VaporWorx

We Give You Gas

Basic installation instructions for the fabrication and installation of the Vaporworx GM5FMMR fuel module mounting ring and FTGMF1R recessed fuel tray and associated components into existing fuel tanks.

WARNING
Fuel tanks that have had fuel in them are extremely dangerous to work on. Any spark can create an explosion that can burn and kill you. Precautions to eliminate any potential explosions or similar condition must be taken by you or your fabricator before any work can begin. Vaporworx assumes no liability, nor is responsible for, any injuries, deaths, personal or property damage, or any other results due to fire, explosion, or any other resultant condition.

Please read this entire instruction sheet carefully prior to performing any work. Once read, read it again, and again. Your fabrication time will be much less once you can visualize what everything will look like once completed. Look at the pictures carefully since there are some details that you may be able to use during fabrication to make the job easier.

Like many custom fabricated parts, no two are the same. Hence, you may encounter differences in your tank that are not covered in this instruction sheet. In some cases it will be necessary to modify the location, lengths, position, etc. of some components in order for them to fit in your tank. Much effort has been placed on making the system as easy as possible to use, but some imagination and creativity may be needed to overcome unforeseen conditions.

1) Clean the tank internals so that no fuel vapors or liquid remain. This is the #1 most important step of the modification process. If any fuel vapor or liquid is present a fire and explosion will result. If you have any doubt as to how to remove the fuel liquid and vapor you must consult with a professional with knowledge of how to perform the needed cleaning procedure. DO NOT PROCEED WITH ANY WORK UNTIL YOU HAVE VERIFIED THAT THE FUEL LIQUID AND VAPORS HAVE BEEN REMOVED AND THE TANK IS SAFE TO WORK ON. IF YOU ARE UNSURE ABOUT ANY OF THESE CONDITIONS STOP IMMEDIATELY AND SEEK HELP FROM A PROFESSIONAL WELDER AND/OR FABRICATOR FAMILIAR WITH MODIFYING FUEL TANKS.
2) Compare the dimensions of the fuel tray, and then cut an approximate 11-1/2”w x 8-5/8”d x 1-1/4”h like that shown in Photo 1 centered left-to-right on the tank. This will allow the fuel module output to be centered left-to-right on the tank. Before cutting measure the fuel tray to confirm that the measurements are correct. You may find that making the hole larger may be

necessary to allow the fuel tray to seat completely flat and not rest on the corner radii of the fuel tray top lips.

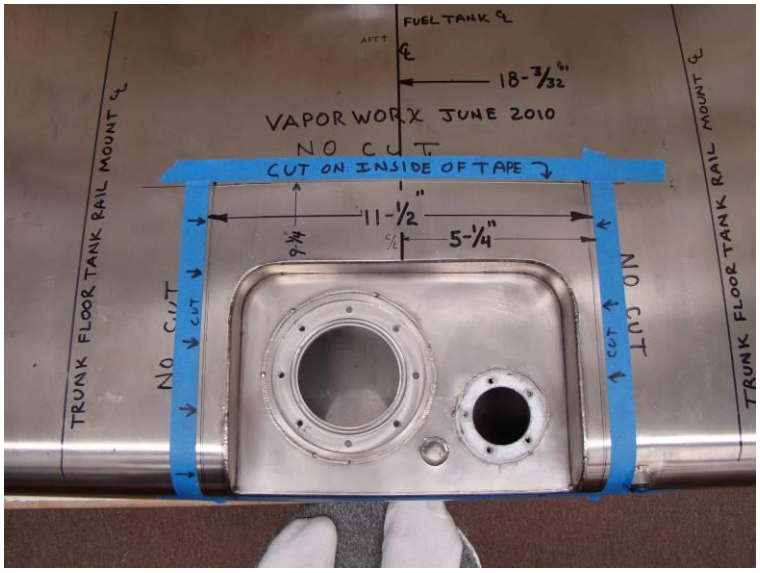

Photo 1. The depth of the cut should just barely remove the bottom of the recessed fuel tray. Remove additional depth as needed to allow the new fuel tray to seat flush with the top of the tank. Disregard the 9-1/4" dimension shown. Compare this distance to your tray which should be approximately 8-5/8".

3) If an internal baffle is found it must be removed. Use a grinder to remove the spot welds but be careful not to grind the tank walls. Save the baffle structure.

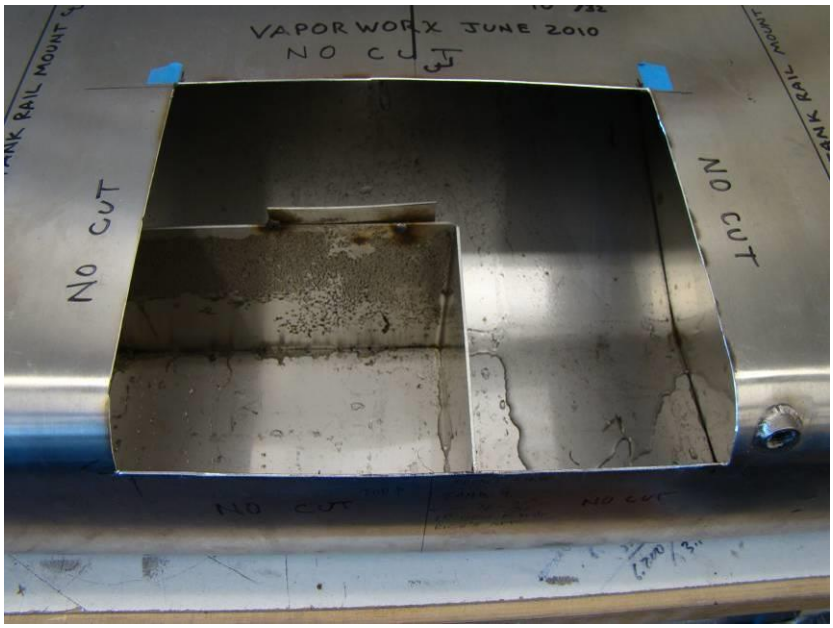

Photo 2. Remove the square-shaped baffle and set aside. It will be used later.

4) Lay the Vaporworx FTGMF1R recessed fuel tray into the cutout on the tank and center it left-to-right and fully aft so that the front lip is flush with the tank. It is helpful to make a centerline mark on the tank and the tray to help facilitate quick alignment. On both sides the front vertical edges will need to be trimmed. In Photo 3 the pencil points to the cutting edge that follows the contour of the tank.

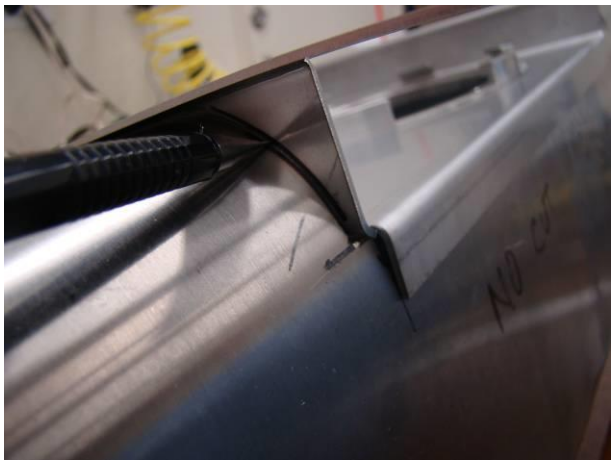

Photo 3. The vertical tray edges will need to be trimmed so that they follow the contour of the tank. Note how the front lip of the tray lays against the front wall of the tank.

5) Cut away the vertical side of the tray only to fit the tank contour. Do not cut the top lips of the tray at this time. See Photo 4.

Photo 4. Note how the side of the fuel tray has been trimmed to follow the contour of the tank radius. The top lip of the fuel tray has not been cut.

6) Bend the top lip of the fuel tray down and form it to tightly fit the corner radius of the tank. Trim the length of the lip to match the bottom of the front lip of the fuel tray. When completed it should look like that in Photo 5.

Photo 5. Minimal material removal and gaps will make for a better weld and lessen chance of leaks. Note that all of the cut edges will need to be welded.

NOTE: Corner pickups are not required in all applications. For most driving conditions the fuel module alone will give excellent performance, especially in street driven applications.

7) Measure the distance from the internal bulkheads/ribs to the outside L/R sides of the tanks. Using a Sharpie draw lines on the outside of the tank to show where the bulkheads/ribs are in relation to the sides. See Photo 6.

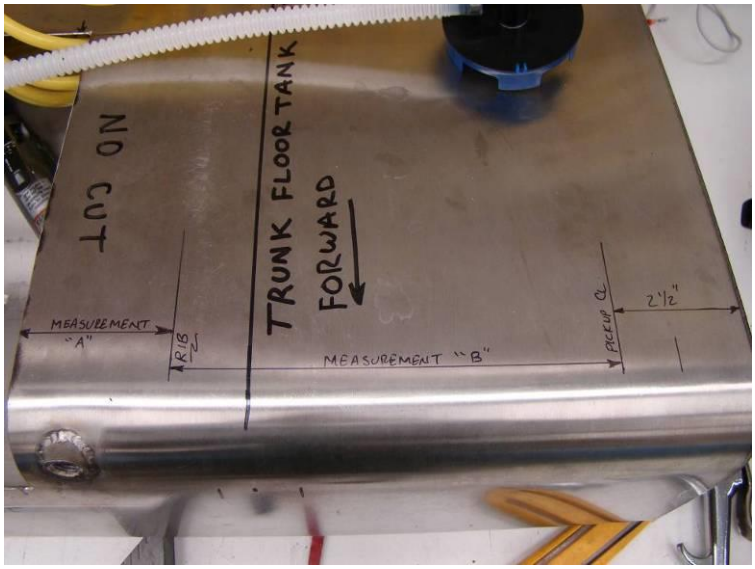

Photo 6. Pickup dimension lines.

8) Each pickup needs a long 15”corrugated fuel hose attached. The hose is then clamped with an Odiker clamp (0.375" - 0.437"). The clamp must slide on to the pickup first before the hose is installed. See Photo 6a below. Note the nipple at the top-center of the pickup. This nipple will used in future steps. Make two assemblies, one each for the RH and LH side.

Photo 6a.

9) Next, each of the hoses is attached to the “Y” using the same size Odiker clamps as used above. For the modified stock fuel level sensor the open leg of the “Y” should point to the RH side of the car as shown in Photo 6b below. A third 15” corrugated hose should be attached to the open leg of the “Y”.

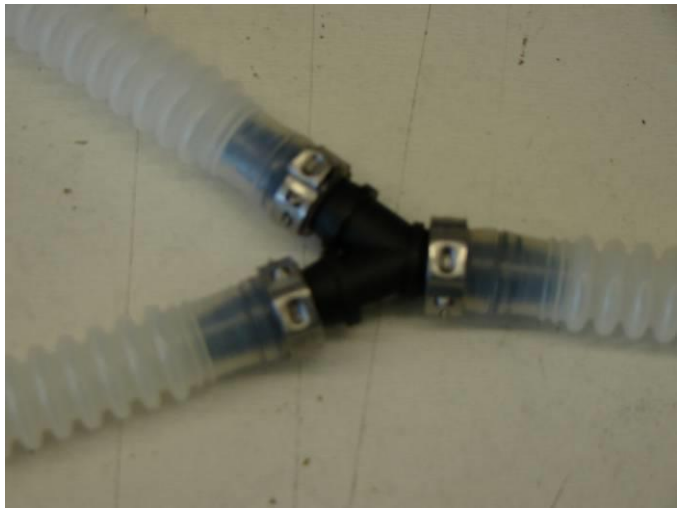

Photo 6b. The assembled “Y” with the two lower legs going to the pickups and the third leg going to the module venturi pump pickup.

10) Pull the pickups so that the hoses are lightly taught. Measure the distance between the centerlines of the pickups. This is the distance from the small nipples centered on the top of the pickups. The distance should be approximately 31”. The pickup assembly can be seen in Photo 7.

Photo 7. Pickup assembly complete with hoses and “Y” connector. The distance from center-to-center of the pickups should be approximately 31”. The hose with nothing attached to one end will eventually attach to the fuel module venturi pump connection.

11) Apply a light coating of oil to the exterior surface of the venturi pickup connection on the bottom of the reservoir module. This is the 3/8” grey quick connector as seen in Photo 7b.
12) NOTE: A 3/8” quick connect x 5/16” plastic barb fitting can be used in place of the following: The hose end that attaches to the fuel module venturi pump connection needs to be expanded. Using a large ½” drive socket, or similar tool, insert the open end of the hose so that only approximately ½” of hose is exposed like that in Photo 7a. Using the socket or similar tool will shield the corrugated section of hose from heat.

Photo 7a. Slowly heat only the exposed section of hose with a heat gun. Do not heat the corrugated section of the hose.

13) Slowly and evenly heat the end of the hose until it softens. Immediately remove the hose from the tool and slide it on to the fuel module venturi pickup connection like that shown in Photo 7b. It is imperative that the corrugated section of the hose not be heated. Allow the hose to cool to room temperature and then remove it from the module connection.

Photo 7b. The expanded hose is allowed to cool on the venturi pump connection.

14) For a 36” wide tank, draw fore/aft lines 2-1/2” from the edges of the tank as seen in Photo 6. These are the pickup centerlines. The distance between these two lines should be 31”, the same or slightly less than the pickup assembly center-to-center distance.
15) Using the removed baffle cut two “L” shaped brackets like that shown in Photo 8. The brackets should be approximately 1-1/2” wide.

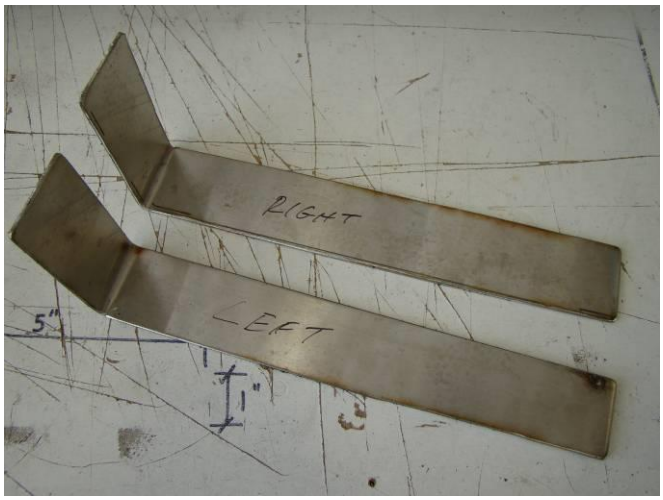

Photo 8. Corner pickup brackets before drilling and final sizing.

16) Lay one of the brackets on top of the tank. The short leg of the “L” should point upward and be parallel to the tank bulkhead/rib line. Trim the long leg of the “L” so that it will easily fit into the tank, approximately 1” short of hitting the side. Also mark where the hole for the pickup will be drilled by centering the mark on the pickup centerline as marked on the tank. See Photo 9.

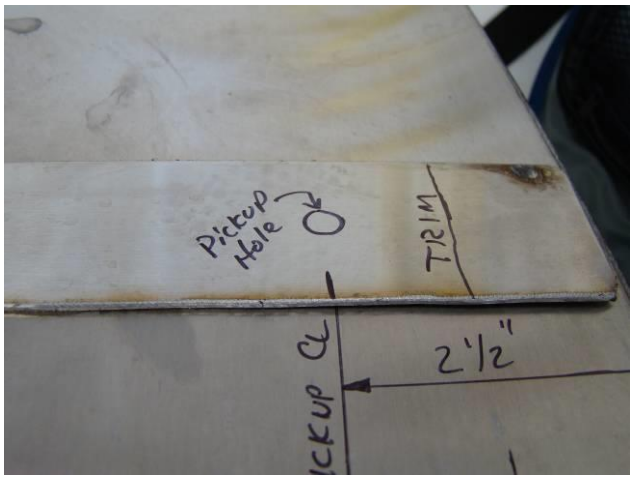

Photo 9. Trim the length of the bracket as shown by the TRIM line above and mark the pickup hole to align with the pickup centerline as drawn earlier.

17) Drill a hole in the bracket at the spot where you made the pickup hole mark. The hole should be slightly larger than the nipple on the top of the pickup, just enough for a tight fit. When completed the bracket should look something like that in Photo 10. Do not yet drill the holes in the short leg of the "L" or the one holding the plastic pipe to the "L" with a zip tie.
18) The same procedures should be done to make corner pickup brackets for both sides.

Photo 10. Completed corner pickup leg.

19) Make a cardboard template approximately 2"h x 3"w. Place the template against the inside edge of the internal bulkhead/rib so that it is approximately ¾" off the floor and 3" from the flat front wall of the tank. These are minimal dimensions, meaning that if the hole gets bigger it will still work OK, but try to keep it within +/- ¼". Drilling holes on the corners makes using angle grinders easier and helps strengthen the bulkhead. See Photo 11 below.

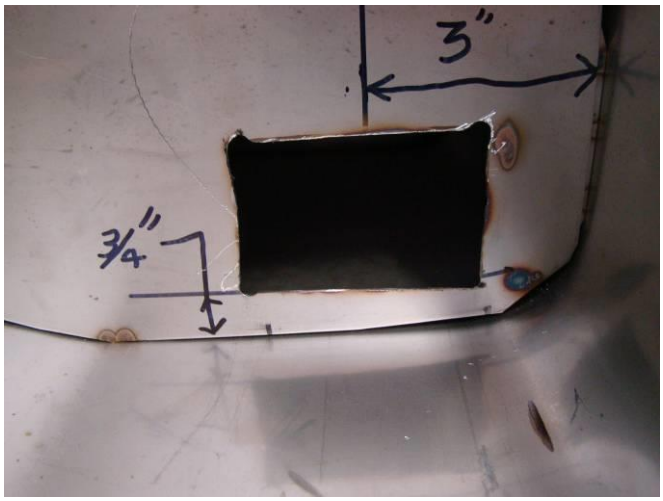

Photo 11. Looking at the LH side bulkhead from inside the tank.

20) The corner pickup brackets need to be attached to the bulkhead using fasteners so that the pickups can be easily serviced in the future. Using more of the leftover baffle materials cut an approximate 1-1/2"w x 2"h section and drill two 17/64" holes approximately 1-1/4" apart as shown in Photo 12. This part is now the corner pickup mount. Align the holes of the corner pickup mount so that it centers on the bulkhead hole but does not hang below the edge. Mark the bulkhead so that 17/64" holes can be drilled in it to match the corner pickup mount.

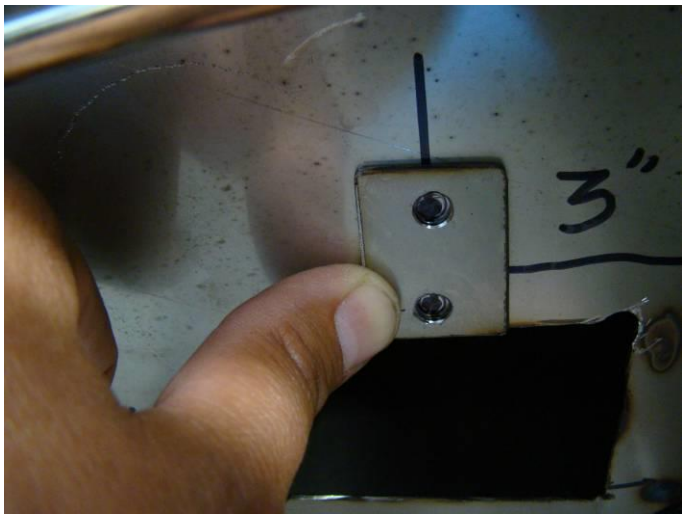

Photo 12. Marking the bulkhead for drilling. The corner pickup mount is centered fore-aft on the 3" edge.

21) Drill the two 17/64" holes in the bulkhead like that shown in Photo 13. Do not yet drill the smaller hole.

Photo 13. Vertical holes drilled for bracket attachment and securing.

22) Weld two ¼”-20 x 1” long stainless bolts, facing the same direction, to the corner pickup mounts.
23) Drill a small hole in the corner pickup mount ½-way between the two ¼”-20 bolts for a flathead self-tapping screw. Make a corresponding hole on the bulkhead but countersink the hole so that a flathead screw can be installed. Once finished, the assembly should look like that in Photo 14.

Photo 14. Corner bracket mount complete.

24) Lay the assembled corner pickup in the tank as shown in Photo 15. With the pickup flat on the tank floor and the horizontal “L” parallel with the tank floor, mark the locations of the holes to correspond to those made for the corner bracket mount.

Photo 15. Mark the locations of the holes to be drilled in the vertical leg of the corner pickup bracket. The long leg of the bracket should be horizontal or slightly sloped downward toward the pickup. In this view the pickup is oriented toward the center of the tank for better viewing. This is acceptable for marking purposes.

25) Drill two 17/64” holes in the corner pickup bracket corresponding to the marks made in Step 15 and centered fore/aft on the bracket.
26) Test fit the corner pickup bracket. Bend the bracket as needed so that the pickup is lightly preloaded against the bottom of the tank after the bracket has been secured with ¼”-20 stainless nuts. See Photo 16.

Photo 16. Corner pickup bracket installed.

27) Repeat as needed to complete the corner pickup brackets for both sides of the tank.

28) Using a heat gun, lightly heat the nipple of the pickup that protrudes past the surface of the corner pickup bracket. Heat the plastic just enough so that the edge of the plastic can be rolled over and secure the pickup to the bracket. See Photo 17.

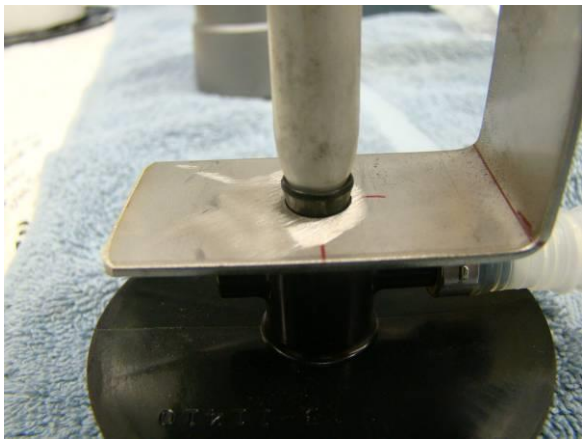

Photo 17. The nipple of the corner pickup was heated and rolled just enough to secure it to the bracket. The end of a Sharpie works well to roll the edge once heated. Use the bracket to protect the main body of the pickup from heat.

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29) Clean the tank. Install the completed corner pickup brackets, pickups, and hoses into the tank. The hoses should not be under tension. If they are either the corner pickup brackets will need to be reworked or a spacer placed between the bracket and bulkhead. Note how the hoses enter the center section of the tank through the windows cut in the bulkheads. Align the hoses so that they tend to point the hose toward the front of the tank. Drill one hole in each corner pickup bracket to secure the hoses in this position with a zip tie. See Photo 10 with the yellow zip tie securing the hose to the bracket as an example. The competed corner pickup bracket assembly should look like that in Photo 17a.

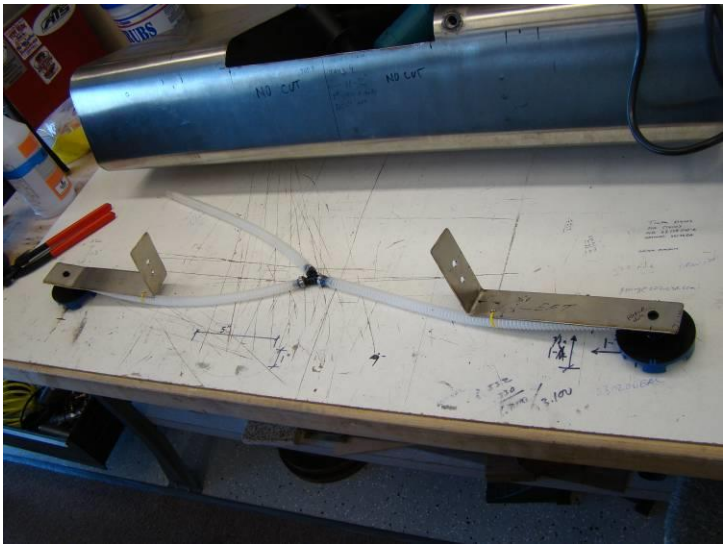

Photo 17a. Competed corner pickup bracket assembly

30) The hose assembly requires a method to be secured to the front-center of the tank. Use another small “L” shaped piece from the leftover baffle to make an attachment bracket. It should be just long enough to secure the

"Y" in the hose assembly to the front of the tank and keep the hose assembly off of the tank bottom. See Photo 18.

Photo 19. Only a few small tack-welds are needed to secure the bracket to the front face of the tank. Keep the overall length of the bracket under 1". Do not final attach the hose assembly until after the fuel tray has been welded in.

31) The fuel line mounting bung can now be placed. Drill a 3/8" hole on the front face of the tank to locate the bung. In Photo 24 the bung is located so that it is approximately 1-1/2" outboard of the tank strap centerline and 2-1/2" down from the top surface of the tank. Care should be taken to mount the bung so that your fuel line and rubber cushion clamp clear the tank strap(s) and any other equipment that may interfere with the fuel components. On some installations it may be beneficial to have the fuel line routed to the LH side of the car vs. the RH side installation as shown. Weld the bung into place and re-tap the hole with a #10-32 tap.
32) Remove all components from the tank and clean it again.
33) It is suggested that for standard tanks that are being retrofitted with the Vaporworx recessed fuel tray that a modified stock 0-90 ohm fuel level sending unit be used. If you have a good functioning stock sending unit it can be modified using the following procedure, or a new OER stainless fuel level sending unit can be modified. The in-line inductive float unit removed from the tank can also be used but fuel tray modifications will be needed to make it fit. These modifications will not be included in this instruction manual.
34) Remove the fuel line sock and tubing to a point just below the fuel level sending unit resistor housing.
35) Cut the fuel outlet tubing just above the top surface of the mounting plate. Remove the spot-welded tab that holds the mounting plate to the tubing being careful to not damage the tubing. Using a propane or MAP gas torch, heat the solder sealing the tube to the mounting plate and remove the mounting plate.
36) Clean the tube of any remaining solder. Using a saw and file remove the least amount of tubing to obtain a sufficient surface to apply an AN6 flare. The flare will not be a sealing surface so it does not need to be perfect.

37) Install an AN6 nut and ferrule on to the top tube of the fuel level sending unit. Flare the tube end to a standard 37-degree flare. The sending unit should now look like that in Photo 20.

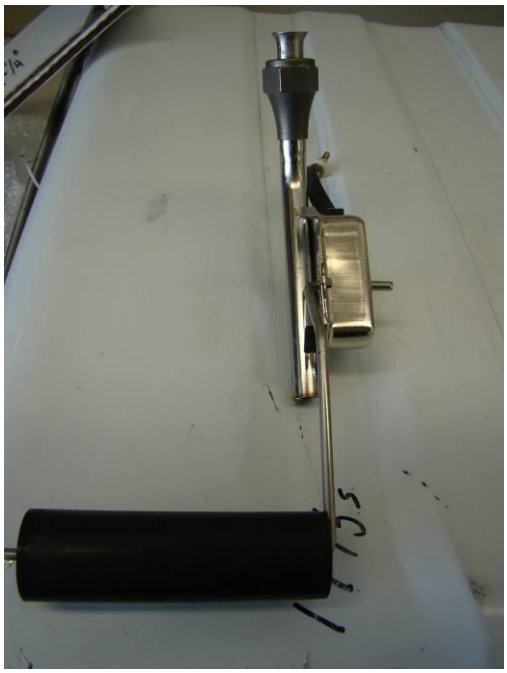

Photo 20. The modified stock sending unit.

38) Remove the wiring from the fuel level sending unit taking care not to damage the sending unit housing.
39) Obtain a fuel level sending unit from a 5th-gen Camaro, GM P/N 19208722 (approximately $20 shipped from gmpartsdirect.com.) Remove from the GM fuel level sending unit the plug and wires. One wire should be blue (gauge), the other white (ground). Remove the wires so that the maximum amount of wire is kept with the plug. Do not cut the wires so that there is wire remaining on the plastic sections of the sending unit. Un-weave the wires and cut them close to their final attachment points. If it is found that your final fuel level sending unit location requires extending the wiring use a wire with an insulation that is resistant to fuel, solder them together, and use a fuel resistant shrink tubing to insulate the connections.
40) Using a soldering iron attach the white wire as shown in Photo 21 to the fuel level sending unit. Modify the stainless strap so that it can be crimped to the blue wire. The blue wire is the conductor that will go to the fuel level gauge. Make sure that the stainless strap or blue wire does not short to ground or else the fuel level gauge will not operate correctly.

Photo 21. The blue wire goes to the brass lug on the sending unit, the white wire to the sending unit body (ground.) Note how the stainless strap used as a conductor has been cut and modified to crimp the blue wire.

41) Take a stainless AN6 plug and screw it into the AN6 nut on the sending unit. Install the corner pickup bracket assembly with hoses into the tank. Place the fuel level sending unit inside the tank with the end of the AN6 plug flush against the underside of the fuel tray. Place the pickup so that it will not interfere with the hoses, pickup brackets, bulkheads, etc through its entire range of motion. Some bending of the fuel level sending unit arm may be needed to obtain the proper location of the float. The float should remain approximately ¼" off the tank floor when fully drooped but not hit the top of the fuel tray or tank when fully extended. Shown for clarity, Photo 22 shows the approximate location of where the AN6 plug and fuel level sending unit assembly will attach to the underside of the tray. Photo 22a shows approximately how the sending unit will be oriented once installed in the tank.

Photo 22. An AN6 plug is located on the underside of the fuel tray. Due to variances in tank design and construction it is necessary to custom fit these components. The plug shown is aluminum; the plug to be welded to the tray should be stainless steel.

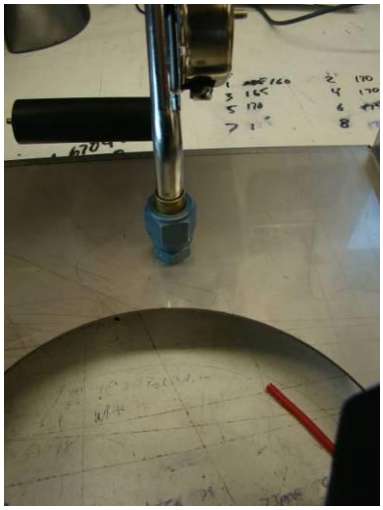

Photo 22a. Note the location of the plug and sending unit float. The float should not come in contact with the fuel tray or tank when fully extended.

42) Mark the location of the plug and weld into position. The use of the AN6 plug and nut will allow for easy rotational positioning and adjustment of the fuel level sending unit as well as make future servicing easier.
43) Draw a left-right centerline to the fuel tray fuel module mounting ring hole. The hole is 6-3/8" in diameter. The line will be parallel to the fuel pump outlet. In Photo 23 note that the centerline is 90˚ to the front edge of the sheetmetal.

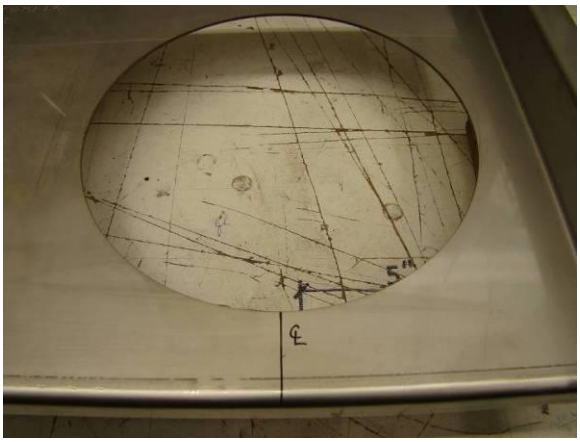

Photo 23. Left–to-right centerline placement. The centerline is placed at a 90˚ to the front edge of the sheetmetal.

39) Place the GM5FMMR fuel module mounting ring in the 6-3/8" diameter hole. Align the clockwise face edge of the mounting lug to the centerline made in Step 38 as shown in Photo 23a.

Photo 23a. Align edge of lug to the hole centerline. Note that the fuel pump outlet will be 1-1/4” to the right, as mounted in the vehicle, of the centerline. The centerline and fuel pump outlet centerline are parallel to each other, but due to parallax in the photo they appear not to be. Only this edge of the lug should be used for alignment purposes.

This orientation should work for most applications where the fuel pump outlet is pointing forward in the vehicle. If a different orientation is needed a line can be drawn representing the fuel pump outlet pathway on the recessed plate. A second parallel line 1-1/4” away can be drawn to represent where to align the edge of the lug.

NOTE: The seven lugs on the fuel module mounting ring are in a symmetrical pattern. Hence, any lug can be used to perform this alignment procedure. The location of the locking screw should be chosen so that it is in the most convenient place for your application.

40) Clamp as needed and weld the fuel module mounting ring to the bottom side of the recessed fuel tray. On the bottom side of the ring there is a slight difference in height between the mounting ring and the tray to help facilitate welding. The ring can also be welded on the top outside diameter location. Caution must be used to minimize the application of excessive heat that will lead to warping and deformation of all components.

41) The fuel pump module has an alignment tab that fits between two of the lugs on the fuel module mounting ring. The tab does not fit tightly between the lugs. There is approximately 3/16” of clearance to allow for small changes in the fuel pump module outlet alignment. Once the cam locking ring is in position the fuel module will remain stationary.

42) Set the recessed fuel tray into the hole in the tank. Recheck the fitment and make adjustments as necessary. Remove the corner pickup assembly and fuel level sending unit. Fully weld the recessed tray to the tank taking care not to apply excessive heat that will lead to warping and deformation of all parts.
43) The tank should now look similar to that in Photo 24.

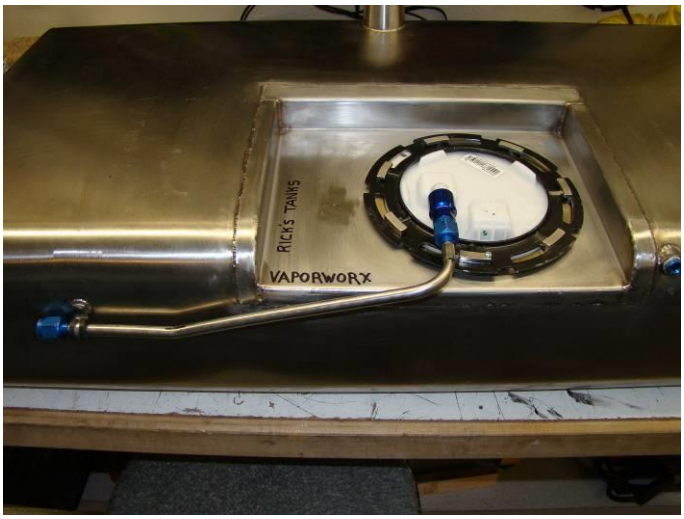

Photo 24. The recessed fuel tray, fuel module mounting ring, and the #10-32 bung have been fully welded. Note how the cushion clamp is just inboard of where the female AN6 connection is located. This fuel line assembly should stay mounted on the tank during installation and removal of the tank. A Russell P/N 640850 will convert the fuel module output to a male AN6 output.

44) Clean the tank and reinstall the corner pickup assembly and fuel level sending unit. Attach the hose assembly to the center bracket using a zip tie across the “Y” like that in Photo 19.

45) Note how the fuel pump module will install into the tank. The venturi pump connection will be at approximately 10:30. Hence, the hose assembly will need to loop around the module to make the final connection. In order to have the correct clocking of the hose attachment, lay the hose in the tank in the approximate location that it will be in after the module is installed. Rotate the hose end slightly so that it suspends itself approximately 1” off the floor of the tank. Place a line on the hose end at the 12:00 position as shown in Photo 25.

Photo 25. Note how the body of the hose is lifted off the bottom of the tank by slightly rotating the hose. Mark the end of the hose at the 12:00 as shown.

46) Place the fuel pump module on a flat surface. Place a line along the top of the venturi connection at the 12:00 position like that in Photo 26, similar to that done on the hose above.

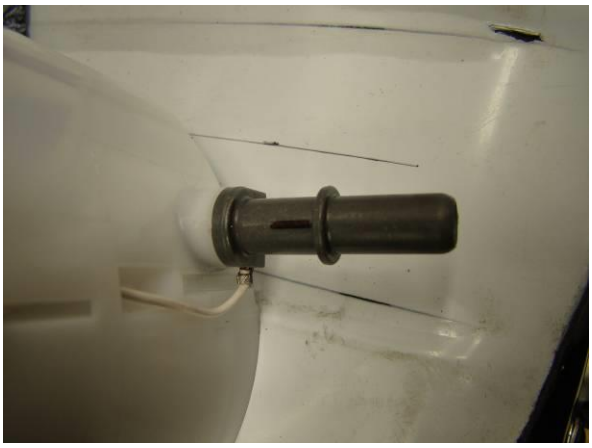

Photo 26. Marking the venturi pump connection on the bottom of the fuel module housing.

47) Install the green fuel module sealing o-ring into the fuel module mounting ring.

48) Leaving the hose in the looped configuration as if it would be installed in the tank, attach the fuel hose to the venturi pickup and clock the line on the hose to the line on the venturi pump connector. Secure the hose with an Odiker clamp (0.453" - 0.531) like that in Photo 27.

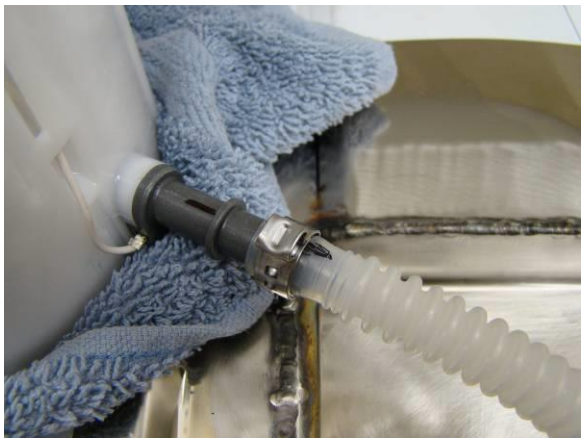

Photo 27. Align the marks on the hose and venturi connection and secure with the Odiker clamp. A 3/8” x 5/16” barb plastic quick connection fitting can also be used.

49) While pushing the module into the tank plug the fuel level sensor connector into the receptacle on the bottom of the fuel module hat. Take care to loop the venturi hose correctly and keep the wiring from the fuel level sending unit clear of pinch-points. The fuel connection on the top of the module should be pointing forward. See Photo 28.

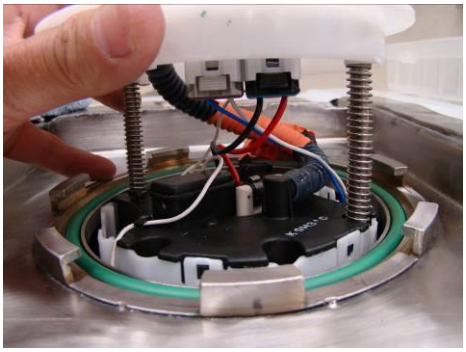

Photo 28. The fuel level sending unit wiring plugs into the bottom of the module hat. In this photo the wiring is coming from the LH side of the tank, not correct for the application being installed for the stock-type fuel level sending unit. The wiring will come from the RH side of the tank for this application.

50) Install the GM P/N 10325852 cam locking ring as shown in Photo 29. Applying a small amount of grease to the ramps on the cam locking ring will make installation easier. Using Channel Lock pliers rotate the cam locking ring until it seats against the fuel module mounting ring lug. Tighten the #4-40 Phillips lock screw until it seats against the lug on the fuel module mounting ring.

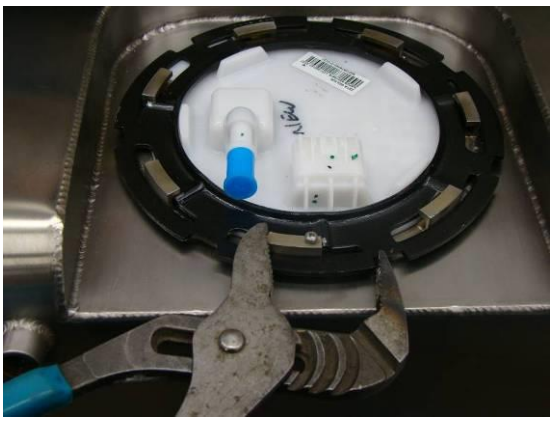

Photo 29. Cam ring and locking screw installation.

51) Check the tank for leaks on all welded joints.
52) Module wiring requires the use of the GM OE wiring plug. No aftermarket plug is yet known to fit this module. Though the plug uses Delphi-type terminals, the plug body is unique. The GM P/N 92202097 wiring harness will have two connectors that will fit the fuel module. One will have four wires, one will have two. The four-wire connector is the one for the fuel module. The other plug can be modified to work with new wiring and terminals. Vaporworx can modify the wiring for either plug to your specifications.
53) Photo 30 shows the plug with the OE wiring. In this configuration the wiring is as follows: Grey = Pump Positive. Pink = Pump Negative. Brown/White = Negative (fuel level sending unit). Lt. Blue = Fuel level to the dash gauge. Do not confuse the color of the wire for its polarity. Double check the polarity by looking at the black and red wires exiting the

plug going to the pump and the blue/white wires to the fuel level sending unit that plug into the bottom of the module hat as seen in Photo 28.

Photo 30. Note that the receptacle on the module has the P- and P+ notations for the pump power connections.

52) It is highly recommended that a four-cavity plug be installed so that the wiring harness that plugs into the module stays with the tank. This will allow for easy removal of the tank wiring. If the extra plug is not used it is very difficult to install the plug on to the module and balance the tank during installation without damaging the module or plug. For first-generation Camaros and Firebirds this plug should be at the back of the tank where the stock wiring normally passes through the trunk floor. Vaporworx carries some complete wiring harnesses in stock with secondary plug and extension wiring.

Supplemental instructions for installing the Vaporworx fuel pressure regulator adapter:

Instructions for Installing the Vaporworx P/N GM5FPRA Fuel Pressure Regulator Adapter into the GM P/N 19208719 Fuel Module.

NOTE: This procedure should not be performed when using the VaporWorx Pulse Width Modulation control systems.

The Vaporworx fuel pressure regulator adapter (FPRA) allows the fuel pressure regulator from a 4th-gen LS1 powered Camaro to be used in a LS3-powered 5th-gen Camaro fuel module. The same LS1 fuel pressure regulator is also used in a variety of Chevrolet pickup trucks. These parts can be obtained through the aftermarket as well, often at a lower cost than a GM dealer. Delphi P/N FP100211B1 and FP10021 are two readily available examples. This regulator, when used with the Vaporworx FPRA, will allow a standard 58psi fuel pump output.

STEP 1: On the lower/side of the fuel module is a circular device held in by a wire retainer. This is the 5th-gen stock fuel pressure regulator that must be removed. Using a screwdriver, carefully remove the retaining wire and ground strap. See Photo 1.

Photo 1: Note the ground strap ring that is located under the retaining ring. Do not use excessive force.

STEP 2: Using a pair of large Channel Lock pliers, twist the fuel pressure regulator and pull it away from the module to dislodge it as seen in Photo 2. A slight rocking motion can also be used. KEEP THIS REGUATOR AND THE PARTS ASSOCIATED WITH IT.

Photo 2: Note the grounding ring has been pushed aside. There are no internal parts that retain the fuel pressure regulator.

STEP 3: Insert the Vaporworx P/N FPRAGM5 into the small hole inside of the fuel module as seen in Photo 3. A small amount of motor oil should be placed on the seal to facilitate easy assembly. Push the FRPA until it fully seats as shown in Photo 4. In some cases the fuel filter may be partially blocking the hole. If the filter interferes with installation of the FPRA use a long round Phillips screwdriver to push the filter away from the hole.

Photo 3: Insert the FPRAGM5 into the small hole until fully seated. If the fuel filter interferes with easy installation use a Philips screwdriver to move to the side (left in the photo.)

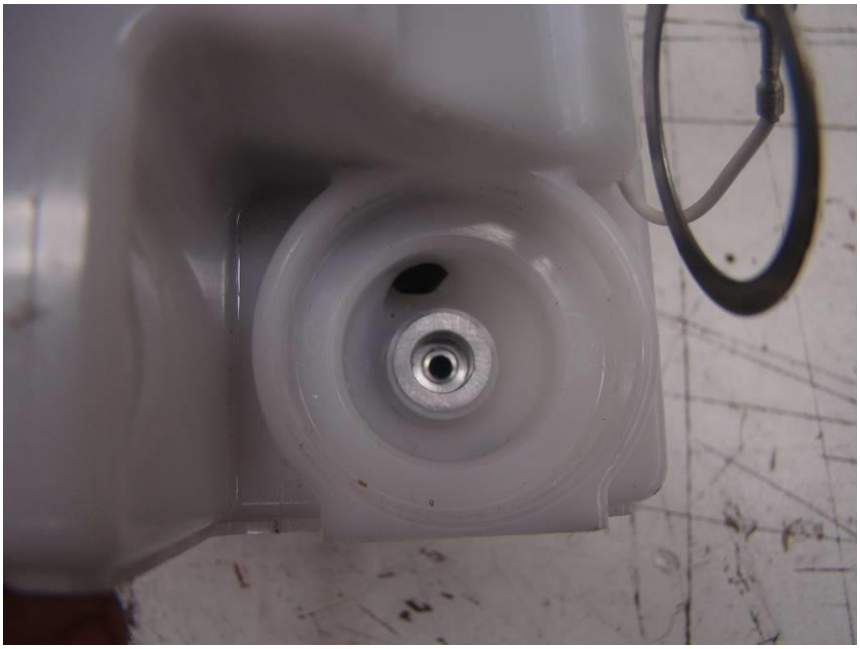

Photo 4: The FPRA is fully seated in the fuel module.

STEP 4: Apply a small amount of oil on both of the new fuel pressure regulator o-rings. The regulator should look similar to that in Photo 5. The extra hardware included with the new regulator will not be used.

Photo 5: The ready-to-install fuel pressure regulator.

STEP 5: Insert the regulator, clocked as shown in Photo 6, until fully seated. Install the ground strap and the retaining wire, also as shown in Photo 6. Continue the retaining wire installation until the ends of the wire fit through the holes/slots on the fuel module body. It may be necessary to push down on the wire end and lightly tap on the head of the wire to fully seat the wire (Photo 7.)

Photo 6: The new regulator is inserted, the ground strap installed, and the retaining wire partially seated. The ends of the wire are close to the holes/slots in the fuel module body. The ends must go into the holes/slots.

Photo 7: In some cases it may be necessary to push down on the end of the retaining wire ends to align them to the holes/slots in the module body. Take care to keep the ground strap under the retaining wire.

STEP 6: Fully seat the retaining wire. After seating use a pair of needle nose pliers to squeeze the wire ends together, making them fit the body of the regulator better, as seen in Photo 8. It may be necessary to slightly bend the wire near the wire head to obtain good fitment.

Photo 8: Squeeze the ends of the retaining wire together to help fit them to the regulator body. When complete the head of the retaining wire will be seated against the fuel module.

The regulator installation is complete. The final assembly should be similar to that in Photo 9.

Photo 9: Installation complete.

Here are some tricks that you may want to consider during the installation the fuel system.

I hate removing fuel tanks that have fuel in them. I'd much rather use the pump to drain the tank and make my life just a little easier. However, it is a bit more difficult to do this with a modern fuel module than just removing a line and pumping the fuel into a jug. Reason? Pumping rules state that as the pressure decreases, the flowrate increases. That makes sense. Put your thumb over the end of the hose, the pressure inside of the hose goes up, flowrate out the end of the hose goes down. However, the venturi pumps, the primary means of getting fuel into the module reservoir, are designed to keep the reservoir full when the fuel pressure is at 58psi. At 40psi the venturi pumps are just barely able to keep up. With no pressure the venturi pumps cannot keep up with pump output, the pressure pump will pump the reservoir dry, and burn up the pump. So, what's the trick?

I suggest putting a "T" at the fuel line junction between the line on the tank and that on the frame rail. Put a cap on one leg of the "T" and use this as your draining tap. When it comes time to use the pump to drain the tank, remove the "T" cap and install a fitting that will allow the use of a 1/8" nylon oil-pressure line. This small line will provide enough restriction so that sufficient pressure is available to drive the venturi pumps and keep the reservoir full. You must listen to the pump during the last stages of the process. The pump speed and tone will start to change. Once you hear this immediately disconnect the power to the pump. I like to do this by disconnecting the fuel pump relay plug and providing power directly to the pump. It's much easier to control, and much faster, than running to the key switch. If you are using a GM ECM to control the fuel pump relay (a VERY GOOD idea) you will only get a few seconds of pumping before the ECM shuts off the power to the relay.

When you are close to firing up the car it is also recommended to flush the fuel line all the way to the connection on the fuel rail. Because of the issue noted above, it is recommended that the following procedure be followed:

NOTE: Fuel is nasty stuff. It catches on fire. It will burn you, your car, your house, and everyone in it to the ground if it is not treated properly. Proper safety precautions must be used during this process in order to reduce the chances of fires.

1) Fill the fuel tank with to at least 1/2-full.
2) Disconnect the fuel line connection at the fuel rail. Put the end of the fuel line into a fuel jug.
3) Turn the pump on for 3-4 seconds. Note if fuel came out the end of the fuel line.
4) Wait 60 seconds. Repeat Step 3 until at least one quart of fuel has been pushed through the line.

5) If the pumped fuel is badly contaminated, repeat Steps 3-4 until the fuel runs clean.
6) Re-attach the fuel line to the fuel rail.
7) Turn the pump on. Inspect the system for leaks and repair as needed.

If the fuel tank is close to full then the 3-4 second rule can be disregarded. Just hook the pump up to power and flush the line. Since the level of fuel in the tank is above that of the module reservoir, there is no need for the venturi pumps to keep up with the pressure pump output.

Another trick is to calibrate your fuel gauge during initial fillup. Put one gallon of fuel into the empty tank and note the reading on the gauge. Write it down. Do the same for the second gallon, and so on until full. Note at what point the gauge reads full but the tank will still accept fuel (this normal.) Make a small laminated card that has the levels on it you noted during fillup. This will help you gauge, to a very close amount, how much fuel is in the tank. This is helpful not just when travelling, but also for open track events, and to know how big a fuel jug you will need if you drain the tank.

Picture of the "T" with plug installed.

Fuel draining hose assembly.

Fuel level card.