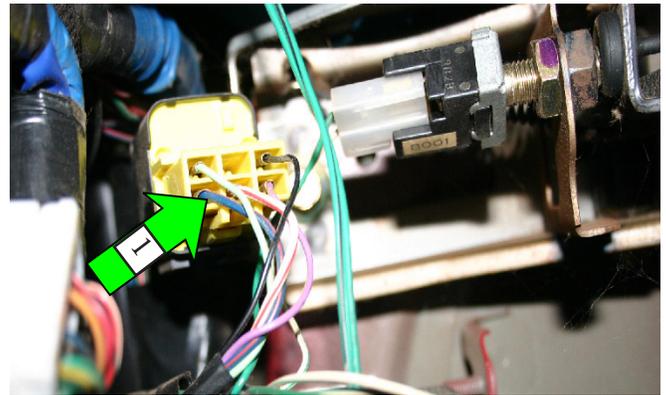


# Flyin' Miata

## Big fuel kit 04-46150

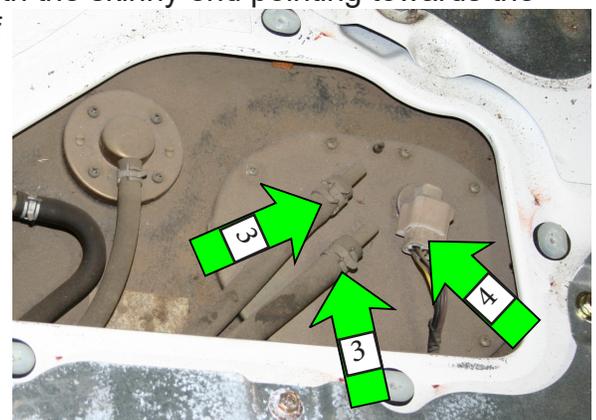
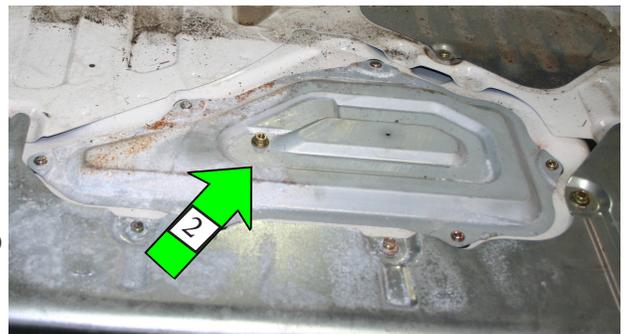
Thanks for purchasing our big fuel kit! This will provide enough flow to feed the thirstiest engines, even those running on E85 - and it's been proven safe for E85 fuel. These instructions will help you properly install the complete kit.

1. The fuel system first needs to have its pressure relieved. First, find the relay that's pictured to the side (1). It will be underneath the dash, near the steering column. It should look similar to the relay in the picture, but different years had different relays, so it might not be exactly the same. Look for a blue wire with a red stripe on a '90 - '97 car, or a red wire with a blue stripe on a '99 - '05; that's the wire that goes to the fuel pump. Start the car and let it idle. While the car is idling, unplug the relay. This will kill the engine, as it's no longer being fed the fuel it needs. Turn the car off once the engine has stopped. The gas cap also needs to be removed, to ensure that pressure doesn't build up in the tank. Don't reinstall it until the fuel system is fully installed.

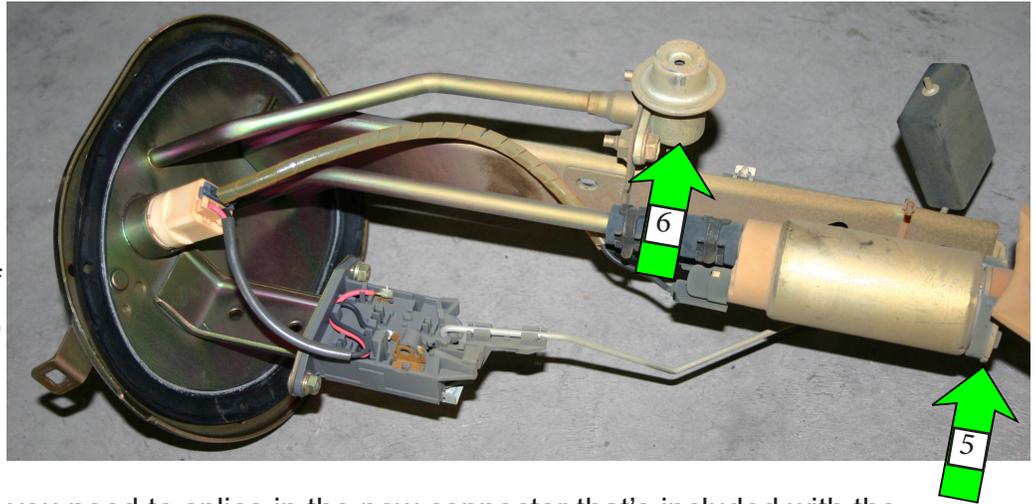


2. Disconnect the negative terminal for the battery. You'll be working near the starter, and you don't want to accidentally touch one of the stainless steel lines to the lead on the starter.

3. Next, remove the fuel pump. You'll need to pull back the carpet on the rear deck (where the top folds down), so release it from the front edge and fold it towards the back. Remove the medium-sized silver sheetmetal cover (2), then disconnect the fuel lines (3). On 90 - 97 cars, you'll need to release the hose clamps, on 99 - 05 cars you'll need to use the included tool to release the lines. To release the lines, slip the tool onto the metal line with the skinny end pointing towards the fuel hose. Push the tool into the fitting, then pull the hose off of the metal line. Fuel will leak out from here, so be prepared, but as long as you followed step 1 it shouldn't be under much pressure. It's still a good idea to wrap the junction in a towel as you disconnect the hose, though. Now unplug the wiring (4), then remove the small Phillip's head screws that hold the fuel pump assembly to the fuel tank. Pull the assembly out and set it on the bench. Cover the hole in the gas tank to ensure that nothing falls in the tank.

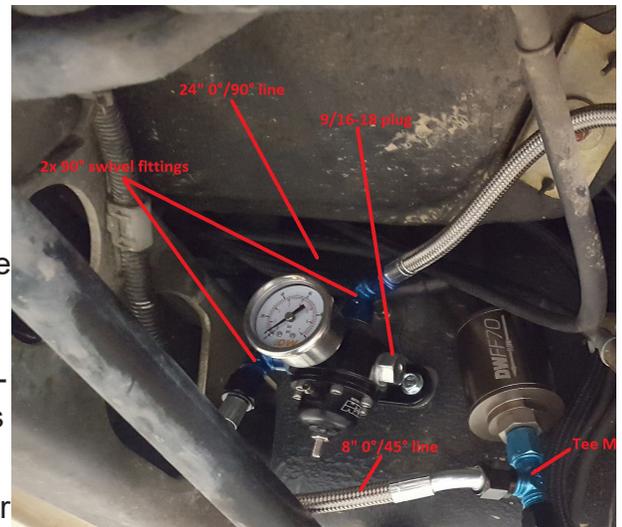


4. Now remove the old fuel pump from its bracket. There's a small bracket on the bottom of the fuel pump (5), remove the two Phillip's head screws to release the fuel pump. Put a little bit of oil on the O-ring at the top of the new pump (90 - 93 only), then swap it in. Its installation is the reverse of the removal of the original pump. On 90 - 97s, the fuel pump simply plugs in. On 99 - 05s, you need to splice in the new connector that's included with the new pump. You need to connect the blue Mazda wire to the new red wire, and the black Mazda wire to the new black wire. If there's any question, the stock pump is labeled with a "+" (that wire goes to the new red wire) and a "-" (that wire goes to the new black wire). Be sure to get the polarity correct so that fuel pump spins in the correct direction. On 99 - 05s only, remove the stock FPR (6) and leave the resulting hole open.



5. Re-install the fuel pump assembly with the new fuel pump. Plug the electrical connector back in. Do not reinstall the silver sheetmetal cover yet.

6. Find the AEM FPR and gently clamp it in a vice. Be sure to pad it, as the anodizing will almost definitely be scratched otherwise. Find the two 90° adapters and the plug that are shown. If the fittings still have O-rings, remove them, and install the fittings using the supplied crush washers. Also install the gauge. This is a NPT (tapered thread) fitting, so be sure to put some solvent-proof sealant on the threads and tighten it until it's snug, as it won't appear to bottom out on anything. Remember that it's more important to get the proper torque than it is to get it exactly lined up, although there is a bit of room to play with.



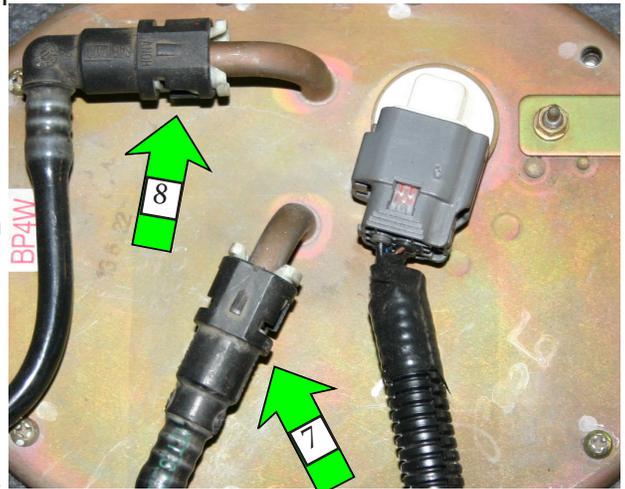
7. In front of the right rear wheel, there's a plastic cover over the fuel filter. Remove it by gently unscrewing the plastic screw in the middle of the plastic push fitting, then pull the plastic fitting out. Set the plastic cover aside, it will be reused. Take the hoses off of the fuel filter (be careful of spilling fuel), then remove the fuel filter. Try to drain the lines as thoroughly as possible - both the lines to the tank and the line(s) to the engine. None of the stock lines will be reused, including the long metal line(s) that run(s) up to the engine, so remove them all and set them aside. You can leave the line for the charcoal canister installed. Next, bolt the stainless steel bracket in place of the fuel filter, then bolt the FPR to the bracket.

8. **90 - 97 only.** Take two short lengths of 5/16" rubber hose and connect them to the inlet and outlet on the fuel pump assembly. Then insert the hose barb to male -6 adapter and tighten the hose clamps at each end of each hose.

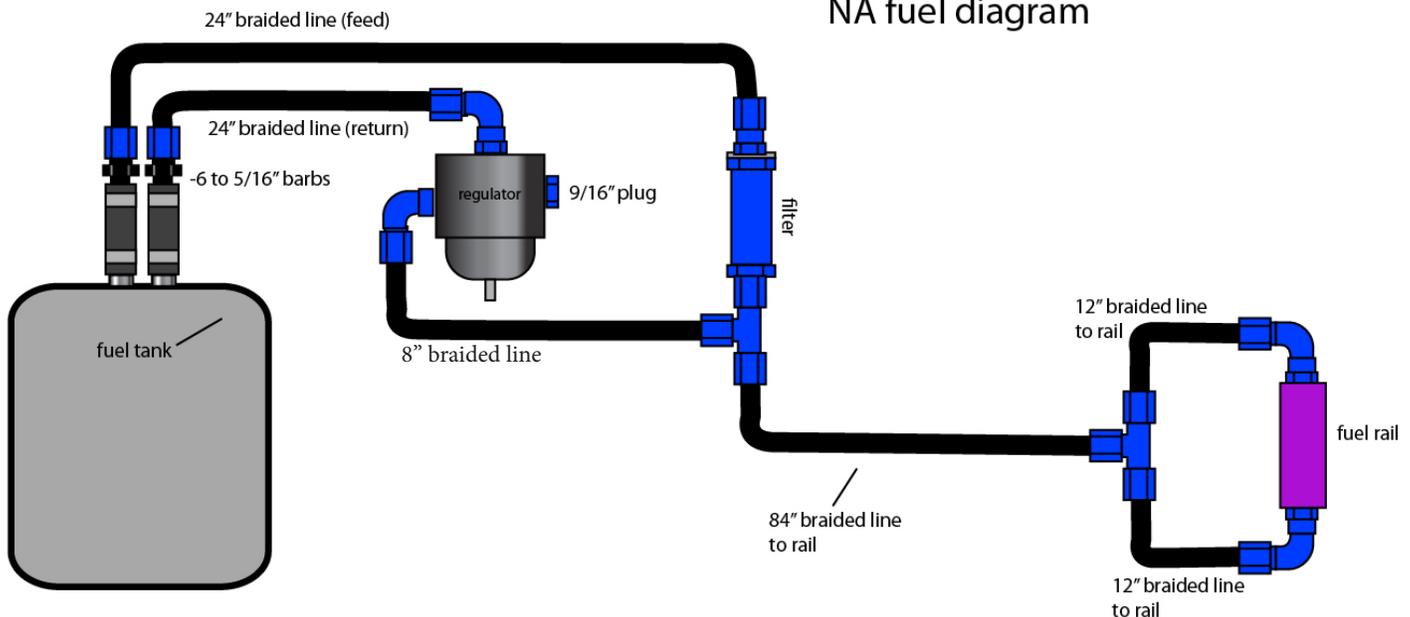
9. **99 - 05 only.** Put a little bit of oil on the end of the hose barb and install the supplied adapter (quick-disconnect on one end, -6 male on the other). You'll need to slip the slotted piece onto the metal pipe (on the tank side of the bump, as shown), then push the other piece of the adapter onto the pipe. Thread the two halves together and tighten them down.



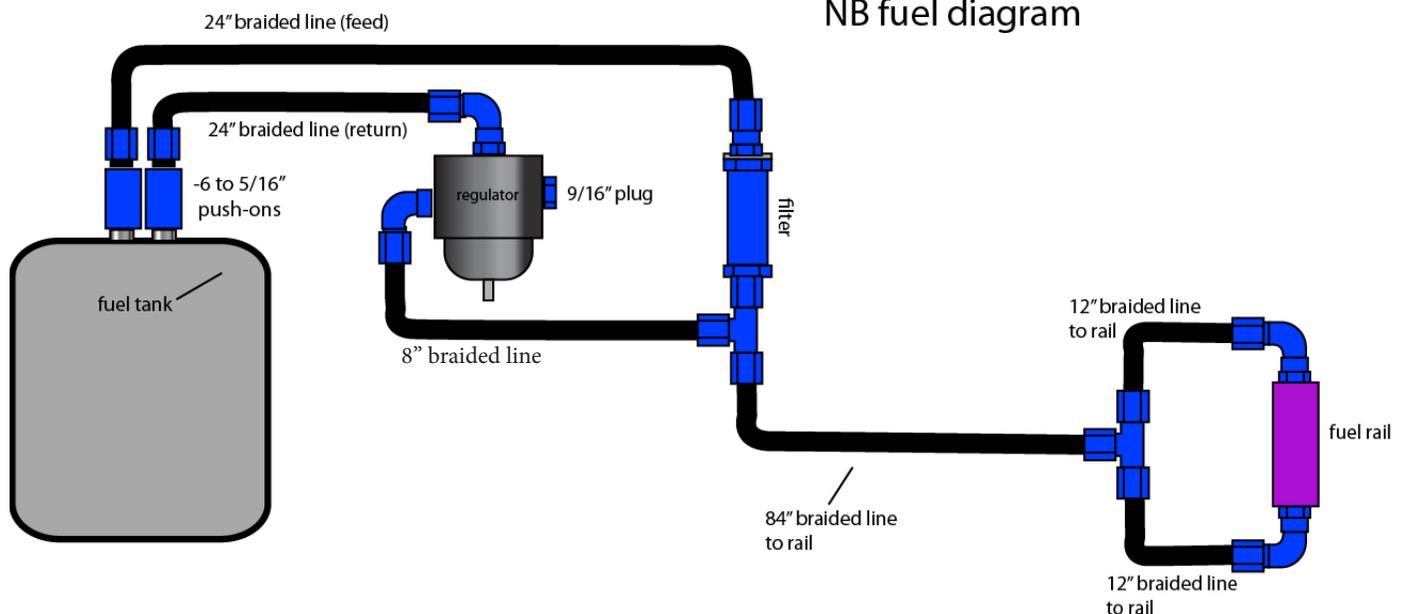
10. Take the two 24" hoses and drop them down between the fuel tank and the bulkhead - where the original lines ran - to the FPR. It's not a bad idea to label them somehow, so that you know which is the feed and which is the return - get the connections swapped and your engine won't get any fuel. The feed is the forward connection (7) and the return is the rear connection (8). To the right is an NB setup, the picture on the first page is of an NA setup - they're slightly different, but the locations (feed / return) are the same. If you can't fit the lines from the pump between the tank and the bulkhead, skip ahead to step 11. You always need to smear some oil on the threads and taper / face of the AN fittings. AN fittings should be tightened to finger-tight plus a 1/4 turn (or 29 ft-lbs). Don't over-tighten them, that's a common mistake.



NA fuel diagram



NB fuel diagram



11. If the lines won't fit in between the tank and the bulkhead, you'll need to drop the fuel tank enough to fit them in. There are four bolts holding the fuel tank in, the front two bolts are easy to access. Support the weight of the tank, remove these two bolts, then gradually and carefully let the tank down a bit. If you still can't get enough clearance loosen the rear bolts, which are harder to access.

12. Run the lines to the appropriate locations on the FPR and filter, per the diagrams on the previous page. Be sure to install the supplied ORB fittings into the fuel filter first and match the flow direction indicated on the filter. Then connect the supplied tee to the outlet of the filter. Connect the 8" line from the side of the tee over to the side of the FPR. Then connect the 84" line to the bottom of the tee and route it up to the engine bay. Don't fasten it in place yet.



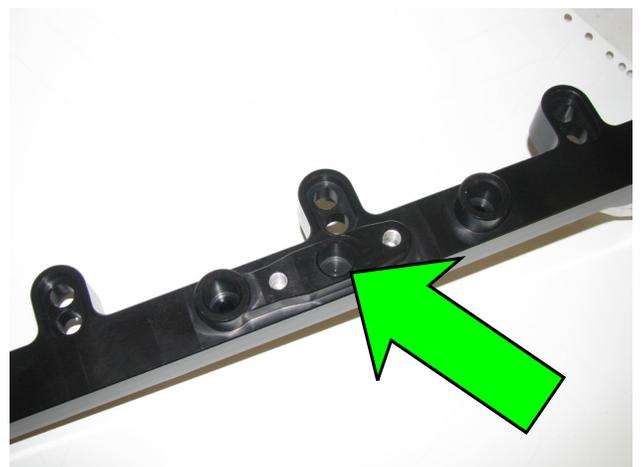
13. If you're also installing our fuel rail at this time, follow the next steps. If you already have it installed, skip ahead to step 22.

14. **'99 - '05 cars only:** The upper intake manifold needs to be removed. There are eight ('99 - '00) or seven ('01 - '05) bolts that need to be removed to allow the two pieces to separate. Two of these bolts are below the throttle body. Be sure to remove any of the hoses and such that will prevent the top half from being lifted off. Make a note of where all of the lines go, so you're sure to put them back in the right places. Once these have been removed, tilt the top half forward and out of the way. Be careful of the various lines going to the throttle body. While they can remain attached, you need to make sure that they don't get kinked. Also put rags in the open holes, to ensure that nothing accidentally falls down there.

15. **'90 - '97 cars only:** Remove the hoses from the fuel pressure regulator (FPR). There will be a fuel line and a vacuum line. If you're not going to reference the FPR to manifold pressure (this will be true for most cars, see step 25 for more details), plug the hole that the vacuum line for the original FPR used.

16. Remove the bolts that hold the fuel rail in. There are small black plastic spacers that these bolts go through, they're below the fuel rail. These are very easy to lose and very hard to find once lost, so be careful with them. Gently pull the rail off of the fuel injectors. There are also four small black rubber rings that the bottom of the injectors sit in, be careful not to lose these either. Remove the rail and hoses from the car.

17. Now it's time to move onto the new parts! First, be sure that there is nothing inside of the fuel rail. You should spray it out with brake cleaner or carb cleaner, just to be sure it's completely clean.



18. You have a choice of where to mount your damper. The damper can be mounted on the top (as described shortly) or on the bottom. If you mount it on the bottom, you'll need to plug the hole on top and drill a 1/4" hole in the location indicated in the picture. If you're using the stock FPR, you'll have to mount it on top - this is also an option with dampers. If you mount it on top, do NOT drill the hole on the bottom. You'll need to thread in the adapter and bolt the FPR / damper to it. Regardless of which location you choose, be sure to lightly oil the O-ring on the FPR / damper before installation. Also, be sure to use a fuel-safe thread tape / paste to seal NPT threads. Don't get any tape / paste on the last couple of threads, as you don't want any of it to get into the fuel.

19. Install the two-piece 90° fittings (like the one that was used on the FPR) onto each end of the fuel rail. Since the flare end of the fittings we use can still rotate, go ahead and tighten them down now. Be sure to use fuel-rated Teflon thread paste.

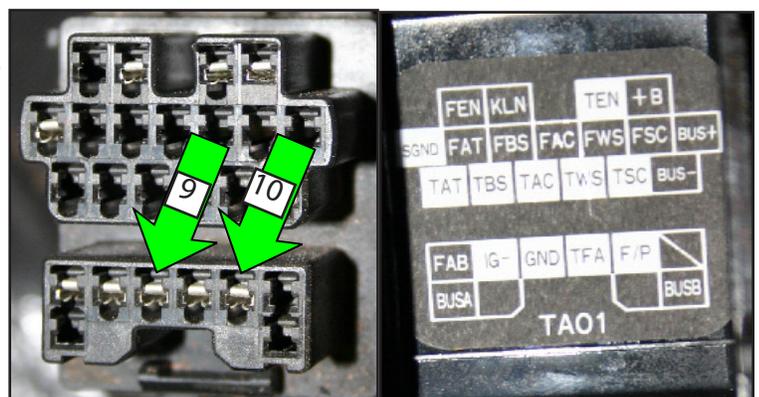
20. Install the new fuel rail on the engine. Be sure to lightly oil the O-rings on the fuel injectors, as was done for the fittings. Carefully line the injectors up with the rail, being sure not to pinch any of the O-rings. Re-use the black plastic spacers at the bolts, again being sure to not lose them. Once everything is properly lined up, tighten down the bolts holding the fuel rail down. You should be able to turn the injectors, although there will be a little resistance. If they spin freely or won't spin at all, something's wrong. Take the assembly apart and see what has happened. If one or more of the injectors won't spin, chances are one of the O-rings was unseated and is binding. Fix this (replace the O-rings if they're damaged) and reinstall everything.

21. Weave the fuel feed lines up to both ends of the rail. Experiment with different routes and which line goes to each end of the rail to get the smoothest, cleanest routing. Be careful with what the SS lines rub against. While the lines won't wear, what they're rubbing against will. Protect or move things as needed. Once you're satisfied, smear some oil on the threads and taper of the male fittings and tighten the lines onto them and the tee.

22. Smear some oil on the threads and taper of the open leg of the tee at the fuel rail line. Then attach the open end of the 84" line.

23. Arrange the lines in the appropriate places / orientations and use zip-ties and / or loom clamps to secure the lines. The 84" line may be a little long, so try to arrange the excess cleanly.

24. Think about all of the fittings. Have you tightened all of them? Are you sure? If you have any questions, re-check them. Once you're sure they're tight, tighten down the gas cap, reconnect the relay, and turn the car on - but DO NOT start it. Jump - a paperclip works well - "GND" (9) and "F/P" (10) in the Diagnosis box in order to keep the fuel pump on. This ensures that the system is fully primed. If you don't have a metal terminal in the "GND" location, use a wire to jump "F/P" to a chassis ground (e.g., a random bolt with no wires going to it). Some of the later cars did away with the "GND" in the diagnosis box. Leave the jumper connected for 5 - 10 seconds, then remove it.



25. Once the fuel system is primed, check all of your connections and be sure that there are absolutely no leaks. Check all of the junctions, including all of the fittings, where the new lines connect to the hard lines, and where the fuel injectors seat into the fuel rail. If there are any leaks, try tightening the fitting just a little more. If that doesn't do it, you'll have to disassemble it (relieve the pressure first following step one!) and inspect the fittings. Did a piece of dirt get onto one of the faces? Were they over-torqued, resulting in a distorted flare? Be sure they're sealed before you move on.

26. The FPR in this kit is a 1:1 unit, just like the factory one, but it's adjustable. Therefore, you have to properly set it up. Most cars will run a static fuel pressure with this setup, so there's no reason to run a vacuum line to the FPR. You'll want to turn the car on (it doesn't have to be running) and jump GND to F/P. Then adjust the small set screw (as indicated in the picture on page 2) until the gauge shows 60 psi. Once the pressure is correct, hold the set screw in place while tightening the locknut. If you're running more than 20 psi of boost or want the fuel pressure to increase with the manifold pressure, you'll need to run a vacuum line from the engine to the nipple indicated in the picture on page 2. Be sure that the vacuum line is sufficiently protected, bad things will happen to your engine if it's damaged. To set up the fuel pressure, follow the steps above, but aim for 50 psi. Be sure that you're doing this without the vacuum line connected. Once the fuel pressure is set, re-connect the vacuum line. Reinstall any covers / carpet / etc that were removed.

27. You'll need to retune the car, so be sure that you have your pressure properly set first.

28. If you're running flex fuel with a Hydra, you'll need to install the flex fuel sensor & wire it in. We install the sensor in-line on the fuel return hose. At the sensor you will see the wiring labels as follows:

- Vcc goes to switched 12V (refer to your factory wiring diagram for a place to T this in).
- Gnd is the signal ground, this goes to GB11 on the Hydra harness. If there's already a wire there, tee into it.
- Out is the signal, this goes to Hydra GB10.

Once this is all connected the Flex Fuel will take over your Aux maps in the Hydra, and automatically trim between your base & Aux tables. In addition, the FF sensor provides fuel temperature readings to the Hydra for fuel temp based trim maps. Contact [tuning@flyinmiata.com](mailto:tuning@flyinmiata.com) if you need help with setting up your mapping for E85.

You're done! Now go make lots of horsepower!