

BI-PHASE **TECHNOLOGIES**

Making Alternative Fuel *Standard*

LPEFI[®] Installation Manual
For
2012 Ford F550 Trucks with 6.8 Liter Engine
Models: F550
Mono-Rail System



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Bi-Phase Technologies, LLC

Eagan, Minnesota, U.S.A.

Bi-Phase Technologies, LLC

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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.

**For more information contact:
Bi-Phase Technologies, LLC
2945 Lone Oak Drive, Suite 150
Eagan, MN 55121
(952) 886-6450
Tech. Support line
(888) 465-0571**

Bi-Phase Technologies, LLC

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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.

Bi-Phase Technologies, LLC

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_3H_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 installation is being performed on a used vehicle please fill out the Pre-Installation inspection form “A.2.13” found at the end of this manual. If forms are needed please contact Bi-Phase Technologies @ 888-465-0571

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: This kit contains all the components needed for conversion, along with 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



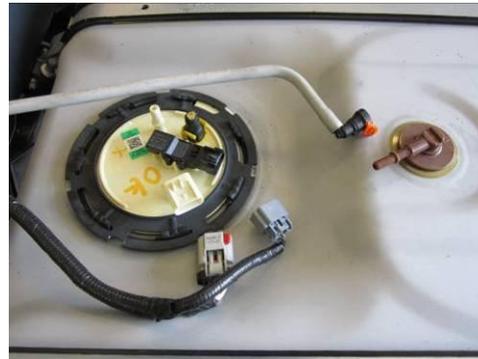
WARNING: Disconnect the battery before you work on any part of the LPEFI[®] system.

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 lines, fuel tank, and fuel lines. A drain pan will be needed to catch any spilt fuel when disconnecting fuel lines



Evap Tank



Fuel Tank

3. Disconnect the OEM wire harness from the fuel tank
4. Drain all gasoline from the fuel tank and remove the tank along with the fuel tank guard
5. The Evaporative emissions canister and mounting plate can be left in place. If removing be sure to remove the fuel system control module located on the bracket. Remount and leave the OEM harness plugged in

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



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

Fuel Rail Removal

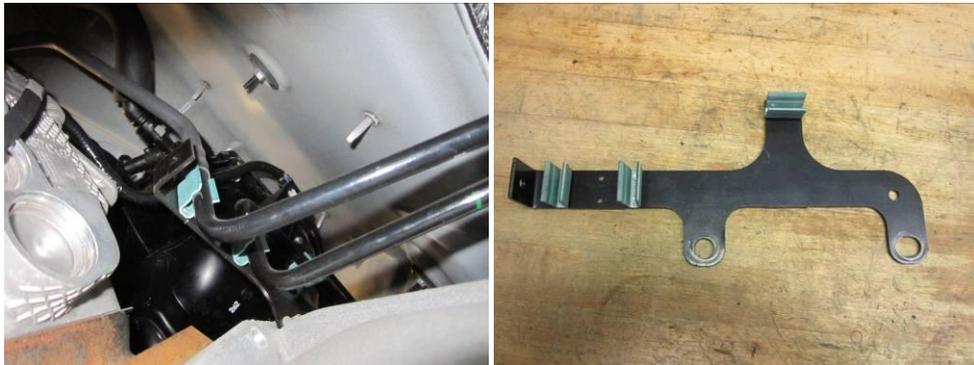
6. Unplug injector wiring harness from each injector for use on the *LPEFI*[®] injectors

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

7. Place drain pan under driver side of bell housing to catch any gasoline spilled while disconnecting the fuel line from the fuel rail
8. Remove six (6 mm) mounting studs and nuts holding the gasoline fuel rails to the intake manifold. Retain these bolts for use with *LPEFI*[®] fuel rails

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

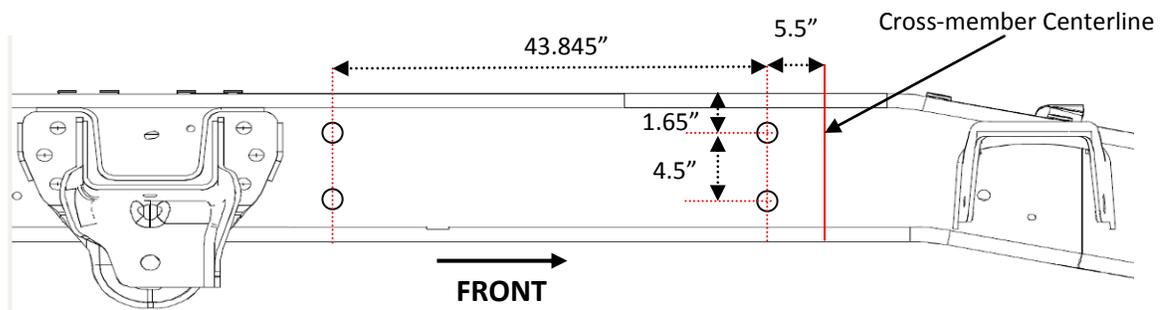
9. Remove the gasoline fuel rails from the engine and recycle all components in an environmentally safe manner according to local, state, and federal regulations
10. Remove the fuel line mounting bracket located on top of the bell housing. 2 bolts will need to be removed from the bell housing to do so, and after the bracket is taken out the bolts will be reinstalled



Secondary Tank Installation



1. The secondary tank is mounted on the passenger side frame rail with the LPDM facing toward the front of vehicle. There are 4 cross members on this chassis. The front cross member centerline is used as a tank mounting reference. Tank mount Template #2 is also located at the back of this manual



2. Mark the frame using the template shown and drill out the mounting holes to an **11/16"** diameter
3. Raise the tank into place and secure using the supplied 5/8" Gr. 8 bolts, 5/8 Belleville washers, and 5/8 lock nuts. Torque to 185-195 ft-lb
4. Install the valve shield onto the tank using the supplied hardware

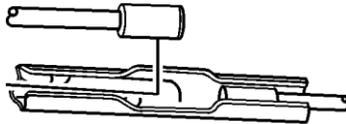


Primary Tank Installation

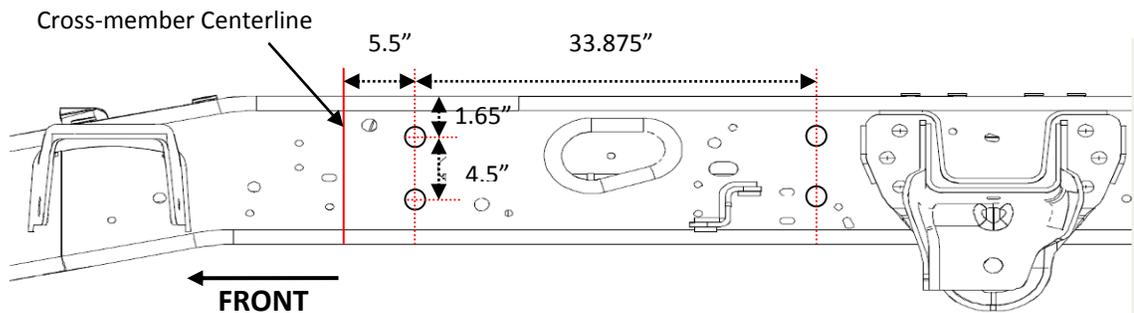


Primary tank is installed on the driver side frame rail with the LPDM facing the front of the vehicle.

1. 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)



2. Use the schematic below to mark the mounting holes in the frame rail. Drill the mounting holes to an **11/16"** diameter. The reference line is the same front cross member centerline closest to the cab. Tank mount Template #1 is also located at the back of this manual



3. Raise the tank into place and secure with 5/8" x 3.5" Gr. 8 Bolts, 5/8 Belleville washers, and 5/8" nylok nuts. Tighten to 148 – 154 ft-lb. Slide the parking brake cable through the tank brackets and reconnect as shown. Remove locking pliers and release brake cable



4. Mount the valve protection bracket onto the tank using the supplied hardware



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



STARBOARD

PORT

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. First install the bushing, followed by the “P” clamp. Please note installation orientation



Install the loop hose to the injector rails

***** (Loop hose is installed onto fuel rails off of the engine) *****



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. Visually inspect QD fitting to ensure proper engagement.

1. Install 21" orange heat sleeve over loop hose, zip tie each end to hold insulation in place
2. Install WARNING label on the loop hose



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

IMPORTANT: Kinking the white nylon inner line will cause drivability issues! **USE EXTREME CAUTION WHEN CONNECTING FUEL LINES!**



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



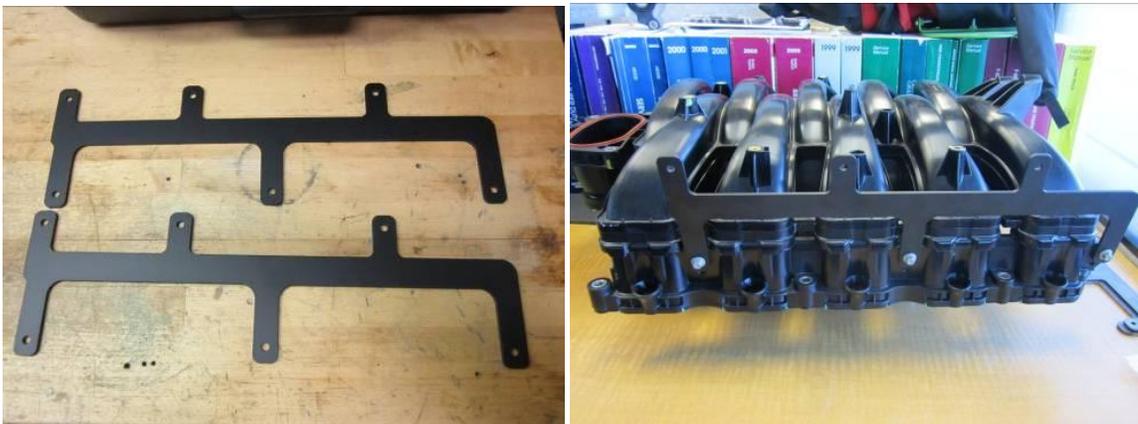
IMPORTANT: After hearing the click of the line quick connecting, visually look and verify the 4 sides of the QD clip are over the locking ring

Shown below are the fuel rails and loop hose installed on an intake manifold. The loop hose will be toward the rearward portion of the engine under the throttle body



Fuel rail/Loop Hose installation

1. Using the bolts you removed from the OEM fuel rails. Secure the supplied fuel rail mounting brackets to the intake manifold studs; tighten to a torque of 12 NM (106 in-lb). Brackets are universal and are installed as shown below



2. Disconnect the wiring harness from the intake manifold, along with ignition coils, throttle position sensor, and vacuum line behind the throttle body. (located on the driver's side engine head) Be sure to label each connector to ensure proper placement upon re-installation
3. Lubricate the green o-rings on the 10 injector housing with o-ring lube or Vaseline

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. Make sure there are no objects obstructing placement of the fuel rails

4. Push loop hose over the top of the throttle body and down behind the intake manifold so the hose loops in the downward position. Slide wiring harness over the rails and seat the injectors into the proper ports



5. Firmly press down and seat each injector fully into the intake manifold. Visually inspect each injector. If the green o-ring is visible, the injector is not fully engaged into the intake manifold
6. Using the supplied M6 flange hardware, connect the 3 hold-down clamps to the fuel rail bracket as shown below. Apply a small amount of downward pressure onto the rail and bracket while securing hardware. Torque hardware to 15 ft-lbs



7. Re-connect ignition coils, vacuum lines, throttle position sensor, and fuel injectors to the proper locations you labeled in the previous steps. Re-secure wire harness to all the proper locations. Check to make sure all routing is done in a manner to prevent any pinching or chaffing.

Note: After installing injector connector pull it back up to verify the connector is latched. Loose or disconnected connector will cause drivability issues

8. Visually inspect to ensure all wires, hoses, and sensors are properly secured and away from any heat sources or moving parts

Primary Hose Installation

1. Install the orange insulation sleeve over the primary hose, zip tie each end to hold insulation in place with safety label tie wraps
2. Install the hose bracket shown onto the front of the engine using the existing stud and mounting hole shown. Location is near the front driver's side engine head. Installed bracket will point toward the driver's side of the vehicle. Use the supplied M8 nyloc nut and M8 HHCS to secure



3. Install the Hose bracket shown to the brake line distribution block mount. Remove the existing M8 lock nut and re-use to secure the bracket. The stud used is the stud closest to the fire wall, and closest to the engine



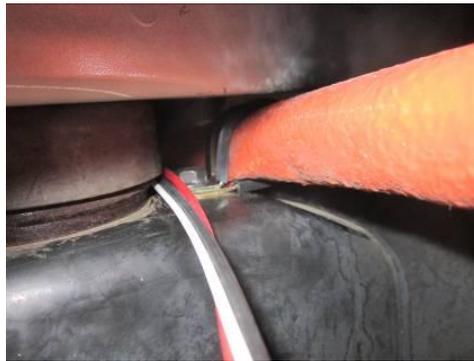
4. Route the primary hose into place with the black hose fitting end connecting to the primary tank. Hose will route down near the driver's side fender past the power steering hoses, and along the top outside of the frame rail back to the primary tank



Driver's Side Engine Head



Top Driver's Side Fender



Underneath cab



WARNING: Route hoses away from any moving parts or sharp edges to prevent chaffing.



WARNING: *Improperly attached fuel lines could cause the release of propane causing personal injury. Use extreme caution when making hose connections!*

5. Remove retaining screws, plate, gasket and split collar retainers from LPDM
6. Remove the installed LPDM Plug
7. Install the red backing plate followed by the gasket onto the black fitting on the primary hose
8. Lubricate the hose end fitting metal surface, white nylon inner line, and gasket with O-lube or Vaseline
9. Insert hose into center of LPDM port and push in and rotate slowly until metal hose end fitting is touching the top of the brass bushing in the port. The locking ring is held in by the two red cone shaped split collar retainers. See pictures below.

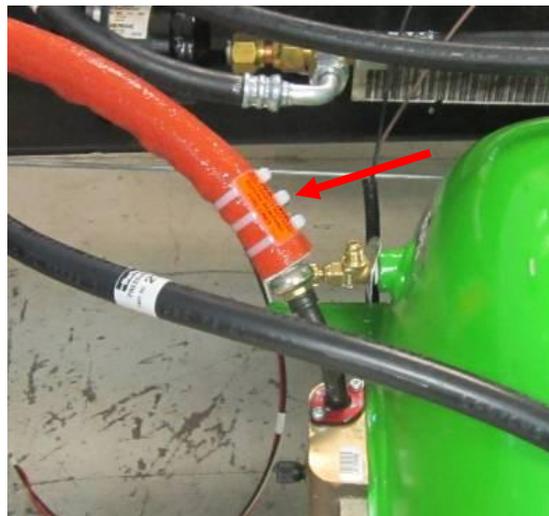
CORRECT



WRONG – LOCKING RING EXPOSED!



10. Tighten the backing plate to the LPDM with the two screws provided in the kit. Use extreme caution when installing the primary hose
11. Install tie wrap warning label



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

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

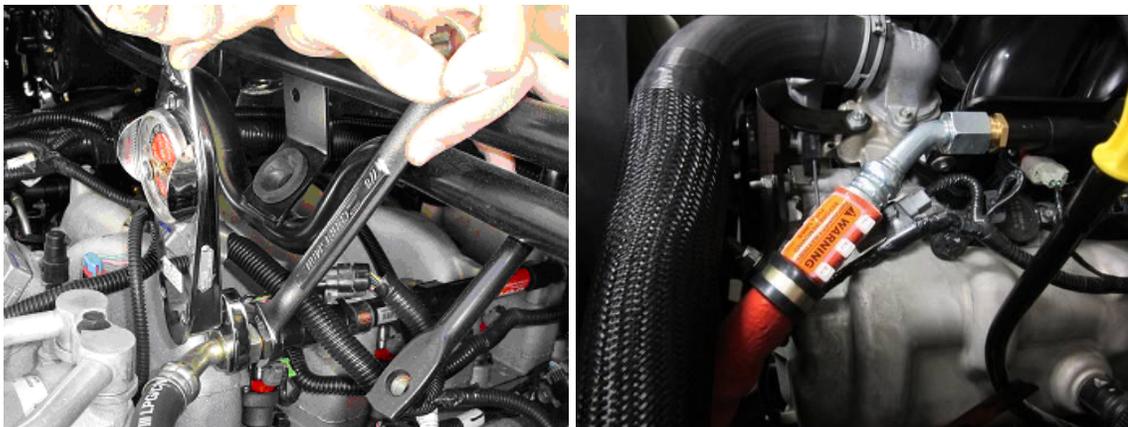
1. Lubricate the hose end fitting metal surface and white nylon inner line for installation into the fuel rail



2. 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.

DO NOT CUT WHITE INNERLINE DURING INSTALLATION! INNERLINE IS MEASURED PRECISELY FOR EACH HOSE AND CUTTING THE INNERLINE WILL CAUSE DRIVEABILITY ISSUES! USE EXTREME CAUTION WHEN INSTALLING FUEL LINES!

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



4. Use the 3 supplied #18 P Clamps, (1) #24 P Clamp, and mounting hardware to secure the Primary hose. Clamps are locations are as stated.
 - Engine Head Bracket
 - 90 degree hose Bracket

- Top of frame rail under cab (#24 P clamp)
- Rear body mount bracket

Fill hose installation

1. Install the fill fitting to the fill bracket located in the front of the Primary Tank



1. Install the fill hose P/N 273886 from the Fill Valve to the black fuel filter



2. Install the fill filter to the frame rail using the #39 "P" clamps and hardware. **NOTE FLOW DIRECTION ON FILTER!!**
3. Install the supplied ½" brass female/female swivel to the out let of the fuel filter, followed by the brass "T" Orient as shown



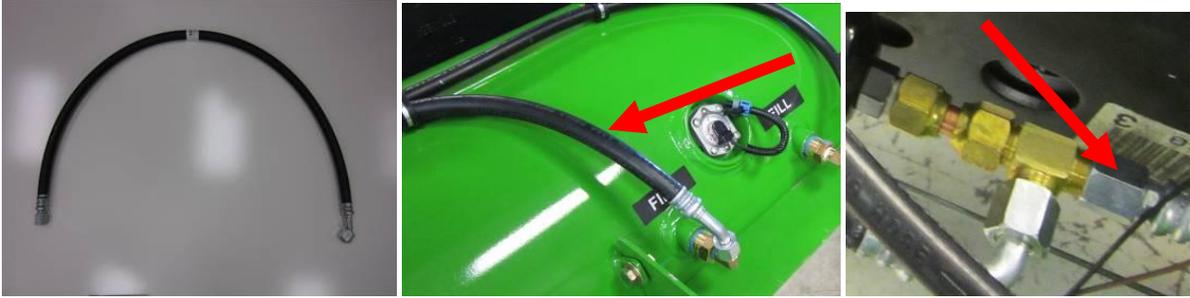
! **WARNING:** Stop fill valve elbows are never tightened at the tank manufacturer. The valve is tight but the elbow must be tightened and clocked to the proper position. Do not allow the valve itself to move while tightening the elbow. Valve needs to be oriented correctly to work properly.



4. Install fill hose P/N 274426 from the Brass "T" to the Secondary Tank 80% stop fill valve elbow. Hose will route across the frame rail and across the secondary tank to the fill valve on the secondary tank. The hose is secured with 2 #20 P clamps, and 1 #15 P clamp



5. Install fill hose P/N 274425 from the Brass "T" to the 80% fill valve located in the center on the Primary tank. Hose will be secure with a #20 P clamp



6. Install transfer hose P/N 274424 from the Secondary LPDM to the 80% stop fill valve located toward the rear of the primary tank. This hose will route across the frame rail and be secured with the fill hose with the 3 #20 P clamps and 1 #15 P clamp. This hose is a -6 size hose. The brass elbow that comes with the tank will need to be replaced with the elbow in the kit. Use a backup wrench on the 80% stop fill valve to prevent turning while installing the new fitting



7. Using 2 heavy duty tie wraps included in the kit to secure the transfer hose and fill hose that route across the frame rail directly behind the Cab



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

Fuel gauge installation

1. When installing a fuel level gauge sending units always manually reset the sender to empty using a small magnet. If there is fuel in the tank the gauge should be oriented to the estimated fuel level. Once installed the float magnets should mate with the gauge card to show the proper fuel level



2. Install fuel level sending units on the primary and secondary tanks. Check to make sure both fuel cards are reading properly



Primary wire harness

Note: Before securing any of the harness makes 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 (Delphi Connector Installation.)

1. Locate the OEM fuel pump harness which was originally connected into the gasoline fuel pump assembly
2. Install the connector supplied in the conversion kit to the OEM fuel pump harness per the pin locations shown below. Ensure to use the proper pin and cable sear per the proper gauge wire
3. Use Delphi hand crimp tool P/N 12085270 or equivalent to ensure proper crimping. It is recommended to place a very small drop of solder on the crimp to ensure a good connection



Ford OEM HARNESS

DELPHI CONNECTOR

Green/Blue	Pin 1 _____	Pin A
Yellow/Violet	Pin 2 _____	Pin B
White/Brown	Pin 3 _____	Pin C
Yellow/Gray	Pin 4 _____	Pin D



Ford Harness

Delphi Connector

Bi-Phase Harness



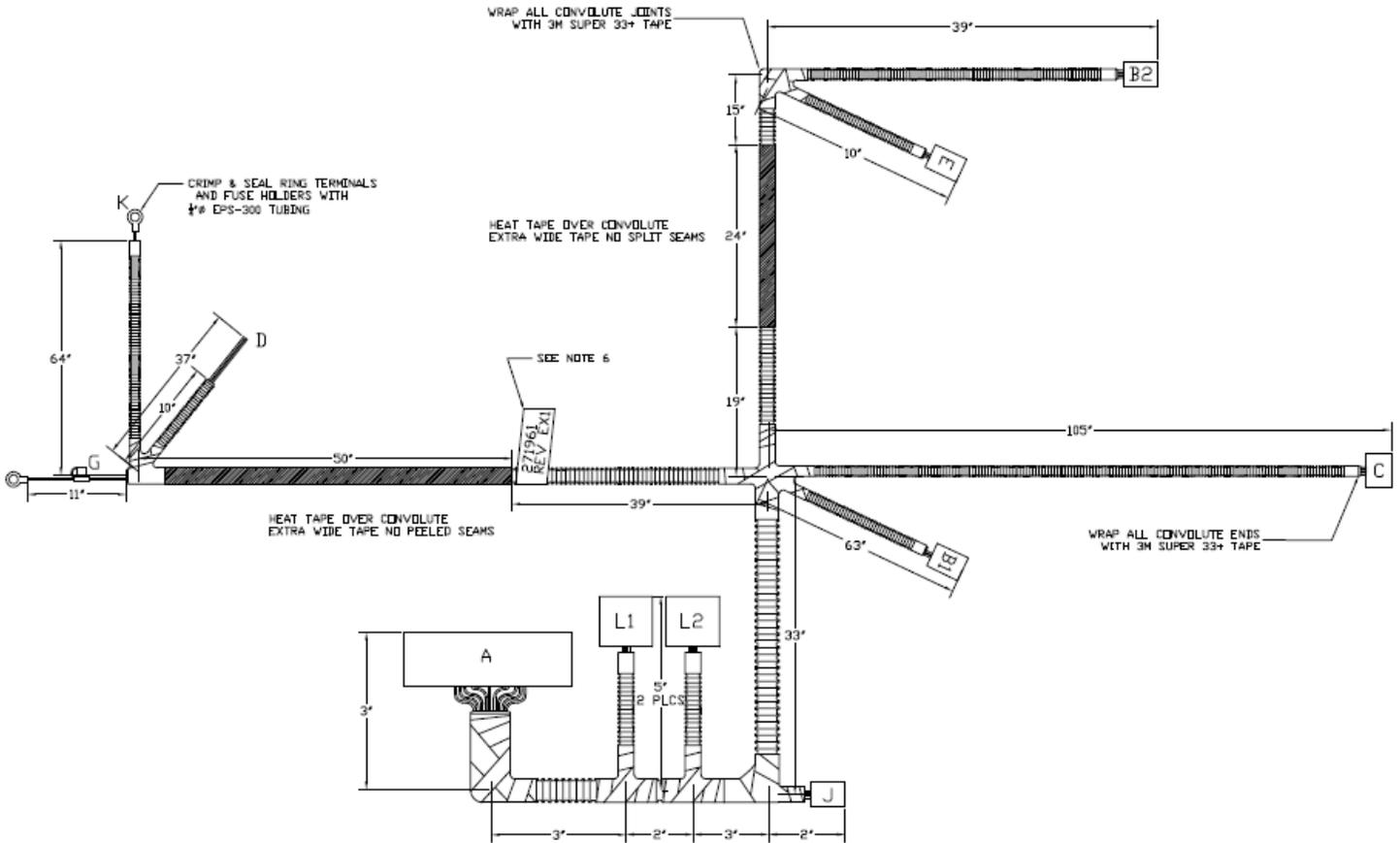
1 Green/Blue		A		A	PLUGGED
2 Yellow/Violet		B		B	
3 White/Brown		C		C	PLUGGED
4 Yellow/Gray		D		D	

Main Wire Harness Installation

Note: Always be aware of harness routing. Do not route near exhaust or moving parts. 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.



1. Start the Wire Harness installation near the front of the primary tank
2. Route the LPEFI Delphi connector (Connector C) along the inside of the frame rail back to the OEM fuel pump harness and connect
3. Route the secondary tank lead of the LPEFI harness (Connector E and B2) across the frame rails to the secondary tank fuel gauge and secondary LPDM and connect. Follow the fill hoses when routing the harness
4. Route the primary tank fuel gauge lead (Connector B1) to the primary tank fuel gauge and connect
5. Route the 12v power, ground, and door purge connectors (Connector K, D, F) along the OEM harness and up into the engine compartment
6. Route the black ground lead across the engine to the battery ground making sure to follow the OEM wire harness. Make sure to leave enough room to allow for engine movement Secure with zip ties
7. The orange ring terminal for 12V supply (connector F) connects to the power distribution block. Do not make this connection at this time

8. Drill a $\frac{3}{4}$ " hole into the firewall near the OEM harness grommet located just behind the power distribution block. This picture was taken from the inside of the cab on the driver's side firewall. Use extreme caution when drilling making sure not to damage any existing wires or connectors



9. Remove any metal burrs and Install the supplied grommet

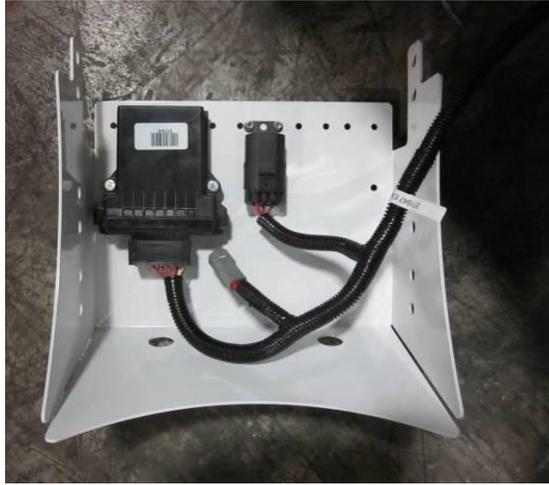
Wait to Start Light



10. Route the black and gray leads into the cab through the grommet and any other wires that need access to the customer up fitter loom. Black and Gray leads do not have any connectors on them
11. Remove the front dash panel. Panel is held in with two screws; 1 located behind the accessory 12 volt outlet, the other behind the auxiliary input outlet
12. Drill a $\frac{9}{32}$ " hole as shown. Solder the gray lead the wait to start light +lead (red) and the black lead to the wait to start light ground lead (black) shrink wrap all connections. (If desired connector may be crimped on for easy dash removal for future needs
13. Zip tie wires to OEM harness. Re-install the dash panel

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

14. Install the provided LPCM box, and pump relays to the driver's side tank plate using the supplied hardware



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:

1. Connect main LPEFI harness connection to the LPCM, pump relay, and LPDM's
2. Assemble tank plates to the front of both the Primary and Secondary Tanks
 - a. Attach the 3 Clip nuts to the tank tabs
 - b. Use the 3/8" flat washers, lock washers and bolts to assemble the cover to the tank



Note: Make sure there are **NO EXPOSED WIRES HANGING OUT OF THE PLATE!**

3. Make sure to tie wrap all harnesses and wires with the supplied tie wraps. Tie-wrap harnesses every 8-12 inches

Install labels on the truck/registration

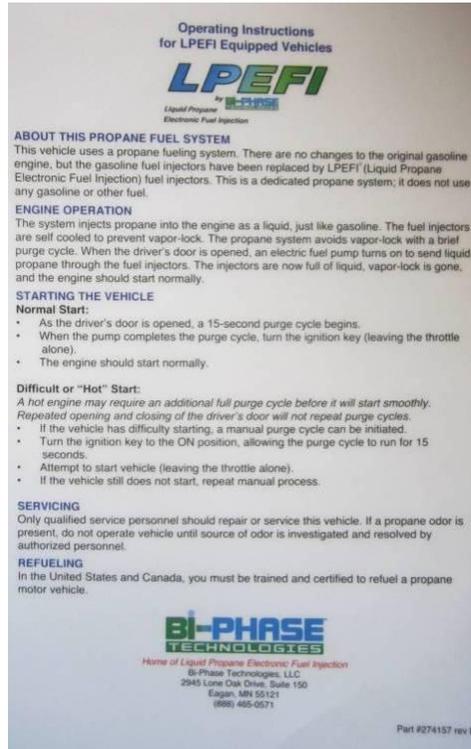
1. Install the EPA emissions label under-hood near the existing OEM Emissions Label
2. Install one "LPEFI[®]" transparent label on each side of the cab
3. If the truck does not have a box or body installed yet, put the propane diamond in the glove box for placement later. If the body is installed on the truck, install the black "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 just above the OBD II port inside the cab
5. Install the orange WARNING label on each tank cover plate



6. Place the Wait to Start label near the Wait to Start light installed on the dash



7. Place laminated owners information cab card in the glove box or door pocket with the OEM's owner's manual & other GM information



8. Fill out vehicle warranty registration card and return to Bi-Phase Technologies along with the Post-Installation Inspection
9. Place laminated owners information cab card in the glove box or door pocket with the OEM's owner's manual

Flashing the PCM

Program ECM using the ProCal II calibration flash tool.

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



Ensure the vehicle battery is at full charge before starting this procedure. Any interruption during the flashing procedure will disable the PCM and require a new PCM

Engine off, vehicle in park, key in off position

****Verify model Year****

Locate the onboard Diagnostic Link Connector (DLC) beneath the driver side dashboard.

Connect your OBDII connector of your ProCal II tool to the vehicle DLC.

If a low voltage warning is received the low battery voltage condition must be repaired before continuing.

Select “**Programming**”, press enter.

Select “**Manual Selection**”, Press enter to proceed.

Display “Calibrations –

For 2012 MY choose “F550 6.8L 3VSR110 Bi-Phase”, press enter

**For 2012 MY w/65MPH speed Limiter choose
“F550 65 MPH 6.8L 3VSR110 Bi-Phase”, press enter**

Display “Turn ignition key to OFF and press enter”, Press enter.

Display “Turn ignition key to ON and press enter”, **Turn ignition key to on position and Press enter.**

Display “Software version at latest version or Software Not Recognized.” Proceed anyway? Press enter

Display "Erasing"

Display "Programming" (programming takes approx. 90 sec)

Display "Update completed", Cycle key Off/On, **after cycling the key**, Press enter

Display "Process Finished", Press enter

Display "ENT = clear DTC, ESC = Finished, **press ESC**"

Disconnect from DLC

Start vehicle

Apply Labels



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 tanks with 50 to 60 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. (If the tank was filled before installation it should have been checked for leaks at that time)
3. Check all fuel level gauges to make sure they are functioning properly
4. Connect the Bi-Phase "3-switch" box to the Primary tank LPDM, and the 3-switch to 12 V power
5. Connect a fuel pressure test gauge to the Schrader valve on the LPDM. Fuel pressure should be 0 psi at first
6. Slowly toggle the supply valve 6-10 times to purge the Primary hose with fuel
7. With supply valve open read the pressure at the gauge. This is the tank pressure and will vary according to ambient air temperature. (35psi @20 °F – 175psi @100 °F) Amp meter draw should be 1-2 amps
8. With the supply valve open, turn on the fuel pump. Amp Draw should be 5-7 amps. Pressure should read 40-70 psi above tank pressure
9. Depress the return valve button. Amp draw should be 7-9 amps. Pressure should read about 10 psi less than pressure reading from step 8
10. Once all pressures are taken and written down, disconnect the 3 switch box and pressure gauge set
 **WARNING: The pressure test hose may contain cold liquid propane. Wear insulated rubber gloves and goggles.**
11. If the connections on the electronic purge control assembly have not been made connect at this time. Attach the electronics to the tank using the supplied J-nuts and 3/8 hardware
12. Connect the battery
13. Turn the key to the Key On Engine Off Position. "Wait to start" light should illuminate for 15 seconds. (this is a purge cycle)
14. 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

Testing the Installation (cont'd)

15. Turn the key off, then on again to start another purge cycle
16. 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



17. Once all connections are checked and assembled correctly start the engine
18. Connect a diagnostic scan tool to the vehicle
19. 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
20. 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)
21. Turn the key off and follow the testing procedures described in the Post-Installation Inspection
22. Fill out the Post-Installation Inspection completely
23. Drive the vehicle for at least 15 minutes, if possible. Drive under various conditions and a variety of speeds
24. 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 - 15%

25. With the vehicle running remove the primary fuel gauge card on the primary tank. Manually sweep the fuel gauge with a small magnet to the 1/8 level. This should initiate a transfer of fuel from the secondary tank to the Primary tank. Verify by checking to see if the secondary pump is running
26. Once transfer is verified sweep the gage to the ¼ level. Transfer should end within 2 minutes. If not check all connections on the vehicle and refer to the General Diagnostics Manual
27. If there are no leaks, no DTCs and the engine runs well (smooth idle, smooth acceleration, good power), the vehicle is ready to use
28. 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

Pre-Installation Inspection Form A

Date: _____ Installation Location _____
 VIN _____ Engine _____
 Year _____ Make _____ Model _____ Wheelbase _____
 Installer company name _____
 Vehicle Mileage _____
 Any stored DTCs in computer memory? Yes No
 List all codes/descriptions: _____

NOTE: If any DTCs are found Bi-Phase does not recommend continuing with the LPEFI installation until all codes are resolved and vehicle is operating properly.

Does vehicle engine idle smoothly? Yes No
 Are all vehicle systems functioning properly? Yes No

Vehicle Comments: _____

<u>Scan Tool DataStream</u>		
Allow Engine to reach full operating temperature (>190°F) before taking measurements		
ECT/Temperature _____ °F		
Fuel Trims at Idle:		
	<u>Bank 1</u>	<u>Bank 2</u>
STFT	_____	_____
LTFT	_____	_____
Misfire Graphic		
	<u>Cylinder #</u>	<u>Counts</u>
	1	_____
	2	_____
	3	_____
	4	_____
	5	_____
	6	_____
	7	_____
	8	_____
	9	_____
	10	_____

Technician Name: _____ Signature _____ Date _____
 Please Print

This inspection form must be returned to Bi-Phase Technologies. Fax 651-681-4441

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.

Pre-Installation Form A

Post-Installation Inspection

Installation & test date _____

VIN _____ Installer company name _____

Year _____ Make _____ Model _____ Wheelbase _____

Tank Mfg. _____ Quantity of propane (GAL) _____

Primary Tank Serial # _____ Secondary Tank Serial # _____

Fuel Rail Serial Numbers: Driver's Side _____ Passenger Side _____

Injector Electrical Connectors Seated? Yes No

Primary hose(s) installed properly with audible click/visual inspection? Yes No

All fill hoses installed, tightened, torque marked, and leak checked? Yes No

Loop hose installed properly with audible click/visual inspection? Yes No N/A

Wait to start light/purge operating correctly? Yes No N/A

Door Purge operating correctly? Yes No N/A

Auto Purge operating correctly? Yes No N/A

Transfer system operating correctly? Yes No N/A

Idle Shutdown operating correctly? Yes No N/A

Leak test tank & *LPEFI*[®] system complete (refer to installation manual for test procedure) Yes No

Leaks found & repaired Yes No

Where _____

Any stored DTCs in computer memory? Yes No

List all codes: _____

If any DTCs found (other than the codes listed in the BPT Installation manual for the specific vehicle), repair all codes and retest

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

Does vehicle engine idle smoothly? Yes No

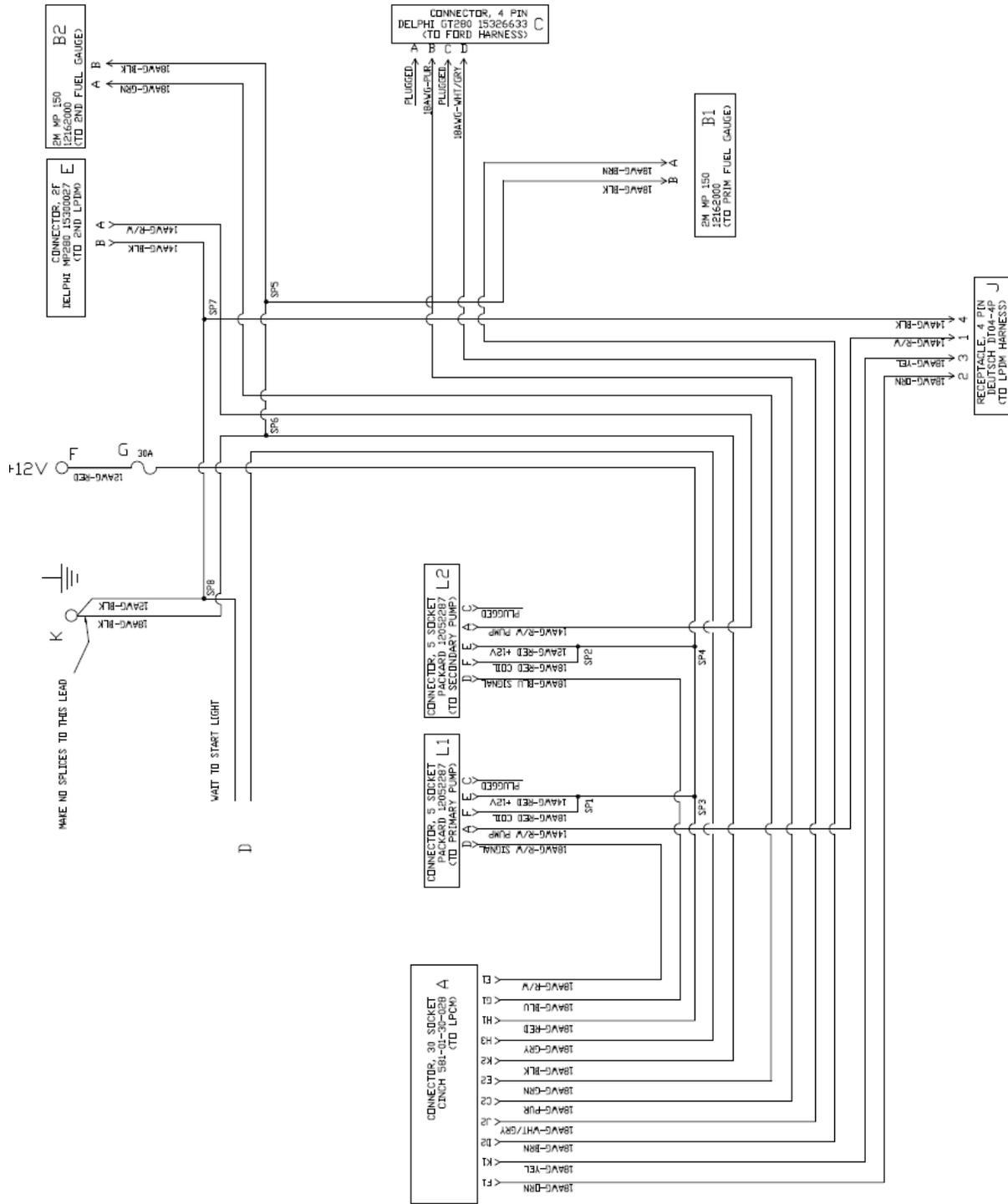
Check fuel gauge operation, does tank gauge and dash gauge correspond? Yes No

Vehicle Comments: _____

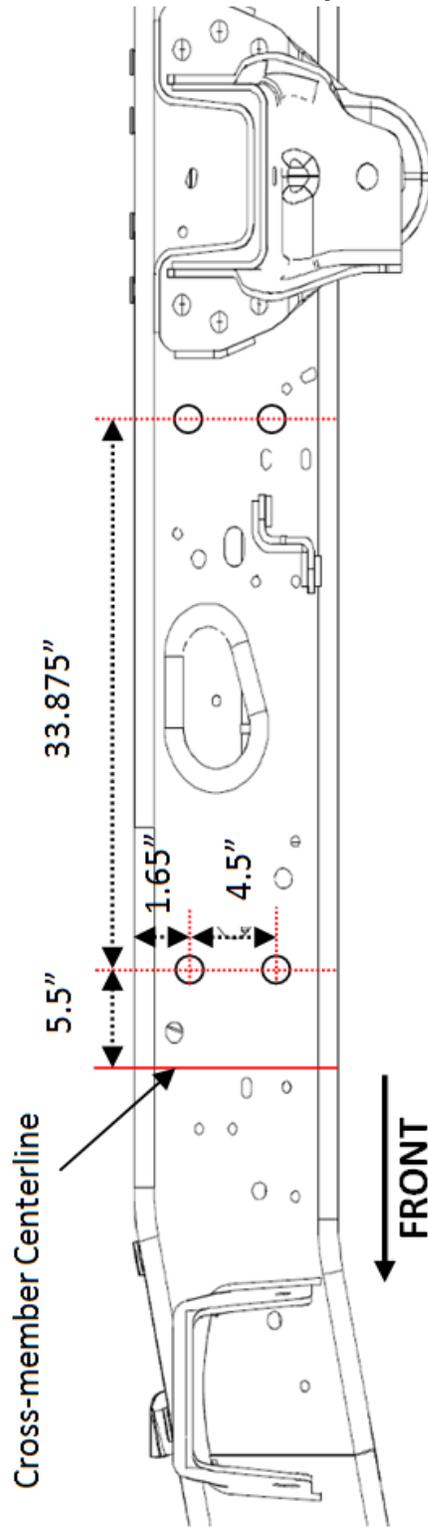
<p><u>Tank Temps & Operating Pressures @ LPDM</u></p> <p>Tank temperature (bottom of tank) _____°F</p> <p>Room temperature _____°F</p> <p><u>Pump Pressures with 3 Switch Box</u></p> <p>1. Tank pressure (Supply & Return on) _____ PSI Example: Tank Pressure =100 PSI</p> <p>2. Pump boost pressure (Supply & Pump on) _____ PSI Note: Pump boost pressure is observed with supply valve and pump in the on position. (Pump acceptable boost is min 35 psi over tank pressure) Example: 135psi tank/pump – 100psi tank = Pump boost Pressure 35PSI</p> <p>3. Purge reduction pressure (Supply, Pump on & Return) _____ PSI Note: Purge Reduction Pressure is observed with supply valve, pump, and return valve all in the on position (Purge reduction range is 1 to 15 psi) Example: 135psi tank/pump – 125psi tank/pump/return = Purge reduction 10 PSI <i>*Note: If specifications are out of range reference Bi-Phase LPEFI Diagnostic Manual</i></p>	<p><u>Scan Tool DataStream</u></p> <p>PCM Flash performed? _____</p> <p>ECT/Temperature _____°F</p> <p>Fuel Trims at Idle:</p> <table style="width: 100%; border: none;"> <tr> <td></td> <td style="text-align: center;"><u>Bank 1</u></td> <td style="text-align: center;"><u>Bank 2</u></td> </tr> <tr> <td>STFT</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> <tr> <td>LTFT</td> <td style="text-align: center;">_____</td> <td style="text-align: center;">_____</td> </tr> </table> <p>Note: Fuel trims range from 0 to -17% and shouldn't differ between bank by more the 10%</p> <p><i>*Note: If specifications are out of range reference Bi-Phase LPEFI Diagnostic Manual</i></p>		<u>Bank 1</u>	<u>Bank 2</u>	STFT	_____	_____	LTFT	_____	_____
	<u>Bank 1</u>	<u>Bank 2</u>								
STFT	_____	_____								
LTFT	_____	_____								

Generic Post A.2.13

2012 FORD F550 WIRING SCHEMATIC (P/N 271961)



Template #1



Template #2

