

Introduction

This guide will show the installation of the Novak fuel system conversion for Jeep Full-Size SJ Trucks & Wagons, 1972-1991.

The Jeep conversion industry has seen various evolutions of fuel system modifications to accommodate modern fuel injection engines, including the installation of additional fuel pumps, the gutting of Jeep pressure regulators, and the installation of various variable pressure regulator systems. None of these methods are as simple, cost effective or desirable as this method.

Modern automotive fuel injection supply systems are actually quite standardized in their design, though pressures to the various makes and models of engines vary. Novak's Gen III+ FSJ Jeep fuel system integration kit will cleanly upgrade the Jeep fuel module from ~5 PSI output to ~58 PSI. The factory Jeep fuel system plumbing can largely be retained if desired.



The Fuel Kit

This kit is designed specifically for 1972-1991 Jeep Wagoneers, Cherokees and J Trucks, and retains the factory Jeep fuel tank.

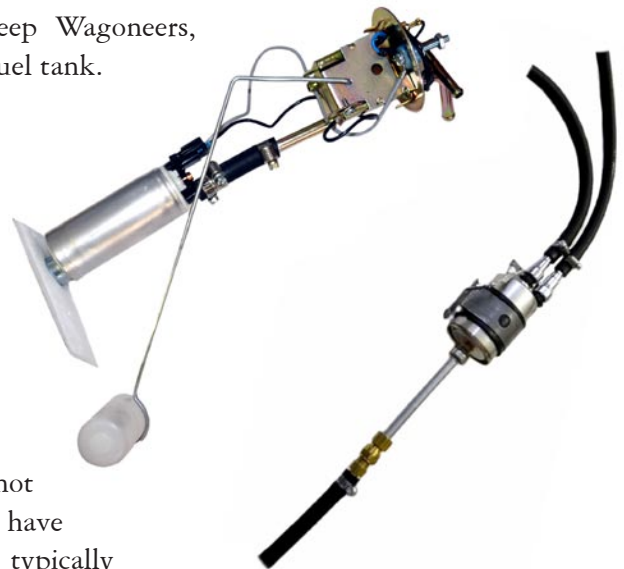
Options

Option I: With Pressure Regulator

Included in this kit is a pressure regulator / filter combo that will supply ~58 psi to the fuel injection rails through a return-less supply line. This is for Gen. III+ engines that require a regulator external to the GM fuel rail.

Option II: Without Pressure Regulator

Identical to the above kit, except the regulator is not included. This kit is for Gen. III engines that already have the factory regulator integrated into the fuel rail, typically many 1997-2002 GM LS / Vortec series engines. You will notice the presence of a diaphragm style regulator and its associated return line, in addition to the always-present supply line. Check your engine for applicability.



Warning

First a word of caution: you are working with a highly explosive and flammable fuel and fuel vapors. Errors here could well mean individuals' health and lives. You must work in a well ventilated area that is free of any sparks, flames, heat sources (including all types of garage and shop heaters), furnaces, water heaters or any other source of open spark or flame. If you're not feeling confident to do this level of work, we urge you to stop now. These instructions are merely suggestions and your acceptance and use of them implies that you accept the risk and liability in its entirety. Note that any electrical sparking that occurs in a fuel tank could cause an explosion. The soundness of your work and your electrical connections are critical!



Novak shall bear no liability for any loss, damage or injury, either to a person or to property, resulting from the direct or indirect use of any of Novak's products this information, or inability by the buyer to determine proper use, loads or application of Novak products. Novak shall not be liable for any claims, demands, injuries, damages, actions or causes of action whatsoever to buyer arising out of or connected with the use of any of our products or information. Novak shall not have any obligation with respect to the Product or any part thereof, whether based on contract, tort, strict liability or otherwise. The buyer assumes all risks and liability from use of these products and information.

Note to the Installer

This document and the use of any Novak products assumes safe and adequate working knowledge of the automotive systems involved. Vehicular repair, upgrade and conversion work can be among the most difficult of automotive mechanical and electrical tasks and it is upon the customer to ascertain whether they are working within their expertise or whether they should acquire assistance. Because Novak has no control over the customer's project procedures, Novak instructions and recommendations do not constitute a warranty of fitness, applicability or compatibility with the customer's particular project. Novak cannot determine the skill level of the customer and/or the installer of Novak products, nor can Novak publish all of the information on fundamentals that an installer should know before attempting these advanced procedures. While every attempt at informational accuracy has been made, these instructions and any recommendations therein are for guidance only. This guide is not intended to replace the service manual specific to your vehicle. It is not possible to document the wiring, routing and specific system details of every vehicle and the installer should obtain and use both their vehicle's manual and the engine or transmission donor vehicle's manual in conjunction with these instructions.

Your Legal Requirements

Novak products and procedures are intended and recommended for off-road use only and installation on a vehicle for use on public roads could violate laws within your jurisdiction. Additionally, installation of Novak products may adversely affect the warranty coverage on your vehicle.



This guide is not meant to explain, interpret or notify the installer any laws concerning vehicle changes, engine conversions and the emissions systems surrounding them. It is the installer's responsibility to know and understand their local, state and national legal requirements and regulations and to make their installation conform to emission and vehicle safety demands of the jurisdictions in which the vehicle may operate. Novak does not recommend nor condone the disabling or modification of the vehicle or any system within it that could render it out of conformance with any laws in which the vehicle may be licensed or operate. Neither Novak Conversions nor its directors, principles nor employees are responsible for any changes made to your vehicle.

If you are performing a powertrain conversion and if your vehicle requires a referee inspection, you may wish to establish a rapport with them and discuss your plans and seek advice and approval from them.

These instructions and the products and procedure described herein are offered only in accordance with the Novak policies and liability limitations found at: <http://www.novak-adapt.com/about/policies.htm>, which may supersede and prevail over these policies.

Preparation

We highly recommend that you work with your fuel tank at or near empty. The tank may be ungainly and dangerous to work with if it contains too much fuel.

Pay very close attention to not allow any particles or contamination to wreck your work. Fuel injectors are highly precise mechanisms and any ingress particles will hinder or damage the injectors. Use compressed air often to blow off your work.

We'll note here that some FSJ Jeeps have an access port in the floor that may be screwed or riveted into place which may be removed and allow for adequate access to replace the fuel module. However, we've not tried it here and we feel that lowering the tank to do this work is best.

You may choose to blow compressed air it through all hose circuits prior to final assembly.

Electrical Connections Test

While not required, it would be very wise and safest to test your electrical connections and the fuel pump and fuel level sender operation **prior** to installing it into the fuel tank.

Connect the fuel sender electrical connections, which will include a ground circuit, a reference supply voltage from your fuel level gauge and a fuel pump 12V+ supply circuit, which is typically powered from a relay which is triggered by the GM PCM, all as per your own wiring, or the wiring provided by Novak and the associated diagrams and circuit call-outs in our instructions *GM Gen III+ Wiring to Jeeps*.

Have an assistant help by turning on the key to the On position at which point the installer will hold the fuel pump steady while the computer briefly cycles it on then off. Do not do this more than enough to verify that the pump and connections work, as excessive dry-running of the pump could damage it.

Also test the operation of the fuel gauge by moving the float arm up and down and verifying operation of the indicator needle.

Fuel Tank Removal

Disconnect the battery terminals. Move to the back of the Jeep and disconnect the fuel tank filler hose from the tank inlet. Next, disconnect the filler vent hose. Disconnect the factory Jeep fuel supply line and vent line from the top of the tank's fuel module. Disconnect all electrical connectors.

Support the tank at its center of mass with a jack. Once you've verified that all connections to the fuel tank are free and clear, detach the hardware and straps that secure the tank into the Jeep. Using that jack or lift, lower fuel tank from Jeep. Move your tank to a clean and safe work area.

You may choose to thoroughly clean your tank (see images) at this point if it needs it, especially in the area you'll be working around the top port of the tank.

Factory Fuel Module Removal

Unscrew and remove the retention ring (plastic or steel, depending on your model year) from the original fuel module assembly. Gently remove the old fuel module assembly unit from tank. You will retain the original o-ring seal from your Jeep fuel sending unit.



The fuel tank from our project Wagoneer was, expectedly, a mess. Detergent and a pressure washer made quick work of the clean-up. This was, incidentally, a good time to clean the fuel tank's steel mounting pan and paint it with a hard-core industrial, anti-rust paint and rubberized coating in place of the old, water-trapping pan liner.



Fuel Injection Module Installation

Make sure the fuel injection hose and wire and pump connections are all secure and satisfactory and safe.

Thread the new fuel hoses provided and attached to the new fuel injection pump module through the o-ring and lock ring.

Install the fuel pump's rubber seal and fabric intake screen

Gently inserting the fuel pump and sender module assembly into the tank port, with the sender level float going in first.



securely onto the bottom of the fuel pump. Carefully feed the fuel float and its wire into the port of the tank and without straining the fuel level float assembly.

Now lower the fuel pump into the tank, inserting the intake screen in and allowing it to flex into the hole, as shown. Seat the module's top plate to the port on the tank and tighten the lock ring.

Hose & Line Connections

Run the provided high-pressure supply hose (the larger diameter one) from "Out" directly to the factory Jeep fuel hard line, if you are retaining it, or to a new hard line or fuel injection rated hose.



If your GM engine does not have a fuel pressure regulator and you therefore purchased Option I from Novak (as described above), use the provided regulator, which can be physically attached to the Jeep chassis where you best see fit. The fuel tank support pan is an option. Make sure to attach the provided ground lead to vehicle to prevent any sparking due to static build-up.

If your GM engine has a regulator built into the fuel rail at the engine and you therefore purchased Option II from Novak (as described above), you can connect your supply and return lines (larger diameter and smaller diameter, respectively) to the GM fuel rail, as per factory.

Electrical Connections

Connect the fuel sender electrical connections just as recommended in the above section *Electrical Connections Test*.

You are now ready to cycle your fuel pump. Your GM computer will control the fuel pump relay. It will cycle immediately for a couple of seconds when in Key-Run. You should check your fuel pressure with an appropriate gauge at the GM fuel rail. You should see approximately 58 PSI.

Fuel Tank Reinstallation

When you are satisfied with all of the details of your module and circuits installation, you can lift the fuel tank back into the Jeep and reinstall in the reverse order as it was removed. Remember to do extremely careful and good work in securing the fuel tank back into the vehicle.

Emissions

Fuel system evaporative emissions is a related topic, but is treated in the companion Novak document, *Emissions for GM Gen III+ Engine Conversions in Jeeps*.

Conclusion

We suggest that you keep these instructions for future reference. For questions concerning your conversion, contact us. We'll be pleased to answer your questions.

There is no final word to our instruction packages. If you have a question you feel this information should have covered and didn't, please let us know about it. You are also welcome to submit your suggestions, ideas and images that you think we should include here which may help future conversion installers. Note our contact information below.

Part No.	Description	Qty.
FE0114	Pump, fuel, in-tank, 90 psi	1
5357373	Sending unit, fuel level, CJ5 & CJ7, 1972-1986	1
800-120	Fitting, quick connect, 5/16 barb	1
* G8836	Regulator, fuel pressure, with integrated filter, Corvette LS engines, 1999-2003	1
H-FI516	Hose, 5/16, high pressure, fuel safe	3
H-516	Hose, 5/16, regular pressure, fuel safe	3
CL-4	Clamp, hose, 1/4" to 3/8"	8
800-121	Fitting, quick connect, 3/8 barb	1
* 800-155	Line, steel, 3/8, for compression fitting to filter regulator	1
* 166640	Fitting, compression, 3/8" x 1/4"	1
* 744450	Fitting, 1/4 NPT to 5/16 barb, straight, Edelmann	1
CL-B516	Clamp, butterfly, 5/16 hose, 19/64" width, 31/64" to 19/32", double pinch style, steel	2
FS-22	Screen, filter, specific for 3270 fuel pump	1
33300	Filter, fuel, inline, for high pressure fuel injection, 5/16" inlet x 3/8" outlet	1

* Regulator version only

Fuel Pressure Bleed-Down When Vehicle Off

Possible Causes

- There may be an injector that is not closing completely
- The check valve in the fuel pump assembly could be bad
- The pressure regulator on the rail could be leaking- either to the fuel return line or the vacuum line.
- Weakening fuel pump.

Possible Solutions

- Use an advanced level scanner (Snap On, etc.) capable of test firing each injector, while watching a PSI gauge attached to the fuel rail. If the gauge drops differently on one injector vs. the others when firing, that injector is suspect.
- Pressurize the fuel rail and put a gauge on the test port if one is available. Clamp off the feed line, and wait a few hours to see if it loses pressure. If not, then the fuel pump check valve is bad.
- Try taking the vacuum line off the regulator and smelling it. If it smells like fuel went down it then it's probably a bad regulator. If it does lose pressure, run the pump again and this time clamp off the return line. Let it sit, and if it loses pressure you have a leaky injector. If not, you have a bad regulator.
- The pump should be able to bring the system back up to pressure with just one prime. If it isn't doing that, you may have a weak pump.



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