ROUSH CLEANTECH

2009 - 2011

Ford E-350 DRW

LIQUID PROPANE AUTOGAS

April 26, 2011
REV. January 1, 2012
REV. April 18, 2012

KIT INSTALLATION INSTRUCTIONS

TABLE OF CONTENTS

Part Number P11C2-350DRW-IM-BC

Important Notice:
The engine will run only with propane as fuel when this installation is complete. Before replacing the gasoline system with the ROUSH CleanTech Liquid Propane Autogas system, provide a supply of HD5 liquid propane with which to fill the new tank.

Introduction

This manual is a guide for the installation of the ROUSH CleanTech kit for converting a 2009-2011 Ford E-350 cutaway, equipped with the 5.4L-2V engine, 5R transmission, and 40 or 55 gallon aft-axle fuel tank. Only a few components are involved.

Before installing your liquid propane conversion kit, read the installation instructions and verify that all items in the packaging list are present.

The liquid propane conversion kit is designed and tested to function properly only on Ford Motor Company vehicles as they are equipped from the factory (stock powertrain). The use of aftermarket parts and equipment, or any other performance parts not sold by, manufactured by, or approved in writing by ROUSH CleanTech for specific application to the 2009–2011 E-350 cut-away equipped with the 5.4L 2V V8 engine with a liquid propane conversion kit will result in powertrain damage and potential engine failure. ROUSH CleanTech will not accept responsibility for such damage and failure.

The ROUSH CleanTech parts serve the same functions as the Ford parts they replace. The ROUSH CleanTech parts are designed for durability, reliability and economy in combination with liquid propane.

Propane, like gasoline, must be handled safely with knowledge of its characteristics. *Training in Basic Principles and Practices* developed by the Propane Education and Research Council (PERC), Washington, DC is available via an interactive DVD program at a modest price.

For most purposes in an automobile dealership, the basic course should be sufficient. Certification, if required, based on this material is also available, either on-line or through local facilities, at additional cost.

Safety

The National Fire Protection Association (NFPA) publishes a code book of rules that apply to the storage, handling, transportation and use of liquefied petroleum gas (LP-Gas or LPG). The book is known as *NFPA 58*. It is revised as necessary and published every other year. This code is adopted as law in virtually every political subdivision in the United States. Check with your local authorities for regulations applicable to liquid propane.

Observe all safety precautions provided in the Ford Motor Company Technical Services service information concerning the handling of the gasoline fuel system.

Alert Messages

The following alert messages appear from time to time in appropriate places in this manual. Ensure that all personnel in the immediate area are aware of these reminders.

⚠ **Danger:** Although propane is nontoxic, nonpoisonous, has the lowest flammability range of any alternative fuel and dissipates quickly when released into the atmosphere, propane vapor is heavier than air and seeks the lowest point. When the ratio of propane to air is between 2.2% and 9.6%, propane will burn in the presence of an ignition source at 940°F (504°C) or hotter. Keep away from heat, sparks, flames, static electricity or other sources of ignition. Failure to heed this danger may result in severe personal injury or death.

⚠ **Danger:** The fuel supply lines remain pressurized after engine shutdown. Keep away from heat, sparks, flames, static electricity or other sources of ignition. Do NOT enter storage areas or confined space unless they are adequately ventilated. Failure to heed this danger may result in severe personal injury or death.

⚠ **Danger:** Do NOT carry lighted smoking materials or smoke while working on fuel system components. Failure to heed this danger could result in severe personal injury or death.

⚠ **Danger:** Disconnect the battery ground at the battery to ensure that the vehicle electrical system has no current. Failure to heed this danger could result in severe personal injury or death.

Limited Liability Disclaimer

The information in this publication was accurate and effective at the time the publication was approved for printing and is subject to change without notice or liability. ROUSH CleanTech reserves the right to revise the information herein and to make changes and discontinue production of described parts at any time.

Two-Person Procedures

Removal and installation procedures take place under the hood and under the vehicle. The vehicle must be raised to permit working underneath. Installing the tank under the vehicle requires the cooperation of two persons in conjunction with a hoist of at least 500-pound capacity.

Stainless Steel Fuel Lines

Unlike Ford, the ROUSH CleanTech fuel lines are constructed from stainless steel. Do NOT attempt to use the original fuel lines. Carbon steel corrodes more quickly in the presence of liquid propane.

Jiffy-Tite Fuel Line End Connectors

Some of the ROUSH CleanTech fuel lines use a Jiffy-Tite quick connection to aid in assembly. Before insertion into the Jiffy-Tite fitting, apply clean engine oil to the male tubing end form. To remove these lines once the connection has been made, a special tool is required.

Threaded Fuel Line End Connectors

Also unlike Ford, some of the ROUSH CleanTech fuel lines are equipped with threaded end connectors. Do NOT cross thread these connectors. Always tighten each connector by hand before applying a wrench to avoid cross threading.

Threaded Fasteners

Hand tighten all threaded fasteners before applying a wrench to avoid cross threading.

Bare Metal Surfaces

You will be drilling holes through painted metal. Bare metal must be deburred and coated with a primer or sealer as specified in order to prevent rapid corrosion. The coatings must be allowed to dry before the affected parts are assembled.

Metal-to-Metal Contact

There are locations where fuel lines pass closely to each other and to other metal surfaces. Do NOT allow direct contact between these parts. Apply EPDM sleeves to the fuel lines to prevent direct contact. Ensure that the sleeves cover the targeted areas.

Packaging

Carefully inspect the contents of the kit you receive to ensure that all parts are available before beginning installation. A parts list is enclosed with the propane kit.

Installation, Garaging and Training

Chapter 11, page 58-67, of *NFPA 58, 2008 edition*, applies to engine fuel systems using LP-Gas in internal combustion engines, including containers, container appurtenances, carburetion equipment, piping, hose and fittings and their installation. Additionally, this chapter applies to garaging of vehicles and to the training of personnel.

Paragraph 11.2 specifies that each person engaged in installing, repairing, filling or otherwise servicing an LP-Gas engine fuel system shall be trained. For additional information about the CETP E-Learning computer-based training program developed by PERC, contact Courtney Gendron at courtney.gendron@propanecouncil.org.

Purging and Venting (Tanks and Lines)

Venting of LP-Gas to the atmosphere is covered by paragraphs 7.3.1, General, and 7.3.2, Purging, on page 58-55 of *NFPA 58, 2008*.

Paragraph 7.3.2.2 reads as follows. “Venting of cylinders indoors shall only occur in structures designed and constructed for cylinder filling in accordance with (*NFPA 58, 2008: paragraph*) 6.5.1, Chapter 10 and 7.3.2.2(A) through 7.3.2.2(C). The following paragraphs are quoted from *NFPA 58, 2008*.

7.3.2.2(A) Piping shall be installed to convey the vented product outdoor at least 3 ft (1 m) above the highest point of any building within 25 ft (7.6 m).

7.3.2.2(B) Only vapors shall be exhausted to the atmosphere.

7.3.2.2(C) If a vent manifold is used to allow for the venting of more than one cylinder at a time, each connection to the vent manifold shall be equipped with a backflow check valve.

7.3.2.3 Venting of containers outdoors shall be performed under conditions that result in rapid dispersion of the product being released.

7.3.2.4 If conditions are such that venting into the atmosphere cannot be accomplished safely, LP-Gas shall be burned at least 25 ft (7.6 m) from combustibles.

7.3.2.5 Venting of containers and burning of LP-Gas from containers shall be attended.

ROUSH CleanTech Technical Assistance

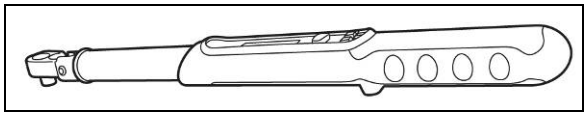
Call ROUSH CleanTech Customer Service at 1-800-597-6874 with any questions regarding kit installation.

Special Tools

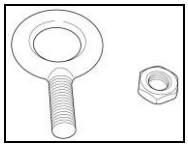
Touch-Up Paint

Liquid Leak Detector

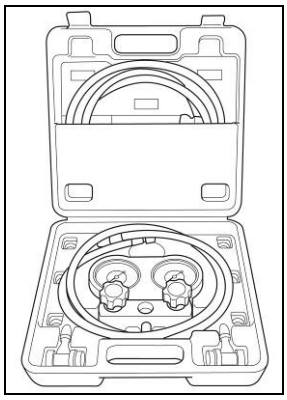
Premium Aerosol Undercoating



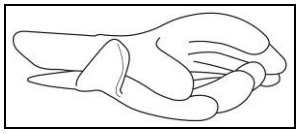
Torque Wrenches (to 22 Nm and to 200 Nm)



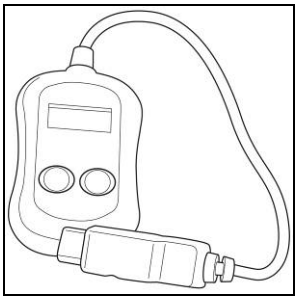
5/8"-11 Eyebolt and Locknut



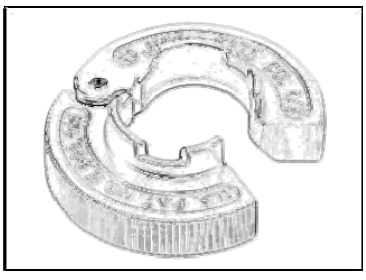
A/C Manifold Gauge Kit



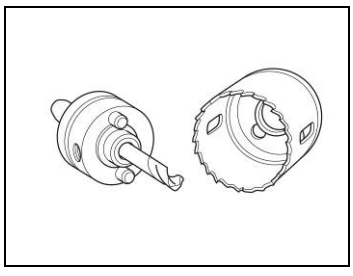
Gloves (Approved for Propane)



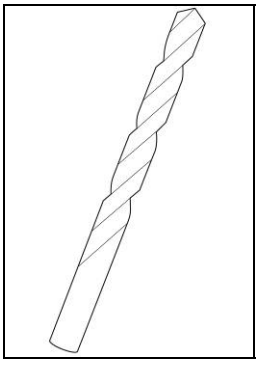
Scan Tool



Jiffy-Tite Disconnect Tools, 1/4” and 3/8”



Hole Saw – 29 mm



Drill Bit – 15 mm

Disassembly and Installation

Special care should be taken to label the reusable fasteners and parts taken off during this procedure.

⚠ **Danger:** The fuel supply lines remain pressurized after engine shutdown. Keep away from heat, sparks, flames, static electricity or other sources of ignition. Do NOT enter storage areas or confined spaces unless they are adequately ventilated. Failure to heed this danger may result in severe personal injury or death.

⚠ **Danger:** After de-pressurizing the gasoline system, disconnect the battery ground at the battery to ensure that the vehicle electrical system has no current. Failure to heed this danger could result in severe personal injury or death.

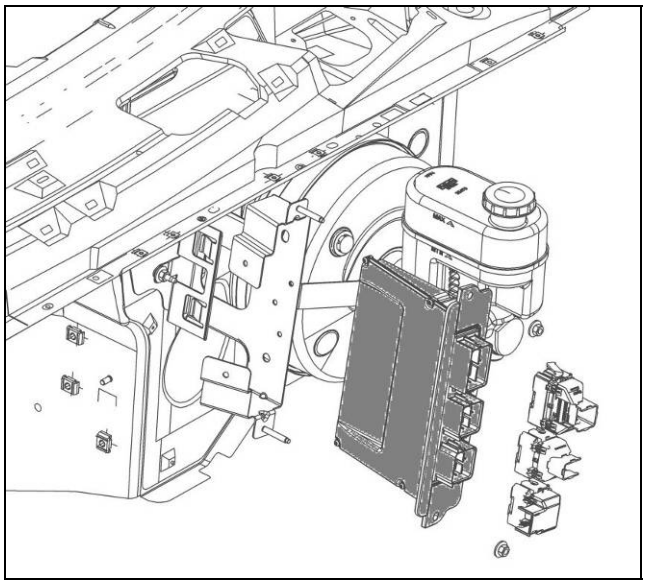
Reprogramming the Powertrain Control Module

> ⚠ **Caution**
>
> **The Ford E-350 Powertrain Control Module (PCM; also called ECM, ECU, PCU or EEC) is programmed specifically for the vehicle using the vehicle identification number (VIN). It must be reprogrammed and returned to the vehicle from which it was removed.**
>
> **Before removing the PCM and sending it to ROUSH CleanTech for reprogramming, a self-test diagnosis MUST BE performed and resulting error codes corrected.**
>
> **Failure to heed this caution may result in improper function of the diagnostic and anti-theft programs.**

⚠ **Caution:** Operating the engine without reprogramming by ROUSH CleanTech will result in engine damage or failure and will void all warranties.

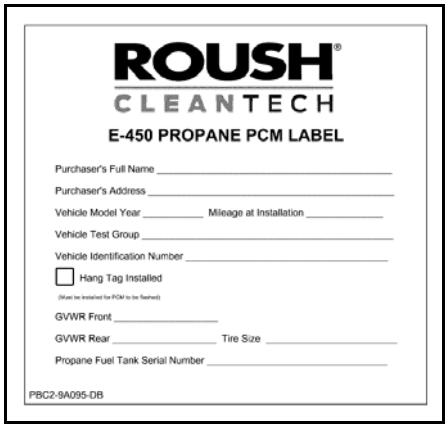
ROUSH CleanTech provides the necessary PCM packaging, overnight transportation (each way) and reprogramming at no charge. Follow these steps to expedite the service.

1. Using a scan tool, check for all error codes. Correct all errors before continuing.
2. Depressurize the fuel rail using the procedure described in *Section 310-00, Fuel System, General Information, in the Ford Service Information Workshop Manual*.
3. Remove the battery from the vehicle.
4. Following the procedure described in the *Ford Service Information Workshop Manual, Section 303-14A, Electronic Engine Controls — Gasoline Engines*, remove the powertrain control module (PCM). Disconnect the three (3) PCM connectors by lifting the release levers over the connector back shell and lifting the connectors from their sockets. Remove the two nuts and position the PCM wiring harness out of the way. Remove the PCM from the vehicle by pulling the PCM forward and lifting it out of the engine compartment. Keep the fasteners for reuse.



5. Install the hang tag label (P07L3-9A095-K) onto the rear view mirror of the vehicle.

6. Write the requested information, including the GVWR, and Vehicle Test Group (example: 6.8L – Group: 9FMXE06.8BWX), on the propane PCM label (P10C2-9A095-E). The test group information will be found on the original VECI label. The propane fuel tank serial number can be found 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**.**


ROUSH CLEANTECH

E-450 PROPANE PCM LABEL

Purchaser's Full Name _____

Purchaser's Address _____

Vehicle Model Year _____ Mileage at Installation _____

Vehicle Test Group _____

Vehicle Identification Number _____

☐ Hang Tag Installed

(Must be installed for PCM to be flashed)

GVWR Front _____

GVWR Rear _____ Tire Size _____

Propane Fuel Tank Serial Number _____

PBC2-9A095-DB


Ford Motor Company

IMPORTANT ENGINE INFORMATION/
VEHICLE EMISSION CONTROL INFORMATION

Conforms to regulations: 2009 MY Incomplete

U.S. EPA: HDE* **OBD:** HD **Fuel:** Gasoline

California: HDE* **OBD:** EMD **Fuel:** Gasoline

* FOR USE ONLY IN HDV WITH GVWR ABOVE 14,000#.

Fuel Tank Capacity: 55 gal max. Persons wishing to add fuel tank capacity beyond the maximum must meet the requirements of 40CFR 86.095-35 (g)(2).

TWC/HO2S/SFI | No adjustments needed.

SAMPLE

6.8L - Group: 9FMXE06.8BWX

Evap: 9FMXF0265NAT

Notice: 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.

7. Using the bubble wrap provided, wrap the PCM securely and package it within the PCM shipping box (PBC2-SB-A).
8. Enter your name and address in the FROM area of the shipping label provided with the box.
9. Peel off the label on the right side of the form and attach it to the outside of the shipping box in the indicated area. Retain the left side of the form for your records.
10. 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.
11. Inform the agent that you have a FedEx Express Prepaid Stamp package and request 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 newly flashed PCM will be a ROUSH VECI label which must be affixed to the hood so that both the original and new labels can be read. Refer to the section “Installing Badges and Labels” for VECI placement. The graphic shown is a typical sample of the ROUSH VECI label.

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

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

If you need to ship via another carrier, our address is:

ROUSH Powertrain Development
Building 57
Attention: PCM Flash
777 Republic Drive
Allen Park, MI 48101

If you have any questions, call ROUSH CleanTech Customer Service at 800-597-6874.

Removing the Original Fuel Tank

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

⚠ **Danger:** Read and follow all applicable alert messages in the Ford manual. Failure to heed this danger may result in severe personal injury or death.

⚠ **Danger:** The fuel supply lines remain pressurized after engine shutdown. Keep away from heat, sparks, flames, static electricity or other sources of ignition. Do NOT enter storage areas or confined spaces unless they are adequately ventilated. Failure to heed this danger may result in severe personal injury or death.

⚠ **Danger:** Do NOT bring lighted smoking materials or smoke while working on fuel system components. Failure to heed this danger could result in severe personal injury or death.

⚠ **Danger:** Disconnect the battery ground and positive connections at the battery to ensure that the vehicle electrical system has no current. Failure to heed this danger could result in severe personal injury or death.

Removing the Original Filler Pipe

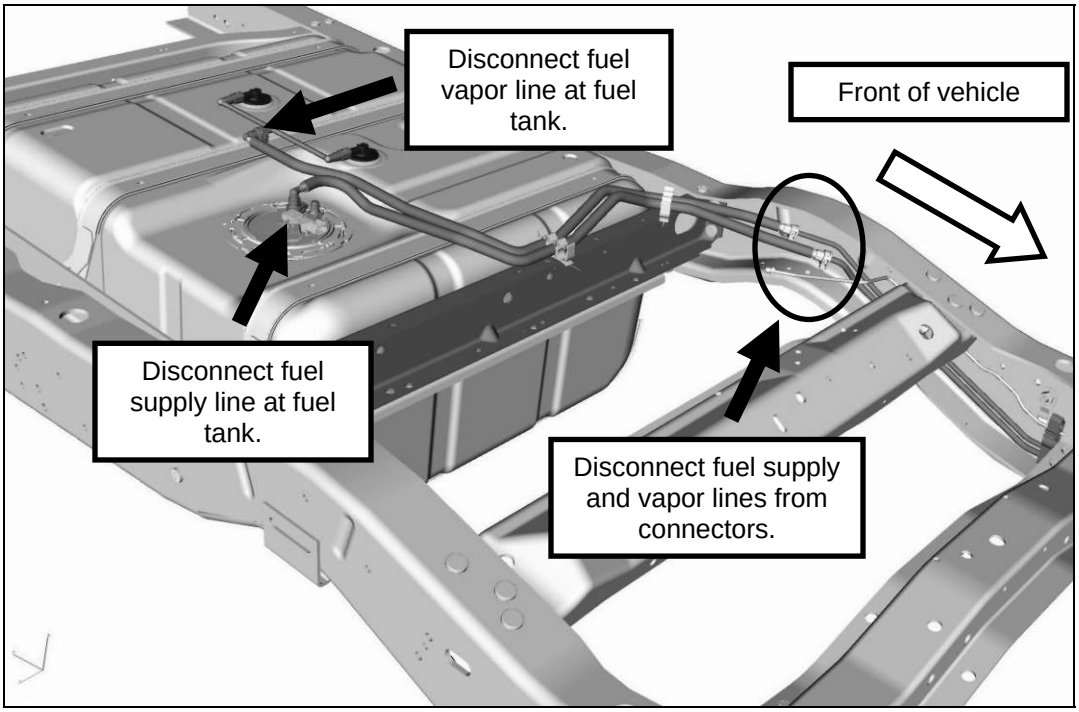
Refer to the *Ford Workshop Manual, Section 310-01, Fuel Tank and Lines*, for complete instructions for removing the original filler pipe.

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.

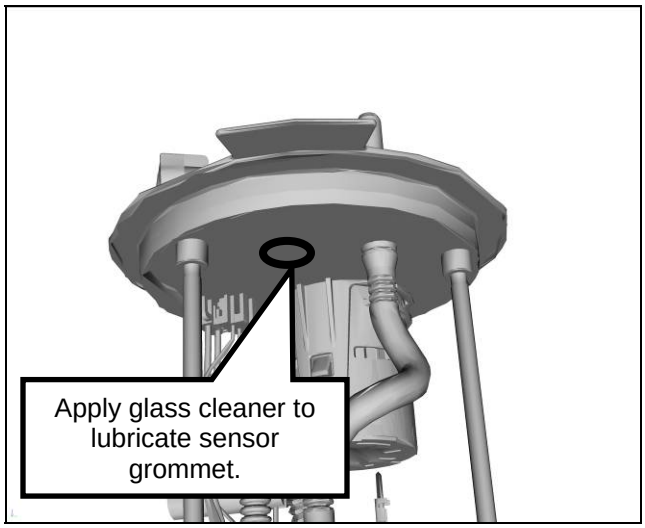
Removing the Original Fuel Supply and Vapor Lines

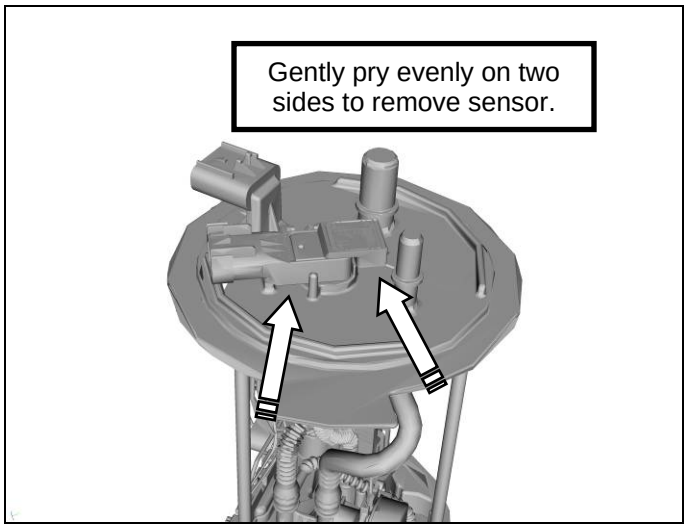
Refer to *Ford Workshop Manual, Section 310-01, Fuel Tank and Lines, Fuel Lines*, for complete instructions for removing the fuel supply and vapor lines forward along the frame rail to the engine except as follows:

1. Be careful NOT to remove, damage or discard any fuel line retention clips or brackets attached to either the frame or transmission. These clips or brackets will be used to retain the new propane fuel lines.
2. Remove and discard the fuel supply and vapor lines that run from the aft axle fuel tank to the connectors at the frame rail.

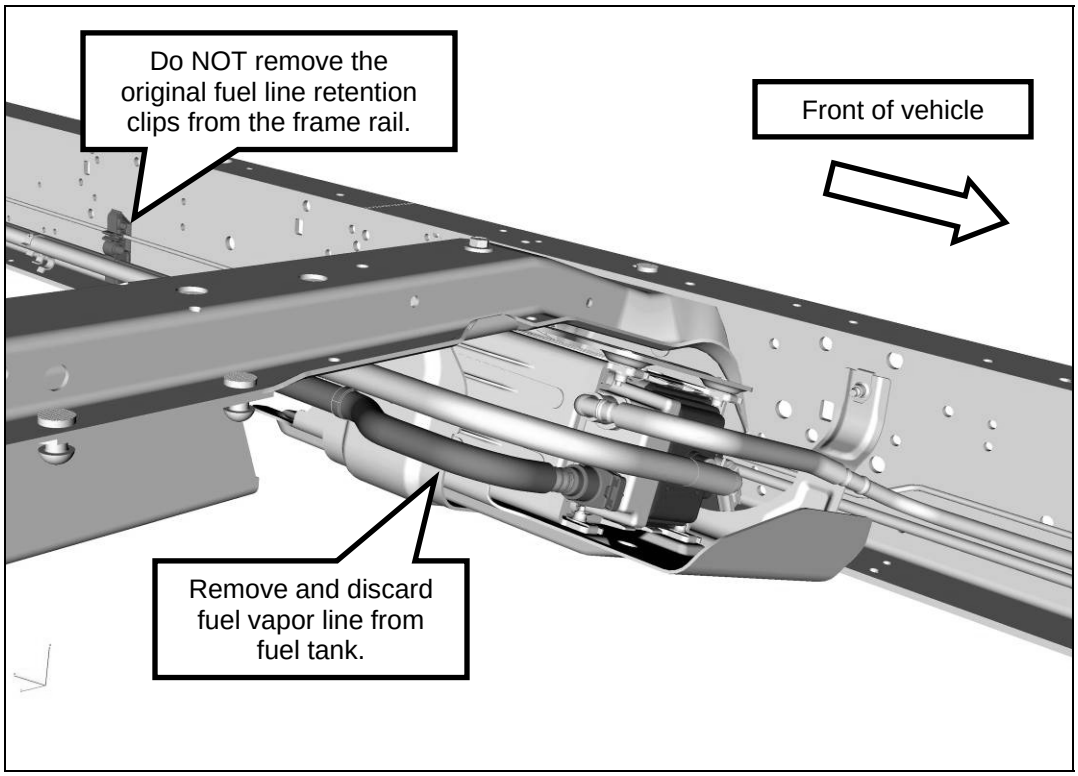


3. Remove the fuel delivery module from the fuel tank. To remove the fuel temperature pressure transducer (FTPT) sensor from the delivery module, apply glass cleaner as a lubricant to the FTPT sensor grommet at the underside of the fuel delivery module. Gently pry evenly on two sides to remove the sensor from the fuel delivery module. Save the FTPT sensor for use in the ROUSH CleanTech system.

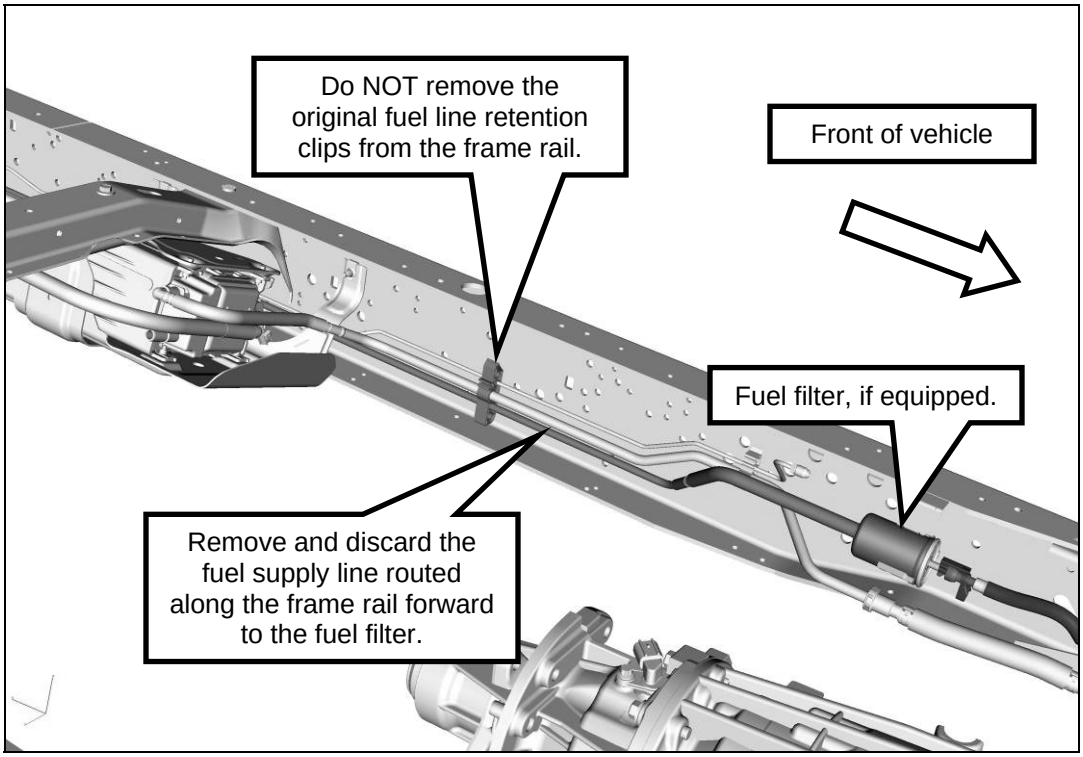




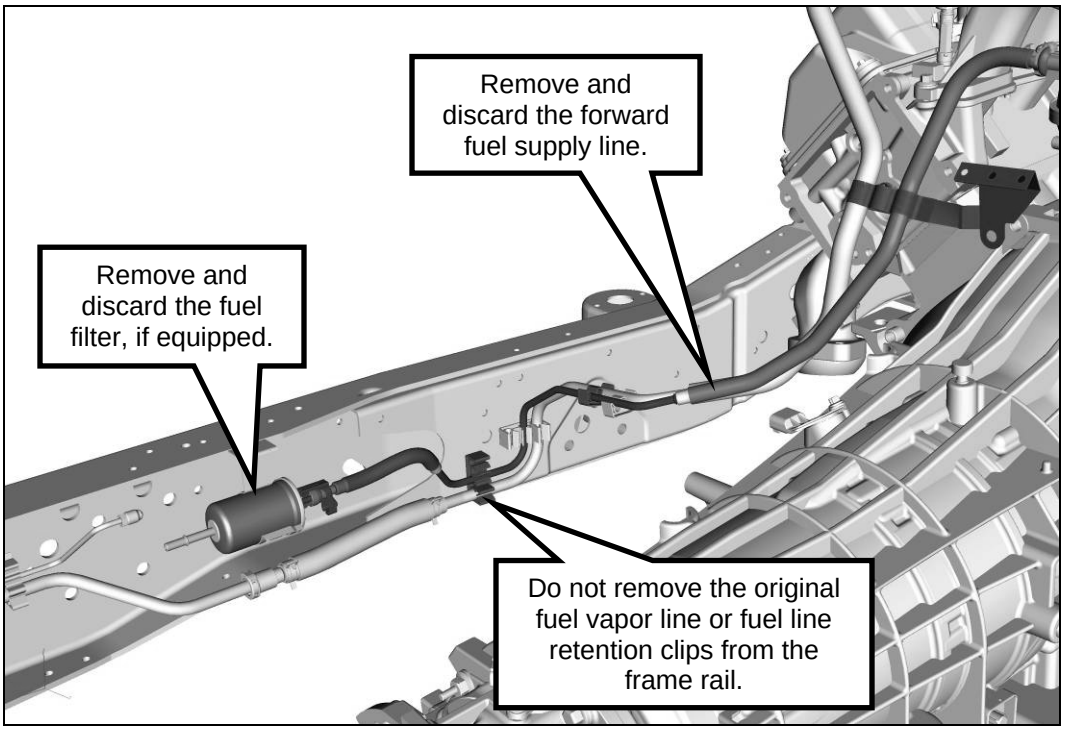
4. Remove and discard the fuel vapor line that runs along the frame rail from the fuel tank to the vapor canister mounted on the crossmember.



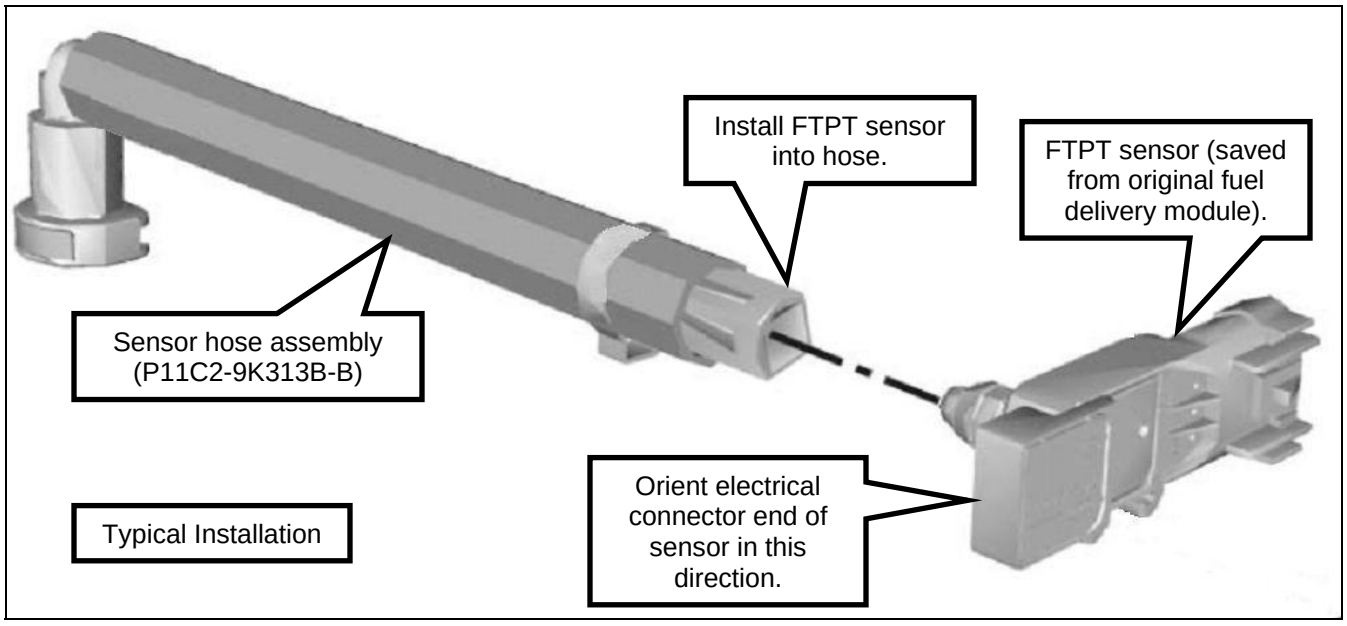
5. Remove and discard the fuel supply line that is routed along the left frame rail from the rear axle area forward to the fuel filter, if equipped. Do NOT remove the fuel vapor line that is routed from the vapor canister to the engine.



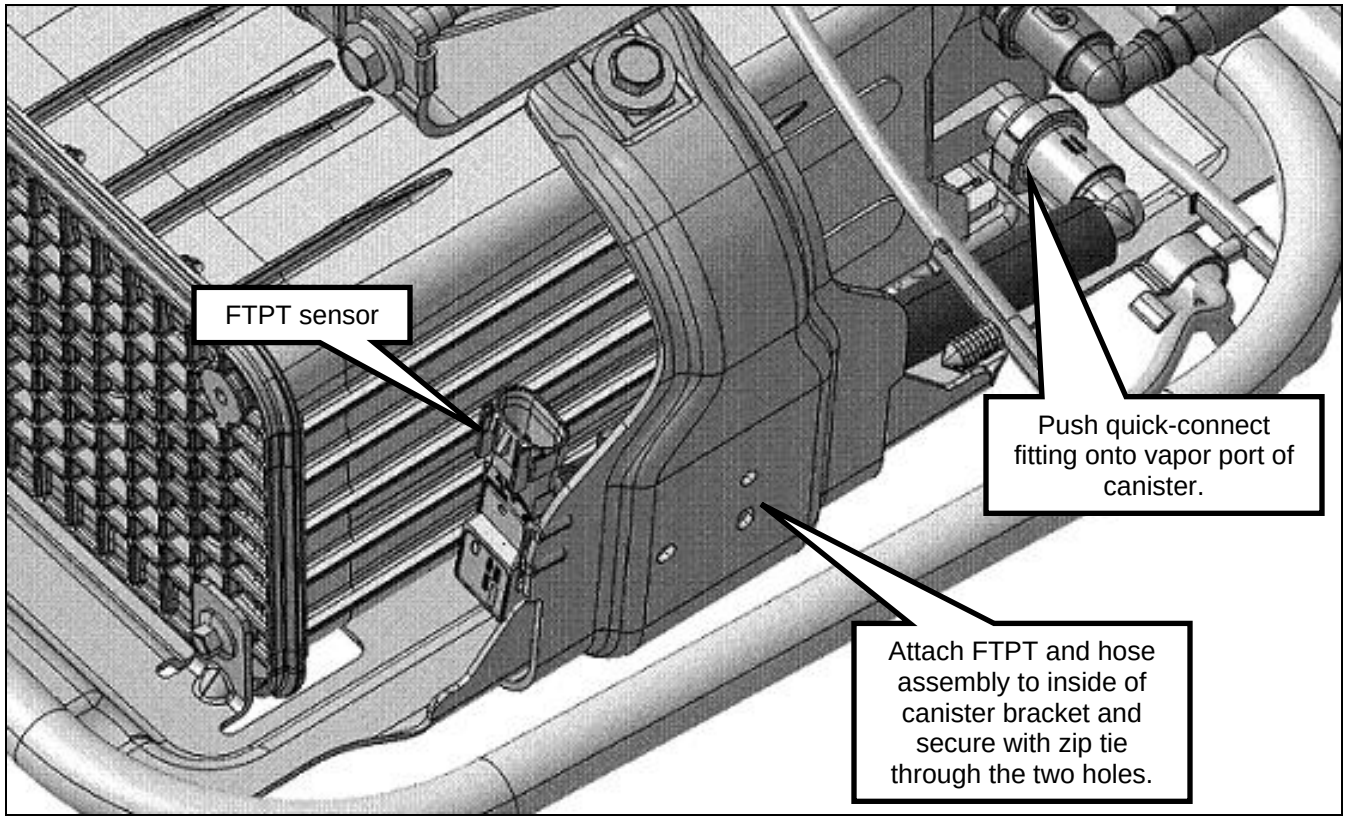
6. Remove and discard the fuel filter (if equipped) and forward fuel supply line that is routed from the left frame rail up to the engine. Do NOT remove the fuel vapor line from the vapor canister to the engine.



7. Inspect the FTPT sensor seal to make sure it is clean and not damaged. Apply glass cleaner as a lubricant to the open end of the sensor hose assembly (P11C2-9K313B-B) and fully insert the FTPT sensor into the hose assembly.



8. Position the sensor hose assembly with FTPT sensor to the inside of the vapor canister mounting bracket. Before securing the assembly to the canister bracket, push the quick-connect fitting of the assembly onto the vapor port of the canister. Secure the sensor and hose assembly to the canister bracket using a zip tie through the two center holes in the bracket.



Preparing the Engine Compartment

Refer to the *Ford Workshop Manual, Section 303-04A, Fuel Charging and Controls, Removal and Installation*, for complete instructions for removing the fuel rails and injectors.

Some parts will be reused. The following procedures indicate which items may be salvaged or discarded and which are to be set aside for reuse.

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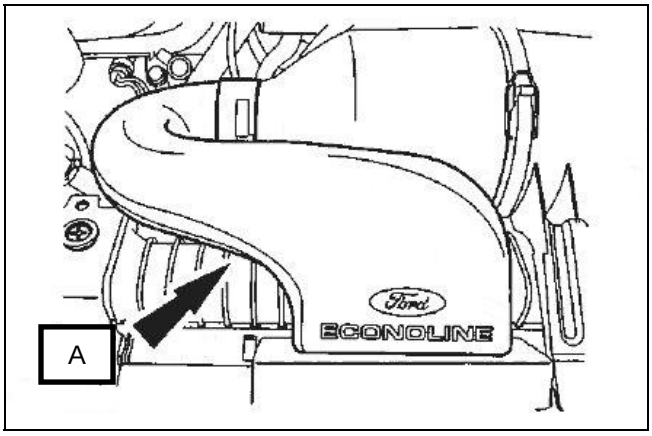
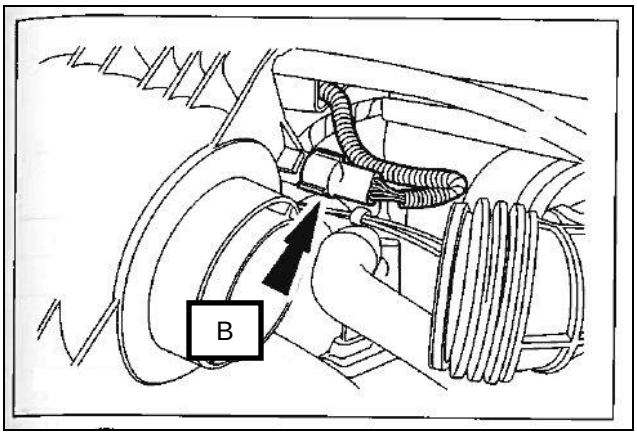
⚠ **Danger:** Read and follow all applicable alert messages in the Ford manual. Failure to heed this danger may result in severe personal injury.

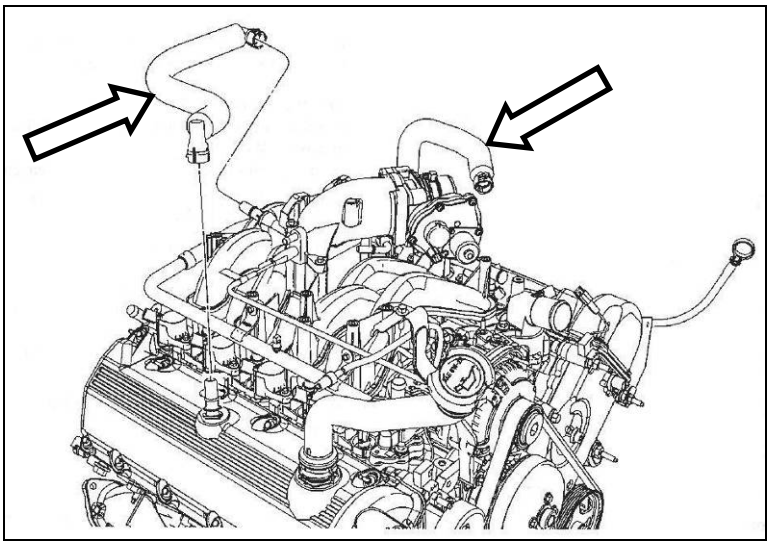
⚠ **Danger:** If not already done, disconnect the battery terminals from the battery.

1. Remove the engine cover (doghouse) located inside the vehicle to gain access to the top and rear of the engine.
2. Remove the air cleaner inlet assembly (A), disconnect the mass air flow (MAF) sensor connector (B) and remove the air cleaner cover. The upper radiator shroud will need to be removed for tool access. These components and fasteners will be reused.

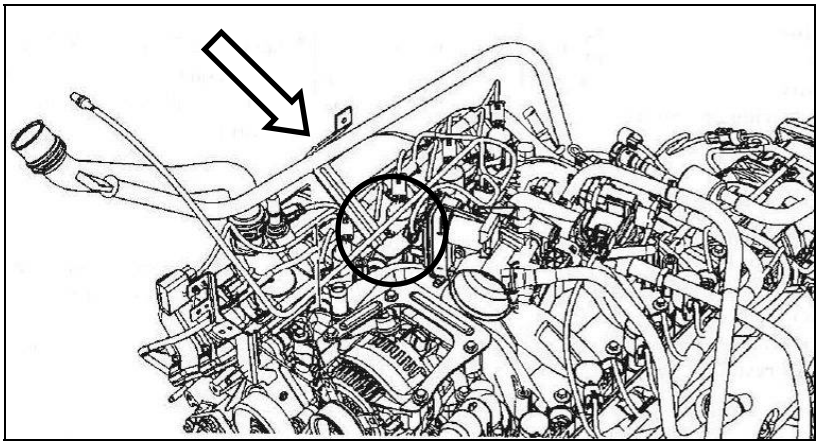




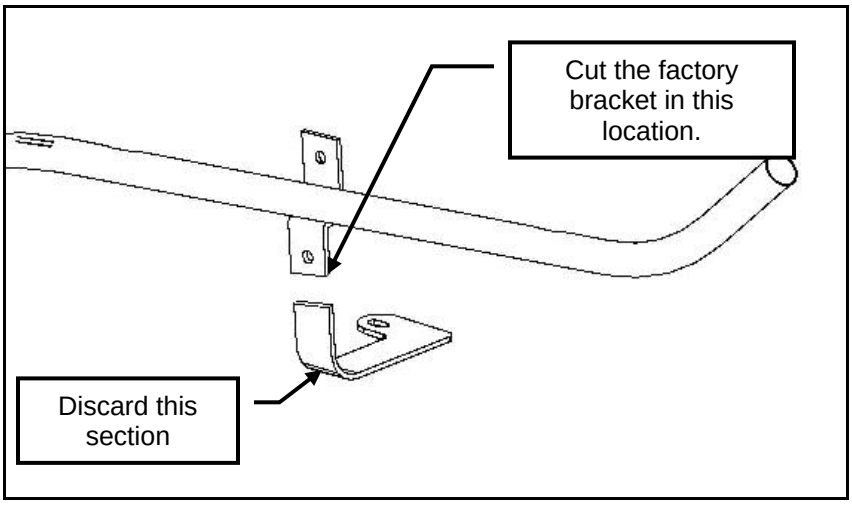
3. If necessary, disconnect the heater hose support bracket for additional working clearance. Set aside the bracket and fastener, they will be reused.
4. Disconnect and remove the PCV lines and tubes for additional working clearance. These lines and tubes will be reused.



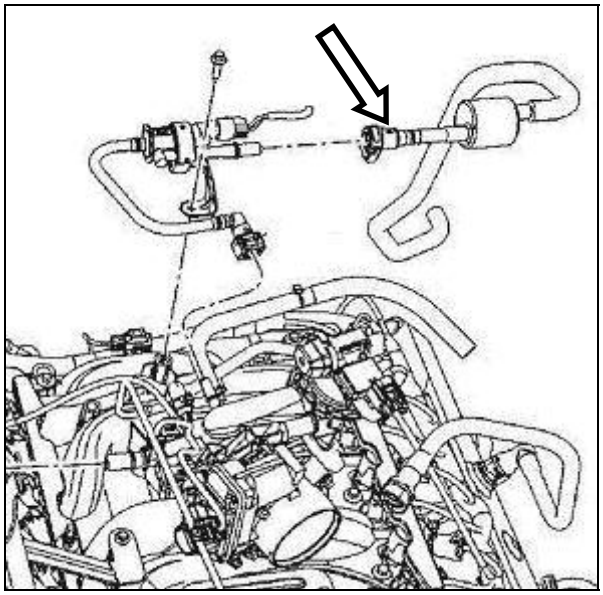
5. Remove the bolt that retains the transmission dipstick mounting bracket to the intake manifold. Do not remove the dipstick tube from the transmission. The following modification can be done in vehicle. Place a suitable cloth below the dipstick mounting bracket to cover engine components and catch metal cuttings and debris.



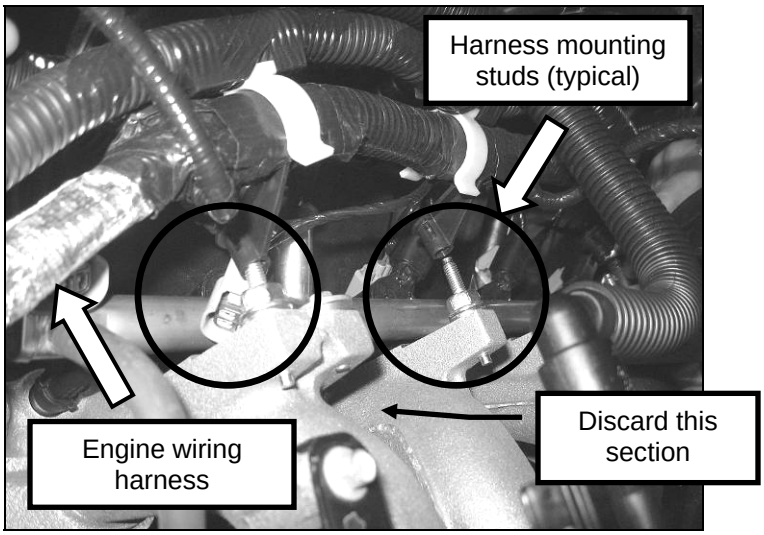
6. Modify the factory dipstick tube mounting bracket as shown. The cut line will be 12mm (1/2”) below the edge of the existing hole in the bracket. Debur and apply a rust preventive coating to the newly cut edge of the bracket. ROUSH CleanTech suggests Motorcraft Premium Undercoating (PM-25-A).



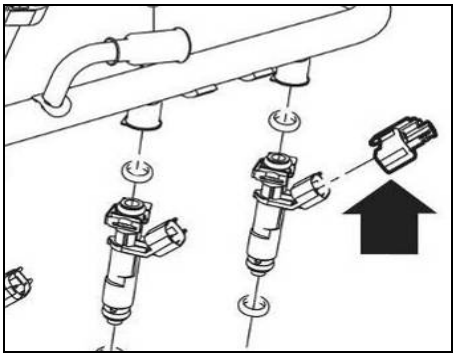
7. Disconnect the VMV tube from the VMV located on the intake manifold at the rear of the engine. Do NOT remove the VMV. Unplug the electrical harness connector from the VMV.



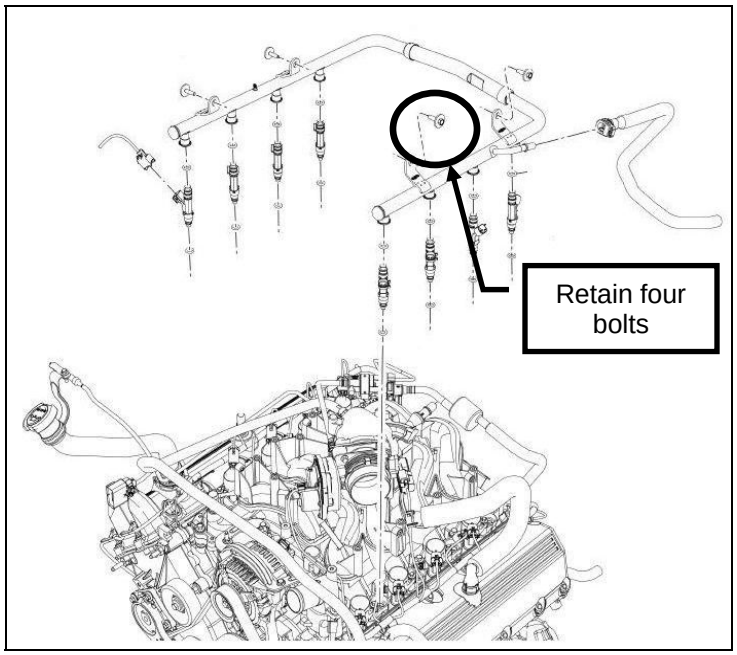
8. Carefully remove the engine wiring harness from the mounting studs on the intake manifold and let it rest on top of the valve covers.



9. Disconnect the engine wiring harness from all eight fuel injectors.



10. Using a Ford-approved fuel line removal tool, disconnect the fuel supply line from the fuel rail. Remove and set aside the fuel rail and injectors. The rail and injectors will not be reused. Retain the four fuel rail mounting bolts for re-purposing in a later step.



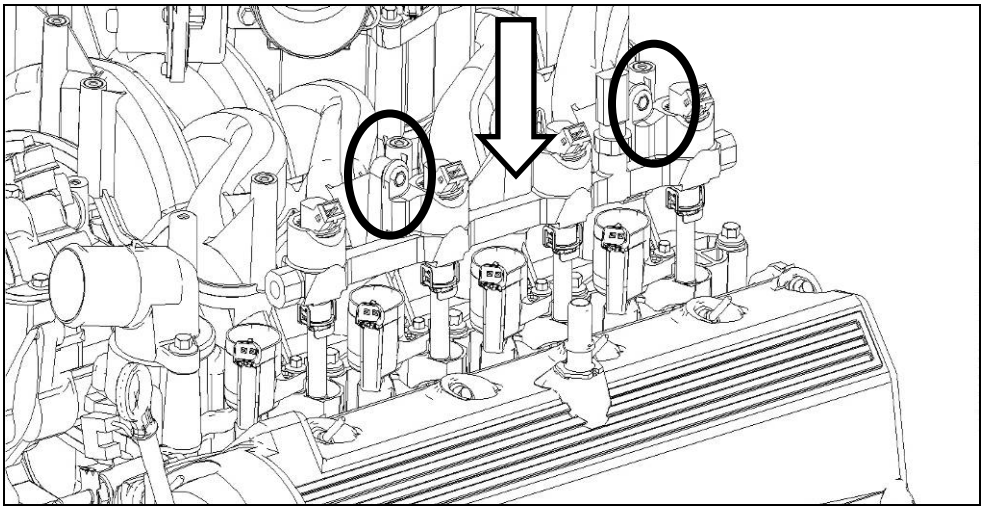
11. Remove the studs from the intake manifold holding the engine wiring harness in position. These components will not be reused.

Installing the New Fuel Rail Assemblies

⚠ **Caution:** Hand tighten all fuel line connectors and fasteners before applying a wrench to avoid cross threading. Failure to heed this caution may result in property damage.

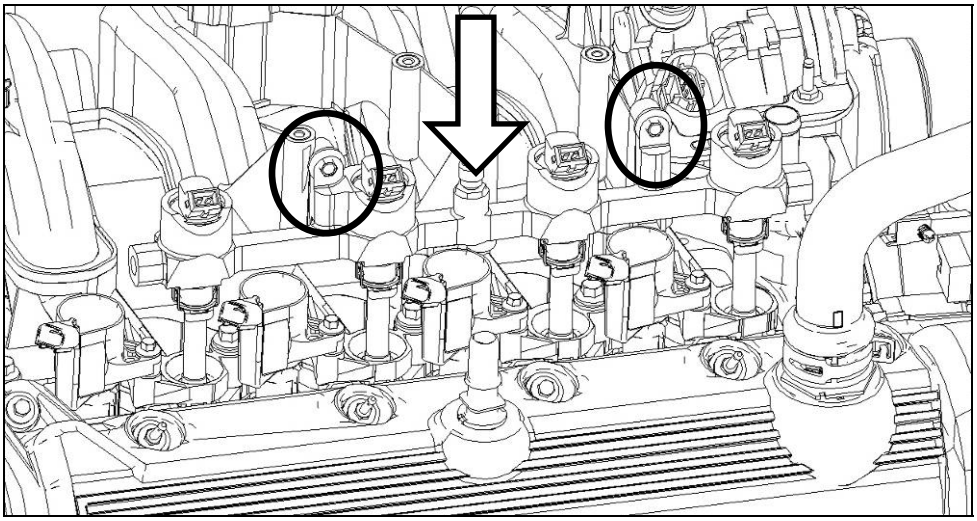
1. Using engine oil (Motorcraft SAE 5W-20 or equivalent), lubricate the lower O-rings on the injector nozzles before seating the rail assemblies into the intake manifold injector pockets.
2. Position the left hand (LH) fuel rail assembly (P07HD-03D001-A) onto the driver side of the intake manifold and fully seat the nozzles. Using two M6 x 1 x 20 bolts (W500214-S437), secure the LH fuel rail to the intake manifold. Carefully install bolts by hand to avoid cross-threading. Tighten the bolts to 8–12 Nm.

⚠ **Caution:** Make sure the nozzles are correctly aligned before seating. Failure to heed this caution could result in serious property damage.

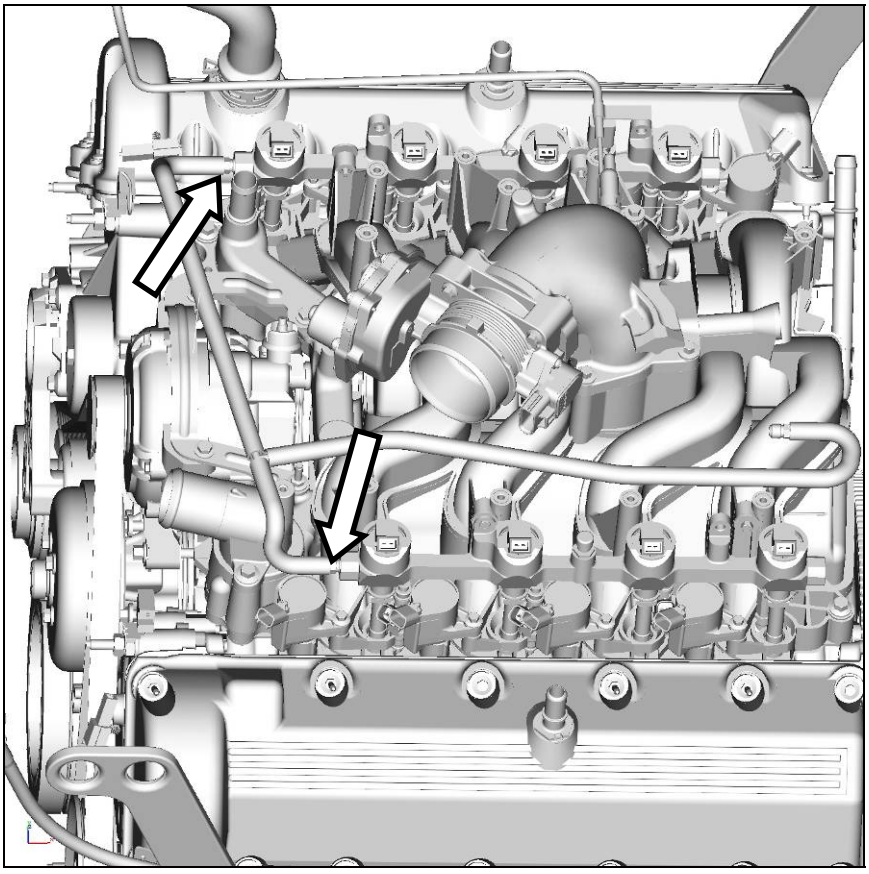


3. Position the right hand (RH) fuel rail assembly (P07HD-03D002-A) onto the passenger side of the intake manifold and fully seat the nozzles. Using two M6 x 1 x 20 bolts (W500214-S437), secure the RH fuel rail to the intake manifold. Carefully install bolts by hand to avoid cross-threading. Tighten the bolts to 8–12 Nm.

⚠ **Caution:** Make sure the nozzles are correctly aligned before seating. Failure to heed this caution can result in serious property damage.

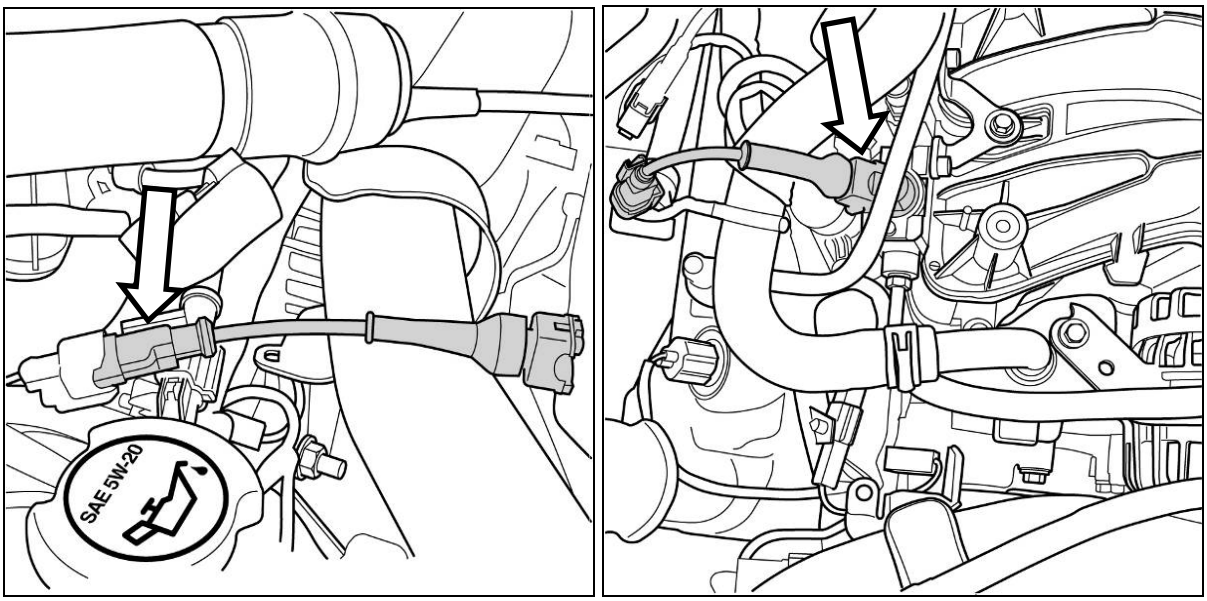


4. Orient and install the fuel return line and tee assembly (P07C2-9E965-A) onto the forward end of the fuel rails. Tighten the connections to 18–22 Nm. The rear connection (fuel supply line and tee assembly) will be done after the FRPCM is installed.

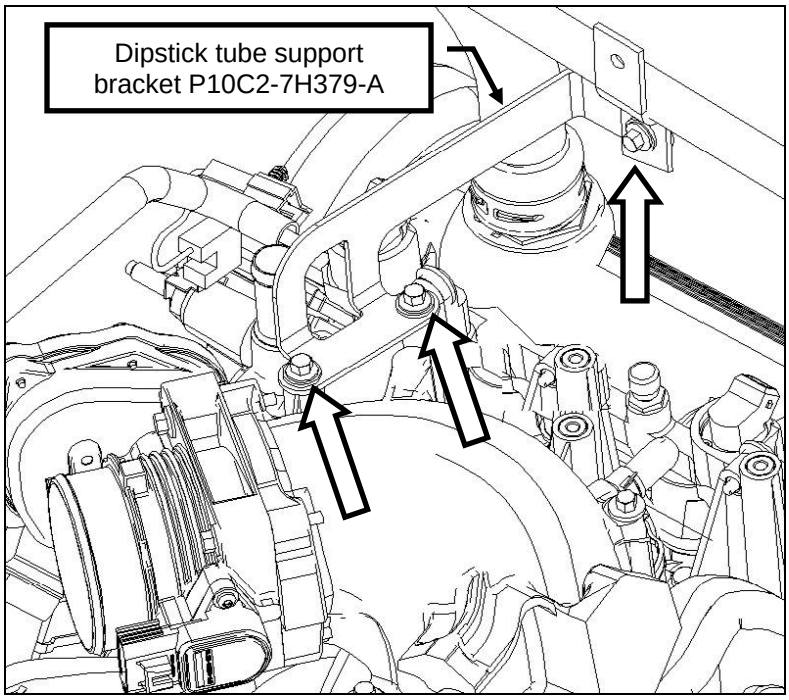


5. Connect one fuel injector jumper (P07L3-9C978-A) to each original harness connector (8 places). Connect the opposite end of each jumper to its respective fuel injector.

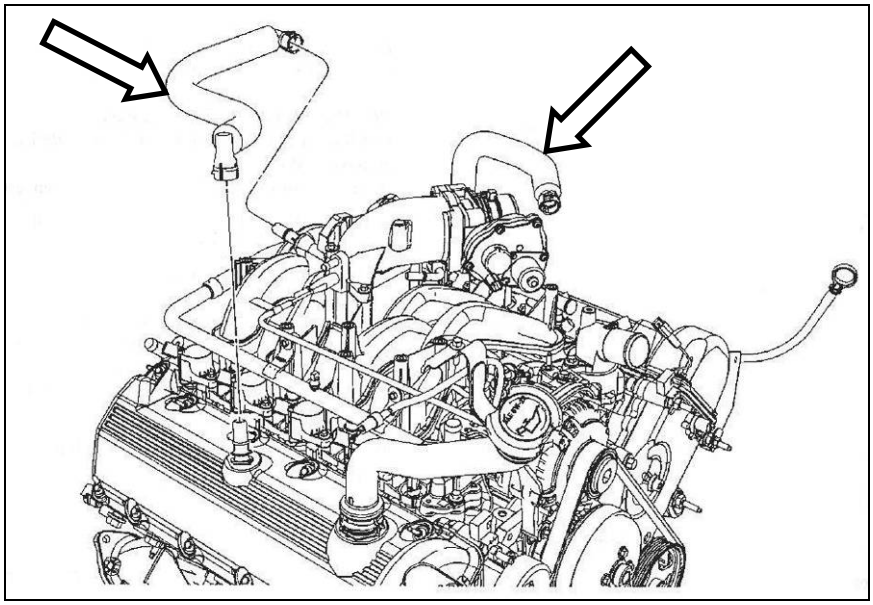
⚠ **Caution:** Make sure that each jumper attaches to its correct mating connector to avoid cross wiring. Failure to heed this caution will result in engine malfunction and possible property damage.



6. Install the transmission dipstick tube support bracket (P10C2-7H379-A) to both the intake manifold and previously modified transmission dipstick mounting bracket using (repurposing) three of the Ford M6 fuel rail mounting bolts in the locations shown. Tighten to 8–12 Nm.



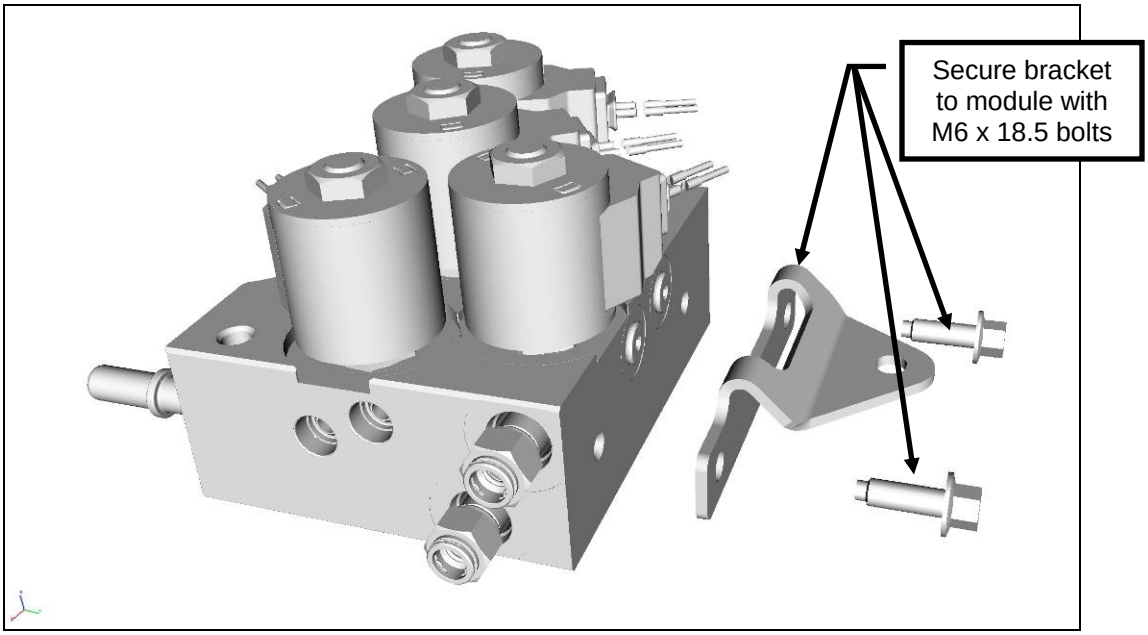
7. Reinstall the PCV hoses.



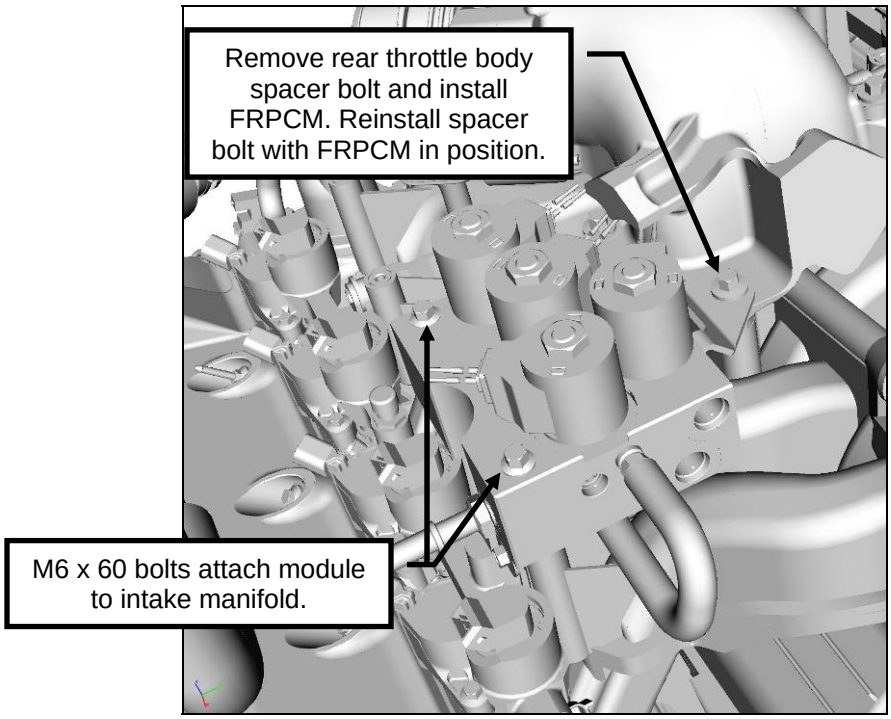
Mounting the Fuel Rail Pressure Control Module (FRPCM)

⚠ **Caution:** Hand tighten all fuel line connectors and fasteners before applying a wrench to avoid cross threading. Failure to heed this caution can result in property damage.

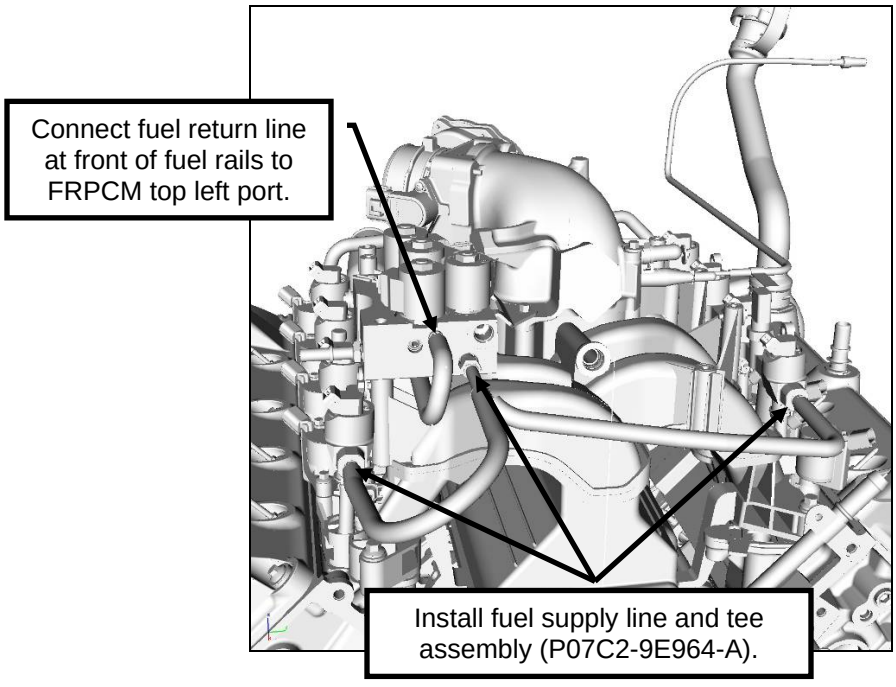
1. Install the FRPCM-to-Intake (throttle body) bracket (P07C2-9E360-A) onto the FRPCM using the two M6 x 1.0 x 18.5 mm bolts (W500213-S437) as shown. Tighten the bolts to 8–12 Nm.



2. Remove and retain the left-rear throttle body spacer-to-intake manifold bolt. Position the FRPCM onto the two vertical bosses located on the left rear corner of the intake manifold. Loosely install two M6 x 1.0 x 60 bolts (W709552-S437) to secure the FRPCM to the intake manifold. The mounting bracket should now be aligned with the rear left throttle body spacer mounting hole. Reinstall the throttle body spacer bolt. Tighten all bolts to 8–12 Nm.



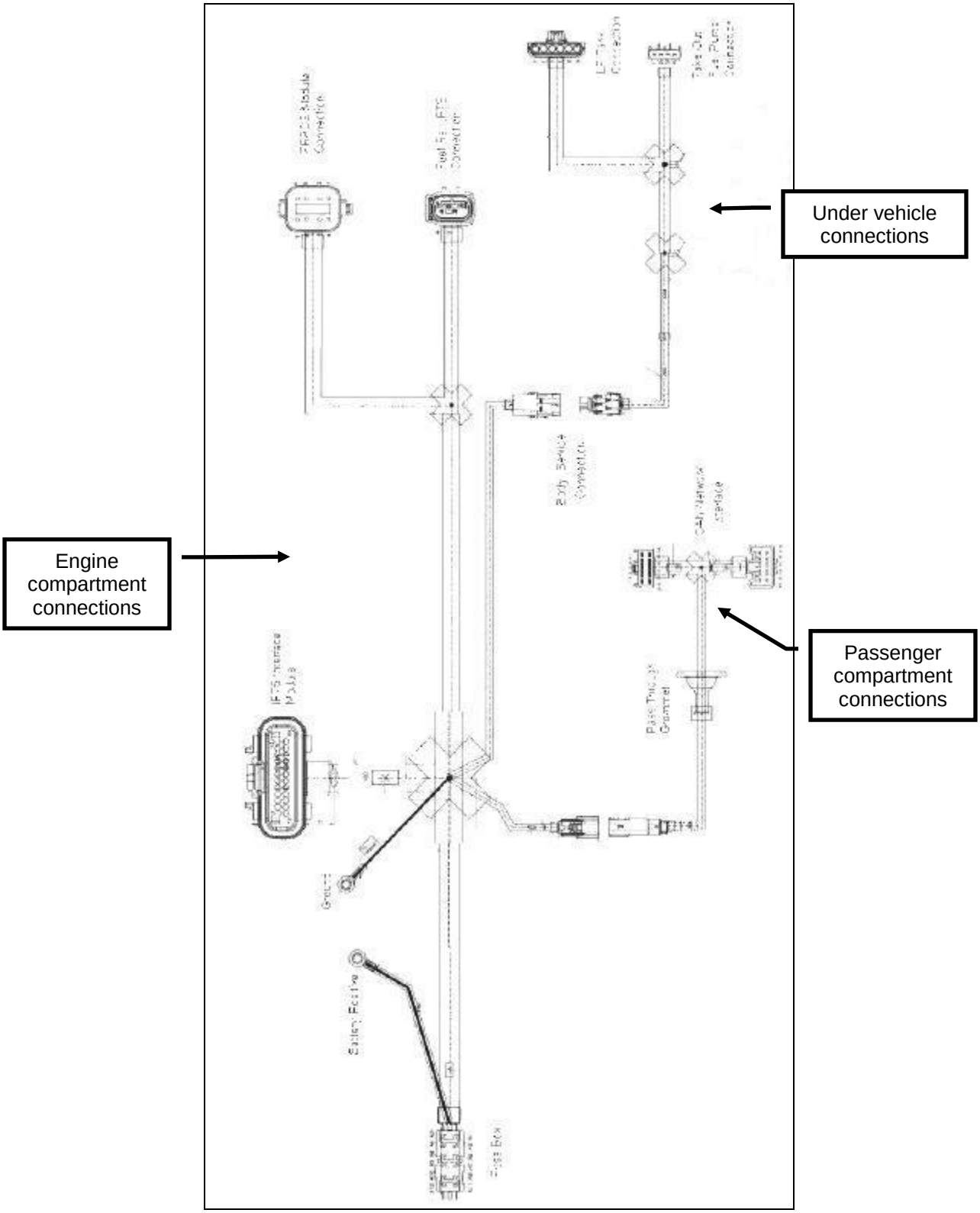
3. Install the fuel return line and tee assembly (P07C2-9E965-A) into the top left port on the FRPCM. Tighten the line fitting to 18–22 Nm.
4. Install the fuel supply line and tee assembly (P07C2-9E964-A) between the left and right fuel rails and the bottom right port on the FRPCM. Tighten the line fittings at the fuel rails to 18–22 Nm. Apply a thin film of clean engine oil to the male tubing end form before insertion into the quick-connect fitting on the FRPCM. Push the male tubing end form into the quick-connect fitting on the FRPCM until it clicks into place. Firmly pull on the fitting to make sure it is locked in place.



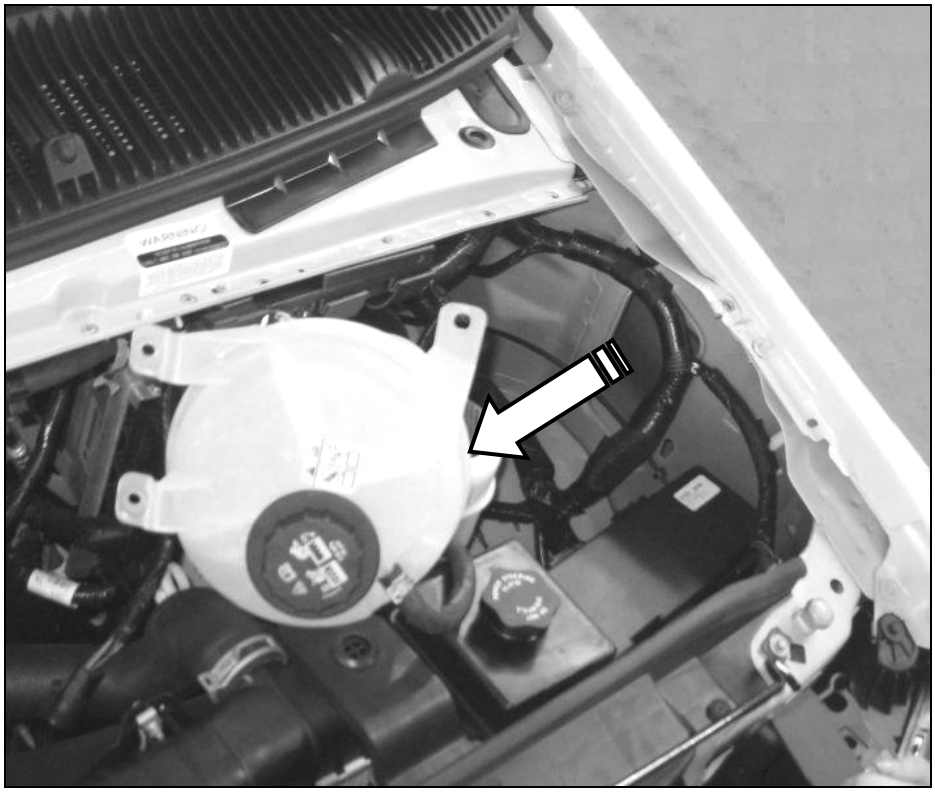
Installing the New Wiring Harness

Note: A graphic representation of the wiring harness is shown below. We recommend reviewing this illustration and becoming familiar with each connector along with its corresponding location on the vehicle prior to installation.

Note: Disconnect the “CAN Network” section of the wiring harness from the main harness.

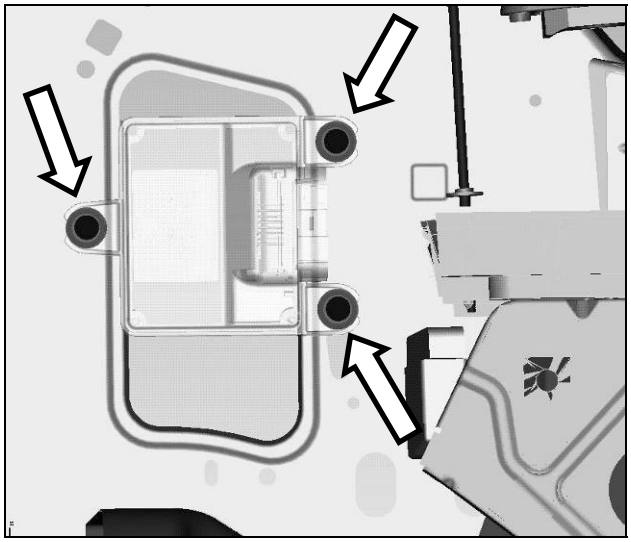


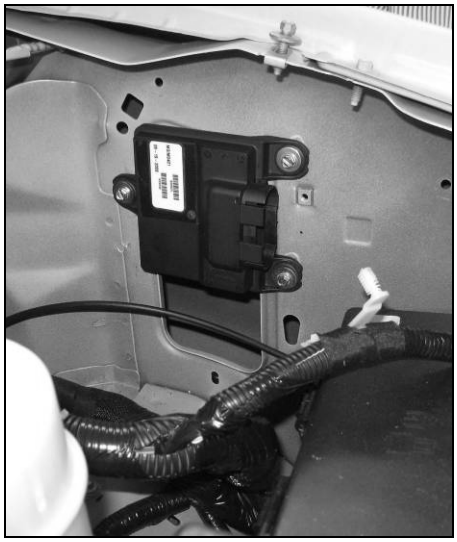
1. Remove and retain the three degas bottle mounting fasteners and lay the degas bottle on its side on top of the brake master cylinder area as shown.



2. Position the IPTS interface module (P10C2-12A650-A) onto the inner fender in the position shown. Using three #12-14 x 1.5" self-tapping screws (91324A582), secure the module to the inner fender.

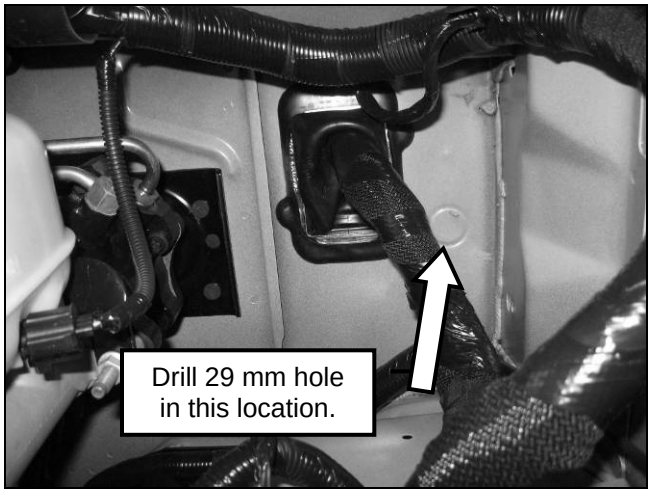
Note: It may be necessary to remove the wiring harness push pins/retainers from the inner fender to gain access to this area. Once the module is installed, reinstall the push pins/retainers to secure the wiring to the inner fender.



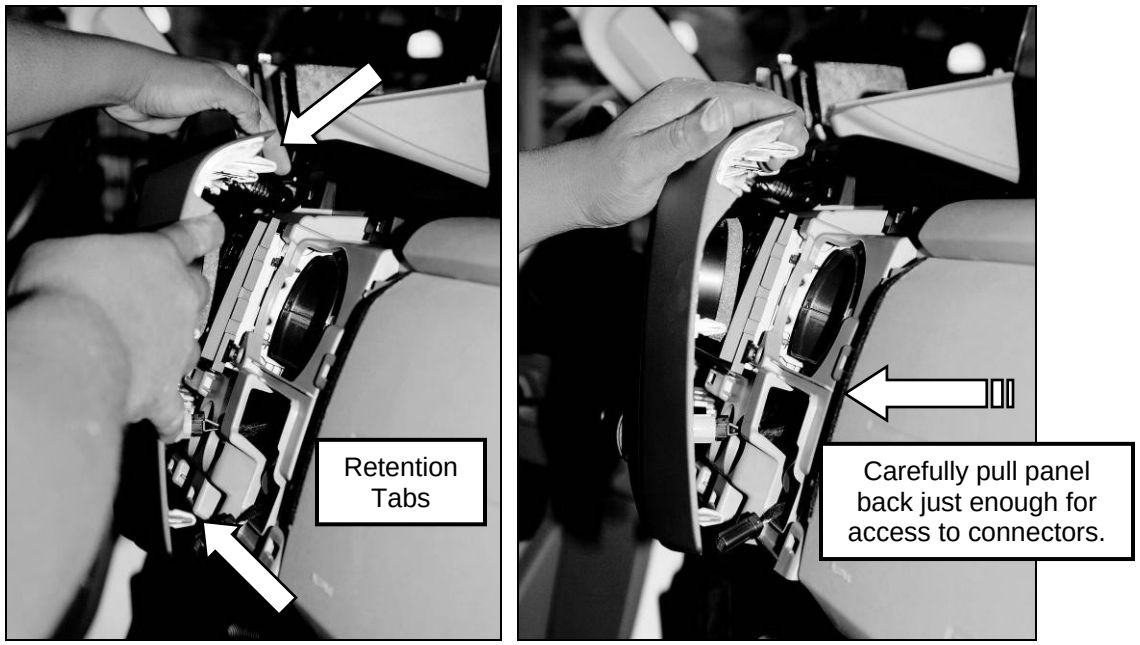


3. Drill a 29 mm (1-1/8”) hole in the dash panel to the right of the master cylinder and main wiring pass through in the location shown (indent in sheet metal).

⚠ **Caution:** Use care when drilling to avoid damaging the wiring harness in the cab interior behind the panel. Use a 29 mm hole saw with a pilot bit extending No MORE than 1/2-inch beyond the saw teeth and push the drill no deeper than what is necessary to cut through the metal panel.

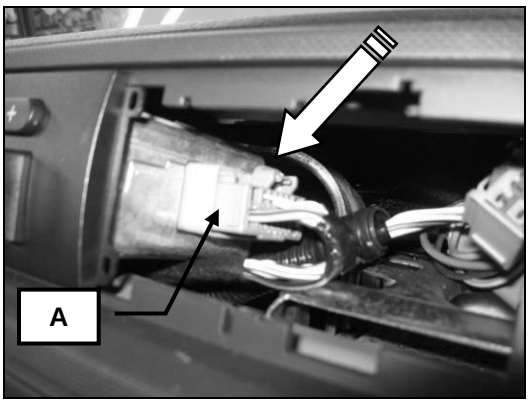


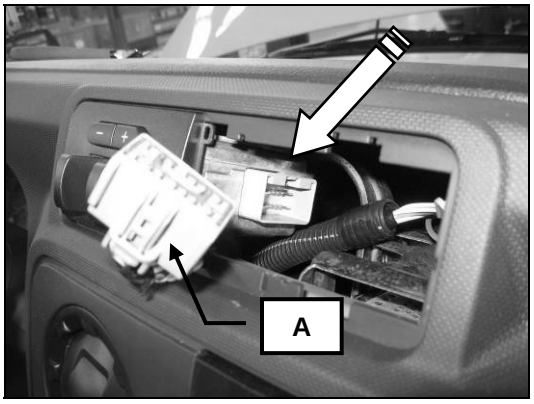
4. From the passenger side of the instrument panel, grasp the instrument cluster finish panel at the lower right corner and the top and carefully pull back to release the retention tabs. Carefully continue to pull the right side of the panel back just enough (approximately three inches) to gain access to connectors for completing the ROUSH CleanTech harness connections illustrated in Steps 5 and 6.



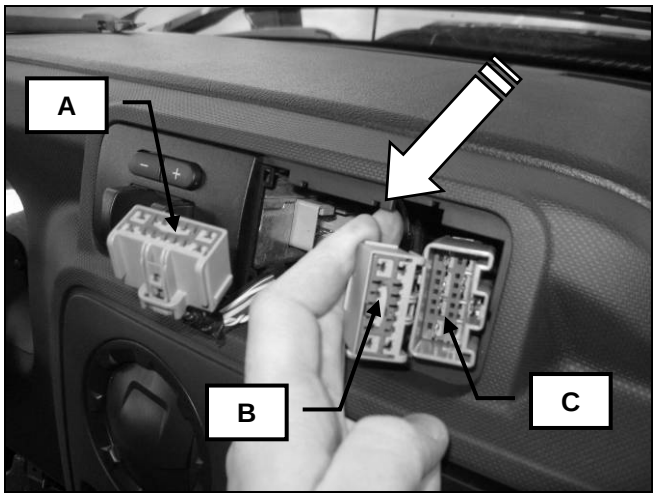
Note: In Steps 5 and 6, the change cubby/close out panel is removed for clarity in illustrating the electrical connections to be made. It is not necessary to remove the change cubby/close out panel to making the connections. (Model with optional electronic brake controller is shown.)

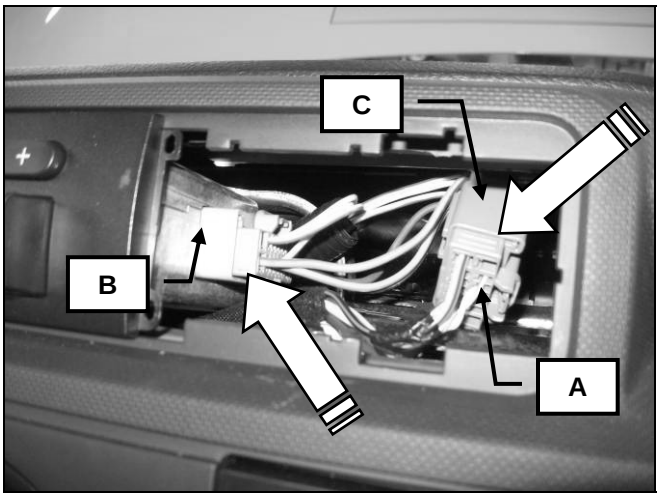
5. If vehicle is equipped with an electronic trailer brake controller, disconnect the harness from the brake controller. On models not equipped with the electronic brake controller, the wiring harness connector “A” will be stowed in this area from the factory.



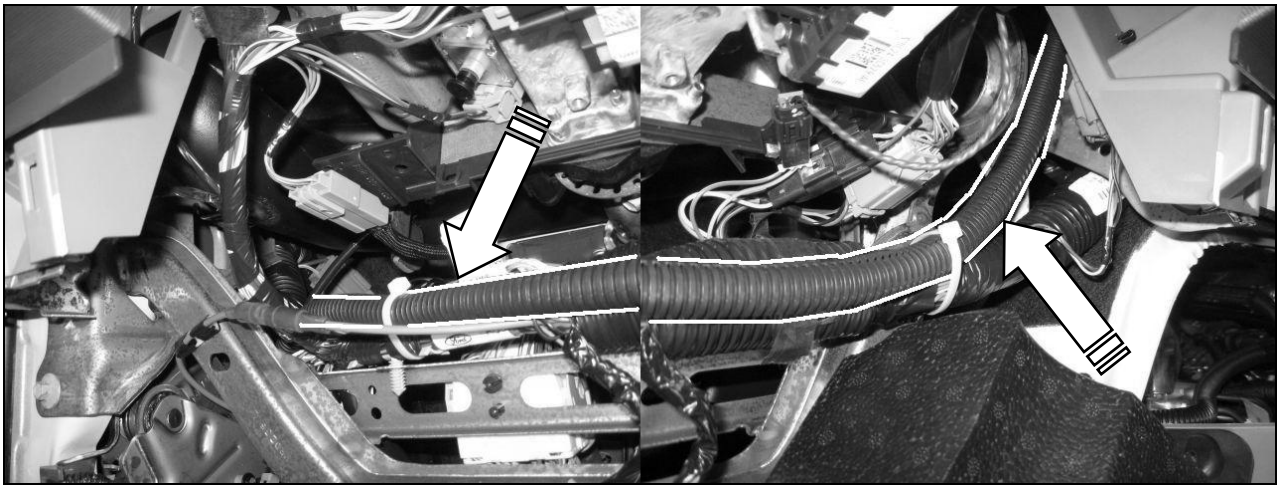


6. Insert the opposite end of the harness from connectors B and C through this opening and pull the wiring through until the two multi-pin connectors (B and C) are inside the opening. Connect the “B” end of the “CAN Network” section of the wiring harness to the brake controller and the opposite end “C” to the vehicle harness “A” that is either stowed in this area or was disconnected from the trailer brake controller.

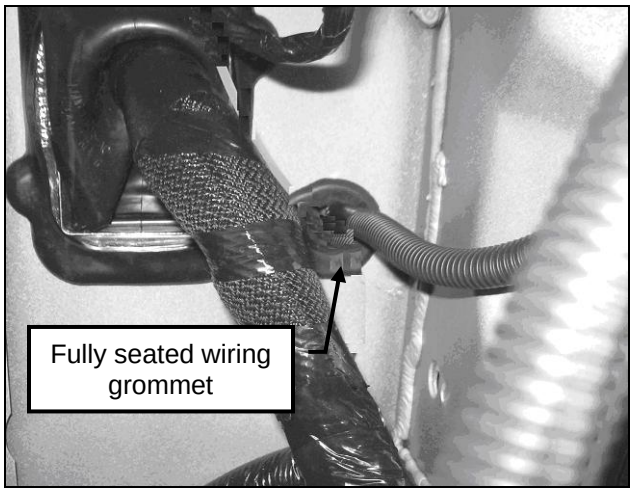




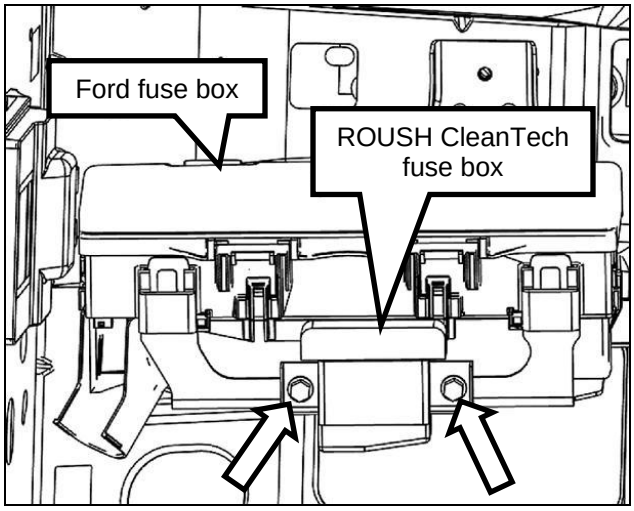
7. Route the end of the harness with the single connector down through the dash, behind the close out panel located below the steering wheel. The close out panel below the steering wheel will have to be removed to access this area. Secure the harness to the factory wiring with zip ties and route it over to the hole that was drilled through the dash panel beside the fuse box.

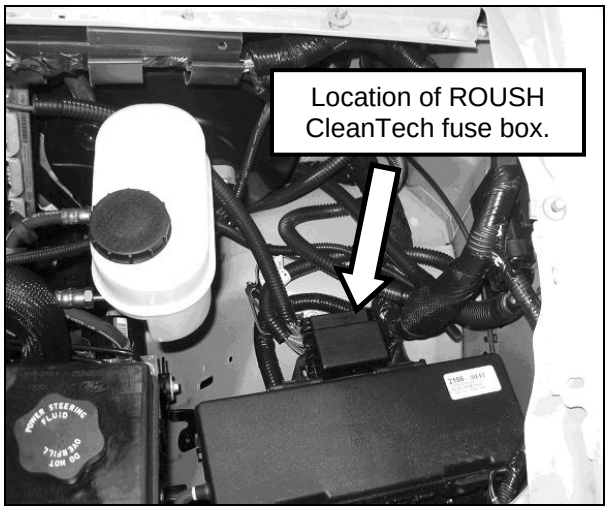


8. From inside the passenger compartment, beside the fuse panel to the left of the accelerator pedal, carefully pass the end of the harness through the dash panel until the grommet is properly seated in the newly drilled hole. After passing the wiring through the dash panel, you will have to reconnect this harness to the rest of the vehicle main wiring harness to be installed next.



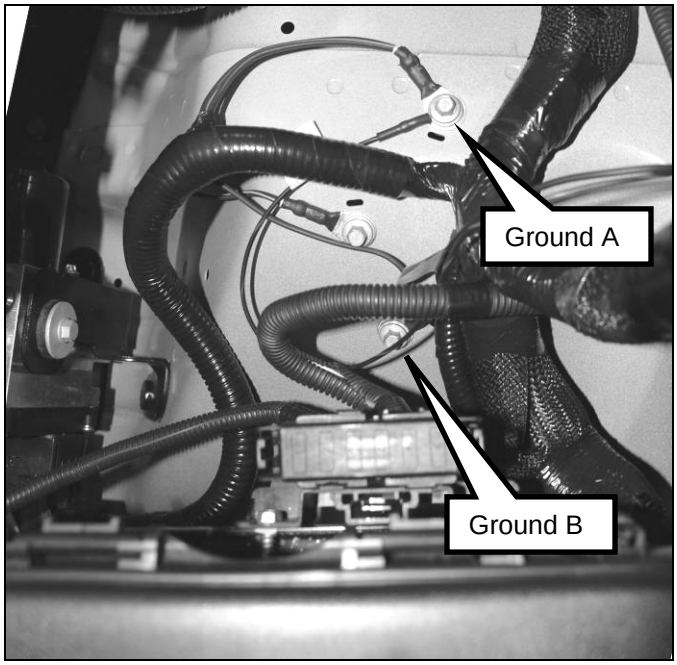
9. Position the “fuse box” portion of the vehicle main wiring harness assembly (PBC2-3075-B) onto the back edge of the Ford fuse box bracket as shown. Secure the fuse box to the Ford fuse box bracket using the two #12-14 x 0.75” self-tapping screws (91324A580).



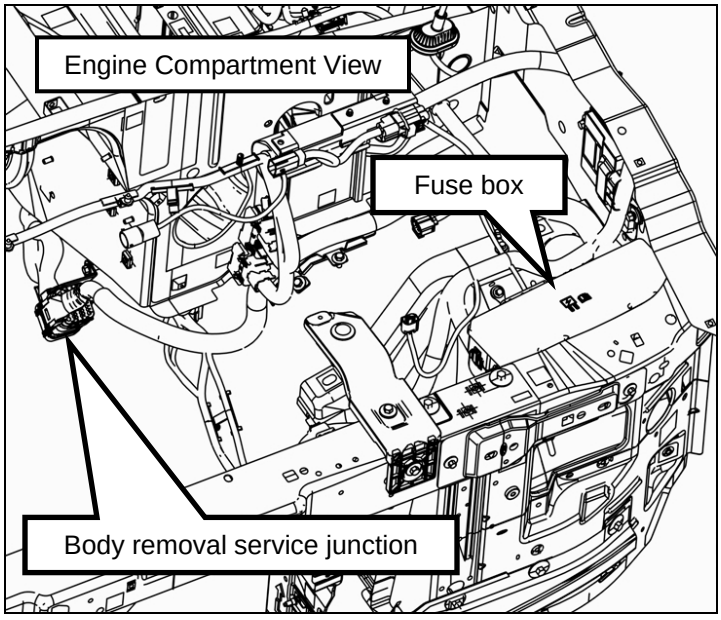


10. Once the fuse box is firmly secured to the bracket, make the connection between the vehicle main wiring harness assembly and the newly installed IPTS module on the inner fender. Reconnect the “CAN Network” section of the harness which passes through the dash panel to the main harness.

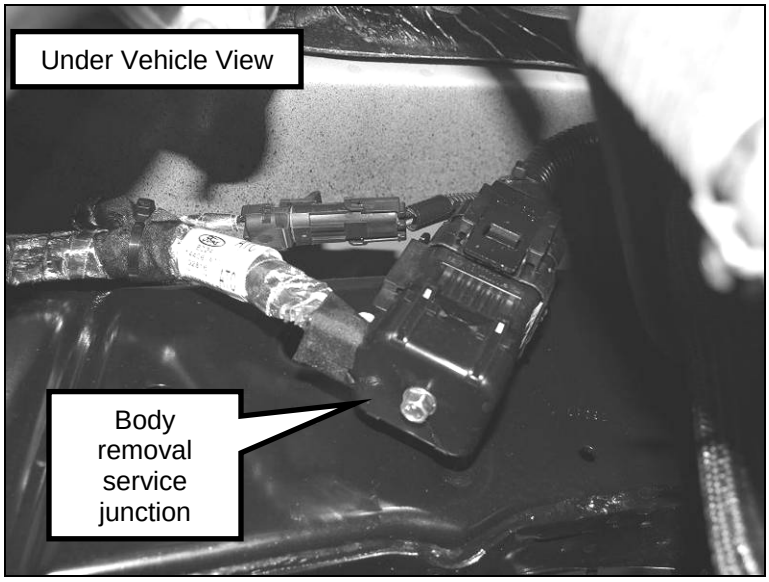
11. Secure the wiring harness system ground eyelet “A” to the existing ground location found rear of fuse box on the inner fender as shown. Secure the second wiring harness shield ground eyelet “B” in the other ground location.



12. Open the factory Ford fuse box and connect the new wiring harness battery positive eyelet to the positive post.
13. Route the remainder of the harness toward the engine along the cowl/dash panel below the brake booster. Route the break out with the 6-pin service connection behind the engine and back toward the left (driver side) frame rail, following the Ford chassis harness.



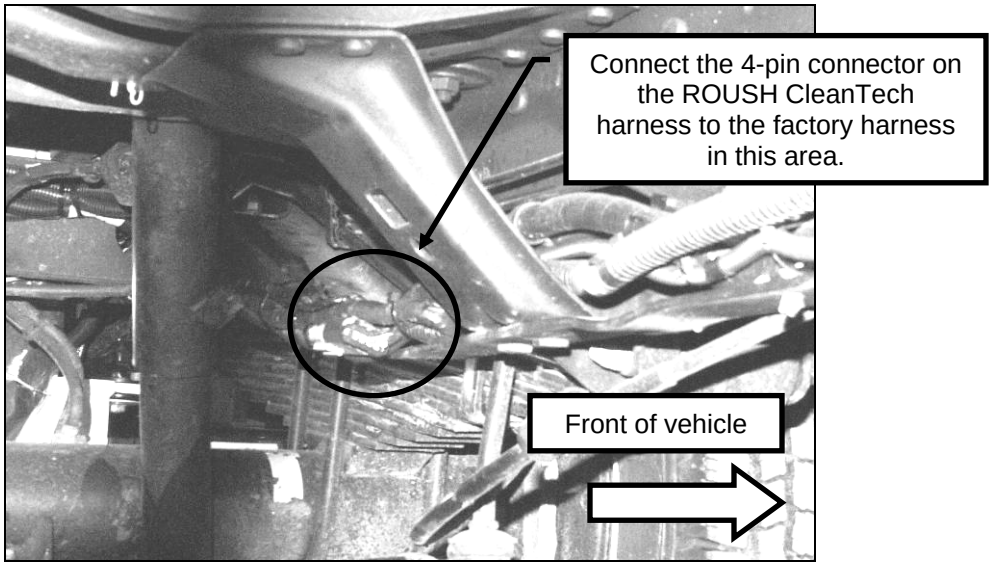
Note: Make sure that the ROUSH CleanTech main harness is routed away from the exhaust pipes, manifolds, catalytic converters and exhaust heat shields.



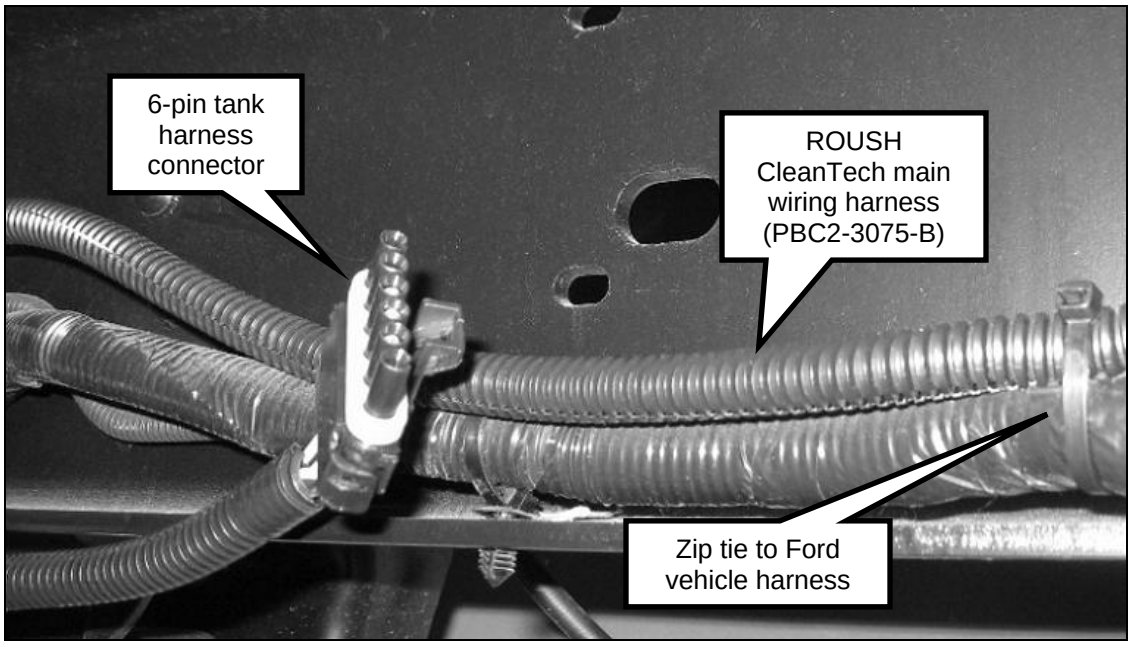
14. Reinstall the degas bottle using the three screws. Tighten the screws to 8–12 Nm.
15. Route the IPTS and FRPCM connectors along side of the Ford engine wiring harness on the left side of the engine. Plug-in the IPTS on the fuel rail and the FRPCM connector into the FRPCM harness.

Note: It is recommended to route the entire harness and make all connections prior to retaining the harness with zip ties. Retaining the wire harness with zip ties is the final step of the wiring harness install.

16. Connect the 6-pin service connector to its mating connector on the rear part of the harness. Extend the harness rearward along the Ford chassis harness. Use zip ties to secure the harnesses to each other. Continuing rearward behind the rear suspension plug the 4-pin connector into the fuel pump/sender connector of the Ford vehicle harness (This connection was unplugged when the original gasoline fuel tank was removed from the vehicle.) Secure the FTPT jumper harness to this harness using zip ties.



17. Connect the original factory wiring harness connection for the FTPT sensor to the FTPT sensor using the FTPT jumper harness (P11C2-9C072-A). Connect the jumper harness to the sensor, route it rearward along the ROUSH CleanTech harness (secure it with zip ties) and plug it into the factory harness connection for the FTPT sensor.
18. If applicable, install the retainer clip to secure the wiring harness to the vapor canister.
19. Use zip ties to secure the 4-pin connector harness to the vehicle main wiring harness. The 6-pin connector that connects the ROUSH CleanTech main wiring harness to the fuel tank will be made after the tank is installed.

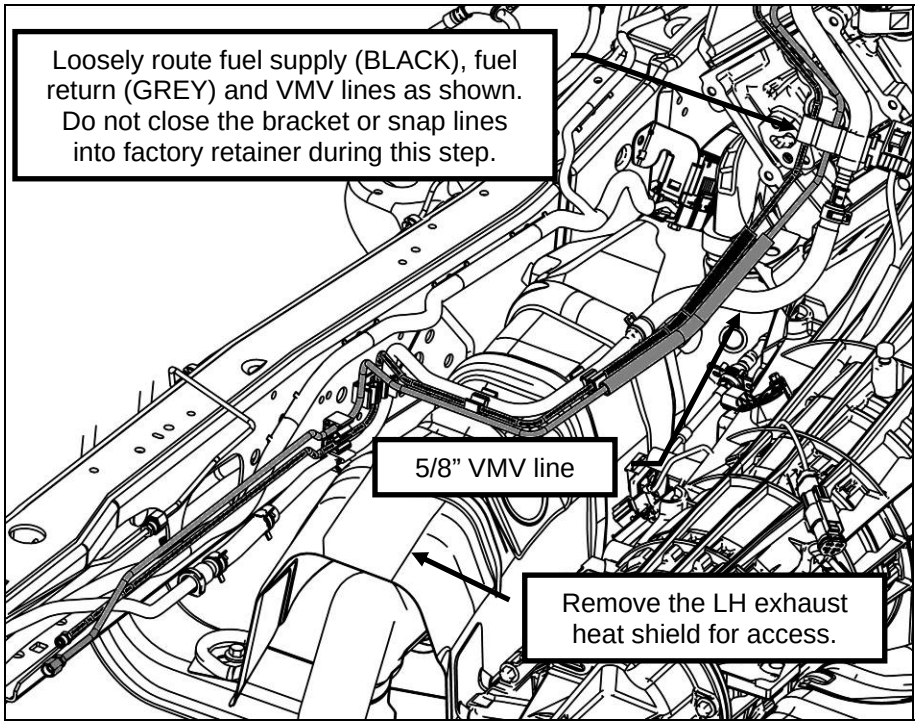


Note: It is recommended to route the entire harness and make all connections prior to retaining the harness with zip ties. Retaining the wire harness with zip ties is the final step of the wiring harness install.

Installing the New Forward Fuel Lines

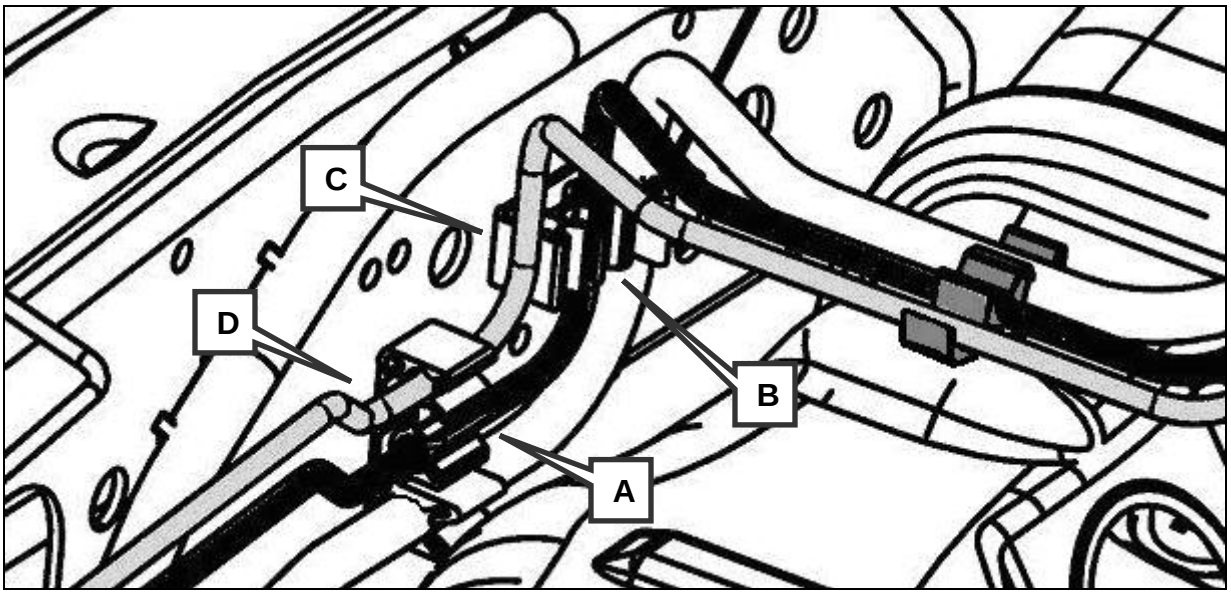
⚠ **Caution:** Hand tighten all fuel line connectors and fasteners before applying a wrench to avoid cross threading. Failure to heed this caution may result in property damage.

1. Install the forward fuel supply line (P07C2-9F911-A) (shown in BLACK) and the forward fuel return line (P07C2-9F912-A) (shown in GREY) from underneath the vehicle. Following the stock 5/8” VMV line, route both lines above the LH exhaust heat shield, which should be removed for greater access, through the transmission bellhousing bracket and into the engine compartment. Do not close the bellhousing bracket at this time. This will be done once all connections to the FRPCM are complete.



2. Install the fuel supply line (BLACK) into the clips in two places (“A” and “B”). Install the fuel return line (GREY) into locations “C” and “D”. No EPDM sleeves are needed at the forward location.

Note: Thin EPDM Sleeves (1/4” to 3/8” — P07L3-9C328-B) are used to secure the fuel return line in the retaining clips along the frame rail in back of this location.



3. Reinstall the LH exhaust heat shield if it has been removed for greater access.
4. Route the forward fuel supply and return lines from the engine down along the frame rail. Unclip the VMV line quick-connect above the LH exhaust heat shield. Place both of the new propane fuel lines behind this line and reconnect the VMV joint. At each point where the fuel lines snap into the factory retention clips, install one EPDM sleeve (P07L3-9C328-B) on each line, to make sure there is proper retention of the lines. Using the factory fuel line retention clips, snap the lines into the clips.

Note: The fuel return line should be routed in the top grooves and the fuel supply line should be routed in the bottom grooves for proper design clearances.

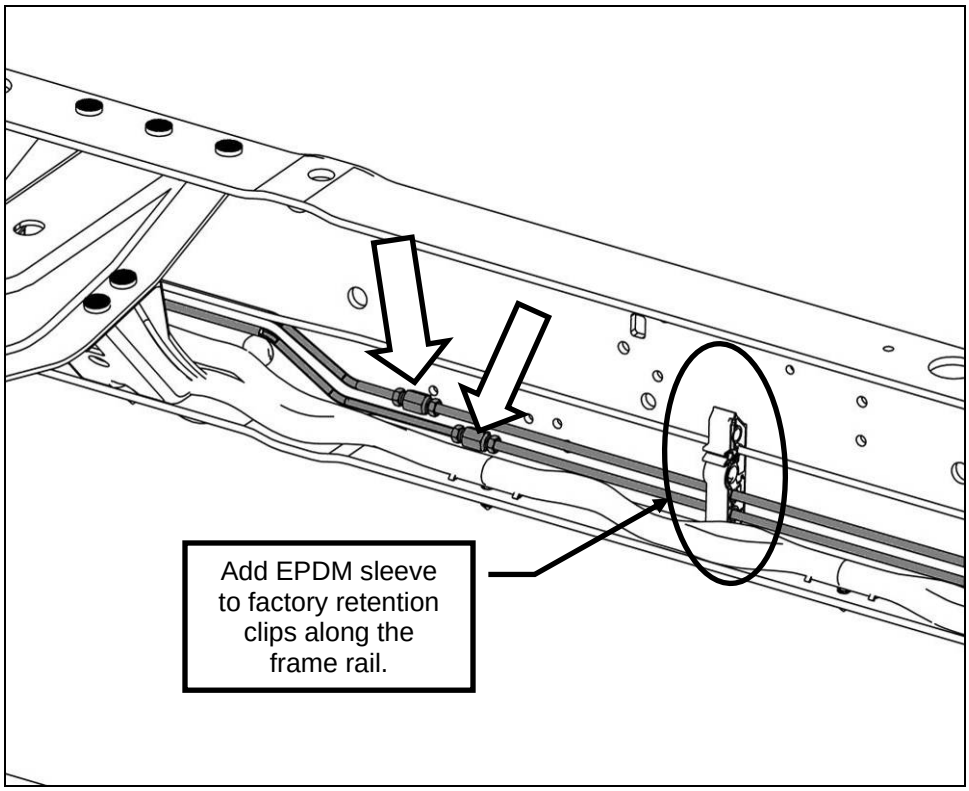
5. Install the rear supply line (PBC2-9288-C) and the rear return line (PBC2-9A086-A) from behind the rear axle, through the hole in the frame cross member. Snap these into position using the factory fuel line retention clips.

Note: The fuel return line should be routed in the top grooves and the fuel supply line should be routed in the bottom grooves for proper design clearances.

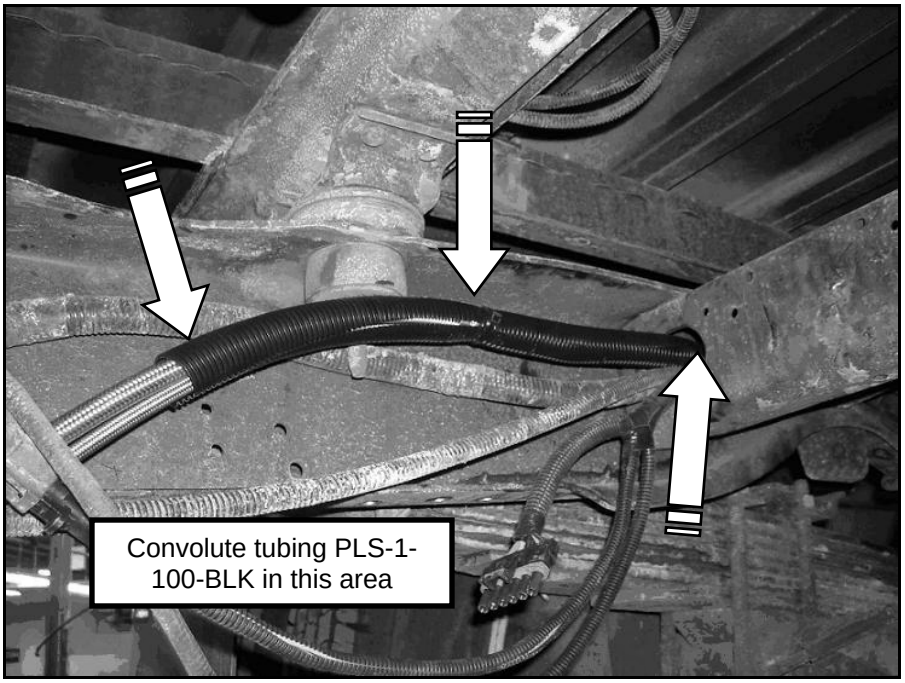
If the vehicle being built is a 176” wheelbase, two intermediate fuel lines (return PBC2-9J280-A and supply PBC2-9J280-B) found in Fuel Line Supplemental Kit — E-350 (PBC2-FUELKIT-A) is needed. These lines join the forward supply and rear supply lines as well as the forward return and rear return lines. If the vehicle being built has a 158” wheelbase, the forward and rear, supply and return lines mate directly to one another without the need for the intermediate lines.

6. Tighten all of the line fittings to 18–22 Nm.

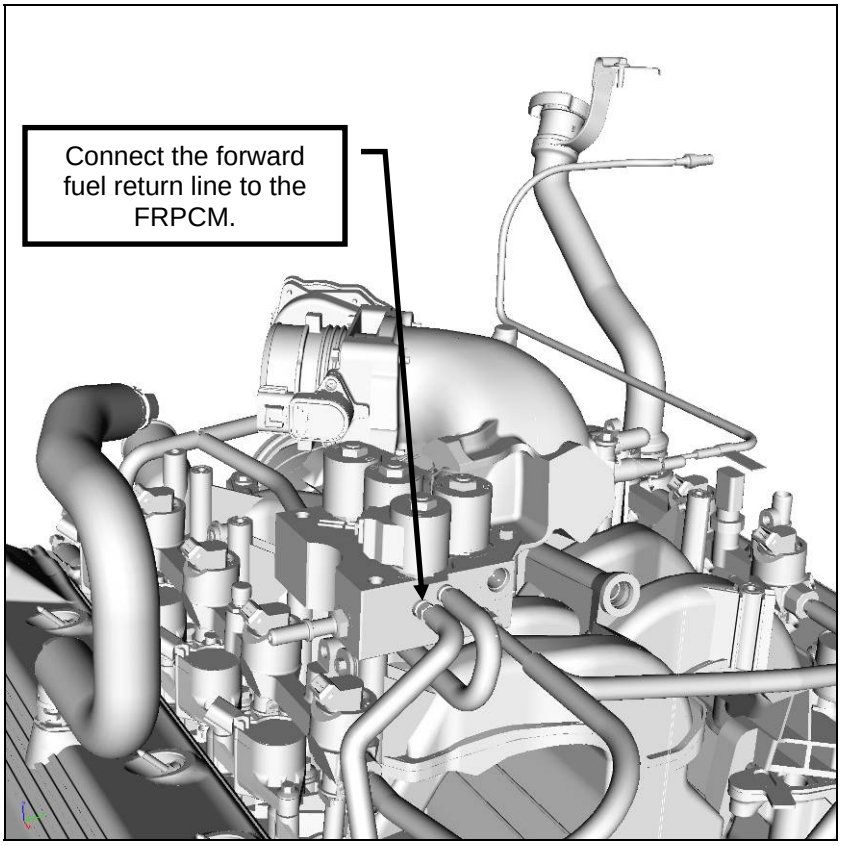
Note: Match color tags on mating lines for proper routing.



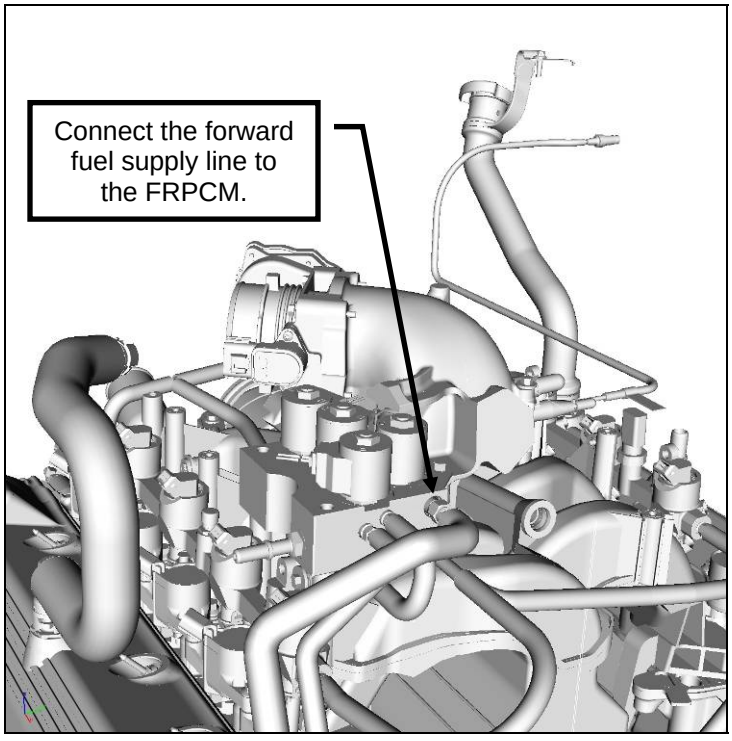
7. Wrap both the fuel return and fuel supply lines with convolute 1” diameter tubing 30” in length (PLS-1-100-BLK) in the area shown. Make sure the convolute tubing starts ahead of the crossmember opening approximately two inches and then extends as far as it will to the rear. Attach the convolute to the fuel lines using three zip ties, one at each end and one in the middle.



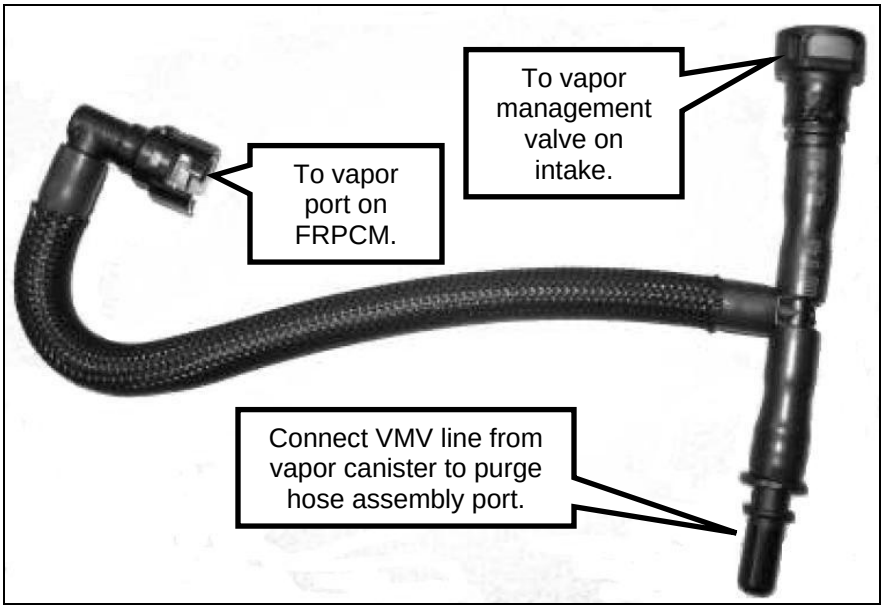
8. Install the forward fuel return line (P07C2-9F912-A blue tag) into the lower left port on the FRPCM. Tighten the line fitting to 18–22 Nm.



9. Install the forward fuel supply line (P07C2-9F911-A orange tag) into the top right port on the FRPCM. Apply a thin film of clean engine oil to the male tubing end form before insertion into the quick-connect fitting. Push the male tubing end form into the quick-connect fitting on the FRPCM until it clicks into place. Firmly pull on the fitting to make sure it is locked in place.



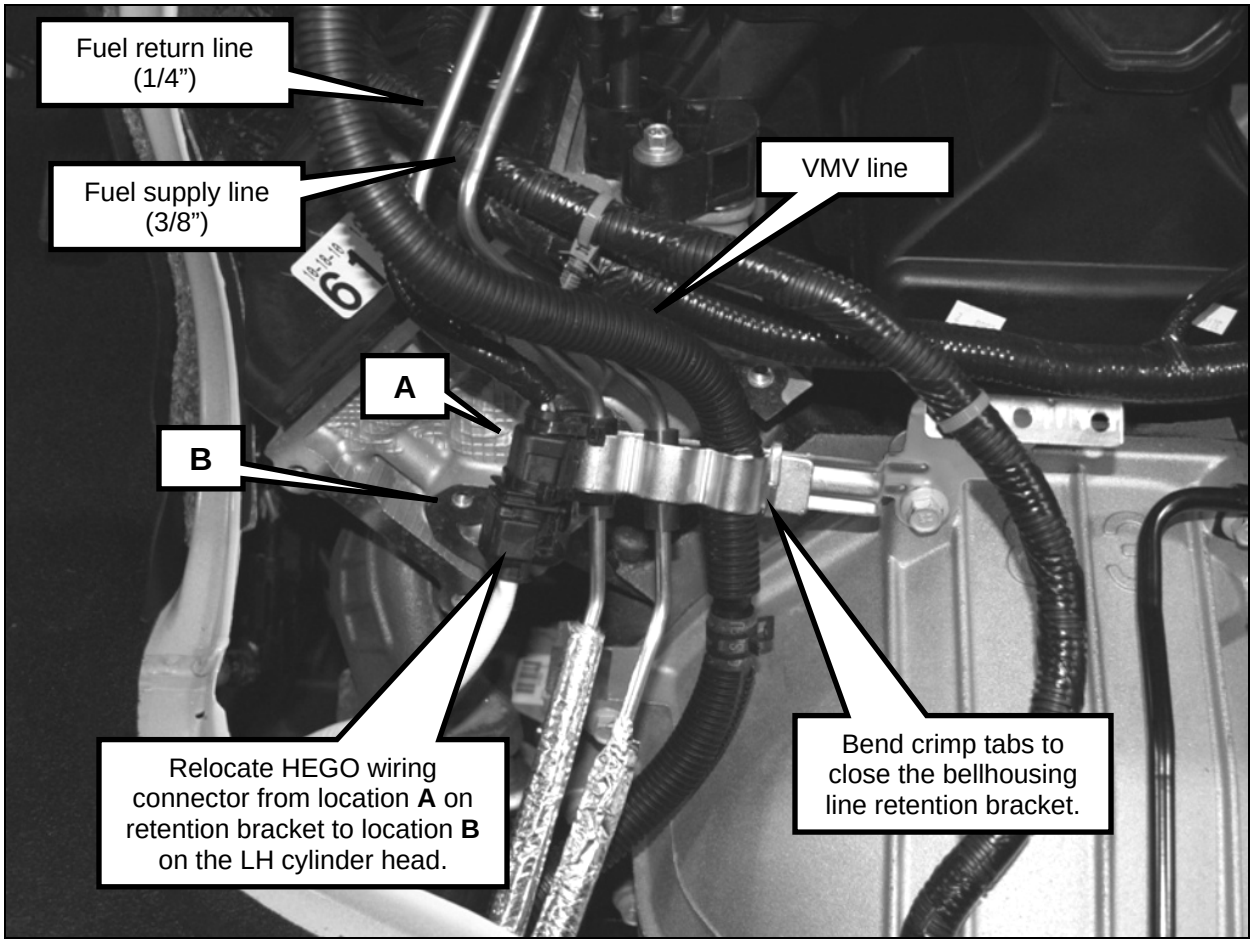
10. Connect the vapor port on the FRPCM to the Ford vapor management valve (VMV) using the FRPCM purge hose assembly (P10C2-9K313-A). Connect the VMV line from the vapor canister to the FRPCM purge hose assembly port.



11. Reconnect the VMV electrical connection.
12. With the Ford engine harness routed around the fuel lines, reinstall the harness push pins as needed.

13. With both lines, along with the 5/8” VMV line, correctly positioned as shown, close the bracket and bend the crimp tabs to firmly secure the lines.

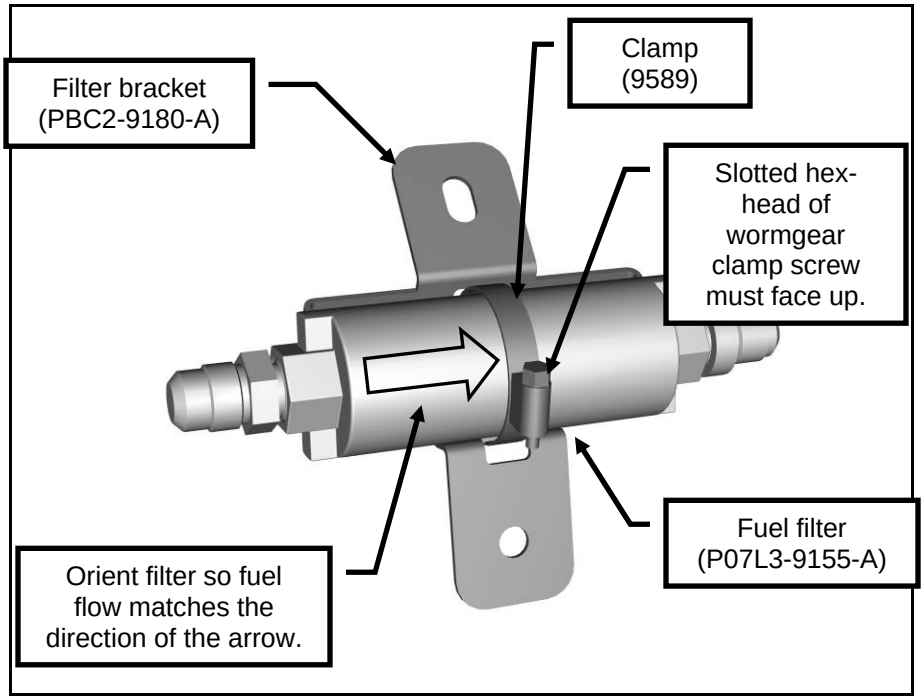
Note: In order to properly seat the return fuel line in the leftmost “slot”, it is necessary to relocate the HEGO wiring connector from its location on the retention bracket (A) to one of the threaded holes (B) located on the rear of the LH cylinder head.



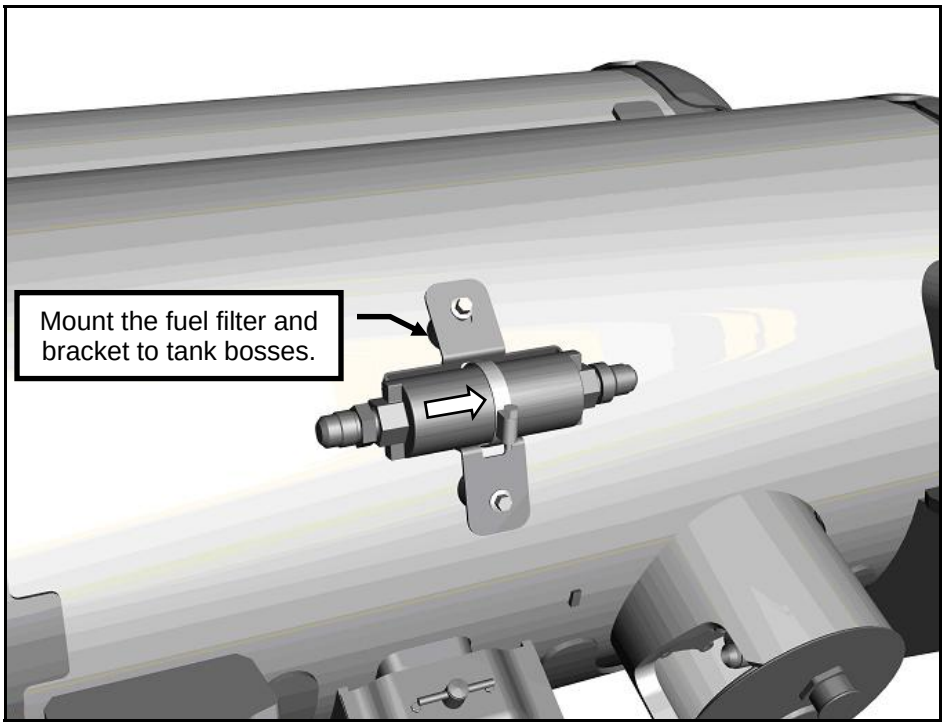
Preparing the Tank Assembly

1. Assemble the fuel filter (P07L3-9155-A) to the fuel filter bracket (PBC2-9180-A) using one wormgear clamp (9589). Tighten the clamp to 4–5 Nm.

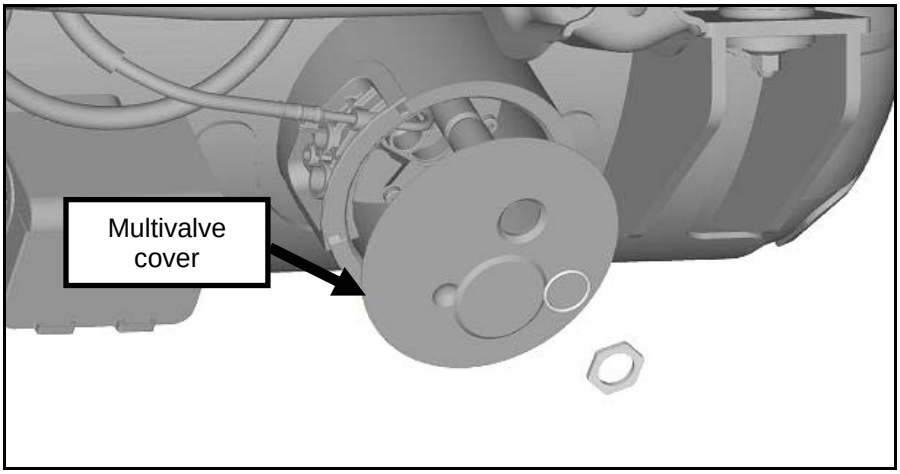
Note: The arrow on the filter indicates the direction of fuel flow; make sure the filter is assembled to the bracket in the correct orientation and that the slotted hex-head of the wormgear clamp screw is facing up to provide access from above the frame rail and fuel tank left half.



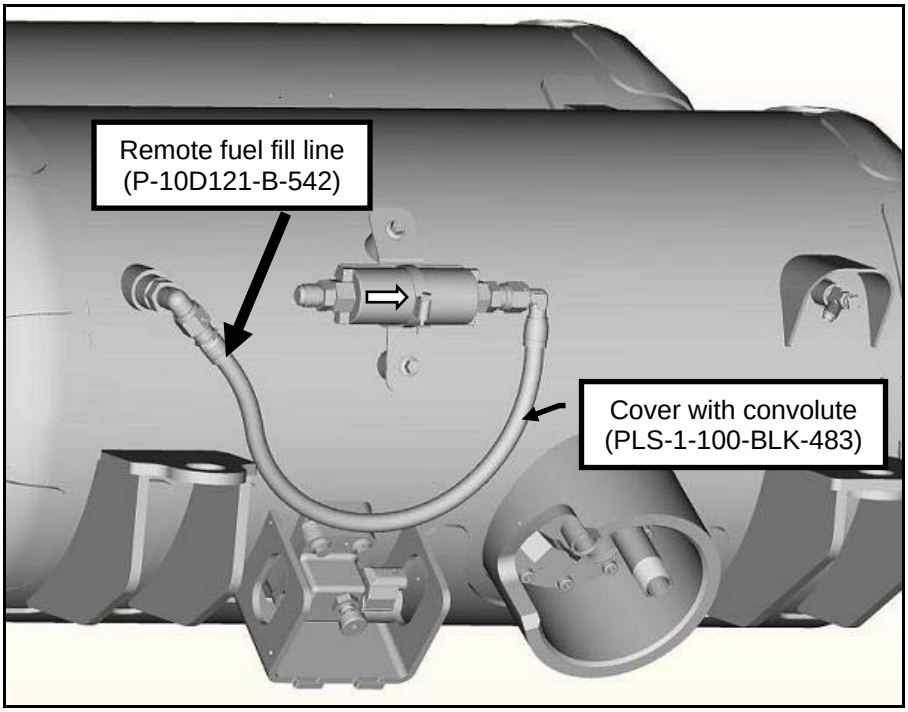
2. Install the fuel filter and bracket assembly to the tank using two M8 x 1.25 x 20 bolts (W500223-S439). Tighten the bolts to 20–30 Nm.



3. Remove the plastic shipping cap, M24 nut, O-ring and cover from the multivalve assembly. Set the cover, O-ring, M24 nut and shipping cap aside. These parts, including the shipping cap, will be installed later.

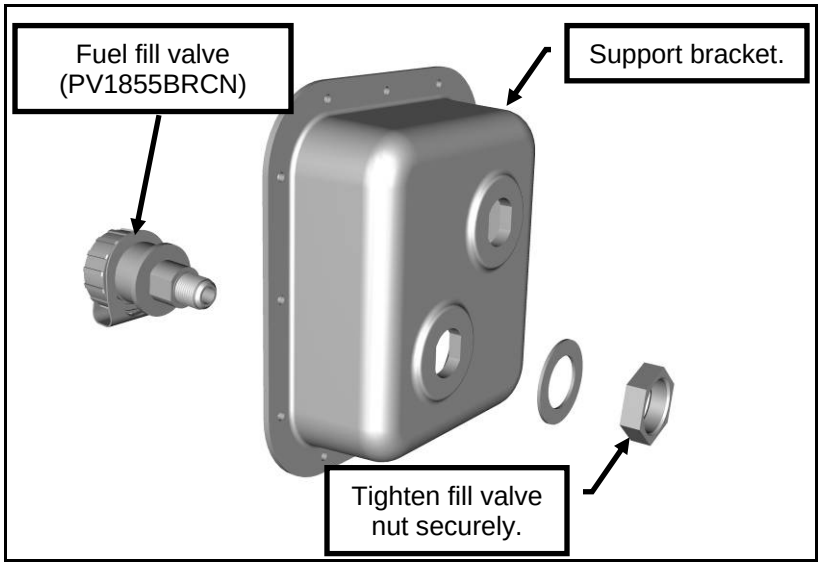


4. Before making the fuel line connections, check that the fuel supply valve is functioning by briefly applying 12-volt power to the pink and brown wire terminals at the 6-pin connector. The fuel supply valve is functioning if a “click” is heard.
5. Cover the fuel fill line (P-10D121-B-542) with convolute (PLS-1-100-BLK-483) from fitting to fitting before installing the line. Connect the fuel remote fill line to the outlet of the fuel filter. Tighten to 41–49 Nm. Connect the opposite end of this line to the fitting on the fuel fill port of the tank. Tighten to 41–49 Nm.

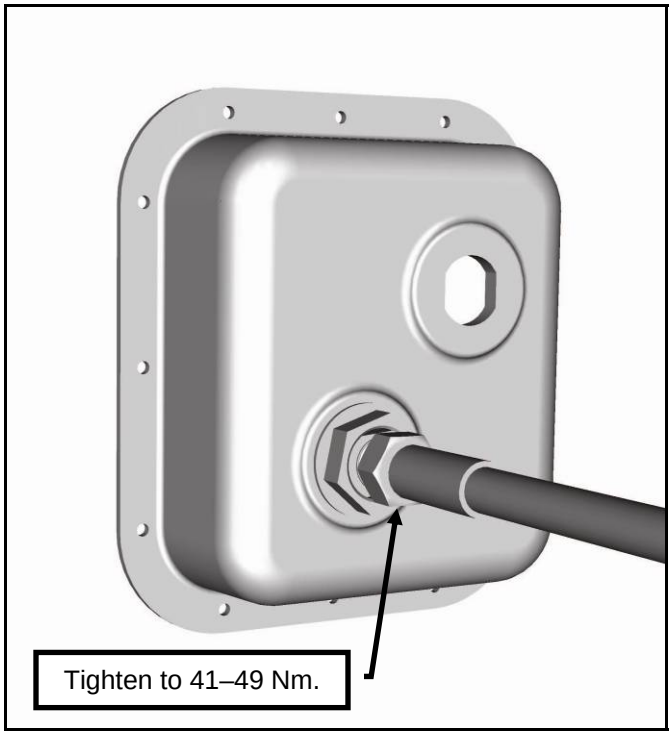


⚠ **Caution:** Hand tighten all fuel line connectors and fasteners before applying a wrench to avoid cross threading. Failure to heed this caution may result in property damage.

6. Remove the nut and washer from the fuel fill valve (PV1855BRCN or ME602-8) and assemble the valve to the fuel filler neck mounting bracket (P10C2-9B213-A) as shown. Support the fill valve and bracket assembly and tighten the nut securely.

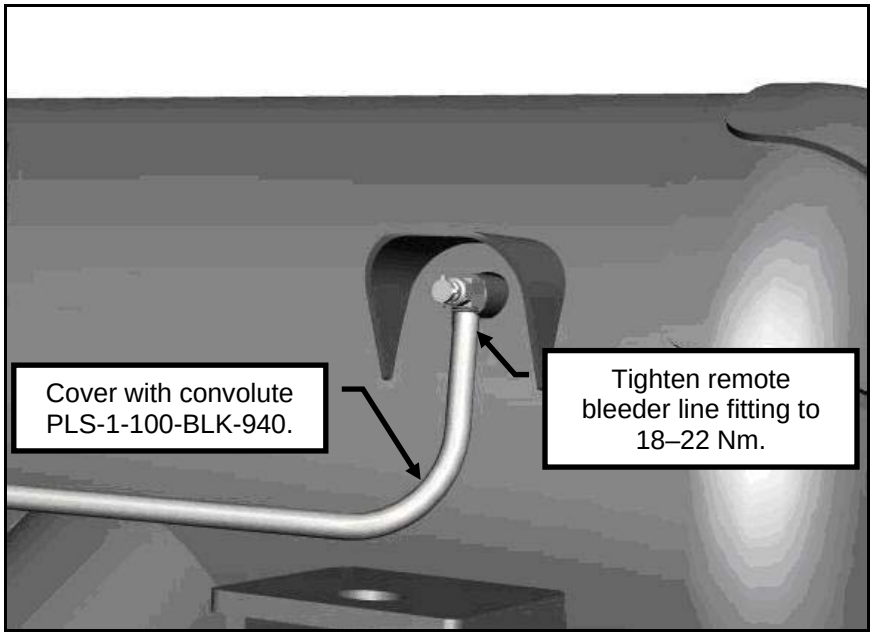


7. Install the remote fill line (P-10D121-B-1000) to the fuel fill valve. Tighten to 41–49 Nm.



8. Route the remote fill line over the frame rail temporarily. The opposite end of the line will be connected to the inlet of the fuel filter after the tank is installed.

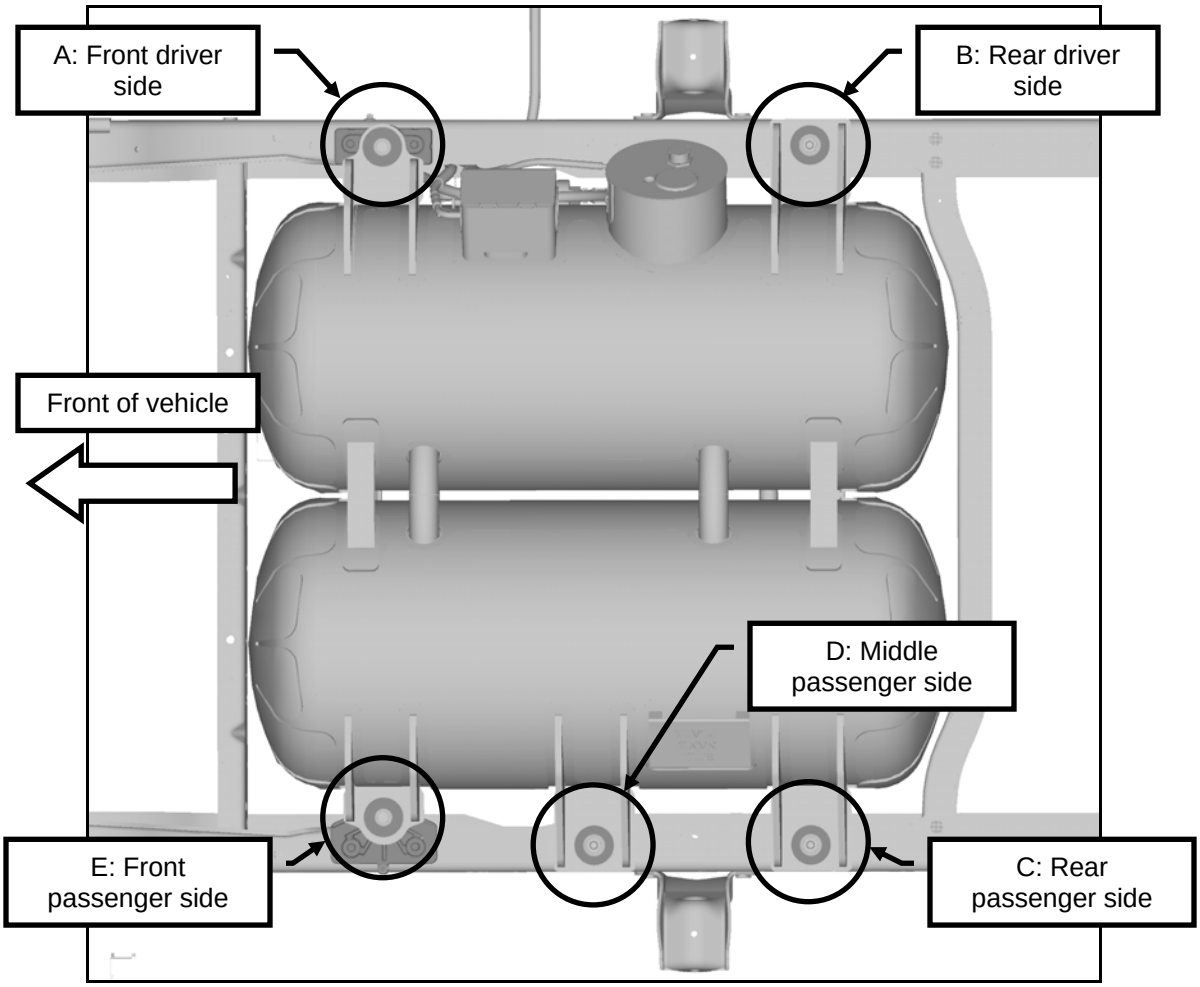
9. Connect the remote bleeder line to the bleeder valve on the fuel tank. Tighten the connection to 18–22 Nm.



Preparing the Frame

Note: On same earlier E-350 chassis the rear crossmember must be removed and repositioned to accommodate installation of the ROUSH CleanTech fuel tank and also add a new fuel tank guard. Please refer to the Appendix at the end of this kit installation instruction manual in *Rear Crossmember Position Modification for Fuel Tank and Fuel Tank Guard Installation*.

The following picture illustrates the tank location from looking up beneath the vehicle rearward of the rear axle assembly. The following steps refer to each section (A thru E) as each mount location requires unique mounting hardware and assembly procedures.

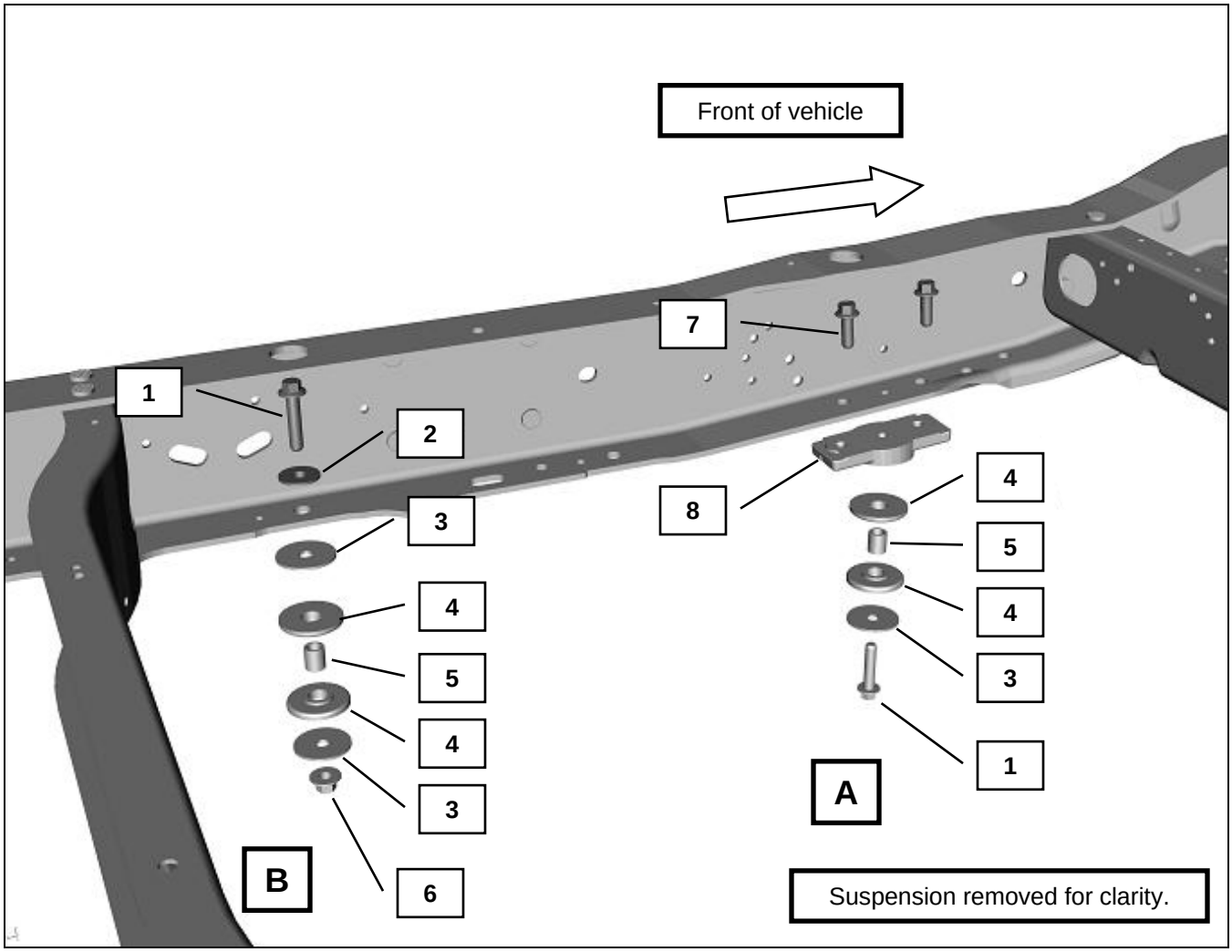


⚠ **Caution:** At locations B, C and D, a step-collar washer is required to be installed on the top side of the frame rail. During final tightening, the washer must be properly seated flat against the frame rail surface with the step collar inserted in the frame hole. Failure to follow this procedure can cause damage to the tank mounting components.

Mounting hardware for each location is shown in the exploded views that follow. The hardware used on E-350 cutaway applications is shown in the exploded views.

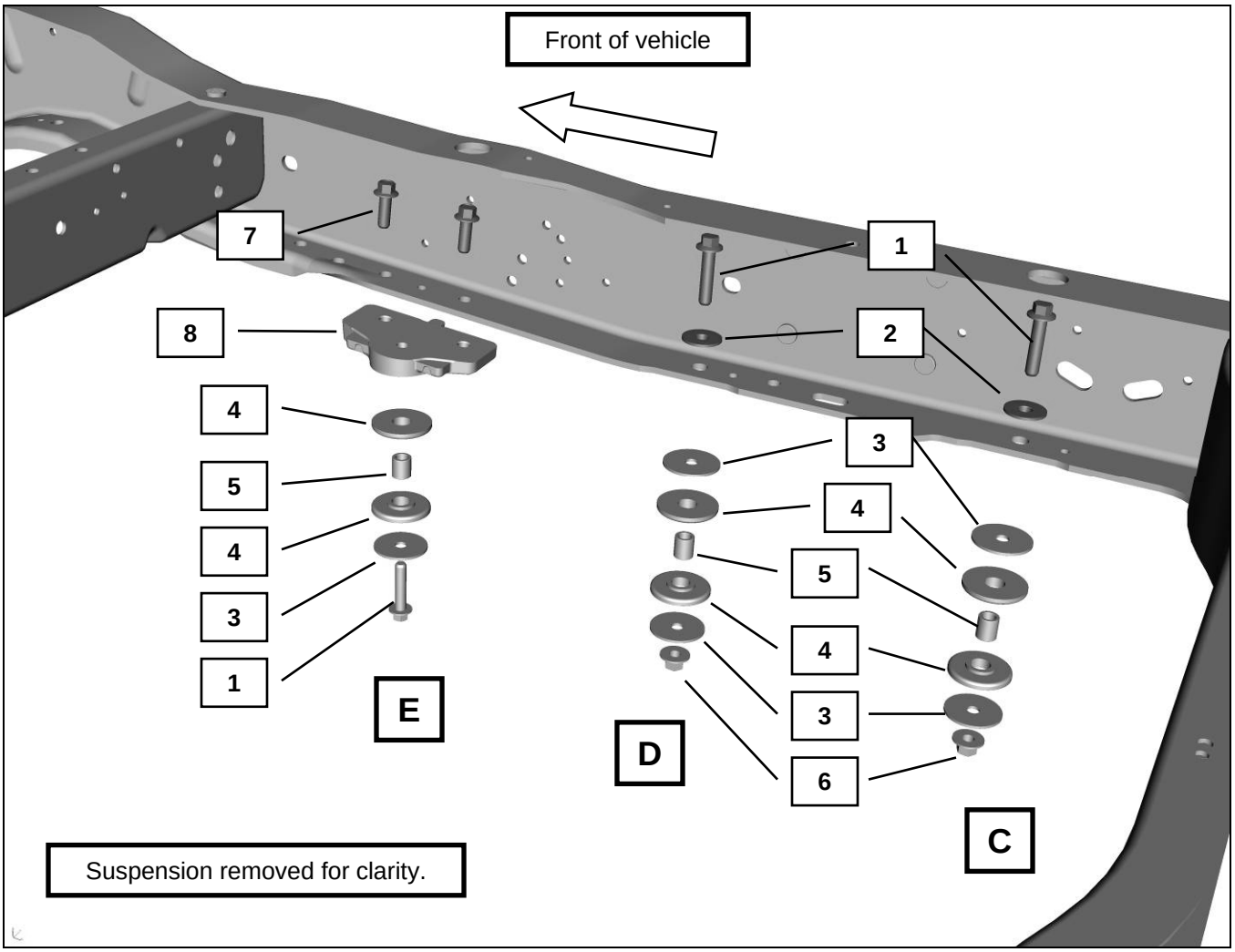
Note: In the following two exploded views, a washer with step collar (PBC2-3932-A) is used in three locations above the frame rail lower flange. In these three locations, the frame hole is larger than the bolt diameter. The step collar of the washer is positioned in the frame hole, providing a tight fit for the bolt.

Driver side frame rail and fuel tank mounting hardware



1. M12 x 1.75 x 55 bolts (W709906-S439)	5. Washer (with step collar) (PBC2-3932-A)
2. Washer (P07L3-3932-A)	6. Rubber isolator (P07L3-9N052-A)
3. Isolator crush limiter (PBC2-11293-A)	7. M12 x 1.75 nut (W710807-S440)
4. M12 x 1.75 x 35 bolt (W710233-S439)	8. Frame mounting bracket, left (P07C2-9046-A)

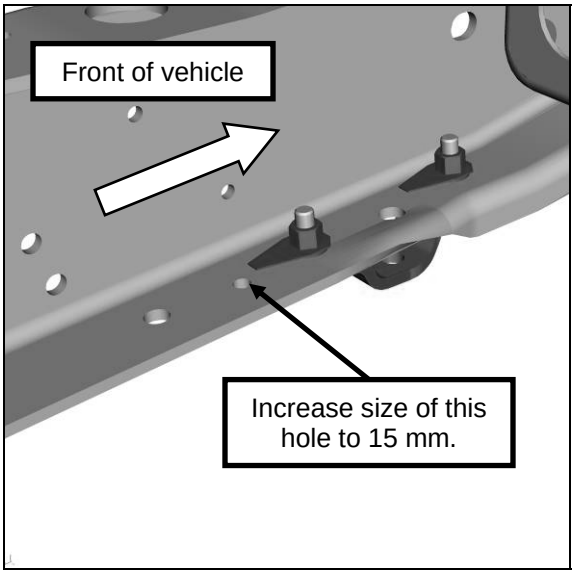
Passenger side frame rail and fuel tank mounting hardware

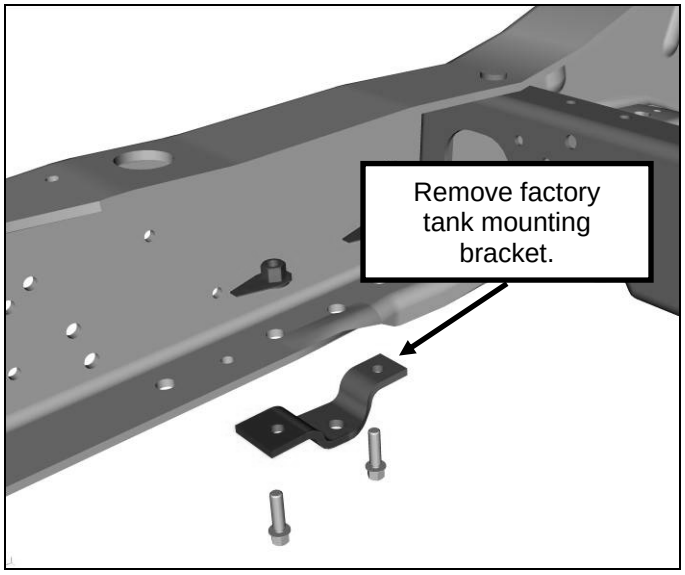


1. M12 x 1.75 x 55 bolts (W709906-S439)	5. Washer (with step collar) (PBC2-3932-A)
2. Washer (P07L3-3932-A)	6. Rubber isolator (P07L3-9N052-A)
3. Isolator crush limiter (PBC2-11293-A)	7. M12 x 1.75 nut (W710807-S440)
4. M12 x 1.75 x 35 bolt (W710233-S439)	8. Frame mounting bracket, right (P07C2-9045-A)

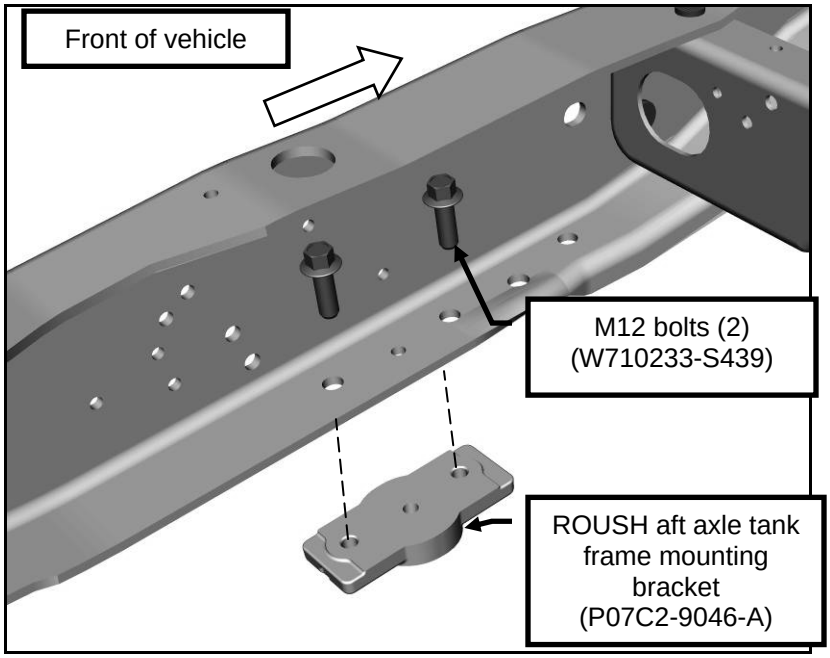
Note: The factory 55-gallon fuel tank mounting bracket that is bolted to the frame in location "A" must be removed prior to modifying the frame.

1. **Area A: Front Driver Side Mount** — Before installing the new mounting bracket to the frame, you will have to drill out an existing frame hole which will be the center through bolt hole of the cast bracket. The hole that needs to be opened up is the first hole on the frame directly before the factory tank mounting bracket.



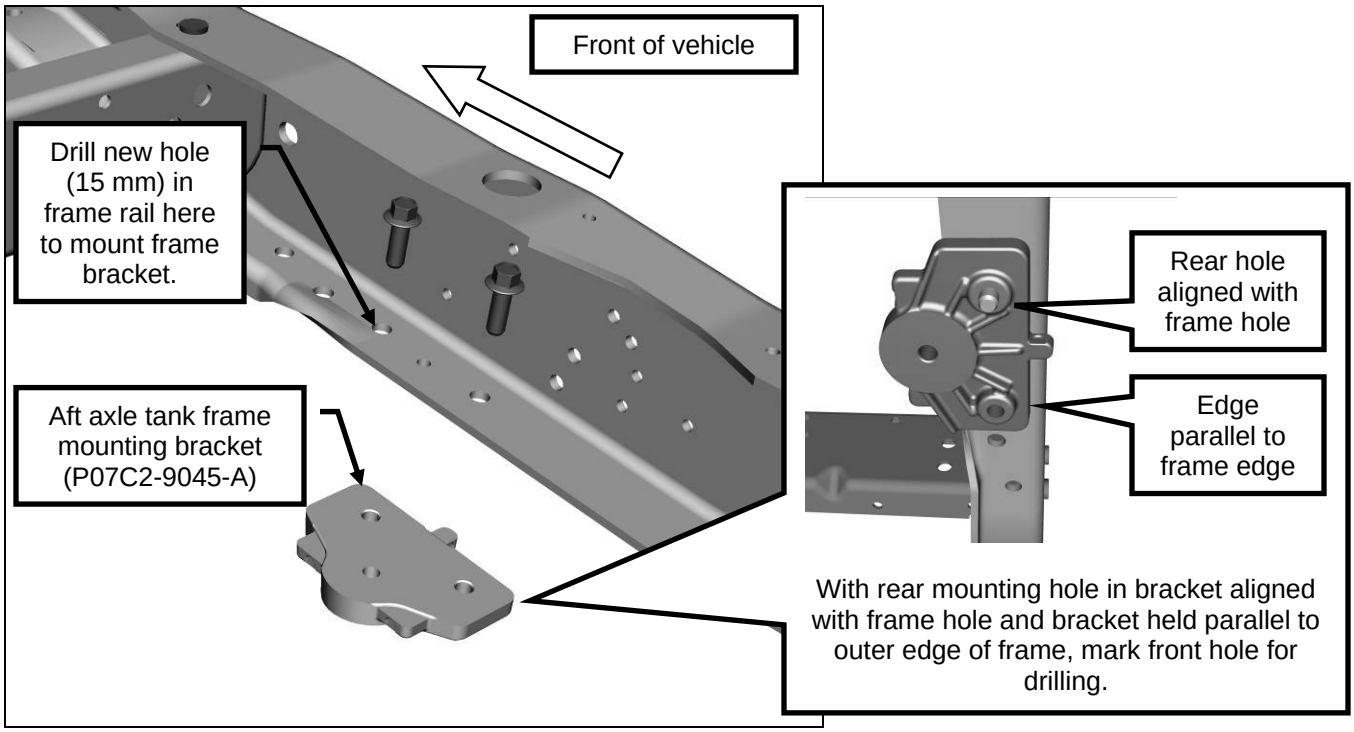


Drill this hole out to 15 mm. Debur and coat all bare metal using a premium undercoating. ROUSH CleanTech suggests Motorcraft Premium Undercoating (PM-25-A). Install the aft axle tank front frame mounting bracket (P07C2-9046-A) using two M12 x 1.75 x 35 (W710233-S439) bolts. The bolts are to be installed from the inside of the frame and threaded into the cast bracket. Install bolts, threading them into the bracket. Tighten the bolts to 100–110 Nm.



2. **Area B: Rear Driver Side Mount** — No modifications are needed in this area to mount the propane tank. The factory Ford fuel tank mounting location is reused.
3. **Area C: Rear Passenger Side Mount** — No modifications are needed in this area to mount the propane tank. The factory Ford fuel tank mounting location is reused.
4. **Area D: Middle Passenger Side Mount** — No modifications are needed in this area to mount the propane tank. The factory Ford fuel tank mounting location is reused.

5. **Area E: Front Passenger Side Mounting** — Before installing the new passenger side mounting bracket to the frame, you must drill a new frame hole. Hold the tank mounting bracket in its correct location on the frame and use the bracket to mark the new hole position. Drill a 1/8” pilot hole and then drill this hole out to 15 mm. Debur and coat all bare metal using a premium undercoating. ROUSH CleanTech suggests Motorcraft Premium Undercoating (PM-25-A). Install the passenger side tank frame mounting bracket (P07C2-9045-A) using two M12 x 1.75 x 35 (W710233-S439) bolts. The bolts should be installed from the inside of the frame and threaded into the tank mounting bracket. Tighten the bolts to 100–110 Nm.

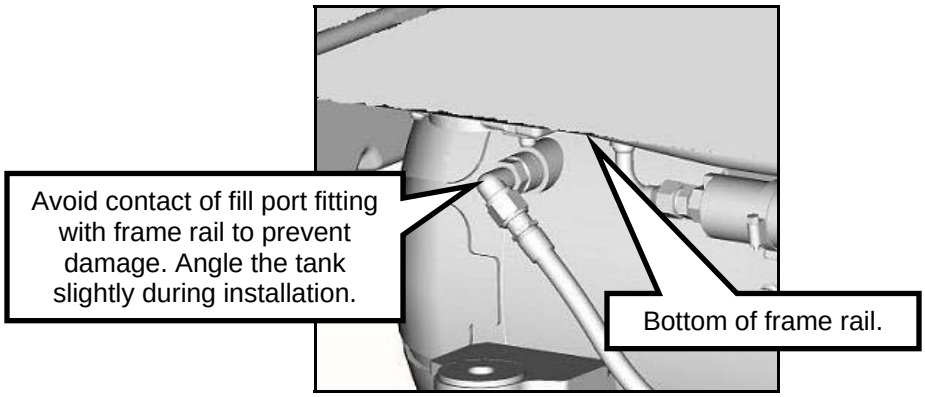


Installing the Fuel Tank Assembly

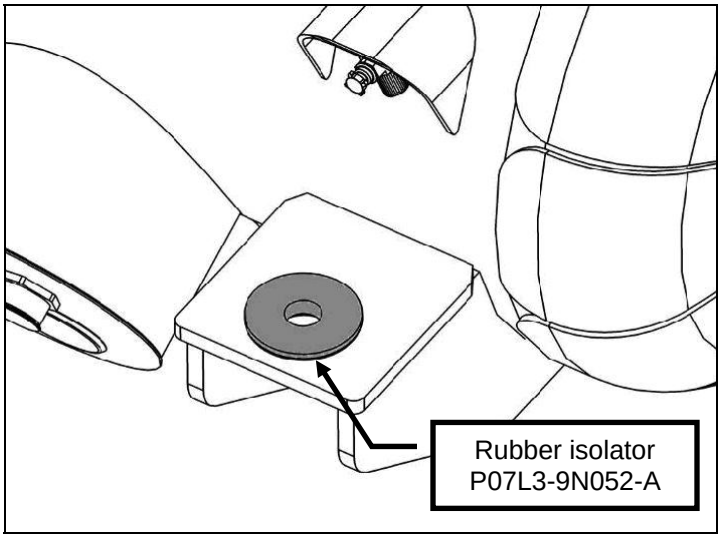
⚠ **Caution:** Hand tighten all fuel line connectors and fasteners before applying a wrench to avoid cross threading. Failure to heed this caution may result in property damage.

1. Position the fuel fill line from the fuel fill valve to the fuel filter on the top of the tank assembly and tuck the wiring harness up against the fuel tank. Slowly begin to raise the tank into position.

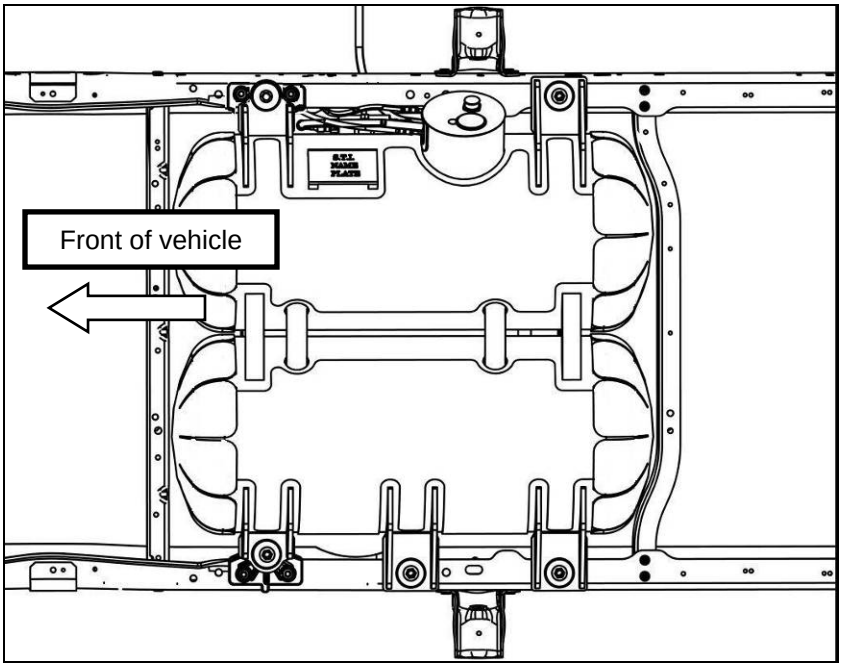
⚠ **Caution:** Use care when lifting the tank into position between the frame rails to prevent damage to the fill port elbow fitting on the tank. Failure to heed this caution can result in component damage.



2. On the top of each tank mounting bracket place one rubber isolator (P07L3-9N052-A).

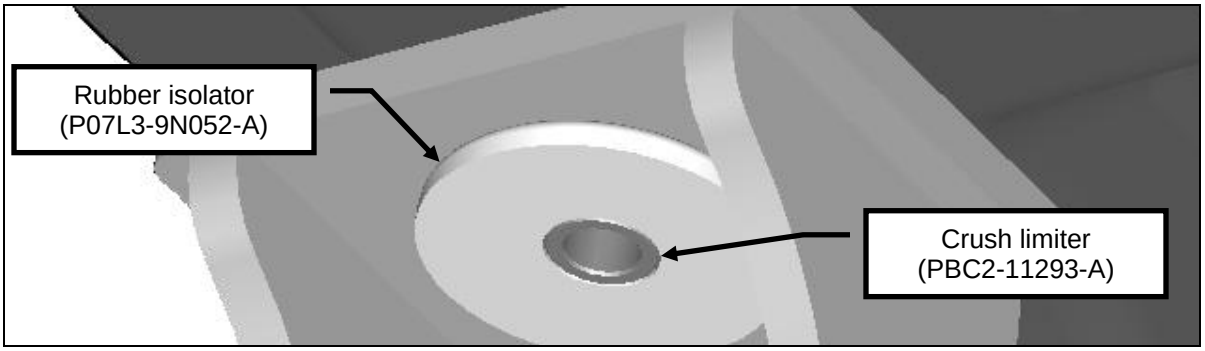


3. Place one tank mounting washer (P07L3-3932-A) onto the top of the rubber isolators in tank mounting positions B, C and D.
4. Carefully raise the tank into position. Stop at a point before the tank is fully seated. Route the fuel fill and remote bleeder lines into position over the frame rail. Connect the remote fuel fill line from the fill valve to the filter and tighten the fitting to 41–49 Nm. Hold the 90-degree line fitting toward the fuel tank while tightening to prevent the line from contacting the frame rail when the tank is fully installed.
5. Continue to raise the tank into position, being careful to align the mounting holes on the tank brackets with the five respective mounting holes in the frame brackets and frame rails before fully seating on all five locations.



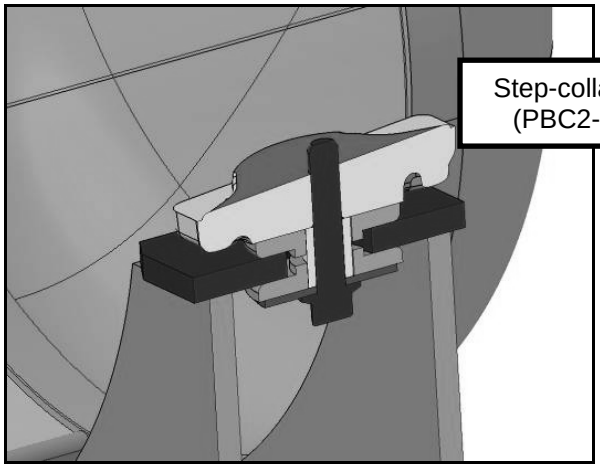
Bottom view illustrating a fully installed tank

6. Once all of the tank mounting brackets are aligned and seated firmly in position against the frame brackets and rails, install five isolator crush limiters (PBC2-11293-A) and the five remaining rubber isolators (P07L3-9N052-A) into the underside holes on the tank mounting brackets (5 places).

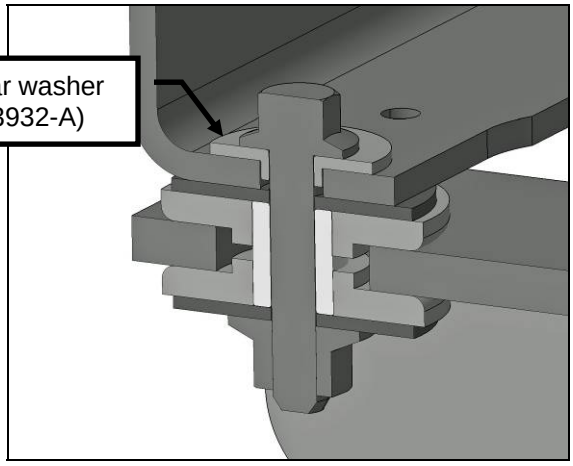


7. Loosely install the M12 x 1.75 x 55 bolts (W709906-S439) and washers (P07L3-3932-A). At locations B, C and D, mount the tank using a step-collar washer (PBC2-3932-A) positioned on the top side of the frame rail and a bolt inserted from the top side to a nut (W710807-S440) on the bottom side of the frame rail. Do NOT tighten the bolts at this time. Thread bolts in only up to the preapplied Loctite®. Once all five tank mounting bolts have been installed in the brackets, the bolts will be tightened to specification, engaging and setting the Loctite®.

Tank Mounting Fasteners — Cross-sectional Views

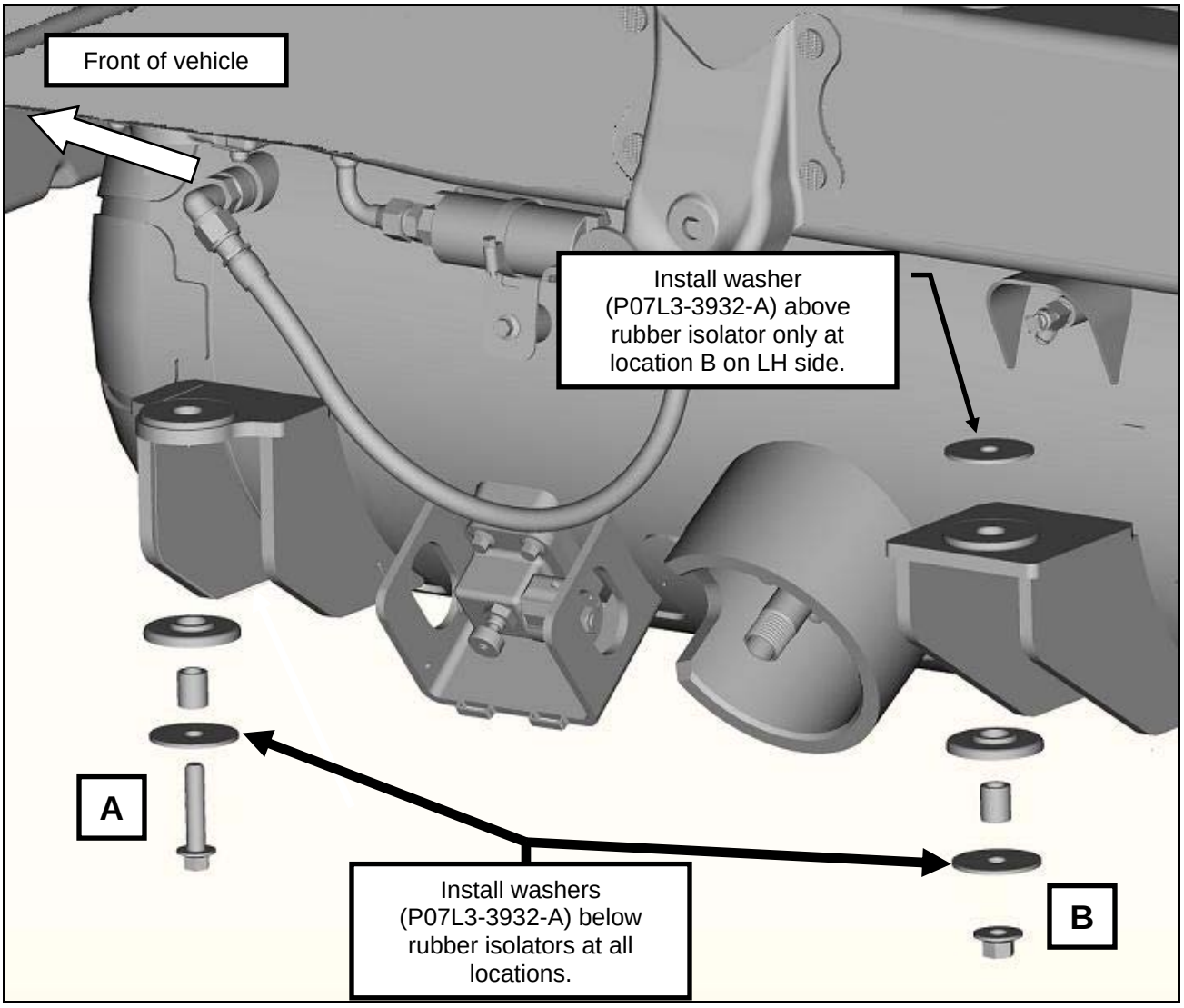


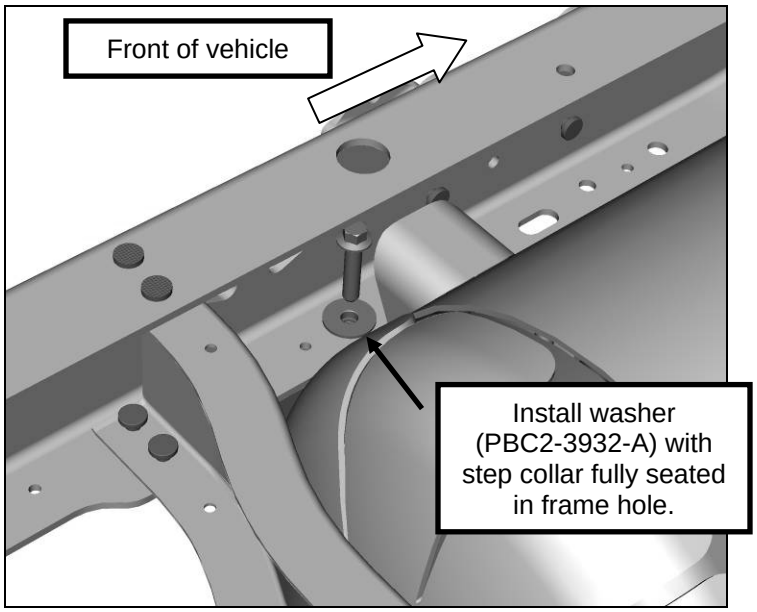
Frame Locations A and E



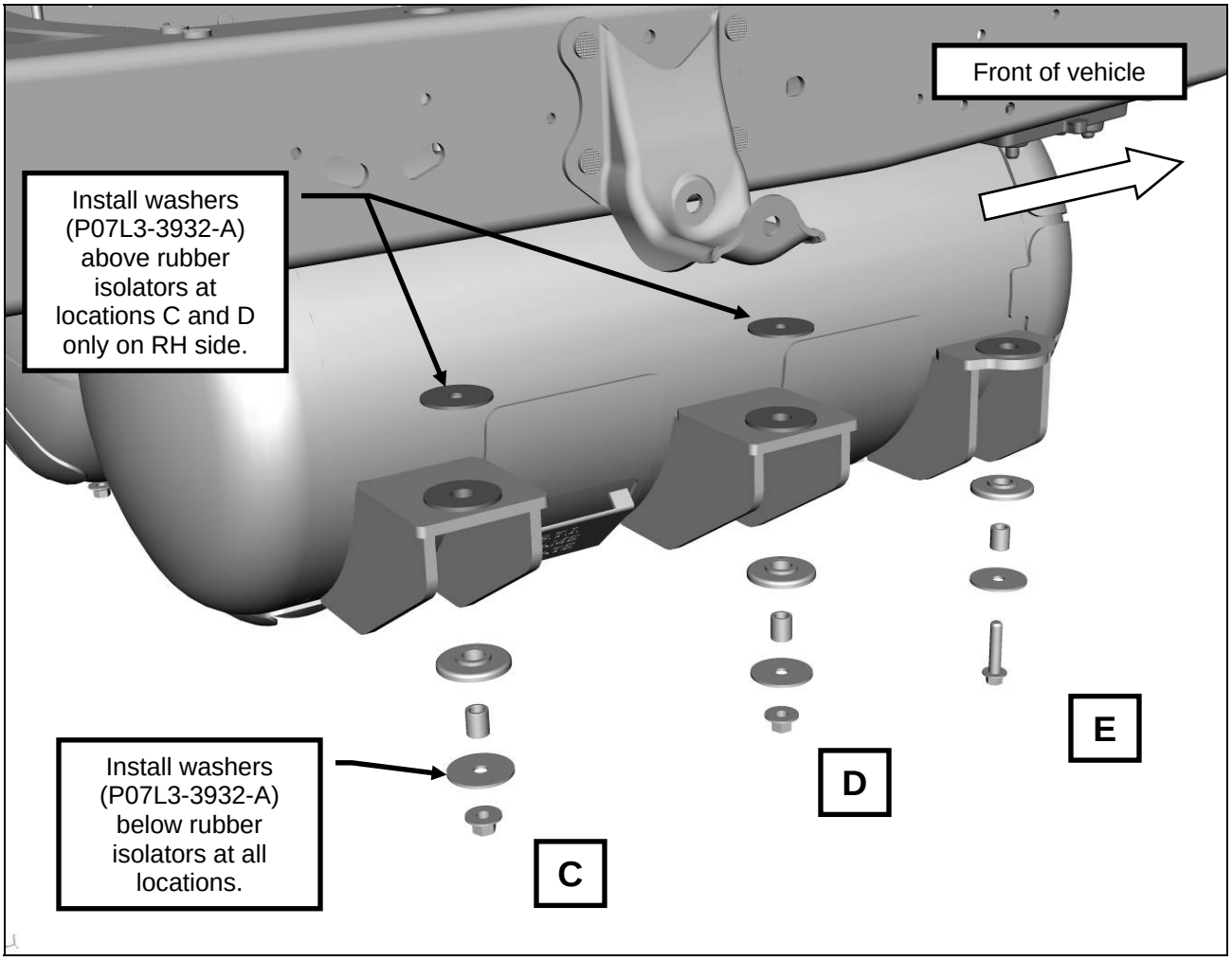
Frame Locations B, C and D

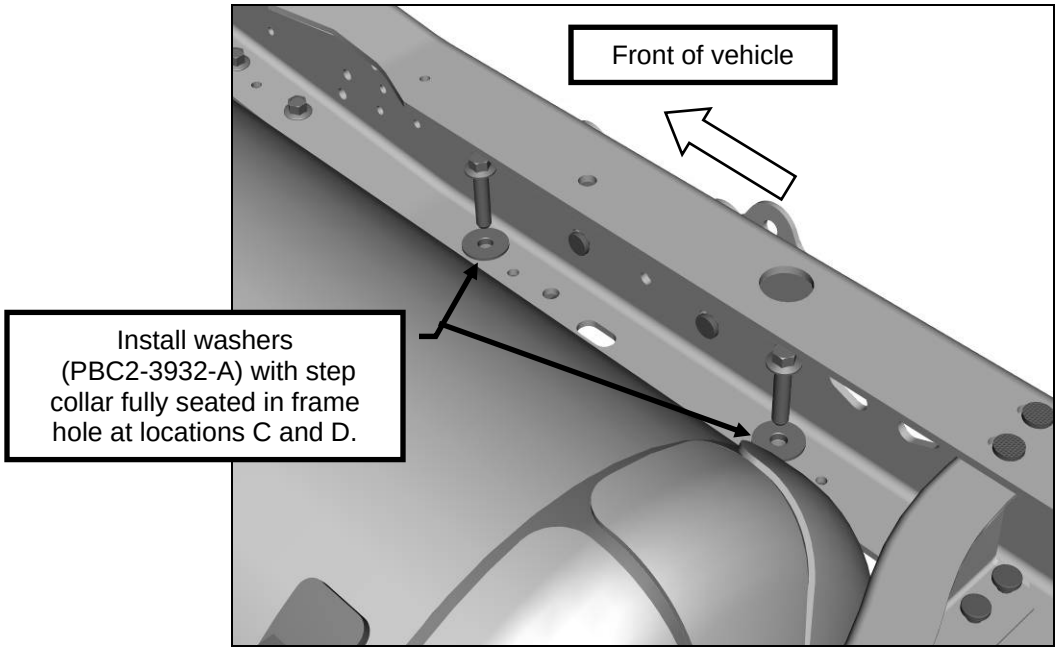
Tank Mounting — Driver Side (Locations A and B)





Tank Mounting — Passenger Side (Locations C, D and E)

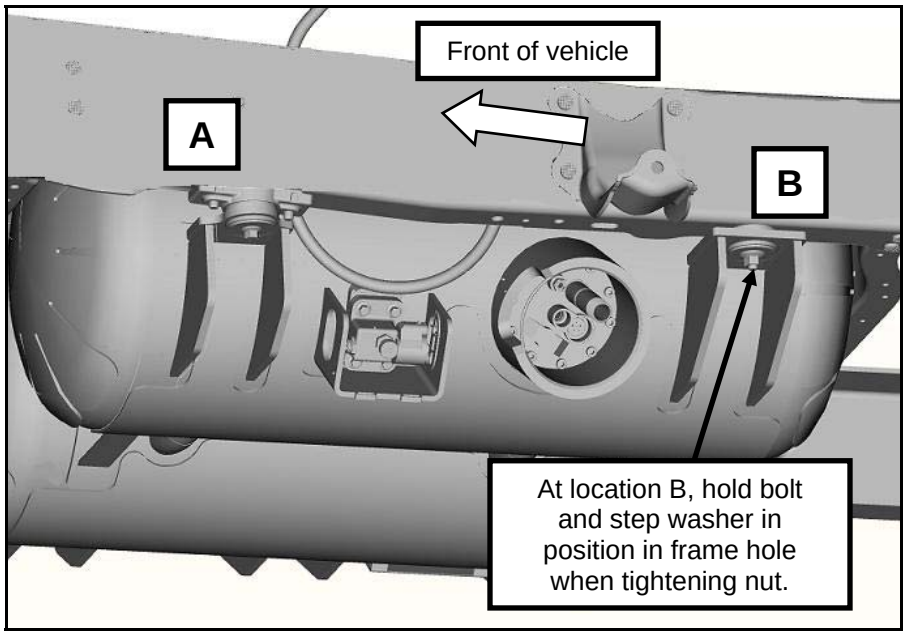


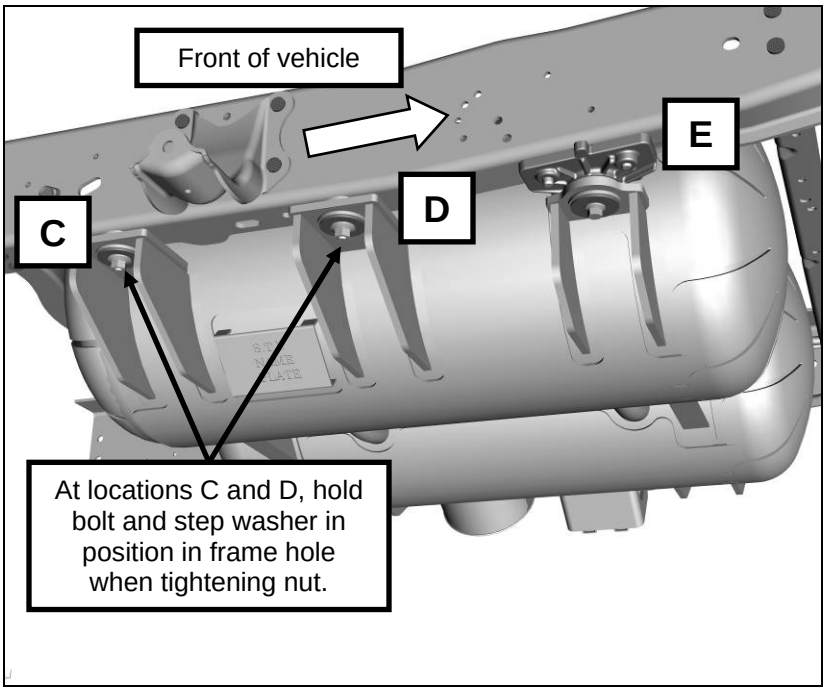


8. Once all tank mounting fasteners have been installed, tighten the five tank mounting fasteners to 100–110 Nm.

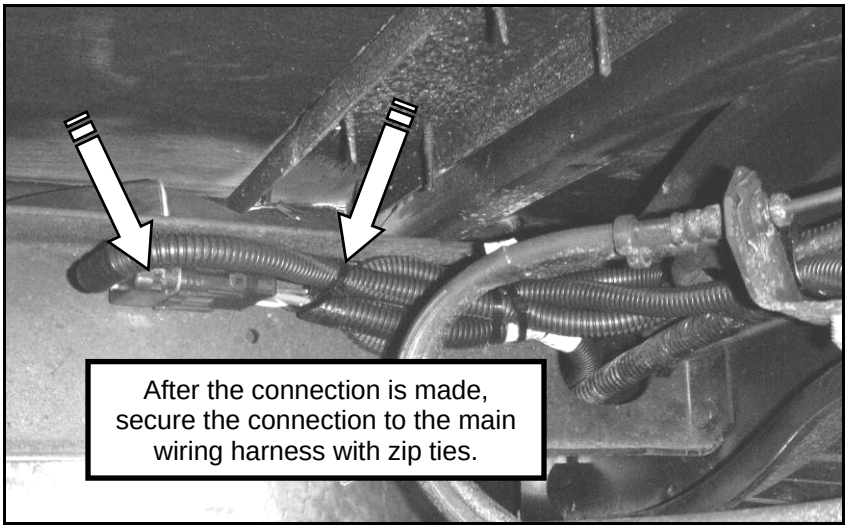
Note: At locations B, C and D, hold bolt and step washer in position to ensure that the step collar of the washer remains properly seated in the frame hole during tightening.

⚠ **Caution:** If the step-collar washers (locations B, C and D) are not properly seated in the frame holes during the tightening sequence, the washer(s) can be damaged and result in a loose mounting.

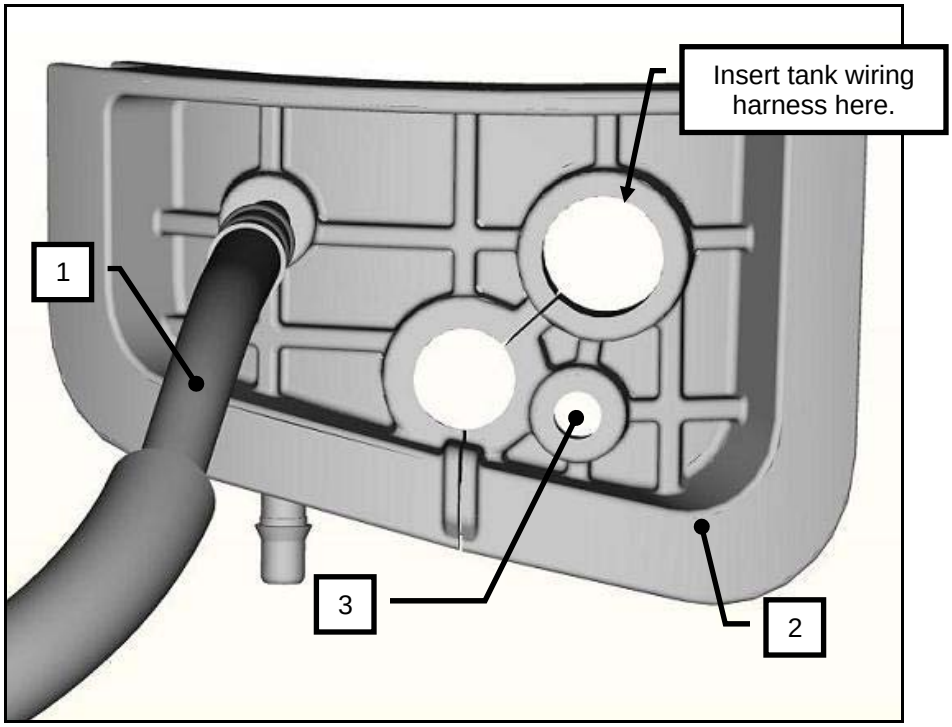




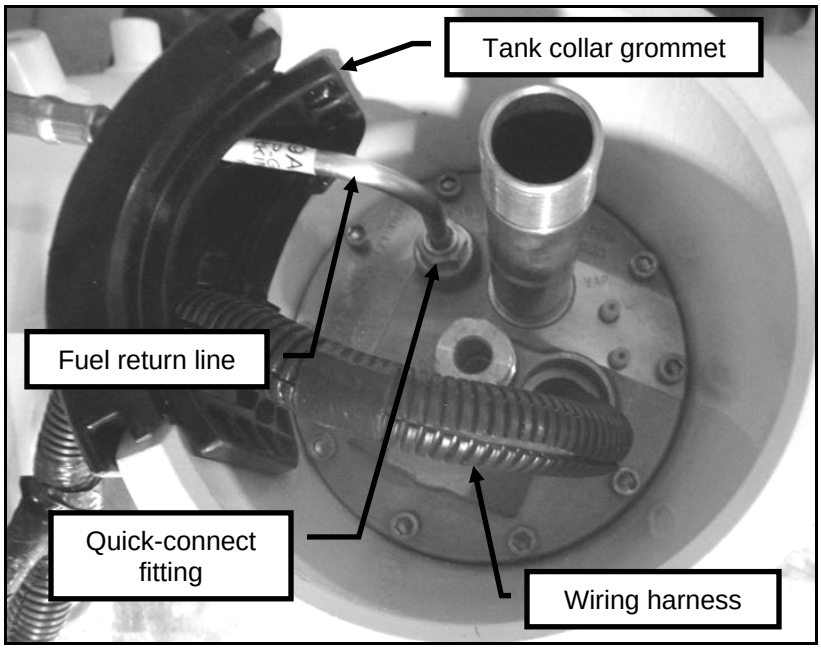
9. Route the fuel tank 6-pin harness connector up along the frame through the fuel line routing hole. Connect the 6-pin tank wiring harness connector located on the ROUSH CleanTech vehicle main wiring harness (PBC2-3075-B) to the tank harness connector as shown.



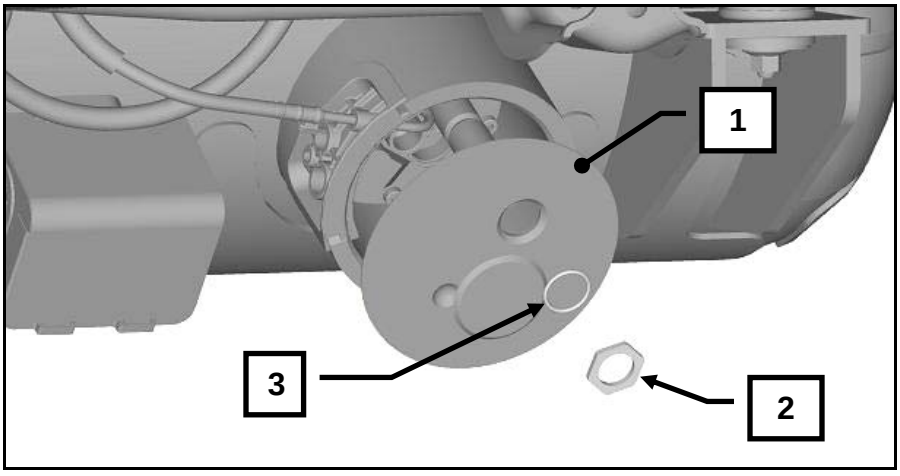
10. Install the fuel return line (Item 1 — PBC2-9A086-A) through the tank collar grommet (Item 2 — P10C3-14487-A). Insert the fuel tank wiring harness (which is connected to the fuel tank) into the upper right hole of the grommet. Install the nylon push-pin plug (Item 3 — 90221A119) into the small hole at the bottom of the grommet.



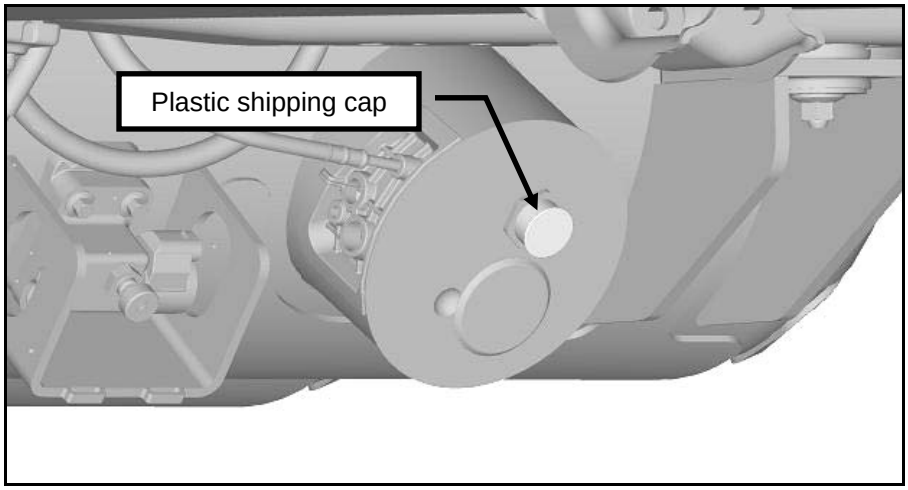
11. Remove the protective dust cap from the quick-connect fittings on the Multivalve (located inside the tank collar). Apply a thin film of clean engine oil to the male tubing end form before insertion into the quick-connect fitting (if so equipped). Install the tank collar grommet into the tank collar opening and push the fuel lines into the quick-connect fittings. Give each line a firm pull to ensure that the connections are secure.



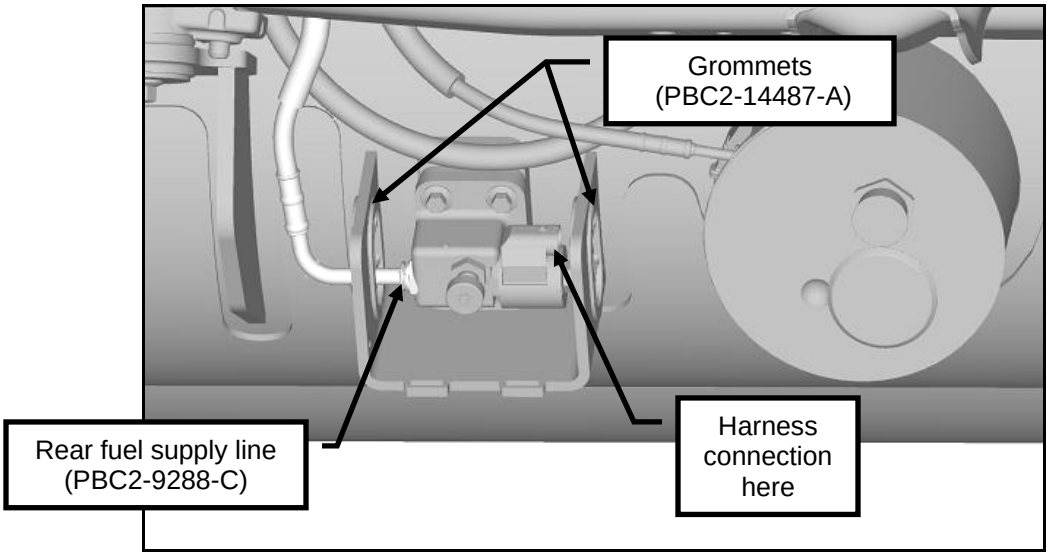
12. Once all connections have been made to the multivalve, and the hoses and wiring are neatly arranged inside of the collar as shown, secure the aluminum multivalve collar cover (item 1) to the tank using the M24 nut (item 2) and O-ring (item 3). All of these parts were removed and saved earlier.



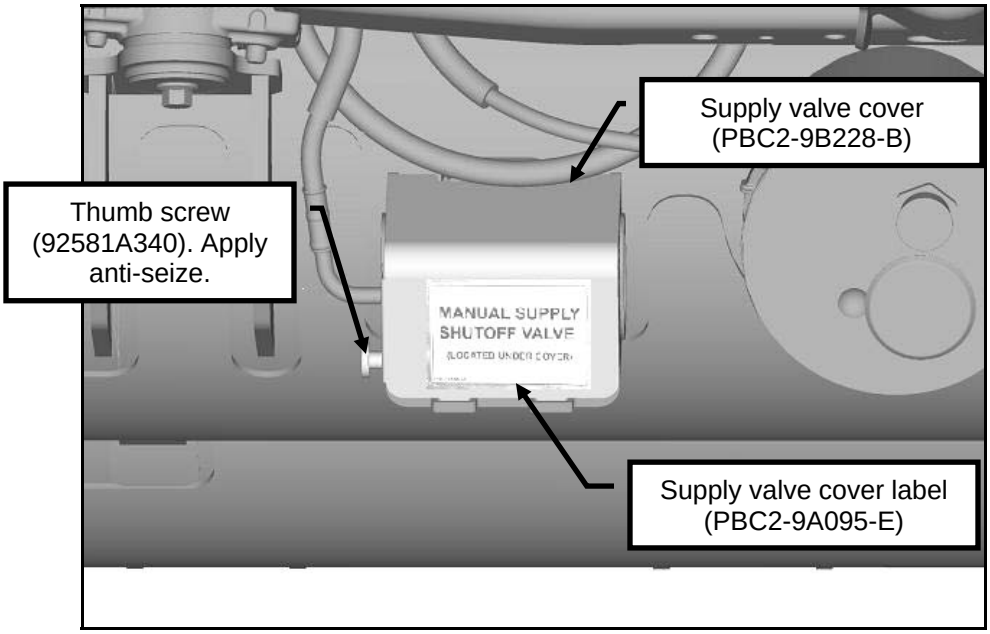
13. Install the plastic shipping cap onto the open port sticking out through the multivalve cover.



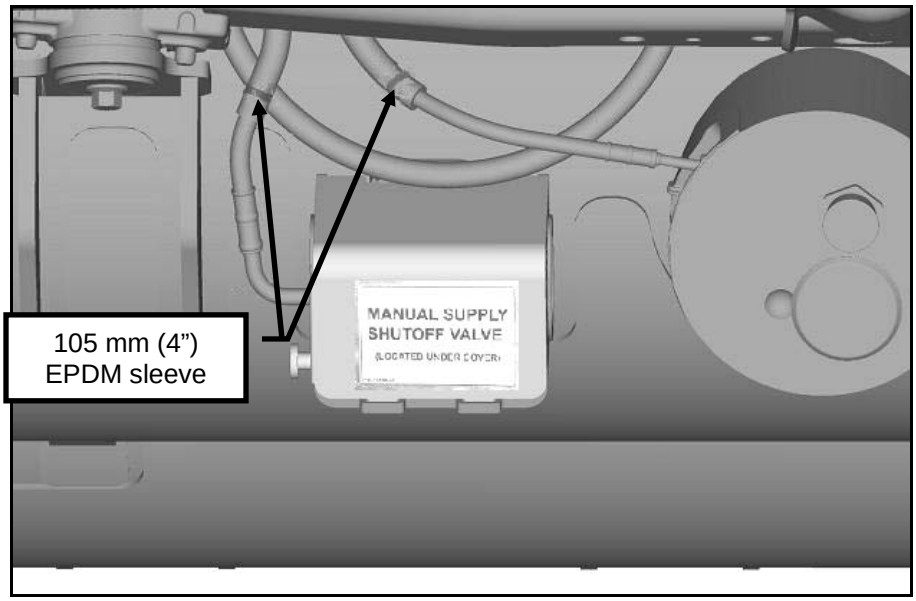
14. Remove the protective shipping cap from the fuel supply valve port. Insert the rear fuel supply line (PBC2-9288-C) through the grommet area. Apply a thin film of clean engine oil to the male tubing end form before insertion into the quick-connect fitting (if so equipped). Align the male tubing end form of the fuel supply line with the quick-connect fitting on the supply valve port; push in to connect. Pull firmly on the line to ensure the connection is fully engaged. Insert the wiring harness supply valve lead (part of harness PBC2-3075-B) through the second grommet area and connect the lead to the valve terminal. Lubricate the edges of both grommets (PBC2-14487-A) and push them in to seat with the tank supply valve collar at both sides.



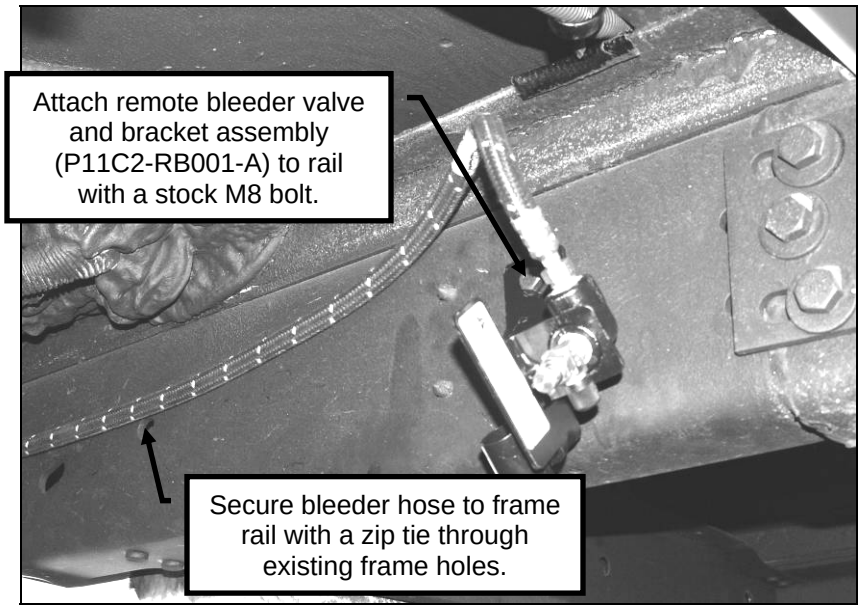
15. Place the supply valve cover (PBC2-9B228-B) in position on the tank. Apply anti-seize to the thumb screw (92581A340) and tighten to secure the cover in place. Apply the label (PBC2-9A095-E) to the cover as shown.



16. Add one protective EPDM sleeve (PBC2-9C328-A) along the flex section of each fuel line in the area where they may rub/contact the frame. Secure the sleeves to the lines using zip ties (1A868).



17. Route the remote bleeder valve line over the frame rail and back along the left frame rail. Attach the remote bleeder valve and bracket assembly (P11C2-RB001-A) to the frame rail (near the rail end). Secure the bracket using a stock M8 bolt. Tighten the bolt to 20–30 Nm.



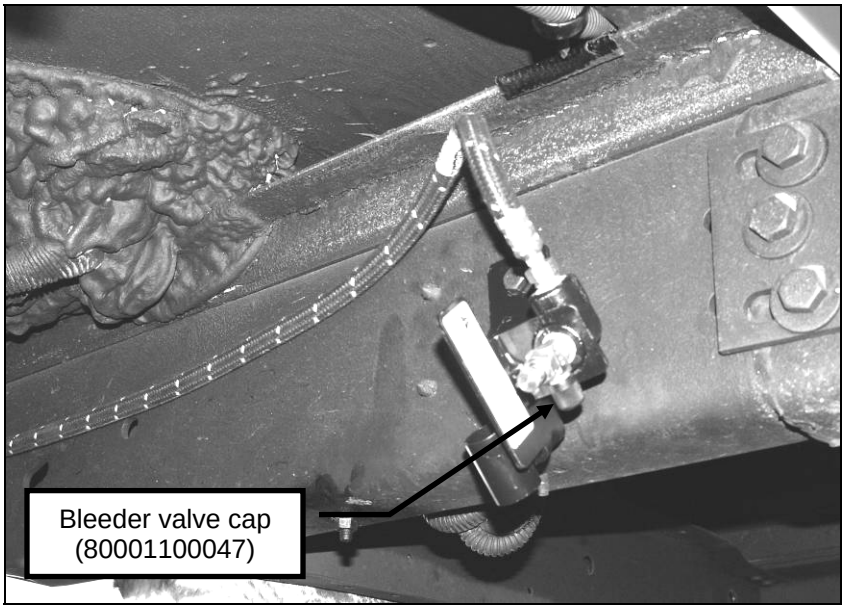
Installing the Reprogrammed PCM

1. Following the procedure described in the *Ford Workshop Manual, Section 303-14, Electronic Engine Controls*, install the powertrain control module (PCM).
2. Reinstall the vehicle battery and connect the positive and negative terminals.

System Leak Check

⚠ **Caution:** Hand tighten all fuel line connectors and fasteners before applying a wrench to avoid cross threading. Failure to heed this caution may result in property damage.

1. Remove the bleeder valve cap from the remote bleeder valve on the frame rail.



2. Attach a pressure gauge to the remote bleeder valve on the frame rail.
3. Make sure the bleeder valve located on the tank is open.
4. Open the remote bleeder valve. Pressure must exceed 20 psi. If it does, continue to the next step. If pressure does not exceed 20 psi, contact ROUSH CleanTech Customer Service at 1-800-597-6874 for assistance.
5. Close the valve and remove the gauge.
6. Attach the fuel pressure gauge to the service port on the passenger side fuel rail.
7. Cycle the ignition key repeatedly until the gauge reading equals the reading at the remote bleeder valve.
8. Allow the gauge to remain connected for a minimum of 10 minutes.
9. If the pressure degrades, search for leaks using a leak detector (i.e. soapy water, Snoop®, etc).
10. Repeat Steps 6–8 until all leaks have been stopped and the pressure does not degrade for 10 minutes.
11. Remove the fuel pressure gauge from the service port on the fuel rail and install the protective cap onto the service port.

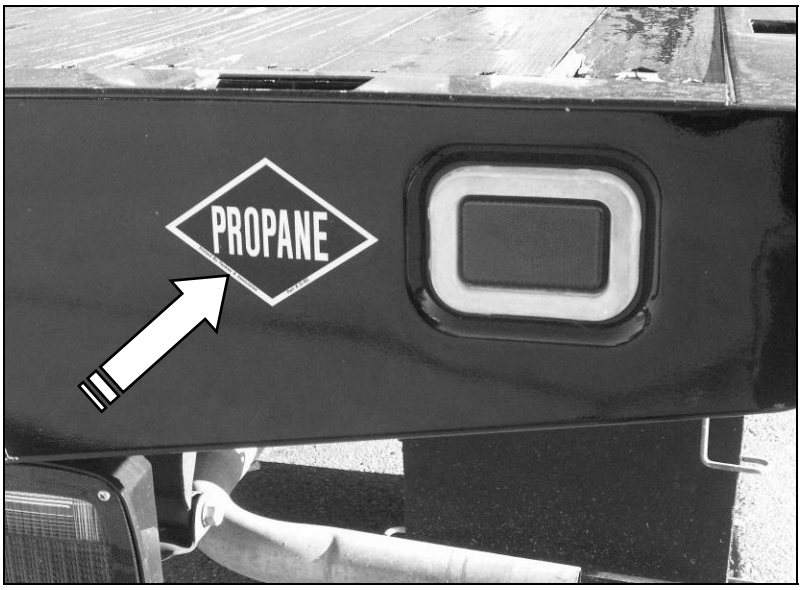
Note: If the vehicle continues to fail this test, contact ROUSH CleanTech Customer Service at 1-800-597-6874 for assistance.

12. Open the remote bleeder valve to allow the contents of the tank to escape.
13. Close the valve.
14. Install the cap onto the remote bleeder valve.
15. Reinstall the air induction system in the reverse order it was removed.
16. Reinstall the engine cover (doghouse) inside the passenger compartment.

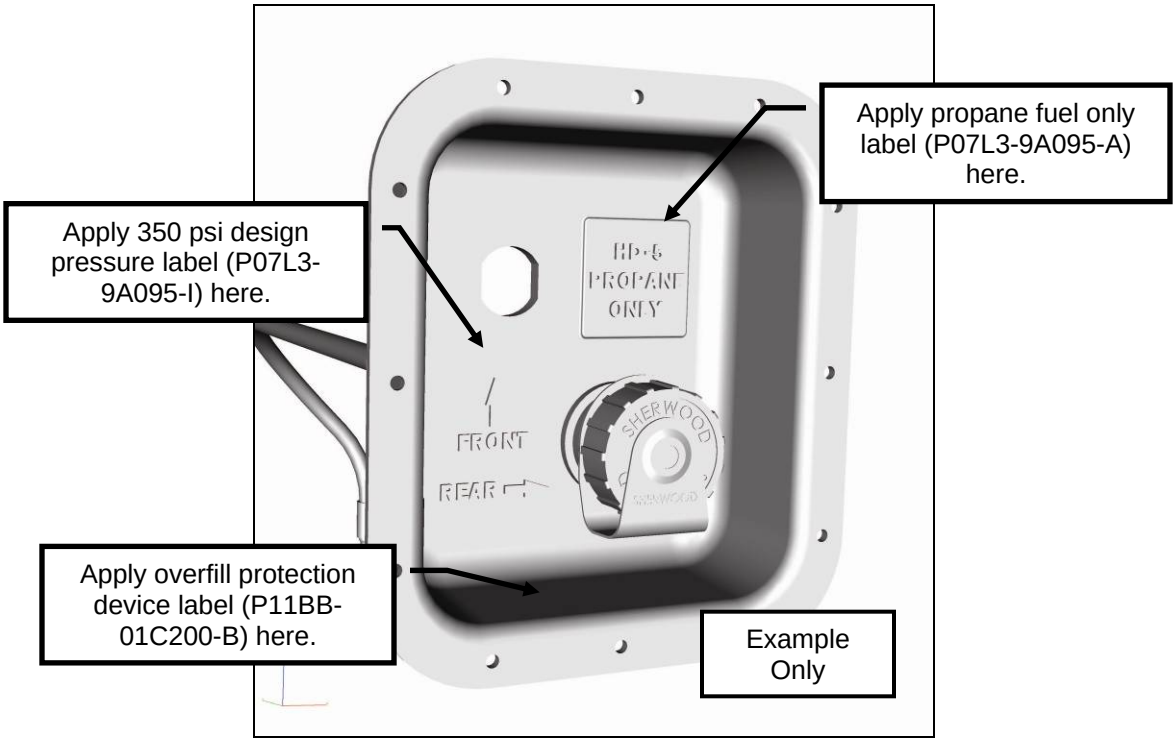
Installing Badges and Labels

To prevent damage, label and badge installation should be performed in an environment with temperatures above 60°F. Clean and dry area on vehicle where labels will be placed. The required VECI labels are supplied with the return PCM

1. Apply one “PROPANE” reflective diamond label (D85) onto the lower right rear corner of the completed vehicle.



2. Apply one propane fuel only label (P07L3-9A095-A) on the inside of the fuel fill bucket or on the bed beside the mounting location for the bucket. Apply one 350 psi design pressure label (P07L3-9A095-I) on the left center of the fuel fill bucket. Apply one overfill protection device label (P11BB-01C200-B) on the bottom center flange of the fuel fill bucket.



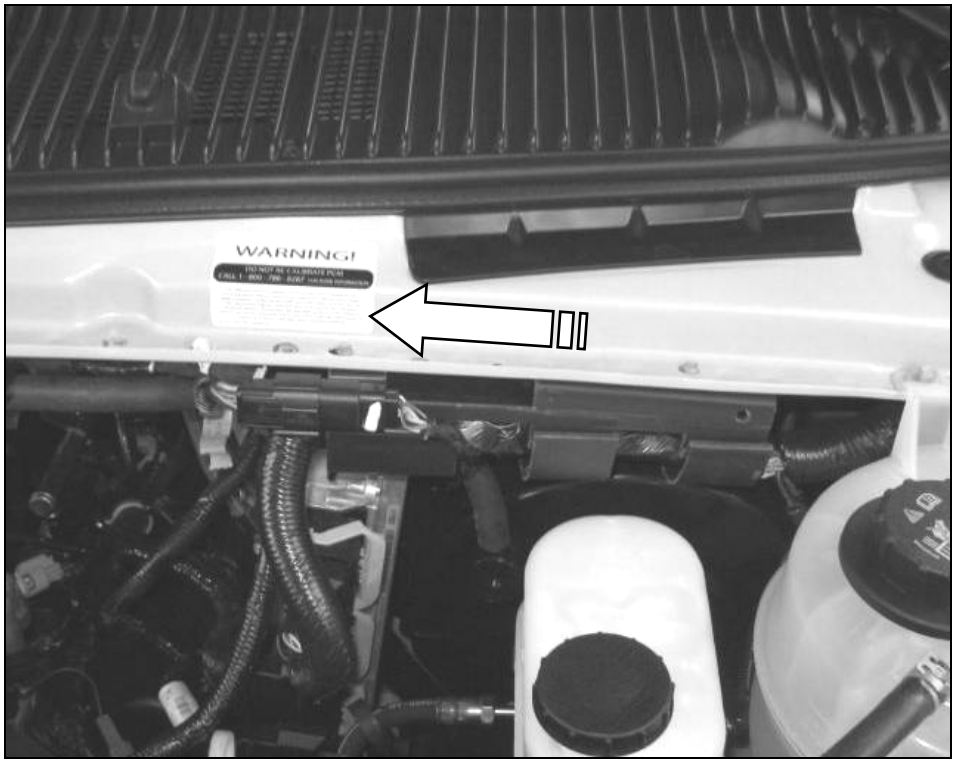
3. Apply the ROUSH VECI labels to the location specified in the supplemental instructions included with the return PCM.

Note: These labels are vehicle specific and are required by law to be applied to the vehicle to which it is assigned. Use the labels included with the PCM returned to you by ROUSH CleanTech.

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

4. Apply the OPD inspection label (P07L3-9A095-C) to the end of the driver side door as shown.

5. Install the PCM tamper warning label (R07100008-A) onto the cowl below the wiper tray near the PCM.



6. Install the ROUSH CleanTech badge (P11GD-01G100-A) under the Ford badge on the right and left front fenders. Right side shown as an example.

Completing the Installation

The following procedure is required in order to ensure that the fuel system is leak-free and that any residual nitrogen is removed from the system. Failure to complete this process could result in leaks, excessive tank pressure and filling problems.

Fuel tank preparation prior to liquid propane fill

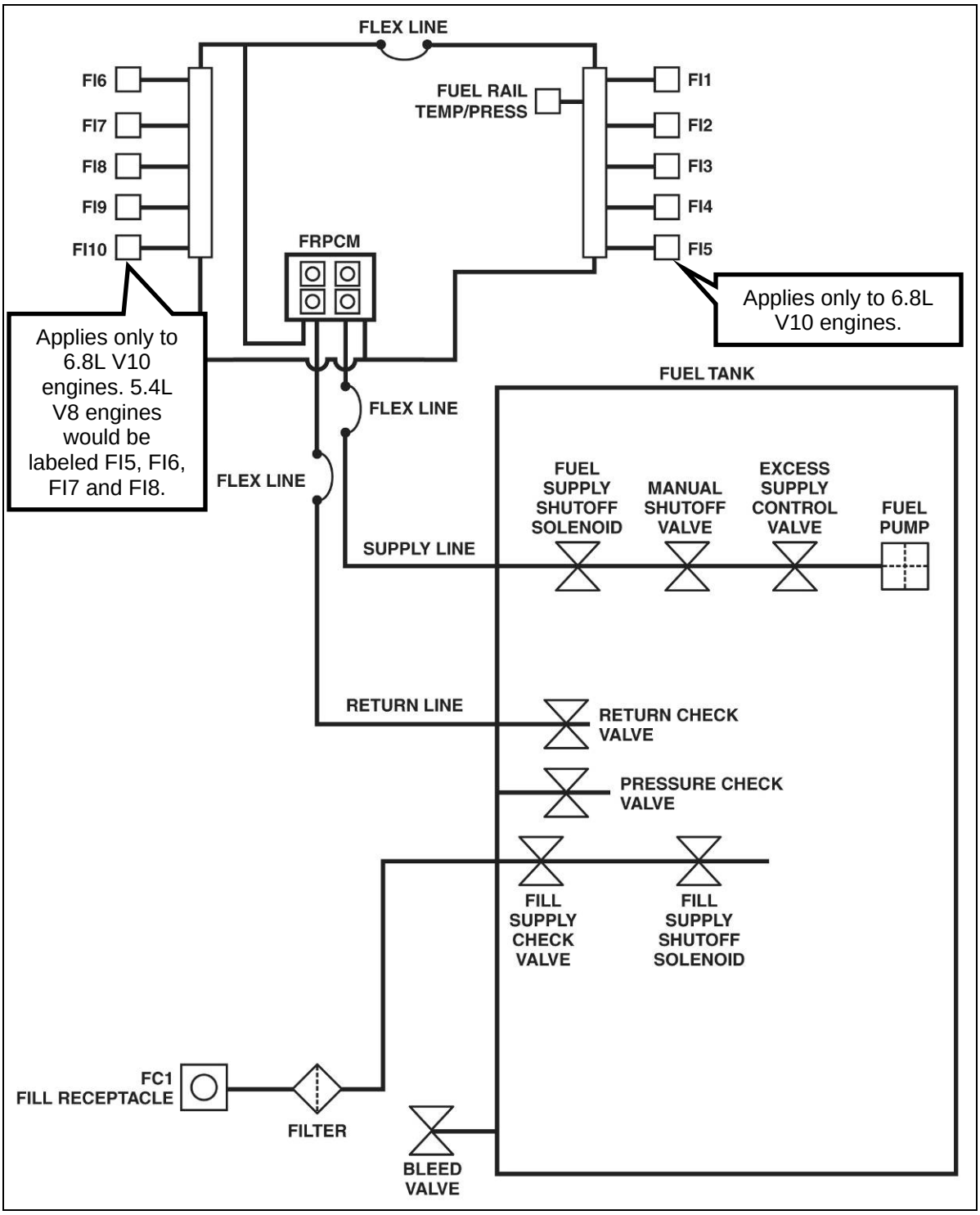
1. Verify that the remote bleeder valve is closed and that the bleeder valve on the tank is open.
2. Remove the remote bleeder valve cap. Open the remote bleeder valve and bleed the system until the system depressurizes. Close the valve and replace the cap.
3. Fill the tank with 0.1 (1/10) gallon of propane. Cycle the ignition key to the START position and then back to the OFF position. **Do NOT allow the engine to start during this step**.
4. Inspect and monitor for any leaks.
5. Remove the remote bleeder valve cap and open the remote bleeder valve for 10 minutes or until propane stops bleeding, whichever comes first. Close the remote bleeder valve and install the remote bleeder valve cap.
6. Fill the tank with 5 gallons of propane. Cycle the ignition key to the START position and then back to the OFF position. **Do NOT allow the engine to start during this step**.

Note: The next step confirms if any leaks are present in the fuel system.

7. Perform a final leak inspection at all fuel fill and fuel line connections to ensure no leaks are present using Snoop®, or a dish soap and water mixture.
8. Perform End of Line (EOL) testing and road test the vehicle.
9. Verify that there are no concerns; then, fill the vehicle tank with propane and record the total amount, in gallons, to fill the tank.
10. Insert the supplied ROUSH CleanTech Owner's Manual into the glove box.

IF YOU HAVE ANY QUESTIONS DURING THE INSTALLATION OF THIS KIT, PLEASE CALL 1-800-59-ROUSH.

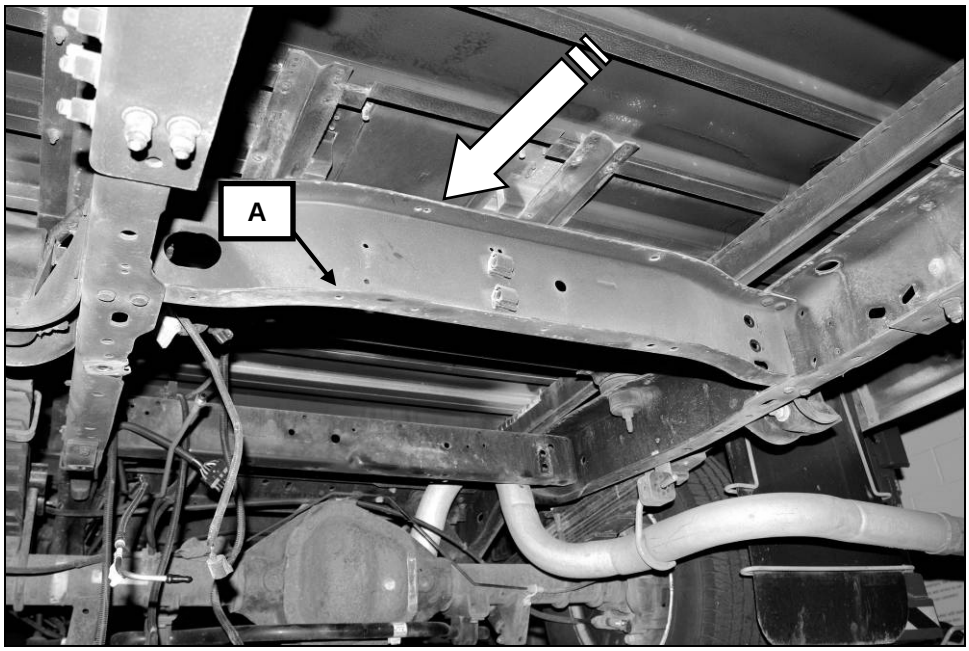
LP System Schematics and Diagrams



Appendix

Rear Crossmember Position Modification for Fuel Tank Installation

The fuel tank installation for the ROUSH CleanTech Liquid Propane Autogas System in some E-350 Super Duty DRW chassis must have the OEM rear crossmember moved to a position that allows the installation of the fuel tank. The crossmember must be moved rearward approximately 12 inches to accomplish fuel tank installation and maintain frame rigidity and integrity.



OEM Rear Crossmember Location

Remove the OEM Fuel Tank

⚠ **Warning**: Before working on or disconnecting any fuel system related components, relieve the fuel system pressure to prevent fuel spraying; fuel in the system is under high pressure, even with engine not running. Failure to follow this warning can result in serious personal injury.

1. Disconnect the negative battery cable from the battery.
2. Drain the fuel from the fuel tank.
3. Remove the OEM fuel tank, fuel tank shield, fuel vapor tube, fuel supply tube, fuel tank straps and electrical connections. Refer to the appropriate year *Ford E-250, 350, 450, 550 Super Duty Workshop Manual Volume 2, Fuel System Section 310-01* for aft-of-axle fuel tank removal procedures.
4. Remove the ground connection on the top of the rear crossmember. Save the ground lug screw for reuse. Ground to be relocated to hole A in crossmember.

Remove the Rear Crossmember

Remove the rivets securing the crossmember to the frame side rails. Do the following.

⚠ **Caution**: Wear safe eye and ear protection when grinding, cutting and punching rivets to avoid serious personal injury.

⚠ **Caution**: Be careful while grinding or punching out rivets. Do not elongate or distort crossmember or frame side rail rivet holes. Do not grind on the crossmember or frame side rails. This can cause a loose or misaligned crossmember. Damage to components can result.

1. Working at the bottom of the four lower rivets (two each side), grind off the rivets or cut two perpendicular grooves into the end of the rivets.

Cutting Lower Rear Crossmember Rivet

2. Use a chisel to cut the rivets flush with the frame side rail.

Chiseling Lower Rear Crossmember Rivet

3. Trim the end of the rivets until flush with the frame side rail.

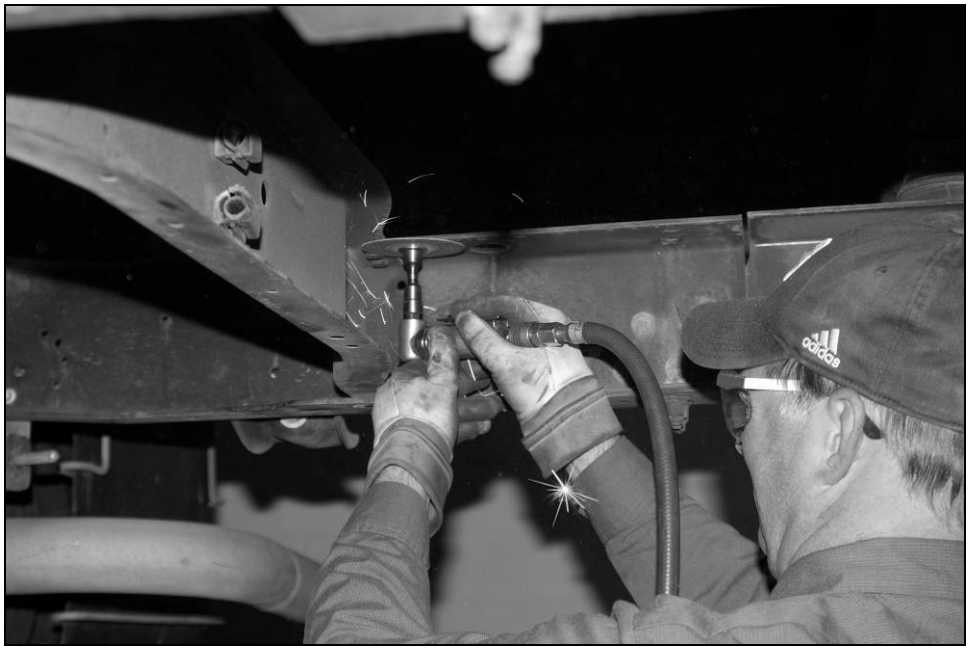
Trimming Lower Rear Crossmember Rivet

4. Punch the rivets out of the frame side rail and rear crossmember.

Punching Out Rear Crossmember Rivet

5. Perform Steps 1–4 for the remaining three lower rivets.

6. Working at the bottom of the four upper rivets (two each side, inside flanges of crossmember), grind off the rivets or cut two perpendicular grooves into the end of the rivets.



Grinding Upper Rear Crossmember Rivet

7. Use a chisel to cut the rivets flush with the rear crossmember.
8. Trim the end of the rivets until flush with the crossmember. Punch the rivets out of the rear crossmember and frame side rail.
9. Perform Steps 6–8 for the remaining three upper rivets.
10. Separate the rear crossmember from the frame side rails.

Separating Rear Crossmember

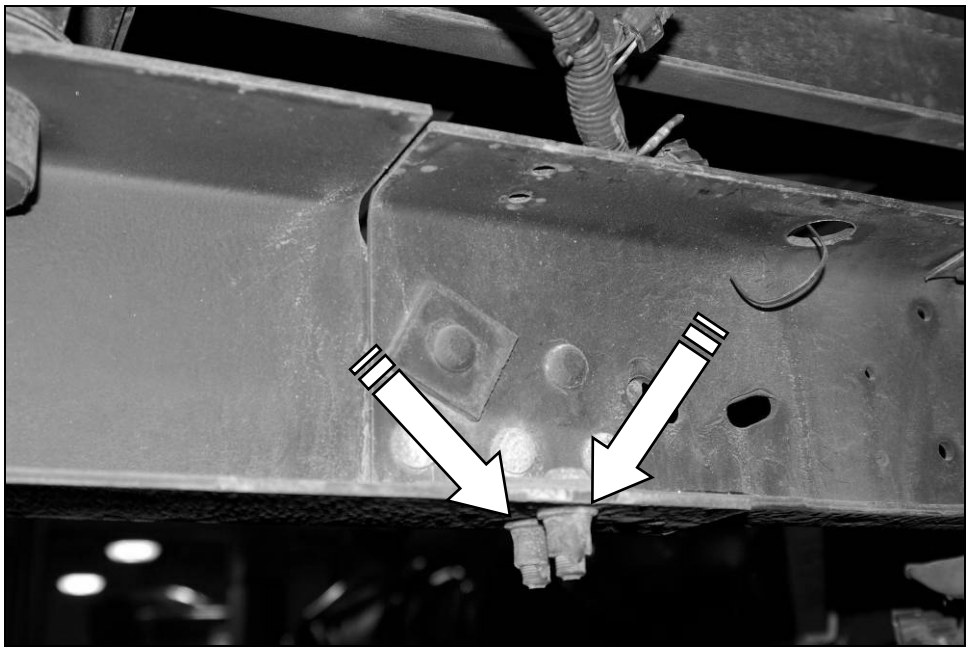
11. Debur and apply a rust preventive coating to the original crossmember location, to include the frame rails and rivet holes. ROUSH CleanTech suggests Motorcraft Premium Undercoating (PM-25-A).

Preparing the New Location of Rear Crossmember

⚠ **Caution**: Wear safe eye and ear protection when grinding, cutting and punching rivets to avoid serious personal injury.

⚠ **Caution**: Be careful while grinding or punching out rivets. Do not elongate or distort crossmember or frame side rail rivet holes. Do not grind on the crossmember or frame side rails. This can cause a loose or misaligned crossmember. Damage to components can result.

1. Locate the four lower HUCK™ fasteners securing the frame rail extensions to the OEM frame side rails, located approximately 12 inches behind the original position of the rear crossmember.



Lower HUCK™ Fasteners at Frame Rail Extension

2. Using a cutoff grinding wheel, cut through the collar of the HUCK™ fastener. Make the cut from the flange of the collar to the end of the HUCK™ fastener. Cut through the collar as much as possible to release it from the HUCH™ Pin.

Cutting Lower HUCK™ Fastener Collar

3. Separate the HUCK™ collar from the HUCK™ pin and drive the pin out of the frame side rail and frame extension.

Separating Lower HUCK™ Collar from Pin

4. Perform Steps 1–3 for the three remaining lower HUCK™ fasteners.

⚠ **Caution**: Do not remove or disturb the ten (five each side) HUCK™ fasteners securing the sides of the frame extensions to the sides of the frame side rails. Damage to components can result.

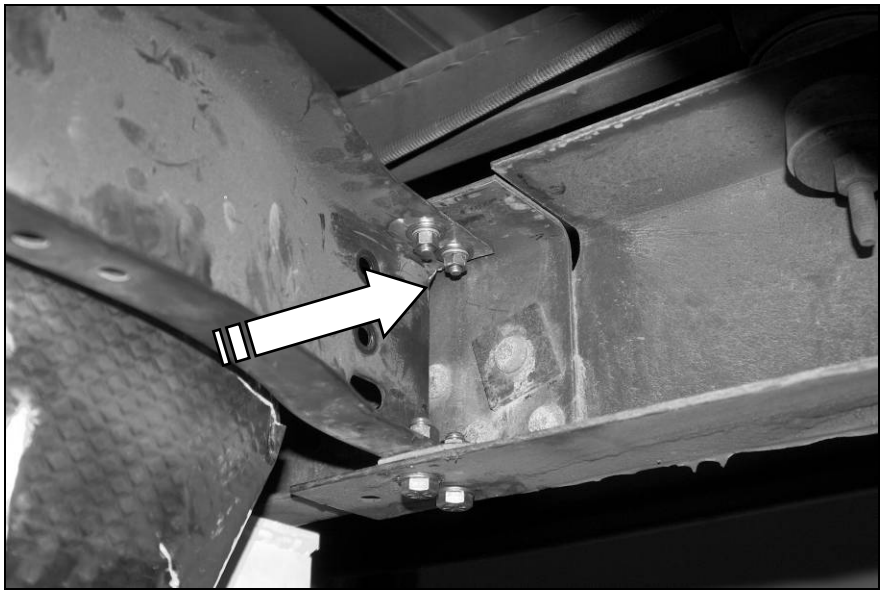
5. Debur and apply a rust preventive coating to the new crossmember location, to include the frame rails and HUCK™ fastener holes. ROUSH CleanTech suggests Motorcraft Premium Undercoating (PM-25-A).

Preparing the Rear Crossmember for Installation

Slight modifications must be made to the rear crossmember so that the crossmember can be easily positioned and installed in its new location between the frame side rails.

1. At each end of the rear crossmember, trim approximately 1/2 inch of material out of the web of the crossmember. Leave a slight radius of material where the web meets the flange.

Note: Trimming the crossmember web is done to provide clearance from the HUCK™ pin heads (inside frame side rails) as the crossmember is being installed into position.

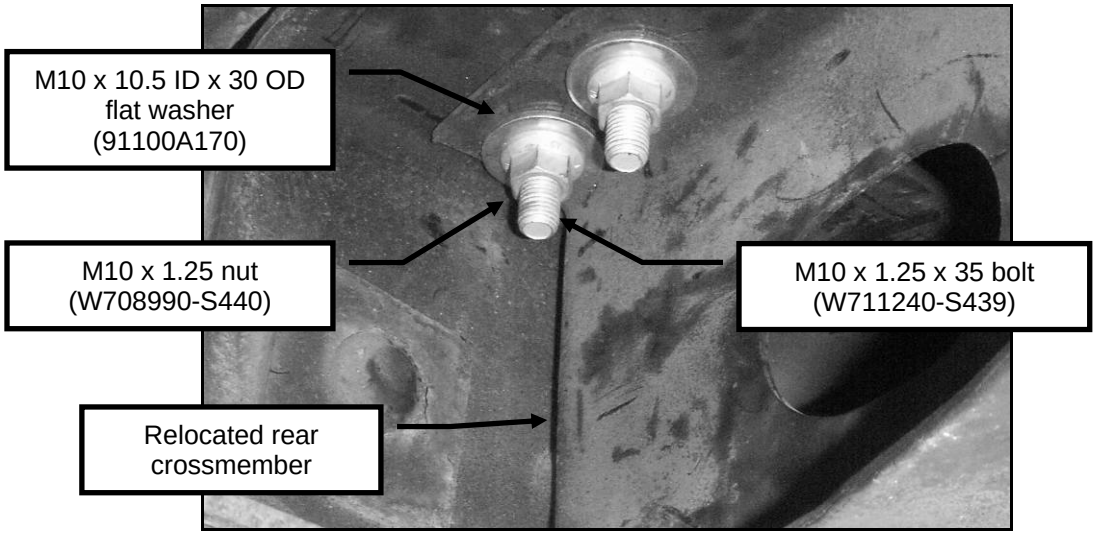


Area of Rear Crossmember Modification

2. If necessary, enlarge the rivet holes in the flanges of the rear crossmember (eight locations, two upper and two lower in each end). Use a 1/2 inch drill bit to enlarge the holes.
3. Debur and apply a rust preventive coating to the new crossmember where modifications have been made, including the bolt holes and web. ROUSH CleanTech suggests Motorcraft Premium Undercoating (PM-25-A).
4. Obtain four M10 x 1.25 x 35 bolts (W711240-S439), M10 x 1.25 nuts (W708990-S440) and M10 x 10.5 x 30 flat washers (91100A170) which can be found in Frame Supplemental Hardware Kit P07C2-FRAMEKIT-A.
5. Obtain four M12 x 1.75 x 35 bolts (W710233-S439), M12 x 1.75 nuts (W710807-S440) and M12 x 37 flat washers (91100A180) which can be found in Frame Supplemental Hardware Kit P07C2-FRAMEKIT-A.

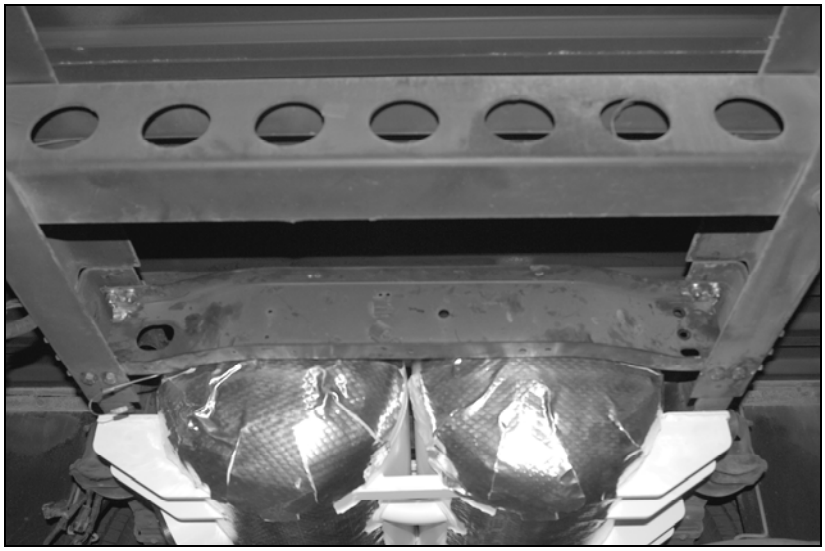
Installing the Rear Crossmember

1. Position the rear crossmember at the new location. From the top, insert four M10 x 1.25 x 35 bolts (W711240-S439) with M10 x 10.5 ID x 30 OD flat washers (91100A170) through the frame rail flange and crossmember mounting holes. Add a M10 x 10.5 ID x 30 OD flat washer (91100A170) and a M10 x 1.25 nut (W708990-S440) to each upper bolt to secure the crossmember at the top.



Rear Crossmember Upper Mounting Bolts (LH side shown)

2. Tighten the fasteners to the specified torque:
   - Tighten M12 fasteners to 90–100 Nm.
   - Tighten M10 fasteners to 45–55 Nm.



Relocated Rear Crossmember and Fuel Tanks Installed