



# CNG CONVERSION SYSTEM INSTALLATION MANUAL

# 2017-2018 FORD F-250/350 6.2L BI-FUEL / DEDICATED

Updated: 11-15-17



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### NOTE: Disconnect the vehicle battery before install. This includes partial install, servicing, and or maintenance.

- All owner information supplied by Ford must remain with the unit. The incomplete vehicle manual is not owner information and is excluded from this requirement. ٠
- Compressed natural gas is a combustible fuel, flammable and highly explosive.
- CNG is stored under high pressure (maximum of 3,600psi) at 70°F (21°C).
- Tampering with or improperly maintaining the high pressure fuel system can result in fatality or serious injury.
- Never attempt to modify the fuel system and always have the fuel system maintenance performed at an authorized dealership by qualified technicians.
- Exercise extreme caution and follow all related safety guidelines.
- Always leave 1/4 tank of gasoline in the tank as not to damage the OEM fuel pump.

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**WARNING !!** Follow instructions as directed in the installation manual and do not attempt shortcuts. Follow proper safety procedures. Failure to do so can lead to bodily harm or fatality. Tampering with or improperly maintaining the high pressure fuel system can also result in bodily harm or fatality. !! WARNING !! Batteries normally produce explosive gas. Therefore, do not allow flames, sparks or lighted substances to come near the battery. When charging or working near a battery, always shield your face and protect your eyes. Always provide ventilation. Failure to follow these instructions may result in personal injury. **!! CAUTION !!** Be aware that this installation requires the use of High Pressure, Flammable, and Highly Explosive compressed natural gas. CNG is stored under at maximum of 3,600psi and at 70°F (21°C). **!! CAUTION !!** Failure to complete the pre-installation checklist may result in severe engine damage after installation is complete. **!! CAUTION !!** This installation is intended for unmodified vehicles. If the vehicle has been modified, consult Altech-Eco before the beginning install.

### DISCLAIMER

Altech-Eco assumes no responsibility for damages occurring from accident, misuse, abuse, improper installation, improper operation, and lack of reasonable care or all previously stated reasons resulting in incompatibility with other manufacturer's products.

**Chemicals and Lubricants** 

- 1. Silicone lubricant spray is required on all O-rings on fittings.
- 2. Epoxy primer or equivalent to rust proof any exposed metal.
- 3. Ford approved coolant liquid to top off the reservoir.

On Bi-Fuel systems gasoline shall not remain uncirculated for extended periods of time (over 60 days).



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This manual is subject to change to include upcoming modifications. All updated versions are available on Altech-Eco Installer Portal. Contact Altech-Eco if you are unsure of the latest version.

### Check list:

- Confirm packing slip to insure that you have received all components, assemblies and sub-assemblies. 1.
- Make sure none of the components and assemblies have been damaged in shipping. 2.
- Pre-inspect the vehicle following the QVM, Q185, and NFPA 52 regulations (Contact ALTECH-ECO for the inspection check list). 3.
- 4. Begin your conversion process.
  - -Cylinder Installation

-Regulator assembly installation

-Fuel fill installation

-High pressure line installation and routing

-Low pressure and coolant line installation and routing

-Underhood installation

-Wiring (Including Switch and gauge) Installation

-Decal placement

-Fill and leak test

-Begin your QC Process

- 5. Check Tire Pressure before test driving.
- 6. Check and fill coolant fluid before starting and test driving.
- 7. Be sure the rear harness is routed properly and is not loose under vehicle.
- 8. Be sure all provided parts are installed.
- 9. Final test drive.



### **Attaching Accessories to Aluminum Panels and Structure**





SVE BULLETIN SPECIAL VEHICLE ENGINEERING - BODY BUILDERS ADVISORY SERVICE E-Mail via Website: www.fleet.ford.com/truckbbas (click "Contact Us") Toll-free: (877) 840-4338

QVM Bulletin: Q-222

Date: 22 July, 2014

Attaching Accessories to Aluminum Panels and Structure

### Background:

The high-strength aluminum alloy in the all-new F-150 does not produce red rust like steel. We have gone to great lengths to develop coatings to inhibit corrosion. However, customers should take note that when installing aftermarket equipment, aluminum can still corrode if the aluminum is attached to dissimilar metals. This type of corrosion is called "galvanic corrosion" and it occurs where there is contact between different metals, like steel or stainless steel fasteners.

### Protecting against galvanic corrosion

When installing aftermarket equipment, it is necessary that the installer pay special attention when drilling or clamping dissimilar metals to the aluminum body.

- Anytime the factory paint is damaged, it is recommended that the paint be repaired with a suitable coating prior to installing aftermarket equipment (i.e. splash guards, bug shields, tool boxes, etc.)
- · When installing fasteners into the mounting hole the fastener should not have contact or have an interference fit with the sheet metal
- · For zinc coated steel bolts and screws, an aluminum washer should be used
- · For further protection, an isolation layer should be used between the two dissimilar metals
- · When clamping onto the truck, a polypropylene or urethane tape can be used as the isolating layer

### Paint, Isolator, and Fastener Recommendations

We have tested many combinations of fasteners and coatings that are widely used in the aftermarket and have provided a list of approved products to help ensure durability, strength and quality.

\*\* For small repair of factory paints around mounting hole. Follow manufacturer's directions for use

Approved Anti-Corrosion Coatings\*\*

~	Motorcraft PM13-A	✓	NOX-Rust 7703-W	✓	Zinc Rich Primer	
Recommended Acrylic Lacquer Touch-up Paints**						
~	Motorcraft	✓	Duplicolor	✓	Rustoleum	

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Date Issued: 07/22/14

Approved Fasteners

- ✓ Aluminum Clamps ✓ Plastic Scrivets
- ✓ Aluminum Pop Rivets ✓ Plastic Push Pins
- ✓ Zinc coated steel fasteners used with an aluminum washer

### Isolator Recommendations

Aluminum washer

✓ Urethane tape

### Examples

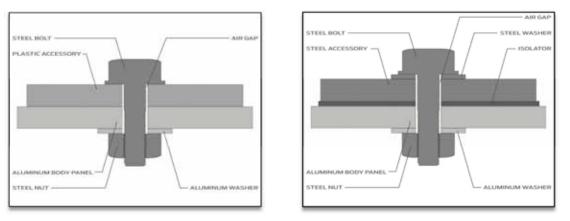
In this section we illustrate some best practices to isolate steel from coming in contact with aluminum. Using the previously listed fasteners and coatings in addition to good isolation techniques will help ensure durability, strength and quality of your F150.

Note: The following illustrations are not vehicle specific and are intended for reference only.

Figure 1 shows a plastic accessory attached to the aluminum sheet metal and the fastener properly isolated from contact with the aluminum sheet metal

Figure 2 shows a steel accessory and steel fastener properly isolated from contact with the aluminum sheet metal.

Note: both figures show the fastener using an aluminum washer and having an oversize hole providing an air gap to the aluminum sheet metal.





### Important: Fasteners or coatings that should be avoided

× steel rivnut

The items listed below can accelerate galvanic corrosion in aluminum and should be avoided. If a steel fastener must be used it is necessary to properly isolate from contact with the aluminum. × self-tapping screws

- × steel pop rivets
  - ✗ steel spring clips

If you have any questions, please contact the Ford Truck Body Builders Advisory Service as shown in the header of this bulletin

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✓ Aluminum Rivnuts

✓ Polypropylene tape

Figure 2

X RTV silicone × stainless steel fastener

Date Issued: 07/22/14



### **PREPARATION FOR INSTALLATION**

### Have Ford factory vehicle manual available for additional instructions necessary for the CNG system installation.

FIRST: Depressurize the fuel system: Raise the vehicle, disconnect the OEM fuel pump electrical connector, lower the vehicle and start the engine. Let run until engine stalls. Crank engine to make sure no fuel pressure remains. Reconnect the fuel pump electrical connector after the CNG system installation is complete.

Disconnect the negative terminal from the vehicle battery and place a plastic cap on to protect from accidental contact. Battery is to stay disconnected until a fully CNG system is installed. The vehicle battery may be reconnected before the toolbox/cover installation; connecting the vehicle battery is necessary for leak testing.



Remember to always lubricate ALL o-rings right before component installation.



coalescing filter.

Refer to packing slip for part details.

NOTE: For the 2018 model year, the bleeder valve plug is located on the



### **PREPARATION FOR INSTALLATION**

### **Fuel System Pressure Release**

- With the vehicle in NEUTRAL, position it on a hoist. 1.
- NOTE: Typical application shown. 2.

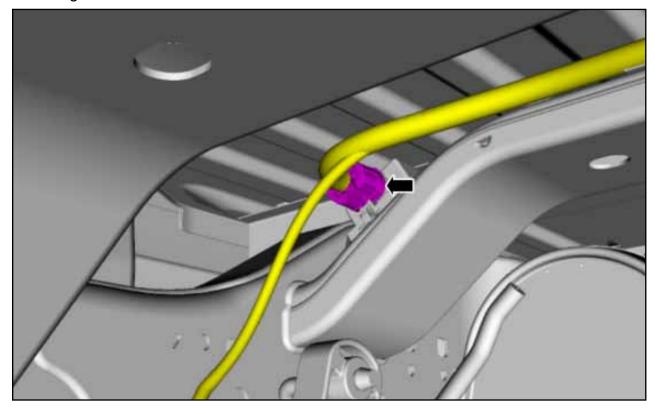
NOTE: Pickup and Chassis Cab with midship fuel tank shown. Chassis Cab with aft of axle fuel tank is similar, with the Fuel Pump Control Module (FPCM) located on the frame crossmember near the rear muffler.

Disconnect the Fuel Pump Control Module electrical connector.

- Start the engine and allow it to idle until it stalls. 3.
- 4. After the engine stalls, crank the engine for approximately 5 seconds to make sure the fuel rail pressure has been released.
- NOTE: Typical application shown. 5.

When the fuel system service is complete, reconnect the Fuel Pump Control Module electrical connector.

- Cycle the ignition key and wait 3 seconds to pressurize the fuel system. Check for leaks before starting the engine. 6.
- 7. When service on the fuel system is complete, start the engine and check for leaks.





# CYLINDER INSTALL - 6.5' SHORT BED (21x60 CYLINDER)

Coming soon..



# CYLINDER INSTALL - 6.5' SHORT BED (21x60 CYLINDER)

Coming soon..



### CYLINDER INSTALL - 8' LONG BED (21x60 CYLINDER)

- Use the template layout and measure out 1. each drill point. Mark the holes in shown locations. Always verify your measurements before drilling.
- Drill each hole according to the template. 2. Deburr and rust proof any exposed metal.





# **CYLINDER INSTALL - 8' LONG BED**

### 8' BED

- 1. Remove two front OEM bolts and discard.
- 2. Drill holes using the template provided in the previous page. Deburr and rust proof any exposed metal. Fit 2 1/8" grommet.
- Install the cylinder package. 3. Secure front with two M12-2.0 x 120mm bolts and 1/2" washers. For the rear, four 1/2"-13 x 2" bolts, 1/2 washers and nuts, and backing plates underneath, thread facing up. Tighten each bolt to 75 ft-lbs.

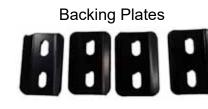


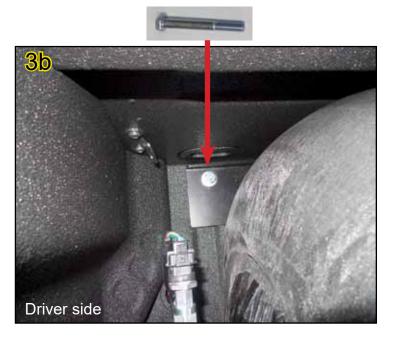
2 1/8" grommet.



















### CYLINDER INSTALL - 6.5' SHORT BED / 8' LONG BED

Upon wiring and hose routing completion, connect each end to the cylinder package accordingly.

- Connect Low Pressure fuel line to the regulator once it is routed. Torque to 30-35 ft-lbs. 4. Connect Rear Harness to the high pressure sensor located at the cylinder valve, once the harness has been routed. Connect Coolant hoses to the regulator once hoses are routed. Secure with coolant hose clamps.
- Note: Once Low Pressure hose, Rear Harness, and Coolant hoses have been routed, secure them with a zip tie near the grommet to eliminate any slack in the lines.





Rear harness connection.

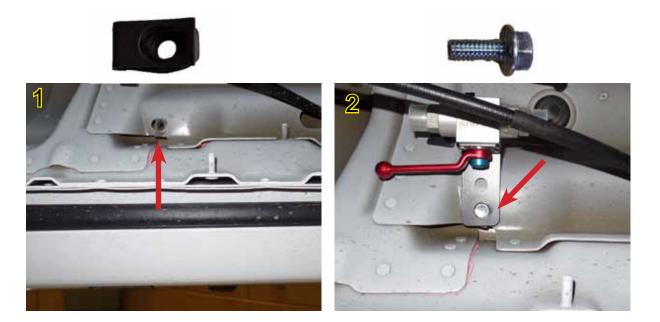
Fuel Fill Hose connection





# **QUARTER TURN VALVE INSTALL**

- Place 5/16 -18 short u-nut into the OEM slotted hole. 1.
- Retrieve the assembly and secure it in location shown using 3/4" bolt. 2. Torque to 20 ft-lbs.
- Connect low pressure hoses to each end and torque to 30-35 ft-lbs. 3.





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# **FUEL FILL INSTALLATION**

- Remove OEM fuel cap. 1.
- Remove plastic cover. 2.
- Remove fuel tank breather. Discard OEM bolts. 3.
- Underneath, use a 1/2" p-clamp and a self tapping screw to secure breather to the side. Enlarge breather OEM location holes to 5/16". 4.
- 5.







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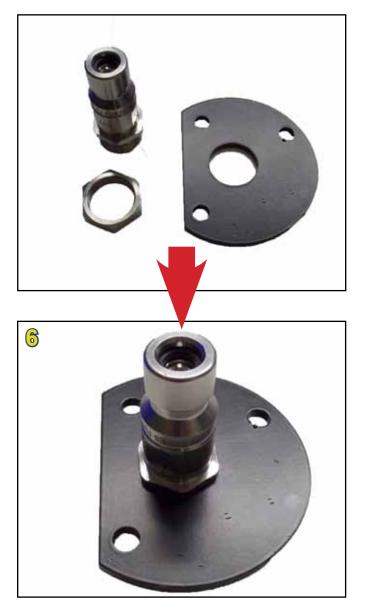


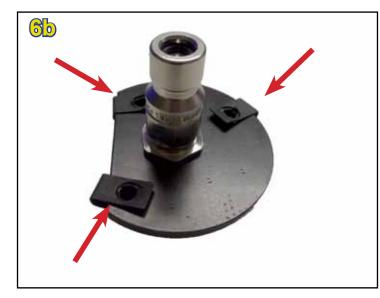




# **FUEL FILL INSTALLATION**

- Assemble fuel fill receptacle. 6. Place u-nuts into each hole location.
- 7. Install receptacle assembly into fuel tank breather location. Secure with three 1/4" kit bolts. Place rubber cap over nozzle.











# FUEL FILL INSTALLATION

- 8. Connect 45 degree fitting to the rear of the receptacle. Angle properly and tighten to 30-35 ft-lbs.
- Attache 20" high pressure hose to fuel fill assembly and run through grommet hole to the check valve located on the cylinder package. Tighten each end to 30-35 ft-lbs.

Note: Upon completion, ensure high pressure hose is labeled with a high pressure warning sticker.







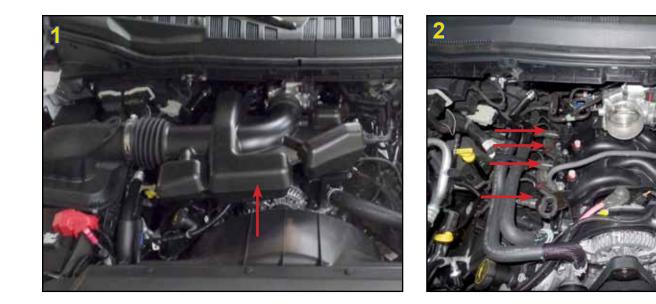


### LOW PRESSURE INSTALLATION - BI-FUEL

- Disconnect all connections to the air box and remove air box. 1.
- Unplug gasoline injectors and spark plug connectors. 2.
- Remove gasoline fuel rails and set aside. DO NOT DISCONNECT THE LINE. Gasoline rails are under pressure and contain fuel, use caution. 3. Discard OEM bolts.
- Install CNG fuel rails into OEM fuel ports. 4.
- 5.
- Place gasoline fuel rails on top and into the CNG fuel rail ports. Place a kit spacer in all four locations between the Gasoline and CNG fuel rail bolt locations. 6. Secure with M6 125mm kit bolts and M6 washers. Torque to 89 in-lbs.



### **DO NOT USE POWER TOOLS!**





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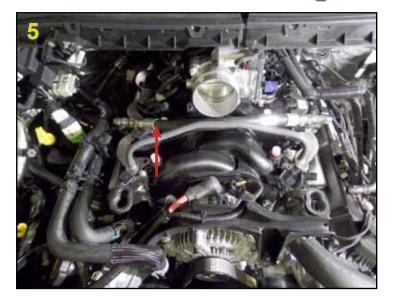


### LOW PRESSURE INSTALLATION - BI-FUEL

- Connect CNG fuel rails with a 22" low pressure hose.
   Tighten each end and fittings to 30-35 ft-lbs and also tighten fittings on the CNG fuel rails.
- 8. Reconnect OEM harness connections going to gasoline injectors and spark plugs.
- 9. Connect low pressure fuel line to the CNG rails previously ran and torque each end to 30-35 ft-lbs.
  Connect previously ran CNG main harness to the CNG injectors and to the low pressure sensor.
- 10. Reinstall and reconnect air box and all OEM vacuum hoses and wiring.

Ensure low pressure warning sticker is attached close to the hose end.









## LOW PRESSURE INSTALLATION - DEDICATED

Coming soon..



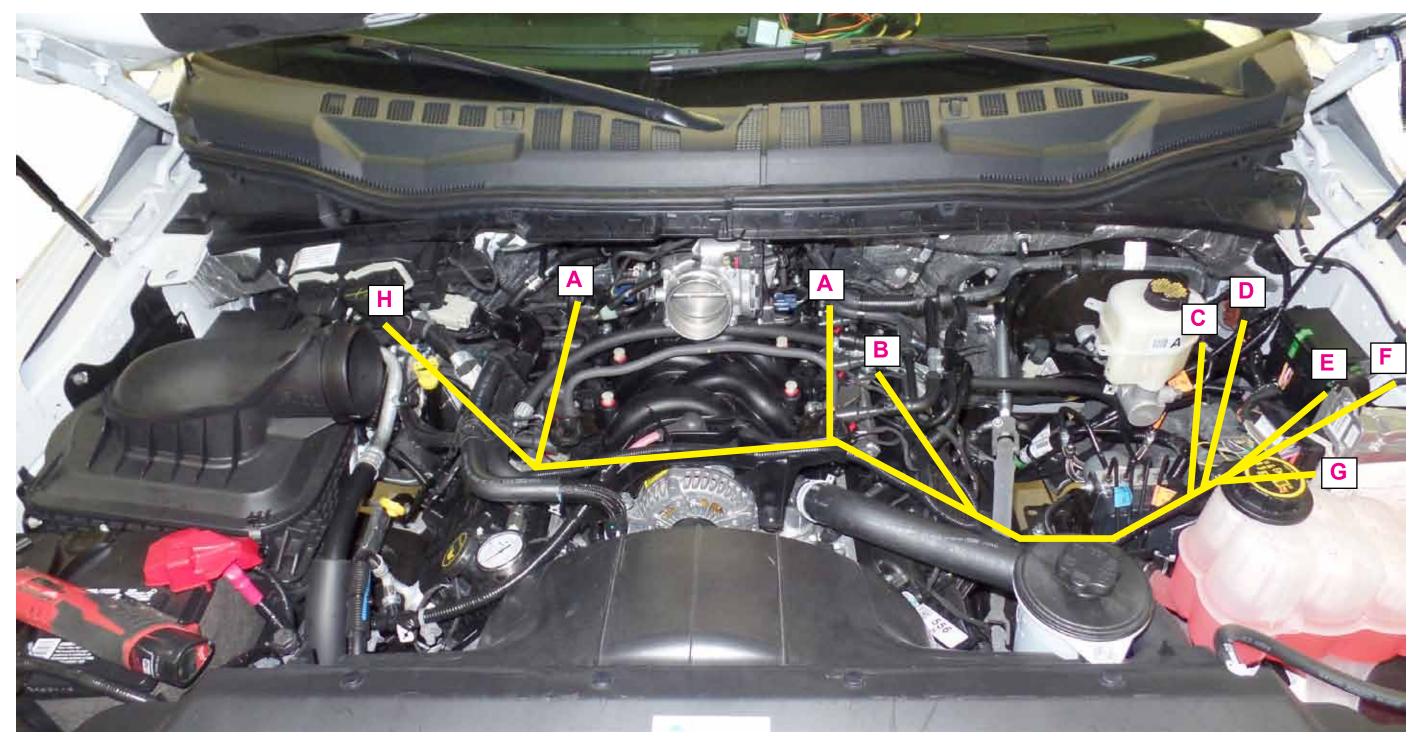
## LOW PRESSURE INSTALLATION - DEDICATED

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## MAIN CNG HARNESS ROUTING

See next page for location descriptions.





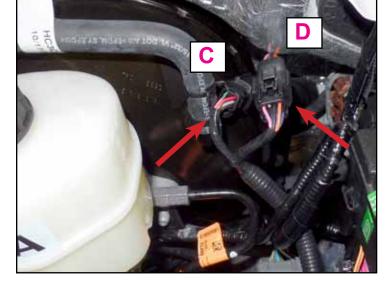
### MAIN CNG HARNESS ROUTING

Zip wiring slack to OEM harnesses. Remember to snip remaining zip tie ends for a clean installation. Connect harness connectors to each component accordingly.

- to CNG injectors Α
- to Low Pressure Sensor Β
- to Rear Harness С
- to Switch Gauge Harness D
- to CNG Prepped OEM Connector Ε
- to Ground (-) F
- to AFCM G
- **CKP-** Crank Position Sensor (must be soldered in) Н

\*\*Ship OEM dummy connector plug to Altech-Eco.\*\*



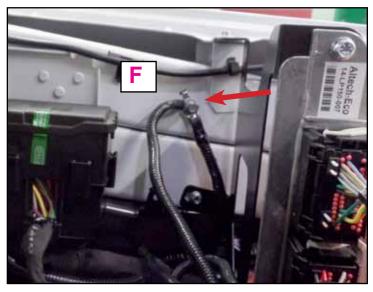




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# \*\*NOTE: Refer to OEM owner's manual for CNG side fuse replacement instructions.\*\*

Attach ground to OEM same location.





### **AFCM INSTALLATION**

- 1. Remove OEM bolt and save for reuse.
- Retrieve AFCM Bracket and use it as a template. Install bracket using and secure 2. using the same OEM bolt. Mark the bottom slotted hole.
- Remove AFCM bracket. 3. Verify drill point and make a 25/64" hole. Deburr and rust proof.
- 4.
- Install the 1/4-20 (RN2520165LR) rivet nut. **Note: Rivet gun not included**. Re-install AFCM bracket and secure top with OEM bolt and bottom with a 1/4" bolt. 5.







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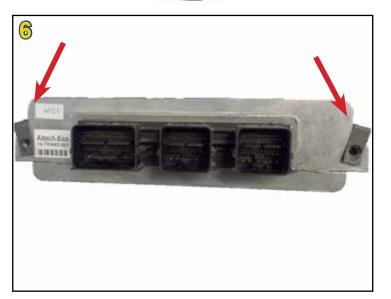
# **AFCM INSTALLATION**

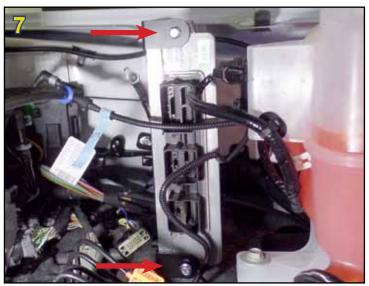
- Fit both ends of the AFCM with u-nuts. 6.
- Install AFCM and tighten with 1/4" bolts. 7.

Connect Main CNG Harness when ready. Follow CNG Main Harness section for further directions.







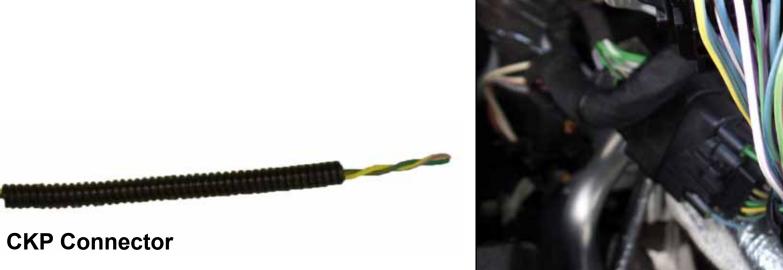






### **CKP - CRANK POSITION SENSOR**

- Remove plug back cover and expose OEM wires going to the PCM plug A. 1.
- Use included pin-out and solder CKP connector wires to the OEM wiring. 2. Green/Brown to Green/Brown Yellow/Violet to Yellow Violet
  - Make sure to place shrink tube on wire before soldering.
- Put plug cover back on and plug CKP connector to the main CNG harness. 3.





Note: Solder each wire one at a time.





- 1. Below the steering column in the location shown, drill a 7/8" hole. Deburr and rust proof.
- This hole will be used for the switch gauge harness leading into the engine compartment. Feed the switch/gauge harness through the hole and into the engine compartment. 2. Secure the harness grommet.
- Attached to the main CNG harness (see Main CNG Harness wiring section). 3.

### Perform ONLY the fuel gauge portion of this install for a DEDICATED CNG system.



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PREPARATION: REMOVE SHOWN PLASTIC PANELS, COVERS, AND CAPS FIRST. See below.

- Remove the caps and unscrew the OEM bolts, save for reuse. a.
- Loosen the rubber strip and remove the driver side A pillar. b.
- Detach top of the control panel without removing it. C. (OPTIONAL) Remove control panel underneath the steering wheel. Disconnect OEM wiring. Remove four OEM bolts.

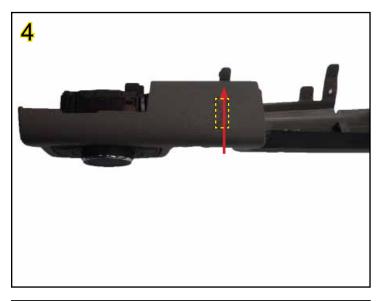


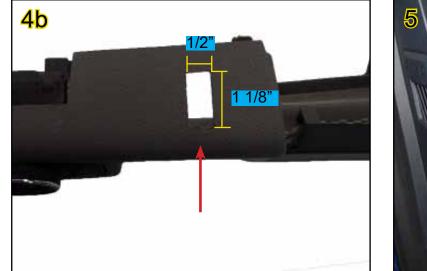




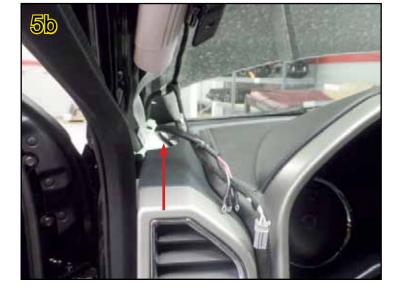


- Use switch template and cut out the area for the switch. 4.
- Run the switch/gauge harness with switch connectors through the precut whole and the gauge harness upwards the A piller. Be sure to zip tie any loose wiring to the OEM wiring (trim the zip 5.
- ties for a clean installation). Re-install panel if previously removed. Reconnect all OEM connections. 6. Install switch and use the pin out sheet to connect harness to switch.
- Zip tie FEPS red wire to the OEM OBD connector wiring. 7.



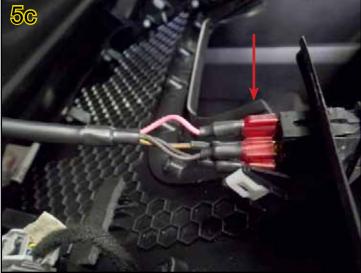










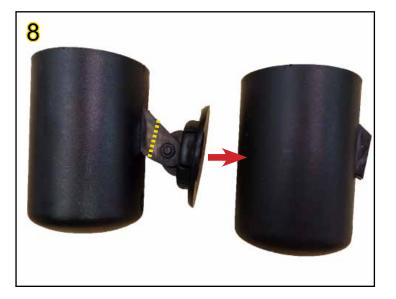


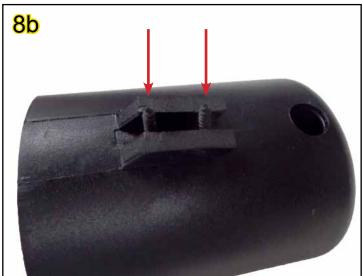


8.

# SWITCH / GAUGE ROUTING

Modify the gauge pod. Using a drill, drill two small holes to fit pod kit screws. Drill a small hole directly above the two holes on modified pod base. This will be used to screw in the pod to the A pillar.











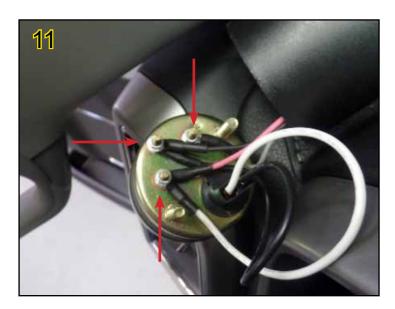
- Modify the A pillar by drilling a 3/8" hole in location shown. 9.
- Using the two screws included with the pod kit, secure the pod to the panel. Use the pilot hole and 10. a screw driver to screw in the two screws through the pod and into the panel to secure. Ensure the pod (3/8" hole) lines up with the hole on the panel. Run the gauge wire through and into the pod.
- 11. Fit the rubber o-ring around the gauge (included with gauge kit). Using the pin out, connect the wires to the gauge. Caution: Do not overtighten the nuts after connecting harness wires to the gauge.
- 12. Fit the gauge inside the pod, adjust as needed to ensure clear even visibility. Re-install column panel and secure at the handle with the two OEM bolts. Re-install both handle caps.
- Re-install and reattach all OEM panels. Verify all OEM harnesses are reconnected. 13. See finished product.















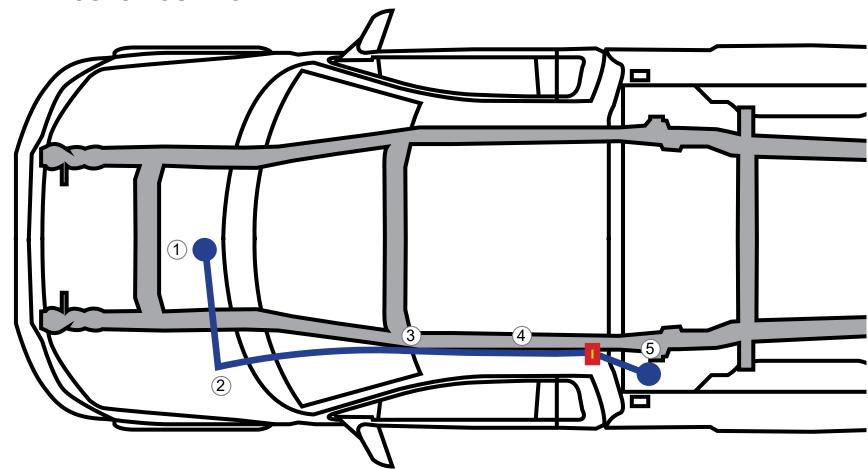
# LOW PRESSURE HOSE, REAR WIRE HARNESS, AND COOLANT HOSES ROUTING

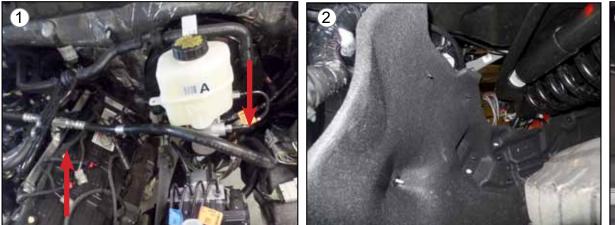
### Low Pressure Hose Routing

### Note: P-clamp securing locations will vary depending on cab size.

\*\*Associate diagram numbers ONLY with picture numbers for demonstration\*\*

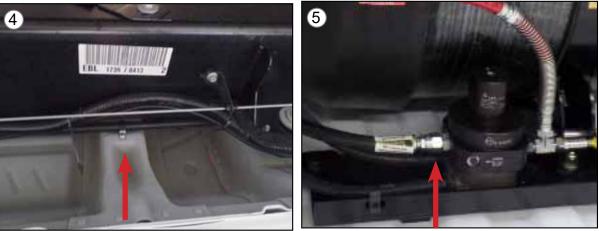
- 1. Begin by connecting the hose to the regulator located with the high pressure cylinder package at the bed of the truck, then run the hose outside frame and along the path shown into the engine bay. Adjust length as needed to avoid slack.
- 2. Secure hose with a P-clamp and bolt.
- Continue running the hose along the outside of the frame and connect to the check valve (once installed). Proceed to run the other half of the low pressure hose through the wheel well and into the engine bay. Torque each hose connection point to 30-35 ft-lbs. Secure any slack to the OEM harness using zip ties. Cut off any lose zip tie end.
- Verify the hose is not obstructed or loose.
   Connect the hose to the fuel rail.
   Ensure each end of the hose is labeled with a low pressure sticker.





### See quarter turn valve installation section





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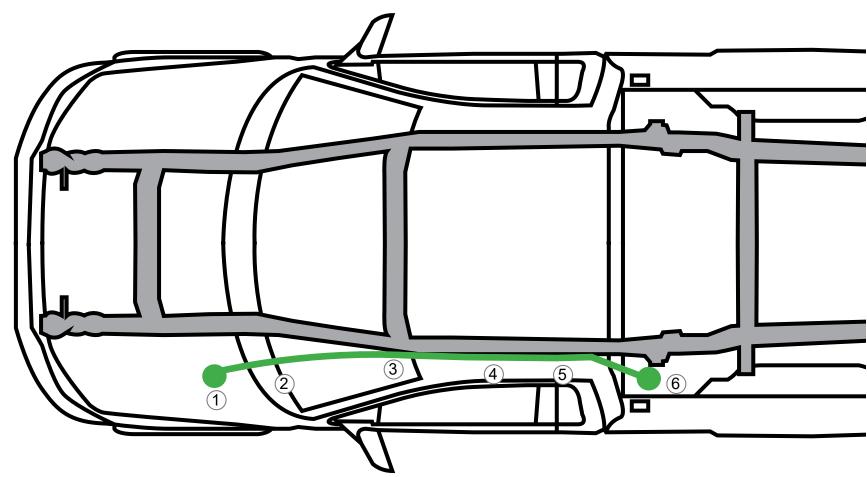
## **REAR WIRE HARNESS, COOLANT HOSES, AND LOW PRESSURE HOSE ROUTING**

### **Rear Harness Routing**

**Note**: Always check to be clear of any exhaust or suspension parts that can damage the CNG components.

- 1. Beginning from under the vehicle, run the rear harness from rear to front along side the OEM harness.
- 2. Run the solenoid plug side of the harness into the bed of the truck through the 2 1/8" grommet. Attach to high pressure sensor and solenoid(s) and secure with a zip tie to eliminate any slack.
- 3. Other end of harness will emerge on driver side corner of the engine bay. Connect to main CNG harness (if already installed) and secure a with zip tie.
- 4. Zip tie rear harness to the OEM harness, every 1-1 1/2 ft especially in curved areas.
- 5. Cut off all zip tie ends.









### COOLANT HOSES, REAR WIRE HARNESS, AND LOW PRESSURE HOSE ROUTING

### **Coolant Hoses Routing**

### Note: P-clamp securing locations will vary depending on cab size.

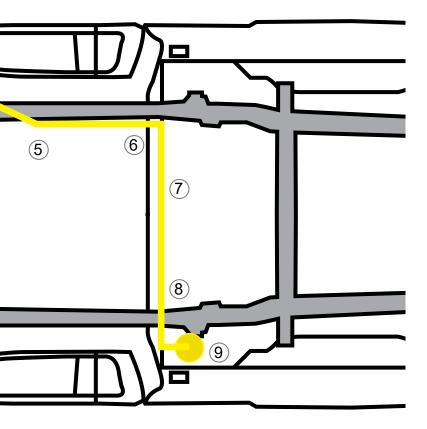
\*\*Associate diagram numbers ONLY with picture numbers for demonstration\*\*

**Note**: Always check to be clear of any exhaust or suspension parts that can damage the CNG components.

- 1. Route hoses from the high pressure area under the bed and follow beneath the cab, inside the frame, then over back to the outside, and finally through the wheel well into the engine bay. See diagram for path.
- Connect hoses to the regulator located with cylinder package at the rear, and tap into OEM coolant lines at the front (NOTE: Some coolant fluid will escape. Ensure to top off the fluid after installation). Coolant "Y" side facing to the engine fire wall. Secure with 3/4" and 17mm hose clamps. (see next page for a close up).

Secure with 1 1/8" p-clamps and 1/4in-20 x 3/4 bolts.





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# COOLANT HOSES, REAR WIRE HARNESS, AND LOW PRESSURE HOSE ROUTING

**Coolant Hoses Routing** 

Continued...



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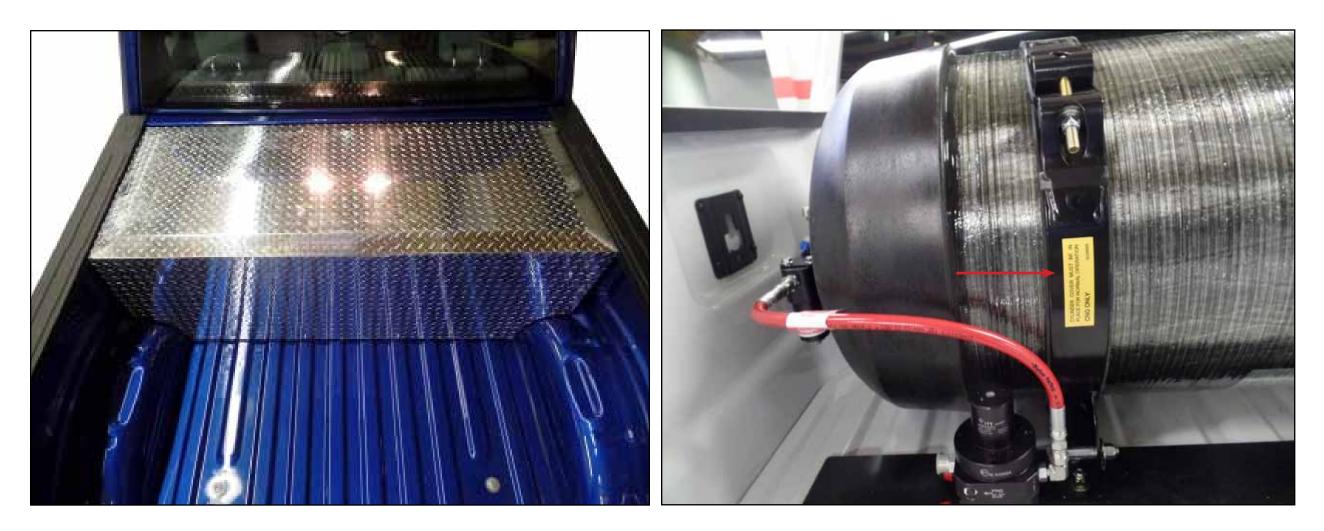


### **CYLINDER COVER - SOLID**

Place cover decal inside the cylinder cover and on the cylinder bracket closest to the valve. 1. This decal must be clearly visible for maintenance purposes.

- Place eight u-nuts (333) on front and back cylinder plates. 2.
- Place cover over cylinder and secure with eight 1/4-20 x 1" bolts (334). 3.

# NOTE: Perform a leak check first before placing cover!!

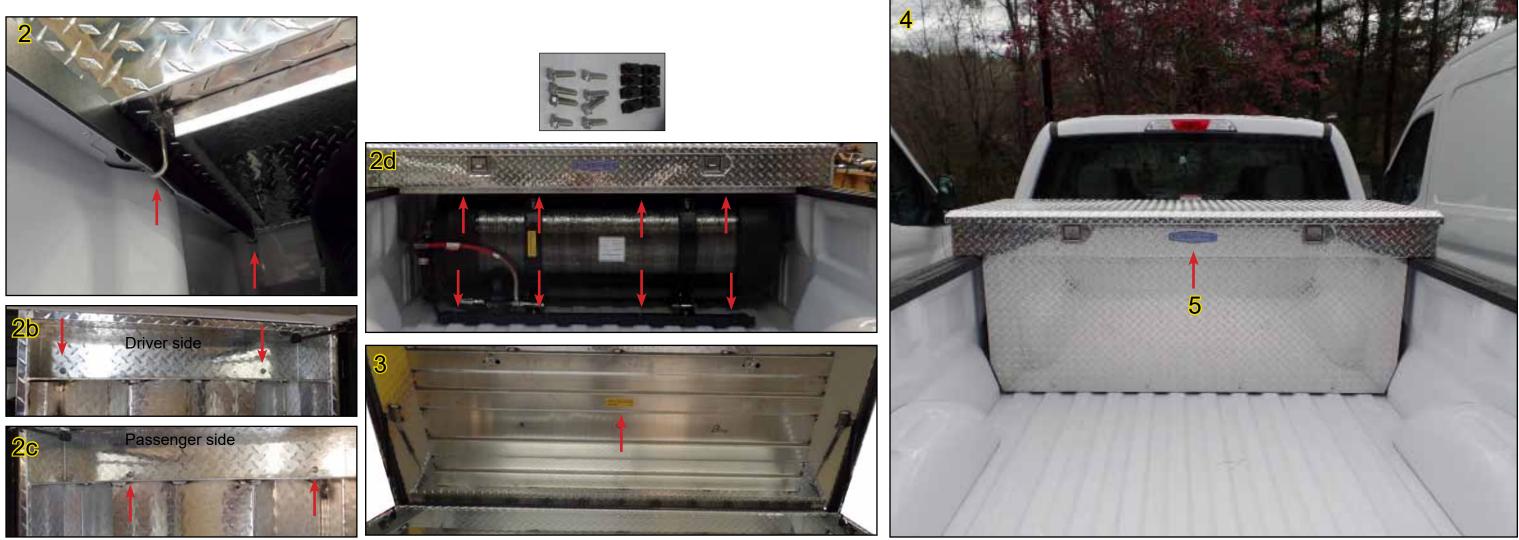




### **CYLINDER COVER - TOOL BOX OPTION**

- Place the toolbox over the cylinder. 1. Secure toolbox to the truck bed with four hooks (two on each side) and bolts supplied with kit.
- Place four u-nuts (333) onto rear cylinder base plate. 2. Drill four holes on toolbox lip and place four u-nuts (333).
- on the inside of the skirt. Decal must be clearly visible. Place cover decal 3. NG ONLY Place cover decal inside the cylinder cover and one on cylinder strap closest to the valve.
- Place skirt into place and secure with eight 1/4-20 x 1" bolts (334). 4.
- Center and place Altech Eco logo decal on toolbox. 5.

### NOTE: Perform a leak check first before placing the cover on!!





### 2017-2018 FORD F-250/350 6.2L COMPRESSED NATURAL GAS CONVERSION SYSTEM INSTALLATION INSTRUCTIONS

# **DECAL PLACEMENT**

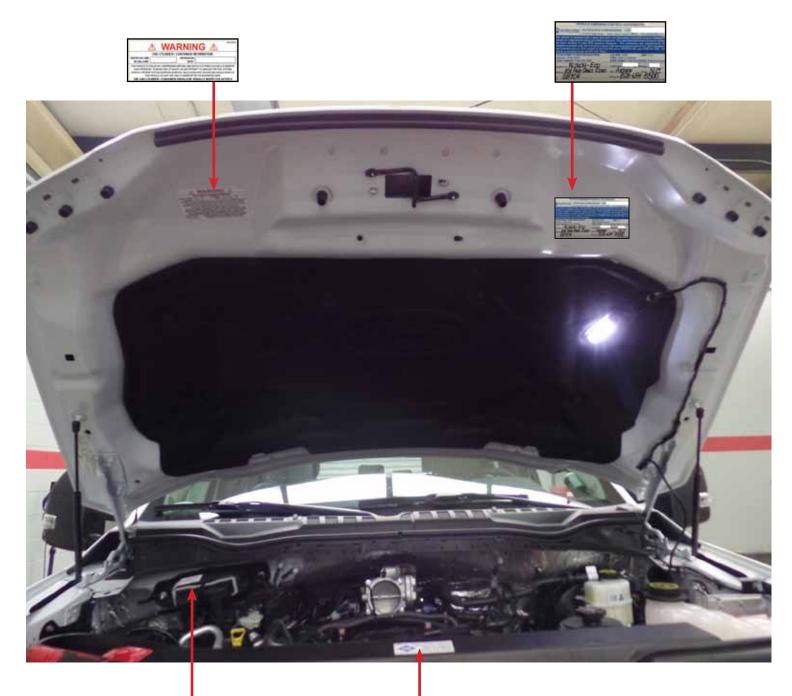




NOTE: All high pressure hoses must be labeled with a high pressure sticker.



1718F6.2LINSTALL











# **DECAL PLACEMENT**









# CNG ONLY 3600 PSI



### Location will vary with each different cover









### LEAK CHECKING THE SYSTEM

After the ALTECH-ECO CNG system has been installed on the vehicle, all fuel connections, fuel rails and injectors must be checked for leaks. Also check the overall installation of wiring, zip ties and components to make sure they are not loose or hanging. Tools:

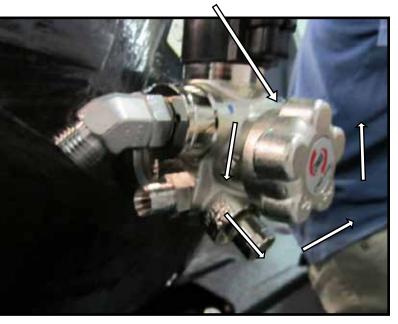
- Combustible Gas Leak Detector TPI 721 (Davis Instruments)
- Soapy Water Solution or Liquid Leak Check Solution

- 1. Double check and verify wiring is correct and secure with nothing hanging loose. Check that zip ties are snipped properly to avoid potential injury.
- Check and verify that all installed hoses and fittings are not loose and are secure per torque specifications. 2.
- Close the valve by turning clockwise and pressurize the system to 3600 psi. 3.
- Leak test using a methane detector or bubble soap. 4. a. PASS: Continue to step 5. b. FAIL: Depressurize the system and correct the issue before continuing.
- Open the manual valve on the fuel tank. Using your hand, rotate the manual valve counter clockwise until fully open. Then close the valve back 5. 1/4 turn (this is will help avoid the valve sticking in the future).
- Fill the tank with CNG. 6.
- Pressurize the system by turning the ignition on but do not start the vehicle (3 key cycles). This opens the solenoid and fills the lines. 7.
- Turn the ignition off, then back on and start the engine. This is to pressurize the lines again. While the engine is running, perform a leak test by 8. using a methane detector, bubble soap, or other appropriate means.
  - PASS: Complete required paper work and notify your supervisor. a.

FAIL: Turn off the ignition and manually shut-off on the cylinder (tank) valve. Depressurize the system and correct any issues. After all b. corrections have been made, open the manual shut-off valve and start the engine. Run the leak test again. For un-repairable issues, notify appropriate personnel for further instructions.

Third party installers: After completing the final checklist, it is required that an original or a copy of the entire completed checklist be sent to 9. ALTECH-ECO. Failure to do so will void the warranty and may result in suspension of installer's license. For additional information, contact your supervisor.

Open manual valve counter-clockwise until fully open. Then a 1/4 turn back.





# **Contact Information**

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