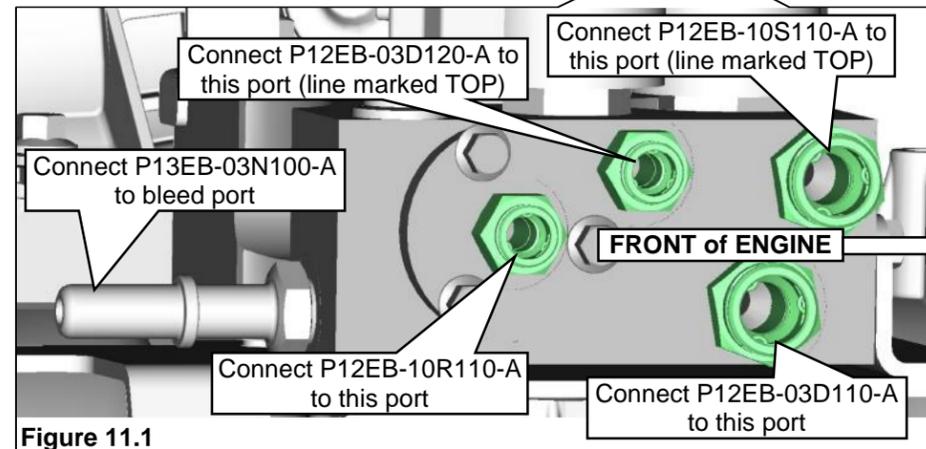
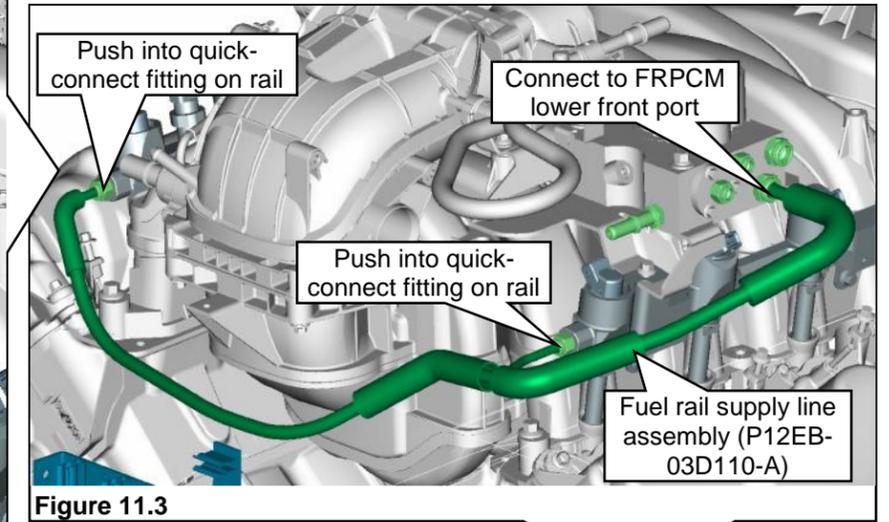
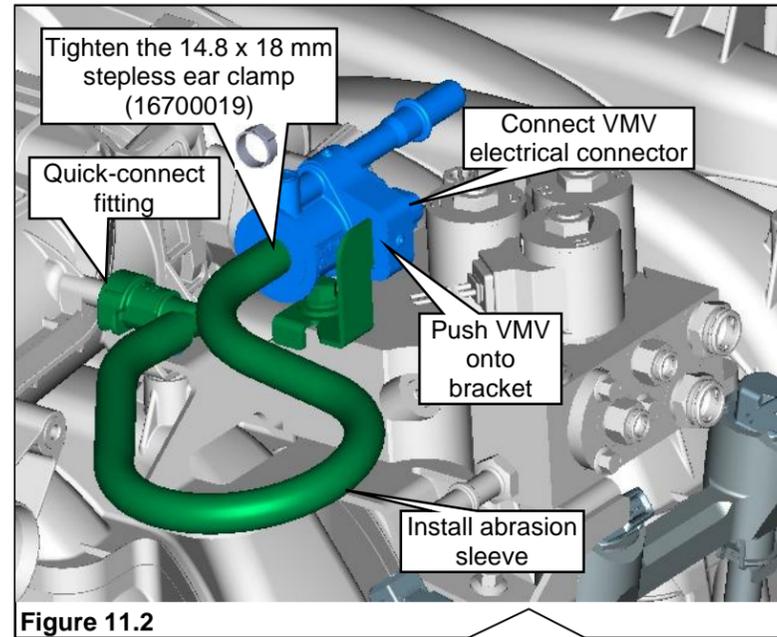
ROUSH CleanTech Liquid Propane Autogas Fuel System: Ford F-450 / F-550 Chassis Cab

Note: For all quick-connect fittings and lines, make sure you push and pull on the lines to make sure they are securely connected.

6. If not done, slide an abrasion sleeve onto the vapor hose before installation. **Figure 11.2.**
7. Position the VMV with new vapor hose assembly to the bracket. Slide the VMV onto the bracket until secure. Plug the vapor hose assembly quick-connect fitting onto the port of the throttle body adaptor. Use a crimping tool to tighten the stepless ear clamp after the assembly is installed and correctly oriented. Refer to *Special Tools* for more information. Connect the OEM electrical connector to the VMV. **Figure 11.2.**

Note: Refer to **Figure 11.1** for FRPCM fuel line identification for line-to-port and vapor hose bleed port location.

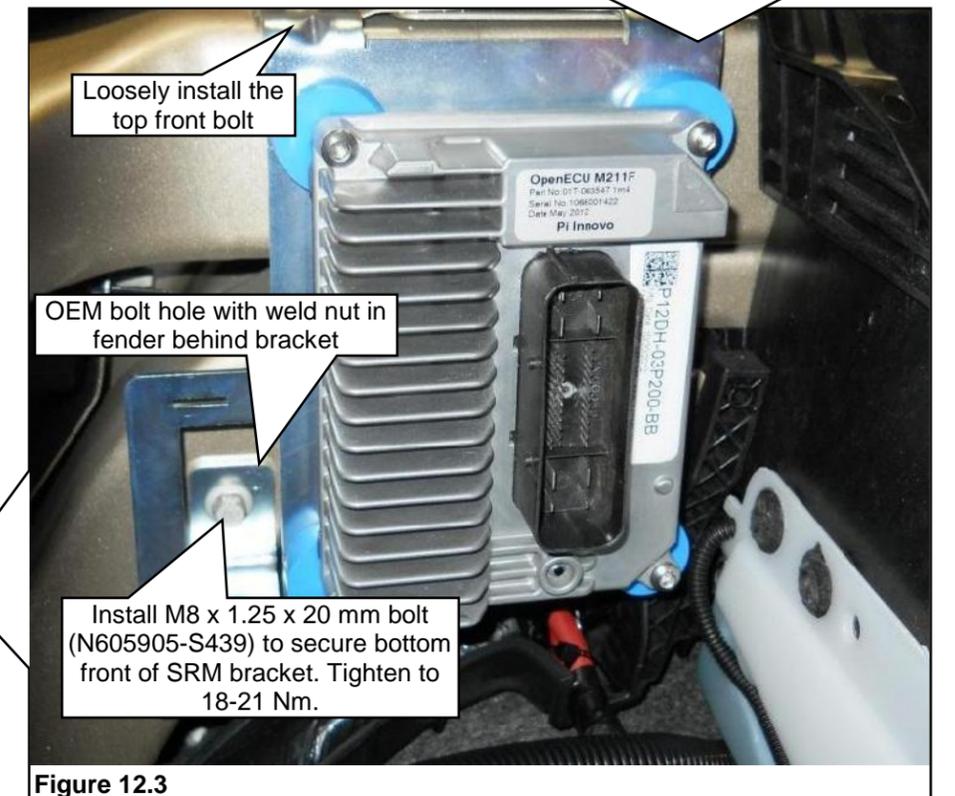
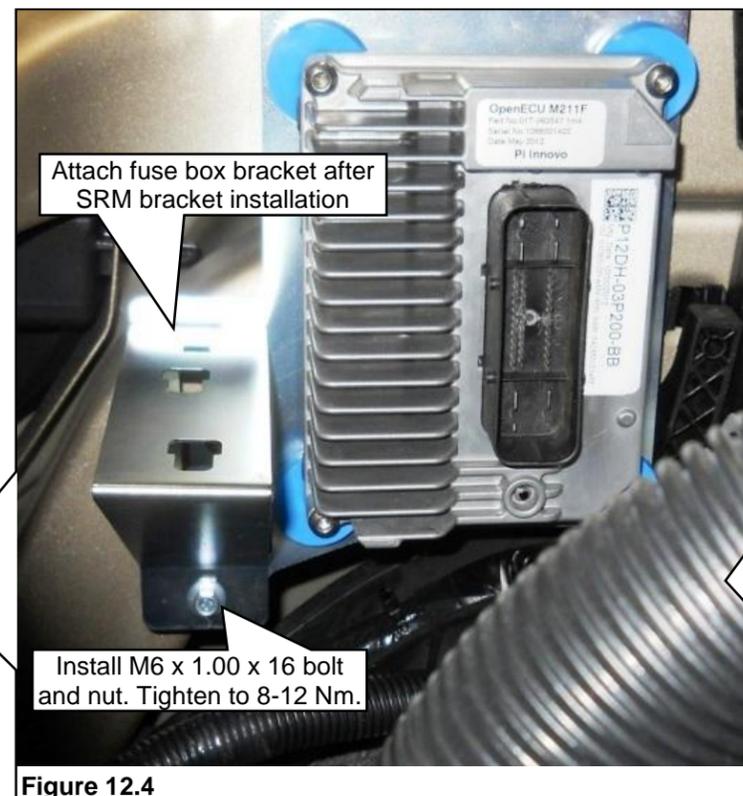
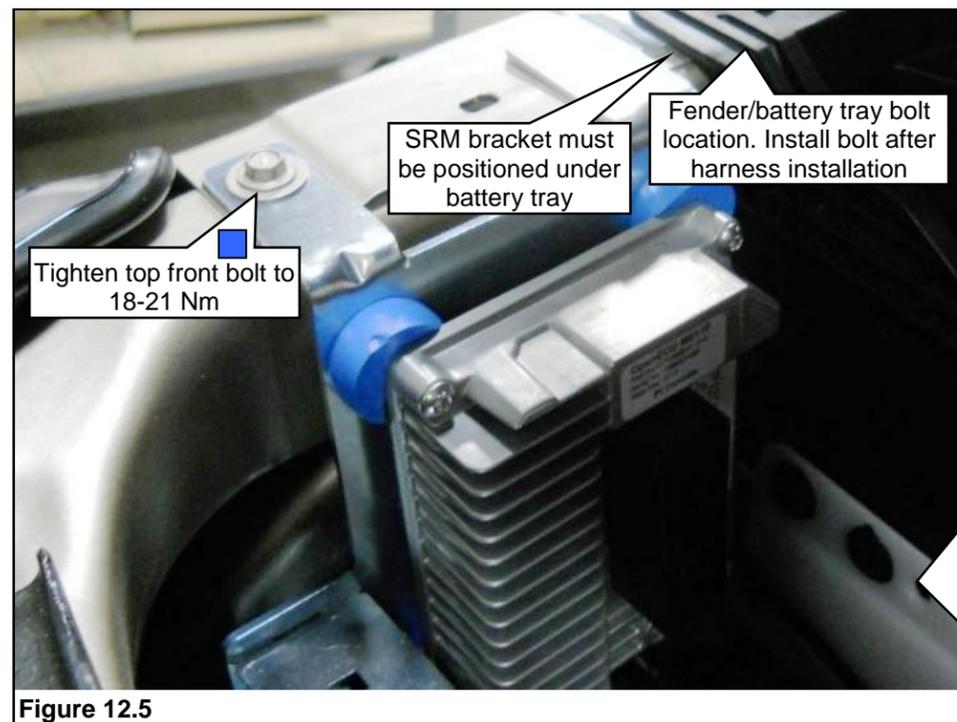
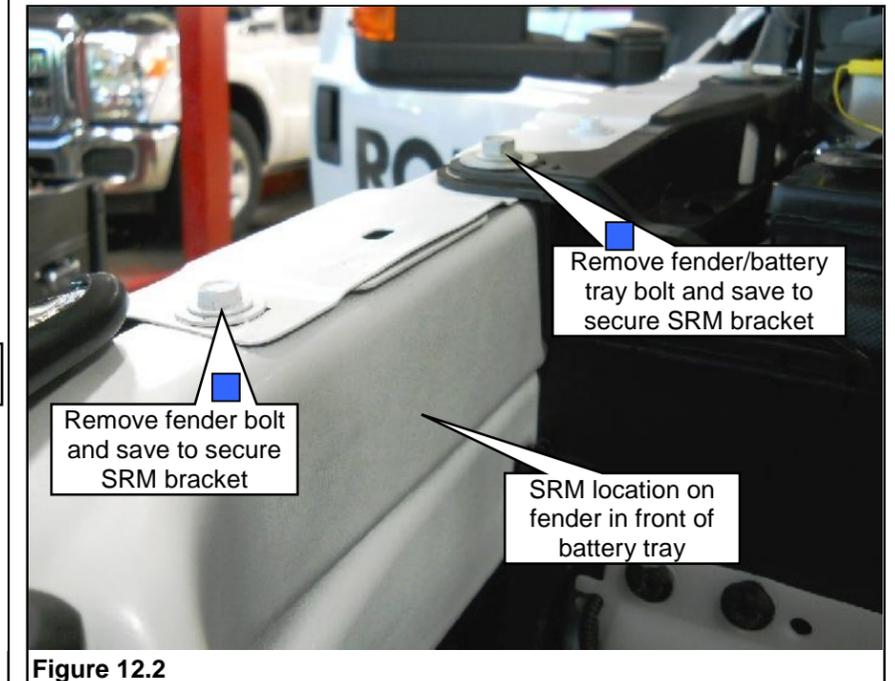
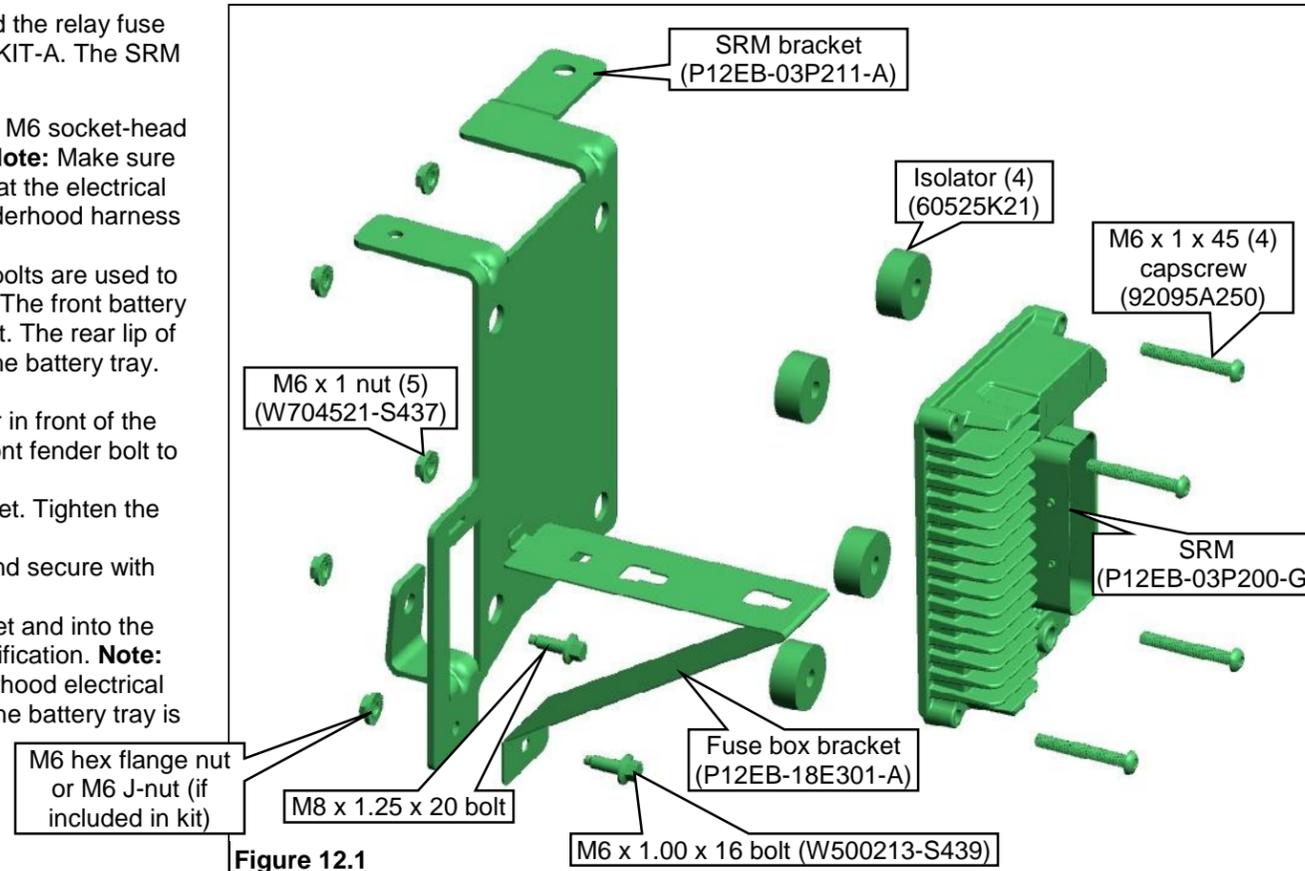
8. Orient and install fuel rail supply line assembly onto rearward ends of fuel rails. Push to connect fittings. Plug the open end of the fuel rail supply fuel line into the FRPCM lower front 3/8" port. **Figure 11.3.**
9. Connect the forward fuel return line into the FRPCM lower rear 1/4" port. **Figure 11.5.**
10. Connect the forward fuel supply line into the FRPCM upper front 3/8" port. **Figure 11.5.** This line may be labeled with a tag indicating **TOP**.
11. Connect the fuel rail fuel return line into the FRPCM upper rear 1/4" port. **Figure 11.6.** This line may be labeled with a tag indicating **TOP**.
12. Connect the vapor canister purge hose assembly to the bleed port on the FRPCM and to the VMV port. **Figure 11.7.**



INSTALLING SMART RELAY MODULE AND RELAY FUSE BOX BRACKET

Note: All parts for installing the smart relay module and the relay fuse box bracket are supplied in hardware kit P12EB-ELECKIT-A. The SRM is supplied in hardware kit P12EB-ENDITEM-A.

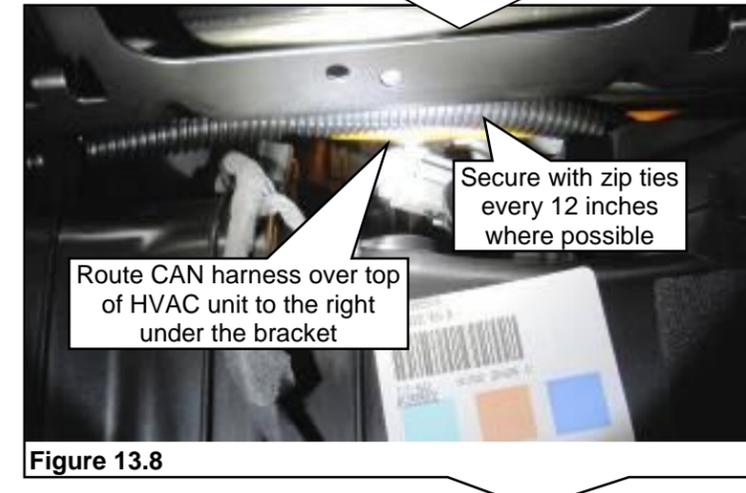
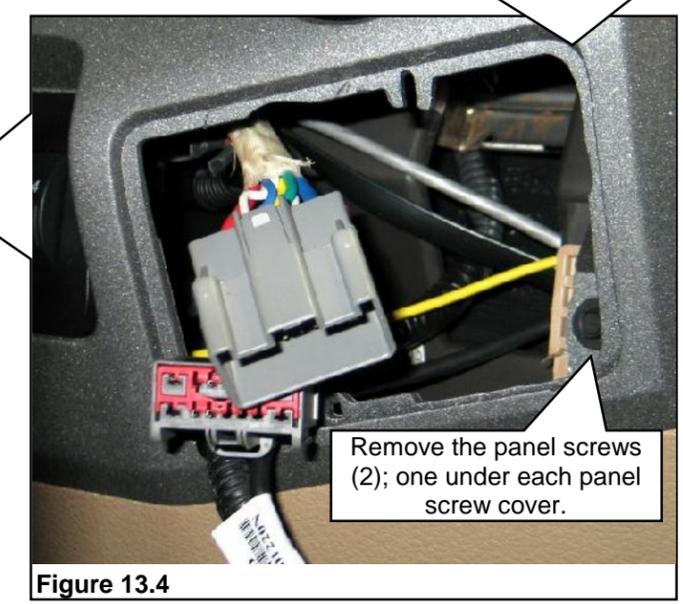
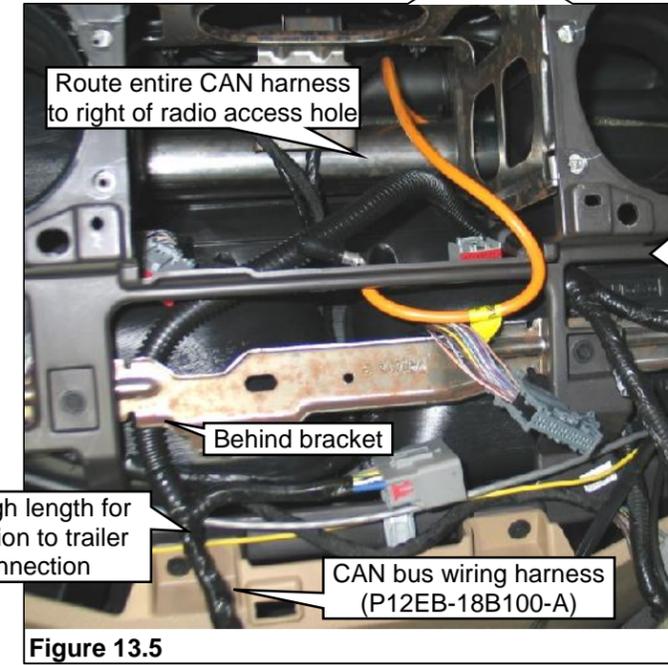
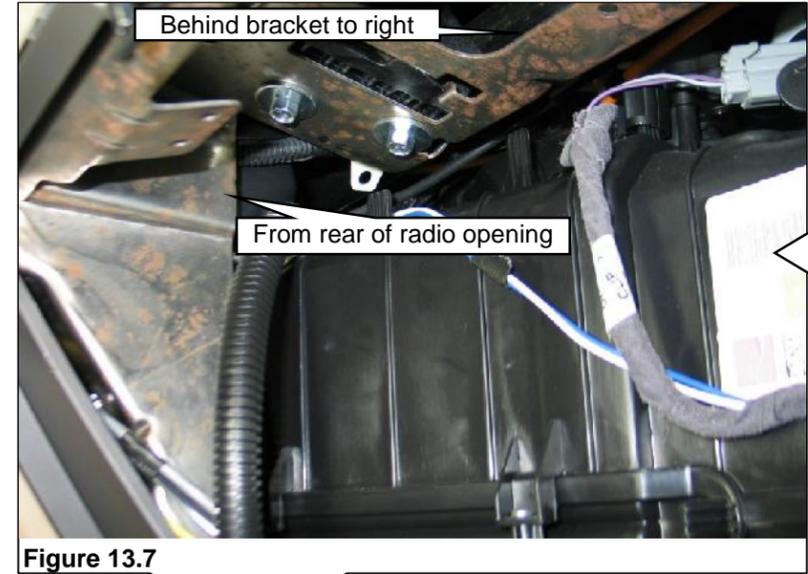
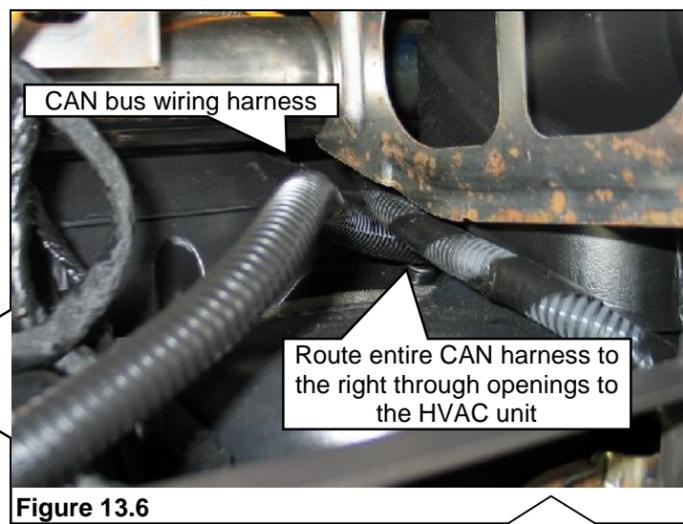
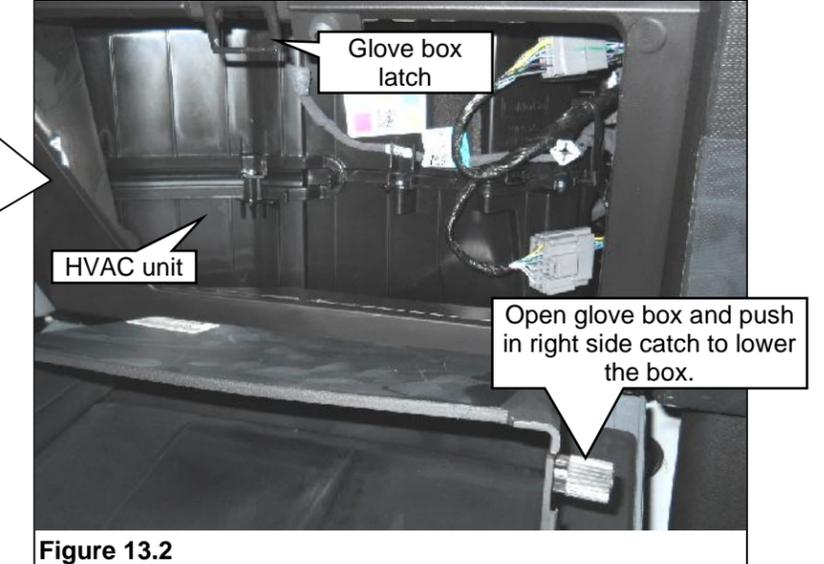
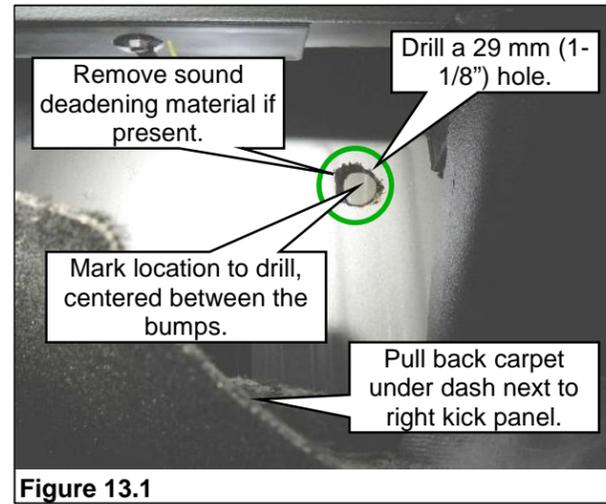
1. Assemble the SRM to the SRM bracket using four M6 socket-head capscrews and four M6 nuts. Tighten until snug. **Note:** Make sure that the SRM is oriented in the SRM bracket so that the electrical connector/harness faces downward for proper underhood harness routing. **Figure 12.1.**
2. Remove the bolts at the top of the fender. These bolts are used to secure the SRM assembly. Save for reuse. **Note:** The front battery tray bolt is used at the top rear of the SRM bracket. The rear lip of the bracket must be placed under the front lip of the battery tray. **Figure 12.2.**
3. Position the SRM bracket on the right inner fender in front of the battery tray, on top of the fender. Install the top front fender bolt to position and stabilize the bracket. **Figure 12.3.**
4. Install one M6 bolt at the bottom front of the bracket. Tighten the bottom front bolt to specification. **Figure 12.3.**
5. Attach the fuse box bracket to the SRM bracket and secure with one M6 bolt and one M6 nut. **Figure 12.4.**
6. Install the upper front bolt through the SRM bracket and into the fender. Tighten the upper front fender bolt to specification. **Note:** Leave the battery tray bolt out until after the underhood electrical harness has been installed. Install the bolt when the battery tray is installed and tighten to 18–21 Nm. **Figure 12.5.**



INSTALLING CAN BUS WIRING HARNESS

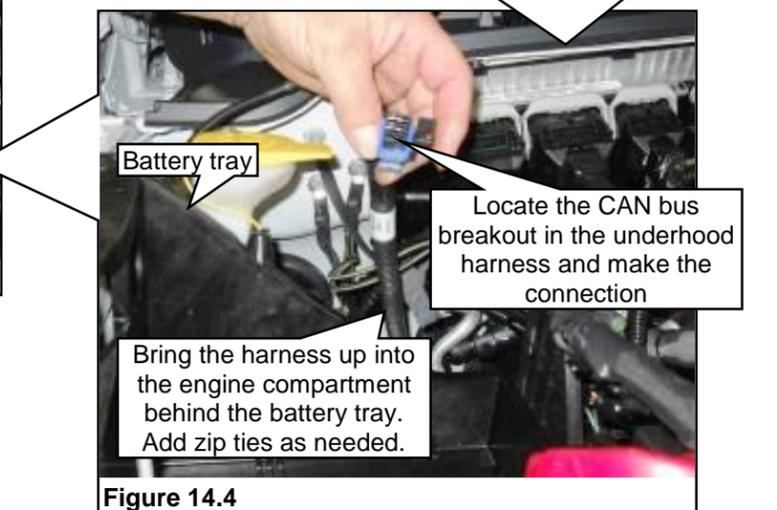
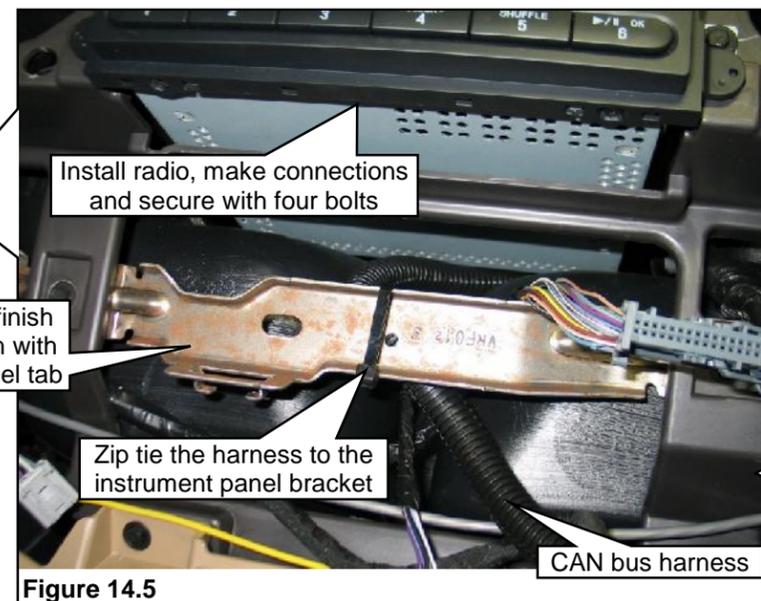
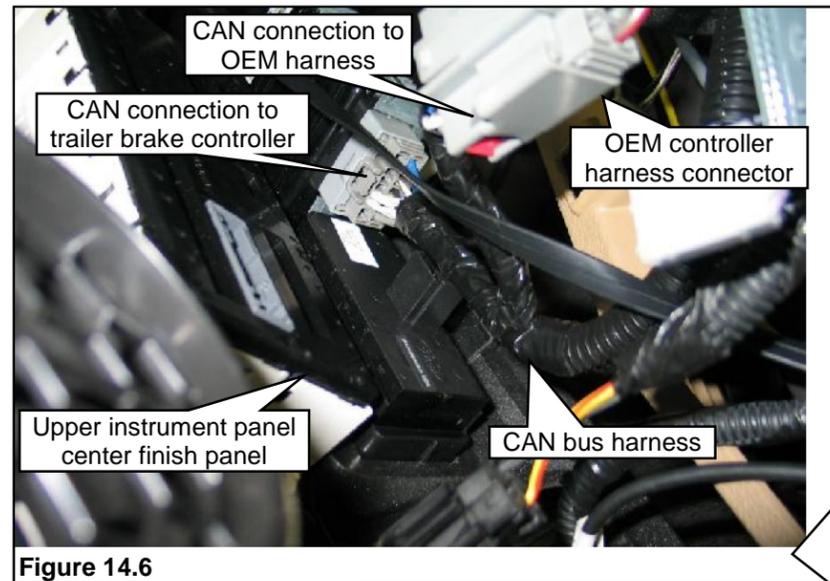
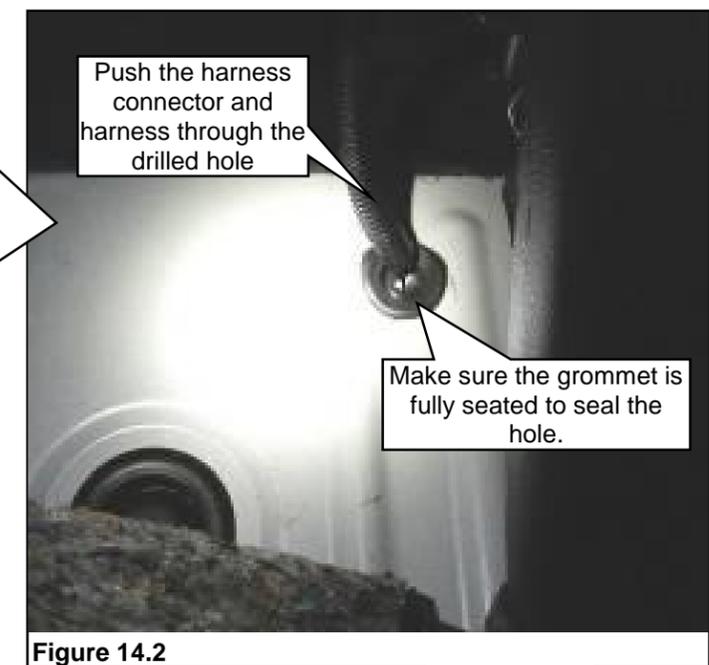
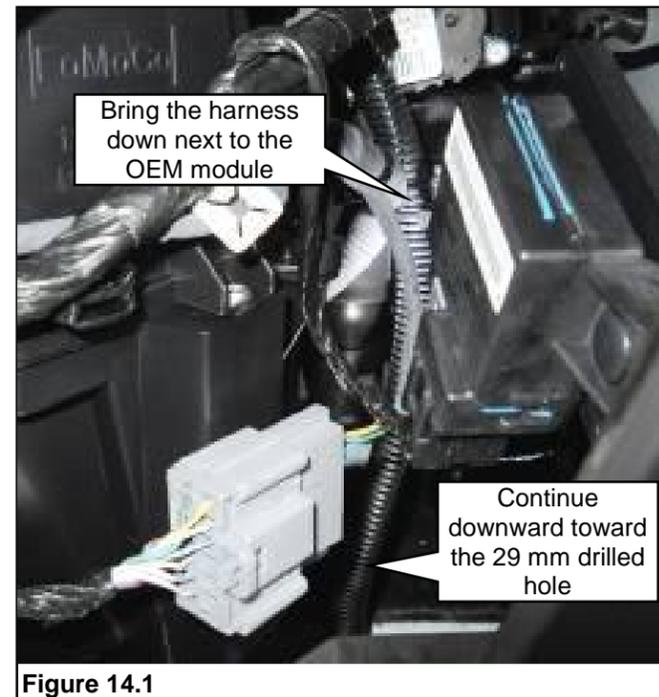
Note: A hole must be drilled so that the controller area network (CAN) bus harness can be routed from the interior into the engine compartment.

1. Pull back the carpet from under the dash next to the right kick panel. Remove the right kick panel if needed. Mark the location (as shown) to drill a 29 mm (1-1/8") hole. **Note:** If equipped, remove any sound deadening material from the location to drill. This material might cause improper seating of the harness grommet. **Figure 13.1.**
2. Drill the hole using a 29 mm (1-1/8") hole saw. **Note:** Use care when drilling to avoid damaging anything behind the panel. The pilot bit of the hole saw should not be extending any more than 13 mm (1/2") beyond the saw teeth. When drilling, push the drill no deeper than what is necessary to cut through the metal panel. **Figure 13.1.**
3. Open the glove box and push in the right side near the catch. Lower the glove box out of the way. **Figure 13.2.**
4. Remove the upper instrument panel center finish panel screw covers (2). **Figure 13.3.** Remove the two panel screws. **Figure 13.4.**
5. Remove the finish panel and remove the radio and radio connections to gain access for CAN bus harness installation and routing. **Figure 13.5.**
6. Feed the CAN bus harness through the finish panel opening, under the lower bracket and to the right rear side of the radio opening. Use any opening to route the CAN connector through. **Figure 13.6.**
7. Route the CAN bus harness from the radio opening onto the top and to the right of the HVAC unit. **Figures 13.7 and 13.8.**



ROUSH CleanTech Liquid Propane Autogas Fuel System: Ford F-450 / F-550 Chassis Cab

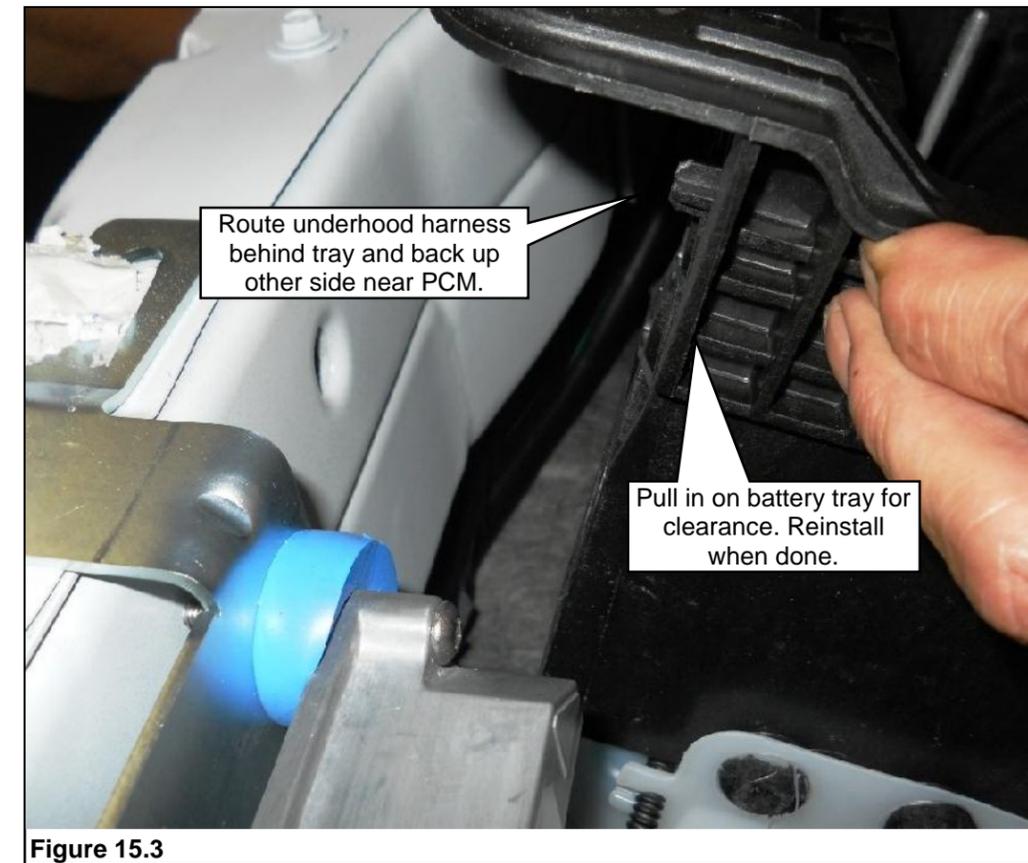
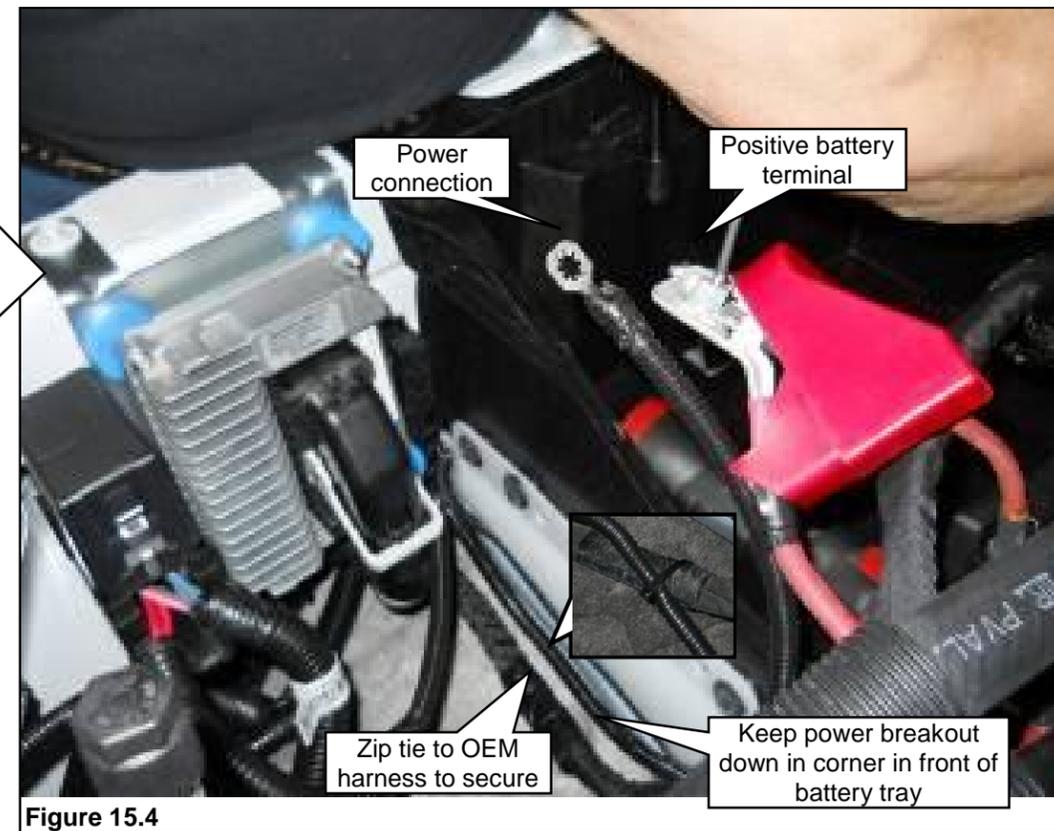
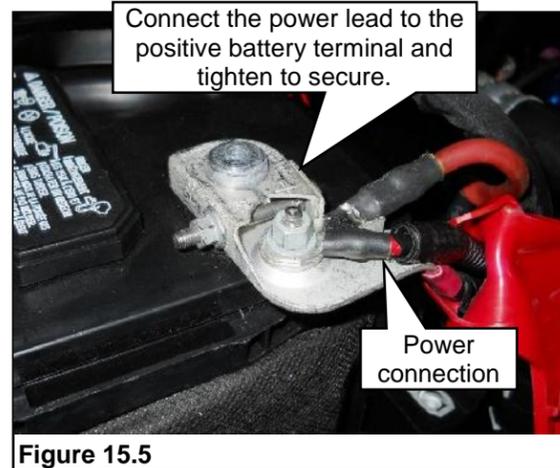
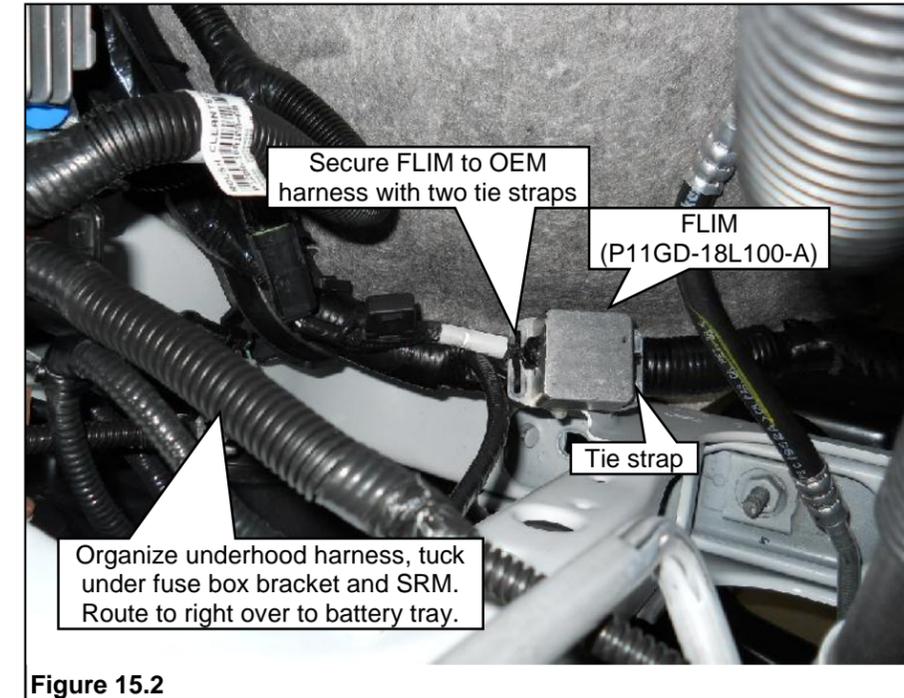
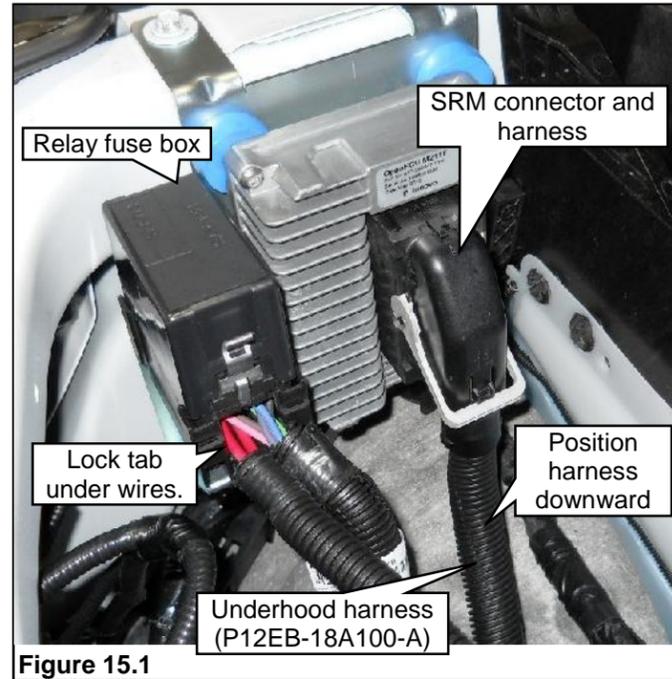
8. Continue down the unit at the right next to the OEM module and down to the 29 mm drilled opening. **Figure 14.1.**
9. Push the underhood harness connector end of the CAN bus harness into the drilled hole. Push the CAN harness through the hole until the grommet is attached and secure. **Figure 14.2.**
10. Have an assistant pull the harness up into the engine compartment until the harness is exposed behind the battery tray. **Figure 14.3.**
11. Locate the CAN bus harness breakout in the underhood harness and make the connection with the CAN bus harness connector. Tuck the harness back into place and secure with zip ties as needed. **Figure 14.4.**
12. Secure the CAN bus harness to the instrument panel bracket using a zip tie. Install the radio, make all radio connections and secure radio with the four bolts. **Figure 14.5.**
13. Position the upper instrument panel center finish panel close to the instrument panel and connect all disconnected electrical connections. Make the connection between the CAN bus harness and the trailer brake controller harness and the controller. **Figure 14.6.**
14. Zip tie the harness along the routing as needed.
15. Install the upper instrument panel center finish panel and the two screws to secure. Install the screw covers. **Figure 14.7.** Lift the glove box into place while pinching the catch area into the panel opening. Close the box.
16. Position the floor carpeting back into place and install the right side kick panel (if removed).



INSTALLING UNDERHOOD WIRING HARNESS

Note: All parts for installing the ROUSH CleanTech underhood harness are supplied in hardware kit P12EB-ELECKIT-A.

1. Drape the underhood harness on the right side of the engine compartment with the fuse box and SRM connector at the right front.
2. Attach the SRM connector to the SRM, push the connector into place until fully seated and close the connector latch securely. **Note:** The SRM connector must be oriented downward for proper harness installation. **Figure 15.1.**
3. Position the fuse box (part of harness) onto the bracket and slide it in until locked in place. Check to make sure that the fuse box tabs are fully seated and that the lock tab is latched. **Figure 15.1.**
4. Plug in the fuel level interface module (FLIM) connector (and in-line fuse) to the underhood harness FLIM connection. Use two zip ties to secure the FLIM to the OEM wiring harness as shown. **Figure 15.2.**
5. Bundle the underhood harness toward the front of the inner fender down in the corner. Tuck the underhood harness under the fuse box bracket and SRM as neatly as possible. **Figure 15.2.**
6. Pull in on the battery tray and route the underhood harness behind the tray and then up the back side of the tray to the right of the PCM. Tuck the harness under the inner fender. **Figure 15.3.**
7. Leave the red battery power harness (breakout from fuse box harness) with electrical eyelet on the front side of the battery tray at the bottom. Connect the power lead to the positive terminal of the battery. Tighten the nut to secure. **Figures 15.4 and 15.5.**



ROUSH CleanTech Liquid Propane Autogas Fuel System: Ford F-450 / F-550 Chassis Cab

Note: It is recommended to route the entire harness and make all connections prior to retaining the harness with zip ties. Retaining the harness with zip ties should be the final step.

8. Attach the two ground connections (breakout from main harness with CAN bus harness connection) to the OEM ground attachments next to the PCM. They are the fuel pump and SRM grounds. Connect the underhood harness ground eyelets to the existing Ford ground location on right side next to the PCM. **Figure 16.1.**
9. Install five cable tie edge clips to the top of the cowl area as shown. Route the underhood harness across the cowl over to the left of the brake booster. Attach the harness to the edge clips. **Figure 16.2.**
10. Route the harness breakout with the integrated pressure temperature sensor (IPTS) connector (on right fuel rail) along the top left of the engine. Attach the breakout harness connector to the sensor. **Figure 16.3.**
11. Route the lower end of the underhood harness with the 6-pin and 2-pin connectors down along the wheel well to the left of the steering column and back toward the left side frame rail. Following the Ford chassis harness. **Note:** Make sure to secure the ROUSH CleanTech underhood harness to keep it away from the steering column and other heated or moving components. **Figure 16.4.**
12. Tighten the cable tie edge clips around the harness to secure the harness. Make sure all connections are routed correctly and attached before tightening. **Figure 16.2.**
13. Reposition the battery tray, install the five bolts and tighten to secure. Install the fender bolt to secure both the top of the battery tray and the rear end of the SRM bracket. Tighten the bolt to 18–21 Nm. **Figure 16.3.**
14. Insert and connect the in-line power pack connector (part of the underhood harness) into the Ford harness. **Figure 16.5.**
15. If the PCM is available and re-attached, connect the three PCM connectors and lock in place. Use a zip tie to secure the harness of the inner PCM connector. Tie the harness to the bracket in place of the OEM push-pin of the harness. **Figure 16.6.**
16. Make the CAN bus harness and the FRPCM harness breakout connections to the underhood harness. **Figure 16.7 and 16.8.**

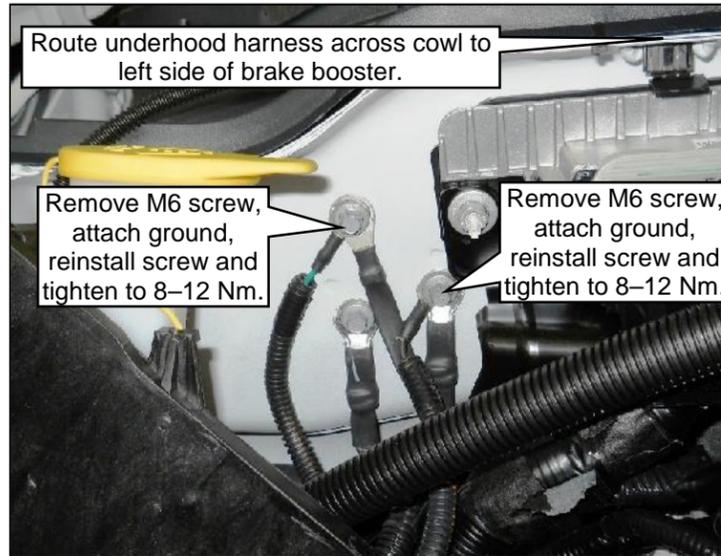


Figure 16.1

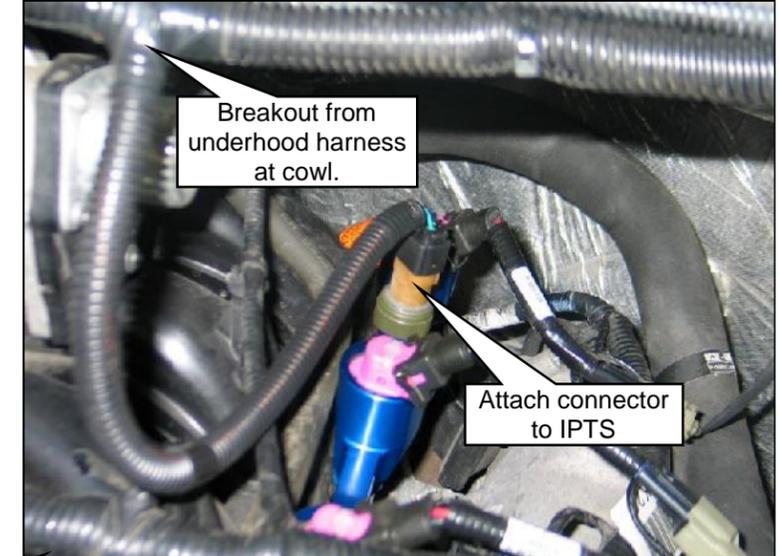


Figure 16.3

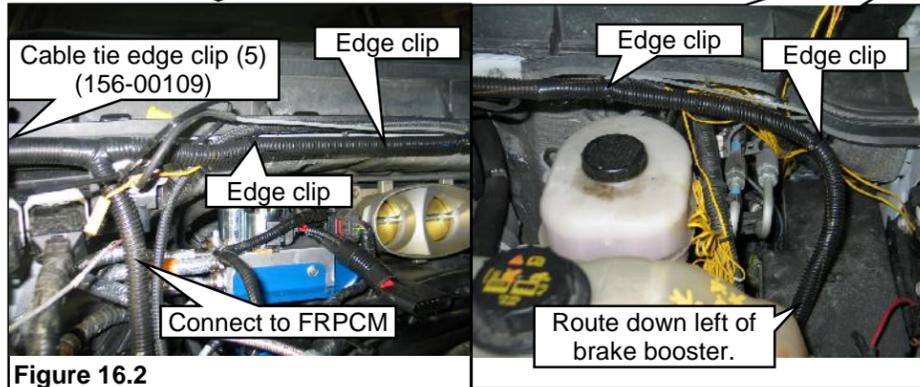


Figure 16.2

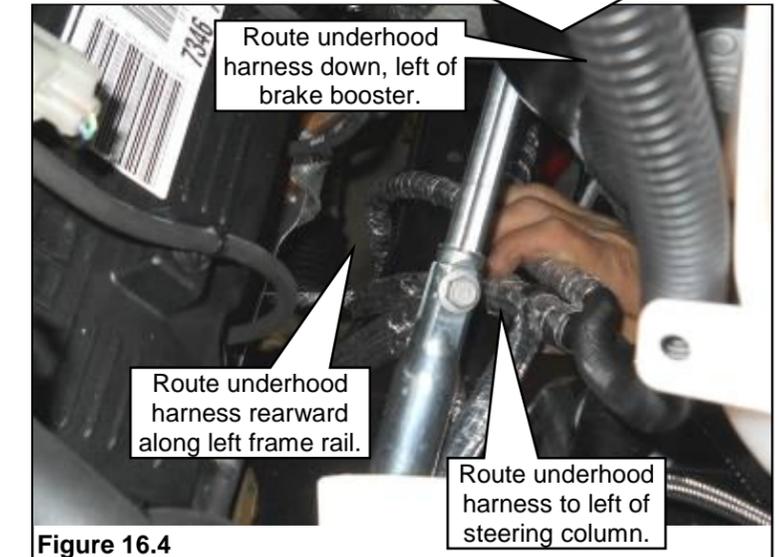


Figure 16.4

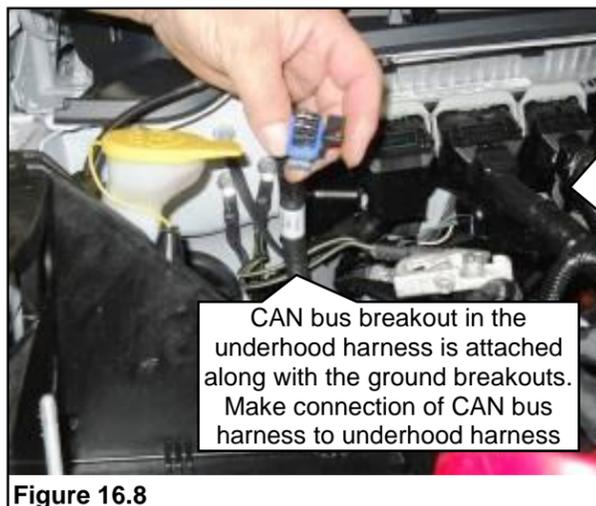


Figure 16.8

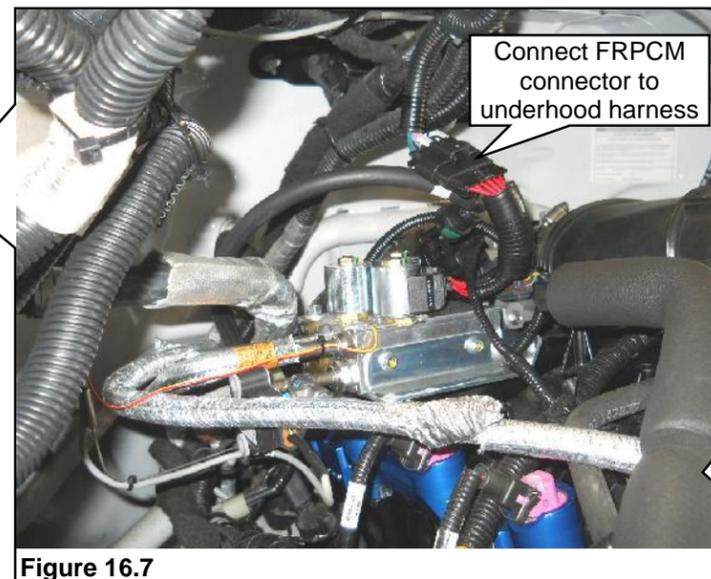


Figure 16.7

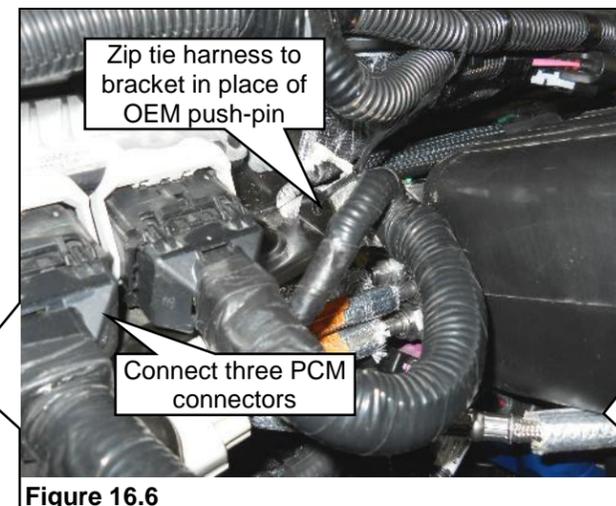


Figure 16.6

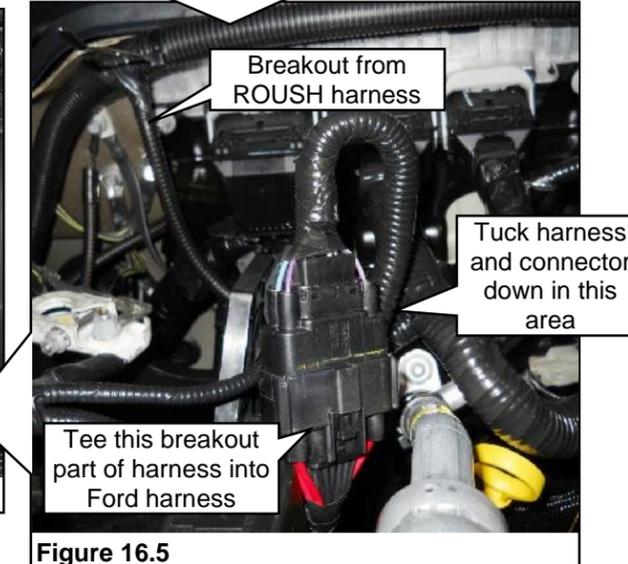


Figure 16.5

PREPARING FOR TANK MOUNTING

Use Measurements to Locate Drilling Locations for Tank Mounting

1. Locate the OEM preexisting holes just to the rear of the cab, one each on the left and right frame rails.
2. Measure from the center of each OEM preexisting hole rearward 20.75" and outward from the inner edge of the frame rails 1.25" to determine the center of the drilling locations for the rear tank mounting fasteners. **Figure 17.1.**
3. Mark the measured locations using a centerpunch or marking gauge.
4. Drill small pilot holes in each of the two locations using a 1/8" drill bit.
5. Using a step bit or gradually increasing bit size, drill the tank rear mounting holes at the left and right frame rails to 1/2" (13 mm).
6. Deburr and coat all bare metal using a premium undercoating. Refer to the *Special Tools* section.

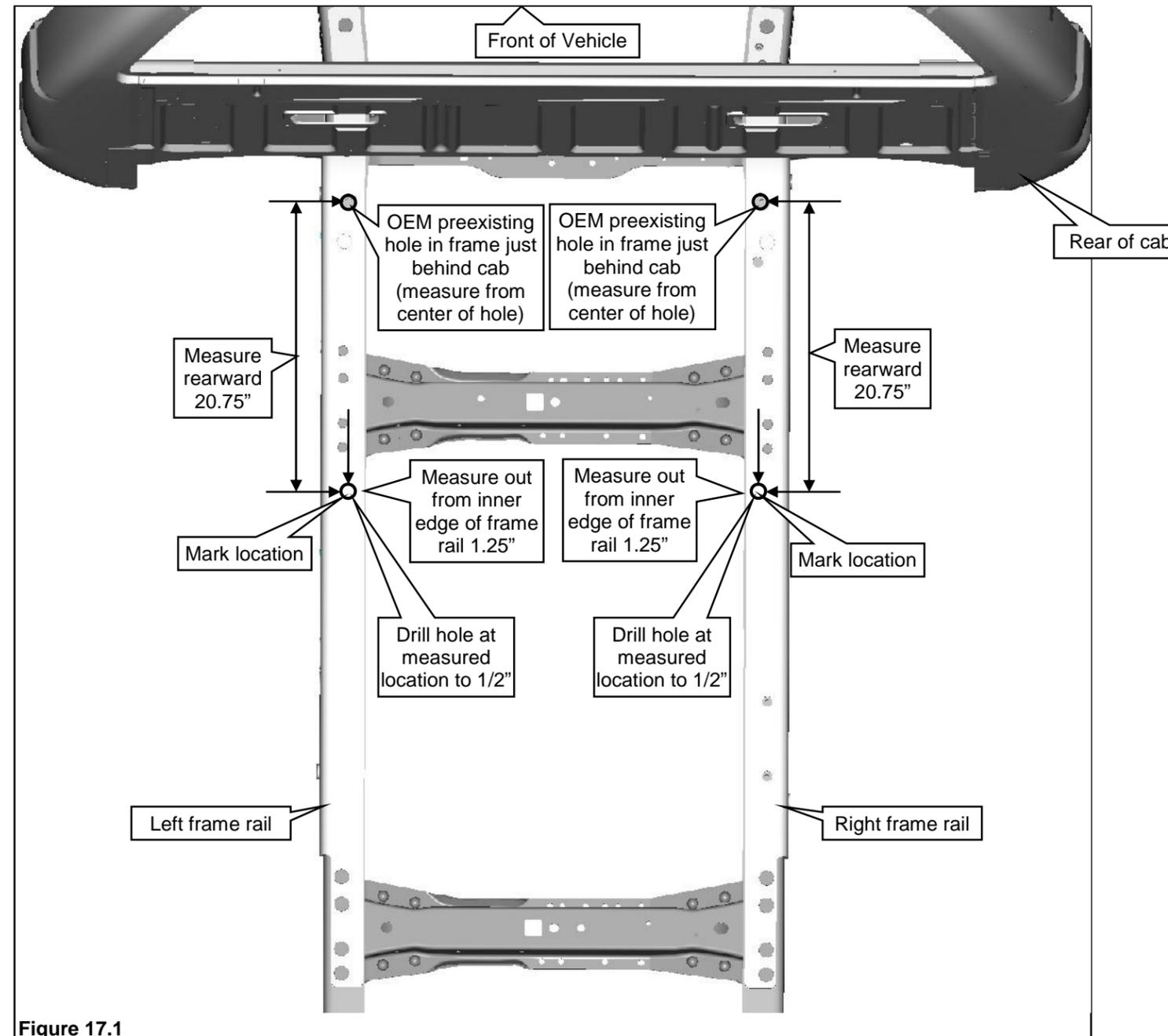
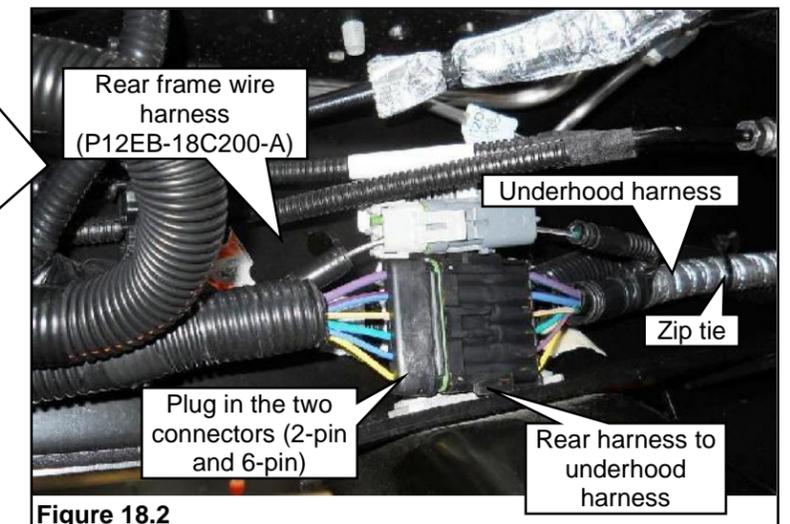
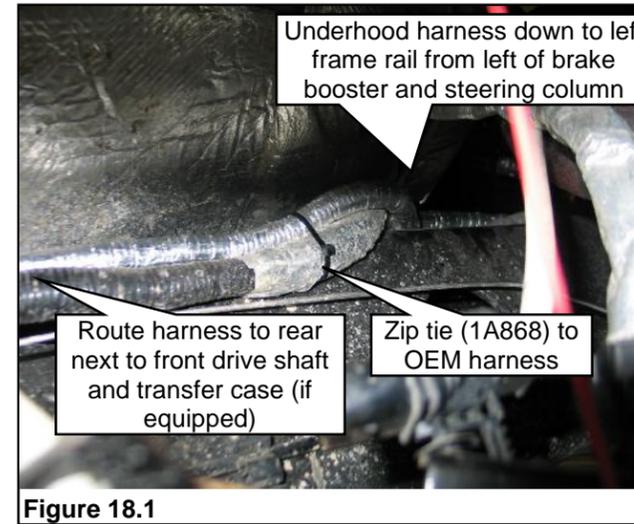


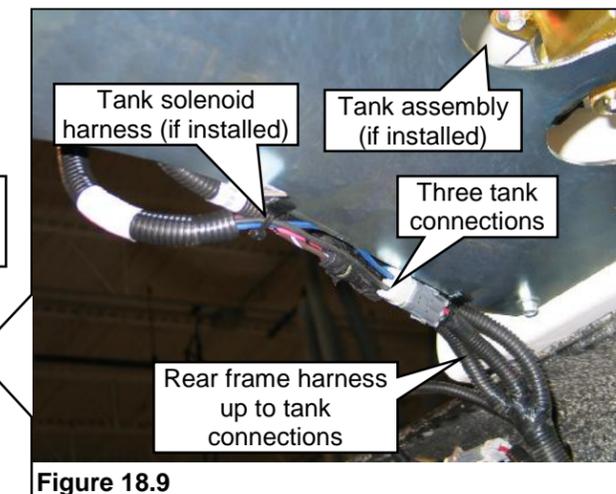
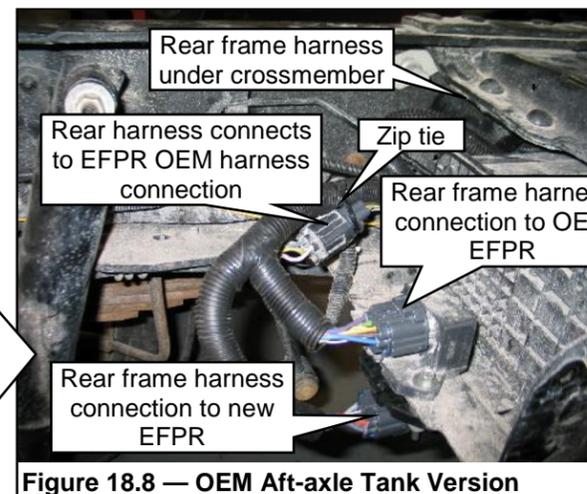
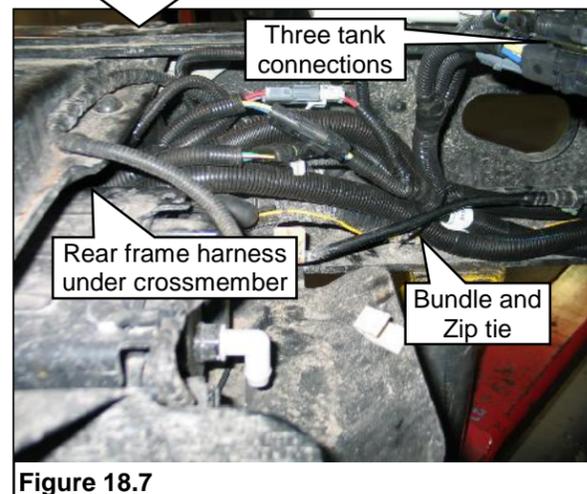
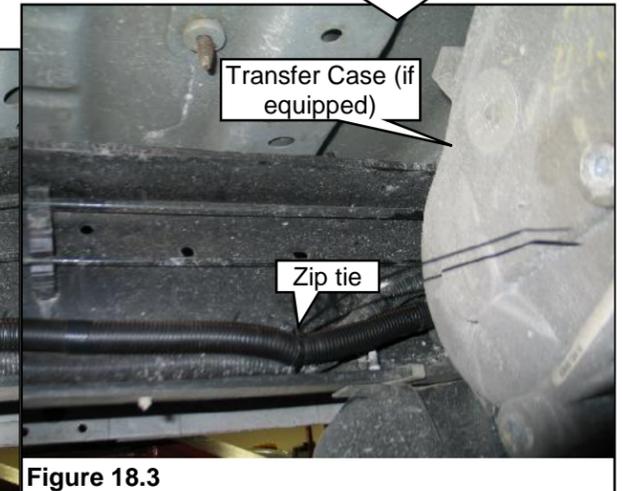
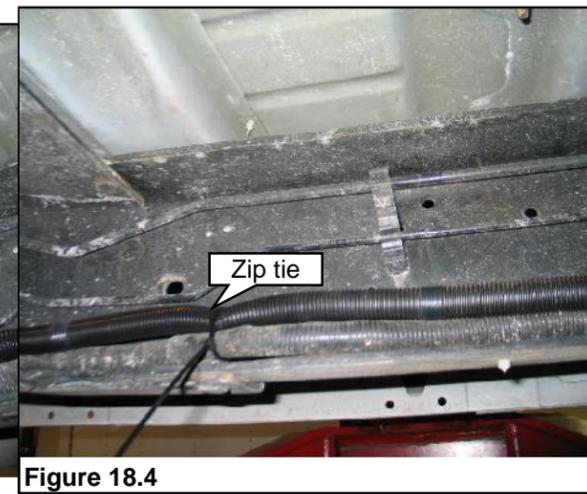
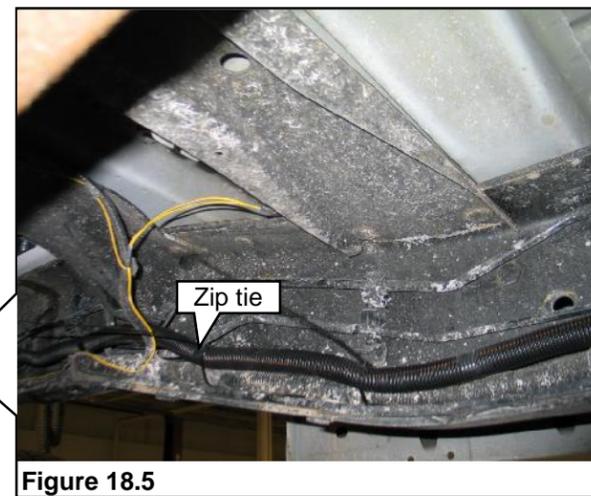
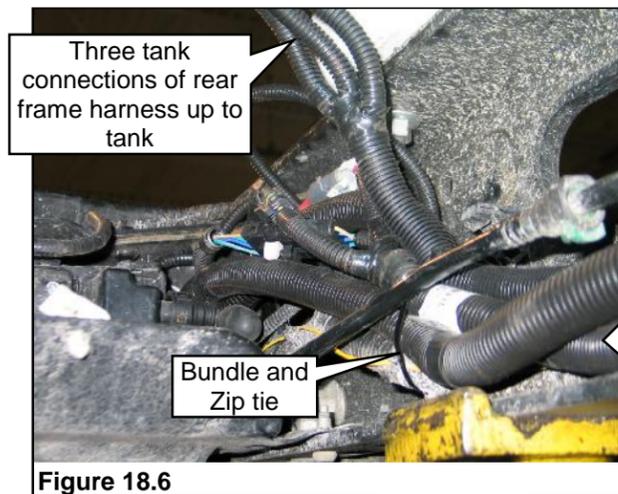
Figure 17.1

INSTALLING NEW REAR WIRING HARNESS

1. Finish routing the bottom end of the underhood harness inside the left frame rail along the OEM vehicle harness toward the rear until the end terminates. **Figure 18.1.**
2. Connect the rear harness to the underhood harness and zip tie to the vehicle harness. **Figure 18.2.** Continue to route the rear frame harness along the OEM vehicle harness and lines to the rear. **Figure 18.2.**
3. Route the rear frame harness along the OEM harness from the end of the underhood harness along the left frame rail. Temporarily drape the harness along the routing so electrical connections can be made. **Note:** Do NOT secure the harness with zip ties until all electrical connections have been made and the harness is routed correctly. **Figures 18.2, 18.3, 18.4, 18.5 and 18.6.**
4. Route the end of the rear frame harness (extension) between the vapor canister bracket and left frame rail and under the crossmember. The rear frame harness connections for the OEM EFPR and the new EFPR are made after the EFPR installation. **Figure 18.8.** Also refer to pages 19 and 20 for EFPR installation. **Figures 19.1–19.4 and Figures 20.1–20.4.**
5. Bundle the rear harness together after all connections have been made. Route the bundling as needed along the OEM vehicle harness to the rear and to itself as needed. Use zip ties to secure. **Note:** The three fuel tank connections are made after the tank is installed. **Figures 18.6 and 18.7.**
6. Route the tank connection breakout of the rear frame harness up to the rear of the tank area. Make these connections after the fuel tank is installed. **Figure 18.9.**



Front of vehicle →



EFPR Location Originally Equipped with Aft-axle Gasoline Tank

7. Disconnect the electrical connector from the OEM EFPR. **Figure 19.1.**
8. Position the EFPR drilling template to the outside of the vapor canister bracket as shown. Mark the two bolt hole locations, as well as the EFPR bracket locator hole and remove the template. **Figure 19.2.**
9. Drill the two marked bolt holes to 5/16" (8mm) and the EFPR locator marked hole to 1/4" (6 mm). **Figure 19.3.**
10. Install the new EFPR to inside of the vapor canister bracket and align with the locator tab and the two bolt holes. Install the two M8 bolts and nuts. Tighten to specification. The new EFPR and fasteners are supplied in hardware kit P12EB-ELECKIT-A. **Figure 19.4.**
11. Connect the rear frame harness ground lead and the fuel tank jumper harness ground lead to the left frame rail using an M6 x 1.0 x 16 bolt and nut. Use the slotted hole as shown in **Figures 19.5, 19.6 and 19.7.** Tighten the ground to 8–12 Nm. **Figure 19.8. Note:** To make sure a good connection to ground is made, remove the paint around the slotted hole and under the ground eyelet location. **Figure 19.7.** Ground bolt and nut are supplied with the kit.

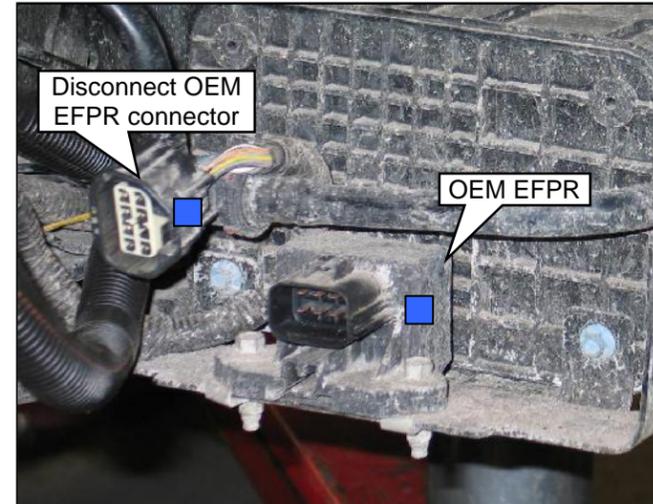


Figure 19.1 — OEM Aft-axle Tank Version

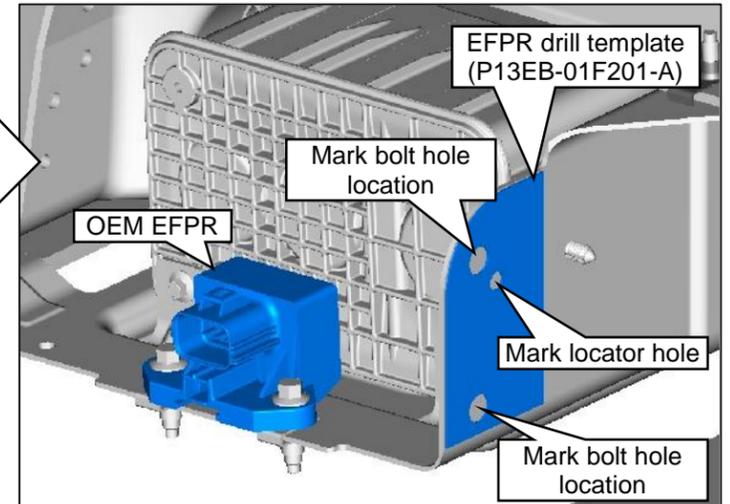


Figure 19.2 — OEM Aft-axle Tank Version

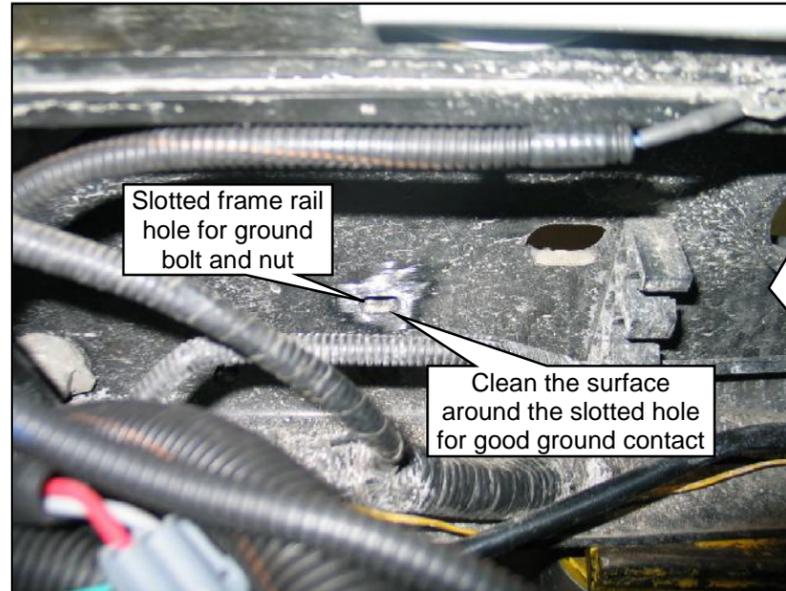


Figure 19.7

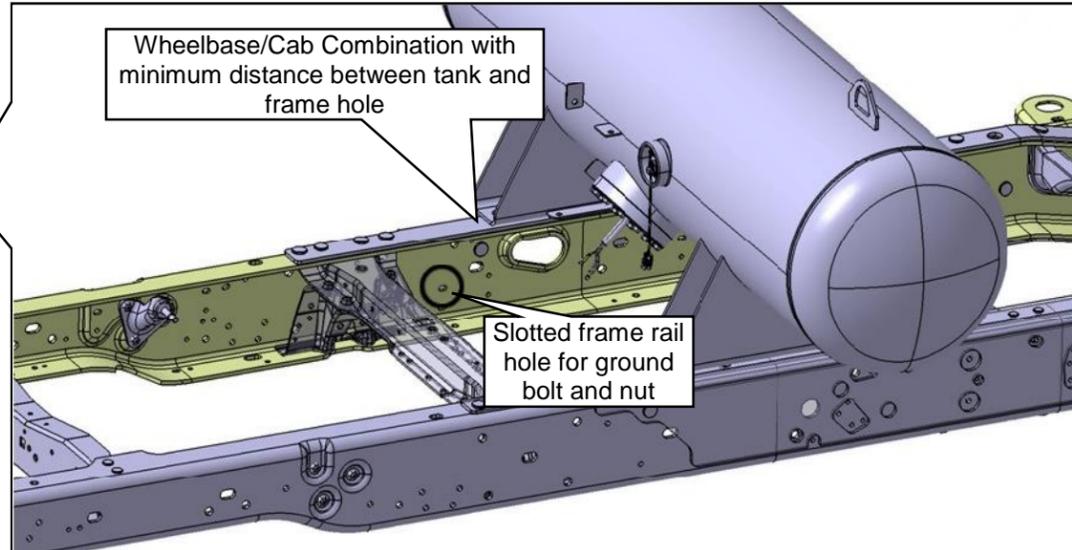


Figure 19.6 — OEM Aft-axle Tank Version

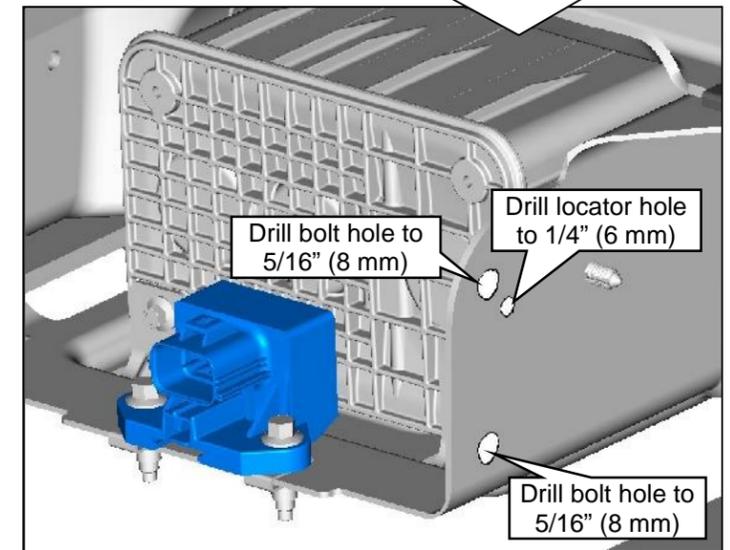


Figure 19.3 — OEM Aft-axle Tank Version

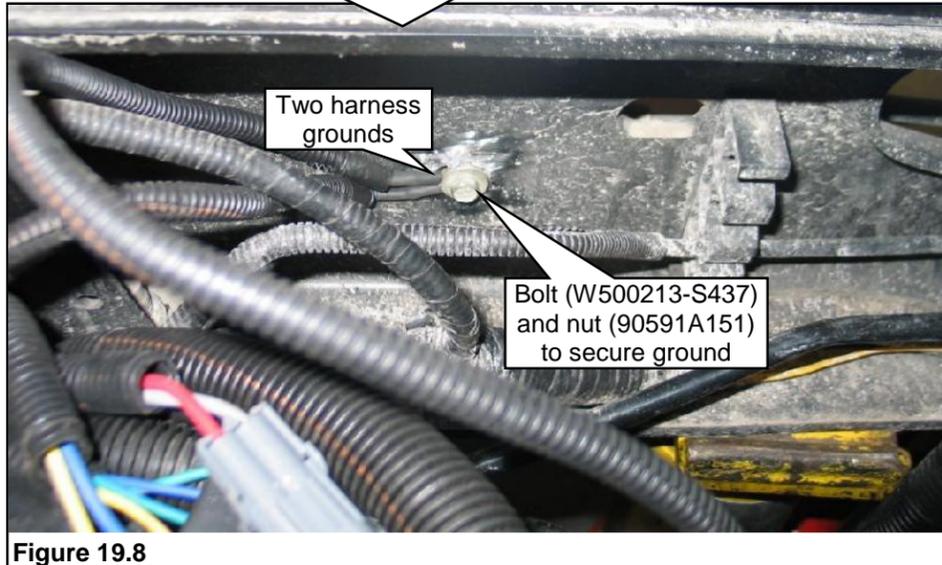


Figure 19.8

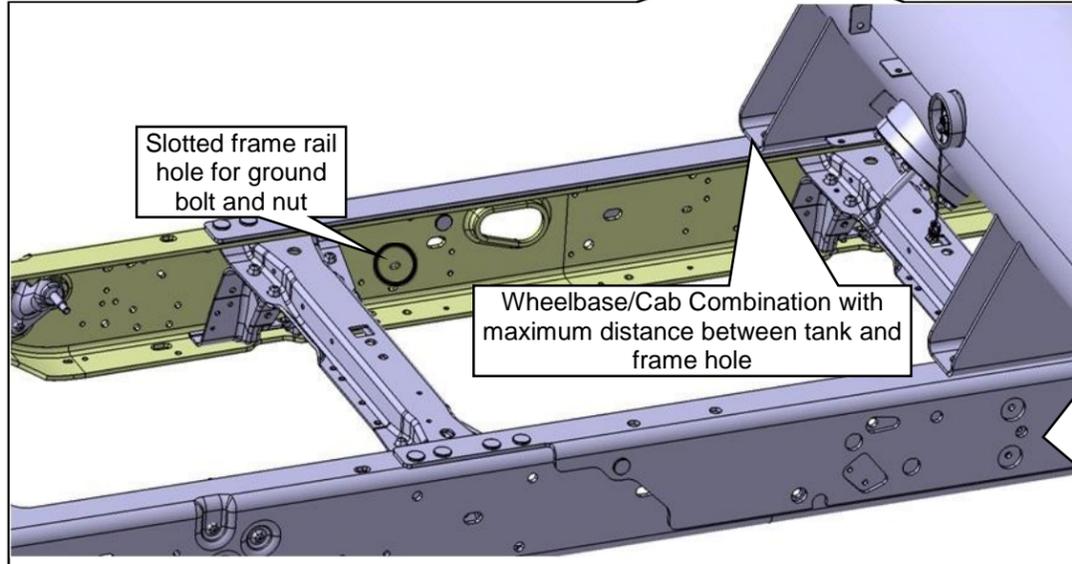


Figure 19.5 — OEM Aft-axle Tank Version

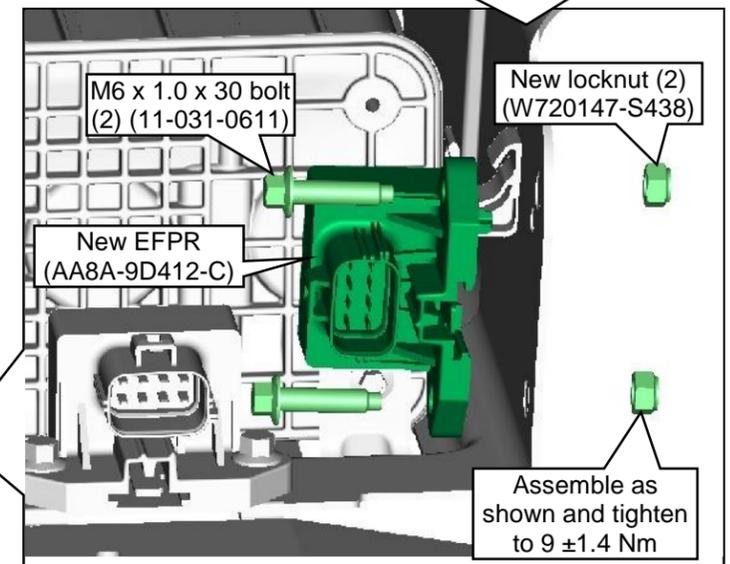


Figure 19.4 — OEM Aft-axle Tank Version

EFPR Location Originally Equipped with Mid-ship Gasoline Tank

12. Disconnect the OEM electrical connector from the OEM EFPR on the left frame rail. Reuse the EFPR (and harness connector) and discard the washer plate bolts and nuts. **Figure 20.1.** The OEM EFPR is to be installed in a new location on the tank heat shield along with the new EFPR. **Note:** Some propane installation kit tank heat shields may not have the EFPR bolt and locator holes. These heat shields must be drilled in the locations shown to accommodate the installation of the two EFPRs. **Figure 20.2.**
13. If holes are not present in the heat shield, use the heat shield EFPR drill template (P13EB-01F201-B) to mark the drilling locations. Drill the six marked holes to 5/16" (8mm). **Figures 20.2 and 20.3.**
14. Install the new and OEM EFPRs to the left underside of the tank heat shield. Align the locator tabs and the two bolt holes per EFPR. Install the new M6 bolts and nuts to secure the EFPRs. Tighten all fasteners to specification. Install the EFPR electrical connectors on the rear frame harness to the EFPRs after the heat shield is installed on the tank.
15. Connect the rear frame harness ground lead and the fuel tank jumper harness ground lead to the left frame rail using an M6 x 1.0 x 16 bolt and nut. Locate a frame rail hole in the area shown in **Figure 20.5** that will accommodate the M6 x 1.0 x 16 bolt and nut. **Note:** To make sure a good connection to ground is made, remove the paint around the located frame rail hole and under the ground eyelet location. Position the grounds to the hole, install the bolt and nut and tighten the ground to 8–12 Nm. **Figure 20.6.** These parts are supplied in hardware kit P12EB-ELECKIT-A.

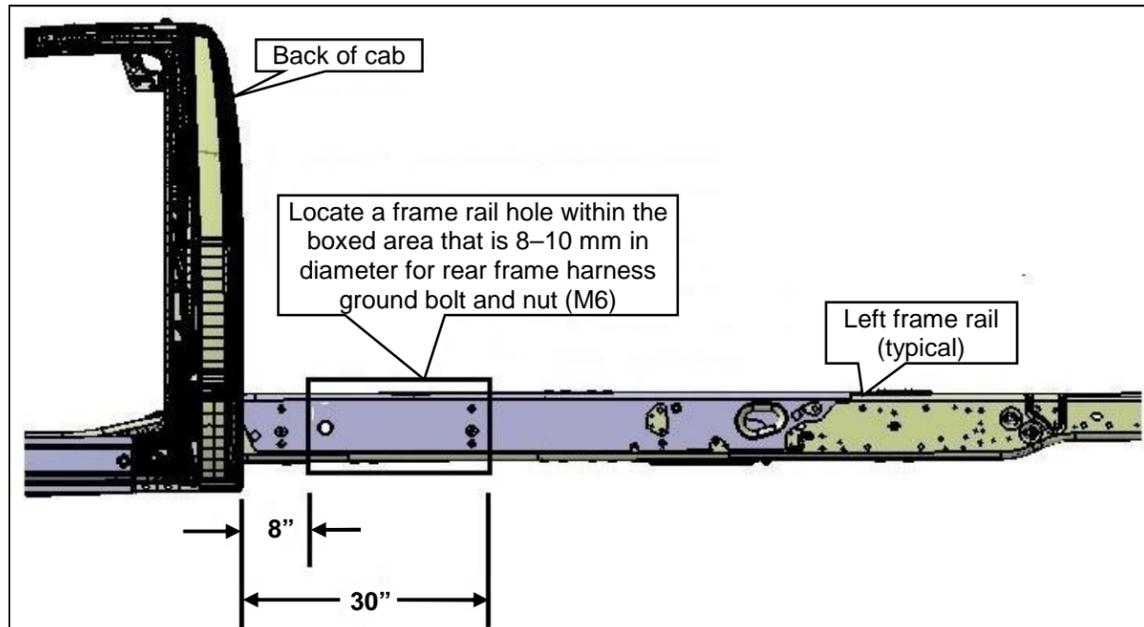


Figure 20.5 — Locate Ground Hole within this Location

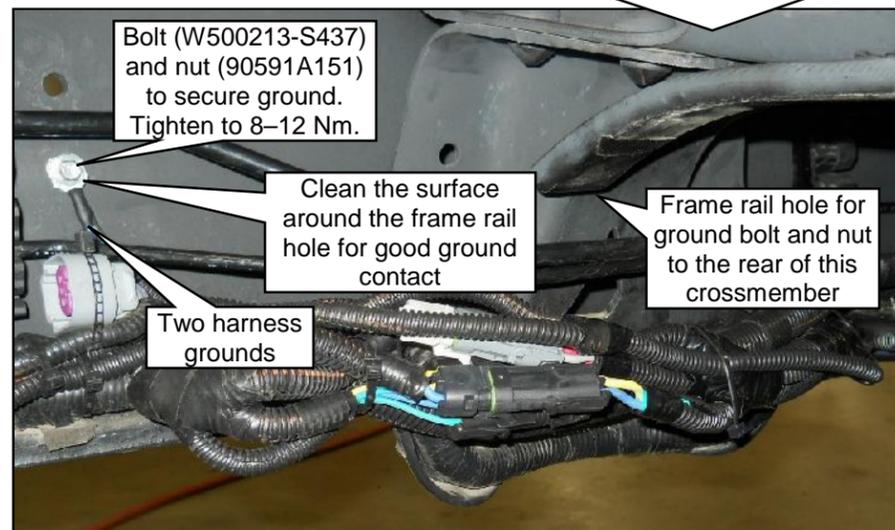


Figure 20.6 — Ground Location

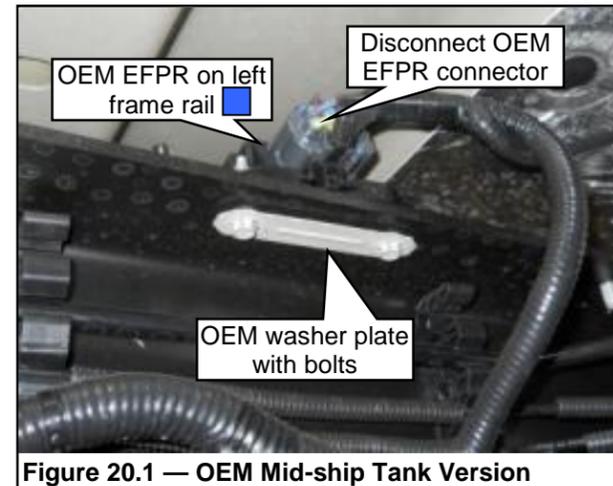


Figure 20.1 — OEM Mid-ship Tank Version

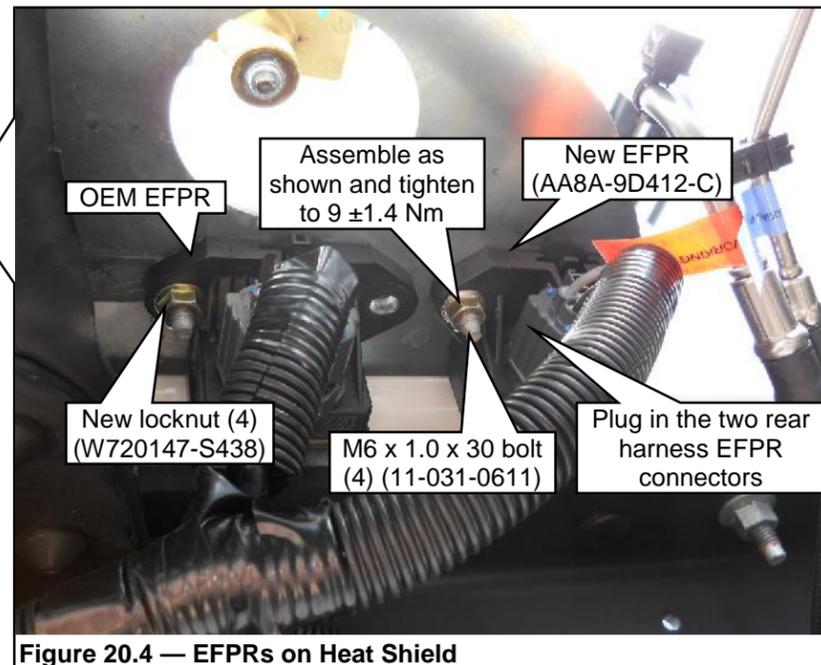


Figure 20.4 — EFPRs on Heat Shield

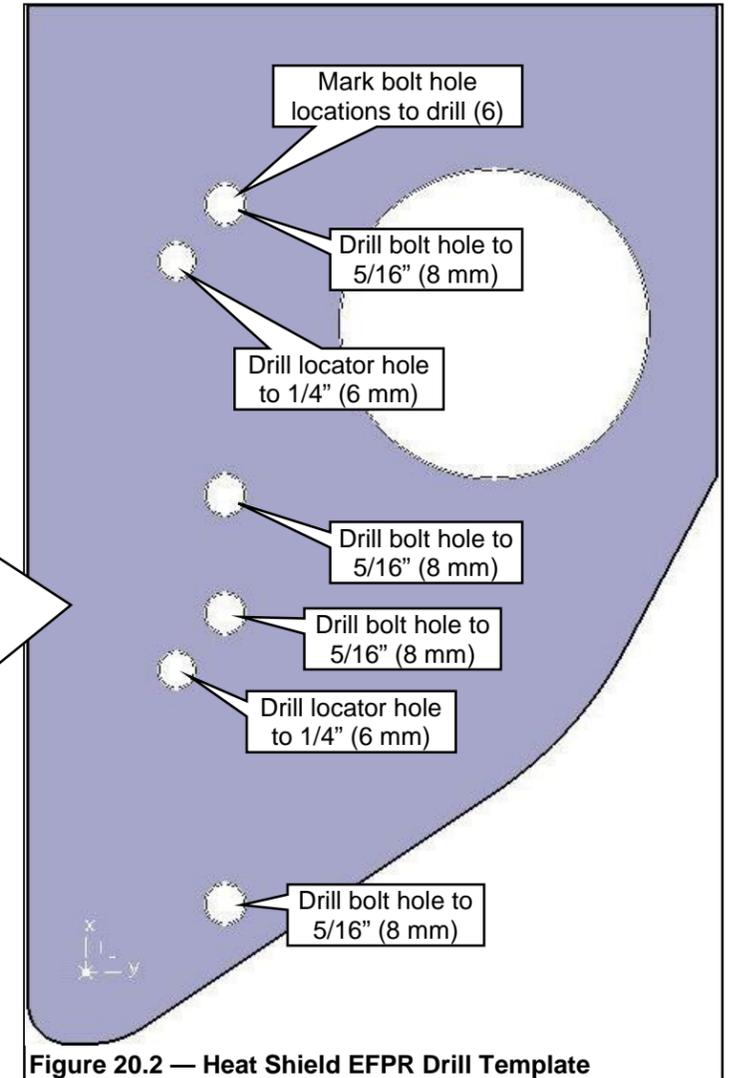


Figure 20.2 — Heat Shield EFPR Drill Template

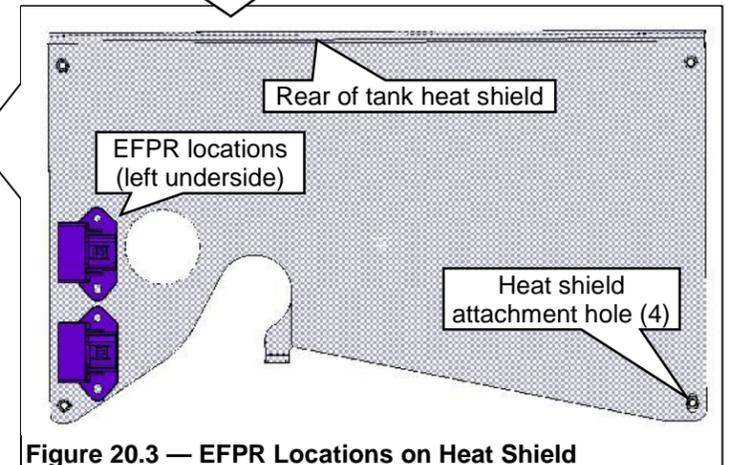


Figure 20.3 — EFPR Locations on Heat Shield

INSTALLING NEW FUEL FILL SYSTEM

1. Remove nut and washer from fuel fill valve and assemble valve to fuel fill bracket. Support fill valve and bracket assembly and tighten nut securely. **Figure 21.1**. These parts are in hardware kit P11GD-FILLKIT-A and P12EB-FILLKIT-A
2. If applicable, install fuel fill valve and fuel fill bracket behind factory fill area using three M5 x 16 mm bolts and washers. Tighten the bolts to 5–7 Nm. **Figure 21.2** and **20.3**.
3. If applicable, install the fuel fill line (P-10D121-C-1700) to the fuel fill valve. **Figure 21.4**. Route the line as necessary, secure the line using cable tie edge clips as needed and attach the line to the fuel filter and tighten to 53–61 Nm after the tank is installed. Refer to *Installing the New Fuel Tank (Aft Cab)* for more information.

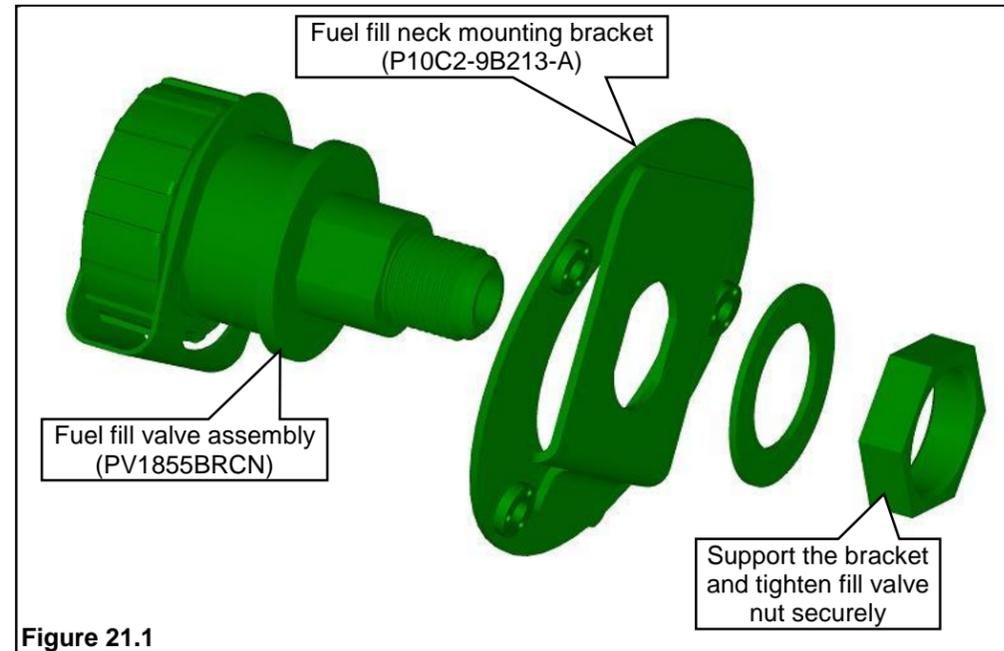


Figure 21.1

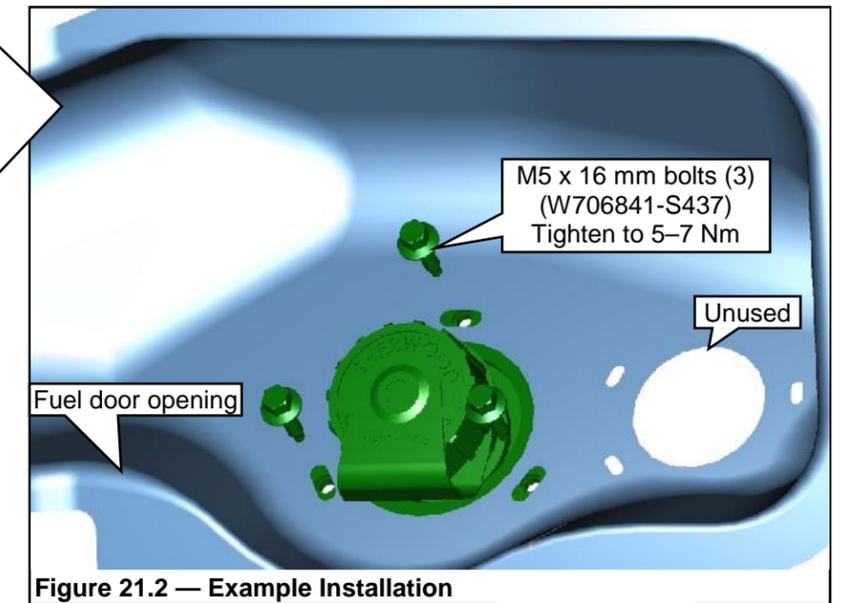


Figure 21.2 — Example Installation

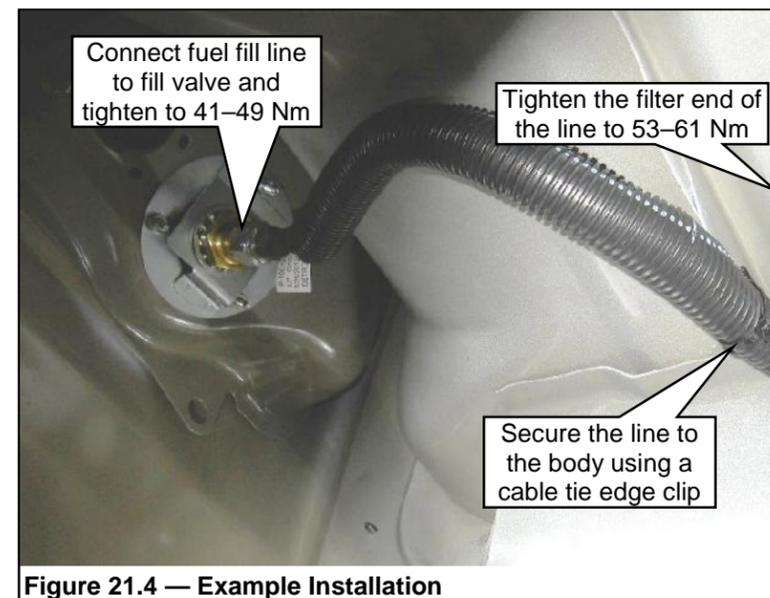


Figure 21.4 — Example Installation

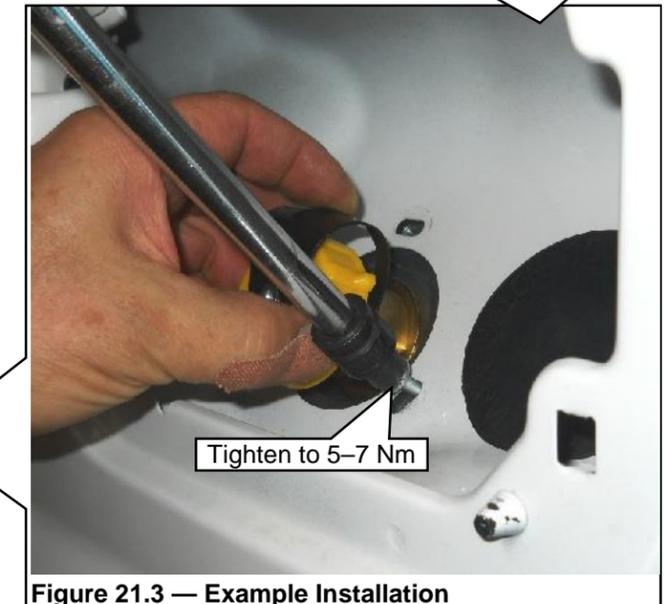


Figure 21.3 — Example Installation

PLUGGING VAPOR CANISTER PORT AND SEALING FTPT CONNECTOR

1. Preassemble quick-connect fitting and vacuum cap found in hardware kit P12EB-VAPOR-A. **Figure 22.1.**
2. Install assembly onto vapor canister top front port or upper rear port. **Figures 22.2 and 22.3.**
Note: OEM gasoline tanks can be either aft-axle or mid-ship configurations. The vapor canister location differs based on which OEM gasoline tank the vehicle had. Both versions require the installation of the quick-connect fitting with vacuum cap.
3. The rear frame harness includes a connector lead for a fuel temperature pressure transducer (FTPT). This lead is not used on F-450/F-550 Liquid Propane Autogas vehicles and requires connector end be sealed and secured. **Figure 22.4.**
 - Pack connector terminals with Ford dielectric grease, or equivalent.
 - Seal open end of connector with electrical tape.
 - Use zip ties to secure rear wiring harness and FTPT connector to Ford vehicle harness.

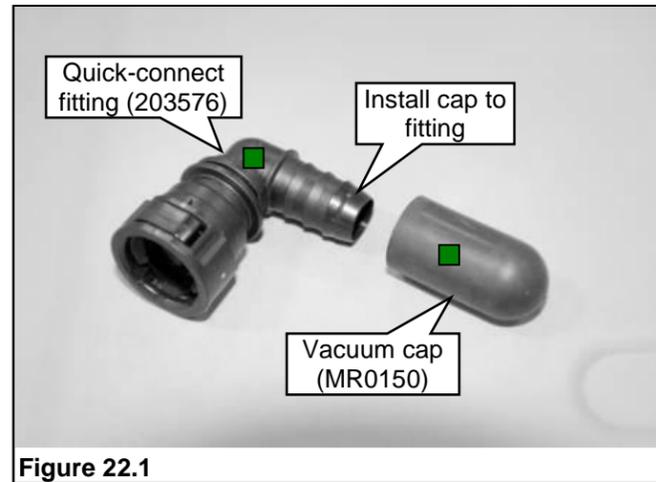


Figure 22.1

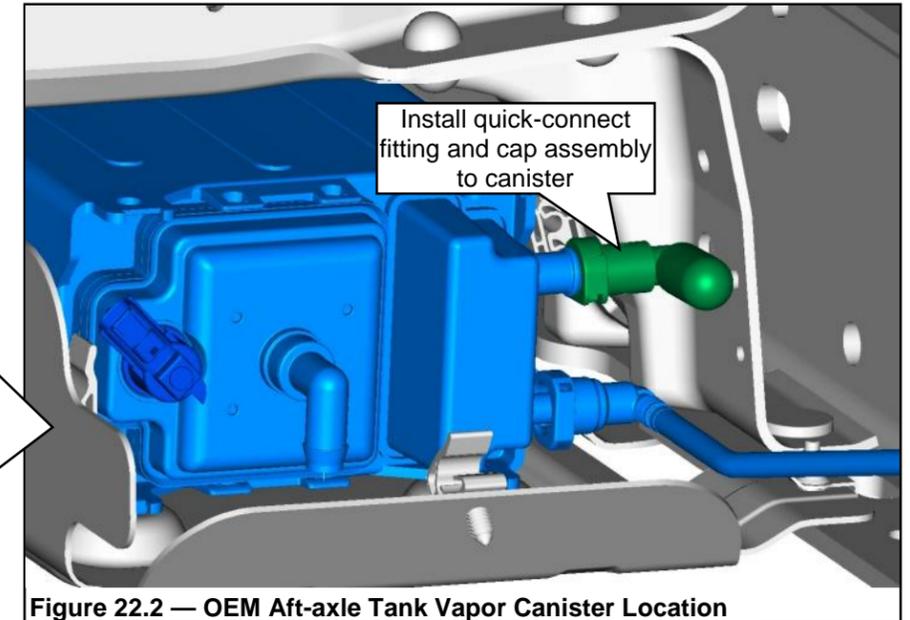


Figure 22.2 — OEM Aft-axle Tank Vapor Canister Location

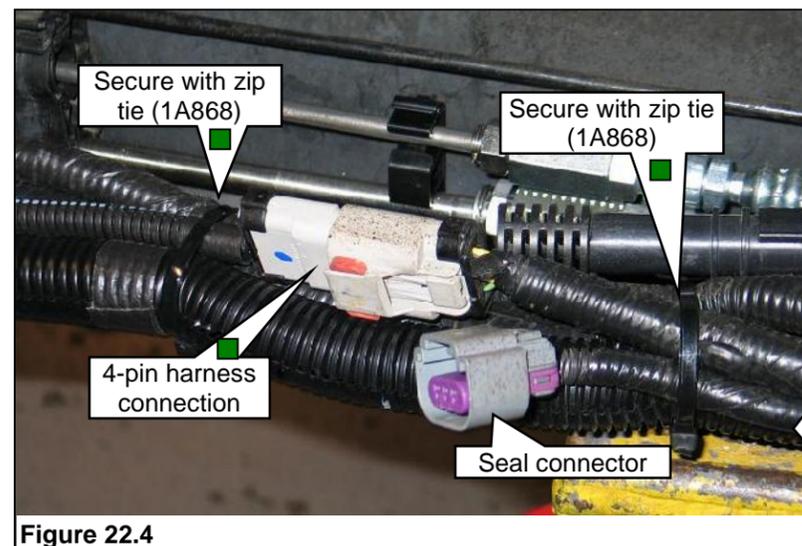


Figure 22.4

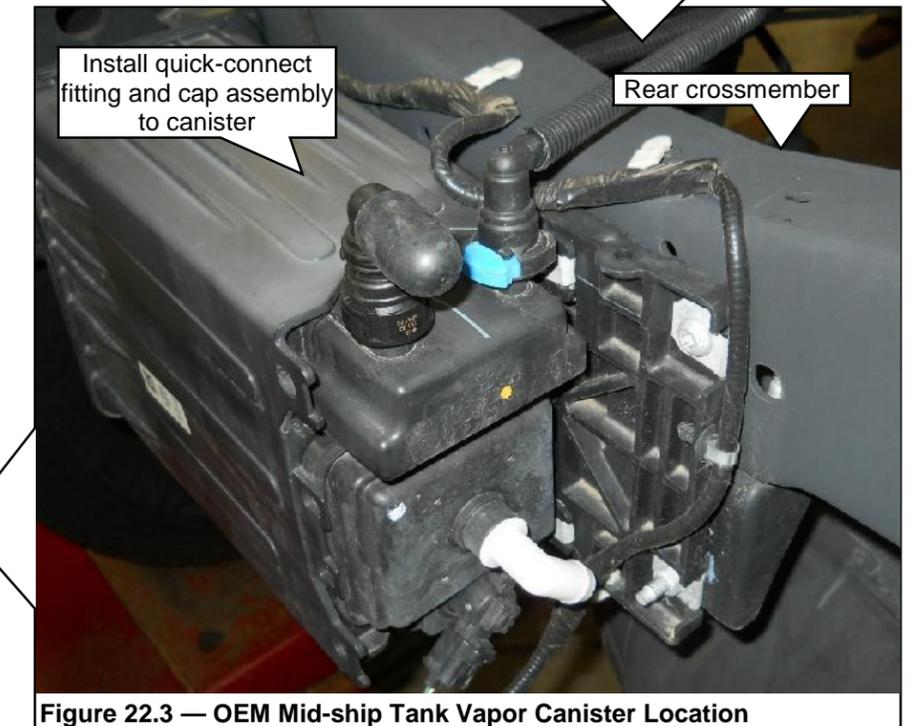


Figure 22.3 — OEM Mid-ship Tank Vapor Canister Location

INSTALLING THE NEW FUEL TANK (AFT CAB)

- Using a suitable lifting device, attach the tank lift brackets to the hoist. Make sure the tank is centered and hangs horizontal to the frame.

Note: The tank mounting hardware (**Figure 23.1**) is the same for the two mounting holes of each bracket. The mounting hardware is found in hardware kit P12EB-TANK-B.

- Install the M12 x 1.75 x 65 mm bolts with upper washers and upper isolators onto the tank mounting brackets with bolts through the holes. Install the crushlimiters and lower isolators under the tank mounting bracket where the bolts protrude. **Note:** The lower isolators and crushlimiters can be installed when the tank is close to the frame rails to prevent them from falling. **Figure 23.1.**
- Position the fuel tank over the left and right frame rails. Align the four mounting holes in the tank brackets with the mounting holes in the frame rails. **Figure 23.1.**
- Carefully lower the tank onto the frame rails. Before the tank is fully seated, lift the bolts slightly and slip the lower washers (and crushlimiters and lower isolators) between the brackets and frame rails. Lower the bolts to trap the crushlimiters, lower isolators and lower washers. Slowly lower the tank assembly onto the frame rails until the tank (and hardware) is aligned and seated. Making sure the tank is firmly seated and that all components are correctly aligned. **Figure 23.1.**
- From under the bed, install the four M12 x 1.75 mounting nuts, one each onto the M12 bolts. Thread the nuts onto the bolts hand tight. Tighten the fasteners to specification. **Figure 23.1.**
- From underneath or as needed, install four M8 U-nuts (J-clips), one each at the four heat shield mounting holes at the inner edge of the tank mounting brackets. **Figure 23.2.**
- Position the heat shield under the inner flange of the tank mounting brackets against the M8 U-nuts. Install the four M8 mm bolts to secure the heat shield to the tank mounting brackets. **Figure 23.3.**
- Connect the rear frame harness EFPR electrical connectors to the OEM harness and the two EFPRs located on the left underside of the heat shield. **Figure 23.4.**

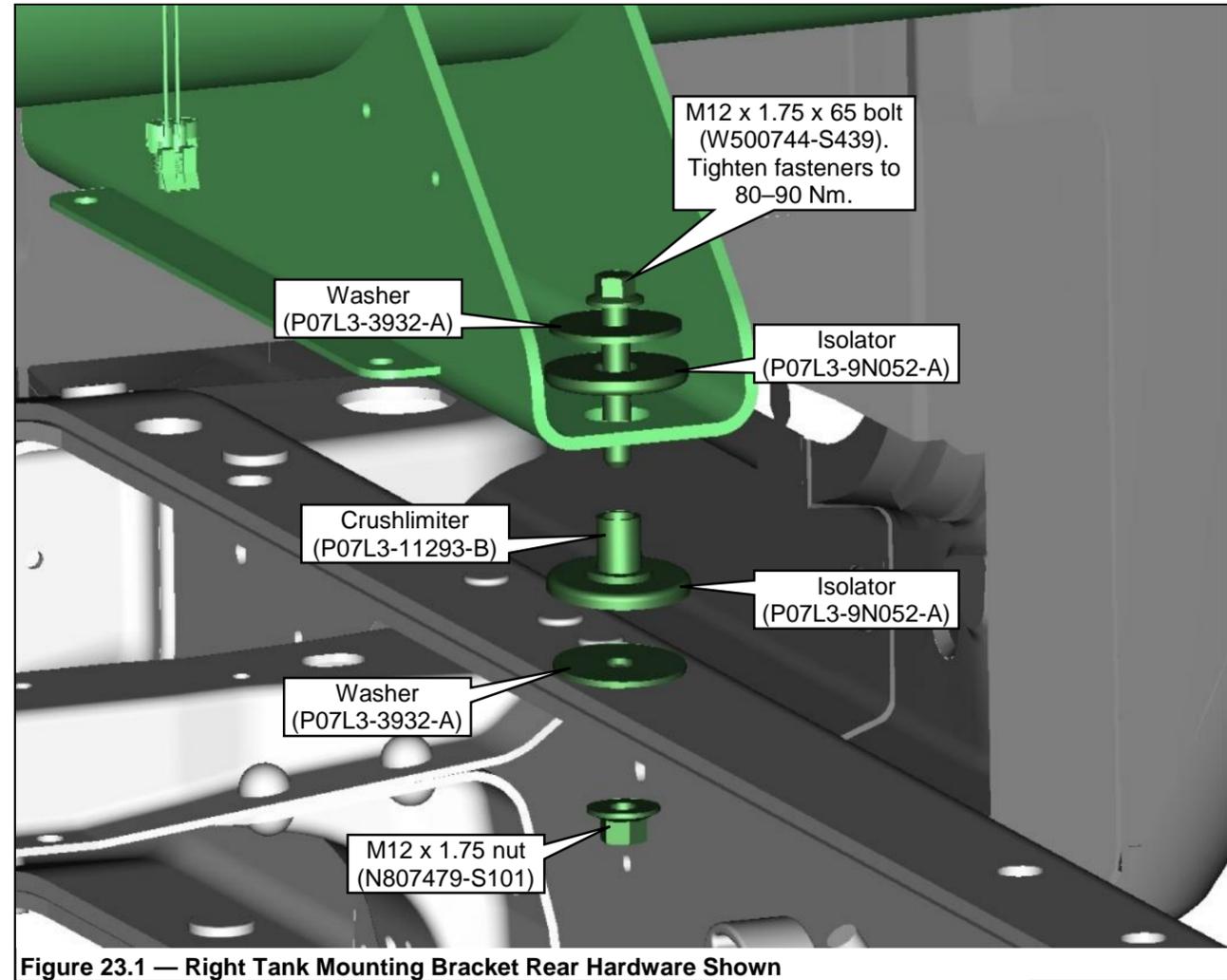


Figure 23.1 — Right Tank Mounting Bracket Rear Hardware Shown

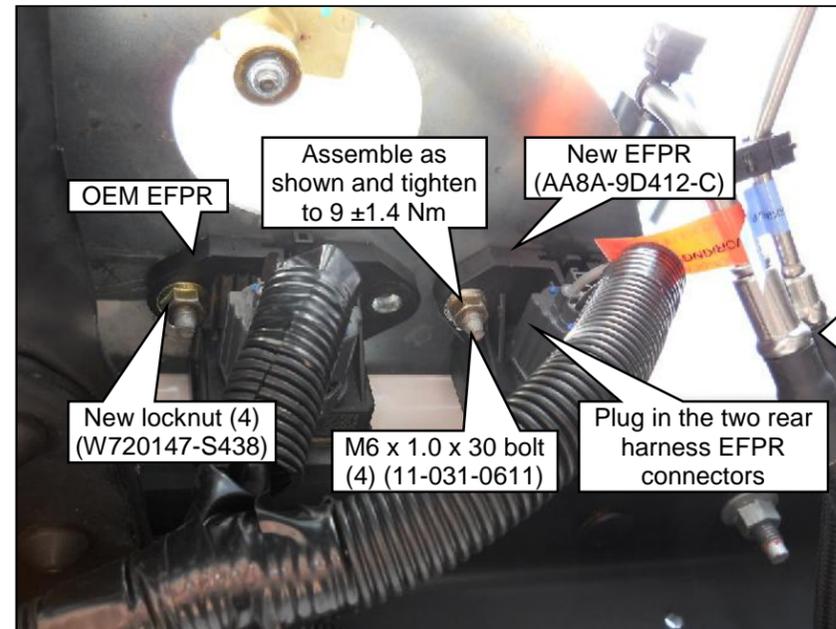


Figure 23.4 — EFPRs on Heat Shield

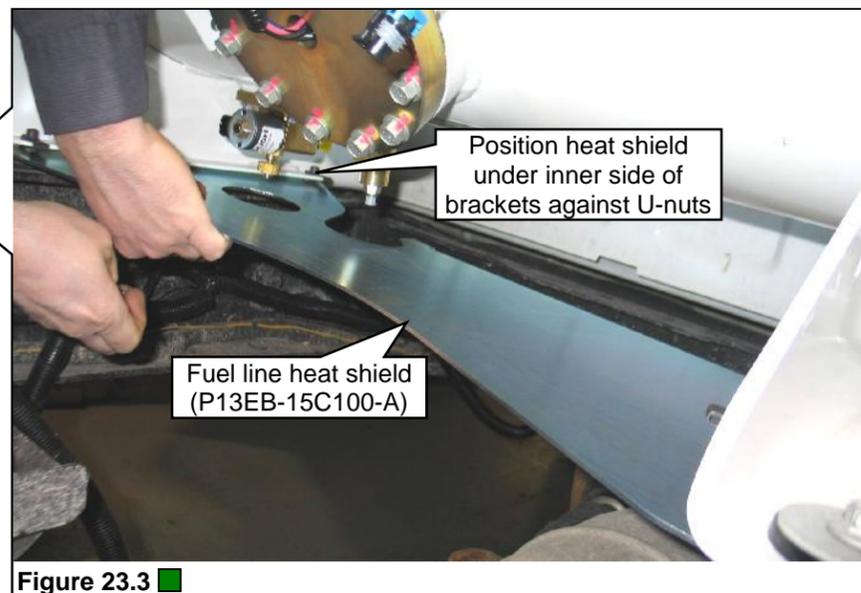


Figure 23.3 ■

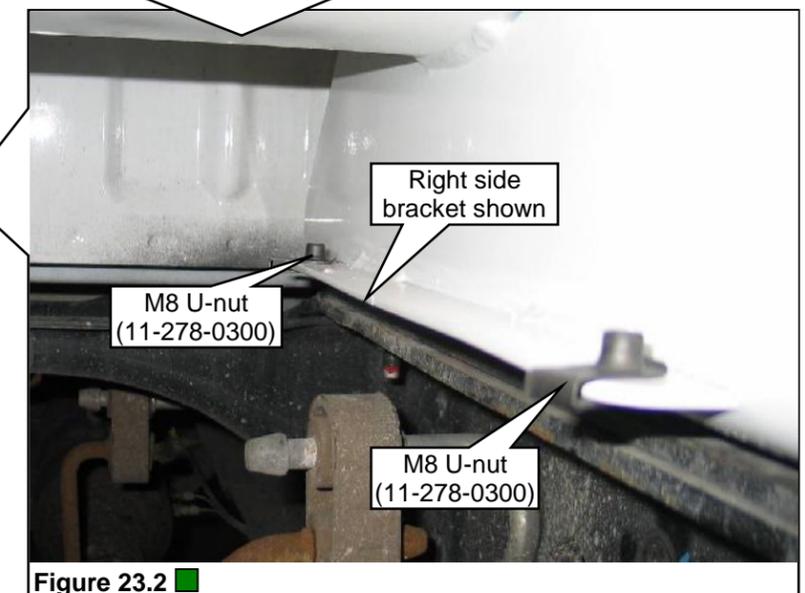


Figure 23.2 ■

ROUSH CleanTech Liquid Propane Autogas Fuel System: Ford F-450 / F-550 Chassis Cab

9. Tighten the four heat shield bolts to specification. **Figure 24.1.**
10. Install supply valve and level sender harness (solenoid harness P12EB-18K377-B) across the tank. Plug in the electrical connectors for the fuel level sender and the fuel supply solenoid. Secure the solenoid harness to the three weld tabs on the side of the tank using zip ties. **Figure 24.2.**
11. Position the fuel filter bracket with clamp and install the two M6 x 1.0 x 16 mm bolts. The filter bracket goes on the outside of the left tank bracket with the bolts coming from the inside into the bracket weld nuts. Tighten the bracket bolts to 8-12 Nm. **Figure 24.3.**
12. Unscrew the worm clamp so that the filter can be installed. Orient the clamp so that it can be easily tightened.
13. Slide the filter over the bracket and through the clamp until the filter is correctly engaged with the bracket. The filter must be oriented so that the arrows are facing the direction of fuel flow; in from the fill valve and out to the tank. Tighten the clamp to secure the filter to the bracket. **Figure 24.4.**
14. Position the fill line between the fuel filter and the overfill protection device (OPD) 90 degree fitting. Thread the line fittings into the filter and the OPD and tighten the fittings to specification. Attach the fuel fill line from the fill valve to the fuel filter and tighten to specification. **Figure 24.5.**
15. The two fuel pump connectors and the 4-pin connector at the other end of the solenoid harness must be connected to the rear frame harness. Install two cable tie edge clamps to the heat shield to secure the harnesses. Make the electrical connections. **Figure 24.6.**

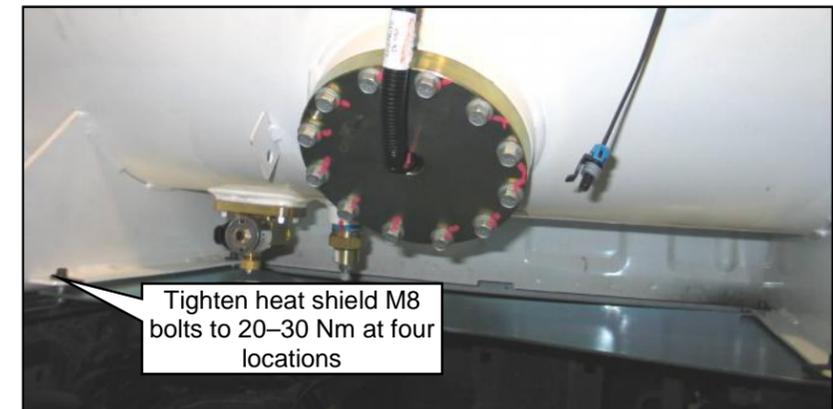


Figure 24.1 ■

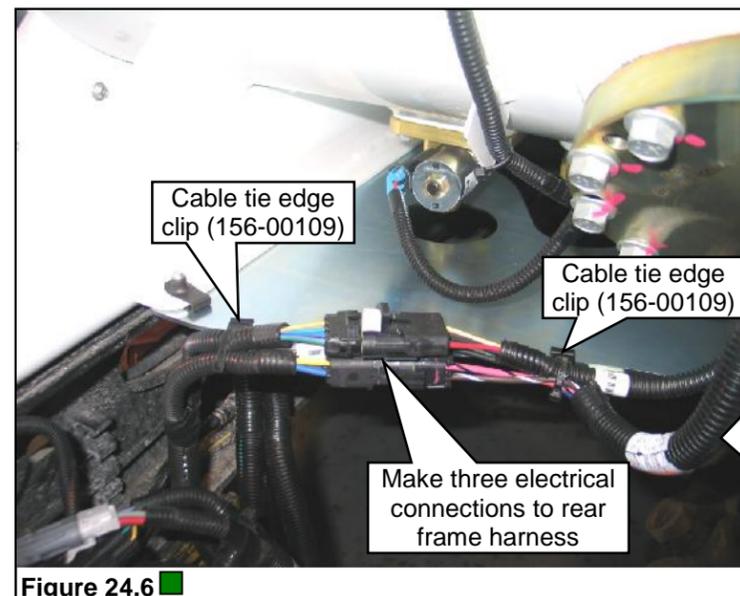


Figure 24.6 ■

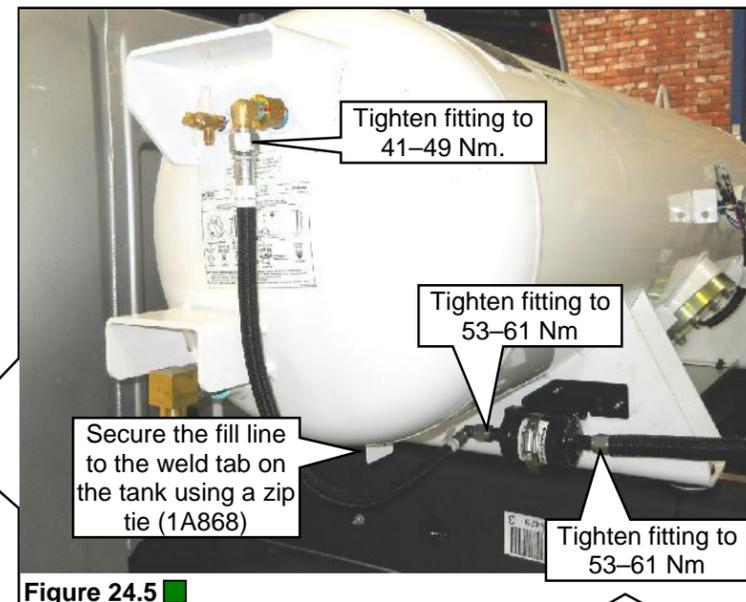


Figure 24.5 ■

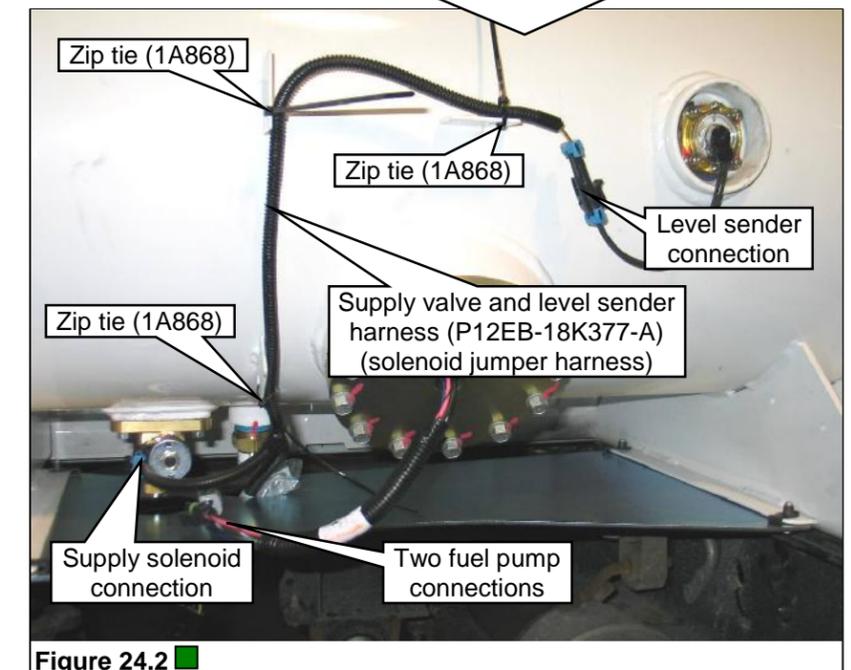


Figure 24.2 ■

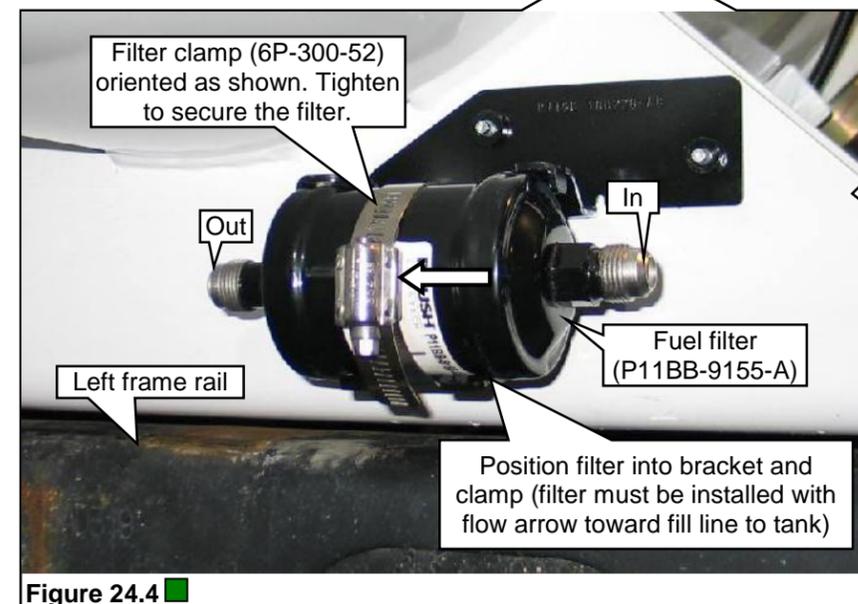


Figure 24.4 ■

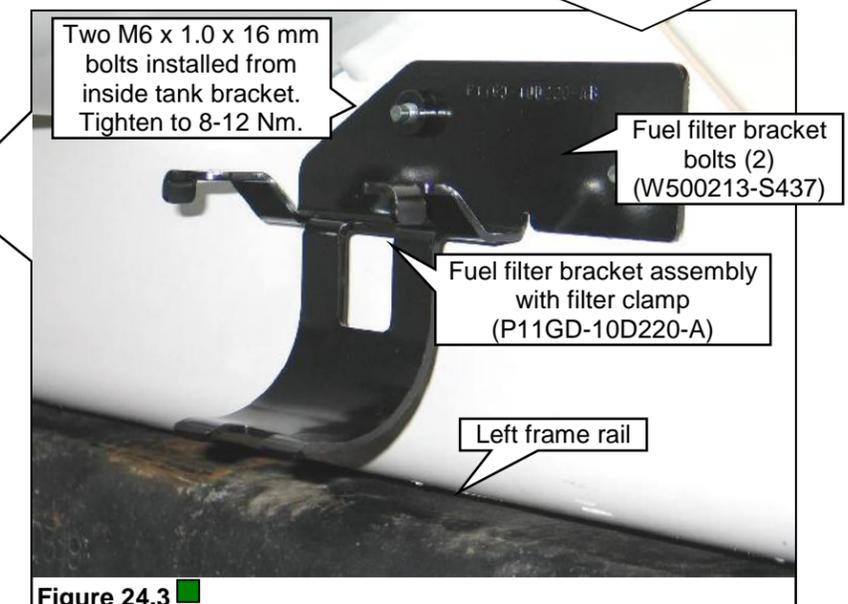


Figure 24.3 ■

INSTALLING NEW REAR FUEL LINES

1. Route new rear fuel supply line and rear fuel return line along frame rail from front to rear.
2. Attach fuel return line into OEM retaining clips (2) along frame rail and snap into place. The fuel supply line is secured to the fuel return line with zip ties.
3. Connect the rear supply and return lines into the forward supply and return lines. **Figure 25.1**. Push the quick-connect fittings together and make sure the connections are secure.
4. Route the back of the rear fuel supply and return lines up to the tank location. **Figure 25.2**. Use five zip ties to secure the fuel supply line to the fuel return line on the Regular cab (center graphic) and seven zip ties to secure the lines in the Super and Crew cabs. **Figures 25.3** and **25.4**. The lines attach to the tank heat shield with cable tie edge clips after the tank is installed.
5. Attach two cable tie edge clips to the fuel line opening of the heat shield. Connect the rear fuel supply line into the fuel supply valve quick-connect fitting and the fuel return line into the tank return check valve quick-connect fitting at the bottom of the tank. Trim the cable ties. **Figure 25.5**.

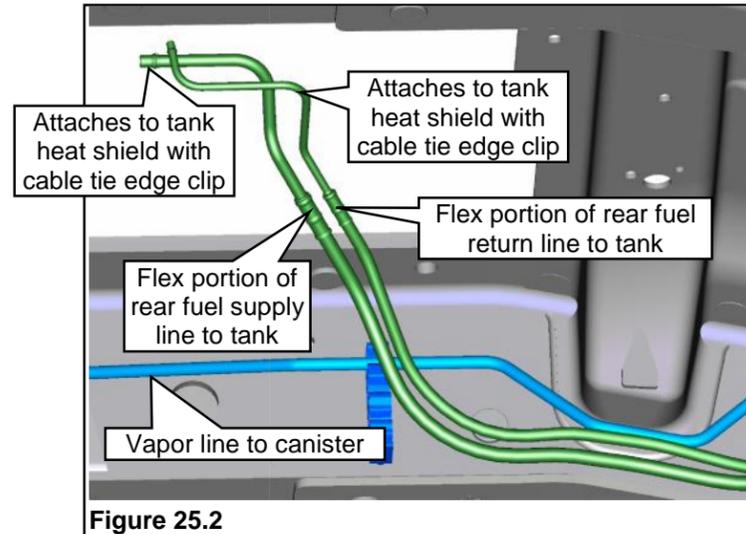


Figure 25.2

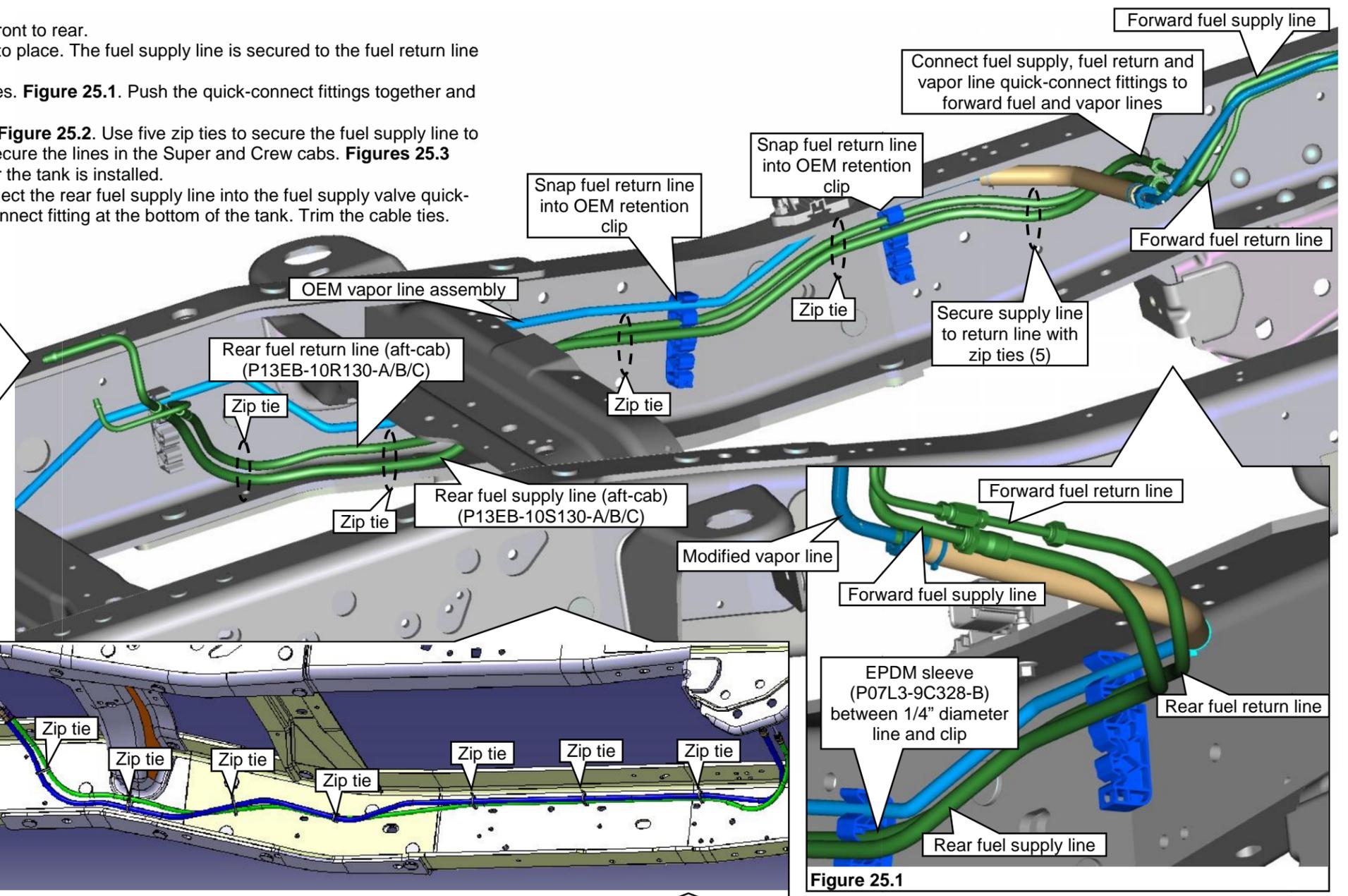


Figure 25.1

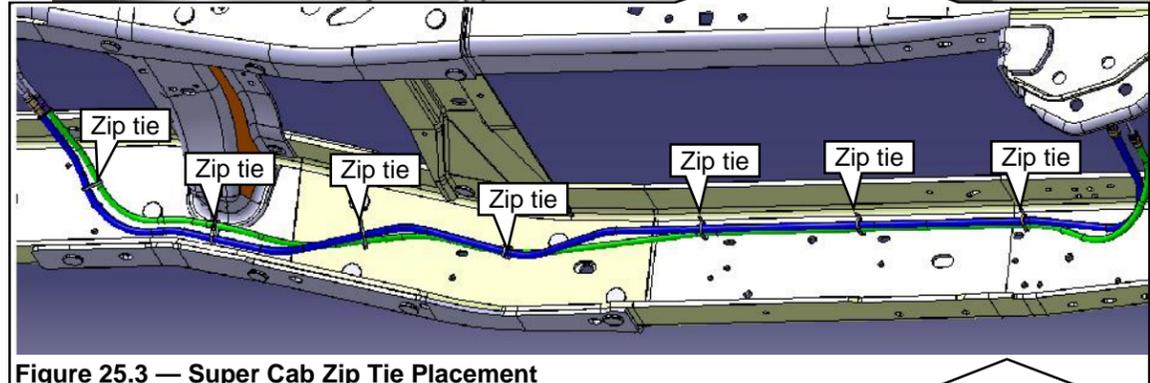


Figure 25.3 — Super Cab Zip Tie Placement

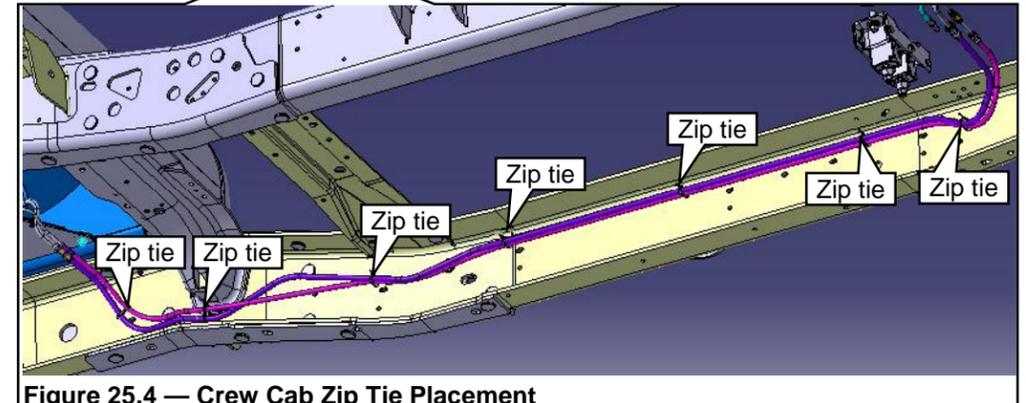


Figure 25.4 — Crew Cab Zip Tie Placement

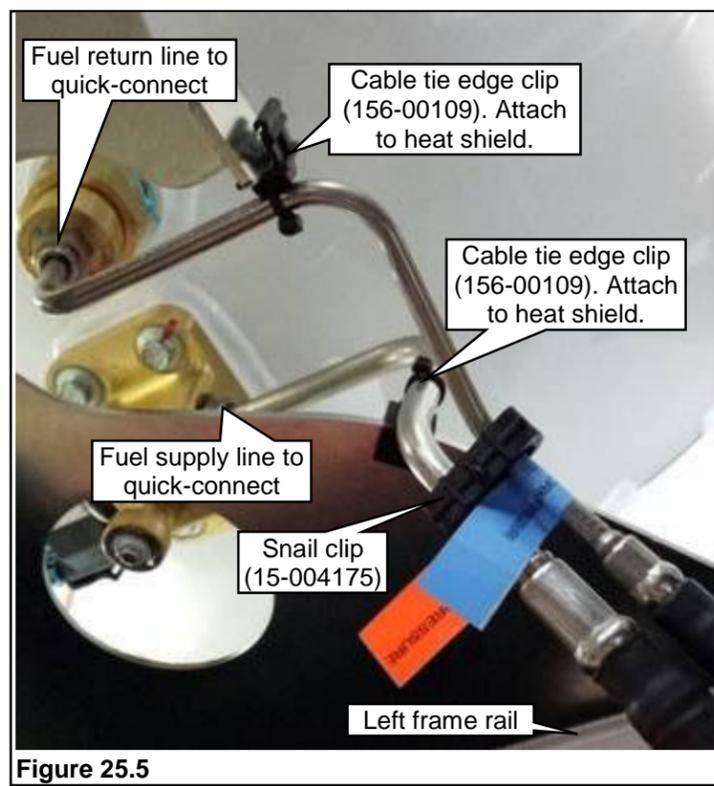


Figure 25.5

INSTALLING BADGES AND LABELS AND COMPLETING THE KIT INSTALLATION

ROUSH VECI Decal returned with PCM
Note: This label is vehicle-specific and is required by law to be applied to the vehicle to which it is assigned.

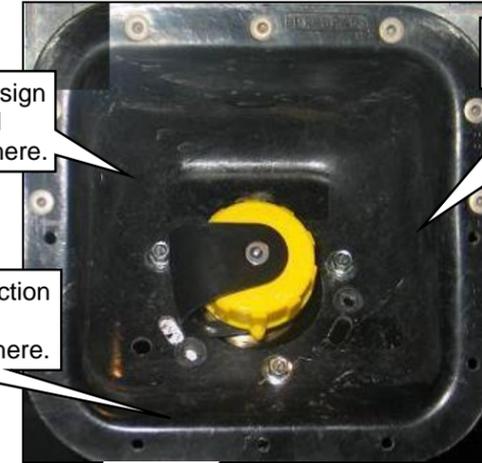
ROUSH	VEHICLE EMISSIONS CONTROL INFORMATION SUPPLEMENTAL LABEL 1 OF 2	
Authorized to convert the following Ford Motor Co. Vehicles 2012 F-450/550/650 Incomplete & Stripped Chassis		
Engine MY: 2011	OEM Gasoline Test Group: BFMXE06.8BW5	
This vehicle/engine is equipped with a Roush clean alternative fuel conversion system that allows it to operate on dedicated LPG fuel.		
Conversion Information:	Model Year: 2012	Test Group: CRIIE06.8BW5
CA Standards: N/A	OBD: N/R	EVAP: CRIIF0265LPG
FOR USE ONLY IN HDV WITH GVWR ABOVE 14,000 lbs.		
This conversion is manufactured and installed consistent with the principles of good engineering judgment and all EPA Regulations.		
Roush Industries, Inc. 12445 Levan Road Livonia, MI 48150 1-800-59-ROUSH	TWC/HO2S/AFS/SFI This clean alternative fuel conversion has been certified to meet EPA Emissions Standards. P12EB-01D049-AA	

PCM Tamper Label (R07100008-10-A)



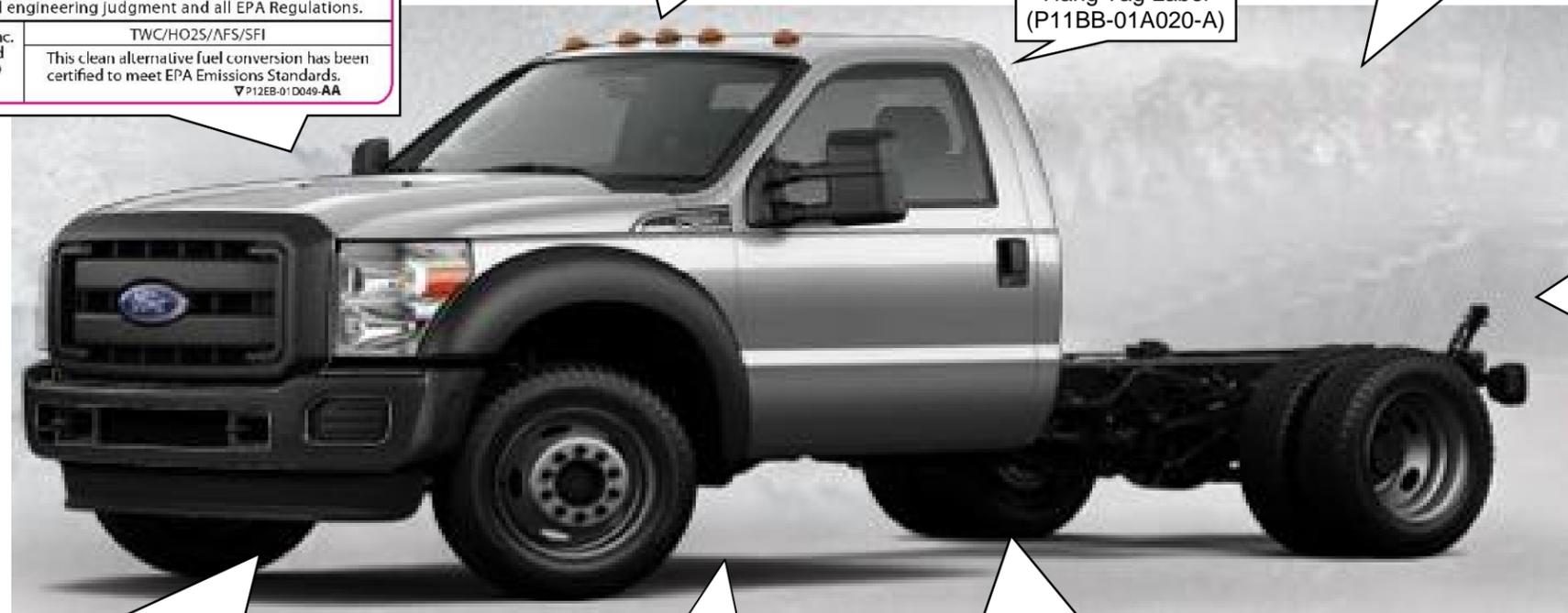
Apply 350 psig design pressure label (P07L3-9A095-I) here.

Apply overflow protection device label (P11BB-01C200-B) here.



Apply propane fuel only label (P07L3-9A095-A) here.

Hang Tag Label (P11BB-01A020-A)



Diamond Propane Reflective (D85)



Badges and Labels

1. Clean and dry all surfaces before applying new self-adhesive badges and labels. All labels are found in hardware kit P13EB-LABELS-A.
2. Apply labels in locations shown.
3. Apply the ROUSH CleanTech VECI label to the location specified in the supplemental instructions included with the returned PCM. **Note:** These labels are vehicle-specific and are required by law to be applied to the vehicle to which they are assigned. Use the labels included with the PCM when returned to you by ROUSH CleanTech.

ROUSH CleanTech Logo Dome Badge (P-01G100-A)



PCM Tamper Warning Label (R07100008-10-A) on knee bolster above OBDII diagnostic port

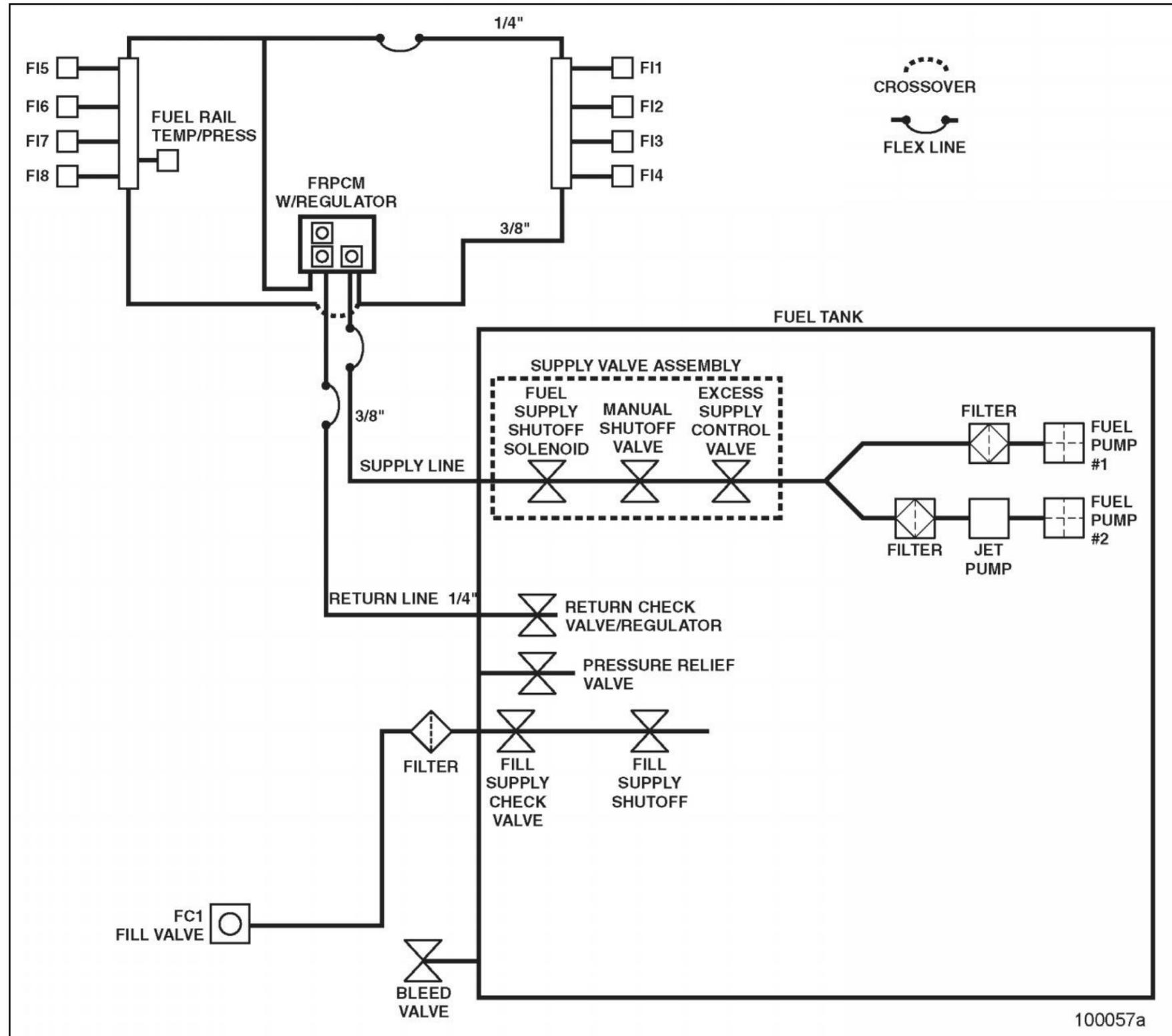


Bleeder Valve Inspection Label (P07L3-9A095-C) to end of driver door

Completing the Kit Installation

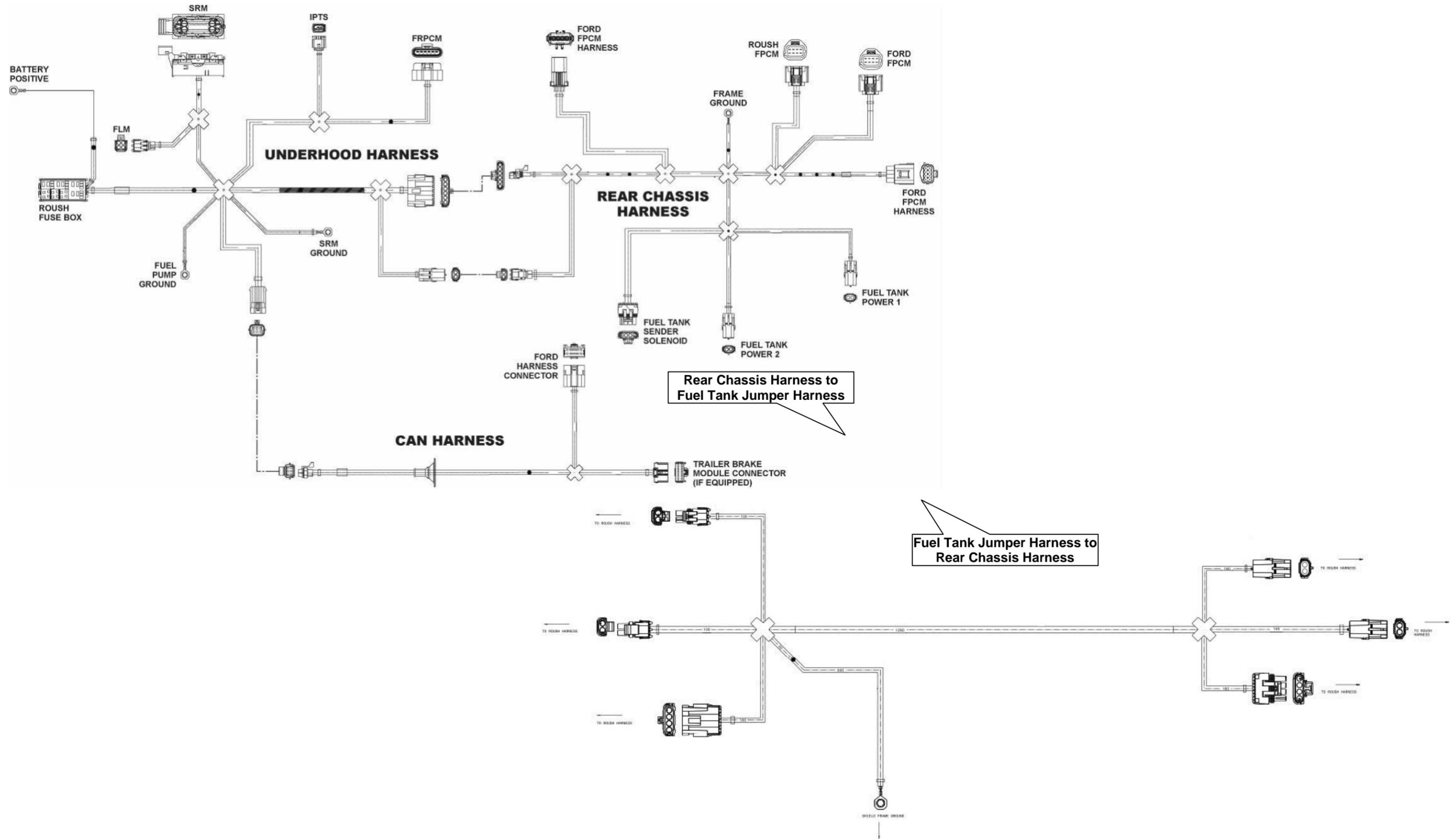
1. If not done, install reprogrammed PCM following procedure in the *Ford Workshop Manual, Section 303-14, Electronic Engine Controls*.
2. Install vehicle battery and connect positive and negative terminals. Tighten to 8–12 Nm.
3. Perform system leak check following established ROUSH CleanTech procedure.
4. Install air induction system.
5. Connect MAF sensor.

SCHEMATIC — ROUSH FUEL SYSTEM (TYPICAL)

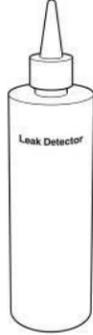
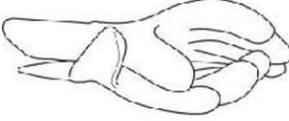
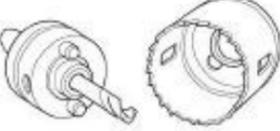


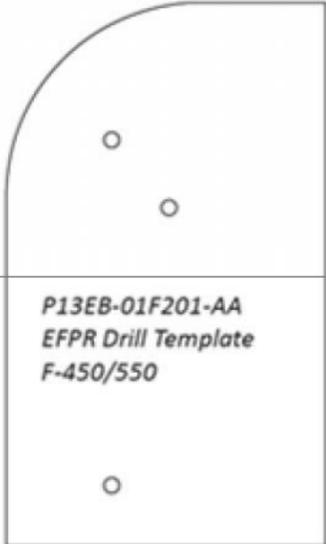
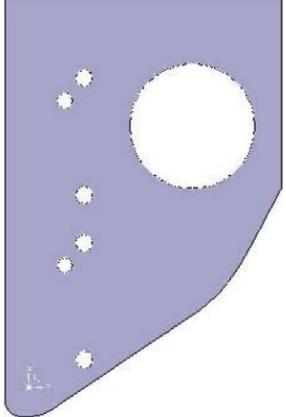
SCHEMATIC — ROUSH WIRING HARNESS (TYPICAL)

Note: This wiring harness print does not include the attachment locations for the ROUSH CleanTech tank jumper harness to the rear chassis harness.



SPECIAL TOOLS

								
Touch-Up Paint	Liquid Leak Detector	Premium Aerosol Undercoating	Torque Wrenches (to 22 Nm and to 200 Nm)	A/C Manifold Gauge Kit	Gloves (Approved for Propane)	Scan Tool	Jiffy-Tite Disconnect Tool (1/4" and 3/8")	Hole Saw — 29 mm

							
Vacuum Gauge	Vacuum Pump	Dielectric Grease	Stepless Ear Clamp Pliers	Drill Bits — 1/8" and 1/2"	EFPR Drill Template (Vapor Canister Bracket) <i>P13EB-01F201-AA EFPR Drill Template F-450/550</i>	Tubing Cutter	EFPR Drill Template (Heat Shield)