



LPEFI[®] Installation Manual
For
2010 Ford E van Trucks with 5.4 Liter Engine
Models: E450
Mono-Rail System



First Edition
May 28, 2010
Bi-Phase Technologies, LLC
Eagan, Minnesota, U.S.A.

Bi-Phase Technologies, LLC

Introduction

This instruction booklet shows how to convert a gasoline vehicle to run on clean burning propane utilizing our *LPEFI*[®] (*Liquid Propane Electronic Fuel Injection*) system.

The system is vehicle specific and installing a system on any vehicle that the kit was not designed for will void the warranty and may also violate emission laws.

Anyone who installs or repairs the *LPEFI*[®] system must be trained and certified. This must also include training in the safe handling and characteristics of propane. Bi-Phase Technologies provides such training upon request. Some states may require a license to work on propane vehicles. Consult your state or local authorities or your state propane gas association. Bi-Phase Technologies, LLC is not responsible for your oversight to comply with federal, state or local laws regulating the installation or repair of propane gas systems.

The *LPEFI*[®] system is a sequential multi-port fuel injection system that injects propane in a liquid state to the engine. It works much the same way as a modern sequential multi-port gasoline fuel injection system and can be diagnosed with the same diagnostic scanners used for gasoline vehicles.

The *LPEFI*[®] system is covered by U.S. and International patents. The *LPEFI*[®] system is also certified to the United States E.P.A. standards.

The information in this manual is believed to be accurate as of its date of publication, but it is subject to change. Up-to-date information and changes, if any, can be requested from Bi-Phase Technologies.

In the event of any safety-related changes Bi-Phase Technologies will notify all customers who returned the warranty registration card for the affected vehicles.

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Table of Contents

Introduction.....	2
Notes	4
Propane Safety	5
Facts about Propane & Propane Powered Vehicles.....	7
Approximate Properties of LP Gases	8
Pre-Installation Inspection	9
LPEFI® System Installation	10
<i>Removing gasoline system</i>	<i>10</i>
<i>Tank installation</i>	<i>12</i>
<i>Fuel tank gauge</i>	<i>15</i>
<i>Fill hose</i>	<i>15</i>
<i>Fuel rails</i>	<i>18</i>
<i>Loop hose</i>	<i>18</i>
<i>Primary hose</i>	<i>21</i>
<i>Main wire harness</i>	<i>24</i>
<i>Tank guard</i>	<i>30</i>
<i>Label installation</i>	<i>30</i>
<i>PCM recalibration procedure.....</i>	<i>31</i>
Testing the Installation	32
Post-Installation Inspection	34
Liquid Propane Control Module (LPCM) Logic	35
Electrical wiring diagram.....	36

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Notes

Propane Safety



This is a safety alert symbol. It is used through out this manual to alert you to potential hazards. Whenever you see this symbol, you should read and obey the safety warnings that follow. Failure to obey these warnings could result in serious personal injury or property damage.

Please read the Specific Warnings below before proceeding with the installation or repair of any propane system



WARNING: Always unplug the LPEFI Liquid Propane Control Module (LPCM) or disconnect the battery before you work on any part of the LPEFI system.

The LPEFI tank contains an electronic control box. Any time the driver door is opened, the LPEFI system could go into a purge mode, pumping liquid propane through the hoses and injectors. To prevent a sudden release of cold liquid propane, disconnect the power from the LPCM before you loosen any hose fittings. Failure to do this could cause personal injury and fire hazard.



WARNING: Never loosen fittings or vent any propane. Escaping liquid propane can cause frostbite and severe freeze burns. If liquid propane touches your skin, it causes a burn similar to frostbite. Wear insulated PVC rubber gloves resistant to propane. Wear goggles for protection against accidental release of pressurized products and thermal protective clothing when handling refrigerated liquids.

Propane is stored as a liquid. When you release liquid propane, it tries to evaporate as quickly as it can, by absorbing heat from its surroundings. Everything it touches gets chilled to -44 degrees F (-42 deg. C). If liquid propane sprays on your fingers, it will freeze them-right down to the bone. Anyone who works with liquid propane must wear insulated PVC rubber gloves.



DANGER: Do not remove any valves, bulkheads or fittings from a propane tank unless the tank has been properly drained (evacuated) completely. The pressure inside a propane tank can push a loosened bulkhead or valve out with enough force to cause injury. Release of propane in an uncontrolled situation will create a flammable/explosive mixture of air and propane, which could cause serious injury, death and property damage.

Propane is stored under pressure. When you remove a valve or bulkhead from the tank, all of the pressure is released at once, in a violent rush. Always drain the tank before you work on it. Failure to do this will result in damage to the tank or valves and can result in severe injury or death. You should drain the tank using a flare stack in an approved safe manner. Your propane supplier can help you with this.



DANGER: Do not vent or release propane indoors or near sewers, pits or low lying areas. Propane can accumulate in low spots, creating a fire hazard. Propane can also displace oxygen, creating a suffocation hazard.

Propane is heavier than air. It can fill low, sheltered areas with flammable vapors. If these vapors are ignited, they can create a fire or explosion, causing severe property damage, injury or death. Never release propane near sewers, pits or indoors.



WARNING: Keep all sources of ignition away from propane vehicles while the fuel system is being serviced. Even if the tank and fuel lines are empty, there may still be flammable vapors near the vehicle.

Do not allow smoking, sparks, flames, running vehicles or other sources of ignition near the vented propane. Failure to do this could result in fire or explosion, causing severe property damage, injury or death.



WARNING: Do not disconnect any propane hoses unless they have been properly drained completely.

Propane in the hoses is kept under pressure, even when the engine is off. When you disconnect a hose, the internal pressure is released all at once. Always drain the fuel lines before you disconnect them. Failure to do this can result in damage to the hose fitting and possible injury.



WARNING: NO SMOKING OR OPEN FLAMES IN OR AROUND PROPANE VEHICLES DURING FUELING OR SERVICING.

Facts about Propane & Propane Powered Vehicles

Propane gas is the most widely used alternative fuel, with nearly 4 million vehicles worldwide running on propane. More than 350,000 vehicles run on propane in the U.S., according to the U.S. Department of Energy's Alternative Fuels Data Center.

Propane powered vehicles offer the best combination of durability, performance and driving range.

The first propane powered vehicle ran in 1913.

Bi-Phase Technologies' *LPEFI*[®] (Liquid Propane Electronic Fuel Injection) system has surpassed other technologies today by introducing liquid fuel injection. This technology improves power, efficiency and operating characteristics. For more information call for our General Information and Training Manual.

Safety comes first is a motto you should always live by. Without knowledge of a product it is hard to follow this motto. In our manuals we try to stress the need for knowledge and provide warning signs to alert you.

It is your responsibility to know the law. NFPA, National Fire Protection Association, has manuals to help you understand safe handling of many products. We recommend that you obtain and read their NFPA #58, Standard for the Storage and Handling of Liquefied Petroleum Gases.

To further enhance the industry's safety and service, a number of training programs and efforts have been implemented throughout the country. The National Propane Gas Association has developed a Certified Employee Training Program (CETP), which provides service personnel with a complete technical training curriculum. We encourage you to contact your state propane gas association or the National Propane Gas Association for more information on how you can benefit from such programs. Visit www.propanesafety.com for more information.

Approximate Properties of LP Gases

(Commercial Propane)

Specific gravity of liquid (water = 1) at 60 degrees F.	0.504
Initial boiling point at 14.7 psia, degrees F.	- 44.0
Weight in lbs per gallon of liquid at 60 degrees F	4.24
Specific heat of liquid, BTU/lb. at 60 degrees F.	0.630
Cubic ft. of vapor per gallon at 60 degrees F.	36.38
Cubic ft. of vapor per pound at 60 degrees F.	8.66
Specific gravity of vapor (air = 1) at 60 degrees F.	1.50
Ignition temperature in air, degrees F.	920 to 1120
Maximum flame temperature in air, degrees F.	3,595
Limits of flammability in air	
Percent of vapor in air/gas mixture	
a) Lower	2.15
b) Upper	9.60
Heating values	
a) BTU per cubic foot	2,488
b) BTU per pound	21,548
c) BTU per gallon	91,500
Chemical formula	C ₃ H ₈
Vapor pressure in psig	
a) 70 degrees F	127
b) 100 degrees F	196
c) 105 degrees F	210

Pre-Installation Inspection
(Recommended)

If the vehicle is new and has less than 1,500 miles we recommend the following:

- Visually inspect the vehicle
 - Is the malfunction indicator lamp illuminated?
 - Does the engine start and run smooth?
 - Are there any fluid leaks?
- Install a diagnostic scan tool and verify there are no DTCs (Diagnostic Trouble Codes) stored in the computer memory

If the vehicle is used and has more than 10,000 miles we recommend in addition to the above:

- Remove and examine the spark plugs and conduct a compression test
- During diagnostic scan mode document the following from the scan tool data stream:
 - Short term fuel trim, bank 1 & 2
 - Long term fuel trim, bank 1 & 2
 - IAC (idle air control %)
 - Oxygen sensor activity

Note: *Proceed with the LPEFI[®] system installation if all conditions are acceptable. If any problems are discovered it is not recommended to install the LPEFI[®] system until the problems are repaired. After the installation is complete refer to the Post-Installation Inspection found in this manual.*

LPEFI[®] System Installation

Note: The kit contains all the components needed for conversion, decals, owner information card and a warranty registration card. The warranty registration card, along with the Post-Installation Inspection form, must be filled in and returned to Bi-Phase Technologies for warranty to be valid. Label placement is described later in this installation manual.

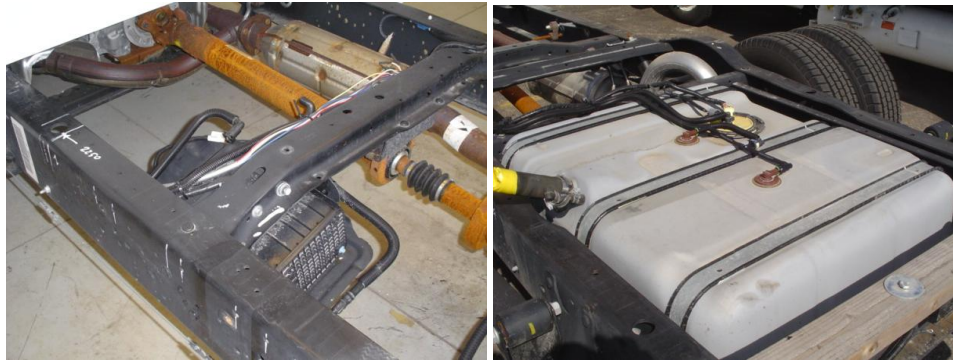
Removing the gasoline system



WARNING: Disconnect the battery before you work on any part of the LPEFI[®] system.

Remove gasoline fuel rails, fuel line, tank & evaporative emission system (if the vehicle is equipped with the EVAP components):

1. Disconnect the battery
2. Remove the evaporative emission system, fuel tank and fuel lines



3. Remove the sensor from the evaporative tank and leave plugged into the OEM harness
4. Remove the fuel tank pressure sensor from the tank and leave it plugged into the OEM harness. The fuel pump connector will plug into the LPEFI[®] harness



5. Drain all gasoline from the fuel tank
6. Remove the fuel line from the fuel pump sending unit. Place drain pan under the line to catch gasoline spilled while disconnecting the fuel line

Note: Gasoline residue will drain out of the lines and rails when you disconnect.

7. Remove the fuel tank from the chassis



CAUTION: Gasoline under pressure. Gasoline is flammable & toxic. Use extreme caution and eliminate all sources of ignition while handling. Wear gloves & goggles.

8. Remove the air box and antifreeze reservoir



9. Remove the seats, the bottom of the dash and dog house

10. Unplug injector wiring harness from each injector for use on the LPEFI[®] injectors

Note: When disconnecting or connecting injector connectors be careful and push in on connector (squeeze) to disconnect.

11. Place drain pan under driver side of bell housing to catch any gasoline spilled while disconnecting the fuel line

Note: Gasoline residue will drain out of the lines and rails when you disconnect.

12. Remove evap lines



13. Remove four (6 mm) mounting studs and nuts holding the gasoline fuel rails to the intake manifold. Retain these bolts for use with *LPEFI*[®] fuel rails
14. Remove the gasoline fuel rails from the engine and discard all components in an environmentally safe manner

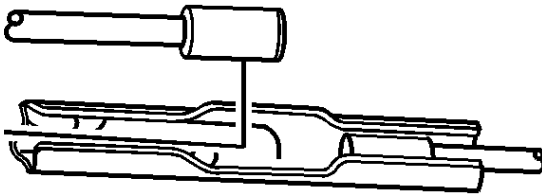
Tank Installation

Primary tank is installed on the driver side

1. Remove the emergency brake cable bracket

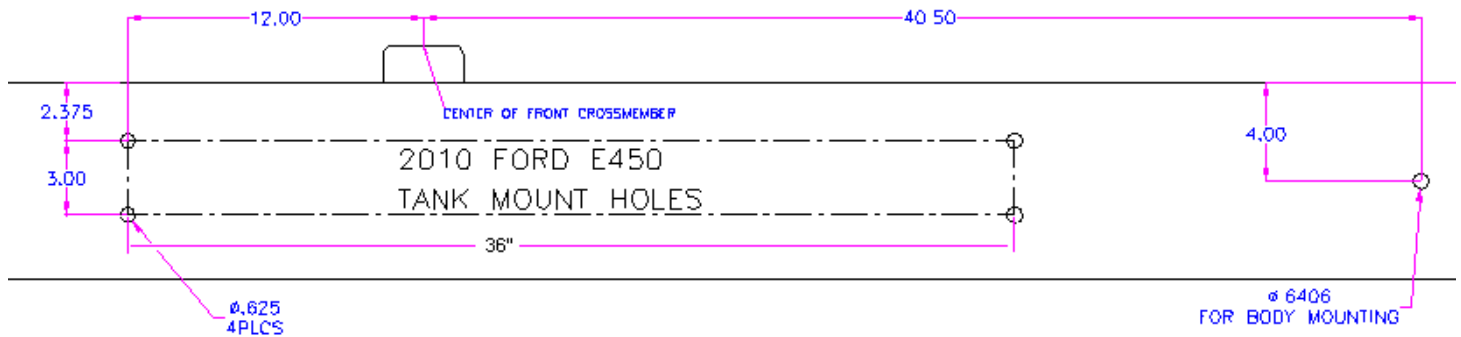


2. Disconnect the front brake cable from the intermediate cable
 - a. Set the parking brake
 - b. Secure brake cable at the rear of the cable (vise grip)
 - c. Release the parking brake. Pull the rear brake cable and have another person secure the front of the cable (vise grip)

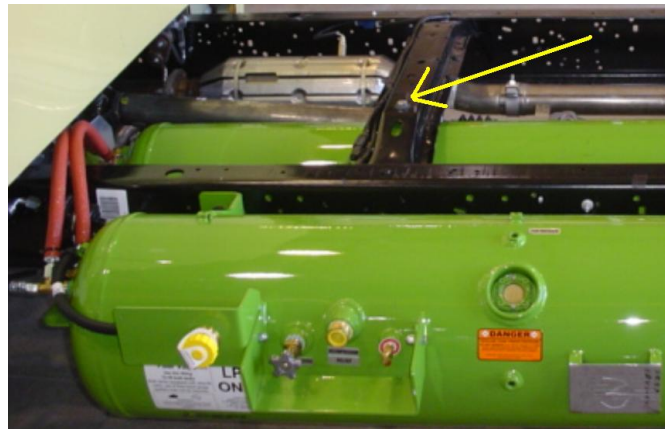
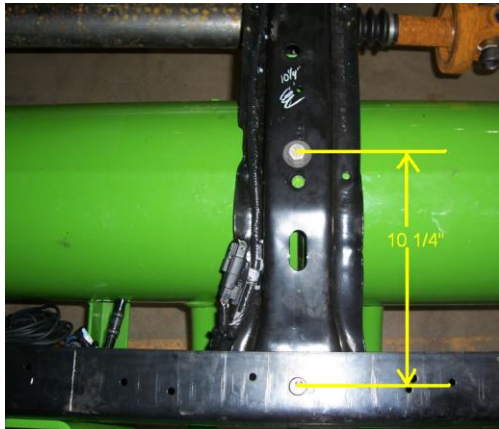


3. Drill a hole on the street side frame rail prior to mounting the propane tank (This hole is needed for the mounting the Johnson Truck Body to the frame rail)
 - a. Measure 40.5" back from the front cross member
 - b. Measure down the frame 4" and drill a 0.641" hole
4. Use a 5/8" drill bit to drill the tank mounting holes; use the 5/8" bolts, Belleville washers & nuts provided in the kit to mount tank

5. Left set of holes are drilled 12.25" forward of the cross member, 2 3/8" down from the top of the frame and 3" apart. Second set of holes 36" apart. Reference diagram below



6. Drill 5/8" 10.1/4 from the center of the driver side frame rail



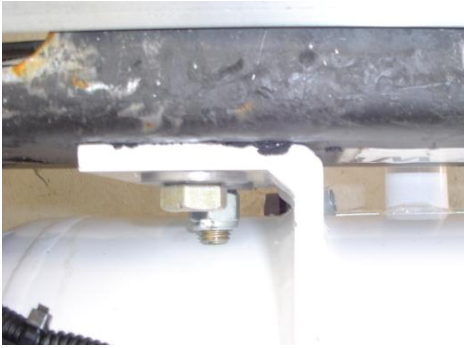
7. Before raising the tank loosely install the 2 tank brackets to be fastened to the frame rail cross members
Note: Use the hardware supplied with the brackets

IMPORTANT: Install all hardware before tightening any tank mounting bolts

8. Install the two bolts to the cross member bracket ring



9. Raise the tank into place and install the frame rail bolts, two bolts per support; tighten these four mounting bolts until the Belleville washers are flat or torque to 148 – 154 ft-lb



10. Install bolt in to cross member into the tank bracket



11. Install the rear bracket



12. Torque the two bolts into the cross members to 70 – 78 ft-lb
13. Slide the intermediate brake cable through the tank brackets and reconnect to front cable
14. Install heat shield to the tab of the inside fuel tank



Primary tank fuel gauge

1. Install fuel level sending unit on the primary tank

Note: Use the 180 - 10 ohm resistance fuel level gauge sending unit supplied in the kit. The first trucks converted will have a modified fuel gauge. The fuel gauge in the dash will read lower than the tank gauge reading

2. When installing a fuel level gauge sending unit always reset the sender to zero using a small magnet; after installed on the tank the sending unit's needle should register zero or empty unless there is fuel in the tank

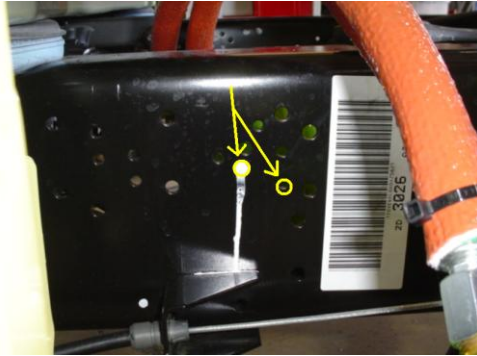


Fill hose installation

1. Install the fill fitting to the fill bracket



2. Drill an additional hole in the frame for the second fill filter p clamp



3. Install the fill filter to the frame rail using two p clamps as shown with the inlet to the rear of the vehicle



4. Install the hose with the two 45 degree fittings. First to the fill fitting, the other end to the inlet of the fill filter (Torque to 44-48 ft-lb.) Labeled P/N 274246



5. Install P clamp to the fill hose using the attached bracket on the tank.





WARNING: *Stop fill valve elbows are never tightened at the tank manufacturer. The valve is tight but the elbow must be tightened and clocked to the proper position. Do not allow the valve itself to move while tightening the elbow.*

6. Install "Run T" fitting into the 80% valve of the outside tank



7. Install the shortest fill hose from the end "Run T" to the outlet of the fill filter. 90 degree end to the fill filter
8. Install fill hose from the T of the "Run T" to the 80% valve of the inboard tank. Labeled P/N 274248
9. Install the vapor hose to each of the spitter valves. Labeled P/N 274249



10. Open the spitter valves

IMPORTANT: Verify the hoses are routed in a way that there is no interference with chassis components that could cause chaffing

LPEFI[®] fuel rail installation

1. Remove the new fuel rails from the conversion kit.
2. Place both rails on the bench as shown in the photo. The top fuel rail in the photo is the passenger side rail



3. The bushings and hold down clamps are not mounted on the rails and will need to be installed prior to installation on the engine



4. Lubricate the lower o-rings (green) on each injector and place each rail on the engine with the QD hose inlet connectors facing toward the front of the engine

Note: The injector electrical connectors should be facing outward to allow clearance between injector & intake plenum. The electrical connector could interfere with the installation of the rail and could damage the injector if not pre-positioned outward.

5. Using the bolts you removed from the OEM fuel rails. Secure the LPEFI[®] injector rails to the intake manifold studs; tighten to a torque of 12 NM (106 in-lb)

Note: Always be aware of routing of the harness. Do not route over the top of the fuel rail.

6. Install original gasoline injector wiring harness and connect each injector connector to the proper cylinder

Install the loop hose to the injector rails



NOTICE: Take extreme care to center the nylon line into the rail end fitting and slowly push the line straight all the way in (turning the hose from side to side or twist it as you are pushing it in) or kinking of the nylon line may occur. Once the white inner line is completely in, push the entire fitting into the rail until it clicks and locks

1. Install 21" hose heat sleeve over loop hose, zip tie each end to hold insulation in place
2. The hose will be inserted so the loop of the hose is facing upwards



3. Lubricate with O-lube the white nylon inner line of the two hose ends and insert into the injector rail

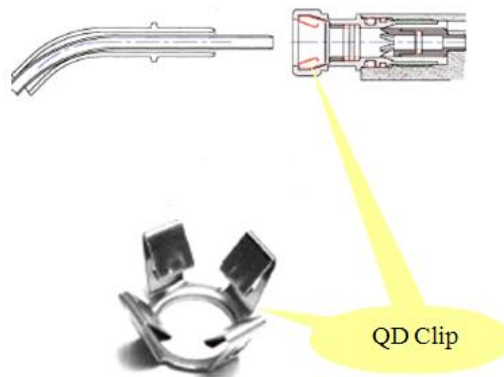
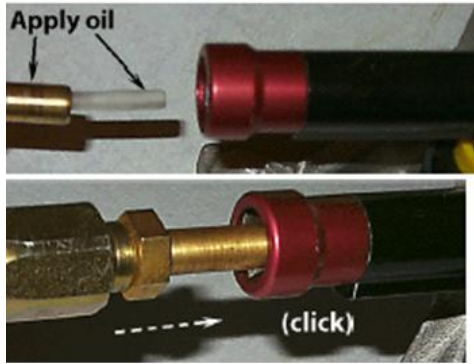


4. Align the white nylon inner line straight into the QD fitting pushing in while then aligning the metal hose straight in to the fitting until it clicks



WARNING: *Improperly attached fuel lines could cause the release of propane causing personal injury.*

5. Using a bright light look at the QD fittings and verify the four locking tabs are secured on the hose fittings
6. Gently pull on the on the hose ends to verify the fitting will not disconnect



IMPORTANT: After hearing the click of the line quick connecting, visually look and verify the 4 sides of the QD clip are over the locking ring.

7. Verify the hose is routed in a way that there is no interference with chassis components that could cause chaffing
8. Install loop hose support bracket
 - a. Use supplied hardware
 - b. Use the two existing nutserts in the manifold to mount the bracket to the intake
 - c. Attach P clamp to the loop hose



9. Install WARNING label on the loop hose



Primary Hose Installation

1. Position the primary hose to be connected to the LPDM by routing the hose over the tank
2. Install hose heat insulation over primary hose, zip tie each end to hold insulation in place
3. The 5' long insulation is installed on the rail end of the primary hose



WARNING: *Improperly attached fuel lines could cause the release of propane causing personal injury.*

4. Remove retaining screws, plate, gasket and split collar retainers from LPDM
5. Install plate and gasket onto hose end fitting of primary hose
6. Lubricate with O-lube, the hose end fitting metal surface and white nylon inner line
7. Insert hose into center of LPDM port and push in slowly until metal hose end fitting is touching the top of the brass bushing in the port

CORRECT



WRONG – LOCKING RING EXPOSED!



8. Insert split collar retainers and tighten screws until plate is flush with the LPDM
9. Install orange zip tie WARNING label to the hose as shown



Note: Primary hose loop will determine how much slack is available to secure the primary hose; verify the primary hose is routed in a way that there is no interference with chassis components that could cause chaffing

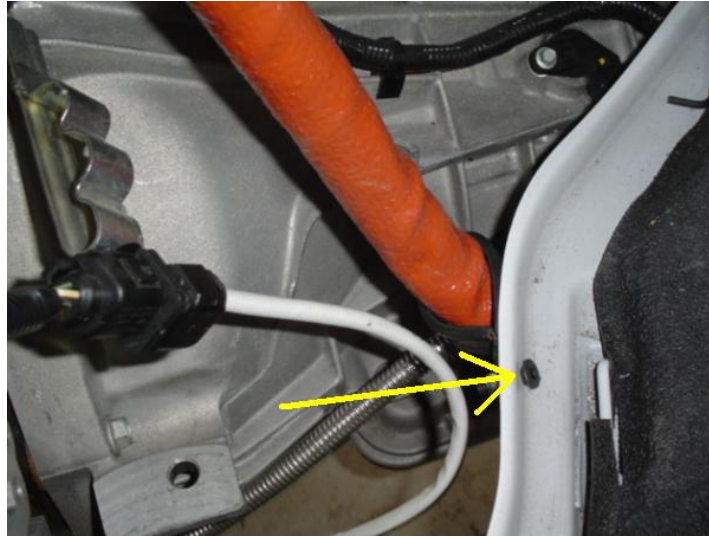
10. Route the hose from the LPDM over the top of the tank
11. Fasten the hose to the top of the fuel tank using 3 P clamps



12. Attach the hose to the top of the frame rail with a P clamp as shown



13. Attach the hose to the floor of the cab as shown



Note: Insure that the hose is aligned so that no tension will be created on the fuel rail or the hold down clamps when installation is complete

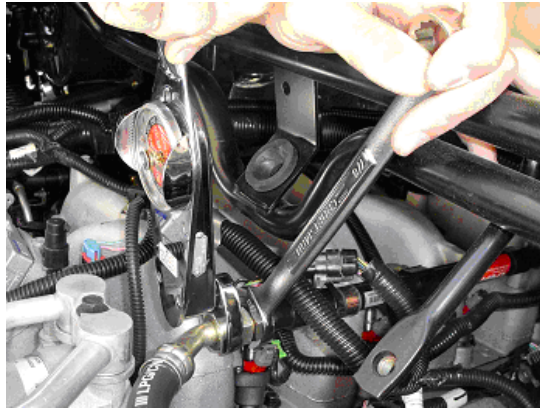
14. Lubricate with O-lube, the hose end fitting metal surface and white nylon inner line for installation into the fuel rail



15. Carefully guide the inner line into the center of the rail and feel for the line to engage the internal o-ring. 2" of inner line must be inserted into the rail to make a proper connection



16. Pull the outer hose onto the fitting on the end of the rail, tighten the flare nut (torque to 33-38 ft-lb); use a “backup wrench” on the rail to keep the brass fitting from turning as you tighten the flare nut; do not over tighten the flare nut; (brass fitting on the rail is tightened to 5-6 ft-lb)



1. Install orange zip tie WARNING label to the hose as shown



Main wire harness

Note: Before securing any of the harness make sure it is routed to meet the length requirement to make each connection. When you are prepared to secure the harness, tie wrap it every 8 inches.

Main LPEFI® harness (to existing Ford fuel pump wire harness)

1. Lay out the main harness with the five connectors pointed toward the rear of the truck. Start the routing from the rear of the tank

2. Route over the top of the tank with the primary hose



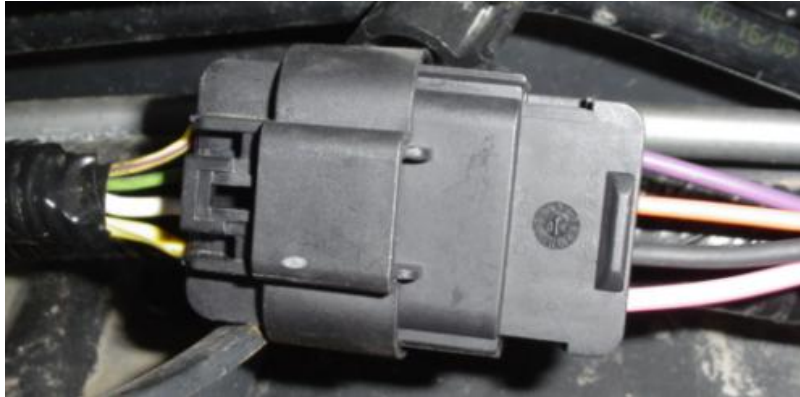
3. From the front of the tank the fuel pump harness connector will route to the rear down the inside of the frame rail
4. Route the OEM fuel pump harness forward down the inside driver side frame rail
5. Cut the 4 pin connector off the Ford OEM fuel pump harness



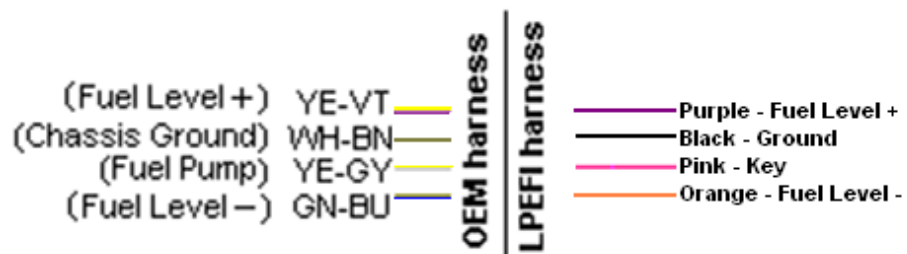
6. Install the connector supplied in the conversion kit to the OEM fuel pump harness



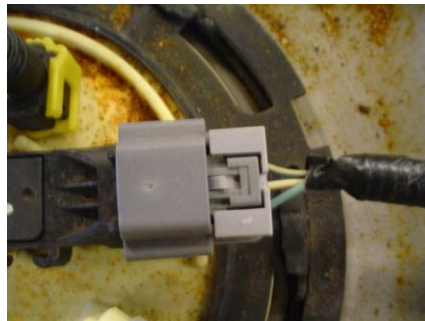
7. Insert wires per into the connector per the photo



8. Plug the LPEFI[®] 4 pin connector to the new connector of the OEM fuel pump harness.



Note: The fuel pressure sensor will remain plugged into the OEM harness



Main LPEFI harness (to sending unit) branch, it is a black two pin connector

9. Connect the main LPEFI harness (to sending unit) branch to the fuel level gauge; use wire ties to secure to the primary hose



Note: Always be aware of routing. Do not route near the exhaust and always use split loom to prevent chaffing.

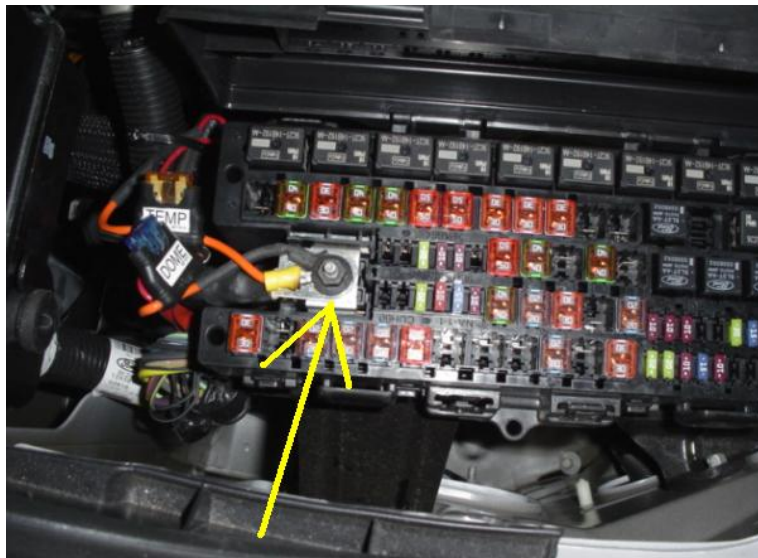


WARNING: Do not make the final electrical connections until the LPEFI system is completely sealed. Applying power could cause the valves in the tank to open, releasing fuel into the hoses.

10. Prepare to install the LPEFI[®] protecting cover with the 3/8" bolts provided; at this time leave the bolts loose and **do not** connect the main LPEFI[®] harness (to LPCM, relay, ISD controller and LPDM), to the electronic control box (LPCM) and relay

Main LPEFI[®] harness (to 12 volt power) branch, is an orange wire with an in-line 20 amp fuse and (to 12 volt power to the ISD Controller) 2 amp fuse with the eyelet connectors on the end

11. Remove the nut from the 12 volt power on the power distribution and install the eyelets from the orange wires with the 20 amp and 2 amp fuse

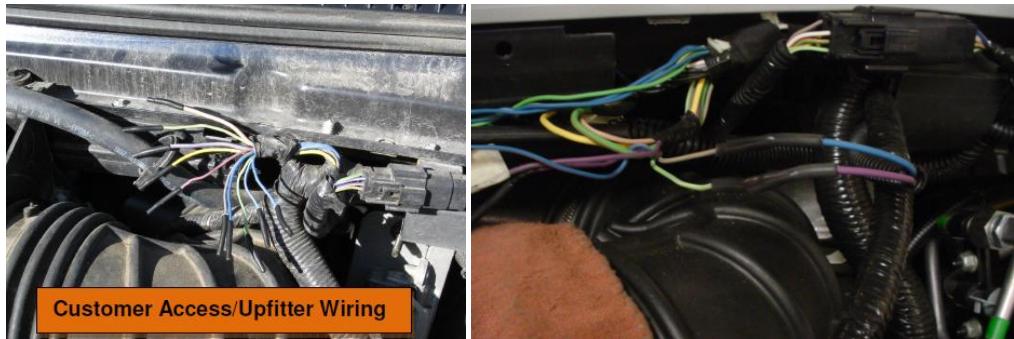


Main LPEFI harness (to park and neutral signal) branch, they are blue and purple 18 gauge wires

12. Locate the upfitter wiring loom



13. Attach the park signal, blue wire to the gray/brown wire of the upfitter wiring under the hood
14. Attach the neutral signal, purple wire to the green/white of the upfitter wiring under the hood



Main LPEFI harness (to door switch) branch, it is a white 16-gauge wire and to ignition signal) branch, it has two Pinks wires, 18 gauge wire

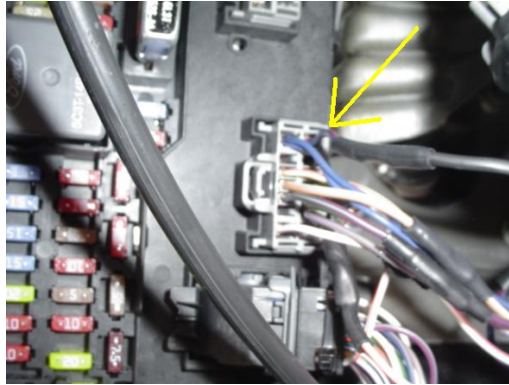
15. Guide the main LPEFI[®] wiring harness white wire (to door switch circuit) and pink wires
16. Route the white wire and pink wires through the grommet to the inside of the cab
Note: If you are installing truck accessories, route the wires for them at this time



17. Connect white wire to the green/violet wire (door switch)



18. Cut the blue/red wire and attach the pink wires



1. Connect the pink wires to each of the blue/red wires
2. Install the kick panel, seats, the bottom of the dash and dog house
3. Install the air box and antifreeze reservoir



WARNING: Do not make the final electrical connections until the LPEFI system is completely sealed. Applying power could cause the valves in the tank to open, releasing fuel into the hoses.

Completing Wire Harness Installation:

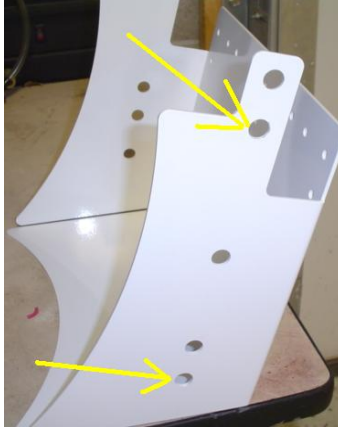
Main LPEFI harness (to LPCM, relay and LPDM) branch, is 4 connectors on 4 branches, tied together.

4. Connect main LPEFI harness connection to ISD Adapter, relay, LPCM and LPDM



5. Assemble tank guard to rear of the primary tank
 - a. Attach the 3 PAL nuts to the tank tabs
 - b. Use the 3/8" flat, lock washers and bolts to assemble the cover to the tank

Note: Use the lower mounting holes so cover plate is level with the bottom of the tank



Install labels on the truck/registration



1. Install one "LPEFI®" transparent label on each side of the cab
2. Install the EPA emissions label on the plate on top of the engine intake air box; once placed do not try to remove this label as it would be destroyed
3. If the truck does not have a box or body installed yet, put the propane diamond in the glove box for placement later. If the body is installed on the truck, install the blue "PROPANE" diamond on the back panel of the truck, toward the bottom right corner

Note: Do not install on the bumper

4. Install the Bi-Phase programmed ECM label **PHOTO NEEDED**
5. Install the orange WARNING label on the center of the dog house



6. Install the yellow ATTENTION label on the left side of the dash



7. Fill out vehicle warranty registration card and return to Bi-Phase Technologies along with the Post-Installation Inspection
8. Place laminated owners information cab card in the glove box or door pocket with the OEM's owners manual & other GM information
9. Program ECM using the ProCal II calibration flash tool

IMPORTANT: Follow the ProCal II instruction sheet supplied with the tool carefully prior to installation!



10. Begin testing the installation and fill out the Post installation Report

Testing the Installation

1. Visually inspect the tank, the hoses, the wiring and the engine compartment. Is everything assembled properly?
2. Fill the tank with 30 to 40 gallons of propane. It is recommended that you purge the tank with propane vapor and check all the fittings on the tank for leaks before filling the tank completely. Use an approved leak detection fluid or an electronic leak detector to verify there are no leaks. If any leaks are found stop and repair the leaks. The battery should not be connected at this time. (If the tank was filled before installation it should have been checked for leaks at that time.)
3. Connect a fuel pressure test gauge to the Schrader valve on the LPDM
4. Fuel pressure should be 0 psi at first.
5. If the connections on the electronic purge control assembly have not been made connect at this time.
6. Connect the battery. You may hear a click at the tank.
7. Open the driver door to start a purge cycle. You should hear the solenoid valves click and the pump running inside the tank. If not, check the electrical connections and refer to the troubleshooting section in the general diagnosis manual.
8. Simultaneously with the preceding step you should inspect all hose connections, the LPDM, the fuel rail connections and the injectors for leaks. If any leaks are found you should disconnect the Liquid

Propane Control Module, evacuate the lines and repair. See the general diagnosis manual for procedures.

9. When the purge cycle ends, listen for leaking fuel near the hoses and around the entire system. If you do not hear any obvious hissing or smell propane, turn on the ignition key but do not start. This will start the fuel pump, followed by a purge cycle.
10. When you hear the fuel pump stop running notice the fuel pressure on the test gauge. This pressure should be anywhere from 30 psi in cold weather to 180 psi in hot weather.
11. Turn the key off, then on again to start another purge cycle.
12. While the pump is running, observe the fuel pressure. It should be 35 to 55 psi higher than it was in step 10.
13. Turn the key off and check for leaks at every hose fitting on the vehicle. Apply an approved leak detection fluid (similar to soapy water) or use an electronic propane leak detector. The tank, tank valves, fuel injectors and fuel rails have been tested at the factory but you must recheck, and check the hoses and hose fittings.



WARNING: Do not use an open flame to check for leaks. If you smell propane, it's from a leak. The LPEFI system uses sealed fittings and lined hoses, and there should never be a propane odor from an LPEFI vehicle.



Testing the Installation (cont'd)

14. If there are no leaks, start the engine.
15. Connect a diagnostic scan tool to the vehicle.
16. With the engine running, check the diagnostic trouble codes (DTCs). Correct any problems you find. If the engine is not running smoothly, refer to the general diagnosis manual.
17. If there are no codes and the engine is running smoothly let the vehicle run until it is to full operating temperature (190° F on your Scan tool).
18. Turn the key off and follow the testing procedures described in the Post-Installation Inspection
19. Fill out the Post-Installation Inspection completely.
20. Turn off the engine and disconnect the fuel pressure gauge set. Be sure to reinstall the dust cap on the Schrader valve.



WARNING: The pressure test hose may contain cold liquid propane. Wear insulated rubber gloves and goggles.

21. Drive the vehicle for at least 15 minutes, if possible. Drive under various conditions and a variety of speeds.

22. After the drive notice the long-term fuel trims as noted in the post-inspection. The long-term fuel trims should not be the same as they were before the drive. The long-term fuel trims should not be more than + or – 20%.
23. After driving and inspecting the vehicle turn it off and let it sit with the hood and doors closed for 15 minutes. After 15 minutes return to the vehicle, open the door to initiate a purge and start the engine. If the engine starts easily, 3 seconds or so, the vehicle is ready to use.
24. If there are no leaks, no DTCs and the engine runs well (smooth idle, smooth acceleration, good power), the vehicle is ready to use.
25. If you did not fill out the warranty registration card in the Installing Labels Procedure do so now. Also complete the Post-Installation Inspection and return both to Bi-Phase Technologies to establish the warranty start date for your vehicle.

Testing the Idle Shut Down (ISD) and Auto Purge functions of the LPCM

1. Testing the Idle Shut Down and Auto Purge control assembly (LPCM).
Note: *Temperature must be above 50F*
2. Open the door, the purge cycle should initiate and run for 12 to 15 seconds.
3. When the purge cycle stops turn the ignition key to the on position. The purge cycle should initiate again.
4. Close the door.
5. Start the engine, the engine should start.
6. Before 30 seconds has passed turn the engine off. The purge cycle should initiate.
7. Re-start the engine again and let it run 60 seconds. After 60 seconds place your foot on the brake and place the vehicle in Drive then back into park. Leave the engine running.
8. 3 minutes after the vehicle was placed back into park the engine will shut off.
9. 90 seconds after the engine has shut off, an Auto Purge will occur.
10. If the system works as described, you have completed the tests of the ISD and Auto Purge functions.
11. If it does not work as described check all wire connections, battery voltage and contact Bi-Phase Technical Hotline at (888) 465-0571.

Post-Installation Inspection

Installation & test date _____
VIN _____ Engine size _____ Mileage _____
Make _____ Model _____ Mfg date _____
Customer name _____ Address _____
City _____ State _____ Zip _____ Phone _____
Installer company name _____ Phone _____
Injector rail serial numbers Right _____ Left _____
Tank mfg. _____ Primary tank s/n _____ Secondary tank s/n _____
Purge & fill propane tank Yes ☐ No ☐
Quantity of propane _____ gallons
Leak test tank & LPEFI® system complete Yes ☐ No ☐
Leaks found & repaired Yes ☐ No ☐
Where _____

Before starting engine check and top off coolant level. After starting engine observe coolant level and heater operation until engine is at 190°F on the scan tool and all air has purged from the cooling system.

<p><u>Tank Temps & Operating Pressures @ LPDM</u></p> <p>Tank temperature (bottom of tank) _____ °F</p> <p>Room temperature _____ °F</p> <p>Static pressure (tank pressure) _____ p.s.i.g.</p> <p><u>Pump Pressures with Engine Running</u></p> <p>Static + supply valve + pump _____ p.s.i.g.</p> <p>Static + supply valve + return valve + pump _____ p.s.i.g.</p>	<p><u>DataStream</u></p> <p>ECT/Temperature _____ °F</p> <p>At Idle: <u>Bank 1</u> <u>Bank 2</u></p> <p> STFT _____</p> <p> LTFT _____</p> <p>Does the engine idle smoothly?</p> <p> Yes <input type="checkbox"/> No <input type="checkbox"/></p>
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Loop hose fingers ((4) engaged Yes ☐ No ☐

Primary hose installed correctly Yes ☐ No ☐

Transfer System (if equipped)

Any faults found using transfer system inspection tool? Yes ☐ No ☐

If yes describe fault/repair _____

Diagnostic Trouble Codes

Any DTCs in computer memory? Yes ☐ No ☐

List all codes: _____

If any DTCs found, repair all codes and retest
Comments: _____

Turn off vehicle & let it sit for 15 minutes with hood and doors closed.

Return to vehicle, open driver door. Does purge cycle initiate? Yes ☐ No ☐

Does vehicle restart easily after purge cycle is complete? Yes ☐ No ☐

Technician Name: _____

This inspection form must be returned to Bi-Phase Technologies.

Any problems found must be noted in the comment section and if a problem cannot be resolved Bi-Phase Technologies must be contacted at 1-888-465-0571.

Idle Shut Down (ISD) Functions

● Idle shut Down Modes

- **3 Minute** - ISD after 3 minutes of idle, the engine will shut off
 - If the truck has been run in the past 30 minutes or if the truck has been moved (meaning if the Drive selector is moved from the Park position)
- **15 Minute** - ISD after 15 minutes of idle, the engine will shut off
 - If the truck has been shut off for over 30 minutes it will go into this ISD mode
 - This will allow for morning warm ups (Defrost windshield, etc)
 - Moving the gear select from the Park position will change the idle shut down mode to 3 minute mode when the truck is placed back into Park

● Auto Purge

- Quicker engine start ups in warm weather
- Auto purge will run the pump after the truck is shut off (either by key or ISD) at approximately 1.5 minutes – 3 minutes – 6 minutes – 12 minutes and one last time in 24 minutes
- Auto Purge is disabled below the temperature of 50 degrees
 - So no drain on the battery will occur

● Tampering Mode

- ANY tampering with the ISD components will shut off the fuel pump in the propane tank; the engine will shut off and may result in a **3 minute reset process or indefinitely if the tampering is not corrected**. The truck will not start within this 3 minutes
 - Tampering may include items like trying to remove or bypass components from the idle shutdown system or having the truck in drive with the parking brake on

● Other notes

- The ISD will not turn off any lights, fan motor, etc
- A weak battery may be more evident with the ISD installed

2010 Ford E450 5.4L LPEFI Electrical Wiring Diagram with Idle Shut Down Main Wiring Harness

