



CNG CONVERSION SYSTEM INSTALLATION MANUAL

2015-2016 FORD F-150 5.0L BI-FUEL

UNDER-HOOD CNG SYSTEM

Version 1.1 - Updated 12/09/15



TABLE OF CONTENTS

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.
- 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.

INDEX

Page (4)	Intro to Installation
Page (5-10)	Low Pressure Install
Page (11-15)	Wiring
Page (16-20)	Switch/Gauge Routing
Page (21)	OBD PIN
Page (22-23)	Low Pressure Hose Routing / Quarter Turn valve
Page (24-25)	Coolant Hose Routing
Page (26)	Rear Harness Routing
Page (27-28)	Decal Placement
Page (29)	Leak Checking the System

!! 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 M-TECH before the beginning install.

DISCLAIMER

M-TECH 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.

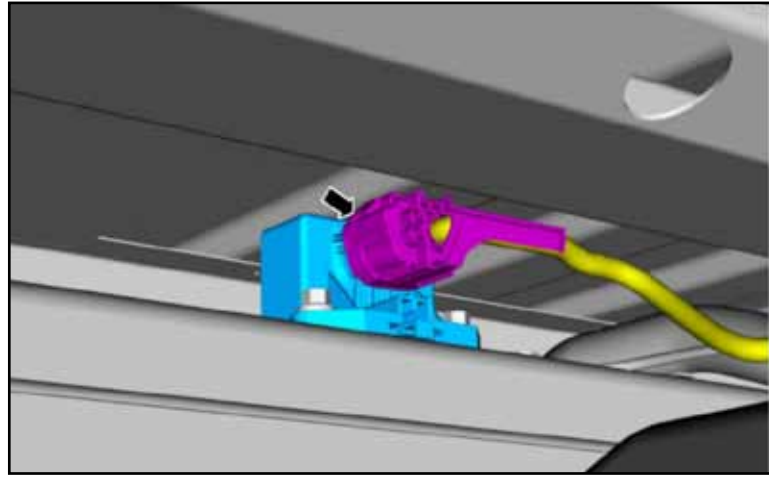
On Bi-Fuel systems gasoline shall not remain uncirculated for extended periods of time (over 60 days).

THIS DOCUMENT CONTAINS PROPRIETARY DATA OF M-TECH AND SHALL NOT BE USED OR DISCLOSED IN WHOLE OR IN PART TO DESIGN OR FABRICATE ANY PRODUCT FOR ANY PURPOSE, NOR REPRODUCED OR TRANSMITTED TO ANY OTHER ORGANIZATION WITHOUT THE EXPRESS PERMISSION OF M-TECH SOLUTIONS.

Check list:

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

Disconnect the fuel pump.



Fuel system Pressure Release

1. With the vehicle in NEUTRAL, position it on a hoist.
2. NOTE: The Fuel Pump Control Module is located on the frame rail above the fuel tank. Disconnect the fuel pump control module electrical connector.
3. Start the engine and allow it to idle until it stalls.
4. After the engine stalls, crank the engine for approximately 5 seconds to make sure the fuel rail pressure has been released.
5. Turn the ignition switch to the OFF position.
6. When the fuel system service is complete, reconnect the fuel pump control module electrical connector.
7. Cycle the ignition key and wait 3 seconds to pressurize the fuel system. Check for leaks before starting the engine.
8. When service on the fuel system is completed, start the engine and check for leaks.

Disconnect the negative terminal on the battery and place a plastic cap on it to protect from accidental contact.



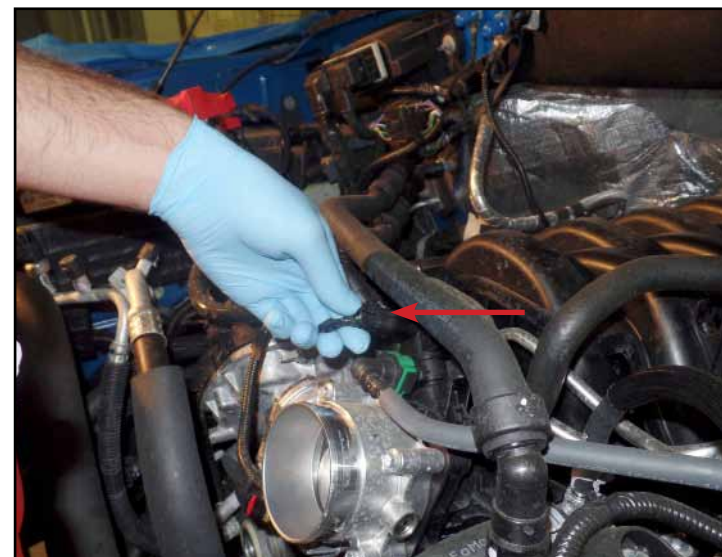
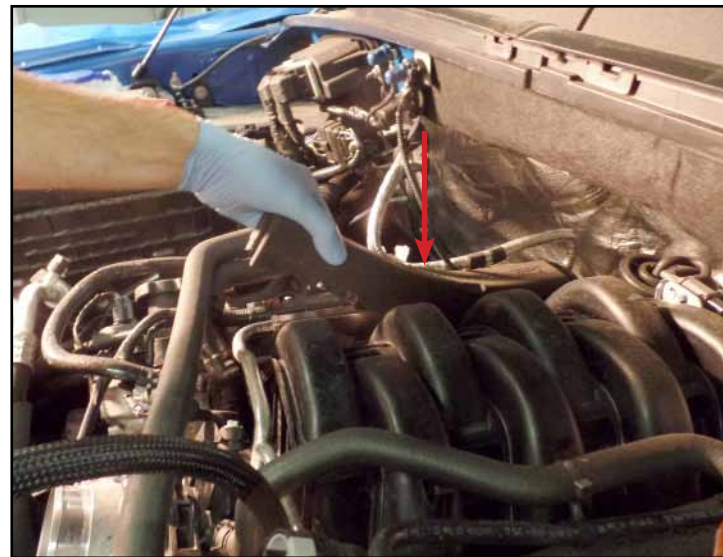
Remember to always lubricate ALL o-rings right before component installation.

Refer to packing slip for part specifics.

LOW PRESSURE

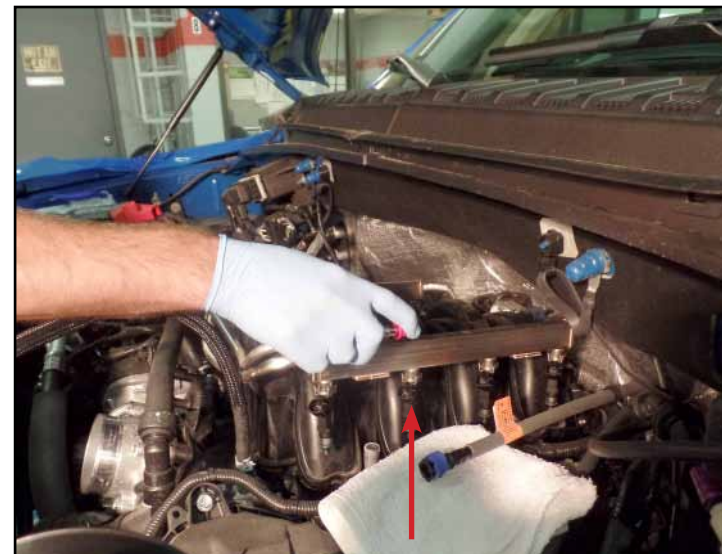
1. Remove air intake hose/tube.
2. Remove foam insulation.
3. Remove all hoses and wiring attached to the manifold.
4. Disconnect OEM connectors connected to the injectors.

DO NOT USE POWER TOOLS!



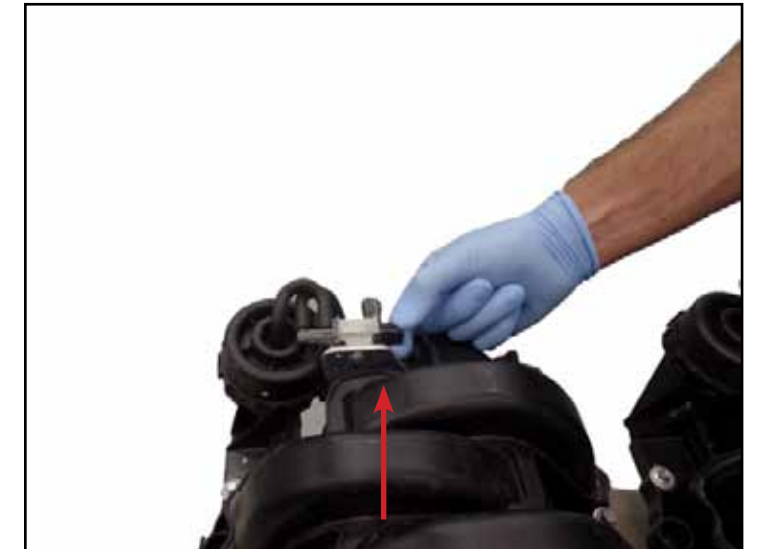
LOW PRESSURE

5. Safely disconnect OEM gasoline line.
CAUTION: Fuel line may be under pressure.
6. Remove discard four OEM fuel rail bolts.
7. Remove OEM fuel rail.
Note: Rail contains gasoline.
8. Remove throttle body.



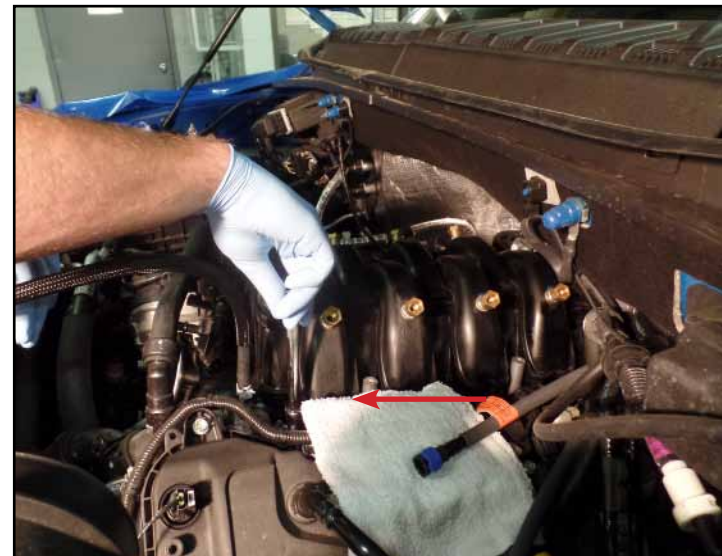
LOW PRESSURE

9. Remove six manifold bolts.
10. Remove any/all additional wiring from the back of the manifold.
11. Remove manifold.
- NOTE: Ship manifold back to M-Tech. Before doing so, follow step 12.**
12. Transfer OEM components to prepped manifold.



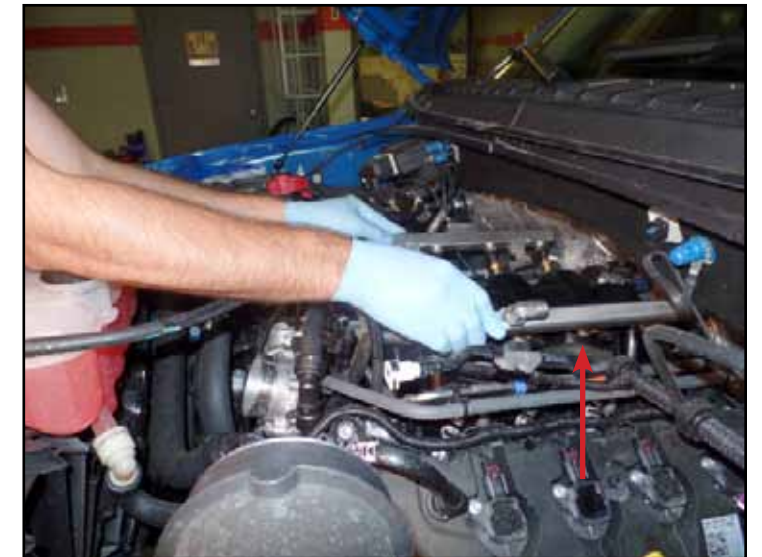
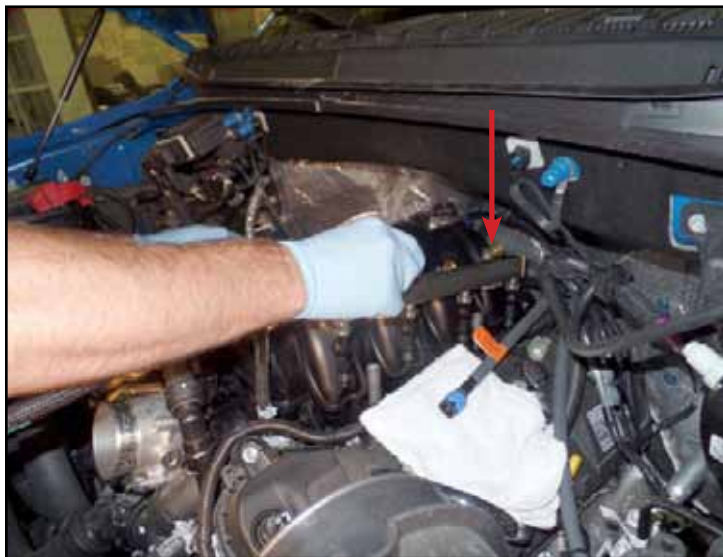
LOW PRESSURE

13. Install prepped manifold.
14. Reconnect all OEM connections to the prepped manifold.
15. Hand start all six manifold bolts.
16. Torque all six bolts in a cross pattern to 89 in/lbs.
17. Re-install throttle body. Torque to 89 in/lbs.



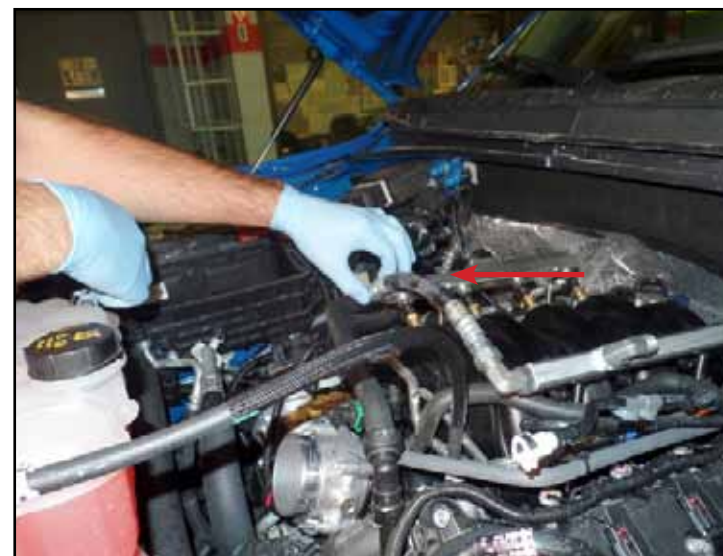
LOW PRESSURE

18. Re-install OEM fuel rail and connect fuel line.
19. Reconnect OEM injectors.
20. Reconnect all OEM wiring and hoses.
21. Install CNG fuel rails.



LOW PRESSURE

22. Use four kit bolts (190mm) and spacers to secure the fuel rails. Tighten to 89 in/lbs.
23. Attach CNG low pressure line between the rails. Tighten to 35 ft/lbs.
24. Re-install foam insulation.



WIRING - AFCM

1. Assemble AFCM bracket.
Place U-nuts on each end.
Attach AFCM.
Secure with bolts (175-H).
Wrench tighten.
2. Use AFCM assembly as a template. Center the assembly between the fuel rails, go as high as possible. Mark three holes.
3. Drill 25/64" holes. **CAUTION: Place something below to collect debris.** Deburr and rust proof.
4. Install three rivet nuts. (Rivet gun not included).



WIRING - AFCM

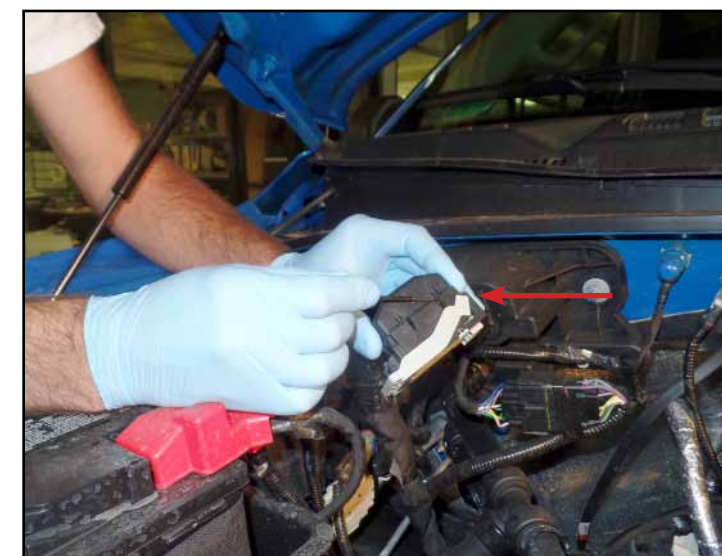
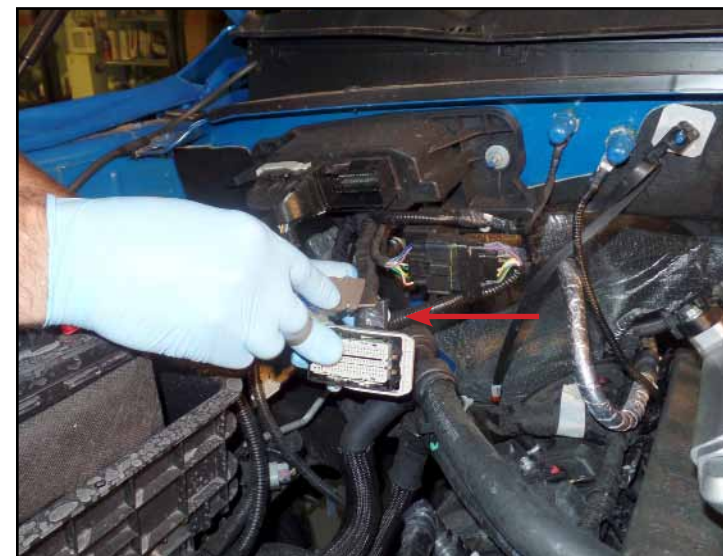
5. Install AFCM assembly.
Secure with bolts (175-H).
Wrench tighten.



WIRING - PIGTAIL

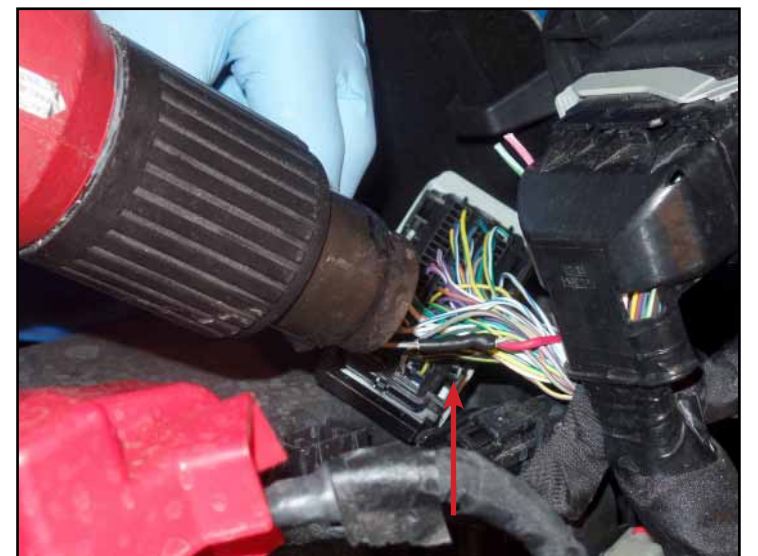
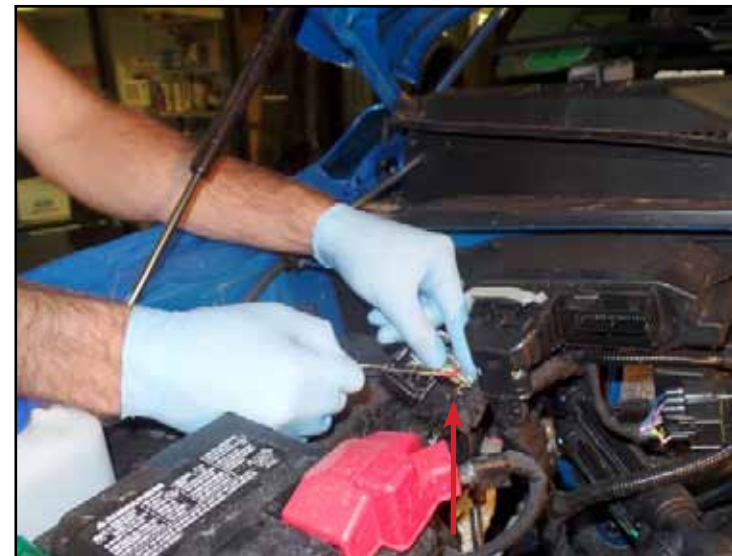
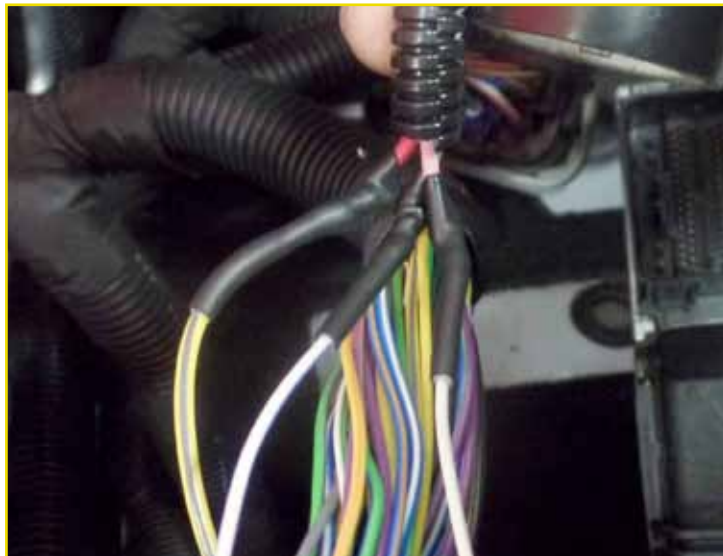
1. Remove PCM connector **A** and **B**.
2. Remove protective cover to expose OEM wires.
3. Remove gray locking tabs to gain access to the terminals.
4. Refer to the bi-fuel **PIN-OUT** (*included with system*).

**PULL ONE WIRE AT A TIME
USE THE PIN OUT DIAGRAM**



WIRING - PIGTAIL

5. Solder to five OEM wires accordingly. Place shrink tube on each end before soldering.
Apply electric tape to cover any exposed wires.
IMPORTANT: Perform this task ONE WIRE AT A TIME!
6. Re-install the protective covers.
7. Re-install gray locking tabs.
8. Re-install PCM connectors.
9. Reconnect all OEM harnesses.
10. Connect CAN Bus harness with CNG Main Harness.



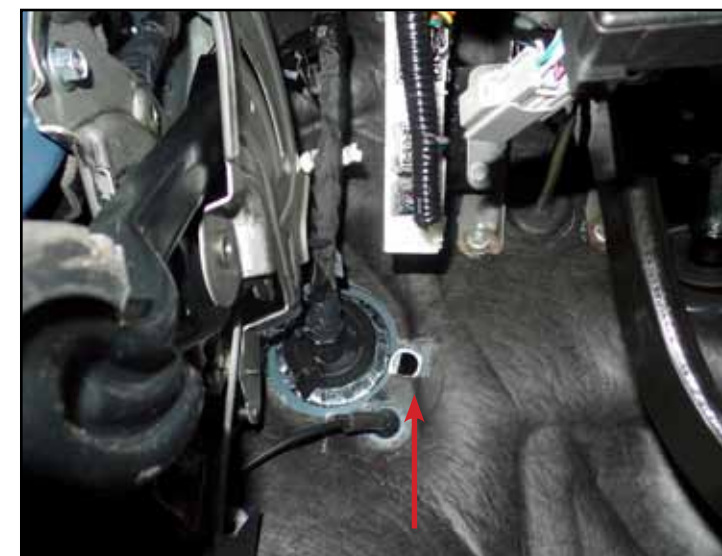
WIRING - CNG HARNESS

Route as shown and zip tie every 1 - 1 1/2 feet, or loose areas.



SWITCH/GAUGE ROUTING

1. Below the steering column, mark around 3 sides of the insulation and cut to accommodate a 7/8" hole.
This hole will be used for the harness leading into the engine compartment.
2. Drill a 7/8" hole. Rust proof and deburr.
3. Feed the switch/gauge harness through the hole and into the engine compartment.
Secure the grommet (included with harness).



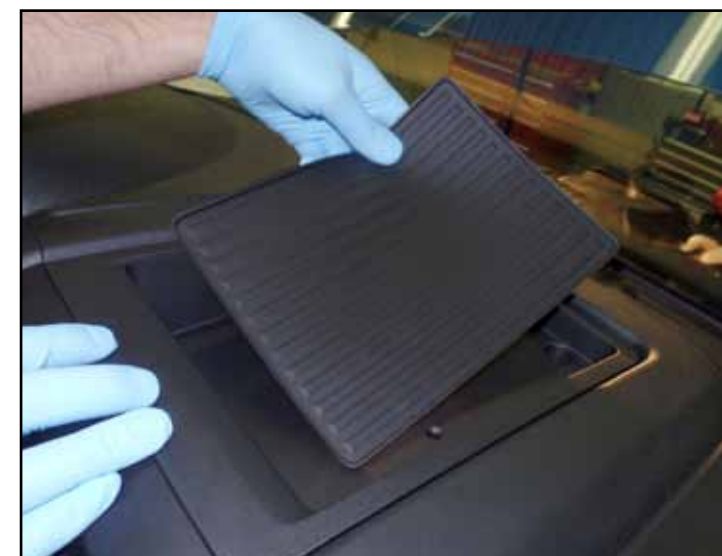
SWITCH/GAUGE ROUTING

4. Remove control panel. (optional)
Disconnect OEM wiring.
Remove four OEM bolts.
5. Use switch template and cut out the area for the switch.



SWITCH/GAUGE ROUTING

6. Use pin out to connect harness to switch.
7. Reconnect all OEM connections.
8. Fit switch into place.
10. Re-install panel.
11. Remove rubber mat on top of dash.
12. Remove two screws.
Remove plastic tray.
Set tray aside.
13. Remove two top screws on stereo panel.
Pull panel back.



SWITCH/GAUGE ROUTING

14. Remove one screw from panel and pull aside.
15. Remove panel on the left of stereo.
Unplug OEM wire(s).
16. Use gauge adaptor included with kit. Mark the opening.
Create opening.
Deburr.



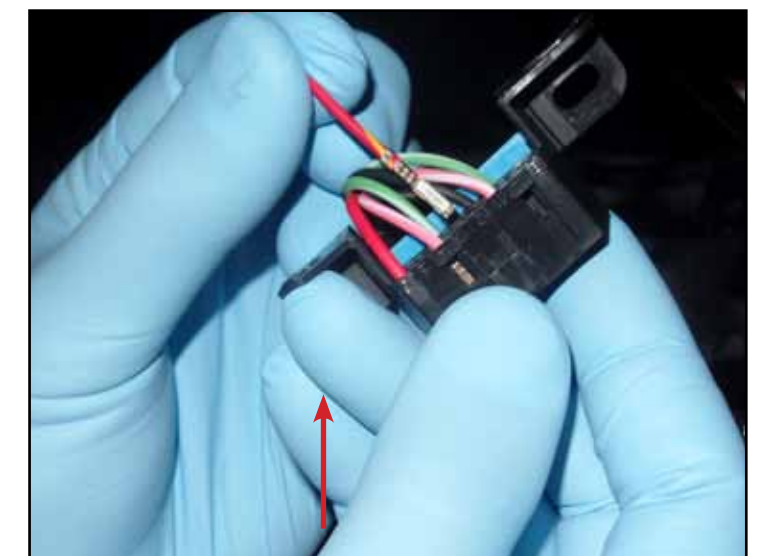
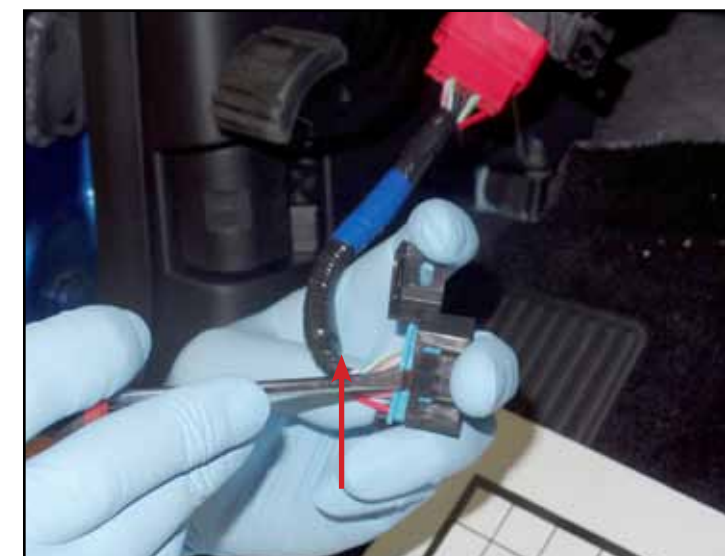
SWITCH/GAUGE ROUTING

17. Fit gauge with adaptor.
Secure with gauge bracket and finger tighten with two nuts.
Follow pin out diagram and connect gauge to the harness.
18. Re-install panels back to factory specifications.



OBD PIN

1. Remove OEM OBD Connector.
2. Connect "Passthru" harness to OEM OBD connector.
Red to Black.
3. Remove blue pin retainer.
Plug red/yellow wire into passthru connector (black side), into pin 13.
4. Re-install retractor cap.
5. Install passthru into OEM OBD location.



LOW PRESSURE HOSE ROUTING / QUARTER TURN VALVE

LOW PRESSURE HOSE

1. Route along the frame as shown. Connect one end to the regulator and other to the fuel rail, tighten to 35 ft/lbs. Ensure Proper routing first before securing.
2. Install 5/16" short u-nut (217) and secure quarter turn valve with 5/16" bolt (127).
3. Secure hose where shown with 13/16" p-clamp (PC13/16).
-First install 1/4in-20 aluminum polynut (RN2520165ALR) and 1/4in-20 x 3/4 bolts (175-H).
-Note: Use location towards the rear of the vehicle to secure both p-clamps used on low pressure hose and coolant hoses.

(see next page for additional pictures)



LOW PRESSURE HOSE ROUTING / QUARTER TURN VALVE

Continued...

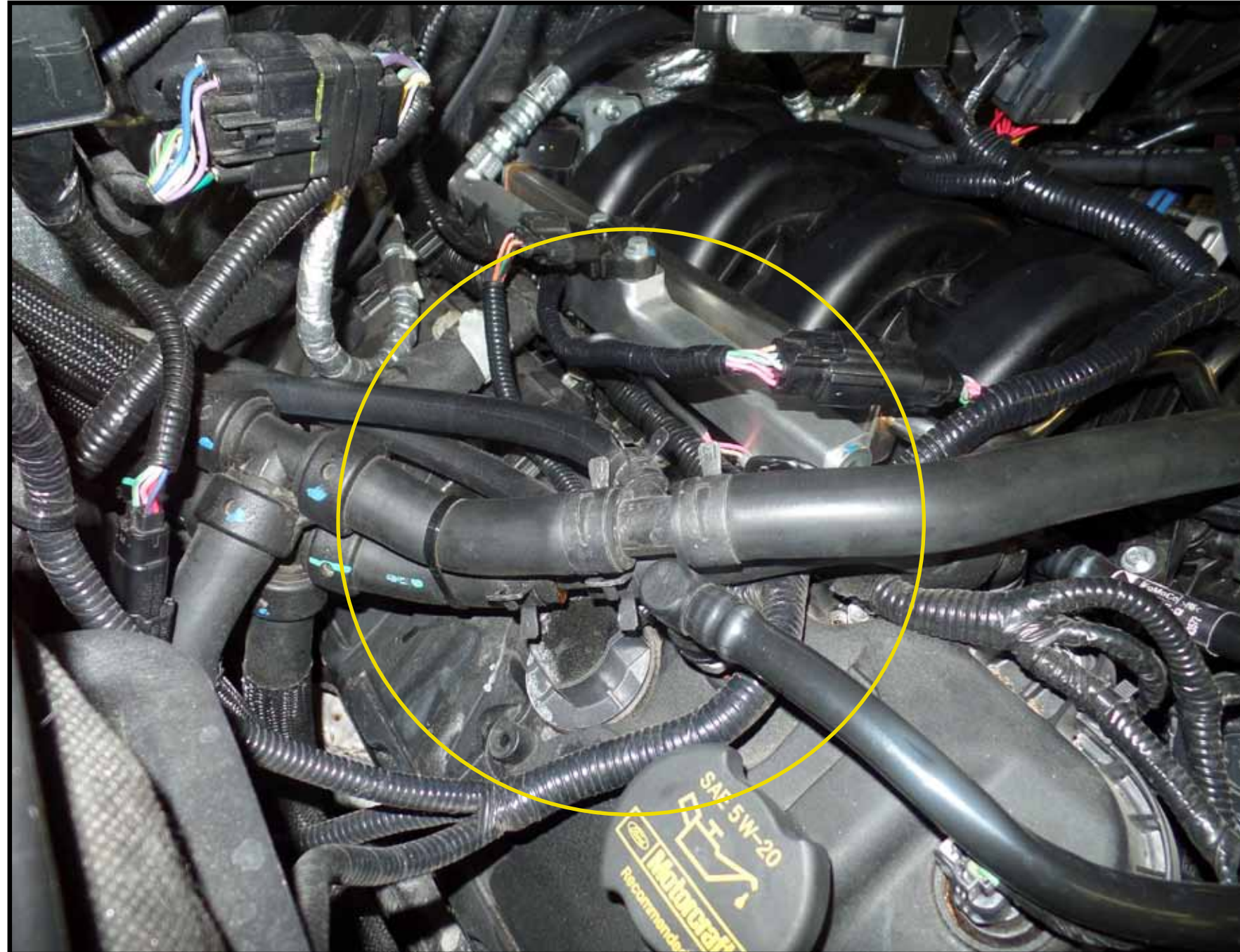


COOLANT HOSE ROUTING

1. Route from high pressure area under the bed and follow beneath the onto passenger side.
-Secure with 1 1/8" p-clamps (PC1 1/8) 1/4in-20 x 3/4 bolts (175-H).
2. Connect one end to the regulator and tap into OEM coolant lines.
Y side facing to the rear.
Secure with 3/4" and 17mm hose clamps.
(see next page for a close up).



COOLANT HOSE ROUTING



REAR HARNESS ROUTING

REAR HARNESS

1. Route rear harness along same path as the low pressure hose and zip any slack in the wire. Connect harness to sensor and solenoid(s).



DECALS

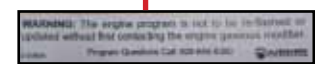
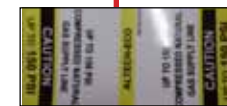


Remove the words "E-85"

Remove



DECALS



**CNG ONLY
3600 PSI**

Location may vary



LEAK CHECKING THE SYSTEM

After the M-TECH 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:

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

1. Close the valve by turning clockwise and pressurize the system.
2. Leak test using bubble soap and or a methane detector.
 - a. PASS: Continue to step 3.
 - b. FAIL: Depressurize the system and correct the issue before continuing.
3. Open the manual valve on the fuel tank. Using your hand, rotate the manual valve counter clockwise until fully open.
4. Fill the tank with CNG.
5. Check and verify that all installed hoses and fittings are not loose and are secure per torque specifications.
6. Double check and verify wiring is correct and secure with nothing hanging loose. Check that zip ties are snipped properly to avoid potential injury.
7. Pressurize the system by turning the ignition on but do not start the vehicle. This opens the solenoid and fills the lines.
8. Shut off the CNG at the cylinder (tank) manually (manual shut-off valve is located on the tank).
9. Use a methane detector, bubble soap, or other approved means to leak test all hoses, lines and fittings at connection points.
 - a. PASS: Continue to step 8.
 - b. FAIL: Turn off the vehicle ignition and double check that you have performed the manual shut-off on the cylinder (tank) valve. Locate any leak(s). Then, depressurize the system and correct the issue before continuing the leak test. Correcting a leak may simply require tightening (re-tightening) the hoses, lines or fittings. If a leak cannot be corrected, notify the appropriate personnel for further instructions.
10. 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 using a methane detector, bubble soap, or other appropriate means.
 - a. PASS: Complete required paper work and notify your supervisor.
 - b. FAIL: Turn off the ignition and manually shut-off on the cylinder (tank) valve. Depressurize the system and correct any issues. After all 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.
11. 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 M-TECH. 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.

