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

Revision History		
-AA	Initial Release	1/2015

Installation Instructions

CONTENTS

PREPARING VEHICLE

1. Using a scan tool, check for all diagnostic trouble codes. Correct all trouble codes before continuing.
2. Depressurize the fuel rails using the procedure described in the *Ford Workshop Manual Section 310-00 Fuel System, General Information*.
3. Disconnect the battery terminals and remove the battery.
4. Disconnect the OEM PCM harness push-pin to allow easier ROUSH CleanTech under hood harness installation.
5. 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 1.1–1.3**.

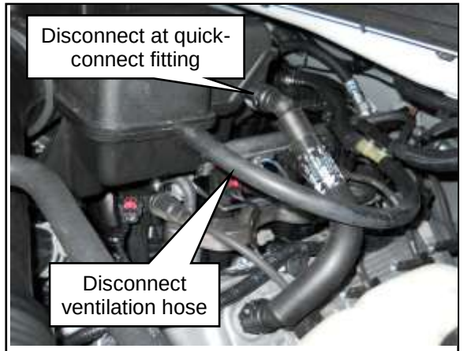
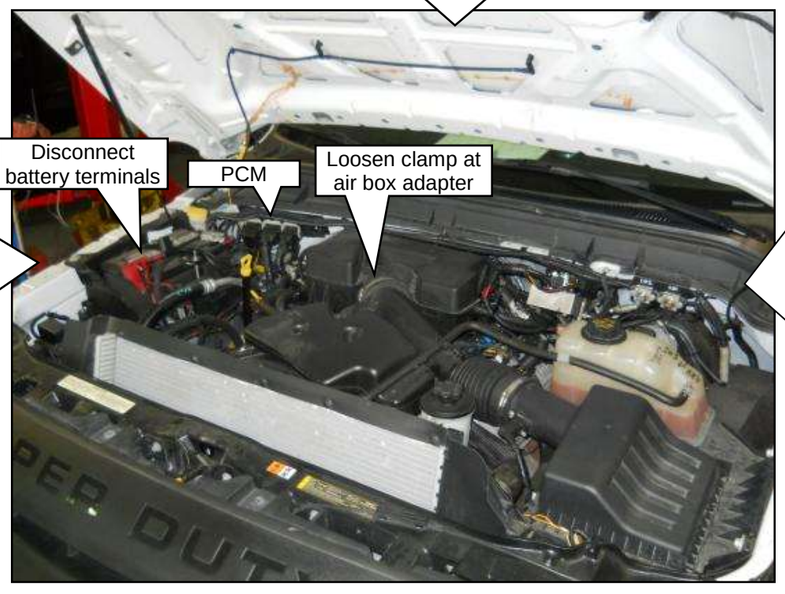


Figure 1.1



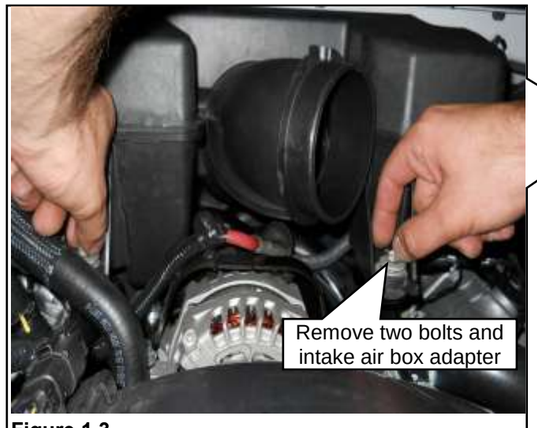


Figure 1.3

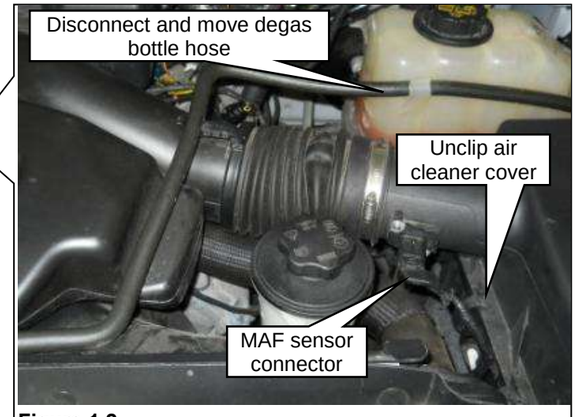


Figure 1.2

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.

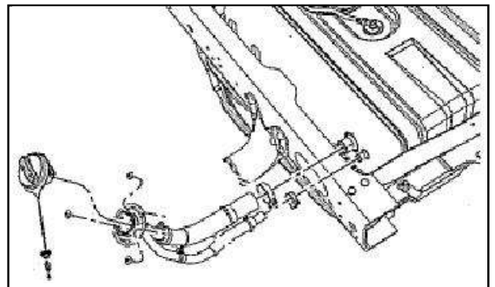


Figure 2.1

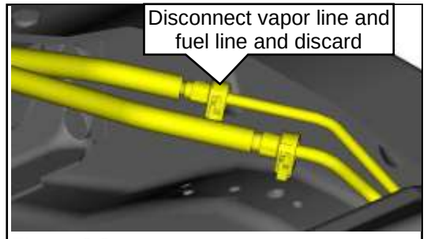


Figure 2.2

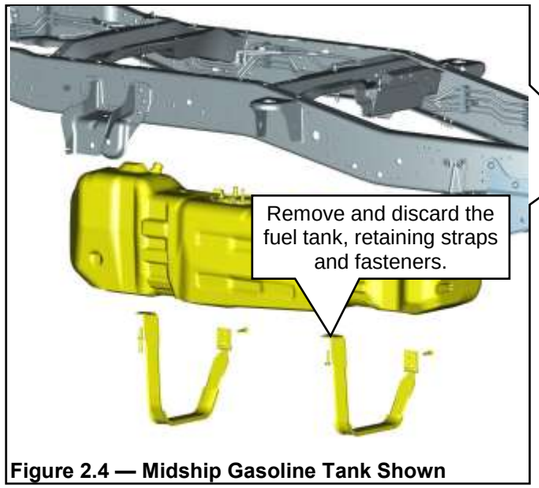


Figure 2.4 — Midship Gasoline Tank Shown

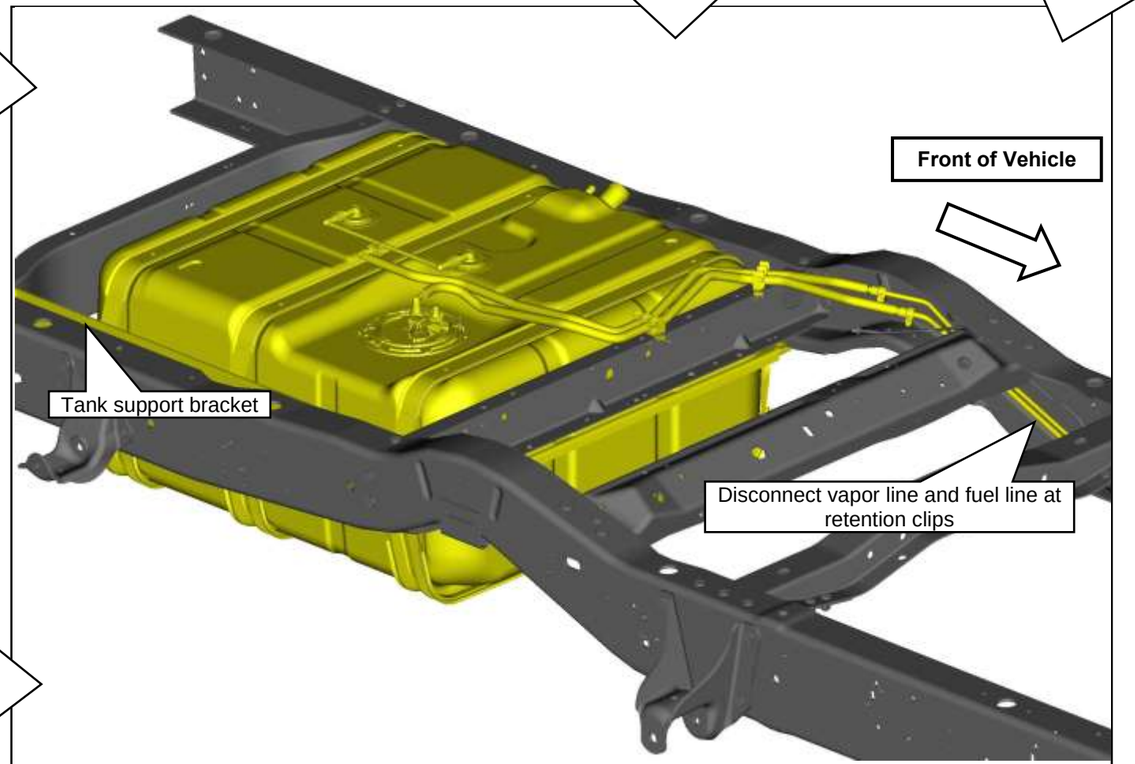


Figure 2.5 — Aft-axle Gasoline Tank Shown

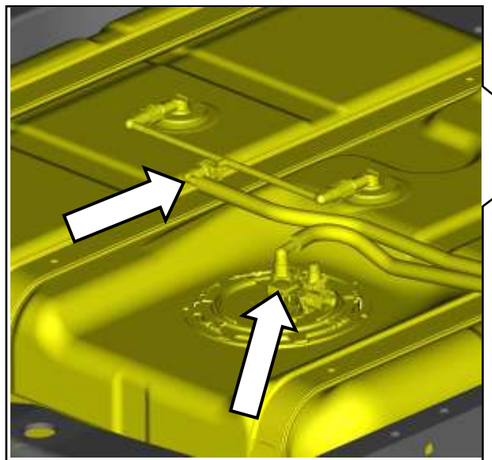


Figure 2.3

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** and **3.4**.

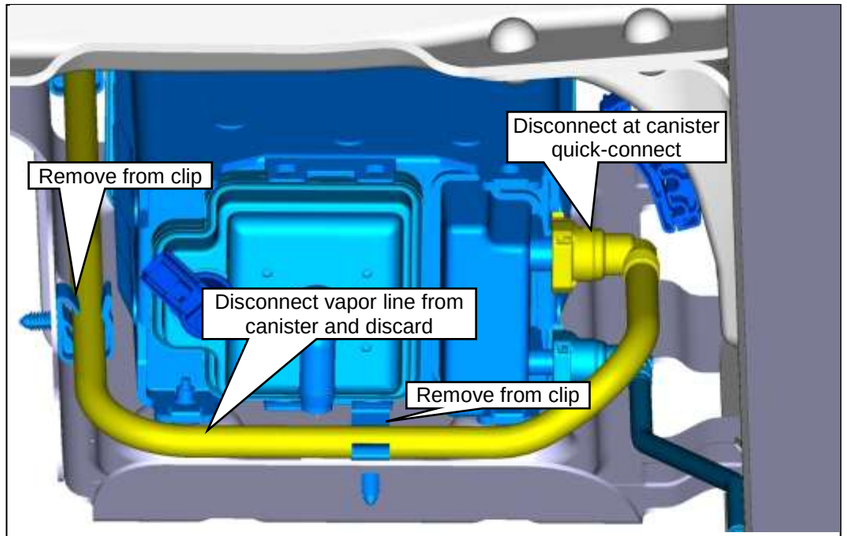


Figure 3.1 — OEM Aft-Axle Tank: Front of Canister

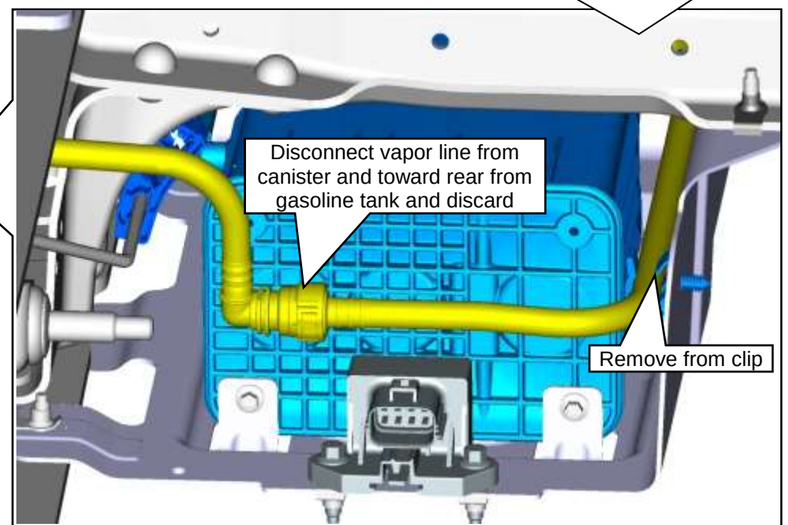


Figure 3.2 — OEM Aft-Axle Tank: Rear of Canister

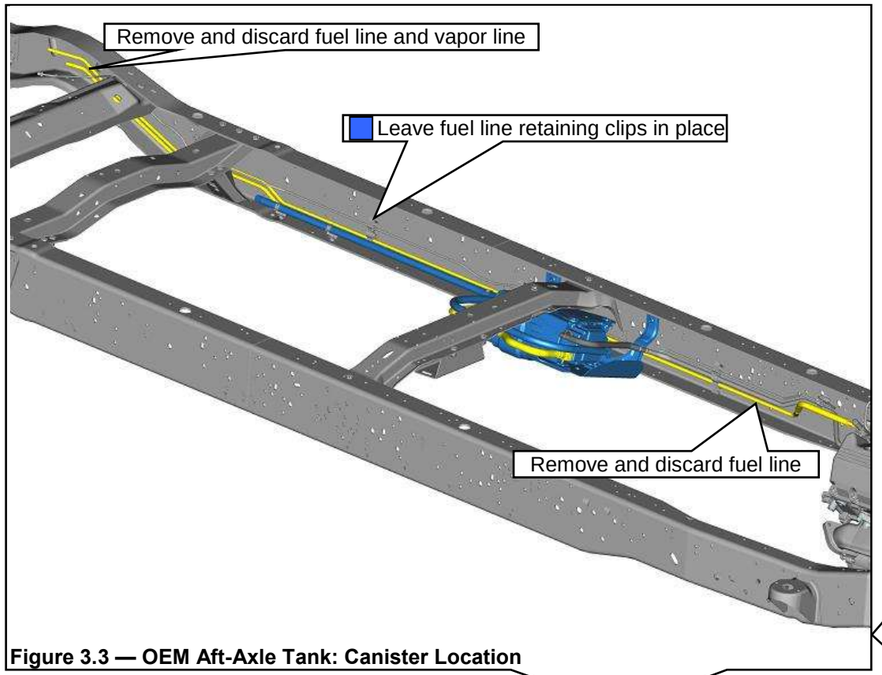


Figure 3.3 — OEM Aft-Axle Tank: Canister Location

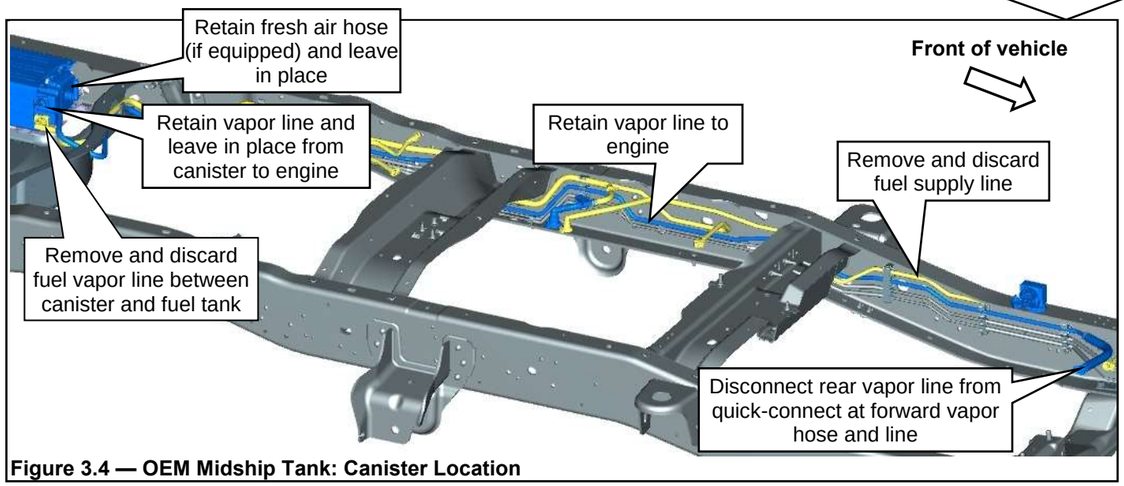


Figure 3.4 — OEM Midship Tank: Canister Location

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**.

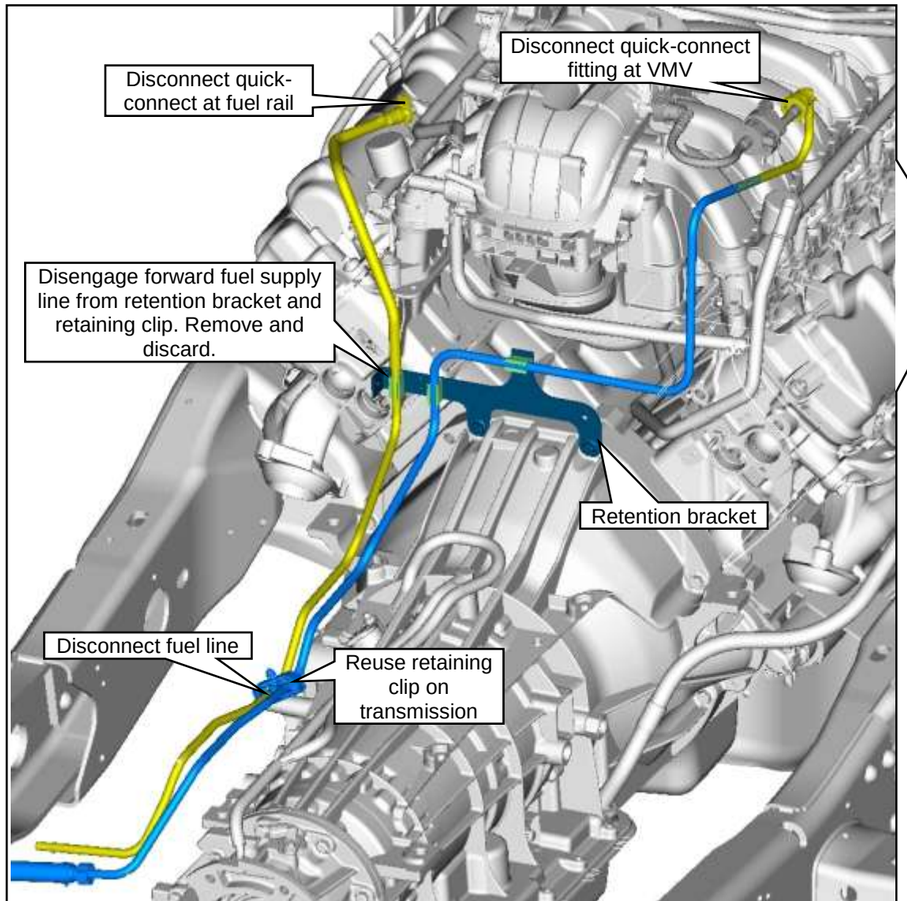


Figure 4.1

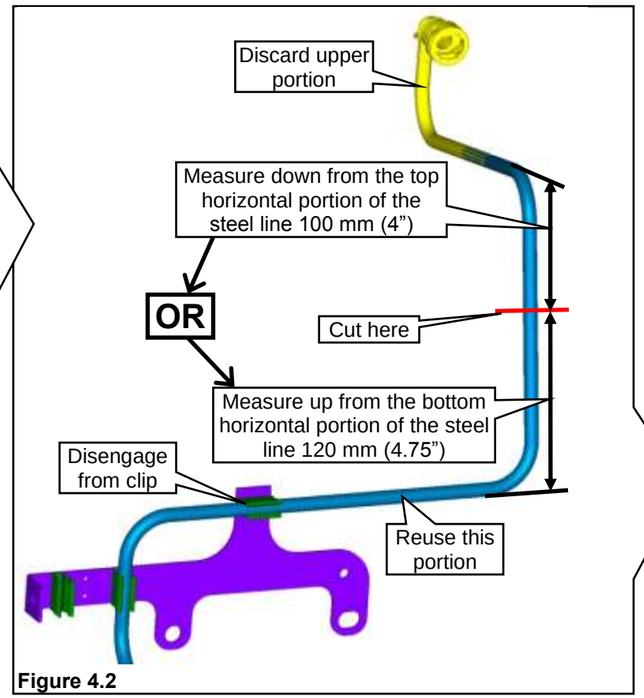


Figure 4.2

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**.

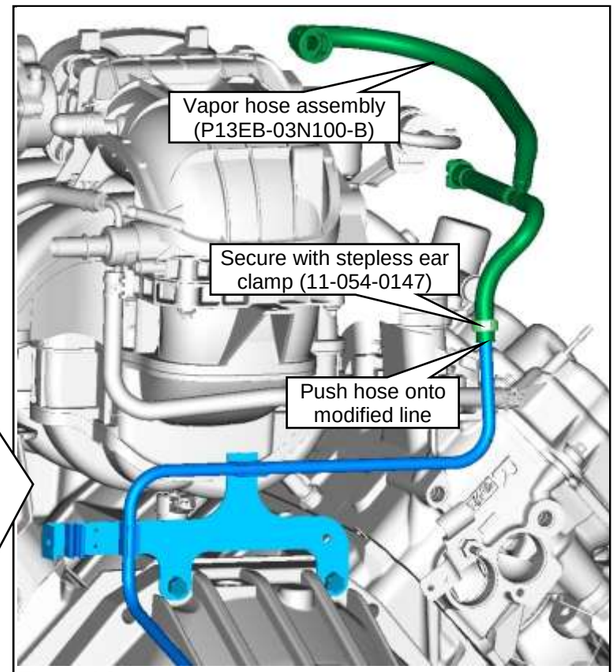
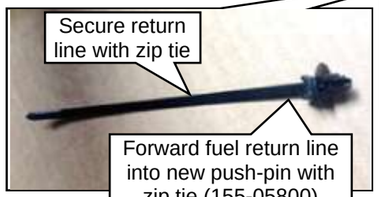


Figure 4.3

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**.



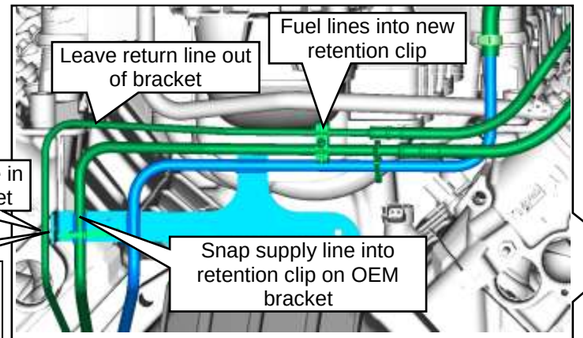


Figure 5.3

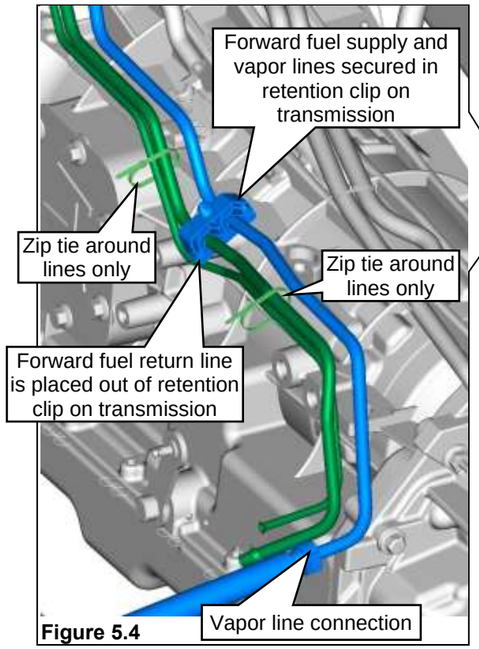
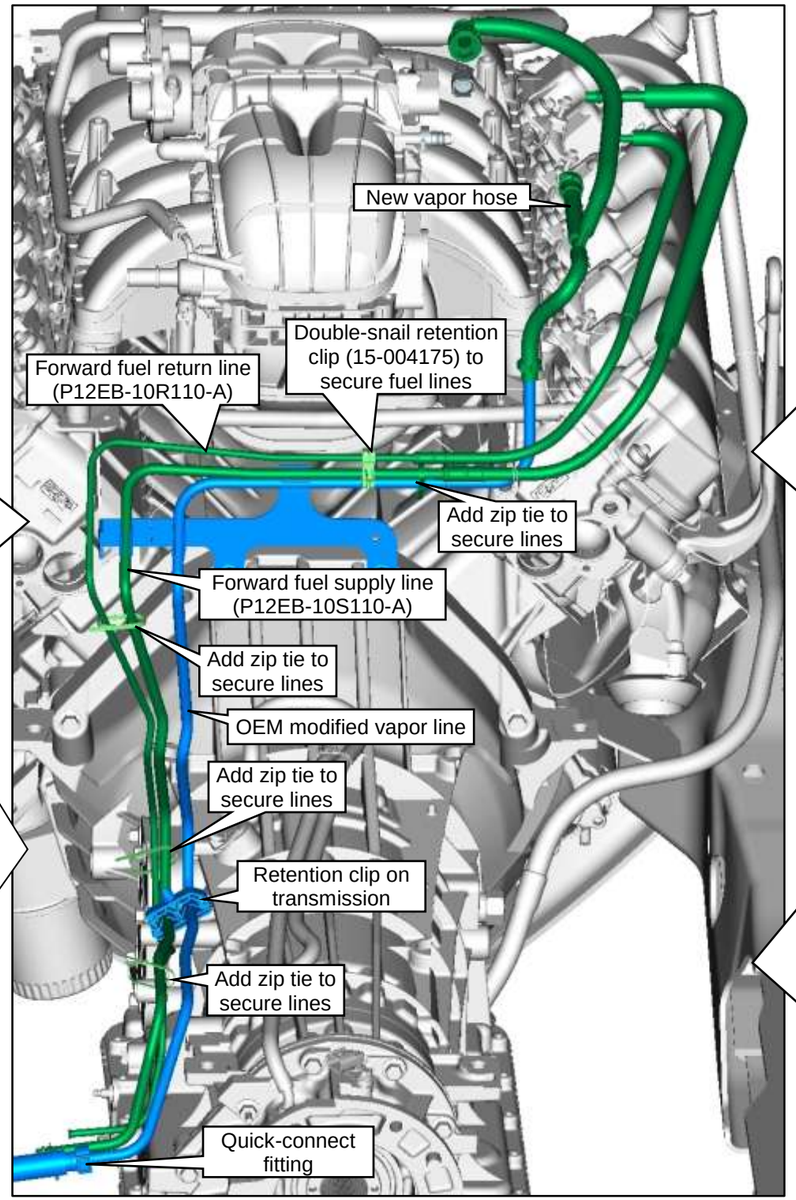


Figure 5.4



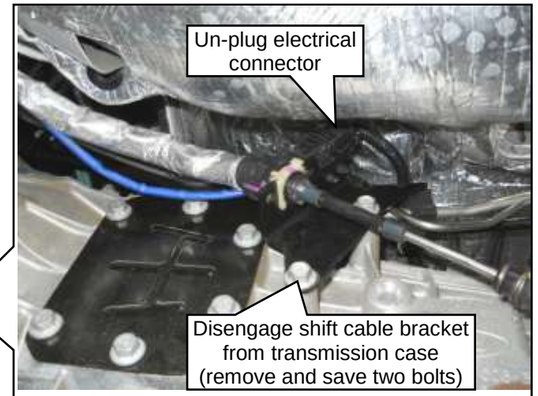


Figure 5.1

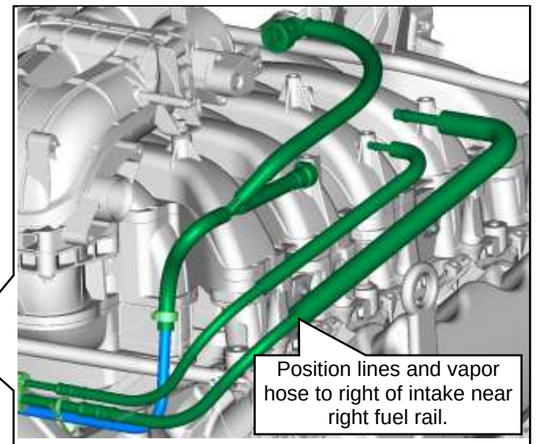


Figure 5.2

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 secure 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**.

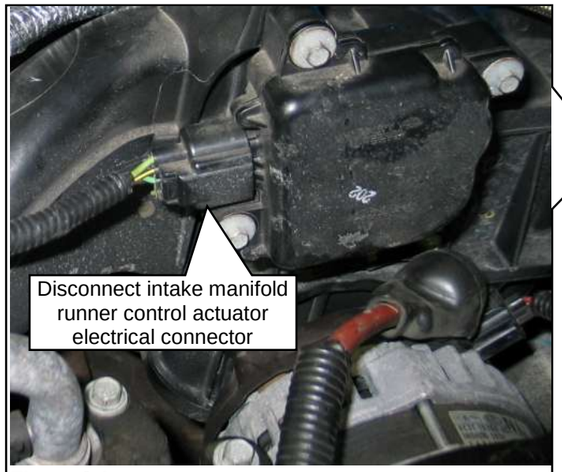


Figure 6.1

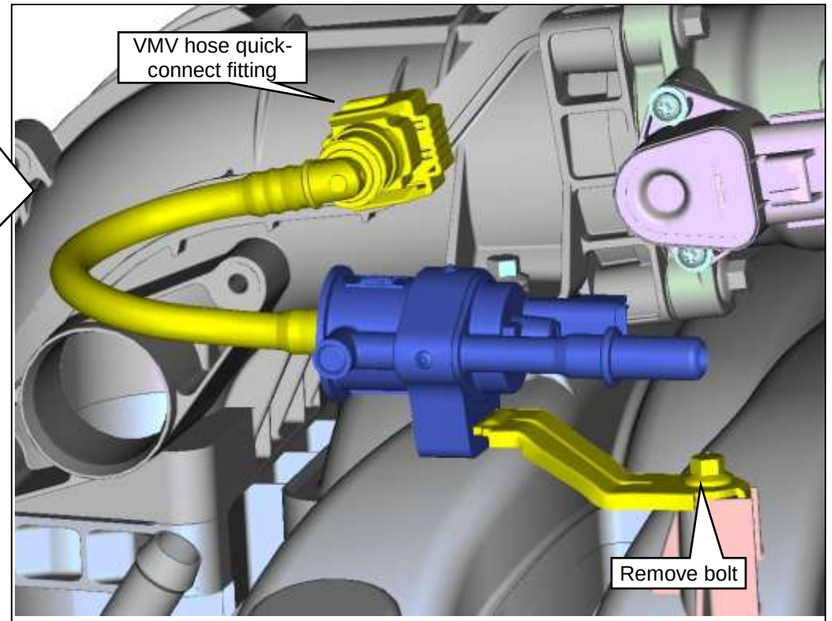


Figure 6.2

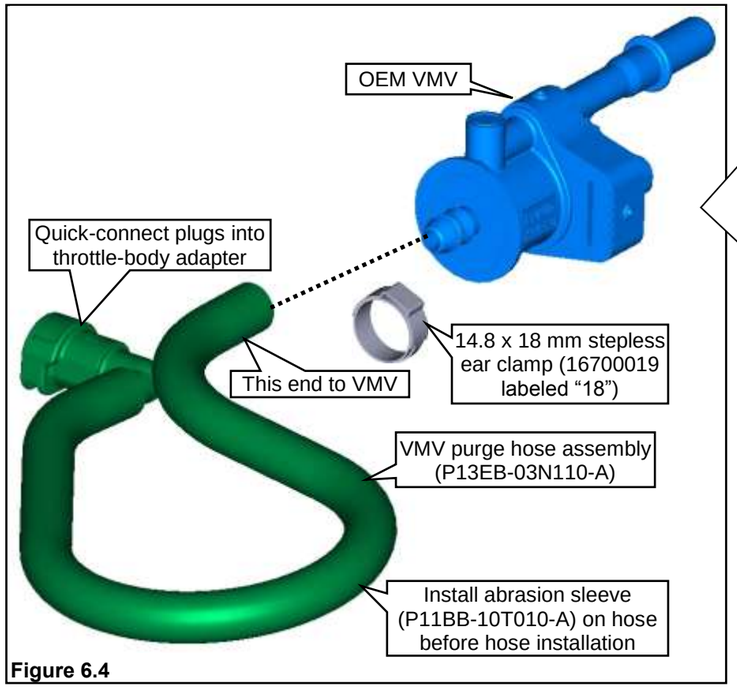


Figure 6.4

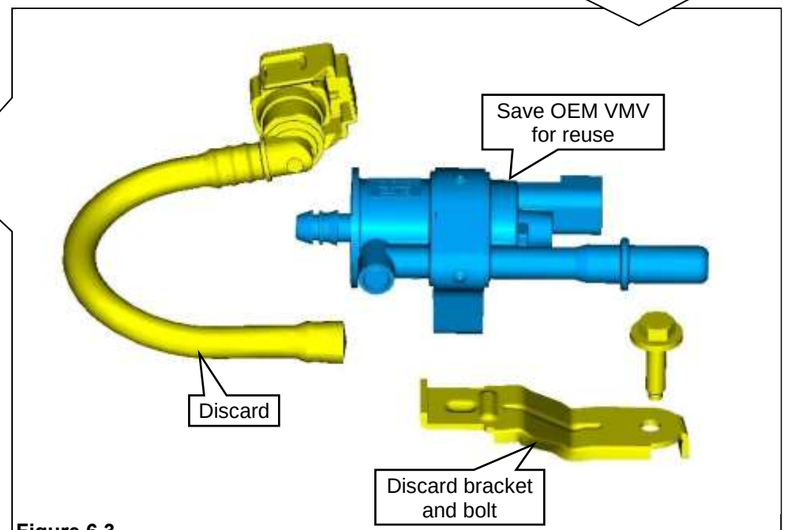


Figure 6.3

PREPARING ENGINE COMPARTMENT (CONTINUED)

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.

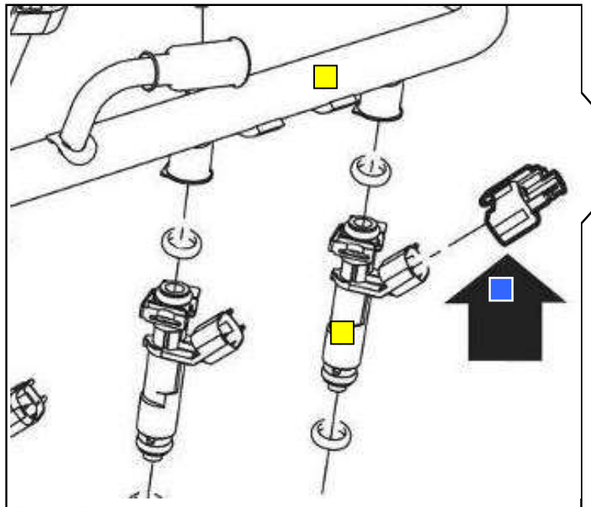


Figure 7.1

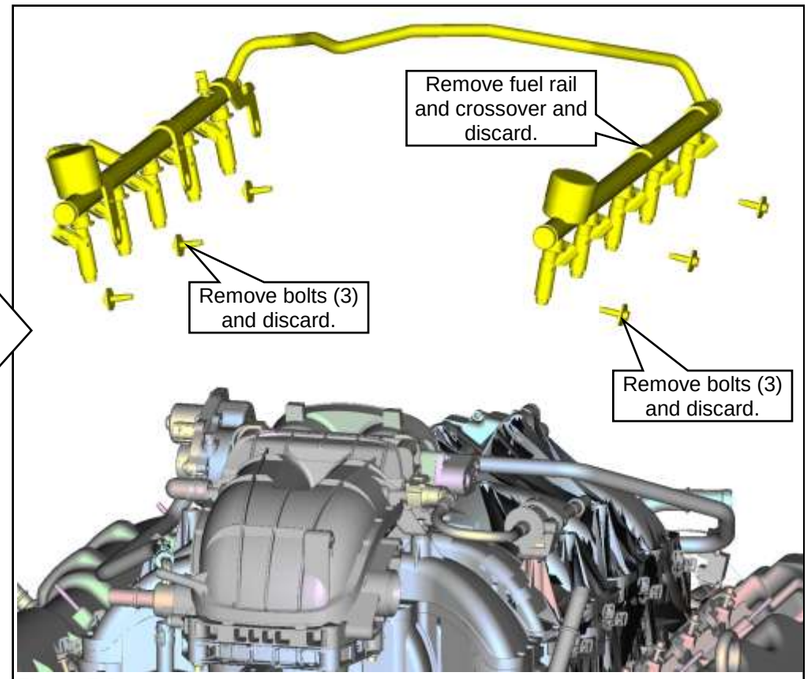


Figure 7.2

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-ENGKIT-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-ENGKIT-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**.

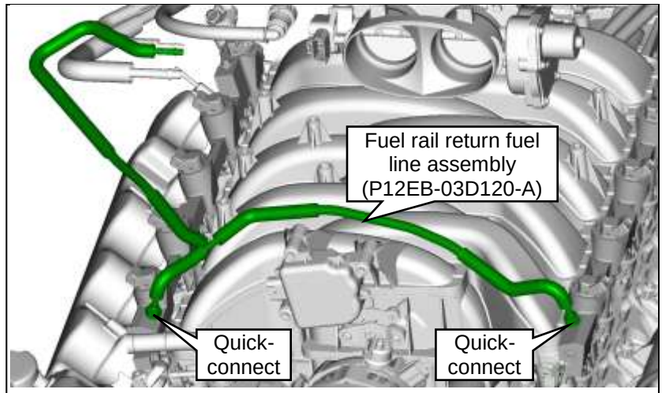


Figure 8.1

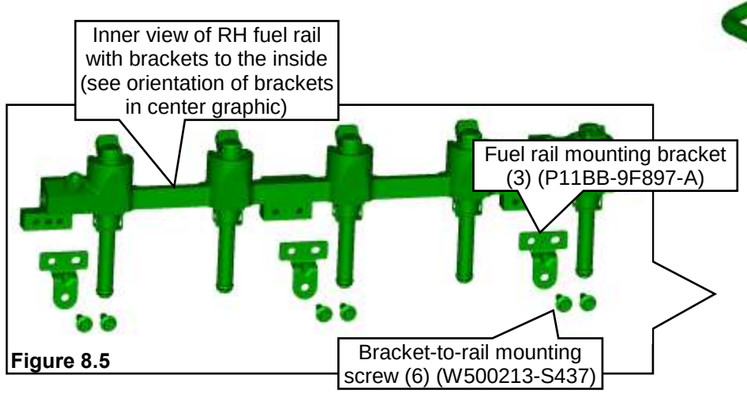
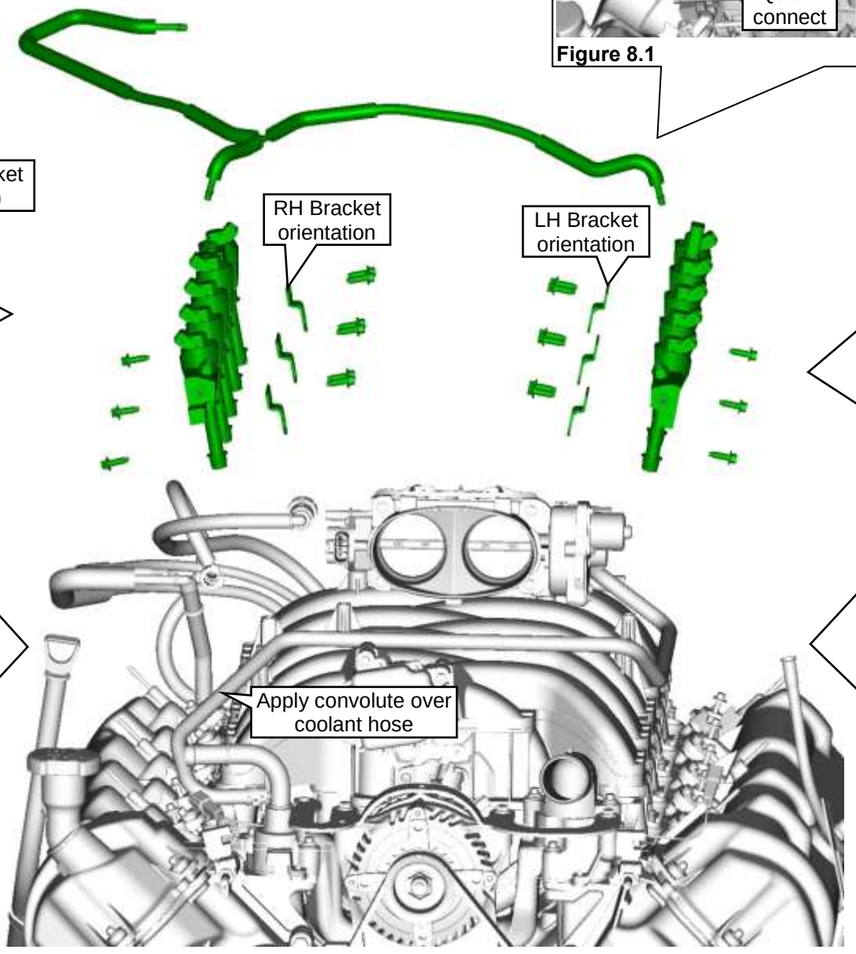


Figure 8.5



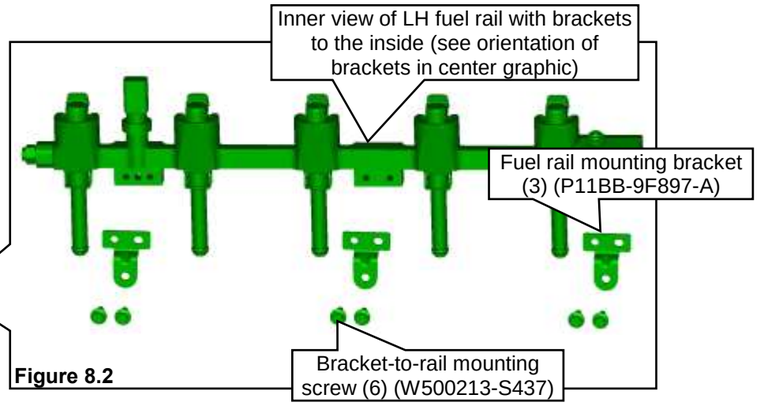


Figure 8.2

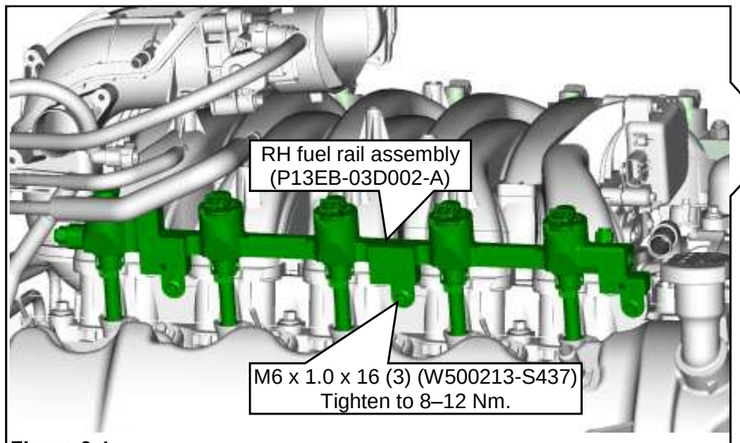


Figure 8.4

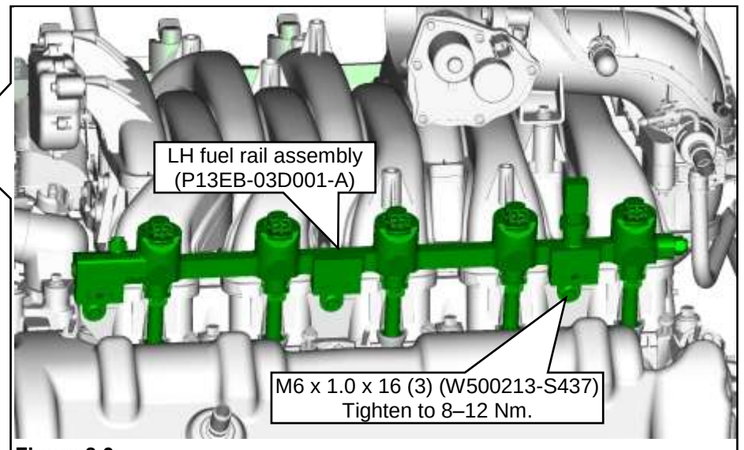


Figure 8.3

INSTALLING NEW FUEL RAILS AND FUEL RAIL RETURN FUEL LINE ASSEMBLY (CONTINUED)

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 P14EB-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**.

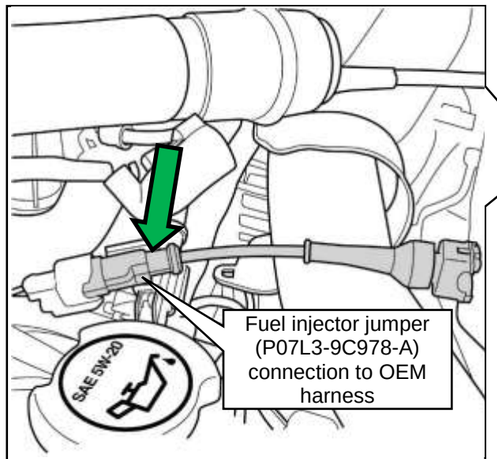


Figure 9.1

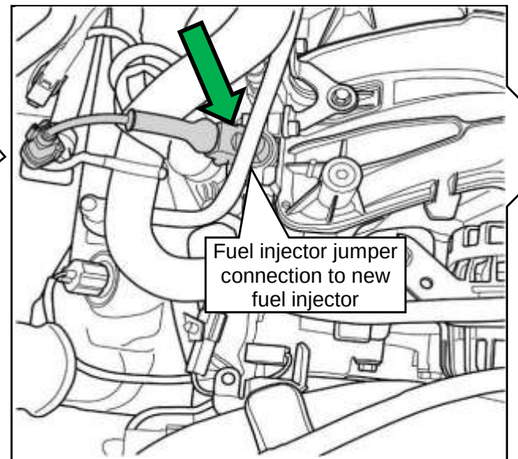


Figure 9.2

Figure 9.3

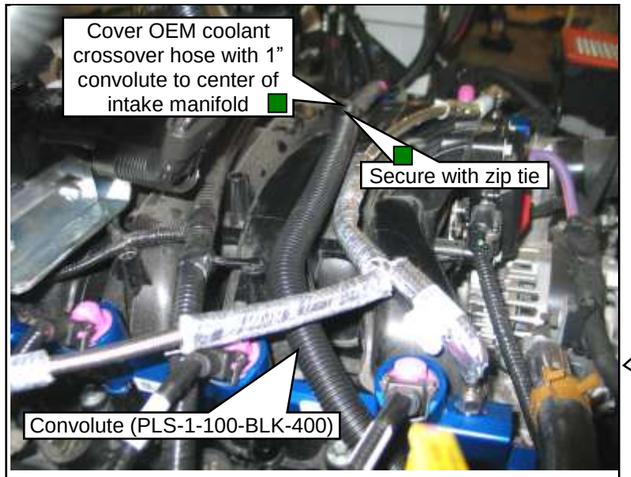


Figure 9.5

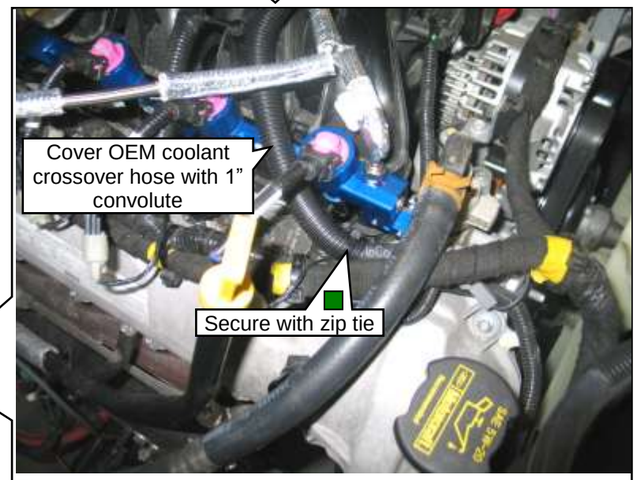


Figure 9.4

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.

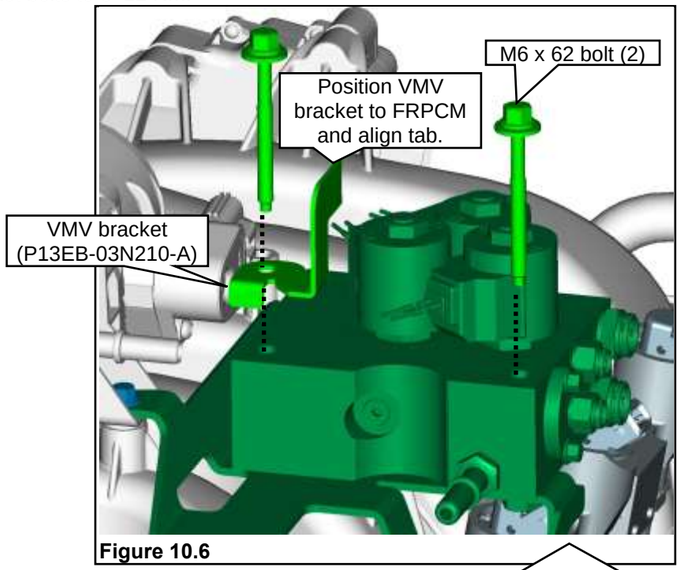


Figure 10.6

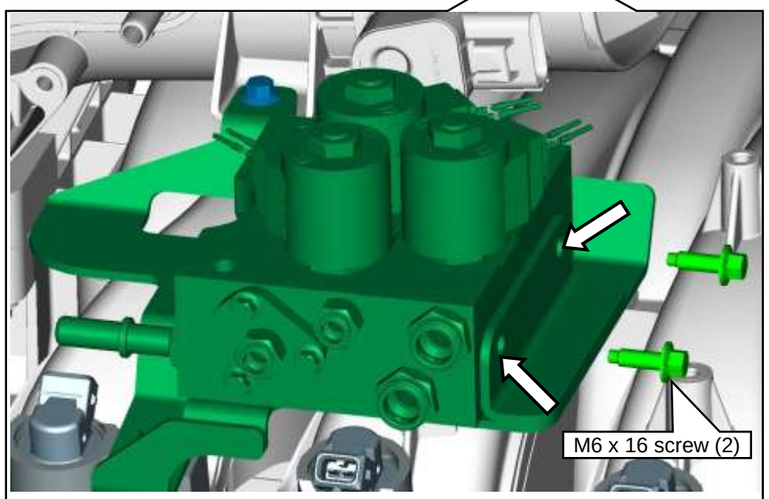


Figure 10.5

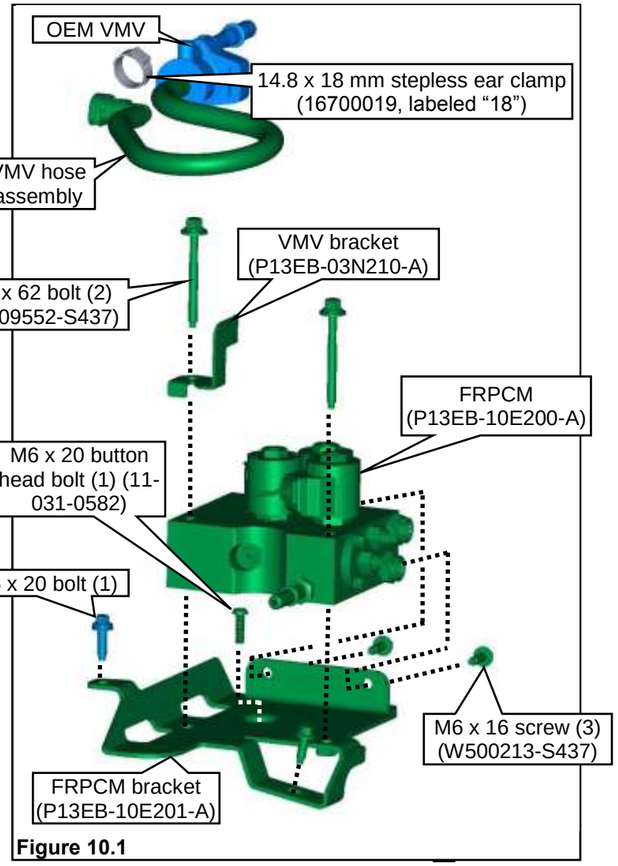


Figure 10.1

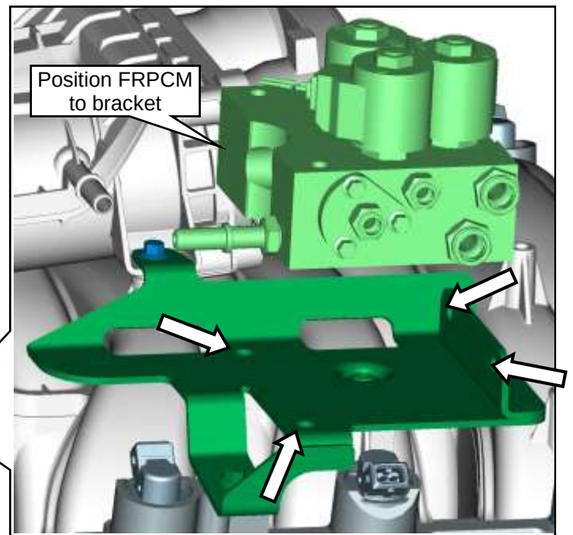


Figure 10.4

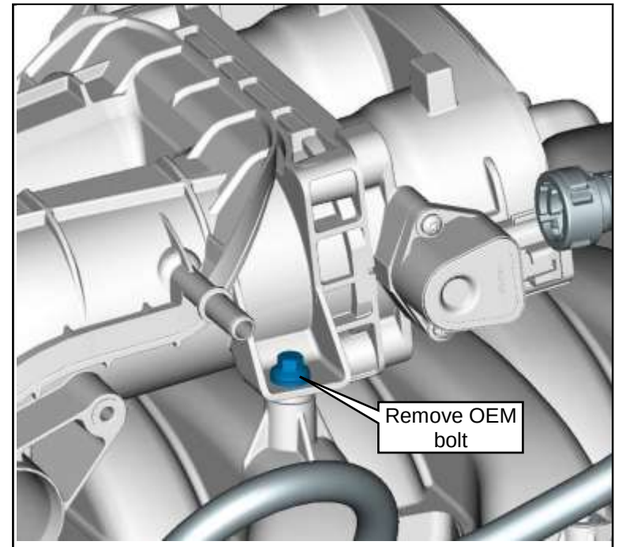


Figure 10.2

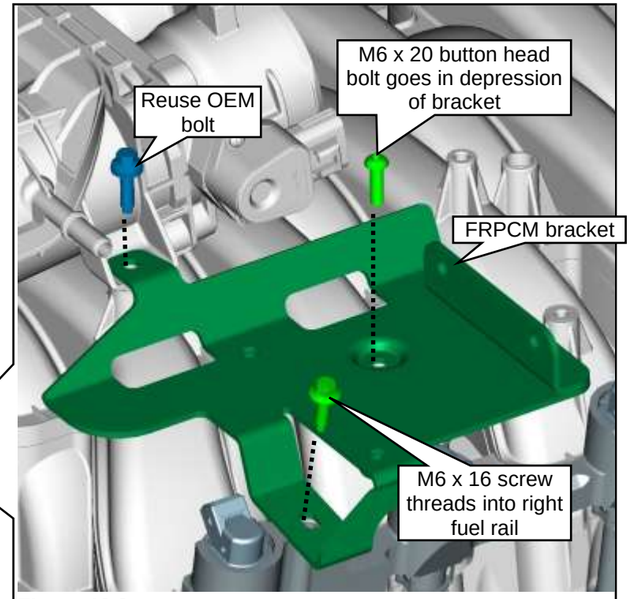


Figure 10.3

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**.

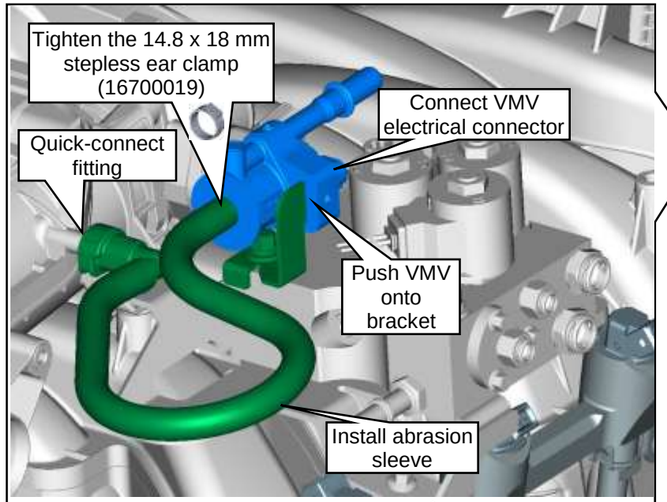
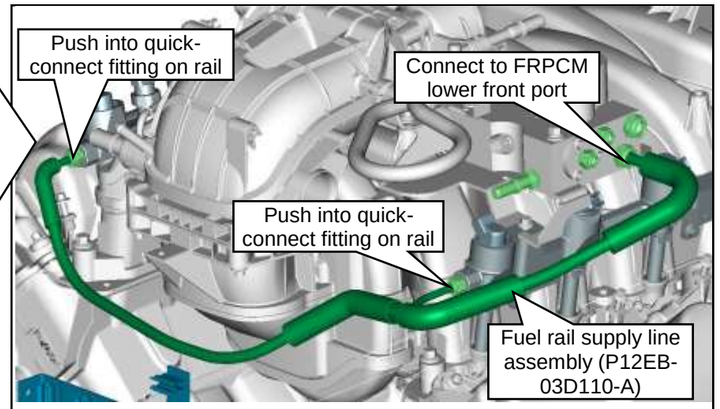


Figure 11.2



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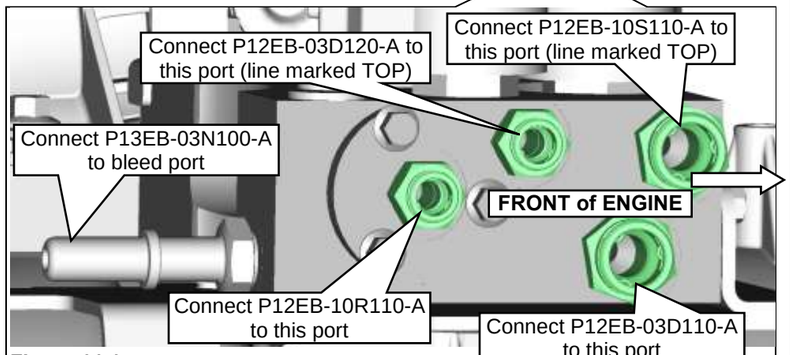


Figure 11.1

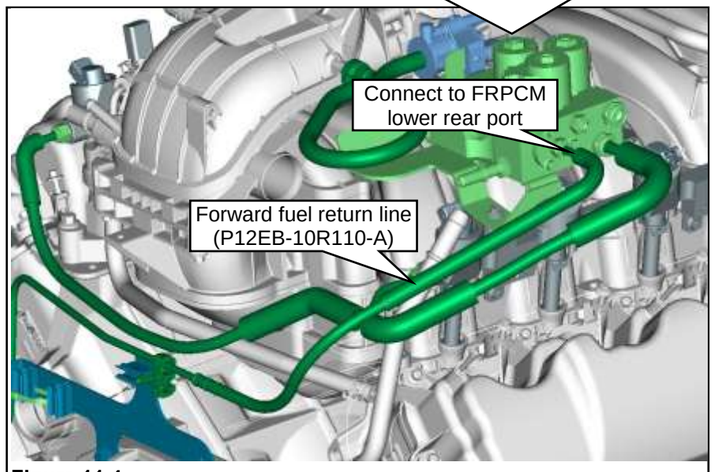
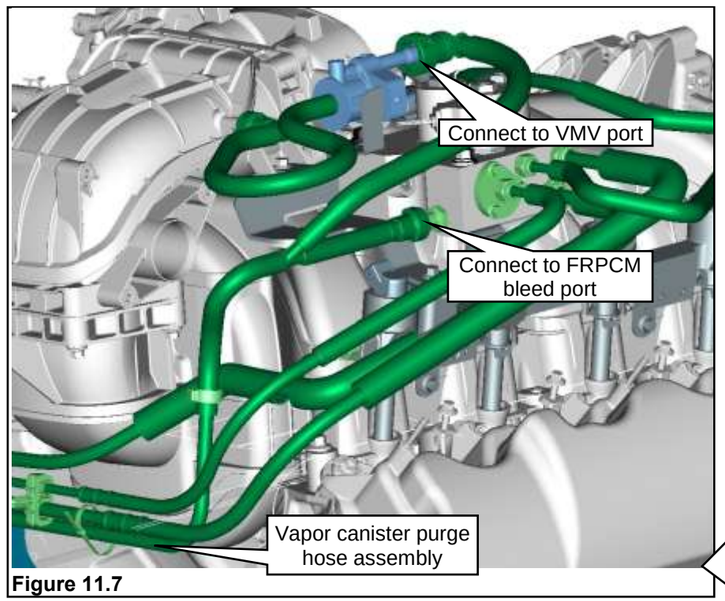


Figure 11.4



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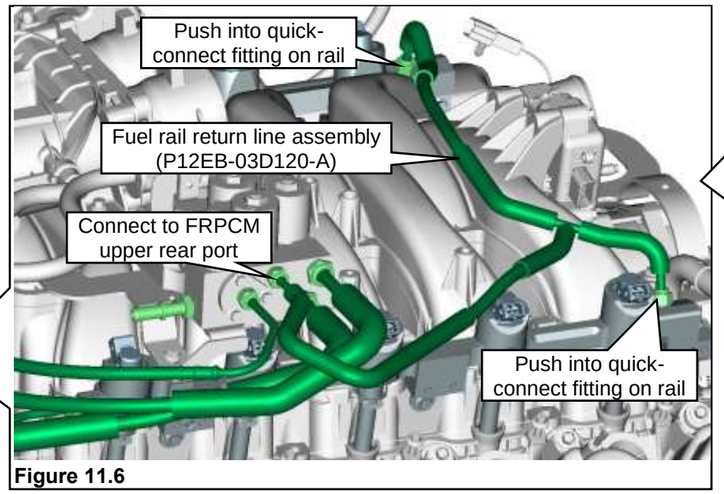


Figure 11.6

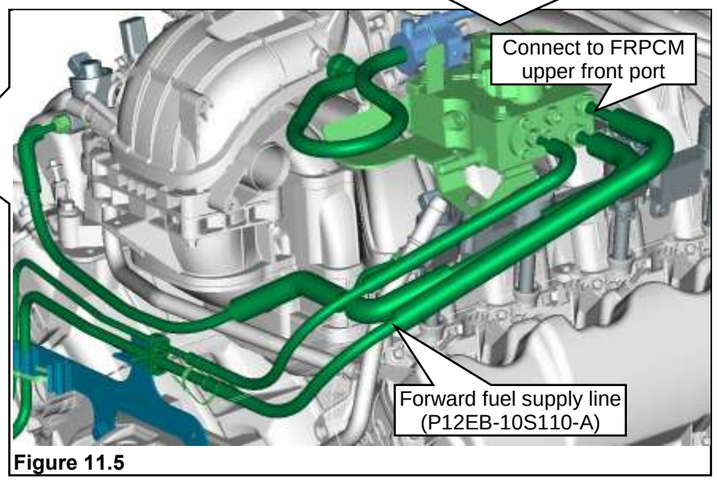


Figure 11.5

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 P14EB-ELECKIT-A. The SRM is supplied in hardware kit P12EB-ENDITEM-B.

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 10.1**.
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 10.2**.
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 10.3**.
4. Install one M6 bolt at the bottom front of the bracket. Tighten the bottom front bolt to specification. **Figure 10.3**.
5. Attach the fuse box bracket to the SRM bracket and secure with one M6 bolt and one M6 nut. **Figure 10.4**.
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 10.5**.

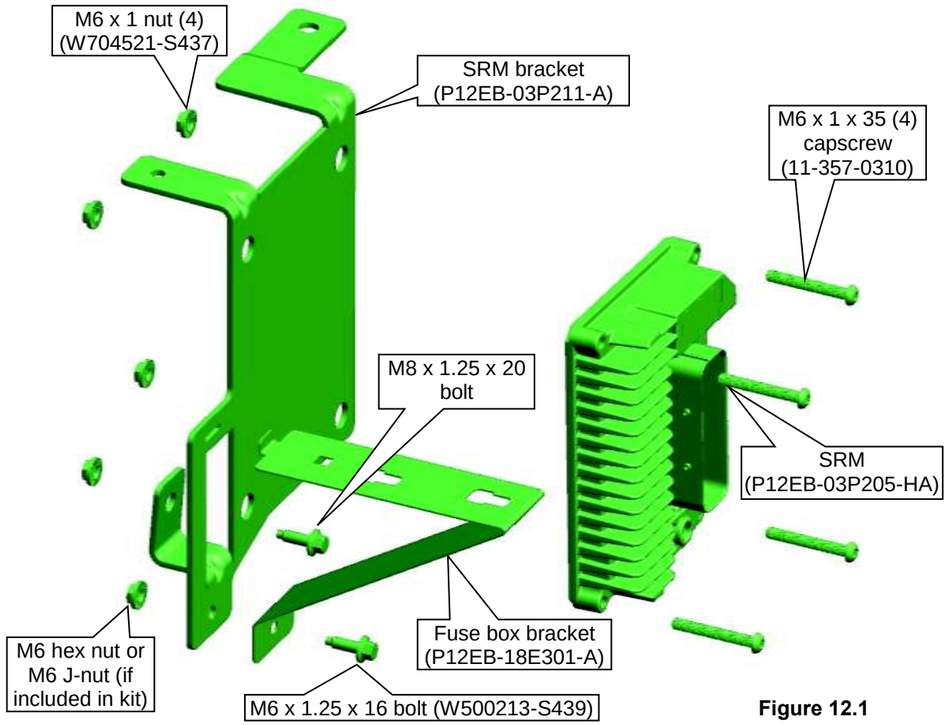


Figure 12.1

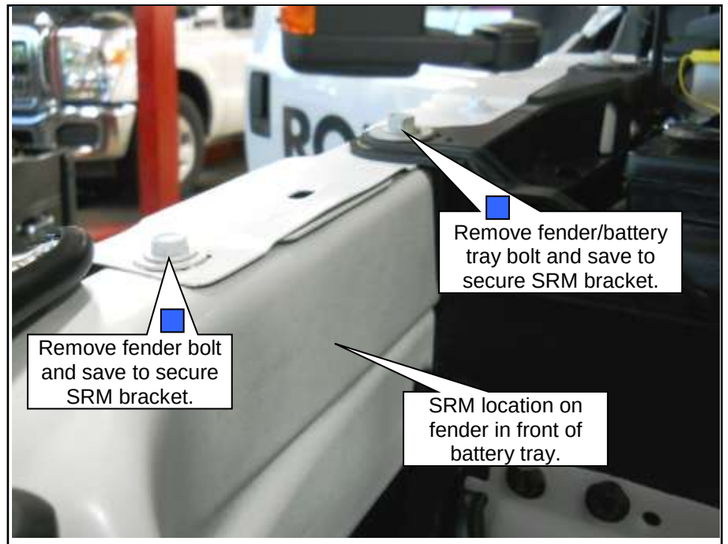


Figure 12.2

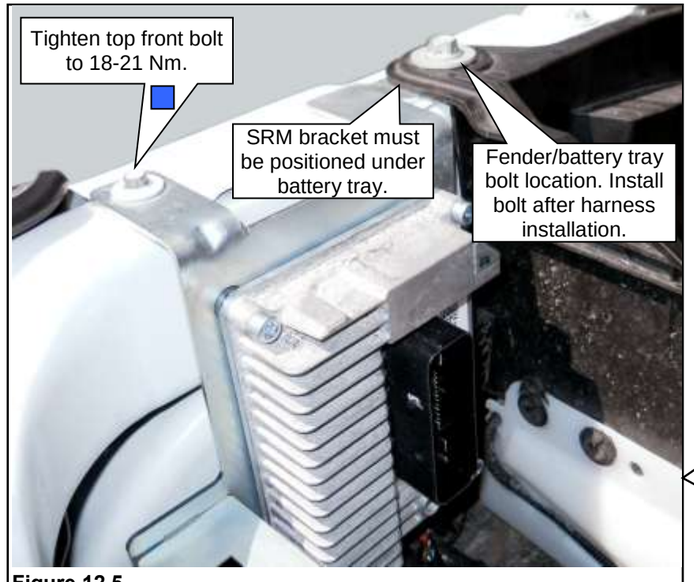


Figure 12.5

Figure 12.4

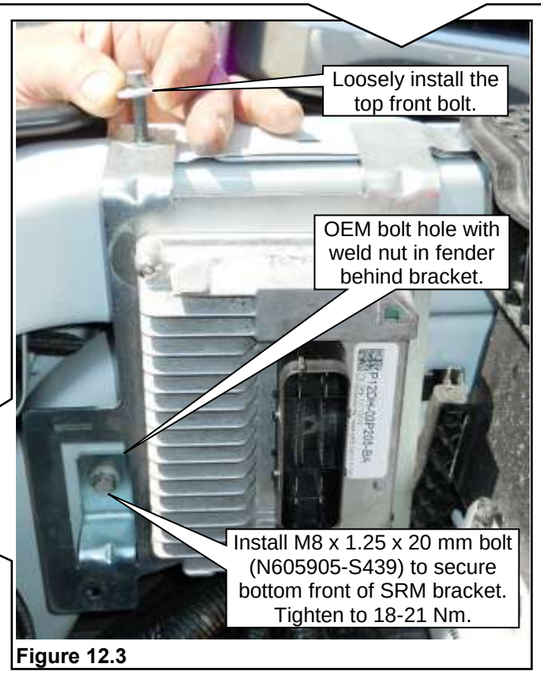


Figure 12.3

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 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.
7. Route the CAN bus harness from the radio opening onto the top and to the right of the HVAC unit. **Figures 13.6**.

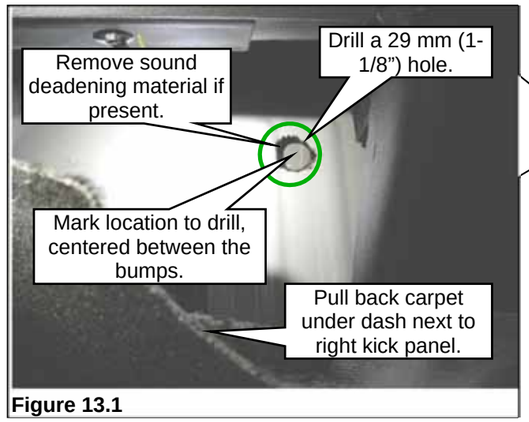


Figure 13.1

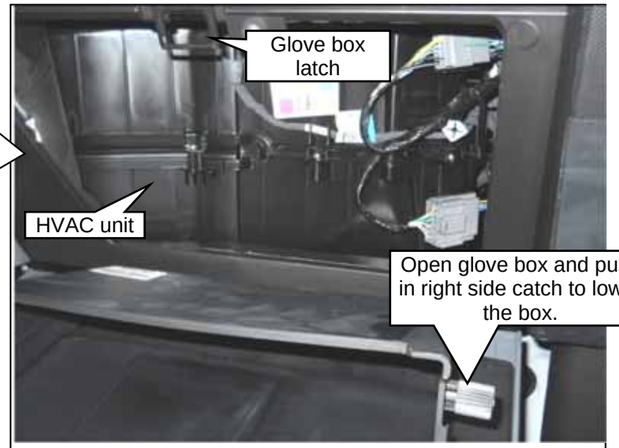


Figure 13.2

Figure 13.3

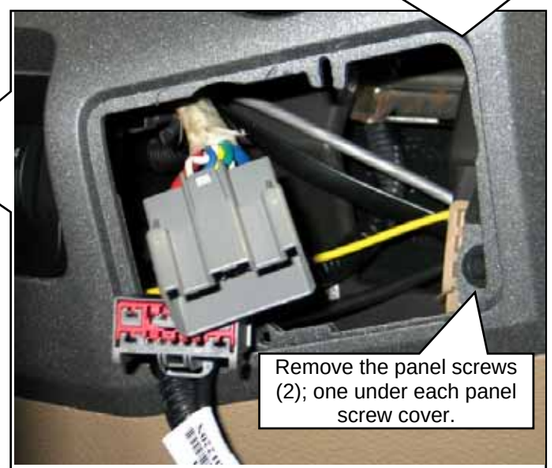


Figure 13.4

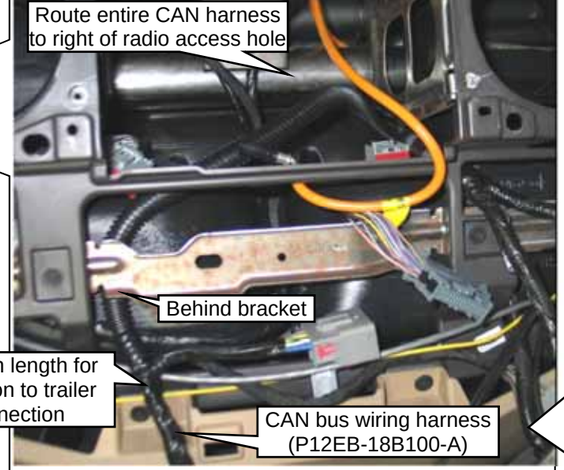


Figure 13.5

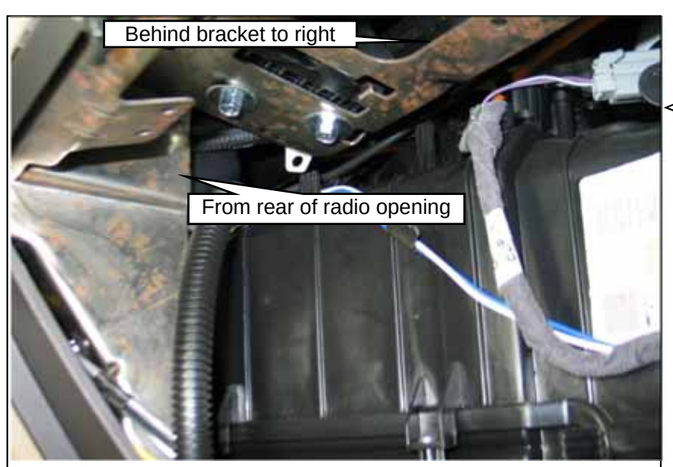


Figure 13.6

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.
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.
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 14.5**. 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).

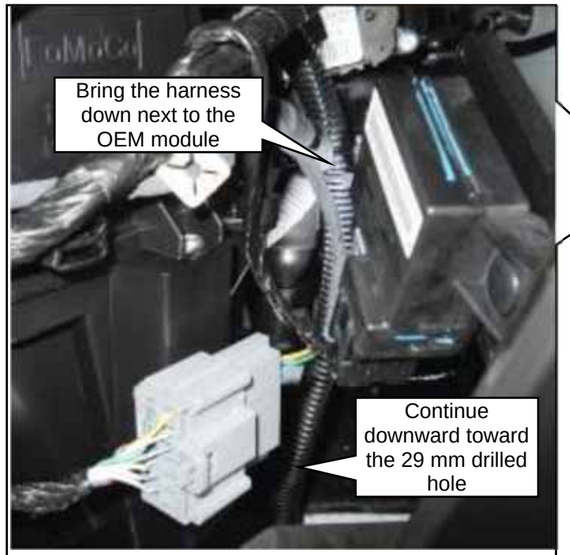


Figure 14.1

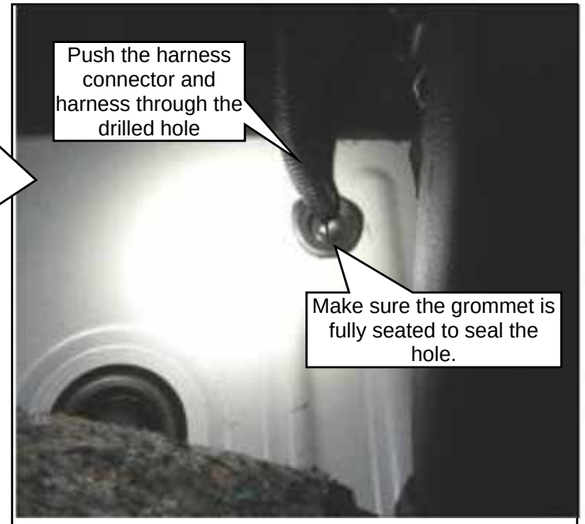


Figure 14.2

Figure 14.3

Figure 14.5

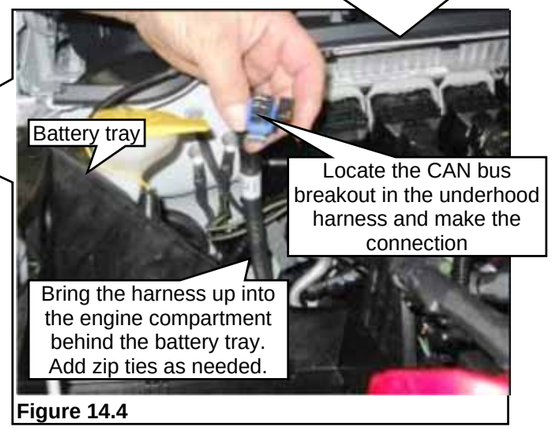


Figure 14.4

INSTALLING UNDERHOOD WIRING HARNESS

Note: All parts for installing the ROUSH CleanTech underhood harness are supplied in hardware kit P14EB-ELECKIT-A.

Note: Refer to Schematics and Wiring Harness section for Connector Layouts.

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**.

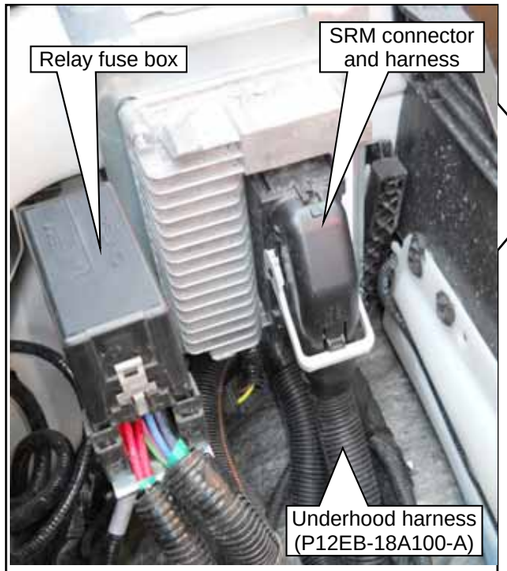


Figure 15.1

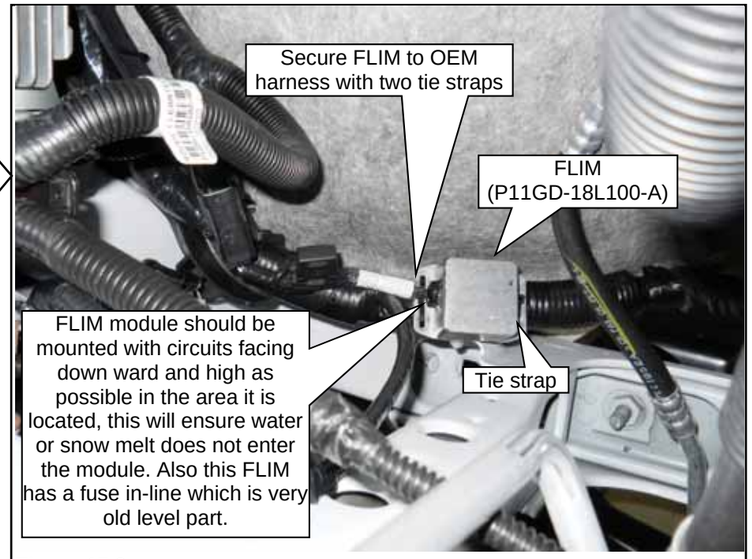


Figure 15.2

Figure 15.5

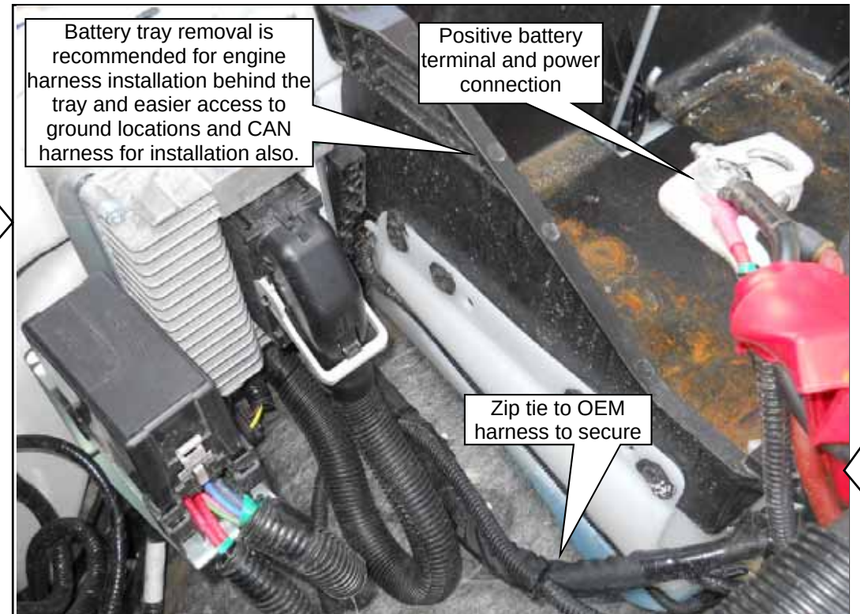


Figure 15.4

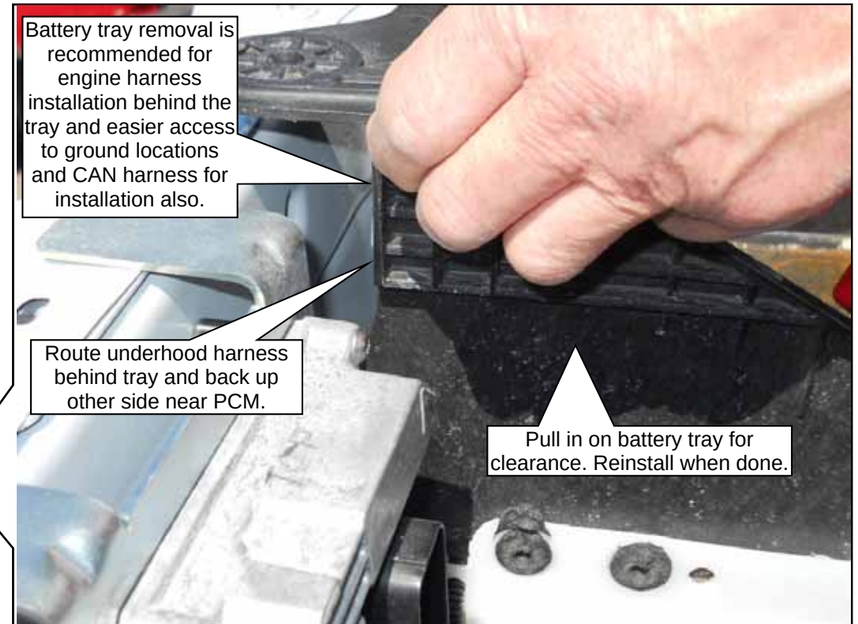


Figure 15.3

INSTALLING UNDERHOOD WIRING HARNESS (CONTINUED)

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. Use a zip tie to secure the harness of the inner PCM connector. Zip tie the harness to the bracket in place of the OEM push-pin. **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**.

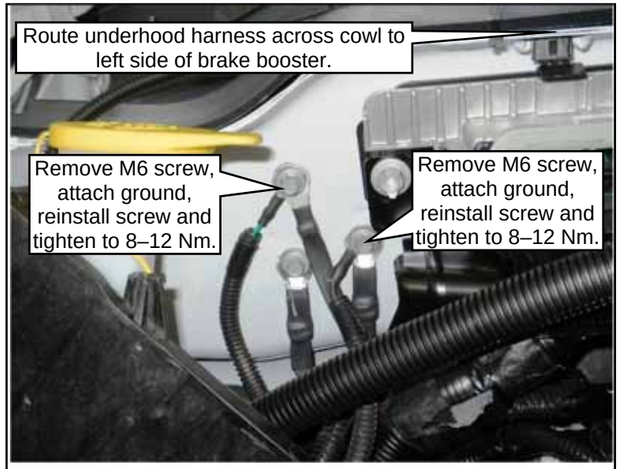


Figure 16.1

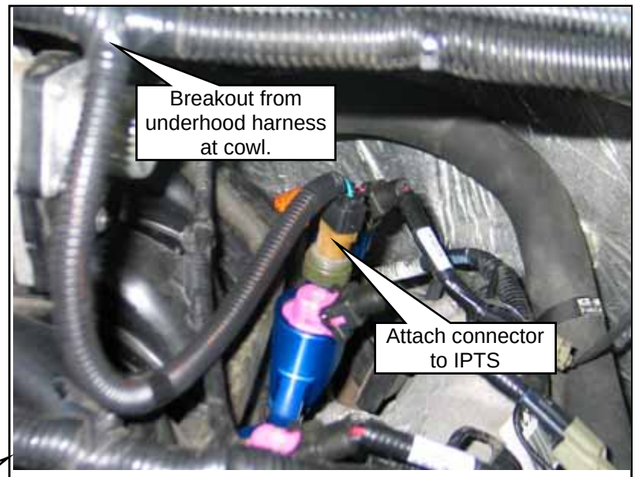
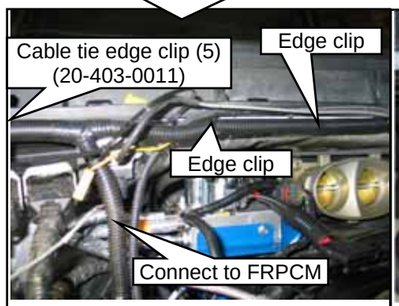


Figure 16.3



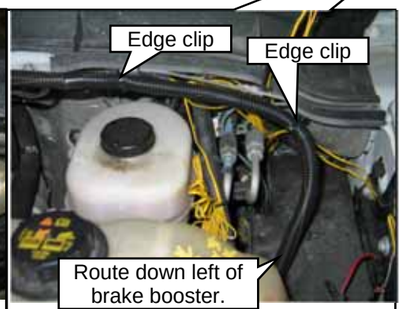


Figure 16.2

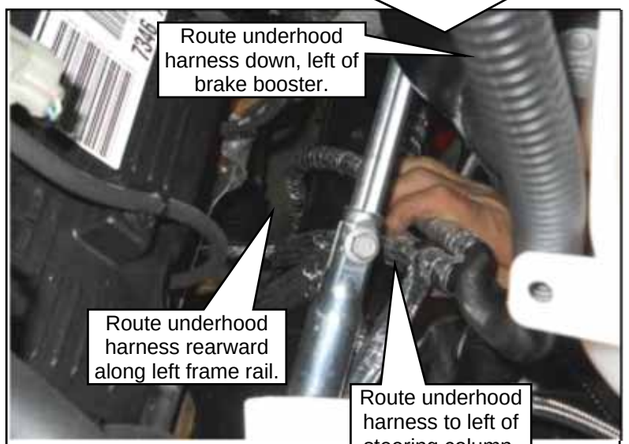


Figure 16.4

Figure 16.8

Figure 16.7

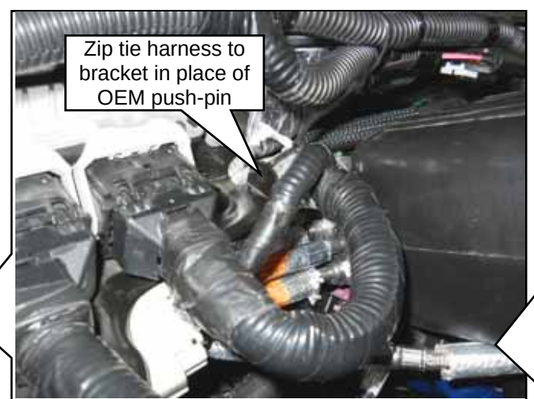


Figure 16.6

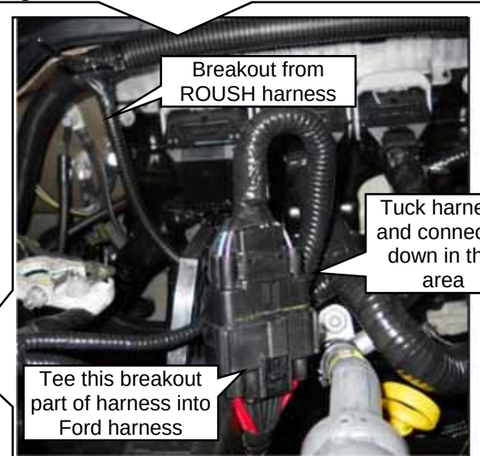


Figure 16.5

PARKING BRAKE CABLE RELOCATION

The brake cable must be rerouted to accommodate the new tank.

NOTE: Due to body mounting variance, clearance issues may exist. Make sure the parking brake cable does not interfere with the body mounting hardware. Contact the appropriate body builder for more detailed instructions on moving and/or modifying body mounting hardware.

1. Release tension on the brake cable and remove the cable from frame bracket. Refer to the Ford Workshop Manual, Section 206-05, Parking Brake and Actuation. Disconnect the OEM park brake cable standoff wire. **Figure 17.1**.
2. From the inside of the frame rail, install the 2 bolts down through the existing holes in the frame rail. **Figure 17.2**.

NOTE: Depending on the vehicle configuration, the vapor canister may be located at the new brake cable bracket mounting location. In such case, remove the nut from the vapor canister mounting bolt along the frame rail. Use the vapor canister bolt in the rear hole of the brake cable bracket. **Figure 17.3**.

3. Install the bracket through the bolts against the underside of the frame rail. Install the nuts and tighten to 20-30 Nm.
4. Install the brake cable through the hole in the bracket.
5. Position the brake cable standoff wire to the bracket. Install the retainer bolt and tighten to specification. **Figure 17.4**.

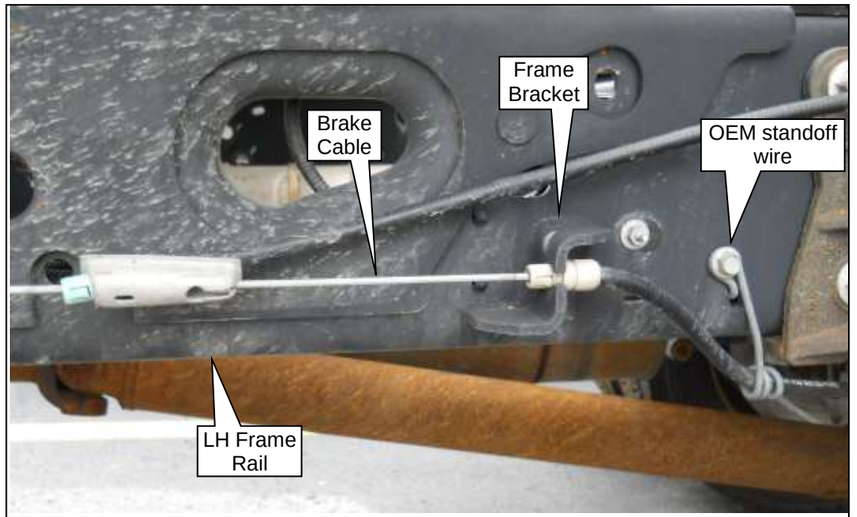


Figure 17.1

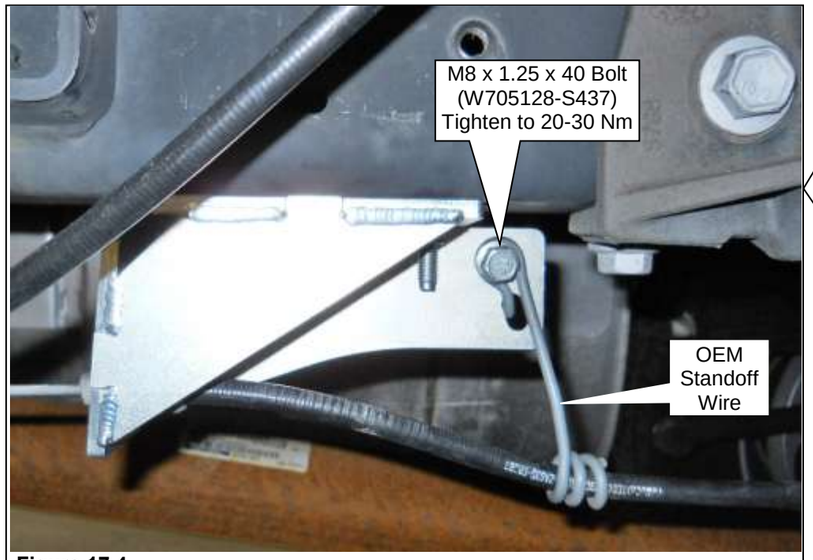


Figure 17.4

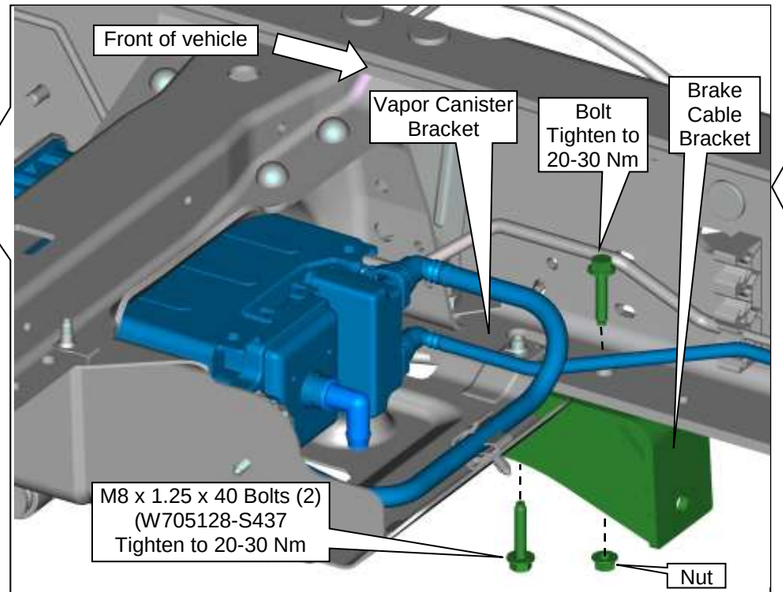


Figure 17.3 – Brake Cable Bracket - OEM aft axle tank

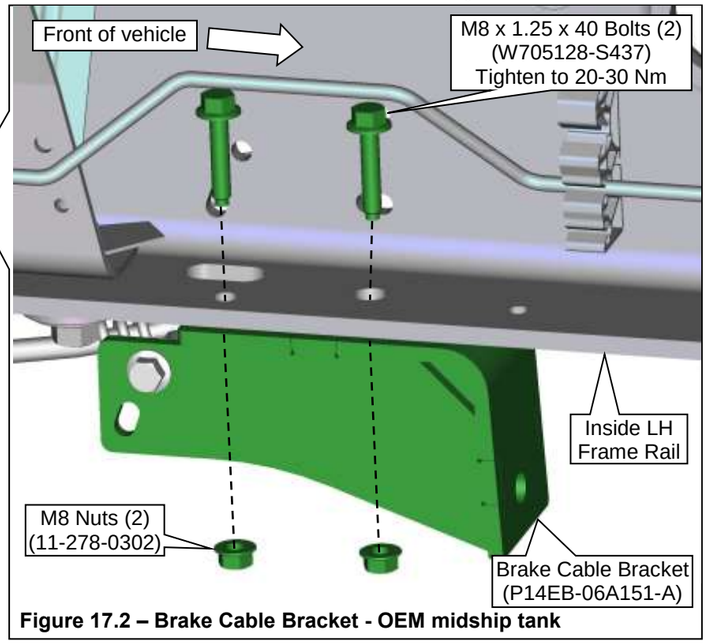


Figure 17.2 – Brake Cable Bracket - OEM midship tank

PARKING BRAKE CABLE RELOCATION (CONTINUED)

7. To install the front support plate, place the brake cable mounting plate in mounting position against the cab-to-frame rail mounting bracket.
8. Temporarily secure the plate with a mounting bolt and nut.
9. Thread the brake cable temporarily through the hole in the plate. Reconnect the cable to the lever assembly. Set the brake cable tension. Refer to the Ford Workshop Manual, Section 206-05, Parking Brake and Actuation.
10. Position the plate so the brake cable passes STRAIGHT through the hole. The cable must not be side loaded or contact any other surfaces.
11. Using the plate as a template, mark the cab-to-frame rail bracket for drilling an additional mounting hole.
12. Remove the plate from its mounting position. Drill the hole through the cab-to-frame rail bracket. Spray the area with Ford-approved rust preventative.
13. Reinstall the plate with the brake cable against the cab-to-frame rail bracket. Secure it in operating position with mounting bolts and nuts and torque to specification.
14. Engage and release the parking brake cable 3 times and check the parking brake operation. Refer to the Ford Workshop Manual, Section 206-05, Parking Brake and Actuation for proper procedures.
15. Recheck parking brake cable to verify cable moves freely and does not contact other installed component parts.

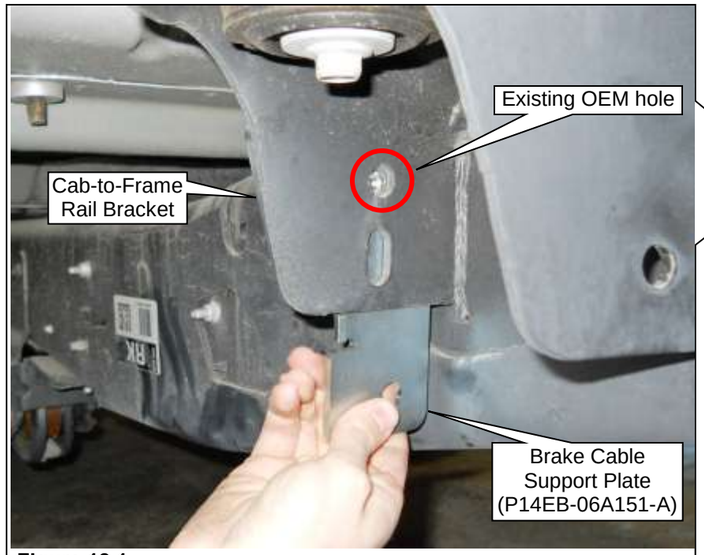


Figure 18.1

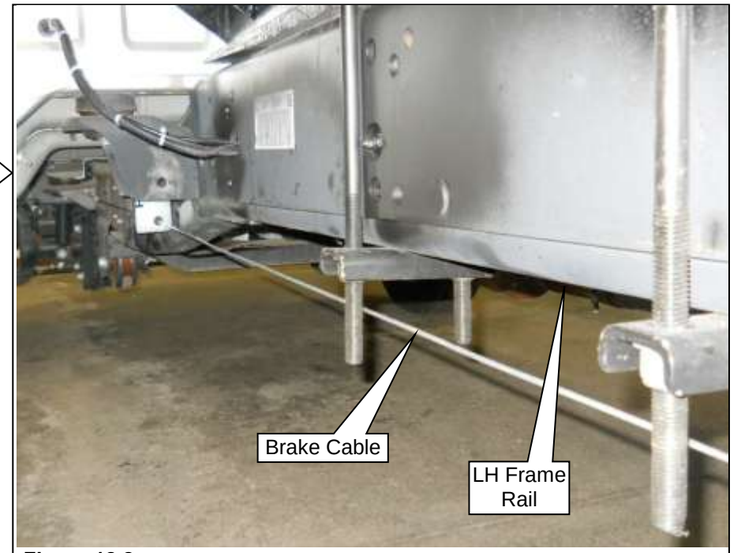


Figure 18.2

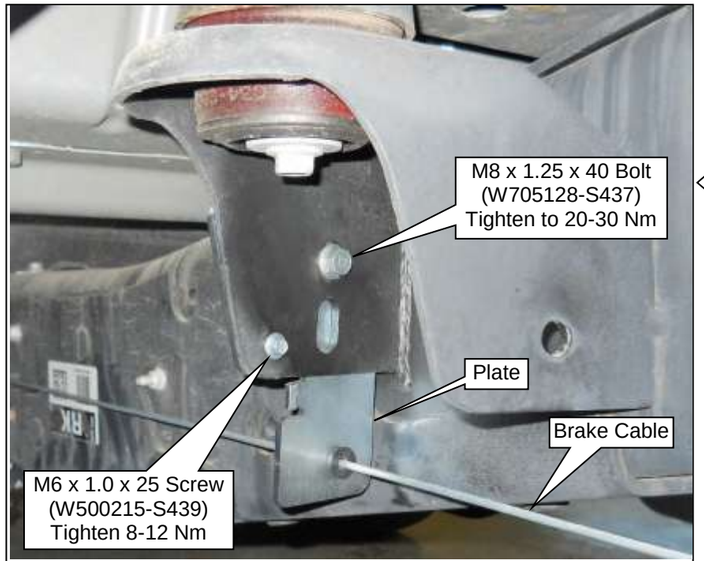


Figure 18.5

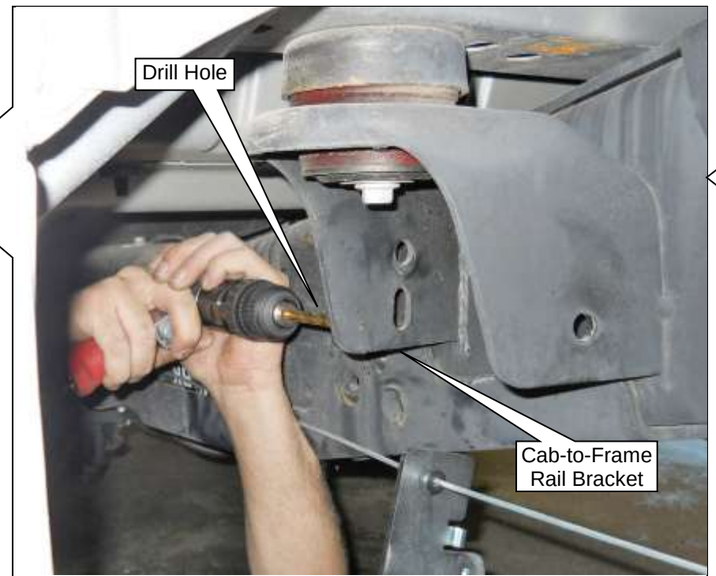


Figure 18.4

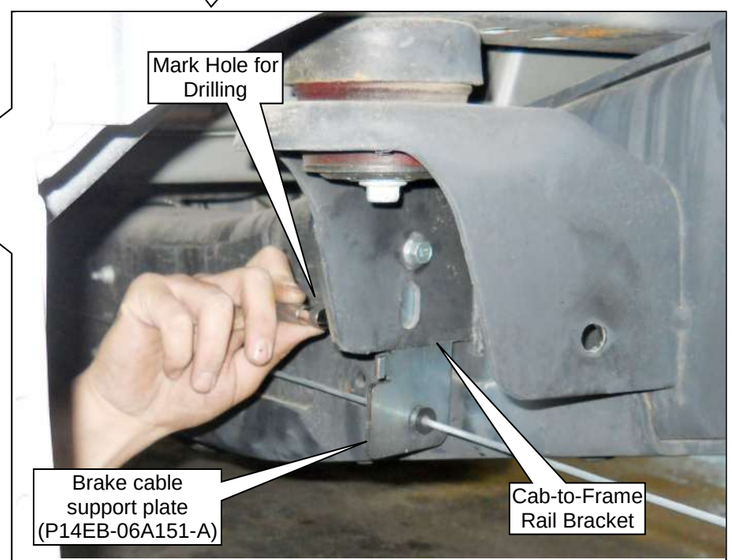


Figure 18.3

PREPARING FOR TANK MOUNTING

Use Measurements to Locate Drilling Locations for Tank Mounting

1. Locate the OEM preexisting holes in the frame. **Figure 19.1**.
2. Align the supplied template to the OEM preexisting hole to determine the center of the drilling locations. If a template is being used, magnets can be utilized to hold the template in position on the frame. **Figure 19.2**.
3. Mark the drill locations using a centerpunch or marking gauge.
4. Drill small pilot holes in each of the six (6) fuel tank mounting locations using a 1/8” drill bit.
5. Using a step bit or gradually increasing bit size, drill all tank mounting holes to 5/8” (16 mm).
6. Deburr and coat all bare metal using a premium undercoating. Refer to the *Special Tools* section.

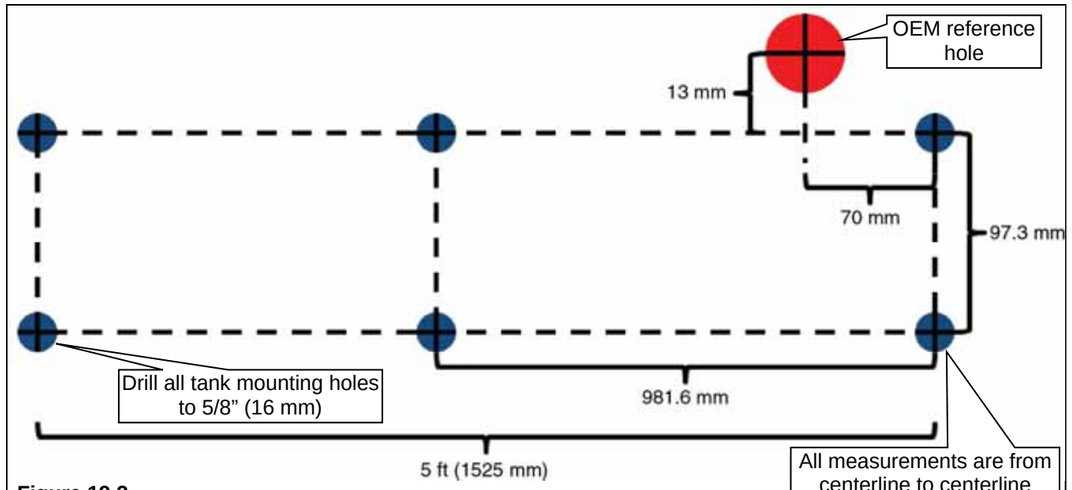


Figure 19.2

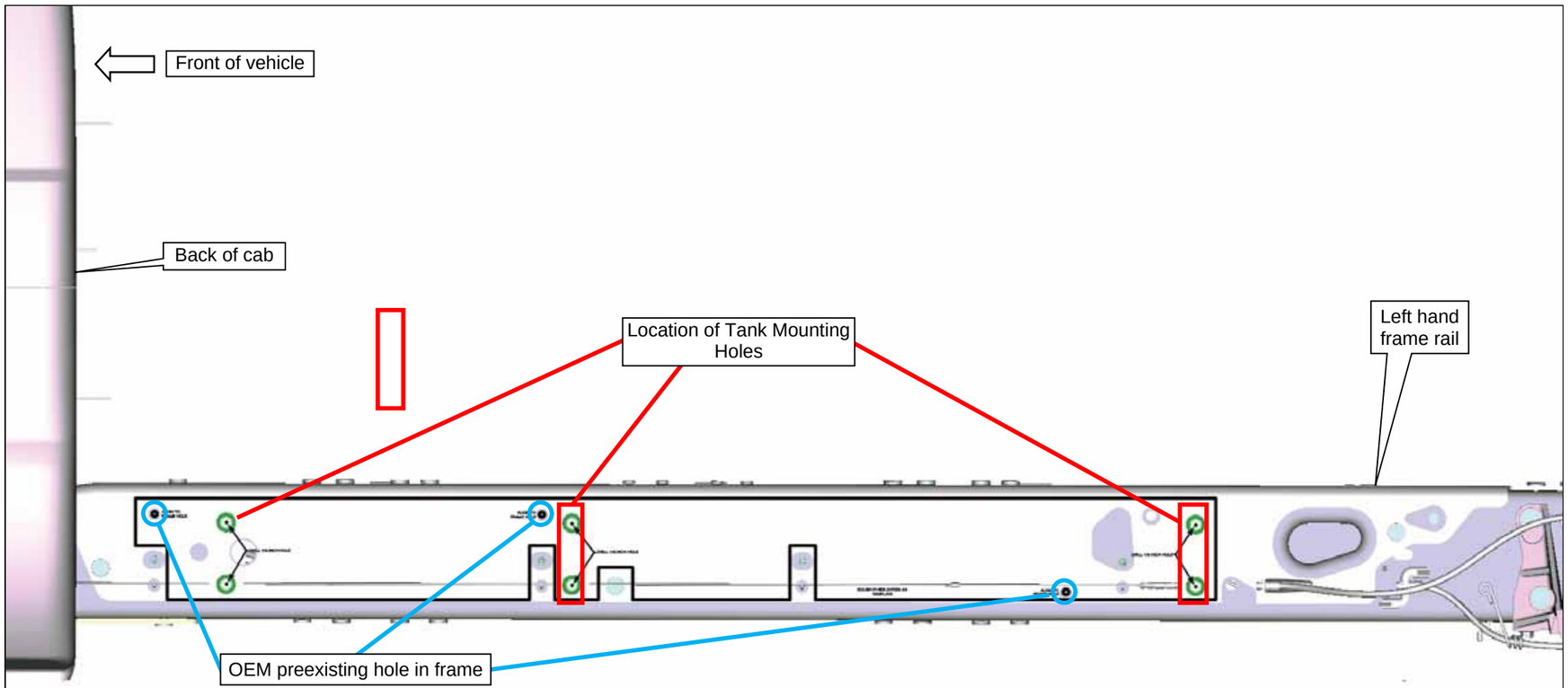


Figure 19.1

PREPARING FOR TANK MOUNTING (CONTINUED)

Installing EFPR – if originally equipped with Aft-Axle Gasoline Tank

7. 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 20.1**.
8. Drill the two marked bolt holes to 5/16” (8mm) and the EFPR locator marked hole to 1/4” (6 mm). **Figure 20.1**.
9. 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 P14EB-ELECKIT-A. **Figure 20.2**.

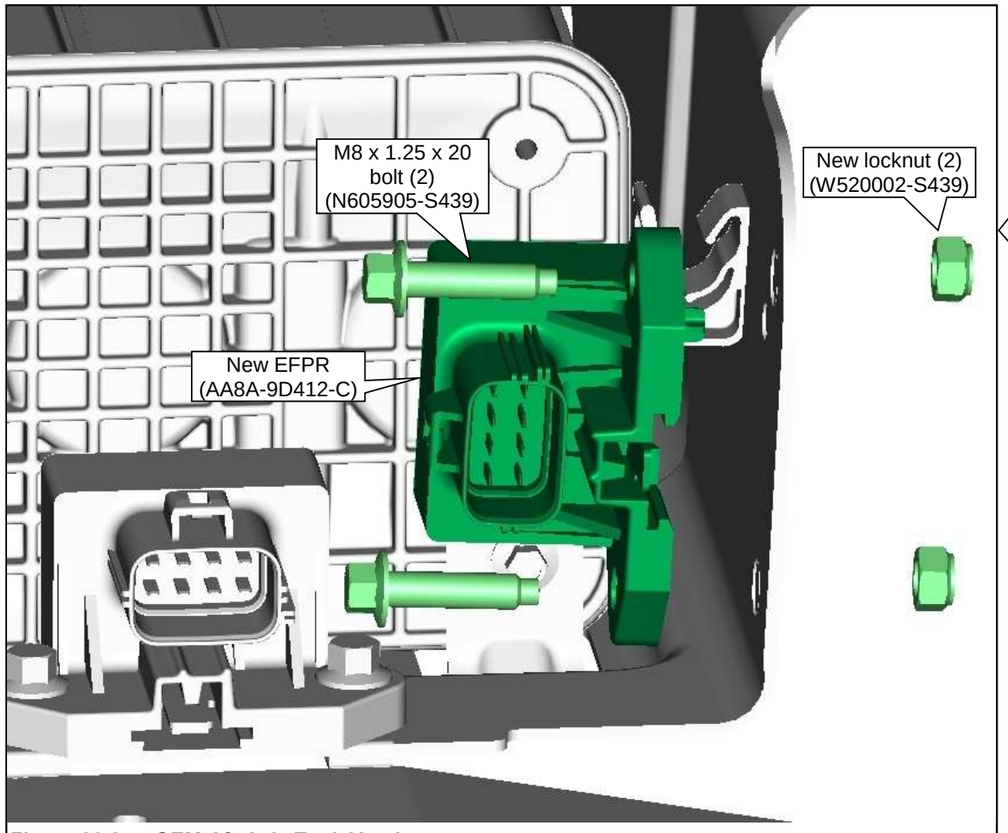


Figure 20.2 — OEM Aft-Axle Tank Version

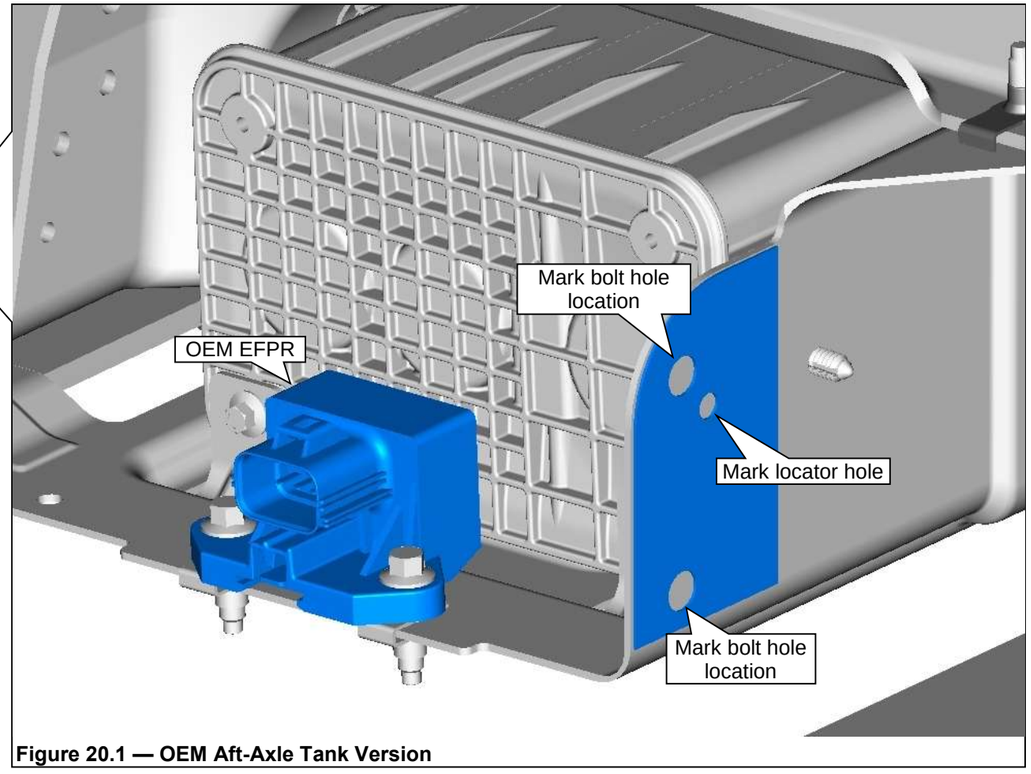


Figure 20.1 — OEM Aft-Axle Tank Version

PREPARING FOR TANK MOUNTING (CONTINUED)

Installing EFPR – if originally equipped with Mid-ship Gasoline Tank

10. Disconnect the electrical connector from the OEM EFPR. Remove the OEM EFPR from the mounting bracket. **Figure 21.1**..
11. Position the Roush and Ford EFPR to the new EFPR mounting bracket. Install the four (4) M6 bolts. Tighten to 7.6-10.4 Nm. The new EFPR, bracket and fasteners are supplied in hardware kit P14EB-ELECKIT-A.

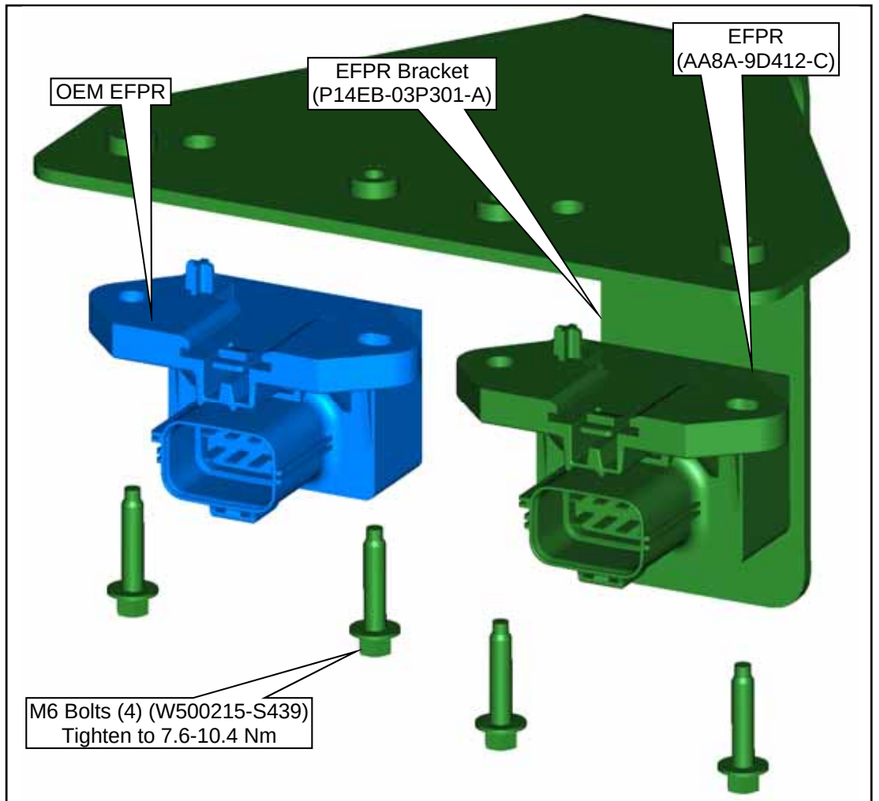


Figure 21.1 — EFPR Mounting – if originally equipped with Mid-ship Gasoline Tank

INSTALLING THE NEW FUEL TANK

NOTE: The tank mounting hardware (**Figure 21.1**) is the same for all of the mounting holes of each bracket. The mounting hardware is found in hardware kit P14EB-TANK-A.

1. Assemble the isolators and crush limiters onto the tank mounting brackets. **Figure 22.1**.
2. Use a suitable lifting device and position the fuel tank to the left frame rail. Align the six mounting holes in the tank brackets with the mounting holes in the frame rail. **Figure 22.2**.
3. Carefully position the tank assembly to the frame rail until the tank (and hardware) is aligned with frame mounting holes. **Figure 22.2**.
4. Place the three doubler plates in position against the inside of the frame rail. **Figure 22.1**. If originally equipped with mid-ship gasoline tank, position the EFPR and bracket assembly against the doubler plate at the forward most tank mounting position. **Figure 22.3**. Install the M12 x 1.75 x 110 mm bolts with washers through the holes in the doubler plate. Slip the inner bracket washers into position between the frame and mounting isolator. Continue installing the bolts through the holes in the tank mounting brackets. **Figure 22.1**.
5. Install the six M12 x 1.75 mounting nuts, one each onto the M12 bolts. Thread the nuts onto the bolts hand tight. Tighten the fasteners to specifications. **Figure 22.1**.

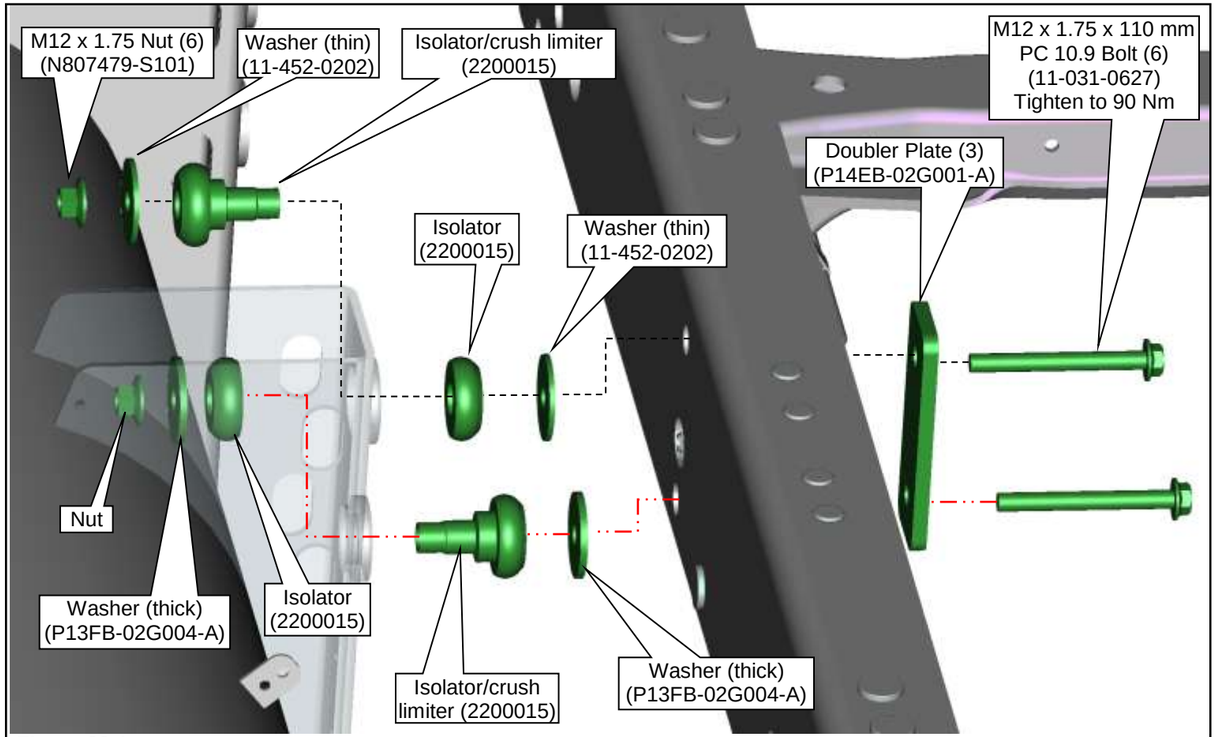


Figure 22.1

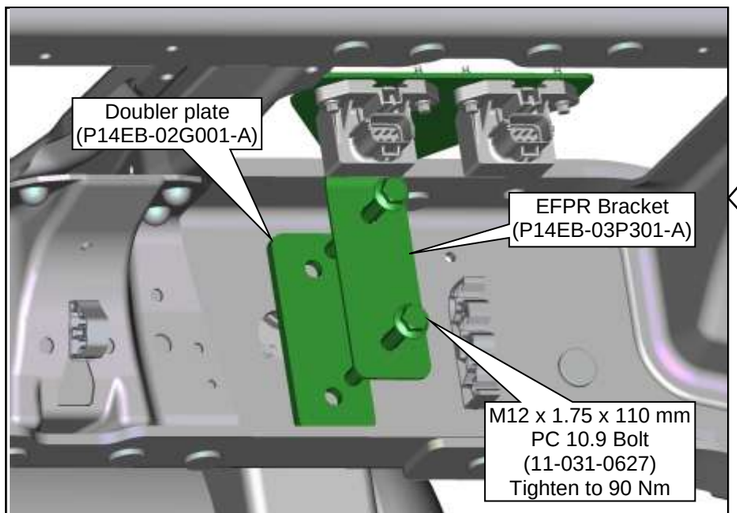


Figure 22.3 — EFPR/Bracket Location – if originally equipped with Mid-ship Gasoline Tank

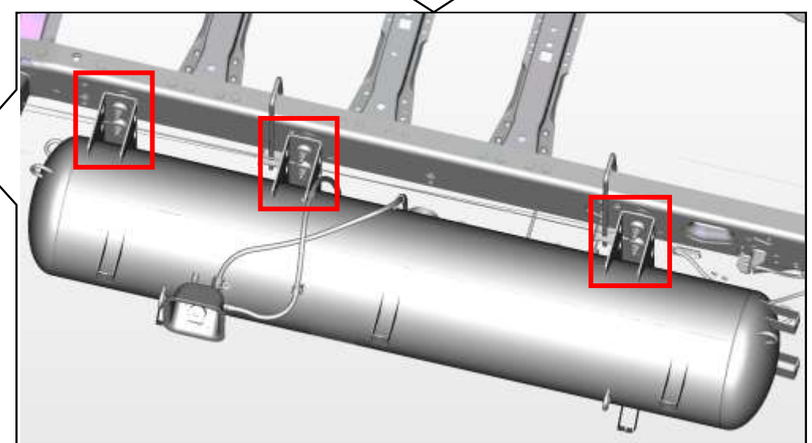


Figure 22.2 — Tank to Frame Mounting

INSTALLING THE NEW FUEL TANK (CONTINUED)

6. Install the two (2) J-clips to the fuel filter bracket mount on the fuel tank. Position the fuel filter bracket with clamp and install the two M6 x 1.0 x 16 mm bolts. Tighten to specification. **Figure 23.1**.
7. Unscrew the worm clamp so that the filter can be installed. Orient the clamp so that it can be easily tightened.
8. 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 23.2**.

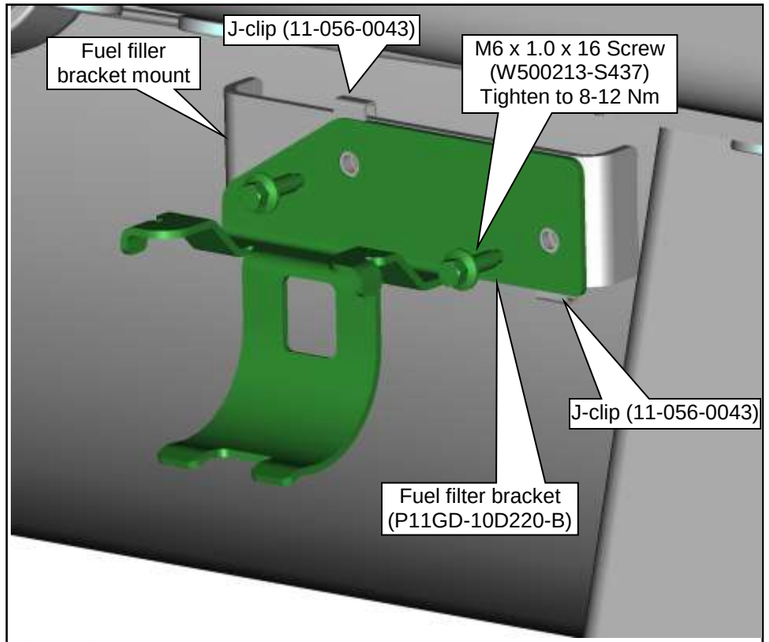


Figure 23.1

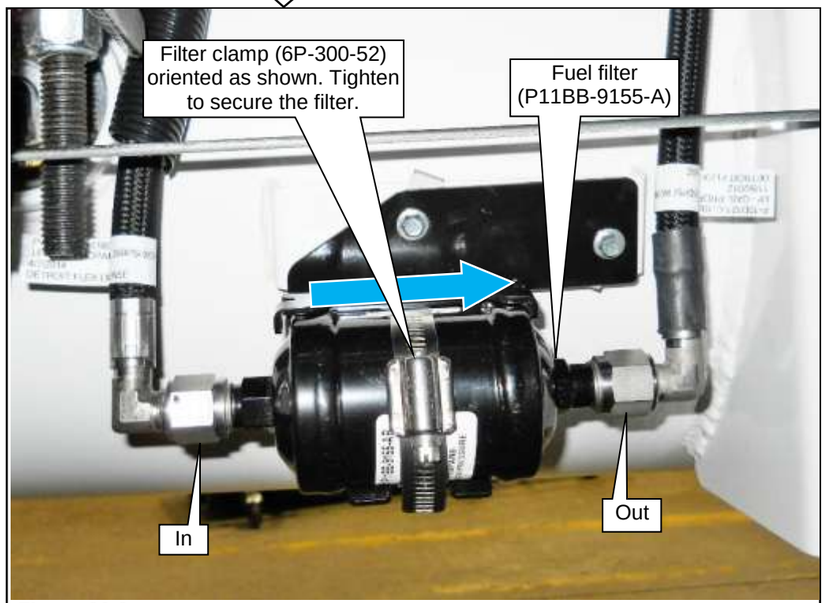


Figure 23.2

INSTALLING THE NEW FUEL TANK (CONTINUED)

9. 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 24.1**. These parts are in hardware kit P11GD-FILLKIT-A and P14EB-FILLKIT-A.
10. Measure 22.5” (575 mm) from the back of the cab to establish the fuel filler assembly mounting bracket location. **Figure 24.2**.
11. Install fuel fill valve assembly to the body mounting bracket using three M5 x 16 mm bolts and washers. Tighten the bolts to 5–7 Nm. **Figure 24.3**.
12. Install the fuel fill line (P-10D121-C-1180) to the elbow attached to the fuel fill valve. Prior to tightening all connections, ensure the elbow is oriented such that the fill hose in not stressed, kinked or twisted. **Figure 24.4** and **24.5**. Route and secure the line to the fuel filter and tighten to specification. **Figure 24.5**.

NOTE: If your fill valve mounting location is not in the position noted here, contact ROUSH CleanTech for information on ordering alternate fill line lengths.

13. 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. Retain the line to the tank using p-clamps. **Figure 24.4**.

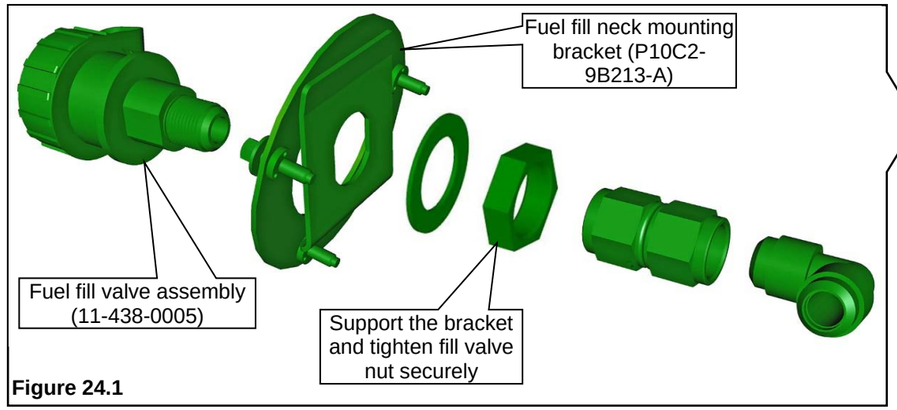


Figure 24.1

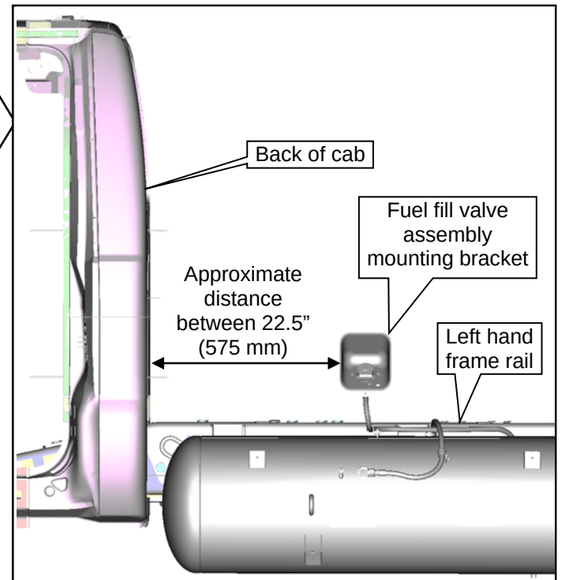


Figure 24.2

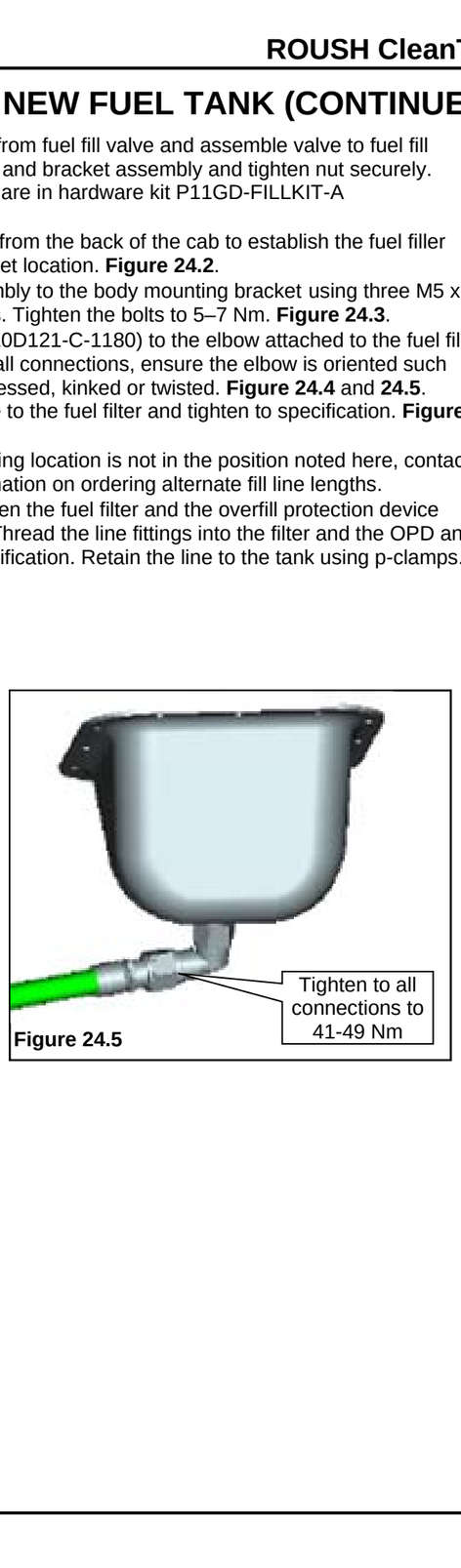


Figure 24.5

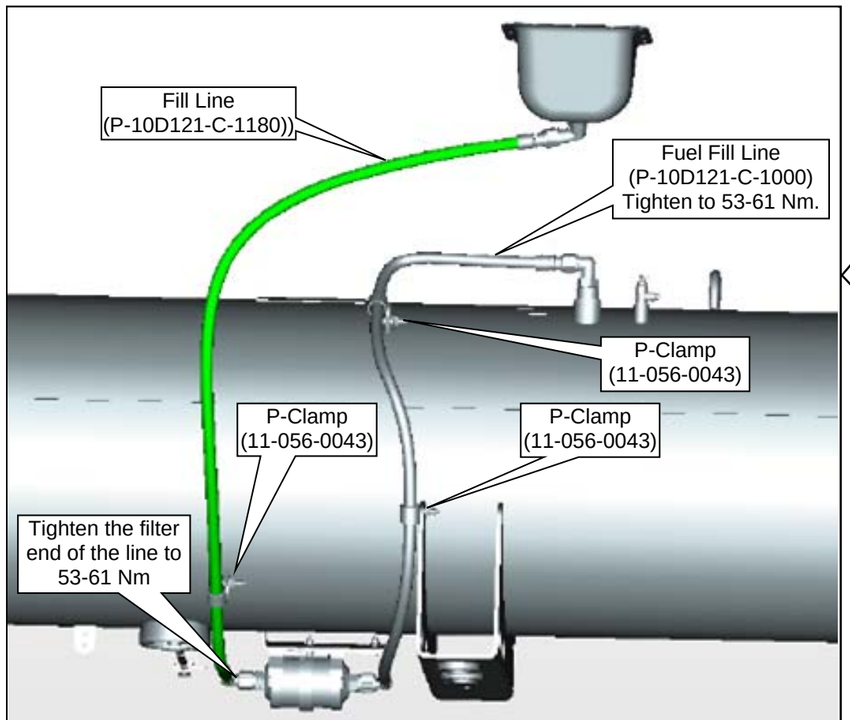


Figure 24.4

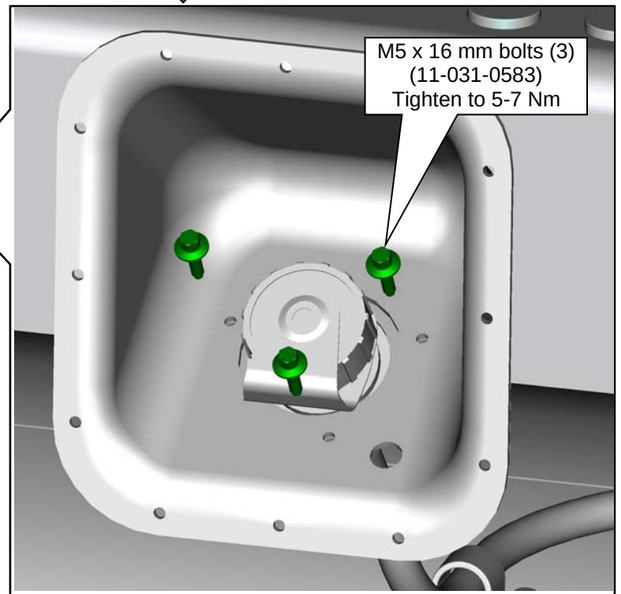


Figure 24.3

INSTALLING NEW REAR FUEL LINES

1. Attach fuel return line into OEM retaining clips (6) along frame rail and secure into place.
2. Attach the rear fuel supply line into the OEM retaining clips (6) along the frame rail and secure into place.
3. Connect the rear supply and return lines into the forward supply and return lines. Push the quick-connect fittings together and make sure the connections are secure.
4. 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.
5. Loosely install double zip tie to fuel supply and return lines. **Figure 25.1**.
6. Position and loosely install the L-bracket to the fuel tank. **Figure 25.2**.
7. Install the retaining bolt and nut through the double zip tie and the L-bracket. Tighten to specification.
8. Tighten the L-bracket to tank retaining fasteners to specification.
9. Install additional double zip tie to the flex portion of the fuel lines. **Figure 25.3**.

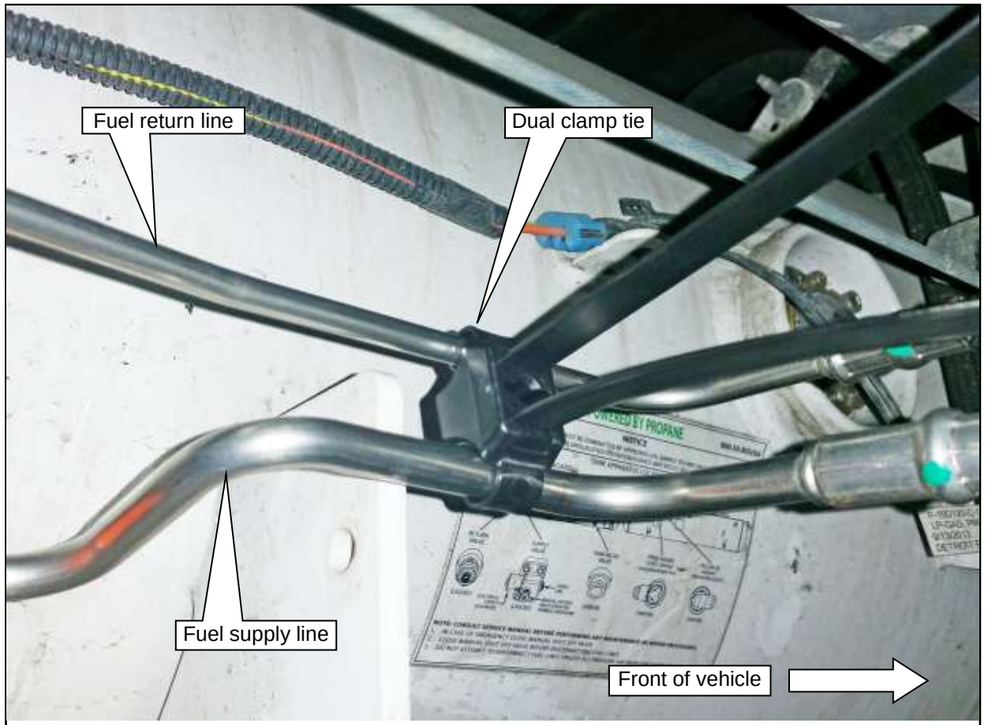


Figure 25.1

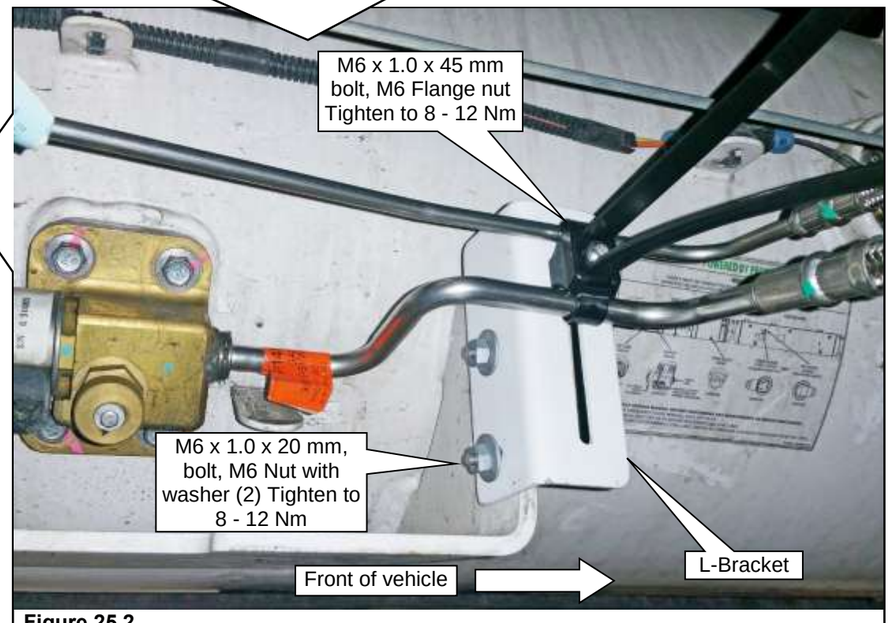


Figure 25.2

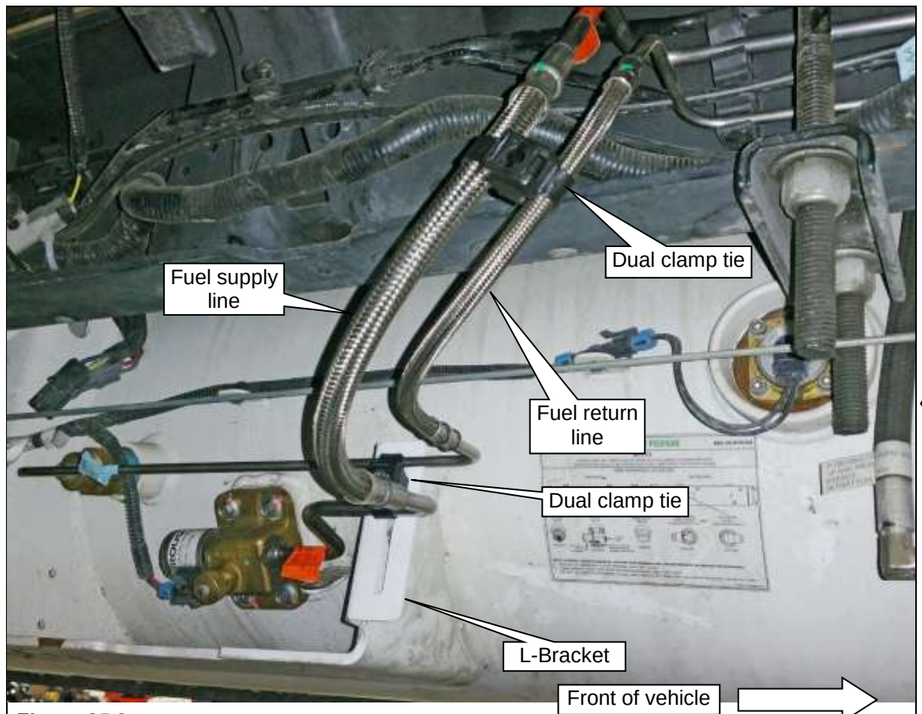


Figure 25.3

INSTALLING NEW REAR WIRING HARNESS

NOTE: It is recommended to route the entire harness and make sure all connections can be made before retaining the harness with zip ties.

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.
2. Connect the rear frame harness to the underhood harness and loosely zip tie to the OEM harness. **Figure 26.1.**
3. Route the rear frame harness along the OEM harness on the left frame rail. Drape the harness along the frame rail and under the crossmembers (View A). **NOTE:** Do NOT secure the harness with zip ties until all electrical connections have been made and the harness is routed correctly.
4. Plug in both EFPR connectors. Check to make sure the connectors are fully seated. **Figure 26.2.**
5. Connect the rear frame harness ground eyelets to the existing hole in the left frame rail using the supplied M6 x 1.0 x 16 screw and nut. Tighten to specification. **NOTE:** To make sure a good connection to ground is made, remove any paint or corrosion from the frame prior to connecting harness ground. **Figure 26.3.** Cover ground connection with dielectric grease to seal connection.

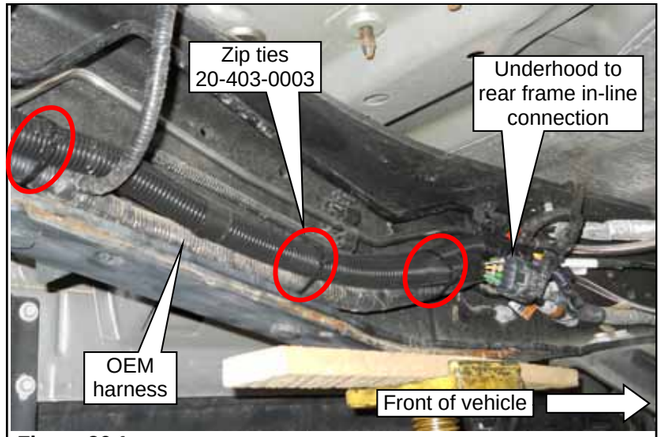


Figure 26.1

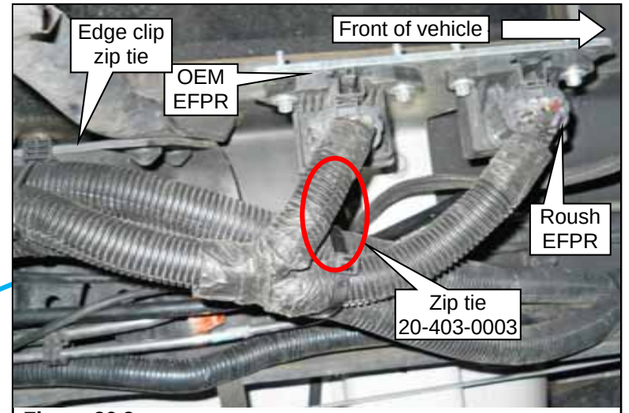
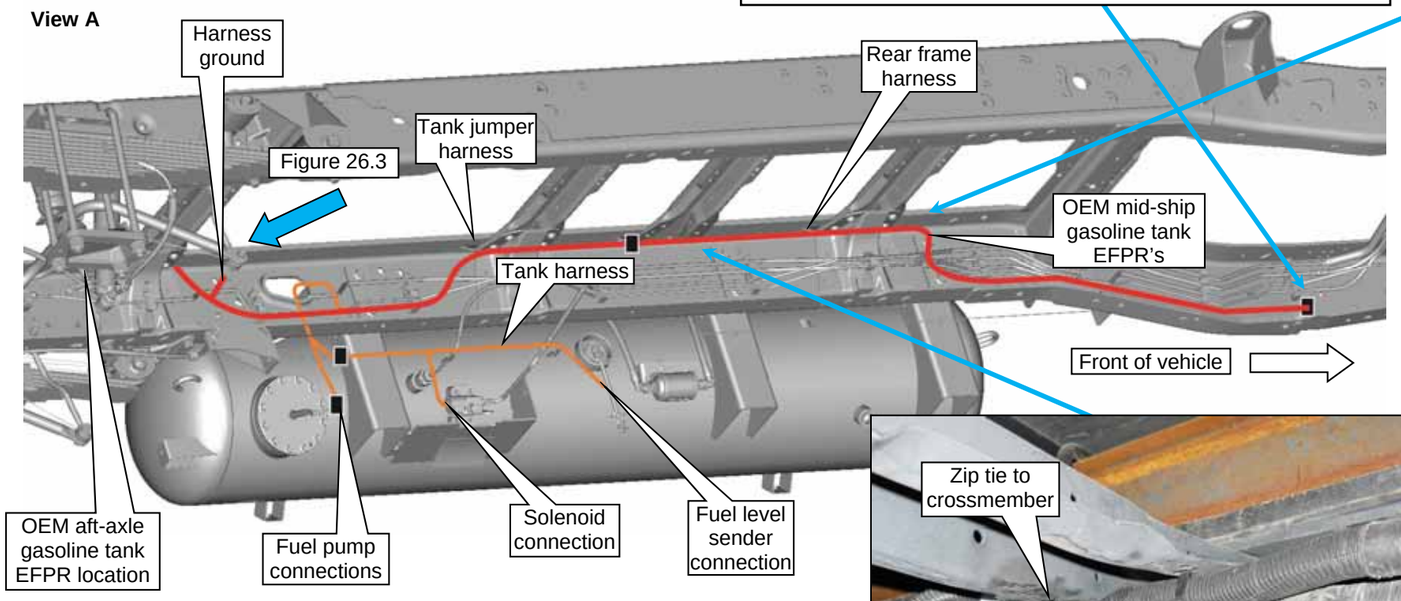


Figure 26.2 –
OEM Mid-ship fuel tank EFPR location



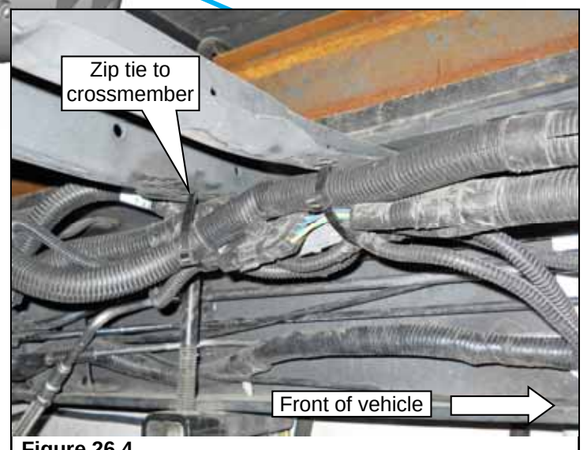


Figure 26.4

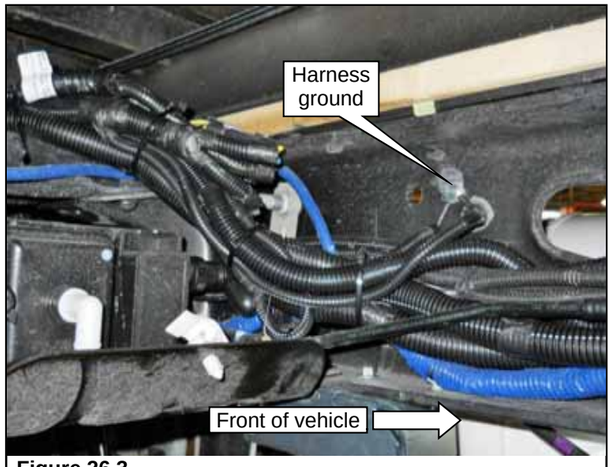


Figure 26.3

INSTALLING NEW REAR WIRING HARNESS (CONTINUED)

6. Connect the 3 inline connectors for rear frame and tank jumper harnesses. Then route tank jumper harness to the outside of the frame using the OEM gasoline fill pipe opening and continue alongside the rear most fuel tank mounting bracket. **View A**.
7. Connect tank jumper harness 4-pin connector to tank harness. Connect tank harness 2-pin connectors to fuel pumps. **Figure 27.2**.
8. Connect the tank harness electrical connectors to the supply valve solenoid and fuel level sender connectors. **Figure 27.1**. Zip tie harness to tabs.
9. Bundle any access wire harness and secure with zip ties. Secure the wire harness to the crossmembers at each location. **Figure 27.3** and **27.4**.

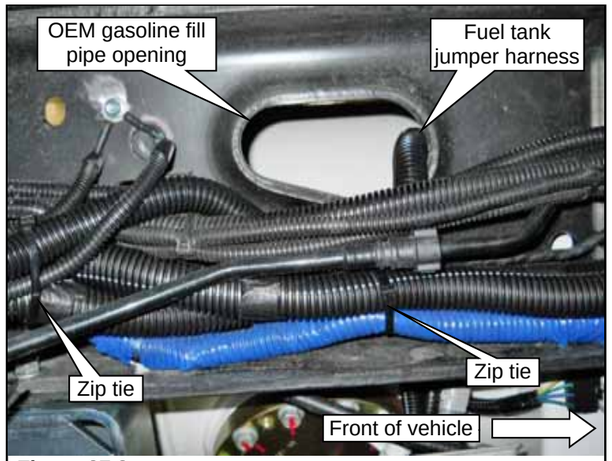


Figure 27.3

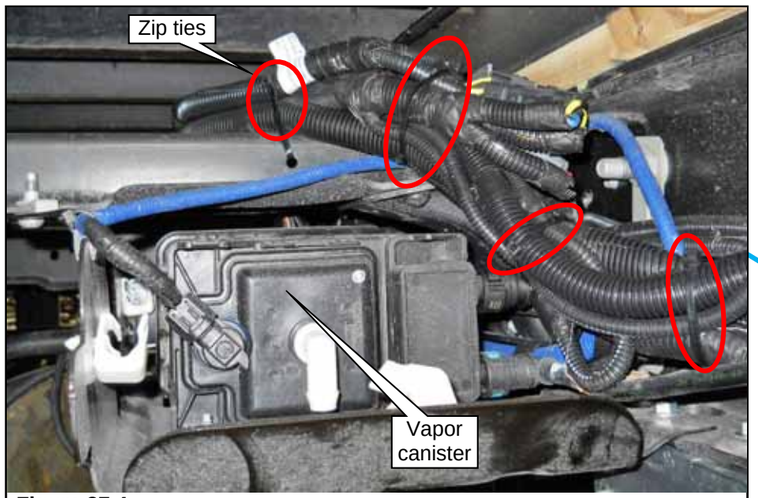
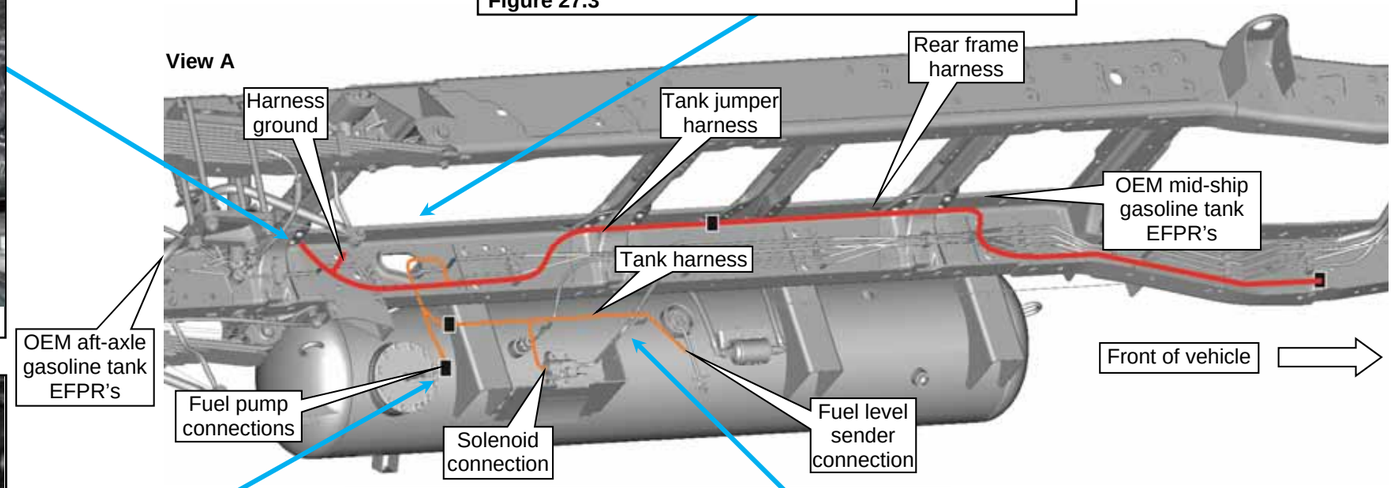


Figure 27.4

View A



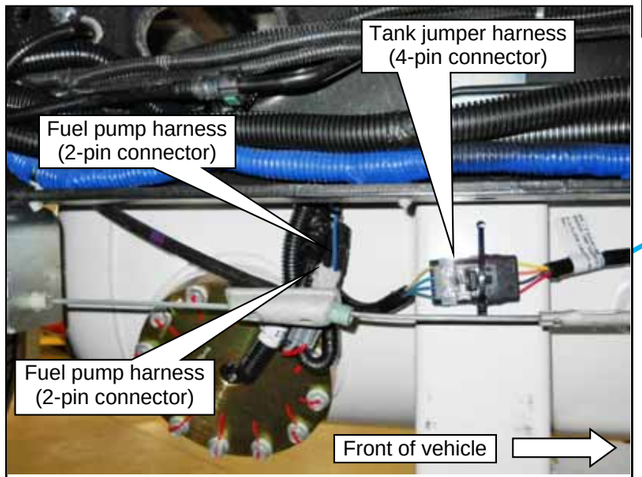


Figure 27.2

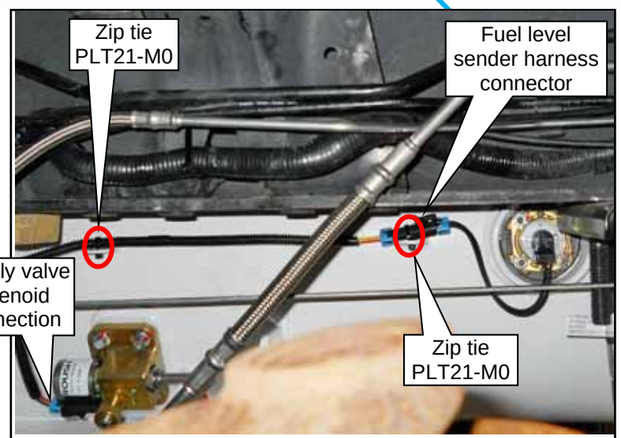


Figure 27.1

PLUGGING VAPOR CANISTER PORT AND SEALING FTPT CONNECTOR

1. Preassemble quick-connect fitting and vacuum cap found in hardware kit P12EB-VAPOR-A. **Figure 28.1**.
2. Install assembly onto vapor canister top front port or upper rear port. **Figures 28.2** and **28.3**. **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 28.4**.
   - 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.

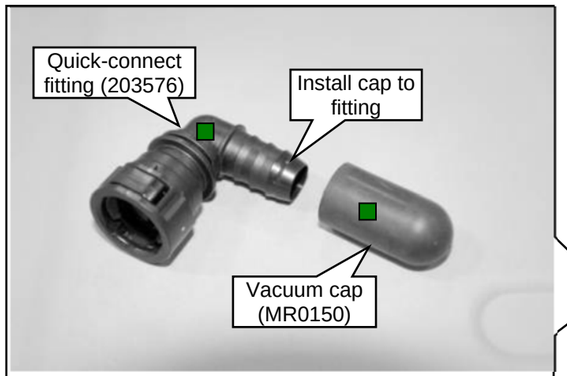


Figure 28.1

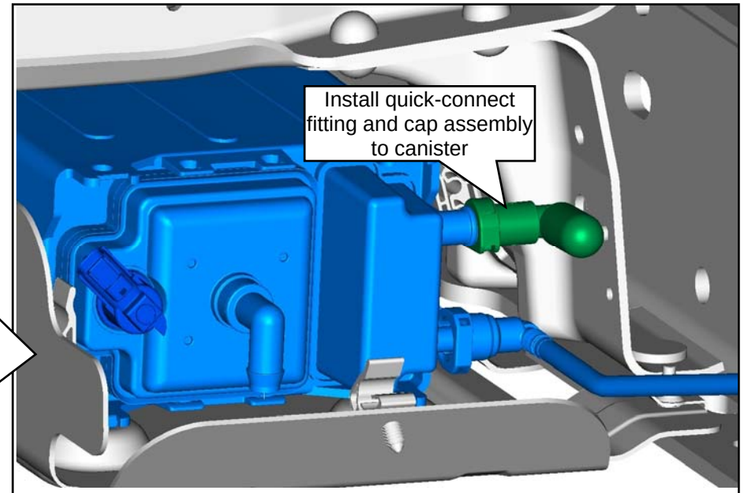


Figure 28.2 — OEM Aft-axle Tank Vapor Canister Location

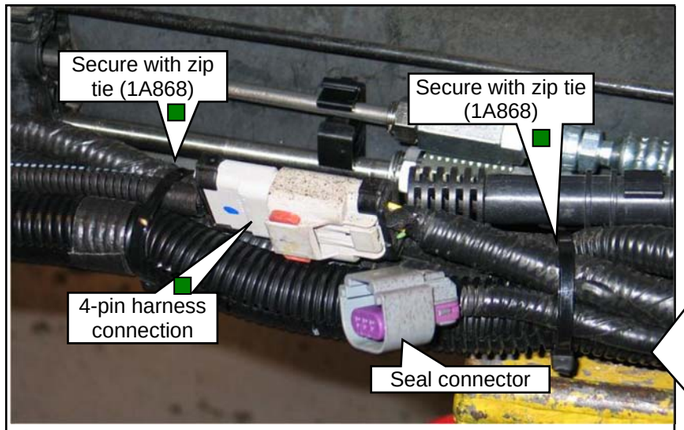


Figure 28.4

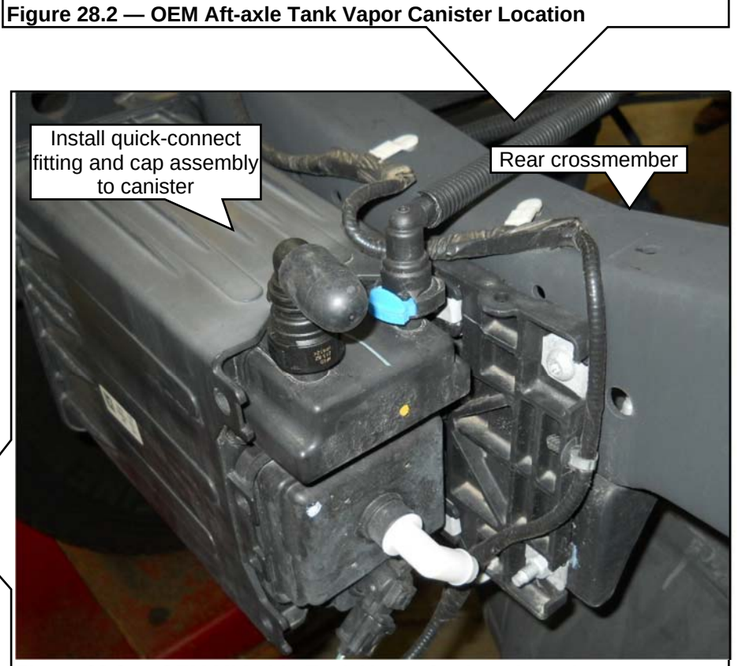


Figure 28.3 — OEM Mid-ship Tank Vapor Canister Location

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.

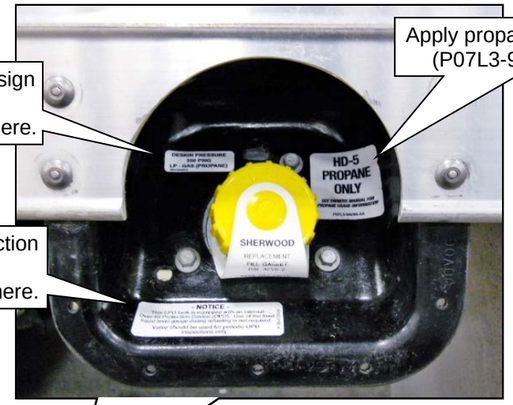
ROUSH	VEHICLE EMISSIONS CONTROL INFORMATION SUPPLEMENTAL LABEL 1 OF 2
Authorized to convert the following Ford Motor Co. Vehicles 2012 F-450/550/650 Incomplete & Stripped Chassis	
Engine MY: 2011	OEM Gasoline Test Group: BFMXE06.8BW5
This vehicle/engine is equipped with a Roush clean alternative fuel 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)

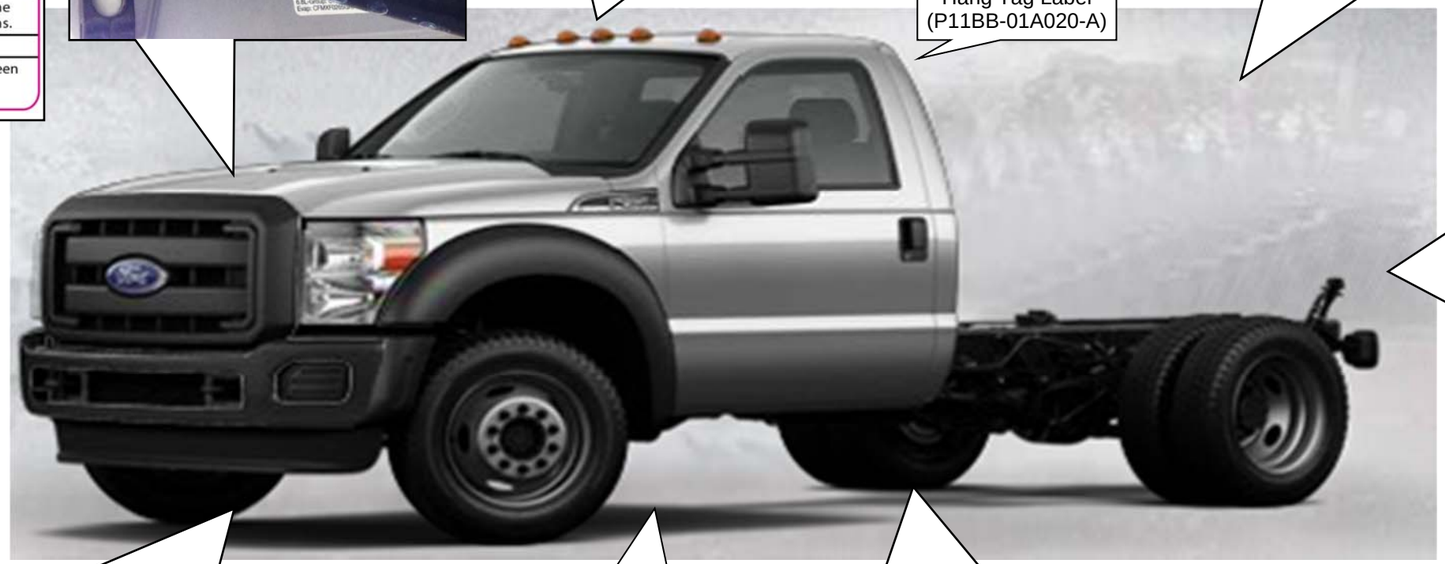
Apply 350 psig design pressure label (P07L3-9A095-I) here.

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 P14EB-LABELS-A.
2. Apply labels in locations shown.
3. Apply the ROUSH CleanTech VECI label to the location specified, adjacent to the Ford label on the inside of the hood. **Note:** These labels are vehicle-specific and are required by law to be applied to the vehicle to which they are assigned.

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

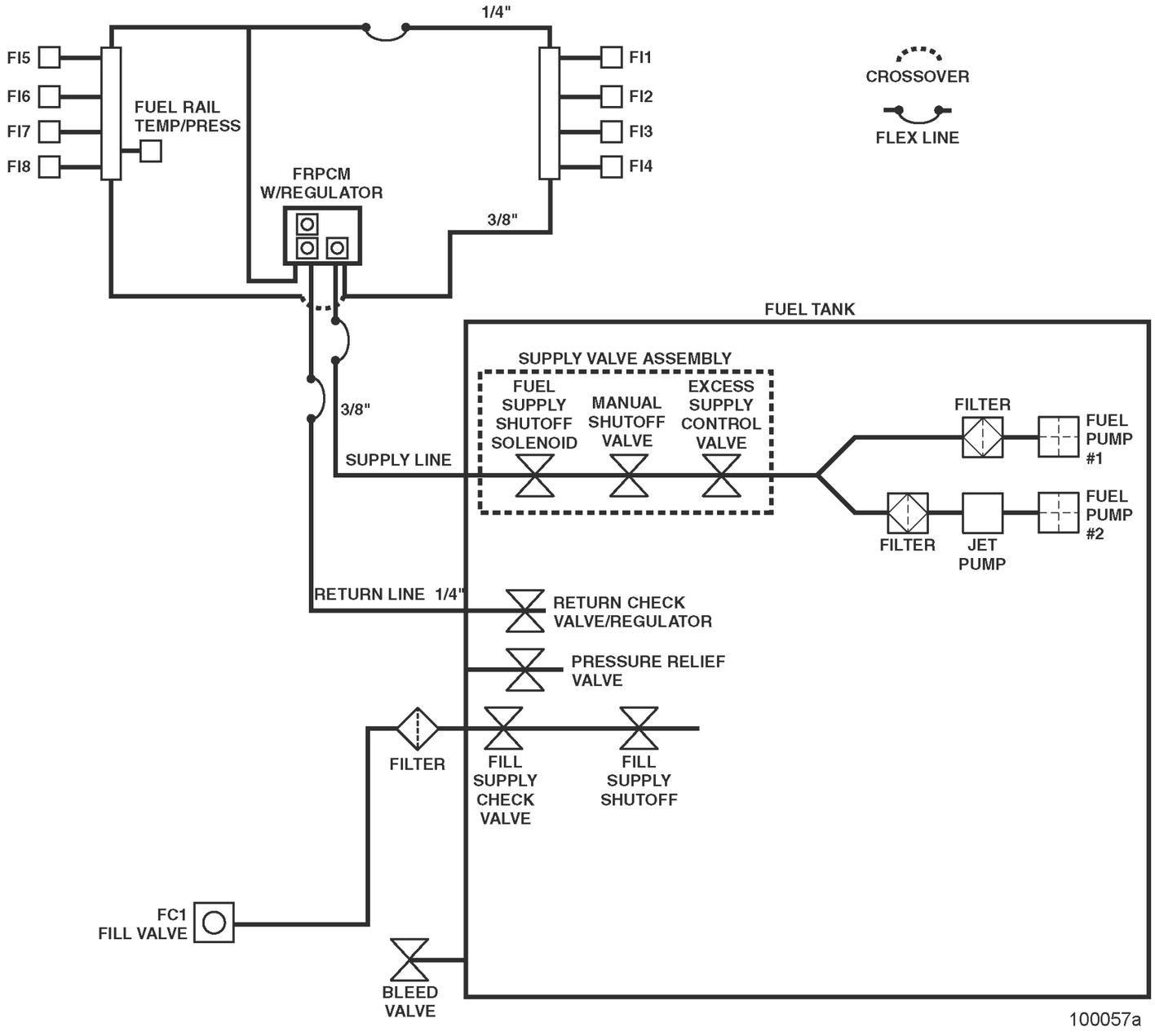
PCM Tamper Warning Label (R07100008-10-A) on knee bolster above OBDII diagnostic port

OPD Inspection Label (P07L3-9A095-CA) to end of driver door

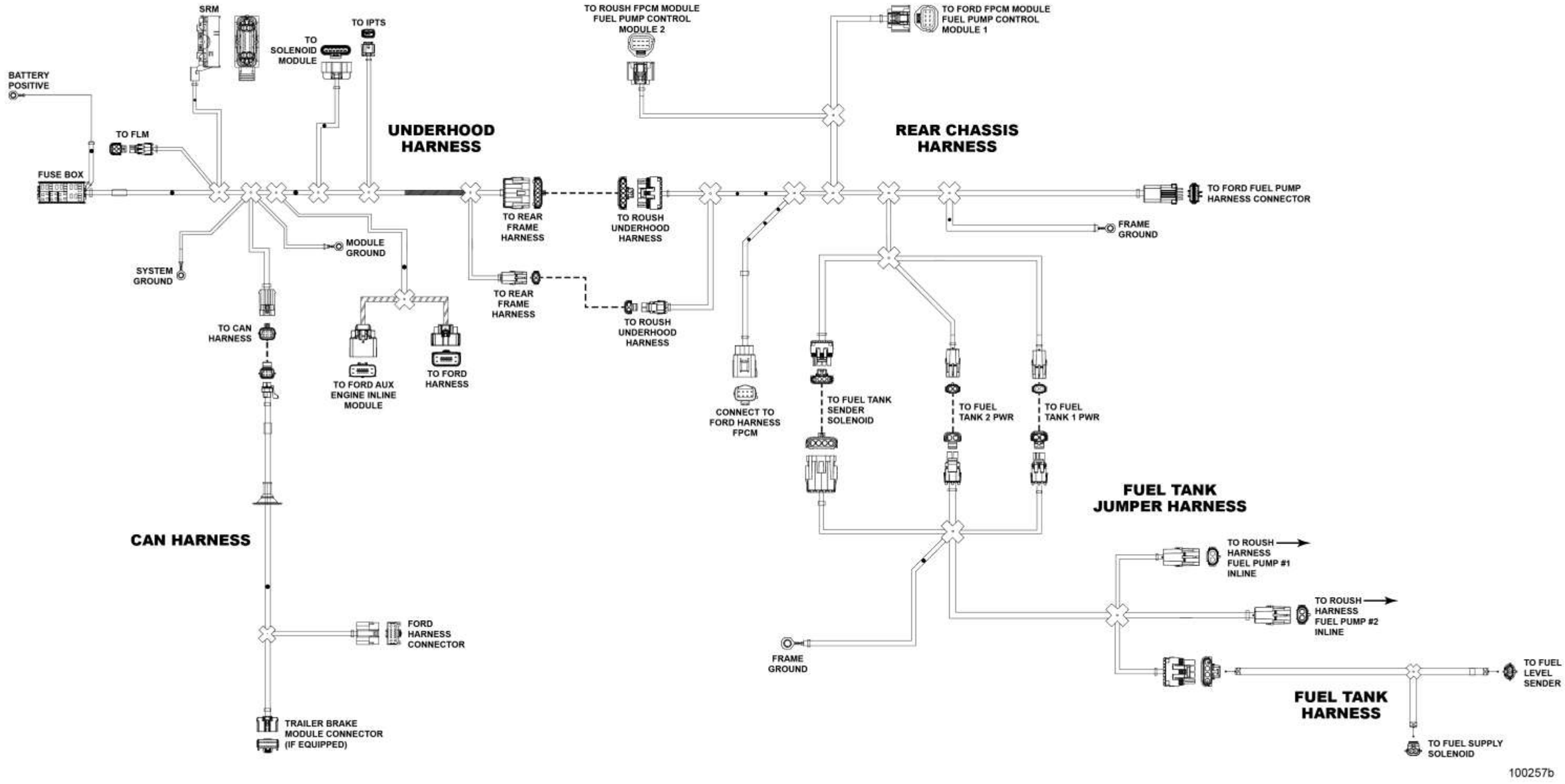
Completing the Kit Installation

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.

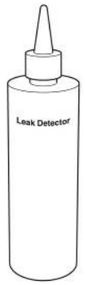
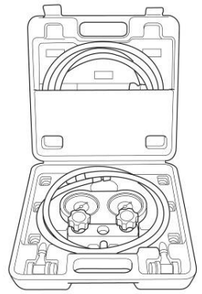
SCHEMATIC — ROUSH FUEL SYSTEM (TYPICAL)

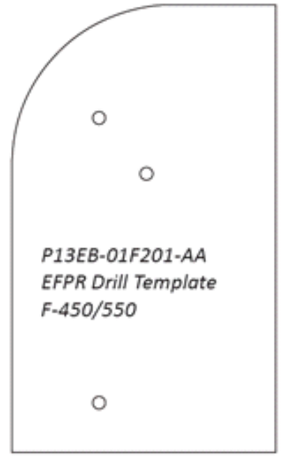


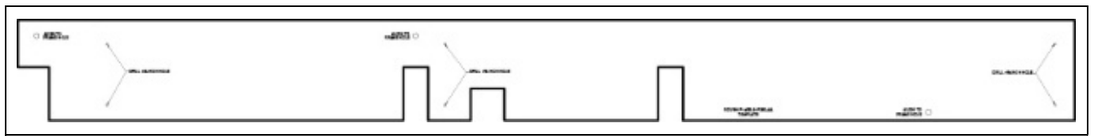
SCHEMATIC — ROUSH WIRING HARNESS



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 — 1/4” and 5/8”**	**Tubing Cutter**	**EFPR Drill Template (Vapor Canister Bracket)**



P14EB-01F250-AA Drill Template